

FLOMOTION FR

PERISTALTIC PUMP

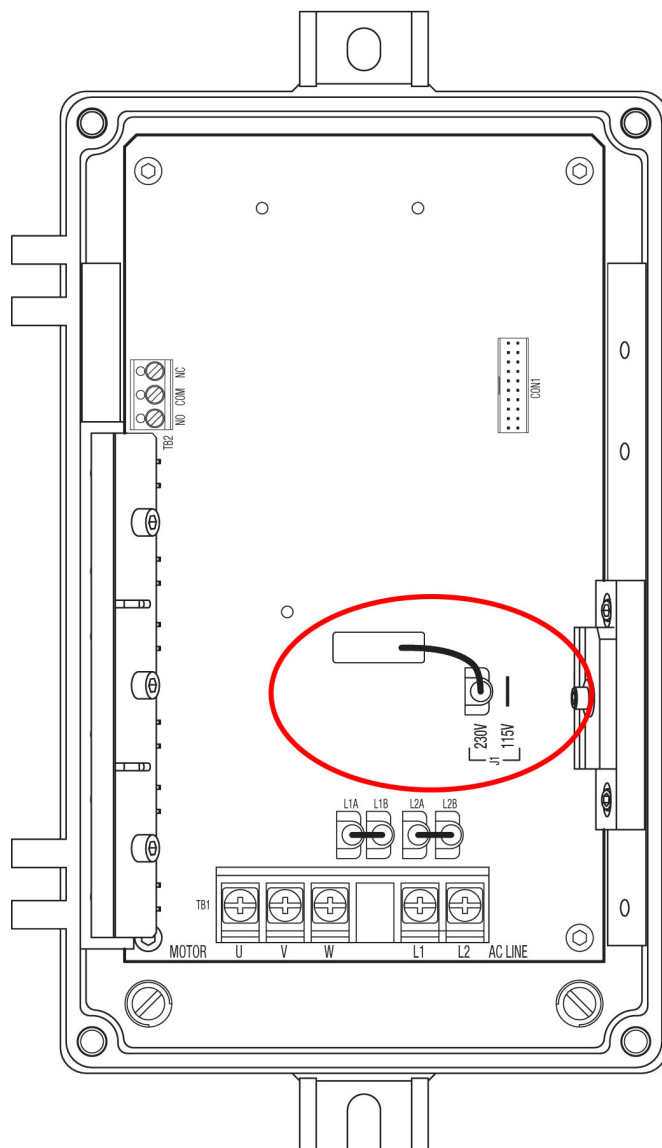
INSTRUCTION MANUAL

Important Information!

Please read before wiring KBDA-SERIES VFD MOTOR DRIVE

The KB Drives are factory set from Flomotion Systems to be wired with 115 volts AC Power.

If 230 Volts AC is required then the “Jumper” wire or J1 connection must be moved to the proper position; see illustration below for the location of J1 Jumper.





IMPORTANT SAFETY AND CONTROL MEASURES

1 - Mechanical risk

Ensure that all protections (cover, cover window, ventilator hood, coupling protection) are in place before operating the pump. Disconnect the electrical supply before any maintenance is performed, except during a hose replacement. Hose replacement must be done with the pump cover closed. While replacing a hose, wear protective gloves and clothes and keep hands away from the brackets, suction and discharge flanges.

During the pump maintenance, check that the lifting points are correctly used. The frame of the pump must be firmly fastened to the ground.

2 - Electrical risk



Ensure that the electrical installation conforms to local codes required in the country of use especially regarding earth and thermal protection.

3 - Operational risk



Check the compatibility of the products to be pumped with :

- > The peristaltic pump principle.
- > The hose material.
- > The insert material.
- > The roller material.

FLOMOTION SYSTEMS cannot guarantee the hose life or the product loss due to a hose rupture. It is the operator's responsibility to prevent pumped liquid loss with additional hose rupture detectors and or automatic shut down valves.

Ensure that the pump is compatible with the required process.

Ensure that the fluid pressures applied are compatible with the pump specifications.

The following must be taken into account in the event of a hose rupture:

- > The pump casing can be filled with the pumped product.
- > If the suction line is loaded product can empty into the pump casing and leak out of the pump.
- > If the discharge line is under pressure, the pumped product may be forced back into the pump casing and leak out of the pump.

A leak detector as well as automatic shut down valves are recommended in order to prevent such consequences. While draining the pump following a hose rupture, take note of the risk of pollution caused by the pumped product.

The pump, being volumetric, may suffer dangerously high pressure by even partial blockage of the discharge line. Ensure that all protections have been made regarding this aspect. A pressure relief valve is recommended on the discharge of the pump.

Before each use, check the direction of rotation of the pump.

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1. HOW TO USE THIS MAINTENANCE MANUAL

This manual is specific to FLOMOTION SYSTEMS FR series hose pumps. It allows the users to install, to start and to carry out maintenance on these pumps. All persons, fitters and users must read this manual in its entirety.

Your local FLOMOTION SYSTEMS distributor is at your disposal for the information that you would not find in this manual. For reply, please indicate the following informations :

- Pump model
- Pump serial number
- Purchase order number

You can also visit our website FlomotionSystems.com for further information.

2. USE OF THE PUMP

2.1 - USE OF THE PUMP

The pump was defined for a specific application. Any other use which does not comply with the initial use is not guaranteed.

FLOMOTION SYSTEMS cannot be held responsible for damage or injury produced during the use of the pump. Use the pump only for the initial application. If you want to change your application, first contact your FLOMOTION SYSTEMS distributor to verify the pump is acceptable for the application.

2.2 - RESPONSIBILITY

FLOMOTION SYSTEMS will be under no circumstances be responsible for damage or injury caused by not following safety directives and maintenance instructions contained in this manual, or by negligence during the installation, use, service or repair of FLOMOTION hose pumps. Moreover, additional directives of safety can be necessary according to working conditions or according processes. Contact your FLOMOTION SYSTEMS distributor if you notice a potential danger during the use of the pump.

2.3 - TRAINING OF THE USER AND INSTRUCTIONS

Every person who installs, uses or performs any operations of maintenance on the pump must be qualified and must have previously read this technical manual. Any temporary personnel must be supervised by skilled users. The order of execution of operations defined in this manual must be carefully followed. Store this manual next to the pump so that it can be consulted at any time.

2.4 - CONDITIONS OF WARRANTY

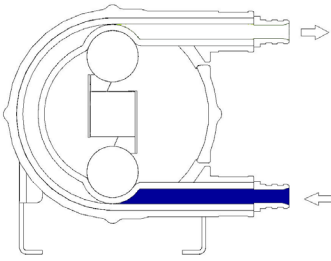
Please refer to the full warranty in the back of this manual.

3. PUMP DESCRIPTION

3.1 - PUMP IDENTIFICATION

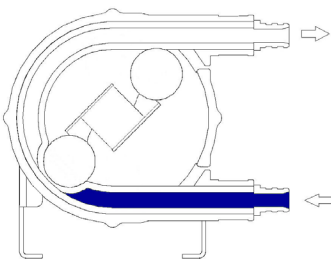
FLOMOTION pumps are identified by the label located on the frame. The label includes the model and serial number of the pump. These numbers lead to all information concerning the materials, nature of the hose, characteristics of the gearbox and characteristics of the motor. The gearbox as well as the motor include their own descriptive name plates on which you can read the reduction ratio, power and electrical voltage etc.

3.2 - OPERATION



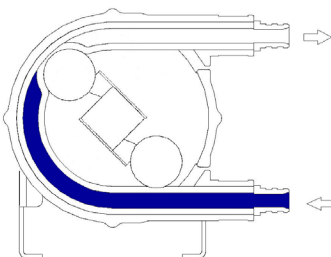
PHASE 1

The pump hose is compressed successively by two rollers assembled on a rotating wheel. The first roller, by pressing the walls of the hose, will create a vacuum and draw the pumped liquid into the hose.



PHASE 2

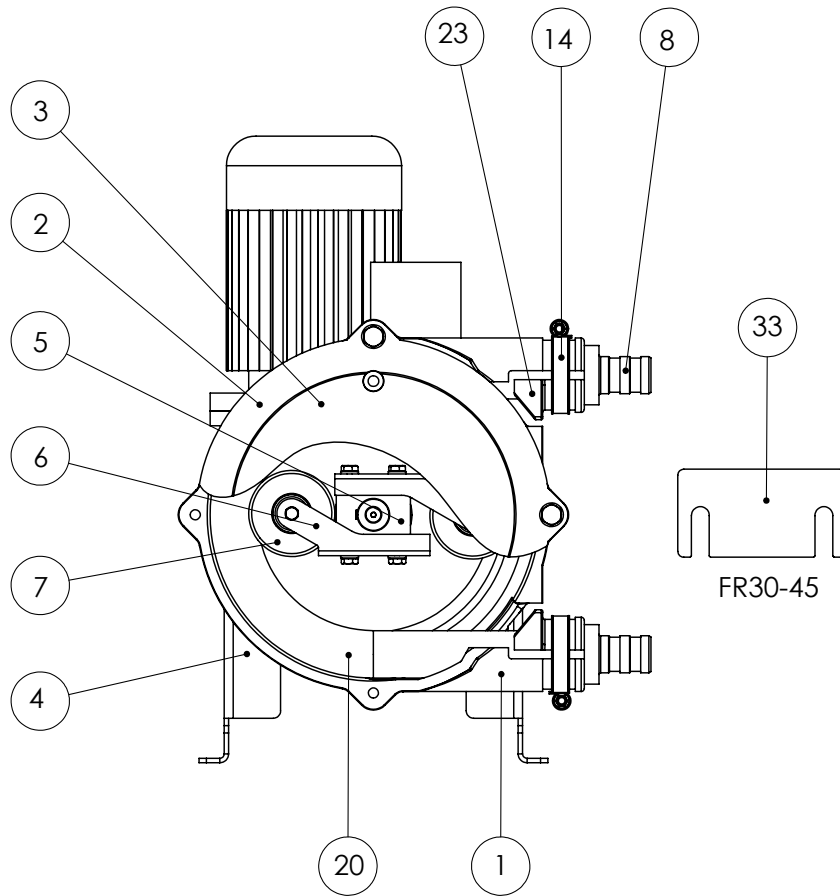
The pumped liquid has now entered the hose. The second roller will compress the hose and push the liquid towards the pump discharge.



PHASE 3

As soon as the discharge roller is detached from the hose, the other roller diametrically opposite is already in compression thus avoiding an internal product leakage. The product is then successively drawn and pushed in the direction of the wheel rotation.

3.3 - PUMP CONSTRUCTION



PART NO	DESIGNATION	MATERIAL FR13 TO 25	MATERIAL FR30 TO 45
1	CASING	ALUMINIUM	ALUMINIUM
2	COVER	ALUMINIUM	ALUMINIUM
3	COVER WINDOW SEAL	LEXAN	LEXAN
4	FRAME	ELECTROPLATED STEEL	ELECTROPLATED STEEL
5	ROTOR	ALUMINIUM	ALUMINIUM
6	ROLLER BRACKET	ELECTROPLATED STEEL	ALUMINIUM
7	ROLLER	NYLATRON (FR25 ALUMINIUM)	ALUMINIUM
8	INSERT	STAINLESS STEEL/PTFE	STAINLESS STEEL/PTFE
14	CLAMP	STAINLESS STEEL	STAINLESS STEEL
20	HOSE	see 3.4	see 3.4
23	HOSE LOCKING	ALUMINIUM	ALUMINIUM
33	SHIM		GALVANIZED STEEL

3.4 - HOSE

The FLOMOTION SYSTEMS hoses are manufactured according to very strict specifications to acquire the best performances of the pump and to assure an optimum hose life. They are available in different materials : Natural Rubber (NR), Buna N (NBR), EPDM, Neoprene, Norprene, Pharmed, Silicone and Hypalon. The material of the hose must be compatible with the pumped liquid.

3.5 - GEARBOX

Our standard gearboxes are worm drives for the FR13 pump and helical gearboxes for pumps FR25 to FR45. They have been sized according to the important radial loads of the pump. Consult the gearbox maintenance manual provided with the pump to know the quantity of lubricant requested as well as the frequency of oil change.

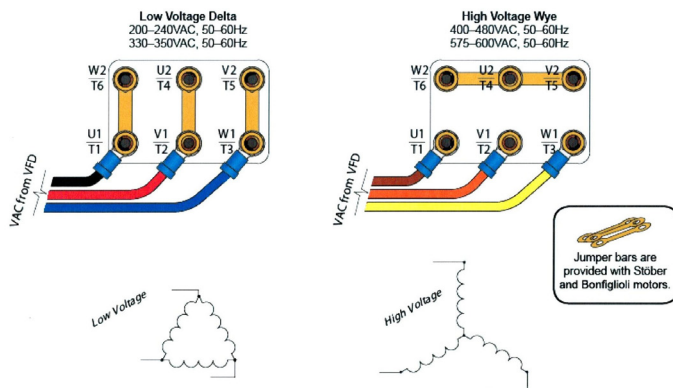
3.6 - ELECTRICAL MOTORS

The standard motors provided on our pumps are inverter duty TEFC motors and have a 230/460 VAC 60Hz three-phase voltage. Other motor options are available.

Motor Wiring

Motor Wiring for **ELVEM 6SM 6SB4** motor as typically used with the FR13 Pump is shown below. Subject to change.

Confirm wiring before applying power if unsure.



4. INSTALLATION

4.1 - UNPACKING AND RECEIVING

Inspect all cartons for damage, which may have occurred during shipping. Carefully unpack equipment and inspect thoroughly for damage or shortage. Report any damage to carrier and/or shortages to supplier. All major components and connections should be examined for damage and tightness, with special attention given to PC boards, plugs, knobs and switches.

4.2 - CONDITIONS OF USE

FR pumps can operate where the temperatures are between -4°F and 113°F (- 20°C and +45°C). They are designed for indoor and outdoor use. Temperatures below 40°F or above 100°F can affect hose life.

4.3 - SET UP

Before installing the pump, check the following points:

- The pump is delivered with a frame provided with four anchoring holes. It must be installed on a solid base with a slope which does not exceed 0.2" for 3ft (5mm for 1m) and must be firmly fastened to the base.
- Allow enough space around the pump to carry out maintenance. If such was not possible, consider moving the pump to a more suitable location.
- Make sure that the room is adequately ventilated to relieve the heat generated by the pump. Leave a space behind the motor fan shroud so as not to obstruct air intake.

4.4 - PIPING

Suction line piping:

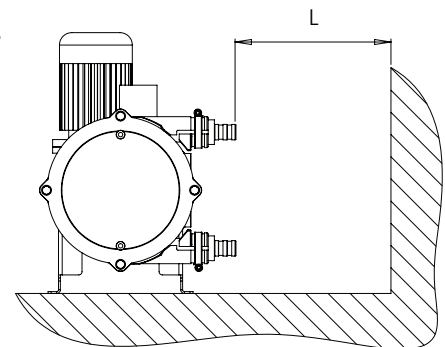
- The internal diameter of the piping must be equal to or slightly larger than that of the pump hose (see 3.4.).
- It must be the shortest and most direct possible to avoid suction loss.
- Install a ball valve on the suction line especially if the pump is on load.
- Limit the presence of bends and make sure that they are as large as possible.
- Make sure that piping can support the service pressure of the pump.

Discharge line piping:

- The internal diameter of piping must be equal to or slightly larger than that of the pump hose (see §3.4).
- It must be the shortest and most direct possible to avoid discharge pressure loss.
- Limit the presence of bends and make sure that they are as large as possible.
- Provide a space for a pulsation dampener.
- Install a ball valve on the discharge line, and install a pressure relief valve a diaphragm protected pressure gauge to avoid any possible damage to the pump and to the installation.
- It is recommended to install rubber expansion joints to absorb vibrations created by the pump pulsations.

During the installation, provide enough space for the hose change.
Distance (L) is the required length for hose removal.

PUMP	DISTANCE (L)
FR13	16" (400mm)
FR17	24" (600mm)
FR25	28" (700mm)
FR30	47" (1200mm)
FR45	60" (1500mm)



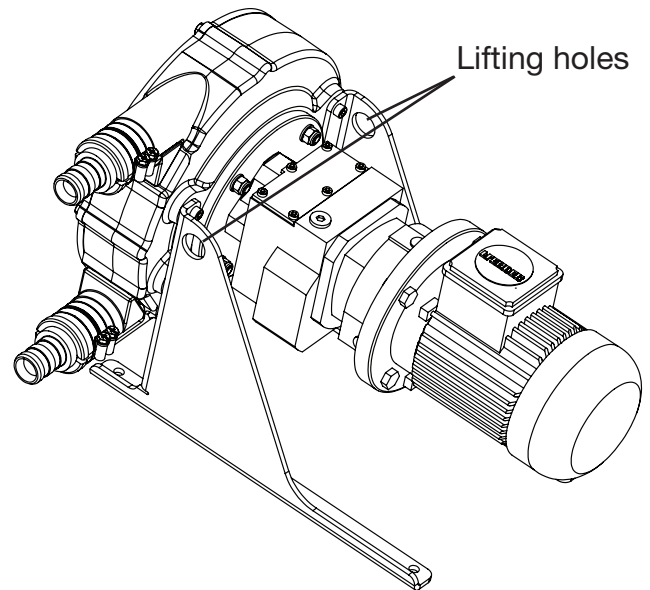
4.5 - LIFTING THE PUMP

Pumps are provided with two lifting holes placed on the upper part of the frame.

While lifting the pump, observe the following:

- Lift the complete hose pump using the lifting holes plus additional support on the gearbox and the motor using suitably rated straps or slings.
- Never exceed the upper limits of lift and control the motorized pump weights in the table below.
- The motorized pump, given its centre of gravity, will tend to overbalance on the pump head side.
- Make sure that personnel are at a secure distance from the pump to avoid any risk of injury.
- Never raise the pump other than by the pump's lifting holes.
- Never raise the pump by it's orifices.

ALL WEIGHTS IN POUNDS					
PART	FR13	FR17	FR25	FR30	FR45
FIXED SPEED	20	33	79	176	280
VARIABLE SPEED	29	42	101	198	331



5 PUMP START UP

5.1 - PREPARATIONS

- a. Connect the electrical motor in accordance with the local code and regulations. This must be performed by qualified personnel.
- b. Perform roller adjustment of the pump according to the pump process (see 6.3 ROLLER ADJUSTMENT). The pumps are always delivered with non-adjusted rollers.
- c. Check the direction of rotation of the pump.

5.2 - START UP

- a. Install piping at the suction and discharge of the pump.
- b. Make sure that valves at the suction and discharge are open.
- c. Start the pump by checking its direction of rotation through the cover window.
- d. Check the flow and discharge pressure and adjust rollers if these figures don't match the pump specifications.

6. MAINTENANCE

6.1 - HOSE CLEANING/FLUSHING

Hose cleaning can be done without removing the hose. It can be done with water or with a cleaning liquid (check compatibility with hose material). With certain products, it is necessary to clean the hose after every use in order to avoid the hardening of the product inside the hose.



CAUTION ! Make sure that the cleaning liquid temperature is within range of the hose material.

6.2 - HOSE REPLACEMENT

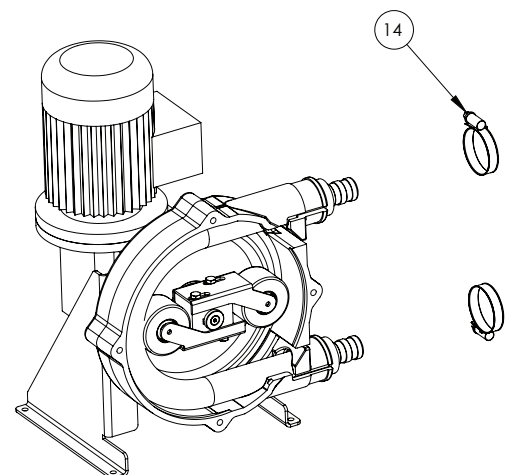
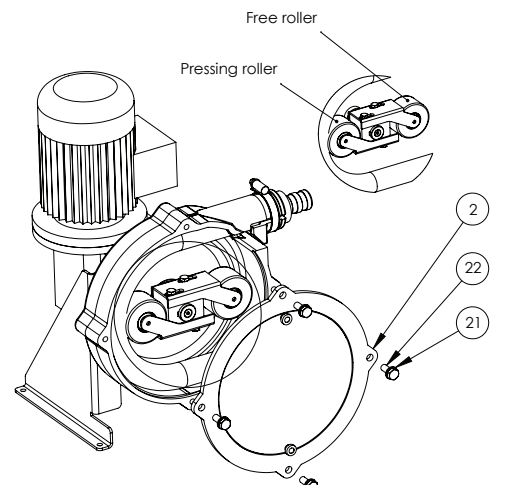


CAUTION ! Before any hose change, check the following points :

- a. This service has to be performed by skilled personnel familiar with this manual.
- b. Suction and discharge valves have to be closed to minimize product loss.
- c. Always wear protective clothes and necessary protection according to the pumped product.
- d. Follow all safety and environmental rules necessary for the handling of the pumped product.

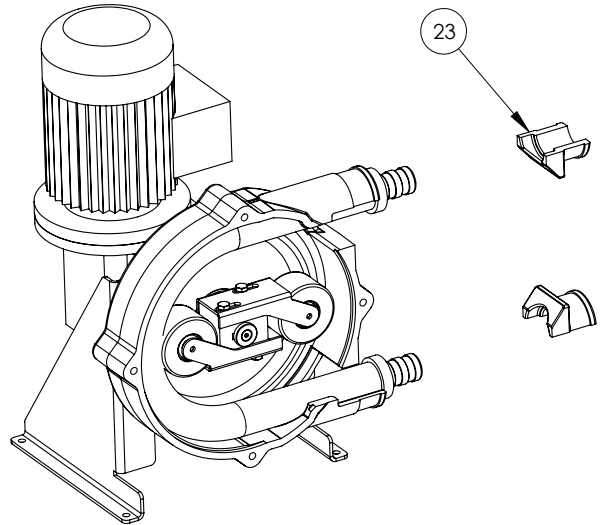
6.2.1 - HOSE REMOVAL FOR FR13 TO FR17

- 1 - Disconnect and remove the suction and discharge piping.
- 2 - Place the rotor in the position showed in the figure so that only one roller is pressing the hose.
- 3 - Disconnect power supply.
- 4 - Remove cover #2
- 5 - Loosen the screws of the roller bracket (2 screws) and withdraw the bracket so that it doesn't press the hose any more. DO NOT loosen the free roller bracket.
- 6 - Remove collars #14 on both sides.



CAUTION ! Never run the pump without the cover installed!

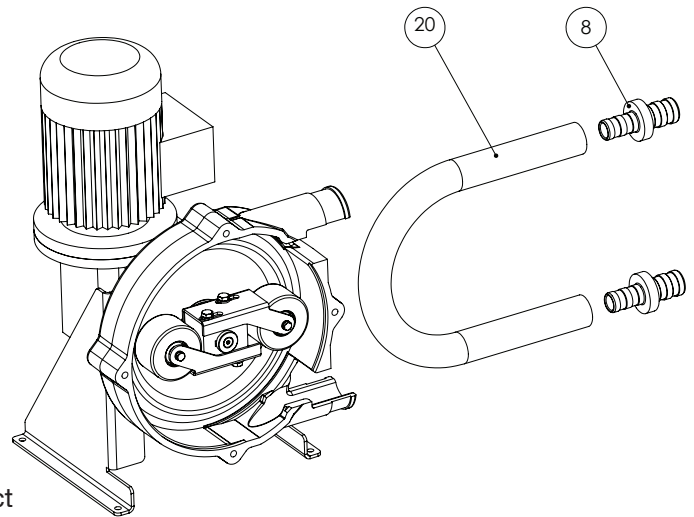
7 - Disassemble hose clamps #23 on both sides.



8. Pull the hose out of the front of the pump casing.

9. Pull the hose connectors from the worn hose.
If re-usable, carefully clean them.

10. Carefully clean the pump casing and front cover.



6.2.2 - HOSE REPLACEMENT FOR FR13 TO FR17

1. Check that the new hose is clean and is the correct size.

2. Install connectors #8 on the new hose #20.

3. Make sure the rollers are in the same position as before.

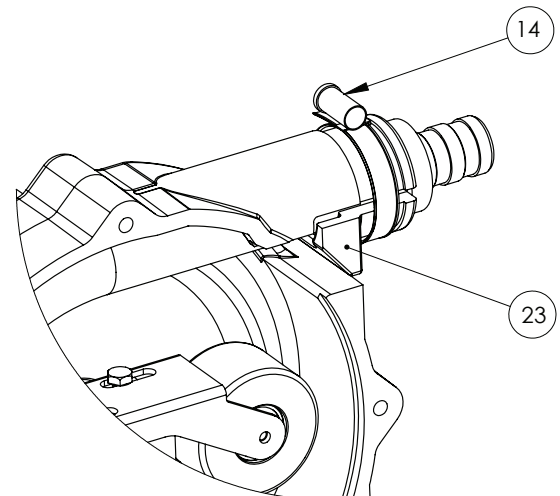
4. Make a U bend with the hose and place it inside the pump casing.

5. Position the upper connector against the pump casing inlet. Place the top hose locking #23 and position the collar #14 in it's groove. Tighten the collar screw.

6. Repeat step 5 on the lower connexion.

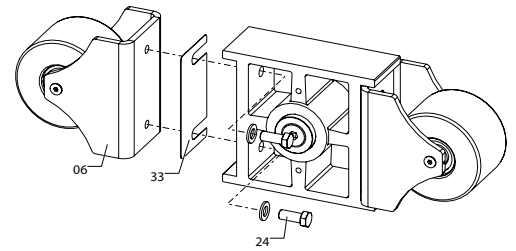
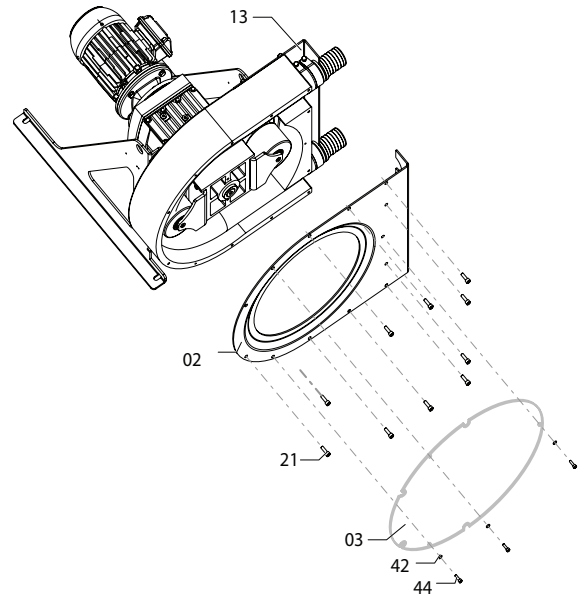
7. Apply GLY04 Lubrication on the inner surface of the hose (where the rollers run).

8. Set the roller pressure according to the procedure described in 6.3.1 ROLLER PRESSURE ADJUSTMENT.



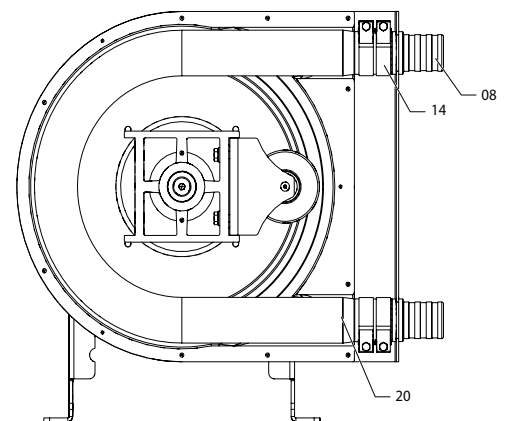
6.2.3 - HOSE REMOVAL FOR FR25 TO FR45

1. Disconnect the suction and discharge connections from the pump.
2. Place the rotor so that just one of the rotors is compressing the hose.
3. Disconnect the electric connection from the pump. Verify that all electrical connections are disconnected from the pumps motor.
4. Take off the cover pos #03 and unscrew screw pos #44.
5. Unscrew the two screws pos #24 and pull back the pressure holder pos #06 and take out pressure holder and shims if there are any.
6. Reinstall the cover pos #02 in place, connect the electricity and turn the rotor 180 degrees so that the second roller is not in contact with the hose. DO NOT UNSCREW the pressure holder pos #06.
7. Disconnect the mains electrical connection from the pump. Verify that all power connections are disconnected from the pump motor. Take off the cover pos #03 and the front support pos #02.
8. Remove the hose from the front of the pump.



6.2.4 - REPLACEMENT OF THE HOSE FOR PUMPS FR25 TO FR45

1. Verify that the new hose is clean and that it corresponds with the size of the pump.
2. Reinstall the inserts pos #08 and the clamps pos #14 on the new hose.
3. Remove one of the pressure holders pos #06.
4. Insert the hose from the front of the pump.
5. Position the inserts in the rear support pos #13.
6. Apply non-petroleum synthetic PTFE grease on the surface of the hose that is in contact with the rollers.
7. Reinstall the front frame pos #02 and the cover pos #03 and reconnect the electrical power.
8. Turn the rotor 180 degrees.
9. Reinstall the pressure holder pos #06 without shims and tighten the two screws pos #24.
10. Adjust the roller pressure as described in chapter 6.3.2 Roller Adjustment.
11. Apply GLY04 Lubrication on the inner surface of the hose (where the rollers run).



6.3 - ROLLER ADJUSTMENT



CAUTION ! The roller adjustment is required to prevent any internal hose leakage. An internal leakage considerably reduces the life of the hose as well as the flow. As a result, it is essential to adjust the rollers according to the rotation speed of the pump, the desired discharge pressure and the liquid viscosity.



WARNING ! Never run the pump without the pump cover installed.

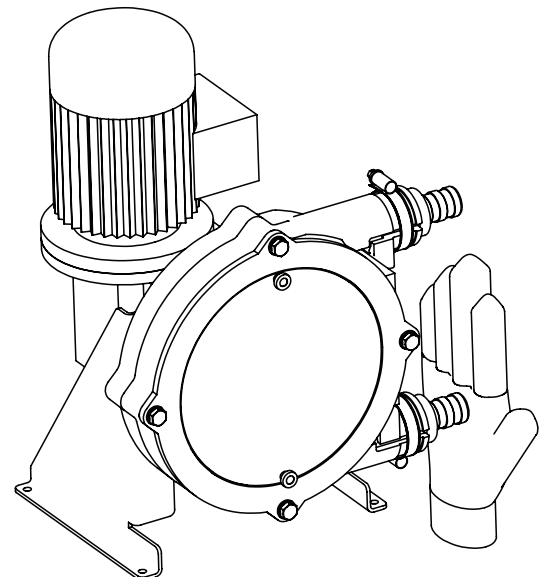
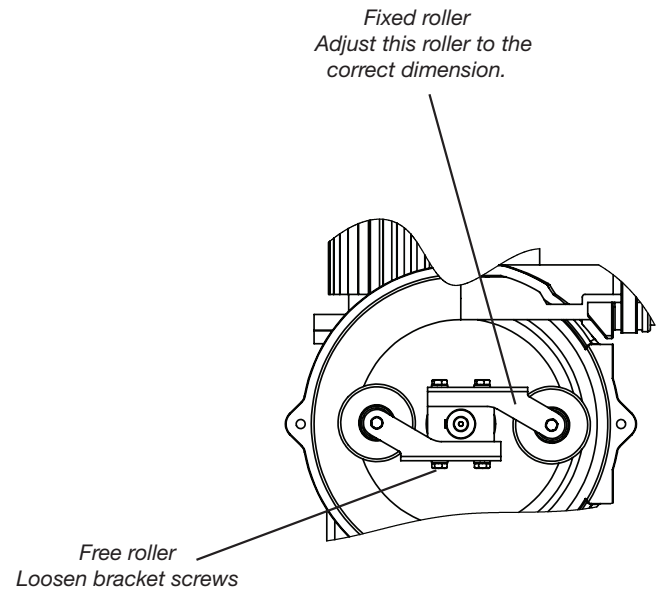
6.3.1 - ROLLER ADJUSTMENT FR13 TO FR25



Note : The pressure setting must be checked when a new hose is installed due to variations in the hose thickness.

1. Remove the pump cover window from the pump casing.
2. Slightly loosen the screws of the bracket that is compressing the hose.
3. Adjust the fixed roller bracket to the third graduation mark on the bracket arm from the control hub. Tighten the bracket screws.

4. Place the sight glass on the pump cover
5. Run the pump and place the palm of your hand over the inlet port (suction side) and check if the fixed roller is adjusted enough to create a suction. If not, remove the cover again and move the fixed roller until it meets the next graduation mark closer to the hub.
6. Repeat steps 4 and 5 moving the bracket side-ways toward the center hub until you obtain the correct suction.
7. Adjust the free roller to the same distance, re-place the cover and test-run the pump. Re-adjust if necessary.



WARNING ! The two rollers must be equally adjusted.

6.4 - MAINTENANCE AND PERIODIC INSPECTIONS

1	Pump hose replacement.	To prevent hose failure, change the pump hose after 90 % of the life time of the first hose.	see 6.2
2	Gearbox oil replacement.	Refer to the gearbox maintenance manual provided with the pump.	
3	Replacement of the rollers.	If rollers are worn on the roller surface.	
4	Check for wear on the roller pressing surface.	At every hose change.	
5	Check the presence of a gearbox oil leakage.	Before starting the pump and periodically during the pump service.	
6	Check for strange noises coming from the pump, gearbox and bearing case or abnormal pump casing temperature.	Periodically during the pump service.	
7	Check for leakages at inlet and outlet ports.	Periodically during the pump service.	Re-tighten connections.

7. STORAGE

7.1 - STORAGE OF THE PUMP

Store the pump in a sheltered and dry place and ensure that the storage room temperature is between -4 and +113°F (-20°C and +45°C).

Protect the pump if necessary and block the inlet and outlet orifices :

After one month of non-use, remove the hose from the pump or withdraw one of the rollers from the hose to avoid a compression point on the hose.

If you cannot remove the hose or withdraw the rollers, run the pump 5 minutes a week.

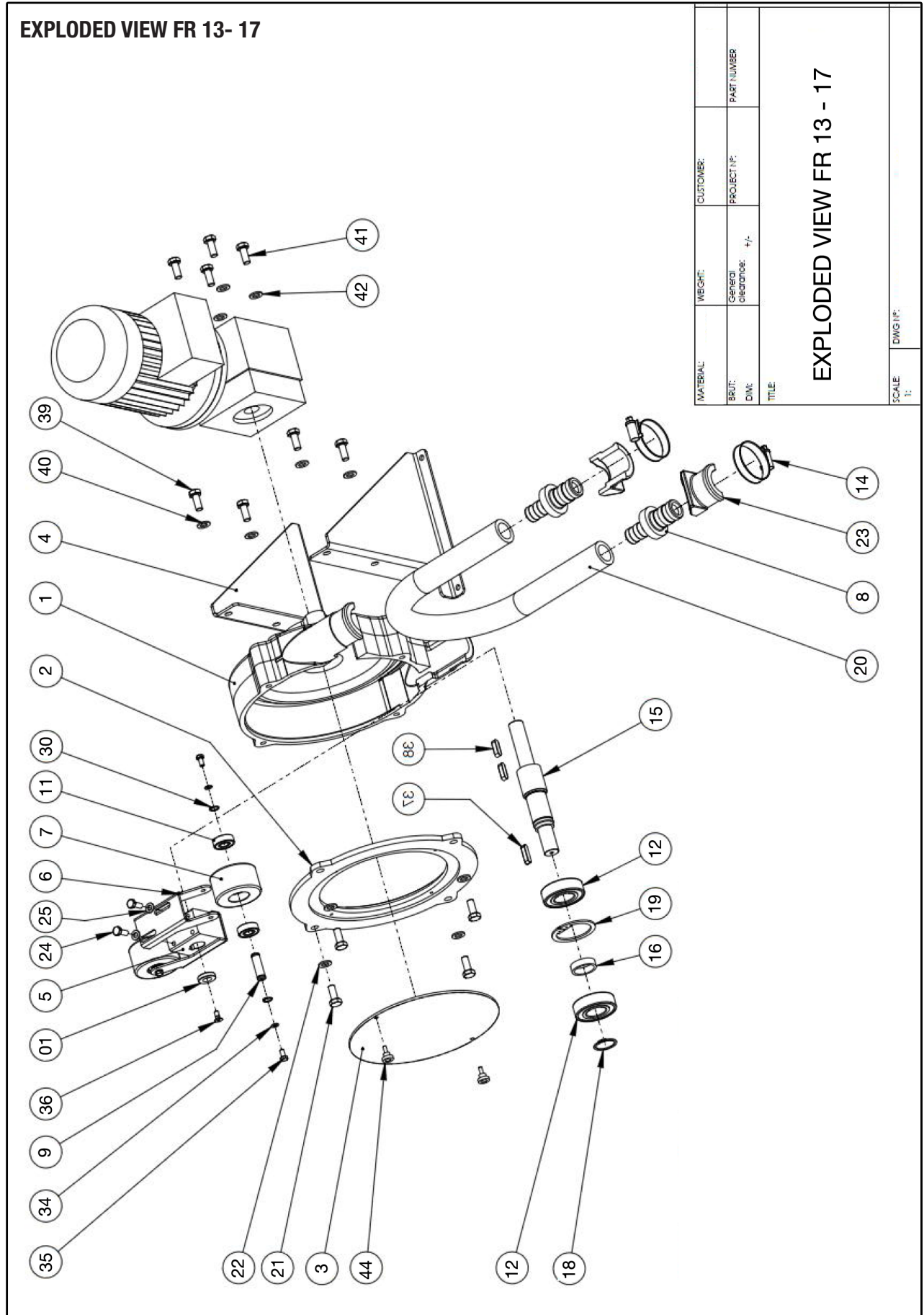
7.2 - STORAGE OF THE HOSE PUMP

Hoses must be stored sheltered from light in a cool, dry place. Life or performance may be reduced after two years.

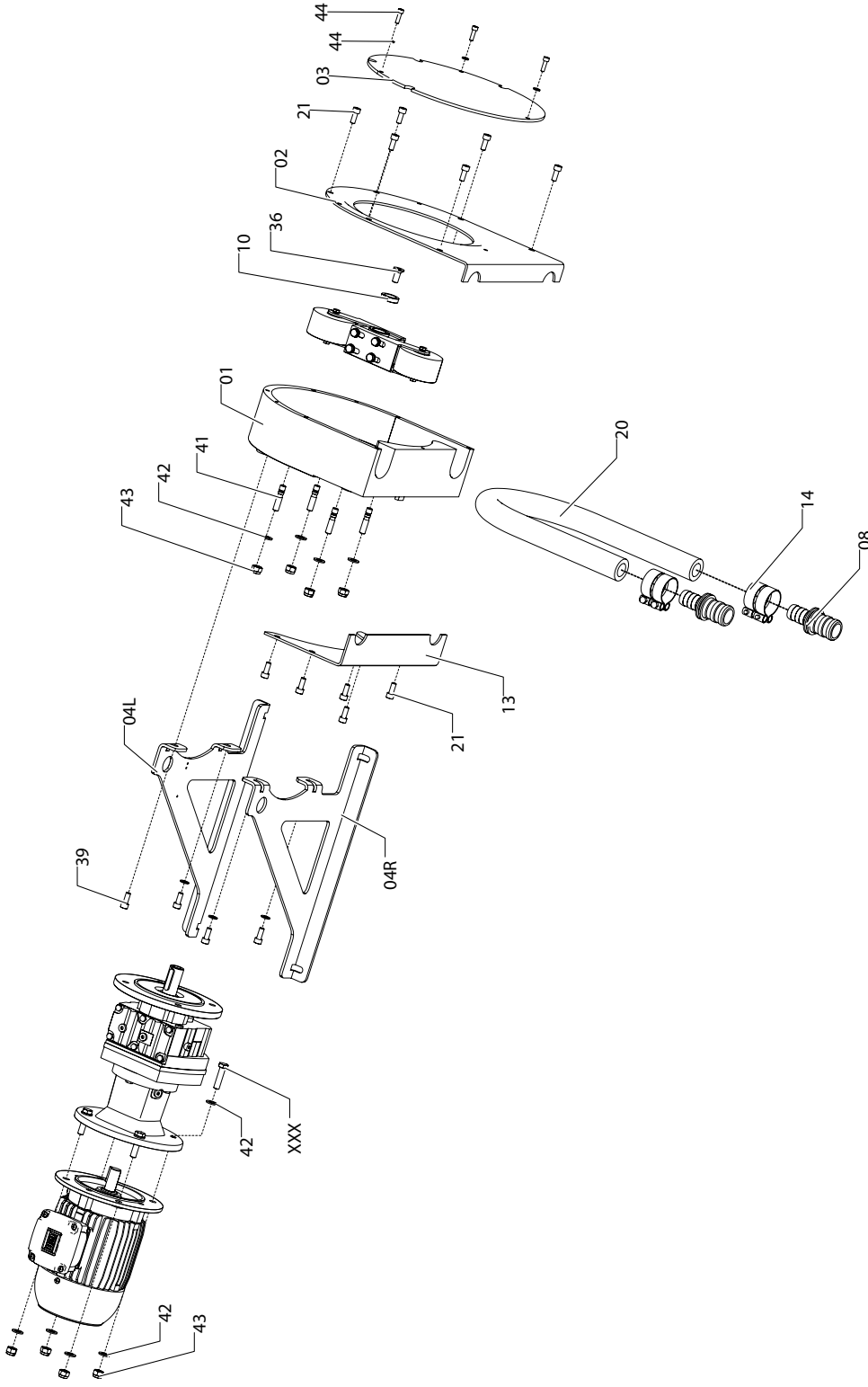
8. TROUBLESHOOTING

PROBLEM	POSSIBLE REASON	RESOLUTION	
The pump does not work	No power supply.	Check that the pump power switch and/or electrical breaker is in "ON" position.	
		Check the connection of the motor.	
	The roller assembly does not rotate.	Check the roller adjustment.	
		Check that the discharge pressure is not too high. Check that the product hasn't left sedimentation in the hose.	
Low capacity or pressure	Bad roller adjustment.	Readjust the rollers.	
	Air leak at the inlet of the pump.	Check the tightness of the clamps on the pump hose and the sealing of the inlet piping.	
	Valve closed or partly closed at inlet.	Fully open the valve.	
	Wear of the hose.	Replace the hose.	
	Product too viscous or too high pump speed in comparison with the product viscosity.	Ask for advice from your FLOMOTION distributor.	
	Piping blocked or partly blocked at inlet.	Unblock piping at inlet and make sure there is good flow of the product.	
Hose life time is too short.	Incompatibility of the hose with the pumped product.	Make sure the compatibility of the hose with your product and contact your FLOMOTION distributor.	
	Discharge pressure too high.	Check that the discharge pressure of the pump does not exceed the maximum pressure of the pump (see curves). Check that the outlet piping is not blocked up and that all valves are opened. Make sure that the pressure relief valve works correctly. Make sure that the piping friction losses do not exceed the value requested for an appropriate functioning of the pump.	
		Pump speed too high.	Reduce the pump speed.
		Bad roller adjustment.	Check the adjustment.
	Too high temperature of the product.	Contact your FLOMOTION distributor.	
	Insufficient hose lubrication	Apply GLY04 Lubrication on the inner surface of the hose (where the rollers run).	
Pulsations in piping.	Deficient fastening of the piping.	Correct piping connections.	
	Process creating important pulsations due to the product, the speed of the pump, discharge pressure or the sizing of piping.	Contact your FLOMOTION distributor.	
Abnormal noise coming from the bearing case.	Worn bearings.	Replace bearings.	

9. EXPLODED VIEWS

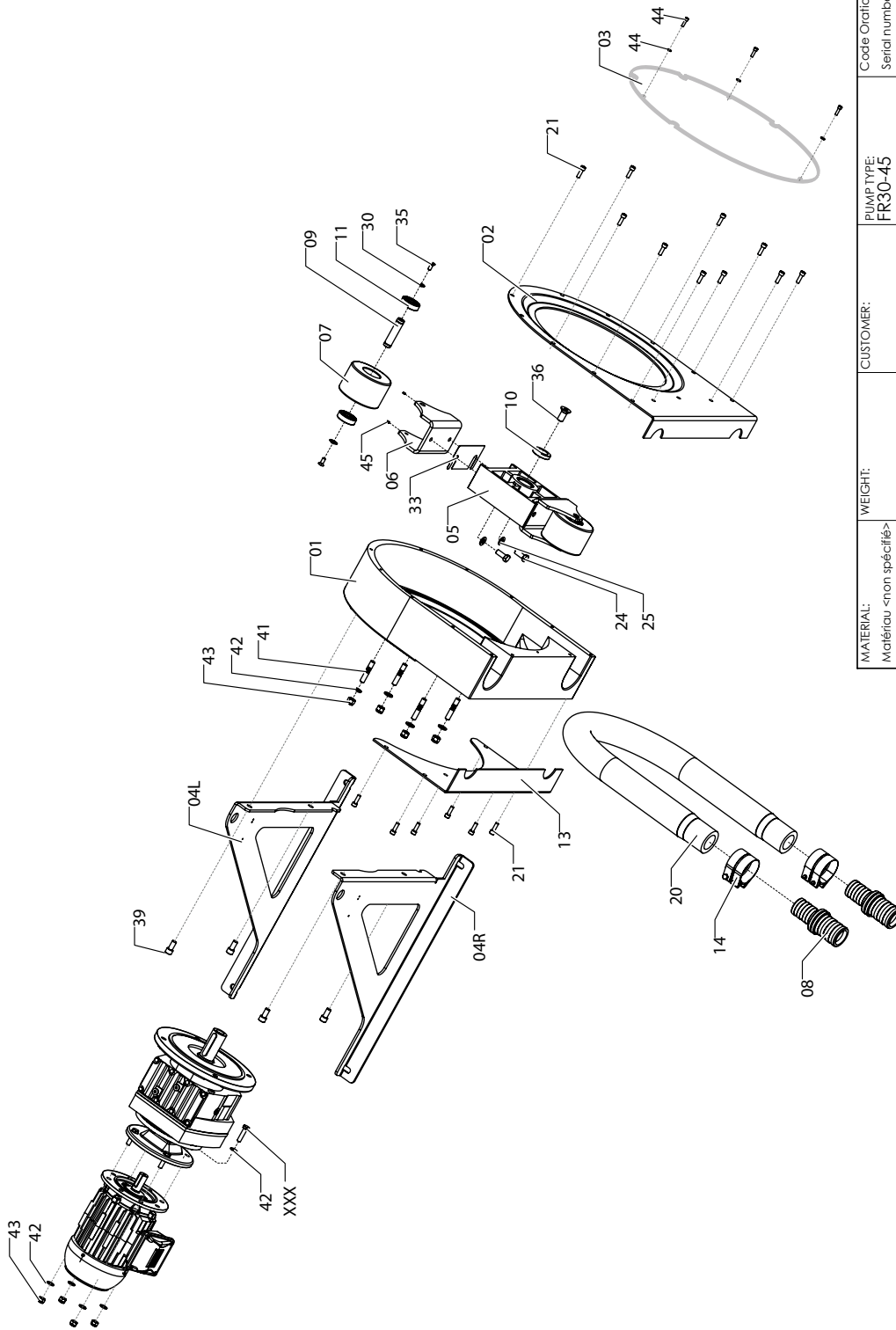


EXPLODED VIEW FR 25



MATERIAL: Matériau <non spécifié>	WEIGHT:	CUSTOMER:	PUMP TYPE: FR25	Code Oratio: Serial number:
BRUT:	General clearance: +/-	PROJECT N°:	PART NUMBER	
DIM:				
TITLE: EXPLODED VIEW FR25				
SCALE: 1:	DWG N°: EXPLODED VIEW FR25 IND01 02-2011	SIZE: A3	REV: 1	

EXPLODED VIEW FR 30-45



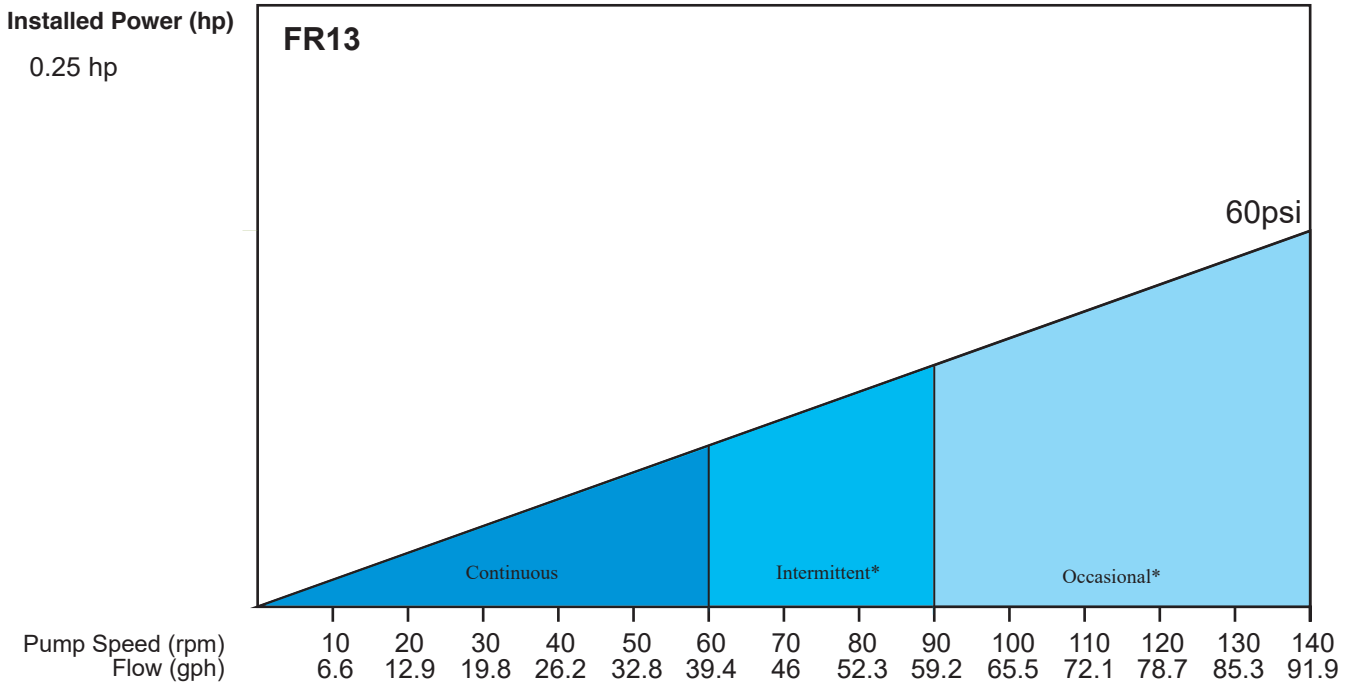
MATERIAL: Materiau <non spécifié>	WEIGHT:	CUSTOMER:	PUMP TYPE: FR30-45	Code Oratio: Serial number:
BRUT:	General clearance: +/-	PROJECT N°:	PART NUMBER	
DIM:				
TITLE: EXPLODED VIEW FR30-45				
SCALE: 1:	DWG N°: EXPLODED VIEW FR30-45 INDO1 02-2011	SIZE: A3	REV: 1	

FR PUMP PARTS LIST (see specific exploded view)

REF.	DESIGNATION	FR13-17	FR25	FR30-45
1	CASING	X	X	X
2	COVER	X	X	X
3	SIGHT GLASS	X	X	X
4	FRAME	X	X	X
5	ROTOR X	X		
6	PRESSURE HOLDER	X	X	X
7	PRESSURE ROLLER	X	X	X
8	HOSE CONNECTOR	X	X	X
9	ROLLER PIN	X	X	X
10	ROUND ROTOR ASSY	X	X	X
11	BALL BEARING - ROLLER	X	X	X
12	BALL BEARING - CASING	X		
13	REAR BRACKET		X	X
14	COLLAR	X	X	X
15	ROTOR SHAFT	X		
16	SPACER	X		
18	CIRCLIP - SHAFT	X		
19	CIRCLIP - CASING	X		
20	HOSE	X	X	X
21	SCREW- COVER	X	X	X
22	WASHER - COVER	X	X	X
23	HOSE LOCKING	X		
24	SCREW - BRACKET	X	X	X
25	WASHER - BRACKET	X	X	X
30	CIRCLIPS - ROLLER PIN	X	X	X
33	SHIM			X
34	WASHER -PIN	X	X	
35	SCREW - PIN	X	X	X
36	SCREW - SHAFT	X	X	X
37	KEY - ROTOR	X		
38	KEY - GEARBOX	X		
39	SCREW - FRAME	X	X	X
40	WASHER - FRAME	X		
41	GUDGEON OR SCREW	X	X	X
42	WASHER - GEARBOX	X	X	X
43	NUT - GEARBOX		X	X
44	SCREW - SIGHT GLASS	X	X	X

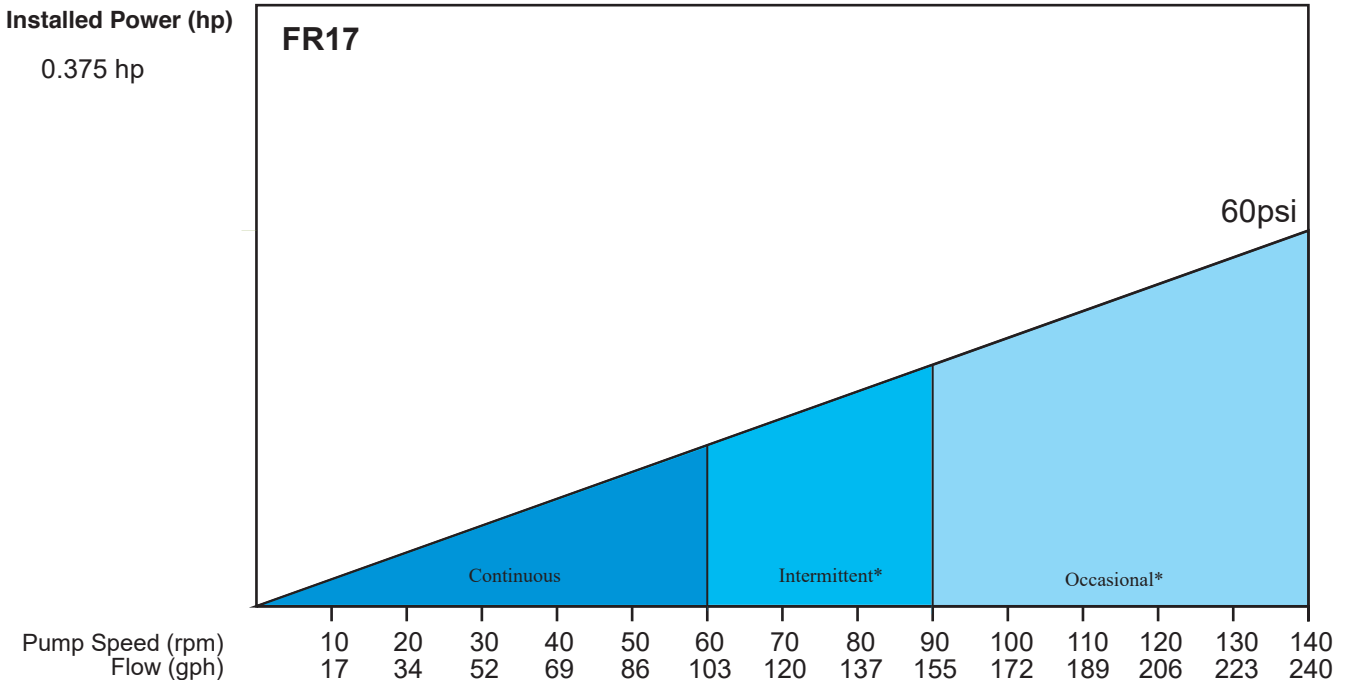
10 PUMP CURVES & DIMENSIONS

FR 13



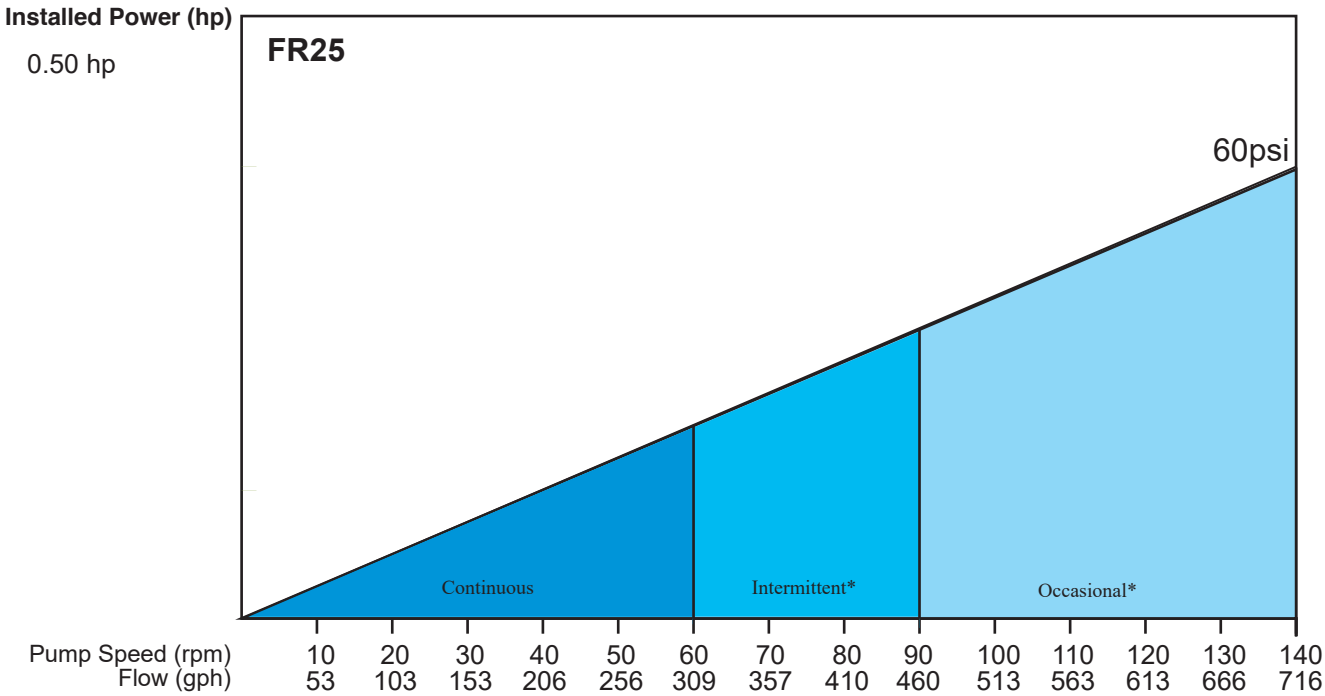
*Intermittent use : minimum one hour stop after 2 hours run / *Occasional use : maximum one hour a day

FR 17



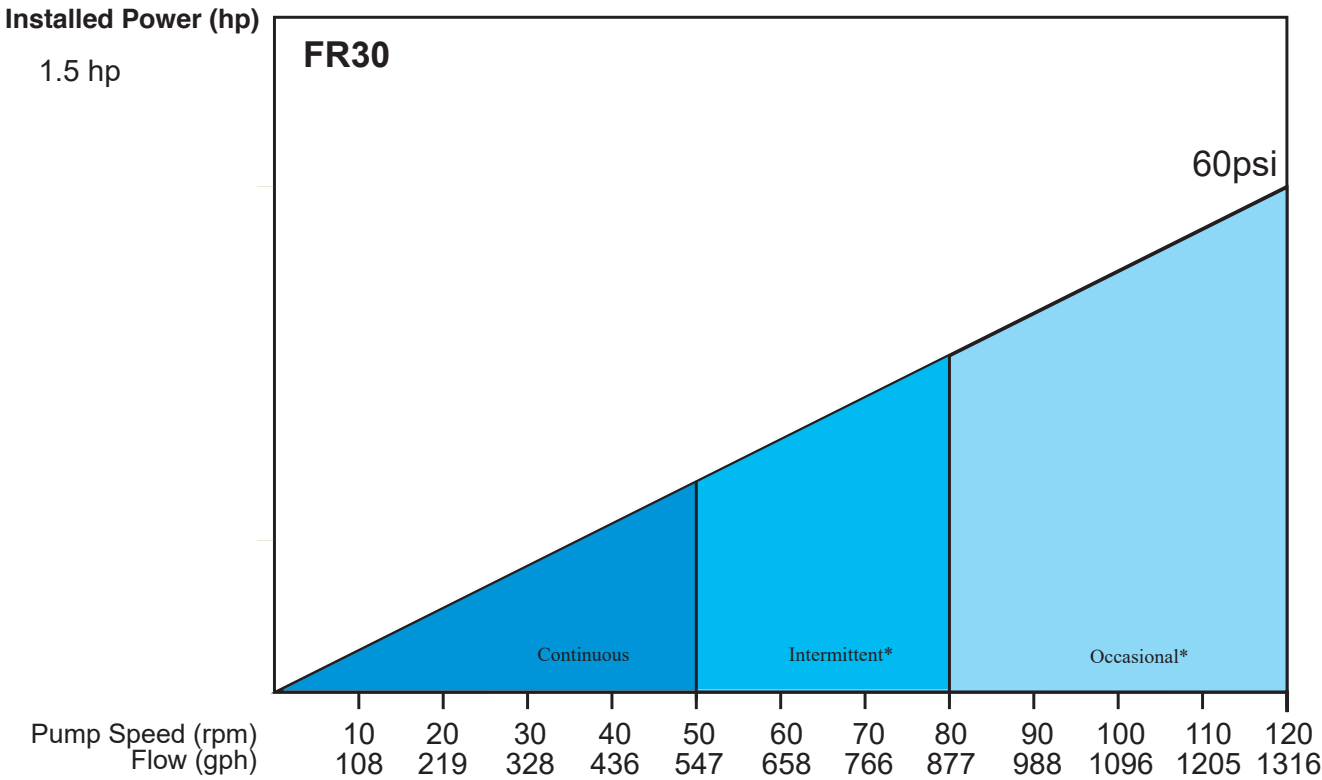
*Intermittent use : minimum one hour stop after 2 hours run / *Occasional use : maximum one hour a day

FR 25



*Intermittent use : minimum one hour stop after 2 hours run / *Occasional use : maximum one hour a day

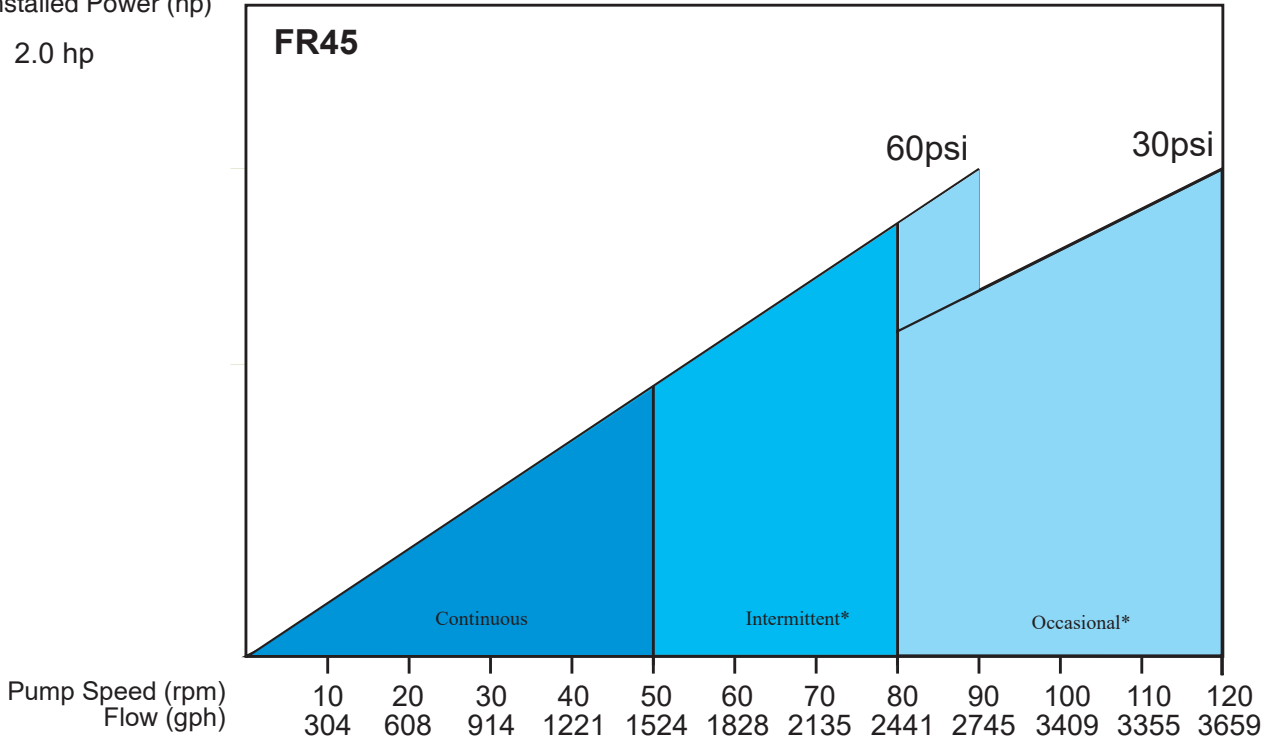
FR 30



*Intermittent use : minimum one hour stop after 2 hours run / *Occasional use : maximum one hour a day

FR 45

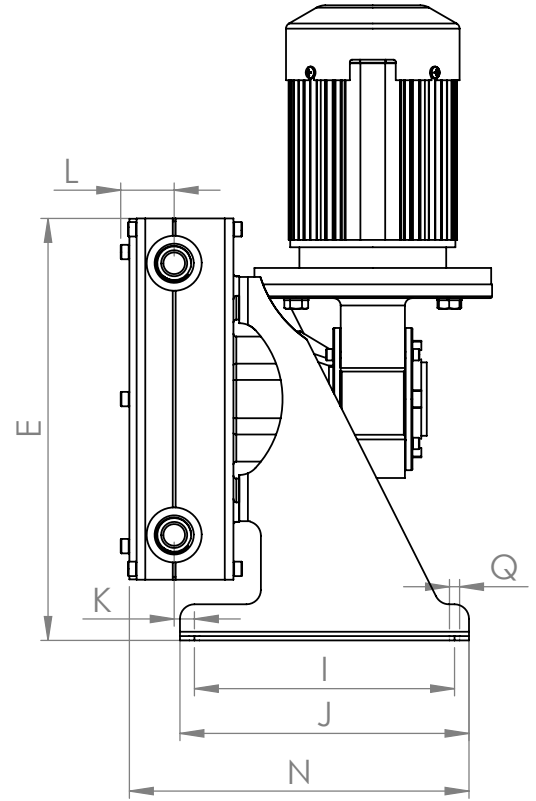
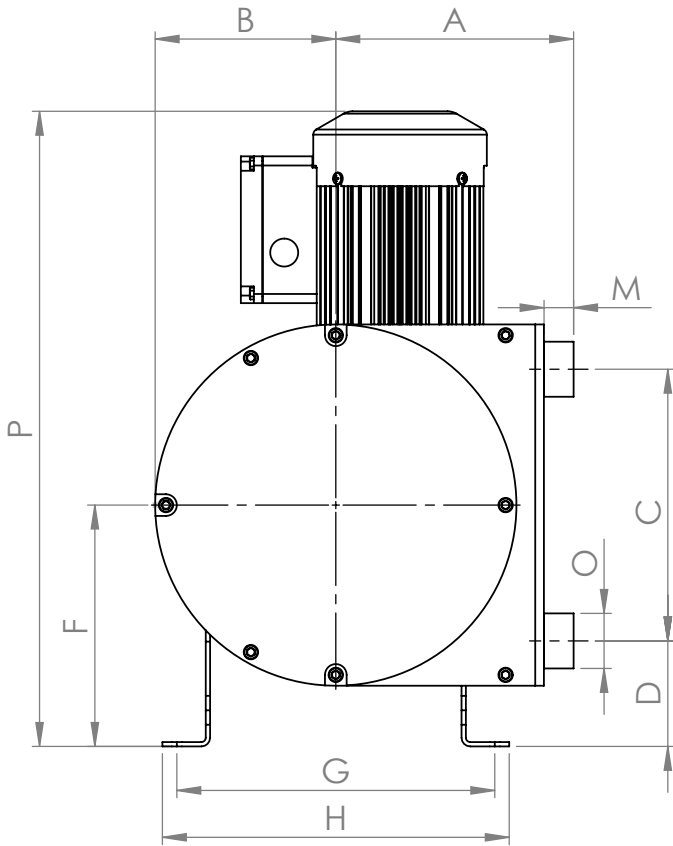
Installed Power (hp)
2.0 hp



**Intermittent use : minimum one hour stop after 2 hours run / *Occasional use : maximum one hour a day*

PUMP DIMENSIONS FR13 TO FR17

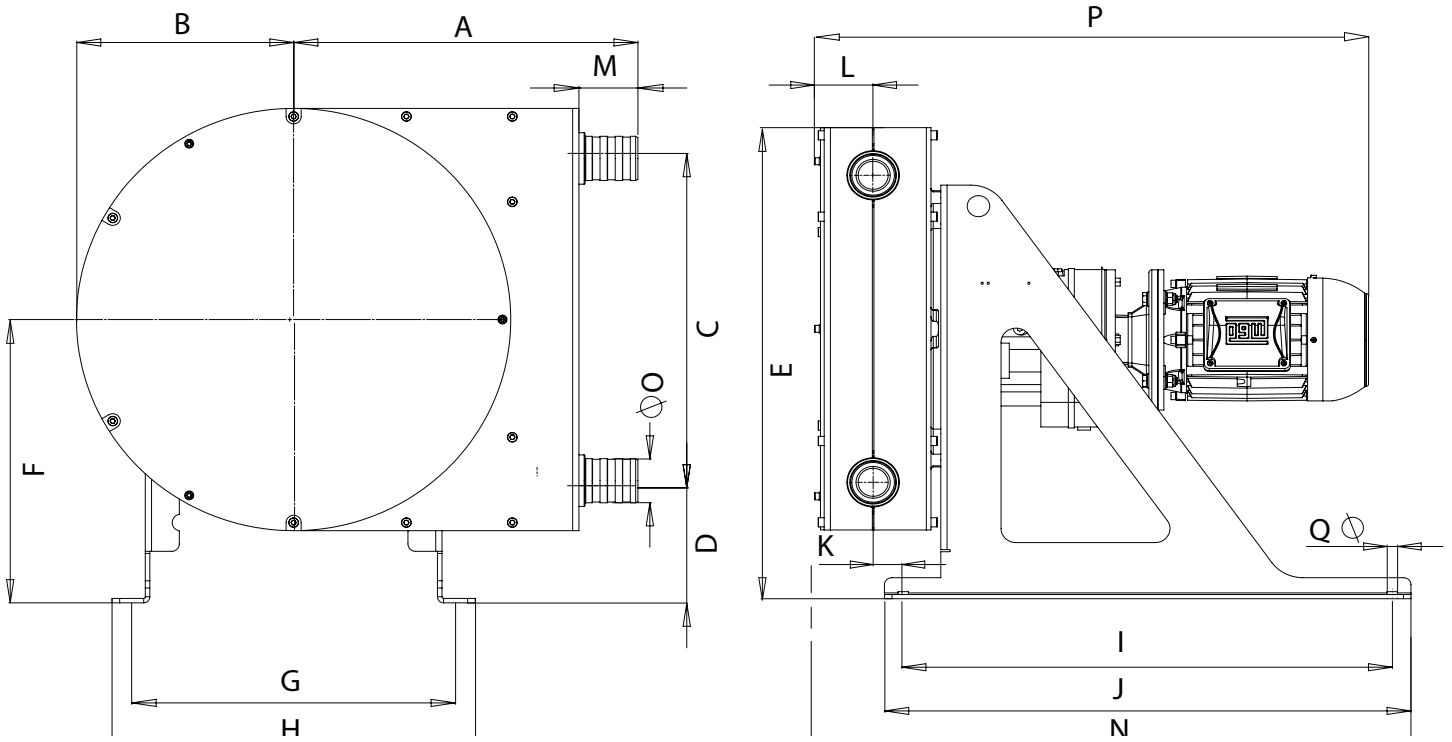
All dimensions are subject to change without notice.



SIZE		A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	ØQ
FR 13F	in	5.0	3.7	5.2	2.4	8.7	5.0	6.5	7.1	6.1	6.7	0.4	1.1	0.79	7.8	0.75	13.9	0.24
	mm	126	95	132	61	222	127	165	180	156	170	10	28	20	197	19	352	6

SIZE		A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	ØQ
FR 17F	in	7.4	5.2	7.4	2.9	11.4	6.6	8.7	9.3	7.1	7.9	0.53	1.6	1.4	9.3	0.98	16.8	0.24
	mm	187	131	188	73	290	167	220	235	180	200	13.5	40.5	35	235.5	25	427	6

PUMP DIMENSIONS FR25 TO FR45



SIZE		A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	ØQ
FR 25F	in	10.8	6.7	10.1	3.6	15.3	8.6	9.5	10.6	15.8	17.3	0.7	2.1	1.8	19.0	1.4	22.8	0.4
	mm	275	170	256	90	388	218	240	270	400	440	18	52.5	45	482	35	580	11

SIZE		A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	ØQ
FR 30F	in	13.6	8.9	14.3	5.8	21.9	13.0	13.0	15.0	21.7	23.6	0.9	2.6	2.3	26.2	1.8	26.5	0.6
	mm	345	226	364	148	556	330	330	380	550	600	22	66.5	55	655.5	45	672.5	14

SIZE		A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	ØQ
FR 45F	in	17.9	11.3	18.0	6.2	26.5	15.2	16.5	18.5	25.6	27.6	1.6	3.1	2.8	31	2.4	31	0.6
	mm	455	287	456	157	672	385	420	470	650	700	40	79	70	786	60	776.5	14

11. K4 Series Pump Controller

11.1 Operation

For complete details about the motor drive controller please refer to the included K4 SERIES Operating Instructions booklet.

NOTE: For pumps over 1HP please refer to the Lenze SMVector manual or see customer provided VFD manual. The SMVector VFD manual is available on our website at FlomotionSystems.com/support

Shown below are program settings specific to operation with the FR SERIES Pumps.

11.2 Making Programming Changes

1. Press the Stop key to make sure the pump is stopped. Display will read Stop.
2. Press the Program key.
3. Using the arrow keys, enter the parameter number you would like to change and then press Enter.
4. Using the Arrow keys, enter the desired settings.
5. Press the Program key when all changes have been made.
6. Press the Run key for pump operation.

11.3 K4 Programming Defaults

MENU VALUE	DEFAULT SETTING	DESCRIPTION
0.01	Varies	Set to the motor nameplate rating in Amps . Factory Setting is the drive rated output current.
0.04	0000	GFCI Operation. Set to 0000 if power to VFD is not connected to a GFCI (default). Set to 0001 (standard GFCI) or 0002 for a sensitive GFCI.
1.00	0001	Remote Start/Stop input enabled when using 4-20mA speed control (CHANGE TO 0000 to use 4-20 with manual start/stop)
1.05	0003	Automatically restarts the pump after a power fail or when a fault is cleared (except a short circuit fault).
2.00	0003	Use an analog 4-20mA signal to control pump speed. Uses Analog Input #2 on pins 21(+) and 22(-) of the terminal strip.
2.01	0001	Initiate a manual speed change immediately w/o having to press the Enter key.
2.02	0002	Enable External Local/Remote switching
3.02	80 Hz	Upper Frequency Limit is the max speed for manual control and also corresponds to the 20mA value when using Analog Input speed control. Adjust this value down to control dosing. Consult factory prior to increasing above default value. See the Draw Down/Calibration procedure on following pages to help set this value
3.03	5 sec	Acceleration Speed. Number of seconds to go from stop to set speed.
3.04	5 sec	Deceleration Speed. Number of seconds to go from set speed to stop.
3.10	7 sec	Current Limit trip time in seconds. Increase value a little at a time for situations where current draw briefly exceeds rated motor value while pumping. Example: when pumping into higher pressures or with viscous liquids.

4.00	0002	Display preference. Set to 0000 to display speed in Hz. Set to 0002 to use custom units (GPH).
4.01	Varies	When using GPH setting in 4.00 enter the whole number of your maximum GPH here (GPH at full speed of pump). Example: If full speed GPH is 25.5GPH enter 255 here. Set the decimal place in 4.02 below.
4.02	Varies	When using GPH setting in 4.00 enter the number of decimal places for the value in 4.01 above. Example: If full speed GPH is 25.5GPH enter 255 in step 4.01 above then enter 0001 here so value displayed will be 25.5.
4.03	0001	Determines what is displayed when in Stop Mode: 0000 = last run setting, 0001 = "STOP" (Default), 0002 = "0000".
5.00	0000	Main board RUN relay operation. Set to 0000 to enable relay closure when pump is running. See K4 manual for other choices.
7.03	0010	N.O. Start Start/Stop Input. Terminals 16 & 4 default.
7.04	0013	N.O. Remote/Local Select Input. Terminals 5 & 20 default.
7.05	0008	N.O. Enables External Fault Input. Terminals 7 & 8 default.
8.01	0010	N.O. Fault Status Output. Terminals 24 & 25 default.
8.02	0013	N.O. Remote Status Output. Terminals 26 & 27 default.
8.09	0000	Analog Output type. Set to 0002 When speed feedback 4-20ma output is connected. Use pins pins 17(+) and 18(-)
9.07	20	Analog Input Offset. Set to 20 to scale input to 4-20mA.

11.4 Calibration Procedure for Maximum Pump Output in GPH

A 30-second graduated calibration cylinder should be used to perform a draw-down of actual chemical and including typical system injection pressure to establish the maximum pump output during normal operating conditions.

Using the pump to fill the cylinder, make sure the K4 Drive/VFD is set to the highest possible speed using the 'up' arrow on the keypad. Since there is a short ramp-up time for the pump to reach maximum speed, it is recommended to over-fill the calibration cylinder for higher accuracy. After filling the calibration column, make sure the appropriate valves are open to allow the pump to draw from the calibration column only.

11.5 Draw Down Procedure:

At the same time start the pump and the stop watch. If you slightly over-filled the calibration cylinder, start the pump and then start the watch when the chemical reaches the "0" point on the calibration cylinder.

Once the stopwatch reaches 30 seconds stop the pump.

Review the graduated markings on the calibration cylinder to find out how much liquid was pumped in 30 seconds.

See menu settings 4.00 through 4.03 above for setting the GPH value to be displayed.

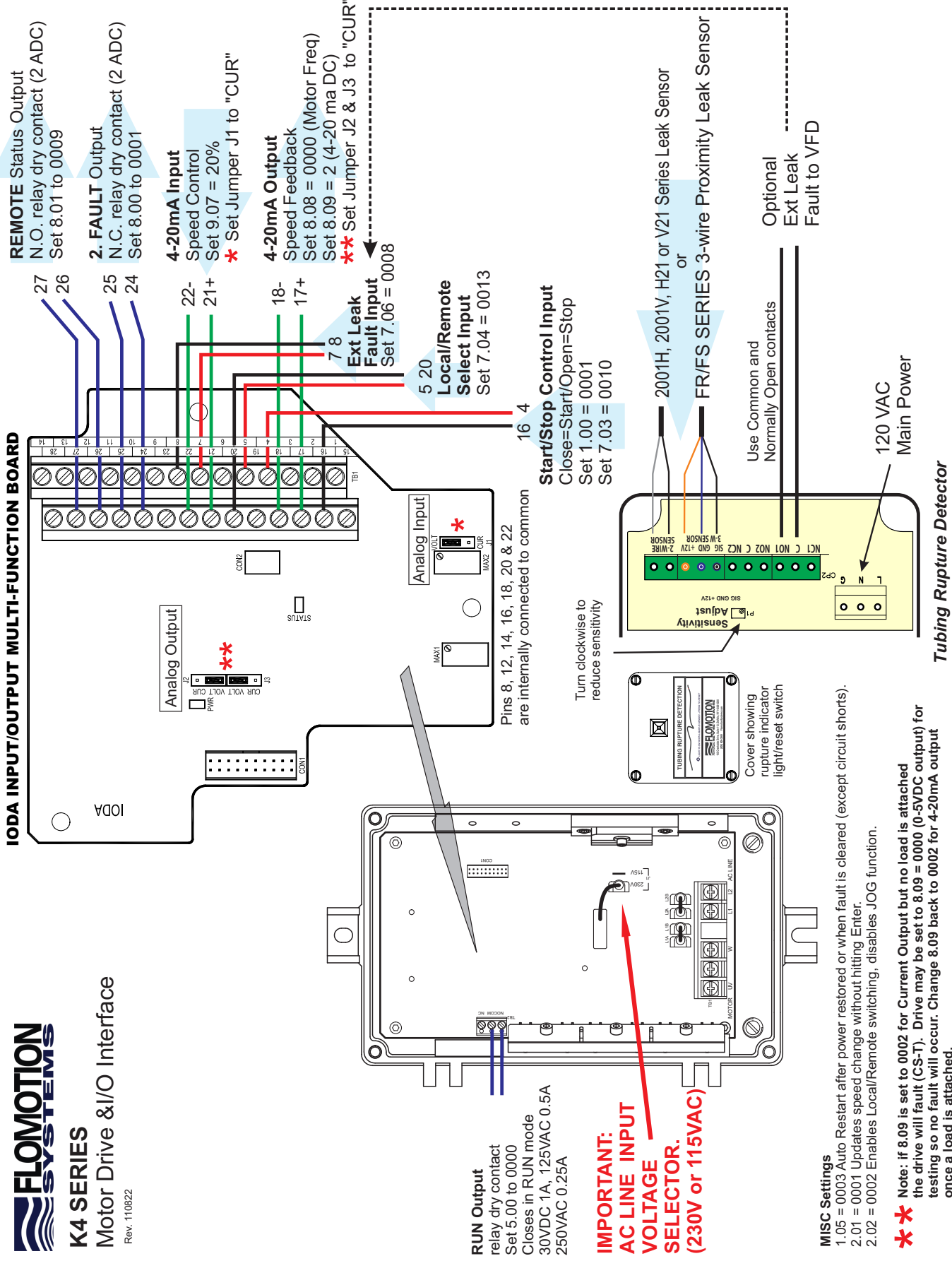
The full K4 SERIES Drive Operating & Programming manual may be downloaded from our web site at www.flomotion-systems.com/support

11.6 Important Program Settings for Special Conditions

- **CS-T Fault.**
Set 8.09 = 0000 to avoid CS-T fault when 4-20mA Output is disconnected (when not using 4-20mA output). This sets the analog output to voltage instead of current which stops the error.
- **Manual speed control with remote start/stop.**
set 2.00 to 0000 (keypad speed control)
- **Pump powers back up in manual mode when using auto-restart after power failure.**
Set 7.04 to 0000 if using auto-restart after power failure or else it powers back on in manual mode and does not restart running.
- **For remote (4-20ma) speed control with keypad start/stop.**
Set 1.00 to 0000
- **Large hose pumps struggle to start at low speed.**
Increase Boost Value in menu 3.11 one number at a time until startup is achieved
- **Remote Start/Stop not working.**
Make sure menu 7.00, 7.01, 7.02 and 7.06 are set to defaults (0, 1, 2 & 4)
7.00 = 0000
7.01 = 0001
7.02 = 0002
7.06 = 0004
- **GFCI trips when pump starts running**
Set menu 0.04 = 0001 for typical GFCI or to 0002 for extra sensitive GFCI
(some additional noise from the drive is normal)

11.6 K4 Series Pump Controller - Input / Output Wiring

FLOMOTION
SYSTEMS
K4 SERIES
Motor Drive & I/O Interface
Rev. 110822



REMOTE Status Output
N.O. relay dry contact (2 ADC)
Set 8.01 to 0009

2. FAULT Output
N.C. relay dry contact (2 ADC)
Set 8.00 to 0001

4-20mA Input
Speed Control
Set 9.07 = 20%
* Set Jumper J1 to "CUR"

4-20mA Output
Speed Feedback
Set 8.08 = 0000 (Motor Freq)
Set 8.09 = 2 (4-20 ma DC)
** Set Jumper J2 & J3 to "CUR"

Ext Leak Fault Input
Set 7.06 = 0008

Local/Remote Select Input
Set 7.04 = 0013

Start/Stop Control Input
Close=Start/Open=Stop
Set 1.00 = 0001
Set 7.03 = 0010

2000H, H21 or V21 Series Leak Sensor
or
FR/FS SERIES 3-wire Proximity Leak Sensor

Optional Ext Leak
Fault to VFD

IODA INPUT/OUTPUT MULTI-FUNCTION BOARD

Analog Output
CUR VOLT CUR
PWR

Analog Input
MAX
MIN

Ext Leak Fault Input
Set 7.06 = 0008

Local/Remote Select Input
Set 7.04 = 0013

Start/Stop Control Input
Set 1.00 = 0001
Set 7.03 = 0010

2000H, H21 or V21 Series Leak Sensor
or
FR/FS SERIES 3-wire Proximity Leak Sensor

Optional Ext Leak
Fault to VFD

120 VAC Main Power

Tubing Rupture Detector

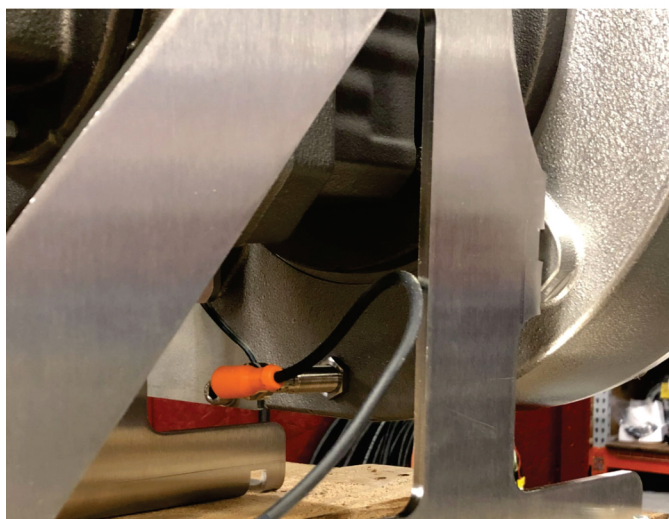
RUN Output
relay dry contact
Set 5.00 to 0000
Closes in RUN mode
30VDC 1A, 125VAC 0.5A
250VAC 0.25A

IMPORTANT: AC LINE INPUT VOLTAGE SELECTOR. (230V or 115VAC)

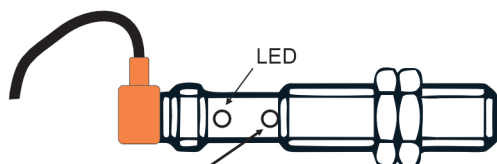
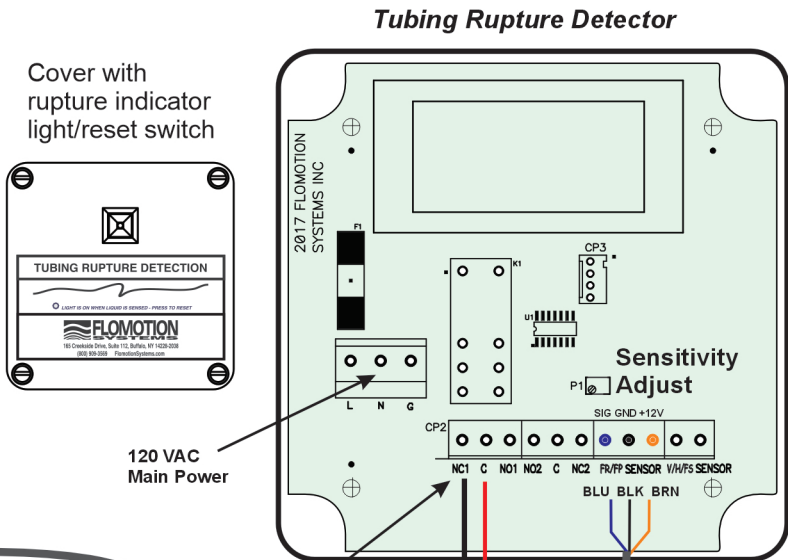
MISC Settings
1.05 = 0003 Auto Restart after power restored or when fault is cleared (except circuit shorts).
2.01 = 0001 Updates speed change without hitting Enter.
2.02 = 0002 Enables Local/Remote switching, disables JOG function.

** Note: if 8.09 is set to 0002 for Current Output but no load is attached the drive will fault (CS-T). Drive may be set to 8.09 = 0000 (0-5VDC output) for testing so no fault will occur. Change 8.09 back to 0002 for 4-20mA output once a load is attached.

11.6 K4 Series Hose Rupture Detector

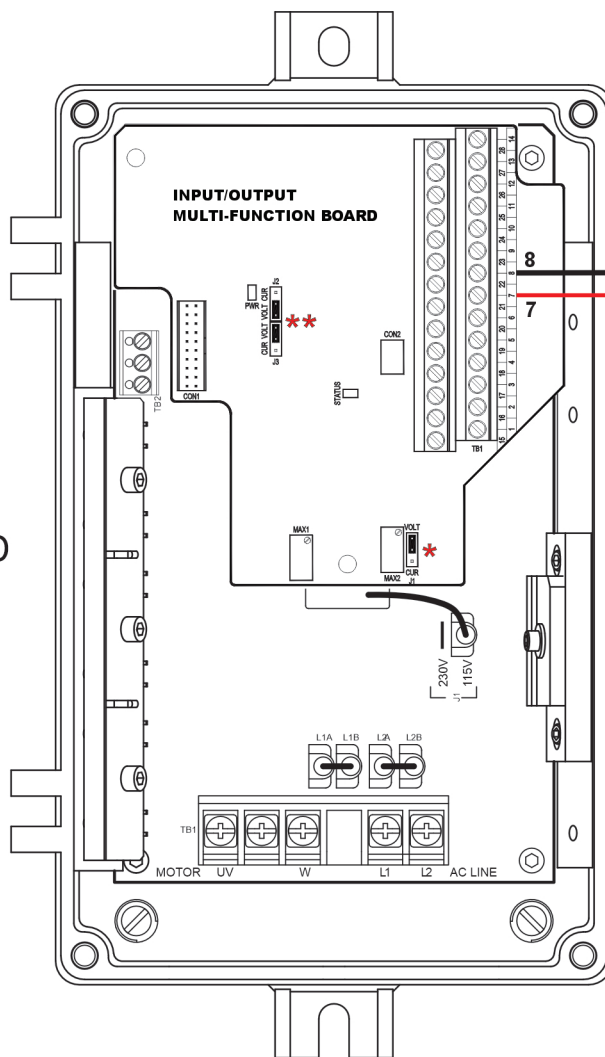


Proximity Sensor in Pump



Sensitivity Adjust
(Clockwise = more sensitive)

K4 SERIES
Pump Controller VFD



12. WARRANTY

Flomotion Systems, Inc. warrants all Flomotion Systems pumps against any defects that are due to faulty material or workmanship for a period of two years from date of shipment.

In the event that a defect is discovered during the warranty period, Flomotion Systems, Inc. agrees that, at its option, it will repair or replace the defective product. Any product repaired or replaced under this warranty will be warranted only for the remainder of the original product warranty period.

This warranty does not apply to consumable components of a product such as, but not limited to, hose, tubing, rollers, and fuses.

Contact Flomotion Systems, Inc. or your distributor to initiate warranty support. Products may not be returned without authorization from Flomotion Systems, Inc. All returns shall be freight prepaid.

Limitations

This warranty does not cover:

- Damage caused by acts of God, natural disaster, labor unrest, acts of war (declared or undeclared), terrorism, civil strife, acts of any governmental jurisdiction or any other cause beyond the seller's control
- Damage caused by misuse, neglect, accident or improper application or installation
- Damage caused by any repair or attempted repair not authorized by Flomotion Systems, Inc.
- Any product not used in accordance with the instructions furnished by Flomotion Systems, Inc.
- Any product not paid in full in agreed upon terms.
- Modifications performed on this product by person(s) not authorized by Flomotion Systems, Inc.
- Freight charges to return merchandise to Flomotion Systems, Inc.
- Freight charges on expedited or express shipment of warranted parts or product
- Travel fees associated with on-site warranty repair

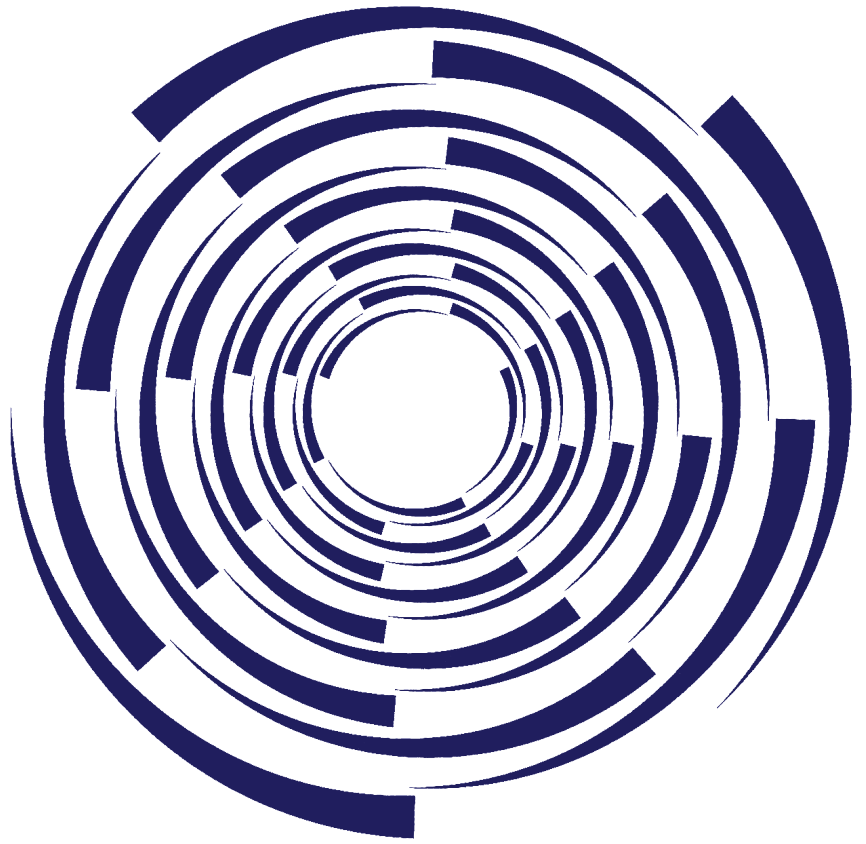
This warranty contains the sole express warranty made by Flomotion Systems, Inc. in connection with its products. All implied warranties, including with limitation, the warranties of merchantability and fitness for a particular purpose, are expressly disclaimed.

Some states within the United States do not allow the disclaimer of implied warranties and if this is true in your state the above limitation may not apply to you. This warranty gives you specific rights, and you may also have other rights that vary from state to state.

This warranty constitutes the final, complete, and exclusive statement of warranty terms and no person is authorized to make any other warranties or representations on behalf of Flomotion Systems, Inc.

Limitation of Remedies

The remedies of repair or replacement as stated above are the exclusive remedies for the breach of this warranty. On the basis of strict liability or under any other legal theory, in no event shall Flomotion Systems, Inc. be liable for any incidental or consequential damages of any kind for breach of warranty or negligence.



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