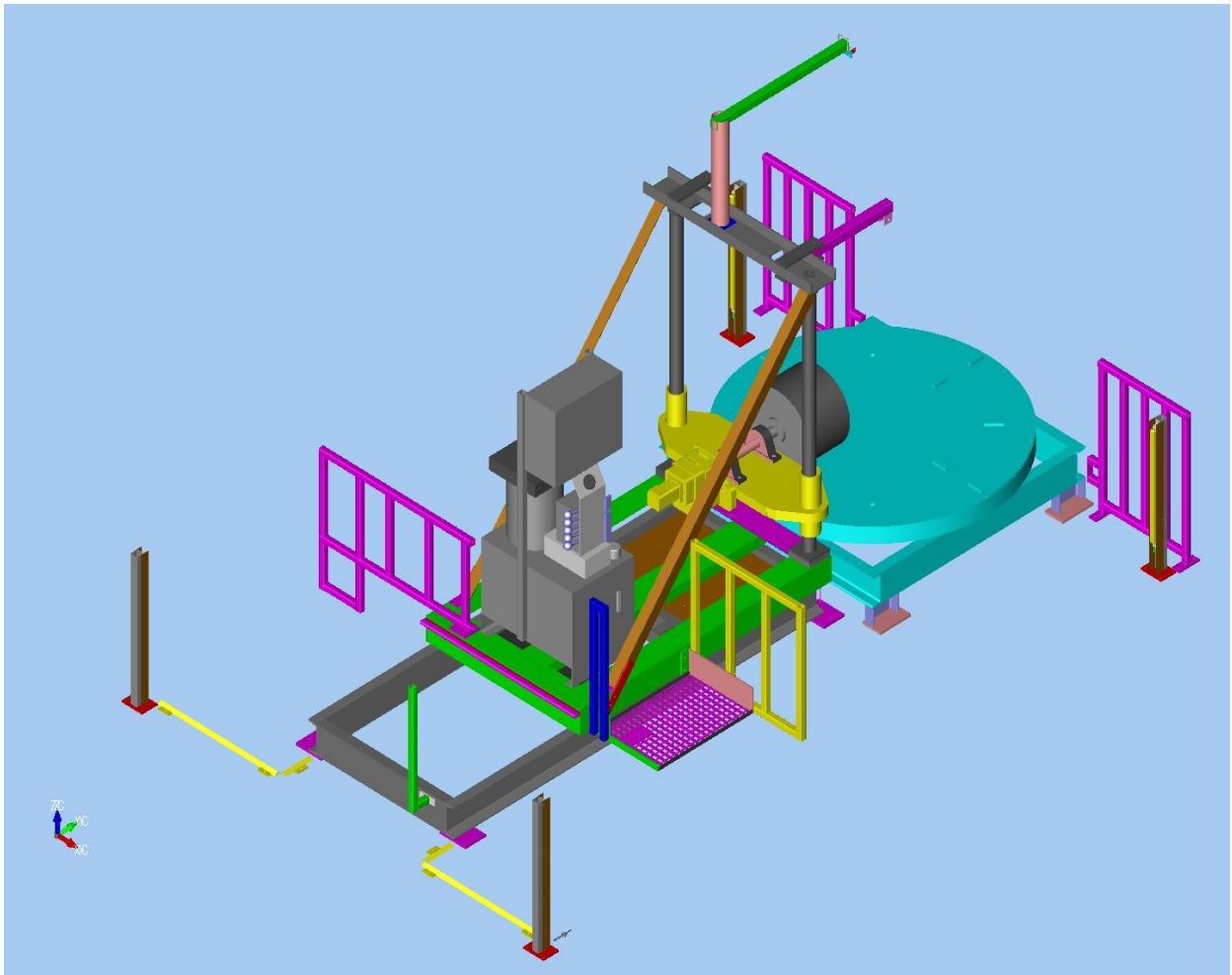


Hydrokor V

Safety, Operation, and Maintenance Manual

Model # 91830

Serial # 23795



OVERVIEW

The Hydrokor V core drilling machine is expressly manufactured for use by manhole producers. It is a versatile and highly durable in-plant machine designed to have a wide range of core drilling capabilities coupled with simple operation.

PURPOSE

The purpose of this manual is to provide key information on safety, operation, and maintenance. This manual is one of three Trelleborg manuals:

- Safety, Operation, and Maintenance Manual
- Hydraulic Power Unit Manual
- Parts Manual

- Additional OEM manuals are included in the full machine binder supplied with the machine

As with any industrial machine, the operator must be trained before operating this machine.



WARNING! Serious physical injury and equipment damage could occur due to improper system operation. Please read all instructions before use to avoid injury.

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SAFETY

HYDROKOR V SAFETY

IMPORTANT! TO AVOID SERIOUS INJURY, READ ALL INSTRUCTIONS BEFORE USE.

Keep this manual for future reference.



NOTICE! The following safety precautions must be fully understood and followed by every operator of this equipment. Supervisors should review the following safety precautions with operators frequently.



WARNING! All operators should be trained in the safe operation of the machine before being allowed to operate the machine.

THE FOLLOWING SAFETY MEASURES MUST BE OBSERVED DURING DAILY OPERATION.

Training in safety procedures is part of Trelleborg's Field Service Installation and is available for an unlimited number of personnel at that time.

Key safety training points include, but should not be limited to, the following:

1. The machine and core drills should be inspected prior to each use for any signs of worn or damaged components that could create a safety hazard.
 - An inspection log should be maintained noting the time, date and initials of the operator inspecting the machine prior to its operation.
 - If an issue is identified, the machine should not be allowed into service until the issue is evaluated and cleared by qualified maintenance personnel.
2. Good housekeeping is important to avoid trip and fall hazards.



DANGER! Wet slurry can be slippery. Excessive accumulations in access areas and walkways should be avoided.

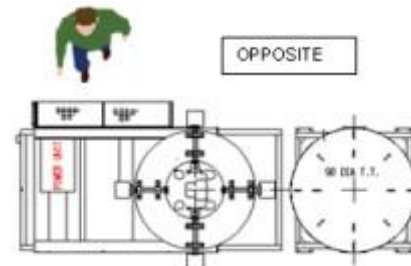
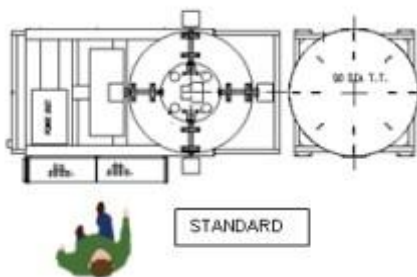
3. Lifting core drills and loading manholes should be included in your plant's safe lifting guidelines.

SAFETY

- Determine what size core drills will require the use of lifting aids. Trelleborg offers a Core Drill Jam that can be used with overhead cranes etc. for lifting larger core drills.
 - Lifting equipment used for loading and unloading of manholes and manholes onto the coring machine should be approved for use and inspected on a regular basis.
 - Manholes are large and heavy and often block the view of the forklift operator while being loaded and unloaded. Personnel should always stay clear of the turntable area while it is being loaded and unloaded.
 - Positioners should be put on the proper locating dogs (48/5, 60/6 and 72/7 for example) before the product is loaded on to the turntable.
4. Operators should always look for damaged manholes that could pose a safety hazard during loading, unloading, and coring.
 5. Maximum manhole weight on turntable:
 - 24,000 pounds maximum on 90 inch (4) heavy duty caster design turntable.
 - 42,000 pounds maximum on 90 inch super duty heavy duty caster design turntable.
 - 42,000 pounds maximum on 117 inch turntable.
 6. Always stay clear of the rotating core drill, spindles, and turntables.
 7. The operator should wear proper PPE (Personal Protective Equipment) including, but not limited to:
 - Hearing Protection.
 - Eye Protection.
 - Steel Toe Shoes.
 - An appropriate dust mask if there is a dust generation issue.
 8. The operator should not leave the coring machine area while coring.
 9. Only one operator should work on the machine at a time when the hydraulics are energized. The light stack on the power unit will illuminate when the hydraulics are energized. Additional **Personnel should not attempt to change bits or otherwise interact with the machine while an operator is at the controls.** Approaching the machine while in operation or while an operator is at the controls can create an unsafe condition. Examples include the operator turning on the core bit when it is being installed or rotating the turntable when a second worker is standing on the table.

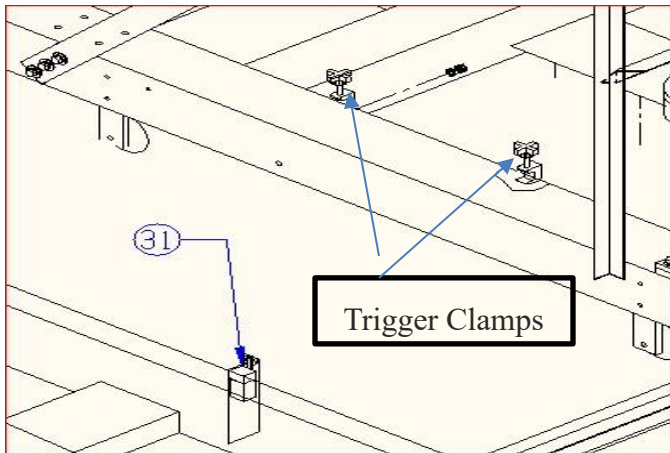
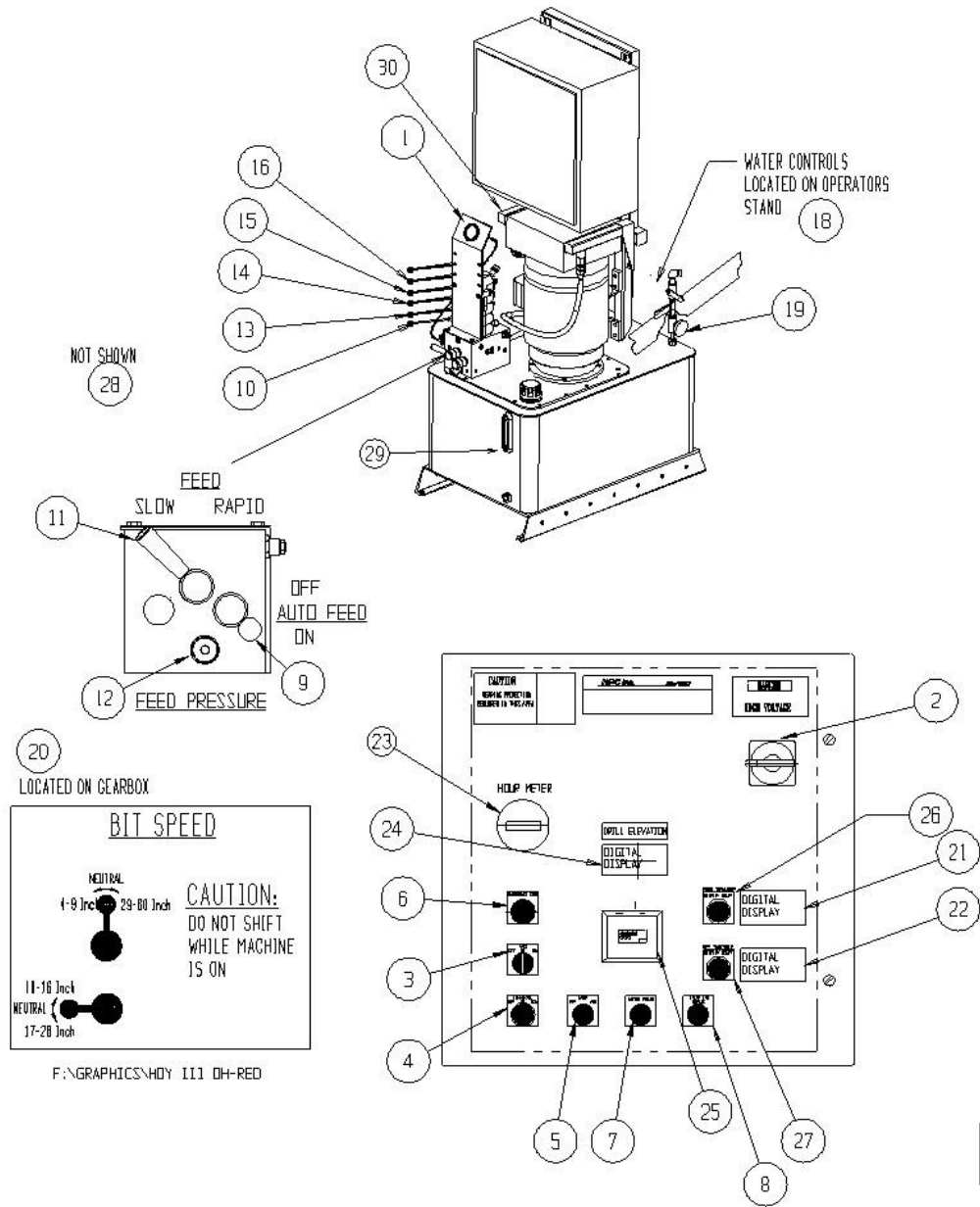
SAFETY

10. The operator must shut off the hydraulic pump motor before changing a core drill. This removes the hydraulic energy source to the machine. The light stack on the hydraulic power unit will illuminate when the hydraulics are energized.
11. Never leave the Hydrokor V unattended when the hydraulic pump motor is on.
12. Prior to coring, the operator must make sure that the product being cored is stable and will not be pushed over during coring, creating a hazard. This is especially important with any non-standard manholes that are tall and narrow, or that otherwise have a high center of gravity.
13. Water should be turned on high before the core drill makes contact with the manhole. This will eliminate dust generated from dry contact between the rotating core drill and manhole.
14. Use caution when removing and handling pucks. Striking concrete can create flying chips that require eye protection. Pucks are heavy and can be a falling object hazard.
15. Personnel should always stay clear of moving components, including the coring machine, frame, and turntable, when the machine is in operation.
16. Always follow proper LOTO (Lock Out Tag Out) safety procedures to avoid personal injury when servicing the machine.
17. Coring machines can be configured with the controls facing either side of the machine as shown below:



WARNING! If there are multiple machines in one plant, it is important to be aware that the movement of the controls relative to the movement of the machine will be different for the operator if the controls are not located on the same side. Keeping controls on the same side is the preferred configuration for multiple machines.

MACHINE CONTROLS



MACHINE CONTROLS

ELECTRICAL CONTROLS

Main Disconnect Rotary Switch (Item 2)

Disconnects main power from all controls

Hydraulics Off/On Rotary Switch (Item 3)

To start or stop hydraulic pump motor

Note: safety controller must be enabled to allow pump to run

Core Drill Advance/Retract Rotary Switch (Item 4)

To advance and retract core drill

Stop Advance/Retract Push Button (Item 5)

To stop the core drill advancing or retracting

Emergency Stop Push Button (Item 6)

Shuts off power to hydraulic pump motor and directional control valve to deenergize machine

Safety Reset Push Button (Item 7)

Resets safety controller. Press and hold (1-2 seconds) two times at start up to reset and enable the hydraulic pump motor to run

If a light curtain is triggered, e-stop engaged, or the safety bumper is triggered it will need to be reset

Push button will illuminate when reset is required

Light Curtain Bypass Push Button Switch (Item 8)

Bypasses light curtains allowing for functions such as traverse and offset coring that would normally trigger the light curtains

A safety alarm will sound when pressed

Right Digital Turntable Reset Push Button (Item 26) Press

to reset turntable display to zero degrees

Left Digital Turntable Reset Push Button (Item 27) Press

to reset turntable display to zero degrees

Retract And Park Limit Switch (Item 31)

For non-Smart-Kor Hydrokor V machines only

Uses two adjustable trigger clamps to set an auto retract position and a retract park position

MACHINE CONTROLS

LS1A: double-acting switch stops core drill advance and starts retract

LS1B: double-acting switch stops core drill retract.

Note: LS1A and LS1B are the same physical switch.

HYDRAULIC CONTROLS

Auto Feed On/Off Lever (Item 9)

To turn auto feed feature on or off

Lever down = On

Lever up = Off

Auto feed automatically reduces feed pressure when the core drill encounters cage wire. It reduces stalling of the core drill in cage wire

Core Drill On/Hydraulics On Lever (Item 10)

Left position is *Core Drill On*

Right position is *Hydraulics On* and enables:

- Elevation
- Turntable rotation
- Traverse

Center position is *Neutral*

Rapid Advance Feed/Slow Advance Feed Lever (Item 11)

Controls core drill advance feed rate

Left position is *Slow Advance Feed*

Right position is *Rapid Advance Feed*

This valve does not control the retract speed

Core Drill Feed Pressure Regulator Knob (Item 12)

Controls the pressure that the core drill is feed into the concrete

Clockwise increases pressure

Counter clockwise decreases pressure

Core Drill Elevation Lever (Item 13)

Left position lowers elevation

Right position raises elevation

Requires **Core Drill On/Hydraulics On Lever** is set to *Hydraulics On*

Left Turntable Rotate Lever (Item 14)

Left position to rotate turntable counter clockwise

Right position to rotate turntable clockwise

Requires **Core Drill On/Hydraulics On Lever** is set to *Hydraulics On*

Right Turntable Rotate Lever (Item 15)

MACHINE CONTROLS

Left position to rotate turntable counter clockwise

Right position to rotate turntable clockwise

Requires **Core Drill On/Hydraulics On Lever** is set to *Hydraulics On*

MACHINE CONTROLS

Traverse Lever (Item 16) Left

position to traverse left

Right position to traverse right

Requires **Core Drill On/Hydraulics On Lever** is set to *Hydraulics On* When machine is elevated traverse speed is restricted

WATER CONTROLS

Water On/Off Valve (Item 18)

Use ball valve to quickly turn water on and off to core drill

Water Flow Control Valve (Item 19)

Use gate valve to control flow of water to core drill

MECHANICAL CONTROLS

Core Drill Speed Selection Levers (On Transmission) (Item 20)

Controls core drill speed based on size

One lever must always be in the neutral position

With one in neutral, the other may then be shifted to the desired diameter range

DISPLAYS

Core Drill Pressure Gauge (Item 1)

Oil Level And Temperature Display (Item 29) Sight glass with integrated thermometer

Closed Circuit Camera Screen (Item 30)

Provides view of core drill during operation

Refer to camera manual for operation instructions

Right Turntable Digital Display (Item 21)

Displays the turntable position in 0-359 degrees

Display can be reset to zero at any time

Direction of counting can easily be changed by swapping input a and b

Left Turntable Digital Display (Item 22)

Displays the turntable position in 0-359 degrees

MACHINE CONTROLS

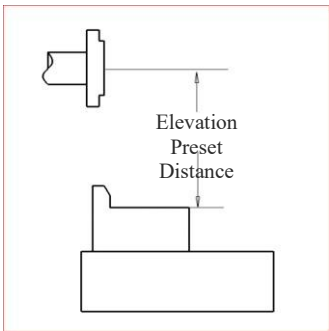
Display can be reset to zero at any time
Direction of counting can easily be changed by swapping input a and b

Hour Meter (Item 23)

Displays the drilling time of the machine
Only runs when the machine is advancing

Elevation Digital Display (Optional) (Item 24)

Displays core drill elevation preset distance above the turntable Elevation is normally measured from top of the positioner to center of spindle. The factory setting is 8 inches but should be calibrated after machine set-up and checked periodically



Digital Elevation Display Adjustment									
TO CALIBRATE UNIT OR CHANGE THE ZERO REFERENCE POSITION									
1	Move elevation platform to lowest position								
2	Measure distance in inches, from spindle center to desire zero reference point								
3	Press "PAR"								
4	Press F1(up) and F2 (down) to select measured distance from step 2								
5	Press "PAR" to enter value								
6	Press "Reset" to complete Calibration								



Smart-Kor Screen (Item 25)

Proface HMI (Human Machine Interface) touch screen for the SmartKor system

SMART-KOR CONTROLS

The Smart-Kor system provides several important features. It automates the retract of the core drill and it tracks information on production rates and core drill performance that can be viewed or downloaded onto a thumb drive. The user can configure the unit with common core drill and manhole sizes.

Coring Pressure:

MACHINE CONTROLS

The Smart-Kor looks at coring pressure close to the core drill. The system pressure gage shows pressure at the power unit. It is normal for the pressure on the Smart-Kor to read 100-200 PSI lower than the system pressure.

Resetting Auto-Retract Trigger:

If Smart-Kor triggers before drilling starts, hit the **Stop Advance/Retract Push Button** on control panel. Reset Smart-Kor by toggling *Auto Retract* on and off once. Smart-Kor will automatically detect the start of coring and the “% complete” will display progress.



Push Button Presets:

The core drill and manhole buttons can be programmed to your popular sizes in the operator configuration screen.



Park Position:

This is the retracted stop position, as measured in inches from the outside of the manhole. This should be set at the minimum distance that allows clearance for rotation and elevation changes before the next core. Typical value is 1-2 inches.

MACHINE CONTROLS



User Entered Offset:

If a user would like to enter an offset, press *Offset* on the run screen. The offset will be stored in memory. When the manhole or core drill is changed, Smart-Kor will revert to the default offset.



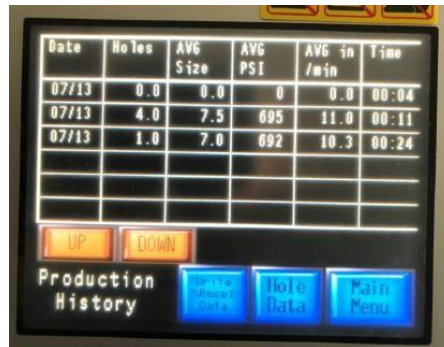
Default Offset:

Smart-Kor automatically calculates the full drilling depth based on core drill size and manhole size. The offset is then subtracted from the full depth to calculate the ideal core drill depth. The coefficients for default offset are set at the factory but can be adjusted depending on the concrete mix design and consistency of the wall thickness.

Viewing Production Screen:

The production screen shows the production date for each day. The number of holes cored, the average size, the average PSI, speed and time. This can be used to see the loading and speed of production. It is important to note that large core drills will take more time to core than smaller holes so consider the average core drill size when comparing output from one day to the next.

MACHINE CONTROLS



Date	Holes	AVG Size	AVG PSI	AVG in /min	Time
07/13	0.0	0.0	0	0.0	00:04
07/13	4.0	7.5	695	11.0	00:11
07/13	1.0	7.0	692	10.3	00:24

UP DOWN

Production History

Settings
Reset Data

Hole Data

Main Menu

Viewing Core Drill Screen:

The core drill screen tracks the performance of specific core drill sizes over time. When a new core drill is purchased clear out the old core drill. Enter a 12 inch core drill for example. Each time this core drill is selected and used the Smart-Kor will keep track of the number of holes, the average coring pressure, the total feet that has been cored and the average speed in inches per minute.



	Size	Date	Holes	Avg. PSI	Feet Cored	In/Min
0	9.1	1/06/08	0	0	0.0	0.0
1	5.0	1/06/09	0	0	0.0	0.0
2	6.0	1/06/08	0	0	0.0	0.0
3	9.0	1/06/09	0	0	0.0	0.0
4	0.0	0/00/00	0	0	0.0	0.0
5	0.0	0/00/00	0	0	0.0	0.0
6	0.0	0/00/00	0	0	0.0	0.0
7	0.0	0/00/00	0	0	0.0	0.0

Page Down

Core Drill History

Reset

Main Menu

Setting the Time and Date:

1. Unplug the ethernet cable to cause Proface to go off-line
2. Press button as shown

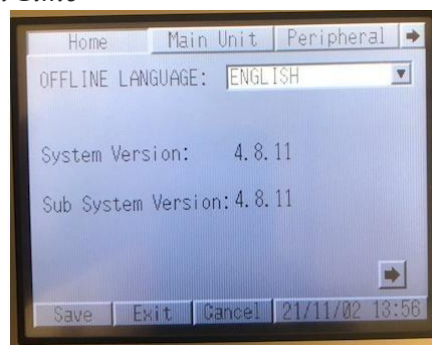


MACHINE CONTROLS

3. Press *Offline*



4. Press *Date And Time*

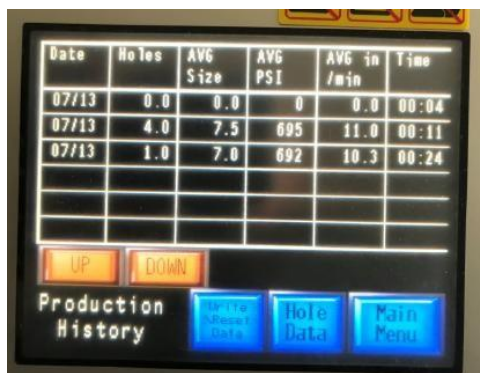


5. Edit date and time and press *Save*



To view EACH HOLE / hole data:

1. Go to *Production* screen



MACHINE CONTROLS

2. Press Hole Data

Date	Time	MH Dia (in)	Wall Thick (in)	Drill Dia (in)	Core Time (sec)
07/13	00:05	50.0	8.0	5.0	25
07/13	00:07	50.0	8.0	5.0	45
07/13	00:09	50.0	8.0	10.0	46
07/13	00:10	50.0	8.0	10.0	46
07/13	00:23	50.0	8.0	7.0	45
07/13	08:19	50.0	8.0	10.0	46

MH Dia (in)	Wall Thick (in)	Drill Dia (in)	Core Time (sec)	PSI	Depth Cored (in)
50.0	8.0	5.0	25	697	0.0
50.0	8.0	5.0	45	698	7.7
50.0	8.0	10.0	46	698	7.9
50.0	8.0	10.0	46	698	7.9
50.0	8.0	10.0	46	698	7.9
50.0	8.0	7.0	45	698	7.7
50.0	8.0	10.0	46	698	7.9

This provides a tabular listing of cored holes. If a blank thumb drive is installed in the PROFACE unit this data can be downloaded onto the drive for reference.

For question regarding Smart-Kor including downloading data, English and metric and configuration feel free to contact Trelleborg Pipe Seals Milford at 800-626-2180.

OPERATING INSTRUCTIONS

HYDROKOR V OPERATING INSTRUCTIONS



CAUTION! Review all safety instructions before attempting to operate the machine.

1. Turn on **Main Disconnect Rotary Switch**.
2. Reset **Emergency Stop Push Button** if actuated.
 - a. Confirm lovejoy spider is in place.
 - b. If applicable, remove current core drill by removing (4) $\frac{3}{8}$ -18 x 1.5 inch bolts (grade 5 or better) while safely supporting the core drill.
 - c. Install new core drill using (4) $\frac{3}{8}$ -18 x 1.5 inch bolts (grade 5 or better) while safely supporting the core drill.



WARNING! Follow safe lifting practices when lifting and lowering core drills.

3. Select core drill speed per BIT SPEED chart near **Core Drill Speed Selection Levers** on transmission:



WARNING! Machine power must be off before shifting. Damage may result if transmission is shifted while rotating.

- Referencing the BIT SPEED chart, adjust **Core Drill Speed Selection Levers**.
 - One lever must always be in the neutral position so the other may then be shifted to the desired diameter range.
 - BIT SPEED range may vary slightly depending on the concrete aggregate or other variables. To maximize drilling performance, it may be necessary to shift to the next speed up or down when drilling at either end of the recommended range.
4. Move positioners to appropriate locating dogs for manhole size.
 - NOTE: Prior to coring, the operator must make sure that the product being cored is stable and will not be pushed over during coring, creating a hazard. This is especially important with any non-standard

OPERATING INSTRUCTIONS

manholes that are tall and narrow, or that otherwise have a high center of gravity

5. Select Smart-Kor settings if equipped
 - a. Select *Run Screen* from *Main Menu*.



- b. Using touch screen buttons select the *Manhole Size* and *Drill Size*.
 - c. Select *Auto Retract On*.
 - d. If manhole or core drill size is not available, use *Other* button and enter the required sizes.



NOTICE! If manhole wall varies from nominal, the actual wall should be entered into Smart-Kor. For example, 48/5 manhole with off center form may have 6 inch wall on one side and a 4 inch wall on the other.

- e. The *Default Offset* button is displayed in the lower right corner of the touch screen. "Offset" is the thickness of concrete that is left behind when the core drill retracts. If you would like to enter a value other than the default, simply press the button and enter the desired value.
 - f. Use *Auto Retract On* for all coring. It should be turned off only in special situations such as a stuck core drill. Smart-Kor will not record data with *Auto Retract Off*. With *Auto Retract Off*, the touch-screen button will flash.

6. Press **Safety Reset Push Button** if required (will illuminate if required).

7. Turn on **Hydraulics Rotary Switch**.

OPERATING INSTRUCTIONS



NOTICE! When performing functions that will trigger the light curtains, the **Light Curtain Bypass Push Button** will need to be pressed continuously. A safety alarm will sound to alert personnel that the machine is in bypass mode. Offset coring and traversing will require the **Light Curtain Bypass Push Button**.

- NOTE: In cold weather the hydraulics can be prewarmed. Run the core drill motor with the transmission in neutral. This will warm and circulate the hydraulic oil.
 - Put transmission in *Neutral* using both **Core Drill Speed Selection Levers (On Transmission)**
 - Turn on **Hydraulics Rotary Switch**
 - Select *Core Drill On* using the **Core Drill On/Hydraulics On Lever**
 - Reference the **Oil Level And Temperature Display** for current hydraulic oil temperature
 - Once warmed, resume from BIT SPEED selection step.
8. Select *Hydraulics On* with the **Core Drill On/Hydraulics On Lever**.
 9. Before coring, rotate turntable to desired zero position using the **Left Turntable Rotate Lever** or the **Right Turntable Rotate Lever**. Once in zero position reset turntable display to zero using **Left Digital Turntable Reset Push Button** or **Right Digital Turntable Reset Push Button**.
 10. Rotate turntable to required degree position using the **Left Turntable Rotate Lever** or the **Right Turntable Rotate Lever**.
 11. Elevate core drill to desired height using **Core Drill Elevation Lever**.



CAUTION! Watch clearance between back core drills and machine decking while lowering elevation near bottom. Do not continue to hold **Core Drill Elevation Lever** left or right once hydraulic elevation cylinders are at end of travel.

12. Check that **Auto Feed Off/On Lever** is down, engaging semi-automatic feed mode. This should be the default mode.
13. Turn on core drill water using **Water On/Off Valve**.



CAUTION! Water must be turned ON before core drill makes contact with the product to minimize dust generation and overheating of core drill.

OPERATING INSTRUCTIONS



NOTICE! Water must be turned ON prior to core drill rotation. Failure to do so can result in premature water swivel wear.

14. Select *Core Drill On* using **Core Drill On/Hydraulics On Lever**.
15. Advance core drill using **Core Drill Advance/Retract Rotary Switch** with *Slow Advance Feed* selected on **Rapid Advance Feed/Slow Advance Feed Lever**.
16. Engage *Rapid Advance Feed* using **Rapid Advance Feed/Slow Advance Feed Lever**.
17. Engage *Slow Advance Feed* using **Rapid Advance Feed/Slow Advance Feed Lever** when core drill is approximately 1-2 inches (50mm) from manhole.
 - Use **Closed Circuit Camera Screen** to monitor core drill position
18. While coring, adjust core drill feed pressure using **Core Drill Feed Pressure Regulator Knob** as needed
 - Clockwise to increase pressure
 - Counter clockwise to decrease pressure
 - 1100-1300 PSI for core drills 7-60 inches
 - 400-800 PSI for core drills under 7 inches
 - It is normal for the pressure to rise when the core drill encounters cage wire. 1500 PSI is the stall pressure of the core drill motor. Auto feed minimizes stalling in cage wire.
19. Retract core drill at appropriate depth using **Stop Advance/Retract Push Button**, or by using **Core Drill Advance/Retract Rotary Switch** then **Stop Advance/Retract Push Button**.
 - a. Machines not equipped with Smart-Kor have two options for core drill stop and retract:
 - Option A: The operator can view the **Closed Circuit Camera Screen** to see the position of the core drill as it exits the wall of the manhole.
 - Option B: For repeat coring with same core drill and manhole sizes (such as 12 inch holes in 48/5 manholes), the **Retract And Park Limit Switch** trigger can be adjusted for

OPERATING INSTRUCTIONS

the proper retract depth. The machine will automatically retract when trigger is hit.



NOTICE! The goal when coring is to retract before the hole is complete. Sufficient material should be remaining to safely retain the puck in the manhole. At a later time, the puck can be removed leaving a clean hole.



CAUTION! Not cutting completely through the manhole wall will prevent the puck from breaking off inside the core drill. In the event a puck breaks off inside the core drill, use caution when removing the puck to avoid injury.

20. When core drill has sufficiently retracted hit **Stop Advance/Retract Push Button** or allow core drill to fully retract to **Retract And Park Limit Switch** so that the retract solenoid is de-energized.

- Smart-Kor machines will automatically stop at the programmed park position.

21. Shut off water using **Water On/Off Valve**.

22. Select *Neutral* on **Core Drill On/Hydraulics On Lever**.

23. Stop hydraulic pump motor unit using **Hydraulics Off/On Rotary Switch**.

24. Repeat as needed for multiple holes. Refer to Smart-Kor Controls for viewing production information.

MAINTENANCE

RECOMMENDED MAINTENANCE

The Hydrokor V machine is made with industry standard hydraulic components designed for many years of service. With all hydraulic equipment it is important to keep the hydraulic oil clean. Please refer to the *Hydraulic Power Unit Manual* for more information on hydraulic system maintenance.

- **Daily**
 - Check hydraulic oil level and maintain as needed
 - Inspect elevation rod bellows and replace if worn
 - Check pressure on oil filter. Replace if pressure is >45-50 PSI when machine is at operating temperature (100°F+)
 - Inspect machine for any maintenance and or potential safety issues including worn hydraulic hoses, loose fittings, damaged components, damaged core drills, etc.
- **Monthly**
 - Grease feed frame casters and base frame rear casters with Mobiltemp 78 or equivalent
 - Grease (4) traverse shaft flange mount bearings with Mobiltemp 78 or equivalent
 - Grease turntable casters with Mobiltemp 78 or equivalent
 - Grease spindle pillow block bearings with Mobiltemp 78 or equivalent
 - Inflate turntable drive wheel to 50 PSI
 - Coat vertical guide posts with light oil such as way oil, hydraulic oil, or equivalent
- **Yearly**
 - Service hydraulic power unit
 - Change transmission oil with (4) quarts 80W-90W gear oil
 - Remove turntable lid and clean and inspect drive tire, encoder, casters and center post bearing and replace as needed
 - Inspect feed casters, traverse casters and traverse wheels and service as needed
 - Inspect vertical guide post bearings for wear and torque to 10 foot pounds nominal

MAINTENANCE

TURNTABLE SERVICE



TRELLEBORG

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To remove the turntable lid:

1. Loosen (4) motor mount slide bracket bolts for each drive tire.
2. Back off adjuster rod in the corner until tire is not contacting inside of lid.
3. Remove (4) retaining bolts from center of lid.
4. Using a three-or four-point chain, attach hooks to underside of lip and lift lid. Place to side while maintaining the angular alignment if possible to aid reassembly.



WARNING! Do not stand on edge of machine while loading turntable lid

To service the turntable:

1. Check that inside of turntable lid skirt where the tire touches is clean, dry and free from damage.
2. Check, grease, and replace broken or seized casters.
3. Check that the tire pressure is 45-50 PSI and that the tread is in good condition.
4. Check that motor has no damage or signs of wear, and is free of oil leaks.
5. Check that tire mounting flange fits securely.
6. Check that lid sealing gasket is in place on the mounting plate and that all surfaces are clean.

To install the turntable lid:

1. Align bolt pattern of lid and hub and install (4) bolts.
 - NOTE: Bolt pattern is not square
 - Two threaded rods, (1) 24 inches long and (1) 18 inches long, can be helpful to pre-align the mounting pattern for installation of the lid. Temporarily install threaded rod in diagonal corners of hub. As lid is lowered align 24 inch rod first and 18 inch rod second. Lower the assembly and the adjacent holes will be aligned. Install two bolts then remove rods allowing 3rd and 4th bolt to be installed.

2. Re-adjust drive tire. As the tire is tensioned the sidewall will bulge. Tension until the side wall has approximately 3/16 inch clearance to the mounting bolts. Insufficient tension will allow wheel spin.

HYDRAULIC CIRCUIT DIAGRAM

INSTALLATION

BASICS FOR INSTALLING A HYDROKOR III WITH TRAVERSE

1. Position Hydrokor Vmachine on pad according to the plant layout drawings. **Do not anchor either the machine or the turntable to floor before performing the steps described below.**
2. Level the machine and turntable. Make sure that turntable is same level, front to back, as machine. This is very important to insure the strength and stability of the machine, and for truer, smoother cuts.
 - a. Connect electrical power using a **licensed Electrician**
 - b. Fill hydraulic power unit reservoir with 40 U.S. Gallons of DTE 25 Oil or equivalent (refer to *Hydraulic Power Unit Manual*)
 - c. Connect machine to water supply using $\frac{3}{4}$ inch piping or flexible hose.
 - d. Make all hydraulic turntable connections using quick connect fittings
 - e. Connect turntable encoder
 - f. Start hydraulic pump motor and check rotation. Rewire if needed for correct rotation by swapping the phases.
3. All displays should be lit and operable at this point.
4. Use **Light Curtain Bypass Push Button Switch** to allow set-up operation before light curtains are in place
 - a. Shift both **Core Drill Speed Selection Levers** into *Neutral* (item 20) and turn *Core Drill On* using **Core Drill On/Hydraulics On Lever**
 - i. Advance machine using **Core Drill Advance/Retract Rotary Switch** and select *Rapid Advance Feed* on the **Rapid Advance Feed/Slow Advance Feed Lever** ii. Select *Slow Advance Feed* on the **Rapid Advance Feed/Slow Advance Feed Lever** and press **Stop Advance/Retract Push Button** when machine is fully advanced. Fully retract machine. Repeat five times.
 - iii. Select *Hydraulics On* using the **Core Drill On/Hydraulics On Lever** and then use **Traverse Lever** to *gently* move machine from full-left to full-right positions, carefully checking for full contact at each extreme. This will help align the rails to the machine and purge air out of the hydraulic oil
 - b. Load a manhole on positioners, install a 12 inch core drill on the spindle, and select *Hydraulics On* using the **Core Drill On/Hydraulics On Lever**.

Use the **Traverse Lever** to traverse machine to the center of the manhole. Advance machine using the **Core Drill Advance/Retract Rotary Switch** with the transmission in neutral to 1 inch from the manhole.

INSTALLATION

- i. Measure the distance from the manhole to the left and right sides of the core drill. Keeping the turntable square to the machine, adjust the turntable location left to right until the measurements of both side of the core drill are equal.
- c. The machine now needs to be cleared of all air from its hydraulic system.
 - i. Select *Hydraulics On* using the **Core Drill On/Hydraulics On Lever**
 - ii. Lift and lower elevation five times using **Core Drill Elevation Lever**, holding at extremes for several seconds.
 - iii. Rotate each turntable five times in both directions using **Left and Right Turntable Rotate Levers**.
 - iv. Check oil level and top off as needed.

HYDROKOR VT ASSEMBLY DRAWING

