ENCHLOR E2500 METERING PUMPS SELECTION GUIDE

CAPACITY/PRESSURE RATINGS -PER HEAD **GPD** (Litres per Hour)

LIQUID END CODE	PUMP SPEED (strokes / minute)					PRESS RATII kPa	NG
	55 86 110 134				316SS /	PVC	
-001	10(1.6)	15(2.4)	19(3)	24(4)		2000	1400
-002	48(7.7)	76(12)	97(15)	118(18.7)		2000	1400
-005	91(14.4)	144(22)	182(29)	228(36)		2000	1400
-015	281(44.4)	441(69)	563(89)	684(108)		1250	
-025	502(79.2)	786(124)	1001(158)	1224(193)		850	
-050	989(156)	1547(244)	1978(312)	2409(380)		700)

LABORATORY ACCURACY INDUSTRIAL DURABILITY

The 2500 offers accurate, competitively prices chemical metering for all applications.

- ٠ Multiplexed designs with choice of liquid end sizes and material of construction.
- ٠ Available with or without motor. Motor mount flange to suit standard 56c frame or D71 metric motors.
- * * * *
- Variable or fixed motor speeds. Manual / Auto capacity control-stroke length and speed. Precision micrometer for manual capacity adjustment.
- No maintenance, oil filled mechanism.
- ٠ Self-cleaning valve operation.
- ٠ Screw in valves.
- ٠ Precise and positive volumetric displacement.
- Heavy duty mechanical actuation with 5 year warranty on the diaphragm .



LIQUID END

DIMENSIONS

diaphragm.
RECEIPTION FOR LODIES
OVÉRALL 395 TRIPLEX

DIMENSIONS

CODE	А	В	φE	'F'	BSPT F
001-005	81	81	90	10	(3/8")
-015	87	87	105	15	(1/2")
-025	87	87	114	15	(1/2")
-050	119	119	149	15	(1/2")

PHASE	С	D	G	Н	φJ
1φ	285	114	87	158	145
3φ	183	102	80	60	140
MA	X WEIGH	IT KG. (\	with mo	otor avg.)
Simplex 24 kg Duplex 32 kg Triplex 40 kg					40 kg

Contents

1. 1.1 1.2 1.3	SAFETY1General1Mechanical Precautions1Electrical Precautions1
2.	INTRODUCTION2
3.	INSTALLATION2
4. 4.1 4.2 4.3 4.4	PIPING2General2Suction3Discharge4Piping Arrangement5
5. 5.1 5.2	OPERATION6Before Starting6After Starting6
6.	CAPACITY ADJUSTMENT7
7. 7.1 7.2 7.3 7.4	MAINTENANCE.8Pre Maintenance Cleaning8Lubrication8Suction & Discharge Valves8Diaphragm9
8.	TROUBLESHOOTING10
9. 9.1 9.2 9.3 9.4 9.5	2500 SERIES METERING PUMP 13Drive End (Simplex) - Side Elevation13Drive End (Simplex) - Side Elevation - Parts List14Drive End (Simplex) - End Elevation15Drive End (Simplex) - End Elevation - Parts List16Liquid Head Section Drawings17-28
10.	CALIBRATION OF A METERING PUMP
11.	BACK PRESSURE & PULSATION VALVE INSTRUCTIONS

METERING PUMPS 2500 SERIES

1. <u>SAFETY</u>

1.1 <u>General</u>

Please read and familiarise yourself with all sections of this and other equipment manuals before proceeding with installation.

- Observe all standard precautions which apply to moving machinery.
- Observe all standard precautions which apply to electrical equipment, drives and controls.
- Pay particular attention to special safety 'cautions' and 'notes' in this manual.

1.2 Mechanical Precautions

- Prior to undertaking any mechanical maintenance repair, installation, etc.
 SWITCH OFF, and disconnect power before proceeding.
- Personnel must wear the appropriate protective safety attire and remove loose clothing, jewellery etc.

1.3 Electrical Precautions

- Before undertaking work on the electrical controls or drives, disconnect power and place a notice to advise others of the type of work in process.
- Ensure all necessary grounds are in place and solid.
- Do not disconnect or disable ground connections

CAUTION Follow all electrical regulations where required by electrical engineering trades.

2. INTRODUCTION

Enchlor metering pumps are designed and manufactured for long, low maintenance service life and when properly applied, will give many years of consistent accurate metering and trouble free operation.

The following instructions should be read and followed to correctly install and operate the pump and ensure optimum pump life and performance.

Sectional arrangement drawings and Part Lists are enclosed at the end of this manual.

3. INSTALLATION

- 3.1 It is desirable to locate the pump as close as possible to the supply source (eg tank) in order to minimise friction losses in the suction line.
- 3.2 The pump should be located with sufficient free space provided around the pump to allow access for:
 - Adjustment of the manual capacity adjustment device;
 - To facilitate ease of routine and breakdown maintenance.
- 3.3 The mounting surface should be even and level. The pump base (mounting plate) is provided with four (4) holes for mounting bolts.

4. <u>PIPING</u>

4.1 <u>General</u>

- 4.1.1 The pump suction valve is located at the bottom of the pump head and the discharge valve on top. The pump cannot operate without these valves and for correct operation, <u>valves must be vertical</u>.
- 4.1.2 Discharge pressure should be more than 20 kPa greater than suction pressure to prevent over feeding or syphoning and to maintain metering accuracy.

NOTE: When the difference is less than 20 kPa, a back pressure valve and pulsation dampener should be installed in the discharge line. The pulsation dampener should be located between pump and valve, as close to the pump as possible.

4.1.3 A characteristic of reciprocating pump performance is pulsating flow. Piping should be sized for flow rates at least 3.5 times greater than maximum capacity of pumps.

<u>NOTE:</u> Small diameter piping will produce unpredictable flow rates and system pressures.

- 4.1.4 Piping should be as short and straight as possible and arranged to avoid loops or pockets where gas may accumulate.
- 4.1.5 All piping should be separately supported close to the pump to avoid imposing pipe loads on the pump. When handling high or low temperature liquids, measures should be taken to prevent distortion of piping imposing loads on the pump.
- 4.1.6 All pipe work should be flushed clean of any solids that may be present in the pipe work (i.e. weld slag, dirt following construction or repair) before <u>final connection</u> to the pump and start-up.
- 4.1.7 Make provision in discharge piping where necessary to facilitate initial priming of pumps against reduced pressure.
- 4.1.8 Capacity adjustment range for accuracy of metering, avoid over sizing of metering pumps. Flow rates of less than 10% of pump maximum capacity may produce unacceptable accuracy.
- 4.1.9 Where lengthy suction and discharge pipelines are involved or there is limitation on size, install pulsation dampeners close to the pump to:
 - Avoid cavitation maintain metering accuracy.
 - Reduce amplitude of pulsations
- 4.1.10 Ensure that the drain line from any pressure relief valve in the system is:
 - Suitably sized to ensure correct operation of the relief valve.
 - Returns to the suction tank.
 - Is fitted with a sight glass for visual indication.

4.2 **Suction**

- 4.2.1 Piping must be air tight.
- 4.2.2 For ease of maintenance an isolating valve should be located near the pump inlet.
- 4.2.3 Solids should be prevented from entering low volume pumps or pumps used for high accuracy metering. A strainer of 150-200 mesh is recommended and should be adequately sized to prevent restriction of flow.
- 4.2.4 Suction pipe entrance should be at least 75 mm above the bottom of solution tank to allow settlement of larger solids in the tank.
- 4.2.5 Make provision in suction piping where necessary to facilitate automatic venting of any gases likely to accumulate.

4.3 Discharge

- 4.3.1 Should it be necessary to install an isolating valve in the discharge line, a relief valve must be installed between the pump and isolating valve.
- 4.3.2 The 2500 Metering Pump, being a positive displacement pump, will be damaged if operated against a closed valve.

NOTE:	The relief valve should be set to operate at the maximum rated pump discharge pressure or maximum system operating pressure, whichever is lower.
CAUTION:	When pumping hazardous liquids the relief valve discharge should be piped back to the supply source.
<u>NOTE:</u>	Where relief valve is likely to operate frequently, to ensure correct operation and maximise valve life, a pulsation dampener should be installed between valve and pump

- 4.3.3 A pressure gauge with gauge protector should be installed to check if the pump is not operating at too great a discharge pressure. The gauge should be provided with a petcock valve for isolation from the system when not required.
- 4.3.4 When pumping into a high pressure system, a non return valve should be installed as a safety precaution at the injection point.
- 4.3.5 Make provision in pipe work to facilitate priming against reduced pressure.

4.4 **Piping Arrangement**



Metering pumps are positive displacement pumps and produce pulsating flow. Consequently there is considerable line pressure loss and suction piping should be sized to ensure adequate NPSHA. If piping extends for a considerable distance a suitable break tank or pulsation dampener should be installed near the pump.

Avoid pockets or loops in piping where gas may accumulate.





The presence of solids in the pumped liquid can cause incorrect pump valve operation and affect metering accuracy. If solids are present install a strainer with 150 to 200 mesh and large mesh surface in order to keep pressure drop as small as possible and ensure that strainer does not become quickly clogged.



5. <u>OPERATION</u>

5.1 Before Starting

- 5.1.1 Ensure the pump will be operated within its specification.
- 5.1.2 Check gearbox oil level. Prior to leaving factory, each pump is filled to the correct level with the recommended grade of oil (see maintenance section).
- 5.1.3 Check direction of rotation. Correct direction is anti-clockwise when viewing pump from top of motor.
- 5.1.4 Ensure system control of isolating valves in discharge line are open.

5.2 After Starting

5.2.1 Pump will normally prime automatically. However, it may be necessary to run the pump at maximum capacity to clear air. If this is unsuccessful install a return line from discharge pipe to supply tank with valve to facilitate priming at reduced pressure and/or air release.

<u>CAUTION:</u> If pumped liquid is hazardous do not disconnect discharge pipe work.

- 5.2.2 Check that pump is operating correctly against discharge pressure.
- 5.2.3 Ensure that any problems are noted and appropriate corrective or preventative action is taken.

6. <u>CAPACITY ADJUSTMENT</u>

- 6.1 Standard manual capacity adjustment is by means of a micrometer. For multiplex pumps, each pump head is individually controlled by a micrometer located behind the respective pump head.
- 6.2 Adjustment should be made whilst the pump is running. To adjust whilst stopped will cause damage to the pump mechanism.

6.3 Capacity Control – Zero Adjustment

Individual capacity control is provided for each pump head by means of a micrometer located directly behind the respective pump head.

Should it become necessary to reset the mechanism, the procedure is as per the following steps:

- 6.3.1 Rotate micrometer barrel clockwise towards zero setting until it stops.
- 6.3.2 Adjust the thumbscrew located on the side of the micrometer assembly until it locks the micrometer in place.
- 6.3.3 Hold the knurled micrometer barrel steady with multigrips and undo the grub screws located at the end of the micrometer barrel.
- 6.3.4 Releasing the multigrips, wind the micrometer barrel until the graduations on both the micrometer barrel and anvil are set at zero.
- 6.3.5 Hold the micrometer barrel with the multigrips at the zero setting and retighten the grub screw located at the end of the barrel.
- 6.3.6 Loosen the thumbscrew located on the side of the micrometer assembly.
- 6.3.7 Reset the micrometer adjustment to the desired capacity required and lock the thumbscrew in place.

7. <u>MAINTENANCE</u>

7.1 <u>Pre Maintenance Cleaning</u>

- Flush the pump liquid head internals to remove all chemical residue.
- Clean the pumps exterior to ensure chemical free surface.
- Check that appropriate chemical handling and cleaning standards have been met.

<u>CAUTION:</u> Enchlor is unable to accept any Metering Pump returned for maintenance that has not been suitably cleaned.

It is an Enchlor Quality Assurance policy that all equipment returned for repair or service be supplied with a completed copy of the 'Equipment Decontamination Advice' form, as shown on page 37 of this manual.

7.2 <u>Lubrication</u>

7.2.1 Change oil after 750 hours of operation and at 4,500 hours intervals thereafter.

The following are recommended grades:

SHELL	:	OMALA 320
BP	:	GR-XP-320 ISO
MOBIL	:	MOBIL GEAR 632
CASTROL	:	ALPHA SP 320

7.2.2 Fill oil until oil starts to overflow from the filler port. Oil volume : 450 ml

7.3 Suction & Discharge Valves

7.3.1 During routine maintenance, valves should be dismantled and checked. Replace worn ball checks and valve seats. When pumping clean liquids of moderate viscosity, valves will give many years of trouble free service. However, valve life can be reduced in applications where discharge pressure is high, liquid viscosity low or solids are present.

NOTE: Should it be necessary to service the valves, cleanliness is essential and care should be taken to avoid damaging components. Refer to valve drawing at end of manual prior to dismantling.

7.3.2 When reassembling, ensure that all O-Rings, ball checks and ball stops are in the correct position. Failure to fit ball stops can result in closed head situation and severe pump damage.

7.4 <u>Diaphragm</u>

- 7.4.1 When fitting a new diaphragm, the diaphragm bolt should be tightened firmly with the correct spanner available from Enchlor.
- 7.4.2 Before tightening the diaphragm bolt, capacity adjustment should be set at 0% eg stroke length should be in the extreme forward position.
- 7.4.3 Place diaphragm in position ensuring holes line up and screw in two (2) solution head bolts (opposing each other) through diaphragm bolt holes into solution head adaptor. This is to ensure that the diaphragm does not rotate when tightening the diaphragm bolt.
- 7.4.4 Having tightened diaphragm bolt, remove solution head bolts and fit solution head.

<u>NOTE:</u> Excessive tightening of solution head bolts should be avoided as this will result in early diaphragm failure.

7.4.5 After the new diaphragm has been fitted, calibration should be checked and monitored until diaphragm has stabilised.

All major mechanical repairs should be undertaken by Enchlor's specialist servicing workshop in Silverdale,PA. In most cases a pump can be repaired and despatched in one day.

8. TROUBLESHOOTING

	Trouble	Cause	Corrections
(A)	Pump does not start.	Blown electrical. Fuse.	Check cause and change to suitable capacity fuse
		Electrical overload relay trips.	Change relay capacity to correct value.
		Electrical wiring breakdown or defective contact.	Change or reconnect.
		Low voltage. Difference in supply voltage and rated voltage of motor.	Find cause and correct.
		Defective motor.	Check and replace.
		Excessive pressure in discharge line.	Reduce pressure.
		Valve in discharge line closed.	Open valve
		Pump discharge valve incorrectly reassembled during maintenance. Ball stop cushion missing	Reassemble correctly.
		Air in liquid end.	Relieve pressure in discharge line.
(B)	No Flow	Valve in discharge line closed.	Open valve.
		Pump discharge valve incorrectly reassembled during maintenance. Ball stop cushion missing.	Reassemble correctly.
		Overload relay	Reset the switch after checking the cause and correcting.
(C)	Pump does not work after operating normally	Overload relay	Reset the switch after checking the cause and correcting.
		Discharge pipe clogged.	Clear the pipe.
		Valve in discharge line closed.	Open valve.
		Pump discharge valve incorrectly reassembled during maintenance. Ball stop cushion missing.	Reassemble correctly

	Trouble	Cause	Corrections
(D)	Reduced pump flow rate or unstable rate.	Valve clogged.	Clean.
		Worn valve seat.	Replace seat or valve.
		Flow meter incorrect.	Inspect meter, repair or change.
		Leakage from relief valve.	Inspect, repair or change.
		Air leaking into suction piping	Check for leak source and repair.
		Air lock in suction line.	Review suction pipework layout to eradicate air pockets.
		Change in pump rpm	Correct electric power sources, speed control etc.
(E)	Reduced pump flow rate. Unstable flow rate. Flow rate does not increase as stroke	Insufficient NPSH available: (a) Suction pipe diameter too small.	Enlarge suction pipe, or install accumulator in the line close to pump or raise level of tank.
	length is increased. Cavitation noise may be apparent.	(b) Suction lift too great.	Raise liquid level.
		Viscosity of liquid too high.	 Heat or lower viscosity by other means. Increase suction pipe diameter. Increase suction pressure.
		Vapour pressure high.	 Lower liquid temperature at inlet port. Raise liquid level.
		Suction piping and/or valve clogged	Clean
		Suction strainer clogged or too small	Clean or replace with larger unit.

	Trouble	Cause	Correction
(F)	Excessive pump flow rate. Flow continues after pump has stopped.	Pressure difference across pump less than 20 KPa	Increase pressure difference (ie install back pressure valve).
		Discharge line too long or diameter too small	Reduce length and/or increase diameter. Install accumulator in discharge line.
(G)	Liquid leakage from pump adaptor drain	Ruptured diaphragm.	Check/replace diaphragm.
(H)	Knocking sound in gearbox	Excessive discharge pressure	Check discharge pressure.
(I)	Liquid end noise	Rhythmic noise of pump valves	Normal
		Clogged discharge or suction valve	Clean
(J)	Overheating of motor	Improper voltage	Adjust voltage to motor specification.
		Overload	(Refer to Section K).
		Inadequate ventilation	Change motor or relocate
(K)	Overload	Improper Oil	Change
		Discharge pressure too high	Lower to permissible pressure
		Erratic noise of pump valves	 Clean valves. Increase pressure difference (ie install back pressure valve).

9. 2500 SERIES METERING PUMP

9.1 Drive End (Simplex) – Side Elevation



9.2 Drive End (Simplex) – Side Elevation - Parts List

ITEM	PART NO	DESCRIPTION	QTY	NOTES
7	E-42	WORM	1	\$
8	10/01/11	PIN (DRIVE MOTOR)	2	
9	08/12/02	OIL FILL PLUG	1	
10	10354	WORM EXTENSION SHAFT	1	
12	10302	PRIMARY PISTON	1	
13	11/01/21	CIRCLIP (STRIKER SHAFT)	1	
21	09/03/06	WAVE WASHER	1	
26	10311	SPRING RETURN	2	
27	10358	STRIKER SHAFT	1	
52	08/01/64	CAP SCREW (MICROMETER)	1	
53	10368	SPACER (MICROMETER)	1	
54	08/03/06	COUNTERSUNK SCREW	1	
55	KDM	MICROMETER ASSEMBLY	1	\otimes
57	06/01/42	BEARING (WORM EXTENSION SHAFT – BOTTOM)	1	
61	8023	GASKET – OUTER (MICROMETER)	1	
62	10361	RETAINING PLATE	1	
63	06/01/43	BEARING (WORM EXTENSION SHAFT – TOP)	1	
64	08/03/20	COUNTERSUNK SCREW	3	

Notes:

- ⊗ State Head Size
- ♦ State Stroking Rate (SPM)
- State Drive Motor Frame Size

9.3 Drive End (Simplex) – End Elevation



9.4 Drive End (Simplex) – End Elevation - Parts List

ITEM	PART NO	DESCRIF	DESCRIPTION		NOTES
1	08/01/74	SCREW	(MOTOR)	4	
2	09/02/24	SPRING WASHER	(MOTOR)	4	\otimes
3	10355	WORM WHEEL		1	\$
4	06/04/07	BUSH	(MAIN SHAFT)	1	
5	10325-1	MAIN SHAFT		1	\otimes
6	08/12/02	DRAIN PLUG		1	
11	AS SPEC	DRIVE MOTOR		1	
28	10351	PUMP BODY		1	
29	06/01/44	BEARING ECCENTRIC		1	
32	10306	Gasket	(END COVER)	1	
38	10362	END COVER		1	
39	08/01/77	SCREW	(END COVER)	4	
44	06/04/11	BUSH	(END COVER)	1	
47	12/01/09	WOODRUFF KEY		1	
48	08/13/31	GRUB SCREW		1	

Notes:

- ⊗ State Head Size
- ♦ State Stroking Rate (SPM)
- State Drive Motor Frame Size

COMMENT		St	St	PTFE	SS	CAST IRON	SS	SS	SS	CAST IRON	St	SS	SS	SS	PTFE		SS	SS	PTFE			DRAWN: AZ	DATE: 30.07.03	SCALE: NTS	CHECKED:	APPD:
QTY	-	2	-	1	1	1	1	4	4	-	2	4	1	1	2	1	-	-	2	1		14 WINTERTON ROAD.	CLAYTDN, VIC. 3168	END		_/
DESCRIPTION	GASKET-ADAPTOR	CAP SCREW-ADAPTOR	OIL SEAL 16X28X7	DIAPHRAGM (001)	SOLUTION HEAD	SECONDARY PISTON (001)	DIAPHRAGM BOLT ASSEMBLY	BOLT-SOLUTION HEAD	WASHER-SOLUTION HEAD	ADAPTOR	SPRING PIN	316 ST/STEEL BALL CHECK 1/4"	DISCHARGE VALVE ASSEMBLY	S VALVE BODY	E VALVE INSERT	"0"-RING	SUCTION VALVE ASSEMBLY	S VALVE BODY	E VALVE INSERT	"O"-RING	2	ACCONET 14 VIN		CROSS SECTION-SOLUTION END	ZDUU - UUT SEKIES (T GALLUN)	DRG. No.: 10414-01 SHT.
PART No.	10313	08/01/77	07/01/26	S-094-1	S-080-1W SS	S-099-1W	AS-096-1 SS	08/02/103	09/01/28	S-097-1W	10/01/18	14/01/01	KVD-1-D-SS	S-083-1-3W-SS	S-088-1-3W PTFE	07/03/73	KVD-1-D-SS	S-083-1-3W-SS	S-088-1-3W PTFE	07/03/73		ST / STEEL		and the first state		MG. +/- 1 DEG.
ITEM	14	15	16	17	18	19	20	22	23	24	25	45		37	44	46		37	4	46		ST/			300 ANGE	
																						MATERIAL	FINISH		0)
					$\begin{array}{c ccccccccccccccccccccccccccccccccccc$						(45)										33		(15) (25)			

9.5 Liquid Head Section Drawings

COMMENT		St	St	PTFE	SS	CASTIRON	SS	SS	SS	CAST IRON	St	SS	SS	SS	РТЕЕ		PTFG	SS	SS	PTFE		PTFG	DRAWN: AZ	DATE: 30.07.03	-	CHECKED:	APPD:
QTY	-	2	-	1	+	*	1	4	4	-	2	2	~	1	+	+	+		-	-	-	-	NTERTON ROAD	CLAYTON, VIC. 3168	ON END	(NO-	-/
DESCRIPTION	GASKET-ADAPTOR	CAP SCREW-ADAPTOR	OIL SEAL 16X28X7	DIAPHRAGM (005)	SOLUTION HEAD	SECONDARY PISTON (002)	DIAPHRAGM BOLT ASSEMBLY	BOLT-SOLUTION HEAD	WASHER-SOLUTION HEAD	ADAPTOR	SPRING PIN	316 ST / STEEL BALL CHECK 1/4"	DISCHARGE VALVE ASSEMBLY	VALVE BODY	E VALVE INSERT	"0"-RING	3 SPACER-VALVE INSERT	SUCTION VALVE ASSEMBLY	VALVE BODY	E VALVE INSERT	"O"-RING	G SPACER-VALVE INSERT			TITLE: CROSS SECTION-SOLUTION END		DRG. No.: 10414 - 03
PART No.	10313	08/01/77	07/01/26	S-094-2-3	S-080-2W SS	S-099-2W	AS-096-2 SS	08/02/103	09/01/28	S-097-2W	10/01/18	14/01/01	KVD-2-3-S-SS	S-083-1-3W SS	S-088-1-3W PTFE	07/03/03	S-089-2-3W PTFG	KVS-2-3-S-SS	S-083-1-3W SS	S-088-1-3W PTFE	07/03/03	S-089-2-3W PTFG				TOLERANCE:	DEC. 0.0 4/- 0.2 MG. 4/- 1 DEG.
ITEM	14 10	15 08	16 07	17 S.	18 S	19 S	20 /	22 08	23 0	24 S	25 10	45 14	X	37b S-(44 S-(46 0	47 S-	K	37a S-	44 S-(46 07	47 S.	00	2		3RD ANG.E	
					$\begin{array}{c ccccccccccccccccccccccccccccccccccc$						(45)												(37a) (37a)	15			

MITETAI	44A E-16 PVC STOP BALL CHECK (SUCTION) 1 PVC	37A S-083-2-3W VALVE BODY 1 PVC	KVD-2-3-S-PVC DISCHARGE VALVE ASSEMBLY 1 PVC	1401/04 CERAMIC BALL CHECK 1/4" 2 PLEASE SPEC	14/01/03 PYREX BALL CHECK 1/4" 2 PLEASE SPEC	1400/02 HAST. C BALL CHECK 1/4" 2 PLEASE SPEC	45 14/01/01 316 ST/STEEL BALL CHECK 1/4" 2 PLEASE SPEC	25 10/01/18 SPRING PIN 2 St	24 S-097-2W ADAPTOR 1 CASTIRON	23 09/01/28 WASHER-SOLUTION HEAD 4 SS	22 08/02/103 BOLT-SOLUTION HEAD 4 SS	ITEM PART No. DESCRIPTION QTY COMMENT	
								XIIIAA					14 10313 GASKET-ADAPTOR 15 08/01/77 CAP SCREW-ADAPTOR 16 07/01/26 OIL SEAL 16/28/X7 17 S-094-2-3 DIAPHRAGM (002) 18 S-098-2PVC SOLUTION HEAD 19 S-098-2PVC SOLUTION HEAD 19 S-098-2PVC SOLUTION HEAD 19 S-098-2PVC SOLUTION HEAD 20 BAS-086-2PVC DIAPHRAGM BOLT-SOLUTION HEAD 20 09/01/28 BOLT-SOLUTION HEAD 20 09/01/28 BOLT-SOLUTION HEAD 21 S-098-2VC DIAPTOR 22 08/07/28 BOLT-SOLUTION HEAD 23 09/07/28 BOLT-SOLUTION HEAD 24 S-097-2W ADAPTOR 25 10/07/18 SPRING PIN 45 14/07/02 HAST.C BALL CHECK 1/4" 46 14/07/03 PYREX BALL CHECK 1/4" 47 KVD-2-3-SFPVC DISCHARCE VALVE ASSEMBLY 378 S-084-2-3W VALVE BODY 48 F-16 PVC
		44A E-16 PVC STOP BALL CHECK (SUCTION) 1	37B S-084-2-3W VALVE BODY 1 44B E-16 PVC STOP BALL CHECK (DISCHARGE) 1 45 070303 "0"-RING 1 46 070303 "0"-RING 1 57A S-083-23W VALVE BODY 1 44A E-16 PVC STOP BALL CHECK (DISCHARGE) 1 45 070303 "0"-RING 1 57A S-083-23W VALVE BODY 1	Image: State of the state	Identified Identified CERAMIC BALL CHECK 1/4* 2 Image: Image in the image in	15 1400.03 PYREX BAL CHECK 1/4" 2 1400.03 PYREX BAL CHECK 1/4" 2 1400.04 CERAMIC BAL CHECK 1/4" 2 1400.05 KVD-2-3-SFPVC DISCHARCE VALVE ASSEMBLY 1 140 CERAMIC BAL CHECK 1/4" 2 1400.04 KVD-2-3-SFPVC DISCHARCE VALVE ASSEMBLY 1 178 S-084-2-3W VALVE BODY 1 179 KVS-2-3-SFPVC SICOP BALL CHECK (DISCHARCE) 1 170 KYS-2-3-SFPVC SUCTION VALVE ASSEMBLY 1 171 XYS-2-3-SFPVC SUCTION VALVE ASSEMBLY 1 171 XYS-2-3-SFPVC SUCTION VALVE ASSEMBLY 1	1401/02 HAST. C BALL CHECK 1/4" 2 1401/03 PYREX BALL CHECK 1/4" 2 1401/04 CERAMIC BALL CHECK 1/4" 2 1401/05 VALVE BODY 1 1401/05 VALVE BODY 1 1401/05 105043 1 1401 CERAMIC BALL CHECK 1/4" 2 15 5.08423W VALVE BODY 1 15 14.0 E16 PVC STOP BALL CHECK (DISCHARGE) 1 15 17 S10303 "0"-RING 1 16 07/03/03 "0"-RING 1 1 17 5.083-23W VALVE BODY 1 1 17 5.083-23W VALVE BODY 1 1 17 5.083-23W VALVE BODY 1 1	45 140101 316 STSTEEL BALL CHECK 1/4" 2 1407.02 HAST. C BALL CHECK 1/4" 2 1407.03 PYREX BALL CHECK 1/4" 2 1407.04 CERAMIC BALL CHECK 1/4" 2 1407.05 PYREX BALL CHECK 1/4" 1 1407.05 PYREX BALL CHECK 1/4" 1 17 PYREX BALL CHECK 1/4" 1 17 PYREX BALL CHECK 1/4" 1 18 S-084-23W VIALVE BODY 1 18 E-16 PVC STOP BALL CHECK 1/4" 1 17 PYREBODY 1 1 18 PYREBODY 1 1 17 PYREBODY 1 1 18 PYREBODY 1	25 100/18 SPRING PIN 2 45 1401/01 316 STISTEEL BALL CHECK 114* 2 45 1407/02 HAST. C BALL CHECK 114* 2 1407/03 PYREX BALL CHECK 114* 2 1407/04 CERAMIC BALL CHECK 114* 2 1407/05 PYREX BALL CHECK 114* 2 1407/04 CERAMIC BODY 1 1407/05 PYREX BALL CHECK 114* 2 1407/04 CERAMIC BALL CHECK 114* 2 1407/05 PYREX BODY 1 1407 PYREX BODY 1 1407 PYREX BODY 1 1517 PYREX BODY 1 1517 PYREX BODY 1 1518 PYREX BODY	24 5037-2W ADAPTOR 1 25 100/1/18 SPRING PIN 2 25 140/107 316.STISTEEL BALL CHECK 1/4" 2 140/107 PYREX BALL CHECK 1/4" 2 140/103 PYREX BALL CHECK 1/4" 2 140/104 CERAMIC BALL CHECK 1/4" 2 140/105 PYREX BALL CHECK 1/4" 2 140/104 CERAMIC BALL CHECK 1/4" 2 140/105 PYREX BALL CHECK 1/4" 2 140/105 PYREX BALL CHECK 1/4" 1 150/105	23 0901/28 WISHERSOUTION HEAD 4 24 S.097.2W ADAPTOR 1 25 1001/18 SPRING PIN 2 26 1407.00 316 STISTEEL BALL CHECK 1/4" 2 27 1407.00 PREX SALL CHECK 1/4" 2 28 1407.00 PREX SALL CHECK 1/4" 2 29 1407.00 PREX SALL CHECK 1/4" 2 20 1407.00 PREX SALL CHECK 1/4" 2 20 1407.00 PREX SALL CHECK 1/4" 2 20 1407.00 PREX SALL CHECK 1/4" 2 21 1407.00 PREX SALL CHECK 1/4" 2 21 1407.00 PREX SALL CHECK 1/4" 2 21 1407.00 CHERAIN CHECK 1/4" 2 21 1407.00 PREX SALL CHECK 1/4" 2 21 1407.00 PREX SALL CHECK 1/4" 2 22 1407.00 PREX SALL CHECK 1/4" 1 23 1407.00 VULVE BOOY 1 24 E-16 PVC STOP BALL CHECK (DISCHARGE) 1 2	14 (1013) CARET-JOAPTOR 1 15 001/17 C49 2 16 0/1055 0.1 1 17 19 16 0/1055 0.1 17 19 16 0/1055 0.1 1 17 19 16 24 14 18 508-20/10 500/100/16-10 1 19 508-20/10 500/100/16-10 1 10 16 200/000/16-10 1 11 508-20/10 500/100/16-10 1 12 508-20/10 500/100/16-10 1 13 508-20/10 500/100/16-10 1 14 2 60/105 0.156/14/16 2 14 5 508-20/100/16-10 1 15 508-20/100/16-10 1 2 16 100/105 801/16 2 2 17 19 16 2 4 1 16 100/105 801/16 2 2 1 17 10 10 2 1 1 2 16 100/105 10 1 1 1 16 100/105 1 </td <td></td>	
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22 6007105 BOLTSOUTION HEAD 4 23 600728 WKSHER-SOUTION HEAD 4 24 5497-2W ADAPTOR 1 25 1001/18 SPRING PIN 2 26 1401/01 316 STRFEE BAL CHECK 1/4* 2 27 1401/02 HIST C BALL CHECK 1/4* 2 28 1401/02 HIST C BALL CHECK 1/4* 2 29 5042.3W VALVE BODY 1 20 000003 VALVE BODY 1 21 1401/02 HIST C BALL CHECK 1/4* 2 21 1401/02 HIST C BALL CHECK 1/4* 2 21 1401/02 HIST C BALL CHECK 1/4* 2 22 1401/02 HIST C BALL CHECK 1/4* 2 23 5042.3W VALVE BODY 1 24 5042.3W VALVE BODY 1 25 5082.3W VALVE BODY 1 1 24 5.082.3W VALVE BODY 1 1 25 5.082.3W VALVE BODY 1 1 26 700803 VALVE BODY 1 1 27 5.082.3W VALVE BODY 1 1 28 5.082.3W <	22 0607103 BOLT-SOUTTION HEAD 4 23 0607728 WASHER-SOUTTION HEAD 4 24 5.087-2W ADAPTOR 1 25 1007/18 SPRING FIN 2 26 1407/07 316 STISTEL BAL CHECK 1/4* 2 27 1407/07 316 STISTEL BAL CHECK 1/4* 2 28 1407/07 316 STISTEL BAL CHECK 1/4* 2 29 1407/07 316 STISTEL BAL CHECK 1/4* 2 2002.33W VALVE BODY 1 2 2003.30 V-440/05 CTON VALVE ASSEMBLY 1 2004.233W VALVE BODY 1 1 2013.43 S-062-33W VALVE BODY 1	22 08/02/103 BOLT-SOUTION HEAD 4 23 09/07/28 WASHER-SOUTION HEAD 4 24 5.037-2W ADAPTOR 1 25 100/178 SPRING PIN 2 26 100/178 SPRING PIN 2 27 140/107 SIGSTSTELE BALL CHECK 1/4* 2 28 140/103 PYREX BALL CHECK 1/4* 2 29 140/103 PYREX BALL CHECK 1/4* 2 20 140/103 PYREX BALL CHECK 1/4* 2 29 140/103 PYREX BALL CHECK 1/4* 2 20 140/103 PYREX BALL CHECK 1/4* 2 20 140/103 PYREX BALL CHECK 1/4* 2 20 140/103 PYREX BALL CHECK 1/4* 2 21 140/103 FYREX BALL CHECK 1/4* 2 21 140/103 FYREX BALL CHECK 1/4* 2 21 140/103 FYREX 20007 1 21 2004.2.3W VALVE BODY 1 21 4/6 070303 </td <td>22 08/07/28 BOLT-SOLUTION HEAD 4 23 09/07/28 WASHER-SOLUTION HEAD 4 24 S-097-2W ADAPTOR 1 25 10/07/18 SPRING PIN 2 26 14/01/07 316 ST/STEEL BALL CHECK 1/4* 2 14/01/02 HAST.C BALL CHECK 1/4* 2 14/01/03 PYREX BALL CHECK 1/4* 2</td> <td>22 08/02/103 BOLT-SOLUTION HEAD 4 23 09/07/28 WASHER-SOLUTION HEAD 4 24 S-097-2W ADAPTOR 1 25 100/1/8 SPRING PIN 2 45 140/101 316 STISTEEL BALL CHECK 1/4" 2 45 140/102 HAST.C BALL CHECK 1/4" 2 140/102 PYREX BALL CHECK 1/4" 2</td> <td>22 08/02/103 BOLT-SOLUTION HEAD 4 23 08/07/28 WASHER-SOLUTION HEAD 4 24 S-097-2W ADAPTOR 1 25 10/01/18 SPRING PIN 2 45 14/01/01 316 STISTEEL BALL CHECK 114" 2 45 14/01/02 HAST.C BALL CHECK 114" 2</td> <td>22 08/02/103 BOLT-SOLUTION HEAD 4 23 09/01/28 WASHER-SOLUTION HEAD 4 24 S-09/1-2W ADAPTOR 1 25 10/01/18 SPRING PIN 2 45 140/101 316 STISTEEL BALL CHECK 1/4" 2</td> <td>22 08/02/103 BOLT-SOLUTION HEAD 4 23 09/07/28 WASHER-SOLUTION HEAD 4 24 S-097-2W ADAPTOR 1 25 10/01/18 SPRING PIN 2</td> <td>22 06/02/103 BOLT-SOLUTION HEAD 4 23 09/07/28 WASHER-SOLUTION HEAD 4 24 S-097-2W ADAPTOR 1</td> <td>22 08/02/103 BOLT-SOLUTION HEAD 4 23 09/01/28 WASHER-SOLUTION HEAD 4</td> <td>22 08/02/103 BOLT-SOLUTION HEAD 4</td> <td></td> <td>$\begin{array}{c ccccccccccccccccccccccccccccccccccc$</td> <td>PVC</td>	22 08/07/28 BOLT-SOLUTION HEAD 4 23 09/07/28 WASHER-SOLUTION HEAD 4 24 S-097-2W ADAPTOR 1 25 10/07/18 SPRING PIN 2 26 14/01/07 316 ST/STEEL BALL CHECK 1/4* 2 14/01/02 HAST.C BALL CHECK 1/4* 2 14/01/03 PYREX BALL CHECK 1/4* 2	22 08/02/103 BOLT-SOLUTION HEAD 4 23 09/07/28 WASHER-SOLUTION HEAD 4 24 S-097-2W ADAPTOR 1 25 100/1/8 SPRING PIN 2 45 140/101 316 STISTEEL BALL CHECK 1/4" 2 45 140/102 HAST.C BALL CHECK 1/4" 2 140/102 PYREX BALL CHECK 1/4" 2	22 08/02/103 BOLT-SOLUTION HEAD 4 23 08/07/28 WASHER-SOLUTION HEAD 4 24 S-097-2W ADAPTOR 1 25 10/01/18 SPRING PIN 2 45 14/01/01 316 STISTEEL BALL CHECK 114" 2 45 14/01/02 HAST.C BALL CHECK 114" 2	22 08/02/103 BOLT-SOLUTION HEAD 4 23 09/01/28 WASHER-SOLUTION HEAD 4 24 S-09/1-2W ADAPTOR 1 25 10/01/18 SPRING PIN 2 45 140/101 316 STISTEEL BALL CHECK 1/4" 2	22 08/02/103 BOLT-SOLUTION HEAD 4 23 09/07/28 WASHER-SOLUTION HEAD 4 24 S-097-2W ADAPTOR 1 25 10/01/18 SPRING PIN 2	22 06/02/103 BOLT-SOLUTION HEAD 4 23 09/07/28 WASHER-SOLUTION HEAD 4 24 S-097-2W ADAPTOR 1	22 08/02/103 BOLT-SOLUTION HEAD 4 23 09/01/28 WASHER-SOLUTION HEAD 4	22 08/02/103 BOLT-SOLUTION HEAD 4		$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	PVC
20 KS-066-2 PVC DIAPTRACAII EOLT ASSEMBLY 1 21 0602103 BOLT-SOUTTION HEAD 4 22 060715 BOLT-SOUTTION HEAD 4 23 0607163 BOLT-SOUTTION HEAD 4 24 S-087-ZW ADAPTOR 1 25 1001/16 SPRIMG FIN 2 26 1001/16 SPRIMG FIN 2 27 06027-SW ADAPTOR 2 28 140101 SI STISTEEL BALL OHECK (14* 2 29 1401012 HAST C BALL CHECK (14* 2 20 1401012 PYREX BALL CHECK (14* 2 20 1401012 NAVE BOLY 1 2 20 1401013 PYREX BALL CHECK (14* 2 21 1401012 HAST C BALL CHECK (14* 2 21 1401012 HAST C BALL CHECK (14* 2 21 1401012 HAST C BALL CHECK (14* 2 22 1401013 16504466E 1 1 23 200423W VALVE BODY 1 1 1	20 AS-086-2 PVC DIAPHRAGMBOT ASSEMBLY 1 22 08027103 BOLT-SOLUTION HEAD 4 23 0601728 WASHER-SOLUTION HEAD 4 24 S-097-2W ADAPTOR 1 25 1001/16 SPRING PIN 2 24 S-097-2W ADAPTOR 2 25 1001/16 SPRING PIN 2 26 1400102 HIST C BALL CHECK 114* 2 27 1400102 PIREX BALL CHECK 114* 2 28 1400103 PIREX BALL CHECK 114* 2 29 1400103 PIREX BALL CHECK 114* 2 20 20423W VALVE BODY 1 48 E-	20 AS-086-2 PVC DIAPHRAGAI BOLT ASSEMBLY 1 22 0607/263 BOLTSOLUTION HEAD 4 23 0607/283 WASHER SOLUTION HEAD 4 24 S-067-2W AD-APTOR 1 25 1001/18 SISTISTEL BALL CHECK 1/4" 2 26 1401/07 HAST C BALL CHECK 1/4" 2 27 1407/03 PYREK BALL CHECK 1/4" 2 28 1407/03 PYREK BALL CHECK 1/4" 2 29 204/23/W VALKE ASSEMBLY 1 40 070.033 VALKE ASSEMBLY 1 41 204/23/W VALKE ASSEMBLY 1 42 204/23/W VALKE ASSEMBLY 1 43 E-16 PVC DISCHARGE VALKE ASSEMBLY 1 44 E-16 PVC DISCHARGE VALKE ASSEMBLY 1 45 07/3003 ''''ALKE ASSEMBLY 1 46 07/3003 ''''''''''''''''''''''''''''''''''''	20 AS-096.2 PVC DIAPHRAGM BOLT ASSEMBLY 1 22 0802/03 BOLT-SOLUTION HEAD 4 23 0907/28 WASHER-SOLUTION HEAD 4 24 S-097.2W ADAPTOR 1 25 1007/18 SPRING PIN 2 45 1407/01 316 STISTEEL BALL CHECK 1/4* 2 1407/02 PYREX BALL CHECK 1/4* 2 1407/03 PYREX BALL CHECK 1/4* 2 1407/03 PYREX BALL CHECK 1/4* 2 1407/03 PYREX BALL CHECK 1/4* 2 1407/04 CERAMIC BALL CHECK 1/4* 2	20 AS-096.2 PVC DIAPHRAGM BOLT ASSEMBLY 1 22 06002103 BOLT-SOLUTION HEAD 4 23 0900728 WASHER-SOLUTION HEAD 4 24 S-097-2W ADAPTOR 1 25 1000718 SPRING PIN 2 45 1400101 316 STISTEEL BALL CHECK 1/4" 2 1400102 HAST.C BALL CHECK 1/4" 2 1400102 PYREX BALL CHECK 1/4" 2 1400103 PYREX BALL CHECK 1/4" 2	20 AS-096.2 PVC DIAPHRAGN BOLT ASSEMBLY 1 22 06/02/103 BOLT-SOLUTION HEAD 4 23 09/07/28 WASHER-SOLUTION HEAD 4 24 S-097.2W ADAPTOR 1 25 10/01/18 SPRING PIN 2 26 14/01/01 316 STISTEEL BALL CHECK 1/4" 2 45 1/401/02 HAST.C BALL CHECK 1/4" 2	20 AS-096.2 PVC DIAPHRAGIN BOLT ASSEMBLY 1 22 08/02/103 BOLT-SOLUTION HEAD 4 23 09/07/28 WASHER-SOLUTION HEAD 4 24 S-087-2W ADAPTOR 1 25 10/01/18 SPRING PIN 2 26 1401/01 316 STISTEEL BALL CHECK 1/4* 2	20 AS-096.2 PVC DIAPHRAGM BOLT ASSEMBLY 1 22 08/02/103 BOLT-SOLUTION HEAD 4 23 09/07/28 WASHER-SOLUTION HEAD 4 24 S-097.2W ADAPTOR 1 25 10/07/18 SPRING PIN 2	20 AS-096.2 PVC DIAPHRAGM BOLT ASSEMBLY 1 22 08/02/103 BOLT-SOLUTION HEAD 4 23 09/07/28 WASHER-SOLUTION HEAD 4 24 S-097-2W ADAPTOR 1	20 AS-096-2 PVC DIAPHRAGM BOLT ASSEMBLY 1 22 08/02103 BOLT-SOLUTION HEAD 4 23 09/07/28 WASHER-SOLUTION HEAD 4	20 AS-096.2 PVC DIAPHRAGM BOLT ASSEMBLY 1 22 0802/103 BOLT-SOLUTION HEAD 4	20 AS-096-2 PVC DIAPHRAGM BOLT ASSEMBLY 1	17 19 16 24 10313 GASKET-ADAPTOR 1 15 08/01/77 CAP SCREW-ADAPTOR 2 16 07/01/26 OIL SEAL 16X/28/7 1 17 24 14 5-084-2-3 DIAPHRAGM (002) 1	CAST IRON
19 5.089.2 M SECONDARY PSITON (R02) 1 20 A5.095.2 PVC DMAPHRAGN BOLT ASSEMBLY 1 21 0.0007.03 BOLT-SOLUTION HEJO 4 22 0.0007.03 BOLT-SOLUTION HEJO 4 23 0.0017.03 WASHER SOLUTION HEJO 4 24 5.097.2 W A.0ATOR 2 25 1000/103 SFRITEL BALL CHECK (14* 2 25 1000/103 PREX BALL CHECK (14* 2 25 1000/103 PREX BALL CHECK (14* 2 26 1401/02 HIST C BALL CHECK (14* 2 26 1401/03 PREX BALL CHECK (14* 2 27 S040-2 W VALKE BALL CHECK (14* 2 28 S040-2 W VALKE BALL CHECK (14* 2 29 S040-2 W VALKE BODY 1 2010 S040-2 W VALKE BODY 1 2011 S040-2 W VALKE BODY 1 2012 S040-2 W VALKE	19 S.089.2W SECONDRY PISTON (002) 1 20 AS-098.2 PUC DIAPTHAGM BOLT ASSEMBLY 1 21 AS-098.2 PUC DIAPTHAGM BOLT ASSEMBLY 1 22 060/fr23 BOLT-SOLUTION HEAD 4 23 060/fr23 MSHER-SOLUTION HEAD 4 24 S.087.2W ADAPTOR 1 25 1001/fill SFENCE FILL 2 26 401/fill SIGSTISTEEL BALL CHECK 1/4* 2 27 1001/fill SIGSTISTEEL BALL CHECK 1/4* 2 28 1001/fill SIGSTISTEEL BALL CHECK 1/4* 2 29 1001/fill SIGSTISTEEL BALL CHECK 1/4* 2 21 401/fill SIGSTISTEEL BALL CHECK 1/4* 2 21 1401/fill SIGSTISTEEL BALL CHECK 1/4* 2 21 1401/fill SIGSTISTEEL BALL CHECK 1/4* 2 21 401/fill SIGSTISTEEL BALL CHECK 1/4* 2 21 1401/fill SIGSTISTEEL BALL CHECK 1/4* 2 21 1401/fill SIGSTISTEEL BALL CHECK 1/4* 2 21	19 5.089.2/W SECONDARY PISTON (002) 1 20 A5.086.2 PVC DIAPIRAGE BOLT ASSEMBLY 1 21 0.007.03 BOLT-SOLUTION HEAD 4 22 0.007.03 MASHER-SOLUTION HEAD 4 23 0.007.03 MASHER-SOLUTION HEAD 4 24 5.087.70 MASHER-SOLUTION HEAD 4 25 1.007.16 SPRING FINI 2 26 1.007.16 SPRING FINI 2 27 1.007.16 SPRING FINI 2 28 1.007.16 SPRING FINI 2 27 1.007.16 SPRING FINI 2 28 1.007.16 3 2 29 1.007.16 3 2 2007.17 1 1 2 2007.16 1 1 2 1 207.17 1 1 1 1 1 207.17 1 1 1 1 1 1 208.17 1 1 1 1 1 1 1	19 S.098-2W SECONDARY PISTON (002) 1 20 AS-096.2 PVC DIAPHRAGM BOLT ASSEMBLY 1 22 06/07/03 BOLT-SOLUTION HEAD 4 23 09/07/28 WASHER-SOLUTION HEAD 4 24 S-097-2W ADAPTOR 1 25 100/1/18 SPRING PIN 2 45 140/1/01 316 STISTEEL BALL CHECK 114" 2 15 1400/102 HAST.C BALL CHECK 114" 2 160/013 PYREX BALL CHECK 114" 2 160/014 PYREX BALL CHECK 114" 2	19 S-089-2W SECONDARY PISTON (002) 1 20 AS-096-2 PVC DIAPHRAGM BOLT ASSEMBLY 1 22 08/07/28 WASHER-SOLUTION HEAD 4 23 09/07/28 WASHER-SOLUTION HEAD 4 24 S-097-2W ADAPTOR 1 25 1001/18 SFRING PIN 2 45 140/101 316 STISTEEL BALL CHECK 1/4" 2 15 PYREX BALL CHECK 1/4" 2 140/102 PYREX BALL CHECK 1/4" 2	19 \$-089-2W SECONDARY PISTON (002) 1 20 AS-096-2 PVC DIAPHRAGM BOLT ASSEMBLY 1 22 08.0703 BOLT-SOLUTION HEAD 4 23 0907.28 WASHER-SOLUTION HEAD 4 24 \$-097-2W ADAPTOR 1 25 10001/18 SPRING PIN 2 26 1401/01 316 STISTEEL BALL CHECK 1/4" 2 45 1401/02 HAST C BALL CHECK 1/4" 2	19 S-089-2W SECONDARY PISTON (002) 1 20 AS-096-2 PVC DIAPHRAGM BOLT ASSEMBLY 1 22 06.002/103 BOLT-SOLUTION HEAD 4 23 09.001/28 WASHER-SOLUTION HEAD 4 24 S-097-2W ADAPTOR 1 25 10.001/18 SPRING PIN 2 24 S-097-2W ADAPTOR 2 25 10.001/18 SPRING PIN 2 26 1401/01 316 STISTEEL BALL CHECK 1/4* 2	19 S-089-2W SECONDARY PISTON (002) 1 20 AS-096-2 PVC DIAPHRAGM BOLT ASSEMBLY 1 22 08/02/103 BOLT-SOLUTION HEAD 4 23 09/07/28 WASHER-SOLUTION HEAD 4 24 S-097-2W ADAPTOR 1 25 10/01/18 SPRING PIN 2	19 S-099-2W SECONDARY PISTON (002) 1 20 AS-096-2 PVC DIAPHRAGM BOLT ASSEMBLY 1 22 08.007103 BOLT-SOLUTION HEAD 4 23 09.07/28 WASHER-SOLUTION HEAD 4 24 S-097-2W ADAPTOR 1	19 S-089-2W SECONDARY PISTON (002) 1 20 AS-096-2 PVC DIAPHRAGM BOLT ASSEMBLY 1 22 08/02/103 BOLT-SOLUTION HEAD 4 23 09/07/28 WASHER-SOLUTION HEAD 4	19 S-099-2W SECONDARY PISTON (002) 1 20 AS-096-2 PVC DIAPHRAGM BOLT ASSEMBLY 1 22 08/02/103 BOLT-SOLUTION HEAD 4	19 S-099-2W SECONDARY PISTON (002) 1 20 AS-096-2 PVC DIAPHRAGM BOLT ASSEMBLY 1	10313 GASKET-ADAPTOR 1 08/01/77 CAP SCREW-ADAPTOR 2 08/01/76 OIL SEAL 16X28X7 2 07/01/26 OIL SEAL 16X28X7 1 S-094-2-3 DIAPHRAGM (002) 1	PVC
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17 5:08-23 DUPFIAGAN (002) 1 18 5:08-2W S:UUTION HE-JO 1 19 5:08-2W S:UUTION HE-JO 1 11 2:0807.03 BOT-SOUTION HE-JO 1 11 2:0807.04 WISHERSOUTION HE-JO 1 11 2:0807.04 WISHERSOUTION HE-JO 1 11 2:0807.04 WISHERSOUTION HE-JO 1 1 11 2:0807.04 WISHERSOUTION HE-JO 1 1 12 1007.16 WISHERSOUTION HE-JO 1 1 12 1007.16 2:007.14 2: 2 1 13 2:017.18 2:017.14 2: 2 2 1 1 1 2 1 1 1 1 1 1 1 2 2 1 1 </td <td>17 5:08-23 DIAPPRAGN (002) 1 19 5:08-2PVC SOUTTON HELD 1 19 5:08-2PVC SOUTTON HELD 1 10 19 5:08-2PVC SOUTTON HELD 1 11 5:08-2PVC SOUTTON HELD 1 1 12 0.027103 BOLT SOUTTON HELD 1 1 12 0.007103 BOLT SOUTTON HELD 1 1 13 5:08-2PVC DIAPPRAGN BOLT ASSENBLY 1 1 140101 S:0827-2PVC DIAPPRAGN BOLT ASSENBLY 1 2 140101 S:087-2PVC DIAPPRAGN BOLT ASSENBLY 1 2 1401010 S:087-2PVC DIAPPRAGN BOLT ASSENBLY 1 2 1401010 S:087-2PVC DIAPPRAGN BOLT ASSENBLY 1 2 1401010 S:087-2PVC DIAPPRAGN BALL CHECK HIF 2</td> <td>17 19 16 24 14 18 5.080-27VC SOUTTON HEJO 1 19 16 249-27V SOUTTON HEJO 1 19 5.080-27VC SOUTTON HEJO 1 1 20 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140101 316 STGTELE BALL CHECK 1/4** 1 1</td><td>15 0801/17 CAP SCREW-ADAPTOR 2 16 0701/26 OIL SEAL 16X28X7 1 17 19 16 24 1 18 S-080-2PVC SOUTTON HEAD 1 19 S-080-2PVC SOUTTON HEAD 1 19 S-080-2PVC DIAPHRAGM (002) 1 19 S-080-2PVC SOUTTON HEAD 1 10 19 S-080-2PVC DIAPHRAGM BOLT ASSEMBLY 1 11 19 16 20 1 1 10 16 24 14 1 1 1 11 19 16 24 1 1 1 11 19 16 24 1 1 1 10 10 1<</td><td>17 19 16 070/17 Cap SCREW-ADAPTOR 2 17 19 16 070/126 OL SEA 16X287 1 18 S-084-23 DIAPHRAGM (002) 1 19 S-080-2PVC SOLUTION HEAD 1 19 S-080-2PVC SOLUTION HEAD 1 19 S-080-2PVC SOLUTION HEAD 1 20 AS-086-2PVC DIAPHRAGM BOLT ASSEMBLY 1 21 0907/28 BOLT-SOLUTION HEAD 4 22 0807/28 BOLT-SOLUTION HEAD 4 23 0907/28 MASHER-SOLUTION HEAD 4</td><td>15 0801/17 CAP SCREW-ADAPTOR 2 16 070/126 OIL SEAL 16X28/7 1 17 19 16 24//14 1 18 S-084-2-3 DIAPHRAGM (002) 1 19 S-080-2PVC SOLUTION HEAD 1 19 S-096-2PVC SOLUTION HEAD 1 20 AS-096-2PVC DIAPHRAGM (002) 1 21 S-096-2PVC DIAPHRAGM (002) 1 22 06/07/03 BOLT-SOLUTION HEAD 4 23 06/07/28 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QTY COMMENT	1	2 St	1 St	1 PTFE	1 SS	1 CAST IRON	BLY 1 SS	4 SS	4 SS	1 CASTIRON	2 St	2 SS	BLY 1 SS	1 SS	1 PTFE	1	1 PTFE	LY 1 SS	1 SS	1 PTFE	1	1 PTFE	_	14 VINTERTON ROAD.	9	CROSS SECTION-SOLUTION END	ES (5 GALLON) CHECKED:
DESCRIPTION	GASKET-ADAPTOR	CAP SCREW-ADAPTOR	OIL SEAL 16X28X7	DIAPHRAGM (005)	S SOLUTION HEAD	SECONDARY PISTON (005)	S DIAPHRAGM BOLT ASSEMBLY	BOLT-SOLUTION HEAD	WASHER-SOLUTION HEAD	ADAPTOR	SPRING PIN	316SS BALL CHECK 1/4"	SS DISCHARGE VALVE ASSEMBLY	SS VALVE BODY	TFE VALVE INSERT	"0"-RING	TFE SPACER-VALVE INSERT	S SUCTION VALVE ASSEMBLY	SS VALVE BODY	TFE VALVE INSERT	"O"-RING	TFE SPACER-VALVE INSERT		ACRONE	- IB	IILE:	2500 - 005 SERIES (5 GALLON)
ITEM PART No.	10313	08/01/77	07/01/26	S-094-2-3	18 S-080-3W SS	19 S-099-3W	AS-096-3 SS	08/02/103	23 09/01/28	24 S-097-3W	25 10/01/18	45 14/01/01	KVD-2-3-S-SS	37 S-083-1-3W SS	44 S-088-1-3W PTFE	46 07/03/03	47 S-089-2-3W PTFE	KVS-2-3-S-SS	37 S-083-1-3W SS	44 S-088-1-3W PTFE	46 07/03/03	47 S-089-2-3W PTFE		SS			340 ANGE TOLERANCE:
				((((17 (19) (16) (24) (14)	イントン					1 Alexandre				•												

QTY COMMENTS	-	4 St	1 St	1 PTFE	1 SS	1 CAST IRON	BLY 1	6 SS	6 SS	1 CAST IRON	2 St	X 3/8" 2 SS	IBLY 1 SS	1 SS	1 PTFE	1	LY 1 SS	1 SS	1 PTFE	1
DESCRIPTION	GASKET-ADAPTOR	CAP SCREW-ADAPTOR	OIL SEAL 16X28X7	DIAPHRAGM (15)	S SOLUTION HEAD	SECONDARY PISTON (15)	S DIAPHRAGM BOLT ASSEMBLY	BOLT-SOLUTION HEAD	WASHER-SOLUTION HEAD	ADAPTOR	SPRING PIN	316 ST / STEEL BALL CHECK 3/8"	S DISCHARGE VALVE ASSEMBLY	SS VALVE BODY	TFE VALVE INSERT	"0"-RING	SUCTION VALVE ASSEMBLY	SS VALVE BODY	TEE VALVE INSERT	"O"-RING
PART No.	10310	08/01/77	07/01/26	S-094-4	S-080-4W SS	S-099-4W	AS-096-4 SS	08/02/102	09/01/28	S-097-4W	10/01/18	14/01/18	KVD-4-S-SS	S-083-4W SS	S-088-4W PTFB	07/03/44	KVS-4-S-SS	S-083-4W SS	S-088-4W PTFE	07/03/44
ITEM	14	15	16	17	18	19	20	22	23	24	25	45		37	44	46		37	4	46

0. DESCRIPTION DESCRIPTION DESCRIPTION	GASKET-ADAPTOR 1	CAP SCREW-ADAPTOR 4	OIL SEAL 16X28X7 1 St	DIAPHRAGM (50) 1 PTFE	W SS SOLUTION HEAD 1 SS	W SECONDARY PISTON (50) 1 CAST IRON	-6 SS DIAPHRAGM BOLT ASSEMBLY 1 SS	BOLT-SOLUTION HEAD 6 SS	8 WASHER-SOLUTION HEAD 6 SS	W ADAPTOR 1 CASTIRON	SPRING PIN 2 St	BALL CHECK 9/16" 2 SS	-S-SS DISCHARGE VALVE ASSEMBLY 1 SS	5W SS VALVE BODY 1 SS	S-088-56W PTFE VALVE INSERT 1 PTFE	7 ************************************	55-SS SUCTION VALVE ASSEMBLY 1 SS	-6W SS VAL VE BODY 1 SS	S08856W PTFE VALVE INSERT . 1 PTFE	"0"-RING	ACHOMET 14 VINTERIN ROLD. DRAWI: AZ		CROSS SECTION-SOLUTION END
ITEM PART No.	10313	15 08/01/77	16 07/01/26	S-094-6	18 S-080-6W SS	19 S-099-6W	20 AS-096-6 SS		23 09/01/28	24 S-097-6W	25 10/01/18	45 14/01/05	KVD-5-6-S-SS	37 S-084-5-6W SS	44 S-088-54	46 07/03/67	KVS-5-6-S-SS	37 S-084-5-6W SS	44 S-088-54	46 07/03/67	SS		TDLERANCE:
	(17 (19) (16) (24) (14)																			MITERIAL	25	

10. CALIBRATION OF A METERING PUMP

To perform a calibration test on the delivery rate you will require a stop watch and materials necessary to perform a series of simple calculations.

To utilise this system efficiently, the following procedure should be followed whilst the pump is operating.

- 1. Valve V1 must remain open except when the user is testing the deliver rate.
- 2. To test the delivery rate, open valve V2 and flood the calibration cylinder well above the top graduation mark.
- 3. Close valve V1.
- 4. At the moment when the fluid level reaches the top graduation mark, begin timing the test.
- 5. When the liquid reaches the desired lower graduation, stop your watch and note down the time and calibration discharge quantity. Open valve V1 quickly and close V2 to avoid air being drawn into the system via the calibration cylinder.
- 6. Should another calibration test be required, then proceed to Item 2.



FIG. 1

EXAMPLE OF TYPICAL CALIBRATION TEST:

Test volume recorded Test time taken	:	1190 millilitres 63 seconds
Flow Rate (L/H)	=	volume recorded (ml) x 3.6 time taken (sec)
	=	$\frac{1190}{63}$ x 3.6 = 68 litre/hour

CALIBRATION CYLINDER – INSTALLATION GUIDE

LOCATION:

Install the calibration cylinder as shown in Figure 1. The cylinders must be installed in the suction piping in a vertical position and as close as possible to the suction tank.

Remember the location should make allowance for sufficient free space around the calibration cylinder for easy reading of graduations.

PIPING:

It is essential that the size of the pipe to the calibration cylinder be the same size as the suction piping and cylinder inlet connection. Under-sized pipe work will cause suction losses and, hence, affect calibration accuracy.

We strongly recommend that the use of full-flow ball values to give consistent system throughput and rapid open and shut operation – an important feature when checking calibrations.

Piping should be air-tight and suitably supported at regular intervals.

An overflow/venting line should be connected between the top of the calibration cylinder and the supply tank.

<u>CAUTION:</u> NEVER USE THE CYLINDER ON THE DISCHARGE SIDE OF ANY PUMP.

11. <u>BACK PRESSURE & PULSATION DAMPENER VALVE</u> <u>INSTRUCTIONS</u>

INSTALLATION:

See diagram overleaf of recommended installation layout for pressure relief and back pressure applications.

We recommend installation of a pulsation dampener between valve and pump for both applications to provide smoother, more accurate valve operation and maximise valve life.

Coat pipe fittings with suitable thread sealant such as PTFE tape before connecting to prevent leakage.

<u>CAUTION:</u> Do not over-tighten screwed connection. Should leakage occur during operation, unfasten connection and recoat threads with sealant.

ADJUSTMENT:

Valve operating pressure is controlled by the spring (8) and can be increased or decreased by varying the spring preload.

At date of purchase, Enchlor will adjust the valve to meet customer's requirements.

To alter or set operating pressure at site, it is necessary for a pressure gauge with snubber to be installed in the line between the valve and the pump and with pump operating:-

<u>For Back Pressure:</u> Unfasten locknut (5). Unscrew adjustment screw (4) to decrease pressure or screw in to increase pressure. When required pressure is achieved, retighten locknut.

<u>For Pressure Relief:</u> Unfasten locknut. Unscrew adjustment screw to decrease pressure or screw in to increase pressure. When full flow through valve at required relief pressure is achieved, retighten locknut.

MAINTENANCE:

The valve and its components should be inspected annually or when incorrect operation is suspected.

Disassembly is relatively simple. Unfasten locknut and unscrew adjustment screw to remove spring preload. Unfasten the three main bolts (3). These bolts hold the upper and lower halves together. Separate body halves and remove internals.

Carefully inspect and clean all components. Worn or damaged parts should be replaced. Smear the outer surface of the plunger and the bore of the upper body with grease to prevent plunger sticking in bore during operation.

Assembly procedure is reverse of disassembly.

After reinstalling, adjust valve operating pressure as previously described.

INSTALLATION LAYOUT



GENERAL ASSEMBLY 502 SERIES



BACK PRESSURE VALVE



GENERAL ASSEMBLY 502 SERIES