INSTALLATION, OPERATION, & MAINTENANCE MANUAL

S-2 Series

Pump Serial Number: _____

Date: 11/22/2016

Revision: 02.1

MP Systems
34 Bradley Park Road
East Granby, CT 06026
Phone 877-689-1860 • Fax 860-653-2877
Email: info@mp-systems.net


MP
Systems

S-2 SERIES INSTALLATION, OPERATION, MAINTENANCE MANUAL		
DOCUMENT PART #: B S-2 OPERATOR		
REV.	DESCRIPTION	DATE ISSUED
00	Original	06/05/2014
01	• Updated all control signal electrical drawings. • Added kVA ratings. • Added aeration explanation.	12/24/2014
02	• Added S & SS chiller start signal	04/21/2015
02.1	• Minimum pour point of oil	11/21/2016

Safety Precautions/Hazards

1. Certain coolants are flammable and should not be used without a fire control system.

2. Dangerous voltage is present inside the S-2 Series and must only be serviced by qualified personnel.

3. Dangerous voltage is present inside the S-2 Series. It must be disconnected before servicing.

4. All S-2 Series must be disabled before servicing.

5. Sharp chips are present in a used filter bag. Handle with care.

6. The return line must not be blocked.

7. The S-2 Series must stop if the fire control system is tripped.

8. Do not move S-2 Series while coolant tank is full.

Table of Contents

1. Intended Uses

Section: 1

- MP System's high pressure pumps are constructed for use on milling and turning machines that have existing low pressure pumps (flood), tanks, complete machining environment enclosures, and CNC controls with interlocks.
- MP System's high pressure pump is intended as an auxiliary coolant and chip control system working alongside the standard low pressure pump. The high pressures developed can dramatically improve tool life and cycle time, but should only be used where process improvements warrant its use.
- MP System's high pressure pump includes a large capacity filter. The filter primarily protects the high pressure pump system and cutting tools. Its presence in the system keeps the machine tool and its coolant much cleaner.
- MP System's high pressure pump is intended for use with water based coolants or oils with viscosities between 90 and 140 SUS @ 100 F
- The chiller is capable of removing up to 18,000 BTUs from the coolant while keeping the machine tool tank within +/- 1 degree F.

1.1. Features & Benefits

- High pressure coolant when properly applied can save considerable cycle time, dramatically improve tool life, and remove many of the requirements for operator intervention.
- Most cutting operations that have chip evacuating problems can be improved in speed, accuracy, surface finish and reliability.
- In problem holes, higher speeds, higher feeds, with little to no pecking can add up to 5 -20 times faster drilling.
- Coolant fed reamers, either through the tool or a close nozzle; can dramatically improve finish, tool life and accuracy.
- Severe milling will see improvements and far less re-cutting of chips. This will improve tool life and surface finish.
- Coolant fed boring tools, either through tool or a close nozzle, can dramatically improve finish, tool life and accuracy.
- Heavy cuts can be made more reliably. Any tool that is smoking or burning will hold up much better with high pressure coolant. Most tools in heavy cuts can be pushed much harder with high pressure coolant.
- Any job that is already set with standard coolant can be run harder with high pressure coolant.
- Often, time consuming programming methods, rough/finish cuts, interrupted feed, non-optimum speeds and feeds can be eliminated by using high pressure to break or control the chip.
- Rings of material left on drills and boring bars can be blown off.
- Coolant through the sub spindle can stop miss chucking and stop parts from being marked by chips in the collet.
- By bringing tank temperature to +/- 1º ambient, the open loop chiller can greatly improve tolerances that would normally be affected by machine tool temperatures.

2. Specifications

Section: 2

*All specifications are subject to change.

All MP Systems equipment ships with an identification label. The label is located by main disconnect on front of system.

The label contains

- **Serial Number**
- **Build Date**
- **Series/ Model**
- **Operating voltage (208,230/480)**
- **FLA / Largest Load for determining power service requirements**

The operating voltage can be changed in the field if necessary by a qualified technician. For necessary parts and instructions please contact MP Systems.

2.1. Electrical Specifications

All power for motor and hydraulics is derived from the high pressure pump input source.

Main Power: 3 Phase @ 60Hz = 38.3FLA

Model	208-230VAC	KVA
S-2 (All Variants)	38.3	15.2

Motor	HP	RPM	208-230 VAC FLA
High Pressure Main	7.5	1750	22 - 21
Feed Pump	1.0	3450	3.5 - 3.4
Condensing Unit	1 ½ Ton	N/A	14.3

Control Power - Isolated	Control Signals	Alarm Circuit
150VA Transformer	24vdc	NC
110VAC Secondary		NO
Primary Fused		

2.2. Mechanical Specifications

Model	S-2 (All Variants)
Length	51”
Width	21”
Height	44”
Weight	700 lbs

Model	PSI	@GPM
S-2 W	1000psi	8gpm
S-2 O	2000psi	5gpm

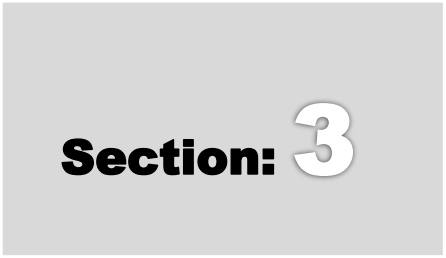
Filter	Area	Dimension	Rating
HB BAG ORING #2 5MC 7X32	4.4 ft²	7” X 32”	5 Micron

Viscosities of fluid must be between 90-140 SUS @ 100°F.
Pour Point of **Oil** must be **NO** higher than 5°F.
Fluids will not separate out of the evaporator.

2.3. S-2 Series Variations

Option	Description
Local 2 Port	2 Port Manifold Located inside S-2 Series
Remote 8 Port	Remote Manifold to be affixed to machine tool with 8 ports. Allows for only 1 hose to run to machine tool.
Remote 12 Port	2 Remote Manifolds to be affixed to machine tool with 12 ports. Allows for only 1 hose to run to machine tool.

3. Installation



All MP Systems, S-2 Series are shipped on custom wooden pallets designed for the S-2 Series to ensure safe shipment. A large MP Systems box covers the S-2 Series to avoid and unnecessary damage.

Inspect container for damage. If any damage has occurred IMMEDIATELY NOTIFY THE CARRIER & MP SYSTEMS @ 877-689-1860

3.1. Unpacking

1. Remove MP System box covering S-2 Series.
2. Remove any stretch wrap on S-2 Series.
3. Remove any and all parts, boxes, and hoses on or underneath S-2 Series.
4. Remove shipping straps.
5. Using a fork truck remove S-2 Series off pallet.

*NOTE: Position fork truck forks under the S-2 Series avoiding mounting bolts on the base of the S-2 Series. This will allow for a stable lift with fork truck.

6. Unlock casters on level surface to position S-2 Series where needed.

3.2. Parts Included Lathe Installation Kit

1 - Power Harness/ Connectors/ Mounting Screws

1 - Signal Harness/ Connectors/ Mounting Screws

1 - Jumper Plug for Signal Harness

1 - Spare Filter Bag

1 – Set of Manuals

1 - 12” Inlet Dip Tube

1 - 9” Return Dip Tube

1 - 1 ¼” Diameter Polywire Inlet Hose.@ 15’

1 -1 ¼” Diameter Polywire Return Hose @ 15’

4 – 2” Hose clamps

2 – Weld Clamp (*Mounting Dip Tubes*)

4 – Self Taping Hex Screws (*Mounting Weld Clamp*)

2 – ¾”x 1-3/8” Nip

2 – ¾” NPT x 3/8” NPTF Bushing

2 – ½” NPT x 1 1/8” Nip

2 – 3/8” NPT x 1” Nip

1 - ½” JICF x ½”JICF x 120” High Pressure Hose/

1 – ¾” NPT x ¾” NPT Check Valve

1 - ½” JIC x ¾” NPT

1 – ¾” NPTF Tee

2 - ¾” NPT x ½” NPTF Bushing

1 – Dynamic Jumper

*Generic Late Installation Kit: Parts subject to change.

3.2.1. Parts Included in Mill Instillation Kit

1 - Power Harness/ Connectors/ Mounting Screws

1 - Signal Harness/ Connectors/ Mounting Screws

1 - Jumper Plug for Signal Harness

1 - Spare Filter Bag

1 – Set of Manuals

1 - 12” Inlet Dip Tube

1 - 9” Return Dip Tube

1 - 1 ¼” Diameter Polywire Inlet Hose.@ 15’

1 -1 ¼” Diameter Polywire Return Hose @ 15’

4 – 2” Hose clamps

2 – Weld Clamp (*Mounting Dip Tubes*)

4 – Self Taping Hex Screws (*Mounting Weld Clamp*)

1 – ½” JICF x 3/8” JICF x 120”

1 – 3/8” Japanese flare fitting x 3/8” SAE

1 – ½” Japanese flare fitting x ½” JIC

1 - 3/8” Japanese flare fitting x 3/8” JIC

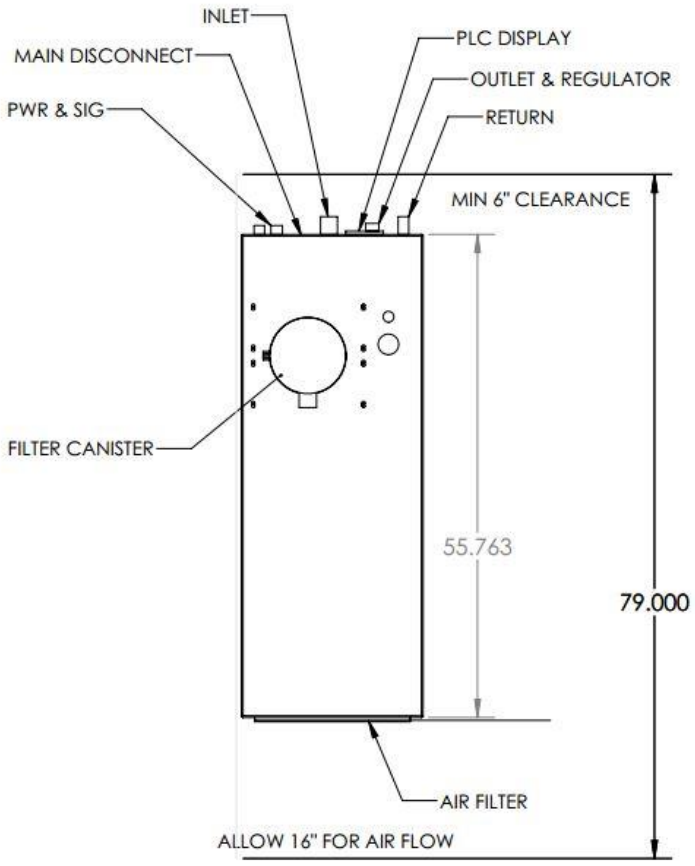
1 – Dynamic Jumper

*Generic Mill Installation Kit: Parts subject to change.

3.3. Tools Required for Instillation

- Phillips Head Screwdriver
- Flat Blade Screwdriver
- Drill
- 7/8” Step Drill
- 1 ¼” Conduit Punches or equivalent size drills or punches.
- Multiple Size Adjustable Wrenches
- 12” Pipe Wrench (Minimum)
- Metric Hex Keys
- Teflon Pipe Tape / Liquid Pipe Sealant

3.4. Floor Plan



3.5. Electrical Installation

There are two electrical harnesses to be installed in the electrical cabinet for the S-2 Series high pressure coolant system. One 3 phase power cable and one control signal cable. *Please refer to machine specific insert in back of manual for proper wiring once installation is complete.

***Lock Out / Tag Out any and all disconnect switches before performing any maintenance / work on any equipment.**

- Verify on the service tag of machine that the 3 phase power is adequate for the FLA of R Series. R Series FLA is located on identification label.
- Confirm correct voltage from supply power with voltage on R Series identification label.
- If available power is too great, a circuit breaker will need to be installed. Circuit breaker needs to be rated 40 to 100 amps @ 208,230VAC.
- Ensure all State and Federal electrical codes are followed.

3.5.1. 3 Phase Power Cable Instillation

1. Mount supplied power/ signal cable with hardware provided in S-2 Series installation kit * If ¾" conduit plug is not available, knock out hole and install supplied cord grip. Make sure S-2 Series power cable reaches desired mounting point.

2. Run supplied power cable through supplied ¾" cord grip.

3. Run supplied cable inside cabinet, wire cable into appropriate 3 phase power and ground. (Ground is usually away from 3 phase, leave enough slack to reach grounding point.)

3.5.2. Control Signal Cable Instillation

1. Mount supplied control signal harness with hardware provided in S-2 Series Kit and route cable.
    - Make sure the S-2 Series plug is able to reach mounted harness.
    - If ½" conduit plug is not available, knock out hole and use cord grip.*
    - Use zip tie to attach supplied jumper plug to control signal*.

*IF THE S-2 SERIES HIGH PRESSURE COOLANT PUMP NEEDS TO BE UNPLUGGED FROM MACHINE, REPLACE S-2 SERIES CONTROL SIGNAL CONNECTION WITH SUPPLIED JUMPER PLUG.

2. Wire the signals needed to perform desired pump function.
    - All MP signals are 24vdc. Relays may need to be installed for 110VAC signals.
    - Signals and M codes may vary between machines. Confirm with machine tool electrical drawing before wiring.
    - Some external M codes may require latching functions.
    - MP Alarm contains both NC and NO connections through 1 common.
    - NC alarms are typically wired in series with machine low pressure pump.
    - NO alarms are typically wired in parallel with machine low pressure pump.
    - Refer to S-2 Series signal schematic located in S-2 Series electrical drawing book for specific installations.

S-2 Series high pressure cooling system requires a chiller run signal in order to run. Run signal should be present whenever machine tool is not in hard alarm or E-stop. Chiller run signal should drop out when machine tool goes in into hard alarm or E-stop, this will cause S-2 Series chiller to go into a pump down cycle than shut down. The S-2 High pressure cooling system will come back online once the alarm has been cleared.

***PLEASE CALL MP SYSTEMS WITH ANY QUESTIONS OR CONCERNS BEFORE WIRING. 877-689-1860**

3.5.3. Generic Mill Applications

- Typical Mill installations require one port and one alarm signal.
- Locate 'Through Spindle' contactor in machine cabinet. (Please refer to machine electrical drawings booklet.)
- Wire #1 and #5 are to be used when tying in with machine voltage.
- Wire #1 and #9 are used when put across dry contact. (Terminals 13 and 14 NO)
- Remove 3 phase power from bottom of low pressure TSP contactor.
- Some TSP setups require a second supply pump to be disconnected as well.
- Wire NC connections in series with TSP overload circuit.
- Wire NO connections in parallel with TSP overload circuit.
- Additional machine alarms may need to be jumped out.

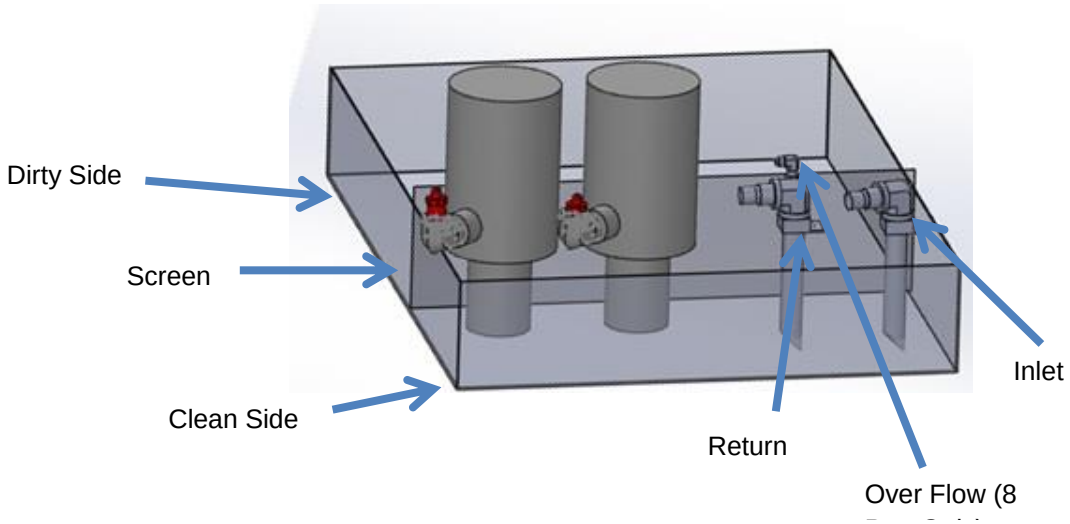
3.5.4. Generic Lathe Applications

- Typical lathe configurations consist of wiring in series with the existing low pressure contactor along with an external M code. This allows for both low and high pressure pumps to be utilized.
- Wiring through low pressure contactor before external M codes ensure the MP R Series Pump will shut down whenever machine is in hard alarm.
- Typical lathe applications use wire #9 to supply +24vdc from R Series through a series of dry contacts.
- Wire NC connections in series with low pressure coolant overload circuit.
- Wire NO connections in parallel with low pressure coolant overload circuit.
- Additional machine alarms may need to be jumped out.
- Parameters may need to be set in order to latch external M code functions
  See Insert for Machine-Specific Signals and Keep Relay instructions

3.6. Low Pressure Installation

1. Mount supplied weld clamps on clean side of reservoir tank, after the screens, usually near the low pressure pumps already on reservoir tank.
    - Use an already open area on the tank. If no opening, use 1 ¼" Conduit Punch or equivalent size drills.
    - Make sure hole for inlet dip tube is away from low pressure pumps and always touching bottom of the tank to ensure proper suction of coolant.
2. Run the Inlet and Return hose to their respected connections. The S-2 Series return and inlet are clearly marked so there is no confusion of where to place them.
    - Inlet dip tube will always be longer than Return dip tube.
    - Connect the inlet and return hoses with the 4x 2" hose clamps supplied in S-2 Series Instillation Kit.
    - Inlet & Return hoses should be no longer than 15'.
    - Hoses must be placed on floor near S-2 Series. To ensure proper priming of the S-2 Series.

*DO NOT PLACE HOSES ON TOP OF S-2 SERIES OR STAND VERTICAL, THIS WILL CAUSE THE S-2 SERIES TO NOT PRIME PROPERLY.



3.7. Generic High Pressure Installation Warning

*Caution: Hoses on machine tool must be rated for appropriate pressure. Please refer to the **APPENDIX** in rear of this manual to properly identify high pressure hoses.

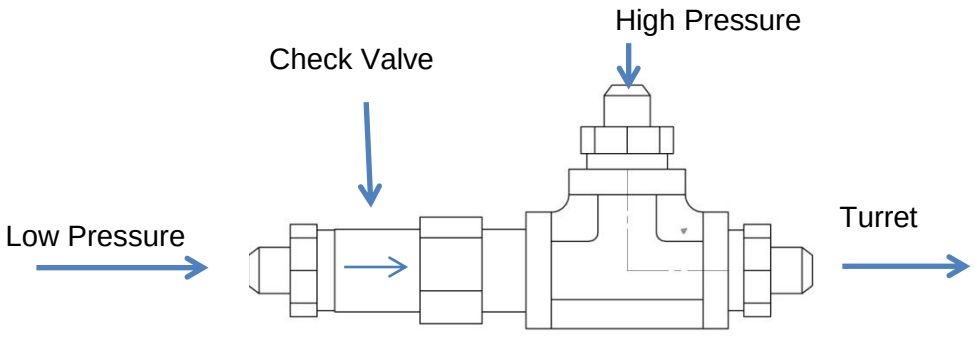
*Caution: Coolant distributors must be rated for appropriate pressure. If coolant distributors are not rated for appropriate pressure, coolant distributors will need to be modified. **If unsure please contact MP Systems @ 877-689-1860.**

3.7.1. Generic Lathe Installation

Please see caution above before proceeding. A few fittings will need to be installed in-line with low pressure turret pump. All necessary fittings for installation will be included in S 2 Series installation kit. All S 2 Series installation kits ship with specific fittings, if extra fittings are necessary they will ship with machine specific installation kit.

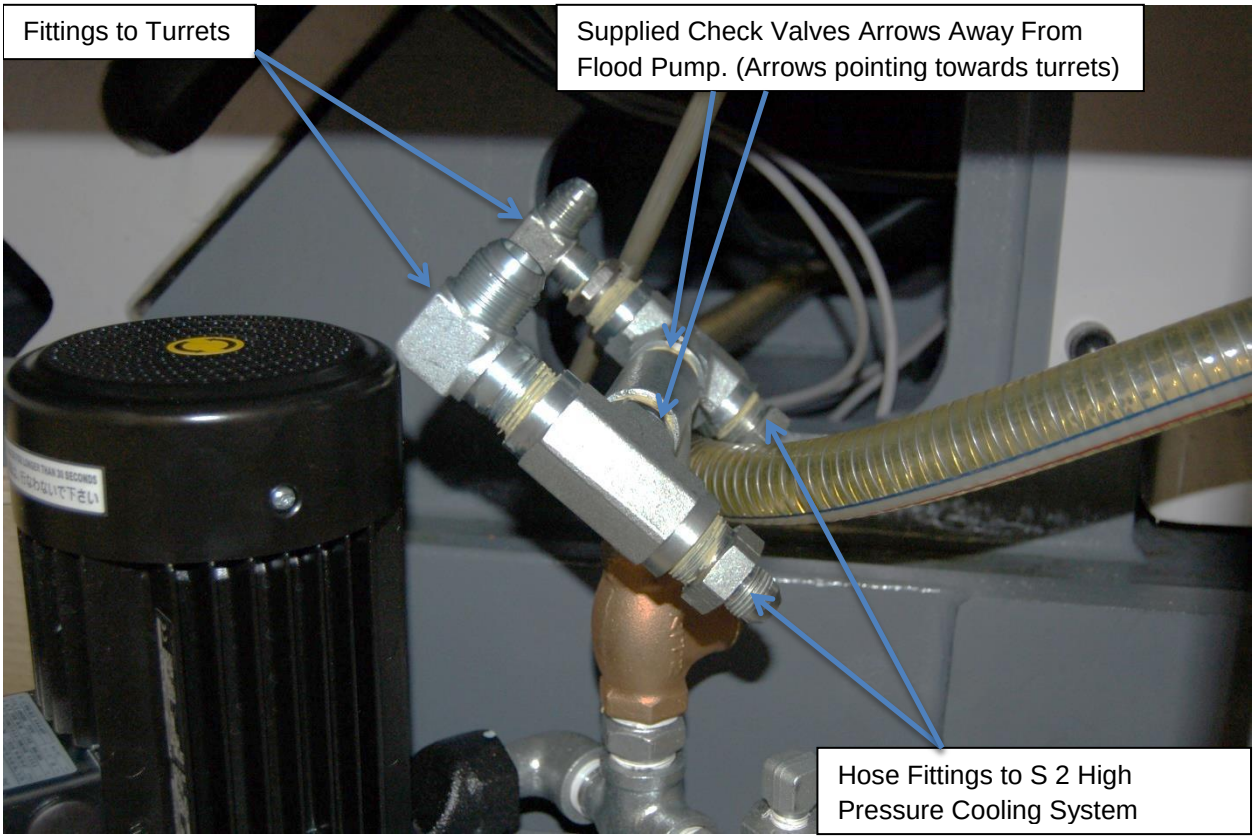
1. Remove hose leading to the turrets as well as the ¾" BSPT fitting
2. Install supplied ¾" NPT check valves with arrow facing AWAY from machine tool pump (towards turret).
3. Install supplied ¾" NPTF tees.
4. Install supplied ¾" NPT X ½ JIC fittings on side of tee.
5. Reinstall machine coolant pump fittings and hoses.
6. Connect supplied ½" High Pressure Hoses from respective port to side of TEE.

*Please refer to images that follow.



3.7.1.1. Generic 2 Port Lathe Installation

Generic 2 Port Lathe Assembly From 1 Flood Pump



*Normally 2 flood pumps with 1 TEE assembly per flood pump

4. Operation

Before S 2 Series high pressure system can be put into operation a few steps must be completed to ensure proper function. Priming, a few test to ensure proper installation and initial startup procedures

Section: 4

4.1. Priming & Startup

After all low pressure hoses are connected to S 2 Series the internal feed pump must be primed before first use.

Make sure inlet hose to feed pump is as short as possible and not above tank level.

To Prime:

- Remove side door panel and open the ball valve located on bottom of the filter vessel.
- Using the filter as a funnel, pour coolant into filter vessel, you can see coolant start to trickle out of feed pump inlet.
- Keep this valve open until coolant comes out of the feed pump inlet and starts to fill up the hose on the inlet side of the feed pump. This may take a few minutes.
- After the hose is about ¾ full of coolant, close the T-handle ball valve and reseal the filter top.
- The feed pump has now been primed with coolant and it is ready for motor rotation check and operation.
- *Feed pump may need to be run a few times on startup to pull full prime. Reset alarm on PLC a couple times to allow pump to run if necessary. Contact MP Systems with any issues.*

4.2. Testing

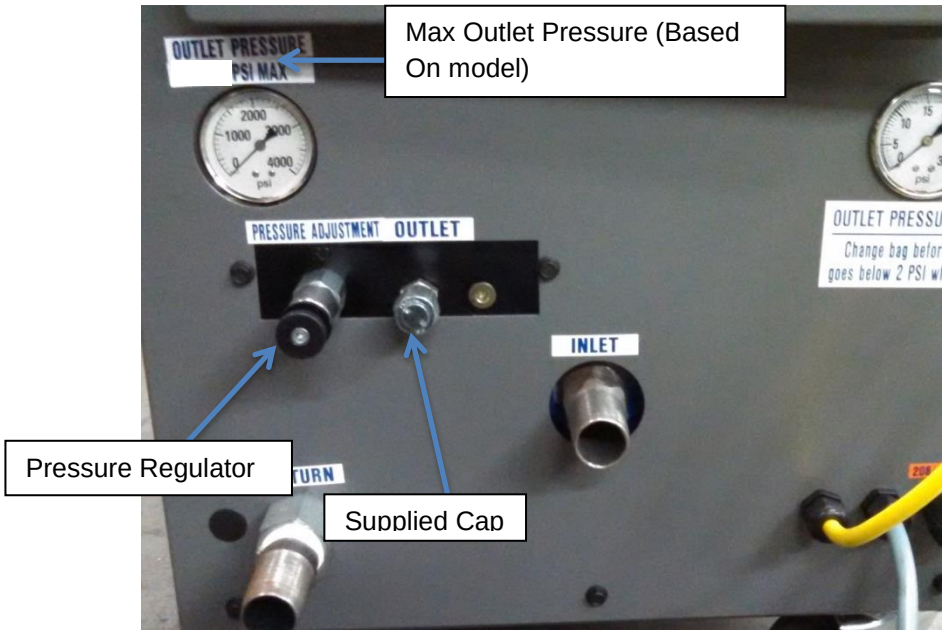
1. Make sure all connections are secure and no hoses are rubbing.
2. Make sure Feed Pump is properly primed.
3. Make sure Prime Valve is closed after priming.
4. Check motor rotation on both High Pressure and feed pumps.(Clockwise Rotation)
5. Fire the High Pressure M-Code to ensure that corresponding solenoid is opening.
6. For Lathes, while M-Code is on index the turret and check magnetism on the Dump solenoid.
7. Trip the overload inside the S 2 Series electrical panel to ensure machine reports error and stops running.

4.3. Initial Pressure Setting

After S 2 Series has been primed and checked for proper function the output manifold must be set to desired PSI. Please refer to max output label above output gauge. DO NOT SET ABOVE MAX PSI, DOING SO WILL VOID WARRENTY.

1. Before setting pressure make sure relief valve is backed out all the way, counter clock wise.
2. Make sure all outlets on pump are capped.
3. Turn on high pressure system.
4. Slowly turn regulator clock wise to achieve desired PSI. This will ‘dead head’ the pump to maximum output so as to not let the pump ever go over rated PSI.
5. Once desired pressure is acquired shut down high pressure system.
6. Reattached supplied high pressure lines.
7. High Pressure system is ready to run.

*On lathe applications, when high pressure is TEE’d into machine tools low pressure pump, simply place high pressure hose leading from the tee in to machine coolant reservoir & secure. This will ensure no coolant spills while running low pressure pump. It is also possible to dead head turret or set to smallest possible orifice.



4.4. Alarms & Alarm Descriptions

All S-2 Series high pressure systems use one alarm output, NC (Normally Closed) or NO (Normally Open) to interface with machine tool. If a fault occurs, a single is sent to the alarm circuit on machine tool, which will put machine to in feed hold. MP Systems recommends the use of Normally Closed alarm circuit. This will allow the machine tool, to go into feed hold if the S-2 Series should ever become disconnected from the machine tool.

Alarm Display	Symptom	Cause
Filter Dirty	▪ Pressure in filter to low	Clogged Filter
MCP Trip	▪ Too much load on motor.	Overload Tripped
Low Flow	▪ Prime Issue ▪ Machine tool coolant filter clogged ▪ Dip tube not fully submerged ▪ Improper feed pump rotation	Input cannot keep up with output.
Refrig Error	▪ Low on refrigerant	Refrigeration error Please contact MP Systems @ 877 689 1860

4.5. S-2 Series Settings

It is possible to change parameters on the S2 Series high pressure coolant systems. All settings are preset during the manufacturing process for each individual order. Changing parameters without proper instruction could cause S2 Series to malfunction and possibly void warranty. This section will explain the parameters and their functions. The **ENTER/RETURN** key is used to cycle through parameters.

Press -1- & -2- simultaneously (Hold for a few Seconds). Password: 0515. The arrow keys are used to navigate menu.**-9- Key must be pressed before and after each function. ex- -9- pick day of week -9-**

- **DAY OF WEEK** – Monday=1 – Sunday=7
- **SET TIME** – -F1- = Hour. -F2- = Minutes (24 Hour Clock)
- **AMBIENT TEMPERATURE CONTROL** – Temperature control can be set between ambient to +10ºF over ambient.
- **MORNING START UP** – This function is used to stabilize tank temperature without receiving a 'Run' signal from machine tool. (Start & Stop times must be within same hour. ex. Start 6:00AM – Stop 6:59AM)
  - START TIME: F1 = Hour, F2 = Minutes
  - STOP TIME: F3 = Hour, F4 = Minutes
- **ALARM LATCH** – Used only during initial install. Some machine tools require latched or non-latched alarm circuit. (If unaware please contact MP Systems)
- **STATIC TEMPERATURE** – Set tank to desired static temperature
  - F1 = Enable/Disable
  - Input: 1 = Set Temp On
  - Input; 0 = Set Temp Off
  - -F2- = Sets desired temperature (Up to 100ºF)
  - Press -0- Key to return Main Display.
- **ALARM HISTORY** – Will show past 10 alarms.

Call MP Systems for any questions or concerns @ 877-689-1860

5. Maintenance

Section: 5

Regular scheduled maintenance consists of filter bag changes, maintaining Hydracell™ crankcase oil, and possible feed pump maintenance. Most issues can be eliminated or reduced by maintaining clean filter bags. Long term service items include the pump head and fluid components inside the machine tool such as added nozzles.

Filter bag service intervals will vary widely depending upon application. Filter bag must be changed when the pump goes into alarm. As the filter bag becomes plugged, the feed pump will run more often. Smaller the fines the more often the filter bag will need to be replaced.

Filter Bag must be changed when Red Dirty Filter Button is illuminated. After filter bags have been replaced, press Red Button to clear fault.

- Work material or chip sizes that stay suspended in the coolant will shorten filter bag life.
- Higher viscosity coolants tend to shorten filter bag life.
- Air entrapped in the coolant will lower flood pump pressure and shorten filter bag life.

5.1. Filter Bag Replacement

To change a Filter Bag:

1. Power off S-2 Series High pressure system.
2. Let pressure equalize for 30 seconds.
3. Loosen 3 galvanized eye bolts on filter cover lift away filter lid.
4. Lift filter bag by handles on bag seal (coolant should drop as bag is lifted)
5. Install new bag.
6. Replace filter top and secure 3 galvanized eye bolts.

5.2. Basic Pump Maintenance

Pump Crank Case Maintenance (HydraCell™ Only)

- Hydracell™ (crank case) uses high quality 10w 30 motor oil. (MP Systems recommends Synthetic motor oil).
- Change after first 100 hours.
- After initial change, change every 2000 hours of pump operation.
- See pump builders service manual for more details.

Media Filter Replacement

1. It is recommended that this is done with the unit not running.
2. Be sure to remove ambient sensor located on media filter before removing. (If applicable)
3. Loosen panel holding media filter in place and slide filter out.
4. Using a gentle cleaner or simple soap and water, wash out media filter.
5. Filter can be dried using compressed air, if needed.
6. Let filter dry completely.
7. Reinstall according to flow arrows on filter and retighten panel.
8. Reinstall ambient sensor on media filter. (If applicable)

6. Variations

Section: 6

- S2 Series 2 port local valve block

  typically used on mills / simple lathes.

- S2 Series 4 port & 8 port local valve block. The local valve blocks simplify the S2 Series high pressure system. Local valve blocks tend to make hose routing much more difficult. Some set ups will greatly benefit from this option.

- S2 Series 8 port remote block is MP System's standard configuration for S2 Series high pressure system. The remote valve block is mounted on machine tool with 8 ports facing inside cabinet. This allows for only one hose running from the S2 Series to machine tool. Another benefit of the remote valve block is the reduced pressure on ports 3&4.

- MP Systems offers an add on for the 8 port remote valve block. It adds an extra 4 ports for a total of 12 ports. Very useful for a more permanent hose routing, on more complex machines.

7. Spare Parts

Section: 7

Part Name	Part Number
Filter Bag	HB BAG ORING #2 5MC 7X32
O Ring	M ORING MPA
5gpm – Gear Pump (Oil Only)	P OIL PUMP 5 GPM

Please call MP Systems with any other part that may not be listed @ 877-689-1860

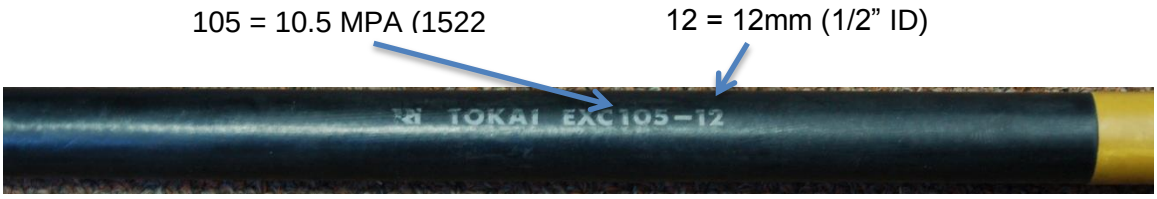
Appendix A: Hoses & Fittings

Identifying High Pressure Hoses & Fittings.

Most high pressure hoses will have the MPA/PSI and size clearly labeled on the hose. This section will cover how to interrupt hose labels. For any questions please call MP Systems @ 877-689-1860

Minimum Rating	
MPA	**PSI**
7	1015 PSI
14	2030 PSI

Tokai High Pressure Hoses:



The picture above is labeled EXC105-12. 105, 12 represent pressure rating and hose size, respectively.

105 = 10.5 MPA (1522 PSI)

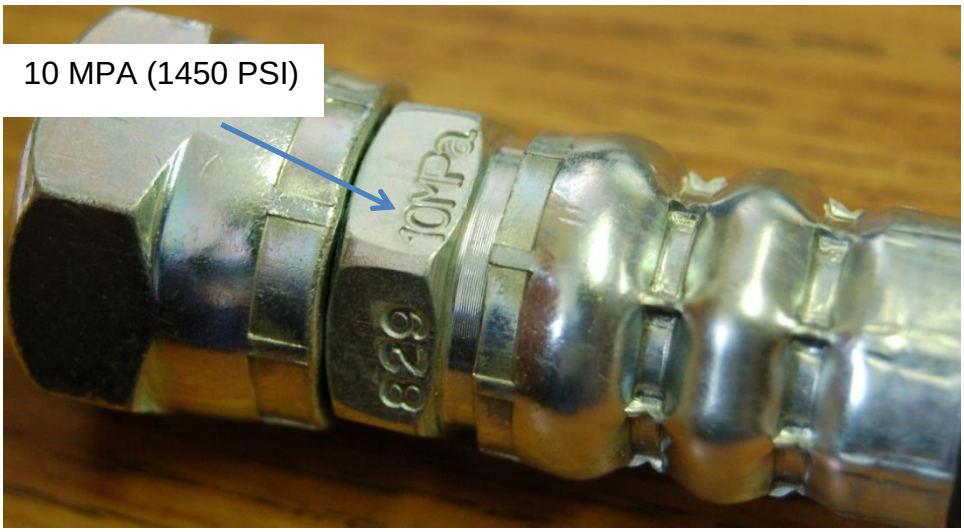
12 = 12 MM (1/2”)

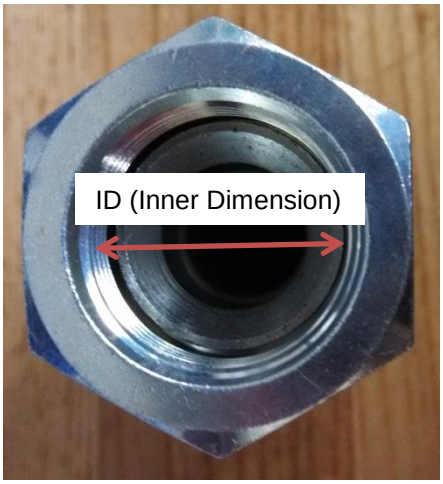
The picture above is labeled PA1004, 10 and 04 represent pressure rating and hose size, respectively.

10 = 10 MPA (1450 PSI)

04 = 1/4" ID

The crimp on hose fitting is the most important information when determining proper high pressure hose rating. Some high pressure hoses may be properly rated but the fittings may not be properly rated. Use caution and make sure to check both MPA ratings to ensure proper high pressure hose rating.





To determine the size of the fitting the ID (Inner Dimension) of the fitting must be measured.

Determining Hose Fitting

JIC Fitting Identification

Fitting Size Inch (mm)	Nominal Size	No. Thread Per Inch	Male Thread OD (Outer Dimension)	Female thread ID (Inner Dimension)
-4 (6)	1/4"	20	11.0 mm	9.9 mm
-6 (9)	3/8”	18	14.1 mm	12.9 mm
-8 (12)	1/2"	16	18.9 mm	17.5 mm
-12 (19)	3/4"	12	26.9 mm	25.0 mm

*JIC Fittings have 37º flare, straight thread.

JIS Fitting Identification

Fitting Size Inch (mm)	Fitting Nominal Size	No. Thread Per Inch	Male Thread OD (Outer Dimension)	Female thread ID (Inner Dimension)
-4 (6)	1/4"	19	13.5 mm	11.7 mm
-6 (9)	3/8”	19	16.7 mm	15.2 mm
-8 (12)	1/2"	14	20.5 mm	18.9 mm
-12 (19)	3/4"	14	26.3 mm	24.4 mm

*JIS fittings have 30º flare with BSP thread. (British Standard Pipe Thread)

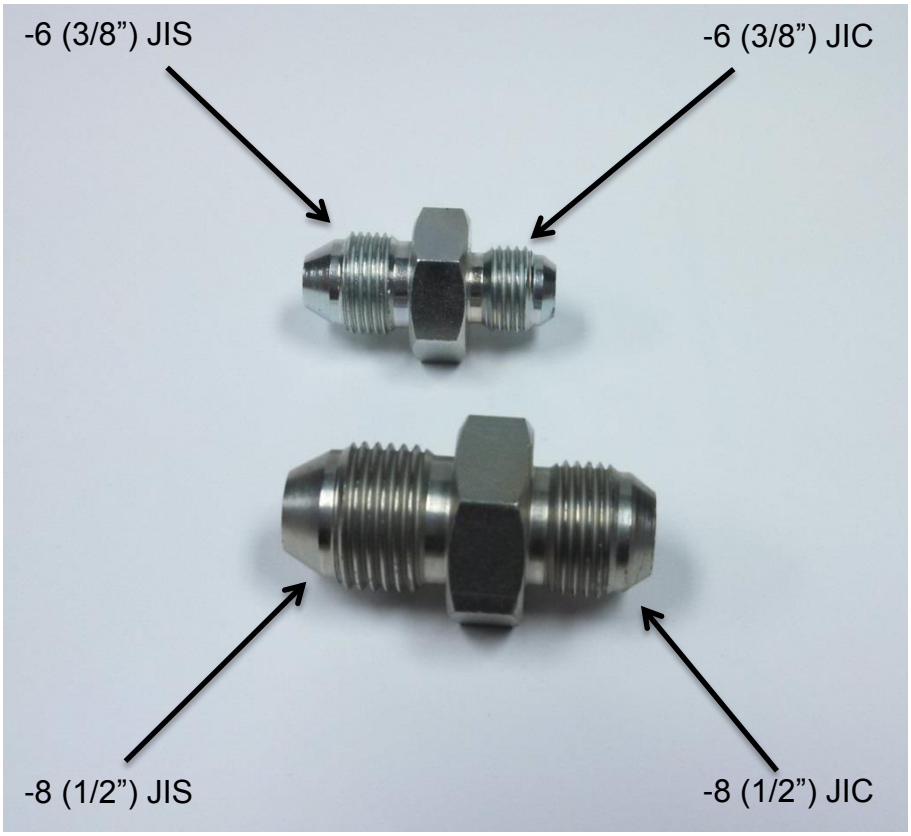
JIS fittings and Komatsu style fittings are very similar and may be mistaken for one another. Both fittings have a 30º flare. Komatsu fittings have a different thread pitch and thread diameter.

Fitting Dash Size	Fitting Nominal Size	Metric Thread Size	Male Thread OD (Outer Dimension)	Female thread ID (Inner Dimension)
-4	1/4"	M14 x 1.5	14 mm	12.5 mm
-6	3/8”	M18 x 1.5	18 mm	16.5 mm
-8	1/2”	M22 x 1.5	22 mm	20.5 mm
-12	3/4”	M30 x 1.5	30 mm	28.5 mm

*Komatsu fittings have 30º flare with metric thread @ 16.9 threads per inch.

JIS & JIC Example

S-2 Series installation kit includes 2 adaptors (depending on application). The image below will show the difference between JIS & JIC.



Appendix B: Pipe Sizing

Pipe Sizing

The following table will help identifying pipe sizes.

Pipe Trade Size	OD(Outer Diameter) Inches	Wall Thickness	
		Schedule 40	Schedule 80
1/8”	0.045”	0.068”	0.095”
1/4"	0.540”	0.088”	0.119”
3/8”	0.675”	0.091”	0.126”
1/2"	0.840”	0.109”	0.147”
3/4"	1.050”	0.113”	0.154”
1”	1.315”	0.133”	0.179”
1 ¼”	1.660”	0.140”	0.191”
1 ½”	1.900”	0.145”	0.200”
2”	2.375”	0.154”	0.218”
2 ½”	2.875”	0.203”	0.276”
3”	3.500”	0.216”	0.300”

The following table contains approximate dimensions of female pipe fittings.

Pipe Trade Size	ID(Inner Dimension) Inches
1/8”	.330”
1/4”	.450”
3/8”	.590”
1/2"	.725”
3/4"	.920”
1”	1.170”
1 1/4"	1.510”
1 1/2"	1.750”
2”	2.230”
2 1/2"	2.650”
3”	3.280”

Appendix C: Power Harness

S-2 Series Power Cable & Power Harness

MP Systems S-2 Series high pressure system comes equipped with an 8 gauge SJEOOW cable for Power Cable& Power Harness. If supplied S-2 Series Power cable/harness is not adequate for local electrical code please contact MP Systems @ 877-689-1860.

Power Feed to MP Systems

If local electrical code requires a circuit breaker to feed power to MP Systems S-2 Series high pressure system, MP Systems offers them separately.

S-2 Series Model	Part Number #
S-2 Series - 230V	AK CB50 KIT

Appendix D: Aeration

Aeration Causes

Adding horsepower to fluid will entrain air in fluid, once the fluid has left the nozzle.

Air Entrainment & Foaming

Foaming on top of coolant, in most cases, will not cause any pumping issues, as long as coolant below foam is liquid. If machine tool tank is over flowing with foam, a fluid supplier should be contacted immediately.

Air entrainment below surface, may occur which can lead to cavitation of any pump in the system, which will cause shorter filter life and false alarms. Mp Systems filtration systems alleviate air & foam before any fluid reaches nozzles.

Possible Solutions

- Moving a nozzle closer to the working area (1/4” to 1/2" is recommended), will greatly reduce air that can become entrained in fluid.
- Running high pressure for shorter amounts of time will help reduce aeration in fluid. Do not run high pressure when not needed. Proper programming is important.
- Lowering pressure, if tolerable, will decrease velocity which in turn will lower the force of impact which will lower the chance of aeration.

Warranty Information

All MP Systems equipment comes standard with a 2 year parts warranty. Warranty is void if proper installation, specification, and operational procedures are not followed. Use only filter bags purchased directly from MP Systems to maintain warranty of flow related parts. Contact MP Systems directly for warranty claims.

MP Systems
34 Bradley Park Road
East Granby, CT 06026
Phone 877-689-1860 • Fax 860-653-2877
Email: info@mp-systems.net