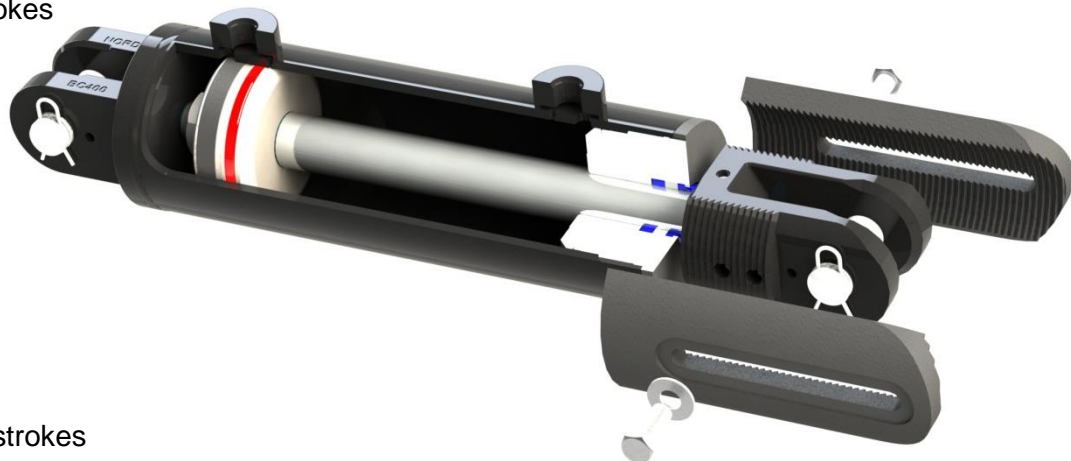


Phasing Cylinder Range

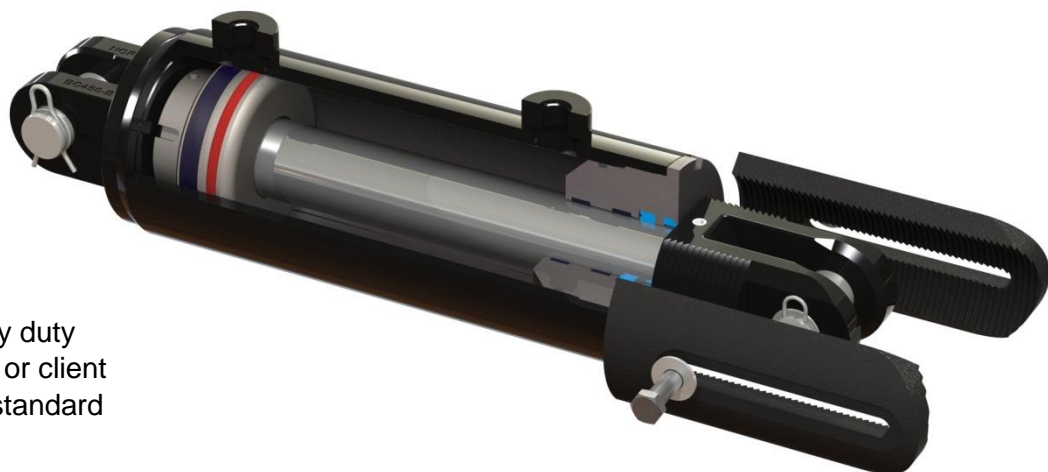
NAP Series

- Standard duty
- Standard bores and strokes



NHP Series

- Heavy duty
- Standard bores and strokes



NIP Series

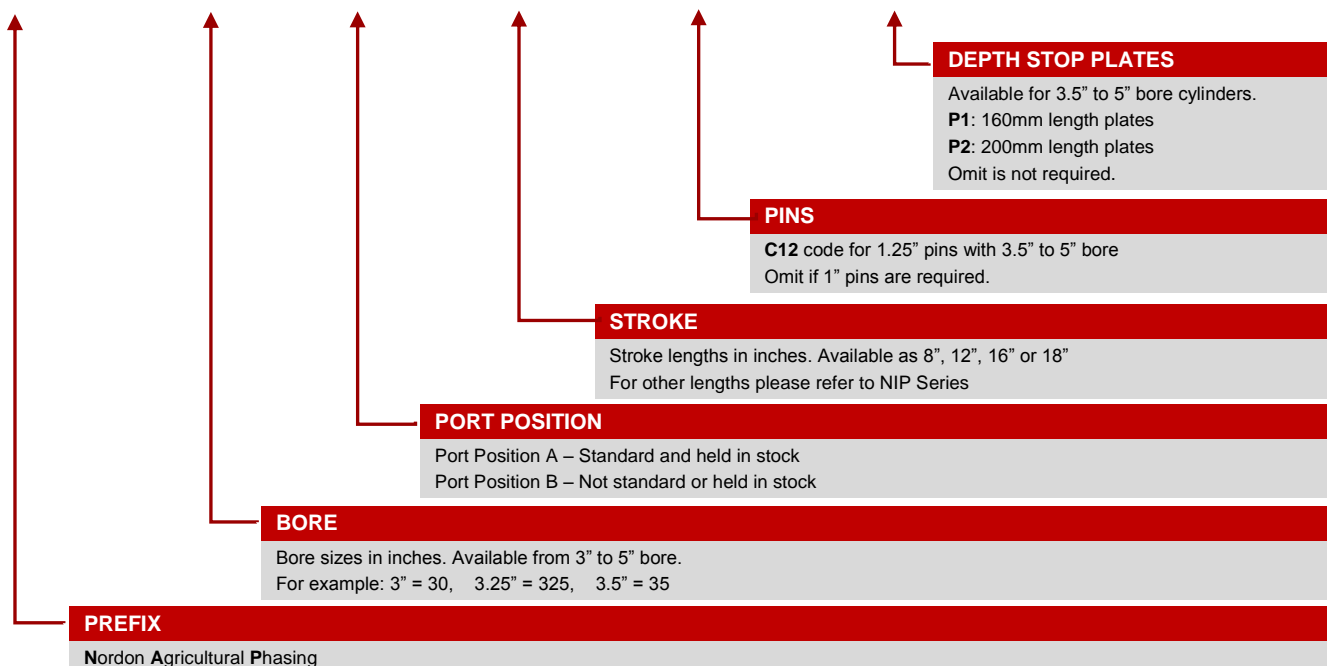
Configured standard or heavy duty using any applicable Nordon or client specific mountings and non standard stroke lengths



NAP Part Numbering Code

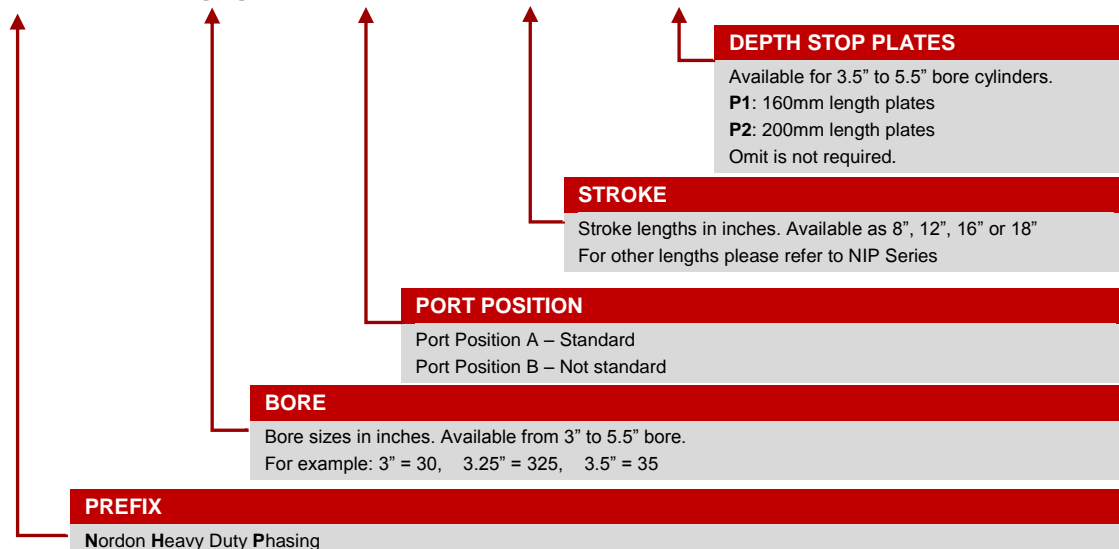
Nordon Cylinders utilises a unique part numbering system that provides comprehensive and unmistakable reference for each and every part.

NAP - 35 - A - 12 - C12 - P2



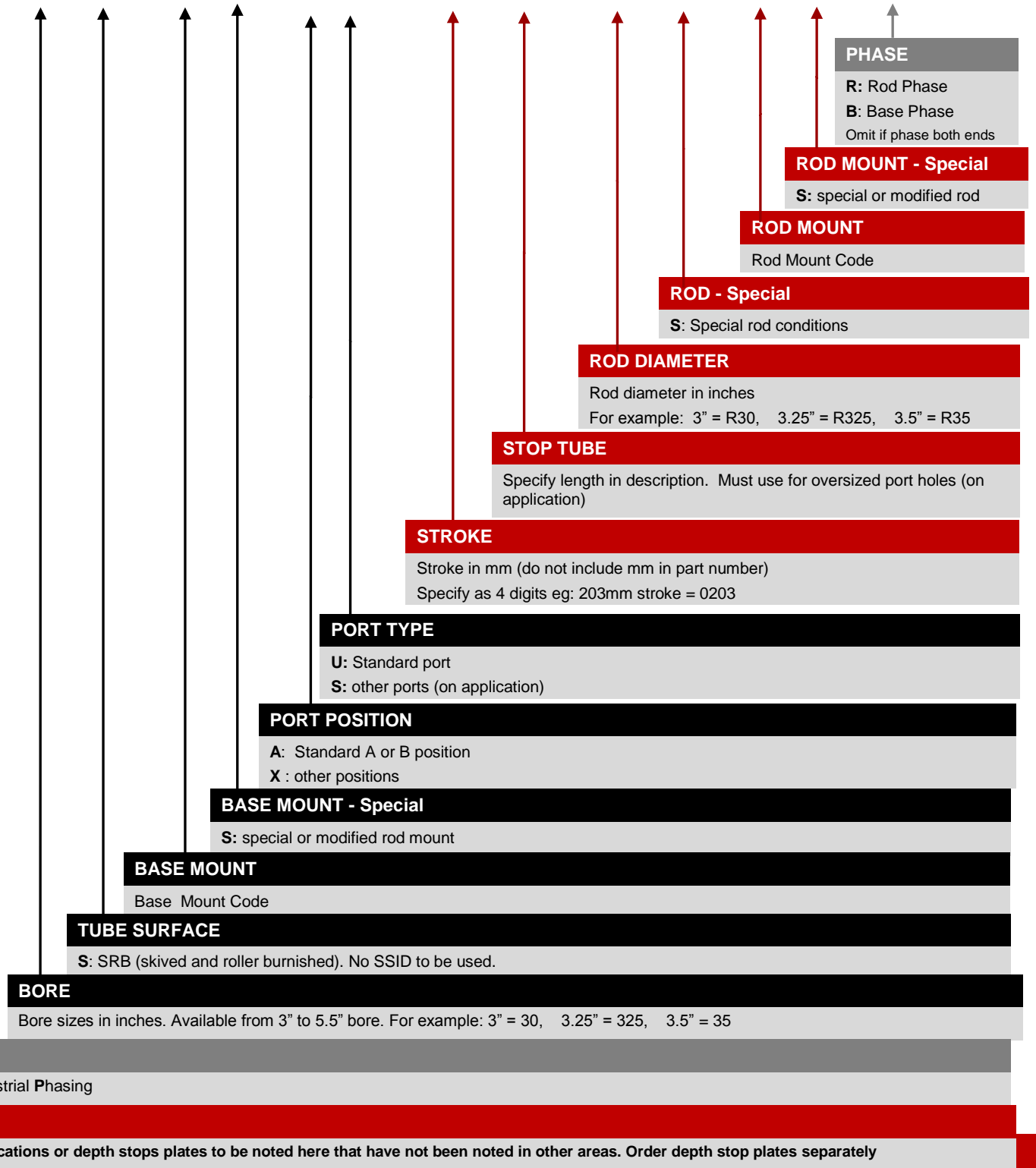
NHP Part Numbering Code

NHP - 35 - A - 12 - P2



NIP Part Numbering Code

NIP- 35 S - C1 S - A S - 1000 S - R13 S - C1 S - R - S4

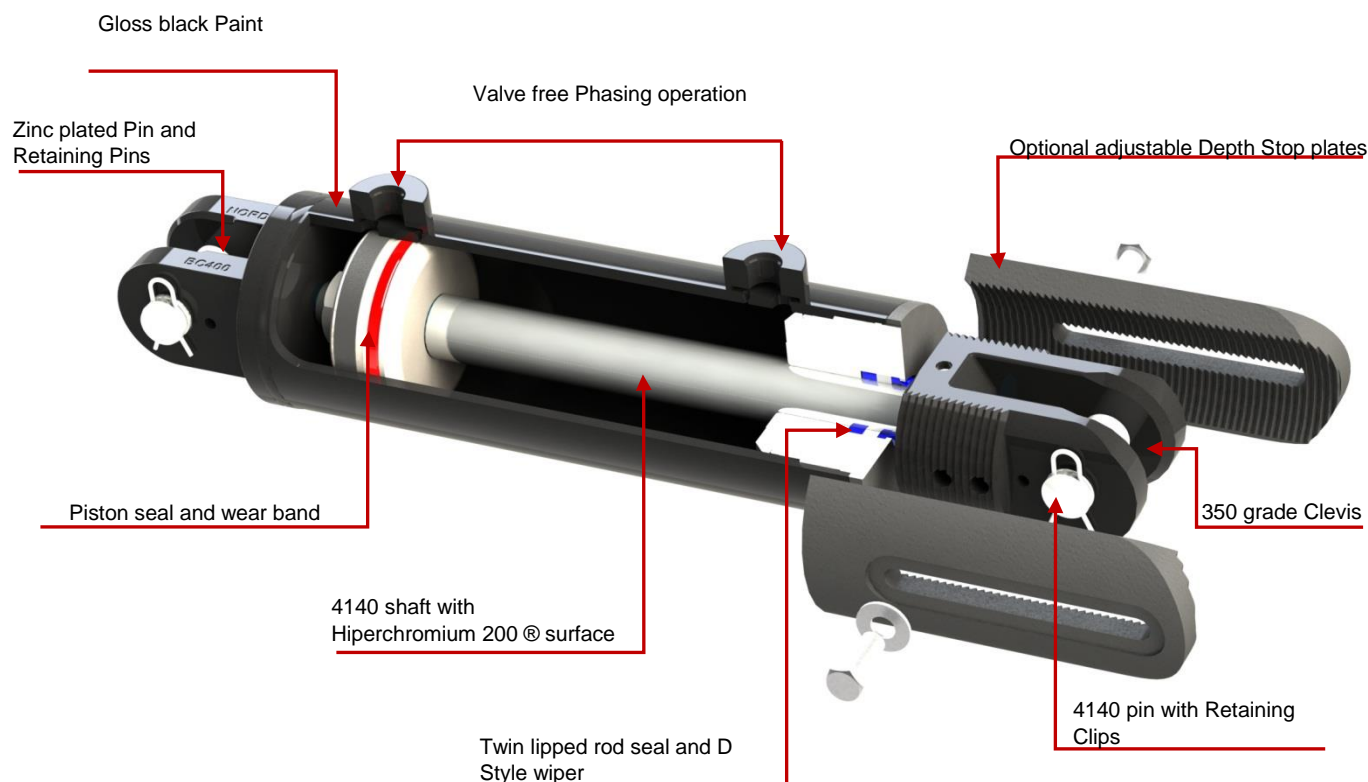


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NAP Series



Nordon Quality

Nordon exclusive re-phasing ports:

No valves to be affected by contamination and no grooves across the piston seal to cause wear.

High quality skived and roller burnished tube:

0.1micron RA surface finish results in extended seal life.

4140 High Tensile shaft:

More than double the tensile and shear strength of standard shafts.

4140 plated rod clevis pins:

Greater wear resistance where it is needed most

Hiperchrome 200 ® hard chrome plating:

200 hours rating 9 corrosion certification mean enhanced corrosion protection

Twin lipped rod seal:

Improved sealing performance over a wider range of operating conditions.

D Style rod wiper:

Enhanced rod wiping performance and durability.

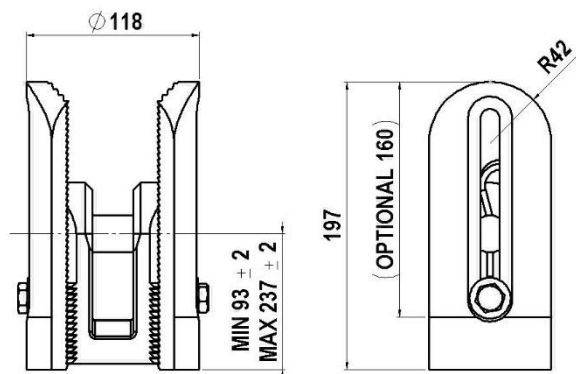
350 grade cast steel clevises:

Provides greater strength and accuracy

Available Specifications

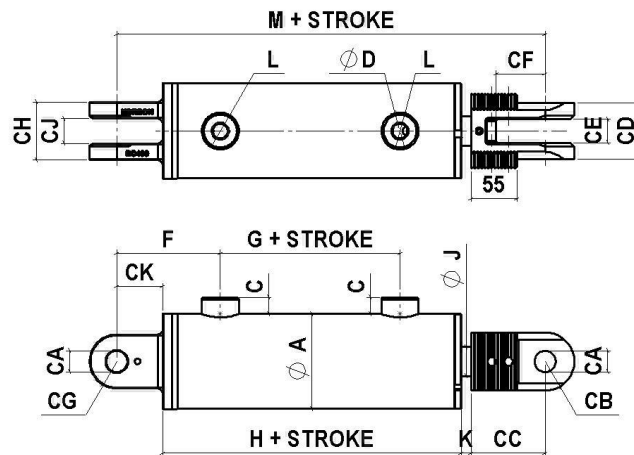
Bore	from 3" to 5" in 1/4 " increments
Stroke	8", 12",
Mounts	Female Clevis (both ends)
Depth Stop	from 3.5" to 5" bores
Max Pressure	200* Bar
Max Diff Pressure	160 Bar
Min System Flow	20 ltrs per min
Speed	0.25 meters per second
Duty	Medium
Colour	Gloss Black

NAP Technical Specifications



DEPTH STOP PLATE KIT

Not available in 3.0" and 3.25" Bore



Depth Stops (Optional)

The Depth Stop Clevises have 4mm pitch on depth engagement teeth allowing for finer adjustment than other products.

Depth stop kits are available in 160mm and 200mm lengths and give extended adjustments range for those who need it.

Please Contact the Sales Office on 07 3889 6522 for requirements outside of these specifications

Bore dia	Rod Buckle	
	Max differential piston pressure	
	Stroke	
	16"	18"
3.0"	155	132
3.25"	134	113
3.5"	115	97
3.75"	147	124
4.0"	129	108
4.25"	115	96
4.5"	144	122
4.75"	130	109
5.0"	117	99

Bore dia	Dimensional Data: Closed Centre = 311mm plus Stroke																			
	A	C	D	F	G	H	J	K	L	M	*CA	CB	CC	CD	CE	CF	CG	CH	CJ	CK
3.0"	89	20	45	115	12	145	1.25"	40	3/4 UNO	311	1"	28	75	64	28	45	25	62	28	51
3.25"	95	20	45	119	12	145	1.25"	36	3/4 UNO	311	1"	28	75	64	28	45	33	70	30	55
3.5"	102	20	45	119	13	150	1.25"	17	3/4 UNO	311	1"	35	89	68	28	59	33	70	30	55
3.75"	108	20	45	124	13	150	1.375"	12	3/4 UNO	311	1"	35	89	68	28	59	33	70	30	55
4.0"	114	20	45	124	13	150	1.375"	12	3/4 UNO	311	1"	35	89	68	28	59	33	70	30	55
4.25"	121	20	45	124	13	150	1.375"	12	3/4 UNO	311	1"	35	89	68	28	59	33	70	30	55
4.5"	127	20	45	124	13	150	1.5"	12	3/4 UNO	311	1"	35	89	68	28	59	33	70	30	55
4.75"	133	20	45	124	13	150	1.5"	12	3/4 UNO	311	1"	35	89	68	28	59	33	70	30	55
5.0"	140	20	45	124	13	150	1.5"	12	3/4 UNO	311	1"	35	89	68	28	59	33	70	30	55

Optional – 1.25" pins on 3.5" to 5" bore. D9 tolerance on pin holes

Subject to change without notice

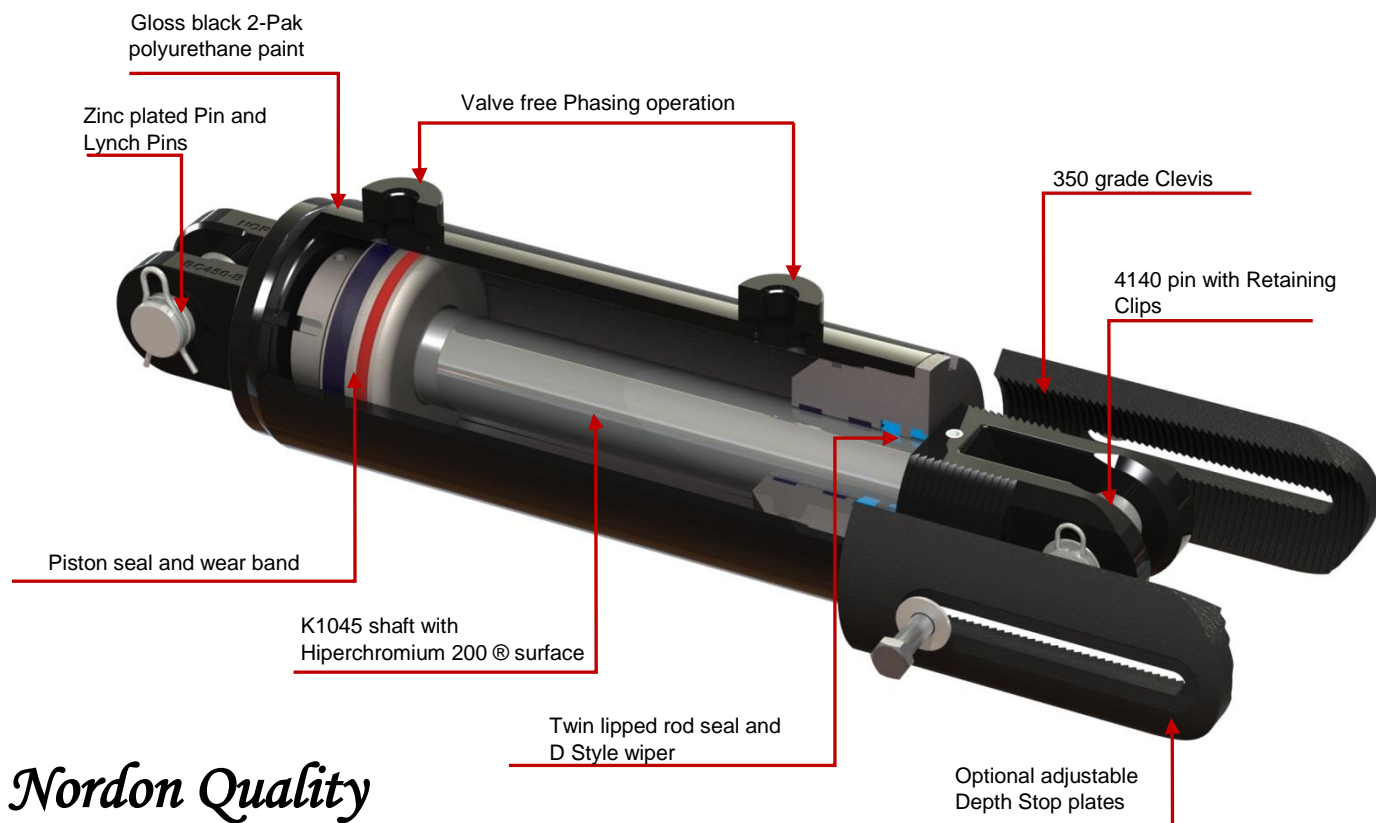
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NHP Series



Nordon Quality

Nordon exclusive re-phasing ports:

No valves to be affected by contamination and no grooves across the piston seal to cause wear.

High quality skived and roller burnished tube:

0.1micron RA surface finish results in extended seal life.

1045 plated rod clevis pins:

Greater wear resistance where it is needed most

Hiperchrome 200 ® hard chrome plating:

200 hours rating 9 corrosion certification mean enhanced corrosion protection

Twin lipped rod seal:

Improved sealing performance over a wider range of operating conditions.

D Style rod wiper:

Enhanced rod wiping performance and durability.

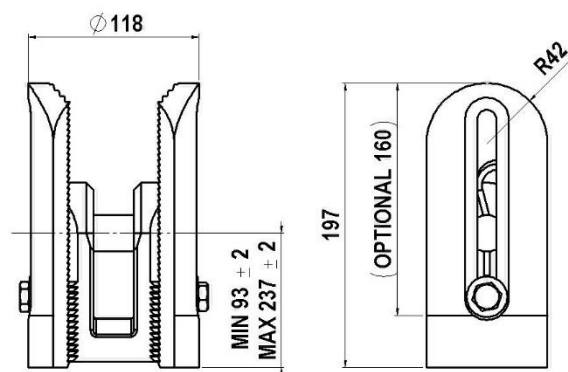
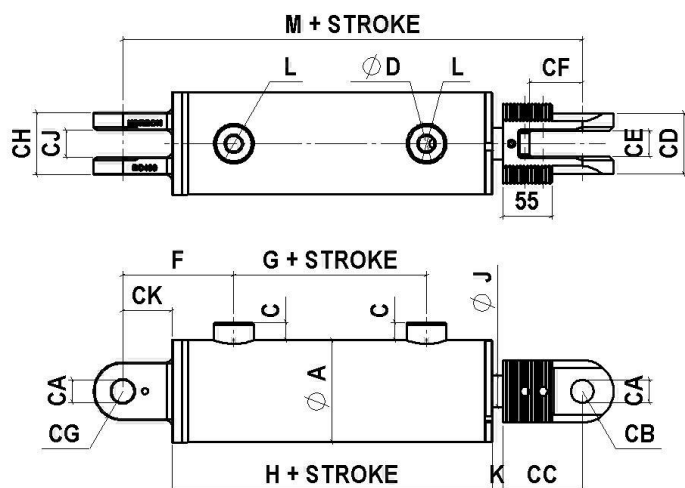
350 grade cast steel clevises:

Provides greater strength and accuracy

Available Specifications

Bore	from 3" to 5" in 1/2 " increments
Stroke	8", 12", 16" and 18"
Mounts	Female Clevis (both ends)
Depth Stop	from 3.5" to 5.5" bores
Max Pressure	200* Bar
Max Diff Pressure	160 Bar
Min System Flow	20 ltrs per min
Speed	0.25 meters per second
Duty	Heavy
Colour	Gloss Black

NHP Technical Specifications



DEPTH STOP PLATE KIT
Not available in 3.0" and 3.25" Bore

Depth Stops

Only Nordon Phasing Cylinders can be fitted with a depth stop kit at any time without the need to change the rod clevis.

The Depth Stop Clevises have 4mm pitch on depth engagement teeth allowing for finer adjustment than other products.

Depth stop kits are available in 160mm and 200mm lengths and give extended adjustments range for those who need it.

Bore dia	Dimensional Data: Closed Centre = 311mm plus Stroke																			
	A	C	D	F	G	H	J	K	L	M	*CA	CB	CC	CD	CE	CF	CG	CH	CJ	CK
3.0"	90	20	45	124	12	150	1.5"	18	3/4 UNO	311	1.25"	35	75	64	28	59	33	70	30	55
3.5"	102	20	45	124	12	155	1.75"	12	3/4 UNO	311	1.25"	35	89	68	28	59	33	70	30	55
4.0"	114	20	45	124	12	155	2.0"	12	3/4 UNO	311	1.25"	35	89	68	28	59	33	70	30	55
4.5"	134	20	45	122	13	163	2.0"	4	3/4 UNO	311	1.25"	35	89	68	28	59	33	70	30	55
5.0"	146	20	45	122	11	163	55mm	4	3/4 UNO	311	1.25"	35	89	68	28	59	33	70	30	55
5.5"	159	20	45	122	11	163	2.25"	4	3/4 UNO	311	1.25"	35	89	68	28	59	33	70	30	55

D9 tolerance on all pins

Subject to change without notice

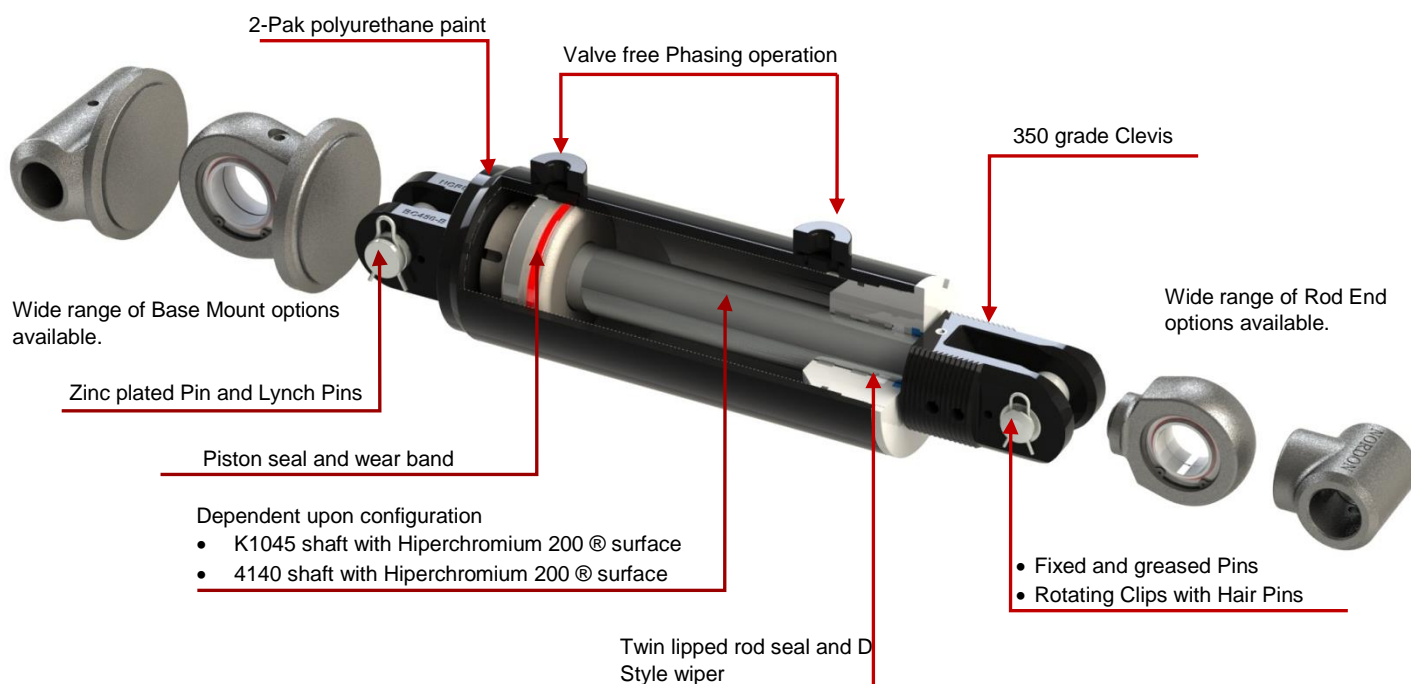
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NIP Series



Nordon Quality

Nordon exclusive re-phasing ports:

No valves to be affected by contamination and no grooves across the piston seal to cause wear.

High quality skived and roller burnished tube:

0.1micron RA surface finish results in extended seal life.

K1045 or 4140 High Tensile shaft

4140 hard chromed plated rod clevis pins:

Greater wear resistance where it is needed most

Hiperchrome 200 ® hard chrome plating:

200 hours rating 9 corrosion certification mean enhanced corrosion protection

Twin lipped rod seal:

Improved sealing performance over a wider range of operating conditions.

D Style rod wiper:

Enhanced rod wiping performance and durability.

350 grade cast steel clevises:

Provides greater strength and accuracy

Available Specifications

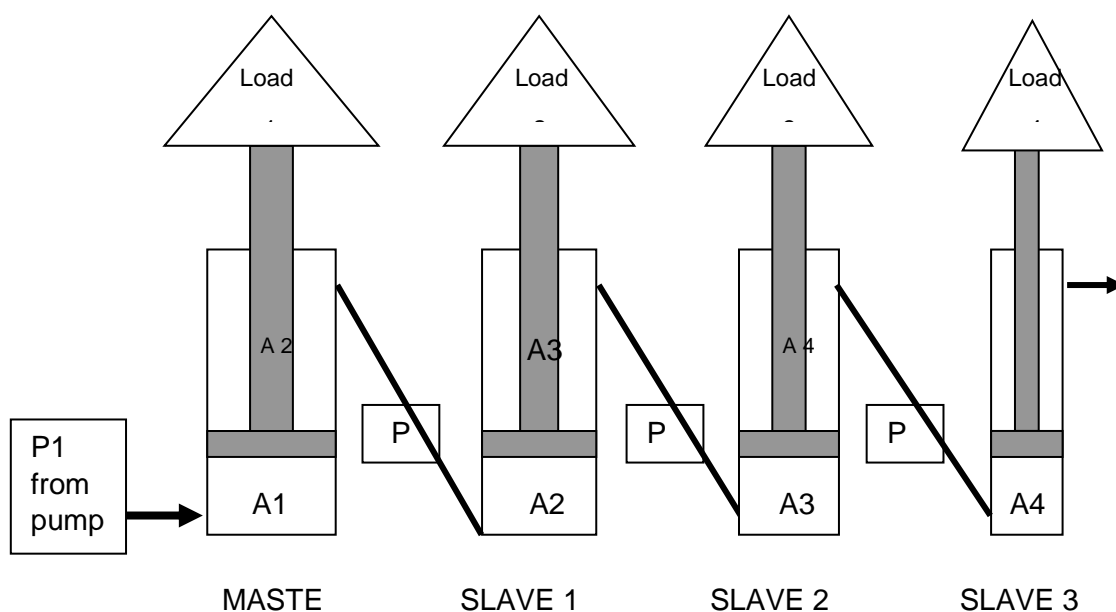
Bore	from 3" to 5.5" in 1/4 " increments
Stroke	Up to 5 meters and beyond
Mounts	Female Clevis Spherical Bearings Pin Eye Male lug Trunion
Depth Stop	from 3.5" to 5.5" bores
Max Pressure	200* Bar
Max Diff Pressure	160 Bar
Min System Flow	20 ltrs per min
Speed	0.25 meters per second
Duty	Heavy
Colour	Gloss Black

Nordon provides the industry leading NI Industrial Phasing range of cylinders - the first and still the only roundline cylinder manufactured in Australia. This range is the only industrial cylinder product that offers a complete range of standard mounting and accessories to provide clients with limitless range options. Featuring high 350 grade steel castings and machined steel mountings which are held in stock, the NI range offers designers a standard product to incorporate within their designs.

Phasing Cylinder Size Calculation Instructions

SELECTION OF CYLINDERS

Formulae: $P1 = \frac{T1}{A1}$: $P2 = \frac{T2}{A2}$: etc., where $T1 = L1+L2+L3+L4.....$, $T2 = L2+L3+L4....etc.$



STEP 1: Determine effective area A for largest (master) cylinder in series by formula:

$$A1 = L1 + L2 + L3 \text{ etc.}$$

STEP 2: Determine pressure in each cylinder starting with smallest cylinder using the formula. $P = \frac{T}{A}$

STEP 3: Check that the pressure does not exceed system pressure. If P is excessive select a larger series of cylinders and recheck P

Phasing Cylinder Stroke Gain or Loss from Larger to Smaller Bore Size

BORE IN INCHES	BORE IN mm	SHAFT IN INCHES	SHAFT IN mm	AREA PISTON SIDE	AREA ROD SIDE	STROKE GAIN OR LOSS	BORE IN INCHES
5	127.00	1.5	38.10	126.685	115.283		5
					0.82%	GAIN	
4.75	120.65	1.5	38.10	114.333	102.932		4.75
					0.31%	GAIN	
4.5	114.30	1.5	38.10	102.615	91.213		4.5
					0.35%	LOSS	
4.25	107.95	1.375	34.93	91.53	81.949		4.25
					1.06%	GAIN	
4	101.60	1.375	34.93	81.078	71.498		4
					0.33%	GAIN	
3.75	95.25	1.375	34.93	71.26	61.68		3.75
					-0.64%	GAIN	
3.5	88.90	1.25	31.75	62.075	54.158		3.5
					-1.17%	LOSS	
3.25	82.55	1.25	31.75	53.524	45.606		3.25
						SAME	
3	76.20	1.25	31.75	45.606	37.688		3
					-1.68%	GAIN	
2.75	69.85	1.125	28.58	38.322	31.909		2.75
					0.75%	GAIN	
2.5	63.50	1.067	27.10	31.671	25.95		2.5
					1.14%	GAIN	
2.25	57.15	1.067	27.10	25.654	20.586		2.25
					1.54%	GAIN	
2	50.80	1	25.40	20.269			2

NHP Phasing Cylinder Stroke Gain or Loss from Larger to Smaller Bore Size

BORE IN INCHES	BORE IN mm	SHAFT IN INCHES	SHAFT IN mm	AREA PISTON SIDE (in ²)	AREA ROD SIDE (in ²)	STROKE GAIN OR LOSS	BORE IN INCHES
5.5	139.7	2.25	57.15	23.758	19.782		5.5
					0.74%	GAIN	
5	127	2.165	55	19.635	15.595		5
					0.30%	GAIN	
4.5	114.3	2	50.8	15.904	12.763		4.5
					1.54%	GAIN	
4	101.6	1.969	50	12.566	9.523		4
					-1.03%	LOSS	
3.5	88.9	1.772	45	9.621	7.156		3.5
					1.22%	GAIN	
3	76.2	1.625	41.275	7.096	4.995		3

PHASING CYLINDER INSTALLATION PROCEDURE

1. **FILL ROD END OF CYLINDERS WITH OIL** (MANUALLY WITH CONTAINER & FUNNEL) preferably this is done in the horizontal position off the machine, but can be done on the machine if rod port is in uppermost position.
2. **INSTALL CYLINDERS**
3. **CONNECT HOSES**
4. **BACK BLEED THE SYSTEM** (This is done by bleeding the air out of the hoses working on the retract side) Crack the hose connection at the rod end of the second smallest cylinder.
5. **OPERATE CONTROL VALVE IN THE CYLINDER RETRACT POSITION UNTIL ALL THE AIR IS DISPELLED FROM CONNECTING HOSE, THEN TIGHTEN FITTING** (This oil bleeding is fairly slow as the oil has to go through the phasing hole which is usually 3mm Dia allowing about 10 Litres per minute through, so allow enough time to displace the air out of the hose. This is why it is important to fill the cylinders with oil prior to bleeding)
6. **REPEAT THIS STEP** If more than two cylinders are in the one phasing system working on the third smallest cylinder rod end to bleed from.
7. **EXTEND BLEEDING.** (Crack the base port of the largest cylinder operate the extend control valve carefully to bleed the air from the supply hose) This hose will bleed a lot faster than on the rod side as you have no restriction as the oil coming direct from the tractor or oil surface

This has the system bleed free of air. The cylinders can now be extended with care. There may be a small amount of air in the system; this can be dispelled by holding the control valve open at end of stroke to further bleed any remaining oil through the system via the phasing system in the cylinders.

**** REMEMBER ALL PHASING SYSTEMS HAVE SOME INACCURACY MOST COME LESS THAN 1.8% OF STROKE**

There are 4 areas to take into consideration when using Phasing Cylinders

1. Mount Ports uppermost so no air is trapped in the cylinder (particularly when mounting horizontally do not use side ports)
2. Bypass oil: make sure that there is enough oil supply to bypass and extra to do the pushing: Nordon Cylinders have different bypass amounts for each bore size. Usual bypass from 6 to 20 litres per min so either specify bypass flow or ensure there is enough oil available
3. Phasing Cylinders can be found to have up to 6mm end float at each end so allow for this in the mounting design
4. Nordon Cylinders Standard Phasing piston seal is a Wynns CC seal which has a high mechanical load which may have a sticking or jerky operation at low pressures. If the load is working at a low working pressure please specify a Hallite 755 Seal

60 Litre Hydraulic Cylinder Load Hold Valve Block Specially Designed for Ease of Installation to Cylinder

Part Number	Body Type	Valve Type	No of Valves
SCV	Single	Check Valve	1
DCV	Double	Check Valve	2
SCBV	Single	Counter Balance Valve	1
DCBV	Double	Counter Balance Valve	2

Plumbing & Fitting Extra

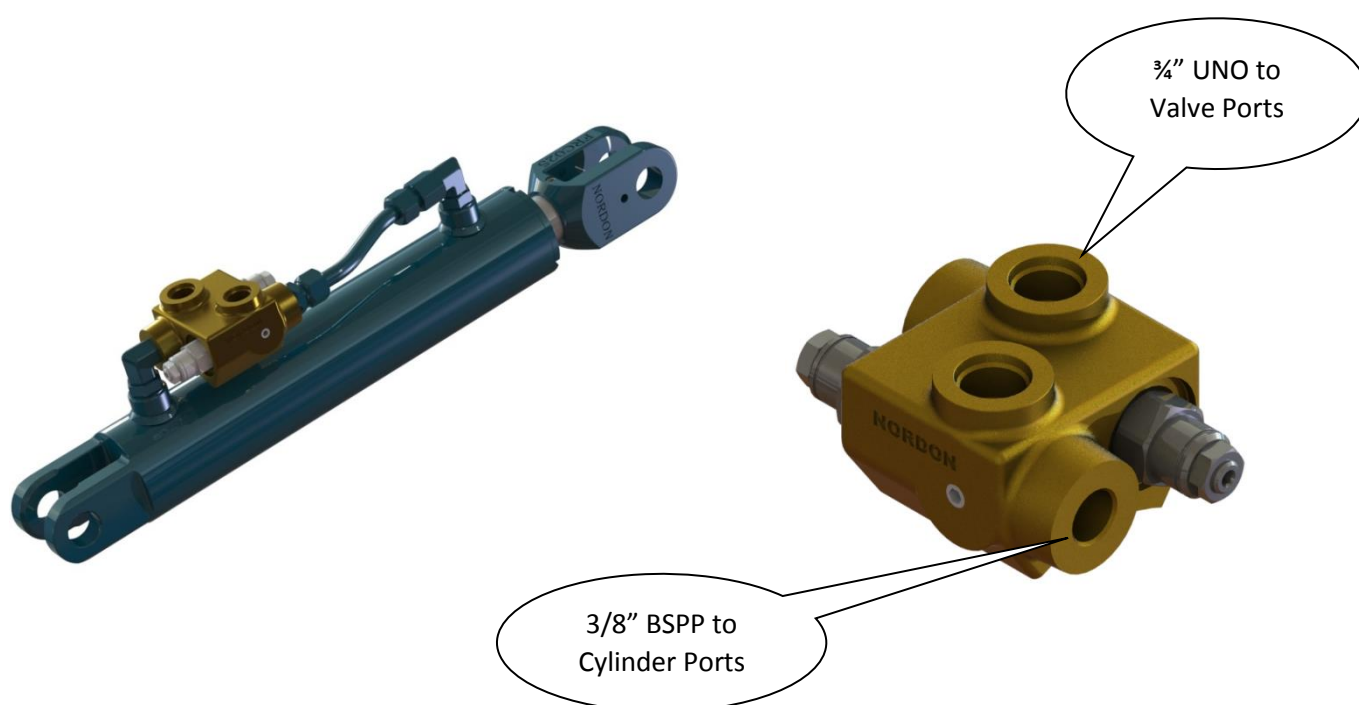
Valve Specification:

60lt Pilot Operated Check Valves

3:1 PILOT; 350bar max System Pressure; Manual Load Release; 2Bar Cracking Pressure: Buna-n Seals

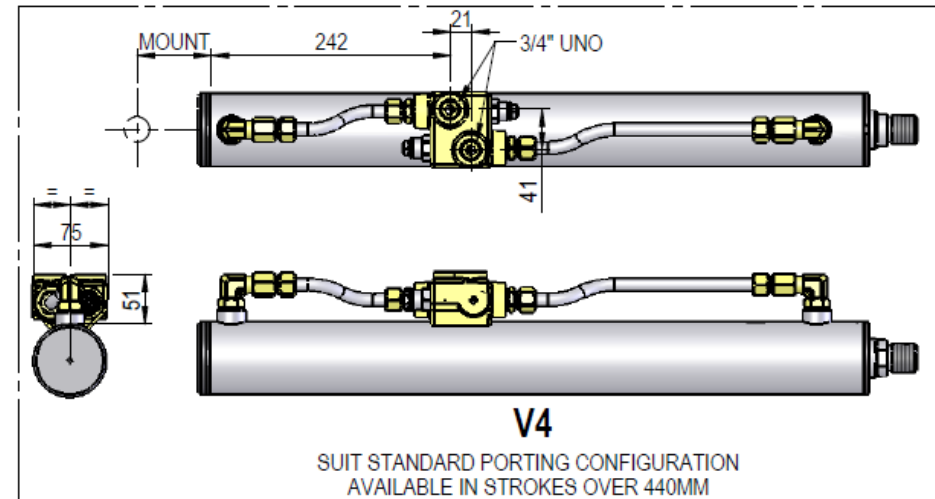
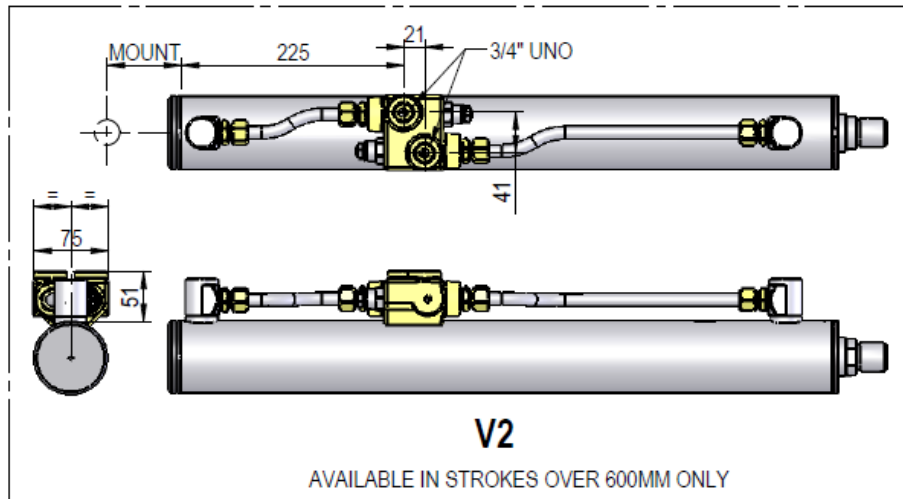
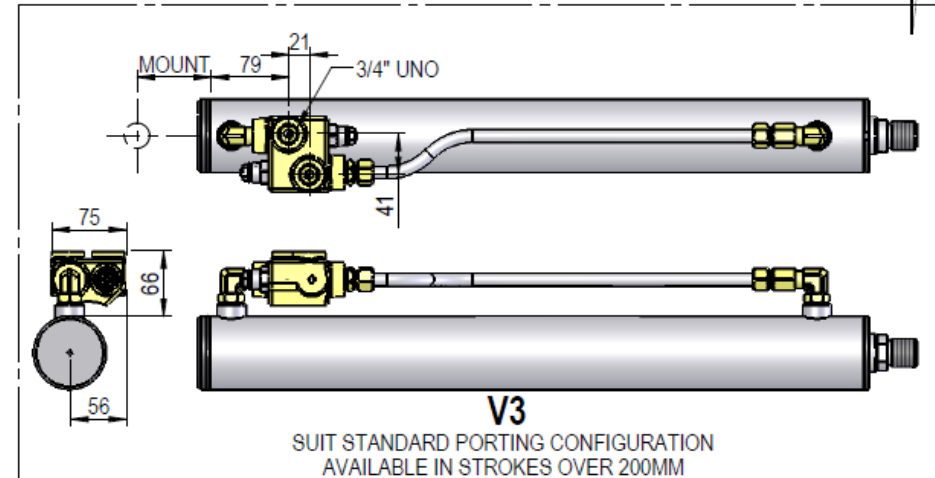
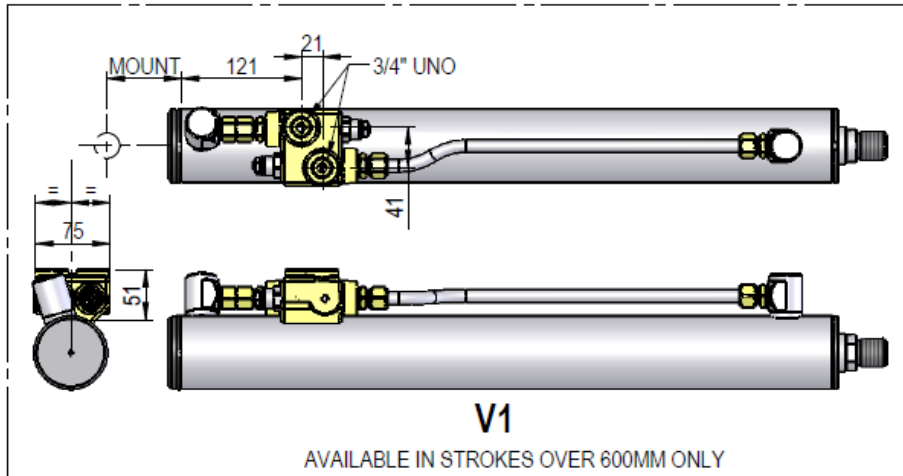
60Lt Counterbalance Valve:

3:1 pilot Ratio; Std screw adjustment; 70 to 280 Bar 210 Bar Standard setting Buna-N Seals



VALVE MOUNTING OPTIONS

NORDON CYLINDERS
Australia

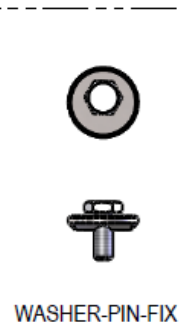
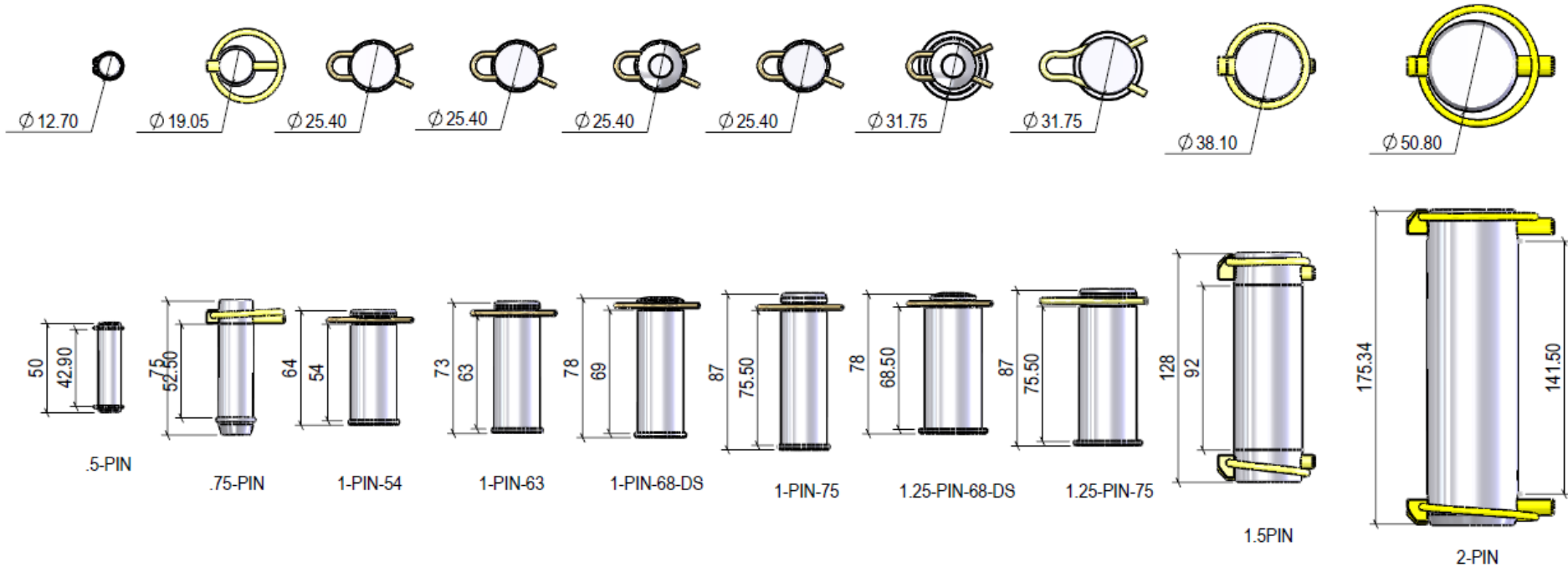


Ordering System

	VALVE TYPE	CONFIGURATION No	SINGLE VALVE OPERATION SIDE
			(R) ROD SIDE (B) BASE SIDE
Part No:	V.....

VALVE TYPE	DESCRIPTION
DO1	60 LITRE DOUBLE OVERCENTRE VALVE
SO1	60 LITRE SINGLE OVERCENTRE VALVE
DC1	90 LITRE DOUBLE PILOT CHECK VALVE
SC1	90 LITRE SINGLE PILOT CHECK VALVE

ROTATING PIN OPTIONS

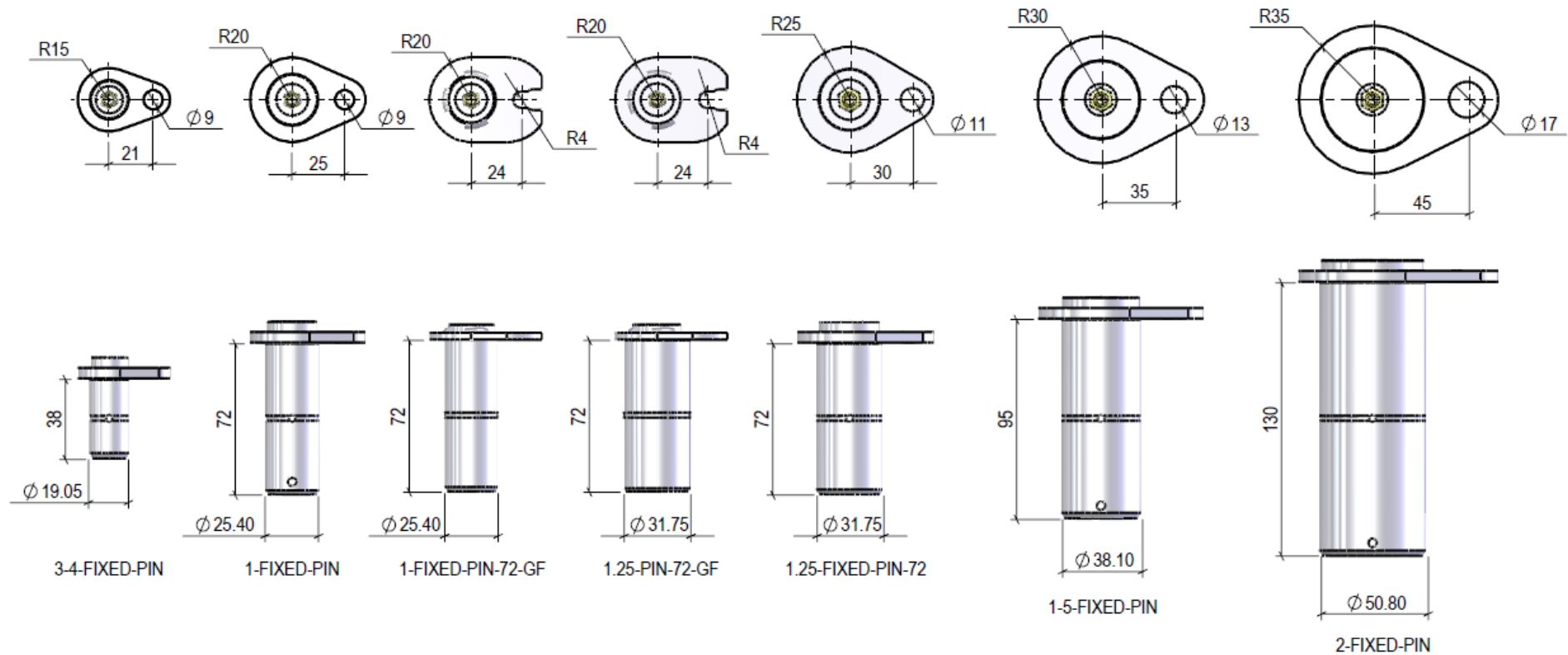


THE FOLLOWING ROTATING PINS CAN ALSO BE RETAINED USING THE WASHER-PIN-FIX, WHICH USES AN M8 HEX HEAD BOLT SCREWED DIRECTLY INTO THE CLEVIS.

- 1-PIN-54
- 1-PIN-75
- 1-PIN-63
- 1-PIN-68-DS
- 1.25-PIN-75
- 1.25-PIN-68-DS

PIN PART NUMBER	MATERIAL	31 FOS	ROD MOUNTS										BASE MOUNTS										
			CL00	CLR00	FR020	FR025	CL001	CL002	CL002B	FR040	FR060	FR060	BC150	BC150K	BC200-K	BC200	BC250-BC300	BC350/BC400/BC450/BC500	BC350/BC400/BC450/BC500	FB0350/FBC400/FBC450/FBC500	FB060	CLR-DS-10-111	CLR-DS-10-111
0.5-PIN	1020	1T	X									X											
0.75-PIN	1020	2.3T		X	X								X	X									
1-PIN-54	4140	14.8T													X	X							
1-PIN-63	4140	14.8T														X							
1-PIN-68-DS	4140	14.8T				X																X	
1-PIN-75	4140	14.8T					X	X									X						
1.25-PIN-68-DS	4140	23T																					X
1.25-PIN-75	4140	23T							X	1.25-PIN-125								X					
1.5-PIN	1020	10.7T									X								X				
2-PIN	1020	16.7T										X								X			

FIXED PIN OPTIONS

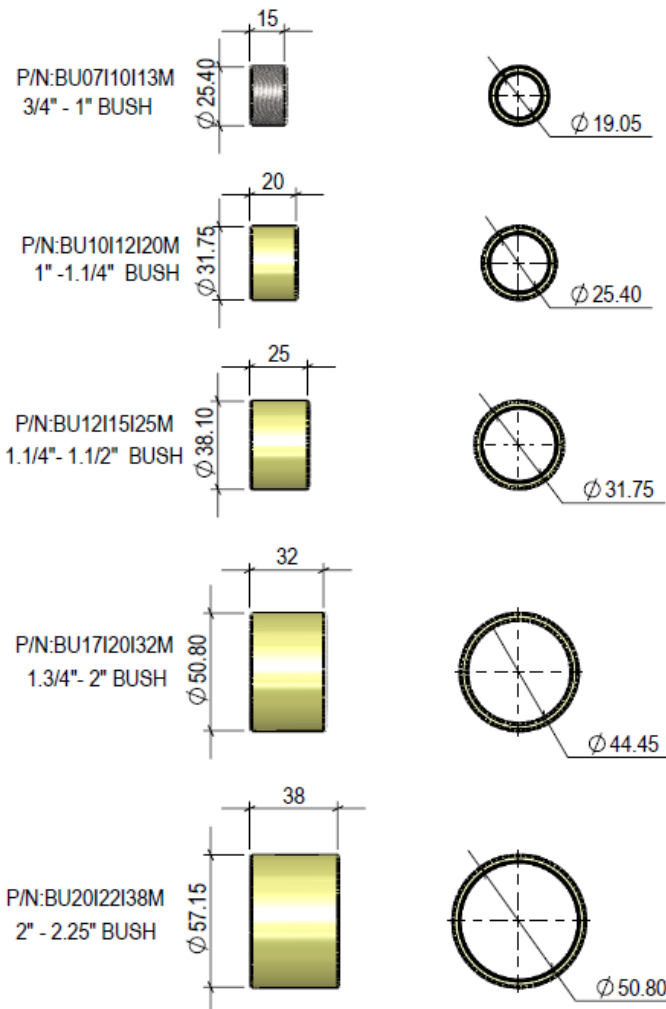


NOTE

- ALL FIXED PINS ARE GREASABLE, AND ARE FITTED WITH A GREASE NIPPLE.
- THEY ARE FIXED ON ASSEMBLY WITH M8, M10, M12, M16 HEX HEAD BOLTS WITH SPRING WASHERS AS REQUIRED.



IMPERIAL BUSHING OPTIONS

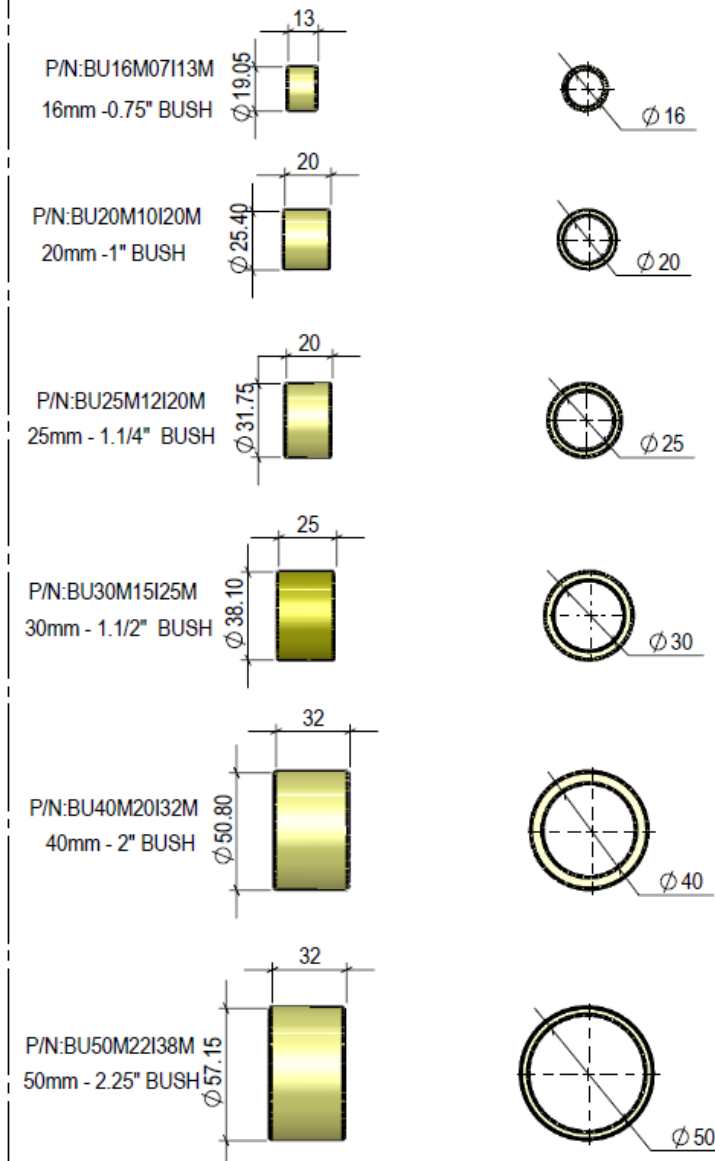


AVAILABLE MATERIALS
BK- BRONZE, KNURLED
DF - D-GLIDE
S - STEEL
HD - HARDENED STEEL

NOTE: ALL PIN HOLES MACHINED TO D9 TOLERANCE

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METRIC BUSHING OPTIONS



SOLID SPHERICAL BEARING OPTIONS

P/N:GE20DO-SOLID 20MM BEARING	
P/N:GE25DO-SOLID 25MM BEARING	
P/N:GE30DO-SOLID 30MM BEARING	
P/N:GE40DO-SOLID 40MM BEARING	
P/N:GE50DO-SOLID 50MM BEARING	
P/N:GE60DO-SOLID 60MM BEARING	

ROD ADAPTOR BUSHES

P/N:BU1107
1.125" THREAD - 0.75" THREAD
ADAPTOR



P/N:BU1511
1.5" THREAD - 1.125" THREAD
ADAPTOR



P/N:BU2015
2" THREAD - 1.5" THREAD
ADAPTOR



P/N:BU2520
2.5" THREAD - 2" THREAD
ADAPTOR



NOTE: ALL THREADS MACHINED TO 2A/8 SPECIFICATION.
ALL PIN HOLES MACHINED TO D9 TOLERANCE.

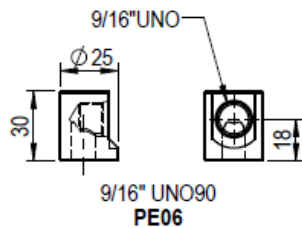
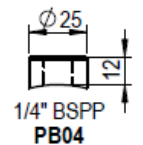
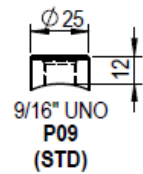
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PORTING OPTIONS

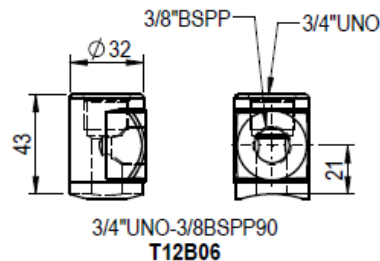
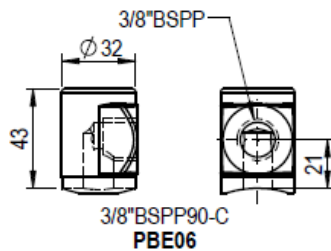
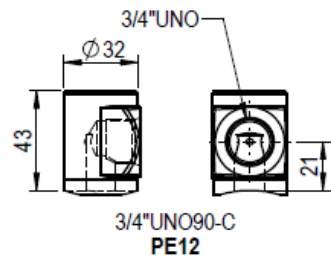
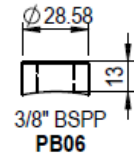
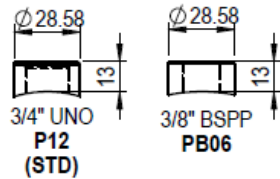
NORDON CYLINDERS
Australia



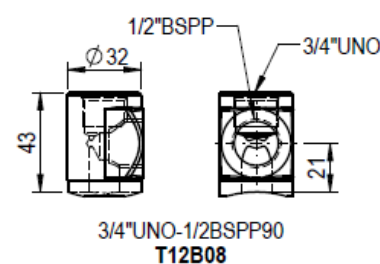
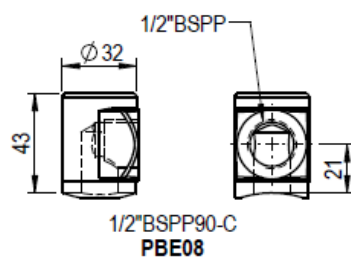
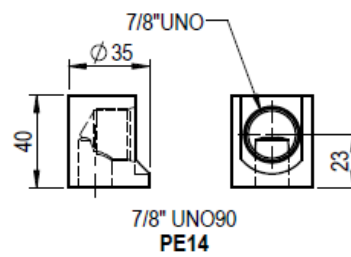
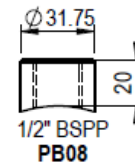
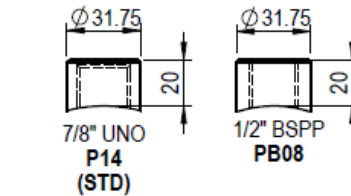
BORE SIZE 1.5" - 2"



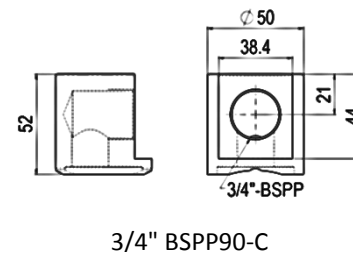
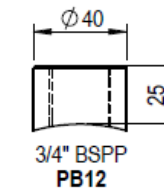
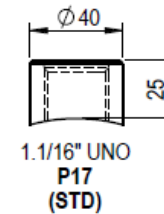
BORE SIZE 2.5" - 3.5"



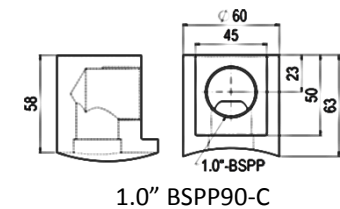
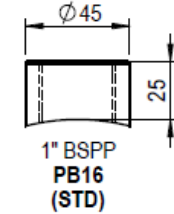
BORE SIZE 4" - 4.5"



BORE SIZE 5"



BORE SIZE 6"



BORE SIZE 7"

