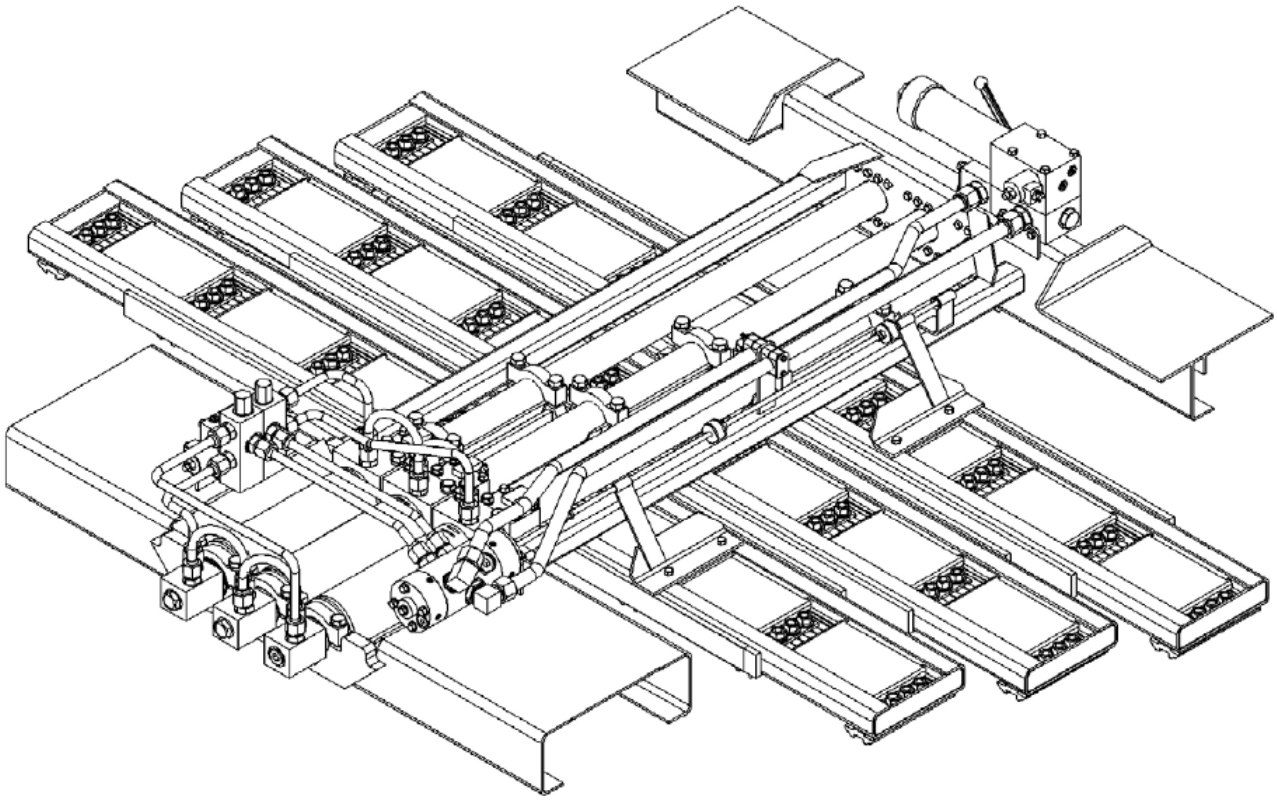
KEITH®
WORKHORSE
UNLOADING SYSTEM



OWNER'S MANUAL

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Introduction

We at KEITH Mfg. Co. and KEITH *WALKING FLOOR* Europe, thank you for having chosen the KEITH® *WALKING FLOOR*® loading and unloading system. We are proud of the fact that we manufacture the simplest and most trouble-free loading and unloading system. With the KEITH *WALKING FLOOR* system you have the versatility of a flat floor, combined with the opportunity to load and unload practically any material you desire.

The following pages contain a description of the operation and the maintenance of your KEITH *WALKING FLOOR* system, a troubleshooting manual and working drawings of a number of the most important components of the system. Important information is also provided concerning the hydraulic installation on your vehicle. You must ensure that this hydraulic installation satisfies the stated requirements. We maintain a website at www.keithwalkingfloor.com which provides an up to date information resource from which manuals can be downloaded.

Make sure that you have read and understood the manual completely before you use the KEITH *WALKING FLOOR* system. If you have problems or require advice do not hesitate to contact us. It goes without saying that we will be pleased to help you!

Once again, thank you for choosing a KEITH *WALKING FLOOR* loading and unloading system.

Yours Faithfully,

Keith Foster
President
KEITH Mfg. Co.

2. Description of the *WALKING FLOOR*® system

WARNING:

The large forces exerted by the floor when moving can result in damage to equipment which may result in serious injury or death. Always ensure that this manual has been read and fully understood by the operator. We advise that the operator keeps this manual with the vehicle at all times. Always ensure that 'best practice' is employed when using our systems. If in any doubt do NOT use this equipment and seek further assistance from your company's safety officer.

2.1 Use of the *WALKING FLOOR* system

The system is built up from a number of separate components. These components are assembled in such a way that they are only suitable for the conveying purpose described in the sales contract. Should you wish to convey other materials then please contact the supplier of your trailer.

2.2 Operation of the *WALKING FLOOR* system

The KEITH® *WALKING FLOOR* system can be used for loading and unloading most materials.

Moving the load with the system is based on the friction between the load and the floor. The floor consists of a number of *floor* slats placed side-by-side (the width of the floor determines the precise number of slats required).

1 X-DRIVE (3)
2 MOUNTING BLOCK
3 ON / OFF VALVE
4 LOAD / UNLOAD BLOCK
5 SWITCHING VALVE
6 CYLINDER (3)

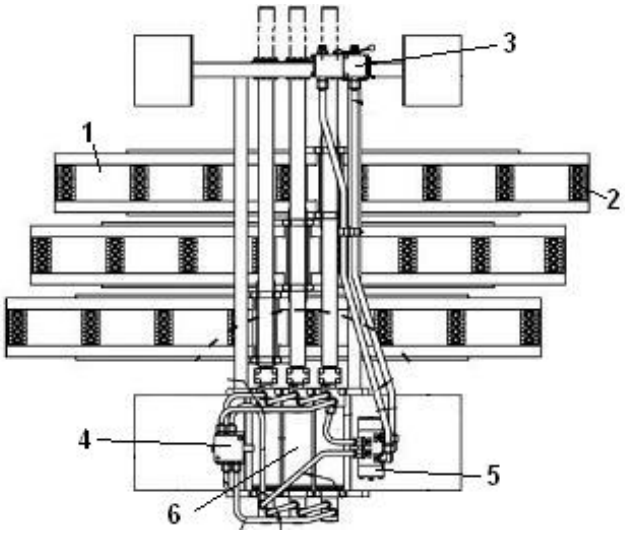


Figure 1.1: KEITH *WALKING FLOOR Workhorse drive-unit*

Three double-acting *hydraulic cylinders* move the floor slats in a cycle with four phases. The forces exerted by the cylinders are transferred to the slats by three *cross drives*. Each cross drive moves 1/3 of the total number of floor slats.

The floor slats slide over plastic *sliding bearings* that support both the upper part and the sides of the slat. Different floor slats, varying in width, surface area and material, have been developed to provide optimum operation with various types of load. The unloading cycle is composed of the following four phases, the loading cycle is the opposite. (Figure1.2a en 1.2b).

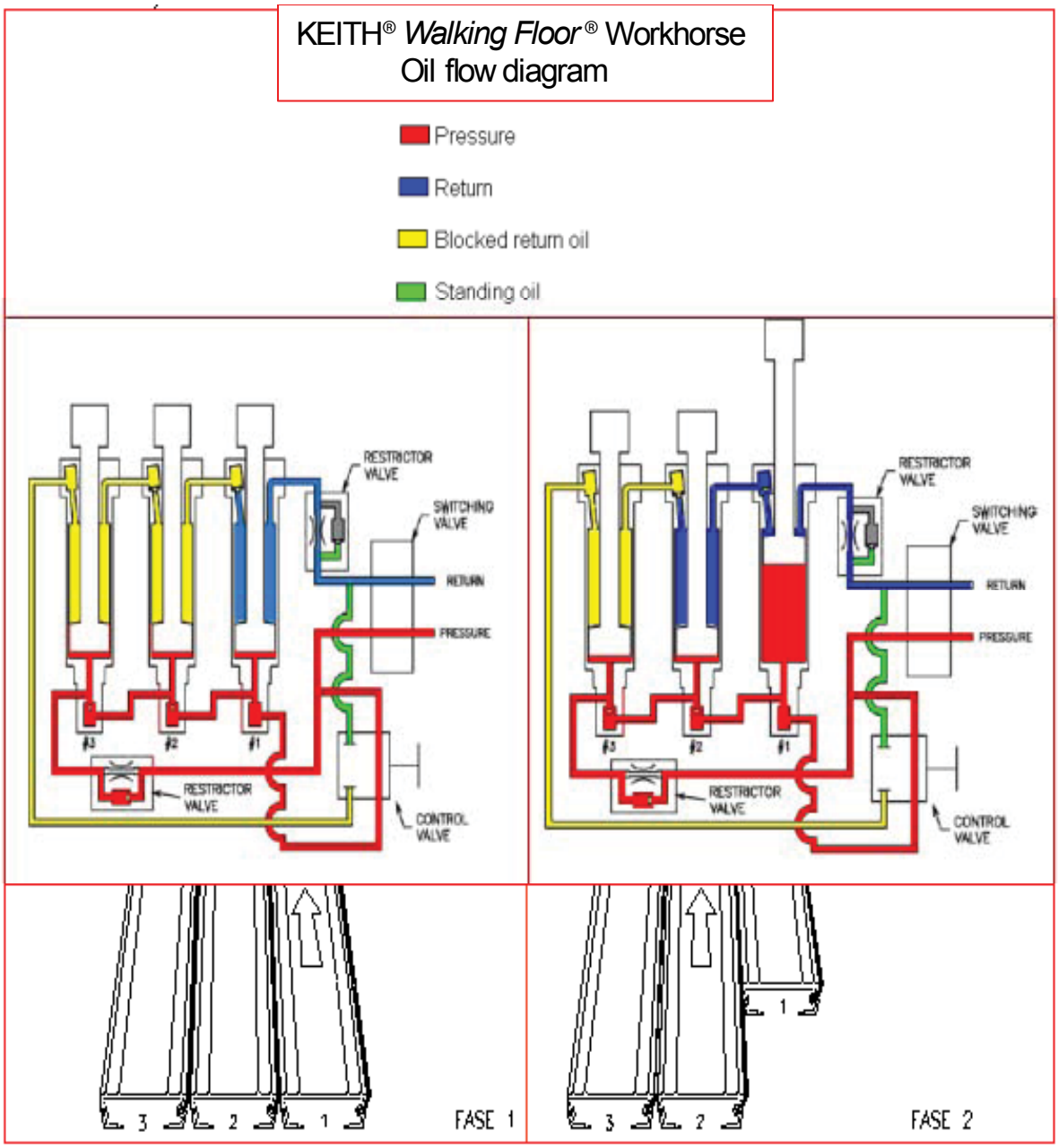


Figure 1.2a

Phase 1: Cylinder 1 (and slats #1) moves towards the front of the bunker. Because only 1/3 of the floor is moving, whereas 2/3 of the floor is not, the load will not move (the friction of this major floor area exceeds the friction force caused by the Walking Floor slats). At the end of its stroke, the cylinder actuates a check valve that allows the oil flow to start phase 2:

Phase 2: Cylinder 2 (and slats #2) moves towards the front of the bunker; again the load will not move. At the end of its stroke, the cylinder actuates a second check valve that allows the oil flow to start phase 3:

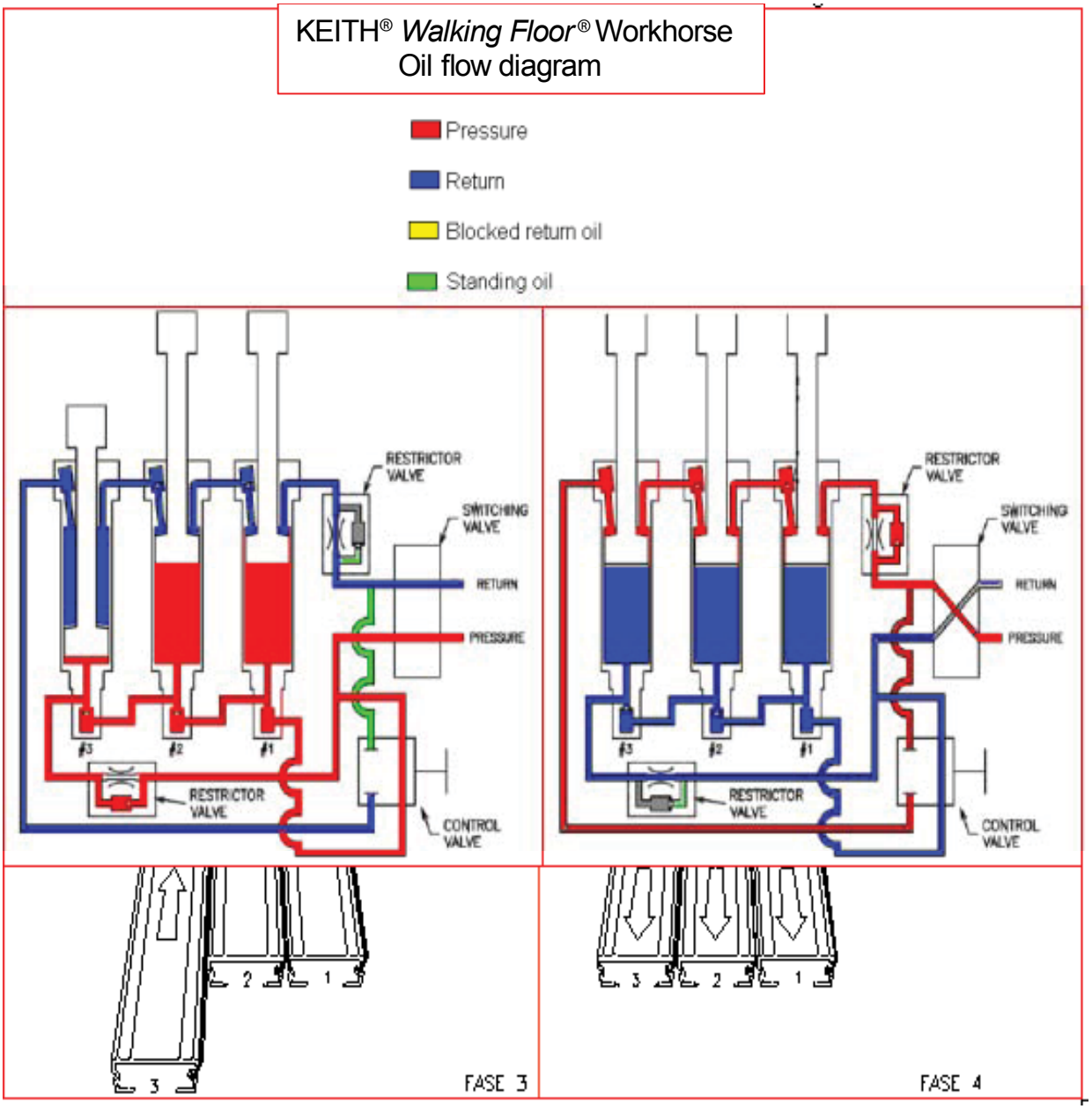


Figure 1.2b

Phase 3: Cylinder 3 (and slats #3) moves towards the front of the bunker; again the load remains still. At the end of the stroke, when all cylinders are lined up, an actuator attached to the cross drive mechanically switches the switching valve. The switching valve switches the pressure from the front end to the rear end of all cylinders, this starts phase 4:

Phase 4: Cylinder 1,2 and 3 (and all slats) move back towards the open side of the bunker. Because of the friction force between the floor and the load, the load will move over a distance equal to the stroke of the hydraulic cylinders. At the end of the stroke the switching valve switches the pressure to the rear end of all cylinders. The cycle is now completed and starts with phase 1 again.

The position of the two control valves (internal) determines the loading or the unloading cycle. A manual or electrical load- / off- / unload valve operates these valves.

The (un)loading time is determined by the speed of action of the cylinders, which depends on oil flow to the cylinders and the cylinder size. The force the cylinders transfer to the floor determines the maximum load, which can be (un)loaded. The cylinder force is dependent on the oil pressure and the cylinder size.

The pump determines both the flow and the maximum oil pressure, and therefore the (un)loading time and the weight, which can be handled. To protect the system, the pressure relief valve, set at 210 bar, limits the pressure.

NOTE:

- For faster (un)loading, the oil flow must be increased; pressure has no influence on (un)loading time.

- The system operating pressure is determined by the load resistance and not by the pressure relief valve setting of the pump.

- Conveying products for which the system has not been designed can cause damage to the system. We therefore advise you to contact your supplier about this first.

3. Specifications of the *WALKING FLOOR* Workhorse drive unit

Cylinders	3		
	standard	ø	102 mm
	stroke		200 mm.
Weight			477 kg.
Capacity	ø 102 mm		26.300 kg. at 140 bar
Pump			
	max.		210 bar
	max.		110 l/min.

3.1 Specifications of the hydraulic installation

Always consult the supplier of your drive unit to ensure you choose the correct hydraulic power unit. Figure 3.1 shows the components of the hydraulic installation in a hydraulic diagram.

1 Bleed
2 Hydraulic reservoir
3 Suction tubing, Min. 2”
4 Pump
5 PTO
6 Return line from filter
7 Exhaust tubing, Min 3/4”
8 Pressure relief valve, Max. 210 BAR
9 Return filter
10 Return / Pressure tubing 1”
11 Quick coupling (M)
12 Quick coupling (F)

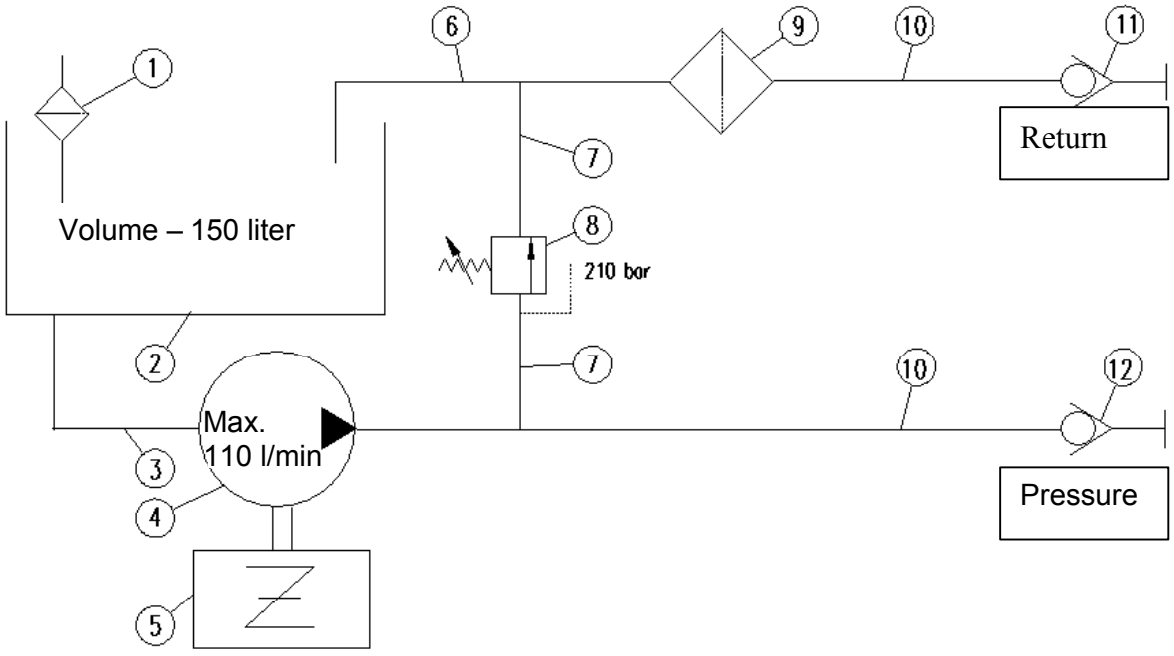


Figure 3.1 Hydraulic diagram

The hydraulic installation must meet the following requirements:

PUMP/ PTO: The quantity of oil that will be pumped in the system determines the loading and unloading time; the oil pressure determines the maximum total weight that can be handled.

The KEITH® WALKING FLOOR® Workhorse System is designed for a recommended maximum oil flow of 110 l/minute. And a recommended maximum speed of 2.6 m/min.

A high power take-off (PTO) ratio (greater than 1:1) reduces the size of the pump for a given rotational speed. This is generally the best alternative, technically as well as financially. Compare the performance of the motors in order to be certain that the motor can drive the pump. Also, check that the rotational speed of the motor will not be greatly reduced by the load. Compare the maximum permitted loading of the PTO with that of the pump.

OIL: The hydraulic oil must be of high quality, suitable for a pressure of 210 bar. The ISO viscosity must be 46 (for example Chevron AW 46 hydraulic oil), while in cold conditions a viscosity of 32 must be used. Conditions of extreme cold demand hydraulic fluids of aviation quality.

RESERVOIR: The volume of oil in the reservoir must be equal to or greater than the oil flow per minute. The reservoir must be filled to a level of 80-90%. Suction and return tubing must be placed so that cavitations will be prevented. The filler cap must have a bleed capability.

PRESSURE RELIEF VALVE - The hydraulic installation must have a pressure relief valve that is adjusted to 210 bar. Ensure that the pressure relief valve is capable of sustaining the oil flow.

WARNING: The correct adjustment of the pressure relief valve is very important. If this is too low it is possible that the system will not load or unload; if it is too high, the system may be damaged.

measures to follow:

FILTER: The filter in the return tubing must have a degree of filtration of 10 microns. In conditions of extreme cold it is better to use filtration of 25 microns. Ensure that the nominal flow volume of the filter is the same as the maximum oil flow that can occur in the system.

HYDRAULIC PLUMBING: All hoses must be suitable for a pressure of at least 300 bar.
Suction Plumbing: in order to prevent cavitations, the oil flow to the suction inlet of the pump must be unhindered. This requires suction tubing with a sufficient diameter (at least 2” or 50 mm) that is as short as possible (not more than 1.5 m), with out constrictions. Cavitations can also be caused by bends or elbows in the pipe work – a straight line is best. Ensure that the hose cannot collapse with the suction.
Pressure plumbing: the hose from the tractor to the trailer must be 1” or 25 mm.
Return plumbing: the hose from the trailer to the filter must also be 1” (25 mm). The hose from the return filter to the reservoir must be at least 1¼” (32 mm).

QUICK-COUPLINGS:

Tractor:	Male on return (to the reservoir)
	female on pressure (from the pump)
Trailer:	female on return (from the “TANK” port on the filter block)
	male on pressure (to the “PUMP” port on the filter block)

4. Operation

WARNING:

The large force exerted by the floor can result in damage to equipment and serious injury or death. Always ensure that this manual has been read and understood by the operator. Take the following precautionary measures:

- First open the doors before switching on the pump.
- Make sure that nobody is under the system when the pump is switched on.
- Ensure that during unloading no people or animals are in the immediate neighbourhood of the location where the load can end up. We suggest that no one should be within 5 m of the discharge danger zone.
- Ensure that there is always someone close to the emergency switch during loading and unloading.
- Always switch off the pump during maintenance or service activities.
- Always switch off the pump when the vehicle is being driven and when the system is not in use.

Two modes of operation are possible: *manual* and *electrical*; the person operating the system during loading or unloading must be able to see the place where the load will be placed.

GENERAL TIPS:

- Depending on the type of load, a part of it can remain on the floor after the unloading operation. This can be prevented by the use a Cleensweep tarp system, a moving headboard or a piece of canvas, possibly attached to a moving head board or attached to the front bulkhead with clips.

- In order to limit the effect of friction between the floor and the load, (so as to protect the load or the floor) a piece of canvas can be laid over the whole floor and fixed at the front to the moving headboard. With a simple arrangement it is possible to roll it up at the rear during unloading.

- The speed of the floor can be changed by changing the speed of the motor. Ensure that the maximum permitted pumping rate is not exceeded.

- Ensure that the material can be freely unloaded: do not push against the material stacked behind the floor.

- Take care that the load does not damage the front wall or headboard. The force exerted by the moving load can be considerable!

- In frosty conditions, stop the three cylinders at the beginning of the unloading movement. As soon as unloading starts, the floor slats will move together to the tail end of the trailer and will detach the load from the side walls.

4.1 Manual operation

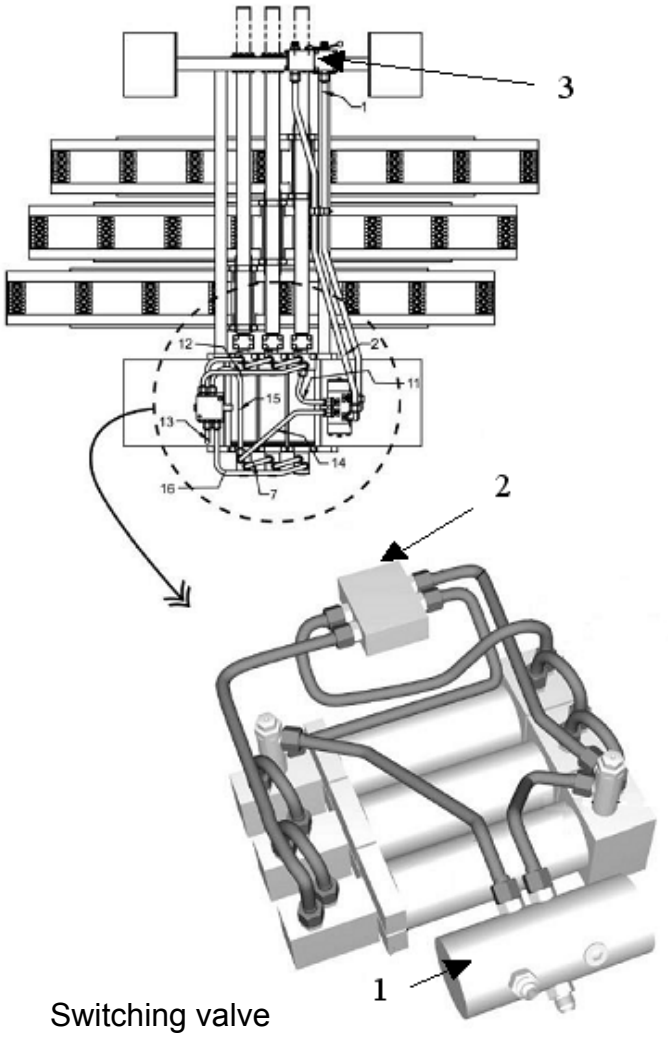
Starting the floor operation:
1. Open the trailer doors.
2. Attach the hydraulic quick couplings to one another.
3. Turn on the PTO and bring the engine to the desired number of revolutions (rpm).

Unloading / loading:
1. Select the desired operation to be performed by the system; unload / load.
2. Set the on/off handle in position; on.

The floor will now begin to function.

Stopping:
1. Set the on/off handle in the position; off.

The floor will now stop.



1. Switching valve
2. Manual Load/Unload valve
3. Manual On/Off valve

Figure 4.1: Manual operation

4.2 Electric operation

Starting the floor operation:

1. Open the trailer doors.
2. Attach the hydraulic quick couplings to one another.
3. Turn on the PTO and bring the engine to the desired number of revolutions (rpm).

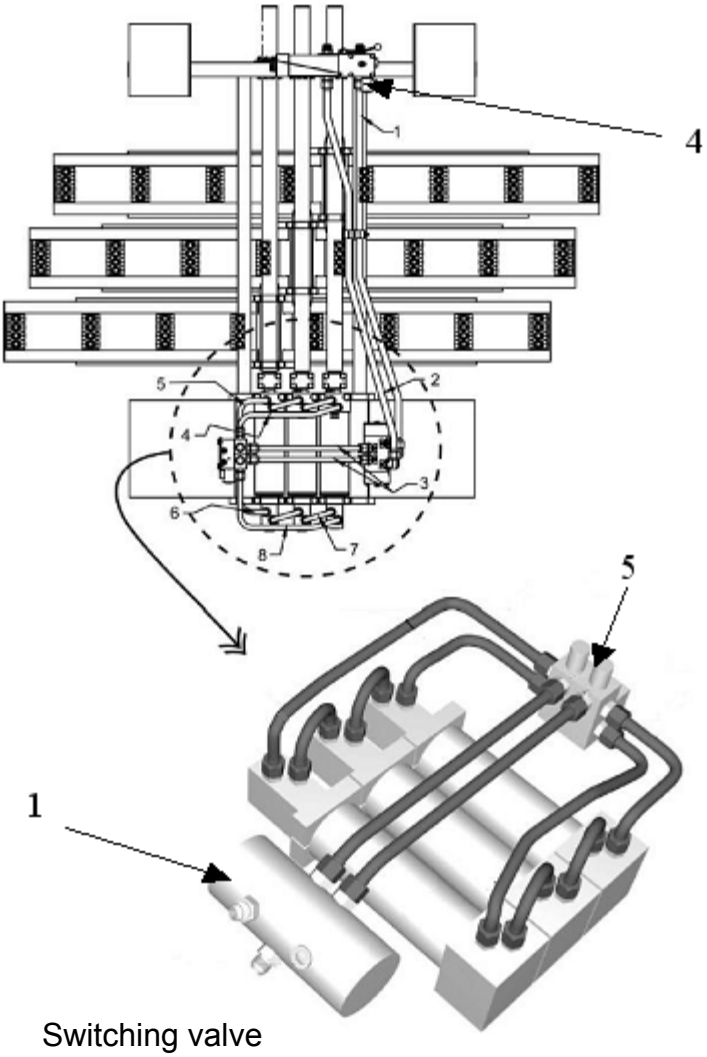
Unloading / loading:

1. Set the control push button for the system in the desired position; unload / load.
2. Set the on/off switch on the control box in the position; *on*

The floor will now begin to function.

Stopping:

1. Set the on/off switch on the control box in the position; *off*



1. Switching valve
4. Electric On/Off valve
5. Electric Load/Unload valve

Figure 4.2: *Electric operation*

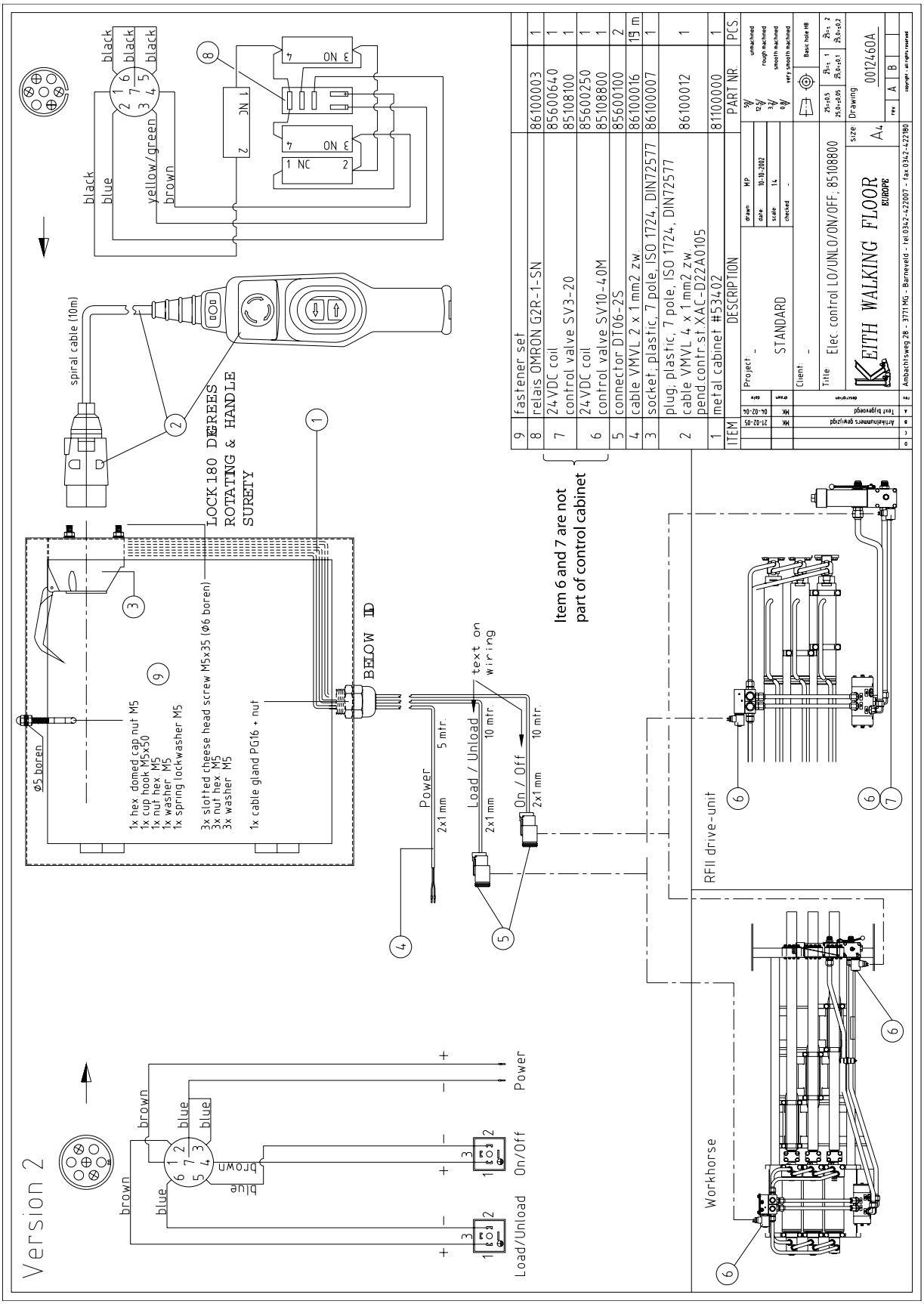
Emergency stop
The system with an optional KEITH® electrical controlbox is provided with an emergency stop push button. If a dangerous situation arises during the operation of the floor it can be stopped immediately with the emergency stop.

Manual operation in an emergency
In case of an interruption in the electrical power supply, the system can be switched on/ off manually. Operate the handle on the block between the pressure and return connection.

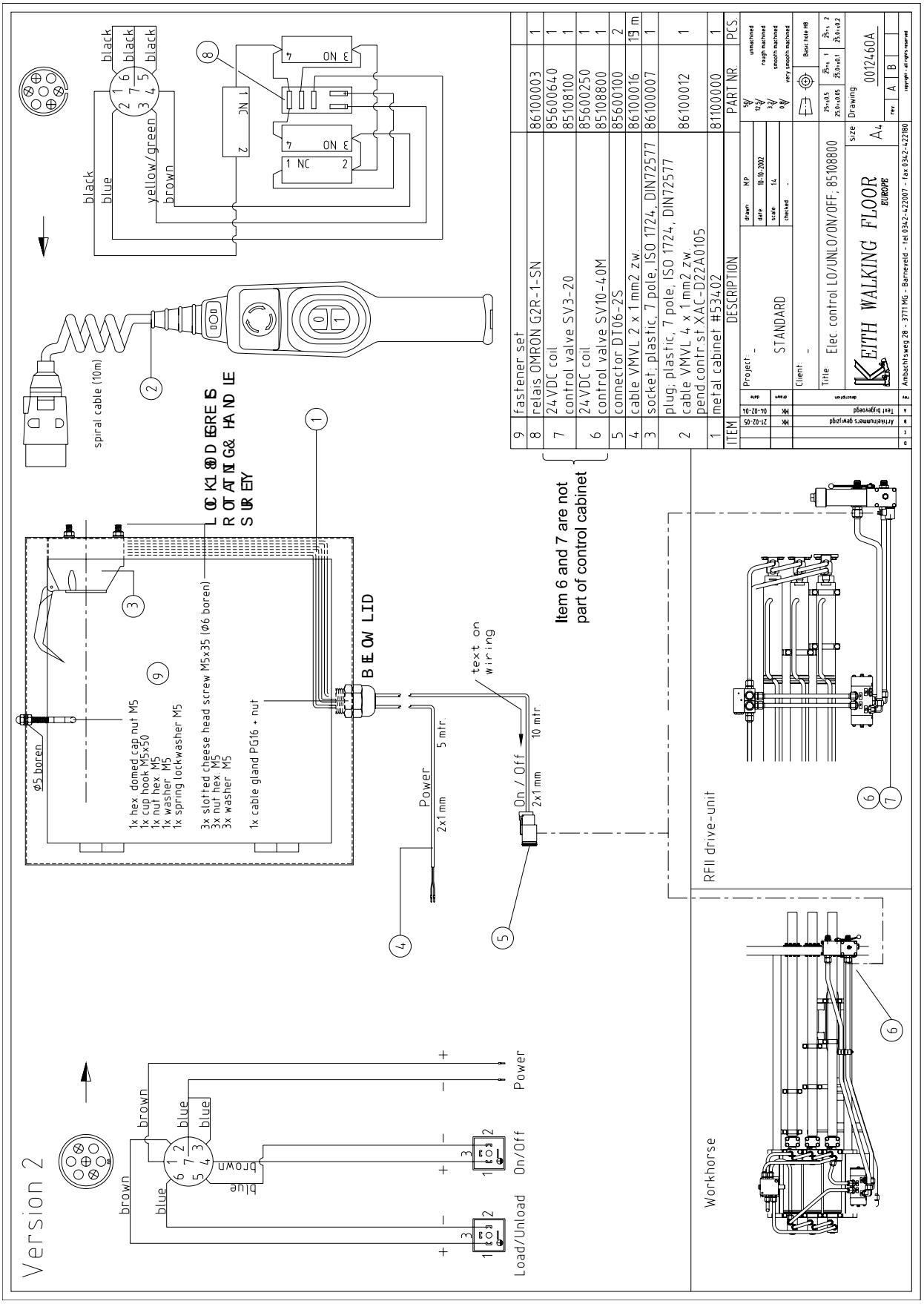
Switching off

1. Stop the floor
2. Switch the PTO off and uncouple the quick couplings, if necessary.

4.2.1 Electrical control Load / Unload / On / Off



4.2.2 Electrical control On / Off



5. Components

WARNING:
The large force and pressure caused by the hydraulic forces in the system can cause serious injuries. Always switch off the pump during maintenance or service work.

5.1 The cylinder

The three cylinders are the drive elements in the KEITH® *WALKING FLOOR*® system.

The cylinders are attached to the frame by a bolt construction. Each piston rod, or extension of the piston rods, are attached to a cross drive with two clamps.

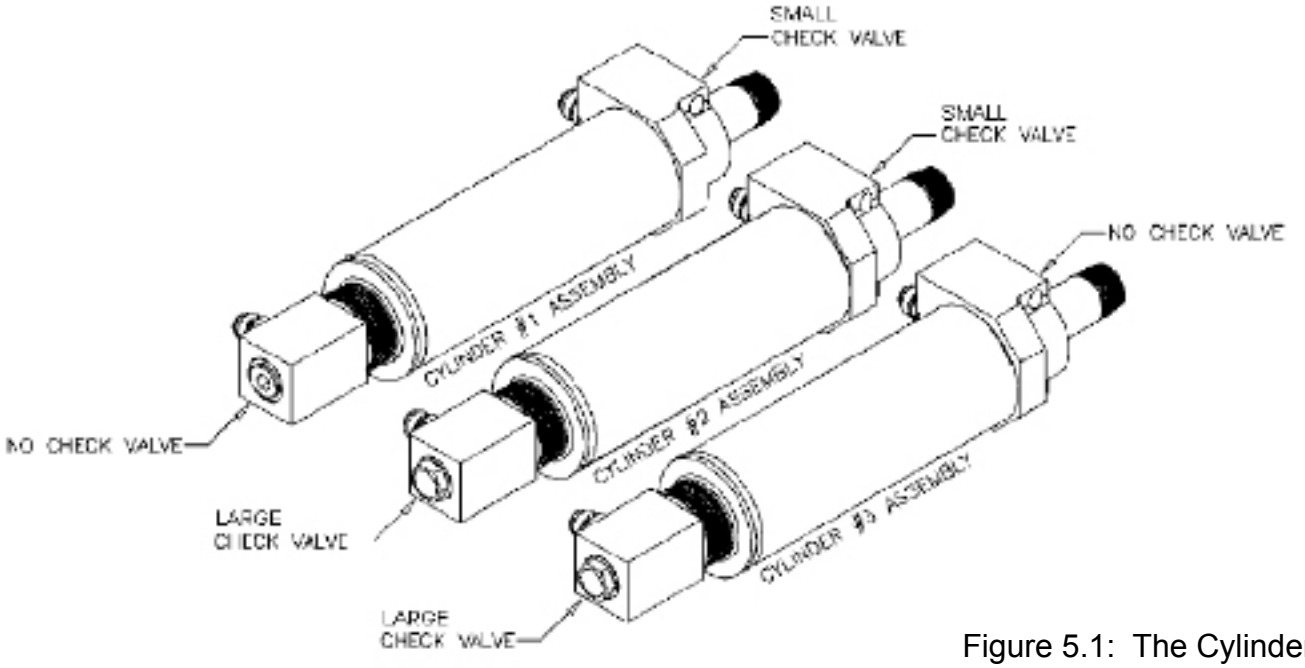


Figure 5.1: The Cylinder

The above figure shows the difference between the cylinder compilation.

For possible repair of a cylinder, in all cases a #2 cylinder will be supplied. Besides the replacement for a #2 cylinder, this cylinder can be modified for the purpose of a cylinder #1 or #3. For modification to cylinder 1, the plug, check valve and the spring at the end of the cylinder needs to be removed. When a cylinder #3 is needed, the check valve, the spring and plug needs to be removed at the front of the cylinder.

After replacement of a cylinder, followed by a full sequence of loading and/or unloading at full load:

Check the torque of the bolts with which the cylinder is attached to the frame - torque 170 Nm.
Check the torque of the bolts in the cylinder clamps - torque 170 Nm.
Check the system for leaks.

5.2 The check valve

The four check valves are the sensors of the KEITH® *WALKING FLOOR*® system. The check valve detects when the cylinder has reached the end of its stroke and opens in order to allow the oil from the following cylinder to flow to the reservoir. The check valves are located at the front and rear of the cylinder in the heads on top of the cylinders. The valves are operated by the piston or piston rod inside the cylinders.

5.3 The switching valve

The only function of the switching valve is to change the pressure from one side of the cylinders to the other side. This ensures that the cylinders move in the opposite direction. The switching valve is mechanically operated at the end of the stroke of cylinder No.1 and cylinder No. 3.

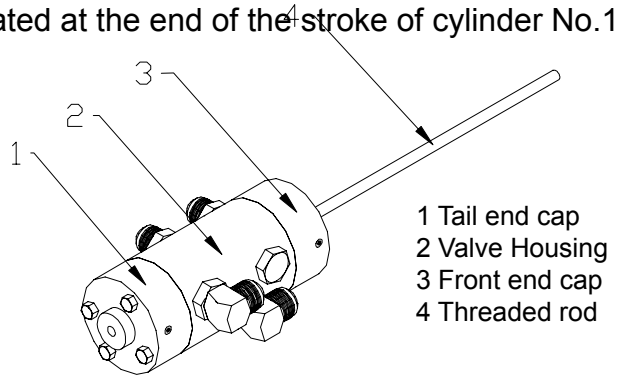
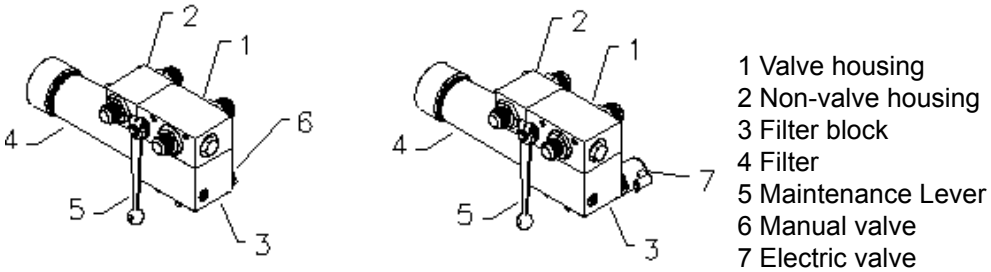


Figure 5.3: *The switching valve*

5.4 The On / Off Valve

The valve, manually and/ or electrically operated, sets the floor in operation. In the <OFF> position the oil flows via the valve directly back to the reservoir. The system will not operate if the pressure and return plumbing is not correctly connected.



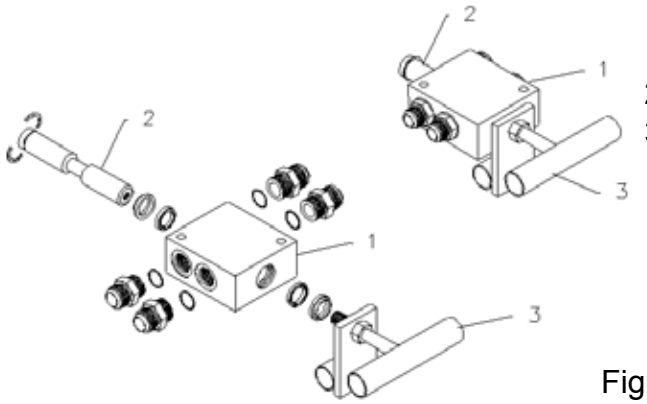
Manual Electric Figure 5.4: The On / Off valve

5.5 The control valve

This valve, which is manually operated, determines the direction of movement of the system. The valve has two positions:

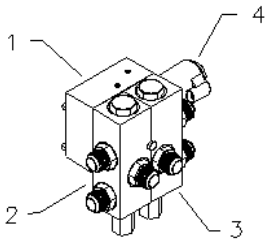
- Fully Withdrawn ; unloading
- Fully Depressed; loading.

Before the floor system is started the correct direction must be set.



1 Valve housing
2 Valve coil
3 Handle

Figure 5.5a: *The Manual Control valve*



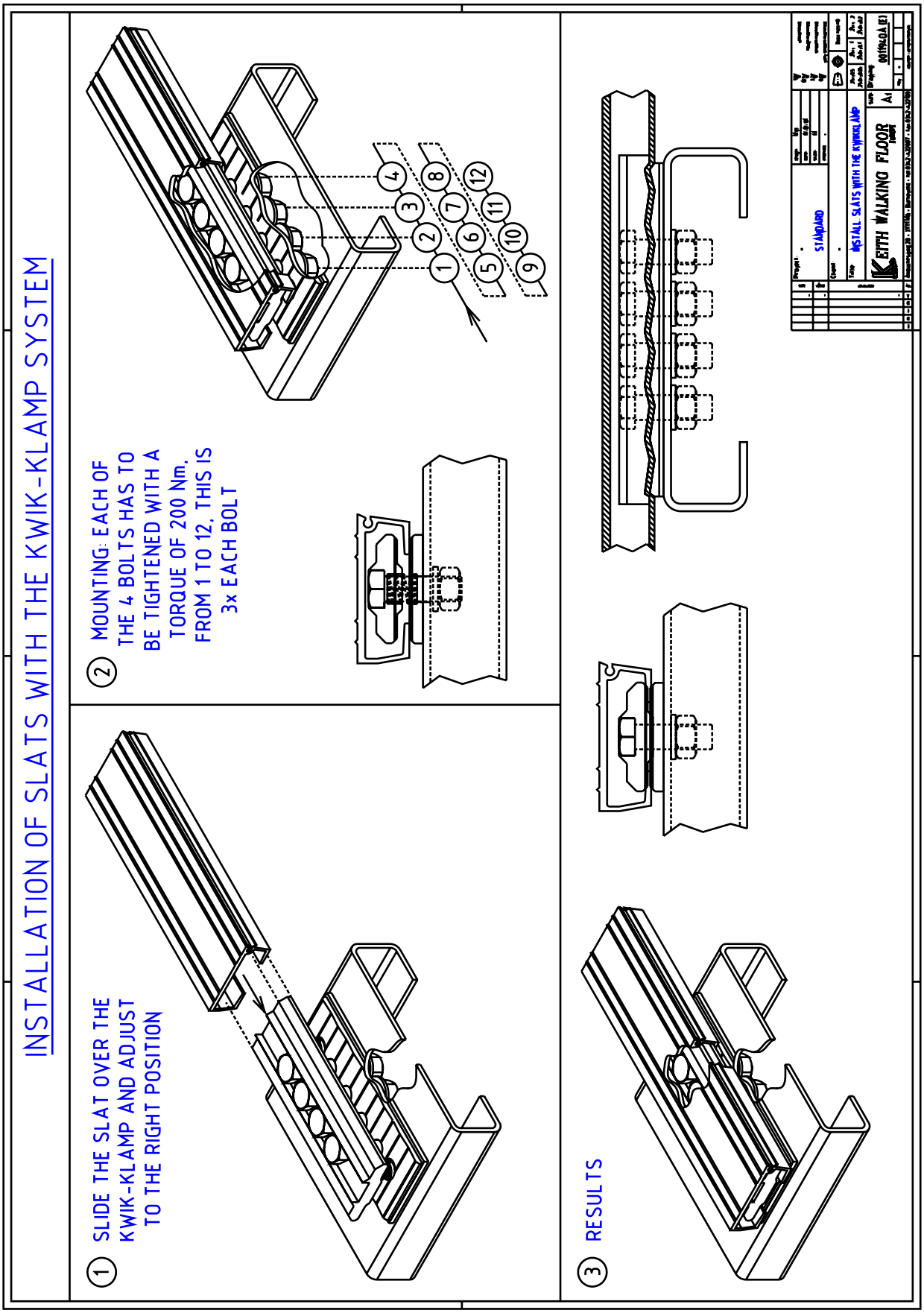
2 Load end cap
3 Unload end cap
4 Control valve

Figure 5.5b: *The Electric Control valve1* Pilot valve housing

5.6 The hydraulic plumbing

All hydraulic plumbing is internally completely hollow. A considerable part of the hydraulic circuit is internal; the external plumbing for both manual and electrical operation are shown in respectively figures 4.1 and 4.2. Ensure, when work is being carried out on the system, that all couplings, covers and plugs make a good seal (“O” – ring or flat seal).

5.7 Installation of the floor slat with Kwik-Klamp® System



6. *WALKING FLOOR*® Workhorse system maintenance

WARNING: The large force and pressure can cause serious injuries. Always switch off the pump during maintenance or service work.

Two conditions that contribute to the life of the KEITH® *WALKING FLOOR* system are:

- Clean oil, free from contamination
- Correct torque for the bolts. The bolts of the cylinder clamps and of the floor profiles must be checked regularly.

The following maintenance must be carried out:

- after the system has been working for 6 hours;
- every half year or after every 150 operating hours whichever is sooner.

1. General inspection of the system and the floor.
   Inspect the system for damage.
   Check for oil leaks.
   Check the system for smooth operation.
   Check the temperature. No single part may be warmer than 70ºC (it must be possible to touch all parts with the bare hand).

2. Change the oil filters:

a. Filter in the return plumbing of the hydraulic installation. Optional:

b. Filter in the pressure plumbing (FA 20ME MXW2-GDL20, 20 microns). Unscrew the filter housing. Clean up any oil that has leaked. Fit a new filter.

3. Check the torque of the cylinder bolts.

a. Cylinder clamps: Torque: 170 Nm.

b. Bolts which connect the cylinder to the frame : 200 Nm

7. Dealing with problems

WARNING: The large force and pressure can cause serious injuries. Always switch off the pump during maintenance or service work.

If you experience problems with the operation of your KEITH® WALKING FLOOR® system this section can help you to find a solution and to make small adjustments. Before you go further, first check whether one of the following most frequently encountered problems is applicable:

- oil*	: is the reservoir full?
- pump*	: does it pump the necessary quantity of oil at 210 bar?
- connections*	: is the system connected as shown in the hydraulic diagram (fig. 3.1)?
-pressure relief valve*	: is this adjusted to 210 bar?
-PTO*	: is this switched on?
-quick couplings	: are they properly connected?
- on/ off valve	: is this on?
-electrical operation	: is there sufficient voltage?
	: is the emergency pushbutton pulled out?

* see the specification for the hydraulic installation (chapter 3).

IMPORTANT: When you perform welding on the system, the part on which welding is performed must be directly connected to earth.

A pressure meter can be connected to the system.

PROBLEM A: The cycle begins, then the floor stops:

1. All cylinders move backward, then the system stops.

Cause #1 : The switching valve is not switching correctly.
Solution : Check the adjustment. (Figure 7.1).
Cause #2 : Insufficient pressure.
Solution : Check the pressure and the position of the pressure relief valve.

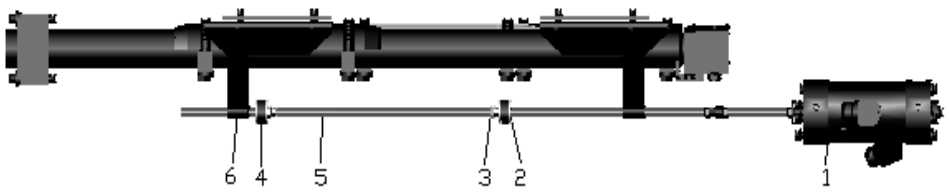
2. Cylinder 1 moves forward, cylinder 2 moves forward, cylinder 3 moves forward, then the system stops.

Cause : The switching valve is not switching correctly.
Solution : Check the adjustment. (Figure 7.1).

3. The floor functions perfectly without a load or with a light load, but not with a heavy load.

Cause #1 : Insufficient pressure.
Solution : : Check the pressure and the setting of the pressure relief valve.
Cause #2 : The switching valve is not switching correctly.
Solution : Check the adjustment. (Figure 7.1).

N.B.: Cylinder 1 is the cylinder on the driver's side, for vehicles driving on the right.
Cylinder 1 is the cylinder on the passenger's side, for vehicles driving on the left.



1.Switching valve
2.Flat Washer M10
3.Nut M10
4. Plastic stop ring
5. threaded rod M10
6. Bracket

Figure 7.1 : Adjustment of the switching valve

PROBLEM B: Cycle runs incorrectly for unloading:

1. Cylinders 1 and 2 move together to the front.

Cause : The check valve on the front of cylinder 1 is not functioning correctly.
Solution : Repair the check valve.

2. Cylinders 2 and 3 move together to the front.

Cause : The check valve on the front of cylinder 2 is not functioning correctly.
Solution : Repair the check valve.

3. All cylinders move together to the front.

Cause #1 : The load/unload valve is not functioning correctly.
Solution : Repair the load/unload valve.
Cause #2 : The check valve on the front of cylinders 1 and 2 is not functioning correctly.
Solution : Repair the check valve.

PROBLEM C: The loading cycle runs incorrectly:

1. Cylinders 3 and 2 move together to the rear.

Cause : The check valve on the rear of cylinder 3 is not functioning correctly.
Solution : Repair the check valve.

2. Cylinders 2 and 1 move together to the rear.

Cause : The check valve on the rear of cylinder 2 is not functioning correctly.
Solution : Repair the check valve.

3. All cylinders move together to the rear.

Cause #1 : The load/unload valve is not functioning correctly.
Solution : Repair the load/unload valve.
Cause #2 : The check valve on the front of cylinders 2 and 3 is not functioning correctly.
Solution : Repair the check valve.

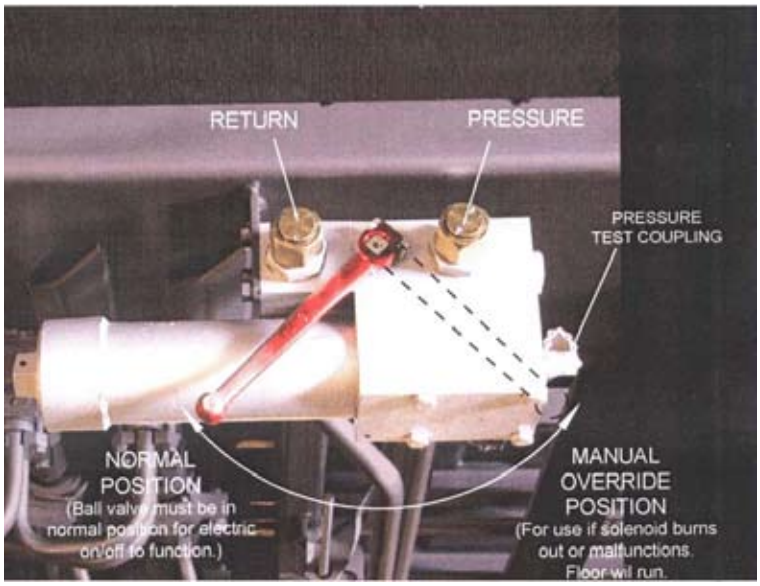
7.1 Emergency Provision

The Electric On / Off valve:

The on/ off valve, controlled electrically, starts and stops the operation of the floor. In the <OFF> position, the oil flows via the valve directly back to the oil reservoir. NOTE: the system will not work if the pressure- and return hydraulic piping are not correctly connected.

Situation : It is not possible to control the electric on/ off valve.

Solution : Place the red handle so it is pointing to the opposite direction of the system; in other words the manual override position (see figure 7.2). The oil shall now flow directly through the system. The Floor will start moving if the pump is switched on. The system will now unload. The floor can be switched into the loading direction by pressing and turning the red button of the coil of the electric control valve. By pressing and turning the red button to the right, the floor will unload again. This will only work when there is no electric power on the coil of the electric load / unload valve. If the red handle is placed in its normal position, meaning pointing toward the system, then the oil flow is blocked and the floor movement will stop.



The functioning of the handle

The red button on the coil

Figure 7.2 : The electric on / off valve

8. Warranty

KEITH Mfg. Co. hereby warrants,

- Only to the first owner of a new KEITH® WALKING FLOOR® unloader from the factory or selling distributorship that the product shall be free from defects in material and workman ship for a period of one year after delivery to the first registered owner.

- This warranty does not cover normal wear and tear and maintenance, and is not to be construed as a service contract.

Owners Obligation:

- To qualify for warranty coverage,
- A warranty card must be completed and on file at KEITH Mfg. Co. and,
- The equipment must be subject to normal use and service only.

Definition of Normal Use and Service:

Normal use and service means:

- The loading and/or unloading of uniformly distributed, non-corrosive material,
- Properly restrained and secured on properly maintained public roads, with gross vehicle weights not in excess of factory rated capacity.
- For stationary installations, normal use and service means the conveying of uniformly distributed, non-corrosive materials, with weights not in excess of factory rated capacity.

Sole and Exclusive Remedy:

If the product covered hereby fails to conform to the above stated warranty,
KEITH Mfg. Co.'s sole liability under this warranty and the owner's sole and exclusive remedy is,
Limited to repair or replacement of the defective part(s) at a facility authorized by KEITH Mfg. Co.
This is the owner's sole and exclusive remedy for all contract claims, and
All tort claims including those based on the strict liability in tort and negligence.
Any defective part(s) must be shipped freight prepaid to the facility authorized by KEITH Mfg. Co.

Except As Expressly Set Forth Above, KEITH Mfg. Co. Makes No Warranties:

- Express, implied or statutory, specifically no warranties of fitness for a particular purpose or warranties of merchantability are made.
- Further, KEITH Mfg. Co. will not be liable for incidental damages or consequential damages such as, but not limited to:
- Loss of use of the product, damage to the product, towing expenses, attorney's fees and the liability you may have in respect to other reasons.

Tort Disclamer:

•KEITH Mfg. Co. shall not have any liability in tort with respect to the products, including any liability based on strict liability in tort and negligence.

If This Warranty Violates Law:

•To the extent any provision of this warranty, contravenes the law of any jurisdiction, that provision shall be inapplicable in such jurisdiction and the remainder of the warranty shall not be affected thereby.

8.1 Warranty conditions

This guarantee applies to the free-of-charge provision of replacement components, provided;

- In the case of a malfunction KEITH *WALKING FLOOR* Europe must be informed first.
- The KEITH *WALKING FLOOR* system has been installed by your installer in accordance with our installation specifications.
- Our maintenance and operating instructions have been observed.

Not covered by the guarantee;

- Malfunctions of/caused by equipment supplied by third parties.
- Malfunctions of/caused by the use of contaminated and/or incorrect oil.
- Malfunctions of/caused by injudicious use.
- Malfunctions of/caused by repairs/additions carried out by third parties.
- Normal wear and tear of components and filter elements.
- Defects of electrical parts resulting from bad connections and/or incorrect voltages.
- Labor costs.

The guarantee will lapse if;

- The KEITH *WALKING FLOOR* system is used for material other than that for which the original was intended.
- The KEITH *WALKING FLOOR* system has not been installed correctly by your installer so that the operation of the system is negatively influenced.

Warranty registration card

USER DETAILS

NAME :____

ADDRESS :____

POSTAL CODE + PLACE :_______________________________________

COUNTRY:____

TEL. :_________________________ FAX :_________________________

E-MAIL :____

SYSTEM DATA

DATE OF PURCHASE :______________________________________

MODEL / SERIAL NUMBER : ____________________________________

PURCHASED FROM : _______________________________________

LOAD : ____

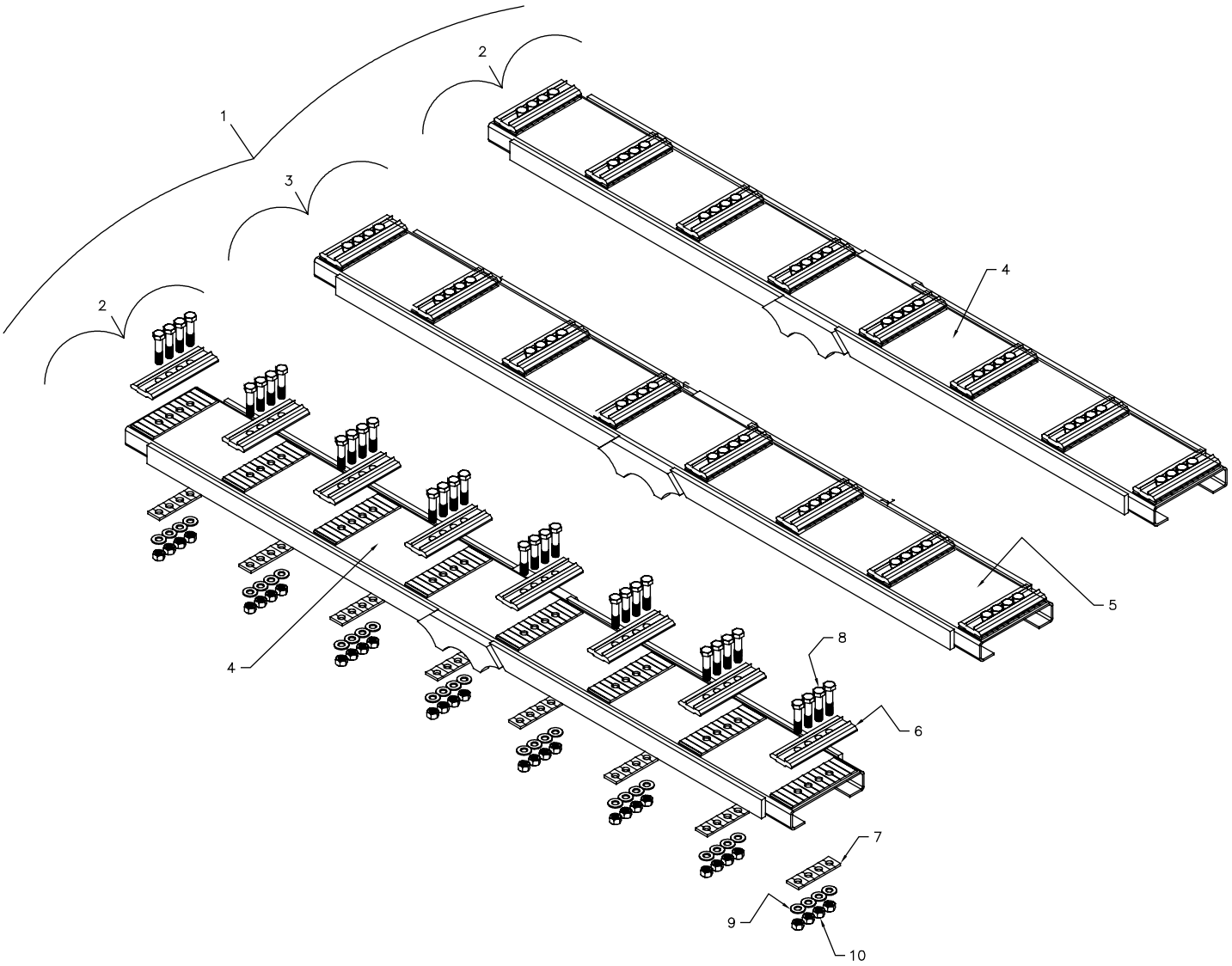
HEREBY DECLARE THAT I HAVE READ AND AGREE TO THE GUARANTEE CONDITIONS OF KEITH *WALKING FLOOR* EUROPE.

Place	Date	Signature
_____________	__________	_______________________

N.B. IN ORDER TO SUBMIT A CLAIM UNDER THE GUARANTEE, THIS REGISTRATION CARD MUST BE SENT TO KEITH *WALKING FLOOR* EUROPE WITHIN 10 DAYS OF PURCHASE.

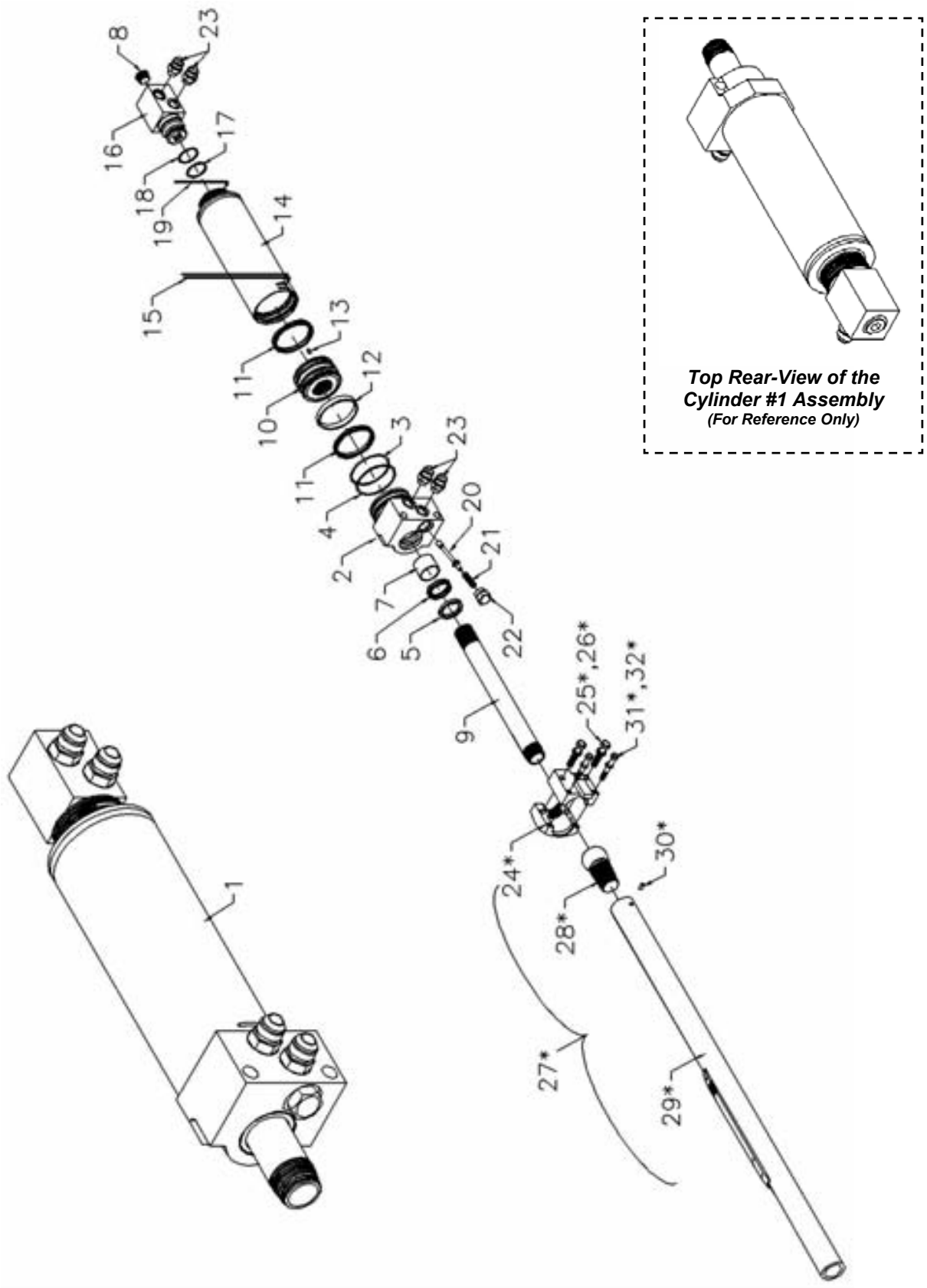
Send with sufficient postage to:

KEITH WALKING FLOOR EUROPE
AMBACHTSWEG 28
3771 MG BARNEVELD



Notes:
1. This view is an inverted bottom view of the Cross-Drive Assemblies.
2. Both #2 assemblies are identical, however one unit is rotated 180° as shown above.

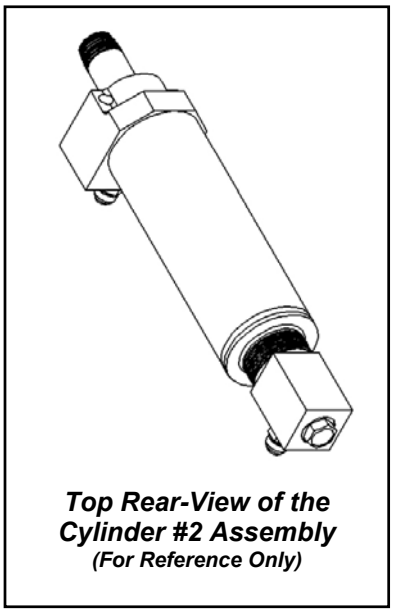
ID#	QUANTITY	DESCRIPTION	PART#
	1	**Workhorse Drive Conversion Kit to Electric On/Off w/ integrated Filter**	**04839602**
-	-	Includes items 1-14	-
1	1	Fairley Arlon Filter Block	04436502
2	1	Test Coupling SMK20-G1/4VC	84904000
3	4	10mm x 110mm Hex Bolt	87011500
4	1	6408-04 O-Ring Hex Plug	84686500
5	1	Solenoid Control Valve SV10-40	85108800
6	2	218 O-Ring	84382800
7	2	112 O-Ring	84376300
8	1	On/Off Poppet	04438401
9	1	Spring #B-18273	84453400
10	1	Fairley Arlon Filter Element #MXW2-GDL20 w/Spring 7 Rubber Seal	84006520
11	2	147 O-Ring Backup	84389047
12	2	147 O-Ring	84378447
13	1	Welded Filter Canister Assy.	06151501



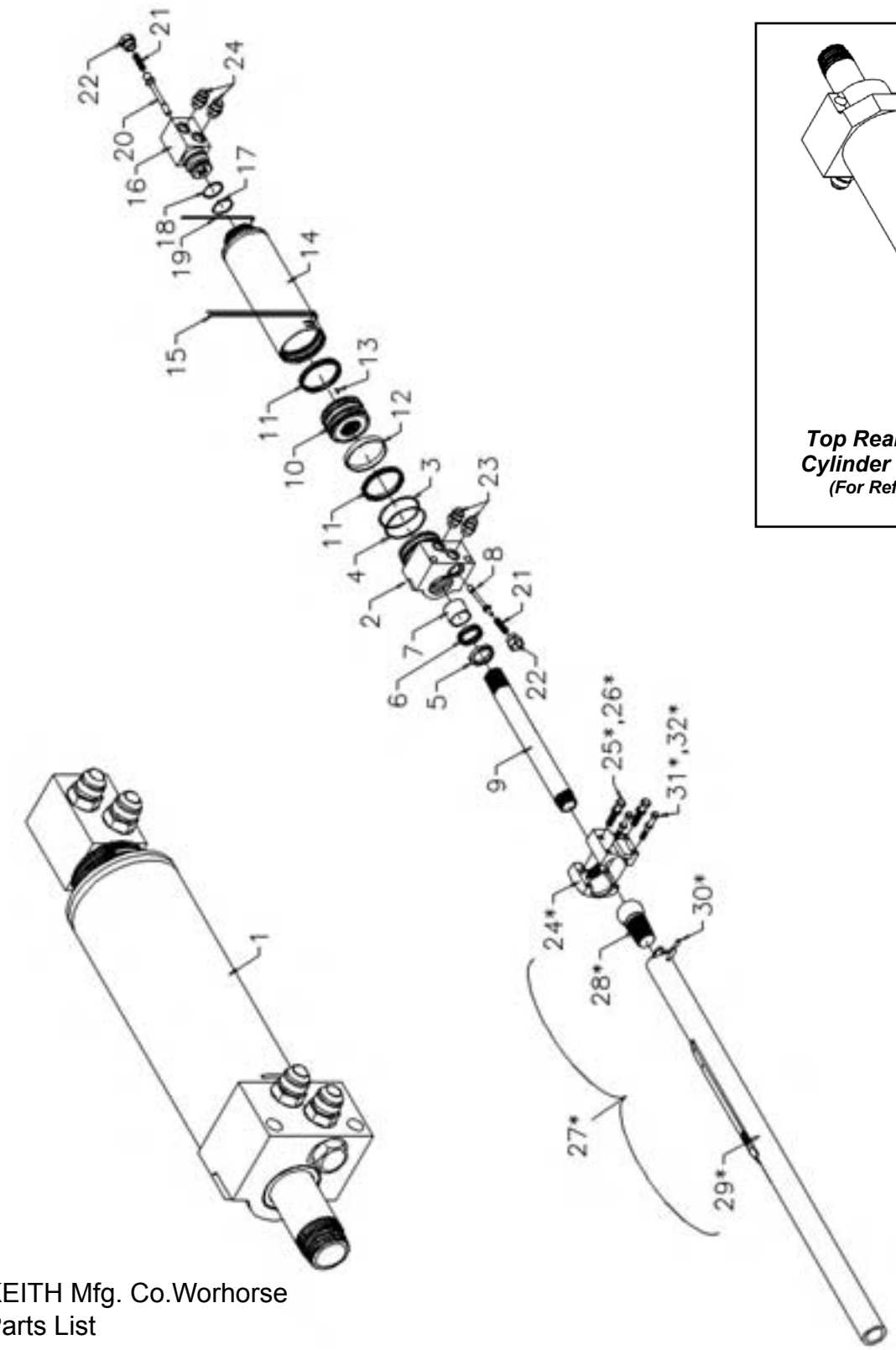
Top Rear-View of the Cylinder #1 Assembly
(For Reference Only)

ID#	QUANTITY	DESCRIPTION	PART #
1	**1**	**Workhorse Cylinder Assembly #1**	**04626101**
		Includes items 2-23	
2	1	4” Aluminum Head w/Round Lock Wire	04620801
3	1	240 O-Ring	84385000
4	1	8-240 O-Ring Backup	84393200
5	1	45mm Canned Rod Wiper	84426600
6	1	45mm Rod Seal	84354200
7	1	45mm Rod Wear Ring (1.5”)	84401200
8	1	-12 O-Ring Socket Plug	84687700
9	1	45mm Rod w/Tapered Grooves	04936901
10	1	4” Steel Piston	04581901
11	2	4” Piston Seal	84352600
12	1	4” Piston Wear Ring (.5”)	84403800
13	1	3/16” x 1/2” Drive Lock Pin	86650400
14	1	4” Barrel Weld Assembly	04621001
15	2	1/8” Round Wire Lock	04834401
16	1	Check Valve Body Steel Head Mounted	04581101
17	1	224 O-Ring	84383700
18	1	8-224 O-Ring Backup	84392160
19	1	1/8” Round Wire Lock	04834401
20	1	Check Valve Poppet 11/16” x 4-1/8”	4537301
21	1	.48” O.D. x .63” Wire x 2” Compression Spring	84454730
22	1	-12 O-Ring Hex Plug	84686900
23	4	-12 to -10 Straight Fitting	84684900
		Items 24-32 Are Not Included With Cylinder Assembly	
24	1	Ball Socket w/ Tapered Grooves and Split Clamp Upper and Lower (metric)	04936802
25	4	12mm x 60mm Hex Cap Screw	87013100
26	4	1/2” Lock Washer	86557000
27	1	Cross-Drive Tube Assembly #1	04828501
31	2	10mm x 60mm Hex Cap Screw	87008540
32	2	10mm Lock Washer	86555000

Note: Cylinder #1 has a HEX plug (part ID #22) on the shaft end and a socket plug (Part ID #8) on the check valve end. Cylinder #1 can be identified by these features.



Top Rear-View of the Cylinder #2 Assembly
(For Reference Only)

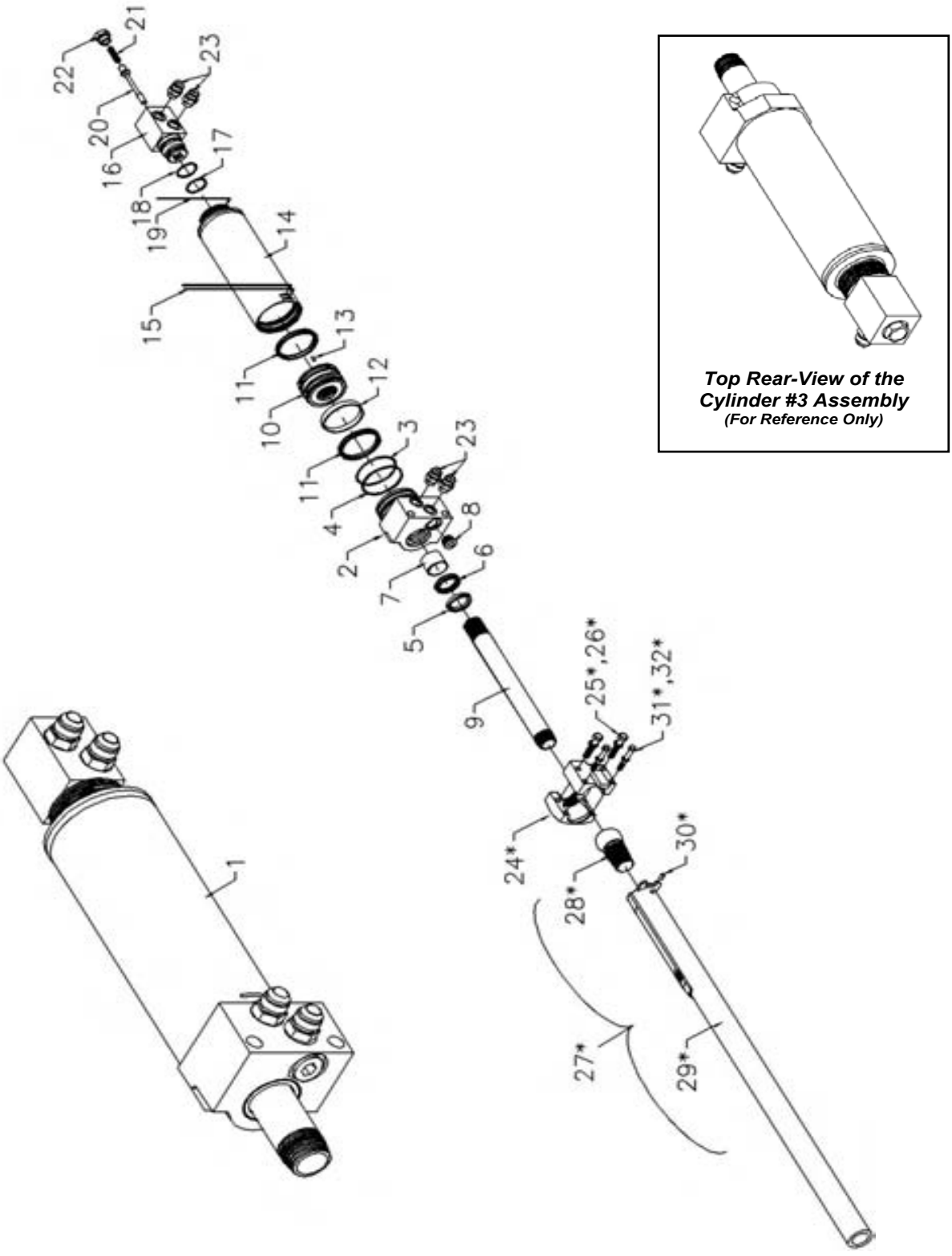


KEITH Mfg. Co.Worhorse
Parts List

ID#	QUANTITY	DESCRIPTION	PART
1	**1**	**Workhorse Cylinder Assembly #2**	**04626201**
		Includes items 2-23	
2	1	4” Aluminum Head w/Round Lock Wire	04620801
3	1	240 O-Ring	84385000
4	1	8-240 O-Ring Backup	84393200
5	1	45mm Canned Rod Wiper	84426600
6	1	45mm Rod Seal	84354200
7	1	45mm Rod Wear Ring (1.5”)	84401200
8	1	Check Valve Poppet 11/16” x 4-1/8”	04537301
9	1	45mm Rod w/Tapered Grooves	04936901
10	1	4” Steel Piston	04581901
11	2	4” Piston Seal	84352600
12	1	4” Piston Wear Ring (.5”)	84403800
13	1	3/16” x 1/2” Drive Lock Pin	86650400
14	1	4” Barrel Weld Assembly	04621001
15	2	1/8” Round Wire Lock	04834401
16	1	Check Valve Body Steel Head Mounted	04581101
17	1	224 O-Ring	84383700
18	1	8-224 O-Ring Backup	84392160
19	1	1/8” Round Wire Lock	04834401
20	1	Check Valve Poppet 13/16” x 5”	4601901
21	1	.48” O.D. x .63” Wire x 2” Compression Spring	84454730
22	2	-12 O-Ring Hex Plug	84686900
23	4	-12 to -10 Straight Fitting	84684900
		Items 24-32 Are Not Included With Cylinder Assembly	
24	1	Ball Socket w/ Tapered Grooves and Split Clamp Upper and Lower (metric)	04936802
25	4	12mm x 60mm Hex Cap Screw	87013100
26	4	1/2” Lock Washer	86557000
27	1	Cross-Drive Tube Assembly #2	04828502
31	2	10mm x 60mm Hex Cap Screw	87008540
32	2	10mm Lock Washer	86555000

Note: Cylinder #2 has a HEX plug (Part ID #22) on the shaft end and a HEX plug (Part ID #22) on the check valve end. Cylinder #2 can be identified by these features.

For parts and repair (unless otherwise noted), a #2 Cylinder will be shipped. To use this cylinder in the #1 position, remove the check valve (#20) and spring (#21) at the rear of the cylinder. To use the #2 Cylinder in the #3 position, remove the check valve (#8), spring (#21) at the front of the cylinder. (See Reference Diagram #01)

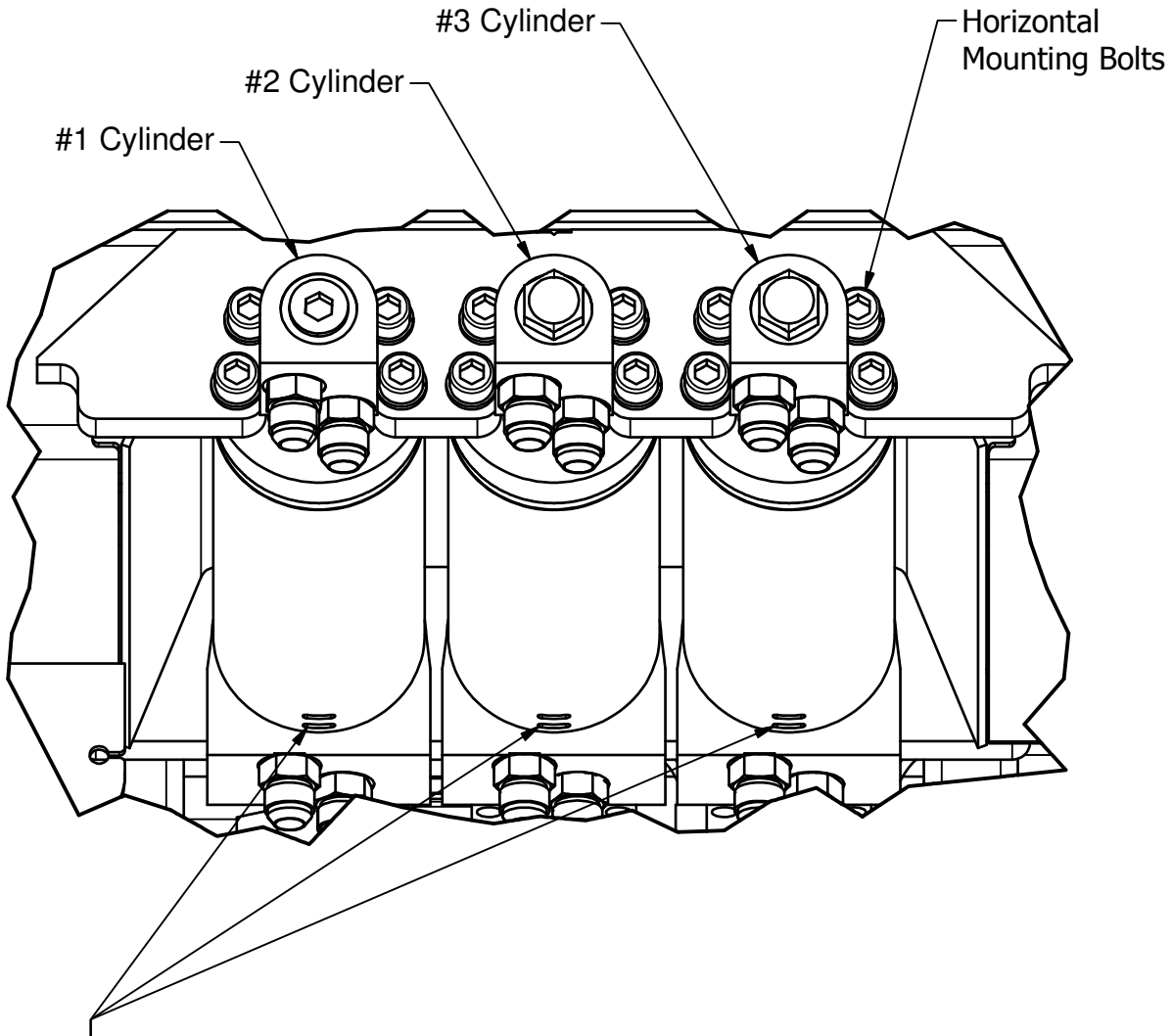


Top Rear-View of the Cylinder #3 Assembly
(For Reference Only)

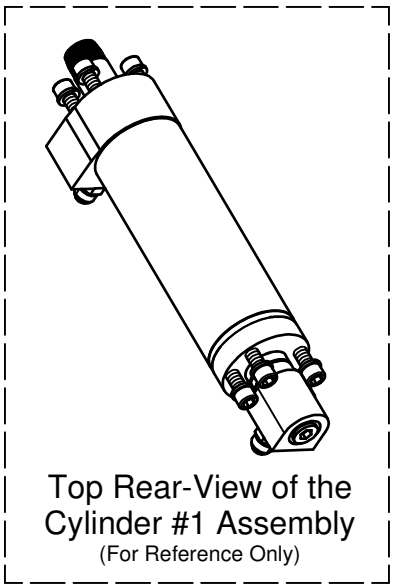
ID#	QUANTITY	DESCRIPTION	PART #
1	**1**	**Workhorse Cylinder Assembly #3**	**04669101**
		Includes items 2-23	
2	1	4” Aluminum Head w/Round Lock Wire	04620801
3	1	240 O-Ring	84385000
4	1	8-240 O-Ring Backup	84393200
5	1	45mm Canned Rod Wiper	84426600
6	1	45mm Rod Seal	84354200
7	1	45mm Rod Wear Ring (1.5”)	84401200
8	1	-12 O-Ring Socket Plug	84687700
9	1	45mm Rod w/Tapered Grooves	04936901
10	1	4” Steel Piston	04581901
11	2	4” Piston Seal	84352600
12	1	4” Piston Wear Ring (.5”)	84403800
13	1	3/16” x 1/2” Drive Lock Pin	86650400
14	1	4” Barrel Weld Assembly	04621001
15	2	1/8” Round Wire Lock	04834401
16	1	Check Valve Body Steel Head Mounted	04581101
17	1	224 O-Ring	84383700
18	1	8-224 O-Ring Backup	84392160
19	1	1/8” Round Wire Lock	04834401
20	1	Check Valve Poppet 13/16” x 5”	4601901
21	1	.48” O.D. x .63” Wire x 2” Compression Spring	84454730
22	1	-12 O-Ring Hex Plug	84686900
23	4	-12 to -10 Straight Fitting	84684900
		Items 24-32 Are Not Included With Cylinder Assembly	
24	1	Ball Socket w/ Tapered Grooves and Split Clamp Upper and Lower (metric)	04936802
25	4	12mm x 60mm Hex Cap Screw	87013100
26	4	1/2” Lock Washer	86557000
27	1	Cross-Drive Tube Assembly #3	04828503
31	2	10mm x 60mm Hex Cap Screw	87008540
32	2	10mm Lock Washer	86555000

Note: Cylinder #3 has a socket plug (Part ID #8) on the shaft end and a HEX plug (Part ID #22) on the check valve end. Cylinder #3 can be identified by these features.

Unload End



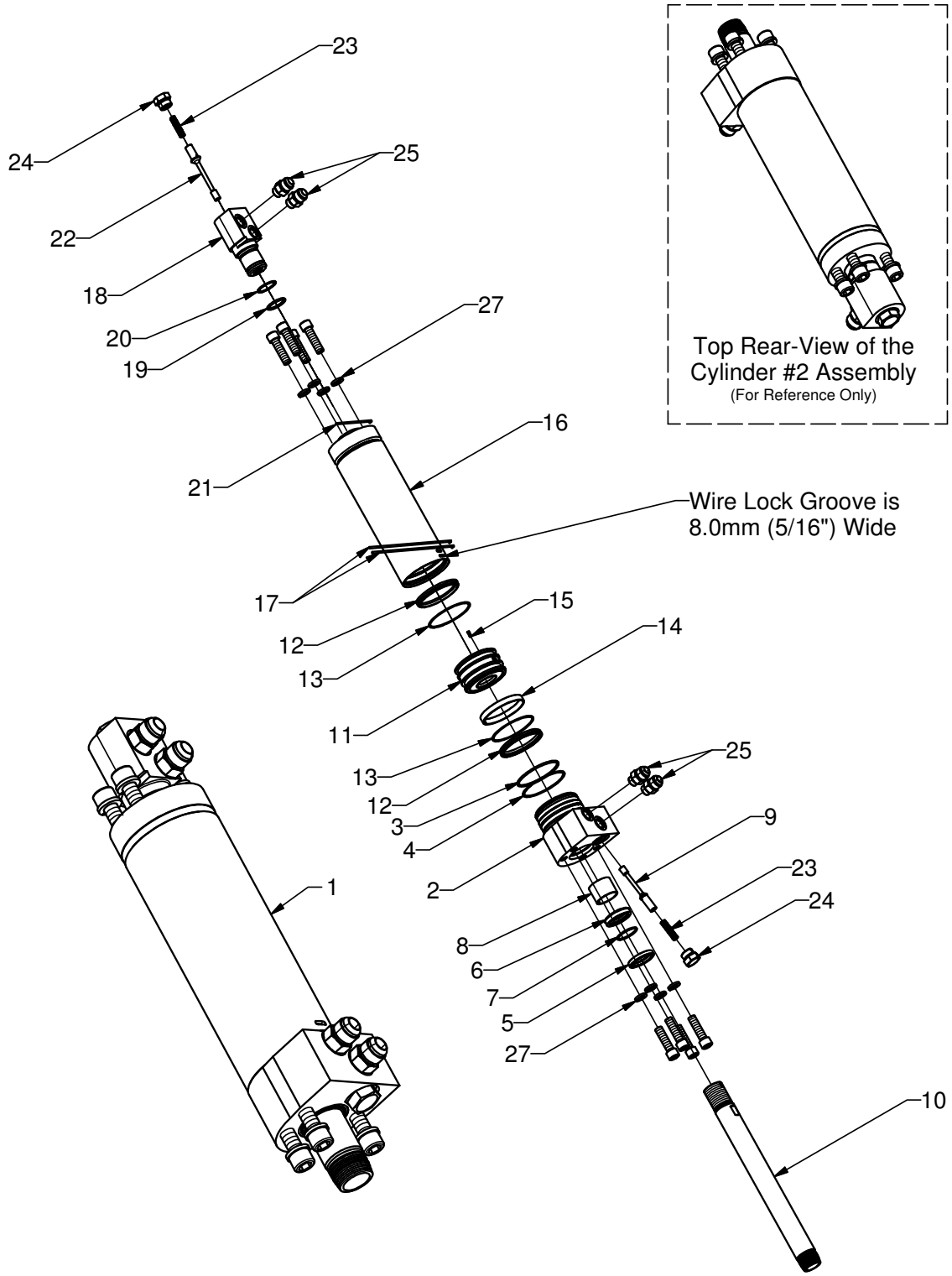
Note wire lock slot width for cylinder model identification.
8.0mm (5/16") wide groove - no shims - assembly numbers are
#1 Cyl. 05792301, #2 Cyl. 05792401, #3 Cyl. #05792501.
See pages 35 thru 40.
4.75mm (3/16") wide groove - use shims - assembly numbers are
#1 Cyl. 06336102, #2 Cyl. 06336202, #3 Cyl. 06336302.
See pages 42 thru 47.



Top Rear-View of the Cylinder #1 Assembly
(For Reference Only)

PARTS LIST			
ID #	QUANTITY	DESCRIPTION	PART #
1	1	Workhorse Cylinder #1 w/ Horizontal Bolts	05792301
		includes items 2-25	
2	1	4" Aluminum Head w/Round Lock Wire & Horizontal Bolts	05791302
3	1	240 O-Ring	84385000
4	1	8-240 O-Ring Backup	84393200
5	1	45mm Canned Rod Wiper	84426600
6	1	45mm Rod Seal	84354200
7	1	45mm Rod Seal Back-up	w/Seal
8	2	45mm Rod Wear Ring (1.5")	84401200
9	1	-12 O-Ring Socket Plug	84687700
10	1	45mm Rod w/Tapered Grooves	05791501
11	1	4" Steel Piston	04581901
12	2	4" Piston Seal	84352600
13	2	4" Piston Seal Back-up	w/Seal
14	1	4" Piston Wear Ring (.5")	84403800
15	1	3/16" x 1/2" Drive Lock Pin	86650400
16	1	4" Barrel Weld Assembly	06184001
17	2	1/8" Barrel Round Wire Lock	04834401
18	1	Check Valve Body Steel Head Mounted w/Horizontal Bolts	05791802
19	1	222 O-Ring	84383500
20	1	8-222 O-Ring Backup	84392160
21	1	1/8" Check Valve Round Wire Lock	04834401
22	1	Check Valve Poppet 11/16" x 4-1/8"	04537301
23	1	.48" O.D. x .063" Wire x 2" Compression Spring	84454730
24	1	-12 O-Ring Hex Plug	84686900
25	4	-12 to -10 Straight Fitting	84684900
		Items 26-27 are not included in Cylinder Assembly	
26	8	M16 x 2 x 50mm Socket Head Cap Screw	87012905
27	8	M16 Lock Washer	87078000

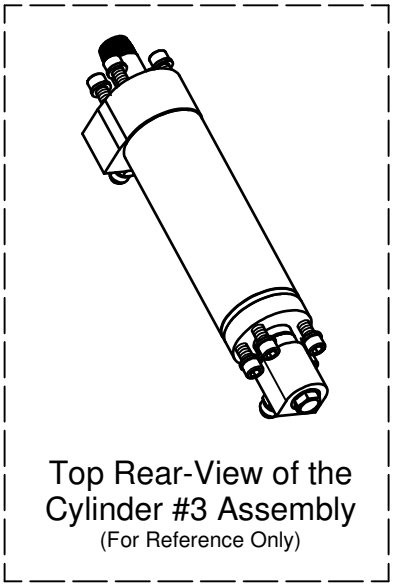
Note: Cylinder #1 has A Hex plug (Part ID #24) on the shaft end and a Socket plug (Part ID #9) onthe check valve end. Cylinder #1 can be identified by these features.



PARTS LIST			
ID #	QUANTITY	DESCRIPTION	PART #
1	1	Workhorse Cylinder #2 w/ Horizontal Bolts	05792401
		includes items 2-25	
2	1	4" Aluminum Head w/Round Lock Wire & Horizontal Bolts	05791302
3	1	240 O-Ring	84385000
4	1	8-240 O-Ring Backup	84393200
5	1	45mm Canned Rod Wiper	84426600
6	1	45mm Rod Seal	84354200
7	1	45mm Rod Seal Back-up	w/Seal
8	2	45mm Rod Wear Ring (1.5")	84401200
9	1	Check Valve Poppet 11/16" x 4-1/8"	04537301
10	1	45mm Rod w/Tapered Grooves	05791501
11	1	4" Steel Piston	04581901
12	2	4" Piston Seal	84352600
13	2	4" Piston Seal Back-up	W/Seal
14	1	4" Piston Wear Ring (.5")	84403800
15	1	3/16" x 1/2" Drive Lock Pin	86650400
16	1	4" Barrel Weld Assembly	06184001
17	2	1/8" Round Wire Lock	04834401
18	1	Check Valve Body Steel Head Mounted w/Horizontal Bolts	05791802
19	1	222 O-Ring	84383500
20	1	8-222 O-Ring Backup	84392160
21	1	1/8" Round Wire Lock	04834401
22	1	Check Valve Poppet 13/16" x 5"	04601901
23	1	.48" O.D. x .63" Wire x 2" Compression Spring	84454730
24	1	-12 O-Ring Hex Plug	84686900
25	4	-12 to -10 Straight Fitting	84684900
		Items26-27 are not included in Cylnder Assembly	
26	8	M16 x 2 x 50mm Socket Head Cap Screw	87012905
27	8	M16 Lock Washer	87078000

Note: Cylinder #2 has A Hex plug (Part ID #24) on the shaft end and a Hex plug (Part ID #24) on the check valve end. Cylinder #2 can be identified by these features.

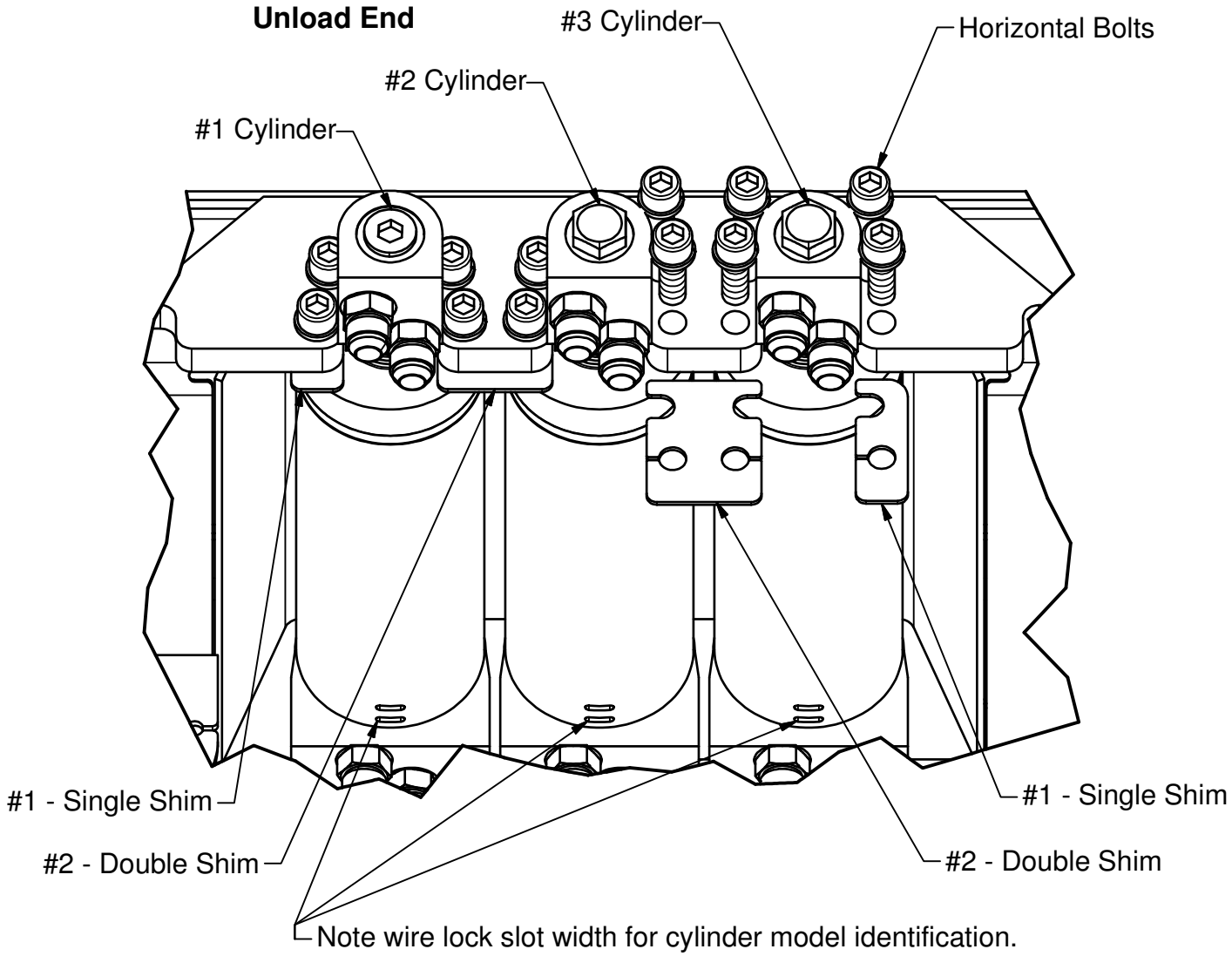
For parts and repair (unless otherwise noted), a #2 Cylinder will be shipped. To use this cylinder in the #1 position, remove the check valve (#22) and the spring (#23) at the rear of the cylinder. To use the #2 Cylinder in the #3 position, remove the check valve (#9), spring (#23), at the front of the cylinder. (See Reference Diagram #01)



Top Rear-View of the Cylinder #3 Assembly
(For Reference Only)

PARTS LIST			
ID #	QUANTITY	DESCRIPTION	PART #
1	1	Workhorse Cylinder #3 w/ Horizontal Bolts	05792501
		includes items 2-23	
2	1	4" Aluminum Head w/Round Lock Wire & Horizontal Bolts	05791302
3	1	240 O-Ring	84385000
4	1	8-240 O-Ring Backup	84393200
5	1	45mm Canned Rod Wiper	84426600
6	1	45mm Rod Seal	84354200
7	2	45mm Rod Wear Ring (1.5")	84401200
8	1	-12 O-Ring Socket Plug	84687700
9	1	45mm Rod w/Tapered Grooves	05791501
10	1	4" Steel Piston	04581901
11	2	4" Piston Seal	84352600
12	1	4" Piston Wear Ring (.5")	84403800
13	1	3/16" x 1/2" Drive Lock Pin	86650400
14	1	4" Barrel Weld Assembly	06184001
15	2	1/8" Round Wire Lock	04834401
16	1	Check Valve Body Steel Head Mounted w/Horizontal Bolts	05791802
17	1	222 O-Ring	84383500
18	1	8-222 O-Ring Backup	84392160
19	1	1/8" Round Wire Lock	04834401
20	1	Check Valve Poppet 11/16" x 5"	04601901
21	1	.18" O.D. x .63" Wire x 2" Compression Spring	84454730
22	1	-12 O-Ring Hex Plug	84686900
23	4	-12 to -10 Straight Fitting	84684900
24	8	M16 x 2 x 50mm Socket Head Cap Screw	87012905
25	8	M16 Lock Washer	87078000

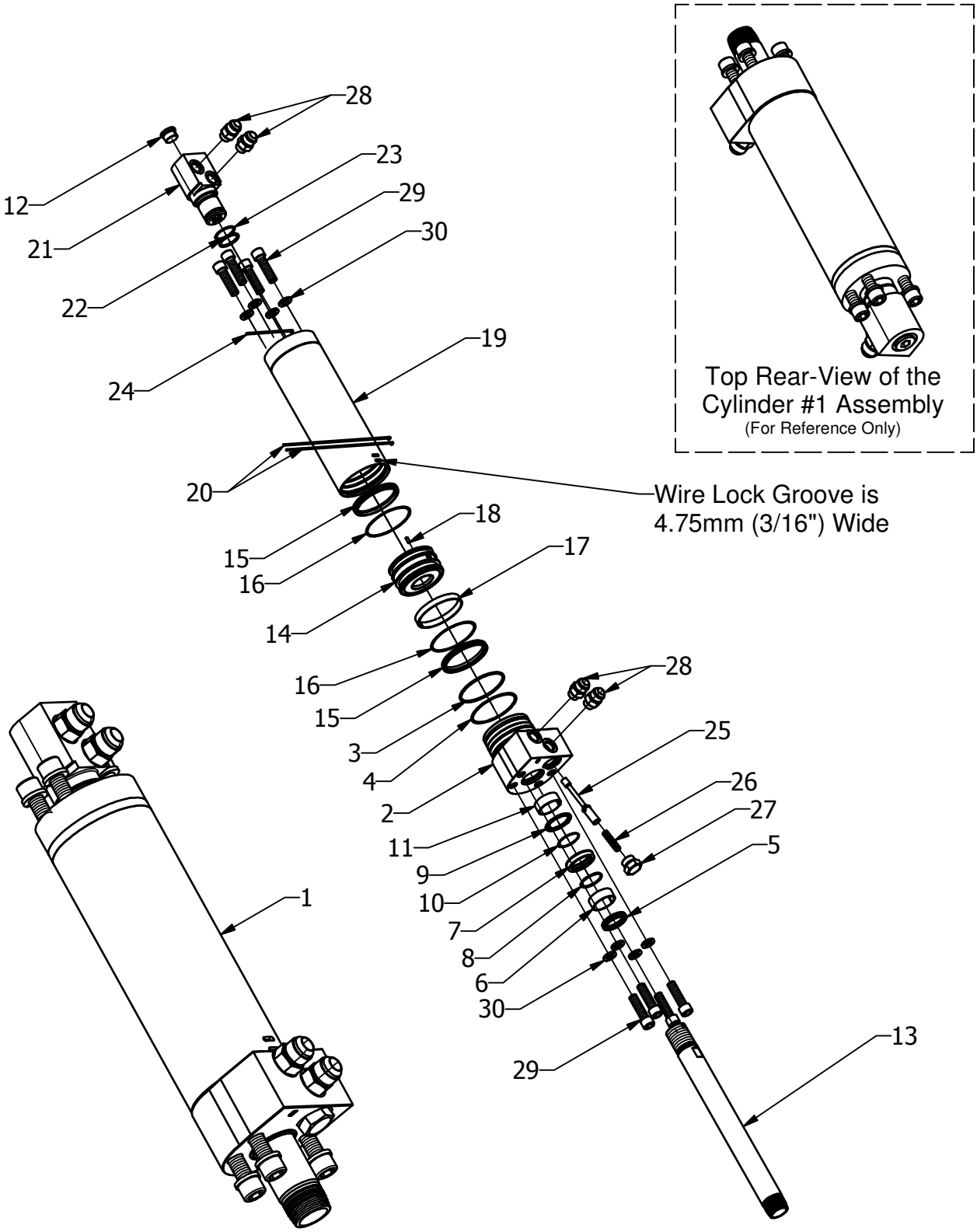
Note: Cylinder #3 has A socket plug (Part ID #8) on the shaft end and a Hex plug (Part ID #22) on the check valve end. Cylinder #3 can be identified by these features.



Note wire lock slot width for cylinder model identification.
8.0mm (5/16") wide groove - no shims - assembly numbers are
#1 Cyl. 05792301, #2 Cyl. 05792401, #3 Cyl. #05792501.
See pages 35 thru 40.
4.75mm (3/16") wide groove - use shims - assembly numbers are
#1 Cyl. 06336102, #2 Cyl. 06336202, #3 Cyl. 06336302.
See pages 42 thru 47.

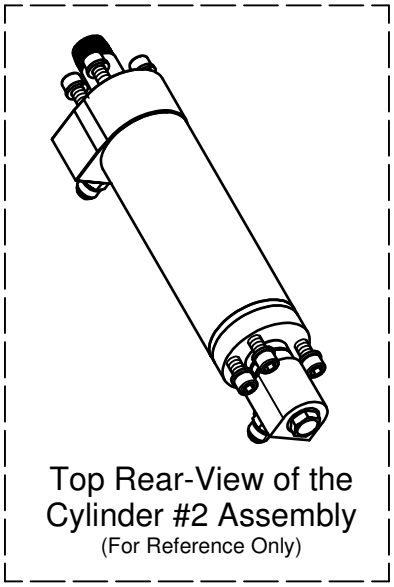
SHIM PARTS LIST				
ID #	QTY.	DESCRIPTION	SIZE	PART #
1	2	Double Shim	10 Gauge 3.4mm (.135")	06260801
1	2	Double Shim	12 Gauge 2.7mm (.105")	06260802
1	2	Double Shim	14 Gauge 1.9mm (.075")	06260803
1	2	Double Shim	18 Gauge 1.2mm (.048")	06260804
2	2	Single Shim	10 Gauge 3.4mm (.135")	06260901
2	2	Single Shim	12 Gauge 2.7mm (.105")	06260902
2	2	Single Shim	14 Gauge 1.9mm (.075")	06260903
2	2	Single Shim	18 Gauge 1.2mm (.045")	06260904

All 4 Shims must be the same size.



ID#	Quantity	Description	Part #
1	1	Workhorse II Cylinder Assembly #1 w/Horizontal Bolt w/ Shim	06336102
		includes items 2-28	
2	1	4" Aluminum Head w/Horizontal Bolt	06373102
3	1	240 "O"-Ring Buna 90	84385000
4	1	8-240 "O"-Ring Back-up	84393200
5	1	45mm Rod Wiper	84426605
6	1	45mm Rod PTFE Wear-Ring (Color Blue)	84401205
7	1	45mm Seal	84354200
8	1	45mm Seal Back-up	w/Seal
9	1	45mm Buffer Seal	84400201
10	1	45mm Buffer Seal Back-up	w/Buffer Seal
11	1	45mm Wear-Ring (Color Gray)	84401105
12	1	-12 "O"-Ring Socket Plug	84687700
13	1	45mm Rod w/Tapered Grooves	05791501
14	1	4" Steel Piston	04581901
15	2	4" Piston Seal	84352600
16	2	4" Piston Seal Back-up	w/Seal
17	1	4" Piston Wear-Ring (.5")	84403800
18	1	3/16" x 1/2" Drive Lock Pin	86650400
19	1	4" Barrel Weld Assembly	06325901
20	2	1/8" Barrel Round Wire Lock	04834401
21	1	Check Valve Body Steel Head Mounted w/Horizontal Bolt	05791802
22	1	222 "O"-Ring Buna 90	84383500
23	1	8-222 "O"-Ring Back-up	84392140
24	1	1/8" Check Valve Round Wire Lock	04834401
25	1	Check Valve Poppet 11/16" x 4-1/8"	04537301
26	1	.48" O.D. x .063" Wire x 2" Compression Spring	84454730
27	1	-12 "O"-Ring Hex Plug	84686900
28	1	-12 to -10 Straight Fitting	84684900
		items 29-30 Are not included with Cylinder Assembly	
29	8	M16 x 2 x 50mm Socket Head Cap Screw	87012905
30	8	M16 Lock Washer	87078000

Note: Cylinder #1 has a Hex plug (Part ID #27) on the shaft end and a Socket plug (Part ID #12) on the check valve end. Cylinder #1 can be identified by these features.

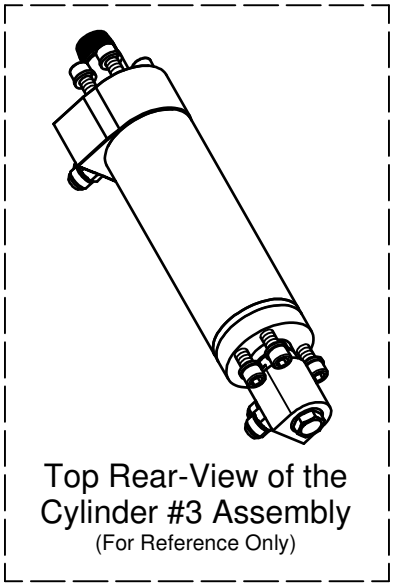


Top Rear-View of the Cylinder #2 Assembly
(For Reference Only)

Workhorse II #2 Cylinder			
ID#	Quantity	Description	Part #
1	1	Workhorse II Cylinder Assembly w/Horizontal Bolt w/ Shim	06336202
		includes items 2-28	
2	1	4" Aluminum Head w/Horizontal Bolt	06373102
3	1	240 "O"-Ring Buna 90	84385000
4	1	8-240 "O"-Ring Back-up	84393200
5	1	45mm Rod Wiper	84426605
6	1	45mm Rod PTFE Wear-Ring (Color Blue)	84401205
7	1	45mm Seal Rod	84354200
8	1	45mm Seal Rod Back-up	w/Seal
9	1	45mm Buffer Seal	84400201
10	1	45mm Buffer Seal Back-up	w/Buffer Seal
11	1	45mm Wear-Ring (Color Gray)	84401105
12	1	Check Valve Poppet 11/16" x 4-1/8"	04537301
13	1	45mm Rod w/ Tapered Grooves	05791501
14	1	4" Steel Piston	04581901
15	2	4" Piston Seal	84352600
16	2	4" Piston Seal Back-up	w/Seal
17	1	4" Piston Wear-Ring (.5")	84403800
18	1	3/16" x 1/2" Drive Lock Pin	86650400
19	1	4" Barrel Weld Assembly	04834401
20	2	1/8" Barrel Round Wire Lock	04834401
21	1	Check Valve Body Steel Head Mounted w/Horizontal Bolt	05791802
22	1	222 "O"-Ring Buna 90	84383500
23	1	8-222 "O"-Ring Back-up	84392140
24	1	1/8" Check Valve Round Wire Lock	04834401
25	1	Check Valve Poppet 13/16" x 5"	04601901
26	2	.48" O.D. x .063" Wire x 2" Compression Spring	84454730
27	2	-12 "O"-Ring Hex Plug	84686900
28	4	-12 to -10 Straight Fitting	84684900
		Items 29-30 Are Not Included with Cylinder Assembly	
29	8	M16 x 2 50mm	87012905
30	8	M16 Lock Washer	87078000

Note: Cylinder #2 has a Hex Plug (Part #27) on the shaft end and a Hex Plug (Part #27) on the check valve end. Cylinder #2 can be identified by these fearures.

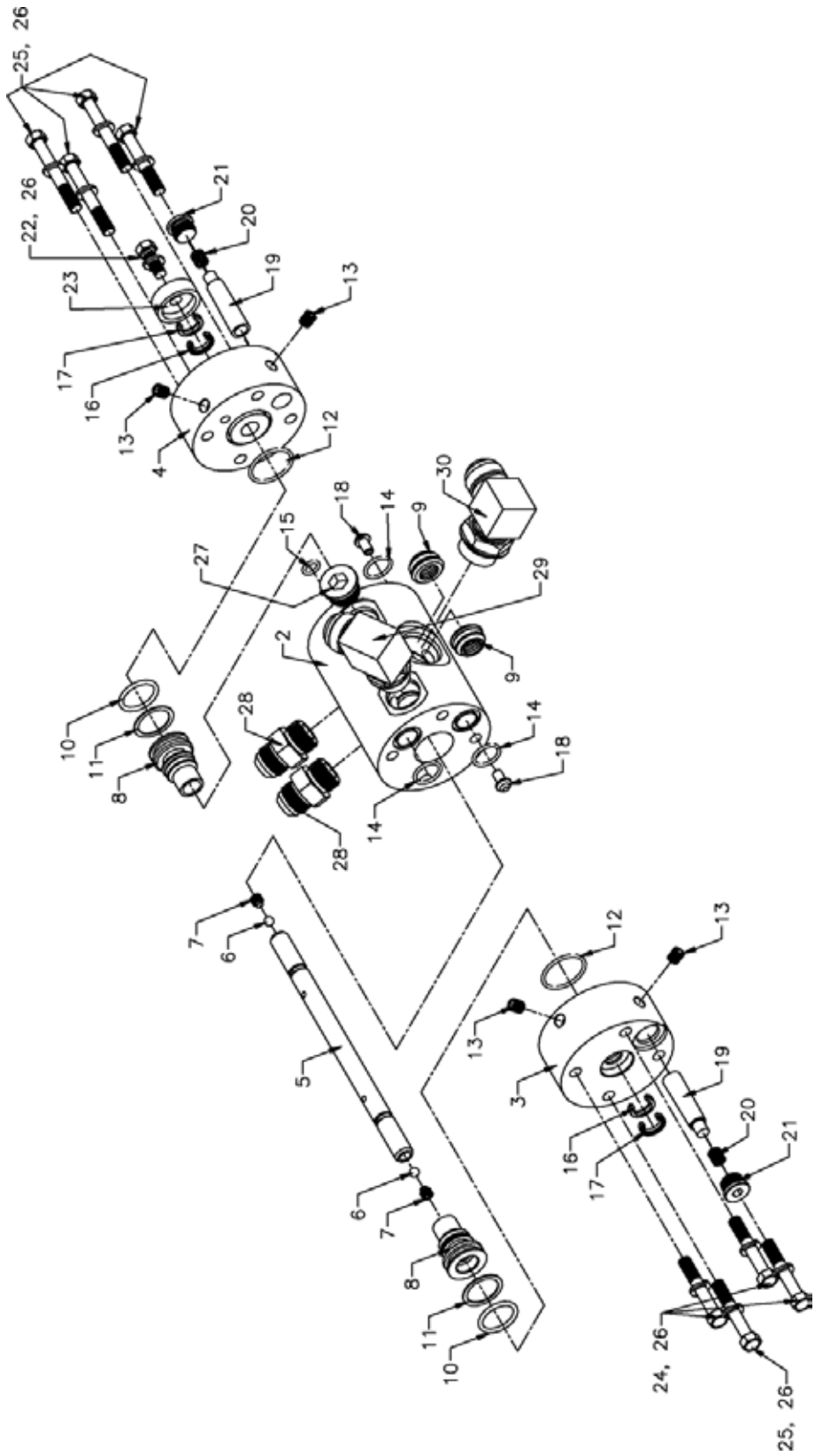
For parts and repair (unless otherwise noted), a #2 Cylinder will be shipped. To use this cylinder in the #1 position, remove the check valve (#25) and spring (#26) at the rear of the cylinder. To use the #2 Cylinder in the #3 position, remove the check valve (#12), spring (#26) at the front of the cylinder. (See Reference Diagram #01).



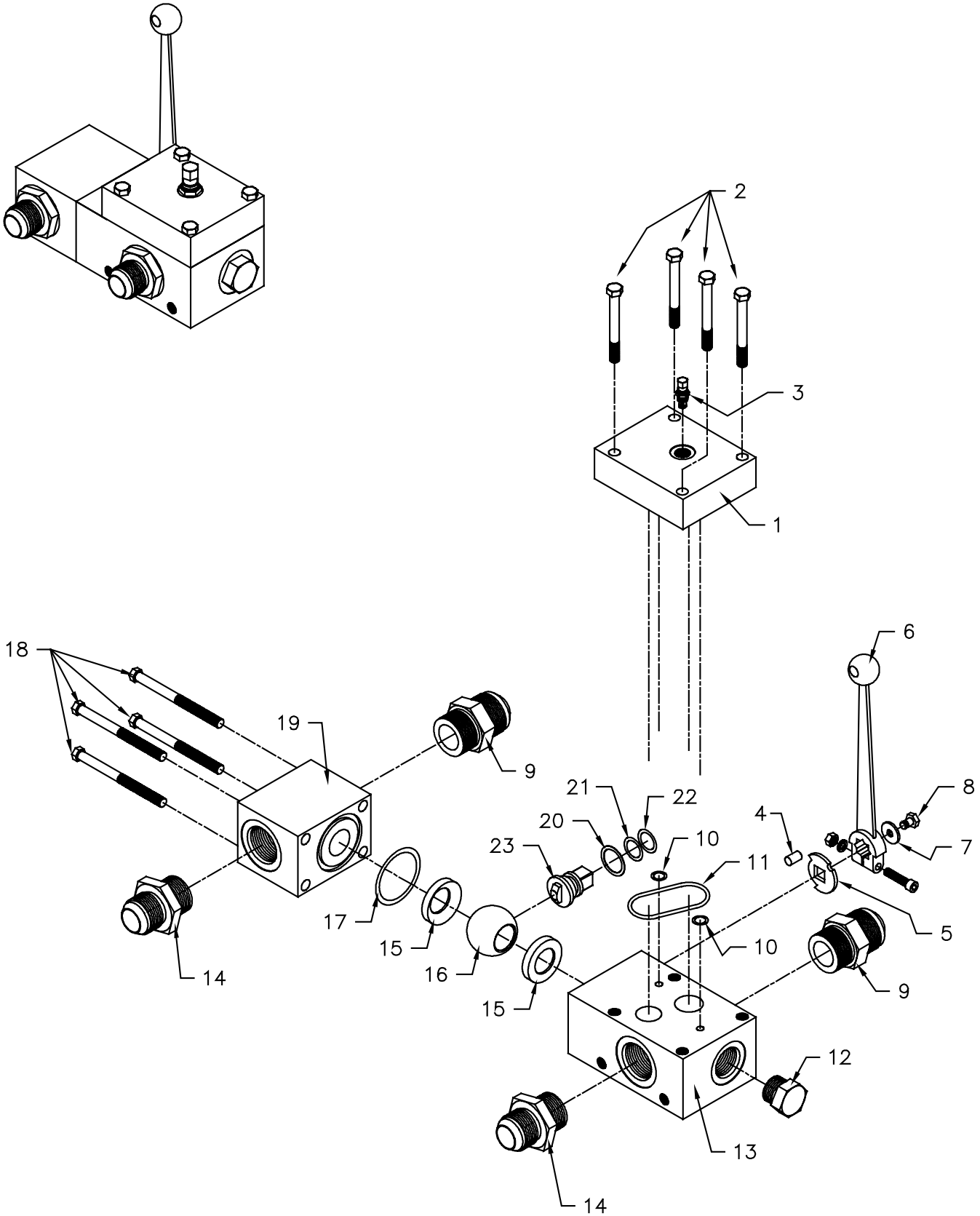
Top Rear-View of the Cylinder #3 Assembly
(For Reference Only)

Workhorse II #3 Cylinder			
ID#	Quantity	Description	Part #
1	1	Workhorse II Cylinder Assembly #3 w/Horizontal Bollt w/ Shim	06336302
		includes items 2 - 28	
2	1	4" Aluminum Head w/ Horizontal Bolt	06373102
3	1	240 "O"-Ring Buna 90	84385000
4	1	8-240 "O"-Ring Back-up	84393200
5	1	45mm Wiper Rod	84426605
6	1	45mm Rod PTFE Wear- Ring (Color Blue)	84401205
7	1	45mm Seal Rod	84354200
8	1	45mm Seal Rod Back-up	w/Seal
9	1	45mm Buffer Seal	84400201
10	1	45mm Buffer Seal Back-up	w/Buffer Seal
11	1	45mm Wear-Ring (Color Gray)	84401105
12	1	-12 "O"-Ring Socket Plug	84687700
13	1	45mm Rod w/Tapered Grooves	05791501
14	1	4" Steel Piston	04581901
15	2	4" Piston Seal	84352600
16	2	4" Piston Seal Back-up	w/Seal
17	1	4" Piston Wear-Ring (.5")	84403800
18	1	3/16" x 1/2" Drive Lock Pin	86650400
19	1	4" Barrel Weld Assembly	06325901
20	2	1/8" Barrel Round Wire Lock	04834401
21	1	Check Valve Body Steel Head Mounted w/Horizontal Bolt	05791802
22	1	222 "O"-Ring Buna 90	84383500
23	1	8-222 "O"-Ring Back-up	84392140
24	1	1/8" Check Valve Round Wire Lock	04834401
25	1	Check Valve Poppet 13/16" x 5"	04601901
26	1	.48" O.D. x .063" Wire x 2" Compression Spring	84454730
27	1	-12 "O"-Ring Hex Plug	84686900
28	4	-12 to -10 Straight Fitting	84684900
		Items 29-30 Are Not Included With Cylinder Assembly	
29	8	M16 x 2 x 50mm Socket Head Cap Screw	87012905
30	8	M16 Lock Washer	87078000

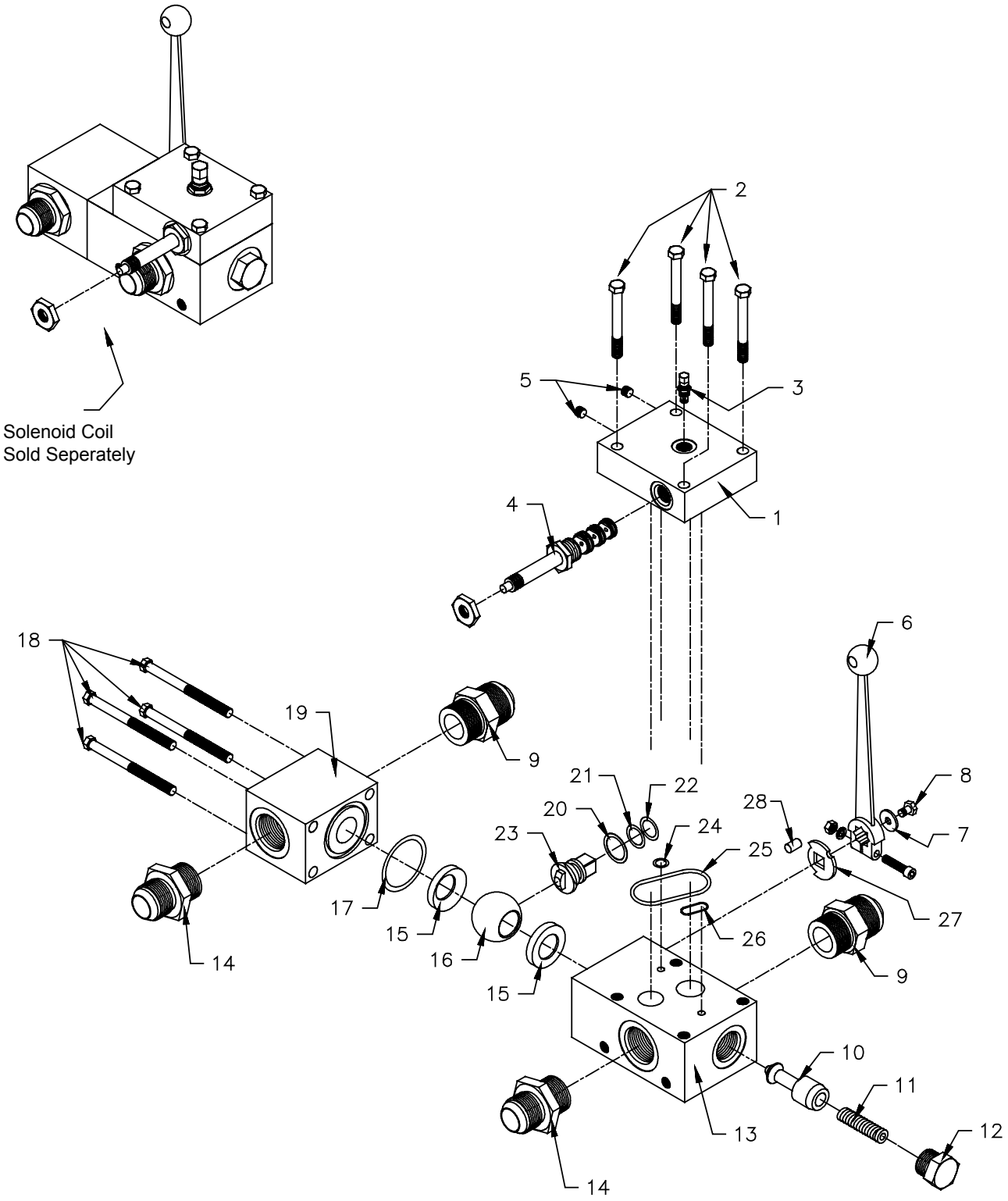
Note: Cylinder #3 has a Socket Plug (Part #12) on the shaft end and a HEX Plug (Part #27) on the check valve end. Cylinder #3 can be identified by these fearures.



ID #	QUANTITY	DESCRIPTION	PART #
1	**1**	**Switching Valve Assembly METRIC**	**4201502**
-	-	Includes items 1-34	-
2	1	Body Switching Valve	04504602
3	1	End Cap Right Switching Valve	04504701
4	1	End Cap Left Switching Valve	04504801
5	1	Rod Control Switching Valve	01335502
6	2	Ball 5/16” Chrome Steel	84800500
7	2	Set Screw 10mm x 10mm Half Dog	87008000
8	2	Poppet Switching Valve	03718901
9	2	Ring Poppet Switching Valve	03718801
10	2	O-Ring 216	84382200
11	2	O-Ring Backup 8-216	84391600
12	2	O-Ring 126	84378200
13	2	1/8” Socket Pipe Plug	84680780
14	3	O-Ring 117 Urethane	84377000
15	1	O-Ring 111	84376200
16	2	Seal Rod 5/8”	84352200
17	2	Woper Canned 5/8” Rod	84427200
18	2	Pilot Filter Seat	04802701
19	2	Filter Element CF0563-46	84012700
20	2	Spring S157	84451750
21	2	6409-08 M O-Ring Socket Plug	84687500
22	1	Hex Bolt 10mm x 20mm	87008470
23	1	Cap Limit Switching Valve	02552101
24	2	Hex Bolt 10mm x 75mm	87009750
25	5	Hex Bolt 10mm x 65mm	87009000
26	8	Lock Washer 3/8”	86555000
27	1	6408-H-12 O-Ring Socket Plug	84687700
28	2	6400-12-12 Straight	84685000
29	1	6801-16-12 90° Fitting	84691700
30	1	6801-16-16 90° Fitting	84691800
31	1	6801-12-12 90° Fitting	84691500
32	1	Socket Head Bolt 10mm x 65mm	87009100
33	2	2404-4-2 Pipe Adaptor	84673400

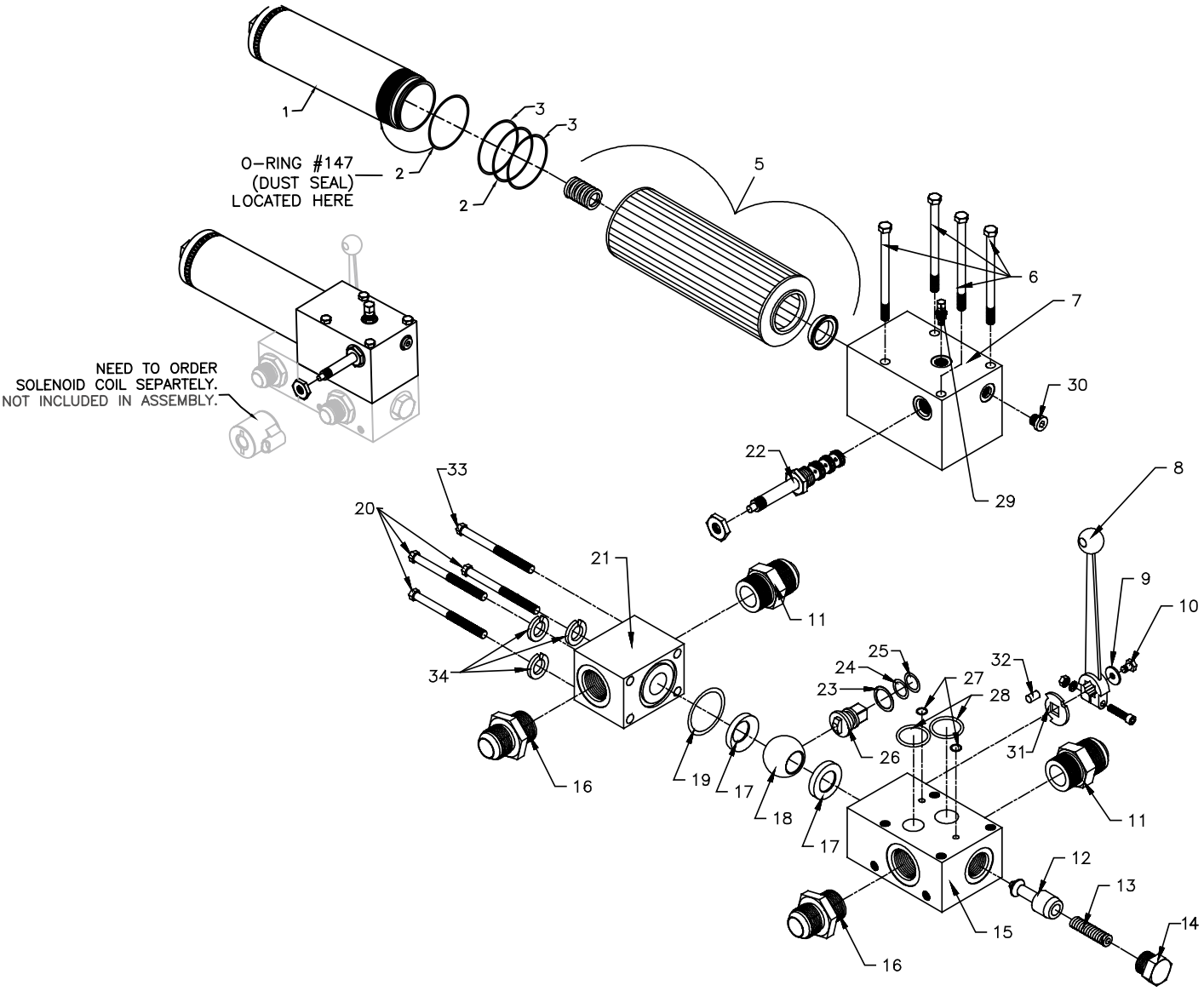


ID#	QUANTITY	DESCRIPTION	PART NUMBER
	1	**Manual On/Off Ball Valve Assembly**	**04840002**
		Includes items 1-25	
1	1	Manual Cover Plate On/Off Ball Valve	04796402
2	4	10mm x 50mm Hex Bolt	87008530
3	1	Test Coupling SMK20-G1/4VC	84904000
4	1	5/16” x 1/2” Dowel Pin	86651500
5	1	Spud Stop	84802910
6	1	Ball Valve Handle w/bolt, washer & nut	84802900
7	1	6mm Flat Washer	87075400
8	1	6mm x 10mm Hex Bolt	87002450
9	2	2404-16-16 BSPP Straight Fitting	84671400
10	2	112 O-Ring	84376300
11	2	228 O-Ring	84384000
12	1	6408-12 O-Ring Plug	84686900
13	1	Valve Housing	04436602
14	2	6400-16-16 Straight Fitting	84685400
15	2	Ball Valve Seal Bushing	04337301
16	1	Ball Valve Ball	04337101
17	1	225 O-Ring	84383800
18	4	10mm x 100mm Hex Bolt	87011000
19	1	Non-Valve Housing	04437902
20	1	Spud Wear Washer	04337601
21	1	208 O-Ring	84379600
22	1	208 O-Ring Backup Teflon	84390200
23	1	Spud Shaft	04438101
24	1	10mm x 90mm Hex Bolt	87010500
25	3	10mm Lock Washer	87076500



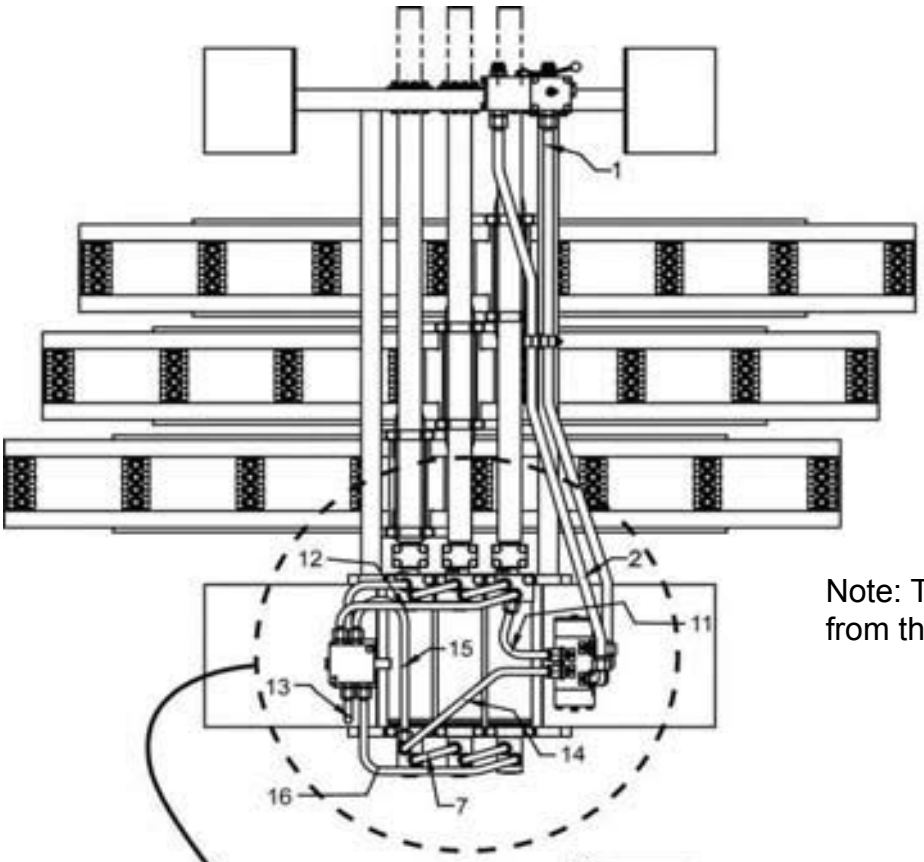
ID#	QUANTITY	DESCRIPTION	PART
	1	**Pilot Operated / Manual On**	**04718802**
		Includes items 1-30	
1	1	Electric Cover Plate On/Off Ball Valve	04795702
2	4	10mm x 50mm Hex Bolt	87008530
3	1	Test Coupling SMK20-G1/4VC	84904000
4	1	Solenoid Control Valve SV10-40	85108800
5	2	1/16” NPT Pipe Plug	84680770
6	1	Ball Valve Handle w/bolt, washer & nut	84802900
7	1	6mm Flat Washer	87075400
8	1	6mm x 10mm Hex Bolt	87002450
9	2	2404-16-16 BSPP Straight Fitting	84671400
10	1	On/Off Poppet	04438401
11	1	Spring #B-18273	84453400
12	1	6408-12 O-Ring Plug	84686900
13	1	Valve Housing	04436602
14	2	6400-16-16 Straight Fitting	84685400
15	2	Ball Valve Seal Bushing	04337301
16	1	Ball Valve Ball	04337101
17	1	225 O-Ring	84383800
18	4	10mm x 100mm Hex Bolt	87011000
19	1	Non-Valve Housing	04437902
20	1	Spud Wear Washer	04337601
21	1	208 O-Ring	84379600
22	1	208 O-Ring Backup Teflon	84390200
23	1	Spud Shaft	04438101
24	1	112 O-Ring	84376300
25	2	228 O-Ring	84384000
26	1	216 O-Ring	84382200
27	1	Spud Stop	84802910
28	1	5/16” x 1/2” Dowel Pin	86651500
29	3	10mm Lock Washer	87076500
30	1	10mm x 90mm Hex Bolt	87010500

Information for ordering solenoid Coil & Connectors:
24 Volt Coil (HF 24 VCD 6353024)- Part #85602000
Din Connect (RR Din Plug RR00011039) - Part #85102790

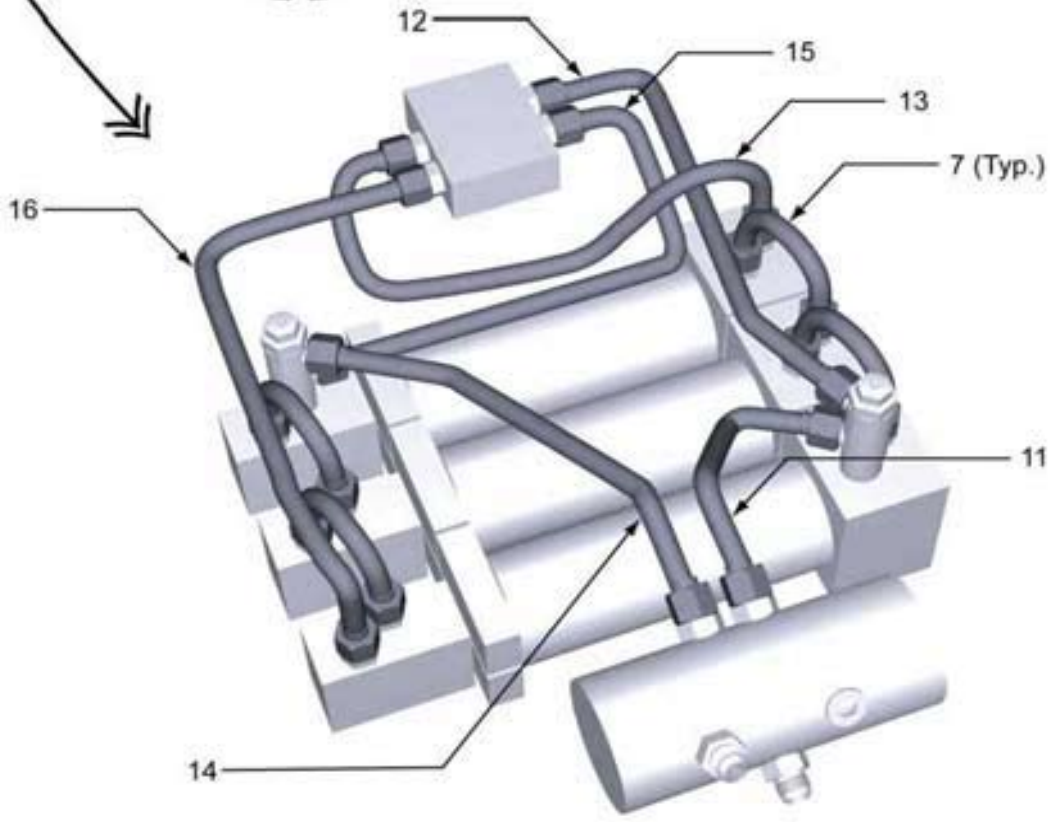


ID#	QUANTITY	DESCRIPTION	PART
	1	**Pilot Operated/Manual On/Off Fairley Arlon Filter Ball Valve**	**04465802**
-	-	Includes items 1-34	-
1(1)	1	Threaded end Cap	04426601
1	1	Welded Filter Canister Assy.	06151501
2	2	147 O-Ring	84378447
3	2	147 O-Ring Backup	84389047
4 (1)	1	Threaded Barrel	04426501
5	1	Fairley Arlon Filter Element #MXW2-GDL20 w/Spring 7 Rubber Seal	84006520
6	4	10mm x 110mm Hex Bolt	87011500
7	1	Fairley Arlon Filter Block	04436501
8	1	Ball Valve Handle w/bolt, washer & nut	84802900
9	1	6mm Flat Washer	87075400
10	1	6mm x 10mm Hex Bolt	87002450
11	2	2404-16-16 BSPP Straight Fitting	84671400
12	1	On/Off Poppet	04438401
13	1	Spring #B-18273	84453400
14	1	6408-12 O-Ring Plug	84686900
15	1	Valve Housing	04436602
16	2	6400-16-16 Straight Fitting	84685400
17	2	Ball Valve Seal Bushing	04337301
18	1	Ball Valve Ball	04337101
19	1	225 O-Ring	84383800
20	3	10mm x 100mm Hex Bolt	87011000
21	1	Non-Valve Housing	04437902
22	1	Solenoid Control Valve SV10-40	85108800
23	1	Spud Wear Washer	04337601
24	1	208 O-Ring	84379600
25	1	208 O-Ring Backup Teflon	84390200
26	1	Spud Shaft	04438101
27	2	112 O-Ring	84376300
28	2	218 O-Ring	84382800
29	1	Test Coupling SMK20-G1/4VC	84904000
30	1	6408-04 O-Ring Hex Plug	84686500
31	1	Spud Stop	84802910
32	1	5/16” x 1/2” Dowel Pin	86651500
33	1	10mm x 90mm Hex Bolt	87010500
34	3	10mm Lock Washer	87076500

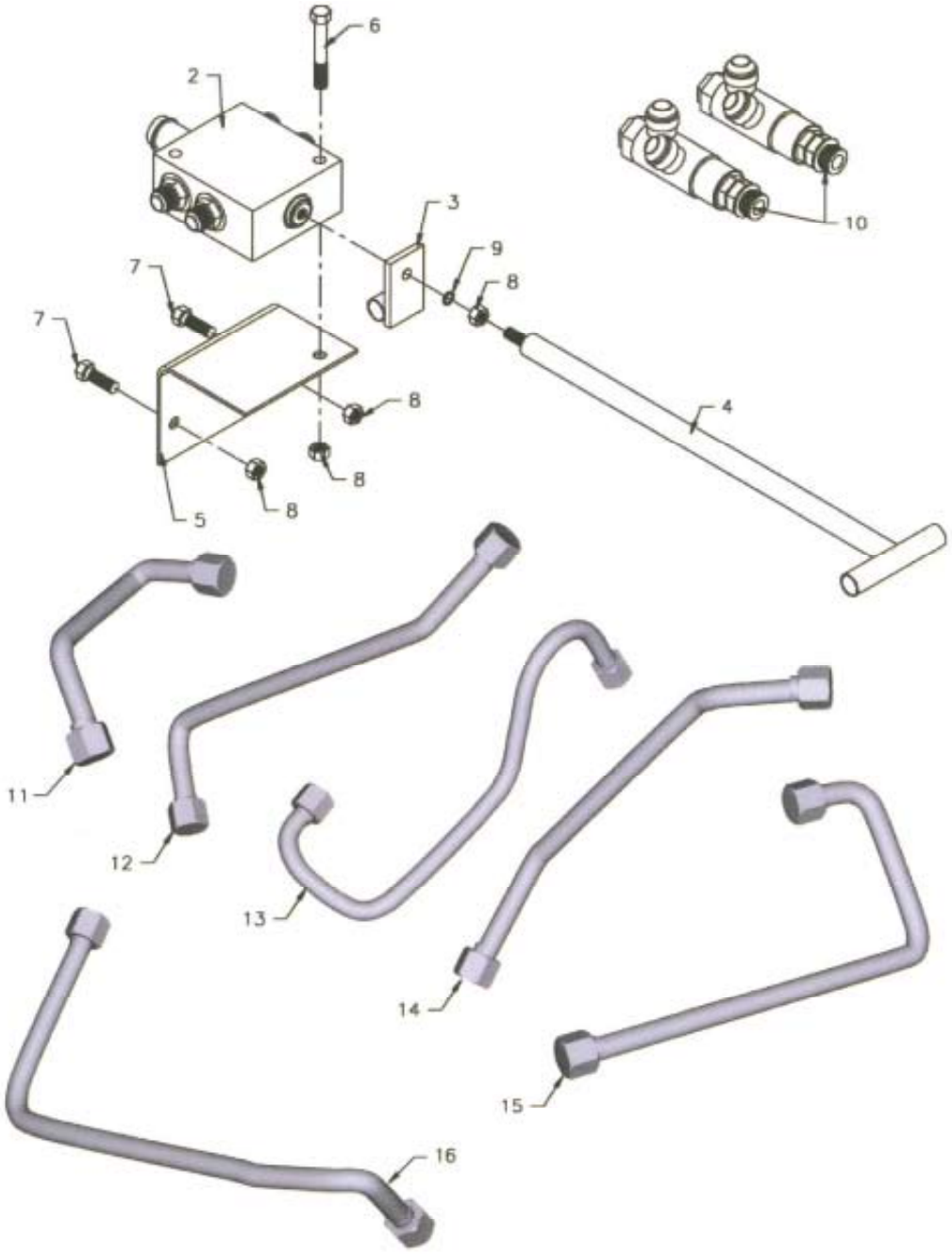
(1) Not Shown. For use with previous models.



Note: Tubes may vary from those represented.

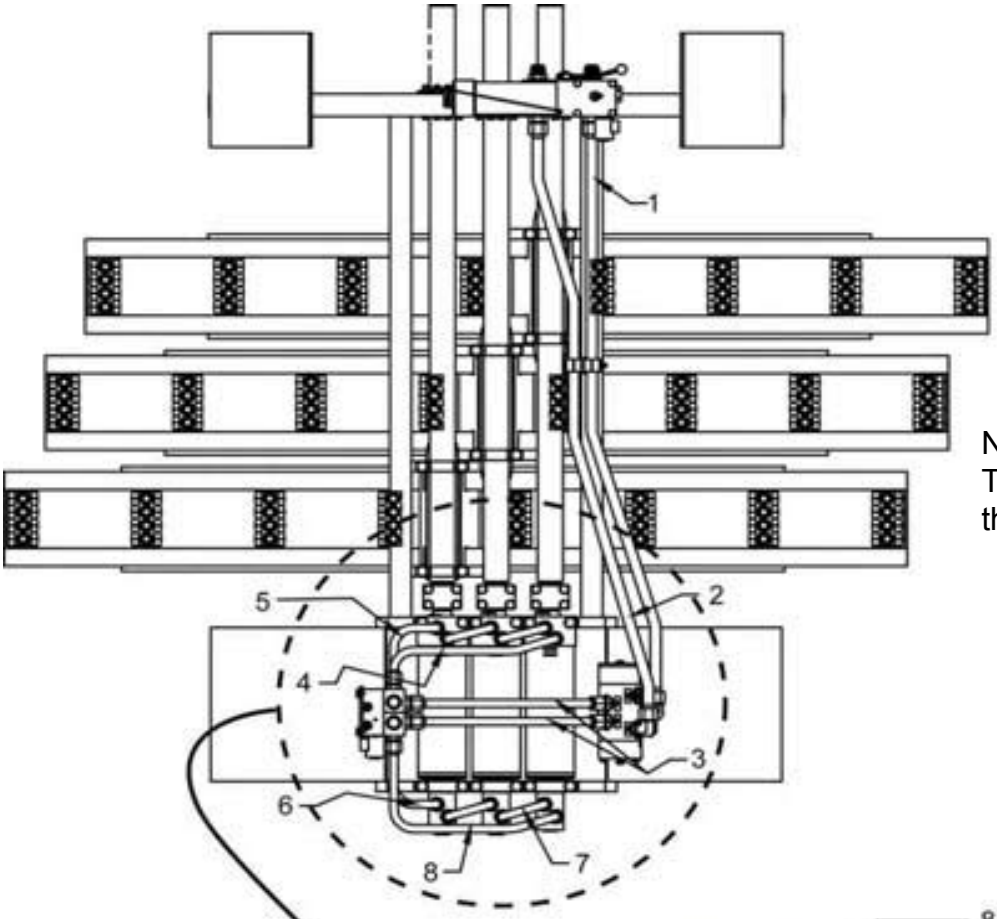


ID#	QUANTITY	DESCRIPTION	PART #
1	1	1” Tube: Ball Valve to Switching Valve Pressure Tube	04841201
2	1	1” Tube: Ball Valve to Switching Valve Return Tube	04841301
7	4	3/4” Tube: Cylinder Cross-Over Tubes	04840501
11	1	3/4” Tube: #1 Cylinder Unload End to Switching Valve	04840601
12	1	3/4” Tube: #1 Cylinder Load End to Control Valve	04840801
13	1	3/4” Tube: #3 Cylinder Load End to Control Valve	04840901
14	1	3/4” Tube: #3 Cylinder Unload End to Switching Valve	04841001
15	1	3/4” Tube: #3 Cylinder Unload End to Control Valve	04840701
16	1	3/4” Tube: #1 Cylinder Unload End to Control Valve	04840701

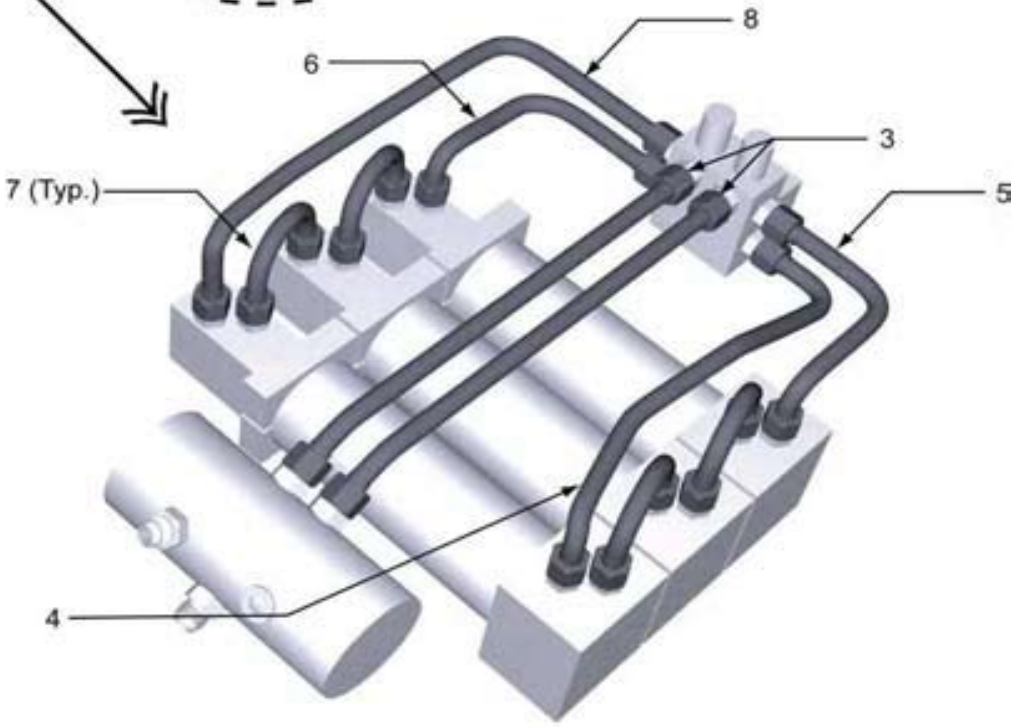


* Tubes are drawn only for representation

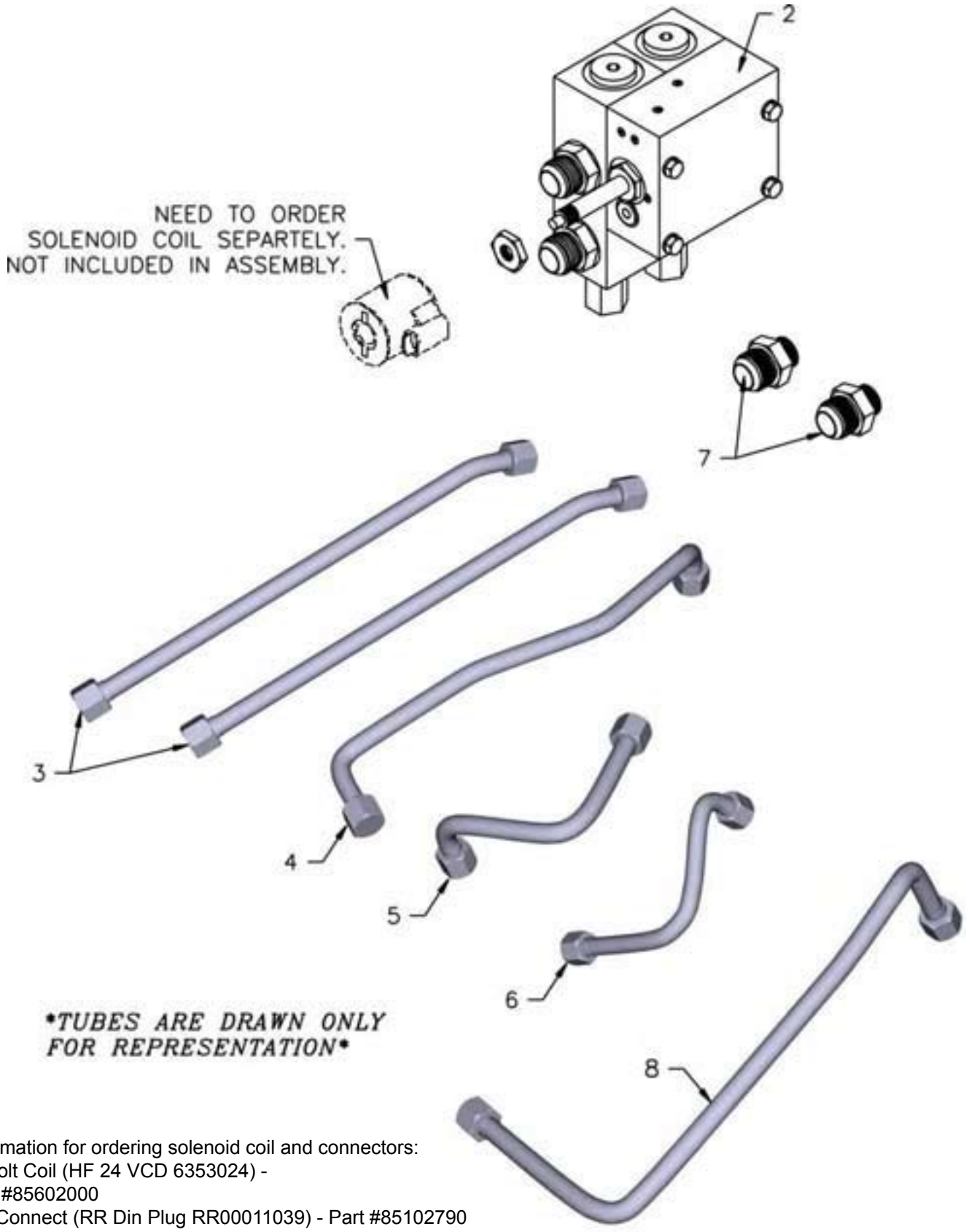
ID#	QUANTITY	DESCRIPTION	PART #
1	1	Workhorse Drive Conversion Kit to Electric Load/Unload	04839202
-	-	Includes items 2-15	-
2	1	Control Valve Manual Metric	02552702
3	1	Lock Bushing	03215801
4	1	Control Valve Long Handle	04839002
5	1	Control Valve Mount Plate Manual	04838501
6	1	10mm x 70mm Hex Cap Screw	87009500
7	2	10mm x 20mm Hex Cap Screw	87008470
8	4	10mm Hex Nut	87101500
9	1	10mm Lock Washer	87076500
10	2	Restrictor Valve	04935701
11	1	3/4” Tube: #1 Cylinder Load End to Switching Valve	04840601
12	1	3/4” Tube: #1 Cylinder Load End to Control Valve	04840801
13	1	3/4” Tube: #3 Cylinder Load End to Control Valve	04840901
14	1	3/4” Tube: #3 Cylinder Unload End to Switching Valve	04841001
15	1	3/4” Tube: #3 Cylinder Unload End to Control Valve	04841101
16	1	3/4” Tube: #1 Cylinder Unload End to Control Valve	04840701



Note:
Tubes may vary from these represented.

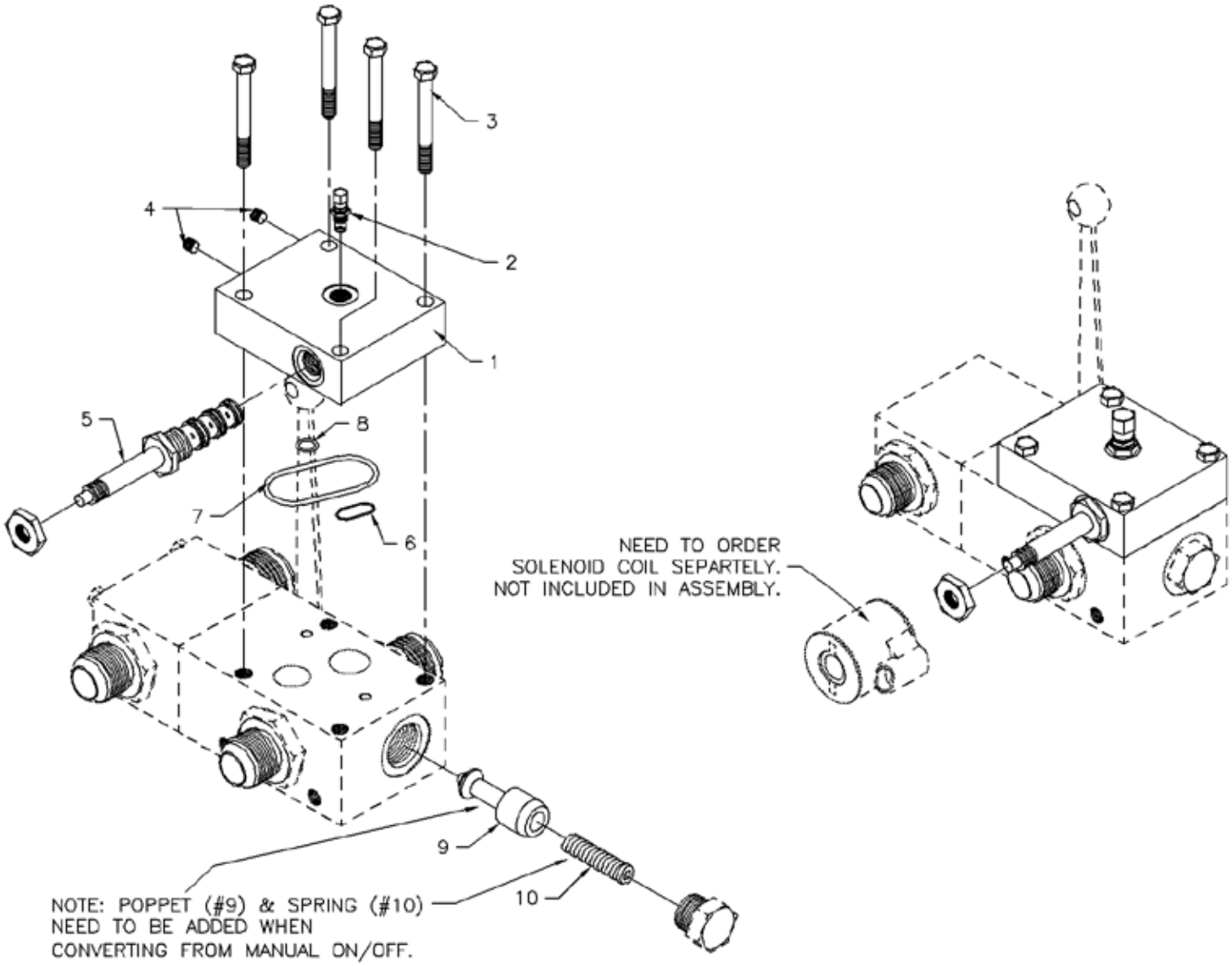


ID#	QUANTITY	DESCRIPTION/ DESCRIPCION	PART #
1	1	1” Tube: Ball Valve to Switching Valve Pressure Tube	04841201
2	1	1” Tube: Ball Valve to Switching Valve Return Tube	04841301
3	2	3/4” Tube: Control Valve to Switching Valve	04841401
4	1	3/4” Tube: #1 Cylinder Load End to Control Valve	04841501
5	1	3/4” Tube: #3 Cylinder Load End to Control Valve	04841601
6	1	3/4” Tube: #3 Cylinder Unload End to Control Valve	04841701
7	4	3/4” Tube: Cylinder Cross-Over Tubes	04840501
8	1	3/4” Tube: #1 Cylinder Unload End to Control Valve	04840701



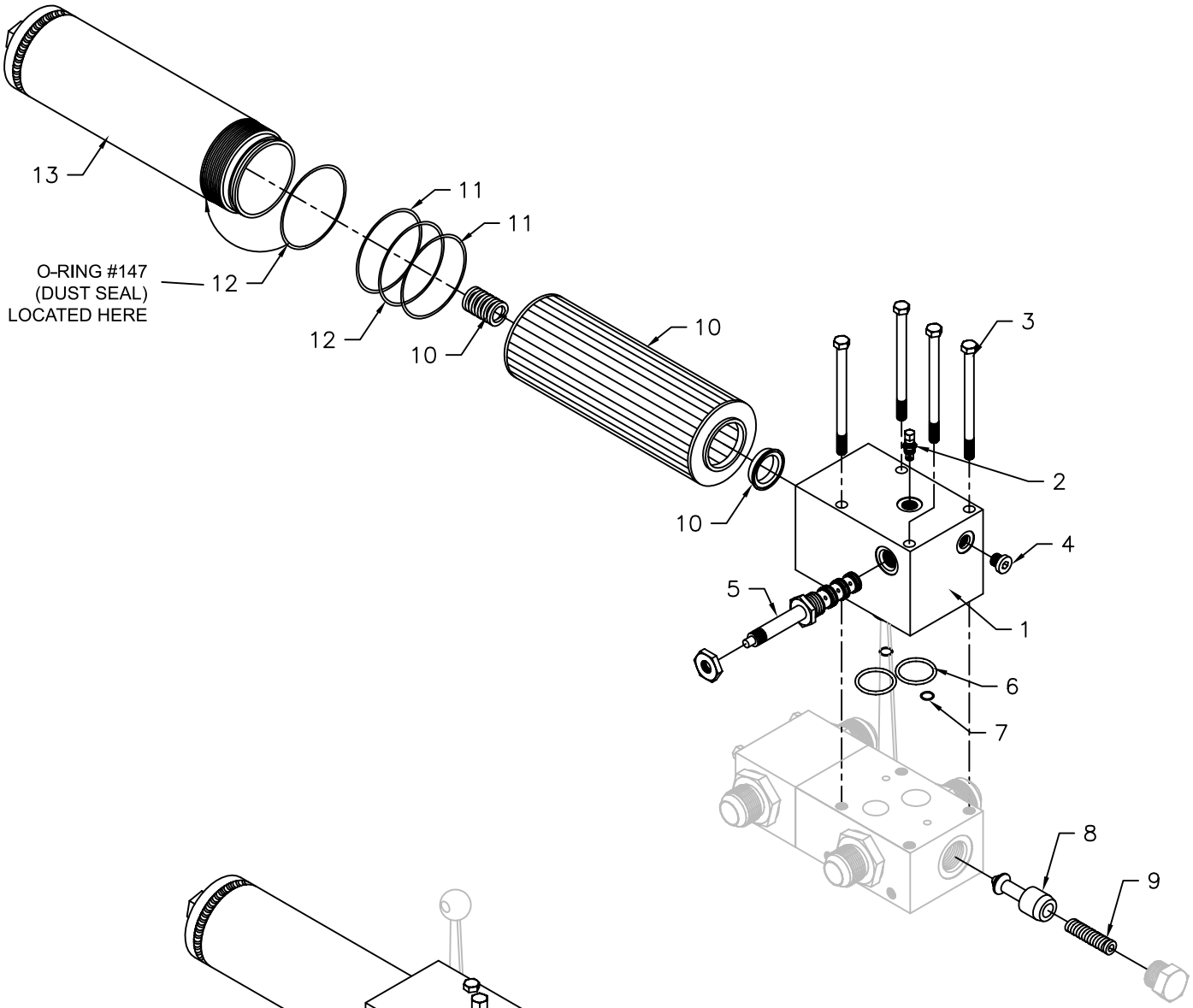
Information for ordering solenoid coil and connectors:
24 volt Coil (HF 24 VCD 6353024) -
Part #85602000
Din Connect (RR Din Plug RR00011039) - Part #85102790

ID #	QUANTITY	DESCRIPTION	PART
1	**1**	**Workhorse Drive Conversion Kit to Electric Load/ Unload**	**04839302**
-	-	Includes items 2-7	-
2	1	Control Valve Modular 6-Port Metric	04459401
3	2	3/4” Tube: Control Valve to Switching Valve	04841401
4	1	3/4” Tube: #1 Cylinder load end to Control Valve	04841501
5	1	3/4” Tube: #3 Cylinder load end to Control Valve	04841601
6	1	3/4” Tube: #3 Cylinder unload end to Control Valve	04841701
7	2	Hydraulic Straight Fitting Male 37° JIC to Male O-Ring	84684900
8	1	3/4” Tube: #1 Cylinder unload end to Control Valve	04841701



Information For Ordering Solenoid Coil & Connectors: 24 Volt Coil (HF 24 VCD 6353024) – Part #85602000
Din Connect (RR Din Plug RR00011039) – Part #85102790

ID#	QUANTITY	DESCRIPTION	PART #
	1	**Workhorse Drive Conversion Kit to Electric On/Off**	**04839502**
-	-	Includes items 1-10	-
1	1	Electric Cover Plate On/Off Ball Valve	04795702
2	1	Test Coupling SMK20-G1/4VC	84904000
3	4	10mm x 50mm Hex Bolt	87008530
4	2	1/16” NPT Pipe Plug	84680770
5	1	Solenoid Control Valve SV10-40	85108800
6	1	216 O-Ring	84382200
7	1	228 O-Ring	84384000
8	1	112 O-Ring	84376300
9	1	On/Off Poppet	04438401
10	1	Spring #B-18273	84453400



Information For Ordering Solenoid Coil & Connectors:
24 Volt Coil (HF 24 VCD 6353024) - Part #85602000
Din Connect (RR Din Plug RR00011039) - Part #85102790

ID#	QUANTITY	DESCRIPTION	PART #
	1	**Workhorse Drive Conversion Kit to Electric On/Off w/ Integrated Filter**	**04839602**
-	-	Includes items 1-14	-
1	1	Fairley Arlon Filter Block	04436502
2	1	Test Coupling SMK20-G1/4VC	84904000
3	4	10mm x 110mm Hex Bolt	87011500
4	1	6408-04 O-Ring Hex Plug	84686500
5	1	Solenoid Control Valve SV10-40	85108800
6	2	218 O-Ring	84382800
7	2	112 O-Ring	84376300
8	1	On/Off Poppet	04438401
9	1	Spring #B-18273	84453400
10	1	Fairley Arlon Filter Element #MXW2-GDL20 w/Spring Rubber Seal	84006520
11	2	147 O-Ring Backup	84389047
12	2	147 O-Ring	84378447
13	1	Welded Filter Canister Assy.	06151501