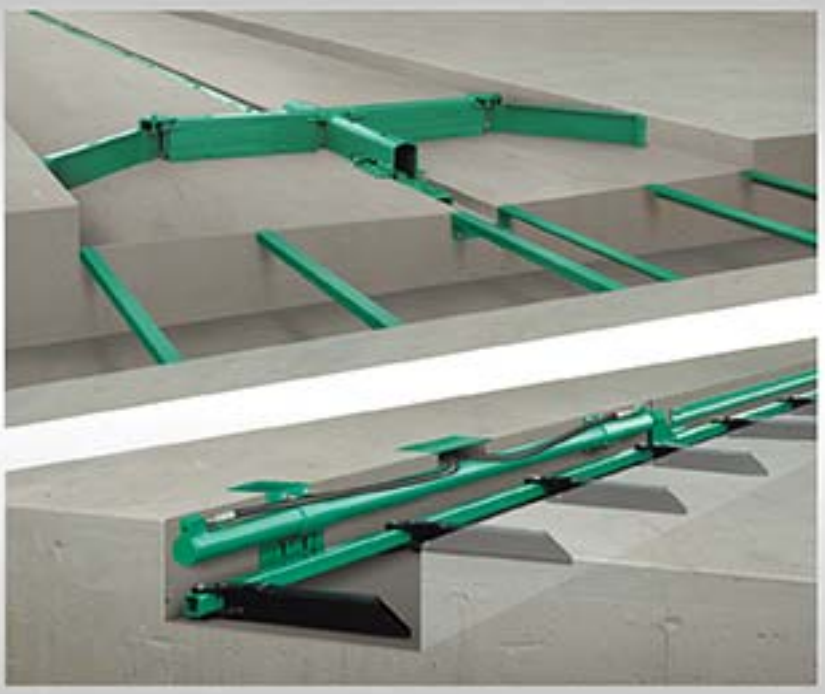


Hydraulic Cleaners

Hydraulic Cleaners

Instruction Manual / Installation Instructions
(Original instructions)

2013-9015-001
01-2014

engineering for a better world

GEA Farm Technologies

Contents

1 Preface

1.1 Information on the instructions

The manufacturer reserves the right to make changes due to technical developments in the data and images given in this manual.

Reproductions, translations and copies of any kind, even of extracts, require written authorization from the manufacturer.

Abbreviations, units, specialist terms, special names or specialist terminology are explained in more detail in the ”Appendix”.

These instructions are part of the supply.

- They should be kept close at hand and remain with the equipment even if the equipment is sold.
- This manual is not subject to an amendment service. The most recent version at any time can be obtained through the technical dealer or directly from the manufacturer.

Necessary documents:

This manual is only part of the product documentation.

- The complete documentation consists of the following manuals:

Part No.	Description
2013-90..-001	Instruction manual (Hydraulic Cleaners)
2013-90..-002	Design guide (Hydraulic Cleaners)

Pictograms used

This pictogram indicates information that will help towards better understanding of a procedure or operation.

This pictogram refers to another document or another section of this manual.

If a manual number is given, the middle 4 figures indicate the language, as follows:

	language		**language**		**language**
-9000-	German	-9013-	Dutch	-9032-	Serbian
-9001-	English (United Kingdom)	-9015-	English (North American)	-9034-	Slovakian
-9002-	French (France)	-9016-	Polish	-9035-	Chinese
-9003-	Italian	-9018-	Japanese	-9036-	Lithuanian
-9004-	Romanian	-9021-	Danish	-9038-	Portuguese (Brazil)
-9005-	Spanish (Spain)	-9022-	Hungarian	-9039-	French (Canada)
-9007-	Swedish	-9023-	Czech	-9040-	Latvian
-9008-	Norwegian	-9024-	Finnish	-9041-	Estonian
-9009-	Russian	-9025-	Croatian	-9043-	Spanish (Central America)
-9010-	Greek	-9027-	Bulgarian		
-9012-	Turkish	-9029-	Slovenian		
Not all of the above languages may be available.					

1.2 Manufacturer address

GEA Farm Technologies Canada Inc. / Division GEA Houle
4591 boul. St-Joseph
Drummondville, Qc, J2A 0C6

☎ +1 819 477 - 7444
🖷 +1 819 477 - 5565
✉ geahoule@gea.com
@ www.gea-farmtechnologies.com

1.3 Customer service

Authorized technical dealer:

If necessary, please contact your nearest authorized technical dealer.

There is a comprehensive dealer Internet search function on our website at the following address:

www.gea-farmtechnologies.com

European contact information:

GEA Farm Technologies GmbH
Siemensstraße 25-27
D-59199 Bönen

☎ +49 (0) 2383 / 93-70
🖷 +49 (0) 2383 / 93-80
✉ contact@gea.com
@ www.gea-farmtechnologies.com

US contact information:

GEA Farm Technologies, Inc.
1880 Country Farm Dr.
Naperville, IL 60563

☎ +1 630 369 - 8100
🖷 +1 630 369 - 9875
✉ contact_us@gea.com
@ www.gea-farmtechnologies.com

1.4 Declaration of conformity

Manufacturer:	**GEA Farm Technologies Canada Inc. / Division GEA Houle** **4591 boul. St-Joseph** **Drummondville, Qc, J2A 0C6**
Product category:	**Hydraulic Cleaner Systems**
Type of product:	**Hydraulic Scraper and Hydraulic Gutter Cleaner**

The named product is in conformity with the requirements of the following European directives:

2006/42/EC Machinery Directive

Conformity with the requirements of these directives is testified by complete adherence to the following standards:

- Harmonized European standards

EN 809 (2009-06)	Pumps and pump units for fluids - general safety requirements
EN 953 (2009-07)	Safety of machinery Guards
EN 1037 (2008-11)	Safety of machinery Avoidance of unexpected start-up
EN 4254-1 (2010-01)	Agricultural Machinery - safety General requirements
EN 4413 (1999-08)	Hydraulic fluid power General rules relating to systems
EN 12100-1 (2009-10)	Machine safety, basic terms, general design guidelines. Part 1: Basic terminology, methods
EN 12100-2 (2009-10)	Machine safety, basic terms, general design guidelines. Part 2: Technical guidelines and specifications
EN ISO 13857 (2008-06)	Safety of machinery - Safety distances to prevent hazard zones being reached by upper and lower limbs
EN ISO 14121-1 (2007-12)	Safety of machinery - Risk assessment - Part 1: Principles
EN ISO 14121-2 (2007-12)	Safety of machinery - Risk assessment - Part 2: Practical guidance and examples of methods
NF X 08-003-1 (2006-07)	Graphic and pictographic symbols - colors and safety signs

Person responsible for compiling the relevant technical documents:

Josef Schröer
GEA Farm Technologies GmbH
Siemensstraße 25-27
D-59199 Bönen
☏ +49 (0) 2383 / 93-70

Drummondville, 01 January 2014

Yann Desrochers
(Head of Research and Development)

The undersigned is acting by virtue of power of attorney from the management of:
GEA Farm Technologies Canada Inc. / Division GEA Houle, 4591 boul. St-Joseph, Drummondville, Qc, J2A 0C6

This declaration certifies compliance with the guidelines indicated, but does not establish any guarantee in the sense of paragraphs 443, 444 of the BGB.
This declaration of conformity becomes invalid if design changes are made which affect the technical data given in the instructions and the correct use of the product, thereby significantly altering the machine!

1.5 GEA Farm Technologies Canada Inc. / Division GEA Houle - General Equipment Warranty

☞ **Important notice!**
THIS GENERAL WARRANTY APPLIES TO ALL EQUIPMENT SOLD UNDER THE GEA HOULE TRADEMARK.

1.5.1 Limited warranty

GEA Farm Technologies Canada Inc. / Division GEA Houle (hereinafter referred to as ”the Company”) warrants to the original buyer and end user (hereinafter referred to as the ”Purchaser”) that the parts of all equipment sold under the Company trademark are free from defects in material or workmanship for a period of twelve (12) months from the date of delivery of the equipment to the Purchaser. This written warranty takes precedence over any other written warranty included in previous versions of the Company's manuals. Any equipment used for commercial usage, commercial lease on one or more farms is warranted for a reduced period of thirty (30) days only.

Components from third-party manufacturers that are not built by the Company, and which are accessory to the equipment sold under the Company trademark (including, without limitation, the motors and tires), are subject to such third-party manufacturers' specific warranty coverage.

THIS WARRANTY EXTENDS ONLY TO THE PURCHASER AND DOES NOT APPLY IN THE EVENT THAT THE EQUIPMENT IS SOLD OR OTHERWISE TRANSFERRED.

1.5.2 Condition of the limited warranty

The Company, through its GEA authorized dealers only (hereinafter referred to as ”Authorized Dealer”, reserves the right to either repair or replace all parts deemed defective under the following conditions:

1. That the equipment is installed, operated and maintained in accordance with the Company directives;
2. That the Purchaser uses the equipment in accordance with specific instructions, under normal conditions, for the sole purpose for which the equipment was designed;
3. That the Purchaser notifies in writing his Authorized Dealer or the Company (whichever the case may be) of any defect of the equipment. In either case the notification must be made within the twelve (12) months following the date of the delivery to the Purchaser;
4. The Purchaser or the Authorized Dealer must keep the defective parts or equipment for inspection by the Company and return such defective parts or equipment prepaid to the Company, if requested;
5. That the Purchaser does not modify the equipment, nor attempts to repair any equipment or parts without proper authorization from the Company;
6. Depending on the nature of the equipment involved and whether it is fixed or transportable, the Company will repair or replace the defective parts of the equipment free of charge where installed, or at the business place of the Authorized Dealer or the Company, at its sole discretion.

1.5.3 Extent of limited warranty

This limited warranty DOES NOT cover:

- Defects caused by negligence of the Purchaser in the maintenance of the equipment, improper use resulting from failure to adhere strictly to the Company's manuals or non-compliance with prescribed maintenance instructions provided by the Company (including, without limitation, lack of lubrication of the equipment), as well as damages arising from non-conforming installation of the equipment, or ambient temperature or conditions of storage of the equipment that do not comply with the Company's recommendations (including, without limitation, any damages resulting from storage or operation of the equipment at a temperature equal or below (5°C/41°F));
- Damages to equipment due to normal wear and tear or to external causes, including issues of power or inadequate electrical conditions (including, without limitation, inadequate tension (neutral/ground), abnormal mechanical or environmental conditions (including, without limitation, damages caused by fire, lightening, flood or other natural disaster), damages caused by the use of sand litter or other abrasive or inadequate material (including, without limitation, damages caused by solids in the manure, such as stone, wood, iron, concrete, and strings), as well as damages caused by ice or frozen manure blocking the evacuation line of the equipment or the introduction of such solids in the equipment;
- Freight and shipping associated with repair or replacement of equipment under this limited warranty, as well as all costs relating to removal or replacement of any equipment that is welded or affixed permanently to the ground or a building (including, without limitation, labour costs, and costs related to concrete or excavation);
- Claims arising from repairs or replacements made by the Purchaser without the prior written consent of the Company. The Purchaser shall not remove or alter any safety device, guard, or Warning sign.

If the Purchaser fails to comply with any of its obligations referred to in this paragraph, the Purchaser agrees to save the Company and the Authorized Dealer harmless in respect of any liability or obligation incurred by the Company or the Authorized Dealer resulting from such failure of the Purchaser.

1.5.4 Warranty limitations and exclusion

NO WARRANTY, ORAL OR WRITTEN, EXPRESS OR IMPLIED, OTHER THAN THE ABOVE WARRANTY IS PROVIDED IN RESPECT OF THE EQUIPMENT SOLD.

Some states (or jurisdictions) do not allow the exclusion of implied warranties so it is possible that this limitation may not apply.

THE COMPANY DISCLAIMS ALL IMPLIED WARRANTIES, INCLUDING THE WARRANTIES OF MERCHANTABILITY, ADAPTABILITY OR OF PERFORMANCE, PROVIDED THAT SUCH EXCLUSION OF LIABILITY COMPLIES WITH THE LAWS HAVING APPLICABLE REGULATORY JURISDICTION.

THE LIABILITY OF THE COMPANY AND ITS AUTHORIZED DEALERS UNDER THIS WARRANTY IS LIMITED TO REPAIR OR REPLACEMENT OF DEFECTIVE PARTS UP TO THE CONTRACT VALUE FOR THE PURCHASED EQUIPMENT. IN NO EVENT SHALL THE COMPANY BE LIABLE FOR ANY SPECIAL, INDIRECT, CONSEQUENTIAL, INCIDENTAL, PUNITIVE OR EXEMPLARY DAMAGES IN ANY KIND OR CHARACTER, INCLUDING INDIRECT COSTS, LOSS OF PRODUCTION, LOSS OF REVENUES OR PROFITS, AND OTHER DISBURSEMENTS WHICH MAY OCCUR.

Some states (or jurisdictions) do not allow the exclusion or limitation of incidental or consequential damages and so it is possible that these limitations or exclusions may not apply.

1.5.5 General statements

THIS WARRANTY GIVES YOU SPECIFIC LEGAL RIGHTS AND YOU MAY ALSO HAVE OTHER RIGHTS THAT VARY BY JURISDICTION.

THE DEALER IS NOT AUTHORIZED TO MAKE ANY ADDITIONAL REPRESENTATIONS OR PROMISES THAT DIFFER IN ANY WAY FROM THE TERM OF THIS LIMITED WARRANTY, OR MODIFY THE PROVISIONS, DURATION AND CONDITIONS OF THIS LIMITED WARRANTY. NO WAIVER OR MODIFICATION OF THIS LIMITED WARRANTY IS VALID UNLESS AGREED TO IN WRITING AND SIGNED BY THE AUTHORIZED REPRESENTATIVES OF THE COMPANY.

IN THE EVENT OF ANY CONFLICT BETWEEN THE ENGLISH LANGUAGE VERSION AND ANY OTHER TRANSLATED VERSION OF THIS LIMITED WARRANTY (WITH THE EXCEPTION OF THE FRENCH LANGUAGE VERSION) THE ENGLISH VERSION SHALL PREVAIL.

2 Safety

2.1 Owner's obligation of care

This product is designed and constructed while taking into account a potential risk analysis and after careful selection of the harmonized standards and other technical specifications to be complied with to guarantee a maximum level of safety.

Safety is achieved when the safety instructions are followed. It is part of the owner's obligation of care to implement these safety measures and make sure they are carried out at all times.

In particular, the owner must ensure that:

- everyone working with or performing activities in connection with this product, including himself, read the instructions contained in this instruction manual and follow those instructions;
- everyone is regularly instructed on relevant matters.

The owner must ensure a safe environment by providing:

- this instruction manual with this product;
- a safety fence surrounding each manure storage, service pit and danger area. Refer to the local requirements;
- a padlock on each electric source feeding this product or its equipment to secure the product when performing maintenance. A caution label is set onto the electric panel ”CAUTION! Lock before maintenance or adjustment work”. A removable caution sign ” Maintenance in progress” must be affixed on the panel when applicable;
- an equipotential bond for electric protection when this product or its equipment is powered by an electric source. All electric conductive parts and the installation's protective earth conductor must be connected to the equipotential bond;
- adequate lighting in all areas where activities in connection with this product are performed. A minimum of 200 lux is required to ensure visibility of the equipment, the controls and the safety labels;
- all required personal safety gear such as hearing, eye, feet protection, etc. in all areas where activities in connection with this product are performed;
- supervision for inexperienced personnel working or performing activities in connection with this product;
- the tools listed in this manual to perform activities in connection with this product;
- an adequate installation of the product in order to use it only for the sole purpose for which it was designed;
- new parts to replace defective, worn and damaged parts on this product;
- appropriate devices such as motor, engine, hydraulic unit, etc. to safely operate this product. To meet the technical requirements, refer to section Technical data.
- a product meeting the local rules and regulations.

2.2 Explanation of the safety symbols

Safety symbols draw attention to the importance of the adjacent text.

The design of the warnings is based on ISO 3864-2 and ANSI535.6.

Safety symbols and key words

Danger!
The indication ”Danger” signals immediate danger to life or health of personnel.
Death or serious injury will result if the danger is not avoided.

Warning!
The indication ”Warning” signals potential danger to life or health of personnel.
Death or serious injury may result if the danger is not avoided.

Caution!
The indication ”Caution” signals a hazardous situation.
Minor or moderate injury may result if the danger is not avoided.

Attention!
The indication ”Attention” signals important information on risks for the product or the environment.

2.3 Basic safety instructions

2.3.1 Safety instructions

- Read and follow the instructions of this instruction manual before performing activities in connection with this product. Keep the instruction manual with this product allowing anyone to refer to it at any time.
- Only trained personnel can operate this product to ensure safe operating methods. Make sure the personnel performing activities in connection with this product have the skills when special qualifications are required. Read the section Safety - Personnel qualifications.
- Always wear personal safety gear such as hearing, eye, feet protection, etc. when performing activities in connection with this product. Inspect the personal gear and replace if worn and/or defective.
- Make sure the environment is safe through all steps listed in this manual. Always be familiar with the environment surrounding the working area. Locate the elements that can be dangerous in order to avoid them. Beware of leaks and spills such as grease, oil, water, etc. which can make a surface slippery causing injuries.
- No one stands near this product unless they are performing instructions included in this manual. When near this product, keep body parts such as hands, feet, hair as well as clothing away from dangerous parts such as rotating parts, articulated parts, sharp edges, etc.
- Use this product only when in perfect working condition and for the sole purpose for which it was designed. Do not use damaged, worn or defective parts on this product, replace immediately to avoid serious damages and injuries.
- Use only the tools listed in this manual to perform activities in connection with this product in order to avoid injuries.
- Do not stand underneath suspended loads when handling this product or parts: there is a potential risks of fall, damage and/or loss of stability.
- Never remove the safety devices such as guards, covers, chains, labels, etc. from this product to ensure safety unless otherwise indicated in this instruction manual. Refer to section Safety - Safety devices. Read and follow the instructions of the safety labels set on this product and make sure the safety labels are legible.
- The devices supplied by the owner to operate this product such as a motor, an engine, a hydraulic unit, etc. must meet the technical requirements indicated in section Technical data.

2.4 Personnel qualifications

The manufacturer intends to determine the difference between TRAINED PERSONNEL and QUALIFIED PERSONNEL.

Trained personnel

The operator was trained by the manufacturer or its legal representative to follow all safety rules, cleaning method, general maintenance as well as the operating methods.

It is the operator's responsibility to inform the farm workers of those rules, maintenance and methods.

Qualified personnel

Qualified personnel refers to those having obtained the academic knowledge of a specific field of work. This personnel has followed a training and subsequently obtained a certification, diploma or any other official document provided by a recognized academic facility in the country of study. An equivalence may be required when operating in other countries.

The special qualifications required in the following activities will be specified in each section when applicable:

- Handling and installation
- Initial commissioning
- Operation
- Operating faults
- Maintenance
- Advanced maintenance
- Decommissioning

2.5 Protective devices

2.5.1 Protective safety parts

This product is equipped with safety parts protecting the user against dangerous elements.

Those parts must be in a perfect working condition and remain in place at all times.

Replace when damaged, worn or defective. Refer to the part number for the appropriate part.

Trigger rod switch guard
(Part No. 2013-7617-110) 36 ½" of length
(Part No. 2013-7617-100) 46 ½" of length

2.5.2 Safety labels

The labels set onto this product inform the user on the potential dangers, the prohibited manoeuvres, the proper procedures and applications when performing activities in connection with this product.

The labels must remain in place and be legible at all times. Replace when damaged.

Refer to the part number for the appropriate label.

Refer to section Appendix - Label position.

3 Description (Overview)

3.1 Product applications

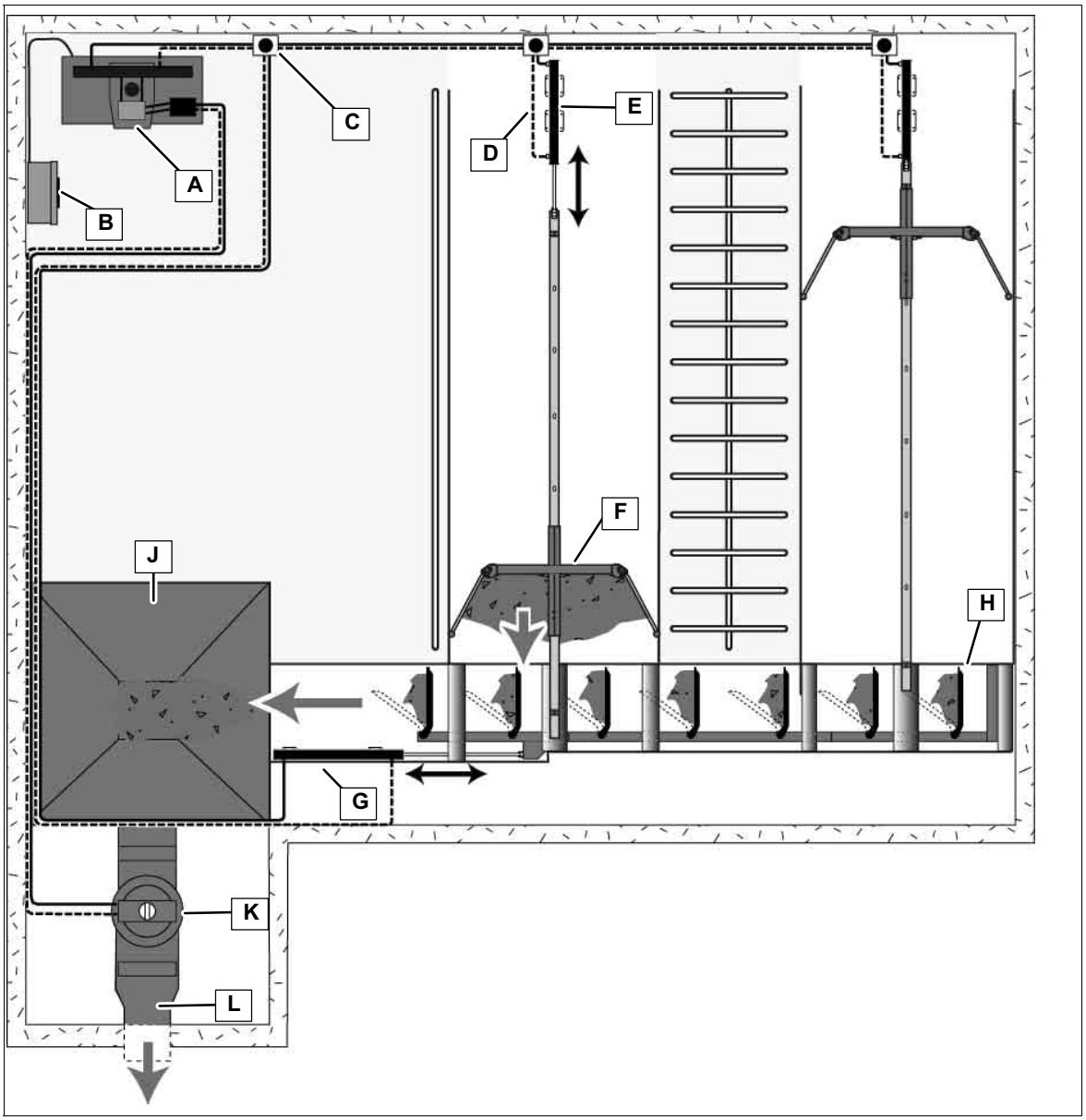
A common design uses scrapers to collect manure in the alley (s) to direct the accumulation inside a cross gutter.

When the gutter is filled with manure, the cross gutter cleaner carries the load to an underground pump, as illustrated below.

To power the hydraulic cleaners, a control panel is programmed to start the hydraulic power unit that supplies oil to the cylinders of the free stall cleaner (s) and/or the cross gutter cleaner (s).

The oil that flows in the system travels through heavy duty steel pipes and hydraulic hoses. When the oil reaches a cylinder, the cylinder rod extends or retracts.

It allows the rails of the scraper and/or the gutter cleaner to move in order to push or pull the manure to the next collector.



Legend:			
A	Hydraulic power unit	**B**	Control panel
C	Solenoid	**D**	Stop mechanism (not shown)
E	Scraper cylinder	**F**	Scraper
G	Gutter cylinder	**H**	Paddles
J	Hopper	**K**	Underground manure pump
L	Evacuation line going to the storage area		

This GEA Houle product and its equipment are designed for agricultural purposes only. Other applications than the ones listed above are considered as improper use and will void the warranty!

The manufacturer is not liable for any resulting damages due to improper use of this product. The user carries the risk. Proper use also includes reading and following the instructions of this instruction manual.

- Original GEA Houle parts and accessories are specially designed for GEA Houle products and equipment.
- The manufacturer expressly points out that only original parts and original accessories supplied by GEA Houle are adapted, tested and authorized to be used with this product or equipment. Do not use other supplier's parts or equipment with GEA Houle product unless otherwise approved in writing by GEA Houle.
- The manufacturer does not accept any liability toward injured people or animals or damaged products and equipment caused by the use of other manufacturers products.

3.2 Modification made to this product

Unauthorized modifications of the product can have a negative impact on the safety, life span or functionality of the product.

Any modifications not described in the product documentation are deemed to be prohibited.

For safety reasons, do not carry out any unauthorized modifications!

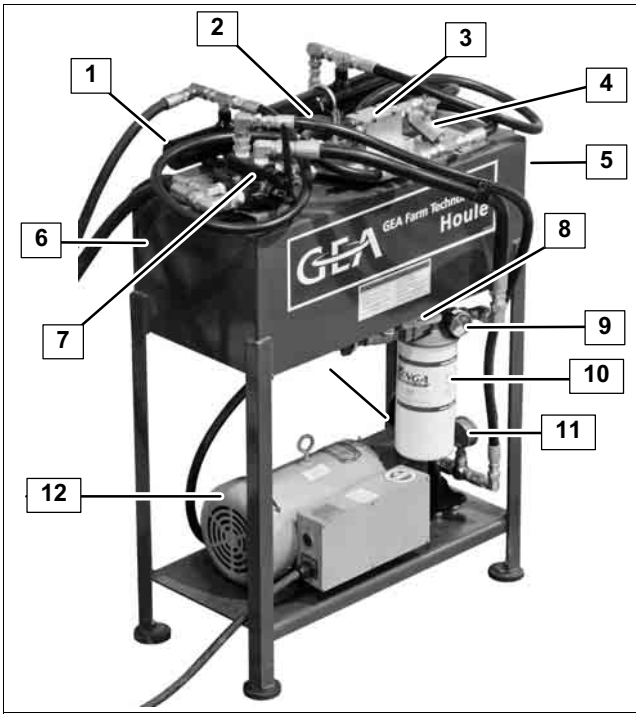
Planned changes must be approved by the manufacturer in writing.

Any unauthorized modifications to the product will invalidate the warranty and may invalidate the provided manufacturer's declaration or installation declaration.

4 Technical data

This section lists technical specification on each component contained in hydraulic cleaner systems.

4.1 Hydraulic power unit



Length	33” [0.83 m]
Width	14½” [0.36 m]
Height	42” [1.06 m]
Weight **(filled with oil)**	423 lbs @ 540 lbs [192 kg @ 245 kg]
Volume	16 US gallons [60 liters]
Maximum operating time	720 minutes per day

Legend:			
1	Hydraulic damper	**2**	Reservoir cap and air breather
3	Reversing and relief valve block	**4**	Needle valve
5	Oil sight gauge (not illustrated)	**6**	Oil reservoir
7	Selector valve	**8**	Ball valve
9	Oil filter gauge	**10**	Oil filter
11	Pressure gauge	**12**	Electric motor

4.1.1 Hydraulic pump

Maximum operating pressure	2000 psi [138 bar]
Maximum peak	4640 psi [320 bar]
Minimum speed	500 rpm
Maximum speed	3500 rpm
Construction	Extruded aluminum body

4.1.2 Electric motor

The motor used to operate the hydraulic cleaner systems must comply with the specifications indicated in the following table. For further information, contact your dealer.

Standard specifications	NEMA	IEC
Frame sizes required**	182T, 184T	100, 112
Type of construction	B3	
Weight	No special requirements	
Frame material	No special requirements	
Degree of protection	IP 55	
Method of cooling	TEFC, IC 411 (Totally Enclosed, Fan Cooled)	
Vibration class	No special requirements	
Insulation	155(F) @ 130(B)	
Duty type	S1(continuous operation)	
Direction or rotation	Bi-directional	
Rated motor voltage	As per local requirements	
Frequency	50Hz or 60Hz as per local requirements	
Rated motor power	3 HP / 5 HP [2.2 KW / 3.7 KW]	
Rated motor speed	50Hz@1450rpm 60Hz@1760rpm	
Rated motor torque	No special requirements	
Rated motor current		
Power factor		
Efficiency	80% minimum	

** Motor frame sizes can be fitted on the motor support.

4.1.3 Operating pressure chart of pump and motor

60 Hz / 1760 rpm					
Motor	**Pump**	**Flow rate**		**Maximum operating pressure**	
Hp	Model	GPM	LPM	psi	bar
3	PLP20-9	3.95	17.95	1400	97
	PLP20-11.2	4.90	18.40	1100	76
5	PLP20-11.2	4.90	18.40	1800	124
	PLP20-14	6.40	24.30	1500	103
	PLP20-16	7.50	28.25	1200	83

50 Hz / 1450 rpm					
Motor	**Pump**	**Flow rate**		**Maximum operating pressure**	
kW	Model	GPM	LPM	psi	bar
2,2	PLP20-9	3.30	12.40	1150	80
	PLP20-11.2	4.05	15.30	930	65
3,7	PLP20-11.2	4.05	15.30	1550	110
	PLP20-14	5.30	20.20	1175	81
	PLP20-16	6.20	23.40	1000	69

4.1.4 Cleaning speed chart

60 Hz / 1760 rpm					
Motor	**Cylinder**	**Pump**	**Cleaning speed**		**Maximum operating pressure**
			Scraper	Gutter Cleaner	
Hp	Type of connection	Model	ft/minute	ft/minute	psi
3	Serial	PLP20-9	7	5	1400
		PLP20-11.2	8.75	6.25	1100
5		PLP20-11.2	8.75	6.25	1800
		PLP20-14	11.5	8.25	1500
		PLP20-16	13.25	9.75	1200
3	Parallel	PLP20-9	8	5.85	1400
		PLP20-11.2	10	7.55	1100
5		PLP20-11.2	10	7.25	1800
		PLP20-14	13	9.5	1500
		PLP20-16	15	11	1200

50 Hz / 1450 rpm					
Motor	**Cylinder**	**Pump**	**Cleaning speed**		**Maximum operating pressure**
			Scraper	Gutter Cleaner	
kW	Type of connection	Model	m/minute	m/minute	bar
2,2	Serial	PLP20-9	1.78	1.27	80
		PLP20-11.2	2.22	1.59	65
3,7		PLP20-11.2	2.22	1.59	110
		PLP20-14	2.9	2.1	81
		PLP20-16	3.37	2.48	69
2,2	Parallel	PLP20-9	2.03	1.49	80
		PLP20-11.2	2.54	1.92	65
3,7		PLP20-11.2	2.54	1.84	110
		PLP20-14	3.3	2.4	81
		PLP20-16	3.8	2.8	69

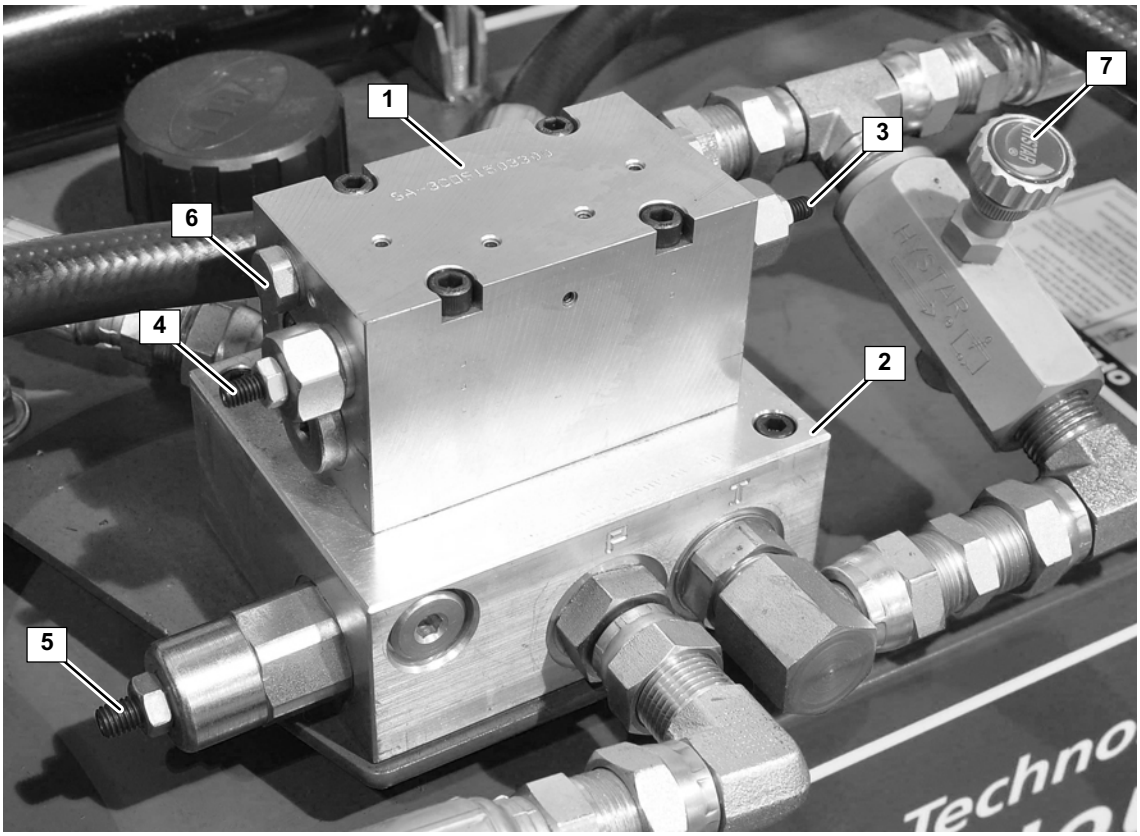
4.1.5 Reversing and pressure relief valve

A pressure relief valve and an automatic reversing valve are combined in an aluminum block which is installed on top of the hydraulic power unit reservoir.

These valves are connected to the hydraulic pump to ensure adequate pressure inside the hydraulic system.

When adjusted, the pressure relief valve routes the excess pressure inside the return line of the reservoir.

The automatic reversing valve reverses hydraulic flow when the adjusted pressure is reached allowing the cylinders to extend or retract.



Legend:			
1	Automatic reversing valve	**2**	Relief valve
3	Reversing valve adjustment screw A	**4**	Reversing valve adjustment screw B
5	Relief valve adjustment screw	**6**	Reversing valve spool
7	Needle valve		

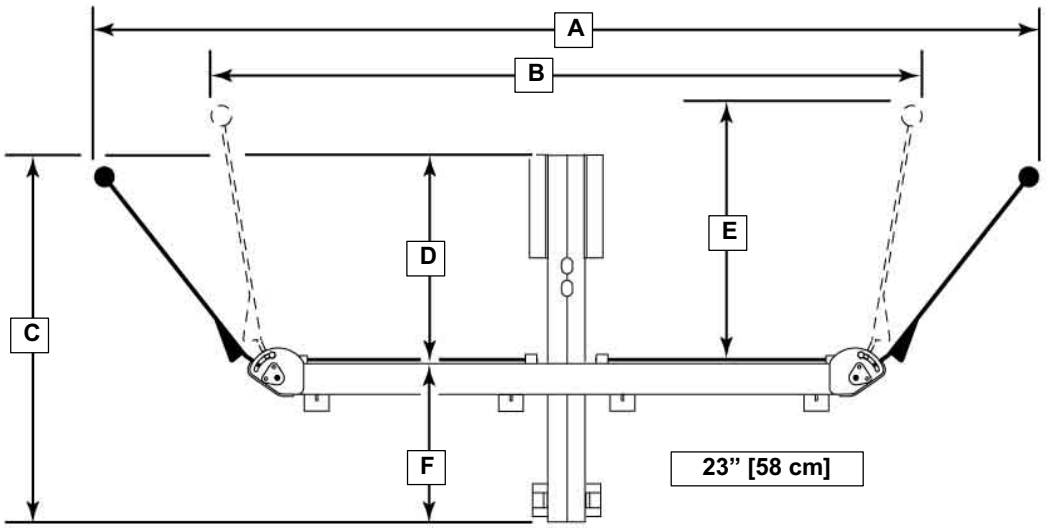
4.1.6 Acoustic emission

Noise level	Less than 65 dBA

4.2 Free stall cleaner

Scraper dimension

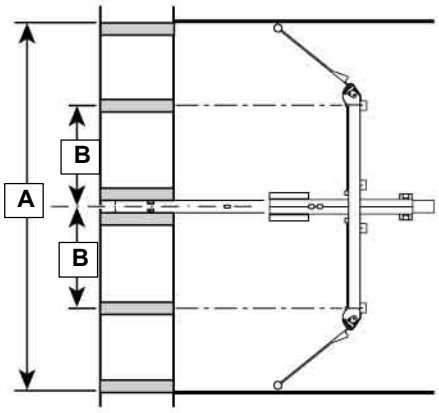
Alley width	A Maximum width when cleaning an alley	B Minimum width when returning to park position	C	D	E	F
6'-6" @ 7'-5"	94" [2.4 m]	63" [1.6 m]	48" [1.2 m]	27" [0.7 m]	30" [0.8 m]	21" [0.2 m]
7'-6" @ 8'-5"	106" [2.7 m]	75" [1.9 m]				
8'-6" @ 9'-5"	118" [3 m]	87" [2.2 m]				
9'-6" @10'-5"	130" [3.3 m]	99" [2.5 m]				
10'-6" @ 11'-5"	142" [3.6 m]	111" [2.8 m]				
11'-6" @ 12'-5"	154" [3.9 m]	123" [3.1 m]				
12'-6" @ 13'-5"	166" [4.2 m]	135" [3.4 m]				
13'-6" @ 14'-5"	178" [4.5 m]	147" [3.7 m]				



A folding scraper folds to 23" [58.4 cm] of width.
This option can be useful when accessing the alley with machinery, equipment, etc.

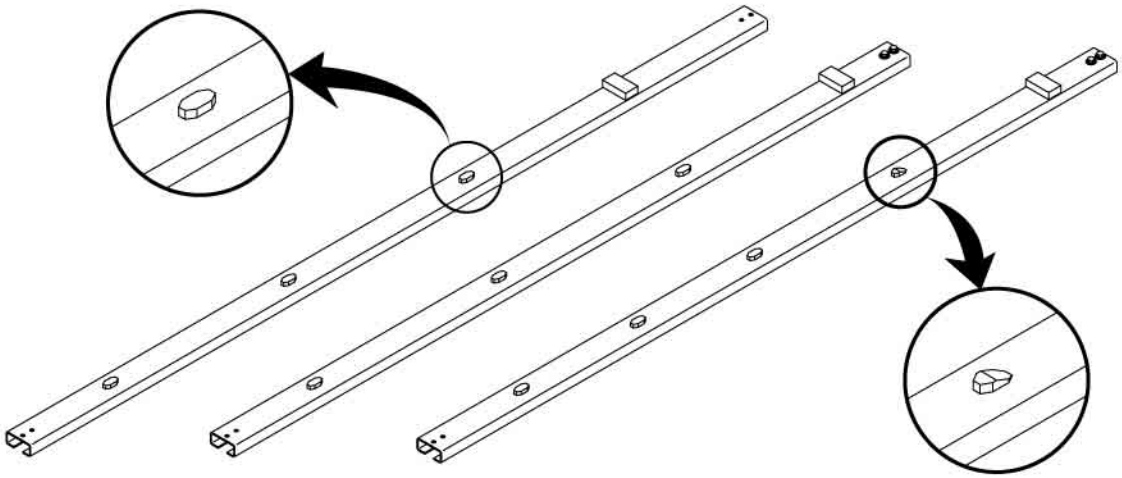
The folding arms of a standard scraper measure 6" [15.2 cm] high.
4" [10 cm] high folding arms are available.

Scraper supports position



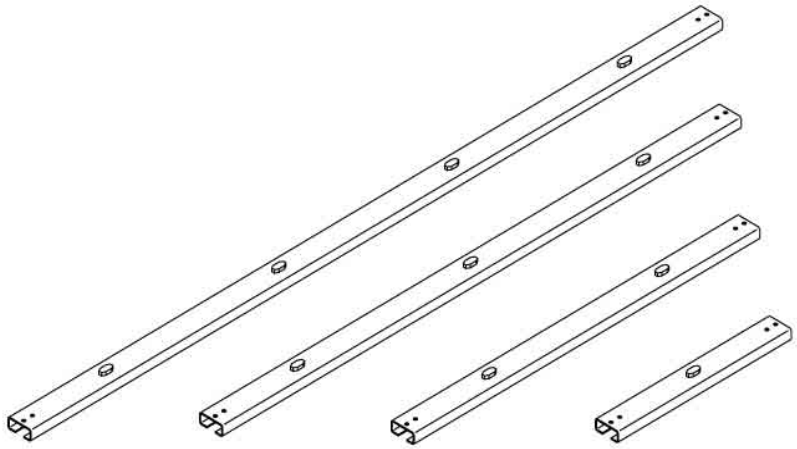
A	B
6'-6” [2 m] @ 7'-5” [2.25 m]	21 ⅞” [56 cm]
7'-6” [2.3 m] @ 8'-5” [2.6 m]	27 ⅞” [71 cm]
8'-6” [2.6 m] @ 9'-5” [2.9 m]	33 ⅞” [86 cm]
9'-6” [2.9 m] @10'-5” [3.2 m]	39 ⅞” [101 cm]
10'-6” [3.2 m] @ 11'-5” [3.5 m]	45 ⅞” [117 cm]
11'-6” [3.5 m] @ 12'-5” [3.8 m]	51 ⅞” [132 cm]
12'-6” [3.8 m] @ 13'-5” [4.1 m]	57 ⅞” [147 cm]
13'-6” [4.1 m] @ 14'-5” [4.4 m]	63 ⅞” [162 cm]
14'-6” [4.4 m] @ 15'-5” [4.7 m]	69 ⅞” [177 cm]
15'-6” [4.7 m] @ 16'-5” [5 m]	75 ⅞” [193 cm]

Starting rail length



Rail model	Standard		Factory modified
Hydraulic connection	Serial or parallel		Serial
Type of drive	Pushing	Pulling	Pushing or Pulling
Rail length	120” [3.05 m]	110” [2.8 m]	110” [2.8 m]

Intermediate rail length

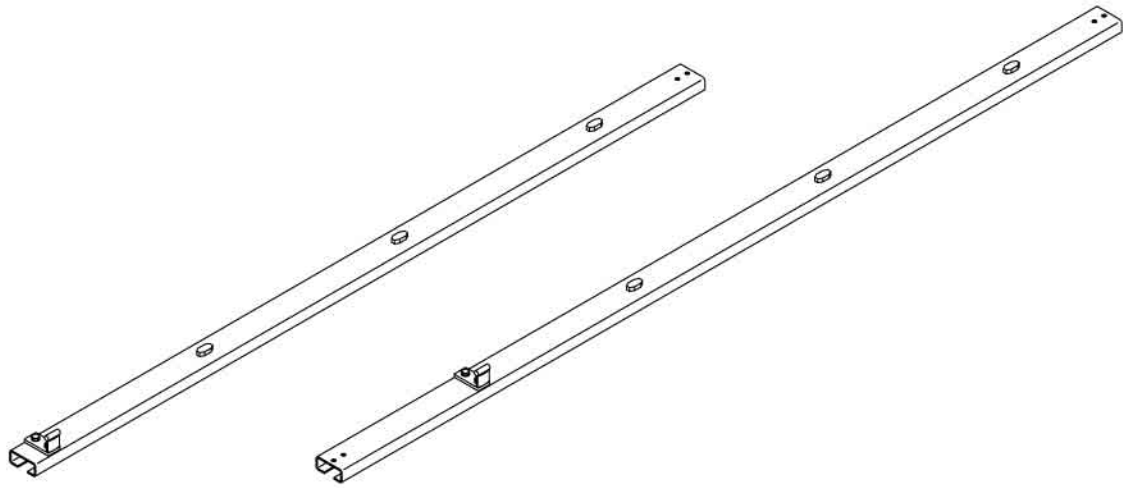


Rail model	Standard or factory modified			
Rail length	30” [0.76 m]	60” [1.5 m]	90” [2.3 m]	120” [3.05 m]

Adjustment rail length

The adjustment rail is an intermediate rail that is customized to fit the length of the alley.
The adjustment rail uses standard intermediate rail length.

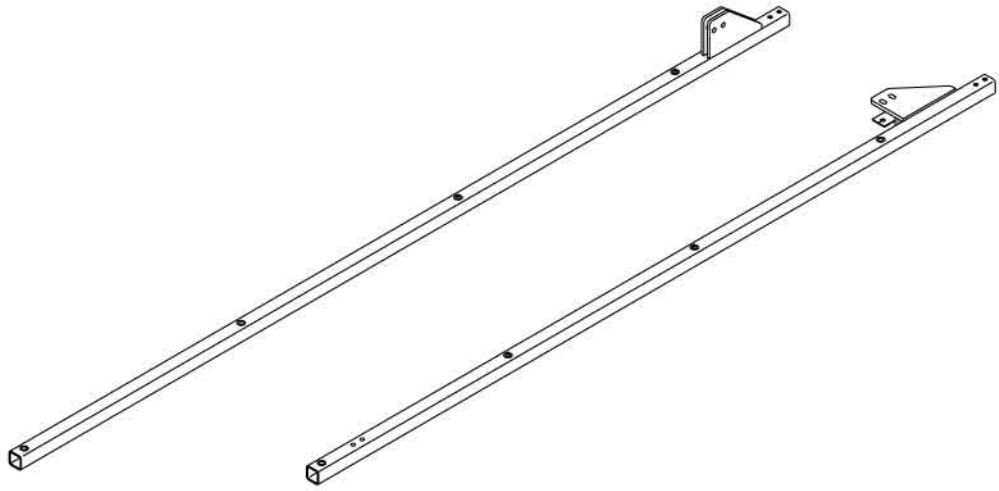
End rail length



Type of drive	Push	Pull
Rail length	103” [2.6 m]	120” [3.05 m]

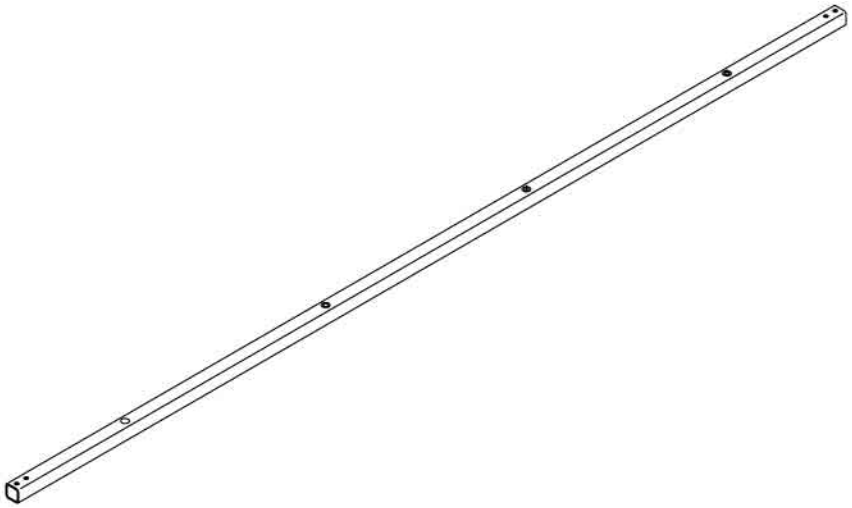
4.3 Cross gutter cleaner

Starting rail length

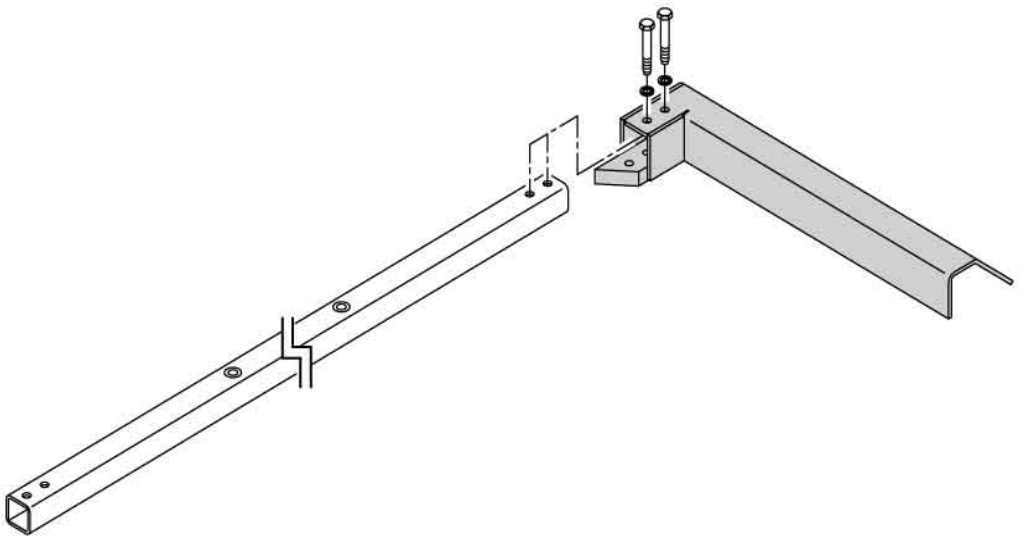


Gutter depth	All depth	
Cylinder length	82 ¼” [2.09 m]	118 ¼” [3 m]
Rail length	91 ½” [2.32 m]	127 ½” [3.24 m]

Intermediate rail length

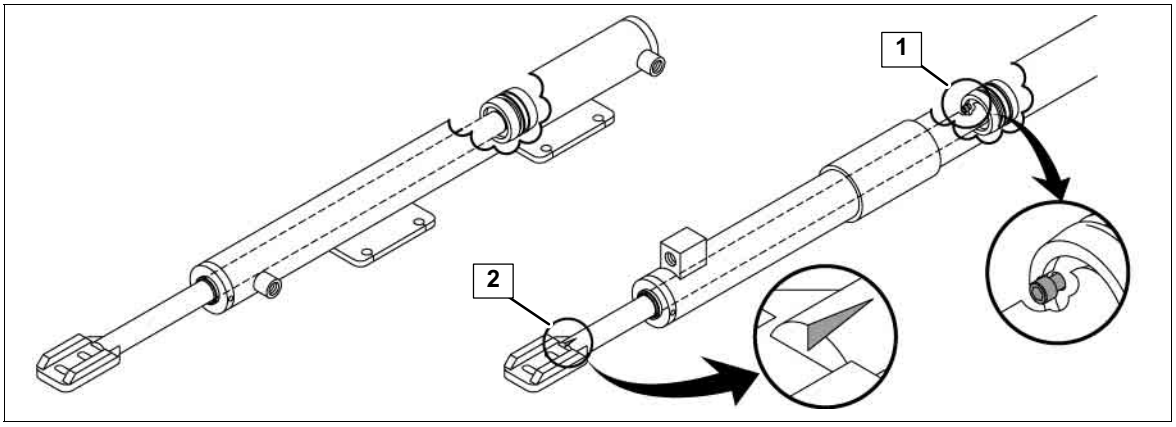


Rail length	144” [3.66 m]

End rail length

The end rail is customized to fit the length of the cross gutter.

4.4 Cylinders

The internal construction of a cylinder that connects in series must be equipped with a factory built compensator (1). The cylinder is identified by a mark (2) on the fixing plate.



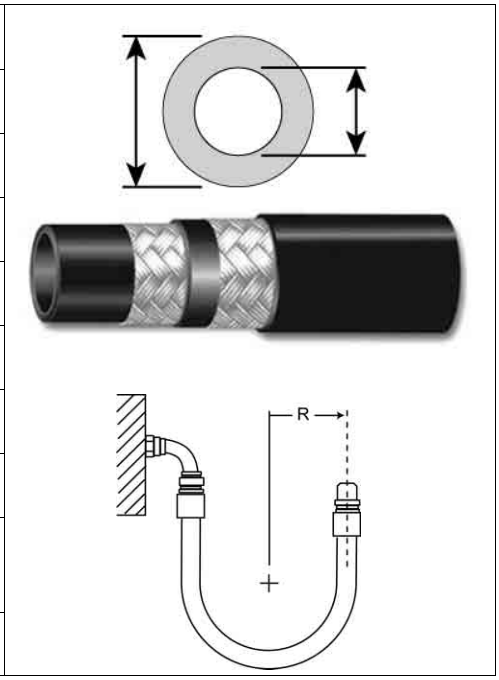
I.D. inside diameter	2 ½” [63.5 mm]
O.D. outside diameter	2 ⅞” [73.5 mm]
Rod diameter	1 ¼” [31.755 mm]
Maximum working pressure	2000 psi
Overall length (including fixing plate)	Free stall cleaner cylinder 43 ¼” [1.09 m]
	Cross gutter cleaner cylinder 82 ¼” [2.09 m] or 118 ¼” [3 m]
Stroke length	Free stall cleaner cylinder 33” [0.8 m]
	Cross gutter cleaner cylinder 72” [1.8 m] or 108” [2.7 m]

4.5 Hydraulic hose

The ½” hydraulic hose cannot exceed 10' [3.05 m] in length.

When determining the length of a hose, add 5% to the length to allow flexing which is required for oil pressure and temperature variation.

Inside diameter	½” [13 mm]
Outside diameter	0.86” [22 mm]
Max. length	10' [3.5 m]
Max. work pressure	4000 psi [276 bar]
Min. burst pressure	16 000 psi [1103 bar]
Feature	High pressure
Type	AT
Construction	Nitril type C
Number of braids	2 (high-tensile steel wire)
Minimum bend radius	7” [180 mm]

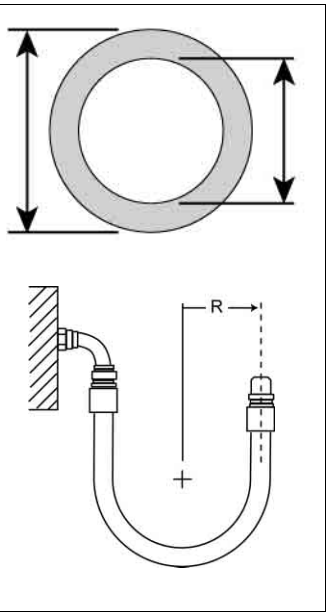


4.6 Heavy duty steel pipe

A hydraulic cleaning system requires ¾" heavy duty steel pipes to supply oil on long distances.

In some applications, it can be necessary to use 1" heavy duty steel pipes to reduce friction loss in the hydraulic system.

Inside diameter	¾" [19 mm]
Outside diameter	1.050" [27 mm]
Wall	0.154" [3.9 mm]
Max. Working pressure	3764 psi [260 bar]
Min. burst pressure	16 133 psi [1112 bar]
Feature	Heavy duty
Type	Hydraulic grade
Construction	Carbon steel
Minimum bend radius	30" [762 mm]



4.7 Control panel

The control panel used to control the hydraulic cleaner systems must comply with the specifications indicated in the following table. For further information, contact your dealer.

The control panel must:

- comply with the following requirements:
  2006/95/CE directives (Electrical equipment designed for use within certain voltage limits)
  92/31/CEE directives (Electromagnetic compatibility)
- comply with the following harmonized standards:
  EN 60204-1 (Safety of machinery - Electrical equipment of machines);
  EN 61082-1 (Documents used in electrotechnology);
  EN 60617 (Graphical symbols).
- be equipped with an emergency stop.
- be protected by a lockable disconnect switch (cut-off switch).
- meet all motor specifications provided in this manual.
- meet local electrical requirements.

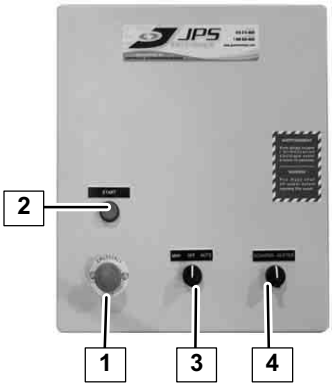
Special specifications:

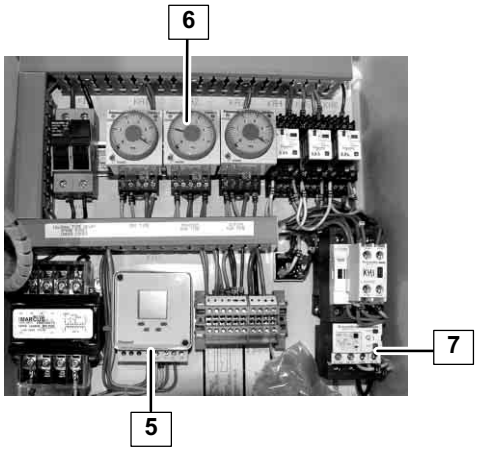
- The control panel protection devices must be designed to avoid any unexpected start.

4.7.1 Standard control panel

The standard control panel uses electric and electromechanical components such as relays, magnetic contactors, timers, proximity switches, etc. For further cleaning options, the panel can be equipped with additional components such as solenoid valves and proximity switches.

Attention!
A control panel cannot interrupt a cleaning cycle when a cattle is laying down in an alley. Livestock can be injured and/or killed against a gate or a cross gutter. It is highly recommended to remain on cleaning site to stop the system in case of emergency.





1	Emergency or stop button	**2**	Start button
3	Manual or automatic mode	**4**	Cleaning options
5	Programmable clock set on 24 hours to program 28 starts and stops. Winter-summer time change	**6**	Adjustable timers
7	Thermal overload relay		

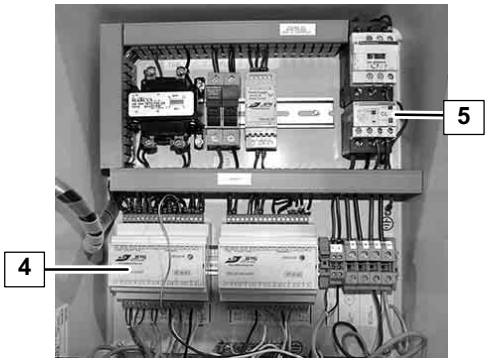
4.7.2 Sequencer control panel

The sequencer panel consists of electronic components such as a micro-processor, LCD screen, keypad, SD card, etc. and I/O boards to connect up to 30 input/output.

Each input/output can power a solenoid valve. A maximum of two solenoid valves can be powered simultaneously for each power supply included in the control panel.

Attention!
A control panel cannot interrupt a cleaning cycle when a cattle is laying down in an alley. Livestock can be injured and/or killed against a gate or a cross gutter. It is highly recommended to remain on cleaning site to stop the system in case of emergency.

Attention!
A single power supply can activate only 2 solenoid valves simultaneously. Two power supply can activate a total of 4 solenoid valves simultaneously.



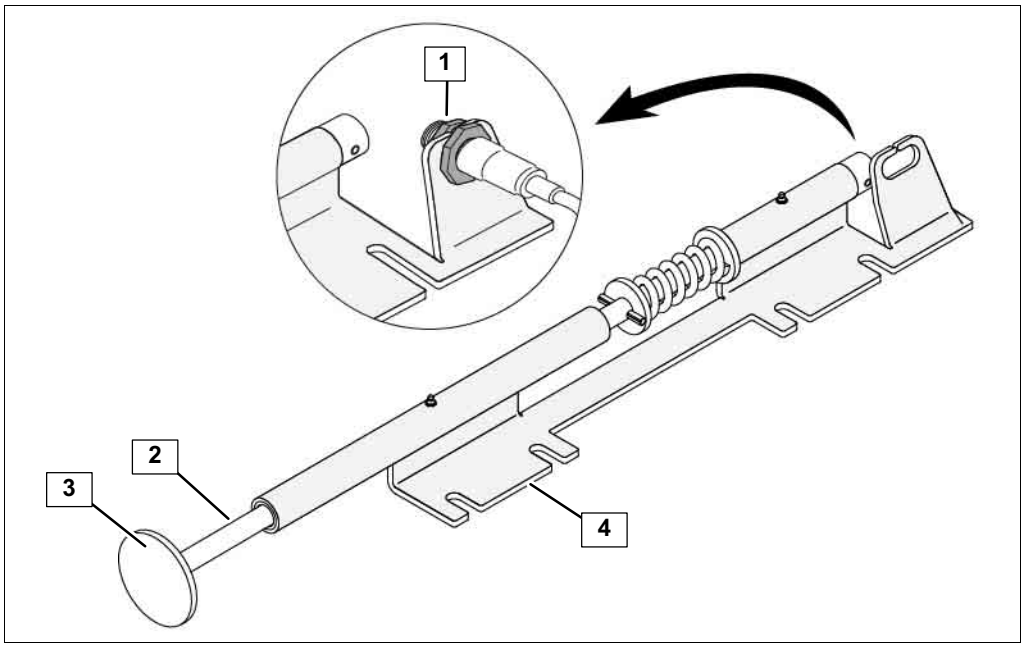
1	Emergency or stop button	**2**	Manual or automatic mode
3	LCD screen	**4**	I/O board up to 30 input/output
5	Thermal overload relay		

4.8 Proximity switch

The proximity switch is a sensor used to stop the scraper. The electric current naturally present in metal generates a magnetic field.

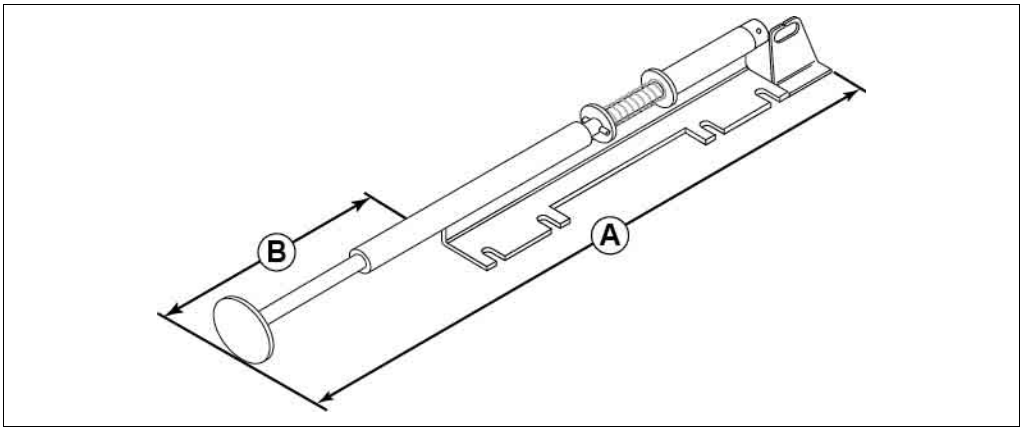
When a metal object such as a metal rod approaches the proximity switch, the current of the switch increases.

The control panel detects the current variation and stops the scraper.



Legend:			
1	Proximity switch	**2**	Trigger rod
3	Stop plate	**4**	Fixing plate

4.9 Trigger rod



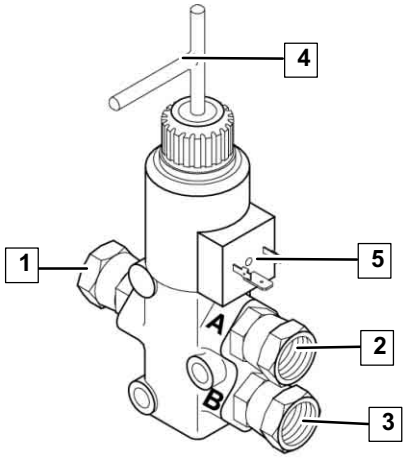
Starting rail model	Cleaning method	A	B
Standard	Pulling	47 ⅛" [1.2 m]	22 ⅜" [57 cm]
	Pushing	38 ¾" [1 m]	14" [35.5 cm]
Factory modified	Pulling	69 ⅛" [1.8 m]	44 ⅜" [113 cm]
	Pushing	48 ¾" [1.23 m]	24" [61 cm]

4.10 Solenoid valve

The solenoid valve directs hydraulic flow through a specific path. When inactive, supply line A of the solenoid allows oil flow.

When powered, the spool inside the solenoid changes position to allow oil flow through line B.

Oil can also be manually redirected by flipping the lever.



1	Oil input
2	Oil output A
3	Oil output B
4	Lever
5	Electric outlet

4.11 Bolt torque chart

Note!
Refer to the bolt torque chart unless otherwise specified in this manual.

Bolt	Mat.	Bolt diameter									
		1/4”	5/16”	3/8”	7/16”	1/2”	9/16”	5/8”	3/4”	7/8”	1”
SAE 2 	LCS	6ft-lb (8Nm)	12ft-lb (16Nm)	20ft-lb (27Nm)	32ft-lb (44Nm)	47ft-lb (64Nm)	69ft-lb (94Nm)	96ft-lb (130Nm)	155ft-lb (210Nm)	206ft-lb (279Nm)	310ft-lb (420Nm)
SAE 5 	MCS HT	10ft-lb (14Nm)	19ft-lb (26Nm)	33ft-lb (45Nm)	54ft-lb (73Nm)	78ft-lb (106Nm)	114ft-lb (155Nm)	154ft-lb (209Nm)	257ft-lb (349Nm)	382ft-lb (518Nm)	587ft-lb (796Nm)
SAE 8 	MCAS	14ft-lb (19Nm)	29ft-lb (39Nm)	47ft-lb (64Nm)	78ft-lb (106Nm)	119ft-lb (161Nm)	169ft-lb (229Nm)	230ft-lb (312Nm)	380ft-lb (515Nm)	600ft-lb (814Nm)	700ft-lb (949Nm)
Socket Head Cap Screw	AS HT	16ft-lb (22Nm)	33ft-lb (45Nm)	54ft-lb (73Nm)	84ft-lb (114Nm)	125ft-lb (170Nm)	180ft-lb (244Nm)	250ft-lb (339Nm)	400ft-lb (542Nm)	640ft-lb (868Nm)	970ft-lb (1315Nm)

4.12 Lubricant specifications

Lubricant type	Brands / specifications	Purpose
Biodegradable oil	Use this brand (or equivalent): ● *PPG Chemil Chemlube Agri-eco 1000*	● To spray onto the equipment and rails.
All-purpose grease	Use this brand (or equivalent): ● *EP2 mineral grease*	● To lubricate the equipment.
Hydraulic oil	Use these brand (or equivalent): ● *Petro-Canada MV22* ● *Shell Tellus 32* ● *Exxon Nuto H32* ● *Mobil Aw Hydraulic oil 32*	● Hydraulic power unit reservoir.

5 Handling and installation

Attention!

Always refer to the installation plan when installing the equipment. It gives position of every component as well as their interconnections.

The installation plan layout was uniquely sketched for the barn needs by following requirements given in the design guide.

For more information on this subject, please see manual:
2013-90..-002 Design guide (Hydraulic cleaners)

5.1 Special qualifications required for handling and installation

Handling must be performed by a qualified forklift operator.

Installation work must be performed by trained personnel in accordance with the safety instructions.

Electric work and electric maintenance must be performed by a certified electrician.

Welding work must be performed by a qualified welder.

Read the section Safety - Personnel qualifications.

5.2 Safety instructions for handling and installation

Warning!
Do not stand under suspended loads. Falling loads can cause fatal injuries!

Caution!
Wear protective boots, eye gear and gloves for all steps included in this section.

Caution!
Beware of sharp edges: they can cause injuries.

Attention!
Beware of potential fire hazards such as those caused by welding, cutting, grinding, etc.

Read the section Safety.

5.3 Environmental prerequisite

- This product must be installed in a frost-free environment.
- The concrete of each alley and each cross gutter must be levelled, free from imperfections such as holes, cracks, bumps, etc.

5.4 Preparations

Attention!
Use only the tools listed in this instruction manual to handle these products.

5.4.1 Handling tools

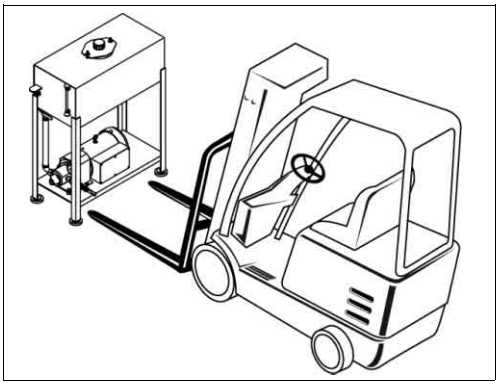
	Description	Purpose
	Forklift truck	To lift components such as hydraulic unit, rails, etc.
	Chain hoist with safety chains	To lift accessories.
	Chain	To lift accessories.

The scraper and gutter cleaner components come in different sizes.

Most components are packed on pallets.

Each cleaner is packed separately.

- Have in hand the installation plan.
- Using a forklift truck, move the components to the installation area.
- Unwrap. Refer to section Packing material disposal.



5.4.2 Installation tools

	Description	Purpose
	Wrench set	To tighten bolts and anchor bolts.
	Ratchet tool set	To tighten bolts and anchor bolts.
	Torque wrench	To tighten bolts and anchor bolts.
	½" concrete drill bit	To drill the anchor bolt holes.
	Screw driver set	To install the valves.
	Cutters	To remove *Tie-Wrap.*
	*Teflon* Tape or *Teflon* paste	To seal fitting assembly.
	Hammer	To insert the anchor bolts.
	Chalk line	To trace straight lines.
	Hammer drill	To drill the anchor bolt holes.
	Bolt cutter	To cut anchor bolts.

Necessary documents

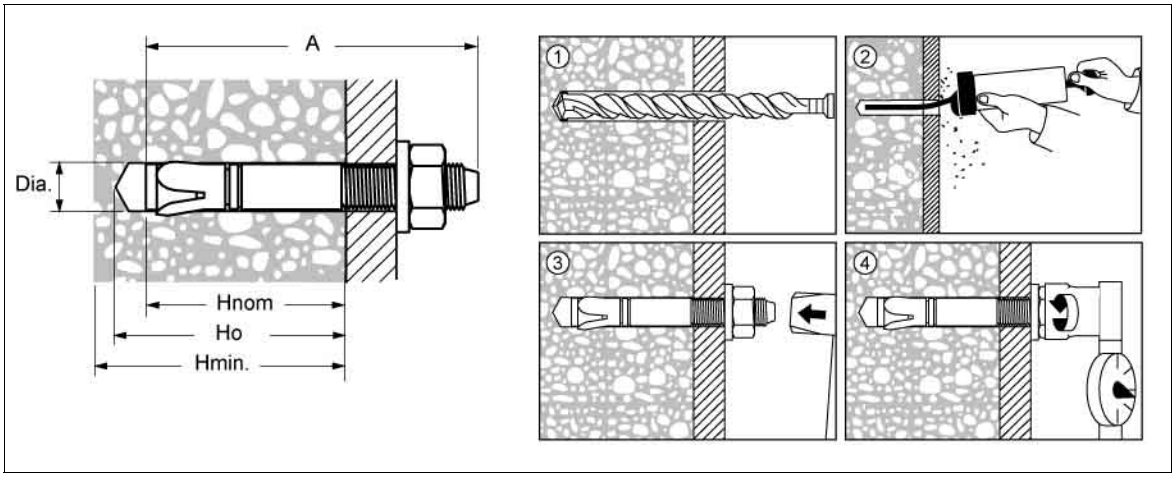
- Installation plan

5.5 Packing material disposal

Handle the packing material properly and dispose according to your local rules and regulations on waste disposal. Please refer to your local resources for any questions. Recycle if possible.

5.6 Anchor bolt installation procedure

Attention!
Wait at least 7 days before drilling into concrete so that the slab has hardened sufficiently.



- Position the component on the concrete surface.
- Drill through the holes of the component to 3 ¾" depth (1).
- Remove the particles inside the holes (2).
- Insert the anchor bolts. Keep 1 ½" of length exceeding from the concrete surface.
- Tap the anchor bolt using a hammer until it firmly secures the component.
- Tighten the assembly to appropriate torque. Refer to the following table.
- Cut the exceeding threads of the bolts when indicated.

Bolt diameter	3/8" [10mm]	1/2" [13mm]			3/4" [19mm]
Bolt length **(A)**	3" [76mm]	2 3/4" [70mm]	3 3/4" [95mm]	3 3/4" [95mm]	5 1/2" [140mm]
Material	Steel	Steel	Steel	SS 304	Steel
Minimum hole depth **(Ho)**	Hnom + 1/4" [6mm]	Hnom + 1/4" [6mm]	Hnom + 3/8" [10mm]	Hnom + 1/4" [6mm]	Hnom + 1/4" [6mm]
Hnom	2 3/8" [60mm]	1 3/4" [45mm]	2 1/4" [57mm]	2 1/4" [57mm]	4 1/4" [108mm]
Hmin	4" [101mm]	4" [101mm]	4" [101mm]	4" [101mm]	6" [152mm]
Concrete drill bit diameter **(Dia.)**	3/8" [10mm]	1/2" [13mm]	1/2" [13mm]	1/2" [13mm]	3/4" [19mm]
Torque	20ft-lb (25Nm)	40ft-lb (54Nm)	40ft-lb (54Nm)	40ft-lb (54Nm)	110ft-lb (150Nm)

5.7 Free stall cleaner installation

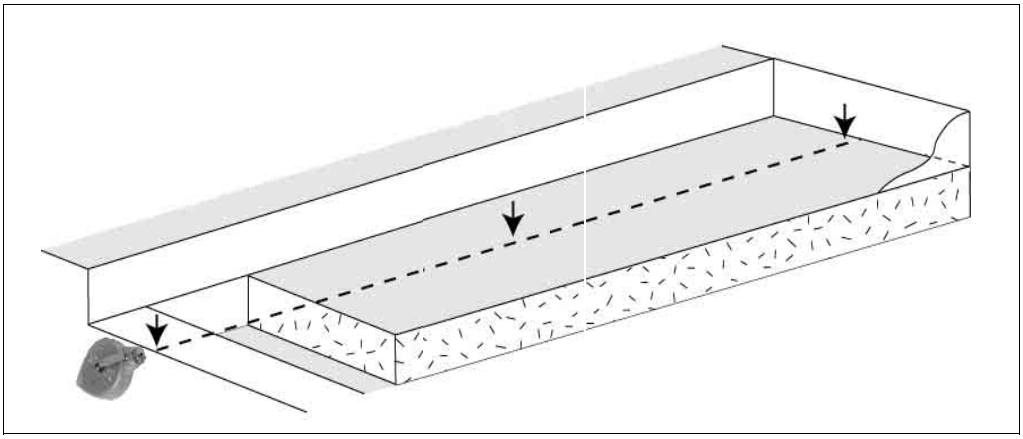
Always refer to the installation plan when installing the equipment.

5.7.1 Step 1: Position of the assembly

Attention!
It requires at least 6” [15.2 cm] thick of concrete under the cylinder.

Note!
Unless otherwise instructed in the installation plan supplied by the manufacturer, proceed with the following installation steps to install the free stall cleaner.

Free stall cleaner on a flat alley



- The purpose of this step is to divide the alley in two, on its entire length. To do so, mark the width of the alley in three places, ideally at each end and in the middle of the alley.
- Join the three marks using a chalk line.

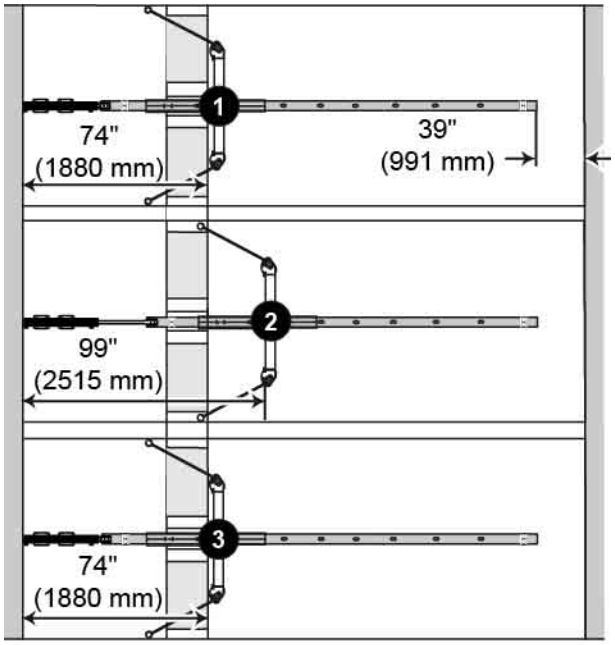
5.7.2 Step 2: Hydraulic cylinder position

Note!
A cylinder that connects in series is identified by a mark on the fixing plate.

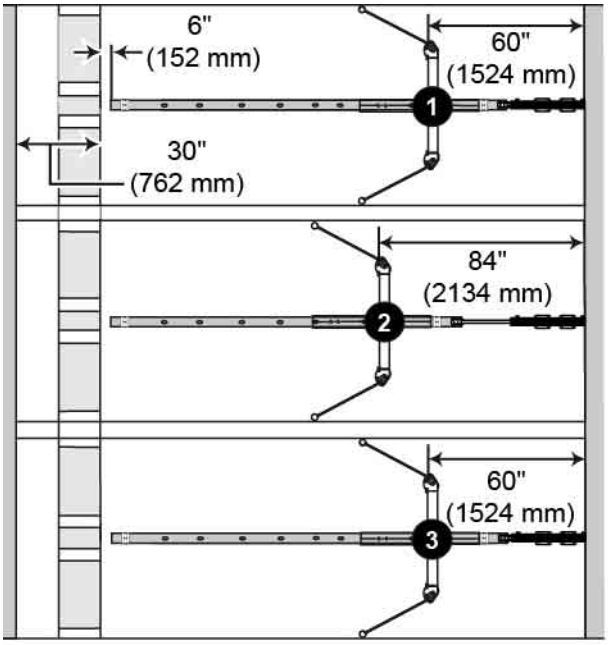
- Refer to the layouts that follow.
- Find the illustration that corresponds to the type of installation.
- Using dimensions provided in the illustration, determine the position of the rear end of the cylinder in the alley.
- Mark the position using a chalk.
- Retract the cylinder completely.
- Position the rear of the cylinder on the chalk mark.
  For a free stall cleaner on a flat alley, center the cylinder on the chalk line that divides the alley in two.
  For a free stall cleaner in a groove, align the cylinder rod inside the groove.

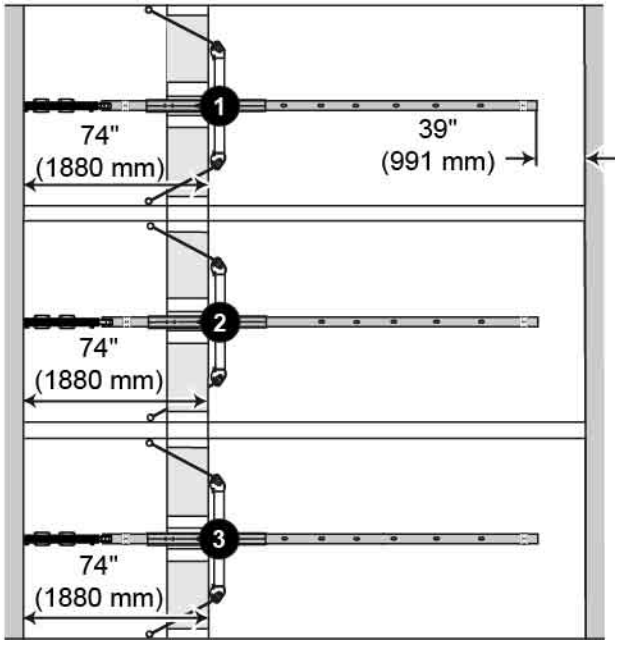
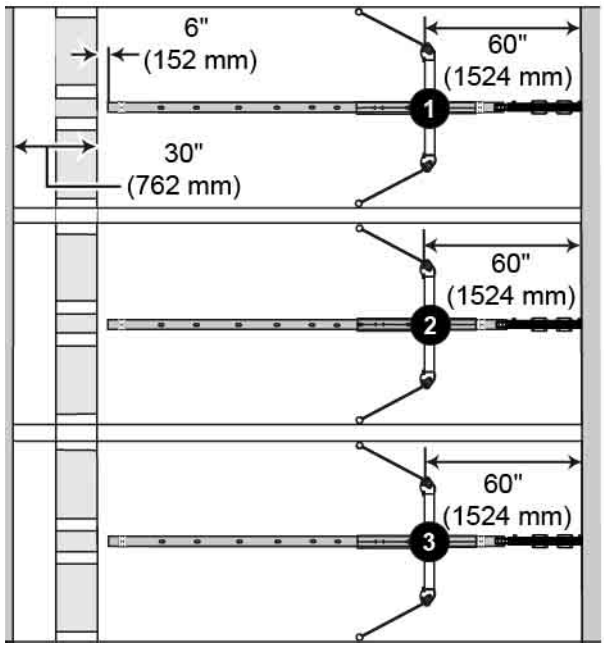
Cylinders connected in series

Pulling



Pushing

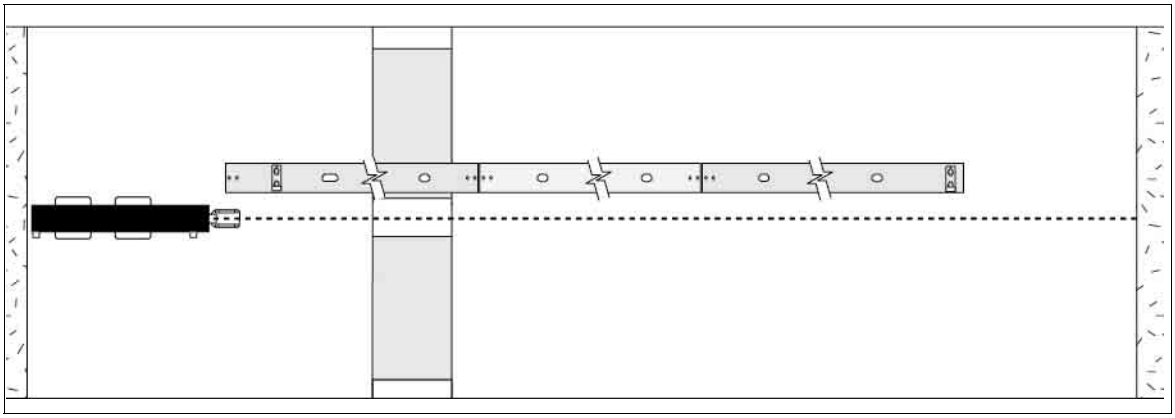


Cylinders connected in parallel	
Pulling	**Pushing**
	

Note!
To learn about the position of the cylinder using a factory modified starting rail, refer to section Appendix - Factory modified starting rail.

5.7.3 Step 3: Rails alignment

Note!
The starting rail and the end rail have two bolt holes to install a reversing block. The starting rail has two additional holes to install the cylinder fixing plate.



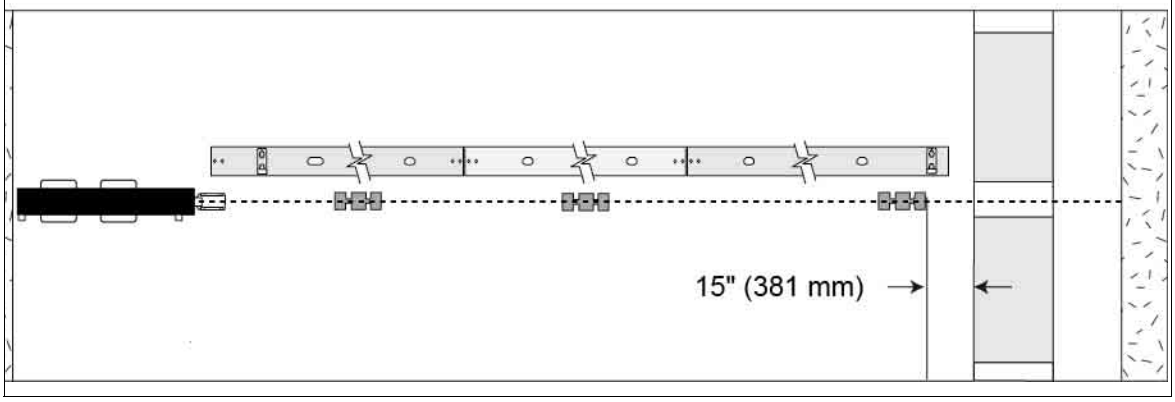
- Make sure the cylinder is retracted.
- Place the starting rail beside the cylinder fixing plate.
- Align the holes of the starting rail and the cylinder fixing plate.
- Place the intermediate rails after the starting rail. Place them in descending order from the longest to the shortest.
- Proceed by placing the adjustment rail and the end rail.
- Do not secure the rails yet.
- To ensure the assembly is positioned properly, measure between the components as shown in the illustration of step 2: Hydraulic cylinder position. Reposition if necessary.

5.7.4 Step 4: Rail guides

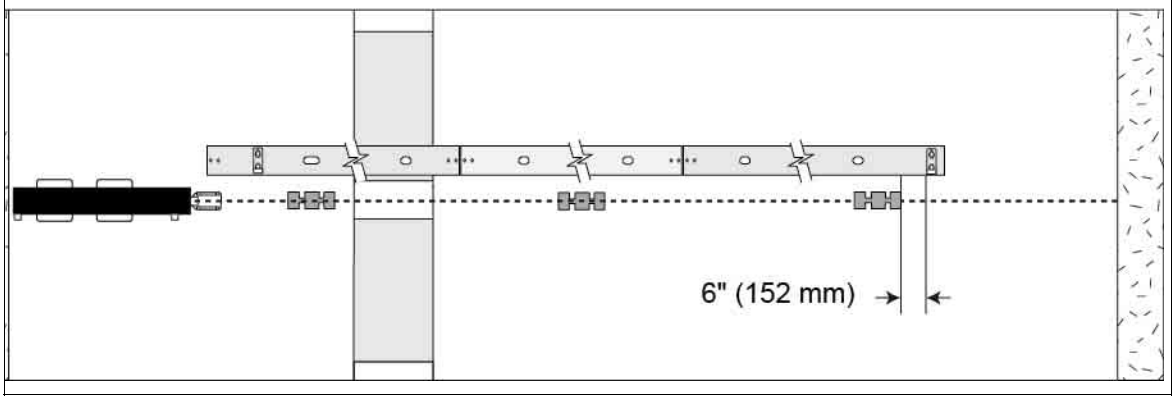
Note!
A scraper installed in a groove does not require rail guides. Proceed with the next step.

Refer to section Handling and installation - Anchor bolt installation procedure.

Pushing

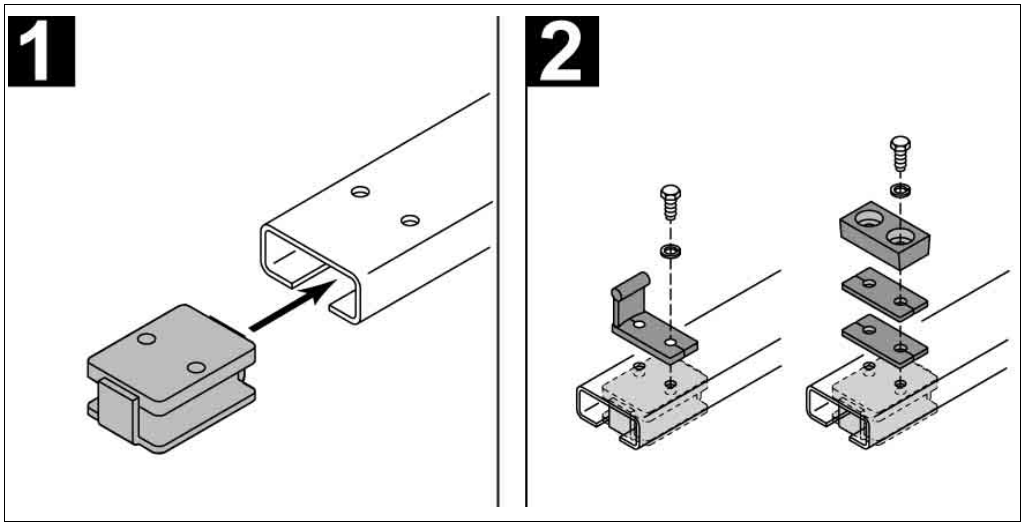


Pulling



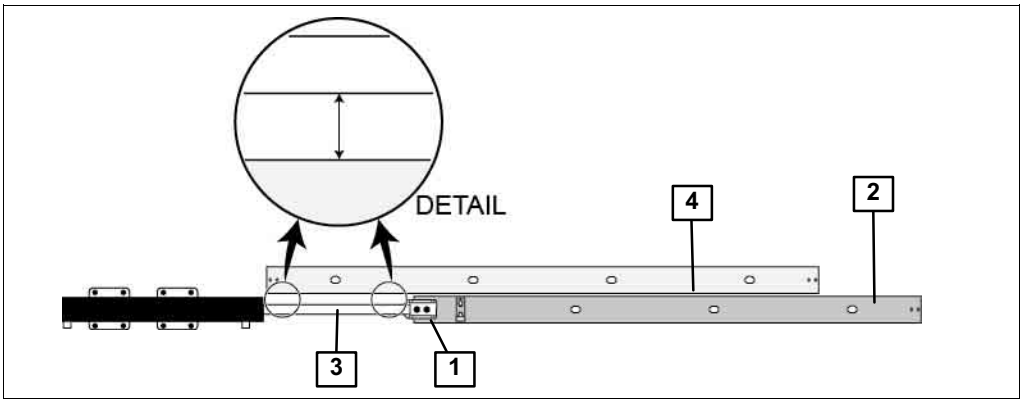
- Make sure the cylinder is retracted.
- Install a rail guide in the middle of each rail except for rails that measure less than 90” [226 cm].
  Do not install a rail guide for the end rail yet.
- Install the end rail guide. Refer to the corresponding illustration above. When a cylinder pushes the manure, the rail guide must be positioned at 15” [381 mm] from the edge of the cross gutter.
  When a cylinder pulls the manure in the cross gutter, install the rail guide at 6” [152 mm] from the reversing block.

5.7.5 Step 5: Starting rail and end rail reversing block



- Place a shoe in the extremity of the starting rail and the end rail, as illustrated in the first image.
- Temporarily place an offset or flat reversing block and spacers over the shoe, as illustrated in the second image.
- Use lock washers and nuts to secure the assembly. Do not tighten yet.

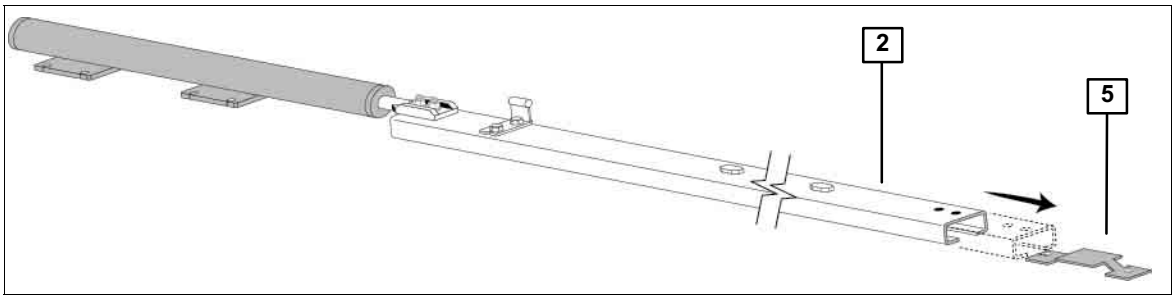
5.7.6 Step 6: Starting rail and cylinder alignment



Refer to section Technical data - Lubricant specifications.

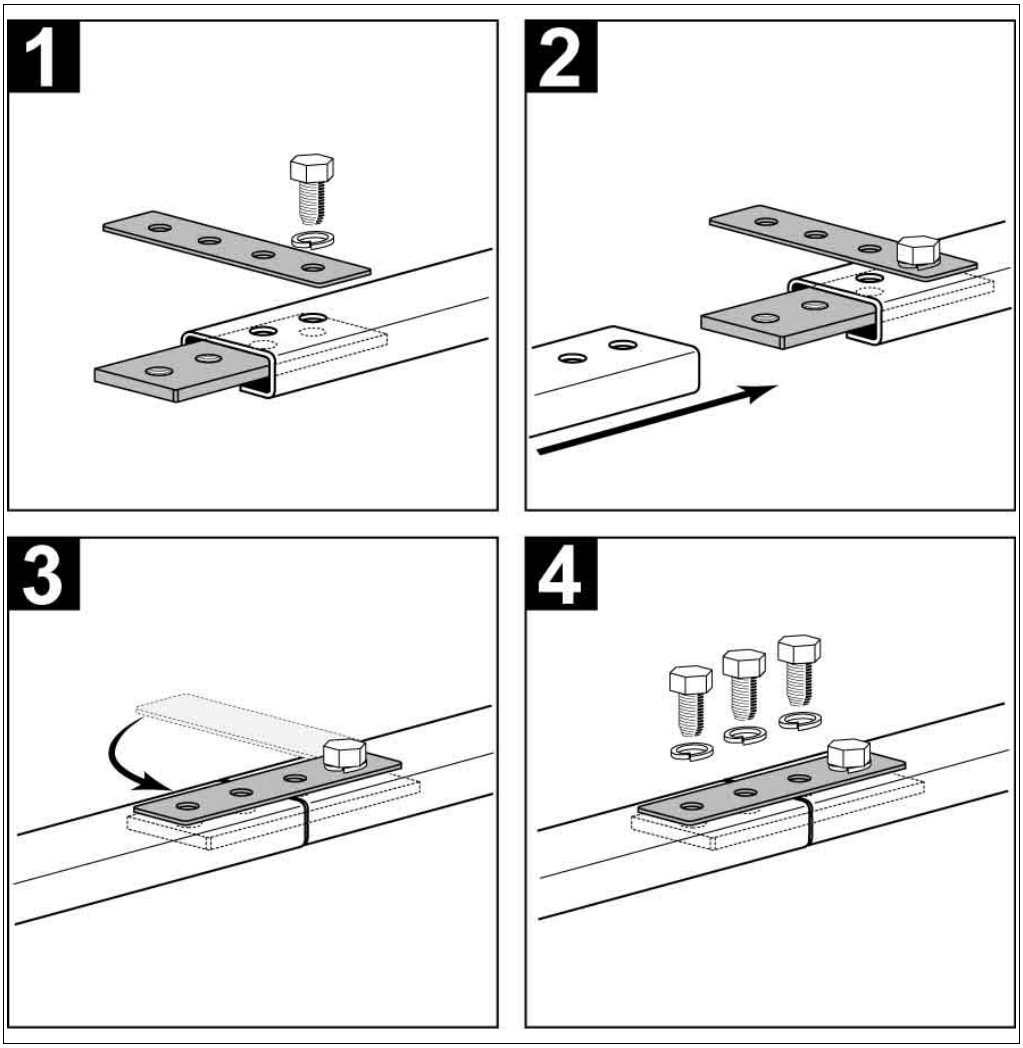
- Secure starting rail (2) on the cylinder fixing plate (1). Use bolts, washers and lock washers. Do not tighten yet.
- Extend the cylinder rod (3).
- Place an intermediate rail (4) parallel to the starting rail and cylinder rod (3).
- Align the cylinder rod (3) and the starting rail (2) by using the intermediate rail (4) as a guide. Measure at both ends of the cylinder rod (3) to ensure perfect alignment.
- Secure the position by tightening the bolts.
  Refer to section Technical data - Bolt torque chart.
- Retract the cylinder rod (3) completely.
- Reposition the intermediate rail in its initial position.

Attention!
Support the cylinder until the installation is completed. Place spacers under the anchor plates of the cylinder to avoid putting pressure on the seals located inside the cylinder.



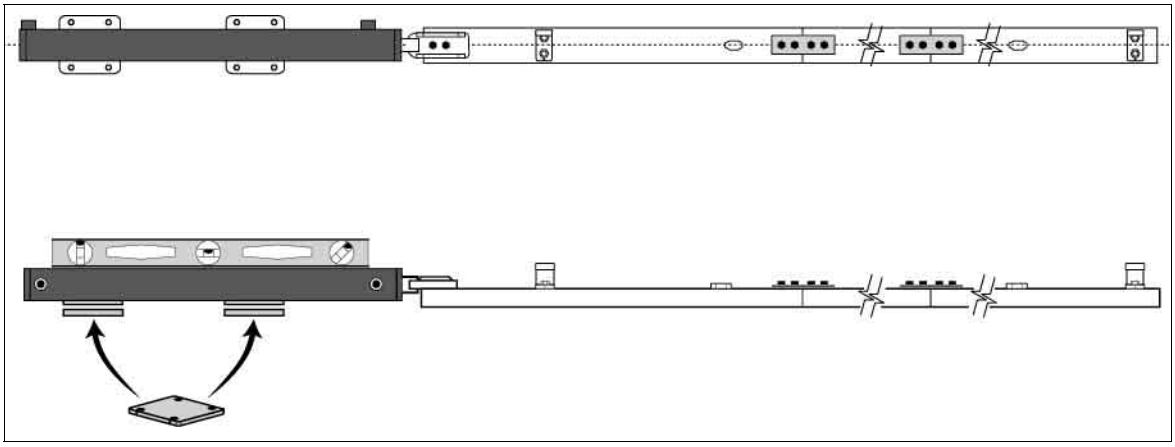
- Lubricate the rail guides (5) with biodegradable oil or grease.
- Slide the starting rail (2) and the cylinder on the rail guides (5).
- Align the cylinder on the chalk mark.

5.7.7 Step 7: Rails



- Insert a threaded joint plate inside the end of the starting rail. Place a joint plate over the rail. Temporarily secure with a bolt, as illustrated in the first image.
- Insert the next rail on the rail guides until the extremity of the rail slides over the threaded joint plate and reaches the starting rail. Refer to the second illustration.
- Place the joint plate over both rails. Align and tighten with bolts and lock washers. Refer to images (3) and (4). Do not torque the assembly. Torquing can distort the assembly.
- Repeat these steps to install each rail.

5.7.8 Step 8: Secure the assembly

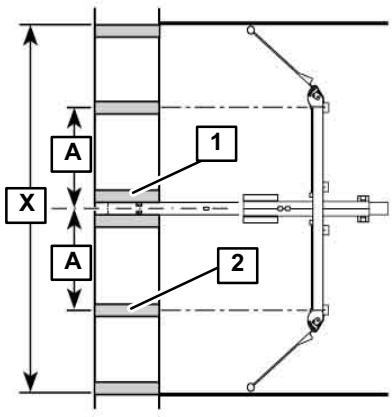


Refer to section Handling and installation - Anchor bolt installation procedure.

- Center the rails and the cylinder assembly either by aligning the assembly on the chalk line or by centering the assembly in the groove. Make sure the rear end of the cylinder is aligned with the chalk mark.
- Level the cylinder with the rails by adding or removing the spacers under the cylinder anchor plates.
- Push on the cylinder to check if the spacers support the cylinder entirely.
- When aligned properly, drill through the holes of the anchor plates and spacers to a minimum depth of 3 ¾" [9.52 cm].
  Use a ½" [1.27 cm] drill bit.
- Install the anchor bolts.
- Torque to 40 ft/lb [54 N/m].

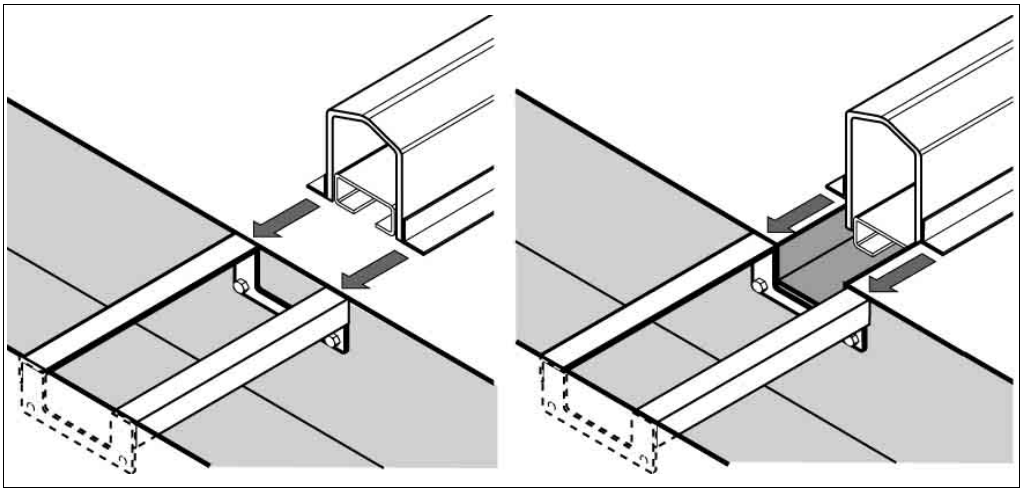
5.7.9 Step 9: Supports over gutter

Alley width (X)	Length (A)
6'-6" [2.00 m] @ 7'-5" [2.25 m]	21 ⅞" [56 cm]
7'-6" [2.30 m] @ 8'-5" [2.60 m]	27 ⅞" [71 cm]
8'-6" [2.60 m] @ 9'-5" [2.90 m]	33 ⅞" [86 cm]
9'-6" [2.90 m] @ 10'-5" [3.20 m]	39 ⅞" [101 cm]
10'-6" [3.20 m] @ 11'-5" [3.50 m]	45 ⅞" [117 cm]
11'-6" [3.50 m] @ 12'-5" [3.80 m]	51 ⅞" [132 cm]
12'-6" [3.80 m] @ 13'-5" [4.10 m]	57 ⅞" [147 cm]
13'-6" [4.10 m] @ 14'-5" [4.40 m]	63 ⅞" [162 cm]
14'-6" [4.40 m] @ 15'-5" [4.70 m]	69 ⅞" [177 cm]
15'-6" [4.70 m] @ 16'-5" [5.00 m]	75 ⅞" [193 cm]



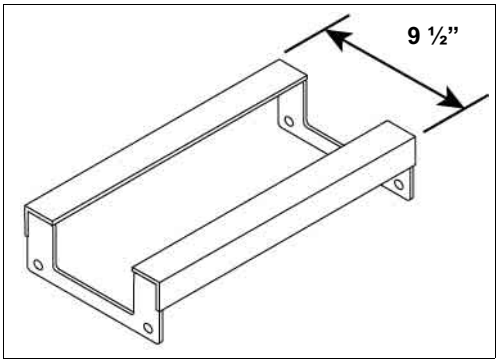
(1) Steel support

Attention!
Make sure the support does not prevent the cross gutter cleaner from moving freely.



- The steel supports provided must be installed directly on the gutter wall. The supports are used for an alley with or without a groove.

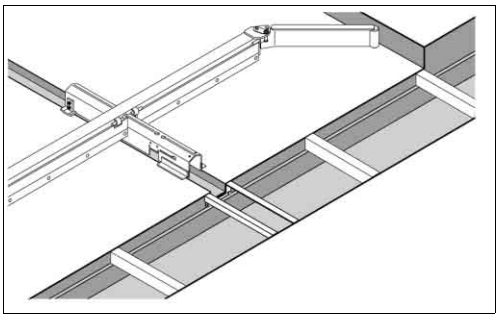
- Cut two flat bar angles of (2” x 2” x ¼”) to the width of the gutter.
- Weld the flat bar angles to the anchor plates.
- Fix the assembly on the walls of the gutter as per the type of ”C” rail: floor mounted or in a groove.



(2) Lumber support

Attention!
Make sure the support does not prevent the cross gutter cleaner from moving freely.

- Cut four pieces of 4x4 (3 ½” x 3 ½”) treated lumber to fit in the notches of the gutter.
- Refer to the table above to position the pieces of lumber.



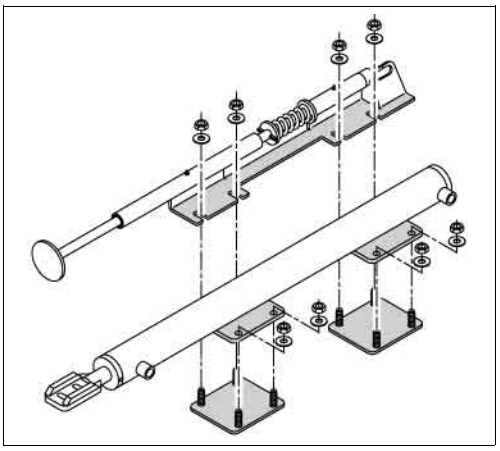
5.7.10 Step 10: Trigger rod mechanism

Refer to section Handling and installation - Anchor bolt installation procedure.

Refer to section Technical data - Bolt torque chart.

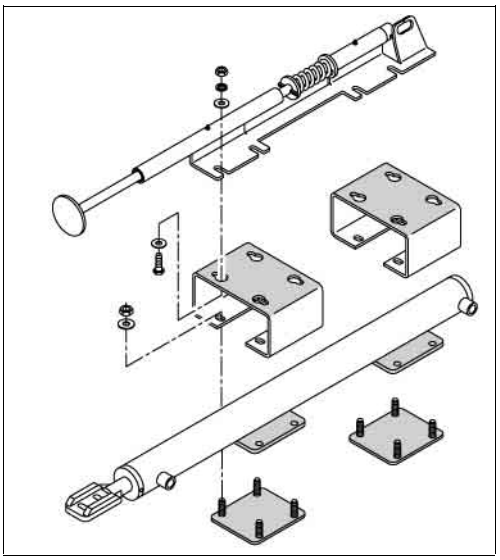
Standard trigger rod mechanism

- Loosen the washers and nuts from the cylinder anchor bolts.
- Slide the trigger rod mechanism assembly over the anchor plates of the cylinder, as illustrated.
- Secure the trigger rod mechanism with the washers and nuts.

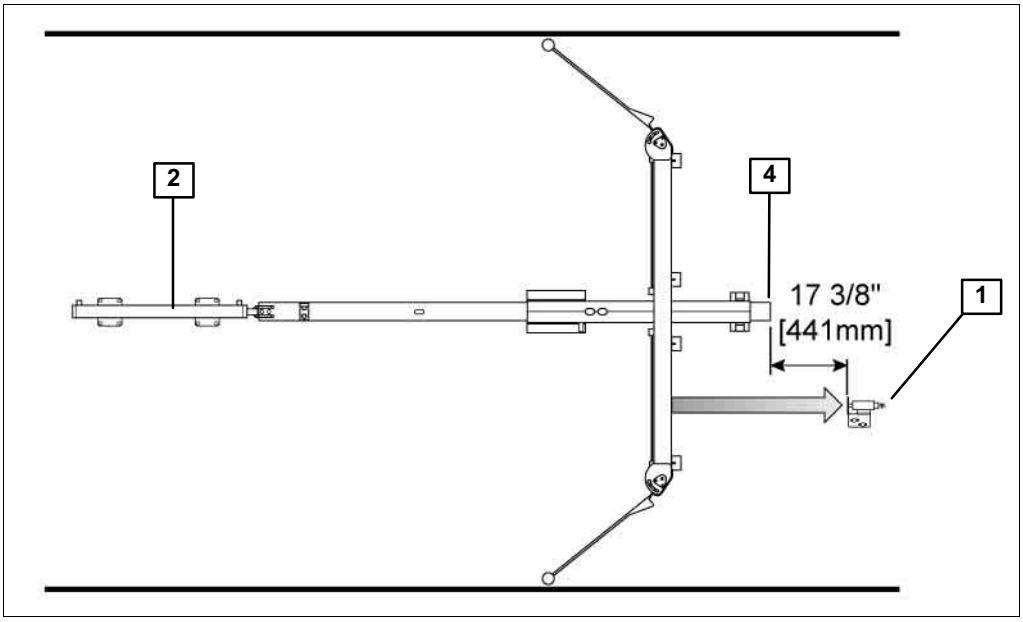


Standard trigger rod mechanism with high supports

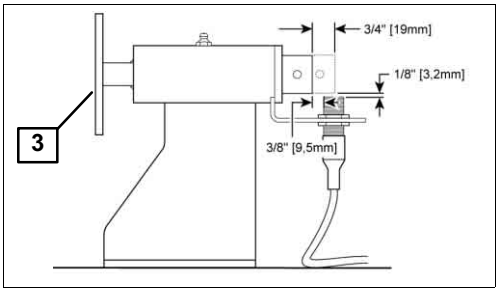
- Install the trigger rod mechanism on the supports using bolts, washers, lock washers and nuts.
- Install the supports with the trigger rod mechanism over the cylinder anchor plates.
- Secure the supports with the washers and nuts.



Remote stroke stop mechanism

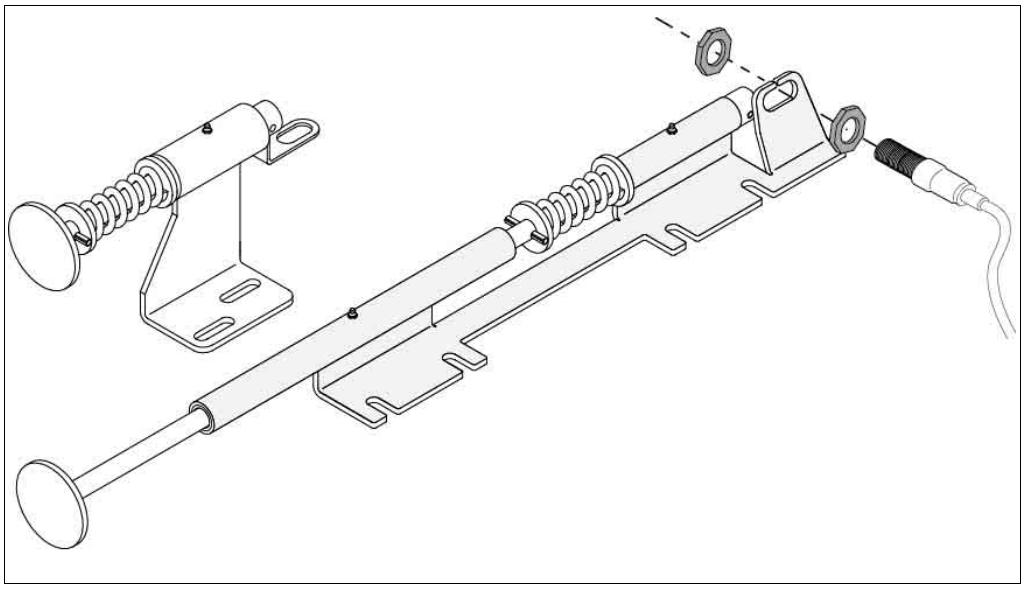


- Install the remote stroke stop mechanism (1) on the opposite end of the cylinder (2).
- Install the stopper plate (3) at 17 ⅜" [441 mm] from the edge of the end "C" rail (4).

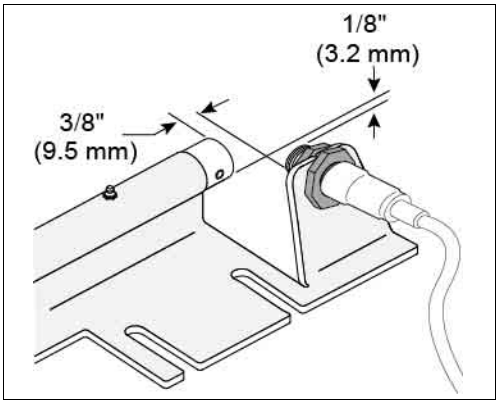


5.7.11 Step 11: Proximity switch installation

Attention!
Make sure the trigger rod cannot touch the proximity switch.

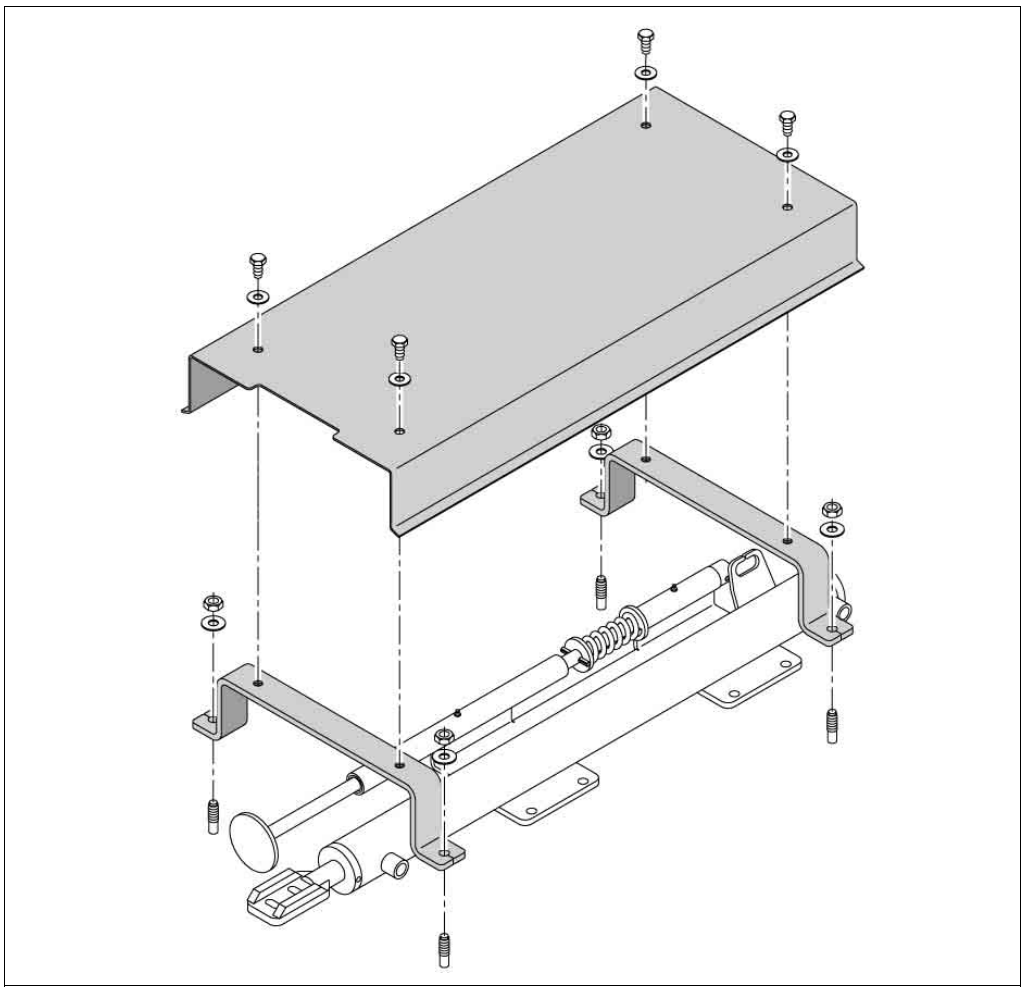


- Unscrew an hexagonal flat nut from the proximity switch.
- Place the proximity switch inside the slotted bracket of the stop mechanism.
- Screw the hexagonal flat nut to hold the switch inside the bracket, do not tighten yet.
- Press the stopper plate to bring out the trigger rod.
- Adjust the hexagonal flat nuts to get ⅛” [3.2 mm] between the trigger rod and the tip of the proximity switch.
- Position the proximity switch at ⅜” [9.5 mm] from the trigger rod.



5.7.12 Step 12: Cylinder guard

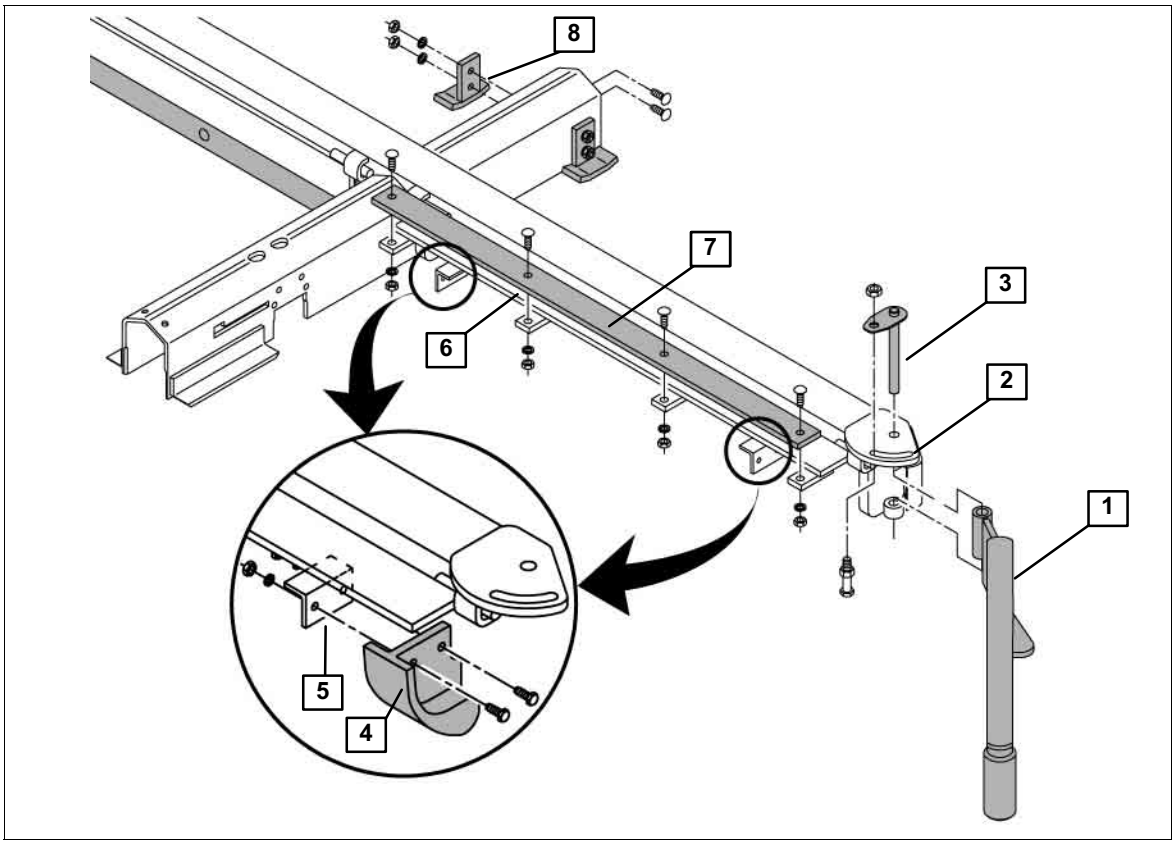
Note!
The cylinder guard cannot be installed when using the standard trigger rod mechanism with high supports.



- Bolt two supports, one at each end of the cylinder guard.
- Place the guard over the pinching point of the cylinder rod and the trigger rod.
- Secure the cylinder guard.
  Perform the anchor bolt installation procedure to secure the assembly in place.

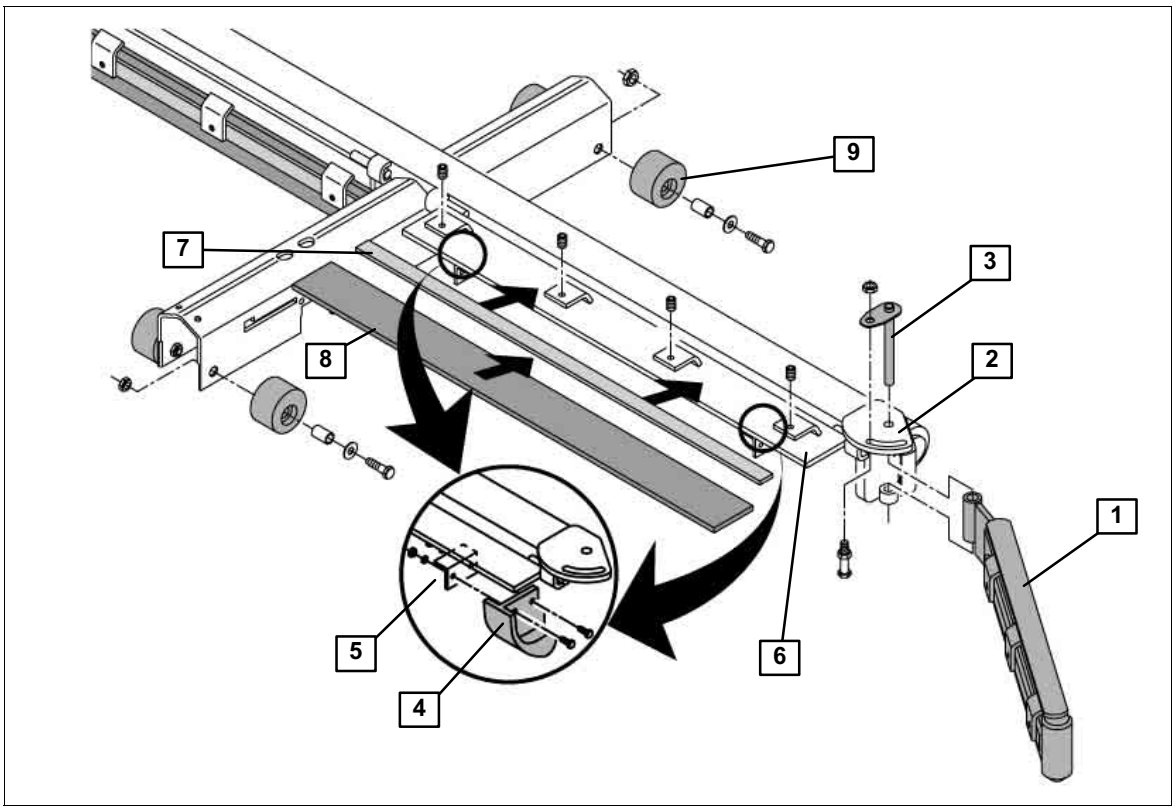
5.7.13 Step 13: Scraper assembly

Steel blade scraper



- Place the folding end (1) inside the hinge (2) of the scraper.
- Insert a hinge pin (3) through the scraper and the folding end.
- Screw a nut on the hexagonal bolt.
- Place the hexagonal bolt through the hinge pin and through the slot of the scraper.
- Screw a nut on the bolt to hold it in place, do not tighten yet.
- The bolts adjust the folding ends when the scraper returns to the park position.
- Install wear shoes (4) under the scraper using bolts, lock washers and nuts. In some cases, the mounting bracket (5) must be welded to the tilting blade (6).
- Place the steel blade (7) over the flat bar.
- Secure the blade using bolts, lock washers and nuts.
- Place an adjustment shoe (8) on each side of the scraper end.
- Place a carriage bolt through the inside of the scraper to hold the shoe.
- Place a lock washer and a nut, do not tighten yet.

Urethane blade scraper



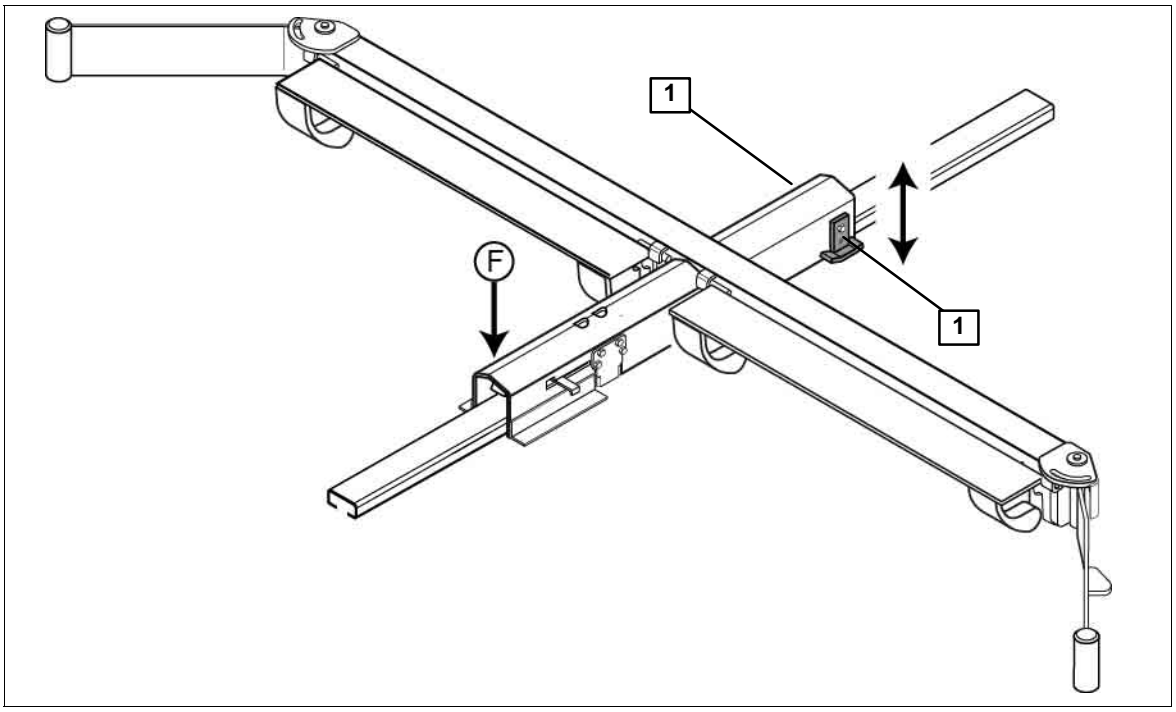
- Place the folding end (1) inside the hinge (2) of the scraper.
- Insert a hinge pin (3) through the scraper and the folding end.
- Screw a nut on the hexagonal bolt.
- Place the hexagonal bolt through the hinge pin and through the slot of the scraper.
- Screw a nut on the bolt to hold it in place, do not tighten yet.
- The bolts adjust the folding ends when the scraper returns to the park position.
- Install wear shoes (4) under the scraper using bolts, lock washers and nuts. In some cases, the mounting bracket (5) must be welded to the tilting blade (6).
- Place a flat bar (7) over the urethane blade (8).
- Slide the urethane blade and flat bar inside the tilting blade. Make sure the urethane blade and the flat bar are centered.
- Secure in place using set screws.
- Install eccentric wheels (9) at the front and at the rear of the scraper. Use bolts, washers and nuts. Do not tighten yet.
- Use bolts, washers and nuts to secure in place. Do not tighten yet.

5.7.14 Step 14: Scraper installation

- Lubricate the rail assembly with biodegradable oil.
- Place the scraper over the rail assembly in front of the cylinder.

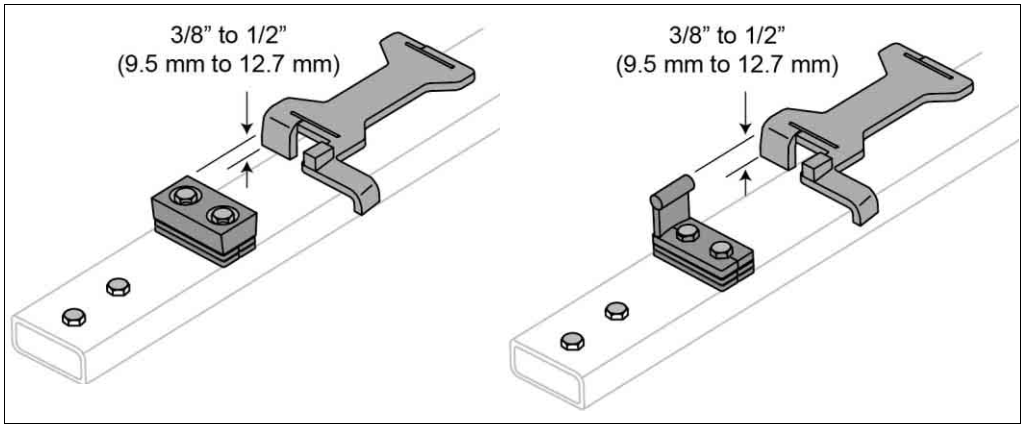
5.7.15 Step 15: Adjust the height of the scraper

The height of a scraper must be adjusted to prevent manure accumulation under the scraper. The back of the scraper must be heightened while the blades remain in contact with the floor.



- Push on the front (F) of the scraper.
- Unscrew the bolt of the shoes (1) or eccentric wheels located on each side of the scraper end.
- Set height by adjusting the position of the shoes or the eccentric wheels.
- Tighten bold to lock the adjustment.

5.7.16 Step 16: Starting rail reversing block



- Move the scraper near the reversing block at the beginning of the alley.
- Check that the reversing block and the reversing mechanism located inside the scraper overlap of ⅜” (9.5 mm) to ½” (12.7 mm), as illustrated above.
- If required, add or remove spacers under the reversing block to adjust.
- Tighten the assembly with lock washers and bolts.
  Do not torque.

5.7.17 Step 17: Cleaning

- Pressure wash the alley, the equipment, the scraper etc, to remove all traces of dirt, dust, oil, etc. resulting from the installation steps.
- Lubricate the rail assembly with biodegradable oil.

5.8 Cross gutter cleaner installation for a gutter deeper than 10” (255 mm)

Always refer to the installation plan when installing the equipment.

5.8.1 Step 1: Position of the assembly

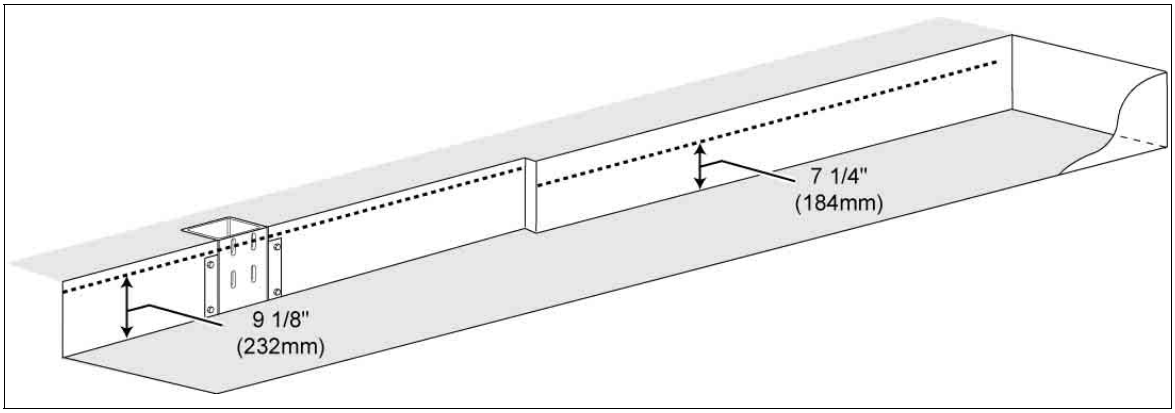
Attention!
Always position the hydraulic cylinder of a cross gutter cleaner on the opposite wall from where the manure drops inside the gutter.

Note!
The cylinder of a cross gutter cleaner must be installed next to the storage pit in order to pull the manure.

Note!
Unless otherwise instructed in the installation plan supplied by the manufacturer, proceed with the following installation steps to install the hydraulic cleaning system.

Note!
A cylinder that connects in series is identified by a mark on the fixing plate.

Refer to section Handling and installation - Anchor bolt installation procedure.



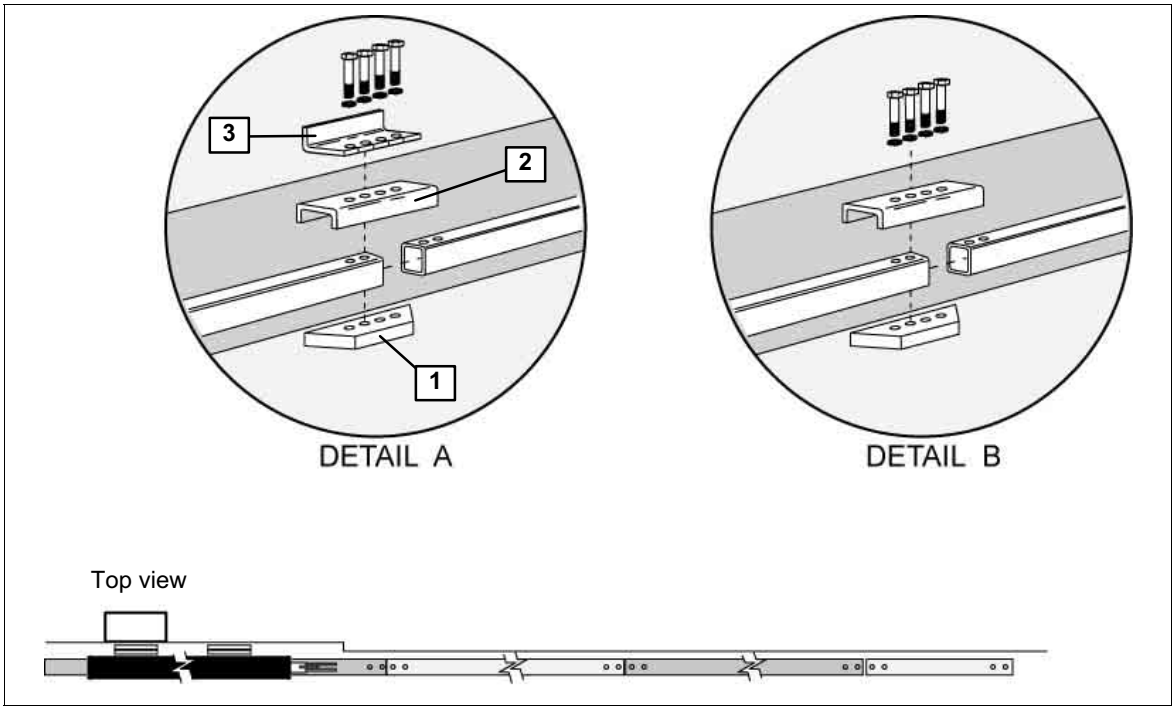
- To locate the cylinder position, measure 9 ⅛” [232 mm] on the gutter wall from the bottom to the concrete floor of the barn at the opposite side of the free stall area.
- Join the chalk marks using a chalk line. Make sure the line is parallel to the bottom of the gutter.
- To locate the ”S” guide position, repeat steps to draw a line at 7 ¼” [184 mm] from the bottom of the gutter.

5.8.2 Step 2: Rails

Attention!
Over tightened bolts will distort the assembly.

Note!
Install an angle guide on the first and the last joint plate. Additional angle guides must be installed within every 48' [14.63 m] from the first joint plate.

Note!
Always place the threaded holes of a shoe upwards.

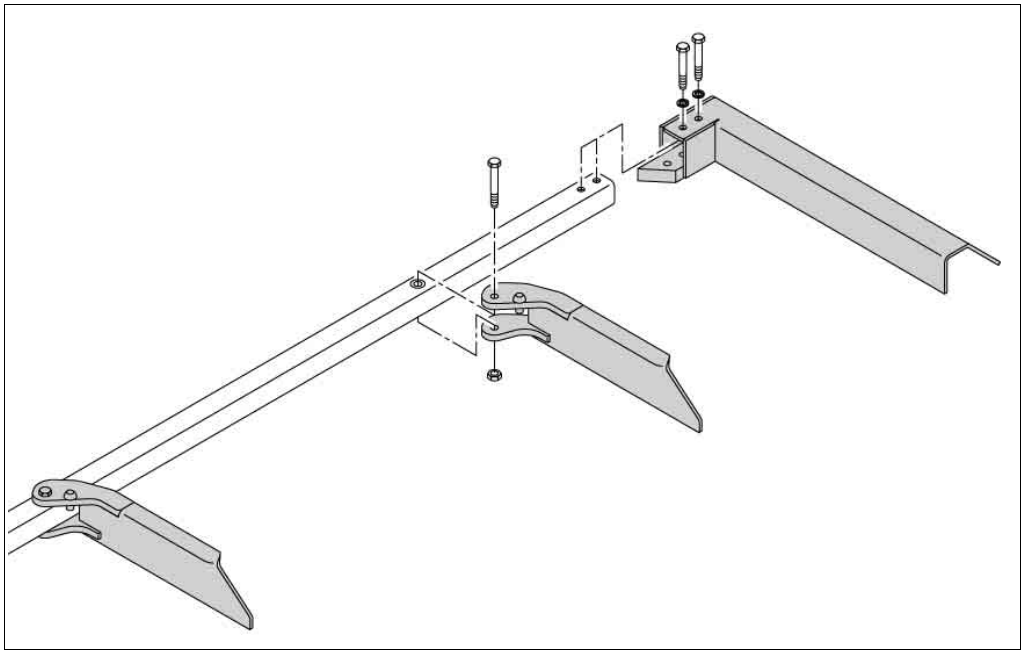


- Position the starting rail next to the gutter wall.
- Align the rails one after the other in descending order. Refer to the installation plan.
- Position a shoe (1) under each rail junction.
- Add a joint plate (2) over.
- Place an angle guide (3) on top of the first and last junction and every 48' [14.63 m] or less from the first junction. See detail A.
- Assemble the remaining junctions as illustrated in detail B.
- Tighten the assembly using bolts and lock washers.
- Make sure the rail assembly is perfectly straight.

5.8.3 Step 3: Paddles

Attention!
Do not over tighten the paddles, they must swivel freely.

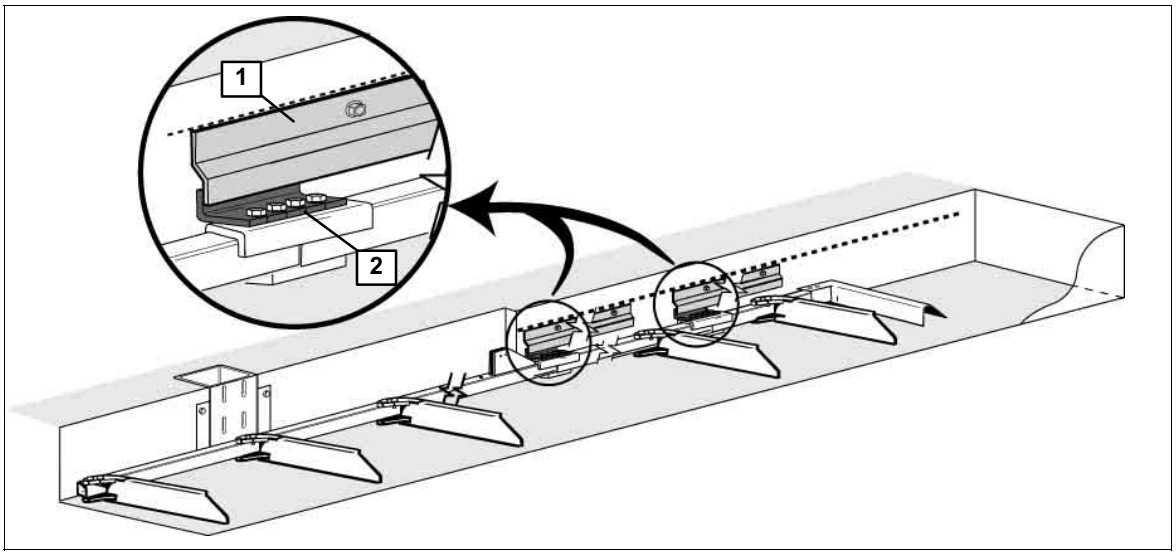
Note!
Always place the threaded holes of a shoe upwards.



- Place a paddle over each hole containing a nylon bushing.
- Insert a bolt through the bushing.
- Secure with a nut. Do not over tighten.
- Place a shoe under the rail end.
- Slide the end paddle over the rail. Secure using two bolts and washers.

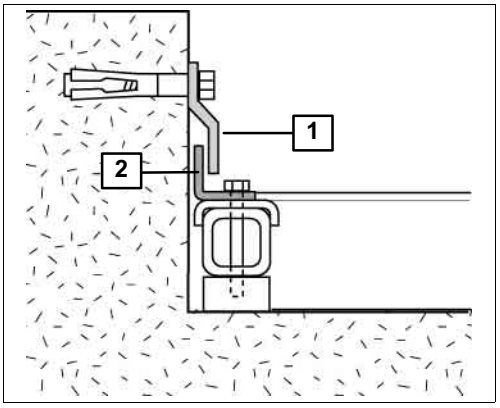
5.8.4 Step 4: ”S” guides

Attention!
Cut the exceeding anchor bolt threads of the first ”S” guide using a bolt cutter.



- Position the rail assembly at the beginning of the gutter.
- Make sure the rail guides lean against the gutter wall.
- Install an ”S” guide (1) above each angle guide (2) on the 7 ¼” [18.42 cm] chalk line. See detailed image.

- Align an ”S” guide (1) at the beginning of each angle guide (2).
- Proceed with the anchor bolt installation procedure to secure the ”S” guides.
- Center the angle guides (2) of the rail assembly between the wall and the ”S” guides (1).

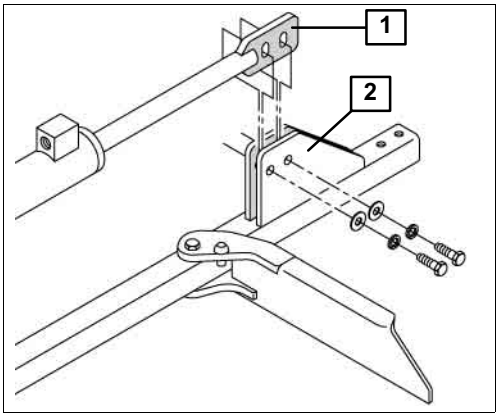


5.8.5 Step 5: Cylinder

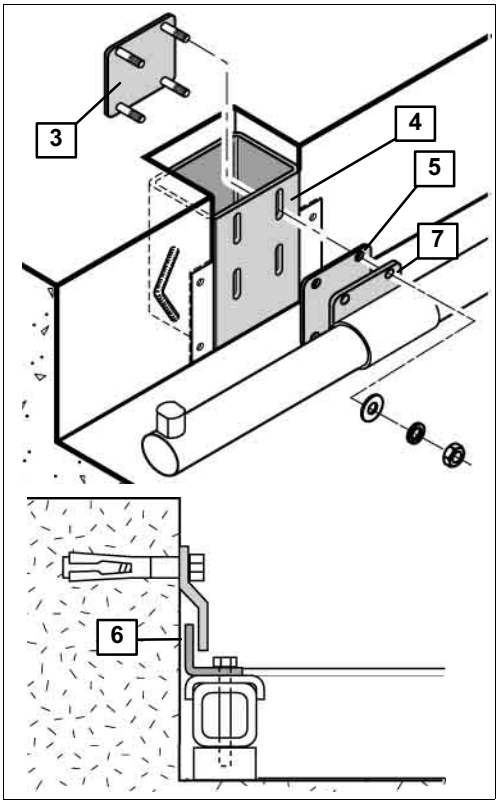
Note!
A cylinder that connects in series is identified by a mark on the fixing plate.

Note!
When the cylinder is completely extended, the end paddle must be at 3” [76 mm] from the gutter end.

- Retract the cylinder completely.
- Secure the cylinder fixing plate (1) to the starting rail fixing plate (2) using bolts, washers, lock washers and nuts. Use spacers to fill in the gap.
- Support the cylinder to avoid adding pressure on the cylinder rod which could damage the rubber seals located inside the cylinder.



- Place the mounting plate (3) inside the mounting post (4).
- Position the cylinder over the bolts.
- If necessary, add spacers (5) under the anchor plates of the cylinder in order to keep the angle guides (6) of the rails centered.
- Align the edge of the cylinder anchor plates (7) to the 9 ⅛” [232 mm] chalk line on the gutter wall.
- Secure the mounting plate and the cylinder anchor plate using nuts, lock washers and washers.
- Proceed with the anchor bolts installation procedure to secure the second anchor plate of the cylinder.



5.8.6 Step 6: Cleaning

- Pressure wash the cross gutter, equipment, etc, to remove all traces of dirt, dust, oil, etc, resulting from the assembly steps.

5.9 Cross gutter cleaner installation for a gutter between 5” and 10” (127 mm to 255 mm) deep

Always refer to the installation plan when installing the equipment.

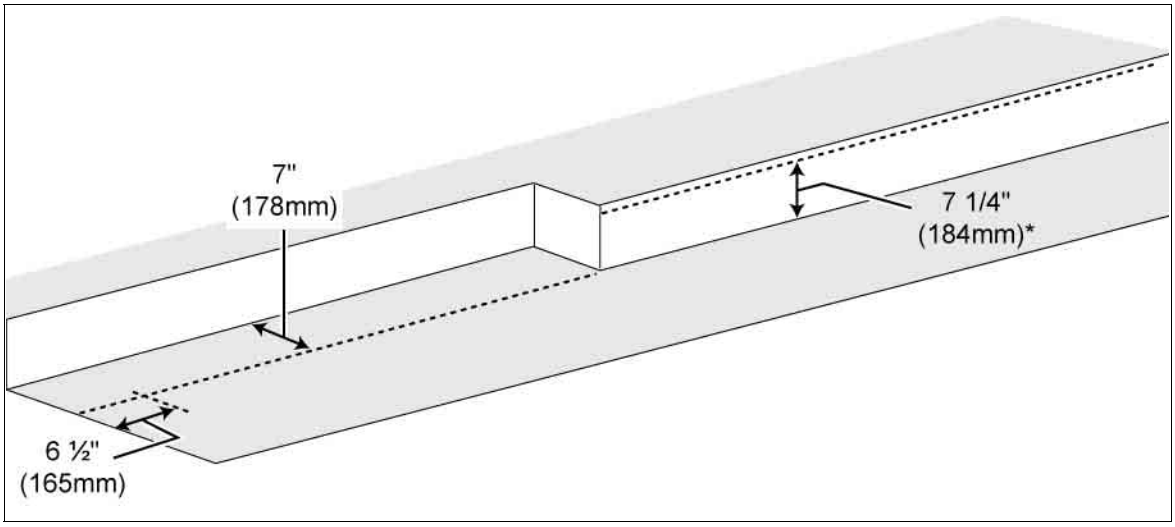
5.9.1 Step 1: Position the assembly

Caution!
Always position the cylinder inside the gutter on the opposite side of the free stall area.

Caution!
Unless otherwise instructed in the installation plan supplied by the manufacturer, proceed with the following installation steps to install the hydraulic cleaning system.

Note!
A cylinder that connects in series is identified by a mark on the fixing plate.

Refer to section Handling and installation - Anchor bolt installation procedure.



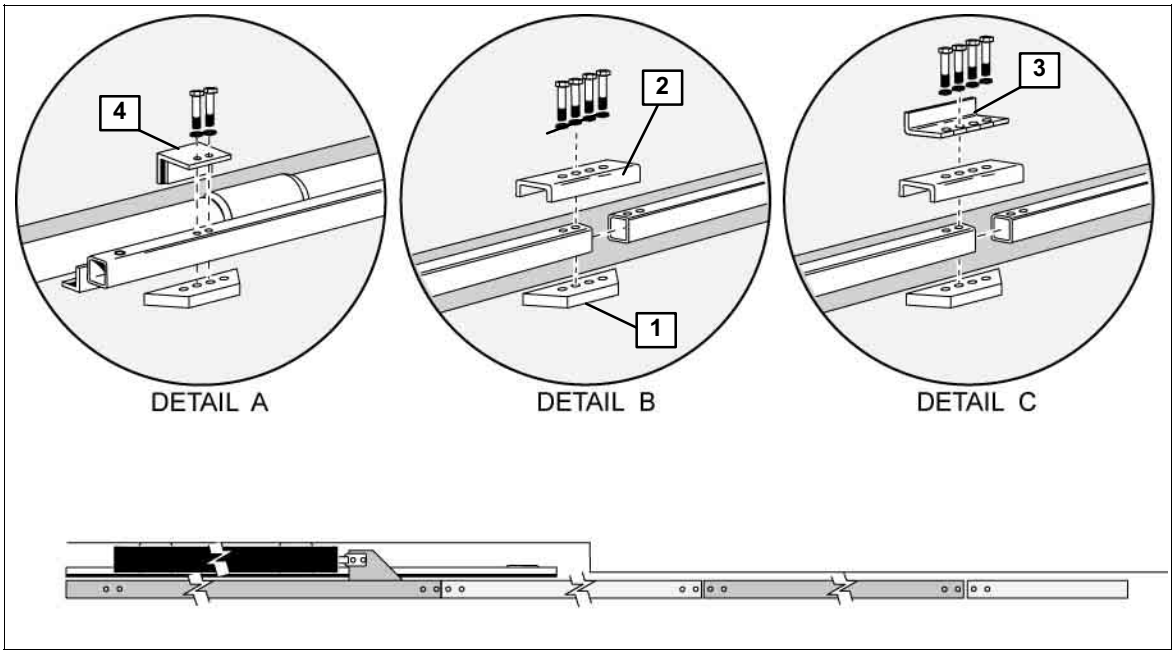
- Measure 7 ¼” [184 mm] from the bottom of the gutter wall. Trace a chalk line, as illustrated.
- Measure 7” [178 mm] on the bottom side of the recess toward the center of the gutter. Trace a line across the entire length of the cross gutter. The line should be aligned with the gutter wall, as illustrated.
- Place a measuring tape at the beginning of the gutter. Measure 6 ½” [165 mm] from the beginning of the gutter toward the end of the gutter, mark with a chalk.

5.9.2 Step 2: Rails

Attention!
Over tightened bolts will distort the assembly.

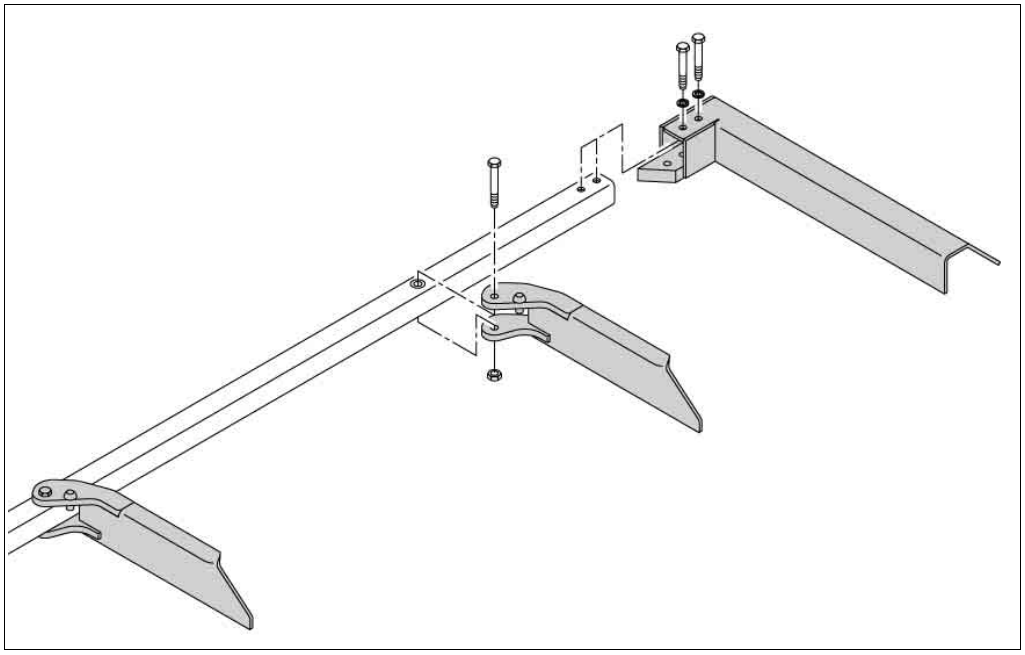
Note!
Install an angle guide on the first and the last joint plate. Additional angle guides must be installed within every 48' [14.63 m] from the first joint plate.

Note!
Always place the threaded holes of a shoe upwards.



- Position the starting rail next to the cylinder.
- Align the rails one after the other in descending order. Refer to the installation plan.
- Install a shoe (1) under the first set of two holes of the starting rail, as illustrated in detail A.
- Place a 4” [10.16 cm] angle guide (4) over the rail and tighten using bolts and lock washer. Do not torque. Torquing can distort the assembly.
- Position a shoe (1) under each rail junction and add a joint plate (2) over each junction. Refer to detail B. Tighten using washers and bolts.
- Place an angle guide (3) on top of the first and the last junction and every 48' [14.63 m] or less from the first junction. See detail C.
- Assemble the remaining junctions as illustrated in detail B.

5.9.3 Step 3: Paddles



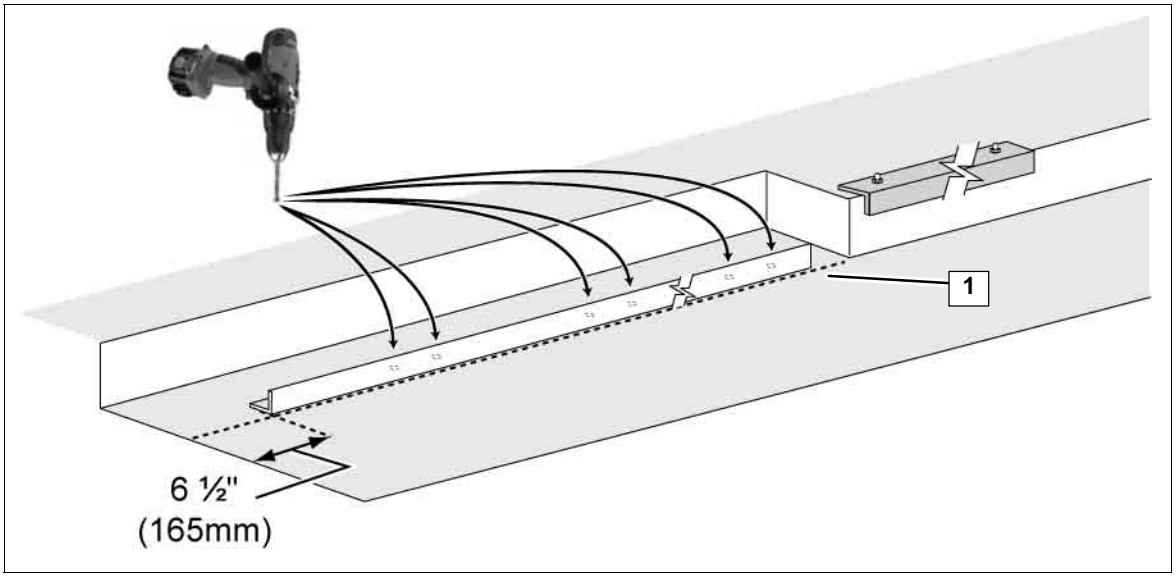
- Place a paddle over each hole containing a nylon bushing.
- Bolt through the bushing and secure with a nut. Do not over tighten, the paddles must swivel freely.
- For the end rail, place a shoe under the end rail and slide the end paddle over the rail. Use two bolts and washers to hold the assembly.

5.9.4 Step 4: Guiding rail and cylinder

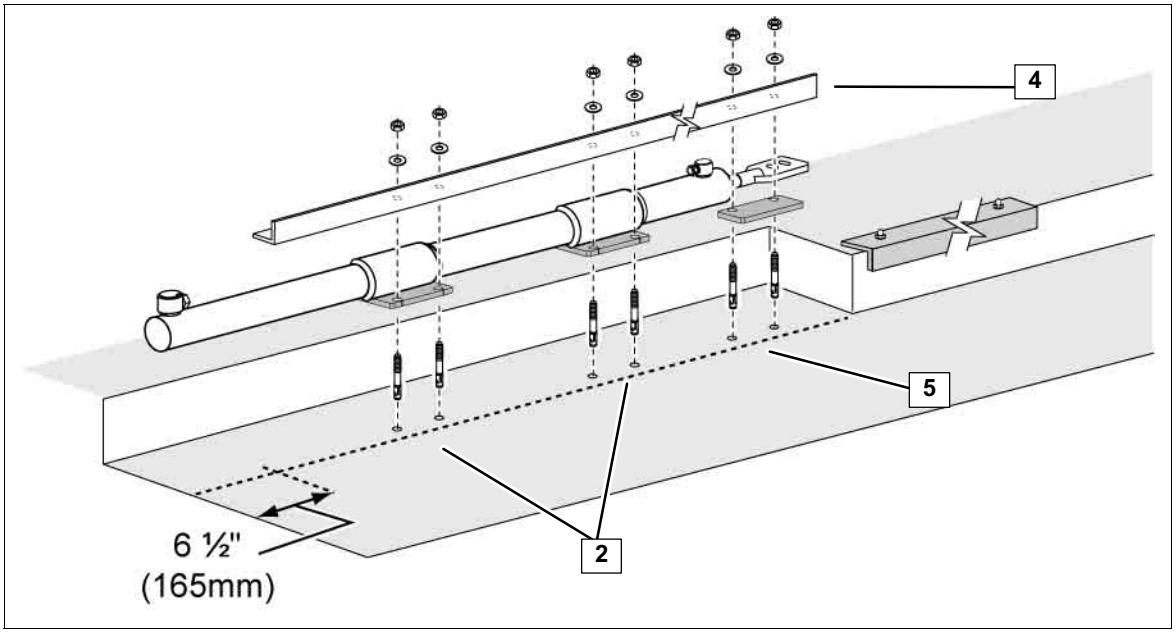
Attention!
Cut the exceeding anchor bolt threads of the first guide using a bolt cutter.

Refer to section Handling and installation - Anchor bolt installation procedure.

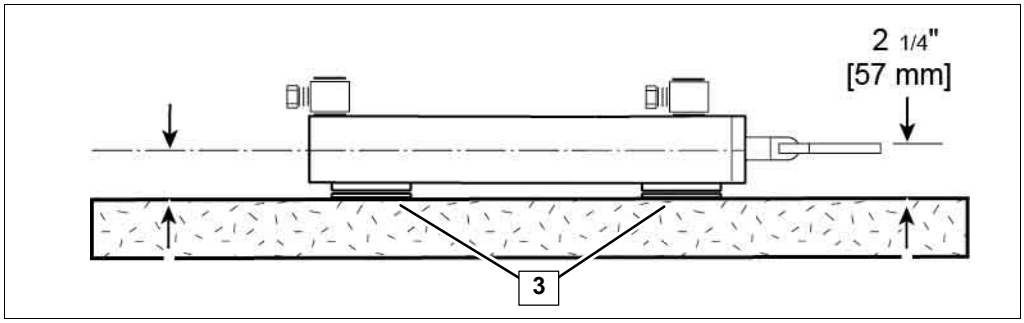
Note!
When the cylinder is completely extended, the end paddle must be at 3” from the gutter end.



- Place the folded edge of the guiding rail (1) on the chalk line.
- The beginning of the guiding rail must align with both chalk lines.
- Drill through the holes of the guiding rail.
- Remove the guiding rail.
- Remove the particles from inside the holes.

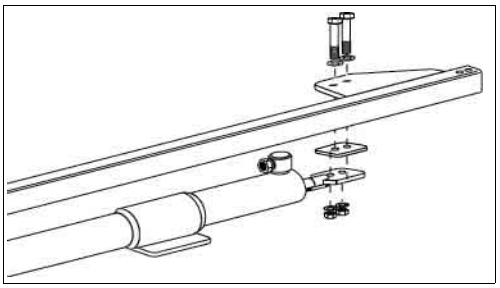


- Install anchor bolts.
- Insert a cylinder spacer on the two first sets (2) of anchor bolts. Place the free holes of the spacers next to the wall.
- Drill through the holes of the spacers.
- Remove the particles from the drilled holes.
- Install anchor bolts.
- Retract the cylinder completely.



- Place the cylinder over the anchor bolts. If necessary, add or remove the spacers (3) under the cylinder in order to keep 2 ¼” [51 mm] between the bottom of the gutter and the top of the cylinder fixing plate.
- Install the guiding rail (4) on the cylinder anchor plates, as illustrated above. Add spacers under the last sets of bolts (5) of the guiding rail to fill in the gap. Ensure the guiding rail is level and aligned with the chalk line.
- Secure the assembly using washers and nuts.
- Secure the cylinder using provided hardware.

- Secure the cylinder fixing plate to the starting rail fixing plate using bolts, washers, lock washers and nuts. Use spacers to fill in the gap.

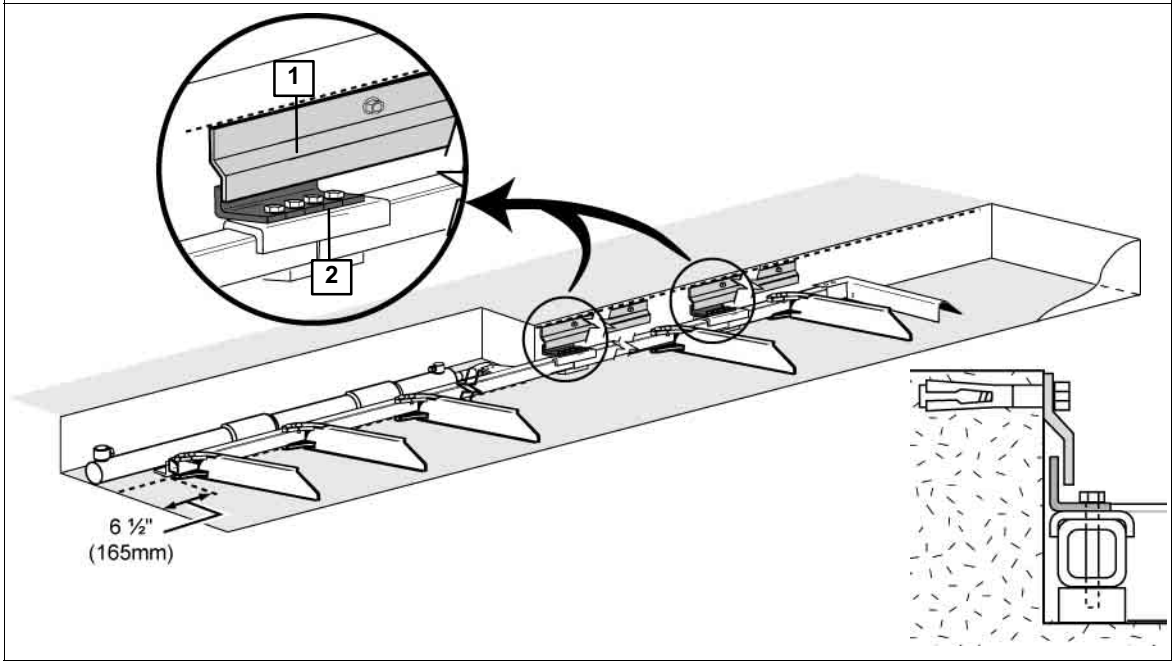


5.9.5 Step 5: ”S” guide or ”L” guide

Attention!
Cut the exceeding anchor bolt threads of the first ”S” guide using a bolt cutter.

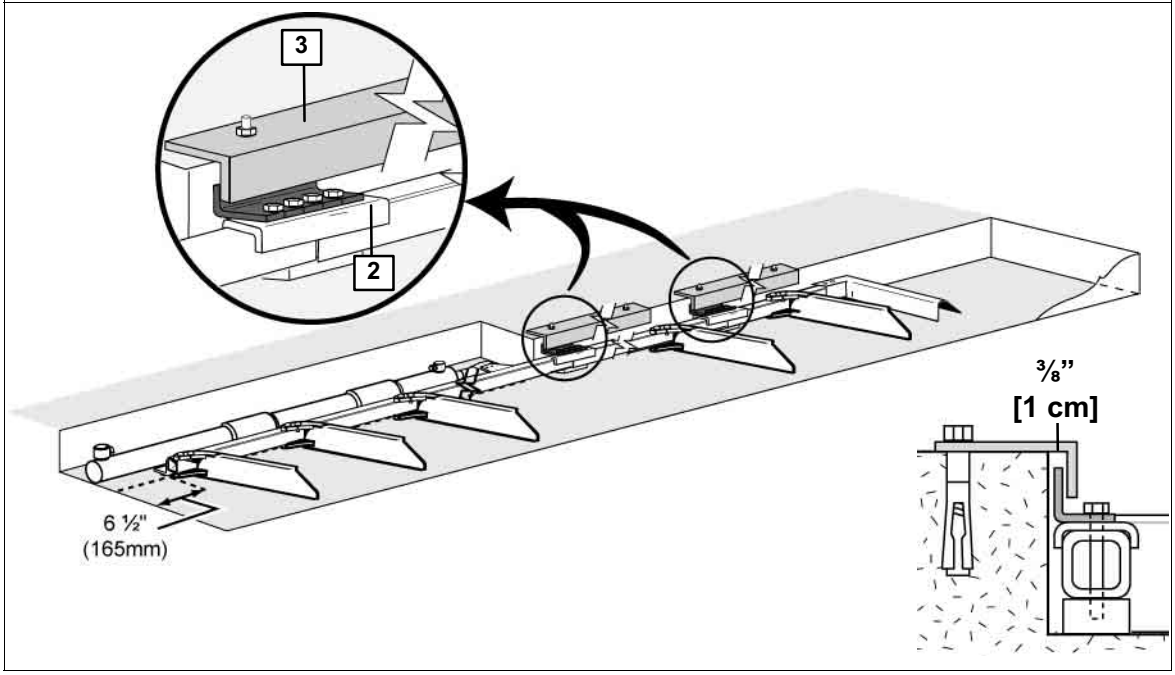
Refer to section Handling and installation - Anchor bolt installation procedure.

Gutter between 7 ¼” [180 mm] and 10” [255 mm]



- Place the rail assembly at 6 ½” [167 mm] from the beginning of the alley.
- Make sure the rail guides lean against the gutter wall.
- For a gutter between 7 ¼” [180 mm] and 10” [255 mm], install a ”S” guide (1) above each angle guide (2) on the 7 ¼” [180 mm] chalk line.
- Align the ”S” guide (1) at the beginning of each angle guide (2).

Gutter between 5” [127 mm] and 7 ¼” [180 mm]



- For a gutter between 5” [127 mm] and 7 ¼” [180 mm], install the ”L” guide (3) above each angle guide (2) over the concrete floor. Leave ⅜” [1 cm] space between the wall and the guide, as illustrated.
- Align the rail assembly in order to center the angle guides between the gutter wall and the ”S” or ”L” guides as illustrated.

5.9.6 Step 6: Cleaning

- Pressure wash the gutter, equipment, etc, to remove all traces of dirt, dust, oil, etc, resulting from the assembly steps.
- Lubricate the rail assembly with biodegradable oil.

5.10 Cross gutter cleaner installation for a gutter less than 5” (127 mm) deep

Always refer to the installation plan when installing the equipment.

5.10.1 Step 1: Position of the assembly

Caution!
Always position the hydraulic cylinder inside the gutter on the opposite side of the free stall area.

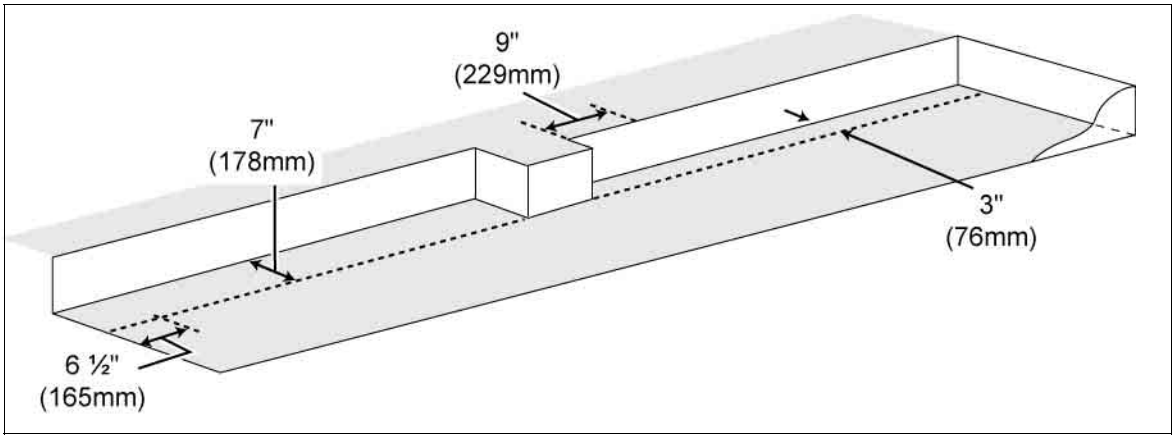
Note!
Unless otherwise instructed in the installation plan supplied by the manufacturer, proceed with the following installation steps to install the hydraulic cleaning system.

Note!
Always place the threaded holes of a shoe upwards.

Note!
When the cylinder is completely extended, the end paddle must be at 3” from the gutter end.

Note!
A cylinder that connects in series is identified by a mark on the fixing plate.

Refer to section Handling and installation - Anchor bolt installation procedure.



First recess

- Place a measuring tape at the base of the opposite wall of the free stall area.
- Measure 7” [178 mm] towards the center of the gutter.
- Mark the bottom using a chalk. Trace a chalk line. The line should align with the side of the wall located between the two recesses.
- Place a measuring tape at the beginning of the gutter.

- Measure 6 ½” [165 mm] towards the end of the gutter.
- Mark the bottom of the gutter using a chalk.
- Measure the space between the wall of the second recess and the chalk line. The line should be at 3” [76 mm] from the wall.

Second recess

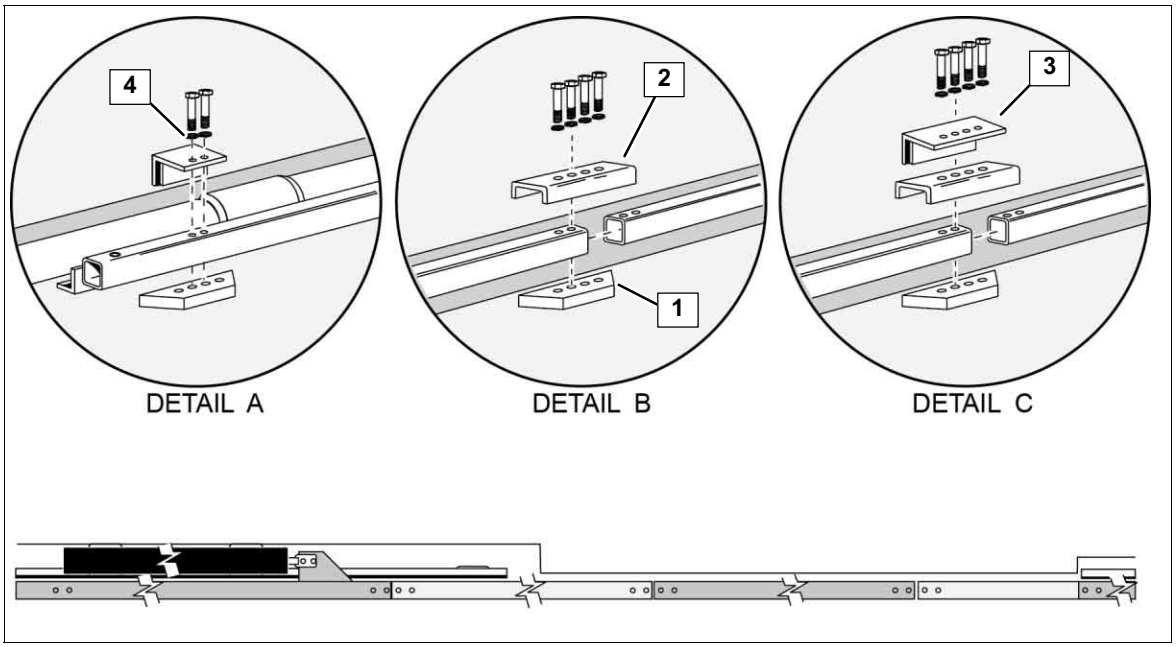
- Place a measuring tape at the base of the wall in the second recess on the opposite side of the free stall area.
- Measure 3” [76 mm] towards the free stall area.
- Mark the bottom of the gutter using a chalk.
- Repeat steps to mark both ends and the center of the second recess.
- Join the marks using a chalk line. Make sure the line is straight and parallel to the gutter wall.
- Place a measuring tape at the beginning of the second recess gutter.
- Measure 9” [229 mm] towards the gutter end.
- Mark the bottom of the gutter using a chalk. Repeat to mark in three areas the width of the second recess.
- Join the marks using a chalk line.

5.10.2 Step 2: Rails

Attention!
Over tightened bolts will distort the assembly.

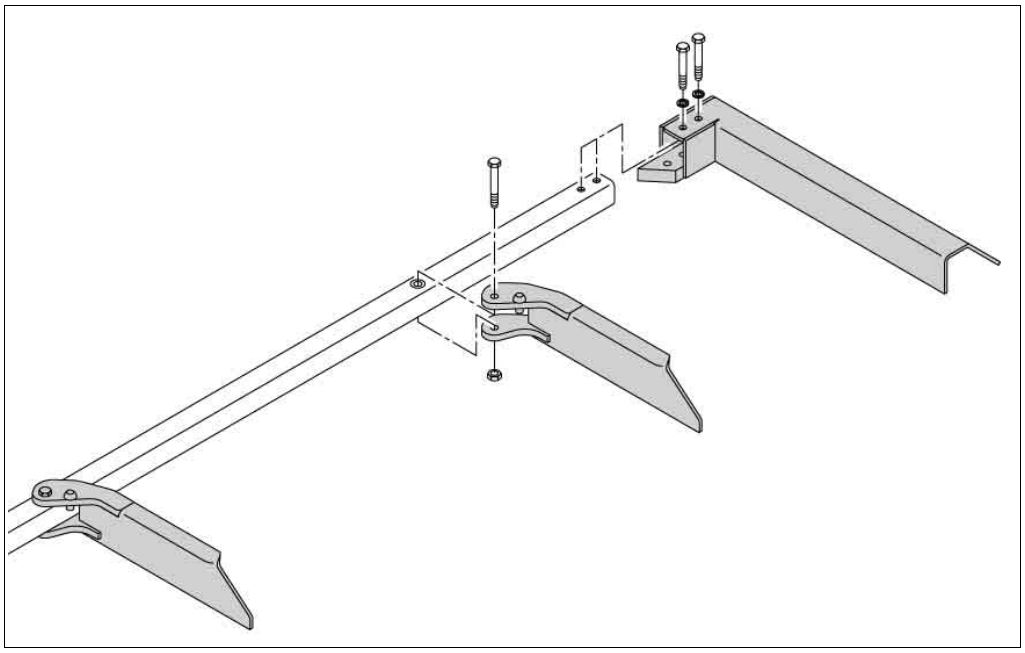
Note!
Install an angle guide on the first and the last joint plate. Additional angle guides must be installed within every 48' [14.6 m] from the first joint plate.

Note!
Always place the threaded holes of a shoe upwards.



- Position the starting rail next to the cylinder.
- Align the rails one after the other in descending order. Refer to the installation plan.
- Install a shoe (1) under the first set of two holes of the starting rail, as illustrated in detail A.
- Place a 4” [102 mm] angle guide (4) over the rail and tighten using bolts and lock washer. Do not torque.
- Position a shoe (1) under each rail junction and add a joint plate (2) over each junction. Refer to detail B. Tighten using washers and bolts.
- Place a 6” [152 mm] angle guide (3) on top of the first joint plate located in the second recess and secure using provided hardware. Add an angle guide every 48' [14.6 m] following the first joint plate. See detail C.
- Assemble the remaining junctions as illustrated in detail B.

5.10.3 Step 3: Paddles



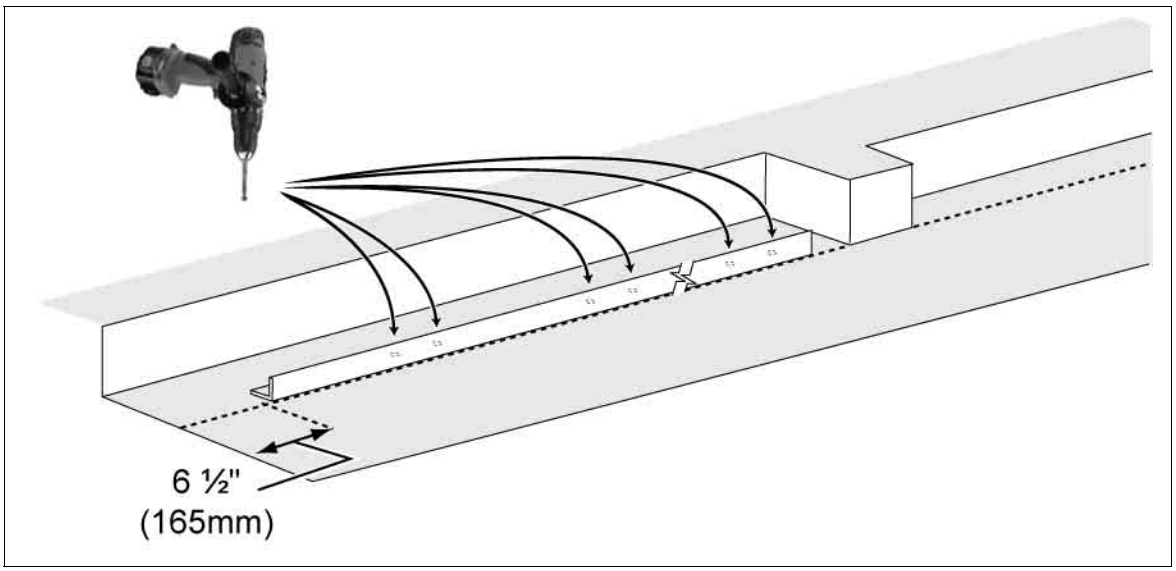
- Install a paddle on each hole containing a nylon bushing.
- Bolt through the bushing and secure with a nut. Do not over tighten, the paddles must swivel freely.
- For the end rail, place a shoe under the end rail and slide the end paddle over the rail. Use two bolts and washers to hold the assembly.

5.10.4 Step 4: Guiding rail and cylinder

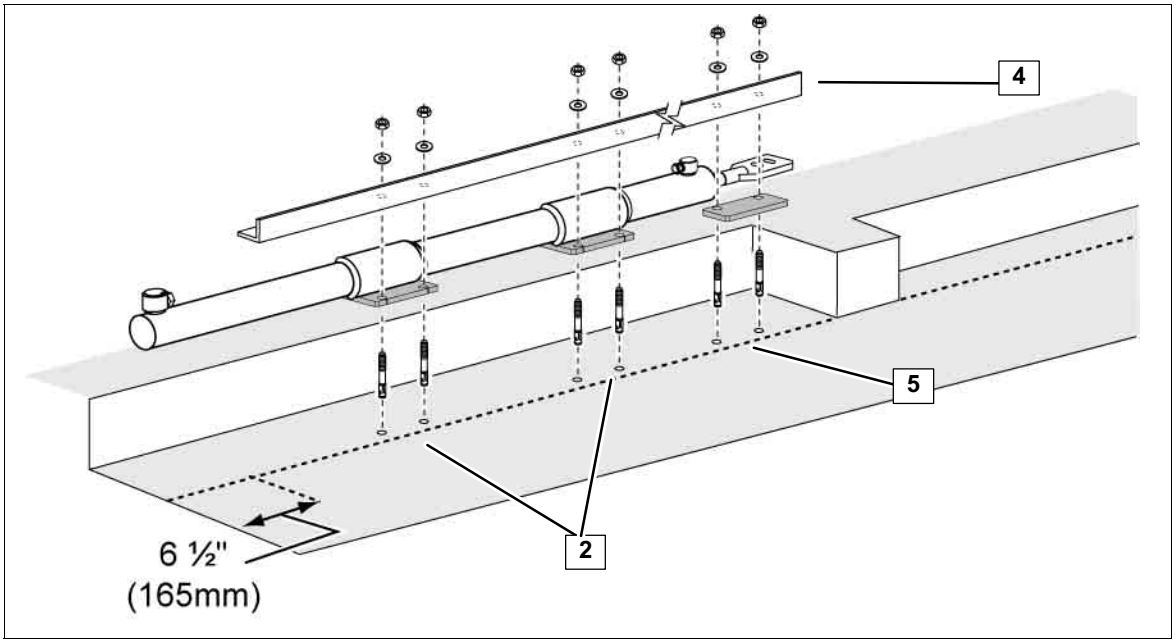
Attention!
Cut the exceeding anchor bolt threads of the first ”S” guide using a bolt cutter.

Note!
When the cylinder is completely extended, the end paddle must be at 3” from the gutter end.

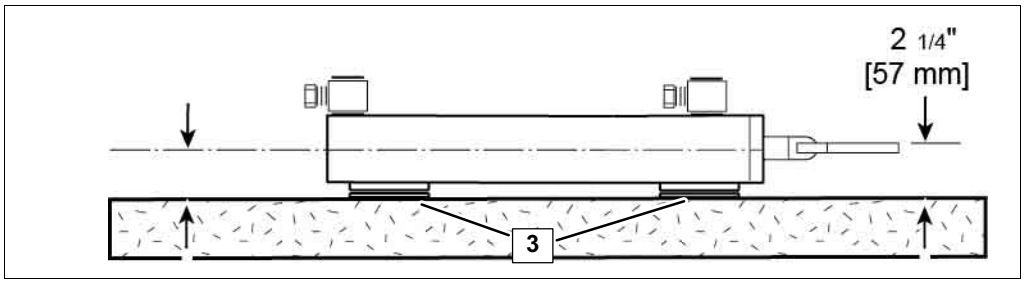
Note!
A cylinder that connects in series is identified by a mark on the fixing plate.



- Place the folded end of the guiding rail on the chalk lines junction at the beginning of the gutter.
- Drill through the holes of the guiding rail.
- Remove the guiding rail.
- Remove the particles from inside the holes.

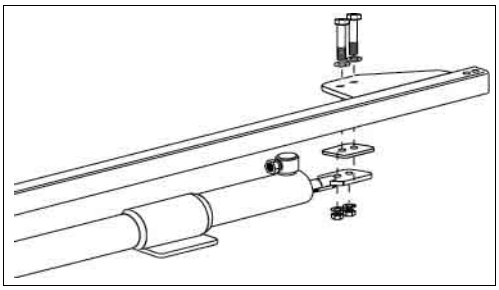


- Install anchor bolts. Refer to the anchor bolt installation procedure.
- Insert a cylinder spacer on the first two sets (2) of anchor bolts. Place the free holes of the spacer next to the wall.
- Drill through the spacers.
- Remove the particles from inside the holes.
- Install anchor bolts.
- Retract the cylinder completely.

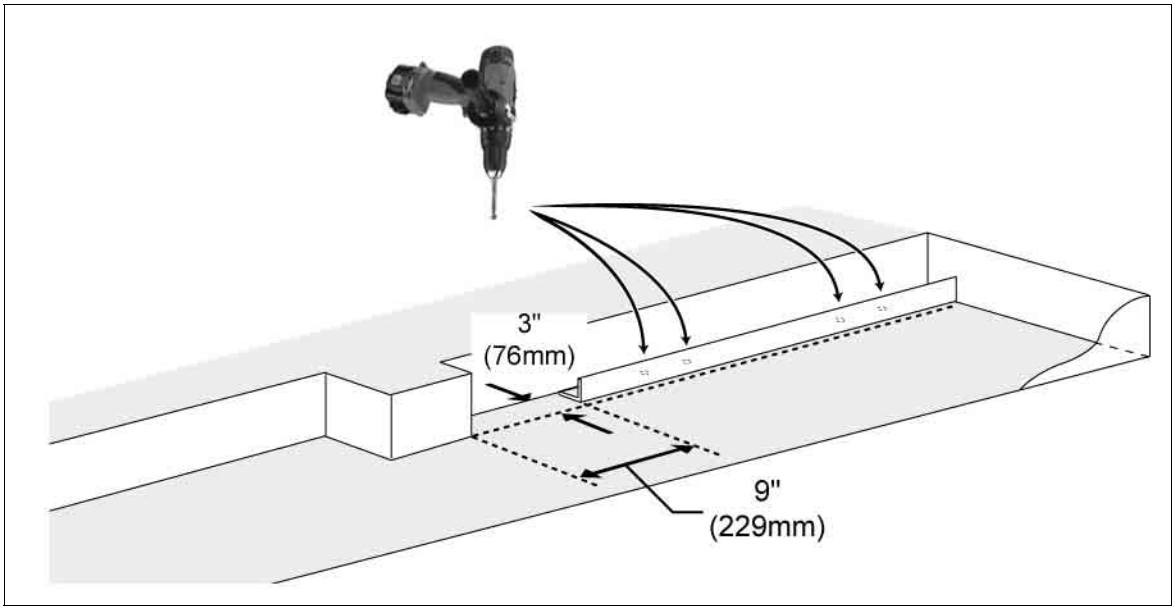


- Place the cylinder over the anchor bolts. If necessary, add or remove the spacers (3) under the cylinder in order to keep 2 ¼” [57 mm] between the bottom of the gutter and the top of the cylinder fixing plate.
- Install the guiding rail (4) on the cylinder anchor plates, as illustrated above. Add spacers under the last sets of bolts (5) of the guiding rail to fill in the gap. Ensure the guiding rail is level and aligned with the chalk line.
- Secure the assembly using washers and nuts.
- Secure the cylinder using provided hardware.

- Secure the cylinder fixing plate to the starting rail fixing plate using bolts, washers, lock washers and nuts. Use spacers to fill in the gap.



5.10.5 Step 5: Rail retainer



- Place the rail retainer inside the rail guides. Position the folded end of the rail retainer on the 3” [76 mm] chalk line in the second recess.
- Align the rail retainer end with the chalk lines junction. The rail retainer should be aligned with the gutter wall located between both recesses.
- Drill through the holes of the rail retainer. Install the anchor bolts. Refer to the anchor bolt installation procedure.

5.10.6 Step 6: Cleaning

- Pressure wash the gutter, equipment, etc, to remove all traces of dirt, dust, oil, etc, resulting from the installation steps.
- Lubricate the rail assembly with biodegradable oil.

5.11 Hydraulic power unit installation

The hydraulic power unit is the key element of a hydraulic system. It consists of a reservoir that contains the oil necessary to operate the hydraulics. The walls of the reservoir are designed to dissipate heat generated by the oil.

The air breather cap is set on the oil reservoir to filter the air entering in the reservoir. Air must remain inside the reservoir to maintain pressure to allow gravity feeding. An oil filter is mandatory to retain the suspended particles contained in the oil. To ensure neatness and prevent premature wear of hydraulic components, the filter must be kept clean. For further protection, a hydraulic damper is installed on the unit to absorb residual hydraulic pressure inside the system.

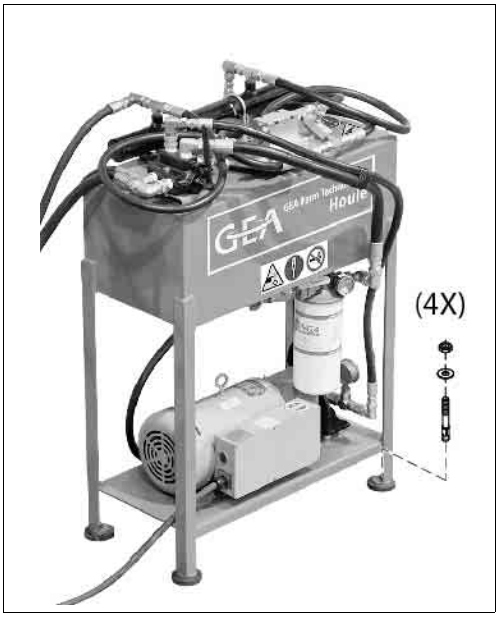
5.11.1 Hydraulic power unit

The oil contained in the reservoir must be clean, free from contaminants such as water, sealant tape, dirt, etc.

Attention!
Place the hydraulic power unit in a cool, frost free and dust free environment.

Attention!
Keep space around the unit to prevent overheating and allow maintenance.

- Position the hydraulic power unit as indicated in the installation plan. Make sure the unit is centered near the cylinders in order to minimize the length of the heavy duty steel pipes and hydraulic hoses.
- Secure the unit in place by following the steps in section Handling and installation - Anchor bolt installation procedure.



Note!
Needle valves are mandatory to supply the appropriate hydraulic flow to the free stall cleaners and the cross gutter cleaners when having an underground pump.

Note!
A solenoid valve is mandatory to separate the reversing valve of the underground pump from the reversing valve of the free stall cleaners and the cross gutter cleaners.

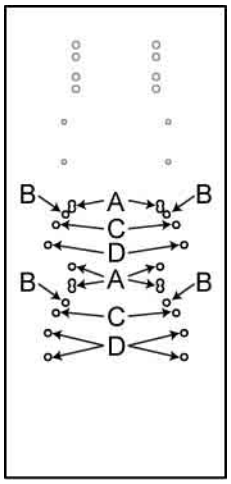
5.11.2 Hydraulic pump assembly

The hydraulic pump supplied by GEA Houle is fixed under the hydraulic power unit reservoir. The reservoir feeds oil to the pump by gravity.

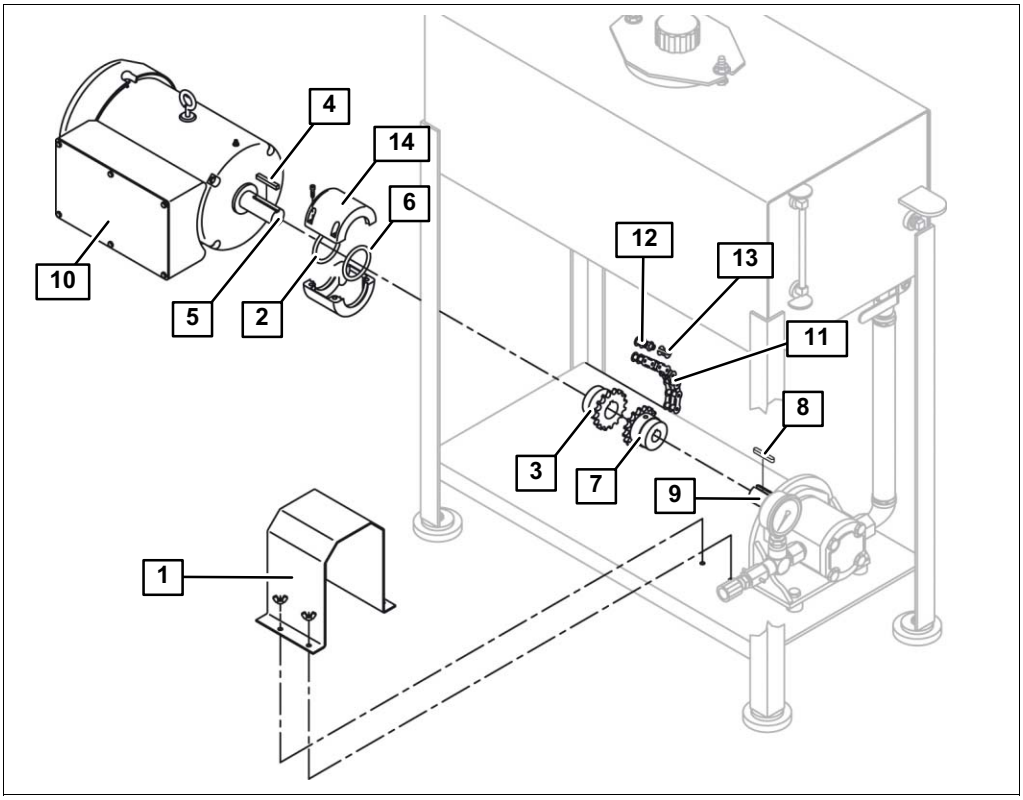
If the hydraulic pump is not supplied by GEA Houle, refer to the instruction manual of the manufacturer for proper installation.

5.11.3 Electric motor assembly

Follow the corresponding bolt pattern to install the electric motor.

	Motor				Motor support bolt pattern
	Power		Type		
	HP	KW	NEMA	IEC	
B	3	2.2	-	100	
C	3	2.2	182T	-	
	5	3.7	184T	112	

Attention!
Make sure the electric motor is level and perfectly aligned with the hydraulic pump to avoid vibration.



- Remove the safety guard (1) from the hydraulic pump.
- Place a seal (2) on the gear end (3).
- Set a key (4) on the motor shaft (5).
- Slide the gear (3) over the key (4) and shaft (5).
- Place a seal (6) on the gear (7) end.
- Place a key (8) on the hydraulic pump shaft (9).
- Slide the gear (7) over the key (8) and shaft (9).
- Position the electric motor (10) over the bolt pattern.
- Level the motor with the pump by placing spacers under the motor. Ensure both gears and shafts are aligned.
- When the motor is level and aligned with the hydraulic pump, secure the motor in place using provided hardware.
- Install the chain (11) over both gears making sure the links of the chain are fully inserted on the gears teeth.
- Use a connecting link (12) with clip (13) to maintain the chain ends.
- Apply grease inside the chain coupling cover (14) and on the chain (11).
- Install the coupling cover (14) over the assembly making sure the seals are well positioned inside the groove of the cover. Secure with set screws.
- Install the safety guard (1).
- Before filling the hydraulic power unit reservoir, make sure the liquid level switch and the oil heater are installed on the reservoir. If not, perform the next steps to complete the installation.

Refer to section: Technical data - Lubricant specifications to fill the hydraulic power unit reservoir with oil.

To install the oil filter, refer to section: Maintenance - Change oil and oil filter of the hydraulic power unit.

If the electric motor is not supplied by GEA Houle, refer to the instruction manual of the manufacturer for proper installation.

5.11.4 Liquid level switch assembly

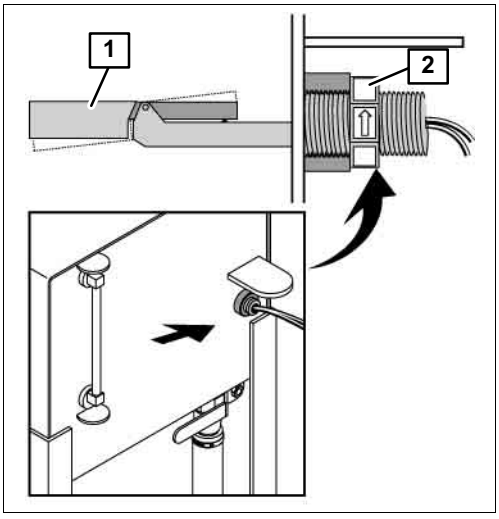
The level switch inside the reservoir remains in position when the oil level is adequate. This allows the electricity to return to the control panel.

When the oil level is low, the switch changes position and prevents the electricity from reaching the control panel. As a result, the panel cuts the electric supply of the motor to protect the hydraulic pump and the components.

Attention!
Apply a thin layer of thread seal tape on the threads. Never apply it on the tip to avoid contaminating the oil with tape residues.

Attention!
Applying more thread seal tape can cause distortion or cracking of the port.

- Slide the float (1) inside the threaded hole located on the side of the reservoir.
- Screw the switch until the float is tight enough and properly positioned, as illustrated.
- The arrow (2) must be positioned upward.



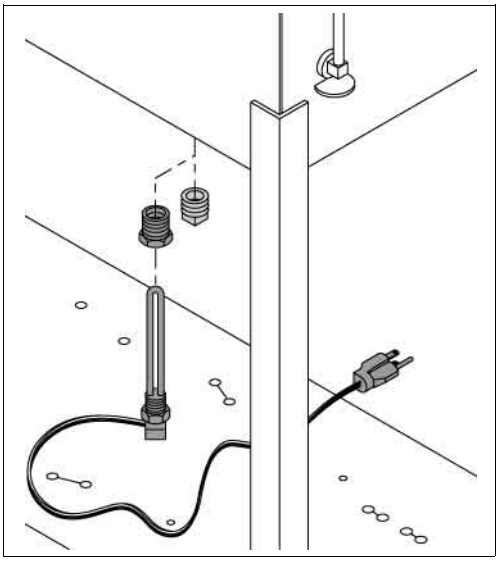
Note!
Wiring steps are indicated in section Handling and installation - Electric wiring.

5.11.5 Oil heater

Attention!
Apply a thin layer of thread seal tape on the threads. Never apply it on the tip to avoid contaminating the oil with tape residues.

Attention!
Applying more thread seal tape can cause distortion or cracking of the port.

- Remove the plug under the hydraulic power unit reservoir.
- Insert the heater inside the threaded hole.
- Screw the heater, tighten in place using a key.
- When the reservoir is filled with oil, connect the power supply of the oil heater.



5.12 Hydraulic components installation

Always refer to the installation plan when installing the equipment.

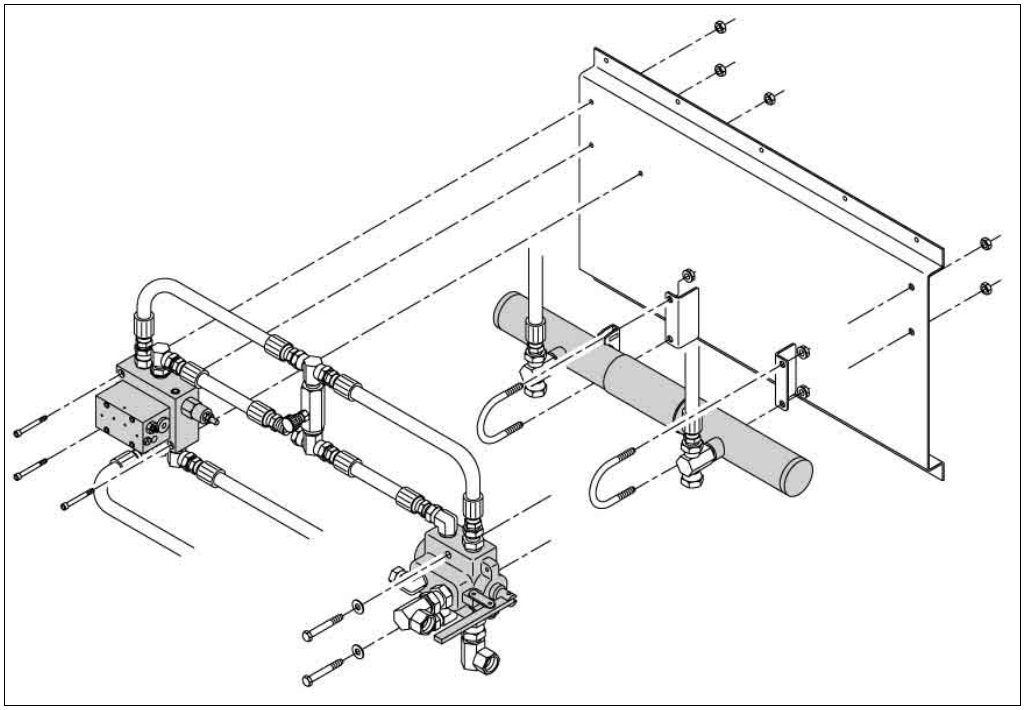
Attention!

- Clean all hydraulic components before connecting them. Send filtered pressurized air inside to remove potential oil contaminants.
- Keep the hydraulic components accessible for maintenance and inspection.
- Always install the automatic reversing valve in such a way that the adjustment screws are placed horizontally. This allows the spool inside the valve to properly operate.

5.12.1 Hydraulic damper and valves

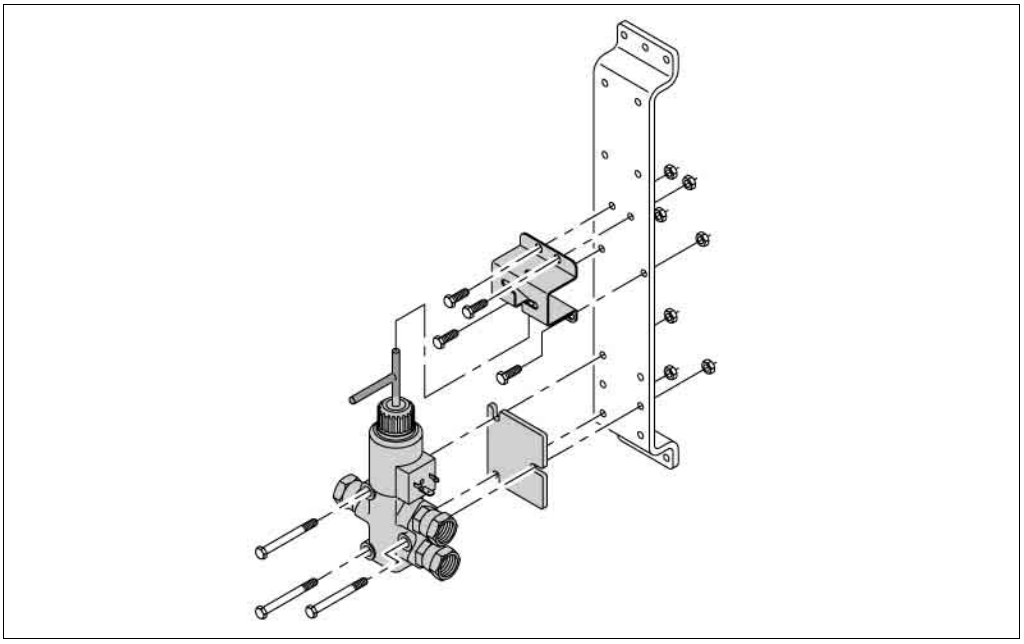
The hydraulic damper as well as the automatic reversing valve, the pressure relief valve, the needle valve and the selector valve are installed when purchasing a new hydraulic power unit.
When it requires installing the damper and valves on a panel, proceed with the following installation steps.

Note!
Hydraulic pump model PLP-14 and PLP-16 are equipped with a hydraulic damper to ensure a smooth reversing action.



- Install the damper panel within 10' [3.05 m] from the hydraulic power unit.
- Proceed with the assembly of the hydraulic components, as illustrated.

5.12.2 Solenoid valve

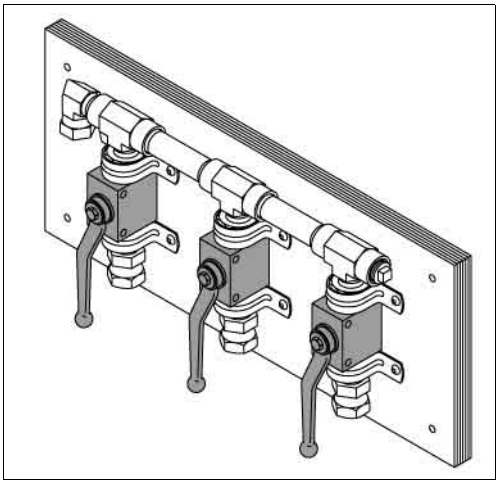


- Install each solenoid on its support, as illustrated.
- Fix the supports on the barn wall.
- Place the lever of each solenoid to allow oil flow in line A.

5.12.3 Manual ball valves

Manual ball valves are used to manually direct oil through a specific path. The operator must manually activate or deactivate cleaning by turning the lever.

- Fix the manual ball valve panel on the barn wall.



5.13 Hydraulic connections

Attention!
Follow the installation plan to correctly connect hydraulic components. Never perform changes regarding the hydraulic configuration of the cleaning systems. Changing the type of connection, adding or removing hydraulic equipment/components can result in important damages to the system.
Contact your dealer to get more information on how to modify your installation plan.

Attention!
Clean all hydraulic components before connecting them.

- After cutting, threading a hose/pipe, brush inside and out the openings of the pipe/hose to remove particles, burrs, etc.
- Send pressurized air inside the hose and pipe to remove particles, dust, etc.

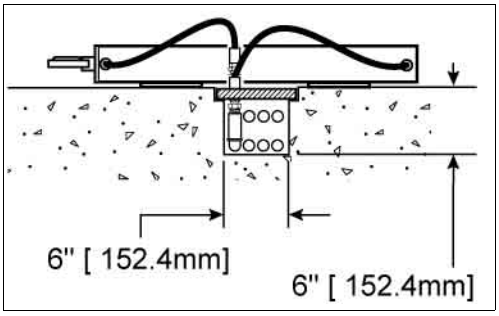
Attention!
Never exceed the bend radius of a steel pipe/hydraulic hose to ensure its ability to resist pressure.
Refer to section Technical data - Hydraulic hose or Heavy duty steel pipe.

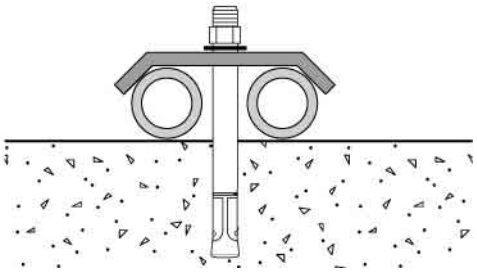
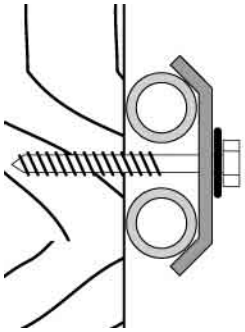
Attention!
Visually inspect the hydraulic components for damages.

5.13.1 Heavy duty steel pipes

- Determine the pipe length.
  Make sure the pipes limit the hydraulic hose length to 10' [3 m] maximum.
- Cut pipes using a cutting tool.
- Thread the ends with a threader, when applicable.
- Install the fittings. Refer to section Fittings.

- Run the pipes in a trench, when applicable.
- Always hold the pipes in place using ¾" [1.9 cm] supports placed every 10' [3 m].
- Connect the pipes.



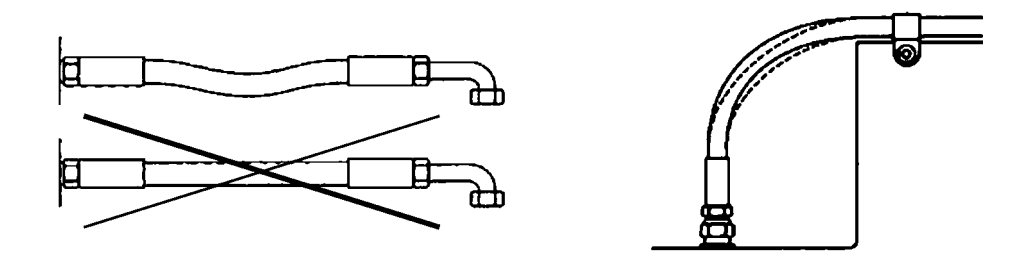
Concrete support	Wood support
	

5.13.2 Hydraulic hoses

Attention!
Never use hydraulic hose that measures more than 10' [3 m].

Attention!
Inappropriate hose connection can cause oil restriction, pressure increase, premature hose failure.

Note!
Use a protective tubing over a hose bending point when near an edge to avoid abrasion of the hose.



- Determine the minimum hose length between the hydraulic components and add 5% in length to make sure the hose can flex and absorb the motion when it is under pressure.
- Cut the hose using a cutting tool.
- Install the fittings. Refer to section Fittings.
- Connect the hose.

5.13.3 Fittings

Thread seal tape application

Attention!
Choose straight fitting or long radius fitting.
Avoid the use of 90° elbow and short radius fitting which can cause significant friction loss in the hydraulics.

Attention!
Applying too much thread seal tape can cause distortion or cracking of the port.

Attention!
Do not apply thread seal tape on a fitting that is equipped with an o-ring or on a fitting that connects to a swivel fitting.

Apply thread seal tape on all NPT male fitting.

- Wrap 1 ½ to 2 turns of thread seal tape in clockwise direction when viewing the threads of the fitting.
- Apply sufficient pressure when wrapping the tape to ensure that the sealant bonds well to the threads.
- Never apply the thread sealant on the tip of the fitting. Tape residue that enters the oil can cause contamination which can result in clogging, damages, etc.

Fitting assembly

Note!
A hydraulic fitting must be engaged between 3 ½ to 6 threads to ensure that it complies with the threads tolerance.

- Manually engage the fitting on the pipe or hose to ensure proper alignment of the threads.
- Screw 2-3 turns.
- Tighten with a wrench to reach a total of 3 ½ to 6 turns.

Attention!
When tightening a fitting, never unscrew the fitting for alignment purposes. This can cause leaking threaded joints.

5.14 Control panel installation

Step 1: Locating the control panel

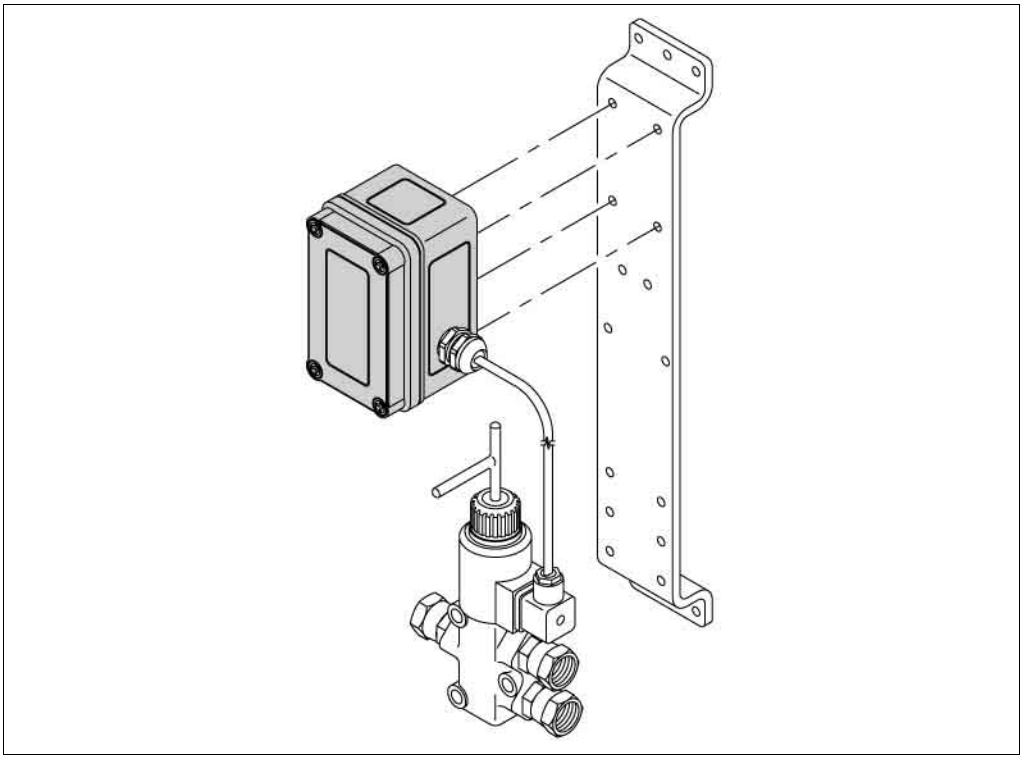
Set the location of the control panel by ensuring that it is:

- Set at proper elevation for easy access;
- Accessible for maintenance;
- Well positioned in relation with the hydraulic components;
- Protected from weather conditions;
- Not directly exposed to sun rays;
- Well ventilated;
- Not close to a heat source;
- Not exposed to frost;
- Installed on a surface that can support the weight.

Step 2: Installing the control panel

- Open the control panel.
- Remove the bracket from the mounting bracket.
- Assemble the brackets behind the panel.
- Fix the control panel on the barn wall using appropriate hardware.

Step 3: Installing the junction box



- Install a junction box on a wall mounting bracket next to the solenoid.

Step 4: Wiring the control panel

WARNING!
Electric wiring must be performed by a certified electrician.

Attention!
Never wire a warning light or a horn using the 24 VAC power outlet.

Refer to the wiring diagram supplied with the control panel.

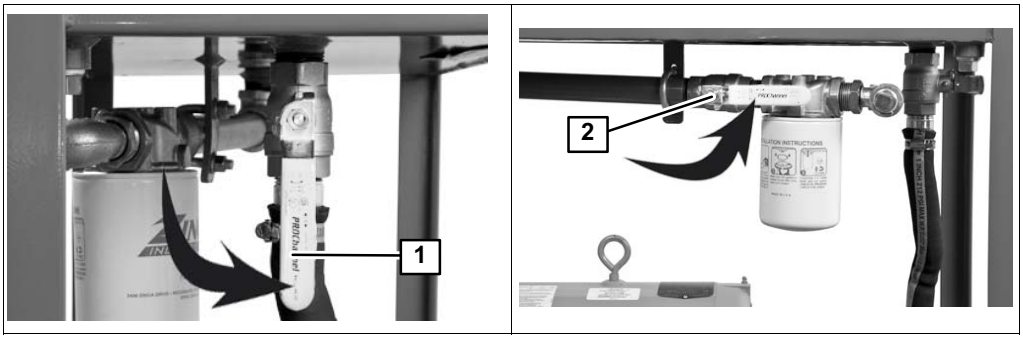
5.15 Adjustments and verifications

Note!
The electric wiring of the system must be completed before performing the steps included in this section.

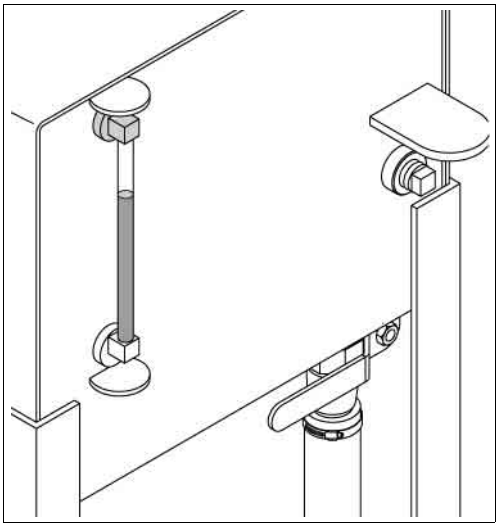
5.15.1 Step 1: Fill the hydraulic system with oil

Attention!
Omitting to open the ball valves under the hydraulic power unit can cause permanent damages to the hydraulic components if the system is activated.

Attention!
When all ball valves are opened, wait 10 minutes for the oil to flow in the hydraulic system before starting the electric motor.



- Open the ball valves (1, 2) located under the reservoir of the hydraulic power unit.
- Check the oil level through the level indicator (3) located on the side of the reservoir. The indicator must be filled to ⅔.
- Add oil, if necessary.

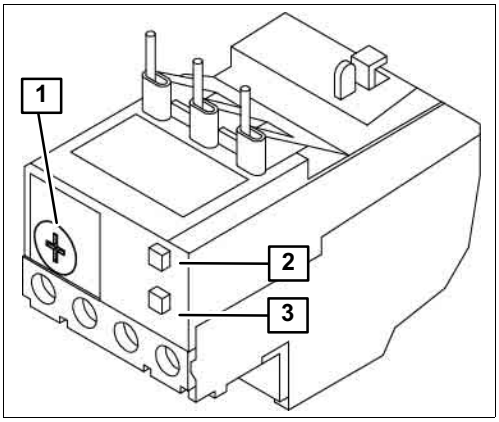


5.15.2 Step 2: Set the thermal overload

The thermal overload relay located inside the control panel must be set according to the motor rated current. This device shuts down the motor in case of overheating caused by a current overload.

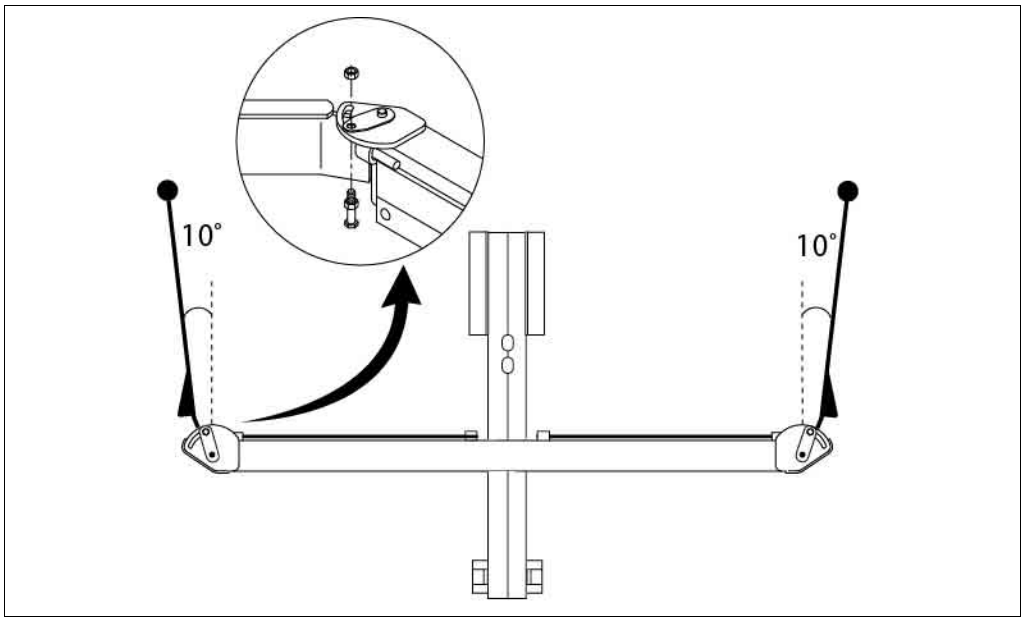
Attention!
The thermal overload setting must be performed by a certified electrician.

- Set the dial (1) according to the motor current rating indicated on the motor nameplate.
- The indicator light is active when an overload detection occurs. The operator must manually restart the system by pressing the reset button (2).
- Press the stop button (3) to deactivate the overload detection.



5.15.3 Step 3: Adjust the folding ends of the scraper

The folding ends of a scraper swivel when the scraper cleans the alley and returns to its park position. When the scraper draws back to its park position, the folding ends of the scraper should be positioned at a 10° angle minimum in order to fold properly when reversing.



- Loosen the nut of the hinge pin.
- Place the folding end of the scraper at a 10° angle, as illustrated.
- Tighten the nut to secure the adjustment in place.
- Repeat adjustment on the second folding end.

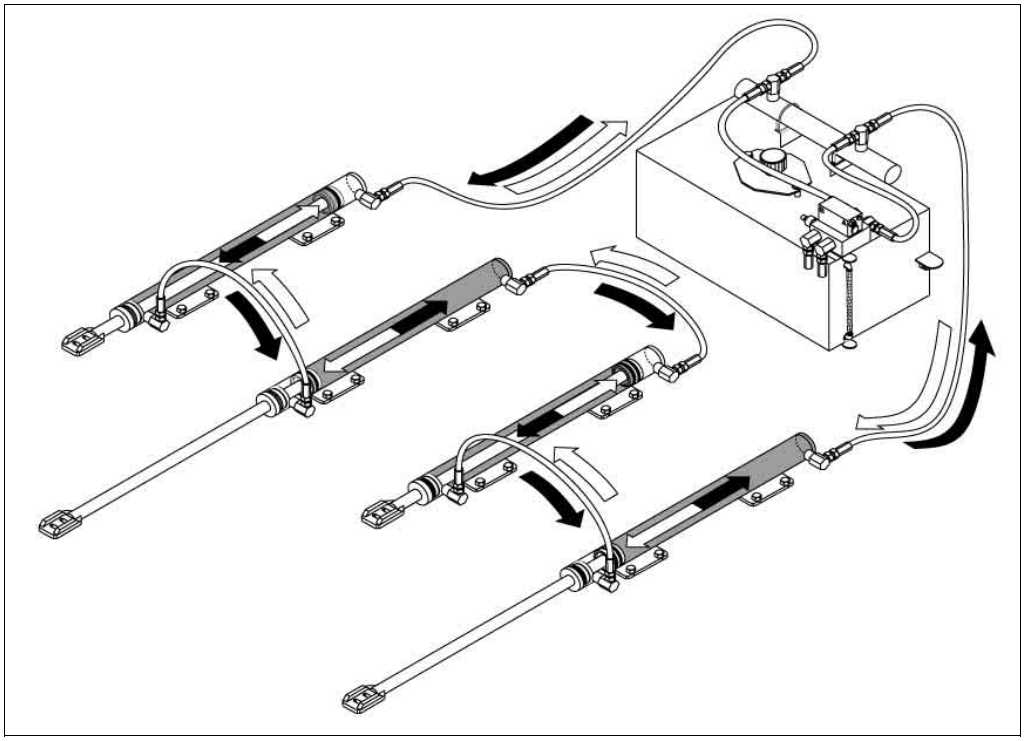
Note!
If the folding arms do not return quickly enough in position when the scraper moves forward to clean the alley, adjust the folding arms to a greater angle.

5.15.4 Step 4: Purge the hydraulic lines

After installing or replacing cylinders and hydraulic lines, the circuit contains air. The air must be removed and replaced by hydraulic oil. Proceed with the following steps to purge air from the system.

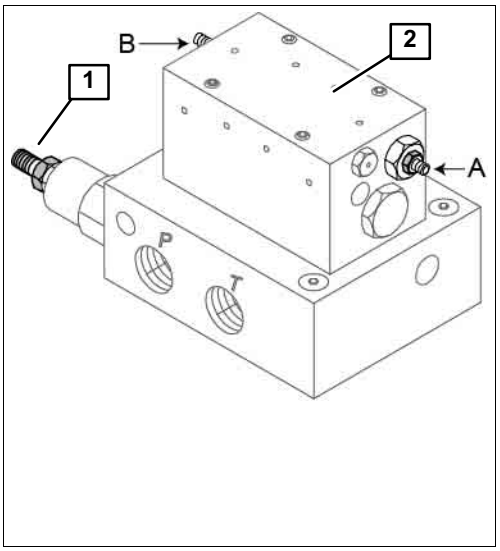
Attention!
Air that infiltrates the hydraulic cleaning system can lead to aeration. This phenomenon causes metal intrusion inside the hydraulic components resulting in permanent damages.

Note!
1 adjustment turn of the reversing or relief valve equals to approximately 500 PSI.



Note!
The purging procedure allows the air to pass through each cylinder and reach the oil reservoir. This process can take up to 40 minutes.

- Keep off the hydraulic power unit.
- Remove the cap of the relief valve (1).
- Unscrew the relief valve (1) 1 to 3 turns to minimize pressure inside the hydraulics. Remember the number of turns.
- Screw the adjustment screws (A and B) of the reversing valve (2) without tightening. The reversing action will not occur once the system operates because the relief pressure is set lower than the reversing pressure.



- Turn on the hydraulic power unit by rotating the selector knob of the control panel to ”MAN”.
- Engage the cylinder(s) connected in series by flipping the lever of the corresponding solenoid or the ball valve.
- Screw the adjustment of the relief valve (1) until the pressure gauge under the reservoir indicates 1 000 PSI.
- Let all cylinders extend or retract completely.
- When the last cylinder has extended or retracted completely, keep the hydraulics running for 10 minutes.
- Stop the hydraulics.
- Reposition the relief valve screw in initial position.

5.15.5 Step 5: Adjust the reversing pressure

The hydraulic pressure required to start a hydraulic system depends on the amount and type of cleaner used in the system.

Several elements such the flatness of the concrete floor, the length of the heavy duty steel pipes and hydraulic hoses, the temperature, the type and quantity of bedding, etc. can affect the pressure.

To perform the hydraulic reversing pressure adjustment, the cleaner(s) must operate under normal daily conditions. The adjustment must take place while the cleaner moves a significant volume of manure. If there is no manure, repeat the adjustment steps to set the reversing pressure under normal daily conditions.

Attention!
Always purge the air from the hydraulic lines and cylinders before proceeding with the adjustment of the reversing pressure.
Perform step 4: Purge the hydraulic lines and cylinders.

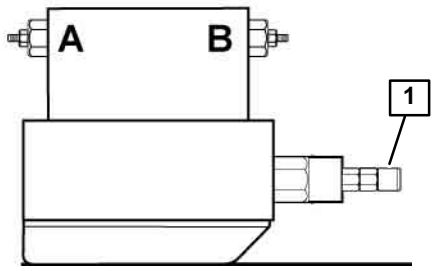
Attention!
If the reversing pressure is set too high, it creates detonation when the reversing action occurs. This is harmful to the hydraulic power unit, the hoses, the damper and all related hydraulic components.

Attention!
Inappropriate hydraulic design and/or defective components increase the pressure inside the hydraulic system. This causes early reversing motion which prevents the cylinder from completing its stroke even if the pressure relief valve and the reversing valve are set to an adequately low pressure. As a result, the oil temperature increases, the time required to clean increases, the hydraulic power unit cannot operate within the maximum run time, etc. Increasing the pressure of the relief and reversing valves will not solve this issue but only cause further defects. Find the origin of the problem and repair.

Note!
1 adjustment turn of the reversing or relief valve equals to approximately 500 PSI.

This table indicates the adjusted pressures of the reversing valve done at the factory. The pressure is determined according to the pump and motor combination for the purpose of facilitating the pressure adjustment.

Motor	Pump	Reversing valve adjusted pressure
3 hp [2237 watt]	PLP 20-9	1 400 psi [96.5 bar]
3 hp [2237 watt]	PLP 20-11.2	1 100 psi [75.8 bar]
3 hp [2237 watt]	PLP 20-14	850 psi [58.6 bar]
5 hp [3728 watt]	PLP 20-11.2	1 800 psi [124.1 bar]
5 hp [3728 watt]	PLP 20-14	1 500 psi [103.4 bar]
5 hp [3728 watt]	PLP 20-16	1 200 psi [82.7 bar]



For smooth operation, the reversing valve should be set approximately 300 psi (20.6 bar) higher than the pressure indicated on the pressure gauge. The relief valve should be adjusted to about 250 psi (17.2 bar) higher than the reversing pressure.

- Turn on the hydraulic power unit. Let the oil warm up.
- Activate the solenoid/ball valve that is connected to the hydraulic cleaner(s).
- Allow the cleaner to push or pull a full load of manure.
- Note the pressures indicated on the pump pressure gauge when the cylinder of the cleaner is halfway on its pushing and halfway on its pulling motion. Keep the highest reading. (Never take into account the reversing pressure)
- Turn off the hydraulic power unit when the cylinder starts a pushing or pulling motion.
- Unscrew the relief valve (1) from 1 to 3 turns.
- Turn on the hydraulic power unit. When the cylinder reaches the end of its pulling or pushing stroke, the oil returns directly in the reservoir, therefore the reversing action will not occur.
- Gradually screw or unscrew the relief valve (1) until the pressure gauge reaches the pressure noted previously + 300 psi (20.6 bar).

☞ **Note!**
The position of the spool inside the reversing valve is unknown. Thus, the oil can flow through line A or B of the valve depending on its position. When adjusting one of the set screws of the reversing valve, this one might not engage oil flow to the cylinder because of the position in which the spool lies. In such a case, the set screw must be repositioned in order to proceed with the adjustment of the other set screw.

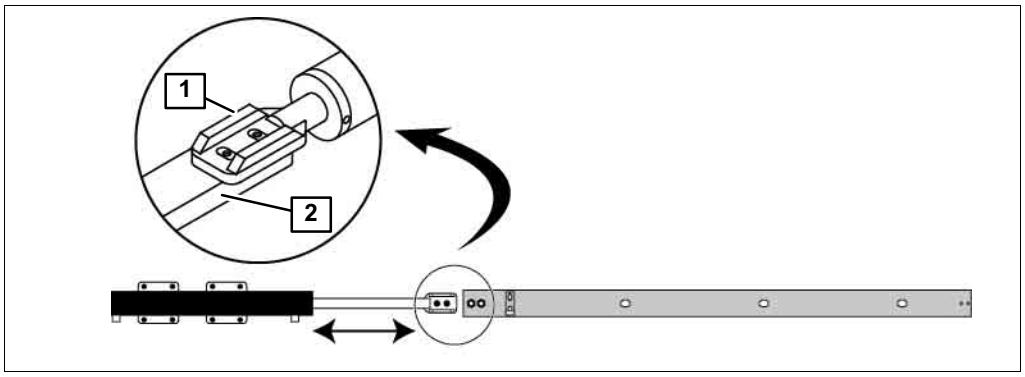
- Unscrew the reversing valve adjustment (A or B) until the reversing occurs. The cylinder will begin its pushing or pulling stroke. When the cylinder reaches the end of its stroke, the oil returns directly in the reservoir, therefore the reversing action will not occur.

- Unscrew the other reversing valve adjustment (A or B) until the reversing occurs in the other direction.
- Turn off the hydraulic power unit.
- Screw the relief valve (1) ½ turn which equals to about 250 psi (17.2 bar).
- Tighten each hexagonal nut to lock the adjustments of the reversing valve and the relief valve.

5.15.6 Step 6: Check the cylinder alignment

Perform the following steps to validate that the rail assembly and the cylinder are perfectly aligned. This ensures that there is no tension on the rubber seals inside the cylinder which prevents potential oil leaks and premature wear of the cylinder.

Attention!
Tighten all bolts including the anchor bolts after the FIRST cleaning cycle.



- Observe if there are imperfections on the concrete floor such as holes, bumps, cracks, etc. Correct the imperfections.
- Place the control panel selector knob to ”MAN” to engage the hydraulics.
- Manually engage the solenoid or ball valve to power the cylinder(s) that require(s) checking the alignment.
- Allow the cylinder to extend completely then stop the hydraulics.
- Unbolt the cylinder fixing plate (1) of the cylinder from the rail (2).
- Engage the hydraulics.
- Let the cylinder retract and extend.
- Stop the hydraulics when the fixing plate is aligned over the rail.
- The bolting holes of the fixing plate and the bolting holes of the rail must align perfectly. If they do not, realign the cylinder to the rail assembly. Refer to section Handling and installation - Free stall cleaner installation and/or Cross gutter cleaner installation for a gutter deeper than 10" (255 mm).
- When the cylinder is aligned properly, bolt the fixing plate and rail assembly.
- Repeat step 6 to test the alignment of each cylinder.

6 Starting for the first time

6.1 Special qualifications required for initial commissioning

Initial commissioning must be performed by trained personnel in accordance with the safety instructions.

Read the section Safety - Personnel qualifications.

6.2 Initial commissioning checklist

This checklist must be completed by the dealer and the customer to validate that the product is assembled and/or installed according to the manufacturer's instructions and is safe for use.

General	**DONE**	**N/A**
The owner received the instruction manual from the dealer and commits to read it.		
The owner is instructed by the dealer on how to operate and maintain the product.		
The hydraulic cleaning system is assembled and installed.		
The safety guards and safety labels are installed.		
The lubrication points are lubricated.		
All bolts are torqued.		
All types of connections are secured.		
A visual inspection is performed to ensure there are no leaks, signs of distortion or defective parts.		
The equipment/component provided by the owner, if any, complies with the specifications contained in section Technical data.		
Hydraulic power unit	**DONE**	**N/A**
The hydraulic power unit is installed in a cool constant temperature environment free of dust.		
The oil level is adequate.		
The oil filter is installed.		
The air breather cap is installed on the reservoir.		
The ball valves located under the reservoir are opened.		
The motor and pump are compatible and suitable for the cleaning applications.		
The motor and pump are perfectly aligned.		
The hydraulic power unit will not operate more than 720 minutes per day.		
The hydraulic circuit connected is purged from air.		
The relief valve and reversing valve are adjusted.		
The oil level float switch is installed and powered by the control panel.		
Heavy duty steel pipes and hydraulic hoses are accessible for inspection and repair.		
The length of each hydraulic hose is 5% longer than the length required for connection to ensure that the hose can flex adequately when under pressure.		
The length of each hydraulic hose does not exceed 10' [3.05 m].		
The automatic reversing valve is installed in such a way that the adjustment screws are placed horizontally. This allows the spool inside the valve to properly operate.		
All hydraulic connections are secured.		

Scraper	**DONE**	**N/A**
The rails are aligned with the cylinder.		
The cylinders are secured and anchored.		
The length of each alley does not exceed 200' [61 m].		
The length of the alley with two scrapers facing each other does not exceed 250' [76 m].		
The cumulative length of the scraper alleys connected in series does not exceed 600' [182 m].		
The scraper height is adjusted.		
The proximity switch allows detection.		
The reversing mechanism of the scraper allows contact with the reversing block.		
Gutter cleaner	**DONE**	**N/A**
The rails are aligned and leveled with the cylinder.		
The cylinders are secured and anchored.		
The cumulative length of the gutters connected in series does not exceed 200' [61 m].		
The length of each gutter connected in parallel does not exceed 165' [50 m].		
The paddles are secured on the rails and swivel freely.		
Control panel	**DONE**	**N/A**
All wires are connected.		
Each electric component is grounded.		
The panel is equipped with a safety locking device.		
The control panel is programmed.		
All connections are safe and tight.		

☞ **Note!**
The dealer and the owner must fill the warranty registration form when the checklist is completed.

Dealer's signature: _____

Owner's signature: _____

Date: _____

6.3 First start

Caution!
Do not start this product until the initial commissioning checklist is completed.

The first start steps intend to test the product in order to validate its functionality and efficiency before handing it over to the customer. Therefore, the authorized dealer along with the customer must operate the product as well as the operating elements.
Follow the steps in section Operating.

6.4 Checks after initial commissioning

The owner must make sure that:

- there are no damaged, worn, defective parts or signs of distortion;
- the safety devices such as guards, covers, etc. are in perfect working condition and remain in place to ensure safety;
- the lubricants such as grease, oil, etc. are at an appropriate level;
- there are no leaks;
- all bolts are tight. Refer to section Technical data - Bolt torque chart;
- the product works perfectly.

6.5 Handing over to the customer

Hand-over warranty registration form

The warranty registration form must be completed and signed by the customer and the authorized dealer. The warranty registration form must be returned to GEA Farm Technologies Canada Inc. / Division GEA Houle to validate the warranty.

7 Programming the standard control panel

In order to perform cleaning, start by setting the basic information required for the programmable clock to be in operation such as ”Time setting” and ”Winter/summer mode setting”.

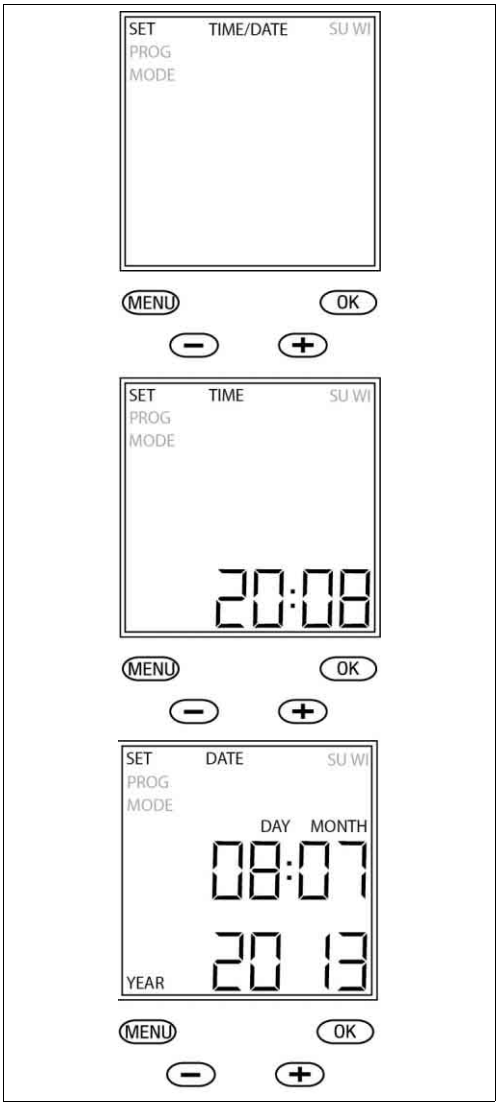
Next, program the adjustable clock and adjust the timers according to the type of cleaning mode.

Note!
Press the ”menu” key several times to display the main menu of the programmable clock.

7.1 Time setting

Note!
The time is set on a 24 hour period.

- Press the ”menu” key.
- Press ”ok” to select ”set”.
- Press ”ok” to select ”time/date”.
- Set the hours using the ”-/+” keys. Press ”ok” to validate.
- Enter the minutes using the ”-/+” keys. Press ”ok” to confirm.
- Set the date.
- Set the day, month and year by using the ”-/+” keys. Confirm by pressing ”ok” after each entry.

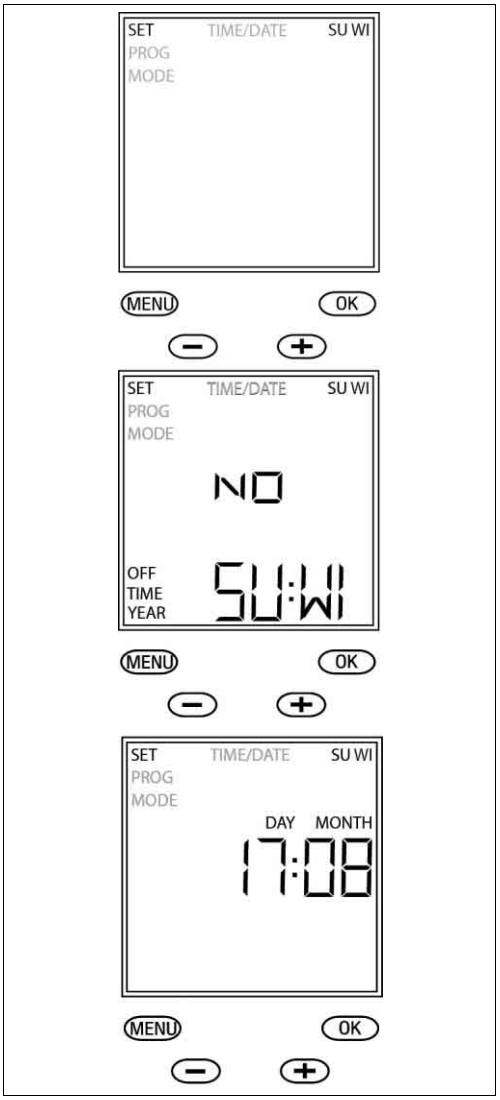


7.2 Summer or winter mode setting

Set the clock according to the time zone. This allows the clock to switch automatically back and forth from winter to summer time.

Choose ”us” for America time, ”eu” for Europe time or ”special” for all other time zone.

- Press the ”menu” key.
- Press ”ok” to select ”set”.
- Select ”su-wi” using the ”-/+” keys.
- Press ”ok”.
- Scroll the type of time change by using the ”-/+” keys.
- When choosing ”no su:wi”, the clock will not change time according to seasons.
- When choosing ”us” or ”eu”, press ”ok” to confirm. The clock will switch time according to that particular country.
- When choosing ”special”, enter both days, months and years when the change must occur.
- Press ”ok”.



7.3 Types of cleaning mode

A standard control panel is equipped with a programmable clock and two or more adjustable timers.

The control panel allows cleaning in three different ways depending on how each component is set.

Choose the type of cleaning among the following choices.

> ☞ **Note!**
> A cleaning cycle implies that the hydraulic cleaner completes its cleaning task. For a free stall cleaner, the scraper must leave the park position, clean the alley and return in park position.

7.3.1 Clean on specific hours

This cleaning mode allows the user to start cleaning at specific hours.

The start time acts as a start signal which activates the hydraulic cleaners. The hydraulic free stall cleaner(s) perform(s) a complete cleaning cycle and stop only when the scraper hits the trigger rod of the stop mechanism which activates the proximity switch.

In the case of a hydraulic cross gutter cleaner, the system stops only when time elapsed from the timer that monitors the operating time of the gutter cleaner. The user can enter up to 28 start/stop.

> ☞ **Note!**
> The stop time does not shut down the hydraulic cleaners when using this type of cleaning mode. Therefore the stop time must be set to one minute after its corresponding start time.

7.3.2 Clean on a time period with a pause time between each cleaning cycle

This cleaning mode allows the user to set a time period during which the hydraulic cleaners perform cleaning.

Usually, the period lasts a few hours. To clean the barn in a common way, a pause time is entered in order to keep the cleaners inactive after each cleaning cycle.

In other words, the pause time determines the number of cleaning cycles that will occur within the time period.

For example, one can program the clock to start daily at 8:00 and stop at 20:00. When the timer is set to 30 minutes, a pause time of 30 minutes occurs after each cleaning cycle during the entire period of time. After 20:00, the system remains inactive until next scheduled period.

7.3.3 Clean 24/7 with a pause time between each cleaning cycle

This cleaning mode allows the hydraulic cleaners to operate continuously.

However, the hydraulic power unit cannot operate more than 12 hours per day. Therefore a pause time between each cleaning cycle is required in order to reduce the operating time of the unit.

This cleaning mode is useful when temperature is near freezing point or when the user wishes to clean at regular intervals without managing the start and stop times.

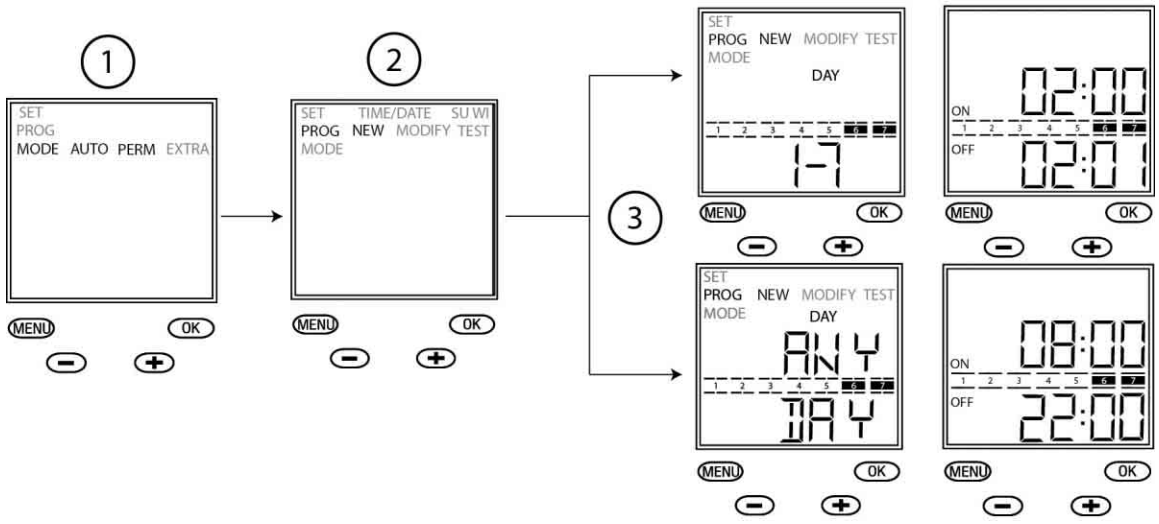
When temperature is near freezing point, the pause time can be shortened as much as possible so that the cleaners operate more often. On the other hand, the user can set the pause time to a longer period in order to clean normally.

☞ **Note!**
When keeping the cleaners in continuous operation, eventually the cleaners will undergo time shifting.

7.4 Programming the clock

After having chosen the type of cleaning mode, set the programmable clock according to the settings in the table. Next, adjust the adjustable timers in section Adjusting the timers.

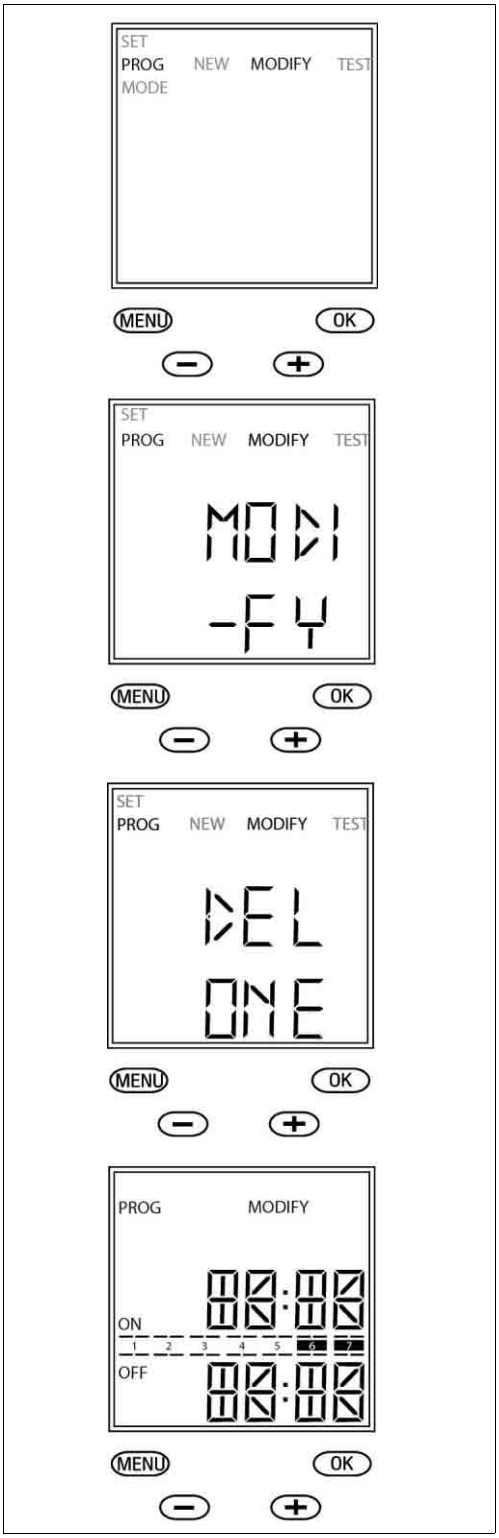
	Clean on specific hours	Clean during a time period with a pause time between each cleaning cycle	Clean 24/7 with a pause time between each cleaning cycle
1	• Press the ”menu” key. • Select ”mode” using the ”-/+” keys. Press ”ok” to confirm. • Select ”AUTO” mode using the ”-/+” keys. Press ”ok” to confirm.		• Press the ”menu” key. • Select ”mode” using the ”-/+” keys. Press ”ok” to confirm. • Select ”PERM” using the ”-/+” keys. Press ”ok” to confirm.
2	• Press the ”menu” key. • Use the ”-/+” keys to select ”prog”. Press ”ok” to confirm. • Press ”ok” to select ”new”. The number of programs available will display. • Press ”ok” to continue.		
3	• Select the ”1-7” mode using the ”-/+” keys. By selecting the 7 days mode, all programmed start/stop times will apply the same time everyday. • Press ”ok” to confirm. • Set the start time. • Press ”ok” to confirm. • Set the stop time. Remember that the stop time is set to one minute later than the start time. • Press ”ok” to confirm. • Enter up to 28 start/stop times.	• Select the ”any day” mode using the ”-/+” keys. Press ”ok” to confirm. • Set the start time. Press ”ok” to confirm. • Set the stop time. Press ”ok” to confirm. • The number (1) stands for Monday. Press ”ok” to display the cursor over Monday. Repeat to apply every day. Do the same to display the cursor under each day. With both cursors displayed, the time frame will apply to everyday. Press ”ok” to confirm. • Enter up to 28 start/stop times.	



Note!
When choosing program ”1-5” or ”6-7” mode, the stop/start times will occur during the week or the weekend.

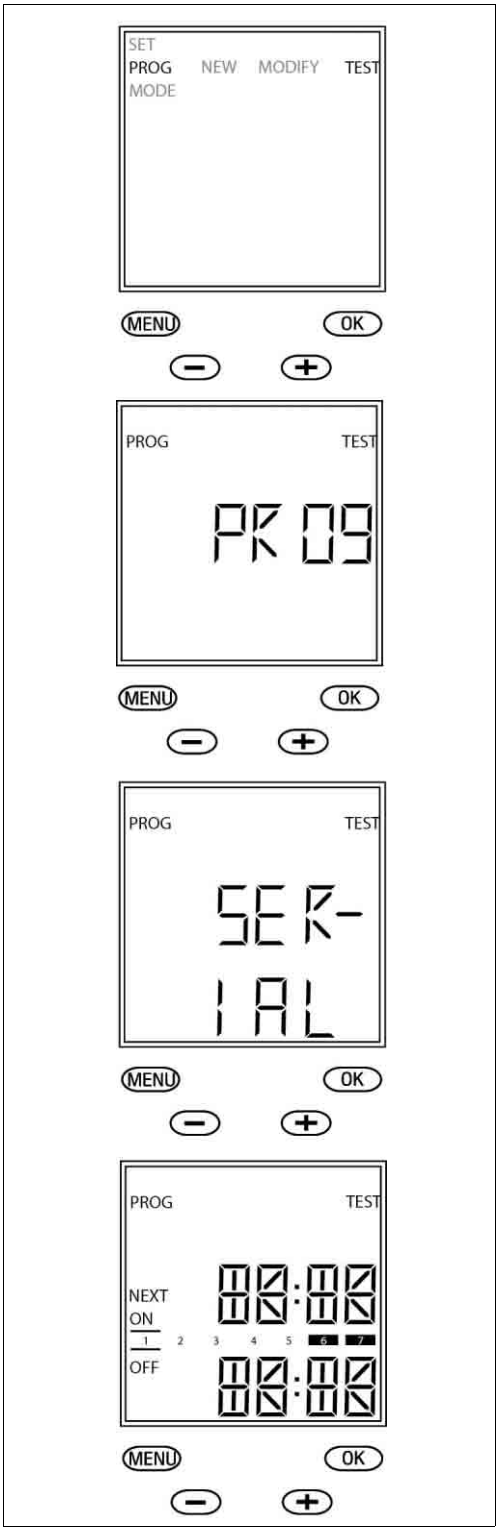
7.5 Modify or delete cleaning cycle

- Press ”menu”.
- Select ”prog” using the ”-/+” keys.
- Press ”ok”.
- Select ”modify” using the ”-/+” keys.
- Press ”ok”.
- Choose between ”modify, delete one or delete all” programs using the ”-/+” keys.
- Press ”ok”.
- Select the program that requires a change by using the ”-/+” keys.
- Press ”ok”.
- When modifying a program, start by changing the start/stop time. If the program was set on ”any day”, it requires to choose when the start/stop time must occur. Place the underscore sign above and under the corresponding day(s). Refer to section Programming the clock, for proper setting.
- Press ”ok” to confirm.



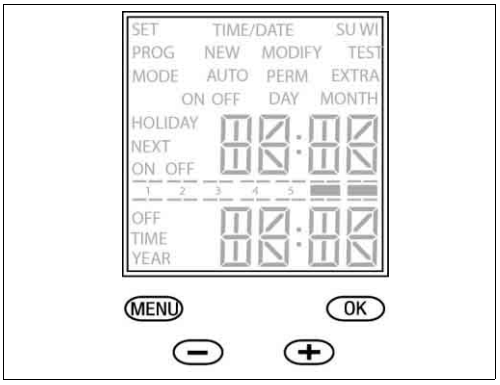
7.6 Review cleaning cycle

- Press ”menu”.
- Select ”prog” using the ”-/+” keys.
- Press ”ok”.
- Select ”test” using the ”-/+” keys.
- Press ”ok”.
- Press ”-/+” to display ”prog” or ”serial”. When choosing ”prog”, each program will display one after the other. When choosing ”serial”, each program will display in chronological order according to the day, starting from Monday to Sunday.
- Press ”ok”.
- Press ”ok” to scroll through the program(s). At the end of the list, ”end” will display.



7.7 Reset the programmable clock

- Press all four buttons to reset the programmable clock.
- ”Reset” will display. The screen will return to the main menu by itself.



7.8 Types of adjustable timer

In the standard control panel, the adjustable timers are identified by the letter ”KT”.

Each timer has a specific function, it depends on the type of hydraulic cleaner to which it is related.

Read the following to understand the purpose of each timer.

Refer to the wiring diagram supplied with the control panel in order to identify the function of each timer included in the panel.

7.8.1 Off time (pause time)

The off time purpose is to set a pause time between each cleaning cycle.

The hydraulic cleaners remain inactive until time elapsed from the timer.

In some cases, a pause time is not required.

7.8.2 Minimum runtime

The minimum runtime purpose is to bypass a detection signal coming from a switch, sensor, etc.

When using free stall cleaner(s), this timer prevents the proximity switch from stopping the cleaner(s) during the first minutes of operation.

In some cases, when a scraper reaches the trigger rod at the end of a cleaning cycle, the spring of the trigger rod remains loaded. Then, the rod pushes the scraper away from its parking position. So, on the next cleaning cycle, the scraper will hit the trigger rod and cause shutdown.

The minimum time must be set to 1 minute to avoid shutdown.

7.8.3 Runtime

The runtime purpose is to set the operating time of a cross gutter cleaner and/or an underground pump.

The equipment operates until time elapsed from the timer.

7.8.4 Maximum runtime

The maximum runtime purpose is to protect the hydraulic system from operating continuously in case of a faulty operation.

In the event that a scraper does not stop or complete a cleaning cycle, the maximum runtime will stop the hydraulic power unit.

The time set must include the time required to clean and a buffering period.

7.9 Adjusting the timers

Set the timers according to the type of cleaning mode programmed in the programmable clock. Follow the settings indicated in the corresponding table below.

For more information on the types of cleaning mode, refer to the section Types of cleaning mode.

7.9.1 Clean on specific hours

Timers	Related equipment	Setting
Off time (pause time)	Free stall cleaner(s)	Set the timer to: 0, because the cleaners operate according to the start times.
Minimum runtime		Set the timer to: 1 minute, so that the proximity switch does not stop the scraper(s) at the beginning of each cleaning cycle.
Maximum runtime		Set the timer to: Time required to clean the alley(s) + ½ the time to clean the alley.
Runtime	Cross gutter cleaner	Set the timer to: The time required for the cross gutter cleaner to empty the gutter.
	Underground pump	Set the timer to: The time required for the underground pump to empty its hopper.

7.9.2 Clean during a time frame with a pause time between each cleaning cycle.

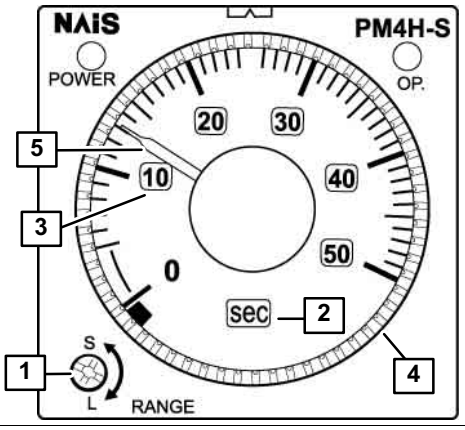
Timers	Related equipment	Setting
Off time (pause time)	Free stall cleaner(s)	Set the timer to: The pause time required between each cleaning cycle.
Minimum runtime		Set the timer to: 1 minute, so that the proximity switch does not stop the scraper(s) at the beginning of each cleaning cycle.
Maximum runtime		Set the timer to: Time required to clean the alley(s) + ½ the time to clean the alley.
Runtime	Cross gutter cleaner	Set the timer to the time required for the cross gutter cleaner to empty the gutter.
	Underground pump	The time required for the underground pump to empty its hopper.

7.9.3 Clean 24/7 with a pause time between each cleaning cycle

Timers	Related equipment	Setting
Off time (pause time)	Free stall cleaner(s)	Set the timer to: The pause time required between each cleaning cycle.
Minimum runtime		Set the timer to: 1 minute, so that the proximity switch does not stop the scraper(s) at the beginning of each cleaning cycle.
Maximum runtime		Set the timer to: Time required to clean the alley(s) + ½ the time to clean the alley.
Runtime	Cross gutter cleaner	Set the timer to: The time required for the cross gutter cleaner to empty the gutter.
	Underground pump	Set the timer to: The time required for the underground pump to empty its hopper.

7.9.4 Setting the timer

- Turn the time range selector (1) to set the period in seconds, minutes or hours as displayed in the window (2).
- Once the time range is set, keep turning the selector to display the appropriate time range (3).
- Turn the knob (4) until the arrow (5) indicates the desired time.



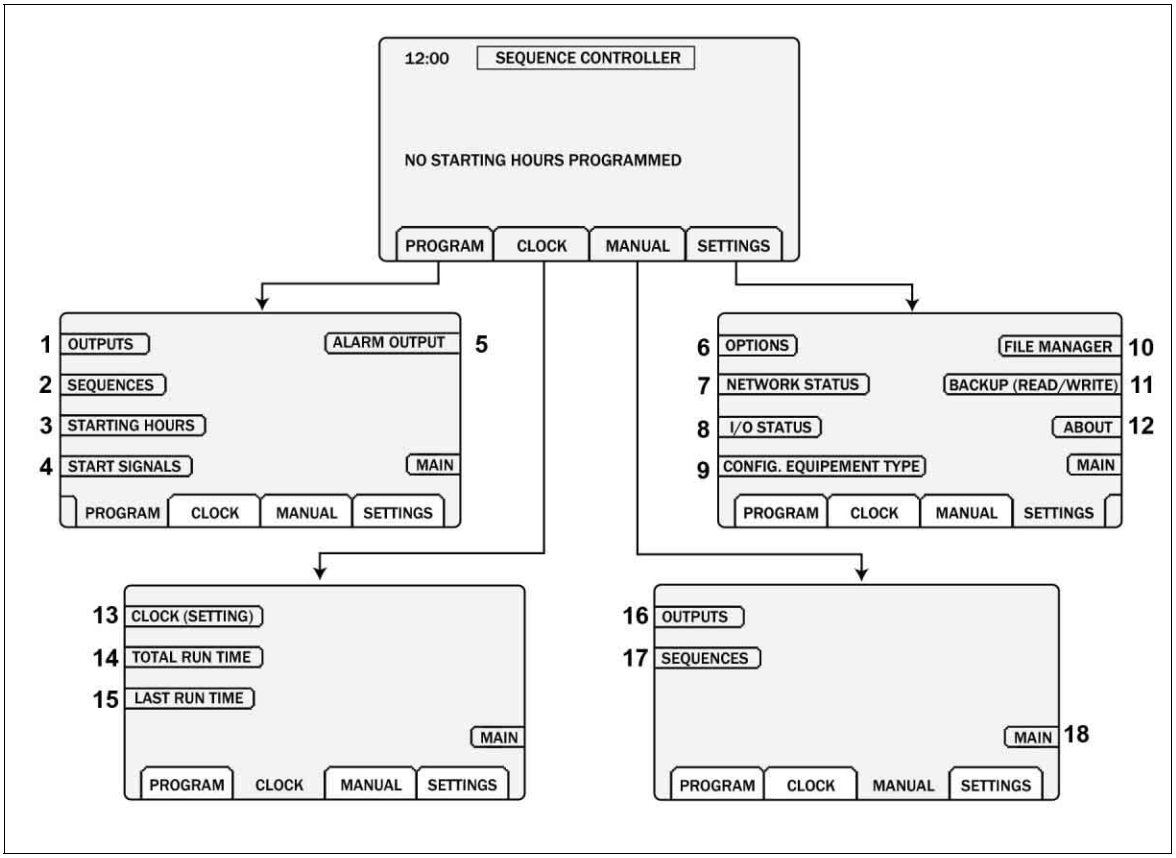
Note!
The operation signal indicator ”OP.” blinks when timer is counting. The indicator remains lit when time elapsed.

8 Programming the sequencer control panel

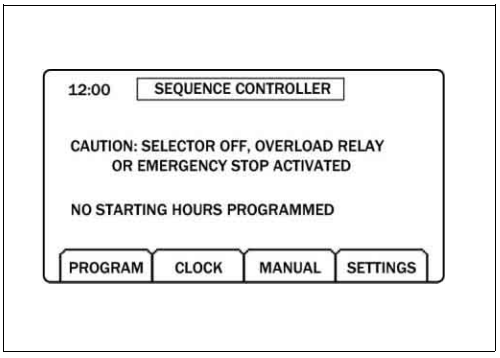
The following sections give information on the different functions of the sequencer control panel. Follow the programming steps.

8.1 Menus

Find the main menu and the different sub-menus in the illustration. The purpose of each menu is explained in the following table.



The main menu displays the time and the next starting hours that are scheduled in the present day. When the system encounters a fault, an alarm message appears in the main menu in order to advise the user. There are different causes that generate an alarm. In such a case, find the cause and repair.



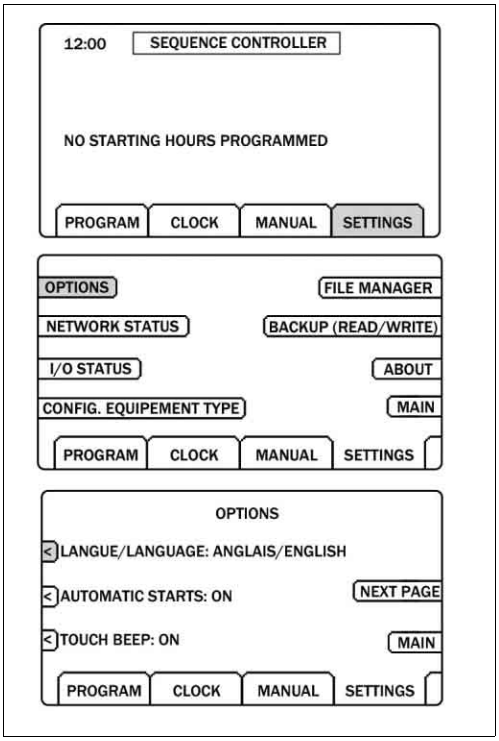
Note!
When a fault occurs, the entire system shuts down. To continue operation in the event of a fault, refer to section Choose the type of alarm, to learn about this option.

Menu		Purpose
1	Outputs	Assign each of the outputs of the sequencer to the type of equipment that is physically connected to the output inside the control panel.
2	Sequences	Program a cleaning sequence by listing the outputs that must operate in a specific order.
3	Starting hours	Set the time when a sequence must start automatically.
4	Start signals	Assign which input of the control panel must receive a start signal coming from a device such as a start button and assign a sequence that will be performed when the signal is received.
5	Alarm output	Assign a specific output to a warning device (horn, light, etc) to signal when the system encounters a fault.
6	Options	Set different options such as the language, the brightness of the screen, the security code, etc.
7	Network status	Read the current status of each module included inside the control panel.
8	I/O status	Read the current status of each input/output of the control panel.
9	Config. equipment type	Configure the equipment, create and/or change parameters.
10	File manager	Update the software, read and delete saved files.
11	Backup (read/write)	Save and recover settings. Delete present configuration.
12	About	Learn about the software version.
13	Clock setting	Set the time.
14	Total run time	Learn about the total operating time of each output.
15	Last run time	Know when was the last time the system operated.
16	Outputs	Manually start or stop an output.
17	Sequences	Manually start or stop a sequence.
18	Main	Return to the main menu.

Note!
When accessing the different menus, the sequencer returns to the main screen after 30 seconds of inactivity.

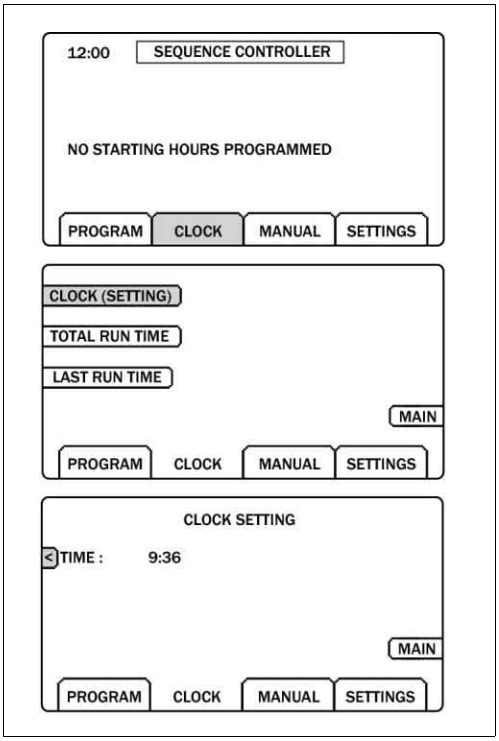
8.2 Step 1: Language setting

- Press ”settings”.
- Press ”options”.
- Press on ”langue/language” to switch languages.



8.3 Step 2: Time setting

- Press ”clock”.
- Press ”clock (setting)”.
- Press ”time”.
- Enter the time using the keypad. The time range is of 24 hours.



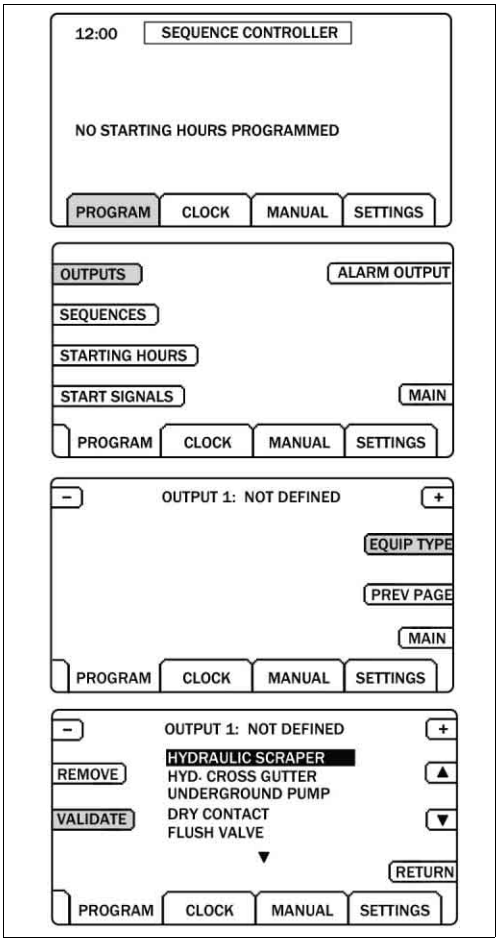
8.4 Step 3: Assign an equipment to an output

The sequencer control panel is wired according to the type of equipment used in the system. Each input/output is assigned to an equipment as required when ordering.

The following steps are intended to ensure that each input/output is assigned to the right equipment. Use the wiring diagram supplied with the control panel. When required, modify the assignment.

> **Note!**
> When using an additional hydraulic power unit, assign the ”auxiliary pump” to its corresponding output.

- Press ”program”.
- Select the ”outputs”.
- Use the ”+/-” keys to scroll through each output. Check that the outputs are assigned to the right equipment.
- To change the type of equipment, press ”remove”. The output will be ”undefined”.
- Press ”equip. type”.
- Use the arrow keys to scroll through the different equipments.
- When the corresponding equipment is highlighted, press ”validate” to assign it to the output.
- Press ”return”.



> **Note!**
> When changing the assignment of an output, the default parameters of the new equipment will be applied. The user must set the times.

8.5 Step 4: Set the times

The purpose of this step is to set the minimum time, the runtime and/or the maximum time. Choose the type of hydraulic equipment and set the times.

8.5.1 Hydraulic scraper

The minimum time

The minimum time purpose is to bypass a detection signal coming from the proximity switch of a hydraulic scraper.

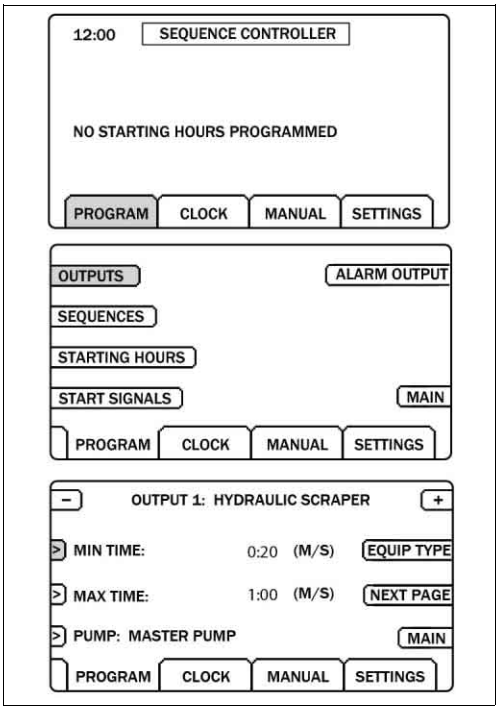
When using free stall cleaner(s), this timer prevents the proximity switch from stopping the cleaner(s) during the first seconds of operation.

In some cases, when a scraper reaches the trigger rod at the end of a cleaning cycle, the spring of the trigger rod remains loaded. Then, the rod pushes the scraper away from its parking position. So, on the next cleaning cycle, the scraper will hit the trigger rod and cause shutdown.

The minimum time is preset to 0:20 seconds which gives sufficient time for the scraper to leave its parking position and avoid shutdown.

Attention!
The user cannot stop a scraper by pressing the trigger rod while the minimum time is on. Press the emergency button, if necessary.

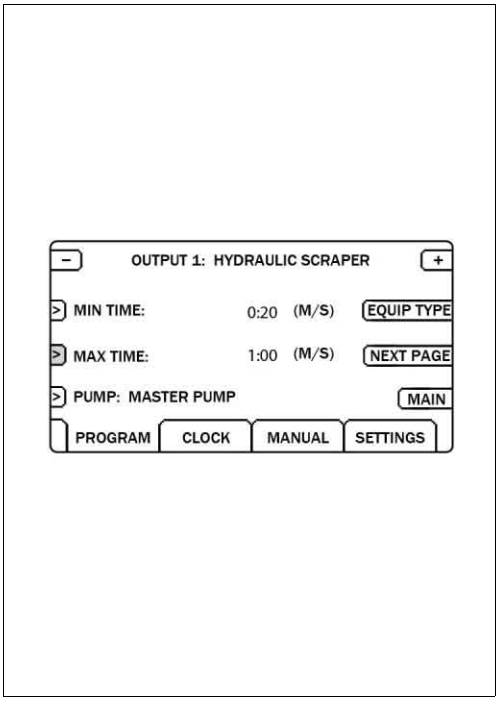
- Press ”program”.
- Press ”outputs”.
- Choose the hydraulic scraper. Use the ”-/+” keys to scroll.
- Press ”min time”.
- Change the time, if required, using the keypad.
- Press ”enter” to confirm.



The maximum time

The ”maximum time” limits the operating time of the equipment in case of a faulty operation in order to avoid continuous operation of the hydraulics.

- Press ”program”.
- Press ”outputs”.
- Choose the hydraulic scraper. Use the ”-/+” keys to scroll.
- Press ”max time”.
- The maximum time is determined by the time required to clean the alley. For scrapers connected in series, use the longest time required to clean.
  For example, it takes 30 minutes to clean the alley, set the maximum time to
  [30 minutes + 30 minutes/2] = 45 minutes.
- Change the time using the keypad.
- Press ”enter” to confirm.



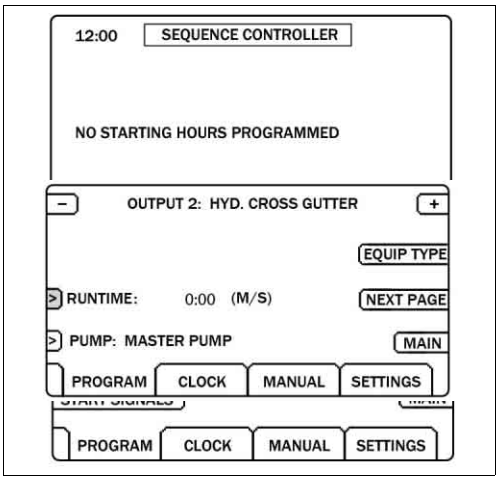
Note!
The ”maximum time” allows the user to choose between two types of alarm: ”output alarm” or ”sequence alarm”.
For more information on the purpose and how to set these alarms, refer to section Choose the type of alarm.

8.5.2 Hydraulic cross gutter

The runtime

The ”runtime” determines the time during which the equipment operates to complete its function.

- Press ”program”.
- Press ”outputs”.
- Choose the hydraulic cross gutter. Use the ”-/+” keys to scroll.
- Press ”runtime”.
- Set the runtime according to the time required for the hydraulic cross gutter to empty the gutter.
- Change the time using the keypad.
- Press ”enter” to confirm.

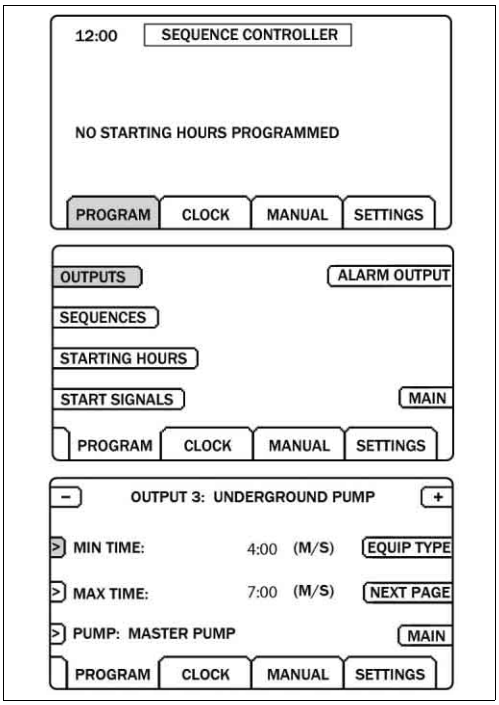


8.5.3 Underground pump

The minimum time

For an underground pump, the minimum time is the time required for the pump to complete its function.

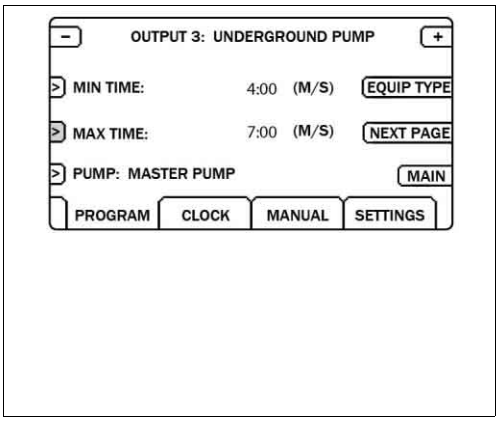
- Press ”program”.
- Press ”outputs”.
- Choose the underground pump. Use the ”-/+” keys to scroll.
- Press ”min time”.
- Set the time according to the time required for the underground pump to empty its reservoir.
- Change the time using the keypad.
- Press ”enter” to confirm.



The maximum time

The ”maximum time” limits the operating time of the equipment in case of a faulty operation of the proximity switch in order to avoid continuous operation of the hydraulics. Commonly, the maximum time is determined by adding 2 minutes to the minimum time.

- Press ”program”.
- Press ”outputs”.
- Choose the underground pump. Use the ”-/+” keys to scroll.
- Press ”max time”.
- Set the maximum time to: minimum time + 2 minutes.
- Change the time using the keypad.
- Press ”enter” to confirm.



Note!
The ”maximum time” allows the user to choose between two types of alarm: ”output alarm” or ”sequence alarm”. For more information on the purpose and how to set these alarms, refer to section Choose the type of alarm.

Note!
It is highly recommended to equip an underground pump with a proximity switch for proper operation of the pump. In the event that the underground pump is not equipped with a proximity switch, the user must change the maximum time for a runtime. Refer to section Equipment setting - Choose between the runtime and maximum time mode.

Note!
When using the runtime mode, set the time according to the time required for the underground pump to empty its reservoir.

8.6 Step 5: Choose a pump

Hydraulic cleaners and underground pumps must be fed by a hydraulic pump. Therefore they must be assigned to the right pump.

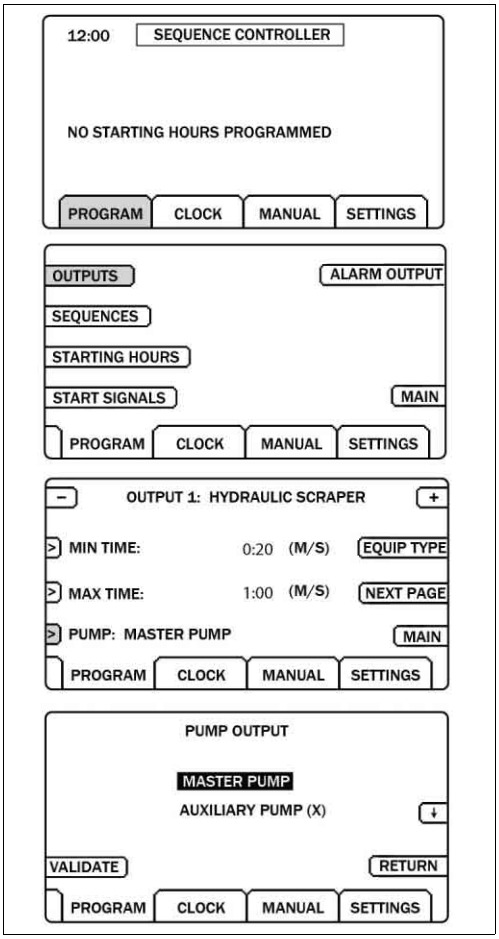
In a common design, each hydraulic equipment is connected to the ”master pump”. The master pump is installed on the main hydraulic power unit and is connected to the main supply of the sequence control panel.

In other designs, using an additional hydraulic power unit can be required. In that event, an ”auxiliary pump” must be assigned to the equipment that operates with this pump.

Note!
When using an auxiliary pump, always assign the pump to the output to which it is connected. Refer to Step 3: Assign an equipment to an output.

Note!
When the ”auxiliary pump” displays in the ”pump output” menu, the (X) indicates the output to which the pump is assigned to.

- Press ”program”.
- Press ”outputs”.
- Choose the output. Use the ”-/+” keys to scroll.
- Press ”pump”.
- Choose the pump. Use the arrow to scroll.
- Press ”validate” to confirm.



8.7 Step 6: Sequence programming

After having assigned each equipment, set the times and assigned the right pump, program the cleaning sequence(s). A sequence is a series of outputs that operate in a chronological order.

The outputs can operate one after the other and/or operate simultaneously.

For outputs to operate one after the other, the sequence must contain the ”-” sign between each output up to a maximum of 10 outputs.

For outputs to operate simultaneously, the sequence must contain the ”&” sign between the outputs:

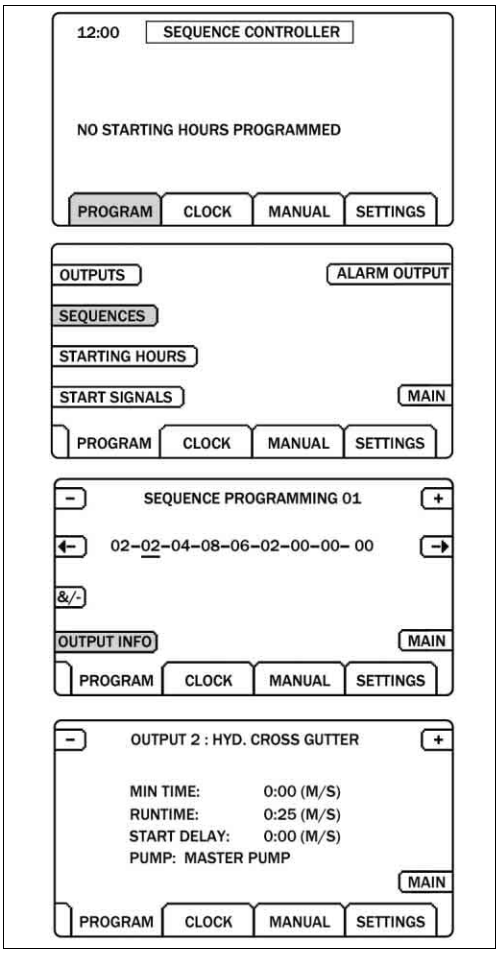
- When outputs trigger a dry contact used for an agitator, a chain gutter or flush valves, the sequence can contain up to 10 outputs.
- When outputs are used to power solenoid valves connected to hydraulic cleaners, the sequence must comply with the following limitations. Only 2 solenoid valves can operate simultaneously. Each solenoid valve must be connected to its own hydraulic power unit, therefore have its own hydraulic circuit. In that event, the hydraulic configuration must have been designed for that application. For more information on simultaneous operation of hydraulic cleaners, please contact your dealer.

Attention!
Never power more than 2 solenoid valves simultaneously to avoid damaging the power supply.

Note!
There are 10 programmable sequences and each sequence can contain 10 outputs.

Note!
A sequence can contain the same output(s) several times.

- Press ”program”.
- Press ”sequences”.
- Choose a sequence. Press the ”-/+” keys to scroll from a sequence to another.
- Enter the output numbers in chronological order. Use the keypad to enter the output numbers. Press ”output info” to view the settings of the output, as illustrated in the last image.
- Press the arrow keys to move the underscore sign from an output to another if it requires to change the output number.
- Press ”&/-” so that the appropriate sign displays between each output. In the example illustrated in the third image, the first output to operate is output 02. Once the output stops, it will start operating again. Then output 04 will operate, and so on in chronological order.



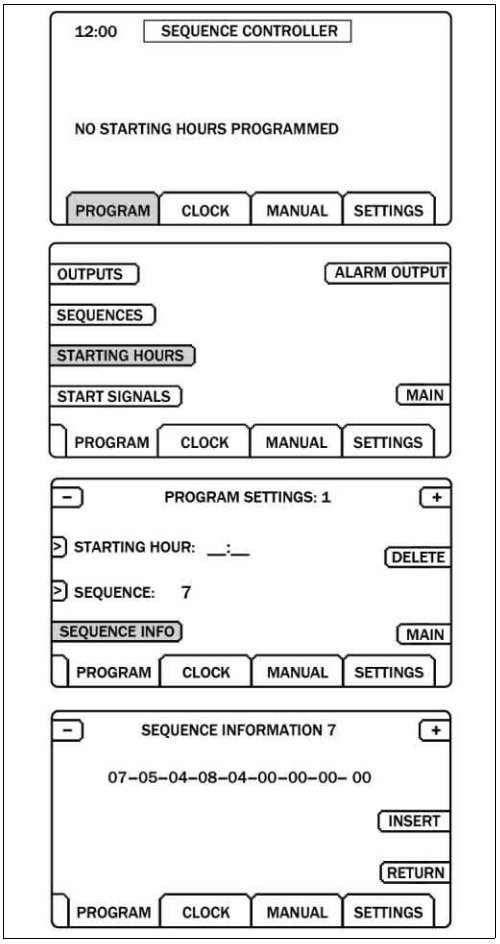
Note!
00, pumps and undefined outputs are ignored in a sequence. For example: 1&2&0-0&3, output 1 and 2 will run simultaneously and then only output 3 will run.

8.8 Step 7: Automatic starting hours programming

The automatic starting hour allows to start a sequence at a specific time.

Note!
The sequencer control panel clock is set on a 24-hour period from 0:00 to 23:59.

- Press ”program”.
- Press ”starting hours”.
- Choose the ”program settings”. Use the ”-/+” keys to scroll.
- Press ”starting hour”.
- Enter the time using the keypad.
- Press ”sequence”.
- Enter the sequence number using the ”-/+” keys.
- Press ”sequence info” to view the sequence. To choose that sequence, press ”insert” to confirm.
- Press ”return” to return to the previous menu.



Note!
The starting hours that will occur in the current day displays in the main menu.

Note!
There are 10 programmable sequences and each sequence can contain 10 outputs.

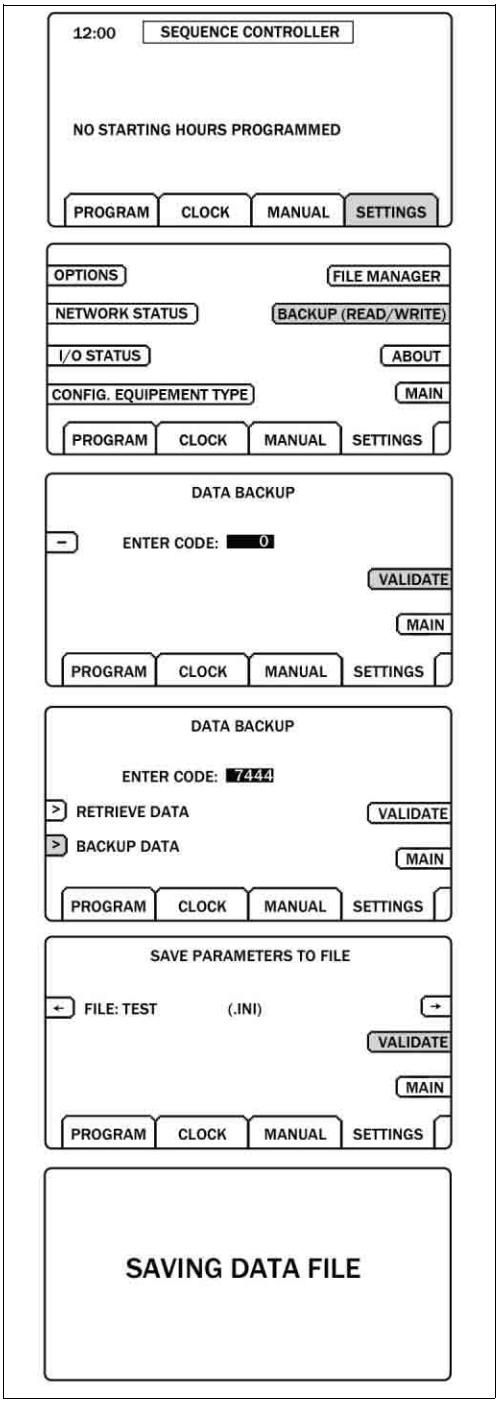
8.9 Step 8: Save the settings

After having programmed the sequencer, the user can perform a backup of the settings. The settings can be retrieved in case of a lost file, corrupted data or deleted settings.

Attention!
Do not operate the system when performing the following steps.

- Press ”settings”.
- Press ”backup (read/write)”.
- Enter the default code ”7444” using the keypad.
- Press ”validate”.
- Press ”backup data” to save the actual settings programmed.
- Enter a file name. A maximum of 32 files can be saved. When using the same file name, the previous file will be replaced with the new file.
  The sequencer adds automatically the file extension (.ini).
- Press ”validate” to confirm.

  Note: To change the security code, see section Modify the different options.



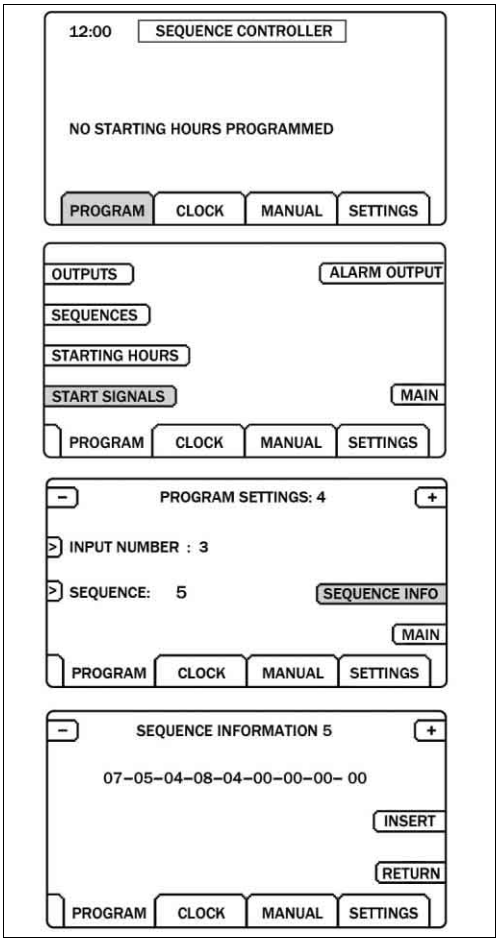
8.10 Start signal programming

A start signal is an electric signal coming from an external device connected to an input of the sequencer. When the device sends an electric signal, the panel engages the sequence assigned to that particular input.
Out of the 30 possible I/O, 8 inputs can be used as start signal. When using an input, its corresponding output cannot run another equipment. The sequencer must be wired accordingly for this type of application.

Note!
A start signal can be assigned to one of the 10 possible sequences.

Note!
Commonly, a start signal is generated by a start button.

- Press ”program”.
- Press ”start signals”.
- Choose the ”program settings”. Use the ”-/+” keys to scroll.
- Press ”input number”.
- Enter the input number that corresponds to the device (start button) that is connected to the control panel.
- Press ”sequence”.
- Enter the sequence number that must run when the device (start button) is activated. View the sequence by pressing the ”sequence info”. Navigate through the sequences using the ”-/+”. To select a sequence, press ”insert”.



8.11 Set the start delay

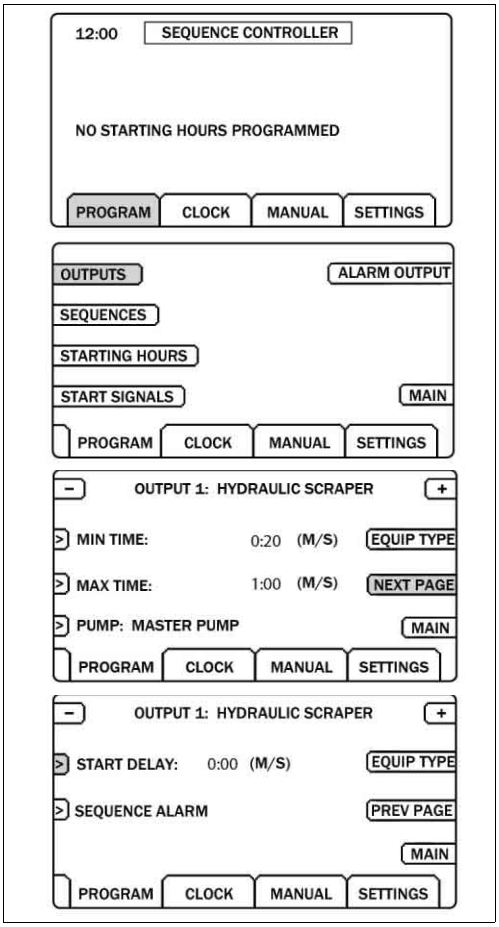
The purpose of a ”start delay” is to delay the activation of an output.

This option is useful when starting multiple equipment simultaneously if it requires to delay the operation of a particular equipment.

The start delay only occurs when the output is started through a sequence, it does not occur when manually starting the output.

> **Note!**
> The ”start delay” does not affect the ”minimum time” and ”maximum time/runtime”.

- Press ”program”.
- Press ”outputs”.
- Choose the equipment. Use the ”-/+” keys to scroll.
- Press ”next page”.
- Press ”start delay”.
- Enter the time using the keypad.
- Press ”enter” to confirm.



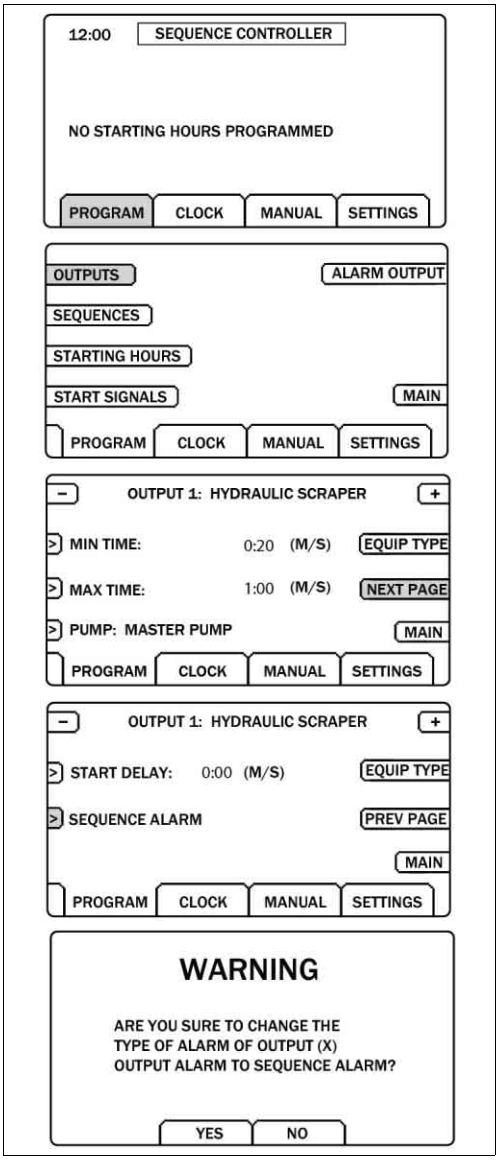
8.12 Choose the type of alarm

The ”maximum time” limits the operating time of an equipment in case of a faulty operation.

When a fault occurs, the sequencer can either stop the sequence that is operating or stop the faulty equipment only. To stop the sequence, the user must set the alarm to ”sequence alarm”. To stop only the faulty equipment, the user must set the alarm to ”output alarm”.

To choose the type of alarm, the equipment must be set to ”maximum time”, as described in section Equipment setting - Choose between the runtime or maximum time mode.

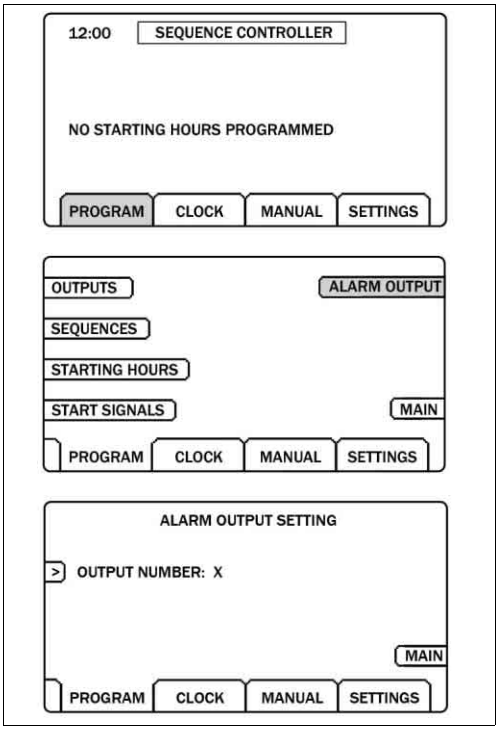
- Press ”program”.
- Press ”outputs”.
- Choose the equipment. Use the ”-/+” keys to scroll.
- Press ”next page”.
- Press ”sequence alarm” or ”output alarm” to toggle from one alarm mode to another.
- A warning message displays to advise the user of the alarm change. Press ”yes” to confirm.



8.13 Set an alarm output

The ”alarm output” purpose is to connect a signaling light which indicates to the user that a fault has occurred.

- Press ”program”.
- Press ”alarm output”.
- Press ”output number”.
- Use the keypad to enter the output to which the device is connected to.
- Press ”enter” to confirm.

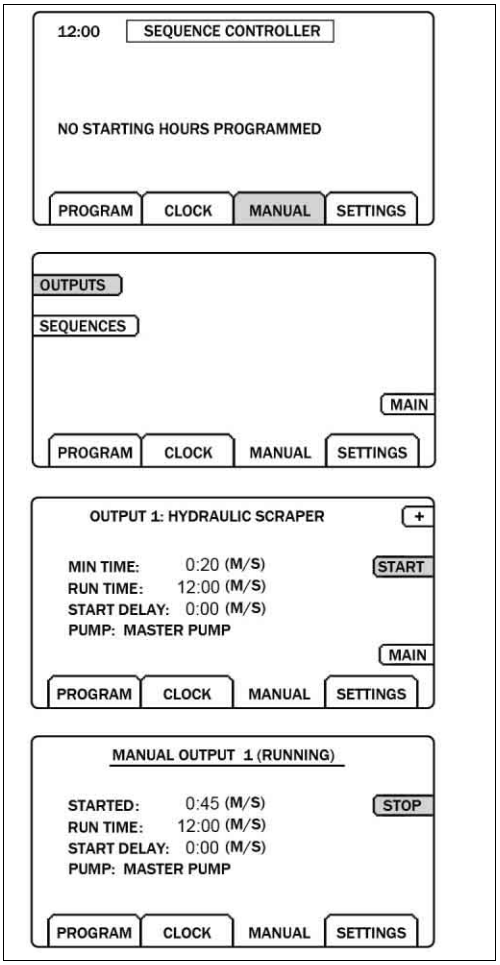


8.14 Manually start or stop an output

Manually start or stop an equipment for troubleshooting, testing purposes.

> **Note!**
> The ”start delay” function does not operate when the output is manually started. The system engages immediately when pressing ”start” and stops when pressing ”stop”.

- Press ”manual”.
- Press ”outputs”.
- Choose the equipment. Use the ”-/+” keys to scroll.
- Press ”start” or ”stop”.

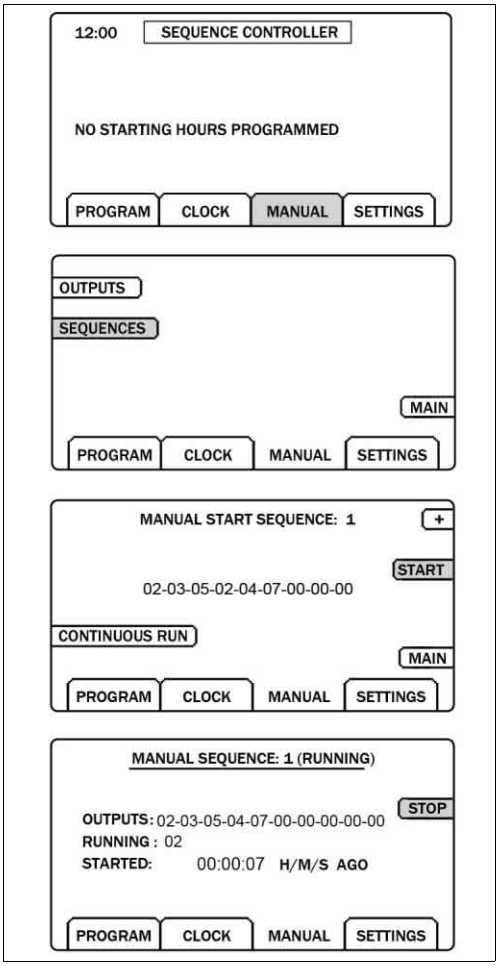


8.15 Manually start or stop a sequence

Manually start or stop a sequence for troubleshooting, testing purposes.

Note!
The ”start delay” function does not operate when a sequence is manually started.

- Press ”manual”.
- Press ”sequences”.
- Choose the sequence. Use the ”-/+” keys to scroll.
- Press ”start” to perform the sequence once. When pressing ” continuous run” the sequence will operate continuously. To stop the sequence, press ”stop” or ”last sequence”.

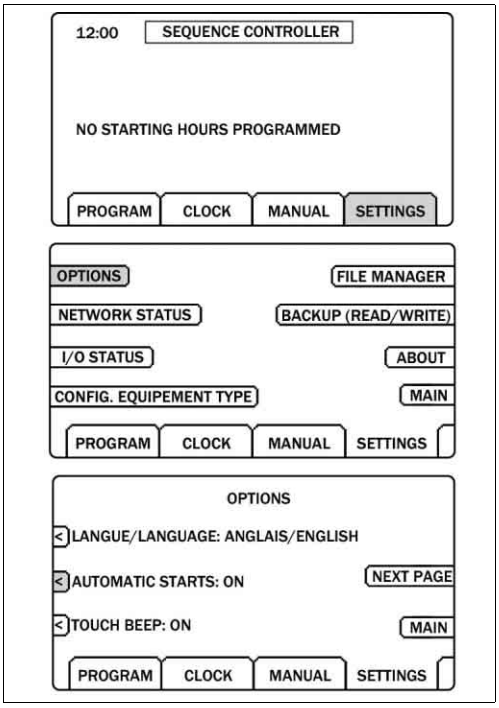


Note!
When pressing ”stop”, the system will shut down immediately.

Note!
When pressing ”last sequence”, the system will shut down only when the last equipment in the sequence has completed its cleaning cycle.

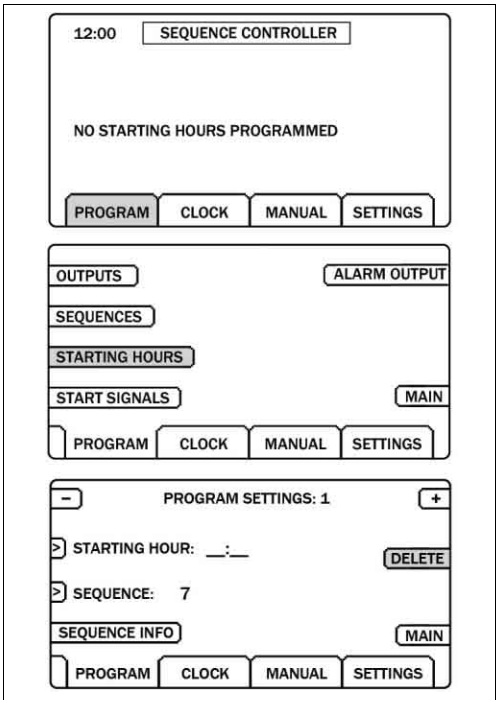
8.16 Shut off the automatic starting hours

- Press ”settings”.
- Press ”options”.
- Press ”automatic starts” to toggle from ”off” to ”on”.



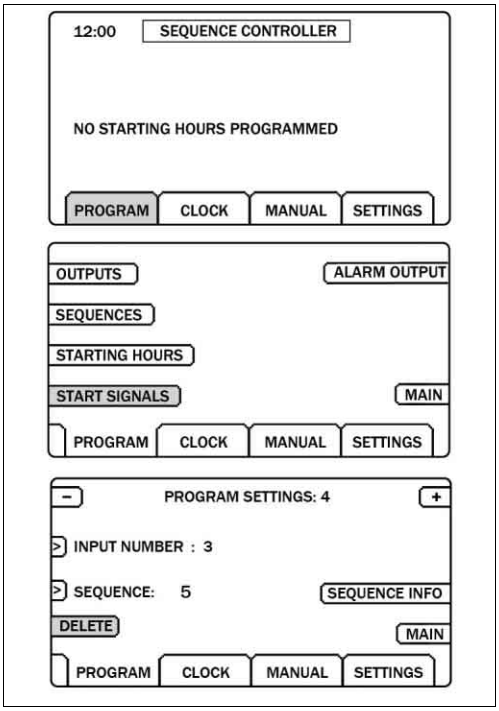
8.17 Delete an automatic starting hour

- Press ”program”.
- Press ”start hours”.
- Choose the ”program settings”. Use the ”-/+” keys to scroll.
- Press ”delete”.



8.18 Delete a start signal

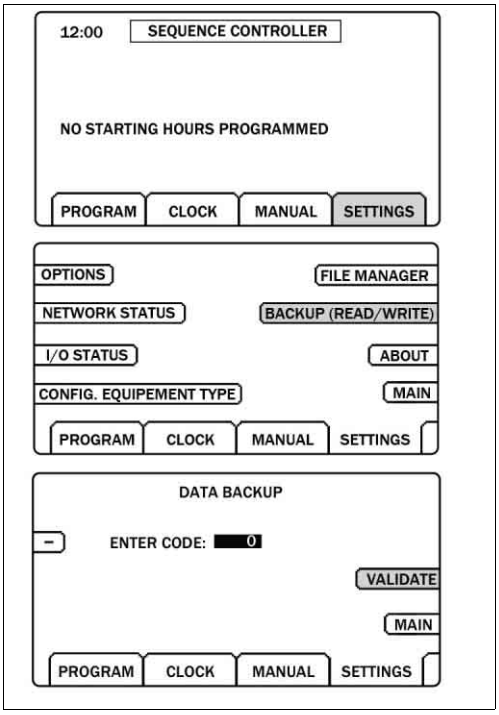
- Press ”program”.
- Press ” start signals”.
- Choose the ”program setting”. Use the ”-/+” keys to scroll.
- Press ”delete” to erase the input number. Once the input number is erased, the delete tab will disappear. The sequence number will remain assigned to the program setting.



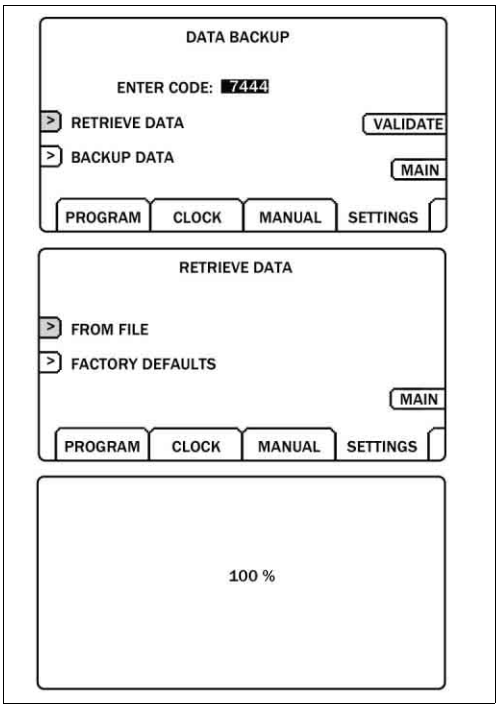
8.19 Retrieve a saved program

Attention!
Do not operate the system when performing the following steps.

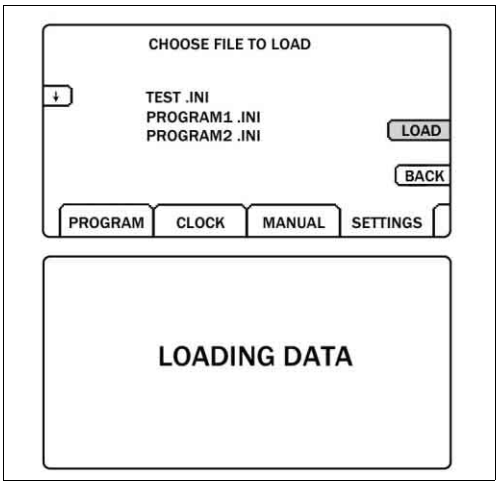
- Press ”settings”.
- Press ”backup (read/write)”.
- Press ”validate”.
- Enter the code. The default code is ”7444”.



- Press ”retrieve data”.
- Press ”from file” to scroll through the different saved files or press ”factory defaults” to load the default setting created by the factory.
- When choosing the ”factory default” settings, the sequencer will load the settings.



- When choosing ”from file” the different files will appear.
- Use the arrow keys to scroll.
- Press ”load” to apply the settings.



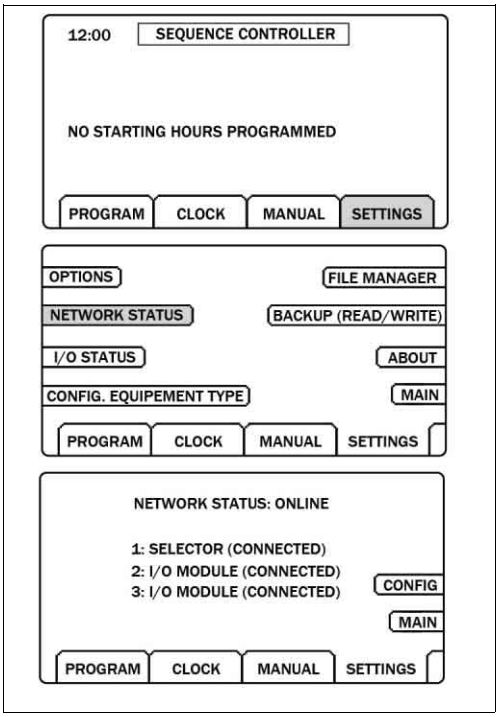
Note!
If the data has not loaded successfully, a message will display. Repeat steps.

8.20 Network status

The network status indicates if each module is properly connected to the sequencer and functional.

Note!
If a network fault occurs, each operating output connected to the faulty modules will shut off.

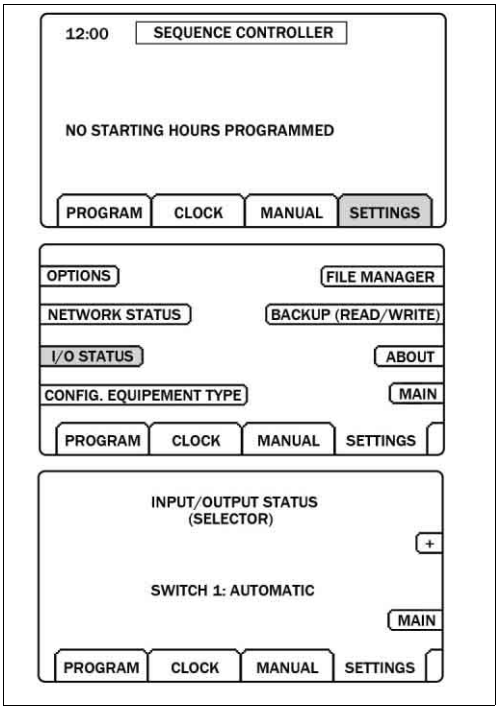
- Press ”settings”.
- Press ”network status”. Each component of the network will display.



8.21 I/O status

All inputs and outputs are linked to the sequencer by a network. The I/O status indicates the status of each input and output.

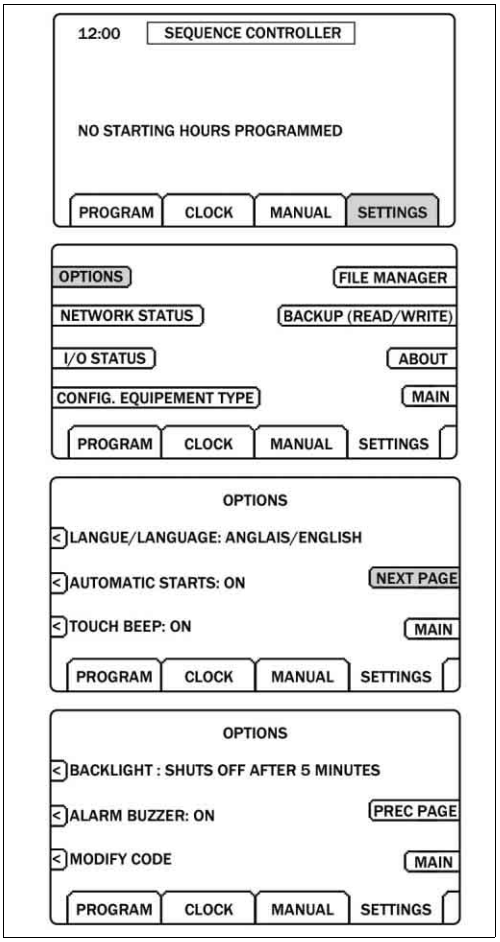
- Press ”settings”.
- Press ”I/O status”.
- Press ”-/+” to scroll through the different I/O.



8.22 Modify the different options

In the menu ”settings”, there are preferences that can be changed in the tab ”options” such as shutting down the touch beep sound, keeping the screen lit or shutting down the alarm buzzer.

- Press ”settings”.
- Press ”options”.
- Toggle from one page to the other by pressing ” next page” or ”prec page”.
- Press the push button next to the option to modify the setting.



8.23 Equipment setting

The sequencer control panel contains a list of typical equipments that are used with this control panel. Each equipment has default parameters. Among those parameters, some can be modified when accessing the ”settings” menu such as the name of the equipment, the max/run time mode and the pump setting.

Learn about the different equipments and change their parameters, if necessary.

8.23.1 Default parameters

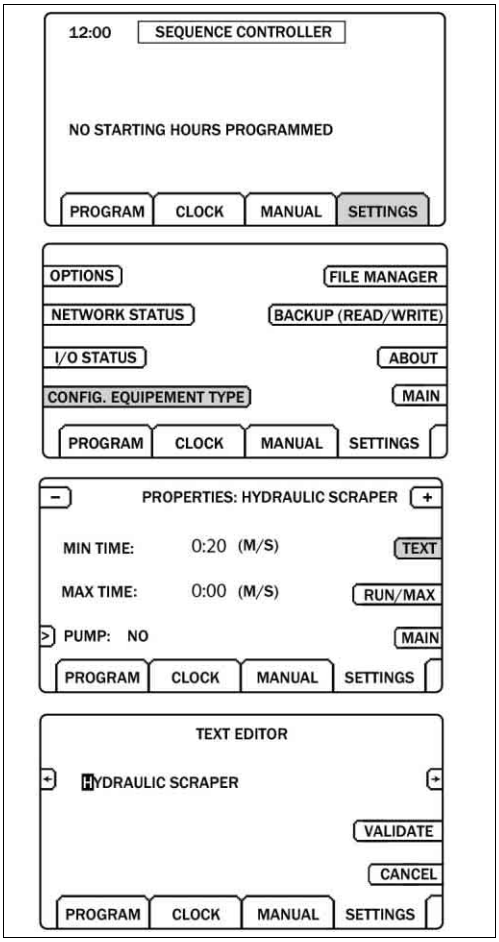
Note!
When it requires using an equipment that is not listed in the types of equipment, the ”configurable” can be customized for that purpose.

	Type of equipment	Minimum time (mm:ss)	Maximum time or runtime setting	Time of max or run (mm:ss)	Pump: Yes/no
Hydraulic solenoid valve	**Hydraulic scraper**	00:20	Max	01:00	Yes
	Hyd. gutter cleaner	00:00	Run	00:00	Yes
	Underground pump	04:00	Max	07:00	Yes
Pneumatic valve	**Flush valve**	00:00	Run	00:00	Yes
Dry contact	**Dry contact**	00:00	Run	01:00	No
	Auxiliary pump	00:00	Run	10:00	No
	Configurable	00:00	Run	00:00	No

8.23.2 Equipment name

The name of each equipment can be customized, if required.

- Press ”settings”.
- Press ”config. equipment type”.
- Choose the equipment. Use ”-/+” keys to scroll.
- Press ”text”.
- Use the keypad to modify the name. Press the digit repeatedly to toggle from one letter to another.
  Use the ”delete” key to erase and the arrows to move from left to right.
- Press ”validate” to confirm the change or press ”cancel” to void.



8.23.3 Choose between the runtime or maximum time mode

The user can set an equipment to runtime or maximum time.

Runtime:

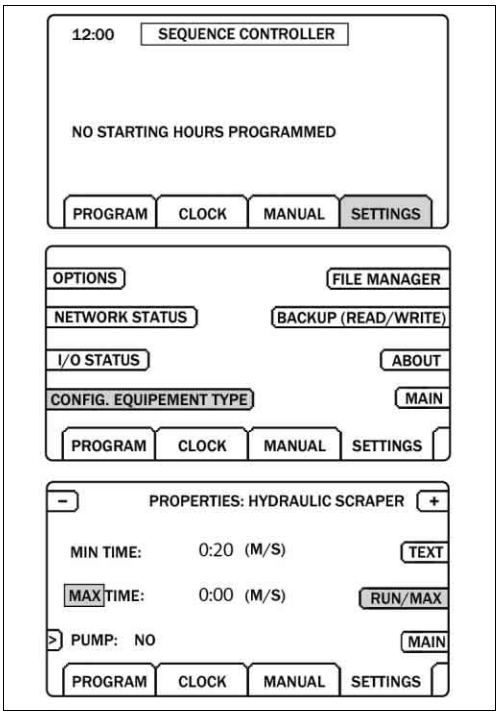
The runtime determines the time during which the equipment must operate to complete its function.

Maximum time:

The maximum time limits the operating time of the equipment in case of a faulty operation.

For example, a hydraulic scraper operates on the maximum time to protect the system from operating continuously in case the proximity switch does not detect the scraper at the end of its cleaning cycle. Contrariwise, a cross gutter cleaner operates on the runtime because it runs for a period of time in order to complete its function.

- Press ”settings”.
- Press ”config. equipment type”.
- Choose the equipment. Use ”-/+” keys to scroll from an equipment to another.
- Press ”run/max” to toggle from maximum time to runtime.



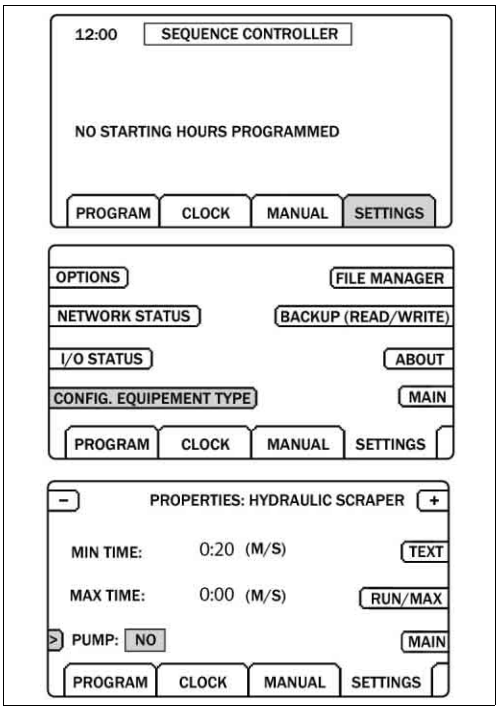
Note!
When setting the equipment to ”maximum time”, the user can choose between two types of alarm: ”output alarm” or ”sequence alarm”. For more information on the purpose and how to set these alarms, refer to section Choose the type of alarm.

8.23.4 Pump setting

Among the different equipments listed, some require to be fed by a hydraulic pump in order to operate. When the equipment requires to operate with a pump, the setting ”pump” must indicate ”yes”.

For example, free stall cleaner, gutter cleaner and underground pump require to be fed by a hydraulic pump to operate. Contrariwise, a chain gutter operates with a motor. When required, choose if the equipment must operate with a hydraulic pump or not.

- Press ”settings”.
- Press ” config. equipment type”.
- Press ”pump” to toggle from ”no” to ”yes”.



9 Operating

9.1 Special qualifications required for operating

Operation must be performed by trained personnel in accordance with the safety instructions.

Read the section Safety - Personnel qualifications.

9.2 Safety instructions for operating

Warning!
Keep the safety devices in place.

Warning!
All electric devices must be grounded as per the local regulations.

Caution!
Wear protective boots, eye gear and gloves for all steps included in this section.

Attention!
The proximity switch of a scraper cannot be used to stop a scraper during the minutes of operation. If necessary press the emergency button to stop the scraper.

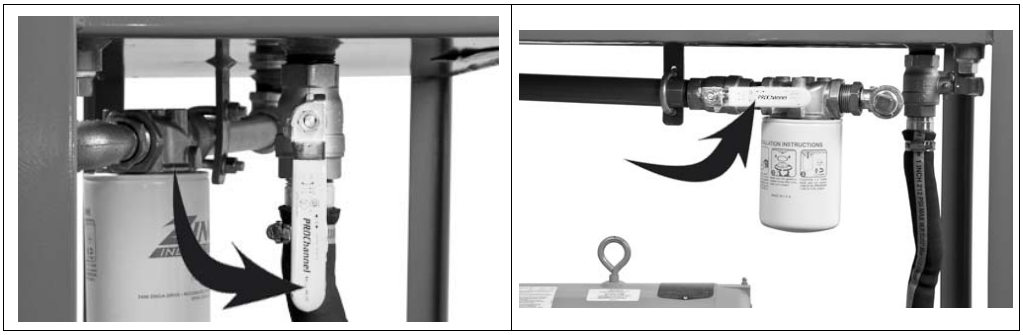
Attention!
The control panel cannot detect a load present in an alley such as a cow lying down. Remain in the cleaning area in order to stop the hydraulic system in case of emergency.

Read the section Safety.

9.3 Step 1: Open the ball valves of the hydraulic power unit

Attention!
Omitting to open both ball valves under the hydraulic power unit can cause permanent damages to the hydraulic components if the system is activated.

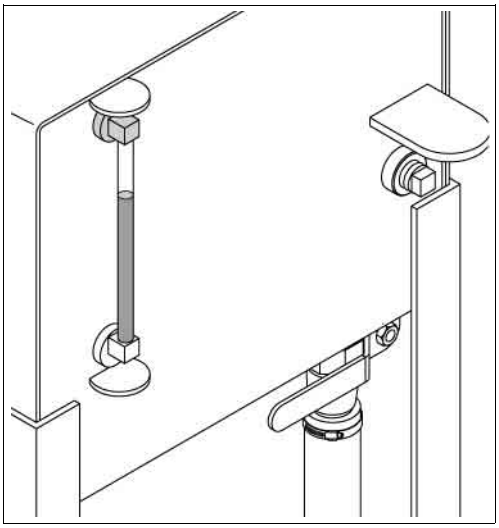
Attention!
When starting for the first time or after an oil or hose change, open the ball valves and wait for 10 minutes to let oil flow in the hydraulic system before starting the electric motor.



- Open both ball valves located under the reservoir of the hydraulic power unit.

9.4 Step 2: Check the oil level in the reservoir

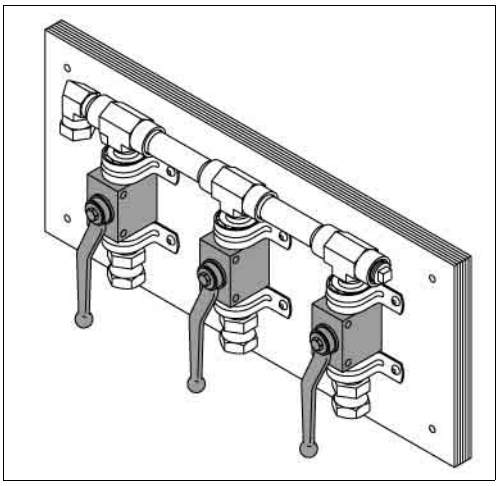
- Check the oil level through the level indicator located on the side of the reservoir of the hydraulic power unit. The indicator must be filled to ⅔.
- Add oil, if necessary.



9.4.1 Open the ball valves

When applicable:

- Open the ball valve(s) to direct the oil in the proper circuit.



9.5 Step 3: Program the control panel

To operate the hydraulic cleaner systems, the control panel must be programmed and the components adjusted. Each panel requires particular settings depending on the type of hydraulic configuration and the user requirements.

Refer to section Programming the standard control panel or Programming the sequencer control panel.

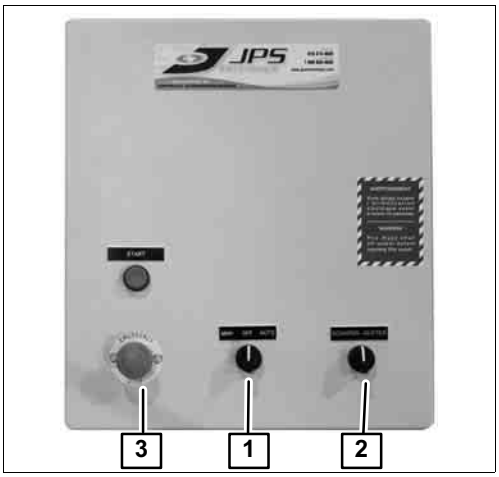
9.6 Step 4: Operate the control panel

Follow the steps that correspond to the type of control panel.

Attention!
Tighten all bolts including the anchor bolts after the tenth cleaning cycle.

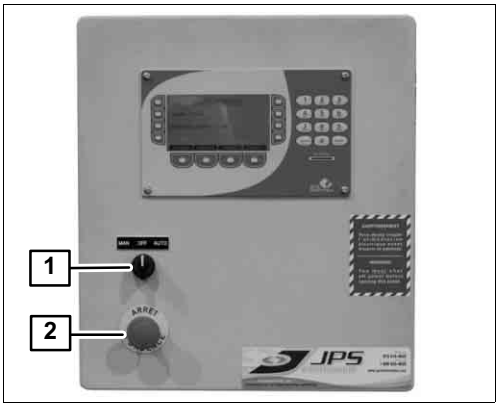
Standard control panel

- To operate the cleaner(s) automatically according to the scheduled hours, turn the knob (1) to ”AUTO”.
- Turn the knob (2) to operate the cleaner(s) connected to that circuit.
- To stop the cleaner(s), turn the knob (1) to ”OFF”. Use the emergency button (3) when necessary.



Sequencer control panel

- To operate the cleaner(s) automatically according to the scheduled hours, turn the knob (1) to ”AUTO”.
- To stop the cleaners, turn the knob (1) to ”OFF”. Use the emergency button (2) when necessary.



Note!
To activate the cleaner(s) at a distance, use a remote button.

10 Troubleshooting

10.1 Special personnel qualifications required for troubleshooting

Troubleshooting can be performed by qualified and/or trained personnel in accordance with the safety instructions.

Read the section Safety - Personnel qualifications.

10.2 Safety instructions for troubleshooting

Warning!
HYDRAULIC LINE UNDER PRESSURE!
Do not use your fingers to check for leaks. Fluids can penetrate skin and cause serious or fatal injuries. Hold a piece of cardboard to check for leaks.

Warning!
Keep the safety devices in place.

Caution!
Wear protective boots, eye gear and gloves for all steps included in this section.

Caution!
Always turn off the power source feeding this product. Secure with a locking device to avoid accidental activation that could lead to electrocution.

Read the section Safety.

10.3 Troubleshooting possible faults

Symptom	Possible cause	Solution
The hydraulic power unit runs while the cylinder does not perform a back and forth movement.	The hydraulic pressure is not set properly.	Adjust the hydraulic pressure. Refer to section Handling and installation - Adjustments and verifications - Step 5: Adjust the reversing pressure.
	The manual selector valve is not in proper position.	When equipped with this type of valve, place the manual selector valve in proper position.
	The oil temperature is too cold.	Place the hydraulic power unit in a frost free and constant temperature environment. Add an oil heater in the oil reservoir. Refer to section Handling and installation - Hydraulic power unit installation - Oil heater.
	The oil viscosity is inappropriate.	Check that the oil contained in the reservoir corresponds to the hydraulic oil specifications indicated in section Technical data - Lubricant specifications. If not, proceed with an oil and filter change. Refer to section Maintenance - Change the oil and oil filter of the hydraulic power unit.
	The reversing valve is clogged.	Flip the valve spool. Refer to section Maintenance - Change the seal of the hydraulic damper.
	There is an oil leak inside the hydraulic system.	Check the seals of the hydraulic damper. Refer to section Maintenance - Change the seals of the hydraulic damper.

Symptom	Possible cause	Solution
The hydraulic power unit runs while the rail assembly performs a back and forth movement but the scraper remains stationary.	The hydraulic pressure is not set properly.	Proceed with the adjustment of the hydraulic pressure. Refer to section Handling and installation - Adjustments and verifications - Step 5: Adjust the reversing pressure.
	There is too much bedding or the fiber is too long.	Use less bedding or use shorter fibers bedding.
	The reversing mechanism is not maintained adequately.	Maintain the reversing mechanism of the scraper. Refer to section Maintenance - Pressure wash and grease the reversing mechanism of the scraper.
	The leveling of the scraper is inappropriate.	The scraper is not level and/or the front of the scraper is misadjusted. Refer to section Maintenance - Check and adjust the scraper height.
	The concrete surface of the alley is uneven.	Check if the concrete surface is uneven. Repair.
	The alley is not cleaned often enough.	Set the control panel to clean the alley more often.
	A compensator allows too much oil flow through the cylinders connected in series.	Contact your dealer.
The cleaner performs the cleaning cycle but continues to operate while the next cleaner remains inactive whereas it should operate.	The solenoid valve is clogged.	Flip the lever of the solenoid valve a few times.

Symptom	Possible cause	Solution
The hydraulic power unit does not run.	The control panel is in alarm mode.	Identify and correct the origin of the alarm. Refer to section Operating to verify the programming and the setting of the corresponding control panel.
	The emergency button is activated.	Deactivate the emergency button.
	The oil level in the reservoir is too low.	Fill the reservoir to ⅔ of the level indicator located on the side of the hydraulic power unit. When the reservoir requires more oil, this indicates that there is an oil leak. Find the leak and repair.
	The oil level switch is blocked.	Stop the hydraulic power unit. Flip the level switch inside the reservoir. Reactivate the hydraulic power unit.
	The thermal overload is activated.	Reset the thermal overload. Find the cause and repair. Verify that the motor rating matches the thermal overload setting. Refer to section Handling and installation - Adjustments and verifications - Step 2 : Set the thermal overload.
	The fuse in the control panel is burnt.	Change the fuse inside the control panel.
	Improper or damaged wiring.	Have an electrician check the wiring of the system.
	The proximity switch remains in detection state.	Check the position of the proximity switch. Refer to section Handling and installation - Free stall cleaner installation - Step 11: Proximity switch installation.

Symptom	Possible cause	Solution
The scraper does not park in proper position.	Incorrect programming of the control panel.	Check the programming of the control panel. Refer to the programming section that corresponds to the control panel.
	Inappropriate distance between the trigger rod and the proximity switch or the trigger rod does not trigger properly.	Check the alignment of the trigger rod and the proximity switch. Refer to section Handling and installation - Free stall cleaner installation - Step 11: Proximity switch installation. Lubricate the trigger rod. Refer to section Maintenance - Wash and grease the trigger rod.
	No proximity switch detection.	Check the position of the proximity switch. Refer to section Handling and installation - Free stall cleaner installation - Step 11: Proximity switch installation.
	The wires of the proximity switch are not connected properly or damaged.	Have an electrician check the wiring of the proximity switch.

Symptom	Possible cause	Solution
The scraper does not clean the alley properly.	The folding ends of the scraper are not adjusted properly.	Adjust the folding ends of the scraper. Refer to section Handling and Installation - Adjustments and verifications - Step 3: Adjust the folding ends of the scraper.
	The alley is not cleaned often enough.	Set the control panel to clean more often.
	There is too much bedding or the fiber is too long.	Use less bedding or use shorter fibers.
	The scraper height is not adjusted properly.	Adjust the height. Refer to section Handling and installation - Free stall cleaner - Step 15: Adjust the height of the scraper.
The hydraulic power unit does not operate normally, is noisy or does crackling noises.	The hydraulic pressure is not adjusted properly.	Adjust the hydraulic pressure. Refer to section Handling and installation - Adjustments and verifications - Step 5: Adjust the reversing pressure.
	The oil level in the reservoir is too low.	Fill the reservoir to ⅔ of the level indicator located on the side of the hydraulic power unit. When it requires adding oil in the reservoir, this indicates that there is an oil leak. Find leak and repair.
	The oil and/or oil filter is dirty.	Proceed with an oil and oil filter change. Refer to section Maintenance - Change the oil and oil filter of the hydraulic power unit.
	The oil is too hot.	The permissible operating time is exceeded. Reduce the operating time of the hydraulic power unit. The hydraulic power unit is not placed in a proper environment. Relocate the hydraulic power unit.

Symptom	Possible cause	Solution
The hydraulic power unit does not operate normally, is noisy or does crackling noises.	The oil viscosity is inadequate.	Check if the oil in the reservoir corresponds to the hydraulic oil specifications indicated in section_Technical data - Lubricant specifications.
	The oil is oxidized.	Make sure the maximum operating time of the hydraulic power unit is not exceeded. Make sure the hydraulic power unit is installed in an appropriate environment. Proceed with and oil and oil filter change. Refer to section Maintenance.
	The hydraulic oil is contaminated.	The oil has a milky color which indicates a water contamination. Proceed with an oil and oil filter change. Refer to section Maintenance. Air infiltrates the hydraulic system. Find the cause and repair. The air breather cap is not installed properly or is dirty.
	The reversing and/or pressure relief valve is clogged.	Flip the valve spool. Refer to section Maintenance - Change the seals of the hydraulic damper.
	A clogged hose or pipe.	Find the obstructed hose by isolating sections of the hydraulics. Manually flip the ball valves or solenoids to find the obstruction. Disassemble to unclog.
	The motor and hydraulic pump are not aligned properly.	Align the pump and motor. Refer to section Handling and installation - Hydraulic power unit - Electric motor assembly.

Symptom	Possible cause	Solution
The hydraulic power unit does not operate normally, is noisy or does crackling noises.	The hydraulic damper is damaged.	Refer to section Maintenance - Change the seals of the hydraulic damper.
	The hydraulic pump is cavitating.	Check the pressure gauge under the reservoir. The pressure cannot exceed the permissible pressure indicated in table of section Technical data - Hydraulic power unit - Maximum operating pressure chart. Fill the reservoir to ⅔ of the level indicator located on the side of the hydraulic power unit. When it requires adding oil in the reservoir, this indicates that there is an oil leak. Find leak and repair. Inappropriate oil temperature. Locate the hydraulic power unit is a frost free and constant temperature environment.
A cylinder leaks.	The cylinder is not aligned with the rail system.	Check the alignment of the cylinder. Refer to section Handling and installation - Adjustments and verifications - Step 6: Check the cylinder alignment.
Oil leaks from an hydraulic hose or heavy duty steel pipe.	Improper hose and/or pipe connection.	Stop the hydraulic power unit. Refer to section Handling and installation - Hydraulic connections, to check if the hydraulic hoses and fittings are assembled properly and the thread sealant is well applied.

☞ **Note!**
For any other symptoms, please contact your dealer.

11 Maintenance

11.1 Special personnel qualifications required for maintenance work

Maintenance work must be performed by trained personnel in accordance with the safety instructions.

Read the section Safety - Personnel qualifications.

11.2 Safety instructions for maintenance

Warning!
HYDRAULIC LINE UNDER PRESSURE!
Do not use your fingers to check for leaks. Fluids can penetrate skin and cause serious or fatal injuries. Hold a piece of cardboard to check for leaks.

Caution!
Always turn off the power source feeding this product. Secure with a locking device to avoid accidental activation.

Caution!
Wear protective boots, eye gear and gloves for all steps included in this section.

Note!
Have within reach containers to collect all substances potentially harmful such as oils, coolants, cleaning and disinfecting agents, etc. Dispose according to the local rules and regulations.

Read the section Safety.

11.3 Schedule maintenance responsibilities

Task	Daily	After the first 100 hours of use	Weekly	Every 1000 hours of use or every six months, whichever comes first	Every 3000 hours of use or yearly, whichever comes first	Every 5000 hours of use	Action by
Clean the ends of the alleys and gutters	X						Trained personnel
Inspect the hydraulic cleaning system	X						
Re-tighten all bolts		X					
Check the oil level in the reservoir			X				
Check the oil filter gauge			X				
Pressure wash the rails			X				
Pressure wash and grease the reversing mechanism of the scraper			X				
Wash and grease the trigger rod			X				
Check and adjust the scraper height				X			
Rotate the wheels of the scraper				X			
Change oil and oil filter of the hydraulic power unit		X		X			
Inspect the hinge pins of the scraper					X		
Clean the hydraulic power unit					X		
Change the wear shoes under the scraper					X		
Change the seals inside the hydraulic damper						X	

Attention!
When operating this GEA Houle product using other manufacturer's components and/or products such as a motor, a tractor, etc. Always perform maintenance of the component and/or product as recommended by its manufacturer.

11.4 Clean the ends of the alleys and gutters

Daily

Attention!
Use tap water to clean this product. Do not exceed 2000 psi [105 bar] when using a pressure washer and keep the nozzle at a distance of 1 ft [30 cm] from the surface to be cleaned.

- Shovel the accumulated manure located on each ends of the alleys and gutters.

11.5 Inspect the hydraulic cleaning system

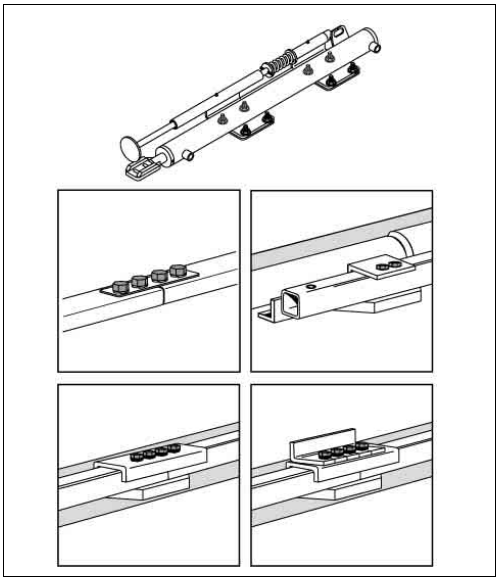
Daily

- Activate the hydraulic cleaning system.
- Inspect the hydraulic power unit, the scrapers, cylinders, rails, trigger rod, etc. for any signs of distortion, unusual wear, leaks and excessive noise. Refer to section Operating Fault.
- Repair the defective component.

11.6 Re-tighten all bolts

After the first 100 hours of use

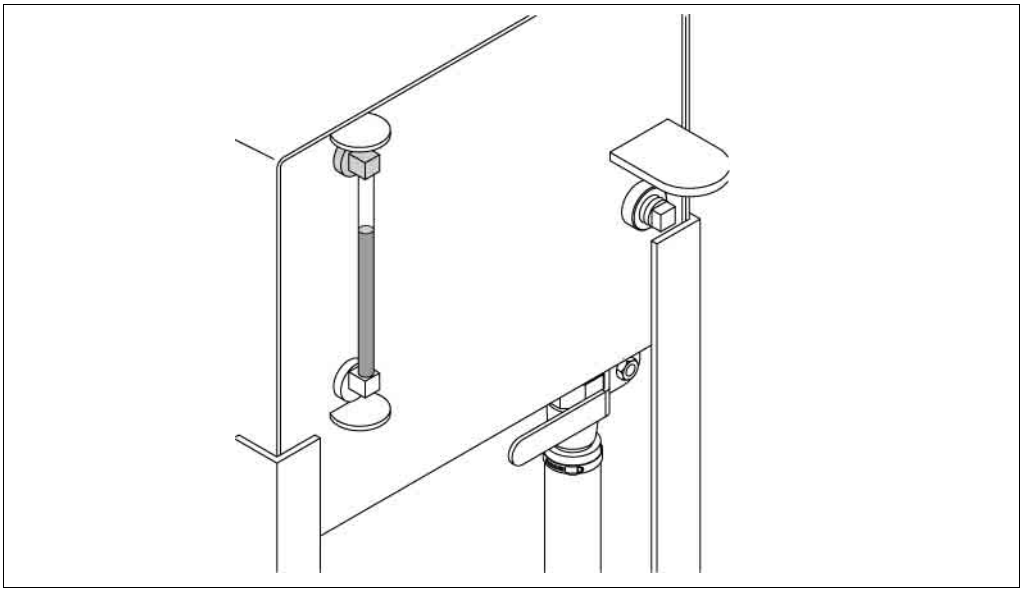
- Re-tighten the bolts of the cylinder fixing plate.
- Re-tighten the bolts of the joints plates holding the rails together.
- Make sure the anchor bolts are firmly secured.



Refer to section Technical data - Bolt torque chart.

11.7 Check the oil level in the reservoir

Weekly



- Check the oil sight gauge located on the side of the hydraulic power unit reservoir. The indicator must be filled to ⅔.
- Add oil if necessary.
- Check the color of the fluid. When the oil is dark, and/or has a milky color, proceed with an oil and filter change, refer to section Maintenance - Change Oil and Oil Filter of the Hydraulic Power Unit.
  Refer to section Operating Fault to find the cause of contaminated oil.

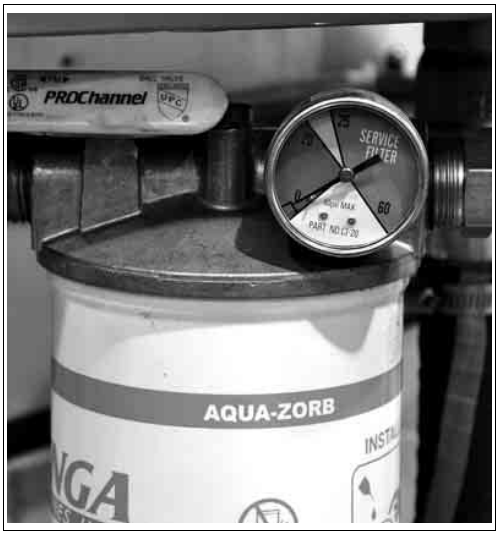
Attention!
If oil needs to be added in the reservoir this indicates that there is an oil leak. Find the oil leak and repair.

Refer to section Technical data - Lubricant specifications.

11.8 Check the oil filter gauge

Weekly

- Check the oil level of the oil filter gauge located under the reservoir.
- If the arrow is located within the section that indicates ”Service Filter”, the oil is dirty. Proceed with an oil and filter change.



11.9 Pressure wash the rails

Weekly

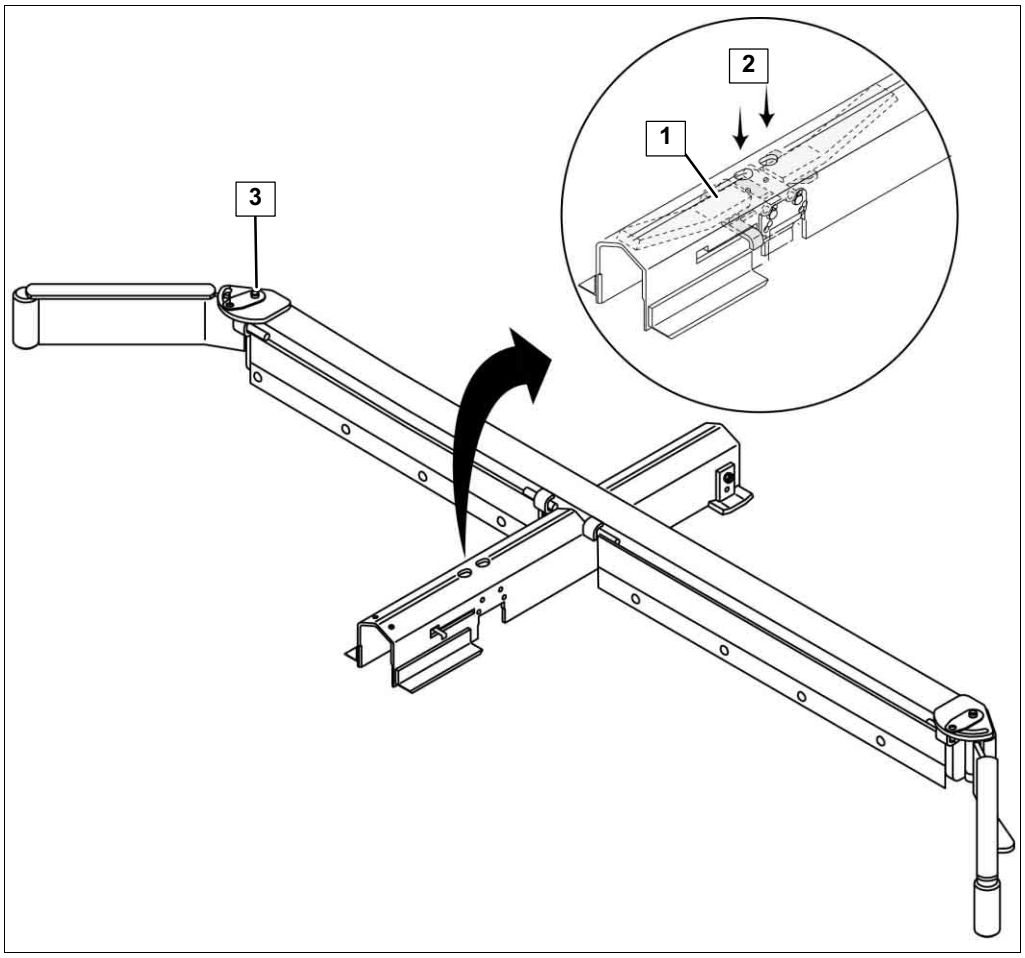
Attention!
Use tap water to clean this product. Do not exceed 2000 psi [105 bar] when using a pressure washer and keep the nozzle at a distance of 1 ft [30 cm] from the surface to be cleaned.

- Remove the excess manure in the alleys and the gutter, the rails, the cylinders, etc.
- Pressure wash the rails to remove accumulated manure.

11.10 Pressure wash and grease the reversing mechanism of the scraper

Weekly

Attention!
Use tap water to clean this product. Do not exceed 2000 psi [105 bar] when using a pressure washer and keep the nozzle at a distance of 1 ft [30 cm] from the surface to be cleaned.



- Pressure wash the reversing mechanism (1) located under the scraper.
- Remove all traces of manure to free the flipping latches and all mobile parts.
- Grease the latch through the grease fittings (2) and the mobile parts with biodegradable all-purpose grease.
- Grease both folding ends (3) of the scraper.

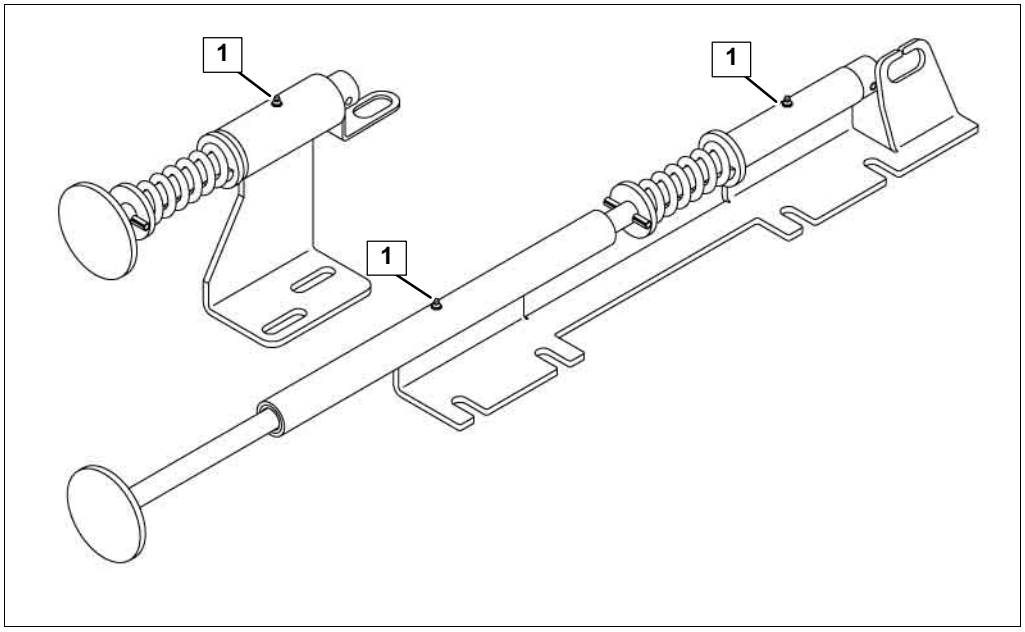
Refer to section Technical data - Lubricant specifications.

11.11 Wash and grease the trigger rod

Weekly

Attention!
Use tap water to clean this product. Do not exceed 2000 psi [105 bar] when using a pressure washer and keep the nozzle at a distance of 1 ft [30 cm] from the surface to be cleaned.

Attention!
Do not pressure wash the proximity switch.



- Remove the guard over the cylinder.
- Remove all traces of manure on the trigger rod, the proximity switch, the cylinder, etc.
- Grease the trigger rod through the grease fitting (1) using all-purpose grease.

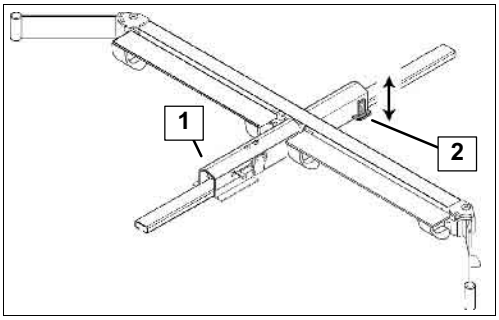
Refer to section Technical data - Lubricant specifications.

11.12 Check and adjust the scraper height

Every 1000 hours of use or every six months, whichever comes first

The height of a scraper must be adjusted to prevent manure accumulation under the scraper. The back of the scraper must be raised while the blades remain in contact with the concrete floor.

- Push on the front of the scraper (1).
- Unscrew the bolt of the shoes (2) or eccentric wheels located on each side of the scraper end.
- Set height by adjusting the position of the shoes or the eccentric wheels.
- Tighten bold to lock the adjustment.

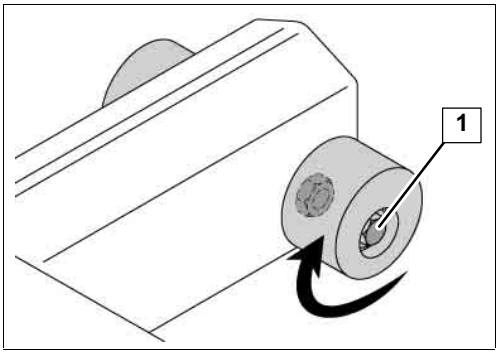


Refer to section Technical data - Bolt torque chart.

11.13 Rotate the wheels of the scraper

Every 1000 hours of use or every six months, whichever comes first

- Unscrew the wheels (1).
- Lightly rotate the wheels. Make sure the position will even the wear.
- Secure in place.
- Perform the scraper height adjustment steps.
- Secure the wheels in place.



Part No.	Description	Quantity
2005-7508-230	Eccentric wheel kit	1

Refer to section Technical data - Bolt torque chart.

11.14 Change oil and oil filter of the hydraulic power unit

Every 1000 hours of use or every six months, whichever comes first

Attention!
Use only hydraulic oil from sealed containers stored in an adequate room temperature.

Attention!
Do not mix hydraulic oil types.

Attention!
Each time an oil and/or oil filter is changed, purge the system to remove air infiltration.

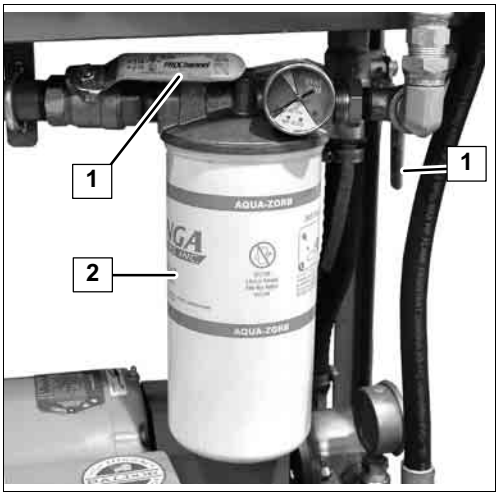
Attention!
Apply a thin layer of thread seal tape on the magnet threads. Never apply on the tip to avoid contaminating the oil with tape residues.

Note!
Use the following hydraulic oil brand: Petro-Canada MV22.
For other equivalent oil brand, refer to section Technical data - Lubricant specifications.

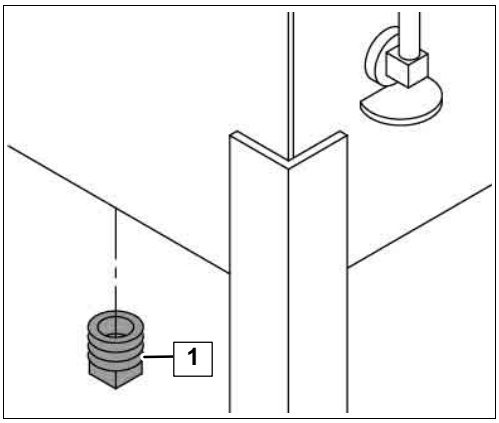
Oil and oil filter change

Part No.	Description			Quantity
2013-3303-290	Oil filter - water absorbing	ZINGA LE-10AZ	10 micron	1

- Stop the hydraulic cleaning system.
- Place a large container under the oil filter. The container must contain more than 16 US gallons [60 liters].
- Close both ball valves (1) under the hydraulic power unit.
- Unscrew the oil filter (2).
- Open the air breather cap on top of reservoir.
- Open both ball valves (1) to drain the oil completely.



- Place a container under the magnet (1) located under the hydraulic power unit reservoir.
- Remove the magnet.
- Remove old sealant tape from the threads and clean the magnet.
- Apply a thin layer of thread seal tape on the magnet threads.
- Install the magnet in place.

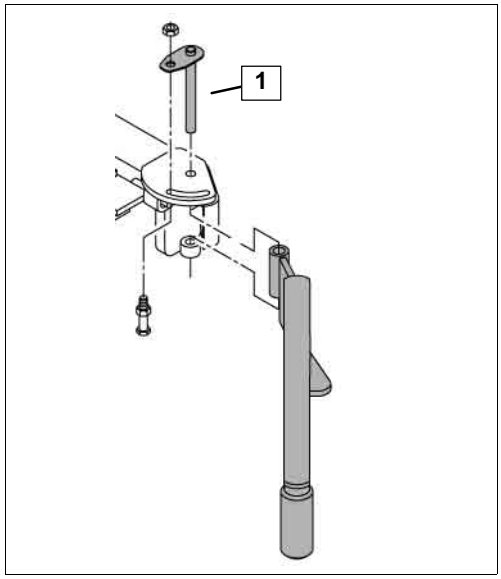


- Lubricate the seal of the new oil filter.
- Install the new filter.
- Pour 16 US gallons [60 liters] of hydraulic oil in the reservoir making sure it is 2/3 full.
- Reinstall the air breather cap.
- Purge the air from the system. Refer to section Handling and installation - Adjustments and verifications - Step 4: Purge the hydraulic lines and cylinders.
- Perform the hydraulic pressure adjustment. Refer to section Handling and installation - Adjustments and verifications - Step 5: Adjust the reversing pressure.

11.15 Inspect the hinge pins of the scraper

Every 3000 hours of use or yearly, whichever comes first

- Remove the hinge pins (1) of the scraper.
- Replace if worn or distorted.
- Adjust the position of the folding ends. Refer to section Handling and installation - Adjustments and verifications - Step 3: Adjust the folding ends of the scraper.



Part No.	Description	Quantity
2013-7710-950	Hinge pin	1

Refer to section Technical data - Bolt torque chart.

11.16 Clean the hydraulic power unit

Every 3000 hours of use or yearly, whichever comes first

Caution!
Wear protective boots, eye gear and gloves for all steps included in this section.

Attention!
Use tap water to clean this product. Do not exceed 2000 psi [105 bar] when using a pressure washer and keep the nozzle at a distance of 1 ft [30 cm] from the surface to be cleaned.

Attention!
Prevent water from entering into the hydraulic power unit reservoir.

Attention!
Do not wash this product near an electric source.

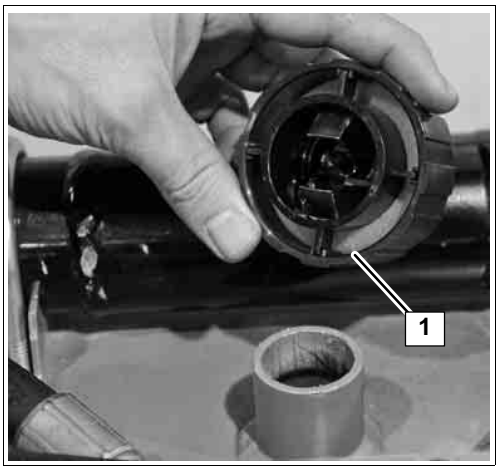
Note!
Refer to section Technical data - Lubricant specifications.

Pressure wash

- Stop the hydraulic power unit.
- Shut and lock the electric supply of the hydraulic cleaning system.
- Pressure wash the entire product and equipment. Let dry.
- Spray a thin layer of biodegradable oil on the product and equipment to protect it from corrosion.

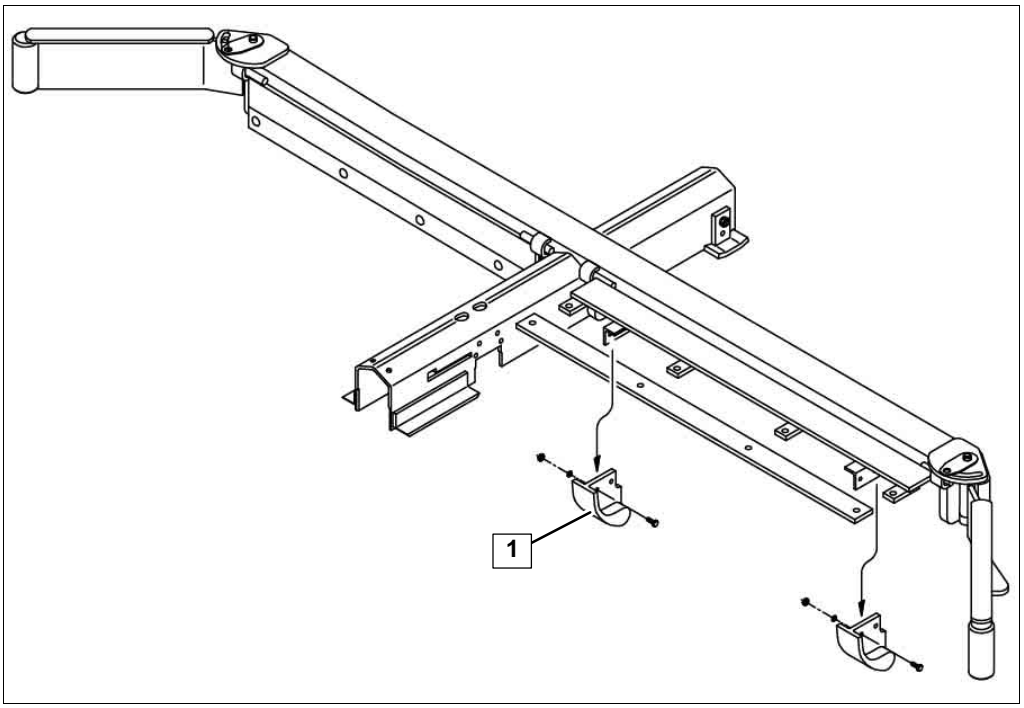
Clean the air breather cap

- Remove the air breather cap.
- Clean the foam filter. Soak the air breather cap and foam in fuel to dissolve the oil from the foam.
- Let the fuel evaporate before reinstalling the cap on the hydraulic power unit.



11.17 Change the wear shoes under the scraper

Every 3000 hours of use or yearly, whichever comes first



Part No.	Description	Quantity
2005-7504-070	Wear shoe kit	1

- Remove the wear shoes (1).
- Replace with new parts.

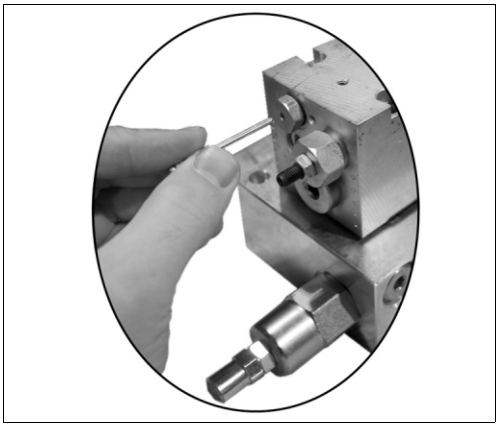
Refer to section Technical data - Bolt torque chart.

11.18 Change the seals of the hydraulic damper

Every 5000 hours of use

Flip the valve spool

- Shut the control panel to disengage the hydraulics.
- Release the hydraulic pressure inside the hydraulic circuit. Flip the spool inside the pressure relief valve using a nail. Repeat this step on the other side of the valve.

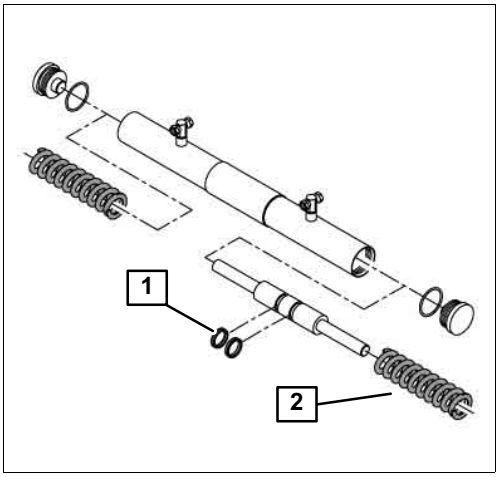


Attention!
The damper springs are under pressure.

Change the seals

Part No.	Description	Quantity
2013-3905-760	Seal	1

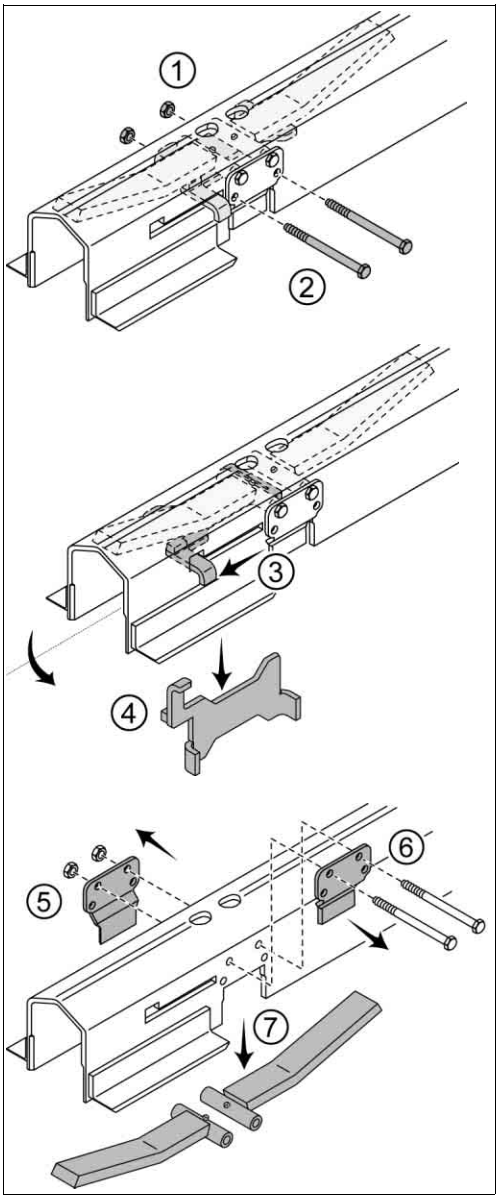
- Have in hand a container to collect oil from the hydraulic damper.
- Close both ball valves under the hydraulic power unit.
- Disconnect the hydraulic damper from the hydraulic power unit.
- Drain the oil from the damper.
- Unscrew the end caps of the damper using vise-grip pliers.
- Remove the seals (1) and the springs (2) inside the damper, if necessary.
- Replace with new components.
- Reassemble. Place the seal of the end caps properly.
- Connect the hydraulic hoses.
- Open both ball valves under the hydraulic power unit.



- Proceed with the air purge step from section Maintenance - Change the oil and oil filter of the hydraulic power unit.

11.19 Changing the reversing mechanism of the scraper

- Remove the lower set of bolts and nuts (1,2) from the frame.
- Slide the reversing plate in the notch (3) of the frame.
- Flip the reversing plate (4) to remove it from the frame.
- Remove the remaining set of bolts and nuts along with the knife brackets (5,6).
- Remove the latches (7) from under the frame.
- Replace damaged and/or worn parts.
- Reinstall all parts.
- Make sure that the reversing plate can slide properly.



Part-No.	Description	Quantity
2013-7717-790	Reversing plate (designed for offset reversing block)	1
2013-7717-800	Reversing plate (designed for flat reversing block)	1
2013-7617-030	Latch of reversing mechanism	1

12 Decommissioning

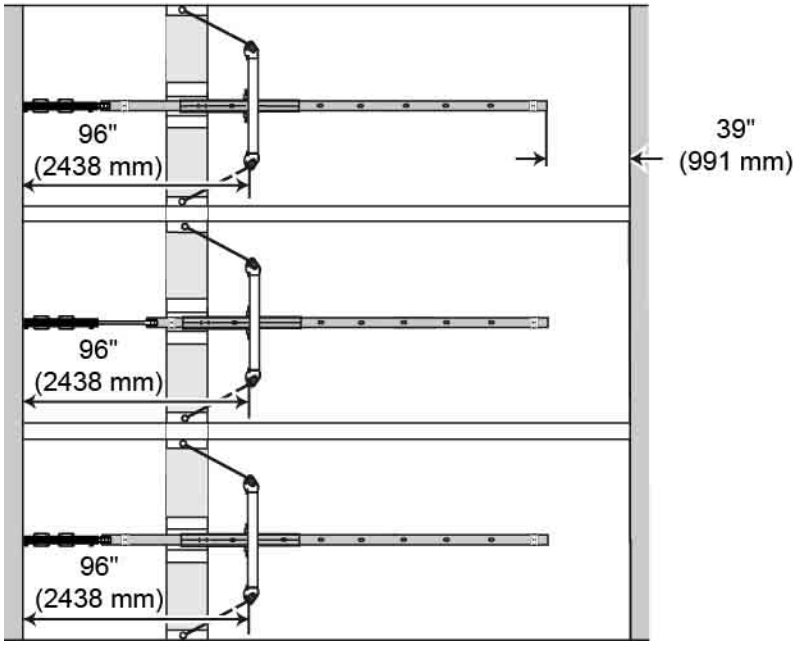
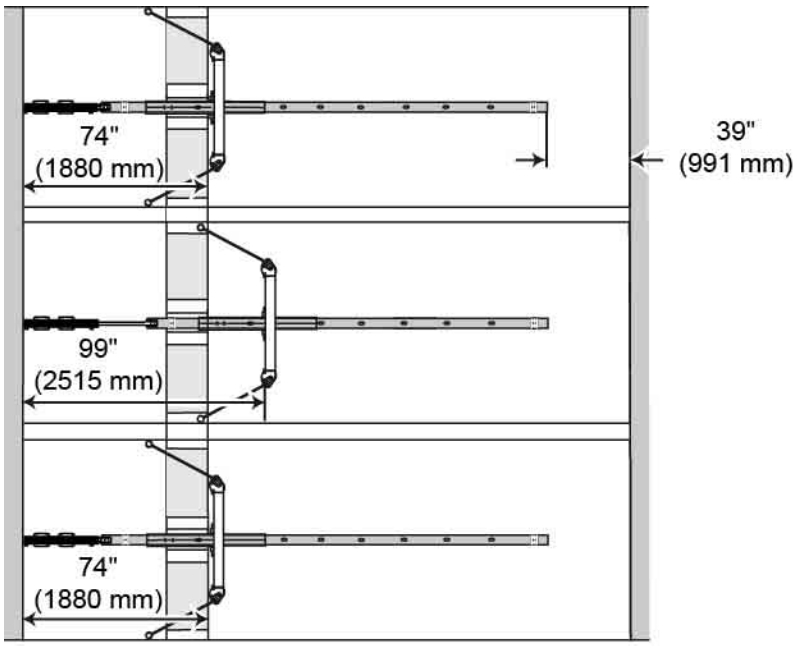
12.1 Final decommissioning / disposal

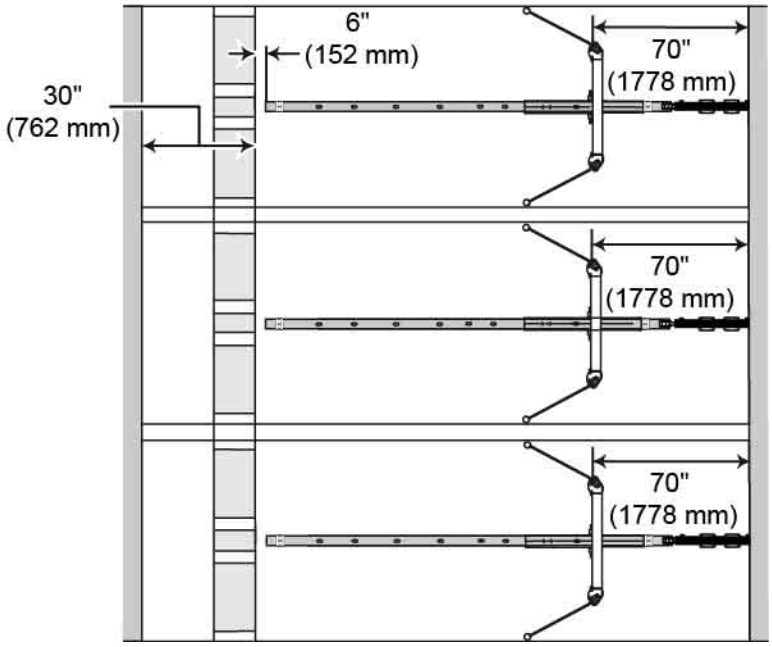
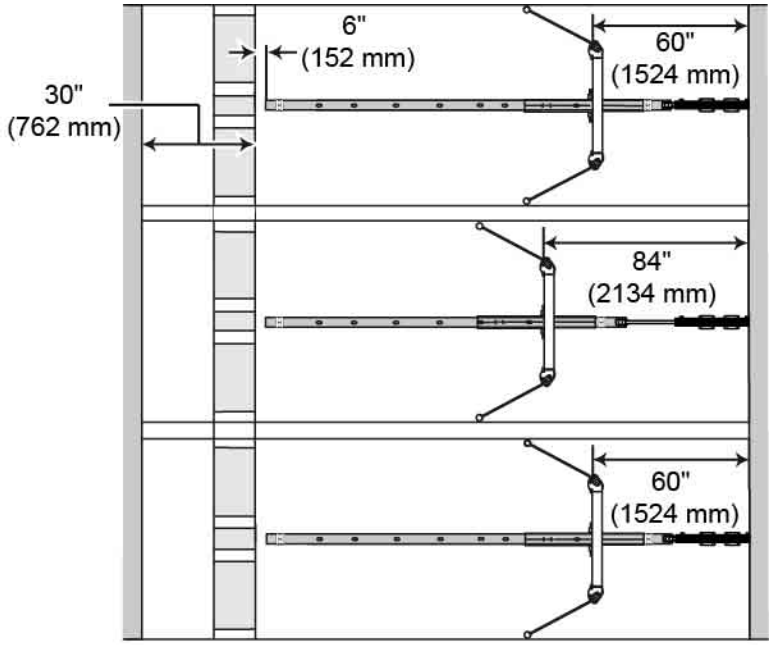
After final decommissioning, handle all components properly and dispose of them in accordance with your valid local rules and regulations on waste disposal. Recycle if possible.

13 Appendix

13.1 Factory modified starting rail

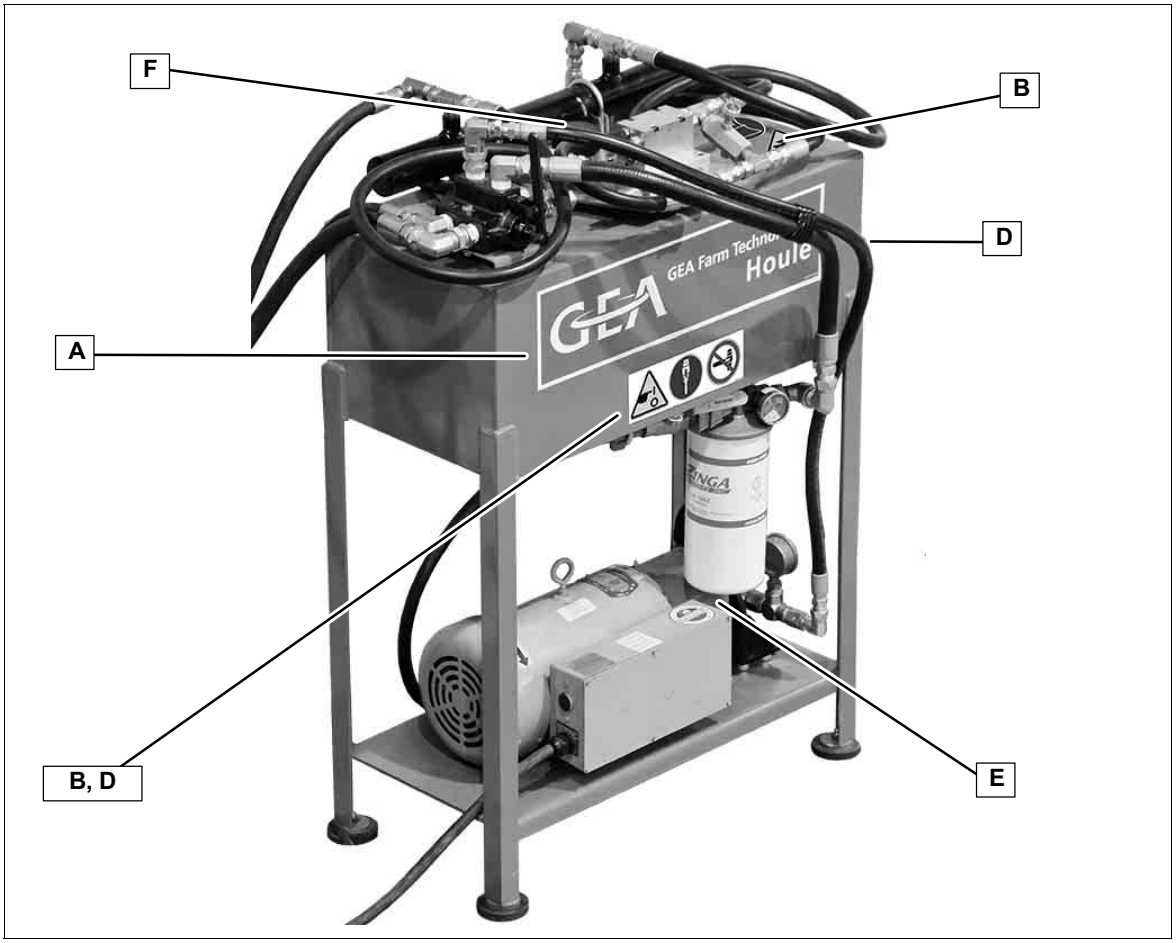
Free stall cleaners connected in series can align when parked only if they are equipped with factory modified starting rails. The alignment depends on the type of cleaning method: pushing of pulling the manure to the next collector.

Pulling scrapers
Modified starting rail

Standard starting rail


Pushing scrapers
Modified starting rail

Standard starting rail


13.2 Label position

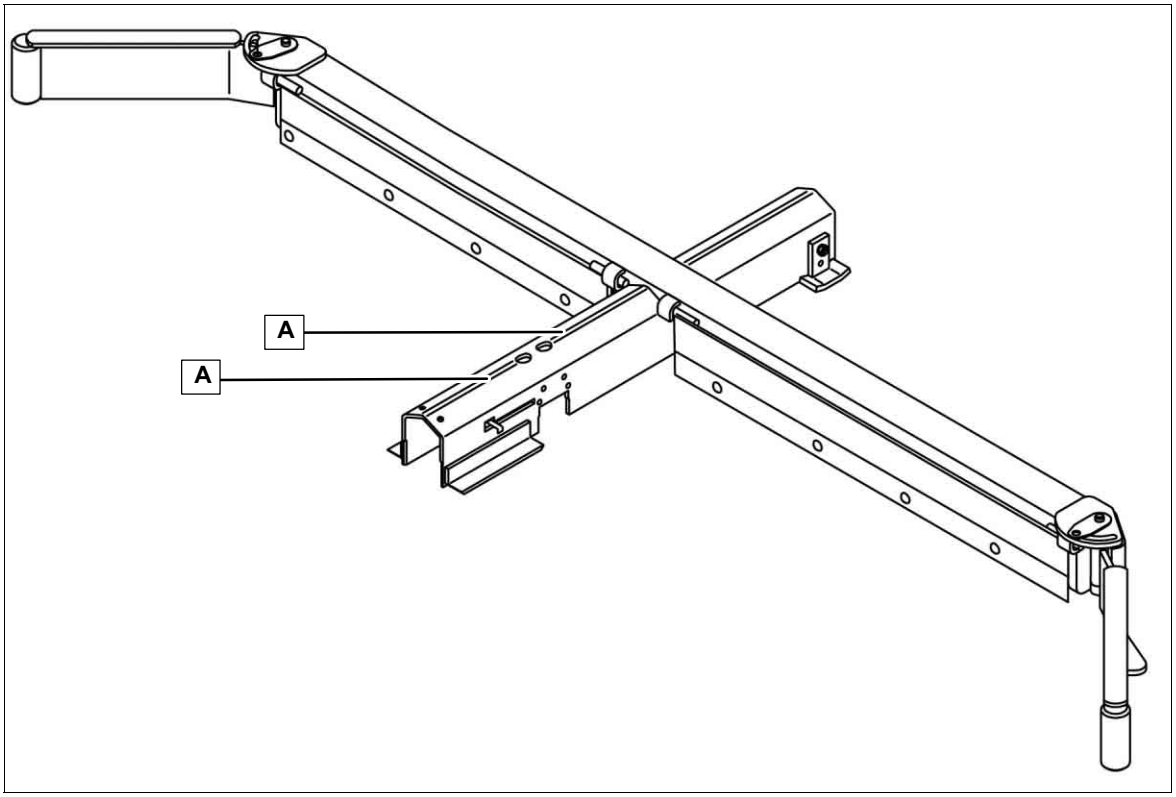
13.2.1 Hydraulic power unit



A	**US + EU** GEA Farm Technologies Houle 2010-4703-560	**B**	**US** WARNING / AVERTISSEMENT 2099-4720-000	**C**	**US** OPERATION 2099-4724-030
D	**EU** 2099-4725-420	**E**	**US + EU** 2099-4700-390	**F**	**US + EU** AW32 2099-4725-360

US = American label / EU= European label

13.2.2 Scraper



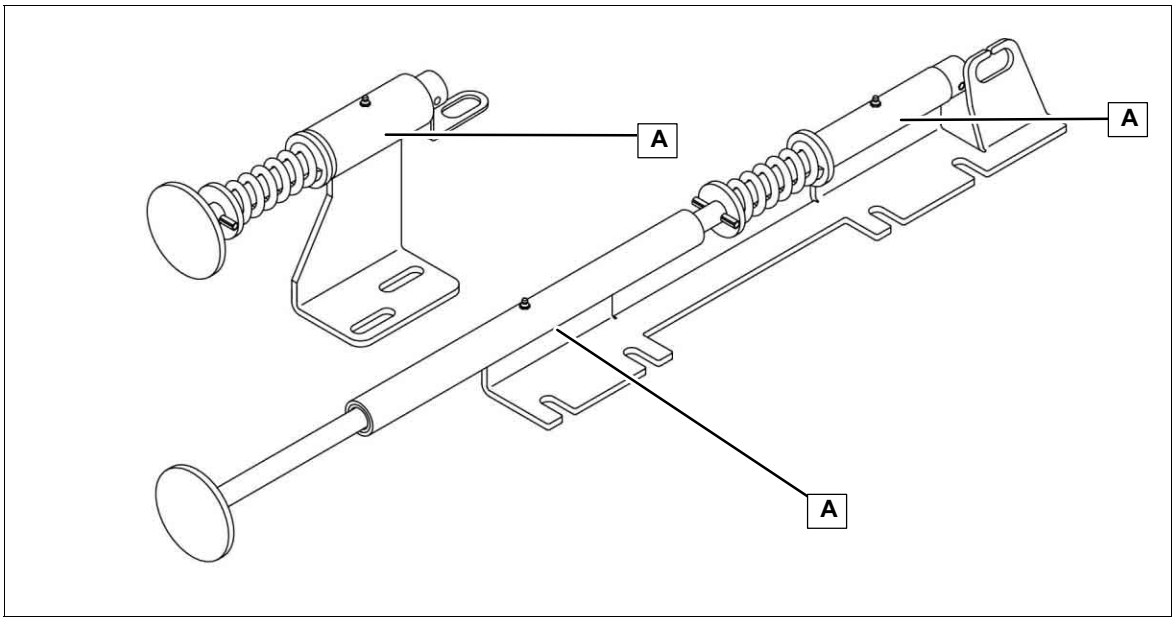
A	**US + EU**  2003-4701-240				

US = American label / EU= European label

13.2.3 Trigger rods

WARNING!
Always shut off the hydraulic power unit before greasing the trigger rods.

Note!
Remove the guard that covers the trigger rod when necessary. Always reinstall the guard. Refer to section Handling and installation - Free stall cleaner installation - Step 12: Cylinder guard.



A	**US + EU**  2003-4701-240				

US = American label / EU= European label

13.3 Abbreviations

Terms	Explanation	Terms	Explanation
@	at	Ø	diameter
EC	European Community	CW	clockwise
CCW	counterclockwise	fax	facsimile
I.D.	inside diameter	Inc.	Incorporated
NC	national coarse	O.D.	outside diameter
PTO	power take off	PVC	polyvinyl chloride
QC	Quebec	SAE	Society of Automotive Engineers
USA	United States of America	WWW	World Wide Web

Units	Explanation	Units	Explanation
A	ampere	kg	kilogram
AC	alternative current	kPa	kilopascal
cm	centimeter	kW	kilowatt
°	degree	km/h	kilometres per hour
°C	degree Celsius	lpm	liter per minute
°F	degree Fahrenheit	lb	pound
DC	direct current	m	meter
ft	foot	min	minute
ft-lb	foot-pound	mph	miles per hour
gal	gallon	mm	millimeter
gpm	gallons per minute	NM	newton meter
HP	horsepower	psi	pounds per square inch
hr	hour	RPM	revolutions per minute
Hz	hertz	s	second
in.	inch	v	volt

We live our values.

Excellence • Passion • Integrity • Responsibility • GEA-versity

GEA Group is a global engineering company with multi-billion euro sales and operations in more than 50 countries. Founded in 1881, the company is one of the largest providers of innovative equipment and process technology. GEA Group is listed in the STOXX® Europe 600 index.

2013-9015-001 01-2014

GEA Farm Technologies Canada Inc. / Division GEA Houle

4591 boul. St-Joseph, Drummondville, Qc, J2A 0C6
☏ +1 819 477 - 7444, 🖷 +1 819 477 - 5565
www.gea.com / www.gea-farmtechnologies.com