Single Station CAP 72 Machine

Operation & Maintenance Manual

Infrastructure Precast – Beaver Dam, KY

Machine Serial No. CP-430

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Single Station CAP 72 Machine Manual

Your new **SS CAP 72 Machine** was carefully designed and manufactured to give years of dependable service. It is important that the equipment be operated properly and that regular service is performed to avoid costly downtime and unnecessary repairs. This manual is intended to provide you with information on proper operation, as well as the maintenance and parts necessary to keep this equipment operating safely and efficiently Use the ***Table of Contents*** provided to help guide you to the section of the manual containing the information you require.

The manual should be stored in an area near the machine where it will be accessible to all workers. Whenever the operator or other workers have questions that pertain to proper procedure or instructions, the manual will be available for their use. Keep the other copy of the manual in an office location for easy reference by management personnel and when requesting service assistance or ordering parts.

When needing parts or service assistance, state your equipment's model and serial number. If help is needed for any reason, please contact:

Afinitas
P.O. Box 9
506 S. Wapello Street
Return Parts ..... 435 S. Blaine Street
Mediapolis, Iowa 52637-0009
Phone: 319-394-3197 Fax: 319-394-3977
Toll-Free Phone: 800-626-1451

Notes

1 Introduction

SS CAP 72 Machine

Machine Serial No. CP-430

Notes

The machine safety instructions must be examined by all people who have access to the operation area of the machine.

The machine operators must examine the operating instructions before they are permitted to operate the machine.

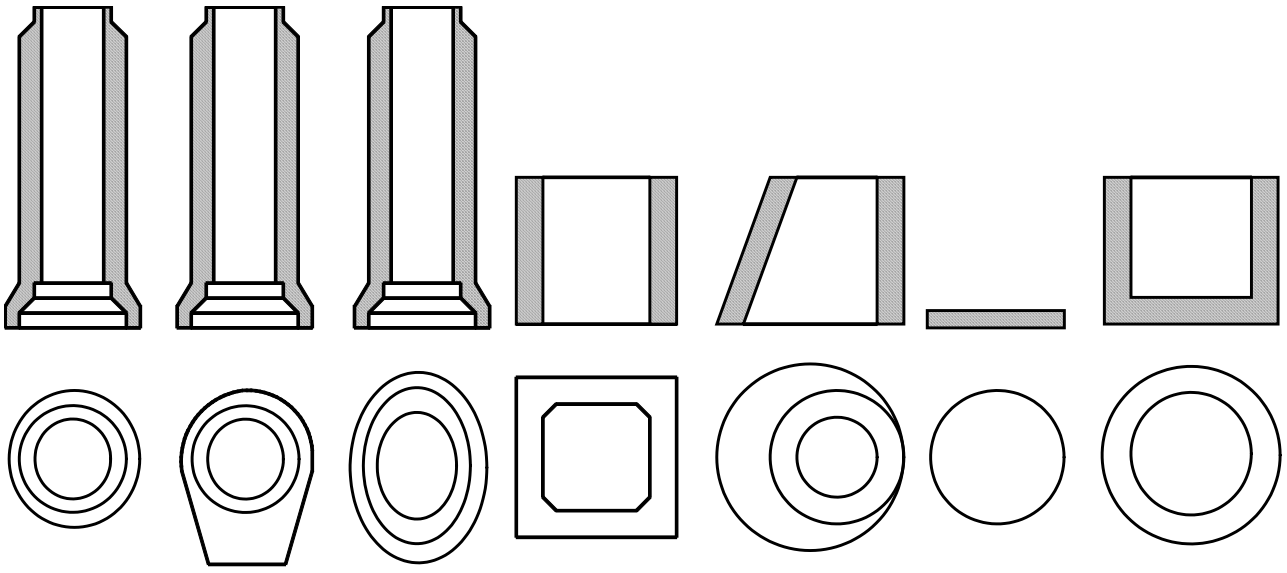
The SS CAP 72 Machine is a highly flexible, manual or semi-automatic machine for manufacturing large concrete products. The SS **CAP 72 Machine** series is designed for the production of a wide range of other concrete products like pipes and manhole systems.

1.1 Product Dimension for SS CAP 72 Machine

Maximum inner diameter for circular products: Ø72 in
Max. product height / pipe length (effective length): 8 ft / 8 ft

1.2 Product Types

The machine is designed for a wide selection of other concrete pipe and manhole types - both reinforced and non-reinforced - can be manufactured. Additional machine equipment and features will be needed to produce some of the products.



- Circular pipes
- Pipes with prebed
- Egg-shaped pipes
- Jacking pipes
- Lined pipes
- Manhole rings
- Cones
- Manhole bases

1.3 Machine Configuration

The standard machine consists of the following main components and optional components as needed:

- Dual Purpose Crane Mounted Concrete Feeder
- Production Base
- 72 Triple Ram Press
- Header Jib
- Hydraulic plant
- Electric panel
- Lift Devices
- Mould equipment
- Demoulding/Strip Assist System – Option

1.4 Dual Purpose Crane Mounted Concrete Feeder

The Dual Purpose Crane Mounted Concrete Feeder can be used with two applications: first as mounted on the turret base located with the SS CAP 72 machine, and secondly mounted to the overhead crane used for an egg lay style application. The concrete feeder consists of a silo for storage of concrete as well as a conveyor belt for transportation of the concrete from the silo to the mould equipment. On the end of the concrete feeder a rotating distributor with distributor belt can be mounted. The feeding belt and the distributor if mounted are electrically operated.

1.5 Production Bases

The 72 Production Base and Riser Base are mounted directly to the basement floor making a fixed mounting location for the mould equipment. The mould set is mounted to the production base or Riser Base, depending on style of mould equipment.

1.6 72 EXT Triple Ram Press

The 72 Triple Ram Press, equipped with tongue trowel functionality, engages the mould set via the rotating tongue trowel press plate.

1.7 Header Jib

The machine is supplied with a header jib sized according to station capacity. The header jib uses an electric hoist and lifting equipment to engage the mould headers and bring them into the production station.

1.8 Hydraulic Plant

A hydraulic pump station for operating all hydraulic functions on the machine belongs to the machine. The pump station consists of pumps, motors, a filter and necessary control valves, proportional valves and pressure valves to control the machine. The pump station is placed behind the belt feeder or in the basement.

1.9 Electric Panel

An electric panel that can be connected to the customer's electricity supply belongs to the machine. The electric panel contains the necessary electric components for supply and control of all electrically operated components. The electric panel is placed on the floor behind the machine and the electric control desk is placed in front of the machine.

1.10 Mould Equipment

The machine is equipped with mould equipment corresponding to the product dimensions and product types to be produced. The mould equipment gives the concrete product the required geometry during casting and subsequent curing. The mould equipment is described in the **Vibration, Form Maintenance, and Manhole Form Equipment** sections.

1.11 Demoulding/Strip Assist System - Option

The Demoulding/Strip Assist System consists of a lifting mechanism mounted to the form base and located near the basement floor and is used to assist the overhead crane in demoulding the product from the production machine. These mechanisms can extend and push onto the product stripping beam or the mould itself, depending upon mould design.

1.12 Additional Optional Features

The machine can be equipped with a wide spectrum of optional features; for instance, a laser-controlled filling process, distributor belt for circular products, press/rotating device for circular product, reinforcement centering, equipment for casting of lined pipes, etc.

Notes

2 Machine Specifications

SS CAP 72 Machine

Machine Serial No. CP-430

Notes

2.1 Machine Type
Concrete Pipe Machine

2.2 Machine Name
SS CAP 72 Machine

2.3 Machine Size
Casting Station, Single

Max. Pipe Diameter ø72 in

Max. Pipe Length 8 ft

2.4 Production Year
2022

2.5 Type Number
Machine Serial No. CP-430

Job *56091*

2.6 Machine Supplier
Afinitas

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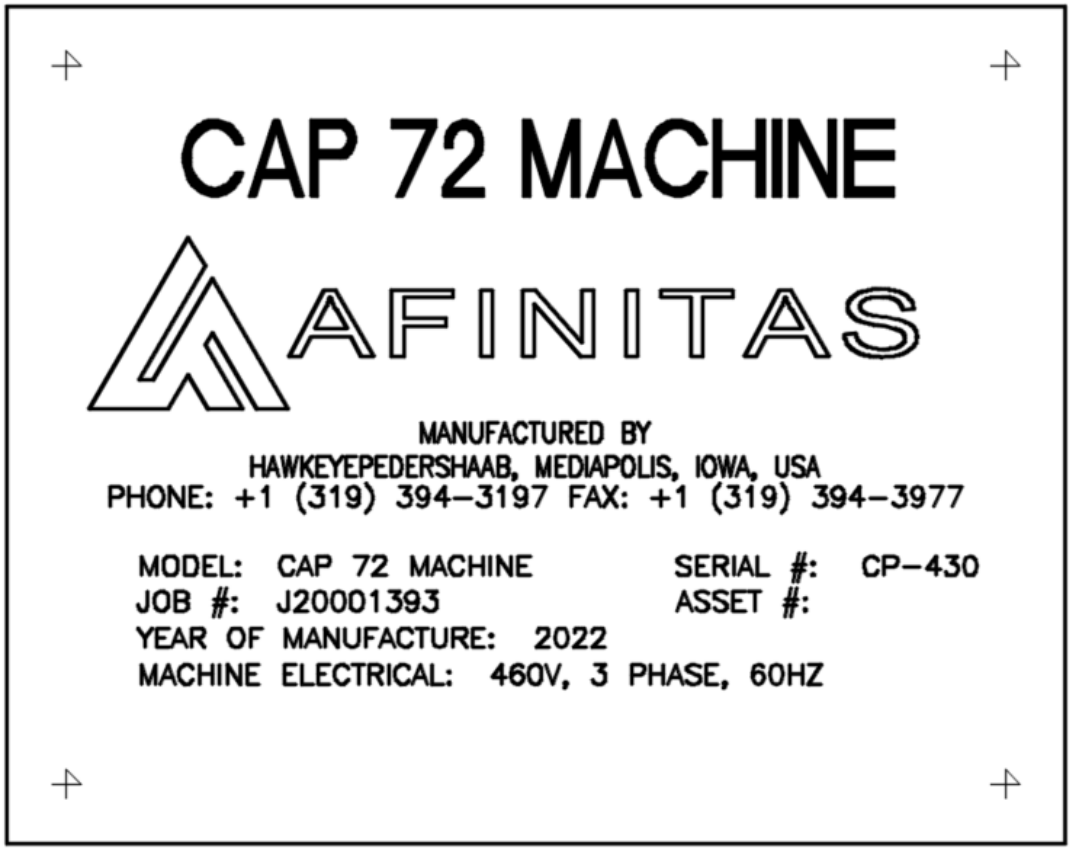
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CAP 72 MACHINE
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PHONE: +1 (319) 394-3197 FAX: +1 (319) 394-3977
MODEL: CAP 72 MACHINE
SERIAL #: CP-430
JOB #: J20001393
ASSET #:
YEAR OF MANUFACTURE: 2022
MACHINE ELECTRICAL: 460V, 3 PHASE, 60HZ

3 Safety

SS CAP 72 Machine

Machine Serial No. CP-430

Notes

3.1 Introduction to Machine Safety

General safety precautions are contained in this section of the operation manual. Read the safety messages in the operation manual and the safety decals on the equipment before performing any service or repair procedures. Contact **Afinitas** if you have any questions.

All possible circumstances that can involve potential hazard cannot possibly be included in this manual. Therefore, you must make a judgment that an operation, service procedure, etc., will be safe for you and others around you.

If the machine is damaged, something is not adjusted correctly, or there are missing parts, make sure they are repaired, adjusted, or replaced, respectively, before continuing operation. Incorrect or improper use of this equipment can cause injury or death. Most accidents can be avoided by following basic rules and precautions.



This safety alert symbol can be found throughout the manual. This symbol identifies important safety messages and warns of hazards or potential hazards concerning the machine and the operator's safety. tor. A signal word accompanies each safety message /or others in the immediate area. Whenever you see this symbol be alert to the possibility of personal injury and read and understand the message that follows the symbol. Each safety message is accompanied by a signal word. The following signal words may be used: **Danger, Warning, Caution** and **Note**.



DANGER! indicates an imminently hazardous situation that, if not avoided, can result in serious injury or death.



WARNING! indicates a potentially hazardous situation that, if not avoided, can result in severe injury or death.



CAUTION indicates a potentially hazardous situation that, if not avoided, can result in minor to moderate injury, or damage to the equipment.

NOTE conveys information to the operator concerning machine operation and other general information.

3.2 Safety Precautions

Safety is a basic factor that must always be considered in the operation and maintenance of mechanical equipment. Accidents involving machine operation and machine maintenance can be avoided if you follow basic rules and instructions. To reduce the possibility of personal injuries, give complete and undivided attention to the job at hand. You can make operation of the **SS CAP 72 Machine** safer if you observe the precautions that follow. Insist that they are followed by those working with you and for you. If you have any questions about your safety, or the safety of those people around you, contact **Afinitas** for more information.

The safety information in this manual does not replace safety codes, insurance regulations, or federal, state/provincial, or local laws. Make sure that you know these rules or laws before you operate this machine. Safety messages in this safety section list situations which can be encountered during normal operation or maintenance of this machine.

3.3 Wear Personal Protective Equipment (PPE)

Wear personal safety equipment as instructed by company safety rules.



Prolonged exposure to vibration noise can cause permanent hearing loss. Always wear suitable ear protection.

Avoid wearing loose fitting clothing, loose or uncovered long hair, jewelry, or loose personal items. These things can get caught in the machine and you can be injured.

3.4 Follow Safety Instructions

Carefully read all safety messages in this manual and on your machine safety decals. See following section for guidelines for maintaining decals. Other safety messages are used in the text of the manual to show specific safety hazards, as mentioned previously.



Read and understand the operator's manual before operating this machine. Know how to operate all the controls. Know the functions of all the controls, gauges, and instruments. Some controls, when actuated, make several machine functions occur in sequence. Know what machine component each control button operates.

Certain mechanical functions on the machine can be enabled so they run automatically under PLC control, or they can be disabled to run only by operator control. When any automatic machine function is enabled, be alert for machine components starting without operator control or warning.

Read and follow the manual sections for the various components of this machine. Follow all safety precautions, inspection, and service procedures outlined in these sections.

Know the warning lights and audible warning alarms before you start to operate the machine.

Keep all shields, guards, and electric eyes in place and/or fastened and in good condition. Do not override any safety interlock. Always replace guards, shields and rails after services are completed.

Keep your machine in proper working condition. Before you start each day, walk around your machine and check for oil leaks, missing or broken parts, and missing or dirty safety decals. Do the required maintenance or service that is required. Unauthorized modifications to the machine may impair function and/or safety and affect the machine's life.

3.5 Safety Decals

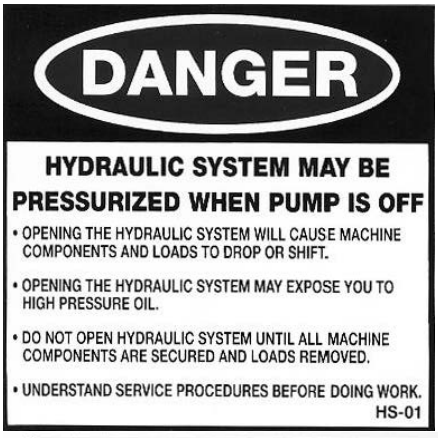
Follow the checklist below to keep the safety decals in good condition.

WARNING! Injury or death can occur if you cannot read a safety decal or if a safety decal is missing from the machine.

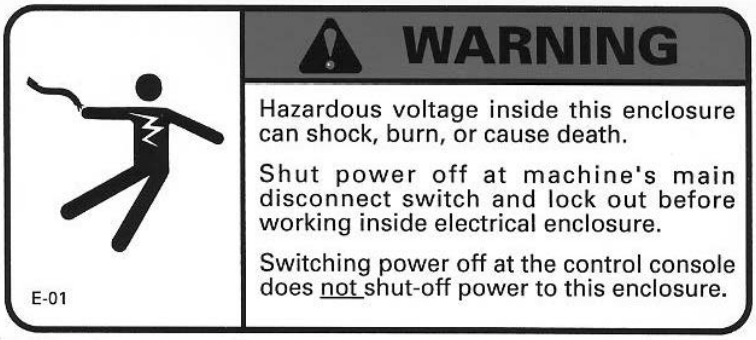
- Check each decal every day before starting work.
- Make sure you read all safety and instructional decals on the machine.
- Clean or replace any decal that cannot be read.
- Use only soap and water when cleaning the decals.
- Replace all missing or damaged decals.
- Contact **Afinitas** for all replacement decals.
- If a decal is attached to a part that must be replaced, make sure that you replace the decal along with the replacement part. Contact **Afinitas** for the replacement decal.

The following are some examples of warning decals. These and/or other decals may be present on your machine.









HAZARD DECAL LISTING

A		WEAR HEAD, HEARING, AND EYE PROTECTION
B		NO ACCESS
C		TRIPPING HAZARD
D		DROP/FALL HAZARD
E		SLIPPERY SURFACE
F		ELECTRICAL SHOCK/ELECTROCUTION
G		BODY CRUSH/FORCE FROM ABOVE
H		AUTOMATIC START–UP
I		SKIN PUNCTURE/HYDRAULIC LINE
J		HAND CRUSH/FORCE FROM ABOVE
K		MOVING PARTS CAN CRUSH
L		PINCH POINT/ENTANGLEMENT
M		HAND CRUSH/FORCE FROM ABOVE

Hawkeye Pedershaab
Concrete Technologies Worldwide™

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3.6 Emergency Stop Buttons and Main Switch

The machine is fitted with emergency stop buttons and a main switch. The large red emergency stop buttons are located on the operator's console, feeder, cleanout conveyor, and in the pit of the machine. Memorize the location of these buttons in case the machine must be stopped quickly.

When an emergency stop button has been activated, all machine functions will stop immediately. It is not possible to restart the machine until all the emergency stop buttons have been reset.



DANGER! Do not operate the machine if the emergency stop buttons are not functioning properly.

The main switch is on the main electrical cabinet outside the safety fence and is designed to be locked with a padlock. When the main switch is off, all machine functions will stop immediately. To restart the machine, turn on the main switch.

3.7 Operate the Machine Safely

The machine may be operated only by authorized operators who are familiar with the contents of the safety and operating instructions for the machine. Only the operator is required near the machine while it is in operation. Be alert and always know where other workers are located in your area. Keep all other people completely out of the work area and outside of the railed areas. Stop the machine immediately if you see anyone in these areas. The operator must not start the machine until he has made sure that no one is present in the working area of the machine or in the machine pit. Other workers or bystanders must stand well clear of the machine until the pipe cycle is complete.

At no time must the operator leave the machine without activating the emergency stop switch. At the end of the working day, the main switch must be switched off and locked with padlock.

Overhead lifting is dangerous. Do not stand or walk under any overhead load. Do not stand or work under any load or pipe while it is suspended, being raised or lowered. Stand a safe distance from all overhead loads.

Foreign materials, oil, or grease on the floor can cause an accident. Keep the floor clean at all times.

Be aware! The machine starts without warning and form components move by stationary objects with minimum clearances creating crush and pinch points. Never stand or permit others to stand inside the safety rails or in forklift loading and unloading areas when the machine is operating. If a problem develops, shut off and lock-out machine before correcting the problem.

Improper machine settings can cause injury or death. Only qualified personnel with knowledge of machine operation and the effects of the settings can change them.

Always give attention to the machine when the machine is operating.

Do not operate this machine if you do not feel well or are not fully alert. You can injure yourself or others in the area of the machine.

3.8 Overhead Crane Safety Precautions

Certain safety features must be incorporated into the design of the overhead crane used with the **SS CAP 72 Machine** for off-bearing and stripping concrete pipe. Failure to comply with these instructions may result in property damage, serious personal injury or death.



The overhead crane must be equipped with a safety device which will prevent overloading of the crane when it is attached to a fully anchored load which cannot be raised, or when attached to a load that exceeds the crane's weight capacity. A fully anchored load condition can occur during the manufacturing cycle when the crane attaches to a form containing a fully compacted pipe which, for a variety of reasons, develops a bond to the inner surfaces of the form. Should the crane be unable to break the bond between the pipe and the form, the crane could be subject to an anchored load of unknown magnitude. In this event, in order to prevent possible serious injury and property damage, the hoisting motion of the crane must stop immediately upon overload with this overload protection mechanism. Failure to add this overload protection or the mechanism working improperly may cause property damage, serious personal injury, or death.

Your overhead crane must be equipped with a safety device on the crane hook which will prevent the hook from becoming fully or partially disengaged from the stripping beam and/or form set if the crane lift cables would become slack during any phase of production. Failure to have the hook's safety latch working properly may cause property damage, serious personal injury, or death.

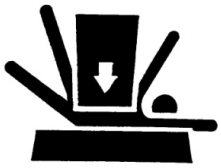
The overhead crane's hoist must be equipped with an upper limit switch which limits the height to which the load hook can be elevated. This upper limit switch must be set so when the stripping beam is attached to the crane hook, the upper limit switch stops the hoist's lifting motion before the stripping beam can strike the crane's bridge girders or any other obstruction. Failure to have an overhead crane equipped with this hoist upper limit switch, or a crane equipped with a defective or improperly set switch may cause property damage, serious personal injury, or death.

3.9 Practice Safe Maintenance

Understand service procedures before doing work. Keep areas clear and dry. Follow all maintenance instructions carefully.



WARNING! Personal injury or death can occur if proper procedures are not followed when performing service or repair on this equipment. Before performing any service or repair procedures, read and understand the safety and maintenance portions of this manual.



Before service is done on the machine for any reason, always put a “DO NOT OPERATE” tag on the machine.

If a problem develops during operation, shut off and lockout the machine before attempting to correct the problem.

Always wear face and/or eye protection when hammering on the machine. Use a hammer with a soft face if driving a hardened pin. Metal chips can fly off the pin and cause personal injury.



Always replace all guards, shields and safety rails after services are completed.

Never lubricate, service, or make machine adjustments while the machine is operating. Turn power off at the main switch and lockout with a padlock. Follow company lockout procedures. As stated before, when the main switch is off, all machine functions will stop immediately. To restart the machine, turn on the main switch.

Hydraulic and electric installations are to be carried out by authorized personnel only.

The machine must be used solely to make the products stated in the sales contract. Do not make unauthorized modifications to this machine. Unauthorized modifications can cause injury or death. Always contact **Afinitas** if you have any questions about any possible modifications.

Improper service or repair of the machine can cause injury or death. If you do not understand a service or repair procedure, contact **Afinitas** for the correct procedure.

Keep all parts in good condition and properly installed. Replace worn or damaged parts immediately. Use only **Afinitas** replacement parts to be assured of proper safety specifications.

The machine may be mounted and dismounted only by **Afinitas** engineers or by persons approved by **Afinitas**.

3.10 Precautionary Measures for Cleaning, Maintenance and Repair of Machine

Before carrying out cleaning, maintenance, repairs, troubleshooting, etc. of the machine, the emergency stop switch must be activated and the main switch shut off and locked with a padlock. If supplied, the optional hydraulic ball valve located in the pit must be locked with a padlock before any cleaning, maintenance or repair is begun on the hydraulic system or components. The key to the padlock is to be kept by the person working on the machine (the cleaner/repairman). Some types of repairs/troubleshooting will require that power is supplied to the machine. In such situations, the machine must only be started and operated by the repairman/troubleshooter. Upon completion of his tasks, the cleaner, repairman, or troubleshooter must make sure that all dismounted safety barriers, covers, connections, fencing, etc. are mounted and tightened correctly before switching on the power.

When working with oily components, use rubber gloves to protect hands. Avoid spilling oil on skin and clothing when dismounting, mounting, or exchanging machine parts, hoses etc. and when handling hydraulic oil. In case of oil spillage, change clothes immediately and wash skin with soap and water. Before dismounting the hydraulic system, make sure that pressure is released.

3.11 Avoid High-Pressure Fluids

Escaping fluid under pressure can penetrate the skin causing serious injury.



Avoid the hazard by relieving pressure before disconnecting hydraulic or other lines. Tighten all connections before applying pressure.

Search for leaks with a piece of cardboard. Protect hands and body from high-pressure fluids.

If an accident occurs, see a doctor immediately. Oil that penetrates the skin can cause serious infection if proper medical treatment is not performed immediately.

3.12 Safety System (Optional)

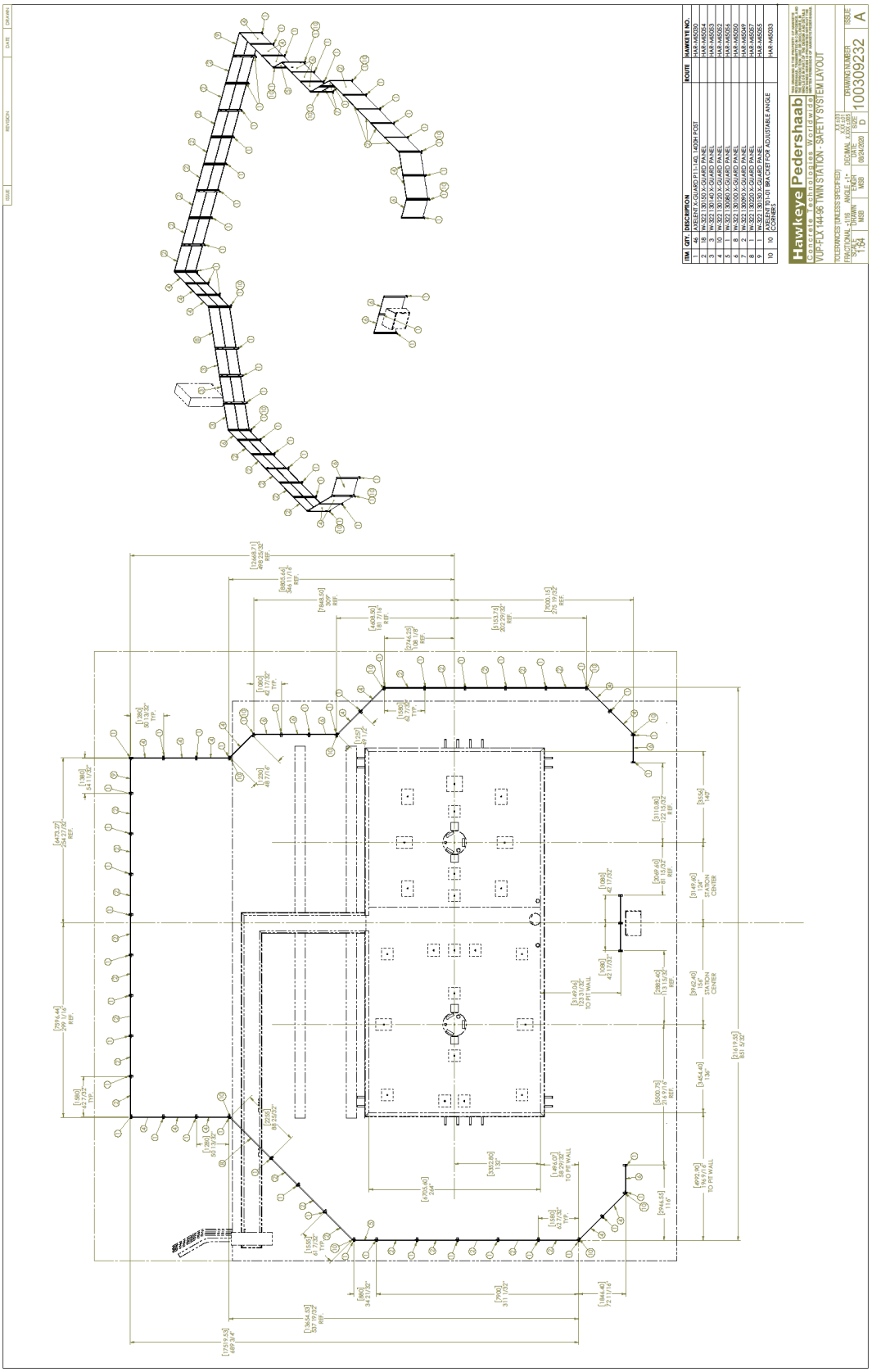
The **SS CAP 72 Machine incorporates** many safety functions within the design of the standard machinery. Safety guarding around moving mechanical components, pit covers with doors and railing, and hazard labeling are all parts of the standard **SS CAP 72 Machine equipment**.

The Safety System is additional safety equipment available as an additional option. When the Safety System is supplied it may consist of mechanical barriers (fencing) and/or photocell barriers as required that encompass the entire machine area. See ***Figure 3-1***.

- Mechanical barriers are used at places where no access to the machine is required for operational purposes.

- Photocell barriers are used if the operator needs access to the working area of the machine in order to carry out manual operations or in order to remove products from the machine. Always make sure that the machine has/is stopped in this (these) area(s) before carrying out the task.

When the operator leaves the working area of the machine, he must activate an acknowledge button to restart the machine, however, not until he has checked that there is nobody present in the working area.



Example of a Two Station Machine Safety System Layout

Notes

4 Preparation Before Operation

SS CAP 72 Machine

Machine Serial No. CP-430

Notes

4.1 Preparing Jacket for Production

WARNING: Use proper lifting equipment for overhead lifting. Use spreader bar to assure vertical lift. Be sure all lifting equipment is of adequate capacity for overhead lifting. Read and understand detailed instructions before lifting. Failure to comply with this warning may result in serious bodily injury.

Lifting the Jacket

To lift the jacket, attach the jacket to the overhead crane with a spreader bar lifting device. Connect this lifting device to the two lift pickups on the jacket wall, located 90° on each side of the emergency splice. Connect the lifting device to these pickups only.

Installing Vibrators to Jacket

The jacket is equipped for mounting the proper number of vibrators. It is important that the instructions below are followed to ensure that the vibration system works effectively.

Bolt the vibrators to the vibrator mounting pads. When vibrators are bolted to the vibrator pads, they must be watched for the early period of operation for loosening of the bolts. After initial tightening, they should be run for one minute and the bolts checked again for tightness. After about 15 minutes of operation, bolts should be rechecked for tightness. At the end of the first half day of operation, they should be checked once more. After this time, bolts are usually well seated and need only be checked with the normal visual inspection.

IMPORTANT: All vibrators must be bolted to the mounting pads so that the electrical cords hang down when attached to the jacket. This will assure proper rotation of the vibrators and prevent the vibrator cords from "wiggling". "Wiggling" of the cords will cause the electrical wires to over-flex and break.

Hook the vibrator mounting pads on the vibrator hooks located on the jacket wall. Two vibrator hooks are located on each vibration transmission band. There is a top, middle, and bottom vibration transmission band on the jacket. Connect the two vibrators together on each band with two special alloy transmission chains. Attach the opposite end of the chain to the chain tightener take-up. Attach the take-up to the second vibrator mounting pad. Repeat this same procedure with the second transmission chain.

The vibrator mounting pads must be tight to the vibration transmission bands at all times. Do not over tighten transmission chains as this will distort the jacket shape. Use of a 10" pipe wrench (or smaller) for tightening the take-ups is recommended. A distinct change in the noise level will be noticed if the vibrators are not properly tightened or if they become loose during operation. Tighten the transmission chains until the noise level remains constant. If the tightener take-ups loosen in operation, dismantle and wash excess lubricant from threads. If the vibrators tend to run hot, it is usually a sign that the vibrator has loosened.

The vibrator chain tightener take-up (exposed threads on take-up) should not exceed 4-3/4” or be less than 1". Excessive take-up length allows flexing in the straight portion of the tightener during vibration and may cause early fatigue failure. If the chains are too short, add extra chain shackles (Crosby-Laughlin in 5/8" S-215 or equivalent) to the transmission chain in order to avoid excessive tightener take-up. If the chains are too long, remove links until there is approximately 1" of take-up on the tightener.

NOTE: Add or remove links in pairs only for the chains to attach properly at the vibrator mounting pads. An odd number of links must be maintained on the transmission chains.

IMPORTANT: For the final tightening of the chains, use short bursts of vibration while tightening. Do not run the vibrators continuously as this may damage the jacket. Use only the special design transmission chain furnished with the machine. Substitute chain can cause premature fatigue failure to the jacket resulting in excessive down time. This chain is meant to be a wearing part subject to considerable fatigue. If a chain breaks, remove the complete chain immediately and replace it with a new chain.

WARNING! Worn or discarded transmission chain has been worn out from metal fatigue. Visually, the chain may look safe. However, vibration fatigue has weakened it and it must not be used for any other application. Tag the chain defective and scrap immediately.

4.2 Preparing Core for Production

Lifting the Core

WARNING! The overhead crane used with this machine must have certain safety specifications. Read and understand *Overhead Crane Safety Specifications* of the Safety Section of this manual. Failure to comply with this warning may result in serious personal injury.

The core is designed to be lifted by the overhead crane. Attach the crane hook to the core lifting round on top of the core. Inspect the crane hook daily to assure that the safety latch is always working properly. It is possible during production, for the crane hook to become slack on the lifting round. If the safety latch is defective, the hook could detach from the core lifting round causing the core to fall to the ground.

Installing Vibrators to the Core

On large diameter form sets (78" diameter and above) core vibration is required. Two vibrator mounting pads are located on each of the three transmission bands. Normally, only the top and middle band is equipped with vibrators unless the core is for 12" long pipe production. Bolt each vibrator on to the mounting pad using the same bolt tightening procedure. See ***Installing Vibrators to Core***.

Auxiliary Vibration

The core vibration box can also be used for controlling six auxiliary vibrators at the pushbutton control console. For operating forms where the vibrators must be disconnected each time for stripping, it is recommended that the core vibrator box be hung over the top railing at the pit entrance door. In this location it will be easy to connect and disconnect the vibrators from the box.

If the vibrators do not have to be disconnected each time for shipping, such as when producing core strip box sections with jacket vibration; it is recommended that the box be supported below the platform, so the vibrator cords are out of the way.

Connect the auxiliary vibrators to the receptacle outlets on the core vibration box. Connect the core vibration box control plugs to the proper receptacle outlets on the jib lock post. Read and understand ***Vibrating the Form*** for starting and stopping the vibrators.

IMPORTANT: The core vibration box is equipped with overload protection for the machine vibrators. Check the overload settings for the auxiliary vibrators before operating. Adjust if necessary.

Core Stripping Lugs

The lower end of the core is equipped with a series of stripping lugs. When extended outward form the core, they engage under the pallet and "lock" the pallet to the core. The lugs are synchronized so that all lugs extend or retract simultaneously by turning a single master drive nut 90°. This master drive nut is located on top of the core. These stripping lugs must be below the pallet before extending to assure their complete extension.

At the end of each day's production run, these stripping lugs should be thoroughly cleaned and oiled. Core stripping lugs are adjustable so they may be kept in proper synchronization. Daily, rotate all lugs to the extended position and check to see if they are hitting the stops simultaneously. If out of alignment, loosen the clamps on each individual strip lug drum and align properly.

Attached to the drum of the "caboose" lug is a lug locking spring. The purpose of this spring is to "lock" the lug in either the extended or retracted position preventing the stripping lugs from rotating accidentally. This lug locking spring must be always kept in good operating condition. Check the lug locking mechanism daily. If the spring is worn or missing, replace it immediately.

WARNING! Operating the core with a defective or missing stripping lug locking spring is dangerous. The lugs may retract accidentally and drop the product from the core. Failure to comply with this warning may result in serious personal injury.

4.3 Preparing the Machine for Production

The following information explains the procedure for installing SS CAP 72 Machine style forms to the **SS CAP 72 Machine** and preparing the machine for production. The machine is also designed to

accept PipePlus-style form equipment. See ***PipePlus Jacket Vibration System*** for detailed instructions. This equipment employs a different form of anchorage method.

Bolts and Nuts

Before starting to operate the machine, check to ensure all nuts and bolts are tight, all cotter pins are spread, and all hair pins are in place. After the machine has been operating for several hours, check to ensure all bolts are still tight.

Production Station Floor

The jacket and core rest on the machine's production station floor during pipe-making. Foreign materials on the floor that are worn, unlevel floor may cause the jacket, core, or both to sit "tilted." This may cause the form's wall cavity to vary from top to bottom. To avoid this problem, ensure the floor has been thoroughly cleaned before placing the jacket or core in the production station. If the floor plate needs replacing, see ***Base Maintenance***.

Plumbing Power Trowel/Strip Assist Cylinder

The power trowel/strip assist cylinder must always be kept plumb. When properly adjusted, a distinct pressure will be required to move this cylinder off plumb. There should be no play or lost motion on the cylinder in any direction. If adjustment is required, see ***Power Trowel/Strip Assist Cylinder Maintenance***.

Installing the Platform Planks and Sliding Sections

Platform planks and sliding sections are provided with the form to fit around the form while in the production station. This allows the machine operator close, 360° access to the forms. Various combinations of planks and sliding sections are used to adapt to all pipe sizes.

WARNING! Never operate the machine until all planks and sliding sections are in place and secure. Do not operate the machine with the permanent platform structure only.

Semi-permanent bolt-on planks are placed at the front and rear of each production station. After the bolt-on plank has been located correctly in the machine, bolt the plank down securely. These planks are normally not removed, unless when producing larger box culverts.

WARNING! Pick up the sliding platform sections with the overhead crane and a 10' long chain sling. Connect the sling to the two lift notches provided in each platform section. Use an adequate strength chain to pick up the platform sections.

The finish of the concrete contact surfaces has a definite relationship to the finish of the concrete in the joint. Therefore, the headers should be cleaned and oiled before use.

4.4 Preparing Machine for PipePlus Forms

Your **SS CAP 72 Machine is** designed to accept PipePlus forms. PipePlus style forms are principally used to produce 72" diameter pipe and smaller ones. Perform the steps that follow for preparing the machine for PipePlus forms.

Form Anchorage Pins

PipePlus forms require two form anchorage pins on the **SS CAP 72 Machine base** that anchor the PipePlus core to the machine base. These two pins are to be located 24-3/4"on both sides of the station center.

Pressurehead

For PipePlus forms, a closed plate presshead is required. Install the presshead to the pressurehead jib, same as for **SS CAP 72 Machine** style pressureheads.

IMPORTANT: Pressure heading forces on PipePlus form equipment must be reduced as compared for SS CAP 72 Machine style forms. The hydraulic oil pressure to the pressurehead cylinders for 12" through 36" diameter forms must not exceed 350 PSI. The hydraulic oil pressure to the pressurehead cylinders for 42" diameter through 72" diameter forms must not exceed 800 PSI. Select the minimum pressure for pressure heading that will adequately perform this process.

PipePlus Platform Adapter

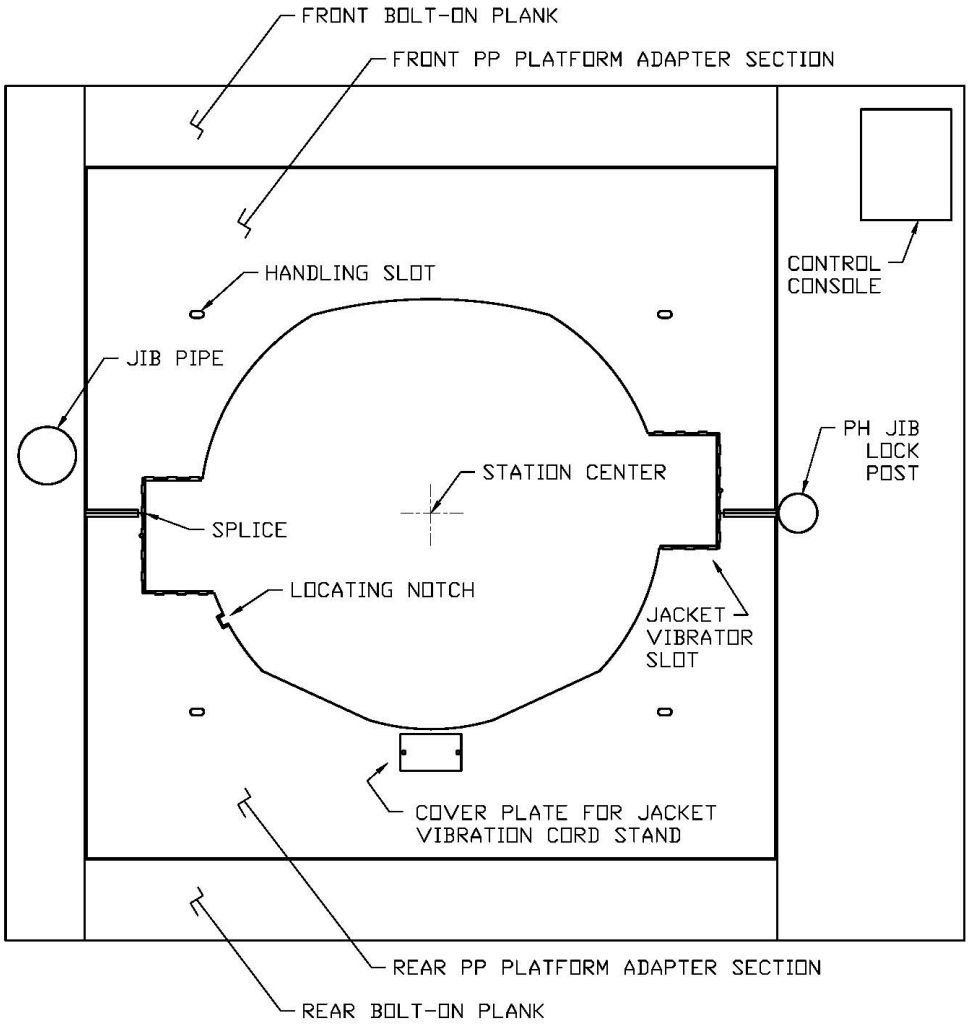
For PipePlus forms, a platform adapter section is required. The PipePlus platform adapter reduces the platform opening of the **SS CAP 72 Machine** production station to the large station platform opening of the PipePlus Machine.

The PipePlus platform adapter consists of two half-sections. To install the PipePlus platform adapter in the right-hand production station, perform the following steps:

1. Identify the two-platform adapter half-sections that are used for the right-hand production station. These sections will have the word "RIGHT" welded to the framework (the left-hand production station half-sections are marked "LEFT").
2. Install the two half-sections in the **SS CAP 72 Machine** platform as shown in ***Figure 4-7*** and ***Figure 4-8***. Handle each half-section individually, lifting at the handling slots provided.
3. Bolt the two half-sections to the 2" x 3" angle structure on the inside of the **SS CAP 72 Machine** platform opening.
4. Bolt the two half-sections together at each splice.

Each PipePlus platform adapter is supplied with a small station platform adapter ring. This ring bolts to the PipePlus platform adapter and further reduces the platform opening to that of the smaller PipePlus production station.

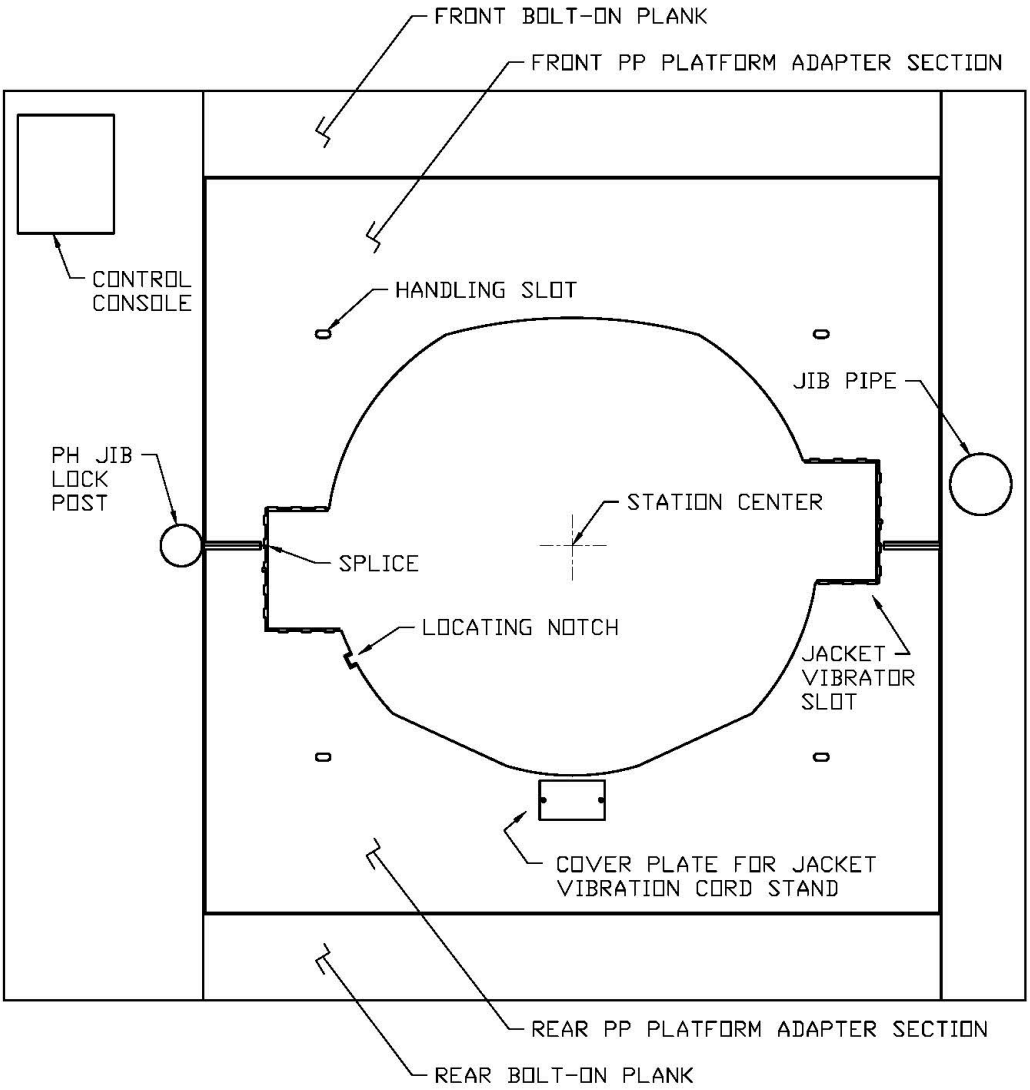
Vibrator slot filler sections are supplied with the PipePlus platform adapter to cover the jacket vibrator slots in the large and small PipePlus station platform openings. Each vibrator slot filler section is secured with a pin and hairpin.



TOP VIEW OF RIGHT-HAND PRODUCTION STATION

INSTALLATION OF PipePlus PLATFORM ADAPTER - RIGHT-HAND STATION

Figure 4-7



TOP VIEW OF LEFT-HAND PRODUCTION STATION

INSTALLATION OF PipePlus PLATFORM ADAPTER - LEFT-HAND STATION

Figure 4-8

4.5 Reinforcement Production for SS CAP 72 Machine

A considerable portion of the credit for the success of an efficient **SS CAP 72 Machine** operation can be claimed by the reinforcement crew that can furnish good, round, accurately made cages. It is vital that cages used in the manufacture of **SS CAP 72 Machine** pipe be round and accurately spaced in the forms to prevent undue tensions and localized pressures which may damage the freshly made pipe when it is stripped from the form. By following these commonsense methods, first class reinforcement cage can be produced.

Reinforcement

All standard types of reinforcement are acceptable for the **SS CAP 72 Machine**. Cross wires should be a minimum of 5 gauge (0.207) on 8' centers. Mesh should be purchased so that when rolled, cross wires are on the outside of the cage.

Diameters

Cage diameters are designed for 1-1/8" nominal concrete cover for the **SS CAP 72 Machine**. The inner cage is calculated for diameter while the outer cage is fitted to the Afinitas reinforcement spacer. See ***Pipe Reinforcement – Single Cage***. Normally the 8" spacing of mesh is of adequate tolerance to be used in determining the circumference of a cage. However, if the tolerances are too great, it will be indicated by the spacers when installed and may have to be more accurately measured to prevent loose spacing.

Rolling

The most challenging of **SS CAP 72 Machine** concrete pipe production is the rolling of a truly round cage in big pipe diameters. On concrete pipe 60" or larger, the weight of the cage is enough to cause sagging of the cage when rolled, which in turn changes the tension of the mesh coming out of the roller. Unless this tension is kept constant, cages become oval in shape. For large cages it is required that a support, preferably a round pipe, be placed over the top of the roller at a height which will catch and support the cage when it is approximately at the half-way point of rolling and prevent sagging. Cages must not have flat spots since flat spots will cause local over-feeding in the production and cause the cage to be moved out of place and be wedged against the core building up damaging tensions. Cages should be handled carefully after rolling.

Welding

Minimum welding at the splice for 20 or 40 diameters lap is as follows:

- **Outer Cage -** Every other line wire must be welded to provide a "corset" effect to confine the concrete which has been pressured into the area between the cages. Cages should be jig held for maximum roundness when welding and welds should be alternated to near the opposite ends of the lap to provide maximum bridging effect across the lap.
- **Inner Cage -** One weld per foot plus one or approximately 12" on center are required on the inner cage. Welds should be alternated to the outer edges of the lap similar to the outer cage welds.

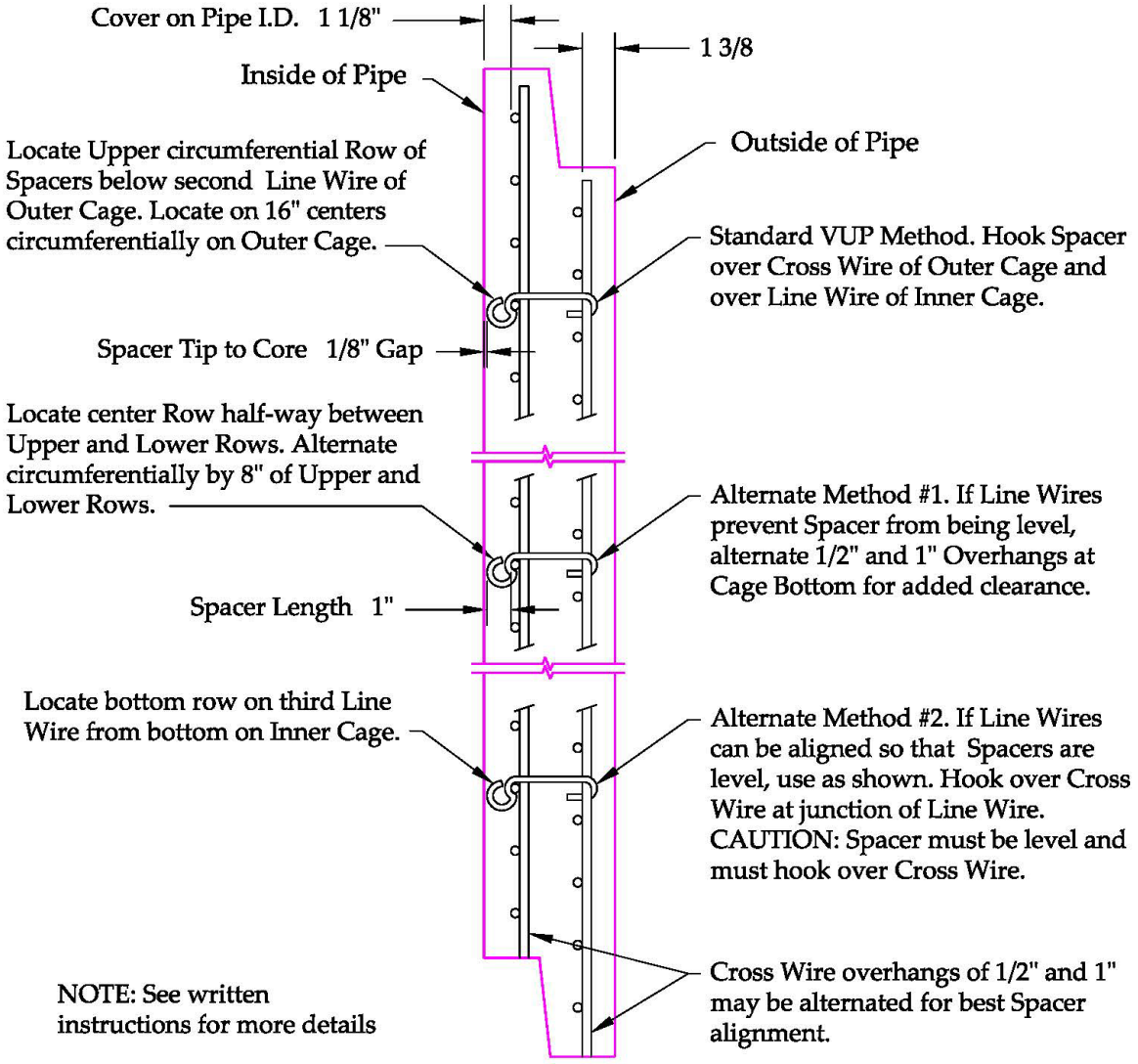
For fully welded splices, jib-hold the cage for maximum roundness. Cages should be held to proper circumference using four spacer tools. See ***Figure 10-3*** for information on making the spacer tools.

Spacing

Utilizing Afinitas spacers will ensure best results. See ***Figure 4-9*** for spacer information. Cross wires must never be cut or used for spacers since considerable column strength is required in the cage to bear the load of the vibration under pressure cycle of manufacture and the weight of the fresh concrete of the finished pipe.

Handling

Every effort must be made to deliver round cages to the **SS CAP 72 Machine**. The skill and diligence of the finest reinforcement crew can be for naught if finished cages are carelessly handled.



Use of Afinitas Spa-Stir in SS CAP 72 MachinePipe Manufacturing

Figure 4-9

4.6 The Afinitas Spa-Stir

The Afinitas Spa-Stir Spacer/Stirrup has been used for a number of years in the manufacture of concrete pipe on the **SS CAP 72 Machine** with a high degree of success. The Spa-Stir has proven to be a necessity in the production of concrete pipe by holding mesh firmly in place against the stress imposed by the pressuring of concrete into the pipe and during the subsequent stripping operation. The simple steps outlined below will ensure the best results with the Spa-Stir.

1. Roll inner cage to diameter required to provide 1-1/ 8" concrete cover to pipe I.D. See ***Figure 4-10: Wall "B" Reinforcement Data*** for dimensional data. Weld as specified in ***Welding*** on ***page 4-22***.
2. Roll outer cage to required diameter and fit to Spa-Stirs. This need be done only on the first cage to set production circumference. Once recorded, the circumference may be used on all production. To set outer cage circumference, set cage circumference to nominal shown in ***Figure 4-10***. Clamp one-line wire in place with Vise-Grips. Install Spa-Stirs on every cross wire or every 8" of one-line wire only.

NOTE: Be sure Spa-Stirs are level and pointed to the center line of the cage since accuracy is important in setting production dimensions. If circumference is too big to allow installation of all Spa-Stirs, reduce circumference by easing off on Vice-Grips. The purpose of spacing on 8" centers is to find the exact circumference which will fit the Spa-Stirs. When an exact fit is achieved, note the measurement of the partial space at lap, add 1/4" to 1/2" to this dimension and record for production. The additional 1/4" to 1/2" of circumference will assure that Spa-Stirs are under proper tension when installed on standard 16" centers.

3. With outer cage circumference set, weld as specified.
4. Set on base pallet. Align 1/2" and 1" overhangs for best Spa-Stir clearance. See ***Figure 4-9***.
5. Install four Spa-Stirs at 90° on the center row to center cages.
6. Install Spa-Stirs on alternate cross wires.

NOTE: The last two Spa-Stirs should be forced into place with a definite snap and should slightly deform the cage between Spa-Stirs. This tension is important in SS CAP 72 Machine production.

CAUTION: Be sure Spa-Stirs are level and point to center line of cage to prevent mesh movement.

7. Install three rows of Spa-Stirs as shown on ***Figure 4-9***. Offset center row 8" so that Spa-Stirs are staggered vertically from top to bottom.

NOTE: If Spa-Stirs are not tight enough, adjust diameter of cages. Inner cage diameter must maintain gap from Spa-Stir to core to prevent excessive deformation of the cage. This gap can be very small if the cage is perfectly round. Spa-Stir contact to core must be

loose enough to permit cage to spin by hand pressure. If inner cage diameter is excessive, diameter may be decreased to increase Spa-Stir tension. Normally, only cage diameter is increased.

This data is compiled for ASTM Wall "B", Table 3 concrete pipe with 40 diameter lap, 1-1/8" concrete cover, and 2" line wire mesh spacing. Allowance must be made for variable such as other strength pipe, lap types, wall thickness, etc.

Inner Cage

Pipe Size	Spaces to Cut for 40" Diameter Lap	No. of Spaces In Circumference	Plus Partial Spaces in Inches	Cage Circumference	Lap
36"	16	15	3/16" *	120.166"	7.640" *
42"	18 ½	17	3" *	139.016"	8.280" *
48"	21	19	5 7/8" *	157.865"	9.120" *
54"	23 ½	22	11/16" *	176.715"	9.960" *
60"	26	24	3 9/16" *	195.565"	10.720"
66"	28 ½	26	6 7/16" *	214.414"	11.840"
72"	31	29	1 ¼" *	233.264"	12.720"
78"	33 ½	31	4 1/8" *	252.113"	14.000"
84"	36	33	6 15/16"	270.963"	14.480"
90"	38 ½	36	1 13/16"	289.813"	15.320"
96"	41	38	4 11/16"	308.662"	15.760"

Outer Cage

Pipe Size	Spaces to Cut for 40" Diameter Lap	No. of Spaces In Circumference	Plus Partial Spaces in Inches	Cage Circumference	Lap
36"	17 ½	16	3 3/16" *	133.162"	6.680"
42"	20 ½	19	1 1/8"	153.153"	7.440"
48"	23	21	7 1/8"	175.144"	7.840"
54"	26	24	5 1/8"	197.135"	8.480"
60"	29	27	3 1/8"	219.127"	9.480"
66"	31 ½	30	1 1/8"	241.118"	110.240"
72"	34 ½	32	7 1/8"	263.109"	11.160"
78"	37 ½	35	5 1/8"	285.100"	11.840"
84"	40 ½	38	3 1/16"	307.093"	13.000"
90"	43	41	1 1/16"	329.083"	13.120"
96"	46	43	7 1/16"	351.074"	14.000"

* This dimension is approximate only and will be set by fitting outer cage to spacers. Dimension shown in calculated nominal.

Wall "B" Reinforcement Data

Figure 4-10

4.7 Production Checklist for SS CAP 72 Cages

1. Roll
   a. Roll or shape cage to within 1" of round.

2. Weld cage joints by:
   a. Spacing for proper diameter with four jigs.
   b. Holding splice area to same roundness as rest of cage.
   c. (Cage must be round and splice wires must be in plane).
   d. Staggering welds for maximum "bridging" effect by welding 1" from alternate ends of splice wires (on 40" diameter laps).
   e. Welding inner cage minimum of one weld per foot.
   f. Welding outer cage on every other line wire.

3. Recheck Roundness
   a. Recheck cage for being within 1" of roundness, especially across splice. Reshape if needed.

4. Nest and Set on Pallet
   a. Nest inner and outer cages and set on bottom pallet. Line wires should be either aligned horizontally or offset by 1/2" minimum. Invert one cage to get offset if needed.

5. Offset Splices
   a. Align inner and outer cage splices to 90^{o} of each other.

6. Center Cage
   a. Install all Spa-Stirs on center row at 90^{o} to center inner cage within outer cage.

7. Install Spa-Stir
   a. Install all Spa-Stirs. Top row should be on second space down on outer cage, bottom row should be approximately 12" up on inner cage, and center row should be halfway between upper and lower row. Alternate center row vertically from top and bottom rows.

8. Inspect. Double check assembled cages for:
   a. Spa-Stirs too tight or too loose. (If Spa-Stirs are loose, cage will fall apart when handled).
   b. Check splices for roundness.
   c. Spa-Stir tension is important. If Spa-Stirs are not properly tensioned, dismantle cage and correct the cause.

4.8 Manufacture of Radius Pipe

To produce radius pipe on the **SS CAP 72 Machine**, a special header is placed in the form at an angle during the vibration under pressure cycle. See ***Figure 4-12*** for details. To do this, an angled spacer is required to transmit the pressure head force at an angle. The following specifications show the method of fabricating the necessary equipment.

In use, it is recommended that the form be filled and compacted by vibration. The compacted concrete on the low side is then removed and the remaining concrete is shaped as near as possible to the finished angle. The header is then forced into place using vertical pressure and release motions.

Spacer Specifications

See ***Figure 4-11***.

1. Lay out radius joint and calculate width of 1/2" thick spacer plate. Roll plate to an I.D. of core plus 1/4".

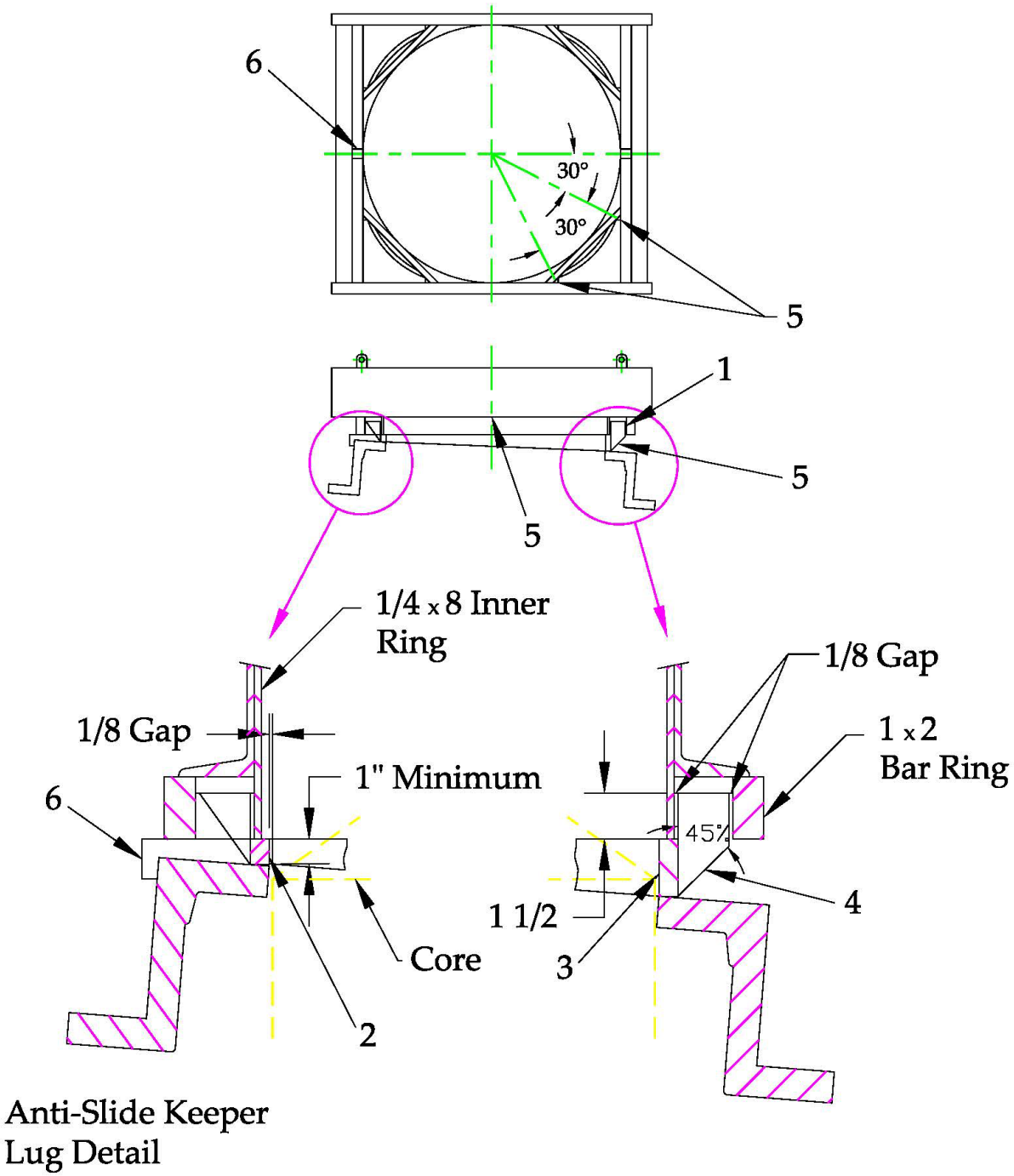
NOTE: To obtain a second spacer of a different angle virtually free of charge, you may add a minimum of 1-1/2" to the calculated width.

2. The thin side of the "pie" shaped spacer should be a minimum of 1".
3. Rolling to core O.D. plus 1/4" will center the 1/2" plate spacer on the 1/4" x 8" inner ring of the pressure head.
4. To assure bearing of the 1/4" ring on the 1/2" plate, guides are welded to the 1/2" plate to protrude 1-1/2" into the channel formed by the 1/4" x 8" ring and the 1" x 2" ring. Guides should be 3/8" material. Width should provide 1/8" clearances as shown.
5. Guides should be located at 30-degree spacing starting from the cylinder hanger eyes.
6. An anti-slide device to hold the spacer centered on the tongue is required. Weld lug to 1/2" spacer plate and shape to fit header so that 1/2" ring has 1/8" clearance to core.

Converting Standard SS CAP 72 Header for Radius Use

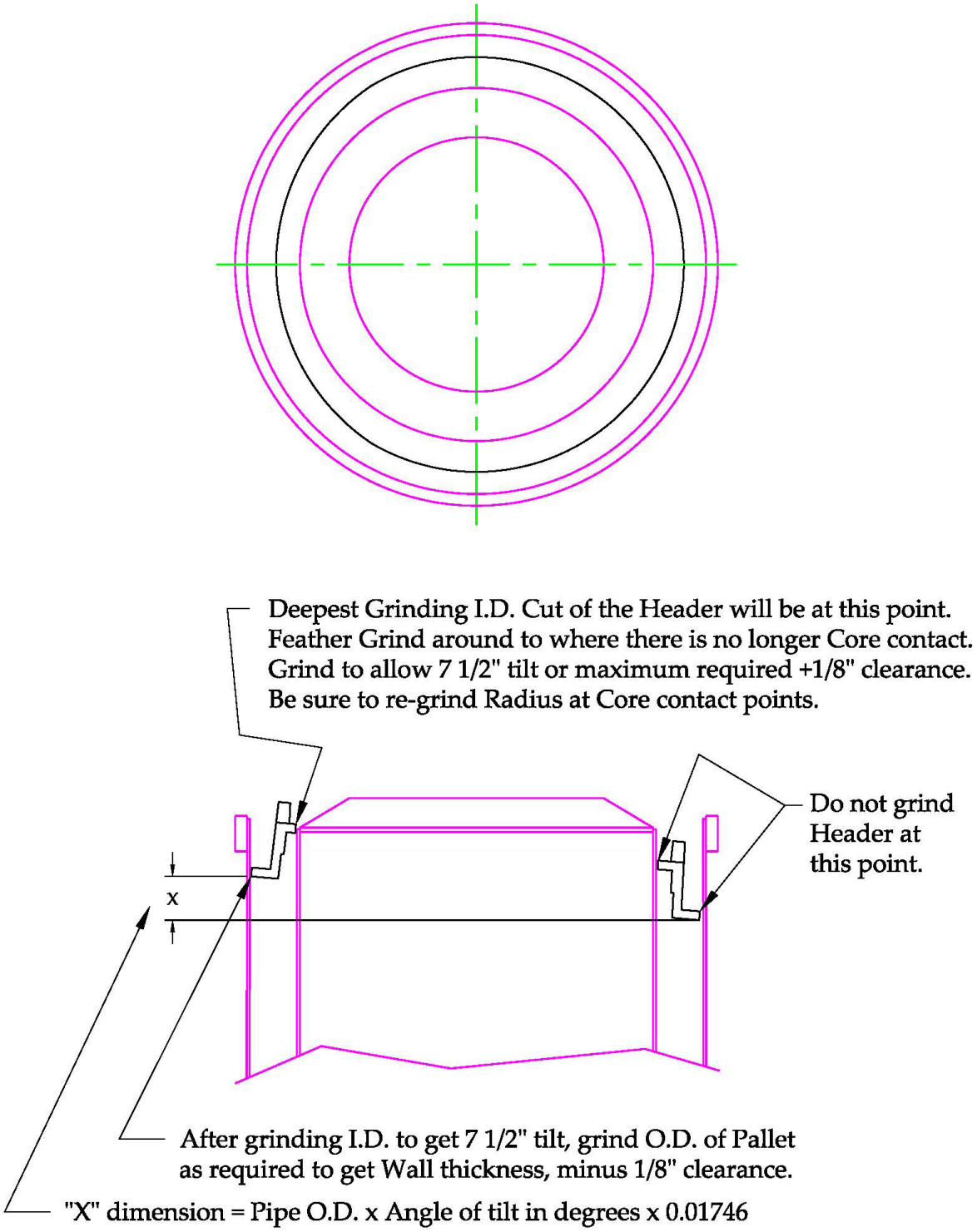
See ***Figure 4-12*** for details on how to convert a standard **SS CAP 72 Machine** header for producing radius pipe. Please note the following:

1. These instructions are for a maximum 7 1/2”.
2. Converting a header to manufacture radius pipe will ruin it for the future production of straight pipe.
3. Hand finish the pipe ends.
4. If volume of production warrants, a special header is available which will eliminate the need for hand-finishing by fitting forms to **SS CAP 72 Machine** standard clearances.



Spacer Ring for Making Radius Pipe

Figure 4-11



Converting Standard Header to Manufacture Radius Pipe

Figure 4-12

5 Machine Controls

SS CAP 72 Machine

Machine Serial No. CP-430

Notes

The Operator Interface (OI) Screen allows the operator to set up and monitor the **SS CAP 72 Machine** operation. Screens are included to monitor the status of the machine, to set up the individual forms being run, and to set up the operating parameters or settings of the machine. It is important to remember that not all the features listed in the following explanations are included on all machines. Some features are options purchased.

5.1 Common Screen Features

The screens have common navigational buttons to view different screens. The buttons are listed below. To change screens, push the function button corresponding to the desired screen.

 Go to Previous Menu Screen

 Go to Alarm Screen

 Go to Menu Screen

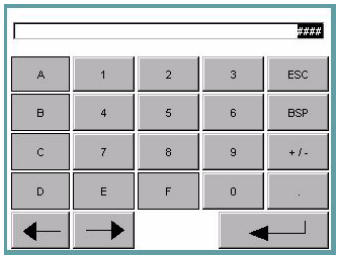
 Go back to Previous Group of Screens

 Go to Next Group of Screens

 Go to Previous Screen in the Current Group

 Go to Next Screen in the Current Group

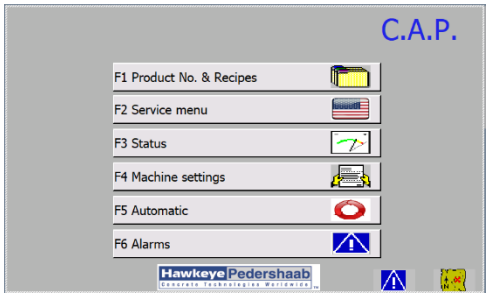
5.2 Changing Numeric Values



On the settings screens numeric value can be changed from the screen. To change a value, touch the screen at the location of the value. The screen will then display the Numeric Data Entry Screen. The current value is shown at the top of the screen. Enter in the new value and press the 'ENTER' key to modify the actual value. Press the 'ESC' key to go back to the previous screen. Pressing the ‘ESC’ key before pressing the enter key will not change the actual value of the setting. The 'BSP' key can be used to correct any data entry mistakes.

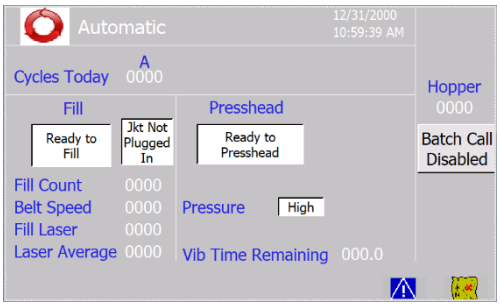
5.3 Machine Status Screen

Main Menu Screen



The Main Menu Screen allows access to the various pages of the interface. The Recipes Screen, Service Screen, Machine Status Screen, Machine Settings Screen, Automatic Screen and Alarm Screen can be accessed from the buttons on the bottom of the screen.

Automatic Screen



The Automatic Screen allows quick access to all the automatic operation status of the **SS CAP 72 Machine**.

Cycle Count

At the top of the screen is displayed the number of times the form has been filled and stripped during the current day. This value automatically gets reset to zero at midnight.

Filling Status

The filling status is on the left side of the screen. The status box shows the following information.

The top button shows the current status of the filling cycle. It will display one of the following messages:

- Ready to Fill
- Filling
- Filling Paused
- Vibration After Fill
- Fill Done
- Waiting for Concrete

Fill Count-The elapsed count of the current fill cycle.

Belt Speed-The current speed of the conveyor belt is displayed as a percentage of full speed (0-100).

Fill Laser. (Option) This shows the current reading of the filling laser. As the concrete rises in the form, this number gets smaller.

Laser Average. (Option) This shows the average concrete level of the form.

Presshead Status

The presshead status is in the middle of the screen. The status box shows the following information.

The top button shows the current status of the pressure heading cycle. It will display one of the following messages:

- Ready to Presshead
- Troweling
- Pressure heading Paused
- Normalize
- Vibrators Stopping
- Pressurehead Raising
- Pressurehead Done

Pressure. This displays the current commanded pressure to the main pressurehead cylinders.

Miscellaneous

Miscellaneous buttons are on the right side of the screen. This status box has the following:

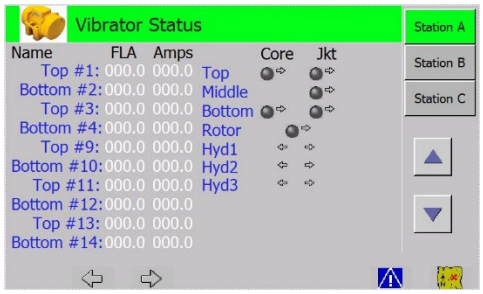
- ***Hopper Weight. (Option)-***The weight of the hopper load cells is displayed.
- ***Batch Call Enable/Disabled-***This button will enable the batch calling.
- ***Hyd. Unit OFF/ON-***This button will turn the hydraulic unit on or off.

5.4 Status Screens

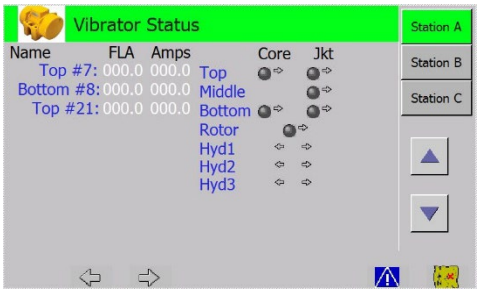
Vibrator Status Screen

If programmable motor overload modules are used on the vibrator starters, they can be set to trip at various current levels. Different forms have different size and number of vibrators, meaning that often the overload setting must be different for different forms. The Vibrator Status Screen shows the value of every vibrator overload trip set point for the current station.

The station that is being displayed is highlighted in green in the upper right corner. To change to a different station, touch that station button.



If the machine is 230V AC then there is a second page with more vibrator settings on it. Switch to that page with the up and down arrows on the right side of the screen.



The current amp draw of all the vibrators as well as the current FLA setting are displayed by default when the page is displayed. To get a faster refresh rate on the amp draws, touch the word ‘Amps’ at the top of the page. To only get one amp draw to display for the quickest refresh rate, touch the amp draw value. If a value is not being refreshed, it will be grayed out.

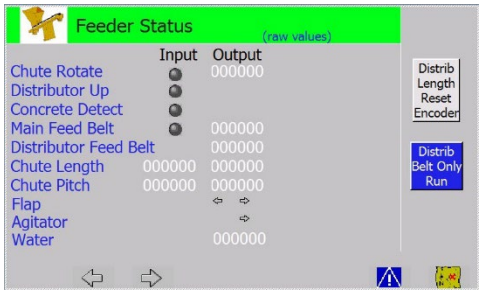
On the right side of the screen the status of the contactors and center pipe values are displayed. The arrows will turn green when the PLC is turning on the outputs to the device. The circle will turn green when the auxiliary contact input to the PLC is on for that contactor.

The order of the devices is:

- Top Core Vibrator, Top Jacket Vibrator
- Middle Jacket Vibrator
- Bottom Core Vibrator, Bottom Jacket Vibrator
- Rotor Contactor
- Hydraulic Valve 1 (Selectable function) (optional)
- Hydraulic Valve 2 (Selectable function) (optional)
- Hydraulic Valve 3 (Selectable function) (optional)

Feeder Status Screen

The Feeder Status Screen includes information for the feeder of the **SS CAP 72 Machine**.



Indicators

Circles indicate green when a sensor is on. The arrows turn green when the output to the valve or contactor is on.

The following items are displayed:

- ***Chute Rotate (Option)*-**Home prox and proportional valve.
- ***Distributor Rotate (Option)*-**Home prox and proportional valve.
- ***Distributor Up. (Option)*-**Up prox.
- ***Concrete Detect.*** Concrete sensor above the belt.
- ***Man Feed Belt*-**Belt counter prox and proportional valve.
- ***Distributor Feed Belt (Option)*-**Proportional valve.
- ***Chute Length (Option)*-**Cylinder length transducer and proportional valve.
- ***Chute Pitch (Option)*-**Cylinder length transducer and proportional valve.
- ***Distributor Length (Option)*-**Encoder reading and proportional valve.
- ***Distributor Height (Option)*-**Cylinder length transducer and proportional valve.
- ***Flap*-**Directional valve.
- ***Agitator*-**Directional Valve.
- ***Water*-**Proportional Valve.

Function Buttons

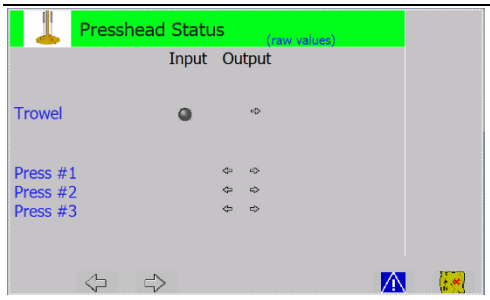
There are two functional buttons on the right side of the screen if the machine is equipped with a distributor belt.

Distributor Length Reset Encoder. Push and hold this button when the distributor belt section is fully retracted to reset the encoder count.

Distributor Belt Only Run. Push this button to run the distributor belt and not the main feed belt.

Presshead Status Screen

The Presshead Status Screen includes information for the presshead of the **SS CAP 72 Machine**.



Indicators

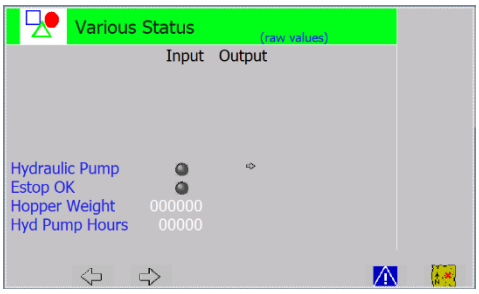
Circles indicate green when a sensor is on. The arrows turn green when the output to the valve or contactor is on.

The following items are displayed:

- ***Trowel***-Home prox and directional valve.
- ***Press #1***-Directional Valve.
- ***Press #2***-Directional Valve.
- ***Press #3***-Directional Valve.

Various Status Screen

The Various Status Screen includes information on various parts of the **SS Cap 72 Machine**.



Indicators

Circles indicate green when a sensor is on. The arrows turn green when the output to the valve or contactor is on.

The following items are displayed:

- ***Hydraulic Pump***-Auxiliary input and contactor output.
- ***Estop OK***-Feedback from Estop relay.
- ***Hopper Weight***-(Option) Reading from load cells.
- ***Hyd Pump Hours***-The number of hours the pump has run.

Alarm Screen

The Alarm Screen lists the active alarms of the **SS CAP 72 Machine**.

Clear Alarms by pressing the button.

Product Recipe Screens

There are (5) five Recipe Screens for the **SS CAP 72 Machine**, which are accessed from the Main Menu Screen.

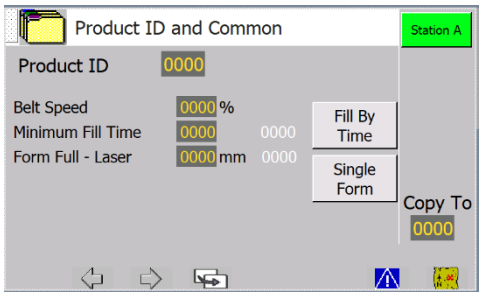
The first screen that is displayed is the Product ID and Common Screen. All the other screens are accessed by the left and right arrow buttons (F2 & F3). The back button (F1) can be used from this screen to return to the Product ID Screen.

The screens are reached in this order:

- Feeder
- Vibrators
- Presshead 1
- Presshead 2

Product ID & Common Screen

This screen allows the Product ID to be changed as well as displays some of the most common settings.



Numeric Data Entry

This screen contains the following numeric data only boxes:

Product ID-This box shows the *Identification Number* for the pipe at the respective station. The value of most of the pipe settings depends on the size of the pipe and other characteristics of the pipe. Therefore, each size pipe must be assigned a unique I.D. All settings on these screens apply only to the pipe to which the I.D. shown is assigned. Changing this value will load up the *Saved Settings* for the entered Product ID. Valid Product IDs are between 1 and 50.

Belt Speed-This is the speed that the conveyor's feed belt will run while filling the form. Valid values for this setting range between 0 and 100, where 0 would turn the belt off and 100 would run the

belt at full speed. The faster the belt runs the faster the form fills. Too fast does not allow the concrete to settle and causes voids. Too slow extends the cycle time unnecessarily.

The optimum setting depends on the mix, cage style, wall thickness, number of pipes per form, etc. It is usually determined by trial. If the last pipe was good, try a little faster the next turn. If the last pipe had voids, slow it down a little. Voids can often be detected while the form is still at the fill station by manually vibrating the form for quite a while before indexing the turntable. If the concrete level goes down, there were voids. Basically, this is one purpose of the *Vibrate After Fill* function.

Minimum Fill Time-This setting controls how much concrete is put in the form automatically. The machine measures the time that the feeder belt is running. It assumes that there is concrete on the belt and that the concrete is the same depth on the belt all the time, so this is not an exact measurement, and the form usually must be topped off manually. There are two methods of topping off the form:

- The first is by *Manual Operation* of the individual controls (chute, belt, vibrators).
- The second method uses the *Start/Continue Filling* pushbutton.

After the fill time has expired, the chute will continue to rotate, and the vibrators will continue to run for the after-fill time and then stop.

While the *Start/Continue Filling* button is held down the feeder belt will run, when the button is released, the vibrators will run for the after-fill time and then shut off.

The actual filling time of the current filling cycle is shown to the right of the setting.

Form Full Laser Point (Option)-This is the laser reading of the concrete height where the feeding belt will stop. As the concrete height moves between the “Start Laser Height” and this setting the feeder belt will proportionately reduce its speed.

Enable/Disable Buttons

The following *Enable/Disable* button is on the screen:

***HINT*:** Pressing these buttons toggles the buttons from Enable to Disable, and vice versa.

The *Enable/Disable* button is described below:

Single Form/Multi Form-Set this parameter to the type of form at the station. This setting will determine if rotor is used by the type of trowel that can happen and other functions.

Fill by Time/Fill by Laser (Option)-Set this parameter to the type of fill method. Fill by Time will use time and belt count values and will require manual finishing of the form. Fill by Laser will use the distributor belt laser to determine when the form is full.

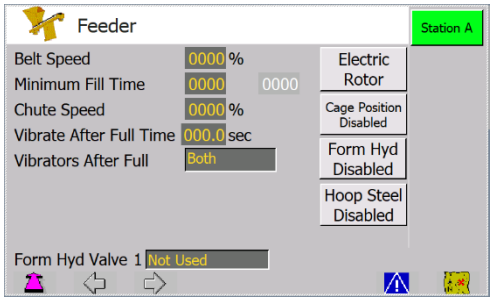
Recipe Copy

It is possible to copy the current recipe shown on the screen to another Product I.D. To copy, follow this procedure:

- Enter the Product I.D. that you want to copy the settings to in the setting under the “Copy To” in the lower right of the screen.
- Push the “F4” button under the copy icon.
- Check the “Copy To” setting. It should change back to ‘0’.

Feeder Recipe Screen

This screen displays the settings from the feeding cycle.



Numeric Data Entry

This screen contains the following numeric data-only boxes. The *Numeric Data Entry Boxes* are described below:

Belt Speed-This is the speed that the conveyor’s feed belt will run while filling the form. Valid values for this setting range between 0 and 100, where 0 would turn the belt off and 100 would run the belt at full speed. The faster the belt runs the faster the form fills. Too fast does not allow the concrete to settle and causes voids. Too slow extends the cycle time unnecessarily.

The optimum setting depends on the mix, cage style, wall thickness, number of pipe per form, etc. It is usually determined by trial. If the last pipe was really good, try a little faster the next turn. If the last pipe had voids, slow it down a little. Voids can often be detected while the form is still at the fill station by manually vibrating the form for quite a while before indexing the turntable. If the concrete level goes down there were voids. Basically, this is one purpose of the *Vibrate After Fill* function.

Minimum Fill Time-This setting controls how much concrete is put in the form automatically. The machine measures the time that the feeder belt is running. It assumes that there is concrete on the belt and that the concrete is the same depth on the belt all the time, so this is not an exact measurement and the form usually has to be topped off manually. There are two methods of topping off the form:

- The first is by *Manual Operation* of the individual controls (chute, belt, vibrators).

- The second method uses the *Start/Continue Filling* pushbutton.

  After the fill time has expired, the chute will continue to rotate and the vibrators will continue to run for the after fill time and then stop.

While the *Start/Continue Filling* button is held down the feeder belt will run, when the button is released, the vibrators will run for the after fill time and then shut off.

The actual filling time of the current filling cycle is shown to the right of the setting.

Chute Speed or Distributor Rotate Speed-This value controls the speed of the rotating conveyor chute while filling the form. Valid values for this setting are between 0 and 100, where 0 would not turn the chute and 100 would turn the chute at full speed.

Vibrate After Full Time-After the conveyor's feed belt is shut off, the vibrators will continue to run for this length of time before automatically shutting off. This value applies after the filling time has expired as well as during the manual top off of the form.

Vibrators After Full-This setting is used to set how many vibrators are running after the form is considered "full". The options are: Both, Top or Bottom.

Table Hyd Valve 1 & 2 (Option)-This setting is used to determine the function of the hydraulic valves mounted on the turntable centerpipe for this station. The options are the same for all valves. All combinations are allowed, but some do not make practical sense. The options:

- **Not Used**-This valve will not ever be turned on.
- **Core Hyd**-This valve will be used to control core hydraulic functions and the hydraulic form rotor for multiforms. Core hydraulic functions will retract after the pressing sequence. The valve will stay powered in the last state when the manual switches are centered for core hydraulic functions and at the stripping station.
- **Cage Pos**-This valve will be used to control jacket mounted cage positioner cylinders. Cage positioners will retract after the filling sequence. The valve will center after the function has completed when the station is at the stripping station.
- **Form Raise**-This valve will be used to raise and lower the mould set and is only run from the manual switches.
- **Hoop Steel**-This valve will be used to control jacket mounted hoop steel cylinders. Hoop steel cylinders will retract after the
- **Jacket Hyd**-This valve will be used to control jacket mounted hydraulic functions. These functions will retract after the presshead sequence. The valve will center after the function has completed when the station is at the stripping station.

Enable / Disable Buttons

The following *Enable/Disable* buttons are on the Feeder Screen.

 Pressing these buttons toggles the buttons from Enable to Disable, and visa versa:

- Cage Position
- Form Hydraulic (Step Pins)
- Elec/Hyd Rotor
- Hoop Steel

The *Enable/Disable* buttons are described below:

Cage Position-For a form that has cage positioners this setting controls whether they will be controlled automatically. When *enabled* is selected, the cage positioners will extend when the form is at the fill station and stay extended until the form is at the presshead station. They will retract while the form is at the presshead station. While the form is at the strip station, the valve is closed to allow disconnection and connection of the hoses. The cage positioners use the form jacket hydraulics outlet. If *Disabled* is selected the valve is inactive.

Form Hydraulics (Step Pins)-Turns *On* or *Off* the automatic control of the hydraulic form options (like core stephole pins) for the form when it is in all three stations. When the setting is *Enabled*, the form hydraulics will extend while indexing to the fill station, stay extended through the fill and presshead cycles, and retract when indexing to the strip station. The form core hydraulics outlets are used for this function. This setting can be used to control any option that would use the form core hydraulics and is desired to function as described above. Layhole pins would be an example.

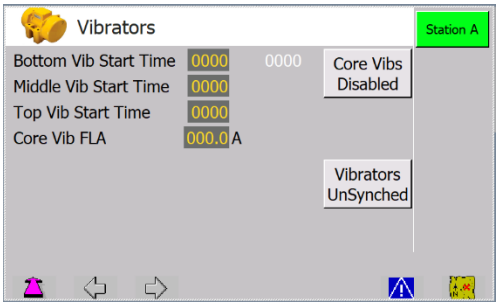
Note: When the hydraulic hoses on the form need to be disconnected from the machine, this setting will need to be disabled.

Electric/Hydraulic Rotor-Most Single forms do not have rotors. Most Multiforms do. Some of the rotors are driven by a hydraulic motor and some by an electric motor. Since they use different start signals, the control system has to know which kind of rotor the form has. If there is no rotor, use the *Rotor Enable/Disable* setting to disable the rotor.

Hoop Steel-For a form that has hoop steel positioners this setting controls whether they will be controlled automatically. When *enabled* is selected, the hoop positioners will extend when the form is at the fill station and stay extended until the form is at the presshead station. They will retract while the form is at the presshead station. While the form is at the strip station, the valve is closed to allow disconnection and connection of the hoses. The hoop positioners use the form jacket hydraulics outlet. If *Disabled* is selected the valve is inactive.

Vibrator Recipe Screen

This screen includes the settings for the vibrator.



Numeric Data Entry

This screen contains the following numeric data only boxes. The *Numeric Data Entry Boxes* are described below:

***Bottom Vib Start Count*-**The number of feed belt counts the *Bottom* vibrators wait before turning on during the filling cycle.

***Middle Vib Start Count*-**The number of feed belt counts the *Middle* vibrators wait before turning on during the filling cycle (if middle vibrators are enabled).

***Top Vib Start Count*-**The number of feed belt counts the *Top* vibrators wait before turning on during the filling cycle.

***FLA*-**This is the full load amperage of the individual vibrator motors. All motors on a given form have the same full load amp rating. The PLC uses this setting to program the vibrator starter overload modules.

Enable / Disable Buttons

The following *Enable/Disable* buttons are on the vibrator Screen:

Pressing these buttons toggles the buttons from Enable to Disable, and visa versa.

- Core Vibs
- Jacket Vibs
- Vibs Synch/Unsynched

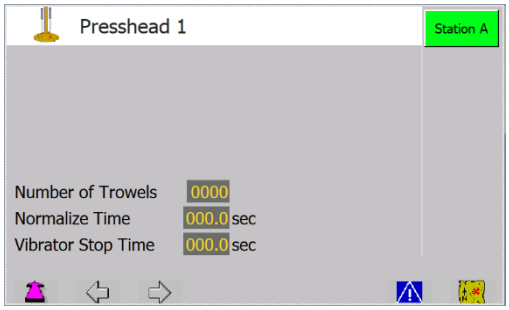
The *Enable/Disable* buttons are described below:

Core Vib. This setting refers to the vibrator starters. If the form has core vibrators, usually their starters will be enabled. Disable them if the form has no core vibration.

Vibs Synch/Unsynched. If *Vibs Synch* is selected, all the vibrator motors will start simultaneously. If *Vibs Unsynched* is selected, the vibrators can be set to stage as the form fills by using the *Vib Start Count* settings on the previous setting screen. If the form has synchronized vibration, *Vibs Synch* must be selected, or the overloads will trip and/or motors will burn out.

Presshead 1 Recipe Screen

This screen includes part of the settings for the presshead cycle.



Numeric Data Entry

This screen contains the following numeric data only boxes. The *Numeric Data Entry Boxes* are described below:

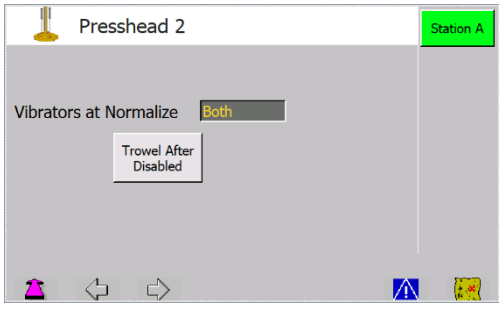
Number of Trowels-The number of 1/3 turns the tongue trowel makes during its *Trowel Cycle* before the form will normalize.

Normalize Time-This is the length of time that the pressurehead will normalize before turning off the vibrators. The normalize time starts when the normalize light on the control panel starts to flash.

Vibrator Stop Time-This is how long the pressurehead waits for the vibrators to wind down after the form has been normalized before raising the pressurehead.

Presshead Two Recipe Screen

This screen includes part of the settings for the presshead cycle.



Numeric Data Entry

This screen contains the following numeric data only boxes. The *Numeric Data Entry Boxes* are described below:

Vibrators at Normalize-This option selects how many vibrators are running during the normalize time. The options are: Both, Top or Bottom.

Enable/Disable Buttons

The following *Enable/Disable* buttons are on Presshead 2 Screen.

- Trowel After

The *Enable/Disable* buttons are described below:

 Pressing these buttons toggles the buttons from Enable to Disable, and visa versa.

Trowel After-This enables the *Tongue Trowel Cycle* that occurs after the form has normalized but before the pressurehead has lifted.

5.5 Machine Settings Screens

There are two Machine Settings Screen Groups for the **SS CAP 72 Machine**, which are accessed from the Cover Screen.

The first screen to be displayed will be the Feeder Settings screen. Use the  *Forward* and  *Reverse* buttons (F2 & F3) at the bottom of the screen to display the subsequent groups. Use the  *Up* and  *Down* arrow buttons (F4 & F5) to scroll through the various screens in a group. Use the  .

Feeder Group

There is one screen in this group.

Feeder Settings

The Feeder Group Screen contains the following *Numeric Data Entry Boxes*. They are described below:

Flap In Position Time-The amount of time required for the chute flap or distributor flap to fully lift or lower.

Concrete on Belt Count-The number of *Belt Counts* before the concrete reaches the chute, after the concrete sensor detects concrete. This is also the number of belt counts before the concrete flow stops after the concrete sensors no longer detects concrete.

Belt Slow Factor After Fill-The speed of the belt as a percentage of the *Normal Fill Speed* that goes into effect after the fill count is reached. This setting can be used to slow the belt for topping off the form.

Minimum Belt Speed After Fill-The minimum speed the belt will move with after the *Belt Slow Factor* is calculated.

Min Manual Chute or Distributor Speed-When manually activated, the conveyor chute or distributor will rotate with at least this speed.

Chute or Distributor Homing Speed-When the chute or distributor rotates to its home position this is the speed it moves.

Presshead Group

There is (1) one screen in this group.

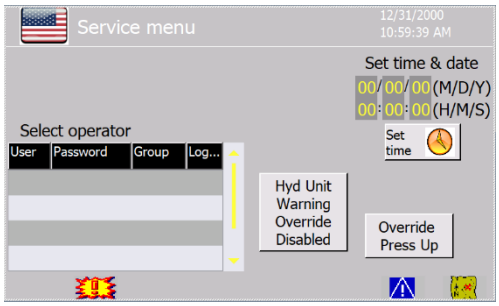
Presshead Settings 1

The Presshead Settings 1 Screen contains the following *Numeric Data Entry Boxes*. They are described below:

P-Head Valve Delay Time

This is a delay of the pressurehead directional valve to allow pressure to normalize inside the main pressurehead cylinders.

Service Screen

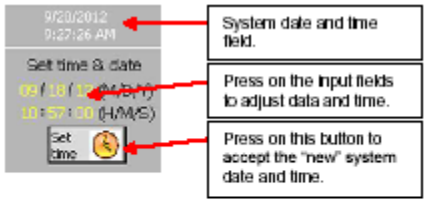


Language Selection



Select the language on all menus by pressing on the actual flag. (Optional)

Set System Time & Date



Put in the actual date and time on the yellow fields and press “Set time” to adjust the system date and time.

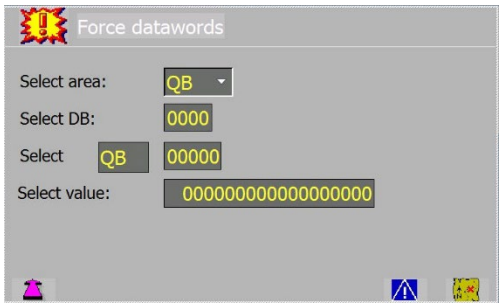
Hydraulic Override

Push button to override the temperature and low oil warning. If overridden, the pump will continue to operate until the alarm levels are reached and then it will turn off.

Override Press Up

Push button to override the presshead up status. Not used on this machine.

Force PLC Data



Selecting F1 gives the operator access to adjust all data in the PLC.

Select the area, DB and DB address. The value of the memory address will be shown in the bottom box. Changing this value will change the value at that memory address. Do not do this unless directed by **Afinitas** personnel.

6 Machine Components

SS CAP 72 Machine

Machine Serial No. CP-430

Notes

The SS CAP 72 Machine Components section of the manual consists of the technical data, maintenance, and lubrication requirements for the entire machine. This section contains data for the overall machine, as well as all the individual modular machine component sections, which are specific to the machine. The “Machine Components” section consists of, but is not limited to, the following components and/or optional components.

- Hydraulics
- Dual Purpose Crane Feeder
- Production Base and Riser
- Elevating System
- Triple Ram Press
- Header Jib
- Pneumatic System
- Lift Devices
- Demoulding/Strip Assist System

6.1 General Maintenance and Service

Due to the severe vibration involved in a vibration product machine, the machine operator should be trained to keep an eye open for vibration damage. This will include loose bolts, rubbing rubber cords or hoses, and any metal-to-metal contact. Periodically, check to be sure that all nuts on bolts are tight, all cotter pins are spread, and all hair pins are in place.

Lubricate all moving parts and pivot points. All parts should work smoothly. Make sure grease fittings are firmly installed and free of dirt before lubricating.

After the daily operation of the machine, clean up the machine as mentioned in ***Machine Clean Up Instructions***.

Guidelines for Tightening Bolt Connections

TORQUE CHART

AFINITAS

May 2017

IMPERIAL

COARSE THREAD		TIGHTENING TORQUE (FT-LB)					
Bolt Size	threads per inch	HHCS, GR5		HHCS, GR8		SHCS	
		lubed	dry	lubed	dry	lubed	dry
#10	24	2.7	3.5	3.7	5.0	4.4	5.8
1/4	20	6.3	8.5	8.9	12	10	14
5/16	18	13	17	18	25	22	29
3/8	16	23	31	33	44	38	51
7/16	14	37	49	52	70	61	81
1/2	13	57	75	80	106	93	124
5/8	11	113	150	159	212	179	238
3/4	10	200	267	282	376	317	423
7/8	9	322	429	455	606	511	682
1	8	483	644	681	909	767	1022
1 1/8	7	596	794	966	1288	1087	1449
1 1/4	7	840	1121	1363	1817	1533	2044
1 1/2	6	1462	1950	2371	3162	2668	3557
FINE THREAD		TIGHTENING TORQUE (FT-LB)					
Bolt Size	threads per inch	HHCS, GR5		HHCS, GR8		SHCS	
		lubed	dry	lubed	dry	lubed	dry
#10	32	3.0	4.0	4.3	5.7	5.0	6.6
1/4	28	7.2	9.7	10.2	14	12	16
5/16	24	14	19	20	27	24	32
3/8	24	26	35	37	49	43	58
7/16	20	41	55	58	78	68	91
1/2	20	64	85	90	120	105	140
5/8	18	127	170	180	240	202	270
3/4	16	223	297	315	420	354	472
7/8	14	355	474	502	669	564	752
1	14	542	722	765	1020	860	1147
1 1/8	12	668	890	1083	1444	1218	1625
1 1/4	12	930	1241	1509	2012	1697	2263
1 1/2	12	1645	2194	2668	3557	3001	4002

METRIC

COARSE THREAD		TIGHTENING TORQUE (FT-LB)					
Bolt Size	thread pitch	HHCS, 8.8		HHCS, 10.9		SHCS, 12.9	
		lubed	dry	lubed	dry	lubed	dry
M5	0.8	3.4	4.6	4.9	6.5	5.7	7.6
M6	1.0	5.8	7.7	8.3	11.1	9.7	13
M8	1.25	14	19	20	27	24	31
M10	1.5	28	37	40	53	47	62
M12	1.75	49	65	70	93	81	109
M14	2.0	78	104	111	148	130	173
M16	2.0	121	161	173	230	202	269
M18	2.5	172	230	239	318	279	372
M20	2.5	244	325	337	450	394	525
M24	3.0	421	562	583	777	681	908
M30	3.5	837	1116	1158	1544	1354	1805
M33	3.5	1139	1519	1576	2102	1842	2456
M36	4.0	1464	1952	2025	2700	2366	3155

lubed and dry refers to condition of threads, use lubed condition whenever any oil or loc-tite is present on bolt or nut/tap threads.

Engr. notes: lubed, K=0.15; dry, K=0.2; target bolt stress = 75% proof stress

Bolt Connections Quality 8.8

All bolted connections, particularly on vibration table and mould equipment, should be tightened with a torque wrench. Use torque from list below.

Maximum torque in Nm for electroplated, oiled bolts, quality 8.8:

Dimension	Torque
M8 x 1,25	21 Nm
M10 x 1,5	41 Nm
M12 x 1,75	71 Nm
M16 x 2,0	177 Nm
M20 x 2,5	346 Nm
M24 x 3,0	598 Nm
M30 x 3,0	1.190 Nm

Hydraulic Connections

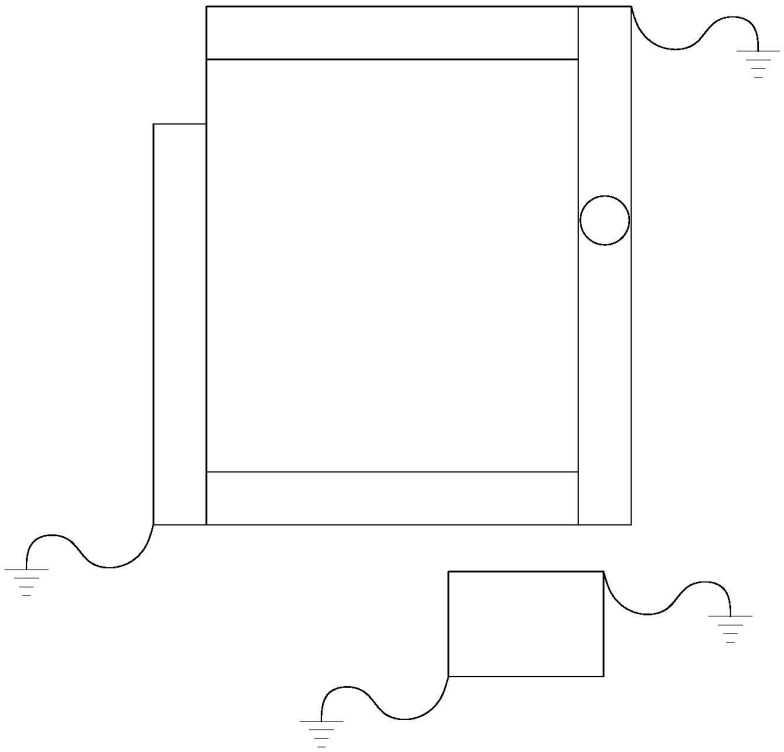
Tube	Thread	Torque	Thread	Torque	Series
6 mm	G1/8”	25 Nm	M10x1	25 Nm	
8 mm	G1/4”	50 Nm	M12x1.5	30 Nm	
10 mm	G1/4”	50 Nm	M14x1.5	50 Nm	
12 mm	G3/8”	80 Nm	M16x1.5	80 Nm	
15 mm	G1/2”	160 Nm	M18x1.5	90 Nm	L
18 mm	G1/2”	105 Nm	M22x1.5	160 Nm	Light
22 mm	G3/4”	220 Nm	M26x1.5	285 Nm	
32 mm	G1”	370 Nm	M33x2	425 Nm	
35 mm	G11/4”	600 Nm	M42x2	600 Nm	
42 mm	G1½”	800 Nm	M48x2	800 Nm	
6 mm	G1/4”	60 Nm	M12x1.5	35 Nm	
8 mm	G1/4”	60 Nm	M14x1.5	60 Nm	
10 mm	G3/8”	110 Nm	M16x1.5	95 Nm	
12 mm	G3/8”	110 Nm	M18x1.5	120 Nm	
15 mm	G1/2”	170 Nm	M20x1.5	170 Nm	S
18 mm	G1/2”	140 Nm	M22x1.5	190 Nm	Heavy
22 mm	G3/4”	320 Nm	M27x2 3	20 Nm	
32 mm	G1”	380 Nm	M33x2	500 Nm	
35 mm	G11/4”	600 Nm	M42x2	600 Nm	
42 mm	G1½”	800 Nm	M48x2	80 Nm	

Electrical System Maintenance

***Periodically*-**Check the electrical cords for wear or abrasion. Replace cords as required.

The **SS CAP 72 Machine's** vibration system has been wired to permit counter-rotation of vibrators when connected to the correct machine receptacle outlet. When it becomes necessary to make repairs to the machine's electrical system it is very important to make sure the polarity of the receptacle outlets and vibrators are correct. Refer to ***Vibrator Care*** for details.

WARNING: Machine frame and hydraulic unit frame must be properly grounded to avoid damage to equipment and/or serious personal injury or death. Before operating equipment, check to be certain that the machine frame and hydraulic unit frame are properly grounded. See *Figure 1* for details.



Local or National Code should govern how machine is to be grounded. However, machine should have a minimum ground protection of that shown below.

Machine Frame and Hydraulic Unit Frame each should be grounded to Building Ground, or to a minimum of two (2) Grounding Rods having not more than ten (10) ohms resistance each. Grounding Conductor to be not less than #6 copper to Rods. Use #3 copper. if over 50 hp.

Electrical – Machine Frame Grounding

Figure 1

Lubrication & Service

This section of your manual also describes adjustments and services that you can perform to keep your machine running smoothly. Read and follow the instructions of these service sheets because they explain how to service and maintain these components.

WARNING! Before maintaining or servicing any component on this machine, disconnect the electrical source at the machine main disconnect switch and lock-out to avoid accidental startup.

Break-In

The break-in period is vitally important to the long life and satisfactory performance of your machine. During this period, follow these instructions.

Nuts and Bolts

After the First Week of Operation-all bolts and nuts should be checked for tightness. The bolts at all splices, bearings, etc. should all be checked.

Vibrator Mounting Bolts

Follow closely the bolt tightening instructions in ***Mounting Vibrators to the PipePlus Form Jacket*** and ***Installing Vibrators to Core***. To avoid vibrator damage, it is important that the vibrator bolts are closely monitored during the break-in period for tightness.

Electrical Wires

After several hours of operation, check the electrical cords for early signs of abrasion. If cords are rubbing against metal surfaces, etc., reposition cords as required.

Hydraulic Hoses

After several hours of operation, check the hydraulic hoses for early signs of abrasion. If the hoses are rubbing against metal surfaces, etc., reposition the hoses as required.

Hydraulic Unit Filter

After the First Week of Operation-the filter on the hydraulic unit should be changed. Remove original filter and replace with the replacement filter furnished. Thereafter, replace the filter every six months.

Lubrication

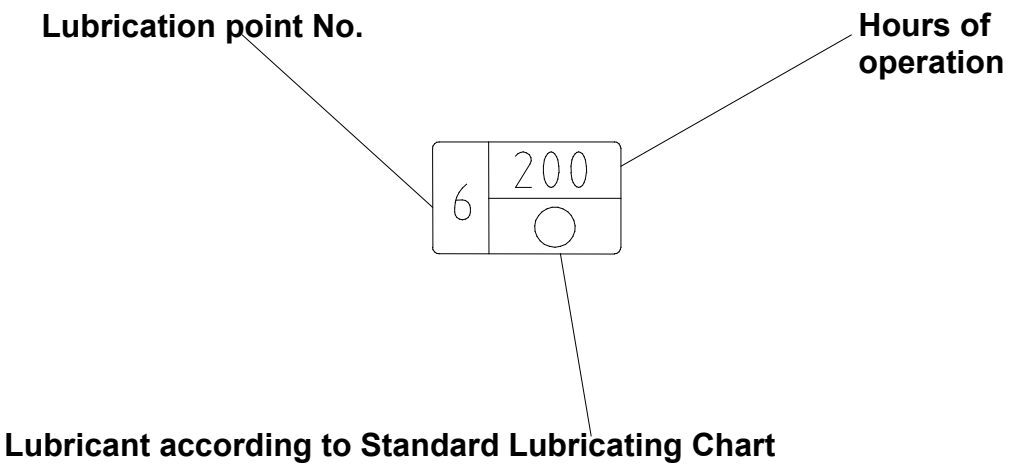
When lubricating the machine, the main switch is to be switched off and locked with a padlock, and the key is to be kept by the person carrying out the work.

Further safety directions in connection with lubrication can be found in the Safety section.

The machine is to be lubricated or service is to be carried out in accordance with the intervals stated on the following charts of lubrication points.

Only types of oil and grease stated on the Afinitas Standard Lubricating Chart (see next page) or similar must be used.

The lubrication points are stated as follows:



AFINITAS

Standard Lubrication Chart

No.	Symbol	Application	KUWAIT PETROLEUM	TEXACO CALTEX	CHEVRON	MOBIL EXXON	SHELL	ELF	BP AMOCO	CASTROL	FINA	ARAL
1		HYDRAULIC PLANTS	Handel 46	Rando Oil HDZ LT 46	Rykom Premium Oil 46	DTE 15M	Tellus Oil TX 46	Hydrelf DS 46	Bartran HV 46	Hyspin AWH - M 46	Hydran TSX 46	Vitam HF 46
2		HYDRODYNAMIC COUPLINGS	Handel 15	Rando Oil HDZ LT 15	Rykom Premium Oil 15	DTE 11M	Tellus Oil T 15	Hydrelf DS 15	Bartran HV 15	Hyspin AWH - M 15	Hydran TSX 15	Vitamol ZH-M
3		BEARERS-COLUMNS-CHAINS	Wagner 68	Way Lubricant X 68	Way Oil Vistac 68	Vactra Oil No. 2	Tonna Oil S 68	Moglia 68	Maccurat 68 D	Magna Glide D68	Hydran G 68	Deganit BWX 68
4		CLOSED TOOTHED GEARINGS	Goya 320	Meropa 320	Gear Compound EP 320	Mobilgear 632	Omala Oil 320	Reductelf SP 320	Energol GR-XP 320	Alpha SP 320	Giran 320	Degol BG 320
5		AIR VIBRATORS	Chopin 46	Aries XLX 32	Rock Drill Oil Vistac 32	Almo 525	Torcula Oil 32	Perfora 46	Energol RD-E 46	Kilfrost 400	Finaroc 32 W	Vitam DE 46
6		MOULD OIL FOR PALLET SPRAYER	da Vinci C	Texaform PR 5	Form Oil 22	Formoil 6803	Form 5	Carol BF 17	Energol CM 55 DK	Ms form 1000		Granitol C
7		OIL LUBRICATED COREVIBRATORS (alt. mix 45% 32 cSt. and 55% 68 cSt.)	Schumann 46	Cetus PAO 46	Tegra Oil 46	Mobil SHC 625	Corena AS 46	Reductelf Synthese 46	Enersyn RC-S 46	Alphasyn T 46	Eolan SPO 46	Motanol SPA 46
8		OIL LUBRICATED BOX VIBRATORS	Schumann 100	Cetus DE 100	Tegra Oil 100	Mobil SHC 627	Omala 100	Reductelf Synthese 100	Enersyn RC-S 100	Alphasyn T 100	Eolan SPO 100	Motanol SPA 100
9		GREASE LUBRICATED VIBRATORS AND ROLLER BEARINGS EXPOSED TO HEAVY CHOCK LOADS	Rembrandt EP 2	StarPlex EP 2	Dura-Lith Grease EP 2	Mobilux EP 2	Retinax EP2	Epexelf 2	Energrease LS-EP 2	Castrol LMX	Lical EP 2	Aralub HLP 2
10		OPEN SLIDING SURFACES GREASE WITH GREAT ADHERSION	Rembrandt Moly	Molytex EP 2	Ultra Duty Grease EP 2	Mobiltac 81	Retinax LX	Epexelf Mo2	MOG 222	Molymax	Marson LM 32 N	Radlagerfett
11		GREASE LUBRICATED GEARS AND GEAR MOTORS	Rubens 00	Martak 00	Dura-Lith Grease EP 00	Glygoyle Grease 00	Gatrebelt H	Multimotive 2	Energrease FG 00-EP	Gear Grease EP 00	Marson ZS	Fließfett N
12		LUBRICANT WITH GREAT ADHERENCE FOR OPEN PINIONS	Giotto	Texclad Premium 2	Open Gear Grease	Mobiltac 81	Malleus Fluid GL 95	Cardrexa GR2	MOG 222	Grippa 355	Cerran EP	Mehrzweckfett F

Revideret: 18.01.2011 / JKR

Lubricant Selection

This section gives more details on the type of lubricants that should be used to service **Afinitas** equipment. Specific examples of lubricants are listed for reference only. Many other brands and types of lubricants exist that are equivalent or perhaps even superior to the lubricants listed. Work with your local lubricant supplier to finalize lubricant selection.

Rolling Bearing Grease

Rolling bearing grease is specified for components with enclosed rolling elements such as ball bearings and linear rail bearings. The grease should have the following characteristics:

- NGLI No. 2 consistency
- Lithium based
- EP additives (not solid lubricants)

It is not recommended that grease for ball bearings, roller bearings and linear bearings contain solid lubricants such as graphite or molybdenum disulfide particles. These additives can interfere with the rolling action of the rolling elements.

Molydisulfide Grease

This grease contains Molybdenum Disulfide solid lubricant particles and provides extra protection for slowly moving, heavily loaded metal to metal sliding or pivoting contact. Molydisulfide grease should have the following characteristics:

- NGLI No. 2 consistency
- Lithium based
- At least 3% Molybdenum Disulfide

SAE 30 Chain Oil

SAE 30 refers to the viscosity grade of the oil. The ISO equivalent of SAE 30 is ISO 100. Do not use motor oil.

Gearbox Oil

Oil in gearbox will be as shown on lubrication pictorials and oil charts within the Lube and Maintenance portions of this manual.

Open Gear Lubricant

Lubricant should:

- Be labeled as an open gear lubricant
- Be rated for extreme pressure
- Contain Molybdenum Disulfide

Alternatively, a dry film Molybdenum Disulfide Spray Lubricant can be used for open gears and racks such as:

- DOW D-321R Molykote
- Kluber UNIMOLY C 220
-

7 Hydraulics

SS CAP 72 Machine

Machine Serial No. CP-430

Notes

7.1 Hydraulic System Operation

The **SS CAP 72 Machine is** powered by hydraulic motors and cylinders. High pressure oil is introduced into the machine's closed-centered system with a pressure compensated piston pump. The pump maintains a given operating pressure, automatically compensating for the oil volume required at any one time.

WARNING! Before disconnecting any hydraulic line, be sure to relieve all pressure. Replace any hose that shows signs of wear or abrasion. Fluid escaping from a small hole can be almost invisible. Do not check for any oil leaks with your hand. Use a piece of wood, etc. If injured by an oil leak, consult a doctor immediately. Oil that penetrates the skin can cause serious infection if proper medical treatment is not performed.

IMPORTANT: The hydraulic system is of simple and dependable design. The maintenance procedures described in *Hydraulic Power Unit Maintenance* must be followed to ensure years of dependable service.

IMPORTANT: It is critical that the hydraulic oil in the unit's reservoir be at a temperature of 50° F (10° C) before attempting to start the unit each time. Starting the unit with oil at less than 50° F may result in the failure of the hydraulic pump.

Initial Startup Procedures

The first time the pump is started or whenever repairs are made that require oil to be drained from the unit; proper procedures must be followed to prevent damage to the unit. See ***Starting the Hydraulic Unit***.

Starting the Hydraulic Unit

The hydraulic unit is controlled at the operator's console. Pull out the "emergency stop" button to start the hydraulic pump. To stop the pump, depress the emergency stop button. The normal operating pressure of this system is 1500 PSI.

The normal temperature of the oil in the hydraulic system is 130°F. If the oil temperature should exceed 160°F, stop the hydraulic unit immediately because excess heat is an indicator of a system malfunction. Repair any malfunction before operating the hydraulic unit.

NOTE: The hydraulic unit is equipped with a temperature limit device that will shut down the unit if the oil in the reservoir exceeds 190° F (87.7° C).

System Emergency Pressure

The hydraulic system is designed to provide emergency oil pressure at 2000 PSI (138 bar) if required. Emergency power may be necessary for example, if the conveyor belt would jam and stall with concrete while operating at standard pressure.

To actuate emergency power, depress and hold the ***PRESSURE BOOST*** button located at the operators' console. To return the system pressure back to normal operating pressure, release the button. Avoid prolonged use of the ***PRESSURE BOOST*** button because it may generate excessive heat in the hydraulic system.

Adjusting System Oil Pressure

See ***Adjusting System Oil Pressure*** (pg. 7.12).

Power Trowel/Strip Assist Cylinder

When using the power trowel/strip assist cylinder, the cylinder may use the entire oil volume of the hydraulic system, resulting in the conveyor feed belt stopping. When manufacturing larger diameter pipe which requires greater pressures to raise the strip cylinders, it may be necessary to stop the conveyor belt when actuating the strip cylinder in order to develop the necessary strip cylinder oil pressure.

7.2 Hydraulic Power Unit Maintenance

The information that follows gives instructions on maintenance items that should be performed on the **SS CAP 72 Machine's** hydraulic power unit. Refer to the equipment manufacturer's manual commissioning pages (***Figures 1a-1h***).

Clean fluid is important to service life because pumps and motors depend upon the fluid for internal lubrication. If the fluid becomes contaminated, thoroughly drain the system and clean the reservoir before new fluid is added.

Before starting the hydraulic power unit after servicing, or after a prolonged idle period; it may be necessary to prime the hydraulic pump before starting. See ***Figure 2:*** *Priming Hydraulic Pump*.

WARNING: Before disconnecting any hydraulic line, be sure to relieve all pressure. Replace any hose that shows signs of wear or abrasion. Fluid escaping from a small hole can be almost invisible. Do not check for any oil leaks with your hand. Use a piece of wood, etc. If injured by an oil leak, consult a doctor immediately. Oil that penetrates the skin can cause serious infection if proper medical treatment is not performed.

RA 90 400/05.93

Installation and Start-up of Axial Piston Units

Commissioning

Summary

It is essential to observe the special installation and operating instructions for the components, together with their operating parameters. In addition, we recommend the following information sheets:

- VDI Guidelines for Commissioning and Maintenance of Fluid Hydraulic Systems
- CETOP Recommendations

Check Required Before Filling with Operating Fluid

- Tank cleaned and thoroughly flushed?
- Pipelines cleaned and correctly laid, free of tension?
- Pipe fittings, flanges tightened? (Identify with color marking)
- Pipelines correctly connected in accordance with installation drawing and/or piping diagram?
- Pressure accumulators charged with nitrogen? It is recommended to note the gas pre-load on the accumulator itself (e.g. with a sticker) and on the hydraulic circuit, so that later comparatory checks are possible.
- Coupling between drive motor and pump (or hydraulic motor) correctly assembled and aligned?
- Drive motor correctly connected?
- Filter elements of specified pore size?
- Filter correctly installed in direction of flow?
- Measuring devices necessary for commissioning connected?
- Electrical control and regulating devices - do these have correct voltages and currents?
- Is the seal material compatible with the specified hydraulic fluid?

Hydraulic Fluid

All types of hydraulic fluid on a petroleum base are more or less suitable for use. The exact choice of fluid is determined by its wear and temperature-viscosity characteristics, taking into consideration oxidation and corrosion protection, material compatibility and air/water separation characteristics.

Preferred hydraulic fluids are petroleum based fluids type HL, HLP (HM-SIO) and HV as per DIN 51524, Parts 1 to 3 (see also RA 90 220).

For special fluids and for selection criteria, please see RA 90 223 and RA 90 221.

Tank filled with specified fluid up to max. fluid level mark?

Pump housing/motor housing filled with fluid?

Filter and heat exchanger filled with fluid?

Checks Required After Filling the Tank and Housings with Fluid

- Are isolating valves, particularly in the suction line, fully open?
- Is the direction of rotation of the drive motor the same as that specified for the pump?
  Switch on for short period and test or use starter to run without load.
- Check position of directional valves and if necessary move into required position - bypass without pressure.
- Unlead machine, jack up vehicle, brakes and locks on.
- If a boost/pilot fluid pump is fitted, this should be commissioned first.
- Start motor - run internal combustion engine at idling speed.
- In closed circuits, in order to bleed the main pressure line loosen fitting on motor side if boost is on pump side and conversely loosen fitting on pump side if boost is on motor side.
- Swivel pump approx. 5° and listen for noise. Insofar as this is possible with the control devices fitted, otherwise start at full flow.
- Bleed System.
- Carefully loosen bleed screws or fittings at highest point in system. When the escaping fluid is free of bubbles, filling is complete. Re-tighten fittings.
- Monitor fluid level in tank continuously and if necessary top up.
- Check functions without load, if possible operating manually.
- Before carrying out functional testing of the electro-hydraulic control or automatic operation without load, make sure the Emergency Off function is operating.
- When operating temperature has been reached, put the system under load.
- Check monitoring and measuring devices and compare readings with data given in hydraulic circuit.
- Listen for any unusual noises.
- Check fluid level and if necessary top up.

MANNESMANN REXROTH 21/28

Commissioning

Figure 1a

RA 90 400/05.93

Installation and Start-up of Axial Piston Units

- Check or reset the setting of pressure relief valves by loading or braking the system.

- Check for leakage. Do not tighten any loose fittings immediately - tighten only when the system is not under pressure!

- Switch off drive.

- Tighten all fittings and plugs, even if there is no evidence of leakage. Note: on certain types of non-throttling swivel joints, the screwed section and the plug must be tightened separately.

- Check fluid level.

- Full functional test of the system. Compare measured values with the permissible or required data (pressure, speed, settings of additional control devices).

- Jerky movements indicate the presence of air pockets. A certain amount of these air pockets can be eliminated by swivelling the pump out in one or both directions for a short time with the serviced unit under load or braked. The system is completely bled when all functions can be carried out smoothly and continuously and there is no foaming on the surface of the fluid. In our experience, foaming should have stoped by one hour after start-up at the latest.

- Check temperature.

- Switch off drive.

- Remove filter inserts and inspect for residue.

- Cut open paper cartridges. The presence of dirt indicates a lack of cleanliness in the system.

- Clean filter inserts, replace paper cartridges.

- If further contamination is found in the filters, additional flushing of the system is necessary in order to prevent premature failure of system components.

- Record all settings in an acceptance protocol. This protocol should also form the basis for the inspection and maintenance book which will later be kept. This will record the necessary inspection intervals for the various parts of the system and what variations are found from the data recorded during commissioning.

Beginning of operations at low temperatures

The already established steps for the beginning of operations are still valid at low temperatures, but the following facts are to be noted:

- For all variable displacement units in operation at full power, the borderline temperature is
  maximal t = -13° F (-25° C)
  Lower temperatures require special measures.

- Borderline viscosity without compressive load but with less than 30% displacement

$$v_{cold\,1} \leq 23{,}175 \text{ SUS } (5000 \text{ mm}^2/\text{s})$$

- Borderline viscosity without compressive load but with less than 30% displacement

$$v_{cold\,2} \leq 11{,}588 \text{ SUS } (2500 \text{ mm}^2/\text{s})$$

- Borderline viscosity with full pressure and displacement loads, temporary

$$v_{cold\,3} \leq 4{,}640 \text{ SUS } (1000 \text{ mm}^2/\text{s})$$

It must usually be verified that the optimal operation viscosity is reached at the self-establishing operating temperature, after the start phase and after a run-through of the above viscosity.

$$v_{opt.} = 167 \text{ to } 75 \text{ SUS } (36 \text{ to } 16 \text{ mm}^2/\text{s})$$

Notes:

- The filling of the unit is not practically possible equal to or higher than = 13,905 SUS (3000 mm²/sec.); then the fluid does not flow through the bearings. In this case, the power unit and machinery materials must be heated. The power unit may not re-empty during installation; this makes the prefilling of the S and T pipelines necessary.
  Another possibility is to fill the cold unit with a low-viscosity pressure fluid. Then it is necessary to test if the new mixed viscosity satisfies the requirements and if the two fluids are miscible.

- In cases where the drive comes from internal combustion machines (ICM), it is noteworthy that, with separate preheating for a reduction in the cold-start phase, the hydraulics must also be preheated; or appropriate equipment guarantees a viscosity-dependent start of operation.
  Since the ICM rapidly runs through the cold-start phase, the operators get the impression that the hydraulics too are warm and capable of being loaded. But the limiting viscosity, which does not permit a load, still lies ahead.
  The commonly practiced method of heating cold hydraulics through pressure limit valves, is unreliable due to disadvantages associated with it!

Flushing and Clealiness Grades

Summary

We recommend that flushing of the system be carried out before every commissioning of a new system, or following repairs.
Flushing should also be carried out if there are indications of contamination in the system.
The pore size of the flushing filter should match that of the hydraulic system, but should nevertheless correspond to a

Commissioning

Figure 1b

Installation and Start-up of Axial Piston Units

value of β_{30} - 100. Flushing filters should have no bypass valve, but should be equipped with a clogging indicator.
The flushing filter inserts should be pressure resistant. We recommend the use of 2 filters - a coarse, cleanable metal fiber filter being installed before the actual fine filter with disposable paper cartridge.

Separate Pump and Filter Station

This station is also used to fill the system. It is portable and therefore suitable for use wherever required. After flushing, with valves in neutral position, operate all serviced units and components under zero pressure. Finally, inspect filters; the system can now be connected ready for operation.
Note:
Protect against overload with motor protection switch. Compare pressure for operation without load with permissible pressure of components installed in the filter station. For closed circuits, the filter station is only suitable for filling the system and components.

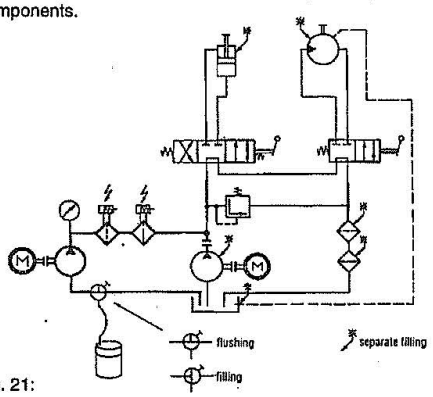
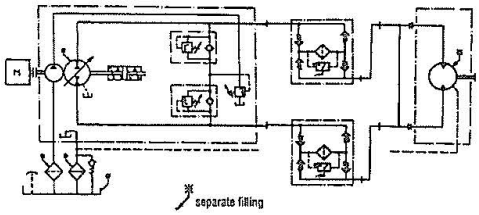


Fig. 21:

Flushing in Bypass Circuit

Serviced units such as hydraulic motors and cylinders are by means of a filter combination and should if possible be operated at low speed and without load.
This will prevent damage by dirt particles, until these are completely filtered out, as can occur at high speeds and high pressures.
The reversal of the flow direction for the filters is compensated by the rectifier plate.
This circuit should also be used for closed hydraulic circuits.

For closed circuit (Fig. 22:)



For open circuit

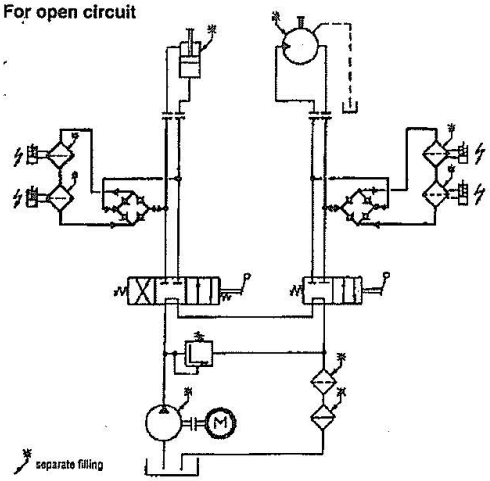


Fig. 23:

Flushing with Filter Combination

The system filter in a completed system is replaced by a filter combination, which is either removed again after flushing or can remain in place for a longer period.

Note:
This flushing circuit is only suitable for open circuits and is only worthwhile if the flushing filters are finer than the system filter.

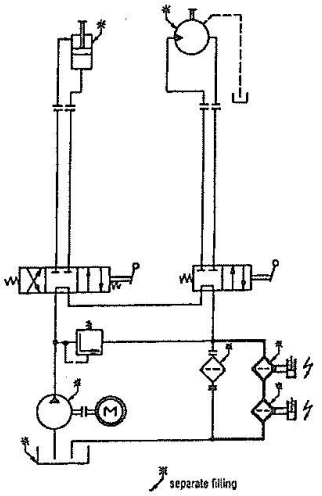


Fig. 24:

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Figure 1c

RA 90 400/05.93

Installation and Start-up of Axial Piston Units

Cleanliness Grades

	ISO/ DIS	NAS	SAE
Standard	4406	1638	
Grade	18/ 15	9	6

In order to achieve these values, filters should normally have a minimum ß-value of:

$$ß_{30} = 100$$

To SAE, ASTM, AIA
e.g. to SAE:

Micron	Grade						
0	1	2	3	4	5	6	
5 - 10	2.700	4.600	9.700	24.000	32.000	87.000	128.000
10 - 25	670	1.340	2.680	5.360	10.700	21.400	42.000
25 - 50	93	210	380	780	1.510	3.130	6.500
50 -100	16	28	56	110	225	430	1.000
> 100	1	3	5	11	21	41	92

Inspection, Maintenance and Trouble Shooting

Inspection

Summary

Any defects or abnormalities noticed by operating personnel must be rectified immediately, their cause sought and effectively eliminated. Those inspection points not already being continuously monitored should be checked daily immediately after commissioning. Findings should be recorded in an inspection book. Longer inspection intervals (e.g. weekly or monthly) can then be introduced as required. Signalling devices at automatically monitored inspection points should be checked monthly.

Inspection Points

- Loose pipe connections or component fixings
- External leakage
- Abnormal noises and vibration
- Functional deficiencies, e.g. drop in torque or speed and drop in pressure or flow
- Contamination of filters (filter clogging indicator only correct when system is at operating temperature)
- External contamination and damage, particularly on air/fluid heat exchangers
- Check accumulator charging pressure in line with manufacturer's instructions (annually)
- Rusting of inside of tank
- Water separation following long periods of inoperation
- Foaming in tank
- The hydraulic fluid:
  In our experience, inspection of the hydraulic fluid is an area subject to many errors and neglect. Nevertheless, the condition of the hydraulics can be quickly and reliably assessed from the condition of the hydraulic fluid. Because of its importance, and in order to give a few pointers, the inspection of the hydraulic fluid is described in greater detail below.

Inspection of the Hydraulic Fluid

The hydraulic fluid is one of the most important components of a hydraulic system and fulfills a number of duties. In addition to the known inspection points, such as:

- Level in tank
- Discoloration (milky, dark, foaming)
- Temperature in tank

which must be continuously monitored, additional checks are necessary.

In particular, evaluation of the hydrauic fluid in the system and the changes undergone since new allows irregularities in the hydraulics - the cause of future machine damage - to be identified at an early stage. Laboratory tests are especially recommended because of their highly reliable findings. The cost involved is usually quickly recouped by lengthened fluid change intervals.

If operating temperature falls below the minimum permissible value (viscosity limits), pre-warming of the fluid is necessary. During this, make sure that the fluid is being circulated, since the thermal movement of the fluid is not sufficient (fire risk). It is recommended to warm up the system when starting at minimum operating temperature. This is carried out by operating the system under low load conditions. Speeds should be no higher than the medium range.

Inspection Methods and Intervals

Initially, proceed in accordance with the following guidelines. Thereafter the optimum intervals for testing the hydraulic fluid can be determined by the laboratory.

Less than	13 gallons: (50 liters)	Change according to maintenance instructions.
	13 - 66 gallons: (50 - 250 liters)	Bi-annually; evaluation by sight and odor as described on page 2.
	132 gallons: (500 liters)	Annual inspection in laboratory.

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Figure 1d

RA 90 400/05.93

Installation and Start-up of Axial Piston Units

Visual and Odor Testing of Hydraulic Fluids on Petroleum Fluid Base

	Findings	Action
Color	Slight darkening without bottom sediment	None. Fluid darkens with use.
	Pronounced darkening with bottom sediment	Filter fluid, on large systems follow up with laboratory test.
	Cloudiness	See next section.
Contamination by foreign matter	Clean and clear, no sediment.	None.
	Clean and clear, small amount of sediment	Shorten test intervals.
	Floating contamination (clouding) or deposited contamination	Filter fluid, clean system. Inspect system filter - residue found usually gives better indication of cause. On large systems follow up with laboratory test.
Water in Fluid	Clouding (emulsion) visible water separation	Detect water by a spatter test. Drain off water deposists. Separate or change fluid. HLPD or HD engine fluids bond a small percentage of water without danger. However, shorter inspection intervals are then necessary to monitor the water content.
Foaming	Increased foaming Foam escaping from tank	Check airtightness of suction line and fluid level in tank.
Odor	Odor of scorched fluid	Normally no cause for concern. If occurring in conjuction with other changes (build-up of residue and pronounced darkening), see foregoing sections.
	Sour odor (with darkening and bottom sediment)	Immediate fluid change and cleaning of system.

Seek out the cause of the problem and eliminate!

Visual and Odor Testing of Fire-Resistant Fluids

	Findings	Action
HFA	Foul smell, brown discoloration	Measure pH value with litmus paper; add biozide or change fluid. Cleaning of system with systematic cleaner may be necessary.
	Emulsifying or fluid separation	Laboratory inspection Where there is fluid separation or penetration of foriegn fluid, remove fluid layer.
	Floating or deposited contamination	Change fluid or clean. Where large volumes are involved, carry out laboratory tests.
	Foaming	Add foam dispersant or harder water.
HFC	Clear change in color or appearance of fresh fluid	Laboratory test
	Water content	Continuous laboratory tests - important!
	Foaming	Laboratory test; consult with supplier and add suitable foam dispersant.
	Water on surface, clouding	Remove water, if in doubt carry out laboratory test.
HFD	Layer of fluid on surface	Remove fluid, if necessary change fluid (impaired fire-resistance properties.)
	Floating/deposited contamination	Clean fluid, check filters. If heavy contamination is found, laboratory test.
	Foaming	Consult supplier.
	Smell of disinifectant	Immediate laboratory test (ageing).

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Figure 1e

RA 90 400/05.93

Installation and Start-up of Axial Piston Units

Instructions on Taking Fluid Sample

- The fluid sample must be taken while the system is running and at operating temperature.
- Equipment and containers used must be absolutely clean. Many laboratories supply their own hermetically sealed sample containers.
- Samples should be taken via valves provided for the purpose on the tank or return line. If using a siphon, take sample near the pump suction inlet. Samples taken near the tank floor or the drain plug will give a false picture due to dirt, mud or water.
- Evaluate by sight and smell in tapered sedimentation tubes.
- Laboratory samples should be taken in accordance with their instructions.

In addition to the results of your own evaluation, the machine running time and the volume and type of any top-up fluid should be recorded.
1/4 gallon (1 liter) of fluid is normally required for laboratory tests, less for »sight and odor« testing.

Maintenance

Summary

Our products require no routine maintenance. Maintenance work is therefore confined to the care of the fluid and changing of filters. Maintenance intervals vary from system to system and depend on operating and application conditions.
In our experience, up to 80% of faults and damage occurring in hydraulic fluid systems can be attributed to wrong choice of fluid or inadequate servicing of the fluid.
In the following, this point has therefore been given particular attention.
Naturally, the separate instructions of both the machine and the fluid manufacturers must also be observed in the same way.

Maintenance of Hydraulic Fluid

- Top up fluid to required level via filter (continuously; filter of same pore size as system filter).
- After long shutdown periods drain off water deposits (in the morning).
- Additional maintenance of fluids by secondary flow filtration with portable filter station.
- When the fluid is not continuously monitored, change every 1000 - 5000 operating hours, or at least once a year or as indicated by laboratory tests.
  In systems with a high thermal loading, shorter fluid change intervals are desirable.
- Winter/Summer operation must be taken into consideration if the fluid used is not capable of bridging both temperature ranges while still ensuring that the optimum operating viscosity at operating temperature is obtained.
- Clean fluid tank at every fluid change.
- Refill only via filter. The filter pore size must be at least as fine as that of the system filter. To reduce filling time, hand or electrically operated portable pump/filter stations are recommended.

Maintenance of Fluid Filter

- Always change filter insert following start-up. We recommend the use of paper filters for commissioning, which can then be cut open and will give a good indication of the cleanliness of the system. In doubtful cases, flush the system.
- If the filters are not continuously monitored, change the insert every 500 operating hours. Paper inserts cannot be cleaned. Metal fiber elements only to a limited extent, by the manufacturer.
- With continously monitored filters, the inserts should be changed immediately after the first warning signal when the system is at operating temperature.
- After removal, the inserts should be thoroughly inspected. If an abnormal amount of dirt is found, the cause must be sought. In such cases, the inspection interval must always be shortened. If in doubt, flush the system.
- A supply of filter inserts should be kept at the machine in their original packaging to protect from dirt.

Maintenance of Air Filter

- As a general rule, carry out maintenance at the same time as the fluid filter.
- A particularly dusty or damp environment can mean shorter maintenance intervals or re-location of the filter.
- The pore size of the filter insert must be the same as that of the fluid filter.

Maintenance of the Heat Exchanger

- Water/fluid heat exchangers normally require no routine maintenance, however the manufacturer's instructions should be observed.
- Air/fluid heat exchangers - at the time of changing the filter element, the air side should be thoroughly cleaned. Under particularly dusty conditions (harvesting machines), daily cleaning may be necessary.

Additional Maintenance Points

- Check gas charge of pressure accumulator and if necessary top up.
- Replace wear parts (seals, hoses).
- Lubricate all points requiring hand lubrication according to instructions (universal drive shafts, plug connections).

Commissioning

Figure 1f

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Installation and Start-up of Axial Piston Units

Notes:
- Water deposits in the tank causes the fluid level to rise and gives a misleadingly high fluid level.
- Mark fluid type used on tank with sticker.
- Escaping leakage fluid is always dirty and must not be returned to the tank.
- If repairs or modifications are carried out in the system, flushing and filter inspection must be carried out again as described for initial commissioning.
- For transport over long distances, sea voyages, storage, etc., the units must be conserved.
- Hydraulic systems, even when already commissioned, must be protected against corrosion when shut down for long periods.
- When re-commissioned, all preservative materials must be carefully removed, and inspection and maintenance initially carried out twice as frequently as previously.
- Additional notes on systems using special fluids are to be found in our data sheet RA 90 223, or the publications of the fluid manufacturer.

Troubleshooting

Summary

Troubleshooting is described here in general terms. Special instructions for individual products are described in their relevant operating instructions. Particular emphasis is placed on the central importance of the hydraulic fluid in a hydraulic system. The notes given here apply to hydraulic fluids on a petroleum base, but can also be applied in principle to other fluids.

Causes of Dirty Fluid

Solid contamination particles in the fluid are the cause of most damage in fluid hydraulic systems.
They can cause spontaneous failures, but in most cases cause gradual wear, leading to reduced power and efficiency and consequent machine breakdowns and repairs. If inspection of the fluid shows the dirt content to be too high, then the following are possible causes:

- Inadequate or neglected system cleaning and flushing prior to commissioning and following repairs.
- Dirty transport conditions; unsuitable storage areas.
- Fluid change not carried out.
- Dirty service equipment.
- Absence of, or too coarse, clogged or defective filter inserts.
- Air filter on hydraulic fluid tank too coarse.
- Hydraulic fluid tank not airtight (pipe inlets not airtight, cleaning openings, etc.)
- Metal or seal wear particles from pumps, motors, valves or cylinders.
- Rust particles from tank lid.
- Ingress of dirt via faulty seals (wiper rings on cylinders).
- Leakage fluid returned to tank.

Causes of Water in Hydraulic Fluid

Water entering the hydraulic fluid encourages wear, contamination and corrosion of the system, changes the properties of the ffluid and can thus lead to faults in the system. Possible causes of abnormally high water content in hydraulic fluids are:

- Ingress of watery cutting fluid.
- Penetration of rain or cleaning water.
- Condensation as a result of temperature fluctuations and/or fluctuating fluid volume in the tank.
- Leaking heat exchanger.
- Failure to drain off deposited water from the hydraulic fluid tank at regular intervals.

Causes of Air Bubbles in the Fluid

Air bubbles contained in the fluid can cause irritating noise (cavitation), malfunctions and damage to the system. The following are the main causes for the formation and retention of air bubbles in the fluid:

- Wrong choice of fluid or dirty fluid.
- Hydraulic fluid tank too small or of wrong design (fluid life too short, turbulence of fluid returning to tank and being resucked).
- Negative pressure areas not airtight (e.g. suction lines, pumps, throttle valves).
- Formation of air bubbles as a result of pressure drop (e.g. due to sharp pipe bends, kinks in hoses).
- Inadequate bleeding of system (during initial commissioning; following repairs).
- Sieves or filters before suction line too fine.

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Figure 1g

RA 90 400/05.93

Installation and Start-up of Axial Piston Units

Causes of Surface Foaming in Hydraulic Fluid

Surface foaming can result in foam being sucked in through the pump or foam escaping from the fluid tank. The following are the main causes of excessive surface foaming:

- Excessive contamination of the fluid (dirt, water, ageing products, conservation materials, solvents, etc.)
- Unsuitable tank design.
- Circulating speed too high.
- Absence of, or ineffective baffle plate.

Causes of Abnormally High External Leakage

Leakage losses frequently call for larger top-up volumes than a complete fluid change. Leakage losses are expensive: 1 leakage point leaking one drop per every 5 seconds causes an annual loss of approximately 200 liters of hydraulic fluid, not to mention the associated environmental damage.
Frequent causes of escaping fluid are:

- Leakage from pipe connections on components.
- Inadequate inspection and maintenance of system.
- Faulty cylinder and shaft seals.
- Inaccessible pipe connections (make the finding and elimination of leakages more difficult).
- Faulty hoses.
- Absence of seal protection (e.g. wipers, bellows, protective cover) at points at risk from dirt or metal chips.

Causes of Overheating of the Fluid

As a rule, the fluid temperature in the hydraulic fluid tank should not exceed 194° F (90° C).
Too high fluid temperatures shorten the life of the hydraulic fluid, seals and hoses.
They encourage the formation of residue and increase wear.
Possible causes of excessive fluid temperatures are:

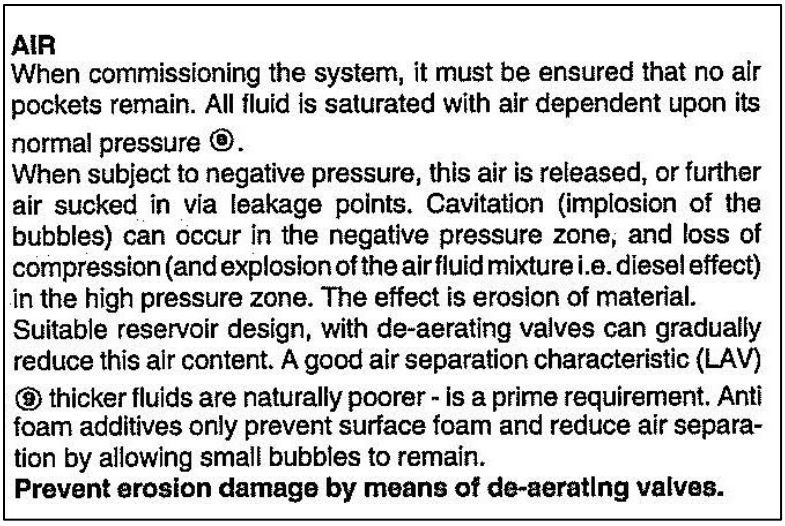
- Pump flow too large (excessive throttling).
- Hydraulic fluid tank too small or of unsuitable design.
- Cooler not fitted, too small, incorrectly set, dirty, or cooler bypass valve open.
- Pipes undersized.
- Pressure relief valve incorrectly set, dirty or defective, pressure regulator (pressure cut-off) set above the setting of the safety valve.
- Heating due to external influences (sunshine, furances, high ambient temperatures, faulty air-conditioning).
- Air in fluid (compression heat).
- Fluid level too low.
- Metal or seal wear on pumps, valves, motors or cylinders.
- If fluid used is of wrong viscosity, this can lead to thermal overloading. In this event, overheating is not confined to the tank, but can also occur in the individual units.

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Commissioning

Figure 1h



Priming Hydraulic Pump

Figure 2

As Required

Inspecting Hydraulic Fluid Strainer Elements

Periodically-Check the strainer elements and clean if necessary. The strainer is attached to the pump intake line and is immersed in the oil reservoir tank.

To remove strainer elements, drain the oil from the tank and remove the end cap from the supply tank to gain access to the strainer elements.

Checking Hydraulic Connections

Periodically-Check all the hydraulic connections to make sure they are tight, but not to the point of distortion, so that the air is excluded from the system.

Electric Motor Lubrication

The electric motor furnished with your power unit is equipped with ball bearings having sufficient grease to last indefinitely under normal service. Under wet, dirty, or corrosive conditions, it may be necessary to add oil.

Clean Hydraulic Unit Motor of Dirt

Periodically-Inspect the hydraulic unit's electric motor for dirt accumulation. Clean as required. Keep the ventilation openings clear to allow free passage of air.

Check Oil Reservoir Fluid Level

Daily-Check the fluid level of the oil reservoir tank. Add oil, if necessary. Refer to ***Figure 5*** for recommendations on oil types, etc. that should be used with the hydraulic system.

To add oil to the hydraulic system, remove the filler/ breather cap from the reservoir tank top. All hydraulic fluid added to the system should be filtered through a 25-micron filter. The use of cloth for straining oil should be avoided to prevent lint from getting into the system.

Replacing Hydraulic Return Line Filter

***After the First Week of Operation*-**The hydraulic return line filter should be changed.

***Every Six Months*-**The filter should be changed after each 6 months or 1,000 hours of operation.

Initial Startup Procedures

The first time the pump is started or whenever repairs are made that requires oil to be drained from the unit, perform the following startup procedures:

1. Fill pump's case drain with oil.
2. Verify that pump is rotating in correct direction.
3. Bump or jog electric motor to prime pump.
4. Reduce pump pressure at normal operating pressure adjustment valve (Rotate counter-clockwise) before starting pump. Slowly increase pressure to operating pressure after pump has started.

Adjusting System Oil Pressure

Under normal operating conditions, 1500 PSI oil pressure is adequate for operating the **SS CAP 72 Machine**. If for any reason the normal operating pressure needs an adjustment, follow the instructions below.

1. Close all valves on the pipe machine so oil is not circulating in the system and make sure the *High Power* pushbutton is not actuated.
2. Locate normal operating pressure adjustment valve on hydraulic power unit. See ***Figure 3***. Loosen jam nut on valve stem and rotate stem with an Allen wrench.
   - Rotate stem clockwise (inward) to increase pressure.
   - Rotate stem counter-clockwise (outward) to decrease pressure.
3. After pressure is adjusted to desired setting, tighten jam nut on stem.

IMPORTANT: Do not use safety relief valve as a means to adjust oil pressure. This valve is for safety relief only. Using this valve to regulate oil pressure to normal operating pressure will super heat the oil and damage hydraulic system.

Your hydraulic unit is factory set to provide emergency boost oil pressure at 2000 PSI. This boost pressure should not exceed 2000 PSI. If it is necessary to adjust the emergency boost pressure, perform the steps that follow:

1. Close all valves on the pipe machine so oil is not circulating in the system.
2. Locate high boost pressure adjusting valve on side of hydraulic pump. See ***Figure 4***. Remove acorn nut from valve to access adjusting stem.

IMPORTANT: Do not make adjustment to the flow compensator valve; adjust only the high boost pressure.

3. Loosen jam nut on stem, then actuate *High Power* pushbutton to initiate high boost pressure.
4. Rotate stem with high boost actuated until desired pressure is obtained. Do not rotate stem too far out, it will come out of body.
5. After high-boost pressure set, release *High Power* pushbutton. Tighten jam nut on stem and install acorn nut.

NOTE: The high boost valve must be set to a pressure higher than the normal operating pressure valve. The high boost valve must not be adjusted to a pressure that exceeds 2000 PSI.

Hydraulic Oil

Oil in the hydraulic system performs the dual function of lubrication and transmission of power. It constitutes a vital factor in the hydraulic system and careful selection of it should be made with the assistance of a reputable supplier. Proper selection of oil assures satisfactory life and operation of the system components with particular emphasis on hydraulic pumps and motors. Any oil selected for use with pumps or motors is acceptable for use with valves.

For the **SS CAP 72 Machine's** hydraulic system it is recommended that you purchase ISO 68 oil or an equivalent.

To add oil to the hydraulic system, remove the filler/breather cap from the reservoir tank top. Whenever adding oil to the reservoir, be sure to filter the oil as it is being poured from the supplier's barrel into the reservoir tank to prevent any contaminates in the oil from being introduced into the system's reservoir.

Filter the oil being added to the reservoir with a 10-micron filter. The use of a cloth for straining oil should be avoided to prevent lint from getting into the system.

If unit is in an enclosed room (as recommended), maintain room temperature that assures 50^{o} F (10^{o} C) oil temperature in reservoir. If room temperature cannot be controlled, install a heater to unit's oil reservoir.

IMPORTANT: It is critical that the hydraulic oil in the unit's reservoir be at a temperature of 50^{o} F (10^{o} C) before attempting to start the unit each time. Starting unit with oil at less than 50^{o} F may result in failure to the hydraulic pump.

Note: ISO 68 oil is recommended for typical applications. Depending upon your actual conditions, high or low ambient weather conditions, a different viscosity oil may be required. Normally, the oil temperature should rise an average of 10° (F) every 15 minutes after the pump is started and before the machine operation starts. Standard run temperature should not exceed 140° - 150° F (60° - 65.5° C).

In service, minute quantities of rust, films of oil degradation products, water from condensation or accidental contamination, or hydraulic fluid foaming or entrained air can seriously impair hydraulic system operation.

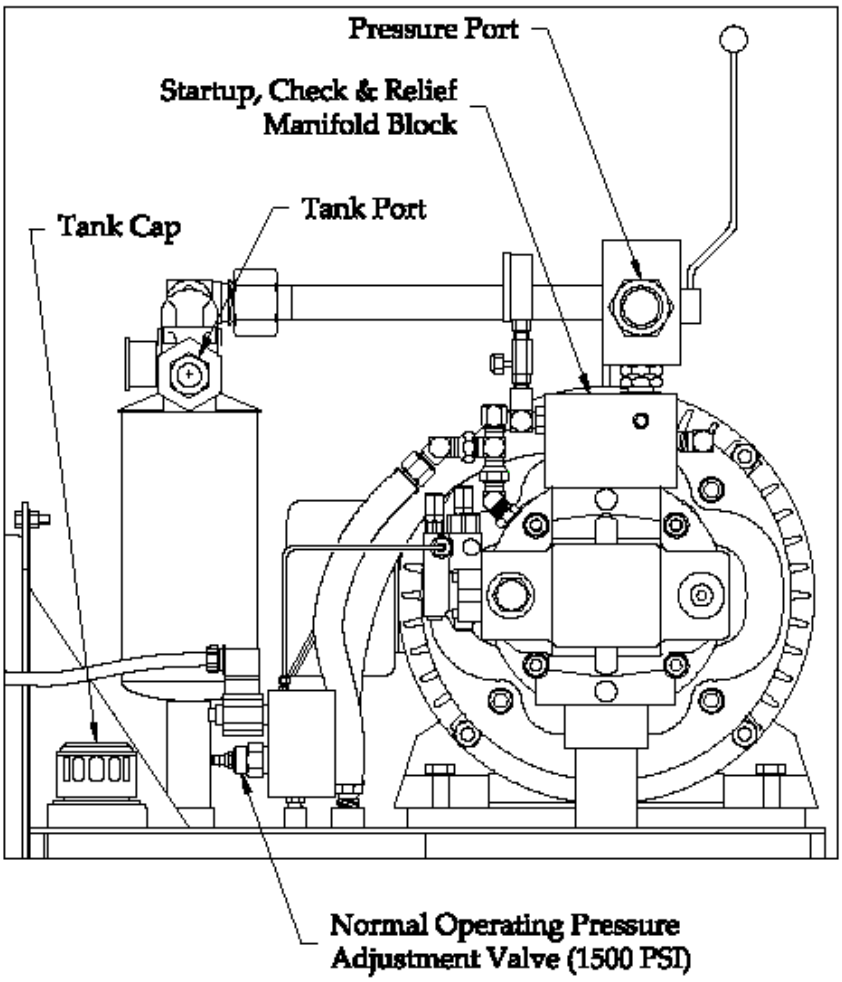
Water contamination can adversely affect the function of a hydraulic system and allow rapid pump wear unless the oil separates from the water.

Hydraulic oils must also be especially resistant to foaming and air entrainment in order to prevent erratic and uncontrolled operation.

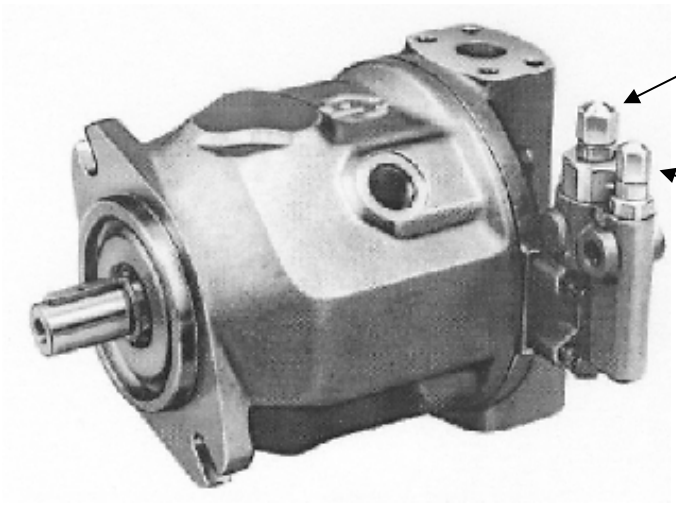
Rando Oil 22, 32, 46, 68 and 150 are Texaco's primary recommendation for industrial hydraulic applications not requiring HD type oils (***Figure 5***). These products are made from high quality paraffin distillate oils. The high Viscosity Index characteristics of these oils permit operation over a wider temperature range than with low or medium VI oils. Rando Oils are also used in a wide variety of industrial applications other than hydraulic, such as blowers, gear reducers, machine tools, and electric motor bearings. They are not recommended for turbine lubrication or for use in pumps containing silver plated parts.

Hydraulic Manifolds

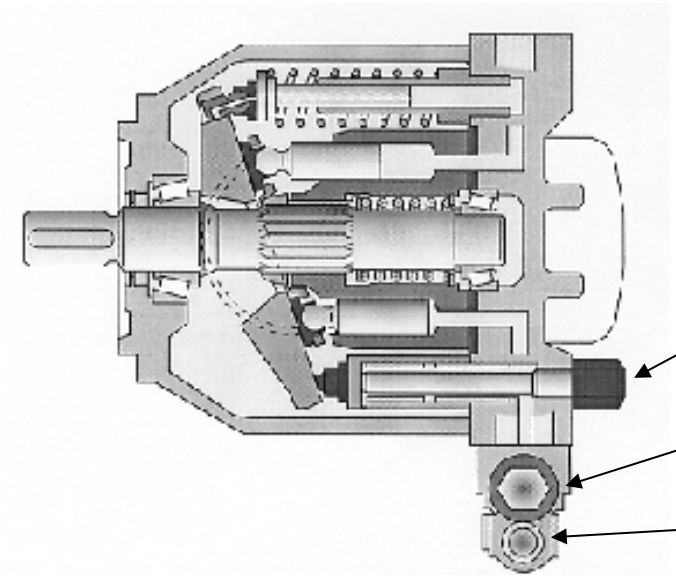
There are hydraulic manifolds located at various points on the machine. The schematics identify which machine components are controlled at each valve.



Normal Operating Pressure Adjustment
Figure 3



Side (Iso) View



Top View

High Boost Pressure Adjustment
Figure 4

Typical Characteristics		Rando Oil				
		22	**32**	**46**	**68**	**150**
Code Number		633	1658	1647	1649	2219
Appearance		Pale	Light Pale	Light Pale	Light Pale	Pale
Gravity °API		23.8	31.0	30.0	28.9	27.6
Flash, COC, °F		330	400	415	440	480
Pour Pt., °F		-45	-25	-30	-15	-5
Viscosity CST at:	**40°C**	20.3	29.9	42.9	61.9	138
Viscosity CST at:	**100°C**	3.5	5.3	6.5	8.3	13.3
Viscosity SUS at:	**100°F**	108	150	219	322	725
Viscosity SUS at:	**210°F**	38	44	48	54	73
Viscosity Index		-4	108	109	101	89
Neutralization No.		0.07	0.08	0.08	0.08	0.07

Rando Oil Specifications

Figure 5

Notes

Notes

8 Dual Purpose Concrete Feeder

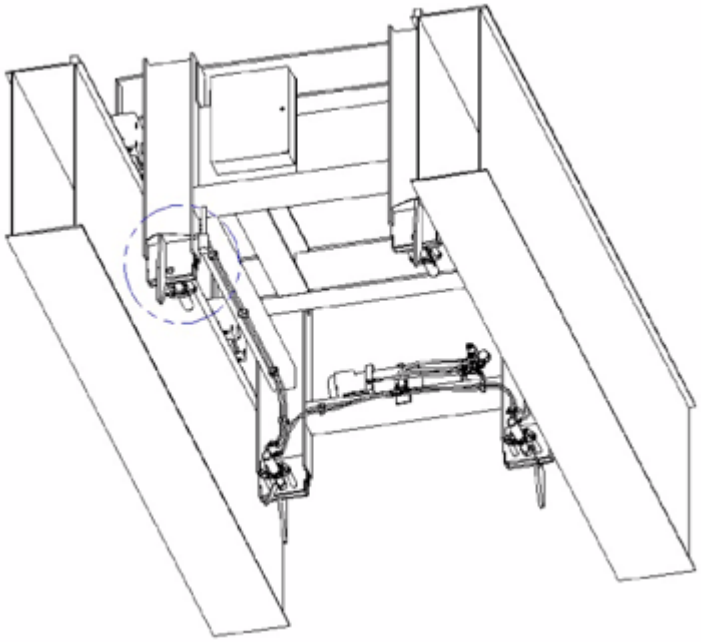
SS CAP 72 Machine

Machine Serial No. CP-430

Notes

8.1 Converting Compon-A-Plant Feeder to Box Configuration

Attaching Scissors to Overhead Crane



Crain Trolley

Figure 1

- Verify all four locking pins located on the crane trolley are retracted (indicator light MUST show **red**).

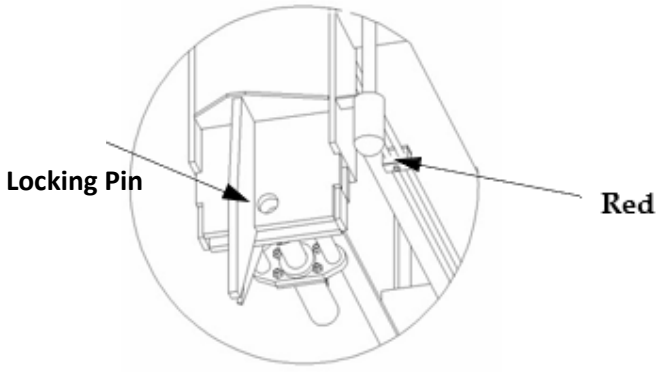
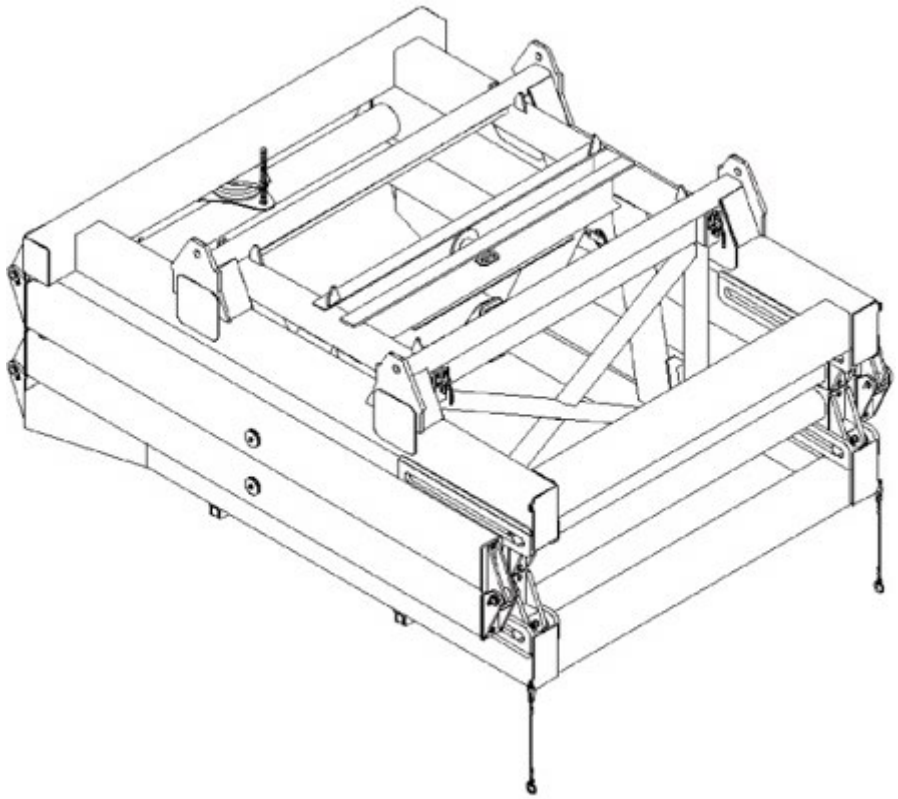


Figure 2

- Lower crane hook and connect to main lifting pin on the scissor's assembly.
- Connect scissors pneumatic line to air thruster supply located at the crane hook.



Scissor Assembly
Figure 3

- Attach wire rope lanyards to the front lower corner of scissors. Lift scissors up to crane hook upper travel limit switch.
- Carefully extend scissors air spring using thruster air control buttons on crane pendant.
- **USE WIRE ROPELANYARDS TO GUIDE SCISSORS INTO RECEIVING SOCKETS. FAILURE TO GUIDE SCISSORS MAY RESULT IN DAMAGE TO LOCKING MECHANISIM.**
- When the air spring is fully extended, actuate locking cylinders until indicator light shows green.
- Fully deflate air spring using thruster air control buttons on crane pendant.
- The scissors are now ready to connect to the hopper.
-
- When the air spring is fully extended, actuate locking cylinders until indicator light shows green.
- Fully deflate air spring using thruster air control buttons on crane pendant.
- The scissors are now ready to connect to the hopper.

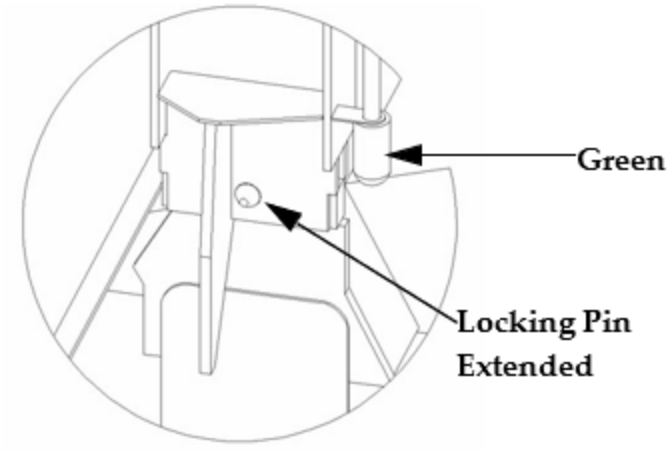


Figure 4

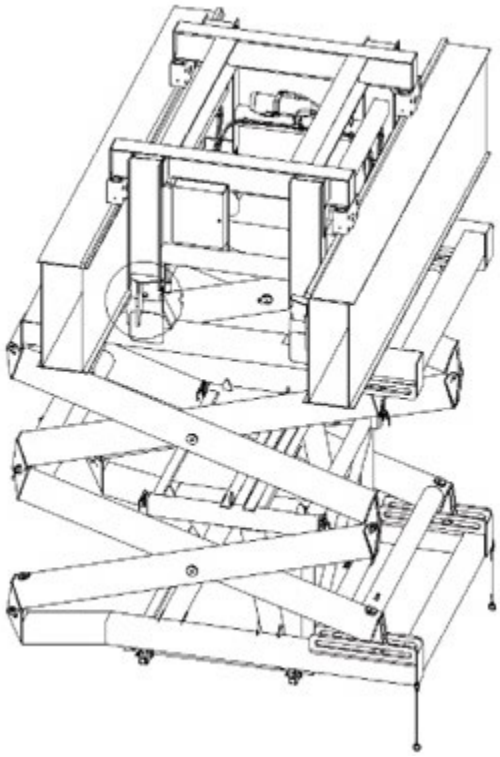


Figure 5

Attaching the Scissor to the Feeder Hopper

- Position the scissor and spacer over the feeder/hopper.
- Lower the spacer until the liftholes on the spacer are aligned with the liftholes on the hopper.
- Pin the hopper to the spacer and scissors using the four box feeder/hopper pins.

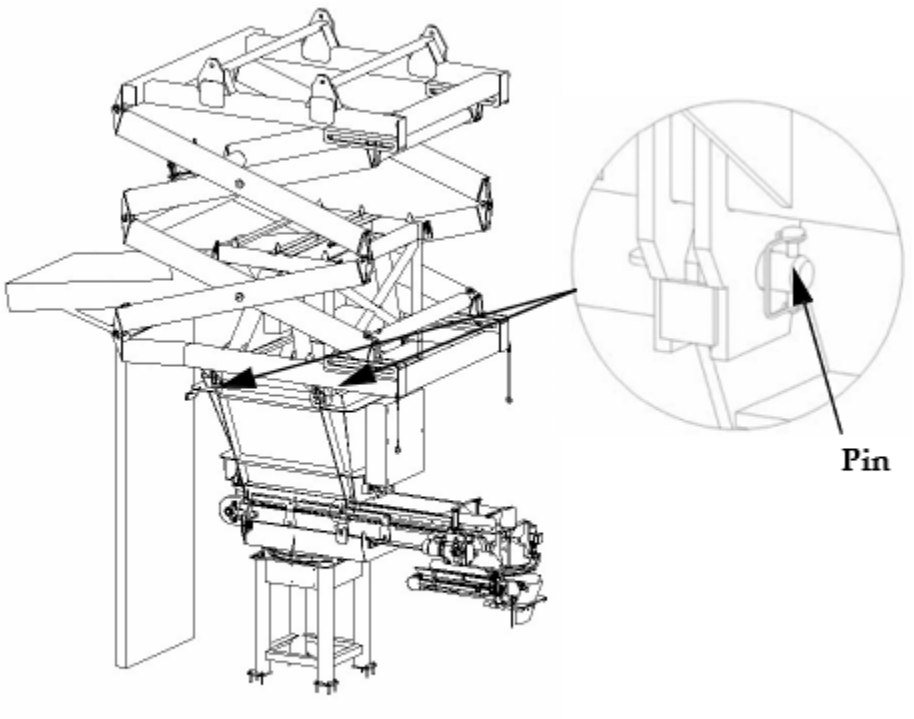


Figure 6

Moving Hopper on Frame

- To reduce stresses on scissors frame it is necessary to move the hopper into the forward position when using the feeder for box configuration.
- To move hopper forward, lift crane slightly to remove tension on hopper/conveyor pin.
- Pull the (4) four pins and move the hopper forward into hopper box configuration position and re-insert the (4) four pins.

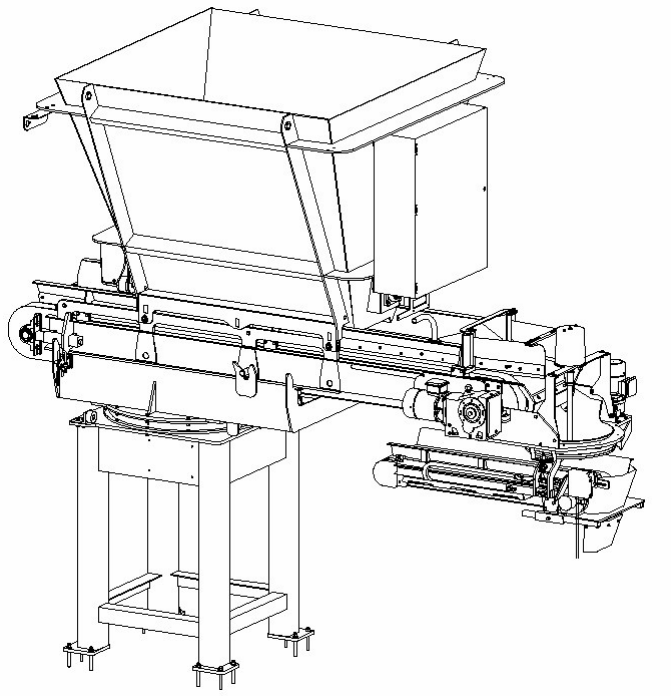


Figure 7

Removing Feeder from Base Turret Stand

- Unclamp the two rear toggle over-center clamps.
- Lift the feeder free from the base turret stand.
- Rotate the Turret 90 degrees to prevent collision damage.
- The feeder is now ready for box configuration.

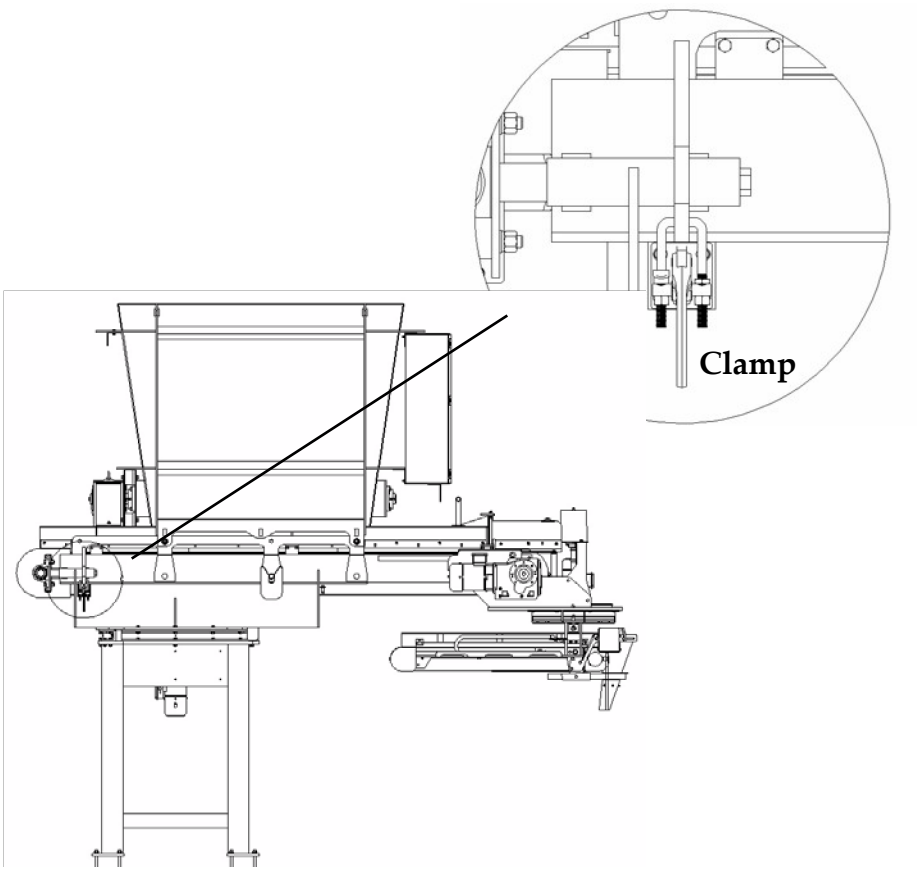


Figure 8

Converting Box Feeder to Compon-A-Plant Configuration-Attaching Feeder to Base Turret Stand

- Align box configuration above the base turret stand.
- Rotate the turret 90 degrees to align with feeder.
- Lower the hopper/feeder onto the base turret stand using the aligning pin.
- Clamp the feeder to the stand using the two rear toggle over-center clamps.

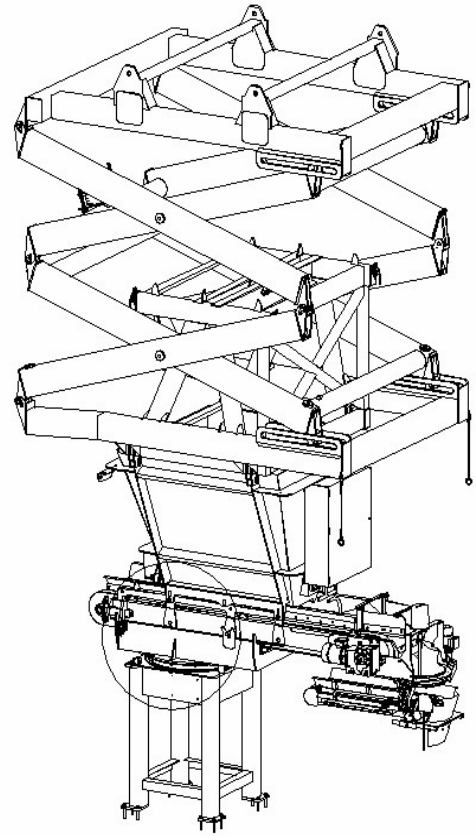


Figure 9

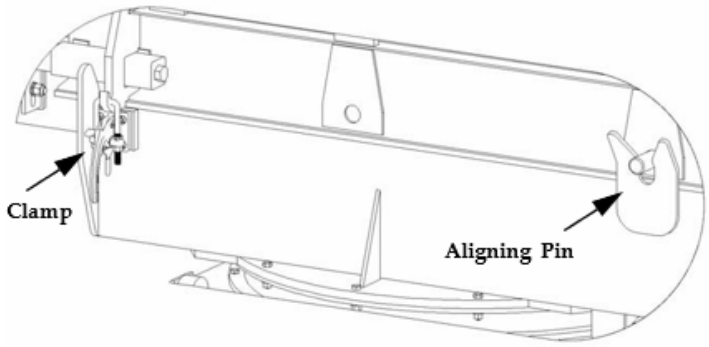


Figure 10

Moving Hopper to Frame

Lift crane slightly to remove tension on the hopper/conveyor pins.

Pull the (4) four pins and move the hopper backward into rear position and re-insert the (4) four pins.

Detaching Scissors from Hopper

- Remove the scissors/hopper pins and raise the scissors and spacer.

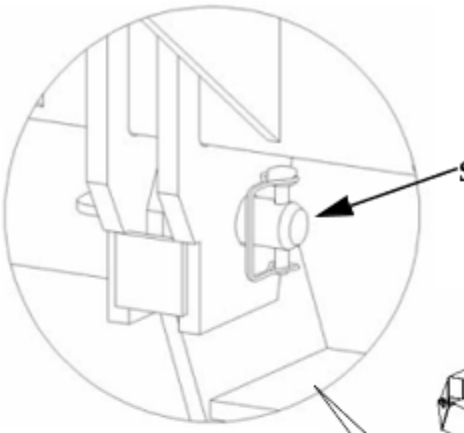


Figure 12

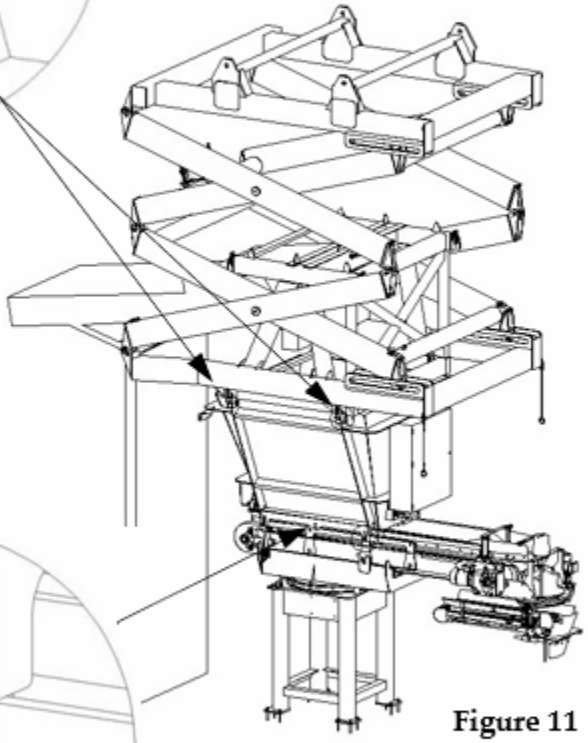


Figure 11

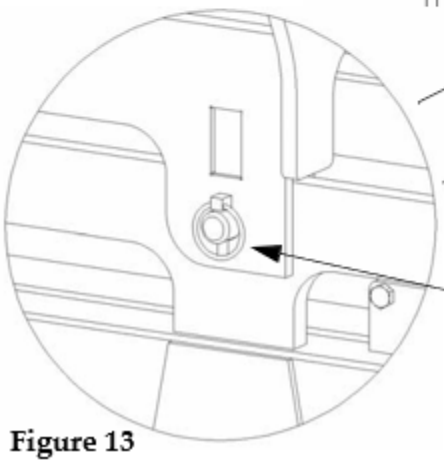


Figure 13

Detaching Scissors from Overhead Crane

- With feeder disconnected, raise the scissors up until the crane load hook upper limit switch is reached.
- Fully inflate the scissors air spring using the thruster air control buttons on the crane pendant.
- Actuate the unlock valve until all four locking pins are fully retracted (the indicator light MUST show **red**).

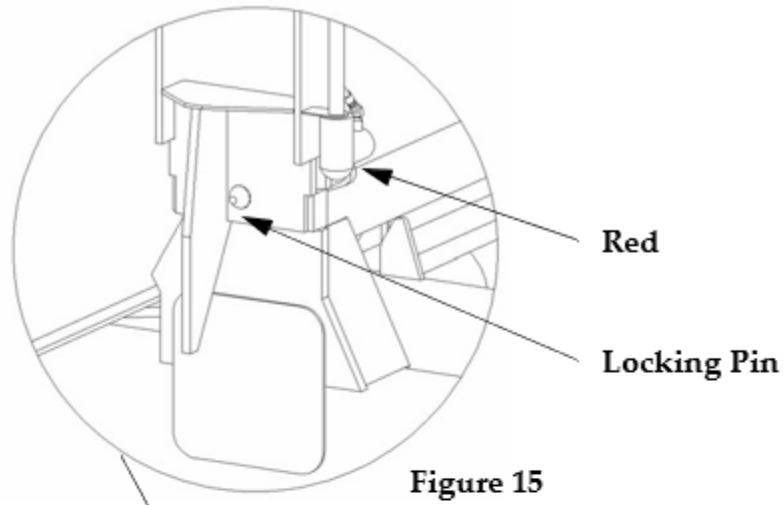


Figure 15

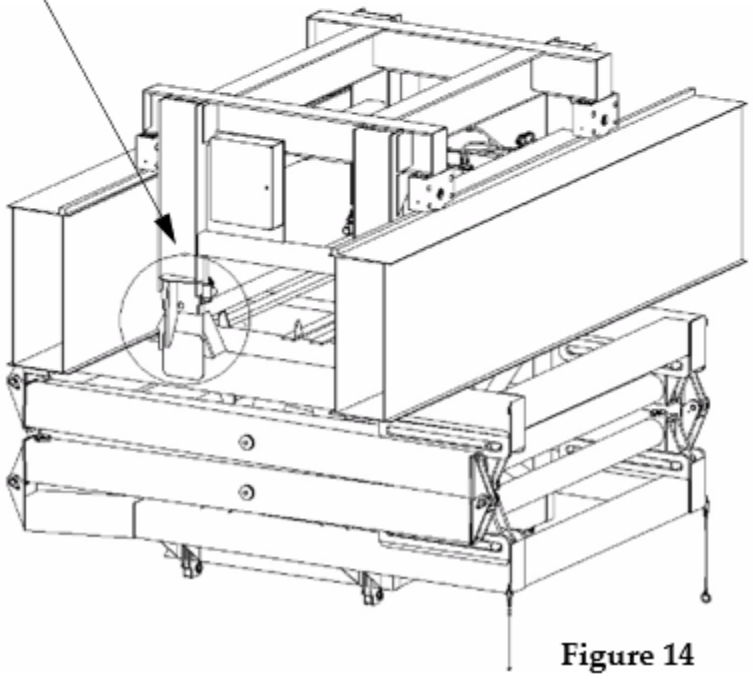


Figure 14

- Fully deflate aire spring using thruster air control buttons on crane pendant.
- The scissors should settle slightly. This indicates unlocked pins.
- Lower the scissors assembly to the ground with the crane load hook.
- Disconnect the scissors pneumatic line from the air thruster supply located at the crane hook.
- Disconnect the crane hook from the main lifting pin on the scissors assembly.

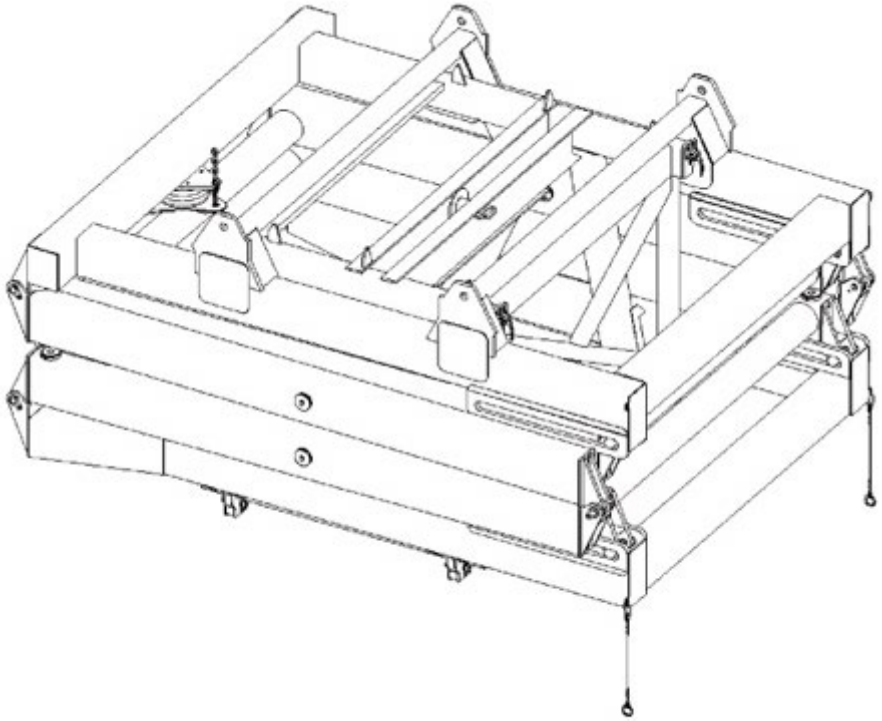


Figure 16

Afinitas Scissors Installation Notes

The following settings must be attained with no air in the air spring and the scissors fully collapsed on its hard stops!

- **Crane Hook Upper Limit**-Must be set to stop load hook when top frame of scissors in approximately 6” below crane bridge girders.
- **Crane Hook Emergency Upper Limit**-Must be set to stop load hook when top frame of scissors is approximately 3” below the crane bridge girders.
- The “Unlock Scissors” valve solenoid must be interlocked to prevent actuation unless the crane hoist encoder shows that the load hook is in the top 6”-9” of travel (based on limit settings described above).

8.2 Concrete Feeder & Pedestal Operating Adjustments

Hopper-Rear Door Operation/Clean Out

- The hopper rear door gate opening can be set for “normal operation” and “clean-out” mode.
- Loosen the screw “A” (2), one per side, and adjust as shown in Figure 1 for normal operation. For clean out loosen screw “A” and open door gate to fully open position.

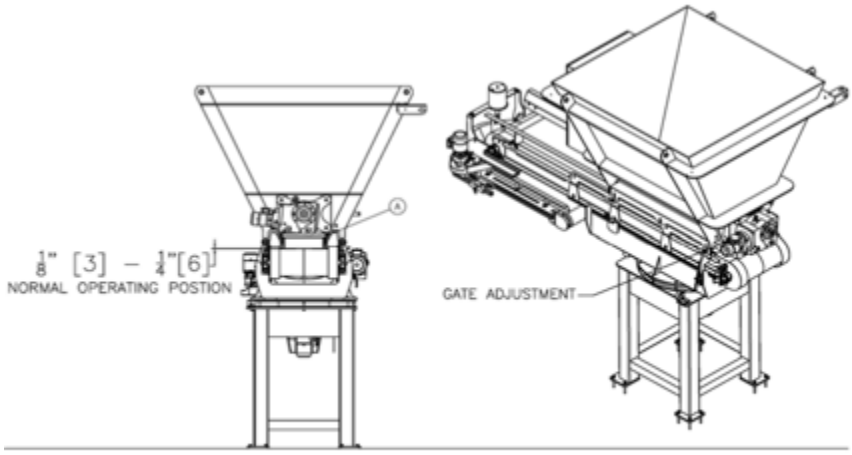


Figure 1

Adjust Tensioner on Feeding Belt

- At all-time the feeding belt must be so tight that it does not slip on the drums.
- To adjust the belt tension, tighten the screw on the back of the tensioner “B” (see Figure 2) until belt is sufficiently tight.

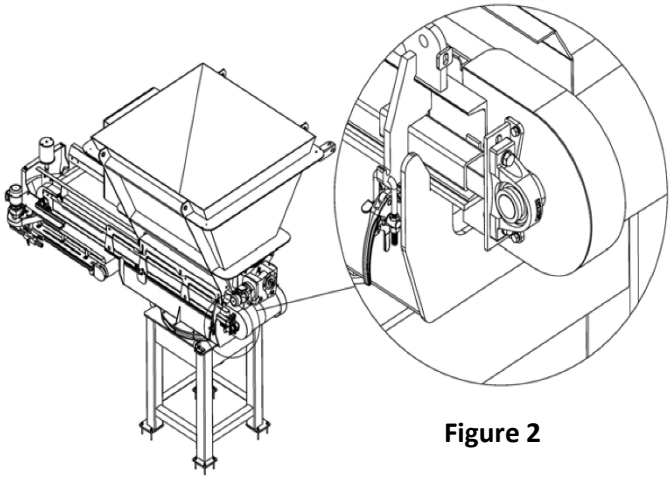


Figure 2

Note: Adjust both sides uniformly, so belt maintains proper tracking.

Adjusting Tensioner on Concrete Distributor

- At all times the V-belt for the concrete distributor must be so tight that it does not slip on the belt pulleys.
- To adjust the belt tension, loosen the screws “C,” (2) per side of motor and the jam nut on the jacking screw “D.” Tighten jacking screw “D” until V-belt is sufficiently tight and then re-tighten the screws “C” (see Figure 3).

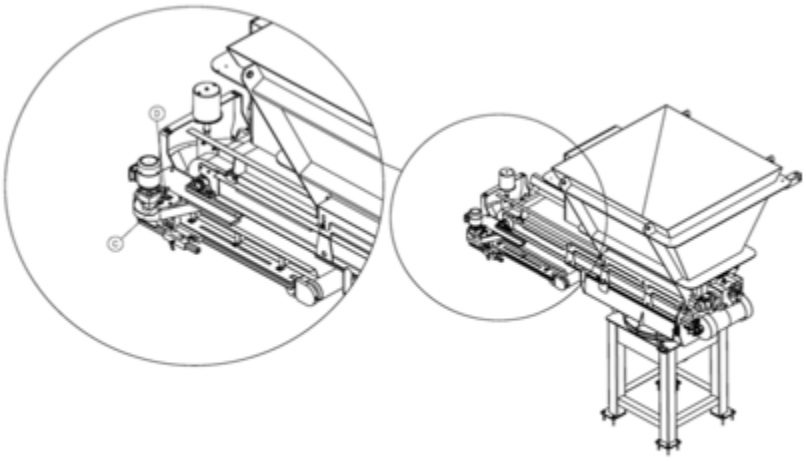


Figure 3

Swivel Movement Adjustment

- When the concrete feeder is moved to a position over the casting station, its travel is limited by a shock absorber. The angular position of the center over the casting station can be fine-tuned by adjusting the shock absorber. To adjust the position, loosen the (2) screws “E” (see Figure 4) and adjust as necessary. Re-tighten (2) screws “E.”

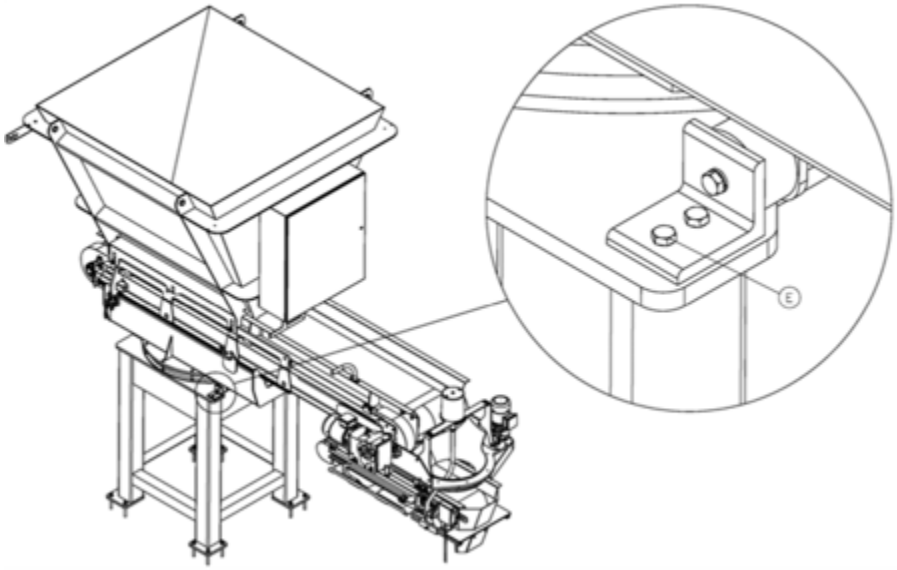


Figure 4

Distributor Conveyor Belt Tensioner Adjustment

- At all times the distributor conveyor belt must be so tight that it does not slip. To adjust the tension on the belt, tighten the screw “F,” one on each side of the rear of the distributor (see Figure 5).

Note: Do not adjust the tensioner on the front of the distributor unless absolutely necessary.

Note: Adjust both sides uniformly, so the belt maintains proper tracking.

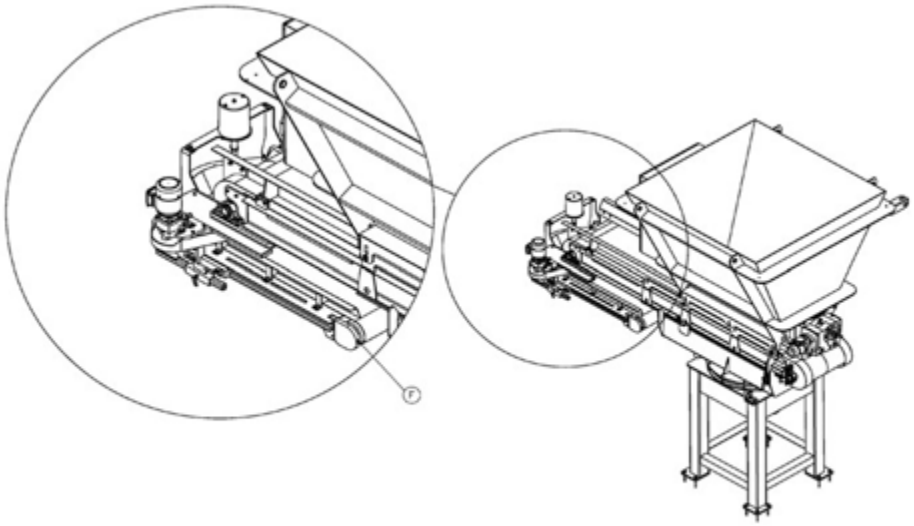


Figure 5

Distributor Filling Funnel Adjustment

- Precision adjustment of the concrete filling process is done by loosening screw “G,” one on each side of distributor (see Figure 6). The funnel can then be pushed forward or backward for fine tune adjustment. Re-tighten screw “G,” one on each side, after the adjustment.

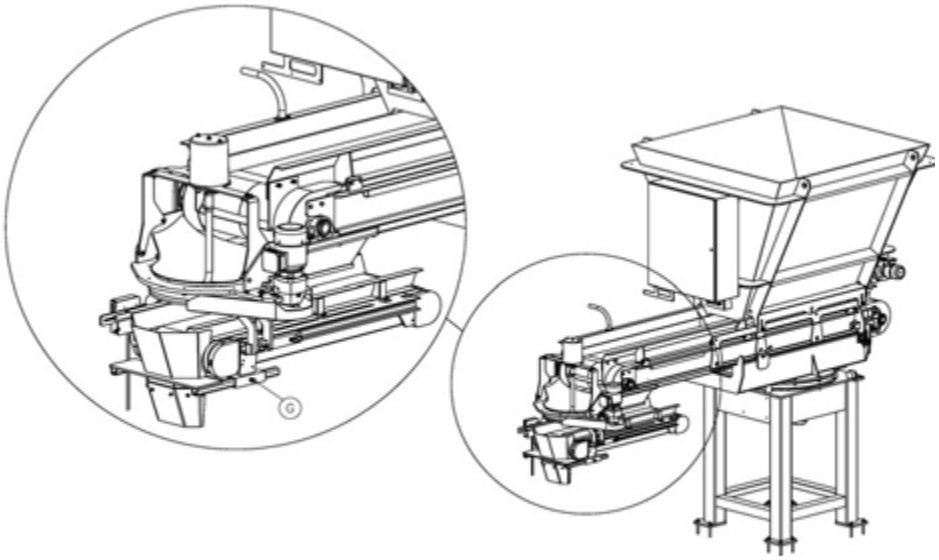


Figure 6

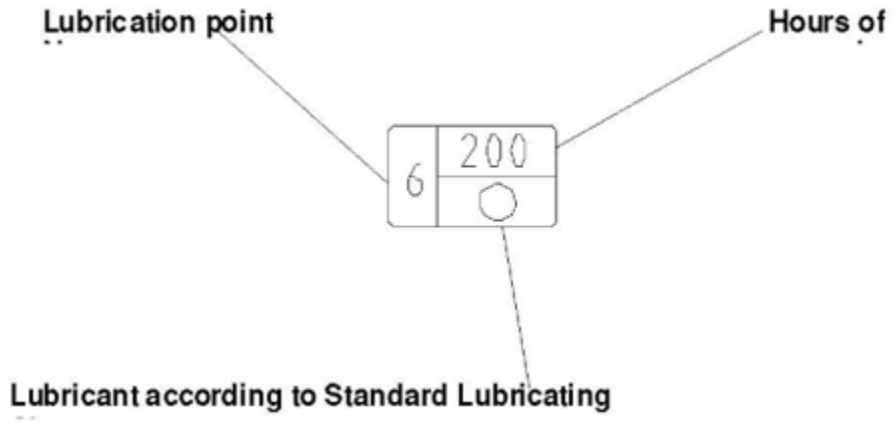
8.3 Lubrication & Service

When lubricating the machine, the main switch must be switched off and locked with a padlock and key must be kept by the person carrying out the work.

The machine must be lubricated, or service must be carried out in accordance with the intervals stated on the following charts of lubrication points.

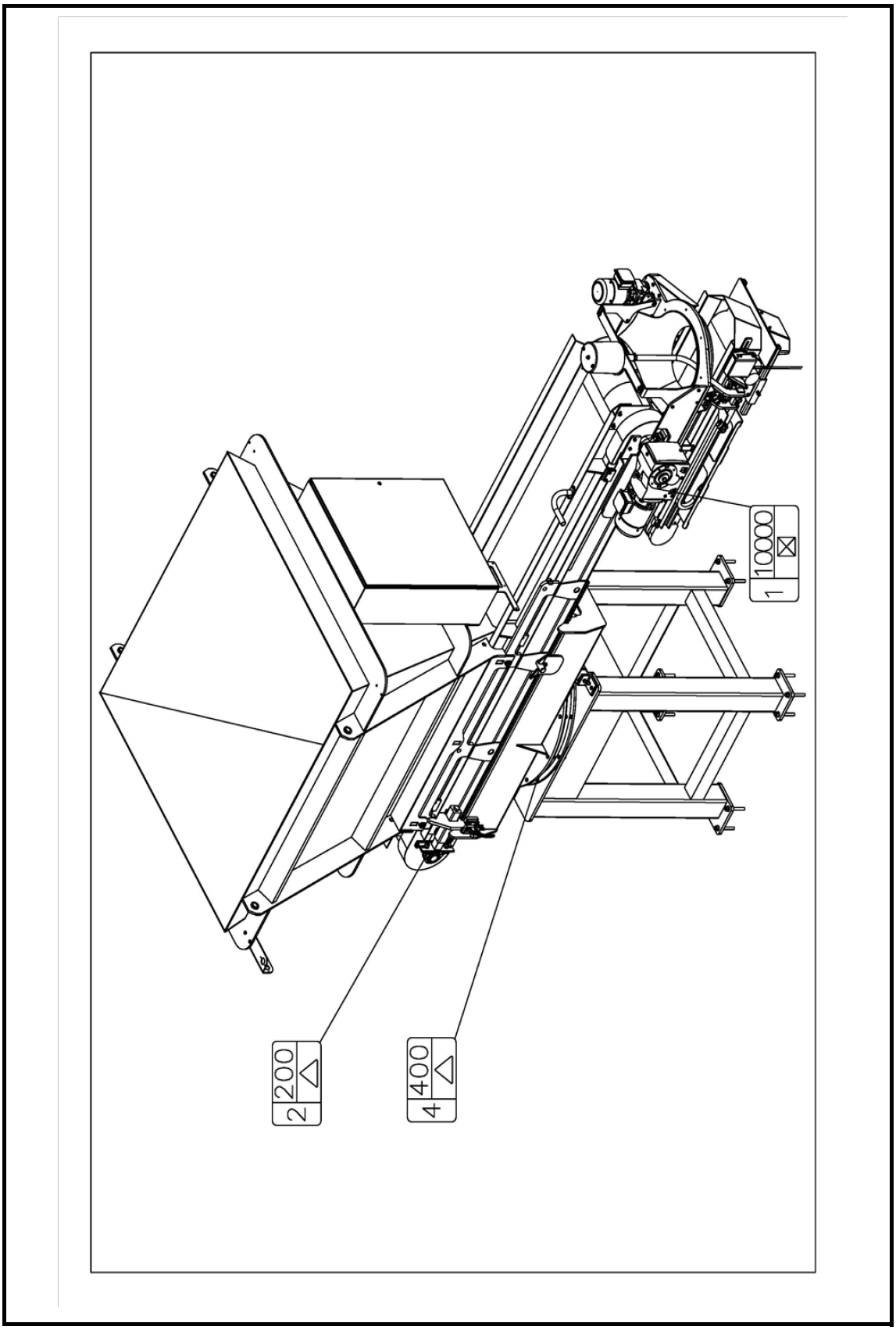
Only types of oil and grease stated on the Afinitas Standard Lubricating Chart or similar must be used.

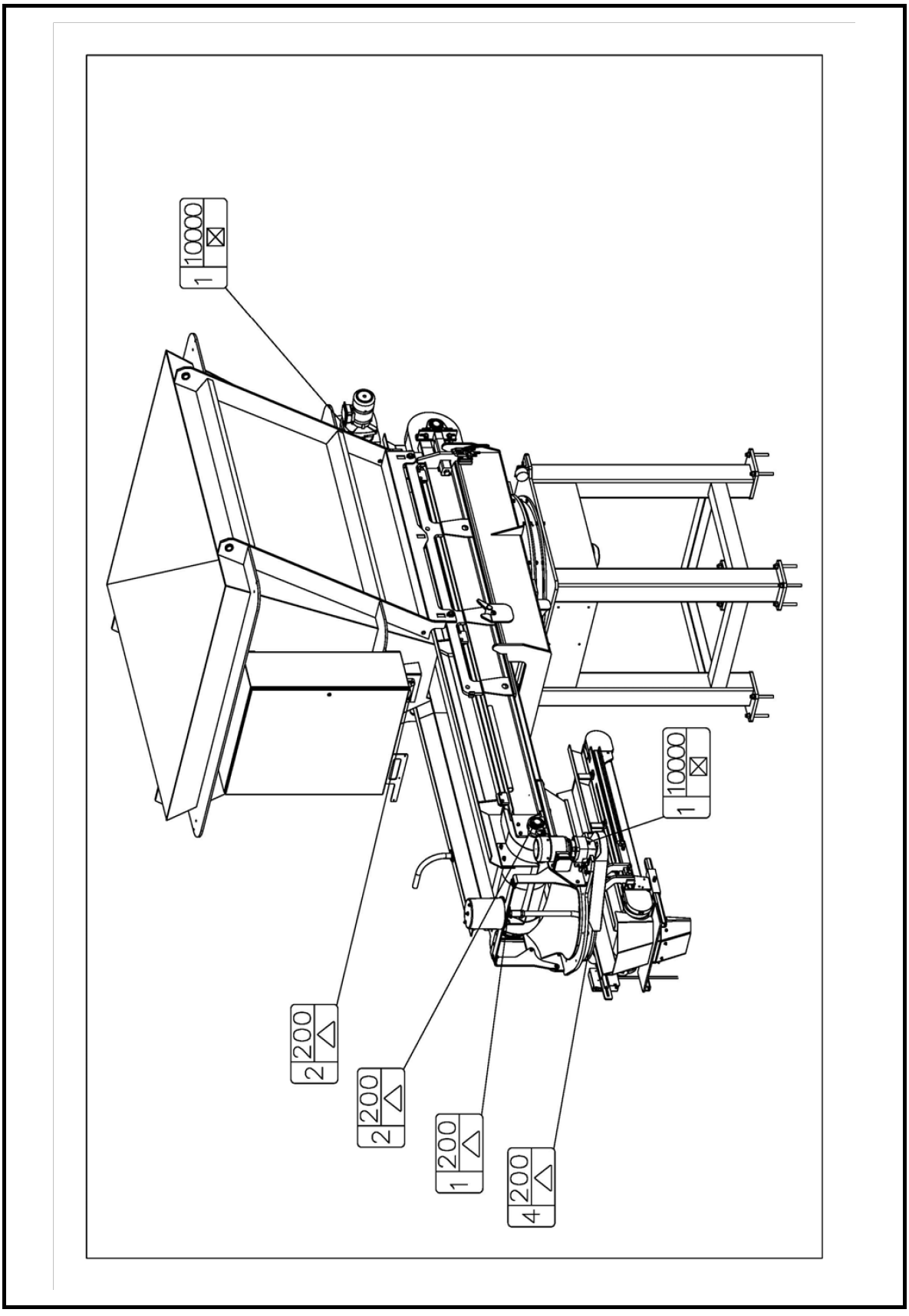
The lubrication points are stated as follows:

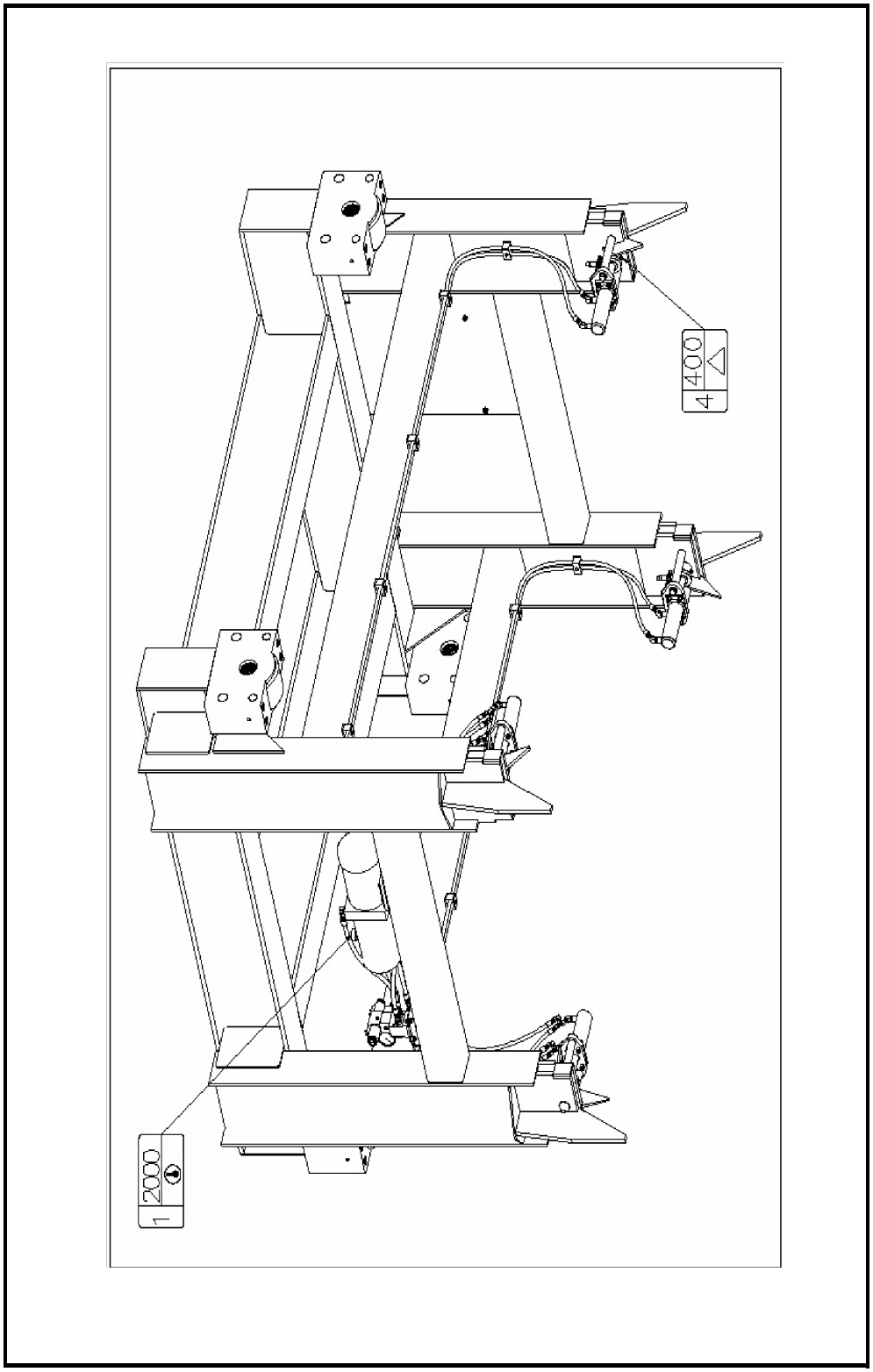


Lubrication Points

- Gearbox for Swivel of Concrete Feeder
- Open Gears for Swivel of concrete Feeder
- Bearings for Swivel of Concrete Feeder
- Gearbox for Concrete Hopper Agitator
- Bearings for Concrete Hopper Agitator
- Gearbox for Concrete Feeding Belt
- Bearings for Concrete Feeding Belt Drums
- Gearbox for Distributor
- Bearing for Distributor
- Bearing for Electrical Collector
- Hydraulic Unit for Scissors Connecting Frame
- Shot Pins for Scissors Connecting Frame


10000
1
200
2
400
4


1 10000
1 10000
2 200
2 200
1 200
4 200


4
400
1
2000

Notes

9 Production Base

SS CAP 72 Machine

Machine Serial No. CP-430

Notes

Description

The Production Base is in the machine pit and is where moulds are mounted for production. The Production Base may be mounted on a stand, an elevating system, or mounted directly to steel imbeds in the pit floor.

9.1 Base Maintenance

Form Anchor Replacement

Periodically-The form anchors on the base should be checked for wear. Vibration will wear the form anchors after continual use.

- If less than 3/16” of steel cover is present over the pin slots, replace the anchors.
- Use only Afinitas replacement parts. The connecting pins are of a special heat-treated material.

See ***Form Anchors*** **(pg. 10.3)** for maintenance information on the form portion of the anchor system.

Notes

10 Elevating System

SS CAP 72 Machine

Machine Serial No. CP-430

Notes

10.1 Elevating System for Production Base

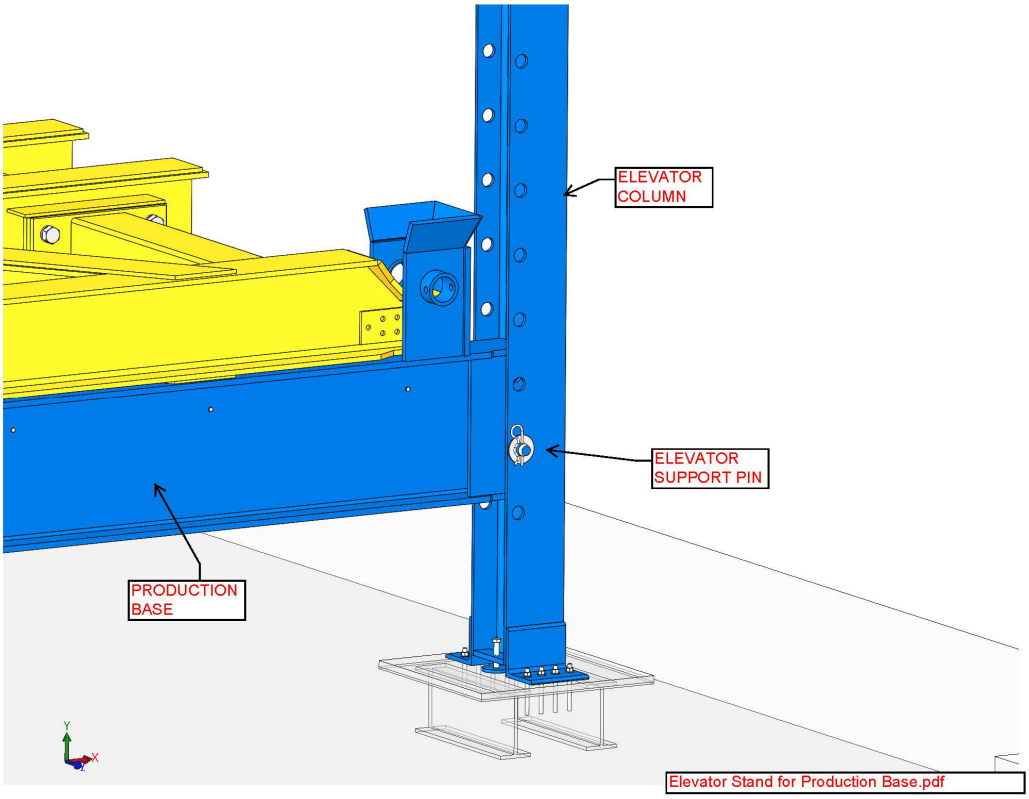
Description

The elevating system is a steel construction which is placed in the machine pit and on which the production base is mounted.

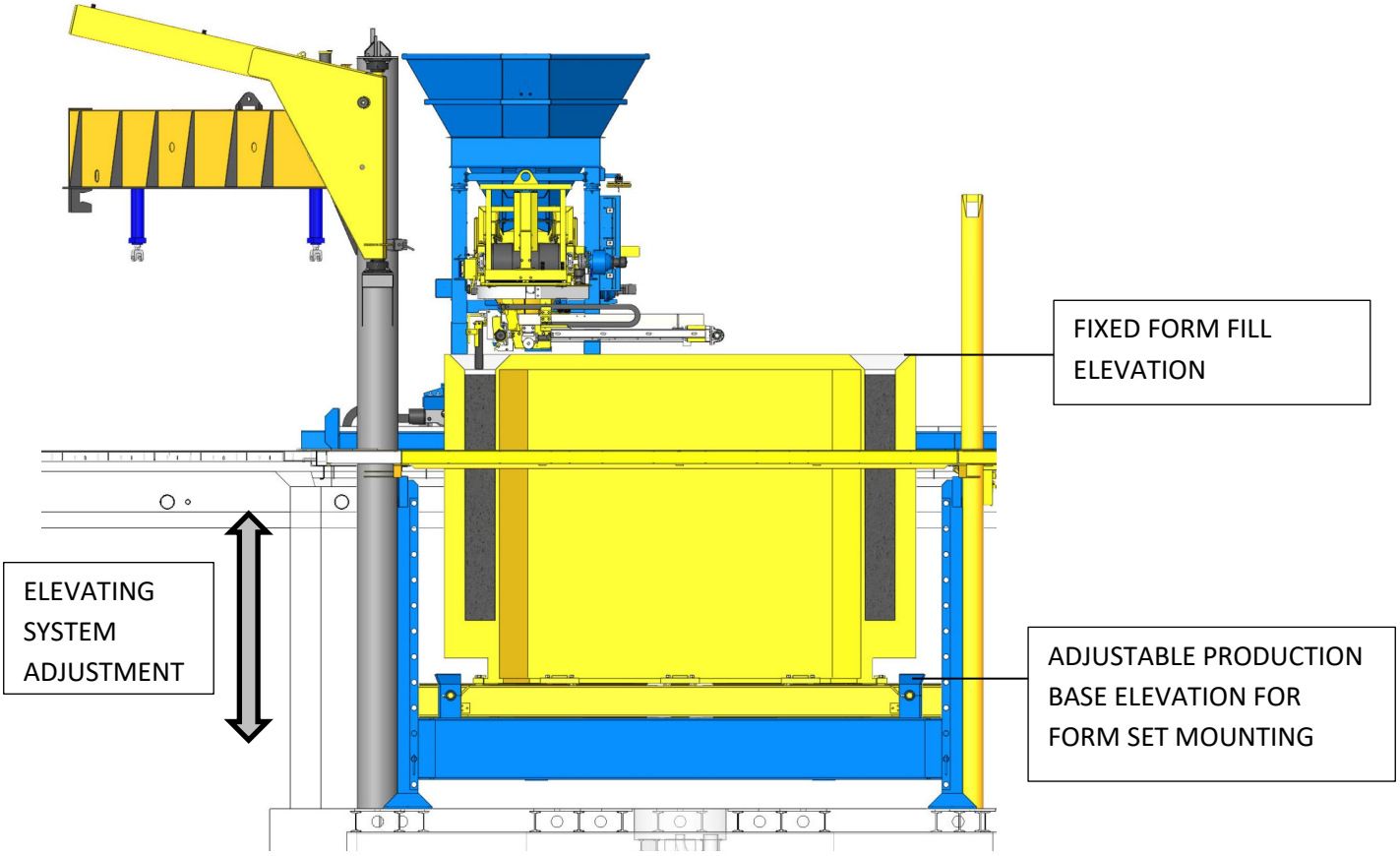
The elevating system is constructed from four vertical steel profiles bolted in the pit cover and floor in accordance with the assembly drawing. Between the vertical columns, two horizontal beams are placed which are locked to the columns by means of a support pin.

Height Adjustment

Attach the crane hook to the support beams using lift sling as required. Lift the production base slightly and remove support pin. Lift or lower the table to the required height and replace support pins.



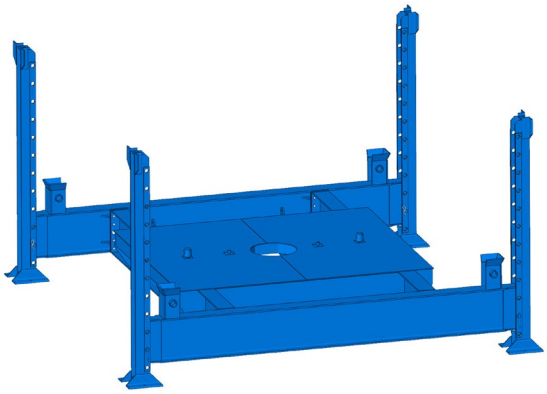
The SS CAP 72 Machine Press, Triple-Ram Press, and X-Y Feeding systems require a relatively fixed elevation of the top of the form set. When the SS CAP 72 Machine Production Base is used with the elevating system, many different product lengths may be fit onto the SS CAP 72 Machine without additional components/equipment.



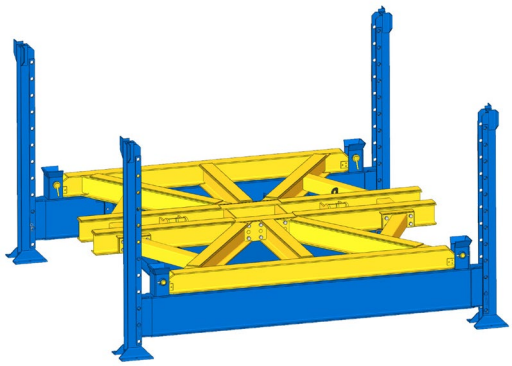
(Note: Machine shown with SS CAP 72 Machine *style press and XY style feeding system)*

By raising or lowering the SS CAP 72 Machine Production Base on the elevator columns and pinning in place, shorter products may be run at a similar top of form elevation.

The SS CAP 72 Machine Production Base is used as a base mounting structure for the form set. The SS CAP 72 Machine Production Base can be used alone for PipePlus type mountings, or in conjunction with the SS CAP 72 Machine Mounting Star for SS CAP 72 Machine style or adjustable box style mountings.



ELEVATING SYSTEM WITH PRODUCTION BASE



ELEVATING SYSTEM WITH PRODUCTION BASE AND MOUNTING STAR

The SS CAP 72 Machine Mounting Star may be used with the SS CAP 72 Machine Production Base and Elevating System. The SS CAP 72 Machine Mounting star is pinned to the 96 anchor lugs of the SS CAP 72 Machine Production Base and use retaining pins at the mounting sockets located near the elevator columns. All pins must be in place to utilize this structure.

The SS CAP 72 Machine Mounting Star uses simple mount brackets to attach the form set to the Mounting Star.

Notes

10.2 Base Maintenance

Form Anchor Replacement

Periodically-The form anchors on the base should be checked for wear. Vibration will wear the form anchors after continual use.

- If less than 3/16” of steel cover is present over the pin slots, replace the anchors.
- Use only Hawkeye replacement parts. The connecting pins are of a special heat-treated material.

See ***Form Anchors*** **(pg. 10.3)** for maintenance information on the form portion of the anchor system.

Form Isolator/Anchor Chain Slings

The form isolator/anchor chains are heat treated alloy chain of precise length. If replacement becomes necessary, these chains must be ordered from Hawkeye in matched sets.

Notes

11 Triple Ram Press

SS CAP 72 Machine

Machine Serial No. CP-430

Notes

11.1 Triple Ram Pressurehead Operation

Concrete in the form was initially compacted by vibration as the form was filling. The purpose of the pressure heading operation is to apply pressure to the concrete to form the pipe's spigot and to assure maximum final compaction of the concrete. Air powered cylinders provide the thrust for the pressure heading operation.

The instructions that follow explain the procedure for operating the pressurehead for pipe production, utilizing single mode form sets.

Pressureheading Principles

As an aid in pressureheading concrete pipe, we have provided information on important pressureheading principles that if understood, will help you perform the heading operation successfully. Remember these principles as you perform the heading operation so you can select proper air pressure settings, operating techniques, etc.

Concrete Fluidity

Vibration destroys the friction between concrete particles and turns the concrete into a fluid. When pressurehead force is added, friction again is recreated. The concrete, with the pressurehead force applied, is in a semi-solid state instead of a fluid state. It is a common misconception that applying more pressure causes the header to be pressed down easier into the concrete. However, adding more pressure makes pressing headers down a more difficult task. Increasing pressure increases friction between the concrete particles which causes concrete to become less fluid. Therefore, it is suggested that the customer use the least amount of pressure needed to press down headers. That is why, if possible, headers are allowed to float down as far as possible under low pressure before applying the full pressureheading force.

Normalizing (Or Stress Relieving)

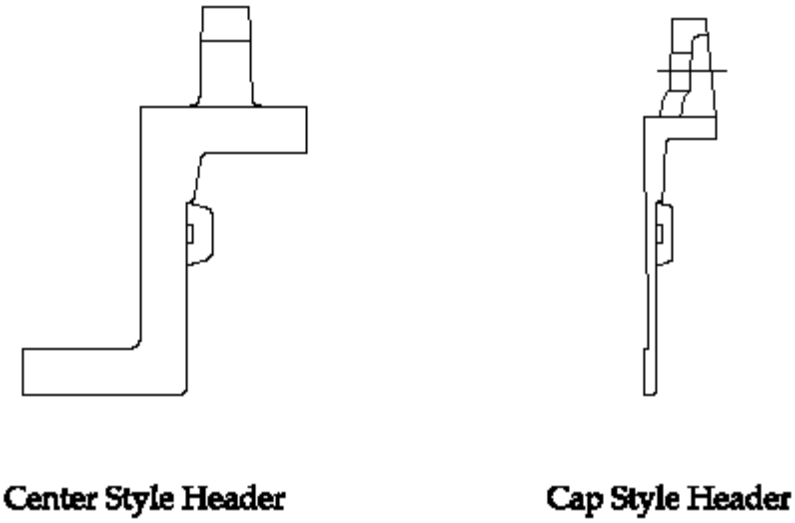
The concrete at the top of a form is in a semi-solid state due to pressureheading as explained earlier. Normalizing is the process that changes the concrete from a semi-solid state back into a fluid state.

While the concrete is in a semi-solid state, two problems arise. The semi-solid concrete presses on the reinforcement cage creating stresses. Concrete flow is also limited during this time. Therefore, the concrete will not be able to effectively fill the voids in the tongue or spigot of the pipe. When the concrete turns back into a fluid state during the *Normalizing* cycle, these problems can be avoided. The fluid concrete relieves stresses on the reinforcement cage and flows much easier to fill the voids in the tongue.

To normalize the pipe, allow the form to vibrate for 20 to 30 seconds with full pressurehead force after the pressurehead is in full contact with the jacket top. When the pressurehead comes in full contact with the jacket, pressure is transferred to the jacket and is no longer being applied to the concrete. This, along with vibration, is what turns the semi-solid concrete back into a fluid concrete.

Center Style Headers Versus Cap Style Headers

See Figure 1 for a section view of the center style header and the cap style header. As the header floats or is pressed down into the product, excess concrete flows from the product onto the core top through the gap between the header and core. This is called concrete displacement. The customer will notice that center style headers displace more concrete than the cap style headers. Therefore, two different pressureheading techniques are used for both headers. The total pressureheading time for both headers is normally one-half to three-quarter of the fill time.



Header Styles
Figure 1

11.1.1.1 Center Style Headers

Center style headers should be permitted to float down as far as possible before pressure is applied with the presshead. There should be as much concrete as possible displaced before pressure is applied. This can be achieved by letting the headers float down under their own weight while the vibrators are running. When the headers stop floating down, pressure can then be applied with the presshead to force the headers further into the filled form.

11.1.1.2 Cap Style Headers

Cap style headers displace very little concrete. Therefore, it is necessary to trap a maximum amount of concrete inside the header as it is being pressed into the pipe form in order to retain enough concrete in the header to effectively form a tongue or spigot on the pipe end. This is why the pressureheading technique is different for cap-style headers as compared to the center style headers. When a cap style header is placed on the form, apply pressure to the header before turning on the vibrator. Do not permit the header to float down. Pressure should be applied to the header during the entire heading sequence.

A void can be formed at the top of the tongue if there is not enough concrete trapped inside the header to completely form the tongue. If voids are being noticed, the cap style headers may have been allowed to float down initially before pressure was applied. A second cause of voids is that the form was not sufficiently filled during the filling process.

11.2 Pressurehead Air Cylinder Pressure

The **Triple Ram Pressurehead Machine** has been designed with an air pressure system that permits different heading forces depending upon pipe diameter. Smaller diameter pipes with a single cage of reinforcement cannot withstand the greater pressureheading forces that are applied to larger diameter pipes with two cages of reinforcement. Thus, unique pressure settings are available for production purposes.

As a rule of thumb, all double cage pipes are normally produced at a higher-pressure setting, normally 70-90 PSI (4.8-6.2 bar). All single cage pipes are run at a lower pressure setting, normally 0-20 PSI (0-1.4 bar). The low-pressure setting should be adjusted so maximum pressureheading forces can be obtained without buckling the reinforcement cage.

To set or regulate the air pressure for the high-pressure setting, adjust the regulator located above the main console on the overhead control console. An air pressure gage is attached to this regulator for monitoring air pressure. This air regulator should be set to permit an operating pressure of approximately 120-140 PSI (8.3-9.7 bar).

To regulate the air pressure for the low-pressure setting, adjust the regulator located on the vertical column just above the main console. An air pressure gage is mounted on this regulator for monitoring air pressure. This air regulator should be set at the maximum pressure setting that does not result in buckling of the pipe's reinforcement cage, normally a range of 20 to 40 PSI. In order to regulate or adjust the pressure at this regulator, the hi/lo pressure valve lever must be in the down or "adjusted pressure" position.

11.3 Oil Mist Lubricator

An oil mist lubricator for lubricating the presshead air cylinders is located on the overhead control console near the high-pressure air regulator. The lubricator should be set so a light film of oil is always present on the air cylinder shafts. See ***Pneumatic System*** for information on adjusting and servicing the lubricator.

11.4 Operating the Tongue Trowel

The presshead on your **Triple Ram Pressurehead Machine** may be equipped with an optional tongue trowel mechanism which, when engaged to the header lugs, rotates the header to obtain a smoother trowel finish to the pipe's tongue or spigot. Usually only one-third revolution of rotation is recommended for the troweling process. More rotation usually does not result in a better surface finish and only makes header removal more difficult because the concrete release agent is wiped off the header in greater amounts.

The trowel is powered by a hydraulic motor. The trowel can be started and stopped by using the tongue trowel valve located at the control console.

The speed of the trowel is also adjustable. Located under the hydraulic solenoid valve that controls the hydraulic motor for the trowel is a flow-spool which can be adjusted for speed control. Typically, the speed should be set so after one-third revolution of the header, the presshead will be down and bearing against the jacket top.

IMPORTANT: It is important that the tongue trowel always travels in the correct direction of rotation because the Triple Ram Pressurehead Machine is designed to resist the troweling forces only along this one direction of rotation. Therefore, if repairs are made to the hydraulic system or to the tongue trowel itself, always check to make sure the tongue trowel rotates in the proper direction.

The correct direction of rotation depends on whether your machine is a standard image or mirror image machine. To determine which type of machine you have, stand at the operator’s control console and face the center post of the pipe machine where the vibrator receptacle outlets hang. If the presshead is to your left, your machine is a standard image machine. If the presshead unit is to your right, your machine is a mirror image machine. All standard image machine's tongue trowel units must rotate in a counterclockwise motion when viewed from above, looking down. All mirror image machine's tongue trowel units must rotate in a clockwise motion when viewed from above, looking down.

WARNING: Improper operation of the tongue trowel mechanism can be dangerous. Before rotating a header, be sure that all three header lug contact bars on the trowel mechanism are in full contact with the header lugs. Disengagement of the header lug contact bars from the header lugs during the rotation process may force the form sideways. Failure to comply with this warning could result in serious bodily injury or death.

The tongue trowel is equipped with a rotating indicator at the center of the trowel. This indicator rotates by three fixed targets at the center to indicate the position of the trowel. By using this indicator, you can monitor the amount of trowel rotation.

Note: When rotating headers, it is important that a quality concrete release agent be applied to the concrete contact surfaces of the header before each use. Without this release agent, header removal from the cured products will be difficult.

11.5 Pressureheading Procedures

The information that follows gives instructions on how to perform the pressurehead cycle. See ***Machine Controls*** for information on controlling the pressurehead and tongue trowel.

Also included in this section of the manual are the different operating sequences that should be performed when pressureheading pipe. These sequences may need to be modified depending upon the actual product being headed, or because of other factors such as joint design, concrete mix, etc.

WARNING: Never attempt to lower or raise the pressurehead unless everyone, including you, is a safe distance away from the pressurehead and the form. Only control the pressurehead from the side of the main machine console, back away from the presshead. The moving presshead creates crush and pinch points that can result in serious personal injury or death.

Indexing the Presshead

WARNING: Never start the presshead with personnel near the presshead or when personnel are under the machine in the pit area. Failure to comply with the warning may result in serious personal injury or death.

Perform the following pre-starting checks before indexing the presshead:

- Check that all work operations are complete at each of the production stations.
- Check that all personnel are off and well clear of the platform.
- Check that the presshead is positioned correctly to clear the form.

1. Index the pipe machine's presshead to the filled pipe form at the machine's station.

WARNING: Do not approach the platform to perform any work operations until the presshead has come to a complete stop. Stand a safe distance away from the machine's presshead while it is rotating.

2. Insert the header into the filled form with the machine's header jib. See ***Header Handling Jib*** for information on placing the header into the filled form.
3. Position the hi/lo pressure valve to the desired pressure; either hi-pressure or lo-pressure.
4. Start the top and bottom vibrators.
    - Start the jacket vibrators at the main console.
    - Start the core vibrators from the platform control post.
5. Permit the headers to vibrate and settle into the concrete with float pressure before applying high pressure.

Note: For cap style headers, do not permit headers to vibrate and settle under float pressure. Apply high pressure to header before starting vibrators.

6. When desired, apply the full heading force to the header by actuating the three presshead air valves to lower the presshead onto the header.
7. If troweling of the header is desired, actuate the tongue trowel switch. It is recommended that the tongue trowel only be actuated for one-third revolution.

IMPORTANT: Do not attempt to trowel the header unless the pressurehead lugs on the header are in full contact with the contact bars on the tongue trowel. Attempting to trowel the header without full engagement of the trowel to the header lug may cause the form to be twisted to the side.

8. When the header is fully inserted into the form and the pressurehead is in full contact with the pipe form:
   - Maintain high pressure on the header and permit pipe to vibrate for approximately 20 to 30 seconds for the pipe to normalize.
   - After the pipe has been normalized, turn off the form vibrators and raise the pressurehead to its full up position.
9. For jacket vibrated forms, it is necessary to unplug the vibrators from the machine receptacles at the press lock post. This should be done after the presshead has been raised to its full up position and switched off.

11.6 Triple Ram Pressurehead Maintenance

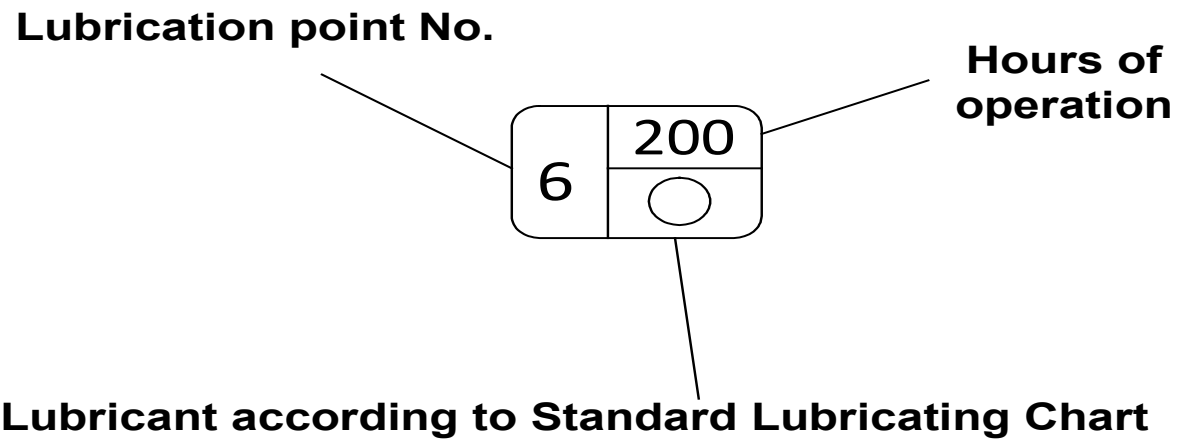
The information that follows gives instructions on how to maintain and service the **Triple Ram Pressurehead Machine's** pressurehead. Perform the procedures as listed below to be assured of safe, smooth operation of the pressurehead.

WARNING: Never service, clean up or go under the pressurehead before lockout of pressurehead to prevent accidental startup.

1. **Raise the pressurehead to its maximum height and check that safety latches are in place under pressurehead guide trough pins, in order to block the pressurehead from traveling down.**
2. **Shut off and lock out the hydraulic unit to prevent the tongue trowel from accidentally rotating.**

Only types of oil and grease stated on the Afinitas Standard Lubricating Chart or similar must be used.

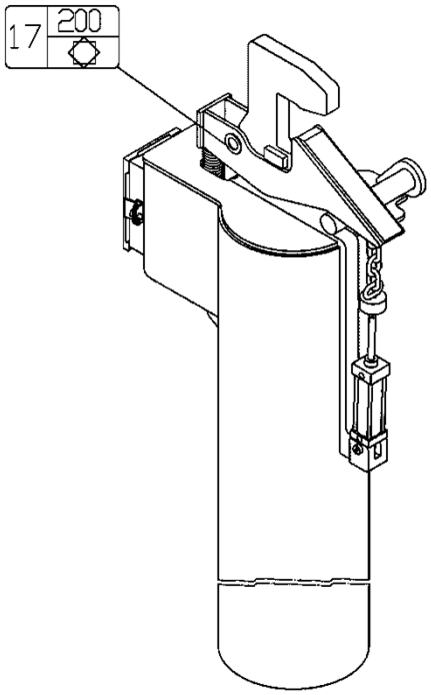
The lubrication points are stated as follows:

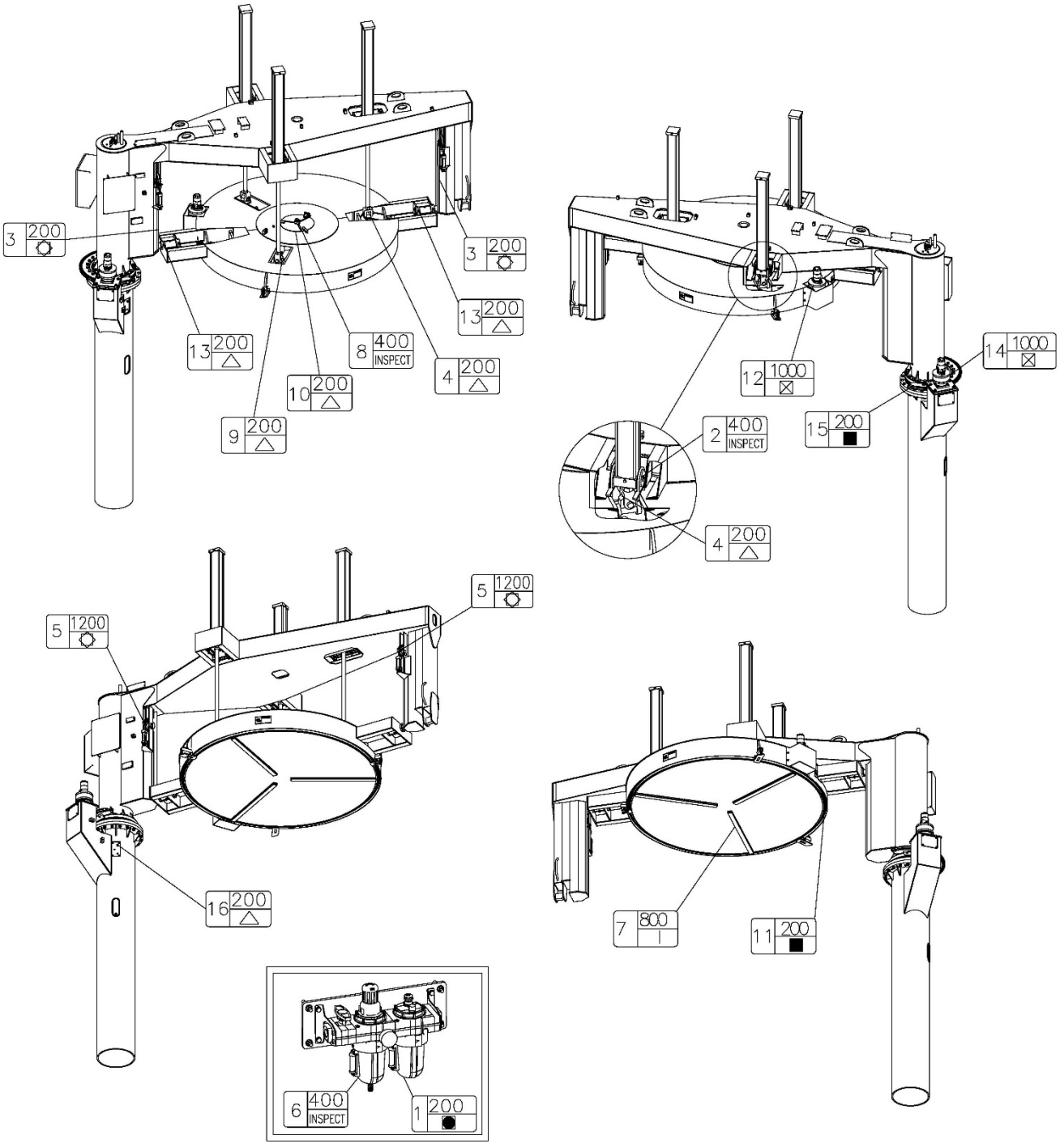


Triple Ram Press Lube and Maintenance

11.6.1.1 Lubrication Point Number

1. Air Line Lubricator
2. Press Cylinder Mounts Inspection
3. Guide Trough
4. Press Cylinder Mount Lube
5. Presshead Safety Latch Lubrication
6. Presshead Air Line Filter
7. Tongue Trowel Bars – Inspection
8. Tongue Trowel Bottom Plate
9. Tongue Trowel Cam Wheels
10. Tongue Trowel Center Thrust Bearing
11. Tongue Trowel Gear Chain
12. Tongue Trowel Gearbox
13. Tongue Trowel Guide Pins
14. Press Pivot Gearbox
15. Press Pivot Gear Chain
16. Press Pivot Bearing
17. Latch Mechanism Lubrication – spring and pivot




3 200
3 200
13 200
13 200
8 400 INSPECT
4 200
10 200
9 200
12 1000
14 1000
2 400 INSPECT
15 200
4 200
5 1200
5 1200
16 200
7 800
11 200
6 400 INSPECT
1 200

11.6.1.2 Servicing Pressurehead Air Line Lubricator

The overhead of the operator control console is a lubricator for lubrication of the pressurehead air cylinders.

IMPORTANT: Before adding oil to the lubricator, inlet pressure to the lubricator must be eliminated before the fill plug is removed.

Periodically

Check the supply bowl to make sure oil is present and fill when necessary. Utilize ISO 3448 Viscosity grade 32 or equivalent.

For normal operation, the lubricator can be adjusted to deliver the proper oil amount by closing the adjusting screw and then backing off 4-1/2 revolutions.

11.6.1.3 Replacing Air Pressurehead Cylinder Mounts

The air cylinders are equipped with rubber cushion mounts that help to suppress vibration.

Periodically

These mounts should be checked for wear and replaced as required. To replace, lower the pressurehead to its lowest position and block to prevent it from tipping. Then, disconnect the cylinders from the pressurehead at the clevises.

Unbolt the U-bolts from the rubber mounts and replace the existing mounts with new mounts. When bolting the U-bolts, be sure to double nut the bolts to prevent the bolts from working loose.

11.6.1.4 Lubricating Pressurehead Guide Trough

Located on each side of the pressurehead are guide pins that travel inside guide troughs located at the center post and outside jib post.

Bi-Weekly

Brush the guide troughs with a multipurpose grease to prevent wear to pins and trough.

11.6.1.5 Lubricating Cylinder Mounts on Pressurehead

Monthly

Lubricate the cylinder mounts on the pressurehead. Lubricate each of the mounts at three places, a total of (9) locations. A 1/8" oil hole is provided at each location for lubricating with a multipurpose grease.

11.6.1.6 Lubricating Pressurehead Safety Latches

Every 6 Months

Lubricate the pressurehead safety latch bearings at the zerks with a multipurpose grease.

Servicing Pressurehead Air Line Filter

The overhead of the operator control console is a filter that removes both free moisture and solids from the incoming air.

Periodically
Check the water level in the filter and drain. Water must be drained before the separated moisture and oil reaches the bottom lower baffle. Also, periodically check the filter element and remove when the pressure differential across the filter unit is excessive.

11.7 Tongue Trowel Maintenance

Replacing Tongue Trowel Abrasion Bars

The bottom star plate on the tongue trowel is equipped with (3) replaceable 1/2” x 2” (13mm x 50mm) abrasion bars welded to permanent 1/2” x 2” (13mm x 50mm) bars that stay connected to the bottom plate.

Bi-Weekly
Check these bars for wear and replace as required. Replace the bars before they are worn through to prevent wear to the permanent bars located underneath each of these replaceable bars.

11.7.1.1 Abrasion Bar Replacement Procedure

1. Remove the wear bars by cutting the welds that attach the wear bars to the permanent 1/2” x 2” (13mm x 50mm) bars. Each replaceable bar is held to the permanent bar with a weld at each end and (3) welds along each side, a total of (8) welds.
    a. **Note: Do not remove the permanent 1/2” x 2” (13mm x 50mm) bars under each of the replacement bars.**
2. For replacement bars, use 1/2" x 2" 1045 (13mm x 50mm) high carbon steel. Leave each of the bar ends 3/8" (10mm) short of the permanent bar ends for a 3/8" x 2" (10” x 50”) weld. Cut notches along the replacement bar sides for three equally spaced 1/4" (6mm) welds x 1-1/2" (38mm) long.
3. Accurately position the replacement bars over the permanent bars so the edges are flush and the ends are both 3/8" (10mm) short of the permanent bar ends.
4. Weld the replacement bars to the permanent bars with a 3/8" (10mm) weld x 2" (50mm) long at each end. Along the sides, place a 1/4" (6mm) weld x 1- 1/2" (38mm) long in the notches provided.
5. Grind these 1/4" (6mm) welds flat so they don't protrude out from the bottom or sides.

Tightening Tongue Trowel Bottom Plate

The rotating tongue trowel bottom plate is supported to the stationary structure of the pressurehead by a center bearing. The plate is supported about its perimeter by (3) cam followers that are mounted on the stationary structure of the pressurehead.

Periodically
Check the bottom plate for "play" at the cam followers. If loose, tighten the bottom plate.

Bottom Plate Tightening Procedure
1. Remove the top inspection cover.
2. Remove the cotter key from the center shaft bolt.

3. Rotate the nut on the center bolt until the bottom plate draws up tight to the cam followers.
   a. **Note: Do not over tighten. This may cause the bottom plate to distort.**
4. Insert the cotter key to prevent the bolt from turning.
5. Install the cover plate.

Lubricating Tongue Trowel Cam Rollers

Bi-Weekly

Lubricate the three cam rollers that support the perimeter of the tongue trowel bottom plate. Grease at the zerk on each roller axle with a high-quality multipurpose grease.

Lubricating Tongue Trowel Center Thrust Bearing

Monthly

Lubricate the center bearing mounted to the stationary structure of the pressurehead. Grease at the zerk with a high-quality multipurpose ball bearing grease.

Lubricating Tongue Trowel Gear Chain

Around the outside perimeter of the tongue trowel bottom plate is a roller chain.

Monthly

Lubricate the roller chain with SAE-30 weight oil.

Lubricate Press Pivot Latching Mechanism

The Press head pivots out over the form set and latches in place before the pressing function is engaged. The Press Pivot Latch is fixed on the lock post.

Periodically

Lubricate the latching pivot mechanism, spring and retainer chain with SAE-30 weight oil.

Notes

12 Header Jib

SS CAP 72 Machine

Machine Serial No. CP-430

Notes

12.1 Operating Header Return/Handling Jib

The purpose of the header return jib is to lift the headers from the floor, transport, and place into the filled form sets. With the header return jib, the overhead crane need not be used for lifting headers. The jib hoist is controlled by the pendant control suspended from the hoist.

A 21" - 72" (500mm-1800mm) header handling beam may be furnished with the **SS CAP 72 Machine that** places 21" - 72" (500mm-1800mm) diameter headers in single mode form sets. For optional multiform sets, a tong is required for each individual form set. The header handling beam is designed so it can be quickly detached from one multiform header tong to another during the production sequence.

A 21”-96” header handling beam may be furnished to place 21”-96” diameter headers in single mode form sets.

The electric hoist mounted to the jib is operated from a pendant control attached to the end of the header jib.

WARNING: The header pickup beam's lift components are made of special alloy steel. Inspect the components frequently for wear and replace as required. Use only Afinitas replacement parts to be assured of proper strength specifications.

WARNING: Do not use the header handling jib, hoist, or pickup beam for any other purpose except for which they were designed; elevating headers from the floor to the form.

Attaching Header to Header Sling or Beam

IMPORTANT: Check to be sure that the correct size header sling or beam is used with headers. The sling or beam size is marked on the identification tag attached to the connecting link. Do not use the header slings or beams for any other purpose except that for which it was designed. Do not use slings or beams for removing headers from the finished product. This will overload the sling or beam.

Fasten the header sling connecting link to the hoist hook. Inspect to be sure that the hook safety latch is present and working properly.

Fasten the shackles at the end of each sling leg to three equally spaced lugs on the header. Insert shackle pins through holes in header lugs. Check that all three shackle pins are secured with hairpins.

12.1.1.1 Transporting Header to Form

WARNING! Keep well clear of all overhead loads. Do not use the hoist limit switch for stopping the header in the elevated position. Do not place the header on the form if the core vibrator plugs have not been disconnected from the machine receptacle outlets and placed in the core socket holder.

Elevate the header to an overhead height that will allow the header clearance over the pipe form. Unlock the header return jib from the jib support pipe by pulling down on the jib lock arm lever until the lock arm disengages from the jib lock cog. Pull the chain line attached to the jib until the jib swings centers over the form. Do not attempt to swing jib by pulling on the pendant control cord. Lower header onto the form.

Disconnect the header sling from the header and return the jib to its original position. Lock the jib to the jib support pipe to avoid accidental movement of the jib. Lock jib by pushing down on jib lock arm lever, adjust jib swing to selected location, and then return lock arm lever to original position allowing lock arm to engage to jib lock cog. Finally, lower the header sling to the floor level.

WARNING! Do not elevate the header overhead for the next product until the header is required for the pressureheading operation.

Operating 21" - 72" (500mm-1800mm) Header Pickup Beam (Tong)

The 21" - 72" (500mm-1800mm) header pickup beam is designed for lifting one header at a time in the 21" - 72" (500mm-1800mm) diameter range. This tong is used for single mode form sets only. Headers for 10" - 18" (250mm-450mm) diameter forms are placed into the filled form set with a tong designed specifically for multiform operation.

In order to secure the 21" - 72" (500mm-1800mm) header tong to the jib hoist's lift chain, the lift chain's end connection is equipped with a connector link that mates to a 3/4" (19mm) pin that is placed through the beam's center. To fasten the connector link to the beam, align the connector link to the holes in the beam center and insert the 3/4" (19mm) pin through the beam and connector link, then secure the 3/4" (19mm) pin to the beam with the cotter key.

Note: If Multiform and Singleform production is to occur together during the production shift, it is necessary to switch header tongs for each form set. To perform this task quickly, the 3/4" (19mm) pin and cotter key can be replaced with a 3/4" (19mm) draw pin with a thumb release safety lock.

To pick up the header, position the pickup beam over the header and fully insert the hook at each end of the beam's lift chain into the liftholes located in the header lugs. The hooks must be attached to header lugs located 180^{o} apart to be assured that the header will be picked up level.

Elevate the header to a height sufficient to clear the filled form set. Then, swing the header over the form set and lower the header into the filled form. To disconnect the pickup beam from the header, lower the pickup beam to slacken the beam's lift chain and remove the lift hooks from the header handling lugs.

WARNING: Keep well clear of overhead loads. Do not stand under the elevated header or lift header over others that may be nearby.

Return the header pickup beam to the next header to be lifted and connect the beam to the header lugs in the proper manner. Do not elevate the header; leave the header on the ground so the header jib and beam are anchored to prevent movement.

WARNING: When not in use, the header pickup beam must be attached to the header setting on the floor to anchor the beam from movement. An unanchored jib or pickup beam may inadvertently swing out of control and strike others or become lodged under the presshead while it is operating.

Operating the Multi Header Tong - Optional

For multiform production, header handling tongs are designed to pick up either two or four headers at a time, depending upon whether dual mode or quad mode production is occurring. A separate tong is required for each individual form set.

A quick disconnect pin is provided at the tong center for detaching the hoist's lift chain in each tong. With the use of this quick disconnect pin, the header jib can be quickly attached to the different header tongs.

WARNING: Do not operate the header tong if the fastener pin is not in good working condition. The fastener pin is equipped with a thumb release pin which must be depressed in order to remove the pin from the tong bracket. If the pin locking mechanism is not working properly, the pin could fall out of the tong and drop the header tong and header to the floor.

1. The multi header tong attaches to the bottom of the 21" to 72" (500mm-1800mm) header tong. Before making this attachment, flip the two sets of chains out and over the end of the beam. Place the hooks in the gap at the center of the beam. Then align the center pickup eye located on the bottom of the 21" to 72" (500mm-1800mm) header tong, with the pin bracket at the tong center. Insert the fastener pin through the tong bracket and pickup eye. The fastener pin is equipped with a thumb-release pin that locks the pin to the holder to prevent accidental disengagement.
2. To engage the headers to the tong, situate two or four headers on the floor (depending upon Duoform or Quadform production) at the same approximate centers they will assume in the form. Locate the header tong over the headers and lower the tong so the two front non-adjustable tong forks for each header drops inside the headers, then push forward on the tong so each set of non-adjustable forks latch under the lip of the header flange.
3. Rotate the tong lever so the third adjustable fork inside each header rotates around and latches under the header flange. Lock the adjustable fork's tong lever in its locked position by pushing down on the vertical safety pin that prevents the tong lever from accidentally being rotated.

4. Elevate the headers to a height sufficient to clear the filled form set. Then, swing the header over the form set and lower the header into the filled form.
5. To remove the tong from the headers, pull up approximately 3/4" (19mm) on the safety pin and rotate the tong lever to rotate the adjustable forks out from under the header flange. Then pull back and lift the tong out from the headers. Leave the safety pin in its "up" position and close your lock only after the next set of headers have been installed to the tong. It is not necessary to remove the safety pin from its holder, lifting it approximately 3/ 4" (19mm) will hold the pin up so the tong lever can be rotated under it.
6. Return the header pickup tong to the next header to be lifted and connect the tong to the headers in the proper manner. Do not elevate the headers, leave the headers on the ground so the header jib and beam are anchored to prevent movement.

WARNING: When not in use, the header pickup beam must be attached to a header setting on the floor to anchor the beam from movement. An unanchored jib or pickup beam may inadvertently swing out of control and strike others or become lodged under the presshead while it is operating.

With the header return jib, it is possible to stack a quantity of headers at the machine for use during production. It is suggested that a stand or support pallet be constructed for the headers to be placed upon. These can be purchased from Afinitas or manufactured locally. Headers are oily and unstable when stacked unsupported. The support pallets should be designed in such a manner that if the headers were accidentally struck, they would not scatter or fall to the floor but rather be contained or supported by the support pallet. Remember, when constructing the support pallet to position bracing materials so they do not interfere with the header pickup beam when it is lowered for attachment to the headers.

12.2 Header Handling Jib Maintenance

The information that follows gives instructions on how to maintain and service the **Triple Ram Press Machine's** header handling jib. Perform the procedures as listed below to be assured of safe, smooth operation of the header handling jib.

Performing Hoist Inspections

To maintain continuous and satisfactory operation, a regular inspection procedure for the hoist must be initiated so that worn or damaged parts can be replaced before they become unsafe.

Daily-Perform daily inspections as stated by the original manufacturer's manual, Figure 1a-1g. Refer to the instructions, maintenance, and parts manual for the hoist for detailed information on the inspection schedule.

Inspecting Header Handling Beam Chains & Pins

Daily-Inspect load chains and pins on header handling beam for wear or damage. Replace worn or damaged parts.

Lubricating Hoist Load Chain

A small amount of lubricant will greatly increase the life of the load chain. Therefore, the chain should not be allowed to run dry. Refer to ***Figure 2a-2f,*** the Maintenance and Handling pages from the equipment manufacturer's manual, for more information.

Daily-Under hot and/or dirty conditions, it may be necessary to clean the chain at least once a day and lubricate it several times between cleanings.

Bi-Weekly-Under ordinary conditions, biweekly lubrication and cleaning with a solvent is satisfactory.

When lubricating the chain, the lubricant must be applied in sufficient quantity to obtain natural run-off and full coverage of the chain.

Lubricating Jib Lower Hook Thrust Bearing

Monthly-Lubricate the lower hook thrust bearing. Refer to Figure 2a-2f for detailed instructions.

Lubricating Hoist Chain Idler Sprocket Bearings

Every 6 Months-Lubricate the hoist chain idler sprocket bearings with a multipurpose spray lubricant.

Adjusting Jib Limit Switch

The hoist provided with your machine has upper and lower limit switches that automatically stop the hoisting motion of the hoist. These limit switches are factory set to their proper settings. It is very important that the limit switches, especially the upper limit switch, remain set properly to prevent damage to the hoist or jib.

The upper limit switch must be set so the header handling tong top, where the load chain is connected, stops 1¾" from the bottom of the jib.

The lower limit switch must be set so the tongs can be lowered far enough to reach headers on the floor. Do not allow the chain to lower further than that stated in the original manufacturer's manual Maintenance and Repair section, ***Figure 3a-3d***. For details on adjusting limit switches see ***Figure 3a-3d***.

Lubricating Jib Limit Switch Threads

Yearly-Apply a light film of machine oil to the limit switch shaft threads.

Lubricating Jib Bearings

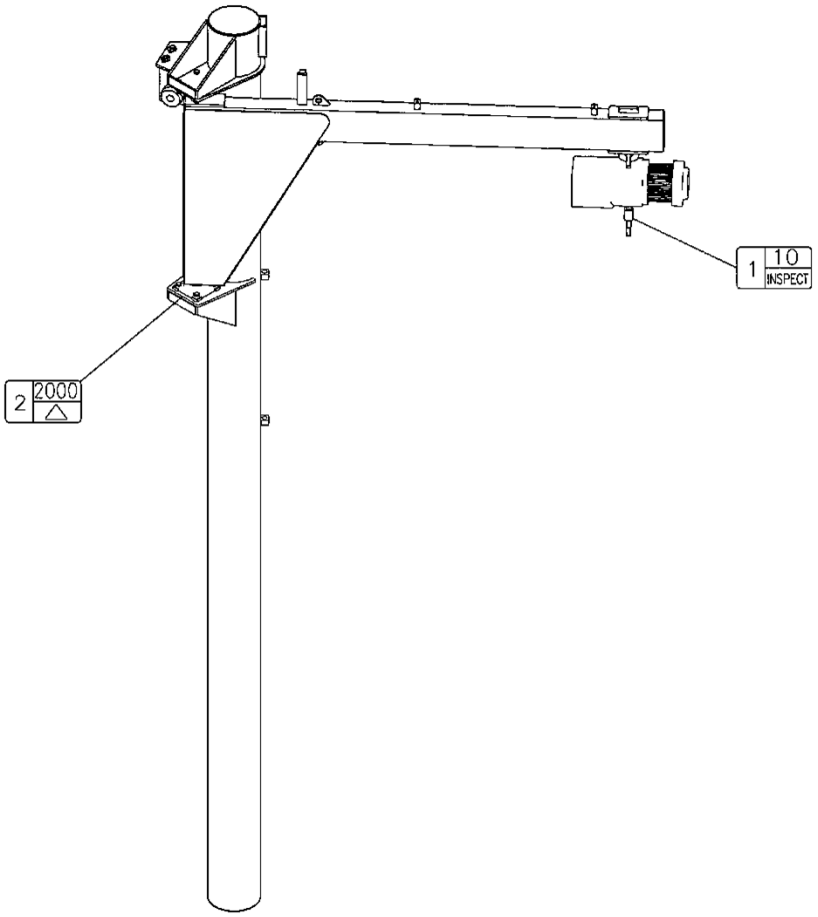
Yearly-Lubricate the (4) jib bearings at the zerks with a high-quality multipurpose ball bearing grease.

Performing Yearly Hoist Inspection

Yearly-Perform a complete inspection on the hoist. Records should be kept of this inspection to provide the basis for continuing evaluation of the condition of the hoist. Refer to ***Figures 1a-1g*** for more information on conducting this yearly inspection.

Lubrication Point Numbers

1. Hoist
2. Jib Bearings



Inspection

General

5.1.1 The inspection procedure herein is based on ANSI/ASME B30.16. The following definitions are from ANSI/ASME B30.16 and pertain to the inspection procedure below.

- **Designated Person** – a person selected or assigned as being competent to perform the specific duties to which he/she is assigned.
- **Qualified Person** – a person who, by possession of a recognized degree or certificate of professional standing, or who, by extensive knowledge, training, and experience, has successfully demonstrated the ability to solve or resolve problems relating to the subject matter and work.
- **Normal Service** – that distributed service which involves operation with randomly distributed loads within the rated load limit, or uniform loads less than 65% of rated load for not more than 25% of the time.
- **Heavy Service** – that service which involves operation within the rated load limit which exceeds normal service.
- **Severe Service** – that service which involves normal or heavy service with abnormal operating conditions.

Inspection Classification

5.2.1 Initial Inspection – prior to initial use, all new, altered, or modified hoists shall be inspected by a designated person to ensure compliance with the applicable provisions of this manual.

5.2.2 Inspection Classification – the inspection procedure for hoists in regular service is divided into two general classifications based upon the intervals at which inspection should be performed. The intervals in turn are dependent upon the nature of the critical components of the hoist and the degree of their exposure to wear, deterioration, or malfunction. The two general classifications are herein designated as FREQUENT and PERIODIC, with respective intervals between inspections as defined below.

5.2.3 FREQUENT Inspection – visual examinations by the operator or other designated personnel with intervals per the following criteria:

- Normal service – monthly
- Heavy service – weekly to monthly
- Severe service – daily to weekly
- Special or infrequent service – as recommended by a qualified person before and after each occurrence.

5.2.4 PERIODIC Inspection – visual inspection by a designated person with intervals per the following criteria:

- Normal service – yearly
- Heavy service – semiannually
- Severe service – quarterly
- Special or infrequent service – as recommended by a qualified person before the first such occurrence and as directed by the qualified person for any subsequent occurrences.

Inspection Figure 1a

5.3 Frequent Inspection

5.3.1 Inspections should be made on a FREQUENT basis in accordance with Table 5-1, "Frequent Inspection." Included in these FREQUENT Inspections are observations made during operation for any defects or damage that might appear between Periodic Inspections. Evaluation and resolution of the results of FREQUENT Inspections shall be made by a designated person such that the hoist is maintained in safe working condition.

Table 5-1 Frequent Inspection
All functional operating mechanisms for maladjustment and unusual sounds.
Operation of limit switch and associated components
Hoist braking system for proper operation
Hooks in accordance with ANSI/ASME B30.10
Hook latch operation
Load chain in accordance with Section 5.7
Load chain reeving for compliance with Section 3.2 and 6.4

5.4 Periodic Inspection

5.4.1 Inspections should be made on a PERIODIC basis in accordance with Table 5-2, "Periodic Inspection." Evaluation and resolution of the results of PERIODIC Inspections shall be made by a designated person such that the hoist is maintained in safe working condition.

5.4.2 For inspections where load suspension parts of the hoist are disassembled, a load test per ANSI/ASME B30.16 must be performed on the hoist after it is re-assembled and prior to its return to service.

Table 5-2 Periodic Inspection
Requirements of frequent inspection.
Evidence of loose bolts, nuts, or rivets.
Evidence of worn, corroded, cracked, or distorted parts such as load blocks, suspension housing, chain attachments, clevises, yokes, suspension bolts, shafts, gears, bearings, pins and rollers.
Evidence of damage to hook retaining nuts or collars and pins, and welds or rivets used to secure the retaining members.
Evidence of damage or excessive wear of load and idler sheaves.
Evidence of excessive wear on motor or load brake.
Electrical apparatus for signs of pitting or any deterioration of visible controller contacts.
Evidence of damage of supporting structure or trolley, if used.
Function labels on pendant control stations for legibility.
Warning label properly attached to the hoist and legible (see Section 1.2).
End connections of load chain.

Inspection Figure 1b

5.5 Occasionally Used Hoists

5.5.1 Hoists that are used infrequently shall be inspected as follows prior to placing in service:

- Hoist Idle More Than 1 Month, Less Than 1 Year: Inspect per FREQUENT Inspection criteria in Section 5.3.
- Hoist Idle More Than 1 Year: Inspect per PERIODIC Inspection criteria in Section 5.4.

5.6 Inspection Records

5.6.1 Dated inspection reports and records should be maintained at time intervals corresponding to those that apply for the hoist's PERIODIC interval per Section 5.2.4. These records should be stored where they are available to personnel involved with the inspection, maintenance, or operation of the hoist.

5.6.2 A long range chain inspection program should be established and should include records of examination of chains removed from service so a relationship can be established between visual observation and actual condition of the chain.

5.7 Inspection Methods and Criteria

5.7.1 This section covers the inspection of specific items. The list of items in this section is based on those listed in ANSI/ASME B30.16 for the Frequent and Periodic Inspection. In accordance with ANSI/ASME B30.16, these inspections are not intended to involve disassembly of the hoist. Rather, disassembly for further inspection would be required if frequent or periodic inspection results so indicate. Such disassembly and further inspection should only be performed by a qualified person trained in the disassembly and re-assembly of the hoist.

Table 5-3 Hoist Inspection Methods and Criteria

Item	Method	Criteria	Action
Functional operating mechanisms.	Visual, Auditory	Mechanisms should be properly adjusted and should not produce unusual sounds when operated.	Repair or replace as required.
Limit Switch	Function	Proper operation. Actuation of limit switch should stop hoist.	Repair or replace as required.
Limit Lever Assembly	Visual, Function	Lever should not be bent or significantly worn and should be able to move freely.	Replace.
Braking System Operation	Function	Braking distance with rated capacity should not exceed 3% of the lifting speed (approximately two chain links).	Repair or replace as required.
Hooks - Surface Condition	Visual	Should be free of significant rust, weld splatter, deep nicks, or gouges.	Replace.
Hooks - Fretting wear	Measure	The "u" and "t" dimensions should not be less than discard value listed in **Table 5-4**	Replace.
Hooks - Stretch	Measure	The "k" dimension should not be greater than 1.15 times that measured and recorded at the time of purchase (See **Section 3.6**). If recorded "k" values are not available for hooks when new, use nominal "k" values from **Table 5-4.**	Replace.
Hooks - Bent Shank or Neck	Visual	Shank and neck portions of hook should be free of deformations.	Replace.

Inspection Figure 1c

Table 5-3 Hoist Inspection Methods and Criteria			
Item	**Method**	**Criteria**	**Action**
Hooks - Yoke Assembly	Visual	Should be free of significant rust, weld splatter, nicks, gouges. Holes should not be elongated, fasteners should not be loose, and there should be no gap between mating parts.	Tighten or replace as required.
Hooks - Swivel Bearing	Visual, Function	Bearing parts and surfaces should not show significant wear, and should be free of dirt, grime and deformations. Hook should rotate freely with no roughness.	Clean/lubricate, or replace as required.
Hooks - Idle Sheave and Axle (Bottom Hook on Double Fall Hoist)	Visual, Function	Pockets of Idle Sheave should be free of significant wear. Idle Sheave surfaces should be free of nicks, gouges, dirt and grime. Bearing parts and surfaces of Idle Sheave and Axle should not show significant wear. Idle Sheave should rotate freely with no roughness or significant free play.	Clean/lubricate, or replace as required.
Hooks - Hook Latches	Visual, Function	Latch should not be deformed. Attachment of latch to hook should not be loose. Latch spring should not be missing and should not be weak. Latch movement should not be stiff - when depressed and released latch should snap smartly to its closed position.	Replace.
Load Chain - Surface Condition	Visual	Should be free of rust, nicks, gouges, dents and weld splatter. Links should not be deformed, and should not show signs of abrasion. Surfaces where links bear on one another should be free of significant wear.	Replace.
Load Chain - Pitch and Wire Diameter	Measure	The "P" dimension should not be greater than maximum value listed in Table 5-5. The "d" dimension should not be less than minimum value listed in Table 5-5.	Replace. Inspect Load Sheave (and Idle Sheave for double fall hoist).
Load Chain - Lubrication	Visual, Auditory	Entire surface of each chain link should be coated with lubricant and should be free of dirt and grime. Chain should not emit cracking noise when hoisting a load.	Clean/lubricate (see Section 6.0).
Load Chain - Reeving	Visual	Chain should be reeved properly through Load Sheave (and Idle Sheave for double fall hoist) - refer to Section 6.4. Chain, Chain Springs, Cushion Rubbers, Striker Plates, and Stoppers should be installed properly - refer to Section 3.2.	Reeve/Install chain properly.
Chain Container (optional)	Visual	Container should not be damaged. Brackets should not be deformed or missing.	Replace.
Housing and Mechanical Components	Visual, Auditory, Vibration, Function	Hoist components including load blocks, suspension housing, chain attachments, clevises, yokes, suspension bolts, shafts, gears, bearings, pins and rollers should be free of cracks, distortion, significant wear and corrosion. Evidence of same can be detected visually or via detection of unusual sounds or vibration during operation.	Replace.

Inspection Figure 1d

Table 5-3 Hoist Inspection Methods and Criteria			
Item	**Method**	**Criteria**	**Action**
Bolts, Nuts and Rivets	Visual, Check with Proper Tool	Bolts, nuts and rivets should not be loose.	Tighten or replace as required.
Motor Brake	Measure, Visual	Motor brake gap should be adjusted to the distance shown in Table 6-4 before measuring the brake wear. Brake lining dimension "A" should not be less than discard value listed in Table 5-6. Refer to Section 6.3 for gaining access to motor brake and for adjustment and inspection procedures. Braking surfaces should be clean, free of grease/oil and should not be glazed.	Adjust, Repair or Replace as required.
Contactor Contacts	Visual	Contacts should be free of significant pitting or deterioration. On hoists equipped with Count/Hour Meter check the contactor cycles – refer to Section 6.1.	Replace.
Load Sheave	Visual	Pockets of Load Sheave should be free of significant wear.	Replace.
Cushion Rubber	Visual	Should be free of significant deformation.	Replace.
Chain Springs	Visual	Chain springs should not be deformed or compressed.	Replace.
Pendant - Switches	Function	Depressing and releasing push-buttons should make and break contacts in switch contact block and result in corresponding electrical continuity or open circuit. Push-buttons should be interlocked either mechanically or electrically to prevent simultaneous energization of circuits for opposing motions (e.g. up and down).	Repair or replace as necessary.
Pendant - Housing	Visual	Pendant housing should be free of cracks and mating surfaces of parts should seal without gaps.	Replace.
Pendant - Wiring	Visual	Wire connections to switches in pendant should not be loose or damaged.	Tighten or repair
Pendant - Cord	Visual, Electrical Continuity	Surface of cord should be free from nicks, gouges, and abrasions. Each conductor in cord should have 100% electrical continuity even when cord is flexed back-and-forth. Pendant Cord Strain Relief Cable should absorb all of the load associated with forces applied to the pendant.	Replace.
Pendant - Labels	Visual	Labels denoting functions should be legible.	Replace.
Warning Labels	Visual	Warning Labels should be affixed to the hoist (see Section 1.2) and they should be legible.	Replace.
Hoist Capacity Label	Visual	The label that indicates the capacity of the hoist should be legible and securely attached to the hoist.	Replace.

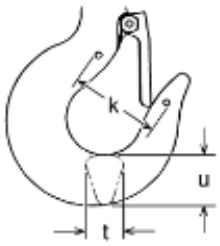
Inspection Figure 1e

Table 5-4 Top Hook & Bottom Hook Dimensions

"k" Measured When New:

Top: _____

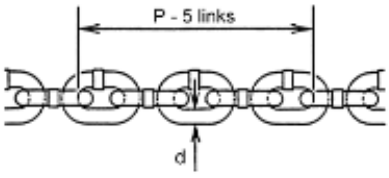
Bottom: _____



Capacity Code	Nominal "k" Dimension* inch (mm)	"u" Dimension inch (mm)		"t" Dimension inch (mm)	
		Standard	Discard	Standard	Discard
001H, 003S, 003H, 005L, 005S	1.65 (42)	0.93 (23.5)	0.83 (21)	0.69 (17.5)	0.63 (16)
010L, 010M, 010S	1.97 (50)	1.22 (31)	1.10 (28)	0.89 (22.5)	0.79 (20)
015S	2.36 (60)	1.44 (36.5)	1.30 (33)	1.04 (26.5)	0.94 (24)
020L, 020M, 020S	2.46 (62.5)	1.57 (40)	1.42 (36)	1.14 (29)	1.02 (26)
025S	2.72 (69)	43.5 (1.71)	1.54 (39)	1.24 (31.5)	1.10 (28)
030C, 030L, 030S	2.95 (75)	1.87 (47.5)	1.69 (43)	1.36 (34.5)	1.22 (31)
050L	3.27 (83)	2.20 (56)	1.97 (50)	1.67 (42.5)	1.50 (38)

* These values are nominal since the dimension is not controlled to a tolerance. The **"k"** dimension should be measured when the hook is new - this becomes a reference measurement. Subsequent measurements are compared to this reference to make determinations about hook deformation/stretch. See Section 5.7, "Hooks - Stretch".

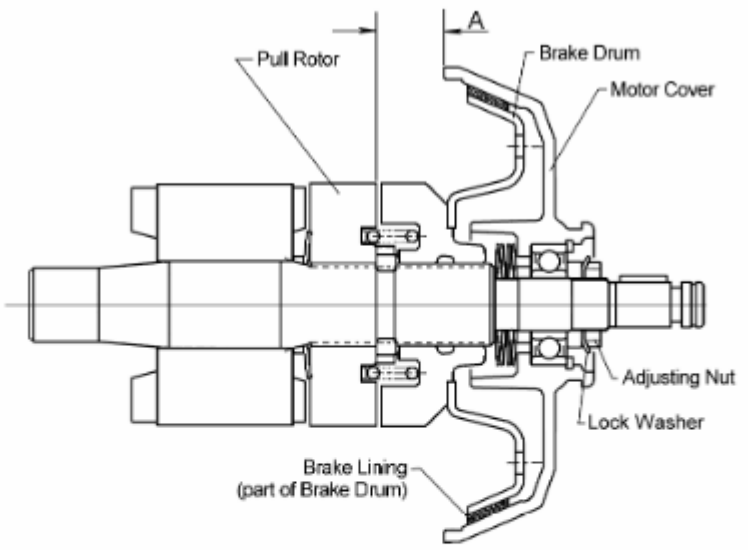
Table 5-5 Chain Wear Dimensions



Capacity Code	"P" Dimension inch (mm)		"d" Dimension inch (mm)	
	Standard	Discard	Standard	Discard
001H, 003S,	2.97 (75.5)	3.02 (76.6)	0.22 (5.0)	0.18 (4.5)
003H, 005L, 005S	3.76 (95.5)	3.82 (96.9)	0.25 (6.3)	0.22 (5.7)
010L, 010M, 010S	4.76 (121.0)	4.91 (124.6)	0.31 (8.0)	0.28 (7.2)
015S, 020L, 020M, 020S, 030C	5.96 (151.5)	6.05 (153.8)	0.39 (10.0)	0.35 (9.0)
025S, 050L	6.75 (171.5)	6.85 (174.1)	0.44 (11.2)	0.40 (10.1)
030L, 030S	7.52 (191)	7.74 (196.7)	0.49 (12.5)	0.44 (11.3)

Inspection Figure 1f

Table 5-6 Motor Brake Wear Dimensions



NOTICE Brake must be properly adjusted before measuring "A". See Section 6.3

Capacity Code	"A" Dimension - inch (mm)			
	Single Speed		Dual Speed	
	Standard	Discard	Standard	Discard
001H, 003S, 005L	0.67 (17)	0.61 (15.5)	0.67 (17)	0.61 (15.5)
003H, 005S, 010L, 010M	0.85 (21.5)	0.79 (20)	0.85 (21.5)	0.79 (20)
010S, 015S, 020L, 020M, 030C	0.89 (22.5)	0.83 (21)	1.06 (27)	1.00 (25.5)
020S, 025S, 030L, 030S, 050L	0.83 (21)	0.77 (19.5)	1.54 (39)	1.48 (37.5)

Maintenance and Handling Figure 2g

6.0 Maintenance and Handling

6.1 Count/Hour Meter

6.1.1 The Count/Hour (C/H) Meter located in on the electrical control panel records the hoist's on time and number of starts. To view the two values press the button on the C/H Meter one time. The display will first show an "H" and a 4 digit number which is the hoist's total on time (up and down) in hours. After 3 seconds the display will automatically change to a 6 digit number which is the number of starts of the hoist's down contactor. Refer to Figure 6-1.

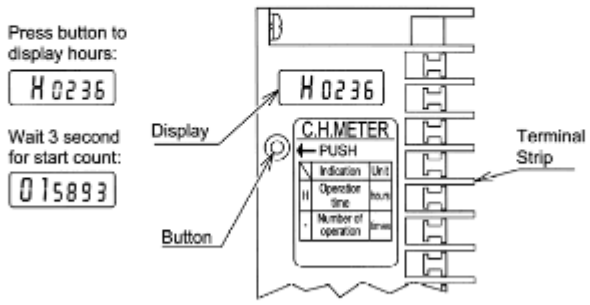


Figure 6-1 Count/Hour Meter

6.1.2 Contactor – The C/H Meter can be used in conjunction with the amount of jogging to estimate when the contactor(s) should be replaced. Jogging is when the pendant control buttons are pressed quickly and repetitively to move the hook in small increments. Refer to Table 6-1.

Table 6-1 Criteria for Recommended Contactor Replacement

Jogging During Normal Operation		Change Contactor After:
Rating	Approximate Jogging Frequency	(starts)
Low	Jogging is rare.	1,000,000
Medium	During 25% of operations/lifts.	500,000
High	During 50% or more of operations/lifts.	200,000

6.1.3 Gear Oil – The C/H Meter can be used in conjunction with the average load lifted by the hoist to estimate when the gear oil should be changed. Refer to Table 6-2.

Table 6-2 Criteria for Recommended Gear Oil Replacement

Loading During Normal Operation		Change Gear Oil After:
Rating	Average % of Rated Capacity	(hours)
Light	0 to 33%	360
Medium	33 to 67%	240
Heavy	67 to 100%	120

6.1.4 You are encouraged to use the Count/Hour Meter in conjunction with your experience with the hoist's application and usage to develop a history upon which to gage and fine tune your maintenance program for the hoist.

Maintenance and Handling Figure 2a

6.2 Lubrication

6.2.1 Load Chain

- For longer life, the load chain should be lubricated.
- The load chain lubrication should be accomplished after cleaning the load chain with an acid free cleaning solution.
- Apply Harrington lubricating grease (Part No. ER1BS1951) or an equivalent to industrial general lithium grease, NLGI No. 0, to the bearing surfaces of the load chain links as indicated by the shaded areas in Figure 6-2. Also apply the grease to the areas of the load chain (shaded areas in Figure 6-2) that contact the load sheave. Insure that the grease is applied to the contact areas in the load sheave pockets.
- Machine or gear oil (grade ISO VG 46 or 68 oil or equivalent) may be used as an alternative lubricant but must be applied more frequently.

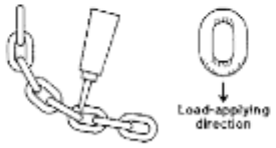


Figure 6-2 Chain Grease Application

- The chain should be lubricated every 3 months (more frequently for heavier usage or severe conditions).
- For dusty environments, it is acceptable to substitute a dry lubricant.

6.2.2 Hooks and Suspension Components:

- Hooks - Bearings should be cleaned and lubricated at least once per year for normal usage. Clean and lubricate more frequently for heavier usage or severe conditions.
- Suspension Pins - Lubricate at least twice per year for normal usage; more frequently for heavier usage or severe conditions.

6.2.3 Gear Box:

- **⚠WARNING** Using an incorrect type/grade of gearbox oil or the wrong quantity of oil may prevent the friction clutch from working properly and may affect the ability of the hoist to hold the load. Refer to Section 3.1 for the correct oil and quantity.
- The oil level can be checked using the oil check hole on the side of the hoist body shown in Figure 3-1. The oil level should be in accordance with Table 6-3 below.

Table 6-3 Criteria for Checking Hoist Gear Oil Level

Capacity Code	Oil Level (Hoist at level position)	
	Min	Max
Up to and including 010M	½ " below bottom edge of check hole	Even with bottom edge of check hole.
010S and Up	1" below bottom edge of check hole	Even with bottom edge of check hole.

Maintenance and Handling Figure 2b

- Change gear oil at least once every 5 years. The oil should be changed more frequently depending on the hoist's usage and operating environment. Refer to Section 6.1.
- Refer to Figure 3-1 and Table 3-1 to change the gear oil, remove both fill and drain plugs and allow the old oil drain completely. Replace the drain plug and refill the gear case with the correct quantity of new oil or until the oil level is within the range shown in Table 6-3.
- **NOTICE** Dispose of the used oil in accordance with local regulations.

6.3 Motor Brake

6.3.1 To keep your hoist working in optimum condition and prevent possible down time, it is recommended to check your motor brake lining and adjustment at regular intervals.

6.3.2 Motor Brake Unit Removal - Adjustment and inspection of the motor brake requires removal of the motor brake unit from the hoist as an assembly.

1) **CAUTION** Before proceeding disconnect the power supply and make sure the hoist is unloaded. To keep the load chain from moving secure it by tying together the load and no-load sides directly under the hoist using a cord or wire.

2) Refer to Figure 6-3.

3) Remove the four Fan Cover bolts (A), Fan Cover (B), Fan snap ring (C), and Fan washer (D).

4) Pull the Fan (E) off the motor shaft using a wheel puller if necessary.

5) Remove the four Motor Cover Assembly bolts (F) and carefully pull the motor brake unit (G) out of the hoist.

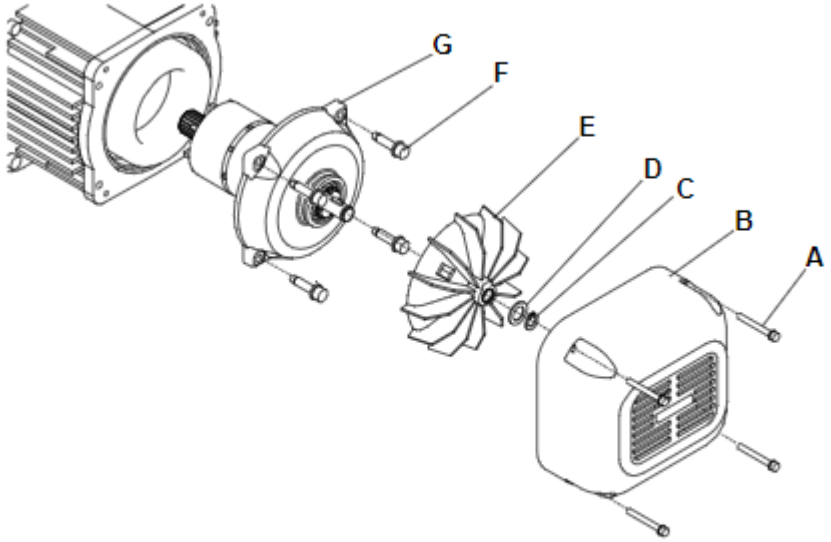


Figure 6-3 Motor Brake

6.3.3 Brake Gap (G) - The Brake Gap should be measured between the Brake Drum and Pull Rotor. Adjustment of the Brake Gap is accomplished by turning the Adjustment Nut in the center of the Motor Cover as shown in the figure with Table 6-4. Do this as follows:

Maintenance and Handling Figure 2c

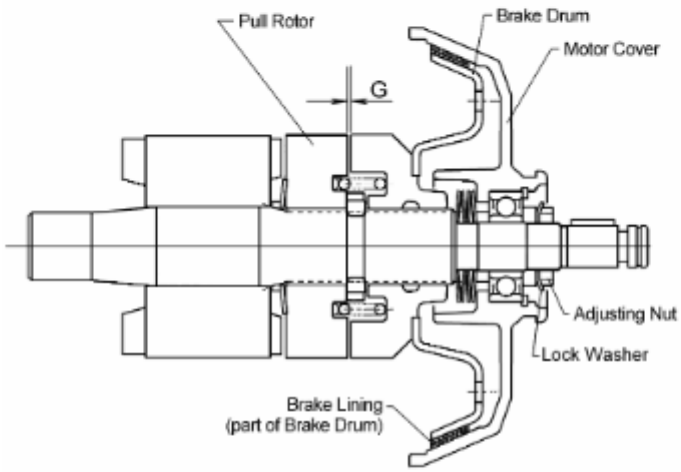
1) Bend the tab of the Lock Washer away from the Adjusting Nut so that the Adjusting Nut can be rotated.

2) Using a spanner wrench and a feeler gauge, rotate the Adjusting Nut to attain the proper Brake Gap per Table 6-4.

3) After the Brake Gap is set, secure the Adjusting Nut by bending one of the tabs of the Lock Washer into a slot in the Adjusting Nut. If necessary rotate the Adjusting Nut clockwise (tightening) to line up the tab with the slot.

4) If the proper brake adjustment cannot be achieved, disassemble the motor brake and inspect all motor brake parts. Replace the Brake Drum and/or Motor Cover if necessary.

Table 6-4 **Motor Brake Gap**



Capacity Code	Brake Gap (G) inch (mm)
001H, 003S, 005L, 003H, 005S, 010L, 010M, 010S, 015S, 020L, 020M, 030C	0.020 (0.5)
020S, 025S, 030L, 030S, 050L	0.032 (0.8)

6.3.4 Brake Lining Inspection –The brake lining is designed for a long life and should provide years of trouble-free service. If the brake lining is being inspected due to excessive load chain drift during operation (see Section 5.7), disassemble the motor brake and inspect all motor brake parts. Braking surfaces should be clean, free of grease/oil and should not be glazed. Replace the Brake Drum and/or Motor Cover if necessary. For normal inspections, the Brake Lining and Motor Cover wear should be measured as follows.

1) Adjust the Brake Gap per Section 6.3.3 before measuring the Brake Lining and Motor Cover wear.

2) Refer to Table 5-6.

3) Measure the distance "A" using calipers and a straight edge. Place the straight edge across the edge of the motor cover and measure from the straight edge to the face of the Pull Rotor.

4) Compare the measurement with the values listed in Table 5-6. Replace the Brake Drum and/or Motor Cover if the "A" measurement is smaller than the discard limit.

Maintenance and Handling Figure 2d

6.3.5 Motor Brake Unit Installation - After the brake is properly adjusted and inspected, carefully replace the motor brake unit back into the hoist. Be sure to reseal the Motor Cover to motor frame surface using a small bead of liquid (hi-temperature) sealant. Refer to Section 6.3.2 and reassemble the parts in reverse order of removal.

6.4 Load Chain

6.4.1 Lubrication and Cleaning – refer to Section 6.2.

6.4.2 Load Chain Replacement:

1) **CAUTION** The hoist must be properly powered and operational in order to perform the following procedures.

2) **WARNING** Be certain that the replacement chain is obtained from Harrington and is the exact size, grade and construction as the original chain. The new load chain must have an odd number of links so that both its end links have the same orientation. If the load chain is being replaced due to damage or wear out, destroy the old chain to prevent its reuse.

3) **CAUTION** When replacing load chain, check for wear on mating parts, i.e. Load Sheave, Chain Guides and Idle Sheaves, and replace parts if necessary.

4) Remove all chain components including the Bottom Hook Set Assembly, Stoppers, Cushion Rubbers, Chain Springs, Striker Plates, Chain Pin and End Wire (or End Suspender) from the chain for reuse on new chain. Inspect and replace any damaged or worn parts.

5) Using a C-link, attach the new chain to the end link of the old chain on the no-load side. The end link of the new load chain should be connected so that the welded portions of the load chain's standing links are oriented to the outside as they pass over the sheave. Refer to Figure 6-4.

6) Operate the hoist down to move the chain though the hoist body. Stop when a sufficient amount of new chain is accumulated on the load side.

7) Single fall hoists - Attach the chain components (step 4 above) to the chain. Refer to Section 3.2 for the proper locations.

8) Double falls (030C, 050L) - Feed the end link on the load side of the new chain through the required chain components (step 4 above) and the bottom hook's Idle Sheave. Attach the remaining chain components to the chain referring to Section 3.2 for the proper locations. Connect the end link to the top connection yoke with the chain pin, slotted nut and cotter pin. Ensure that chain remains free of twists. Refer to Figures 3-6 and 3-7.

9) **WARNING** Make sure Stoppers, Cushion Rubbers, Chain Springs and Striker Plates are properly installed. Refer to Section 3.2.

10) After installation has been completed, perform steps outlined in Section 3.6 "Preoperational Checks and Trial Operation".

6.5 Friction Clutch and Mechanical Load Brake with Friction Clutch

6.5.1 Friction Clutch (NER Models) – If abnormal operation or slippage occurs do NOT attempt to disassemble or adjust the Friction Clutch. Replace the worn or malfunctioning Friction Clutch as an assembly with a new, factory adjusted part.

6.5.2 Mechanical Load Brake with Friction Clutch (ER Models) – If abnormal operation or slippage occurs do NOT attempt to disassemble or adjust the Mechanical Load Brake with Friction Clutch. Replace the worn or malfunctioning Mechanical Load Brake with Friction Clutch as an assembly with a new, factory adjusted part.

Maintenance and Handling Figure 2e

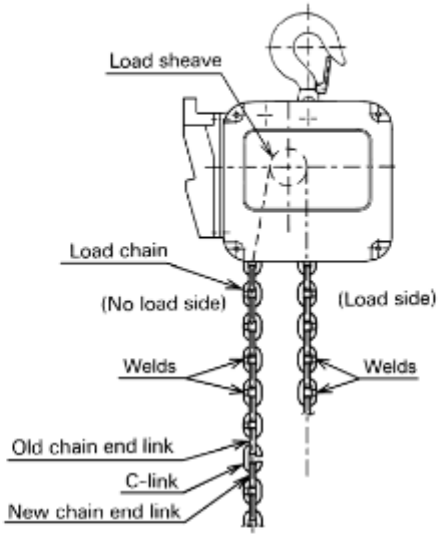


Figure 6-4 Chain Replacement

6.6 Storage

6.6.1 ER models with vented oil cap assemblies should be stored with the cap oriented up to prevent oil leakage.

6.6.2 The storage location should be clean and dry.

6.7 Outdoor Installation

6.7.1 For hoist installations that are outdoors, the hoist should be covered when not in use.

6.7.2 Possibility of corrosion on components of the hoist increases for installations where salt air and high humidity are present. Make frequent and regular inspections of the unit's condition and operation.

Maintenance and Repair Figure 2f

SECTION V

MAINTENANCE AND REPAIR

5-1. General

This section provides instructions for the most common routine maintenance and adjustments. Major repairs are not within the scope of this manual and should be referred to qualified service facilities.

SAFETY NOTE

Always remove load and disconnect hoist from power supply before removing end covers or making repairs.

5-2. Limit Switch Adjustment

Limit switches are provided to protect the hoist against damage resulting from overtravel. For easy identification the upper (No. 2, Figure 5-1) and lower (No. 3, Figure 5-1) limit switch adjusting nuts are colored brass and zinc respectively. Each limit switch nut has ten slots for adjustment, and the increment of adjustment is such that one slot is equivalent to one link of chain travel. Care should be exercised when adjusting either limit of travel. When a geared type limit switch is furnished (long lift hoists) each adjustment is equal to 3 links of chain, or 30 links per revolution.

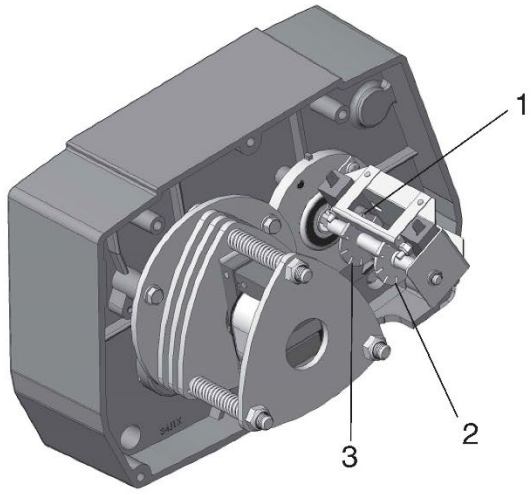


FIGURE 5-1. LIMIT SWITCH ADJUSTMENT

COFFING® HOISTS

Maintenance and Repair Figure 3a

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FAX: (800) 374-6853

a. **Adjusting Upper Limit (Brass Nut).**

1.) Carefully raise the load block to a point where its top is 2" or more from the hoist housing.

2.) DISCONNECT POWER from the hoist and remove the short end cover.

3.) With a screwdriver, pry the spring guide plate (No. 1, Figure 5-1) out of the slots in the colored limit switch nuts (Nos. 2 and 3).

4.) Turn the slotted brass nut (No. 2) toward its limit switch until the switch clicks.

5.) Release the spring guide plate and be sure it snaps back into the slots in both nuts. Do not disturb the other slotted nut if is has been previously set.

6.) Replace the short end cover and reconnect power to the hoist.

7.) Carefully raise the load block to its upper limit and observe to see if it stops automatically at the desired point. Do not allow the load block to run into the hoist housing. The stopping point should be at least 2" below the hoist housing.

b. **Adjusting Lower Limit (Zinc Nut)**

1.) Carefully lower the load block to a point where at least 12 links of slack chain hang down from the hoist housing.

2.) DISCONNECT POWER from the hoist and remove the short end cover.

3.) Adjust the zinc limit switch nut in the same manner described above for the brass nut.

4.) Replace the short end cover and reconnect power to the hoist.

5.) Carefully lower the load block to its lower limit and observe if it stops automatically at the desired level. Do not run chain out of hoist or allow the slack end loop to become taut against the hoist housing. At least 12 links of slack chain should hang from the hoist.

NOTE

If upper and lower limits are not operating satisfactorily, repeat adjustment.

5-3. Motor Brake Adjustment

When properly adjusted, the multiple disc motor brake should release promptly, operate without noticeable chatter, and stop the load with no more than one inch of drift. If the hoist hesitates to lift the load promptly when the pushbutton is depressed, the brake should be adjusted per the following procedure.

a. Remove any load and DISCONNECT POWER from hoist.

b. Remove the short end cover.

c. Referring to Figure 4-2, check the gap between armature (A) and frame (B). The correct gap is .015".

d. Adjust the gap by turning the three lock nuts (F) and check with a feeler gauge to be sure the gap is the same on both ends of the solenoid.

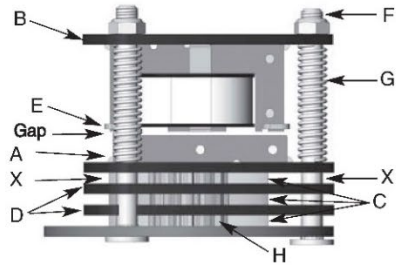


FIGURE 5-2. MOTOR BRAKE ADJUSTMENT

CAUTION

Be sure the bottom of the armature does not touch the splined adapter (H). As wear occurs, the original clearance will be reduced. When this clearance is gone, THE BRAKE DISCS MUST BE REPLACED.

e. Replace short end cover and reconnect power. If the brake still chatters or is hesitant to release, refer to Section VI, Troubleshooting.

5-4. Top Suspension Removal and Replacement

A number of different top suspension assemblies are available to accommodate different methods of hanging the hoist. If it should be necessary to change top suspensions, proceed as follows:

a. DISCONNECT POWER from hoist and move the hoist to a safe working area. If necessary, remove trolley and/or rotate suspension lug to gain access to the socket head cap screws bolting the top suspension yoke to the frame of the hoist.

b. Remove socket head screws ($^{7}/_{16}$" hex) and lift out the suspension assembly.

c. Install new suspension assembly and tighten socket head screws to 75 ft-lbs torque.

NOTE

Due to the off-center hook or lug hole, the suspension yoke can be installed in the hoist in two different ways. With the hoist level, the hook or lug must always be directly over the bottom hook. Refer to Figure 5-4 for the proper yoke orientations for single, double and triple chain hoists.

5-5. Chain Replacement (Old chain still in hoist)

Refer to Figure 5-4, Chaining and Suspension Diagrams, and proceed as follows:

a. Run the load block up to its top limit.

b. DISCONNECT POWER from the hoist and remove the short end cover.

c. With a screwdriver, push the spring guide plate (No. 1, Figure 5-1) out of the slots in the limit switch nuts. Turn the brass slotted nut (2) back to about the center of the threaded screw. DO NOT DISCONNECT THE WIRES FROM THE LIMIT SWITCHES.

Maintenance and Repair Figure 3b

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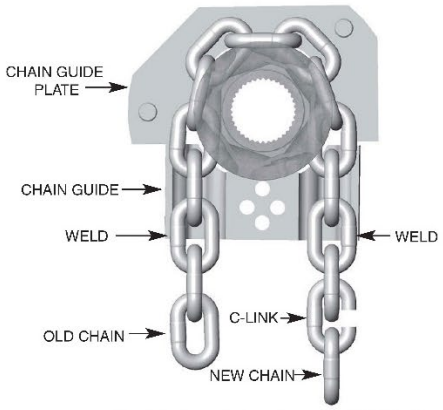


FIGURE 5-3. CHAINING HOIST

d. Remove the load hook assembly from the old chain.

e. Make a "C"-shaped chain link by grinding through one side of the end link of either the old or new chain. See Figure 5-3.

f. Hook the special "C" link to the end link of both chains thus joining them. BE SURE the welds of the upstanding links of the new chain are out away from the load sheave, and that proper orientation is observed for attachment of the slack end in paragraph j. below.

NOTE

On triple chain hoists be sure all welds are aligned like the welds on the old chain. It may be necessary to cut a link from one or both ends of the chain to accomplish this.

g. With the end cover off, connect the hoist to power supply. Be sure the green ground wire is properly grounded.

h. Carefully jog the "UP" button and run the joined pieces of chain into the hoist until about 12 inches of the new chain comes out the other side.

i. DISCONNECT POWER from the hoist.

j. Remove both the "C" link and the old chain from the slack end pin (No. 28, Figure 8-11). This can be accomplished by depressing the pin against the slack end spring (29) with a small screwdriver. Remove the soft split link (23) from the old chain and attach the link to the new chain. Depress the slack end pin and install the split link observing proper orientation of the slack end of the chain when secured. Avoid twists in the chain.

k. Adjust the lower limit switch per paragraph 5-2.b.

l. Attach the bottom hook on single-chained hoists to the loose end of the chain. On double-chained hoists, feed the loose end of the chain through the load block (welds of the upstanding links will be in towards the sheave) and fasten the end of the chain to the dead end lug (No. 18, Figure 8-11).

NOTE

On triple chain hoists, feed the loose end of the chain through the load block (welds away from sheave), around the idler sheave in the hoist, and to the center of the load block.

m. Adjust the upper limit switch per paragraph 5-2.a.

n. Lubricate the new chain per paragraph 5-6.a and perform an operation test of the hoist.

5-6. Lubrication

Proper lubrication is necessary for long, trouble-free hoist operation. Refer to the following and to Table 5-1, Recommended Lubrication Schedule, for lubrication points, type of lubricant, and frequency of lubrication.

a. **Load Chain –** Clean the load chain with a non-acid and non-caustic solvent and coat with SAE 90 gear oil. Wipe excess oil to prevent dripping. If the hoist is used in an atmosphere containing abrasive dust, the chain should be cleaned and oiled more frequently. Never apply grease to the chain.

b. **Gearing –** The gear case of the hoist is filled at assembly with 46 oz. of a gear oil containing special friction reducing additives.

WARNING

The use of gear oils other than that recommended in Table 5-1 can cause brake chatter or can render the load brake incapable of holding a load. A 48-oz. container of this oil is available from the Duff-Norton Co. (Part No. 14J1).

a. **To check the oil level,** remove the 1/8" pipe plug from the side of the hoist. With the hoist hanging level, transmission oil should be even with the edge of the tapped plug hole.

b. The length of time between necessary oil changes will depend on the severity of use the hoist receives. In general, the oil should be changed every 12 months of normal operation, or every 200 hours of actual hoist on-time. Very heavy use or operation in high ambient temperatures (over 105°F) will require that oil be changed more often. An indication of the need for oil replacement is load brake noise. If an erratic tapping sound is made when lowering a load, the oil should be changed.

c. **Limit Switch Shaft.** To prevent rust, the threaded limit switch shaft should be given a light coat of grease or be sprayed with a general purpose lubricant.

d. **Idler Sheave Bearing (double and triple chain models only).** Use a grease gun to put about a teaspoon of grease through the grease fitting in the bottom block shaft. Avoid pumping an excessive amount of grease into the bottom block. On triple chain hoists, use a grease gun to lubricate the idler sheave in the hoist until fresh grease pumps from the end of the sheave bearing.

e. **Hook Bearing.** Apply a few drops of SAE 30 oil around the edge of the bearing.

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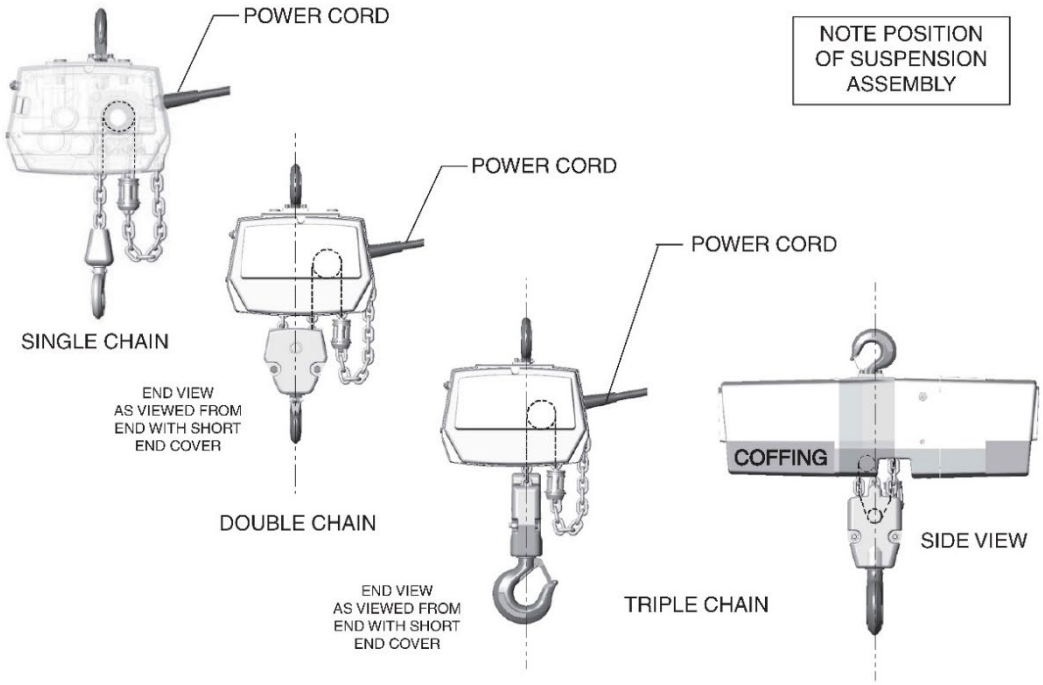


FIGURE 5-4. CHAINING AND SUSPENSION DIAGRAMS

TABLE 5-1. RECOMMENDED LUBRICATION SCHEDULE* MODEL EC ELECTRIC CHAIN HOIST

Figure and Index No.	Component	Type of Lubricant	Type of Service and Frequency of Lubrication		
			Heavy	Normal	Infrequent
Figure 8-6, No. 7	Load Chain	SAE 90 Gear Oil	Daily	Weekly	Monthly
Figure 8-5	Gearing	Coffing No. H-7813 transmission oil (Kit No. 14J1 contains quantity of oil sufficient for one oil change)	At periodic inspection (See Figure 4-1, paragraph 5-6-2)		
Figure 8-8A, No. 9; Figure 8-8B, No. 7	Limit Switch Shaft	"WD-40" or general purpose spray lubricant	Monthly	Yearly	Yearly
Figure 8-6, No. __ & No. __	Load Hook Bearing	SAE 30 Gear or Motor Oil	Weekly	Monthly	Yearly
Figure 8-1, Nos. 1, 3, 4 & 5	Top Hook or Suspension Lug Bearing Surfaces	SAE 30 Gear or Motor Oil	Monthly	Yearly	Yearly
Figure 8-10C, No. 11 Figure 8-10D, No. 11	Idler Sheave Bearing (Bushing)	NLGI #2 multi-purpose lithium base grease (Coffing No. H-7610)	At periodic inspection (See Figure 4-1)		

NOTE: All bearings except hook and idler sheave bearings are prelubricated and sealed.
*This lubrication schedule is based on a hoist operating in normal environmental conditions. Hoists operating in adverse atmospheres containing excessive heat, corrosive fumes or vapors, abrasive dust, etc., should he lubricated more frequently.

Maintenance and Repair Figure 3d

Notes

13 Pneumatic System

SS CAP 72 Machine

Machine Serial No. CP-430

Notes

The information that follows gives instructions on maintenance items that should be performed on the **SS CAP 72 Machine's** pneumatic system.

13.1 Pneumatic System Maintenance

Machine Air Line Filter

Above the control console is a filter that removes both free moisture and solids from incoming air.

Weekly-Check the water level in the filter and drain as needed.

Check the filter element and remove when the pressure differential across the filter unit is excessive. Typical flow setting example: 10 bar (150 psig) inlet pressure, 6.3 bar (90 psig) set pressure, and a drop of 1 bar (15 psig) from set: 240 $\frac{dm^3}{s}$ (509 scfm).

Machine Air Line Lubricator

Above the control console is a lubricator for lubrication of several of the pneumatic circuits.

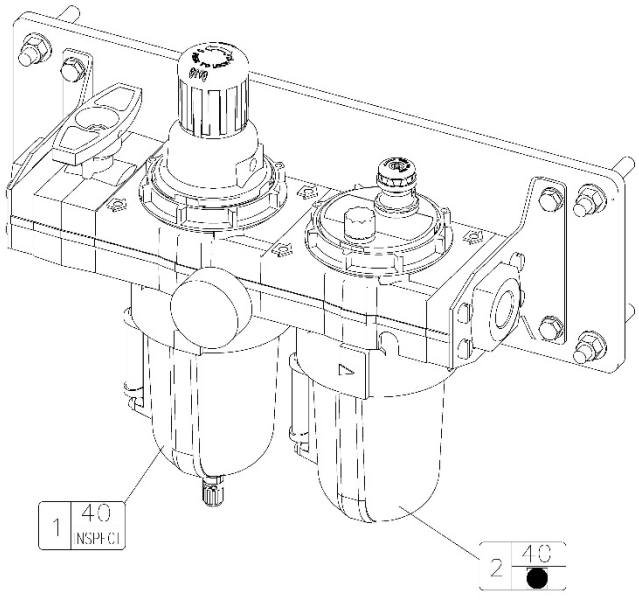
Weekly-Check the supply bowl to make sure oil is present. Fill when necessary. Utilize ISO 3448 Viscosity grade 32 or equivalent.

For normal operation, the lubricator can be adjusted to deliver the proper oil amount by closing the adjusting screw and then backing off 4-1/2 revolutions.

IMPORTANT: Before adding oil to the lubricator, inlet pressure to the lubricator must be eliminated before the fill plug is removed.

Lubrication Point Numbers

1. Filter
2. Lubricator



Notes

14 Lift Devices

SS CAP 72 Machine

Machine Serial No. CP-430

Notes

14.1 Typical Methods of Handling Concrete Pipe and Joint Rings

A variety of methods are used to move finished pipe from the plant to the yard. Retrieval of joint rings can also be done in several ways. Many factors such as level of mechanization, production tonnage, pipe size, climate, and past experience should be considered in selecting the method best suited for your operations.

To help in making your selection, we illustrate a variety of typical methods which we have observed in use in several plants using Affinitas equipment. Use of any combination of these methods can help make the job safer and easier.

WARNING! Handling of pipe and joint rings can be hazardous. Establish and enforce safe working procedures.

Removal and Handling of Pallets and Headers

To assist in the removal, joint rings are equipped with holes, knock-off lugs, or both. It is important that proper procedures are used for removal to prevent damage to rings and the product. Following these steps will give the best results.

1. Pipe should be laid horizontally across runners of a size to keep the bells clear of the ground. Pipe should be spaced to allow a minimum of 1" between bells. (See detailed illustration.)
2. Use of air hammers or other power tools not specifically designed to duplicate the action of the slide hammers will damage joint rings.

CAUTION: Driving wedges between concrete and the joint ring will destroy the ring.

3. The use of a proper release agent is essential to the clean and easy removal of joint rings. Proper release agents should keep the ring surfaces that come in contact with the concrete clean. If not clean, cleaning of the sloped 2^{o} surfaces will be necessary to assure smooth slip-out surfaces.
4. For efficient ring removal, always use two slide hammers operating simultaneously at 180^{o}. This method will be at least four times faster and require one-half the work of using a single hammer.

WARNING! Improper use of the slide hammers can cause cumulative trauma injuries. Frequent changes in work patterns are required to prevent injury.

For example, on a small pipe, knock off enough rings for one transport stack. Stacking of these rings should give the required work pattern change to prevent injury. Other work pattern changes could be cleaning and oiling of the pallet seal surface or removing of snap rings on O-ring joint rings.

- Pull the joint ring off parallel to the cured pipe to prevent cocking or wedging in the pipe. A very small amount of misalignment can easily damage the joint.
- The concrete surfaces, the I.D. and O.D. of the rings and the two areas of the pallet where the jacket and core seal meet must be cleaned and oiled Daily.

CAUTION: Use of a larger than 3 lb. hammer will damage or destroy joint rings.

14.1.1.1 Header Removal

It is important that headers be removed as soon as possible after removal from the curing area and while they are still warm. The reason for this is that cast iron headers cool faster than the more massive concrete pipe and tend to shrink causing them to grip tighter to the concrete. Removal before this shrinkage occurs will be easier. Pallets should be removed last, as this shrinkage will help their removal.

Follow these steps for removal of headers:

1. Use two slide hammers at 180° as explained above, to remove the header. Six or eight blows on pipe diameter sizes 12-24 should be adequate.

CAUTION: Removal of small diameter headers must be done carefully and correctly to prevent damage to the delicate tongue area. To accomplish this, three major problems must be overcome.

2. **Concrete to Header Bond.** Breaking the bond of the concrete to the header on the 2° slope must be done very carefully. This is best done with force which puts the concrete in compression rather than tension. Concrete in compression has approximately 4,000 PSI strength. In tension, this is only about 400 PSI. With the pipe laying horizontally, a medium blow on each of the six header lugs with a 3 lb. hammer should break this bond. This blow should be aimed toward the bottom of the pipe and strike the top of the lugs. Use of a medium sized air-powered chipping hammer with a blunt tool makes this job easier. After the bond is broken, use the Afinitas slide hammers starting lightly until the bond is totally broken.

3. **Cocking of Rings.** Small bore rings need cock only a fraction of an inch to put a very heavy cantilevered inward load on the tip of the delicate tongue. Great care must be taken to bring the ring off squarely.

4. **Ring Release Agent.** Joint ring release agents should accomplish two things. They should break the bond between the concrete and the joint ring, and they should keep the joint rings clean. Any concrete buildup will cause increased friction on the 2° slope and make joint ring removal more difficult.

   Experience has shown that a release agent that works well in one geographical area may or may not work in another area. We believe that this is due to the differences in the chemical makeup of the cement, aggregate, and water.

   Our recommendations are to test various release agents until you find one that is compatible with your materials. We recommend the use of one release agent for a minimum of two weeks to get a fair test.

   If your present source cannot furnish an adequate release agent, contact **Afinitas** for additional sources.

5. Remove and mate snap rings, if so equipped, to headers securely enough for transport to cleaning facilities.

6. Stack for pickup with lugs "nested". This will allow more rings to be transported per fork and will make the stack self-supporting. (See detailed illustration.)

14.1.1.2 Pallet Removal

Follow these steps for the removal of pallets:

1. In order to avoid severe damage or destruction of the pallet, do not strike or pry the pallet on the outer seal flange. The use of hammers on the outer-machined seal area of the pallet will destroy the pallet seal capability by chipping the outside diameter.

2. Before removal, the machined seal area where the O-ring seal of the core contacts the pallet must be cleaned and oiled. Concrete residue in this area will destroy the O-ring seals of the core.

3. The first step in pallet removal should be a series of medium strength tapping on four points all around the inside sloped surface of the pallet with a 3 lb. hammer. This procedure will tend to loosen the pallet for easier removal.

4. After hammer tapping's described above, two methods can be used to complete the pallet removal process. They are:
   - Insert slide hammers in holes cast into legs and remove pallet using medium strength blows.
   - Tap on raised knock-off lugs.

14.2 Lifting Form Equipment

The information that follows gives instructions on how to lift the different style forms that can be used with the **SS CAP 72 Machine**. Make sure to use proper lifting techniques to prevent damage to the forms or accidental tip over of a form.

Lifting Single Mode Form Sets

Single mode 10" - 39" (250mm-1000mm) forms are designed to be lifted with the core and jacket as one unit. Jacket to core anchor brackets are required for attaching the jacket to the core before lifting the form.

To lift single mode forms, perform the following:

1. Attach the extruder beam to the jacket at the jacket pickups.
2. Lift the jacket over the core in its correct orientation and then lower over the core so the pickup lugs at the jacket bottom align to the pickup lugs located on the core's jacket bearing ring. See ***Figure 1***.
3. Slide an anchor bracket over each pickup lug as shown in ***Figure 1*** and insert (2) 3/4" (19mm) diameter T-Bar pins through the anchor bracket and lift lugs.
4. Secure the T-Bar pins to the bracket by inserting hairpins through the T-Bar pins to prevent disengagement.
5. Repeat Steps 3 and 4 at adjacent pickup lugs. Two anchor brackets are required for lifting the form set, one at each set of lugs on the form.
6. With core attached to the jacket by the anchor brackets, lift the jacket with the extruder beam.

Lifting Single Mode Cores

It is also possible to lift single mode cores without the jacket in order to service the equipment. 10" - 39" (250mm-1000mm) diameter forms require a different method of lifting as does 42" - 72" (1100mm-1800mm) diameter forms. Information on each method follows.

14.2.1.1 Lifting 10” - 39” (250mm-1000mm) Diameter Cores

To lift the core, attach the "corset type" sling at the lift eyes located at the core bottom; with the sling wrapped around the core barrel as shown in ***Figure 2***. The corset sling prevents the core from pivoting about the lift-eyes and tipping over.

The corset type sling attaches to the core's lift lugs with 3/4” (19mm) diameter T-Bar pins. Be sure to insert the hairpins through the 3/4" (19mm) pin to prevent the T-Bar pins from accidentally disengaging from the pickups.

To lift the core, attach the overhead crane's load hook to the 3/4" (19mm) master link atop the chain sling.

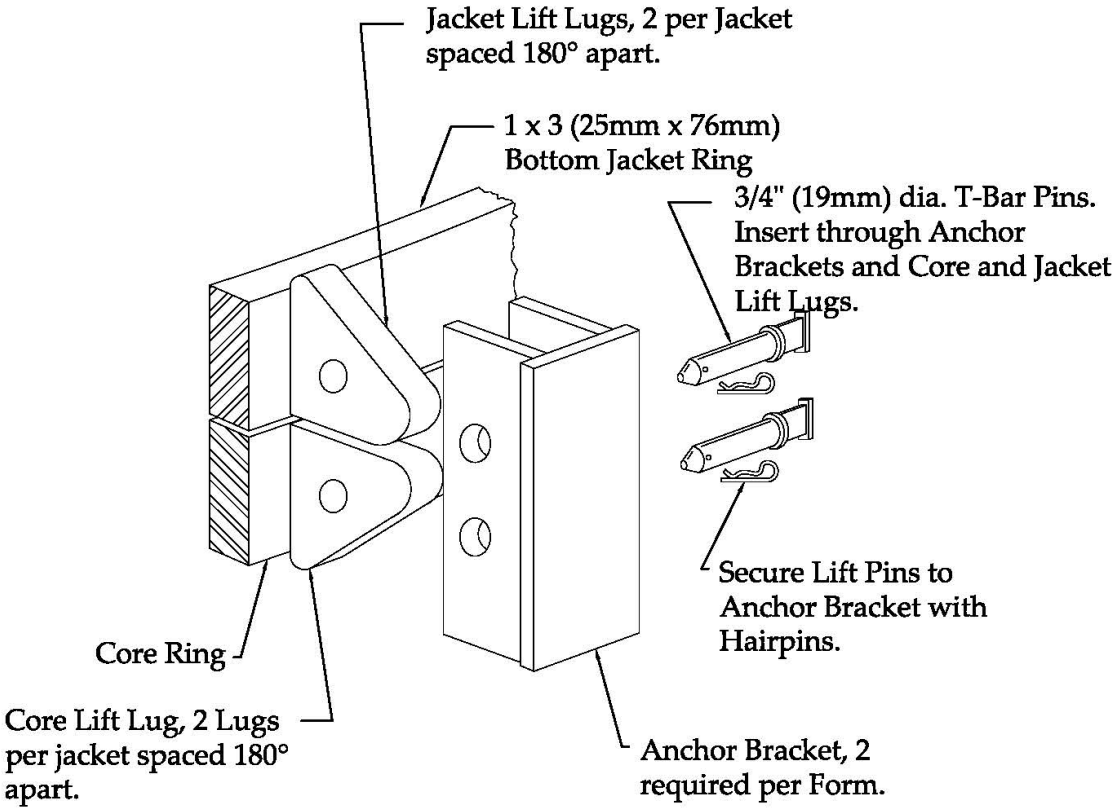
WARNING: Do not attempt to lift the core from the pickup unless the sling corset is wrapped around the core barrel to confine its movement. Lifting the core at the pickups without the core barrel confined by the corset sling will cause the core to tip over resulting in property damage and/or serious injury.

14.2.1.2 Lifting 42" - 72" (1100mm-1800mm) Diameter Cores

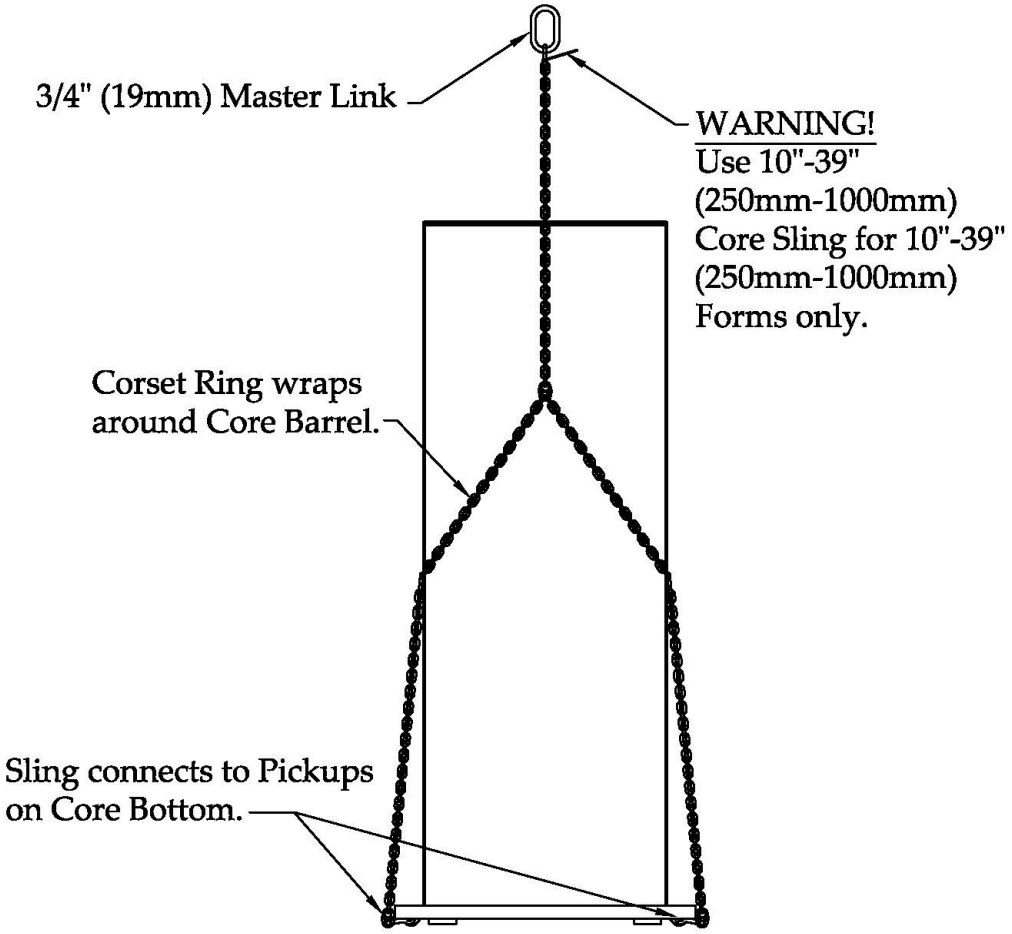
The cores on 42" - 72" (1100mm-1800mm) diameter form equipment are equipped with a pickup lug at the top of the core. Connect the form lift sling to the pickup for lifting the core.

The core and jacket can also be lifted together as a single unit from this core lift lug. The lift lug is not designed for lifting the form set when the form is filled or partially filled with concrete.

WARNING: Do not attempt to lift a filled or partially filled form set from the lift lug atop the core. Lifting a filled or partially filled form set from the core lift lug will overload the lug causing it to fail, a condition that will result in equipment damage or serious personal injury.



Single Core – Jacket to Core Anchor Brackets
Figure 1



10” – 39” (250mm – 1000mm) Core Pickup Sling
Figure 2

Lifting Multiform Sets

Multi core form sets are designed to be lifted with the core and jacket anchored together as a single unit. To lift the multi core unit, perform the following:

1. Attach the extruder beam to the jacket at its jacket pickups.
2. Lift the jacket over the cores in its correct orientations, and then lower the jacket until the four jacket outrigger supports bear upon the core's four mating supports.
3. Two of the jacket outrigger supports are equipped with holes that align to mating holes in the core base's support pad. Insert the two 1" (25mm) diameter x 10-1/4" (260mm) long pins through the holes and secure with hairpins. See ***Figure 3***.
4. With the jacket attached to the core, lift the entire assembly by the extruder beam with the overhead crane.

Lifting Cores

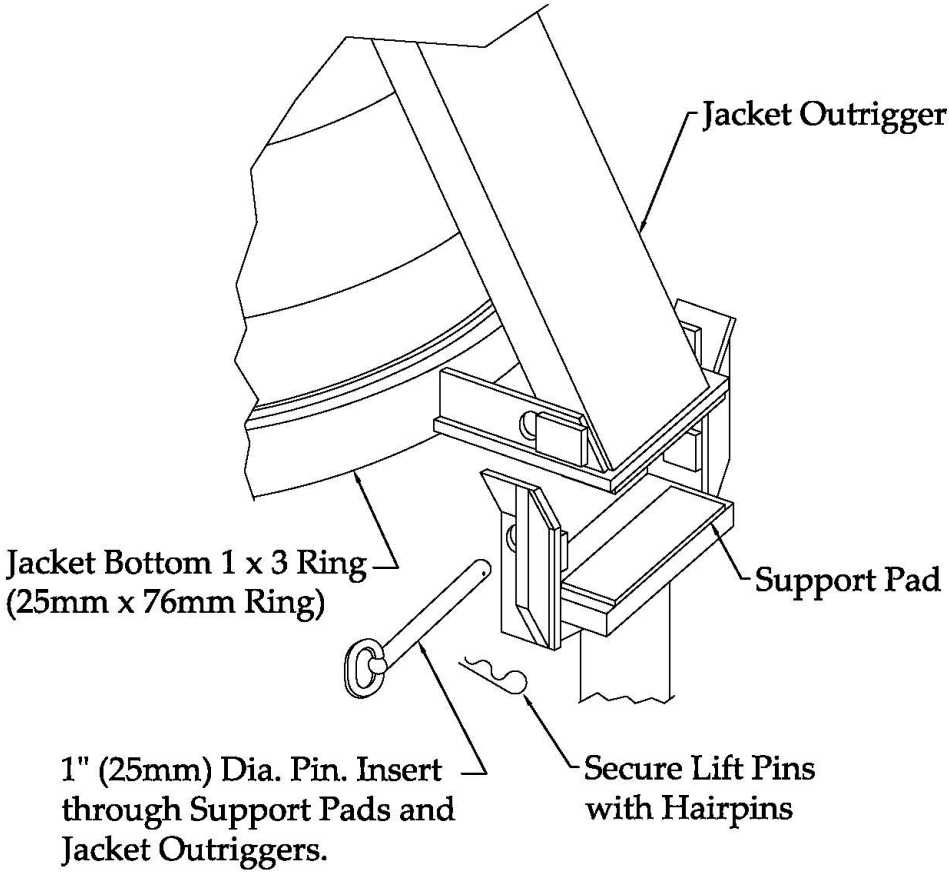
Multi core forms are designed so the cores can be detached from the core base and lifted individually with a corset type sling.

Before attempting to lift cores, it is necessary to disconnect them from the core bases. Each core anchors to the base at two pins on the base. Mating anchor tubes on the core align over these pins. To disconnect the core anchor tubes from the pins, remove the connector pins that are inserted through the core's anchor tubes.

To lift the core, perform the following:

1. Make sure core is disconnected from the base as described above.
2. Slide the corset type sling over the core barrel and attach the sling ends at the two lift brackets at the core bottom. Make sure the sling is wrapped around the core as shown in ***Figure 2***.
3. Attach the sling ends to the core lift brackets with the two 3/4" (19mm) diameter T-Bar pins. Insert hairpins through pins to make sure they cannot disengage.
4. Attach crane or lifting means to the 3/4" (19mm) master link at the top of the sling and lift.

WARNING: Do not attempt to lift the core from the pickup unless the sling corset is wrapped around the core barrel to confine its movement. Lifting the core at the pickups without the core barrel confined by the corset sling will cause the core to tip over resulting in property damage and/or serious personal injury.



Multiform – Jacket to Core Base Attachment Method
Figure 3

14.3 Off-Bearing the Product

The information that follows gives instructions on how to lift or off-bear the finished product from the pipe machine and release the jacket from the finished product in the curing area. These instructions are for standard forms; refer to specific instructional sheets for special products that deviate from standard design.

Typically, products are off-borne from the machine with an overhead crane. It is possible to use a forklift truck, but you must be sure of lifting in a true vertical motion, otherwise damage to the product will result.

WARNING: Stand a safe distance from the jacket and product while it is being off-borne from the machine, transported to the curing area, and stripped from the form. Never stand under a raised load or travel over other workers with a raised load. Failure to comply with this warning may result in serious bodily injury or death.

Stripping Beams

Afinitas provides several different style stripping beams for use with the **SS CAP 72 Machine**. The beams are designed for different range of product diameters and lengths. Information on each beam follows. It is important to use the correct beam with the products being produced to be assured that the beam's capacity is not exceeded.

Afinitas stripping beams are equipped with an air thruster that provides pressure against the product's header during the stripping operation. Applying pressure to the header, stabilizes the ring to prevent it from lifting as the jacket slides up past the header during the stripping operation. The other purpose of the air thruster is to help extrude the pipe out of the jacket. Frictional forces between the jacket and product tend to lock the product to the jacket; the air thruster provides the necessary force to break this bond.

14.3.1.1 12”-48” (300mm-1200mm) Strip Beam

The 12”-48” (300mm-1200mm) strip beam is designed with two sets of lift chains and a center air thruster. Refer to ***Figure 4*** for a diagram of the beam. The beam is designed to work with the following forms:

- 10" - 48" (250mm-1200mm) diameter Singleforms in lengths up to 12' (3.5M).
- 60" (1500mm) diameter Singleforms in lengths up to 6' (2.0M).
- 10" - 18" (250mm-450mm) diameter Quadforms in lengths up to 8' (2.5M).
- 10" - 24" (250mm-600mm) diameter Duoforms in lengths up to 8' (2.5M).

14.3.1.2 Attaching Strip Beam to Jacket

The 12”-48” (300mm-1200mm) strip beam is equipped with two sets of lift chains.

The inside set of lift chains are required for use with the following forms:

- 10" - 36" (250mm-900mm) diameter Singleforms

- 10" - 12" (250mm-300mm) diameter Duoforms

The outside set of chains is required for use with the following forms:

- 42" - 48" (1100mm-1200mm) diameter Singleforms
- 60" (1500mm) diameter x 5' (1.5M) Singleforms
- 15" - 24" (400mm-600mm) diameter Duoforms
- 10" - 18" (250mm-450mm) diameter Quadforms

14.3.1.3 Attaching Star to Beam

The 12”-48” (300mm-1200mm) beam's air thruster is equipped with a bottom latch plate to which individual stars are attached. The star is a device, which bears against the product's top joint ring when the air thruster is actuated. Each time the strip beam is attached to the jacket, a star for that particular form needs to be attached to the beam. With Singleforms, the star is lifted onto the form top before lowering the beam to the jacket. For Duoforms and Quadforms, the star is also used to press headers into the form during the pressureheading cycle, so it is already in place when attaching strip beam.

To attach the star to the beam's latch plate perform the following:

1. Pull back on the latch lock pin to release latch arm, then pull back on the latch arm so latch is flush with center shaft.
2. Lower center shaft through star's center opening, push the latch pin forward to engage latch to star plate, then secure latch arm by pushing forward on the latch lock pin.

14.3.1.4 Removing Star from Beam

The star must be removed after the product has been stripped from the jacket. The star is normally removed after the jacket has been returned to the pipe machine.

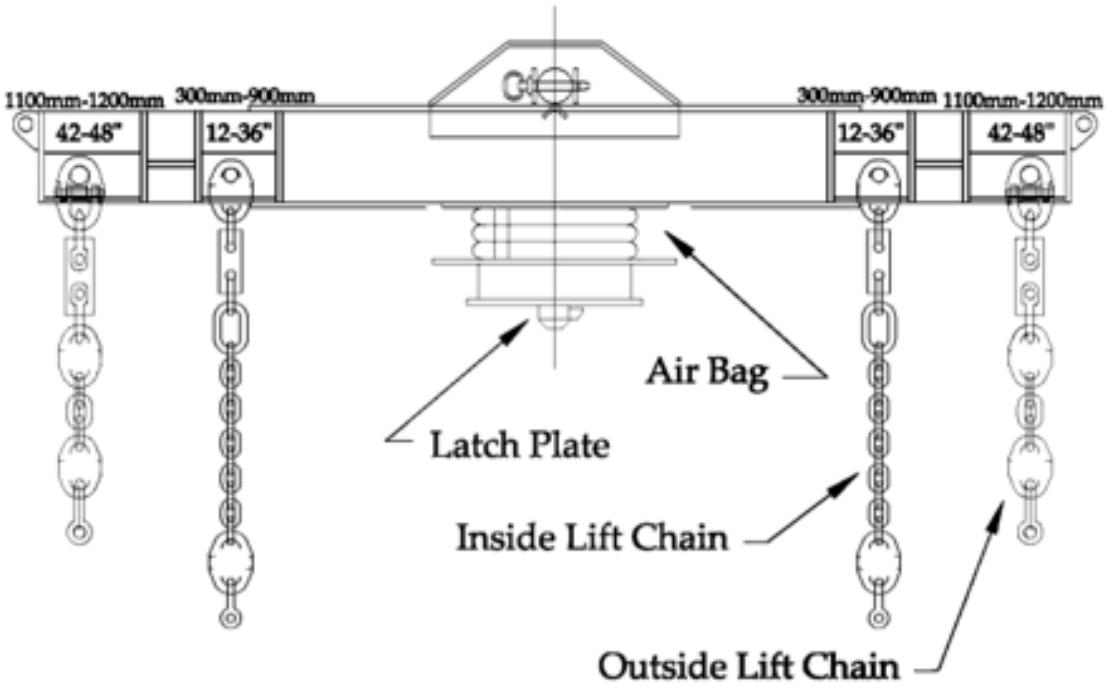
To detach the star from the beam's latch plate, perform the following for Singleforms:

1. Pull back on the lock pin and slide the latch bar back so latch is flush to the center shaft.
2. Unhook lift chains from jacket pickups and lift beam from form.
3. Lift star from form top and remove from form set.

For Duoforms and Quadforms use the following procedure for removing the star from the stripping beam:

1. Unhook the beam's lift chains from the jacket pickups.
2. Elevate the strip beam and star so the star's side pins line up with the storage track on the form.
3. In one motion, position the star pins in the track and unlock the star from the beam's latch plate.

4. The beam can be elevated to full height and the star slid back and placed in its stored position in the track.



12" – 48" (300mm – 1200mm) Strip Beam
Figure 4

14.3.1.5 30"-72" (750mm-1800mm) Strip Beam

The 30"-72" (750mm-1800mm) strip beam is designed for use with 30" (750mm) through 72" (1800mm) diameter forms. The strip beam is equipped with two sets of lift chains. The inside set is required for use with 30" (750mm) through 36" (900mm) diameter forms and the outside set are required for use with 42" (1100mm) through 72" (1800mm) diameter forms. The beam is primarily designed for Singleforms, but can be used with Duoforms and Quadforms if an optional latch plate is installed to the beam. Refer to ***Figure 5*** for a diagram of the beam.

Note: An optional third set of lift chains can be installed to the 30"-72" (750mm-1800mm) beam. This set of chains set inside the 30"-36" (750mm-900mm) chain legs. This optional set of chains is used with core strip forms.

IMPORTANT: The 30"-72" (750mm-1800mm) strip beam can be provided for 8' (2.5M) length products or 12' (3.5M) length products. It is important to make sure you use the correct beam for 12' (3.5M) length pipe. Using an 8' (2.5M) rated beam for 12' (3.5M) pipe production will overload the beam, resulting in beam failure.

The center air thruster on the strip beam is equipped with a permanent adjustable star. With the permanent star, it is not necessary to attach and detach individual stars as required on the 12”-48” (300mm-1200mm) strip beam. The adjustable star can be adjusted to work with products ranging from 30" (750mm) through 72" (1800mm) diameter. It is not possible to use the 30”-72” (750mm-1800mm) beam with Duoforms and Quadforms with the adjustable star.

Note: The adjustable star can be unbolted from the air thruster and replaced with a latch plate. With the latch plate, the 30”-72” (750mm-1800mm) strip beam can be used with Duoforms and Quadforms in addition to 30”-72" (750mm-1800mm) diameter Singleforms. However, when using the latch plate, individual stars are required with the Singleforms same as with the 12”-48” (300mm-1200mm) strip beams.

14.3.1.6 Attaching Strip Beam to Jacket

The 30”-72” (750mm-1800mm) strip beam is equipped with two sets of lift chains. The inside set of chains are required for use with the following forms:

- 30" - 36" (750mm-900mm) diameter Singleforms.
- 10" - 12" (250mm-300mm) diameter Duoforms. (Requires Latch Plate)

The outside set of chains is required for use with the following forms:

- 42" - 72" (1100mm-1800mm) diameter Singleforms.
- 15" - 24" (400mm-600mm) diameter Duoforms. (Requires Latch Plate)
- 10" - 18" (250mm-450mm) diameter Quadforms. (Requires Latch Plate)

To attach the strip beam to the jacket pickups, perform the following:

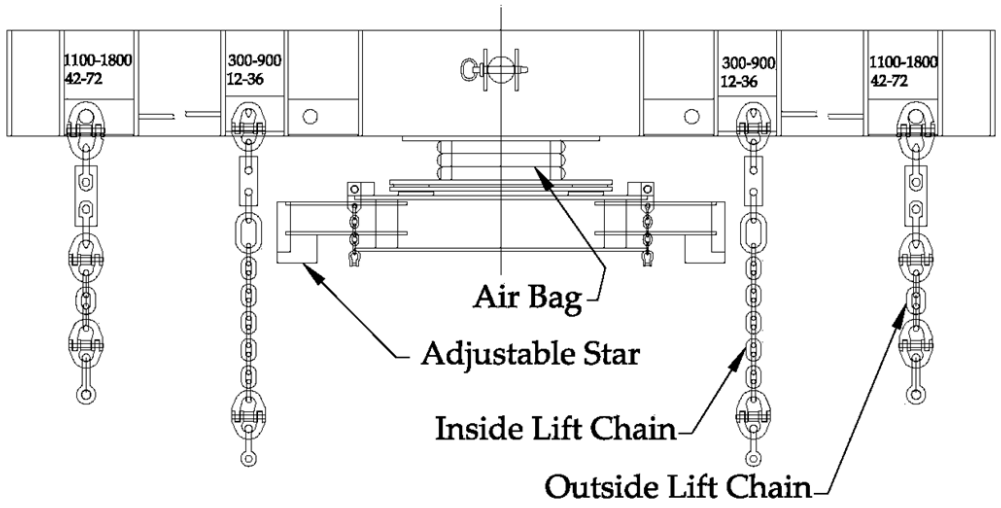
1. Center the beam over the jacket and lower until the lift chains can be attached to the jacket pickups.
2. Remove the load pins from the shackles and position shackles over the jacket pickups.

   IMPORTANT: Make sure to remove all twist from lift chains before attaching to jacket pickups.
3. Reinsert the load pins through shackle and jacket pickup. Check that the locking ball on load pin is fully through shackle end so pin cannot be removed from shackle.

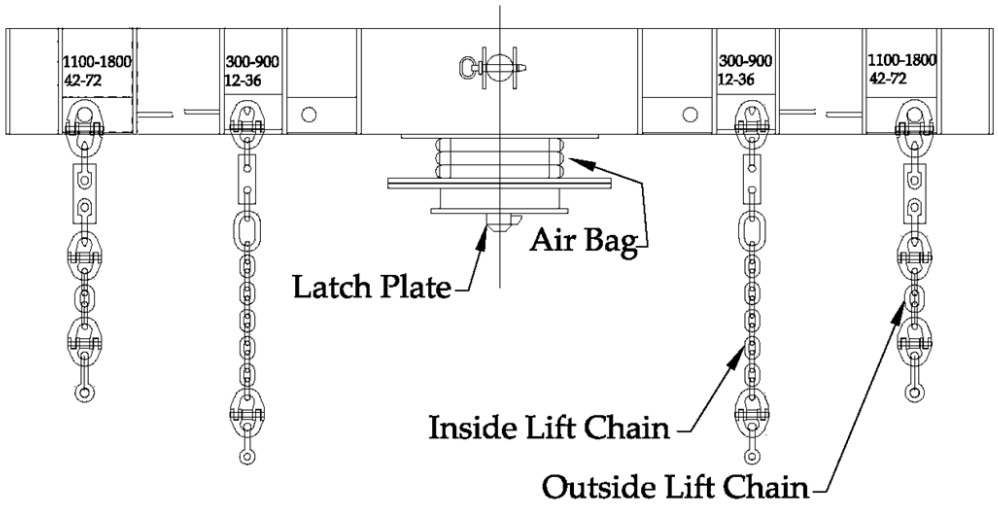
Note: The load pins used with the Afinitas strip beam have a self-locking ball at the pin end. To install or remove the pin, it is necessary to depress the button at the handle end to "unlock" the locking ball. Hairpins are not required with these load pins.

⚠ WARNING: Do not use load pins that have defective lock mechanisms. They may disengage from the shackle and disconnect the lift chains from the load. Replace defective pins before attempting to use the strip beams. Use only Afinitas replacement

pins; they are made of a special high strength steel. Failure to comply with this warning may result in serious bodily injury or death.



A. Beam With Adjustable Star



B. Beam With Latch Plate

30” – 72” (750mm – 1800mm) Strip Beam Configurations
Figure 5

14.3.1.7 Adjustable Star

The 30”-72” (750mm-1800mm) strip beam is equipped with a star that is adjustable to different pipe diameters. To adjust the star, perform the following:

Remove the leg lock pin from the circular star plate and rotate one leg of the star until the star leg matches up with the hole in the circular star plate that is identified by the desired size diameter.

Reinsert the leg lock pin through the star leg and star plate to secure the star legs stationary.

Refer to ***Figure 6*** for a diagram of the adjustable star. The diagram shows the star adjusted for a 30" (750mm) diameter product and a 72" (1800mm) diameter product.

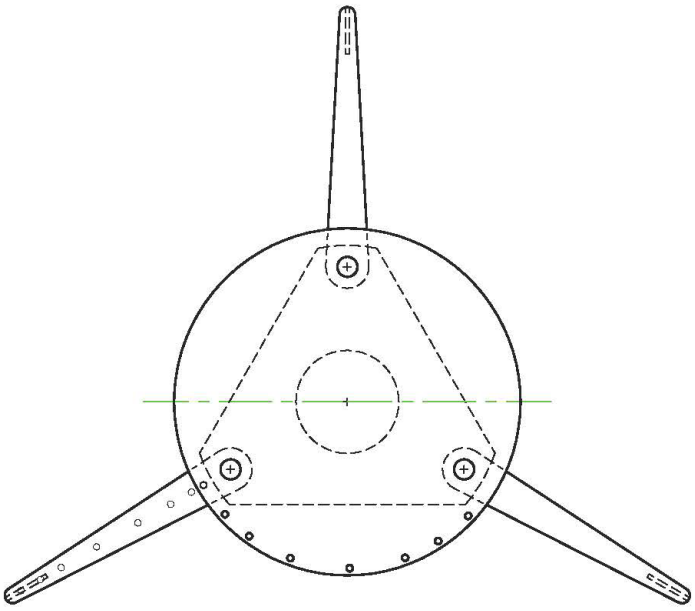
14.3.1.8 Latch Plate

The adjustable star assembly can be removed from the air thruster and replaced with a latch plate similar to the 12”-48” (300mm-1200mm) beam. Refer to information on the 12”-48” (300mm-1200mm) beam for instructions on using the latch plate.

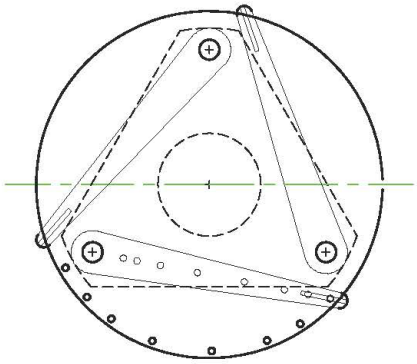
14.3.1.9 Strip Booster Sockets (Optional)

Your 30”-72” (750mm-1800mm) strip beam may be equipped with optional sockets for strip boosters. These sockets are located at each end of the strip beam. The strip booster cylinders are mounted to the form set's core structure. The cylinder rams raise and push on the strip beam at the sockets.

Typically, sockets are provided for 66" (1650mm) and 72" (1800mm) diameter form sets when 15-ton (13.6 metric ton) cranes are used for off-bearing products. The cylinders are actuated against the beam, then the crane is actuated. The cylinders should be lowered before transporting the jacket and product from the machine to prevent the form from hitting the rams during product transport.



A. Adjustable Star Expanded For Largest Form (72"/1800mm Dia.)



B. Adjustable Star Retracted For Smallest Form (30"/750mm Dia.)

Adjustable Star Detail for 30" – 72" (750mm – 1800mm) Strip Beam
Figure 6

Off-Bearing and Stripping Procedures

The information that follows gives instructions on how to off-bear products from the pipe machine and strip products from the jacket. Refer to individual manual sheets for stripping products that deviate from standard design.

WARNING: Never attempt to off-bear or remove the product from the pipe machine until the turntable is locked into its exact station position. The turntable must be in exact station position to permit the hold-down anchors on the turntable to grip to the corresponding anchors on the machine base. Attempting to strip products without anchoring turntable may result in damage to the turntable.

To off-bear the product from the pipe machine, perform the following:

1. Adjust star to correct diameter (30”-72” (750mm-1800mm) beam only) or install correct throw-on star.
2. Attach strip beam to star and jacket pickups.
3. Lift jacket slowly from the anchored core the first 12" (300mm) making sure product is not bonded to the core. Then, finish lift at normal speed.

   Note: When first lifting the jacket from the anchored core at the machine, the header may have a tendency to slightly lift and settle back down. This will result in the product's tongue having a rough "cantaloupe" look. To prevent this you can apply pressure to the header with the air thruster before beginning your initial lift from the machine. After the product has been elevated several inches, the air thruster can be released. Use a pressure approximately 5 PSI (0.3 bar) less than the extrusion pressure.

4. Transport jacket and product to curing area; set gently onto curing floor. Make sure pendulum motion has stopped before setting product on floor.
5. Slowly lift strip beam to make sure load chains are tight. Do not lift jacket off floor. Then, open pallet locking lugs.
6. Actuate air thruster so star or press plate presses against header. When desired air pressure is obtained, slowly lift jacket from product while maintaining pressure in air thruster. Air pressure can be monitored at the gauge located at the beam's end.

   Note: The air thruster's pneumatic circuit has a needle valve in the circuit which regulates the flow of air into the air bag. The valve should be set so air enters the bag at a rate that maintains pressure while the bag expands as the jacket raises.

7. After the jacket has lifted approximately 12"(300mm), continue up at high speed. Release the air thruster push button to permit air bag to deflate.
8. Transport and lower the jacket over the next reinforcement cage and pallet. Lock the pallet to the jacket with the pallet locking lugs.

9. Transport the jacket, pallet, and cage to the pipe machine and lower onto the core. Release star and jacket from strip beam and raise strip beam.

Selecting Air Thruster Pressure

The pressure required for holding the header and extruding the product during the stripping operation is dependent upon several factors which include the pipe diameter, mix design, materials, moisture, etc. You should experiment with different air pressures until a setting is determined for each pipe size. The pressure exerted on the header with the air thruster must be great enough to hold and prevent the pipe from lifting with the jacket during the stripping operation, but the air pressure must not be so great that the pipe or the pipe joint is disturbed or deformed.

One method of setting the air pressure for the thruster is to observe the header on top of the product while pressure is being applied. With the extruder star bearing on the header, increase the air pressure until the header just slightly moves. This pressure or one slightly less, is the pressure you should try using for that particular pipe diameter. If the product remains on the floor when the jacket is stripped, if the header stays on the product without lifting, and if the pipe and its joint is not disturbed, then this pressure is okay. However, if the above conditions are not met, it will be necessary to increase the pressure if the header or product lift during stripping, or it will be necessary to decrease the pressure if the pipe or its joint is disturbed because of excessive pressure.

Figure 7 shows typical pressure settings for the different pipe diameters when using the 12”-48” (300mm-1200mm) and 30”-72” (750mm-1800mm) strip beams. You can start at these settings and adjust accordingly.

Note: For the form break-in, greater air pressure settings are required than that required when the form is broken in. Therefore, after a form has been used for a couple of weeks, the pressure setting should be re-adjusted. Pressure settings during the break-in period can sometimes be twice as high as that required after the form is broken in.

Extruder Pressure, 12”-48” & 30”-72” Beams (300mm-1200mm & 750mm-1800mm Beams)			
Pipe Dia.	Air Pressure (psi or bar)		
	Single	Dual	Quad
12” / 300mm	7/0.5	14/0.96	14/0.96
15” / 400mm	8/0.55	16/1.1	16/1.1
18” / 450mm	9/0.6	18/1.2	18/1.2
24” / 600mm	11/0.75	22/1.5	22/1.5
30” / 750mm	15/1.0	30/2.1	30/2.1
36” / 900mm	15/1.0	30/2.1	30/2.1
42” / 1100mm	20/1.4	40/2.6	40/2.6
48” / 1200mm	20/1.4	40/2.6	40/2.6
54” / 1400mm	25/1.7	50/3.4	50/3.4
60” / 1500mm	30/2.1	60/4.1	60/4.1
72” / 1800mm	35/2.4	70/4.8	70/4.8

Extruder Air Pressure Table

Figure 7

Transporting Empty Form Sets

Some single mode form sets are equipped with a center pickup lug on the core. These form sets can be transported by this core lug, provided the form set is empty and not filled or partially filled with concrete. Supplied with your form sets is a form lift sling that can be attached to the extruder beam chain legs for lifting from this core pickup lug. The instructions that follow explain the procedure to use for transporting the form sets with the strip beam and form lift sling.

Note: Form sets that are not equipped with a lift lug on the core, such as multiform modules and smaller diameter core vibration form sets, can only be transported by lifting from the jacket pickups with the extruder beam. In these instances, the core is designed to be anchored to the jacket so both can be lifted simultaneously. Refer to the core vibration section of the manual for details.

WARNING: The core lift lug is designed to support only the load of the pipe form's jacket and core. Do not lift a form set at the core lug if there is concrete in the form set. The core lug will not support the weight of the form set if filled or partially filled with concrete. Lifting the form at the core lift lug when concrete is present in the form will overload the pickup lug and strip beam lift chains resulting in equipment damage and possible serious injury.

To lift the form set at the core's pickup lug it is necessary to attach the extruder beam's lift chains to the form lift sling provided with your form equipment. This rigging procedure is shown in ***Figure 8*** for the 12”-48” (300mm-1200mm) and 30”-72” (750mm-1800mm) extruder beams.

IMPORTANT: Form lift slings are available for 8' (2.5M) long and 12' (3.5M) long form sets. It is important that the proper lift sling be used for 12' (3.5M) long form sets in order to avoid overloading the lift sling. An identification tag is installed to the lift sling so you can determine which lift sling you possess.

Use the 12” - 36" (300mm-900mm) set of lift chain legs on the 12”-48” (300mm-1200mm) extruder beam and the 30”-72” (750mm-1800mm) extruder beam for attachment to the form lift sling. Connect the chain leg shackles through the lift sling's master link.

WARNING: Use the correct extruder beam chain legs for attachment to the form lift sling. Using the improper legs will result in the chain legs laying along a severe angle, greatly reducing the load bearing capacity, resulting in a condition that could cause the chains to fail and drop the load.

To attach the form lift sling to core's lift lug, position the shackle on the lift sling over the core lift lug and insert the shackle pin to the shackle and lift lug. Secure the shackle pin with the hairpin to prevent accidental disengagement of the shackle pin.

IMPORTANT: When the strip/extruder beam chain legs are attached to the form lift sling, the chain legs lay along an angle that greatly reduces their load bearing capacity. Therefore, do not attempt to lift any object with the form lift sling with the chains in this position except Afinitas form sets that are empty of concrete. Lifting any other object may overload the lift beam's chain legs resulting in property damage and serious bodily injury or death.

Emergency Strip Procedures

In the case of unforeseen breakdowns, power losses, etc., emergency strip procedures may need to be initiated. It is important to get the concrete product out of the form set quickly; otherwise the product will setup and it will become impossible to strip the product from the form.

There are several steps that should be performed when initiating emergency strip procedures. Procedures may vary depending upon the problem.

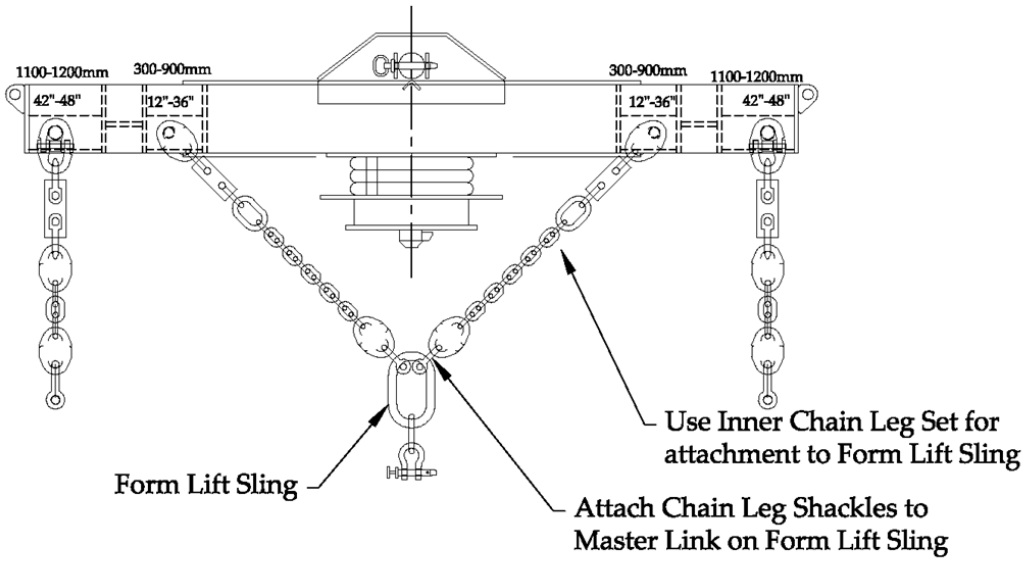
14.3.1.10 Overhead Crane Not Working

1. Attempt to strip jacket and product with forklift truck. Adjust forks to bear under strip beam, then lift.
2. If unable to lift jacket and product with forklift, switch on vibrators and attempt to lift jacket and product.
3. If still unable to lift jacket and product, unlock jacket pallet locking lugs, permit vibrators to run, and lift jacket from product and core.
4. Manually remove concrete from around core.

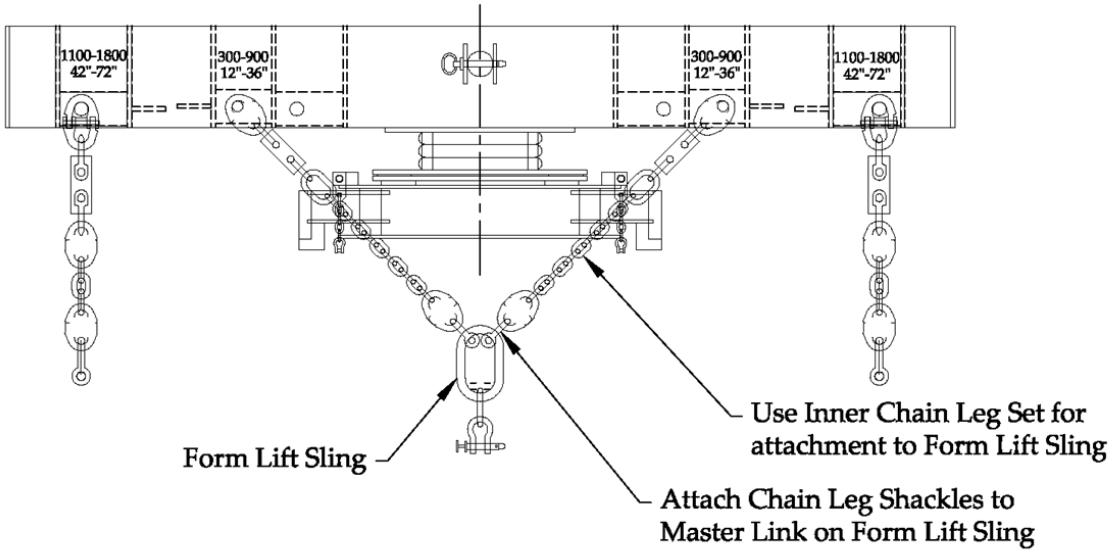
14.3.1.11 Core Anchor Tubes Fail

Form equipment anchors to the turntable with two core anchor tubes. These tubes are designed to shear or fail if the form is subject to overload to prevent damage to the form or turntable. Should the tubes shear, the core will become unanchored from the turntable and it may not be possible to strip the jacket and product from the core in the standard manner. Emergency steps should be initiated as follows:

1. Attempt to lift jacket and product while applying force to the core top with the strip beam's air bag.
2. If Step 1 is not successful, turn on the form vibrators and attempt to lift product and jacket from the core.
3. If still unsuccessful, unlock jacket pallet locking lugs, turn on vibrators, and strip jacket from the core and product.
4. Manually remove the concrete from around the core.



A. Method Of Attaching Form Lift Sling to 12"-48" (300mm-1200mm) Strip Extruder Beam



B. Method Of Attaching Form Lift Sling To 30"-72" (750mm-1800mm) Strip Extruder Beam

Lift Chain Arrangement in Form Lift Sling
Figure 8

14.4 Extruder Beam Maintenance

The information that follows gives instructions on how to maintain and service the extruder beams used with the **SS CAP 72 Machine**. Perform the procedures as listed below to be assured of safe, smooth operation of the extruder beams.

Beam Maintenance

14.4.1.1 Servicing the Air Line Lubricator

On the beam is a lubricator for forms with air-actuated pallet locks.

Periodically-Check the supply bowl to make sure oil is present and fill when necessary.

14.4.1.2 Inspecting Load Chains & Pins

Daily-Inspect load chains and pins on the extruder beam for wear or damage. Replace worn or damaged parts.

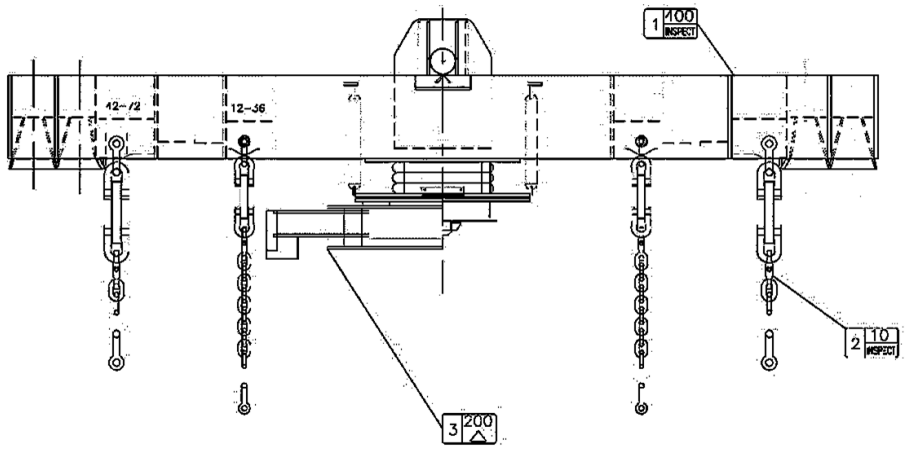
14.4.1.3 Lubricating Adjustable Star

Monthly-Lubricate the extruder beam with a multipurpose grease at the following locations:
Three pivot arm pipe bearings at the 1/8" (3mm) diameter oil hole.
Roller chain idler sprocket at the 1/8" (3mm) diameter oil hole.
Adjustable star circular plate at the grease zerk.
Adjustable star center pivot bearing at the grease zerk.

14.4.1.4 Lubrication Point Numbers

1. Beam
2. Chain Assemblies
3. Adjustable Star

Extruder Beam Lube and Maintenance



15 Strip Assist System-Option

SS CAP 72 Machine

Machine Serial No. CP-430

Notes

15.1 Strip Assist System-Option

The strip assist cylinder on the **SS CAP 72 Machine provides** the basic function to assist the overhead crane in stripping the product from the jacket. These strip cylinders are mounted onto the form base frame in specific sockets made for them. These cylinders are used with the strip beam.

Your 30”-72” 750mm-1800mm) strip beam may be equipped with optional sockets for strip boosters. These sockets are located at each end of the strip beam. The strip booster cylinders are mounted to the form set's core structure. The cylinder rams raise and push on the strip beam at the sockets.

Typically, sockets are provided for 66" (1650mm) and 72" (1800mm) diameter form sets when 15-ton (13.6 metric ton) cranes are used for off-bearing products. The cylinders are actuated against the beam, then the crane is actuated. The cylinders should be lowered before transporting the jacket and product from the machine to prevent the form from hitting the rams during product transport.

Operating the Strip Assist Cylinder

15.1.1.1 Controlling Strip Cylinders

The strip cylinders are operated from the main operator control console by depressing either the strip "UP" or "DOWN" button. Depressing the control button starts the cylinder stroke movement, releasing the control button stops the cylinder stroke movement. The "UP" control button raises the cylinder ram and the "DOWN" control button lowers the cylinder ram.

The oil pressure to the strip cylinder is adjustable. A pressure should be selected that is adequate to lift the core. Do not use more force than is required, see ***Power Trowel Oil Pressure*** on next page.

15.1.1.2 Stripping Operation

WARNING! Check to be sure that the overhead crane safety overload and safety lock mechanism features are working properly. Read and understand *Overhead Crane Safety Precautions* in the *Safety* section of this manual before stripping the product from the form. Failure to comply with this warning may result in serious personal injury.

15.1.1.2.1 Stripping Product from Anchored Jacket

WARNING! The jacket may shift sideways when the core and product are being removed. Green concrete on the product may separate from the core, falling to the platform or ground. Keep well clear of the jacket and product during the stripping operation.

Center the overhead crane hoist over the product and attach the crane hook to the core lifting round. Lift the core and product completely from the anchor jacket with the overhead crane and the power trowel/strip assist cylinder. Assist the crane with the strip cylinder as required. On the average size pipe, the strip assist cylinder is usually only required for the first 2' of lift. Experience will tell the machine operator how much strip assistance must be provided to successfully strip the

product. If the crane overload switch "cuts out", this is a good indication that more assistance needs to be given to the overhead crane.

WARNING! Before transporting the core and product from the anchored jacket, the strip assist cylinder ram should be lowered back down into the cylinder casing to allow clearance for the jacket and product to be removed.

15.1.1.2.2 Adjusting Strip Assist Cylinder Pressure for the Stripping Operation

If the crane overload switch "cuts out" repeatedly, this is a good indication that the strip cylinder oil pressure may have to be increased in order to strip the product. A high volume of oil is required for the strip operation. The conveyor should be shut off at the opposite station to provide the strip cylinder with the necessary oil volume.

To adjust the strip cylinder oil pressure, adjust the strip assist cylinder pressure valve located at the rear operator console.

In extreme cases, the emergency power may have to be used to strip the product. If so, set the valve adjusting knob to the maximum pressure setting and depress the "PRESSURE BOOST" button if so supplied.

Strip Assist Cylinder Maintenance

15.1.1.3 Plumbing the Strip Assist Cylinder

The strip assist cylinder must be kept plumb at all times. When properly adjusted, there will be a distinct pressure required to move this cylinder off plumb. There should be no play or lost motion on the cylinder in any direction.

15.1.1.4 Replacing Strip Assist Cylinder Wiper Ring

The wiper located at the top of each strip cylinder prevents foreign material from entering the hydraulic system. If this wiper is not maintained in good condition, it is possible for considerable contamination to enter the hydraulic system. Keep this wiper in good condition at all times and check Periodically-Should a new wiper become necessary, it should be installed promptly. The wiper is pressed fit into the cylinder. Removal of wiper will not release the hydraulic packing, which is held in place by an additional snap ring.

15.1.1.5 Removing Strip Assist Cylinder from Machine

The strip assist cylinders are designed to be removed from production station in order to facilitate the production of various types of products.

To remove the cylinders, disconnect the two hydraulic hoses located at the form base where they connect to the strip cylinders internally. Cover the hose fittings with dust caps. Remove the form base from the machine as in normal operation.

To re-install the cylinder in machine, first check to be sure that the strip cylinder base is clean. Lower the cylinder onto the base while orienting the connectors on the strip cylinder towards the hole in which the hoses enter the form base. Check the cylinder for plumb and for wobbling.

Strip Assist Cylinder Maintenance

Inspect the cylinder for plumb each day of use.

Inspect the cylinder seals and cylinder shaft every 400hrs and clean/lube as required.

Notes

16 Vibration

SS CAP 72 Machine

Machine Serial No. CP-430

Notes

16.1 Vibrating The Form

Vibrator Control Buttons

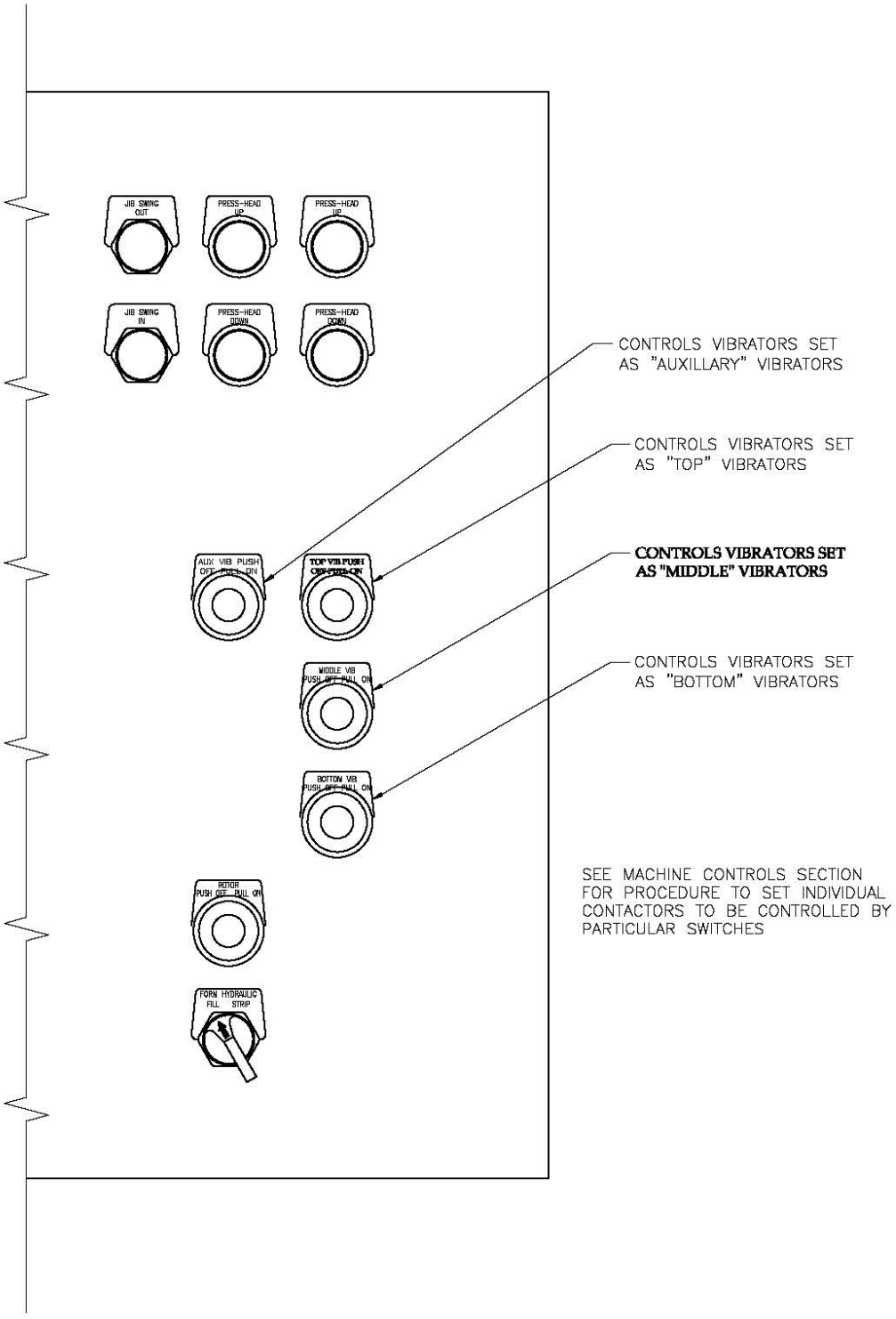
The jacket and core vibrators are controlled from electrical switches on the main operator console. It is important that the form vibrators are connected to the correct machine receptacle outlets so the correct vibrators are controlled from the switches and also, so vibrator rotation is correct. Refer to the ***Preparation Before Operation*** section for instructions on the proper outlets to which the form vibrators are to be connected.

Figure 7-1 shows a diagram of the control console of the vibration control switches for the right side of the machine. Actuating one of these switches will cause multiple outlets to become energized. Therefore, it is important that when the vibrators are connected to the outlets, the two vibrators located on each vibration transmission band are connected to two outlets controlled by the same switch.

The jacket vibrators should rotate as shown in ***Figure 7-2***. The core vibrators' rotation is shown in ***Figure 7-3***. This rotation will be automatic if the vibrators and plugs are wired to their correct polarity and connected to the correct machine outlets. Refer to ***Checking Vibrator Rotation*** and ***Checking Machine Receptacle Outlets Polarity*** for more details.

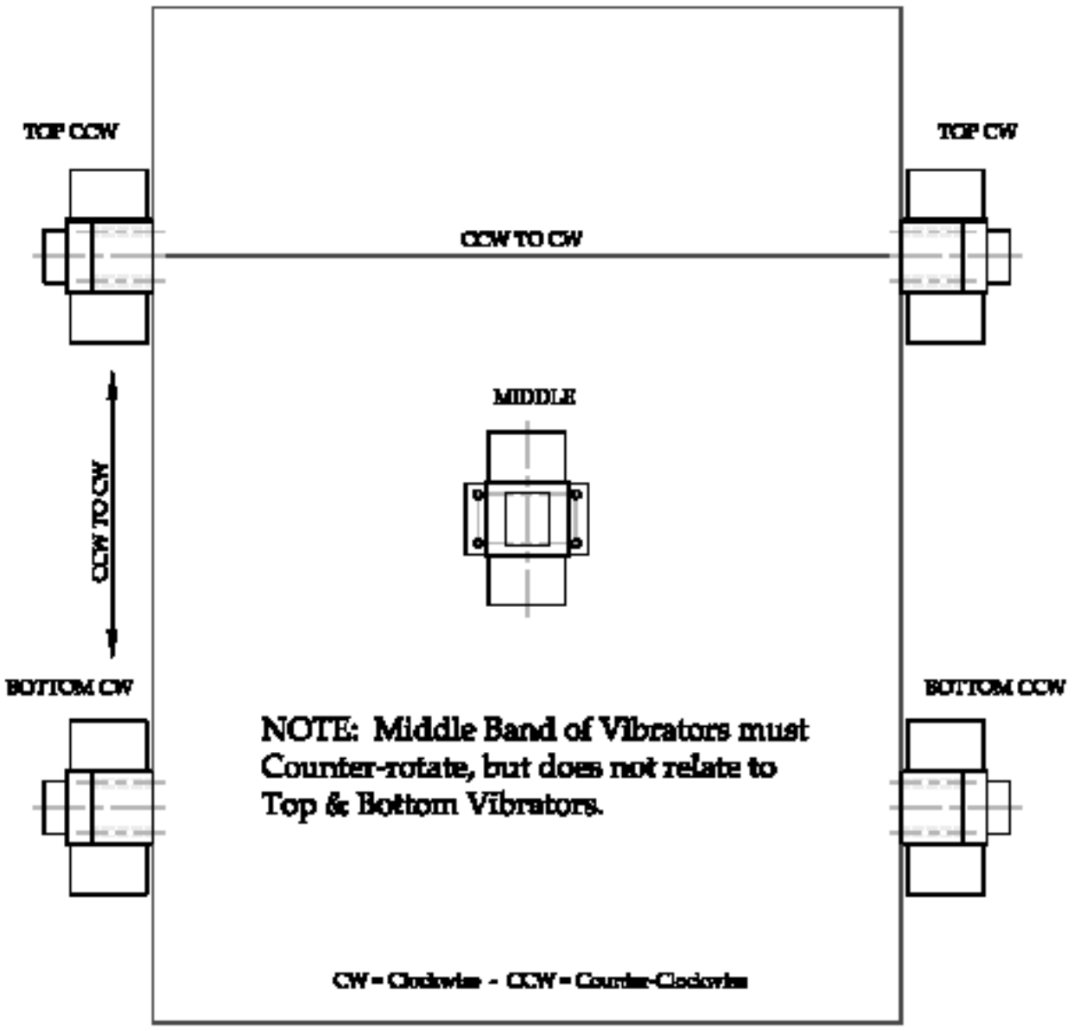
Vibrating Product During the Feeding Operation

Start the lower band of vibration on the jacket as concrete begins to be fed to the form. When the form is approximately half full; start the middle band of vibration on both the jacket and core. When the form is about 3/4 full, start the top band of vibration on both the jacket and the core. From experience, an operator can tell if a vibration band "loads down" after starting. If a vibration band does not "load down", the band should be turned off and re-started after additional concrete has been added to the form. Vibrate the form only with sufficient concrete present. Failure to do so may shorten the life of the form set.



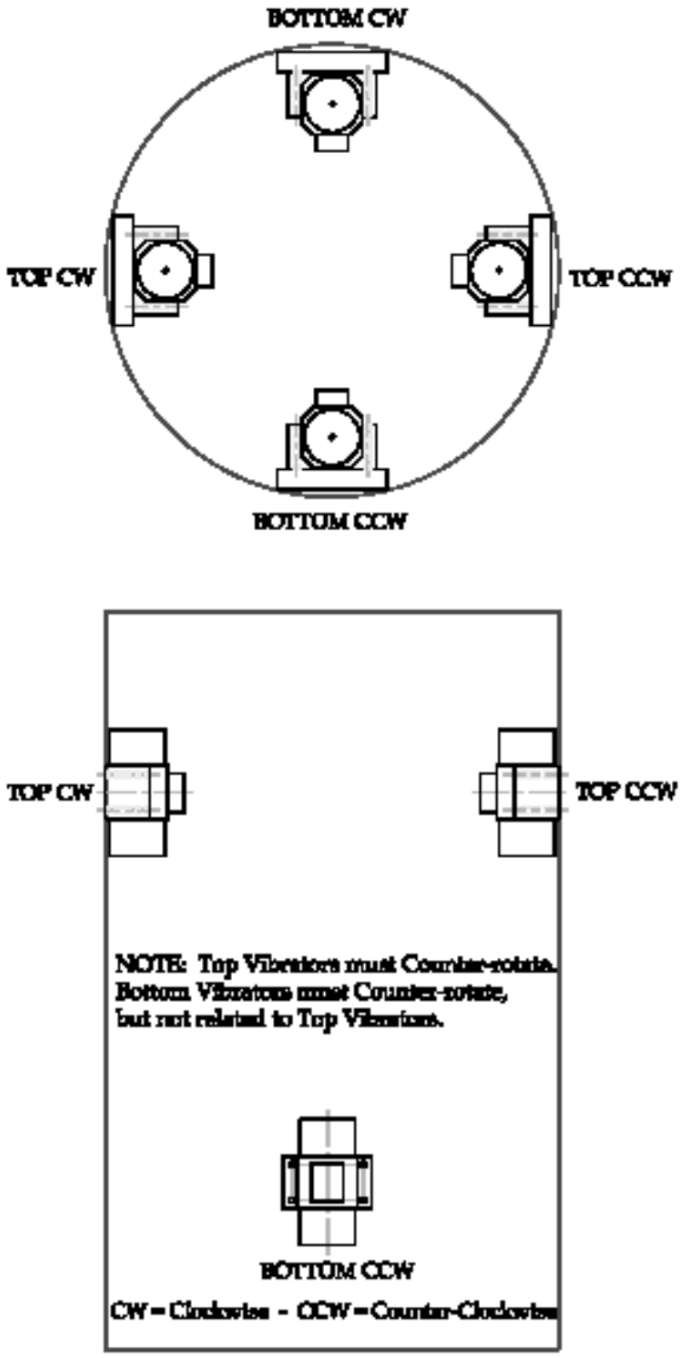
Vibrator Control Switches

Figure 7-1



SS Cap 72 Machine Jacket Form Vibrator Rotation

Figure 7-2



SS CAP 72 Machine Core Vibrator Rotation

Figure 7-3

Vibrating the Product After Feeding Operation

WARNING! The core vibrator control plugs must be disconnected from the machine receptacle outlets and placed in the core socket holder before placing header or pressurehead on the form set.

Before placing the header into the filled form, turn off the core vibrators and unplug the power and control cords from the console outlets and return the plug ends of the cords to the holder in the core top.

After the form has been filled, the header is in place, and the pressurehead ready to pressurize the form, re-connect the core vibrators. The core and jacket vibrators should remain on until the header has been "pressed" into its proper position and with the pressurehead tight against the form set. Allow the vibrators to operate for an additional 15 seconds to normalize any pressure spots in the pipe.

16.2 Core Vibration System

This section of the manual gives instructions on how to operate your machine when using Classic Core Vibration System form equipment. This vibration system follows several of the basic principles incorporated into the jacket vibration system, but there are important differences between the two systems that must be recognized.

NOTE: Be sure to read the following instructions to become familiar with the core vibration system.

Afinitas's internal Classic Core Vibration System is an option with single core form sets. The instructions that follow detail the Classic Core Vibration System. For instructions on how to produce pipe, refer to ***Pressureheading Procedures***.

Afinitas's Classic Core Vibration System form equipment uses five different size vibrators. The size of vibrator selected for a form is based on the product's diameter and length. A major difference between the classic core and jacket vibration is that with jacket vibration, vibrators are set at their maximum impact setting. With the classic core vibration, each vibrator's impact setting is set differently, depending upon the form's size. Refer to ***Classic Core Vibration System*** for information on the size and impact setting of the vibrators used for each form.

The Classic Core Vibration System uses the same vibrator counter-rotation principal as the Jacket Vibration System. The top vibrator in a core counter-rotates with respect to the bottom vibrator in a core. This counter-rotation principal occurs automatically during the production cycle as long as the form vibrators are connected to the proper vibrator receptacle outlets and the machine's vibration components have been maintained properly.

In addition to proper operating techniques, you must be sure that the **SS CAP 72 Machine's** Classic Core Vibration System is maintained properly. There are three basic service functions that must be performed or monitored to be assured of counter-rotation between vibrators in a core:

1. Core vibrators must be installed properly in the core. See ***Installing Vibrators to Core***.

   Because working clearance inside the cores is limited, it is recommended that once a vibrator is installed to a core, that it is left there permanently except for servicing and repair. It is important that when a vibrator is installed to a core that the vibrator mounting bolts be properly torqued to their correct tightness. Otherwise, a vibrator may work loose from its mount during operation, resulting in damage to the vibrator. See ***Installing Vibrators to Core*** for mounting bolt torquing specifications.

2. Core vibrators must all be wired to the same, correct polarity. See ***Vibration System Wiring Method***.
3. Each machine receptacle outlet must be wired to its correct polarity. See ***Checking Machine Receptacle Outlet Polarity***.

NOTE: Refer to *Vibrator Care* for details on additional important vibrator service and maintenance functions.

NOTE: See *Installing Vibrators to Core* for details on mounting the vibrators to the core.

Controlling the Vibrators

The core vibrators are controlled by the core vibrator switches located on the control console. The vibrators in the cores are controlled from switches located at the control console. These "PULL/ON", "PUSH/OFF" switches have a built-in indicator light. When vibrators are energized (the switch is pulled to the "ON" position), the indicator light comes on. If for any reason the electrical circuit to the receptacle outlets controlled by that switch is interrupted or disconnected, the indicator light will go off. By monitoring the lights, the machine operator can make a visual check during the vibration cycle to make sure that power to the machine receptacle outlets has not been interrupted. If an indicator light would go out during the machine operating cycle, the reason should be identified immediately because a de-energized electrical circuit is usually the result of an electrical overload, a signal that some equipment malfunction is occurring.

To be assured that the control switches are controlling the correct vibrator in the core, it is important that the core vibrators are plugged into the proper machine receptacle outlets.

Connecting Core Vibrators to Machine Receptacle Outlets

The **SS CAP 72 Machine** has machine receptacle outlets located under the machine platform at each production station. The plug end of the core vibrators are to be connected to the machine receptacle outlets at the core vibration boxes. ***Figure 7-4*** shows the core vibration box and outlets.

NOTE: The machine receptacle outlets used for core vibration forms are also used for the jacket-vibrated forms. It is necessary to route extension cords above the platform. See *Jacket Vibration System* for details.

The plug end of the core vibrators is connected to the machine receptacle outlets hanging from the core vibration box, which is located under the production platform. Because the machine receptacle outlets are wired to different polarities to permit the vibrators to counter-rotate with respect to one another, it is important that each vibrator is plugged into the correct receptacle outlet. See ***Figure 7-4*** for proper vibrator connections.

As was explained earlier, the vibrators in a core counter-rotate in order to achieve proper vibration transmission. Because the vibrators are all wired to the same polarity, the machine receptacle outlets at the core vibration boxes are wired to different polarities to achieve counter-rotation between vibrators. Therefore, it is important that the vibrators be connected to the correct outlets so counter-rotation will result between vibrators.

There is a second reason that it is important that vibrators be plugged to the correct machine receptacle outlets. The vibrators are protected against thermal overload by relays in the machine's electrical circuit. Since five different size vibrators are used with the core vibration system, different relay sizes are used in the system. To be assured that a vibrator is being protected properly, it is important that the vibrators be connected to the correct machine receptacle outlets.

Refer to ***Figure 7-5*** for a list which shows what size vibrator is used in each pipe form. With this information, you can determine which group of outlets to use for a particular form. As an operation aid, all forms except those equipped with Model 18120 Bosch vibrators, have a colored decal applied to the form's jacket that matches to colored-tubes on the electrical outlet cords. For example, if a form has a green decal, its vibrators would be connected to the machine outlets identified with a green tube.

After identifying which group of outlets the vibrators are to be connected to, it is important that the top and bottom vibrator in the core be attached to the correct outlets in the group. Information on connecting vibrators to the correct outlets follows.

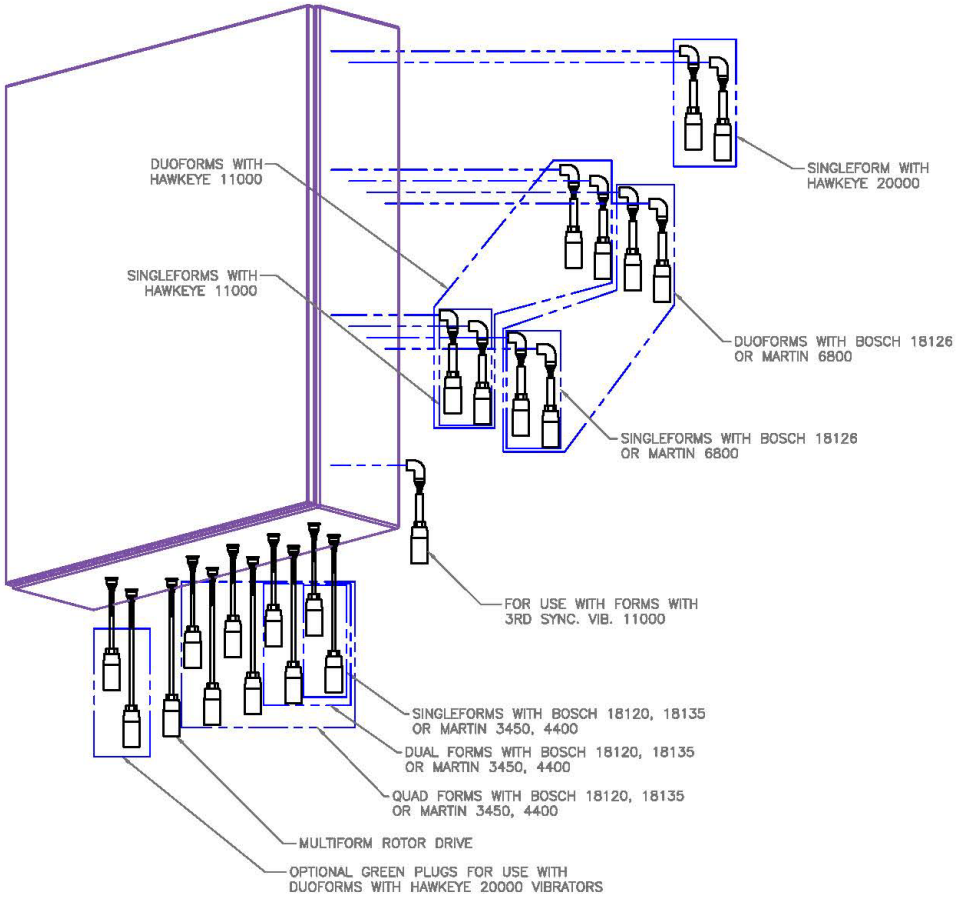
IMPORTANT: For vibrators to rotate in the proper direction, it is not only important that the vibrators be connected to the correct machine receptacle outlet, but it is also very important that the vibrators are all wired to the same correct polarity and also that the machine receptacle outlets are wired to their correct polarity. See *Testing Vibrator Rotation* and see *Checking Machine Receptacle Outlet Polarity* in the maintenance section of the manual for detailed instructions on these two important points.

WARNING! Do not attempt to connect or disconnect vibrators from the machine receptacle outlets unless all vibrators have been switched off at the station control posts and the indicator lights at the control post are not illuminated. Plugging or

unplugging vibrators before power to the machine receptacle outlets is cut may result in a possible electrocution hazard and serious bodily injury.

Before connecting or disconnecting vibrators at the machine receptacle outlets, turn off all the vibrators at the control switches on the station control console. Check that all vibrator-on indicator lights are off as a visual check to make sure that the electrical circuit to the machine receptacle outlets has been interrupted.

IMPORTANT: Replace the vibrator on indicator lights immediately upon burn out. A burned-out light can be a safety hazard, given the machine operator the false visual impression that electrical power to the machine receptacle outlets has been interrupted when in fact the receptacle outlets may still be energized.



VIBRATOR PLUG GUIDE			
PLUG	USED FOR	ROTATION DIR.	CORD COLOR
1	BOSCH 18120, 18135 MARTIN 3450, 4400	CCW	WHITE
2	BOSCH 18120, 18135 MARTIN 3450, 4400	CW	NONE
3	BOSCH 18120, 18135 MARTIN 3450, 4400	CW	NONE
4	BOSCH 18120, 18135 MARTIN 3450, 4400	CCW	WHITE
5	BOSCH 18126 MARTIN 6800	CCW	BLUE
6	BOSCH 18126 MARTIN 6800	CW	BLUE
7	HAWKEYE 11000	CCW	RED
8	HAWKEYE 11000 **	CW	RED/GRAY
9	BOSCH 18120, 18135 MARTIN 3450, 4400	CCW	WHITE
10	BOSCH 18120, 18135 MARTIN 3450, 4400	CW	NONE
11	BOSCH 18120, 18135 MARTIN 3450, 4400	CW	NONE
12	BOSCH 18120, 18135 MARTIN 3450, 4400	CCW	WHITE
13	HAWKEYE 20000	CW	GREEN
14	HAWKEYE 20000	CCW	GREEN
15	ROTOR PLUG		NONE
17	BOSCH 18126 MARTIN 6800	CW	BLUE
18	BOSCH 18126 MARTIN 6800	CCW	BLUE
19	HAWKEYE 11000 **	CW	RED/GRAY
20	HAWKEYE 11000	CCW	RED
21	HAWKEYE 11000 **	CW	RED/GRAY
* 38	HAWKEYE 20000	CCW	GREEN
* 39	HAWKEYE 20000	CW	GREEN

* ONLY FOR BOXES WITH (2) ADDITIONAL GREEN PLUGS
** GRAY PLUGS FOR USE WITH FORMS USING (3) SYNC. VIB. 11000 VIBRATORS

Machine Receptacle Outlets at Core Vibration Box
Figure 7-4

Pipe Diameter (Inches/mm)	Pipe Length (Feet/Meter)	BOSCH 18135	BOSCH 18120	BOSCH 18126	*MotoMagnetic CD36-11000	MotoMagnetic CD36-20000
10” / 250mm	8’ / 2.5M	◆				
12” / 300mm	8’ / 2.5M		◆			
15” / 400mm	8’ / 2.5M		◆			
18” / 450mm	8’ / 2.5M		◆			
21” / 500mm	8’ / 2.5M		◆			
24” / 600mm	8’ / 2.5M		◆			
27” / 700mm	8’ / 2.5M			◆		
30” / 750mm	8’ / 2.5M			◆		
33” / 825mm	8’ / 2.5M			◆		
36” / 900mm	8’ / 2.5M			◆●		
39” / 1000mm	8’ / 2.5M				◆	
42” / 1100mm	8’ / 2.5M				◆	
48” / 1200mm	8’ / 2.5M				◆	
54” / 1400mm	8’ / 2.5M				◆	
60” / 1500mm	8’ / 2.5M					◆
66” / 1650mm	8’ / 2.5M					◆
72” / 1800mm	8’ / 2.5M					◆

● Requires vibrator eccentric weight modification for 36” (900mm) diameter pipe form.

Form Vibrator Size Chart
Figure 7-5

Bosch 18120 & 18135 Vibrator Hookup Procedure

Figure 7-4 shows machine receptacle outlets hanging from the core vibration box bottom side. The plugs that are hanging from the box bottom are to be used with form equipment equipped with the Bosch Model 18120 and 18135 vibrators.

Note in the four-outlet cluster, two of the outlets hang lower than the other two. The purpose of this concept is to give the worker an instinctive feel for which outlet is to be used with the top or bottom vibrator in the core. For example, the lower hanging outlets are to be connected to the bottom vibrator in the core while the upper hanging outlets are to be connected to the top vibrator in cores.

Figure 7-6 shows the method of connecting Singleform equipment to the machine receptacle outlets. The vibrators in these cores must be connected at the four-cluster outlet group identified for Singleform equipment. Since only two vibrators are used in the core, use only one upper hanging and one lower hanging outlet in the four-cluster group. The top vibrator in the core will be connected to the upper hanging outlet and the bottom vibrator in the core will be connected to the lower hanging outlet. The remaining two outlets in the cluster are not to be used. It is important to use the correct two outlets in the group, so vibrators counter rotate. Select the two outlets positioned together as shown in ***Figure 7-6***.

Bosch 18126 Vibrator Hookup Procedure

Figure 7-4 also shows outlets located to the side of the core vibration boxes. These outlets are required for the Bosch 18126 vibrator, Afinitas MotoMagnetic 11000 vibrator and Afinitas MotoMagnetic 20000 vibrator.

The outlets for the Bosch 18126 vibrator are identified with a blue cord placed just above the outlets. Forms equipped with this same vibrator will be color coded with a blue decal on the form's jacket. This will alert the worker to the fact that the form is equipped with Model 18126 vibrators and that the vibrators should be connected only to outlets on the core vibration box identified with a blue tube.

Note that the outlets hang at different elevations. This concept will give the worker an instinctive feel for which outlet is to be used with the top vibrator in the core and which is to be used with the bottom vibrator in the core. For example, the lower hanging outlet is to be connected to the bottom vibrator in the core while the upper hanging outlet is to be connected to the top vibrator in the core.

Figure 7-7 shows the method of connecting form equipment equipped with the Bosch Model 18126 vibrator to the machine receptacle outlets. Connect the upper-hanging outlet to the top vibrator in the core and connect the lower hanging outlet to the bottom vibrator in the core.

Afinitas CD36-11000 Vibrator Hookup Procedure

In addition, ***Figure 7-4*** identifies the two vibrator machine receptacle outlets at the core vibration box side that are to be used with form equipment equipped with the Afinitas MotoMagnetic CD36-

110000 vibrator. Form equipment with this vibrator will be identified with a red decal. This will alert the worker to the fact that vibrators in these forms are to be connected to the two outlets on the core vibration box identified with the red tube.

Note that for the two outlets, one is mounted higher than the other. This concept will give the worker an instinctive feel for which outlet is to be used with the top vibrator in the core and which is to be used with the bottom vibrator in the core.

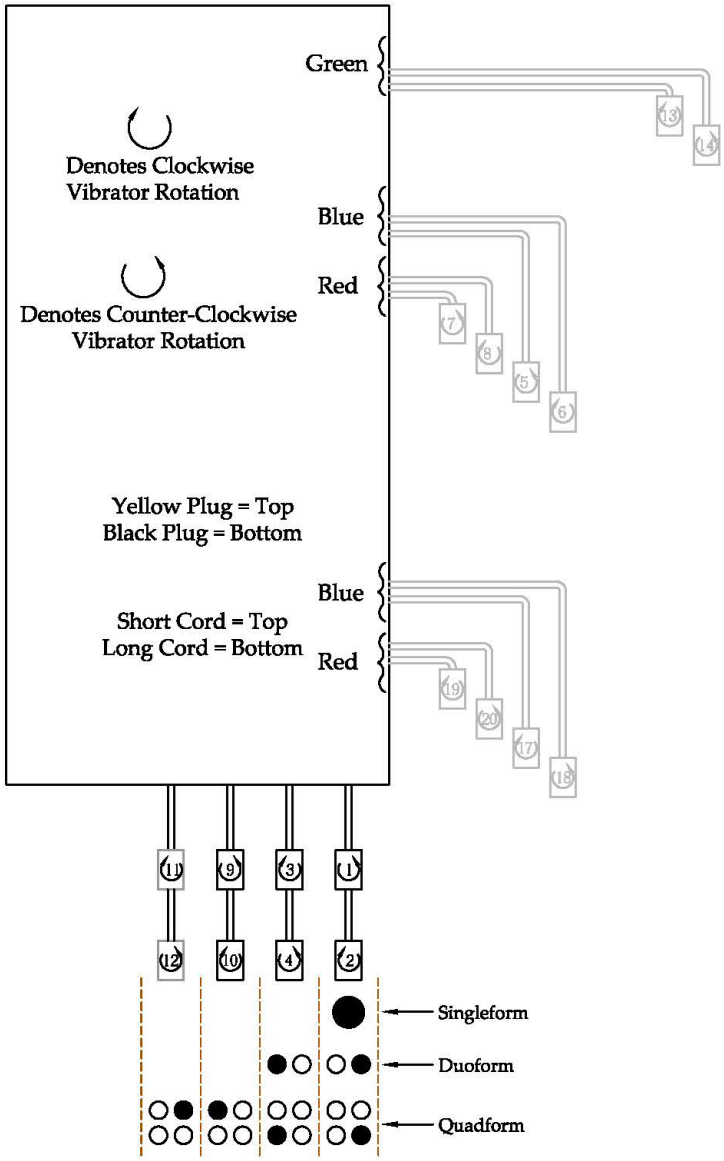
Figure 7-8 shows the method of connecting form equipment equipped with the Afinitas MotoMagnetic CD36-11000 vibrator to the machine receptacle outlets. Connect the upper mounted outlet to the top vibrator in the core and connect the lower mounted outlet to the bottom vibrator in the core.

Afinitas CD36-20000 Vibrator Hookup Procedure

Finally, ***Figure 7-4*** identifies the two vibrator machine receptacle outlets at the core vibration box side that are to be used with form equipment equipped with the Afinitas MotoMagnetic CD36-20000 vibrator. These two outlets are identified with a green hose. Form equipment equipped with this vibrator will be color-coded with a green decal on the form's jacket. This will alert the worker that this form equipment's vibrators are to be connected only to the outlets identified with the green hose.

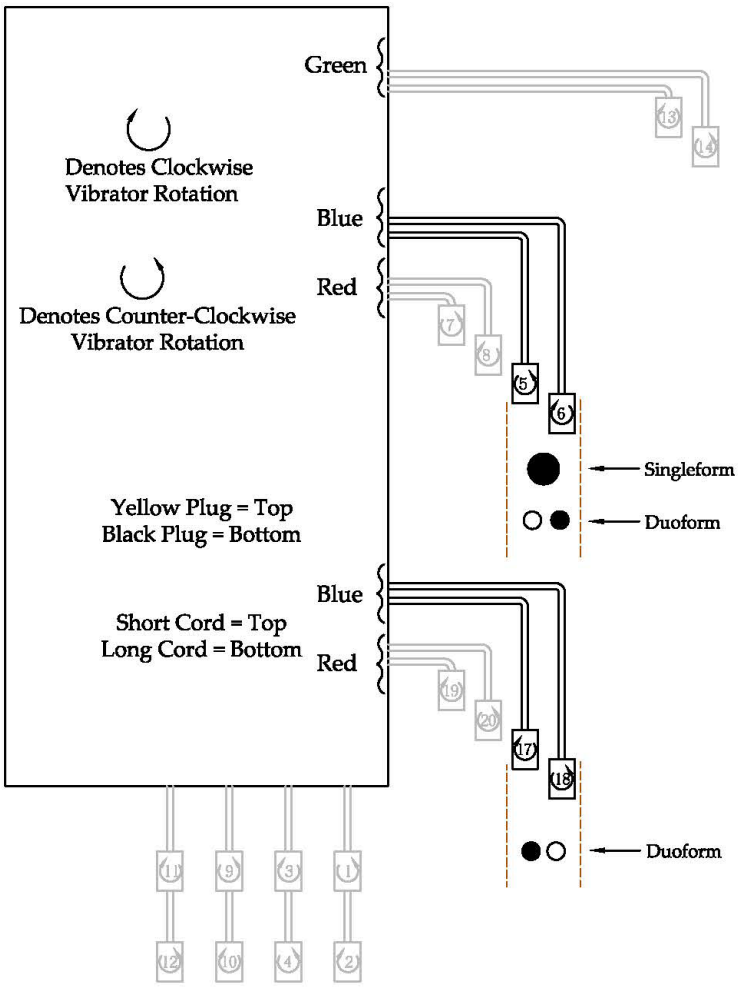
Note that for the two outlets, one hangs higher than the other. The upper outlets are for the upper or top vibrator in the core, while the lower outlet is for the lower or bottom vibrator in the core.

Figure 7-9 shows the method of connecting form equipment with the Afinitas MotoMagnetic CD36-20000 vibrator to the outlets on the core vibration box. Please note that the outlets on the core vibration box are identified with a green hose, same as the color decal on the form's jacket.



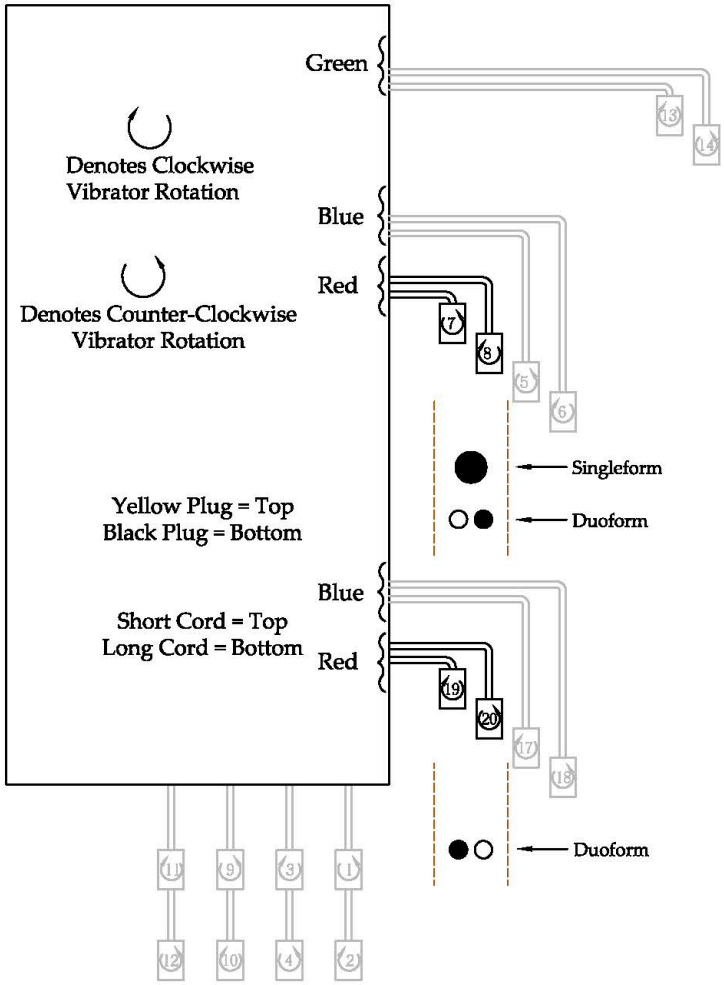
Vibrator Connection to Machine Receptacle Outlets
Bosch 18120 & 18135

Figure 7-6



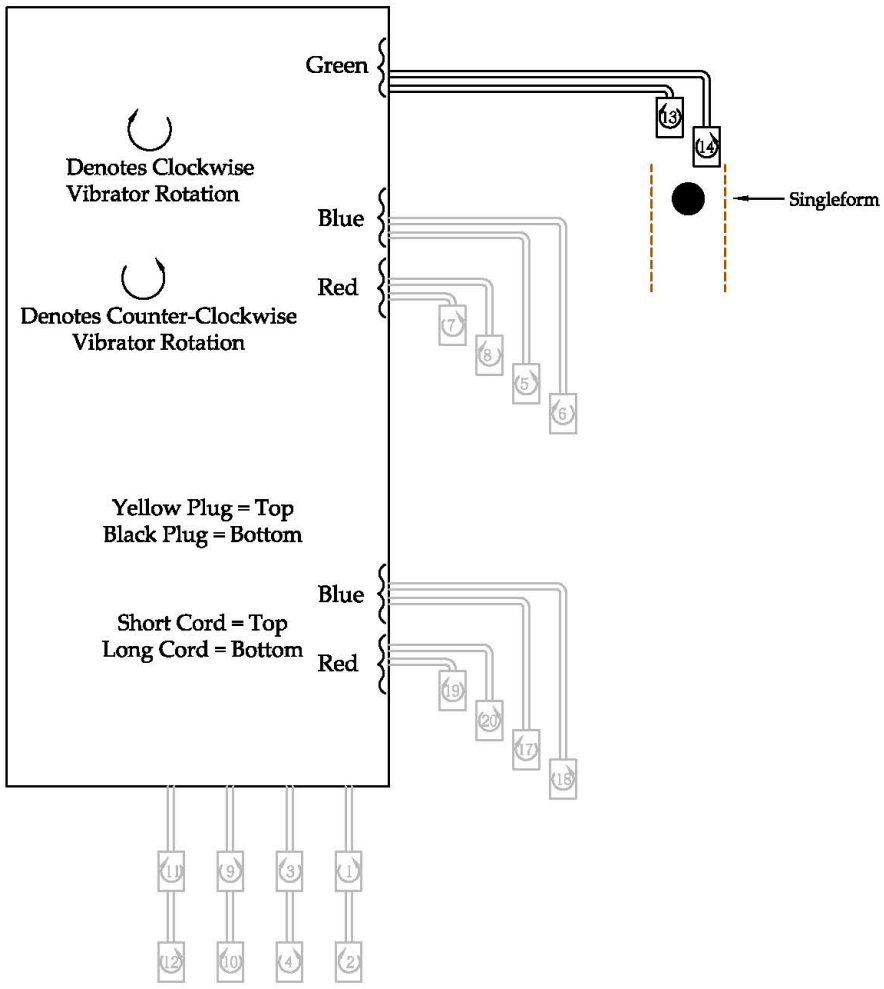
Vibrator Connection to Machine Receptacle Outlets
Bosch 18126

Figure 7-7



Vibrator Connection to Machine Receptacle Outlets
Afinitas MotoMagnetic CD36-11000

Figure 7-8



Vibrator Connection to Machine Receptacle Outlets
Afinitas MotoMagnetic CD36-20000

Figure 7-9

Operating the Vibrators

Careful attention to operating and maintenance procedures will assure years of dependable service from the vibrators. See ***Vibrator Care*** for important information concerning the proper care and service of the vibrators.

WARNING! Make sure the ground circuit is maintained in a good condition on the vibrators to help prevent an electrocution hazard. Failure to comply with this warning may result in serious personal injury. See *Vibrator Care*.

Always have a load for the vibrators to work against. Avoid starting the vibrators on a form before there is sufficient concrete in the forms to load the vibrators down. Improper operation of the vibrators can cause over flexing of the core, resulting in premature wear or even failure of the forms.

Afinitas core vibrated form equipment is designed for the vibrators to run at different impact force settings, unlike the system used for the jacket vibration system. Therefore, it is important that whenever a vibrator is repaired or installed in a core vibrated form, that its impact setting be first checked to make sure that it is correct. See ***Vibrator Impact Settings*** located in the service section of the manual for information on how to check and change the vibrator's impact settings.

IMPORTANT: Using the vibrators on Afinitas form equipment that have had their impact force adjusted differently from that stated in this manual could result in improper vibration transmission to the concrete or may cause premature wear to the form equipment.

16.3 Jacket Vibration System

Proper operation and maintenance of the **SS CAP 72 Machine vibration** system is of great importance to be sure that concrete products are being vibrated adequately and to prevent premature wear or damage to form equipment.

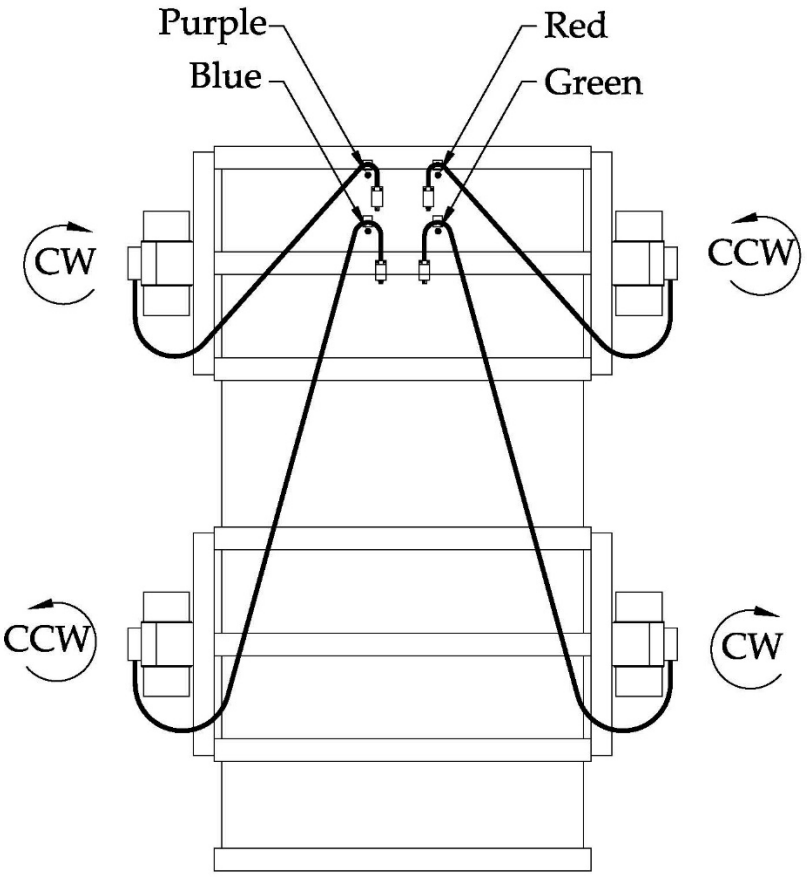
The **SS CAP 72 Machine vibration** system is designed so the jacket vibrators, when installed on the form set, counter-rotate with respect to one another. For example, on an 8' pipe form equipped with four vibrators, the two top vibrators counter-rotate with respect to each other and the two lower vibrators counter-rotate with respect to each other as shown in ***Figure 7-10***. Therefore, one of the top and bottom vibrators rotates in a clockwise direction while the other two vibrators rotate in a counterclockwise motion. This counter-rotation principle is automatic if the vibration system is operated and maintained properly. See ***Vibrator Counter-Rotation*** for more information on this system.

The vibrators are wired so they all rotate in the same direction when plugged into a “master” outlet. Therefore, in order to obtain counter-rotation between the vibrators, the machine receptacle outlets are wired to different polarities. Depending upon which machine receptacle outlet a vibrator

is connected to, the vibrators will rotate in either a clockwise or counterclockwise motion. For the system to operate properly, it is vital, then, that the following be maintained:

1. Vibrators must be installed correctly to the form.
2. Vibrators must be connected to the correct machine receptacle outlet during vibration.
3. All vibrators must rotate in the same direction when plugged into the same master outlet.
4. All machine receptacle outlets must be wired to their correct polarity.

The information that follows gives instructions on the above points and other important points that are necessary to obtain maximum performance and life from your machine's vibration system.



Jacket Vibrators Mounted to Form Equipment for 4 Vibrators

Figure 7-10

Connecting Jacket Vibrators to Machine Receptacle Outlets

The plug end of the jacket vibrators is connected to the machine receptacle outlets hanging from the station's outlet support post. Because the machine receptacle outlets are wired to different polarities to permit the vibrators to counter-rotate with respect to one another, it is important that each vibrator is plugged into the correct receptacle outlet.

The machine receptacle outlets at the support post connect to the core-box receptacles as shown in ***Figure 7-11***. It is important that the support post receptacles be connected to the correct core box receptacle, so outlet polarity and control are achieved. Only connect plugs as shown in ***Figure 7-11***.

There are four receptacle outlets located at the support post. The four machine receptacle outlets are arranged in a cluster so two of the outlets hang lower than the remaining two outlets in the group. This arrangement gives the operator an instant, instinctive feel for which outlets are used with the bottom vibrators on the form and which outlets are used with the top vibrators on the form. The lower-hanging receptacle outlets are used with the lower vibrators on the form, while the upper receptacle outlets are used with the top vibrators on the form.

This top and bottom hanging outlet principle identifies which two outlets are used with the top vibrators and which two outlets are used with the bottom vibrators, but the principle does not identify specifically, for instance, which top vibrator goes with which "top' receptacle outlet. Therefore, the machine receptacle outlets have been color coded with respect to the vibrators, so the operator knows which outlet goes to which vibrator. Different colored tubes are fixed around the cord of each machine receptacle outlet with matching-colored dots painted on the jacket at each vibrator electrical cord clamp. Match the machine receptacle outlet's colored tube to the vibrator's cord clamp identification dot color to determine which vibrator is plugged into which outlet. For example, the machine receptacle outlet with a purple-colored tube will be connected to the jacket vibrator whose electrical cord is attached to the cord clamp identified by a purple dot.

On forms equipped with only two vibrators, only two of the four machine receptacle outlets in a group are used. A "top" and "bottom" outlet in the group must be used, ignoring the remaining two outlets in the group. It is still important that the jacket vibrators be color-matched to the machine receptacle outlets as explained above to permit vibrator counter-rotation.

For the machine counter-rotation principle to work properly, it is necessary for the vibrators to be wired correctly for proper rotation direction and for the machine receptacle outlets to be wired to their correct polarity. See ***Checking Vibrator Rotation*** and ***Checking Machine Receptacle Outlet Polarity***.

WARNING! Do not attempt to connect or disconnect vibrators from the machine receptacle outlets until the following have been performed.

- All form vibrators have been turned off at the vibrator control pushbuttons on the control console.

- A visual check made of all vibrators on indicator lights to make sure they are off and not glowing.

WARNING! Plugging or unplugging vibrators before power to the machine receptacle outlets is cut could result in a possible electrocution hazard and serious bodily injury.

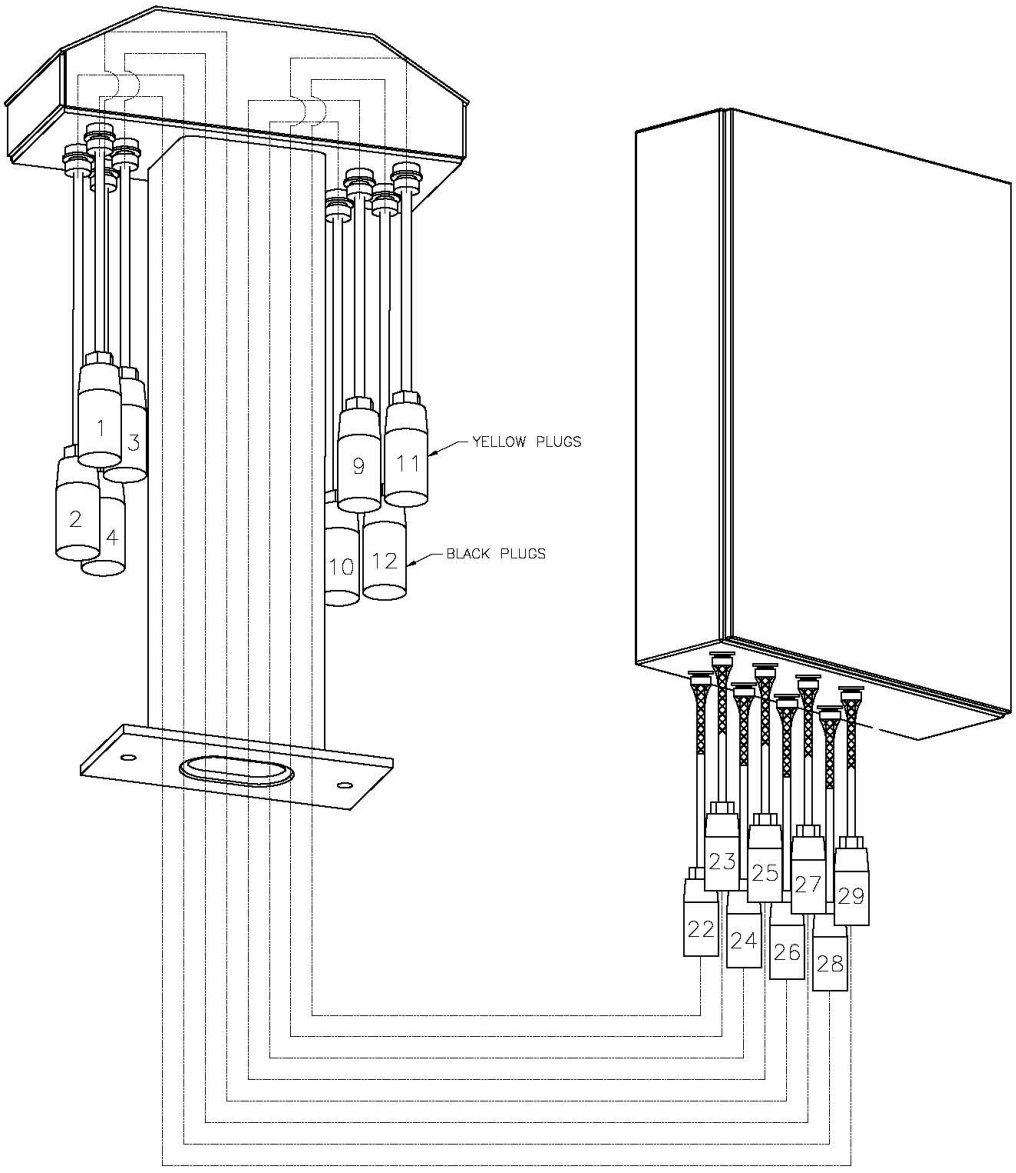
Before connecting or disconnecting vibrators at the machine receptacle outlets, turn off all vibrators at the vibrator control pushbuttons. Check that **all** vibrator-on indicator lights are off as a visual check to make sure that the electrical circuit to the machine receptacle outlets has been cut.

When connecting or disconnecting vibrators from the machine receptacle outlets, it is important to cut power to all the machine receptacle outlets, even if all the vibrators are not going to be disconnected, to prevent the possibility of human error by accidentally connecting or disconnecting vibrators form "live" vibrator receptacle outlets.

Listen to make sure no vibrators can be heard running before connecting or disconnecting vibrators.

IMPORTANT: Replace vibrator-on indicator lights immediately upon burn out. A burned-out light can be a safety hazard, giving the machine operator the false visual indication that electrical power to the machine receptacle outlets has been cut, when in fact the receptacle outlets may still be energized.

The jacket vibrators are controlled by the core vibrator switches located on the main control console. The switches are labeled "Top Vibrator" and "Bottom Vibrator". These “PULL/ON”, “PUSH/OFF” switches have a built-in indicator light. When vibrators are energized (the switch is pulled to the “ON” position), the indicator light should come on. If for any reason the electric circuit to the receptacle outlets controlled by that switch is interrupted or disconnected, the indicator light will go off. Therefore, the machine operator can make a visual check during the vibration cycle to make sure that power to the machine receptacle outlets has not been interrupted.



	VIBRATOR PLUG GUIDE					
PLUG #	JKT. VIB BOX PLUG	CONTACTOR NUMBER	USED FOR	ROTATION DIR.	PLUG COLOR	CORD COLOR
12	22	8	BOSCH 18120, 18135 MARTIN 3450, 4400	CCW	YELLOW	WHITE
11	23	7	BOSCH 18120, 18135 MARTIN 3450, 4400	CW	BLACK	NONE
10	24	8	BOSCH 18120, 18135 MARTIN 3450, 4400	CW	YELLOW	NONE
9	25	7	BOSCH 18120, 18135 MARTIN 3450, 4400	CCW	BLACK	WHITE
4	26	6	BOSCH 18120, 18135 MARTIN 3450, 4400	CCW	YELLOW	WHITE
3	27	5	BOSCH 18120, 18135 MARTIN 3450, 4400	CW	BLACK	NONE
2	28	6	BOSCH 18120, 18135 MARTIN 3450, 4400	CCW	YELLOW	NONE
1	29	5	BOSCH 18120, 18135 MARTIN 3450, 4400	CW	BLACK	WHITE

Jacket Vibration Receptacle Outlet Connector Method

Figure 7-11

Operating the Vibrators

Careful attention to operating and maintenance procedures will assure years of dependable service from the vibrators. See ***Vibrator Care*** for important information concerning the proper care and service of the vibrators.

WARNING! Make sure the ground circuit is maintained in a good condition on the vibrators to help prevent an electrocution hazard. Failure to comply with this warning may result in serious personal injury. See *Vibrator Care.*

Always have a load for the vibrators to work against. Avoid starting the vibrators on a form before there is sufficient concrete in the form to load the vibrators down. Improper operation of the vibrators can cause over-flexing and amplituding of the jacket, resulting in premature wear or even failure of the forms. Before operating a form, perform an amplitude check as detailed in ***Checking Jacket Amplitude*** to determine the best time intervals at which to actuate the vibrators for each individual form set.

IMPORTANT: Using vibrators on Afinitas form equipment that have had their impact force adjusted differently from the Afinitas standard may result in improper vibration transmission to concrete products or may cause premature wear to the form equipment. Refer to *Vibrator Impact Settings* for information concerning vibrator impact force.

16.4 Jacket Vibrator Controls

Mould Equipment on Production Base

This section contains descriptions of the procedures to be followed during installation and adjustment of mould equipment on a **SS CAP 72 Machine with** Production Base and Production Star.

Vibration Controls & Vibrator Receptacle Box

The **SS CAP 72 Machine** with Production Base and Production Star can utilize the mould equipment which operate with a series of electric vibrators on the mould jacket, core and presshead. These vibrators are controlled at the machine desk and are attached to the machine at an above ground vibrator receptacle box and jib assembly. The vibrator receptacle box layout is constructed to accept plugs directly from the mould vibrators. The jacket and presshead vibrators are connected above ground direction to the vibrator receptacle box. The core vibrators may be connected to permanent extension cords, which are routed below ground at a convenient location in the pit. Each of the receptacles is labeled and must be connected to the mould's corresponding numbered vibrator(s). See ***Figures 7-12 - 7-17***.

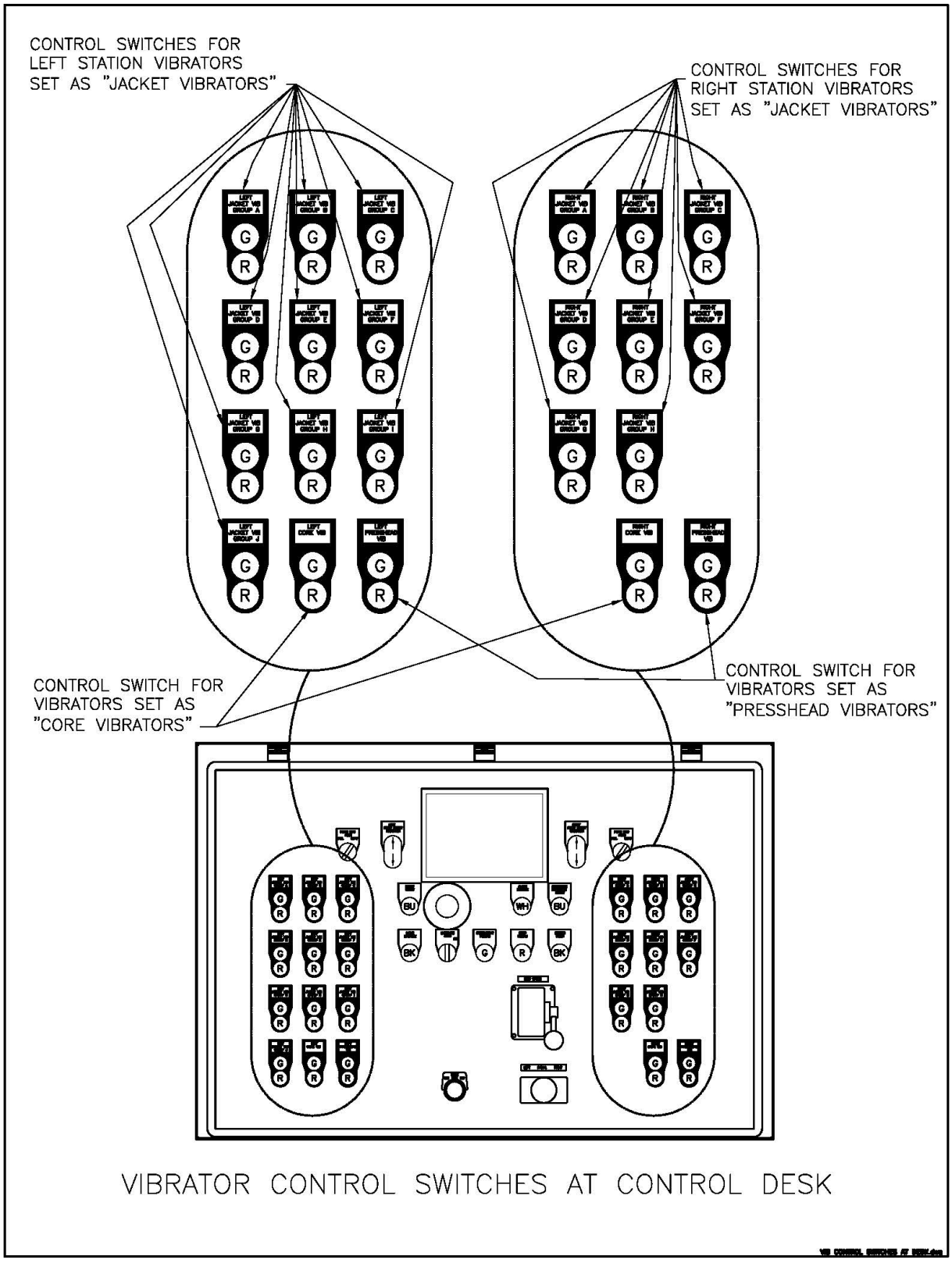

CONTROL SWITCHES FOR
LEFT STATION VIBRATORS
SET AS "JACKET VIBRATORS"
CONTROL SWITCHES FOR
RIGHT STATION VIBRATORS
SET AS "JACKET VIBRATORS"
CONTROL SWITCH FOR
VIBRATORS SET AS
"CORE VIBRATORS"
CONTROL SWITCH FOR
VIBRATORS SET AS
"PRESSHEAD VIBRATORS"
VIBRATOR CONTROL SWITCHES AT CONTROL DESK

Figure 7-12

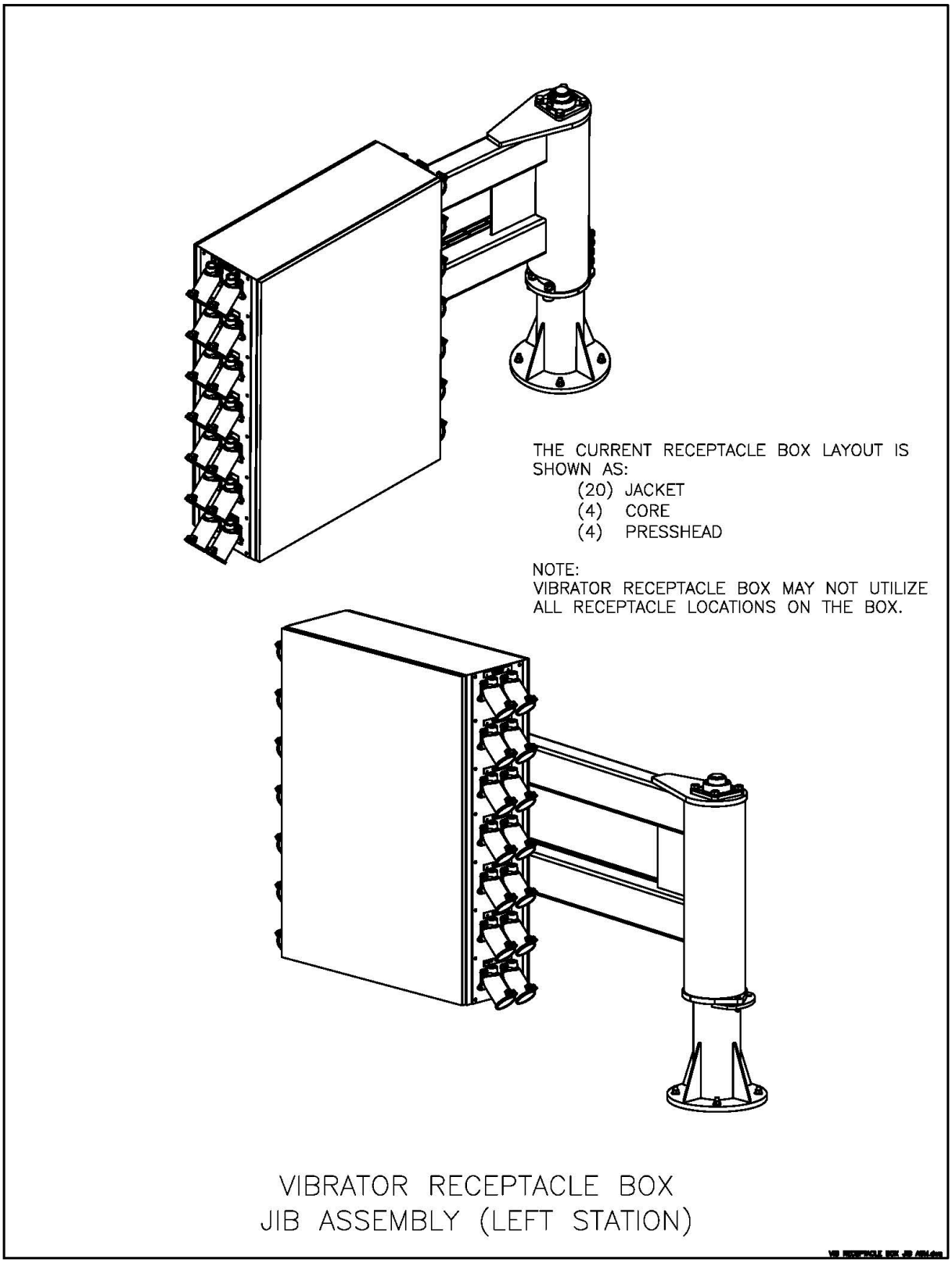

THE CURRENT RECEPTACLE BOX LAYOUT IS SHOWN AS:
(20) JACKET
(4) CORE
(4) PRESSHEAD
NOTE:
VIBRATOR RECEPTACLE BOX MAY NOT UTILIZE ALL RECEPTACLE LOCATIONS ON THE BOX.
VIBRATOR RECEPTACLE BOX
JIB ASSEMBLY (LEFT STATION)

Figure 7-13

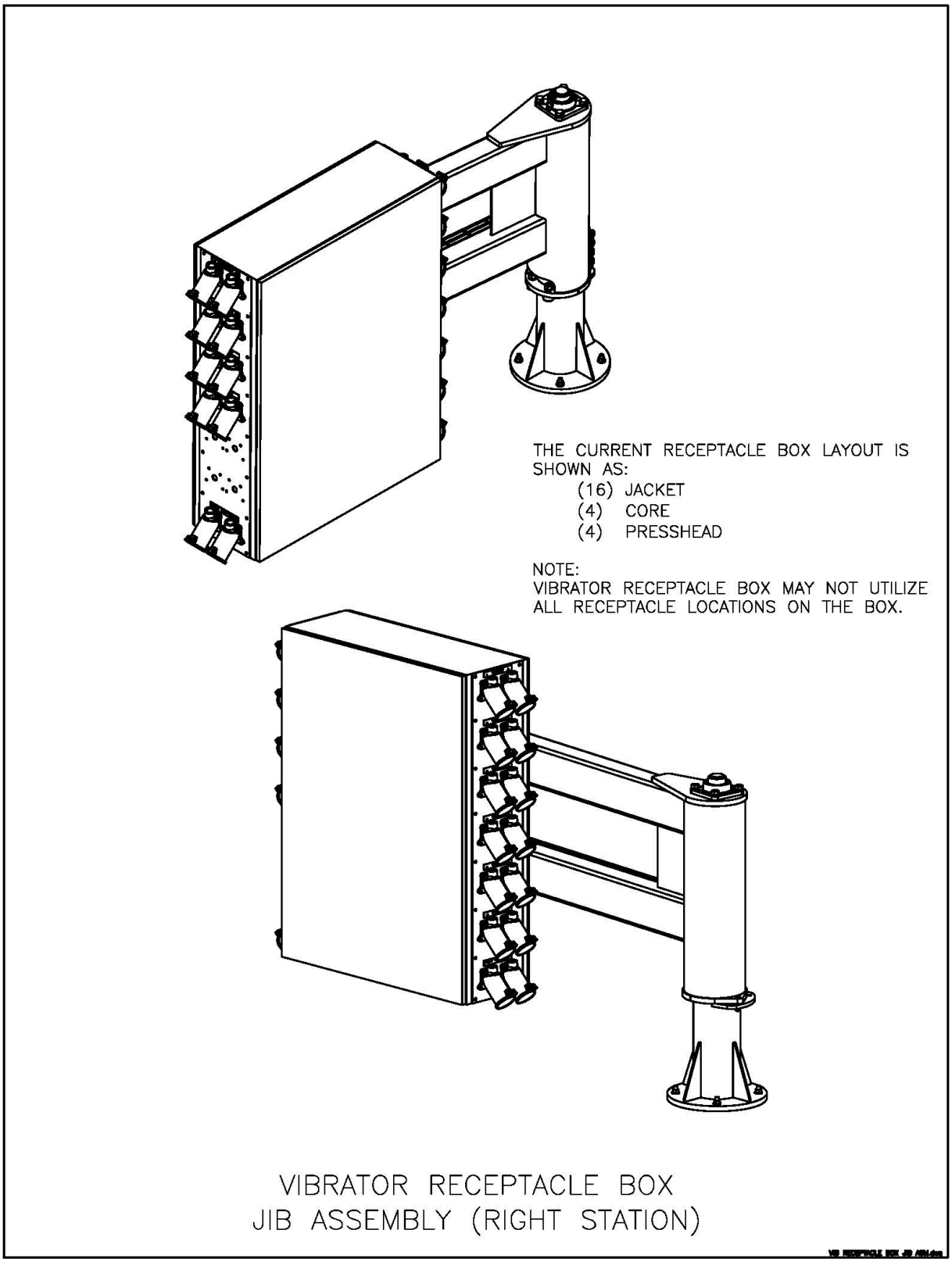

THE CURRENT RECEPTACLE BOX LAYOUT IS SHOWN AS:
(16) JACKET
(4) CORE
(4) PRESSHEAD
NOTE:
VIBRATOR RECEPTACLE BOX MAY NOT UTILIZE ALL RECEPTACLE LOCATIONS ON THE BOX.
VIBRATOR RECEPTACLE BOX
JIB ASSEMBLY (RIGHT STATION)

Figure 7-14

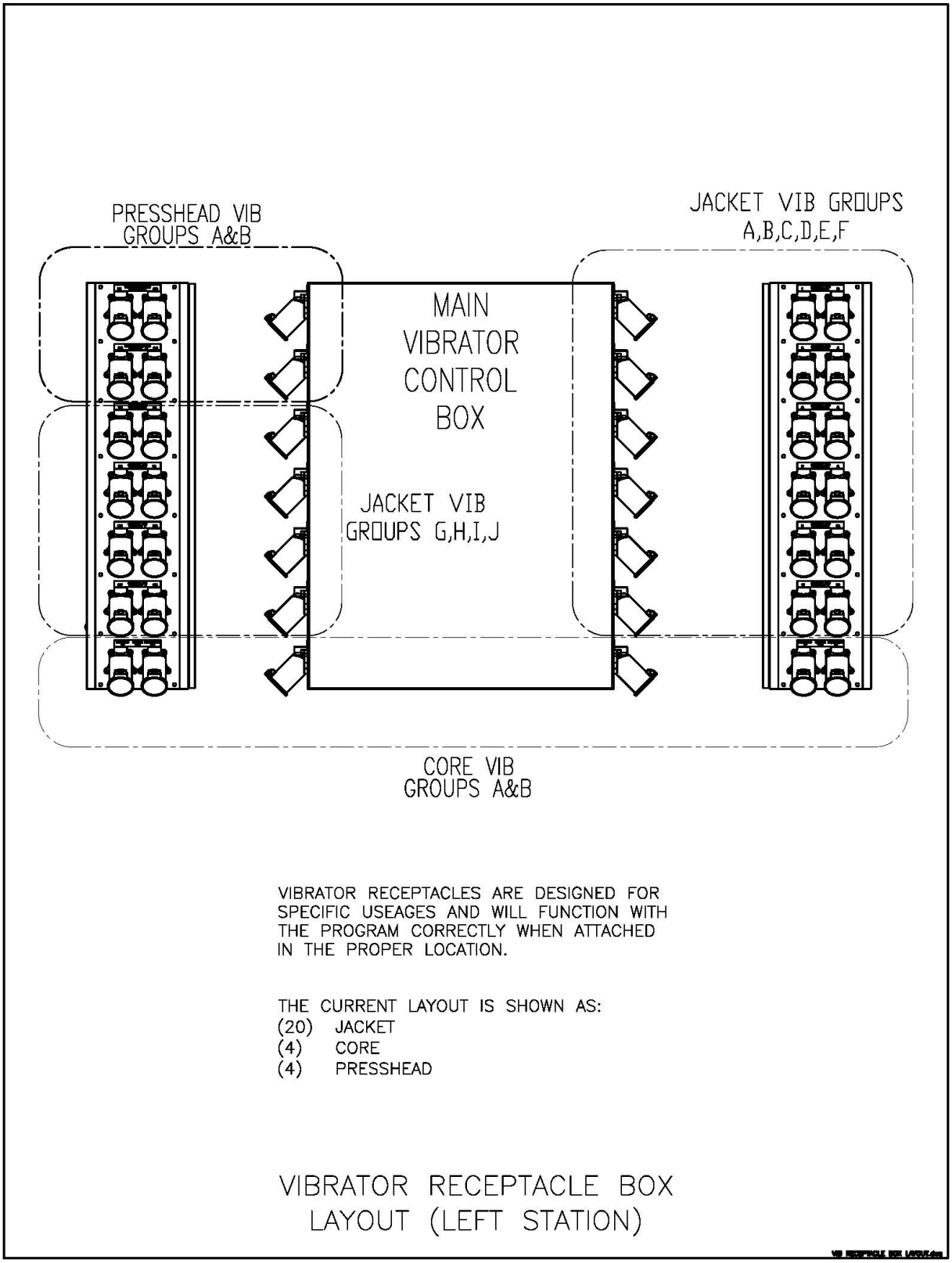

PRESSHEAD VIB
GROUPS A&B
JACKET VIB GROUPS
A,B,C,D,E,F
MAIN
VIBRATOR
CONTROL
BOX
JACKET VIB
GROUPS G,H,I,J
CORE VIB
GROUPS A&B
VIBRATOR RECEPTACLES ARE DESIGNED FOR SPECIFIC USEAGES AND WILL FUNCTION WITH THE PROGRAM CORRECTLY WHEN ATTACHED IN THE PROPER LOCATION.
THE CURRENT LAYOUT IS SHOWN AS:
(20) JACKET
(4) CORE
(4) PRESSHEAD
VIBRATOR RECEPTACLE BOX
LAYOUT (LEFT STATION)

Figure 7-15

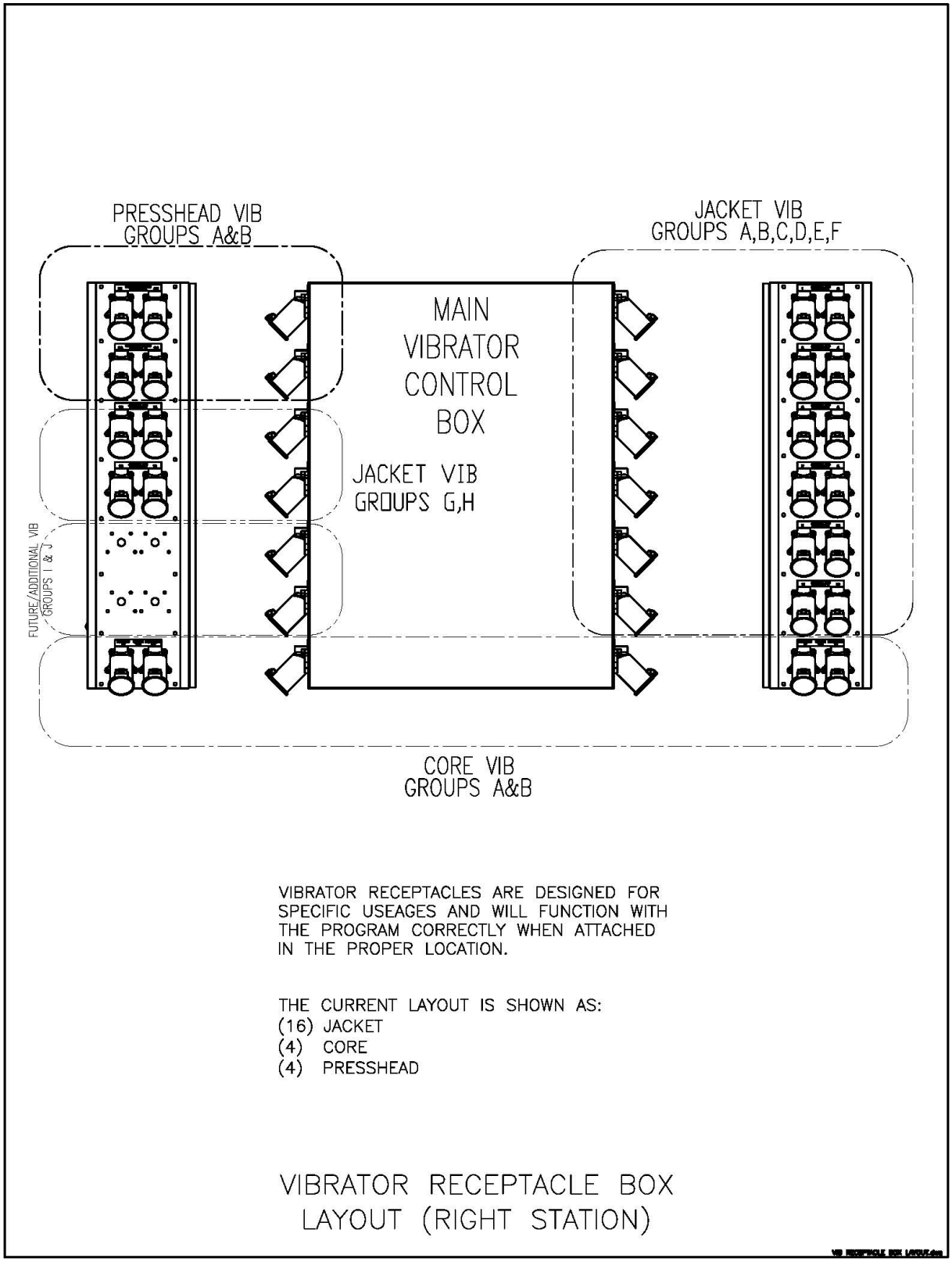

PRESSHEAD VIB
GROUPS A&B
JACKET VIB
GROUPS A,B,C,D,E,F
MAIN
VIBRATOR
CONTROL
BOX
JACKET VIB
GROUPS G,H
FUTURE/ADDITIONAL VIB
GROUPS I & J
CORE VIB
GROUPS A&B
VIBRATOR RECEPTACLES ARE DESIGNED FOR SPECIFIC USEAGES AND WILL FUNCTION WITH THE PROGRAM CORRECTLY WHEN ATTACHED IN THE PROPER LOCATION.
THE CURRENT LAYOUT IS SHOWN AS:
(16) JACKET
(4) CORE
(4) PRESSHEAD
VIBRATOR RECEPTACLE BOX
LAYOUT (RIGHT STATION)

Figure 7-16

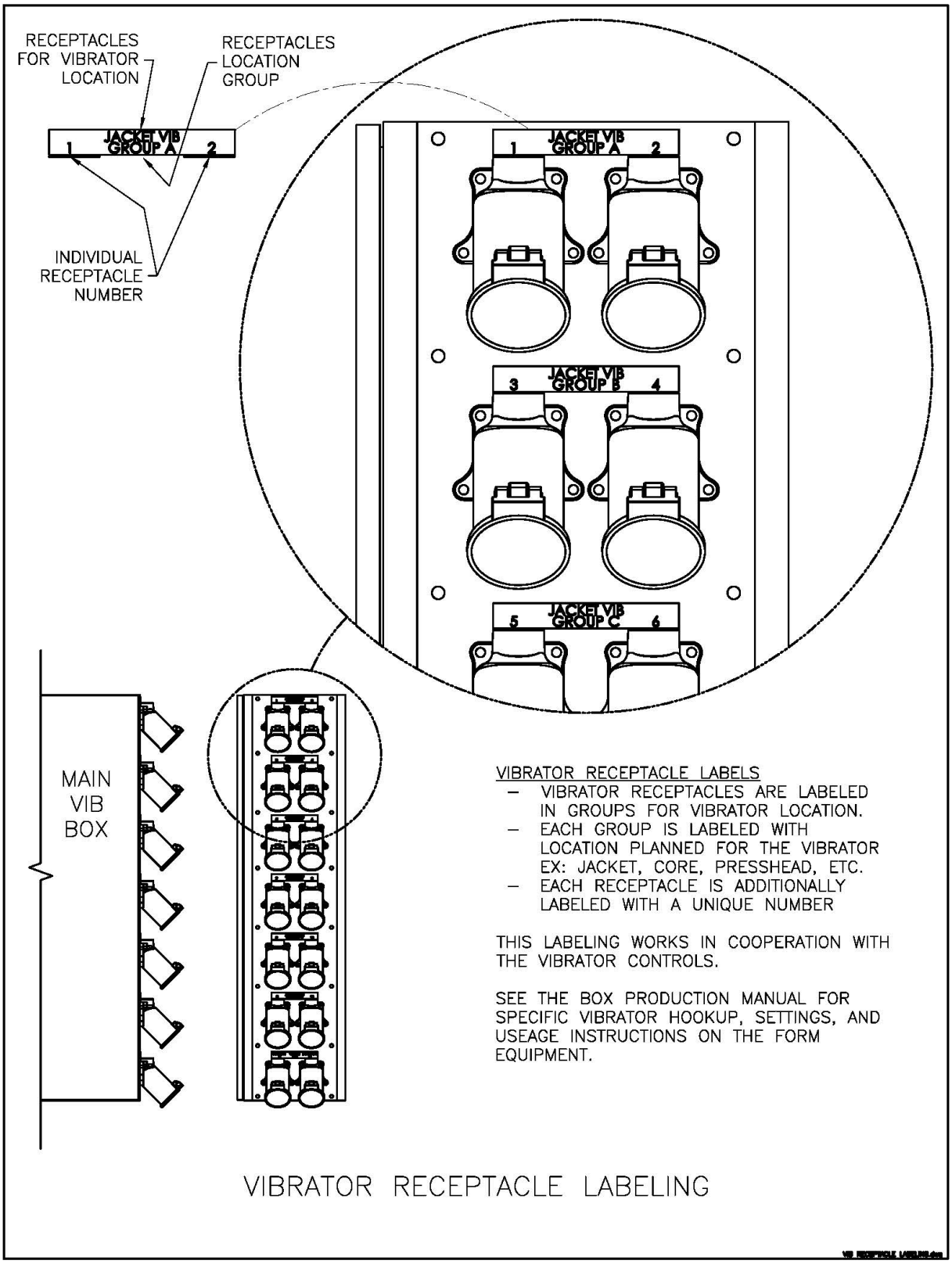

RECEPTACLES FOR VIBRATOR LOCATION
RECEPTACLES LOCATION GROUP
INDIVIDUAL RECEPTACLE NUMBER
JACKET VIB GROUP A
1
2
JACKET VIB GROUP B
3
4
JACKET VIB GROUP C
5
6
MAIN VIB BOX
VIBRATOR RECEPTACLE LABELS
– VIBRATOR RECEPTACLES ARE LABELED IN GROUPS FOR VIBRATOR LOCATION.
– EACH GROUP IS LABELED WITH LOCATION PLANNED FOR THE VIBRATOR EX: JACKET, CORE, PRESSHEAD, ETC.
– EACH RECEPTACLE IS ADDITIONALLY LABELED WITH A UNIQUE NUMBER
THIS LABELING WORKS IN COOPERATION WITH THE VIBRATOR CONTROLS.
SEE THE BOX PRODUCTION MANUAL FOR SPECIFIC VIBRATOR HOOKUP, SETTINGS, AND USEAGE INSTRUCTIONS ON THE FORM EQUIPMENT.
VIBRATOR RECEPTACLE LABELING

Figure 7-17

16.5 Afinitas Jacket Vibration System

The following sections describe the maintenance requirements of the **SS CAP 72 Machine Jacket** Vibration System. Careful attention to these maintenance instructions will assure years of dependable service from the vibrators. See ***Vibrator Maintenance*** for more detailed information on maintaining your vibration system.

IMPORTANT: Store the vibrators in a dry area. Do not store them outside where they may be exposed to the weather. Do not wash the vibrators with a hose or immerse them in water because they are not waterproof.

The Counter-Rotation Principle

For proper vibration transmission with the **Afinitas SS CAP 72 Machine Jacket** Vibration System, PipePlus Jacket Vibration System and Classic Core Vibration System form equipment, it is necessary that vibrators counter-rotate with respect to one another. For this to be achieved the vibrators must be monitored for correct direction of rotation and the machine receptacle outlets must be monitored for their correct polarity.

The counter-rotation principle is automatic with your **SS CAP 72 Machine**, as long as the vibrators are connected to the proper machine receptacle outlets.

If repairs are made to the vibration system, vibrators or electrical connectors, proper service or repair procedures must be followed to make sure that the vibrators and outlets remain wired to their original polarity. To make the counter-rotation principle easy to service and maintain, the vibrator plugs, the machine receptacle outlets, and the relays that control each of the machine receptacle outlets have all been wired following a predetermined, planned wiring method.

By using this color-coded wiring method when servicing the vibration system, the system can be maintained easily. See ***Vibrator System Wiring Method*** for information on vibrator wiring procedures which conform to the color-coded wiring method, as well as how to check the vibration system for proper polarity of the vibrators and machine receptacle outlets. It is recommended that counter-rotation checks be made on a scheduled basis for conformance to the machine's polarity specifications. See ***Vibrator Maintenance*** for information concerning vibrator maintenance and repair procedures.

Machine Vibration System

16.5.1.1 Vibration Transmission System

Under no circumstances should welding, cutting, or drilling be done on the vibration transmission bands. See ***Jacket Vibration Transmission Bands*** (pg. 17.28) for details.

Use only specially designed transmission chain for connecting vibrators. Substitute chains can damage forms and cause premature fatigue failure and excessive down time. This chain is meant to be a wearing part which is subject to considerable fatigue. Should this chain break, it is advisable to discard the complete chain and replace with a new chain. Chain is available from **Afinitas**.

WARNING! Worn or discarded transmission chain has been worn out from metal fatigue. Visually, the chain may look safe. However, vibration fatigue has weakened it and it must not be used for any other application. Tag the chain defective and scrap immediately.

It is important that the vibrators remain in tight contact with the vibration transmission bands at all times. However, tighteners should not be over-tightened as this can result in form damage. See ***Preparing Jacket for Production*** for detailed instructions.

16.5.1.2 Vibration System Connections and Wiring

Figure 7-19 and ***Figure 7-20*** show the schematics of the 32 machine receptacle outlets at each production station on the **SS CAP 72 Machine**. ***Figure 7-21*** shows a schematic of the six outlets that protrude from the auxiliary vibration box. These schematics detail the direction in which a vibrator should rotate when connected to each outlet, assuming that the vibrators are wired to their correct polarity. See ***Checking Vibrator Rotation*** for the procedure to use when checking the vibrator rotation for polarity.

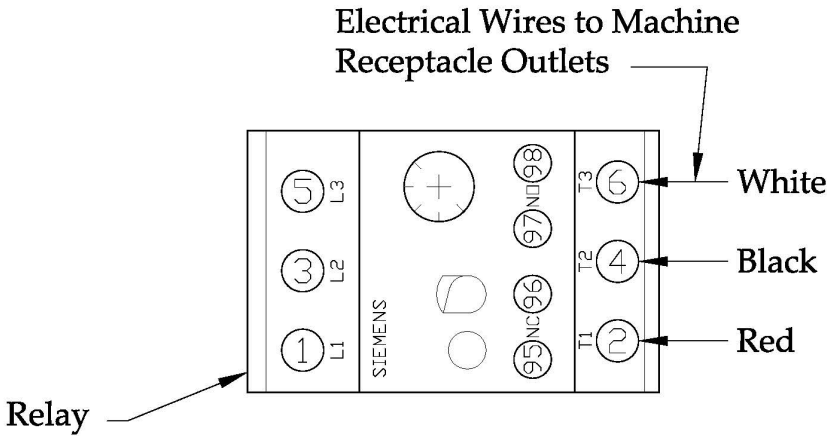
Your **SS CAP 72 Machine's** vibrator outlets were wired following a color coded wiring plan for the outlets and the corresponding relays which control each outlet in the operator's control console. ***Figure 7-18*** shows the wiring method for the relays that control the machine receptacle outlets. If the machine receptacle outlet is to be used for clockwise rotation of the vibrator, the relay that controls this outlet will be wired as shown in the upper section of ***Figure 7-18***. If the relay controls a machine receptacle outlet that requires counter-clockwise rotation of the vibrator, that relay will be wired as shown in the lower section of ***Figure 7-18***. ***Figures 7-22*** and ***7-23*** show the relays on **SS CAP 72 Machine and** which outlet each relay controls. Therefore, if you are replacing a relay, make sure to wire it up the same as the original relay. Otherwise, the vibrator at the relay's outlet will rotate in the wrong direction.

Figure 7-24 shows the wiring method for each machine receptacle outlet on the **SS CAP 72 Machine and** the core vibration box. Because the relays are wired differently for clockwise or counterclockwise rotation of the vibrator, all machine receptacle outlets will use the same wiring plan. If an outlet requires replacement, make sure to wire the replacement outlet to the original wiring plan.

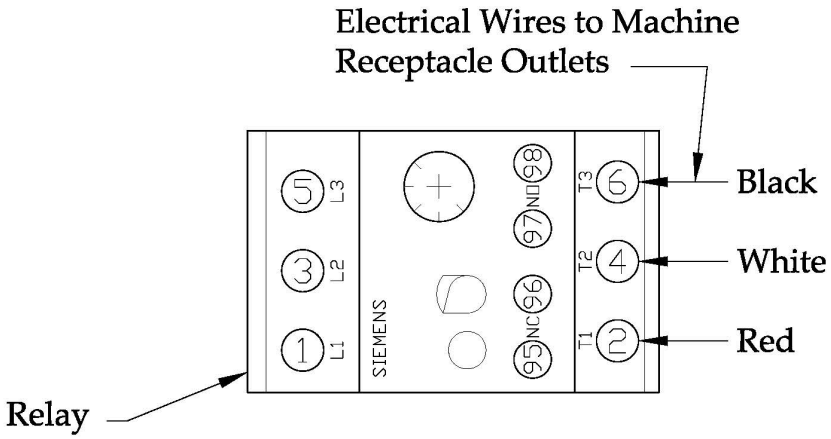
Figure 7-25 shows the wiring method for the vibrator plug that attaches to the cord end of the vibrator's cord. All vibrator plugs are to be wired to the cord in the same manner. Therefore, if a plug is to be replaced on the vibrator's cord, wire the replacement plug to the cord using the same wiring plan as the original plug. Following this procedure, the vibrator's polarity should remain the same as its original polarity after the new plug has been installed.

Note: If the cord should pull out of the vibrator's terminal box, or if a new cord is to be installed to the vibrator, the plug should be wired to the cord end same as shown in *Figure 7-25*. However, it will be necessary to conduct a vibrator rotation check in order to determine if the vibrator is wired to its correct polarity. If the vibrator's polarity is

incorrect, two of the three power lines at the terminal box must be switched. See *Checking Vibrator Rotation* for details on this procedure.



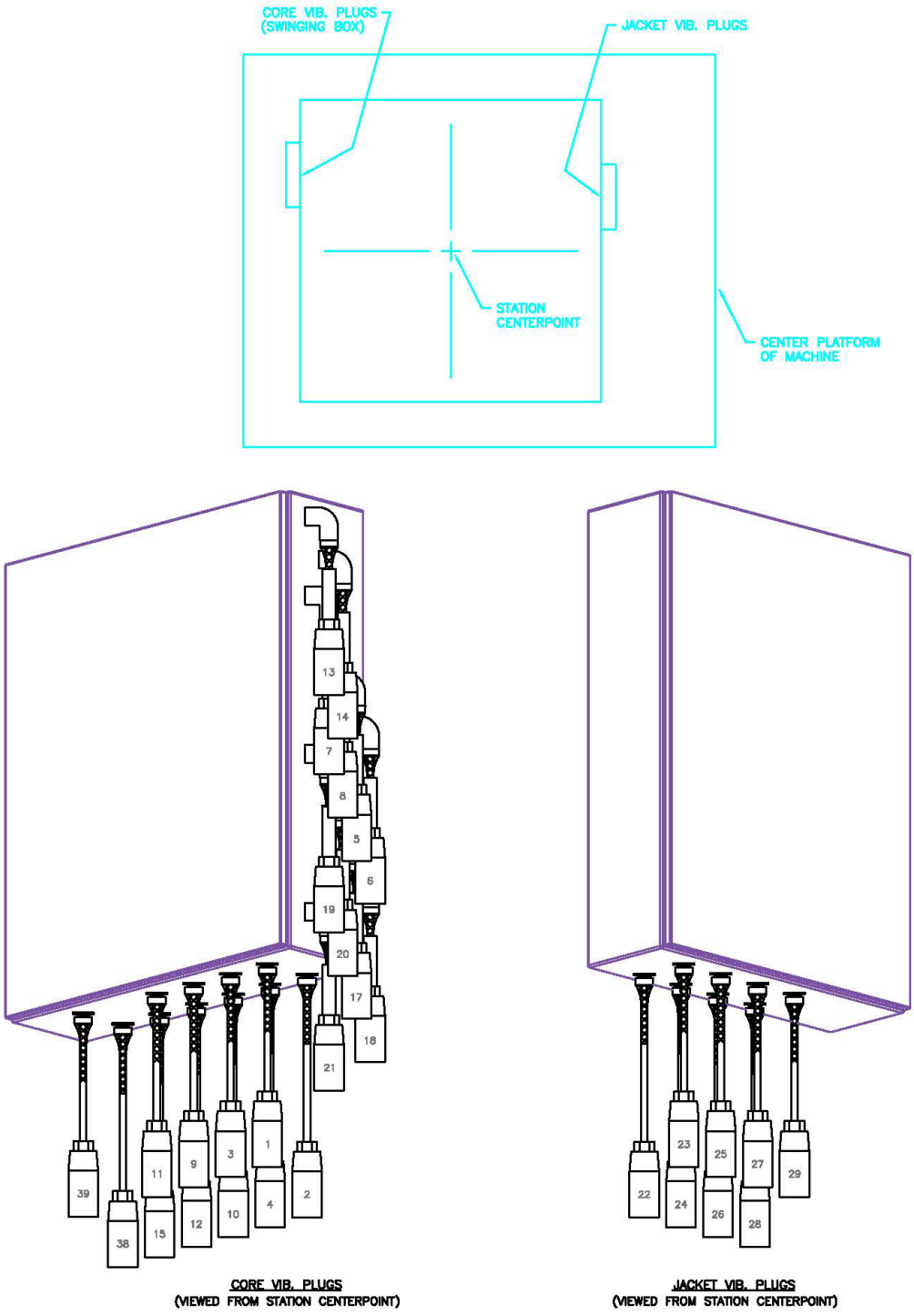
Wiring Method for Clockwise Rotation



Wiring Method for Counter-Clockwise Rotation

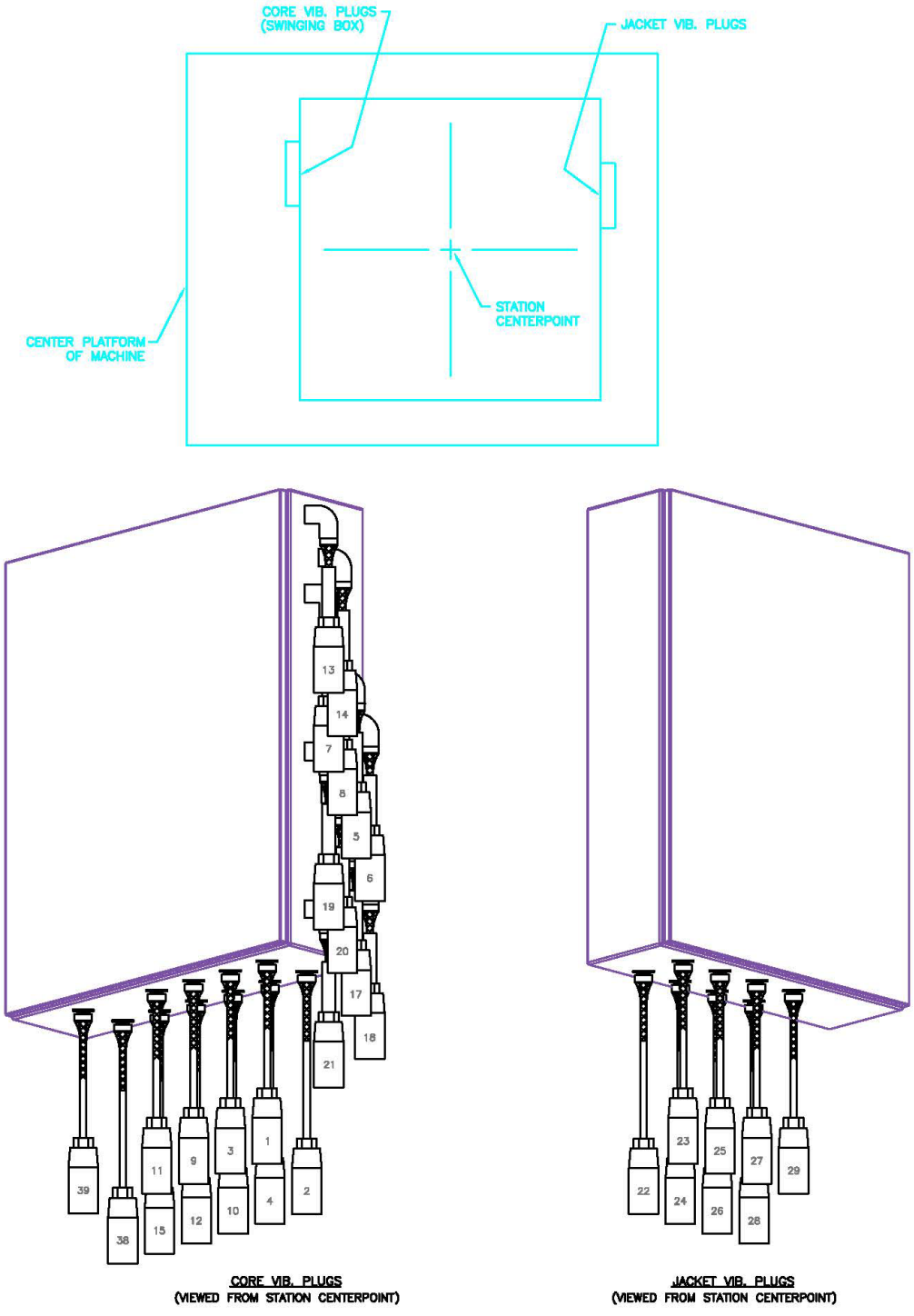
Vibrator Relay Wiring Method (Siemens Relay)

Figure 7-18



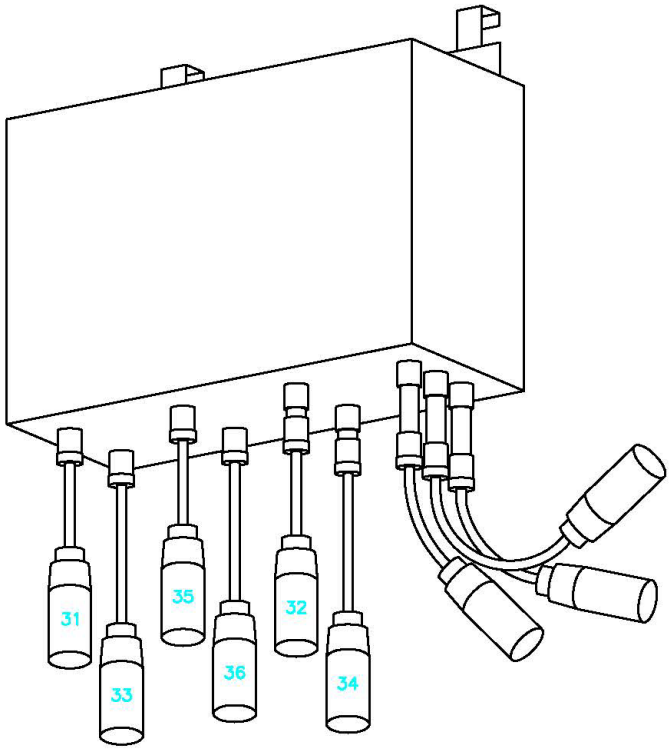
Machine Receptacle Outlets – Left-Station

Figure 7-19



Machine Receptacle Outlets – Right-Station

Figure 7-20

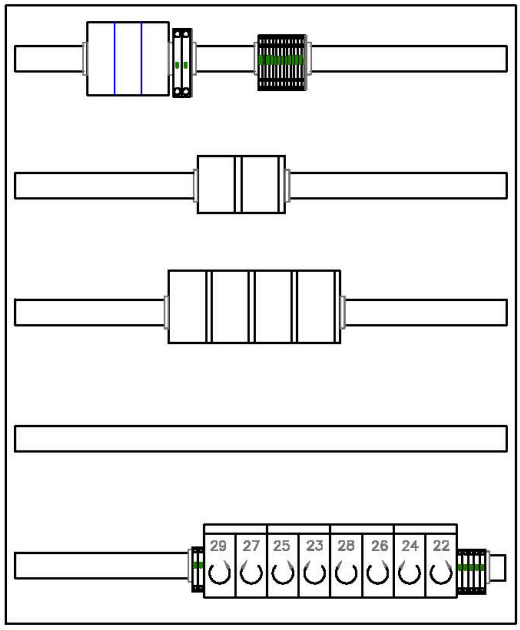


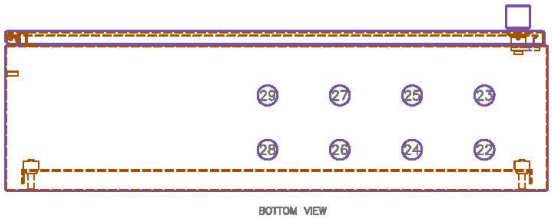
CORE VIBRATION BOX

VIBRATOR PLUG GUIDE					
PLUG	CONTACTOR NUMBER	USED FOR	ROTATION DIR.	PLUG COLOR	CORD COLOR
31	9	BOSCH 18120, 18135 MARTIN 3450, 4400	CCW	YELLOW	WHITE
32	11	BOSCH 18120, 18135 MARTIN 3450, 4400	CCW	YELLOW	WHITE
33	9	BOSCH 18120, 18135 MARTIN 3450, 4400	CW	BLACK	NONE
34	11	BOSCH 18120, 18135 MARTIN 3450, 4400	CW	BLACK	NONE
35	10	BOSCH 18120, 18135 MARTIN 3450, 4400	CW	YELLOW	NONE
36	10	BOSCH 18120, 18135 MARTIN 3450, 4400	CCW	BLACK	WHITE

Auxiliary (Core) Vibration Receptacle Outlets

Figure 7-21



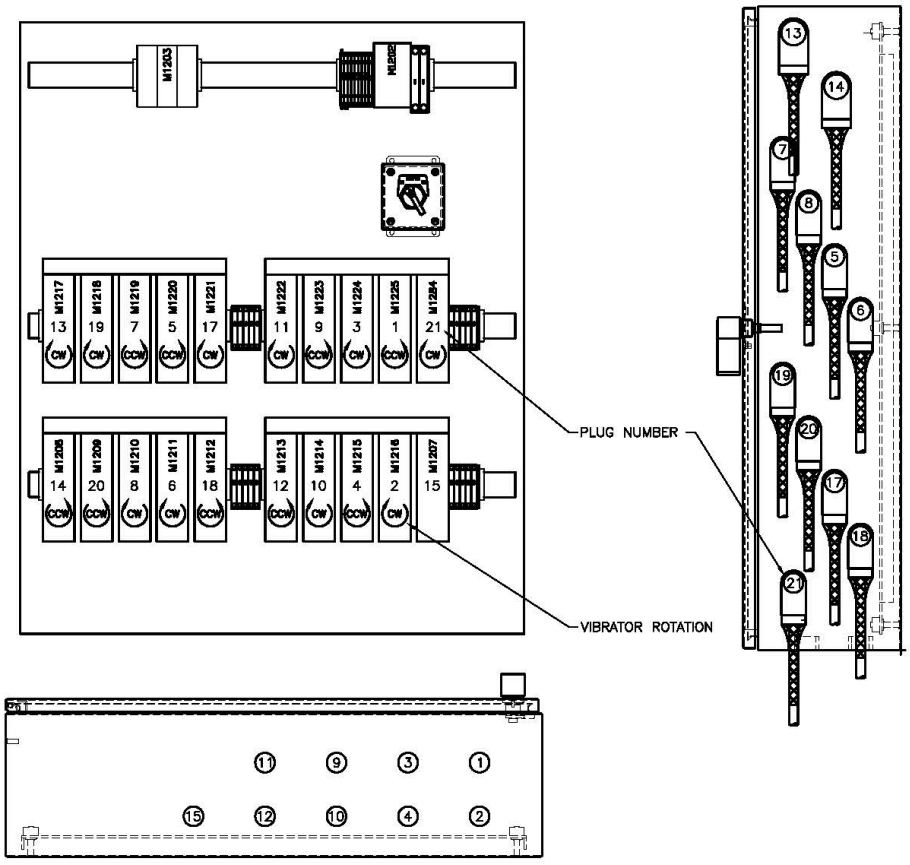


VIBRATOR PLUG GUIDE					
PLUG	CONTACTOR NUMBER	USED FOR	ROTATION DIR.	PLUG COLOR	CORD COLOR
22	8	BOSCH 18120, 18135 MARTIN 3450, 4400	CCW	YELLOW	WHITE
23	7	BOSCH 18120, 18135 MARTIN 3450, 4400	CW	BLACK	NONE
24	8	BOSCH 18120, 18135 MARTIN 3450, 4400	CW	YELLOW	NONE
25	7	BOSCH 18120, 18135 MARTIN 3450, 4400	CCW	BLACK	WHITE
26	6	BOSCH 18120, 18135 MARTIN 3450, 4400	CCW	YELLOW	WHITE
27	5	BOSCH 18120, 18135 MARTIN 3450, 4400	CW	BLACK	NONE
28	6	BOSCH 18120, 18135 MARTIN 3450, 4400	CCW	YELLOW	NONE
29	5	BOSCH 18120, 18135 MARTIN 3450, 4400	CW	BLACK	WHITE

SS CAP 72 Machine Receptacle Outlets

Jacket Vibration Box

Figure 7-22



VIBRATOR PLUG GUIDE					
PLUG	CONTACTOR NUMBER	USED FOR	ROTATION DIR.	PLUG COLOR	CORD COLOR
1	3	BOSCH 18120, 18135 MARTIN 3450, 4400	CCW	YELLOW	WHITE
2	4	BOSCH 18120, 18135 MARTIN 3450, 4400	CW	BLACK	NONE
3	3	BOSCH 18120, 18135 MARTIN 3450, 4400	CW	YELLOW	NONE
4	4	BOSCH 18120, 18135 MARTIN 3450, 4400	CCW	BLACK	WHITE
5	1	BOSCH 18126 MARTIN 6800	CCW	YELLOW	BLUE
6	2	BOSCH 18126 MARTIN 6800	CW	BLACK	BLUE
7	1	MARTIN 11000	CCW	YELLOW	RED
8	2	MARTIN 11000 **	CW	BLACK	RED/GRAY
9	1	BOSCH 18120, 18135 MARTIN 3450, 4400	CCW	YELLOW	WHITE
10	2	BOSCH 18120, 18135 MARTIN 3450, 4400	CW	BLACK	NONE
11	1	BOSCH 18120, 18135 MARTIN 3450, 4400	CW	YELLOW	NONE
12	2	BOSCH 18120, 18135 MARTIN 3450, 4400	CCW	BLACK	WHITE
13	1	MARTIN 20000	CW	YELLOW	GREEN
14	2	MARTIN 20000	CCW	BLACK	GREEN
15	ROTOR PLUG	ROTOR PLUG		BLACK	NONE
17	1	BOSCH 18126 MARTIN 6800	CW	YELLOW	BLUE
18	2	BOSCH 18126 MARTIN 6800	CCW	BLACK	BLUE
19	1	MARTIN 11000 **	CW	YELLOW	RED/GRAY
20	2	MARTIN 11000	CCW	BLACK	RED
21	1	MARTIN 11000 **	CW	YELLOW	GRAY

** GRAY PLUGS FOR USE WITH FORMS USING (3) SYNC. VIB. 11000 VIBRATORS

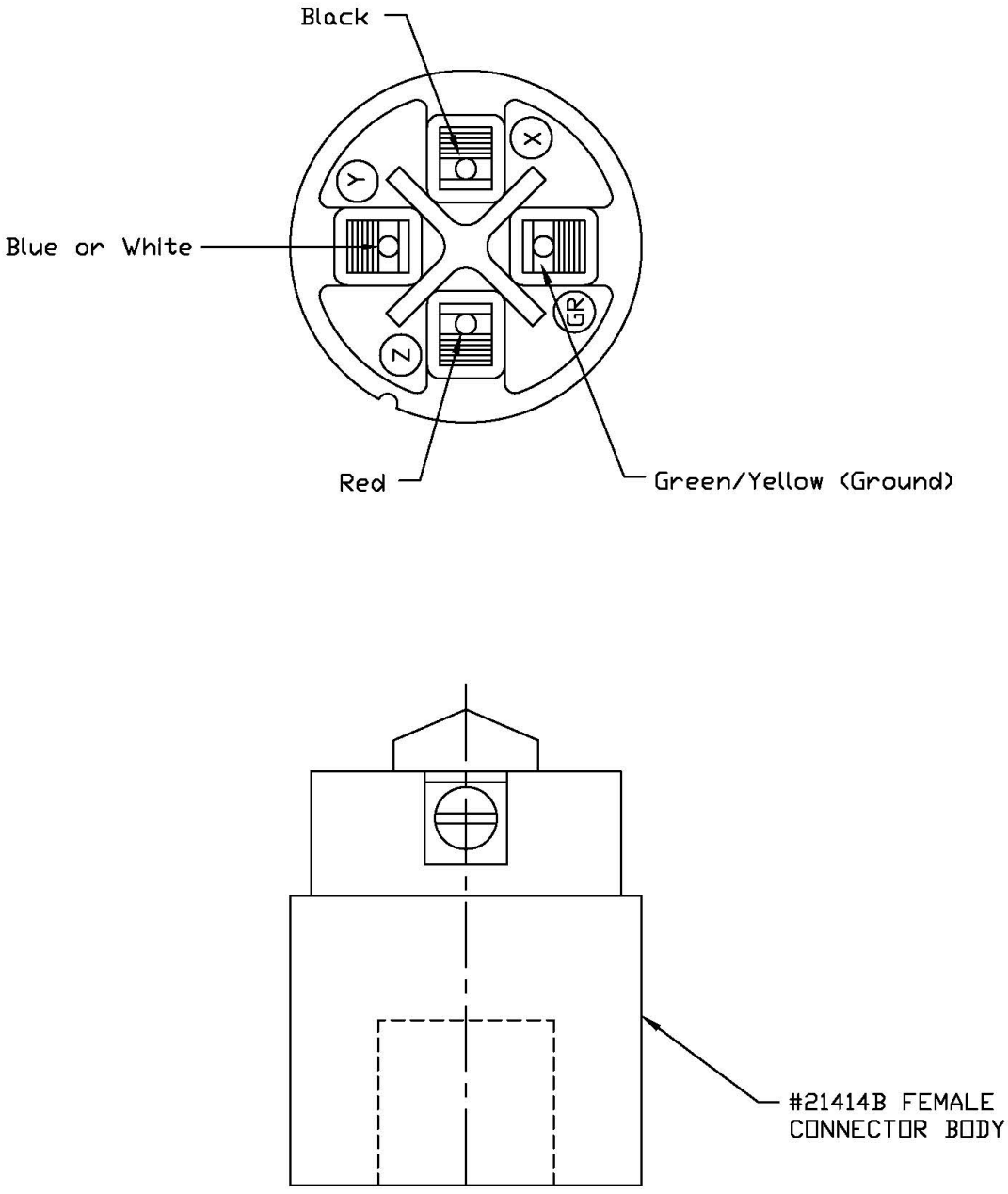
VUP FLX MACHINE RECEPTACLE OUTLETS – CORE VIB. BOX

SVC-9b

SS CAP 72 Machine Receptacle Outlets

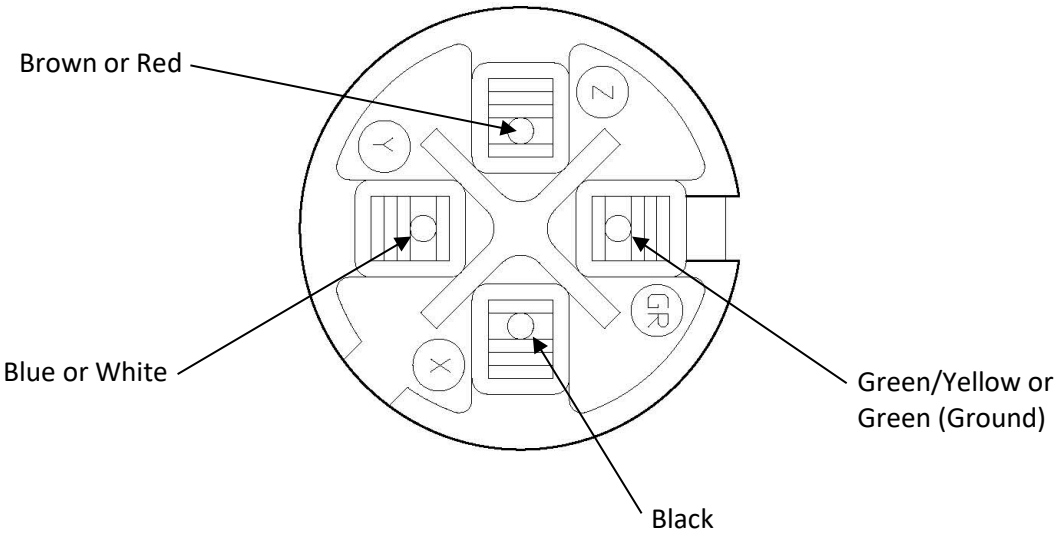
Core Vibration Box

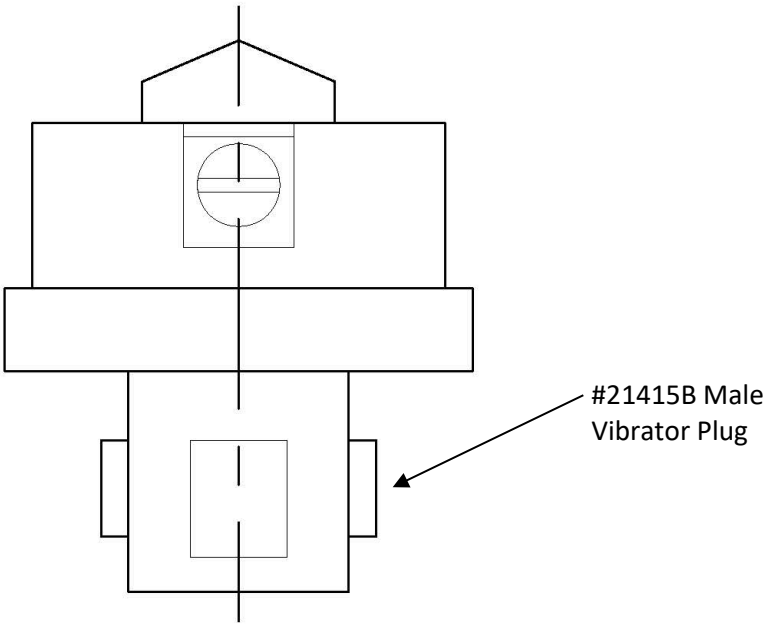
Figure 7-23



Machine Receptacle Outlet Wiring Method

Figure 7-24





Vibrator Plug Wiring Method

Figure 7-25

16.6 PipePlus Jacket Vibration System

Proper operation and maintenance of the **PipePlus** Jacket Vibration System is of great importance to be sure that concrete products are being vibrated adequately and to prevent premature wear or damage to form equipment. The machine's vibration system is designed so the jacket vibrators, when installed on the form set, counter-rotate with respect to one another. For example, on an 8' pipe form equipped with 4 vibrators, the 2 top vibrators counter-rotate with respect to each other and the two lower vibrators counter-rotate with respect to each other as shown in ***Figure 7-26***. Therefore, one of the top and bottom vibrators rotates in a clockwise direction while the other two vibrators rotate in a counterclockwise motion.

The vibrators are wired so they all rotate in the same direction when plugged into the same “master” outlet. Therefore, in order to obtain counter-rotation between the vibrators, the machine receptacle outlets are wired to different polarities. Depending upon which machine receptacle outlet a vibrator is connected to, the vibrators will rotate in either a clockwise or counterclockwise motion.

For the system to operate properly, it is vital that the following be maintained:

1. Vibrators must be installed correctly to the form. See ***Mounting Vibrators to the PipePlus Form Jacket***.
2. Vibrators must be connected to the correct machine receptacle outlet during vibration. See ***Connecting Jacket Vibrators to Machine Receptacle Outlets***.
3. All vibrators must rotate in the same direction when plugged into the same “master” outlet. See ***Checking Vibrator Rotation***.
4. All machine receptacle outlets must be wired to their correct polarity. See ***Machine Receptacle Outlet’s Control Relay Wiring Method***.

The information that follows gives instructions on the above points and other important points that are necessary to obtain maximum performance and life from your **SS CAP 72 Machine’s** vibration system.

Mounting Vibrators to the PipePlus Form Jacket

For proper vibrator transmission, it is very important that the vibrators are properly installed to the form equipment. Each vibrator must be installed to the jacket so the vibrator's electrical cord, where it exits the terminal box, faces down as shown in ***Figure 7-26*** and ***Figure 7-27***. This is necessary so the vibrators will rotate properly with respect to one another when plugged into the proper machine receptacle outlets.

To mount the vibrators to the jacket:

1. Insert the vibrator bolts to the vibrator's mount holes and into the mount pad.

IMPORTANT: Make sure that the vibrator electrical cord exits from the bottom of the terminal box.

2. Screw the bolts into the mount pad at least 1/2" by hand before tightening with a wrench. This will assure that the bolts have started properly and will prevent cross threading.
3. Tighten all bolts securely, using a crisscross pattern.
4. After the vibrators are bolted to the mounting pads, they must be watched in the early period of operation for loosening of the bolts. After initial tightening, they should be run for one minute and the bolts checked again for tightness.
5. After about 15 minutes of operation, the bolts should again be checked for tightness.
6. At the end of 1/2 day of operation, they should be checked once more. After this time, bolts are usually well seated and need only to be checked with normal visual inspection.

NOTE: The vibrator mounts employ the use of captive nuts. Therefore, no wrench is needed to hold the nuts when tightening bolts. If a nut needs replaced, merely drive the nut inward to shear the holding pins and to remove the old nut. Replacement nuts should be held in place with 7-penny cement coated pins only.

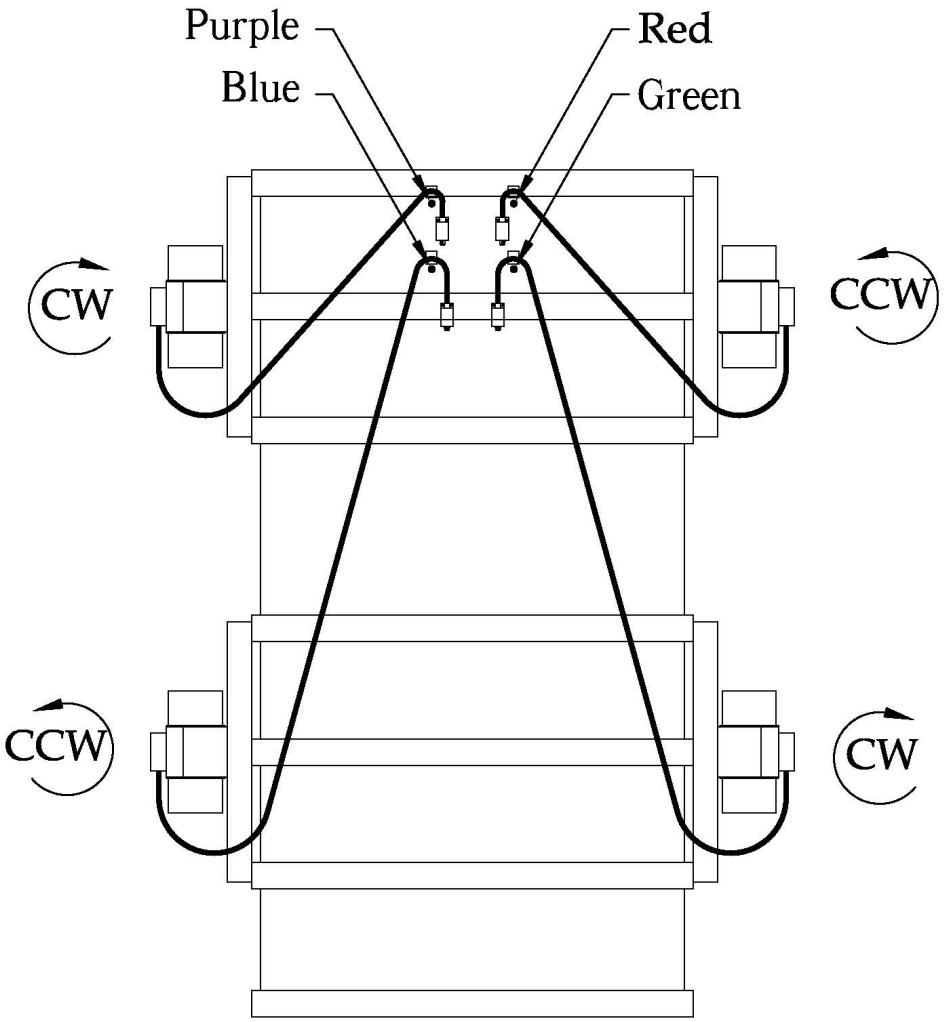
With the vibrators mounted, the vibrator electrical cords must be connected to the proper cord clamp on the jacket. These jacket cord clamps are color coded to the machine receptacle outlets so it is important that each vibrator cord be placed into the proper cord clamp to be assured that the vibrator will be plugged into the proper receptacle outlet. For jackets equipped with four vibrators, attach the two top vibrator electrical cords to the two top clamps, using the clamp closest to each vibrator. Attach the two bottom vibrator electrical cords to the two bottom clamps, using the clamp closest to each vibrator as shown in ***Figure 7-26***. For jackets equipped with only two vibrators, attach the vibrator cords to the clamp closest to the vibrator as shown in ***Figure 7-27***.

Only the amount of cord required to reach the machine receptacle outlet should extend beyond the cord clamp. Excessive cord lengths should be wrapped around the vibrator. Excessive cord length should be avoided to prevent cord damage during the stripping operation and also to reduce the chance of the cords becoming entangled in the platform structure.

Vibrator electrical cords must be routed to the correct cord clamp on the core base so those plugging the vibrators into the machine receptacle outlets know which plug is from the top or bottom vibrator. Cords from top vibrators are fastened to clamps identified by the letter "T", and cords from the bottom vibrators are fastened to clamps identified by the letter "B" as shown in ***Figure 7-35***.

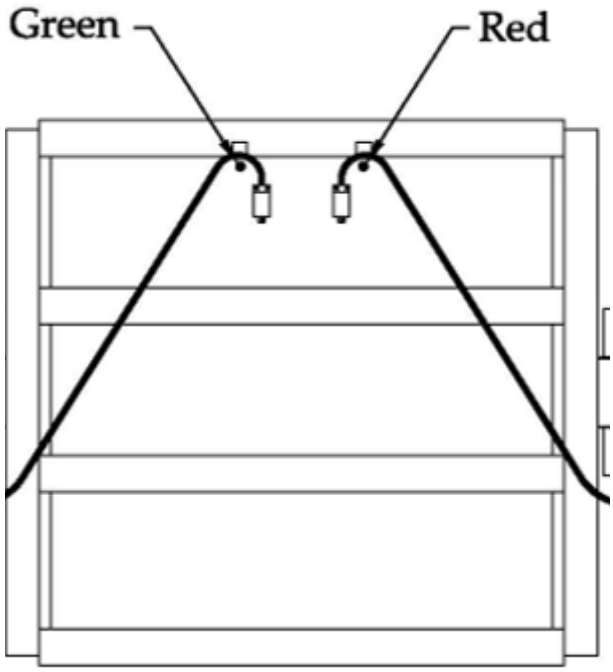
It is important that the vibrator's mounting bolts be properly torqued. Under-torqued bolts will fatigue prematurely and fail, resulting in possible damage to the vibrator. Refer to ***Figure 7-36*** for bolt and torquing details.

Whenever electrical repairs are made to a vibrator, proper wiring procedures must be followed. See ***Vibration System Wiring Method*** for information on how to make repairs to the vibrator's electrical cord or plug.



Jacket Vibrators Mounted to Form Equipment – 4 Vibrators

Figure 7-26



Jacket Vibrators Mounted to Form Equipment – 2 Vibrators

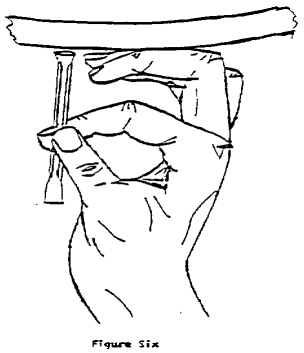
Figure 7-27

Checking Jacket Amplitude

To prevent fatigue damage to your Afinitas jacket vibrated form equipment, it is important that the forms are not over vibrated, particularly during the filling operation. Actuating the vibrators before there is a load for the vibrators to work against, or vibrating the form for an excessive time period, will cause fatigue damage to the form set.

To guard against the possibility of this condition occurring, it is recommended that a jacket amplitude check be performed on each individual form set. By performing this check, you can determine the proper time sequence for actuating the bottom and top vibrators during the filling operation. It is recommended that this amplitude check be run when the form is initially purchased and then, whenever changes have been made to the concrete design which may affect the vibration properties of the concrete.

To be assured of accurate amplitude readings, it is important that the check be performed properly and at specific locations about the form set. Check jacket amplitude at either the vibrator mounts, at the vibrators themselves, or at a location around the jacket that is exactly 90^{o} from the vibrator mounts. Do not check amplitude at any other point about the form set as a true reading will not be obtained.


Figure Six

After a location on the jacket has been selected to check amplitude, hold a small, rounded-end steel probe such as a Spa-Stir or the strike end of a small chisel, between the thumb and index finger of one had and then lightly touch the remaining fingers of the hand against the surface of the form set in order to hold the probe steady. With the thumb and index finger, lightly move the probe forward until it barely touches the vibrating jacket. By moving the probe toward the jacket and offering no force to resist the moving form surface, a gap will be formed between the probe and the outward movement of the vibrating jacket. This gap represents the amplitude measurement. Contact of the probe against the jacket should be light enough so that the probe will not vibrate.

The amplitude should be approximately 1/32" on the average. If the amplitude is less than 1/32" and the concrete still flows adequately and the heading operation is being performed adequately, then the amplitude should be okay. If the amplitude is greater than 1/16", the form is being subjected to excessive vibration and form damage will result if the condition is allowed to continue. To decrease the amplitude, the form should be filled with more concrete before actuating the vibrators, depending upon when the over-amplitude condition occurs during the filling operation.

It is recommended that this amplitude check be conducted during the entire filling operation. After the amplitude check has been completed, and when the fill height in relation to actuating the vibrators has been established, it is recommended that this information be recorded so it can be referred to for later use.

16.7 Classic Core Vibration System

This section of your manual gives instructions on how to service and maintain the **SS CAP 72 Machine's** Classic Core Vibration System. Follow these instructions carefully. It is essential that the core vibration system be maintained properly to assure proper vibration of concrete, and satisfactory life and performance from your form equipment. These instructions cover important details such as mounting vibrators inside the cores, checking machine receptacle outlet polarity, setting vibrator impact force settings, etc.

Although all maintenance functions are important, there are several service functions that must be performed or maintained properly. These functions are listed below and then explained in greater detail later.

- **Vibrator Counter-Rotation -** The vibrators in the core must counter-rotate with respect to each other. Counter-rotation will occur automatically if the machine's core vibration system is maintained properly. See ***Vibrator Counter-Rotation***.
- **Vibrator Impact Settings -** The vibrators used with core vibrated form equipment must be set to an impact setting dependent upon the core's diameter. See ***Vibrator Impact Settings***.
- **Vibrator Mounting Bolts -** The mounting bolts used to fasten the vibrators to the core's mounting plates must be tightened to proper torque specifications to prevent premature failure of the bolts. See ***Installing Vibrators to Core***.

Vibrator Counter-Rotation

Afinitas's classic core vibrated form equipment is designed so the top vibrator in a core counter-rotates with respect to the bottom vibrator in the core. When the operator connects the vibrators to the correct machine receptacle outlets, counter-rotation between vibrators will occur automatically if the machine's vibration system has been maintained properly.

There are several basic maintenance functions that must be understood to be assured of counter-rotation between vibrators.

1. First, it is necessary that all vibrators be wired to the same polarity. See ***Vibration System Wiring Method*** and ***Checking Vibrator Rotation*** for instructions for wiring and monitoring correct vibrator rotation.
2. Secondly, **SS CAP 72 Machine receptacle** outlets must be wired to their correct polarity. Some outlets are wired for counterclockwise rotation of vibrators while others are wired for clockwise rotation for vibrators. See ***Vibration System Wiring Method*** and ***Checking Machine Receptacle Outlet Polarity*** for instructions on wiring and checking the machine receptacle outlet polarity.

If the machine's receptacle outlets are wired to their correct polarity and the vibrators are all wired to their correct direction of rotation and if the machine operator has connected the form vibrators to the correct machine receptacle outlets, you can be assured of counter-rotation between the top and bottom vibrators in a form set.

To make repairs to the vibration system simpler, the vibrator plugs, machine receptacle outlets, and the relays in the core vibration boxes which control the vibrators, are all wired following a color-coded plan. Following the color-coded system, repairs can be made easily while maintaining the correct polarity of the vibrators and machine receptacle outlets. See ***Vibration System Wiring Method*** for information on this color-coded wiring method.

IMPORTANT: This wiring system must be followed to be assured of counter-rotation between vibrators.

Installing Vibrators to Core

The information that follows gives instructions on how to install vibrators to the cores. Although all the instructions that follow are important, pay special attention to the following vibrator installation details.

- Vibrator mounting bolts must be torqued to their correct specifications. Under torqued bolts will fatigued prematurely causing bolt failure and possible vibrator damage. See ***Figure 7-31***, ***Figure 7-32***, ***Figure 7-33*** and ***Figure 7-36*** for core vibrator bolting techniques and torques.
- The Model 18135 vibrator used in the 10" (250mm) diameter form equipment and the 18120 vibrator used in 12" (300mm) diameter form equipment must have modifications made to the frames in order to fit inside the cores. See ***10" (250mm) & 12" (300mm) Core Vibrator Modification***.

Access Panels

10" (250mm) through 72" (1800mm) diameter form equipment is equipped with removable top lids in order to gain access to the top vibrators in the core. For the 10" (250mm) core, four bolts must be removed to take off the top lid of the core. For the 15" (400mm) core, only one bolt must be removed in order to remove the lid. For 18" (450mm) through 72" (1800mm) diameter cores, two bolts must be removed. For 18" (450mm) through 72" (1800mm) diameter forms, only a section of the top lid is removed for gaining access to the vibrators.

The bolts that connect the top lid to the core are recessed so the bolt heads are flush to the core top. In order to loosen the bolts, it will probably be necessary to dig concrete away from the bolt heads in order attach a wrench to the bolts.

For the 10" (250mm) and 12" (300mm) diameter cores only, two access panels are located in the wall of the core for gaining access to the top vibrator's mounting bolts. These two panels are located toward the top of the core at the same elevation as the top vibrator. These two panels must be removed in order to tighten or loosen the vibrator mounting bolts.

Each wall panel is attached to the core with a bolt and nut. By removing the nut and the bolt, the panels can be removed. To remove the wall access panels at the core top, it is necessary to first remove the core's top lid to gain access to the wall panels.

Vibrator Electrical Cord Protection Sleeves

Core vibrated form equipment vibrators have protective sleeves installed to their electrical cord to prevent wear and abrasion. These sleeves are placed over the electrical cord and extend from the electrical plug to approximately 12" (300mm) inside the core.

10" (250mm) & 12" (300mm) Core Vibrator Modification

The top vibrator in 10" (250mm) and 12" (300mm) Singleform equipment must be modified in order to clear the core structure and shell wall. The vibrator's casing must be ground in several areas to reduce the vibrator's physical size. These modifications are detailed in ***Figure 7-28*** and ***Figure 7-29***.

The second modification required with the vibrator is that the top vibrator electrical cord must be protected with a rubber sleeve. This rubber sleeve is required to protect the electrical cord against abrasion because clearances in the 10" (250mm) & 12" (300mm) diameter cores are limited and extra protection must be provided to guard the cord. The rubber guard is to extend from the top of the vibrator cord, where it leaves the vibrator's junction box down to the first cord clamp on the core base.

Installing Bosch Model 18135 & 18120 Core Vibrators

The Bosch Model 18135 and 18120 vibrators must be positioned on the core mount plates so the vibrator's electrical cords exit from the bottom of the vibrator's junction box. Vibrators must all be mounted the same, so the vibrator counter-rotation principle is achieved.

The electrical cords must be routed to the correct cord clamp at the core's base so those connecting the vibrator's electrical plug to the machine's electrical receptacles know which vibrator plugs are from the top or bottom vibrator. Electrical cords from the top vibrators are fastened to clamps identified by the letter "T"; bottom vibrator cords to clamps identified by the letter "B". Refer to ***Figure 7-30*** for cord routing details for Singleform, Duoform, and Quadform equipment.

It is important that the vibrator mounting bolts be properly torqued. Under torqued bolts will fatigue prematurely and fail, resulting in possible damage to the vibrator. Refer to ***Figure 7-31*** for bolt and torquing details for the Model 18135 Bosch vibrator. Refer to ***Figure 7-32*** for bolt and torquing details for the Model 18120 Bosch vibrator used with vibrator mount plates that have threaded holes to accept the mounting bolts. These forms do not employ the captive nut design. Refer to ***Figure 7-33*** for bolt and torquing details for the Model 18120 Bosch vibrator used in cores with “through-hole style” mounting plates equipped with captive nuts.

It is not necessary to hold the nut when tightening bolts with mounting pads using the captive nut design. The nut is held by a square casing. Pins are positioned through the casing to prevent the nut from falling out. Whenever a nut is replaced, the pins must be removed and new pins inserted. The new pins must be bent to keep them locked to the casing. Because of tight clearances in the cores, it may be necessary to bend these pins from the front face of the mount plate as illustrated in ***Figure 7-34***.

Whenever electrical repairs are made to a vibrator, proper wiring procedures must be followed. See ***Vibration System Wiring Method*** for information on how to make repairs to the vibrator's electrical cord or plug.

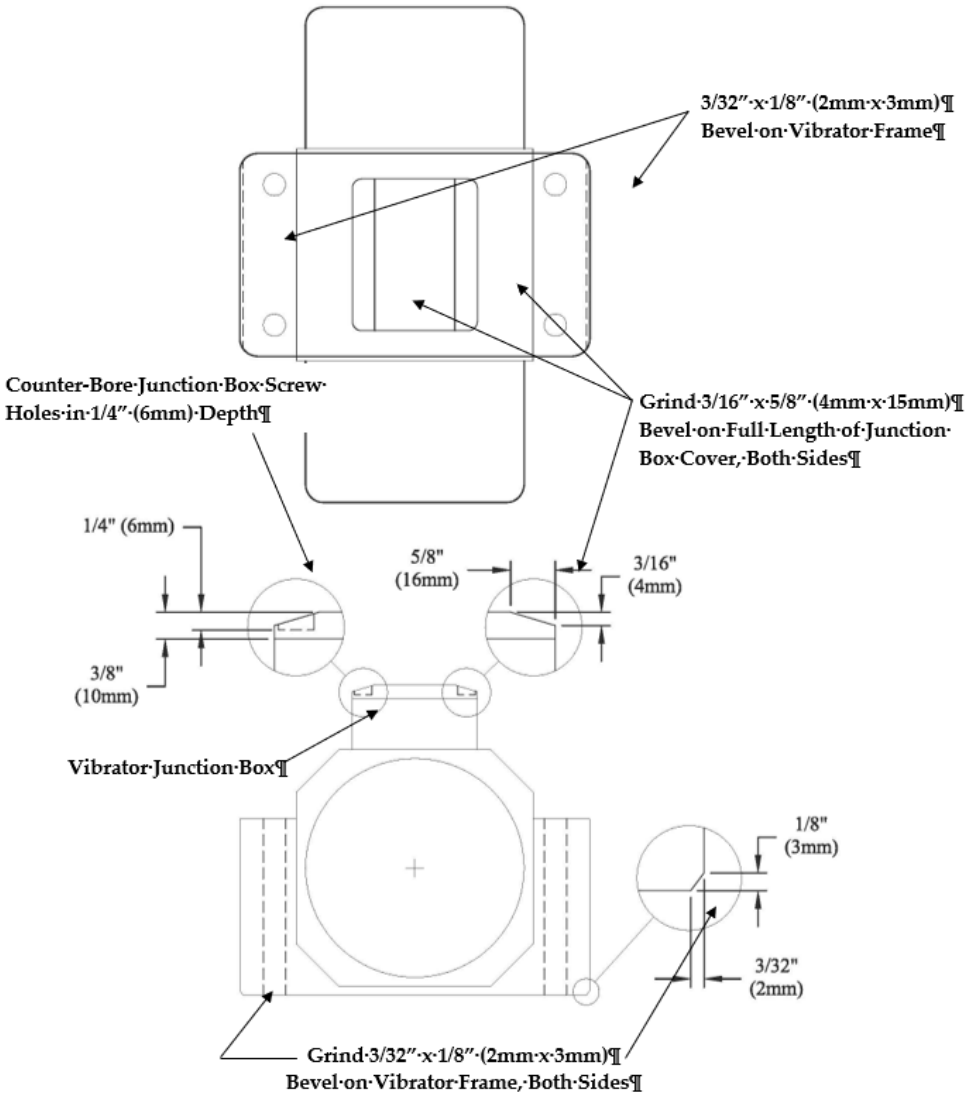
Installing Bosch Model 18126 Core Vibrators

The Bosch Model 18126 vibrators must be installed onto the core mount plates so the vibrator's electrical cord exits from the right side of the junction box when viewed from the front of the vibrator as shown in ***Figure 7-35***. Vibrators must all be mounted in the same orientation, so the vibrator counter-rotation principle is achieved.

Vibrator electrical cords must be routed to the correct cord clamp on the core base so those plugging the vibrators into the machine receptacle outlets know which plug is from the top or bottom vibrator. Cords from top vibrators are fastened to clamps identified by the letter "T", and cords from the bottom vibrators are fastened to clamps identified by the letter "B" as shown in ***Figure 7-35***.

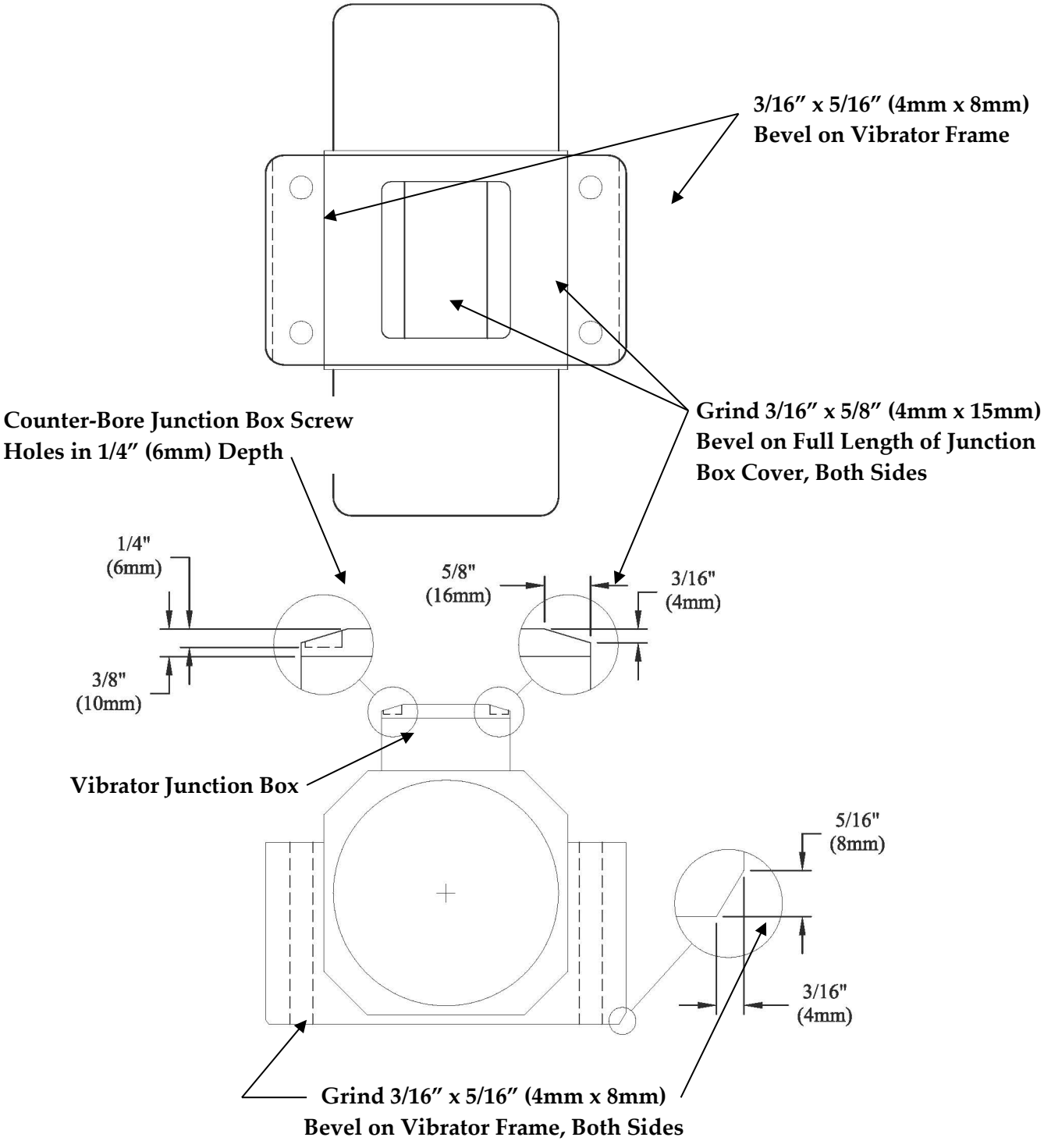
It is important that the vibrator's mounting bolts be properly torqued. Under torqued bolts will fatigue prematurely and fail, resulting in possible damage to the vibrator. Refer to ***Figure 7-36*** for bolt and torquing details.

Whenever electrical repairs are made to a vibrator, proper wiring procedures must be followed. See ***Vibration System Wiring Method*** for information on how to make repairs to the vibrator's electrical cord or plug.

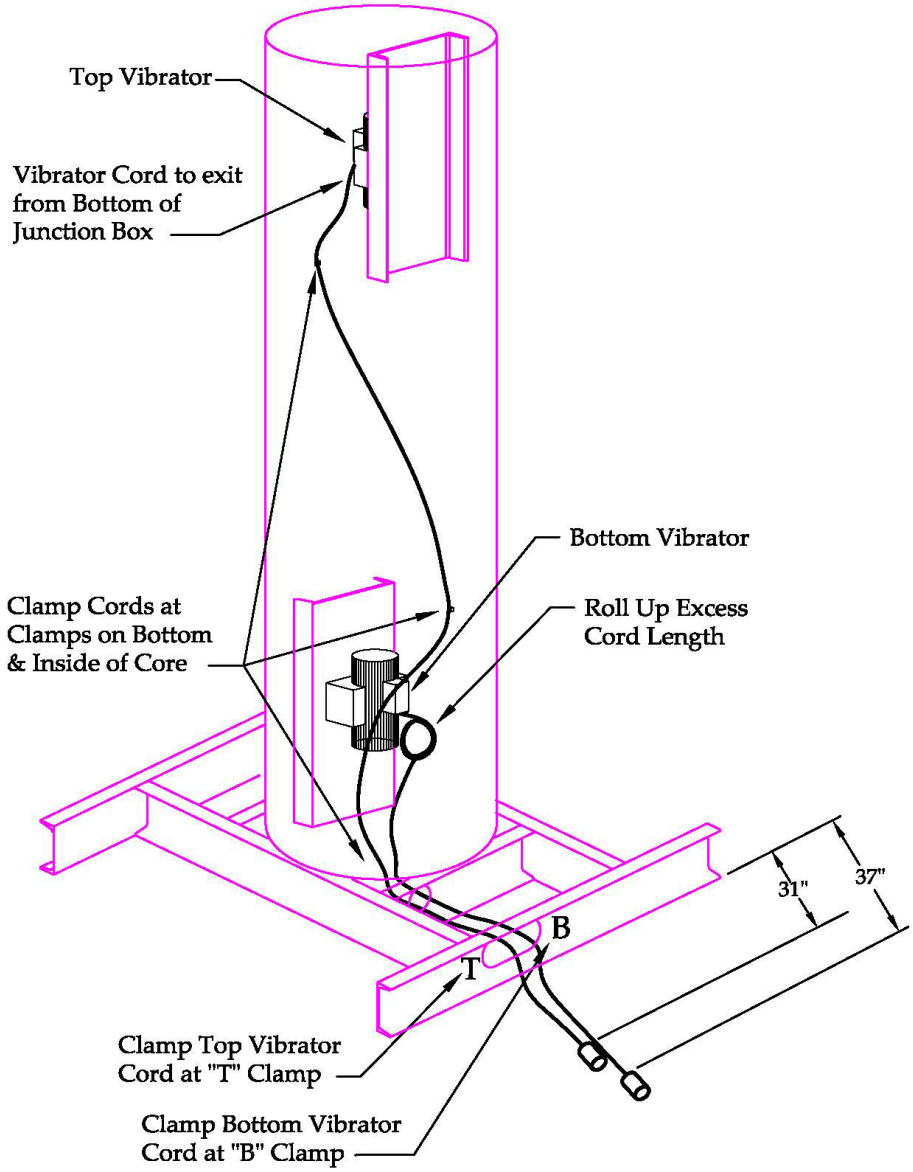


Model 18135 Vibrator Modification – 10" (250mm) Diameter Core

Figure 7-28

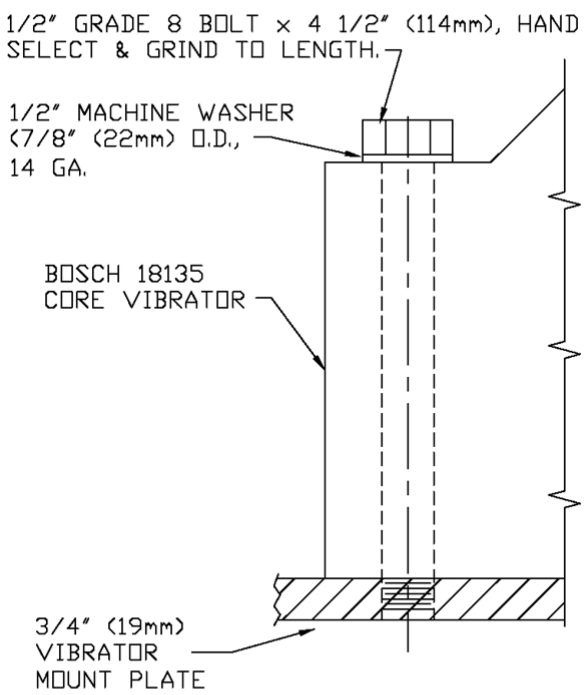


Model 18120 Vibrator Modification – 12″ (300mm) Diameter Core
Figure 7-29



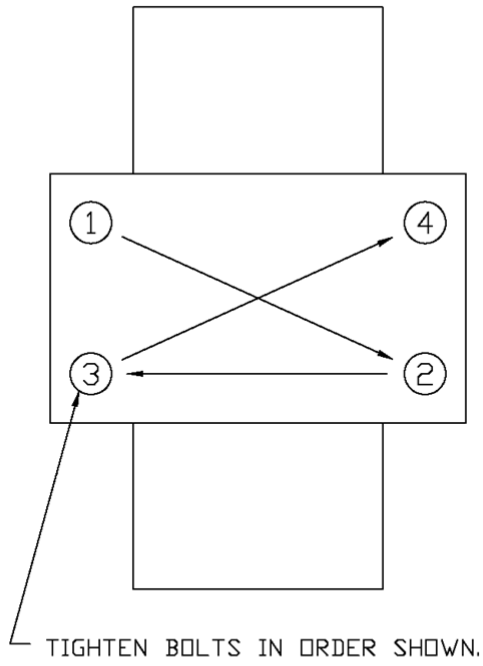
Bosch 18120 & 18135 Vibrator Installation

Figure 7-30



VIBRATOR MOUNT BOLT INSTALLATION DETAIL

FIGURE A



VIBRATOR MOUNT BOLT TIGHTENING DETAIL

FIGURE B

VIBRATOR MOUNTING BOLT INSTALLATION & TIGHTENING PROCEDURE

NOTE: All specifications below are for dry torques. Make certain that there are no oils or lubricants on any of the bolts or threads; or on any of the bearing surfaces.

Place washer under bolt head as shown above.

Always use the crisscross pattern shown above in Figure B when tightening vibrator bolts.

Tighten bolts as follows:

A. Snug up all bolts.

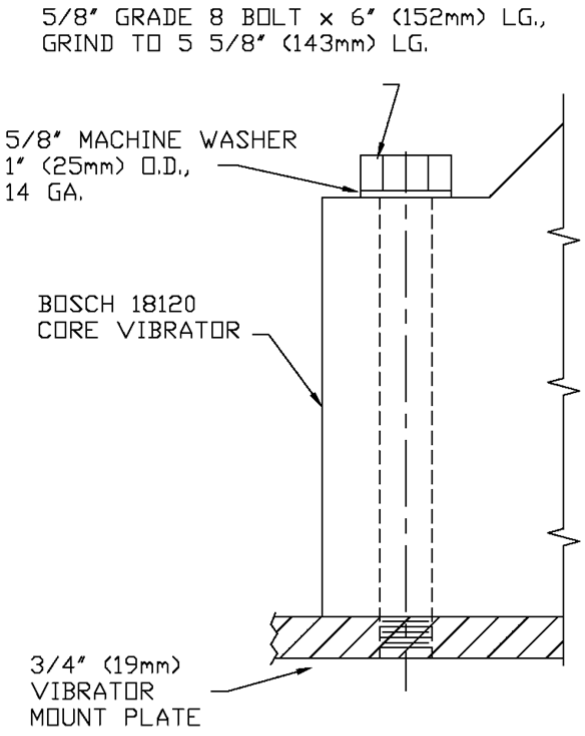
B. Tighten all bolts to 50 ft/lbs (68 Nm) Torque.

C. Bring all bolts up to 75 ft/lbs (102 Nm) Torque.

C. Bring all bolts up to 105 ft/lbs (143 Nm) Final Torque.

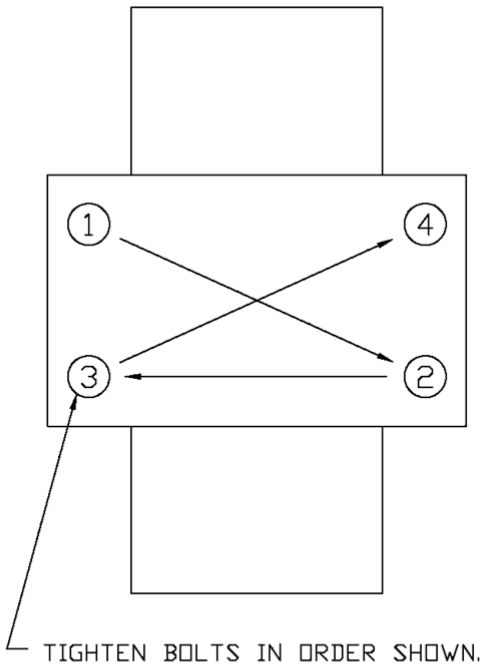
Bosch 18135 Vibrator – 10" (250mm) Diameter Core
Vibrator Mounting Bolt Installation & Tightening Specs

Figure 7-31



VIBRATOR MOUNT BOLT
INSTALLATION DETAIL

FIGURE A



VIBRATOR MOUNT BOLT
TIGHTENING DETAIL

FIGURE B

VIBRATOR MOUNTING BOLT INSTALLATION & TIGHTENING PROCEDURE

NOTE: All specifications below are for dry torques. Make certain that there are no oils or lubricants on any of the bolts or threads; or on any of the bearing surfaces.

Place washer under bolt head as shown in FIGURE A above.

Always use the crisscross pattern shown above in FIGURE B when tightening vibrator bolts.

Tighten bolts as follows:

A. Snug up all bolts.

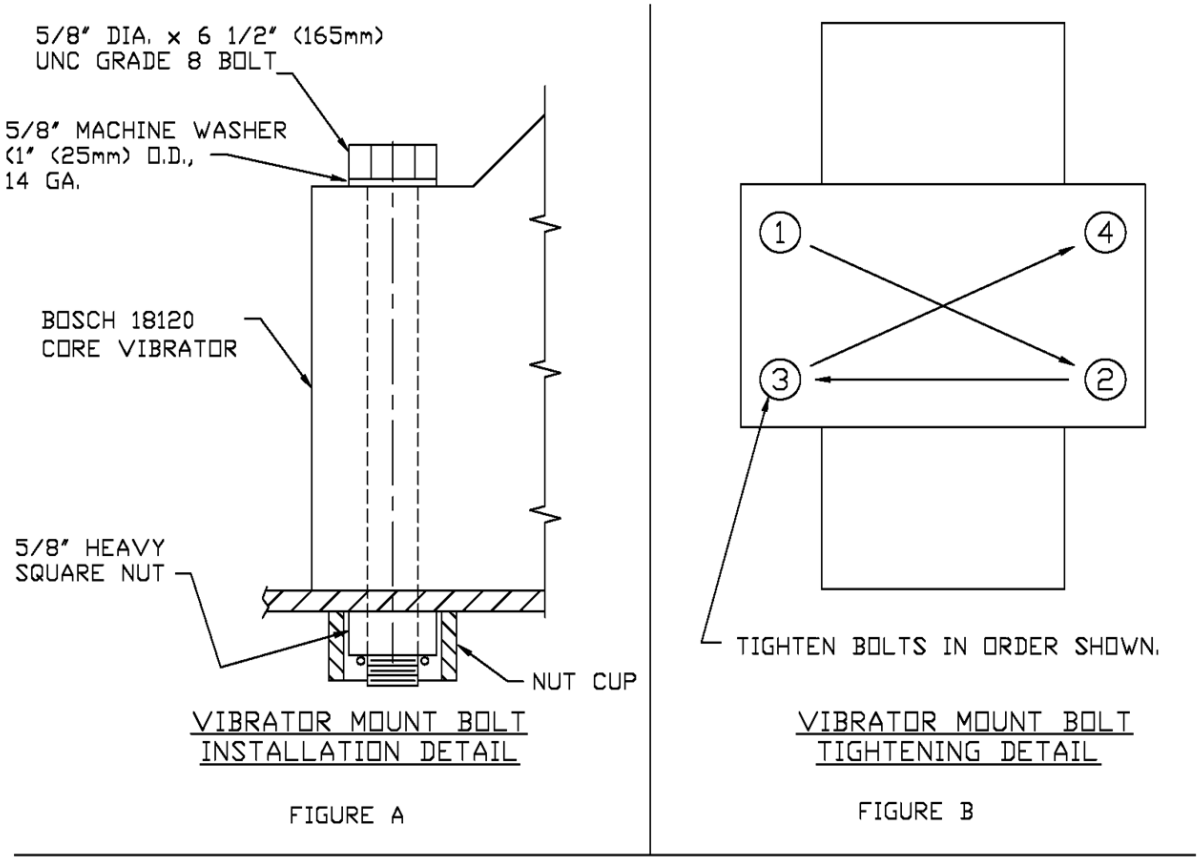
B. Tighten all bolts to 75 ft/lbs (102 Nm) Torque.

C. Bring all bolts up to 150 ft/lbs (203 Nm) Torque.

C. Bring all bolts up to 200 ft/lbs (271 Nm) Final Torque.

Bosch 18120 Vibrator – Threaded Mount Plate Style
Vibrator Mounting Bolt Installation & Tightening Specs

Figure 7-32



VIBRATOR MOUNTING BOLT INSTALLATION & TIGHTENING PROCEDURE

NOTE: All specifications below are for dry torques. Make certain that there are no oils or lubricants on any of the bolts or threads; or on any of the bearing surfaces.

Place washer under bolt head as shown in FIGURE A above.

Always use the crisscross pattern shown above in FIGURE B when tightening vibrator bolts.

Tighten bolts as follows:

A. Snug up all bolts.

B. Tighten all bolts to 75 ft/lbs (102 Nm) Torque.

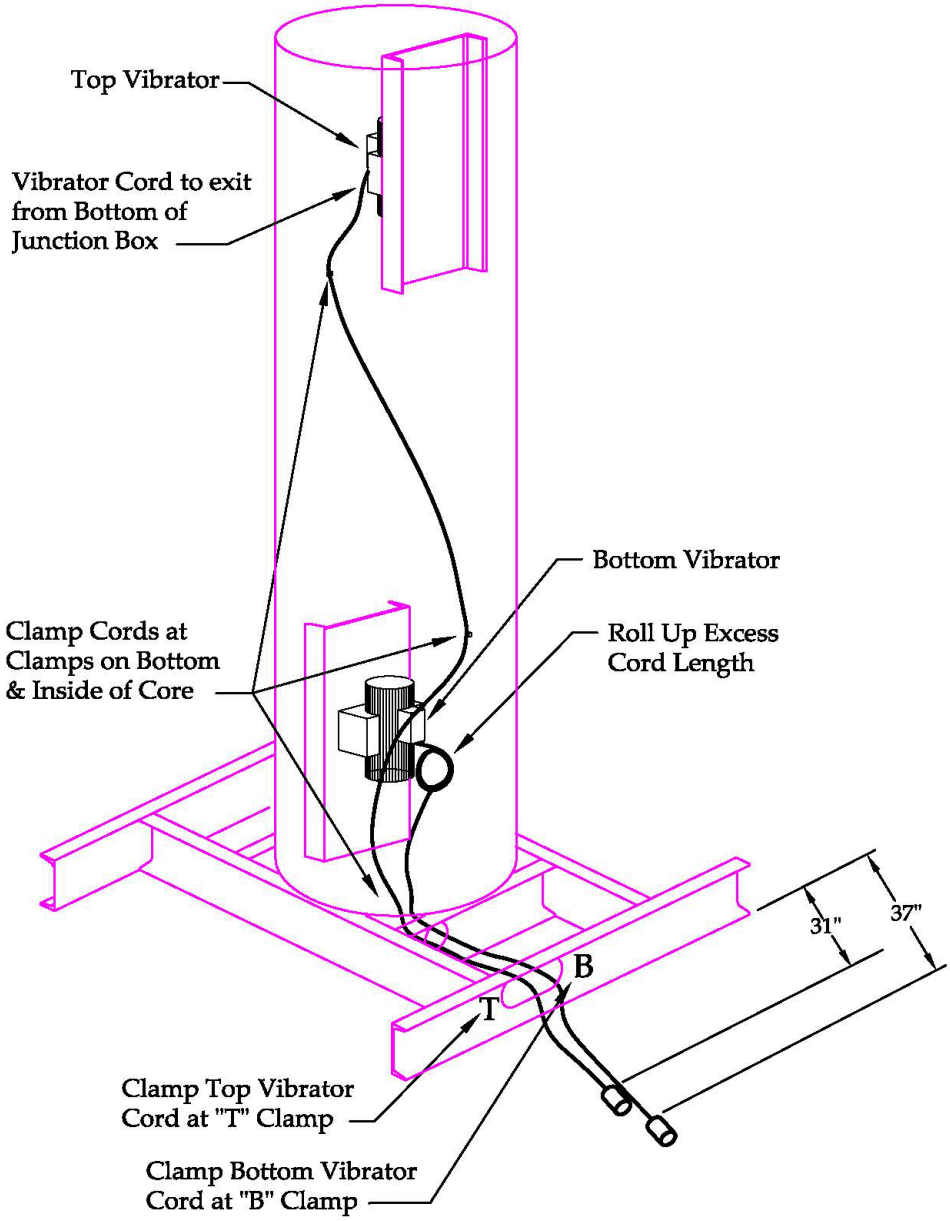
C. Bring all bolts up to 150 ft/lbs (203 Nm) Torque.

C. Bring all bolts up to 200 ft/lbs (271 Nm) Final Torque.

Bosch 18120 Vibrator – Through-Hole Plate Style
Vibrator Mounting Bolt Installation & Tightening Specs

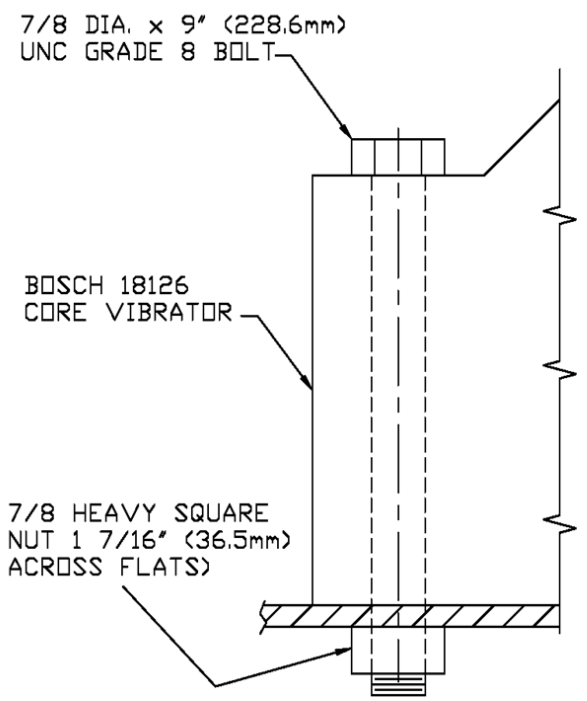
Figure 7-33
Nut Cup Nail Bending Tool

Figure 7-34



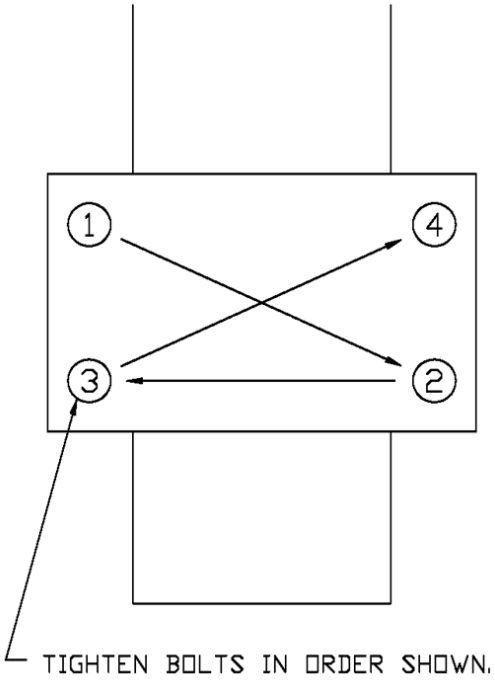
Bosch 18126 Vibrator Installation - Singleform

Figure 7-35



VIBRATOR MOUNT BOLT INSTALLATION DETAIL

FIGURE A



VIBRATOR MOUNT BOLT TIGHTENING DETAIL

FIGURE B

VIBRATOR MOUNTING BOLT INSTALLATION & TIGHTENING PROCEDURE

NOTE: All specifications below are for dry torques. Make certain that there are no oils or lubricants on any of the bolts or threads, or on any of the bearing surfaces.

Always use the crisscross pattern shown above in FIGURE B when tightening vibrator bolts.

Tighten bolts as follows:

A. Snug up all bolts.

B. Tighten all bolts to 200 ft/lbs (271 Nm) Torque.

C. Bring all bolts up to 400 ft/lbs (542 Nm) Torque.

C. Bring all bolts up to 600 ft/lbs (813 Nm) Final Torque.

Bosch 18126 Vibrator
Vibrator Mounting Bolt Installation & Tightening Specs

Figure 7-36

Installing CD36-11000 Core Vibrators

The **Afinitas MotoMagnetic CD36-11000** vibrators must be installed to the mount plates so the vibrator's electrical cord exits from the bottom of the junction box when viewed from the vibrator's front side. See ***Figure 7-37***. This is important so the vibrator counter-rotation principle is achieved.

The vibrator electrical cords must be routed to the correct cord clamps on the core base so those plugging the vibrators into the machine receptacle outlets know which plug is from the top or bottom vibrator. The cord fastened to clamp identified by the letter "T" is from the top vibrator; the cord fastened to the clamp identified by the letter "B" is from the bottom vibrator. Refer to ***Figure 7-37*** for cord routing details.

It is important that the vibrator's mounting bolts be properly torqued. Under torqued bolts will fatigue prematurely and fail, resulting in possible damage to the vibrator. Refer to ***Figure 7-38*** for bolt and torquing details for the **MotoMagnetic CD36-11000 vibrator**.

Whenever electrical repairs are made to a vibrator, proper wiring procedures must be followed. See ***Vibration System Wiring Method*** for information on how to make repairs to the vibrator's electrical cord or plug.

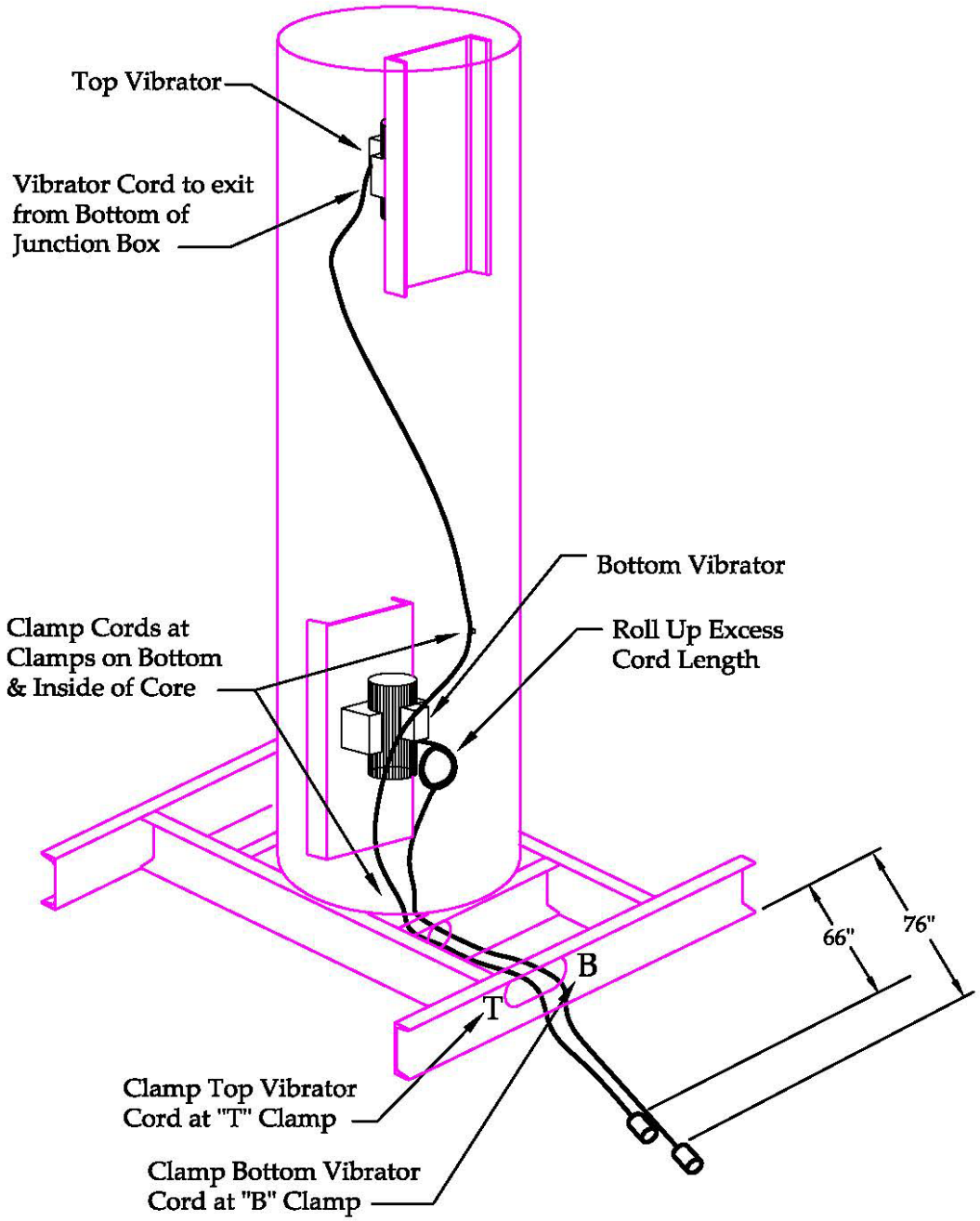
Installing CD36-20000 Core Vibrators

The **Afinitas MotoMagnetic CD36-20000** vibrator must be installed to the core vibrator mount so the electrical cord exits from the right side of the vibrator's junction box when viewed from the vibrator's front. This is important so vibrator counter-rotation is achieved. See ***Figure 7-39***.

The vibrator's electrical cords should be routed so the top vibrator cord connects to the clamp identified by the letter "T" and the bottom vibrator cord to the letter "B". This will help those who plug the vibrator into the machine receptacle outlets identify which cord goes to the top and bottom vibrator. See ***Figure 7-39***.

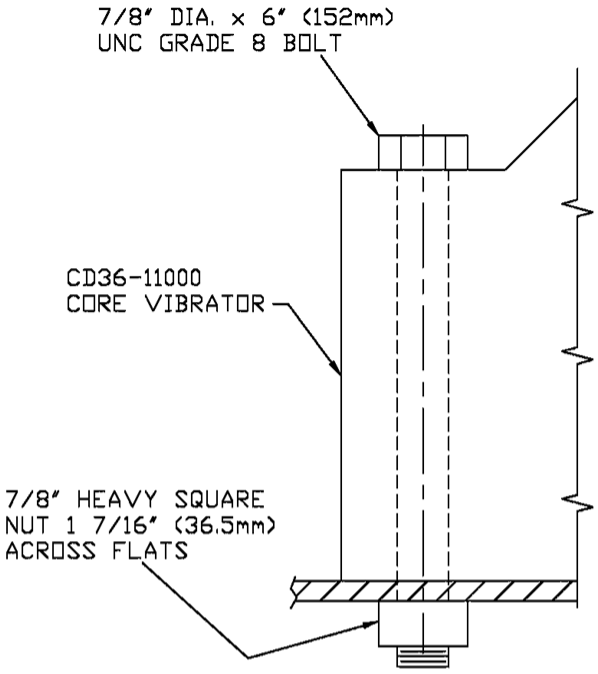
It is important that the mounting bolts be torqued to proper specification. Refer to ***Figure 7-40*** for details on the bolt and their torque requirements.

Whenever electrical repairs are made to the vibrator, it is important proper wiring procedures be followed. See ***Vibration System Wiring Method*** for details.



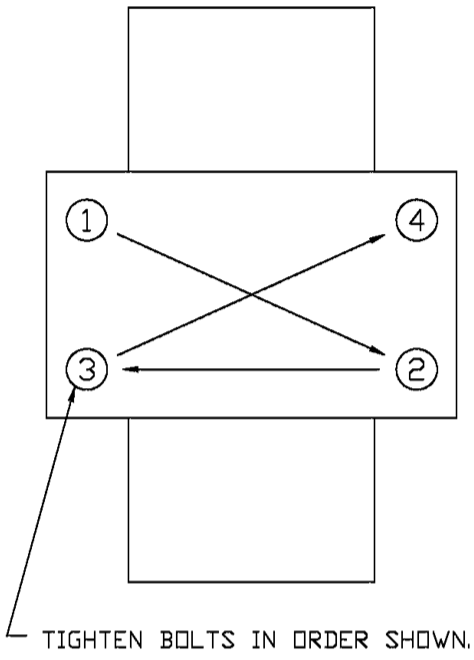
Afinitas Motomagnetic CD36-11000 Vibrator Installation - Singleform

Figure 7-37



VIBRATOR MOUNT BOLT
INSTALLATION DETAIL

FIGURE A



VIBRATOR MOUNT BOLT
TIGHTENING DETAIL

FIGURE B

VIBRATOR MOUNTING BOLT INSTALLATION & TIGHTENING PROCEDURE

NOTE: All specifications below are for dry torques. Make certain that there are no oils or lubricants on any of the bolts or threads; or on any of the bearing surfaces.

Always use the crisscross pattern shown above in FIGURE B when tightening vibrator bolts.

Tighten bolts as follows:

A. Snug up all bolts.

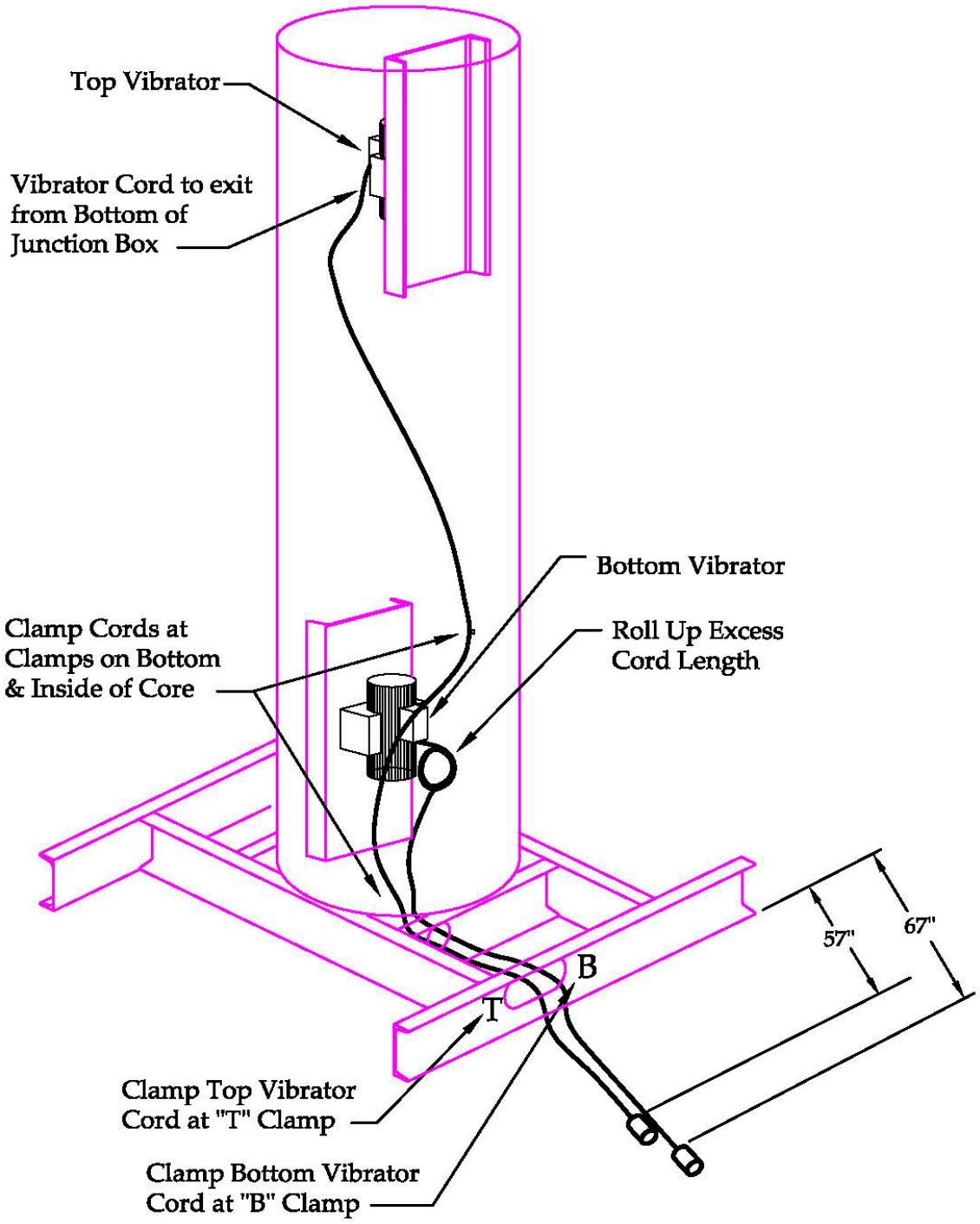
B. Tighten all bolts to 200 ft/lbs (271 Nm) Torque.

C. Bring all bolts up to 400 ft/lbs (542 Nm) Torque.

D. Bring all bolts up to 600 ft/lbs (813 Nm) Final Torque.

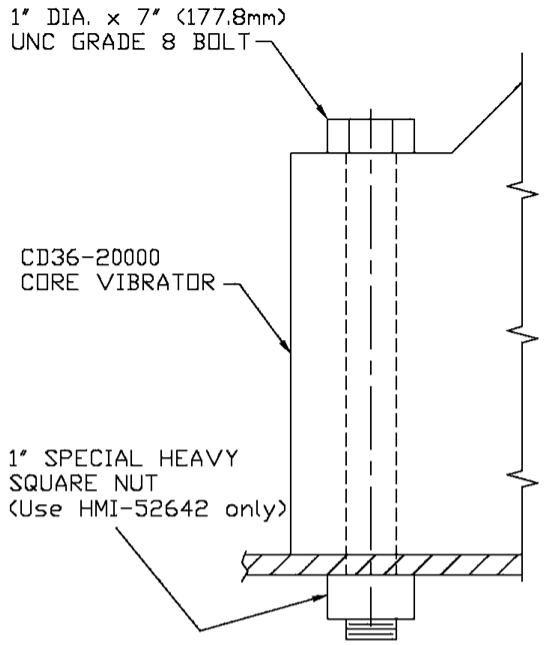
Afinitas Motomagnetic CD36-11000 Vibrator
Vibrator Mounting Bolt Installation & Tightening Specs

Figure 7-38



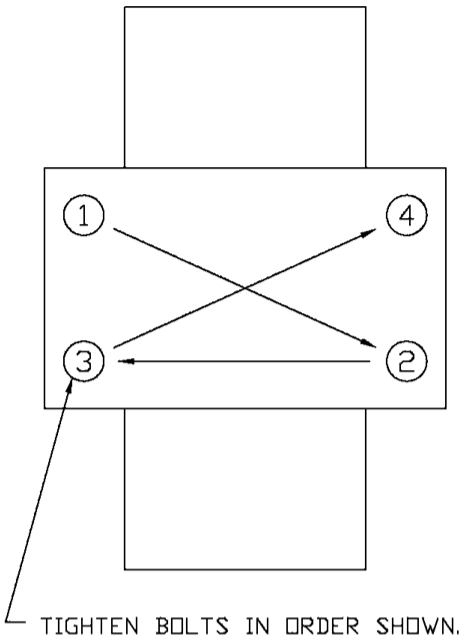
Afinitas Motomagnetic CD36-20000 Vibrator Installation - Singleform

Figure 7-39



VIBRATOR MOUNT BOLT
INSTALLATION DETAIL

FIGURE A



VIBRATOR MOUNT BOLT
TIGHTENING DETAIL

FIGURE B

VIBRATOR MOUNTING BOLT INSTALLATION & TIGHTENING PROCEDURE

NOTE: All specifications below are for dry torques. Make certain that there are no oils or lubricants on any of the bolts or threads; or on any of the bearing surfaces.

Always use the crisscross pattern shown above in FIGURE B when tightening vibrator bolts. Also, when tightening the bolts, the 4 TO 1 torque multiplier must be used. NOTE: The actual torque at the bolt is approximately 20% less than 4 to 1.

Tighten bolts as follows:

A. Snug up all bolts.

B. Tighten all bolts to 300 ft/lbs (407 Nm) Torque..

C. Bring all bolts up to 600 ft/lbs (813 Nm) Torque.

D. Using the small torque wrench and a 4 to 1 torque multiplier, set torque wrench at 250 ft/lbs (339 Nm) & tighten all bolts. (Actual torque at bolt is approximately 800 ft/lbs (1085 Nm).)

E. Repeat Step D with wrench set to 280 ft/lbs (380 Nm). (900 ft/lbs (1220 Nm) actual at bolt.)

Afinitas Motomagnetic CD36-20000 Vibrator
Vibrator Mounting Bolt Installation & Tightening Specs

Figure 7-40

16.8 Vibrator Maintenance

The vibrators chosen for the **SS CAP 72 Machine** are considered to be the best vibrators available. Careful attention to maintenance instructions will assure you years of dependable service from your vibrators.

Vibrator Care

Store the vibrators in a dry area. Do not store them outside where they may be exposed to the weather. Do not wash the vibrators with a hose or immerse them in water because they are not waterproof.

Handle the vibrators with care. A small dent in the end cap cover could cause the eccentric weight to stop against the dented cap and prevent the motor from turning. This could result in the vibrator burning up.

Vibrators are equipped with a ground wire in the electrical cord. This ground wire is connected to the ground terminal in the vibrator casing and to the ground terminal in the vibrator plug. When making repairs; always make sure that this ground circuit is connected properly. The ground lead is necessary for several reasons, the most important being to protect personnel from the hazard of electrical shock.

16.8.1.1 Checking Bolts and Nuts for Tightness

Periodically- Check all the vibrator nuts and bolts for tightness. If any bolts would work free, it is possible that the rotating balance disc inside the vibrator could catch a screw and force it through the vibrator end cover, shattering the end cover and exposing personnel to flying metal particles.

16.8.1.2 Vibrator Lubrication

The Bosch vibrators are equipped with permanently lubricated bearings. Therefore, no lubrication is required.

Periodically- The Martin vibrators require periodic lubrication. The bearings can be lubricated from the two grease zerks. The bearings should be lubricated following recommendations in the vibrator manuals.

16.8.1.3 Vibrator Electrical Cords

Periodically- Check vibrator cords for wear and abrasion. Prevent the electrical cords from bending sharply in the same place. Do not fasten cords too close to the vibrator. Try to get the strain of vibration distributed over a considerable length of cord.

Note: The top vibrator used in 10″ (250mm) and 12″ (300mm) diameter cores must be fitted with a protective sleeve over the electrical cord to protect from abrasion. This rubber sleeve starts at the cord where it leaves the vibrator junction box and extends to the first clamp on the core base.

If an electrical cord is to be wired into the vibrator plug, make sure to follow the color-coded wiring plan when connecting the plug to the electrical cord. Proper wiring procedures are required to maintain the original polarity of the vibrator. See ***Vibration System Wiring Method***.

In the event that the electrical cord is pulled out of the vibrator's terminal box, it will be necessary to rewire the cord back into the vibrator. It is important that proper procedures be used for wiring the cord into the vibrator because it will affect the polarity of the vibrator. Refer to ***Vibration System Wiring Method*** when making this repair. Whenever wiring a cord at the vibrator's terminal box, it is also necessary to make a vibrator rotation check. See ***Checking Vibrator Rotation***.

IMPORTANT: When wiring an electrical cord into the vibrator or at the electrical plug, make sure that the ground (green) line is connected to the ground terminal in the plug and the vibrator's terminal blocks. Maintaining the ground line is important to help prevent the hazard of electrocution.

16.8.1.4 Vibrator Overload Protection

The core vibrators are protected against electrical overload by the relays that control each vibrator. These relays are located in the core vibration box. Refer to ***Machine Receptacle Outlet's Control Relay Wiring Method*** for information on the relays used with the vibrators. Because of the different vibrators used with the core vibration system, different protection is required for the vibrators.

When a relay begins to kick out during operation, check for the reason immediately because it is a sign of system malfunction. Repeatedly operating vibrators when they are kicking out can result in damage to the vibrators or form equipment. Use only the relay settings recommended in ***Figure 7-48*** for vibrator overload protection.

16.8.1.5 Vibrator Impact Settings

Your form equipment was installed with vibrators set to their correct impact settings. The **Afinitas** Jacket Vibration System and Classic Core Vibration System require different vibrator settings to operate properly. The following paragraphs describe how each system is designed to operate.

IMPORTANT: When replacing a vibrator or when repairing an existing vibrator, always check to make sure that its impact setting is correct for the form into which it is to be installed.

16.8.1.6 Jacket Vibration System

The impact force of the Model 18120 Bosch vibrator used on **Afinitas** Jacket Vibration System equipment can be adjusted from 1,575 lbf (7 kN) to a maximum impact force of 3,150 lbf (14 kN). The vibrator is set at our factory to its highest setting, 100%. **Afinitas** jacket vibrated form equipment is designed for the vibrators to run at this highest setting. Therefore, there is no reason for adjusting the impact force on the jacket vibrated form equipment. However, if the vibrator impact force has been altered, if repairs have been made to the vibrator, or if the vibrator is to be used in another application, the vibration impact force must be checked to assure that it is set to 100%. See ***Figure 7-42***.

NOTE: The illustration *in Figure 7-42* shows the vibrator's balance discs set at the 100% mark. For Afinitas jacket vibrated form equipment, the balance discs must be set to the 100% mark. See *Figure 7-41* for Classic Core Vibration System settings.

IMPORTANT: Using vibrators on Afinitas jacket vibrated form equipment where the impact force has been adjusted differently than the 100% setting may result in improper vibration transmission or may cause premature wear to form equipment.

16.8.1.7 Classic Core Vibration System

Bosch and Martin vibrators are used in **Afinitas** Classic Core Vibration Systems. The charts in ***Figure 7-41*** show the settings required at the outer balance discs to achieve certain impact forces. The vibrator impact force varies depending on the model of the vibrator and the form to which it is attached.

16.8.1.8 Setting the Vibrator Impact Force

The Bosch and Martin vibrators are all equipped with a main eccentric weight and an adjustable weight at each end of the vibrator's motor shaft. The main eccentric weight has a decal that displays different percentage marks. To obtain a certain impact force, the adjustable weights are set to the correct percentage mark on the main weights. ***Figure 7-41*** shows the correct impact settings for the Bosch and Martin vibrators for each core size in which the vibrators are to be used.

To adjust the impact force of a Bosch or Martin vibrator, perform the following:

1. Disconnect the vibrator from its electrical source and remove the end caps from each end of the vibrator to expose the outer balance discs.
2. Loosen the clamping screw A of the outer balance disc and set the outer balance disc to the required % mark as shown in ***Figure 7-42***, then re-tighten screw A.

NOTE: The illustration in *Figure 7-42* shows the vibrator's balance discs set at the 100% mark. For Afinitas jacket vibrated form equipment, the balance discs must be set to the 100% mark. See *Figure 7-41* for Classic Core Vibration System settings.

3. Make the same adjustment to the outer balance disc at the opposite side of the rotor shaft. Both balance discs must be set to the same setting. It is also important to check to make sure that the balance discs line up axially across the motor shaft or the impact force will be incorrect.
4. Apply a light coating of grease to the end cap sealing ring located on the bearing flange to help assure a tight seal between the end cap and bearing flange.
5. Place the end covers back onto the vibrator ends and bolt tightly.

Classic Core Vibrator Impact Settings§	
Core Diameter§	Weight Setting§
Bosch 18135 Vibrator§	
10"§	90%§
Bosch 18120 Vibrator§	
12"§	70%§
15"§	55%§
18"§	85%§
21"§	95%§
24"§	100%§
Bosch 18126 Vibrator§	
27"§	90%§
30"§	95%§
33"§	100%§
36"§	100% w/strap*§

*Strap welded to outside of adjustable weight. Strap by **Hawkeye.**¶

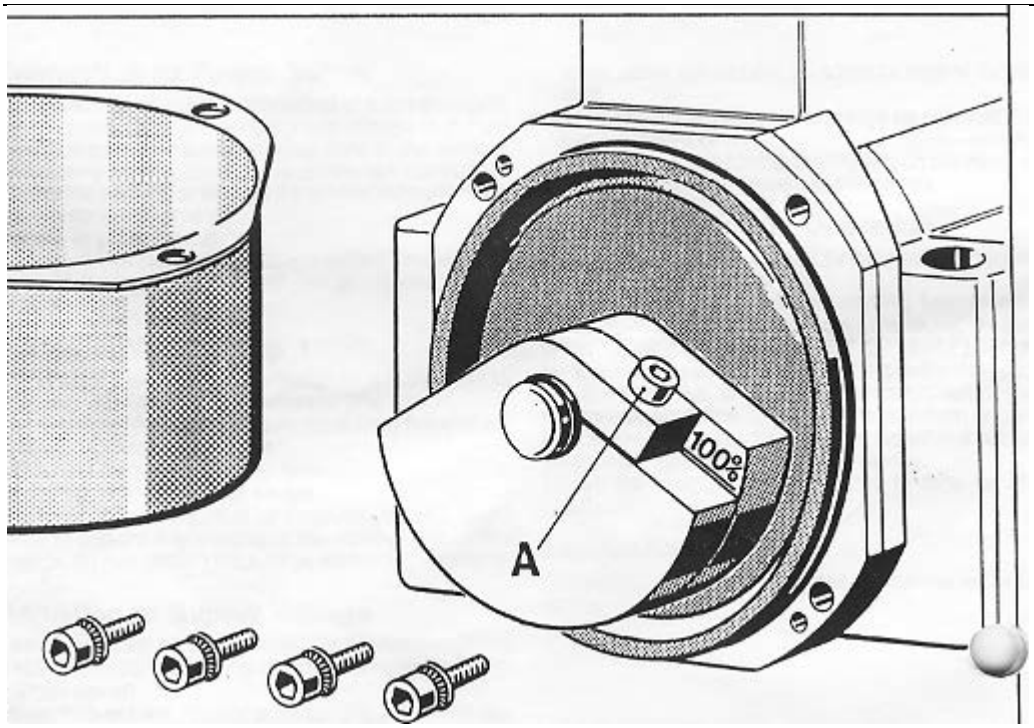
Hawkeye CD-11000 Vibrator§			Hawkeye CD-20000 Vibrator§		
Core ¶ Diameter§	**Weight Setting§ Top Vibrator§	Bottom Vibrator§	Core ¶ Diameter§	* Weight Setting§ Top Vibrator§	Bottom Vibrator§
39"§	64%§	51%§	60"§	50%§	50%§
42"§	64%§	64%§	66"§	55%§	55%§
48"§	78%§	78%§	72"§	60%§	60%§
54"§	78%§	78%§	--§	--§	--§

** Vibrator weight is at its correct position if:

1. The vibrator setting corresponds to the specified chart setting
2. All remaining settings visible on weight are of a lower valve than the specified chart setting.

Classic Core Vibrator Impact Settings

Figure 7-41



Model Number	100% LBF	90% LBF	80% LBF	70% LBF	60% LBF	50% LBF
18135	2265	2039	1812	1586	1359	1133
18120	3283	2955	2626	2298	1970	1641
18126	5717	5145	4574	4002	3430	2858

Bosch Adjustable Vibrator Impact Settings

Figure 7-42

16.9 Vibration System Wiring Method

As mentioned in the operation section of this manual, it is important that the form vibrators counter-rotate with respect to each other in order to provide proper vibration to the concrete. This counter-rotation feature will occur automatically if the vibrators are plugged into the correct machine receptacle outlets, providing the vibration system's electrical components have all been maintained to their original polarity.

The vibration system is designed so all vibrators are wired to the same polarity. In other words, if you would plug each of your vibrators into the same outlet, they should all rotate in the same direction. In order to achieve counter-rotation between the vibrators in a form, the machine receptacle outlets are wired to different polarities.

In order to make electrical repairs easy for you to perform, the vibration system's electrical components have been wired using a predetermined color-coded wiring method. If you are replacing a plug on the cord end of a vibrator, replacing a machine receptacle outlet on the machine, or replacing a relay in an electrical console, the correct original polarity of the vibrator machine receptacle outlets will be maintained if this wiring method is used. The information that follows explains the color-coded wiring method.

When wiring an electrical cord into the vibrator's terminal box, the color-coded wiring method is to be followed. However, a vibrator rotation check is required after the cord has been installed to make sure that the vibrator has maintained its original polarity. A rotation check is necessary because following the color-code at the terminal box is not a foolproof or 100% accurate method of establishing the vibrator's polarity.

Vibrator Cord and Plug Wiring Method

The instructions that follow explain the procedure for wiring the electrical vibrator plug to the cord end of the vibrator, and for wiring the electrical cord into the vibrator's terminal box. To wire the plug to the vibrator cord, refer to ***Figure 7-25***. All vibrators should have their plugs installed following this plan.

To wire the vibrator's electrical cord into the vibrator's terminal box, follow the color code plan as shown by ***Figure 7-43*** (Model 18135/18120 vibrator), ***Figure 7-44*** (Model 18126 vibrator), ***Figure 7-45*** (Model CD36-11000 vibrator), and ***Figure 7-46*** (Model CD36-20000 vibrator). Following this plan at the terminal box will not assure correct polarity of the vibrator, thus it is necessary to perform a vibrator rotation check to determine if polarity remains correct. Refer to ***Checking Vibrator Rotation*** for details. If rotation is determined to be incorrect, reverse the proper wires at the vibrator terminal box.

IMPORTANT: Do not change wires at the vibrator plug.

IMPORTANT: The vibrator's voltage can be changed at the vibrator's terminal box. Make sure your vibrators are wired to the correct voltage.

The reason it is necessary to perform a rotation check on the vibrator, even though the cord has been wired into the terminal box as shown by the drawings is because the color-code plan at the terminal box is not 100% accurate for establishing the vibrator's polarity. Thus, the only way to make sure that the vibrator has maintained its original polarity after cord installation is by performing this test.

Once the vibrator cord has been wired correctly into the vibrator's terminal box, it is not necessary to perform a vibrator rotation test when replacing the plug at the cord end. If the plug is installed following the prescribed wiring method, the vibrator will maintain its original polarity. The only time the vibrator rotation check is required is when installing the electrical cord into the vibrator's terminal box.

Machine Receptacle Outlet Wiring Method

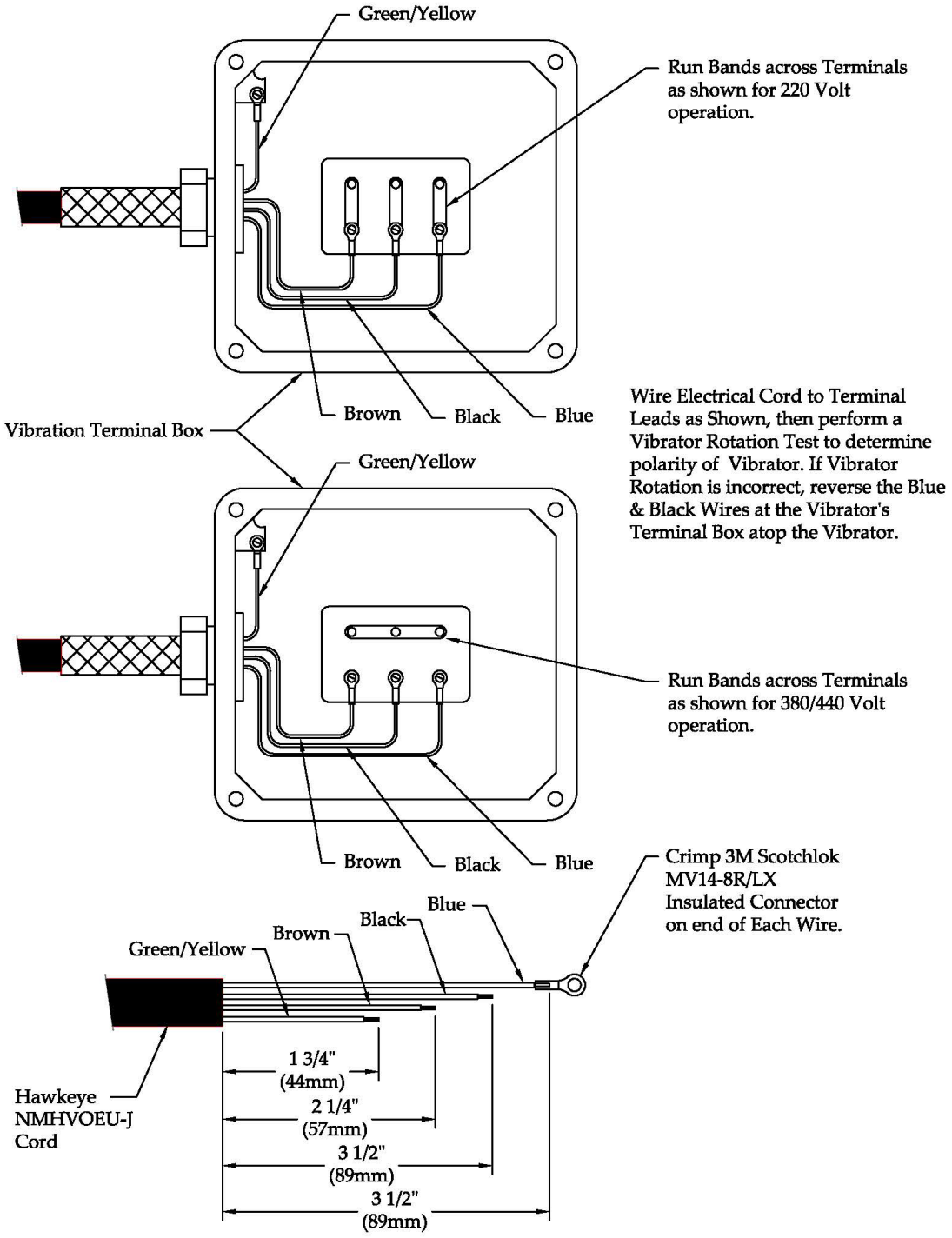
When wiring the machine receptacle outlets at the machine's electrical cords, follow the wiring plan as shown by ***Figure 7-24***. Each machine receptacle outlet should be wired the same. The polarity of the outlets will be controlled at the outlet's relay in the electrical enclosure box, not at the outlet.

Machine Receptacle Outlet's Control Relay Wiring Method

Each core vibration machine receptacle outlet on the **SS CAP 72 Machine is** controlled by a relay in the electrical enclosure. The polarity of the outlets is controlled at the relays. ***Figure 7-18*** shows the relay wiring plan to follow if the machine receptacle outlet is to permit a vibrator to run in a clockwise or counterclockwise direction.

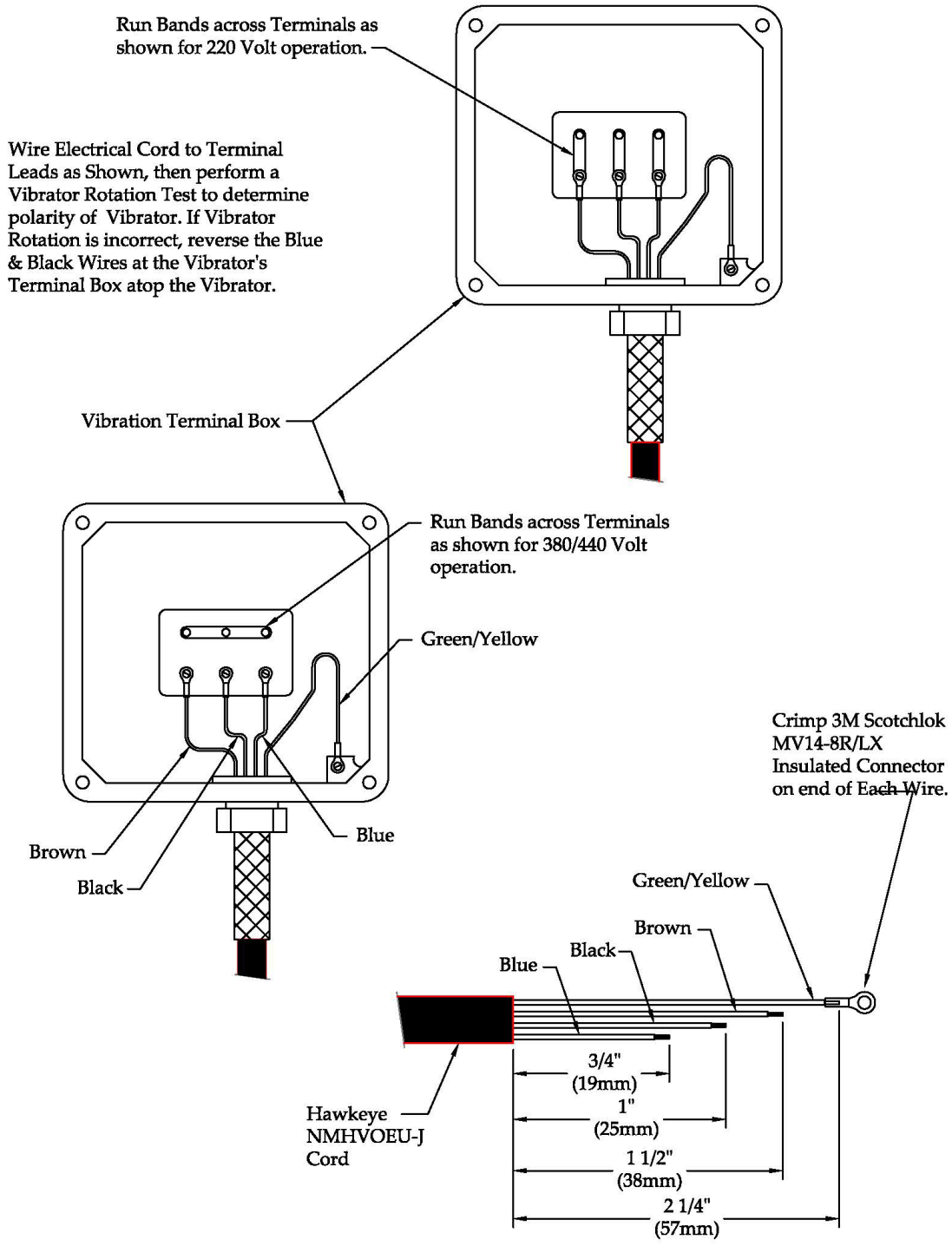
Figure 7-47 shows a schematic of the machine receptacle outlets. The chart under the schematic shows the correct rotation of a vibrator when plugged into each of the machine receptacle outlets. For detailed information on checking outlet polarity, refer to ***Checking Machine Receptacle Outlet Polarity***.

Figure 7-48 shows a schematic of the relays in the core boxes and details which relay controls which machine receptacle outlet. The schematic shows the correct rotation of a vibrator when it is plugged into each of these outlets. For detailed information on checking outlet polarity, refer to ***Checking Machine Receptacle Outlet Polarity***.



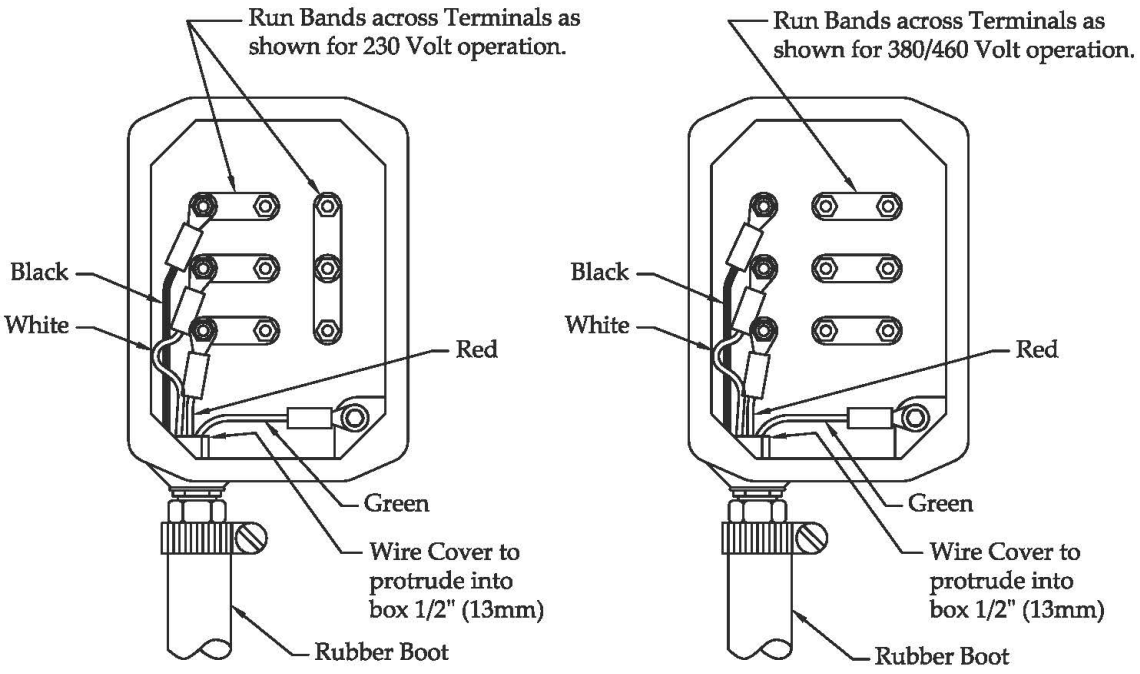
Bosch 18120 & 18135 Vibrator Terminal Box Wiring Diagram

Figure 7-43

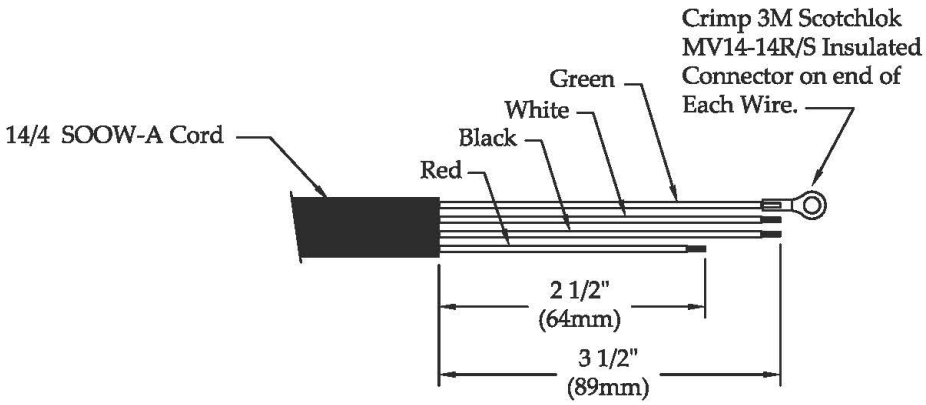


Bosch 18126 Vibrator Terminal Box Wiring Diagram

Figure 7-44

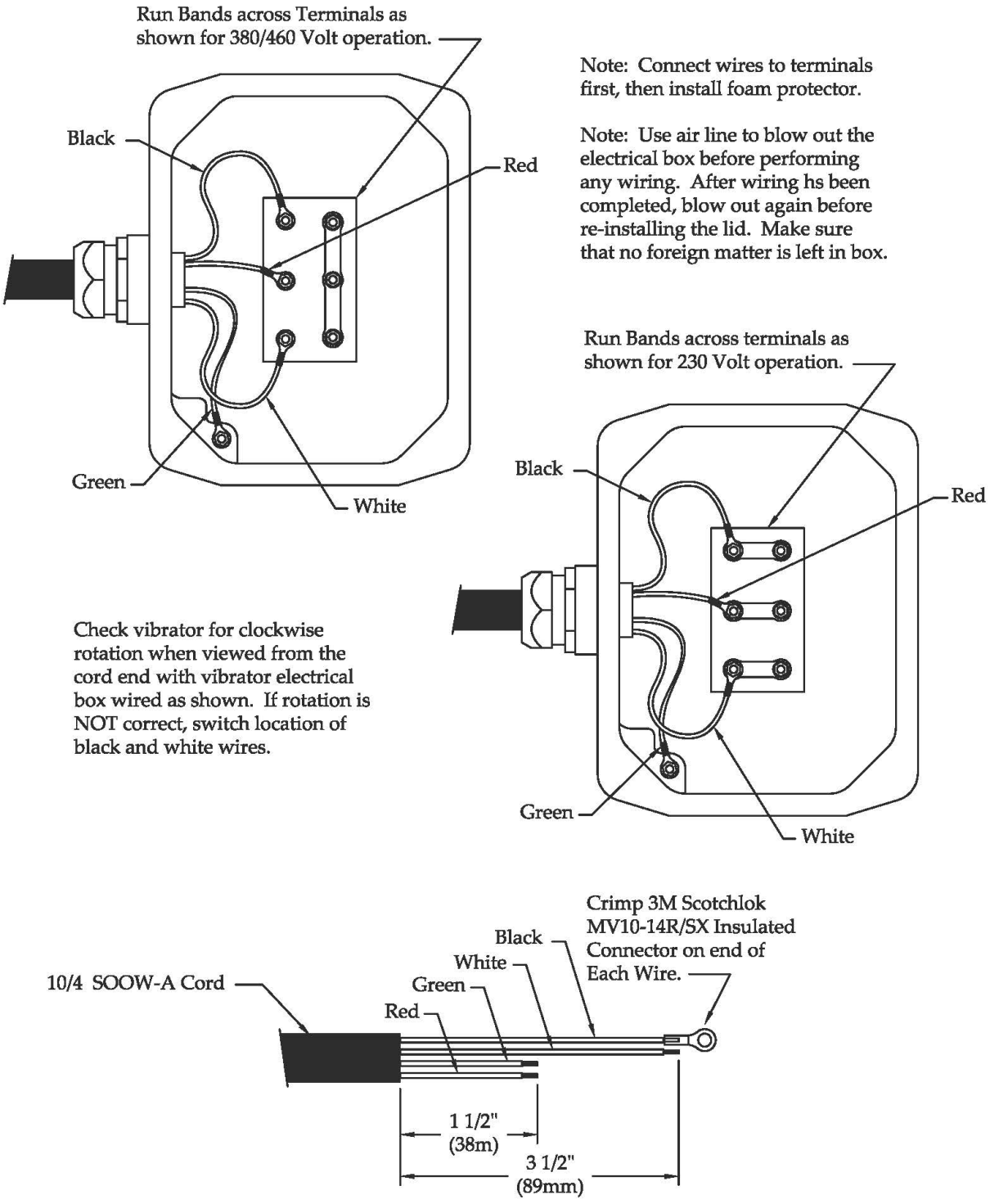


Wire Electrical Cord to Terminal Leads as Shown, then perform a Vibrator Rotation Test to determine polarity of Vibrator. If Vibrator Rotation is incorrect, reverse the Red & Black Wires at the Vibrator's Terminal Box atop the Vibrator.



CD36-11000 Vibrator Terminal Box Wiring Diagram

Figure 7-45



CD36-20000 Vibrator Terminal Box Wiring Diagram

Figure 7-46

Checking Vibrator Rotation

For the machine vibration system to work properly, it is critical that all vibrators rotate in the same direction when they are plugged into the same “master” outlet. This permits the vibrators, if connected to the correct machine receptacle outlets, to counter rotate in relationship to each other to achieve proper vibration transmission. Therefore, it is important that the vibrators be checked periodically for correct rotation.

Before performing the rotation test, make sure that the vibrator plug is wired to the electrical cord following the color-coded wiring method. Also, wire the electrical cord at the vibrator's terminal box as instructed. However, it may be necessary to reverse two wires in the terminal box depending upon the outcome of the vibrator rotation check.

16.9.1.1 Testing Vibrator Rotation

To test the rotation of the vibrators, perform the following:

1. Remove end cap from vibrator to expose shaft. Remove correct end cap as instructed in ***Figure 7-49***. It is necessary to always remove the end cap from the correct side of the vibrator to properly monitor rotation.
2. For the Bosch vibrators, after removing the end cap, screw the end cap bolts back into the vibrator to hold the bearing flange in place.
3. Plug the vibrator into an outlet, with the vibrator in front of the observer and with the exposed end of the Plug the vibrator into an outlet, with the vibrator in front of the observer and with the exposed end of the vibrator facing the observer as shown in ***Figure 7-49***. Start the vibrator momentarily and observe the direction of vibrator rotation and compare to the rotation as shown in ***Figure 7-47***. If rotation is incorrect, reverse the proper wires in the vibrator's terminal blocks. See ***Vibration System Wiring Method***.

IMPORTANT: Do not reverse the wires at the vibrator plug.

⚠ WARNING! Do not disconnect the ground (green) line from the terminal ground in the vibrator plug. Disconnecting the ground line will unground the vibrator and result in an electrocution hazard.

4. After adjustments have made to the line wires, re-check the vibrator for correct rotation. If correct, place the end cap back onto the vibrator.

Checking Machine Receptacle Outlet Polarity

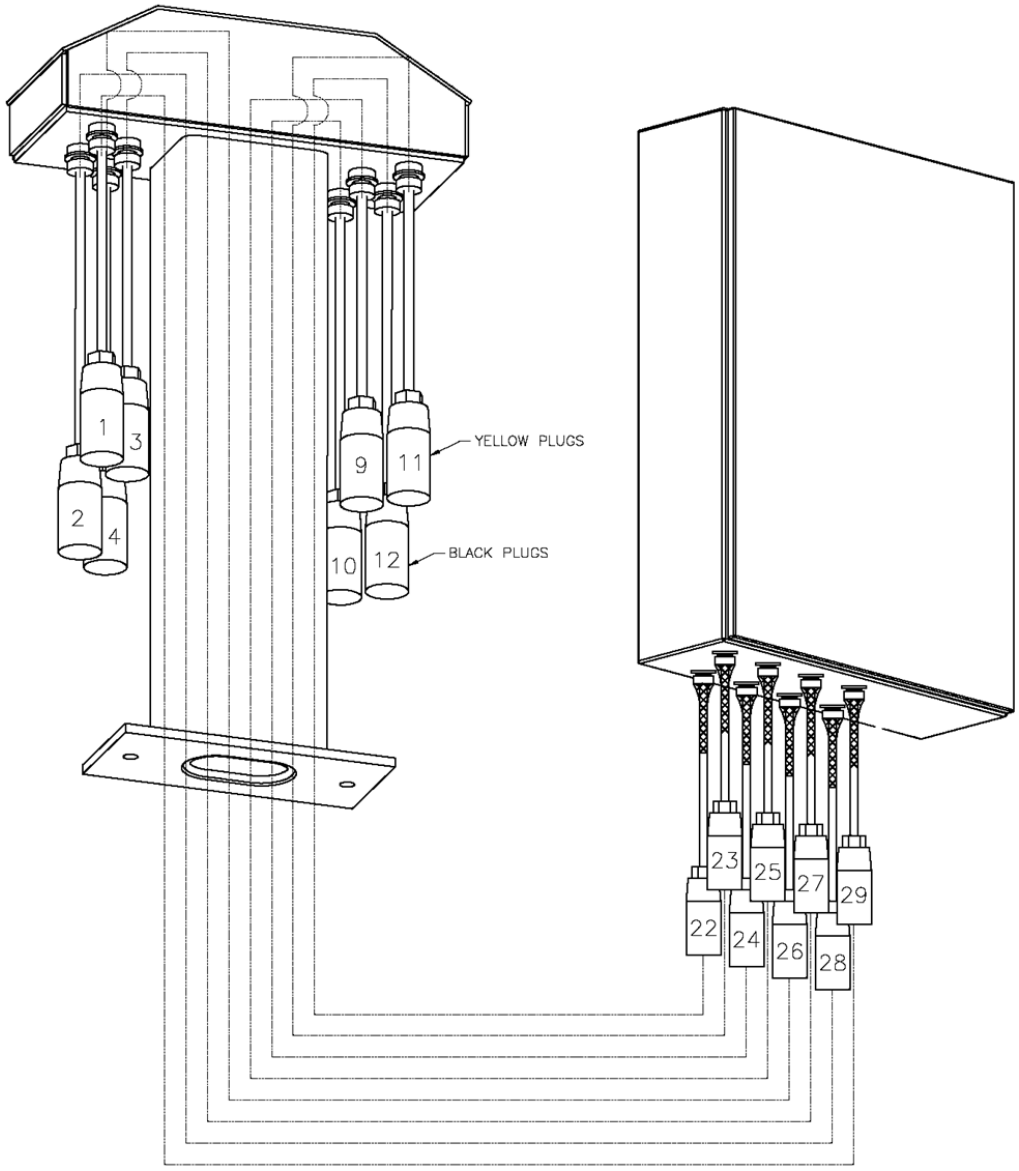
It is important that the core vibration receptacle outlets remain wired to the correct polarity. Because vibrators are all wired to the same polarity, it is necessary that the machine receptacle outlets be wired to different polarities to achieve the counter-rotation principles. ***Figure 7-47*** identifies all machine receptacle outlets and the correct direction of rotation. The test vibrator should rotate in the proper direction when plugged into each of these outlets. Whenever repairs are made to the machine receptacle outlets or to their relays in the electrical boxes, make sure to wire the outlets and relays following the color coded plan detailed in ***Vibration System Wiring Method.*** It is recommended that the outlets be checked on a scheduled basis to make sure that they remain wired to their correct polarity.

To check the polarity of machine receptacle outlets:

1. Select a vibrator to use as a test vibrator. Prepare the vibrator for a rotation check as discussed in ***Checking Vibrator Rotation***. Check the vibrator's rotation at a plug that you know is wired to the correct polarity to make sure that the vibrator's polarity is correct.
2. Plug the test vibrator into each machine receptacle outlet and monitor the direction that the vibrator rotates at each plug. Compare this direction of rotation to ***Figure 7-47***.
3. If vibrator rotation is incorrect at an outlet, check the color-coding of the wiring at the machine receptacle outlet and at the outlet's relay in the electrical enclosure box to make sure that it conforms to the machines wiring specifications.

⚠ WARNING: Do not disconnect the ground (green) line from the machine receptacle outlet's terminal ground. Disconnecting the ground line from the ground terminal will unground the vibrator and result in an electrocution hazard.

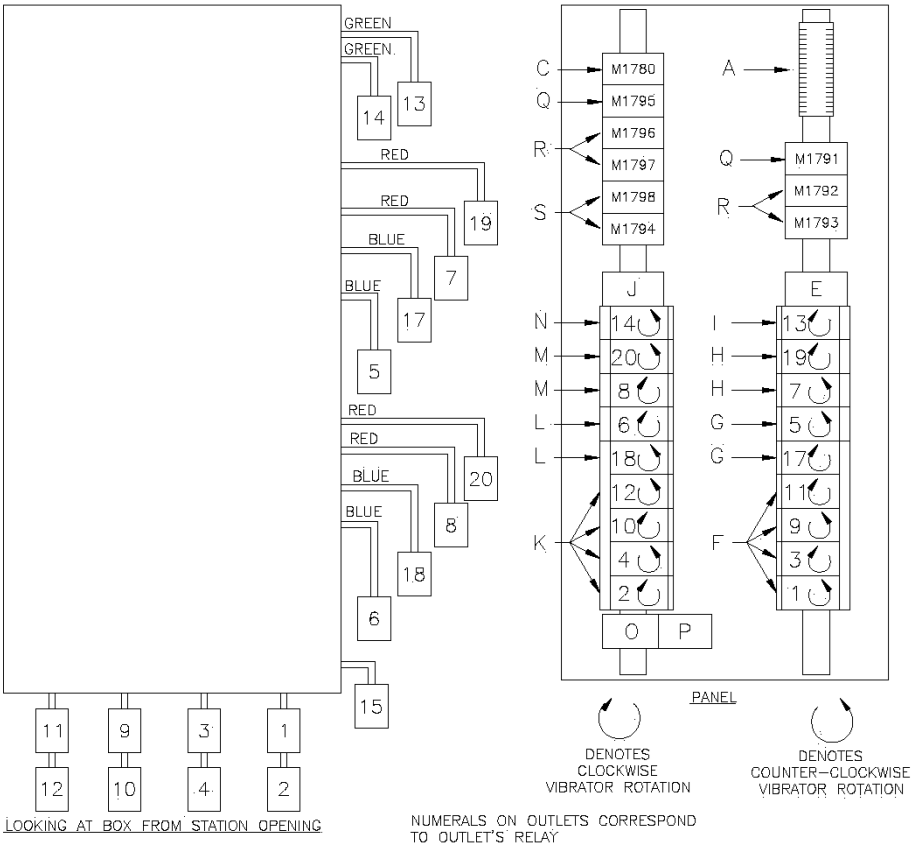
4. Recheck the test vibrator to each outlet to make sure that the vibrator rotates in the correct direction at indicated by ***Figure 7-47***.



	VIBRATOR PLUG GUIDE					
PLUG #	JKT. VIB BOX PLUG	CONTACTOR NUMBER	USED FOR	ROTATION DIR.	PLUG COLOR	CORD COLOR
12	22	8	BOSCH 18120, 18135 MARTIN 3450, 4400	CCW	YELLOW	WHITE
11	23	7	BOSCH 18120, 18135 MARTIN 3450, 4400	CW	BLACK	NONE
10	24	8	BOSCH 18120, 18135 MARTIN 3450, 4400	CW	YELLOW	NONE
9	25	7	BOSCH 18120, 18135 MARTIN 3450, 4400	CCW	BLACK	WHITE
4	26	6	BOSCH 18120, 18135 MARTIN 3450, 4400	CCW	YELLOW	WHITE
3	27	5	BOSCH 18120, 18135 MARTIN 3450, 4400	CW	BLACK	NONE
2	28	6	BOSCH 18120, 18135 MARTIN 3450, 4400	CCW	YELLOW	NONE
1	29	5	BOSCH 18120, 18135 MARTIN 3450, 4400	CW	BLACK	WHITE

Jacket Vibration Receptacle Outlet Connector Method

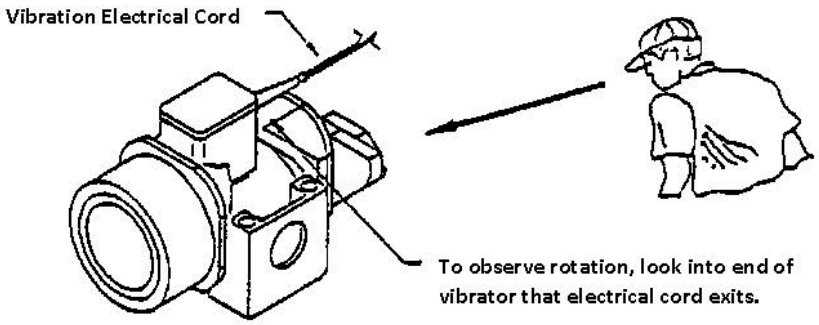
Figure 7-47



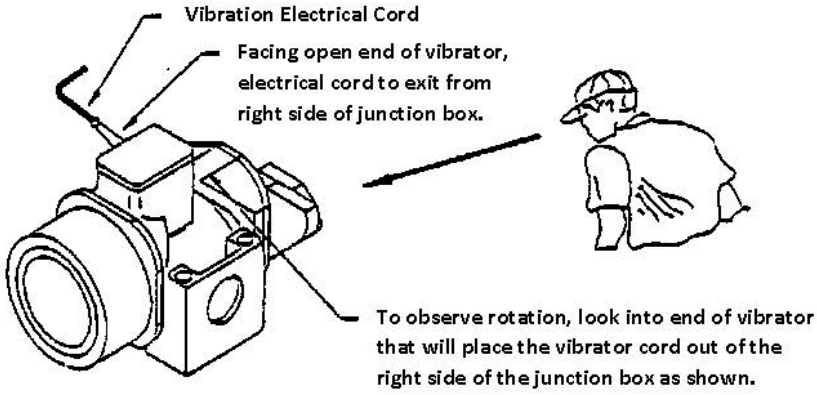
Item #	Description
A	Terminal Strip
C	Rotor Fuses: 600VAC, 5A, Class CC Time Delay
E	Top Vibrator Plugs, Contactor
F	Model 18120 Top Vibrator Plugs, Relay Set at 3.5
G	Model 18126 Top Vibrator Plugs, Relay Set at 5.3
H	Model CD-11000 Top Vibrator Plugs, Relay Set at 9
I	Model CD-20000 Top Vibrator Plug, Relay Set at 16.5
J	Bottom Vibrator Plugs, Contactor
K	Model 18120 Bottom Vibrator Plugs, Relay Set at 3.5
L	Model 18126 Bottom Vibrator Plugs, Relay Set at 5.3
M	Model CD-11000 Bottom Vibrator Plugs, Relay Set at 9
N	Model CD-20000 Bottom Vibrator Plug, Relay Set at 16.5
O	Rotor, Contactor
P	Rotor, Relay Set at 3.2
Q	Green Vibrator Plug Fuses: 600VAC, 30A, Class CC Time Delay
R	Red Vibrator Plug Fuses: 600VAC, 20A, Class CC Time Delay
S	Blue/Black Vibrator Plug Fuses: 600VAC, 15A, Class CC Time Delay

Electrical Components Inside PipePlusPlus Core Vibration Enclosure

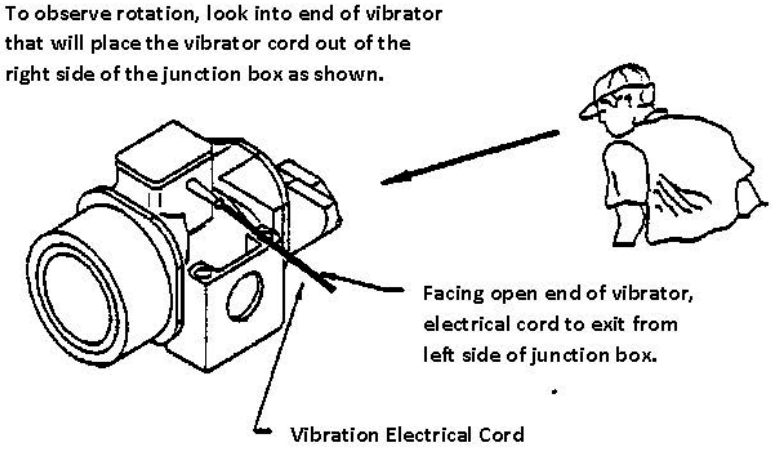
Figure 7-48



Bosch 18120/Bosch 18135/Martin CD36-11000



Bosch 18120/Martin CD36-20000



Wacker AR-45

Checking Vibrator Rotation
Figure 7-49

16.10 Vibrator Parts

When ordering vibrator parts; please state the serial number of the vibrators. Include the full reference number, part number, description, and quantity to avoid any errors. It is also important to state how you want it shipped and a routing if you have a preference. Please order all parts and replacements direct from:

Afinitas

P.O. Box 9

506 S. Wapello Street

Return Parts .....

435 S. Blaine Street

Mediapolis, Iowa 52637-0009

Phone: 319-394-3197 Fax: 319-394-3977

Toll Free Phone: 800-626-1451

Vibrators may be sent to **Afinitas** for service. In the event a vibrator is needed to continue operations, one can be sent to you at once. You can then return your vibrator for exchange. The only charge for this service will be the cost of repairs to your old vibrator.

17 Form Maintenance

SS CAP 72 Machine

Machine Serial No. CP-430

Notes

17.1 General Form Service & Maintenance

The information that follows gives instructions on services and maintenance procedures that should be performed on your **Afinitas** style form equipment.

Form Clean Up

Keep all forms polished and oiled to protect against rust and concrete buildup. The polish on the form equipment has a definite relationship to the concrete pipe finish.

Joint Equipment Maintenance

Keep all pallets and headers (tongue and groove forming castings) clean and oiled. The finish of the concrete contact surfaces will have a definite relationship to the finish of the concrete in the joint.

Always store the pallets and headers flat. Both cast iron and steel fabricated pallets tend to stress relieve with age and could be distorted by undue side pressure.

Vibration System

For service information on the form's vibration system, refer to ***PipePlus Jacket Vibration System*** and ***Classic Core Vibration System***.

Core to Pallet Seal

The pallet sets upon a rubber o-ring seal at the core that helps prevent concrete from bleeding between the core and pallet. This rubber seal is supported in a trough to keep it confined.

Daily-At the end of each production day, the rubber seal should be rolled up onto the core barrel so the trough can be cleaned out. If the trough is permitted to fill with concrete, wear to the rubber seal will be accelerated.

IMPORTANT: The rubber core seal is constructed of hollow o-ring material. Do not use a solid o-ring for this application because it will not "squeeze down" adequately to permit the form set to assemble together correctly.

Jacket to Pallet Rubber Seal

The jacket is designed with a rubber seal where it sets upon the pallet. This rubber seal is subject to wear and abrasion. Whenever you notice concrete bleed occurring at the outside of your pipe bell, the rubber seal should be checked and replaced if necessary.

Form Anchors

Afinitas pipe form equipment is designed to be connected to the machine turntable by anchorage of two form lock pipes under the form base to two form anchors welded to the turntable as shown in ***Figure 8-1***. The lock pipes on the form base are designed to shear away from the form anchors if the form is subjected to an overload condition when the concrete product is off-borne from the

machine. These form lock pipes act as "shear pins" to prevent overload to the pipe machine, the pipe form, and the stripping beam which is attached to the overhead crane.

If the lock pipes are shearing, stop and check for the reason because continual shearing of lock pipes is a result of some malfunction.

WARNING: Do not reinforce or replace form's lock pipes with heavier than original pipes. The lock pipes are designed to shear upon overload. Reinforcing these pipes may result in overloading the pipe machine, form equipment, or stripping beam; a condition that may result in equipment damage or serious bodily injury.

Refer to ***Form Anchor Replacement for*** maintenance information on the base portion of the anchor system.

Replacing Jacket Wear Ring

The header outside bears against a jacket wear ring which is designed to be replaced when worn. After use, this wear ring will begin to develop a groove. When a groove is noticed, the ring should be removed and replaced as follows. ***See Figure 8-2***.

1. Remove the existing wear ring from the jacket. The ring is welded to the jacket at the top of the ring and at the ring bottom.
   - On single mode forms, plug welds are used to weld the ring bottom to the jacket.
   - Multiforms do not use the plug weld method at the ring bottom. On multiforms the wear ring is welded 100% to the jacket at the ring bottom.
2. After the old wear ring is removed, grind the jacket surface and the plug weld holes (if applicable) smooth before installation to the new wear ring.
3. Weld 3 - 5 angle irons or blocks to the inside of the jacket. The angle irons/blocks will set the depth of the new wear ring from the top of the form to the bottom of the wear ring.
4. Contact **Afinitas** engineering for this dimension.

   Note: The dimension acquired from Afinitas does not include the 1/4” (6mm) A.R. plate. Add 1/4” (6mm) to achieve the correct distance from the top of the form to the bottom of the wear ring. Check your A.R plate to be certain that it is still 1/4” (6mm) thick. If wear has occurred, adjust the dimension accordingly.

5. Install the new wear ring. The ring should bear on the angle irons/blocks as noted in Step 3.
6. Measure the I.D of each shell plate to check its size.
   - If the shell plate I.D. is nominal, the wear ring may be placed tight against the shell plate.
   - If the shell plate I.D. is over nominal, shimming is required.
     - Use 1/64” (0.4mm) and/or 1/32” (0.8mm) banding to shim the wear ring.

       Shims may be tack welded to the wear ring before being installed or may be slipped down behind the wear ring after it is in the jacket.

- The jacket wear ring must not taper inward at the bottom (reverse taper). A 1/64" (0.4mm) differential between the top and bottom of the wear ring is acceptable, which can help to avoid reverse taper.

  To check for reverse taper, place a straight edge across the top of the form and square down from it.

  Note: When checking for reverse taper, possible wear of the top A.R. plate must be taken into consideration.

7. When everything is tight to the shell plate:
   - Tack weld the wear ring top & bottom.
   - Weld top and bottom as specified on ***Figure 8-2***.
     - Singleforms and Duoforms, 1" (25mm) welds every 6" (152mm).
     - Tri, Quad, SixPak, & EightPak forms, weld 100%.
   - After fully welding the wear ring, recheck taper as described in Step 6 to make certain that there is no gap at the top of the wear ring to the square.
   - Grind if required.

     Note: The plug weld holes through the jacket are 1/2" (13mm) diameter. If holes enlarge after removal of existing wear ring, weld around the hole rather than attempting to fill the hole entirely with weld.

Core Top Maintenance

Over time, the face of the core shell plate will begin to wear due to the product repeatedly being drawn across it during the stripping process. The result will be that the core shell plate O.D. will be reduced. This condition should be monitored, and action taken to restore the proper O.D. before the wear has progressed too far.

17.1.1.1 Determining if Core Top Repairs are Required

There are two main conditions to look for to determine if the core top is wearing (tapering). If either or both conditions are met, repairs to the core are indicated.

1. Core top wear often results in a "thick-thin" condition where the wall thickness of the product varies across 180°. When wall thickness variances threaten to go beyond ASTM allowances, core top repairs should be performed.
2. Measure down from the A.R. plate on the top of the core. If the O.D. wear/tapering is extending down 3" to 3 1/2" (76- 89mm), repairs should be performed. Wear that extends beyond 3 1/2" (89mm) will require more extensive repairs. Contact **Afinitas** before repairs are attempted for further information if this is the case.

17.1.1.2 Repairing the Core Top

It will be necessary to add material to the core shell plate to restore the original O.D. of the core where the tapering has occurred. There are a number of methods that can be used to accomplish this. Two of the best methods are covered here.

IMPORTANT: In order to avoid shrinking or "sucking-in" of the shell plate material during repairs, excessive heat buildup must be avoided. The methods that follow are designed with this in mind.

17.1.1.3 Repairing the Core Top with Welds

Determine where the wear taper begins on the shell plate. Place vertical (longitudinal) welds extending from this point to the top of the shell plate.

- Start by spacing several welds around the circumference of the core shell plate to avoid excessive heat buildup.
- Continue by placing a second series of welds adjacent to the first, allowing time for the shell plate to cool. Repeat this step until the entire core circumference is covered with weld.

Following are two methods to remove excess weld and achieve a smooth surface to the repaired area.

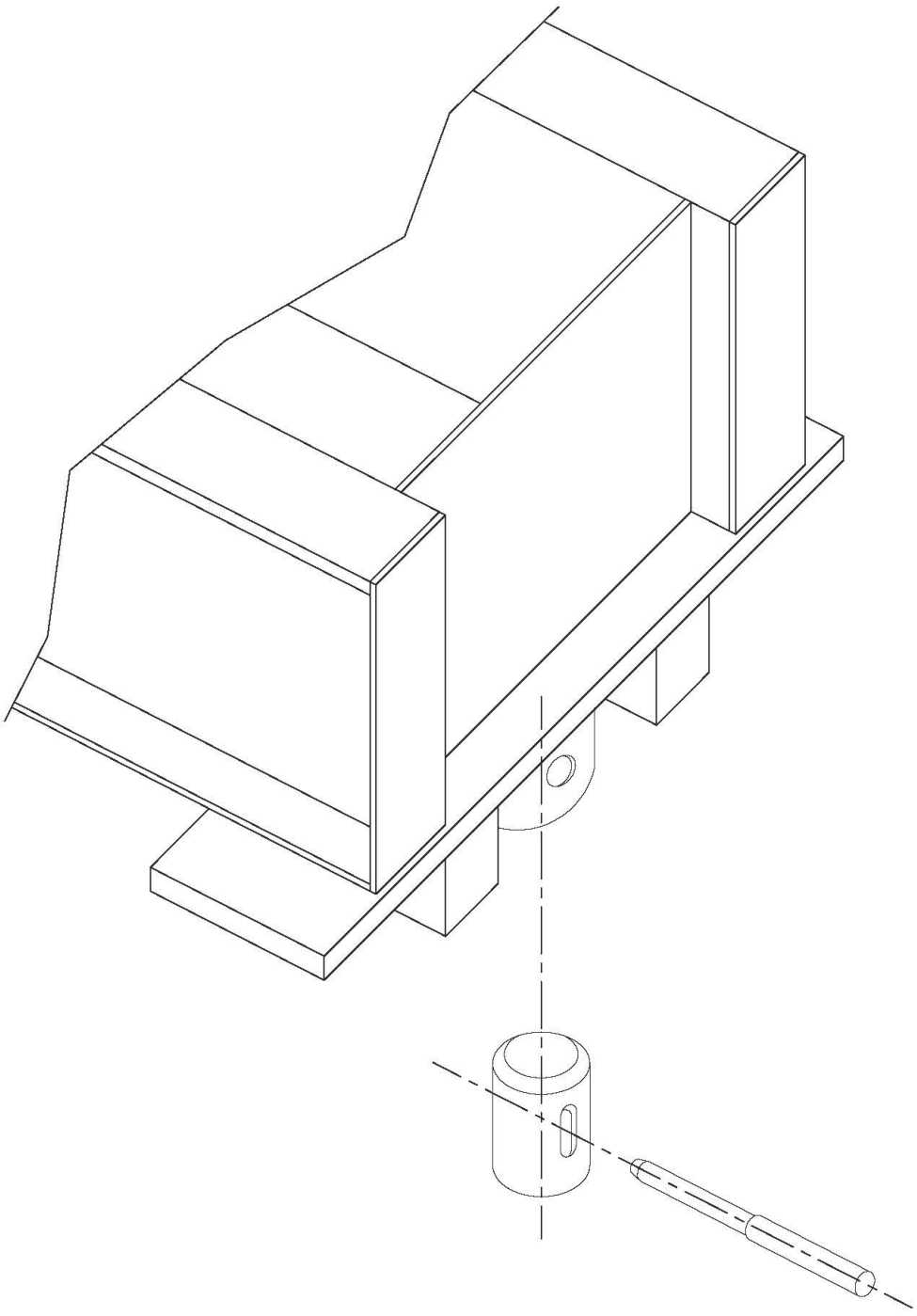
- Using a grinder, grind the surface of the welds until the correct O.D. is achieved, checking frequently to be sure that the surface is truly uniform.
- The core may also be "turned" or "machined" in a machine shop to reduce the welds to the proper O.D.

Regardless of the method used to reduce the welded surface to the proper O.D., care must be taken to assure that the new surface is smooth, uniform and matches the shape and taper (if any) of the original shell plate.

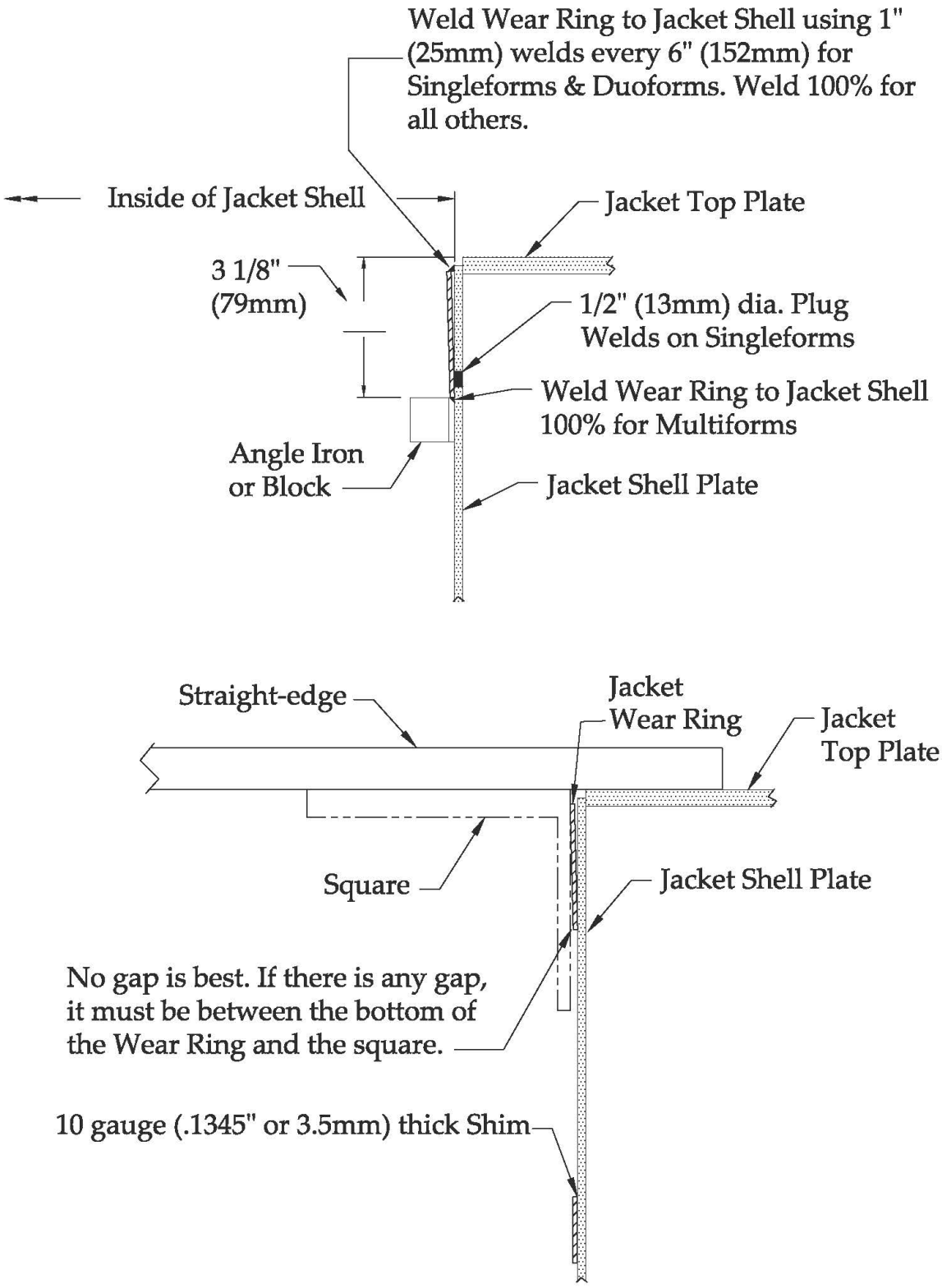
Any bevel or radius at the top outer edge of the core must be restored to its original size and shape. Refer to ***Figure 8-3, Figure 8-4 and Figure 8-5*** for dimensions and instructions concerning the restoration of this bevel/radius.

17.1.1.4 Repairing the Core Top with Spray-On Metal

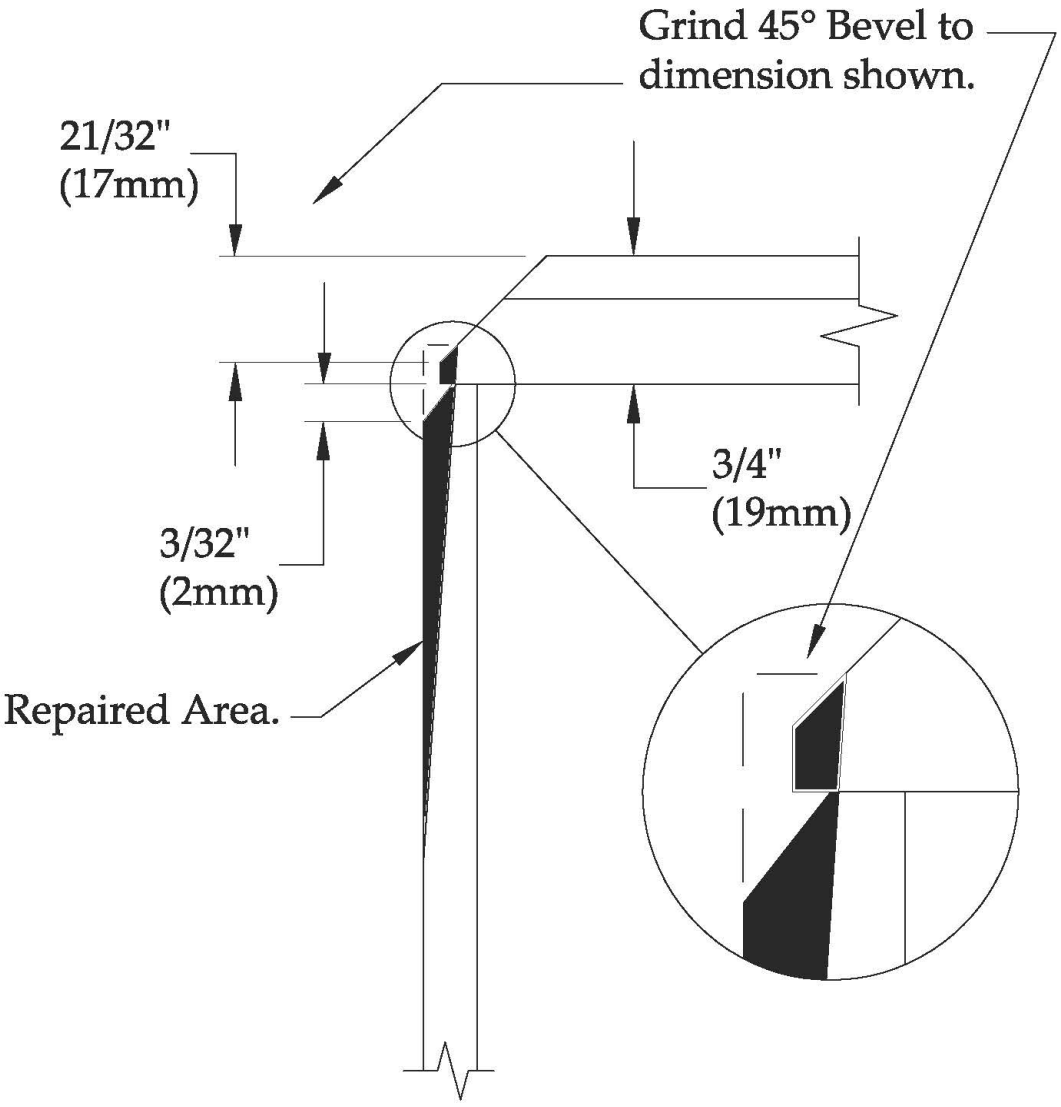
An alternate method that achieves good results is to utilize a spray-on metal process. This method involves applying a molten metal "spray" to the shell plate and turning or grinding this new layer of metal to the proper O.D. and finish.



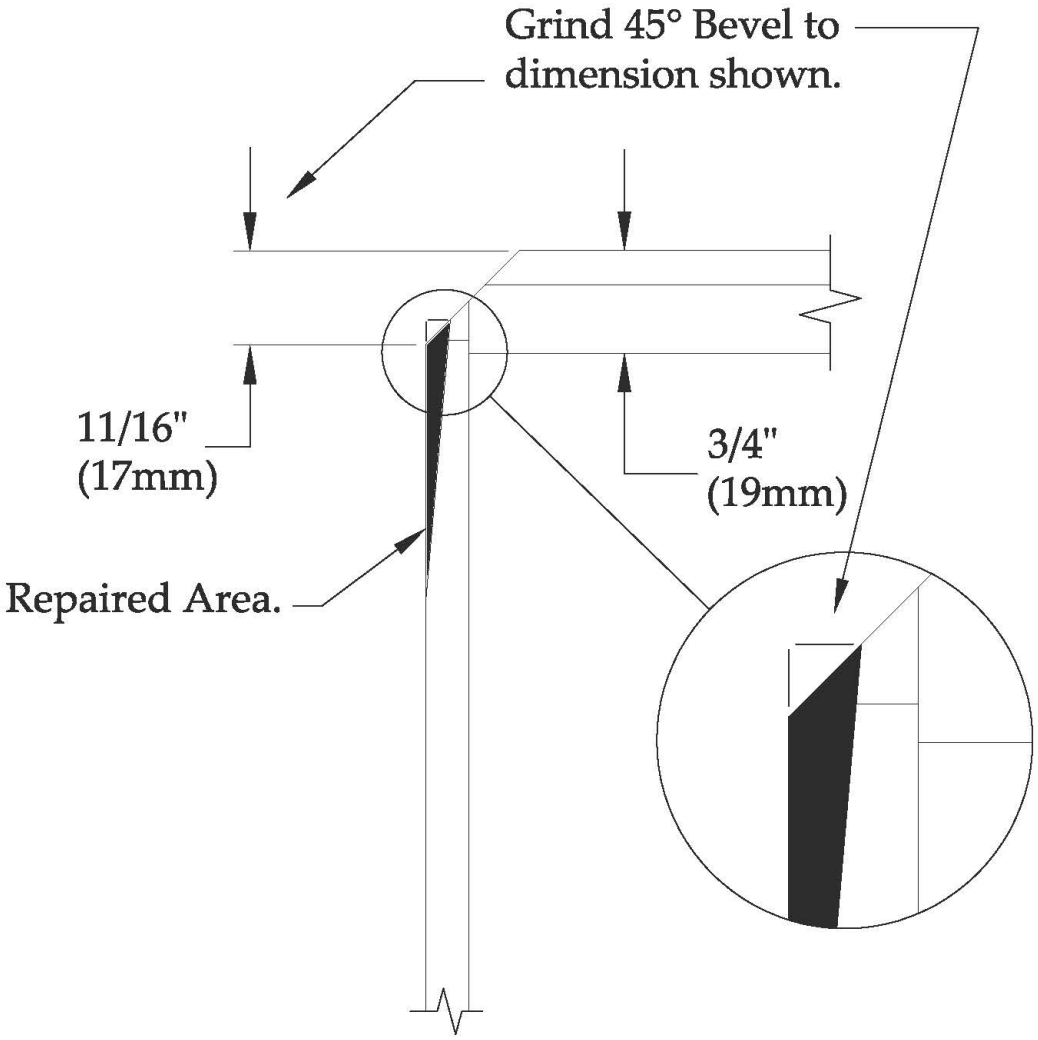
Form Anchors
Figure 8-1



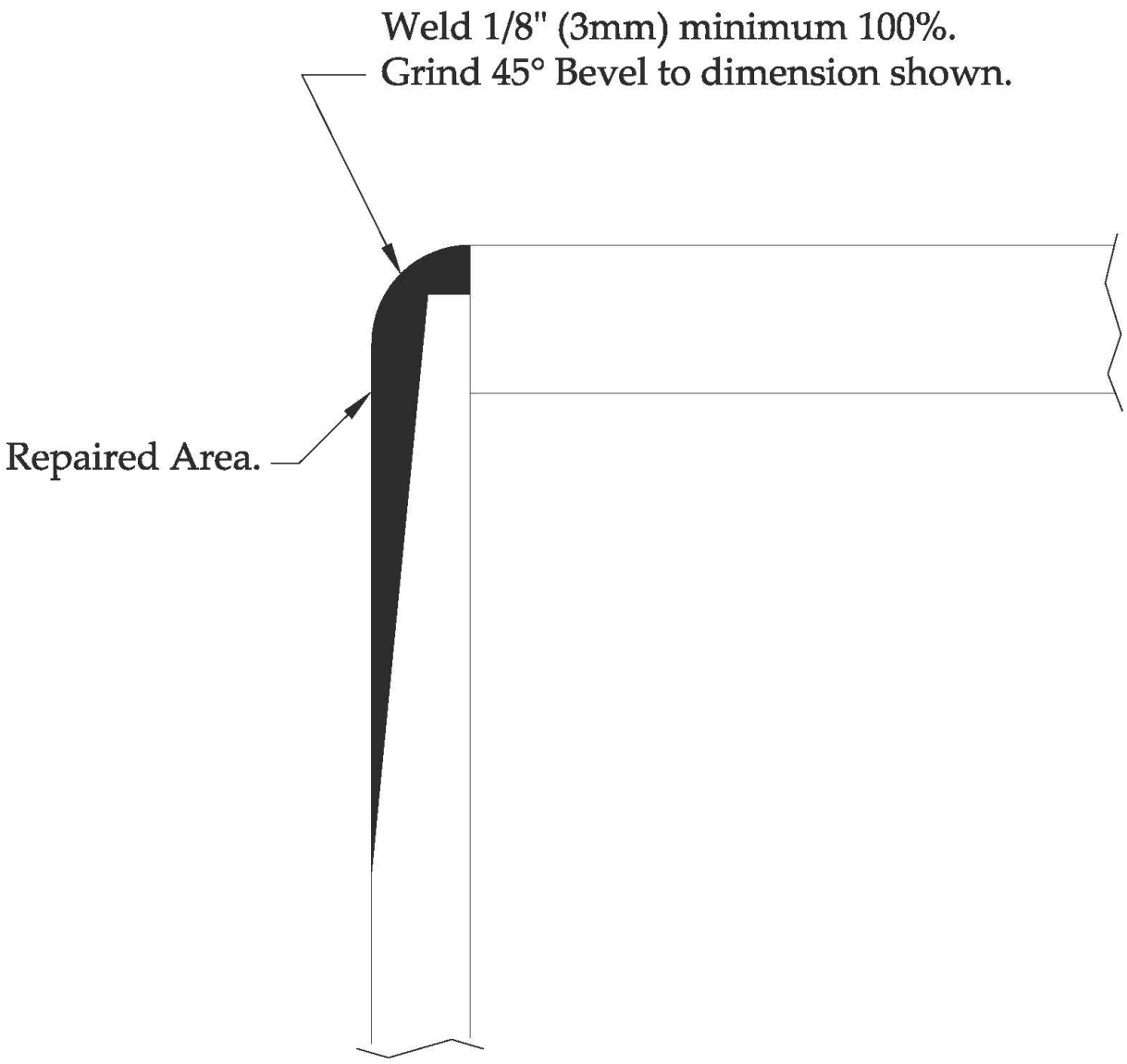
Jacket Wear Ring Replacement
Figure 8-2



Core Top Maintenance – Bevel Restoration
10" – 12" (250mm-300mm) Multiforms
Figure 8-3



Core Top Maintenance – Bevel Restoration
15" – 24" (400mm-600mm) Multiforms
Figure 8-4



Core Top Maintenance – Bevel Restoration
30” – 72” (750mm-1800mm) Forms
Figure 8-5

Maintaining Jacket to Core Support Pads

Singleform jackets bear at four bearing pads on the core base structure. With continual vibration, these four bearing points will begin to wear. The procedure that follows gives instructions on how to inspect and maintain the jacket to core support points for single mode form equipment. Maintenance procedures are different for forms equipped with chain driven pallet locks as compared with forms equipped with AirForce pallet locks.

17.1.1.5 AirForce Style Pallet Locks

1. Remove the jacket from the core.
2. Inspect the 1/4" (6mm) thick wear pads on the core support ledge for wear. Replace if required. See ***Figure 8-6***.
3. Inspect the 1/4" (6mm) thick wear pads on the bottom jacket ring for wear. Replace if required. See ***Figure 8-6***.

   Note: The 1/4" (6mm) thick wear pads are made of abrasion-resisting (A.R.) material to permit longer wear life. Use only A.R. material for this application.
4. After the repair procedures have been performed, insert a pallet into the jacket and lower over the core so the four jacket-to-core contact points meet.

   Check that the jacket sets on the core support pads without rocking and that the wall thickness at the form top is equal all around.

   Also, check that jacket top is even or approximately 1/16” (1.5mm) higher than the core top.

17.1.1.6 Chain Style Pallet Locks

1. Remove the jacket from the core and inspect the 1/8" (3mm) thick wear pads on the core support ledges.

   If the pads are worn, remove the existing pads and replace with new 1/8" (3mm) pads. See ***Figure 8-6***.

   Note: The 1/8" (3mm) wear pads are of a mild steel construction. Do not use an abrasion resisting steel for this application. Mild steel is used so that the 1/8" (3mm) pads wear rather than the contact point of the jacket ring, which is more difficult to repair.
2. Inspect the bottom ring of the jacket at the four points on the ring where they bear at the core support ledges.

   If the jacket ring is worn at these points, build the jacket ring bottom back up to their original height with hard surface weld. You can measure the ring adjacent to the wear points to determine the original height of the ring.

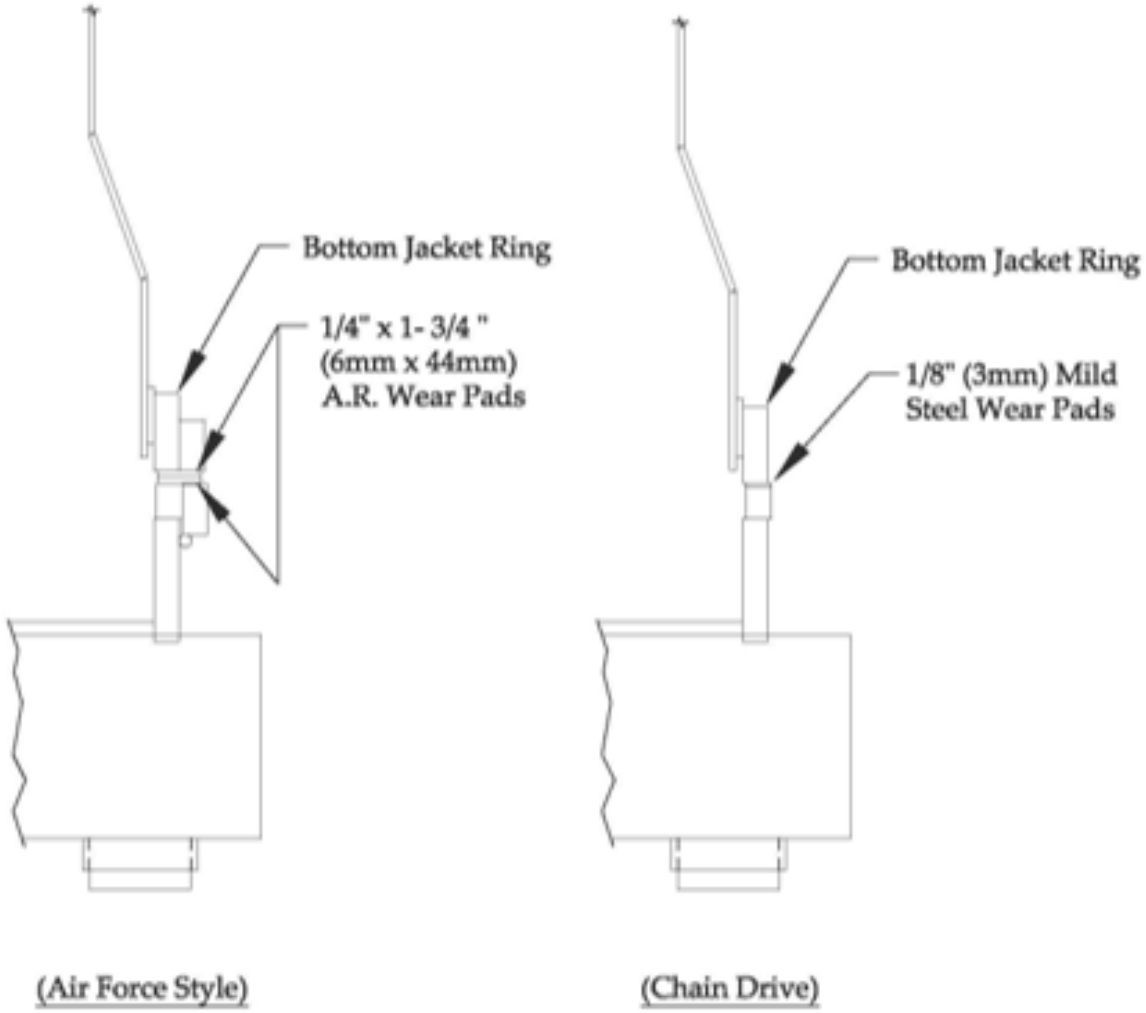
   Note: Use hard surface weld for repairing wear at the ring. The hard surface weld will help prevent wear on the ring bottom in the future, isolating the wear only to the 1/8" (3mm) thick wear pads on the core support ledges.

3.

4. After the repair procedures have been performed, insert a pallet into the jacket and lower over the core so the four jacket-to-core contact points meet.

   Check that the jacket sets on the core support pads without rocking and that the wall thickness at the form top is equal all around.

   Also, check that jacket top is even or approximately 1/16” (1.5mm) higher than the core top.



Jacket to Core Support Pad Maintenance - Singleform
Figure 8-6

Pallet Lock Maintenance

The lower end of the jacket is equipped with a series of pallet locks. There are two styles of **Afinitas** pallet locks:

- **Chain Style -** Manually Operated (Stripping Lugs)
- **AirForce Style -** Pneumatically Operated (P-Locks)

Pallet locks extend or retract simultaneously by either turning one of the drive nuts located on the stripping lug tops (chain style) or by activating the pneumatic system (AirForce style p-lock.)

Note: Make sure that the pallet locks are below the pallet before rotating to assure complete engagement.

Excess length is provided on the pallet lock should a hammer be required to free a jammed pallet lock.

17.1.1.7 Chain Style Pallet Lock (Stripping Lug) Maintenance

For good operation of the chain drive pallet locks, it is important that proper maintenance be performed. It is also recommended that only MolyKote ER-2 plus lubricant (available from Dow & Corning), be used to lubricate the pallet locks.

Daily-The pallet locks should be lubricated each day before starting production, without the pallet in the jacket. To properly lube the pallet locks, follow the procedure as listed below. See ***Figure 8-7***.

1. Place the pallet lock in locked position.
2. Lubricate all bearings in two places.
3. Lubricate roller chain for 2" (50mm) on the contact side of the sprockets.
4. Lubricate all points of roller chain where it contacts the shell or jacket or other contact points.
5. With lube complete, rotate the pallet locks fully open to fully closed five or six times to spread the lubrication.
6. Spray bottom of jacket and roller chains with form release oil each morning before starting.
7. Make sure that the bottom of all pallets where the pallet locks contact, and slide are kept clean and oiled.
8. At the end of each day's run the pallet locks should be thoroughly cleaned and oiled.

The pallet locks are adjustable so that they may be kept in proper synchronization.

Daily-The following procedures should be performed daily to maintain pallet lock synchronization. Move all the pallet locks to the extended position and check to see if they are all hitting the stops simultaneously. To synchronize:

1. Check to be sure that the cable is tight. Retighten if required.
2. Release the cable clamps on the pallet locks, which are out of alignment.
3. Set the pallet lock against its respective stop.
4. Tighten the cable clamps securely.
5. After the first normal load, retighten all clamps.

The pallet lock locking spring located at the bottom of the jacket must be always kept in good operating condition. The purpose of this spring is to keep the stripping pallet locks tightly locked in the extended position during the manufacturing cycle.

WARNING: Do not operate the form with a defective or missing pallet lock locking spring. The pallet locks may retract unexpectedly and drop the product from the jacket. Failure to comply with this warning may result in serious personal injury.

17.1.1.8 AirForce Style Pallet Lock (P-Lock) Maintenance

AirForce p-locks must be properly maintained for satisfactory operation and to prevent premature wear. P-locks must be maintained so they hold tightly to the pallet in order to keep the p-locks from vibrating excessively during the manufacturing cycle. Excessive vibration will result in rapid wear to the p-locks. ***Figure 8-8*** details the critical maintenance items of the AirForce p-lock.

There are three critical points that must be maintained on the AirForce p-locks for them to remain tightly locked to the pallet. These three points include the following:

1. The pallet-to-jacket rubber seal must be maintained properly to hold pressure between the pallet and the p-lock.

   Replace this rubber seal before it is worn completely.

2. The p-locks bear against the pallet bottom. A worn pallet contact-point will not bear tightly against the pallet.

   The p-locks are equipped with a replaceable bearing pad that must be replaced or built-up with weld when worn.

3. The AirForce style p-lock's chain linkage is designed to go slightly off-center in order to lock the p-lock into position. The rod end of the cylinder bears against the p-lock top in order to hold the linkage in an over-center position. As the rod end and p-lock top begin to wear, this over-center dimension may begin to increase. This will result in the p-lock foot dropping down and away from the pallet.

Periodically-The linkage should be checked for the proper over-center dimension. This over-center dimension should be maintained at 1/16" (1.5mm) to 1/8"(3mm). Maintain the rod end and p-lock bearing point in order to maintain this over-center specification.

17.1.1.9 AirForce P-Lock Lubrication

Weekly-A grease hole is provided in the 1-1/4" (32mm) diameter pivot shaft of the p-lock mechanism. Each week, this shaft should be liberally greased at the 1/8" (3mm) grease hole.

Daily-Spray oil on the chain linkage mechanism of the AirForce p-lock to lubricate the mechanism. Linkage side plates are designed to be replaced when worn. The linkage holes through which the bolts pass will elongate after use. This will result in the p-lock not firmly gripping the pallet. These plates can be removed by removing the bolts. The bolts are secured with "Gripco" self-locking nuts in order to prevent them from vibrating loose on the bolts. Whenever a self-locking nut is removed from a bolt, NEW self-locking nuts should be installed.

IMPORTANT: Self-locking "Gripco" nuts should never be re-used, as the self-locking properties are destroyed when the nut is removed. To prevent nuts from vibrating loose, always install new self-locking nuts.

17.1.1.10 AirForce P-Lock Repair

The pivot points on the AirForce pallet lock are equipped with replaceable steel bushings.

Periodically-Inspect these bushings and replace if necessary. The 1-1/4" (32mm) pivot shaft that connects the P-Lock to the side plates of the mechanism is of a heat-treated material. This shaft can be removed and replaced if necessary.

17.1.1.11 Pivot Shaft Removal

Remove the main pivot pin is as follows:

Note: One strap is 100% welded to the pivot pin. One strap is tack welded to the pivot pin.

1. Use a torch to cut the top and bottom side plate welds off the "tacked" strap.
2. Use a torch to cut the tacked pivot pin welds off the "tacked" strap.
3. On the side plate where the "tacked" strap was, grind the broken welds off smoothly.
4. Use a torch to cut the top and bottom side plate welds off the "100% welded" strap.
5. Tap the pivot pin out of pallet lock assembly from the "tacked" strap side.
6. On the side plate where the "100% welded" strap was, grind the broken welds off smoothly.

17.1.1.12 AirForce P-Lock Cylinder Repair

Cylinder disassembly is possible after the retainer ring is removed. The retainer ring is not a snap ring but overlaps itself by 1/2 revolution.

Use two screwdrivers to remove the retainer ring. Use one screwdriver to pry up the retainer ring. Use the other screwdriver below the first one to get more leverage. Work one screwdriver around the ring until it pops out.

17.1.1.13 Inspecting Pallet Lock Air System

Periodically-Inspect the air valve that controls the p-locks for proper operation. Also, inspect all hoses and fittings for leaks.

Daily-Check the lubricator for sufficient oil. The p-lock cylinders require an oil mist lubrication for proper operation. The oil mist lubricator that lubricates the p-lock cylinders is located in the stripping beam.

If pipe forms are going to be stored outside, it is recommended that a light oil be applied to the exposed shaft of the cylinder to prevent rusting. If the piston shaft is allowed to rust, accelerated wear will result to the cylinder's rubber seal.

17.1.1.14 Replacing Pallet Locks

Eventually the p-locks may need to be replaced due to excessive wear or damage. The information that follows outlines the procedure for replacing the AirForce style p-locks. Instructions for 1/2" (13mm) and 3/4" (19mm) thick pallets are included.

Note: References to the "Installation Fixture" refers to a fixture that is available from Afinitas, which is needed to ensure that the p-locks are installed properly, confirming a secure lock on the form. This fixture is used to set the elevation of the p-lock.

17.1.1.15 Replacing P-Locks - 1/2" (13mm) Thick Pallets

See ***Figure 8-9***.

1. Assemble the jacket.
2. Position the 1/8 x 3/4 x 2 1/2" (3mm x 19mm x 64mm) strap (located on the end of the fixture) up against the seal ring as shown.
3. Slide the tube end of the fixture to the opposite side of the jacket.
4. Tighten the bolt handle.
5. Clamp the 1/2" x 3" x 3" (13mm x 76mm x 76mm), which is located on the end of the tube, against the bottom of the jacket to hold it in place.

IMPORTANT: The following conditions must be met before welding the p-lock in place:

- **The p-lock must be vertical.**
- **The p-lock must be tight against the bottom of the jacket.**
- **The "foot" of the p-lock must be fully locked.**

- **The wear pad on the "foot" of the p-lock must be up against the 1/2" x 3" (13mm x 76mm) strap of the fixture.**
- **The top of the 1/8" x 3/4" x 2 1/2" (3mm x 19mm x 64mm) strap must be contacting the bottom of the seal ring.**

6. When the above conditions have been met, securely tack weld the p-lock to the jacket.
7. Remove the clamp.
8. Loosen the bolt handle.
9. Unlock the p-lock.
10. Remove the installation fixture.
11. Finish welding the p-lock to the jacket as shown.

17.1.1.16 Replacing P-Locks - 3/4" (19mm) Thick Pallets

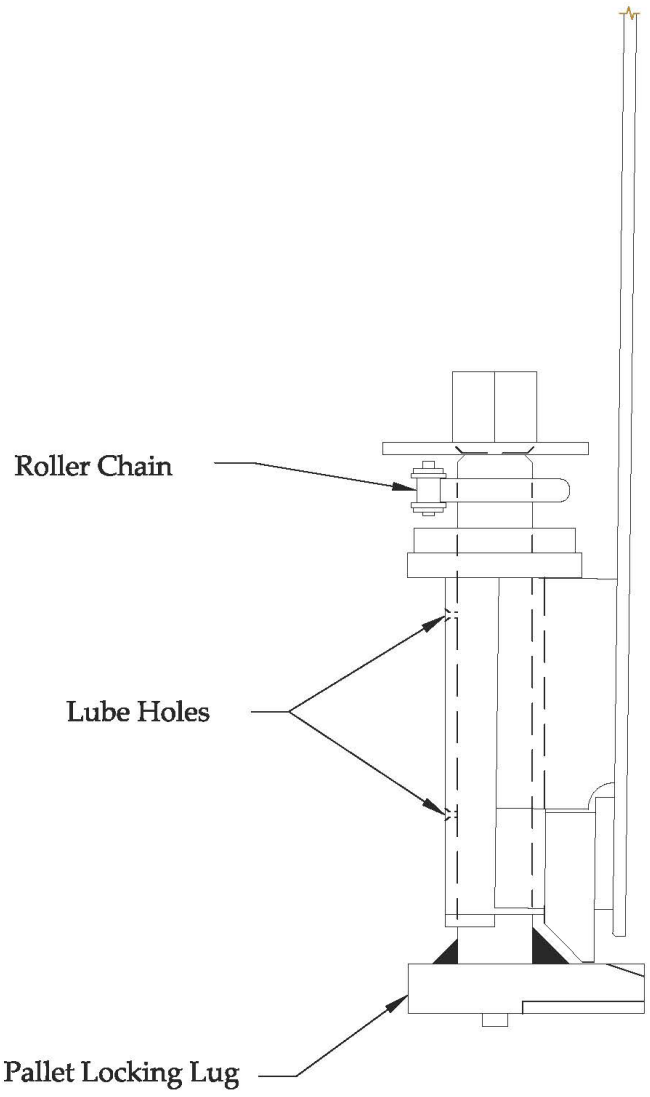
See ***Figure 8-10***.

1. Assemble the jacket.
2. Position the 1/8" x 3/4" x 2 1/2" (3mm x 19mm x 64mm) strap (located on the end of the fixture) up against the seal ring as shown.
3. Slide the tube end of the fixture to the opposite side of the jacket.
4. Tighten the bolt handle.
5. Clamp the 3/4" x 3" x 3" (13mm x 76mm x 76mm), which is located on the end of the tube, against the bottom of the jacket to hold it in place.

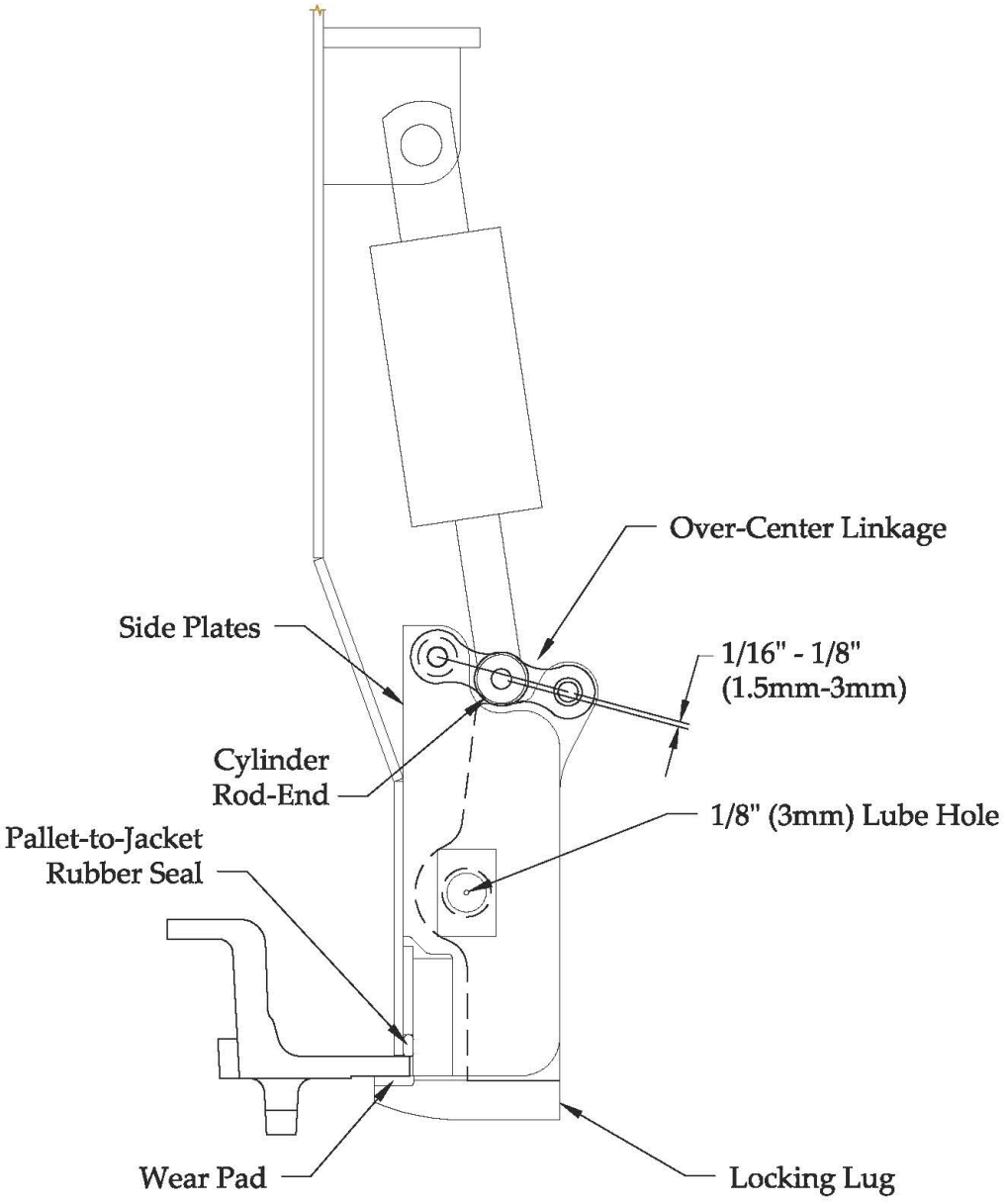
IMPORTANT: The following conditions must be met before welding the p-lock in place:

- **The p-lock must be vertical.**
- **The p-lock must be tight against the bottom of the jacket.**
- **The "foot" of the p-lock must be fully locked.**
- **The wear pad on the "foot" of the p-lock must be up against the 3/4" x 3" (13mm x 76mm) strap of the fixture.**
- **The top of the 1/8" x 3/4" x 2 1/2" (3mm x 19mm x 64mm) strap must be contacting the bottom of the seal ring.**

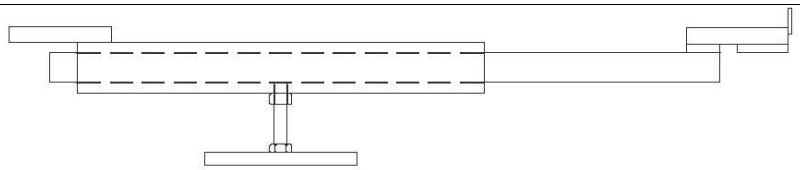
6. When the above conditions have been met, securely tack weld the p-lock to the jacket.
7. Remove the clamp.
8. Loosen the bolt handle.
9. Unlock the p-lock.
10. Remove the installation fixture.
11. Finish welding the p-lock to the jacket as shown.



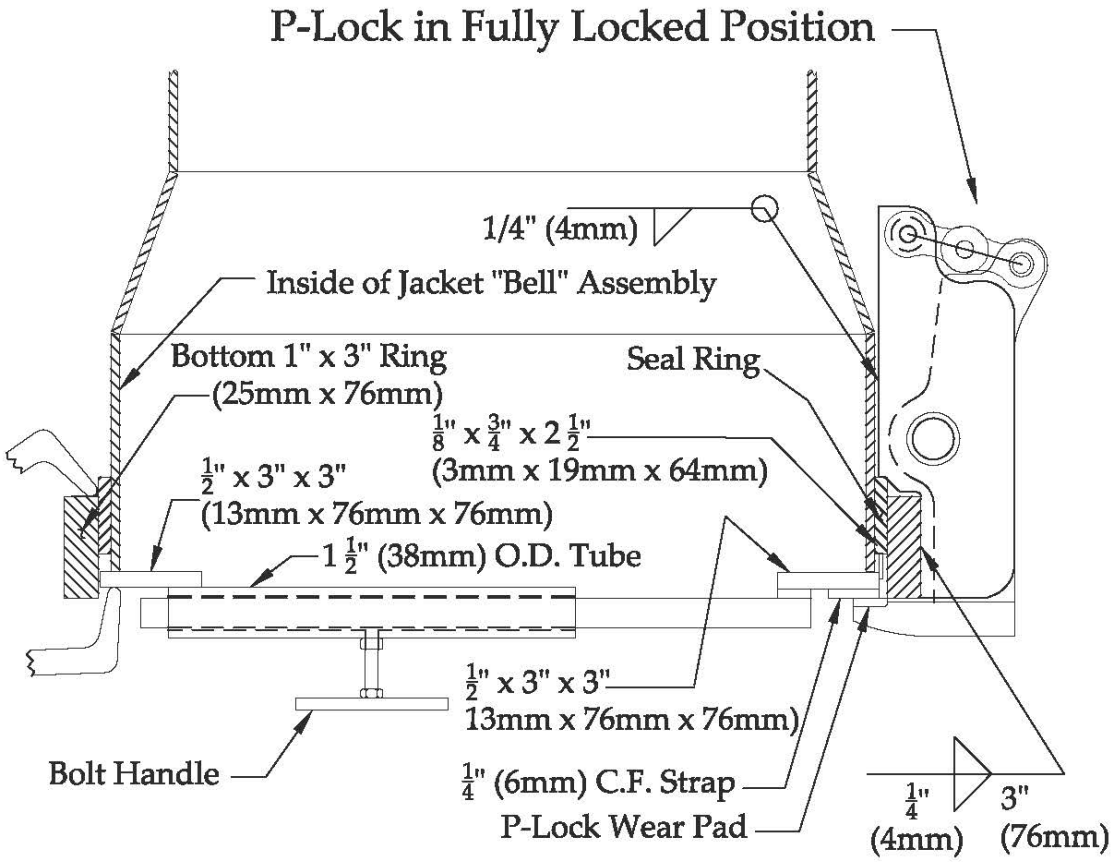
Pallet Lock Lubrication – Roller Chain Style
Figure 8-7



Pallet Locking Lug Lubrication – AirForce Style
Figure 8-8

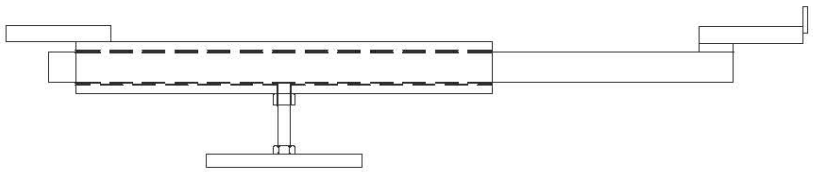


P-Lock Installation Fixture for 1/2" (12.7mm) Thick Pallets
(Supplied by Hawkeye)

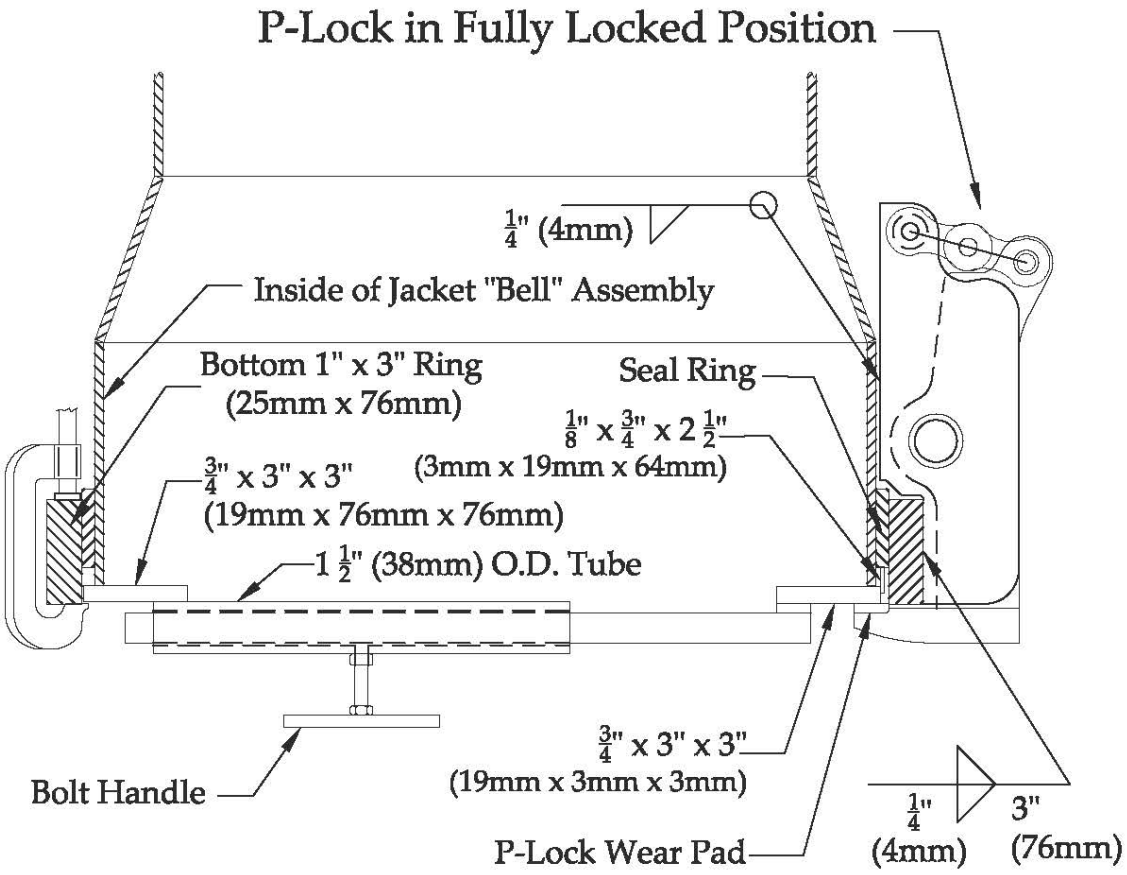


Cross-Section through bottom of Jacket

P-Lock Installation Fixture Usage – 1/2" (12.7mm) Thick Pallets
Figure 8-9



P-Lock Installation Fixture for 3/4" (19.1mm) Thick Pallets
(Supplied by Hawkeye)



Cross-Section through bottom of Jacket

P-Lock Installation Fixture Usage – 3/4" (19.1mm) Thick Pallets
Figure 8-10

17.2 Repairing Worn Jacket and Core at Pallet

After a period of time, a groove can be worn in both the jacket and core shells due to contact with the pallet joint casting during vibration. Subsequently, the joint casting may settle into either the core or jacket groove, tending to lock the casting to the form during the stripping operation. Concrete leakage can also be an unwanted result of this wear. To rectify this situation, the following repair methods are recommended.

There are two main core designs, partial seal and 100% seal, which have different wear patterns and different repair procedures.

IMPORTANT: It is recommended that when welding the shell plate, a 1" x 3" (25mm x 76mm) rolled ring be installed in the inside of the core to help avoid shrinking (sucking-in) of the shell plate, and to act as a heat sink. This ring should be forced against the inside of the core with hydraulic jacks.

17.2.1.1 Core Wear Repair - Partial & 100% Seal Designs

The same method is used for both the partial seal and 100% seal design cores to repair the core shell that is worn by the pallet casting.

Figure 8-11, illustration ***"A"*** shows typical wear points on the core shell plates of a partial seal and 100% seal forms.

The instructions that follow describe the procedure to repair the grooves that are worn into the core shell plate by the pallet casting. See ***Figure 8-11***, illustration ***"B"***.

1. Place beads of hard surface weld vertically in the groove worn into the core shell plate. This will prevent the casting from bottoming out in the groove and will allow the groove to refill with concrete.

   Hard surface weld beads should be placed vertically on approximately 6" - 8" (152mm-200mm) centers around the shell.

   If the shell wear is excessive, welds may be spaced at as little as 3" (76mm). Care must be taken to avoid warpage of core shell plate. ***See Figure 8-12***.

   IMPORTANT: Do not attempt to fill the entire groove with weld, as this may cause warpage of the shell.

2. Grind welds.

   The welds on the core shell should protrude from 0" to a maximum of 1/32" (0.8mm) above shell plate surface.

3. Keep weld beads to width of one pass.

17.3 Jacket Wear Repair - Partial Seal Design

Repairing Groove Worn into Jacket Shell Plate by Pallet Casting

Figure 8-12, illustration "***A***" shows typical wear point on the jacket shell plate of a partial seal form.

The instructions that follow describe the procedure to repair the groove that is worn into the jacket shell plate by the pallet casting. See ***Figure 8-12***, illustration "***B***".

1. Place beads of hard surface weld vertically in the groove worn into the shell. This will prevent the casting from bottoming out in the groove and will allow the groove to refill with concrete.

   Hard surface weld beads should be placed vertically on approximately 6" (152mm) centers around the shell.

   If shell wear is excessive, welds may be spaced at as little as 3" (76mm). Care must be taken to avoid warpage of jacket shell plate.

   Note: Do not attempt to fill the entire groove with weld, as this may cause warpage of the shell.

2. Grind welds.

   The welds on the jacket shell plate MUST be ground flat, with NO protrusion above the shell plate surface.

3. Keep weld beads to width of one pass.

17.4 Jacket Wear Repair -100% Seal Design

Repairing Groove Worn into Jacket 1" x 3" (25mm x 76mm) Ring by Pallet Casting

Figure 8-13, illustration "***A***" shows typical wear point on the jacket 1" x 3" (25mm x 76mm) ring of a 100% seal form.

The instructions that follow describe the procedure to repair the groove that is worn into the jacket 1" x 3" (25mm x 76mm) ring by the pallet casting. See ***Figure 8-13***, illustration "***B***".

1. Place beads of hard surface weld vertically in the groove worn into the shell. This will prevent the casting from bottoming out in the groove and will allow the groove to refill with concrete.

   - On forms up to 42"(1100mm), hard surface weld beads should be placed vertically on approximately 6" (152mm) centers around the shell.

     If shell wear is excessive, welds may be spaced at as little as 3" (76mm). Care must be taken to avoid warpage of jacket shell plate.

   - On forms 48" (1200mm) and larger, hard surface weld beads should be placed vertically on approximately 18" (457mm) centers around the shell.

     If shell wear is excessive, welds may be spaced at as little as 6" (152mm). Care must be taken to avoid warpage of jacket shell plate.

     Note: Do not attempt to fill the entire groove with weld, as this may cause warpage of the shell.

2. Welds should protrude from 0" to a maximum of 1/32" (0.8mm) above the plate surface.
3. Keep weld beads to width of one pass.

Repairing Bottom Edge of Jacket Shell Plate Worn by Pallet Casting

Figure 8-13, illustration "***A***" shows typical wear point on the jacket shell plate of a 100% seal form.

The instructions that follow describe the procedure to repair the bottom edge of the jacket shell plate that has been worn down by the pallet casting. See ***Figure 8-13***, Steps 1, 2 and 3.

Repair of Worn Jacket Shell Plate When 2" A.R. Ring is Present

1. Preparing to Repair Jacket Shell Plate

- Find the seam where the abrasion resistant (A.R.) x 2" (50mm) ring was installed at **Afinitas**.
- Measure thickness of jacket shell plate (or bell plate) to determine the thickness of A.R. strap required.
  - *If plate is 1/4" (6mm), use 1/4" x 2" A.R. (6mm x 50mm A.R.)*
  - *If plate is 3/16" (4mm), use 7 ga. (.1793) x 2" A.R. (4mm x 50mm A.R.)*

2. Removal of Worn A.R. Ring

- Remove worn A.R. x 2" (50mm) ring with a torch and chisel.

3. Installation of New A.R. Ring

- If bottom 1" x 3" (25mm x 76mm) ring is worn, repair as follows before installing new A.R. ring.
  - *Buildup bottom of 1" x 3" (25mm x 76mm) ring with hard surface weld to full 3" (76mm) depth.*
  - *Grind to proper shape.*
- Cut 5/8" (16mm) plug weld holes in the 2" (50mm) A.R. plate.
  - *8" (203mm) centers for 21" - 27" (500mm-700mm) diameter forms.*
  - *10" (254mm) centers for 30" - 72" (750mm-1800mm) diameter forms.*
- Grind 1/16" (2mm) x 45° chamfer all around ***bottom outer*** edge of A.R. plate.
- Grind 1/8" x 1" (3mm x 25mm) chamfers in ***top inside*** edge of A.R. plate.
  - *Center chamfers between plug weld holes.*
- Roll 2" (50mm) wide A.R. plate of proper thickness (see Step 1) to fit jacket.
- Accurately set the bottom edge of the A.R. ring from the bottom of the 1" x 3" (25mm x 76mm) ring.
  - *Check **Afinitas** engineering department for proper dimension.*
- Weld the 2" (50mm) A.R. ring in place.
  - *Plug weld full and grind flush.*

- *Weld the shell plate and A.R. plate together with 1/8" x 1" (3mm x 25mm) long welds placed into 1/8" x 1" (3mm x 25mm) chamfers (see Step 3.4.)*
- *Grind all welds smooth.*

- If the shell plate has worn thinner than the new A.R. ring, it may be necessary to grind the inside of the A.R. ring flush with shell plate located above it.

Repair of Worn Jacket Shell Plate When No A.R. ring is Present

1. Preparing to Repair Jacket Shell Plate

- Check with **Afinitas** engineering department for the dimension from the bottom of the 1" x 3" (25mm x 76mm) ring to where the top of the 2" (50m) A.R. plate will be.
- Scribe a line all around the inside of the jacket shell plate at this dimension.
- Measure thickness of jacket shell plate (or bell plate) to determine the thickness of A.R. strap required.
  - *If plate is 1/4" (6mm), use 1/4" x 2" A.R. (6mm x 50mm A.R.)*
  - *If plate is 3/16" (4mm), use 7 ga. (.1793) x 2" A.R. (4mm x 50mm A.R.)*

2. **Removal of Worn Section of Shell Plate**

- Remove lower section of worn shell plate using an arc/air gun to cut the core shell plate.

3. **Installation of New A.R. Ring**

- If bottom 1" x 3" (25mm x 76mm) is worn, repair as follows before installing new A.R. ring.
  - *Buildup bottom of 1" x 3" (25mm x 76mm) ring with hard surface weld to full 3" depth.*
  - *Grind to proper shape and size.*
- Cut 5/8" (16mm) plug weld holes in the 2" (50mm) A.R. plate.
  - *8" (203mm) centers for 21" - 27" (500mm-700mm) diameter forms.*
  - *10" (254mm) centers for 30" - 72" (750mm-1800mm) diameter forms.*
- Grind 1/16" (2mm) x 45° chamfer all around ***bottom outer*** edge of A.R. plate.
- Grind 1/8" x 1" (3mm x 25mm) chamfers in ***top inside*** edge of A.R. plate.
- Center chamfers between plug weld holes.
- Roll 2" wide A.R. plate of proper thickness to fit jacket.
- Accurately set the bottom edge of the A.R. ring from the bottom of the 1" x 3" (25mm x 76mm) ring.
  - *Check **Afinitas** engineering department for proper dimension.*
- Weld the 2" (50mm) A.R. ring in place.
  - *Plug weld full and grind flush.*
  - *Weld shell plate and A.R. plate together with 1/8" x 1" (3mm x 25mm) long welds.*
  - *Grind all welds smooth.*

- If the shell plate has worn thinner than the new A.R. ring, it may be necessary to grind the inside of the A.R. ring flush with shell plate located above it.

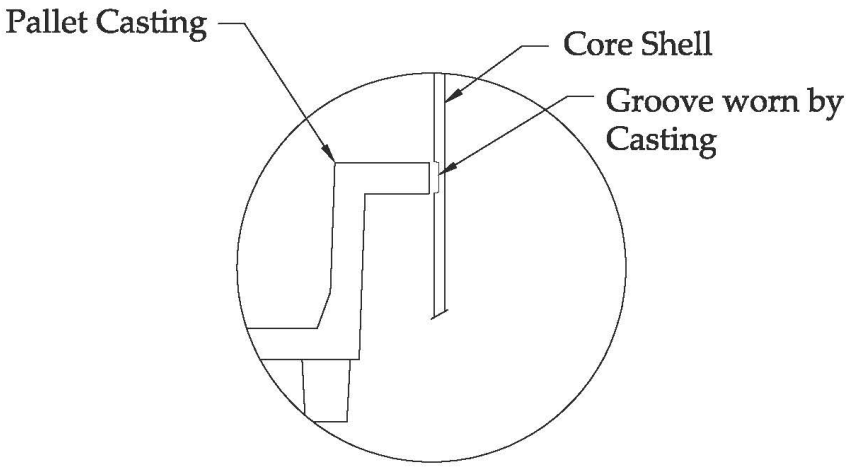


Illustration A

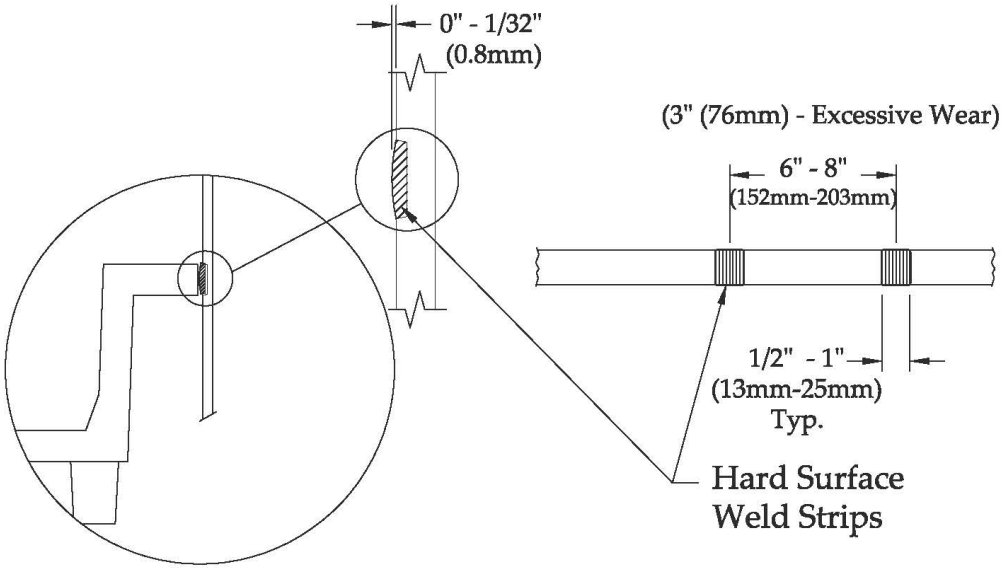


Illustration B

Repairing Worn Core Shells – Partial & 100% Seal Design
Figure 8-11

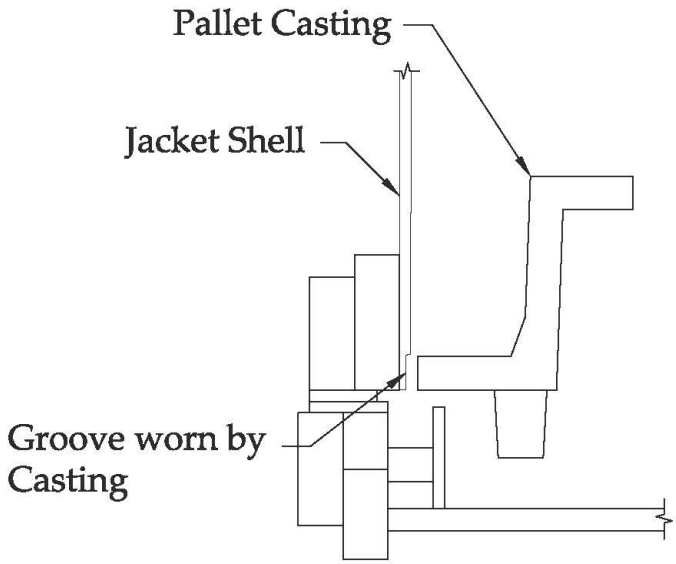


Illustration A

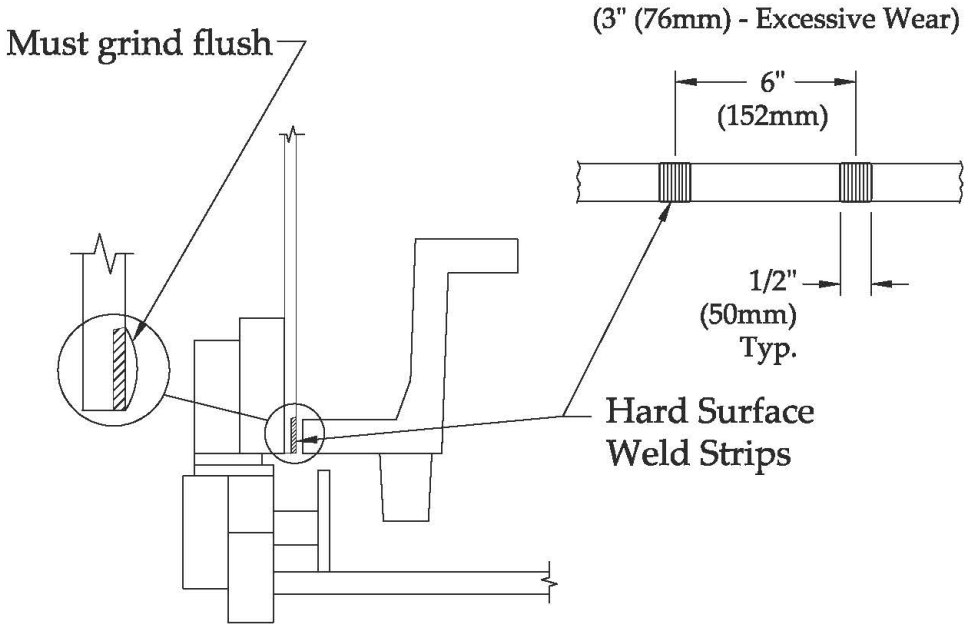


Illustration B

Repairing Worn Jacket Shell – Partial Seal Design
Figure 8-12

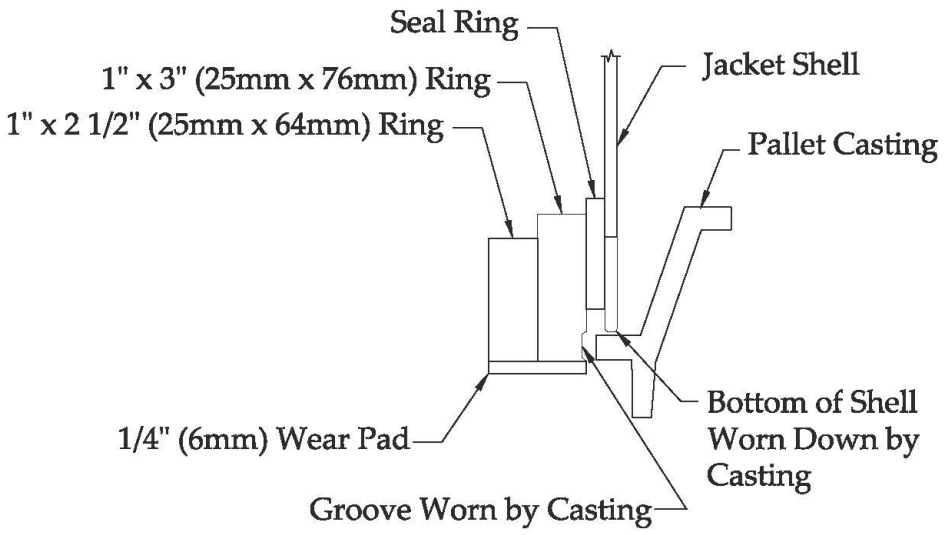


Illustration A

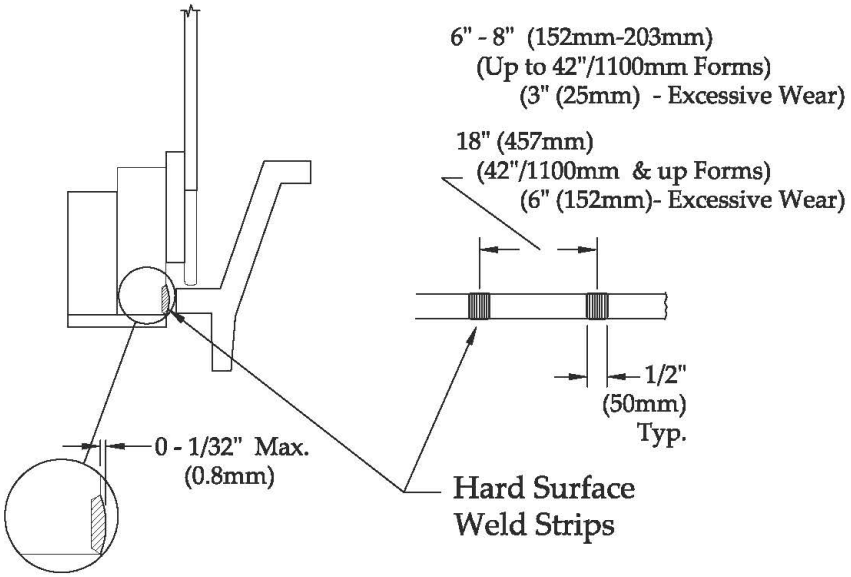


Illustration B

Repairing Worn Jacket Shell – 100% Seal Design
Figure 8-13

17.5 Form & Joint Equipment Maintenance for Manhole Production Equipment

Jacket Vibration Transmission Bands

An important part of all manhole forms is the vibration transmission bands. These bands are so designed that they hold the form rigid enough to maintain proper shape, but flexible enough to properly transmit vibration. Vibration bands are subject to extreme flexing, and it is necessary that precautions be taken to preserve the fatigue resistant design. Under no circumstances should any welding, cutting, or drilling be done on these vibration transmission bands.

Periodically

Inspect the jacket and core for cracked welds. If fatigue breaks appear, re-weld with regular welding rod. Normally the initial break serves to relieve tension and has some beneficial value. However, it is wise to check to be sure that excessive vibration is not being used. Should a second break occur, grind out a “V” and carefully re-weld using only "Utectic #680" welding rod. The second break will indicate that vibrator amplitude or time must be reduced.

Short Product Header Anchor

Weekly

The bearings for the short product header anchor clamps should be lubricated weekly. If required, grease the bearings more frequently.

Jacket Vibrators

Vibrators must always be kept in tight contact forms. Check the bolts frequently to be sure tight vibrator contact.

Form Wearing Surfaces

The automatic concrete compaction feature of manhole form equipment is dependent on the proper maintenance of certain wearing surfaces. These surfaces are the contact points, which maintain the height of the jacket. When worn surfaces are evident, lost metal should be replaced. Be sure to buildup these surfaces evenly as the jacket must set plumb to assure proper wall thickness. Lost metal on the bottom surface of the jacket and the upper and lower bearing surfaces of the pallet locks, which contact the jacket and the core, respectively, should be replaced with hard surfacing.

As Required

The wear plates on the bottom of the core where the jacket rests during production should be replaced when needed. This will alleviate wear to the p-locks and jacket and direct it to the core where it will be easily detected and repaired. To facilitate the hard surfacing of the bottoms of the p-locks and the jacket, the jacket should be inverted to allow easy welding of these hard-to-reach places.

Form Equipment Clean Up

See ***Form Clean Up (pg. 17.1)***.

17.6 Joint Equipment

Joint Clean Up & Storing

See ***Form Clean Up*** (pg. 17.1) and ***Joint Equipment Maintenance*** (pg. 17.5).

Water Content

For producing good manhole products, it is important that the concrete contains the proper amount of water. Concrete should be wet enough to hand pack into a ball without crumbling. Concrete containing the proper amount of water will pressurehead and compact properly. If the concrete is too dry it tends to continue settling in the form when the product is pressureheaded and will never compact properly. Experience will tell the proper amount of water that needs to be added to the concrete.

Observing the finished product will tell if the product contains the proper amount of water. A finished product produced with the proper water content will be relatively rough and have fins or webbing on its surface. However, if the product was produced too dry, the surface will appear to be smooth and shiny without fins or webbing. Dry products may also have rough or gravelly looking joints.

Additives

- **Air Entrainment -** Not recommended because concrete tends to get too much air in it.
- **Soap or Plasticizers -** Adds lubricity to concrete. These can be used satisfactorily, although they are not required or necessarily recommended.

Replacing Snap Rings on Gasket Joint Equipment

New replacement snap rings will be larger than required for a proper fit. The following procedure should be used to insure a tight fit at the snap ring butt joint.

1. Position the snap ring around header. Be careful not to over flex the snap ring as this will result in it bending. Trim excess off ends to get an approximate initial fit.
2. For a final fit, grind the snap ring end until a tight butt joint is achieved. If the snap ring is ground too short, build ends up with weld and regrind to correct length. Snap rings must fit tight.
3. With a snap ring properly positioned on the casting, tighten the cap screws into the snap ring groove to check that the snap ring seats properly.

17.7 Cured Concrete Pipe Stuck in Form

Pipe Extrusion Procedure

1. Build a frame over the top of the jacket from which to push against with a hydraulic jack. The frame should allow enough room for a hydraulic jack and a structure to span across the pipe and

core. The structure across the pipe and the hydraulic jack frame must be able to withstand the load that the hydraulic jack will exert. See ***Figure 8-14***, illustration "***A***".

2. Attempt to remove the concrete pipe from the jacket by extending the hydraulic jack. Be sure the pallet locks are unlocked. If the concrete pipe does not move, continue to Step #3 after retracting the jack.
3. Remove the seam bars from the jacket and cut or grind through any welds in the seam. See ***Figure 8-14***, illustration "***B***".
4. Weld minimum of 1" (25mm) tall bars to the reinforcing ribs, centered on the seam, with a 3" (76mm) wide shim between the bars. Remove the 3" (76mm) shim and cut through the reinforcing ribs. See ***Figure 8-14***, illustration "***C***". Do this to all the ribs, but NOT the top plate. The minimum 1" (25mm) tall bars are used in repairing the jacket.
5. Next, cut through the jacket shell plate in the bell area of the jacket. Also cut through all the rolled rings at the jacket bottom. These cuts should be in the line with the jacket seam in Step #3.
6. Pry or drive the seam open and remove the concrete pipe from the jacket.

Procedure to Repair Form After Pipe Extrusion

Jacket repair will involve three major steps:

- Reinforcing Ribs Repair
- Seam Repair and Straightening
- Bell Rebuilding

17.7.1.1 Repairing the Reinforcing Ribs

- Place the 3" (76mm) wide shim block between the welded bars.
- Using a clamp, squeeze the bars together tightly to the 3" (76mm) shim block. The reinforcing rib should now be back in its original shape. See ***Figure 8-15***, illustration "***A***".
- Tack the seam in the reinforcing rib while being held in position.
- Remove the clamp, 3" (76mm) shim block, and welded bars.

17.7.1.2 Preparing & Welding the Rib Seam

- Bevel the edges of the seam in the reinforcing rib 1/ 4" (6mm) deep before welding, ***see Figure 8-15***, illustration "***B***".
- Weld the seam full, grind flat and smooth.
- Install a bar, 1/2" x 2" x 4" (13mm x 50mm x 100mm), centered over the welded seam to reinforce the repair.
- Weld the 1/2" x 2" x 4" (13mm x 50mm x 100mm) bar to the rib all around. See ***Figure 8-15***, illustration "***C***".
- Follow Steps #1 and #2 to repair all the reinforcing ribs.

17.7.1.3 Repair Seam of Outer Mould

- When completed, the seam must be flat within 1/16" (2mm).

- Begin by placing a 5" (127mm) heavy channel 3/4" (19mm) from the seam. The end of the channel is to be below the wear ring in the jacket top.
- Using a clamp, pull the outer mould skin to the channel and tack weld the channel and mould skin together.
- Proceed from one end of the mould to the other end, tack welding the channel to the mould every 2" (50mm). See ***Figure 8-16***, illustration "***A***". The channel will hold the seam flat during repair.

17.7.1.4 Even Edges of Seam

- The seam edges must be even and flat across the seam. See ***Figure 8-16***, illustration "*B*".
- Tack weld the seam edges together every 2" (50mm). Work from one end to the other.

17.7.1.5 Install 1/2" x 1-1/2" (13mm x 38mm) Seam Bars to Outside of Mould Centered Over Seam

- Weld the 1/2" x 1-1/2" (13mm x 38mm) seam bars to the mould using 2" (50mm) long welds with 4" (100mm) gap between welds, on both sides of the seam bar. See ***Figure 8-16***, illustration "***C***". Set the length of the 1/2" x 1-1/2" (13mm x 38mm) seam bars as required to go between reinforcing ribs.

17.7.1.6 Weld Inside of Mould at Seam Gap

- If seam gap is 1/16" (2mm) or less, do not weld inside.
- If seam gap is greater than 1/16" (2mm), fill gap with shim and weld lightly to keep heat down.

17.7.1.7 Allow Entire Seam Area to Cool Completely After Welding

- After area has cooled, remove the 5" (127mm) heavy channel by breaking its tack welds to the mould skin.
- Grind the entire seam area smooth and flat.
- Check the seam area with a straight edge to see that it is flat. A 1/16" (2mm) shim must not fit between the straight edge and the jacket shell plate in any area along the seam. Grind down any high areas that cause a gap of 1/16" (2mm) or more.
- Follow Steps #3 through #7 to repair the seam on the other jackets of a multiform.

17.7.1.8 Repair Bell Area Jacket

- Even the seams as required and weld the seams 100% both sides.
- Grind the inside smooth and flat.
- Bevel the bottom 1" x 3" (25mm x 76mm) ring 3/4" (19mm) deep.
- Weld full grind flat.

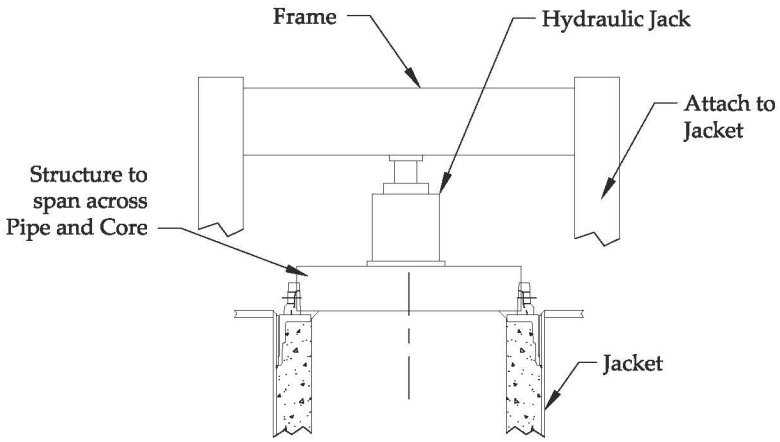


Illustration A

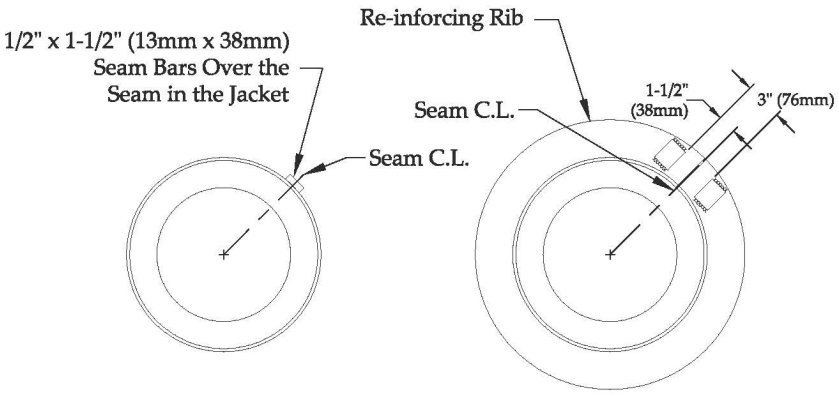


Illustration B

Illustration C

Cured Pipe Extrusion Procedures
Figure 8-14

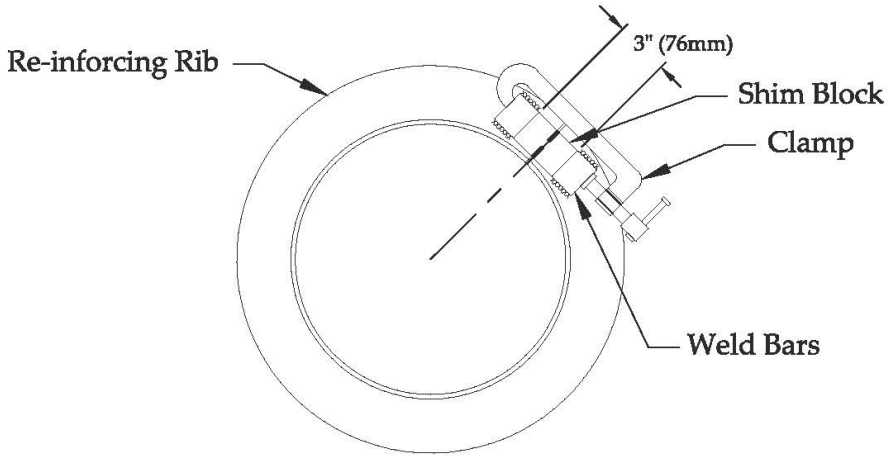


Illustration A

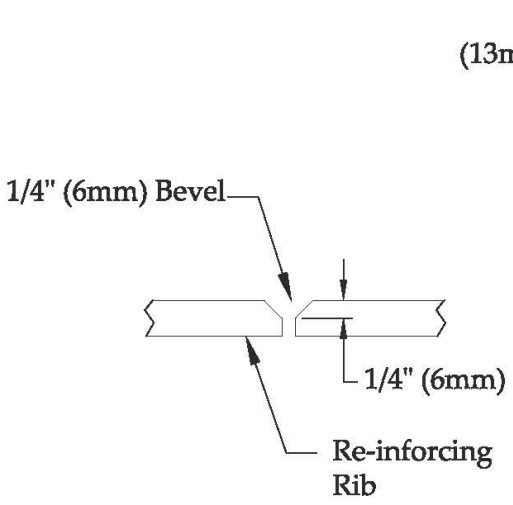


Illustration B

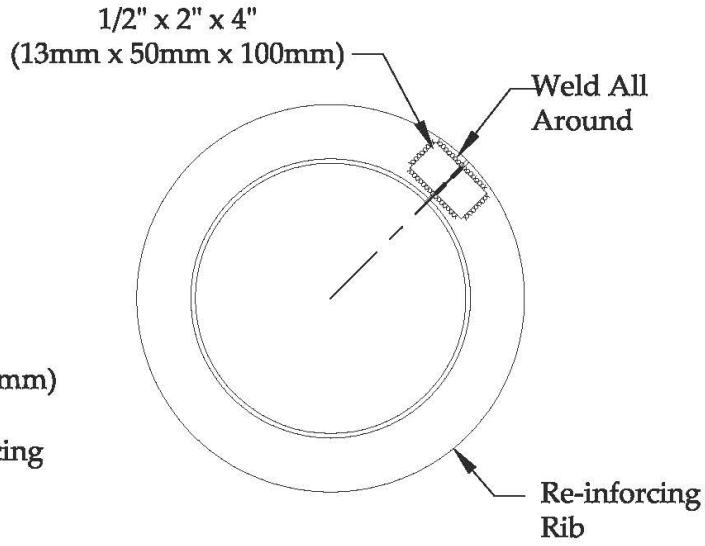


Illustration C

Form Repair After Cured Pipe Extrusion
Figure 8-15

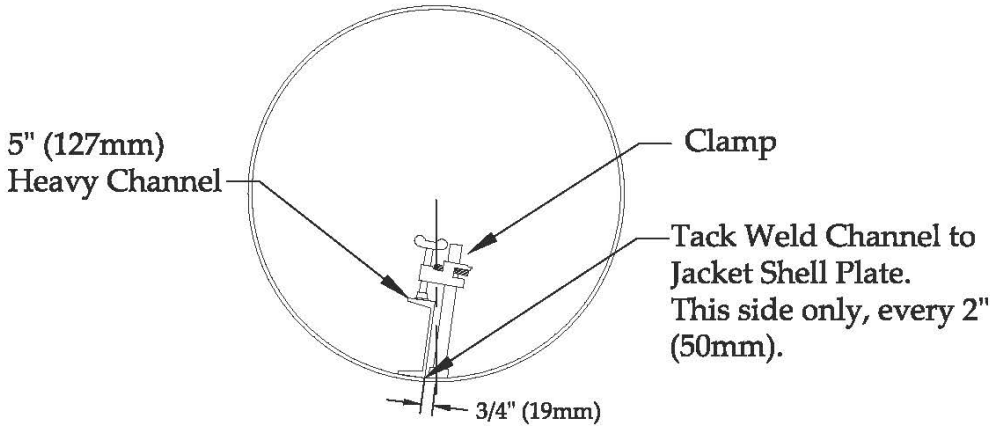


Illustration A

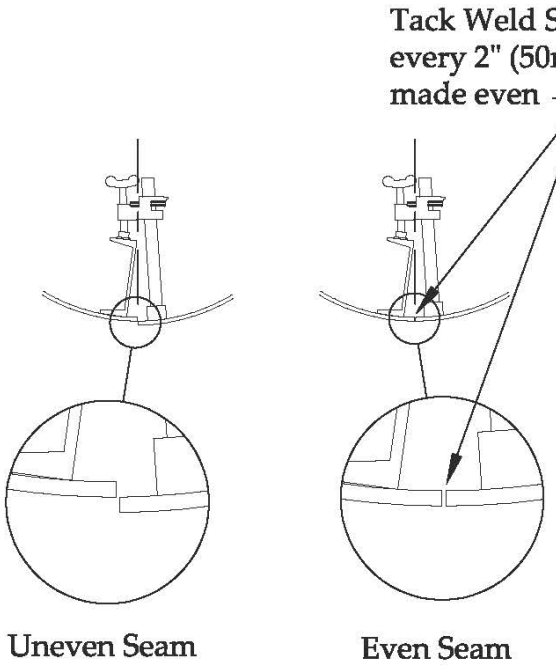


Illustration B

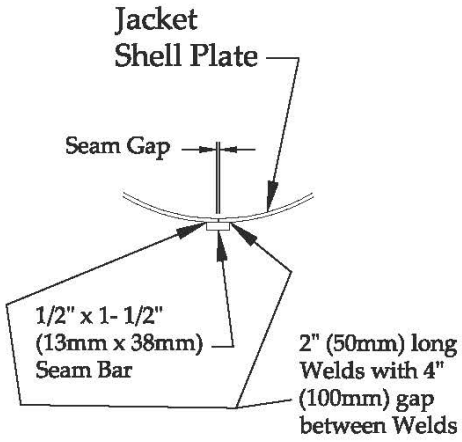


Illustration C

Form Repair After Cured Pipe Extrusion
Figure 8-16

Shipping Instructions





LAYDOWN SHIPPING
1. WELD CORE TO JACKET AT TOP
2. WELD FRAME TO JACKET RIBS ONLY NOT TO SHELL PLATE
3. WHEN SHIPPING JACKETS ONLY, USE X BRACING TO KEEP JACKET ROUND
3. STRAP DOWN WITH WIDE NYLON STRAPS – DO NOT USE CHAIN

STANDUP SHIPPING
1. WELD JACKET TO BASE AT BOTTOM
2. STRAP DOWN USING CHAIN FROM JACKET PICKUP EYES.





SCALE: NTS	TOLERANCES UNLESS NOTED:	HAWKEYE FORM SHIPPING INSTRUCTIONS	
DRAWN: BHS	FRACTION: ±1/16		
ENG: BHS	DEC: x.x ±.05 x.xx ±.01 x.xxx ±.005		DWG. NO. 69600A ISSUE A
ISSUED: 11/11/2008	ANGLE: ±1°		

HAWKEYE CONCRETE PRODUCTS CO.
P.O. BOX 9
MEDIAPOLIS, IOWA

Notes

18 Manhole Form Equipment

SS CAP 72 Machine

Machine Serial No. CP-430

Notes

This section of the manual gives instructions on how to prepare your form equipment for production, how to operate the equipment, and how to install the equipment to the machine. Read and understand the information that follows to become familiar with the form components and their operation.

For information concerning maintenance on Afinitas manhole form equipment, see ***General Form Service & Maintenance***.

Note: The SS CAP 72 Machine maybe equipped with various types of form mounting locations to the machine in the pit. An optional machine base, or production plate may be used to anchor the form to the machine.

18.1 Manhole Form – Jacket

Lifting the Jacket

Attach the **Afinitas** strip beam to either an overhead crane or mount to a forklift truck.

Adjust the **Afinitas** strip beam chain legs to the diameter of the jacket by removing the chain holder pin and aligning chain legs to the proper holes in the strip beam. Then replace the chain holding pins and hairpins.

To lift the jacket, hook the strip beam safety hooks to the jacket lift pickups provided on each side of the jacket.

WARNING: Check to be sure that the safety latches on each of the strip beam hooks function properly and are maintained in good condition and that the chain holding pins are secured with hairpins before operating.

Installing Vibrators to Jacket

The vibrator mounts on the jacket and employs the use of "captive" nuts. Therefore, no wrench is needed to hold the nuts when tightening bolts. To replace the nut, drive the nut inward shearing the 7-penny (57mm) locking pins nail and allowing the old nut to be removed. Replacement nuts should be held in place with 7-penny (57mm) nails only. Refer back to ***Figure 7-34***.

Hold the vibrator up to the vibrator mounts so the vibrator bolt holes align with the jacket mount holes. Be sure that the vibrators are mounted so the vibrator cords hang down. This will assure proper vibrator rotation on the form and prevent the cords from wiggling during production. Wiggling of the cords will cause electrical wires in the cord to over-flex and break.

Insert the vibrator bolts through the vibrator mount holes and into the mount pad. Screw the bolts into the mount pad at least 1/2" (13mm) by hand before tightening with a wrench. This will assure that the bolts have started properly and will prevent cross-threading. After the vibrators are bolted to the mounting pads, they must be watched during the early period of operation for loosening of

the bolts. After initial tightening they should be run for one minute and the bolts checked again for tightness. After about 15 minutes of operation, bolts should be rechecked for tightness. At the end 1-2 of the first one-half day of operation they should be checked once more. After this time, bolts are usually well seated and need only be checked with the normal visual inspection.

"Rifle Bolt" Style Handling Hole Plugs

"Rifle Bolt" style handling hole plugs are provided on the jacket to form handling holes in the product wall.

To use, slide the "rifle bolt" into the jacket sleeve until the hole in the plug aligns with the sleeve hole. Place the draw pin through the holes to lock the "rifle bolt" into place. Insert the hairpin through the draw pin.

To remove the "rifle bolts" from the product, remove the draw pin from the assembly and revolve the "rifle bolts" by the handle 180° to break the grip of the compacted concrete. Then retract the "rifle bolt" from the product.

The "rifle bolt" can be stored by placing the handle of the "rifle bolt" through the sleeve hole where the draw pin normally is placed. The draw pin can then be placed through the "rifle bolt" plug hole. Insert the hairpin into the draw pin.

Note: The "rifle bolt" must be removed from the product before the stripping operation begins. Failure to extract plugs from the product wall before stripping the jacket from the product will damage the product. The "rifle bolt" should be removed from the jacket before the product is off-borne from the machine.

WARNING: Modification or relocation of the "rifle bolt" style handling hole plugs on manhole form equipment and failure to provide adequate steel reinforcement in the lifthole area of the concrete product is dangerous. Read and understand the detailed information *Liftholes, Recommended Product Lifting Method,* etc... on several pages following.

18.2 Manhole Form - Core

Lifting the Core

A single lift lug is provided on the core top. To lift the core, install the core lift attachment to this core lug and the overhead crane or forklift. The core lift and the core lift attachment is designed for lifting the core or the core and jacket simultaneously.

WARNING: Lift the core only with the core lift attachment furnished with your manhole form equipment. Do not exceed the rated capacity of this lifting device. Use the core lift attachment only for the purpose it was designed…lifting the core. Always check to be sure that the hairpin is installed to the core lift attachment shackle pin before lifting the core. Never attempt to lift the form set from the core lift lug if the

form set has been filled or partially filled with concrete or if the core is anchored to the machine. After the core has been anchored to the machine, remove the core lift attachment from the core lift lug to avoid subjecting the core lift attachment and core lift lug to vibration that occurs during the production cycle. Subjecting these lift members to vibration will result in their accelerated wear.

Short Product Header Anchor Clamps

Manhole products of various lengths can be manufactured on full length manhole form equipment. To make short products, a spacer equal to the length of the concrete to be eliminated from a full-length product is used. This spacer bears on the bottom pallet support ledge on the core. The pallet, with product shortener in place, will now bear on the top ledge of the product shortener.

Riser cores are equipped with anchor clamps on the core top to prevent the header from raising until the jacket lugs reach or contact the pallet. These clamps are not required when producing full length manhole products. See ***Producing Short Products on Standard Length Manhole Forms***.

Stephole Panel System

Your core may be equipped with a stephole option for providing stepholes in the product wall. To form the stepholes a stephole plug panel is attached to the core before filling the form with concrete. When the product and jacket are off-borne from the core, the panel is removed with the product. The panel is removed from the product after the jacket has been stripped from the product and then returned to the core for the next product.

Stephole plug panels are designed to be connected to the core by a "fail-safe" method. The panel is attached to the core by placing the panel over the attachment pin on top of the core. A hairpin is then inserted through the attachment pin to prevent the panel from accidentally disconnecting from the core. This hairpin must be removed before the product and jacket are stripped from the anchored core. If the hairpin is not removed, a light pin which holds the attachment pin to the core will shear, preventing damage to the plug panel. This shear pin should only be heavy enough to withstand normal operation forces.

Anchoring Core to the Machine

To anchor the core to the machine:

1. Position the core so the core anchor tubes center over the corresponding anchor pins protruding from the machine. Be sure to position the core on the machine so the core locating lug (located at machine of core) is situated away from the machine's center post, facing to the machine outside.
2. Detach the two anchor connecting pins from the core and slide the pins through the core anchor tube and machine anchor pin.
3. Re-attach the anchor connecting pins to the core to prevent pins from vibrating out of the anchor tube.

WARNING: Do not use form equipment on the SSCAP 72 Machine until the core is properly anchored to the machine with the anchor connecting pins. Failure to anchor core to machine or secure pins to core to prevent pins from vibrating free of the machine anchor pins may cause core to pick up or raise during the off-bearing operating. Anchor connecting pins are made of a special material and design. Do not substitute any other type of pin.

Assembling Jacket to Core

After the core has been anchored to the machine, the jacket can be assembled to the core. Normally, the reinforcement cage, pallet, and jacket are assembled on the production floor and set on the core as a unit.

Lift the jacket and lower it over the core. Position the jacket so the locating blocks on the jacket bottom align between the locating lug on the core. This will ensure that the jacket has been placed on the core correctly.

Raiser Stands

Normally, form equipment can be mounted directly to the machine in order to perform all necessary work operations. Sometimes special form equipment may require a raiser stand to elevate the form set to a proper working elevation. A raiser stand must be selected for use with the form set so that:

- The form set when attached to the raiser stand is at the proper working height.
- The rubber isolators on the bottom of the core, rest on the form raiser bearing pads.

To anchor the form raiser stand to the machine, position the raiser stand anchor tubes down over the anchor pins protruding from the machine. Detach the anchor connecting pins from the raiser and slide the anchor pins through the raiser tube and the machine anchor pin until the anchor connecting pin is fully seated. Re-attach the anchor connecting pins to the raiser stand to prevent pins from vibrating out of the anchor tubes.

With the raiser stand anchored to the machine, the core can be lifted and attached. The core must be positioned on the raiser stand so that the core locating lug is situated away from the machine center post or facing the machine outside. Anchor the core to the raiser stand in the same manner that the core is connected to the machine. See ***Anchoring Core to the Machine*** above.

18.3 Producing Short Products on Standard Length Manhole Forms

Manhole products of various lengths can be manufactured on full length manhole form equipment. To make short products a spacer equal to the length of the concrete to be eliminated from a full-length product is used. This spacer bears on the bottom pallet support ledge on the core. The pallet, with product shortener in place, will now bear on the top ledge of the product shortener.

Installing the Product Shortener

To install the product shortener to the core, select the correct size shortener to produce the pipe in the required length. For example, if a 2' (600mm) long product is to be produced from a 3' (900mm) long manhole form set, a 1' (300mm) long product shortener should be used.

Loosen the tightener clamps on the product shortener and slide the shortener down over the trunk of the core until the bottom of the product shortener bears evenly along the bottom pallet's support ledge.

Note: On product shorteners longer than 24" (600mm), handling hooks are located on the shortener for hoist pickup.

Position the product shortener on the core so the tightener clamps will face out in front of the machine.

Note: If a product shortener is installed on a core equipped with the stephole plug panel option, position the product shortener on the core so that one of the shortener uprights and the shims on the top and bottom bands locate on each side of the core's stephole panel opening. This will keep the shortener's bands "spaced" out from the panel opening, allowing the stephole panel to slide freely in the opening. Do not overtighten the product shortener as this may cause the top and bottom bands to "draw" into the panel opening and interfere with the panel.

Anchoring the Short Product Header

When off-bearing the short product and jacket from the anchored core, the joint forming header must be clamped to the product. Before the product and jacket can be stripped from the core, the jacket must be raised until the pallet locks (p-locks) engage to the pallet. During this initial lift of the jacket, the header must be clamped to the product to prevent it from raising or moving. Movement of the header must be avoided, or it will cause damage to the product's joint. In order to clamp the header to the product, a series of header clamp locks are arranged around the core top so when rotated over the header, they lock it down and prevent it from rising.

At the pressurehead station, after the short product has been pressureheaded and while the pressurehead is still in full contact with the jacket top, the machine operator must then actuate the short product header clamp locks.

To actuate each clamp the machine operator must rotate each of the anchor lock levers protruding from the machine of the core. Rotate the levers by foot from the "unlock" to the "lock" position to clamp the header to the core.

After the product has been rotated to the off-bearing station the jacket is raised on the anchored core until the p-locks make contact with the pallet.

Note: When making short products, the pallet is suspended up from the core bottom. Thus, the p-locks must travel upward before making contact with the pallet.

WARNING: Do not attempt to lift the jacket and product from the core with the header "locked" to the core. Jog the jacket slowly upward to engage the pallet and p-locks. Stop crane lifting motion upon engagement. Attempting to lift the jacket and product from the core with the header "locked" to the core will create a fully anchored load condition and may result in property damage and serious personal injury.

When the p-locks have engaged under the pallet the lifting motion on the jacket must be stopped and the short product header anchor clamps rotated inward to release the header from the core. Rotate the anchor lock levers from the "lock" position to the "unlock" position to release the header from the core.

IMPORTANT: Do not allow the upward force of the short product against the header anchor clamps to become excessive or it may become difficult to release the header anchor clamps from the header.

When the short product header anchor clamps have been released, strip the jacket and product from the anchored core in the standard method.

Liftholes

The position of the "rifle bolt" style handling hole plugs on **Afinitas** manhole forms are designed for longer products. Shorter than full length products manufactured on these forms may require a special lifthole method. Read and understand ***Recommended Lifthole Method for Short Concrete Products***.

WARNING: Modification or relocation of the "rifle bolt" style handling hole plugs on manhole form equipment and failure to provide adequate steel reinforcement in the lifthole area of the concrete product is dangerous. Read and understand the detailed information in *Recommended Lifthole Method for Short Concrete Products* on lifthole design, lifting method, etc.

18.4 Recommended Lifthole Method for Short Concrete Products

A special lifthole method is required for short products, which are produced on longer form sets. The liftholes on the form sets are positioned to provide for handling of the longer products. The standard lifthole would be off-balance on short products. There could also be insufficient concrete cover and reinforcement around the standard lifthole on short products. If the product flipped over, or partially flipped over, the lifting device could break loose from the product and cause the product to fail. If a special lifthole is placed too high on the short product, insufficient concrete cover and reinforcement may allow the lifting device to break out of the lifthole resulting in the product falling.

To avoid this situation, the following procedures must be followed when producing short concrete products:

- The lifthole must be positioned to balance the product.
- The lifthole area must be strengthened with reinforcement to prevent such a failure.

WARNING: Serious personal injury could result if the procedures outlined above are not followed.

The following is the recommended procedure to reinforce the lifthole in short concrete products. See ***Figure 9-1*** for details.

Lifthole Reinforcement

Key to ***Figure 9-1*** components and procedures:

- Item 1 - Cross-Section of Wall of Short Manhole Riser Section
- Item 2 - Product Reinforcement Cage Wire
- Item 3 - Lifthole Plug
- Item 4 - Lifthole Reinforcement Loop
- Item 5 - Weld Locations
- Item 6 - Inserting Plug into Holes

18.4.1.1 Material Requirements

Lifthole Plug - Provide two pieces of 1-7/8"(48mm) O.D. plugs, each 1/2" (13mm) less than the wall thickness of the product:; (i.e., 1-1/2" standard weight black pipe) longer plugs could catch, twist, and jam between the form walls during stripping.

Lifthole Reinforcement Loop - Two rebar loops are required per lifthole. These must be designed to accommodate the heaviest product under the worst lifting condition.

WARNING: The design and material size of the rebar loops should take into consideration the reduction in the cross-sectional area of the rebar due to welding and the carbon content of the rebar loops. Failure to consider these points could result in lifthole breakout and allow a product to fall causing serious personal injury.

18.4.1.2 Installation

- **Tooling -** Align and install reinforcement loops (Item #4) on each side of the cage wire (Item #2) as shown. Use tooling to assure product balance, both vertically and across diameter. The tooling diameter should be slightly larger than the plug diameter. The cage wire (Item #2) should touch the tooling; deflect the cage wire if necessary. The hole between the top of the reinforcement loops and the cage will then allow the removable plug (Item #3) to slip in and out freely.

  Note: On cages made on the Afinitas Cage Machine, center the loops between the uprights.

WARNING: All welding around the loops must be kept to a minimum to prevent burning away and weakening of the reinforcement loops. Excessive welding

could cause the product to break from the lifting device and fall, causing serious personal injury.

- Weld each rebar loop lightly to the cage as shown.

18.4.1.3 Production

Insert the plugs in the holes and the cage assembly is now ready for production. After the jacket is stripped off the product, poke the plugs out of the fresh concrete.

18.4.1.4 Recommended Product Lifting Method

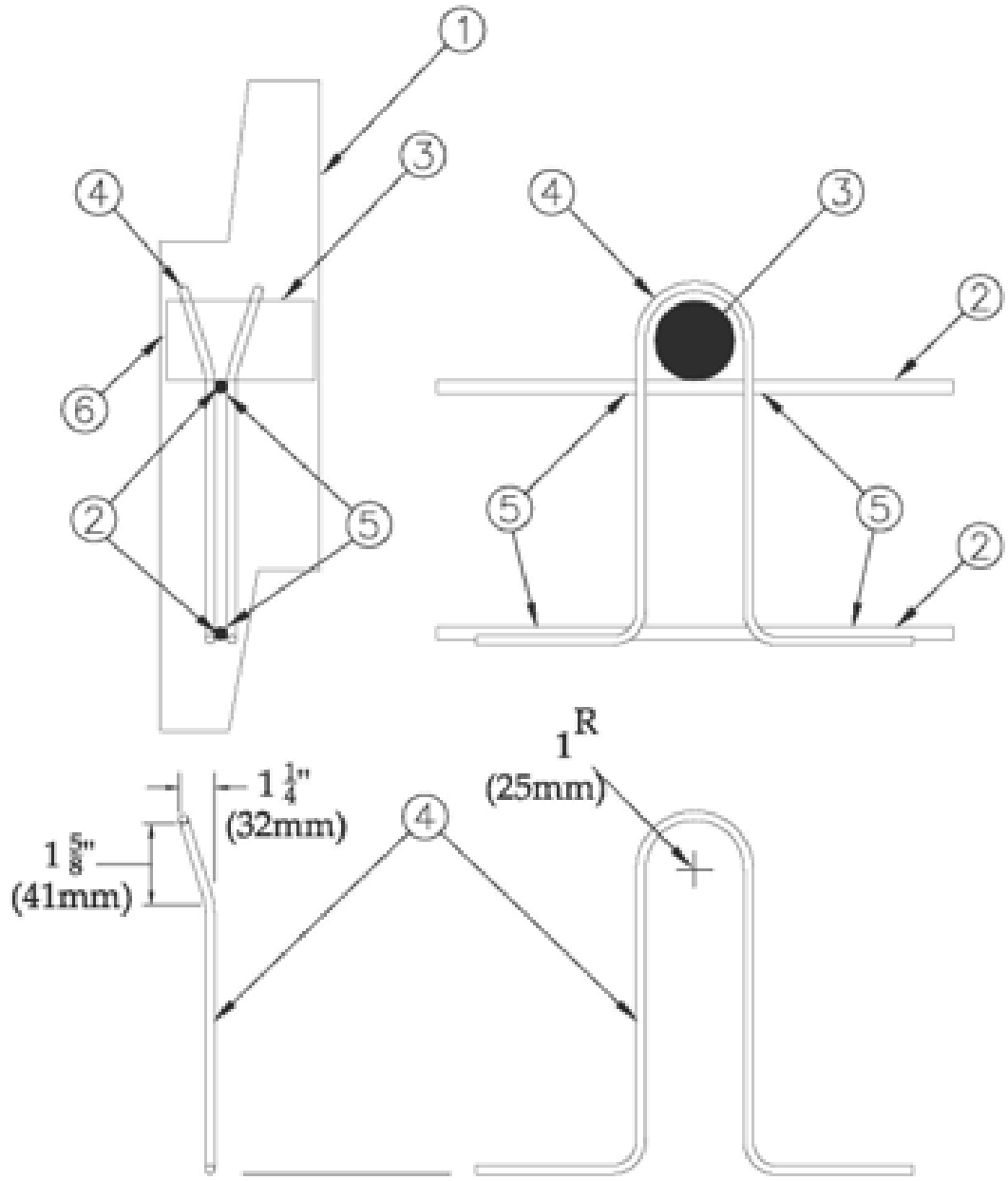
WARNING: Lifting equipment must bear evenly across the top of the lifthole. Other methods such as cantilevered loading may seriously overload the reinforcement loops. Follow instructions below for proper lifting procedures.

The lifting holes in concrete products produced on **Afinitas** manhole equipment require lifting devices that bear uniformly along the entire top surface of the lifthole whenever the product is lifted.

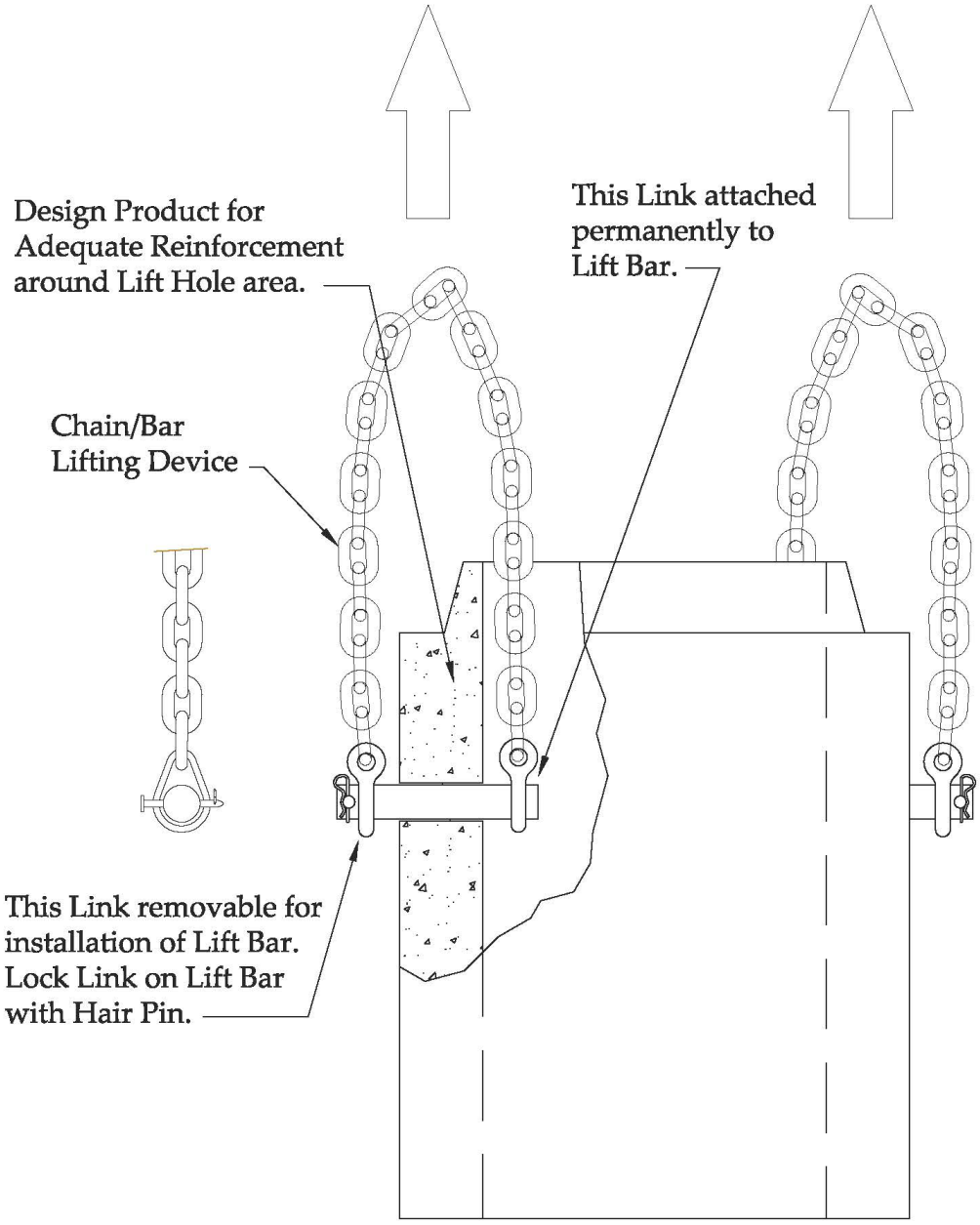
Concentrating the lift load on one end of the lifthole could be dangerous and may result in breaking out the lifthole. A chain/bar lifting device (see ***Figure 9-2***) is recommended for lifting. The chain loops must be lifted with a spreader bar so that the load on each chain is directed upward as indicated by the arrows. Failure to lift chains upward in the indicated direction may exert uneven pressure on the lifthole bearing surface. Components of this type of lifting device should be designed and manufactured by a company qualified to provide such equipment.

WARNING: Serious injury could result if short concrete products are lifted without following these guidelines:

- **Liftholes must be designed for adequate concrete cover and steel reinforcement in the lifthole area.**
- **Do not exceed the capacity of chain/bar lifting device.**
- **Operation of this equipment, all equipment involving overhead lifting, is dangerous. Always keep well clear of all overhead lifting operations.**



Recommended Lifthole Method for Short Concrete Products
Figure 9-1



Recommended Product Lifting Method Details
Figure 9-2

19 Reinforcement Guidelines

SS CAP 72 Machine

Machine Serial No. CP-430

Notes

19.1 Pipe Reinforcement – Single Cage

Single Cage Wire Fabric Purchasing Guidelines

The guidelines that follow are to aid you in the purchasing of wire fabric used for reinforcement cages in products made on **Afinitas** pipe equipment. Read and understand the guidelines that follow because proper reinforcement and placement of the reinforcement is essential for producing quality concrete products. These guidelines serve only as an aid; the mesh you purchase must conform to all specifications, ASTM, state, local, etc. that apply to your particular application.

The single cage guidelines that follow are based on pipe where **Afinitas's** Style "H-361" standard modified bell joint equipment is used. If another joint style is used, these guidelines may have to be modified to your own particular application for such items as cage length, etc.

19.1.1.1 Circumferential Wires

Circumferential wire size and spacing is dependent upon the steel area requirements for the pipe being produced. Normally, for single cage pipe, a 3" (76mm) spacing between circumferential wires is recommended.

19.1.1.2 Longitudinal Wires

On a startup basis when pipe is first being produced on **Afinitas** pipe equipment, it is recommended that fabric, expanded and non-expanded, be purchased with the longitudinal wires on 6" (152mm) centers. It is also recommended that W3 or #6 gauge wire (approximately .1920 diameter) be used for the longitudinals.

After some experience has been gained in producing pipe, you can begin to experiment with the longitudinals if desired. For example, W2.5 rather than W3 longitudinals could be used or the longitudinal centers could be increased from 6" (152mm) to 8" (203mm). The most common problem associated with using too light of a longitudinal wire is that the cage will either crush or deflect during the pipe making operation and then attempt to return to original position in the curing area, resulting in the pipe cracking or if cage deflection is severe enough, the pipe may actually fall over in the curing area.

Cage deflection is most severe with expanded wire fabric where the lower portion of the cage is expanded to fit to the pipe's bell. The longitudinal wires at the expanded section of the cage must bend to conform to the large diameter of the expanded section. These bent longitudinals create a weak spot along the longitudinal, which results in easier cage deflection during the pipe making process. Therefore, when using expanded wire fabric, it will probably be necessary to use a heavier longitudinal or longitudinals spaced on closer centers than that required with non-expanded cages.

IMPORTANT: Avoid expanding too much and leaving the bent longitudinals nearly horizontal. This leaves the cage too easy to deflect.

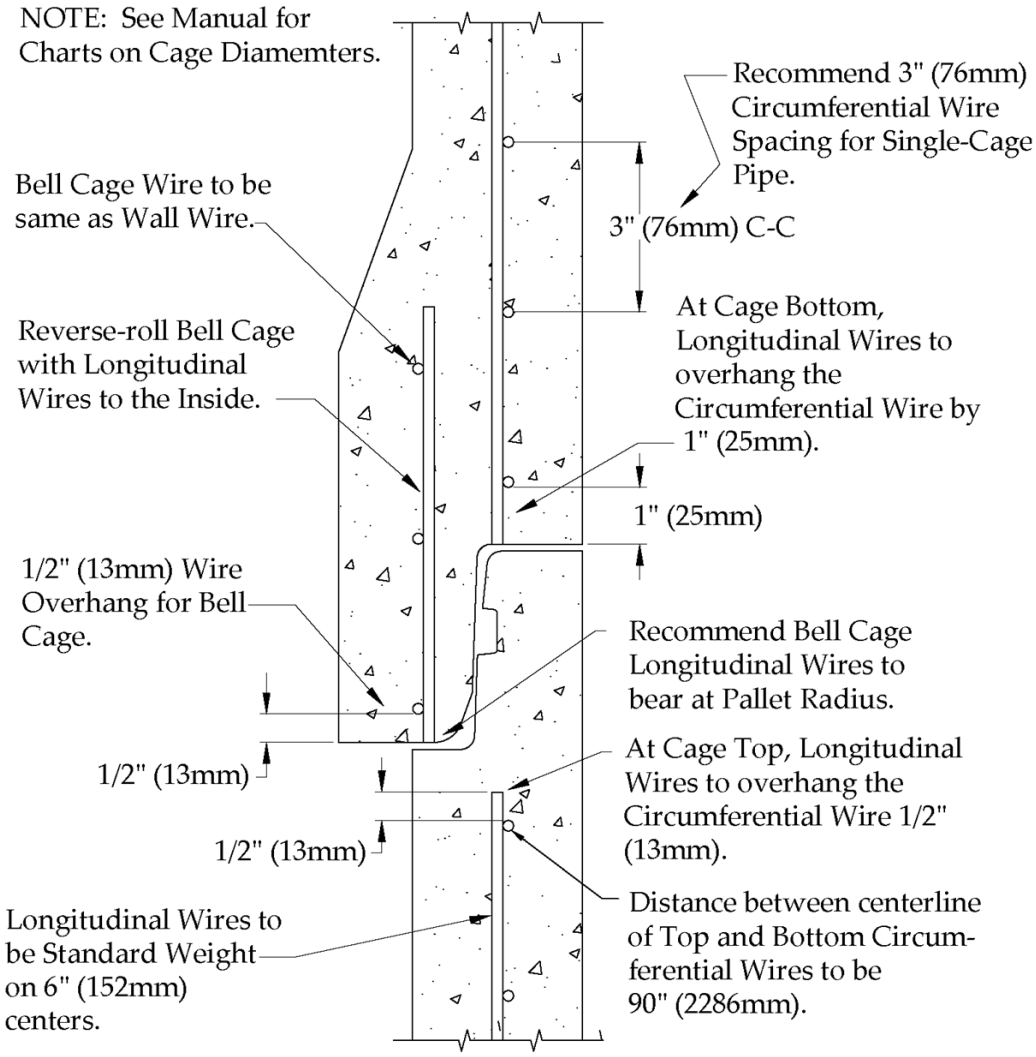
19.1.1.3 Cage Length

Figure 10-1 shows a typical cross-section of a single cage pipe and its reinforcement. It is important that the cages are not too long, or they may interfere with the header when it is placed in the pipe

during the pressureheading process. If the header should contact the cage, the cage may bend or deflect during the pressureheading process and then stress relieve or return to its normal position when the pipe is curing, resulting in the pipe cracking.

Figure 10-1 shows the length between the centerlines of the top and bottom circumferential wires to be 90" assuming a 3-1/2" (89mm) joint length. At the cage bottom, the longitudinal wires overhang the bottom circumferential wire by 1" (25mm) and at the top the longitudinal wires overhang the top circumferential wire by 1/2" (13mm).

If expanded wire fabric is to be used for single cage pipe where the lower portion of the cage is expanded to set in the bell of the pipe, the wire fabric length should be set by your supplier's recommendations. The finished cage length will vary depending upon the amount that the cage bottom is expanded. You should aim for the top circumferential wire to be at the same location as that shown on ***Figure 10-1***.



Cage Guidelines - Single, Wire Fabric - H-361 Joint Type
Figure 10-1

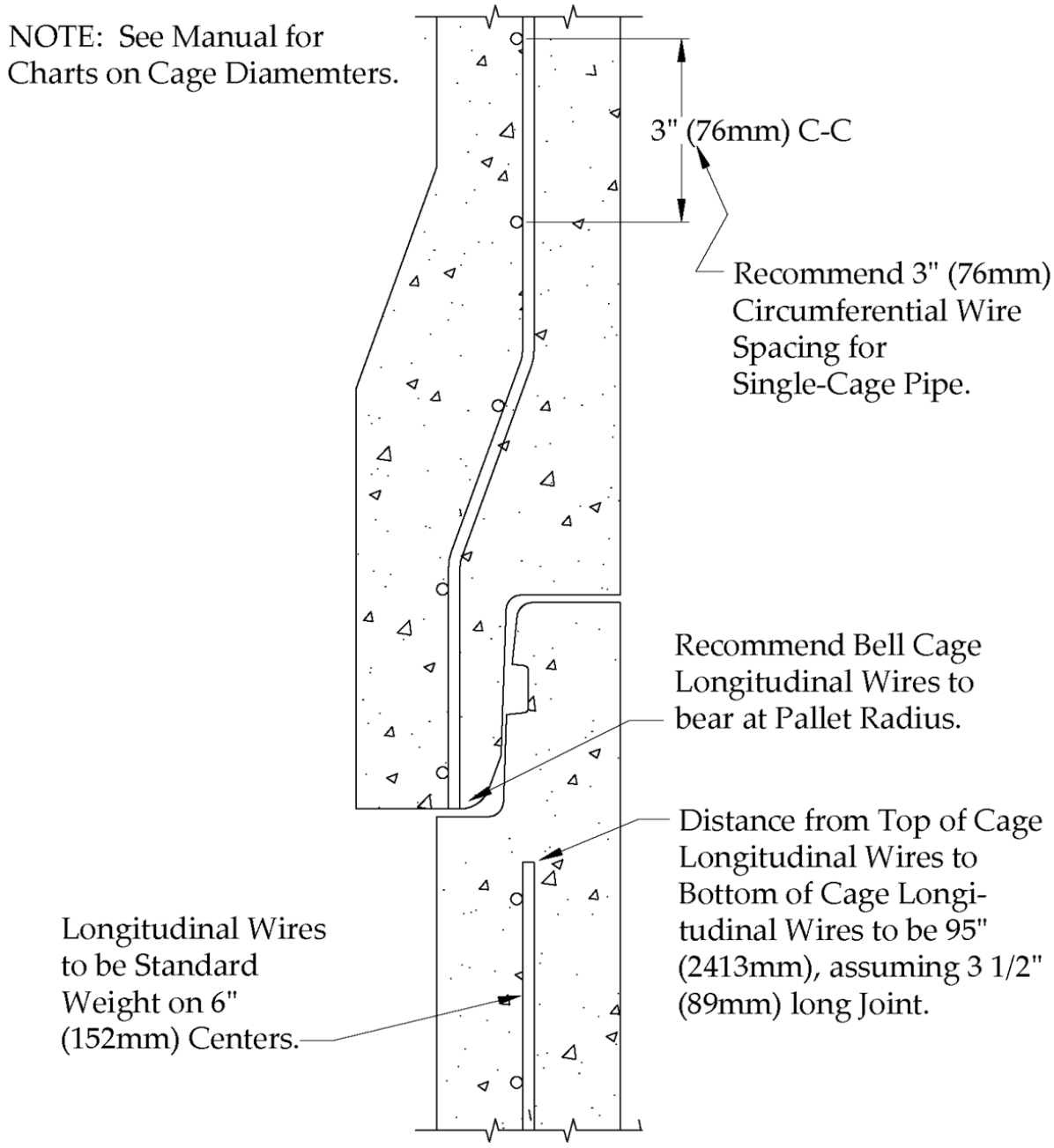
19.1.1.4 Bell Cage

When expanded wire fabric is used for single cage pipe, a bell cage is not required because the expanded portion of the cage is positioned in the bell. For single cage pipe, when expanded fabric is not used it is necessary to place a reinforcement cage in the bell of the pipe. ***Figure 10-1*** shows a cage of the same fabric used in the wall of the pipe. The cage is shown reverse-rolled, that is with the longitudinal wires to the inside of the circumferential wires. The longitudinal wires are shown overhanging the bottom circumferential wire by 1/2" (13mm). The purpose of reverse rolling the bell cage is so the longitudinals can be used to "space" the cage at the bottom radius of the pallet.

Note: Spacers may NOT be used on the bell cage between cage and jacket.

19.1.1.5 Spiral Wound Cage

An alternative to the wire fabric reinforcement cage is the spiral wound reinforcement cage. A spiral wound cage has a continuous, spiral circumferential wire wrapped around a number of longitudinal wires. With spiral wound cages, a separate bell cage is not required since the spiral wound cage can be manufactured with an expanded bell. ***Figure 10-2*** shows a typical cross-section of a pipe with a single, spiral wound cage.



Cage Guidelines - Single, Spiral Wound - H-361 Joint Type
Figure 10-2

Production Checklist for Single Cages

1. **Cut Cage**

   See ***Figure 10-5*** and ***Figure 10-6*** for instructions for cage length.

   Note: Welded splices require 2" (50mm) minimum lap. Lapped splices require 40-diameter (1016mm) lap for plain wire, 20-diameter (508mm) lap for deformed wire, and lapped splices must contain a longitudinal. See specifications for further explanation.

   Cut cage next to longitudinal on same side of longitudinal each time. It is recommended the wire end that does not have the line wires overhanging the last longitudinal should remain in the cage roller.

2. **Roll**

   Cages should be within 1/4" (6mm) of round.

3. **Prepare Cage for Welding**

   Put the overhanging line wires, which extend beyond the longitudinal to inside of cage (assuming longitudinal wire on outside of cage). Lap line wires side by side. See splice detail in ***Figure 10-3***.

   Space splice for proper diameter with four fixtures. See ***Figure 10-3*** for details to make fixture.

   Hold the splice area to same roundness as rest of cage.

4. **Weld Splice**

   Weld every line wire. Weld strength to be at least 50% of wire strength.

   If required to help hold the splice area round, stagger welds by welding from alternate ends of splice wires. See ***Figure 10-3***.

   A 1/8" (3mm) 6011 arc electrode is suggested for arc welding.

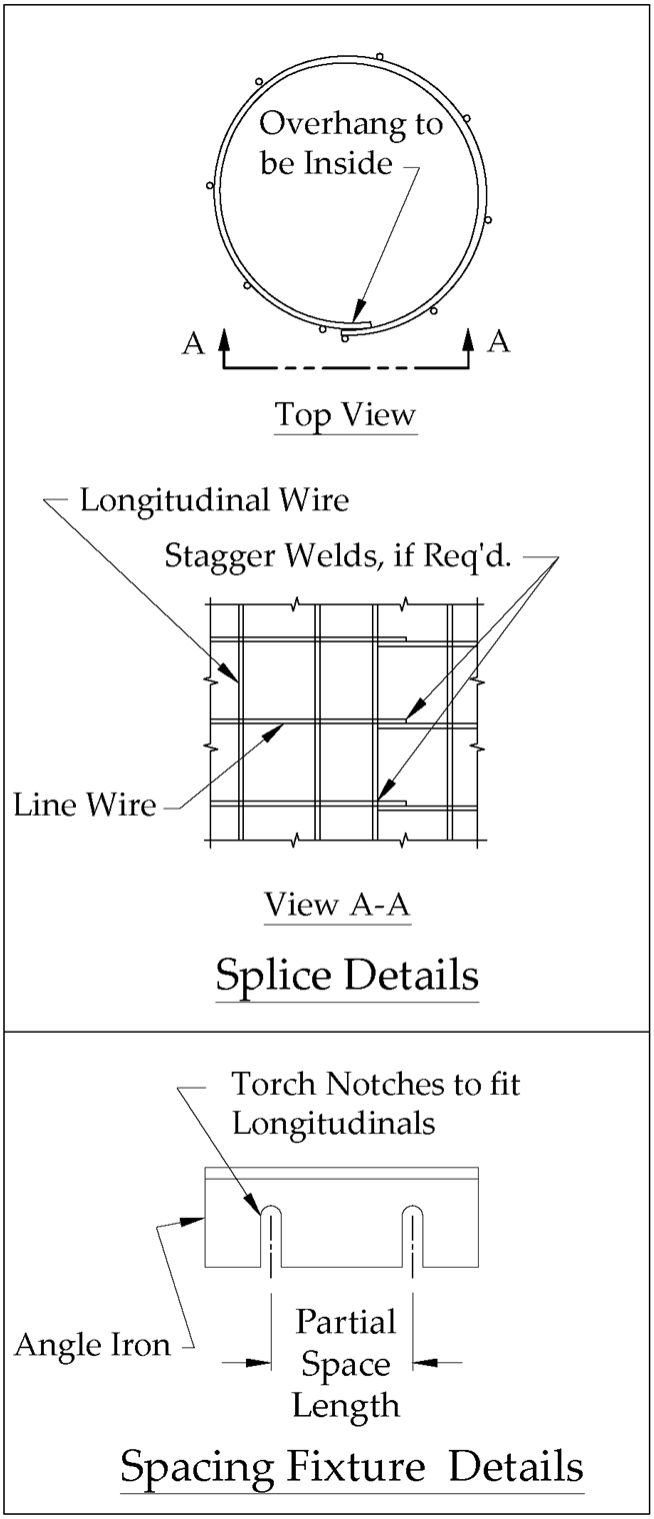
5. **Recheck Roundness**

   Recheck cage to be within 1/4" (6mm) of round. If not, hand form by placing side of cage on floor and pushing on cage until round.

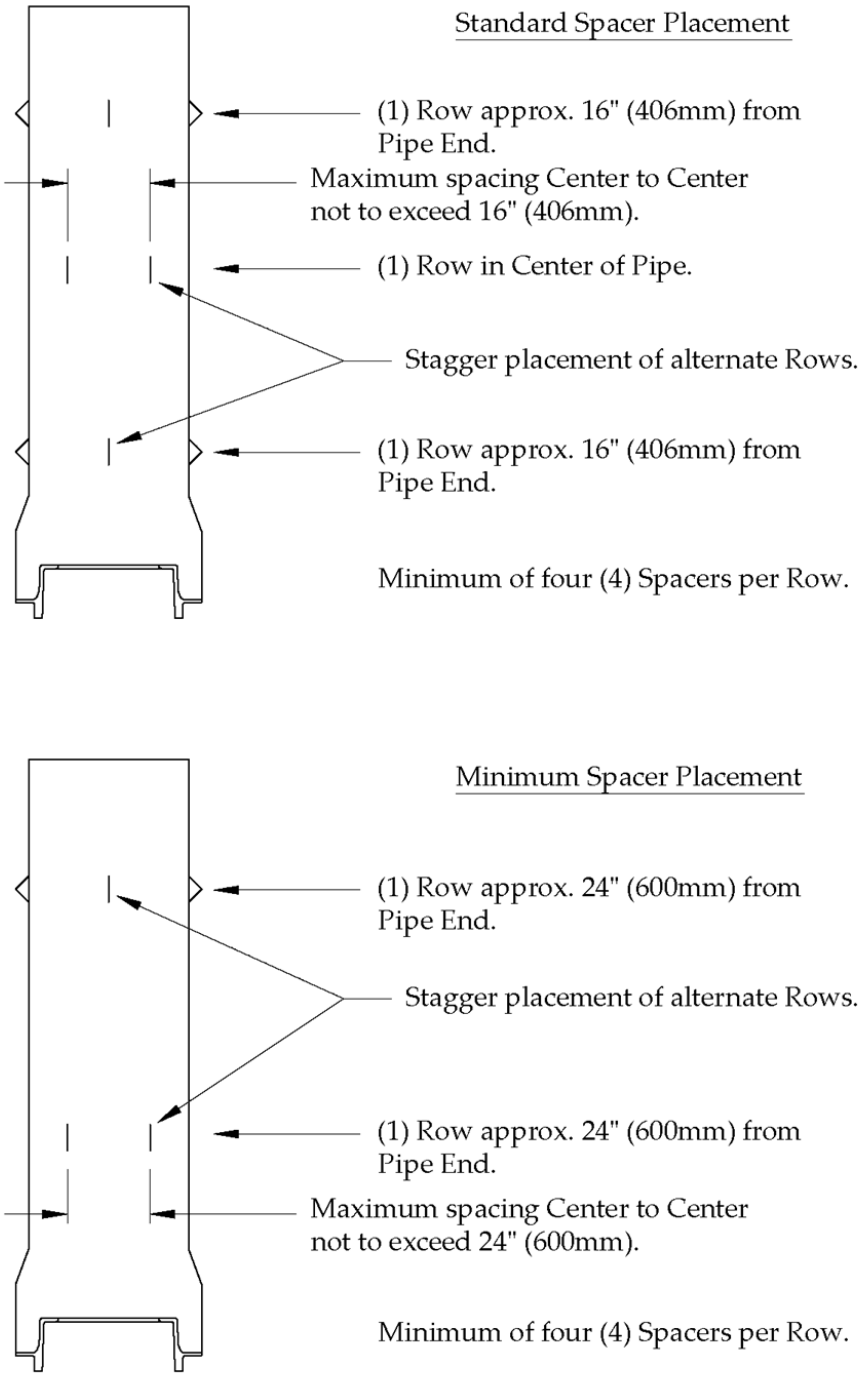
6. **Install Spacers**

   Use spacer concrete cover size shown on ***Figure 10-5*** and ***Figure 10-6***. Refer to ***Figure 10-4*** showing single cage spacer placement guidelines. The proper number of spacers per row for various pipe sizes can best be found by actual usage. Install spacers so cage is spaced to jacket.

   Note: Small diameter cages are sometimes not perfectly round. To avoid undue cage tension, spacer should be attached to the areas of the cage, which are close to nominal diameter. Normally, the splice will be somewhat flat while the oversize diameter will be 90° from the splice. Place spacer at 45° of these points for best result.



Cage Assembly Fixture Details
Figure 10-3



NOTE: Minimum Spacer placement my be used if Cage Roundness is better than average, and concrete cover requirements are less demanding. Production testing must be done to insure that your Spacing Specifications are being met.

Placement of Spacers for Single Cage Pipe
Figure 10-4

Charts are based on the following assumptions:

1. Reinforcement location complies with ASTM C76 concrete pipe specifications.
2. For 12" - 33" (300mm-825mm) pipe sizes, 3/16" (4mm) diameter circumferential wire is used.
3. Cages are spaced to jacket, not core.
4. When cage is centered in jacket, spacers gap jacket by 1/8" (3mm).
5. Cage circumference is set to work with corresponding spacer size.
6. For wire fabric cages, steel is always cut next to longitudinal on same side of longitudinal each time.

Notes:

1. Cage circumferences in charts reflect starting points only. Final circumferences must be set to obtain proper spacer fit to jacket, to meet state and local codes, and to meet ASTM specifications. See attached instructions for more details.
2. See detail below to measure cage circumference for wire fabric cages.
3. For spiral wound cages, cage inside diameters are listed in charts below.
4. All dimensions are in inches.

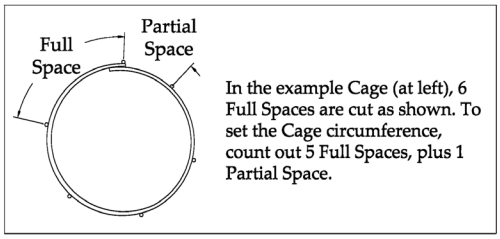
Wire Fabric Cages – 8" (203mm) Spacing of Longitudinal Wire Centerlines

Pipe Size	Cage Circumference				Spacer Concrete Cover Size	Inside Diameter of Cage
	Spaces to Cut for 40" (1016mm) Dia. Long Lapped Splice	Spaces to Cut for 2" (50mm) Long Welded Splice	Full Spaces	Partial Space Length		
12" / 300mm	7	6	5	4 3/16"/106mm	¾"/19mm	13 7/8"/352mm
15" / 400mm	8	7	6	5 5/8"/143mm	1"/25mm	16 7/8"/429mm
18" / 450mm	9	9	7	7"/178mm	1 ¼"/31mm	19 7/8"/505mm
21" / 500mm	11	10	9	2"/50mm	1 ¼"/31mm	23 3/8"/594mm
24" / 600mm	12	11	10	3 7/16"/87mm	1 ½"/38mm	26 3/8"/670mm
27" / 700mm	14	13	11	6 ¼"/159mm	1 ½"/38mm	29 ¾"/756mm
30" / 750mm	15	14	12	6 ¼"/159mm	1 ¾"/44mm	32 ¾"/832mm
33" / 825mm	16	15	14	1 1/8"/29mm	2"/50mm	35 ¾"/908mm

Wire Fabric Cages – 6" (152mm) Spacing of Longitudinal Wire Centerlines

Pipe Size	Cage Circumference				Spacer Concrete Cover Size	Inside Diameter of Cage
	Spaces to Cut for 40" (1016mm) Dia. Long Lapped Splice	Spaces to Cut for 2" (50mm) Long Welded Splice	Full Spaces	Partial Space Length		
12" / 300mm	9	8	7	5/8"/16mm	¾"/19mm	13 7/8"/352mm
15" / 400mm	11	10	8	5 5/8"/143mm	1"/25mm	16 7/8"/429mm
18" / 450mm	12	11	10	3"/76mm	1 ¼"/31mm	19 7/8"/505mm
21" / 500mm	14	13	12	2"/50mm	1 ¼"/31mm	23 3/8"/594mm
24" / 600mm	16	15	13	5 7/16"/138mm	1 ½"/38mm	26 3/8"/670mm

27" / 700mm	18	17	15	4 ¼"/108mm	1 ½"/38mm	29 ¾"/756mm
30" / 750mm	19	18	17	1 11/16"/43mm	1 ¾"/44mm	32 ¾"/832mm
33" / 825mm	21	20	18	5 1/8"/130mm	2"/50mm	35 ¾"/908mm



Single Cage Guidelines for "B" Wall Pipe
Figure 10-5

Charts are based on the following assumptions:

1. Reinforcement location complies with ASTM C76 concrete pipe specifications.
2. For 12" - 33" (300mm-825mm) pipe sizes, 3/16" (4mm) diameter circumferential wire is used.
3. Cages are spaced to jacket, not core.
4. When cage is centered in jacket, spacers gap jacket by 1/8" (3mm).

Cage circumference is set to work with corresponding spacer size.

5. For wire fabric cages, steel is always cut next to longitudinal on same side of longitudinal each time.

Notes:

1. Cage circumferences in charts reflect starting points only. Final circumferences must be set to obtain proper spacer fit to jacket, to meet state and local codes, and to meet ASTM specifications. See attached instructions for more details.
2. See detail below to measure cage circumference for wire fabric cages.
3. For spiral wound cages, cage inside diameters are listed in charts below.
4. All dimensions are in inches.

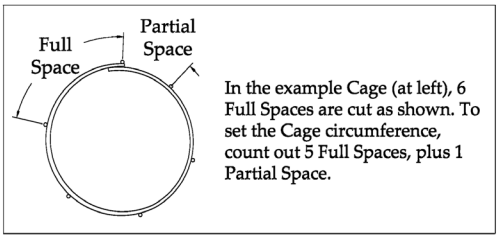
Wire Fabric Cages – 8" (203mm) Spacing of Longitudinal Wire Centerlines

Pipe Size	Spaces to Cut for 40" (1016mm) Dia. Long Lapped Splice	Spaces to Cut for 2" (50mm) Long Welded Splice	Cage Circumference		Spacer Concrete Cover Size	Inside Diameter of Cage
			Full Spaces	Partial Space Length		
12" / 300mm	7	6	5	5 ¾"/146mm	1 ¼"/31mm	14 3/8"/365mm
15" / 400mm	8	8	6	7 3/16"/183mm	1 ½"/38mm	17 3/8"/441mm
18" / 450mm	10	9	8	5/8"/16mm	1 ¾"/44mm	20 3/8"/518mm
21" / 500mm	11	10	9	3 5/8"/92mm	1 ¾"/44mm	23 7/8"/607mm
24" / 600mm	12	11	10	5"/127mm	2"/50mm	26 7/8"/683mm
27" / 700mm	13	13	11	6 7/16"/164mm	2 ¼"/57mm	29 7/8"/759mm
30" / 750mm	15	14	13	1 7/16"/37mm	2 ¼"/57mm	33 3/8"/848mm
33" / 825mm	16	15	14	2 7/8"/73mm	2 ½"/64mm	36 3/8"/924mm

Wire Fabric Cages – 6" (152mm) Spacing of Longitudinal Wire Centerlines

Pipe Size	Spaces to Cut for 40" (1016mm) Dia. Long Lapped Splice	Spaces to Cut for 2" (50mm) Long Welded Splice	Cage Circumference		Spacer Concrete Cover Size	Inside Diameter of Cage
			Full Spaces	Partial Space Length		
12" / 300mm	9	8	7	3 ¾"/95mm	1 ¼"/31mm	14 3/8"/365mm
15" / 400mm	11	10	9	1 1/8"/29mm	1 ½"/38mm	17 3/8"/441mm
18" / 450mm	13	12	10	4 5/8"/117mm	1 ¾"/44mm	20 3/8"/518mm
21" / 500mm	14	13	12	3 5/8"/92mm	1 ¾"/44mm	23 7/8"/607mm
24" / 600mm	16	15	14	1"/25mm	2"/50mm	26 7/8"/683mm
27" / 700mm	17	17	15	4 ½"/114mm	2 ¼"/57mm	29 7/8"/759mm
30" / 750mm	19	18	17	3 ½"/89mm	2 ¼"/57mm	33 3/8"/848mm

33" / 825mm	21	20	19	7/8"/22mm	2 ½"/64mm	36 3/8"/924mm



Single Cage Guidelines for "C" Wall Pipe
Figure 10-6

Setting Final Cage Circumference (Required on First Cage Only)

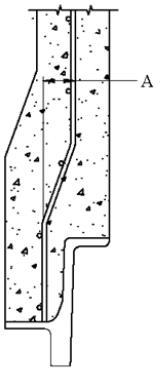
The cage circumferences shown in ***Figure 10-5*** and ***Figure 10-6*** reflect a starting point only. Final circumference is based on a spacer fitting to jacket. The spacer is to gap the jacket by 1/8" (3mm) per side (i.e., if the cage is pushed to one side, it would have a 1/4" (6mm) total gap). Adjust the cage circumferences given in ***Figure 10-5*** and ***Figure 10-6*** as required for proper fit of spacer to jacket.

After getting the cage to final circumference, check that the concrete cover to the pipe inner surface meets state and local codes as well as ASTM. Also check that the final splice lap meets all required specs.

Single Cage "C" Wall Pipe Reinforcement Position

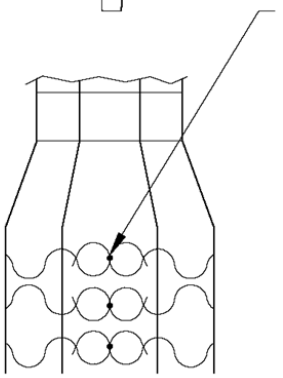
On single cage "C" wall pipe the cage circumference may be large enough that the longitudinals will not rest on the upper flange of the pallet. If this is the case, there are three alternatives:

1. "Wiggle" wire may be used for reinforcement in the bell area of the pipe. The bell area is expanded with a bell expander so that the bottom of the cage rests on the bottom flange of the pallet. See ***Figure 10-7*****.**
2. Standard reinforcement wire may be used and the ends of the longitudinals may be bent in at the bottom so that they will rest on the upper flange of the pallet.
3. In some cases, it may be acceptable to use a "B" wall cage in "C" wall pipe, as long as it is within ASTM permissible wire variation. ASTM allows permissible wire variation outside the range of 35% to 50% of the wall thickness from inner surface. For details see the ASTM code under section "Permissible Variations", sub-section "Position or Area of Reinforcement". Check that the ASTM permissible variation meets all required state and local codes.



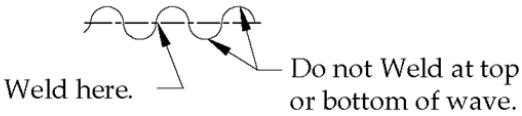
Specification to set Bell Diameter at bottom.

Keep dimension "A" to a minimum to keep Cage spring-back in sloping area of Bell to a minimum during pressureheading.

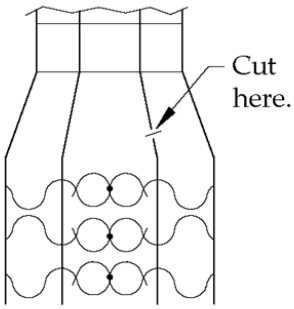


Welding of "Wiggle" Wire Splice.

Put one (1) weld ony at each "Wiggle" Wire splice. Do NOT weld in two (2) places as Bell Wire will not expand uniformly, because two (2) versus one (1) wire must stretch, causing the Bell to go off-center from the Barrel Section of the Pipe. Also, do not put weld at top or bottom of Cage "wave". Put weld only at center of wave as shown, as this helps Cage to expand uniformly.



Cutting of longitudinal steel in splice area.



At splice area where the (2) longtudinals are close together, this may cause Bell to not expand uniformly at splice area due to the unbalance in the number of longitudinals. Therefore, it may be required to cut the extra longitudinal(s) before expanding the Bell. The number of longitudinals to be cut depends on the length of the splice. Make cut in sloped section of the Bell as shown. Cut the extra longitudianls only if, after trying one cage on the Bell Expander, the Bell doesn't expand uniformly. Customer to verify that cutting the extra longitudinals meets state and local specifications.

Expanding Bell.

To expand the Bell, it is suggested that the Bell be expanded half-way, then close expander, turn Cage 90°, and expand the Bell the rest of the way. This may help make the Bell more concentric to the Barrel of the Pipe.

"Wiggle" Wire Bell Specifications
Figure 10-7

Bell Cage Wire for 8" (203mm) CL to CL Longitudinals

19.1.1.6 Joint Style: H-361

Figure 10-8 is based on the following assumptions:

- 3/16" (4mm) diameter longitudinal wires.
- Longitudinals to be to inside of circumferential wires.

Circumference on chart reflects starting points only. Final cage may vary from circumference on chart depending on diameter of longitudinals, building tolerance on reinforcement longitudinals, or other variables. To set circumference, proceed as follows:

1. Build (1) inside bell cage to chart specs with longitudinals to inside.
2. Put cage on pallet.
3. Check if inside longitudinals bear at pallet radius as shown on single cage guidelines in ***Figure 10-1.***

Bell Cage Wire for 6" (152mm) CL to CL Longitudinals

19.1.1.7 Joint Style: H-361

Figure 10-8 is based on the following assumptions:

- 3/16" (4mm) diameter longitudinal wires.
- Longitudinals to be to inside of circumferential wires.

Circumference on chart reflects starting points only. Final cage may vary from circumference on chart depending on diameter of longitudinals, building tolerance on reinforcement longitudinals, or other variables. To set circumference, proceed as follows:

1. Build (1) inside bell cage to chart specs with longitudinals to inside.
2. Put cage on pallet.
3. Check if inside longitudinals bear at pallet radius as shown on single cage guidelines, in ***Figure 10-1*.**

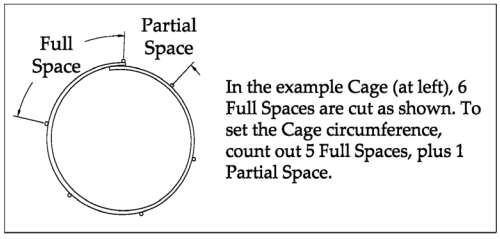
Bell Cage Wire for 8" (203mm) CL to CL Longitudinals

Pipe Size	Spaces to Cut for 40" (1016mm) Dia. Long Lapped Splice	Spaces to Cut for 2" (50mm) Long Welded Splice	*Cage Circumference	
			Full Spaces	Partial Space Length
12" / 300mm	8	7	6	5 11/16"/144mm
15" / 400mm	10	9	8	9/16"/14mm
18" / 450mm	11	10	9	1 15/16"/49mm
21" / 500mm	12	11	10	3 3/8"/86mm
24" / 600mm	13	12	11	4 13/16"/122mm
27" / 700mm	14	14	12	6 ¼"/159mm
30" / 750mm	16	15	14	9/16"/14mm
33" / 825mm	17	16	15	2"/50mm

Bell Cage Wire for 6" (152mm) CL to CL Longitudinals

Pipe Size	Spaces to Cut for 40" (1016mm) Dia. Long Lapped Splice	Spaces to Cut for 2" (50mm) Long Welded Splice	*Cage Circumference	
			Full Spaces	Partial Space Length
12" / 300mm	11	10	8	5 11/16"/144mm
15" / 400mm	13	12	10	4 9/16"/116mm
18" / 450mm	14	13	12	1 15/16"/49mm
21" / 500mm	16	15	13	5 3/8"/137mm
24" / 600mm	17	16	15	2 13/16"/71mm
27" / 700mm	19	18	17	¼"/6mm
30" / 750mm	21	20	18	4 9/16"/116mm
33" / 825mm	22	21	20	2"/50mm

*See Detail Below to Measure Cage Circumference



Bell Cage Wire Specifications – H-361 Joint Style
Figure 10-8

19.2 Pipe Reinforcement - Double Cage

Double Cage Wire Fabric Purchasing Guidelines

The guidelines that follow are to aid you in the purchasing of wire fabric used for reinforcement cages in products made on **Afinitas** pipe equipment. Read and understand the guidelines that follow because proper reinforcement and placement of the reinforcement is essential for producing quality concrete products. These guidelines serve only as an aid; the mesh you purchase must conform to all specifications, ASTM, state, local, etc. that apply to your particular application.

19.2.1.1 Circumferential Wires

Circumferential wire size and spacing is dependent upon the steel area requirements for the pipe being produced. Normally, for double cage pipe, a 2" (50mm) spacing between circumferential wires is recommended.

19.2.1.2 Longitudinal Wires

On a startup basis when pipe is first being produced, it is recommended that wire fabric be purchased with W3 or #6 gauge (approximately .1920 (5mm) diameter) longitudinal wires spaced on 8" (203mm) centers. Also, it is recommended that the longitudinal wires be placed so they are to the outside of the circumferential wires when the cages are rolled.

After the startup period when experience has been gained making pipe on the machine, you can experiment with the cages, if desired, by reducing the longitudinal wires to a smaller size. For example, W2.5 longitudinals could be tried rather than W3. Using a cage with too light of longitudinals will result in the cage deflecting during the pipe making process. Then, when the pipe is in the curing area, the cage will attempt to return to its original position, resulting in the pipe cracking.

Cage Length

Figure 10-9 shows a typical cross-section of a double cage pipe and its reinforcement. It is important that the cages are not too long or they may interfere with the header when it is placed in the pipe during the pressureheading process. If the header should contact the cage, the cage may bend or deflect during the pressureheading process and then stress relieve or return to its normal position when the pipe is curing, resulting in the pipe cracking.

19.2.1.3 Outer Cage

Figure 10-9 shows the length between the centerlines of the top and bottom circumferential wires of the outer cage to be 94" (2388mm). At the cage bottom, the longitudinal wires overhang the bottom circumferential wire by 1/2" (13mm) and at the top the longitudinal wires overhang the top circumferential wire by 1/2" (13mm).

19.2.1.4 Inner Cage

Figure 10-9 shows the length between the centerlines of the top and bottom circumferential wires of the inner cage to be 92" (2337mm). At the cage bottom, the longitudinal wires

overhang the bottom circumferential wire by 1/2" (13mm) and at the top the longitudinal wires overhang the circumferential wire by 1/2" (13mm).

In some cases, the customer may desire to use a particular wire fabric size for both inner and outer cages. In this case he should purchase the fabric with a 94" (2388mm) length between the top and bottom circumferential wires centerlines. When using the fabric as an inner cage, the customer may either cut the cage down to 92" (2337mm) or he may "shrink in" the top circumferential wire so it does not interfere with the snap ring in the header. This concept is illustrated in ***Figure 10-9***.

Double Cage Guidelines – Afinitas "QT" Joint Type

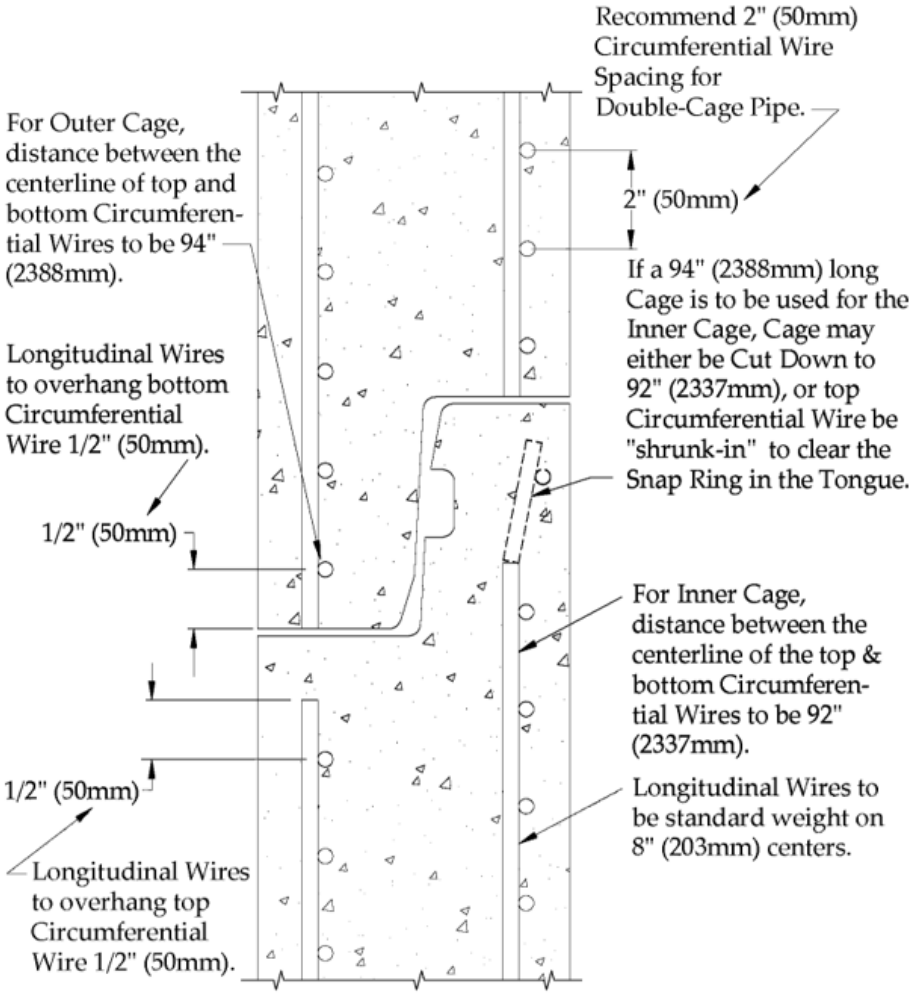


Figure 10-9

Production Checklist for Double Cages

1. **Cut Cage**

   See ***Figure 10-11***, ***Figure 10-12, Figure 10-13,*** and ***Figure 10-14*** for instructions for cage length.

   Note: Welded splices require 2" (50mm) minimum lap. Lapped splices require 40-diameter (1016mm) lap for plan wire, 20-diameter (508mm) lap for deformed wire, and lapped splices must contain a longitudinal.

   Cut cage next to longitudinal on same side of longitudinal each time. It is recommended the wire end that does not have the line wires overhanging the last longitudinal should remain in the cage roller.

2. **Roll**

   Roll cage to within 1" (25mm) of round. Avoid flat spots. On cages 60" (1524mm) and larger it may be necessary that the overhanging mesh passing through the roller be supported when it reaches approximately the half-way point and begins to curl downwardly due to the weight of the mesh. A pipe support directly above the roller, which is adjusted so that the cage will rest on it and maintain the proper diameter for the half of the cage coming through the roller, may be necessary.

3. **Prepare Cage for Welding**

   Put the overhanging line wires, which extend beyond the longitudinal to inside of cage (assuming longitudinal wire on outside of cage). Lap line wires side by side. See ***Figure 10-3*** for details.

   Space splice for proper diameter with four fixtures. See ***Figure 10-3*** for details to make fixture.

   Hold the splice area to same roundness as rest of cage.

4. **Weld Splice**

   Weld every line wire on inner and outer cage. Weld strength to be at least 50% of wire strength.

   If required to help hold the splice area round, stagger welds by welding from alternate ends of splice wires. See ***Figure 10-3*** for details.

   A 1/8" (3mm) 6011 arc electrode is suggested for arc welding.

5. **Recheck Roundness**

   Recheck cage. Must be within 1" (25mm) of round, especially across splice. Reshape if needed.

6. **Nest and Set on Pallet**

   Nest inner and outer cages and set on bottom pallet. This is typically done with cages horizontal.

7. **Offset Splices**

   Align inner and outer cage splices to be 90° from each other.

8. Install Spa-Stirs

Refer to ***Figure 10-10*** showing double cage spacer placement guidelines. Install (4) Spa-Stirs at 90° on each row from center inner cage to outer cage before installing remainder of Spa-Stirs. The proper number of Spa-Stirs per row for various pipe sizes can best be found by actual usage.

Spa-Stirs must be level. If the line wires of the inner and outer cage do not line up, hook to longitudinal wire.

The last Spa-Stir in each row should be forced into place with a definite snap and should slightly deform the cage between the Spa-Stir. A pry bar can be used to assist in deforming the cage to make the last Spa-Stirs go on easier.

Put Spa-Stir on in splice area first, as these are hard to put on if you wait until last.

Install Spa-Stirs with loop to jacket.

9. Inspect

Check Spa-Stirs properly tensioned.

Check the splice for roundness.

Procedure to Set Final Cage Circumference for Double Cage Reinforcement

1. Cut and roll cages to circumference as shown in ***Figure 10-11***, ***Figure 10-12, Figure 10-13,*** and ***Figure 10-14***. Do not weld the inner cage, as it must be adjusted. However, weld outer cage to circumference as shown in ***Figure 10-11***, ***Figure 10-12, Figure 10-13,*** and ***Figure 10-14***. Weld to specs as called out in ***Figure 10-3***.

2. Put the inner cage inside the outer cage and set them on a pallet. Twist the cage splices so they are offset by 90°. Clamp the line wire splice near the center of the inner cage with a vise grip. Install (4) Spa-Stirs 90° apart near line wire clamped with vise grip. These (4) Spa-Stirs are used to center the inner cage to the outer cage before the remaining Spa-Stirs are put in place. Be sure Spa-Stirs are level. If the inner and outer cage line wires do not line up, hook to longitudinal. If circumference of inner cage is too small to allow installation of all (4) Spa-Stirs, increase circumference by easing up on vise grip. Then place Spa-Stirs continuously around the cage on 8" (203mm) centers at the same elevation as the (4) Spa-Stirs already on cage.
    - For jacket strip, place loop to jacket (outside.)
    - For core strip, place loop to core (inside.)

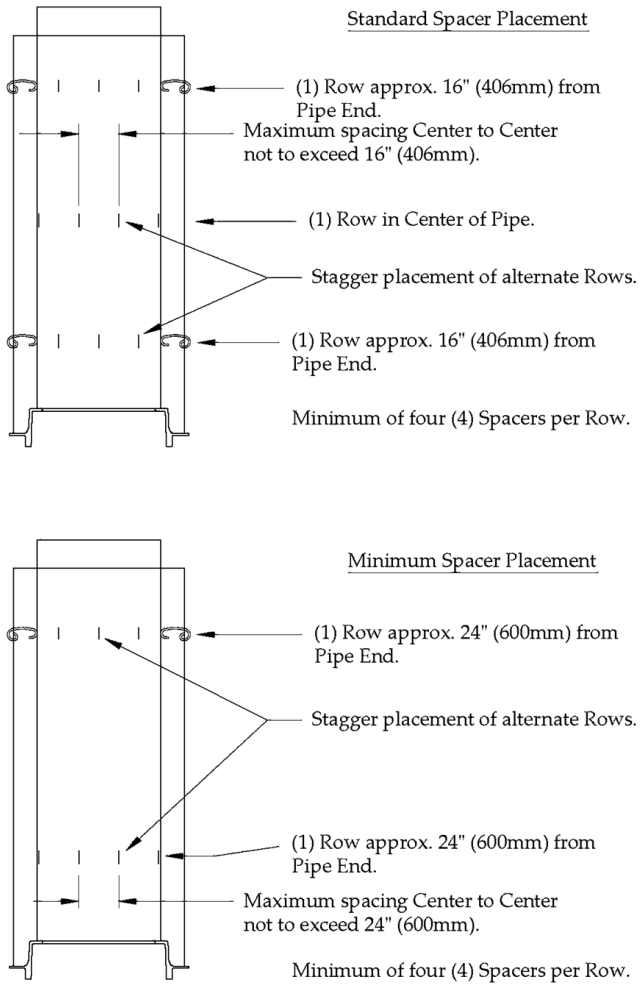
3. With Spa-Stirs installed, pull inner cage splice together until all Spa-Stirs are tensioned. Measure the partial space at cage lap area and subtract 1/2" (13mm) from this dimension. Use this dimension to produce the first inner cage. Subtracting 1/2" (13mm) from the circumference will ensure that the Spa-Stirs are under proper tension when installed on finished cage.

4. Remove Spa-Stirs and weld inner cage to circumference set above. Use weld specs as called out ***Figure 10-3***.

5. Place inner and outer cage on pallet and install Spa-Stirs as called out on double cage production checklist above.

6. Place jacket over complete cage and observe gap from Spa-Stir loop to jacket wall. Loop should gap wall by 1/8" (3mm) per side, i.e. if cage pushed to one side would have 1/4" (6mm) total gap. If you do not have these gaps, adjust the inner cage and outer cage equally until Spa-Stir loop gaps jacket wall by 1/8" (3mm) per side. Check final cage for proper Spa-Stir tension and that splice laps meet all required specs. Adjust cages as required. Also, check concrete cover of inner cage to core meets state and local codes as well as ASTM. If not, a different Spa-Stir must be used and the above procedure must be repeated.

7. Record adjusted inner and outer cage circumference (final circumference) in the chart for later reference.



NOTE: Minimum Spacer placement my be used if Cage Roundness is better than average, and concrete cover requirements are less demanding. Production testing must be done to insure that your Spacing Specifications are being met.

Placement of Spacers for Double Cage Pipe
Figure 10-10

Double Cage Wall "B" Chart

Figure 10-11 and ***Figure 10-13*** are based on the following specifications:

- ASTM C76 Specification
- 8" (203mm) Longitudinal CL to CL
- Wall "B" Pipe
- 2" (50mm) CL to CL Circumferential Wires - 1/4" (6mm) Diameter
- Cage circumference set for 1-1/8" (29mm) cover on cage that has spacer loop on it and 1" (6mm) cover on cage without loop. Spacer loop to outside on jacket strip.
  Note: Cage circumferences in *Figure 10-11* for 8" spacing and *Figure 10-13* for 6" spacing reflect starting points only. Final circumferences are set based on spacer fit to jacket or core and with respect to fit between cages. See instructions for more details.

Double Cage Wall "C" Chart

Figure 10-12 and ***Figure 10-14*** are based on the following specifications:

- ASTM C76 Specification
- 8" (203mm) Longitudinal CL to CL
- Wall "C" Pipe
- 2" (50mm) CL to CL Circumferential Wires - 1/4" (6mm) Diameter
- Cage circumference set for 1-1/8" (29mm) cover on cage that has spacer loop on it and 1" (25mm) cover on cage without loop. Spacer loop to outside on jacket strip.
  Note: Cage circumferences in *Figure 10-12* for 8" spacing and *Figure 10*-14 for 6" spacing reflect starting points only. Final circumferences are set based on spacer fit to jacket or core and with respect to fit between cages. See instructions for more details.

  Charts are based on the following assumptions:

  1. ASTM C76 Specification
  2. 8" (203mm) Longitudinal CL to CL
  3. "B" Wall Pipe
  4. 2" (50mm) CL to CL, 1/4" (6mm) diameter circumferential wires.
  5. Cage circumference is set for 1 1/8" (29mm) cover on cage that has spacer loop on it, and 1" (25mm) cover on cage without loop. Spacer loop to jacket-on-jacket strip.

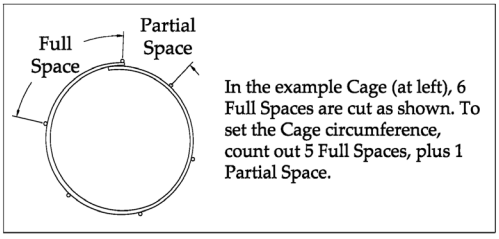
Note: Cage circumferences in charts reflect starting points only. Final circumferences must be set to obtain proper spacer fit to jacket, to meet state and local codes, and to meet ASTM specifications. See attached instructions for more details.

Inner Cage for "B" Wall Jacket Strip - 8" (203mm) Spacing of Longitudinal Wire Centerlines

Pipe Size	Spaces to Cut for 40" (1016mm) Diameter Lap	Spaces to Cut for 2" (50mm) Long Welded Splice	Cage Circumference		Inside Diameter of Cage
			Full Spaces	Partial Space Length	
36" / 900mm	17	16	15	3/16"/3mm	38"/965mm
42" / 1100mm	19	18	17	3"/76mm	44"/1118mm
48" / 1200mm	21	20	19	5 7/8"/149mm	50"/1270mm
54" / 1400mm	24	23	22	11/16"/17mm	56"/1422mm
60" / 1500mm	26	25	24	3 9/16"/90mm	62"/1575mm
66" / 1650mm	29	28	26	6 7/16"/164mm	68"/1727mm
72" / 1800mm	31	30	29	1 ¼"/29mm	74"/1880mm

Outer Cage for "B" Wall Jacket Strip - 8" (203mm) Spacing of Longitudinal Wire Centerlines

Pipe Size	Spaces to Cut for 40" (1016mm) Diameter Lap	Spaces to Cut for 2" (50mm) Long Welded Splice	Cage Circumference		Inside Diameter of Cage
			Full Spaces	Partial Space Length	
36" / 900mm	18	17	16	2 3/8"/60mm	41 ¼"/1048mm
42" / 1100mm	21	20	19	3/8"/10mm	48 ¼"/1226mm
48" / 1200mm	24	23	21	6 3/8"/162mm	55 ¼"/1403mm
54" / 1400mm	26	25	24	4 3/8"/111mm	62 ¼"/1581mm
60" / 1500mm	29	28	27	2 5/16"/59mm	69 ¼"/1759mm
66" / 1650mm	32	31	30	5/16"/8mm	76 ¼"/1937mm
72" / 1800mm	35	34	32	6 5/16"/160mm	83 ¼"/2115mm



Double Cage Guidelines for "B" Wall Pipe – 8" (203mm) Wire Spacing
Figure 10-11

Charts are based on the following assumptions:

1. ASTM C76 Specification
2. 8" (203mm) Longitudinal CL to CL
3. "C" Wall Pipe
4. 2" (50mm) CL to CL, 1/4" (6mm) diameter circumferential wires.
5. Cage circumference is set for 1 1/8" (29mm) cover on cage that has spacer loop on it, and 1" (25mm) cover on cage without loop. Spacer loop to jacket-on-jacket strip.

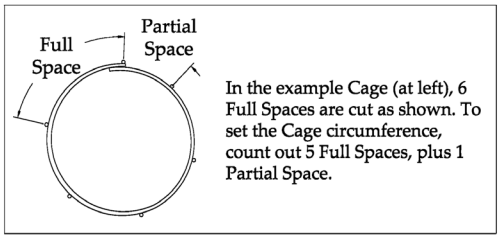
Note: Cage circumferences in charts reflect starting points only. Final circumferences must be set to obtain proper spacer fit to jacket, to meet state and local codes, and to meet ASTM specifications. See attached instructions for more details.

Inner Cage for "C" Wall Jacket Strip - 8" (203mm) Spacing of Longitudinal Wire Centerlines

Pipe Size	Spaces to Cut for 40" (1016mm) Diameter Lap	Spaces to Cut for 2" (50mm) Long Welded Splice	Cage Circumference		Inside Diameter of Cage
			Full Spaces	Partial Space Length	
36" / 900mm	17	16	15	3/16"/3mm	38"/965mm
42" / 1100mm	19	18	17	3"/76mm	44"/1118mm
48" / 1200mm	21	20	19	5 7/8"/149mm	50"/1270mm
54" / 1400mm	24	23	22	11/16"/17mm	56"/1422mm
60" / 1500mm	26	25	24	3 9/16"/90mm	62"/1575mm
66" / 1650mm	29	28	26	6 7/16"/164mm	68"/1727mm
72" / 1800mm	31	30	29	1 ¼"/29mm	74"/1880mm

Outer Cage for "C" Wall Jacket Strip - 8" (203mm) Spacing of Longitudinal Wire Centerlines

Pipe Size	Spaces to Cut for 40" (1016mm) Diameter Lap	Spaces to Cut for 2" (50mm) Long Welded Splice	Cage Circumference		Inside Diameter of Cage
			Full Spaces	Partial Space Length	
36" / 900mm	19	18	16	7 1/8"/181mm	42 ¾"/1086mm
42" / 1100mm	21	20	19	5 1/6"/129mm	49 ¾"/1264mm
48" / 1200mm	24	23	22	3 1/6"/78mm	56 ¾"/1441mm
54" / 1400mm	27	26	25	1 1/16"/27mm	63 ¾"/1607mm
60" / 1500mm	30	29	27	7 1/16"/179mm	70 ¾"/1797mm
66" / 1650mm	32	31	30	5 1/16"/129mm	77 ¾"/1975mm
72" / 1800mm	35	34	33	3 1/16"/78mm	84 ¾"/2152mm



Double Cage Guidelines for "C" Wall Pipe – 8" (203mm) Wire Spacing
Figure 10-12

Charts are based on the following assumptions:

1. ASTM C76 Specification
2. 6″ (152mm) Longitudinal CL to CL
3. "B" Wall Pipe
4. 2″ (50mm) CL to CL, 1/4″ (6mm) diameter circumferential wires.
5. Cage circumference is set for 1 1/8″ (29mm) cover on cage that has spacer loop on it, and 1″ (25mm) cover on cage without loop. Spacer loop to jacket-on-jacket strip.

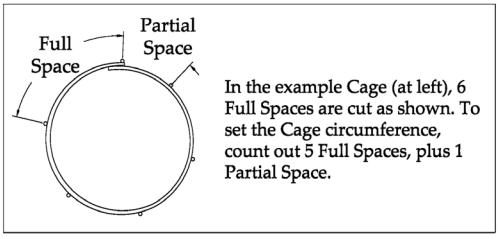
Note: Cage circumferences in charts reflect starting points only. Final circumferences must be set to obtain proper spacer fit to jacket, to meet state and local codes, and to meet ASTM specifications. See attached instructions for more details.

Inner Cage for "B" Wall Jacket Strip - 6" (152mm) Spacing of Longitudinal Wire Centerlines

Pipe Size	Spaces to Cut for 40″ (1016mm) Diameter Lap	Spaces to Cut for 2″ (50mm) Long Welded Splice	Cage Circumference		Inside Diameter of Cage
			Full Spaces	Partial Space Length	
36″ / 900mm	22	21	20	3/16″/3mm	38″/965mm
42″ / 1100mm	25	24	23	1″/25mm	44″/1118mm
48″ / 1200mm	28	27	26	1 7/8″/48mm	50″/1270mm
54″ / 1400mm	32	30	29	2 11/16″/68mm	56″/1422mm
60″ / 1500mm	35	33	32	3 9/16″/90mm	62″/1575mm
66″ / 1650mm	38	37	35	4 7/16″/113mm	68″/1727mm
72″ / 1800mm	41	40	38	5 ¼″/133mm	74″/1880mm

Outer Cage for "B" Wall Jacket Strip - 6" (152mm) Spacing of Longitudinal Wire Centerlines

Pipe Size	Spaces to Cut for 40″ (1016mm) Diameter Lap	Spaces to Cut for 2″ (50mm) Long Welded Splice	Cage Circumference		Inside Diameter of Cage
			Full Spaces	Partial Space Length	
36″ / 900mm	24	23	21	4 3/8″/111mm	41 ¼″/1048mm
42″ / 1100mm	28	26	25	2 3/8″/60mm	48 ¼″/1226mm
48″ / 1200mm	31	30	29	3/8″/10mm	55 ¼″/1403mm
54″ / 1400mm	35	34	32	4 3/8″/111mm	62 ¼″/1581mm
60″ / 1500mm	39	37	36	2 5/16″/59mm	69 ¼″/1759mm
66″ / 1650mm	42	41	40	5/16″/8mm	76 ¼″/1937mm
72″ / 1800mm	46	45	43	4 5/16″/110mm	83 ¼″/2115mm



Double Cage Guidelines for "B" Wall Pipe – 6″ (152mm) Wire Spacing
Figure 10-13

Charts are based on the following assumptions:

1. ASTM C76 Specification
2. 6″ (152mm) Longitudinal CL to CL
3. "C" Wall Pipe
4. 2″ (50mm) CL to CL, 1/4″ (6mm) diameter circumferential wires.
5. Cage circumference is set for 1 1/8″ (29mm) cover on cage that has spacer loop on it, and 1″ (25mm) cover on cage without loop. Spacer loop to jacket-on-jacket strip.

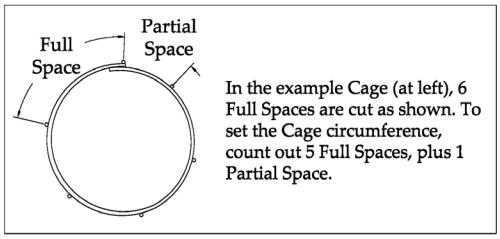
Note: Cage circumferences in charts reflect starting points only. Final circumferences must be set to obtain proper spacer fit to jacket, to meet state and local codes, and to meet ASTM specifications. See attached instructions for more details.

Inner Cage for "C" Wall Jacket Strip - 6" (152mm) Spacing of Longitudinal Wire Centerlines

Pipe Size	Spaces to Cut for 40″ (1016mm) Diameter Lap	Spaces to Cut for 2″ (50mm) Long Welded Splice	Cage Circumference		Inside Diameter of Cage
			Full Spaces	Partial Space Length	
36″ / 900mm	22	21	20	3/16″/3mm	38″/965mm
42″ / 1100mm	25	24	23	1″/25mm	44″/1118mm
48″ / 1200mm	28	27	26	1 7/8″/48mm	50″/1270mm
54″ / 1400mm	32	30	29	2 11/16″/68mm	56″/1422mm
60″ / 1500mm	35	33	32	3 9/16″/90mm	62″/1575mm
66″ / 1650mm	38	37	35	4 7/16″/113mm	68″/1727mm
72″ / 1800mm	41	40	38	5 ¼″/133mm	74″/1880mm

Outer Cage for "C" Wall Jacket Strip - 6" (152mm) Spacing of Longitudinal Wire Centerlines

Pipe Size	Spaces to Cut for 40″ (1016mm) Diameter Lap	Spaces to Cut for 2″ (50mm) Long Welded Splice	Cage Circumference		Inside Diameter of Cage
			Full Spaces	Partial Space Length	
36″ / 900mm	25	24	22	2 5/16″/59mm	42 3/4″/1086mm
42″ / 1100mm	28	27	26	5/16″/8mm	49 3/4″/1264mm
48″ / 1200mm	32	31	29	4 1/4″/108mm	56 3/4″/1441mm
54″ / 1400mm	36	35	33	2 1/4″/57mm	63 3/4″/1619mm
60″ / 1500mm	39	38	37	1/4″/6mm	70 3/4″/1797mm
66″ / 1650mm	43	42	40	4 1/4″/108mm	77 3/4″/1964mm
72″ / 1800mm	47	45	44	2 1/4″/57mm	84 3/4″/2153mm



Double Cage Guidelines for "C" Wall Pipe – 6″ (152mm) Wire Spacing
Figure 10-14

19.3 Manholes - Reinforcement Hints

This section of the manual contains information that can be helpful when preparing reinforcement cages for your manhole products. Read and understand these guidelines because proper reinforcement placement is essential for producing quality manhole products. These guidelines can be changed to meet your particular application. However, be sure to comply with the standard specifications, C 478, for precast reinforced concrete manhole sections.

Mesh & Spiral Cages

19.3.1.1 Mesh Cages

Steel mesh can be used satisfactorily on straight wall manhole riser sections. It is suggested that either 2” x 8” (50mm x 203mm) or 3” x 8” (76mm x 203mm) mesh with 5 gauge (3mm) longitudinals be used because it can be hand formed. Using mesh with a greater spacing than this, 4" (180mm) for example, is too heavy to hand form and must be formed with a mesh roller. If possible, place mesh so the factory overhang is located at the bottom of the product to bear on the pallet. If the bottom overhang is to be cut, be sure to use a gauge so all cross-wires are cut to the same length. Mesh, which is cut unevenly, will not bear solidly on the pallet and may deflect when the product is pressureheaded. Thus, after the product is stripped the cage may spring back to its original shape and crack the product.

Mesh cages are not recommended in cones. Not only do they take a large amount of time to construct, but there may also be areas in the cage that are crisscrossed with two layers of mesh, which will prevent the concrete from flowing properly through the mesh, causing voids in the product wall. Also, mesh cages are seldom rigid enough to provide support for the sloped sections of the cone.

For cones, use accurately formed rigid cages, such as those produced by the **Afinitas Cage Machine**.

19.3.1.2 Spiral Cages

Spiral cages can be used satisfactorily on both straight wall riser and cone sections. Spiral cages can be constructed quickly and accurately to assure proper concrete cover in the product wall. As true with mesh, the cross-wires of the spiral cage should be positioned evenly at the bottom of the cage to assure that it will rest solidly on the pallet.

To keep the reinforcement cages positioned accurately in the form it is suggested that Ca-Jax cage spacing jacks be attached to the cage. Apply two rows of spacing jacks with approximately six spacing jacks on each row. Place the top row of spacing jacks 6" to 8" (152mm to 203mm) from the cage top; bottom row approximately 6" to 8" (152mm to 203mm) from the cage bottom.

Note: Do not cut or bend the vertical wires for spacing the reinforcement cage. Cutting vertical wires will weaken the cage and cause it to bend or deflect when the product is being pressureheaded. After the product is stripped the cage may spring back to its original shape and crack the product.

Cage Diameter

ASTM Specification C 478 states that reinforcement in manhole sections be placed in the center one-third of the wall. For 5" (127mm) thick straight wall sections it is suggested that the reinforcement cage be placed in the wall section to provide 1-3/4" (44mm) concrete cover between the cage and the outside wall. For 6" (152mm) thick straight wall sections maintain 2" (50mm) of concrete cover to the outside wall.

For manhole cones keep the reinforcement cage to the inside of the center one-third wall on the slope section of the cone. For 5" (127mm) thick walls maintain 1-3/4" (44mm) concrete cover between the cage and inside wall. For 6" (152mm) thick sections maintain 2" (50mm) of concrete cover. On eccentric cones position the cage in the straight wall section of the cone to the outer one-third of the wall, same as straight wall or riser sections.

Placing the reinforcement in the product as suggested above will help support the product after it has been stripped free of the core and jacket, preventing the product walls from "falling out" or “slabbing off” before the concrete sets up.

Cage Length

ASTM Specification C 478 states that circumferential reinforcement be placed in either the tongue or groove of the product. **Afinitas** recommends that reinforcement be placed in the groove or bell of the product because in field application, especially with o-ring joints, the groove is in tension while the tongue is in compression. Therefore, to protect against "bell pop" it is recommended that the steel be placed in the groove or bell of the product.

It is important that the reinforcement cages are not made too long. The cage must not interfere with the header when it is placed onto the product during the pressureheading operation. If the header hits the cage, the cage may bend when the header is forced down into its proper position. It is recommended that a distance of not less than 1" (25mm) be maintained between the cage top and the header bottom.

19.3.1.3 Groove Down Products

For manhole sections produced with groove down, **Afinitas** suggests that the reinforcement cage be set in the form so the cage's cross wires bear solidly in the groove of the bottom pallet with the bottom line of circumferential wire approximately 2" (50mm) above the groove bottom.

The cage should extend upward in the product wall so the top line of circumferential wire is approximately 3" (76mm) from the product top (not including tongue.)

19.3.1.4 Tongue Down Products

For manhole sections produced with the groove up, **Afinitas** suggests that the reinforcement cage be set in the form so the cage's cross wires rest evenly on the bottom pallet (not in the tongue section), with the bottom line of circumferential wire approximately 2" (50mm) up from the pallet.

The cage should extend upward in the product wall, so the top line of circumferential wire is positioned in the product's groove approximately 2" (50mm) down from the top of the groove.

Note: If the reinforcement cage interferes with the product layholes or stepholes the dimensions given above for the position of the circumferential wires can be adjusted to clear the product layholes or stepholes.

Notes

20 Typical Methods of Handling Concrete Pipe and Joint Rings

SS CAP 72 Machine

Machine Serial No. CP-430

Notes

A variety of methods are used to move finished pipe from the plant to the yard. Retrieval of joint rings can also be done in several ways. Many factors such as level of mechanization, production tonnage, pipe size, climate and past experience should be considered in selecting the method best suited for your operations.

To help in making your selection, we illustrate a variety of typical methods which we have observed in use in several plants using **Afinitas** equipment. Use of any combination of these methods can help make the job safer and easier.

WARNING: Handling of pipe and joint rings can be hazardous. Establish and enforce safe working procedures.

20.1 Removal and Handling of Pallets and Headers

To assist in the removal, joint rings are equipped with holes, knock-off lugs, or both. It is important that proper procedures are used for removal to prevent damage to rings and the product. Following these steps will give the best results.

5. Pipe should be laid horizontally across runners of a size to keep the bells clear of the ground. Pipe should be spaced to allow a minimum of 1" between bells.
6. Use of air hammers or other power tools not specifically designed to duplicate the action of the slide hammers will damage joint rings.

   CAUTION: Driving wedges between concrete and the joint ring will destroy the ring.
7. The use of a proper release agent is essential to the clean and easy removal of joint rings. Proper release agents should keep the ring surfaces that come in contact with the concrete clean. If not clean, cleaning of the sloped 2^{o} surfaces will be necessary to assure smooth slip-out surfaces.
8. For efficient ring removal, always use two slide hammers operating simultaneously at 180^{o}. This method will be at least four times faster and require one-half the work of using a single hammer.

WARNING: Improper use of the slide hammers can cause cumulative trauma injuries. Frequent changes in work patterns are required to prevent injury.

For example, on a small pipe, knock off enough rings for one transport stack. Stacking of these rings should give the required work pattern change to prevent injury. Other work pattern changes could be cleaning and oiling of the pallet seal surface or removing of snap rings on O-ring joint rings.

- Pull the joint ring off parallel to the cured pipe to prevent cocking or wedging in the pipe. A very small amount of misalignment can easily damage the joint.
- The concrete surfaces, the I.D. and O.D. of the rings and the two areas of the pallet where the jacket and core seal meet must be cleaned and oiled Daily.

CAUTION: Use of a larger than 3 lb. hammer will damage or destroy joint rings.

Header Removal

It is important that headers be removed as soon as possible after removal from the curing area and while they are still warm. The reason for this is that cast iron headers cool faster than the more

massive concrete pipe and tend to shrink causing them to grip tighter to the concrete. Removal before this shrinkage occurs will be easier. Pallets should be removed last, as this shrinkage will help their removal.

Follow these steps for removal of headers:

7. Use two slide hammers at 180^{o} as explained above, to remove the header. Six or eight blows on pipe diameter sizes 12-24 should be adequate.

CAUTION: Removal of small diameter headers must be done carefully and correctly to prevent damage to the delicate tongue area. To accomplish this, three major problems must be overcome.

8. **Concrete to Header Bond.** Breaking the bond of the concrete to the header on the 2^{o} slope must be done very carefully. This is best done with force which puts the concrete in compression rather than tension. Concrete in compression has approximately 4,000 PSI strength. In tension, this is only about 400 PSI. With the pipe laying horizontally, a medium blow on each of the six header lugs with a 3 lb. hammer should break this bond. This blow should be aimed toward the bottom of the pipe and strike the top of the lugs. Use of a medium sized air-powered chipping hammer with a blunt tool makes this job easier. After the bond is broken, use the **Afinitas** slide hammers starting lightly until the bond is totally broken.

9. **Cocking of Rings.** Small bore rings need cock only a fraction of an inch to put a very heavy cantilevered inward load on the tip of the delicate tongue. Great care must be taken to take the ring off squarely.

10. **Ring Release Agent.** Joint ring release agents should accomplish two things. They should break the bond between the concrete and the joint ring and they should keep the joint rings clean. Any concrete buildup will cause increased friction on the 2^{o} slope and make joint ring removal more difficult.

    Experience has shown that a release agent that works well in one geographical area may or may not work in another area. We believe that this is due to the differences in the chemical makeup of cement, aggregate, and water.

    Our recommendations are to test various release agents until you find one that is compatible with your materials. We recommend the use of one release agent for a minimum of two weeks to get a fair test.

    If your present source cannot furnish an adequate release agent, contact **Afinitas** for additional sources.

11. Remove and mate snap rings, if so equipped, to headers securely enough for transport to cleaning facilities.

12. Stack for pickup with lugs "nested". This will allow more rings to be transported per fork and will make the stack self-supporting.

Pallet Removal

Follow these steps for the removal of pallets:

5. In order to avoid severe damage or destruction of the pallet, do not strike or pry the pallet on the outer seal flange. The use of hammers on the outer-machined seal area of the pallet will destroy the pallet seal capability by chipping the outside diameter.

6. Before removal, the machined seal area where the O-ring seal of the core contacts the pallet must be cleaned and oiled. Concrete residue in this area will destroy the O-ring seals of the core.

7. The first step in pallet removal should be a series of medium strength tapping on four points all around the inside sloped surface of the pallet with a 3 lb. hammer. This procedure will tend to loosen the pallet for easier removal.

8. After hammer tappings described above, two methods can be used to complete the pallet removal process. They are:

    - Insert slide hammers in holes cast into legs and remove pallet using medium strength blows.
    - Tap on raised knock-off lugs.

Notes

21 Cleaning

SS CAP 72 Machine

Machine Serial No. CP-430

Notes

21.1 Cleaning

This section contains a description of the cleaning which is to be carried out in order to ensure reliable operation of the machine. This chapter states guidelines for cleaning the machine.

During cleaning of the plant, the main switch must be switched off and locked with a padlock. The key must be kept by the person in charge of the work.

Further safety regulations regarding cleaning and maintenance are stated in the *Safety* section.

If the equipment is not clean, quality pipe/products cannot be produced. Therefore, care must be taken with the daily cleaning of the machine and mould equipment.

Daily Cleaning

This section contains guidelines for the daily cleaning, which is to be carried out on the plant.

At the end of the production day all of the remaining concrete must be removed. There must be no concrete in the concrete hopper or on the feeding belt.

Normally the cleaning can be carried out by using a scraper or similar tool and wiping with rags to remove the remaining concrete. Do not use water on or around the machine as this will make any concrete remains stick. If it is necessary to use water or cleaning chemicals for the cleaning, never point water sprayers as well as other cleaning materials directly toward the electric components. Doing so can allow the water or cleaning materials penetrate the components. This can cause major damage to the electrical components.

Remove all concrete remains on the vibration tabletop, mounting beams, and/or core suspension.

Wipe mould equipment and scrape off concrete remains. Especially by the air bleeds as concrete remains must be scraped off in order that they do not accumulate.

Wipe mould and core with a rag or a stiff brush

Clean thoroughly all contact faces with rubber packing on mould and core as dirt tends to accumulate where two mould parts are assembled.

After the cleaning a thin coat of mould oil should be applied to all surfaces which are in contact with the concrete except for the rubber feeding belt. This will help prevent the concrete from sticking to the components during the next production shift.

Clean thoroughly all contact faces with rubber packing on mould and core as dirt tends to accumulate where two mould parts are assembled.

General Cleaning

At scheduled intervals, the machine needs to be thoroughly cleaned. Every part of the machine needs to be completely inspected and cleaned of any remaining or built-up concrete, dirt, excess oil, etc. Additionally, during this cleaning time, the machine should be inspected for any worn or broken parts.

Regular cleaning and maintenance are the key to ensuring a long life for the machine and mould equipment.

21.2 Machine Clean Up Instructions

It is important that the machine and form equipment be cleaned thoroughly of concrete, slurry, etc. after each production shift to insure proper operation of the machine. Do not hammer concrete off components because the dents that result will only cause more severe concrete build up in the future.

Production Station Base

It is important that the machine base be kept free of built-up concrete. This can best be accomplished by thoroughly cleaning the base every night and coating it with a concrete release agent.

Concrete Feeder

The concrete hopper walls and other concrete-contact surfaces should be scraped clean. It is suggested that this be done twice daily.

IMPORTANT: Do not hammer built up concrete off the hopper walls as this will cause roughness and dents in the walls which will tend to make concrete stick much worse.

After scraping clean, the concrete contact surfaces of the hopper walls should be coated sparingly with oil or a concrete release agent. Do not permit oil or the release agent to get on the rubber conveyor belt or drive pulleys because the belt will slip, and the rubber may deteriorate.

Form Equipment

Keep all forms polished and oiled to protect against rust and concrete buildup.

1. Use a burlap bag and rub the concrete contact surfaces of the form until the surface appears shiny.
2. It is not necessary to oil the forms before use. However, if the forms are to be stored outside, it is recommended that they be oiled. The polish on the form equipment has a definite relationship to the concrete product's finish.
3. At the end of each day's run, the pallet locks should be thoroughly cleaned in oil.

a. The pallet locks should be inspected for proper operation after cleaning up.
b. If p-locks are sticking, correct before using.
c. Check the air valve that is used to actuate the p-locks. This valve and its safety lock must be in proper operating condition to make sure that the valve does not accidentally actuate during pipe production.

Pallets and Headers

The finish of the concrete contact surfaces will have a definite relationship to the finish of the concrete in the joint.

NOTE: Refer to *Removal and Handling of Pallet and Headers* (pg. 14.1/20.1) for detailed instructions on how to remove headers and pallets from the finished product.

The following procedures should be followed to assure an acceptable contact surface:

1. Keep all pallets and headers clean and oiled.
   a. Pallets and Headers should be polished until shiny in order to facilitate removal from the hardened product.
   b. Before use, spray both the pallets and headers with oil or a concrete release agent.
      - Ordinary waste oil may be used. However, a variety of release agents may also be used.
      - Make sure to oil behind the snap ring before it is placed in the header to prevent binding when it is removed from the header.
2. Always store the pallets and headers flat.
   a. Both cast iron and steel fabricated joint equipment tend to stress relieve with age and they could distort if subjected to undue side pressure.
      - Cast iron is normally used for joint equipment to provide maximum strength and rigidity at minimum cost. Although adequate in strength for normal operation, cast iron may break if dropped or carelessly handled.

21.3 General Maintenance and Service

Due to the severe vibration involved in a vibration product machine, the machine operator should be trained to keep an eye open for vibration damage. This will include loose bolts, rubbing rubber cords or hoses, and any metal to metal contact. Periodically, check to be sure that all nuts on bolts are tight, all cotter pins are spread, and all hair pins are in place.

Lubricate all moving parts and pivot points. All parts should work smoothly. Make sure grease fittings are firmly installed and free of dirt before lubricating.

After daily operation of the machine, clean up the machine as mentioned in **Machine Clean Up Instructions**.

Notes

22 General Rules for Production, Concrete Design Suggestions and Adjustment Charts

SS CAP 72 Machine

Machine Serial No. CP-430

Notes

22 General Rules for Production of Dry Cast Concrete Products Compacted by Vibration

Concrete Proportioning

The concrete proportioning must be adjusted to the aggregates available, and as the aggregates are different from one country to another and internally from one place of winning to another the supplier of machinery cannot, unfortunately, refer to a concrete mix design but only to approximate directions which should be adjusted to the aggregates available at the concrete factories in question. Therefore, the following standard rules:

- As far as possible use aggregates from the same place of winning in order to avoid different compounds of materials both as regards the grain form of sand and stone (round and smooth or sharp and rough).
- Preferably the sand should be compounded so that the filler content is the same from time to time.
- The different aggregates do not have the same willingness to compact and therefore the vibration power should also be adjusted, which makes it more difficult for the operator if the aggregates are different from time to time.

Moistness of the Concrete

Necessary content of water and plasticizers also depends on the compound and nature of the aggregate.

Sharp and coarse grained sand in which the filler content is small, tolerates more water and plasticizer than round grained fine sand with a large filler content.

Edged stones (crushed) also tolerate more water and plasticizer than round stones (stones from riverbeds or sea stones).

Slump or Setting in the Finished Products

All concrete products which are compacted by means of vibration and are stripped immediately when compaction is over will slump a little when the mould is removed from the unit.

There is no general rule as to how much the unit slumps, but in our experience it is approx. 1 2% of the length of the unreinforced unit. If the units are reinforced, the slump is somewhat smaller as to some extent the reinforcement counteracts the slump.

The nature of the concrete proportioning and of the aggregates also influences the slump of the units as it is the aggregates that build up the skeleton of the concrete units, which the cement keeps together.

Popularly speaking, sand and stones pile up on top of each other and are packed closely by means of vibration. The packing is made between 2 mould sides (core and outer mould) and when these mould sides are removed the built-up skeleton may fall apart if the materials are too round and smooth as the cement and the water at this time (before curing) act as a slide agent. Therefore, rough and coarse materials mixed in the right proportion stick together better (do not fall apart so easily) and the slump will be smaller than when using round and smooth aggregates.

22.1 Concrete Design Suggestions

This section of the manual contains information that can be helpful when designing the concrete mix for pipe production. The suggested mixes shown in ***Figure 13-1*** should be used only as a starting point.

IMPORTANT: Make sure the concrete mix design used for a particular operation complies to all applicable ATSM standards, and to any other applicable standards that are required for the particular type, class, pipe size, etc.

See ***Figure 13-2*** for a typical sand and stone sieve analysis that works well with **Afinitas** pipe machines.

Suggested Mix Design – Portland Cement Only

Aggregate Types	Weight	Percent by Weight	Percent Cementious Material
Stone	1569 lbs.	45%	
Sand	1918 lbs.	55%	
Cementious Materials			
Portland Cement	563 lbs.	13.9%	13.9%
Total Weight	4050 lbs.		

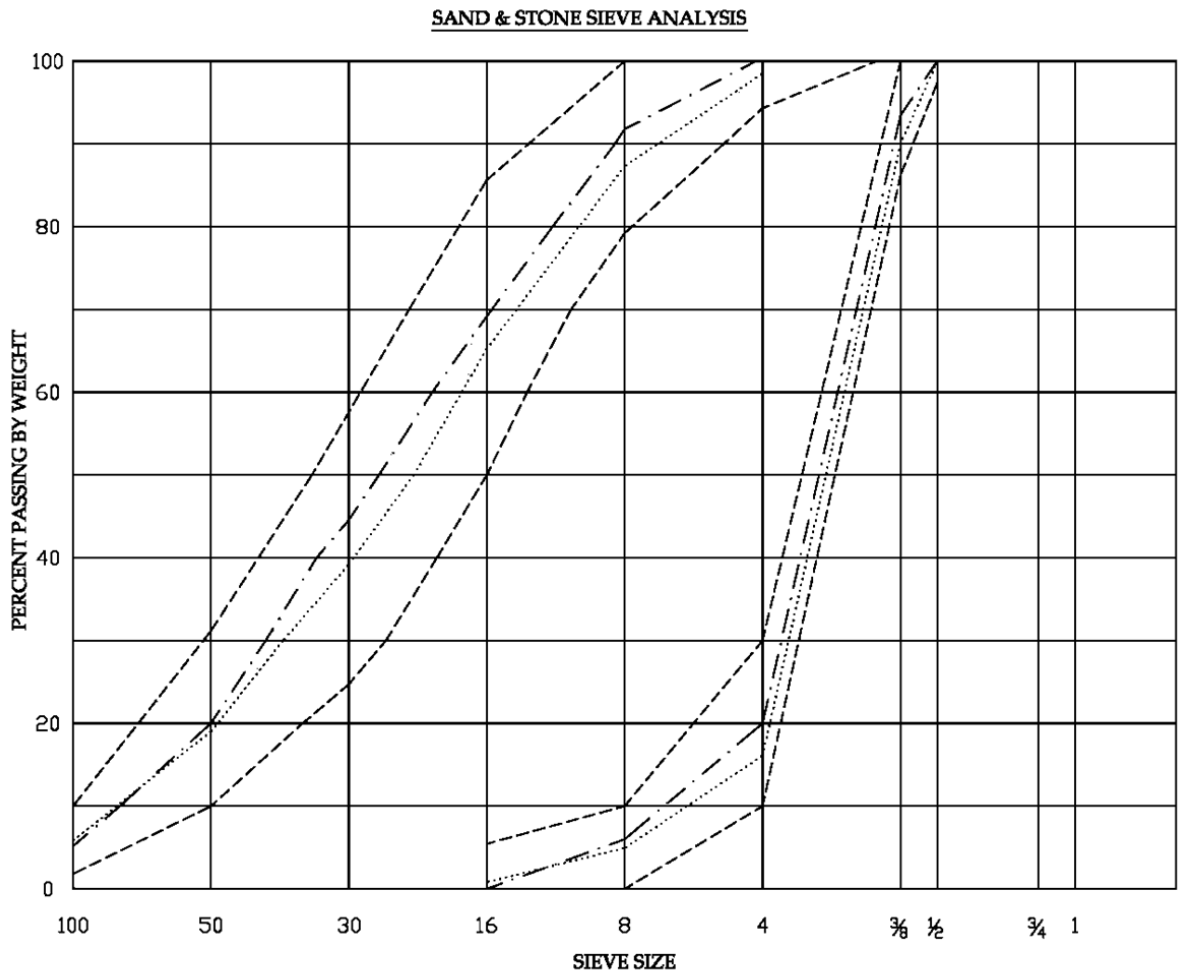
Suggested Mix Design – Portland Cement & Slag

Aggregate Types	Weight	Percent by Weight	Percent Cementious Material
Stone	1549 lbs.	45%	
Sand	1893 lbs.	55%	
Cementious Materials			
Portland Cement	304 lbs.	50%	
Slag	304 lbs.	50%	
Total Weight	4050 lbs.		15%

Suggested Mix Design – Portland Cement & Class "C" Flyash

Aggregate Types	Weight	Percent by Weight	Percent Cementious Material
Stone	1549 lbs.	45%	
Sand	1893 lbs.	55%	
Cementious Materials			
Portland Cement	468 lbs.	80%	
Class "C" Flyash	122 lbs.		
Total Weight	4050 lbs.		15%

Concrete Mix Design Suggestions
Figure 13-1



SAND ANALYSIS

SIEVE	RET.	WT.	% RET.	CUM. RT. %	% PASS
4	4.9	4.9	1	1	99
8	64.5	59.6	12	13	87
16	169.5	105	21	34	66
30	306.9	137.4	27	61	39
50	401.8	94.9	19	80	20
100	471.5	69.7	14	94	6
PASS 100 F.M.	505.9	34.4	6	100	0
				2.83	

STONE ANALYSIS

SIEVE	RET.	WT.	% RET.	CUM. RT. %	% PASS
3/4	0	0	0	0	100
1/2	0	0	0	0	100
3/8	110	110	10	10	90
4	984	874	76	86	14
8	1105	121	10	96	4
16	1135	30	3	99	1
PASS 16	1144	9	1	100	0
				2.83	

- – – – – – – – GRADATION LIMITS
- — · — · — IDEAL GRADING
- ..... GRADING OF SAMPLE

SAMPLE FROM MIXER

WT. RET. NO. 4	1154	gm.	41	%
WT. PASSING NO. 4	1678	gm.	59	%
WT. TOTAL	2832	gm.	100	%

Stone & Sand Sieve Analysis
Figure 13-2

22.2 Adjustment Charts

Use the following adjustment charts to record the machine adjustments for each individual mould size. Settings will have to be adjusted for all mould sizes and based on influencing factors such as humidity, variations in aggregates, ambient temperature, etc. Having these machine adjustments with any additional notes recorded and at the disposal of the machine operators during mould changeover times will greatly reduce set up time and increase overall production efficiencies. Make as many copies of this adjustment chart as needed and keep a file system that can be easily accessed by the machine operators when they are needed.

Pipe and Machine Data				
Pipe Diameter				**mm**
Pipe Length				**mm**
Pipe Type				
Pipe Weight				**kg**
Vibrator Stroke Top	**%**	**~**	**kgcm**	
Vibrator Stroke Bottom	**%**	**~**		**kgcm**
Press Speed	**%**			
Press Pressure	**%**		**bar**	
Gate Opening				**mm**

Concrete Mix		
Sand, Grade		**kg**
Gravel, Grade		**kg**
Gravel, Grade		**kg**
Gravel, Grade		**kg**
Cement, Type		**kg**

Pipe and Machine Data				
Pipe Diameter				**mm**
Pipe Length				**mm**
Pipe Type				
Pipe Weight				**kg**
Vibrator Stroke Top	**%**	**~**	**kgcm**	
Vibrator Stroke Bottom	**%**	**~**		**kgcm**
Press Speed	**%**			
Press Pressure	**%**		**bar**	
Gate Opening				**mm**

Concrete mix		
Sand, Grade		**kg**
Gravel, Grade		**kg**
Gravel, Grade		**kg**
Gravel, Grade		**kg**
Cement, Type		**kg**

Pipe and Machine Data				
Pipe Diameter				**mm**
Pipe Length				**mm**
Pipe Type				
Pipe Weight				**kg**
Vibrator Stroke Top	**%**	**~**	**kgcm**	
Vibrator Stroke Bottom	**%**	**~**		**kgcm**
Press Speed	**%**			
Press Pressure	**%**		**bar**	
Gate Opening				**mm**

Concrete Mix		
Sand, Grade		**kg**
Gravel, Grade		**kg**
Gravel, Grade		**kg**
Gravel, Grade		**kg**
Cement, Type		**kg**

Pipe and Machine Data				
Pipe Diameter				**mm**
Pipe Length				**mm**
Pipe Type				
Pipe Weight				**kg**
Vibrator Stroke Top	**%**	**~**	**kgcm**	
Vibrator Stroke Bottom	**%**	**~**		**kgcm**
Press Speed	**%**			
Press Pressure	**%**		**bar**	
Gate Opening				**mm**

Concrete Mix		
Sand, Grade		**kg**
Gravel, Grade		**kg**
Gravel, Grade		**kg**
Gravel, Grade		**kg**
Cement, Type		**kg**

23 Troubleshooting

SS CAP 72 Machine

Machine Serial No. CP-430

Notes

23.1 Troubleshooting Pipe Failure

This section discusses pipe production problems, possible causes, and solutions to try to alleviate the problem.

Problem:

Concrete cover on the outside of the outer cage of reinforcement loosens, causing voids around wire, vertical separations, bulges in concrete pipe wall, or complete collapse ("fallout") of outer concrete cover.

Probable Cause:

Cage spacing stirrup or "clip" bears too heavily on core causing movement of core to be transmitted to mesh during core withdrawal.

Remedy:

Relieve excess clip pressure; see following remedy descriptions concerning clip quantity, sizing, and spacing.

Probable Cause:

Cage spaced too close to core.

Remedy:

SS CAP 72 Machine specifications call for concrete cover to be 1-1/8". For this cover, clips with 1" spacers should be used.

Probable Cause:

Cages not rolled round forcing a small number of clips into core contact.

Remedy:

Roll cages round. On cages 60" and larger it is necessary that the overhanging mesh passing through the roller be supported when it reaches approximately the halfway point and begins to curl downwardly due to the weight of the mesh. A pipe support directly over the roller which is adjusted so that the cage will rest on it and maintain the proper diameter for half of the cage coming through the roller is necessary.

Probable Cause:

Flat spots in the outer cage particularly at the splice, which cause an excessive gap between the jacket and the outer cage. Excessive gaps allow concrete to fill unevenly between the outer cage and the jacket. A large gap allows a greater quantity of concrete to enter this space forcing the cage toward the core and increasing pressure on the spacing clip. Also, as the cage is forced to a wider gap, it tends to decrease the gap at other points on the cage causing concrete to bridge between the top wire and the jacket sealing off this area and preventing concrete from freely flowing between cage and jacket. Once this condition begins, it will rapidly worsen as the cage is forced out of shape and will place high loadings on the spacer clips.

Remedy:

Roll cages round, handle very carefully to prevent damage, and take every precaution to make sure that the splice area is round. Be sure to stagger the welds as widely as possible in the splice area for maximum bridging effect.

Probable Cause:

Clips not horizontal causing 1" spacing to increase.

Remedy:

Place clips horizontally, either by hooking from circumferential wire to circumferential wire or by hooking from circumferential wire to longitudinal wire. It is vital that clips be installed horizontally since improperly installed clips cause two main problems.

- They tend to pick up the outer cage and suspend it in the air allowing undesirable vertical motion, and
- Clips are so designed that if they are not installed horizontally, the spacing portion will pivot in such a way as to increase the 1" spacer to considerably more than 1".

Probable Cause:

Steel out of place or not properly spaced to core due to insufficient or improperly placed clips.

Remedy:

SS CAP 72 Machine recommendations call for three rows of clips on 16" centers on an 8 ft. pipe cage. The first row of clips should be on the second wire down on the outer cage, the bottom row of clips should be approximately 6" up on the inner cage and the third row should be centered between the upper and lower rows. When properly installed, clips will lightly touch the core to hold the mesh in position. Some simple tests to assure proper spacing are:

- No clip should bear against the core with more than 10 to 20 pounds pressure.
- When the core is moved through cage when picking up pallet and cage, there should be no undue amount of "screeching" due to the clips sliding on the core.
- Clip pressure to core can be simply tested by lowering the core to the floor and then slowly raising the core. If the cage tends to bind or pickup or if clips tend to pop off when the core is lifted, clips are too tight.

Probable Cause:

Cage picking up excessive vibration from vibrating core or jacket.

Remedy:

Relieve tension on clip of 10 to 20 pounds allowing cage to bounce easily. This will cause the cage to gap properly from the vibrating surface and remain in this position when covered with concrete assuring clearance between clip and core.

Probable Cause:

Concrete pipe not sitting plumb during core withdrawal.

Remedy:

Be sure that the floor is clean. Be sure the floor is level and has not sagged or been heaved out of position by frost action.

Probable Cause:

The floor is level but the pipe does not sit plumb.

Remedy:

Check the ledge in the jacket on which the pallet rests to ensure it rests completely on the ledge, making the pipe square on the bottom. With new equipment, it is necessary to check each pipe for the first week or so to guard against pallets being tight and wedging against "shoehorns" which center the pallets above the ledge.

Probable Cause:

Pipe not being set plumb due to pendulum action of crane.

Remedy:

Crane operator to have all pendulum action stopped before lowering pipe.

Probable Cause:

Pipe set down too fast causing shock to settle concrete.

Remedy:

Bring pipe almost to floor, then ease pipe to floor with lowest crane speed.

Probable Cause:

Core wobbles from side to side during withdrawal causing excessive pressure on clips to be transmitted to cage.

Remedy:

Lighten clip pressure. Be sure that the core is clean and smooth. Rust, built up concrete, or gouges and nicks in the core surface tend to catch on tight clips causing the rocking action.

Probable Cause:

"Rocklock" between core and header cause core to rock during withdrawal putting excessive pressure on clips.

Remedy:

There is no known cure for "rocklock" (the locking action caused by small particles of aggregate being drawn into the clearance between core and header which tends to roll more tightly against the core during upward motion producing a locking effect). If rocking occurs, crane operator should stop immediately and realign the core before continuing. Different crane speeds should be used to break the cadence of the rocking motion.

Probable Cause:

Core out of balance causing uneven pressure to be transmitted to pipe walls.

Remedy:

Check for additional equipment such as added vibrators, etc. which tend to unbalance core. Check to be sure that crane hook is centered in the core.

Probable Cause:

Pressure developed during pressurehead operation not normalized. Excessive pressure which tends to deflect reinforcement downwardly is relieved during the stripping cycle. Upward movement of the mesh tends to shear outer concrete and cause voids around mesh.

Remedy:

Normalize pressure as per instructions in manual. Fifteen seconds vibration after pressurehead is completely down would be minimum. An easy test for correct normalizing during pressurehead operation is to note the rise of pressurehead when cylinder pressure is released. This rise should be a maximum of 1/8".

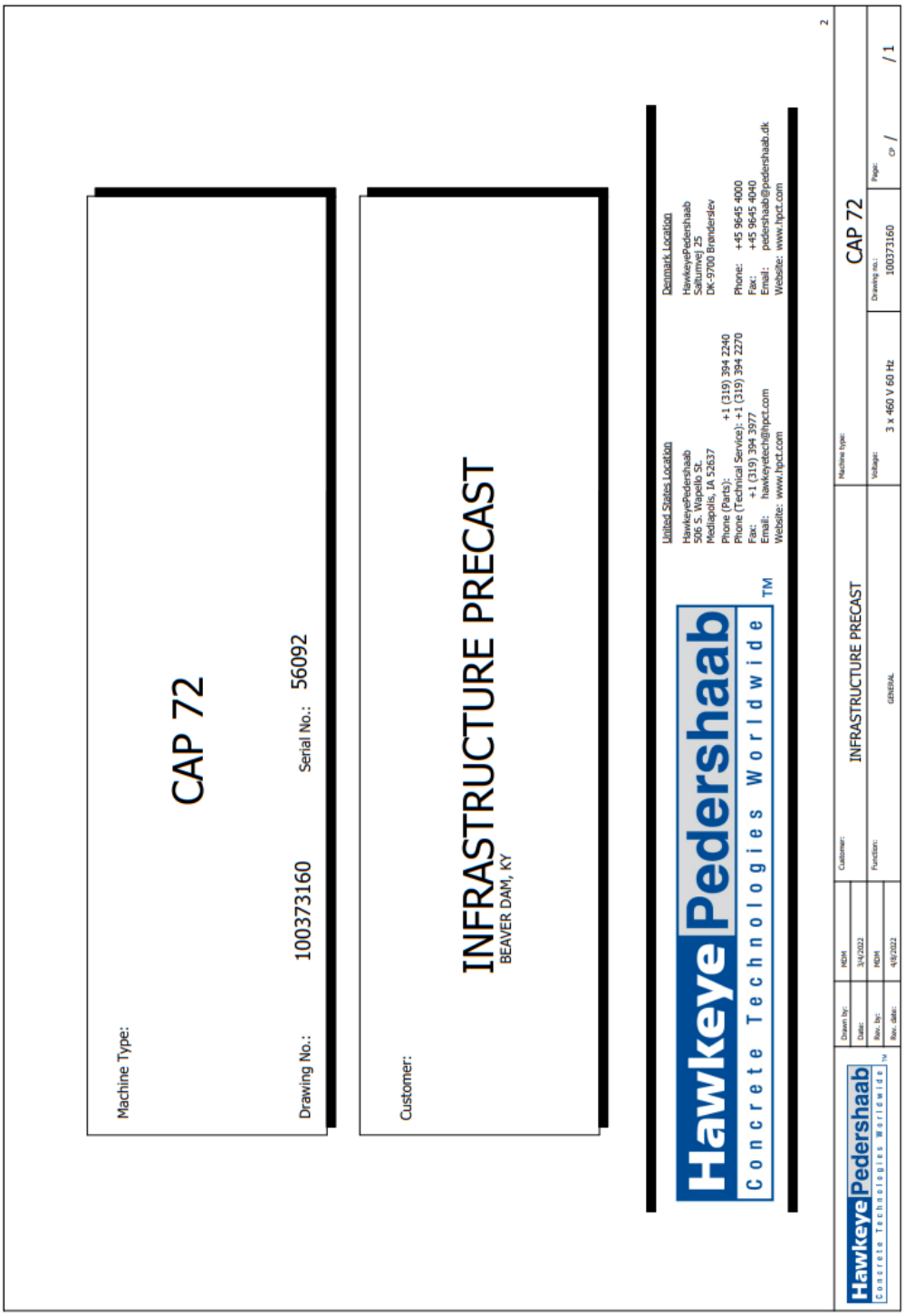
24 Electrical Schematics

SS CAP 72 Machine

Machine Serial No. CP-430

Notes

The following pages are the electrical schematics for your **SS CAP 72 Machine**. Please refer to these when troubleshooting the machine.



Page overview

Column X: an automatically created page was manually reworked

Page	Designation	Additional field	Date	Revisor	X
=CP/1	GENERAL		4/8/2022	MDM	X
=CP/2	Contents		11/16/2022	MDM	
=CP/2.a	Contents		11/16/2022	MDM	
=CP/2.b	Contents		11/16/2022	MDM	
=CP/3	BOX INDEX		4/7/2022	MDM	
=CP/4	NETWORK OVERVIEW		6/6/2022	MDM	
=CP/5	COLOR-CODES		4/8/2022	MDM	
=CP/8	Over view cable		11/16/2022	MDM	
=CP/8.1	Over view cable		4/27/2022	MDM	
=CP+B1001/9	ENCLOSURE NAMEPLATE MARKINGS		4/8/2022	MDM	
=CP+B1001/10	MAIN POWER		4/19/2022	MDM	
=CP+B1001/11	MAIN HYDRAULIC PUMP		4/18/2022	MDM	
=CP+B1001/12	CORE BOX VIBRATION POWER		5/2/2022	MDM	
=CP+B1001/13	JIB HOIST POWER		4/8/2022	MDM	
=CP+B1001/14	FEEDER POWER AND FEEDER PIVOT DRIVE		8/5/2022	MDM	
=CP+B1001/15	24 V DC POWER DISTRIBUTION		8/4/2022	MDM	
=CP+B1001/16	MAIN POWER I/O		4/8/2022	MDM	
=CP+B1001/17	MAIN POWER I/O OVERVIEW (INPUTS/OUTPUTS)		11/16/2022	MDM	
=CP+B1001/18	MAIN POWER I/O SAFETY INPUTS		6/30/2022	MDM	
=CP+B1001/19	MAIN POWER I/O SAFETY OUTPUT		4/8/2022	MDM	
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=CP+B1001/21	MAIN POWER I/O INPUTS		4/18/2022	MDM	
=CP+B1001/22	MAIN POWER I/O INPUTS		4/15/2022	MDM	
=CP+B1001/23	MAIN POWER I/O MODBUS		11/16/2022	MDM	
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=CP+B1001/26	MAIN POWER I/O OUTPUTS		4/8/2022	MDM	
=CP+B1001/27	MAIN POWER I/O ANALOG OUTPUT		8/5/2022	MDM	
=CP+B1001/28	MAIN POWER FREQUENCY DRIVES CONTROL/SWITCH		4/8/2022	MDM	
=CP+B1002/30	CONTROL CONSOLE 24V AND10V DC DISTRIBUTION		4/18/2022	MDM	

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Hawkeye Pedershaab
Concrete Technologies Worldwide ™

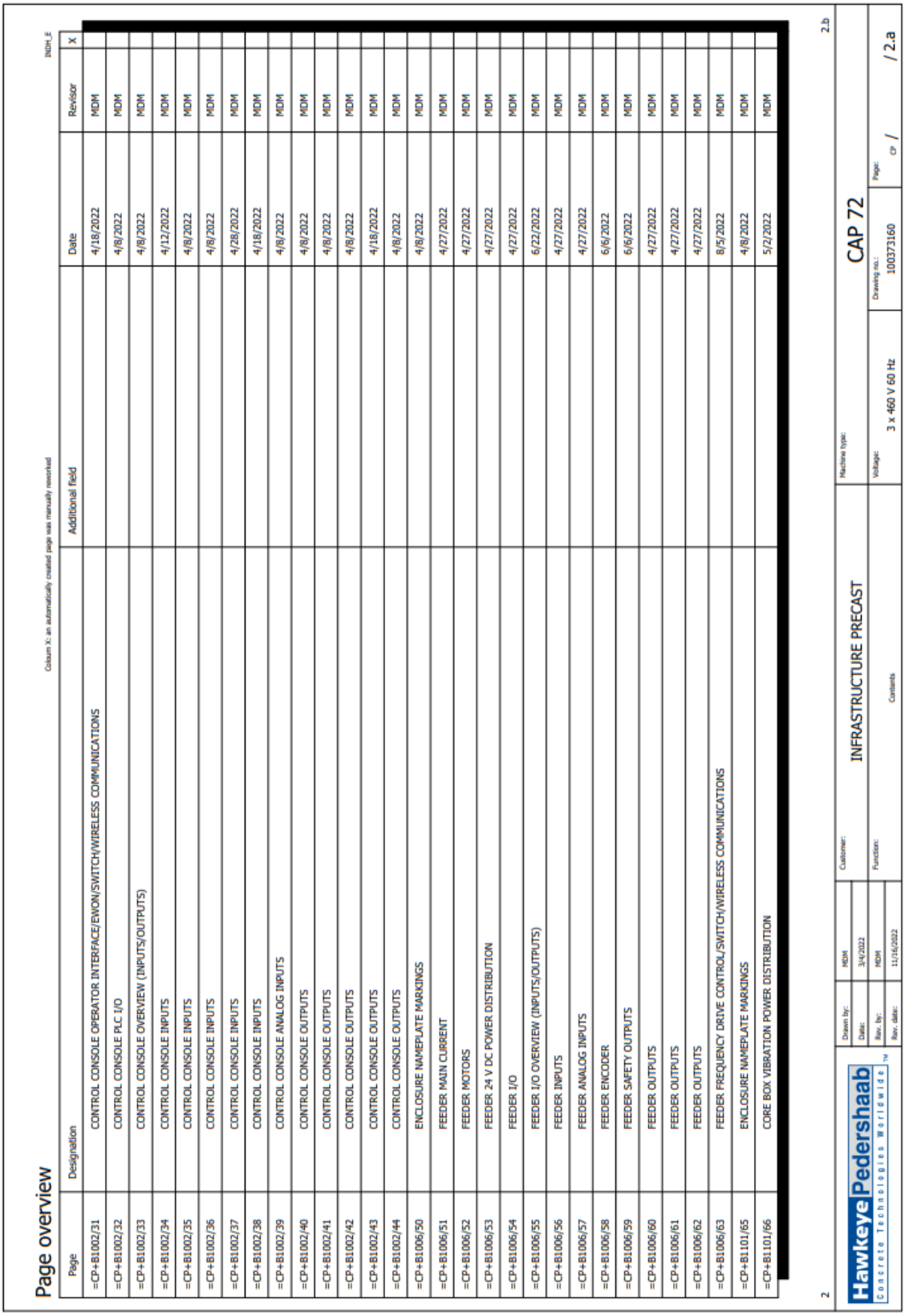
Drawn by: MDM
Date: 3/4/2022
Rev. by: MDM
Rev. date: 11/16/2022

Customer:
Function:
Contents

INFRASTRUCTURE PRECAST

Machine type:
CAP 72
Voltage: 3 x 460 V 60 Hz
Drawing no.: 100373160
Page: CP / / 2

2.a



Page overview

Column X: an automatically created page was manually reworked

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=CP+B1002/32	CONTROL CONSOLE PLC I/O		4/8/2022	MDM	
=CP+B1002/33	CONTROL CONSOLE OVERVIEW (INPUTS/OUTPUTS)		4/8/2022	MDM	
=CP+B1002/34	CONTROL CONSOLE INPUTS		4/12/2022	MDM	
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=CP+B1002/44	CONTROL CONSOLE OUTPUTS		4/8/2022	MDM	
=CP+B1006/50	ENCLOSURE NAMEPLATE MARKINGS		4/8/2022	MDM	
=CP+B1006/51	FEEDER MAIN CURRENT		4/27/2022	MDM	
=CP+B1006/52	FEEDER MOTORS		4/27/2022	MDM	
=CP+B1006/53	FEEDER 24 V DC POWER DISTRIBUTION		4/27/2022	MDM	
=CP+B1006/54	FEEDER I/O		4/27/2022	MDM	
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=CP+B1101/65	ENCLOSURE NAMEPLATE MARKINGS		4/8/2022	MDM	
=CP+B1101/66	CORE BOX VIBRATION POWER DISTRIBUTION		5/2/2022	MDM	

2

2.b

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Drawn by: MDM
Date: 3/4/2022
Rev. by: MDM
Rev. date: 11/16/2022

Customer:
Function:
Contents: INFRASTRUCTURE PRECAST

Machine type: CAP 72
Voltage: 3 x 460 V 60 Hz
Drawing no.: 100373160
Page: CP / / 2.a

Page overview

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=CP+B1101/66	CORE BOX VIBRATION POWER DISTRIBUTION		5/2/2022	MDM	

2

2.b

Hawkeye Pedershaab
Concrete Technologies Worldwide

Drawn by: MDM
Date: 3/4/2022
Rev. by: MDM
Rev. date: 11/16/2022

Customer:
Function:
Contents: INFRASTRUCTURE PRECAST

Machine type: CAP 72
Voltage: 3 x 460 V 60 Hz
Drawing no.: 100373160
Page: CP / / 2.a

Structure identifier overview

Higher-level function	Description
=CP	CAP 72
=CR	CRANE
Mounting location	**Description**
+B1001	MAIN POWER
+B1002	CONTROL CONSOLE
+B1003	PRESSHEAD PNEUMATIC SPLICE BOX
+B1006	FEEDER
+B1012	FEEDER BASE SPLICE
+B1035	PRESSHEAD PNEUMATIC CONTROL BOX
+B1101	CORE BOX VIBRATION
+B1102	REMOTE PUSHBUTTON BOX
+B1103	HEADER JIB HOIST SPLICE BOX
+B1901	HYDRAULIC UNIT
+B8001	CRANE MAIN
+B8007	WIRELESS SPLICE
+B8015	CRANE COMMUNICATION SPLICE
+B8029	SCISSORS SPLICE
+REPORTS	

2.b

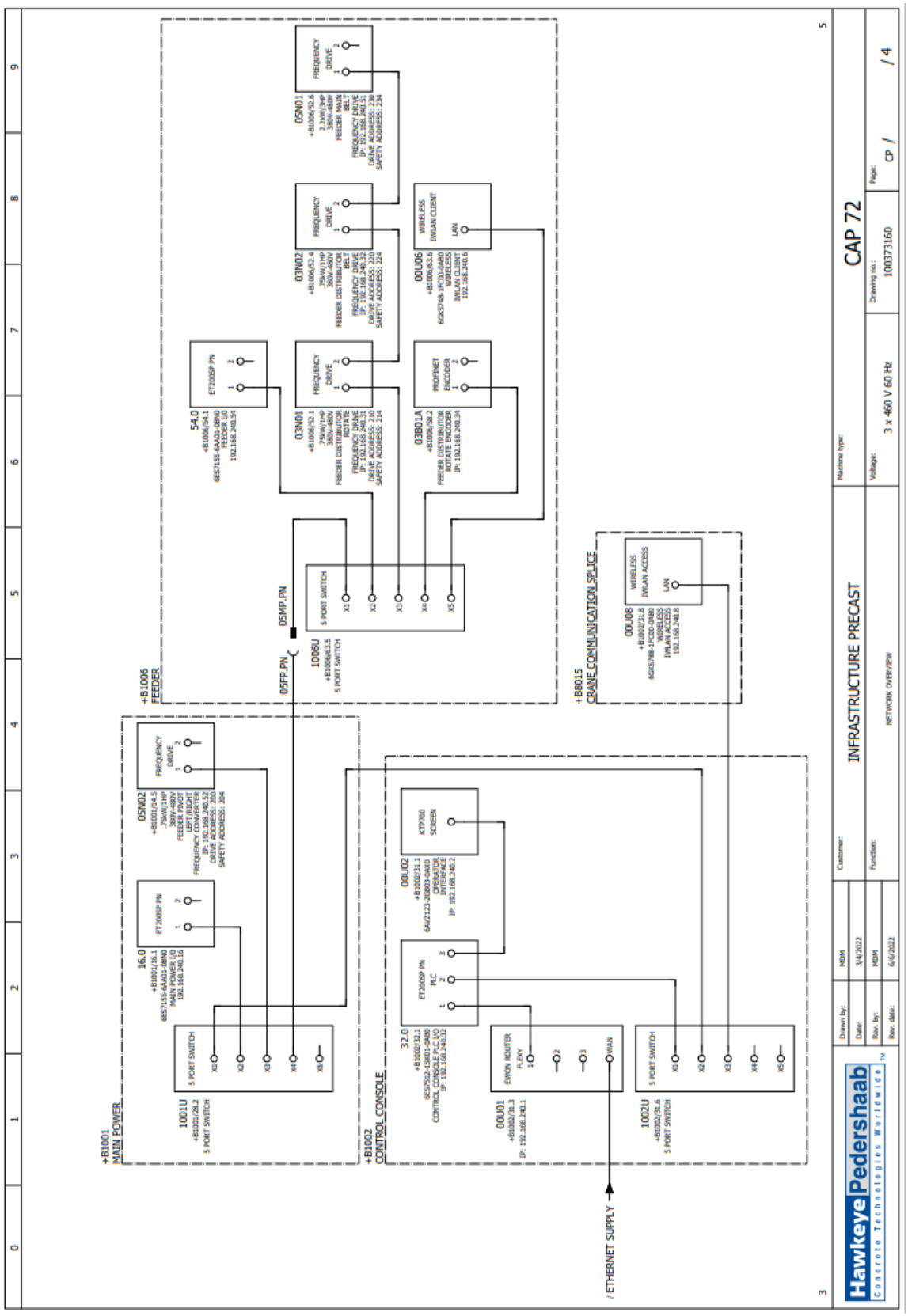
4

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Drawn by: MDM
Date: 3/4/2022
Rev. by: MDM
Rev. date: 4/7/2022

Customer: INFRASTRUCTURE PRECAST
Function: BOX INDEX

Machine type: CAP 72
Voltage: 3 x 460 V 60 Hz
Drawing no.: 100373160
Page: CP / / 3


+B1001
MAIN POWER
+B1002
CONTROL CONSOLE
+B1006
FEEDER
+B8015
CRANE COMMUNICATION SPLICE
INFRASTRUCTURE PRECAST
CAP 72
Hawkeye Pedershaab
Concrete Technologies Worldwide
3 x 460 V 60 Hz
100373160
NETWORK OVERVIEW
/ ETHERNET SUPPLY

COLOR CODES ACCORDING TO IEC 60 757

ABBREVIATIONS

BLACK	BK
BROWN	BN
BLUE	BU
RED	RD
ORANGE	OG
YELLOW	YE
GREEN	GN
VIOLET	VT
GRAY	GY
WHITE	WH
PINK	PK
TURQUOISE	TQ
GOLD	GD
SILVER	SR
GREEN+YELLOW	GNYE
.	.
.	.
.	.

Color codes for connection in switchboards

CIRCUIT	CONDUCTOR TYPE	CE COLOR	UL COLOR	AUSTRALIA COLOR
POWER CIRCUIT	Ungrounded line load and control conductors at line voltage	Black	Black	L1 = RED L2 = WHITE L3 = BLUE
	Grounded circuit conductors	Light blue	Natural gray	Black
CONTROL CIRCUIT AC VOLTAGE LESS THAN LINEVOLTAGE	Ungrounded	Red	Red	Brown
	Grounded circuit conductors	White	White	Black
CONTROL CIRCUIT DC VOLTAGE	Ungrounded (+)	Dark Blue	Dark blue	Purple
	Grounded (GND) (-)	White with blue stripe	White with blue stripe	Orange
FORCED COUPLING CIRCUITS FOR AC OR DC Control circuit conductors that remain energized when the disconnecting means is in the OFF position	Ungrounded conductors	Orange	Orange	N/A
	Grounded conductors	White with Orange Stripe	White with orange stripe	N/A
PROTECTIVE CONDUCTOR	Protective conductor:	Yellow/green	Yellow/green min.AWG14	Yellow/green

4 8

Hawkeye Pedershaab
Concrete Technologies Worldwide ™

Drawn by:	MDM	Customer: INFRASTRUCTURE PRECAST	Machine type: CAP 72		
Date:	3/4/2022				
Rev. by:	MDM	Function: COLOR-CODES	Voltage: 3 x 460 V 60 Hz	Drawing no.: 100373160	Page: CP / / 5
Rev. date:	4/8/2022				

Cable-overview

Cable designation	From	To	Cabletype	Core	Cores in use	Core Size	Length	Remarks	Hawkeye Part Number	Page/path
+B1001-W00E06	+B1001-X00E06	+B1001-00E06		4	4	16	85	TANK HEATER	ELE-WI0519	+B1001/11.3
+B1001-W00M01	+B1001-X00M01	+B1001-00M01		4	4	8	85	MAIN HYDRAULIC PUMP	ELE-WI0523	+B1001/11.1
+B1001-W05B02	+B1001-X05B02	+B1001-05B02;+B1001-05M02		4	3	16	45	FEEDER PIVOT LEFT/RIGHT	ELE-WI0519	+B1001/14.6
+B1001-W05FP01	+B1001-05FP01	+B1001-X05FP01		4	4	14	60		ELE-WI0628	+B1001/14.1
+B1001-W05M02	+B1001-X0PE;+B1001-05N02	+B1001-05M02	SHIELDED	5	4	16	45	FEEDER PIVOT LEFT/RIGHT	ELE-WI0528	+B1001/14.5
+B1001-W05R02	+B1001-05N02	+B1001-05R02	SHIELDED	4	3	14	15	ATTACHED TO THE FEEDER PIVOT BASE AT THE CAP 72	ELE-WI0519	+B1001/14.4
+B1001-W10M01	+B1103-X1103	+B1001-10M01		4	4	14	20	HEADER 3IB HOIST	COMES WITH HOIST	+B1001/13.1
+B1001-W1001PN	+B1001-1001U	+B1002-1002U	SHIELDED TP	4	1	22	40		ELE-WI5236	+B1001/28.2
+B1001-W1002	+B1001-X1002	+B1002-X1002		7	5	16	40		ELE-WI0521	+B1001/18.1
+B1001-W1012	+B1001-X1012	+B1012-X1012		7	7	16	45	EMERGENCY STOP IN CONTROL CONSOLE	ELE-WI0521	+B1001/18.3
+B1001-W1103	+B1001-X1103	+B1103-X1103		4	4	16	60	HEADER 3IB HOIST	ELE-WI0519	+B1001/13.1
+B1001-W1901	+B1001-X1901	+B1901-X1901		7	7	16	85		ELE-WI0521	+B1001/21.0
+B1001-W1901A	+B1001-X1901A	+B1901-X1901A		5	3	18	85		ELE-WI0529	+B1001/25.2
+B1002-W1002A	+B1001-X1002A	+B1002-X1002A		4	3	14	40		ELE-WI0520	+B1002/30.1
+B1002-W1002B	+B1001-X1002B	+B1002-X1002B		4	2	14	40		ELE-WI0520	+B1002/30.1
+B1002-W1003	+B1002-X1003	+B1003-X1003		7	5	16	70		ELE-WI0580	+B1002/38.0
+B1002-W1003B	+B1002-X1003B	+B1003-X1003B		12	10	18	70	PRESSHEAD #3 UP	ELE-WI0609	+B1002/43.2
+B1002-W1035	+B1003-X1003B	+B1035-X1035		4	3	18	15	PRESSHEAD #3 DOWN	ELE-WI0595	+B1002/44.4
+B1002-W1102	+B1002-X1102	+B1102-07SH03;+B1102-07SH04		12	9	18	55	TONGUE TROWEL HOME	ELE-WI0527	+B1002/38.2
+B1002-W8015	+B1002-X8015	+B8015-X8015		4	3	18	100		ELE-WI0595	+B1002/31.7
+B1002-W8015PN	+B1002-1002U	+B8015-00U08	SHIELDED TP	4	1	22	100		ELE-WI5236	+B1002/31.8
+B1006-W03B01	+B1006-X03B01	+B1006-03B01;+B1006-03M01		4	3	16	15	FEEDER DISTRIBUTOR ROTATE	ELE-WI0519	+B1006/52.3
+B1006-W03M01	+B1006-X0PE;+B1006-03N01	+B1006-03M01	SHIELDED	5	4	16	15	FEEDER DISTRIBUTOR ROTATE	ELE-WI0528	+B1006/52.1
+B1006-W03M02	+B1006-03M02	+B1006-03U02	SHIELDED	5	4	16	15	FEEDER DISTRIBUTOR BELT	ELE-WI0528	+B1006/52.4
+B1006-W03PN	+B1006-03B01A	+B1006-1006U	SHIELDED TP	4	1	22	20		ELE-WI5236	+B1006/58.2
+B1006-W03R01	+B1006-03N01	+B1006-03R01	SHIELDED	4	3	14	15		ELE-WI0530	+B1006/52.1
+B1006-W03U02	+B1006-X0PE;+B1006-03N02	+B1006-03U02	SHIELDED	5	4	16	15	FEEDER DISTRIBUTOR BELT	ELE-WI0528	+B1006/52.4
+B1006-W03U02A	+B1006-X03U02A	+B1006-03U02	SHIELDED	5	4	16	15		ELE-WI0528	+B1006/57.1
+B1006-W05FP.PN			SHIELDED TP	4	0	22	60	FEEDER DISTRIBUTOR ROTATE BRAKE	ELE-WI5235	+B1006/63.3
+B1006-W05M01	+B1006-X0PE;+B1006-05N01	+B1006-05M01	SHIELDED	5	4	16	15	FEEDER DISTRIBUTOR BELT	ELE-WI0528	+B1006/52.6
+B1006-W05M03	+B1006-X05M03	+B1006-05M03		4	4	16	15	FEEDER AGITATOR	ELE-WI0519	+B1006/52.9
+B1006-W05MP.PN			SHIELDED TP	4	0	22	15	ATTACHED TO THE FEEDER PIVOT BASE AT THE CAP 72	ELE-WI0628	+B1006/63.4
+B1006-W05MP01	+B1006-05MP01;+B1006-X0PE	+B1006-83S16;PE		4	4	14	25		ELE-WI0628	+B1006/51.0
+B1101-W07U101	+B1101-X1101;+B1001-16.6	+B1101-07U101	SHIELDED TP	4	3	22	35	CORE BOX VIBRATION MODBUS COMMUNICATIONS	ELE-WI5236	+B1101/72.1
+B1101-W1101	+B1001-X1101	+B1101-07S100;+B1101-X1101		4	4	8	35		ELE-WI0523	+B1101/66.1

Hawkeye Pedershaab
Concrete Technologies Worldwide

Drawn by: MDM
Date: 3/4/2022
Rev. by: MDM
Rev. date: 11/16/2022

Customer:
Function:
INFRASTRUCTURE PRECAST
Over view cable

Machine type:
CAP 72
Voltage: 3 x 460 V 60 Hz
Drawing no.: 100373160
Page: / 8

5 8.1

DAN130AE

Cable-overview

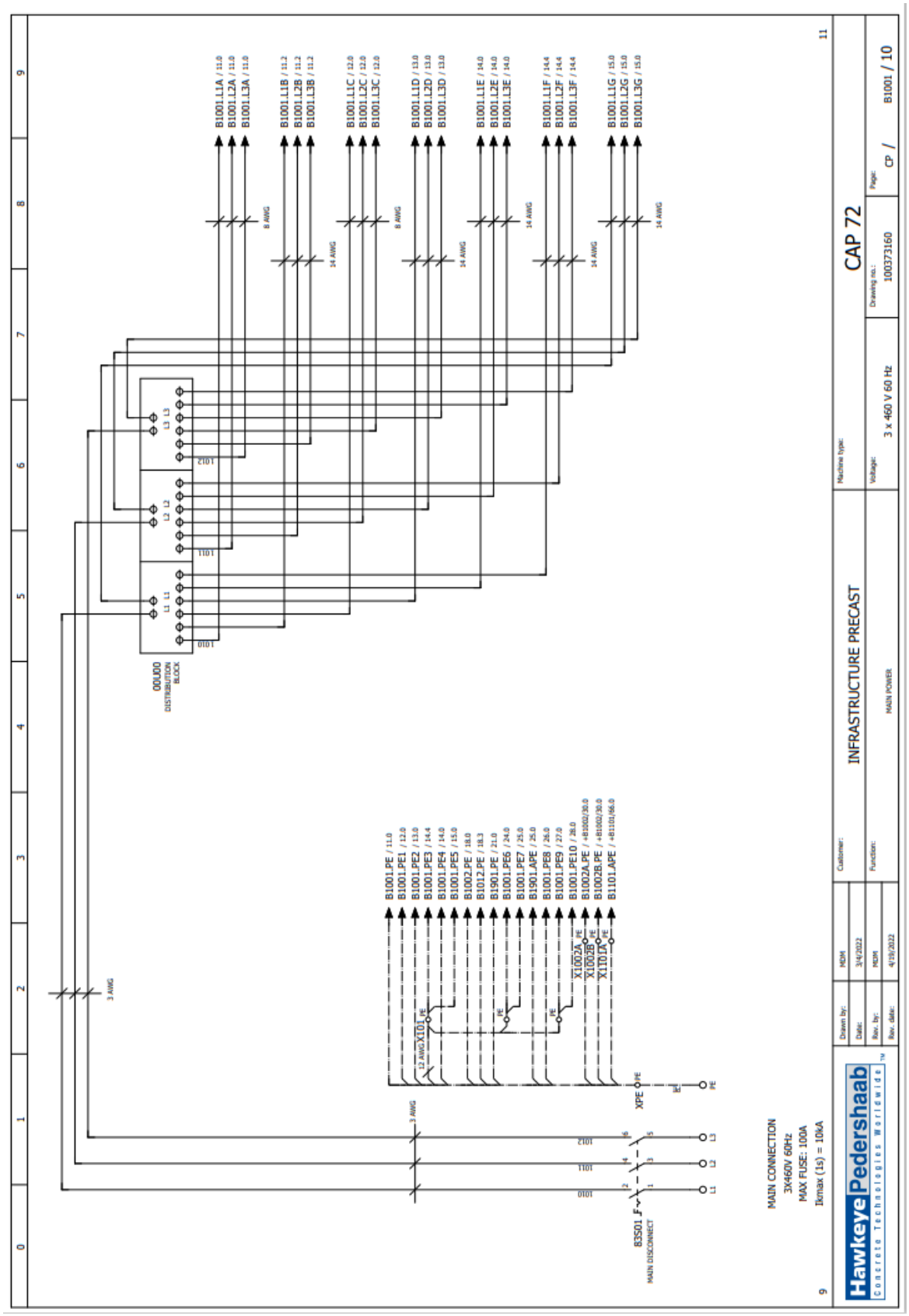
Cable designation	From	To	Cabletype	Core	Cores in cable	Core Size	Length	Remarks	Hawkeye Part Number	Page/path
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+B1101-W1101B	+B1001-X1101B	+B1101-X1101B		4	4	16	35		ELE-W00519	+B1101/70.1
+B1901-W00E06A	+B1901-X1901	+B1901-00E06A		4	3	18	5	TANK HEATER THERMOSTAT	ELE-W00595	+B1001/21.1
+B1901-W00N/TH01	+B1901-X1901	+B1901-00N/TH01		4	4	16		HYDRAULIC PUMP OIL LEVEL SHUTDOWN	ELE-W00013	+B1001/21.2
+B1901-W00N/TH02	+B1901-X1901	+B1901-00N/TH02		4	3	16		HYDRAULIC PUMP LOW OIL / HIGH TEMP WARNING	ELE-W00013	+B1001/21.4
+B1901-W00TH04	+B1901-X1901	+B1901-00TH04		4	3	18		TOO COLD TO START SENSOR SAYS N.O AND N.C.	[illegible]	+B1004/21.5

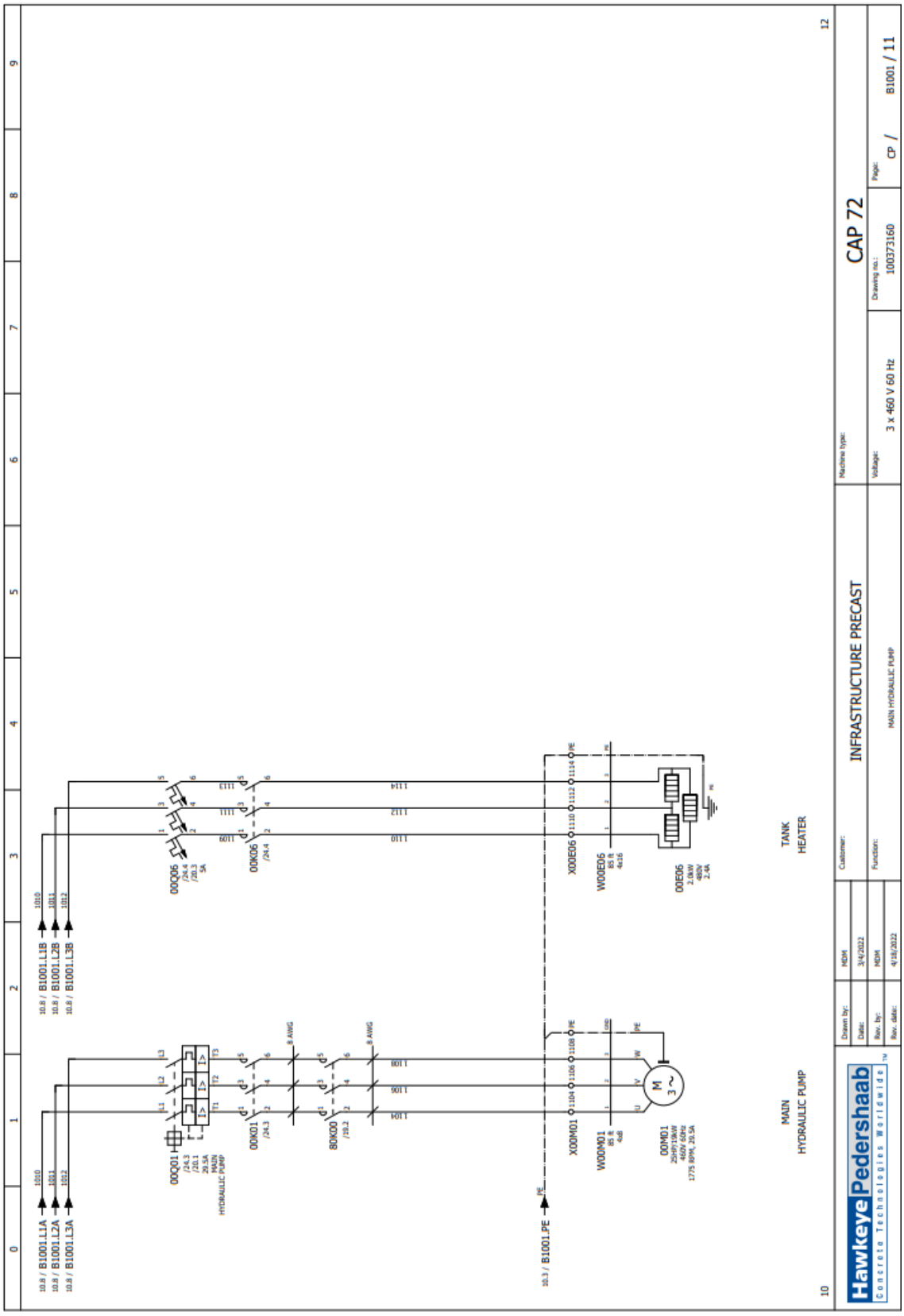
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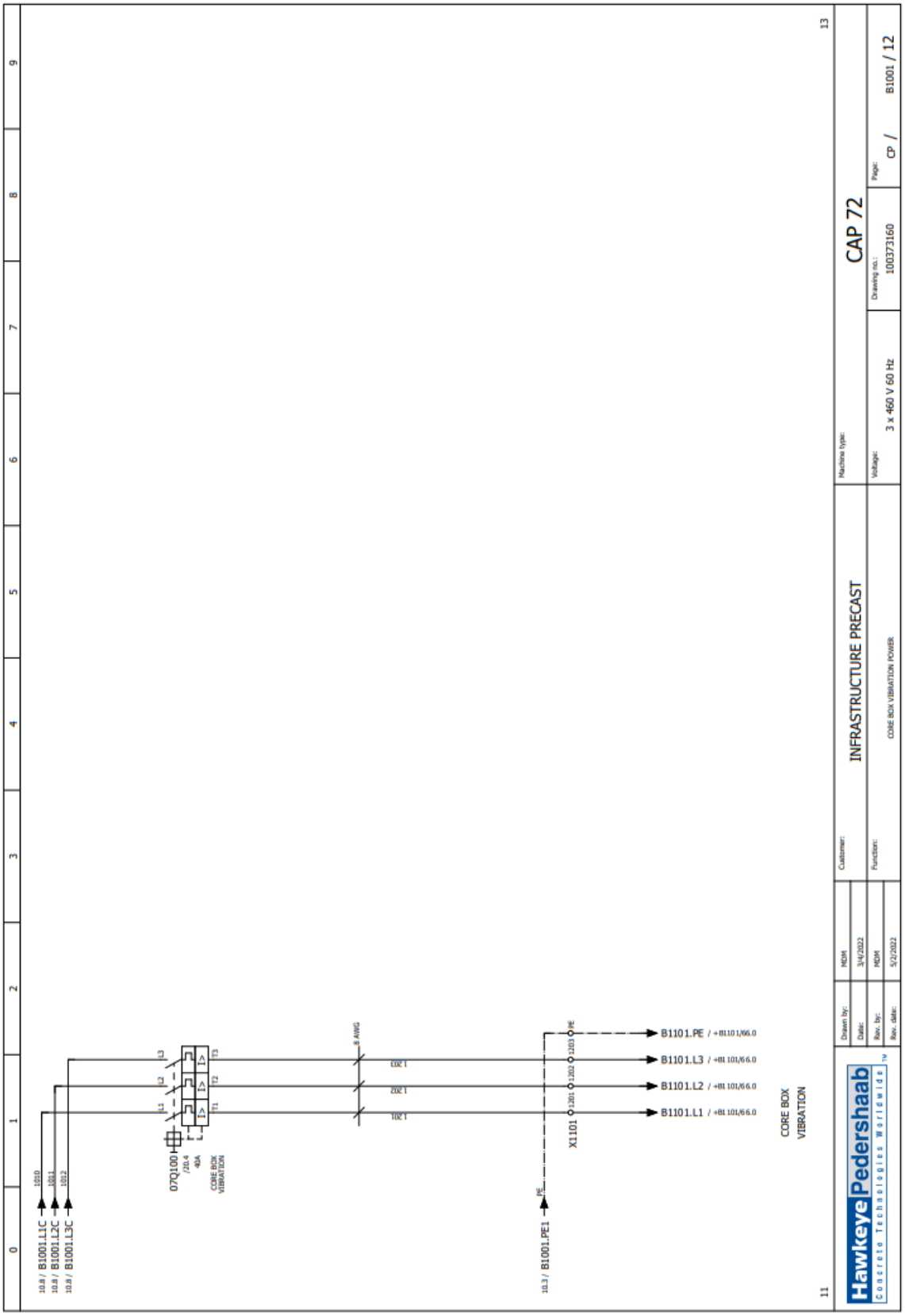
+B1001/9

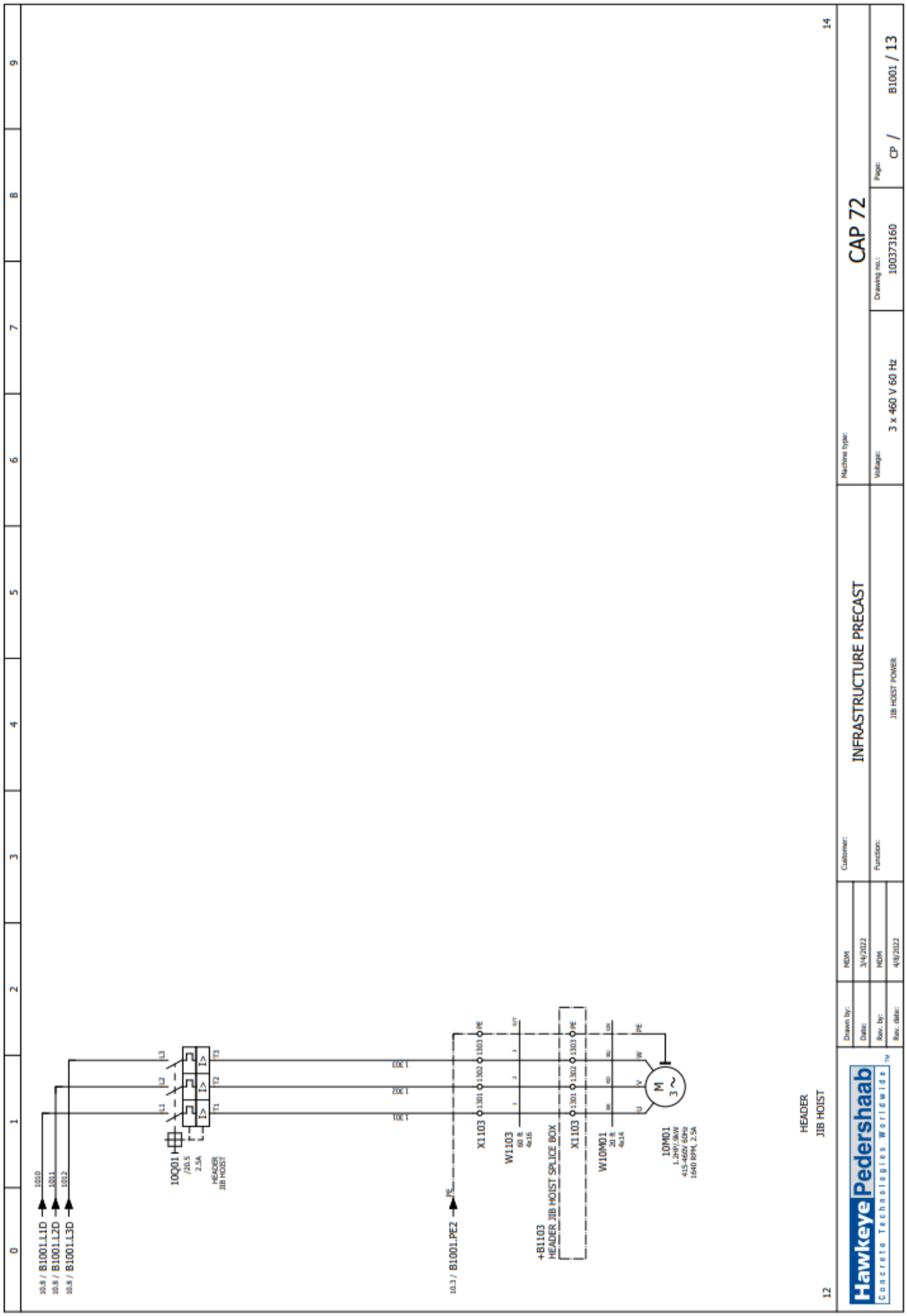
Hawkeye Pedershaab Concrete Technologies Worldwide	Drawn by:	MDM	Customer:	INFRASTRUCTURE PRECAST	Machine type: CAP 72
	Date:	3/4/2022			
	Rev. by:	MDM	Function:	Over view cable	Voltage: 3 x 460 V 60 Hz / Drawing no.: 100373160 / Page: CP / / 8.1
	Rev. date:	4/27/2022			

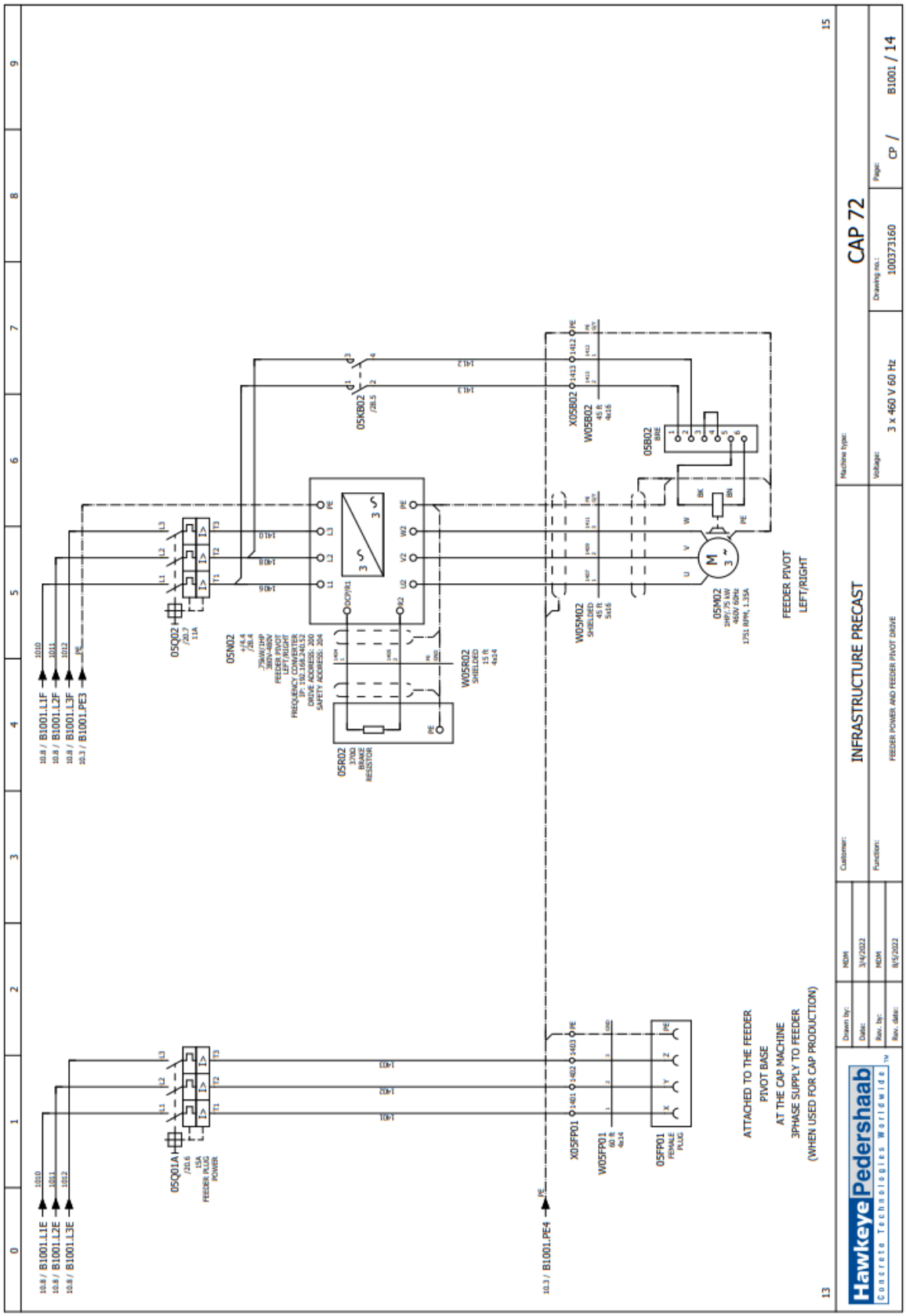
Hawkeye Pedershaab
Concrete Technologies Worldwide
BOX NUMBER B1001
VOLTAGE 3 x 460 V 60 Hz
MAX. CURRENT I 96.1 A
MODEL # CAP 72
SERIAL # 56092
LARGEST MOTOR 19 kW
SCCR 5kA
MAX OVERCURRENT PROTECTION 100 A
TYPE 1 ENCLOSURE
SCHEMATIC REFERENCE # 100373160
MANUFACTURED IN MEDIAPOLIS, IA USA
Drawn by: MDM
Date: 3/4/2023
Rev. by: MDM
Rev. date: 4/8/2023
Customer:
INFRASTRUCTURE PRECAST
Function:
ENCLOSURE NAMEPLATE MARKINGS
Machine type:
CAP 72
Voltage: 3 x 460 V 60 Hz
Drawing no.: 100373160
Page: / B1001 / 9
+/B.1
10

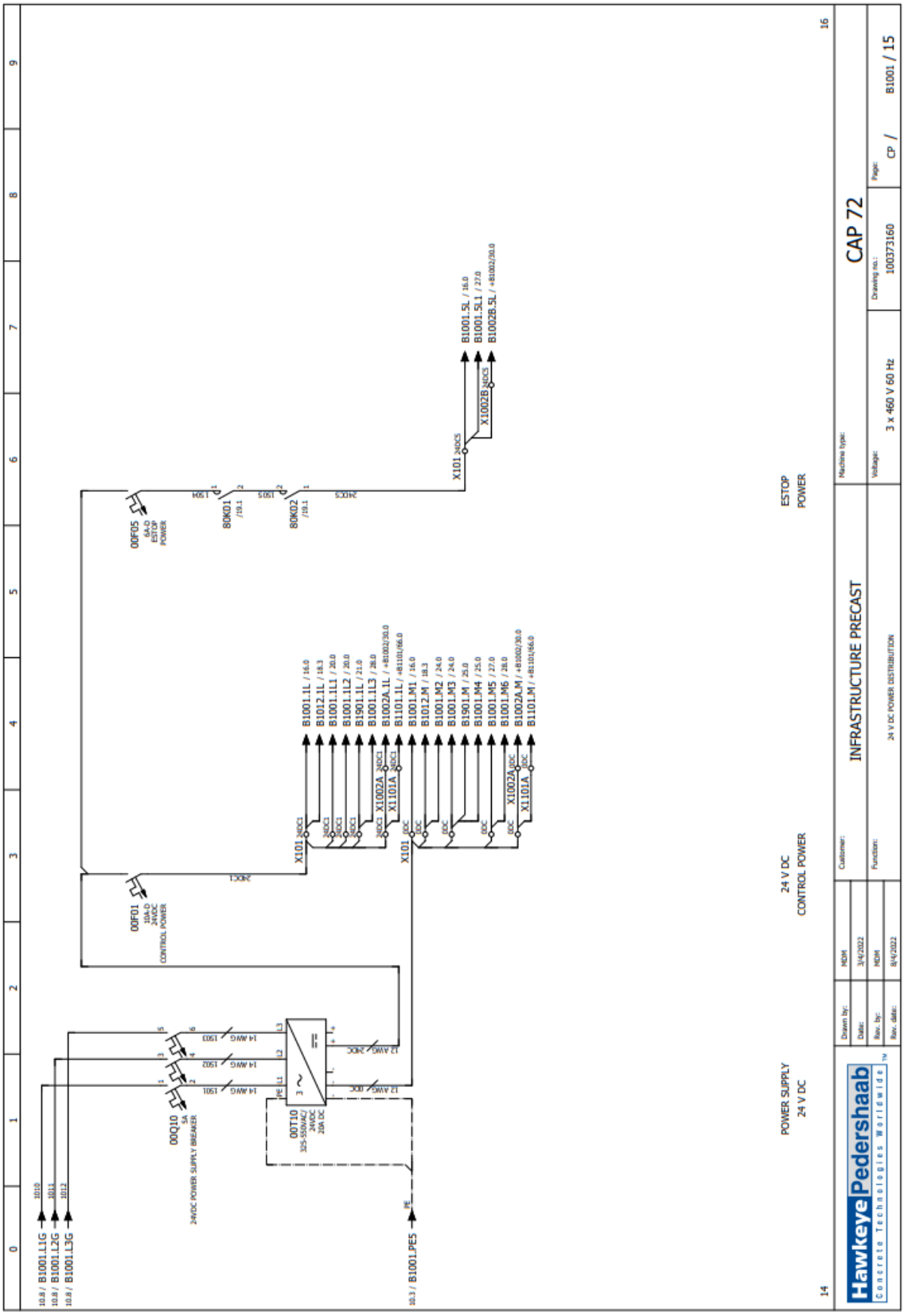

Hawkeye Pedershaab
Concrete Technologies Worldwide
INFRASTRUCTURE PRECAST
CAP 72
MAIN POWER
3 x 460 V 60 Hz
100373160
B1001 / 10
MAIN CONNECTION
3X460V 60Hz
MAX FUSE: 100A
Ikmax (1s) = 10kA
B3S01
MAIN DISCONNECT
ODUDO
DISTRIBUTION BLOCK

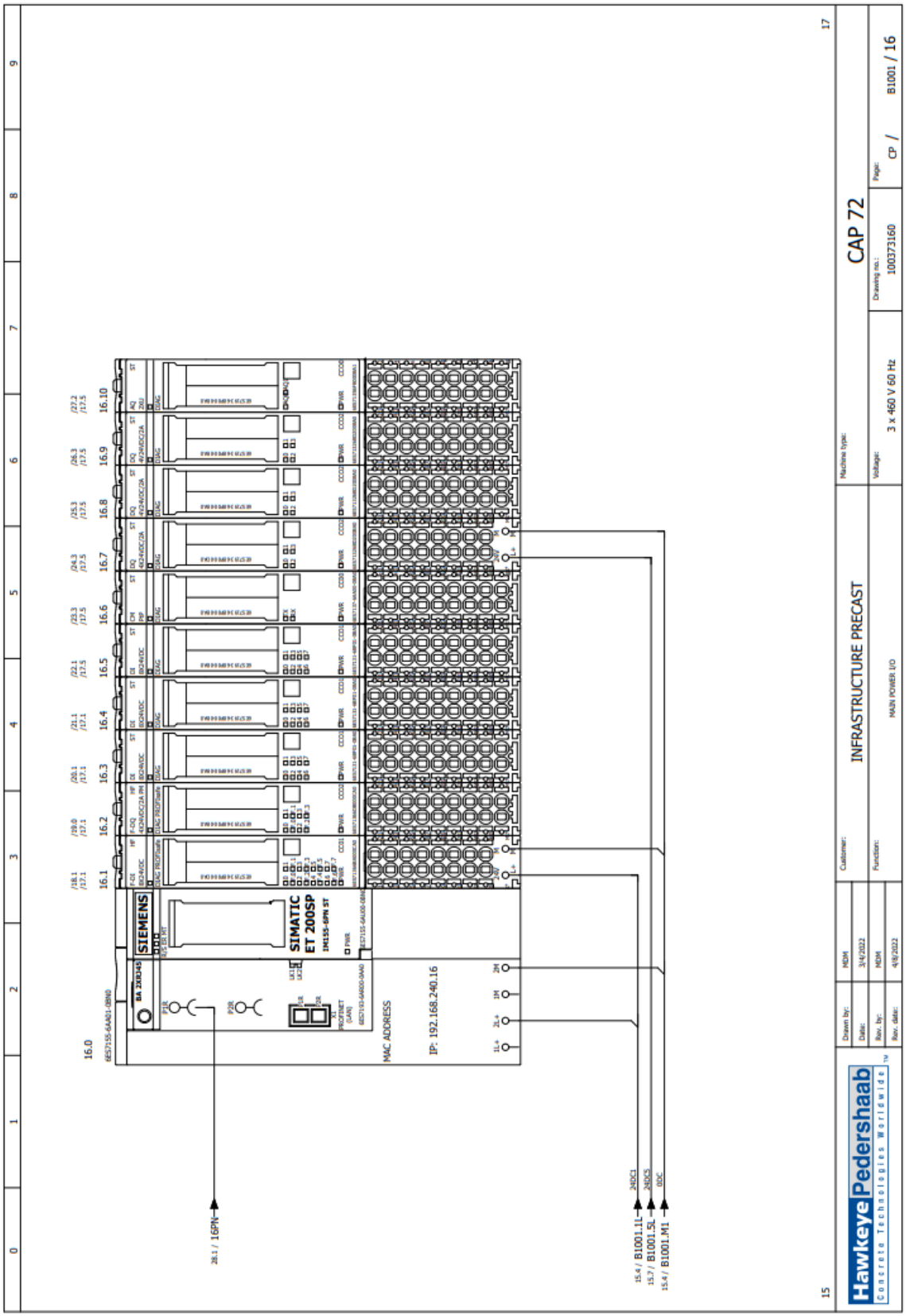

Hawkeye Pedershaab
Concrete Technologies Worldwide
INFRASTRUCTURE PRECAST
CAP 72
3 x 460 V 60 Hz
100373160
B1001 / 11
MAIN HYDRAULIC PUMP
TANK HEATER

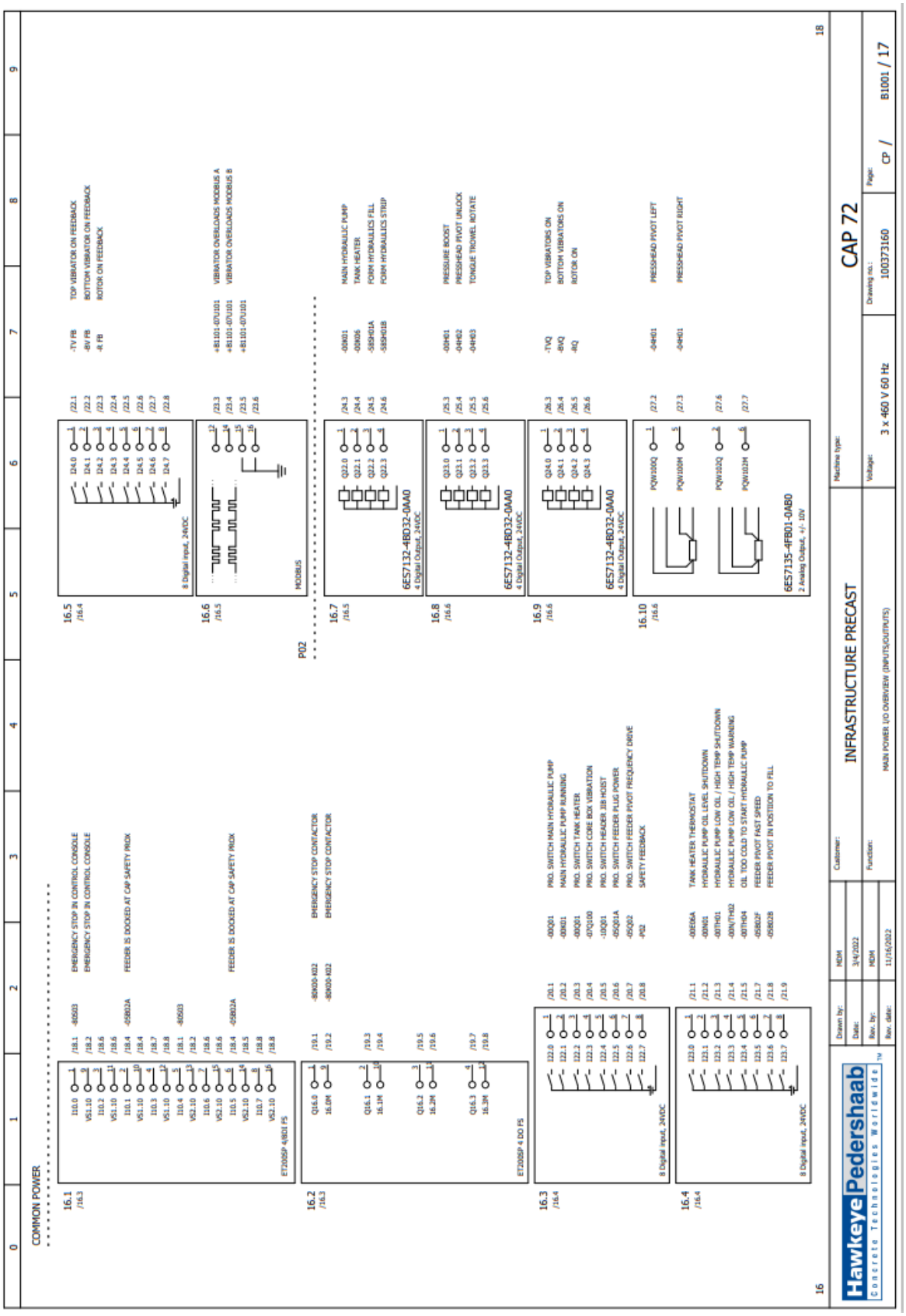

B1001.L1C
B1001.L2C
B1001.L3C
B1001.PE1
Q7Q100
/20.4
40A
CORE BOX VIBRATION
8 AWG
X1101
B1101.PE
B1101.L3
B1101.L2
B1101.L1
CORE BOX VIBRATION
Hawkeye Pedershaab
Concrete Technologies Worldwide
INFRASTRUCTURE PRECAST
CAP 72
3 x 460 V 60 Hz
100373160
B1001 / 12

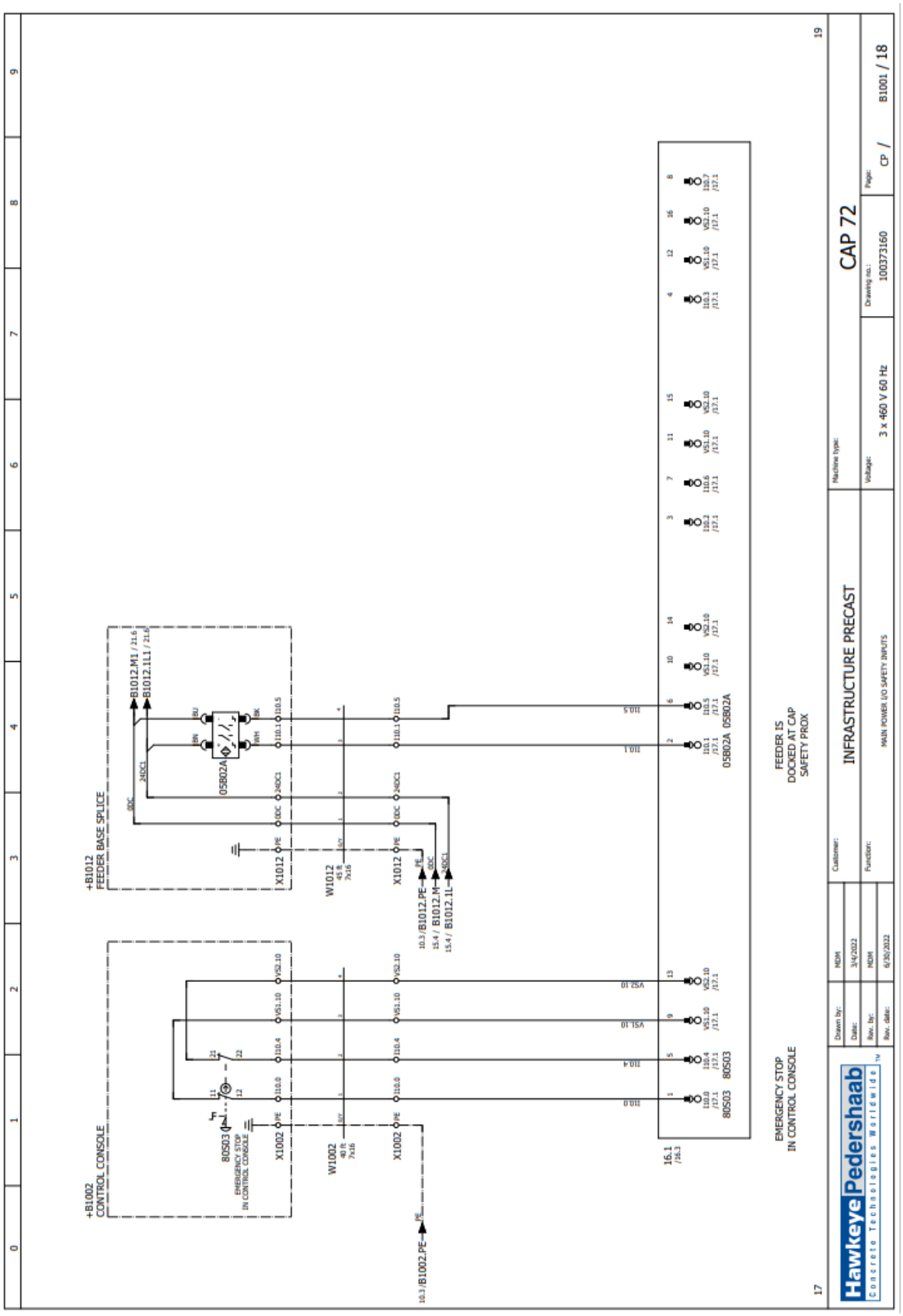

Hawkeye Pedershaab
Concrete Technologies Worldwide
Drawn by: MDM
Date: 3/4/2022
Rev. by: MDM
Rev. date: 4/8/2022
Customer:
INFRASTRUCTURE PRECAST
Function:
JIB HOIST POWER
Machine type:
CAP 72
Voltage:
3 x 460 V 60 Hz
Drawing no.:
100373160
Page:
CP / B1001 / 13
HEADER
JIB HOIST
12
14
1Q01
X1103
W1103
+B1103
HEADER JIB HOIST SPLICE BOX
W10M01
10M01
M
3~

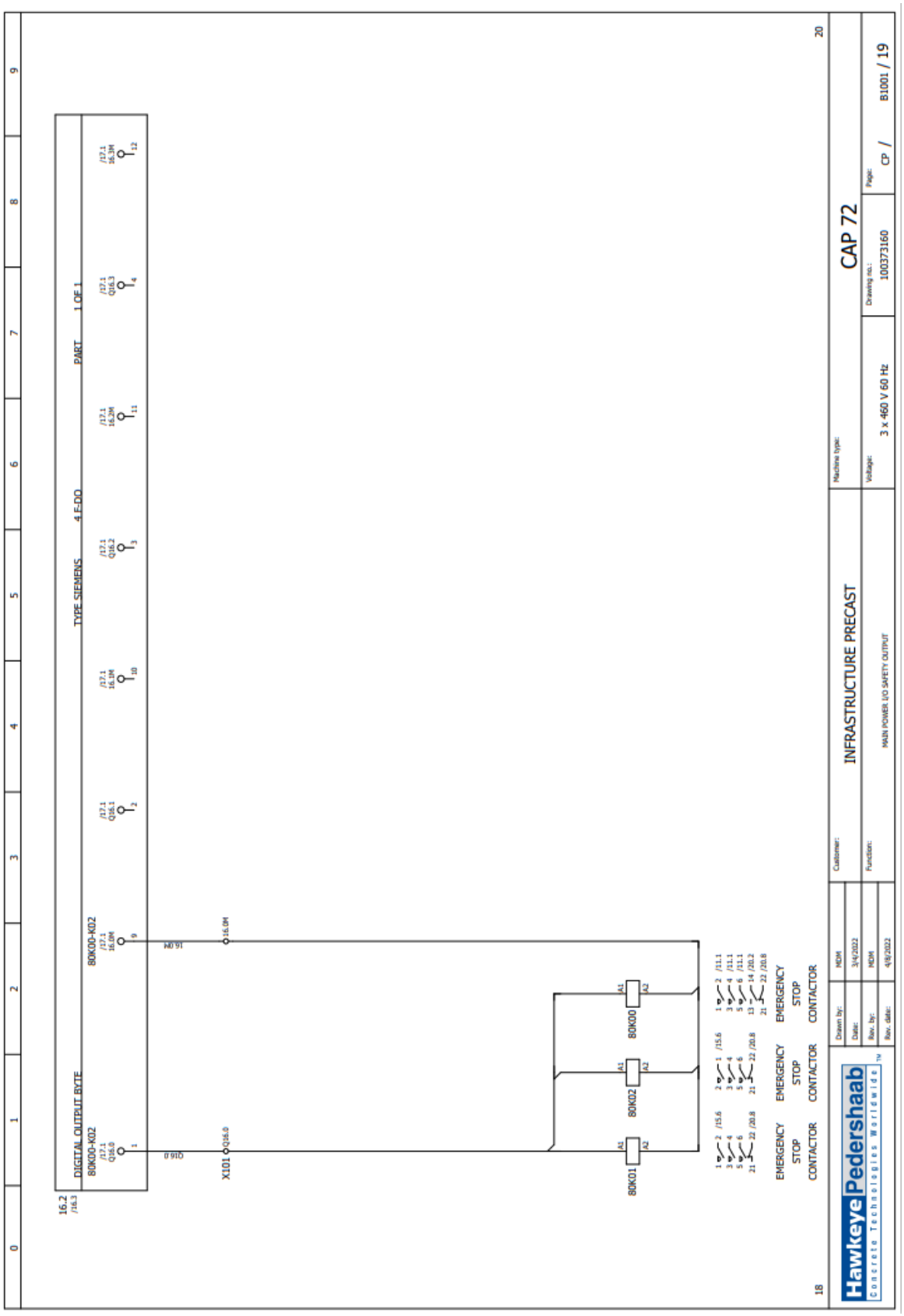

Hawkeye Pedershaab
Concrete Technologies Worldwide
INFRASTRUCTURE PRECAST
CAP 72
FEEDER POWER AND FEEDER PIVOT DRIVE
3 x 460 V 60 Hz
100373160
B1001 / 14
FEEDER PIVOT
LEFT/RIGHT
ATTACHED TO THE FEEDER
PIVOT BASE
AT THE CAP MACHINE
3PHASE SUPPLY TO FEEDER
(WHEN USED FOR CAP PRODUCTION)

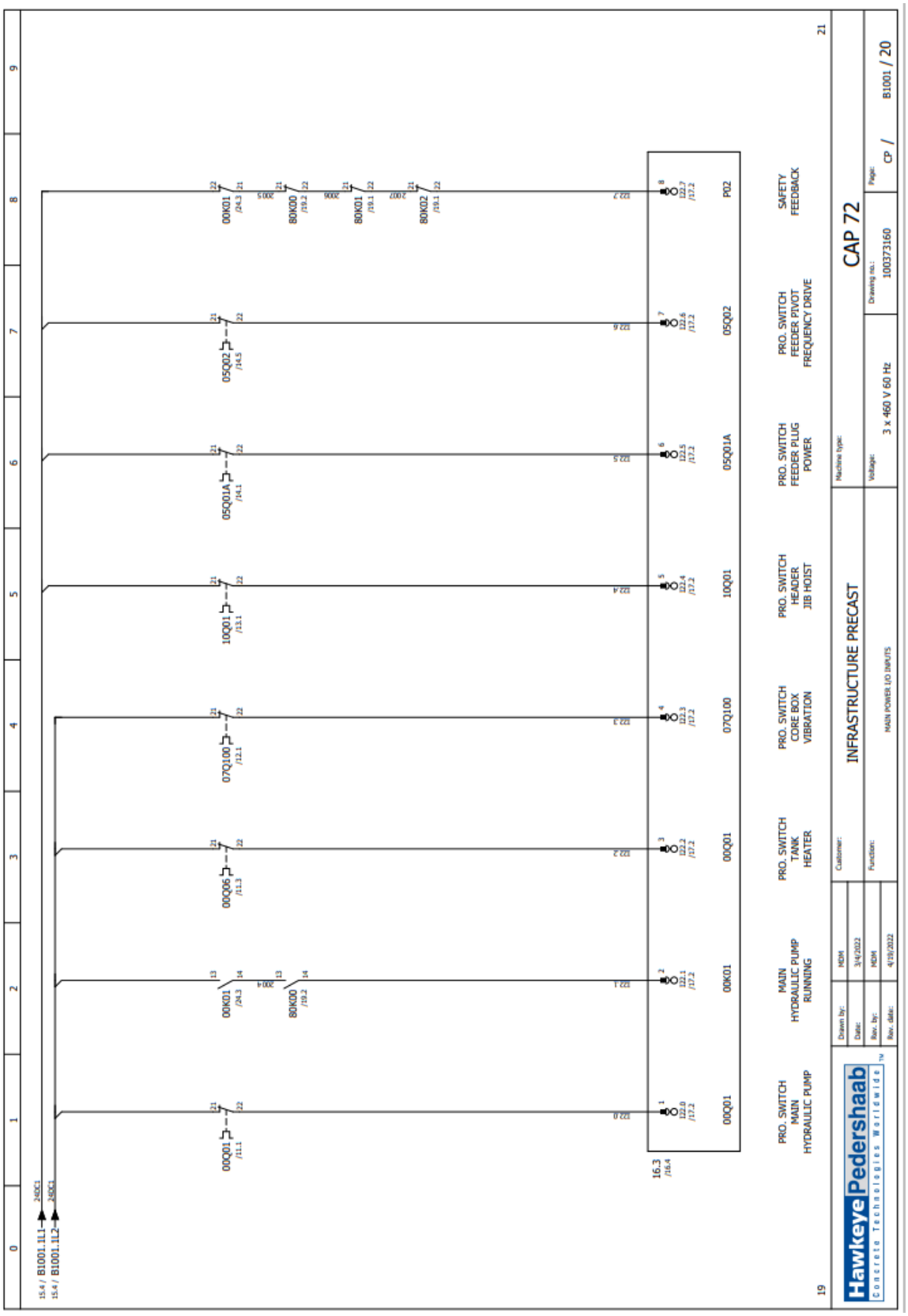

POWER SUPPLY
24 V DC
24 V DC
CONTROL POWER
ESTOP
POWER
INFRASTRUCTURE PRECAST
CAP 72
24 V DC POWER DISTRIBUTION
3 x 460 V 60 Hz
100373160
B1001 / 15
Hawkeye Pedershaab
Concrete Technologies Worldwide

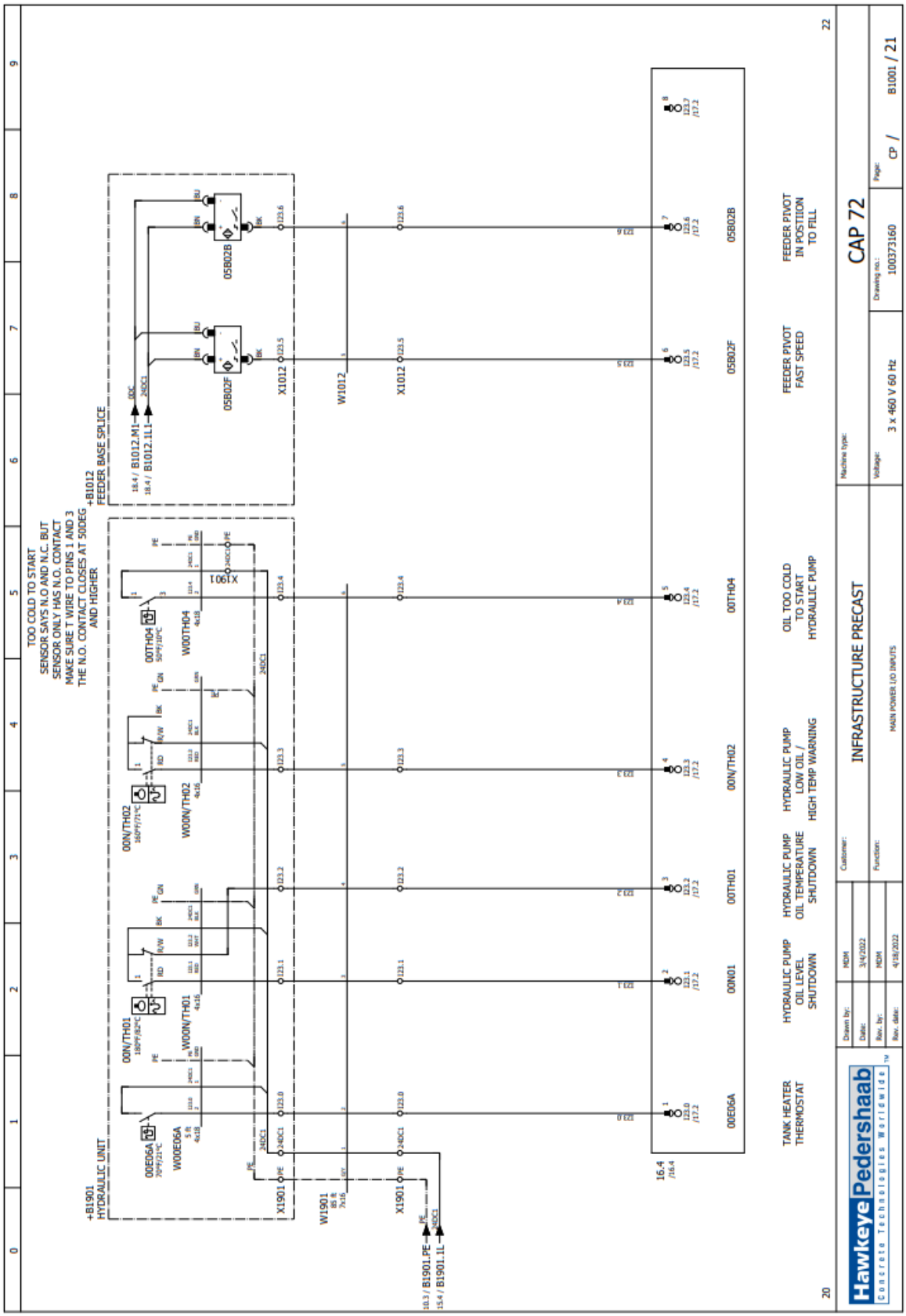

SIEMENS
SIMATIC ET 200SP
IM155-6PN ST
MAC ADDRESS
IP: 192.168.240.16
Hawkeye Pedershaab
Concrete Technologies Worldwide
INFRASTRUCTURE PRECAST
CAP 72
MAIN POWER I/O
3 x 460 V 60 Hz
1003731160
B1001 / 16

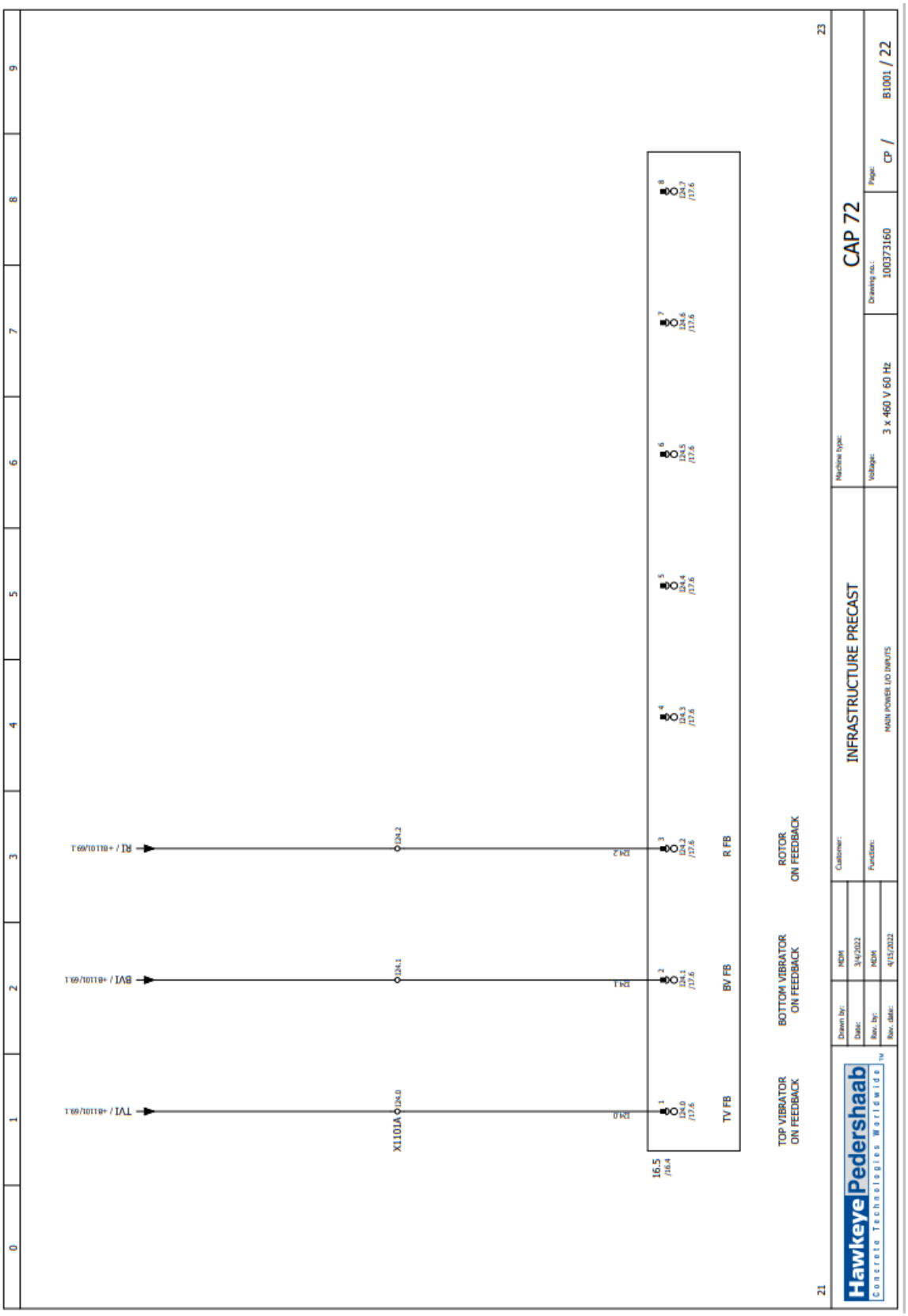

COMMON POWER
INFRASTRUCTURE PRECAST
CAP 72
Hawkeye Pedershaab
Concrete Technologies Worldwide
MAIN POWER I/O OVERVIEW (INPUTS/OUTPUTS)
3 x 460 V 60 Hz
100373160
B1001 / 17
P02
8 Digital input, 24VDC
ET200SP 4/8DI PS
ET200SP 4 DO PS
4 Digital Output, 24VDC
6ES7132-4BD32-0AA0
2 Analog Output, +/- 10V
6ES7135-4FB01-0AB0
HOSBUS
EMERGENCY STOP IN CONTROL CONSOLE
FEEDER IS DOCKED AT CAP SAFETY PROX
EMERGENCY STOP CONTACTOR
PRO. SWITCH MAIN HYDRAULIC PUMP
MAIN HYDRAULIC PUMP RUNNING
PRO. SWITCH TANK HEATER
PRO. SWITCH CORE BOX VIBRATION
PRO. SWITCH HEADER JIB HOIST
PRO. SWITCH FEEDER PLUG POWER
PRO. SWITCH FEEDER PIVOT FREQUENCY DRIVE
SAFETY FEEDBACK
TANK HEATER THERMOSTAT
HYDRAULIC PUMP OIL LEVEL SHUTDOWN
HYDRAULIC PUMP LOW OIL / HIGH TEMP SHUTDOWN
HYDRAULIC PUMP LOW OIL / HIGH TEMP WARNING
OIL TOO COLD TO START HYDRAULIC PUMP
FEEDER PIVOT FAST SPEED
FEEDER PIVOT IN POSITION TO FILL
TOP VIBRATOR ON FEEDBACK
BOTTION VIBRATOR ON FEEDBACK
ROTOR ON FEEDBACK
VIBRATOR OVERLOADS MODBUS A
VIBRATOR OVERLOADS MODBUS B
MAIN HYDRAULIC PUMP
TANK HEATER
FORM HYDRAULICS FILL
FORM HYDRAULICS STRIP
PRESSURE BOOST
PRESSHEAD PIVOT UNLOCK
TONGUE TROWEL ROTATE
TOP VIBRATORS ON
BOTTOM VIBRATORS ON
ROTOR ON
PRESSHEAD PIVOT LEFT
PRESSHEAD PIVOT RIGHT

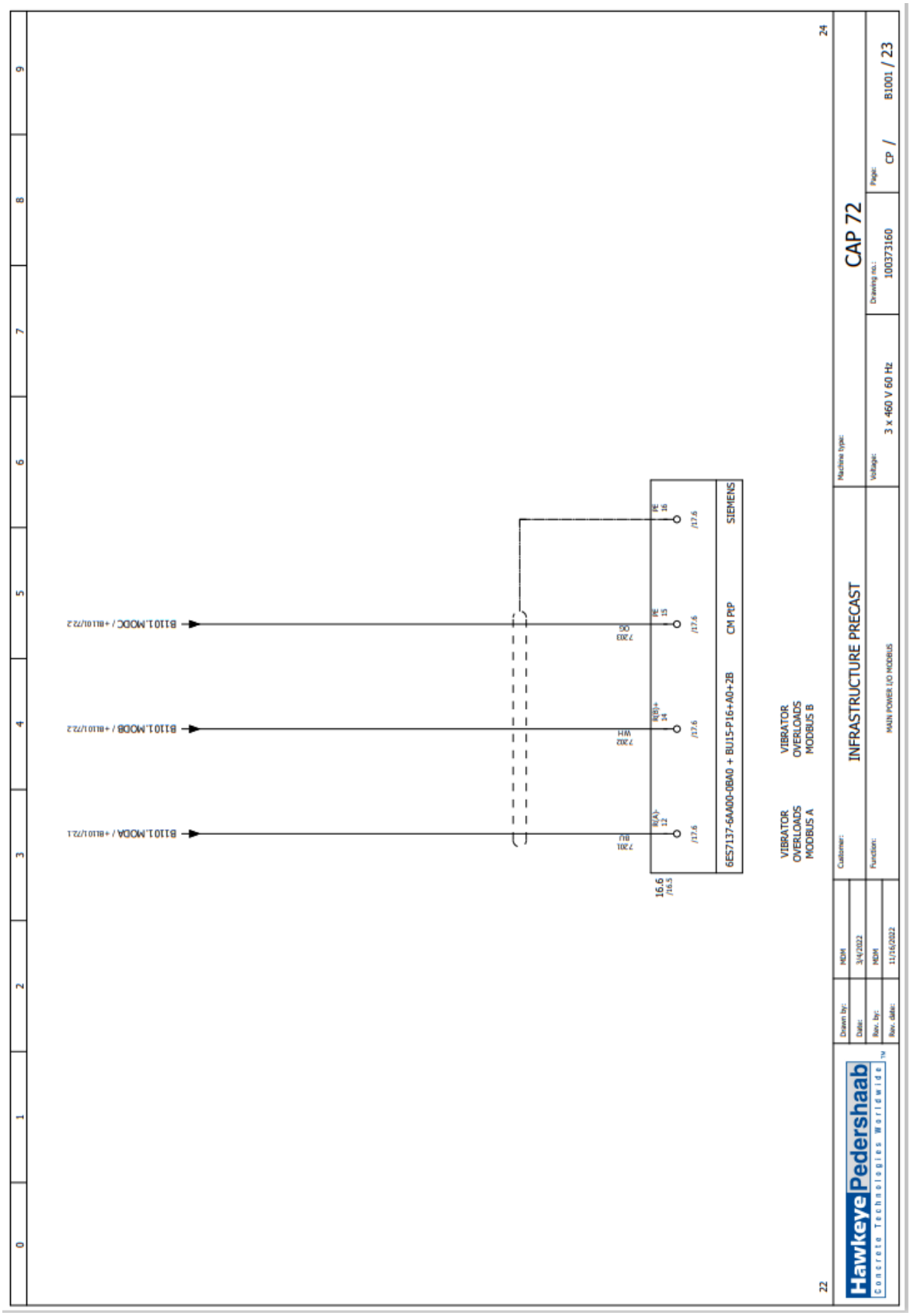

+B1012
FEEDER BASE SPLICE
+B1002
CONTROL CONSOLE
B1012.M1 / 21.6
B1012.1L1 / 21.6
05B02A
80S03
EMERGENCY STOP
IN CONTROL CONSOLE
W1012
45 ft
7x16
W1002
40 ft
7x16
X1012
X1002
24DC1
0DC
PE
10.3 /B1012.PE
15.4 / B1012.M
15.4 / B1012.1L
10.3 /B1002.PE
16.1
/16.3
FEEDER IS
DOCKED AT CAP
SAFETY PROX
EMERGENCY STOP
IN CONTROL CONSOLE
Hawkeye Pedershaab
Concrete Technologies Worldwide
Drawn by:
MDM
Date:
3/4/2022
Rev. by:
MDM
Rev. date:
6/30/2022
Customer:
INFRASTRUCTURE PRECAST
Function:
MAIN POWER I/O SAFETY INPUTS
Machine type:
CAP 72
Voltage:
3 x 460 V 60 Hz
Drawing no.:
100373160
Page:
CP /
B1001 / 18

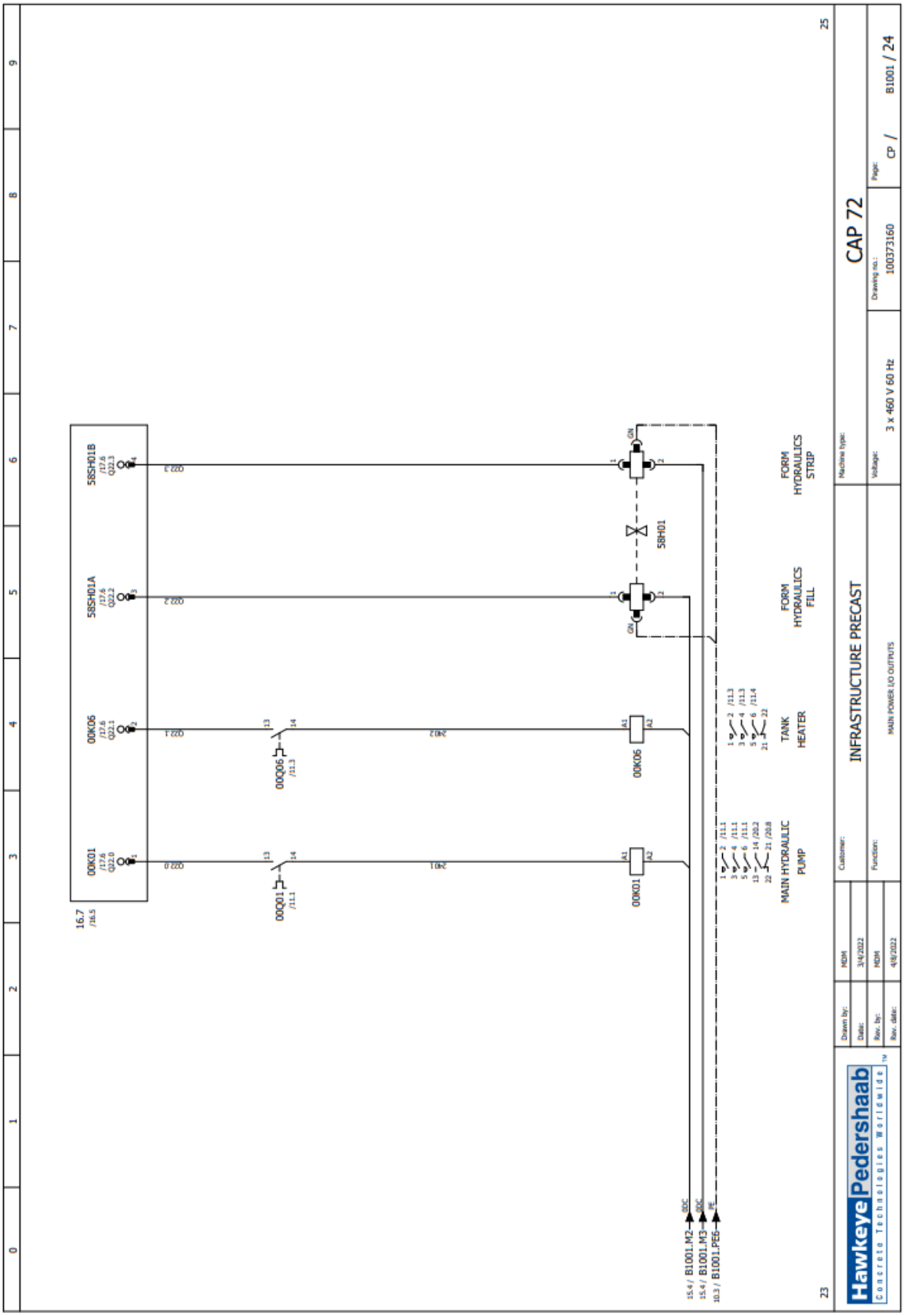

DIGITAL OUTPUT BYTE
80K00-K02
TYPE SIEMENS 4 EOO
PART 1 OF 1
80K01
80K02
80K00
EMERGENCY STOP CONTACTOR
INFRASTRUCTURE PRECAST
CAP 72
3 x 460 V 60 Hz
100373160
B1001 / 19
MAIN POWER I/O SAFETY OUTPUT
Hawkeye Pedershaab
Concrete Technologies Worldwide

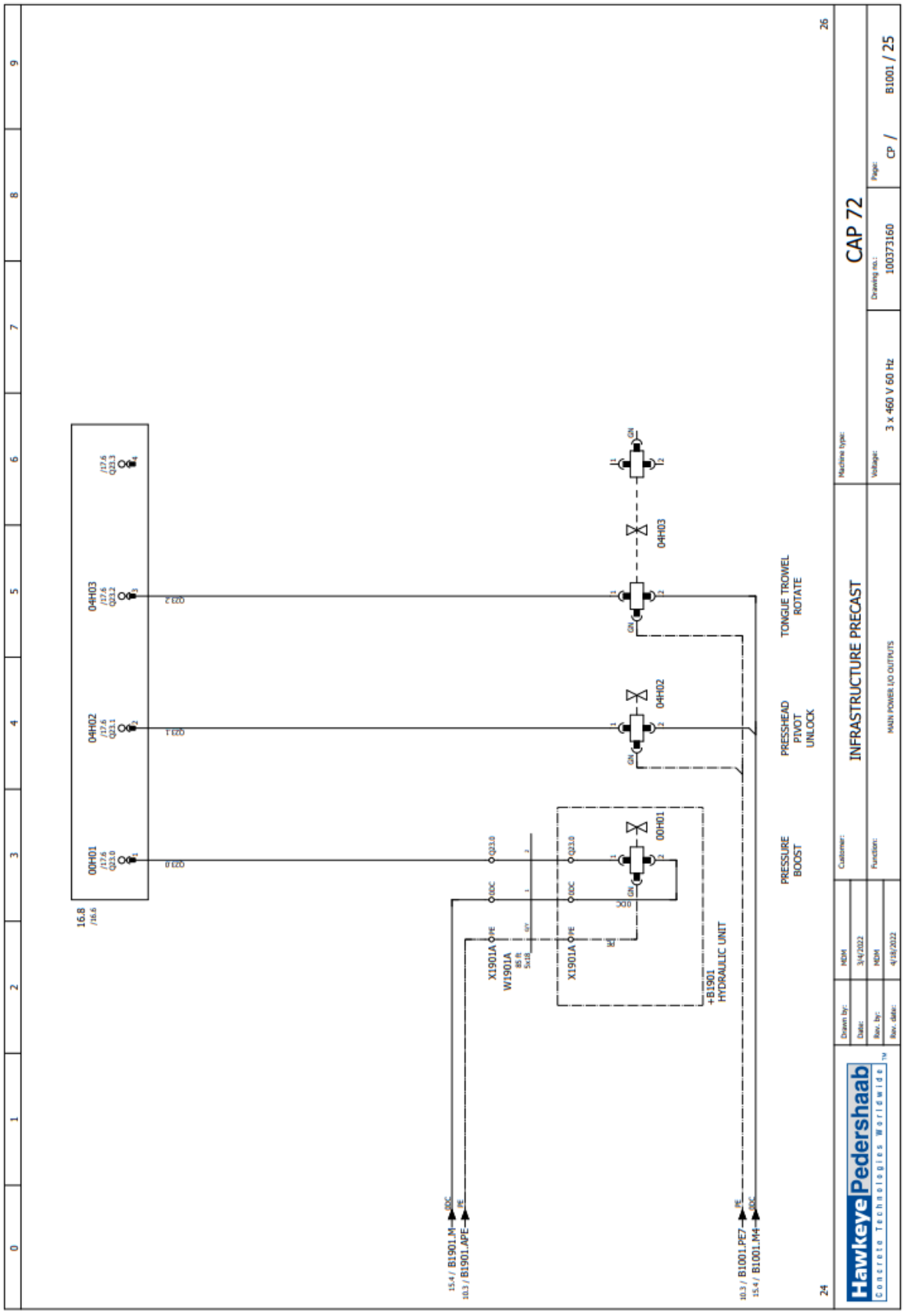

Hawkeye Pedershaab
Concrete Technologies Worldwide
INFRASTRUCTURE PRECAST
CAP 72
3 x 460 V 60 Hz
100373160
B1001 / 20
MAIN POWER I/O INPUTS
PRO. SWITCH MAIN HYDRAULIC PUMP
MAIN HYDRAULIC PUMP RUNNING
PRO. SWITCH TANK HEATER
PRO. SWITCH CORE BOX VIBRATION
PRO. SWITCH HEADER JIB HOIST
PRO. SWITCH FEEDER PLUG POWER
PRO. SWITCH FEEDER PIVOT FREQUENCY DRIVE
SAFETY FEEDBACK
00Q01
00K01
00Q01
07Q100
10Q01
05Q01A
05Q02
P02
B1001.1L1
B1001.1L2

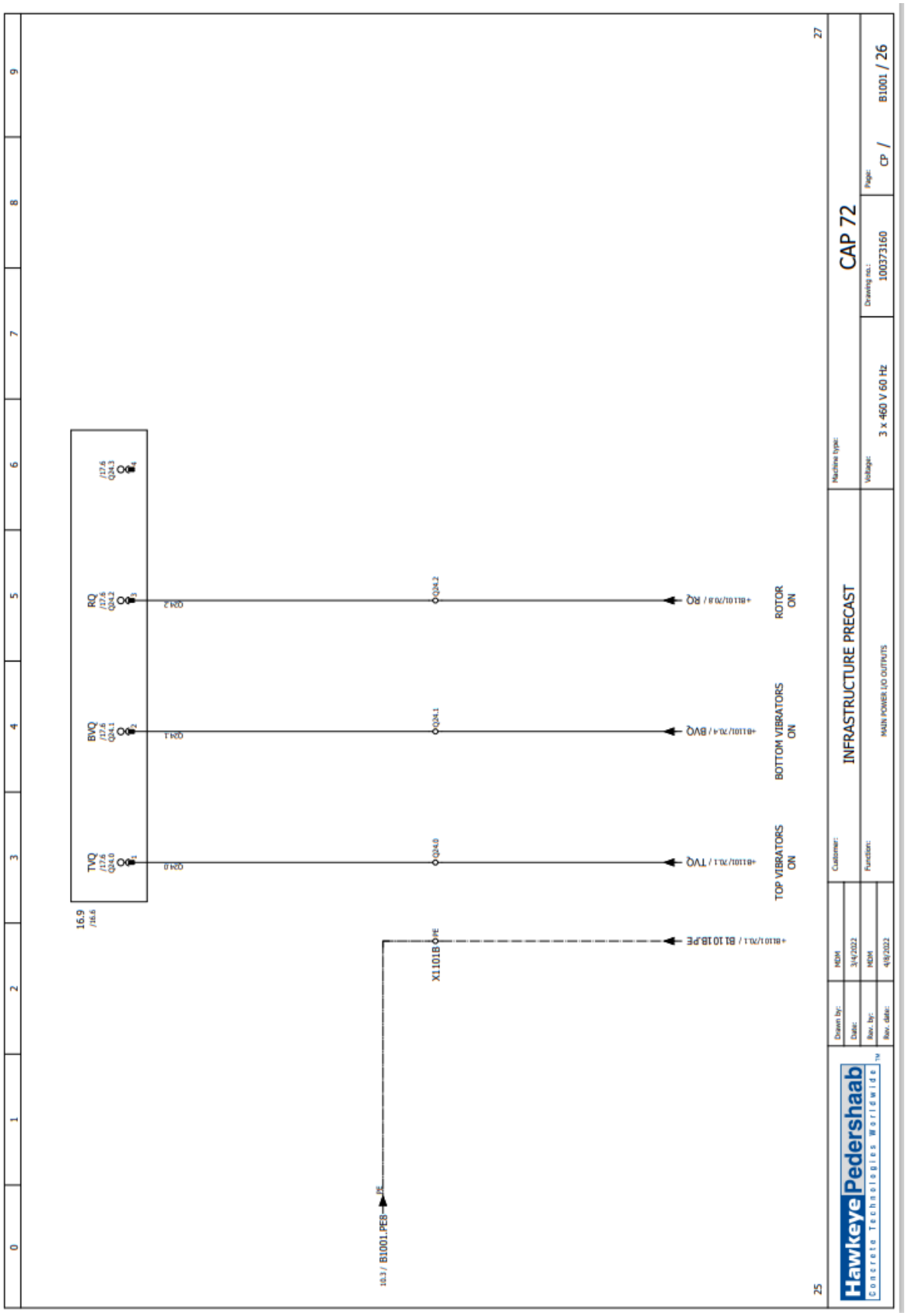

+B1901
HYDRAULIC UNIT
+B1012
FEEDER BASE SPLICE
TOO COLD TO START
SENSOR SAYS N.O AND N.C. BUT
SENSOR ONLY HAS N.O. CONTACT
MAKE SURE T WIRE TO PINS 1 AND 3
THE N.O. CONTACT CLOSES AT 50DEG
AND HIGHER
00ED6A
W00ED6A
00N/TH01
W00N/TH01
00N/TH02
W00N/TH02
00THD4
W00THD4
X1901
W1901
X1012
W1012
05B02B
05B02F
00ED6A
00N01
00TH01
00N/TH02
00THD4
05B02F
05B02B
TANK HEATER
THERMOSTAT
HYDRAULIC PUMP
OIL LEVEL
SHUTDOWN
HYDRAULIC PUMP
OIL TEMPERATURE
SHUTDOWN
HYDRAULIC PUMP
LOW OIL /
HIGH TEMP WARNING
OIL TOO COLD
TO START
HYDRAULIC PUMP
FEEDER PIVOT
FAST SPEED
FEEDER PIVOT
IN POSITION
TO FILL
Hawkeye Pedershaab
Concrete Technologies Worldwide
INFRASTRUCTURE PRECAST
CAP 72
MAIN POWER I/O INPUTS
3 x 460 V 60 Hz
100373160
B1001 / 21

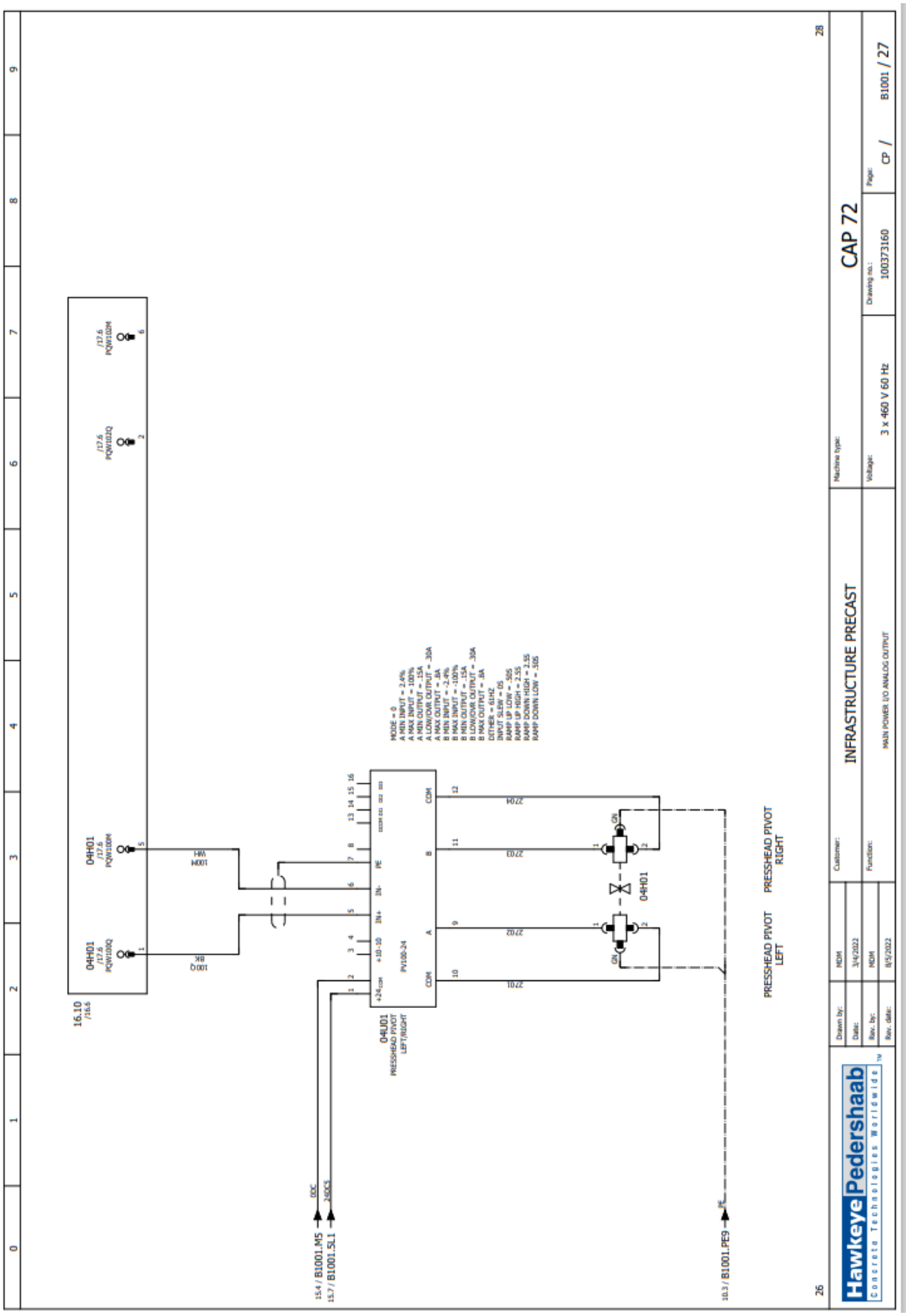

TVI / +B1101/69.1
BVI / +B1101/69.1
RI / +B1101/69.1
X1101A
TOP VIBRATOR ON FEEDBACK
BOTTOM VIBRATOR ON FEEDBACK
ROTOR ON FEEDBACK
TV FB
BV FB
R FB
INFRASTRUCTURE PRECAST
CAP 72
3 x 460 V 60 Hz
100373160
B1001 / 22
Hawkeye Pedershaab
Concrete Technologies Worldwide

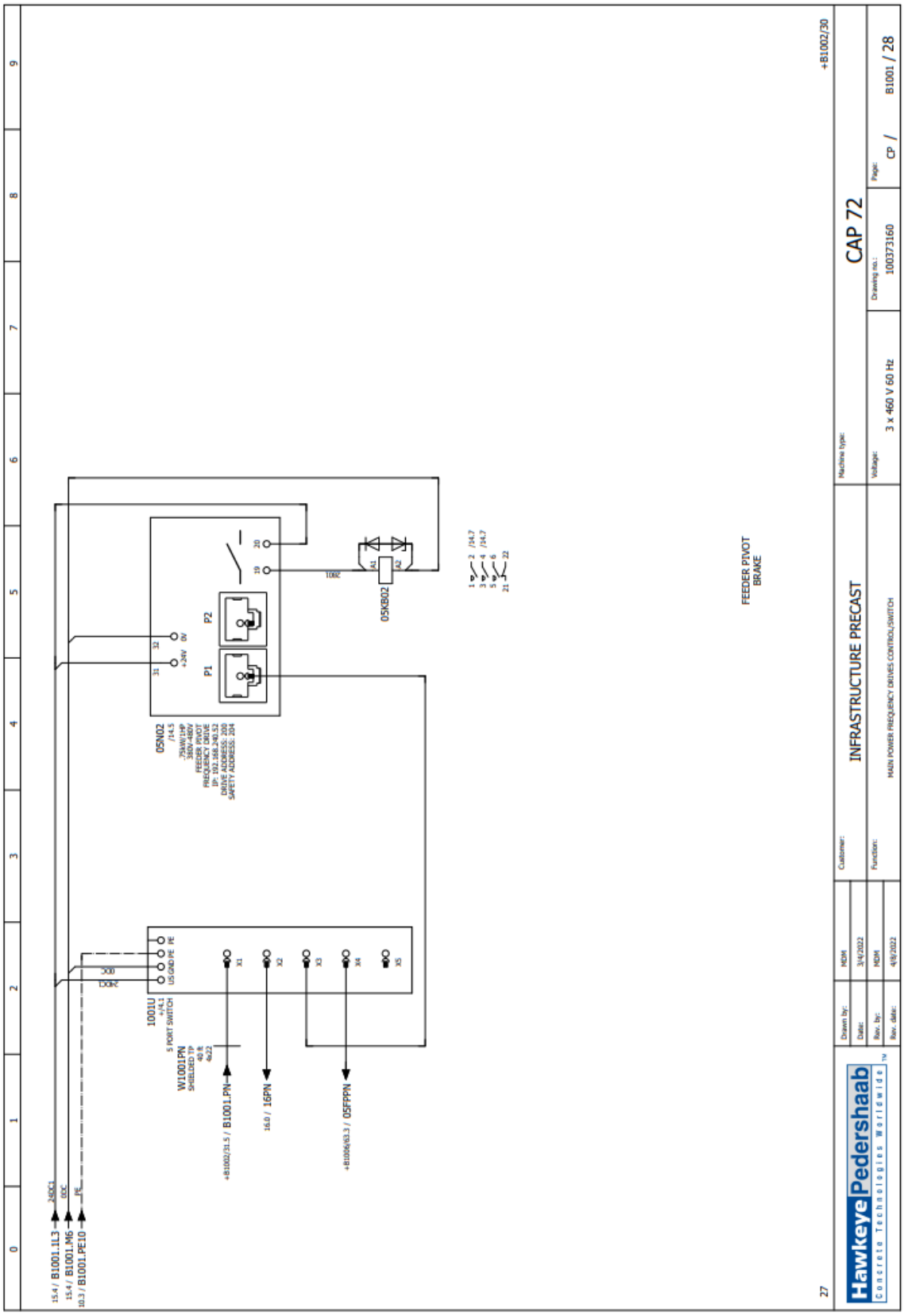

B1101.MODA / +BU101/72.1
B1101.MODB / +BU101/72.2
B1101.MODC / +BU101/72.2
6ES7137-6AA00-0BA0 + BU15-P16+A0+2B
CM PtP
SIEMENS
VIBRATOR OVERLOADS MODBUS A
VIBRATOR OVERLOADS MODBUS B
INFRASTRUCTURE PRECAST
CAP 72
MAIN POWER I/O MODBUS
3 x 460 V 60 Hz
100373160
B1001 / 23
Hawkeye Pedershaab
Concrete Technologies Worldwide

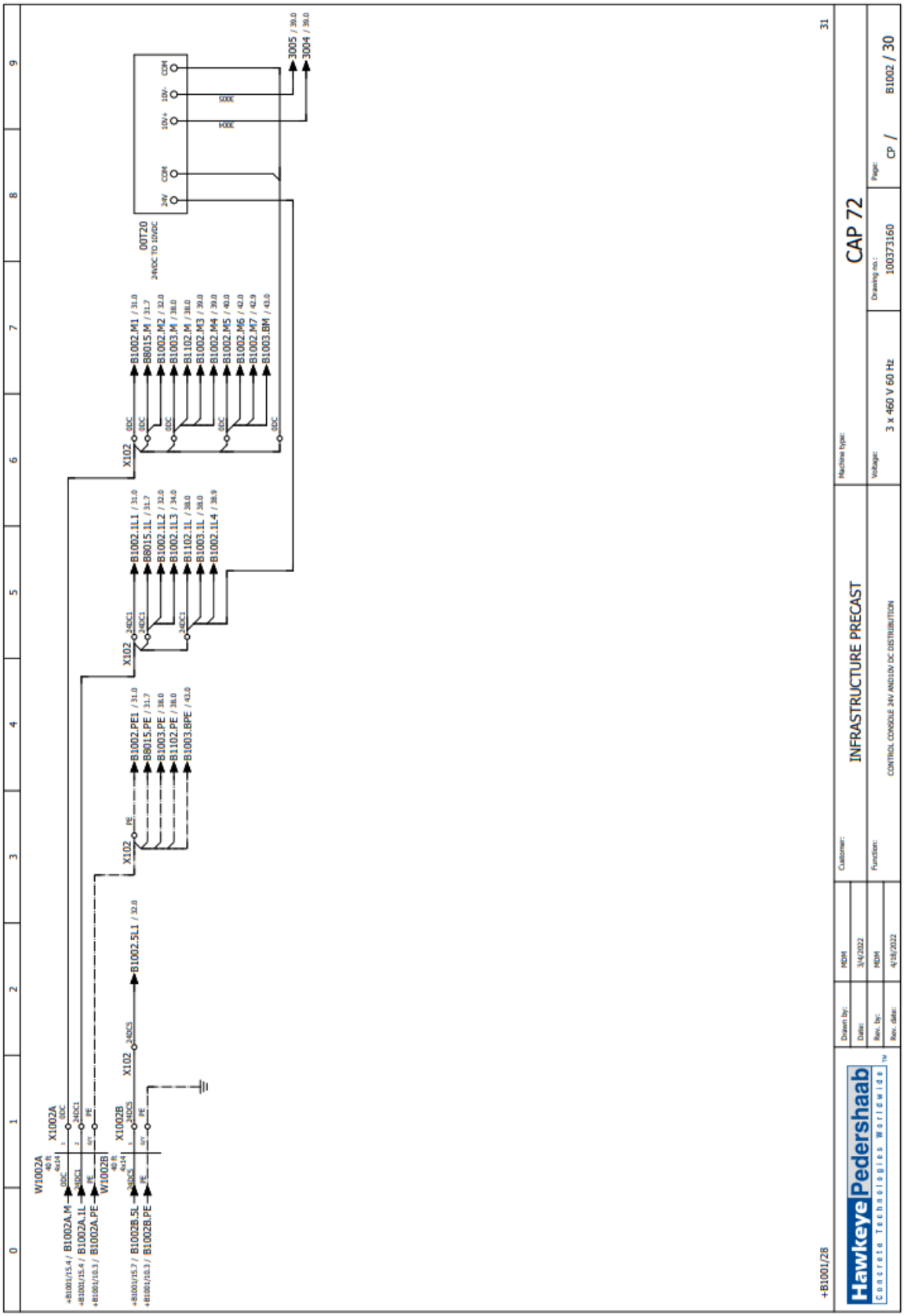

58SH01B
58SH01A
00K06
00K01
00Q06
00Q01
58H01
FORM HYDRAULICS STRIP
FORM HYDRAULICS FILL
TANK HEATER
MAIN HYDRAULIC PUMP
Hawkeye Pedershaab
Concrete Technologies Worldwide
INFRASTRUCTURE PRECAST
CAP 72
3 x 460 V 60 Hz
100373160
B1001 / 24

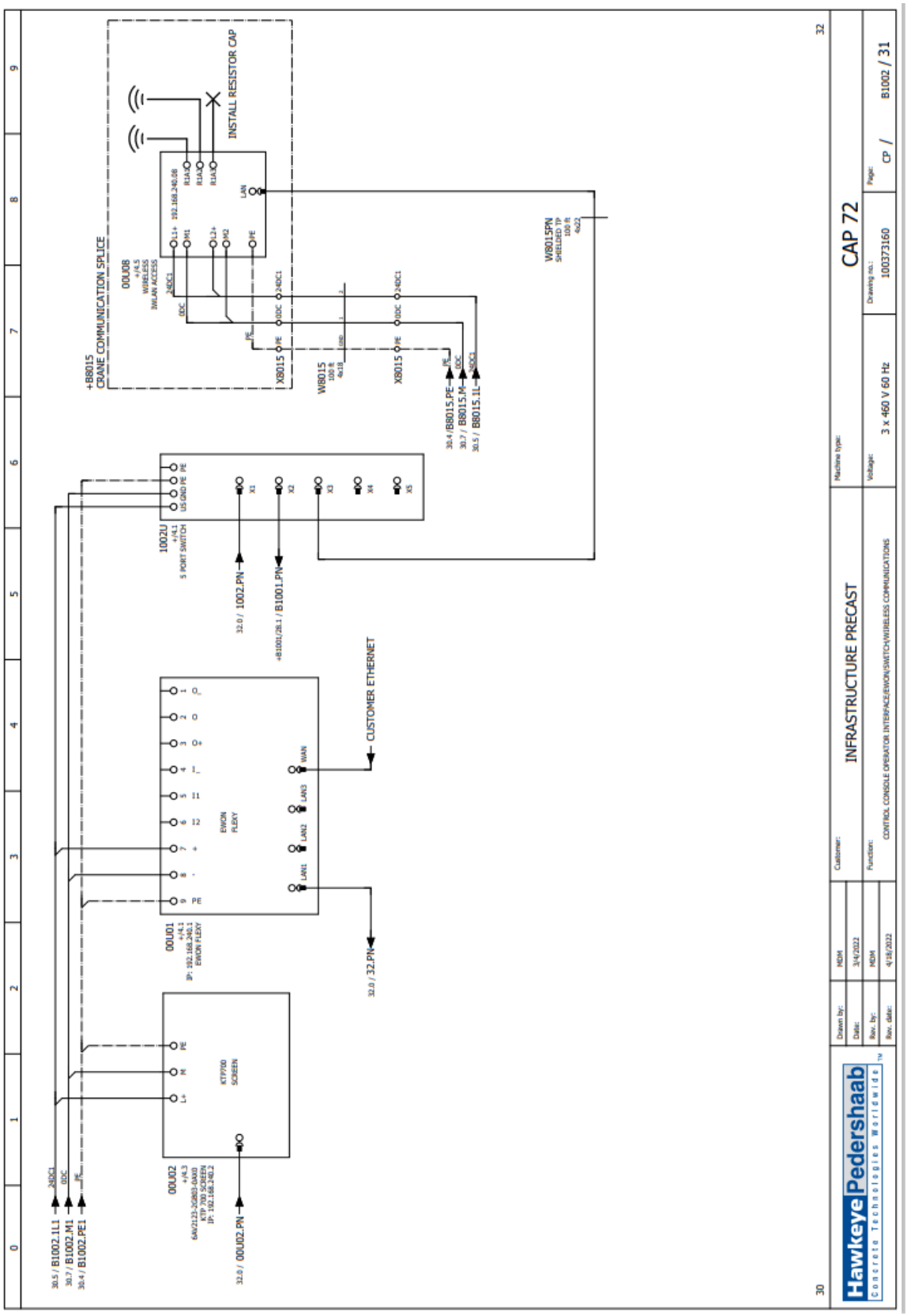

CAP 72
INFRASTRUCTURE PRECAST
Hawkeye Pedershaab
Concrete Technologies Worldwide
3 x 460 V 60 Hz
100373160
B1001 / 25
MAIN POWER I/O OUTPUTS
+B1901
HYDRAULIC UNIT
X1901A
W1901A
04H03
04H02
00H01
TONGUE TROWEL
ROTATE
PRESSHEAD
PIVOT
UNLOCK
PRESSURE
BOOST

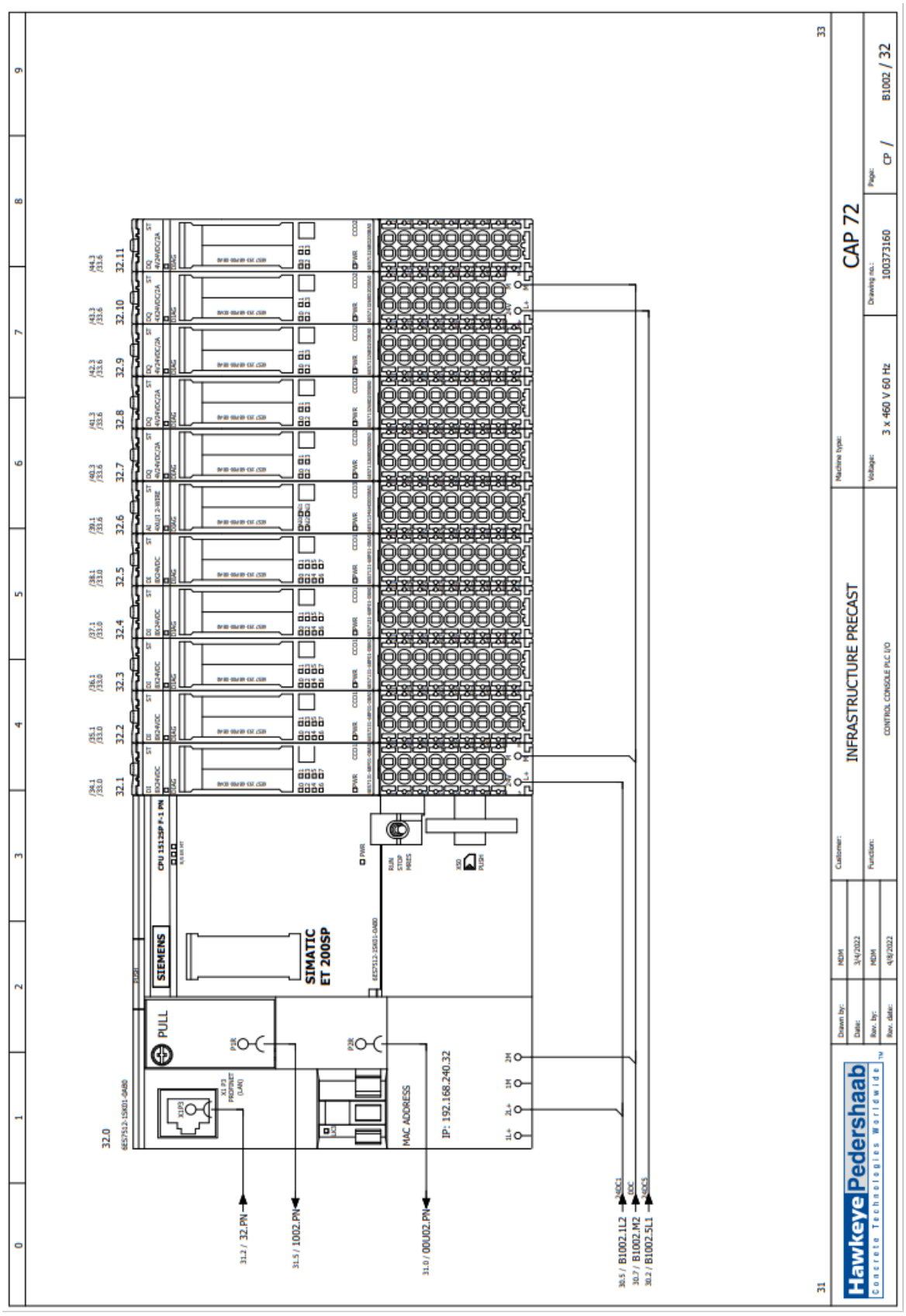

CAP 72
INFRASTRUCTURE PRECAST
Hawkeye Pedershaab
Concrete Technologies Worldwide
3 x 460 V 60 Hz
100373160
B1001 / 26
MAIN POWER I/O OUTPUTS
TOP VIBRATORS ON
BOTTOM VIBRATORS ON
ROTOR ON
TVQ
BVQ
RQ
X11018
B1001.PE3

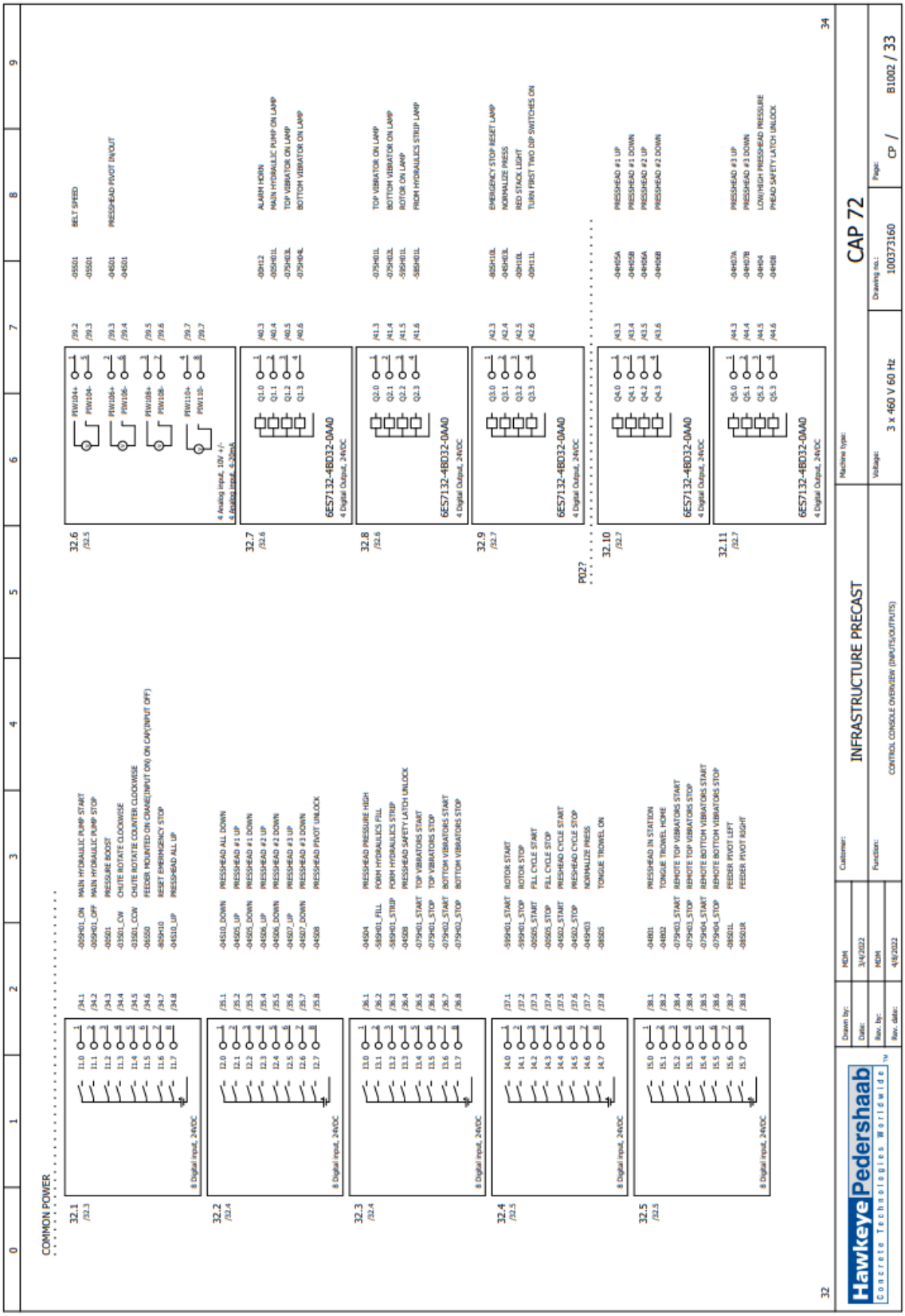

Hawkeye Pedershaab
Concrete Technologies Worldwide
INFRASTRUCTURE PRECAST
CAP 72
3 x 460 V 60 Hz
100373160
B1001 / 27
MAIN POWER I/O ANALOG OUTPUT
PRESSHEAD PIVOT LEFT
PRESSHEAD PIVOT RIGHT
04H01
04U01
16.10
B1001.M5
B1001.SL1
B1001.PE9

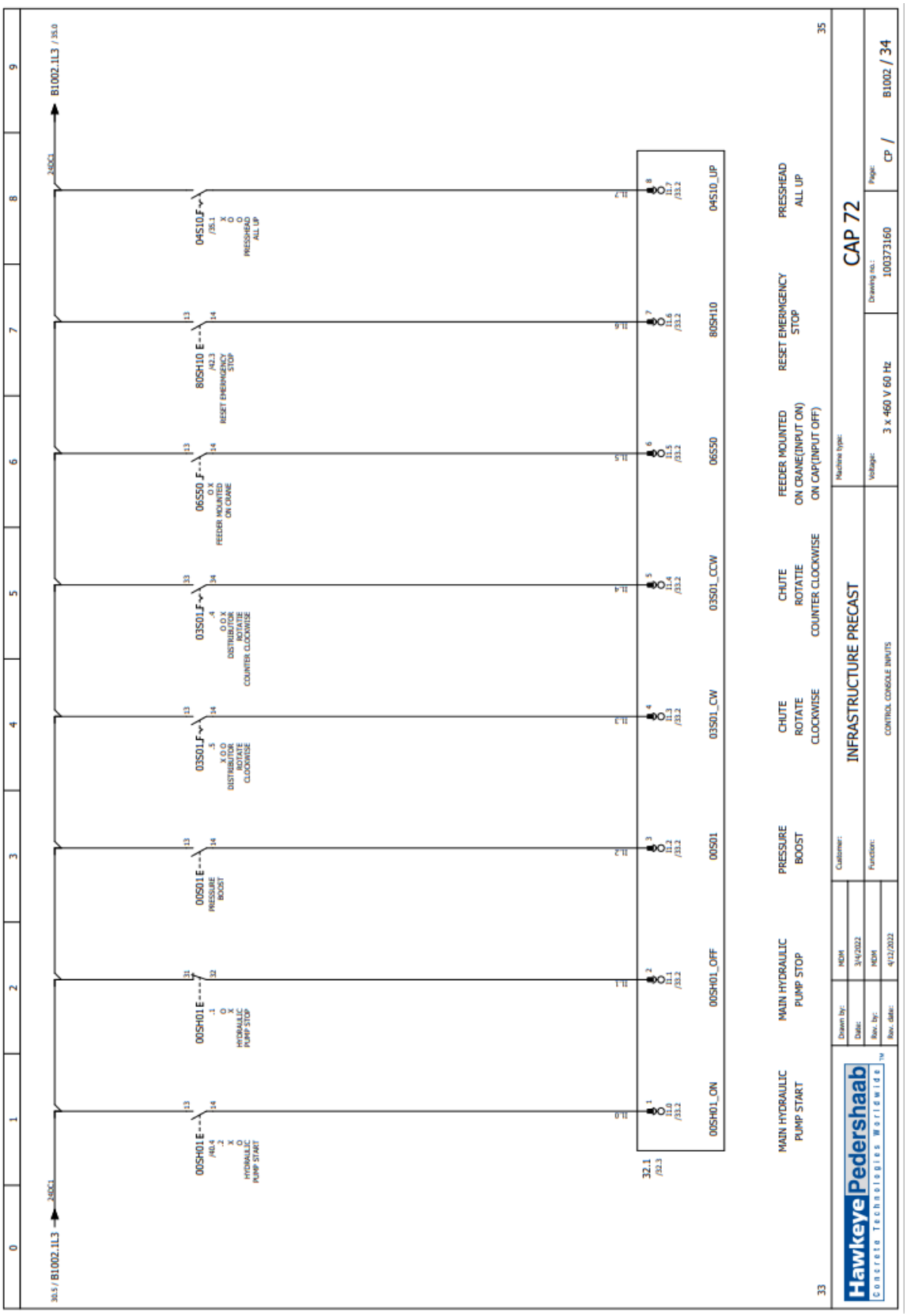

+B1002/30
FEEDER PIVOT
BRAKE
05KB02
05MO2
1001U
W1001PN
B1001.PN
16PN
05FPPN
B1001.1L3
B1001.M6
B1001.PE10
Hawkeye Pedershaab
Concrete Technologies Worldwide
INFRASTRUCTURE PRECAST
CAP 72
3 x 460 V 60 Hz
100373160
B1001 / 28
MAIN POWER FREQUENCY DRIVES CONTROL/SWITCH

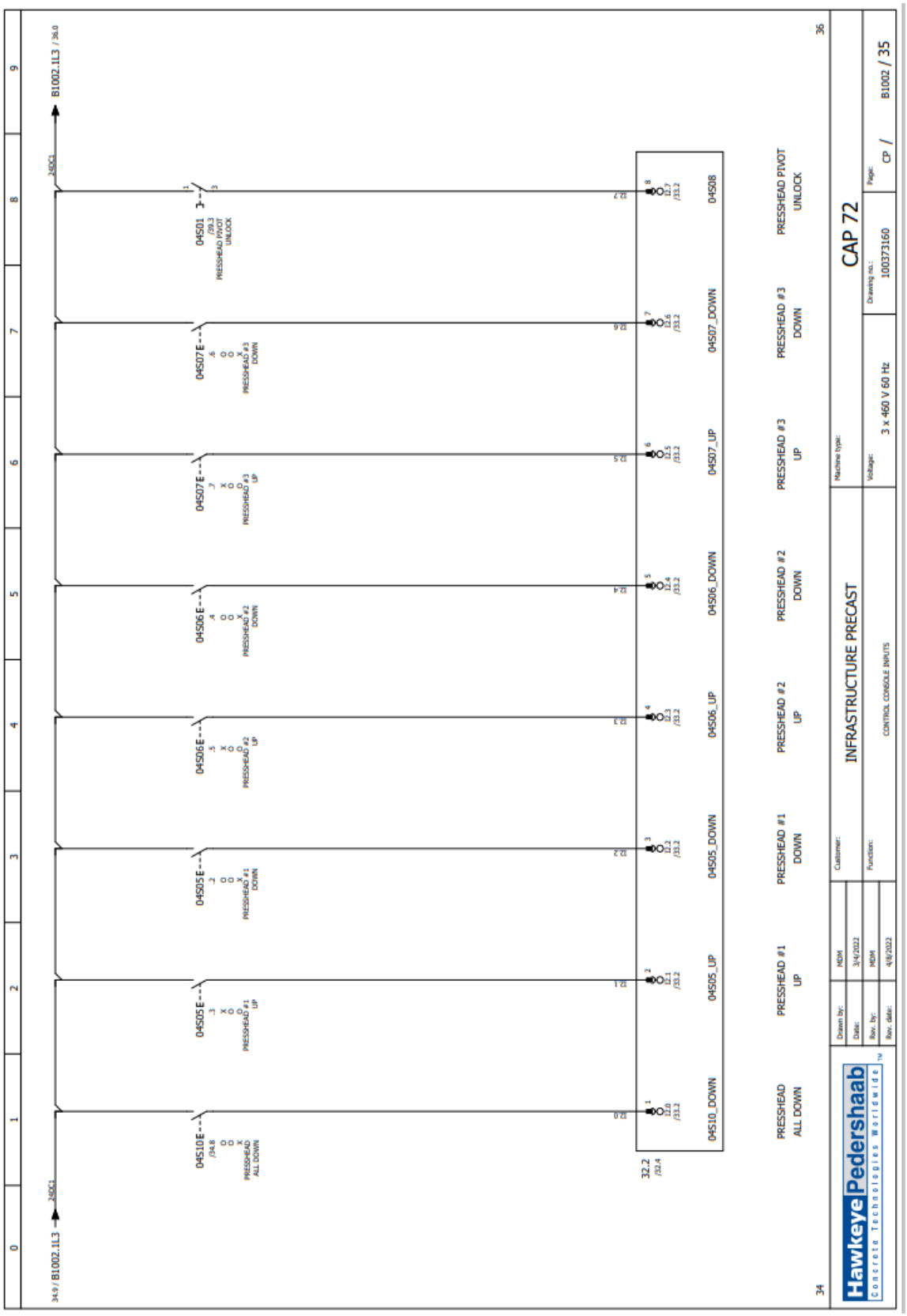

INFRASTRUCTURE PRECAST
CAP 72
CONTROL CONSOLE 24V AND 10V DC DISTRIBUTION
Hawkeye Pedershaab
Concrete Technologies Worldwide
3 x 460 V 60 Hz
100373160
B1002 / 30
CP /
+B1001/28
31
W1002A
X1002A
W1002B
X1002B
X102
00720
24VDC TO 10VDC
3005 / 39.0
3004 / 39.0
+B1001/15.4 / B1002A.M
+B1001/15.4 / B1002A.1L
+B1001/10.3 / B1002A.PE
+B1001/15.7 / B1002B.5L
+B1001/10.3 / B1002B.PE
B1002.M1 / 31.0
B8015.M / 31.7
B1002.M2 / 32.0
B1003.M / 38.0
B1102.M / 38.0
B1002.M3 / 39.0
B1002.M4 / 39.0
B1002.M5 / 41.0
B1002.M6 / 42.0
B1002.M7 / 42.9
B1003.BM / 43.0
B1002.1L1 / 31.0
B8015.1L / 31.7
B1002.1L2 / 32.0
B1002.1L3 / 34.0
B1102.1L / 38.0
B1003.1L / 38.0
B1002.1L4 / 38.9
B1002.PE1 / 31.0
B8015.PE / 31.7
B1003.PE / 38.0
B1102.PE / 38.0
B1003.BPE / 43.0
B1002.5L1 / 32.0

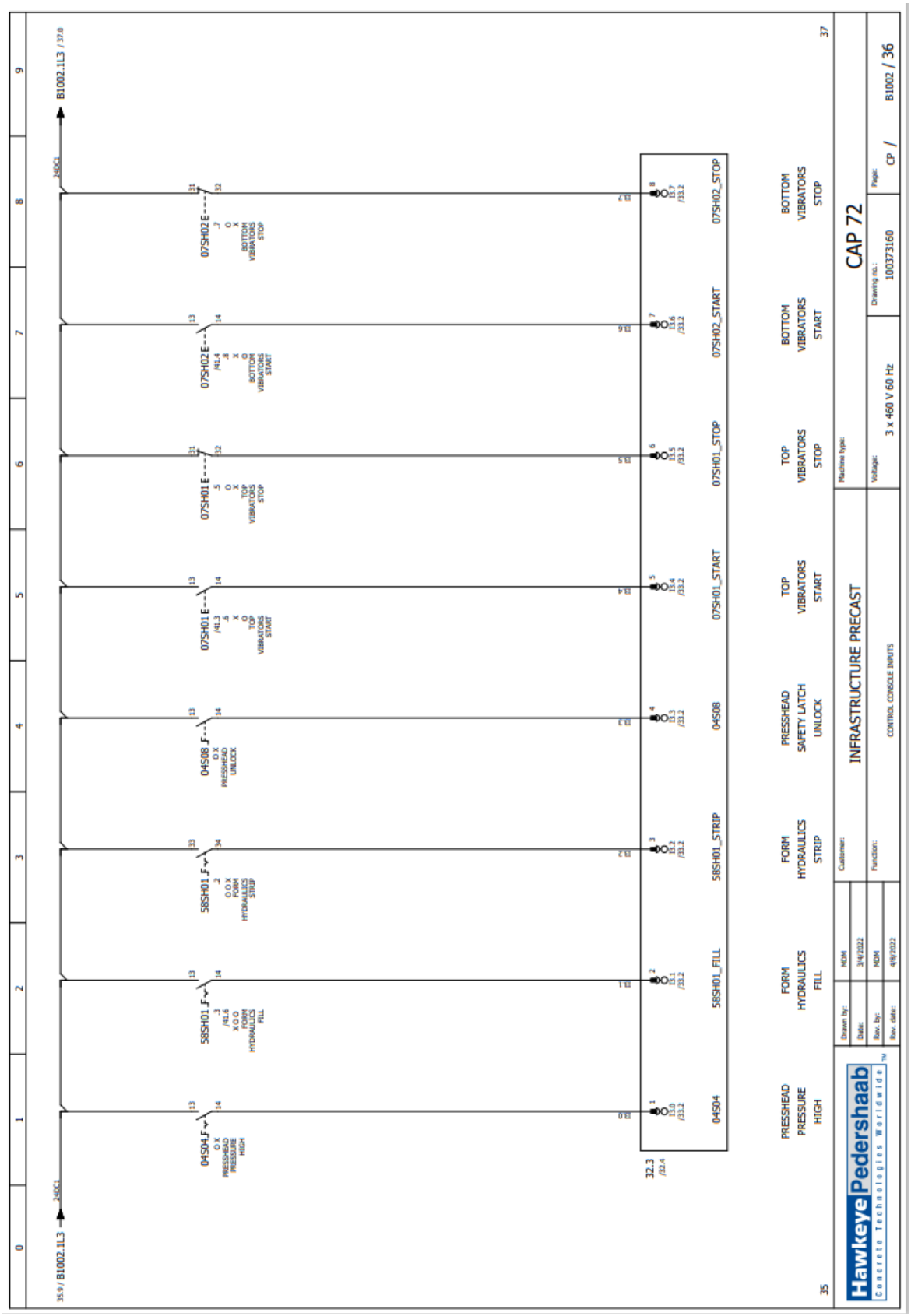

INSTALL RESISTOR CAP
+B8015
CRANE COMMUNICATION SPLICE
00U08
WIRELESS
WLAN ACCESS
X8015
W8015
W8015PN
1002U
5 PORT SWITCH
1002.PN
B1001.PN
CUSTOMER ETHERNET
00U01
EWON
FLEXY
32.PN
00U02
KTP700
SCREEN
00U02.PN
B1002.1L1
B1002.M1
B1002.PE1
B8015.PE
B8015.M
B8015.1L
INFRASTRUCTURE PRECAST
CAP 72
CONTROL CONSOLE OPERATOR INTERFACE/EWON/SWITCH/WIRELESS COMMUNICATIONS
3 x 460 V 60 Hz
100373160
B1002 / 31
Hawkeye Pedershaab
Concrete Technologies Worldwide

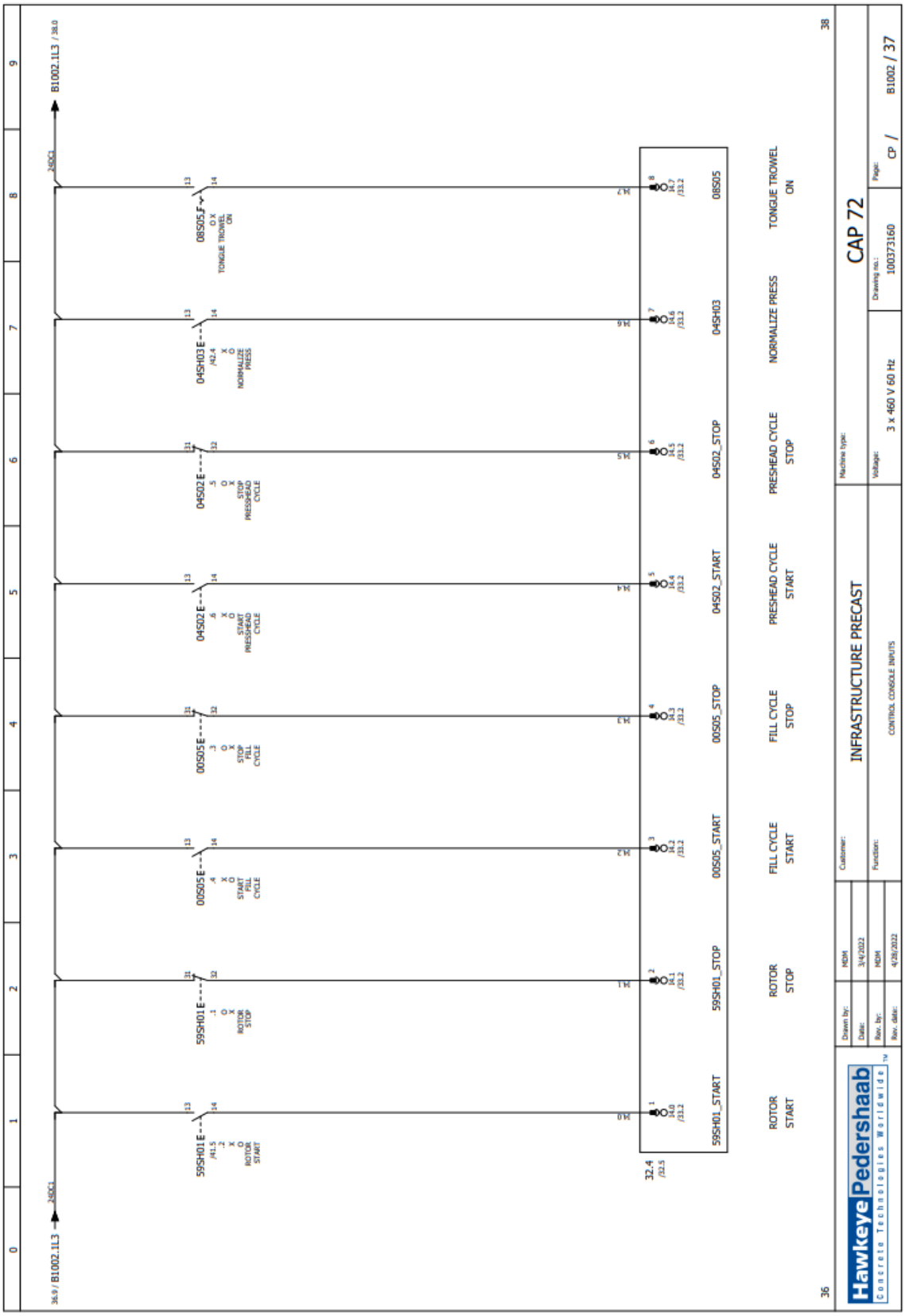

SIEMENS
SIMATIC ET 200SP
CPU 1512SP F-1 PN
PULL
MAC ADDRESS
IP: 192.168.240.32
INFRASTRUCTURE PRECAST
CAP 72
CONTROL CONSOLE PLC I/O
3 x 460 V 60 Hz
100373160
Hawkeye Pedershaab
Concrete Technologies Worldwide

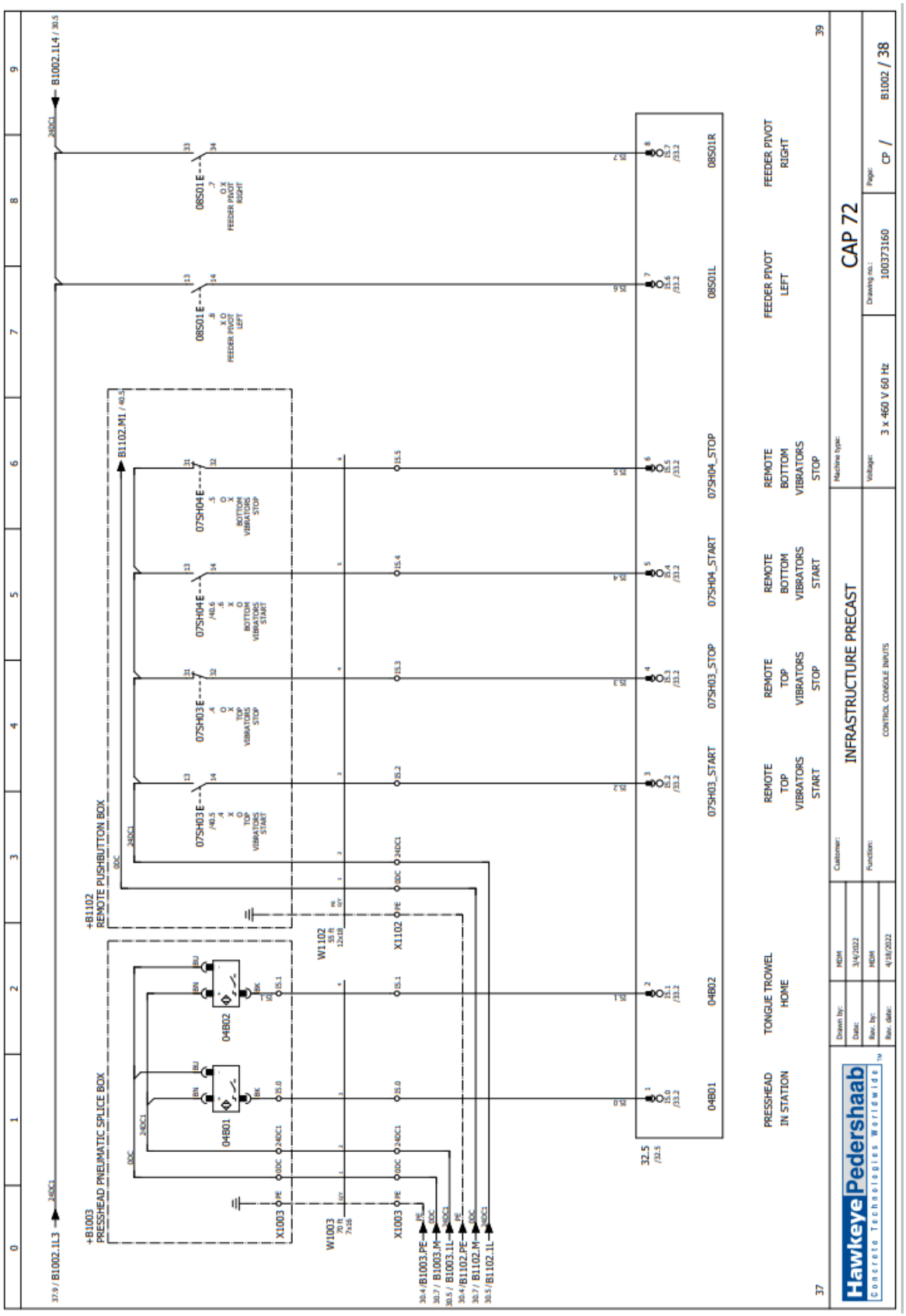

COMMON POWER
INFRASTRUCTURE PRECAST
CAP 72
Hawkeye Pedershaab
Concrete Technologies Worldwide
CONTROL CONSOLE OVERVIEW (INPUTS/OUTPUTS)
3 x 460 V 60 Hz
100373160
B1002 / 33
6ES7132-4BD32-0AA0
4 Digital Output, 24VDC
8 Digital input, 24VDC
4 Analog input, 10V +/-
4 Analog input, 4-20mA

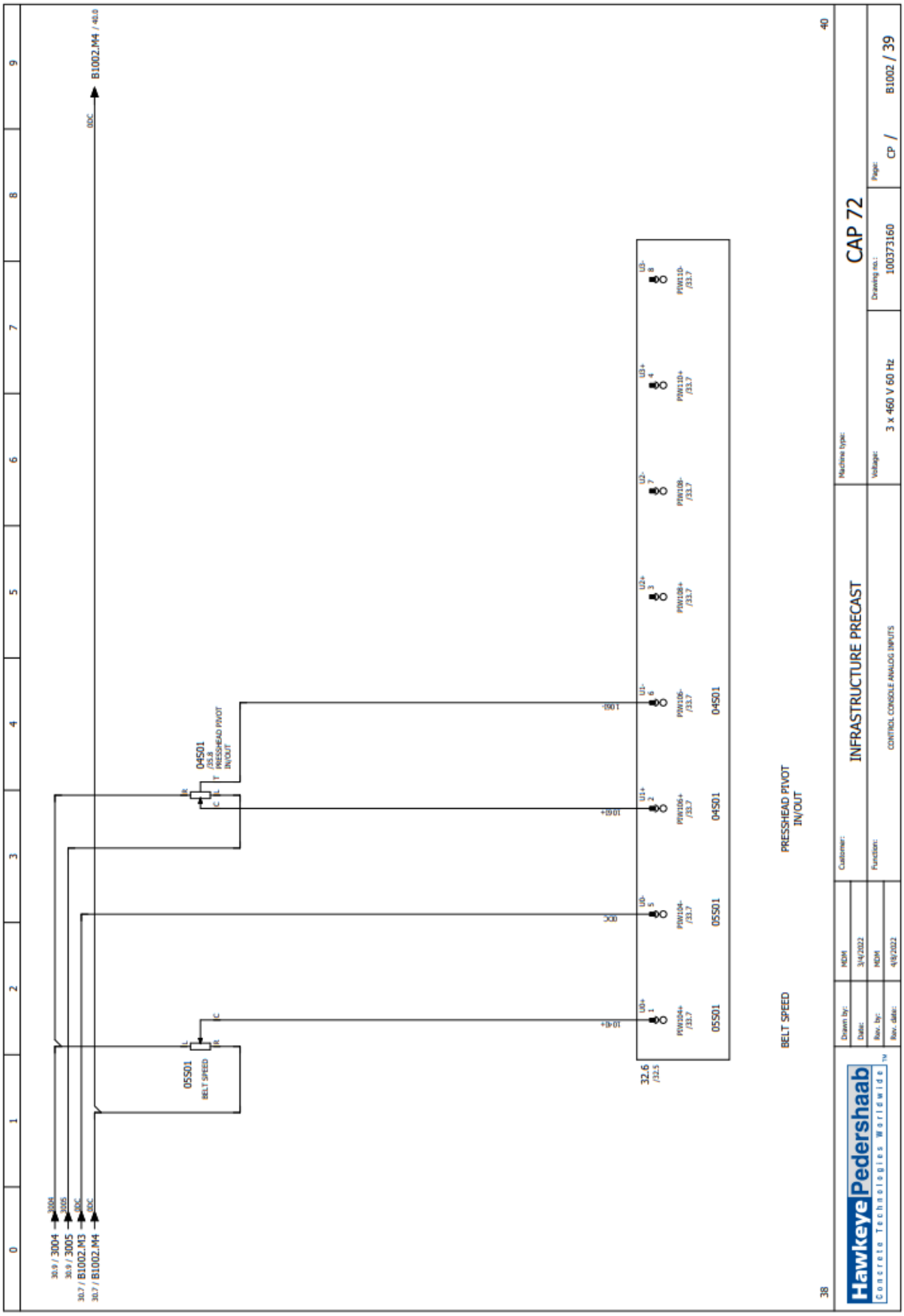

B1002.1L3
00SH01_ON
00SH01_OFF
00S01
03S01_CW
03S01_CCW
06S50
80SH10
04S10_UP
MAIN HYDRAULIC PUMP START
MAIN HYDRAULIC PUMP STOP
PRESSURE BOOST
CHUTE ROTATE CLOCKWISE
CHUTE ROTATE COUNTER CLOCKWISE
FEEDER MOUNTED ON CRANE(INPUT ON) ON CAP(INPUT OFF)
RESET EMERGENCY STOP
PRESSHEAD ALL UP
Hawkeye Pedershaab
Concrete Technologies Worldwide
INFRASTRUCTURE PRECAST
CAP 72
CONTROL CONSOLE INPUTS
3 x 460 V 60 Hz
100373160
B1002 / 34

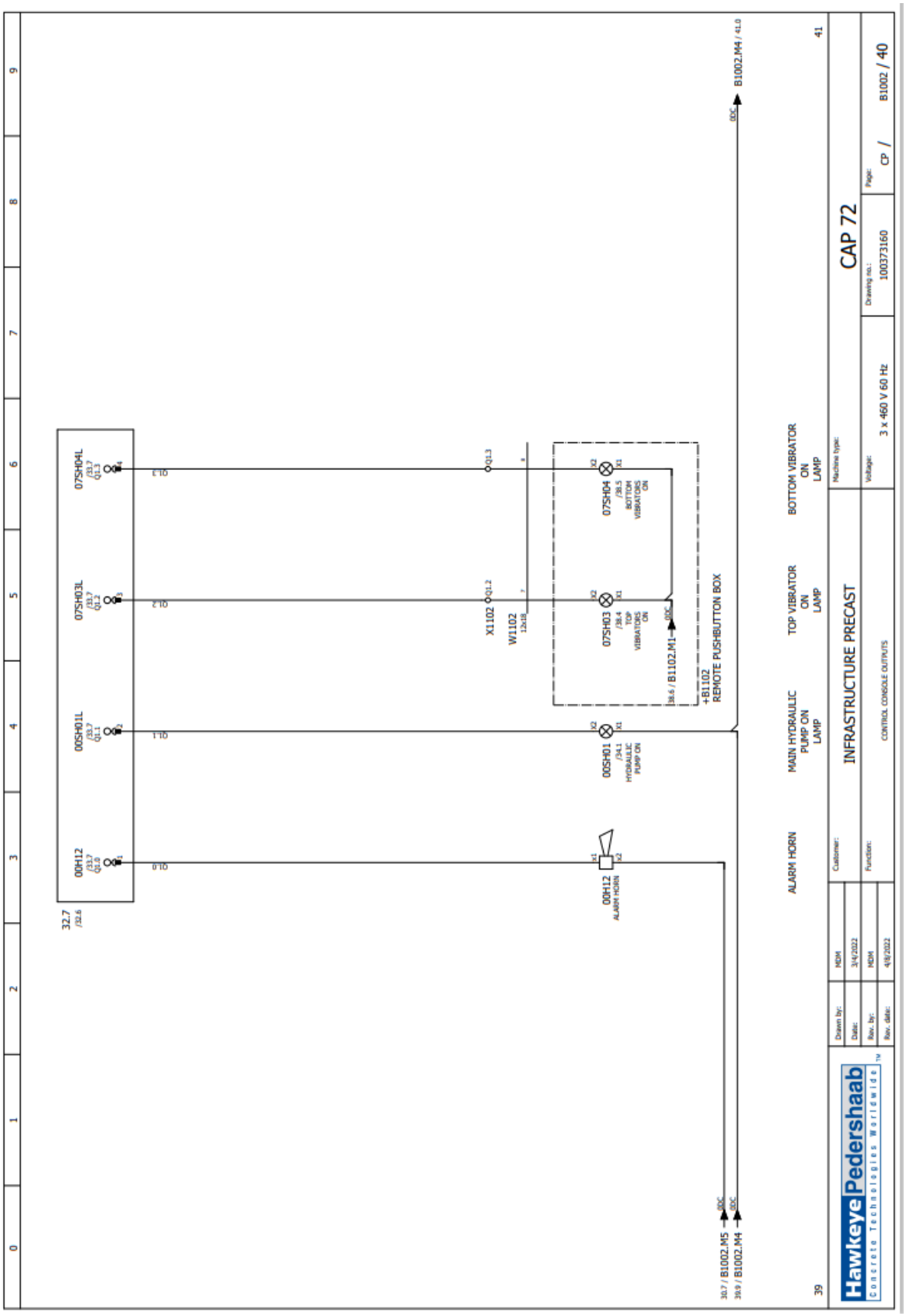

B1002.1L3
04510E
PRESSHEAD ALL DOWN
04505E
PRESSHEAD #1 UP
04505E
PRESSHEAD #1 DOWN
04506E
PRESSHEAD #2 UP
04506E
PRESSHEAD #2 DOWN
04507E
PRESSHEAD #3 UP
04507E
PRESSHEAD #3 DOWN
04501
PRESSHEAD PIVOT UNLOCK
04510_DOWN
04505_UP
04505_DOWN
04506_UP
04506_DOWN
04507_UP
04507_DOWN
04508
PRESSHEAD ALL DOWN
PRESSHEAD #1 UP
PRESSHEAD #1 DOWN
PRESSHEAD #2 UP
PRESSHEAD #2 DOWN
PRESSHEAD #3 UP
PRESSHEAD #3 DOWN
PRESSHEAD PIVOT UNLOCK
Hawkeye Pedershaab
Concrete Technologies Worldwide
INFRASTRUCTURE PRECAST
CONTROL CONSOLE INPUTS
CAP 72
3 x 460 V 60 Hz
100373160
B1002 / 35

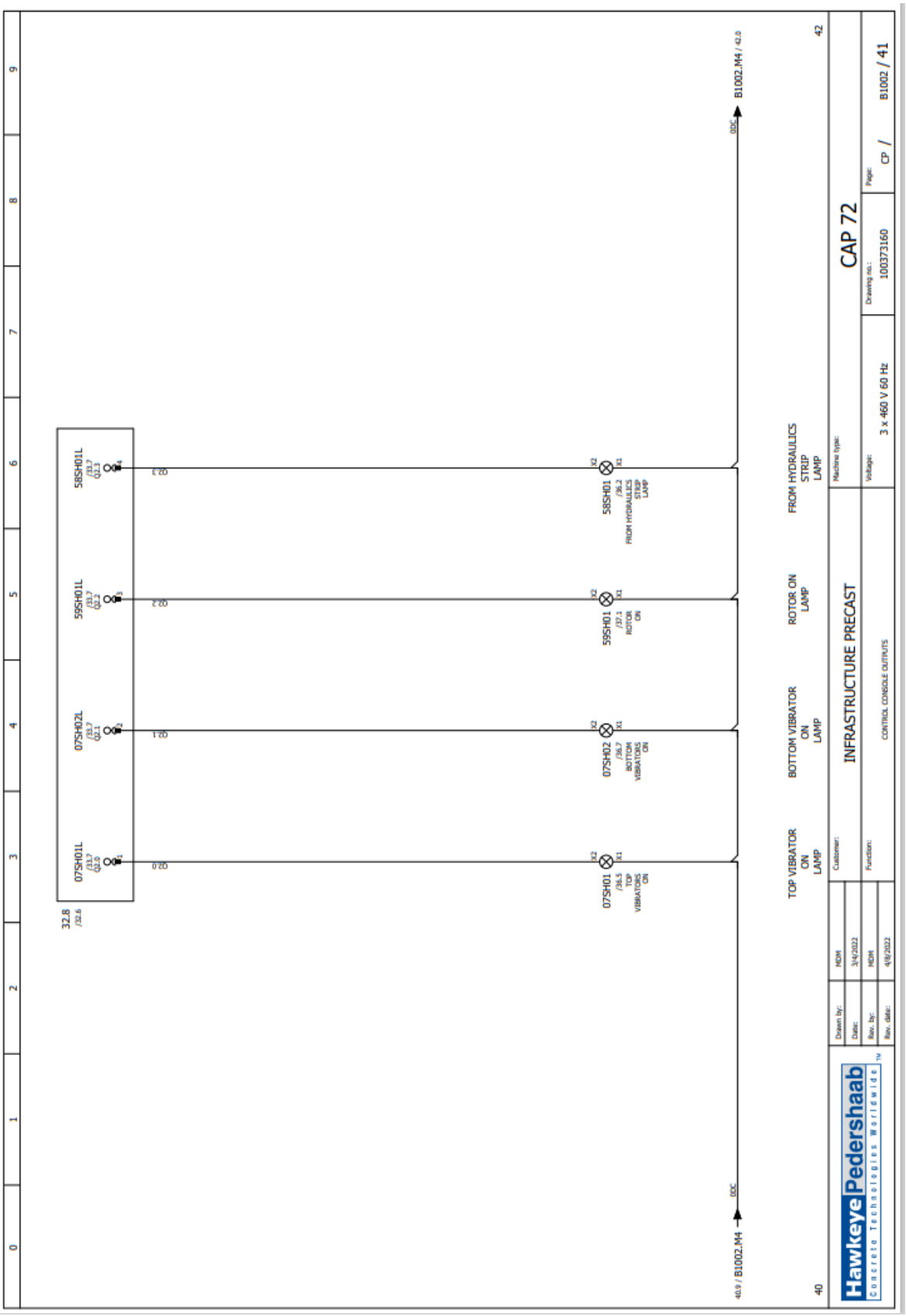

B1002.1L3
INFRASTRUCTURE PRECAST
CAP 72
CONTROL CONSOLE INPUTS
3 x 460 V 60 Hz
100373160
B1002 / 36
PRESSHEAD PRESSURE HIGH
FORM HYDRAULICS FILL
FORM HYDRAULICS STRIP
PRESSHEAD SAFETY LATCH UNLOCK
TOP VIBRATORS START
TOP VIBRATORS STOP
BOTTOM VIBRATORS START
BOTTOM VIBRATORS STOP
04504
58SH01_FILL
58SH01_STRIP
04508
07SH01_START
07SH01_STOP
07SH02_START
07SH02_STOP

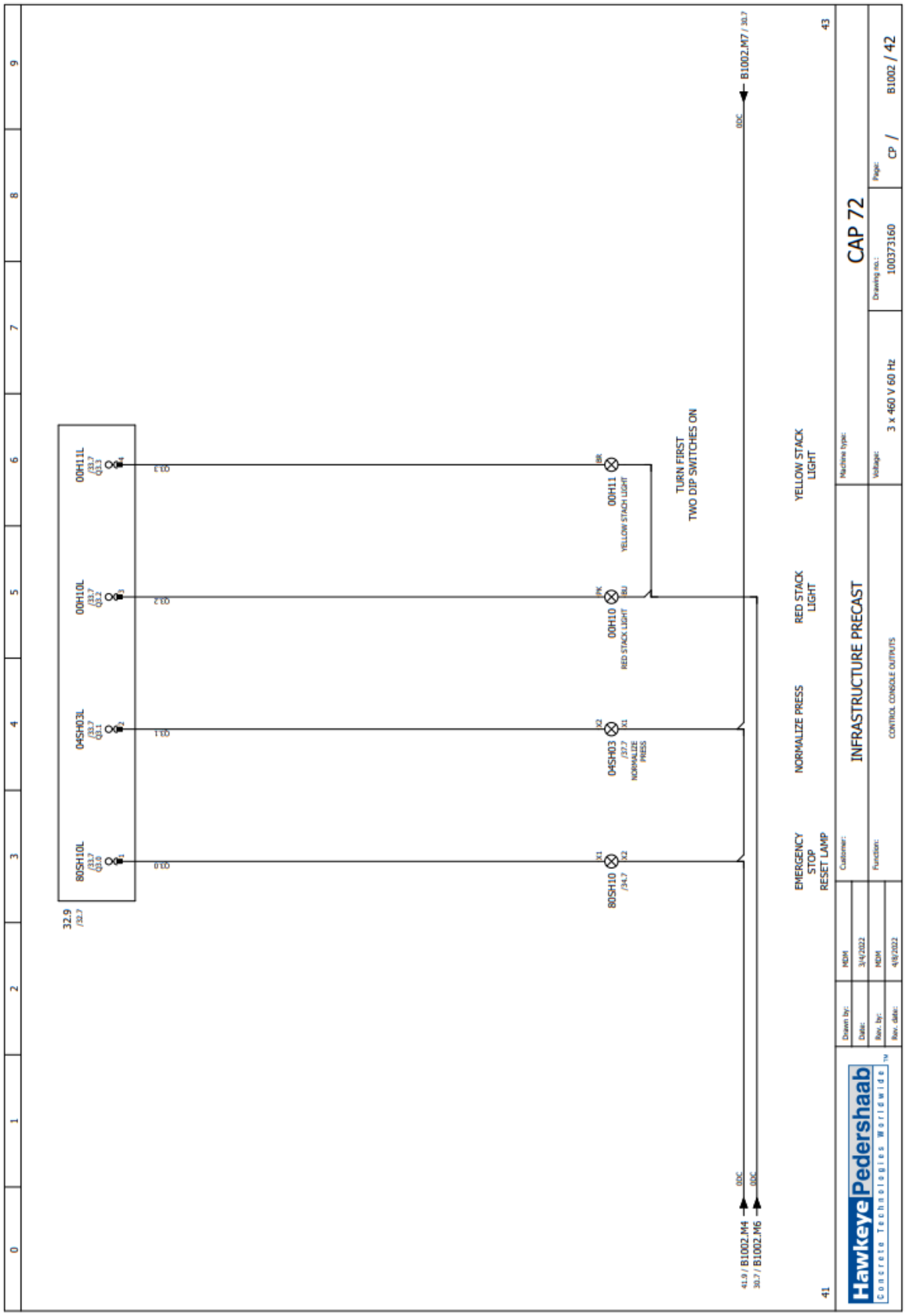

B1002.1L3
595H01_START
595H01_STOP
00505_START
00505_STOP
04502_START
04502_STOP
045H03
08505
ROTOR START
ROTOR STOP
FILL CYCLE START
FILL CYCLE STOP
PRESHEAD CYCLE START
PRESHEAD CYCLE STOP
NORMALIZE PRESS
TONGUE TROWEL ON
INFRASTRUCTURE PRECAST
CAP 72
CONTROL CONSOLE INPUTS
3 x 460 V 60 Hz
100373160
B1002 / 37

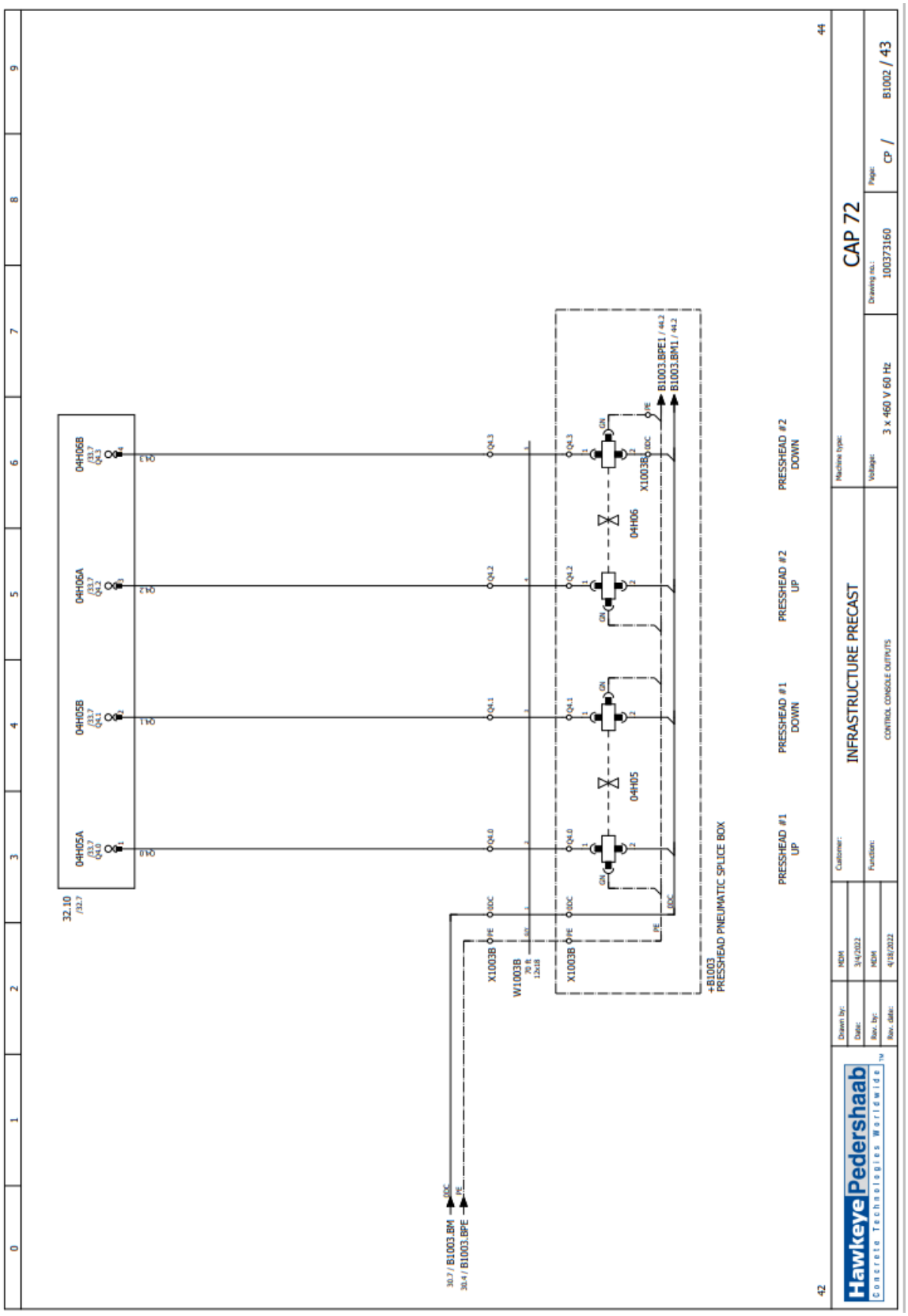

+B1003
PRESSHEAD PNEUMATIC SPLICE BOX
+B1102
REMOTE PUSHBUTTON BOX
B1102.M1
04B01
04B02
04B01
04B02
07SH03E
07SH04E
08S01E
08S01L
08S01R
07SH03_START
07SH03_STOP
07SH04_START
07SH04_STOP
PRESSHEAD IN STATION
TONGUE TROWEL HOME
REMOTE TOP VIBRATORS START
REMOTE TOP VIBRATORS STOP
REMOTE BOTTOM VIBRATORS START
REMOTE BOTTOM VIBRATORS STOP
FEEDER PIVOT LEFT
FEEDER PIVOT RIGHT
W1003
W1102
X1003
X1102
B1002.1L3
B1002.1L4
Hawkeye Pedershaab
INFRASTRUCTURE PRECAST
CAP 72
3 x 460 V 60 Hz
100373160
B1002 / 38

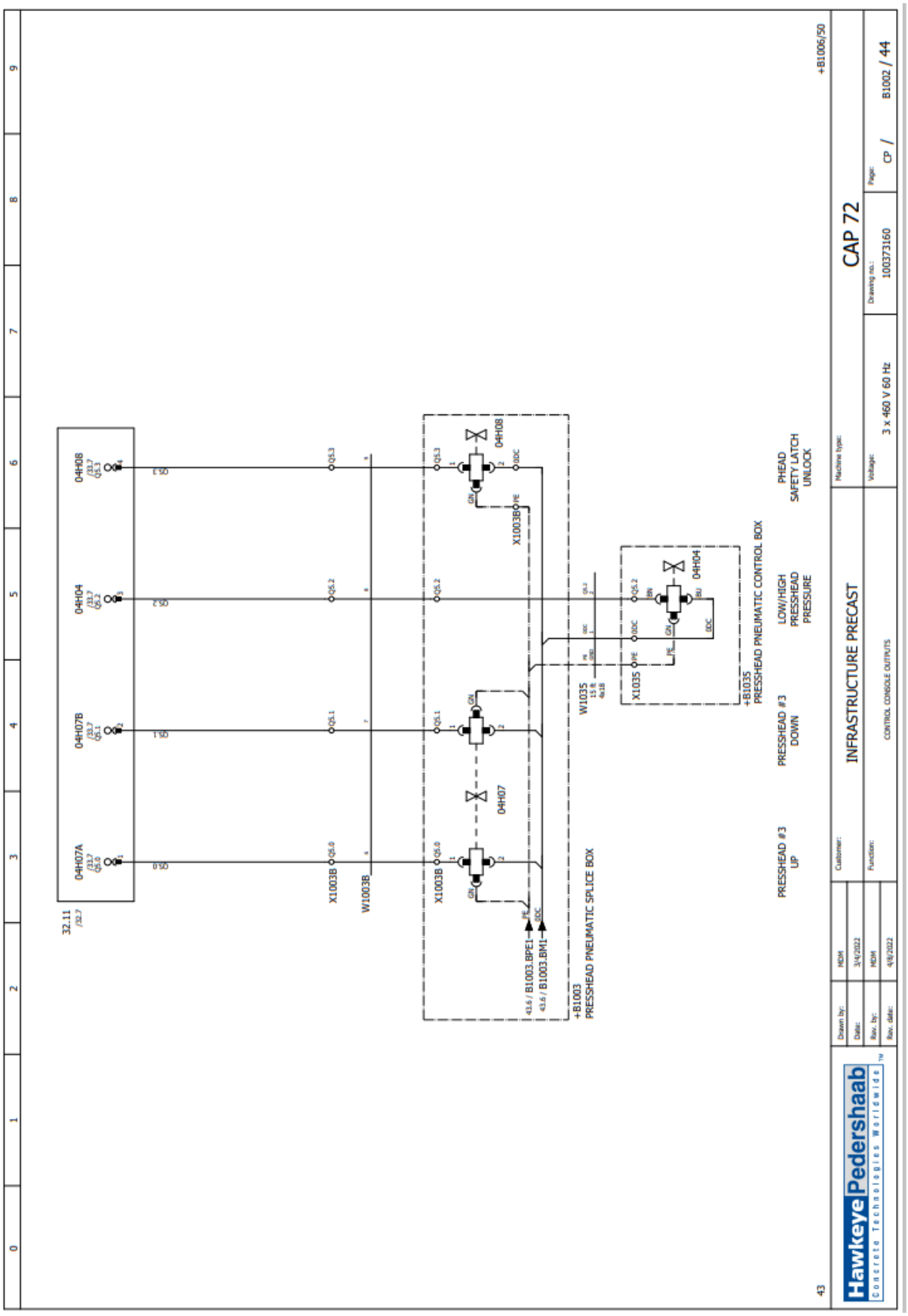

B1002.M4 / 40.0
40
38
30.9 / 3004
30.9 / 3005
30.7 / B1002.M3
30.7 / B1002.M4
04S01
/35.8
PRESSHEAD PIVOT IN/OUT
05S01
BELT SPEED
32.6
/32.5
PRESSHEAD PIVOT IN/OUT
BELT SPEED
Hawkeye Pedershaab
Concrete Technologies Worldwide
Drawn by:
HDM
Date:
3/4/2022
Rev. by:
HDM
Rev. date:
4/8/2022
Customer:
INFRASTRUCTURE PRECAST
Function:
CONTROL CONSOLE ANALOG INPUTS
Machine type:
CAP 72
Voltage:
3 x 460 V 60 Hz
Drawing no.:
100373160
Page:
CP / B1002 / 39


Hawkeye Pedershaab
Concrete Technologies Worldwide
INFRASTRUCTURE PRECAST
CAP 72
3 x 460 V 60 Hz
100373160
B1002 / 40
CONTROL CONSOLE OUTPUTS
ALARM HORN
MAIN HYDRAULIC PUMP ON LAMP
TOP VIBRATOR ON LAMP
BOTTOM VIBRATOR ON LAMP
+B1102 REMOTE PUSHBUTTON BOX
00H12
00SH01
07SH03
07SH04
B1002.M4
B1002.M5
B1102.M1
X1102
W1102


TOP VIBRATOR ON LAMP
BOTTOM VIBRATOR ON LAMP
ROTOR ON LAMP
FROM HYDRAULICS STRIP LAMP
INFRASTRUCTURE PRECAST
CAP 72
CONTROL CONSOLE OUTPUTS
3 x 460 V 60 Hz
100373160
B1002 / 41
Hawkeye Pedershaab
Concrete Technologies Worldwide

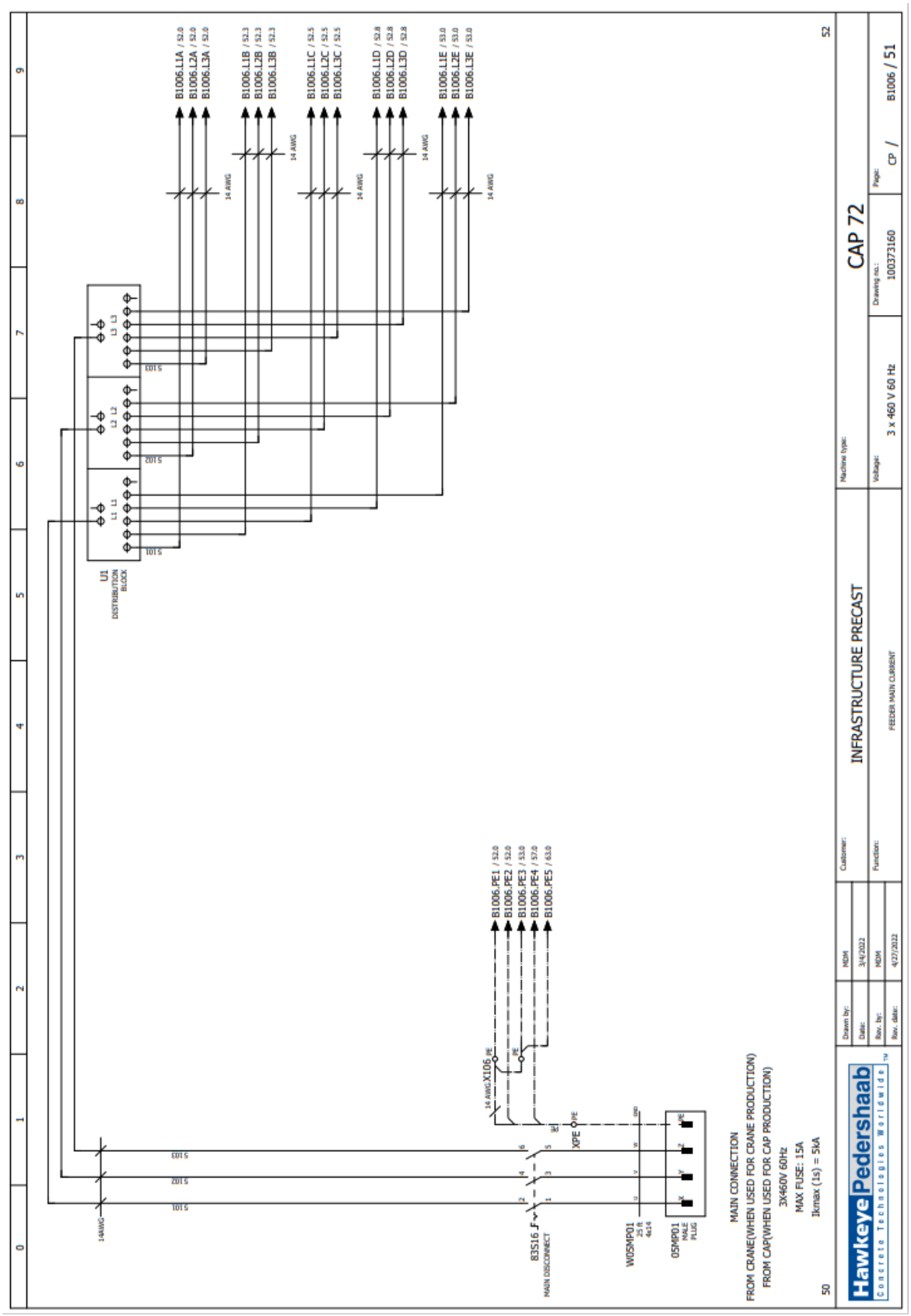

00H11L
00H10L
04SH03L
80SH10L
32.9
00H11
00H10
04SH03
80SH10
TURN FIRST
TWO DIP SWITCHES ON
YELLOW STACK
LIGHT
RED STACK
LIGHT
NORMALIZE PRESS
EMERGENCY
STOP
RESET LAMP
B1002.M7 / 30.7
41.9 / B1002.M4
30.7 / B1002.M6
Hawkeye Pedershaab
Concrete Technologies Worldwide
INFRASTRUCTURE PRECAST
CAP 72
CONTROL CONSOLE OUTPUTS
3 x 460 V 60 Hz
100373160
B1002 / 42

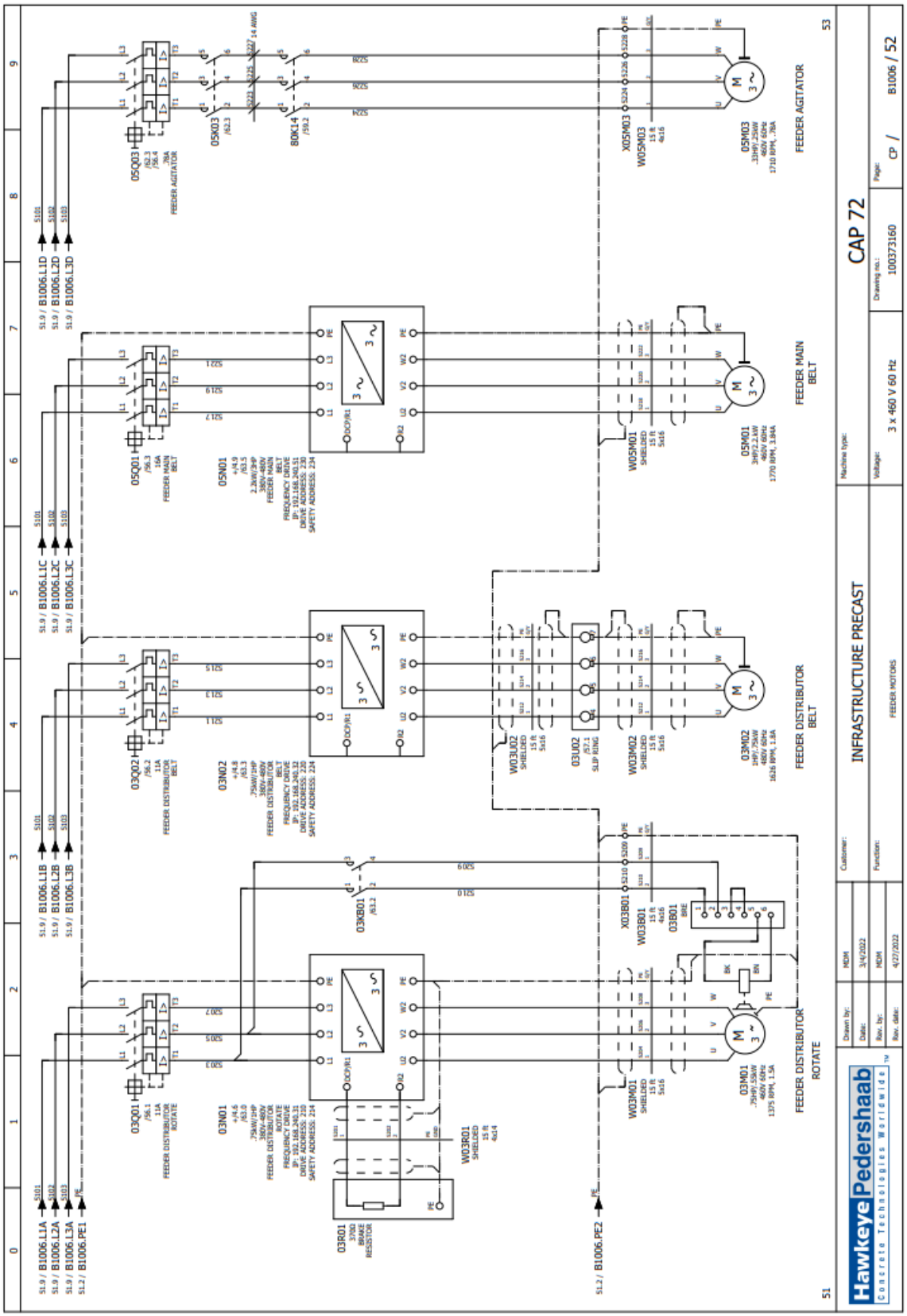

INFRASTRUCTURE PRECAST
CAP 72
CONTROL CONSOLE OUTPUTS
3 x 460 V 60 Hz
100373160
B1002 / 43
Hawkeye Pedershaab
Concrete Technologies Worldwide
04H06B
04H06A
04H05B
04H05A
04H06
04H05
X1003B
W1003B
70 ft
12x18
+B1003
PRESSHEAD PNEUMATIC SPLICE BOX
B1003.BPE1 / 44.2
B1003.BM1 / 44.2
B1003.BM / 30.4
B1003.BPE / 30.4
PRESSHEAD #1 UP
PRESSHEAD #1 DOWN
PRESSHEAD #2 UP
PRESSHEAD #2 DOWN

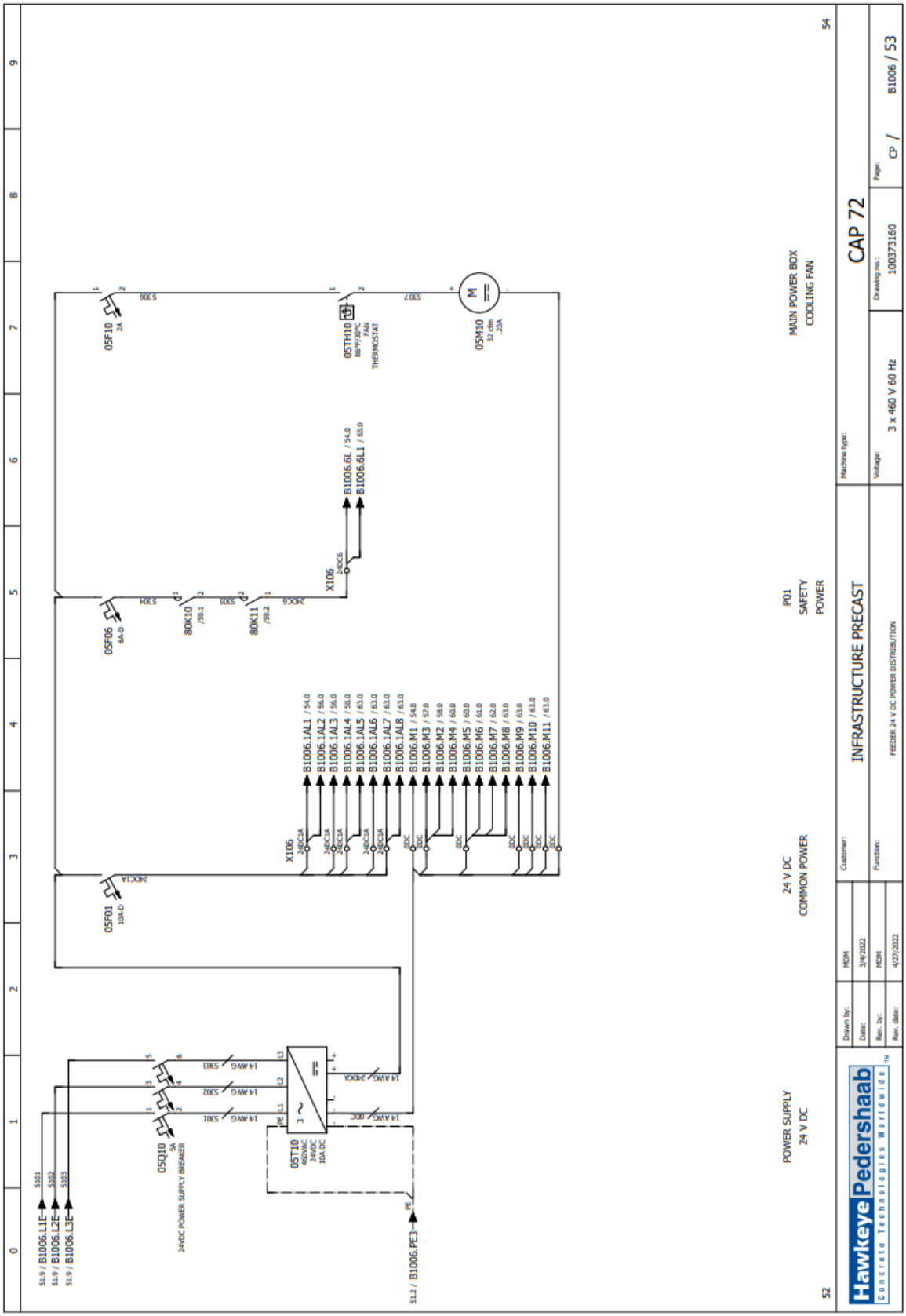

+B1006/50
04H08
04H04
04H07B
04H07A
32.11
X1003B
W1003B
+B1003
PRESSHEAD PNEUMATIC SPLICE BOX
+B1035
PRESSHEAD PNEUMATIC CONTROL BOX
W1035
X1035
PRESSHEAD #3 UP
PRESSHEAD #3 DOWN
LOW/HIGH PRESSHEAD PRESSURE
PHEAD SAFETY LATCH UNLOCK
Hawkeye Pedershaab
Concrete Technologies Worldwide
INFRASTRUCTURE PRECAST
CAP 72
CONTROL CONSOLE OUTPUTS
3 x 460 V 60 Hz
100373160
B1002 / 44

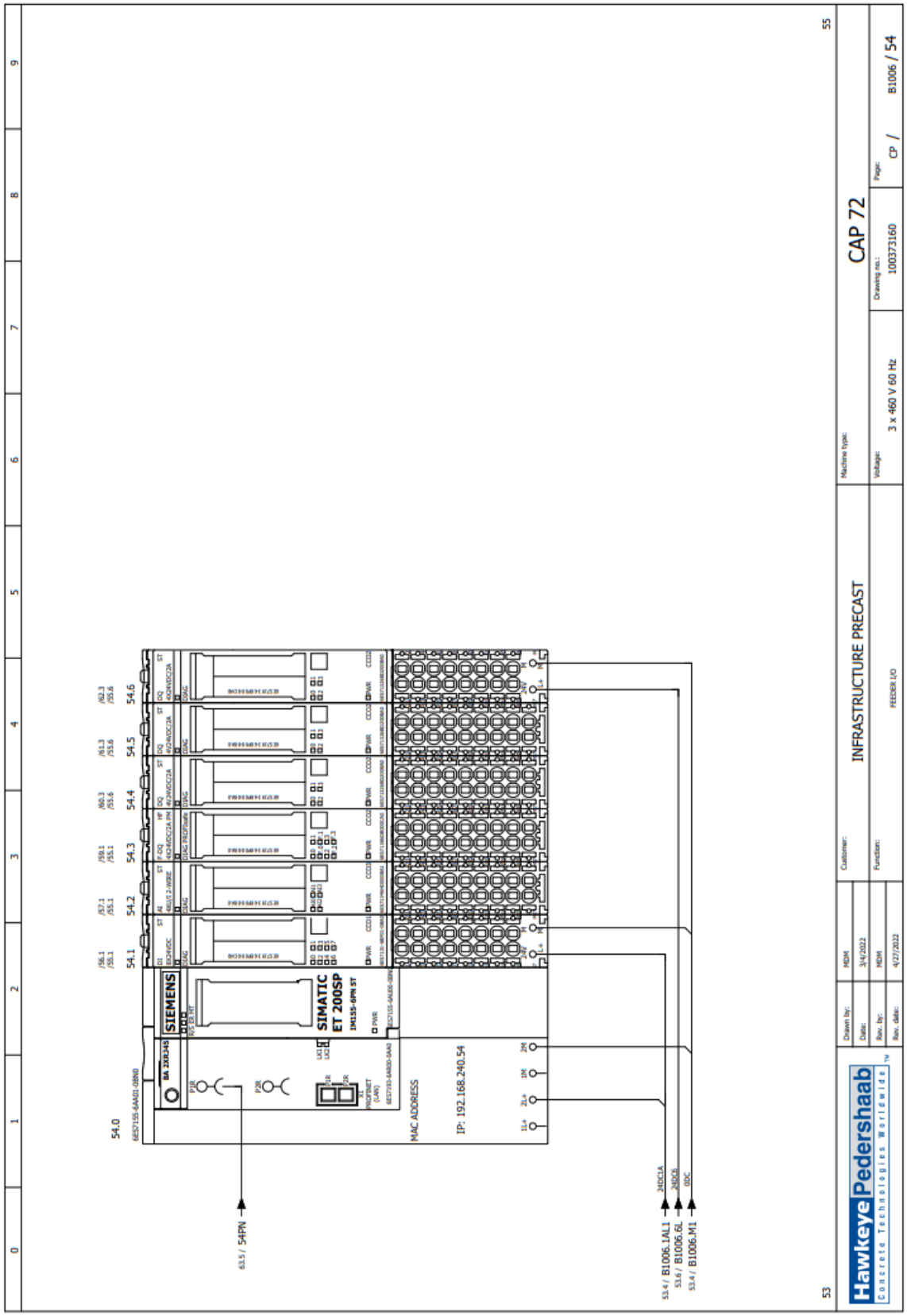
Hawkeye Pedershaab
Concrete Technologies Worldwide ™

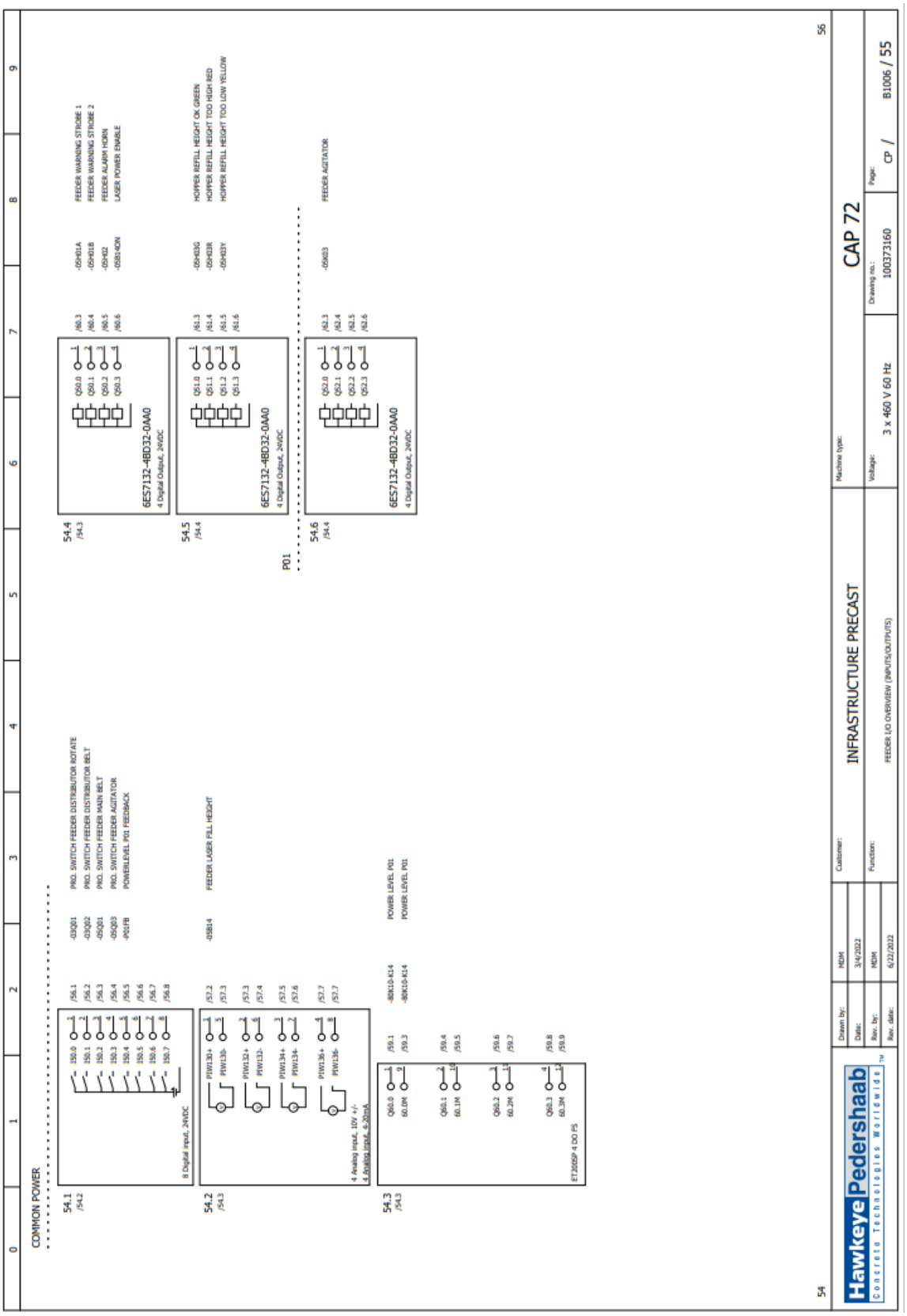
BOX NUMBER	B1006
VOLTAGE	3 x 460 V 60 Hz
MAX. CURRENT I	15 A
MODEL #	CAP 72
SERIAL #	56092
LARGEST MOTOR	2.2 kW
SCCR	5kA
MAX OVERCURRENT PROTECTION	15 A
TYPE 1 ENCLOSURE	
SCHEMATIC REFERENCE #	100373160
MANUFACTURED IN MEDIAPOLIS, IA USA	

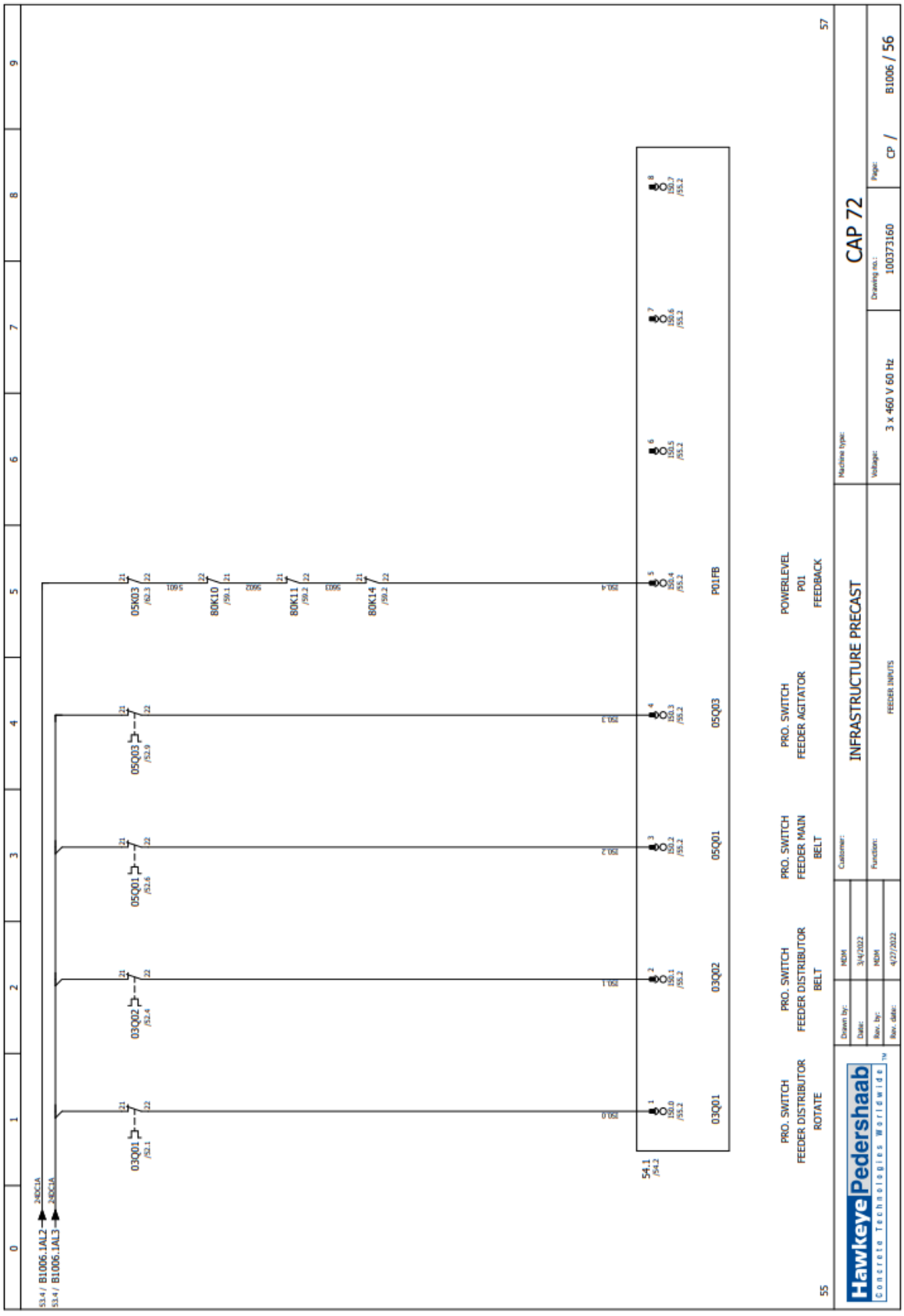

B1006.L1A / 52.0
B1006.L2A / 52.0
B1006.L3A / 52.0
B1006.L1B / 52.3
B1006.L2B / 52.3
B1006.L3B / 52.3
B1006.L1C / 52.5
B1006.L2C / 52.5
B1006.L3C / 52.5
B1006.L1D / 52.8
B1006.L2D / 52.8
B1006.L3D / 52.8
B1006.L1E / 53.0
B1006.L2E / 53.0
B1006.L3E / 53.0
14 AWG
U1
DISTRIBUTION BLOCK
B1006.PE1 / 52.0
B1006.PE2 / 52.0
B1006.PE3 / 53.0
B1006.PE4 / 57.0
B1006.PE5 / 63.0
14 AwgX106
XPE
83S16
MAIN DISCONNECT
WDSMP01
25 ft
4x14
DSMP01
MALE PLUG
MAIN CONNECTION
FROM CRANE(WHEN USED FOR CRANE PRODUCTION)
FROM CAP(WHEN USED FOR CAP PRODUCTION)
3X460V 60Hz
MAX FUSE: 15A
Ikmax (1s) = 5kA
Hawkeye Pedershaab
Concrete Technologies Worldwide
Drawn by: MDM
Date: 3/4/2022
Rev. by: MDM
Rev. date: 4/27/2022
Customer:
Function:
INFRASTRUCTURE PRECAST
FEEDER MAIN CURRENT
Machine type:
CAP 72
Voltage: 3 x 460 V 60 Hz
Drawing no.: 100373160
Page: CP / B1006 / 51

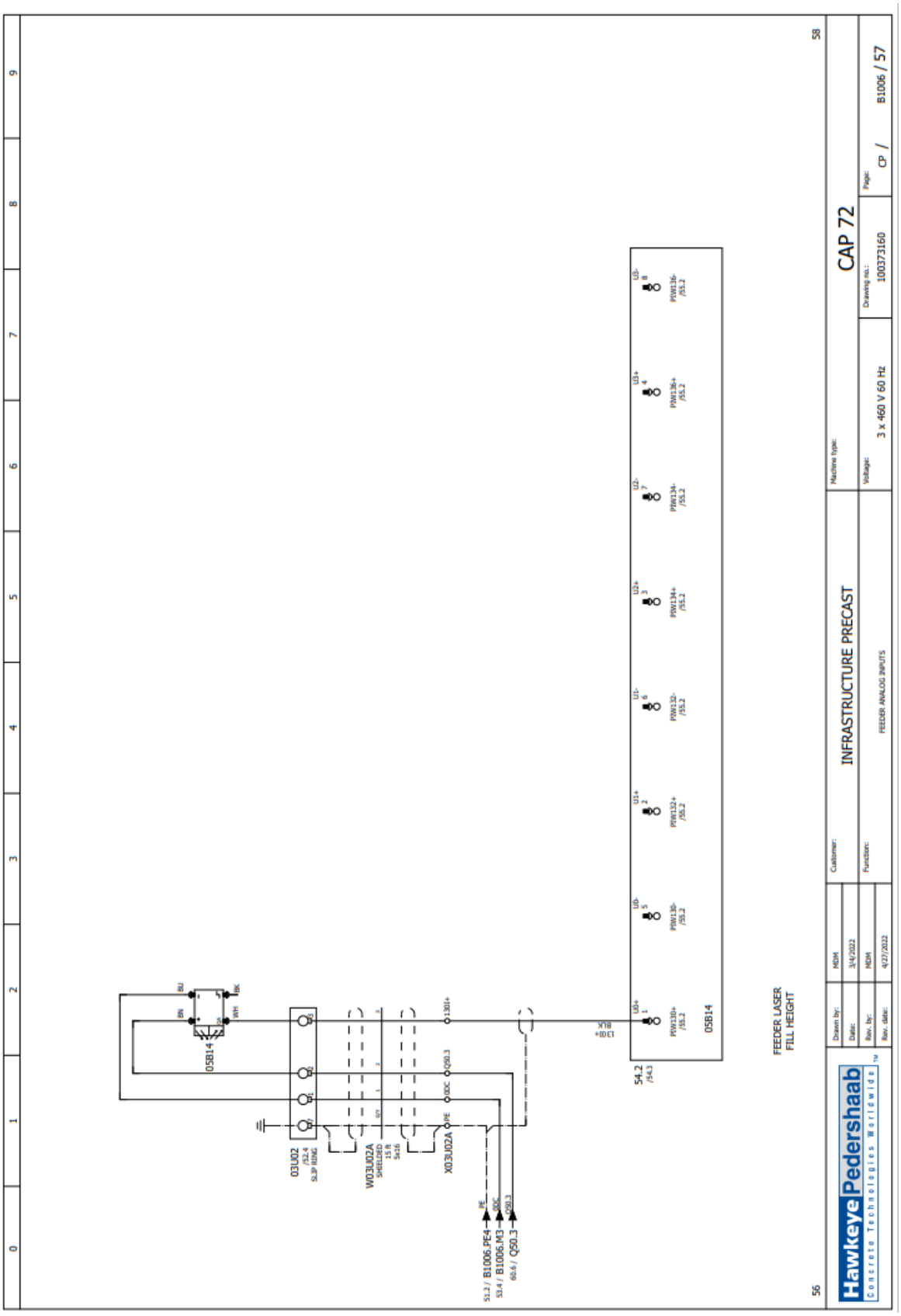

FEEDER AGITATOR
FEEDER MAIN BELT
FEEDER DISTRIBUTOR BELT
FEEDER DISTRIBUTOR ROTATE
FEEDER MOTORS
INFRASTRUCTURE PRECAST
CAP 72
Hawkeye Pedershaab
Concrete Technologies Worldwide
3 x 460 V 60 Hz
100373160
CP / B1006 / 52

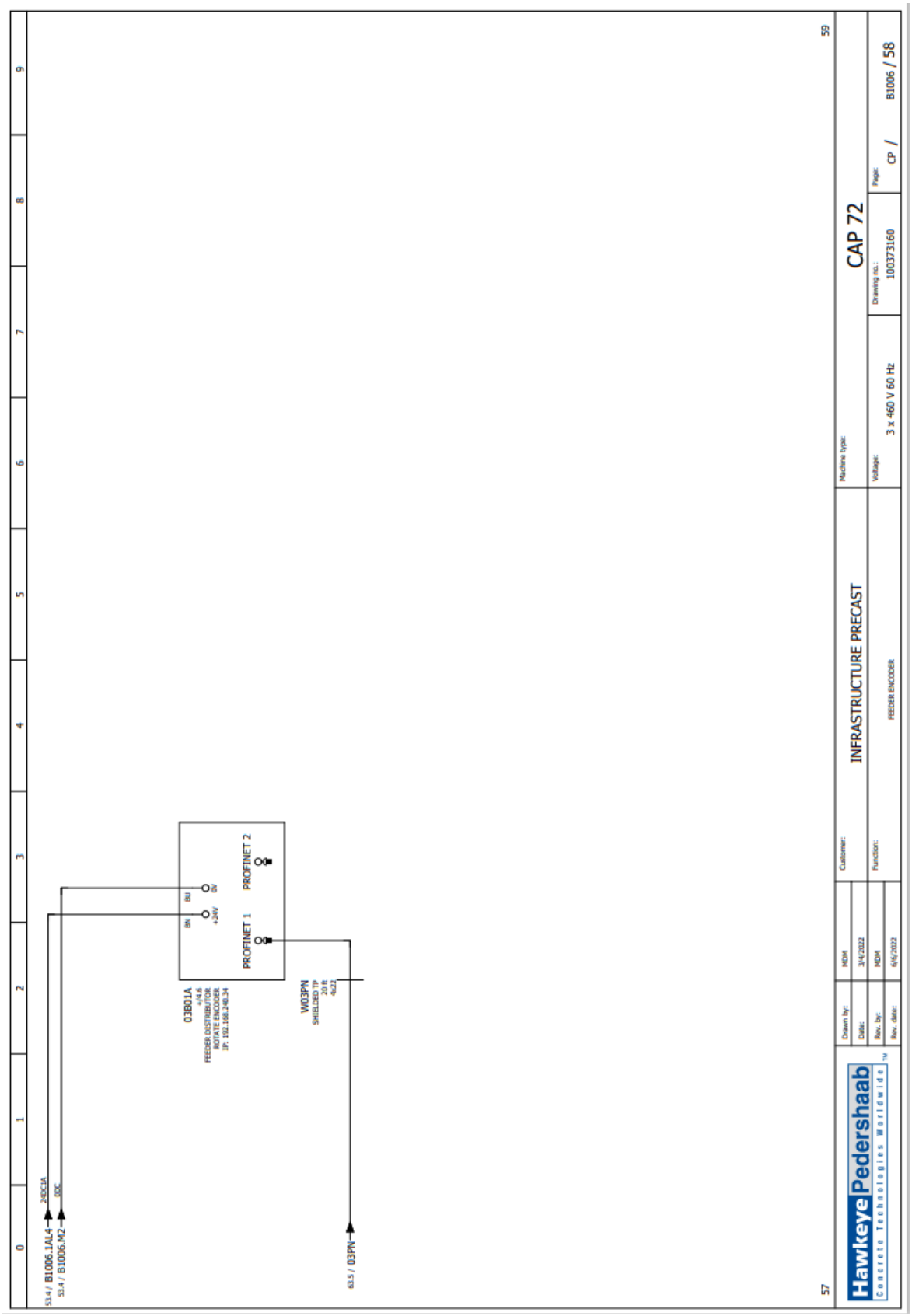

INFRASTRUCTURE PRECAST
CAP 72
Hawkeye Pedershaab
Concrete Technologies Worldwide
MAIN POWER BOX
COOLING FAN
P01
SAFETY
POWER
24 V DC
COMMON POWER
POWER SUPPLY
24 V DC
3 x 460 V 60 Hz
FEEDER 24 V DC POWER DISTRIBUTION
100373160
B1006 / 53
05F10
05TH10
05M10
05F06
80K10
80K11
05F01
05Q10
24VDC POWER SUPPLY BREAKER
05T10
X106
B1006.6L / 54.0
B1006.6L1 / 63.0
B1006.1AL1 / 54.0
B1006.1AL2 / 56.0
B1006.1AL3 / 56.0
B1006.1AL4 / 58.0
B1006.1AL5 / 63.0
B1006.1AL6 / 63.0
B1006.1AL7 / 63.0
B1006.1AL8 / 63.0
B1006.M1 / 54.0
B1006.M3 / 57.0
B1006.M2 / 58.0
B1006.M4 / 60.0
B1006.M5 / 60.0
B1006.M6 / 61.0
B1006.M7 / 62.0
B1006.M8 / 63.0
B1006.M9 / 63.0
B1006.M10 / 63.0
B1006.M11 / 63.0
B1006.L1E
B1006.L2E
B1006.L3E
B1006.PE3

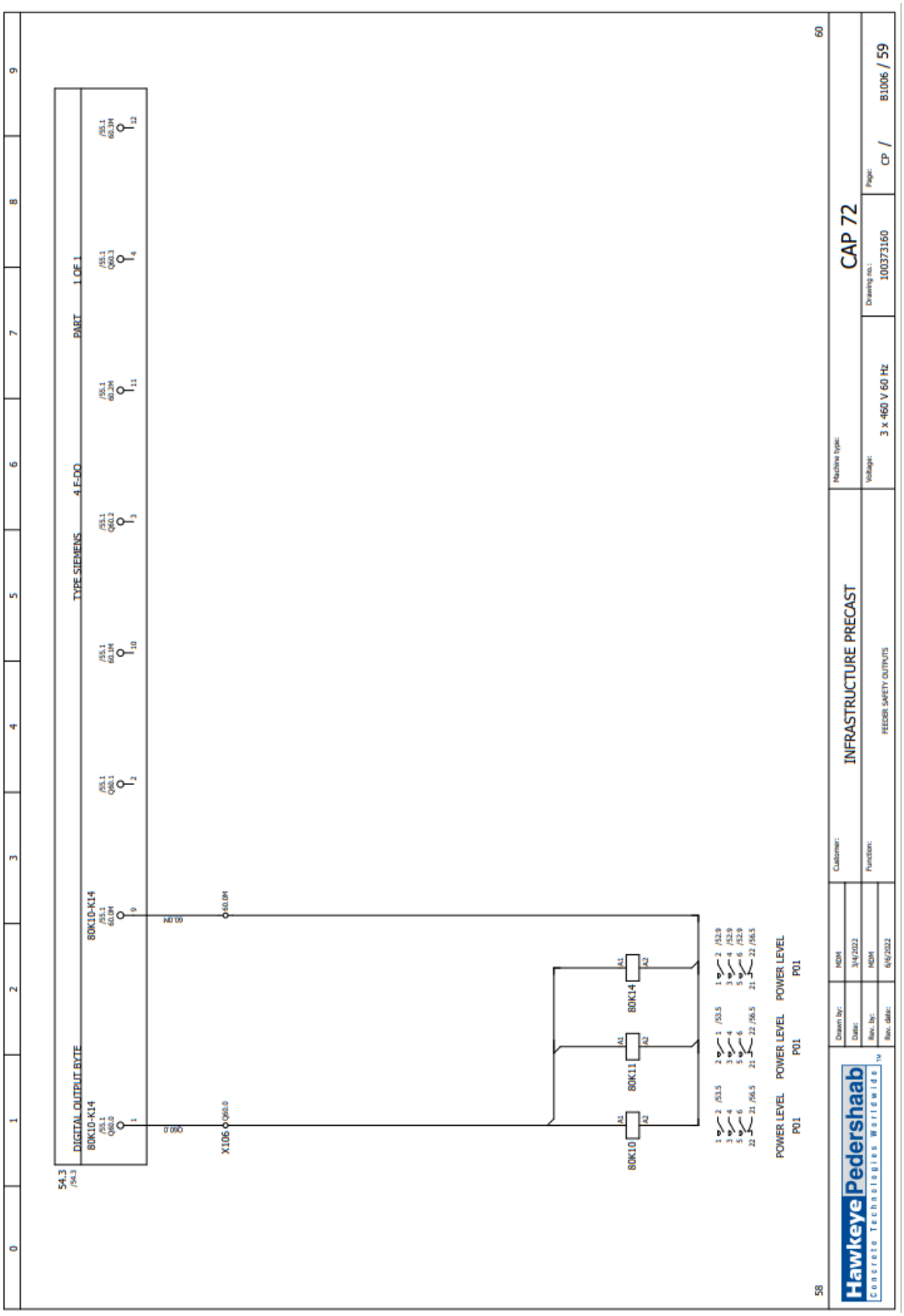

SIEMENS
SIMATIC ET 200SP
IM155-6PN ST
MAC ADDRESS
IP: 192.168.240.54
63.5 / 54PN
53.4 / B1006.1AL1
53.6 / B1006.6L
53.4 / B1006.M1
Hawkeye Pedershaab
Concrete Technologies Worldwide
INFRASTRUCTURE PRECAST
CAP 72
3 x 460 V 60 Hz
100373160
B1006 / 54

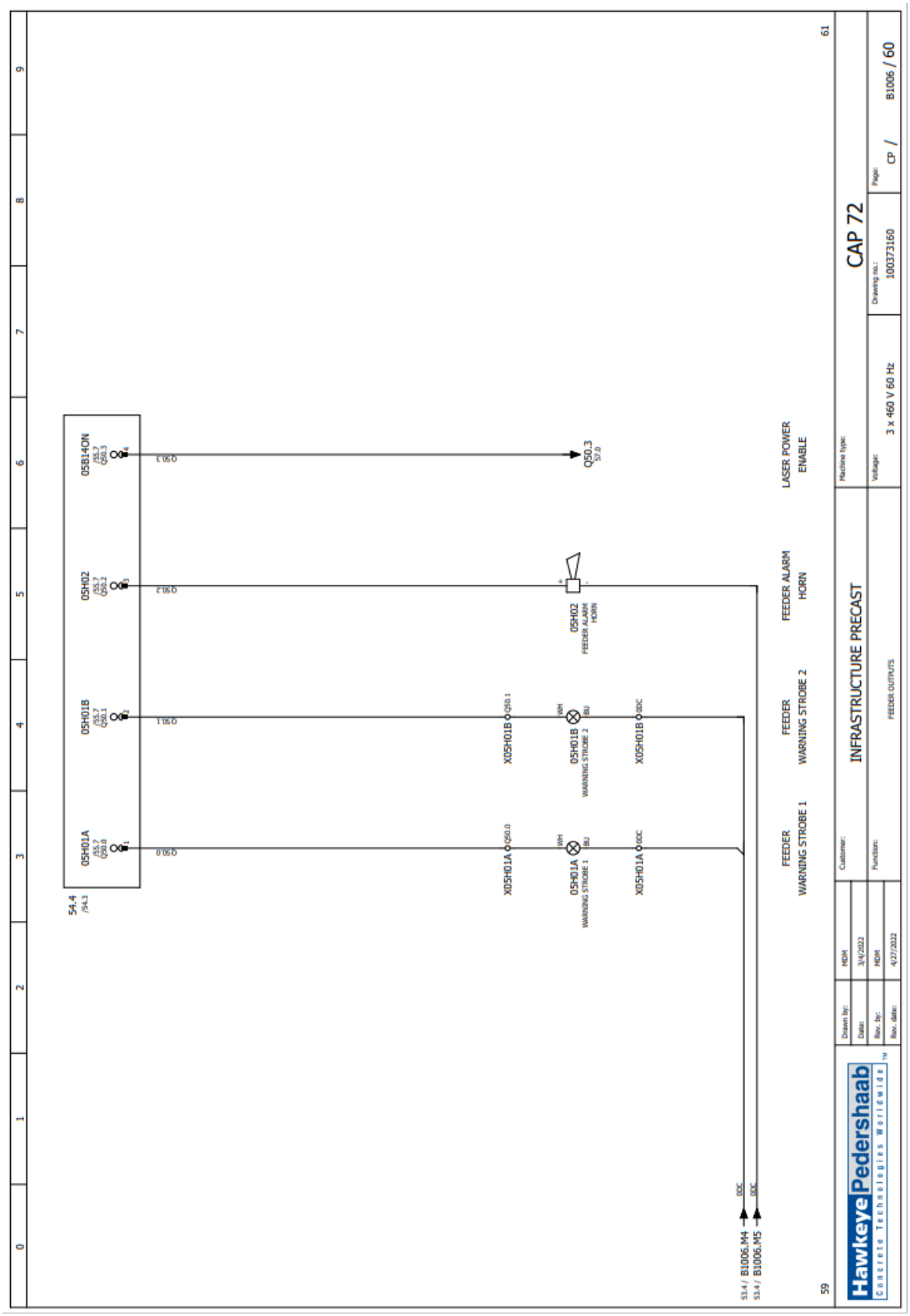

COMMON POWER
54.1
/54.2
8 Digital input, 24VDC
54.2
/54.3
4 Analog input, 10V +/-
4 Analog input, 4-20mA
54.3
/54.3
ET200SP 4 DO PS
54.4
/54.3
6ES7132-4BD32-0AA0
4 Digital Output, 24VDC
54.5
/54.4
6ES7132-4BD32-0AA0
4 Digital Output, 24VDC
P01
54.6
/54.4
6ES7132-4BD32-0AA0
4 Digital Output, 24VDC
FEEDER WARNING STROBE 1
FEEDER WARNING STROBE 2
FEEDER ALARM HORN
LASER POWER ENABLE
HOPPER REFILL HEIGHT OK GREEN
HOPPER REFILL HEIGHT TOO HIGH RED
HOPPER REFILL HEIGHT TOO LOW YELLOW
FEEDER AGITATOR
PRO. SWITCH FEEDER DISTRIBUTOR ROTATE
PRO. SWITCH FEEDER DISTRIBUTOR BELT
PRO. SWITCH FEEDER MAIN BELT
PRO. SWITCH FEEDER AGITATOR
POWERALEVEL P01 FEEDBACK
FEEDER LASER FILL HEIGHT
POWER LEVEL P01
POWER LEVEL P01
Hawkeye Pedershaab
Concrete Technologies Worldwide
Drawn by: MDM
Date: 3/4/2022
Rev. by: MDM
Rev. date: 6/22/2022
Customer:
Function:
INFRASTRUCTURE PRECAST
FEEDER I/O OVERVIEW (INPUTS/OUTPUTS)
Machine type:
CAP 72
Voltage: 3 x 460 V 60 Hz
Drawing no.: 100373160
Page: CP / B1006 / 55

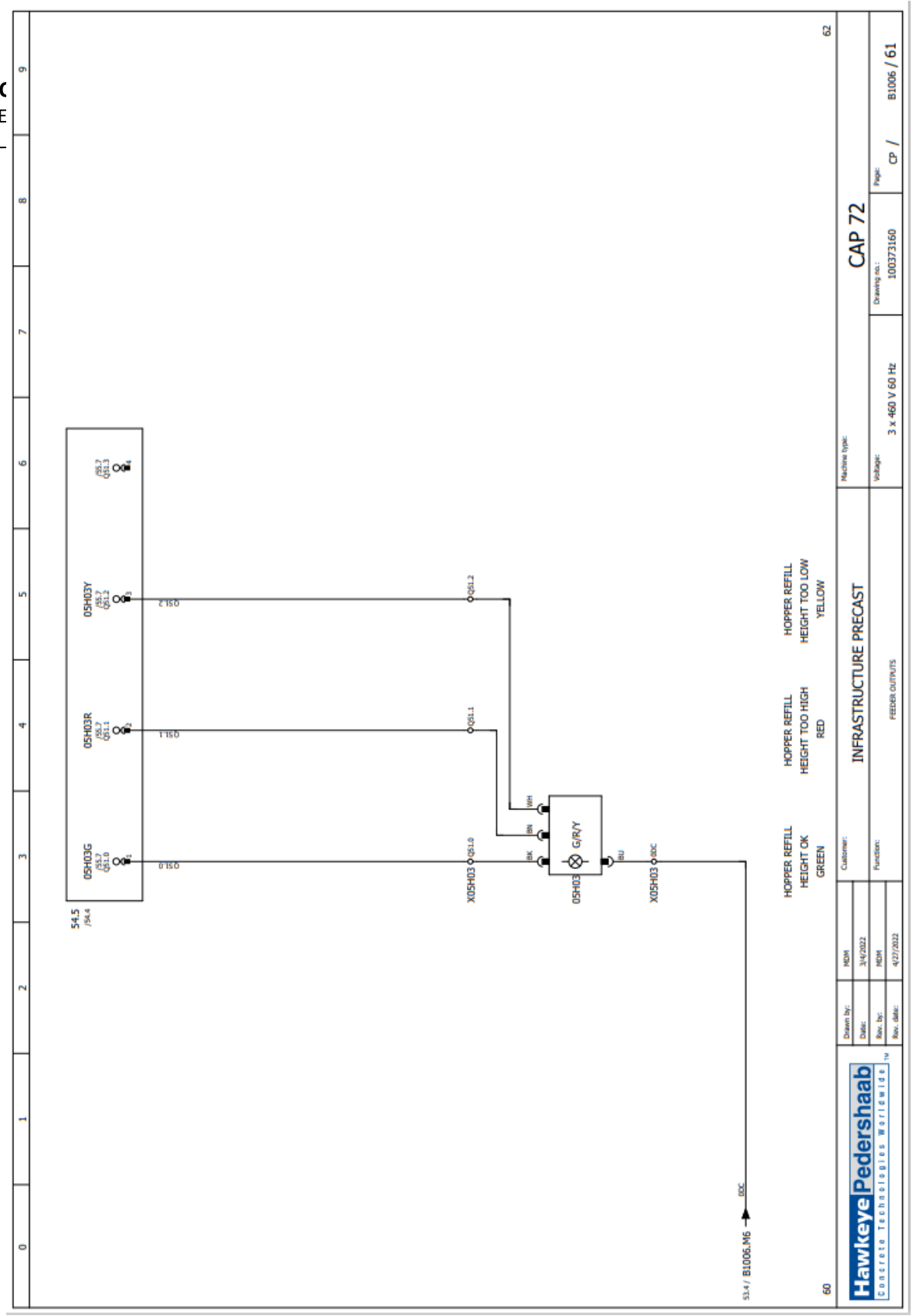

Hawkeye Pedershaab
Concrete Technologies Worldwide
INFRASTRUCTURE PRECAST
CAP 72
3 x 460 V 60 Hz
100373160
B1006 / 56
FEEDER INPUTS
PRO. SWITCH FEEDER DISTRIBUTOR ROTATE
PRO. SWITCH FEEDER DISTRIBUTOR BELT
PRO. SWITCH FEEDER MAIN BELT
PRO. SWITCH FEEDER AGITATOR
POWERLEVEL P01 FEEDBACK
03Q01
03Q02
05Q01
05Q03
P01FB
B1006.1AL2
B1006.1AL3

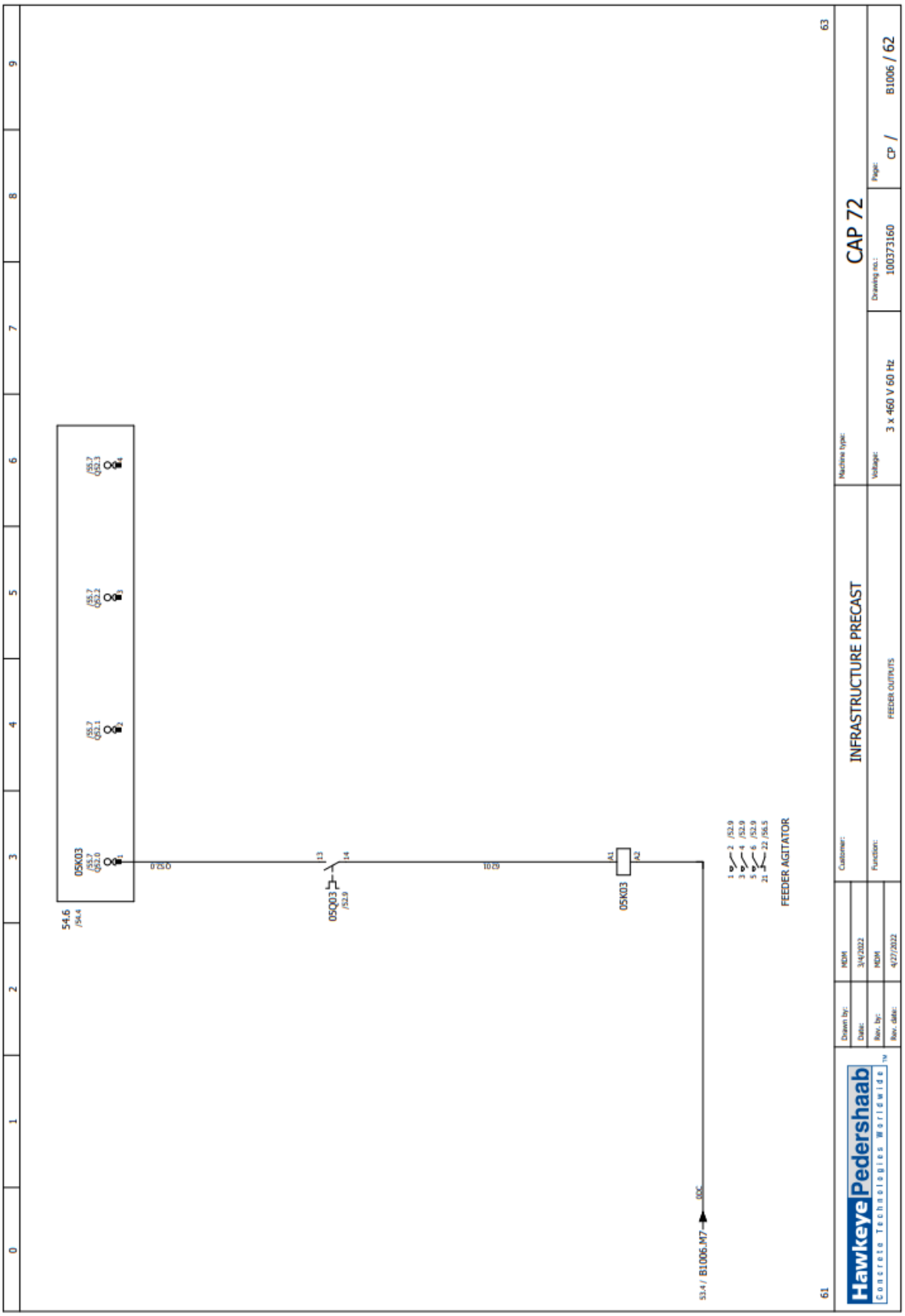

Hawkeye Pedershaab
Concrete Technologies Worldwide
Drawn by: MDM
Date: 3/4/2022
Rev. by: MDM
Rev. date: 4/27/2022
Customer:
INFRASTRUCTURE PRECAST
Function:
FEEDER ANALOG INPUTS
Machine type:
CAP 72
Voltage: 3 x 460 V 60 Hz
Drawing no.: 100373160
Page: CP / B1006 / 57
FEEDER LASER
FILL HEIGHT
05B14
03U02
W03U02A
X03U02A
54.2
/54.3
56
58

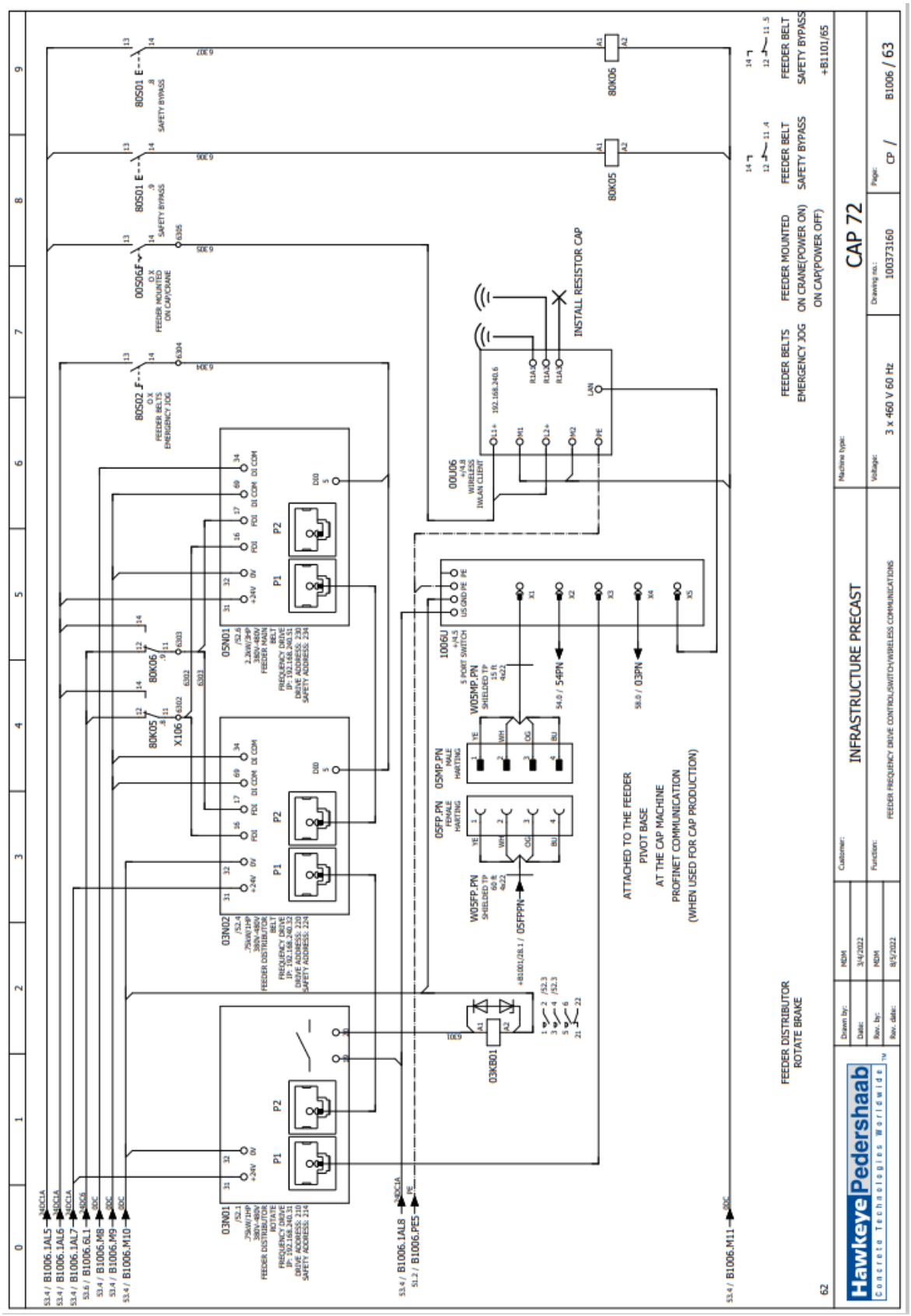

0
1
2
3
4
5
6
7
8
9
57
59
53.4 / B1006.1AL4
53.4 / B1006.M2
24DC1A
0DC
03B01A
+1/4.6
FEEDER DISTRIBUTOR
ROTATE ENCODER
IP: 192.168.240.54
BN
BU
0V
+24V
PROFINET 1
PROFINET 2
W03PN
SHIELDED TP
20 ft
4x22
63.5 / 03PN
Hawkeye Pedershaab
Concrete Technologies Worldwide
Drawn by:
MDM
Date:
3/4/2022
Rev. by:
MDM
Rev. date:
6/6/2022
Customer:
INFRASTRUCTURE PRECAST
Function:
FEEDER ENCODER
Machine type:
CAP 72
Voltage:
3 x 460 V 60 Hz
Drawing no.:
100373160
Page:
CP /
B1006 / 58


DIGITAL OUTPUT BYTE
TYPE SIEMENS 4 F-DO PART 1 OF 1
80K10-K14
80K10
80K11
80K14
X106
POWER LEVEL P01
INFRASTRUCTURE PRECAST
CAP 72
FEEDER SAFETY OUTPUTS
3 x 460 V 60 Hz
100373160
B1006 / 59
Hawkeye Pedershaab
Concrete Technologies Worldwide

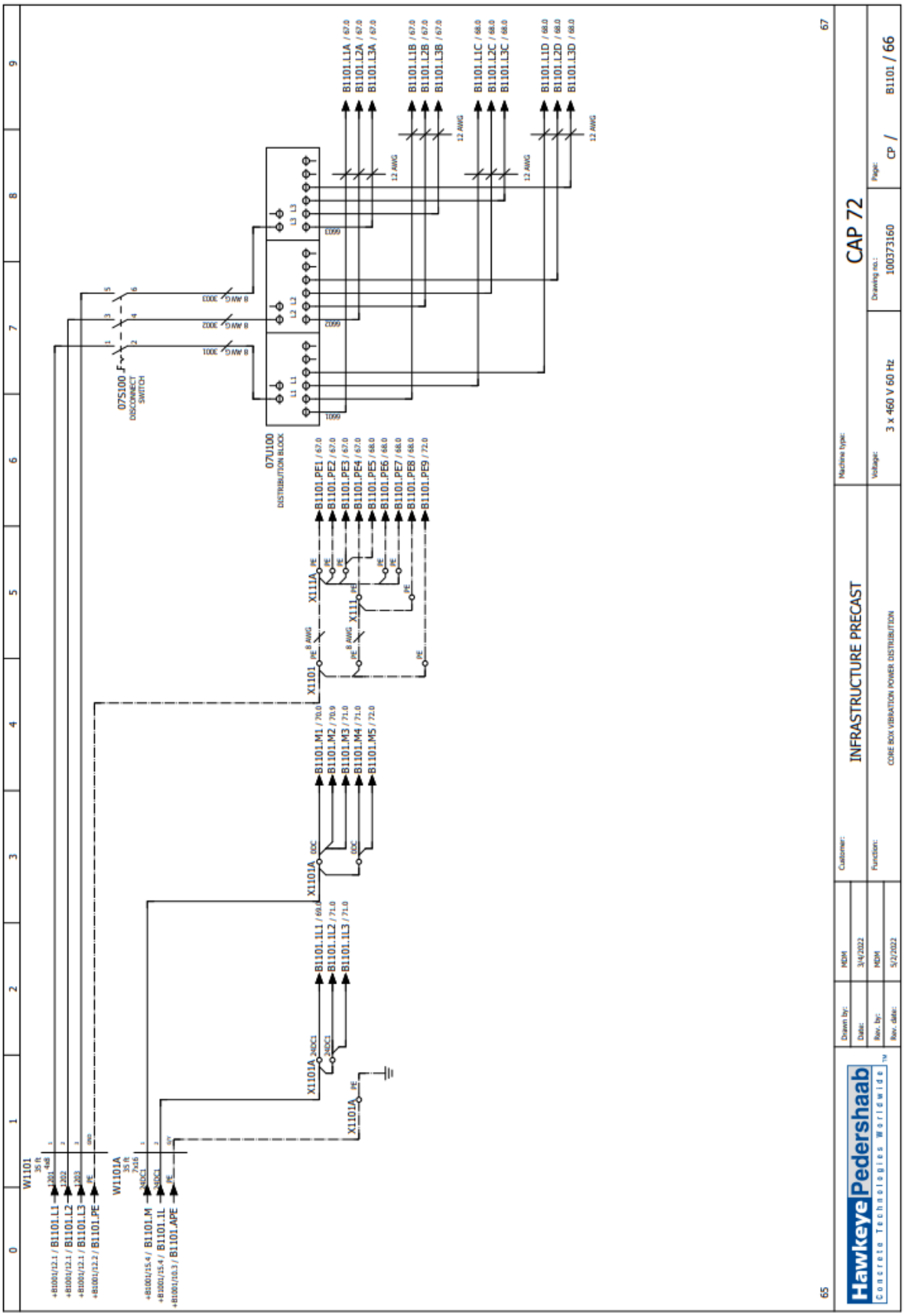

0SB140N
0SH02
0SH01B
0SH01A
54.4
/54.3
Q50.3
57.0
LASER POWER
ENABLE
FEEDER ALARM
HORN
FEEDER
WARNING STROBE 2
FEEDER
WARNING STROBE 1
X0SH01B
X0SH01A
B1006.M4
B1006.M5
59
61
Hawkeye Pedershaab
Concrete Technologies Worldwide
Drawn by:
MDM
Date:
3/4/2022
Rev. by:
MDM
Rev. date:
4/27/2022
Customer:
INFRASTRUCTURE PRECAST
Function:
FEEDER OUTPUTS
Machine type:
CAP 72
Voltage:
3 x 460 V 60 Hz
Drawing no.:
100373160
Page:
CP / B1006 / 60

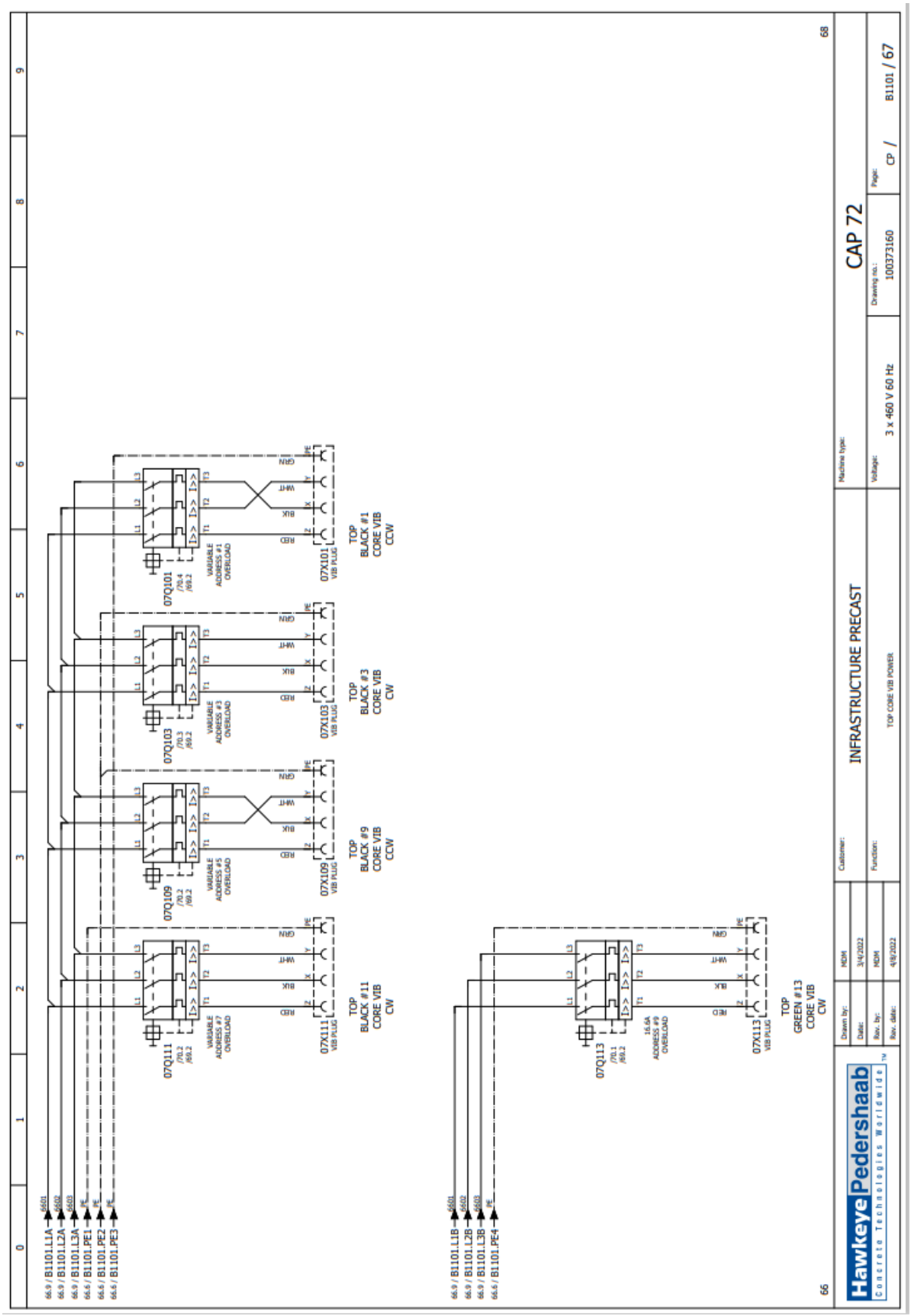

Hawkeye Pedershaab
Concrete Technologies Worldwide
Drawn by: MDM
Date: 3/4/2022
Rev. by: MDM
Rev. date: 4/27/2022
Customer:
INFRASTRUCTURE PRECAST
Function:
FEEDER OUTPUTS
Machine type:
CAP 72
Voltage:
3 x 460 V 60 Hz
Drawing no.:
100373160
Page:
CP / B1006 / 61
60
62
54.5
/54.4
05H03G
05H03R
05H03Y
X05H03
05H03
G/R/Y
HOPPER REFILL
HEIGHT OK
GREEN
HOPPER REFILL
HEIGHT TOO HIGH
RED
HOPPER REFILL
HEIGHT TOO LOW
YELLOW
S3.4 / B1006.M6

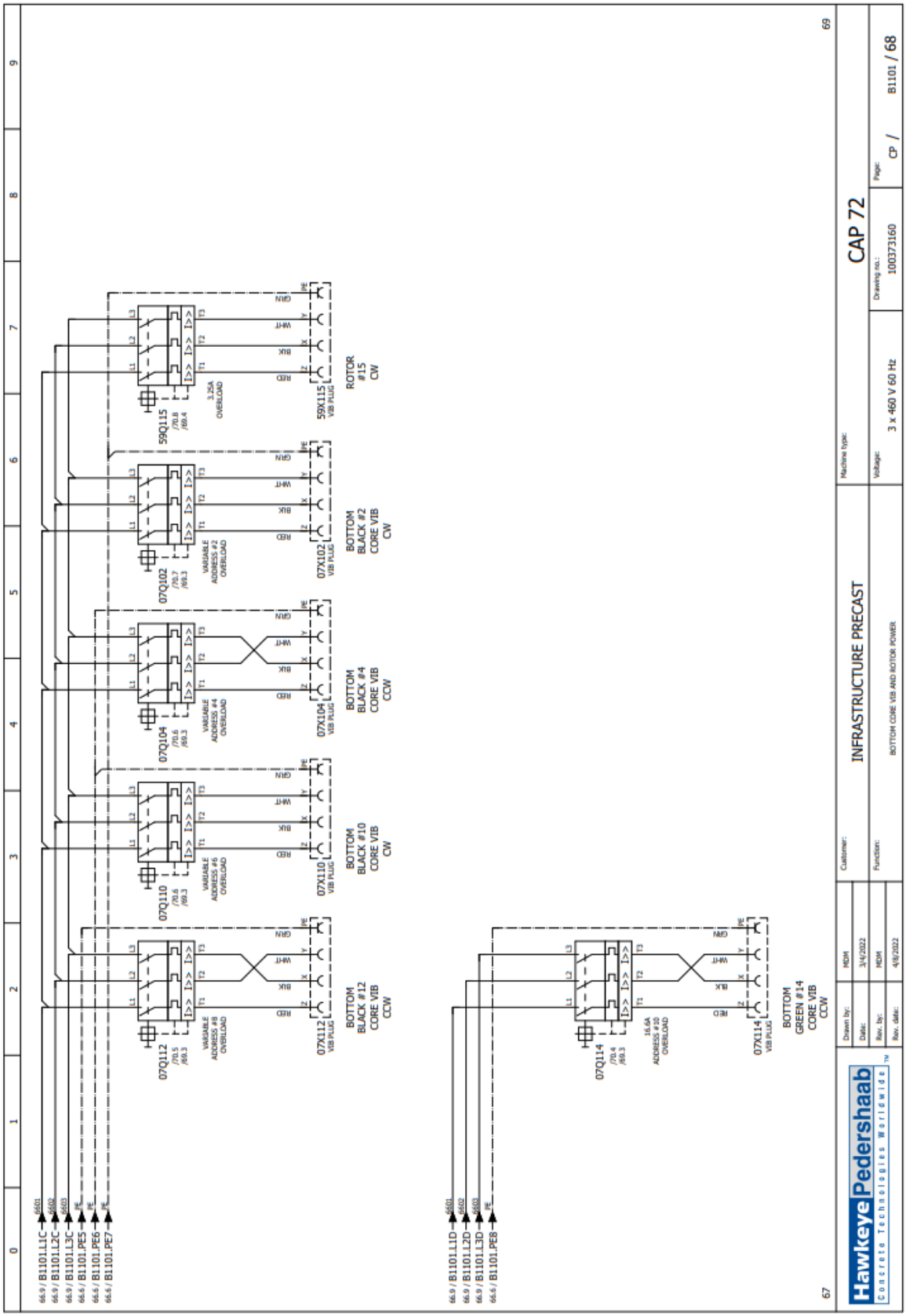

63
61
05K03
54.6
/54.4
05Q03
/52.9
05K03
FEEDER AGITATOR
53.4 / B1006.M7
Hawkeye Pedershaab
Concrete Technologies Worldwide
Drawn by:
MDM
Date:
3/4/2022
Rev. by:
MDM
Rev. date:
4/27/2022
Customer:
INFRASTRUCTURE PRECAST
Function:
FEEDER OUTPUTS
Machine type:
CAP 72
Voltage:
3 x 460 V 60 Hz
Drawing no.:
100373160
Page:
CP /
B1006 / 62

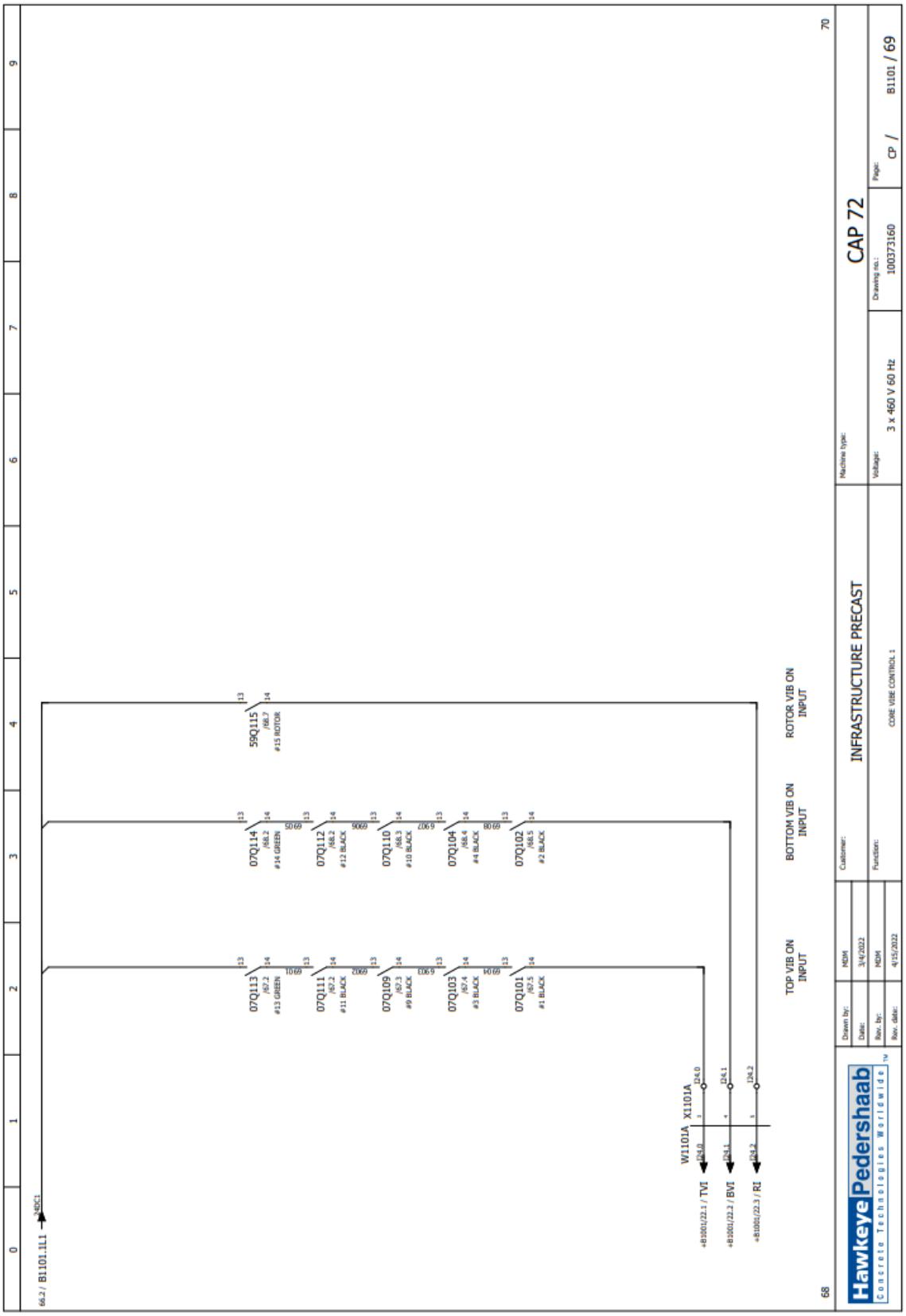

CAP 72
INFRASTRUCTURE PRECAST
Hawkeye Pedershaab
Concrete Technologies Worldwide
FEEDER BELTS EMERGENCY JOG
FEEDER MOUNTED ON CRANE(POWER ON) ON CAP(POWER OFF)
FEEDER BELT SAFETY BYPASS
FEEDER BELT SAFETY BYPASS
INSTALL RESISTOR CAP
ATTACHED TO THE FEEDER PIVOT BASE AT THE CAP MACHINE PROFINET COMMUNICATION (WHEN USED FOR CAP PRODUCTION)
FEEDER DISTRIBUTOR ROTATE BRAKE
3 x 460 V 60 Hz
100373160
B1006 / 63

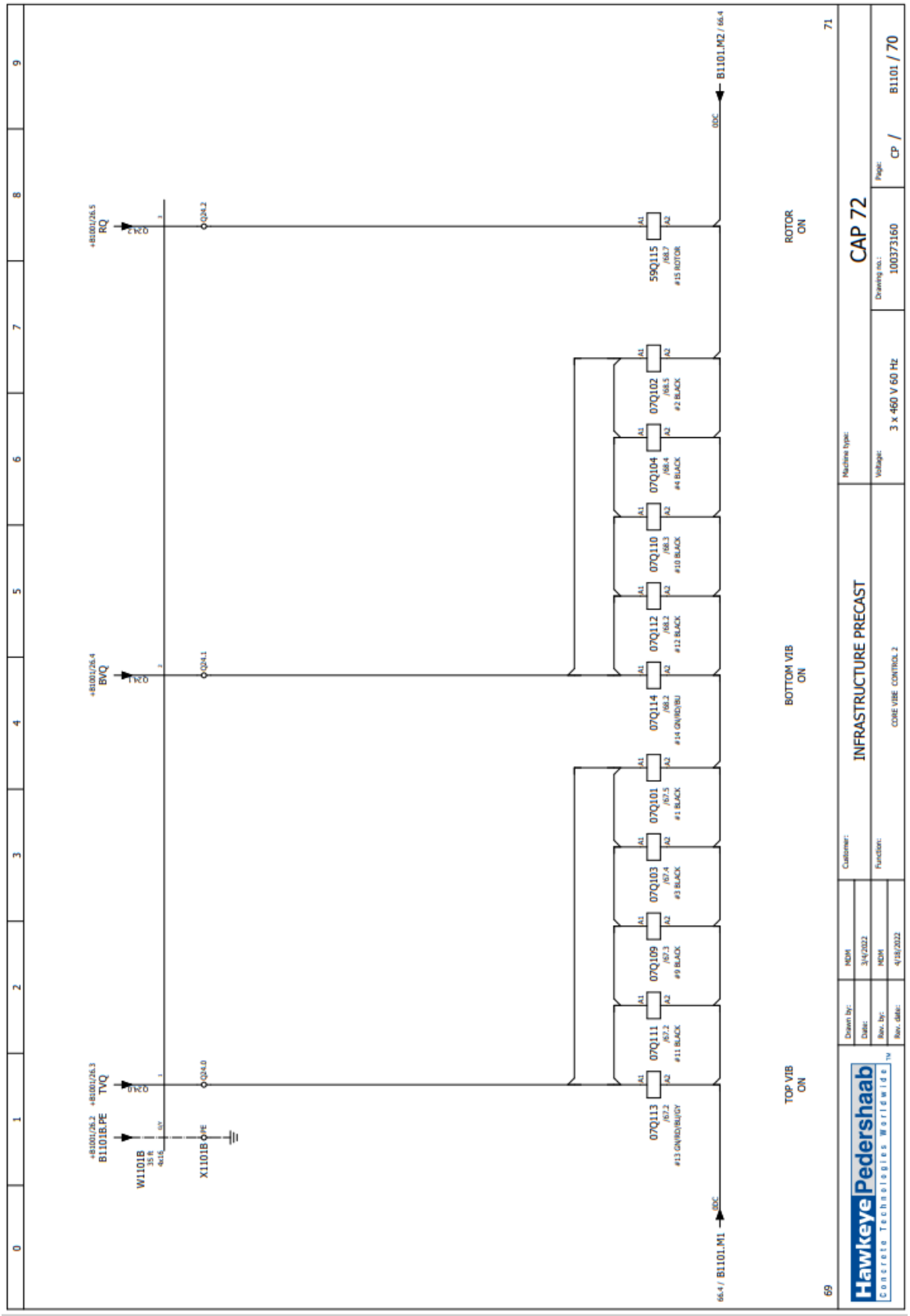
BOX NUMBER	B1101
VOLTAGE	3 x 460 V 60 Hz
MAX. CURRENT I	40 A
MODEL #	CAP 72
SERIAL #	56092
LARGEST MOTOR	11.2 kW
SCCR	5kA
MAX OVERCURRENT PROTECTION	40 A
TYPE 1 ENCLOSURE	
SCHEMATIC REFERENCE #	100373160
MANUFACTURED IN MEDIAPOLIS, IA USA	

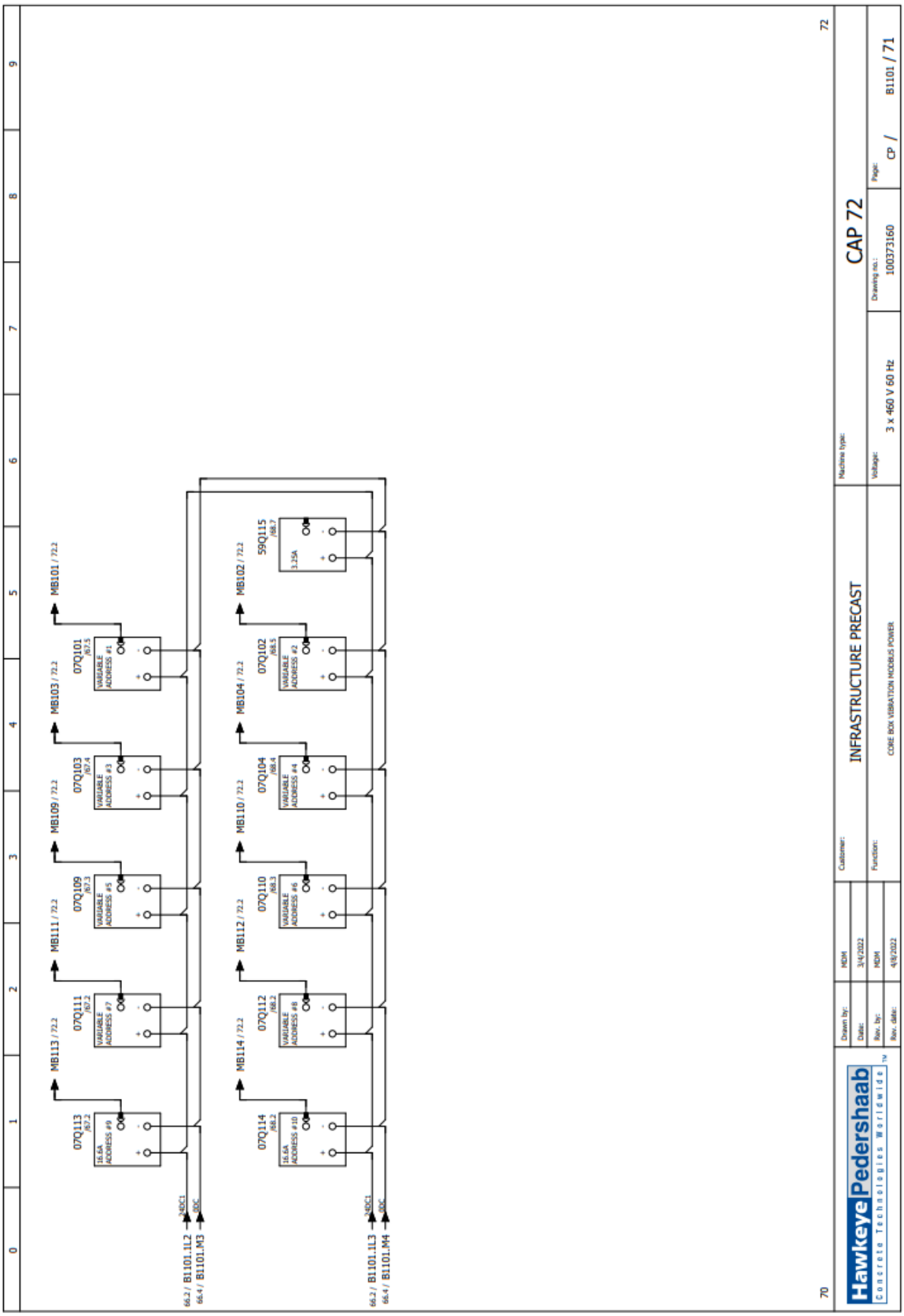

INFRASTRUCTURE PRECAST
CAP 72
CORE BOX VIBRATION POWER DISTRIBUTION
3 x 460 V 60 Hz
100373160
B1101 / 66
Hawkeye Pedershaab
Concrete Technologies Worldwide
W1101
W1101A
07S100
DISCONNECT SWITCH
07U100
DISTRIBUTION BLOCK
X1101
X1101A
X111
X111A

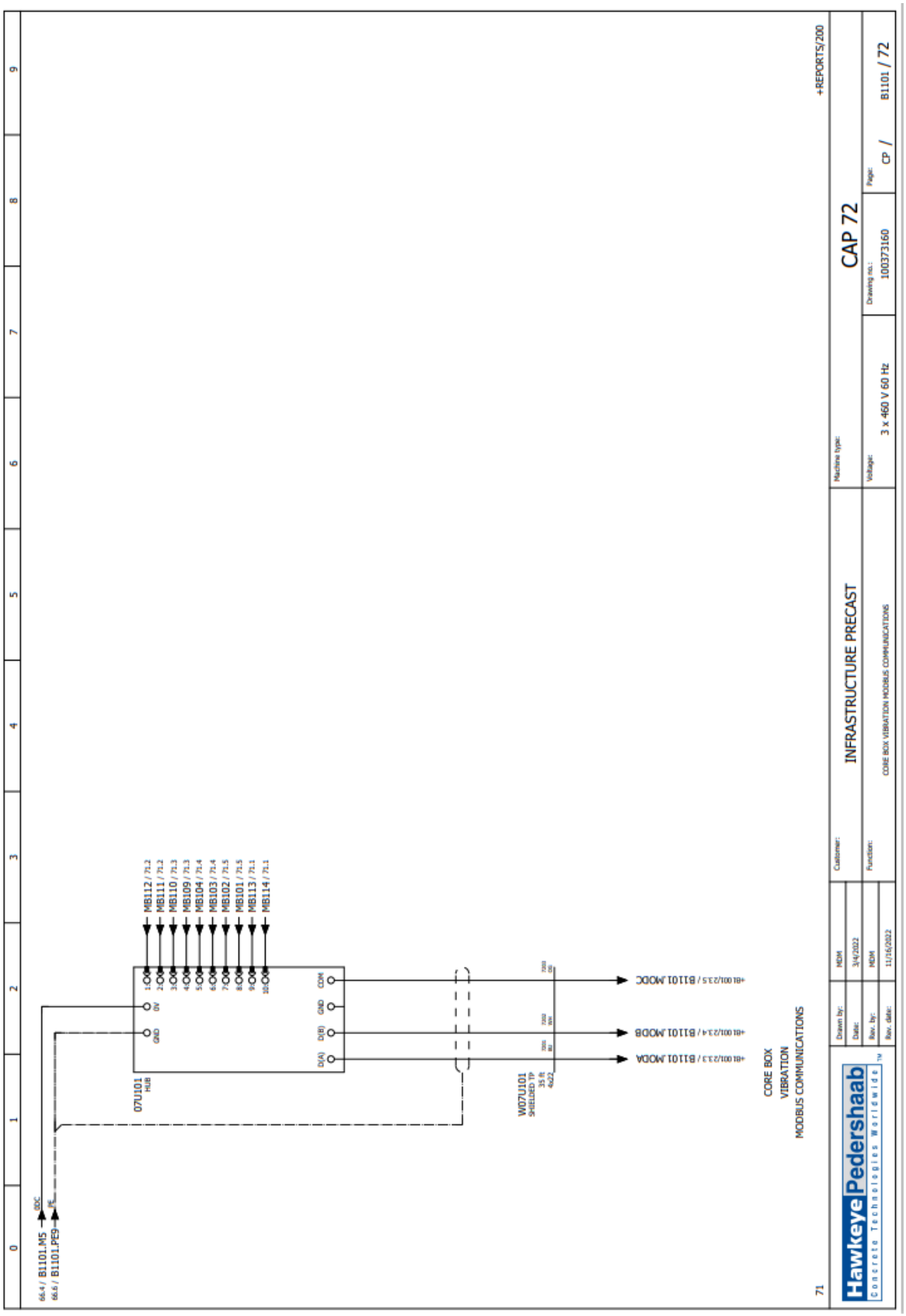

INFRASTRUCTURE PRECAST
CAP 72
3 x 460 V 60 Hz
100373160
B1101 / 67
TOP CORE VIB POWER
Hawkeye Pedershaab
Concrete Technologies Worldwide
07Q101
07Q103
07Q109
07Q111
07Q113
07X101
07X103
07X109
07X111
07X113
TOP BLACK #1 CORE VIB CCW
TOP BLACK #3 CORE VIB CW
TOP BLACK #9 CORE VIB CCW
TOP BLACK #11 CORE VIB CW
TOP GREEN #13 CORE VIB CW


INFRASTRUCTURE PRECAST
CAP 72
3 x 460 V 60 Hz
100373160
B1101 / 68
BOTTOM CORE VIB AND ROTOR POWER
Hawkeye Pedershaab
Concrete Technologies Worldwide
BOTTOM BLACK #12 CORE VIB CCW
BOTTOM BLACK #10 CORE VIB CW
BOTTOM BLACK #4 CORE VIB CCW
BOTTOM BLACK #2 CORE VIB CW
ROTOR #15 CW
BOTTOM GREEN #14 CORE VIB CCW


66.2 / B1101.1L1
-XDC1
59Q115
/66.7
#15 ROTOR
07Q114
/66.2
#14 GREEN
07Q112
/66.2
#12 BLACK
07Q110
/66.3
#10 BLACK
07Q104
/66.4
#4 BLACK
07Q102
/66.5
#2 BLACK
07Q113
/67.2
#13 GREEN
07Q111
/67.2
#11 BLACK
07Q109
/67.3
#9 BLACK
07Q103
/67.4
#3 BLACK
07Q101
/67.5
#1 BLACK
ROTOR VIB ON
INPUT
BOTTOM VIB ON
INPUT
TOP VIB ON
INPUT
W1101A X1101A
+B1001/22:1 / TVI
+B1001/22:2 / BVI
+B1001/22:3 / RI
Hawkeye Pedershaab
Concrete Technologies Worldwide
Drawn by: MDM
Date: 3/4/2022
Rev. by: MDM
Rev. date: 4/15/2022
Customer:
INFRASTRUCTURE PRECAST
Function:
CORE VIBE CONTROL 1
Machine type:
CAP 72
Voltage:
3 x 460 V 60 Hz
Drawing no.:
100373160
Page:
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INFRASTRUCTURE PRECAST
CAP 72
Hawkeye Pedershaab
Concrete Technologies Worldwide
3 x 460 V 60 Hz
100373160
B1101 / 70
CORE VIBE CONTROL 2
ROTOR ON
BOTTOM VIB ON
TOP VIB ON
B1101.M2 / 66.4
B1101.M1 / 66.4
59Q115
07Q102
07Q104
07Q110
07Q112
07Q114
07Q101
07Q103
07Q109
07Q111
07Q113
B1101B.PE
W1101B
X1101B
TVQ
BVQ
RQ


CAP 72
INFRASTRUCTURE PRECAST
3 x 460 V 60 Hz
100373160
B1101 / 71
CORE BOX VIBRATION MODBUS POWER
Hawkeye Pedershaab
Concrete Technologies Worldwide


+REPORTS/200
INFRASTRUCTURE PRECAST
CAP 72
Hawkeye Pedershaab
Concrete Technologies Worldwide
CORE BOX VIBRATION MODBUS COMMUNICATIONS
CORE BOX
VIBRATION
MODBUS COMMUNICATIONS
B1101 / 72
100373160
3 x 460 V 60 Hz
MDM
3/4/2022
11/16/2022
71

Cable Number	Wire Number	Conductor	Wire Size	Sheet	Source		Target	
-W00E06	1110	1	16 AWG	/11.3	-X00E06	1110	-00E06	
-W00E06	1112	2	16 AWG	/11.3	-X00E06	1112	-00E06	
-W00E06	1114	3	16 AWG	/11.4	-X00E06	1114	-00E06	
-W00E06	PE	G/Y	16 AWG	/11.4	-X00E06	PE	-00E06	
-W00E06A	24DC1	1	18 AWG	+B1001/21.1	-X1901	24DC1	-00E06A	
-W00E06A	I23.0	2	18 AWG	+B1001/21.1	-X1901	I23.0	-00E06A	
-W00E06A		3	18 AWG					
-W00E06A	PE	GND	18 AWG	+B1001/21.1	-X1901	PE	-00E06A	
-W00M01	1104	1	8 AWG	/11.1	-X00M01	1104	-00M01	
-W00M01	1106	2	8 AWG	/11.1	-X00M01	1106	-00M01	
-W00M01	1108	3	8 AWG	/11.1	-X00M01	1108	-00M01	
-W00M01	PE	GND	8 AWG	/11.2	-X00M01	PE	-00M01	
-W00N/TH01	24DC1	BLK	16 AWG	+B1001/21.1	-X1901	24DC1	-00N/TH01	
-W00N/TH01	PE	GRN	16 AWG	+B1001/21.1	-X1901	PE	-00N/TH01	
-W00N/TH01	I23.1	RED	16 AWG	+B1001/21.2	-X1901	I23.1	-00N/TH01	
-W00N/TH01	I23.2	WHT	16 AWG	+B1001/21.3	-X1901	I23.2	-00N/TH01	
-W00N/TH02	24DC1	BLK	16 AWG	+B1001/21.1	-X1901	24DC1	-00N/TH02	
-W00N/TH02	PE	GRN	16 AWG	+B1001/21.1	-X1901	PE	-00N/TH02	
-W00N/TH02	I23.3	RED	16 AWG	+B1001/21.4	-X1901	I23.3	-00N/TH02	
-W00N/TH02		WHT	16 AWG					
-W00TH04	24DC1	1	18 AWG	+B1001/21.5	-X1901	24DC1	-00TH04	
-W00TH04	I23.4	2	18 AWG	+B1001/21.5	-X1901	I23.4	-00TH04	
-W00TH04		3	18 AWG					
-W00TH04	PE	GND	18 AWG	+B1001/21.5	-X1901	PE	-00TH04	
-W03B01	5209	1	16 AWG	/52.3	-X03B01	5209	-03B01	2
-W03B01	5210	2	16 AWG	/52.3	-X03B01	5210	-03B01	1
-W03B01		3	16 AWG					
-W03B01	PE	G/Y	16 AWG	/52.3	-X03B01	PE	03M01	
-W03M01	5204	1	16 AWG	/52.1	-03N01		-03M01	
-W03M01	5206	2	16 AWG	/52.2	-03N01		-03M01	
-W03M01	5208	3	16 AWG	/52.2	-03N01		-03M01	
-W03M01		4	16 AWG					

+B1101/72

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Hawkeye Pedershaab
Concrete Technologies Worldwide™

Drawn by: HEH
Date: 3/4/2022
Rev. by: HEH
Rev. date: 4/21/2022

Customer:
INFRASTRUCTURE PRECAST
Function:
CABLE BREAKOUT

Machine type:
CAP 72
Voltage:
3 x 460 V 60 Hz
Drawing no.:
100373160
Page:
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Cable Number	Wire Number	Conductor	Wire Size	Sheet	Source		Target	
-W03M01	PE	E	SHD	/51.1	-XPE	PE	-03M01	
-W03M01	PE	G/Y	16 AWG	/52.2	-03N01		-03M01	
-W03M02	5212	1	16 AWG	/52.4	-03M02		-03U02	
-W03M02	5214	2	16 AWG	/52.4	-03M02		-03U02	
-W03M02	5216	3	16 AWG	/52.4	-03M02		-03U02	
-W03M02		4	16 AWG					
-W03M02	PE	E	SHD	/52.4	-03M02		-03U02	
-W03M02	PE	G/Y	16 AWG	/52.4	-03M02		-03U02	
-W03PN			22	/58.2	-03B01A		-1006U	
-W03R01	5201	1	14 AWG	/52.1	-03N01		-03R01	
-W03R01	5202	2	14 AWG	/52.1	-03N01		-03R01	
-W03R01		3	14 AWG					
-W03R01	PE	E	SHD	/52.2	-03N01		-03R01	
-W03R01	PE	GND	14 AWG	/52.2	-03N01		-03R01	
-W03U02	5212	1	16 AWG	/52.4	-03N02		-03U02	
-W03U02	5214	2	16 AWG	/52.4	-03N02		-03U02	
-W03U02	5216	3	16 AWG	/52.4	-03N02		-03U02	
-W03U02		4	16 AWG					
-W03U02	PE	E	SHD	/51.1	-XPE	PE	-03U02	
-W03U02	PE	G/Y	16 AWG	/52.5	-03N02		-03U02	
-W03U02A	0DC	1	16 AWG	/57.1	-X03U02A	0DC	-03U02	
-W03U02A	Q50.3	2	16 AWG	/57.1	-X03U02A	Q50.3	-03U02	
-W03U02A	130I+	3	16 AWG	/57.2	-X03U02A	130I+	-03U02	
-W03U02A		4	16 AWG					
-W03U02A	PE	E	SHD	/57.1	-X03U02A	PE	-03U02	
-W03U02A	PE	G/Y	16 AWG	/57.1	-X03U02A	PE	-03U02	
-W05B02	1412	1	16 AWG	/14.7	-X05B02	1412	-05B02	2
-W05B02	1413	2	16 AWG	/14.7	-X05B02	1413	-05B02	1
-W05B02		3	16 AWG					
-W05B02	PE	G/Y	16 AWG	/14.7	-X05B02	PE	-05M02	
-W05FP01	1401	1	14 AWG	/14.1	-05FP01	X	-X05FP01	1401
-W05FP01	1402	2	14 AWG	/14.1	-05FP01	Y	-X05FP01	1402

200 202

Hawkeye Pedershaab
Concrete Technologies Worldwide ™

Drawn by: MDM
Date: 3/4/2022
Rev. by: MDM
Rev. date: 4/27/2022

Customer:
Function:
INFRASTRUCTURE PRECAST
CABLE BREAKOUT

Machine type:
Voltage: 3 x 460 V 60 Hz
CAP 72
Drawing no.: 100373160
Page: CP / REPORTS / 201

Cable Number	Wire Number	Conductor	Wire Size	Sheet	Source		Target	
-W05FP01	1403	3	14 AWG	/14.1	-05FP01	Z	-X05FP01	1403
-W05FP01	PE	GND	14 AWG	/14.2	-05FP01	PE	-X05FP01	PE
-W05M01	5218	1	16 AWG	/52.6	-05N01		-05M01	
-W05M01	5220	2	16 AWG	/52.7	-05N01		-05M01	
-W05M01	5222	3	16 AWG	/52.7	-05N01		-05M01	
-W05M01		4	16 AWG					
-W05M01	PE	E	SHD	/51.1	-XPE	PE	-05M01	
-W05M01	PE	G/Y	16 AWG	/52.7	-05N01		-05M01	
-W05M02	1407	1	16 AWG	/14.5	-05N02		-05M02	
-W05M02	1409	2	16 AWG	/14.5	-05N02		-05M02	
-W05M02	1411	3	16 AWG	/14.5	-05N02		-05M02	
-W05M02		4	16 AWG					
-W05M02	PE	E	SHD	/10.1	-XPE	PE	-05M02	
-W05M02	PE	G/Y	16 AWG	/14.6	-05N02		-05M02	
-W05M03	5224	1	16 AWG	/52.9	-X05M03	5224	-05M03	
-W05M03	5226	2	16 AWG	/52.9	-X05M03	5226	-05M03	
-W05M03	5228	3	16 AWG	/52.9	-X05M03	5228	-05M03	
-W05M03	PE	G/Y	16 AWG	/52.9	-X05M03	PE	-05M03	
-W05MP01	PE	GND	14 AWG	/51.1	-XPE	PE	PE	
-W05MP01		U	14 AWG	/51.0	-05MP01	X	-B3S16	
-W05MP01		V	14 AWG	/51.1	-05MP01	Y	-B3S16	
-W05MP01		W	14 AWG	/51.1	-05MP01	Z	-B3S16	
-W05R02	1404	1	14 AWG	/14.5	-05N02		-05R02	
-W05R02	1405	2	14 AWG	/14.5	-05N02		-05R02	
-W05R02		3	14 AWG					
-W05R02	PE	E	SHD	/14.6	-05N02		-05R02	
-W05R02	PE	GND	14 AWG	/14.6	-05N02		-05R02	
-W07U101	7201	BU	22 AWG	+B1001/23.3	+B1001-16.6		-07U101	
-W07U101	PE	E	SHD	/66.4	-X1101	PE	-W07U101	
-W07U101	7203	OG	22 AWG	+B1001/23.5	+B1001-16.6		-07U101	
-W07U101	7202	WH	22 AWG	+B1001/23.4	+B1001-16.6		-07U101	
-W07U101		YE	22 AWG					

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Hawkeye Pedershaab
Concrete Technologies Worldwide

Drawn by: MDM
Date: 3/4/2022
Rev. by: MDM
Rev. date: 4/27/2022

Customer:
INFRASTRUCTURE PRECAST
Function:
CABLE BREAKOUT

Machine type:
CAP 72
Voltage:
3 x 460 V 60 Hz
Drawing no.:
100373160
Page:
CP / REPORTS / 202

Cable Number	Wire Number	Conductor	Wire Size	Sheet	Source		Target	
-W10M01	1301	BK	14 AWG	/13.1	+B1103-X1103	1301	-10M01	
-W10M01	1303	BU	14 AWG	/13.1	+B1103-X1103	1303	-10M01	
-W10M01	PE	GN	14 AWG	/13.2	+B1103-X1103	PE	-10M01	
-W10M01	1302	RD	14 AWG	/13.1	+B1103-X1103	1302	-10M01	
-W1001PN			22	/28.2	-1001U		+B1002-1002U	
-W1002	I10.0	1	16 AWG	/18.1	-X1002	I10.0	+B1002-X1002	I10.0
-W1002	I10.4	2	16 AWG	/18.1	-X1002	I10.4	+B1002-X1002	I10.4
-W1002	VS1.10	3	16 AWG	/18.2	-X1002	VS1.10	+B1002-X1002	VS1.10
-W1002	VS2.10	4	16 AWG	/18.2	-X1002	VS2.10	+B1002-X1002	VS2.10
-W1002		5	16 AWG					
-W1002		6	16 AWG					
-W1002	PE	G/Y	16 AWG	/18.1	-X1002	PE	+B1002-X1002	PE
-W1002A	0DC	1	14 AWG	+B1001/15.4	+B1001-X1002A	0DC	-X1002A	0DC
-W1002A	24DC1	2	14 AWG	+B1001/15.4	+B1001-X1002A	24DC1	-X1002A	24DC1
-W1002A		3	14 AWG					
-W1002A	PE	G/Y	14 AWG	+B1001/10.2	+B1001-X1002A	PE	-X1002A	PE
-W1002B	24DC5	1	14 AWG	+B1001/15.7	+B1001-X1002B	24DC5	-X1002B	24DC5
-W1002B		2	14 AWG					
-W1002B		3	14 AWG					
-W1002B	PE	G/Y	14 AWG	+B1001/10.2	+B1001-X1002B	PE	-X1002B	PE
-W1003	0DC	1	16 AWG	/38.1	-X1003	0DC	+B1003-X1003	0DC
-W1003	24DC1	2	16 AWG	/38.1	-X1003	24DC1	+B1003-X1003	24DC1
-W1003	I5.0	3	16 AWG	/38.1	-X1003	I5.0	+B1003-X1003	I5.0
-W1003	I5.1	4	16 AWG	/38.2	-X1003	I5.1	+B1003-X1003	I5.1
-W1003		5	16 AWG					
-W1003		6	16 AWG					
-W1003	PE	G/Y	16 AWG	/38.0	-X1003	PE	+B1003-X1003	PE
-W1003B	0DC	1	18 AWG	/43.3	-X1003B	0DC	+B1003-X1003B	0DC
-W1003B	Q4.0	2	18 AWG	/43.3	-X1003B	Q4.0	+B1003-X1003B	Q4.0
-W1003B	Q4.1	3	18 AWG	/43.4	-X1003B	Q4.1	+B1003-X1003B	Q4.1
-W1003B	Q4.2	4	18 AWG	/43.5	-X1003B	Q4.2	+B1003-X1003B	Q4.2
-W1003B	Q4.3	5	18 AWG	/43.6	-X1003B	Q4.3	+B1003-X1003B	Q4.3
-W1003B	Q5.0	6	18 AWG	/44.3	-X1003B	Q5.0	+B1003-X1003B	Q5.0

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Hawkeye Pedershaab
Concrete Technologies Worldwide™

Drawn by: HDH
Date: 3/4/2022
Rev. by: HDH
Rev. date: 4/27/2022

Customer:
Function: INFRASTRUCTURE PRECAST
CABLE BREAKOUT

Machine type: CAP 72
Voltage: 3 x 460 V 60 Hz
Drawing no.: 100373160
Page: / REPORTS / 203

Cable Number	Wire Number	Conductor	Wire Size	Sheet	Source		Target	
-W1003B	Q5.1	7	18 AWG	/44.4	-X1003B	Q5.1	+B1003-X1003B	Q5.1
-W1003B	Q5.2	8	18 AWG	/44.5	-X1003B	Q5.2	+B1003-X1003B	Q5.2
-W1003B	Q5.3	9	18 AWG	/44.6	-X1003B	Q5.3	+B1003-X1003B	Q5.3
-W1003B		10	18 AWG					
-W1003B		11	18 AWG					
-W1003B	PE	G/Y	18 AWG	/43.2	-X1003B	PE	+B1003-X1003B	PE
-W1012	0DC	1	16 AWG	/18.3	-X1012	0DC	+B1012-X1012	0DC
-W1012	24DC1	2	16 AWG	/18.3	-X1012	24DC1	+B1012-X1012	24DC1
-W1012	I10.1	3	16 AWG	/18.4	-X1012	I10.1	+B1012-X1012	I10.1
-W1012	I10.5	4	16 AWG	/18.4	-X1012	I10.5	+B1012-X1012	I10.5
-W1012	I23.5	5	16 AWG	/21.7	-X1012	I23.5	+B1012-X1012	I23.5
-W1012	I23.6	6	16 AWG	/21.8	-X1012	I23.6	+B1012-X1012	I23.6
-W1012	PE	G/Y	16 AWG	/18.3	-X1012	PE	+B1012-X1012	PE
-W1035	0DC	1	18 AWG	/43.3	+B1003-X1003B	0DC	+B1035-X1035	0DC
-W1035	Q5.2	2	18 AWG	/44.5	+B1003-X1003B	Q5.2	+B1035-X1035	Q5.2
-W1035		3	18 AWG					
-W1035	PE	GND	18 AWG	/43.2	+B1003-X1003B	PE	+B1035-X1035	PE
-W1101	1201	1	8 AWG	+B1001/12.1	+B1001-X1101	1201	-075100	
-W1101	1202	2	8 AWG	+B1001/12.1	+B1001-X1101	1202	-075100	
-W1101	1203	3	8 AWG	+B1001/12.1	+B1001-X1101	1203	-075100	
-W1101	PE	GND	8 AWG	+B1001/12.2	+B1001-X1101	PE	-X1101	PE
-W1101A	24DC1	1	16 AWG	+B1001/15.4	+B1001-X1101A	0DC	-X1101A	0DC
-W1101A	24DC1	2	16 AWG	+B1001/15.4	+B1001-X1101A	24DC1	-X1101A	24DC1
-W1101A	I24.0	3	16 AWG	+B1001/22.1	+B1001-X1101A	I24.0	-X1101A	I24.0
-W1101A	I24.1	4	16 AWG	+B1001/22.2	+B1001-X1101A	I24.1	-X1101A	I24.1
-W1101A	I24.2	5	16 AWG	+B1001/22.3	+B1001-X1101A	I24.2	-X1101A	I24.2
-W1101A		6	16 AWG					
-W1101A	PE	G/Y	16 AWG	+B1001/10.2	+B1001-X1101A	PE	-X1101A	PE
-W1101B	Q24.0	1	16 AWG	+B1001/26.3	+B1001-X1101B	Q24.0	-X1101B	Q24.0
-W1101B	Q24.1	2	16 AWG	+B1001/26.4	+B1001-X1101B	Q24.1	-X1101B	Q24.1
-W1101B	Q24.2	3	16 AWG	+B1001/26.5	+B1001-X1101B	Q24.2	-X1101B	Q24.2
-W1101B	PE	G/Y	16 AWG	+B1001/26.2	+B1001-X1101B	PE	-X1101B	PE
-W1102	0DC	1	18 AWG	/38.3	-X1102	0DC	+B1102-075H03	

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Hawkeye Pedershaab
Concrete Technologies Worldwide ™

Drawn by: MDM
Date: 3/4/2022
Rev. by: MDM
Rev. date: 6/28/2022

Customer:
INFRASTRUCTURE PRECAST
Function: CABLE BREAKOUT

Machine type: CAP 72
Voltage: 3 x 460 V 60 Hz
Drawing no.: 100373160
Page: CP / REPORTS / 204

Cable Number	Wire Number	Conductor	Wire Size	Sheet	Source		Target	
-W1102	24DC1	2	18 AWG	/38.3	-X1102	24DC1	+B1102-07SH03	
-W1102	I5.2	3	18 AWG	/38.4	-X1102	I5.2	+B1102-07SH03	
-W1102	I5.3	4	18 AWG	/38.4	-X1102	I5.3	+B1102-07SH03	
-W1102	I5.4	5	18 AWG	/38.5	-X1102	I5.4	+B1102-07SH04	
-W1102	I5.5	6	18 AWG	/38.6	-X1102	I5.5	+B1102-07SH04	
-W1102	Q1.2	7	18 AWG	/40.5	-X1102	Q1.2	+B1102-07SH03	
-W1102	Q1.3	8	18 AWG	/40.6	-X1102	Q1.3	+B1102-07SH04	
-W1102		9	18 AWG					
-W1102		10	18 AWG					
-W1102		11	18 AWG					
-W1102	PE	G/Y	18 AWG	/38.3	-X1102	PE		
-W1103	1301	1	16 AWG	/13.1	-X1103	1301	+B1103-X1103	1301
-W1103	1302	2	16 AWG	/13.1	-X1103	1302	+B1103-X1103	1302
-W1103	1303	3	16 AWG	/13.1	-X1103	1303	+B1103-X1103	1303
-W1103	PE	G/Y	16 AWG	/13.2	-X1103	PE	+B1103-X1103	PE
-W1901	24DC1	1	16 AWG	/21.1	-X1901	24DC1	+B1901-X1901	24DC1
-W1901	I23.0	2	16 AWG	/21.1	-X1901	I23.0	+B1901-X1901	I23.0
-W1901	I23.1	3	16 AWG	/21.2	-X1901	I23.1	+B1901-X1901	I23.1
-W1901	I23.2	4	16 AWG	/21.3	-X1901	I23.2	+B1901-X1901	I23.2
-W1901	I23.3	5	16 AWG	/21.4	-X1901	I23.3	+B1901-X1901	I23.3
-W1901	I23.4	6	16 AWG	/21.5	-X1901	I23.4	+B1901-X1901	I23.4
-W1901	PE	G/Y	16 AWG	/21.1	-X1901	PE	+B1901-X1901	PE
-W1901A	0DC	1	18 AWG	/25.3	-X1901A	0DC	+B1901-X1901A	0DC
-W1901A	Q23.0	2	18 AWG	/25.3	-X1901A	Q23.0	+B1901-X1901A	Q23.0
-W1901A		3	18 AWG					
-W1901A		4	18 AWG					
-W1901A	PE	G/Y	18 AWG	/25.2	-X1901A	PE	+B1901-X1901A	PE
-W8015	0DC	1	18 AWG	/31.7	-X8015	0DC	+B8015-X8015	0DC
-W8015	24DC1	2	18 AWG	/31.7	-X8015	24DC1	+B8015-X8015	24DC1
-W8015		3	18 AWG					
-W8015	PE	GND	18 AWG	/31.7	-X8015	PE	+B8015-X8015	PE
-W8015PN			22	/31.6	-1002U		+B8015-00U08	

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HawkeyePedershaab
Concrete Technologies Worldwide ™

Drawn by: MDM
Date: 3/4/2022
Rev. by: MDM
Rev. date: 4/27/2022

Customer:
INFRASTRUCTURE PRECAST
Function:
CABLE BREAKOUT

Machine type:
CAP 72
Voltage:
3 x 460 V 60 Hz
Drawing no.:
100373160
Page:
CP / SHEETS / 205

Device Tag	Qty	Hawkeye Number	Part Number	Function Text	Box	Sheet
05R02					B1001	=CP+B1001/14.4
03R01					B1006	=CP+B1006/52.0
00E06				TANK HEATER	B1001	=CP+B1001/11.3
00F01	1	COM-EL2636	FAZ-D10/1-NA-SP	24VDC CONTROL POWER	B1001	=CP+B1001/15.3
00F05	1	COM-EL2625	FAZ-D6/1-NA-SP	ESTOP POWER	B1001	=CP+B1001/15.6
00H01				PRESSURE BOOST	B1901	=CP+B1001/25.3
00H10	1	ELE-C00529	B-TL70-Q8	RED STACK LIGHT	B1002	=CP+B1002/42.5
00H10	1	COM-EL0534	BCC0995	RED STACK LIGHT	B1002	=CP+B1002/42.5
00H10	1	ELE-C00525	LMBE128A	RED STACK LIGHT	B1002	=CP+B1002/42.5
00H10	1	ELE-C00527	SA-M30	RED STACK LIGHT	B1002	=CP+B1002/42.5
00H10	1	ELE-C00532	SG-TL70-R	RED STACK LIGHT	B1002	=CP+B1002/42.5
00H10	1	ELE-C00528	SOP-E12-150A	RED STACK LIGHT	B1002	=CP+B1002/42.5
00H11	1	ELE-C00531	SG-TL70-Y	YELLOW STACH LIGHT	B1002	=CP+B1002/42.6
00H12	1	ELE-C00686	855H-BD30AD	ALARM HORN	B1002	=CP+B1002/40.3
00K01	1	ELE-C06107	3RT2035-1KB40	MAIN HYDRAULIC PUMP	B1001	=CP+B1001/24.3
00K06	1	ELE-C05529	3RT2016-1BB42	TANK HEATER	B1001	=CP+B1001/24.4
00M01				MAIN HYDRAULIC PUMP	B1001	=CP+B1001/11.1
00N/TH01				HYDRAULIC PUMP LOW OIL / HIGH TEMP SHUTDOWN	B1901	=CP+B1001/21.2
00N/TH02				HYDRAULIC PUMP LOW OIL / HIGH TEMP WARNING	B1901	=CP+B1001/21.4
00Q01	1	ELE-C06137	3RA2931-1AA00	MAIN HYDRAULIC PUMP	B1001	=CP+B1001/11.1
00Q01	1	ELE-C05585	3RV2031-4PA10	MAIN HYDRAULIC PUMP	B1001	=CP+B1001/11.1
00Q01	1	ELE-C06192	3RV2901-1E	MAIN HYDRAULIC PUMP	B1001	=CP+B1001/11.1
00Q06	1	COM-EL2637	FAZ-D5/3-NA	TANK HEATER	B1001	=CP+B1001/11.3
00Q06	1	ELE-C00463	Z-1HK-NA	TANK HEATER	B1001	=CP+B1001/11.3
00Q10	1	COM-EL2637	FAZ-D5/3-NA	24VDC POWER SUPPLY BREAKER	B1001	=CP+B1001/15.1
00S01	1	00687857	M22-CK10	PRESSURE BOOST	B1002	=CP+B1002/34.3
00S01	1	00688370	M22-D-X	PRESSURE BOOST	B1002	=CP+B1002/34.3
00S01	1	ELE-C00432	M22-XD-S	PRESSURE BOOST	B1002	=CP+B1002/34.3
00S05	1	00687858	M22-CK01	START FILL CYCLE	B1002	=CP+B1002/37.3
00S05	1	00687857	M22-CK10	START FILL CYCLE	B1002	=CP+B1002/37.3
00S05	1	ELE-C00421	M22-DDL-GR-X1/X0	START FILL CYCLE	B1002	=CP+B1002/37.3
00S06	1	00687857	M22-CK10	FEEDER MOUNTED ON CAP/CRANE	B1006	=CP+B1006/63.8
00S06	1	ELE-C00426	M22-WK	FEEDER MOUNTED ON CAP/CRANE	B1006	=CP+B1006/63.8
00SH01	1	00687858	M22-CK01	HYDRAULIC PUMP START	B1002	=CP+B1002/34.1
00SH01	1	00687857	M22-CK10	HYDRAULIC PUMP START	B1002	=CP+B1002/34.1
00SH01	1	00688396	M22-CLED-W	HYDRAULIC PUMP START	B1002	=CP+B1002/34.1
00SH01	1	ELE-C00421	M22-DDL-GR-X1/X0	HYDRAULIC PUMP START	B1002	=CP+B1002/34.1
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Hawkeye Pedershaab
Concrete Technologies Worldwide ™

Drawn by: MDM
Date: 3/4/2022
Rev. by: MDM
Rev. date: 7/1/2022

Customer:
INFRASTRUCTURE PRECAST
Function:
DEVICE INDEX

Machine type:
CAP 72
Voltage: 3 x 460 V 60 Hz
Drawing no.: 100373160
Page: CP / REPORTS / 300

Device Tag	Qty	Hawkeye Number	Part Number	Function Text	Box	Sheet
00T10	1	ELE-CO5262	2903155	POWER SUPPLY 24 V DC	B1001	=CP+B1001/15.1
00T20	1	COM-HW1595	24EB10D60	24VDC TO 10VDC	B1002	=CP+B1002/30.8
00T20	1	COM-HW1596	EB35DIN	24VDC TO 10VDC	B1002	=CP+B1002/30.8
00U00	3	COM-EL2498	1SNL3160108D0000	DISTRIBUTION BLOCK	B1001	=CP+B1001/10.5
00U01	1	00688822	6GK1901-1BB10-2AA0	EWON FLEXY	B1002	=CP+B1002/31.3
00U01	1	ELE-WI0055	570-110-003	EWON FLEXY	B1002	=CP+B1002/31.3
00U01	1	ELE-CO1177	WP20500	EWON FLEXY	B1002	=CP+B1002/31.3
00U02	1	ELE-CO5542	6AV2123-2GB03-0AX0	KTP 700 SCREEN	B1002	=CP+B1002/31.1
00U02	1	ELE-WI0057	570-100-010	KTP 700 SCREEN	B1002	=CP+B1002/31.1
00U06	1	ELE-CO5526	6GK5748-1FC00-0AB0	WIRELESS IWLAN CLIENT	B1006	=CP+B1006/63.6
00U06	1	ELE-CO5148	6GK5795-1TR10-0AA6	WIRELESS IWLAN CLIENT	B1006	=CP+B1006/63.6
00U06	2	ELE-CO5256	6GK5795-6MN10-0AA6	WIRELESS IWLAN CLIENT	B1006	=CP+B1006/63.6
00U06	1	ELE-CO5527	6GK5907-4PA00	WIRELESS IWLAN CLIENT	B1006	=CP+B1006/63.6
00U06	1	ELE-CO5039	6XV1875-5CH20	WIRELESS IWLAN CLIENT	B1006	=CP+B1006/63.6
00U06	1	ELE-CO5498	6XV1875-5CH50	WIRELESS IWLAN CLIENT	B1006	=CP+B1006/63.6
00U06	1	ELE-WI0055	570-110-003	WIRELESS IWLAN CLIENT	B1006	=CP+B1006/63.6
00U08	1	00688822	6GK1901-1BB10-2AA0	WIRELESS IWLAN ACCESS	B8015	=CP+B1002/31.8
00U08	1	ELE-CO5524	6GK5788-1FC00-0AB0	WIRELESS IWLAN ACCESS	B8015	=CP+B1002/31.8
00U08	1	ELE-CO5148	6GK5795-1TR10-0AA6	WIRELESS IWLAN ACCESS	B8015	=CP+B1002/31.8
00U08	1	ELE-CO5525	6GK5907-8PA00	WIRELESS IWLAN ACCESS	B8015	=CP+B1002/31.8
00U08	2	ELE-CO5596	6GK57938DP000AA0	WIRELESS IWLAN ACCESS	B8015	=CP+B1002/31.8
00U08	2	ELE-CO5039	6XV1875-5CH20	WIRELESS IWLAN ACCESS	B8015	=CP+B1002/31.8
03B01				BRE	B1006	=CP+B1006/52.2
03B01A	1	COM-EL0562	7000-12341-6141000	FEEDER DISTRIBUTOR ROTATE ENCODER	B1006	=CP+B1006/58.2
03B01A	1	COM-EL0648	SACC-M12MRD-4Q	FEEDER DISTRIBUTOR ROTATE ENCODER	B1006	=CP+B1006/58.2
03KB01	1	ELE-CO6073	3RT2015-1BB42	FEEDER DISTRIBUTOR ROTATE BRAKE	B1006	=CP+B1006/63.2
03KB01	1	ELE-CO6077	3RT2916-1EH00	FEEDER DISTRIBUTOR ROTATE BRAKE	B1006	=CP+B1006/63.2
03M01				FEEDER DISTRIBUTOR ROTATE	B1006	=CP+B1006/52.1
03M02				FEEDER DISTRIBUTOR BELT	B1006	=CP+B1006/52.4
03N01	1	ELE-CO5106	6ES7954-8LC02-0AA0	FEEDER DISTRIBUTOR ROTATE FREQUENCY DRIVE	B1006	=CP+B1006/52.1
03N01	1	ELE-CO6282	6SL3210-1PE13-2AL1	FEEDER DISTRIBUTOR ROTATE FREQUENCY DRIVE	B1006	=CP+B1006/52.1
03N01	1	ELE-CO5287	6SL3244-0BB12-1FA0	FEEDER DISTRIBUTOR ROTATE FREQUENCY DRIVE	B1006	=CP+B1006/52.1
03N01	1	ELE-CO5207	6SL3255-0AA00-4CA1	FEEDER DISTRIBUTOR ROTATE FREQUENCY DRIVE	B1006	=CP+B1006/52.1
03N01	1	ELE-WI0055	570-110-003	FEEDER DISTRIBUTOR ROTATE FREQUENCY DRIVE	B1006	=CP+B1006/52.1
03N02	1	ELE-CO5106	6ES7954-8LC02-0AA0	FEEDER DISTRIBUTOR BELT FREQUENCY DRIVE	B1006	=CP+B1006/52.4
03N02	1	ELE-CO6282	6SL3210-1PE13-2AL1	FEEDER DISTRIBUTOR BELT FREQUENCY DRIVE	B1006	=CP+B1006/52.4
03N02	1	ELE-CO5287	6SL3244-0BB12-1FA0	FEEDER DISTRIBUTOR BELT FREQUENCY DRIVE	B1006	=CP+B1006/52.4
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Hawkeye Pedershaab
Concrete Technologies Worldwide ™

Drawn by: MDM
Date: 3/4/2022
Rev. by: MDM
Rev. date: 4/28/2022

Customer:
Function:

INFRASTRUCTURE PRECAST

DEVICE INDEX

Machine type: CAP 72
Voltage: 3 x 460 V 60 Hz
Drawing no.: 100373160
Page: CP / REPORTS / 301

Device Tag	Qty	Hawkeye Number	Part Number	Function Text	Box	Sheet
03N02	1	ELE-C05207	6SL3255-0AA00-4CA1	FEEDER DISTRIBUTOR BELT FREQUENCY DRIVE	B1006	=CP+B1006/52.4
03N02	1	ELE-W10055	570-110-003	FEEDER DISTRIBUTOR BELT FREQUENCY DRIVE	B1006	=CP+B1006/52.4
03Q01	1	ELE-C06177	3RV2021-4AA10	FEEDER DISTRIBUTOR ROTATE	B1006	=CP+B1006/52.1
03Q01	1	ELE-C06192	3RV2901-1E	FEEDER DISTRIBUTOR ROTATE	B1006	=CP+B1006/52.1
03Q01	1	ELE-C06189	3RV2928-1H	FEEDER DISTRIBUTOR ROTATE	B1006	=CP+B1006/52.1
03Q02	1	ELE-C06177	3RV2021-4AA10	FEEDER DISTRIBUTOR BELT	B1006	=CP+B1006/52.4
03Q02	1	ELE-C06192	3RV2901-1E	FEEDER DISTRIBUTOR BELT	B1006	=CP+B1006/52.4
03Q02	1	ELE-C06189	3RV2928-1H	FEEDER DISTRIBUTOR BELT	B1006	=CP+B1006/52.4
03R01	1	POW-MO0865	DB0370-0300-10000AA0	BRAKE RESISTOR	B1006	=CP+B1006/52.0
03S01	2	00687857	M22-CK10	DISTRIBUTOR ROTATE CLOCKWISE	B1002	=CP+B1002/34.4
03S01	1	ELE-C00449	M22-WR12H	DISTRIBUTOR ROTATE CLOCKWISE	B1002	=CP+B1002/34.4
03U02				SLIP RING	B1006	=CP+B1006/52.4:=CP+B1006/52
04B01	1	COM-EL0533	7000-12221-6141000	PRESSHEAD IN STATION	B1003	=CP+B1002/38.1
04B02	1	COM-EL0533	7000-12221-6141000	TONGUE TROWEL HOME	B1003	=CP+B1002/38.2
04H01	2	COM-EL0573	7000-18021-6160300	PRESSHEAD PIVOT LEFT/RIGHT	B1001	=CP+B1001/27.2
04H02	1	COM-EL0573	7000-18021-6160300	PRESSHEAD PIVOT UNLOCK	B1001	=CP+B1001/25.4
04H03	1	COM-EL0573	7000-18021-6160300	TONGUE TROWEL ROTATE	B1001	=CP+B1001/25.5
04H04	1	COM-EL0579	7000-11021-6160300	LOW/HIGH PRESSHEAD PRESSURE	B1035	=CP+B1002/44.5
04H05	2	COM-EL0573	7000-18021-6160300	PRESSHEAD #1 UP/DOWN	B1003	=CP+B1002/43.3
04H06	2	COM-EL0573	7000-18021-6160300	PRESSHEAD #2 UP/DOWN	B1003	=CP+B1002/43.5
04H07	2	COM-EL0573	7000-18021-6160300	PRESSHEAD #3 UP/DOWN	B1003	=CP+B1002/44.3
04H08	1	COM-EL0573	7000-18021-6160300	PHEAD SAFETY LATCH UNLOCK	B1003	=CP+B1002/44.6
04S01	1	COM-HW0600	MS4M11720 MSR	PRESSHEAD PIVOT IN/OUT	B1002	=CP+B1002/39.3
04S02	1	00687858	M22-CK01	START PRESSHEAD CYCLE	B1002	=CP+B1002/37.5
04S02	1	00687857	M22-CK10	START PRESSHEAD CYCLE	B1002	=CP+B1002/37.5
04S02	1	ELE-C00421	M22-DDL-GR-X1/X0	START PRESSHEAD CYCLE	B1002	=CP+B1002/37.5
04S04	1	00687857	M22-CK10	PRESSHEAD PRESSURE HIGH	B1002	=CP+B1002/36.1
04S04	1	ELE-C00426	M22-WK	PRESSHEAD PRESSURE HIGH	B1002	=CP+B1002/36.1
04S05	1	COM-HW0219	9001 K71H7	PRESSHEAD #1 UP	B1002	=CP+B1002/35.2
04S06	1	COM-HW0219	9001 K71H7	PRESSHEAD #2 UP	B1002	=CP+B1002/35.4
04S07	1	COM-HW0219	9001 K71H7	PRESSHEAD #3 UP	B1002	=CP+B1002/35.6
04S08	1	00687857	M22-CK10	PRESSHEAD UNLOCK	B1002	=CP+B1002/36.4
04S08	1	ELE-C00426	M22-WK	PRESSHEAD UNLOCK	B1002	=CP+B1002/36.4
04S10	1	COM-HW0217	800T-T2H2EEDX	PRESSHEAD ALL UP	B1002	=CP+B1002/34.8
04SH03	1	00687857	M22-CK10	NORMALIZE PRESS	B1002	=CP+B1002/37.7
04SH03	1	00688396	M22-CLED-W	NORMALIZE PRESS	B1002	=CP+B1002/37.7
04SH03	1	ELE-C00423	M22-DL-X	NORMALIZE PRESS	B1002	=CP+B1002/37.7
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HawkeyePedershaab
Concrete Technologies Worldwide ™

Drawn by: MDM | Date: 3/4/2022 | Rev. by: MDM | Rev. date: 4/26/2022

Customer:

INFRASTRUCTURE PRECAST

Function:

DEVICE INDEX

Machine type:

CAP 72

Voltage: 3 x 460 V 60 Hz

Drawing no.: 100373160

Page: CP / REPORTS / 302

Device Tag	Qty	Hawkeye Number	Part Number	Function Text	Box	Sheet
04SH03	1	ELE-CO0429	M22-XDL-G	NORMALIZE PRESS	B1002	=CP+B1002/37.7
04U01	1	COM-HW0065	PV100-24	PRESSHEAD PIVOT LEFT/RIGHT	B1001	=CP+B1001/27.2
05B02				BRE	B1001	=CP+B1001/14.6
05B02A	1	COM-EL0552	8050000D01M050	FEEDER IS DOCKED AT CAP SAFETY PROX	B1012	=CP+B1001/18.4
05B02B	1	COM-EL0545	7000-12341-6140500	FEEDER PIVOT IN POSITION TO FILL	B1012	=CP+B1001/21.8
05B02F	1	COM-EL0545	7000-12341-6140500	FEEDER PIVOT FAST SPEED	B1012	=CP+B1001/21.7
05B14	1	COM-EL0538	7000-12221-6140500	FEEDER LASER FILL HEIGHT	B1006	=CP+B1006/57.2
05F01	1	COM-EL2636	FAZ-D10/1-NA-SP	24 V DC COMMON POWER	B1006	=CP+B1006/53.3
05F06	1	COM-EL2625	FAZ-D6/1-NA-SP	P01 SAFETY POWER	B1006	=CP+B1006/53.5
05F10	1	COM-EL2622	FAZ-D2/1-NA-SP	MAIN POWER BOX COOLING FAN	B1006	=CP+B1006/53.7
05FP01	1	ELE-PL0005	61-1A413	FEMALE PLUG	B1001	=CP+B1001/14.1
05FP01	1	ELE-PL0007	63-14043	FEMALE PLUG	B1001	=CP+B1001/14.1
05FP.PN	4	00686592	09 15 000 6225	FEMALE HARTING	B1006	=CP+B1006/63.3
05FP.PN	1	00686594	09 15 003 3101	FEMALE HARTING	B1006	=CP+B1006/63.3
05FP.PN	1	00686590	09 15 004 3113	FEMALE HARTING	B1006	=CP+B1006/63.3
05FP.PN	1	00658274	09 20 003 1250	FEMALE HARTING	B1006	=CP+B1006/63.3
05FP.PN	1	00688730	09 20 003 5425	FEMALE HARTING	B1006	=CP+B1006/63.3
05FP.PN	1	ELE-FI0607	FMM20-C	FEMALE HARTING	B1006	=CP+B1006/63.3
05H01A	1	COM-EL0545	7000-12341-6140500	WARNING STROBE 1	B1006	=CP+B1006/60.3
05H01A	1	ELE-CO1116	K50BCLS1XYXPQ	WARNING STROBE 1	B1006	=CP+B1006/60.3
05H01B	1	COM-EL0545	7000-12341-6140500	WARNING STROBE 2	B1006	=CP+B1006/60.4
05H01B	1	ELE-CO1116	K50BCLS1XYXPQ	WARNING STROBE 2	B1006	=CP+B1006/60.4
05H02	1	ELE-CO0686	855H-BD30AD	FEEDER ALARM HORN	B1006	=CP+B1006/60.5
05H03	1	COM-EL0545	7000-12341-6140500	HOPPER REFILL HEIGHT OK GREEN	B1006	=CP+B1006/61.3
05H03	1	ELE-CO1118	T30-GRY-PQ	HOPPER REFILL HEIGHT OK GREEN	B1006	=CP+B1006/61.3
05K03	1	ELE-CO6073	3RT2015-1BB42	FEEDER AGITATOR	B1006	=CP+B1006/62.3
05KB02	1	ELE-CO6073	3RT2015-1BB42	FEEDER PIVOT BRAKE	B1001	=CP+B1001/28.5
05KB02	1	ELE-CO6077	3RT2916-1EH00	FEEDER PIVOT BRAKE	B1001	=CP+B1001/28.5
05M01					B1006	=CP+B1006/52.6
05M02				FEEDER PIVOT LEFT/RIGHT	B1001	=CP+B1001/14.5
05M03				FEEDER AGITATOR	B1006	=CP+B1006/52.9
05M10	1	ELE-BO0355	3238.124	MAIN POWER BOX COOLING FAN	B1006	=CP+B1006/53.7
05M10	1	ELE-BO0356	3238.200	MAIN POWER BOX COOLING FAN	B1006	=CP+B1006/53.7
05MP01	1	ELE-PL0005	61-1A413	MALE PLUG	B1006	=CP+B1006/51.0
05MP01	1	ELE-PL0006	63-18043	MALE PLUG	B1006	=CP+B1006/51.0
05MP.PN	4	00686591	09 15 000 6125	MALE HARTING	B1006	=CP+B1006/63.4
05MP.PN	1	00686593	09 15 003 3001	MALE HARTING	B1006	=CP+B1006/63.4

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Hawkeye Pedershaab — Concrete Technologies Worldwide™

Drawn by: MDM | Date: 3/4/2022 | Rev. by: MDM | Rev. date: 6/30/2022

Customer: INFRASTRUCTURE PRECAST

Function: DEVICE INDEX

Machine type: CAP 72

Voltage: 3 x 460 V 60 Hz

Drawing no.: 100373160

Page: CP / REVISION / 303

Device Tag	Qty	Hawkeye Number	Part Number	Function Text	Box	Sheet
05MP.PN	1	00686589	09 15 004 3013	MALE HARTING	B1006	=CP+B1006/63.4
05MP.PN	1	COM-EL0304	09 20 003 1443	MALE HARTING	B1006	=CP+B1006/63.4
05MP.PN	1	00688727	09 20 003 5422	MALE HARTING	B1006	=CP+B1006/63.4
05MP.PN	1	ELE-FI0617	FPPG11G	MALE HARTING	B1006	=CP+B1006/63.4
05N01	1	ELE-CO5106	6ES7954-8LC02-0AA0	FEEDER MAIN BELT FREQUENCY DRIVE	B1006	=CP+B1006/52.6
05N01	1	ELE-CO6222	6SL3210-1PE18-0AL1	FEEDER MAIN BELT FREQUENCY DRIVE	B1006	=CP+B1006/52.6
05N01	1	ELE-CO5287	6SL3244-0BB12-1FA0	FEEDER MAIN BELT FREQUENCY DRIVE	B1006	=CP+B1006/52.6
05N01	1	ELE-CO5207	6SL3255-0AA00-4CA1	FEEDER MAIN BELT FREQUENCY DRIVE	B1006	=CP+B1006/52.6
05N01	1	ELE-WI0055	570-110-003	FEEDER MAIN BELT FREQUENCY DRIVE	B1006	=CP+B1006/52.6
05N02	1	ELE-CO5106	6ES7954-8LC02-0AA0	FEEDER PIVOT LEFT/RIGHT FREQUENCY CONVERTER	B1001	=CP+B1001/14.5
05N02	1	ELE-CO6282	6SL3210-1PE13-2AL1	FEEDER PIVOT LEFT/RIGHT FREQUENCY CONVERTER	B1001	=CP+B1001/14.5
05N02	1	ELE-CO5287	6SL3244-0BB12-1FA0	FEEDER PIVOT LEFT/RIGHT FREQUENCY CONVERTER	B1001	=CP+B1001/14.5
05N02	1	ELE-CO5207	6SL3255-0AA00-4CA1	FEEDER PIVOT LEFT/RIGHT FREQUENCY CONVERTER	B1001	=CP+B1001/14.5
05N02	1	ELE-WI0056	570-100-007	FEEDER PIVOT LEFT/RIGHT FREQUENCY CONVERTER	B1001	=CP+B1001/14.5
05Q01	1	ELE-CO6177	3RV2021-4AA10	FEEDER MAIN BELT	B1006	=CP+B1006/52.6
05Q01	1	ELE-CO6192	3RV2901-1E	FEEDER MAIN BELT	B1006	=CP+B1006/52.6
05Q01	1	ELE-CO6189	3RV2928-1H	FEEDER MAIN BELT	B1006	=CP+B1006/52.6
05Q01A	1	ELE-CO5537	3RV2021-4BA10	FEEDER PLUG POWER	B1001	=CP+B1001/14.1
05Q01A	1	ELE-CO6192	3RV2901-1E	FEEDER PLUG POWER	B1001	=CP+B1001/14.1
05Q01A	1	ELE-CO6189	3RV2928-1H	FEEDER PLUG POWER	B1001	=CP+B1001/14.1
05Q02	1	ELE-CO6177	3RV2021-4AA10	FEEDER PIVOT LEFT/RIGHT	B1001	=CP+B1001/14.5
05Q02	1	ELE-CO6192	3RV2901-1E	FEEDER PIVOT LEFT/RIGHT	B1001	=CP+B1001/14.5
05Q02	1	ELE-CO6189	3RV2928-1H	FEEDER PIVOT LEFT/RIGHT	B1001	=CP+B1001/14.5
05Q03	1	00678533	3RA1921-1DA00	FEEDER AGITATOR	B1006	=CP+B1006/52.9
05Q03	1	ELE-CO6176	3RV2021-0HA10	FEEDER AGITATOR	B1006	=CP+B1006/52.9
05Q03	1	ELE-CO6192	3RV2901-1E	FEEDER AGITATOR	B1006	=CP+B1006/52.9
05Q03	1	ELE-CO6189	3RV2928-1H	FEEDER AGITATOR	B1006	=CP+B1006/52.9
05Q10	1	COM-EL2637	FAZ-D5/3-NA	24VDC POWER SUPPLY BREAKER	B1006	=CP+B1006/53.1
05R02	1	POW-MO0865	DB0370-0300-10000A0	BRAKE RESISTOR	B1001	=CP+B1001/14.4
05S01	1	HMI-41202	MSSM11721 MSS	BELT SPEED	B1002	=CP+B1002/39.2
05T10	1	ELE-CO5258	2903154	POWER SUPPLY 24 V DC	B1006	=CP+B1006/53.1
05TH10	1	ELE-BO0362	ATEMNO	FAN THERMOSTAT	B1006	=CP+B1006/53.7
06S50	1	00687857	M22-CK10	FEEDER MOUNTED ON CRANE	B1002	=CP+B1002/34.6
06S50	1	ELE-CO0426	M22-WK	FEEDER MOUNTED ON CRANE	B1002	=CP+B1002/34.6
07Q100	1	00698151	3RV2031-4VA10	CORE BOX VIBRATION	B1001	=CP+B1001/12.1
07Q100	1	ELE-CO6192	3RV2901-1E	CORE BOX VIBRATION	B1001	=CP+B1001/12.1
07Q101	1	ELE-CO1910	LUB12	OVERLOAD	B1101	=CP+B1101/67.5

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HawkeyePedershaab
Concrete Technologies Worldwide TM

Drawn by: MDM
Date: 3/4/2022
Rev. by: MDM
Rev. date: 6/28/2022

Customer:

INFRASTRUCTURE PRECAST

Function:

DEVICE INDEX

Machine type:

CAP 72

Voltage: 3 x 460 V 60 Hz

Drawing no.: 100373160

Page: CP / REPORTS / 304

Device Tag	Qty	Hawkeye Number	Part Number	Function Text	Box	Sheet
07Q101	1	ELE-C01911	LUCM12BL	OVERLOAD	B1101	=CP+B1101/67.5
07Q102	1	ELE-C01910	LUB12	OVERLOAD	B1101	=CP+B1101/68.5
07Q102	1	ELE-C01911	LUCM12BL	OVERLOAD	B1101	=CP+B1101/68.5
07Q103	1	ELE-C01910	LUB12	OVERLOAD	B1101	=CP+B1101/67.4
07Q103	1	ELE-C01911	LUCM12BL	OVERLOAD	B1101	=CP+B1101/67.4
07Q104	1	ELE-C01910	LUB12	OVERLOAD	B1101	=CP+B1101/68.4
07Q104	1	ELE-C01911	LUCM12BL	OVERLOAD	B1101	=CP+B1101/68.4
07Q109	1	ELE-C01910	LUB12	OVERLOAD	B1101	=CP+B1101/67.3
07Q109	1	ELE-C01911	LUCM12BL	OVERLOAD	B1101	=CP+B1101/67.3
07Q110	1	ELE-C01910	LUB12	OVERLOAD	B1101	=CP+B1101/68.3
07Q110	1	ELE-C01911	LUCM12BL	OVERLOAD	B1101	=CP+B1101/68.3
07Q111	1	ELE-C01910	LUB12	OVERLOAD	B1101	=CP+B1101/67.2
07Q111	1	ELE-C01911	LUCM12BL	OVERLOAD	B1101	=CP+B1101/67.2
07Q112	1	ELE-C01910	LUB12	OVERLOAD	B1101	=CP+B1101/68.2
07Q112	1	ELE-C01911	LUCM12BL	OVERLOAD	B1101	=CP+B1101/68.2
07Q113	1	ELE-C01912	LUB32	OVERLOAD	B1101	=CP+B1101/67.2
07Q113	1	ELE-C01913	LUCM32BL	OVERLOAD	B1101	=CP+B1101/67.2
07Q114	1	ELE-C01912	LUB32	OVERLOAD	B1101	=CP+B1101/68.2
07Q114	1	ELE-C01913	LUCM32BL	OVERLOAD	B1101	=CP+B1101/68.2
07S100	1	ELE-FU0640	H4X-02R	DISCONNECT SWITCH	B1101	=CP+B1101/66.7
07S100	1	COM-EL2024	RD60-3	DISCONNECT SWITCH	B1101	=CP+B1101/66.7
07S100	1	ELE-FU0643	SH4-320	DISCONNECT SWITCH	B1101	=CP+B1101/66.7
07S100	1	ELE-FU0652	SH-GUIDE1	DISCONNECT SWITCH	B1101	=CP+B1101/66.7
07S100	1	ELE-FU0665	TSH3-3TB	DISCONNECT SWITCH	B1101	=CP+B1101/66.7
07SH01	1	00687858	M22-CK01	TOP VIBRATORS START	B1002	=CP+B1002/36.5
07SH01	1	00687857	M22-CK10	TOP VIBRATORS START	B1002	=CP+B1002/36.5
07SH01	1	00688396	M22-CLED-W	TOP VIBRATORS START	B1002	=CP+B1002/36.5
07SH01	1	ELE-C00421	M22-DDL-GR-X1/X0	TOP VIBRATORS START	B1002	=CP+B1002/36.5
07SH02	1	00687858	M22-CK01	BOTTOM VIBRATORS START	B1002	=CP+B1002/36.7
07SH02	1	00687857	M22-CK10	BOTTOM VIBRATORS START	B1002	=CP+B1002/36.7
07SH02	1	00688396	M22-CLED-W	BOTTOM VIBRATORS START	B1002	=CP+B1002/36.7
07SH02	1	ELE-C00421	M22-DDL-GR-X1/X0	BOTTOM VIBRATORS START	B1002	=CP+B1002/36.7
07SH03	1	00687858	M22-CK01	TOP VIBRATORS START	B1102	=CP+B1002/38.4
07SH03	1	00687857	M22-CK10	TOP VIBRATORS START	B1102	=CP+B1002/38.4
07SH03	1	00688396	M22-CLED-W	TOP VIBRATORS START	B1102	=CP+B1002/38.4
07SH03	1	ELE-C00421	M22-DDL-GR-X1/X0	TOP VIBRATORS START	B1102	=CP+B1002/38.4
07SH04	1	00687858	M22-CK01	BOTTOM VIBRATORS START	B1102	=CP+B1002/38.5
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HawkeyePedershaab
Concrete Technologies Worldwide

Drawn by: MDM
Date: 3/4/2022
Rev. by: MDM
Rev. date: 6/28/2022

Customer:
INFRASTRUCTURE PRECAST
Function:
DEVICE INDEX

Machine type:
CAP 72
Voltage: 3 x 460 V 60 Hz
Drawing no.: 100373160
Page: CP / REVISION 305

Device Tag	Qty	Hawkeye Number	Part Number	Function Text	Box	Sheet
07SH04	1	00687857	M22-CK10	BOTTOM VIBRATORS START	B1102	=CP+B1002/38.5
07SH04	1	00688396	M22-CLED-W	BOTTOM VIBRATORS START	B1102	=CP+B1002/38.5
07SH04	1	ELE-CO0421	M22-DDL-GR-X1/X0	BOTTOM VIBRATORS START	B1102	=CP+B1002/38.5
07U100	3	COM-EL2498	1SNL316010R0000	DISTRIBUTION BLOCK	B1101	=CP+B1101/66.6
07U101	2	ELE-WI0056	570-100-007	HUB	B1101	=CP+B1101/72.1
07U101	8	ELE-WI0055	570-110-003	HUB	B1101	=CP+B1101/72.1
07U101	1	ELE-CO1920	LU9GC3	HUB	B1101	=CP+B1101/72.1
07X101	1	ELE-PL0017	21414BYM2	VIB PLUG	B1101	=CP+B1101/67.5
07X101	4	ELE-WI0246	D14-250MB-M	VIB PLUG	B1101	=CP+B1101/67.5
07X102	1	ELE-PL0019	21414BM2	VIB PLUG	B1101	=CP+B1101/68.5
07X102	4	ELE-WI0246	D14-250MB-M	VIB PLUG	B1101	=CP+B1101/68.5
07X103	1	ELE-PL0017	21414BYM2	VIB PLUG	B1101	=CP+B1101/67.4
07X103	4	ELE-WI0246	D14-250MB-M	VIB PLUG	B1101	=CP+B1101/67.4
07X104	1	ELE-PL0019	21414BM2	VIB PLUG	B1101	=CP+B1101/68.4
07X104	4	ELE-WI0246	D14-250MB-M	VIB PLUG	B1101	=CP+B1101/68.4
07X109	1	ELE-PL0017	21414BYM2	VIB PLUG	B1101	=CP+B1101/67.3
07X109	4	ELE-WI0246	D14-250MB-M	VIB PLUG	B1101	=CP+B1101/67.3
07X110	1	ELE-PL0019	21414BM2	VIB PLUG	B1101	=CP+B1101/68.3
07X110	4	ELE-WI0246	D14-250MB-M	VIB PLUG	B1101	=CP+B1101/68.3
07X111	1	ELE-PL0017	21414BYM2	VIB PLUG	B1101	=CP+B1101/67.2
07X111	4	ELE-WI0246	D14-250MB-M	VIB PLUG	B1101	=CP+B1101/67.2
07X112	1	ELE-PL0019	21414BM2	VIB PLUG	B1101	=CP+B1101/68.2
07X112	4	ELE-WI0246	D14-250MB-M	VIB PLUG	B1101	=CP+B1101/68.2
07X113	1	ELE-PL0017	21414BYM2	VIB PLUG	B1101	=CP+B1101/67.2
07X113	4	ELE-WI0225	D10-250M-D	VIB PLUG	B1101	=CP+B1101/67.2
07X114	1	ELE-PL0019	21414BM2	VIB PLUG	B1101	=CP+B1101/68.2
07X114	4	ELE-WI0225	D10-250M-D	VIB PLUG	B1101	=CP+B1101/68.2
08S01	2	00687857	M22-CK10	FEEDER PIVOT LEFT	B1002	=CP+B1002/38.7
08S01	1	00688383	M22-DDL-S-X7/X7	FEEDER PIVOT LEFT	B1002	=CP+B1002/38.7
08S05	1	00687857	M22-CK10	TONGUE TROWEL ON	B1002	=CP+B1002/37.8
08S05	1	ELE-CO0426	M22-WK	TONGUE TROWEL ON	B1002	=CP+B1002/37.8
10M01				HEADER JIB HOIST	B1001	=CP+B1001/13.1
10Q01	1	ELE-CO5538	3RV2021-1DA10	HEADER JIB HOIST	B1001	=CP+B1001/13.1
10Q01	1	ELE-CO6192	3RV2901-1E	HEADER JIB HOIST	B1001	=CP+B1001/13.1
10Q01	1	ELE-CO6189	3RV2928-1H	HEADER JIB HOIST	B1001	=CP+B1001/13.1
16.0	1	ELE-CO5162	6ES7155-6AA01-0BN0	MAIN POWER I/O	B1001	=CP+B1001/16.1
16.0	1	ELE-WI0055	570-110-003	MAIN POWER I/O	B1001	=CP+B1001/16.1
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Hawkeye Pedershaab
Concrete Technologies Worldwide ™

Drawn by: MDM
Date: 3/4/2022
Rev. by: MDM
Rev. date: 4/28/2022

Customer:
INFRASTRUCTURE PRECAST
Function:
DEVICE INDEX

Machine type:
CAP 72
Voltage: 3 x 460 V 60 Hz
Drawing no.: 100373160
Page: CP / REPORTS / 306

Device Tag	Qty	Hawkeye Number	Part Number	Function Text	Box	Sheet
16.1	1	ELE-COS165	6ES7193-6BP00-0DA0	4FDI	B1001	=CP+B1001/16.3
16.1	1	ELE-COS559	6ES7136-6BA00-0CA0	4FDI	B1001	=CP+B1001/16.3
16.2	1	ELE-COS164	6ES7193-6BP00-0BA0	4FDO	B1001	=CP+B1001/16.3
16.2	1	ELE-COS560	6ES7136-6DB00-0CA0	4FDO	B1001	=CP+B1001/16.3
16.3	1	ELE-COS551	6ES7131-6BF01-0BA0	8DI	B1001	=CP+B1001/16.4
16.3	1	ELE-COS164	6ES7193-6BP00-0BA0	8DI	B1001	=CP+B1001/16.4
16.4	1	ELE-COS551	6ES7131-6BF01-0BA0	8DI	B1001	=CP+B1001/16.4
16.4	1	ELE-COS164	6ES7193-6BP00-0BA0	8DI	B1001	=CP+B1001/16.4
16.5	1	ELE-COS551	6ES7131-6BF01-0BA0	8DI	B1001	=CP+B1001/16.4
16.5	1	ELE-COS164	6ES7193-6BP00-0BA0	8DI	B1001	=CP+B1001/16.4
16.6	1	ELE-COS569	6ES7137-6AA00-0BA0	MODBUS	B1001	=CP+B1001/16.5
16.6	1	ELE-COS164	6ES7193-6BP00-0BA0	MODBUS	B1001	=CP+B1001/16.5
16.7	1	ELE-COS165	6ES7193-6BP00-0DA0	4DO	B1001	=CP+B1001/16.5
16.7	1	ELE-COS554	6ES7132-6BD20-0BA0	4DO	B1001	=CP+B1001/16.5
16.8	1	ELE-COS164	6ES7193-6BP00-0BA0	4DO	B1001	=CP+B1001/16.6
16.8	1	ELE-COS554	6ES7132-6BD20-0BA0	4DO	B1001	=CP+B1001/16.6
16.9	1	ELE-COS164	6ES7193-6BP00-0BA0	4DO	B1001	=CP+B1001/16.6
16.9	1	ELE-COS554	6ES7132-6BD20-0BA0	4DO	B1001	=CP+B1001/16.6
16.10	1	ELE-COS164	6ES7193-6BP00-0BA0	AQ	B1001	=CP+B1001/16.6
16.10	1	ELE-COS556	6ES7135-6FB00-0BA1	AQ	B1001	=CP+B1001/16.6
32.0	1	ELE-COS564	6ES7193-6AR00-0AA0	CONTROL CONSOLE PLC I/O	B1002	=CP+B1002/32.1
32.0	1	ELE-COS549	6ES7512-1SK01-0AB0	CONTROL CONSOLE PLC I/O	B1002	=CP+B1002/32.1
32.0	1	ELE-COS567	6ES7954-8LE02-0AA0	CONTROL CONSOLE PLC I/O	B1002	=CP+B1002/32.1
32.0	1	ELE-WI0055	570-110-003	CONTROL CONSOLE PLC I/O	B1002	=CP+B1002/32.1
32.1	1	ELE-COS551	6ES7131-6BF01-0BA0	8DI	B1002	=CP+B1002/32.3
32.1	1	ELE-COS165	6ES7193-6BP00-0DA0	8DI	B1002	=CP+B1002/32.3
32.2	1	ELE-COS551	6ES7131-6BF01-0BA0	8DI	B1002	=CP+B1002/32.4
32.2	1	ELE-COS164	6ES7193-6BP00-0BA0	8DI	B1002	=CP+B1002/32.4
32.3	1	ELE-COS551	6ES7131-6BF01-0BA0	8DI	B1002	=CP+B1002/32.4
32.3	1	ELE-COS164	6ES7193-6BP00-0BA0	8DI	B1002	=CP+B1002/32.4
32.4	1	ELE-COS551	6ES7131-6BF01-0BA0	8DI	B1002	=CP+B1002/32.5
32.4	1	ELE-COS164	6ES7193-6BP00-0BA0	8DI	B1002	=CP+B1002/32.5
32.5	1	ELE-COS551	6ES7131-6BF01-0BA0	8DI	B1002	=CP+B1002/32.5
32.5	1	ELE-COS164	6ES7193-6BP00-0BA0	8DI	B1002	=CP+B1002/32.5
32.6	1	ELE-COS164	6ES7193-6BP00-0BA0	4AI	B1002	=CP+B1002/32.5
32.6	1	ELE-COS555	6ES7134-6HD00-0BA1	4AI	B1002	=CP+B1002/32.5
32.7	1	ELE-COS164	6ES7193-6BP00-0BA0	4DO	B1002	=CP+B1002/32.6
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HawkeyePedershaab
Concrete Technologies Worldwide

Drawn by: MDM
Date: 3/4/2022
Rev. by: MDM
Rev. date: 4/28/2022

Customer:
INFRASTRUCTURE PRECAST
Function:
DEVICE INDEX

Machine type:
CAP 72
Voltage: 3 x 460 V 60 Hz
Drawing no.: 100373160
Page: CP / REPORTS / 307

Device Tag	Qty	Hawkeye Number	Part Number	Function Text	Box	Sheet
32.7	1	ELE-C05554	6ES71326BD200BA0	4DO	B1002	=CP+B1002/32.6
32.8	1	ELE-C05164	6ES7193-6BP00-0BA0	4DO	B1002	=CP+B1002/32.6
32.8	1	ELE-C05554	6ES71326BD200BA0	4DO	B1002	=CP+B1002/32.6
32.9	1	ELE-C05164	6ES7193-6BP00-0BA0	4DO	B1002	=CP+B1002/32.7
32.9	1	ELE-C05554	6ES71326BD200BA0	4DO	B1002	=CP+B1002/32.7
32.10	1	ELE-C05165	6ES7193-6BP00-0DA0	4DO	B1002	=CP+B1002/32.7
32.10	1	ELE-C05554	6ES71326BD200BA0	4DO	B1002	=CP+B1002/32.7
32.11	1	ELE-C05164	6ES7193-6BP00-0BA0	4DO	B1002	=CP+B1002/32.7
32.11	1	ELE-C05554	6ES71326BD200BA0	4DO	B1002	=CP+B1002/32.7
54.0	1	ELE-C05162	6ES7155-6AA01-0BN0	FEEDER I/O	B1006	=CP+B1006/54.1
54.0	1	ELE-WI0055	570-110-003	FEEDER I/O	B1006	=CP+B1006/54.1
54.1	1	ELE-C05551	6ES7131-6BF01-0BA0	8DI	B1006	=CP+B1006/54.2
54.1	1	ELE-C05165	6ES7193-6BP00-0DA0	8DI	B1006	=CP+B1006/54.2
54.2	1	ELE-C05164	6ES7193-6BP00-0BA0	4AI	B1006	=CP+B1006/54.3
54.2	1	ELE-C05555	6ES71346HD000BA1	4AI	B1006	=CP+B1006/54.3
54.3	1	ELE-C05164	6ES7193-6BP00-0BA0	4FDO	B1006	=CP+B1006/54.3
54.3	1	ELE-C05560	6ES71366DB000CA0	4FDO	B1006	=CP+B1006/54.3
54.4	1	ELE-C05164	6ES7193-6BP00-0BA0	4DO	B1006	=CP+B1006/54.3
54.4	1	ELE-C05554	6ES71326BD200BA0	4DO	B1006	=CP+B1006/54.3
54.5	1	ELE-C05164	6ES7193-6BP00-0BA0	4DO	B1006	=CP+B1006/54.4
54.5	1	ELE-C05554	6ES71326BD200BA0	4DO	B1006	=CP+B1006/54.4
54.6	1	ELE-C05165	6ES7193-6BP00-0DA0	4DO	B1006	=CP+B1006/54.4
54.6	1	ELE-C05554	6ES71326BD200BA0	4DO	B1006	=CP+B1006/54.4
58H01	2	COM-EL0573	7000-18021-6160300	FORM HYDRAULICS FILL/STRIP	B1001	=CP+B1001/24.5
58SH01	2	00687857	M22-CK10	FORM HYDRAULICS FILL	B1002	=CP+B1002/36.2
58SH01	1	00688397	M22-CLED-B	FORM HYDRAULICS FILL	B1002	=CP+B1002/36.2
58SH01	1	ELE-C00457	M22-WLK3-B	FORM HYDRAULICS FILL	B1002	=CP+B1002/36.2
59Q115	1	ELE-C01910	LUB12	OVERLOAD	B1101	=CP+B1101/68.7
59Q115	1	ELE-C01911	LUCM12BL	OVERLOAD	B1101	=CP+B1101/68.7
59SH01	1	00687858	M22-CK01	ROTOR START	B1002	=CP+B1002/37.1
59SH01	1	00687857	M22-CK10	ROTOR START	B1002	=CP+B1002/37.1
59SH01	1	00688396	M22-CLED-W	ROTOR START	B1002	=CP+B1002/37.1
59SH01	1	ELE-C00421	M22-DDL-GR-X1/X0	ROTOR START	B1002	=CP+B1002/37.1
59X115	1	ELE-PL0019	21414BM2	VIB PLUG	B1101	=CP+B1101/68.7
59X115	4	ELE-WI0246	D14-250MB-M	VIB PLUG	B1101	=CP+B1101/68.7
80K00	1	ELE-C06107	3RT2035-1KB40	EMERGENCY STOP CONTACTOR	B1001	=CP+B1001/19.2
80K01	1	ELE-C05529	3RT2016-1BB42	EMERGENCY STOP CONTACTOR	B1001	=CP+B1001/19.1
307						309

HawkeyePedershaab
Concrete Technologies Worldwide™

Drawn by: MDM
Date: 3/4/2022
Rev. by: MDM
Rev. date: 4/28/2022

Customer:
INFRASTRUCTURE PRECAST
Function:
DEVICE INDEX

Machine type:
CAP 72
Voltage: 3 x 460 V 60 Hz
Drawing no.: 100373160
Page: CP / REPORTS / 308

Device Tag	Qty	Hawkeye Number	Part Number	Function Text	Box	Sheet
80K02	1	ELE-CO5529	3RT2016-1BB42	EMERGENCY STOP CONTACTOR	B1001	=CP+B1001/19.1
80K05	1	COM-HW1118	857-304	FEEDER BELT SAFETY BYPASS	B1006	=CP+B1006/63.8
80K06	1	COM-HW1118	857-304	FEEDER BELT SAFETY BYPASS	B1006	=CP+B1006/63.9
80K10	1	ELE-CO5529	3RT2016-1BB42	POWER LEVEL P01	B1006	=CP+B1006/59.1
80K11	1	ELE-CO5529	3RT2016-1BB42	POWER LEVEL P01	B1006	=CP+B1006/59.2
80K14	1	ELE-CO6073	3RT2015-1BB42	POWER LEVEL P01	B1006	=CP+B1006/59.2
80S01	1	ELE-CO0419	M22-CK20	SAFETY BYPASS	B1006	=CP+B1006/63.8
80S01	1	00688370	M22-D-X	SAFETY BYPASS	B1006	=CP+B1006/63.8
80S01	1	ELE-CO0432	M22-XD-S	SAFETY BYPASS	B1006	=CP+B1006/63.8
80S02	1	00687857	M22-CK10	FEEDER BELTS EMERGENCY JOG	B1006	=CP+B1006/63.7
80S02	1	ELE-CO0426	M22-WK	FEEDER BELTS EMERGENCY JOG	B1006	=CP+B1006/63.7
80S03	1	00687116	3SB3921-0AB	EMERGENCY STOP IN CONTROL CONSOLE	B1002	=CP+B1001/18.1
80S03	2	00687858	M22-CK01	EMERGENCY STOP IN CONTROL CONSOLE	B1002	=CP+B1001/18.1
80S03	1	ELE-CO0425	M22-PVT	EMERGENCY STOP IN CONTROL CONSOLE	B1002	=CP+B1001/18.1
80SH10	1	00687857	M22-CK10	RESET EMERMGENCY STOP	B1002	=CP+B1002/34.7
80SH10	1	00688397	M22-CLED-B	RESET EMERMGENCY STOP	B1002	=CP+B1002/34.7
80SH10	1	00688370	M22-D-X	RESET EMERMGENCY STOP	B1002	=CP+B1002/34.7
80SH10	1	00688376	M22-XDL-B-X6	RESET EMERMGENCY STOP	B1002	=CP+B1002/34.7
83S01	1	ELE-FU0640	H4X-02R	MAIN DISCONNECT	B1001	=CP+B1001/10.0
83S01	1	ELE-FU0658	RD100-3	MAIN DISCONNECT	B1001	=CP+B1001/10.0
83S01	1	ELE-FU0641	SH4-200	MAIN DISCONNECT	B1001	=CP+B1001/10.0
83S01	1	ELE-FU0652	SH-GUIDE1	MAIN DISCONNECT	B1001	=CP+B1001/10.0
83S01	1	ELE-FU0665	TSH3-3TB	MAIN DISCONNECT	B1001	=CP+B1001/10.0
83S16	1	ELE-FU0640	H4X-02R	MAIN DISCONNECT	B1006	=CP+B1006/51.0
83S16	1	COM-EL2021	RD30-3	MAIN DISCONNECT	B1006	=CP+B1006/51.0
83S16	1	ELE-FU0643	SH4-320	MAIN DISCONNECT	B1006	=CP+B1006/51.0
83S16	1	ELE-FU0652	SH-GUIDE1	MAIN DISCONNECT	B1006	=CP+B1006/51.0
83S16	1	ELE-FU0665	TSH3-3TB	MAIN DISCONNECT	B1006	=CP+B1006/51.0
1001U	2	00688822	6GK1901-1BB10-2AA0	5 PORT SWITCH	B1001	=CP+B1001/28.2
1001U	1	COM-HW0125	2891152	5 PORT SWITCH	B1001	=CP+B1001/28.2
1002U	2	00688822	6GK1901-1BB10-2AA0	5 PORT SWITCH	B1002	=CP+B1002/31.6
1002U	1	COM-HW0125	2891152	5 PORT SWITCH	B1002	=CP+B1002/31.6
1006U	2	00688822	6GK1901-1BB10-2AA0	5 PORT SWITCH	B1006	=CP+B1006/63.5
1006U	1	COM-HW0125	2891152	5 PORT SWITCH	B1006	=CP+B1006/63.5
U1	3	COM-EL2498	1SNL3160100R0000	DISTRIBUTION BLOCK	B1006	=CP+B1006/51.5

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=CR+/1

HawkeyePedershaab
Concrete Technologies Worldwide

Drawn by: MDM
Date: 3/4/2022
Rev. by: MDM
Rev. date: 4/28/2022

Customer:
INFRASTRUCTURE PRECAST
Function:
DEVICE INDEX

Machine type:
CAP 72
Voltage: 3 x 460 V 60 Hz
Drawing no.: 100373160
Page: CP / REPORTS / 309

Machine Type:

CRANE

Drawing No.: 100373160 Serial No.: 56092

Customer:

INFRASTRUCTURE PRECAST
BEAVER DAM, KY

Hawkeye Pedershaab
Concrete Technologies Worldwide TM

United States Location
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Phone (Technical Service): +1 (319) 394 2270
Fax: +1 (319) 394 3977
Email: hawkeyetech@hpct.com
Website: www.hpct.com

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Saltumvej 25
DK-9700 Brønderslev
Phone: +45 9645 4000
Fax: +45 9645 4040
Email: pedershaab@pedershaab.dk
Website: www.hpct.com

2

=CP+REPORTS/309

Hawkeye Pedershaab
Concrete Technologies Worldwide TM

Drawn by:	HDH	Customer:	INFRASTRUCTURE PRECAST
Date:	3/4/2022		
Rev. by:	HDH	Function:	
Rev. date:	4/8/2022		

Machine type: CRANE

3 x 460 V 60 Hz

Drawing no.: 100373160

Page: Ck. / / 1

Page overview

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Page	Designation	Additional field	Date	Revisor	X
=CR/1	GENERAL		4/8/2022	MDM	X
=CR/2	Contents		6/30/2022	MDM	
=CR/3	BOX INDEX		4/7/2022	MDM	
=CR/5	COLOR-CODES		4/8/2022	MDM	
=CR/8	Over view cable		6/29/2022	MDM	
=CR+B8001/10	CRANE MAIN POWER FOR FEEDER AND SCISSOR PUMP		6/28/2022	MDM	
=CR+B8001/11	CRANE BRIDGE 24 V DC POWER DISTRIBUTION		6/29/2022	MDM	
=CR+B8001/12	CRANE BRIDGE MAIN I/O		6/28/2022	MDM	
=CR+B8001/13	CRANE BRIDGE MAIN I/O OVERVIEW (INPUTS/OUTPUTS)		6/23/2022	MDM	
=CR+B8001/14	CRANE BRIDGE INPUTS		6/29/2022	MDM	
=CR+B8001/15	CRANE BRIDGE SAFETY INPUTS		6/30/2022	MDM	
=CR+B8001/16	CRANE BRIDGE SAFETY OUTPUTS		6/28/2022	MDM	
=CR+B8001/17	CRANE BRIDGE OUTPUTS		6/29/2022	MDM	
=CR+B8001/18	CRANE BRIDGE OUTPUTS		6/29/2022	MDM	
=CR+B8001/19	BRIDGE MAIN COMUNICATION		6/28/2022	MDM	
=CR+B8001/20	CRANE BRIDGE FREQUENCY DRIVES CONTROL/ENCODER/LASERS		6/28/2022	MDM	
=CR+REPORTS/200	CABLE BREAKOUT		6/29/2022	MDM	
=CR+REPORTS/201	CABLE BREAKOUT		6/29/2022	MDM	
=CR+REPORTS/300	DEVICE INDEX		6/28/2022	MDM	
=CR+REPORTS/301	DEVICE INDEX		6/29/2022	MDM	

1 3

HawkeyePedershaab
Concrete Technologies Worldwide

Drawn by: MDM
Date: 3/4/2022
Rev. by: MDM
Rev. date: 6/30/2022

Customer:
Function:

INFRASTRUCTURE PRECAST

Machine type:
Voltage: 3 x 460 V 60 Hz

CRANE

Drawing no.: 100373160
Page: CR / / 2

Structure identifier overview

Higher-level function	Description
=CP	CAP 72
=CR	CRANE

Mounting location	Description
+B1001	MAIN POWER
+B1002	CONTROL CONSOLE
+B1003	PRESSHEAD PNEUMATIC SPLICE BOX
+B1006	FEEDER
+B1012	FEEDER BASE SPLICE
+B1035	PRESSHEAD PNEUMATIC CONTROL BOX
+B1101	CORE BOX VIBRATION
+B1102	REMOTE PUSHBUTTON BOX
+B1103	HEADER JIB HOIST SPLICE BOX
+B1901	HYDRAULIC UNIT
+B8001	CRANE MAIN
+B8007	WIRELESS SPLICE
+B8015	CRANE COMMUNICATION SPLICE
+B8029	SCISSORS SPLICE
+REPORTS	

2 5

HawkeyePedershaab
Concrete Technologies Worldwide

Drawn by: MDM
Date: 3/4/2022
Rev. by: MDM
Rev. date: 4/7/2022

Customer:
Function:

INFRASTRUCTURE PRECAST
BOX INDEX

Machine type:
Voltage: 3 x 460 V 60 Hz

CRANE
Drawing no.: 100372160
Page: Ch. / / 3

COLOR CODES ACCORDING TO IEC 60 757

ABBREVIATIONS

BLACK	BK
BROWN	BN
BLUE	BU
RED	RD
ORANGE	OG
YELLOW	YE
GREEN	GN
VIOLET	VT
GRAY	GY
WHITE	WH
PINK	PK
TURQUOISE	TQ
GOLD	GD
SILVER	SR
GREEN+YELLOW	GNYE
.	.
.	.
.	.

Color codes for connection in switchboards

CIRCUIT	CONDUCTOR TYPE	CE COLOR	UL COLOR	AUSTRALIA COLOR
POWER CIRCUIT	Ungrounded line load and control conductors at line voltage	Black	Black	L1 = RED L2 = WHITE L3 = BLUE
	Grounded circuit conductors	Light blue	Natural gray	Black
CONTROL CIRCUIT AC VOLTAGE LESS THAN LINEVOLTAGE	Ungrounded	Red	Red	Brown
	Grounded circuit conductors	White	White	Black
CONTROL CIRCUIT DC VOLTAGE	Ungrounded (+)	Dark Blue	Dark blue	Purple
	Grounded (GND) (-)	White with blue stripe	White with blue stripe	Orange
FORCED COUPLING CIRCUITS FOR AC OR DC Control circuit conductors that remain energized when the disconnecting means is in the OFF position	Ungrounded conductors	Orange	Orange	N/A
	Grounded conductors	White with Orange Stripe	White with orange stripe	N/A
PROTECTIVE CONDUCTOR	Protective conductor:	Yellow/green	Yellow/green min.AWG14	Yellow/green

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Hawkeye Pedershaab Concrete Technologies Worldwide	Drawn by: MDM Date: 3/4/2022 Rev. by: MDM Rev. date: 4/8/2022	Customer: INFRASTRUCTURE PRECAST	Machine type: CRANE		
		Function: COLOR-CODES	Voltage: 3 x 460 V 60 Hz	Drawing no.: 100373160	Page: CR / / 5

Cable-overview

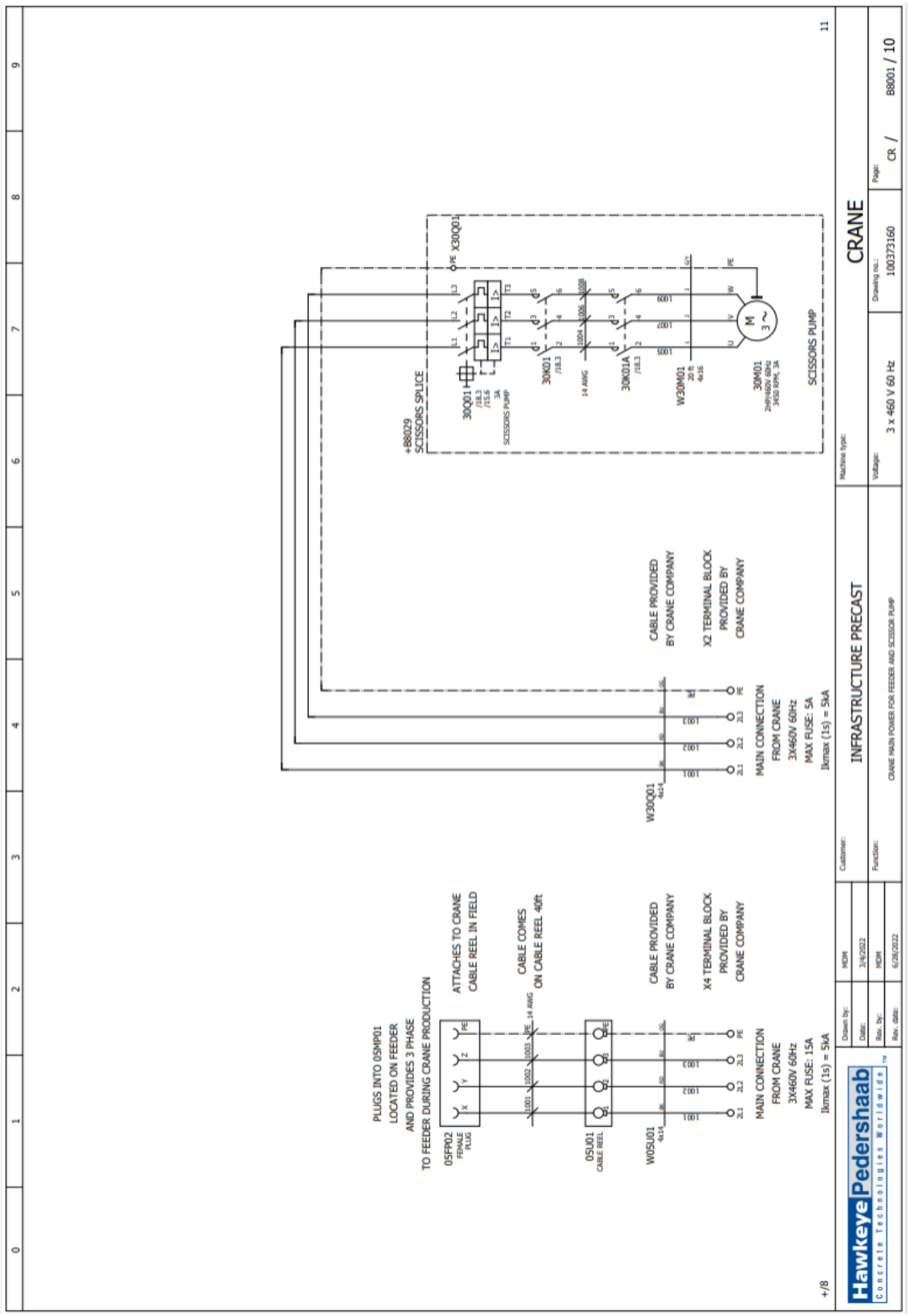
Cable designation	From	To	Cabletype	Core	Cores in cat	Core Size	Length	Remarks	Hawkeye Part Number	Page/path
+B8001-W05U01	+B8001-05U01	2L1;2L2;2L3;PE		4	4	14			HAR-M00357	+B8001/10.1
+B8001-W30Q01	+B8029-X30Q01:+B8029-30Q01	PE;2L1;2L2;2L3		4	4	14		3X4 TERMINAL BLOCK PROVIDED BY CRANE COMPANY	HAR-M00357	+B8001/10.4
+B8001-W8007	+B8001-X8007	+B8007-X8007		4	3	18	70	2 OFF	ELE-W00595	+B8001/19.6
+B8001-W8007PN	+B8001-8001U1	+B8007-00U07	SHIELDED TP	4	1	22	70	2 OFF	ELE-W05236	+B8001/19.7
+B8001-W8029	+B8001-X8029	+B8029-X8029		12	12	16		PRO. SWITCH SCISSORS PUMP	HAR-M00338	+B8001/14.1
+B8001-W8029A	+B8001-X8029A	+B8029-X8029A		8	7	16		SCISSORS INDICATOR GREEN (PINS EXTENDED)	HAR-M00342	+B8001/17.3
+B8029-W30M01	+B8029-X30Q01:+B8029-30K014	B8029-30M01		4	4	16	20	SCISSORS PUMP	ELE-W00519	+B8001/10.7

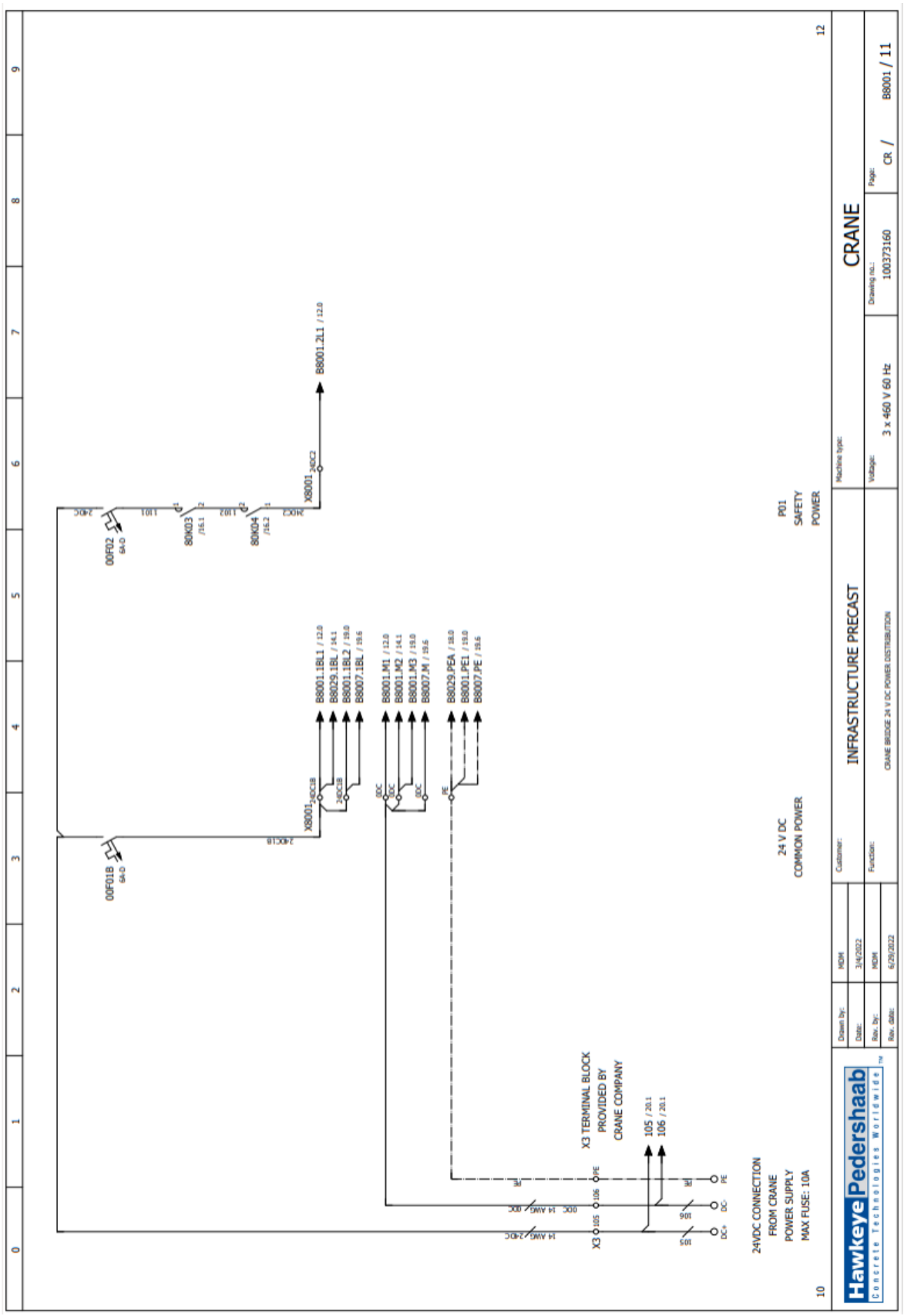
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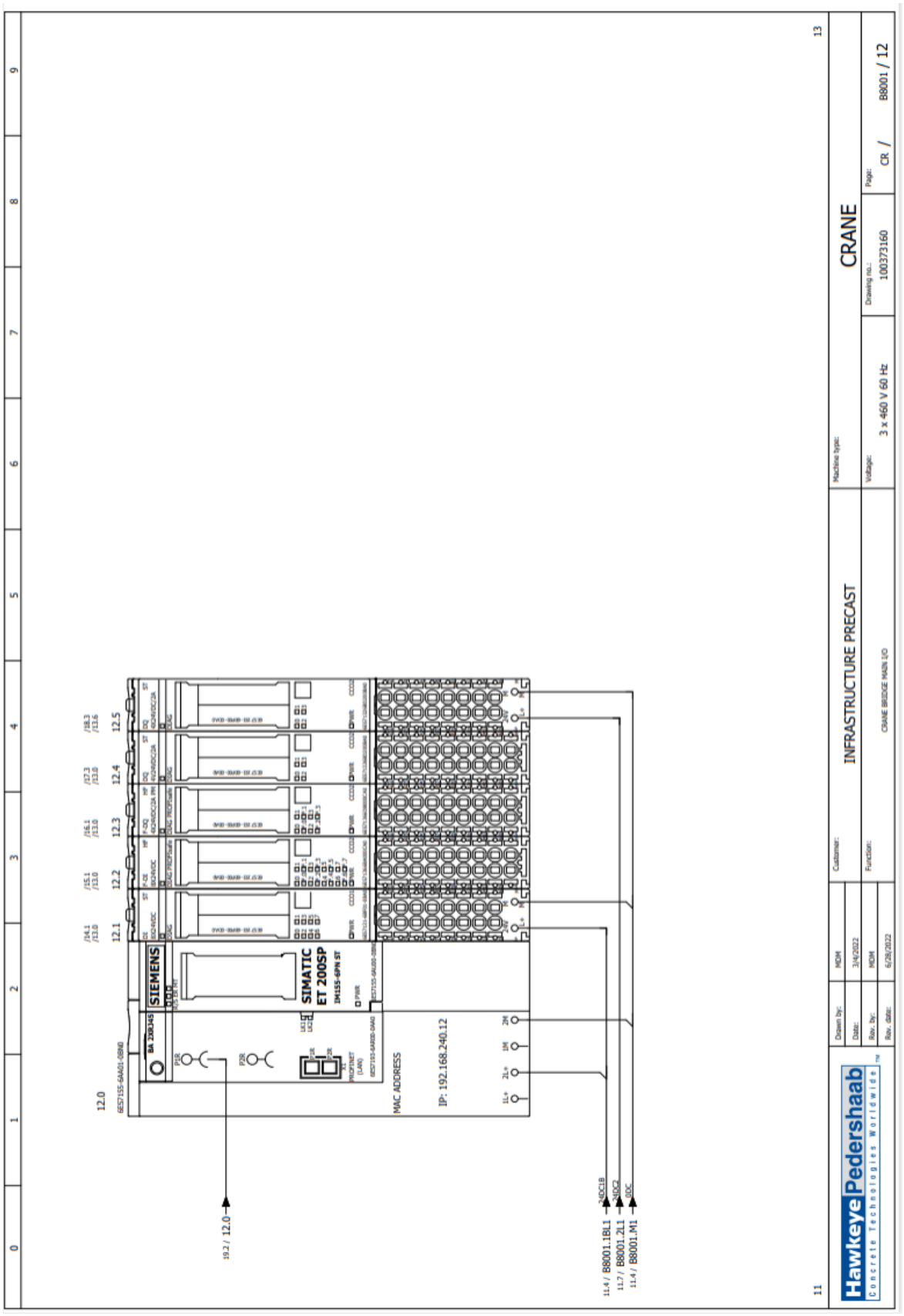
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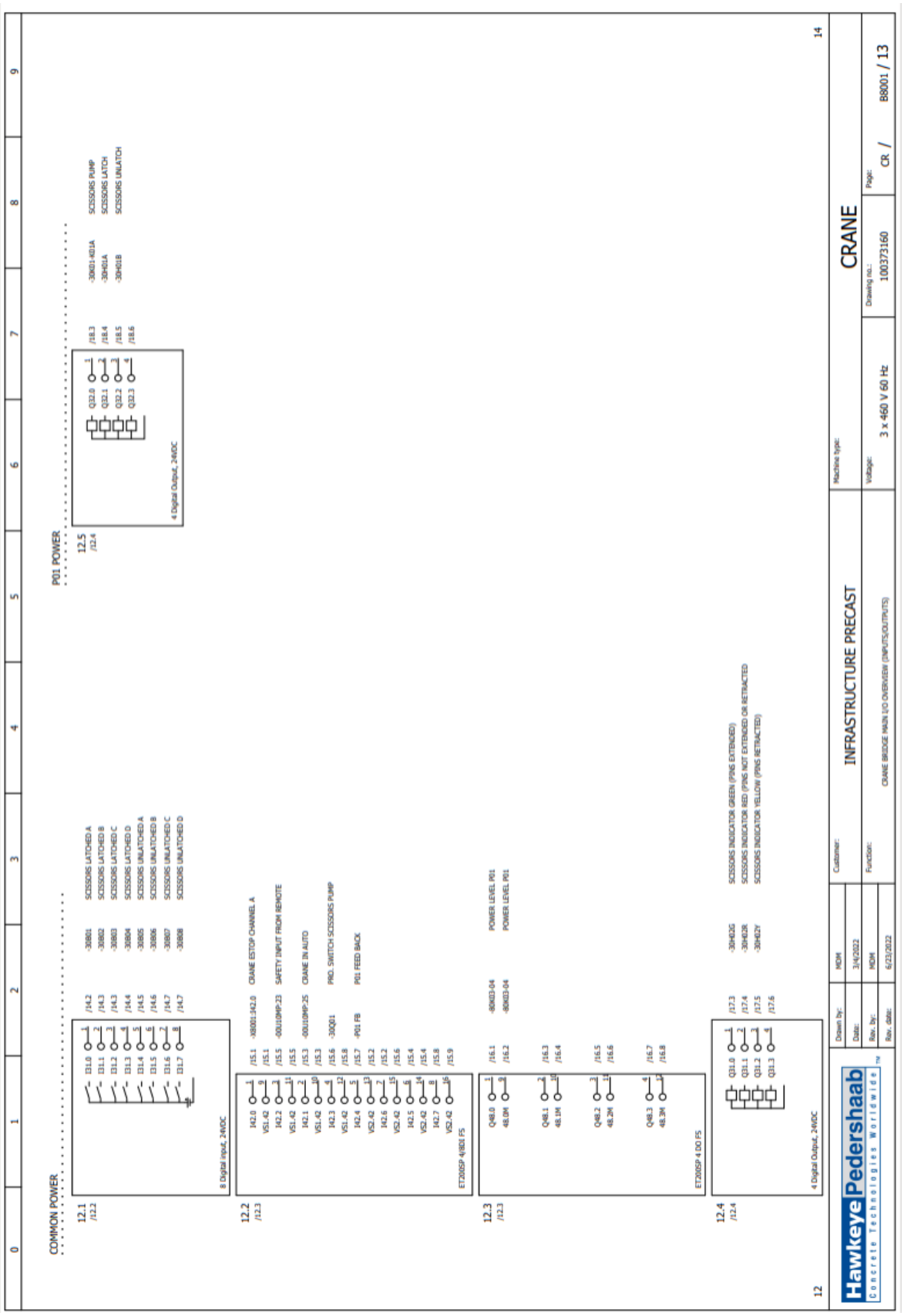
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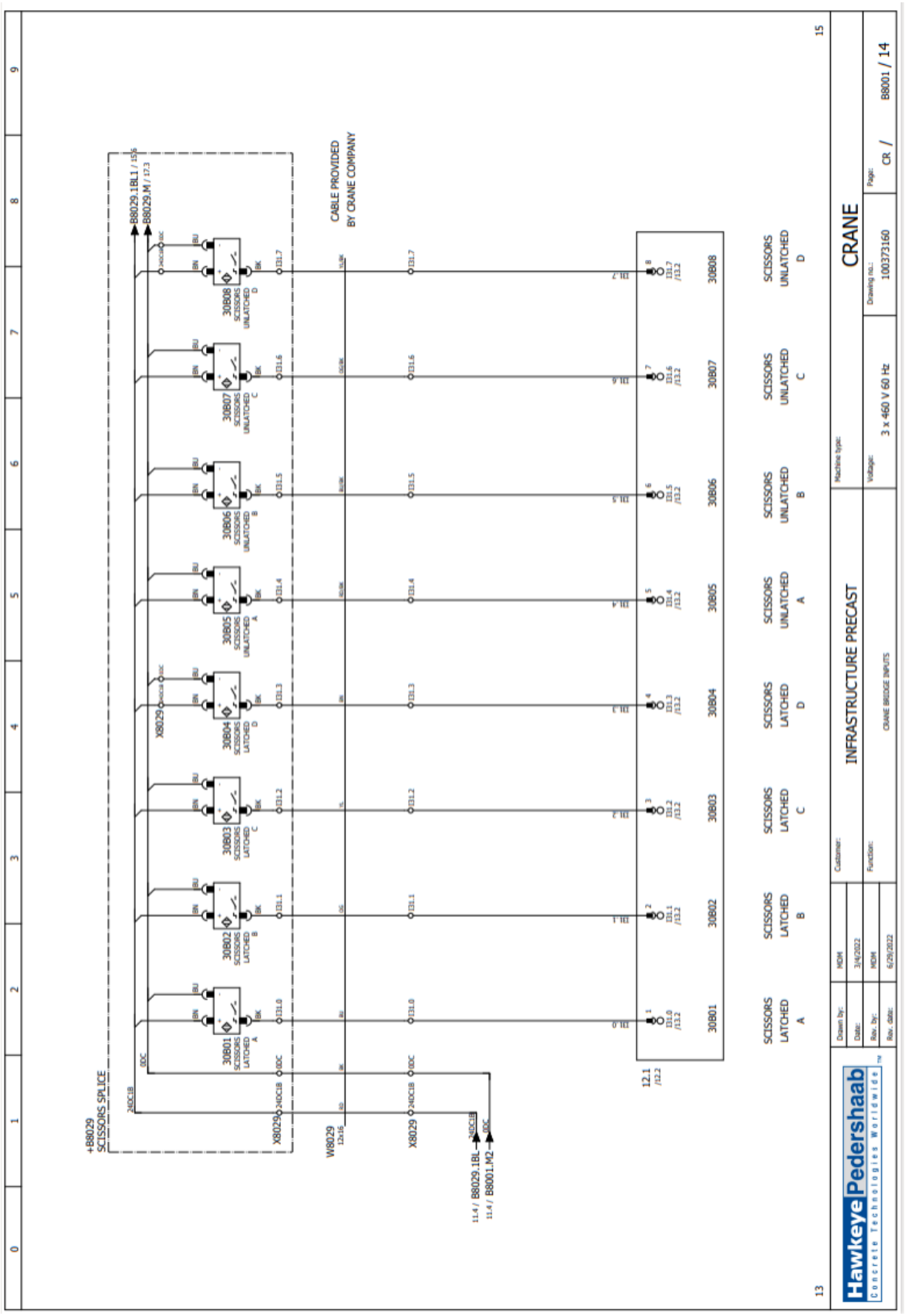
Hawkeye Pedershaab Concrete Technologies Worldwide	Drawn by:	MDM	Customer:	INFRASTRUCTURE PRECAST	Machine type: CRANE
	Date:	3/4/2022			
	Rev. by:	MDM	Function:	Voltage: 3 x 460 V 60 Hz	Drawing no.: 100373160
	Rev. date:	6/29/2022	Over view cable		Page: cit / / 8

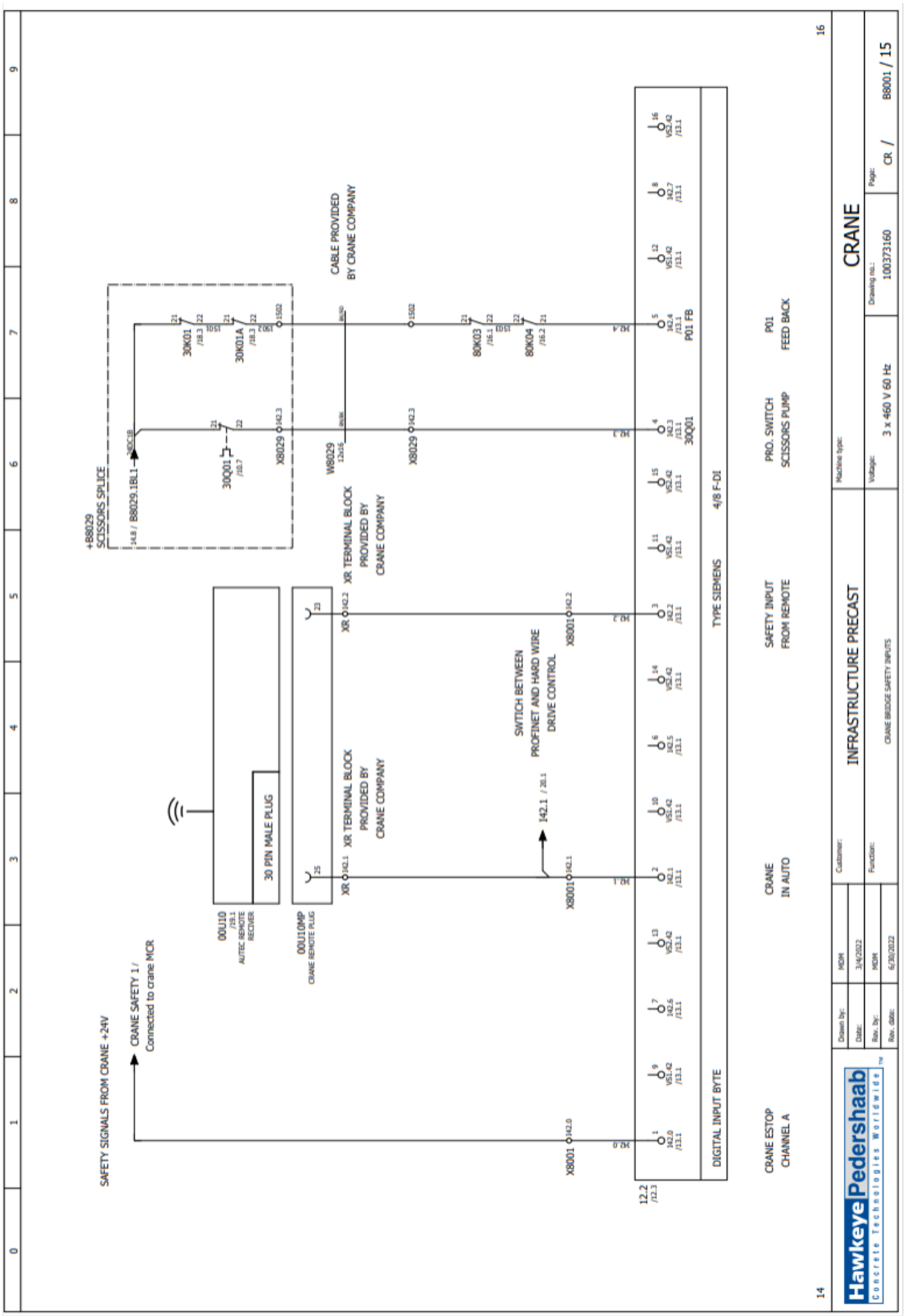

CRANE
INFRASTRUCTURE PRECAST
Hawkeye Pedershaab
Concrete Technologies Worldwide
3 x 460 V 60 Hz
100373160
B8001 / 10
SCISSORS PUMP
+B8029
SCISSORS SPLICE
30Q01
30K01
30K01A
W30M01
30M01
W30Q01
CABLE PROVIDED BY CRANE COMPANY
X2 TERMINAL BLOCK PROVIDED BY CRANE COMPANY
MAIN CONNECTION FROM CRANE
3X460V 60Hz
MAX FUSE: 5A
Ikmax (1s) = 5kA
PLUGS INTO OSMP01
LOCATED ON FEEDER
AND PROVIDES 3 PHASE
TO FEEDER DURING CRANE PRODUCTION
OSFP02
FEMALE PLUG
ATTACHES TO CRANE
CABLE REEL IN FIELD
CABLE COMES
ON CABLE REEL 40ft
05U01
CABLE REEL
W05U01
X4 TERMINAL BLOCK PROVIDED BY CRANE COMPANY
MAIN CONNECTION FROM CRANE
3X460V 60Hz
MAX FUSE: 15A
Ikmax (1s) = 5kA

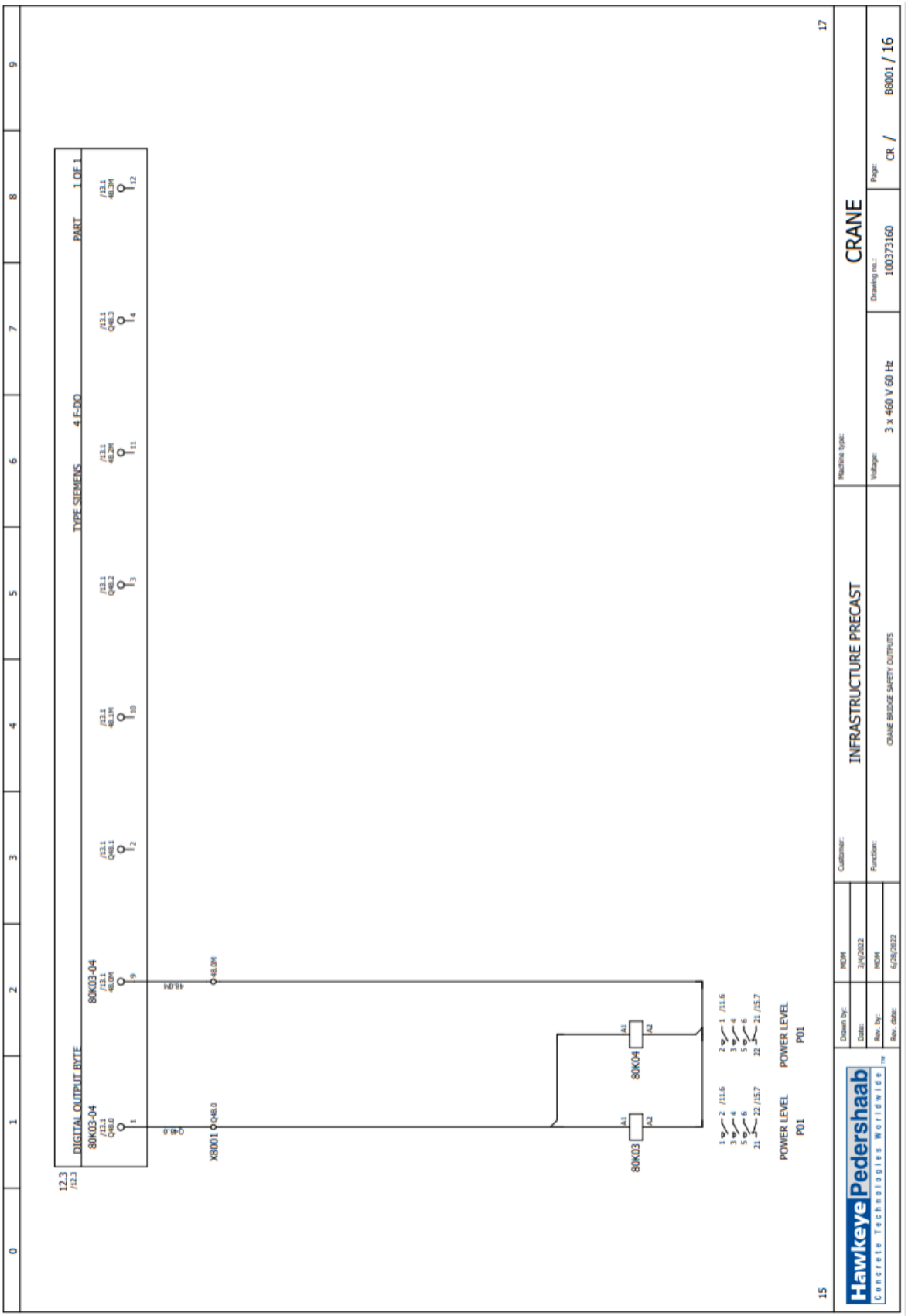

CRANE
INFRASTRUCTURE PRECAST
Hawkeye Pedershaab
Concrete Technologies Worldwide
3 x 460 V 60 Hz
100373160
B8001 / 11
CRANE BRIDGE 24 V DC POWER DISTRIBUTION
24 V DC
COMMON POWER
P01
SAFETY
POWER
24VDC CONNECTION
FROM CRANE
POWER SUPPLY
MAX FUSE: 10A
X3 TERMINAL BLOCK
PROVIDED BY
CRANE COMPANY
00F01B
00F02
80KM3
80KM4
X8001
B8001.2L1
B8001.1BL1
B8029.1BL
B8001.1BL2
B8007.1BL
B8001.M1
B8001.M2
B8001.M3
B8007.M
B8029.PEA
B8001.PE1
B8007.PE

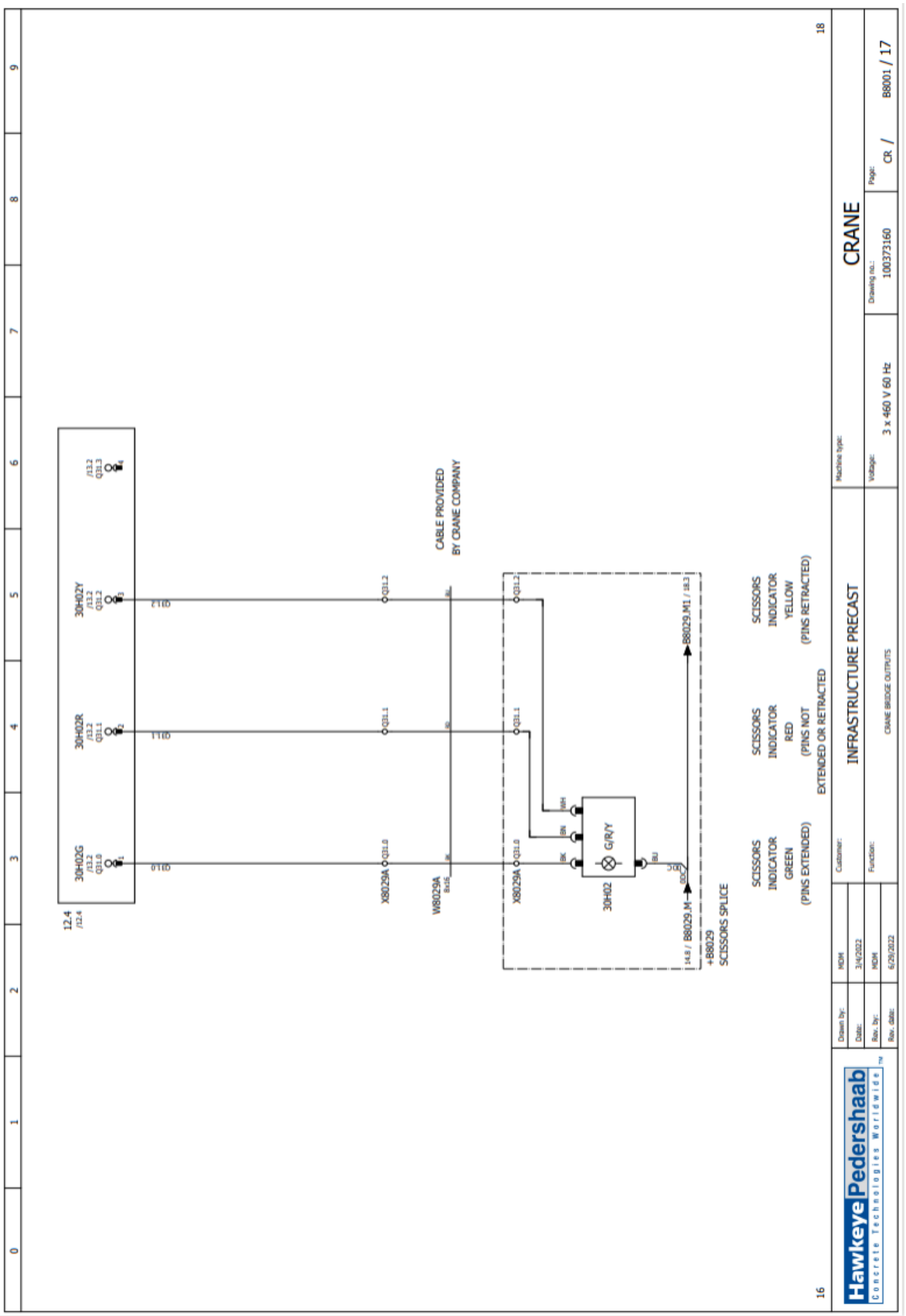

SIEMENS
SIMATIC ET 200SP
IM155-6PN ST
MAC ADDRESS
IP: 192.168.240.12
INFRASTRUCTURE PRECAST
CRANE
Hawkeye Pedershaab
Concrete Technologies Worldwide
3 x 460 V 60 Hz
100373160
B8001 / 12
CRANE BRIDGE MAIN I/O

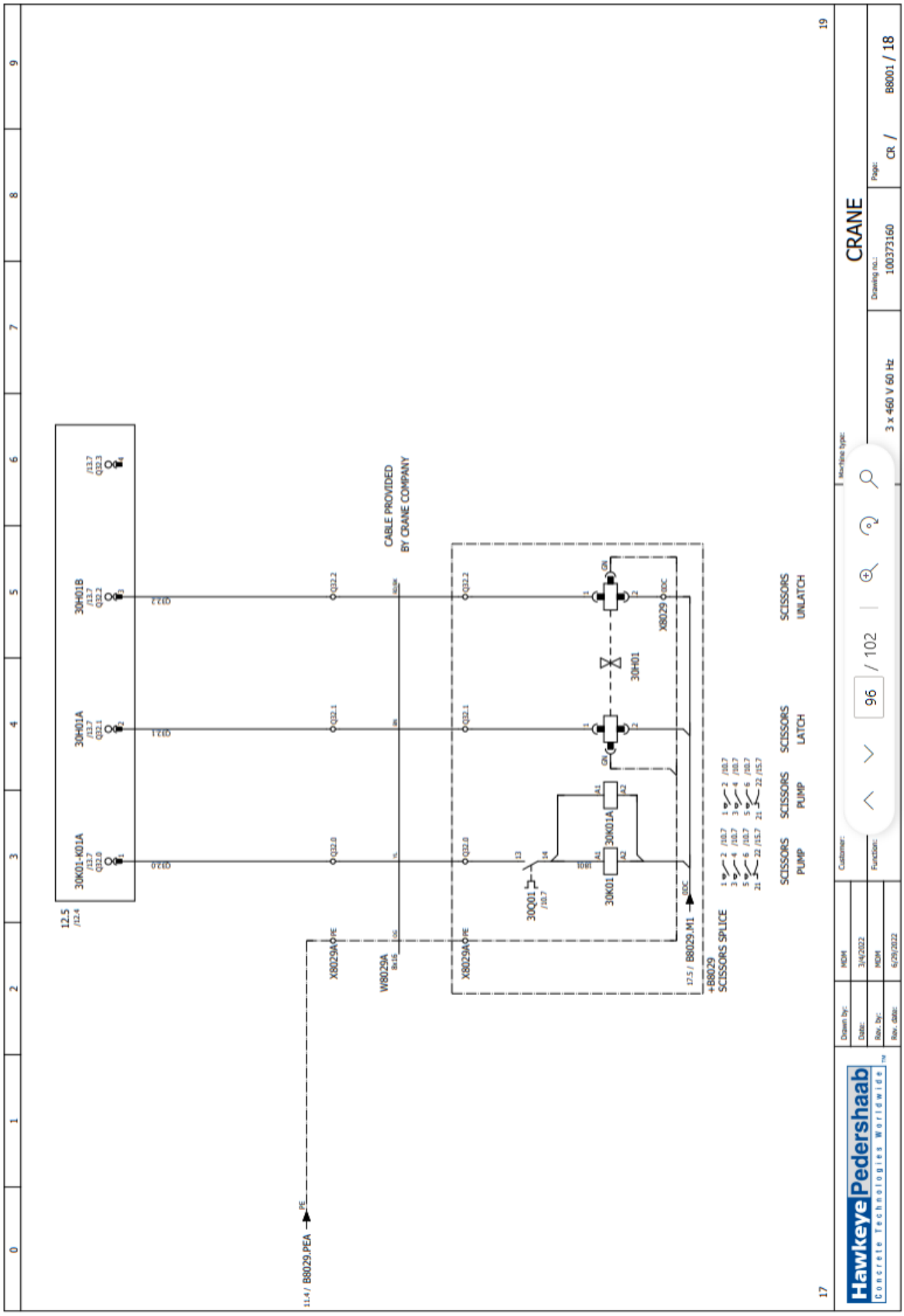

COMMON POWER
P01 POWER
INFRASTRUCTURE PRECAST
CRANE
Hawkeye Pedershaab
Concrete Technologies Worldwide
3 x 460 V 60 Hz
100373160
B8001 / 13
CRANE BRIDGE MAIN I/O OVERVIEW (INPUTS/OUTPUTS)
8 Digital Input, 24VDC
4 Digital Output, 24VDC
ET200SP 4/8DI PS
ET200SP 4 DO PS
SCISSORS LATCHED A
SCISSORS LATCHED B
SCISSORS LATCHED C
SCISSORS LATCHED D
SCISSORS UNLATCHED A
SCISSORS UNLATCHED B
SCISSORS UNLATCHED C
SCISSORS UNLATCHED D
CRANE ESTOP CHANNEL A
SAFETY INPUT FROM REMOTE
CRANE IN AUTO
PRO. SWITCH SCISSORS PUMP
P01 FEED BACK
POWER LEVEL P01
POWER LEVEL P01
SCISSORS INDICATOR GREEN (PINS EXTENDED)
SCISSORS INDICATOR RED (PINS NOT EXTENDED OR RETRACTED)
SCISSORS INDICATOR YELLOW (PINS RETRACTED)
SCISSORS PUMP
SCISSORS LATCH
SCISSORS UNLATCH

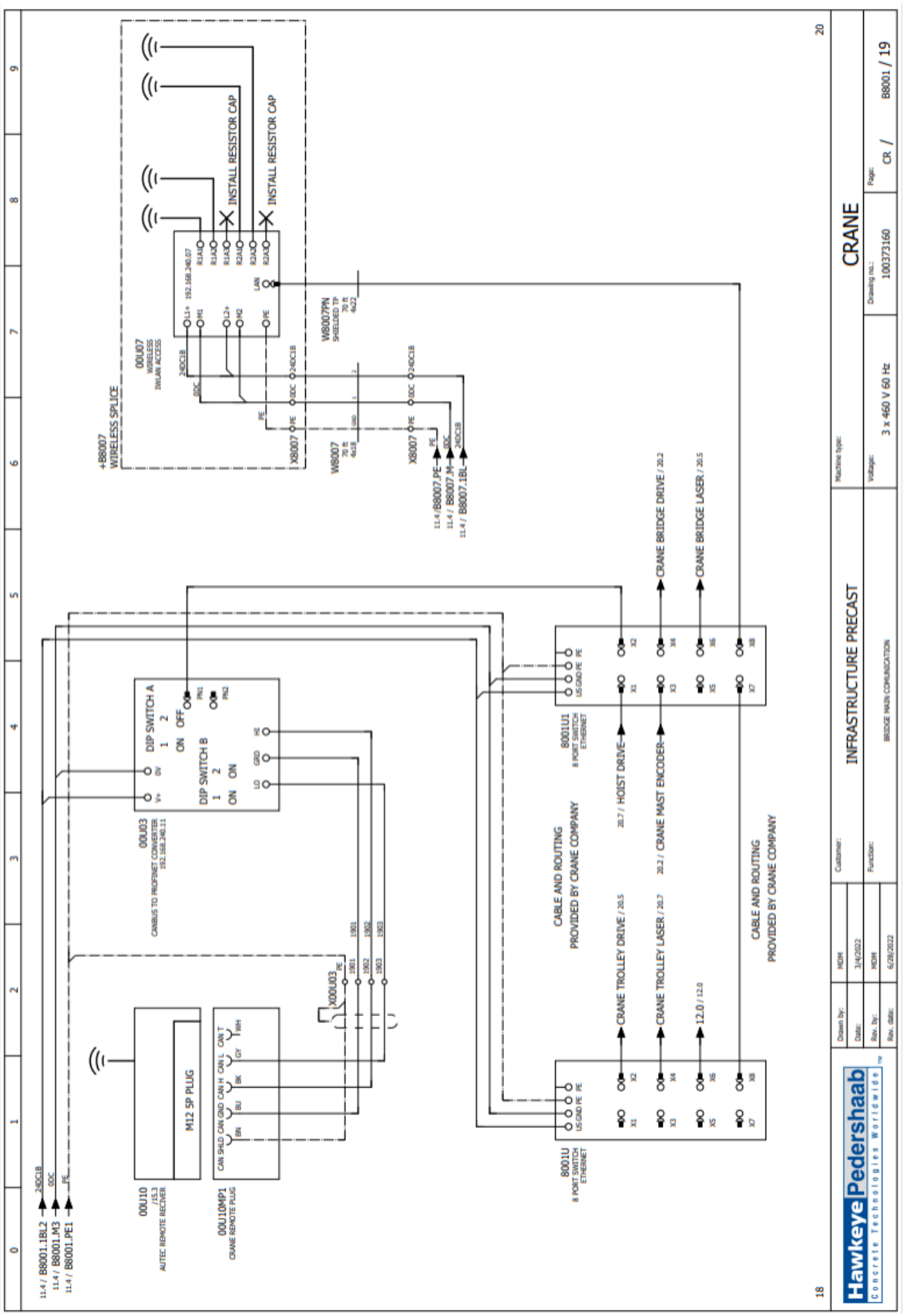

CRANE
INFRASTRUCTURE PRECAST
CRANE BRIDGE INPUTS
Hawkeye Pedershaab
Concrete Technologies Worldwide
CABLE PROVIDED BY CRANE COMPANY
+B8029 SCISSORS SPLICE
B8029.1BL1 / 15.6
B8029.M / 17.3
30801 SCISSORS LATCHED A
30802 SCISSORS LATCHED B
30803 SCISSORS LATCHED C
30804 SCISSORS LATCHED D
30805 SCISSORS UNLATCHED A
30806 SCISSORS UNLATCHED B
30807 SCISSORS UNLATCHED C
30808 SCISSORS UNLATCHED D
X8029
W8029
12.1 /12.2
3 x 460 V 60 Hz
100373160
B8001 / 14

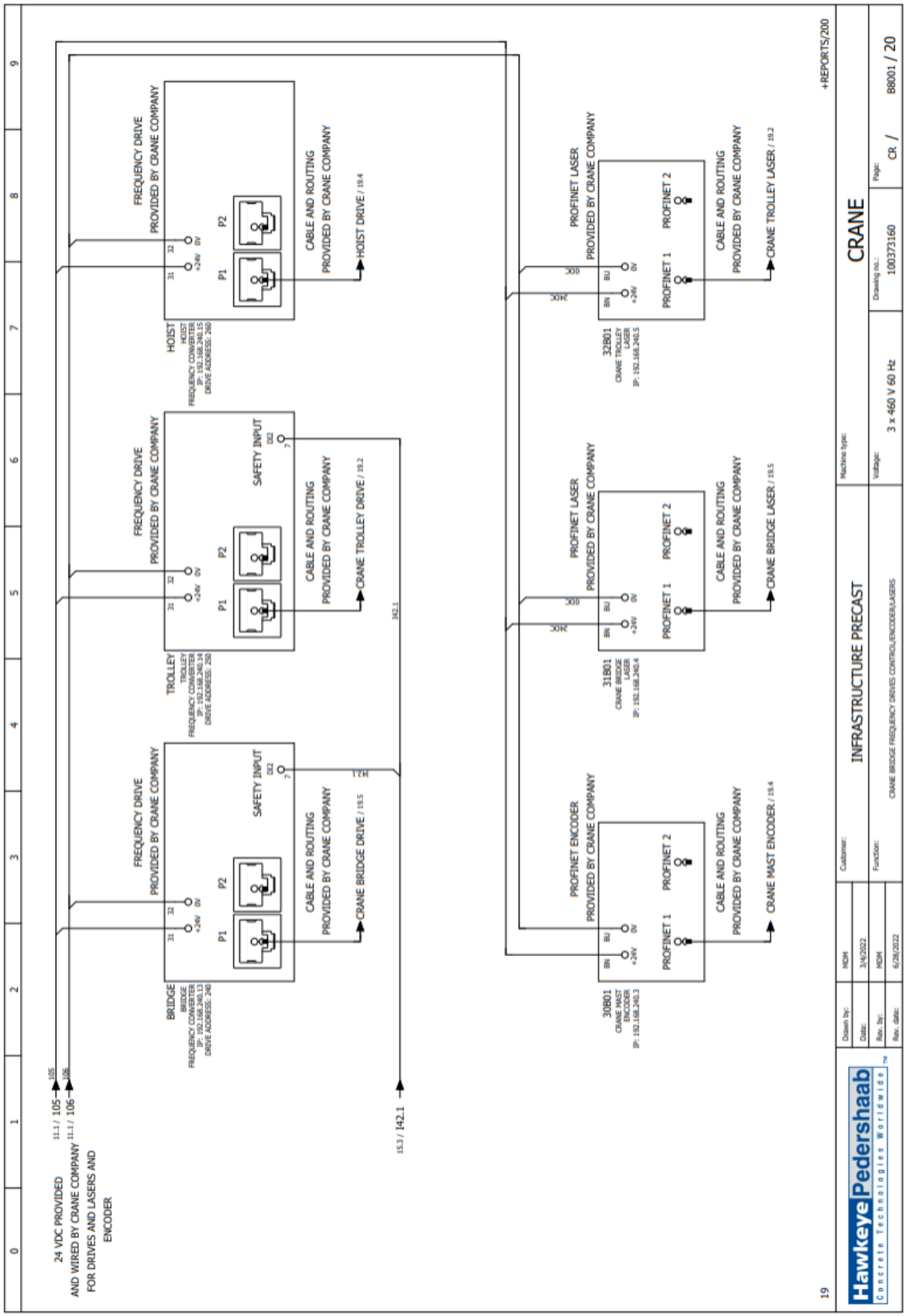

+B8029
SCISSORS SPLICE
CABLE PROVIDED
BY CRANE COMPANY
30K01
30K01A
30Q01
80K03
80K04
W8029
X8029
XR TERMINAL BLOCK
PROVIDED BY
CRANE COMPANY
SWTICH BETWEEN
PROFINET AND HARD WIRE
DRIVE CONTROL
30 PIN MALE PLUG
00U10
AUTEC REMOTE
RECIVER
00U10MP
CRANE REMOTE PLUG
SAFETY SIGNALS FROM CRANE +24V
CRANE SAFETY 1 /
Connected to crane MCR
X8001
DIGITAL INPUT BYTE
TYPE SIEMENS
4/8 F-DI
PRO. SWITCH
SCISSORS PUMP
P01
FEED BACK
P01 FB
SAFETY INPUT
FROM REMOTE
CRANE
IN AUTO
CRANE ESTOP
CHANNEL A
Hawkeye Pedershaab
Concrete Technologies Worldwide
INFRASTRUCTURE PRECAST
CRANE
Drawing no.: 100373160
Voltage: 3 x 460 V 60 Hz
Function: CRANE BRIDGE SAFETY INPUTS
Page: CR / B8001 / 15


DIGITAL OUTPUT BYTE
80K03-04
TYPE SIEMENS
4 F-DO
PART
1 OF 1
X8001
80K03
80K04
POWER LEVEL
P01
INFRASTRUCTURE PRECAST
CRANE
CRANE BRIDGE SAFETY OUTPUTS
3 x 460 V 60 Hz
100373160
B8001 / 16
Hawkeye Pedershaab
Concrete Technologies Worldwide


CRANE
INFRASTRUCTURE PRECAST
Hawkeye Pedershaab
Concrete Technologies Worldwide
3 x 460 V 60 Hz
100373160
B8001 / 17
CRANE BRIDGE OUTPUTS
CABLE PROVIDED
BY CRANE COMPANY
30H02G
30H02R
30H02Y
30H02
G/R/Y
X80229A
W80229A
+B8029
SCISSORS SPLICE
B8029.M1 / 18.3
B8029.M / 14.8
SCISSORS INDICATOR GREEN (PINS EXTENDED)
SCISSORS INDICATOR RED (PINS NOT EXTENDED OR RETRACTED)
SCISSORS INDICATOR YELLOW (PINS RETRACTED)


CRANE
3 x 460 V 60 Hz
100373160
B8001 / 18
CABLE PROVIDED
BY CRANE COMPANY
30H01B
30H01A
30K01-K01A
30H01
30K01A
30K01
30Q01
X8029
SCISSORS
UNLATCH
SCISSORS
LATCH
SCISSORS
PUMP
SCISSORS
PUMP
SCISSORS SPLICE
+B8029
B8029.PEA
B8029.M1
W8029A
X8029A
Hawkeye Pedershaab
Concrete Technologies Worldwide


CRANE
INFRASTRUCTURE PRECAST
Hawkeye Pedershaab
Concrete Technologies Worldwide
3 x 460 V 60 Hz
100373160
B8001 / 19
+B8007 WIRELESS SPLICE
00U07 WIRELESS WLAN ACCESS
INSTALL RESISTOR CAP
INSTALL RESISTOR CAP
W8007PN SHIELDED TP 20 ft 4x22
W8007 20 ft 4x18
X8007
11.4 / B8007.PE
11.4 / B8007.M
11.4 / B8007.1BL
00U03 CANBUS TO PROFINET CONVERTER 192.168.240.11
DIP SWITCH A
DIP SWITCH B
X00U03
00U10 J53 AUTEC REMOTE RECEIVER
M12 5P PLUG
00U10MP1 CRANE REMOTE PLUG
CAN SHLD CAN GND CAN H CAN L CAN T
8001U1 8 PORT SWITCH ETHERNET
8001U 8 PORT SWITCH ETHERNET
CABLE AND ROUTING PROVIDED BY CRANE COMPANY
CRANE TROLLEY DRIVE / 20.5
CRANE TROLLEY LASER / 20.7
20.7 / HOIST DRIVE
20.2 / CRANE MAST ENCODER
12.0 / 12.0
CRANE BRIDGE DRIVE / 20.2
CRANE BRIDGE LASER / 20.5
CABLE AND ROUTING PROVIDED BY CRANE COMPANY
BRIDGE MAIN COMUNICATION
11.4 / B8001.1BL2
11.4 / B8001.M3
11.4 / B8001.PE1


24 VDC PROVIDED AND WIRED BY CRANE COMPANY FOR DRIVES AND LASERS AND ENCODER
105
106
11.1 / 105
11.1 / 106
15.3 / 142.1
142.1
FREQUENCY DRIVE PROVIDED BY CRANE COMPANY
BRIDGE
TROLLEY
HOIST
SAFETY INPUT
CABLE AND ROUTING PROVIDED BY CRANE COMPANY
CRANE BRIDGE DRIVE / 19.5
CRANE TROLLEY DRIVE / 19.2
HOIST DRIVE / 19.4
PROFINET LASER PROVIDED BY CRANE COMPANY
PROFINET ENCODER PROVIDED BY CRANE COMPANY
CRANE BRIDGE LASER / 19.5
CRANE TROLLEY LASER / 19.2
CRANE MAST ENCODER / 19.4
+REPORTS/200
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Hawkeye Pedershaab
Concrete Technologies Worldwide
Drawn by: MDH
Date: 3/4/2022
Rev. by: MDH
Rev. date: 6/28/2022
Customer:
INFRASTRUCTURE PRECAST
Function:
CRANE BRIDGE FREQUENCY DRIVES CONTROL/ENCODER/LASERS
Machine type:
CRANE
Voltage:
3 x 460 V 60 Hz
Drawing no.:
100373160
Page:
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B8001 / 20

Cable Number	Wire Number	Conductor	Wire Size	Sheet	Source		Target	
-W05U01	1001	BK	14 AWG	/10.1	-05U01		2L1	
-W05U01	1003	BU	14 AWG	/10.1	-05U01		2L3	
-W05U01	PE	OG	14 AWG	/10.2	-05U01		PE	
-W05U01	1002	RD	14 AWG	/10.1	-05U01		2L2	
-W30M01	1005	1	16 AWG	+B8001/10.7	-30K01A		-30M01	
-W30M01	1007	2	16 AWG	+B8001/10.7	-30K01A		-30M01	
-W30M01	1009	3	16 AWG	+B8001/10.7	-30K01A		-30M01	
-W30M01	PE	G/Y	16 AWG	+B8001/10.7	-X30Q01	PE	-30M01	
-W30Q01	1001	BK	14 AWG	/10.7	+B8029-30Q01		2L1	
-W30Q01	1003	BU	14 AWG	/10.7	+B8029-30Q01		2L3	
-W30Q01	PE	OG	14 AWG	/10.7	+B8029-X30Q01	PE	PE	
-W30Q01	1002	RD	14 AWG	/10.7	+B8029-30Q01		2L2	
-W8007	0DC	1	18 AWG	/19.6	-X8007	0DC	+B8007-X8007	0DC
-W8007	24DC1B	2	18 AWG	/19.7	-X8007	24DC1B	+B8007-X8007	24DC1B
-W8007		3	18 AWG					
-W8007	PE	GND	18 AWG	/19.6	-X8007	PE	+B8007-X8007	PE
-W8007PN			22	/19.5	-8001U1		+B8007-00U07	
-W8029	0DC	BK	16 AWG	/14.1	-X8029	0DC	+B8029-X8029	0DC
-W8029	1502	BK/RD	16 AWG	/15.7	-X8029	1502	+B8029-X8029	1502
-W8029	I31.3	BN	16 AWG	/14.4	-X8029	I31.3	+B8029-X8029	I31.3
-W8029	I42.3	BN/BK	16 AWG	/15.6	-X8029	I42.3	+B8029-X8029	I42.3
-W8029	I31.0	BU	16 AWG	/14.2	-X8029	I31.0	+B8029-X8029	I31.0
-W8029	I31.5	BU/BK	16 AWG	/14.6	-X8029	I31.5	+B8029-X8029	I31.5
-W8029	I31.1	OG	16 AWG	/14.3	-X8029	I31.1	+B8029-X8029	I31.1
-W8029	I31.6	OG/BK	16 AWG	/14.7	-X8029	I31.6	+B8029-X8029	I31.6
-W8029	24DC1B	RD	16 AWG	/14.1	-X8029	24DC1B	+B8029-X8029	24DC1B
-W8029	I31.4	RD/BK	16 AWG	/14.5	-X8029	I31.4	+B8029-X8029	I31.4
-W8029	I31.2	YL	16 AWG	/14.3	-X8029	I31.2	+B8029-X8029	I31.2
-W8029	I31.7	YL/BK	16 AWG	/14.7	-X8029	I31.7	+B8029-X8029	I31.7
-W8029A	Q31.0	BK	16 AWG	/17.3	-X8029A	Q31.0	+B8029-X8029A	Q31.0
-W8029A	Q32.1	BN	16 AWG	/18.4	-X8029A	Q32.1	+B8029-X8029A	Q32.1
-W8029A	Q31.2	BU	16 AWG	/17.5	-X8029A	Q31.2	+B8029-X8029A	Q31.2
-W8029A		BU/BK	16 AWG					

+B8001/20

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Hawkeye Pedershaab
Concrete Technologies Worldwide

Drawn by: MDM
Date: 3/4/2022
Rev. by: MDM
Rev. date: 6/20/2022

Customer:
Function:

INFRASTRUCTURE PRECAST
CABLE BREAKOUT

Machine type:
Voltage: 3 x 460 V 60 Hz

CRANE

Drawing no.: 100373160
Page: CR. / REPORTS / 200

Cable Number	Wire Number	Conductor	Wire Size	Sheet	Source		Target	
-W8029A	PE	OG	16 AWG	/18.2	-X8029A	PE	+B8029-X8029A	PE
-W8029A	Q31.1	RD	16 AWG	/17.4	-X8029A	Q31.1	+B8029-X8029A	Q31.1
-W8029A	Q32.2	RD/BK	16 AWG	/18.5	-X8029A	Q32.2	+B8029-X8029A	Q32.2
-W8029A	Q32.0	YL	16 AWG	/18.3	-X8029A	Q32.0	+B8029-X8029A	Q32.0

200 300

Hawkeye Pedershaab
Concrete Technologies Worldwide

Drawn by: MDH
Date: 3/4/2022
Rev. by: MDH
Rev. date: 6/29/2022

Customer: INFRASTRUCTURE PRECAST
Function:

Machine type: CRANE
Voltage: 3 x 460 V 60 Hz
Drawing no.: 100373160
Page: / REPORTS / 201

Device Tag	Qty	Hawkeye Number	Part Number	Function Text	Box	Sheet
00F01B	1	COM-EL2625	FAZ-D6/1-NA-SP	24 V DC COMMON POWER	B8001	=CR+B8001/11.3
00F02	1	COM-EL2625	FAZ-D6/1-NA-SP	P01 SAFETY POWER	B8001	=CR+B8001/11.6
00U03	1	ELE-WI0056	570-100-007		B8001	=CR+B8001/19.3
00U03	1	ELE-CO5023	HD67607-A1		B8001	=CR+B8001/19.3
00U07	1	00688822	6GK1901-1BB10-2AA0	WIRELESS IWLAN ACCESS	B8007	=CR+B8001/19.7
00U07	1	ELE-CO5497	6GK5788-2FC00-0AB0	WIRELESS IWLAN ACCESS	B8007	=CR+B8001/19.7
00U07	2	ELE-CO5148	6GK5795-1TR10-0AA6	WIRELESS IWLAN ACCESS	B8007	=CR+B8001/19.7
00U07	2	ELE-CO5256	6GK5795-6MN10-0AA6	WIRELESS IWLAN ACCESS	B8007	=CR+B8001/19.7
00U07	1	ELE-CO5525	6GK5907-8PA00	WIRELESS IWLAN ACCESS	B8007	=CR+B8001/19.7
00U07	2	ELE-CO5596	6GK5793BDP000AA0	WIRELESS IWLAN ACCESS	B8007	=CR+B8001/19.7
00U07	4	ELE-CO5498	6XV1875-5CH50	WIRELESS IWLAN ACCESS	B8007	=CR+B8001/19.7
00U10	1	COM-HW1842		AUTEC REMOTE RECIVER	B8001	=CR+B8001/19.1
00U10	1	COM-EL0551	805001D01M050	AUTEC REMOTE RECIVER	B8001	=CR+B8001/19.1
00U10MP				CRANE REMOTE PLUG	B8001	=CR+B8001/15.3
00U10MP1				CRANE REMOTE PLUG	B8001	=CR+B8001/19.1
05FP02	1	ELE-PL0005	61-1A413	FEMALE PLUG	B8001	=CR+B8001/10.1
05FP02	1	ELE-PL0007	63-14043	FEMALE PLUG	B8001	=CR+B8001/10.1
05U01	1	HYD-PU0595	G-344	CABLE REEL	B8001	=CR+B8001/10.1
12.0	1	ELE-CO5162	6ES7155-6AA01-0BN0		B8001	=CR+B8001/12.1
12.0	1	ELE-WI0056	570-100-007		B8001	=CR+B8001/12.1
12.1	1	ELE-CO5551	6ES7131-6BF01-0BA0	8DI	B8001	=CR+B8001/12.2
12.1	1	ELE-CO5165	6ES7193-6BP00-0DA0	8DI	B8001	=CR+B8001/12.2
12.2	1	ELE-CO5164	6ES7193-6BP00-0BA0	4FDI	B8001	=CR+B8001/12.3
12.2	1	ELE-CO5559	6ES71366BA000CA0	4FDI	B8001	=CR+B8001/12.3
12.3	1	ELE-CO5164	6ES7193-6BP00-0BA0	4FDO	B8001	=CR+B8001/12.3
12.3	1	ELE-CO5560	6ES71366DB000CA0	4FDO	B8001	=CR+B8001/12.3
12.4	1	ELE-CO5164	6ES7193-6BP00-0BA0	4DO	B8001	=CR+B8001/12.4
12.4	1	ELE-CO5554	6ES71326BD200BA0	4DO	B8001	=CR+B8001/12.4
12.5	1	ELE-CO5165	6ES7193-6BP00-0DA0	4DO	B8001	=CR+B8001/12.4
12.5	1	ELE-CO5554	6ES71326BD200BA0	4DO	B8001	=CR+B8001/12.4
30B01				CRANE MAST ENCODER	B8001	=CR+B8001/20.2
30B01	1	COM-EL0538	7000-12221-6140500	SCISSORS LATCHED A	B8029	=CR+B8001/14.2
30B02	1	COM-EL0538	7000-12221-6140500	SCISSORS LATCHED B	B8029	=CR+B8001/14.3
30B03	1	COM-EL0538	7000-12221-6140500	SCISSORS LATCHED C	B8029	=CR+B8001/14.3
30B04	1	COM-EL0538	7000-12221-6140500	SCISSORS LATCHED D	B8029	=CR+B8001/14.4
30B05	1	COM-EL0538	7000-12221-6140500	SCISSORS UNLATCHED A	B8029	=CR+B8001/14.5
30B06	1	COM-EL0538	7000-12221-6140500	SCISSORS UNLATCHED B	B8029	=CR+B8001/14.6
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Hawkeye Pedershaab
Concrete Technologies Worldwide™

Drawn by: HDH
Date: 3/4/2022
Rev. by: HDH
Rev. date: 6/28/2022

Customer:
Function:

INFRASTRUCTURE PRECAST

Machine type:
CRANE

3 x 460 V 60 Hz

Drawing no.: 100373160

Page: CR / REPORTS / 300

Device Tag	Qty	Hawkeye Number	Part Number	Function Text	Box	Sheet
30B07	1	COM-EL0538	7000-12221-6140500	SCISSORS UNLATCHED C	B8029	=CR+B8001/14.7
30B08	1	COM-EL0538	7000-12221-6140500	SCISSORS UNLATCHED D	B8029	=CR+B8001/14.7
30H01	2	COM-EL0575	7000-18021-6160500	SCISSOR LATCH UNLATCH	B8029	=CR+B8001/18.4
30H02	1	COM-EL0538	7000-12221-6140500	SCISSORS INDICATOR GREEN (PINS EXTENDED)	B8029	=CR+B8001/17.3
30H02	1	ELE-CO1118	T30-GRY-PQ	SCISSORS INDICATOR GREEN (PINS EXTENDED)	B8029	=CR+B8001/17.3
30K01	1	ELE-CO5529	3RT2016-1BB42	SCISSORS PUMP	B8029	=CR+B8001/18.3
30K01A	1	ELE-CO5529	3RT2016-1BB42	SCISSORS PUMP	B8029	=CR+B8001/18.3
30M01				SCISSORS PUMP	B8029	=CR+B8001/10.7
30Q01	1	00678533	3RA1921-1DA00	SCISSORS PUMP	B8029	=CR+B8001/10.7
30Q01	1	ELE-CO5538	3RV2021-1DA10	SCISSORS PUMP	B8029	=CR+B8001/10.7
30Q01	1	ELE-CO6192	3RV2901-1E	SCISSORS PUMP	B8029	=CR+B8001/10.7
30Q01	1	ELE-CO6189	3RV2928-1H	SCISSORS PUMP	B8029	=CR+B8001/10.7
31B01				CRANE BRIDGE LASER	B8001	=CR+B8001/20.5
32B01				CRANE TROLLEY LASER	B8001	=CR+B8001/20.7
80K03	1	ELE-CO5529	3RT2016-1BB42	POWER LEVEL P01	B8001	=CR+B8001/16.1
80K04	1	ELE-CO5529	3RT2016-1BB42	POWER LEVEL P01	B8001	=CR+B8001/16.2
8001U	1	COM-HW0126	2891929		B8001	=CR+B8001/19.1
8001U1	1	00688822	6GK1901-1BB10-2AA0		B8001	=CR+B8001/19.4
8001U1	1	ELE-WI0056	570-100-007		B8001	=CR+B8001/19.4
8001U1	1	COM-HW0126	2891929		B8001	=CR+B8001/19.4

300

Hawkeye Pedershaab
Concrete Technologies Worldwide

Drawn by: MDM
Date: 3/4/2022
Rev. by: MDM
Rev. date: 6/29/2022

Customer:
INFRASTRUCTURE PRECAST
Function:
DEVICE INDEX

Machine type:
CRANE
Voltage: 3 x 460 V 60 Hz
Drawing no.: 100373160
Page: CR. / REPORTS / 301

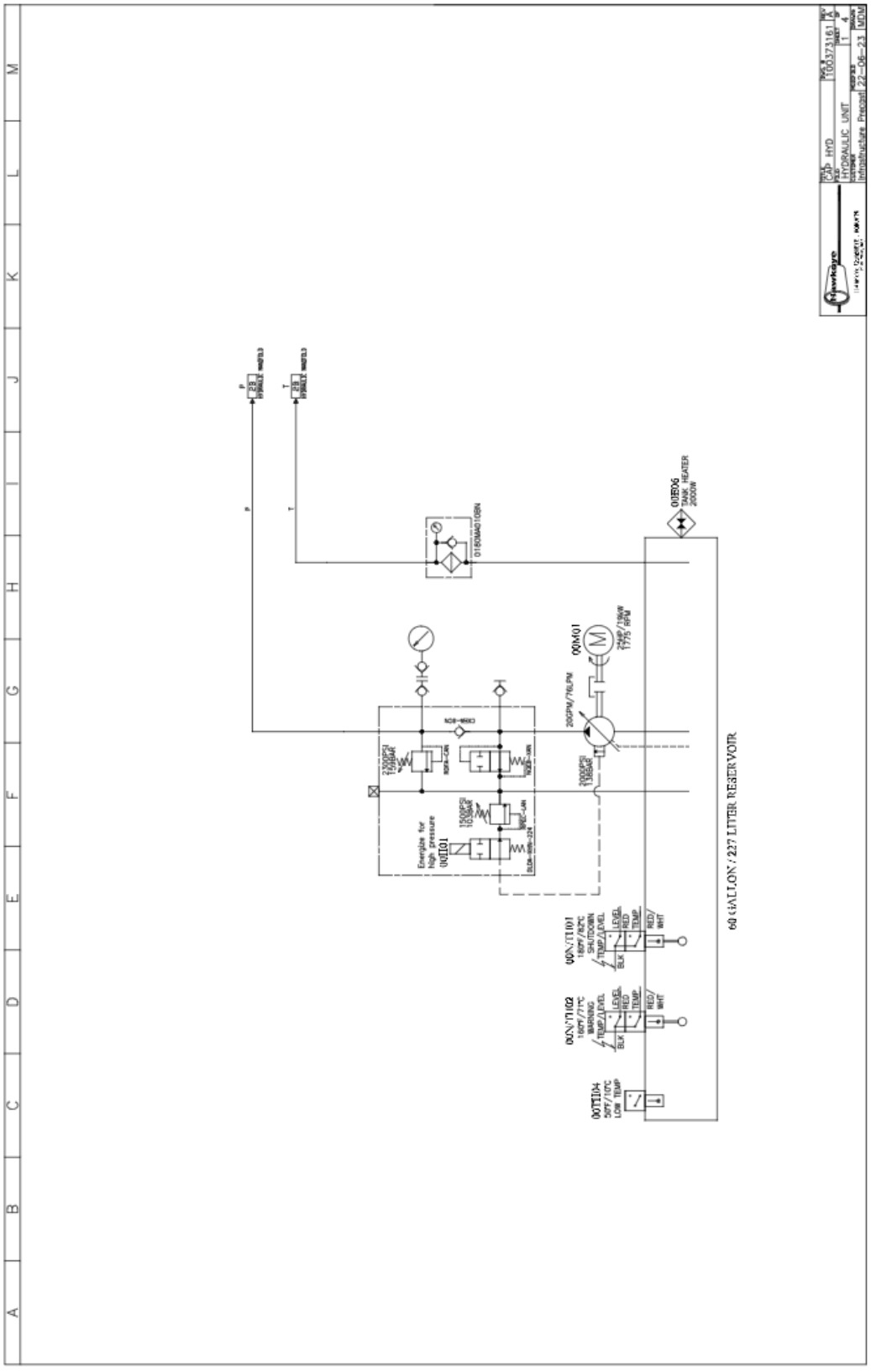
25 Hydraulic Schematics

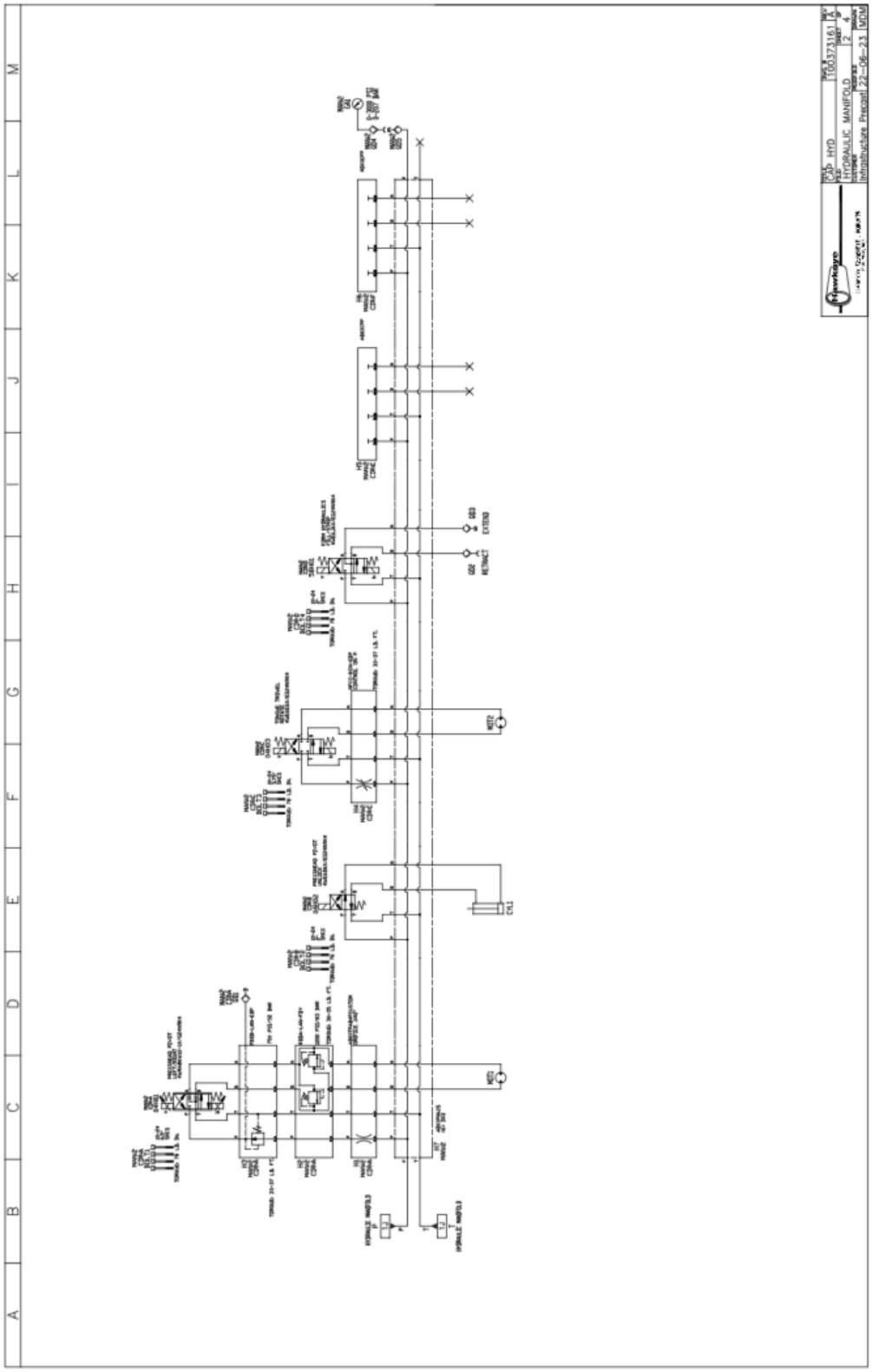
SS CAP 72 Machine

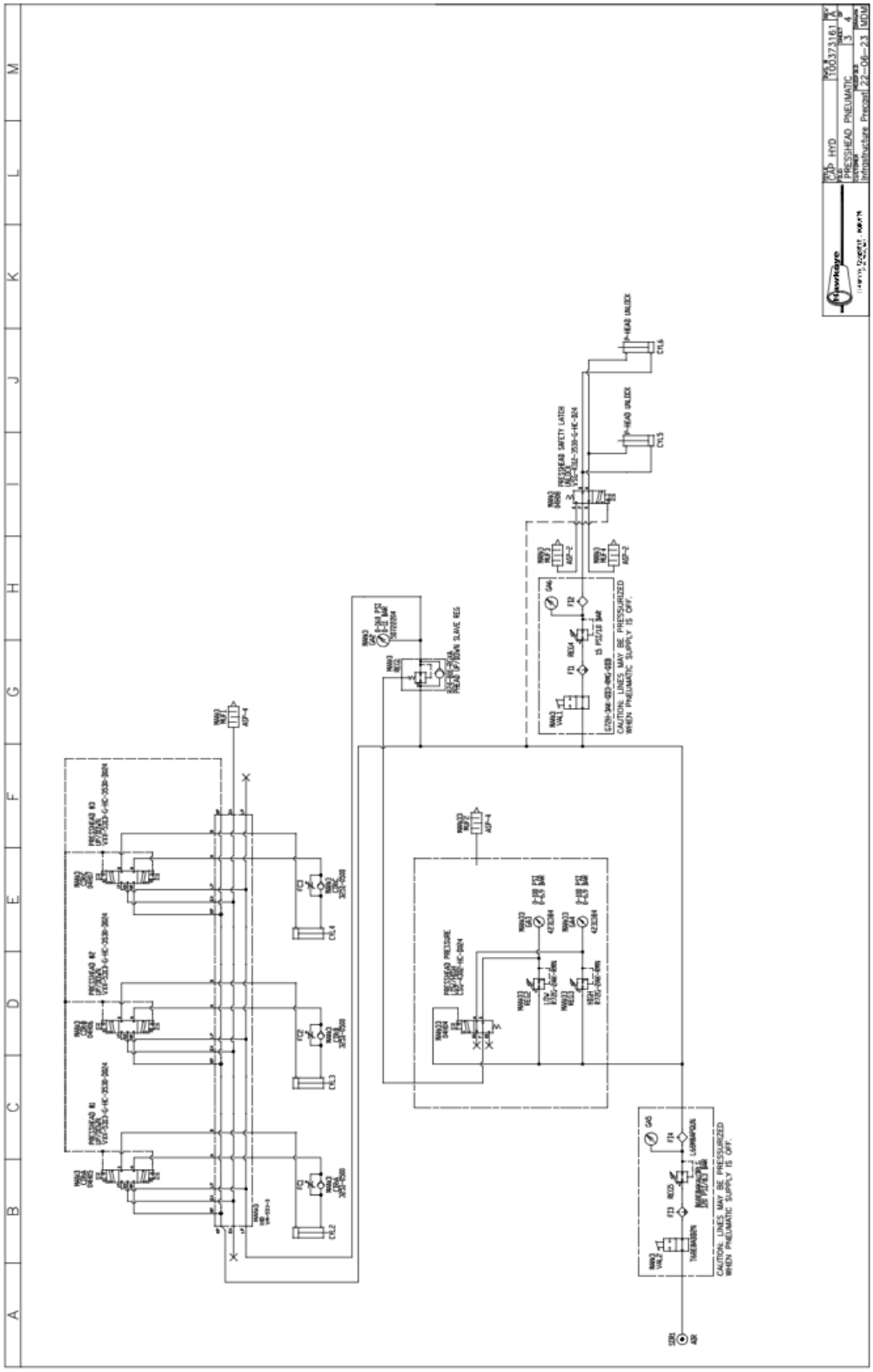
Machine Serial No. CP-430

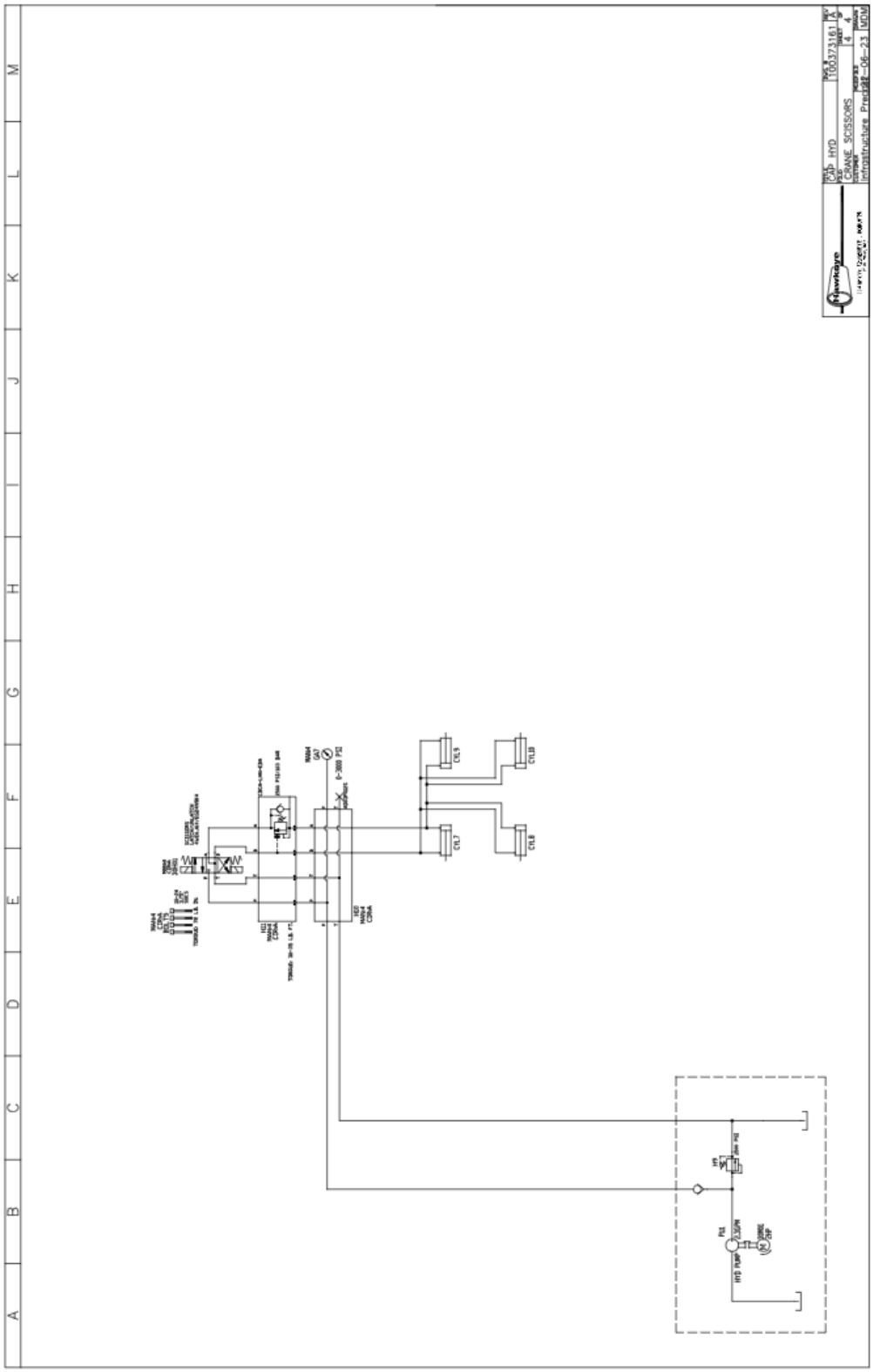
Notes

The following pages are the hydraulic schematics for your **SS CAP 72 Machine**. Please refer to these when troubleshooting the machine.









INDEX OF MODULES

MODULE	HAWKEYE #	DESCRIPTION	LABEL	CIR	SHEET	MAN
04H01	HYD-VA7081	4WRAB6W12-1X/G24N9K4	PRESSHEAD PIVOT	CIR:A	2	MAN:2
04H02	HYD-VA7148	4WE6D6X/EG24N9K4	PRESSHEAD PIVOT	CIR:B	2	MAN:2
04H03	HYD-VA7112	4WE6E6X/EG24N9K4	TONGUE TROWEL	CIR:C	2	MAN:2
04H04	HYD-VA1376	CSG-4302-HC-D024	PRESSHEAD PRESSURE		3	MAN:33
04H05	HYD-VA1566	VXX-5313-G-HC-3530-D024	PRESSHEAD #1	CIR:A	3	MAN:3
04H06	HYD-VA1566	VXX-5313-G-HC-3530-D024	PRESSHEAD #2	CIR:B	3	MAN:3
04H07	HYD-VA1566	VXX-5313-G-HC-3530-D024	PRESSHEAD #3	CIR:C	3	MAN:3
04H08	HYD-VA1453	VSG-4312-3530-G-HC-D24	PRESSHEAD SAFETY LATCH		3	MAN:3
04H08	HYD-VA0960	M-430-A			3	MAN:3
30H01	HYD-VA7114	4WE6J6X/EG24N9K4	SCISSORS	CIR:A	4	MAN:4
30M01					4	
58H01	HYD-VA7114	4WE6J6X/EG24N9K4	FORM HYDRAULICS	CIR:D	2	MAN:2
BOLT1	FAS-BT4512	10-24X6.5	10-24	CIR:A	2	MAN:2
BOLT1	FAS-BT4512	10-24X6.5		CIR:A	2	MAN:2
BOLT2	FAS-BT2877	10-24X2	10-24	CIR:B	2	MAN:2
BOLT2	FAS-BT2877	10-24X2		CIR:B	2	MAN:2
BOLT3	FAS-BT2883	10-24X3.75	10-24	CIR:C	2	MAN:2
BOLT3	FAS-BT2883	10-24X3.75		CIR:C	2	MAN:2
BOLT4	FAS-BT2877	10-24X2	10-24	CIR:D	2	MAN:2
BOLT4	FAS-BT2877	10-24X2		CIR:D	2	MAN:2
BOLT5	FAS-BT2883	10-24X3.75	10-24	CIR:A	4	MAN:4
BOLT5	FAS-BT2883	10-24X3.75		CIR:A	4	MAN:4
CYL1					2	
CYL10					4	
CYL2					3	
CYL3					3	
CYL4					3	
CYL5			P-HEAD UNLOCK		3	
CYL6			P-HEAD UNLOCK		3	
CYL7					4	
CYL8					4	
CYL9					4	
FC1	HYD-VA0300	3251-0500	3251-0500	CIR:A	3	MAN:3
FC2	HYD-VA0300	3251-0500	3251-0500	CIR:B	3	MAN:3
FC3	HYD-VA0300	3251-0500	3251-0500	CIR:C	3	MAN:3
FI1					3	
FI2					3	
FI3					3	
FI4			L68M8APQUN		3	
GA1	HYD-VA0060	9767150	0-3000 PSI		2	MAN:2
GA2	HYD-VA0073	50722204 GAUGE, 2" X 160PSI	0-160 PSI		3	MAN:3
GA3	HYD-VA0045	4231384	4231384		3	MAN:33
GA4	HYD-VA0045	4231384	4231384		3	MAN:33
GA5					3	
GA6					3	
GA7	HYD-VA0060	9767150	0-3000 PSI		4	MAN:4
H1	100375929	AD03TPAB4PCUSTOM	AD03TPAB4PCUSTOM	CIR:A	2	MAN:2
H10	HYD-VA0915	AD03P012S	AD03P012S	CIR:A	4	MAN:4
H11	HYD-VA5100	EBA	CBCA-LHN-EBA	CIR:A	4	MAN:4
H11	HYD-VA1190	CBCA-LHN		CIR:A	4	MAN:4
H2	HYD-VA3051	FBY	RDDA-LAN-FBY	CIR:A	2	MAN:2
H2	HYD-VA6200	RDDA-LAN		CIR:A	2	MAN:2
H3	HYD-VA0878	EBP	PBDB-LAN-EBP	CIR:A	2	MAN:2
H3	HYD-VA5600	PBDB-LAN		CIR:A	2	MAN:2

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H4	HYD-VA3093	NFCC-KCN		CIR:C	2	MAN:2
H5	HYD-VA0925	AD03CPP	AD03CPP	CIR:E	2	MAN:2
H6	HYD-VA0925	AD03CPP	AD03CPP	CIR:F	2	MAN:2
H7	HYD-VA0918	AD03P062S	AD03P062S		2	MAN:2
H8	HYD-VA0260	VM-533-3	VM-533-3		3	MAN:3
H9				CIR:	4	MAN:
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QD2					2	
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