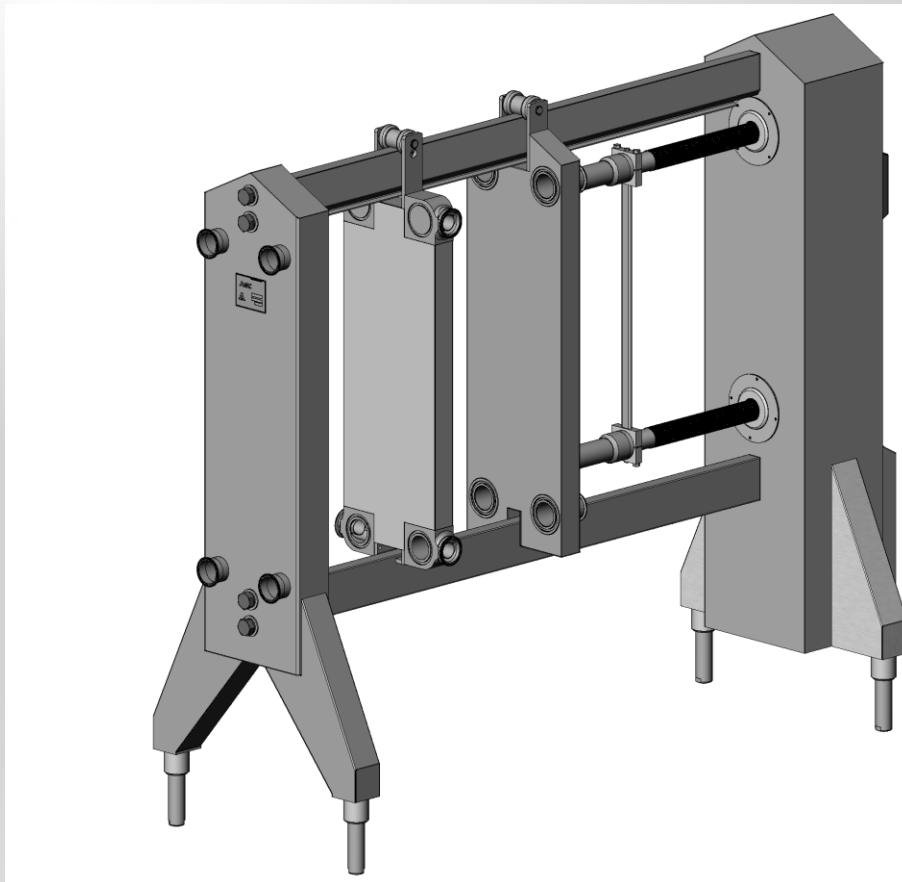




AGC Model Pro31-H

Operation and Maintenance Manual



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Revised 07/01/20

Scope:

This manual is intended to be a supplement to the **AGC Heat Transfer** Proflow Operation Manual. The information provided here is for the normal operation and installation of the AGC Model Pro31-H Plate Heat Exchanger. Please read and follow all safety instructions contained in this manual. Failure to follow all safety recommendations could result in serious injury to the operator or cause damage to the press. If you need additional information or spare parts for this or any other equipment built by AGC please contact your local AGC distributor.

Receiving and Inspection:

Each AGC frame is assembled and fully tested at the factory prior to shipping. After testing, the unit is prepared for shipping. When the press leaves the factory it is in perfect condition. Upon arrival, carefully inspect the frame for any damage that may have occurred during shipping. If you notice any damage from shipping or otherwise note it on the shipping paperwork and report it to AGC immediately. In most cases the frame is shipped assembled with the plates in a separate crate. Because each frame can weigh over 4,000 pounds, only qualified and licensed forklift truck drivers should lift and position the frame. Figure 1 shows the major frame components. Depending on the application, your frame may or may not be equipped with one or more terminals.

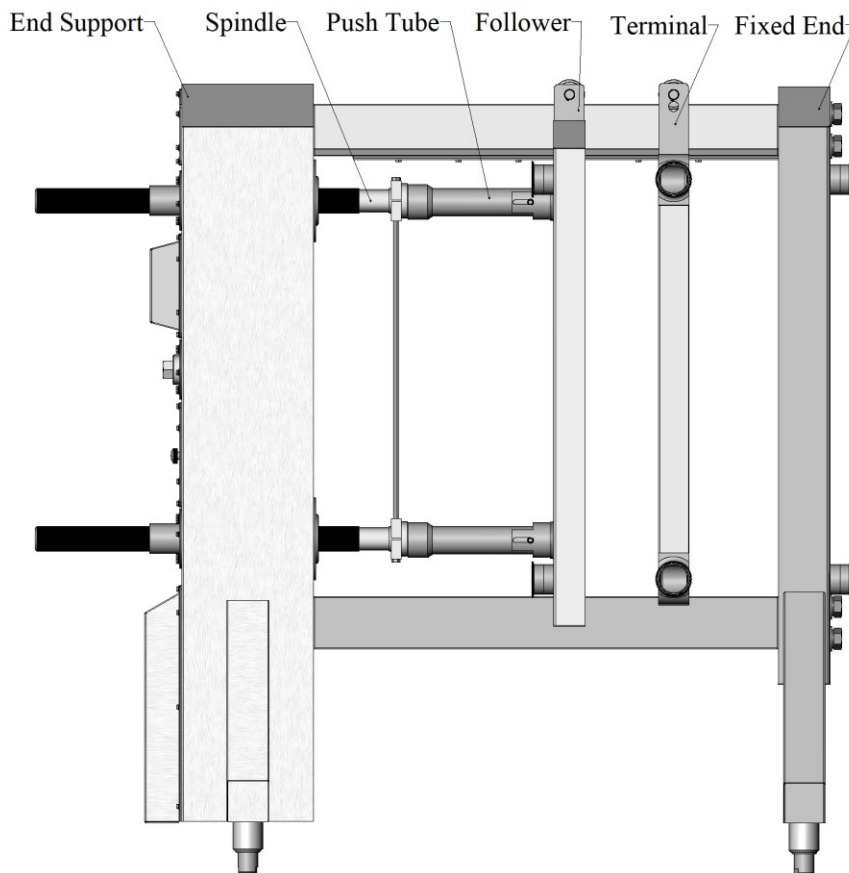


Figure 1
Major Frame Components

Locate the drawing package that was shipped with your frame. This drawing package contains important information specific to your frame. If your frame was delivered without a drawing package, contact AGC or your local AGC distributor for a replacement package prior to installing the frame.

Frame Placement:

The Pro31-H frame should be located on a firm flat surface capable of supporting the press and all of its contents when full. Ensure that adequate space is left around the frame for maintenance and plate installation/removal. The drawing package will show the clearance required for the spindle shafts to be fully retracted. This is the space required to fully open the press.

Each frame is equipped with adjustable ball feet to compensate for minor floor variations. To adjust the ball foot height, turn the base of the foot clockwise to raise and counter clockwise to lower. **CAUTION:** Never exceed the maximum port height dimension shown on the streaming diagram. If this dimension is exceeded, the leg could disengage from the socket and the frame could tip.

When moving the frame, the top rail can provide a good lifting point. However, when using the top rail as a lifting point, exercise caution to prevent damaging the plate hanger. Do not attempt to lift a frame using the port nozzles as a lifting point. Lifting a frame by the port nozzles could crack the nozzles causing leaks. Moving a frame that is fully populated with plates is not recommended.

Normal Operation:

The AGC Model Pro31-H (Hydraulic) end support is designed to provide easy opening and closing the Model Pro31 Plate Heat Exchanger. As with all plate heat exchangers, the unit must be cooled below 90° F and relieved of all internal pressure before opening. **Failure to follow this safety warning could result in serious injury to the operator or damage to the plates and/or plate gaskets.**

The hydraulic end support uses an electric motor to power the hydraulic pump. The hydraulic system is used only when opening or closing the frame and should not be operated when the press is processing product, during the cleaning cycle (CIP), or any time fluids are being circulated through the plate pack.

Opening or closing the press is done by using the open/close valve, which is accessible through a splashguard located on the side of the end support (see figure 2). This is a three-position (open/neutral/close) valve equipped with detents that will hold the valve either open or closed position for a majority of the closing process or opening process. It has been set at the factory to close the press to the “dead-hard” condition when the valve is held in the closed position. When the plates are new it is permissible to operate the unit at or below the start dimension but never below the minimum. After years of service and depending on the amount of operating pressure, valve movement or starting and stopping of pumps, the plates contact points may begin to show normal wear. If this condition exists you may find the hydraulic system will tighten the unit below the originally installed dimension or even below the minimum dimension (not normally) to obtain a “dead-hard” condition. Refer to the operator maintenance section for instructions on adjusting the hydraulic system pressure.

In the event of a power failure, the press can be opened or closed manually by turning the hex on the sprocket drive shaft. Rotate clockwise to open, and counter clockwise to close. Note: Because of the gear reduction used in the closing mechanism, manually opening or closing the frame isn't practical and should only be considered as an option in extreme circumstances.

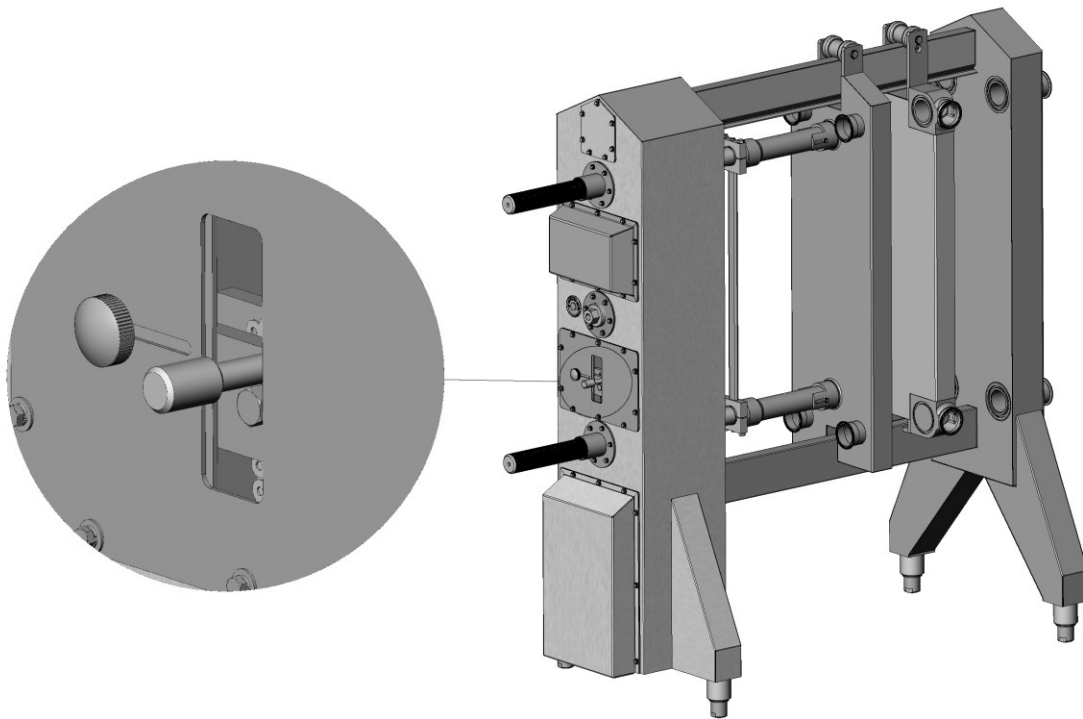


Figure 2
Open/Close Lever

Closing the Frame:

After all the plates and any terminals are installed into the frame it can be closed. Refer to the streaming diagram that was provided with the heat exchanger to determine the proper plate configuration and piping requirements. The Pro31-H will provide enough closing power to compress the plate pack to the factory recommended minimum or “dead-hard” dimension. The press is equipped with a pressure gauge that provides information on how much pressure is being developed in the system as the plate pack compresses. This pressure is associated with the amount of resistance the plates are providing to the spindle screws. The streaming diagram will have a start dimension and a minimum dimension. Figure 3 shows where this information is listed on the drawing. Note: The dimensions for each frame will be listed on the streaming diagram shipped with that frame.

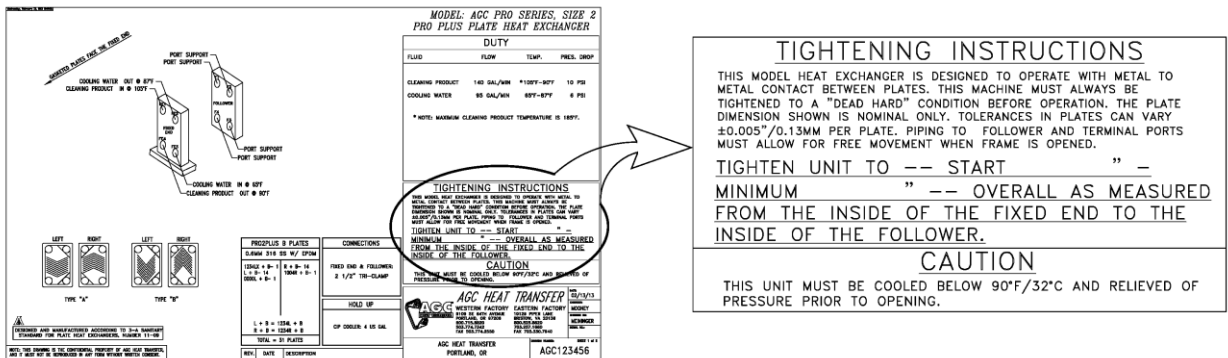


Figure 3
Streaming Diagram Sample

To close the frame, apply power to the hydraulic power unit. Before closing the press the operator should make sure all pipes and lines are clear and the plates are in the correct arrangement per the drawing. Move the open/close lever to the upper locked position. This lock or detent will hold the valve in position until the frame is approximately one to two inches from the start dimension. If this is the first time closing a new press or the first closure after installing new plates the compressed dimension should be observed and compared to that shown on the drawing. Hold the handle in the closed position and continue closing until the unit stalls. After the unit stalls you will be at the “dead-hard” dimension, which is between the start and minimum dimension for a new unit. You are now ready for operation. It should also be noted that as the plates compress, it is normal for the plate pack to make crackling noises. This is caused by the plates sliding along the support rail and is not a cause for alarm. After the hydraulic unit has stopped closing (stalled) disconnect power to the unit and make a note of the actual “dead-hard” dimension as shown in figure 4. If this dimension is below the minimum and the plates are installed per the drawing, you should consider purchasing a new plate pack or obtain a professional opinion from one of our factory engineers as to the actual condition of the plates.

Installation of new gaskets and/or plates is recommended if external leakage is observed when operating at the minimum dimension or below.

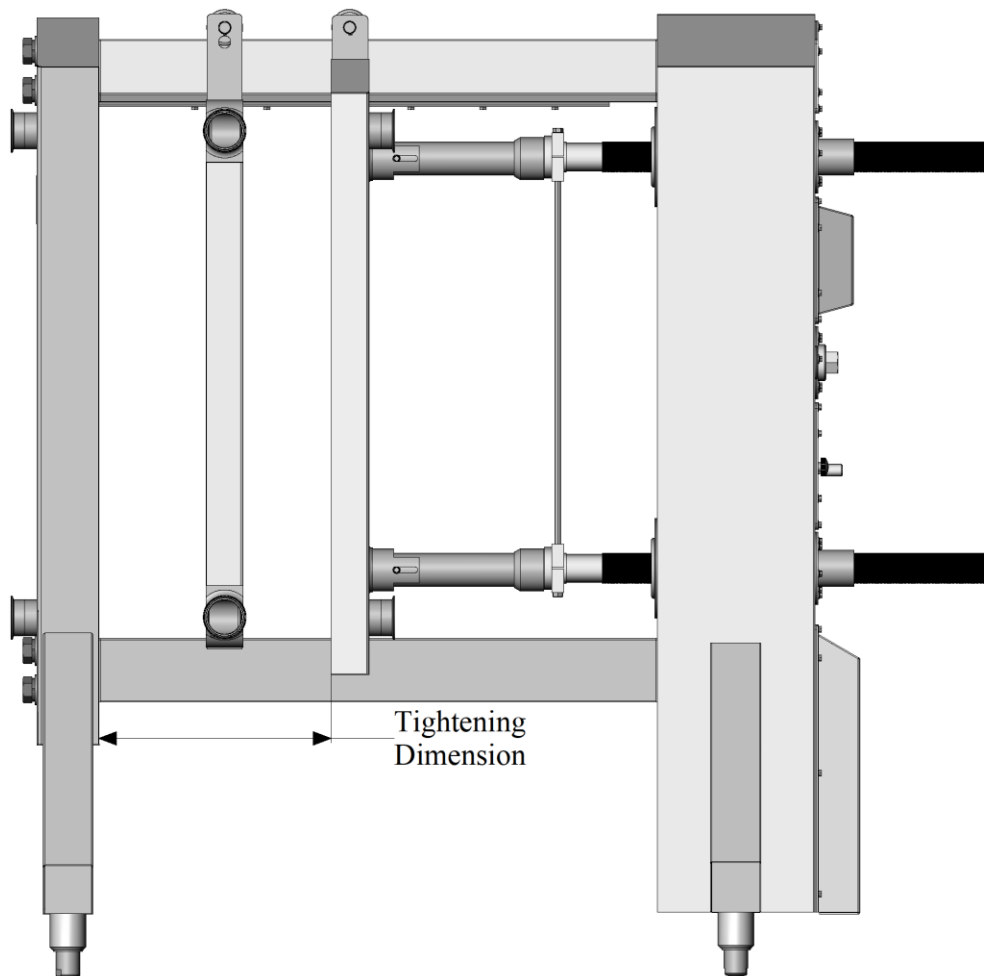


Figure 4
Tightening Dimension

The heat exchanger should be pressure tested to check for leaks. If the pressure check passes, the frame is ready to be put into service.

Opening the Frame:

To open the frame, apply power to the hydraulic power unit. Move the open/close lever down to the open position. The handle is equipped with detents that will hold the lever in the open position after the unit is opened slightly. The spindle shafts will start to retract and the follower will move back toward the end support. The follower will only move back as the plate pack expands to its uncompressed state. As the spindles retract the pushtubes may disengage from the spindles. This could allow the pushtube to rotate about the supporting pin causing the push-tube to swing down (see figure 5). Caution should be exercised when opening the frame to prevent injury by the pushtube.

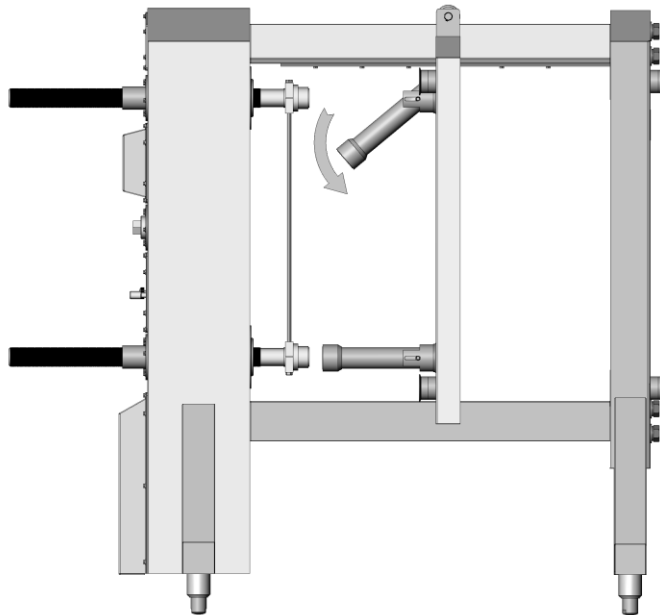


Figure 5
Pushtube Swing

When retracting the spindles, it is recommended to back the spindles out only to the point that the plates can be removed. Once the spindles have been adequately retracted the handle should be moved to the center (neutral) position.

Frame Assembly Instructions:

Assembling a Pro31 frame requires careful attention to detail and should only be attempted by qualified equipment installers or maintenance technicians. The components are large and could cause serious injury or death if mishandled. The procedure described here is the method used at the factory to assemble the press. Your particular site requirements and limitations may require deviation from this description. It is assumed that the persons installing this heat exchanger are familiar with processing equipment and sanitary installation methods. If you have questions about erecting a Pro31 frame or any procedure described in this section, please contact AGC or your local AGC distributor.

Upon delivery, uncrate all components and inspect for damage. Check the drawing package and packing slip to ensure all components are present. To complete this assembly you will need two sets of jack stands (2 stands 19" tall and 2 stands 25³/₄" tall), a forklift truck, a socket wrench with an 8 (eight) inch extension, a 1⁷/₈" socket, a lifting sling rated for 4000 lbs cinch, and a spirit level (or other level measuring device).

To assemble the press:

1. Place the fixed end assembly on the two 19" jack stands (see figure 6-1). The jack stands should be located near the ends of assembly as shown. Position the two 25³/₄" tall jack stands as shown. Depending on the size frame you are assembling the actual distance from the fixed end will vary. These stands will support the rails and should be located so they are opposite from the rail holes in the fixed end.
2. The Pro31 uses two different length bolts to secure the rails. Each press requires 8 (eight) rail bolts. Four each 1¹/₄-12 x 8" long and four 1¹/₄-12 x 7" long.
3. To attach the rails to the fixed end use the four 8" long bolts, 4 each 1¹/₄" flat washers, and 4 each 1¹/₄" lock washers. Prior to installation, apply a liberal amount of food grade anti-seize to the threads of each bolt.
4. Position the bottom rail as shown in figure 6-2. Loosely bolt the bottom rail in place. It may be necessary to adjust the rail to install the end support.
5. Position the upper rail as shown in figure 6-3 (hanger side toward the bottom rail) and loosely bolt the rail in place. Note: The bolts will be fully tightened after the end support is installed.
6. Using a forklift truck, carefully position the end support assembly at the end of the rails as shown in figure 6-5. It will be necessary to remove the upper and lower covers on the end support to gain access to the rail bolts. Install the rail bolts and washers to attach the end support to the rails.

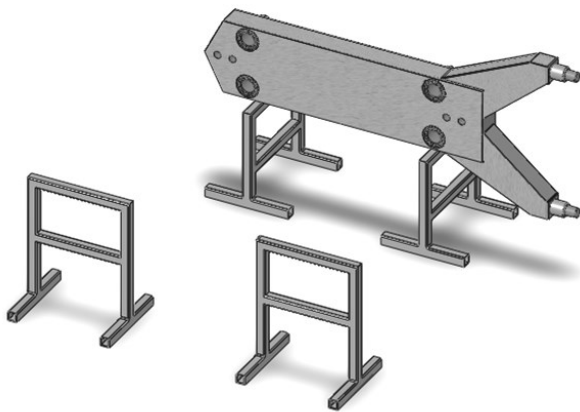


Figure 6-1
Fixed End on 19" Tall Stands

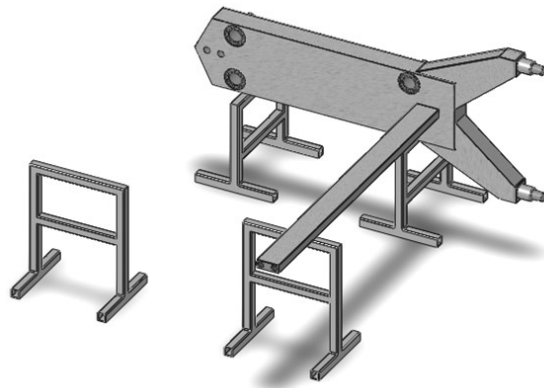


Figure 6-2
Fixed End with Bottom Rail

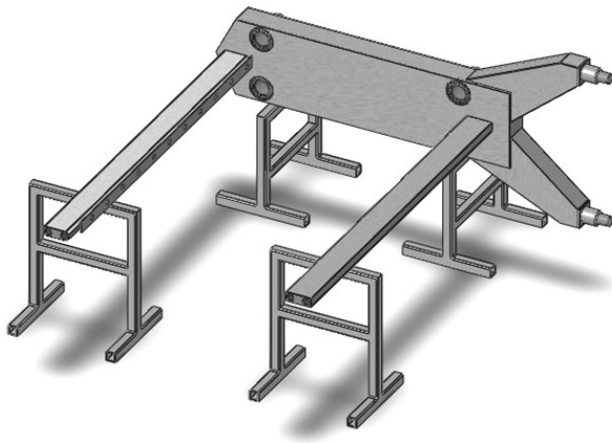


Figure 6-3
Press with Both Rails

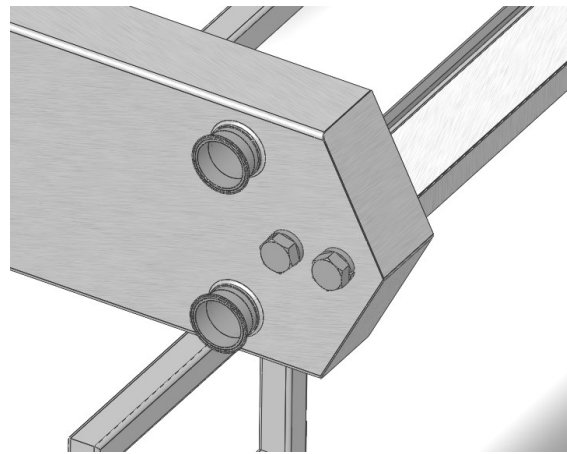


Figure 6-4
Fixed End with Rail Bolts

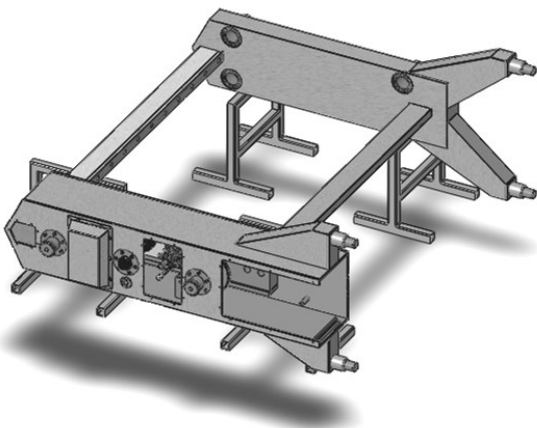


Figure 6-5
Positioning the End Support

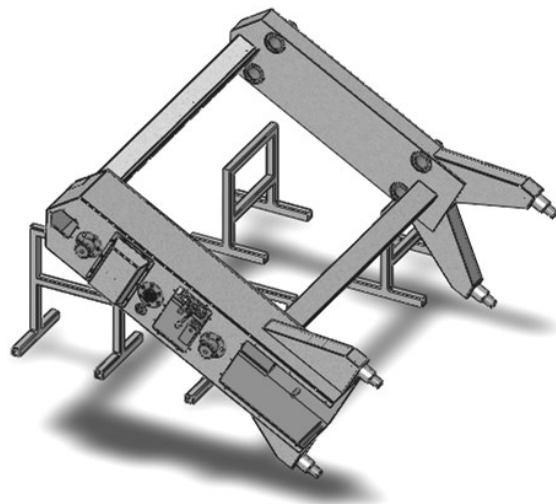


Figure 6-6
Raising Frame

7. After the end support rails are securely tightened, tighten the rail bolts on the fixed end (these bolts were left loose in step 4 above).
8. Using a forklift truck carefully stand the frame assembly upright, lifting it by the upper rail as shown in figure 6-6.
9. After the press is upright (see figure 6-7) and in the desired location it must be leveled so the plates and terminals will hang correctly. Make sure the fixed end is plumb. This can be accomplished by putting a spirit level across the ports (see figure 6-8). Adjust the ball feet as necessary. Caution: Do not exceed maximum port center height as shown in the drawing package.

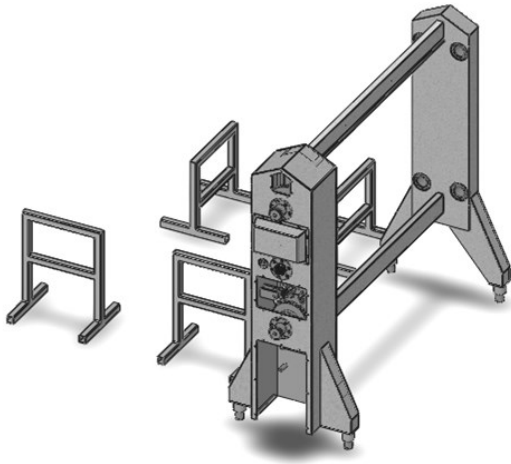


Figure 6-7
Frame Standing

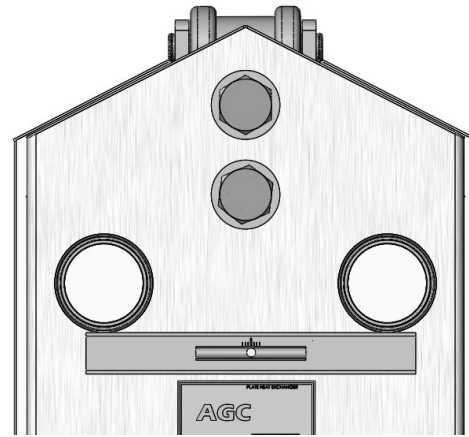


Figure 6-8
Leveling the Ports

10. After leveling the fixed end, check the upper rail to ensure it is level. The plate hanger on the upper rail must also be level in order for the plates to hang correctly.
11. Once the upper rail is level, the rail bolts should be checked to ensure they are fully tightened.
12. To install the follower it is necessary to remove the roller. To remove the follower roller, remove one of the snap rings on the roller pin, then slide the pin out and remove the roller.
13. The follower is installed using a lifting sling. The follower is wrapped with the sling in a cinch configuration and tilted into position using a forklift truck (figure 6-9). After the follower is over the bottom rail, stand the follower upright and re-install the roller and pin. Secure the pin with a snap ring.

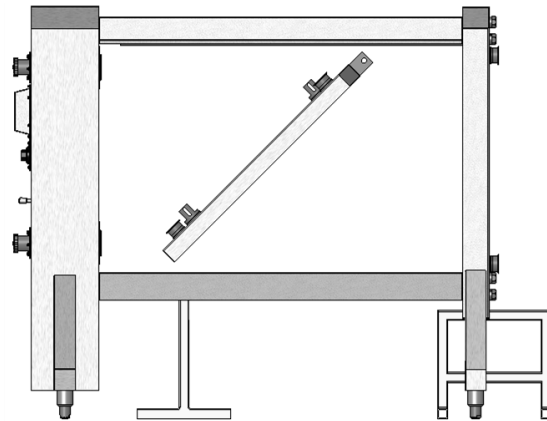
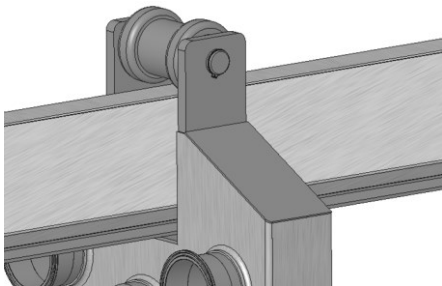


Figure 6-9
Follower Installation

14. Install any terminals using the same procedure as described for the follower.
15. Next, adjust the spindle shafts so they are spaced an equal distance from the End Support (see figure 6-10). Dimensions 'A' and 'B' must be equal. To adjust this dimension, loosen the two outside hex head screws and the center screw on the reaction bar end. Then rotate the spindle to establish matching dimensions A & B.

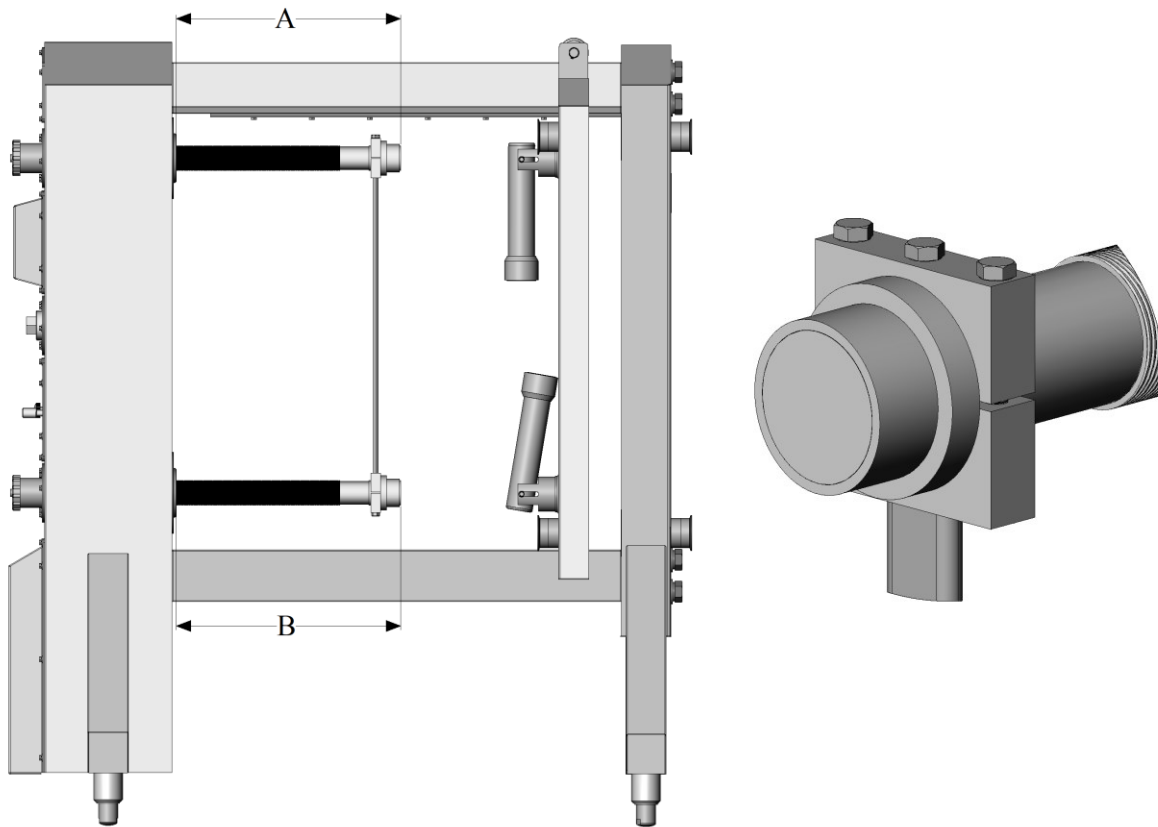


Figure 6-10
Reaction Bar Adjustment

16. Retighten the reaction bar end by first tightening the outer screws then the center screw.

Electrical Connections:

Only a qualified electrician following all applicable local regulations should make the electrical connections to the motor. Because each installation is different, no holes are predrilled at the factory for electrical connections. The frame is designed with adequate spacing for a conduit to run from either the top or the bottom. The electrical motor is a 230/460V 3 phase 5 horsepower NEMA 184T frame unit. The hydraulic power unit is self-contained and can be removed for maintenance or during initial installation to allow easier access to the electrical connections as shown in figure 7. To remove the reservoir assembly, remove the two fasteners located at the back of the tank. The assembly will slide out as shown in the figure. After connecting the motor, return the reservoir to its original location and secure it.

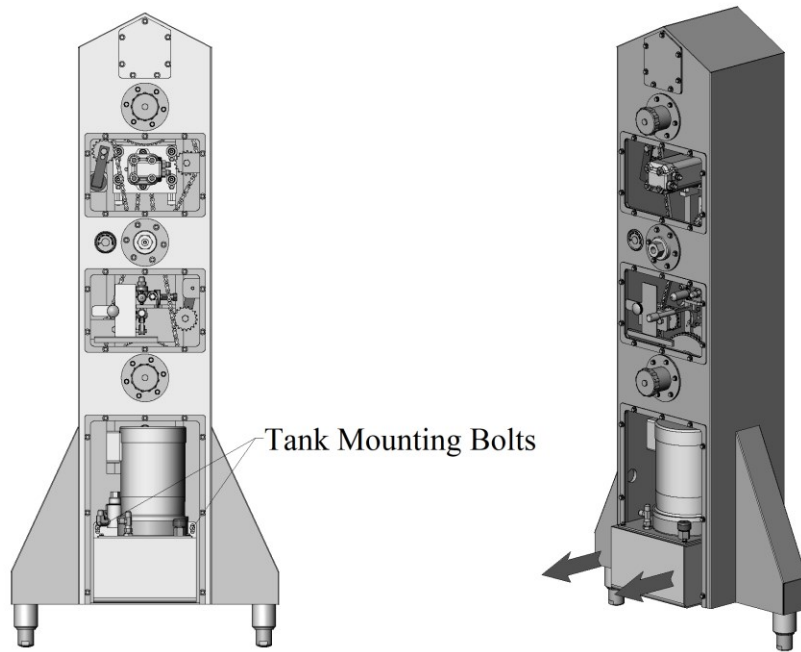


Figure 7

The electrical motor is pre-set at the factory to rotate in the correct direction. New

The gear pump is pre-set at the factory to rotate in the correct direction. New



Figure 8
Wiring Diagram

If the rotation of the motor is incorrect, the pump will not produce pressure and the system will not operate. To reverse the rotation of the motor, swap T-2 and T-3 at the motor.

Hydraulic Power Unit:

After the electric motor is connected, the hydraulic power unit and associated components can be tested/verified. The Pro31-H hydraulic power unit is capable of producing a maximum of 3500 psi. This maximum pressure is regulated down using a pressure-regulating valve. This valve is pre-set at the factory to match the system requirements for closing a new plate pack. As the plates and gaskets age it may be necessary to adjust the hydraulic system pressure. To adjust the system pressure follow the procedure described in the Operator Maintenance section of this manual.

Typically the press is shipped from the factory with a full reservoir. However, if the press is shipped disassembled, the oil will be shipped in a separate container. Prior to testing the motor, ensure the hydraulic reservoir is full. The tank capacity is four gallons and should be run full. To check the oil, remove the breather cap to view the dipstick. The oil level should be visible on the stick near the full indicator line.

The Pro31-H is equipped with a pressure gauge visible to the operator during normal operation. This gauge shows the pressure being developed by the hydraulic system. If after applying power to the electric motor, no hydraulic pressure is developed the most probable cause is incorrect motor rotation. To change the rotation of the motor, refer to the Electrical Connections portion of this manual.

Operator Maintenance:

The unit is designed to operate reliably with little operator maintenance. However, when servicing the frame observe all lockout/tagout regulations prescribed by your company. In addition, you should **NEVER OPEN THE PRESS WHEN IT IS PRESSURIZED OR WHEN HOT**. The press must be cooled below 90° F prior to opening.

A good preventative maintenance schedule will minimize or eliminate major mechanical problems. Operating the press regularly will help to keep the mechanical components in good working order. The press has three (3) lube points (figure 10) that should be lubed monthly.

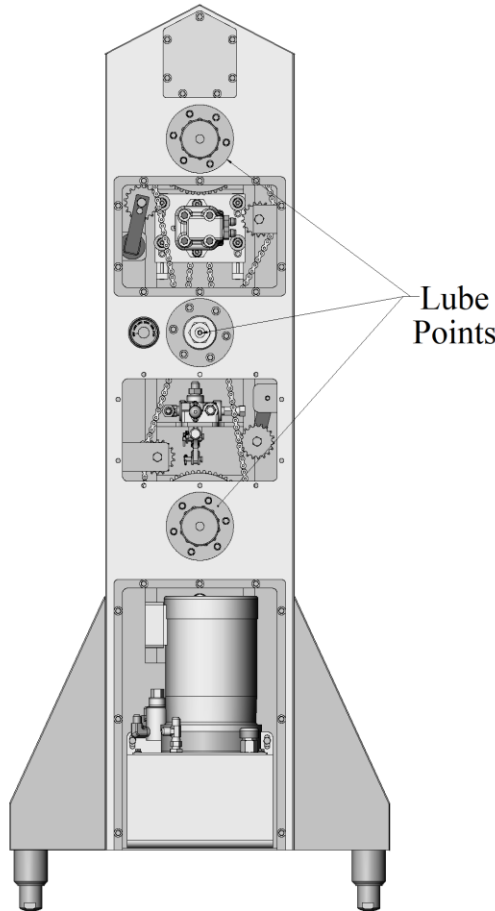


Figure 10
Lube Points

Press Monthly Lube/Inspection:

1. Lockout/Tagout the voltage supply to the press.
2. Remove the upper motor cover by removing the 10 bolts holding the cover.
3. Remove the sliding door cover by removing the 10 bolts holding the cover.
4. Inspect the door gasket for tears or cracks. Replace as required. Both covers use the same gasket (AGC part number 11020014).
5. Inspect drive chains for excessive wear or defects. Lubricate chain with food grade chain lubricant.

6. Inspect hydraulic hoses for signs of leakage or swelling. Replace hoses as necessary. (Contact AGC for appropriate part number.)
7. Locate grease fittings as shown in figure 10. Using food grade grease, lube the three points liberally.
8. Replace the covers removed in steps 2 and 3 above.
9. Inspect the spindle shafts for signs of wear.
10. Apply food grade grease to the exposed threads of the spindle shaft.
11. Remove lockout/tagout device and return press to service.

Because the spindle screws only receive lubrication when they are being moved, the press should be opened/operated once a month. If the procedures in your plant don't allow for opening the press monthly, at a minimum the spindle shafts should be moved out and back to distribute grease.

Spindle Preventative Maintenance:

1. Read all instructions in this procedure before beginning maintenance.
2. Relieve press of all internal product/media pressure.
3. Ensure press is cooled below 90° F.
4. Measure and record compressed dimension of the plate pack (see figure 4).
5. Apply power to the hydraulic power unit.
6. Open splashguard on back of end support and slide the control valve handle out.
7. Move the control valve handle down while measuring the compressed dimension of the plate pack. You will be opening the press approximately ½”.
8. Move the control handle to the upper position to return the plate pack to the compressed dimension measured in step 4 above. Do not exceed the minimum dimension listed on your drawing.
9. Return handle to neutral position and close splashguard door.
10. Remove power from the hydraulic power unit and return press to normal operation.

Hydraulic System

The hydraulic system is self contained and should require little operator maintenance. The oil should be checked regularly and changed after approximately 4000 hours of use. When changing the oil, use only good quality foam inhibited hydraulic oil (Grade 46). Use of lesser grade oils could lead to mechanical malfunctions within the hydraulic power system.

The unit is set at the factory to close the press to a “dead-hard” condition. As the plates, gaskets, and system components age, it may become necessary to adjust the hydraulic system pressure to achieve complete press closure or the “dead-hard” condition. The open/close valve is equipped with an adjusting screw (see figure 11).

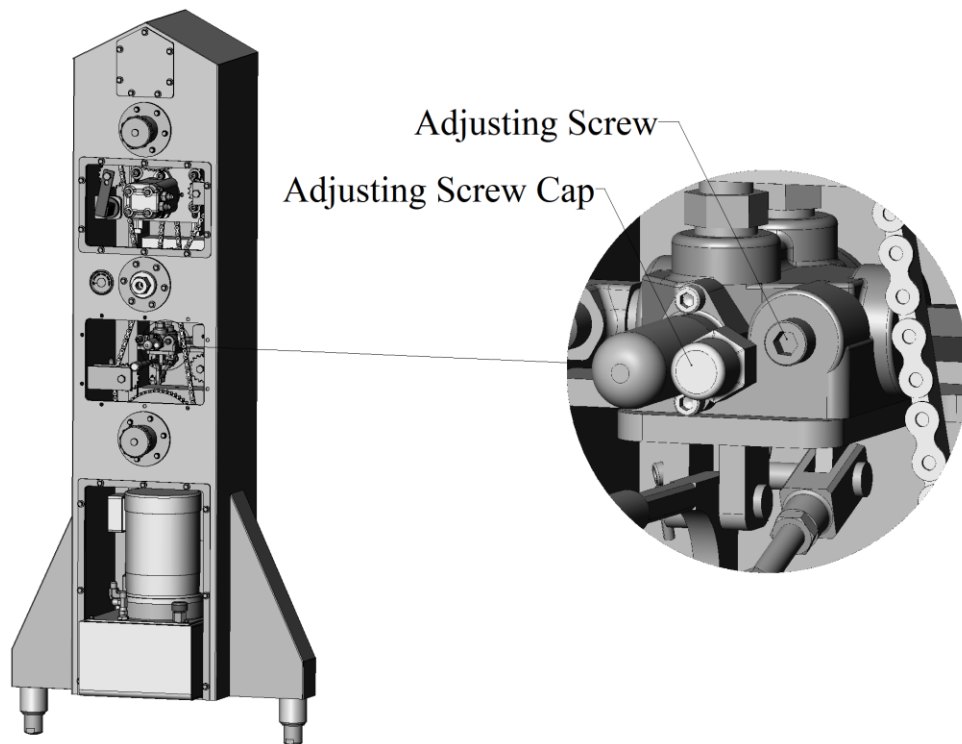


Figure 11
System Pressure Adjustment

To access the adjusting screw, remove the cap as shown. Note: This cap is fitted with an o-ring seal, and hydraulic fluid will seep around the adjusting screw during the adjustment. Turning the screw clockwise increases the system pressure. As a point of reference, $\frac{1}{4}$ turn on the adjusting screw will increase system pressure by as much as 250 psi. Adjust the system pressure in small increments. A new Pro31-H with new Pro3 stainless steel plates requires approximately 1800 psi to close to the “dead-hard” condition. The minimum dimension shown on the streaming diagram will not normally be exceeded. After the pressure is set to the required level, replace the adjusting screw cap and operate the hydraulic system inspecting for system leaks. If no leaks are detected, replace the cover panel and return the press to normal operation.

Parts List:

Replacement parts for the Model Pro31-H can be ordered from AGC or your local AGC distributor. Most parts are in stock and can be shipped within 24 hours from time of order. Some components have had engineering revisions, so when ordering spare parts be sure to have your unit specific information available.

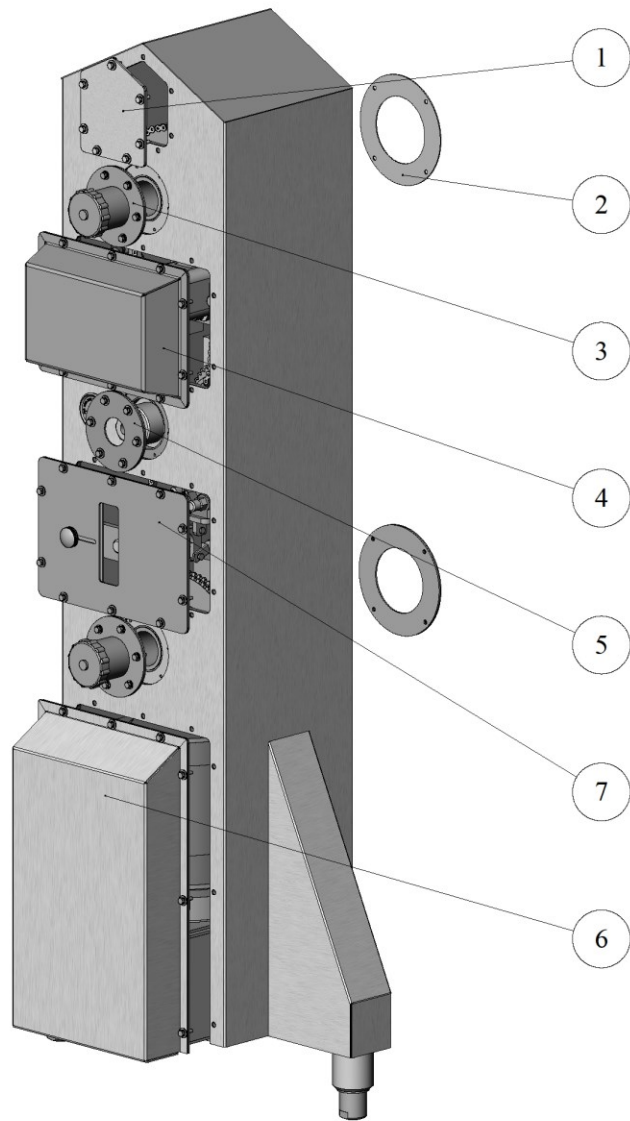
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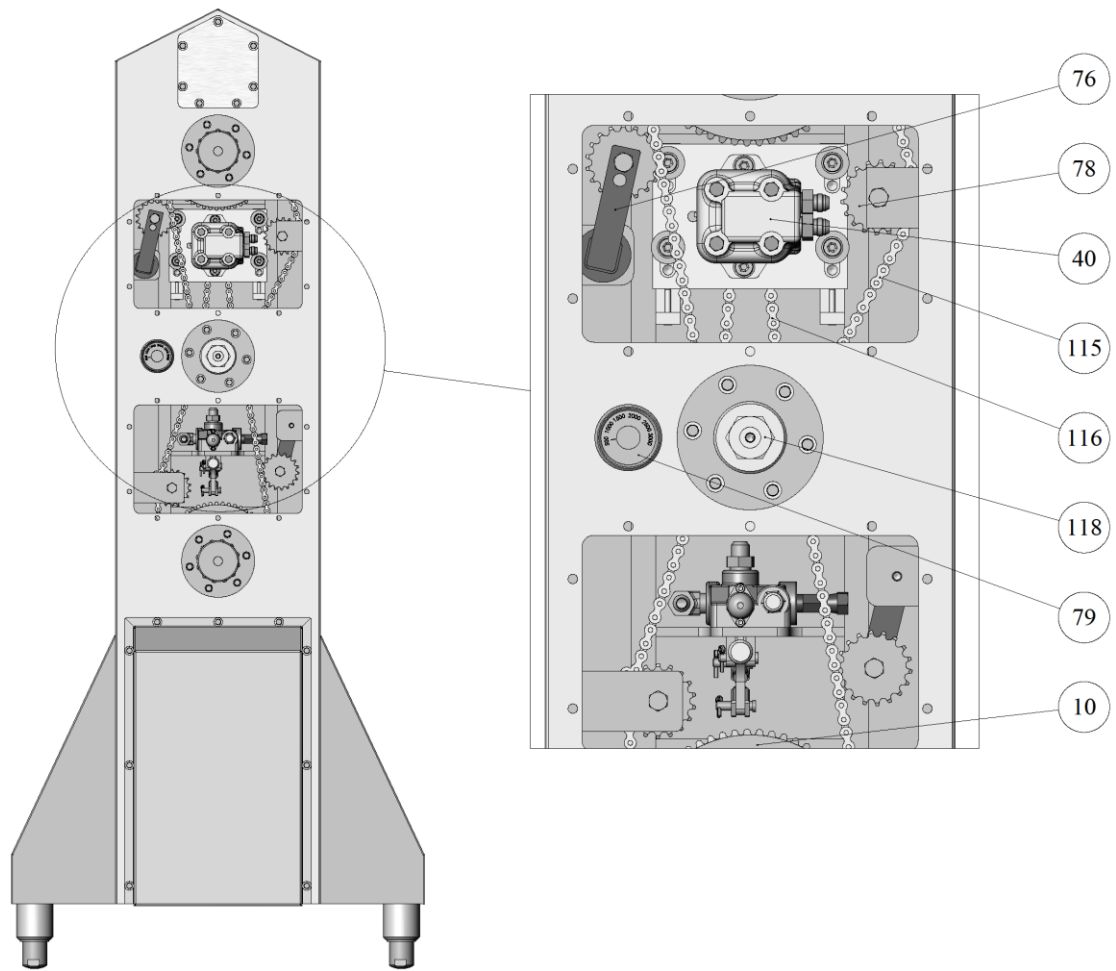
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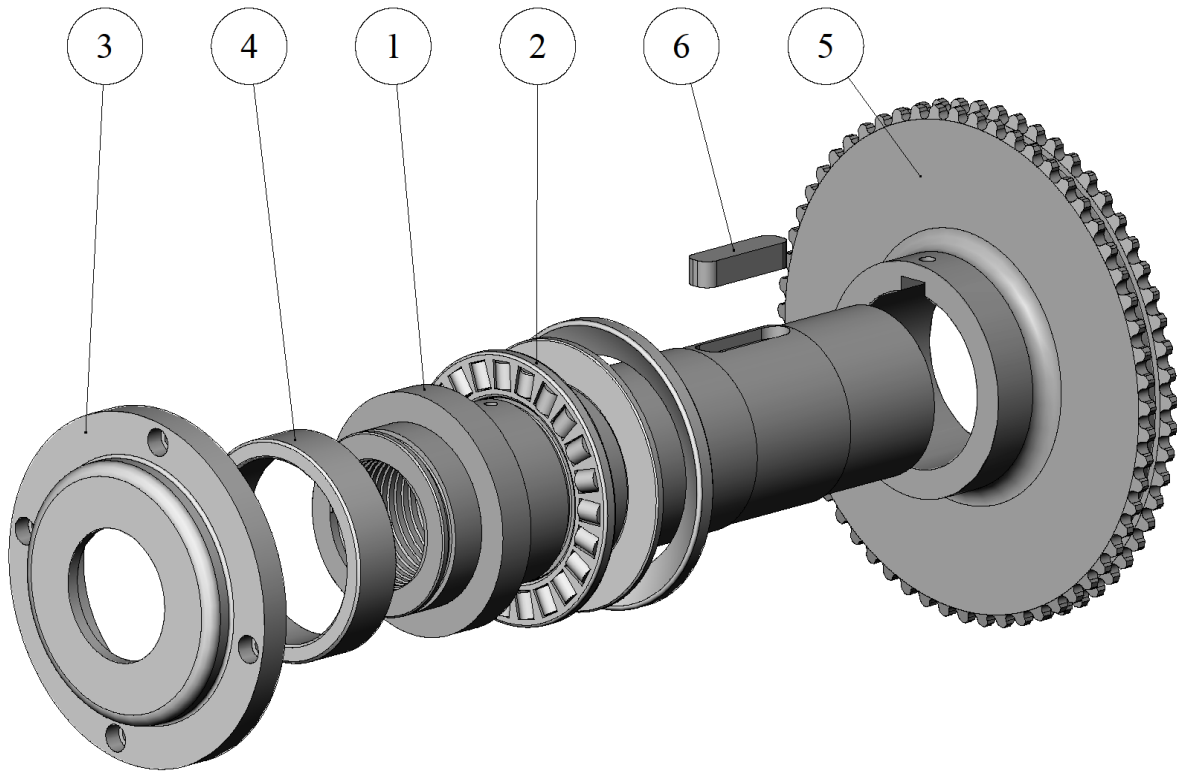
Item	Quantity	Part Number	Description
1	1	11018776	Pro31-H Upper Cover with Gasket and Hardware
2	2	11018773	Spindle Trim Ring with Gasket and Hardware
3	2	11110341	Spindle Cover with Gasket and Hardware
4	1	11018777	Pro31-H Raised Cover with Gasket and Hardware
5	1	11018775	Sprocket Drive Shaft Retainer with Gasket and Hardware
6	1	11018774	Pro31-H Bottom Cover with Gasket and Hardware
7	1	11018772	Pro31-H Sliding Door Cover with Gasket and Hardware

Pro31-H End Support Covers



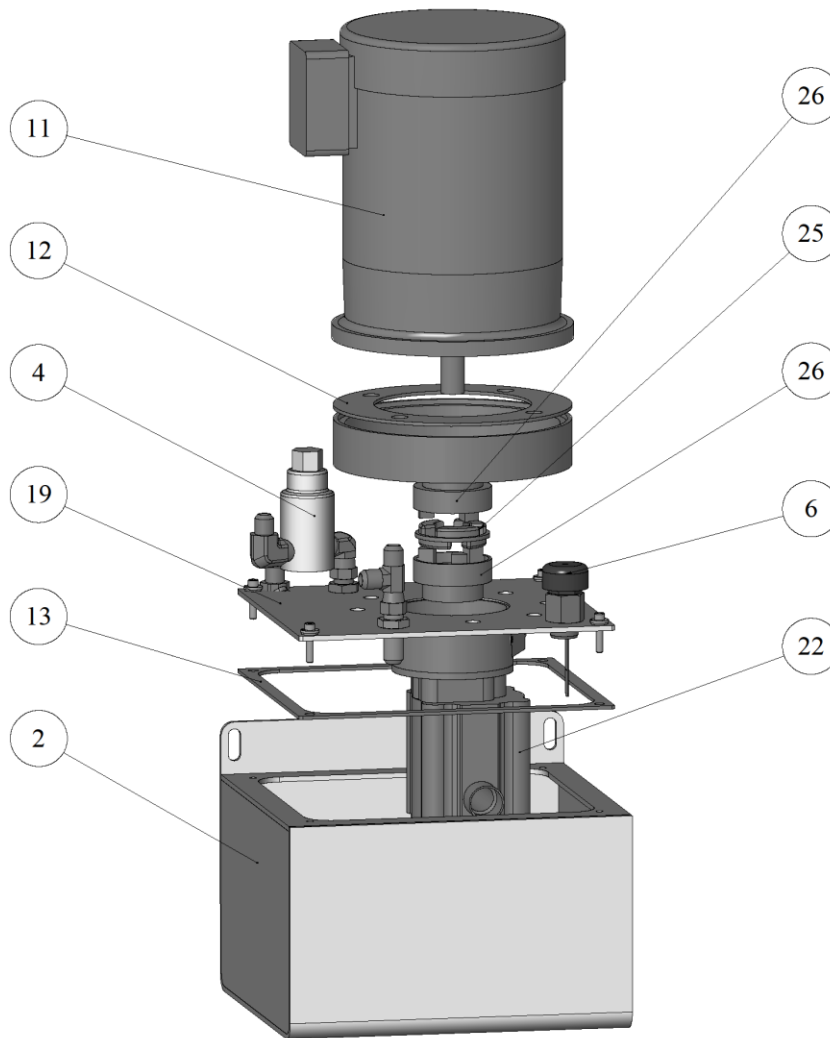
Item	Quantity	Part Number	Description
10	2	11110277	60 Tooth Sprocket
40	1	11110320	Hydraulic Motor Complete with Mount
76	2	88835	Tensioner
78	4	23189	Idler sprocket
79	1	WIK4273358	Pressure Gage
115	2	104995	Double Roller chain 75 inch length
116	1	4745881	Triple Roller Chain 48 inch length
118	1	11001502	Sprocket Drive Shaft

Pro31-H Internal Components



Item	Name	Part Number	Quantity
1	Spindle Drive Nut	11110250	1
2	Spindle Bearing Assembly	11110317	1
3	Spindle Retainer	11021350	1
4	Sprocket Bushing	11110251	1
5	60 Tooth Sprocket	11110277	1
6	Sprocket Key	11110314	1

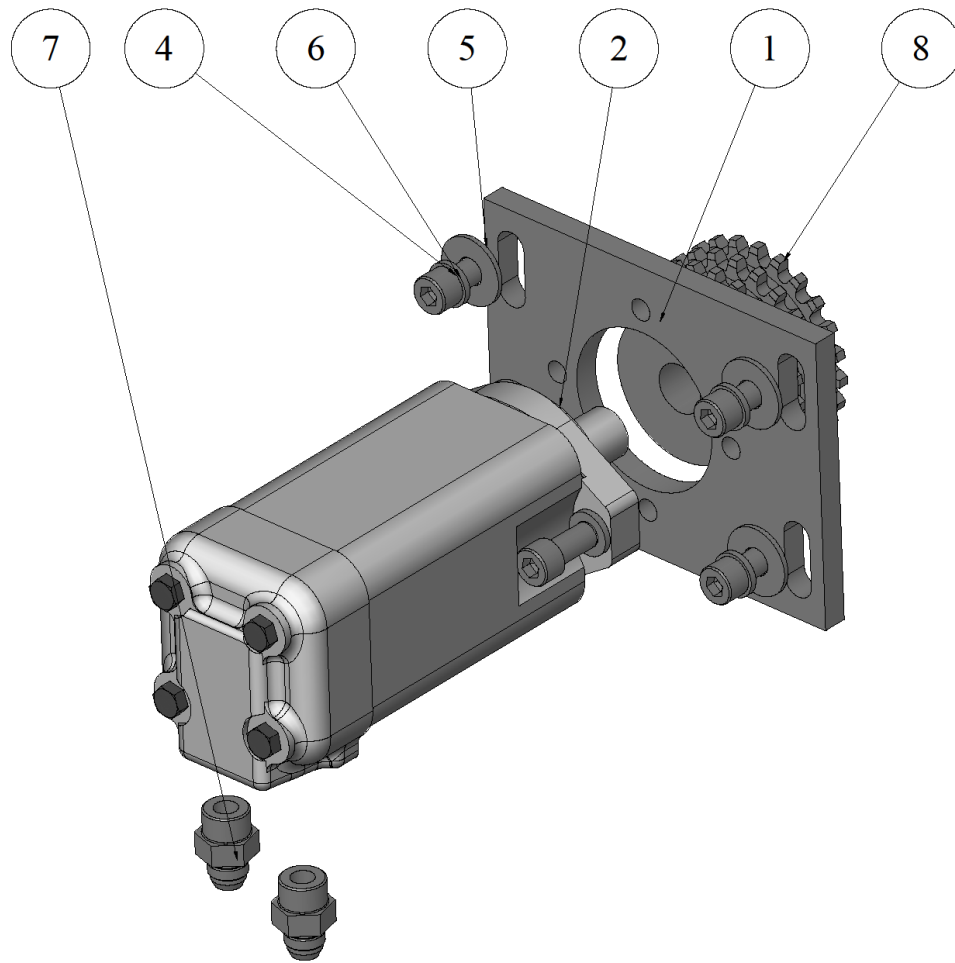
Pro31-H Spindle Drive Nut Assembly



Item	Name	Part Number	Quantity
2	Reservoir Main Tank	11110321	1
4	Relief Valve	11110322	1
6	Dip Stick	11110487	1
11	5 HP NEMA 184T Motor	178945	1
12	Motor to Tank Gasket	11018440	1
13	Tank Top Cover Gasket	11018441	1
19	Tank Cover with Integrated Pump Mount	11001132	1
22	2 Stage Gear Pump	30210010	1
25	Coupling Insert	M270	1
26	Coupling Half (pump)	M2002006	1
27	Coupling Half (motor)	M20010408	1

Pro31-H Reservoir Tank Assembly

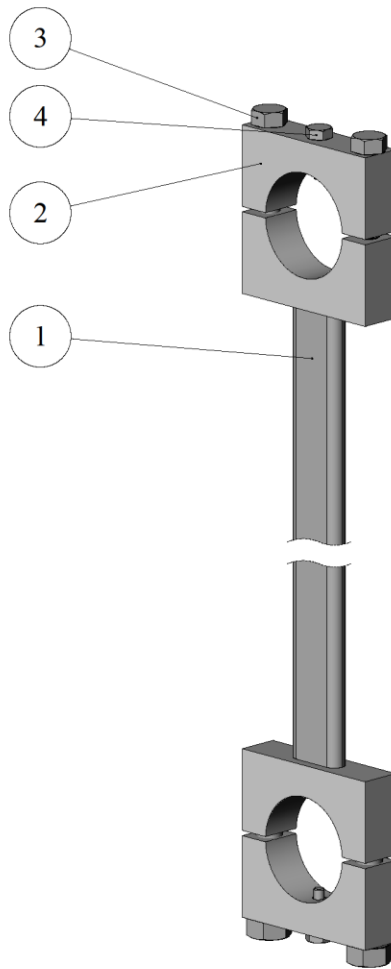
(AGC P/N 11110319)



Item	Name	Part Number	Quantity
1	Motor Mount	11110268	1
2	Hydraulic Motor	104-1007-006	1
4	Socket Head Cap Screw 1/2-13 x 1-1/2	D4012C0112E	6
5	Flat Washer 1/2" SS	DF012	4
6	Lock Washer 1/2" SS	DL012	6
7	O Ring AQ O Ring x JIC	202702-10-65	2
8	24 Tooth Sprocket	6076901	1

Pro31-H Motor Assembly

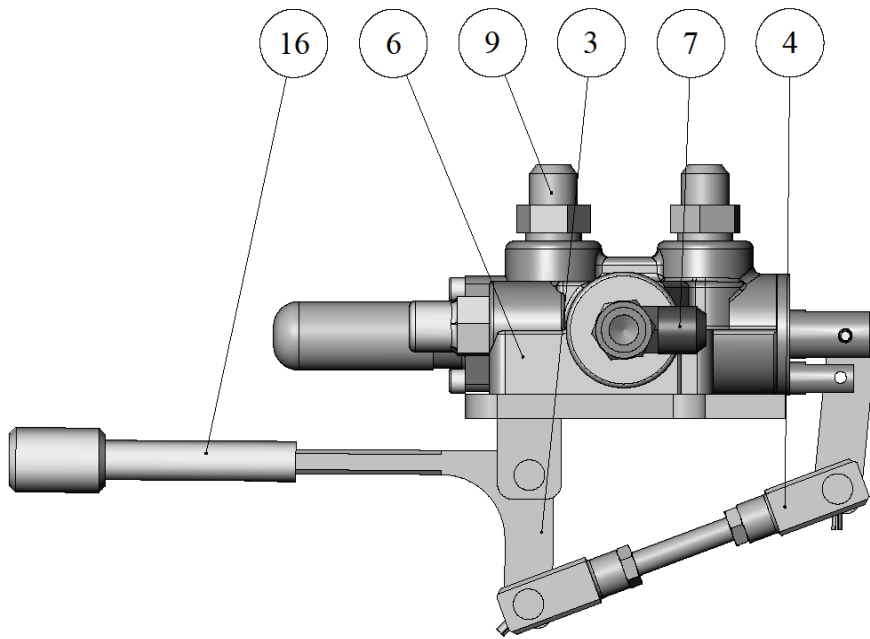
(AGC P/N 11110320)



Item	Name	Part Number	Quantity
1	Reaction Bar Weldment	11110276	1
2	Reaction Bar End Cap	11021707	2
3	Hex Head Cap Screw 3/8-16 x 3	11110764	4
4	Dog Point Screw	11021708	2

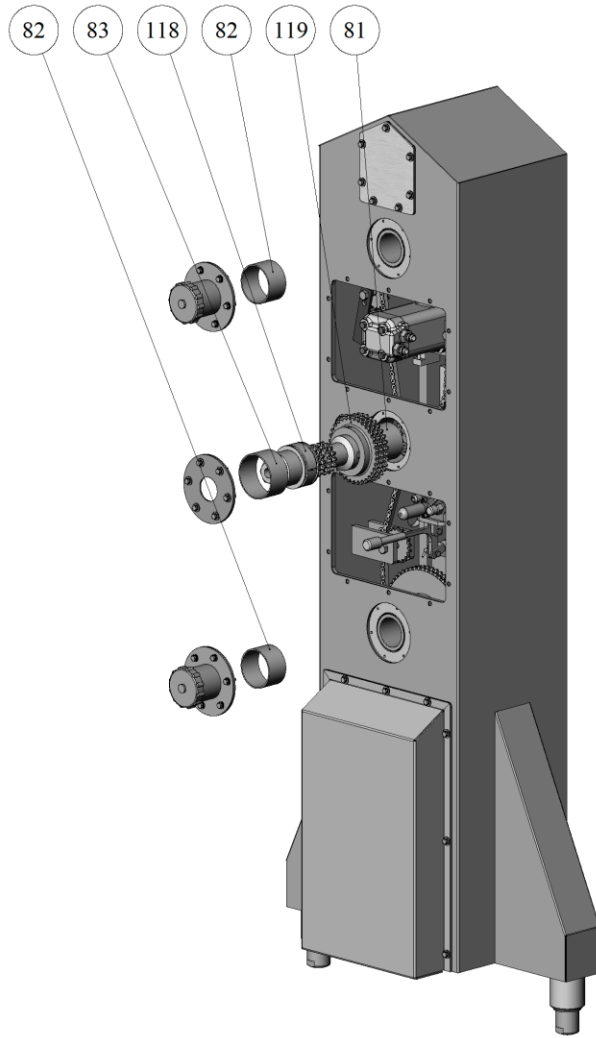
Pro31-H Reaction Bar Assembly

(AGC P/N 11021704)



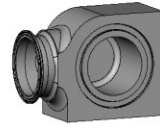
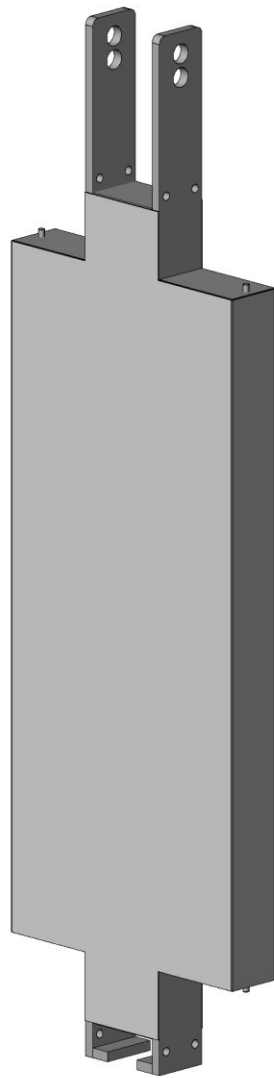
Item	Quantity	Part Number	Description
3	1	11020019	Pivot Link
4	1	11020038	Adjustable Linkage
6	1	11110318	Double Detent Valve with fittings
7	2	2024-8-8S	Hose fitting, 90 Degree
9	2	202702-10-6S	Hose Fitting Straight
16	1	11110248	Control Knob

Pro31-H Valve Linkage Assembly

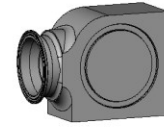


Item	Quantity	Part Number	Description
81	1	105376	Sprocket Drive Shaft Rear Bearing
82	2	105379	Spindle Nut Bearing
83	1	105380	Sprocket Drive Shaft Front Bearing
118	1	11001502	High Speed Sprocket Drive Shaft
119	1	11001501	36 Tooth Sprocket

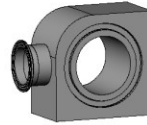
Pro31-H Bearing and Drive Components



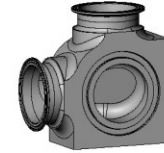
Pro3 'V' Boss



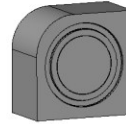
Pro3 'X' Boss



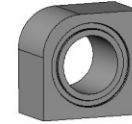
Pro3 Thru with
2" Connection



Pro3 Double



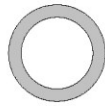
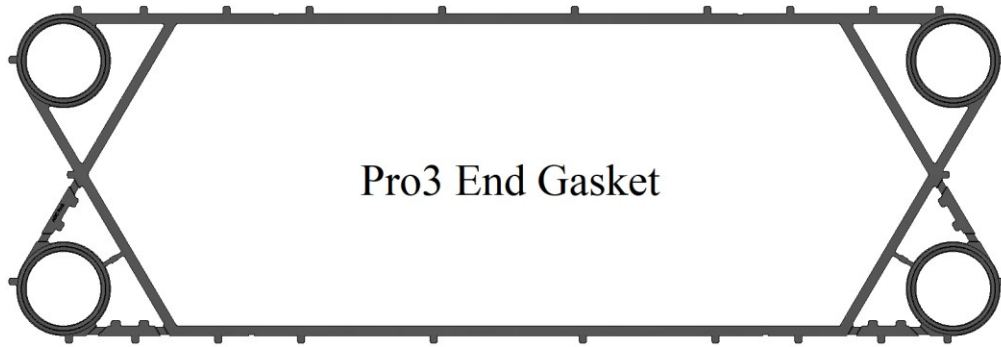
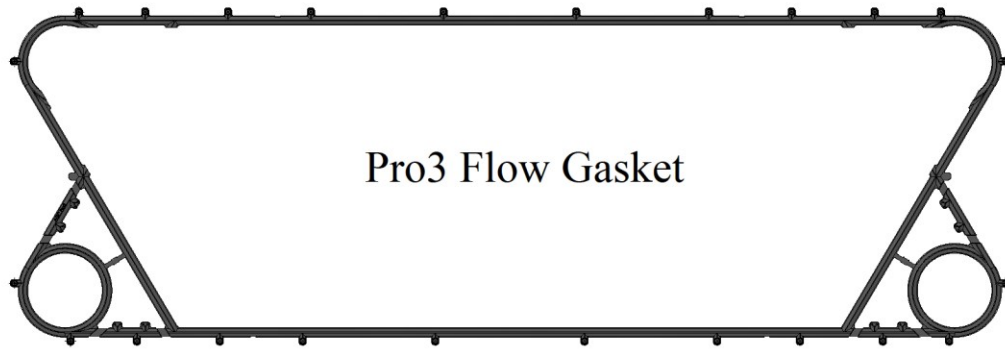
Pro3 Blank



Pro3 Thru

Pro3 Terminal Parts	
Description	Part Number
Pro3 Terminal Body with Roller	11018500
Pro3 Terminal Roller with Pin	11015007
Pro3 Port Boss V Configuration with 3" connection	11018516
Pro3 Port Boss X Configuration with 3" connection	11018515
Pro3 Port Boss Thru with 2" connection	11018520
Pro3 Blank Port Boss	11018520
Pro3 Thru Boss	11018513

Pro3 Terminal Components



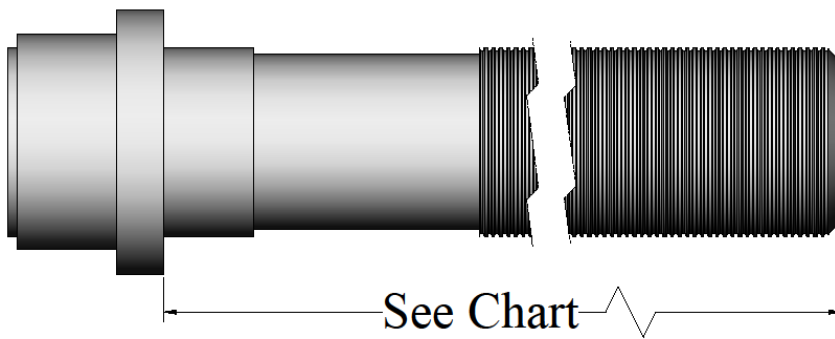
Pro3 Die Cut
Port Gasket



Pro3 Molded
Port Gasket

Description	Part Number	Frame Application
Pro3 Flow EPDM	AGPRO301E	All Pro3 Models
Pro3 Flow NBR	AGPRO301N	All Pro3 Models
Pro3 End EPDM	AGPRO302E	All Pro3 Models
Pro3 End NBR	AGPRO302N	All Pro3 Models
Pro3 Die Cut Port EPDM	11018578	Pro3-I Frames
Pro3 Die Cut Port NBR	11018572	Pro3-I Frames
Pro3 Molded Port EPDM	AGPRO303E	Pro3-S/SH/F/DF/DFH and Pro3 Terminal
Pro3 Molded Port NBR	AGPRO303N	Pro3-S/SH/F/DF/DFH and Pro3 Terminal

Pro3 Gaskets



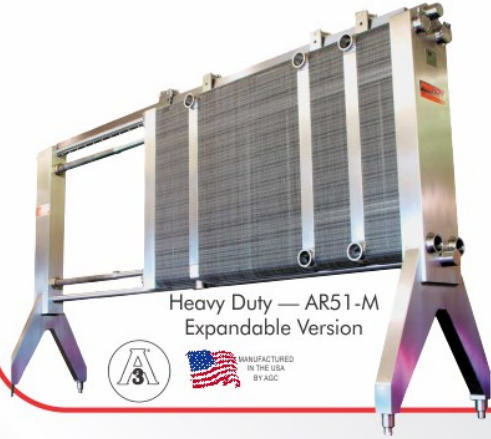
Name	Part Number	Length
36" Spindle Shaft	11018785	36-5/8"
48" Spindle Shaft	11018786	48-5/8"
60" Spindle Shaft	11018787	60-5/8"

Pro31-H Spindle Shaft

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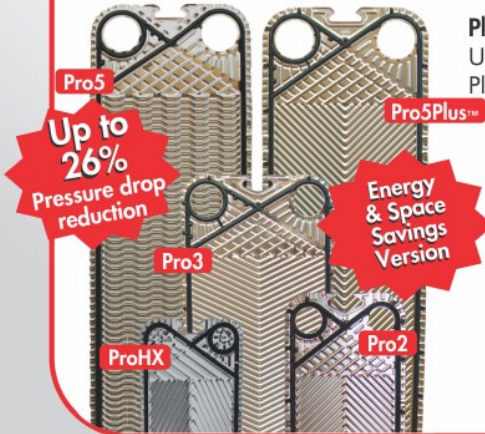
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PRO31
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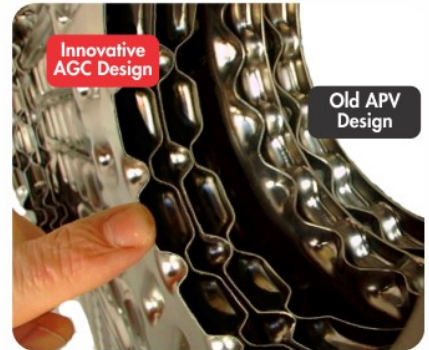
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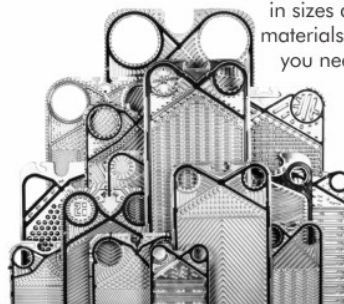
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