



HYDRAULIC CYLINDERS • POWER PACKS • ISO 6022

XDR • HYDCO ENGINEERING

Hydraulics

Production range to ISO 6022 — cylinders to 320 mm bore and 250 bar, and ST power packs to 7.5 kW.

250 bar

MAXIMUM OPERATING PRESSURE

50–320

PISTON DIAMETER, MM

2,700 mm

STROKE, LONGER ON REQUEST

20–150 l

POWER PACK TANK

EXPLORATION DRILL RIGS PTY LTD
REDBANK, QUEENSLAND, AUSTRALIA

MANUFACTURED BY
HYDCO ENGINEERING PVT. LTD., INDIA



THE RANGE

A production range built to *ISO 6022*.

Installation dimensions and mounting options comply with the standard, while leaving the customer maximum flexibility to customise for the application. The cylinders are used in stationary applications across the paper and steel industries, in machine tools, automation and manufacturing — and on onshore workover rigs, drilling rigs and associated equipment exported to Australia and the UAE.

CONTENTS

01	Design features	03
	Configuration, coating, cushioning, seals	
02	Mounting types	04
	General dimensions, flange, clevis and trunnion	
03	Ports	08
	Thread types and port positions	
04	Cylinder selection	09
	Push force, pull force, stroke factor, rod chart	
05	Power packs	13
	ST standard range, characteristics, schemes, dimensions	



PRODUCTION RANGE CYLINDERS



ENDURANCE TESTING AT THE WORKS

01 / STANDARD SPECIFICATIONS

OPERATING PRESSURE

Max. 250 bar

PISTON DIAMETER

50 – 320 mm

MOUNTING TYPES

Bushing or spherical bearing eye at base; round flange at head or base; trunnion mounting

MEDIA PORT

BSPP threaded connection

COATING

Chrome coating 25 µm (±5 µm); higher on request

OPERATING TEMPERATURE

–20 °C to +80 °C

USAGE

Dynamic, static

STROKE LENGTHS

Up to 2,700 mm depending on application; longer on request

PISTON ROD DIAMETER

32 – 220 mm

PISTON ROD CONNECTION

Rod thread; swivel head available as an option

OPERATING FLUID

Hydraulic oil as per ISO 4406: 20/18/15

ANTI-CORROSION

Primed; painted at the customer's request

PISTON SPEED

Up to 1 m/s

DESIGN FEATURES

Finite element designed, *endurance tested.*

Cylinder configuration

Engineered using the finite element method to configure the design, with supporting pulse and endurance tests to verify the calculation results. The industry series is designed for dynamic and static applications.

End of stroke cushioning

Controlled, gentle retraction into the end positions matters in highly dynamic applications. An adjustable cushioning system is available as an option, giving smooth, stutter-free movement.

Piston rod coating

A high-quality single chrome layer 25 µm thick (±5 µm) as standard. A hardened rod with double chrome coating is available where corrosion or impact protection demands it.

Seals

Gland, piston, head and cap end seals in nitrile (NBR), PTFE and polyurethane, compatible with the work fluid over –20 °C to 110 °C. Fluorocarbon elastomer (FPM), PTFE or special mixtures are available where conditions require.

Five ways to *mount it*.

To satisfy the range of installation situations, the series has five mounting options.

A · MF3	Head, circular flange
B · MF4	Cap, circular flange
C · MP3	Cap fixed eye
D · MP5	Cap fixed eye with spherical bearing
E · MT4	Intermediate fixed or movable trunnion

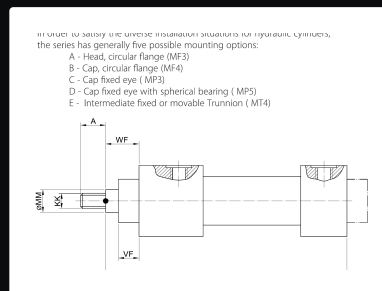


FIGURE 1 – GENERAL DIMENSIONS

TABLE 1 – GENERAL DIMENSIONS, MM

BORE	ROD MM	ZJ	KK	A MAX	VF MAX	WF
50	32 / 36	240	M27 × 2	36	29	47
63	40 / 45	270	M33 × 2	45	32	53
80	50 / 56	300	M42 × 2	56	36	60
100	63 / 70	335	M48 × 2	63	41	68
125	80 / 90	390	M64 × 3	85	45	76
140	90 / 100	425	M72 × 3	90	48	76
160	100 / 110	460	M80 × 3	95	50	85
180	110 / 125	497	M90 × 3	106	55	95
200	125 / 140	540	M100 × 3	112	61	101
250	160 / 180	640	M125 × 4	125	71	113
320	200 / 220	750	M160 × 4	160	88	136

02.1 / FLANGE MOUNTED – MF3 AND MF4

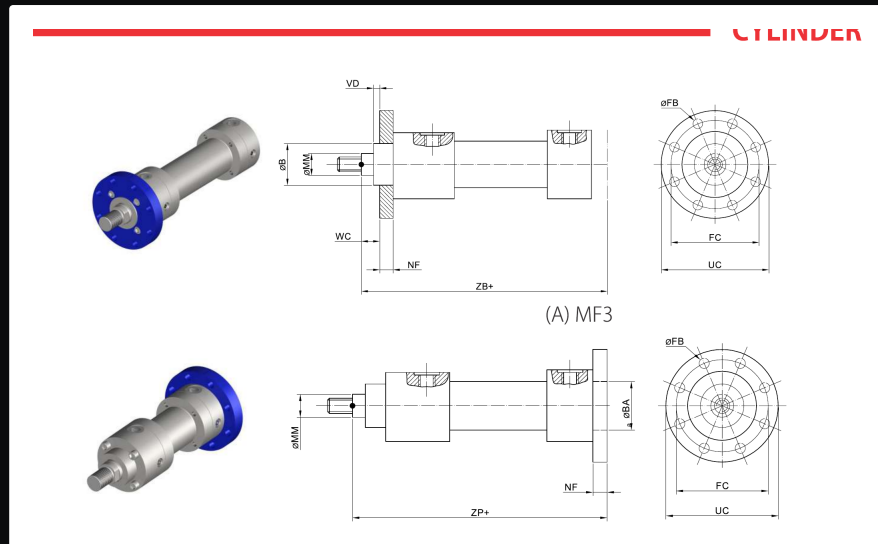


FIGURE 2 – MF3 HEAD CIRCULAR FLANGE, MF4 CAP CIRCULAR FLANGE

TABLE 2 – CIRCULAR FLANGE MOUNTINGS, MM

BORE	FB H13	FC JS13	VD MIN	WC	ZP	ZB MAX	BA H8/18	UC MAX	NF JS13
50	8 × Ø13.5	132	4	22	265	244	63	160	25
63	8 × Ø13.5	150	4	25	298	274	75	180	28
80	8 × Ø17.5	180	4	28	332	305	90	215	32
100	8 × Ø22	212	5	32	371	340	110	260	36
125	8 × Ø22	250	5	36	430	396	132	300	40
140	8 × Ø26	285	5	36	465	430	145	340	40
160	8 × Ø26	315	5	40	505	467	160	370	45
180	8 × Ø33	355	5	45	550	505	185	425	50
200	8 × Ø33	385	5	45	506	550	200	455	56
250	8 × Ø39	475	8	50	703	652	250	545	63
320	8 × Ø45	600	8	56	830	764	320	680	80

02.2 / CLEVIS MOUNTED – MP3 AND MP5

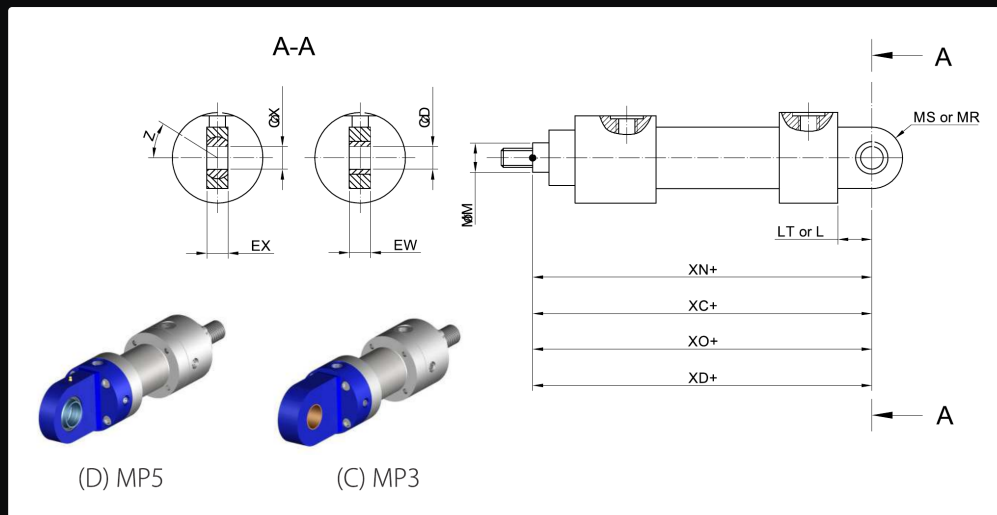


FIGURE 3 – MP3 CAP FIXED PLAIN EYE, MP5 CAP FIXED EYE WITH SPHERICAL BEARING

TABLE 3 – CAP EYE MOUNTINGS, MM

BORE	CD H9	CX H7	EW / EX H12	L / LT MIN	MR / MS MAX	XC, XD, XO, XN	TILT Z MIN
50	32	32	32	40	40	305	4°
63	40	40	40	50	50	348	4°
80	50	50	50	63	63	395	4°
100	63	63	63	71	71	442	4°
125	80	80	80	90	90	520	4°
140	90	90	90	113	113	580	4°
160	100	100	100	112	112	617	4°
180	110	110	110	135	135	690	4°
200	125	125	125	160	160	756	4°
250	160	160	160	200	200	903	4°
320	200	200	200	250	250	1080	4°

02.3 / TRUNNION MOUNTED – MT4

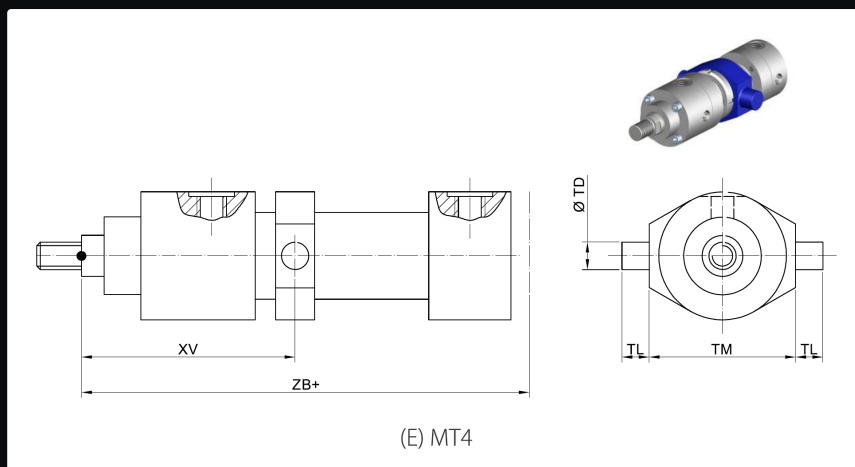


FIGURE 4 – MT4 INTERMEDIATE FIXED OR MOVABLE TRUNNION, MALE

TABLE 4 – INTERMEDIATE MALE TRUNNION, MM

BORE	TD F8	TS JS13	TM H12	ZB MAX
50	32	25	112	244
63	40	32	125	274
80	50	40	150	305
100	63	50	180	340
125	80	63	224	396
140	90	70	265	430
160	100	80	280	467
180	110	90	320	502
200	125	100	335	550
250	160	125	425	652
320	200	160	530	764

XV DIMENSION

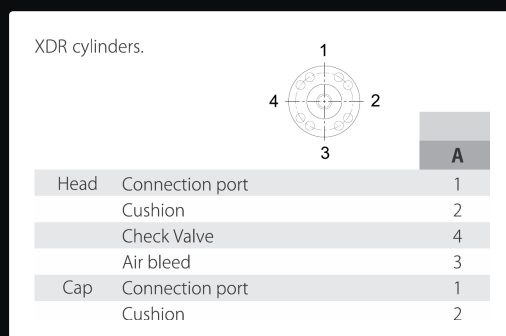
XV is variable. Users should consult the manufacturer for minimum and maximum values.

BSP as standard, *others on request.*

Cylinders are supplied with BSP standard threaded ports to ISO 6022. Metric threaded ports, NPTF and SAE 6000 can be provided on request. Oversize ports are possible, though cylinder dimensions may change.

PORT TYPES, MM

BORE	BSP THREADED	METRIC THREADED	NPTF	PORTS WITH FLANGE SAE 6000
50	G1/2	M22X1.5	NPTF 1/2	SAE 6000 – 1/2
63	G3/4	M27X2	NPTF 3/4	SAE 6000 – 3/4
80	G3/4	M27X2	NPTF 3/4	SAE 6000 – 3/4
100	G1	M33X2	NPTF 1	SAE 6000 – 1
125	G1	M33X2	NPTF 1	SAE 6000 – 1
140	G1-1/4	M42X2	NPTF 1-1/4	SAE 6000 – 1-1/4
160	G1-1/4	M42X2	NPTF 1-1/4	SAE 6000 – 1-1/4
180	G1-1/4	M42X2	NPTF 1-1/4	SAE 6000 – 1-1/4
200	G1-1/4	M42X2	NPTF 1-1/4	SAE 6000 – 1-1/4
250	G1-1/2	M48X2	NPTF 1-1/2	SAE 6000 – 1-1/2
320	G2	M60X2	NPTF 2	SAE 6000 – 2



STANDARD PORT AND CUSHION ADJUSTMENT POSITIONS

POSITIONS

Head and cap each carry a connection port at position 1, cushion adjustment at 2, air bleed at 3 and check valve at 4, for mounting styles A, B, C–D and E. Where limit switch sensors are fitted, these positions can change to suit the customer specification.

Bore from *push force*.

- 1 Identify the operating pressure closest to that required.
- 2 In the same column, identify the force required to move the load, always rounding up.
- 3 In the same row, look along to the cylinder bore required.

If the cylinder envelope is too large, increase the operating pressure if possible and repeat the exercise.

CYLINDER PUSH FORCE, KN

BORE Ø	BORE AREA MM ²	50 BAR	100 BAR	150 BAR	200 BAR	250 BAR
50	1964	10	20	30	40	50
63	3117	15	31	46	63	79
80	5026	25	51	76	102	128
100	7854	40	80	120	160	200
125	12272	62	125	187	250	312
140	15386	77	154	231	308	385
160	20106	102	205	307	410	512
180	25434	127	254	381	508	635
200	31416	160	320	480	640	801
250	49087	250	500	750	1000	1250
320	80425	410	820	1230	1640	2050

04.1 / CYLINDER SELECTION

Net force from *pull force*.

If the piston rod is in tension, use the reduction in cylinder push force below.

- 1 Follow the procedure for push force applications.
- 2 Using the reduction table, establish the force indicated for the rod diameter and pressure selected.
- 3 Deduct this from the original push force. The result is the net force available to move the load.

REDUCTION IN CYLINDER PUSH FORCE, KN

ROD Ø	ROD AREA MM²	50 BAR	100 BAR	150 BAR	200 BAR	250 BAR
32	804	4	8	12	16	20
36	1018	5	10	15	20	25
40	1257	6	12	19	24	31
45	1590	8	16	24	32	40
50	1964	10	19	29	38	49
56	2463	12	25	37	50	62
63	3386	17	34	51	68	85
70	3848	19	39	58	78	98
80	5027	25	50	76	100	126
90	6362	32	64	97	129	162
100	7855	39	79	118	158	196
110	9503	48	96	145	193	242
125	12274	61	123	184	246	307
140	15394	78	156	235	313	392
160	20109	100	201	301	402	503
180	25447	129	259	389	518	648
200	31420	157	314	471	628	785
220	38013	198	387	581	775	969

04.2 / CYLINDER SELECTION

Rod size from *basic length and thrust*.

- 1 Determine the mounting style and rod end connection, and read the stroke factor from the table.
- 2 Basic length = net stroke $\times$ stroke factor.
- 3 Find the thrust by multiplying the full bore area by system pressure, or read it from the push and pull force tables.
- 4 On the selection chart, find the intersection of basic length and thrust. The rod size is read from the curve above that point.

STROKE FACTOR SELECTION

CYLINDER MOUNTING STYLE	ROD END CONNECTION AND LOAD GUIDANCE	STROKE FACTOR
MF3 front flange	Load fixed and rigidly guided	0.5
MF3 front flange	Load pivoted and rigidly guided	0.7
MF4 rear flange	Load fixed and rigidly guided	1.0
MF4 rear flange / MT4 trunnion	Load pivoted and rigidly guided	1.5
MF3 front flange	Load supported but not rigidly guided	2.0
MP3 rear pivot / MP5	Load pivoted and rigidly guided	2.0
MF4 rear flange	Load supported but not rigidly guided	4.0
MP3 rear pivot / MP5	Load supported but not rigidly guided	4.0

Cylinder with stroke factor table in the table of mounting and load guidance. The correct piston rod size is read from the diagonally curved line above the point of intersection.

Stroke Factor Selection

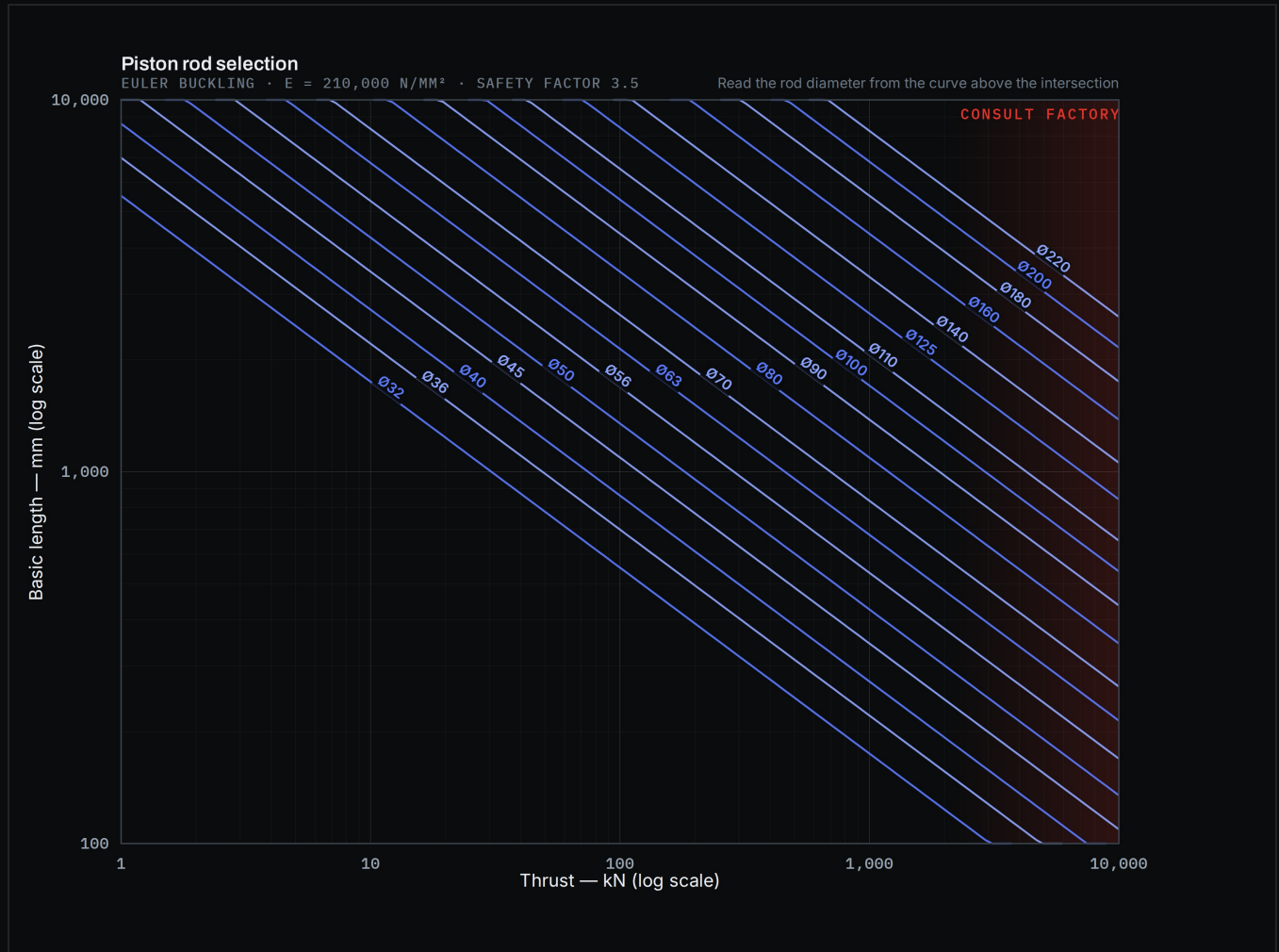
Cylinder Mounting Style	Rod End Connection and Load Guidance	Type of Mounting	Apply Stroke Factor of
MF3 Front Flange mounting	Load is fixed and rigidly guided		0.5
MF3 Front Flange mounting	Load is pivoted and rigidly guided		0.7
MF4 Rear Flange mounting	Load is fixed and rigidly guided		1.0
MF4 Rear Flange mounting MT4 Trunnion mounting	Load is pivoted and rigidly guided		1.5
MF3 Front Flange mounting	Load is supported but not rigidly guided		2.0
MP3 Rear Pivot MP5 mounting	Load is pivoted and rigidly guided		2.0
MF4 Rear Flange mounting	Load is supported but not rigidly guided		4.0
MP3 Rear pivot MP5 mounting	Load is supported but not rigidly guided		4.0

THE EIGHT MOUNTING AND GUIDANCE CASES, AS PUBLISHED

04.3 / PISTON ROD SELECTION CHART

Where the two *meet*.

Enter with the basic length and the thrust. The correct rod diameter is the curve immediately above the point of intersection.



CURVES COMPUTED ON EULER BUCKLING WITH $E = 210,000 \text{ N/MM}^2$ AND A SAFETY FACTOR OF 3.5

ST standard *power packs*.

Hydraulic power packs of the ST type are designed to drive and control hydraulic actuators in mobile and industrial applications — presses, lifts, cranes, elevators and platforms. They are available with different assembly variants for electric motors, pumps and tanks.

MAIN FEATURES

NOMINAL PRESSURE

210 bar

FLOW RATE

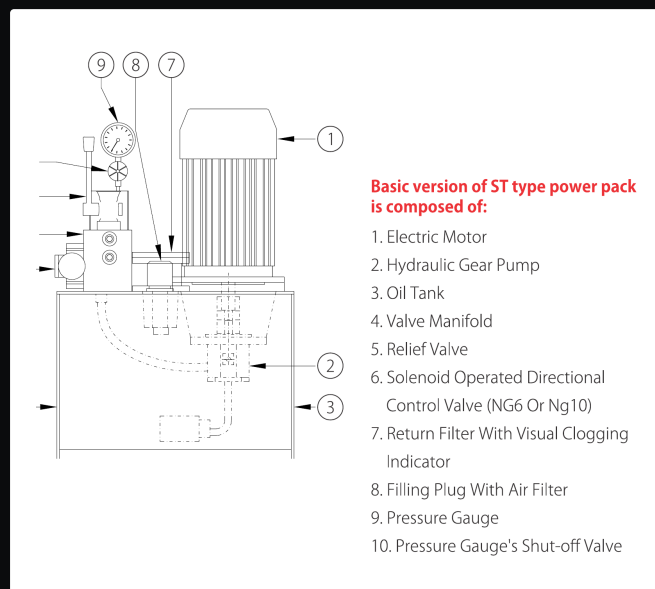
2 to 70 l/min

ELECTRIC MOTORS

Up to 7.5 kW

STEEL TANK CAPACITY

20 l to 150 l



BASIC ST ARRANGEMENT

COMPOSED OF

- 1 Electric motor
- 2 Hydraulic gear pump
- 3 Oil tank
- 4 Valve manifold
- 5 Relief valve
- 6 Solenoid operated directional control valve (NG6 or NG10)
- 7 Return filter with visual clogging indicator
- 8 Filling plug with air filter
- 9 Pressure gauge
- 10 Pressure gauge shut-off valve

05.1 / CHARACTERISTICS

In the standard version the ST power pack is a vertical motor-pump unit on a steel reservoir, with return filter and visual clogging indicator, flow and pressure control valves, and a solenoid operated directional valve. The standard version can be modified with additional valves and blocks to meet the requirements of a specific system.

BASIC HYDRAULIC CHARACTERISTICS

INSTALLATION POSITION	AMBIENT TEMPERATURE
Horizontal, with vertical motor axis	-20 °C to 50 °C
RECOMMENDED TEMPERATURE	FLUID TEMPERATURE
30 °C to 50 °C	-15 °C to 70 °C
FLUID	RECOMMENDED VISCOSITY
Mineral oil, type HLP	20 mm ² /s to 100 mm ² /s
FLUID CONTAMINATION	ELECTRIC MOTOR
Class 21/18/15 according to ISO 4406	4 pole, 230/400 V, 400/690 V, 50 Hz
PUMP TYPE	PORT SIZES
Gear pump	G3/8", G1/2", G3/4"
TANK CAPACITY	
Depending on duty cycle and flow level	

SPECIAL EXECUTIONS

- With proportional valves
- With heat exchangers — coolers or heaters
- With multiple pumps or several independent pump units
- With fixed or variable displacement vane or piston pumps
- With an additional hand pump
- With control valves in sizes NG 16, NG 25, NG 32
- With optional pressure switches, transducers and pressure filters
- With other single-phase motor or DC motors
- With stainless steel elements

ORDERING CODE

ST

Type

35

Tank capacity

4.16

Pump displacement,
cm³/rev

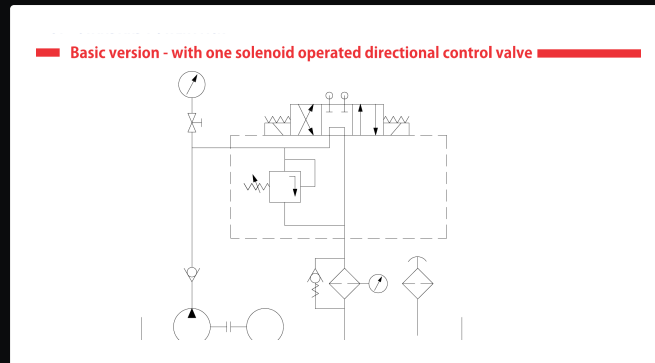
1.1

Power of electric
motor, kW

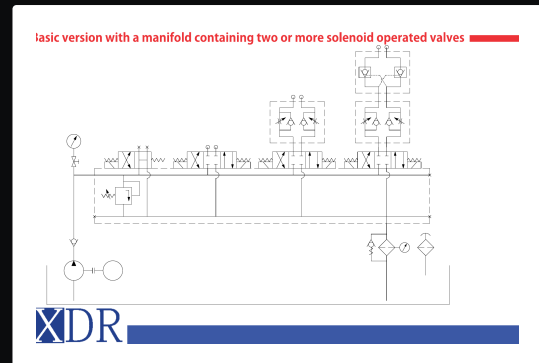
XYZ

XDR design variant

05.2 / SCHEMES AND DIMENSIONS



BASIC VERSION – ONE SOLENOID OPERATED DIRECTIONAL CONTROL VALVE



MANIFOLD WITH TWO OR MORE SOLENOID OPERATED VALVES

TANK DIMENSIONS, MM

TYPE	CAPACITY L	A	B	C	E	F	G
ST-20	20	320	425	334	380	230	11
ST-35	35	32	480	420	435	230	11
ST-50	50	420	530	450	485	330	11
ST-75	75	420	560	560	515	330	11
ST-100	100	420	700	560	655	330	11
ST-150	150	500	750	640	705	410	11

MOTOR FRAME SIZE AND LMAX, MM

MOTOR KW	FRAME SIZE	LMAX
0.37	71	251
0.55	80	247
0.75	80	247
1.1	90	331
1.5	90	331
2.2	100	347
3	100	347
4	112	379
5.5	132	496
7.5	132	501

APPLICATIONS

Stationary, mobile *and* downhole-adjacent.

Onshore workover and drilling rigs

The product has been successfully used on onshore workover rigs, drilling rigs and associated equipment for the oil, gas and minerals industries, exported to Australia and the UAE.

Paper and steel

Stationary applications across the paper and steel industries, including melting furnace handling.

Machine tools and automation

Machine tools, automation and manufacturing technologies.

Presses, lifts and material handling

Presses in manufacturing, scissor lifts for material handling and injection moulding in the plastics industry.

SUPPLIED BY

Exploration Drill Rigs Pty Ltd
27 General Macarthur Place
Redbank QLD 4301, Australia
admin@xdr.com.au · xdr.com.au
+61 (0) 7 3381 5363

MANUFACTURED BY

HYDCO Engineering Pvt. Ltd.
Survey No. 928/1, Nr. GEB Sub-Station
Chhatral-Kadi Road, Chhatral 382 729
Tal. Kalol, Dist. Gandhinagar, Gujarat, India
sales@hydcoengineering.com ·
hydcoengineering.com
+91-2764-233 270 / 271



Dimensions and performance figures are the manufacturer's published data. Actual capacity depends on the application; users should confirm selection with the manufacturer's technical department. Reproduction of this document, wholly or in part, is prohibited without written permission. © Copyright Exploration Drill Rigs Pty Ltd and HYDCO Engineering Pvt. Ltd.