Manifold Cylinders and Systems

Advantages of Nitro-Dyne Manifold Systems

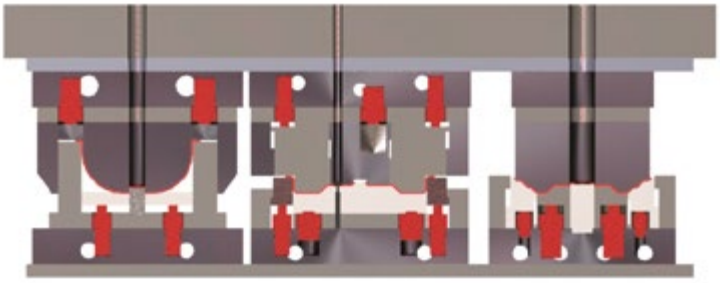
Hyson's Nitro-Dyne® Manifold System are ideal for high volume production. Die designers choose manifold systems for lower pressure rises, improved part quality, and low maintenance. Manifolds interconnect the Cylinders and provide one centralized point for pressurizing and depressurizing, with no hoses or external fittings. Hyson™, a global leader in Manifold design and manufacturing since 1964, manufactures Manifold Systems to your specifications.

Consistent Performance

Nitro-Dyne Manifold System is rugged and never tires, providing consistent force for repeatable performance. Mechanical Springs, on the other hand, can fatigue in addition to being affected by stroke rate and heat and lubrication, impacting spring quality.

Balanced Force

Compared to air cushions, Nitro-Dyne provides a balanced force on the pressure pad which improves part quality, reduces scraps, and increases uptime. Air cushions can experience uneven pad pressure if the cushion is off-center loaded. They may also require additional parts such as counterbalance pins.



Blank & Draw Station

More Force in Less Space

A single 2.5-ton Cylinder with a 1-inch stroke replaces eight, 2-inch X 8-inch Mechanical Springs. As a result, they reduce space and reduce costs in the original die construction. Maintenance costs and downtime are also reduced by replacing traditional Die Springs with Cylinders.

Full Force on Contact

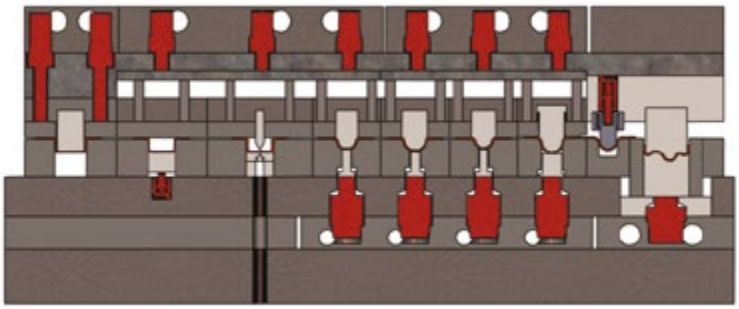
Manifold Systems provide full force on contact, unlike Mechanical Springs that require preload, for higher productivity.

Improved Performance and Quality

Designed with a 10% – 15% pressure rise so the force increase that occurs between contact and die closed is minimal for good quality parts. Self-Contained Gas Springs typically exhibit a 65% force increase that, in some applications, can lead to part tearing. This lower pressure rise also results in lower operating temperatures that add to the longevity of Cylinders and systems.

Easy Force Adjustability

Within the Manifold System, the Cylinders share a common reservoir, allowing the end user to adjust the pressure up or down as necessary depending on material tensile strength or thickness. The adjustment takes place while the die is still in the press instead of shutting down operations and pulling the die to change Mechanical Springs. This is even more important when you have multiple stations with varying stroke lengths and pressure requirements.



Fewer Leak Points

Nitro-Dyne is a self-contained plate with no external hoses or fittings, while a hosed Gas Spring system has many potential leak points hard to detect while mounted in the die.

Faster Set Up

Nitro-Dyne requires none of the Valves, Compressors, and other complex connections leading to faster set-up and increased production compared to air cushions.

Press Versatility for More Efficient Operations

Manifold Systems are inserted directly in the die and move with the die from press to press for more efficient and cost-effective operations.

Choosing the Best System for Your Operations

Selecting the most efficient and effective Cylinder system for your operation is not always simple, and often the lowest initial cost option is more expensive long term. Check out the chart below and contact the Hyson engineered products experts to ensure you get the optimum system for your needs.

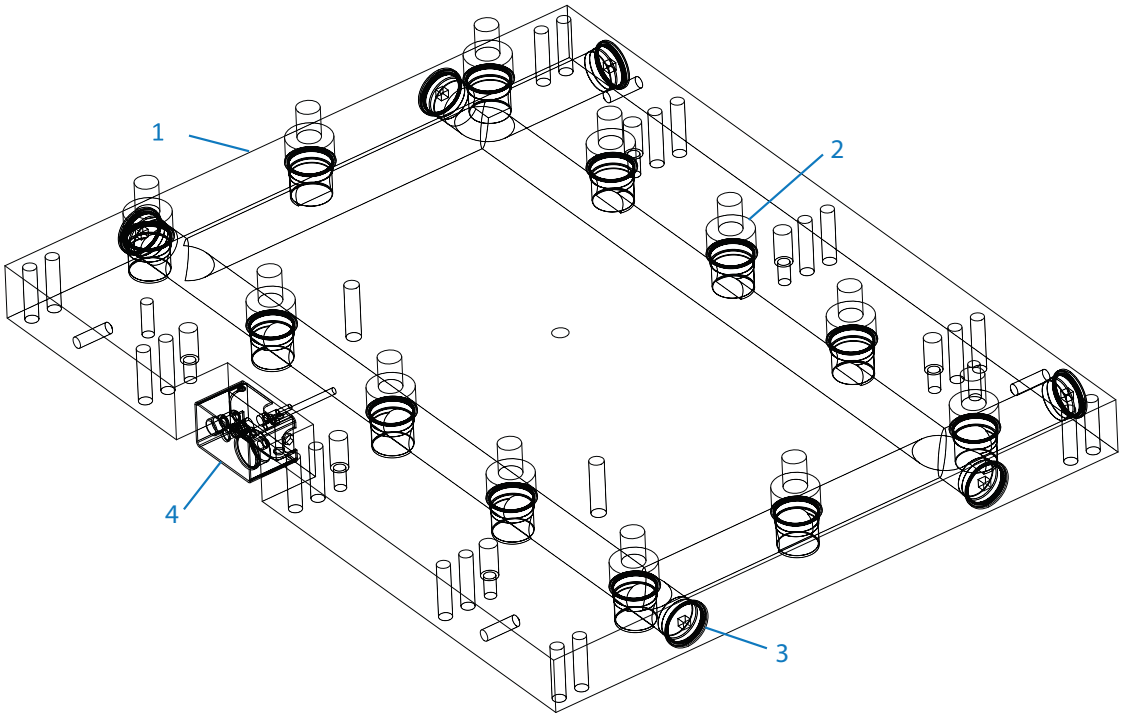
System Selection

Operation Requirement	Nitro-Dyne Manifold System	Mechanical Die Spring	Nitrogen Gas Spring	Hose System	Air Cushion
Consistent Force	Yes	No	Yes	Yes	No
Balance Force	Yes	No	Yes	Yes	No
High Tonnage/Small Space	Yes	No	Yes	Yes	No
Full Contact Force	Yes	No	Yes	Yes	Yes
Force Adjustability In-Press	Yes	No	No	Yes	Yes
Low Pressure Rise	Yes	No	No	No	No
Low Heat Generation	Yes	Yes	No	No	No
Minimum Leak Points	Yes	N/A	Yes	No	No
Low Initial Cost	No	Yes	Yes	Yes	No
Low Cost Die Assembly	Yes	No	No	No	No
Maximum Production Time	Yes	No	No	No	No

Manifold System Design

A typical Manifold System incorporates a metal plate, Cylinders, and control panel. The Manifold plate (1) is machined to hold Cylinders in place and act as a reservoir for nitrogen gas. Cylinders (2) are located wherever force is needed, threaded into the plate, and sealed by an O-ring. The Cylinders are connected by passages through which the nitrogen gas travels (3). A control panel (4) is mounted to the Manifold plate or attached with a hose for remote operation. Through the control panel, pressure within the system can be read, as well as charging and exhausting the system.

Save time and money by letting our engineers design the most cost effective and efficient Manifold System for you. Here is the information we need to expedite your quotation:



- Maximum area available: length, width, thickness, overall height with Cylinders fully extended.
- Cylinder working stroke and preferred usable stroke.
- Tonnage required.
- Maximum number of Cylinders.
- Allowable pressure rises from initial contact to end of work stroke.
- Special features: mounting holes, dowel holes, keyways, pockets, scrap chutes, etc.
- Location of control panel: recessed in plate or remote-hosed to plate.
- Press speed (Strokes Per Minute (SPM)).
- Use of drawing lubricants, e.g., can the die be flooded with lubricants?
- Annual production levels.
- CAD drawing or hand-drawn sketch with data points.

If you choose to design the system yourself, follow the step-by-step guides for designing both standard 1500 psi and high pressure 2000 psi systems.

Guide to Designing a Standard 1500 psi System

1. Force

Determine how much force is needed to form, hold, strip, or draw the part.

Example: 15 tons of force is required for a conventional draw of a rectangular part.

2. Cylinder Quantity

Determine how many pressure points are needed to distribute the pressure evenly across the pad. To accommodate variances in part thickness, tensile strength, and die wear, build in more force than required.

Example: The system design has the capability for 20 tons, more than the 15 tons required.

Cylinder Tonnages	Effective Area	
1/2 Ton	5.03 cm^2	0.78 $in.^2$
1 Ton	11.40 cm^2	1.77 $in.^2$
2.5 Ton	22.20 cm^2	3.44 $in.^2$
4 Ton	34.90 cm^2	5.42 $in.^2$
6 Ton	51.50 cm^2	7.98 $in.^2$

Eight 2.5-ton Cylinders provide a good pressure point distribution with the necessary tonnage.

3. Cylinder Stroke

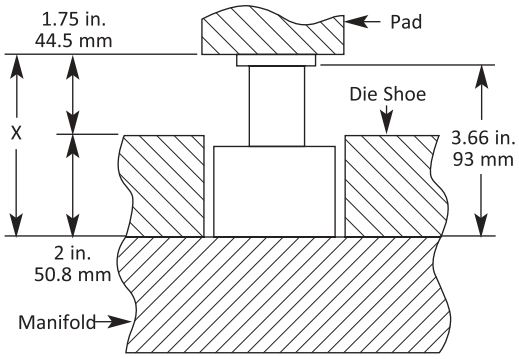
Pad travel dictates stroke length, and standard strokes for most Cylinder types are in ½ -inch increments. Choose the stroke length that will not be exceeded by the actual working stroke.

Example: The travel of the pad is 1 ¾-inch so the proper Cylinder stroke for this application is 2 inches.

4. Pressure Rise/Volume Holes

Controlled material flow is needed in conventional draw dies with Cylinders maintaining constant force throughout the stroke. This type of system is usually designed with a 10% – 20% pressure rise, while other systems can use a higher pressure rise.

Determine the volume requirements, and therefore the length and diameter of the drilled holes, by calculating the Swept Volume (SV), the amount of nitrogen displaced from the Cylinders during the stroke.



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Determine the volume requirements, and therefore the length and diameter of the drilled holes, by calculating the Swept Volume (SV), the amount of nitrogen displaced from the Cylinders during the stroke.

Effective Piston Area

Cylinder Tonnages	Effective Area	
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1 Ton	11.40 cm^2	1.77 $in.^2$
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4 Ton	34.90 cm^2	5.42 $in.^2$
6 Ton	51.50 cm^2	7.98 $in.^2$

SV = number of cylinders X work stroke of cylinders X effective piston area of cylinders.

Example SV = 8 X 1.75 X 3.44 $in.^2$
SV = 48.16 $in.^3$

Calculate the total manifold volume by multiplying the Swept Volume by pressure rise.

Desired Pressure Rise	Pressure Rise Factor (PF)
10%	**SV X 10**
15%	**SV X 6.66**
20%	**SV X 5**

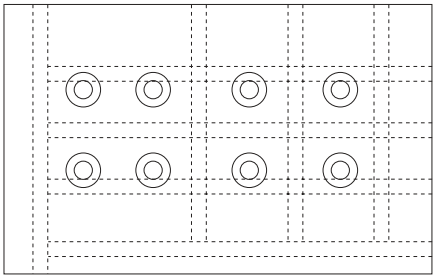
Example (for a 10% pressure rise):
Total Volume = SV X PF
Total Volume = 48.16 $in.^3$ X 10 = 481.6 $in.^3$

From the Volume Hole drilling chart that follows, identify the largest volume hole for the plate thickness.

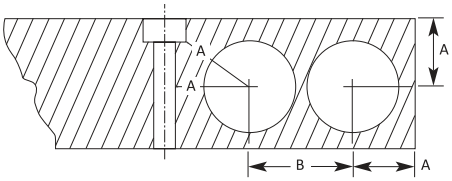
Convert the Total Volume into linear inches of drilling.

$$\text{Linear inches Drilling} = \frac{\text{Volume required}}{\text{Volume per inch of drilled hole*}}$$

*Note: when shut height allows, design the system with a thicker manifold plate and reduce the number and length of drilled holes to reduce cost.



4 holes	45 in. long	180 linear inches
3 holes	25 in. long	75 linear inches
1 hole	30 in. long	30 linear inches
		285 linear inches



Standard Manifold Volume Hole Drilling

Plugs	Thread Size	Area/ Linear Inch	mm in	Hole Diameter	A	B	Suggested Plate Thickness*	Max. Drilling Depth (1 Way)
NF-771-4	7/16-20	.71 cm^2 .110 in^2	mm in	9.53 0.375	9.53 0.375	18.75 0.738	51 2.00	584 23
NF-771-5	1/2-20	.97 cm^2 .151 in^2	mm in	11.13 0.438	10.31 0.406	22.22 0.875	51 2.00	587 23
NF-771-8	3/4-16	2.18 cm^2 .338 cm^2	mm in	16.60 0.656	14.30 0.563	30.96 1.219	51 2.00	483 19
NF-771-10	7/8-14	2.85 cm^2 .442 in^2	mm in	19.05 0.750	15.88 0.625	34.93 1.375	51 2.00	1092 43
NF-771-12	1-1/16-12	4.46 cm^2 .691 in^2	mm in	23.83 0.938	19.05 0.750	42.06 1.656	51 2.00	1092 43
NF-771-14	1-3/16-12	5.71 cm^2 .886 in^2	mm in	26.97 1.062	22.45 0.884	46.05 1.813	51 2.00	1092 43
NF-771-16	1-5/16-12	7.15 cm^2 1.108 in^2	mm in	30.18 1.188	23.83 0.938	50.80 2.000	57 2.25	1092 43
NF-771-20	1-5/8-12	11.40 cm^2 1.767 in^2	mm in	38.10 1.500	26.97 1.062	58.75 2.313	64 2.50	1143 45
NF-771-24 & NF-771-M47	1-7/8-12	15.52 cm^2 2.405 in^2	mm in	44.45 1.750	31.75 1.250	60.33 2.375	70 2.75	1194 47
NF-771-M63	M63-2	27.75 cm^2 4.301 in^2	mm in	59.44 2.340	39.70 1.563	76.20 3.000	89 3.50	1829 72
NF-771-32	2-1/2-12	28.58 cm^2 4.430 in^2	mm in	60.33 2.375	39.70 1.563	76.20 3.000	89 3.50	1829 72
NF-771-82	M82-2	48.51 cm^2 7.518 in^2	mm in	78.59 3.094	53.98 2.125	95.25 3.750	114 4.50	1524 60
NF-771-100	M100-2	71.26 cm^2 11.045 in^2	mm in	95.25 3.750	63.50 2.500	111.25 4.380	133 5.25	1829 72

Guide to Designing a Standard 2000 psi System

1. Force

Determine how much force is needed to form, hold, strip, or draw the part.

Example: 15 tons of force is required for a conventional draw of a rectangular part.

2. Cylinder Quantity

Determine how many pressure points are needed to distribute the pressure evenly across the pad. To accommodate variances in part thickness, tensile strength, and die wear, build in more force than required.

Example: The system design has the capability for 20 tons, more than the 15 tons required.

Cylinder Tonnages	Effective Piston Area	
3/4 Ton	5.03 cm^2	0.78 $in.^2$
1.5 Ton	11.40 cm^2	1.77 $in.^2$
3 Ton	22.20 cm^2	3.44 $in.^2$
5 Ton	34.90 cm^2	5.42 $in.^2$
8 Ton	51.50 cm^2	7.98 $in.^2$

Four 5-ton Cylinders provide a good pressure point distribution with the necessary tonnage.

3. Cylinder Stroke

Pad travel dictates stroke length, and standard strokes for most Cylinder types are in ½-inch increments. Choose the stroke length that will not be exceeded by the actual working stroke.

Example: The travel of the pad is 1 ¾-inch so the proper Cylinder stroke for this application is 2 inches.

4. Cylinder Profile

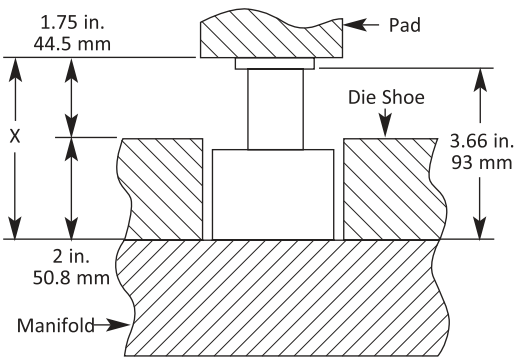
Measurement from the bottom of the shoe to the bottom of the pad in the die-open position is known as the "X" dimension. Choose a Cylinder that closely matches this dimension, remembering that the Cylinder should be always protected from overstroke.

Example: The appropriate Cylinder choice is the MORD 5000 X 2-inch stroke.

5. Pressure Rise/Volume Holes

Controlled material flow is needed in conventional draw dies with Cylinders maintaining constant force throughout the stroke. This type of system is usually designed with a 10% – 20% pressure rise, while other systems can use a higher pressure rise.

Determine the volume requirements, and therefore the length and diameter of the drilled holes, by calculating the Swept Volume (SV), the amount of nitrogen displaced from the Cylinders during the stroke.



High Force Manifold Volume Hold Drilling

Plugs	Thread SIze	Area/ Linear Inch	mm in	Hole Diameter	A	B	Suggested Plate Thickness*	Max. Drilling Depth (1 Way)
NF-771-4	7/16-20	.71 cm^2 .110 $in.^2$	mm in	9.53 0.375	9.40 0.37	19.05 0.750	51 2.00	584 23
NF-771-5	1/2-20	.97 cm^2 .151 $in.^2$	mm in	11.13 0.438	10.41 0.41	22.23 0.875	51 2.00	584 23
NF-771-8	3/4-16	2.18 cm^2 .338 $cm.^2$	mm in	16.60 0.656	15.24 0.60	30.96 1.219	51 2.00	483 19
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NF-771-14	1-3/16-12	5.71 cm^2 .886 $in.^2$	mm in	26.97 1.062	23.62 0.93	46.05 1.813	51 2.00	1092 43
NF-771-16	1-5/16-12	7.15 cm^2 1.108 $in.^2$	mm in	30.18 1.188	25.91 1.02	50.80 2.000	57 2.25	1092 43
NF-771-20	1-5/8-12	11.40 cm^2 1.767 $in.^2$	mm in	38.10 1.500	31.75 1.25	60.33 2.375	67 2.62	1143 45
NF-771-24 & NF-771-M47	1-7/8-12	15.52 cm^2 2.405 $in.^2$	mm in	44.45 1.750	36.32 1.43	69.85 2.750	76 3.00	1194 47
NF-771-M63	M63-2	27.75 cm^2 4.301 $in.^2$	mm in	59.44 2.340	48.01 1.89	88.90 3.500	95 3.75	1829 72
NF-771-32	2-1/2-12	28.58 cm^2 4.430 $in.^2$	mm in	60.33 2.375	61.98 2.44	114.30 4.500	95 3.75	1829 72
NF-771-82	M82-2	48.51 cm^2 7.518 $in.^2$	mm in	78.59 3.094	76.20 3.00	114.30 4.500	124 4.88	1524 60
NF-771-100	M100-2	71.26 cm^2 11.045 $in.^2$	mm in	95.25 3.750	76.20 3.00	136.53 5.375	152 6.00	1829 72

* Drilling patterns can affect plate thickness.

Designing a Nitro-Dyne High Force 150 Bar Manifold System

1. Force

Determine how much force is needed to form, hold, strip, or draw the part.

Example: 400kN of force is required for a conventional draw of a rectangular part.

2. Cylinder Quantity

Determine how many pressure points are needed to distribute the pressure evenly across the pad and what the maximum charge pressure might be for the design. To accommodate variances in part thickness, tensile strength, and die wear, build in more force than required.

Cylinder Model	Force @ 125 bar Charge Pressure (kN)	Force @ 150 bar Charge Pressure (kN)
MOR® 5200	43.7	52.4
MOR 7700	64.4	77.3
MOR 10700	89.1	106.9

Example: The system design has the capability for 445kN at 125 bar of maximum charge pressure, slightly more force than the 400kN required. Seven MOR 7700 cylinders provide good pressure point distribution with the necessary tonnage at 125 bar charge pressure.

3. Cylinder Stroke

Pad travel dictates stroke length. Standard strokes for cylinders are in metric increments. Choose the stroke length that will not be exceeded by the actual working stroke.

Example: The travel of the pad is 80 mm so the proper cylinder stroke for this application is 100 mm, resulting in a cylinder choice of MOR 7700X100.

4. Pressure Rise/Volume Holes

Controlled material flow is needed in conventional draw dies, with cylinders maintaining constant force throughout the stroke. This type of system is usually designed with a 10%-20% pressure rise. Determine the volume requirements, and therefore the length and diameter of the drilled holes, by calculating the Swept Volume (SV), the amount of nitrogen displaced from the cylinders during the stroke. SV = number of cylinders X work stroke of cylinders (mm) X effective piston area of cylinders (mm^2)

Cylinder Tonnages	Effective Piston Area
MOR 5200	3494 mm^2
MOR 7700	5153 mm^2
MOR 10700	7130 mm^2

Example:
SV = 7 X 80 mm X 5153 mm^2
SV = 2,885,680 mm^3

Calculate the total manifold volume by multiplying the Swept Volume by pressure rise factor.

Desired Pressure Rise	Pressure Rise Factor (PF)
10%	SV X 10
15%	SV X 6.66
20%	SV X 5

Example: (for a 15% pressure rise)
Total Volume = SV X PF
Total Volume = 2,885,680 mm^3 X 6.66 = 19,218,629 mm^3

Convert the Total Volume into linear millimeters of drilling.

$$\text{Linear millimeters drilling} = \frac{\text{Volume required}}{\text{Area of drilled hole}}$$

Plug	Thread Size	Area of Drilled Hole	Hole Diameter	A	B	Max Drilling Depth (1 way)
NF-771-100	Size M100-2	7126 mm²	95.25 mm²	76.2 mm	239.7 mm	1829 mm

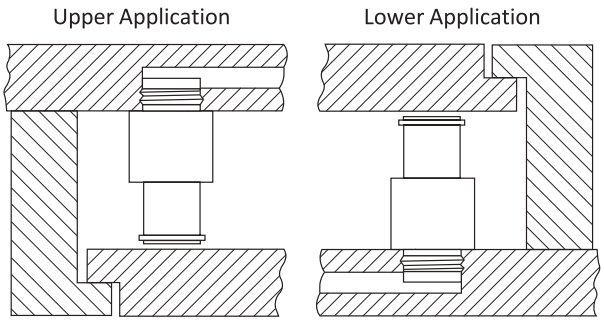
Example: For a plate measuring 150 mm X 450 mm X 1100 mm, the diameter volume hole is 95.25 mm and the area of drilled hole is 7126 mm².

$$\frac{19{,}218{,}629\ \text{mm}^3}{7126\ \text{mm}^2} = 2697\ \text{linear mm of drilling required}$$

Drills include: 2 holes 1100 mm long and 2 holes 450 mm long resulting in 3100 mm total length.

Additional Design Considerations

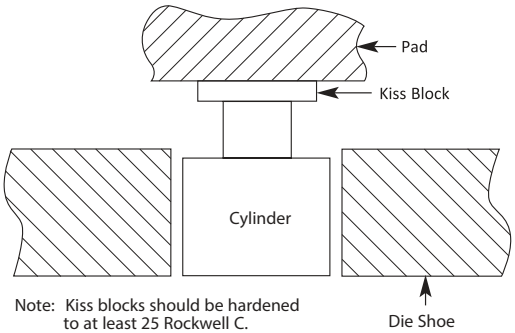
Design with Die Open Clearance



Note: The weight of the pad is not enough to preload the cylinders.

Manifolds require a minimum clearance of .01-inch (.254 mm) in the die to allow the nitrogen Cylinders to come to a full, open position. In an upper application, the clearance occurs between the end of the Cylinder rod and the pad. In a lower application, the clearance is between the pad and its retainer system.

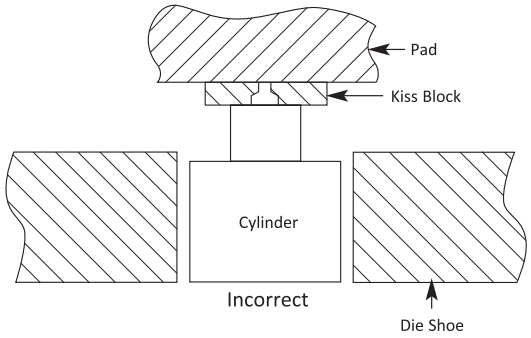
Avoid Special Length Piston Rods

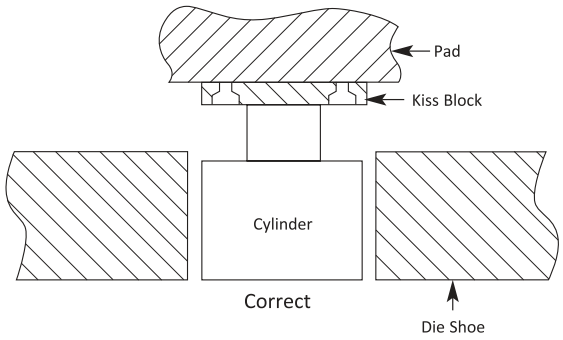


If the height of a standard nitrogen Cylinder does not match the distance to the back of the pad, we recommend using kiss blocks to make up the height difference. Another alternative is to counterbore the Cylinders into the Manifold. Cylinders with special length piston rods are custom orders. Consult your Hyson contact for details.

Piston Rod Contact Surfaces

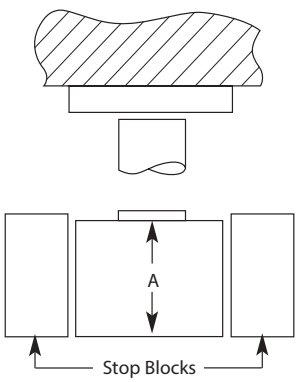
It is essential that the nitrogen Cylinder's piston rod contacts a flat surface.
Never put the piston rod against a counterbored hole, rough casting, or bolt.





Stop Blocks

Use stop blocks to prevent Cylinder damage in the event that the pad is over stroked.
The stop block should be equal to or greater than the "A" dimension on the Cylinder.



In most die designs, Cylinders are placed through a pocket in the die shoe or subplate in the die. This pocket can fill with draw lubricants, metal chips, and/or cleaning solvents that submerge the Cylinder and shorten the life of the system.

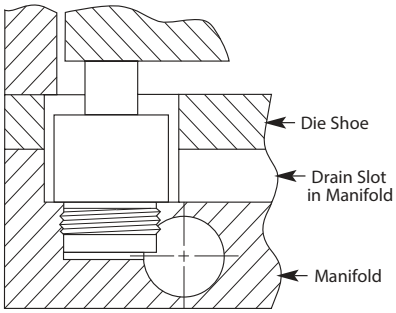
To prevent this, install drainage slots in each Cylinder pocket. They should be of sufficient size to prevent blockage. The size of the drain slots or drain holes depend on the number of Cylinders connected by one slot/hole. Contact Hyson for assistance.

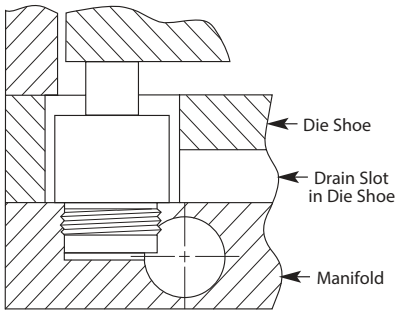
Handling Holes

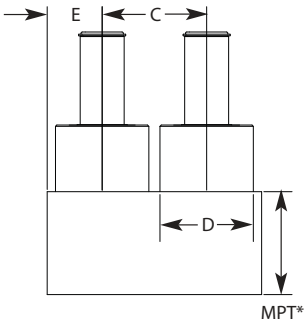
Every Manifold should have handling holes so the system can be installed, turned, and serviced without damaging the nitrogen Cylinders.

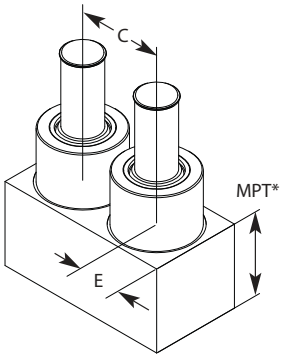
Cylinder Location

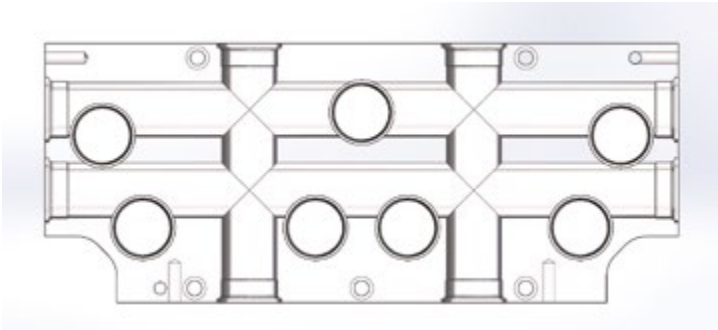
Using the charts that follow, position Cylinders for the standard 1500 psi Manifold or the high pressure 2000 psi Manifold with a minimum distance between the Cylinders and plate edge or features like taps, dowels, or counterbored holes that are open to atmospheric pressure.











Choosing a Manifold Cylinder

HYSON's nitrogen manifold cylinders are available in a wide variety of diameters, tonnages, profiles, strokes and heights to meet your stamping requirements.

MOR

The Cylinder is used most often in basic nitrogen systems. This taller Cylinder extends beyond the surface of the Manifold plate for applications where shut height is not an issue.

Example: MOR400X 1.0

MORD

A shorter Cylinder for applications where space is at a premium. Often vertical die height can be saved using a MORD profile Cylinder. Installed in a thick Manifold, the Cylinder sleeve extends deep to allow the piston to stroke into the plate.

TSB

A low body profile Cylinder for applications where shut heights are very limited. The TSB requires less die shoe machining for Cylinder body clearance and shallower pockets if counterbored in the Manifold.

SB 6X.75-BW*

Not Pictured*

A short-stroke compact Cylinder designed to provide high force in applications where die space or press shut height is very limited. This is a venting Cylinder used in relatively clean environments and usually in upper die applications.

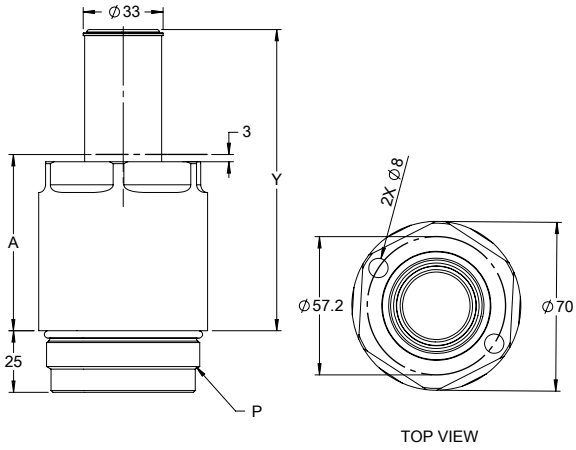
SB

A short height Cylinder for short stroke applications. Designed originally for stripper pad operations, the Cylinder profile allows for minimal clearance and weight when Manifolds are mounted in upper stripping dies.

MOR 400

The most compact Manifold Cylinder, ideal for low tonnage operations. Often used as a lift or when higher speeds are required.

MOR



Dimensional information

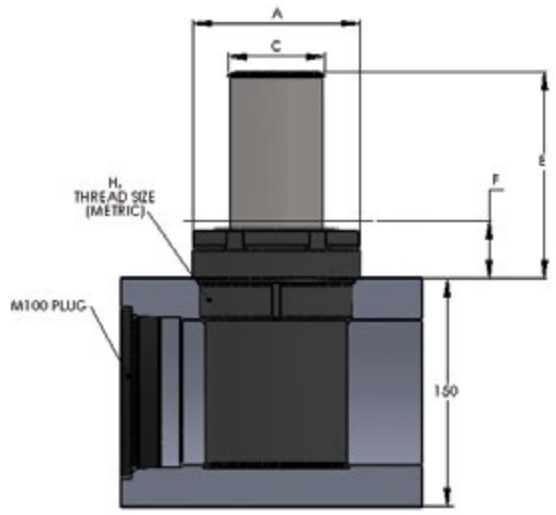
1500 psi Manifold Model/Size	2000 psi Manifold Model/Size	Effective Piston Area	Std. Stroke Lengths	K	P	R	B
MOR .5 1/2 ton	MOR 750 .75 ton	.789 in^2 5.07 cm^2	4.00 in 102 mm	1.60 in 41 mm	1-5/16-12	0.85 in 22 mm	0.88 in 22 mm
MOR 1 1 ton	MOR 1500 1.5 ton	1.77 in^2 11.40 cm^2	5.00 in 127 mm	2.12 in 54 mm	1-7/8-12	1.08 in 27 mm	0.72 in 18 mm
MOR 2.5 2.5 ton	MOR 3000 3 ton	3.45 in^2 22.26 cm^2	6.00 in 152 mm	2.75 in 70 mm	2-1/2-12	1.38 in 35 mm	1.0 in 25 mm
MOR 4 4 ton	MOR 5000 5 ton	5.41 in^2 34.92 cm^2	7.00 in 178 mm	3.56 in 90 mm	M82X2	1.86 in 47 mm	1.25 in 32 mm
MOR 6 6 ton	MOR 8000 8 ton	7.98 in^2 51.50 cm^2	8.00 in 203 mm	4.31 in 109 mm	M100X2	2.51 in 64 mm	1.25 in 32 mm

Maintenance Tools

Tonnage	Seal Kit	Face Spanner	Adjustable Spanner	Socket Wrench	Proper Torque
.5	20-100-7000	FS-482	-----	SW-.5-Ton	100 ft. lbs.
1	20-150-7000	FS-100	HS-200	SW-1-Ton	220 ft. lbs.
2.5	20-209-7000	FS-300	HS-330	SW-2.5-Ton	350 ft. lbs.
4	20-262-7000	FS-434	HS-330	SW-4-Ton	500 ft. lbs.
6	20-319-7000	FS-330	HS-330	SW-6-Ton	800 ft. lbs.

Cylinder Specifications

External hex for easy installation and removal.



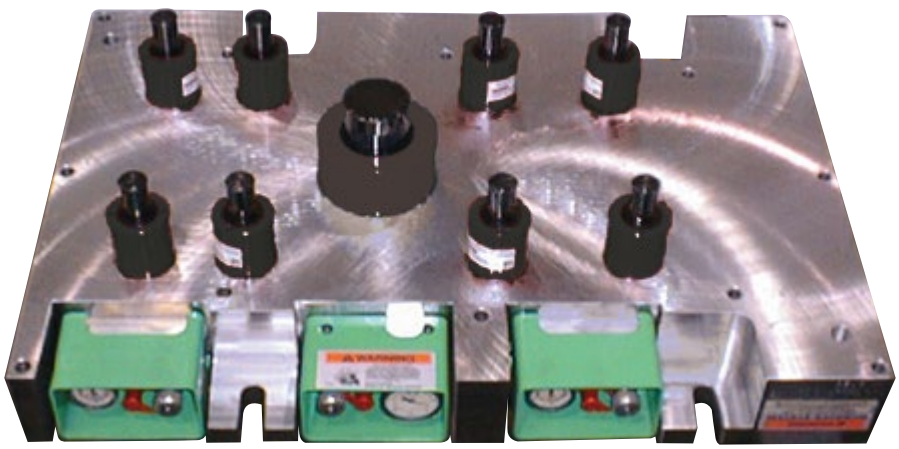
Dimensional Information

Order Number	Contact Force @ 150 Bar (2175 PSI)	Contact Force @ 125 Bar (1812 PSI)	Stroke	A	C	E	F	H
	(kN)	(kN)	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)
MOR 5200 X 100	52.4	43.7	100	90.4	47.5	135	35	M82 X 2
MOR 5200 X 125			125			185	60	
MOR 5200 X 160			160			255	95	
MOR 5200 X 200			200			335	135	
MOR 7700 X 100	77.3	64.4	100	109.5	64	135	35	M100 X 2
MOR 7700 X 125			125			185	60	
MOR 7700 X 160			160			255	95	
MOR 7700 X 200			200			335	135	
MOR 7700 X 250			250			435	185	
MOR 10700 X 100	106.9	89.1	100	130	75.6	135	35	M120 X 2
MOR 10700 X 125			125			185	60	
MOR 10700 X 160			160			255	95	
MOR 10700 X 200			200			335	135	
MOR 10700 X 250			250			435	185	

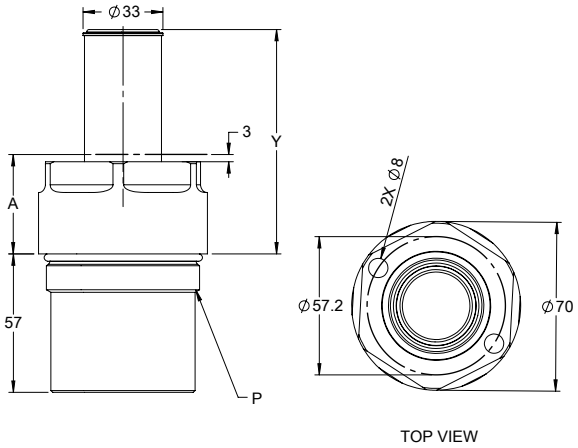
Dimensional information

Stroke	MOR .5/750		MOR .5	MOR 750	MOR 1/1500		MOR 1	MOR 1500	MOR 2.5/3000		MOR 2.5	MOR 3000	MOR 4/5000		MOR 4	MOR 5000	MOR 6/8000		MOR 6	MOR 8000
	Y	A	MPT*	MPT*	Y	A	MPT*	MPT*	Y	A	MPT*	MPT*	Y	A	MPT*	MPT*	Y	A	MPT*	MPT*
0.25 in 6 mm	1.16 29	0.91 23	1.75 44	1.88 48																
0.50 in 13 mm	1.66 42	1.16 29	1.75 44	1.88 48	1.91 48	1.41 36	1.75 44	1.94 49	1.91 48	1.41 36	2.00 51	2.18 55	1.91 48	1.41 36	2.00 51	2.25 57	1.91 48	1.41 36	2.50 64	2.88 73
0.75 in 19 mm	2.16 55	1.41 36	1.75 44	1.88 48	2.41 61	1.66 42	1.75 44	1.94 49	2.41 61	1.66 42	2.00 51	2.18 55	2.41 61	1.66 42	2.00 51	2.25 57	2.41 61	1.66 42	2.50 64	2.88 73
1.00 in 25 mm	2.66 68	1.66 42	1.75 44	1.88 48	2.91 74	1.91 49	1.75 44	1.94 49	2.91 74	1.91 49	2.00 51	2.18 55	2.91 74	1.91 49	2.00 51	2.25 57	2.91 74	1.91 49	2.50 64	2.88 73
1.50 in 38 mm	3.66 93	2.16 55	1.75 44	1.88 48	3.91 99	2.41 61	1.75 44	1.94 49	3.91 99	2.41 61	2.00 51	2.18 55	3.91 99	2.41 61	2.00 51	2.25 57	3.91 99	2.41 61	2.50 64	2.88 73
2.00 in 51 mm	4.66 118	2.66 68	1.75 44	1.88 48	4.91 125	2.91 74	1.75 44	1.94 49	4.91 125	2.91 74	2.00 51	2.18 55	4.91 125	2.91 74	2.00 51	2.25 57	4.91 125	2.91 74	2.50 64	2.88 73
2.50 in 64 mm	5.66 144	3.16 80	1.75 44	1.88 48	5.91 150	3.41 87	1.75 44	1.94 49	5.91 150	3.41 87	2.00 51	2.18 55	5.91 150	3.41 87	2.00 51	2.25 57	5.91 150	3.41 87	2.50 64	2.88 73
3.00 in 76 mm	6.66 169	3.66 93	1.75 44	1.88 48	6.91 176	3.91 99	1.75 44	1.94 49	6.91 176	3.91 99	2.00 51	2.18 55	6.91 176	3.91 99	2.00 51	2.25 57	6.91 176	3.91 99	2.50 64	2.88 73
3.50 in 89 mm	7.66 195	4.16 106	1.75 44	1.88 48	7.91 201	4.41 112	1.75 44	1.94 49	7.91 201	4.41 112	2.00 51	2.18 55	7.91 201	4.41 112	2.00 51	2.25 57	7.91 201	4.41 112	2.50 64	2.88 73
4.00 in 102 mm	8.66 220	4.66 118	1.75 44	1.88 48	8.91 226	4.91 125	1.75 44	1.94 49	8.91 226	4.91 125	2.00 51	2.18 55	8.91 226	4.91 125	2.00 51	2.25 57	8.91 226	4.91 125	2.50 64	2.88 73
4.50 in 114 mm					9.91 252	5.41 137	1.75 44	1.94 49	9.91 252	5.41 137	2.00 51	2.18 55	9.91 252	5.41 137	2.00 51	2.25 57	9.91 252	5.41 137	2.50 64	2.88 73
5.00 in 127 mm					10.91 277	5.91 150	1.75 44	1.94 49	10.91 277	5.91 150	2.00 51	2.18 55	10.91 277	5.91 150	2.00 51	2.25 57	10.91 277	5.91 150	2.50 64	2.88 73
5.50 in 140 mm									11.91 303	6.41 163	2.00 51	2.18 55	11.91 303	6.41 163	2.00 51	2.25 57	11.91 303	6.41 163	2.50 64	2.88 73
6.00 in 152 mm									12.91 328	6.91 176	2.00 51	2.18 55	12.91 328	6.91 176	2.00 51	2.25 57	12.91 328	6.91 176	2.50 64	2.88 73
6.50 in 165 mm													13.91 353	7.41 188	2.00 51	2.25 57	13.91 353	7.41 188	2.50 64	2.88 73
7.00 in 178 mm													14.91 379	7.91 201	2.00 51	2.25 57	14.91 379	7.91 201	2.50 64	2.88 73
7.50 in 191 mm																	15.91 404	8.41 214	2.50 64	2.88 73
8.00 in 203 mm																	16.91 430	8.91 226	2.50 64	2.88 73

All dimensions are nominal. Data shown are typical.
Actual data for any particular unit may vary



MORD



Dimensional information

1500 psi Manifold Model/Size	2000 psi Manifold Model/Size	Effective Piston Area	Std. Stroke Lengths	K	P	R	A
MOR .5 1/2 ton	MOR 750 .75 ton	.789 in^2 5.07 cm^2	4.00 in 102 mm	1.60 in 41 mm	1-5/16-12	0.85 in 22 mm	1.66 in 42 mm
MOR 1 1 ton	MOR 1500 1.5 ton	1.77 in^2 11.40 cm^2	5.00 in 127 mm	2.12 in 54 mm	1-7/8-12	1.08 in 27 mm	1.66 in 42 mm
MOR 2.5 2.5 ton	MOR 3000 3 ton	3.45 in^2 22.26 cm^2	6.00 in 152 mm	2.75 in 70 mm	2-1/2-12	1.38 in 35 mm	1.66 in 42 mm
MOR 4 4 ton	MOR 5000 5 ton	5.41 in^2 34.92 cm^2	7.00 in 178 mm	3.56 in 90 mm	M82X2	1.86 in 47 mm	1.66 in 42 mm
MOR 6 6 ton	MOR 8000 8 ton	7.98 in^2 51.50 cm^2	8.00 in 203 mm	4.31 in 109 mm	M100X2	2.51 in 64 mm	1.66 in 42 mm

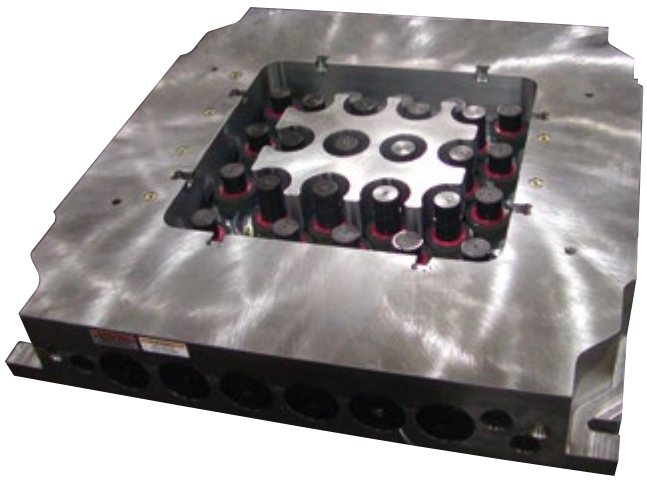
Maintenance Tools

Tonnage	Seal Kit	Face Spanner	Adjustable Spanner	Socket Wrench	Proper Torque
.5	20-100-7000	FS-482	-----	SW-.5-Ton	100 ft. lbs.
1	20-150-7000	FS-100	HS-200	SW-1-Ton	220 ft. lbs.
2.5	20-209-7000	FS-300	HS-330	SW-2.5-Ton	350 ft. lbs.
4	20-262-7000	FS-434	HS-330	SW-4-Ton	500 ft. lbs.
6	20-319-7000	FS-330	HS-330	SW-6-Ton	800 ft. lbs.

Dimensional information

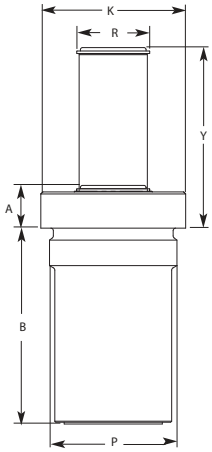
Stroke	MORD .5/750		MORD .5	MORD 750	MORD 1/1500		MORD 1	MORD 1500	MORD 2.5/3000		MORD 2.5	MORD 3000	MORD 4/5000		MORD 4	MORD 5000	MORD 6/8000		MORD 6	MORD 8000
	Y	B	MPT*	MPT*	Y	B	MPT*	MPT*	Y	B	MPT*	MPT*	Y	B	MPT*	MPT*	Y	B	MPT*	MPT*
0.25 in 6 mm	1.91 48	0.59 15	1.75 44	1.88 48																
0.50 in 13 mm	2.16 55	0.59 15	1.75 44	1.88 48																
0.75 in 19 mm	2.41 61	0.63 16	1.75 44	1.88 48																
1.00 in 25 mm	2.66 68	0.88 22	1.75 44	1.88 48	2.66 68	0.97 25	1.75 44	1.94 49	2.66 68	1.25 32	2.00 51	2.18 55	2.66 68	1.50 38	2.50 64	2.75 70	2.66 68	1.50 38	2.50 64	2.88 73
1.50 in 38 mm	3.16 80	1.38 35	1.81 46	1.94 49	3.16 80	1.47 37	1.88 48	2.07 53	3.16 80	1.75 44	2.25 57	2.43 32	3.16 80	2.00 51	2.75 70	3.00 76	3.16 80	2.00 51	2.75 70	3.13 80
2.00 in 51 mm	3.66 93	1.88 48	2.31 59	2.44 62	3.66 93	1.97 50	2.38 60	2.57 65	3.66 93	2.25 57	2.75 70	2.93 74	3.66 93	2.50 64	3.25 83	3.50 89	3.66 93	2.50 64	3.25 83	3.63 92
2.50 in 64 mm	4.16 106	2.38 60	2.81 71	2.94 75	4.16 106	2.47 63	2.88 73	3.07 78	4.16 106	2.75 70	3.25 83	3.43 87	4.16 106	3.00 76	3.75 95	4.00 102	4.16 106	3.00 76	3.75 95	4.13 105
3.00 in 76 mm	4.66 118	2.88 73	3.31 84	3.44 87	4.66 118	2.97 75	3.38 86	3.57 91	4.66 118	3.25 83	3.75 95	3.93 100	4.66 118	3.50 89	4.25 108	4.50 114	4.66 118	3.50 89	4.25 108	4.63 118
3.50 in 89 mm	5.16 131	3.38 86	3.81 97	3.94 100	5.16 131	3.47 88	3.88 98	4.07 103	5.16 131	3.75 95	4.25 108	4.43 113	5.16 131	4.00 102	4.75 121	5.00 127	5.16 131	4.00 102	4.75 121	5.13 130
4.00 in 102 mm	5.66 144	3.88 98	4.31 109	4.44 113	5.66 144	3.97 101	4.38 111	4.57 116	5.66 144	4.25 108	4.75 120	4.93 125	5.66 144	4.50 114	5.25 133	5.50 140	5.66 144	4.50 114	5.25 133	5.63 143
4.50 in 114 mm					6.16 156	4.47 113.5	4.88 124	5.07 129	6.16 156	4.75 121	5.25 133	5.43 138	6.16 156	5.00 127	5.75 146	6.00 152	6.16 156	5.00 127	5.75 146	6.13 156
5.00 in 127 mm					6.66 169	4.97 126	5.38 137	5.57 141	6.66 169	5.25 133	5.75 146	5.93 151	6.66 169	5.50 140	6.25 159	6.50 165	6.66 169	5.50 140	6.25 159	6.63 168
5.50 in 140 mm									7.16 182	5.75 146	6.25 159	6.43 163	7.16 182	6.00 152	6.75 171	7.00 178	7.16 182	6.00 152	6.75 171	7.13 181
6.00 in 152 mm									7.66 195	6.25 159	6.75 171	6.93 176	7.66 195	6.50 165	7.25 184	7.50 191	7.66 195	6.50 165	7.25 184	7.63 194
6.50 in 165 mm													8.16 207	7.00 178	7.75 197	8.00 203	8.66 220	7.50 191	8.25 210	8.63 219
7.00 in 178 mm													8.66 220	7.50 191	8.25 210	8.50 216	8.66 220	7.50 191	8.25 210	8.63 219
7.50 in 191 mm																	9.16 233	8.00 203	8.75 222	9.13 232
8.00 in 203 mm																	9.66 245	8.50 216	9.25 235	9.63 245

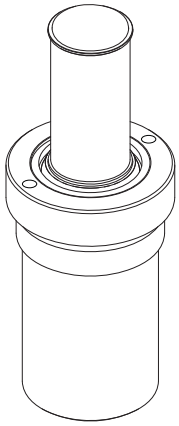
All dimensions are nominal. Data shown are typical.
Actual data for any particular unit may vary



TSB

TSB is for replacement dies only. For new die builds, Hyson recommends MORD Cylinders.





Dimensional information

1500 psi Manifold Model/Size	2000 psi Manifold Model/Size	Effective Piston Area	Std. Stroke Lengths	K	P	R	A
TSB .5 1/2 ton	TSB 750 .75 ton	.789 in^2 5.07 cm^2	4.00 in. 102 mm	1.60 in. 41 mm	1-5/16-12	0.85 in. 22 mm	0.66 in. 17 mm
TSB 1 1 ton	TSB 1500 1.5 ton	1.77 in^2 11.40 cm^2	5.00 in. 127 mm	2.12 in. 54 mm	1-7/8-12	1.08 in. 27 mm	0.66 in. 17 mm
TSM 2.5 2.5 ton	TSB 3000 3 ton	3.45 in^2 22.26 cm^2	6.00 in. 152 mm	2.75 in. 70 mm	2-1/2-12	1.38 in. 35 mm	0.66 in. 17 mm
TSB 4 4 ton	TSB 5000 5 ton	5.41 in^2 34.92 cm^2	7.00 in. 178 mm	3.56 in. 90 mm	M82X2	1.86 in. 47 mm	0.66 in. 17 mm

Maintenance Tools

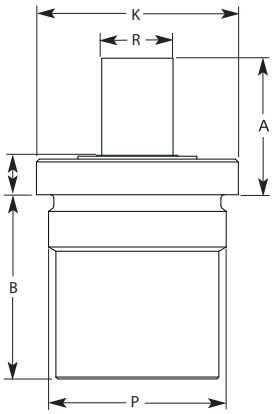
Tonnage	Seal Kit	Face Spanner	Adjustable Spanner	Socket Wrench	Proper Torque
.5	20-100-7000	FS-482	-----	SW-TNK .5	100 ft. lbs.
1	20-150-7000	FS-100	-----	SW-TNK 1	220 ft. lbs.
2.5	20-209-7000	FS-300	-----	SW-TNK 2.5	350 ft. lbs.
4	20-262-7000	FS-434	-----	SW-TNK 4	500 ft. lbs.

Dimensional information

Stroke	TSB .5/750		TSB .5	TSB 750	TSB 1/1500		TSB 1	TSB 1500	TSB 2.5/3000		TSB 2.5	TSB 3000	TSB 4/5000		TSB 6	TSB 8000
	Y	A	MPT*	MPT*	Y	A	MPT*	MPT*	Y	A	MPT*	MPT*	Y	A	MPT*	MPT*
0.25 in 6 mm	0.91 23	1.13 29	1.75 44	1.88 48												
0.50 in 13 mm	1.16 29	1.38 35	1.81 46	1.94 49	1.16 29	1.41 36	1.84 47	2.03 52	1.16 29	1.75 44	2.26 57	2.44 62	1.16 29	2.00 51	2.70 69	2.95 75
0.75 in 19 mm	1.41 36	1.63 41	2.06 52	2.19 56	1.41 36	1.66 42	2.09 53	2.28 58	1.41 36	2.00 51	2.51 64	2.69 68	1.41 36	2.25 57	2.95 75	3.20 81
1.00 in 25 mm	1.66 42	1.88 48	2.31 59	2.44 62	1.66 42	1.91 49	2.34 59	2.53 64	1.66 42	2.25 57	2.76 70	2.94 75	1.66 42	2.50 64	3.20 81	3.45 88
1.50 in 38 mm	2.16 55	2.38 60	2.81 71	2.94 75	2.16 55	2.41 61	2.84 72	3.03 77	2.16 55	2.75 70	3.26 83	3.44 87	2.16 55	3.00 76	3.70 94	3.95 100
2.00 in 51 mm	2.66 68	2.88 73	3.31 84	3.44 87	2.66 68	2.91 74	3.34 85	3.53 90	2.66 68	3.25 83	3.76 96	3.94 100	2.66 68	3.50 89	4.20 107	4.45 113
2.50 in 64 mm	3.16 80	3.38 86	3.81 97	3.94 100	3.16 80	3.41 87	3.48 97	4.03 102	3.16 80	3.75 95	4.26 108	4.44 113	3.16 80	4.00 102	4.70 119	4.95 126
3.00 in 76 mm	3.66 93	3.88 99	4.31 109	4.44 113	3.66 93	3.91 99	4.34 110	4.53 115	3.66 93	4.25 108	4.76 121	4.94 125	3.66 93	4.50 114	5.20 132	5.45 138
3.50 in 89 mm	4.16 106	4.38 111	4.81 122	4.94 125	4.16 106	4.41 112	4.84 123	5.03 128	4.16 106	4.75 121	5.26 134	5.44 138	4.16 106	5.00 127	5.70 145	5.95 151
4.00 in 102 mm	4.66 118	4.88 124	5.31 135	5.44 138	4.66 118	4.91 125	5.34 136	5.53 140	4.66 118	5.25 133	5.76 146	5.94 151	4.66 118	5.50 139	6.20 157	6.45 164
4.50 in 114 mm					5.16 131	5.41 137	5.84 148	6.03 153	5.16 131	5.75 146	6.26 159	6.44 164	5.16 131	6.00 152	6.70 170	6.95 177
5.00 in 127 mm					5.66 144	5.91 150	6.34 161	6.53 166	5.66 144	6.25 159	6.76 172	6.94 176	5.66 144	6.50 165	7.20 183	7.45 189
5.50 in 140 mm									6.16 156	6.75 171	7.26 184	7.44 189	6.16 156	7.00 178	7.70 196	7.95 202
6.00 in 152 mm									6.66 169	7.25 184	7.76 197	7.94 202	6.66 169	7.50 191	8.20 208	8.45 215
6.50 in 165 mm													7.16 182	8.00 203	8.70 221	8.95 227
7.00 in 178 mm													7.66 195	8.50 216	9.20 234	9.45 240

All dimensions are nominal. Data shown are typical.
Actual data for any particular unit may vary

SB 6X.75-BW



Dimensional information

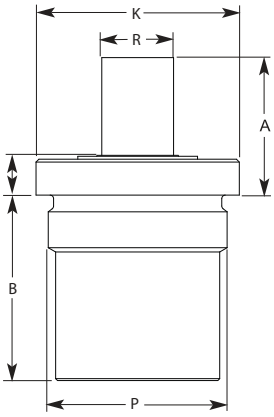
1500 psi Manifold Model/Size	2000 psi Manifold Model/Size	Effective Piston Area	K	P	R	A	B
SB 6x.75-BW 1 ton	SB 6000 6 ton	7.98 in^2 11.40 cm^2	4.38 in. 111.3 mm	3.70 in.	1.87 in 19 mm	0.63 in. 11 mm	1.97 in. 50 mm

Maintenance Tools

Tonnage	Seal Kit	Effective Piston Area	Proper Torque
6	16-319-7000 BW	FS-300	800 ft. lbs.

SB

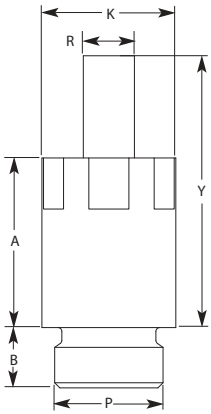
All SB 1-, 2.5-, and 4-ton Cylinders, in addition to SB 1500, 3000, 5000, and 8000 sizes, will be considered special orders, with a minimum order quantity of eight pieces. Seal kits for all SB products will continue to be available:

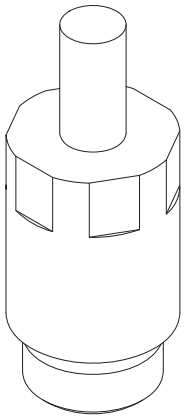


Dimensional information

Cylinder	Seal Kit Order Number
SB-1 and SB-1500	16-150-7000
SB-2.5 and SB-3000	16-209-7000
SB-4 and SB-5000	16-262-7000
SB-60 and SB-8000	16-319-7000
SB-6-ST	16-319-7000-ST
SB-6X.75-BW	16-319-7000-BW

MOR 400





Dimensional information

2000 psi Manifold Model/Size	Effective Piston Area	K	P	R	B
MOR 400 1/4 ton	0.406 in^2 2.62 cm^2	1.307 in. 33 mm	1-1/16-12	0.50 in. 13 mm	0.59 in. 14 mm

Maintenance Tools

Tonnage	Seal Kit	Socket Wrench	Proper Torque
.25	20-072-7000	1-1/4 in. Deep Well Socket	80 ft. lbs.

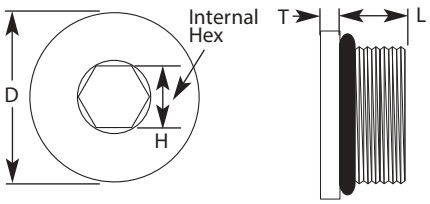
Variable Dimensions

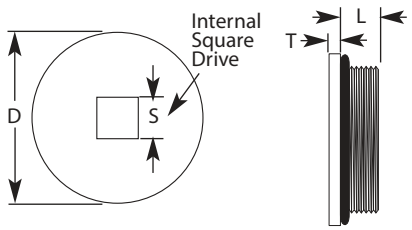
Stroke	Y	A	MPT*
0.50 in. 13 mm	1.66 42	1.16 30	1.00 25.4
0.75 in. 19 mm	2.16 55	1.41 36	1.00 25.4
1.00 in. 25 mm	2.66 68	1.66 42	1.00 25.4
1.50 in. 38 mm	3.66 93	2.16 55	1.00 25.4
2.00 in. 51 mm	4.66 118	2.66 68	1.00 25.4
2.50 in. 64 mm	5.66 144	3.16 80	1.00 25.4
3.00 in. 76 mm	6.66 169	3.66 93	1.00 25.4

Accessories

Port Plugs

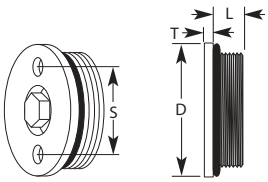
Standard Plugs





Order Number	Thread Size	O-Ring Order Number	H	D	T	L	S	Tool Needed	Torque Req.
NF-771-4	7/16-20	NF-904	0.19 mm 5 in	0.56 mm 14 in	0.11 mm 3 in	0.36 mm 9 in		3/16 Hex Head Allen Wrench	3/16 INT HEX
NF-771-5	1/2-20	NF-905	0.19 mm 5 in	0.63 mm 16 in	0.11 mm 3 in	0.36 mm 9 in		3/16 Hex Head Allen Wrench	3/16 INT HEX
NF-771-8	3/4-16	NF-908	0.31 mm 8 in	0.88 mm 22 in	0.16 mm 4 in	0.44 mm 11 in		5/16 Hex Head Allen Wrench	5/16 INT HEX
NF-771-10	7/8-14	NF-910	0.38 mm 10 in	1.00 mm 25 in	0.16 mm 4 in	0.50 mm 13 in		3/8 Hex Head Allen Wrench	3/8 INT HEX
NF-771-12	1 1/16-12	15-075-4010	0.56 mm 14 in	1.25 mm 32 in	0.18 mm 5 in	0.59 mm 15 in		9/16 Hex Head Allen Wrench	9/16 INT HEX
NF-771-14	1 3/16-12	NF-914	0.56 mm 14 in	1.38 mm 35 in	0.18 mm 5 in	0.59 mm 15 in		9/16 Hex Head Allen Wrench	9/16 INT HEX
NF-771-16	1 5/16-12	NF-916	0.63 mm 16 in	1.50 mm 38 in	0.18 mm 5 in	0.59 mm 15 in		5/8 Hex Head Allen Wrench	5/8 INT HEX
NF-771-20	1 5/8-12	NF-920		1.88 mm 48 in	0.16 mm 4 in	0.59 mm 15 in	0.50 mm 12.7 in	1/2 Sq. Drive Wrench	1/2 INT SQ
NF-771-24 NF-771-M47	1 7/8-12 M47 X 2	NF-924		2.12 mm 54 in	0.16 mm 4 in	0.59 mm 15 in	0.50 mm 12.7 in	1/2 Sq. Drive Wrench	1/2 INT SQ
NF-771-32 NF-771-M63	2 1/2-12 M63 X 2	NF-932		2.75 mm 70 in	0.16 mm 4 in	0.59 mm 15 in	0.50 mm 12.7 in	1/2 Sq. Drive Wrench	1/2 INT SQ
NF-771-82	M82 X 2	NF-982		3.50 mm 89 in	0.25 mm 6 in	0.75 mm 19 in	0.75 mm 19.1 in	3/4 Sq. Drive Wrench	3/4 INT SQ
NF-771-100	M100 X 2	NF-9100		4.25 mm 108 in	0.25 mm 6 in	0.75 mm 19 in	0.75 mm 19.1 in	3/4 Sq. Drive Wrench	1 INT SQ

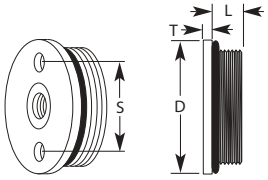
Plugs with Rupture Disc (1500 psi System)



Order Number		D	T	L	S	Tool Needed
NF-771-20 RD	in mm	1.88 48	0.16 4	0.59 15	1.00 25	FS-418 Spanner Wrench
NF-771-24 RD	in mm	2.12 54	0.16 4	0.59 15	1.25 32	FS-200 Spanner Wrench
NF-771-32 RD	in mm	2.75 70	0.16 4	0.59 15	1.75 44	FS-100 Spanner Wrench
NF-771-82 RD	in mm	3.50 89	0.25 6	0.75 19	2.25 57	FS-300 Spanner Wrench
NF-771-100 RD*	in mm	4.25 108	0.25 6	0.75 19	2.25 57	FS-300 Spanner Wrench

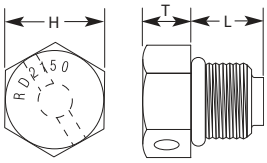
*Can be tightened using a square drive.

Plugs with Internal Ports for 1/2-20 SAE Hose Connection



Order Number		D	T	L	S	Tool Needed
NF-771-20-5	in mm	1.88 48	0.16 4	0.59 15	1.00 25	FS-418 Spanner Wrench
NF-771-24-5	in mm	2.12 54	0.16 4	0.59 15	1.25 32	FS-200 Spanner Wrench
NF-771-32-5	in mm	2.75 70	0.16 4	0.59 15	1.75 44	FS-100 Spanner Wrench
NF-771-82-5	in mm	3.50 89	0.25 6	0.75 19	2.25 57	FS-300 Spanner Wrench
NF-771-100-5	in mm	4.25 108	0.25 6	0.75 19	2.25 57	FS-300 Spanner Wrench

Rupture Disc



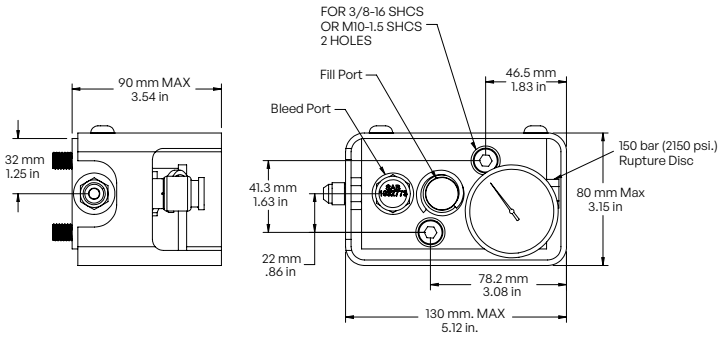
Order Number	Thread Size		H	T	L	Tool Needed
RD-2150	7/16-20	in mm	0.562 14.3	0.274 6.9	0.415 10.5	9/16 Wrench

Standard Control Panels

Standard control panels contain all the necessary controls for reading, charging, and exhausting nitrogen pressure in a psi Manifold System. Control panels should be mounted in an accessible location where the pressure gauge can be read easily.

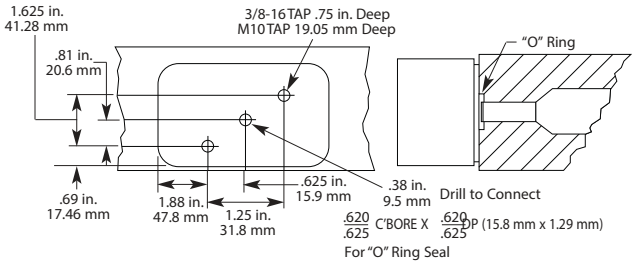
CP-1555

For remote connection to a Manifold Plate. Sensor ready version available to order with part number CPM-1555-S.



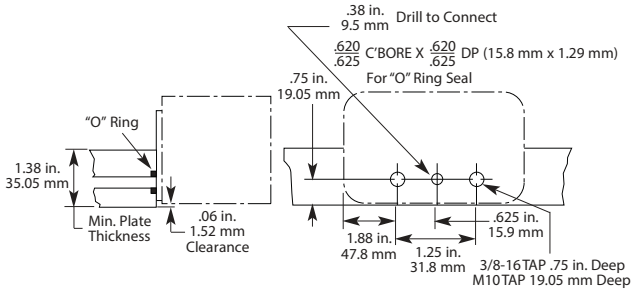
CPM-1555-M

For direct mounting to a finished Manifold Plate by an O-Ring seal. Minimum Manifold thickness required is 3 inches. Sensor ready version available to order with part number CPM-1555-M-S.



CPM-1555-E

For direct mounting to a finished Manifold Plate by an O-Ring seal. Maximum Manifold thickness required is 3 inches. Sensor ready version available to order with part number CPM-1555-E-S.

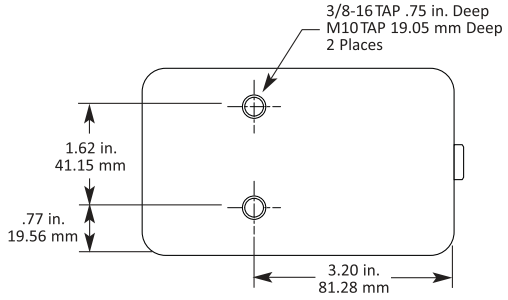


High Pressure Control Panels

High pressure control panels contain all the necessary controls for reading, charging, and exhausting nitrogen pressure in a 2000 psi Manifold System. Control panels should be mounted in an accessible location where the pressure gauge can be read easily.

CP-N2-T-VR

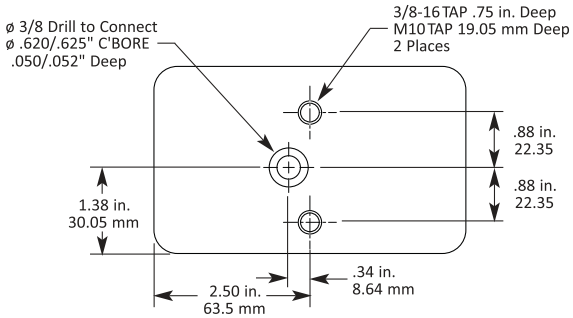
For remote connection to a Manifold Plate. Sensor ready version available to order with part number CP-N2-T-VR-S.



NOTE: For -5 applications, an NF-1000-5-G1/8 service fitting is required.

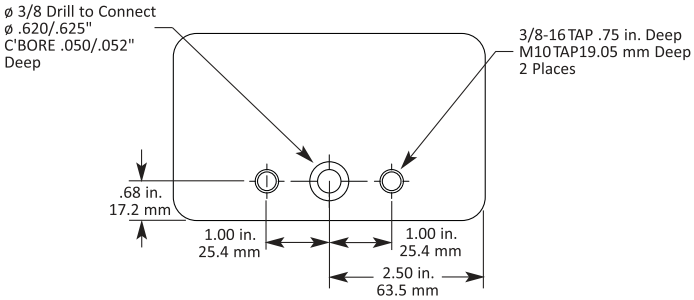
CPM-2000-M

For direct mounting to a finished Manifold Plate by an O-Ring seal. Minimum Manifold thickness required is 3 inches. Sensor ready version available to order with part number CPM-2000-M-S.

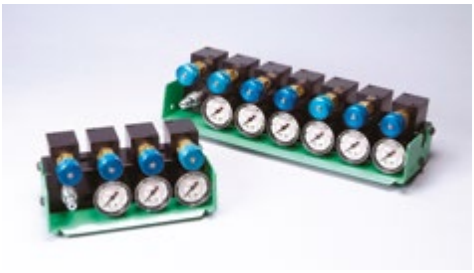


CPM-2000-E

For direct mounting to a finished Manifold Plate by an O-Ring seal. Minimum Manifold thickness required is 3 inches. Sensor ready version available to order with part number CPM-2000-E-S.



MODCP Modular Control Panel



The MODCP Modular Control Panel conveniently controls up to six Manifold systems from one central control unit. Each module can read pressure, add, or bleed pressure as needed, as if each Manifold had its own control panel. Each module features a 5000 psi/345 bar gauge that is easy to read as well as three port locations for piping flexibility.

Model/Size	No. of Modules	Length (L)		Ctr-to-Ctr on M6 Mounting Holes	
		mm	in	mm	in
MODCP	2	133.5	5.26	44.5	1.75
	3	178.0	7.01	89.0	3.50
	4	222.5	8.76	133.5	5.26
	5	267.0	10.51	178.0	7.01
	6	311.5	12.26	222.5	8.76

ST Compression Tank

The ST Compression Tank acts as a reservoir for the "Swept Volume" of the nitrogen gas forced from the Cylinders when they are stroked. This compact, modular tank is designed for pressure to 2175 psi/150 bar. It features multiple ports on each end for increased flexibility and a rupture disc plug for added safety.

Part Number	Standard Volume		Standard Overall Length		Number of Ports on Each Face
	cm^3	in^3	mm	in	
ST-50-HP	819	50	244	9.61	6 each 3/4-16 1 face 7/16-20 1 face 7/16-14
ST-100-HP	1639	100	311	12.23	
ST-160-HP	2622	160	390	15.36	
ST-200-HP	3278	200	443	17.46	
ST-320-HP	5244	320	603	23.73	
ST-460-HP	7540	460	789	31.06	
ST-730-HP	11963	730	1149	45.25	

Pressure Monitors

Automatic Pressure Monitors monitor nitrogen gas pressure in Manifold Cylinder systems. If the pressure drops below a preset lower limit, a warning light alerts the press operator, and the monitor can be wired to shut down the press automatically.

APM-5800

Use with 11-770-2700 quick disconnect to connect to Inlet valve on Hyson control panel. Available with 1/4 NPT thread (APM-5800) or G 1/4 thread (APM-5800-G 1/4).

Pressure range: 0-5800 psi (0-400 bar).

Supplied with: Cable and protective cover.

Connection: 4-wire connection.

Plugs

Order Number	Description	Thread Size	O-Ring Order Number	Required Torque (N*m)	Torque Tool Order Number
NF-771-M100	Standard plug	M100 X2	NF-9100		3/4" square drive
NF-771-M100 RD	Plug with rupture disc			1085	FS-300*
NF-771-100-G1/8	Plug with internal port for hose connection				FS-300

* This can be tightened with a 3/4 square drive.

Control Panel and Hose Connection

CP-N2-T-VR
For remote connection

Hose System	Control Panel	Pressure Monitor
E024	CP-N2-T-VR	DPM-3000

Refer to Hyson Nitrogen Gas Spring Hose System Components Catalog for complete listing of EO24 hose connections.

Seal Kits

Cylinder Model	Seal Kit Order Number
MOR 5200	20-262-7000
MOR 7700	20-319-7000
MOR 10700	20-375-7000

Maintenance Tools

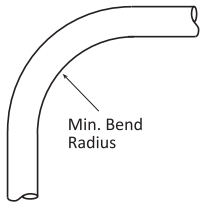
Order Number	Cylinder Model	Socket Size	Required Torque (N*m)	Square Drive Size
SW-5200	MOR 5200	3 1/4"	885	1"
SW-7700	MOR 7700	M100	1085	1"
SW-10700	MOR 10700	4 3/4"	1290	1"

Hose and Fittings

Hose assemblies can be used to connect Manifolds to each other, to connect a remote-control panel, or to connect a compression tank. The following hoses and fittings are ideal for standard 1500 psi Manifold systems. For high pressure 2000 psi Manifold Systems, contact Hyson.

Hose

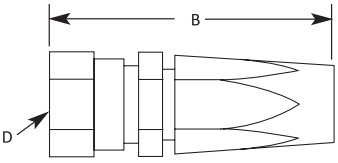
The thermoplastic hose features an abrasion-resistant cover with fiber braid reinforcement for added strength. Designed for factory preassembled or reusable fittings, its maximum working pressure is 1500 psi/103 bar.



Hose Part No.	Hose I.D.	Hose O.B	Minimum Bend Radius
NH-250	0.25 in 6mm	0.47 in 12 mm	2.50 in 64 mm
NH-375	0.38 in 10 mm	0.63 in 16 mm	4.00 in 102 mm
NH-500	0.50 in 13 mm	0.81 in 21 mm	5.50 in 140 mm

Hose Swivel Fitting

This fitting mounts to the end of each hose.



Hose Swivel Part No.	Hose Part No.	A (Thread)	B	Hex D
NHF-5	NH-250	1/2-20	2.24 in 57 mm	0.62 in 15.7 mm
NHF-8	NH-375	3/4-16	2.88 in 73 mm	0.87 in 20.6 mm
NHF-10	NH-500	7/8-14	3.37 in 86 mm	1.00 in 25.4 mm

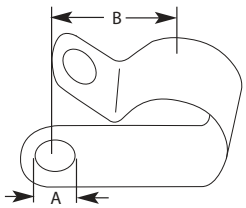
Hose Guard

The Hose Guard provides protection where hose lines are subjected to abrasion, kinking or other damage.

Hose Guard Part No.	Hose Part No.	Hose Guard I.D.
HG-5	NH-250	0.57 in 15 mm
HG-8	NH-375	0.75 in 19 mm
HG-10	NH-500	0.875 in 22 mm

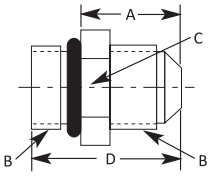
Hose Clamps

The Hose Clamps hold the hose in place to avoid twisting, minimize hose chafing, and provide support where long lengths of hose are used.



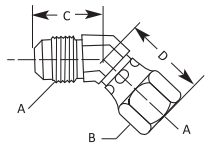
Hose Clamp Part No.	Hose Part No.	Hole A Diameter	B*
HC-5	NH-250	0.20 in 5.1 mm	0.50 in 13 mm
HC-8	NH-375	0.20 in 5.1 mm	0.62 in 16 mm
HC-10	NH-500	0.20 in 5.1 mm	0.81 in 21 mm

Hose



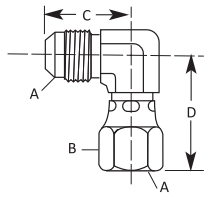
Fitting Part No.	Hose Part No.	A	B (Thread)	C (Hex)	D
NF-1000-5	NH-250	0.87 in 22 mm	1/2-20	0.62 in 15.7 mm	1.23 in 31 mm
NF-1000-8	NH-375	1.04 in 26 mm	3/4-16	0.88 in 22.4 mm	1.48 in 38 mm
NF-1000-10	NH-500	1.20 in 30 mm	7/8-14	1.00 in 25.4 mm	1.70 in 43 mm

Hose



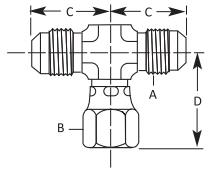
Fitting Part No.	Hose Part No.	A (Thread)	B (Hex)	C	D
SN-4500-5	NH-250	1/2-20	5/8 in	0.77 in 20 mm	1.00 in 25.4 mm
SN-4500-8	NH-375	3/4-16	7/8 in	0.98 in 25 mm	1.28 in 33 mm
SN-4500-10	NH-500	7/8-14	1 in	1.11 in 28 mm	1.44 in 37 mm

Hose



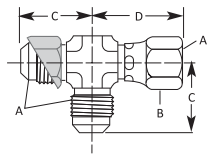
Fitting Part No.	Hose Part No.	A (Thread)	B (Hex)	C	D
SN-2000-5	NH-250	1/2-20	5/8 in	0.95 in 24 mm	1.06 in 27 mm
SN-2000-8	NH-375	3/4-16	7/8 in	1.25 in 32 mm	1.38 in 35 mm
SN-2000-10	NH-500	7/8-14	1 in	1.45 in 37 mm	1.62 in 41 mm

Hose



Fitting Part No.	Hose Part No.	A (Thread)	B (Hex)	C	D
SN-3000-5	NH-250	1/2-20	5/8 in	0.95 in 24 mm	1.06 in 27 mm
SN-3000-8	NH-375	3/4-16	7/8 in	1.25 in 32 mm	1.38 in 35 mm
SN-3000-10	NH-500	7/8-14	1 in	1.45 in 37 mm	1.62 in 41 mm

Hose



Fitting Part No.	Hose Part No.	A (Thread)	B (Hex)	C	D
SN-3300-5	NH-250	1/2-20	5/8 in	0.95 in 24 mm	1.06 in 27 mm
SN-3300-8	NH-375	3/4-16	7/8 in	1.25 in 32 mm	1.38 in 35 mm
SN-3300-10	NH-500	7/8-14	1 in	1.45 in 37 mm	1.62 in 41 mm