mastip™
hot runner solutions

Cylix Hybrid Actuation Technical Guide

Pneumatic/Hydraulic
HVM Manifold Mounted

Assembly Overview

IMPORTANT!!

Pneumatic Requirements

Air quality: Filtered to 40 µM and lubricated

Minimum air: pressure 4 Bar

Recommended air: pressure 6-8 Bar

Hydraulic Requirements

Maximum Hydraulic: 100 bar

Oil Type: Mineral or Synthetic

The HVM Cylix Actuators are bolted to the manifold and must be protected from overheating to ensure long seal life. During system start-up, operation and shut-down the cooling water supply to the actuators must continue flowing to ensure the seals are thermally separated from the hot manifold and excessive heat does not cause premature failure of the components.

Cooling Water Medium

1. Water quality and PH levels must be maintained to ensure it is clean and free of particulates and biological growth
2. Cooling water temperature must not exceed 150°C for actuators without limit sensors or 50°C with limit sensors
3. Cooling water pressure should not exceed 8 bar
4. Cooling water flow rate should be a minimum of 1 l /min. per unit
5. A maximum of 4 Cylix actuators may be connected in series for cooling

Actuator Start-up Procedure

1. Turn on all water chillers/cooling and ensure temperatures are as specified above
2. Turn on water cooling connections to actuators and check cooling flow is operating correctly
3. Continue with normal hot runner mould start-up procedure

Actuator Shut-down Procedure

Use normal hot runner mould shut-down procedures, ensuring all water cooling continues flowing to the actuators until the hot runner is below 150°C.

Pin Diameter

Pin diameter must be taken into account when setting hydraulic pressure to reduce risk of damage. A smaller pin diameter requires less pressure to close. Mastip recommends operating with minimum hydraulic pressure to close the pin and achieve cycle requirements.

Assembly Overview

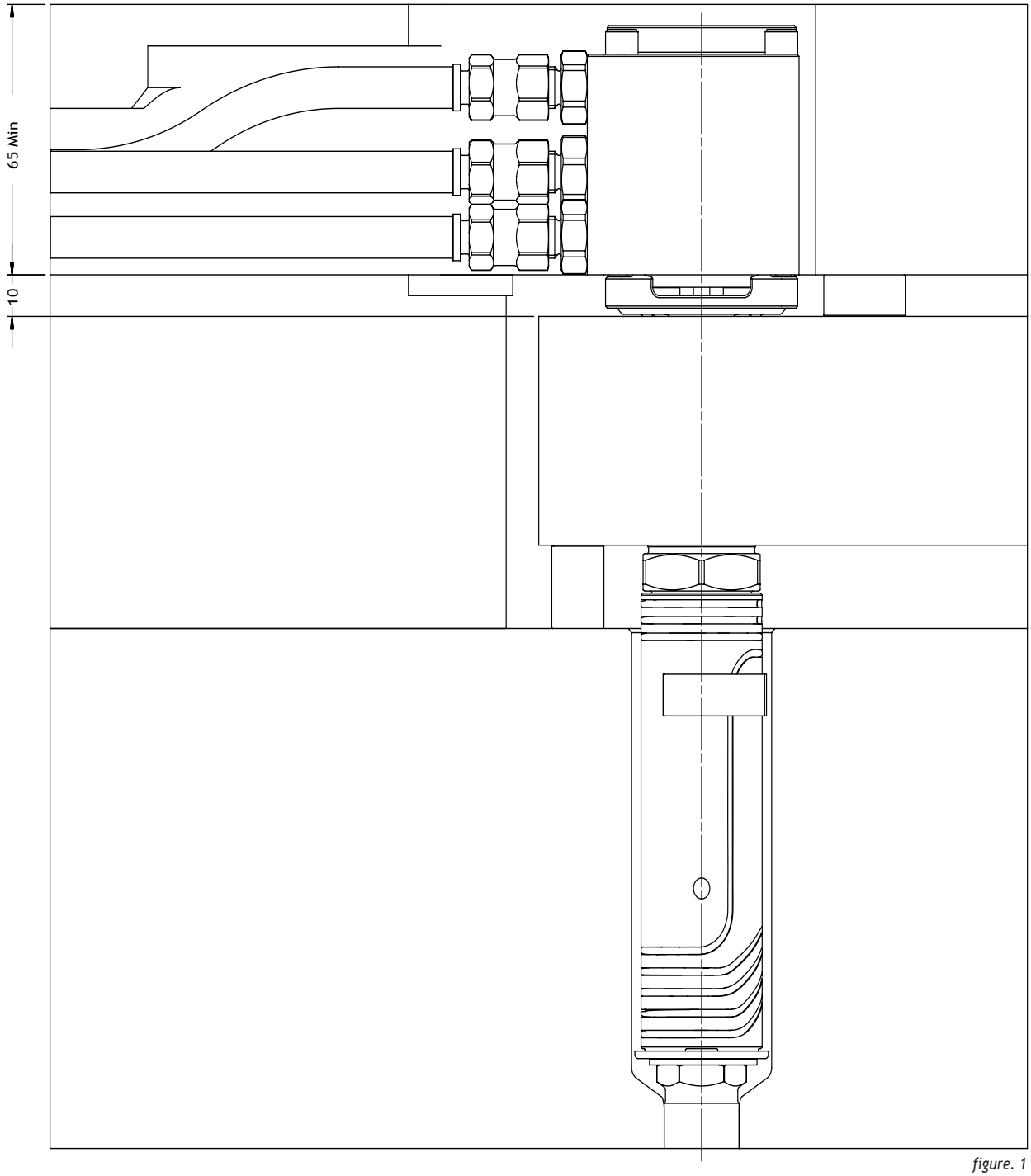
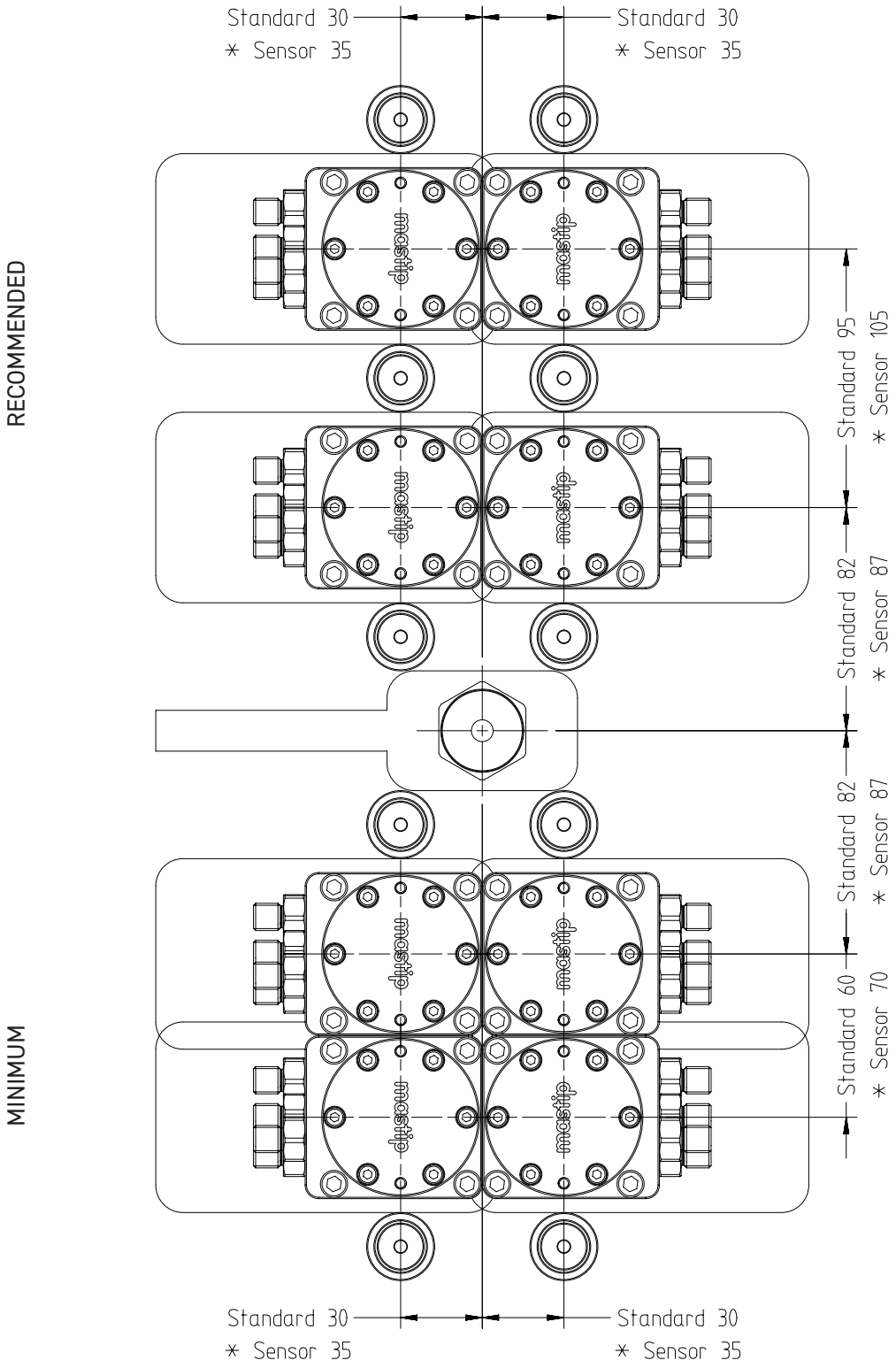


figure. 1

Key Features

- Conical (1) or Cylindrical (2) shut off
- Ø2.0mm, Ø2.5mm, Ø3.0mm and Ø5.0mm pin
- Pneumatic or Hydraulic actuation

Minimum Spacing Layout

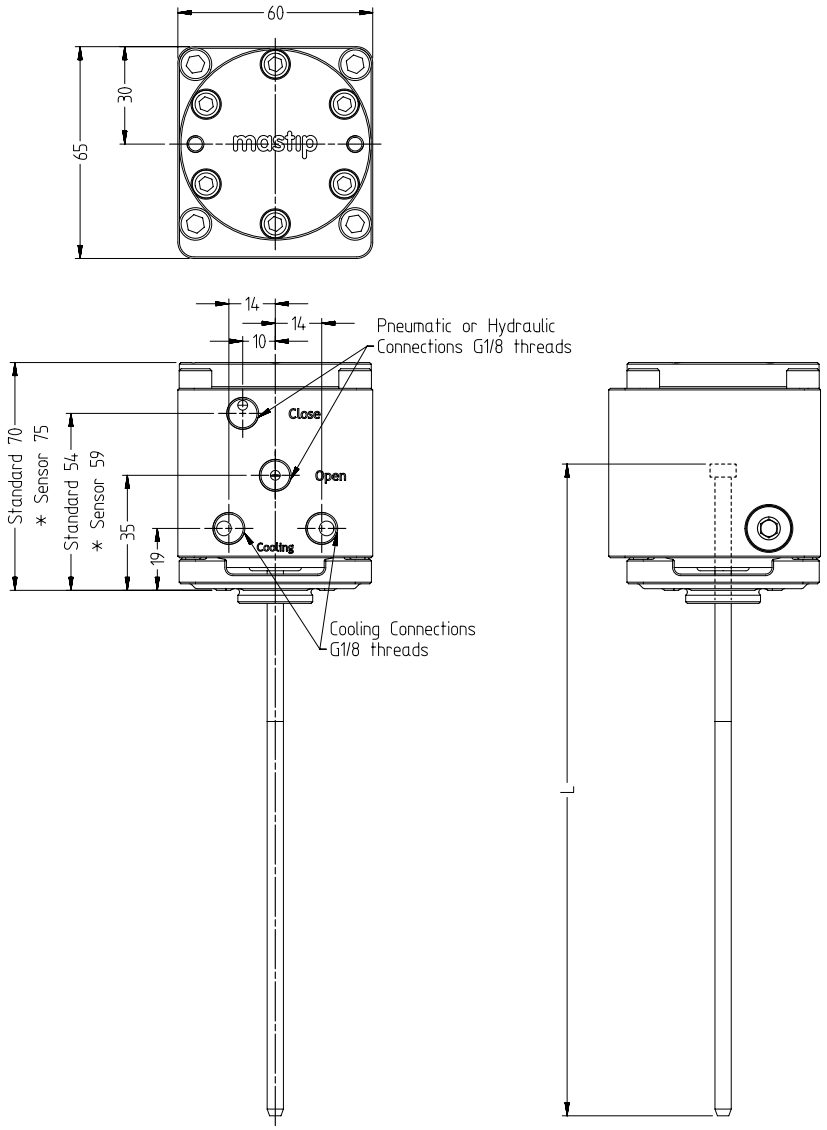


Cylix Actuation Overall Dimensions

Note: Pins are supplied in standard length and must be cut to required length before installation.

Pins can be supplied by Mastip finished ready to use

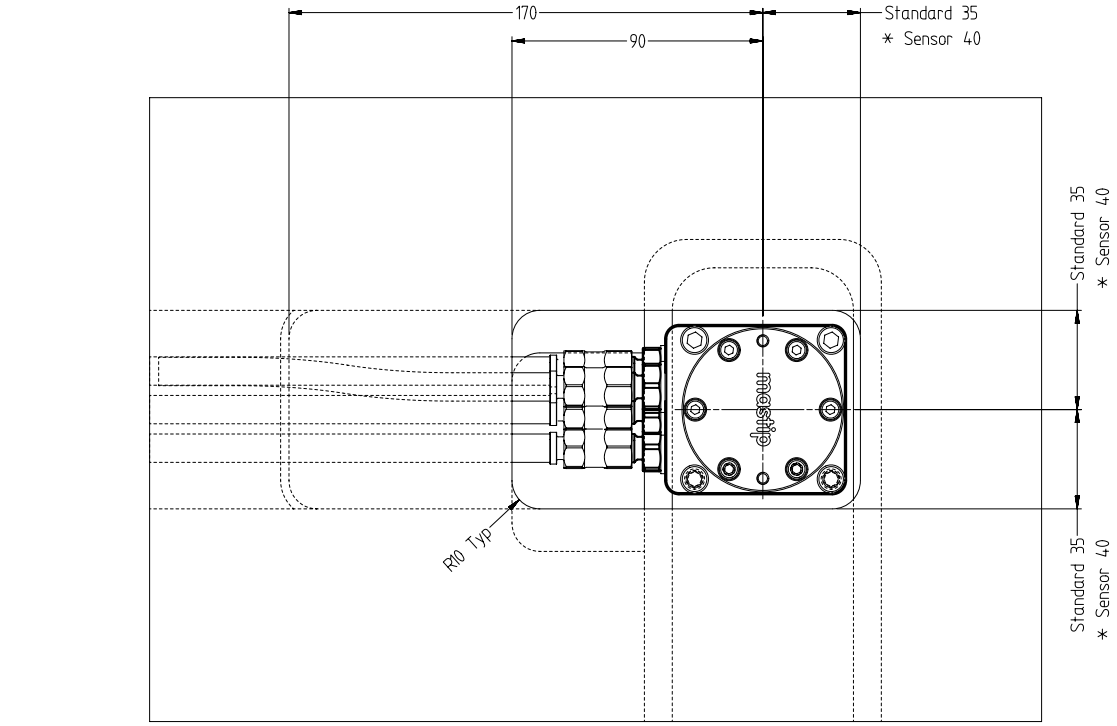
→ Refer to page HVM40-8 Pin Calculations section to calculate required final pin lengths

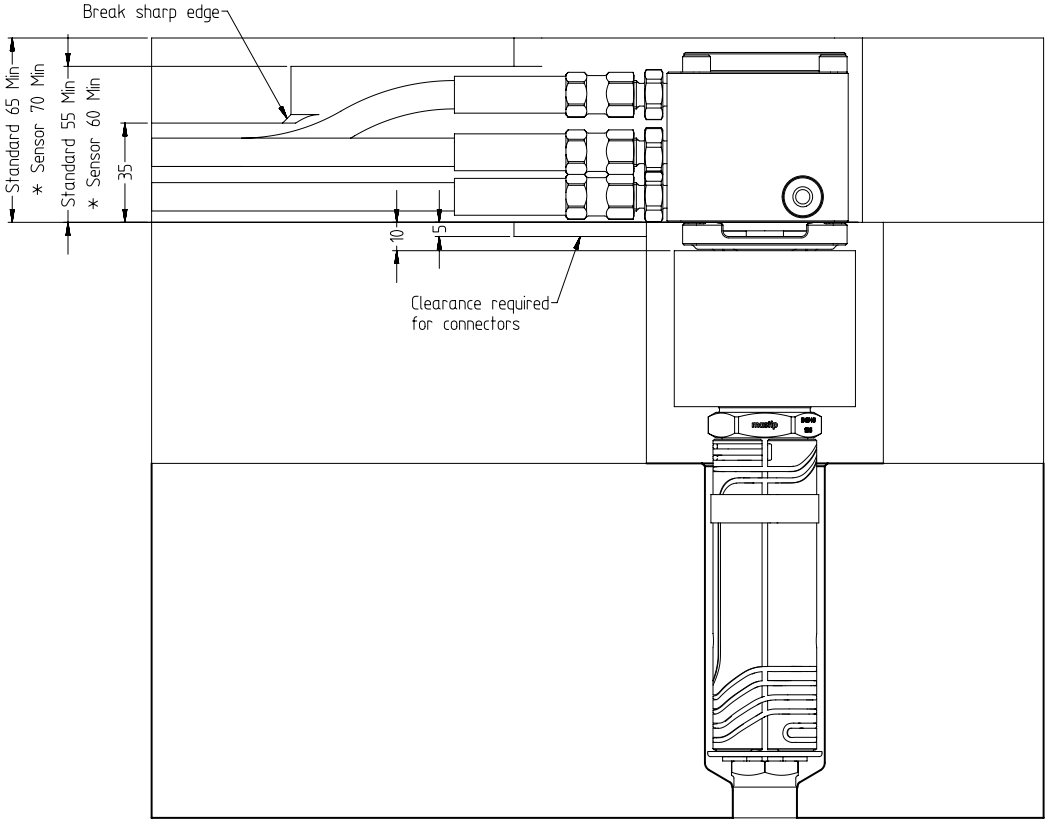


* Limit sensors available on request.

Nozzle Compability		
Description	Nozzle	Supplied Pin Size
HVM40-P1 Headed Pin	MX13 / BX13	Ø2.0
	MX16 / BX16 / TX16	Ø2.5
	MX19 / BX19 / TX19	Ø3.0
	BX27 / TX27	Ø5.0

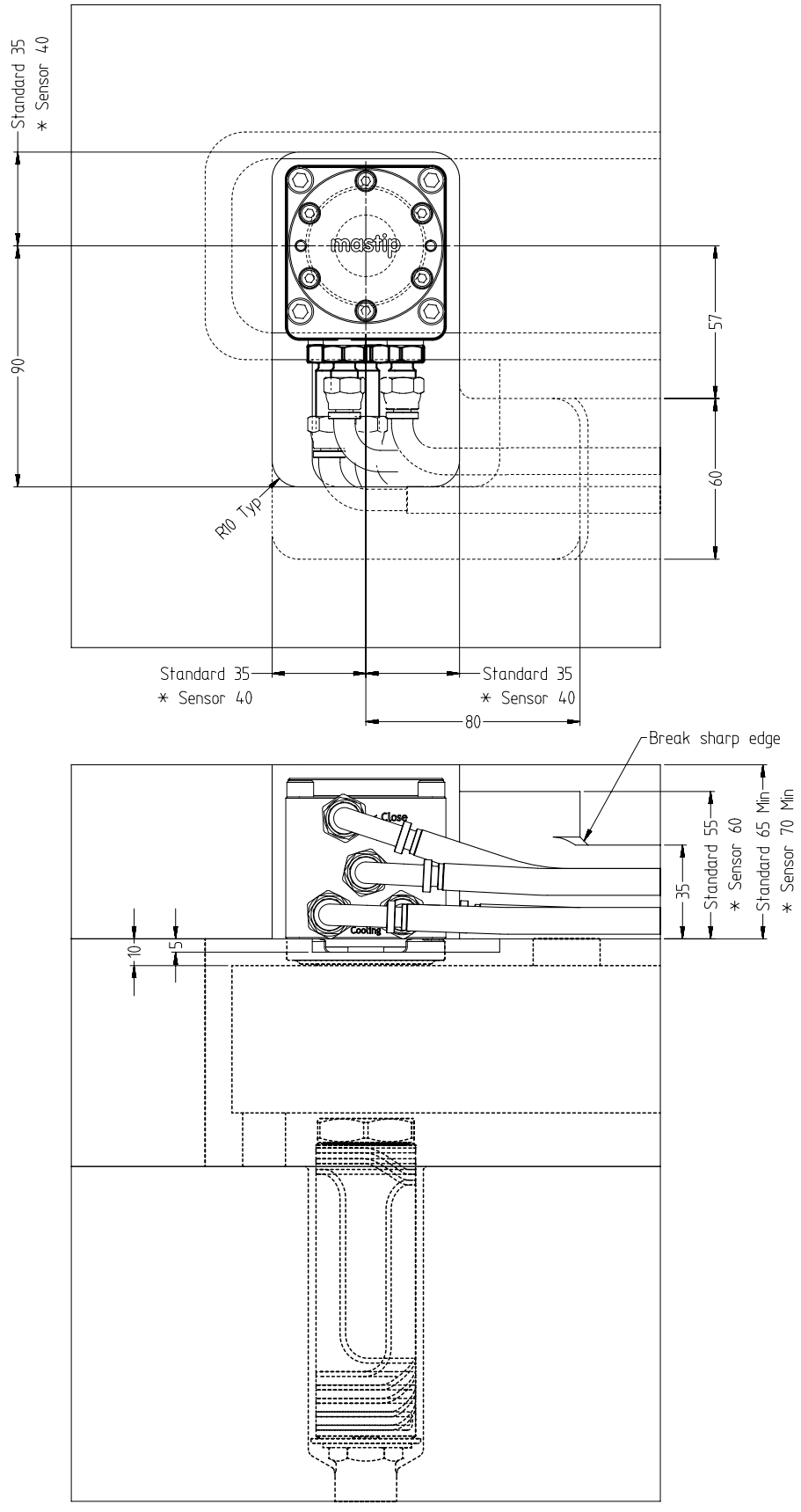
Plate Details – Straight Exit





* Limit sensors available on request.

Plate Details - 90° Bend Exit



* Limit sensors available on request.

Pin Details

To calculate final pin length, use the following equation:

HVM40-P1 – D2.0
HVM40-P1 – D2.5
HVM40-P1 – D3.0

Pin Length = (Y=28.75) + 10.0 + X + L + 0.1

HVM40-P1 – D5.0

Pin Length = (Y=29.00) + 10.0 + X + L + 0.1

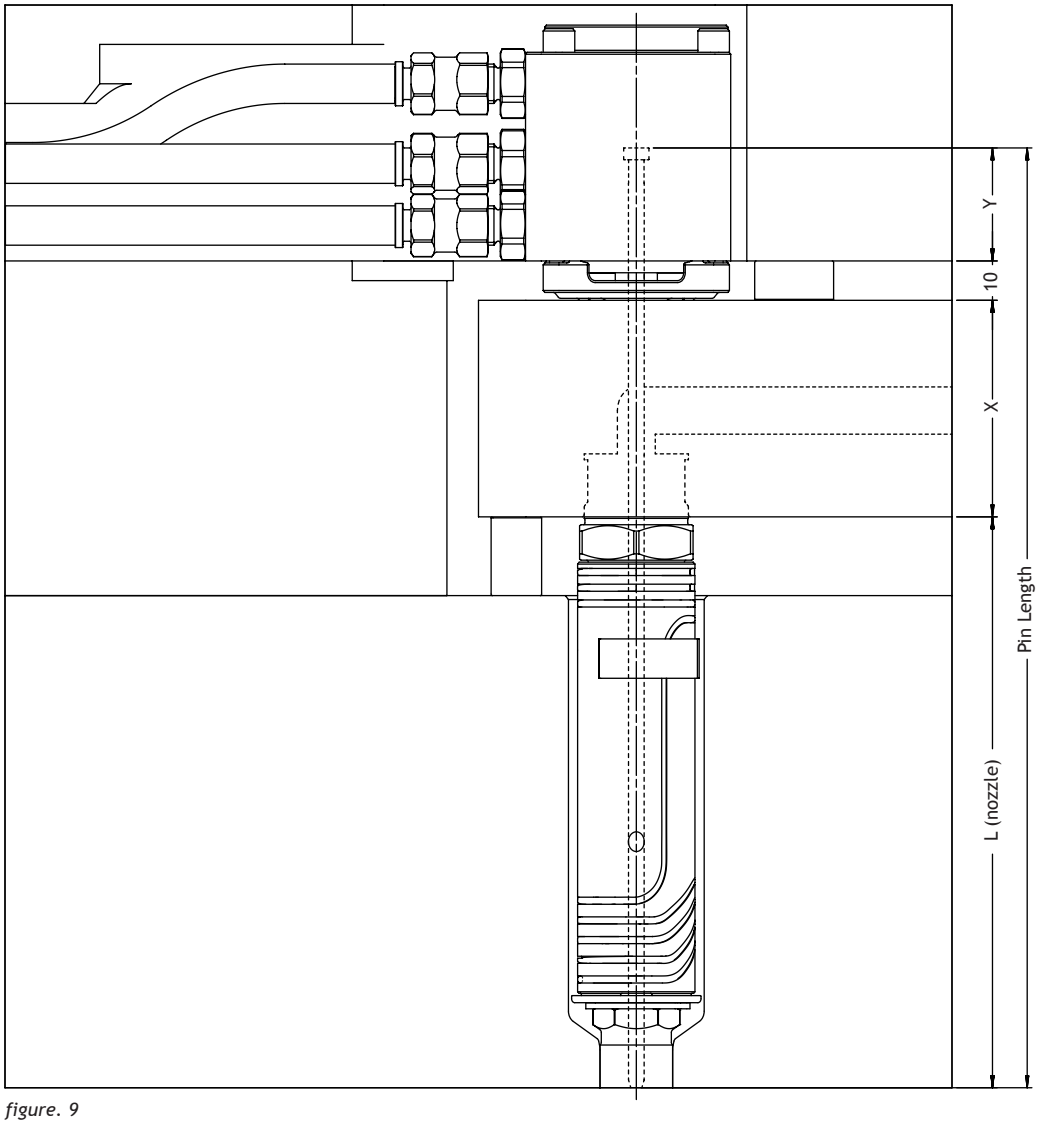
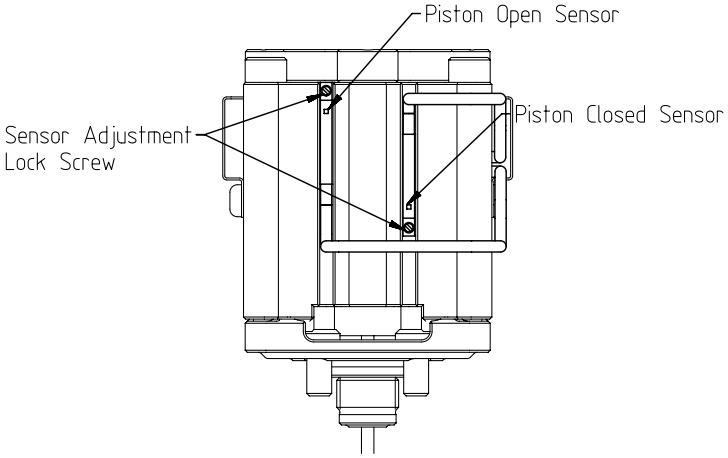
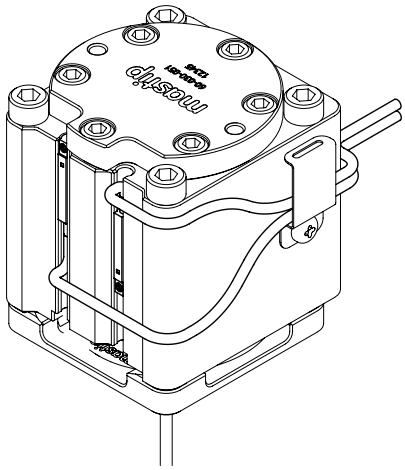


figure. 9

Limit (Position) Sensors

Limit sensors are available upon request, allowing confirmation of the piston and valve pin position. If required the sensors must be specified at the beginning of the quote/order and cannot be retrofitted to existing standard HVM/HVB actuators. The sensors are retained in a slot in the cylinder and are activated by a magnet attached to the piston. The sensors have a screw to allow them to be adjusted as required and locked into position.

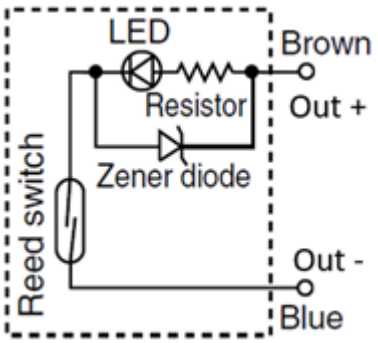




Sensor Specification	
Sensor Type	Reed Switch
Applicable Load	Relay, PLC
Voltage	24 VDC
Current	5 - 40 mA
Ambient Temperature	-10 to +60°C

Limit Sensor Wiring

Typical 2 wire connections for the sensor are shown below. Contact protection is advised.



Conical and Cylindrical Valve Gate Recommendations

	Conical Valve Gate	Cylindrical Valve Gate
Gate Quality	***	***
Pin Cooling	***	*
Filled Materials	*	***
Material with Small Moulding Window	*	***
Ease of Pin Setup	*	***
Ease of Gate Manufacture	***	**
Gate Life	***	*

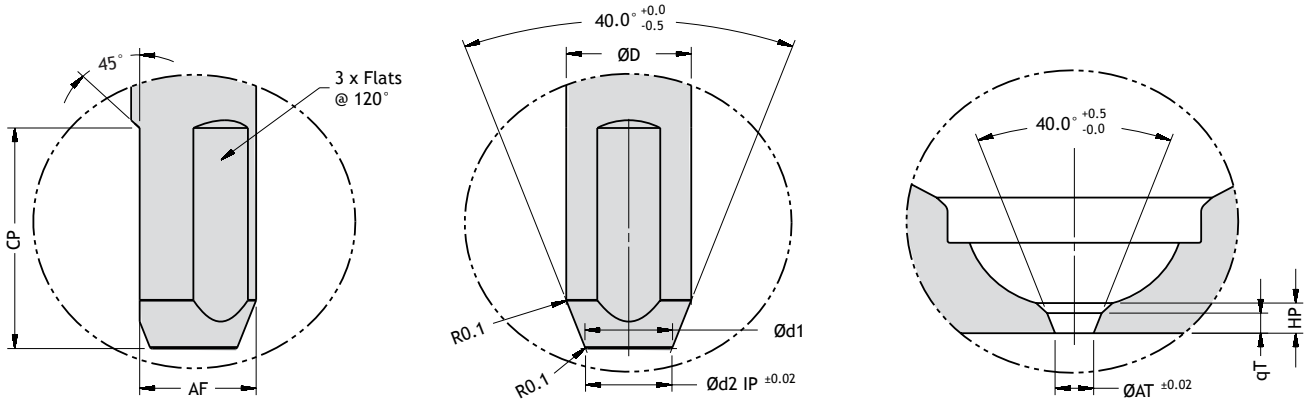
Key	Value
*	Lowest Rating
***	Highest Rating

VG1 - Conical Valve Gate

D	d1	d2	AF	CP	AT	qT	HP
2.0	1.3	1.25	1.80	8	1.30	0.8	1.0
2.5	1.8	1.75	2.30	8	1.80	1.0	2.0
3.0	2.2	2.15	2.75	8	2.20	1.2	2.5
5.0	3.5	3.45	4.65	10	3.50	2.0	3.0

The pin will form a 0.1mm deep dimple on the part.

Recommended for unfilled polymers.

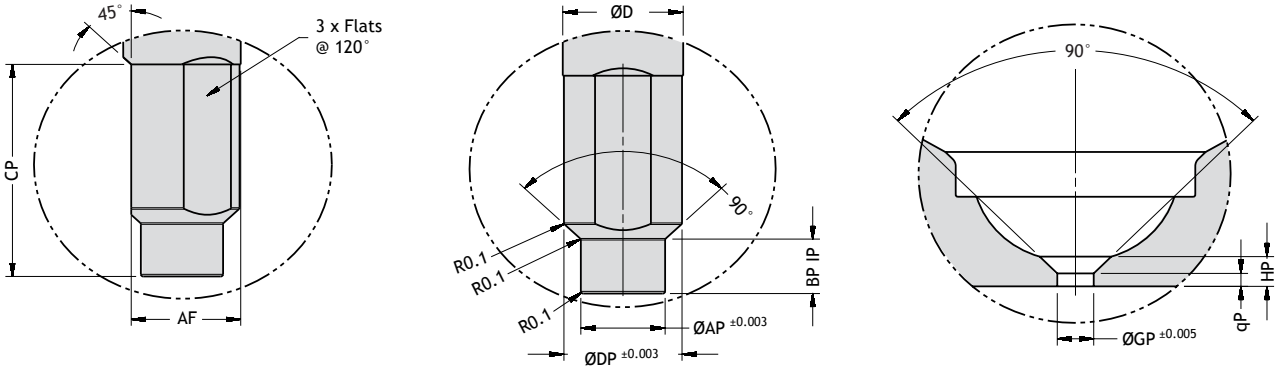


VG2 - Cylindrical Valve Gate

D	AP	BP	CP	DP	AF	GP	qP	HP
2.0	1.292	2.0	8	1.892	1.70	1.305	0.5	1.0
2.5	1.792	2.2	8	2.392	2.20	1.805	0.7	2.0
3.0	2.192	2.5	8	2.892	2.65	2.205	0.8	2.5
5.0	3.492	3.0	10	4.892	4.55	3.505	1.3	3.0

The pin will form a 0.1mm deep dimple on the part.

Recommended for unfilled and filled polymers.



Exploded Diagram

A HVB40 CYLINDER ASSEMBLY

B HVB40 VALVE PIN + SEAL SUPPLIED SEPARATELY

1. Blanking Plate (MANSHS5X12) Retaining Screw
2. Blanking Plate (60-030-050)
3. Blanking Plate Seal (25-001-003)
4. Pin Locking Screw (60-061-020)
5. Pin Locking Screw Seal (25-001-024)
6a. Valve Pin Adjustment Packer — ID3 To Suit 16/19 Series (60-062-222); ID5 To Suit 27 Series (60-062-420)
7. Valve Pin (See BOM) — ID3 (60-062-223) (60-062-224) (60-062-225); ID5 (60-062-421) (60-062-422) (60-062-423)
6b, 6c, 6d. Valve Pin Adjustment Packers
8. Piston Seal (25-003-040)
9. Piston Seal O - Ring (25-003-040)
10. Piston (60-010-150)
11. Rod Seal (25-005-012)
12. Bearing Strip (60-085-035)
13. Rod Wiper (25-005-011)
14. Cylinder Retaining Screws (MANSHS6X60)
15. Cylinder (60-000-050)
16. Flange Plug (21-000-006)
17. Base Mounting Screws (20-190-000)
18. Base (60-020-040)
19. Valve Pin Seal (See BOM)

Note

1. HVM40 Cylix Hybrid Spares Kit (80-000-105). Includes Seals, Wear Ring Strip and Grease
2. Piston Seal Installation Tool (60-090-020), (60-090-021)
3. Piston Hex Socket Tool (60-085-226)
4. Piston Extraction Tool (60-085-022)

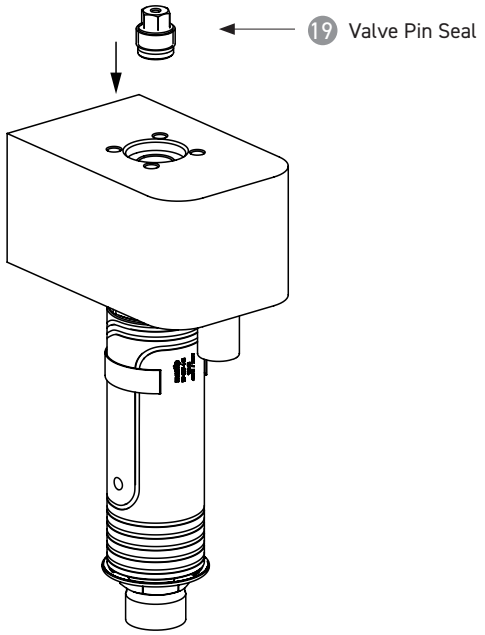
Installation and Pin Adjustment Guide

PRE-INSTALLATION

1. Verify the actuator pockets and hose channels are machined in the back plate as shown in figure 7.
2. Ensure there are no sharp edges or burrs.
3. Cut pins to length and profile end to conical or cylindrical (refer nozzle approval drawing).
4. Pin and seal are a matched set and must remain paired.

VALVE CYLINDER ASSEMBLY

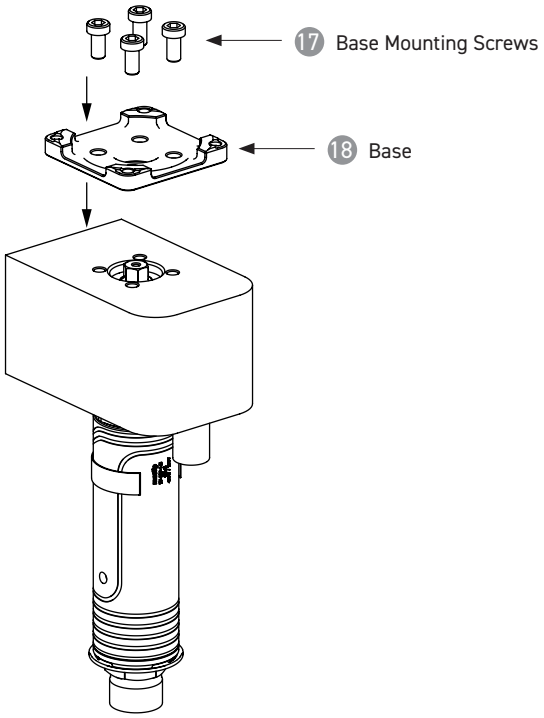
ONE



Apply heat resistant nickel based anti-seize grease to the thread of the **Valve Pin Seal** 19 and screw into the manifold and tighten to 20Nm.

Ensure pins slide smoothly through the pin seal after tightening.

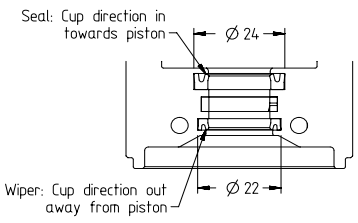
TWO

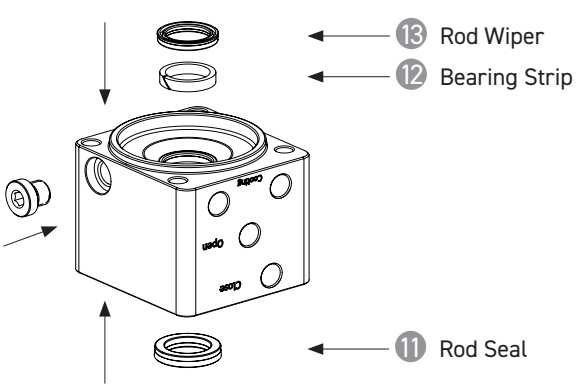


Mount the **Base** 18 onto the manifold and secure in place with the **Base Mounting Screws** 17 and tighten to 14Nm.

THREE

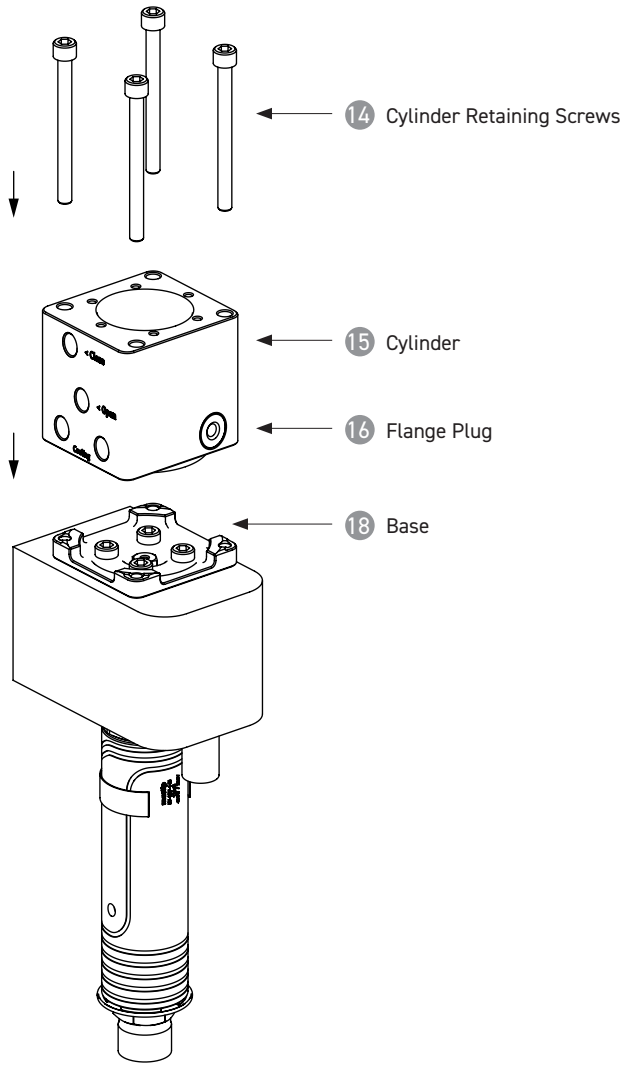
Fit the Rod Seal 11 with the cup groove towards the piston. Fit the bearing strip 12 in the centre groove, then fit the Rod Wiper 13 with the cup groove facing away from the piston.





VALVE CYLINDER ASSEMBLY CONT...

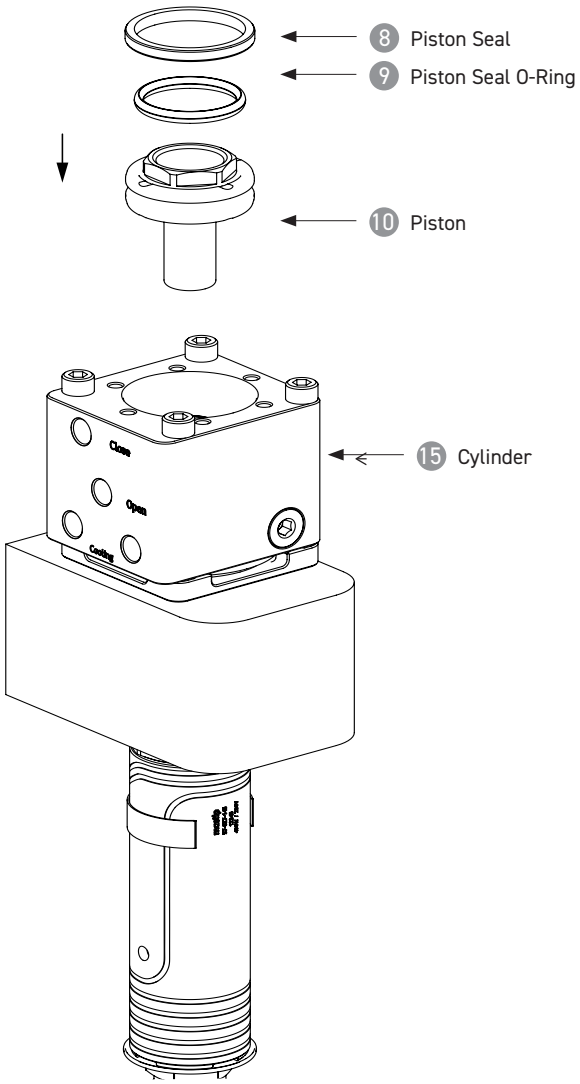
FOUR



Mount the **Cylinder** 15 to the **Base** 18, orientate the **Cylinder** 15 so the connections are facing the correct direction. Secure in place with **Cylinder Retaining Screws** 14 and tighten to 16Nm.

Ensure the **Flange Plug** 16 is tightly sealed in place in the cooling circuit.

FIVE

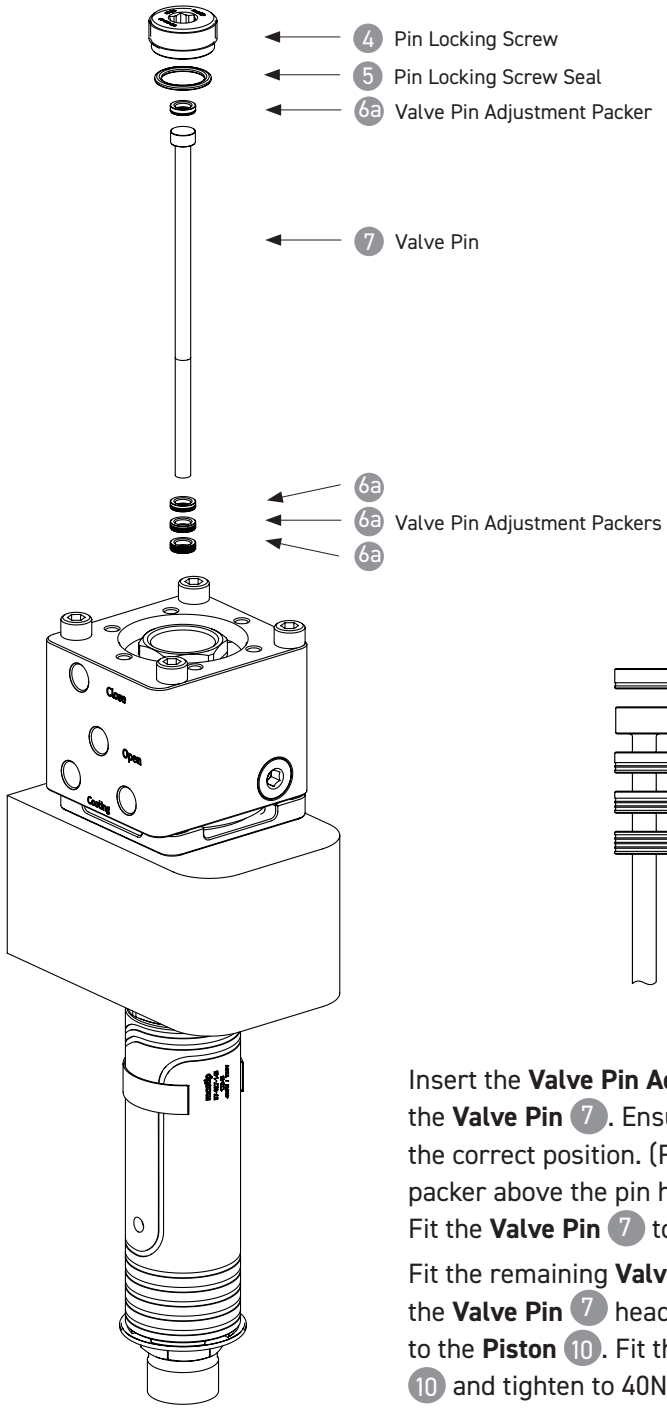


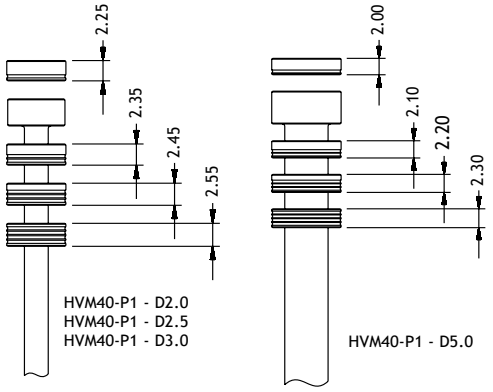
Fit the **Piston Seals** 8 & 9 to the **Piston** 10. Apply high temperature silicon grease to the cylinder bore, **Piston Seals** 8 & 9.

Fit the **Piston** 10 to the **Cylinder** 15.

VALVE CYLINDER ASSEMBLY CONT...

SIX



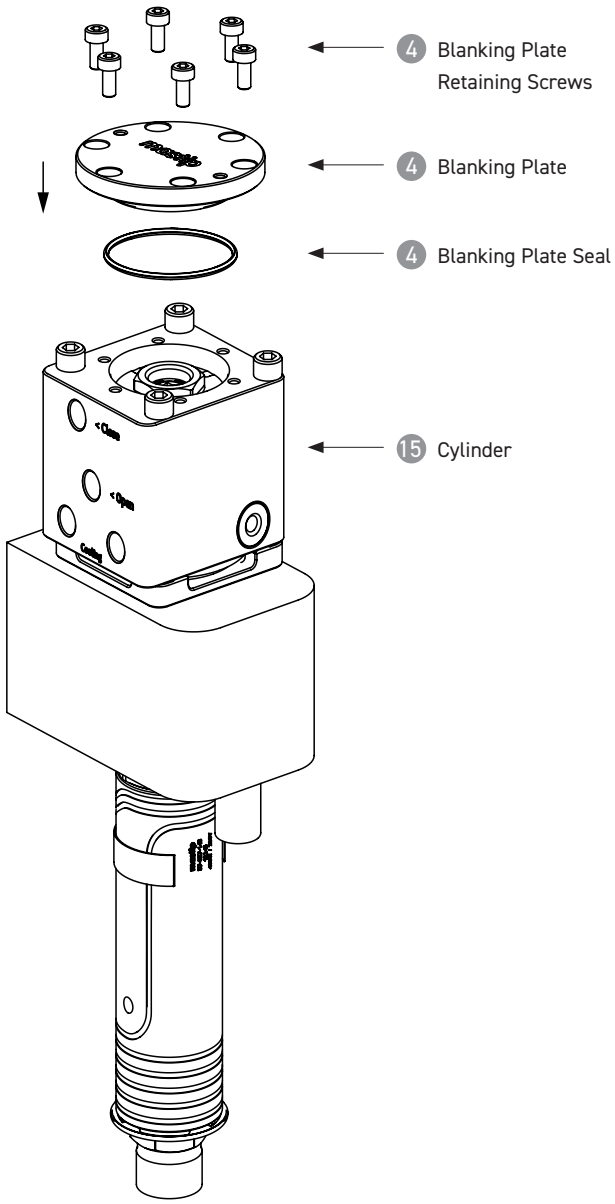


Insert the **Valve Pin Adjustment Packers** 6b, 6c & 6d onto the **Valve Pin** 7. Ensure the correct packer thickness is in the correct position. (Recommend starting with the thinnest packer above the pin head, then adjust to suit if necessary). Fit the **Valve Pin** 7 to the **Piston** 10.

Fit the remaining **Valve Pin Adjustment Spacer** 6a, above the **Valve Pin** 7 head. Fit the **Pin Locking Screw Seal** 5 to the **Piston** 10. Fit the **Pin Locking Screw** 4 to the **Piston** 10 and tighten to 40Nm.

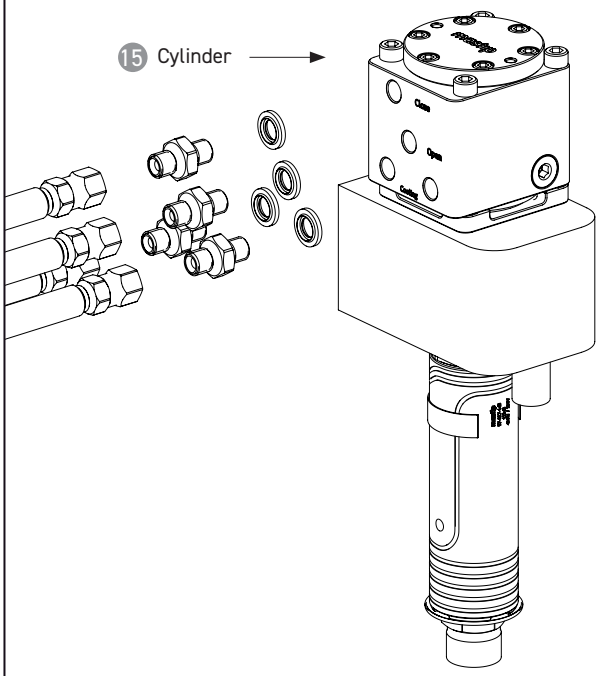
VALVE CYLINDER ASSEMBLY CONT...

SEVEN



Fit the **Blanking Plate Seal** 3 to the **Blanking Plate** 2. Fit the **Blanking Plate** 2 to the **Cylinder** 15, secure with **Blanking Plate Retaining Screws** 1 and tighten to 9Nm.

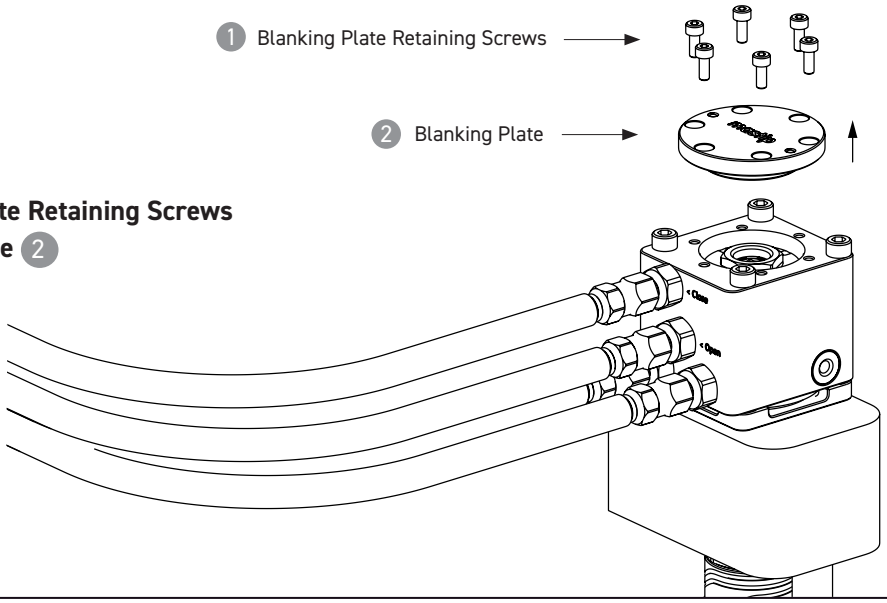
EIGHT



Install all actuation and cooling fittings, hoses and bonded washers to the **Cylinder** 15 (G1/8 threads) and mould connections, and ensure all connections are correct.

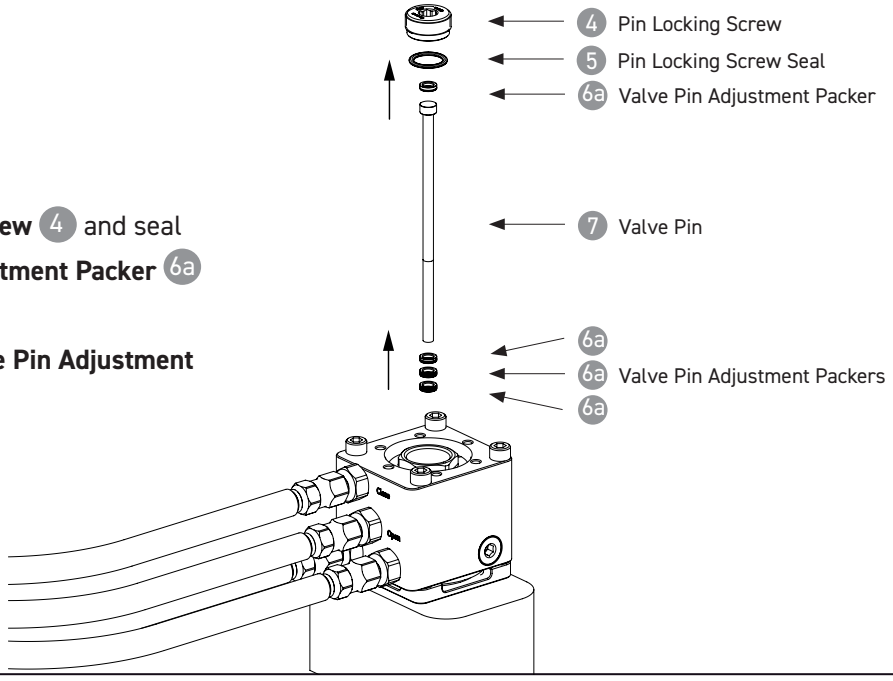
PIN HEIGHT ADJUSTMENT

ONE



Remove **Blanking Plate Retaining Screws** 1 and **Blanking Plate** 2

TWO



Remove the **Pin Locking Screw** 4 and seal

Remove the **Valve Pin Adjustment Packer** 6a

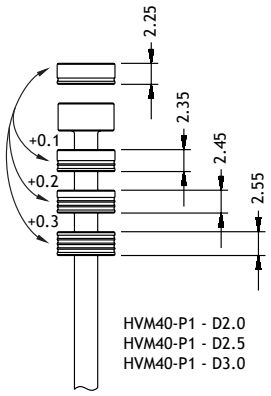
Remove the **Valve Pin** 7

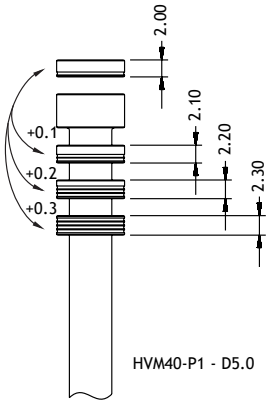
Remove the remaining **Valve Pin Adjustment Packers** 6b, 6c & 6d

PIN HEIGHT ADJUSTMENT

THREE

Minor Adjustment

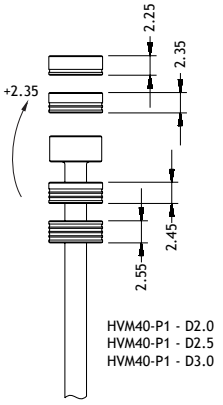


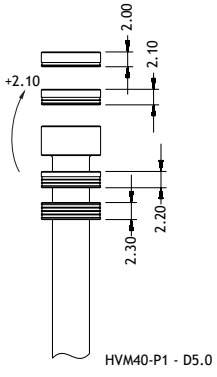


Swap **Valve Pin Adjustment Packers** 6a, 6b, 6c & 6d to achieve small pin adjustments (different packer = different height)

FOUR

Major Adjustment



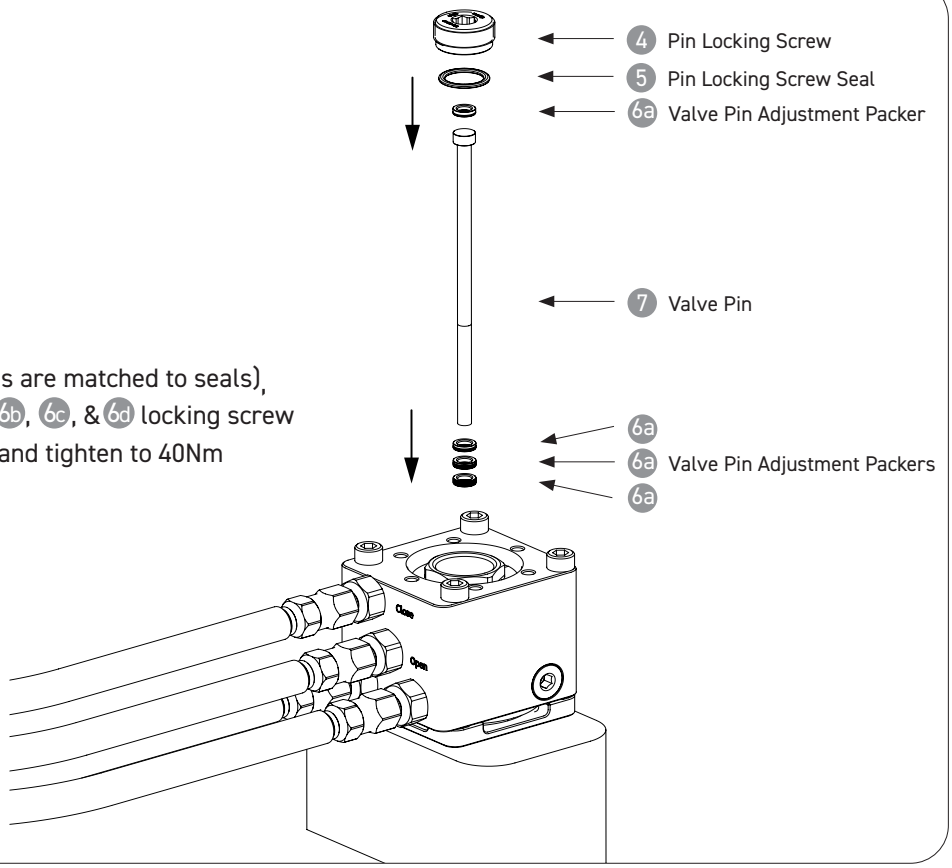


Move one or more **Valve Pin Adjustment Packers** 6a, 6b, 6c & 6d from below the pin head to above the pin head to achieve large pin adjustment

PIN HEIGHT ADJUSTMENT CONT.....

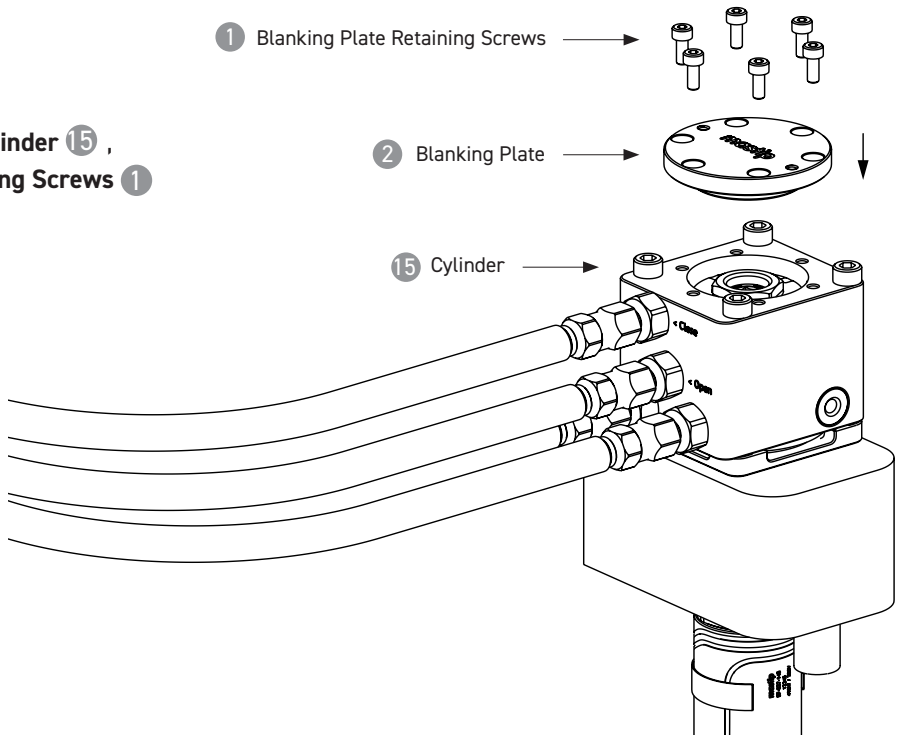
FIVE

Assemble **Valve Pin** 7 (ensure pins are matched to seals), **Valve Pin Adjustment Packers** 6a, 6b, 6c, & 6d locking screw seal and the **Pin Locking Screw** 4 and tighten to 40Nm



SIX

Fit the **Blanking Plate** 2 to the **Cylinder** 15 , secure with **Blanking Plate Retaining Screws** 1 and tighten to 9 Nm.

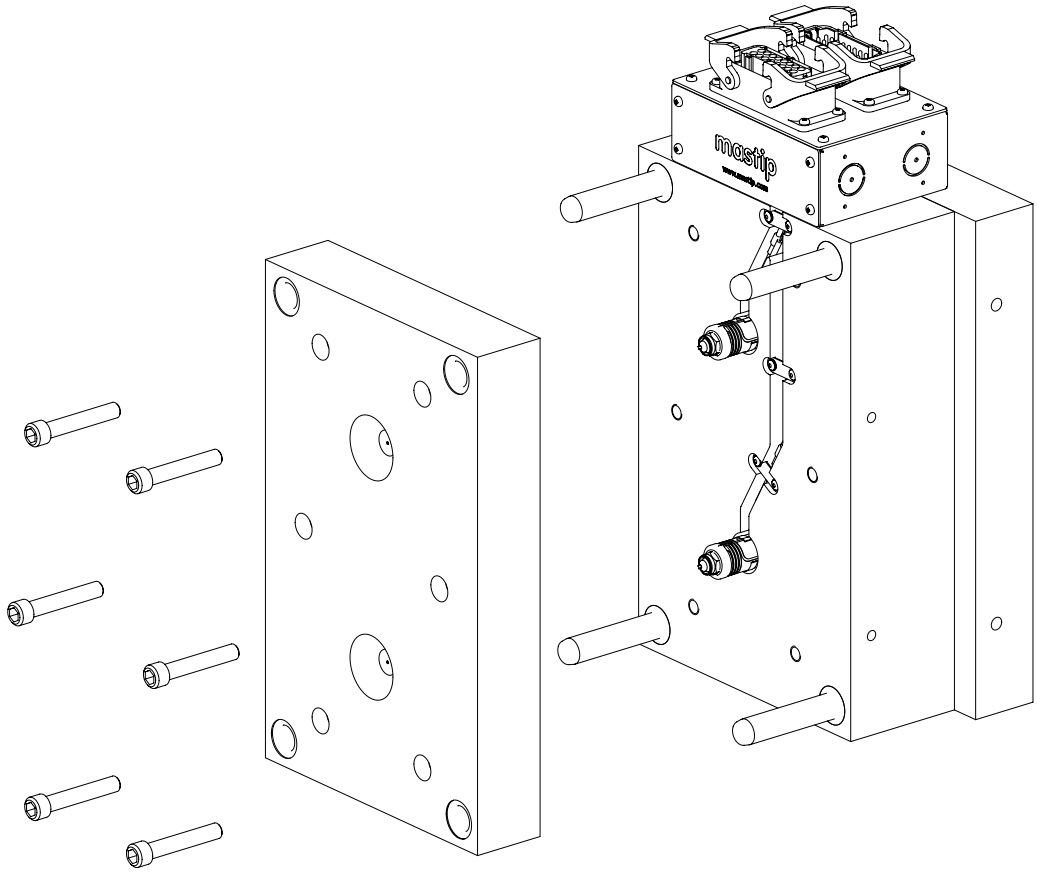


Valve Pin Guide Replacement

Caution: Where possible Mastip recommends removing and assembling the valve pin guide from the front (Nut/Tip) side of the mould.

→ **Guide replacement from the front (cavity side) of the mould**

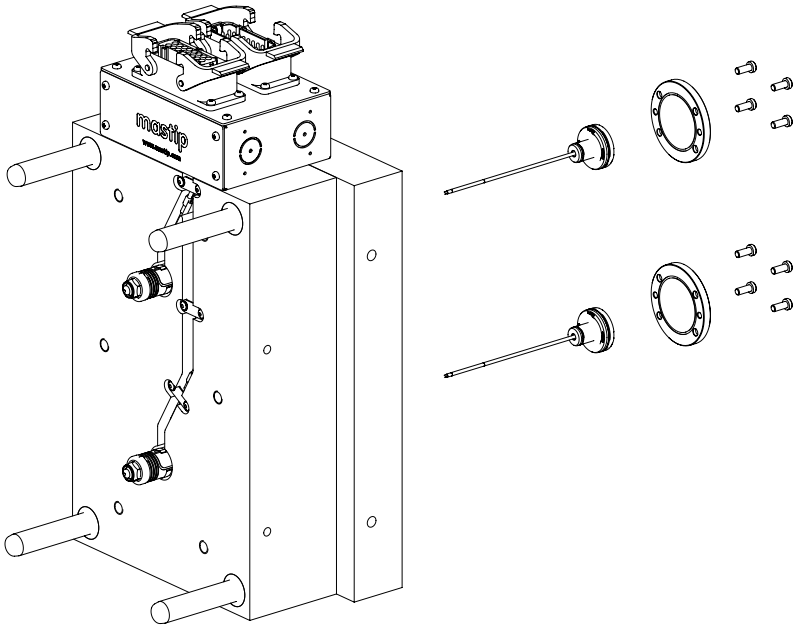
ONE



Ensure the mould plates are at room temperature
Remove the mould plates to expose the nozzle nut and tip
Heat up the nozzle to the melt temperature of the plastic inside
(⚠ Care must be taken not to touch any of the heated components ⚠)

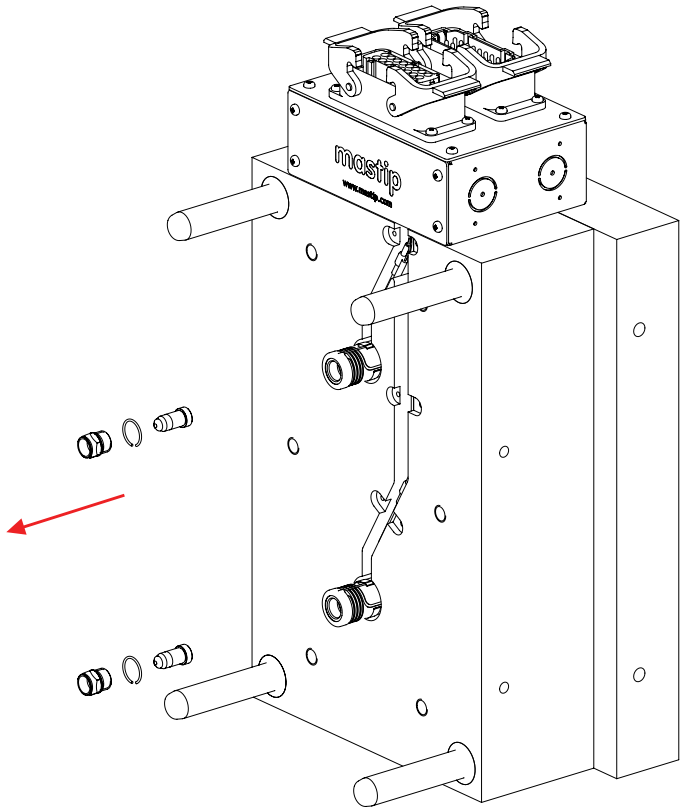
VALVE PIN GUIDE REPLACEMENT CONT.....

TWO



Remove the valve pin and piston assembly from the system using extractor tool (60 - 085 - 015)

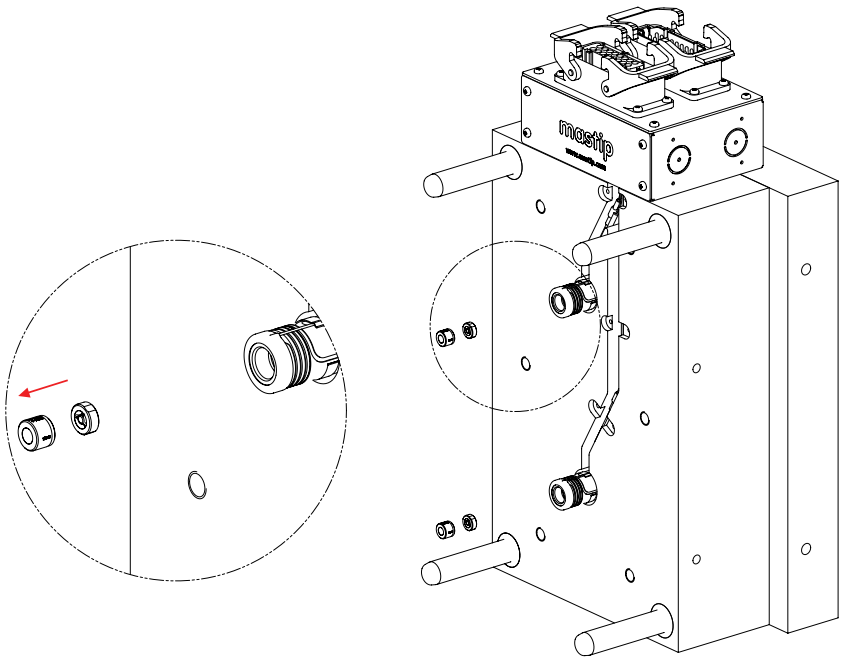
THREE



Allow the manifold and nozzles to cool, then remove the nozzle nut and tip, taking care not to cause any damage to the components

VALVE PIN GUIDE REPLACEMENT CONT.....

FOUR



Using a hook carefully remove the packer and valve pin guide from the nozzle taking care not to cause any damage

Reassemble in the reverse order

Notes

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