

AGC MODEL PRO3

PLATE HEAT EXCHANGER OPERATION AND INSTALLATION MANUAL

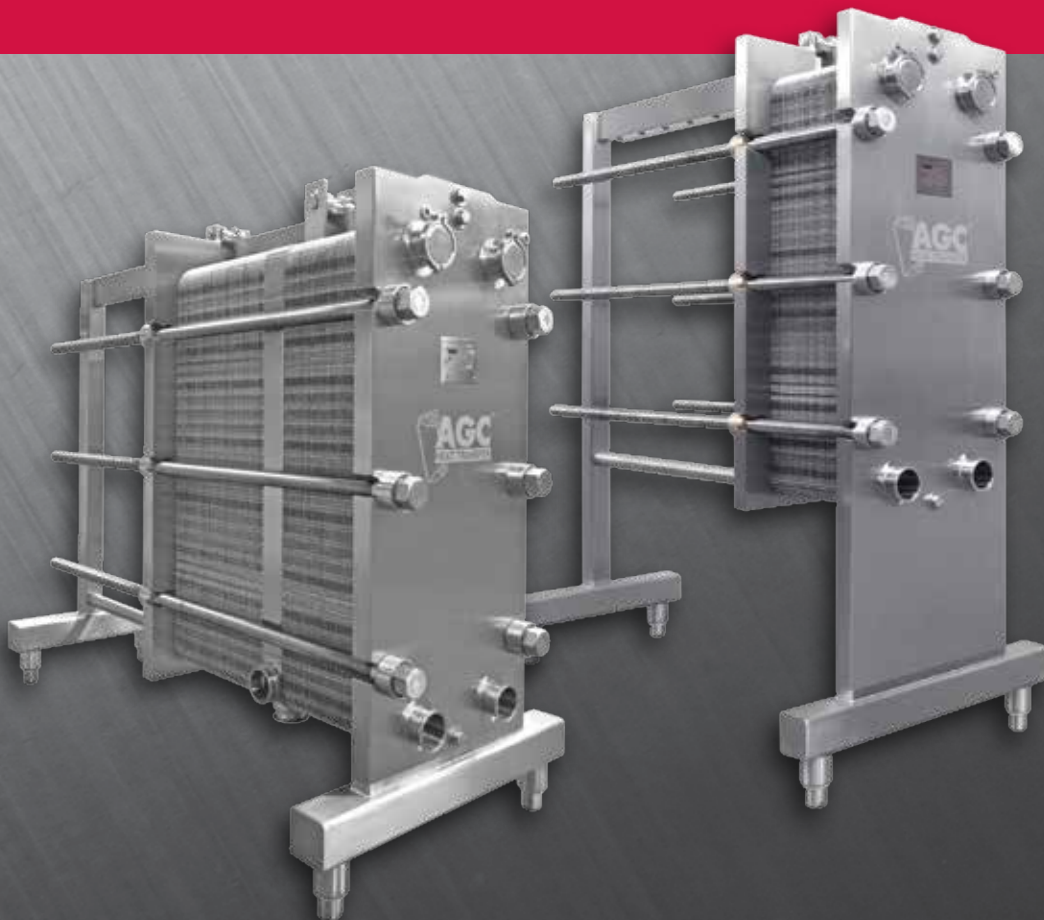




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Scope:

This manual is a supplement to the AGC Heat Transfer ProFlow plate heat exchanger manual. We recommend you read the ProFlow manual first because it will provide you with a basic understanding of plate heat exchangers and define the technical terms used in this document. The information provided within this manual describes the installation, operation, and maintenance of the AGC Heat Transfer Pro3 tiebolt style heat exchangers. Currently 6 (six) different models of the Pro3 tiebolt style heat exchangers are available and this manual covers all 6.

Please read this manual carefully before installing your heat exchanger. Pay particular attention to the safety instructions and the initial startup procedures. Failure to follow all safety recommendations could result in injury to the operator or cause damage to the heat exchanger.

Receiving and Inspection:

Each AGC heat exchanger is assembled and fully tested at the factory prior to shipping. Once the unit has successfully passed all tests it is prepared for shipping. Every AGC heat exchanger is thoroughly inspected to ensure it is in perfect condition before leaving the factory. Upon arrival, carefully inspect your new heat exchanger for any damage that may have occurred during shipping. If the press was damaged during shipping make sure it is annotated on the shipping documents. Also, report any damage to AGC immediately. To aid you in describing where any damage may have occurred, figure one shows the major components of a typical Pro3 frame with one terminal.

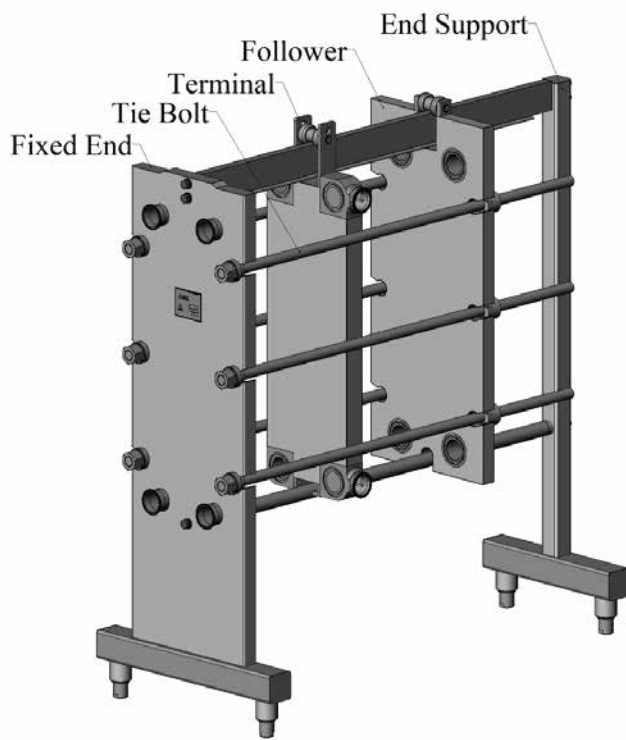


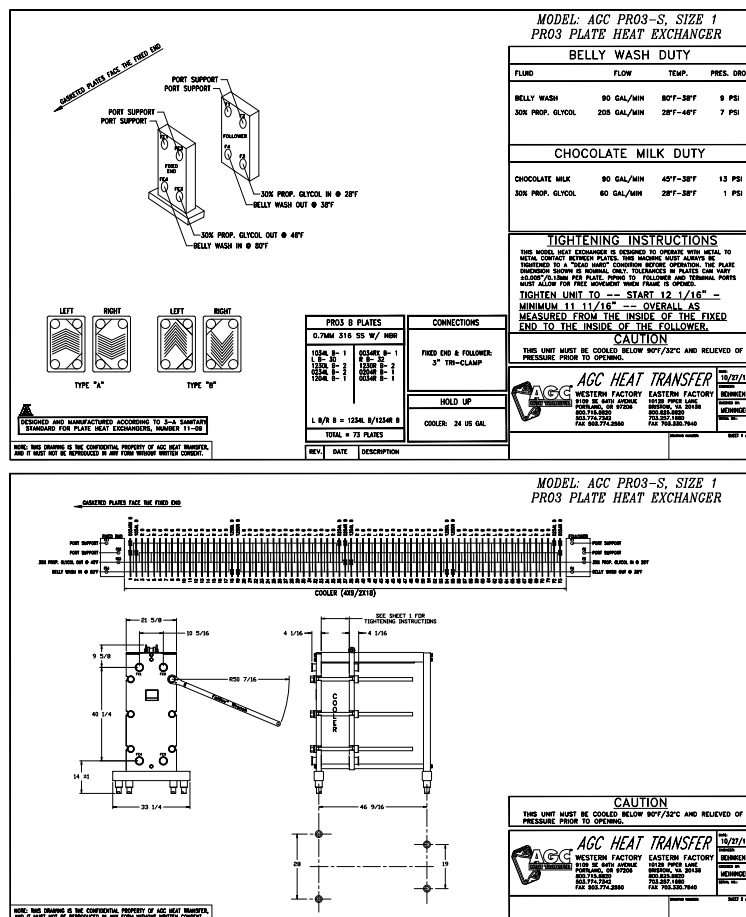
Figure 1
Major Frame Components

Normally, tiebolt style frames are shipped with the plates installed. As a result the press and plates can weigh several thousand pounds. We recommend only qualified forklift drivers should lift and position the unit. It should be noted that high leg frames such as the Pro3-SH and Pro3-DFH can be top heavy and could tip if they are not moved properly.

Drawing Package:

Every frame is shipped with a drawing package. This drawing package contains important information that is specific to your heat exchanger. If you cannot find the drawing package, contact AGC Heat Transfer or your local AGC distributor to obtain a replacement prior to installing the heat exchanger.

The drawing package is a collection of several important documents related explicitly to your heat exchanger. The first of these is the streaming diagram. Two copies of the streaming diagram are included. One copy has been laminated to protect it. This copy is intended to be used by production and maintenance personnel when installing and/or servicing the heat exchanger. The remaining copy should be kept on file in a safe place in the event the production copy is lost or damaged. The streaming diagram (also referred to as the drawing) describes all the characteristics of the heat exchanger. Figure 2 shows a typical two page streaming diagram.



Page one shows the unit serial number, the duty, plate type, plate count, gasket type, connection type, connection size, and the tightening dimension. Revisions are also listed on page one. Page two of the drawing shows how the fluids pass through the heat exchanger. (The ProFlow manual describes how to read this flow diagram). If the unit is small, such as the unit in figure two, a front and side view of the heat exchanger will be shown as well. For larger units the front and side views are shown on page three or page four.

The second document in the drawing package is a plate punching diagram. This diagram will show you how to identify each Pro3 plate either by its configuration number (stamped at the top of each plate) or by looking at the plate noting which ports have been opened. Since the Pro3 plate is a vertical flow plate, each plate can be used for either a right or left hand plate. The ProFlow manual explains how these plates are used in greater detail.

The final document in the drawing package is the ProFlow manual. The ProFlow manual has information about the AGC Heat Transfer product line and a more in-depth discussion about plate heat exchangers in general.

Frame Placement:

Locate the Pro3 frame on a firm flat surface capable of supporting the press and all of its contents when full. If possible, the frame should remain strapped to the shipping skid until it is near its final location. Once the press is positioned cut the metal bands holding it to the shipping skid and, using an appropriately sized lifting strap, carefully lift the press off the skid. The top rail can be used as a lifting point. Never lift the press by the tiebolts or port nozzles. These bolts are in slots and are not designed to support the weight of the frame for lifting. When locating the heat exchanger, ensure that adequate space is left around the frame for maintenance and for plate installation/removal. Also include enough space to allow the AGC Fat Boy™ wrench to fully swing. See figure 3.

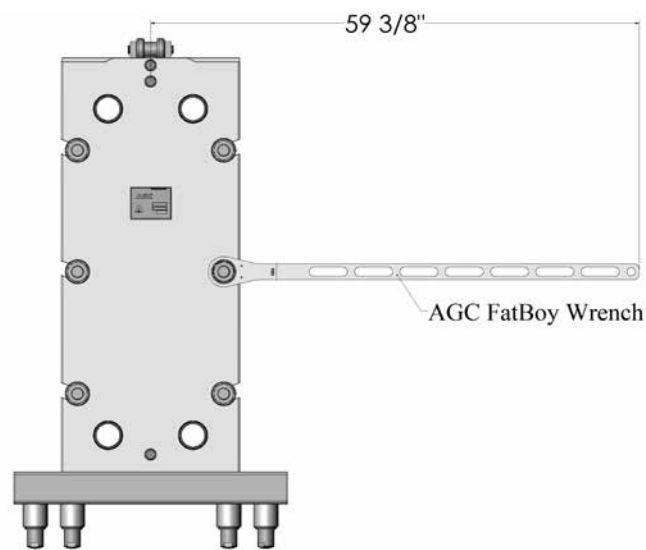


Figure 3
Wrench Space Requirement

The Pro3-SH, Pro3-S, Pro3-DFH and Pro3-DF frames are equipped with adjustable ball feet. These feet are adjusted by turning the base clockwise to lower and counterclockwise to raise the press. The ball feet should be adjusted so the ports are level from side to side. Figure 4 shows a spirit level placed across the ports to establish level.

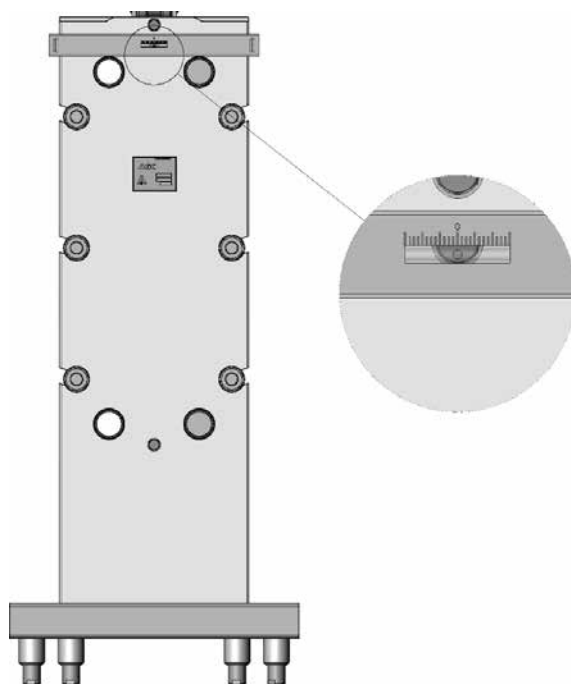


Figure 4
Port Leveling

Once the ports are level the heat exchanger should be adjusted so it will drain properly. This is done by adjusting the ball feet to establish a slope from end to end. Figure 5 shows a press adjusted to drain forward to the fixed end.

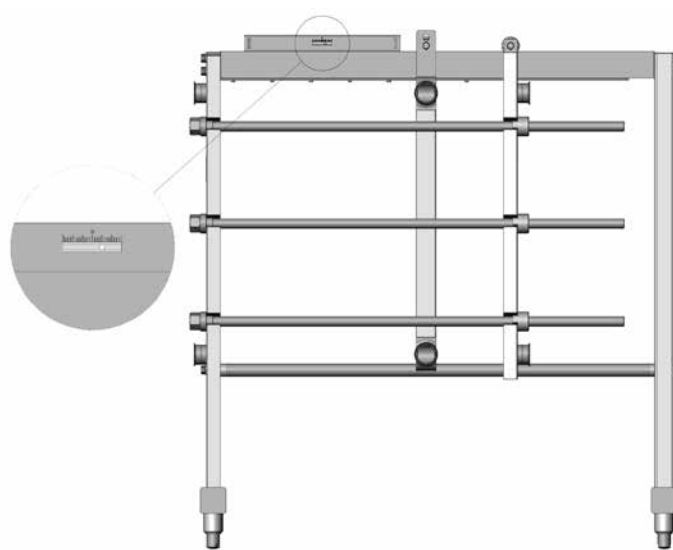


Figure 5
Frame Adjusted to Drain to Fixed End

Consult your onsite Plant Engineer or Project Manager to determine how much slope and which direction (toward the fixed end or follower) is appropriate for your installation.

The Pro3-I and Pro3-F frames are built with flat foot pads that are designed to be bolted to the floor. Therefore, no provisions for leveling are designed into the frame. However, these frames can be leveled by adding an appropriate amount of filler material under each foot pad as required.

Frame Connections:

Careful planning during the installation of your new heat exchanger will help ensure years of trouble free operation. All piping connections should be well supported and carefully aligned with the ports on the heat exchanger. Misaligned pipes or pipes that are not properly supported can lead to connection failures or cracks in the welded joints. When laying out a new installation, include enough breaks in the piping so service and maintenance can be completed easily. The piping connected to the follower should be configured with joints that are easy to remove so the follower can be fully retracted. This will provide enough space for clear inspection of the heat exchanger plates. The streaming diagram will show where all external connections should be made. Figure 6 shows page one of a typical streaming diagram for a single section design heat exchanger.

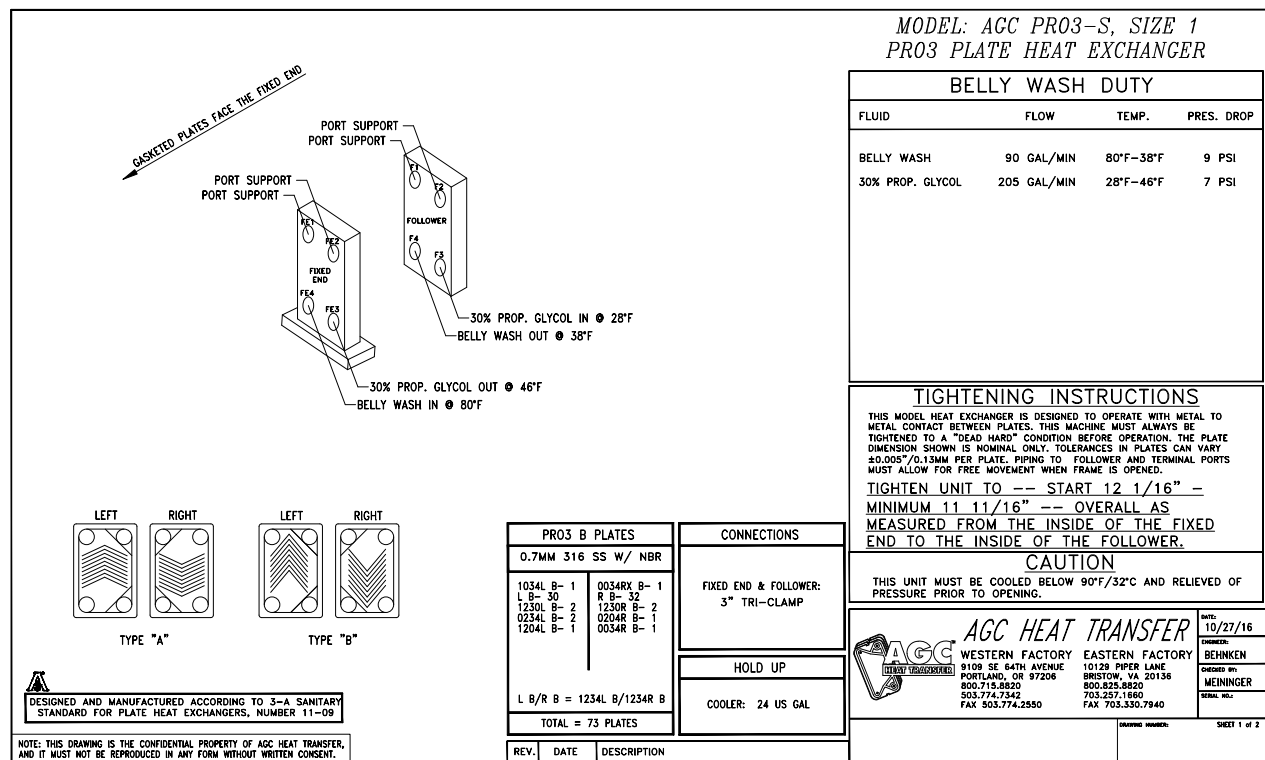


Figure 6
Typical Streaming Diagram

Notice that all ports have labels that clearly state what is to be connected to each one.

Normal Operation:

The Pro3 series heat exchangers are tiebolt style frames. This means the press is closed by using 6 tiebolts to compress the plates. For this type of frame it is important for each tiebolt to take an equal share of the load. After your heat exchanger is in place you should check the compressed dimension if the plates were shipped installed. The dimension for your heat exchanger is listed on the first page of your streaming diagram. Figure 7 shows where the tightening dimension is located on the drawing. If the plates were shipped in a separate crate refer to the ProFlow manual for instructions on installing them.

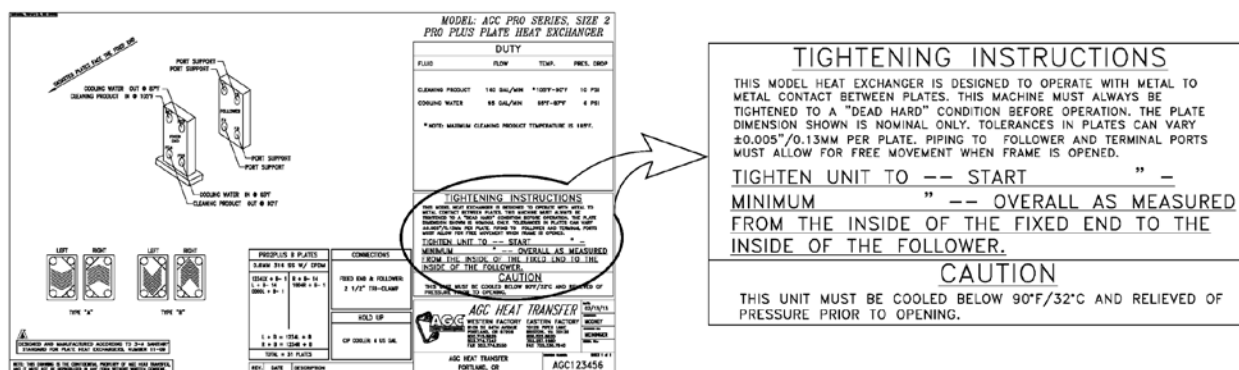


Figure 7

Tightening Instructions

Most new plate packs will seal at the start dimension. As the plates and gaskets wear it may be necessary to compress or close the press further. You should never exceed the minimum dimension shown on the streaming diagram. If your press is closed to the minimum dimension and leaks are noticed contact AGC Heat Transfer for technical assistance. Closing the press beyond the minimum dimension could cause permanent damage to the plates, frame, or both. When measuring the compressed dimension it is a good practice to take the measurement in several locations on the inside of the fixed end and follower as shown in figure 8.

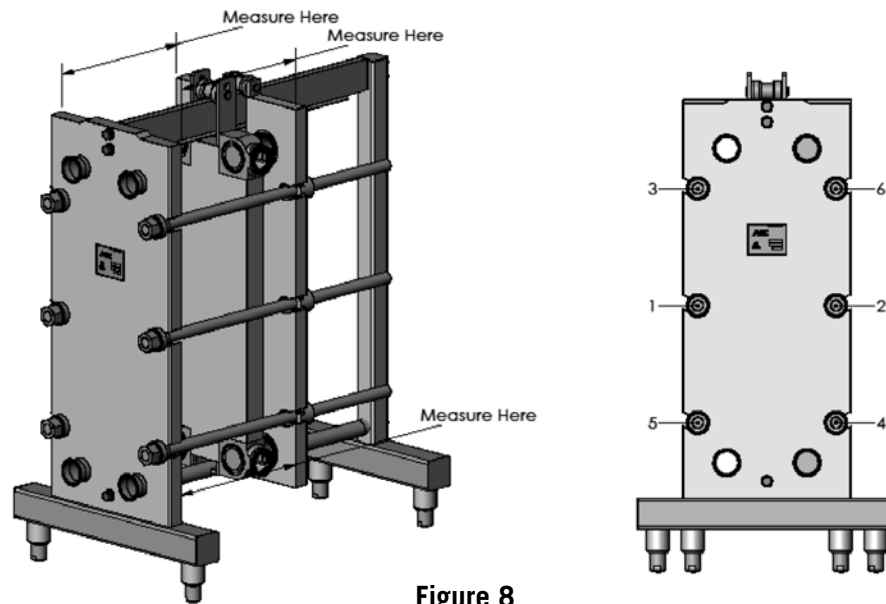


Figure 8
Tightening Location and Sequence

Measure top and bottom as well as front and back. The heat exchanger is designed operate at its top efficiency when it is closed to a metal to metal condition. This means the rubber plate gaskets are fully compressed and the plates contact points are fully engaged with each adjacent plate. In this condition, the plate gap is uniform and the plate is fully supported. To maintain this condition all tiebolts should be tightened equally and in sequence. Following the sequence shown in figure 8, tighten each tiebolt in small increments so the follower remains parallel to the fixed end. As the press approaches the start dimension smaller increments at each bolt will make for easier closing.

After the press is closed and all connections are made to the heat exchanger the unit is ready to be pressure checked. Consult the onsite plant engineer or project manager for the correct procedure on pressure testing the press.

Opening the Heat Exchanger:

Before opening this or any other heat exchanger you must verify the temperature in the unit is below 90° F and that the unit has been relieved of all internal pressure. Failure to follow this safety warning could result in serious injury to the operator or damage to the plates and gaskets. All pipes/connections should be disconnected from the heat exchanger before the tiebolts are loosened.

Prior to opening the press, inspect the tiebolts to ensure they are free from dirt or excessive dust and that lubrication is present on each. Opening or closing the tiebolts without lubrication may cause permanent damage to the tiebolt. Small increments on each bolt will make the process easier and prevent damage to the press or any of its parts. The tiebolts should be loosened using the same sequence as for tightening. See figure 8 for the bolt sequence. As with tightening, the closer the unit is to the minimum dimension the more torque will be required on the Fat Boy™ wrench. Once the plates are completely uncompressed, the tiebolts can be lifted from their slot. Handle the tiebolts with care so the

threads are not damaged. The follower can now be moved back toward the end support and the plates can be inspected or removed.

Operator Maintenance:

All AGC Heat Transfer heat exchangers are designed to require minimal operator maintenance. As long as the unit is operated within the pressure and temperature limits the only maintenance required is routine cleaning, lubrication and inspection. We recommend the unit be leak checked annually using the PlateCheck™ field service provided by AGC Heat Transfer. This service is performed onsite by factory trained service engineers. The PlateCheck™ service provides a thorough inspection of all parts of the heat exchanger. After the service is complete, a detailed written report is provided on the condition of the heat exchanger. This preventative maintenance service greatly reduces unscheduled down time by keeping the heat exchanger in peak operating condition.

Model Features:

The Pro3 tiebolt frame is offered in 6 different models (see figure 9). Regardless of the model chosen, each Pro3 frame will accept the AGC Pro3 heat exchanger plates and one or more AGC terminal(s). Additionally, all AGC heat exchangers can be fitted with special removable port nozzles. This feature is particularly useful in applications where the product erodes the stainless steel nozzles.

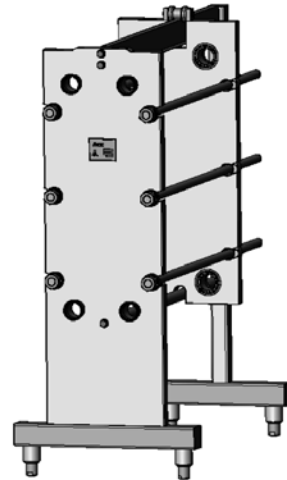
The Pro3-S and Pro3-SH are stainless steel clad frames. Both models conform to the current 3A sanitary standards. The factory installs ports at all eight locations (4 on the fixed end and 4 on the follower) on both models of these frames. The un-used ports are capped using sanitary caps and clamps. This makes it very easy to expand the heat exchanger in the field to increase capacity or to add other processes to the frame. The major difference between the –S and –SH frames is the height of the port centers. The –SH frame is the high leg version. Both frames are equipped with adjustable ball feet.

The Pro3-F and Pro3-I are powder coated mild steel frames. These frames are designed to be bolted to the factory floor or other support structure. They utilize the Pro3 heat exchanger plate and can be configured to have any of the eight available ports used. Typically these models are shipped from the factory with ports installed at the active ports only. The un-used ports are blanked using a stainless steel blanking disk. The major difference between the –F and –I models is the tiebolt material. The –F frame has stainless steel tiebolts with a silicon-bronze nut. The –I frame has galvanized tiebolts with a stainless steel nut. Additional connecting ports can be ordered from the AGC factory if the frame needs to be expanded or restreamed. New port nozzles may require some welding onsite depending on the connections.

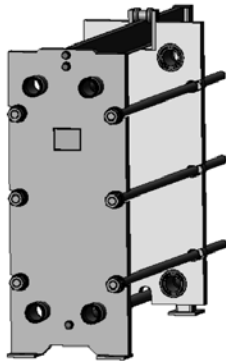
The Pro3-DF and Pro3-DFH are a lower cost alternative to the –S and –SH frames. These frames have adjustable ball feet and a stainless steel leg base, but the main body of the frame is powder coated mild steel. The tiebolts are stainless steel with silicon-bronze nuts. If these frames are ordered with sanitary connections they will comply with the current 3A guidelines for sanitary dairy equipment.



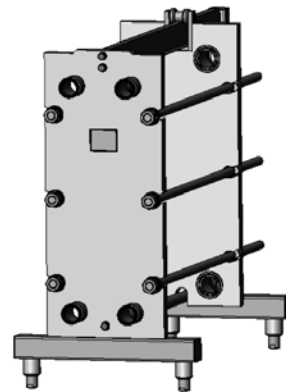
Pro3-S



Pro3-SH



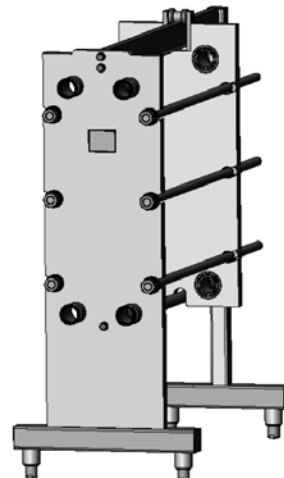
Pro3-F



Pro3-DF



Pro3-I



Pro3-DFH

Figure 11
Pro3 Tiebolt Frame Assemblies

Parts List:

Replacement parts for any AGC Pro3 frame can be ordered from AGC Heat Transfer or from your local AGC Distributor. Most parts are in stock and can be shipped within 24 hours from the time we receive your order. Some parts have been revised so it is important to have your unit model and serial number available when placing an order for spare or replacement parts. All models of the Pro3 heat exchangers have some parts that are common as well as model specific parts. The following parts diagrams are separated by model when appropriate. Most of the field replaceable parts are listed in this manual. If the part you need is not listed on the following pages contact your local AGC distributor or the AGC Heat Transfer Factory.

Contact information is provided below or visit our website for more information:

Eastern

10129 Piper Lane
Bristow, Virginia 20136
Phone 703.257.1660
Fax 703.330.7940
800.825.8820

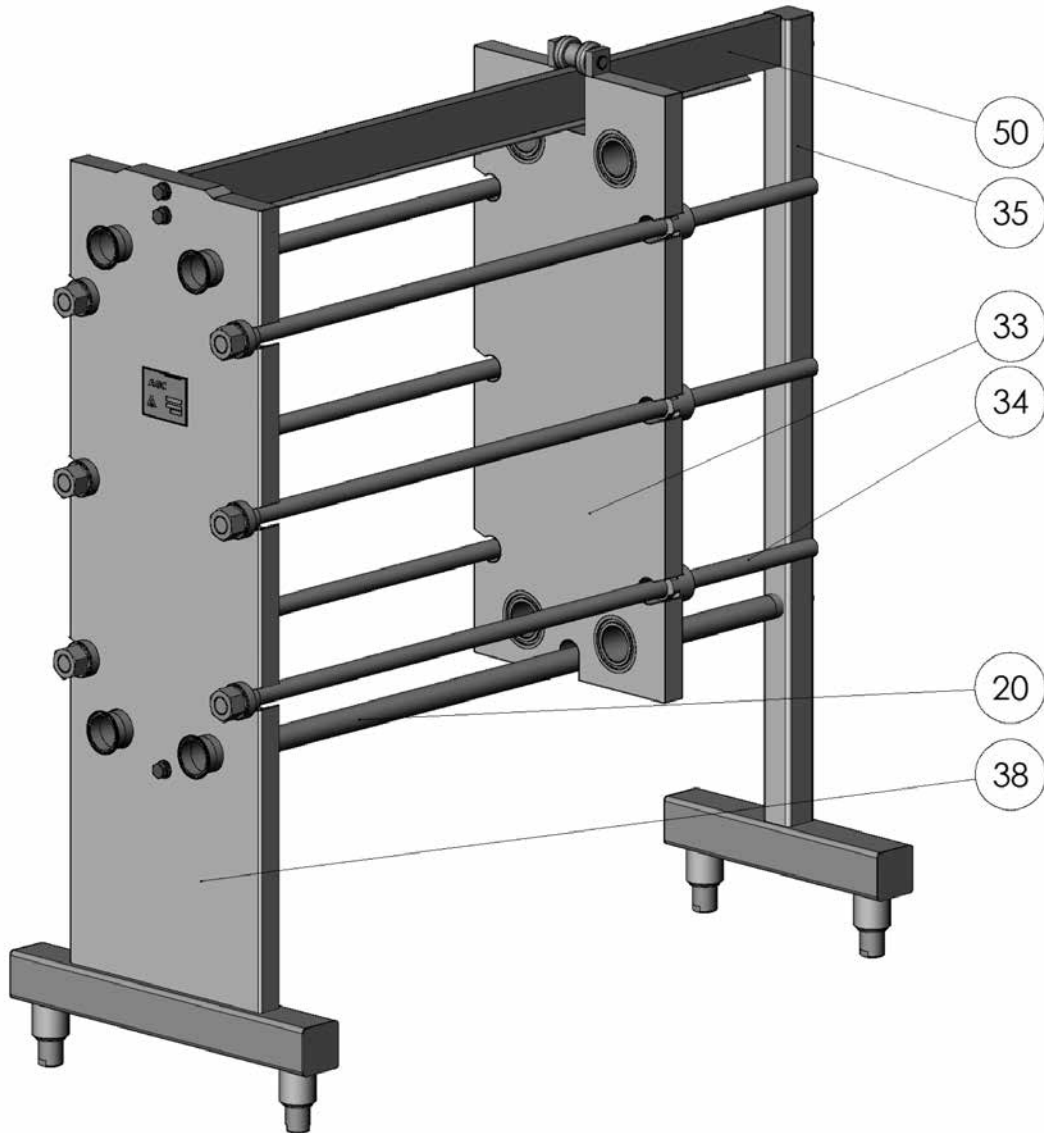
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3109 NE 230th Avenue
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Fax 503.774.2550
800.715.8820

Central

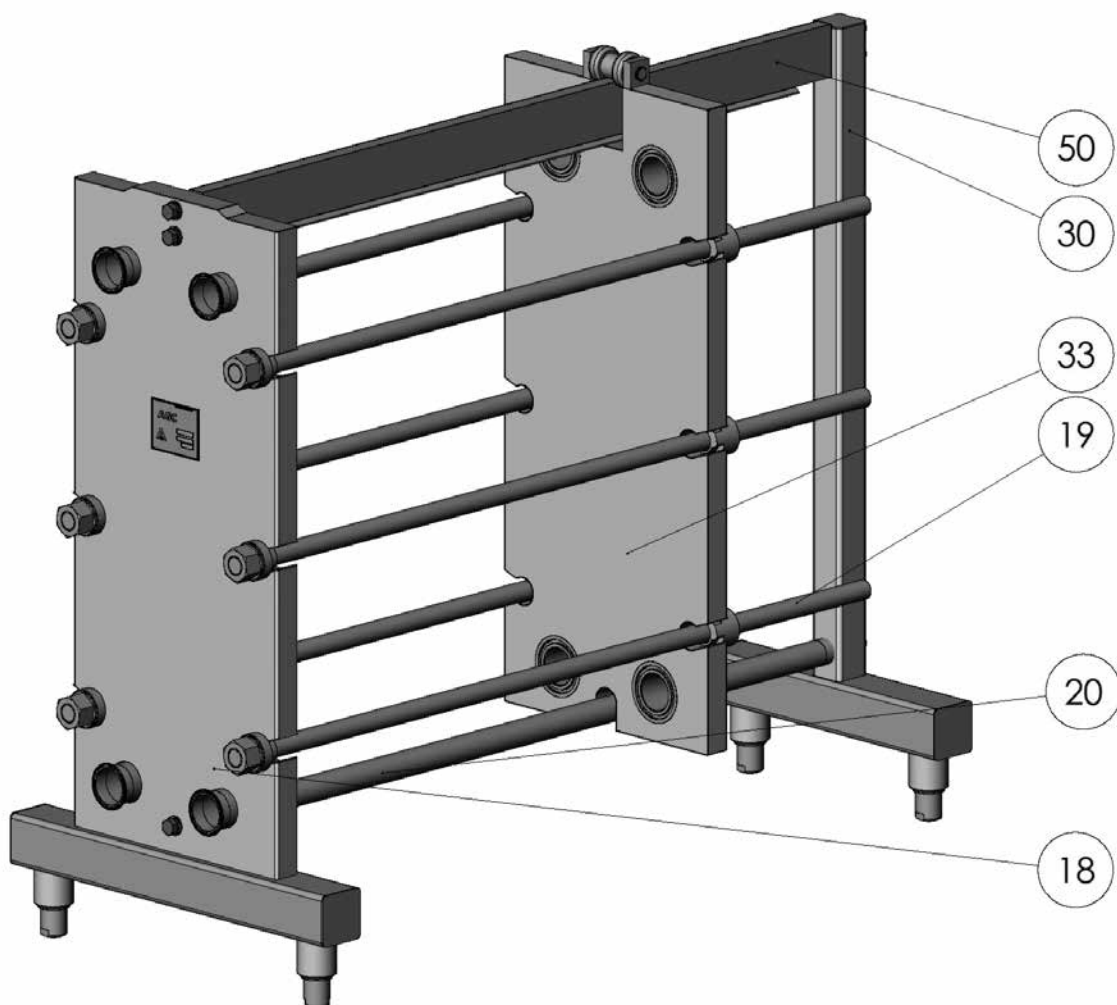
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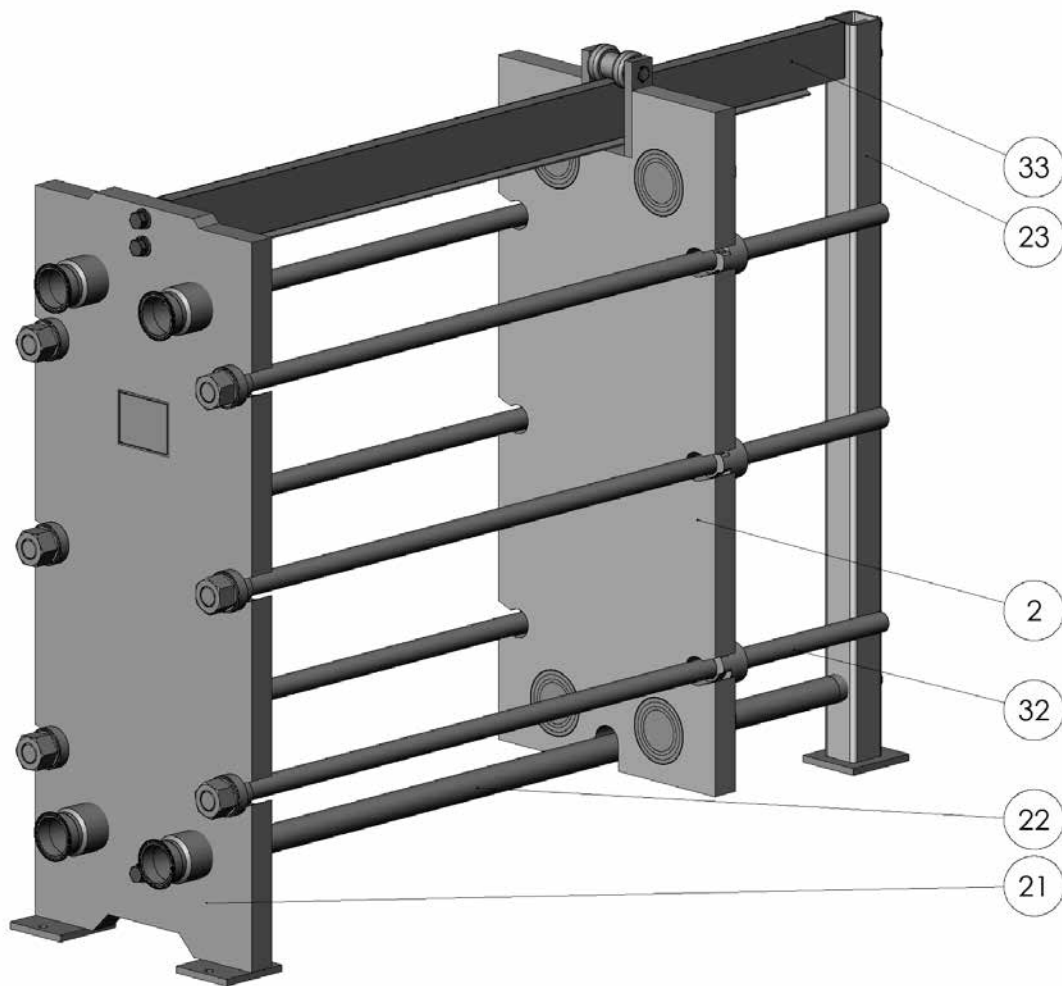
Pro3-SH Frame Components

Item No.	Pro3-SH Qty.	Part Number	Description
20	1	See Table on page 17	Pro3 Bottom Rail
33	1	11018300	Pro3-S/SH Follower
34	6	See Table on page 19	Pro3-S/SH Tiebolt
35	1	11018400	Pro3-S/SH End Support
38	1	11018200	Pro3-S/SH Fixed End
50	1	See Table on page 17	Pro3 Upper Rail



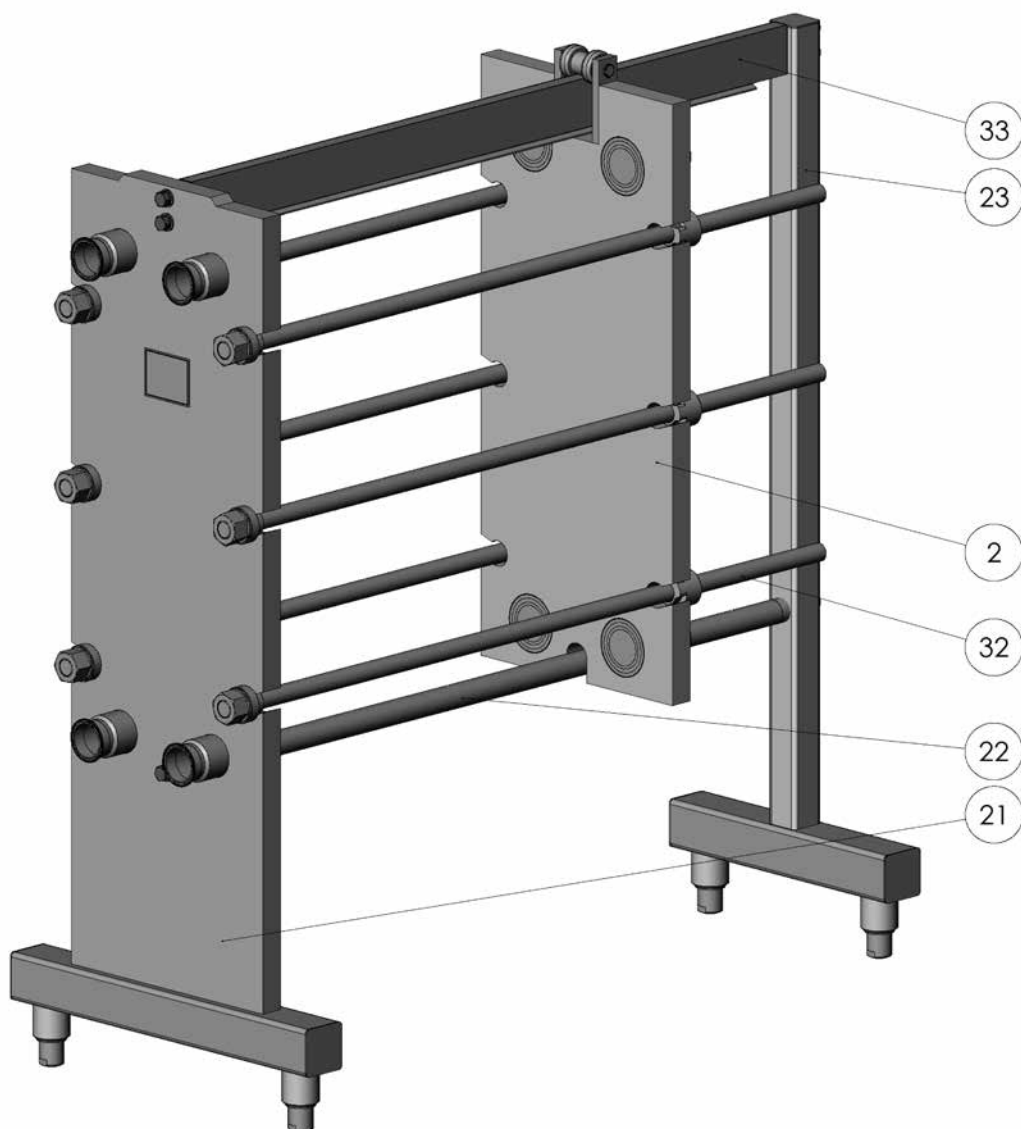
Pro3-S Frame Components

Item No.	Pro3-S Qty.	Part Number	Description
18	1	11011610	Pro3-S Fixed End Assembly
19	6	See Table on page 19	Pro3-S/SH Tiebolt Assembly
20	1	See Table on page 17	Pro3 Bottom Rail Assembly
30	1	11011611	Pro3-S End Support Assembly
33	1	11018300	Pro3-S/SH Follower Assembly
50	1	See Table on page 17	Pro3 Upper Rail Assembly



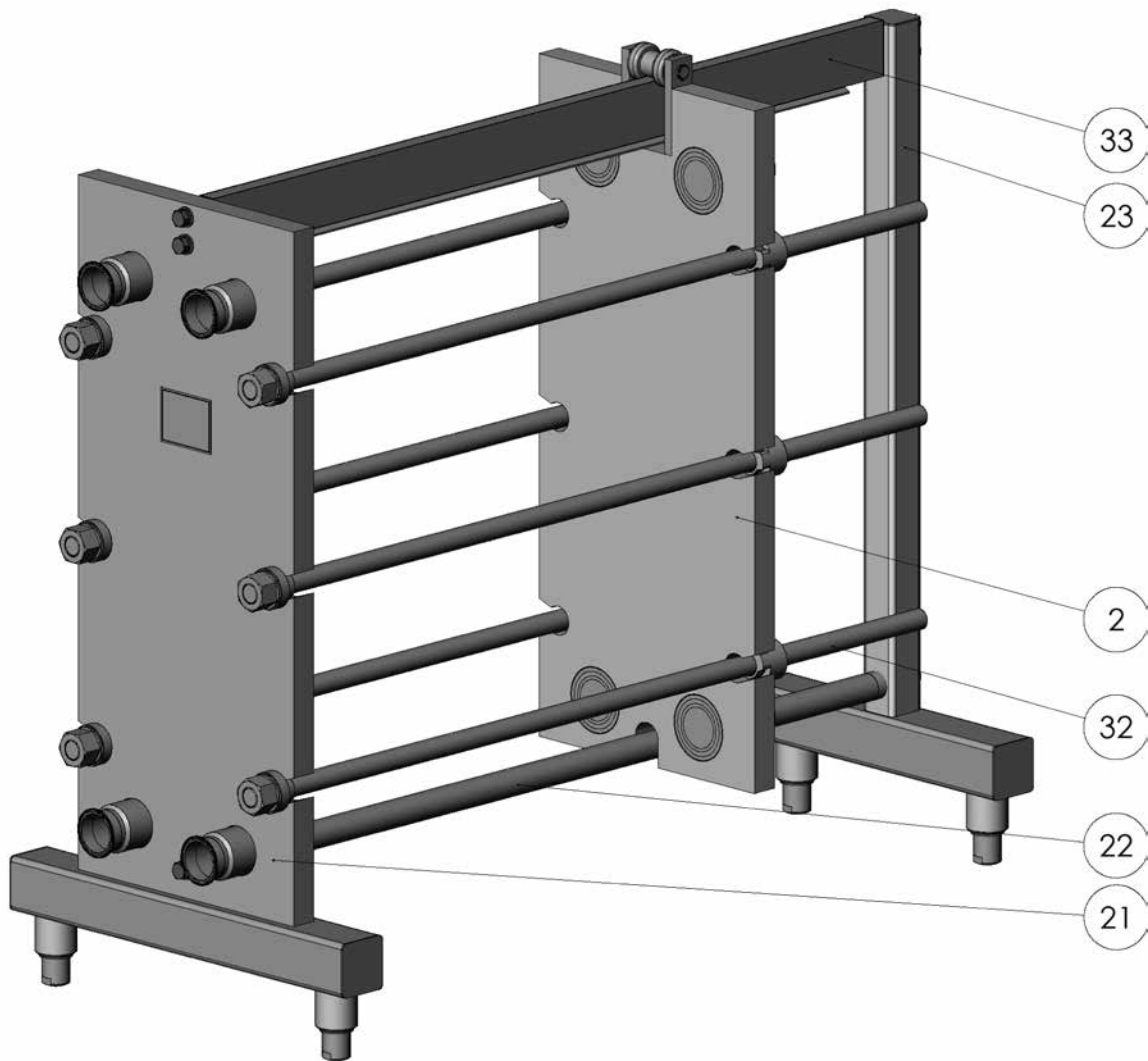
Pro3-F/I Frame Components

Item No.	Pro3-F/I Qty.	Part Number	Description
2	1	11015000	Pro3-F/I Follower Assembly
21	1	11017400	Pro3-F/I Fixed End Assembly
22	1	See Table on page 17	Pro3 Bottom Rail Assembly
23	1	11017500	Pro3-F/I End Support Assembly
32	6	See Table on page 20	Pro3-F Tiebolt Assembly
33	1	See Table on page 17	Pro3 Upper Rail Assembly



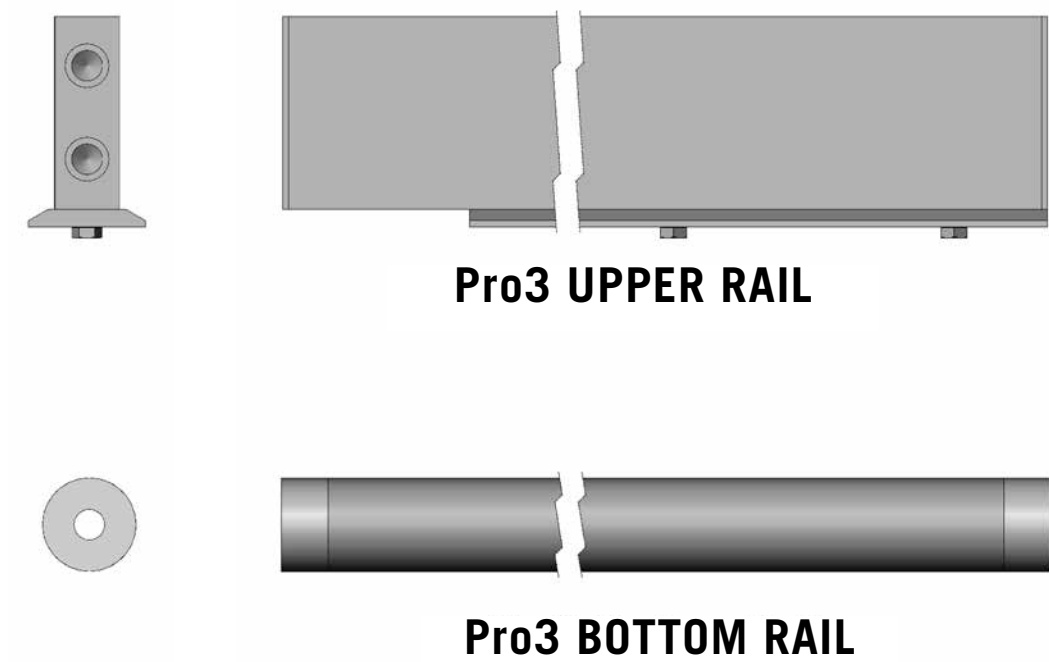
Pro3-DFH Frame Components

Item No.	Pro3-DFH Qty.	Part Number	Description
2	1	11015000	Pro3-F/I Follower Assembly
21	1	11017410	Pro3-DFH Fixed End Assembly
22	1	See Table on page 17	Pro3 Bottom Rail Assembly
23	1	11014899	Pro3-DFH End Support Assembly
32	6	See Table on page 20	Pro3-F Tie Bolt Assembly
33	1	See Table on page 17	Pro3 Upper Rail Assembly



Pro3-DF Frame Components

Item No.	Pro3-DF Qty.	Part Number	Description
2	1	11015000	Pro3-F/I Follower Assembly
21	1	11014600	Pro3-DF Fixed End Assembly
22	1	See Table on page 17	Pro3 Bottom Rail Assembly
23	1	11014900	Pro3-DF End Support Assembly
32	6	See Table on page 20	Pro3-F Tie Bolt Assembly
33	1	See Table on page 17	Pro3 Upper Rail Assembly

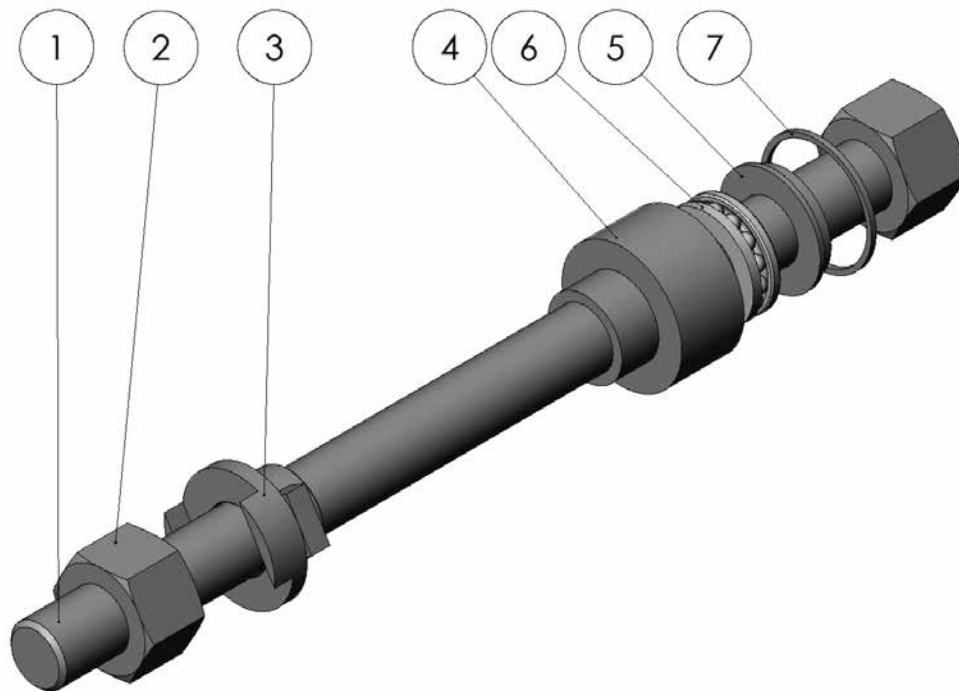


Pro3 Rail Size Chart

(All Pro3 Tiebolt Frame Models)

Rail Size	Rail Length	Bottom Rail Assembly	Upper Rail Assembly
Pro3 Size 1	44"	11014700	11014800
Pro3 Size 2	67"	11014703	11014815
Pro3 Size 3	91"	11014704	11014816
Pro3 Size 4	115"	11014705	11014817

*Note: All rails shipped without bolts and washers unless specifically ordered.



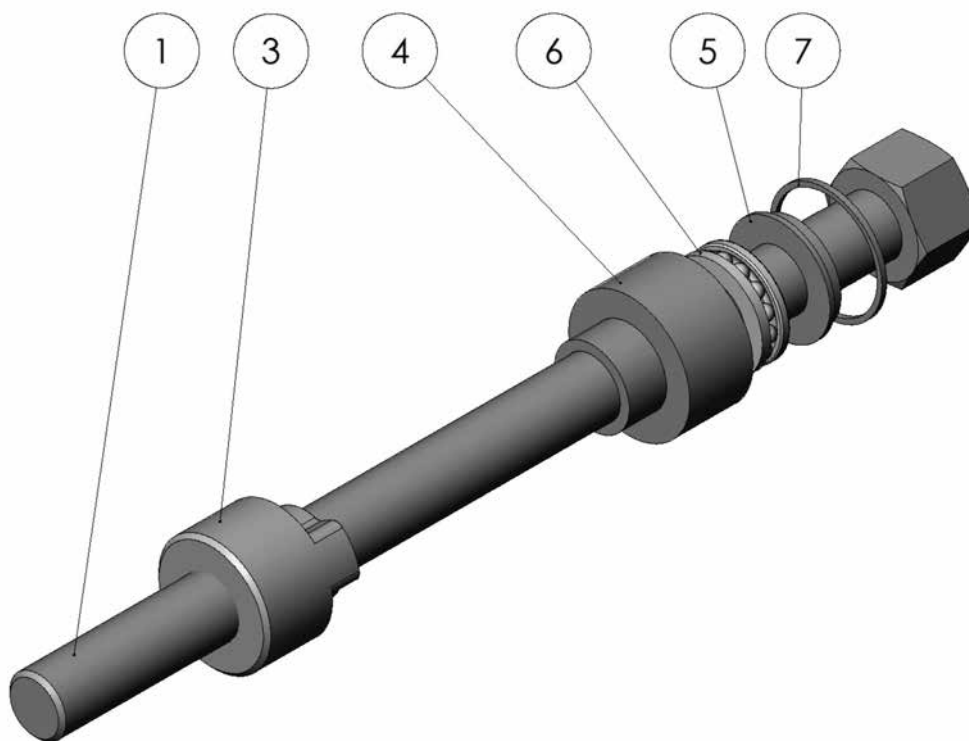
Pro3-I Tiebolt Assembly

Item No.	Pro3-I Tiebolt Quantity	Part Number	Description
1	1	See Size Chart	Pro3-I Tiebolt Base
2	1	DG112C	Nut Hex
3	1	11015102	Pro3-I Tiebolt Locking Insert
4	1	11023021	Tie Bolt Ball Bearing Housing
5	1	11023022	Tie Bolt Ball Bearing Retainer Cap
6	1	11008822	Thrust Ball Bearing
7	1	11023023	Tie Bolt Ball Bearing Retainer Ring

*Note: To order a complete tiebolt assembly use assembly number for desired size.

Pro3-I Tiebolt Size Chart

Tiebolt Size	Overall Length	Tiebolt Part Number	Assembly Number
Pro3-I Size 1	44"	11015130	11025011
Pro3-I Size 2	67"	11015131	11025012
Pro3-I Size 3	91"	11015132	11025013
Pro3-I Size 4	115"	11015133	11025014



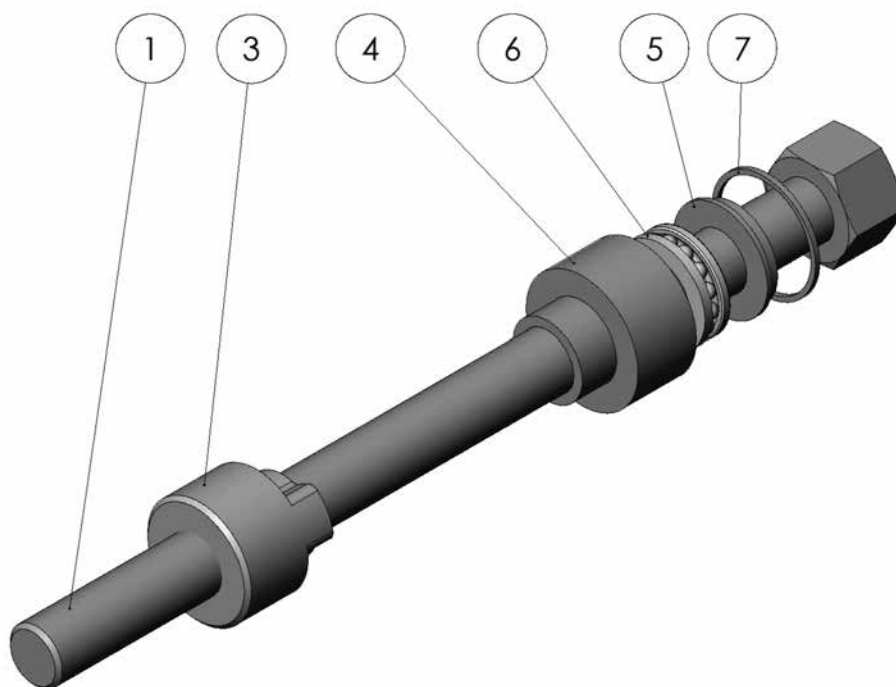
Pro3-S/SH Tiebolt Assembly

Item No.	Pro3-I Tiebolt Quantity	Part Number	Description
1	1	See Size Chart	Pro3-S/SH Tiebolt Base
3	2	11015107	Tiebolt Locking Nut
4	1	11023021	Tie Bolt Ball Bearing Housing
5	1	11023022	Tie Bolt Ball Bearing Retainer Cap
6	1	11008822	Thrust Ball Bearing
7	1	11023023	Tie Bolt Ball Bearing Retainer Ring

Pro3-S/SH Tiebolt Size Chart

Tiebolt Size	Overall Length	Tiebolt Part Number	Assembly Number
Pro3-S/SH Size 1	44"	11015126	11025007
Pro3-S/SH Size 2	67"	11015127	11025008
Pro3-S/SH Size 3	91"	11015128	11025009
Pro3-S/SH Size 4	115"	11015129	11025010

*Note: Item 7 has replaced items 5 and 6. If item 5 or 6 need to be replaced order item 7.



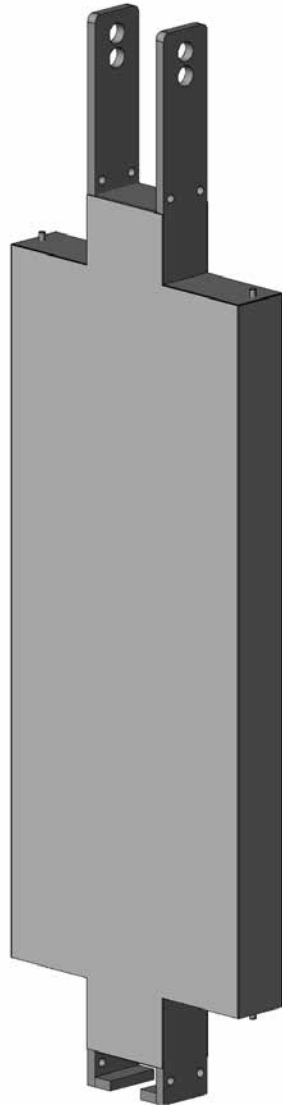
Pro3-F/DF/DFH Tiebolt Assembly

Item No.	Pro3-I Tiebolt Quantity	Part Number	Description
1	1	See Size Chart	Pro3-F Tiebolt
3	1	SG112N	Nut Hex
4	1	11015103	Washer Flat
5	2	TRC 2435	Washer Thrust
6	1	NTA 2435	Bearing Thrust
7	1	11023003	Tie Bolt Bearing Housing
8	1	11015102	Tie Bolt Locking Insert Housing
9	1	11015107	Tie Bolt Locking Nut

Pro3-F/DF/DFH Tiebolt Size Chart

Tiebolt Size	Overall Length	Tiebolt Part Number	Assembly Number
Pro3-F/DF/DFH Size 1	44"	11015110	11024200
Pro3-F/DF/DFH Size 2	67"	11015111	11024201
Pro3-F/DF/DFH Size 3	91"	11015112	11024202
Pro3-F/DF/DFH Size 4	115"	11015113	11024203

*Note: Item 9 has replaced items 3 and 8. If item 3 or 8 needs to be replaced, order item 9.



Pro3 'V' Boss



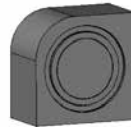
Pro3 'X' Boss



**Pro3 Thru with
2" Connection**



Pro3 Double



Pro3 Blank



Pro3 Thru

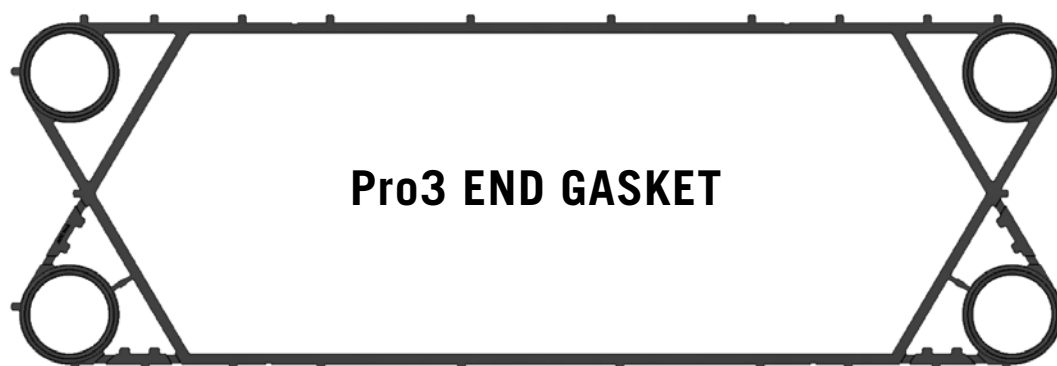
Pro3 Terminal Assembly

(All Pro3 Tiebolt Frames)

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

*Note: Port Bosses shown with tri-clamp ferrules. Other connections are available on request.



**PRO3 DIE CUT
PORT GASKET**



**PRO3 MOLDED
PORT GASKET**

Pro3 Plate and Frame Gaskets

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

“BUILDING THE BEST, SERVICING THE REST”™

AGC Heat Transfer, Inc. is the leading supplier of sanitary plate heat exchangers in North America, manufacturing plate heat exchangers specifically designed for sanitary applications. AGC offers complete heat exchangers services including new frames as well as upgrade plate packs, gaskets and spares that fit other brands. Frames available are tie-bolt, twin spindle and hydraulic (automatic) closure. AGC offers field Leak Testing, Platecheck™ and inspections of plate heat exchangers that meet 3-A sanitary standards.

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PRO3-S



PRO2-S



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WESTERN

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