TENDER SPECIFICATION

Sl No	E-Tender Specification Number	Description of Work
1	BHE:PW:NGP:PUR:BRM-BFG:3229	RENOVATION & MODERNIZATION OF RE-INTRODUCTION OF BLAST FURNACE GAS FIRING SYSTEM IN ALL 3 UNITS (2X30MW +1X14MW) AT PP-II, NSPCL BHILAI

VOLUME – I

FOR

VOLUME I – TECHNICAL BID

THIS TENDER SPECIFICATION CONSISTS OF:

Notice Inviting Tender	
Volume-IA	**Technical Conditions of Contract**
Volume-IB	**Special conditions of Contract**
Volume-IC	**General conditions of Contract**
Volume-ID	**Forms & Procedures**
Volume-IE	**Technical Specifications**
Volume II	**Price Bid**

Bharat Heavy Electricals Limited

(*A Government of India Undertaking*)
Power Sector - Western Region
345-Kingsway, Nagpur-440001

CONTENTS		
Volume No	Description	Hosted in website bhel.com (Briefly) and detailed in BHEL e-Procurement Portal as files titled
NIL	Tender Specification Issue Details	(Part of **Vol-IA-3229**)
NIL	Notice Inviting Tender	(Part of **Vol-IA-3229**)
I-A	Technical Conditions of Contract	Vol-I-A-3229
I-B	Special Conditions of Contract	VOID
I-C	General Conditions of Contract	(Part of Vol-I-CD-3229)
I-D	Forms & Procedures	(Part of Vol-I-CD-3229)
--	HSE Plan	(Part of Vol-I-CD-3229)
II	Price Bid Specification as specified in E-Procurement Portal	Volume-II-**3229**

E-Tender Specification Issue Details

Sl No	E-Tender Specification Number	Description of Work
1	BHE:PW:NGP:PUR:BRM-BFG:3229	RENOVATION & MODERNIZATION OF RE-INTRODUCTION OF BLAST FURNACE GAS FIRING SYSTEM IN ALL 3 UNITS (2X30MW +1X14MW) AT PP-II, NSPCL BHILAI

EARNEST MONEY DEPOSIT: Refer Notice Inviting Tender

LAST DATE FOR TENDER SUBMISSION Refer Notice Inviting Tender

THESE TENDER SPECIFICATION DOCUMENTS CONTAINING VOLUME-I AND VOLUME- II ARE ISSUED TO:

M/s. ……

…….

PLEASE NOTE:
THESE TENDER SPECS DOCUMENTS ARE NOT TRANSFERABLE.

For Bharat Heavy Electricals Limited

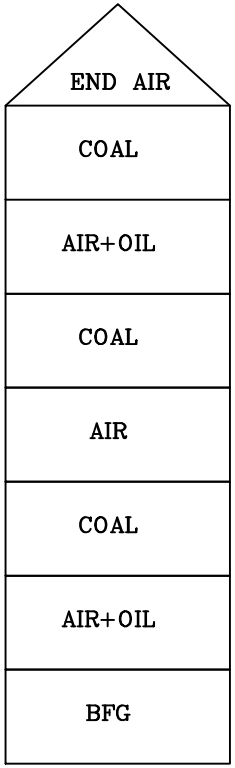
GM (Purchase)
Place: Nagpur
Date:

NSPCL BFG MODIFICATION

ANNEXURE-1

ORIGINAL BHEL DESIGN

CUST. NO.0529



3.1 Current Fuel firing configuration in windbox:

- **BOILER 1**

Elevation	Corner			
	1	2	3	4
CC	COG (pilot)	COG (pilot)	provision for New Scanner (BFI)	ABB Scanner
C	Mill -A	Mill -A	Mill -A	Mill -A
BC	ABB Scanner	COG (pilot)	COG (pilot)	COG (pilot)
B	Mill -B	Mill -B	Mill -B	Mill -B
AB	COG (pilot)	ABB Scanner	COG (pilot)	COG (pilot)
A	Mill -C	Mill -C	Mill -C	Mill -C
AA	Provision for New Scanner (BFI)	Provision for New Scanner (BFI)	Provision for New Scanner (BFI)	Provision for New Scanner (BFI)
BOTTOM COMPT	COG (Bumper)	COG (Bumper)	COG (Bumper)	COG (Bumper)

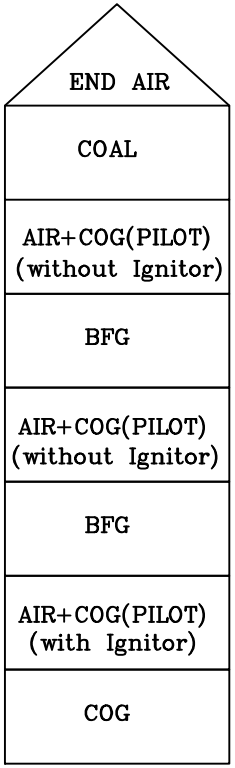
- **BOILER 2**

Elevation	Corner			
	1	2	3	4
CC	COG (pilot)	COG (pilot)	COG (pilot)	ABB Scanner
C	Mill -A	Mill -A	Mill -A	Mill -A
BC	ABB Scanner	COG (pilot)	New Scanner (BFI)	COG (pilot)
B	Mill -B	Mill -B	Mill -B	Mill -B
AB	COG (pilot)	ABB Scanner	COG (pilot)	COG (pilot)
A	Mill -C	Mill -C	Mill -C	Mill -C
AA	New Scanner (BFI)	New Scanner (BFI)	New Scanner (BFI)	New Scanner (BFI)
BOTTOM COMPT	COG (Bumper)	COG (Bumper)	COG (Bumper)	COG (Bumper)

- **BOILER 3**

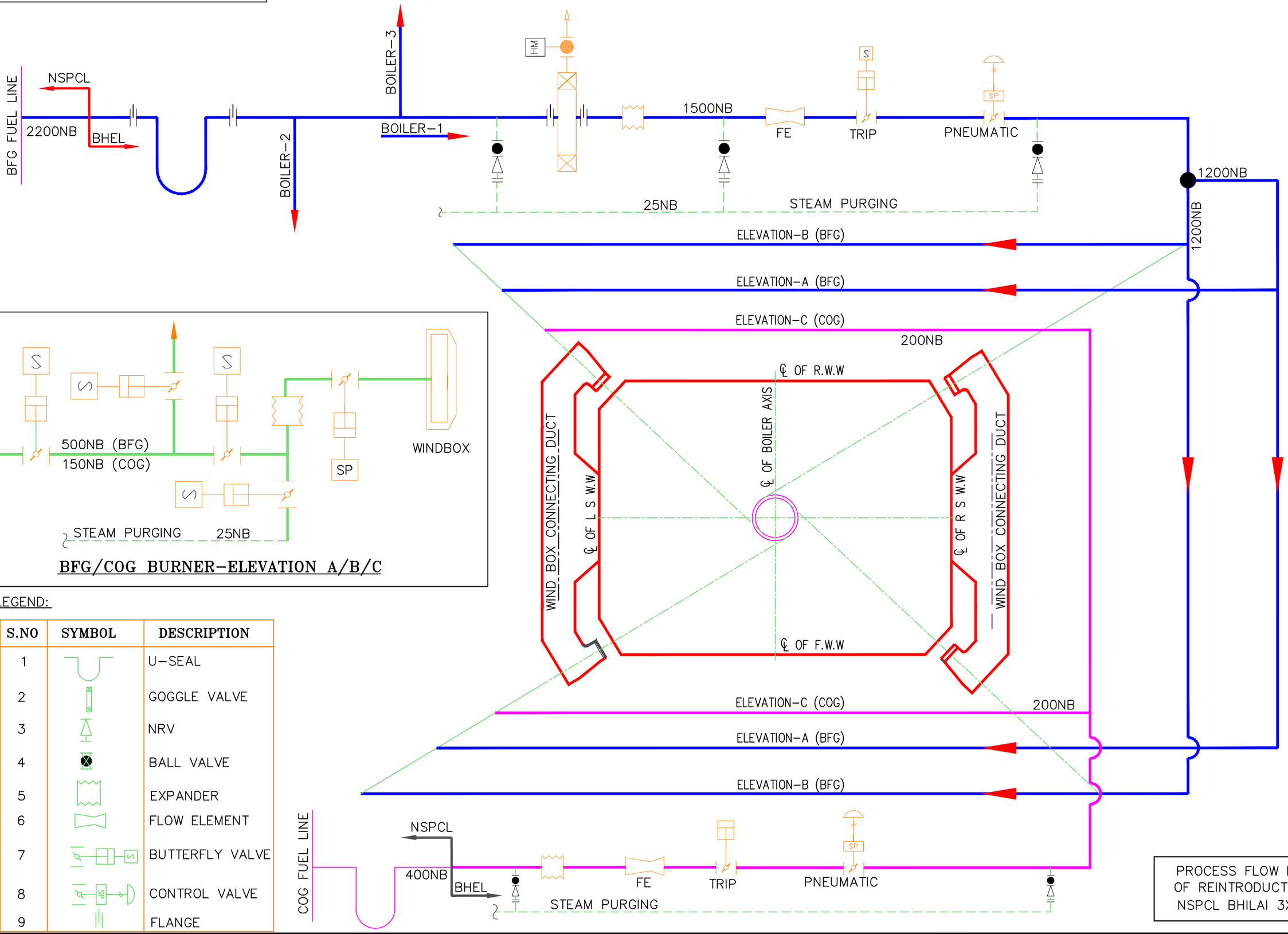
Elevation	Corner			
	1	2	3	4
CC	COG (pilot)	COG (pilot)	New Scanner Provision	ABB Scanner
C	Mill -A	Mill -A	Mill -A	Mill -A
BC	ABB Scanner	COG (pilot)	COG (pilot)	COG (pilot)
B	Mill -B	Mill -B	Mill -B	Mill -B
AB	COG (pilot)	ABB Scanner	COG (pilot)	COG (pilot)
A	Mill -C	Mill -C	Mill -C	Mill -C
AA	COG (pilot)	COG (pilot)	COG (pilot)	COG (pilot)
BOTTOM COMPT	COG (Bumper)	COG (Bumper)	COG (Bumper)	COG (Bumper)

PROPOSED WINDBOX ARRANGEMENT (TENTATIVE)



DRAWING NO:

ANNEXURE-2

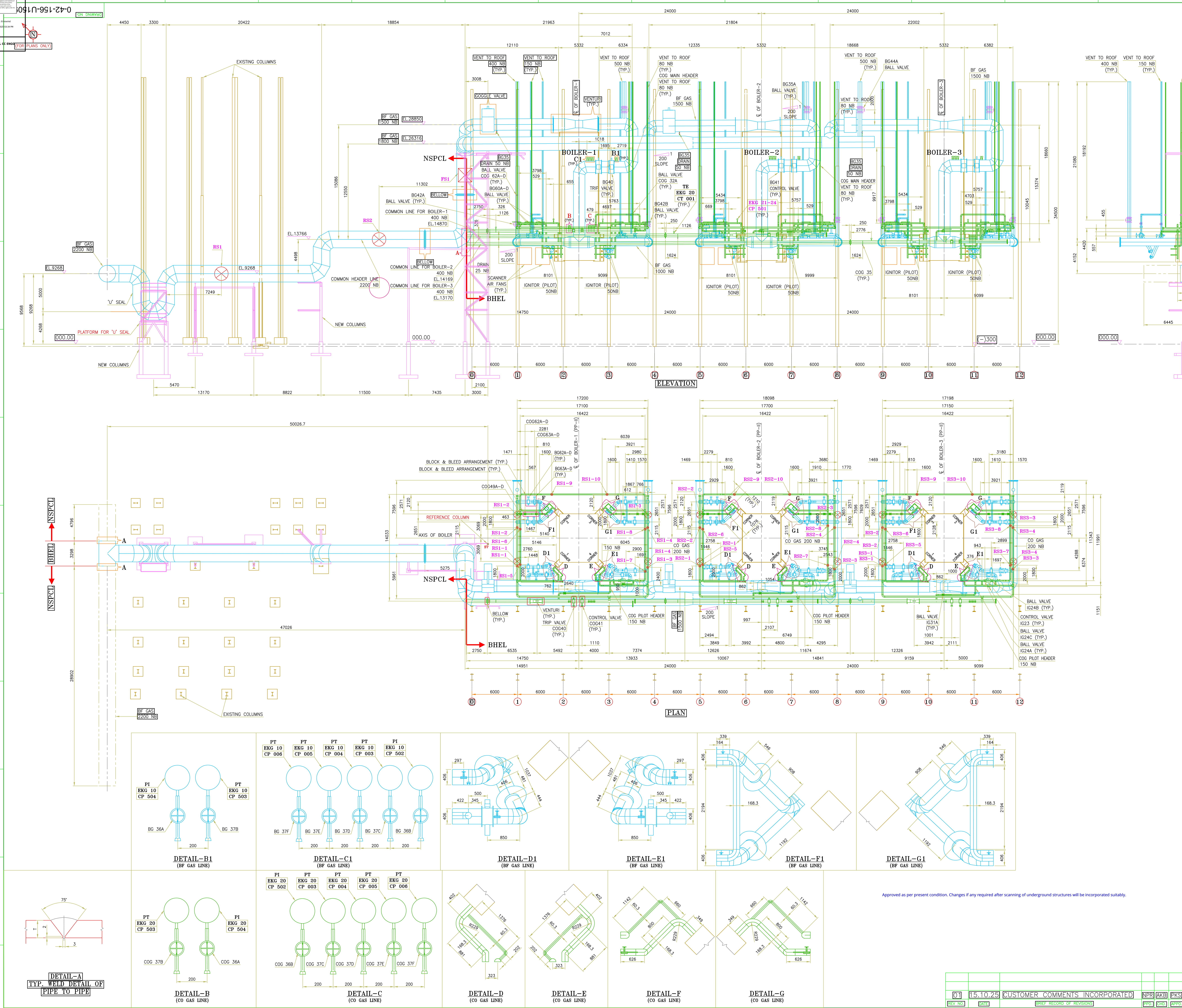


BFG/COG BURNER-ELEVATION A/B/C

LEGEND:

S.NO	SYMBOL	DESCRIPTION
1		U-SEAL
2		GOGGLE VALVE
3		NRV
4		BALL VALVE
5		EXPANDER
6		FLOW ELEMENT
7		BUTTERFLY VALVE
8		CONTROL VALVE
9		FLANGE

PROCESS FLOW DIAGRAM OF REINTRODUCTION OF BFG NSPCL BHILAI 3X150 TPH



Approved as per present condition. Changes if any required after scanning of underground structures will be incorporated suitably.

LEGEND

- RESTING SUPPORT
- FIXED SUPPORT
- BF GAS
- CO GAS
- NEW COLUMNS
- EXISTING COLUMNS

NOTES:-

1. THIS PROJECT BEING A RETROFIT JOB, BF GAS & CO GAS PIPING ROUTING MAY BE MODIFIED TO SUIT SITE CONDITION.
2. FOR EXACT SPOOL LENGTHS, REFER PERTINENT ISOMETRIC DRAWINGS.
3. FOR SUPPORT ARRANGEMENT DETAILS REFER DRG NO. 0-35-110-U0314
4. ALL VENTS SHALL BE TERMINATED AT EL.+34500
5. ALL BFG DRAINS SHALL BE TERMINATED AT BFG DRAIN SYSTEM.
6. ALL COG DRAINS SHALL BE TERMINATED AT CUSTOMER DRAIN TANK.
7. FOR INDIVIDUAL BFG PIPING LAYOUT REFER DRG. NO.0-42-516-U0008
8. FOR INDIVIDUAL COG PIPING LAYOUT REFER DRG. NO.0-42-523-U0009

REFERENCE DWGS.

1. GA DRG. OF BF GAS & CO GAS SYSTEM:-
   BHEL Drg No: 0-42-156-U1509
   NSPCL Drg No: 1120-026-PVM-B-003
2. P&ID DRG. NO.1-00-056-U4109

SO NO. 8122, 8123, 8124

REV NO.	DATE	BRIEF RECORD OF REVISIONS	PPD.	CHD.	APPD.
01	15.10.25	CUSTOMER COMMENTS INCORPORATED	NPR	AKB	PKS

CAUTION: The information on this document is the property of BHARAT HEAVY ELECTRICALS LTD. It must not be used directly or indirectly in any way detrimental to the interest of the company.

Bharat Heavy Electricals Ltd
UNIT: HEAVY PLATES & VESSELS PLANT
VISAKHAPATNAM-530012

	NAME	SIGNATURE	DATE
DRN	N PRAKASA RAO		05-09-2025
CHD	ABHILASH KUMAR BALLA		05-09-2025
APPD	P K SAHOO		05-09-2025

ALL DIMENSIONS ARE IN MM

SCALE: 1 : 150

WEIGHT (Kg): -

NSPCL DRG. NO.: 1120-026-PVM-B-003

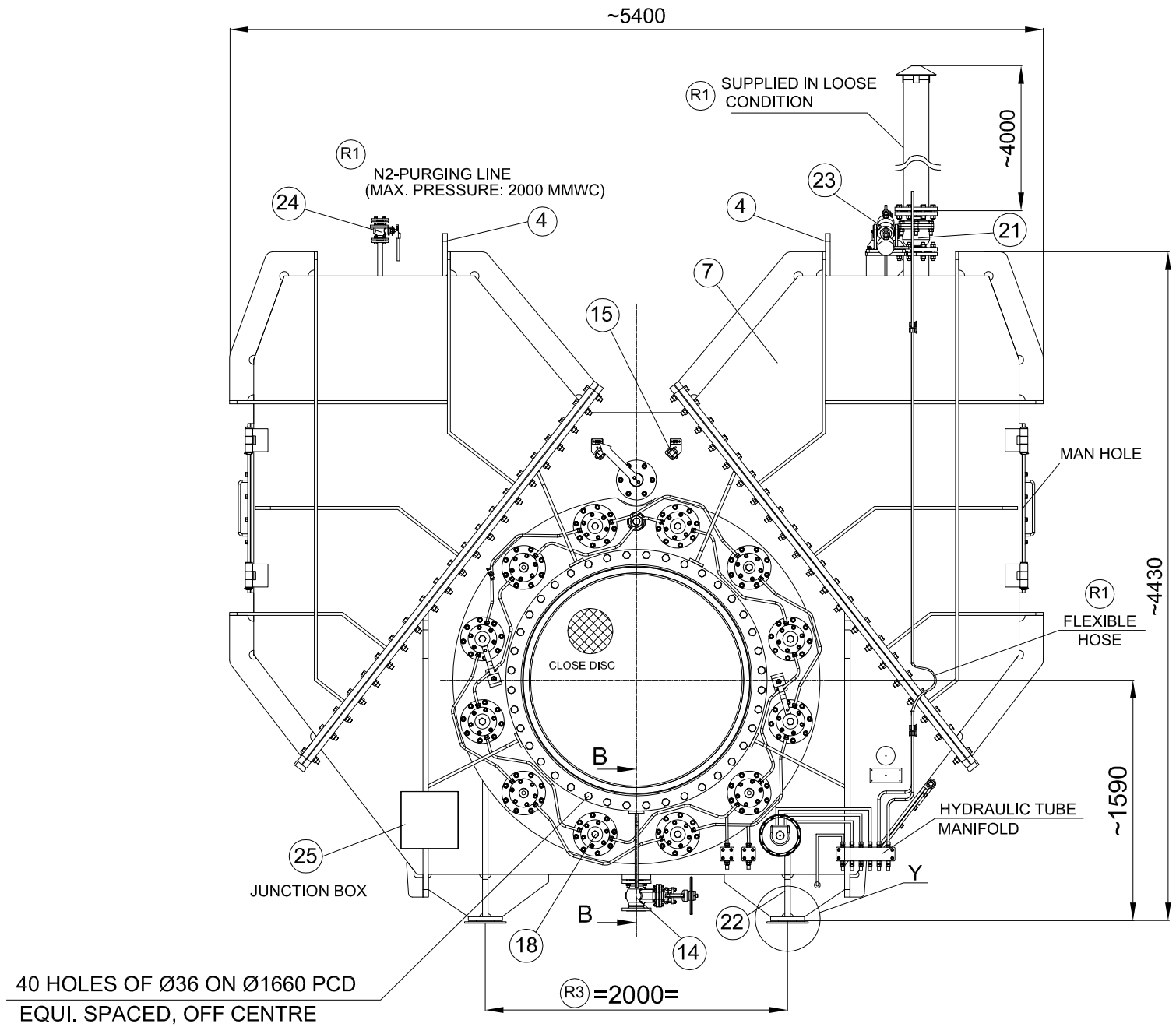
TITLE: G A DRAWING OF BF GAS & CO GAS SYSTEM

DRAWING NO: 0-42-156-U1509

REV: 01

FORM NO. 0427/2

A0 SIZE



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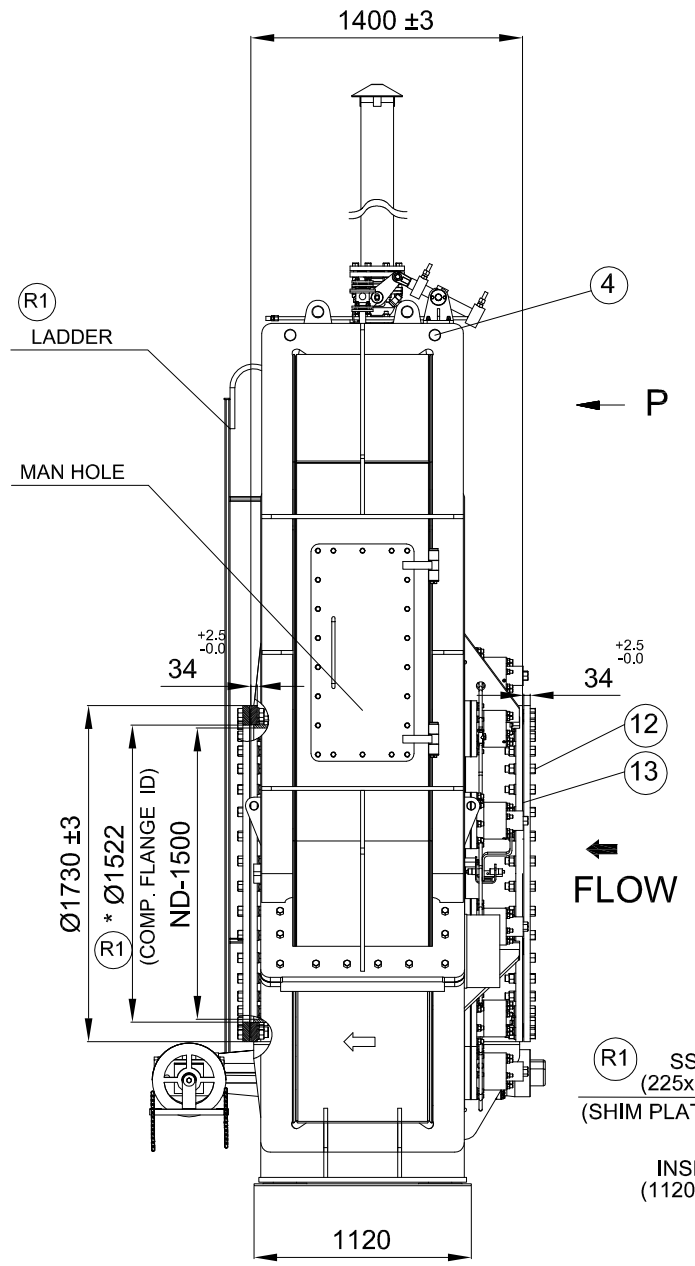
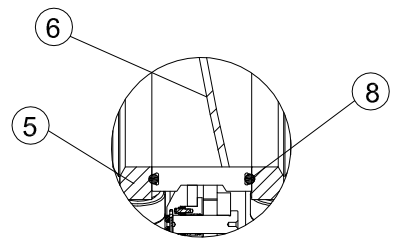
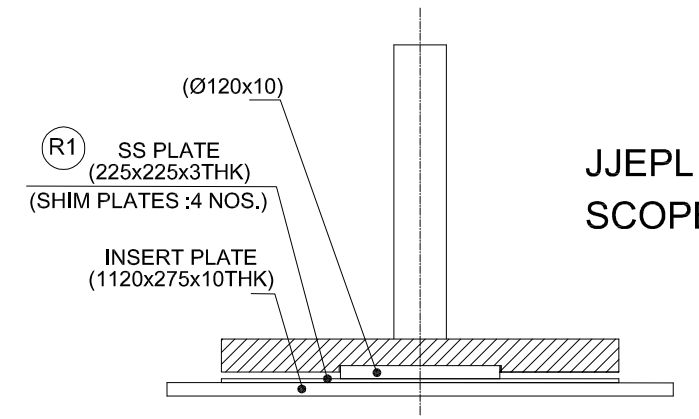
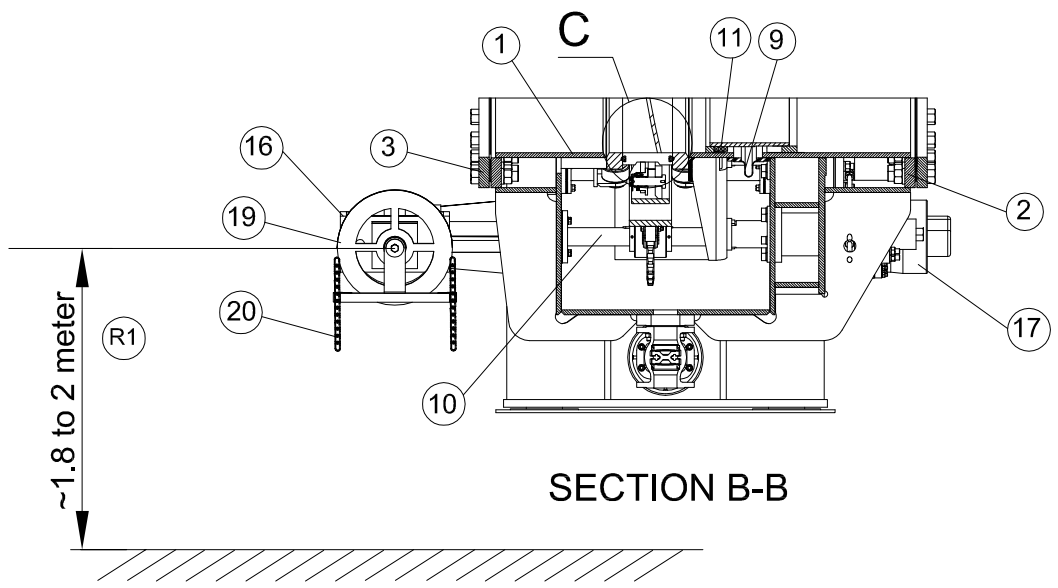




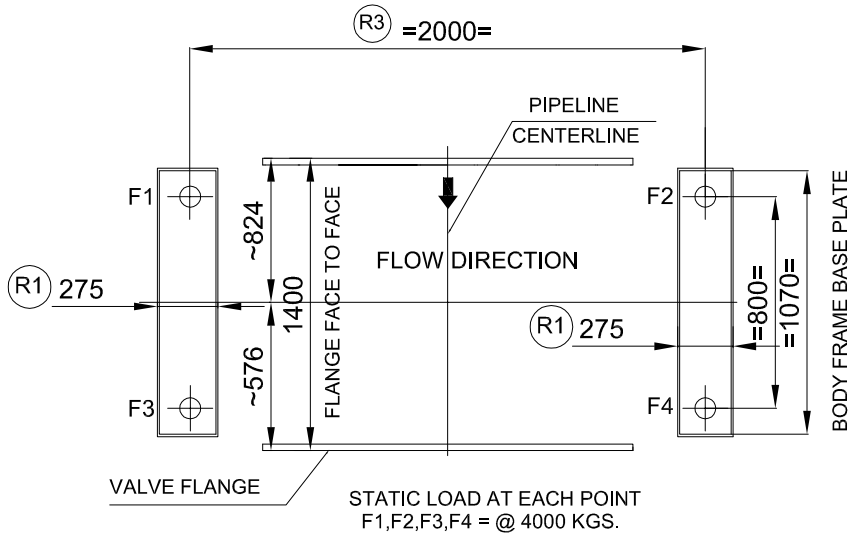
DETAIL C



DETAIL Y



SECTION B-B



STATIC LOAD AT EACH POINT
F1,F2,F3,F4 = @ 4000 KGS.
FOOTPRINT OF FOUNDATION
TOTAL VALVE WEIGHT = APPROX. 15500 KG R1
BONNET WEIGHT = APPROX. 2500 KG R1

NOTE :
1. VALVE SHOULD NOT BE BOLTED/WELDED TO THE PLATFORM SUPPORT. IT SHOULD BE KEPT FREELY SUPPORTED ON PLATFORM /SUPPORT.
R1 2.CUSTOMER CAN ADD STOPPER TO VALVE BOTTOM PLATE AT 5MM DISTANCE.

P.O.NO:- 7000001193
PROJECT NAME: M/s NSPCL BHILAI R1

REV.NO.	DESCRIPTION	BY	DATE
R3	REVISED AS PER CUSTOMER COMMNETS	ADT	12.02.26
R2	REVISED AS PER CUSTOMER COMMNETS	ADT	31.12.25
R1	REVISED AS PER CUSTOMER COMMNETS	ADT	18.12.25

CUSTOMER : M/s. BHARAT HEAVY ELECTRICALS LIMITED.

MATERIAL : REFER PART LIST

TITLE : GENERAL ARRANGEMEMT DRAWING FOR ENCASED ROTARY GOGGLE VALVE ND-1500mm

SCALE NTS

PREPARED BY	ADT	13.12.25
CHECKED BY	BVT	13.12.25
APPROVED BY	JVS	13.12.25

JOSHIJAMPALA ENGINEERING PVT. LTD.
Plot No. M 64 ADDL. M.I.D.C. SATARA
MOB.NO-: +91-7767809107

DRAWING NO- ERGV-1500-P1-R-H-D2-F27-0

REV. NO. R0 R1 R2 R3

WEIGHT ~ 15500KG.

SHEET 1 OF 3

P.O.NO:-7000001193 Dt: 03.12.2025 DATE: 10.12.25

W.O.NO:-01.00.1264.4309.01

TECHNICAL SPECIFICATION		
1	TYPE OF VALVE	ENCASED ROTARY GOGGLE VALVE
2	VALVE NAME	BF GAS ISOLATION VALVE
3	APPLICATION	ON/OFF DUTY
4	INSTALLATION	IN HORIZONTAL MAIN
5	MEDIUM	BF GAS
6	WORKING PRESSURE	500 MMWC (OPE.300-700 MMWC)
7	DESIGN PRESSURE	2000 MMWC
8	DIFF. PRESSURE FOR VALVE OPEN	20 MMWC
9	DIFF. PRESSURE FOR VALVE CLOSED	2000 MMWC
10	WORKING TEMPERATURE	27 °C
11	DESIGN TEMPERATURE	55 °C
12	DIRECTION OF FLOW	UNIDIRECTIONAL
13	DRIVE	FULLY HYDRAULIC
14	CYCLE TIME	< 60 SEC
16	QUANTITY.	1 NO.
17	FLOW RATE	70000 NM3/HR (MAX)
18	TAG NO.	BG-31 A

R2

TABLE NO. 3		
HYDRAULIC CYLINDER DETAILS		
1	TYPE	DOUBLE ACTING, MILL DUTY
2	MOUNTING	INTERMEDIATE TRUNNION MOUNTED
3	BORE DIA.	Ø 50 mm
4	ROD DIA.	Ø 28 mm
5	STROKE	200 mm
6	PORT SIZE	G:1/2"BSP
7	WORKING PRESSURE	170 BAR (G) APPROX
8	DESIGN PRESSURE	250 BAR (G)
9	TESTING PRESSURE	375 BAR(G)
10	MAKE	VELJAN

TABLE - 4		
HYDROMOTOR DETAILS		
1	MODEL	GM1-150-7-H-D47+F10C+R13
2	MAKE	SAI
3	SPECIFIC TORQUE	~17.16 Nm/bar
4	HYD OIL REQUIREMENT	@ 14.3 LPM

R3

TABLE NO. 2 (R2)					
SURFACE PREPARATION & PAINTING SPECIFICATION					
SR. NO	DESCRIPTION	SPECIFICATION	NO. OF COATS	DFT/ COAT	TOTAL DFT IN MICRONS
1	SURFACE PREPARATION	GRIT BLASTING SA2.5	-	-	-
2	PRIMARY PAINT	ALL EXTERNAL FERROUS PARTS SHALL BE PAINTED WITH RED OXIDE ZINC PHOSPHATE (ALKYD BASE)	1	30	30
3	FINAL PAINT	SYN. ENAMEL PAINT (LONG OIL ALKYD) SIGNAL RED SHADE NO- 537 OF IS 5	2	20	40
			TOTAL DFT		70

TABLE NO. 6		
GEAR BOX DETAILS		
1	TYPE	BEVEL GEAR BOX
2	MAKE	AUMA MAKE
3	MODEL	GK 16.1
4	GEAR RATO	4:1
5	MECH. ADVANTAGE	3.5
6	OUT-PUT TORQUE	1000 Nm

TABLE NO. 7	
PROXIMITY LIMIT SWITCH DETAILS MAKE:- P&F / BCH / SICK / EQUI. 24 V DC EXPROOF	
POSITION	QTY
VALVE OPEN	1 NO.
VALVE CLOSE	1 NO.
VALVE CLAMP	1 NO.
VALVE DECLAMP	2 NOS.
VENT VALVE OPEN	1 NO.
VENT VALVE CLOSE	1 NO.
READY FOR AUTOMATION	1 NO.
TOTAL	8 NOS.

TABLE NO. 8	
VALVE OPERATION DETAILS	
CLAMPING	BY PRE-STRESSED DISC SPRING PACK
DE-CLAMPING	BY PRESS & RELEASE ASSEMBLY THROUGH HYDRAULIC POWER PACK
PLATE TRAVEL	THROUGH HYDROMOTOR
VENT VALVE	THROUGH HYDRAULIC CYLINDER
FOR MANUAL OPERATION	CLAMP DE-CLAMP: THROUGH THE MANUAL HAND PUMP PROVIDED ON HYDRAULIC POWER PACK PLATE TRAVEL: THROUGH CHAIN & CHAIN WHEEL

TABLE NO. 9			
MANDATORY SPARES			
SR. NO.	DESCRIPTION	QTY	
R1 1	BEARING FOR MOTOR (EACH TYPE)	2	R2
R1 2	BEARING FOR PUMPS (EACH TYPE)	2	R2

TABLE NO. 2			
TESTING AS PER EN 12266-1			
SR. NO.	DESCRIPTION	TESTING PRESSURE	TIME DURATION	RESULT
1	BODY TEST (PNEUMATIC)	2000 MMWC	3 MINS (R1)	NO LEAKAGE THROUGH WELDS JOINTS & GLANDS
2	SEAT TEST (PNEUMATIC)	770 MMWC	3 MINS (R1)	LEAK RATE A (NO LEAKAGE)
* EXTERNAL STIFFNERS MAY BE APPLIED TO NULLIFY FLANGE DEFLECTION.				

SR. NO.	DESCRIPTION	QTY.	MATERIAL	SPECIFICATION
25	JUNCTION BOX	1	EXPROOF	TRI FLP ENGG./EQUI.
R1 24	PURGING BALL VALVE	1	DN 25, #150 WCB	STANDARD
23	HYDRAULIC CYLINDER	1	REFER TABLE 3	VELJAN
22	MOUNTING SUPPORT	1	CARBON STEEL	IS : 2062 GR. E250BR
21	VENT VALVE (BALL VALVE)	1	DN150,#150 WCB	STANDARD
R1 20	LINK CHAIN	1	STANDARD	5 MTR. ENDLESS
19	CHAIN WHEEL	1	STANDARD	CARBON STEEL/ CI
18	CLAMPING DEVICE	1 SET	STANDARD	JJEPL MAKE
17	HYDROMOTOR- PLATE TRAVEL	1	REFER TABLE 4	SAI / INTERMONT / EQUI.
16	GEAR BOX- PLATE TRAVEL	1	REFER TABLE 6	AUMA INDIA
15	PROXIMITY SWITCH	-	REFER TABLE-7	
R1 14	DRAIN VALVE WITH FLANGE (GATE VALVE)	1	DN 80, #150 WCB	STANDARD
R1 13	GASKET (OD-1620X ID1530X5MM THK)	2	CNAF	120/EQUI.
12	HEX. BOLT, HEX NUT	1 SET	CARBON STEEL	IS:1364 / 1367 CL.10.9/10,8.8/8
11	GLAND PACKING	3	GRAPHITED NON-ASBESTOS ROPE	
R1 10	SHAFT	1	STAINLESS STEEL	ASTM A 479 TYPE 410
R1 9	EXPANSION BELLOW	1	STAINLESS STEEL	ASTM A 240 TYPE 304
8	SEAL	4	ELASTOMER	SILICON / EQUI
7	BONNET TOP COVER	2	CARBON STEEL	ASTM:A516 GR.70
6	DISC PLATE	1	CARBON STEEL	ASTM:A516 GR.70
5	SEAT RING	2	STAINLESS STEEL	ASTM A 240 TYPE 304
4	LIFTING LUG	2 SET	CARBON STEEL	IS : 2062 GR. E250BR
3	COMPANION FLANGE	2	CARBON STEEL	ASTM:A516 GR.70
2	CIRCULAR FLANGE	2	CARBON STEEL	ASTM:A516 GR.70
1	SHELL	1	CARBON STEEL	ASTM:A516 GR.70

BILL OF MATERIALS
TABLE NO. 1

NOTES	
10	DUAL HYDRAULIC CIRCUIT FOR CLAMP& DECLAMPING OPERATION IS PROVIDED.
9	HYDRAULIC OIL/FIRST FILL IS IN JJEPL SCOPE
R1 8	HPP WILL CONSIST OF EXPROOF MOTOR, PUMP & ACCESSORIES. A MANUAL HAND PUMP IS ALSO CONSIDERED IN HPP, TO FACILITATE MANUAL OPERATION IN CASE OF POWER FAILURE.
R1 7	CONTROL PANEL WILL BE EX PROOF, CABLING FROM HPP TO CP WILL BE CONSIDERED 5 MTR CABLING FROM CONTROL PANEL TO JUNCTION BOX WILL BE CONSIDERED 50 MTR ALL CABLES WILL BE SUPPLIED IN LOOSE CONDITION.
6	SUPPLY VOLTAGE TO HPP IS 415 V, 50HZ, 3 PHASE
5	HYD POWER PACK (NORMAL) AND WEATHER PROOF CONTROL PANEL ARE CONSIDERED IN JJEPL SCOPE
4	* COMPANION FLANGE ID IS CONFIRMED BY CUSTOMER.
3	POSITIONS OF STIFFNERS, VENT VALVE & CLAMPING DEVICES,HYDROMOTOR,DRIVES,HYDRAULIC CYLINDERS, ,HYDRAULIC TUBINGS,HYDRAULIC MANIFOLDS, CHAIN AND CHAIN WHEEL,PROXIMITY SWITCHES, BELLOWS, PURGING AND DRAIN VALVE ETC. ARE SHOWN ARE INDICATIVE.
2	FLANGE DRILLING AS PER STANDARD DIN 2501 PN 6. MANUFACTURER'S STANDARD.
1	GENERAL TOLERANCES AS PER ISO-13920-BF /ISO 13920-CG.

P.O.NO:- 7000001193
PROJECT NAME: M/s NSPCL BHILAI (R1)

REV.NO.	DESCRIPTION	BY	DATE
R3	REVISED AS PER CUSTOMER COMMNETS	ADT	12.02.26
R2	REVISED AS PER CUSTOMER COMMNETS	ADT	31.12.25
R1	REVISED AS PER CUSTOMER COMMNETS	ADT	18.12.25

CUSTOMER : M/s. BHARAT HEAVY ELECTRICALS LIMITED.

MATERIAL : REFER PART LIST

TITLE : GENERAL ARRANGEMEMT DRAWING FOR ENCASED ROTARY GOGGLE VALVE ND-1500mm

SCALE : NTS

PREPARED BY	ADT	13.12.25
CHECKED BY	BVT	13.12.25
APPROVED BY	JVS	13.12.25

JOSHIJAMPALA ENGINEERING PVT. LTD.
Plot No. M 64 ADDL. M.I.D.C. SATARA
MOB.NO-: +91-7767809107

DRAWING NO- ERGV-1500-P1-R-H-D2-F27-0

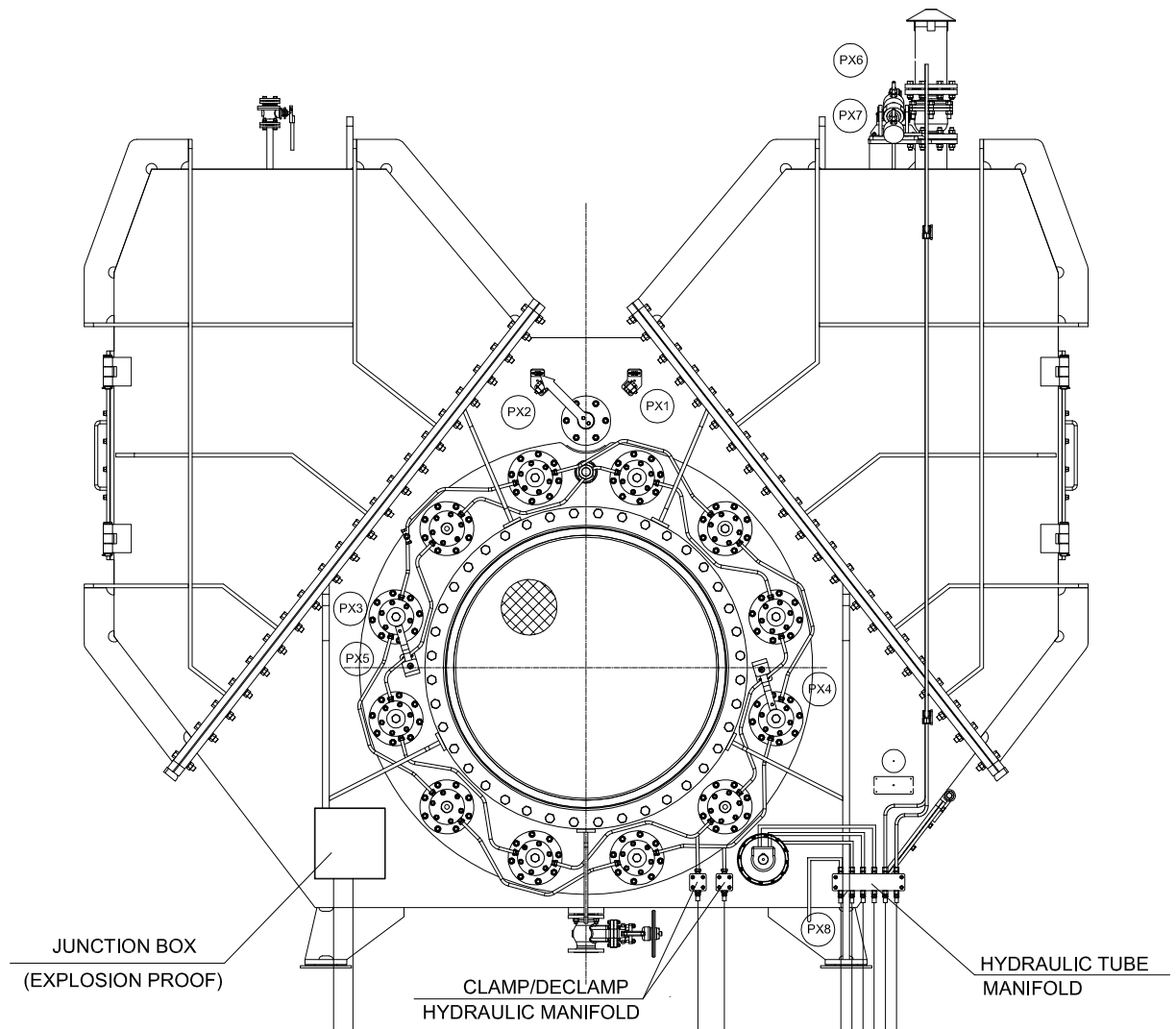
REV. NO. R0 R1 R2 R3

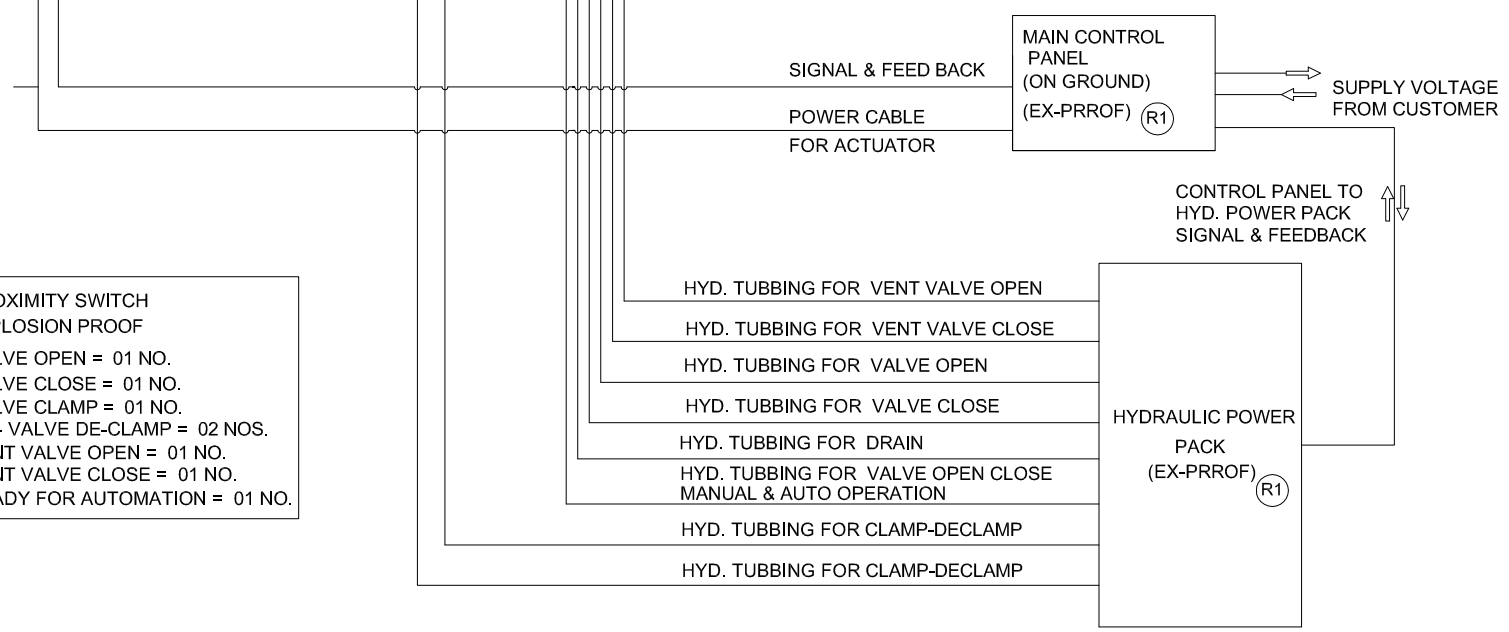
WEIGHT : REFER SHEET 1

SHEET 2 OF 3

P.O.NO:-7000001193 Dt: 03.12.2025 DATE: 10.12.25

W.O.NO:-01.00.1264.4309.01





FEED BACK TO CUSTOMER

1. GOGGLE VALVE OPEN
2. GOGGLE VALVE CLOSE
3. GOGGLE VALVE CLAMP
4. GOGGLE VALVE DECLAMP
5. HPP OIL TEMPERATURE HIGH
6. HPP OIL LEVEL LOW
7. HPP FILTER CLOGGED
8. VENT VALVE OPEN
9. VENT VALVE CLOSE
10. POWER & CONTROL ON
11. EM STOP HEALTHY

LIST OF PROXIMITY SWITCH
24 VDC EXPLOSION PROOF

1) PX1 - VALVE OPEN = 01 NO.
2) PX2 - VALVE CLOSE = 01 NO.
3) PX3 - VALVE CLAMP = 01 NO.
4) PX4,PX5 - VALVE DE-CLAMP = 02 NOS.
5) PX6 - VENT VALVE OPEN = 01 NO.
6) PX7 - VENT VALVE CLOSE = 01 NO.
7) PX8 - READY FOR AUTOMATION = 01 NO.

NOTE: THE VALVE SHOWN ABOVE IS INDICATIVE.

SCOPE OF SUPPLY

JJEPL

1) MAIN HYDRAULIC POWER PACK (EX-PROOF) R1
2) CONTROL PANEL FOR MAIN HYDRAULIC POWER PACK (EX-PROOF) R1
3) 24VDC WEATHERPROOF SOLENOID VALVE WILL BE PROVIDED
4) ELECTRICAL MOTOR FOR HPP IS CONSIDERED AS EX-PROOF R1
5) THIS HPP IS CONSIDEED AS START AS & WHEN REQUIRED.HPP IS NOT DEIGNED FOR 24X7 WORKING
6) HYDRAULIC TUBING 50 METER PER RUN FROM MAIN HYDRAULIC POWER PACK TO MANIFOLD ON THE VALVE, AS A LOOSE SUPPLY
7) ELECTRICAL CABLE BETWEEN JUNCTION BOX TO CONTROL PANEL = 50 MTR. LONG.
8) ELECTRICAL CABLE BETWEEN CONTOL PANEL TO HYD. POWER PACK = 5 MTR. LONG.
9) CABLES FROM ALL PROXIMITY SWITCHES TO JUNCTION BOX.
10) HYDRAULIC TUBING ROUTINE FROM MANIFOLD TO VARIOUS COMPONENTS LIKE HYDROMOTOR, VENT VALVE CYLINDER, CLAMP DECLAMP DEVICE INTERMEDIATE TUBING BETWEEN HPP AND VALVE IS CONSIDERED IN CARBON STEEL MATERIAL. & LENGTH CONSIDERED IS 50 METER PER RUN & WILL BE SUPPLIED IN LOOSE.
11) FOLLOWING HYDRAULIC FITTING
NUMBER OF RUNS = 8 NOS.
a) ELBOW 90° - CARBON STEEL-BOTH END TO SUIT 16 MM OD TUBE-5 NOS PER RUN
b) PIPE CLAMPS - SUITABLE TO 16 MM OD TUBE- 10 NOS PER RUN
c) UNION JOINT - BOTH END TO SUIT 16 MM OD TUBE - 5 NOS PER RUN

CUSTOMER SCOPE:

1) INPUT SUPPLY 415VAC,3 PH, 50 HZS- FOR HYDRAULIC POWER PACK MOTOR
2) WHEN PURGING VALVE WILL OPEN, THE GOGGLE VALVE SHOULD BE IN DECLAMP CONDITION AND VENT VALVE SHOULD BE IN OPEN CONDITION. , AS BODY STRUCTURE IS DESIGNED TO BODY TEST (2000 MMWC) CUSTOMER NEED TO ENSURE

P.O.NO:- 7000001193
PROJECT NAME: M/s NSPCL BHILAI R1

REV.NO.	DESCRIPTION	BY	DATE
R3	REVISED AS PER CUSTOMER COMMNETS	ADT	12.02.26
R2	REVISED AS PER CUSTOMER COMMNETS	ADT	31.12.25
R1	REVISED AS PER CUSTOMER COMMNETS	ADT	18.12.25

CUSTOMER : M/s. BHARAT HEAVY ELECTRICALS LIMITED.

MATERIAL : REFER PART LIST

TITLE : GENERAL ARRANGEMEMT DRAWING FOR ENCASED ROTARY GOGGLE VALVE ND-1500mm

SCALE NTS

PREPARED BY	ADT	13.12.25
CHECKED BY	BVT	13.12.25
APPROVED BY	JVS	13.12.25

JOSHIJAMPALA ENGINEERING PVT. LTD.
Plot No. M 64 ADDL. M.I.D.C. SATARA
MOB.NO-: +91-7767809107

DRAWING NO- ERGV-1500-P1-R-H-D2-F27-0

REV. NO. R0 R1 R2 R3

WEIGHT | REFER SHEET 1

SHEET 3 OF 3

P.O.NO:-7000001193 Dt: 03.12.2025 DATE: 10.12.25

W.O.NO:-01.00.1264.4309.01

JOSHI JAMPALA ENGINEERING PVT. LTD.

Plot No. M-64, Addl. MIDC, Satara, Maharashtra, India. 415004

BILL OF MATERIAL

CUSTOMER :-	BHEL-01.00.1264.4309
APPLICATION	HYDRAULIC POWER PACK FOR ND- 1500- 03 Qty

Drawing No.	SYSTEM PRESSURE IN BAR	SYSTEM FLOW IN LPM	HYDRAULIC FLUID	DATE
RHP-JJPL-ND1500-250-20	200	23 LPM	Oil 68	06.02.2026

Sr	P.NO	DESCRIPTION	MODEL NO	MAKE	QTY	UOM
1		**Oil Tank & Tank Accessories**				
1	1.01	OIL TANK WITH CANOPY (300 LTR) WITHOUT OIL	300 Ltr	RHP	1	Nos
2	1.02	OIL CUM FILLER	FSB-25-BM	HYDROLINE	1	Nos
3	1.03	LEVEL INDICATOR	LG2-05	HYDROLINE	1	Nos
4	1.04	BALL VALVE FOR TANK DRAIN	3/4"	HYDAC	1	Nos
5	1.05	RETURN LINE FILTER WITH CLOGING INDICATOR 10 MICRON	RTF110QBPKG161	PARKER	2	Nos
6	1.06	BALL VALE FOR RETURN LINE FILTER	1/2"	HYDAC	2	Nos
7	1.07	ELECTRICAL JUNCTION BOX FLAME PROOF		TRI-FLP	1	Nos
8	1.08	HYDRAULIC PIPING & FITTING		RHP	1	Nos
9	1.09	HARDWARE & PAINTING		RHP	1	Nos
10	1.10	TEMP. CONTROLLER WITH FLOAT SWITCH	TC1002S	FILPRO	1	Nos
11	1.11	HAND PUMP 13CC		DOWTY	1	Nos
12	1.12	INLINE CHECK VALVE FOR HAND PUMP	CIT-03-30-2080	YUKEN	1	Nos
13	1.13	PRESSURE GAUGE	0-250 Bar	BAUMER	1	Nos
14	1.14	PRESSURE SWITCH	PSM-02	WIKA	1	Nos
15	1.15	FOUNDATION ANCHOR BOLT WITH NUT & WASHER M12	M12 x 75	STD	4	Nos
2		**Motar Pump Assembly**				
16	2.01	Electric Motor 15 HP IE3- Flame Proof	15 HP	CG / ABB	2	Nos
17	2.02	GEAR PUMP 16CC/REV (23 LPM AT 1450RPM)	PGP511A0160CK1H2NE5E381B1	PARKER	2	Nos
18	2.03	BELL HOUSING + COUPLING	15 HP + 1P	LOVEJOY	2	Nos
19	2.04	UNLOADING DIRECTIONAL CONTROL VALVE (EXPLOSION PROOF)	D1VW020BNJEE	PARKER	2	Nos
20	2.05	PRESSURE RELIEF VALVE	BG-03-P-V-32	YUKEN	2	Nos
21	2.06	MANIFOLD BLOCK FOR UNLOADING		RHP	2	Nos
22	2.07	INLINE CHECK VALVE FOR PUMP	CIT-06-50-2080	YUKEN	2	Nos
23	2.08	PRESSURE GAUGE	0 TO 280 BAR	BAUMER	2	Nos
24	2.09	MINIMISE HOSE	1/4 X 6 X 500MM	FIABLE	2	Nos
25	2.10	MINIMISE COUPLING	1/4"	FIABLE	2	Nos
26	2.11	INLINE CHECK VALVE	CIT-06-50-2080	YUKEN	2	Nos

3		**Hydraulic Valve Stack For Actuator**				
27	3.01	NC06 DIRECTION CONTROL VALVE (EXPLOSION PROOF)	D1VW004CNJEE	PARKER	1	Nos
28	3.02	NG06 THROTTLE AND CHECK VALVE	MFCV-3-D-S-N-12	PARKER	1	Nos
29	3.03	NG06 PILOT OPTD CHECK VALVE	MCVP-3-D-N-22	PARKER	1	Nos
30	3.04	HYDRAULIC MANIFOLD BLOCK		RHP	1	Nos
31	3.05	MINIMESS COUPLING	1/4"	FIABLE	2	Nos
32	3.06	HAND LEVEL OPERATED DC VALVE	4DL-06	POLYHYDRON	1	Nos
33	3.07	MANIFOLD BLOCK FOR HAND LEVER DC VALVE		RHP	1	Nos
34	3.08	BALL VALVE	1/2"	HYDAC	2	Nos
35	3.09	PRESSURE RELIEF VALVE	MRV-3-PT-25-S-N-10	PARKER	1	Nos
4		**Hydraulic Valve Stack For Actuator Hydro Motor For Valve Open Close**				
36	4.01	NG06 DIRECTIONAL CONTROL VALVE (EXPLOSION PROOF)	D1VW004CNJEE	PARKER	1	Nos
37	4.02	NG06 THROTTLE AND CHECK VALVE	MFCV-3-D-S-N-12	PARKER	1	Nos
38	4.03	HYDRAULIC MANIFOLD BLOCK		RHP	1	Nos
39	4.04	MINIMESS COUPLING	1/4"	FIABLE	2	Nos
40	4.05	BALL VALVE	1/2"	HYDAC	2	Nos
41	4.06	PRESSURE RELIEF VALVE	MRV-3-PT-25-S-N-10	PARKER	1	Nos
5		**Hydraulic Valve Stack For Actuator Hydraulic Cylinder Chain Wheel**				
42	5.01	NG06 DIRECTIONAL CONTROL VALVE(EXPLOSION PROOF)	D1VW004CNJEE	PARKER	1	Nos
43	5.02	NG06 PILOT OPTD CHECK VALVE	MCVP-3-D-N-22	PARKER	1	Nos
44	5.03	HYDRAULIC MANIFOLD BLOCK		RHP	1	Nos
45	5.04	MINIMESS COUPLING	1/4"	FIABLE	2	Nos
46	5.05	BALL VALVE	1/2"	HYDAC	2	Nos
47	5.06	PRESSURE RELIEF VALVE	MRV-3-PT-25-S-N-10	PARKER	1	Nos
48	5.07	NG06 THROTTLE AND CHECK VALVE	MFCV-3-D-S-N-12	PARKER	1	Nos
6		**Hydraulic Valve Stack For Vent Valve**				
49	6.01	NG06 DIRECTIONAL CONTROL VALVE(EXPLOSION PROOF)	D1VW004CNJEE	PARKER	1	Nos
50	6.02	NG06 PILOT OPTD CHECK VALVE	MCVP-3-D-N-22	PARKER	1	Nos
51	6.03	HYDRAULIC MANIFOLD BLOCK		RHP	1	Nos
52	6.04	MINIMESS COUPLING	1/4"	FIABLE	2	Nos
53	6.05	BALL VALVE	1/2"	Hydac	2	Nos
54	6.06	PRESSURE RELIEF VALVE	MRV-3-PT-25-S-N-10	PARKER	1	Nos
55	6.07	NG06 THROTTLE AND CHECK VALVE	MFCV-3-D-S-N-12	PARKER	1	Nos

BORE 125 X ROD 63 X STROKE 25 MM
QTY. 12 CYLINDERS OPERATING PRESSURE 120 -250 BAR
SPEED CLAMP 5-10 SEC
SPEED DE-CLAMP 5-10 SEC

CLAMP
DECLAMP

HYDRO MOTOR + BRAVE
14.3 LPM
175 BAR

CHAIN WHEEL CYLINDER
120 X 56 X 25
QTY.01 CYLINDER

VENT VALVE
OPEN / CLOSE
50 X 28 X 200
QTY.01 CYLINDER

HYDRAULIC DISC BRAKE

1. Oil Tank Capacity : 300 Litres
   Material : IS 2062 , GRADE B
   C channels : IS 15911:2010
   Mounting Plate and Lifting Hook : Mild Steel Plates(IS 2062)
2. Pump (Wt) : 51 kg (Approximate)
3. Electric Motor 15HP (Wt) : 90 Kg (Approx)
4. Total Weight of bell-housing (Wt) : 9 kg (Approx)
5. Total Weight of HPU (Wt) : 1350 kg (Approx)
6. RAL NO. 5015
7. Oil grade .VG 68

TERMINATIONS:
A1,A2,A3,B1,B2: G3/4 FEMALE THREADING
B3 : BLIND PLUGGED
HYDROMOTOR DRAIN PORT : D1 G1/2BSPP

PRESSURE GAUGE 0-250 BAR

Set at 200 bar

WORKING Q=~23 lpm p=200 bar n=1450 rpm P=15 HP

OIL TANK CAPACITY : 300 LITRES
MATERIAL : MS

ELECTRICAL JUNCTION BOX

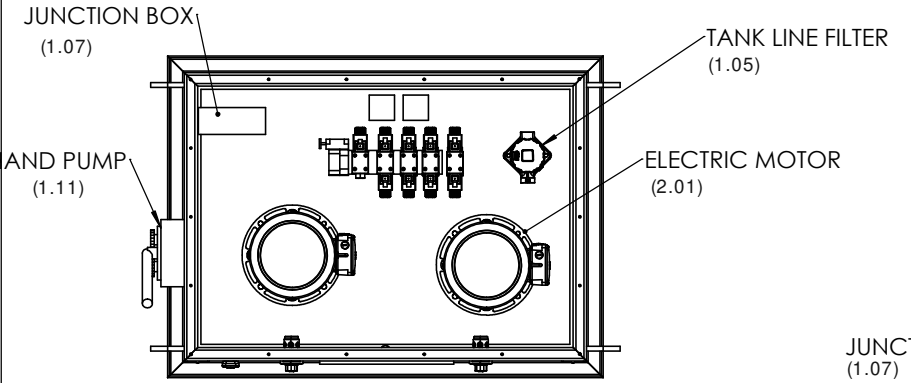
LOW LEVEL
LOW-LOW LEVEL

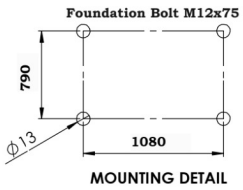
NOTES
SYSTEM WORKING PRESSURE : 200 BAR
SYSTEM TEST PRESSURE : 250 BAR (BY EXTERNAL SOURCE)
PUMP FLOW : 23 LPM AT 1450 RPM
ELECTRIC MOTOR : 15 HP
HYDRAULIC OIL GRADE : VG 68
ALL SOLENOID VOLTAGE 24V DC AND PUG IN CONNECTOR.
ALL ELEMENTS TO IDENTIFIED ANODISED AL. NUMBER PLATES.
FITTING UPTO 20mm O.D : WELD NIPPLE WITH 'O' RING.
TUBES SHALL BE CLEANED BY PICKLING ETC. OILED AFTER FABRICATION.
TUBES SHALL BE CLEANED BY PICKLING ETC. OILED AFTER FABRICATION.
TUBES TO BE FULLY TIG WELDED.
SEAMLESS PIPES CARBON STEEL , UPTO 20mm O.D

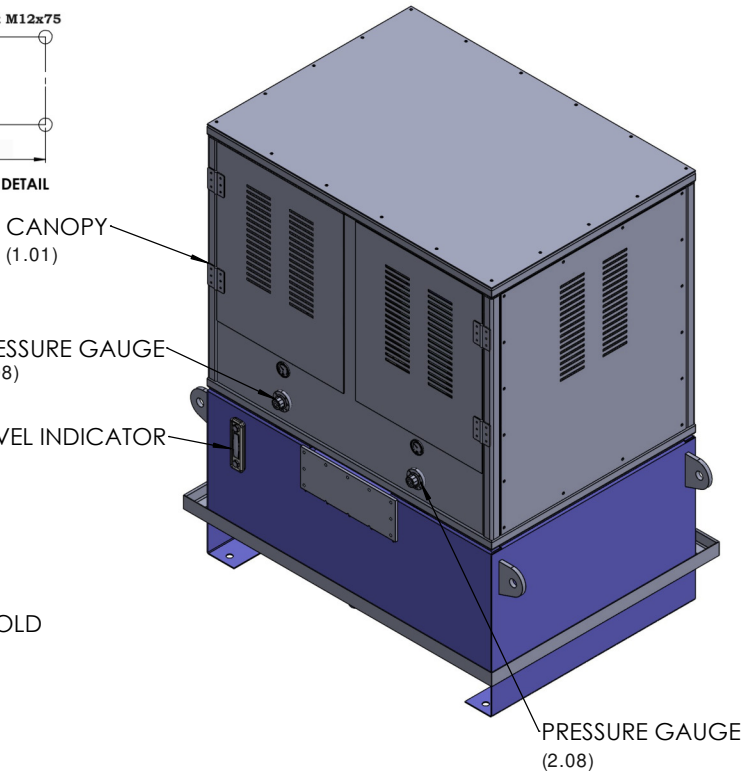
JoshiJampala Engineering Pvt. Ltd.
Industrial equipment supplier
Satara, Maharashtra, India

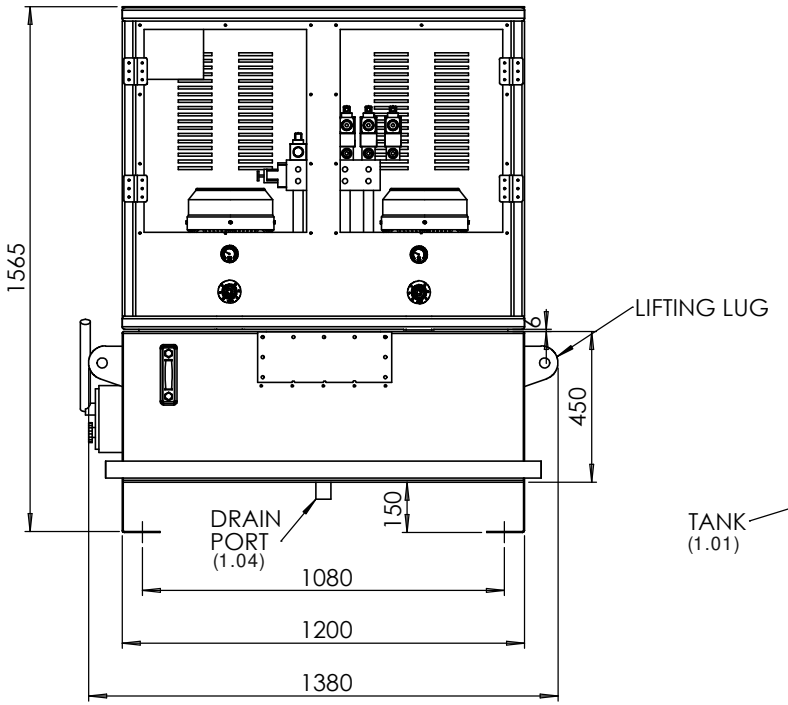
SECTION	MECHANICAL				
LOCATION	Satara				
DESIGNED	VVK				
DRAWN	VVK				
CHECKED AND VERIFIED	GAM				
APPROVED	SIG.	CUST. NAME - BHEL	SCALE– 1:1	SHEET	REV.
	DATE–	DRG.No. RHP-JJPL-ND1500-250-20		1 OF 4	R1

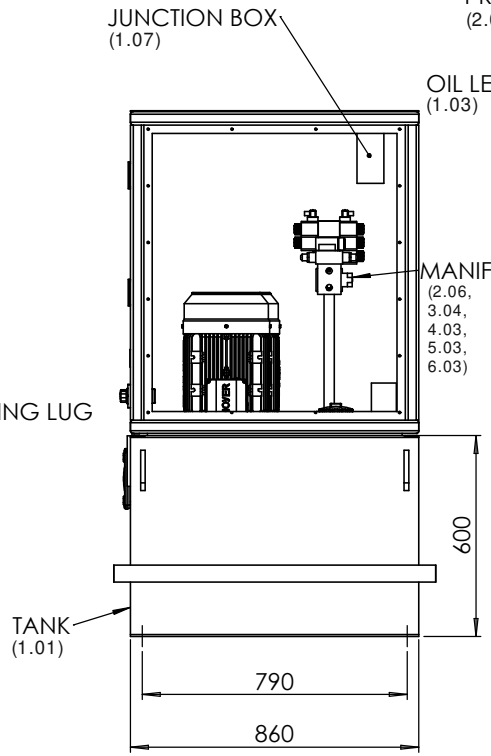
FSR-25











MOC :- M.S.SHEET
APPRX. WT. :- 1500 KG.

1)ALL DIAMENSIONS ARE IN mm.
2)ALL SHARP CORNERS ARE REMOVED.
3)NOT MENTIONED CHAMFER IS 1.5X45°
4)IF THERE IS ANY DOUBT PLEASE FEEL FREE TO ASK.
5)WELDING SHOULD BE UNIFORM IF ANY.
6) ALL PARTS SHOWN ARE INDICATIVE.

GENERAL TOLERANCES

DIM.	FABRICATION	MACHINING	DIM.	FABRICATION	MACHINING
0-10	±0.5	±0.1	501-1000	±3.0	±0.8
11-50	±0.5	±0.2	1001-3000	±5.0	±1.2
51-100	±1.5	±0.3	< 3000	±7.0	±2.0
101-500	±2.0	±0.5			

	NAME	SIGN.	DATE
DRAWN			
CHK'D			
APPV'D			

TYPES OF MACHINING: CLEANS UP; ROUGH MACHINING; FINISH MACHINING; GRINDING & POLISHING

REVISION HISTORY

REV- 00		

MATERIAL:

W.O. NO.- 01.00.1203

WEIGHT:

JOSHIJAMPALA ENGINEERING PVT. LTD

TITLE: **HYD. POWERPACK GA DWG. 250 LTR**

DWG NO. **RHP-JJPL-ND1500-250-20**

CLIENT **BHEL**

A3

SCALE:1:10

SHEET 3 OF 3

Quality Assurance Plan												
JoshiJampala Engineering Pvt.Ltd. **Plot No. M-64, Addl. MIDC, Satara, Maharashtra.**				**ITEM**	**Hydraulic Power Pack Standard QAP** **For ND 1500 Rotary Goggle Valve**							
Sr.no.	Item	Characterstics	Class	Type Of Check	Freq	Reference Document	Acceptance Norms	Format Of Record	RHP	JJEPL	BHEL	Remark
1	2	3	4	5	6	7	8	9	10			11
1	Seamless Pipe	Visual Dimensional Material	Major	Visual Review Of TC (Mechanical & Chemical)	100%	As Per Relevant Drawing / Standard	As Per Relevant Drawing	Supplier TC	p	v	v	
2	Manifold Block	Visual Material Internal Flaw	Major	Visual Review Of TC (Chemical) UT	100%	As Per Relevant Drawing / Standard	As Per Relevant Drawing	Supplier TC	p	v	v	
3	Tank	Visual Leak Test Material	Major	Visual Leak Test Review Of TC (Chemical)	100%	As Per Relevant Drawing / Standard	As Per Relevant Drawing	Supplier TC	p	v	v	
4	Fabcricated Part	Visual Dimensional	Major	Visual Measurement	100%	As Per Relevant Drawing / Standard	As Per Relevant Drawing	Supplier TC	p	v		
5	Bought Out Part											
5.1	Motor	Visual Performance	Major	Visual Testing	100%	Tech Spec	Tech Spec	Routine TC	P	V	V	
5.2	Pressure Gauge / Temp. Gauge	Visual	Major	Review OF TC	100%	Tech Spec	Tech Spec	Supplier TC	P	V	V	
5.3	Pump DC Valve	Visual	Major	Verfication	100%	Approved BOM	Comply With Order	Supplier TC	P	V	V	
6	Final Insp. & Testing	Leakage Test Pressure Test Performance Completeness Overall Dimension	Critical	Inspection & Testing	100%	Circuit &GA Drawing , BOM	Circuit &GA Drawing , BOM	TC & IR	P	W	V	
Prepared By							Abbreviation	P - PerForm W - Witness V - Verification				

CG Power and Industrial Solutions Limited

LT Motors Division
Ahmednagar

Apex IE3

DATA SHEET OF 3 PHASE INDUCTION MOTOR

Customer: MAKHARIA MACHINERIES PVT LT	Project: NA	Enqury Reference:	
Basic Cat Ref No: 11PF4FLG		Date: 20-Jan-2026	
Frame	E160L	Rated Output (kW)	11
Voltage (V)	415 +-10%	Rated Current (A)	20.00
Rated Speed (RPM)	1470	No of poles	4
Frequency (Hz)	50 +-5%	Duty	S1
Method of Cooling	IC411	Degree of Protection	IP55
Gas Group	IIA,IIB	Mounting	B5
Temp Class	T4		
Enclosure	Flame Proof Enclosure Zone I		
Load	100% Load	75% Load	50% Load
Efficiency	IE3 - 91.4 %	92 %	91 %
Power factor	0.83	0.78	0.70
AMB. Temp/Temp rise	50°C/70°C (By Resistance Method)		
Insulation class	F (Temp. rise limited to class 'B')		
Rated Torque (kg-m)	7.29		
Pull out torque % FLT	250		
Method of starting	Direct On Line		
Locked rotor current % FLC	600		
Starting torque % FLT	200		
Locked rotor Withstand time hot (Sec.)	10		
Locked rotor Withstand time cold (Sec.)	20		
Winding connections	Delta		
No of terminals	6		
Direction of rotation	Bidirectional		
Motor GD Sq. (kg-m²)	0.28		
Load GD Sq Assumed. (kg-m²)	0.28		
Stator Thermal / Cooling time constant (min)	30 / 60		
Terminal box position	RHS From DE		
Cable size	2 * 3C,25-MM²		
Bearing DE/NDE	6309-2Z-C3 / 6309-2Z-C3		
Type of lubrication	Sealed Bearing. No Lubrication Required		
Shaft Material	EN8 OR C40	Stator Body Material: Cast Iron	
Net Weight (Approx.) kg	188		
Paint shade	RAL5021 Epoxy Water blue		
Applicable standards	IS/IEC 60079-0, IS/IEC 60079-1		

All performance data is subject to tolerance as per IS/IEC 60034. Noise as per IEC60034-9 & Vibration as per IEC60034-14
Minimum starting voltage 80% of rated voltage for application like pump, fan etc.
Motor is capable of operating satisfactorily at full load at 70% rated voltage for 5 sec .
Motor is capable of withstanding the stresses imposed if started at 110% of rated voltage .
Motor is suitable for 2 hot / 3 cold with 4 equally spread start per hr considering load GD2 less than equal to motor GD2.

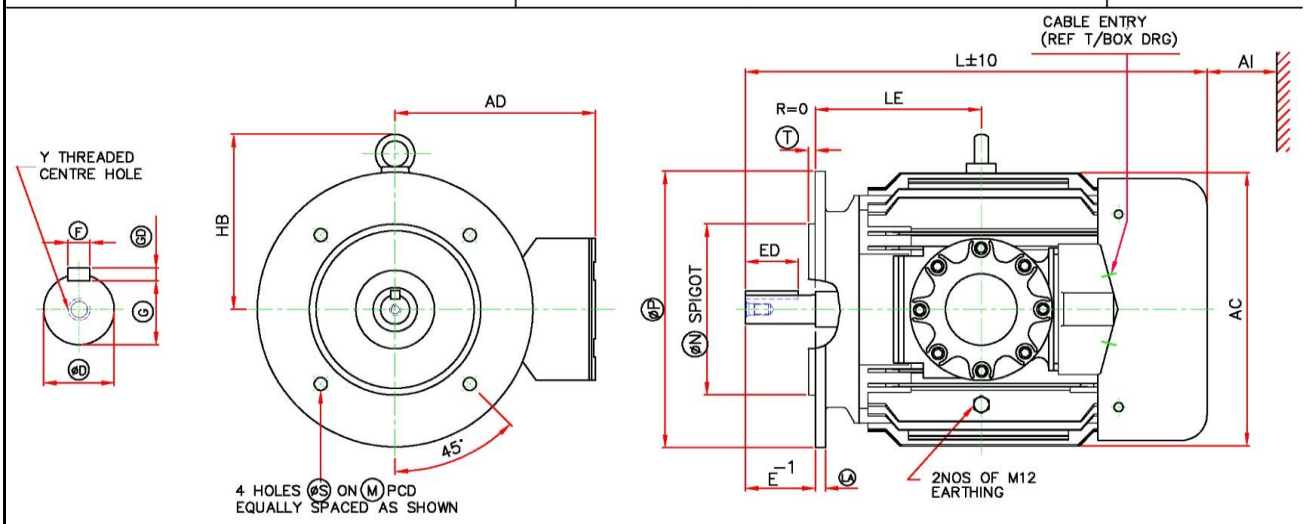
Motor is suitable for sudden application of 150% rated voltage during bus transfer.
Motor overspeed capacity 120% for 2 minutes.
Motor overload capacity for 160% for 15 sec .

Issued By :		Amruta kolekar	

DIMENSION DRAWING OF 3 PH SQUIRREL CAGE TEFC FLAME PROOF (GROUP IIA/IIB) INDUCTION MOTOR

PROJECTION

DO NOT SCALE | PLEASE ASK, IF IN DOUBT



FRAME	FLANGE FIXING						OVER ALL					MOTOR wt (kg)	AI**
	M TOL	N TOL	P	S	T	LA	AD	AC	L	LE	HB		
E160L	300.5 / 299.5	250.016 / 249.987	350	19	5	18	340	320	655	235	215	188	90

D END SHAFT EXTENSION AND KEY						
D TOL	E	ED	F TOL	GD TOL	G	Y
42.018 / 42.002	110	80	12.00 / 11.957	8.0 / 7.9	37.0 / 36.8	M16X32

NOTES

TERMINAL BOX CAN BE ROTATED IN 360 DEG @90 DEG.
ONE EARTHING TERMINAL IS PROVIDED INSIDE MAIN TERMINAL BOX.
**MINIMUM DISTANCE FOR EFFICIENT COOLING OF MOTOR TO BE MAINTAINED BY USER

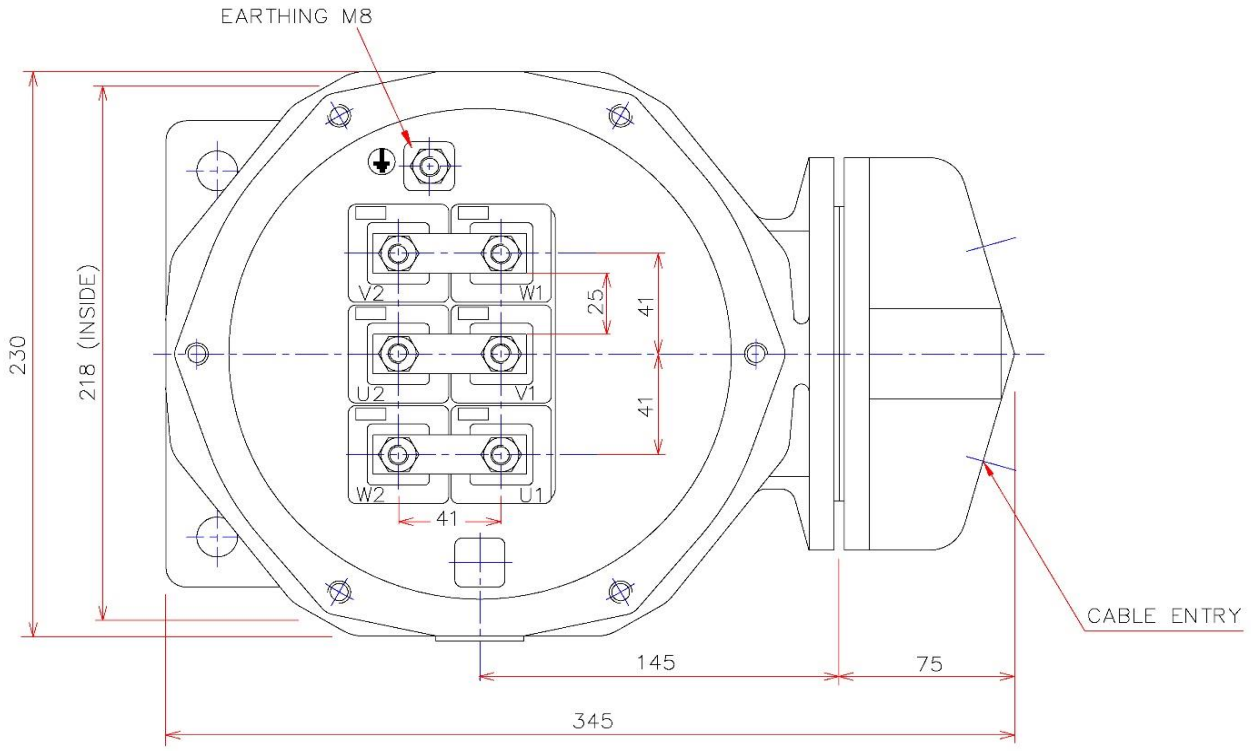
TEST REPORT NO:ERTL(E)/TES/C299/0015/08-22/NABL

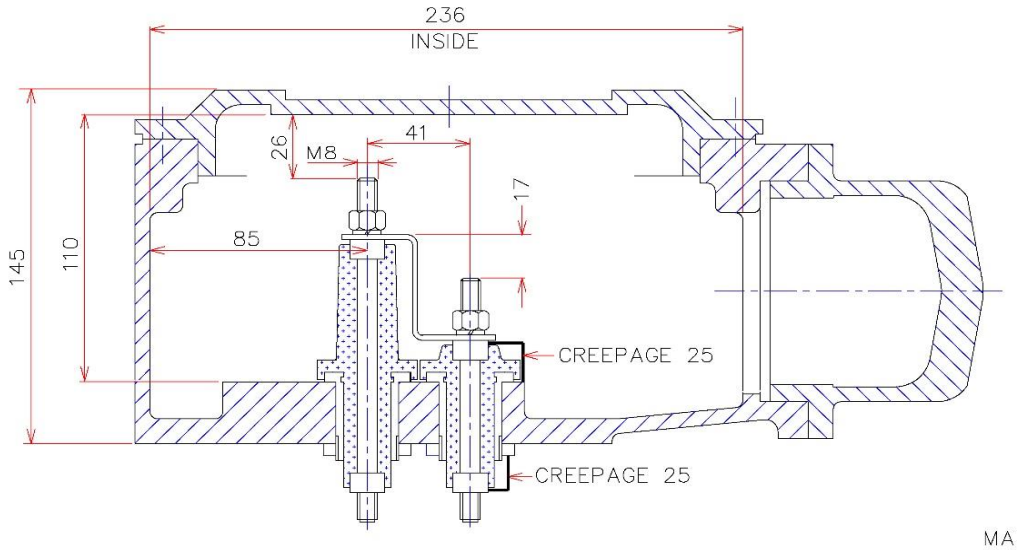
PESO APPROVAL NO: A/P/HQ/MH/104/8126(P591980)

ALL DIMENSIONS ARE IN mm				Rev. 1 Dt:		
RINGED DIMENSIONS ARE AS PER IS:1231/IEC60072				Rev. 2 Dt:		
CUSTOMER	MAKHARIA MACHINERIES PVT LTD		RATED O/P kW	11	NO OF POLES	4
ENQ REF			FRAME	E160L	MAIN CABLE SIZE	2 * 3C,25-MM²
CATREF	11PF4FLG		MOUNTING	B5 (HORIZONTAL FLANGE)		
CLIENT			TAG NO.			
PROJECT	NA					
	NAME	DATE	REMARKS	TITLE		
DRN	SBK	20-Jan-26		**DIMENSIONAL DRAWING**		
CHD	SB	20-Jan-26				
APPROVED	SA	20-Jan-26				

CG Power and Industrial Solutions Limited
LT Motors Division
Ahmednagar

DRG NO
E160LB5R4
REV 0





MATERIAL OF T/BOX
CAST IRON

MAIN CABLE SIZE	2 * 3C,25-MM²		**CABLE ENTRY**	M25X1.5P 2-Nos.	
CUSTOMER	MAKHARIA MACHINERIES PVT LTD			RATED O/P kW	11
ENQ REF				NO OF POLES	4
CATREF	11PF4FLG			FRAME	E160L
CLIENT					
PROJECT	NA				
	NAME	DATE	ALL DIMENSIONS ARE IN MM UNLESS OTHERWISE SPECIFIED		
DRAWN BY	SBK	1/20/2026	**TITLE :**		
CHECKED BY	SB	1/20/2026	TERMINAL BOX ARRANGEMENT		
APPROVED BY	SA	1/20/2026			

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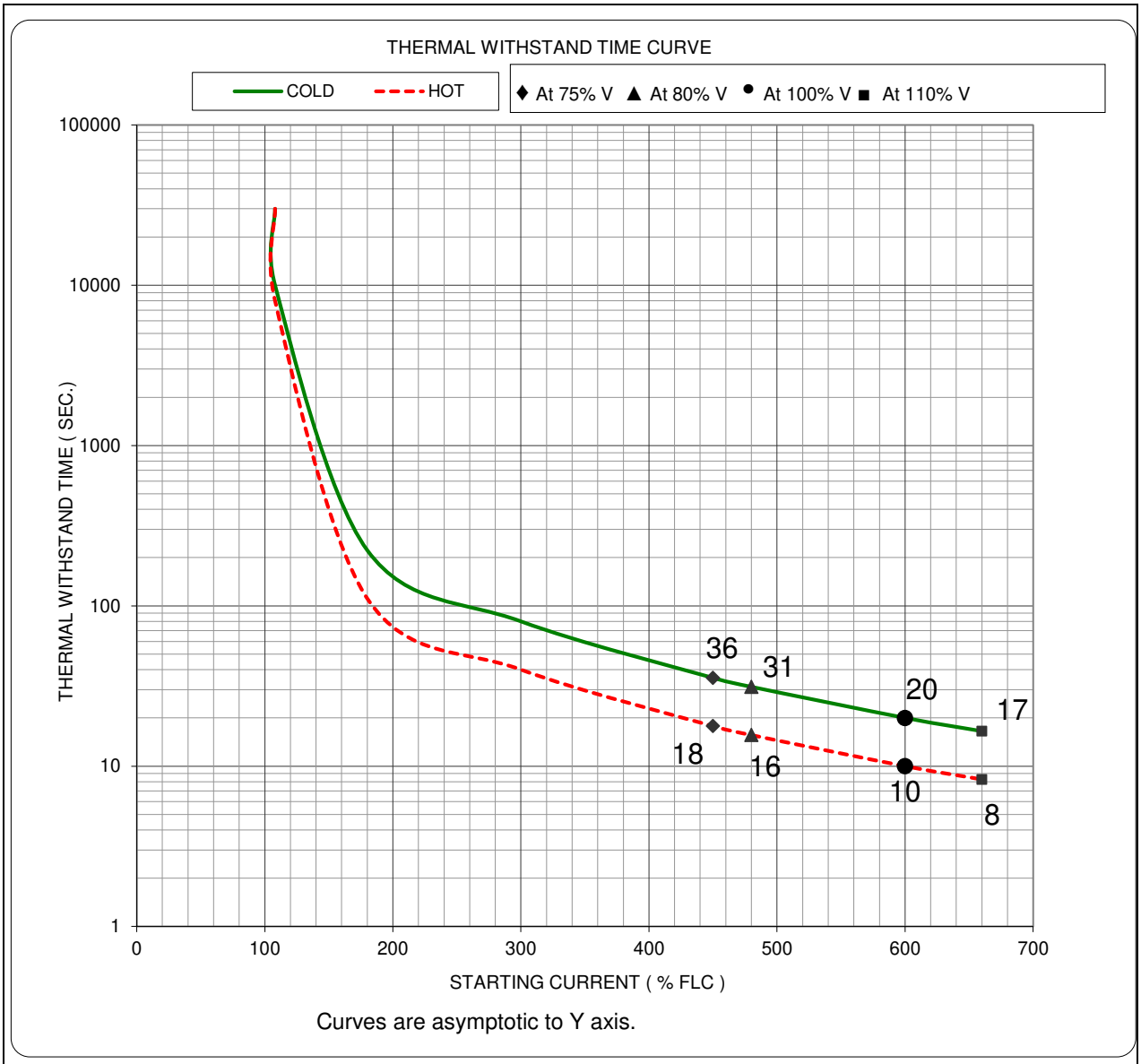
EA2591R2

DRG No :



Curves are asymptotic to Y axis.

CUSTOMER	MAKHARIA MACHINERIES PVT LTD			RATED O/P kW	11
ENQ REF	0			NO OF POLES	4
CATREF:	11PF4FLG			FRAME	E160L
CLIENT:	-			TAG NO.	0
PROJECT:	NA				
	NAME	DATE	TITLE		
DRN	VSR	20-Jan-26	THERMAL WITHSTAND TIME CURVE		
CHD	PLP	20-Jan-26			
APPROVED	SB	20-Jan-26	SC10/20/600		

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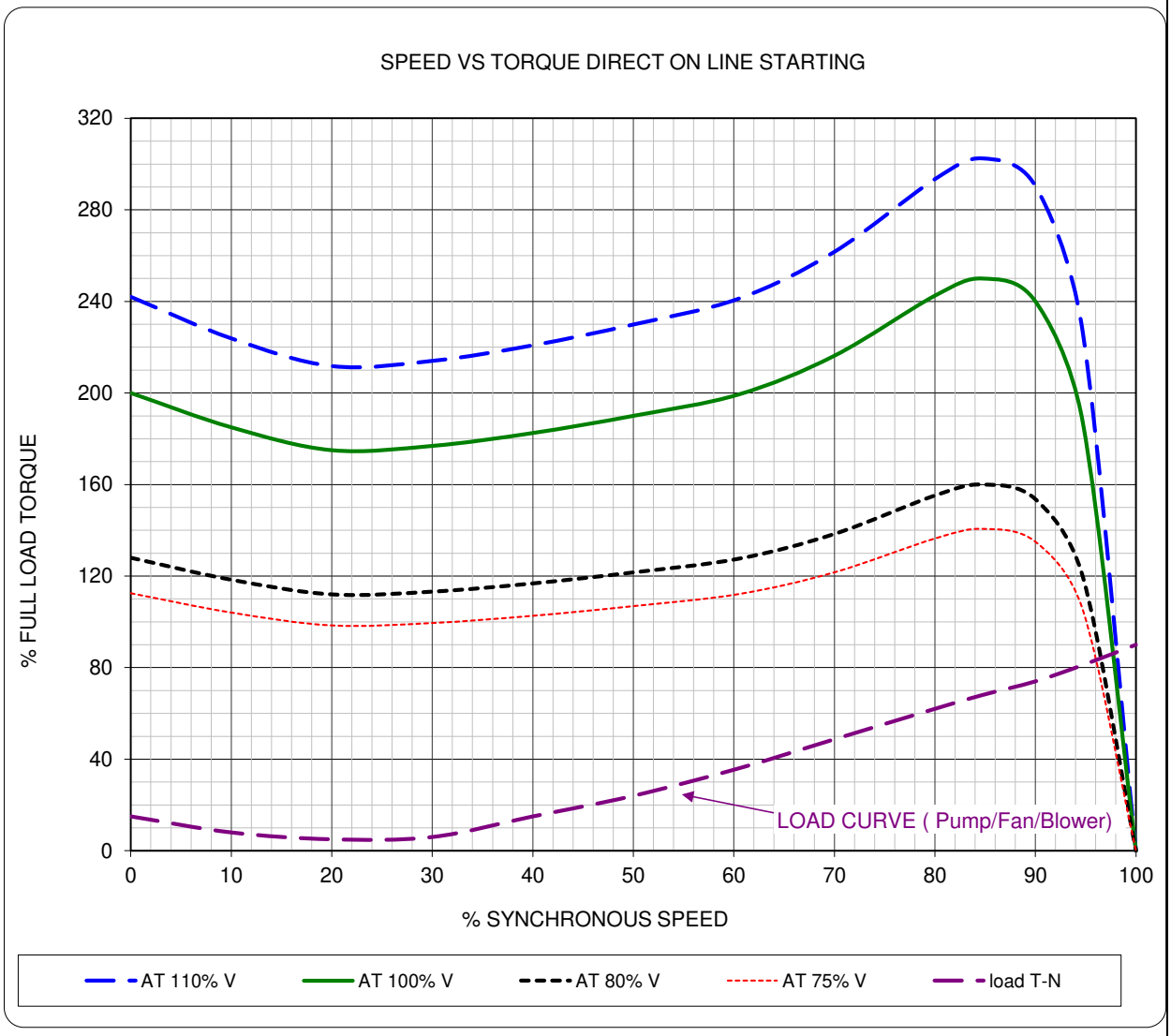
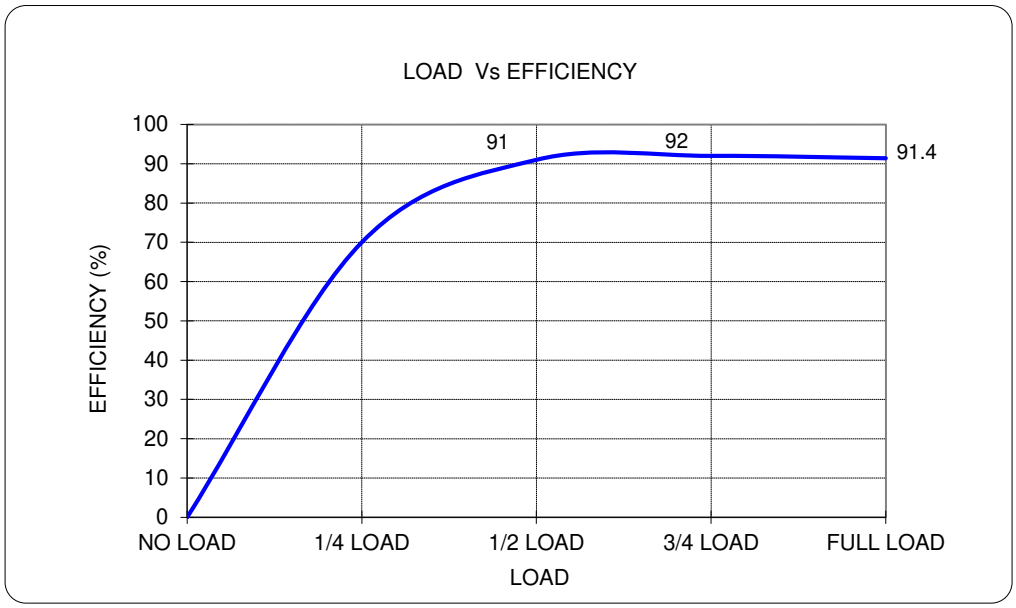
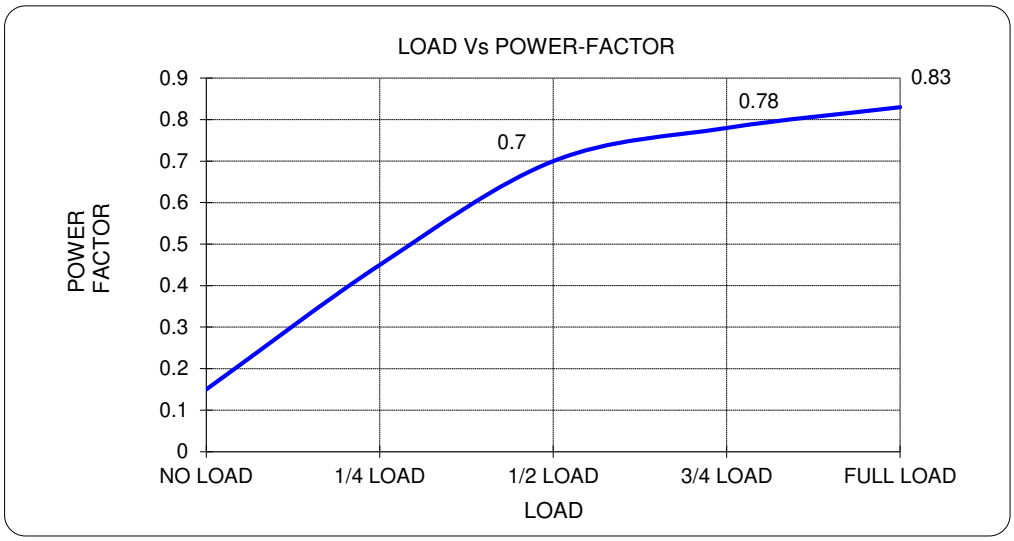
Ahmednagar



CUSTOMER	MAKHARIA MACHINERIES PVT LTD			RATED O/P kW	11
ENQ REF	0			NO OF POLES	4
CATREF:	11PF4FLG			FRAME	E160L
CLIENT:	-			TAG NO.	0
PROJECT:	NA				
	NAME	DATE	TITLE		
DRN	VSR	20-Jan-26	SUPERIMPOSED TORQUE SPEED CURVE		
CHD	PLP	20-Jan-26			
APPROVED	SB	20-Jan-26	SC200/600		

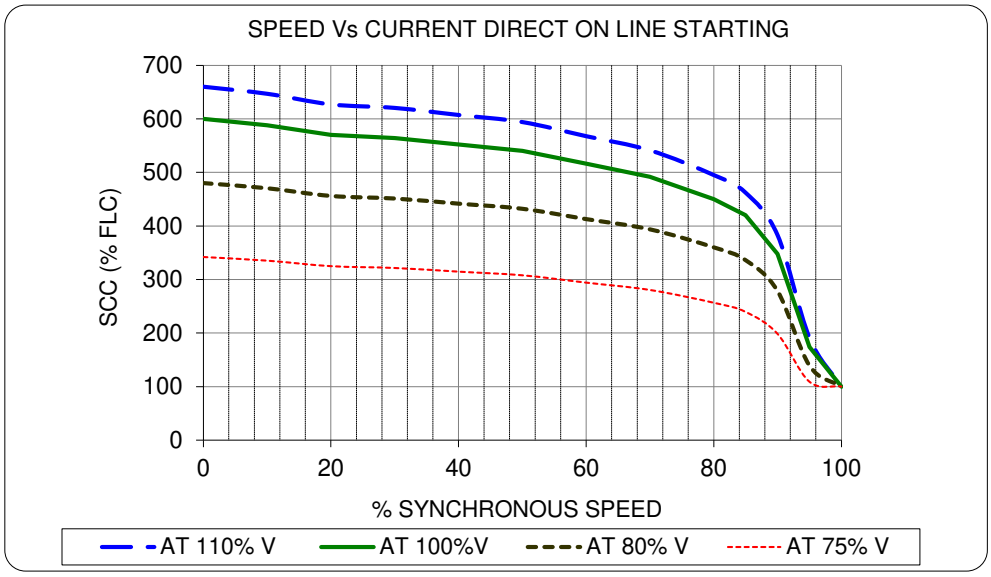
CG Power and Industrial Solutions Limited
LT Motors Division
Ahmednagar

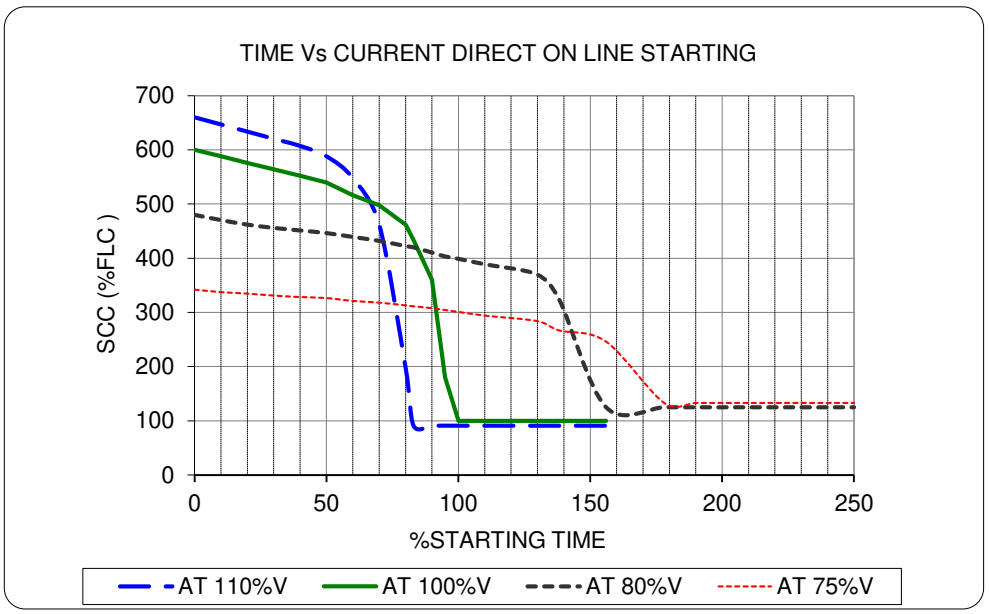




CUSTOMER	MAKHARIA MACHINERIES PVT LTD			RATED O/P kW	11
ENQ REF	0			NO OF POLES	4
CATREF:	11PF4FLG			FRAME	E160L
CLIENT:	-			TAG NO.	0
PROJECT:	NA				
	NAME	DATE	TITLE		
DRN	VSR	20-Jan-26	LOAD Vs EFFICIENCY & POWER FACTOR CURVE		
CHD	PLP	20-Jan-26			
APPROVED	SB	20-Jan-26	SC91.40/0.83		

CG Power and Industrial Solutions Limited
LT Motors Division
Ahmednagar





CUSTOMER	MAKHARIA MACHINERIES PVT LTD			RATED O/P kW	11
ENQ REF	0			NO OF POLES	4
CATREF:	11PF4FLG			FRAME	E160L
CLIENT:	-			TAG NO.	0
PROJECT:	NA				
	NAME	DATE	TITLE		
DRN	VSR	20-Jan-26	CURRENT SPEED & CURRENT TIME CURVE		
CHD	PLP	20-Jan-26			
APPROVED	SB	20-Jan-26	SC1470/100		

CG Power and Industrial Solutions Limited
LT Motors Division
Ahmednagar

A Polyhydron Group Company

LEVER OPERATED DIRECTION CONTROL VALVE
Model : DL06*****11

Ref. No. D 09497
Release 03 / 2022

Description

Completely encapsuiated mechanism for protection against dirt. Five chember design for better reduction in dynamic force and longer valve life.

Valve mounting interface confirms to ISO 4401-03-02.

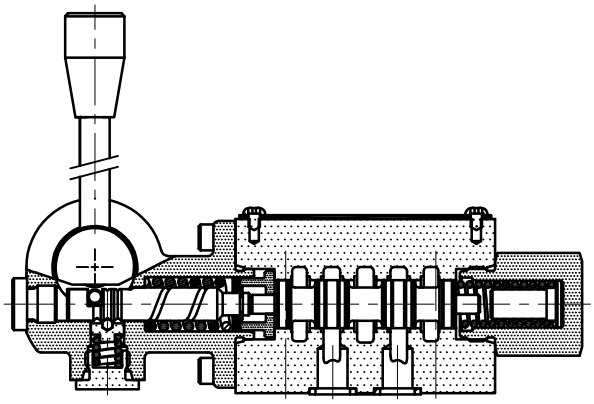
Mounting style - Subplate body. Available as spring centred, spring off-set or detented model.

Operting Head can be rotated by 90° x 4 around spool axis for flexibility in mounting.

Hand lever can also be assembled, so that it is parllel to the axis at valve's netrual position.

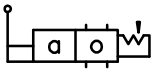
All spool and bodies are interchangable, simplifying maintence.

Section

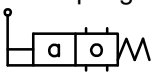


Hydraulic symbol

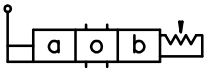
2 position detented



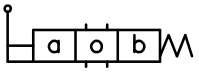
2 position spring offset



3 position detented



3 position spring centred



Technical specifications

Construction	:	Spool type.
Mounting / Standard	:	Subplate body. Interface as per ISO 4401 - 03 - 02
Mounting position	:	Optional, horizontal spool axis preferred.
Flow direction	:	As per spool type .
Maximum operating pressure	:	For port P, A, and B.....315 bar. (Standered valve) For port T.....100 bar. Pressure drop in the tank line adversely affect the returning speed of the cylinder, Hence must be kept as low as possible
Hydraulic medium	:	Mineral oil.
Viscosity range	:	10 cSt to 380 cSt.
Fluid temperature range	:	-20°C to +70°C.
Fluid cleanliness requirement	:	ISO 4406 20/18/15 or better.
Nominal flow handling capacity	:	refer performance curve.
Flow direction	:	Refer spool chart.
Mass (approx)	:	1.5 kg

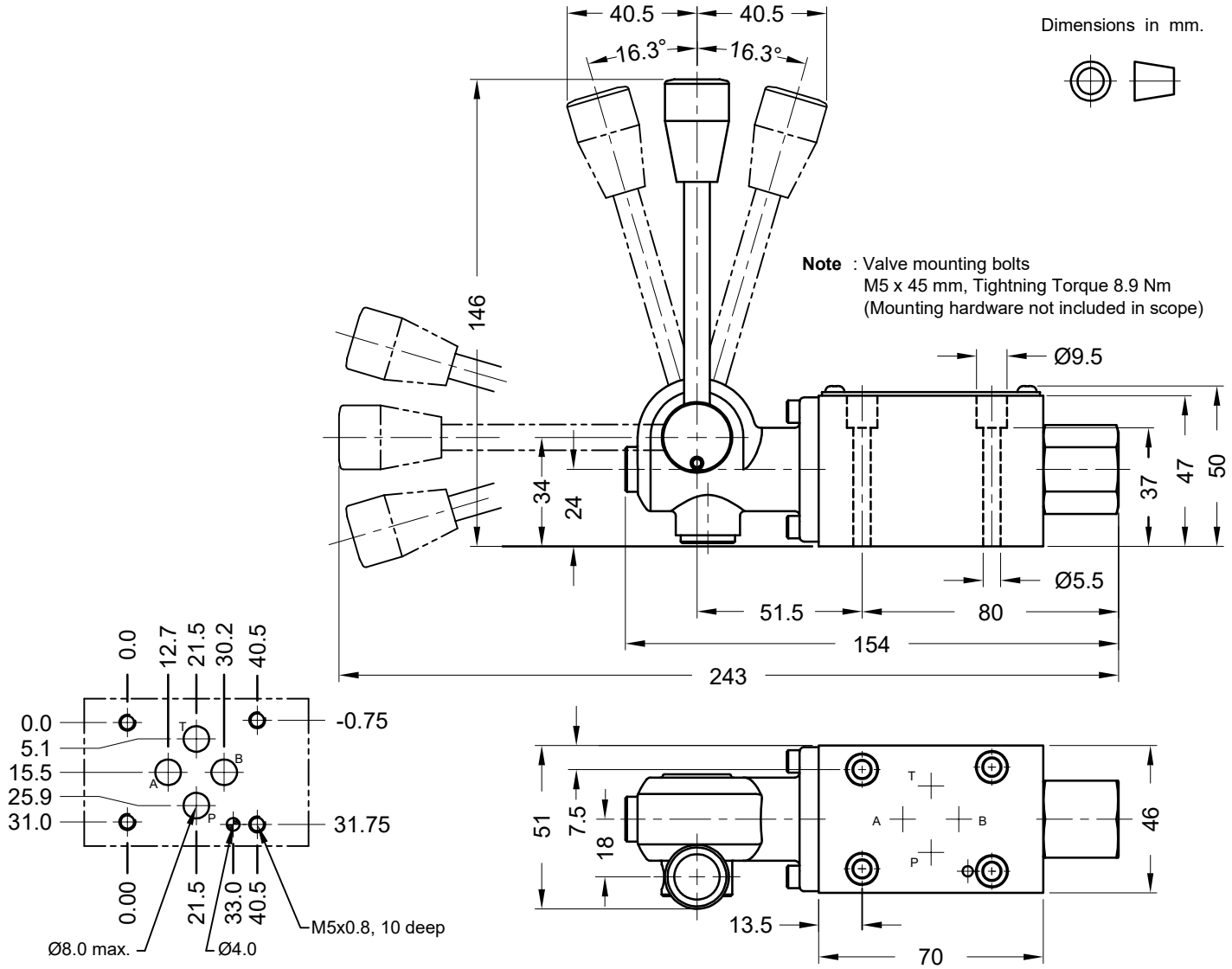
polyhydron pvt. ltd.
78-80, Machhe Industrial Estate,
Machhe, Belgaum - 590 014. INDIA.

Phone : +91-(0)831- 2411001
Fax : +91-(0)831- 2411002
E-mail : polyhydron@gmail.com
Website : www.polyhydron.com

Subplate mounting body

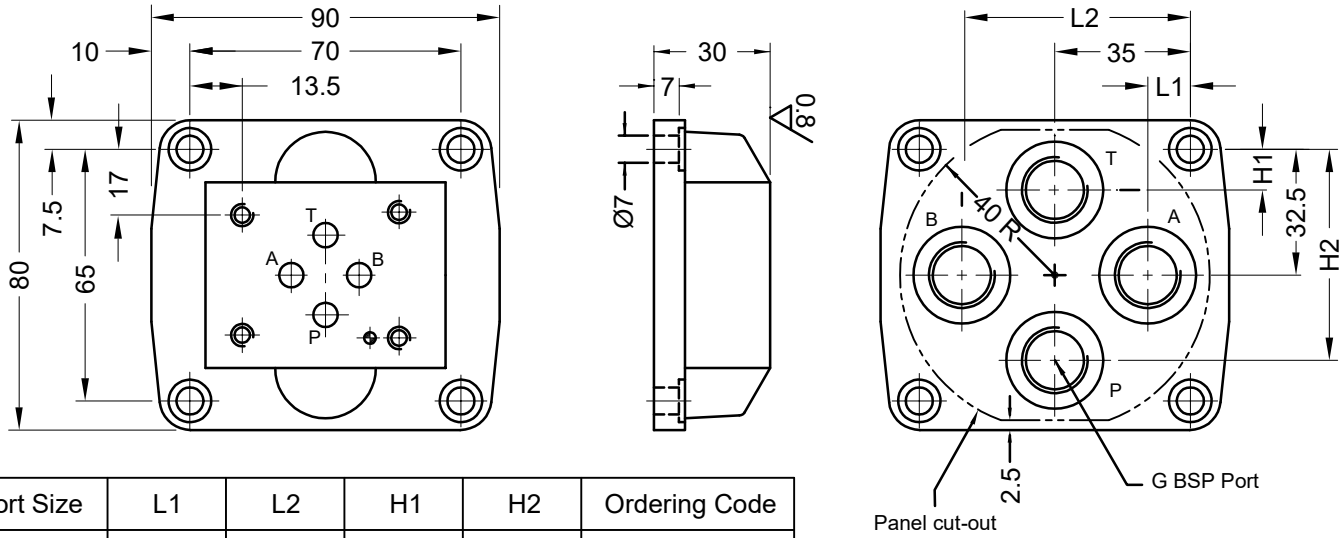
Unit dimensions

Dimensions in mm.



Note : Valve mounting bolts
M5 x 45 mm, Tightning Torque 8.9 Nm
(Mounting hardware not included in scope)

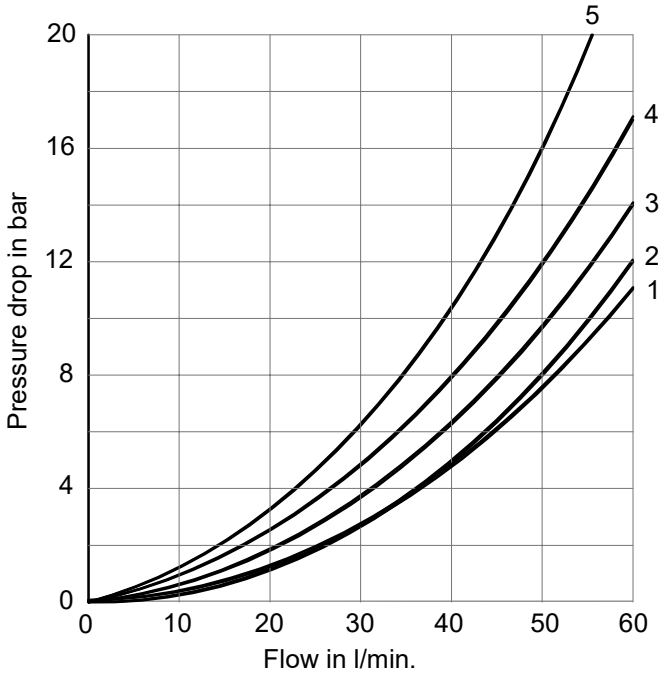
Subplate



Port Size	L1	L2	H1	H2	Ordering Code
G ¼	17	53	15.5	49.5	1 SD 03 G 02
G ⅜	11	59	10.5	54.5	1 SD 03 G 03

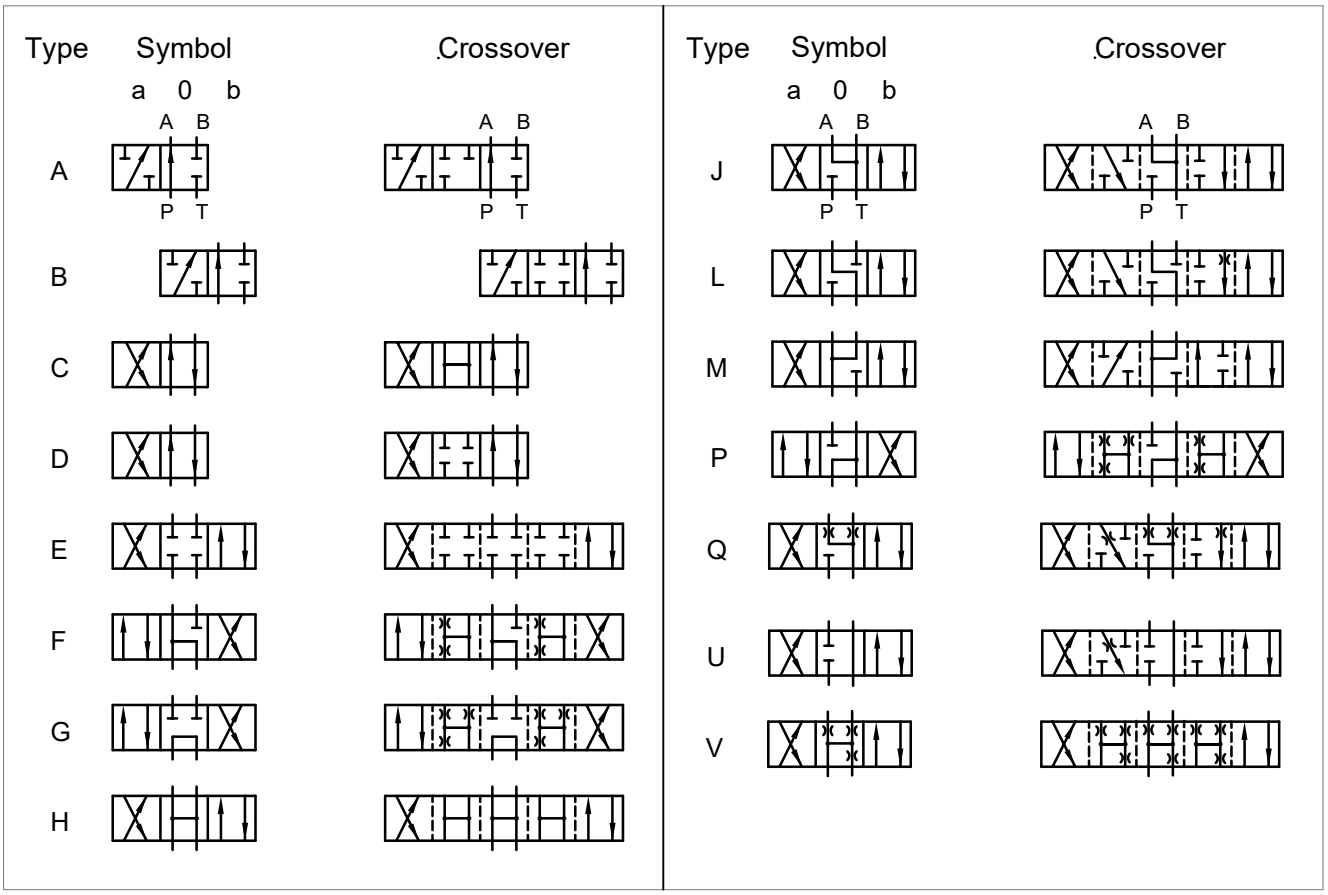
Performance Curves for DL 06

(Pressure drop related to flow, with Oil viscosity 46 cSt at 40°C)

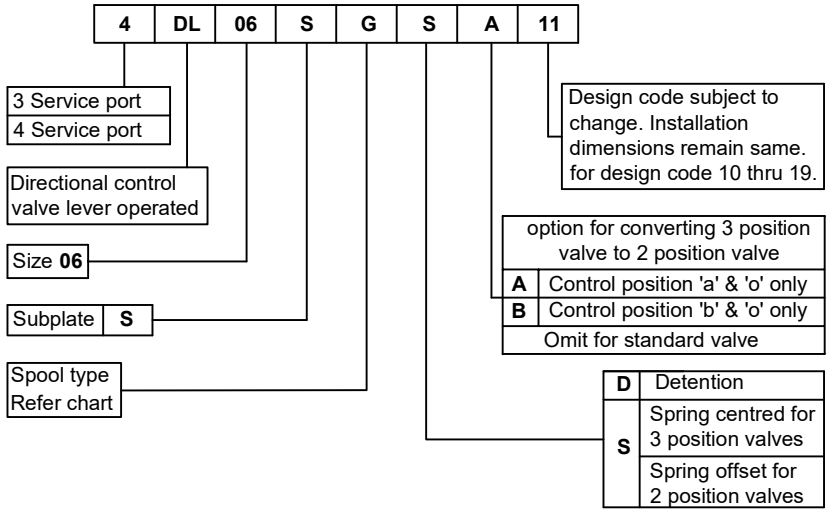


Spool type	Direction of flow / Curve no.				
	P to A	P to B	A to T	B to T	P to T
A	3	3	-	-	-
B	3	3	-	-	-
C	3	3	3	1	-
D	3	3	3	1	-
E	2	2	3	3	-
F	2	2	2	2	-
G	5	5	5	5	4
H	2	2	1	1	3
J	2	2	1	1	-
L	2	2	1	3	-
M	2	2	3	3	-
P	2	2	2	2	-

Spool Chart



Ordering code



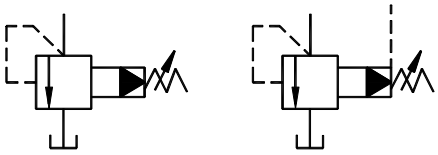
Note :

Sub-plate to be ordered separately.

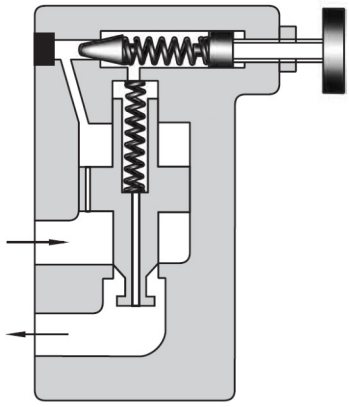
Pilot Operated Relief Valves

These valves protect the hydraulic system from excessive pressure, and can be used to maintain constant pressure in a hydraulic system.
Remote control and unloading are permitted by vent circuit.

Graphic Symbol



Vent Connection



Specifications

Model Number		Max. Operating Pressure Kgf/cm^2	Pres. Adj. Range Kgf/cm^2	Max. Flow L/min.	Mass Kg.	
Threaded Connection	Sub-plate Mounting				BT type	BG type
-	BG-03-※-32	250	* ~ 250	100	-	4.7
BT-06-※-3280	BG-06-※-32			200	5	5.6
-	BG-10-※-32			400	-	8.7

* Refer to the Minimum adjustment Pressure characteristics on Page 5.

Model Number Designation

F-	B	T	-03	P	-V	-32	※
Special Seal	Series Number	Type of Mounting	Valve Size	Plunger Type	High Venting Pres. Feature	Design Number	Design Standards
F: Special Seals for Phosphate Ester type Fluids. (omit if not required)	**B:** Pilot Operated Relief Valves	**T:** Threaded Connections	**06**	**P:** Pull Type	**V:** For High Venting Pressure Feature (Omit if not required)	**32**	**80**
		G: Sub-plate Mounting	**03**			**32**	—
			06			**32**	
			10			**32**	

Use high venting pressure type to reduce the response time from unload to onload.

Attachment

- **Mounting Bolts**

Valve Model Number	Socket Head Cap Screw	Qty Nos.	Bolt Kit Ordering Code
BG-03	M12 x 70Lg., M12 x 95Lg.	2 each	BK BG-03-10
BG-06	M16 x 60Lg., M16 x 80Lg.	2 each	BK BG-06-10
BG-10	M20 x 70Lg., M20 x 90Lg.	2 each	BK BG-10-10

Sub-Plate

Valve Model Number	Sub-plate Model Number	Piping Size	Mass Kg.
BG-03	BGM-03-3080	3/8 BSP.F	2.4
	BGM-03X-3080	1/2 BSP.F	3.1
BG-06	BGM-06-3080	3/4 BSP.F	4.7
	BGM-06X-3080	1 BSP.F	5.7
BG-10	BGM-10-3080	1-1/4 BSP.F	8.4
	BGM-10X-3080	1-1/2 BSP.F	10.3

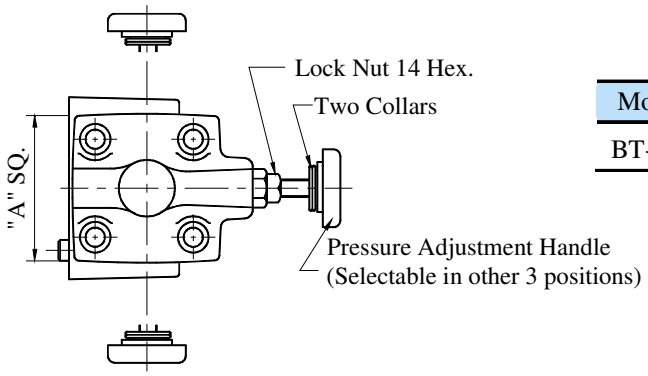
- Sub-plates are available. Specify sub-plate model from the table above. When sub-plates are not used, the mounting surface should have a good machined finish.

Instructions

- If a remote control relief valve is used in the vent circuit, see page 1 in EIC-C-1001-0. In addition, if the internal volume of the vent line is too large, chattering is likely to occur. Thus, as far as possible reduce the inside Dia. and the length of the pipe.
- To adjust the pressure, loosen the lock nut and turn the handle slowly clockwise for higher pressure or anti-clockwise for lower pressures. One revolution of the handle makes about a 50 Kgf/cm^2 pressure change. After adjustments, do not forget to tighten the lock nut.
- Pressure is limited by collars fitted. If a working pressure cannot be attained, remove some collars. One collar is equivalent to 100 Kgf/cm^2.
- Piping of the Tank line should not be connected to any tank line of the other valves, but connected directly to the tank.
- With a small flow, the setting pressure may be unstable. Use models numbered 03 and 06 with a flow rate 8 L/min. and model 10 with 15 L/min.
- There are two threaded connection pressure ports. They can be connected each other in-line one as inlet and the other as an outlet or the valve can be used by plugging one of the pressure ports.

● BT-06P-※-3280

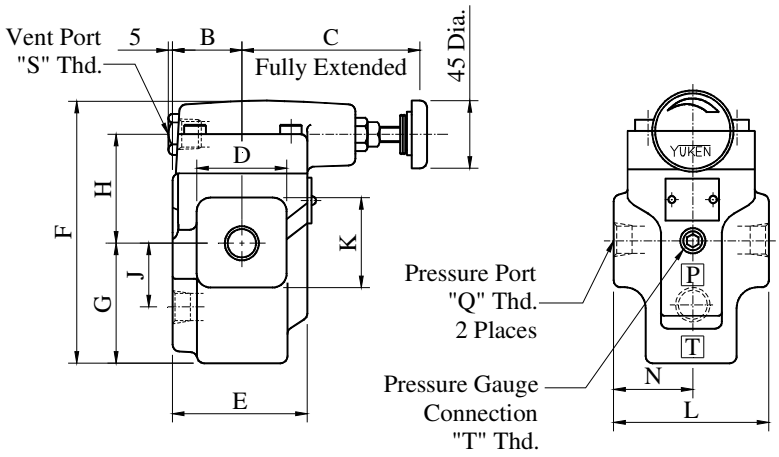
DIMENSIONS IN MILLIMETRES



Model Number	"Q" Thd.	"S" Thd.	"T" Thd.
BT-06P-※-3280	3/4 BSP.F	3/8 BSP.F	1/4 BSP. Tr

Model Number	A	B	C	D	E	F
BT-06	75	40	105	52	78	150.5

Model Number	G	H	J	K	L	N
BT-06	68.5	62	36	52	90	45

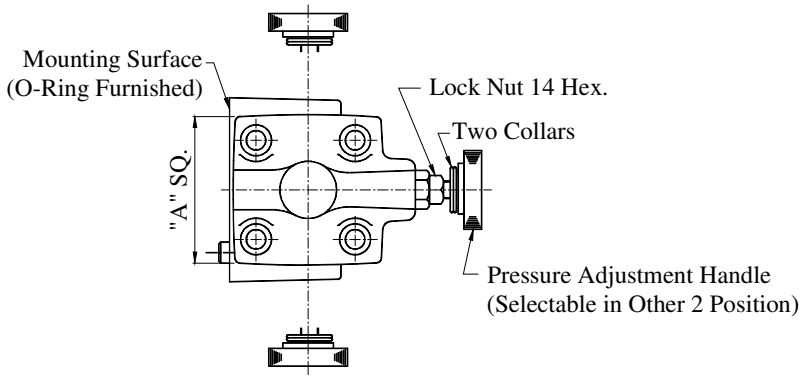


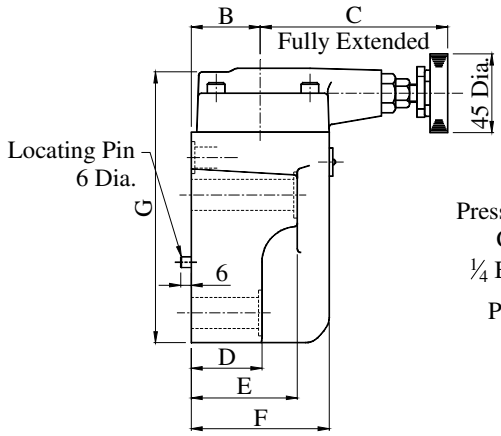
● BG-06 P-※ 32 (03 / 10)

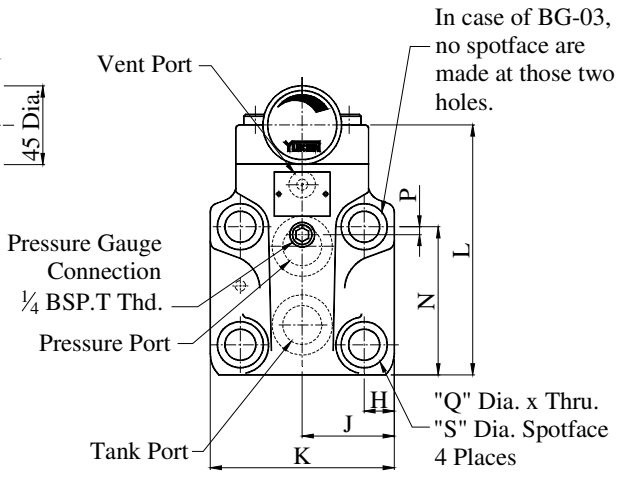
Mounting Surface
BG-03: ISO 6264 AR-06-2-A
BG-03: ISO 6264 AS-08-2-A
BG-03: ISO 6264 AT-10-2-A

Model Number	H	J	K	L
BG-03	14.1	41	82	117
BG-06	17	52	104	141
BG-10	20.7	62	124	175

Model Number	N	P	Q	S
BG-03	77	22	13.5	21
BG-06	83.5	4.5	17.5	26
BG-10	110	6	124	175



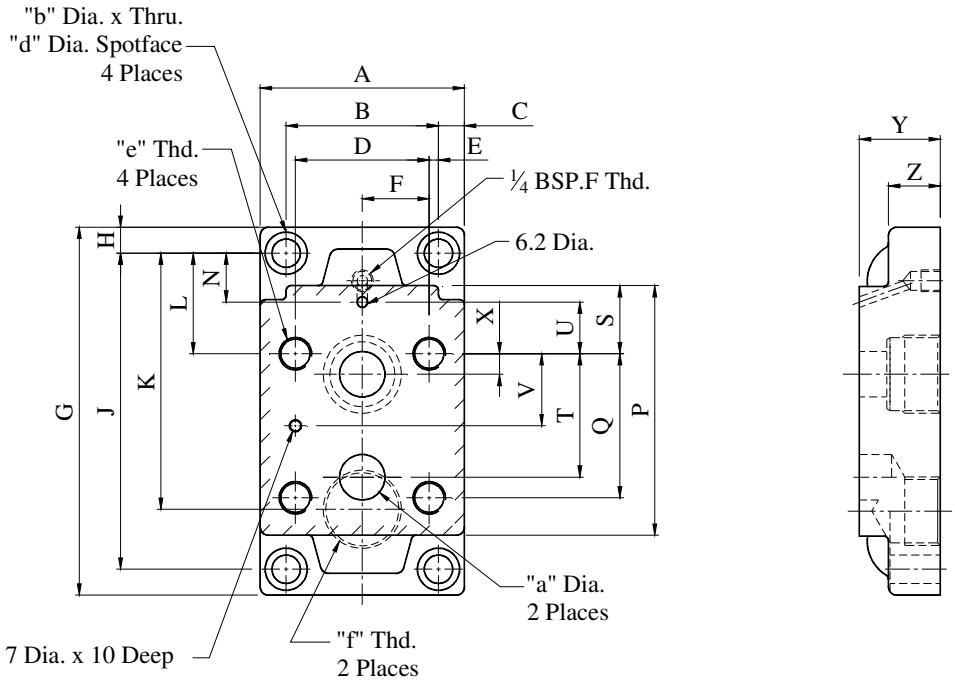




C Pilot Operated Relief Valves

03, 03X
• Sub-Plate: BGM - 06, 06X-3080
10, 10X

DIMENSIONS IN MILLIMETRES



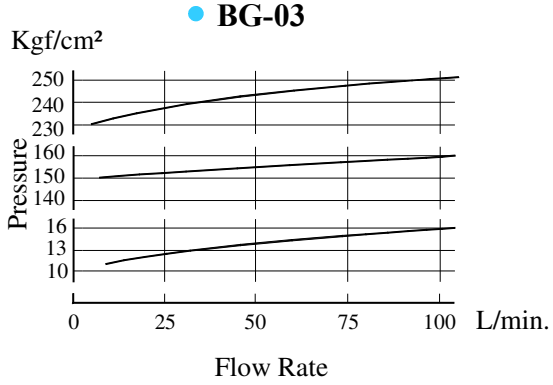
Model Numbers	A	B	C	D	E	F	G	H	J	K	L	N	P	Q
BGM-03	86	60	13	53.8	3.1	26.9	149	13	123	86	32	26	97	53.8
BGM-03X										95		21		
BGM-06	108	78	15	70	4	35	180	15	150	106.5	51	27.2	121	66.7
BGM-06X										119		18		
BGM-10	126	94	16	82.6	5.7	41.3	227	16	195	138.2	62	30.2	154	88.9
BGM-10X										158		17		

Model Numbers	S	T	U	V	X	Y	Z	a	b	d
BGM-03	19	47.4	0	22	22	32	20	14.5	11	17.5
BGM-03X						40				
BGM-06	37	55.5	23.8	33.4	11	40	25	23	13.5	21
BGM-06X						50				
BGM-10	42	76.2	31.8	44.5	12.7	50	32	28	17.5	26
BGM-10X						63				

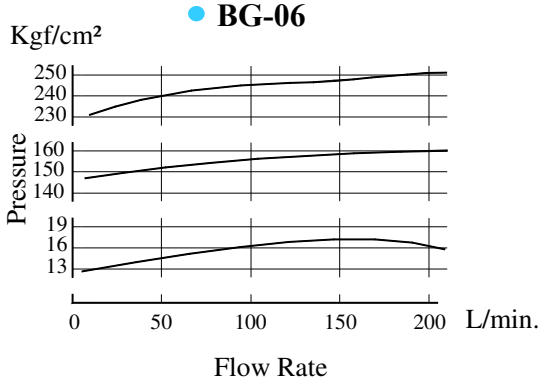
Model Numbers	“e” Thd.	“f” Thd.
BGM-03	M12 Thd. x 20 Deep	3/8 BSP.F
BGM-03X		1/2 BSP.F
BGM-06	M16 Thd. x 25 Deep	3/4 BSP.F
BGM-06X		1 BSP.F
BGM-10	M20 Thd. x 28 Deep	1 - 1/4 BSP.F
BGM-10X		1 - 1/2 BSP.F

Nominal Override Characteristics

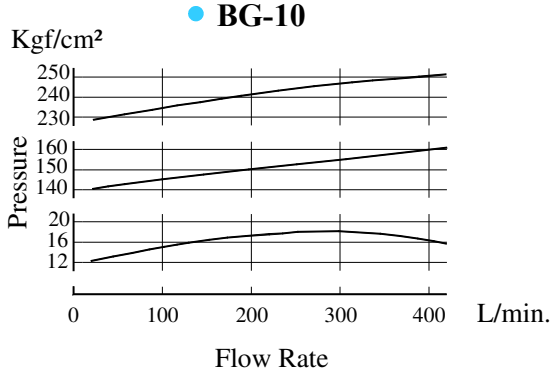
BG-03



BG-06

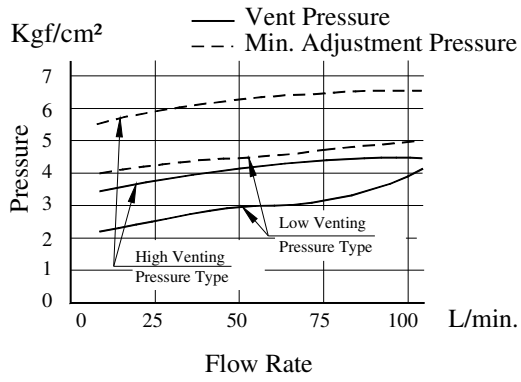


BG-10

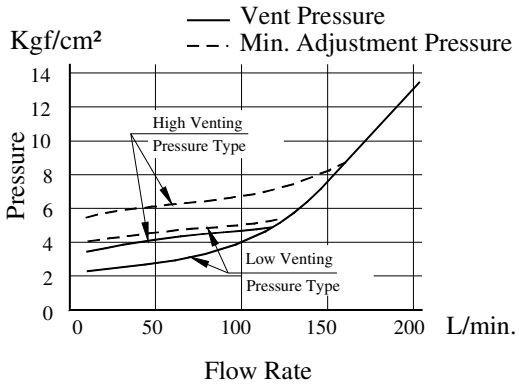


Min. Adj Pressure & Vent Pressure Vs Flow

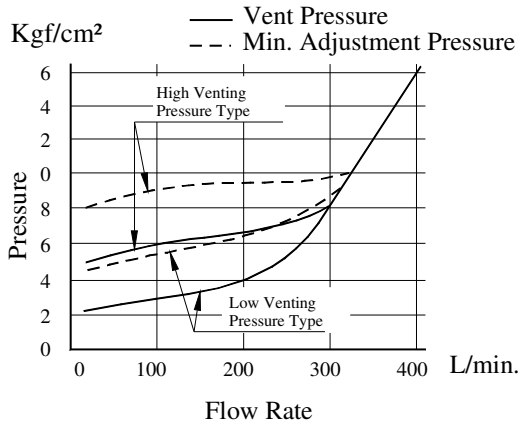
BG-03



BG-06, BG-06



BG-10



Spare Parts List

Sl. No.	Name of Parts	Part Number	Quantity			
			BG-03	BG-06	BG-10	BT-06
1	O-Ring	SO-NA-P9	1	1	1	1
2	O-Ring	SO-NB-P9	1	-	1	-
3	O-Ring	SO-NB-P11	-	1	-	-
4	O-Ring	SO-NB-P18	2	-	-	-
5	O-Ring	SO-NB-P28	-	2	-	-
6	O-Ring	SO-NB-P32	1	1	2	1
7	O-Ring	SO-NB-P42	-	-	1	-

Note: When ordering the seals, please specify the seal kit number from the table below.

List of Seal Kit

Model Numbers	Seal Kit Numbers
BG-03	KS-BG-03-32
BG-06	KS-BG-06-32
BG-10	KS-BG-10-32
BT-06	KS-BT-06-32

2

The D1VW with explosion proof solenoids is based on the standard D1VW series. The specific solenoid design allows the usage in hazardous environments.

The explosion proof class is

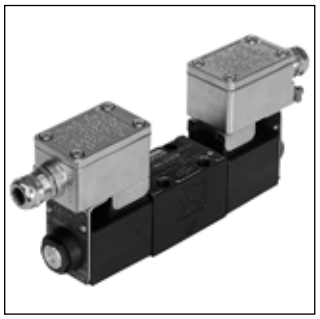
CE Ex II 2 G
Ex e mb IIC T4 Gb

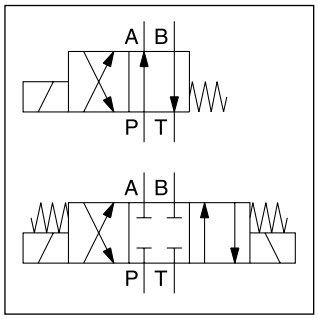
for use in zone 1 and 2 (according to ATEX). Additionally the solenoids are IECEx compliant.

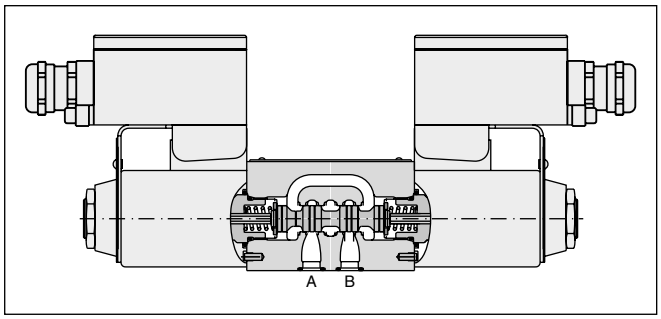
All explosion proof solenoids are DC design. The valves for AC operate with integrated rectifier.

For further explosion proof valves please refer to catalogue MSG11-3343/UK.

Download of the PDF file at www.parker.com/ISDE, see “Support”.





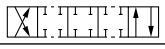
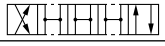
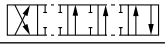
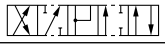
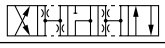
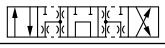
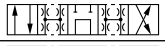
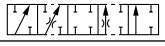
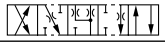
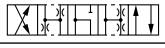
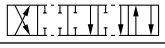


Technical data

General				
Design		Directional spool valve		
Actuation		Solenoid		
Size		DIN NG06 / CETOP 03 / NFPA D03		
Mounting interface		DIN 24340 A6 / ISO 4401 / CETOP RP 121-H / NFPA D03		
Mounting position		unrestricted, preferably horizontal		
Ambient temperature	[°C]	-20 ... +60		
$MTTF_D$	[years]	150		
Weight	[kg]	1.8 (1 solenoid), 2.7 (2 solenoids)		
Hydraulic				
Max. operating pressure	[bar]	P, A B: 350; T: 210		
Fluid		Hydraulic oil according to DIN 51524		
Fluid temperature	[°C]	-20 ... +60		
Viscosity permitted	[cSt] / [mm²/s]	2.8 ... 400		
Viscosity recommended	[cSt] / [mm²/s]	30 ... 80		
Filtration		ISO 4406 (1999); 18/16/13		
Flow max.	[l/min]	60 (see shift limits)		
Leakage at 50 bar	[ml/min]	Up to 10 per flow path, depending on spool		
Static / Dynamic				
Step response at 95 %	[ms]	Energized: 32 (DC), 40 (AC) De-energized: 40 (DC), 75 (AC)		
Electrical characteristics				
Duty ratio		100 % ED; CAUTION: coil temperature up to 135 °C possible		
Max. switching frequency	[1/h]	15000 (DC), 7200 (AC)		
Protection class		CE Ex II 2 G , Ex e mb IIC T4 Gb, IP66 (plugged and mounted correctly)		
	Code	J	N	P
Supply voltage / ripple	[V]	24 V =	230/50 Hz	110/50 Hz
Tolerance supply voltage	[%]	±10	±10	±10
Current consumption	[A]	1.0	0.12	0.25
Power consumption	[W]	24	24	24
Solenoid connection		Box with M20x1.5 entry for cable glands. Solenoid identification as per ISO 9461.		
Wiring min.	[mm²]	3 x 1.5 recommended		
Wiring length max.	[m]	50 recommended		

With electrical connections the protective conductor (PE ⏚) must be connected according to the relevant regulations.

D	1	V	W					E	E	
Directional control valve	**Size DIN NG06 CETOP 03 NFPA D03**	**3-chamber valve**	**Wet pin solenoid**	**Spool type**	**Spool position**	**Seals**	**Solenoid voltage**	**Connection: Explosion proof with cable glands**	**Solenoid options: Explosion proof Ex e mb IIC and IECEx conformity**	**Design series** (not required for ordering)

3 position spools	
Code	Spool type
	a 0 b
001	
002	
003	
004	
005	
006	
007	
008 [1]	
009 [1]	
010	
011	
014	
015	
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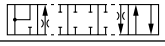
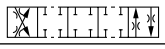
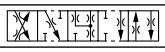
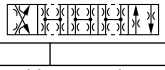
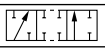
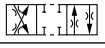
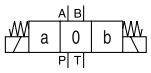
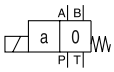
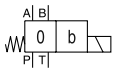
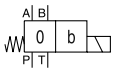
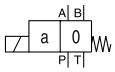
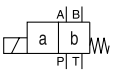
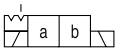
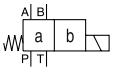
021	
022	
081	
082	
102	

2 position spools	
Code	Spool type
	a b
020	
026	
030	
101	

Code	Voltage
J	24 V=
P	110 V 50 Hz
N	230 V 50 Hz

Code	Seals
N	NBR
V	FPM

3 position spools			
Code	Spool position		
C			3 positions. Spring offset in position “0“. Operated in position “a“ or “b“.
	Standard	Spool type 008, 009	
E	 Operated in position “a“.	 Operated in position “b“.	2 positions. Spring offset in position “0“.
K	 Operated in position “b“.	 Operated in position “a“.	2 positions. Spring offset in position “0“.

2 position spools		
Code	Spool position	
B		2 positions. Spring offset in position “b“. Operated in position “a“.
D		2 positions. Operated in position “a“ or “b“. No center or offset position.
H		2 positions. Spring offset in position “a“. Operated in position “b“.

Further spool types, styles, and combinations on request.

[1] Consider specific spool position.

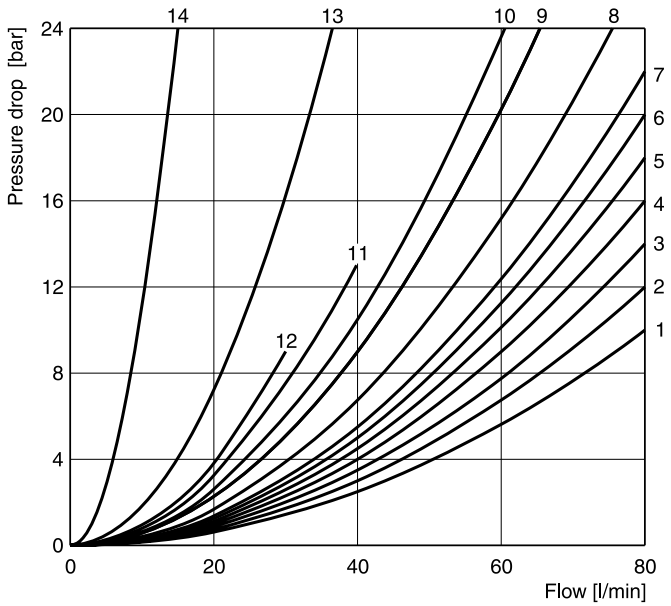
2

The flow curve diagram shows the flow versus pressure drop curves for all spool types. The relevant curve number for each spool type, operating position and flow direction is given in the table below.

	Position "b"			Position "a"			Position "0"				
Spool	P-A	B-T	P-B	P-B	A-T	P-A	P-A	P-B	A-T	B-T	P-T
001	2	2		2	2						
002	1	4		1	4		1	1	5	5	2
003	3	4		3	6				7		
004	2	3		2	3				7	7	
005	2	2		2	2		12				
006	1	4		1	4		7	7			
007	3	2		2	2			3		2	7
010	3			3							
011	2	2		2	2				14	14	
014	3	2		2	2		3		2		7
015	3	6		3	4					7	
016	2	2		2	2			12			
020B	4	4		2	3						
026B	4			4							
030B	2	3		1	2						
081	13	13		13	13						
082	13	13		13	13				[1]	[1]	
101B	11	10		10	9						
102	1	4		1	4		5	5	8	8	6
	P-B	A-T		P-A	B-T		P-A	P-B	A-T	B-T	P-T
008	4	5		4	5						9
009	5	5		6	7						7

	Position "b"			Position "a"		
Spool	P-A	P-B	A-B	P-B	A-T	
021	2	4		4	2	
	P-A	B-T		P-A	P-B	A-B
022	6	2		5	2	

Flow curve diagram

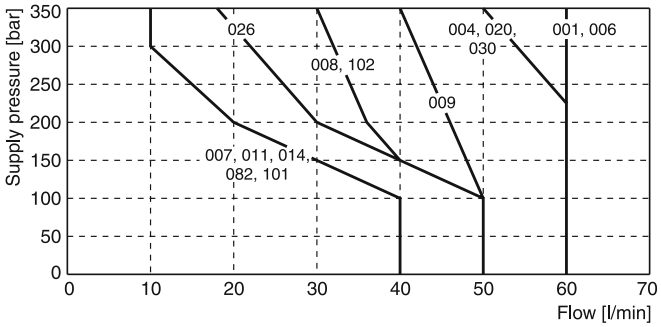


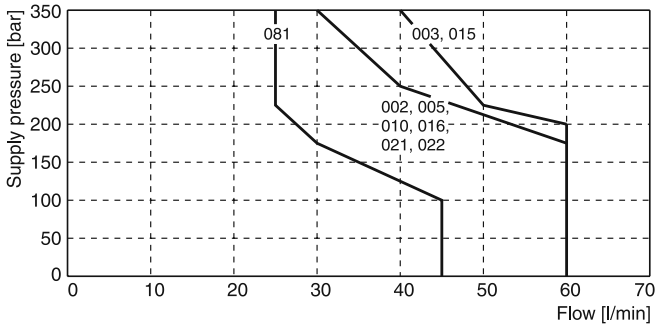
All characteristic curves measured with HLP46 at 50 °C.

[1] Only for pressure compensation, no high flow possible.

The diagram below specifies the shift limits for valves with AC and DC solenoids. The specifications apply to a viscosity of 40 mm^2/s and balanced flow conditions. The shift limits can be considerably lower at unbalanced flow conditions. To avoid flow rates beyond the shift limits, a plug-in orifice can be inserted in the P-port.

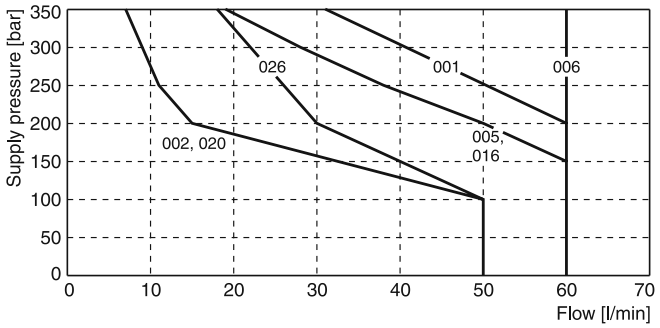
Shift limit diagram with DC solenoid

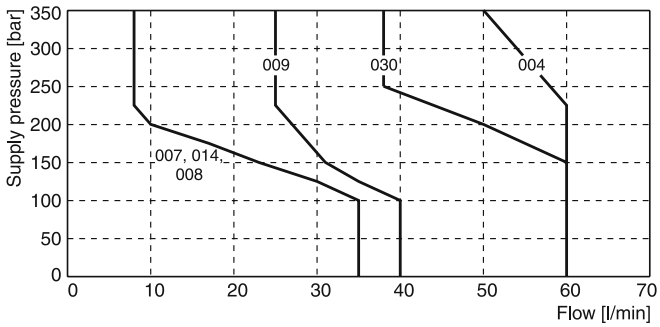




Measured with HLP46 at 50 °C, 90 % U_{nom} and warm solenoids

Shift limit diagram with AC solenoid



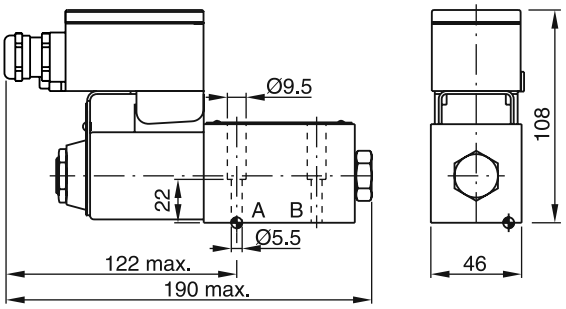


Measured with HLP46 at 50 °C, 95 % U_{nom} and warm solenoids

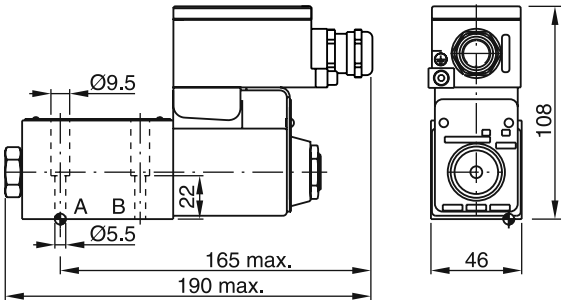
2

Dimensions

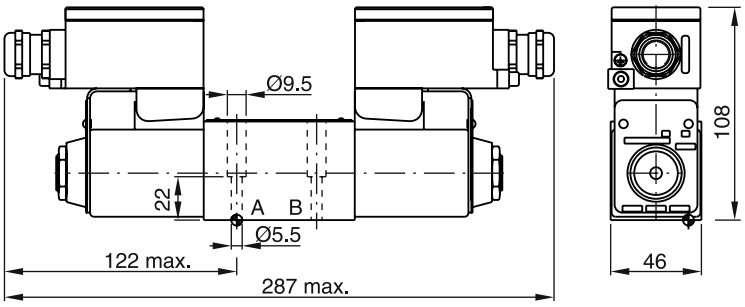
B, E -style



H, K -style

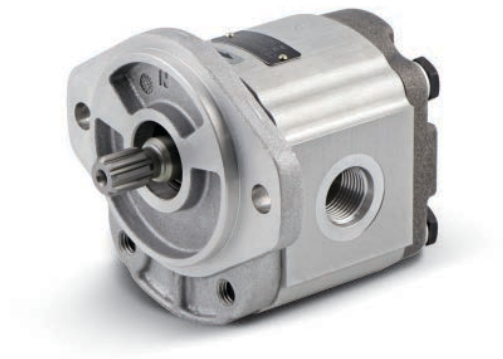


C, D -style



Surface finish	Kit			Kit NBR
R_{max}6.3 ▽ 0.01/100	BK375	4x M5x30 ISO 4762-12.9	7.6 Nm ±15 %	**NBR: SK-D1VW-N-91** FPM: SK-D1VW-V-91

- **Up to 250 bar continuous operation**
  High strength materials and large journal diameters provide low bearing loads for high pressure operation.
- **High efficiency**
  Pressure balanced bearing blocks assure maximum efficiency under all operating conditions.
- **Application flexibility**
  International mounts and connections, integrated valve capabilities and common inlet multiple pump configurations provide unmatched design and application versatility.
- **Low noise**
  12 tooth gear profile and optimized flow metering provide reduced pressure pulsation and quiet operation.
- **Large range of integrated valves**



Product Features	Description
Pump Type	Pressure balanced, aluminum, external gear
Mounting	SAE, rectangular, thru-bolt standard, specials on request
Ports	SAE and metric split flanges and others
Shaft Style	SAE splined, keyed, cylindrical tang drive, specials on request
Maximum Speed	500 - 3500 rpm, see Specifications
Theor. displacement	See Specifications
Drive	Drive direct with flexible coupling is recommended.
Axial / Radial load	Consult with product service for allowable loading.
Inlet pressure	Operating range 0.8 to 2 bar abs. Min. inlet pressure 0.5 bar abs. Short time without load. Maximum suggested inlet flow velocity for pumps: 2.5 mps. Consultation is recommended.
Outlet pressure	See Specifications
Pressure rising rate	Max. 3000 bar/s
Hydraulic fluids	Hydraulic oil HLP, ISO, DIN 51524-2
Fluid viscosity	Range of operating viscosity 8 to 1000 mm²/s. Max. permissible operating pressure dependent on viscosity. Viscosity range for cold start 1000 to 2000 mm²/s at operating pressure p ≤10 bar and speed n ≤1500 rpm.

Product Features	Description
Fluid temperature	For NBR seals, range of operating temperature -40° to +80°C. For FKM seals, range of operating temperature -20° to +105°C. Max. permissible operating pressure dependent on fluid temperature. Temperature for cold start -20° to -15°C at speed ≤1500 rpm. Max. permissible operating pressure dependent on fluid temperature.
Filtration	According to ISO 4406 Cl. 19/17/13
Direction of rotation (looking at the drive shaft)	Clockwise, counter-clockwise or double. Attention! Drive pump only in indicated direction of rotation.
Multiple pump assemblies	• Available in two or three sections; limitations shown in the shaft loading rating table in this catalog. • Max. load is determined by adding the torque values for each pumping section that will be simultaneously loaded.
Separate or common inlet capability	Separate inlet configuration: • Each gear housing has individual inlet and outlet ports. Common inlet configuration: • Two gear sets share a common inlet.

WARNING: This product can expose you to chemicals including lead or DEHP which are known to the state of California to cause cancer, birth defects, and other reproductive harm. www.p65warnings.ca.gov

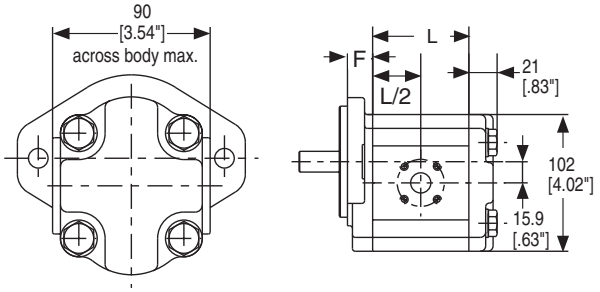
Parker Hannifin Corporation
Pump & Motor Division
Kings Mountain, NC 28086

PGP/PGM511 Specifications

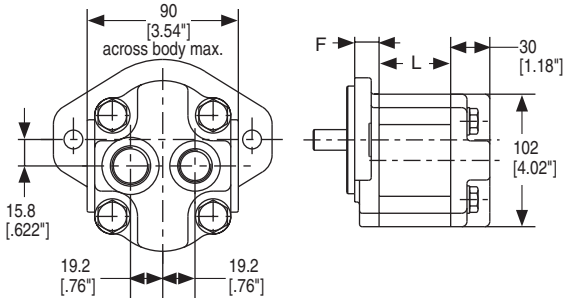
Code		0040	0050	0060	0070	0080	0100	0110	0120	0140	0160	0180	0190	0210	0230	0250	0270	0280	0310	0330
Displacements	cm^3/rev	4	5	6	7	8	10	11	12	14	16	18	19	21	23	25	27	28	31	33
	in^3/rev	0.24	0.31	0.37	0.43	0.49	0.61	0.67	0.73	0.85	0.98	1.10	1.16	1.28	1.40	1.53	1.65	1.71	1.89	2.01
Continuous Pressure	bar	250	250	250	250	250	250	250	250	250	250	250	250	235	225	210	190	185	165	155
	psi	3625	3625	3625	3625	3625	3625	3625	3625	3625	3625	3625	3625	3410	3265	3045	2755	2685	2395	2248
Intermittent Pressure	bar	275	275	275	275	275	275	275	275	275	275	275	275	240	235	220	200	190	170	160
	psi	3988	3988	3988	3988	3988	3988	3988	3988	3988	3988	3988	3988	3480	3408	3190	2900	2755	2465	2320
Min. Speed @ Max. Outlet Pressure	rpm	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500
Max. Speed @ 0 Inlet & Max. Outlet Pressure	rpm	3500	3500	3500	3500	3500	3500	3500	3500	3500	3500	3250	3250	2800	2750	2500	2350	2350	2350	2000
Pump Input Power @ Max. Pressure and 1500 rpm	HP	4.02	5.03	6.03	7.04	8.05	10.06	11.13	12.07	14.08	16.09	18.10	19.18	19.31	19.71	19.98	20.12	21.19	22.40	23.20
	kW	3.0	3.8	4.5	5.3	6.0	7.5	8.3	9.0	10.5	12.0	13.5	14.3	14.4	14.7	14.9	15.0	15.8	16.7	17.3
Dimension L	mm	47.0	48.6	50.1	51.7	53.3	56.5	58.0	59.6	62.8	65.9	69.0	70.6	73.7	76.9	80.0	83.2	84.8	89.5	92.6
	in	1.85"	1.91"	1.97"	2.04"	2.10"	2.22"	2.28"	2.35"	2.47"	2.59"	2.72"	2.78"	2.90"	3.03"	3.15"	3.28"	3.34"	3.52"	3.65"
Approximate Weight	lbs	7.1	7.3	7.5	7.7	7.7	7.8	7.9	8.2	8.2	8.4	8.6	8.6	8.8	9.0	9.3	9.3	9.5	9.7	9.9
	kg	3.2	3.3	3.4	3.5	3.5	3.6	3.6	3.7	3.7	3.8	3.9	3.9	4.0	4.1	4.2	4.2	4.3	4.4	4.5

PGP/PGM511 Dimensions

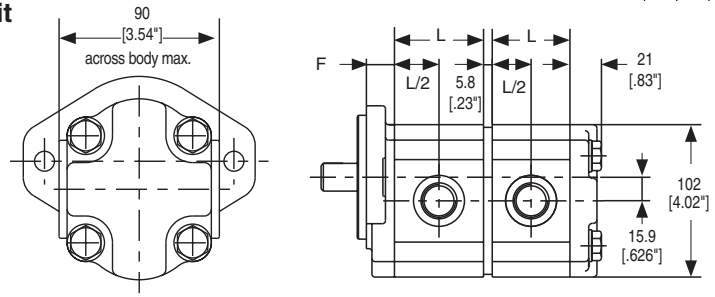
Single Unit



Single Unit with Rear Ports



Tandem Unit



Dimension F:
See Flanges on page 24

WARNING: This product can expose you to chemicals including lead or DEHP which are known to the state of California to cause cancer, birth defects, and other reproductive harm. www.p65warnings.ca.gov

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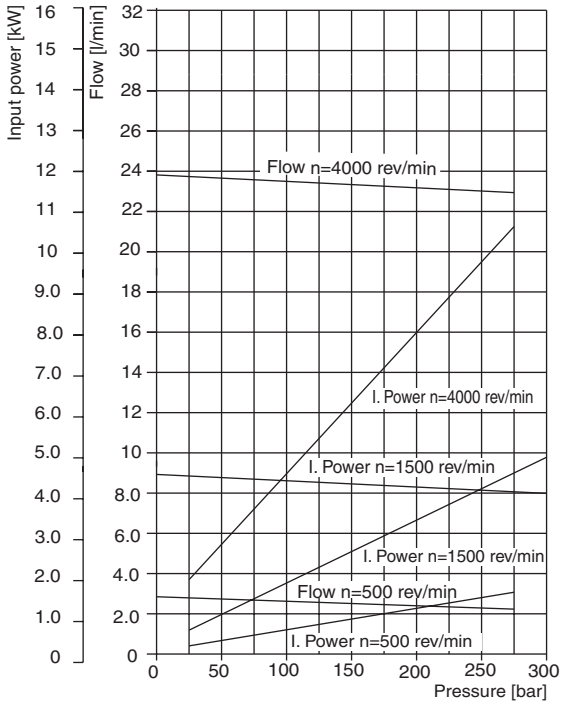
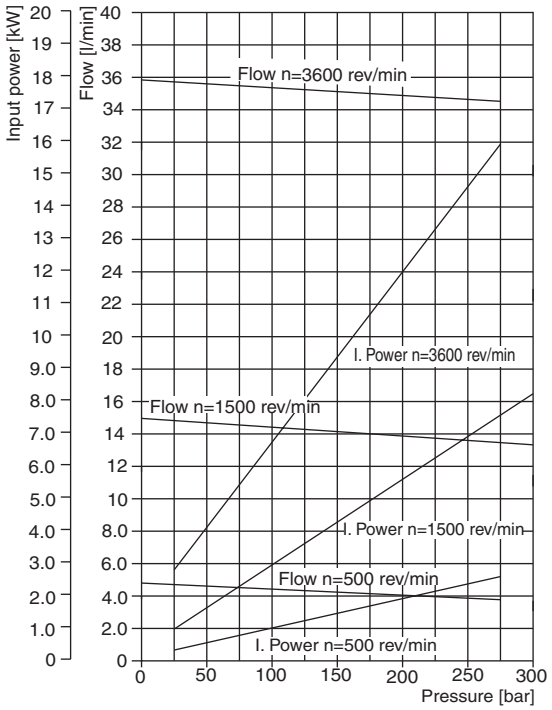
Kings Mountain, NC 28086

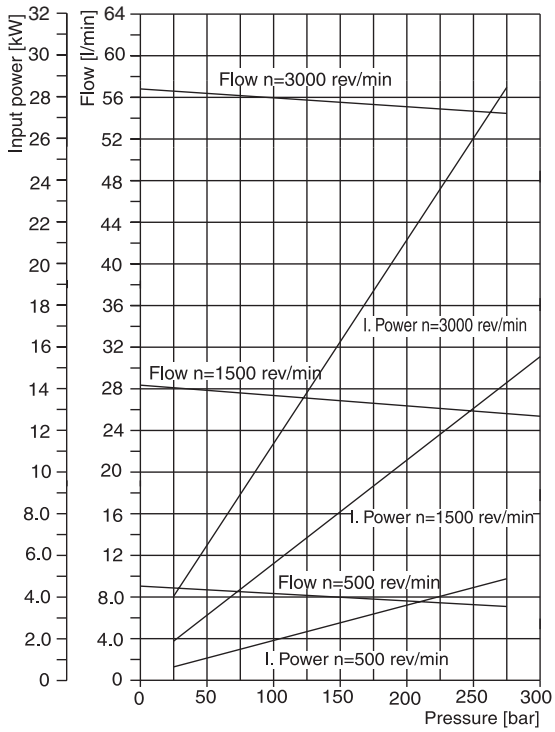
6.0 CC



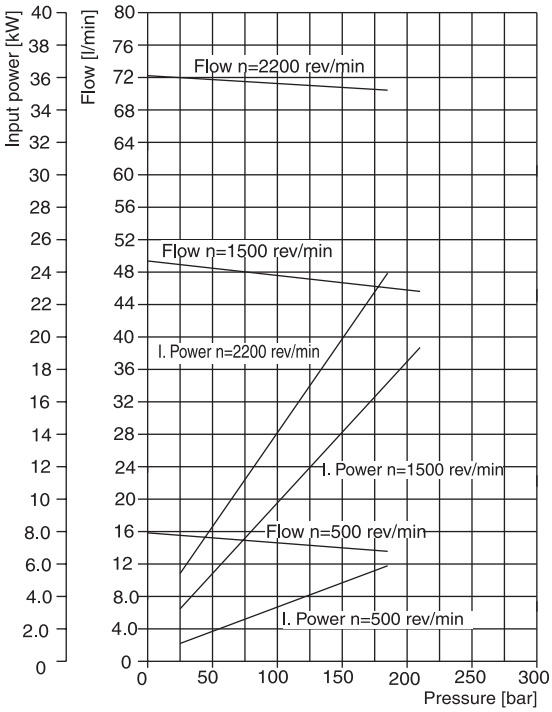
10.0 CC



19.0 CC



33.0 CC



Fluid Temperature = 45± 2ºC
Viscosity = 36 mm²/s
Inlet Pressure = 0.9 + 0.1 bar absolute

WARNING: This product can expose you to chemicals including lead or DEHP which are known to the state of California to cause cancer, birth defects, and other reproductive harm. www.p65warnings.ca.gov

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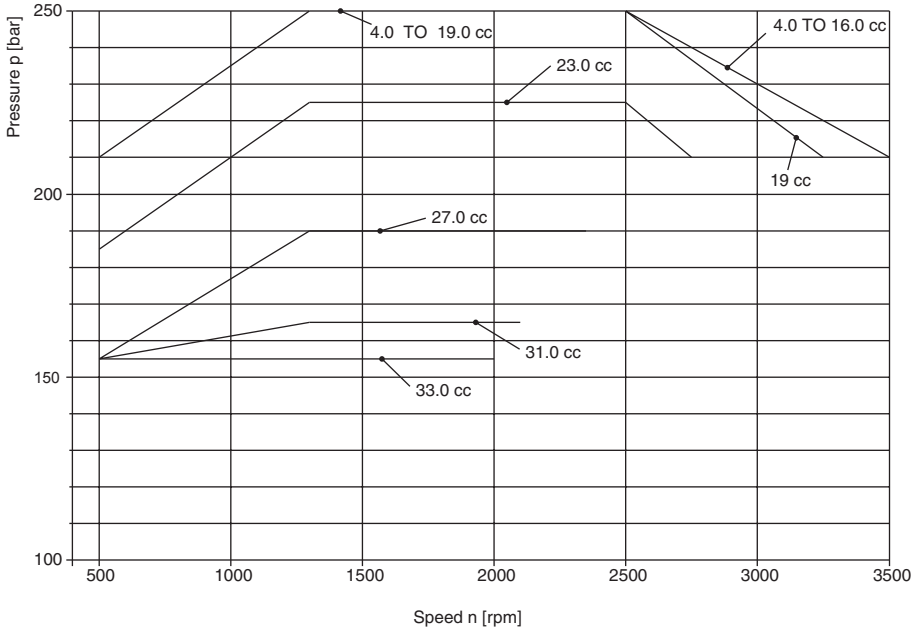
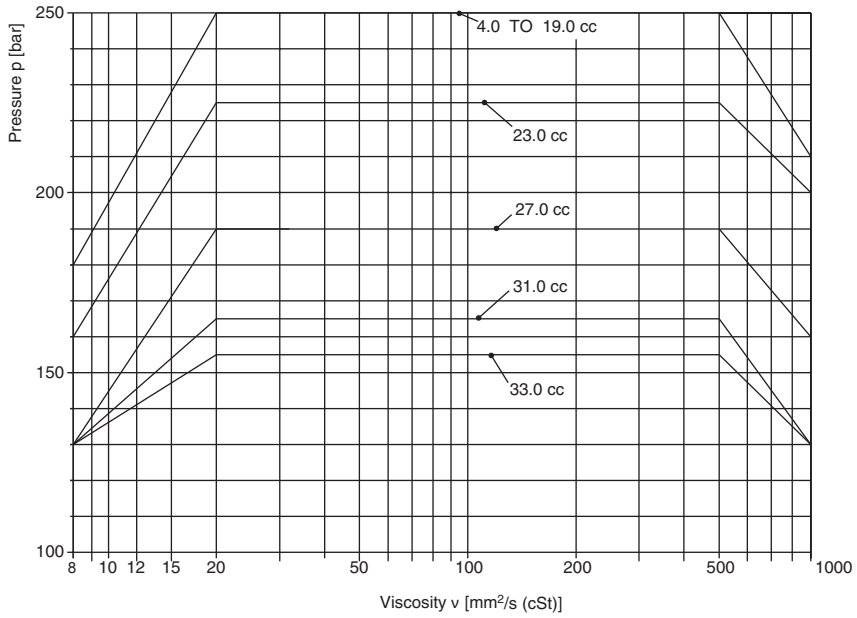
Pressure depending on speed



Pressure depending on viscosity



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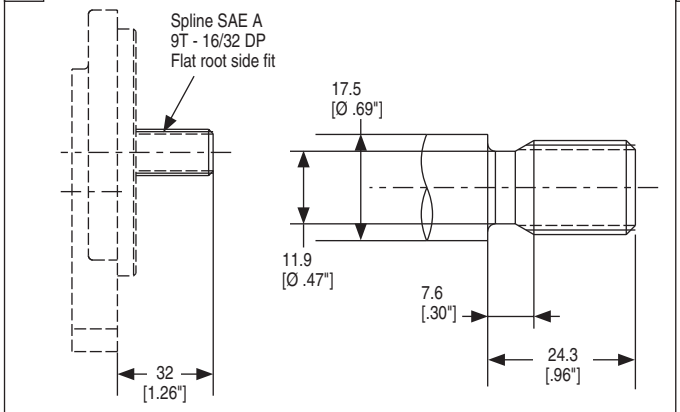
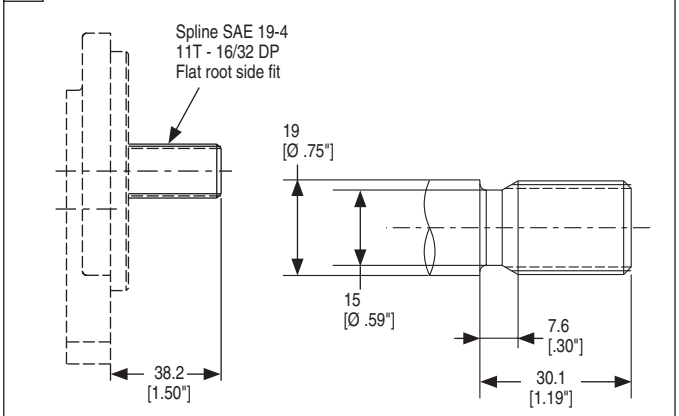
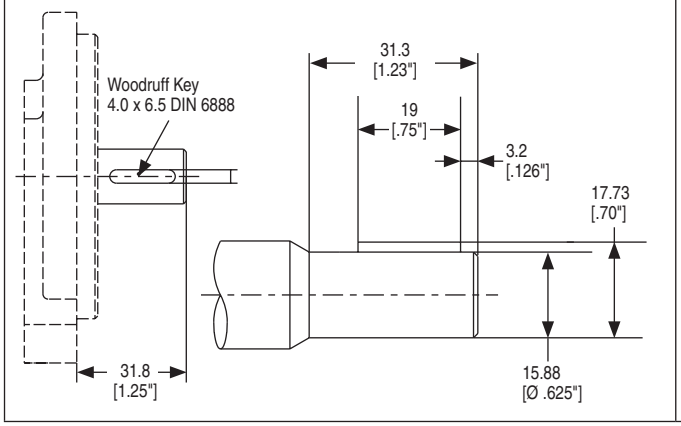
A1



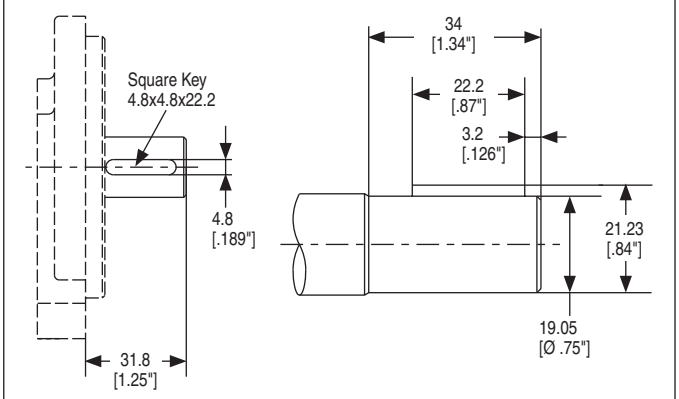
C1



K1



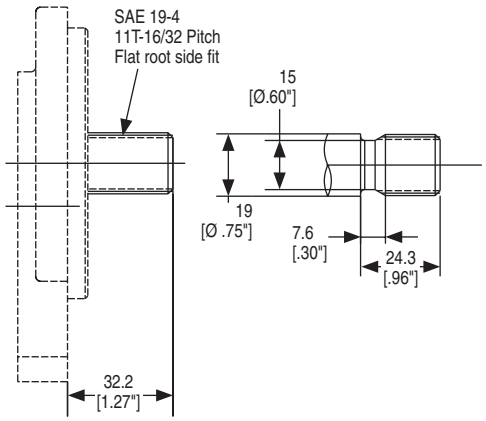
L6



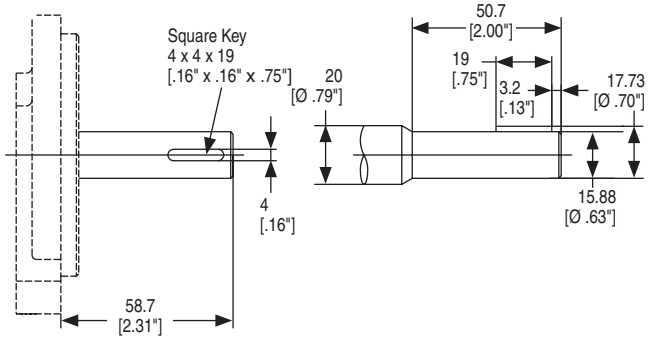
Continued on next page

PGP/PGM511 Drive Shafts (Continued)

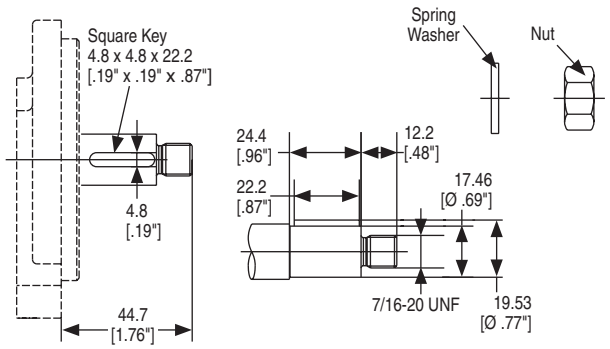
C2



K4



L1



PGP/PGM511 Shaft Load Capacity

Code	Description		Torque Rating [Nm]
A1	9T, 16/32DP, 32L, SAE A	spline	86
C1	11T, 16/32DP, 38.2L, SAE 19-4	spline	184
C2	11T, 16/32DP, 32.2L, SAE 19-4	spline	184
K1	Ø 15.88, 4.0 Key, no thread, 32L, SAE A	parallel	75
K4	Ø 15.88, 3.95 Key, no thread, 58.7L	parallel	75
L1	Ø 17.46, 4.8 Key, 7/16" UNF ext., 44.2L	parallel	112
L6	Ø 19.05, 4.8 Key, no thread, 32L, SAE 19-1	parallel	145
	Tandem pump connection shaft	spline	110

$$\text{Torque [Nm]} = \frac{\text{Displacement [cm}^3\text{/rev]} \times \text{Pressure [bar]}}{57.2}$$

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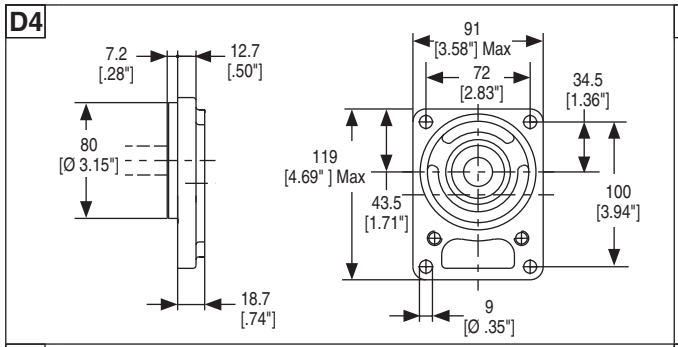
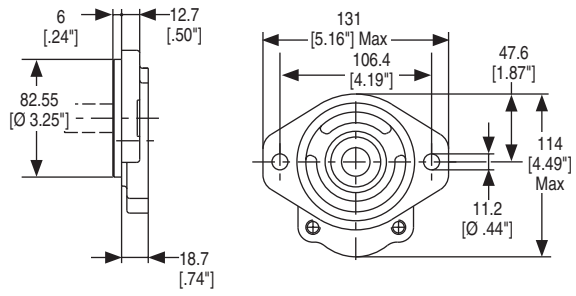
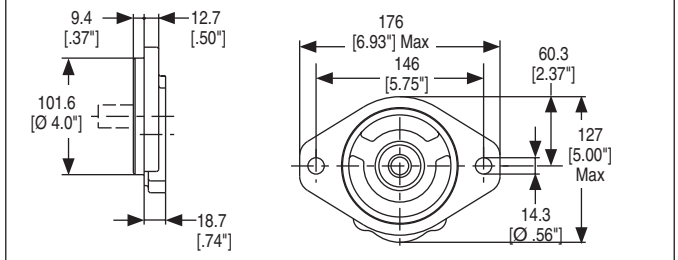
D4



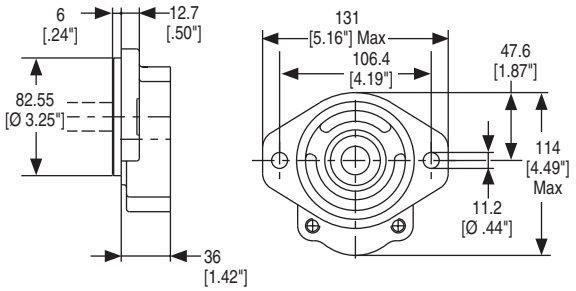
H2



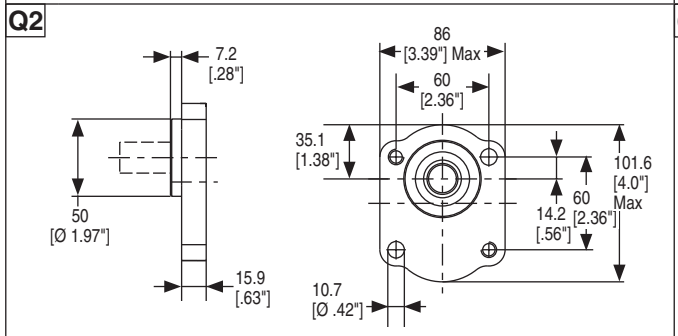
H3



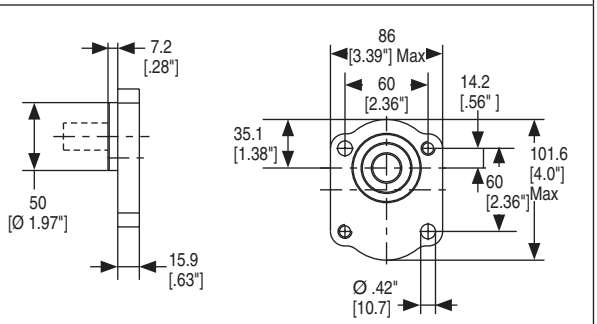
L2



Q2



Q4



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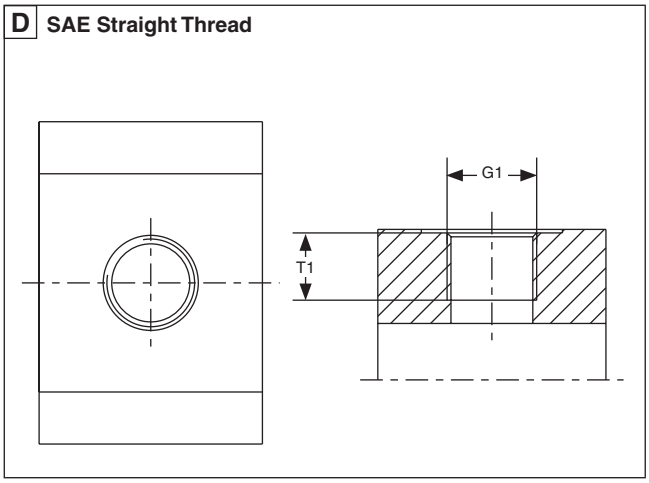
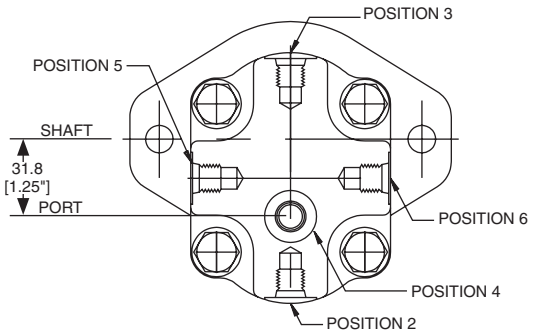
PGP/PGM511 Port Options

D SAE Straight Thread



Code	SAE J1926-1 Dash Size	Nominal Tube OD	G1 Thread	T1 Dimensions
D2	#6	3/8"	9/16" - 18 UNF	0.50" [12.7]
D3	#8	1/2"	3/4" - 16 UNF	0.56" [14.3]
D4	#10	5/8"	7/8" - 14 UNF	0.66" [16.7]
D5	#12	3/4"	1-1/16" - 12 UN	0.75" [19.0]
D6	#16	1"	1-5/16" - 12 UN	0.75" [19.0]
D7	#20	1-1/4"	1-5/8" - 12 UN	0.75" [19.0]
D8	#24	1-1/2"	1-7/8" - 12 UN	0.75" [19.0]

PGP/PGM511 Drain Positions



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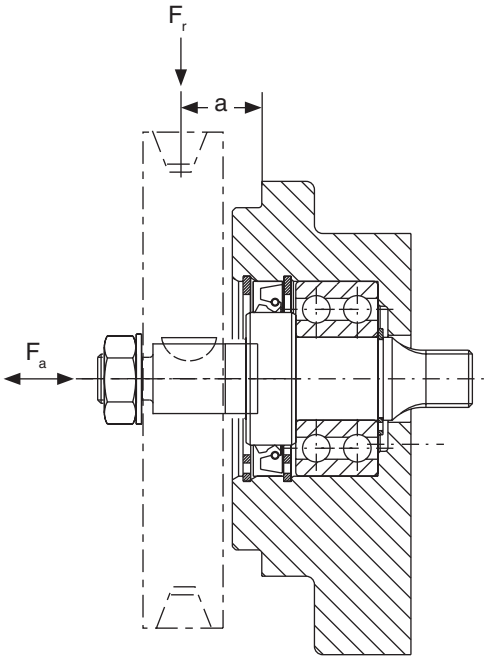
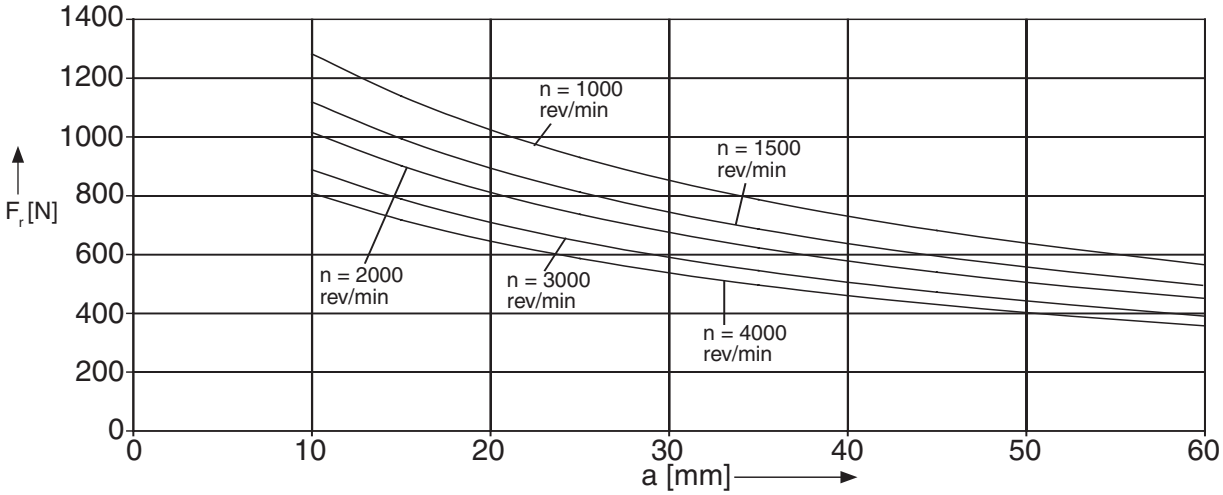
Bearing loads for code L2

Units subject to axial or radial loads, for instance drive with V-belts or gear wheels, must be specified with an outboard bearing. The diagrams below show the maximum axial or radial loads that can be tolerated referred to a bearing life of L_H = 1000 h. F_r is reduced by 0,7 F_a when axial loading is applied.

Outboard Bearing Code L2



Shaft load for outboard bearings



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PG	1	511	2	3	4	5	6	7	8	8	8[1)]	8[1)]	9[2)]	10[2)]	12[5)]	511	2	3	7	8	8	11	3)	4)

Code	1 – Type
P	Pump
M	Motor

Code	2 – Unit	
	Pump	Motor
A	Single unit	Standard Motor without checks
B	Multiple unit	Standard Motor with two checks
C	—	Standard Motor w/ one anti-cavitation check (ACC)
D	—	Standard Motor w/ one ACC + restrictor
M	Single distributor unit	—
Option C MUST NOT HAVE A DRAIN		
Option D MUST HAVE A DRAIN		

3 – Displacement*	
Code	ccm
0040	4.0
0050	5.0
0060	6.0
0070	7.0
0080	8.0
0100	10.0
0110	11.0
0120	12.0
0140	14.0
0160	16.0
0180	18.0
0190	19.0
0210	21.0
0230	23.0
0250	25.0
0270	27.0
0280	28.0
0310	31.0
0330	33.0
* Others on request	

Code	4 – Rotation
C	Clockwise
A	Counter-clockwise
B	Bi-directional

Code	5 – Shaft
A1	9T, 16/32DP, 32L, SAE A spline
C1	11T, 16/32DP, 38.2L, SAE 19-4 spline
C2	11T, 16/32DP, 32.2L, SAE 19-4 spline
K1	Ø15.88, 4.0 Key, no thread, 32L, SAE A, parallel
K4	Ø15.88, 4.0 Key, no thread, 58.7L, parallel
L1	Ø17.46, 4.8 Key, 7/16" UNF ext., 44.7L, parallel
L6	Ø19.05, 4.8 Key, no thread, 32L, SAE 19-1, parallel

Code	6 – Flange	Material
D4	72.0 x 100.0 - Ø80 rectangular	Aluminum
H2	106.4 - Ø82.55 SAE A 2-Bolt	Aluminum
H3	146.1 - Ø101.6 SAE B 2-Bolt	Aluminum
Q2	60.0 x 60.0 - Ø50.0 w/ seal, O thru bolt	Aluminum
Q4	60.0 x 60.0 - Ø50.0 w/ seal, O thru bolt	Aluminum
L2	106.4 - Ø82.55 SAE A 2-Bolt, w/ OBB and cont. drive shaft	Cast Iron

Code	7 – Shaft Seal
X	No seal
N	NBR
V	FPM, FKM
M	Double NBR
W	Double FPM
Standard motor seals are rated for max 75 PSI. For special higher pressure shaft seal solutions please contact Parker.	

Code	8 – Port Options
B1	No ports
D2	9/16" - 18 UNF thread
D3	3/4" - 16 UNF thread
D4	7/8" - 14 UNF thread
D5	1-1/16" - 12 UN thread
D6	1-5/16" - 12 UN thread
D7	1-5/8" - 12 UN thread
D8	1-7/8" - 12 UN thread

Code	9 – Motor Drain Option
B1	No drain
A	7/16" - 20 UNF thread
C	9/16" - 18 UNF thread

Code	10 – Drain Position
2	Drain on bottom
3	Drain on top
4	Rear drain
5	Drain right view on drive shaft
6	Drain left view on drive shaft

Code	11 – Section Connection
S	Separate inlets
C	Common inlets
No code for single unit	

Code	12 – Corrosion Protection
Z	Zinc coated (5)
P1	Black paint 100 hour salt spray
P4	Black paint 400 hour salt spray
No code for no protection	

Not all variances of ordering codes can be offered. Please check available part numbers first.
For not yet implemented part numbers or special requests please contact Parker Hannifin.

1) Only coded for the last section.
2) Only for motors.
3) For further unit repeat displacement, shaft seal between sections, side suction port, side pressure port, rear suction port, rear pressure port.
4) For adding built-in valves enter valve description at the end of the model code. Valve options described on pages 38-48.
5) Rear cover is in cast iron; Zinc coating for rear cover and fasteners, and for mounting flange code L2.

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PGP	511	B	0100	A	C1	H2	N	D6	D5	S	511	A	0110	X	D6	D5	B1	B1	P

PGP	Gear Design / Type	Parker Gear Pump
511	Series	
B	Unit	Tandem Unit
0100	Displacement	10.0 cm³/rev.
A	Rotation Direction	Counter-Clockwise
C1	Drive shaft	SAE 19-4 Spline 11T, 16/32 DP
H2	Flange	Mounting Flange SAE 2-Bolt A
N	Shaft Seal	Shaft Seal NBR
D6	Side Suction Port	1-5/16" - 12 UN Thread
D5	Side Pressure Port	1-1/16" - 12 UN Thread
S	Section Connection	Separate Inlets
511	Series Second Section	
A	Unit	Single Unit
110	Displacement	11.0 cm³/rev.
X	Shaft Seal	No Seal
D6	Side Suction Port	1-5/16" - 12 UN Thread
D5	Side Pressure Port	1-1/16" - 12 UN Thread
B1	Rear Suction Port	No Port
B1	Rear Pressure Port	No Port
P1	Corrosion Protection	Black Paint 100 Hour Salt Spray

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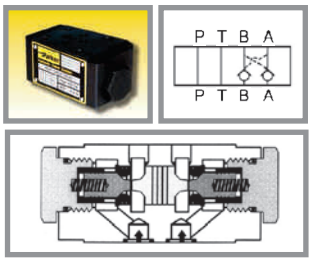
General Description MCVP

The MCVP series valve blocks leakage from the actuator ports to tank when the directional valve is in the center position.

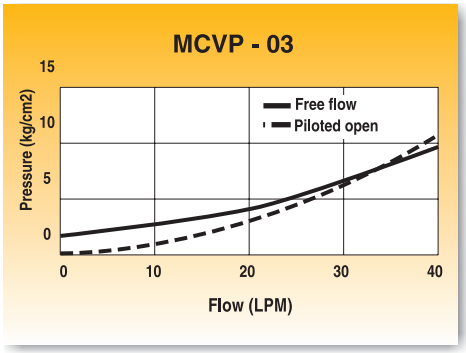


Note) For max. response and shut off, a directional valve with both cylinder ports drained to tank in the center position is recommended for use with manapak double pilot operated check valves.

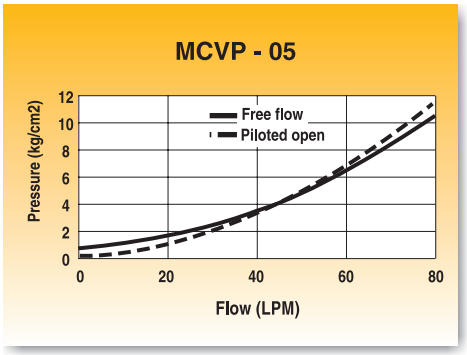
Features MCVP

1. Parker Manapak MCVP sandwich style, pilot operated check valves can be provided in either single or double configurations.
2. Valve bodies are manufactured from ductile which provide extra strength and durability for longer life. Internal hardened steel components also provided longer life.
3. Positive shut-off is provided by a hardened poppet and cage assembly.

Performance Curve

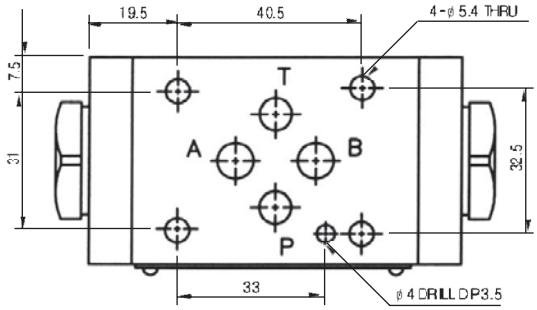


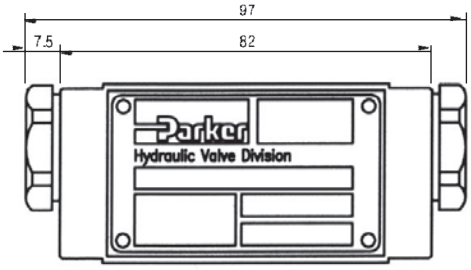
	MCVP3	MCVP5
Mounting Pattern	NFPA D03, NG 6 CETOP 3, 1/4"	NFPA D05, NG 10 CETOP 5, 3/8"
Maximum Pressure	250 Bar (3600 PSI)	250 Bar (3600 PSI)
Maximum Flow	50 LPM (14 GPM) @12.6 Bar (180 PSI)	80 LPM (21.5 GPM)
Craking Pressure	1.75 Bar	1.05 Bar

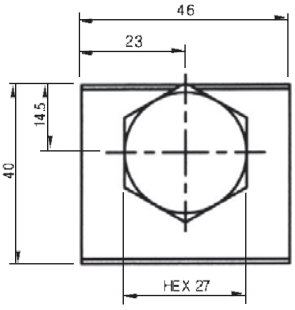


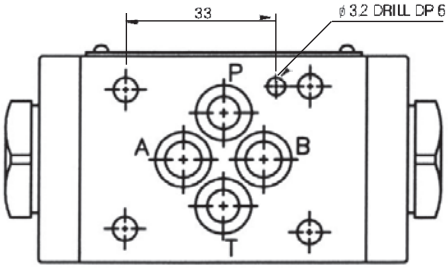
Dimensions

Unit : mm



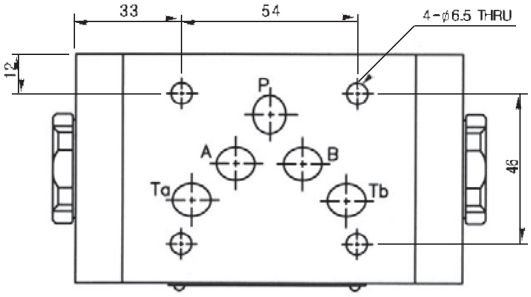


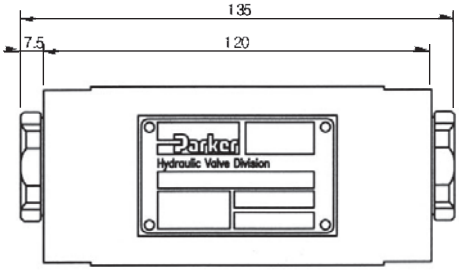


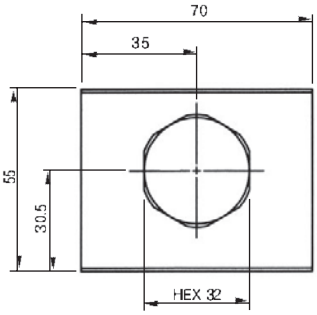


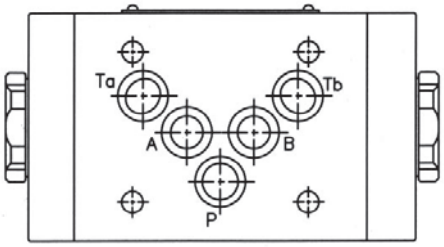
Dimensions

Unit : mm



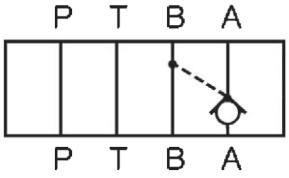




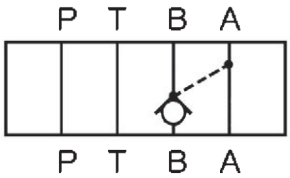


MCVP	*	*	N	10
	Size	Port(s)	Seals	Design
Modular Check Valve Direct Operated	3 = D03 5 = D05	A = A port B = B port D = A & B	Nitrile, std.	

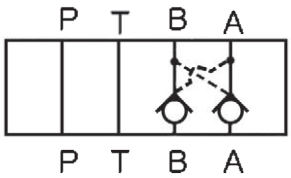
Schematics



A Option



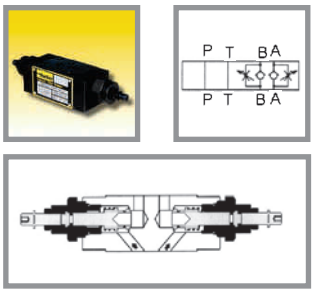
B Option



D Option

General Description MFCV

The MFCV Series flow control valves permit free flow from the direction valve to the actuator and adjustable independent flow regulation in each return line from the actuator (meter-out). The MFCV series have a seal plate and can be inverted for meter-in applications (see installation drawing for flow direction).



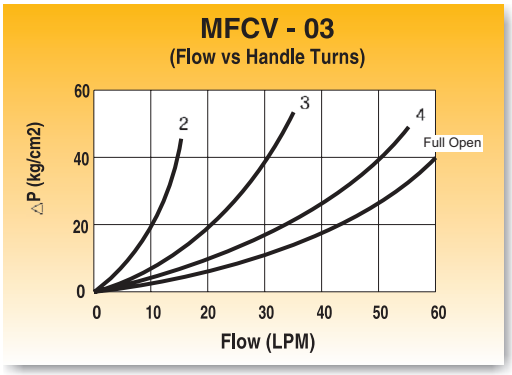
Features MFCV

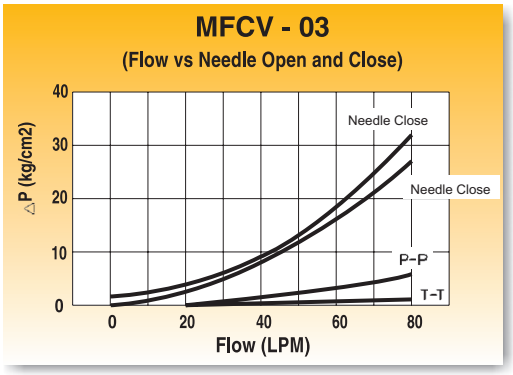
1. Parker Manapak style MFCV flow control valves can be provided in either single or double configurations.
2. Valve bodies are manufactured from ductile which providedextra strength and durability for longer life. Internal hardened steel components also provided longer life.
3. Large bypass check allow high flow at low pressure drop.
4. Reversible (invert 180) for meter-in or meter-out.
5. Pressure adjustment options available : hand knob

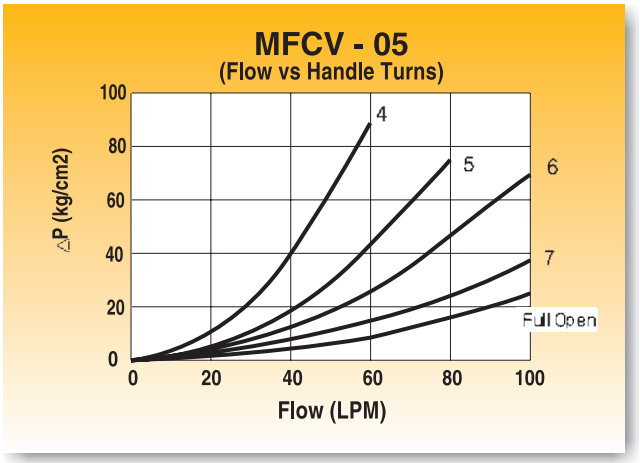
Specifications MFCV

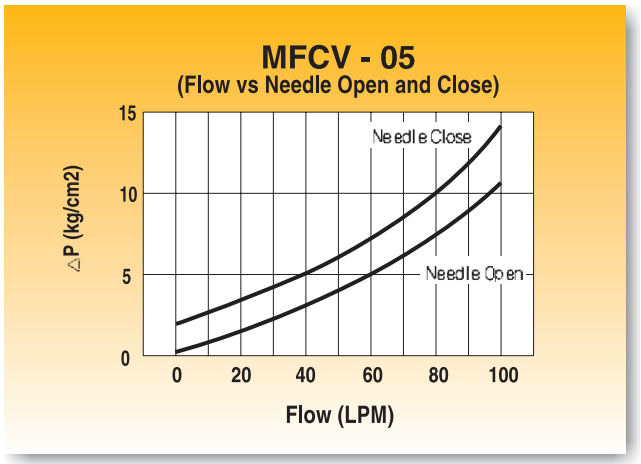
	MFCV3	MFCV5
Mounting Pattern	NFPA D03, NG 6 CETOP 3, 1/4"	NFPA D05, NG 10 CETOP 5, 3/8"
Maximum Pressure	250 Bar (3600 PSI)	250 Bar (3600 PSI)
Maximum Flow	50 LPM (13.5 GPM)	80 LPM (21.5 GPM)

Performance Curve:



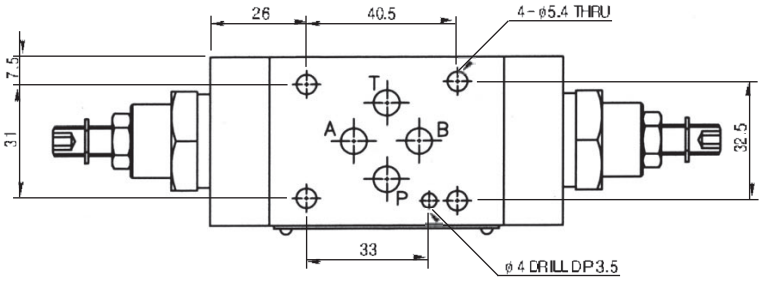


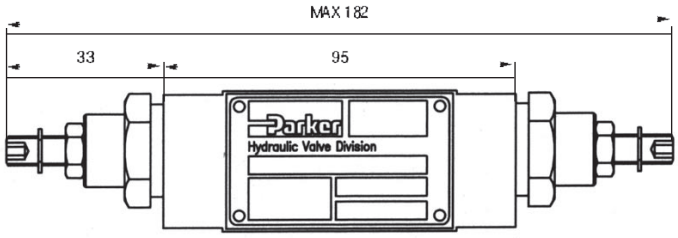

MFCV - 05
(Flow vs Handle Turns)
△P (kg/cm2)
100
80
60
40
20
0
0
20
40
60
80
100
Flow (LPM)
4
5
6
7
Full Open

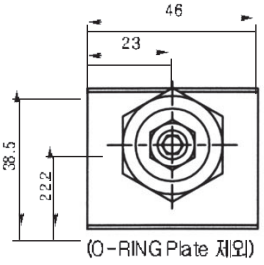

MFCV - 05
(Flow vs Needle Open and Close)
△P (kg/cm2)
15
10
5
0
0
20
40
60
80
100
Flow (LPM)
Needle Close
Needle Open

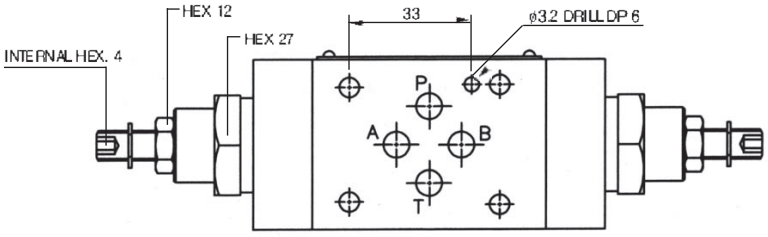
Dimensions

Unit : mm



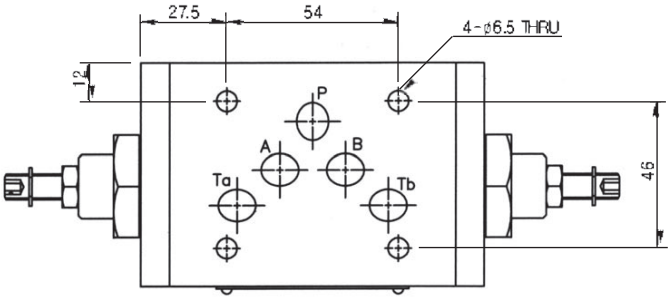


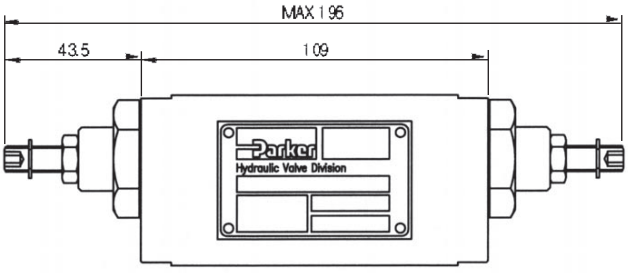


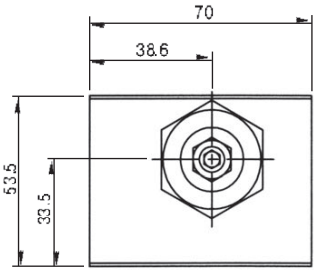


Dimensions

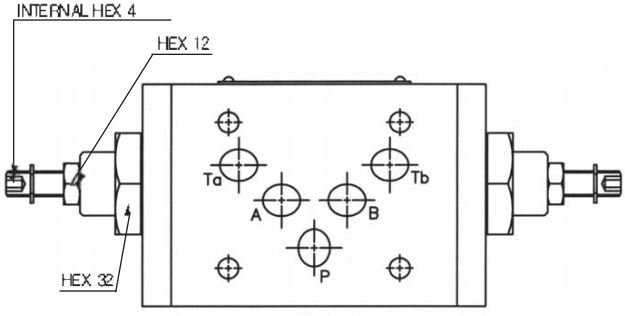
Unit : mm







(O-RING Plate 제외)

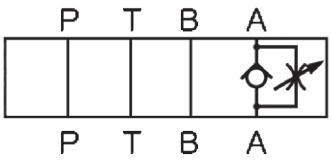


Ordering Information

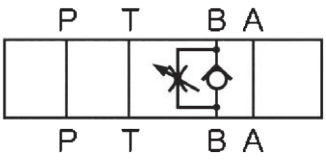
MFCV	*	*	*	N	10
	Size	Port(s)	Adjustment	Seals	Design
Modular Pressure Reducing Valve	3 = D03 5 = D05	A = A port B = B port D = A & B T* = T port	S = Screw K = Knob	Nitrile, std.	

Note: Invert valve for meter in applications (for MFCV 3 Series only)

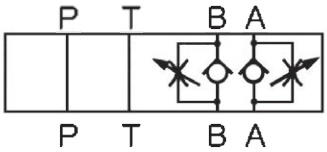
Schematics



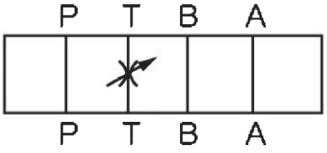
A Option



B Option



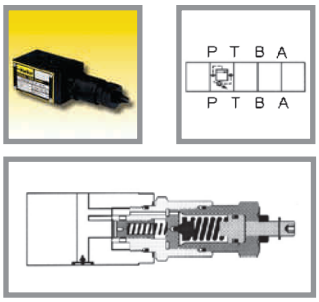
D Option



T Option

General Description MRV

MRV series relief valves can be configured to limit the system pressure in one area of circuit with pressure adjustable spring and spool and limit system pressure by opening to tank when system pressure reaches the valve setting.



Features MRV

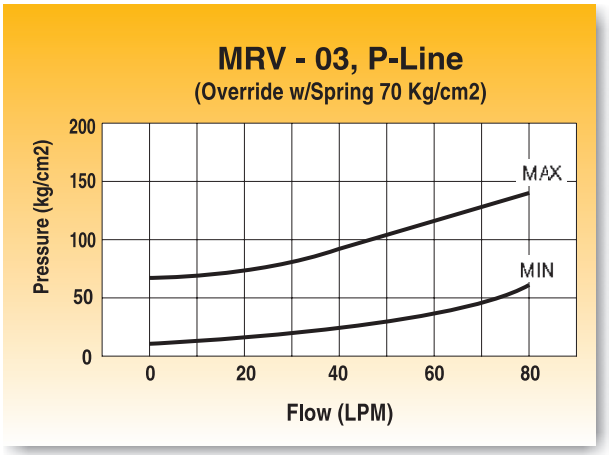
1. MRV series relief valves can be used to limit pressure in the 'P' port, 'A' port, or 'B' port.
2. Valve bodies are manufactured from ductile which provide extra strength and durability for longer life. Internal hardened steel components also

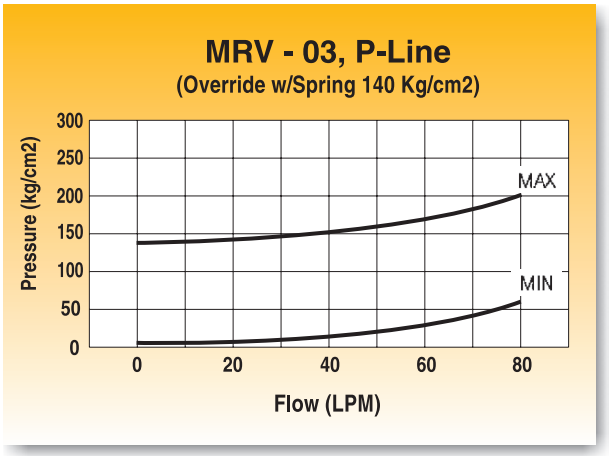
Specifications MRV

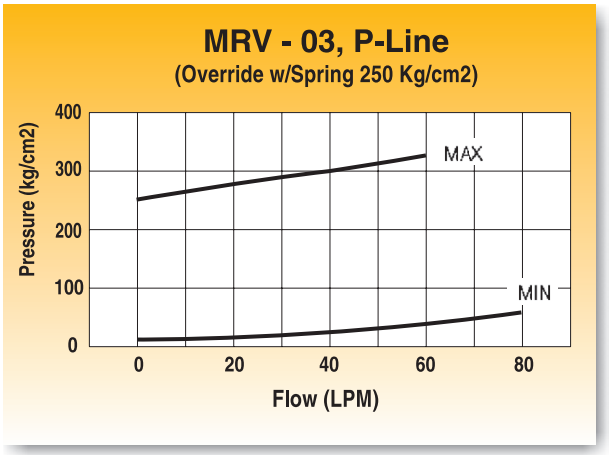
	MRV3	MRV5
Mounting Pattern	NFPA D03, NG 6 CETOP 3, 1/4"	NFPA D05, NG 10 CETOP 5, 3/8"
Maximum Pressure	250 Bar (3600 PSI)	210 Bar (3000 PSI)
Maximum Flow	40 LPM (10.5 GPM)	80 LPM (21 GPM)
Pressure Range	Code / Range 03# 3.5 ~ 35 Bar (50 ~ 500 PSI) 07 20 ~ 70 Bar (285 ~ 1000 PSI) 14 50 ~ 140 Bar (715 ~ 2000 PSI) 21 * 100 ~ 210 Bar (1430 ~ 3000 PSI) 25# 100 ~ 250 Bar (1430 ~ 3600 PSI)	

* 는 MRV 5시리즈에 적용 (For MRV 5 series only)
# 은 MRV 3시리즈에 적용 (For MRV 3 series only)

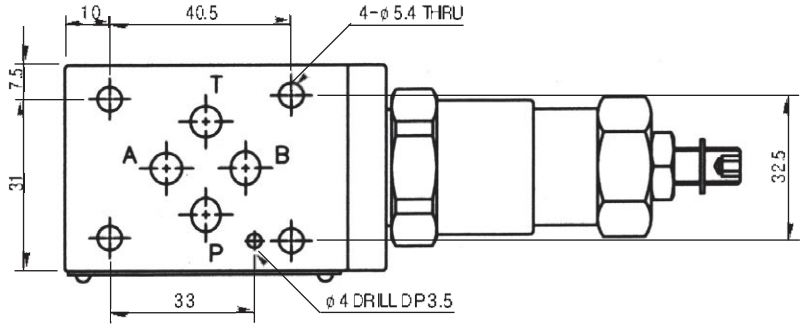
Performance Curve

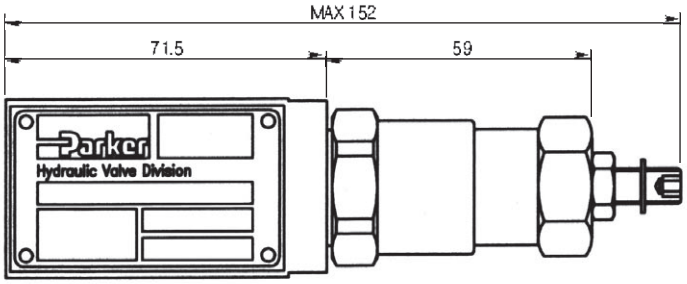


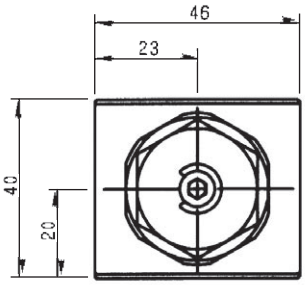


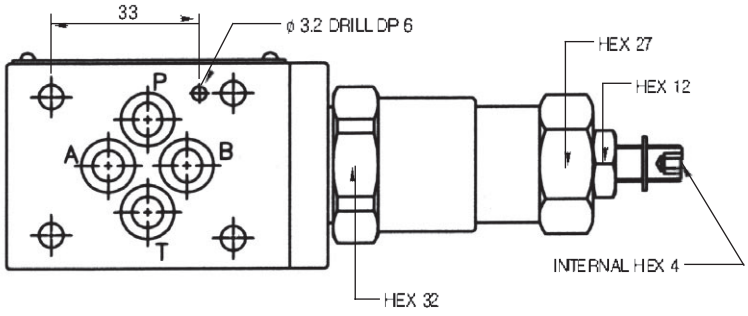


Unit : mm


10
40.5
4-ø 5.4 THRU
7.5
31
T
A
B
P
32.5
33
ø 4 DRILL DP3.5

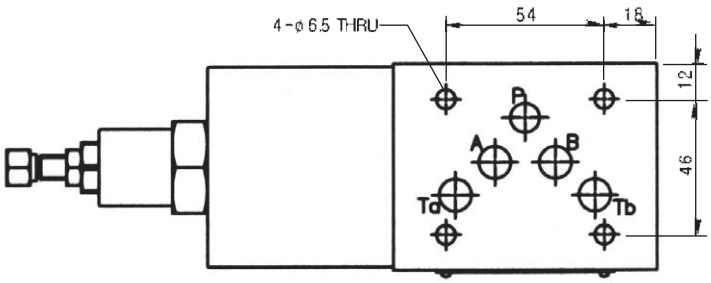

MAX 152
71.5
59
Parker
Hydraulic Valve Division

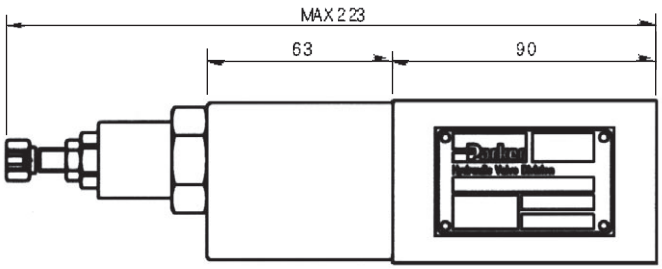

46
23
40
20

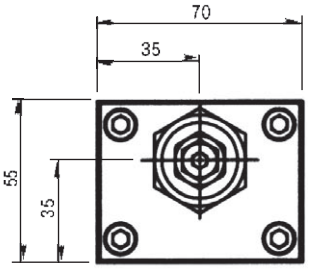

33
ø 3.2 DRILL DP 6
HEX 27
HEX 12
P
A
B
T
INTERNAL HEX 4
HEX 32

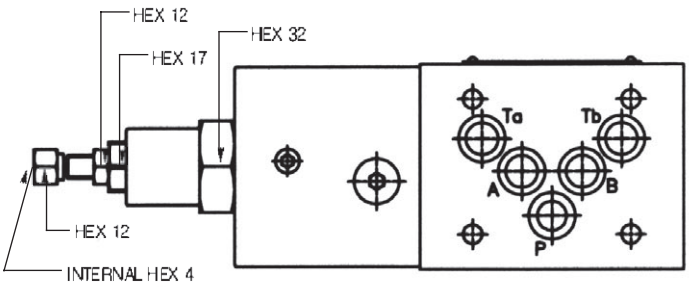
Dimensions

Unit : mm







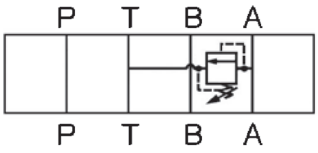


Ordering Information

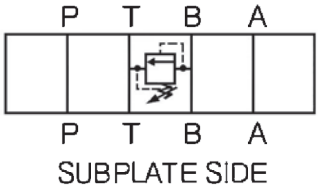
MRV	*	**	**	*	N	10
	Size	Function	Pres. Range	Adjustment	Seals	Design
Modular Pressure Reducing Valve	3 = D03 5 = D05	PT = P to T AT = A to T BT = B to T	03# = 3.5 ~ 35 Bar 07 = 20 ~ 70 Bar 14 = 50 ~ 140 Bar 21* = 100 ~ 210 Bar 25# = 100 ~ 250 Bar	S = Screw K = Knob	Nitrile, std	

* For MRV5 series only
\# For MRV3 series only

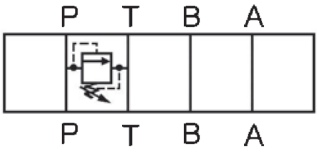
Schematics



A Option



B Option



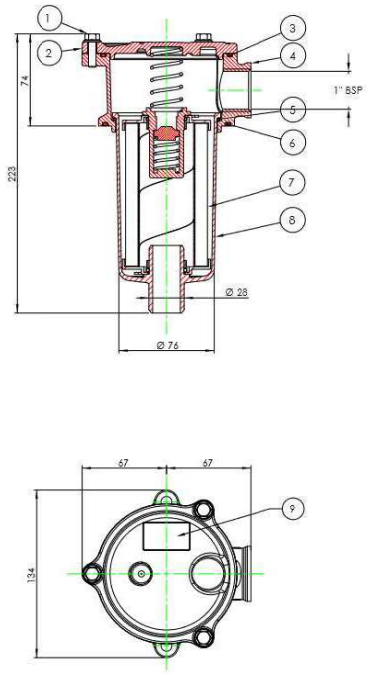
P Option

Returnline Tank Mounted Filters

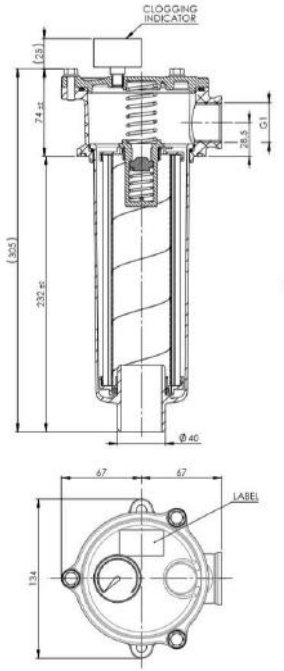
Technical Specifications

- Max working Pressure :8 bar/10bar
- Burst Pressure : 16 bar
- Max Flow Rate : 700lpm
- Cover: Aluminium alloy
- Head: Aluminium alloy
- Bowl: PA6 reinforced
- Seal: NBR
- Connections : G 1”/ G1 ¼”/ 2 ½” SAE Flange

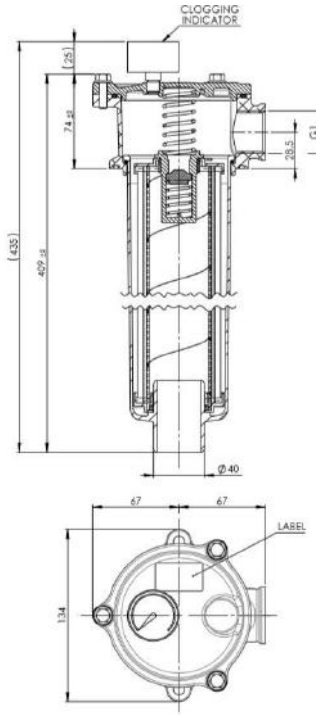
Returnline Tank Mounted Filters



RTF1 Series

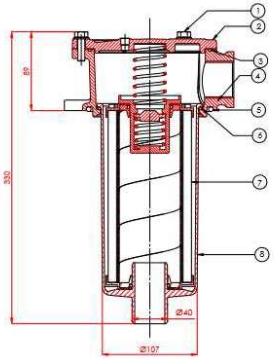


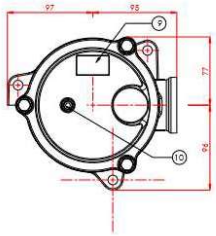
RTF2 Series



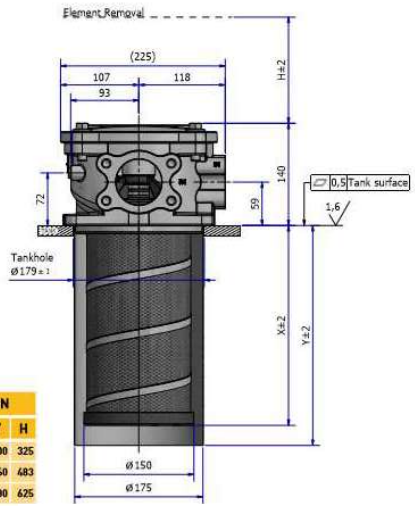
RTF3 Series

Returnline Tank Mounted Filters

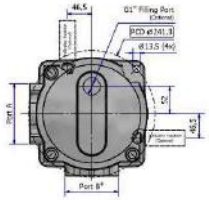




RTF4 Series

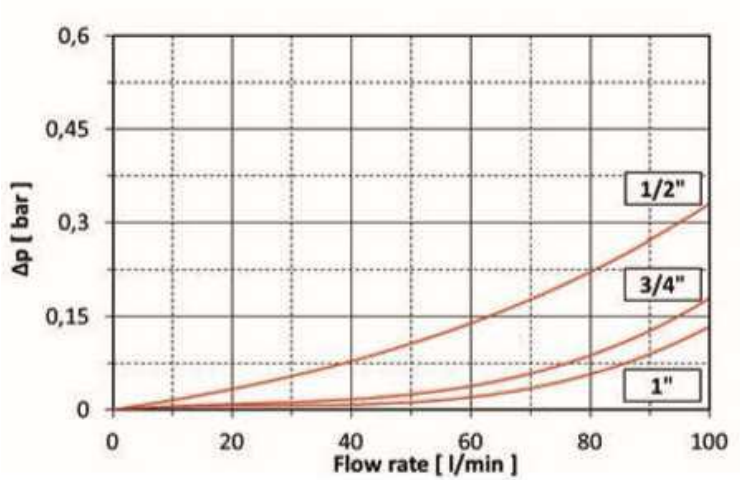


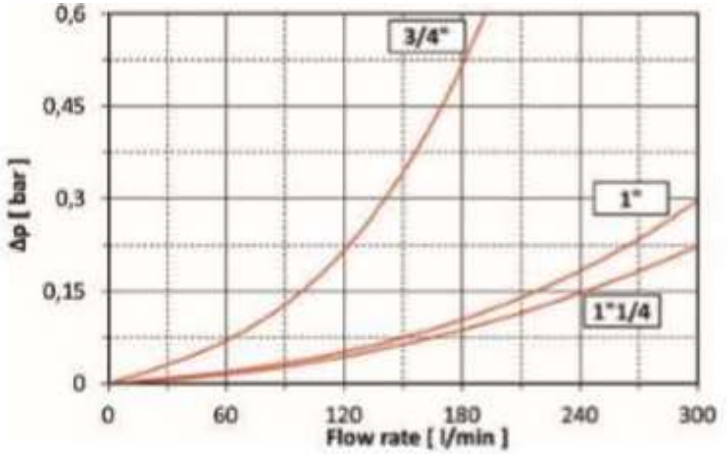
DIMENSION			
TYPE	X	Y	H
GLF41	273	300	325
GLF42	431	460	483
GLF43	571	600	625



GLF4-2 Series

Returnline Tank Mounted Filters

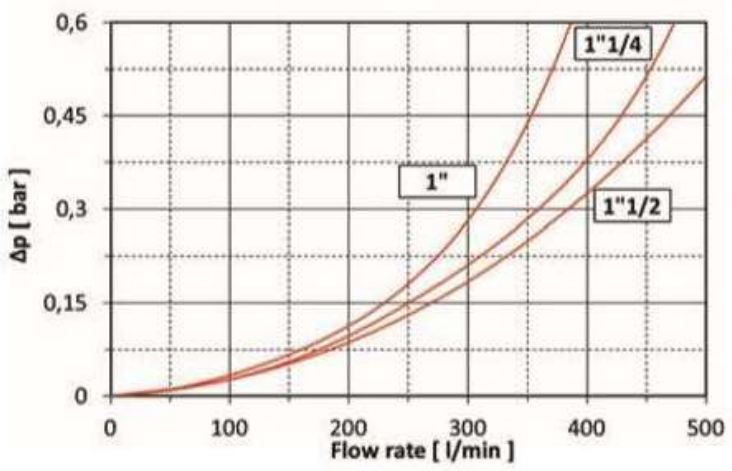


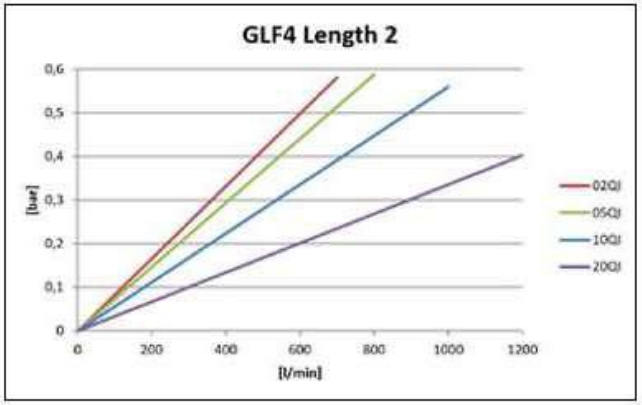


Size	25Q	10Q	05Q	03Q	25C	10C
RTF1	0.0039	0.0040	0.00586	0.0067	0.0014	0.0027
RTF2	0.0022	0.0023	0.0035	0.0056	0.00082	0.0016
RTF3	0.00137	0.0014	0.0022	0.0037	0.00039	0.00085

EXAMPLE OF TOTAL Δp CALCULATION RHF110QBPGG161 with 80 l/min and oil 46 cSt:
Housing Δp 0,07 bar + element Δp 0,46 bar (80 x x0 .0040*46/32) = total assembly Δp 0,53 bar

Returnline Tank Mounted Filters



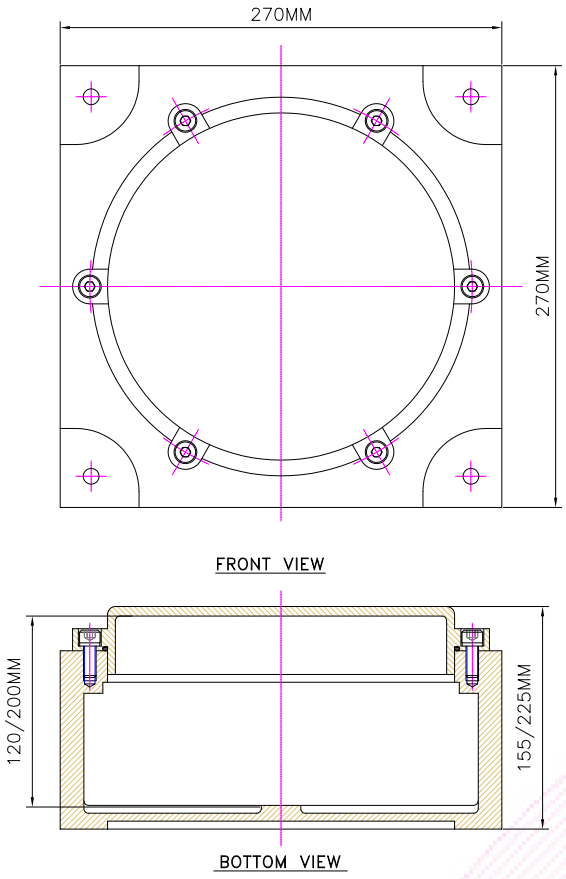


Size	25Q	10Q	05Q	25C	10C
RTF4	0.0011	0.00146	0.0027	0.00025	0.00106

Returnline Tank Mounted Filters

Series	Size/Flow Rate	Micron Rating	Seal Type	Indicator	Bypass	Port Size	Standard
RTF	1 (Upto 100lpm) 2 (Upto 175lpm) 3 (Upto 250lpm) 4 (upto 400lpm)	03Q : 03 Micron 05Q : 05 Micron 10Q : 10 Micron 25Q : 25 micron 10C : 10 Micron Cellulose 25C : 25 Micron Cellulose	B-NBR seal	P- Port Plugged	G- 1.7bar Setting K- 3.5bar Setting	G16 – 1"BSPThreaded G20 - 1 1/4" BSP Threaded (G20-Applicable for RTF3 & RTF4 only)	1
GLF 4	2 (700lpm)	02Q : 03 Micron 05Q : 05 Micron 10Q : 10 Micron 20Q : 20 micron	B-NBR seal	P2 - Port Plugged	G- 1.7bar Setting	R40 - 2 1/2" SAE Threaded	MF

TRI-FLP
ENGINEERING PVT LTD



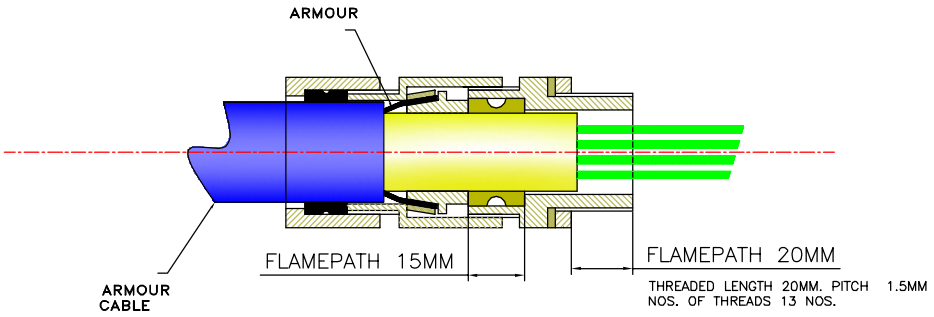
EXPLOSION PROOF JUNCTION BOX 270

TECHNICAL SPECIFICATION

Type of Ex-Protection	EEx-d Type, IS/IEC60079-1:2007
Zone Classification	Zone 1 & Zone 2
Gas Group	IIA, IIB, & IIC IS/IEC60079-0:2004
Ingress IP Protection	Ip66 IS/IEC60529-1:2001
Material of contraction	Dia Cast Aluminum Alloy Lm6
Paint	Epoxy Polyester Powder Coating
Earthling	Internal -01 No. External -02 Nos.
Cable Entry	As per Require
Hardware	Stainless Steel
Lamp Rating	2.5 sq.mm. 30 Nos. In Single Row & 60Nos. in Double Row

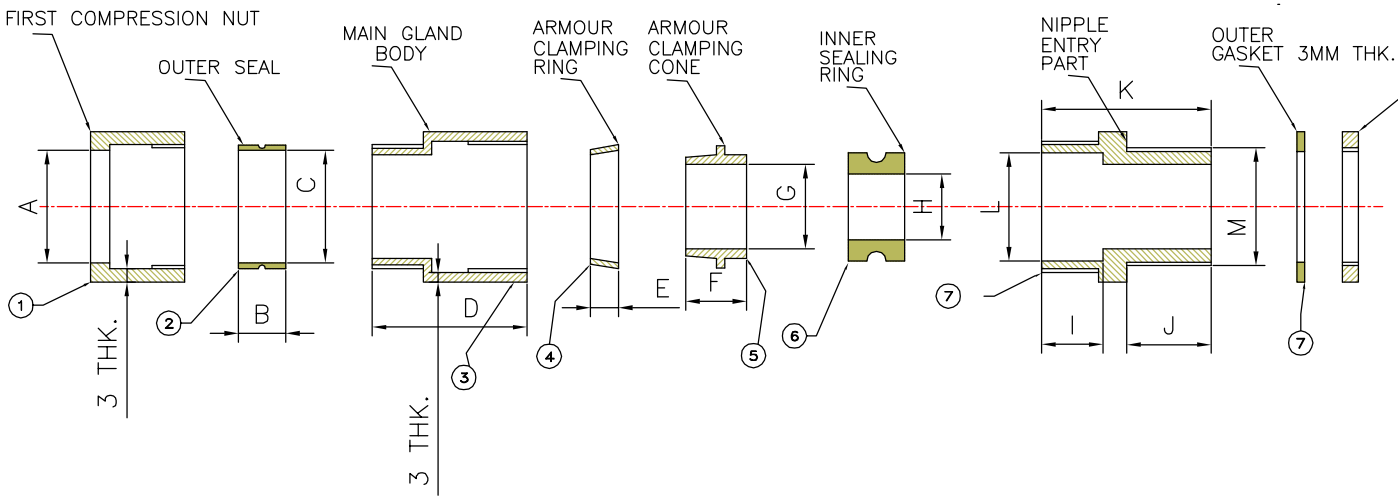
TRI-FLP ENGINEERS PVT. LTD.
11, 1st Floor, Popular Indl. Estate, Gokhale Compound,
Raghuvir Nagar, Near Char Rasta, Dombivli East,
Dist Thane 421201, Maharashtra, India.

Tel : +91 0251 2433393 / 2452001 / 2440071 / 2440081
Email : vikas@trimurtitriflp.com / triflp@gmail.com
Web : www.explosionproof.co.in



DECLARATIONS

1. DESIGN COMFORMS TO STANDARDS IS/IEC 60079-1:2007 &
   AS TO GENERAL DESING, RATING, PERFOMANC IS/IEC 60079-0:2004
   FOR GAS GROUP IIA IIB
   AS TO WEATHERPROOF IP-66 PROTECTION IS/IEC60529-2001
2. ALL WARNING ARE INTEGRALLY CAST RAISED LETTERS
   (WARNING - "DO NOT OPEN WHILE ENERGIZED")
3. ROUTINE TEST IS TO BE CARRIED OUT AT A VALUE AS MENTION IN THE REPORT.
4. ALL DIMENTIONS ARE IN MM.
8. AMBIENT TEMPRETURE: -20 TO +40°C.
9. TEMPRETURE CATEGARY :- T-
10. CAT. REF. NO. - TFE-CG-01
15. THE THREADED TOLERNCE AS PER ISO965-1 & ISO965-3
16. MOC:- ALUMINUM ALLOY LM6 / S.S. / BRASS / C.I. FG200 MATERIAL THK.3MM



NO.	DESCRIPTION	MATERIAL
9	CHECK NUT	BRASS/SS
8	OUTER GASKET 3MM THK.	NEOPRENE
7	NIPPAL ENTRY PART	BRASS / SS
6	INNER SEALING RING	NEOPRENE
5	ARMOUR CLAMPING CONE	BRASS / SS
4	ARMOUR CLAMPING RING	BRASS / SS
3	MAIN GLAND BODY	BRASS / SS
2	OUTER SEAL	NEOPRENE
1	FIRST COMPRESSION NUT	BRASS / SS

SPACE FOR CERTIFICATION

ALL SIZE IN M.M.

A	B	C	D	E	F	G	H	I	J	K	L	M	CABLE O.D.
16	16	10	24	5	12	11	11	15	20	38	M16	M16	15.5
18	15	17.5	24	6	13	13	13	15	20	38	M20	M20	17.5
24	15	23	30	8	15	16	16	15	20	38	M25	M25	23
32	15	28	32	8	16	20	20	15	20	38	M36	M36	31
39	15	37	32	8	20	31	31	15	20	40	M42	M42	37
45	15	45	40	8	22	32	39	15	20	46	M50	M50	43
64	15	64	46	8	22	54	54	15	20	46	M60	M63	61

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SHEET	SCALE	DRN.	CHEKD.	APPD.	DATE	TITLE :-
1 OF 1	NTS	UTTAM	SHRI	VIKAS	04-07-2014	EXPLOSIONPROOF CABLE GLAND
	PROJECTION	CAT. NO :- TFE-CG-01				
		DRG. NO :- DRW-TFE-CG-01				

Compact pressure switch
For industrial applications, adjustable switch hysteresis
Model PSM02

Applications

- Hydraulics and mobile hydraulics
- Pneumatics
- Mobile working machines
- Plastics injection moulding machines

Special features

- Adjustable switch hysteresis
- Setting ranges: 0.2 … 2 bar [3 ... 30 psi] to 30 ... 320 bar [450 ... 4,600 psi] and -0.85 ... -0.15 bar [-25 inHg ... -5 inHg]
- Non-repeatability of the switch point: ≤ 2 %
- Switching functions: Normally closed, normally open or change-over contact
- Media: Compressed air, neutral and self-lubricating fluids and neutral gases

Compact pressure switch, model PSM02

Description

Model PSM02 screw-in pressure switches in a diaphragm or piston design open or close a circuit, depending on whether the pressure is falling or rising. With one adjustment screw, respectively, the required switch point and the switch hysteresis can also be easily and conveniently set on-site. Optionally, WIKA offers its customers the factory setting of the switch point.

Model PSM02 mechanical pressure switches are employed wherever compressed air, neutral and self-lubricating fluids or neutral gases are used and a precisely set switch hysteresis is needed.

The high reproducibility of the switch point of ±2 % and the adjustable switch hysteresis make the model PSM02 pressure switches interesting for all customers who place a value on precision as well as an attractive price.

Data sheets showing similar products:
Compact pressure switch, for industrial applications; model PSM01; see data sheet PV 34.81
Compact pressure switch, block design; model PSM03; see data sheet PV 34.83

Setting ranges

Unit	Max. working pressure	Setting range	Non-repeatability [1]	Measurement principle
bar	20	-0.85 … -0.15	±0.05	Diaphragm
	60	0.2 … 2	±0.04	
		0.5 … 8	±0.16	
		1 … 16	±0.32	
	350	10 … 30	±0.6	Piston
		10 … 80	±1.6	
		10 … 120	±2.4	
		20 … 200	±4	
		20 … 250	±5	
		30 … 320	±6.4	
psi	300	-25 … -5 inHg	±1.4 inHg	Diaphragm
	870	3 … 30	±0.6	
		7 … 115	±2.3	
		15 … 225	±4.5	
	5,000	150 … 425	±8.5	Piston
		150 … 1,150	±23	
		150 … 1,700	±34	
		150 … 2,300	±46	
		300 … 2,900	±58	
		300 … 3,600	±72	
		450 … 4,600	±92	

1) Only for pressure switches with adjustable switch point setting. For instruments with fixed factory setting, which are not adjustable, see “Non-repeatability” on page 3.

The given setting ranges are also available in MPa.
Other units and setting ranges on request.

Switch point setting
- No factory setting, adjustable
- Fixed factory setting, not adjustable
- Factory setting, adjustable

The main selection criterion for the pressure switch is the max. working pressure (see table “Setting ranges”) which can be reached in the application.
From that follows the choice of the setting range in which the desired switch point must lie. The switch point should be in the the range of 30 ... 70 % of the setting range end value. This enables an optimal repeatability and ease of setting of the switch point.

For the switch point setting “Fixed factory setting, not adjustable”, the ordering information of max. working pressure (20 bar [300 psi], 60 bar [870 psi] or 350 bar [5,000 psi]), together with the desired switch point, is sufficient. With this ordering information, the pressure switch can be optimally designed, set and sealed with respect to non-repeatability and long service life. The selection of the setting range is not required with this variant.

Switch contact
High-quality snap-action switch with self-cleaning, solid silver contacts

Switching frequency
max. 1 Hz

Service life per ISO 10771-1
> 2 x 10^6 load cycles

Switching function
Selectable: Normally open, normally closed, change-over contact

Electrical connection	Normally open	Normally closed	Change-over contact
Angular connector DIN 175301-803 A (4-pin)	-	-	x
Circular connector M12 x 1 (4-pin)	-	-	x
Cable outlet	x	x	x

Electrical rating

Utilization category [1]	Voltage			Current
	Angular connector	M 12 x 1, cable	All	
Resistive load AC-12, DC 12	AC 250 V	AC 48 V	DC 24 V	4 A
Inductive load AC-14, DC 14	AC 250 V	AC 48 V	DC 24 V	2 A
Min. switching power	25 mW with solid silver contacts			

1) per DIN EN 60947-1

Non-repeatability

Non-repeatability (guideline value)	Switch point setting
≤ 2 % of setting range end value	No factory setting, adjustable
	Factory setting, adjustable
≤ 4 % of set switch point [2]	Fixed factory setting, not adjustable

2) For diaphragm switches ≥ 0.04 bar; for piston switches ≥ 0.6 bar

Switch hysteresis (adjustable)

Measurement principle	Switch hysteresis (guideline value)
Diaphragm (vacuum)	250 mbar
Diaphragm (gauge pressure)	0.1 bar [1.4 psi] + 5 ... 20 % of switch point Example: With a switch point of 3 bar [42 psi], the switch hysteresis is 0.25 ... 0.7 bar [3.5 ... 9.8 psi].
Piston	5 bar [70 psi] + 5 ... 15 % of switch point Example: With a switch point of 100 bar [1,500 psi], the switch hysteresis is 10 ... 20 bar [145 ... 290 psi].

Operating conditions

Permissible temperature ranges

Medium temperature	Sealing material
-20 … +80 °C [-4 ... +176 °F]	NBR
0 … 100 °C [32 ... 212 °F]	FKM
-40 … +100 °C [-40 ... +212 °F]	EPDM
-40 … +80 °C [-40 ... +176 °F]	TNBR
-40 ... +100 °C [-40 ... +212 °F]	FVMQ

Storage and transport temperature
-20 ... +80 °C [-4 ... +176 °F]

Permissible air humidity (per IEC 68-2-78)
≤ 67 % r. h. at 40 °C [104 °F] (in accordance with 4K4H per EN 60721-3-4)

Vibration resistance (IEC 60068-2-6)
10 g (10 ... 2,000 Hz)

Shock resistance (IEC 60068-2-27)
30 g

Process connections

Thread	Process connection standard	Material of wetted parts
G ⅛ B	DIN EN ISO 228-1	■ Galvanised steel ■ Stainless steel
G ¼ B	DIN EN ISO 228-1	Stainless steel
G ½ B	DIN EN ISO 228-1	Stainless steel (only with measurement principle: Diaphragm)
M10 x 1	DIN 13-5	Galvanised steel
7/16-20 UNF BOSS	SAE J514 E	■ Galvanised steel ■ Stainless steel
⅛ NPT	ANSI/ASME B1.20.1	■ Galvanised steel ■ Stainless steel
¼ NPT	ANSI/ASME B1.20.1	■ Galvanised steel ■ Stainless steel
R ⅛	ISO 7	■ Galvanised steel ■ Stainless steel
R ¼	ISO 7	■ Galvanised steel ■ Stainless steel

Other process connection on request

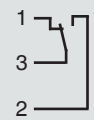
Electrical connection

Designation	Ingress protection [1]	Wire cross-section	Cable ∅
Angular connector DIN 175301-803 A (4-pin)	IP65	-	-
Circular connector M12 x 1 (4-pin)	IP67	-	-
Cable outlet, 2-wire [2]	IP67	2 x 0.75 mm² [1.16 x 10^{-3} in²]	5.0 mm [0.2 in]
Cable outlet, 3-wire [2]	IP67	3 x 0.5 mm² [7.75 x 10^{-4} in²]	5.3 mm [0.21 in]

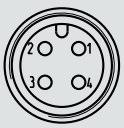
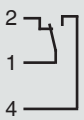
1) The stated ingress protection (per IEC/EN 60529) only applies when plugged in using mating connectors that have the appropriate ingress protection.
2) Cable lengths available in 0.5 m, 1 m and 2 m (1.5 ft, 2 ft or 6 ft), other cable lengths on request.

Connection diagrams

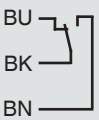
Angular connector DIN 175301-803 A (4-pin)

	Change-over contact
	SPDT  1 = NC 2 = NO 3 = COM

Circular connector M12 x 1 (4-pin)

	Change-over contact
	SPDT  1 = COM 2 = NC 4 = NO

Cable outlet

	Normally open/ normally closed	Change-over contact
	NO/NC 	SPDT 

Colour coding per IEC 60757

BK	Black
BN	Brown
BU	Blue

Materials

Wetted parts
- Galvanised steel
- Stainless steel 303
- PTFE sealing at the piston (only piston version)

For sealing materials, see “Permissible temperature ranges”, page 3.

Non-wetted parts
Case: Galvanised steel or stainless steel

The choice of material for the process connection means that the case is made of the same material.

Approvals

Logo	Description	Country
CE	**EU declaration of conformity** ■ Pressure equipment directive ■ Low voltage directive ■ RoHS directive	European Union
EAC	**EAC** ■ EMC directive ■ Low voltage directive	Eurasian Economic Community

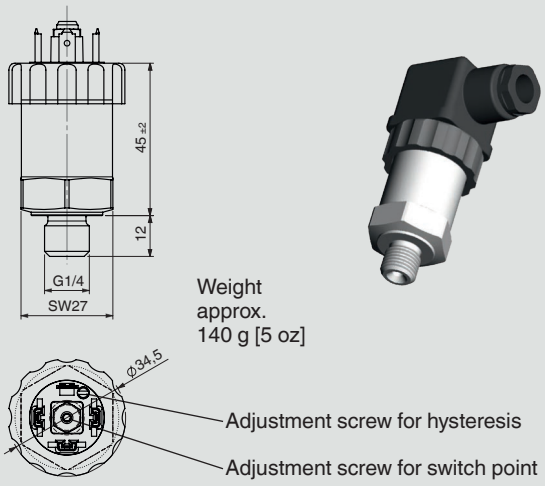
Approvals and certificates, see website

Dimensions in mm [in]

Standard version

Electrical connection

Angular connector DIN 175301-803 A

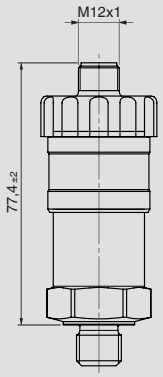


Weight
approx.
140 g [5 oz]

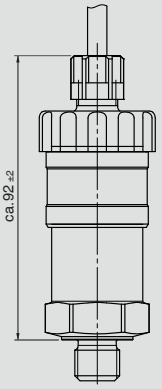
Option

Electrical connection

M12 x 1

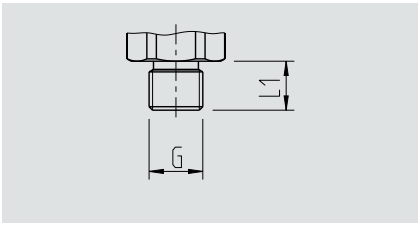


Cable

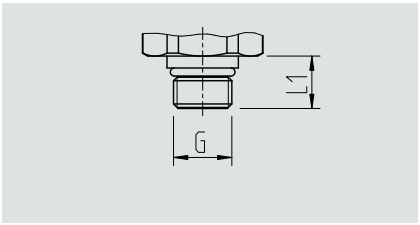


Dimensions in mm [in]

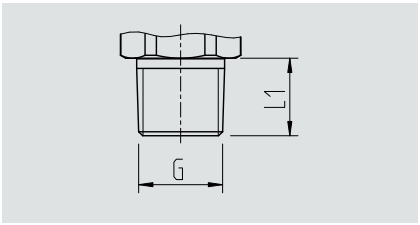
Process connections



G	L1
G ⅛ B	10 [0.4]
G ¼ B	12 [0.47]
G ½ B	14 [0.55]
M10 x 1	10 [0.4]



G	L1
7/16-20 UNF SAE BOSS	9 [0.35]



G	L1
⅛ NPT	10 [0.4]
¼ NPT	12 [0.47]
R ⅛	10 [0.4]
R ¼	12 [0.47]

Scope of delivery

- Pressure switch in individual or multiple packaging
- Only for piston switches: Sealing ring NBR/galvanised steel (G ⅛ B, G ¼ B, M10 x 1)
- Allen key (2 mm) for switch point setting (only with adjustable pressure switch variants)

Accessories

Mating connector

Designation	Order number			
	without cable	with 2 m cable	with 5 m cable	with 10 m cable
Circular connector M12 x 1 (4-pin)				
■ straight	2421262	14086880	14086883	14086884
■ angled	2421270	14086889	14086891	14086892

Ordering information

Model / Switch point setting / Setting range / Maximum working pressure / Switching function / Process connection / Sealing / Electrical connection / Options

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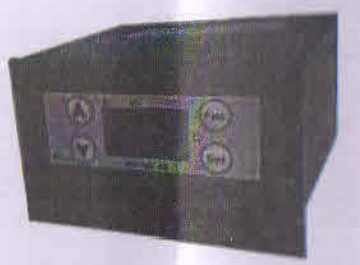
TEMPERATURE CONTROLLER

USER MANUAL



TC-100-2S

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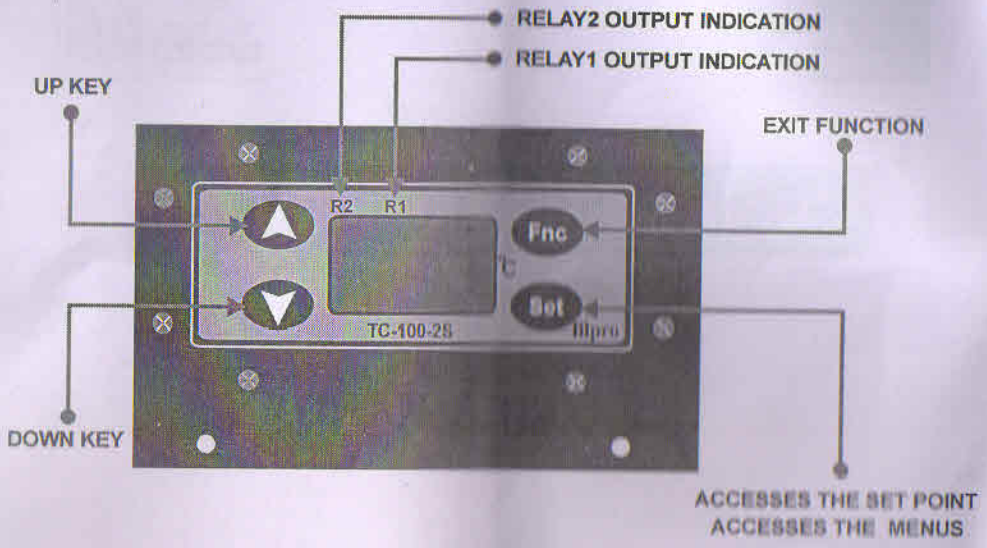

At start-up the instrument performs Lamp test for few seconds the display blink.

TECHNICAL DATA:

Supply Voltage	:	24 VDC ± 20%.
Current Consumption	:	60mA.
Relay1 Output	:	1C/O Relay contact(Potential free) rated 6A@250V AC / 30V DC.
Relay2 Output	:	1C/O Relay contact(Potential free) rated 6A@250V AC / 30V DC.
Input	:	Silicon temperature input(KTY81-210).
Measuring range	:	-50 to 99 °C.
Accuracy	:	0.5% better than end scale +1 digit.
Resolution	:	1 °C .
Dimensions	:	100x60mm , 100mm depth.
Storage temperature	:	-30 to 85 °C.

ACCESSING AND USING MENUS :

Resources are arranged in a menu, which can be accessed by pressing and quickly releasing the "Set" key (machine status menu) or by holding down the "Set" key for 5 seconds (programming menu).

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To access the contents of each folder indicated by the relevant label, just press the "Set" key once.

You can now scroll through the contents of each folder, modify it or use its functions.

If you do not use the key board for over 15 seconds (time-out) or if you press the "Fnc" key once, the last value shown on the display is confirmed and you return to the previous screen mask.

MACHINE STATUS MENU:

To access the "Machine Status " menu press and quickly release the "Set" key.

Setting : Access the "Machine Status" menu by pressing and quickly releasing the "Set" key.
The label of the "SEt" folder appears . To display the set point value press the "Set" key again .
The value appears on the display.
To change the set point value, use the "UP" and "DOWN" keys within 15 seconds.
If the parameter is LOC = y the set points cannot be changed.

PROGRAMMING MENU: (See programming menu table)

To enter the "Programming " menu, press the set key for 5 seconds.
The label of the first folder will appear.
To scroll through the folder, use the "up" and "DOWN" keys; the folder contain the level1 parameters.
To enter the folder, press "Set" key, the label of the first visible parameter appears.
To scroll through the other parameters, use the "UP" and "DOWN" keys; to change the parameter press and release "Set", then set the desired value using the "UP" and "DOWN" keys, and confirm with the "Set" key to move to the next parameter.

SENSOR FAULT ERROR : When the sensor detects an error condition(Probe short circuit or without Probe or temperature>104 or <-55°C
The code "E1" is displayed.

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MACHINE STATUS MENU TABLE:

SEt folder	
PAR	DESCRIPTION
SP1	Set point for RELAY1.
SP2	Set point for RELAY2.
HY1	RELAY1 tripping differential. If HC1=H, RELAY1 is "OFF" when the temperature reaches set value 'SP1' and "ON" when the temperature falls below SP1-HY1. If HC1=C, RELAY1 is "OFF" when the temperature reaches set value 'SP1' and "ON" when the temperature equal to or more than SP1+HY1.
HY2	RELAY2 tripping differential. If HC2=H, RELAY2 is "OFF" when the temperature reaches set value 'SP2' and "ON" when the temperature falls below SP2-HY2. If HC2=C, RELAY2 is "OFF" when the temperature reaches set value 'SP2' and "ON" when the temperature equal to or more than SP2+HY2.

PROGRAMMING MENU TABLE:

CP folder	
PAR	DESCRIPTION
HC1	Heat/Cool mode selection for RELAY1. If set to 'H' the RELAY1 actuates for hot operation . If set to 'C' the RELAY1 actuates for cold operation.
HC2	Heat/Cool mode selection for RELAY2. If set to 'H' the RELAY2 actuates for hot operation . If set to 'C' the RELAY2 actuates for cold operation.
On1	Delay time(ON Delay) in activating the RELAY1.
On2	Delay time(ON Delay) in activating the RELAY2.
OF1	Delay time(OFF Delay) in de- activating the RELAY1.
OF2	Delay time(OFF Delay) in de- activating the RELAY2.
PF1	RELAY1 status when probe fault condition. If set to 'On' RELAY1 is "ON" when the probe fault condition. If set to 'OFF' RELAY1 is "OFF" when the probe fault condition.
PF2	RELAY2 status when probe fault condition. If set to 'On' RELAY2 is "ON" when the probe fault condition. If set to 'OFF' RELAY2 is "OFF" when the probe fault condition.
OdO	Delay time in activating the RELAY1 and RELAY2 after switch-on of the instrument or after power failure 0=not active.

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diS folder	
LOC	Keyboard locking. However, you can enter parameter programming, modify them and change the status of this parameter to unlock the keyboard.
CAL	Calibration 1. Positive or negative temperature value added to the value read on the adjustment room probe (probe 1) before being displayed and used for adjustment.
PAS	Password . When enabled (value other than 0) it constitutes the access key for level 1 parameters.

PARAMETERS-DEFAULT SETTINGS

	PAR	RANGE	DEFAULT	UNITS
SEt	SP1	-50...99	20	°C
	SP2	-50...99	40	°C
	HY1	1.....25	2	°C
	HY2	1.....25	2	°C
CP	HC1	H/C	H	Flag
	HC2	H/C	H	Flag
	On1	0...250	0	Sec
	On2	0...250	0	Sec
	OF1	0...250	0	Sec
	OF2	0...250	0	Sec
	PF1	On/OFF	OFF	Flag
	PF2	On/OFF	OFF	Flag
	OdO	0...250	60	Sec
diS	LOC	Y/n	n	Flag
	CAL	-12...12	0	°C
	PAS	0.....30	0	/

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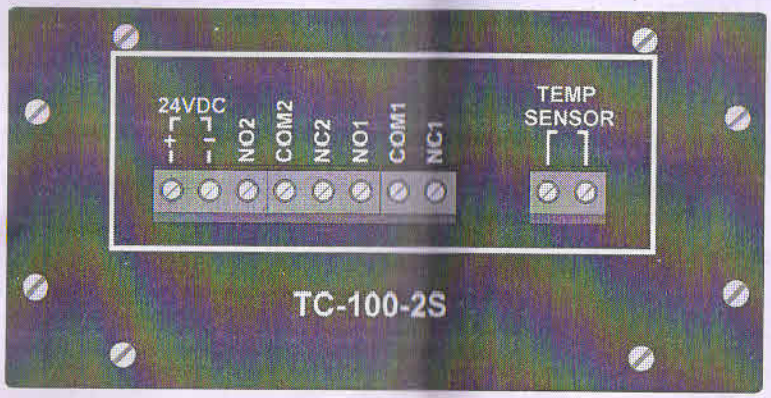
CONNECTION DETAILS :



Terminals	Description
+24VDC	Supply Voltage
-24VDC	
COM1	COMMON
NO1	NO — RELAY1 potential free contacts
NC1	NC
COM2	COMMON
NO2	NO — RELAY2 potential free contacts
NC2	NC
SENSOR	KTY81-210 Temperature Sensor
SENSOR	

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