

**CHEM-AD® XL SERIES B
DIAPHRAGM
METERING PUMP**

BOOK NO. IM 440.601AB UA ISSUE B

EQUIPMENT SERIAL NO. _____

DATE OF START-UP _____

START-UP BY _____

Prompt service available from nationwide authorized service contractors.

ORDERING INFORMATION

In order for us to fill your order immediately and correctly, please order material by description and part number, as shown in this book. Also, please specify the serial number of the equipment on which the parts will be installed.

WARRANTY

Seller warrants for a period of one year after shipment that the equipment or material of its manufacture is free from defects in workmanship and materials. Corrosion or other decomposition by chemical action is specifically excluded as a defect covered hereunder, except this exclusion shall not apply to chlorination equipment. Seller does not warrant (a) damage caused by use of the items for purposes other than those for which they were designed, (b) damage caused by unauthorized attachments or modifications, (c) products subject to any abuse, misuse, negligence or accident, (d) products where parts not made, supplied, or approved by Seller are used and in the sole judgement of the Seller such use affects the products' performance, stability or reliability, and (e) products that have been altered or repaired in a manner in which, in the sole judgement of Seller, affects the products' performance, stability or reliability. **SELLER MAKES NO OTHER WARRANTY OF ANY KIND, AND THE FOREGOING WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING ANY WARRANTY OF MERCHANTABILITY OR OF FITNESS OF THE MATERIAL OR EQUIPMENT FOR ANY PARTICULAR PURPOSE EVEN IF THAT PURPOSE IS KNOWN TO SELLER.** If Buyer discovers a defect in material or workmanship, it must promptly notify Seller in writing; Seller reserves the right to require the return of such defective parts to Seller, transportation charges prepaid, to verify such defect before this warranty is applicable. In no event shall such notification be received by Seller later than 13 months after the date of shipment. No action for breach of warranty shall be brought more than 15 months after the date of shipment of the equipment or material.

LIMITATION OF BUYER'S REMEDIES. The **EXCLUSIVE REMEDY** for any breach of warranty is the replacement f.o.b. shipping point of the defective part or parts of the material or equipment. Any equipment or material repaired or replaced under warranty shall carry the balance of the original warranty period, or a minimum of three months. Seller shall not be liable for any liquidated, special, incidental or consequential damages, including without limitation, loss of profits, loss of savings or revenue, loss of use of the material or equipment or any associated material or equipment, the cost of substitute material or equipment, claims of third parties, damage to property, or goodwill, whether based upon breach of warranty, breach of contract, negligence, strict tort, or any other legal theory; provided, however, that such limitation shall not apply to claims for personal injury.

Statements and instructions set forth herein are based upon the best information and practices known to U.S. Filter/Wallace & Tiernan, Inc., but it should not be assumed that every acceptable safety procedure is contained herein. Of necessity this company cannot guarantee that actions in accordance with such statements and instructions will result in the complete elimination of hazards and it assumes no liability for accidents that may occur.

WALLACE & TIERNAN PRODUCTS
1901 West Garden Road, Vineland, NJ 08360

INTRODUCTION

This technical manual contains all the necessary instructions for the installation, start-up, maintenance, and repair of the USFilter's Wallace & Tiernan Products (USF/W&T) Chem-Ad® XL Series B Diaphragm Metering Pumps.



WARNING: TO AVOID POSSIBLE SEVERE PERSONAL INJURY OR DAMAGE TO THE EQUIPMENT, THIS EQUIPMENT SHOULD BE INSTALLED, OPERATED AND SERVICED ONLY BY TRAINED, QUALIFIED PERSONNEL WHO ARE THOROUGHLY FAMILIAR WITH THE ENTIRE CONTENTS OF THIS INSTRUCTION BOOK. WHEN DEALING WITH HAZARDOUS MATERIAL IT IS THE RESPONSIBILITY OF THE EQUIPMENT USER TO OBTAIN AND FOLLOW ALL SAFETY PRECAUTIONS RECOMMENDED BY THE MATERIAL MANUFACTURER/SUPPLIER. AVOID CONTACTING ELECTRICALLY HOT METER POSTS AND CIRCUIT BOARD COMPONENTS WHILE MAKING METER ADJUSTMENTS.

NOTE: When ordering material, always specify model and serial number of apparatus.

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VERY IMPORTANT SAFETY PRECAUTIONS

This page provides very important safety information related to safety in installation, operation, and maintenance of this equipment.

WARNING

TO AVOID POSSIBLE SEVERE PERSONAL INJURY OR EQUIPMENT DAMAGE, OBSERVE THE FOLLOWING:

THIS EQUIPMENT SHOULD BE INSTALLED, OPERATED, AND SERVICED ONLY BY TRAINED, QUALIFIED PERSONNEL WHO ARE THOROUGHLY FAMILIAR WITH THE ENTIRE CONTENTS OF THIS INSTRUCTION BOOK.

REPAIRS MAY ONLY BE CARRIED OUT WHEN THE PLUG IS DISCONNECTED FROM THE MAINS, OR WHEN THERE IS NO VOLTAGE.

ONLY ORIGINAL SPARE PARTS MUST BE USED FOR REPAIRS.

DO NOT DISCARD THIS INSTRUCTION BOOK UPON COMPLETION OF INSTALLATION. INFORMATION PROVIDED IS ESSENTIAL TO PROPER AND SAFE OPERATION AND MAINTENANCE.

ADDITIONAL OR REPLACEMENT COPIES OF THIS INSTRUCTION BOOK ARE AVAILABLE FROM:

USFILTER'S WALLACE & TIERNAN PRODUCTS
1901 WEST GARDEN ROAD
VINELAND, NEW JERSEY 08360
PHONE: (856) 507-9000
FAX: (856) 507-4125

NOTE

Minor part number changes may be incorporated into USF/W&T products from time to time that are not immediately reflected in the instruction book. If such a change has apparently been made in your equipment and does not appear to be reflected in your instruction book, contact your local USF/W&T sales office for information.

Please include the equipment serial number in all correspondence. It is essential for effective communication and proper equipment identification.





NOTES ON PROTECTIVE EQUIPMENT AND CLOTHING

The following Warning appears in several locations in this book. It is general in nature due to the variety of hazardous liquids this equipment is capable of handling.

WARNING: WHEN DEALING WITH HAZARDOUS MATERIAL, IT IS THE RESPONSIBILITY OF THE EQUIPMENT USER TO OBTAIN AND FOLLOW ALL SAFETY PRECAUTIONS RECOMMENDED BY THE MATERIAL MANUFACTURER/SUPPLIER.

It is good general practice to make use of protective equipment when handling any hazardous material.

IT IS RECOMMENDED THAT SUCH PROTECTIVE EQUIPMENT BE USED BY ALL PERSONS SERVICING THIS PUMP, ASSOCIATED PIPING, TUBING, VALVES, AND ACCESSORIES, WHEN THE EQUIPMENT IS HANDLING ANY HAZARDOUS MATERIAL.

1. Goggles, flexible fitting, hooded ventilation (per ANSI Z87.1)	
2. Face Shield (per ANSI Z87.1)	
3. Chemical Apron	
4. Chemical Gloves	

NOTE: (1) ANSI Z87.1 “practice for occupational.....eye and face protection” recommends goggles (#1 above) as the “preferred protection” when handling chemicals that present a hazard from splash, acid burns or fumes; for severe exposure, a face shield (#2 above) over the goggles is recommended.

(2) An eye flushing fountain and a deluge-type shower may be recommended or required by insurance carriers or governmental safety agencies, which should be consulted for specific requirements.

REGIONAL OFFICES**INSTALLATION, OPERATION, MAINTENANCE, AND SERVICE INFORMATION**

Direct any questions concerning this equipment that are not answered in the instruction book to the Reseller from whom the equipment was purchased. If the equipment was purchased directly from USFilter's Wallace & Tiernan Products (USF/W&T), contact the office indicated below.

UNITED STATES

1901 West Garden Road
Vineland, NJ 08360
TEL: (856) 507-9000
FAX: (856) 507-4125

CANADA

If the equipment was purchased directly from USF/W&T Canada, contact the nearest office indicated below.

ONTARIO

250 Royal Crest Court
Markham, Ontario
L3R3S1
(905) 944-2800

QUEBEC

243 Blvd. Brien
Bureau 210
Repentigny, Quebec
(514) 582-4266

MEXICO

If the equipment was purchased directly from USF/W&T de Mexico, contact the office indicated below.

Via Jose López Portillo No. 321
Col. Sta. Ma. Cuauhtepac, Tultitlan
Edo. México 54900
TEL: +52 55 2159 2976 / +52 55 2159 2989

SECTION 1 - TECHNICAL DATA**List of Contents**

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Chemical Resistance Guide	440.600.190.010A-F

1.1 Technical Data

Type	Mechanically Actuated Diaphragm Metering Pump
Model	Chem-Ad XL, Series B
Service	Metering of mild to very corrosive chemicals
Capacity range	Refer to Capacity Chart
Ambient Temperature	104° F (40° C)
Maximum Liquid Temperature	125° F (52° C)
Maximum Back Pressure	120 PSI (8 BAR) at 60 Hz 150 PSI (10 BAR) at 50 Hz
Suction Lift	6 ft of water
Accuracy	± 3% of full scale
Valves	Double ball, threaded valves
Diaphragm	PTFE - EPDM composite diaphragm
Drive unit	Synchronous Motor
Stroke Length Adjustment E60/E60^{Plus} and M60/M60^{Plus} control modes:	One turn manual knob, 10% increments, range 30-100%
Stroke Frequency Control E60/E60^{Plus} and M60/M60^{Plus} control modes:	Keypad control, 1% increments, on local mode, range 30-100% 0 - 20 mA, 4 - 20 mA, 20 - 0 mA, 20 - 4 mA input or pulse input on remote mode
Connection sizes USA Version:	Adapter for tubing connectoin, 3/8" OD x 1/4" ID
EURO Version:	Connection set for 4/6, 6/8, 6/12 tubing (mm ID/mm OD)

Alarm Output Signal

**E60/E60^{Plus} and
M60/M60^{Plus} control modes:**

Empty Signal Output - Max. Load, 24V
AC/DC, 3 Amps

Stroke Signal Output - Max. Load, 24 V
DC, 300 mA

Power Requirement

USA Version - 115 VAC, 60 Hz, Single
Phase

EURO Version - 230 VAC, 50 Hz, Single
Phase

1.2 Capacity, Pressure, and Power Consumption

Series B Pumps	Capacity			Pressure		Power Watts
	GPH @ 60 Hz, 144 spm	LPH @ 60 HZ, 144 spm	LPH @ 50 Hz, 122 spm	PSI @ 60 Hz	BAR @ 50 Hz	
1	0.44	1.68	1.4	120	10	12
2	0.79	3	2.5	120	10	12
3	1.52	5.76	4.8	50	4	12
4	1.36	5.16	4.3	120	10	20
5	2.28	8.64	7.2	120	10	30
6	3.55	13.44	11.2	60	5	30

NOTE: All data refers to a water temperature of 68° F (20° C).

1.3 Materials of Construction

Pump Component	Material of Construction
Pump Head	PVDF, Polypropylene, 316 Stainless Steel
Connection	PVDF, Polypropylene, 316 Stainless Steel
Diaphragm	PTFE-EPDM Composite Diaphragm
Valves	PVDF, 316 Stainless Steel, Polypropylene, (consists of PVDF inner parts)
Valve Balls	Ceramic, 316 Stainless Steel, Teflon
O-ring	Viton, EPDM, Isolast
Valve Spring	Elgiloy/Hastelloy C4
Housing and Finish	Thermoplastic, Blue per RAL 5007

1.4 Control Modes

The control mode functions for the Chem-Ad XL B series (USA) are as follows:

- E60**
- 6 ft cable with U.S. plug
 - Mechanical stroke adjustment
 - Level switch connection
 - Alarm and stroke signal output connection
 - Reversible analog input, 0/4 - 20 mA / 20 - 0/4 mA or pulse input
 - Remote on/off switch connection
 - Membrane touch pad operator interface
 - Integral back-lit digital display of functions and features
 - Capacity display
 - Multiple language display
 - External or internal operation
 - Input signal scaling
 - Stroke frequency control
 - Batch mode and pulse storage
 - Password protection
- E60^{Plus}**
- Includes all of the above features found in the E60 model, with the addition of:
 - Flow monitoring
 - Set point control

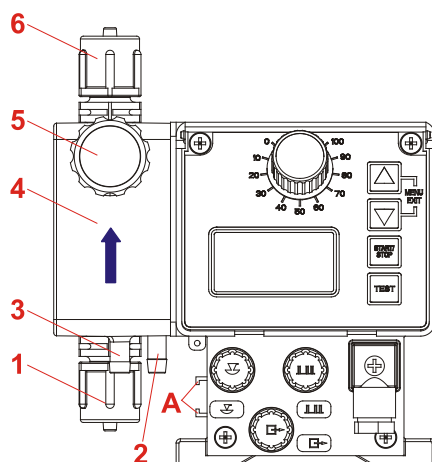
NOTE: In order to achieve E60^{Plus} functionality, order (1) Upgrade kit, part number AAC9446 (USA)

The control mode functions for the Chem-Ad XL B series (EURO) are as follows:

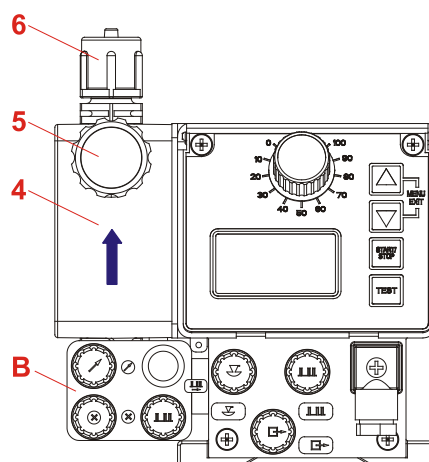
- M60**
- 6 ft cable with EURO plug
 - Mechanical stroke adjustment
 - Level switch connection
 - Alarm and stroke signal output connection
 - Reversible analog input, 0/4 - 20 mA / 20 - 0/4 mA or pulse input
 - Remote on/off switch connection
 - Membrane touch pad operator interface
 - Integral back-lit digital display of functions and features
 - Capacity display
 - Multiple language display
 - External or internal operation
 - Input signal scaling
 - Stroke frequency control
 - Batch mode and pulse storage
 - Password protection
- M60^{Plus}**
- Includes all of the above features found in the M60 model, with the addition of:
 - Flow monitoring
 - Set point control

NOTE: In order to achieve M60^{Plus} functionality, order (1) Upgrade kit, part number AAC9443 (Metric)

CHEM-AD® XL SERIES B



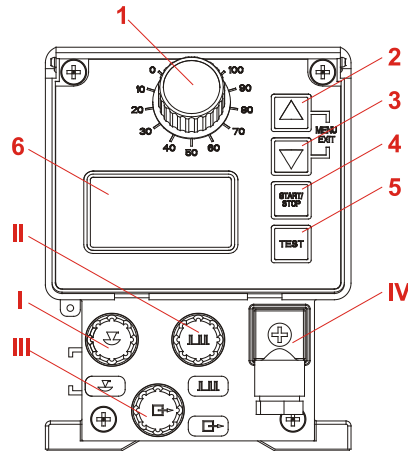
E60 / M60



E60^{Plus} / M60^{Plus}

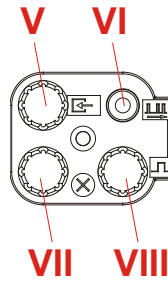
1	Suction valve (connection on the suction side)
2	Diaphragm breakage drain connection
3	Venting connection (feeding back to the container)
4	Pump head
5	Vent screw
6	Discharge valve (connection on the pressure side)
A	Rail for connecting the intelligent control pack (ICP)
B	Intelligent control pack (ICP)
⇒	Flow direction of the metering medium

1.4.1 Indicators / Controls / Jacks



Item No.	Description
1	Control knob for setting the stroke length
2	Menu/Exit, up arrow key
3	Menu/Exit, down arrow key
4	Start/Stop key (Enter function)
5	Test Key
6	Digital display
I	Tank level input for low-level and empty
II	input for pulse-/ mA signal and remote on/off
III	output for empty report, fault report and stroke signal
IV	power supply

1.4.2 Intelligent Control Pack (ICP)



Item No.	Description
V	input for oval gear meter
VI	connection for pulse input to pump (input II)
VII	input for batch pulse and remote on/off
VIII	input for pulse, mA signal input and remote on/off

NOTE:

1. The socket connectors, I and II, must always be occupied, either by the protective cap with the corresponding symbol or the appropriate equipment connected.
2. Keep the protective cap secure, in a place where it will not be lost.

INTRODUCTION

The following pages are offered as a general guide and indication of the suitability of various elastomers and plastics in use today with a wide range of industrial chemicals. The ratings are based, for the most part, on published literature of various plastic suppliers and elastomer manufacturers but, in some cases, they are considered the opinion of experienced compounders.

We cannot guarantee their accuracy nor assume responsibility for use thereof. Several factors must always be considered in using an elastomer or plastic part in service. The most important as we see them are:

TEMPERATURE OF SERVICE

Higher temperatures increase the effect of chemicals on plastic. The increase varies with the plastic and the chemical. The compound quite stable at room temperature might fail at elevated temperature.

CONDITIONS OF SERVICE

A compound that swells badly might still function well as a static seal yet fail in any dynamic application.

GRADE OF PLASTIC

Many types of plastic are available in different grades that vary greatly in chemical resistance.

THE COMPOUND ITSELF

Compounds designed with certain outstanding properties may be poorer in performance with a chemical than one designed especially for fluid resistance.

CAUTION: It is **NOT** recommended that USFilter/Wallace & Tiernan Chem-Ad Metering Pumps be used to handle **FLAMMABLE LIQUIDS**.

In light of the above factors, it is always best to TEST.

Statements and suggestions set forth herein are based upon the best information and practices known to USF/W&T. However, it should not be assumed either that information is complete on the subjects covered or that all possible circumstances, safety measures, precautions, etc., have been included. These statements and suggestions are not intended to reflect state, municipal, or insurance requirements or national safety codes; where applicable, those sources should be consulted directly. Moreover, since the conditions of use are beyond its control, USF/W&T makes no guarantee of results and assumed no liability in connection with the information contained herein.

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MATERIAL ANALYSIS OR DESCRIPTIONS

The following is typical analysis and description of the pump components named in Materials of Construction.

MATERIAL	ANALYSIS or DESCRIPTION
Ceramic	99% aluminum oxide
EPDM	Ethylene Propylene
GFPPL	Glass-filled polypropylene
Duran*** Galss	Borosilicate Glass, 81% SiO ₂ , 13% B ₂ O ₃ , 4% Na ₂ O/K ₂ O, 2% Al ₂ O ₃
Hastelloy C	High nickel-chrome alloy of the following analysis: Ni, 54%, Cr 15.5%, Co 2.5%, Mo 16%, W 4%, Fe 5.5%, C 0.08%, others 3%
Hypalon*	Chlorosulphonated polyethene, CSM
Isolast****	Perfluoroelastomer, FFPM
Kynar*	Polyvinylidene fluoride, PVDF
PVC	Polyvinyl chloride
PE	Polyethylene
PP	Polypropylene
Stainless Steel, 316	AISI 316 Cr 16-18%, Ni 10-14%, C 0.08%, Mn 2%, Si 1%, P 0.045%, S 0.03%, Mo 2-3%
SAN	Styrene-Acrylonitrile
Teflon*	Fluorocarbon resin of tetrafluoroethylene polymer, TFE, PTFE
Viton*	Copolymer of vinylidene fluoride and perfluoropropylene or hexafluoropropylene, FKM, FEPM

* Teflon, Hypalon, and Viton are registered trademarks of E.I. DuPont Co.

** Kynar is a registered trademark of Atochem North America, Inc.

*** Duran is a registered trademark of Schott.

**** Isolast is a registered trademark of Busak + Shamban.

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CHEMICAL	PLASTIC						ELASTOMER							METAL	
	PVC	PVDF	GFPL	Polyethylene	Polypropylene	SAN	Kalrez, Isolast	Teflon	Hypalon	EPDM	Viton	Glass	Ceramic	Hastelloy C	316 SS
Acetic Acid, 5%	B	D	A	A	H	A	N	A	C	A	C	A	A	H	H
Acetic Acid, 80%	C	D	C	B	E	E	G	A	E	C	C	A	A	H	B
Acetic Acid, Glacial	C	D	C	B	G	E	X	A	E	B	C	A	A	H	B
Acetic Anhydride	C	C	A	X	G	E	A	A	A	C	C	A	A	H	B
Aluminum Chloride	F	A	A	A	H	A	A	A	A	A	A	A	A	B	B
Aluminum Flouride	F	A	A	X	H	A	X	A	A	A	A	C	X	G	E
Aluminum Sulfate	A	A	A	A	H	A	A	A	A	A	A	A	A	A	B
Ammonia, 10%	A	A	A	B	X	A	A	A	A	B	A	A	A	N	A
Ammonium Chloride	A	A	A	A	H	A	A	A	A	A	A	A	N	H	B
Ammonium Nitrate	A	A	A	X	H	A	A	A	A	A	A	A	A	B	A
Ammonium Persulfate	A	A	A	X	H	A	X	A	A	A	A	A	A	X	E
Ammonium Phosphate	A	A	A	X	H	A	X	A	A	A	A	A	A	A	A
Ammonium Sulfate	A	A	A	A	H	A	A	A	B	A	B	A	A	A	B
Amyl Alcohol	C	A	X	X	H	C	A	A	B	B	B	A	A	A	A
Aniline	C	B	C	B	H	C	A	A	B	B	A	A	A	A	A
Aqua Ammonia	A	A	A	B	X	B	A	A	B	A	B	A	A	C	A
Aqua Regia	C	A	X	B	X	C	X	A	B	B	A	A	A	C	C
Arsenic Acid	A	A	A	X	H	A	A	A	C	X	A	A	N	A	B
Barium Chloride	A	A	A	X	H	A	A	A	B	X	A	A	A	A	E
Barium Sulfate	A	A	A	X	H	A	A	A	A	X	A	N	A	N	B
Beer	A	A	A	B	H	A	A	A	A	A	A	A	A	A	A
Benzaldehyde	C	B	C	X	X	C	A	A	C	B	C	A	A	A	A
Benzoic Acid	A	A	A	A	H	E	A	A	C	C	A	A	A	A	B
Borax (Sodium Borate)	A	H	A	B	H	X	A	A	B	A	A	A	N	A	A
Boric Acid	A	A	A	A	H	A	A	A	B	A	A	A	A	A	A
Bromine Water	C	A	C	X	C	X	X	A	C	B	A	A	A	A	C
Butyric Acid	D	A	A	X	H	B	B	A	C	C	B	A	A	A	B
Calcium Bisulfite	A	A	A	A	H	X	A	A	A	C	A	N	A	A	B
Calcium Chloride	A	A	A	A	H	A	A	A	A	A	A	A	A	A	C
Calcium Hypochlorite	A	A	C	A	G	A	A	A	A	B	B	A	B	H	C
Calcium Sulfate	A	A	A	X	H	A	A	A	A	B	A	N	N	A	B
Carbon Tetrachloride	E	A	C	C	C	X	A	A	C	C	A	A	A	A	B
Chlorine Dioxide	B	A	E	X	C	X	X	A	C	C	A	A	X	X	C
Carbonic Acid	A	A	A	X	H	A	A	A	B	C	B	A	N	A	B
Chloroacetic Acid	A	C	D	X	C	C	A	A	C	C	C	N	A	A	C
Chlorofoam	C	A	E	X	C	C	A	A	C	C	B	A	A	A	A
Chlorosulfonic Acid	E	C	E	C	C	C	A	A	C	C	C	A	A	A	B

RATING KEY

A – Acceptable
 B – Satisfactory where minor attack is acceptable
 C – Not recommended
 N – Information Lacking
 X – Unknown

D – Good to 70° F (20° C)
 E – Good to 80° F (27° C)
 F – Good to 125° F (52° C)
 G – Good to 150° F (65.5° C)
 H – Good to 185° F (85° C)

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CHEM-AD® XL SERIES B

CHEMICAL	PLASTIC						ELASTOMER							METAL	
	PVC	PVDF	GFPPL	Polyethylene	Polypropylene	SAN	Kalrez, Isolast	Teflon	Hypalon	EPDM	Viton	Glass	Ceramic	Hastelloy C	316 SS
Chromic Acid, 10%	A	A	A	A	H	A	A	A	A	C	A	A	A	B	B
Chromic Acid, 30%	A	A	A	A	H	A	A	A	A	C	A	A	A	B	B
Chromic Acid, 50%	C	A	A	B	G	B	A	A	A	C	A	A	A	B	E
Citric Acid	A	A	A	A	H	A	A	A	A	A	A	A	A	A	B
Copper Chloride	A	A	A	B	H	A	A	A	B	B	B	A	A	A	C
Copper Cyanide	A	A	A	X	H	A	A	A	A	N	B	N	A	A	A
Copper Nitrate	A	A	A	X	H	A	A	A	B	B	B	A	A	B	A
Copper Sulfate	A	A	A	A	H	A	A	A	B	B	B	A	A	A	B
Cresylic Acid (50%)	B	A	X	X	X	X	A	A	C	C	A	A	A	A	A
Ethyl Chloride	C	A	E	X	X	C	A	A	C	A	A	A	A	A	A
Ethylene Glycol	A	A	A	X	G	A	A	A	B	A	B	A	A	A	B
Fatty Acids	A	A	A	C	X	G	A	A	C	C	B	A	A	A	A
Ferric Chloride	A	A	A	A	H	A	A	A	B	A	B	A	A	B	C
Ferric Nitrate	A	A	A	C	H	A	A	A	B	A	B	A	A	B	B
Ferric Sulfate	A	A	A	C	H	A	A	A	B	A	B	A	A	A	B
Ferrous Chloride	A	A	A	A	H	A	A	A	B	B	B	A	A	C	C
Ferrous Sulfate	A	A	A	B	H	A	A	A	B	B	B	A	A	B	B
Fluoboric Acid	F	A	A	C	H	B	X	A	B	B	H	N	C	H	B
Fluosilicic Acid	F	A	A	A	H	B	A	A	H	X	B	C	C	H	B
Formaldehyde, 40%	D	G	H	B	H	A	B	A	B	A	C	A	A	H	A
Formic Acid	C	A	H	B	H	C	B	A	B	B	C	A	A	H	B
Freon 12 (Wet)	N	B	C	X	N	X	N	A	E	B	A	A	A	H	C
Furfural	C	X	N	X	N	X	A	A	N	B	C	A	A	H	B
Glycerine (Glycerol)	D	A	A	X	H	A	A	A	B	A	B	A	A	H	A
Hydrobromic Acid, 20%	D	A	A	B	H	X	A	A	A	B	D	A	D	D	C
Hydrochloric Acid, 0-25%	D	A	A	B	H	A	A	A	B	E	A	A	D	D	C
Hydrochloric Acid, 25-37%	D	A	A	B	D	B	A	A	B	E	N	A	N	D	C
Hydrofluoric Acid, 10%	G	A	A	A	H	B	A	A	A	B	H	C	C	H	C
Hydrofluoric Acid, 30%	G	A	B	B	F	C	A	A	A	E	F	C	C	F	C
Hydrofluoric Acid, 60%	X	A	B	C	N	C	A	A	B	B	D	C	C	N	C
Hydrofluosilicic, 20%	A	A	A	A	X	B	A	A	X	A	B	C	C	N	B
Hydrogen Peroxide, 30%	F	A	A	B	H	B	A	A	A	B	A	A	N	N	C
Hydrogen Peroxide, 50%	E	A	X	B	N	X	A	A	A	C	A	A	N	N	C
Hydrogen Peroxide, 90%	N	A	X	B	N	C	A	A	B	C	A	A	N	N	C
Hydrogen Sulfide, AQ.SOL.	A	A	A	X	X	B	A	A	B	A	B	F	N	N	B

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CHEM-AD® XL SERIES B

CHEMICAL	PLASTIC						ELASTOMER							METAL	
	PVC	PVDF	GFPL	Polyethylene	Polypropylene	SAN	Kalrez, Isolast	Teflon	Hypalon	EPDM	Viton	Glass	Ceramic	Hastelloy C	316 SS
Ketones	C	C	C	X	C	C	X	A	C	X	C	A	A	A	A
Lactic Acid	C	N	A	A	D	C	A	A	B	A	F	A	A	A	N
Lead Acetate	F	A	A	X	H	A	A	A	C	A	C	A	A	A	A
Lubricating Oil	F	A	E	B	H	A	A	A	B	C	A	A	A	A	A
Magnesium Chloride	F	A	A	A	H	A	A	A	A	A	A	A	A	A	N
Magnesium Nitrate	F	A	A	X	H	A	N	A	A	B	A	A	A	A	A
Magnesium Sulfate	F	A	A	A	H	A	A	A	A	A	A	A	A	A	A
Maleic Acid	F	A	A	X	X	C	A	A	A	C	A	A	A	A	B
Methylene Chloride	C	B	C	X	C	C	A	A	C	C	N	A	A	A	A
Napthalene	D	A	E	X	D	C	A	A	C	C	F	F	A	A	A
Nickel Chloride	F	A	A	A	H	A	A	A	H	A	H	A	A	A	N
Nickel Sulfate	F	A	A	A	H	A	A	A	A	A	H	A	A	A	A
Nitric Acid, 10%	F	A	A	A	D	F	A	A	A	B	A	A	N	H	A
Nitric Acid, 20%	F	H	A	B	D	C	A	A	F	C	A	A	N	F	H
Nitric Acid, 50%	N	F	E	E	D	C	A	A	N	C	C	A	N	D	F
Nitric Acid, Anhydrous	C	C	C	C	C	C	A	A	C	X	C	A	N	D	F
Nitro Benzene	C	F	E	X	D	C	A	A	C	C	N	A	A	A	A
Oils and Fats	F	A	A	X	F	X	N	A	X	C	A	A	A	A	A
Oleic Acid	D	A	E	C	D	C	A	A	N	B	D	A	A	F	A
Oleum	C	C	X	C	X	C	A	A	C	X	A	A	A	X	X
Oxalic Acid	D	F	A	B	F	B	A	A	H	B	A	A	A	F	C
Phenol	C	F	B	E	C	A	A	A	C	B	A	A	A	A	H
Phosphoric Acid, 0-50%	D	A	A	A	H	B	A	A	A	B	H	A	A	A	F
Phosphoric Acid, 50-100%	D	A	B	B	H	B	A	A	A	C	H	A	A	F	N
Polymer	B	A	A	A	X	A	A	A	A	A	A	A	A	X	B
Polyphosphate	A	A	A	A	X	X	X	A	A	A	A	X	A	X	A
Potassium Bicarbonate	F	A	A	B	X	A	A	A	B	A	X	N	A	X	B
Potassium Bromide	F	A	A	B	H	A	A	A	H	A	B	N	A	H	F
Potassium Carbonate	F	A	A	B	H	A	A	A	H	A	B	H	N	F	F
Potassium Chlorate	F	A	A	B	H	A	A	A	H	B	B	A	A	F	F
Potassium Chloride	F	A	A	A	H	A	A	A	H	A	B	N	A	H	N
Potassium Cyanide	F	A	A	X	H	A	A	A	H	B	B	F	A	F	A
Potassium Dichromate	F	A	A	B	H	A	A	A	H	B	B	H	A	F	A
Potassium Hydroxide	H	F	A	A	H	C	A	A	H	B	C	C	C	H	H
Potassium Nitrate	F	A	A	A	H	A	A	A	H	B	H	H	A	F	F
Potassium Permanganate	F	A	A	A	F	A	A	A	F	B	F	F	A	A	H
Potassium Sulfate	F	A	A	A	H	A	A	A	H	A	A	F	A	F	H

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CHEM-AD® XL SERIES B

CHEMICAL	PLASTIC						ELASTOMER							METAL	
	PVC	PVDF	GFPPL	Polyethylene	Polypropylene	SAN	Kalrez, Isolast	Teflon	Hypalon	EPDM	Viton	Glass	Ceramic	Hastelloy C	316 SS
Soaps	F	A	A	E	H	A	A	A	A	D	A	A	A	A	A
Sodium Acetate	F	A	A	A	H	A	A	A	A	A	N	A	A	F	A
Sodium Aluminate	B	A	A	A	X	A	A	A	A	A	A	X	A	X	A
Sodium Bicarbonate	F	A	A	A	H	A	A	A	A	A	A	G	A	F	A
Sodium Bisulfate	F	A	A	A	H	A	F	A	A	A	A	G	A	F	A
Sodium Bisulfite	F	A	A	A	X	A	F	A	A	A	A	C	A	X	A
Sodium Carbonate	F	A	A	A	H	A	A	A	A	A	A	F	N	F	A
Sodium Chlorate	F	A	A	A	H	A	A	A	A	A	A	N	A	F	F
Sodium Chloride	F	A	A	A	H	A	A	A	A	A	A	F	A	F	N
Sodium Cyanide	F	A	A	X	H	A	X	A	A	A	A	A	A	A	A
Sodium Hexametaphosphate	F	A	C	A	X	X	A	A	A	A	A	X	A	X	X
Sodium Hydroxide, 20%	D	H	A	A	H	B	A	A	A	A	A	C	C	A	A
Sodium Hydroxide, 50%	N	F	A	B	H	B	A	A	A	N	D	C	C	A	A
Sodium Hypochlorite	F	A	E	A	H	A	A	A	A	A	H	G	A	F	C
Sodium Nitrate	F	A	A	A	H	A	A	A	A	A	D	A	A	F	A
Sodium Silicate	F	A	A	A	H	A	A	A	A	A	A	N	A	F	H
Sodium Sulfate	F	A	A	A	H	A	A	A	A	A	A	A	A	A	A
Sodium Sulfide	F	A	A	A	H	A	A	A	A	A	A	X	A	H	B
Stannic Chloride	F	A	A	A	H	A	X	A	N	N	A	A	A	H	C
Stearic Acid	F	A	E	C	X	C	A	A	X	B	A	A	A	X	A
Stoddards Solvents	C	X	X	X	X	X	X	A	X	C	A	A	X	X	A
Sulfuric Acid, 0-10%	D	A	A	A	H	C	A	A	A	A	A	A	A	A	N
Sulfuric Acid, 10-75%	N	A	A	E	F	C	G	A	C	C	A	A	H	F	C
Sulfuric Acid, 75-95%	N	A	E	E	N	C	E	A	C	C	A	A	F	F	C
Sulfuric Acid, 95-100%	C	N	E	E	N	C	E	A	C	C	H	A	F	F	C
Tannic Acid	F	A	A	B	H	X	A	A	A	B	A	A	A	H	F
Tanning Liquors	F	A	A	A	X	X	X	A	X	C	A	A	A	X	A
Tartaric Acid	F	A	A	X	H	C	A	A	D	D	A	H	A	A	A
Trichloroethylene	C	A	E	C	C	X	D	A	C	C	A	A	A	A	N
Tricresylphosphate	C	A	X	X	X	X	X	A	C	B	A	X	A	X	X
Urea	A	A	A	X	H	X	N	A	N	X	C	A	A	A	B
Vinegar	A	A	A	A	H	A	A	A	A	A	B	A	A	A	A
White Liquor (Acid)	A	A	X	X	X	C	X	A	X	X	A	A	A	X	A
Zinc Chloride	A	A	A	A	H	A	A	A	B	A	B	A	A	A	B
Zinc Sulfate	A	A	A	A	H	A	A	A	A	A	A	A	A	D	A
Zinc Orthophosphate	A	A	A	A	X	X	X	A	A	X	A	N	X	X	A

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Suction and Discharge Connection.....	2.5
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Upgrading From E60 to E60 ^{Plus}	2.8
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2.1 General Information

To provide satisfactory service, the metering pump must be installed in accordance with the instructions that follow. Operational difficulties, lack of accuracy, and possible damage to the pump mechanism may occur if these instructions are not followed properly.

2.2 Unpacking

When the pump is unpacked, check all items inside the box. There are bags of various connection parts. Make sure that no parts are discarded with the packaging material. Whenever possible, unpack the equipment at the installation site.

2.3 Mounting the Pump

Pump location is important to the operation of the pump. Select a place that is dry and that provides a level base for the pump. Allow work space around the pump for inspections, adjustment, and servicing. Be sure it is near a power supply and located where the discharge line may be conveniently run to the point of application. The pump must be bolted down to a mounting base or to a wall bracket.

- If the discharge line can be blocked off, a pressure relief valve must be installed immediately after the pump discharge valve. The relief line returns to the storage tank.

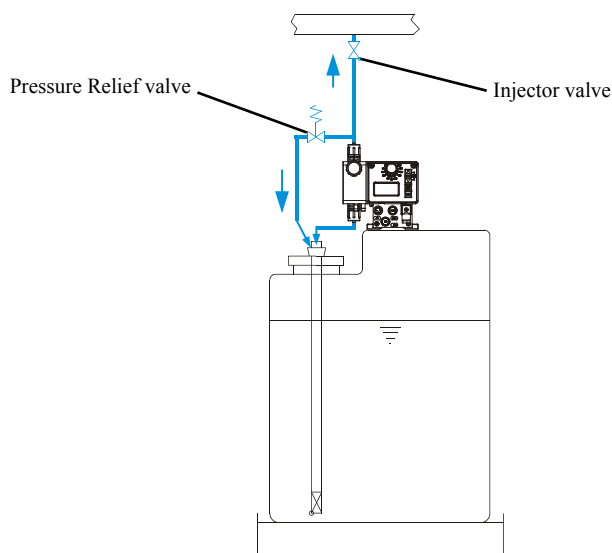


Figure 2.1 - Relief Valve Installation

- If discharging into a negative head, an anti-siphon valve must be installed at the discharge line to prevent siphoning of the process fluids into the point of application. The installation of a solenoid valve may be required to prevent process fluids from siphoning when the pump is not operating.

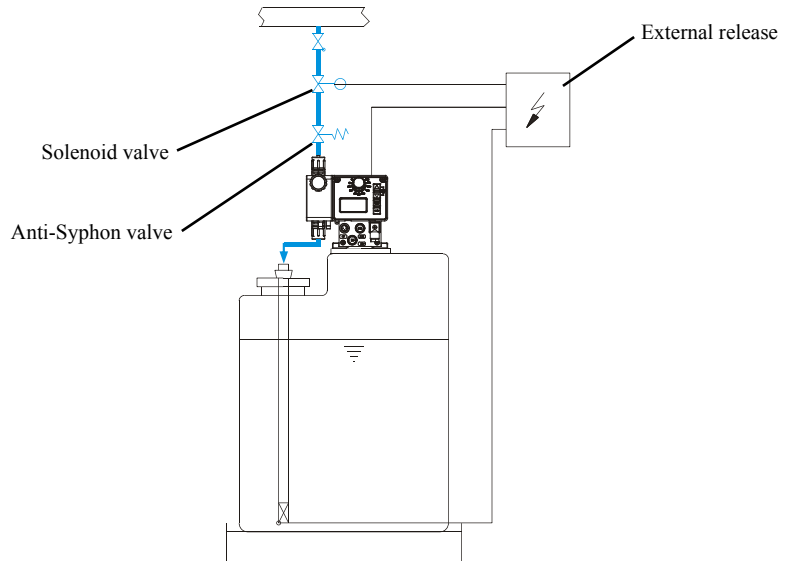


Figure 2.2 - Installation With Anti-Syphon and Solenoid Valve

- If the storage tank is higher than the pump, such that the process fluid may run freely through the pump, a back pressure valve must be installed at the discharge of the pump. The discharge pressure must be at least 15 psi (1 bar) higher than the suction pressure.

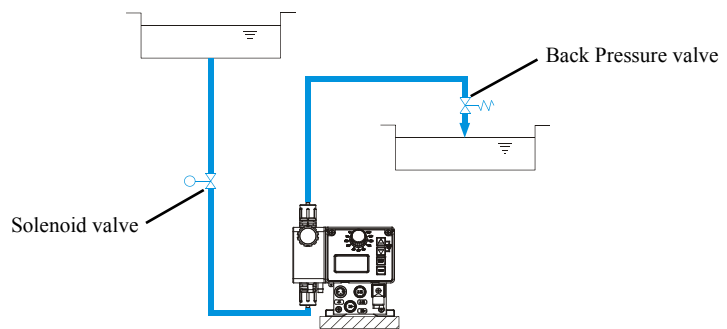


Figure 2.3 - Flooded Suction Installations

NOTE: The use of a Vented Riser Kit, part number AAC8744, is recommended when installing the pump in a flooded suction application.

- Avoid long and twisted suction lines, particularly loops that may create air pockets. Keep the line as short as possible.

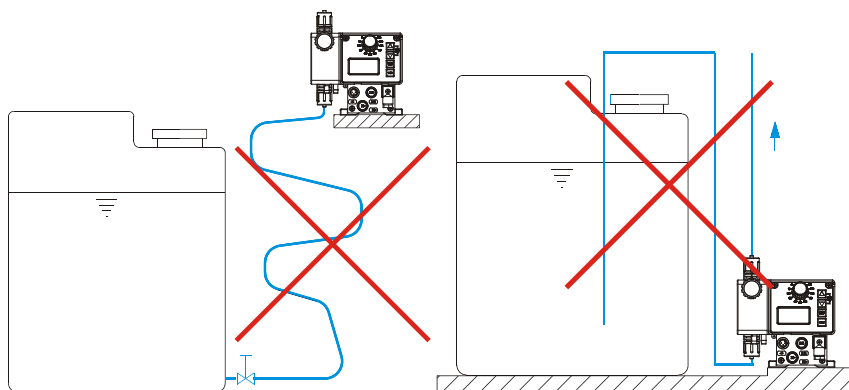


Figure 2.4 - Suction Lines to Avoid

2.4 Dimensions

Wall mounting bracket, kit AAC7594, is a convenient way to mount the pump on the wall. Position the pump for easy access to the liquid end for service and the front face for the controls. Figure 2.5 shows the pump dimensions.

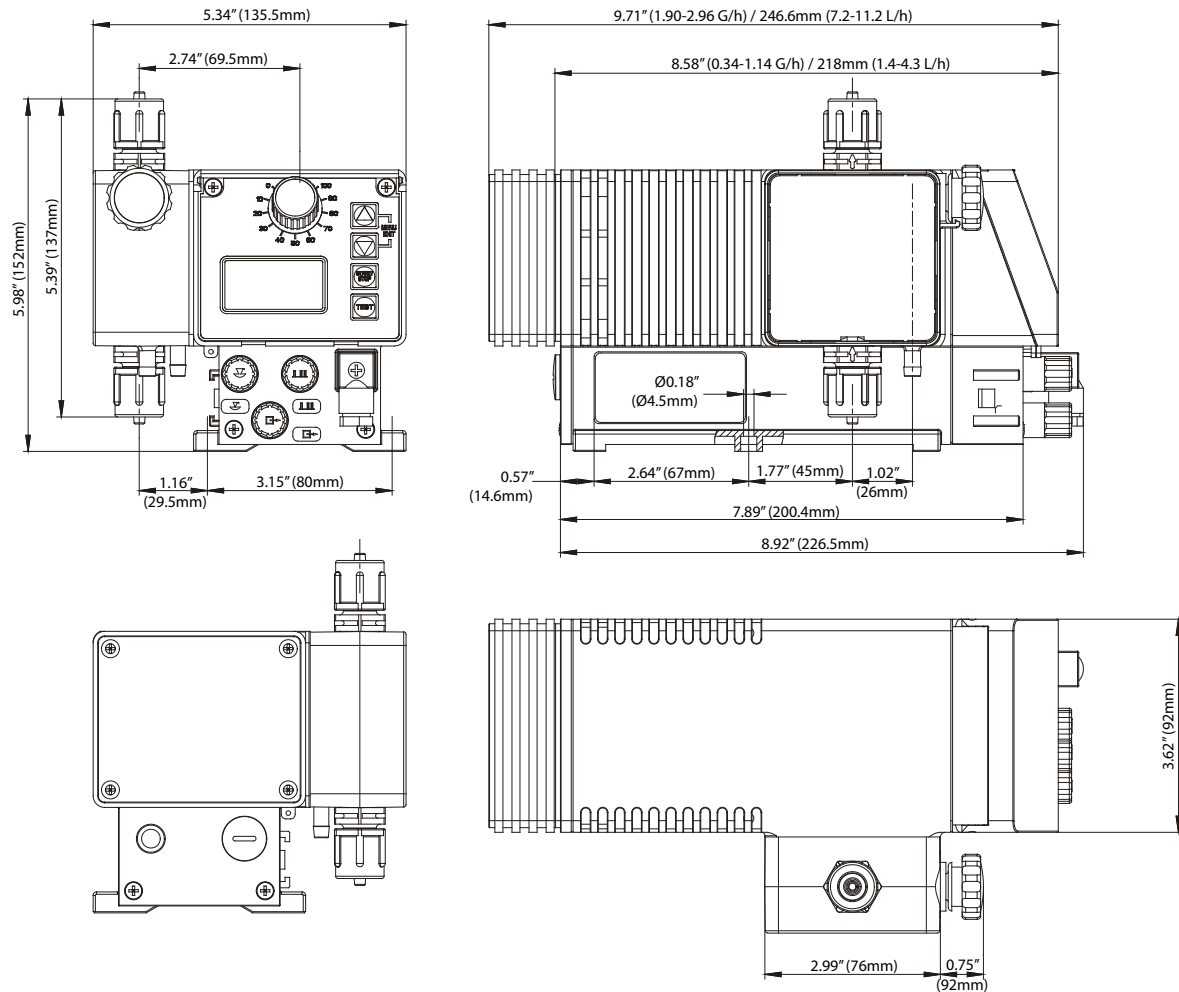


Figure 2.5 - Dimensions, Series B

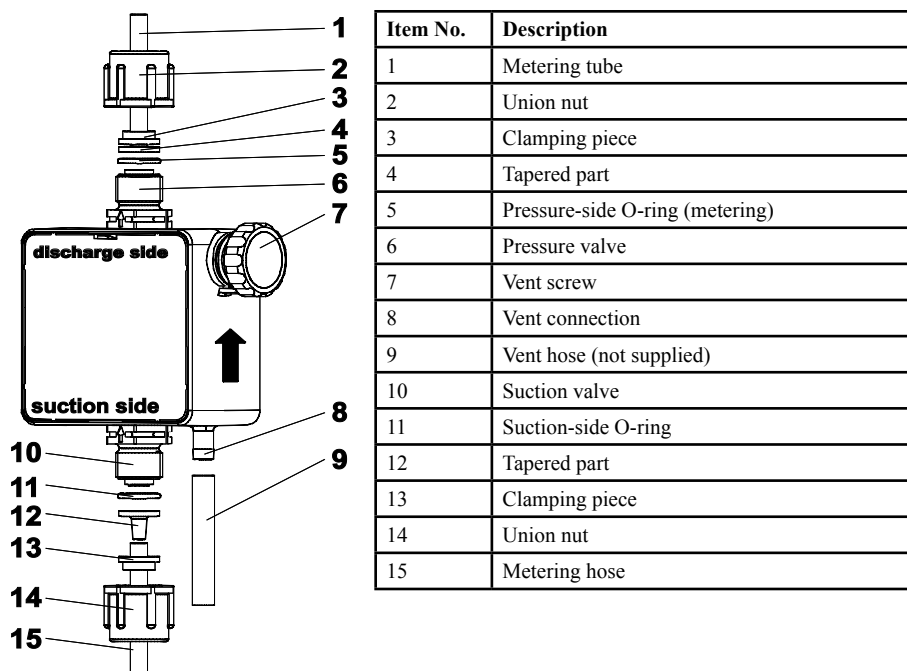
2.5 Suction and Discharge Connection

For USA Version pump, the connection is a complete adapter with G3/8" to 3/8" OD Polyethylene tubing. O-ring (5,11) is required for sealing the connections.

For EURO Version pump, the connection is available as a set consisting of taper part (4,12), union nut (2,14), and clamping piece (3,13), for tubing sizes 4/6, 6/8, and 6/12, (mm ID/mm OD).

Refer to Section 6 for the part numbers.

At the side of the pump head is a priming valve (7). Connect the drain line (9) back to the tank or to a suitable container.



2.6 Electrical Connection

A six-foot cable with a three-prong grounded plug, US standard, is provided with the USA version of the Chem-Ad Series B pumps. It can be plugged into a US standard outlet with 115 VAC, 60 Hz, single phase source. Refer to paragraph 1.2, Capacity, Pressure, and Power Consumption, for correct wattage. For the metric version, a cable with a EURO plug is provided. It can be plugged into a EURO standard outlet with 230 VAC, 50 Hz, single phase source.

NOTE: The electrical connections should comply with local electrical wiring codes.

2.7 Input and Output Connections

The inputs and outputs are equipped with protective caps in the as-delivered condition. These caps must be removed when necessary (positions I-VIII). Connections I through IV are part of the standard E60 pump configuration. Connections I through VIII are part of the E60^{plus} configuration, which includes the Intelligent Control Pack (ICP), part number AAC8774 (optional component sold separately).

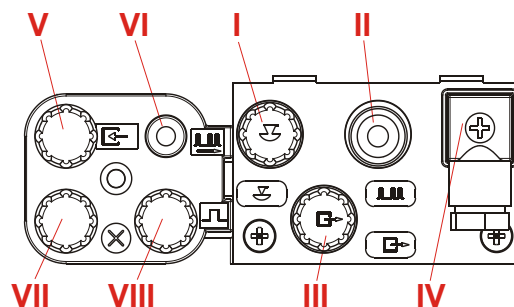


Figure 2.6 - Connection Assignment

NOTE: Since the protective caps or connector plugs are coded, the respective images must be observed (I-III). Do not use force when inserting them.



WARNING: TO PROTECT THE ELECTRONICS AGAINST CONTACT WITH CHEMICALS OR HUMIDITY, NEVER OPERATE THE METERING PUMP WITHOUT PROTECTIVE CAPS OR CONNECTOR CABLES, SINCE THE CONNECTORS CAN BECOME OXIDIZED. MIXING UP THE PROTECTIVE CAPS MAY RESULT IN MALFUNCTIONS OF THE PUMP AND/OR DAMAGE TO THE CONNECTORS.

2.7.1 Connector I

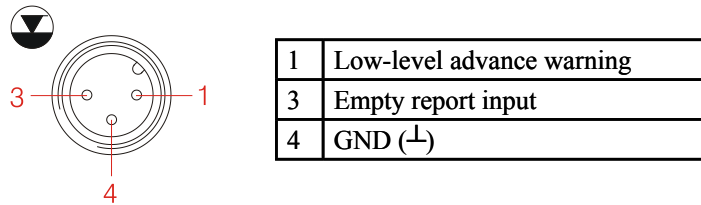
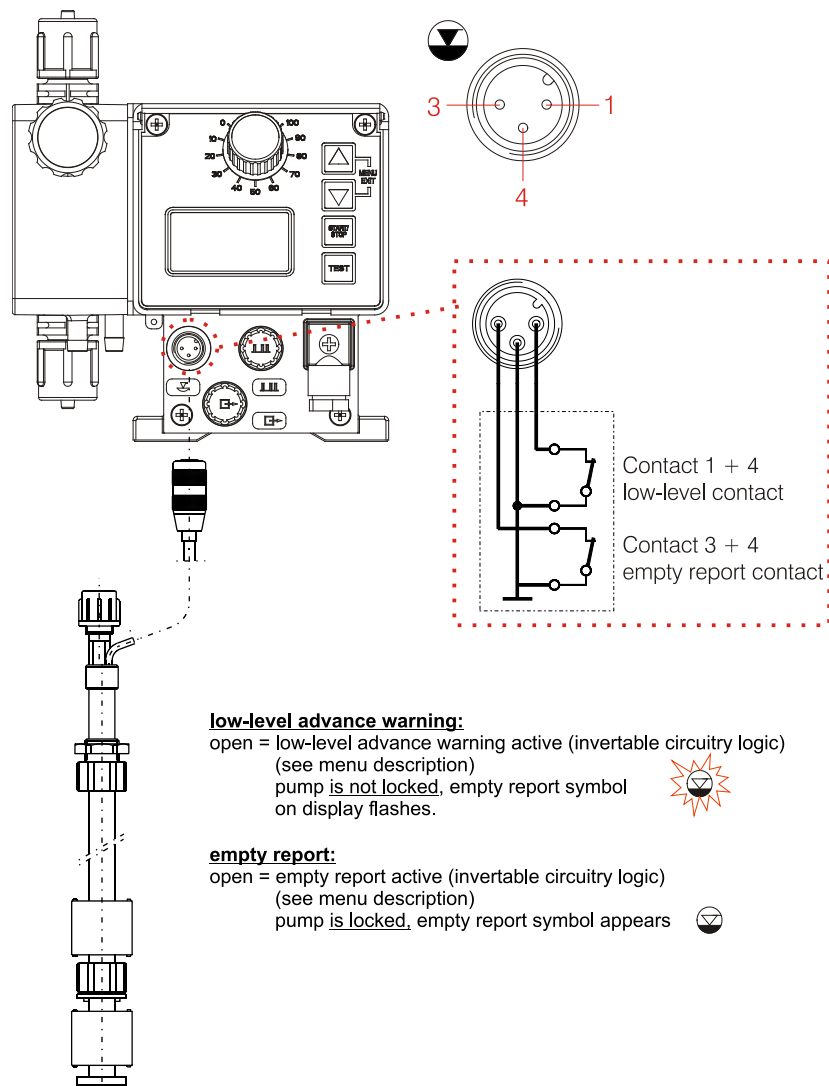


Figure 2.7 - Connector I

When using a suction pipe with low-level advance warning and empty report, remove the dummy connector and mount the suction pie connector.

NOTE: Connector I must always be assigned, either with the corresponding protective cap plug (which contains an internal jumper) or through connection to the empty report device.



2.7.2 Connector II

- a. Remote On/Off, PIN #3 and PIN #4 (Dry contact). Contact is closed; the pump is running.

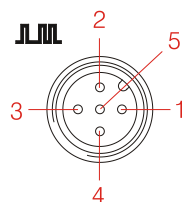
NOTE: If the remote On/Off is not used, PIN # 3 and PIN # 4 must be bridged

- b. Pulse Input, PIN #2 and PIN #4. Contact is closed; a pulse is processed.

Minimum pulse length is 15 milli-seconds = 1 stroke

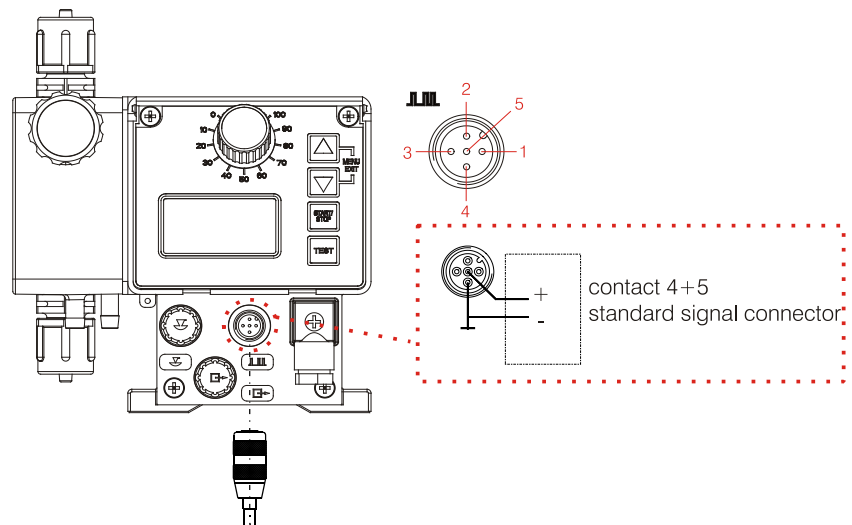
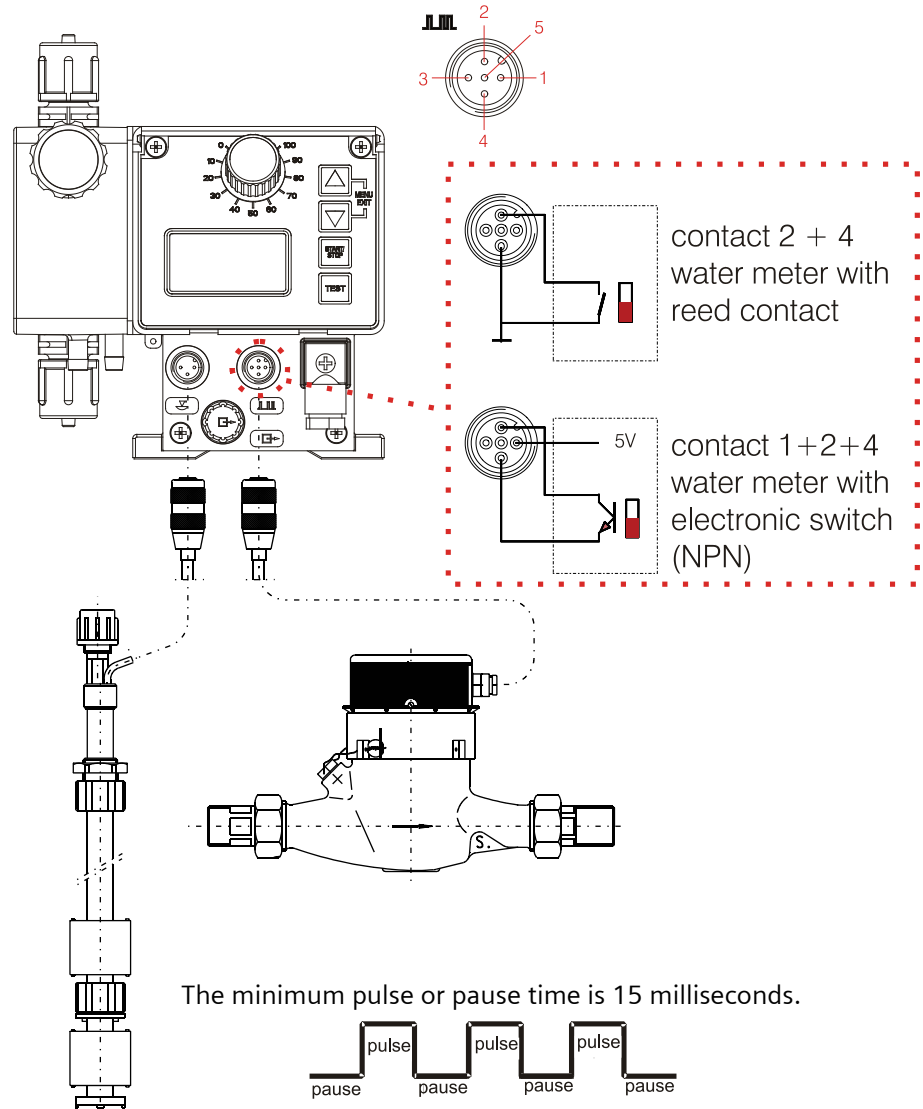
Maximum pulse is 122 pulses per min. = Continuous running

- c. 5 V output, PIN #1 and PIN #4. Connect to a sensor requiring 5VDC power with maximum load of 80 mA.
- d. 0/4 – 20 mA input, PIN # 5 and PIN # 4. Connect to equipment with 0/4 – 20 mA output.



1	output 5 V
2	Pulse input
3	Metering Lock
4	GND (⊥)
5	Input 0/4...20 mA (contact 5/4)

Figure 2.8 - Connector II



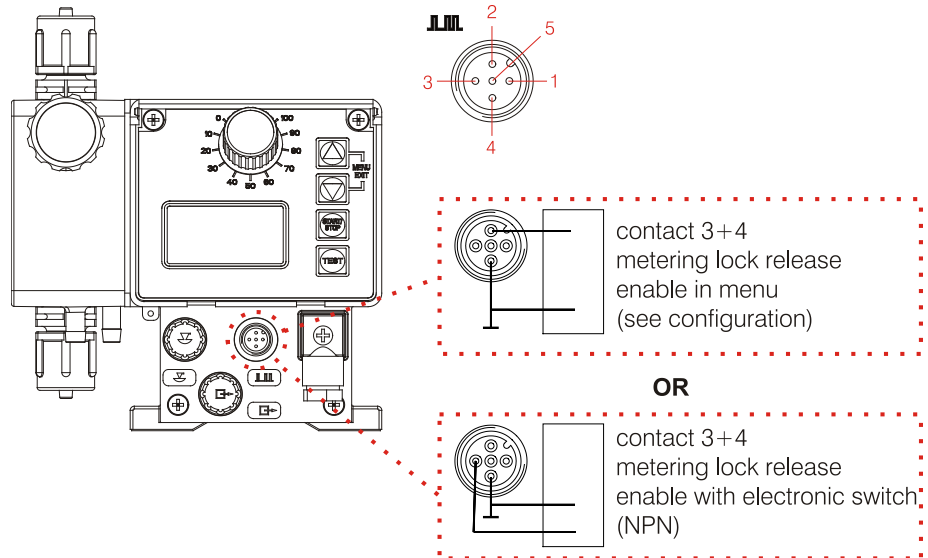


Figure 2.11 - Installing the Control Via the Metering Lock

NOTE: The metering lock is available in all operation modes.

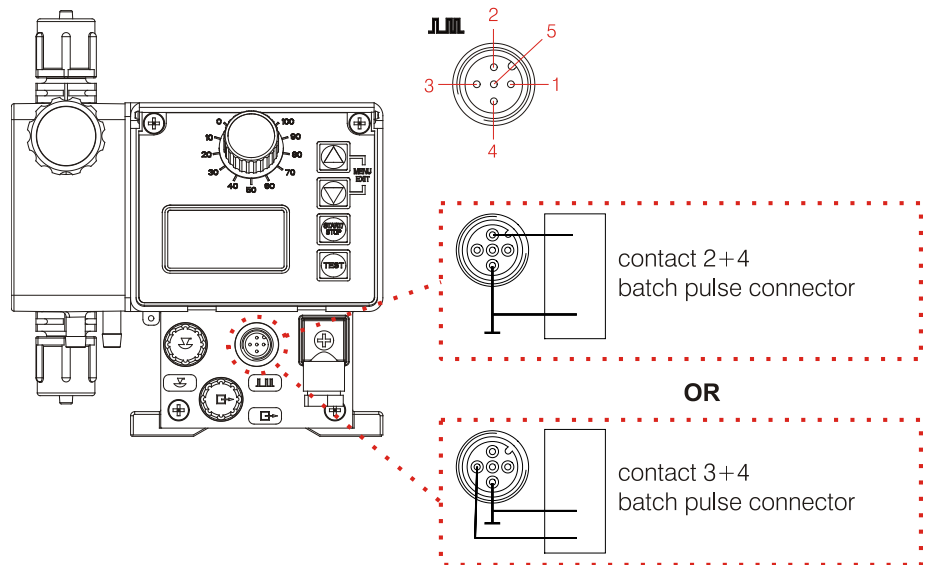


Figure 2.12 - Installing the Batch Function

NOTE: According to the requirements, the input of the batch pulse (contact 2+4 or contact 3+4) must be configured. (see section 2.10.4.3.12)

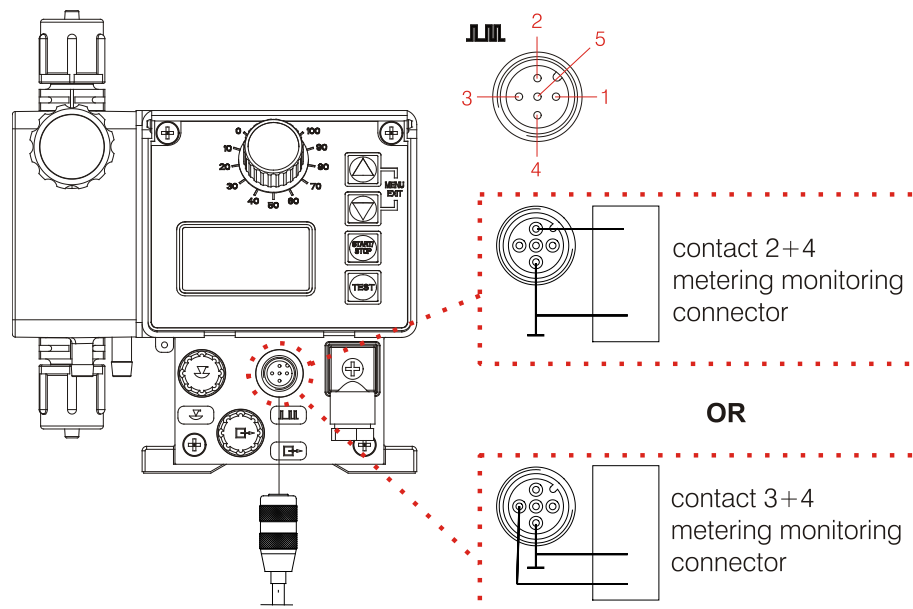


Figure 2.13 - Installing the Metering Monitoring

NOTE: The input of the metering monitoring can be configured according to requirements. (see section 2.10.4.3.11)

2.7.3 Connector III

- Empty signal output, PIN #1 and PIN #2 (Floating relay contact). Contact is closed when pump is in fault mode or tank is empty. When storage tank is almost empty (pre-warning), relay output contact is on and off with every stroke, with local flashing icon shown in the upper right corner of display.

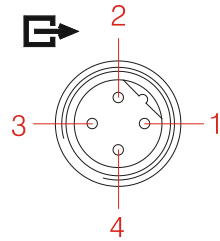
NOTE: Maximum load is 24V AC/DC, 3 amps. External 24V AC/DC power supply required.

120/240V AC/DC, 3 amps power supply can be used, however, PIN #3 and PIN #4 (stroke signal output) must not be used for safety reasons. Use only 2-wire cable.

- Stroke signal output, PIN #3 and PIN #4.
1 pulse = 1 stroke

NOTE: Maximum load is 24VDC, 300mA. External 24VDC power supply required.

This output, PIN #3 and PIN #4, can be directly connected to Connector II, PIN #2 and PIN #4, of another Chem-Ad pump.



1	Low-level advance warning, empty report and fault
2	Low-level advance warning, empty report and fault
3	Stroke signal (+)
4	Stroke signal (-)

Figure 2.14 - Connector III

Remove the protective cap.

Mount the connector plug according to the connector assignment.

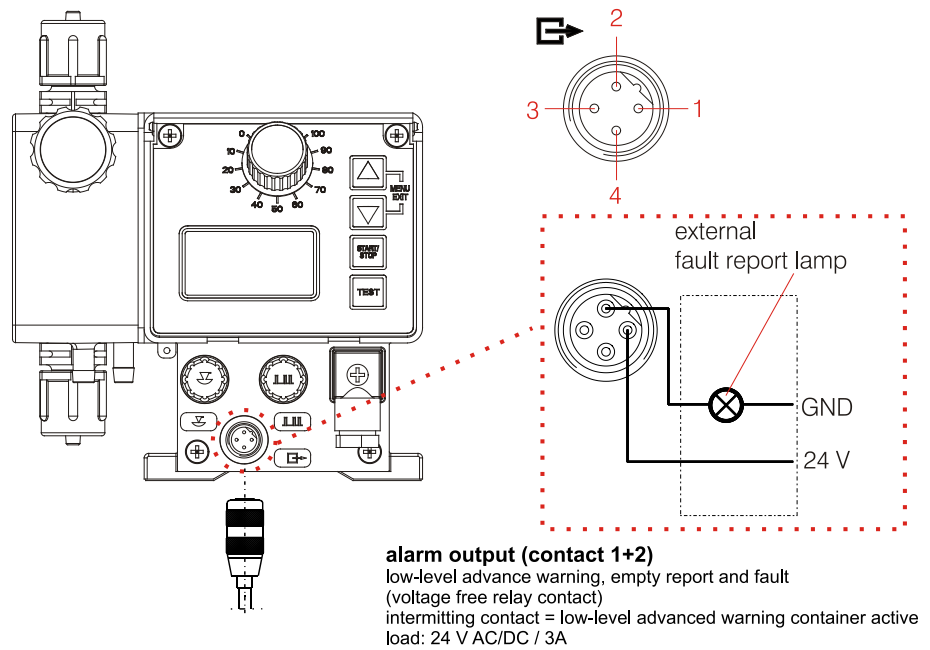


Figure 2.15 - Installing the Alarm or Fault Report Output at 24 V

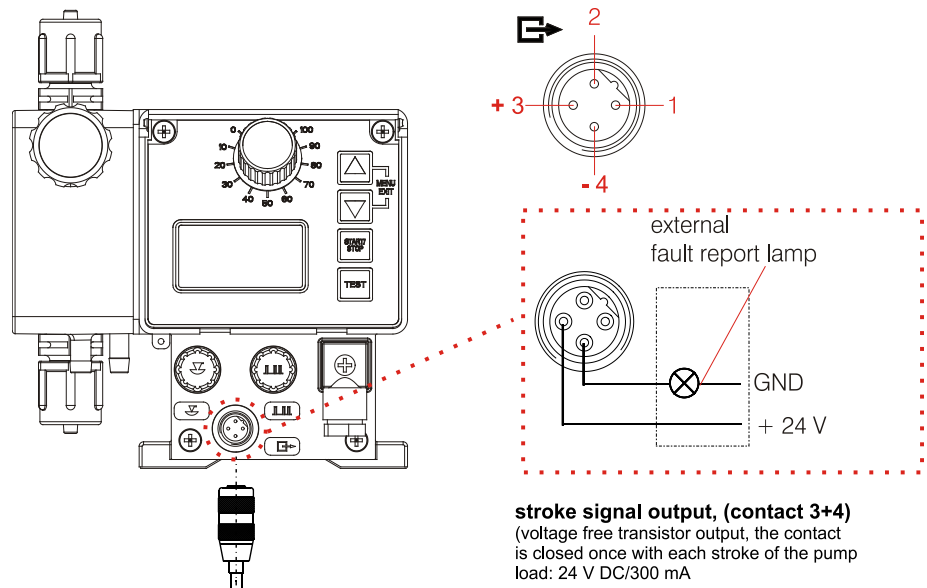


Figure 2.16 - Installing the Stroke Signal Output at 24 VDC

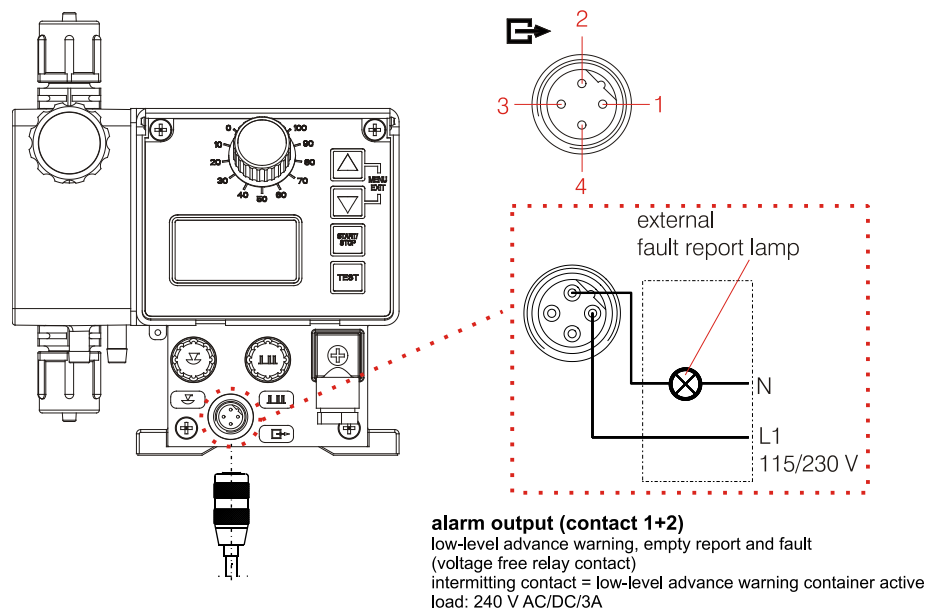


Figure 2.17 - Installing the Alarm Output at 115/230 VAC



WARNING: AT 115/230 V, A SIMULTANEOUS CONNECTION OF CONTACT 1/2 (ALARM OUTPUT) AND 3/4 (STROKE SIGNAL OUTPUT) IS GENERALLY NOT PERMITTED.

2.7.3.1 Changing Alarm Output Contact (Normally Closed or Normally Open)



WARNING: REMOVING THE FRONT CONTROL PANEL OF THE PUMP FOR SERVICE SHOULD ONLY BE PERFORMED BY TRAINED AND QUALIFIED PERSONNEL.

The pump is configured with the alarm relay contact output as "normally closed" from the factory. If a "normally open" alarm contact is preferred, please perform the following procedure:

- Turn the pump on. With the pump running, set the stroke length adjustment knob (Figure 2.18, item 1) to 100%.
- Turn the pump off. Disconnect power to the pump by removing the power cord from its source.
- Remove the Phillips screws (Figure 2.18, item 2) from the front control panel.



Figure 2.18 - Control Panel

- Carefully remove the control panel (Figure 2.19, item 1) from the pump housing (2), being certain NOT to turn, adjust, or remove the stroke length adjustment knob (3). Also, do NOT turn or adjust the stroke length adjustment shaft (4), which will be seen protruding from inside the pump housing.

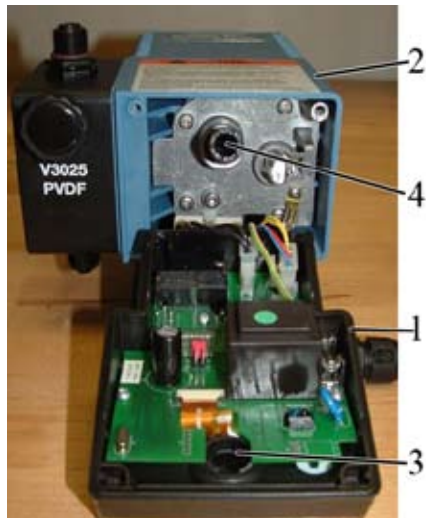


Figure 2.19 - Control Panel Internals

NOTE: If either the stroke length adjustment knob or shaft is accidentally turned or adjusted, finish following the steps hereafter, then review Section 3.1.3 - Calibrating the Pump, and Section 4.4.5 - Setting the Mechanical Stroke Adjustment Calibration, to verify the pump's flow output.

- With the front control panel removed, look for jumper J3 (Figure 2.20, item 1) on the circuit board (located near the inside bottom edge of the control panel). Using small needle nose pliers, remove the jumper from pins 2 and 3, and reinsert the jumper across pins 1 and 2. This will provide a "normally open" alarm contact.

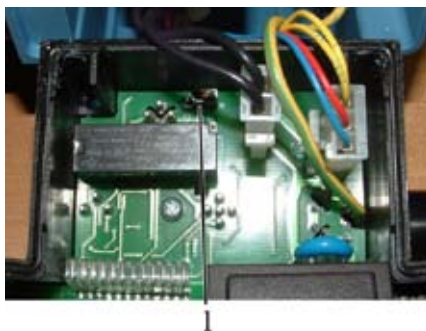


Figure 2.20 - Control Panel Internals

- After changing J3 to the desired setting, carefully replace the front control panel, making sure the stroke length adjustment knob lines up properly with the shaft. **Again, be certain NOT to alter the position of the knob or shaft, as this may change the pump's flow output.**

- Secure the front panel with the four Phillips screws removed earlier.
- Reconnect power to the pump and test.

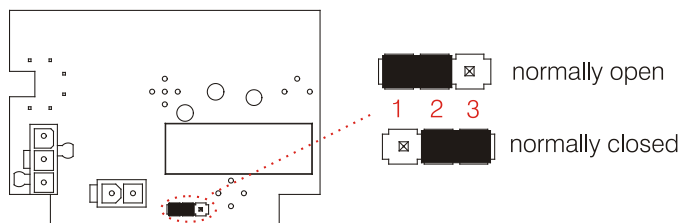


Figure 2.21 - Contact Positions

In the alarm output "ON" ● configuration setting

Jumper	If "No Alarm" (relay inactive)	If "Alarm" (relay active)	Power Off (relay inactive)
	contact open	contact closed	contact open
	contact closed	contact open	contact closed

(See Menu Description in Section 2.10.4.3.7)

In the alarm output "OFF" ○ configuration setting

Jumper	If "No Alarm" (relay active)	If "Alarm" (relay inactive)	Power Off (relay inactive)
	contact closed	contact open	contact open*
	contact open	contact closed	contact closed

* Fail-safe function

(See Menu Description in Section 2.10.4.3.7)

2.7.4 Connector IV

• Power Supply Connection - USA

Connect this cable to a three-pronged, 115 VAC, 60 Hz, single phase source.

• Power Supply Connection - EURO

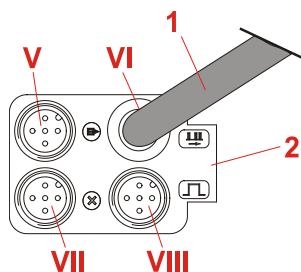
Connect this cable to a three-pronged, 230 VAC, 50 Hz, single phase source.

2.8 Upgrading From E60 to E60 Plus

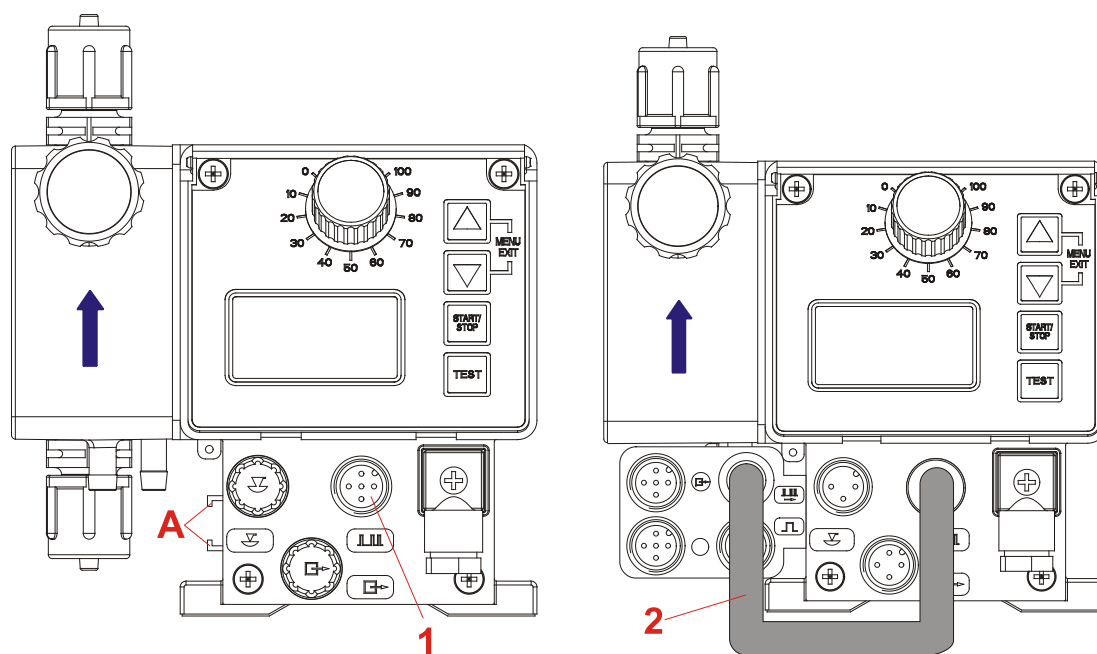
To upgrade the Chem-Ad XL series B E60 model to the E60^{Plus} version, order one E60^{Plus} Upgrade Kit (see Section 6.3.14) to obtain the additional functions. All of the features found in the standard E60 model are still available, in addition to:

- Flow Monitoring (see Section 2.10.4.3.11)
- Set Point Control (see Section 2.10.4.3.10)
- Additional Input Connections through ICP

2.8.1 Fitting the Intelligent Control Pack (ICP)



Item No.	Description
V	Input for oval gear motor
VI	Fixed connector cable for connecting the pulse input to the pump (Input II)
1	Connection lead for connection to input II of the pump
2	ICP
VII	Input for batch pulse and metering lock
VIII	Input for pulse, standard signal input (mA) and metering lock



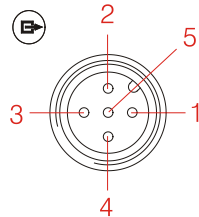
- 1) Slide the ICP onto the rail (A) on the left side of the pump, until it snaps into place.
- 2) Connect the connection cable (2) of the ICP to the input for pulse / standard signal (1) connector II of the pump.

The additional functions in the metering pump electronics can thus be activated and executed.

NOTE: If, before upgrading with an ICP, a plug is connected to the input for pulse / standard signal, then this plug can be connected after the upgrade to plug VIII of the ICP.

2.8.2 ICP Connections

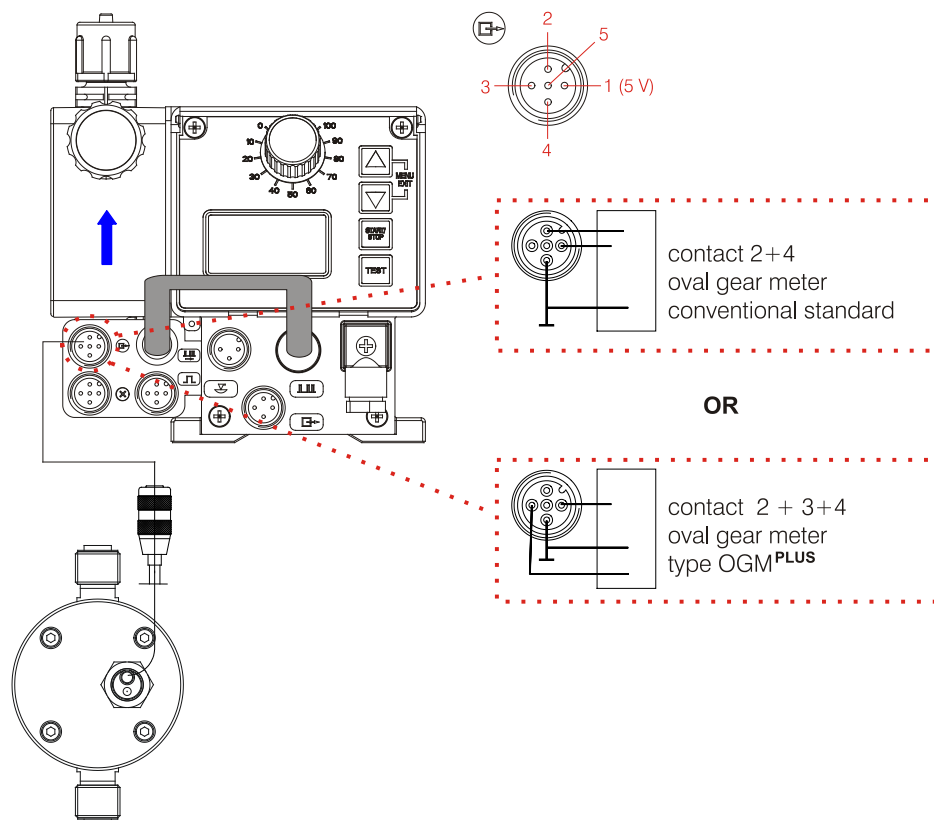
2.8.2.1 Connector V - Input for Oval Gear Meter



Item No.	Description
1	Supply for oval gear meter 5 V
2	Pulse input for oval gear meter, type OGM/OGC (standard)
3	Pulse input for oval gear meter, type OGM ^{PLUS}
4	GND
5	Free for future use

- 1) Remove the protective cap.
- 2) Mount the connector plug according to the connector assignment.

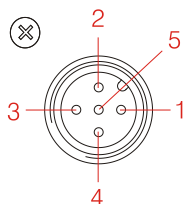
2.8.2.2 Installing the Oval Gear Meter (OGM)



2.8.2.3 Connector VI - ICP Connection to Pump

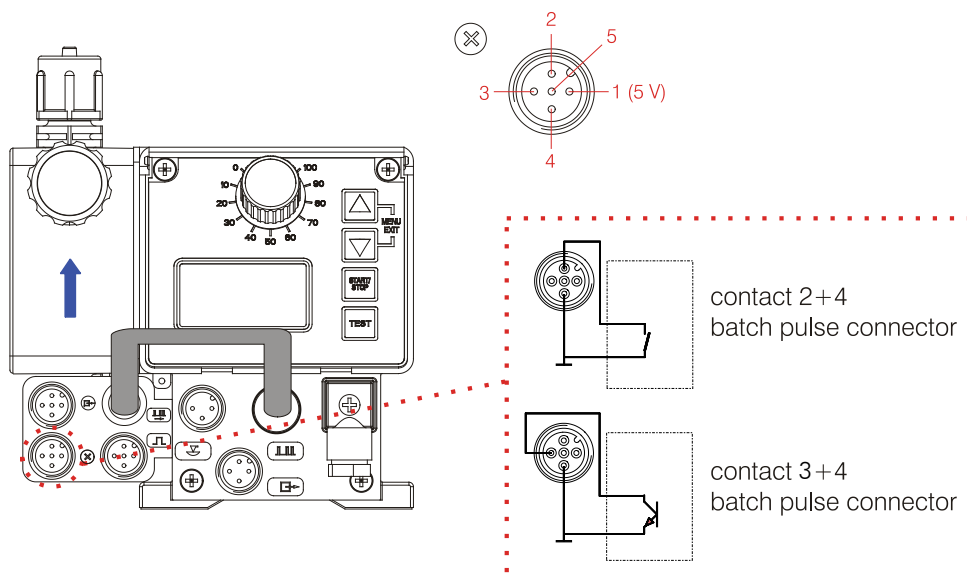
This connection cable is the link between the ICP and the pump. The female connector on the cable will connect to the signal input connection (II) of the pump. By completing this connection, the ICP "unlocks" the additional software features found only with the E60^{Plus}.

2.8.2.4 Connector VII - Input for Batch Pulse and Metering Lock

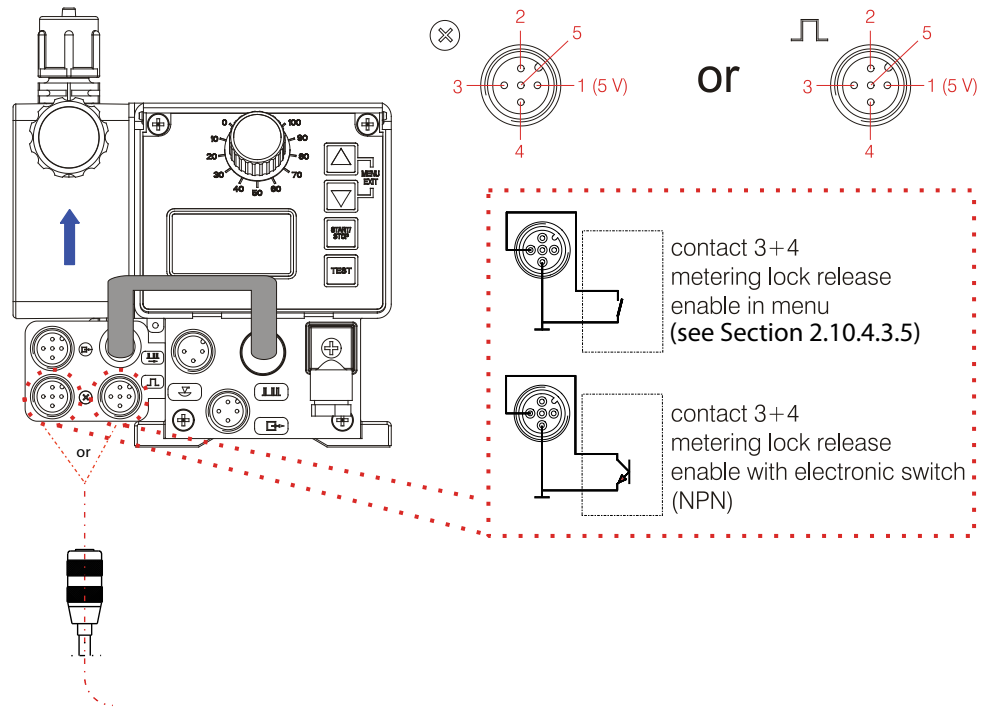


Item No.	Description
1	5 V supply
2	Input for batch pulse
3	Input for metering lock (remote on/off)
4	GND
5	Free for future use

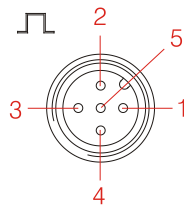
2.8.2.5 Installing the Batch Pulse



2.8.2.6 Installing the Metering Lock



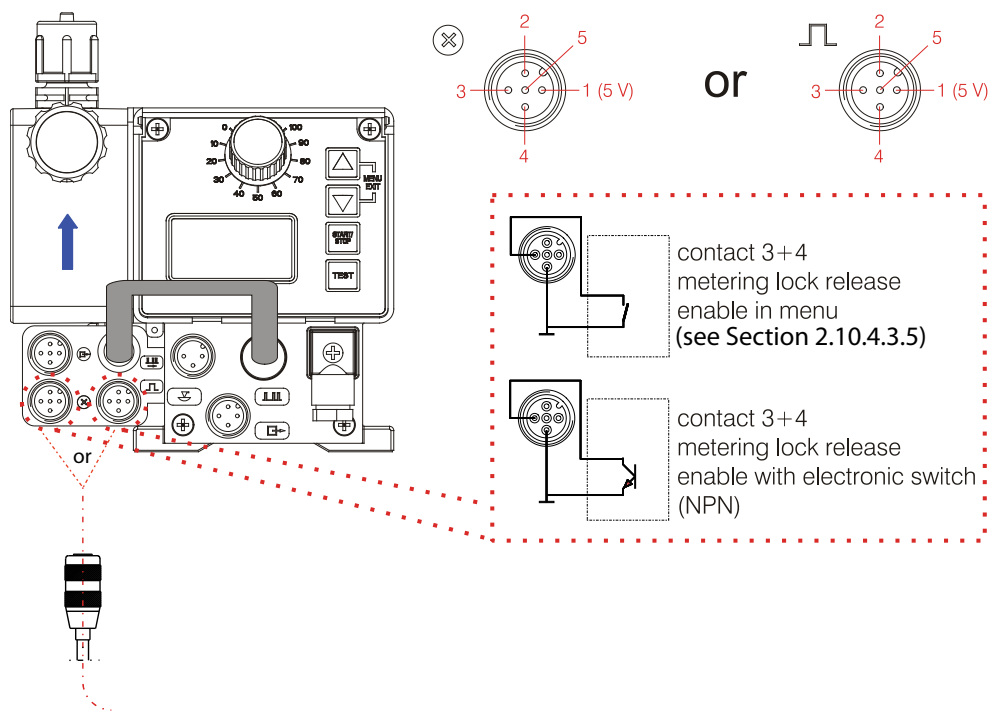
2.8.2.7 Connector VIII - Input for Pulse, Standard Signal Input and Metering Lock



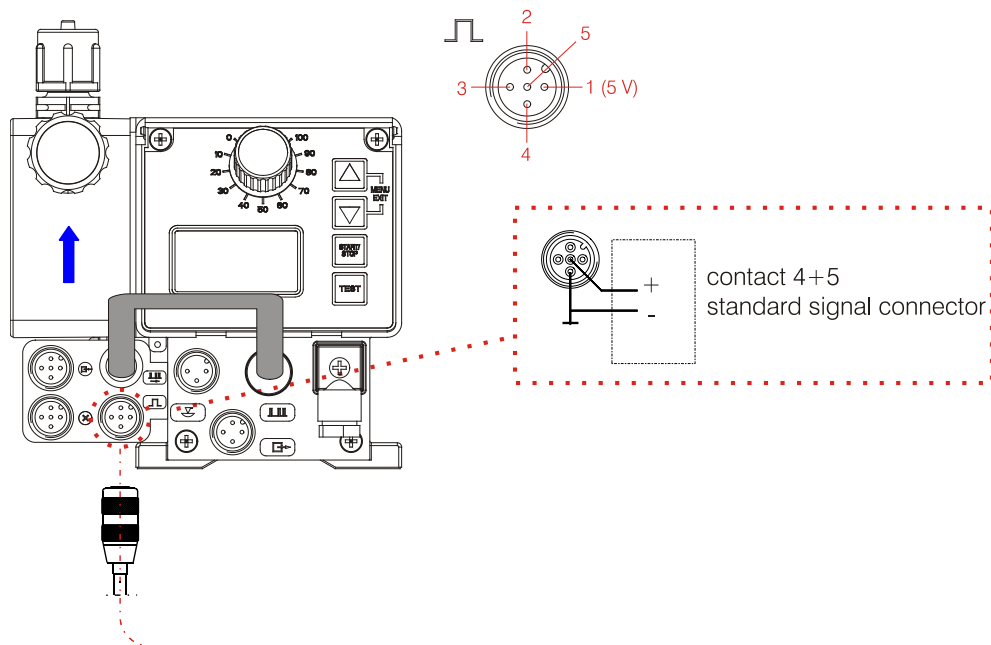
Item No.	Description
1	5 V supply
2	Input for external pulses
3	Input for metering lock (remote on/off)
4	GND
5	Input for standard signal

- 1) Remove the protective cap.
- 2) Mount the connector plug according to the connector assignment.

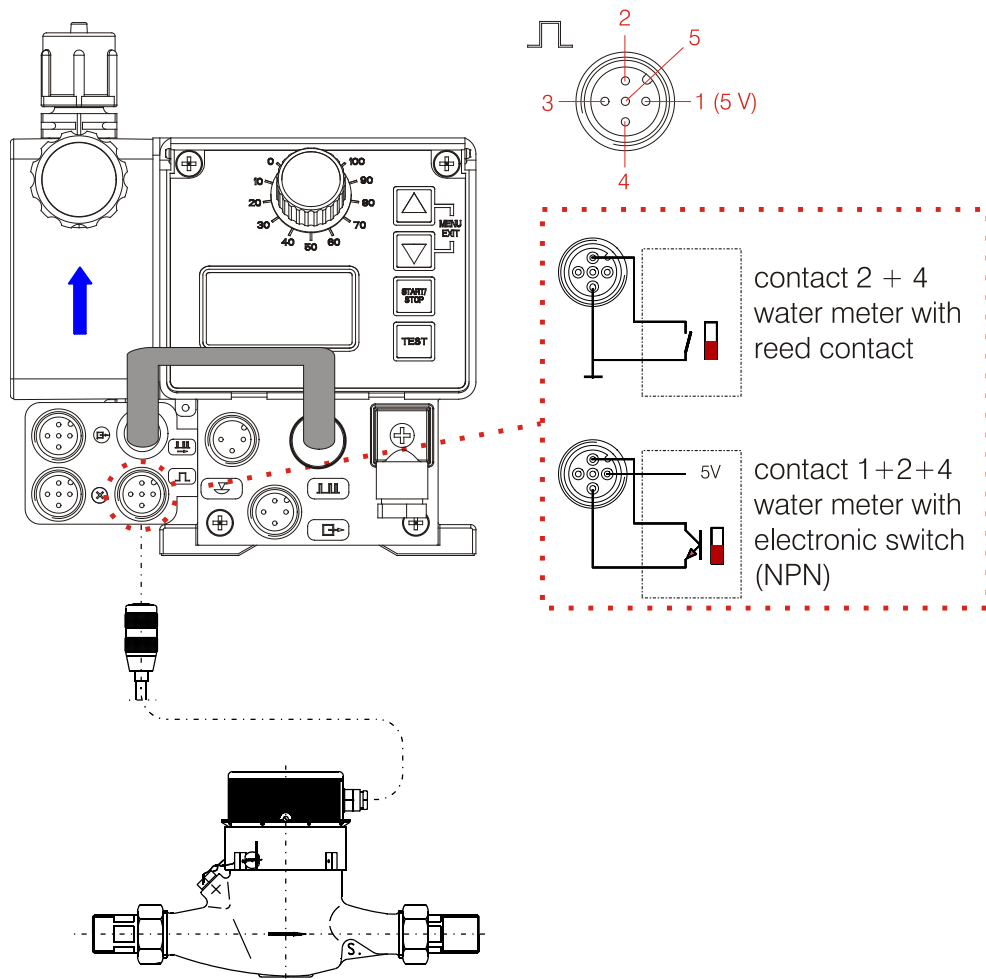
2.8.2.8 Installing the Metering Lock



2.8.2.9 Installing the Standard Signal Input (mA)









2.8.2.10 Installing the Pulse Control (Water Meter)



2.9 Startup

2.9.1 Key Functions

Key	Description
  <div style="position: absolute; left: 398px; top: 215px; font-size: 8px;">MENU EXIT</div>	<ul style="list-style-type: none"> - MENU/EXIT function entry and exiting of the menu levels  - Modify set values upwards  - Modify set values downwards
	<ul style="list-style-type: none"> - Start the pump - Stop the pump - Confirmation key (ENTER) for set values
	<ul style="list-style-type: none"> - Test function (endurance test)

2.9.2 Initial Startup / Delivery Status

In the as-delivered condition, the pump is configured as follows.

Operation mode: Internal

Stroke frequency: 122 strokes/min. (max. at 50 Hz) or 146 strokes/min. (max. at 60 Hz)

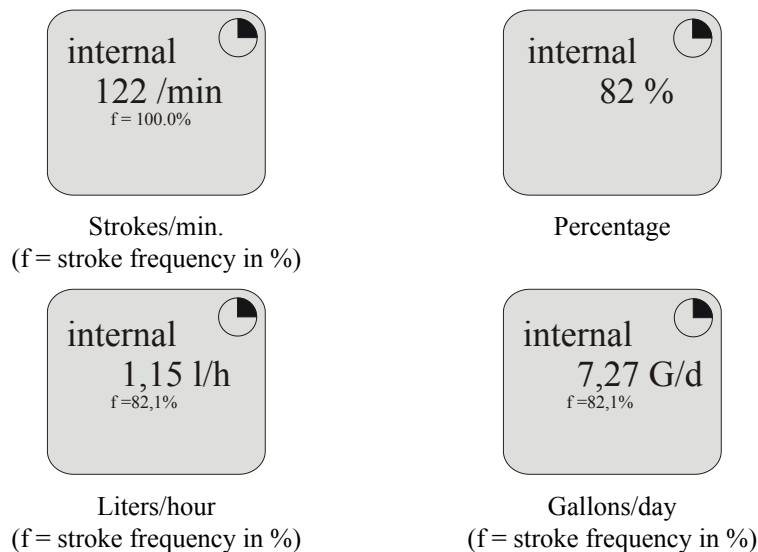
Status: pump in the "Standby" operating state

NOTE: To change the preconfigured factory settings, observe the corresponding menu items in section 2.10.4 "Configuration".

2.10 Menu Description

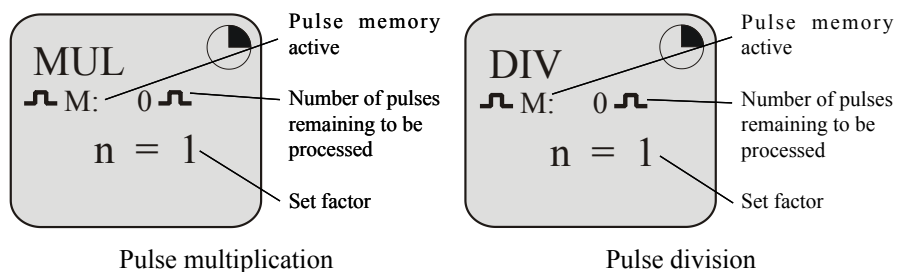
2.10.1 Indicators in Operation Modes

2.10.1.1 Indicators in "Internal" Operation Mode

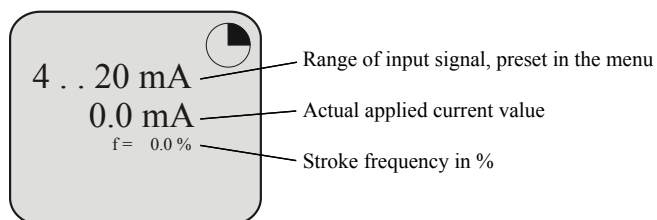


With each stroke of the pump, the indicator in the upper right of the display rotates 1 turn.

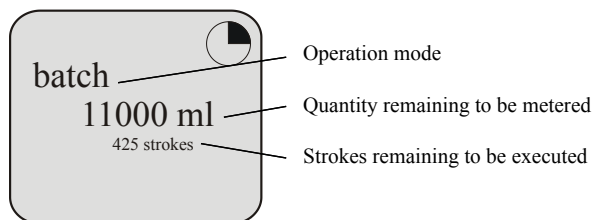
2.10.1.2 Indicators in "External Pulse Processing" Operation Mode



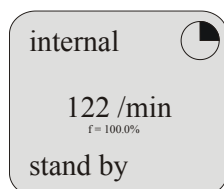
2.10.1.3 Indicators in "External Signal Control" Operation Mode



2.10.1.4 Indicators in "Batch Operation" Operation State



2.10.1.5 Indicator in the "Standby" Operation State



In the as-delivered state, the pump is configured such that, after the application of the power supply, it switches to "Standby" status.

To start the pump, the Start/Stop key must be pressed.

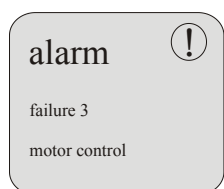
2.10.1.6 Switching Off the Pump

By pressing longer on the START/STOP key (approx. 5 sec.), the pump is switched off. The display goes off.

2.10.1.7 Switching the Pump Back On

By pressing longer on the START/STOP key (min. 2 sec.), the pump is switched back on again. The pump switches to "Standby" status.

2.10.1.8 Indicator in the "Alarm" Operating State



When an alarm occurs, a fault code is shown.

Example: failure 3 - motor control; and the entire display starts flashing.

An error table and troubleshooting of possible errors that may arise can be found in section 4.5.

2.10.2 Main Menu Level (Mode Section)

NOTE: To access the main menu, it is not necessary to interrupt the running operation of the pump. The menu management is active in all operation modes.

Press the key function "MENU/EXIT" (press the Up and Down keys simultaneously).

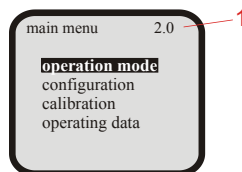
The operation mode menu which appears is divided into: operation mode, configuration, calibration and operating data.

The respective menu item can be brought up by pressing the Up or Down key.

The selected menu item is highlighted by a black background marking.

By pressing the START/STOP key, the submenu of the select main menu item is reached, and once there the corresponding settings can be made.

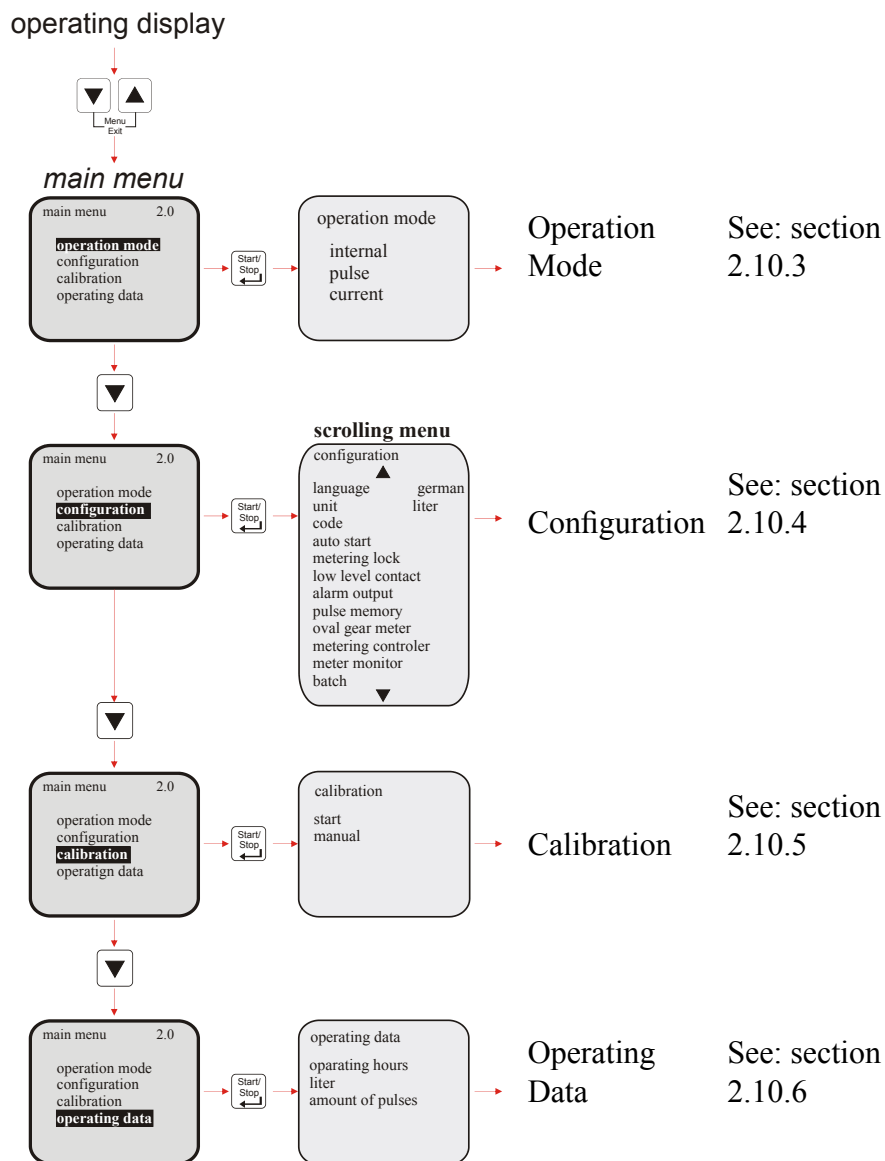
2.10.2.2 Displaying the Current Software Version



In the main menu, the current software version is displayed in the upper right corner (Pos. 1).

2.10.2.3 "Main Menu" Overview

During the running operation, the main menu can be brought up. The main menu is reached as described in section 2.9.1 by simultaneously pressing the "Up" and "Down" keys.



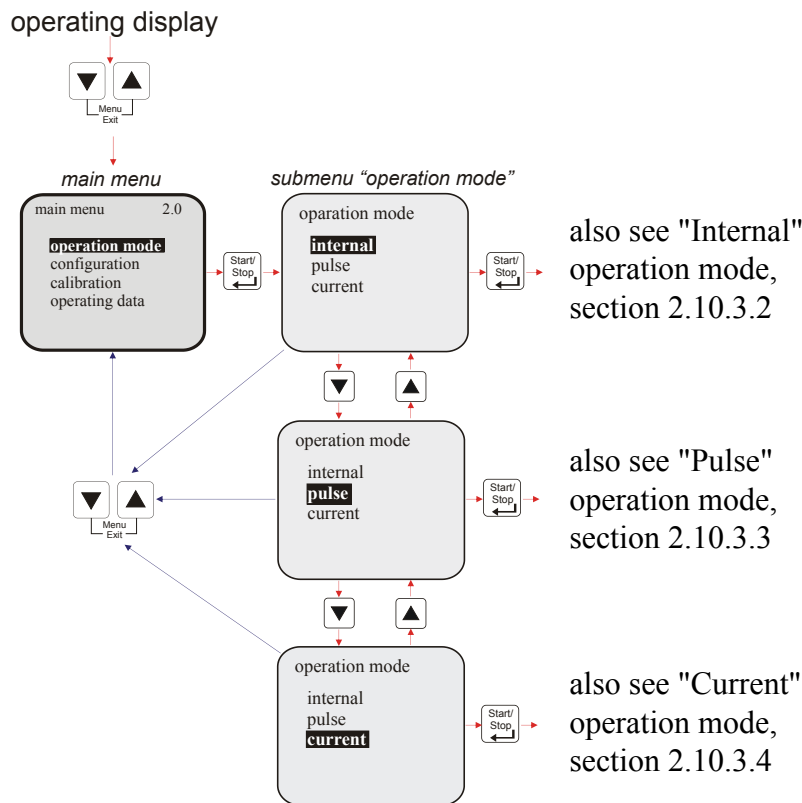
2.10.2.4 Exiting the Main Menu

Press the key function "MENU/EXIT"

The pump continues working in the currently set mode or applies possible changes to the settings and then continues working.

2.10.3 Operation Mode

2.10.3.1 Overview / Entry



- Press the key function "MENU/EXIT".
- Press the START/STOP key.

The operation mode menu which appears is divided into: internal, pulse and current. By pressing the Up or Down keys, one of these submenus can be selected.

2.10.3.1.1 Exiting the "Operation Mode" Menu

To switch from the operation mode menu back to the main menu, proceed as follows:

- Press the key function "MENU/EXIT".

The display switches back to the main menu. To return to the operation level (running operation):

- Press the key function "MENU/EXIT" once again.

- Select the desired indicator using the Up or Down key.
- Press the START/STOP key.

The setting is applied immediately and the pump returns to the main menu.

- Press the key function "MENU/EXIT".

The display shows the current or recently set operation mode.

During the operation of the pump, the set "Internal mode" (strokes/min, percentage or liters or gallons) is now displayed. (See section 2.10.1)

NOTE: To achieve the most accurate delivery rate possible, the pump must be recalibrated according to the new conditions of use (see section 2.10.5).

The pumps are tested and preset with water at 20°C.

For a display in liters/hr or gallons/hr, the local conditions of use (medium, backpressure, hose diameter) must be considered.

2.10.3.2.2 Exiting the "Internal" Menu

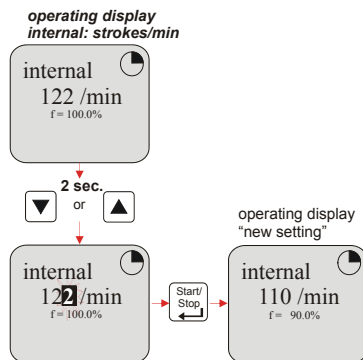
To switch from the "Internal" operation mode menu back to the main menu, proceed as follows:

- Press the key function "MENU/EXIT".

The display switches back to the main menu. To return to the operating level (running operation):

- Press the key function "MENU/EXIT" once again.

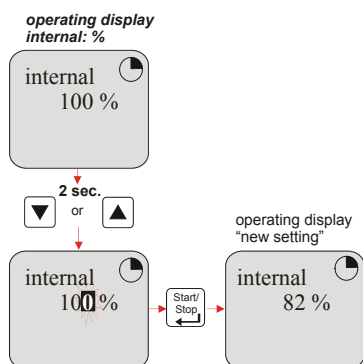
2.10.3.2.3 Setting



During running operation, the stroke frequency can be set in internal mode.

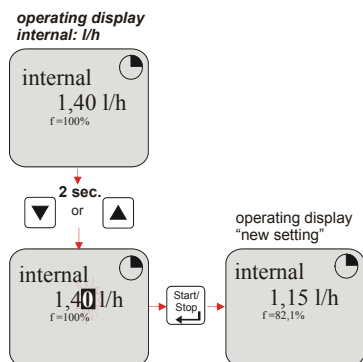
Regardless of whether the currently running operation is in the mode strokes/min, %, l/hr or gallons/day, the adjustment is performed as follows:

- Keep the Up or Down keys pressed down for min. 2 seconds.



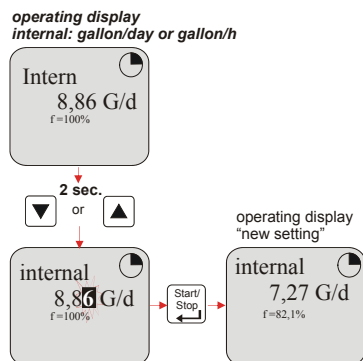
The last digit of the value shown on the display flashes with a black bar. The value can now be set individually.

- Press the Up key to increase the value, or press the Down key to reduce the value.
- Set the required value.
- Press the START/STOP key.



The value set is immediately applied to the running operation.

NOTE: If the newly set value is not confirmed within 10 seconds by pressing the START/STOP key, the system reverts to the previously set running value.



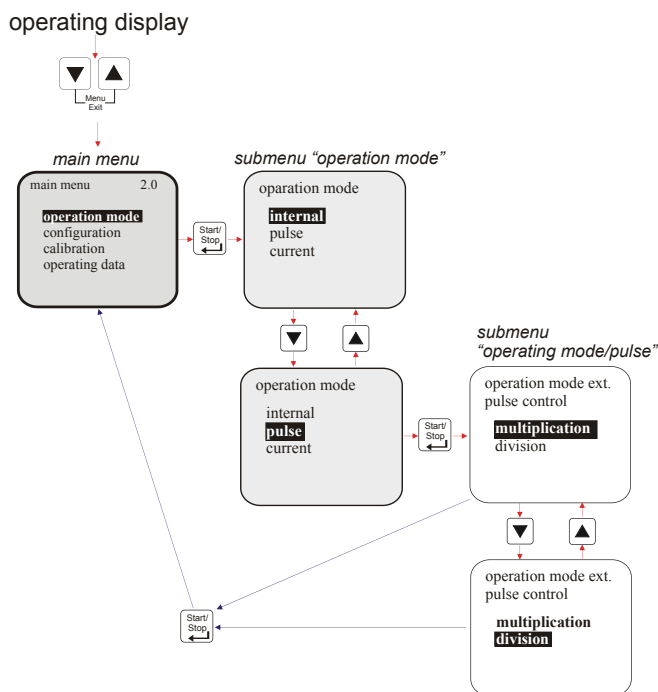
2.10.3.3 Operation Mode: Pulse

Incoming pulses are converted into metering strokes via pulse multiplication or pulse division. Both reed switches (mechanical switches) and also Hall elements (electronic switches) can be used as pulse generators.

In pulse multiplication, each incoming pulse is converted into “n” (set factor) metering strokes.

In pulse division, “n” (set factor) incoming pulses are converted into one metering stroke.

2.10.3.3.1 Selecting



- Press the key function "MENU/EXIT".

The main menu appears with the "operation mode" menu item highlighted.

- Press the START/STOP key.

The operation mode menu which appears is divided into: internal, pulse and current.

- Select the "Pulse" operation mode using the Up or Down key.

- Press the START/STOP key.

The “Pulse operation mode“ submenu appears and offers the following selection:

- Multiplication
- Division

Select the desired indicator using the Up or Down key.

- Press the START/STOP key.

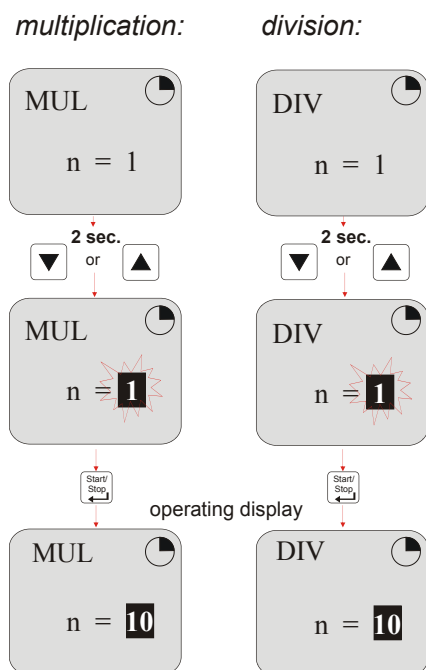
The setting is applied immediately and the view returns to the main menu.

- Press the key function "MENU/EXIT".

The display switches to the newly set operation mode.

In the pulse operation setting mode, the new factor (n) can be selected.
(See section 2.10.3.3.2)

2.10.3.3.2 Setting



After the “pulse” operation mode has been selected, (see section 2.10.3.3.1), the pump switches to the respective operation mode (multiplication /division). To change the factor, proceed as follows:

- With the Up or Down key (held down for min. 2 seconds), select the factor (n).

The factor to be set starts flashing.

- Set the factor (n) as desired using the Up or Down key.

The factor can be set to a value between 1 and 9999.

- Press the START/STOP key.

The set number is applied and the pump switches to the operation mode.

The set factor is now shown on the display and is processed simultaneously.

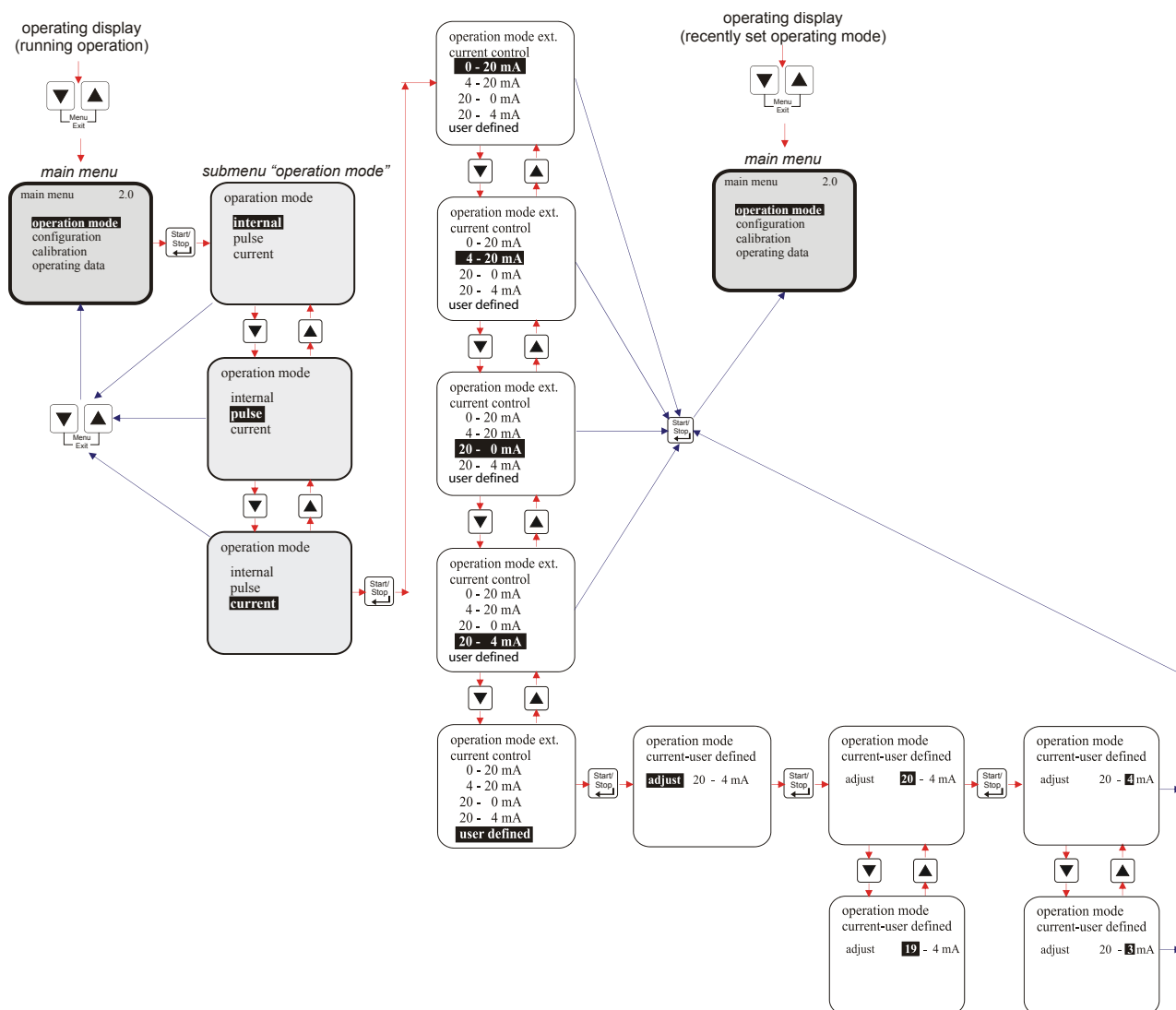
NOTE: If the newly set value is not confirmed within 10 seconds by pressing the START/STOP key, the system reverts to the previously set running value.

2.10.3.4 Power Operation Mode (External Standard Signal)

The incoming standard signal (0/4-20 mA; 20-0/4 mA or adjustable) is converted into a metering frequency 0-100 % (stroke/pause ratio), e.g.:

4 mA	=	0	strokes/min (0 %)
20 mA	=	122	strokes/min at 50 Hz (100 %)
		146	strokes/min at 60 Hz (100 %)

2.10.3.4.1 Selecting / Setting



- Press the key function "MENU/EXIT".

The main menu appears with the "operation mode" menu item highlighted.

- Press the START/STOP key.

The operation mode menu which appears is divided into: internal, pulse and current.

- Select the "Current" operation mode using the Up or Down key.
- Press the START/STOP key.

The “Current operation mode“ submenu appears and offers the following selection:

- 0 - 20 mA
- 4 - 20 mA
- 20 - 0 mA
- 20 - 4 mA
- user-defined

Directly selectable current ranges:

- 0 - 20 mA
- 4 - 20 mA
- 20 - 0 mA
- 20 - 4 mA

can be selected directly.

- Select the desired function using the Up or Down key.
- Press the START/STOP key.

The display switches to the main menu, and the function is applied.

"User-defined" settings:

For a spread of the standard signal, the menu item “user-defined” is provided.

NOTE: The difference in the set values must be greater than or equal to 5. If the difference is less than 5, the setting procedure must be repeated/corrected.

- Select the “user-defined” function using the Up or Down key.
- Press the START/STOP key.

The setting display appears and the “set” menu item is highlighted.

- Press the START/STOP key.

The cursor jumps to the first value and shows it highlighted. The values can be set as follows:

1. adjust preset value:

- Adjust the value using the Up or Down key.
- Press the START/STOP key.

The set value is confirmed and the second value is automatically selected (highlighted).

- Adjust the second value using the Up or Down key.
- Press the START/STOP key.

The setting is applied immediately and the view returns to the main menu.

2. Confirm the set values:

- Press the START/STOP key.

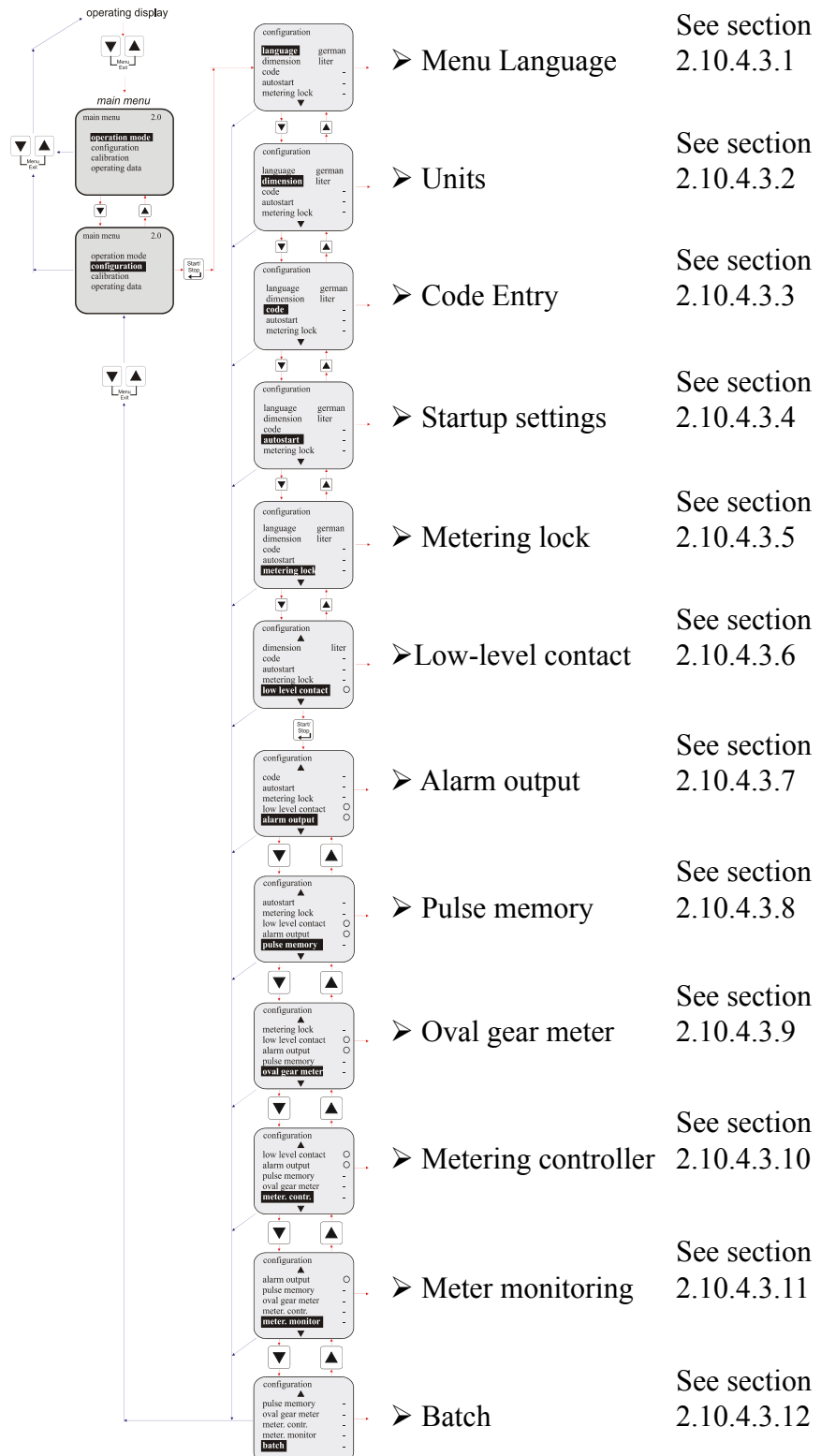
The set value is confirmed and the second value is automatically selected (highlighted).

- Press the START/STOP key.

The displayed value is confirmed and the settings are applied. The pump returns to the main menu.

2.10.4 Configuration

2.10.4.1 Overview



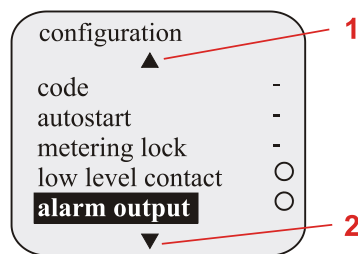
2.10.4.2 Addressing and "Scrolling the Display"

- Press the key function "MENU/EXIT" (press the Up and Down keys simultaneously).

The main menu appears with the "operation mode" menu item highlighted.

- Select "Configuration" using the Up or Down key.
- Press the START/STOP key.

The configuration menu appears on the display. By pressing the "Up" or "Down" keys, the desired menu item can be selected.



The display possesses a "scroll function", i.e. some menu items are only shown on the display when the end of the menu is reached on the display.

Using the symbols ▲ (1) or ▼ (2) on the display, you can see which direction you can scroll in.

1 = scroll the display upwards

2 = scroll the display downwards

2.10.4.3 Exiting the Configuration Menu

Regardless of which setting level or page you are on, the configuration menu can be exited as follows:

- Press the key function "MENU/EXIT"

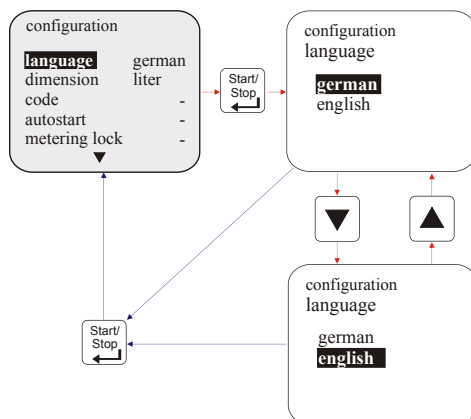
The main menu appears on the display.

- Press the key function "MENU/EXIT"

The pump returns to the current operation mode and shows this on the operating indicator.

2.10.4.3.1 Configuring the "Language"

This configuration permits the selection of either German or English as the menu language. The configuration menu is selected as described in section 2.10.4.2.



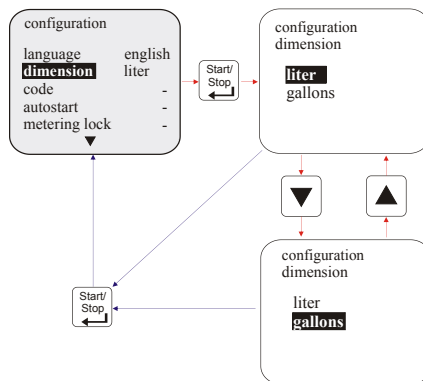
- Select “Language” using the Up or Down key.
- Press the START/STOP key.

The “Language” submenu appears and offers the following selection:

- German
- English
- Select the desired language using the Up or Down key.
- Press the START/STOP key.

The new language setting is applied immediately and the view returns to the configuration menu.

2.10.4.3.2 Configuring the "Units"



Here the display of quantities and units (liters / gallons) can be set. This setting has repercussions on the display in Internal operation, the setting of the quantity in the calibration and batch and also the consumption indicator. The configuration menu is selected as described in section 2.10.4.2.

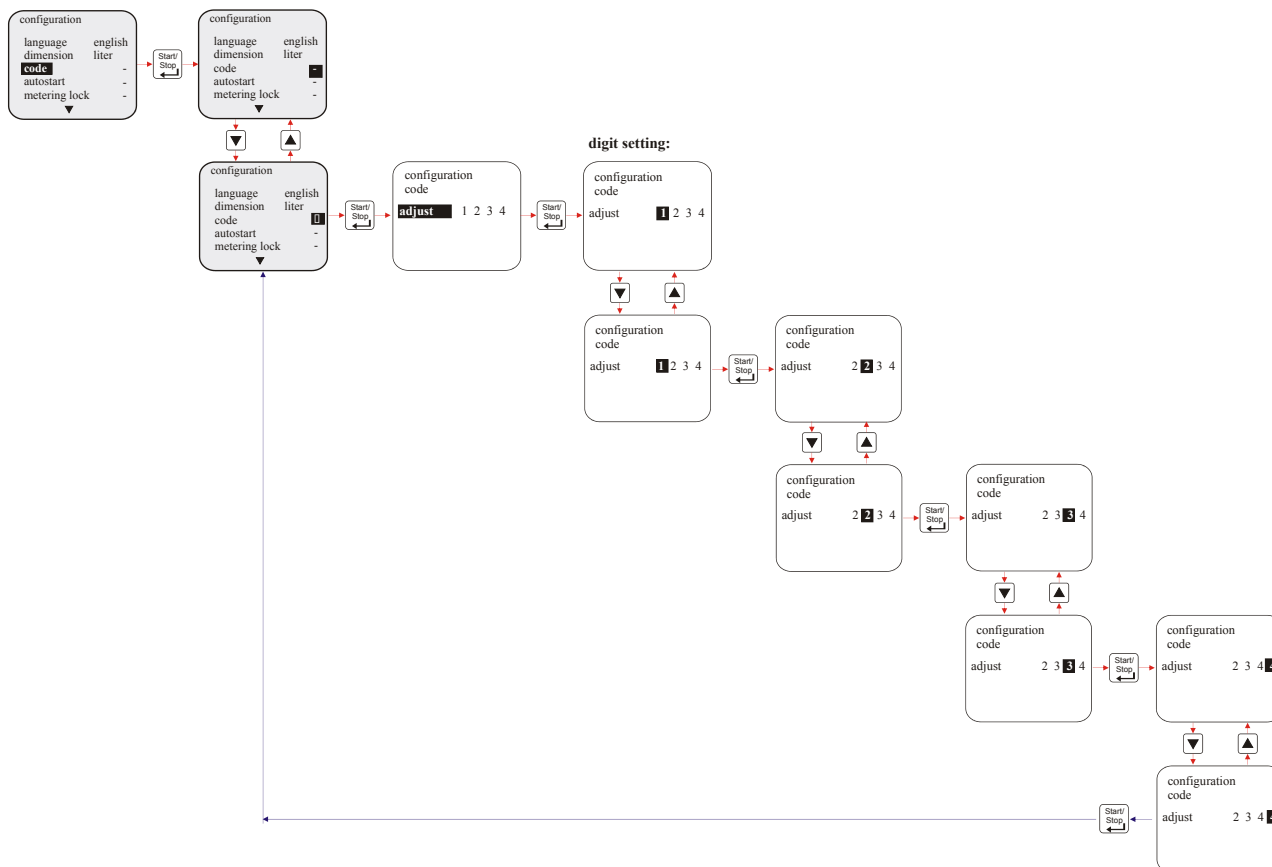
- Select “Unit” using the Up or Down key.
- Press the START/STOP key.

The “Unit” submenu appears and offers the following selection:

- Liters
- Gallons
- Select the desired unit using the Up or Down key.
- Press the START/STOP key.

The setting is applied immediately and the view returns to the configuration menu.

2.10.4.3.3 Configuring the "Security Code"



With this setting, a four-digit number combination can be assigned to secure the configuration settings against unauthorized adjustment. The configuration menu is selected as described in section 2.10.4.2.

- Select “Code” using the Up or Down key.
- Press the START/STOP key.

The selection jumps to the right-hand symbol:

- = Code function is inactive = no code request when making settings in the configuration

✓ = Code function is active = code request during all setting modifications of the pump

- Select the desired function using the Up or Down key. (active / inactive)
- Press the START/STOP key.

The settings menu appears and the “Set” menu item is highlighted.

- Press the START/STOP key.

The first digit of the four-figure code entry is marked and can now be adjusted.

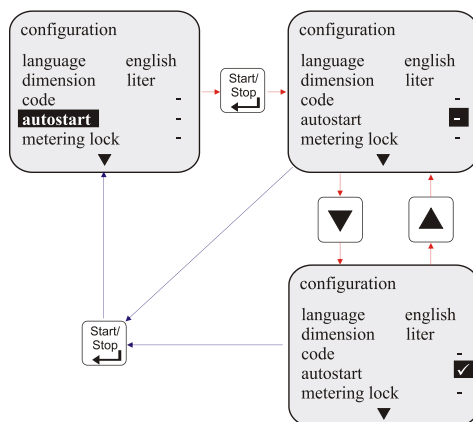
- Select the desired digit using the Up or Down key.
- Press the START/STOP key.

The digit is set and the cursor jumps to the second digit.

Repeat the above procedure up to the fourth digit.

The screen then jumps back to the configuration menu again. If the code request is activated, the four-digit code must be entered when changing the setting values and modifying all of the points described under “Configuration”.

2.10.4.3.4 Configuring the "Autostart"



This option affects the startup behaviour of the pump when the power supply is applied. The configuration menu is selected as described in section 2.10.4.2.

- Select “autostart” using the Up or Down key.
- Press the START/STOP key.

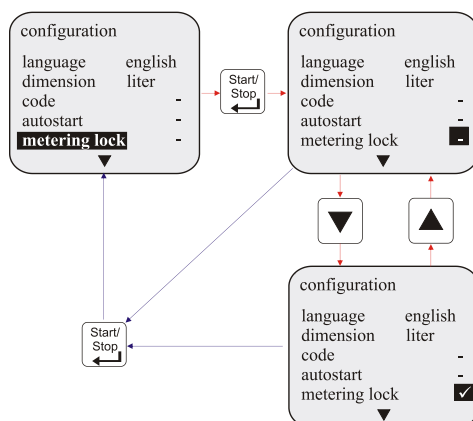
The selection jumps to the right-hand symbol:

- = autostart is inactive. When the power supply is applied, the pump always enters the "Standby" operating function.
- ✓ = autostart is active. When the power supply is reapplied, after a power outage, the pump reverts to the previously current operating state.
- Select the desired function using the Up or Down key. (active / inactive)
- Press the START/STOP key.

The setting is applied immediately and the view returns to the configuration menu.

2.10.4.3.5 Configuring the "Metering Lock"

The metering lock is used to deactivate the pump via an external signal.



This setting defines the input to the external enable of the metering operation. The input can optionally be used for metering monitoring or the batch pulse (only WITHOUT the intelligent control pack). The metering lock function is no longer active. On the E60^{Plus} pump version, the input for the metering lock is on plugs VII and VIII. (see section 2.8.2.7) The configuration menu is selected as described in section 2.10.4.2.

- Select "Metering lock" using the Up or Down key.
- Press the START/STOP key.

The selection jumps to the right-hand symbol:

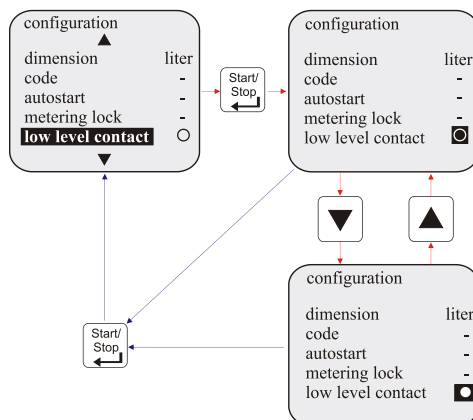
- = The operation of the metering lock is inactive.
- ✓ = The operation of the metering lock is active

- Select the desired function using the Up or Down key. (active / inactive)
- Press the START/STOP key.

The setting is applied immediately and the view returns to the configuration menu.

2.10.4.3.6 Configuring the "Low-level Contact"

This option permits the functional reversal of the empty report signal of the supply tank. The configuration menu is selected as described in section 2.10.4.2.



- Select "Low-level contact" using the Up or Down key.
- Press the START/STOP key.

The selection jumps to the right-hand symbol:

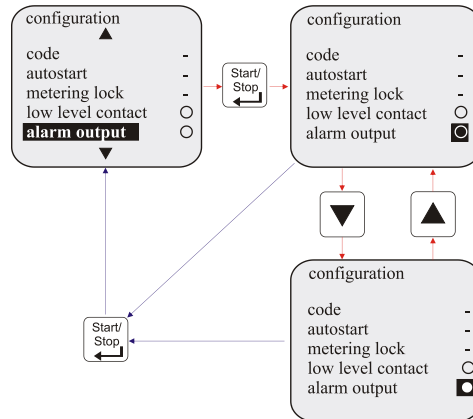
- = The contact is in the open empty state
- = The contact is in the closed empty state

- Select the desired function using the Up or Down key. (active / inactive)
- Press the START/STOP key.

The setting is applied immediately and the view returns to the configuration menu.

2.10.4.3.7 Configuring the "Alarm Output"

This option permits the inversion of the alarm output. To invert the alarm output, change jumper position according to section 2.7.3.1. The configuration menu is selected as described in section 2.10.4.2.



- Select "Alarm output" using the Up or Down key.
- Press the START/STOP key.

The selection jumps to the right-hand symbol:

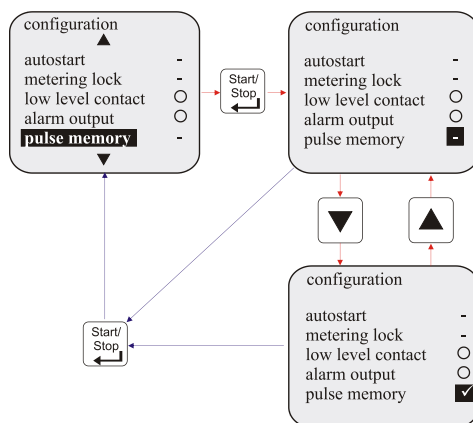
- = The alarm relay is "OFF" on alarm
- = The alarm relay is "ON" on alarm

- Select the desired function using the Up or Down key. (active / inactive)
- Press the START/STOP key.

The setting is applied immediately and the view returns to the configuration menu.

2.10.4.3.8 Configuring the "Pulse Memory"

The pulse memory permits the storing of external pulses, if the pulse rate is higher than the processed stroke rate (122 strokes/min at 50 Hz or 146 strokes/min at 60 Hz). The memory content is erased by activating the metering lock or switching off the pump. This option permits the switching on or off of the display of the pulse memory and has repercussions on the display in multiplication or division operation in external pulse processing operation mode. The configuration menu is selected as described in section 2.10.4.2.



- Select "Pulse memory" using the Up or Down key.
- Press the START/STOP key.

The selection jumps to the right-hand symbol:

- = The pulse memory is inactive
- ✓ = The pulse memory is active

- Select the desired function using the Up or Down key. (active / inactive)
- Press the START/STOP key.

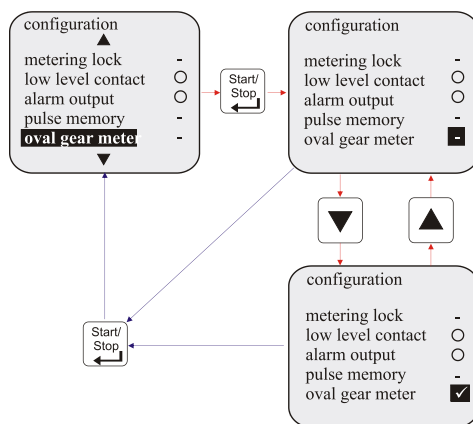
The setting is applied immediately and the view returns to the configuration menu.

2.10.4.3.9 Configuring the "Oval Gear Meter"

The oval gear meter can be used to monitor the metering quantity. If this option is used, the oval gear meter must be activated before calibrating the pump.

NOTE: With activation of oval gear function and a calibration with oval gear meter, the actual metered quantity is indicated in the operating data (liters/gallons).

With the setting oval gear meter -> (yes), the number of incoming pulses of the oval gear meter is displayed during the calibration. The accumulated pulses during the calibration process are the measure for evaluating the monitoring threshold. The configuration menu is selected as described in section 2.10.4.2.



- Select "Oval gear meter" using the Up or Down key.
- Press the START/STOP key.

The selection jumps to the right-hand symbol:

- = The oval gear meter is inactive
- ✓ = The oval gear meter is active

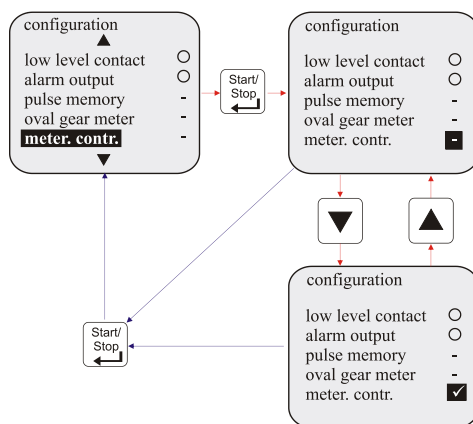
- Select the desired function using the Up or Down key. (active / inactive)
- Press the START/STOP key.

The setting is applied immediately and the view returns to the configuration menu.

2.10.4.3.10 Configuring the "Metering Controller"

(Only on E60^{Plus} with oval gear meter, type OGM^{PLUS}. Available with software version 3.1 and later.)

When the metering controller is activated, the metering output is readjusted within the performance thresholds of the pump, i.e. if it is not possible to reach the set delivery rate due to external influences, then the metering output is automatically increased until the desired discharge flow is reached. The configuration menu is selected as described in section 2.10.4.2.



- Select "Controller function" using the Up or Down key.
- Press the START/STOP key.

The selection jumps to the right-hand symbol:

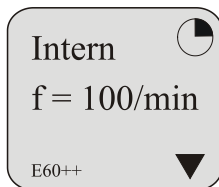
- = The controller function is inactive
- ✓ = The controller function is active

- Select the desired function using the Up or Down key. (active / inactive)
- Press the START/STOP key.

The setting is applied immediately and the view returns to the configuration menu.

NOTE: The metering controller function can only be activated if the pump is upgraded with an intelligent control pack (ICP) to the E60^{Plus} and an oval gear meter, type OGM^{PLUS} (see Accessories) is connected. To activate the intelligent control pack (ICP) in connection with the oval gear meter, the power supply has to be switched off and on again!

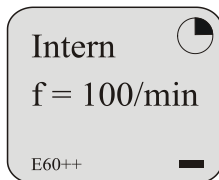
2.10.4.3.10.1 Indicators in the Operating Mode



▼ = Downward metering divergence

The pump is currently delivering less than the preset stroke frequency (here 100/min for example) requires.

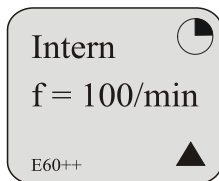
Metering frequency is increased automatically until the actual value matches the target value.



- = No metering divergence

The pump delivers exactly the preset flow (here 100/min for example).

No correction is necessary.



▲ = Upward metering divergence

The pump is currently delivering more than the preset stroke frequency (here 100/min for example) requires.

Metering frequency is reduced automatically until the actual value matches the target value.

NOTE:

indication for:

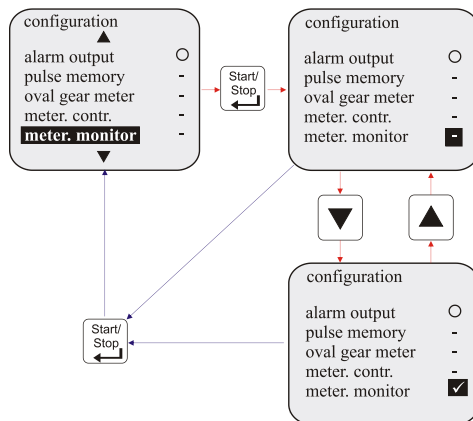
Intelligent Control Pack (ICP)

E60++

Oval Gear Meter OGM^{PLUS} mounted

2.10.4.3.11 Configuring the "Flow Monitoring"

The configuration menu is selected as described in section 2.10.4.2.



- Select "Metering monitor" using the Up or Down key.
- Press the START/STOP key.

The selection jumps to the right-hand symbol:

- = Metering monitoring is inactive
- ✓ = Metering monitoring is active

- Select the desired function using the Up or Down key. (active / inactive)
- Press the START/STOP key.

If metering monitoring was activated (✓) in the "Metering monitoring configuration", the display switches to the metering monitoring configuration menu.

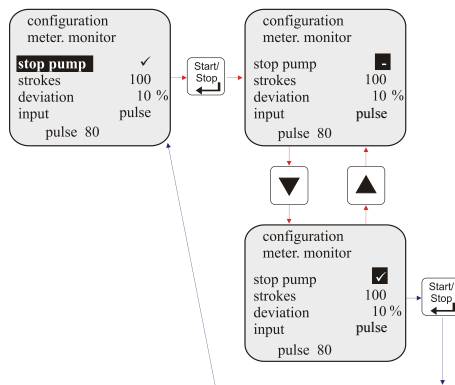
Here the following menu items can be selected:

- Stop pump (see section 2.10.4.3.11.1)
- Strokes (see section 2.10.4.3.11.2)
- Deviation (see section 2.10.4.3.11.3)
- Input (see section 2.10.4.3.11.5)

If metering monitoring is not activated, or has been deactivated (-), then the display jumps back to the configuration

2.10.4.3.11.1 "Stop Pump" Configuration Setting

After metering monitoring has been activated (✓), as described in section 2.10.4.3.11, the configuration settings can be brought up.



- Select “Stop pump” using the Up or Down key.
- Press the START/STOP key.

The selection jumps to the right-hand symbol:

- = The pump is not stopped if the metering monitoring responds.
- ✓ = The pump is stopped if the metering monitoring responds

- Select the desired function using the Up or Down key. (active / inactive)
- Press the START/STOP key.

The setting is applied immediately and the view returns to the configuration menu.

2.10.4.3.11.2 "Strokes" Configuration Setting

The “Strokes” option provides the number of strokes to be monitored.

The oval gear meter pulses are summed up over the number of strokes. Then the summed pulses are compared in a ratio to the anticipated pulses (determined by the calibration). If the deviation is larger than the adjusted percentage, then an alarm is triggered (flow rate).

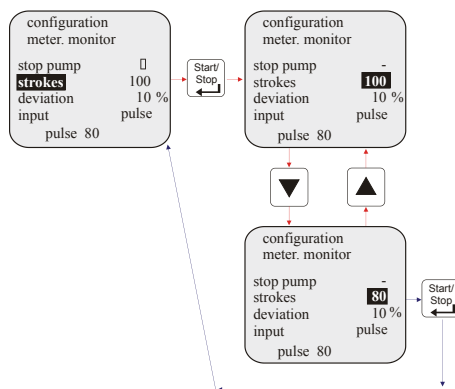
It is recommended to keep the number of strokes to be monitored at a higher setting to prevent a false alarm condition.

Example:

1. If the stroke setting is at 100 strokes and the set flow is not achieved after completing 100 strokes, then the alarm is triggered.
2. If the stroke setting is set at 20 strokes and the flow is not achieved after completing 20 strokes, then the alarm is triggered.

Thus keeping this number higher is recommended to limit the possibility of a false alarm condition.

After metering monitoring has been activated (✓), as described in section 2.10.4.3.11, the configuration settings can be brought up.



- Select “Strokes” using the Up or Down key.
- Press the START/STOP key.

The selection jumps to the right-hand block of numbers.

- Set the desired number of strokes using the Up or Down key
- Press the START/STOP key.

The setting is applied immediately and the view returns to the configuration menu.

2.10.4.3.11.3 "Deviation" Configuration Setting

(Only on the E60^{Plus} WITH Intelligent Control Pack - ICP)

The deviation setting is the allowable +/- % deviation with regards to the maximum calibrated flow rate.

Example:

If the pump capacity is calibrated for 5 GPH and deviation is set at 80%, this means that when the flow drops below 1 GPH, alarm will be triggered.

5 GPH X 80% = 4 GPH acceptable deviation. Alarm is triggered at 1 GPH, (5 GPH - 4 GPH = 1 GPH).

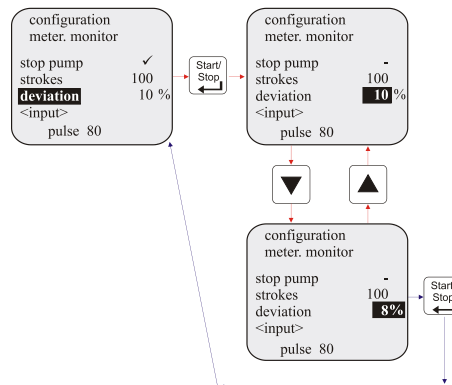
Likewise, if the pump had the capacity to increase above 9 GPH, alarm will be triggered (5 GPH + 4 GPH = 9 GPH).

A higher deviation percentage setting is desirable for preventing false alarms.

In the above example, if the stroke setting is "80 strokes" and "80% deviation", alarm will be triggered at 1 GPH or 9 GPH after completing 80 strokes.

Combination of "# of strokes" and "% deviation" should be used to adjust the sensitivity of flow monitoring to suit local installed conditions.

After metering monitoring has been activated (✓), as described in section 2.10.4.3.11, the configuration settings can be brought up.



- Select “Deviation” using the Up or Down key.

The “Deviation“ option indicates the adjustable pulse tolerance in %.

- Press the START/STOP key.

The selection jumps to the right-hand block of numbers.

- Select the desired number of strokes using the Up or Down key.
- Press the START/STOP key.

The setting is applied immediately and the view returns to the configuration menu.

2.10.4.3.11.4 Displaying the Oval Gear Meter Pulse

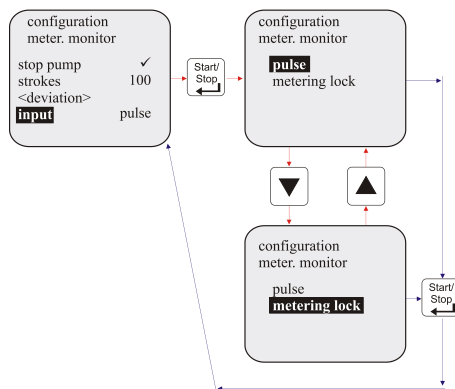
(Only on E60^{Plus} Models)

Here the number of oval gear meter pulses accumulated in the last calibration process is displayed. If the value here is less than 60, then metering monitoring with the oval gear meter is only possible to a limited extent; see also the note in section 2.10.5.3.

2.10.4.3.11.5 "Input" Configuration Setting

(Only on the E60 WITHOUT Intelligent Control Pack - ICP)

After metering monitoring has been activated (✓), as described in section 2.10.4.3.11, the configuration settings can be brought up.



- Select “Input” using the Up or Down key.

The “Input” option defines the input connection of the flow rate control (pulse input / metering lock).

- Press the START/STOP key.

The display switches to “Configuration: Metering monitoring - input”

The following selection can be made:

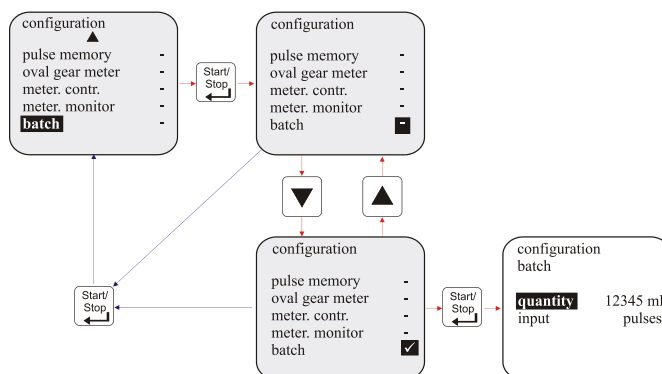
- pulse
- metering lock
- Select the desired input connection using the Up or Down key.
- Press the START/STOP key.

The setting is applied immediately and the view returns to the configuration menu.

2.10.4.3.12 "Batch" Configuration

NOTE: The pump must be calibrated before using batch metering (see section 2.10.5).

When activating batch mode with a signal to the metering lock/pulse input, a previously defined quantity is metered with 100% stroke frequency. The batch metering can be interrupted by activating the metering lock or switching off the pump. On the E60^{Plus} pump version, the input for batch metering is on plug VII. (see section 2.8.2.3) The configuration menu is selected as described in section 2.10.4.2.



- Select "Batch" using the Up or Down key.
- Press the START/STOP key.

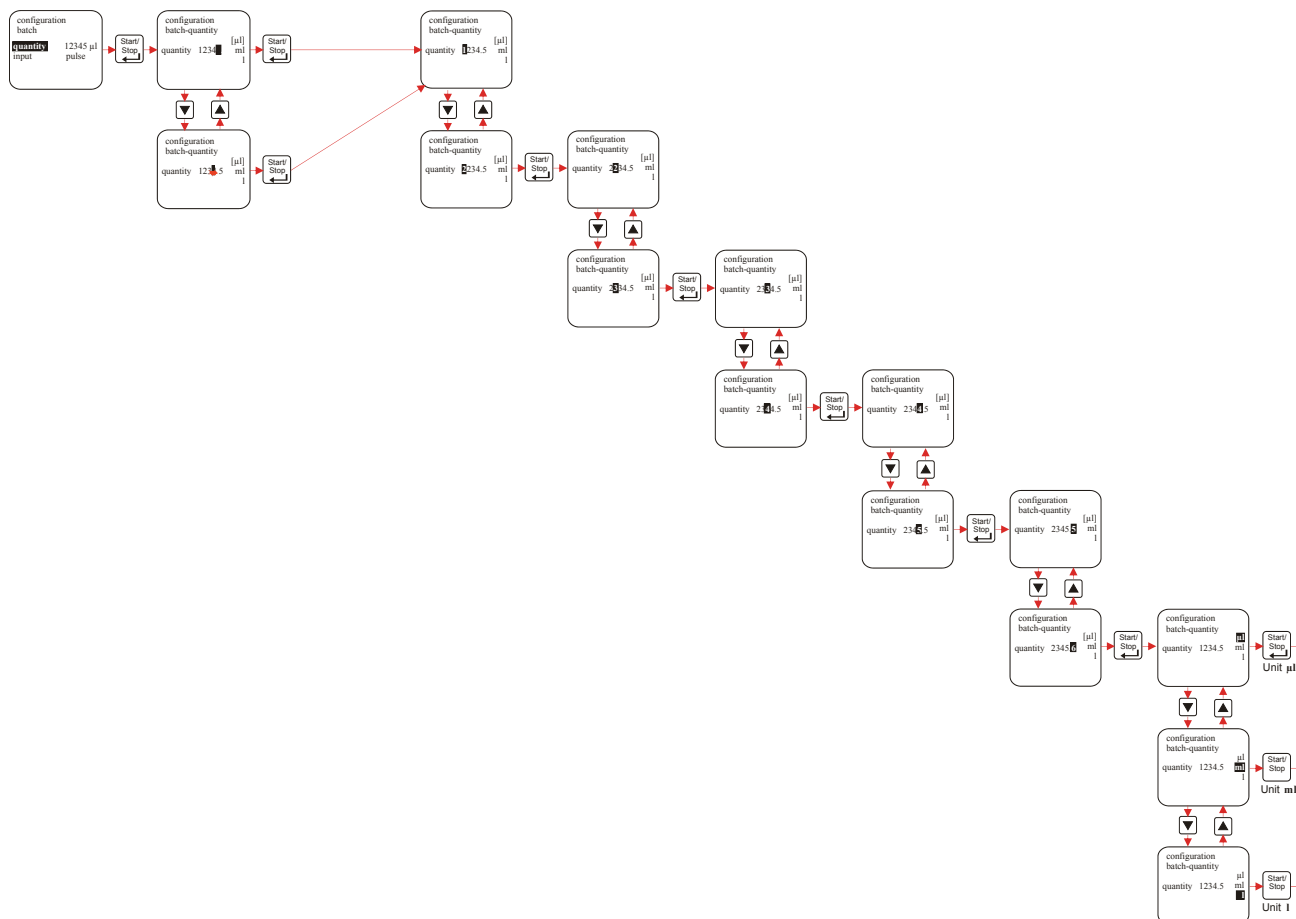
The selection jumps to the right-hand symbol:

- = batch is inactive
- ✓ = batch is active

- Select the desired function using the Up or Down key.
- Press the START/STOP key.

The "Batch" submenu appears and offers the following selection:

- Quantity (see section 2.10.4.3.12.1)
- Input (see section 2.10.4.3.12.2)



- Move the comma using the Up or Down key.
(depending on the output size of the desired quantity)
- Press the START/STOP key.

The comma is set and the first digit is highlighted.

- Set the first digit using the Up or Down key.
- Press the START/STOP key.

The first digit is set, and the second digit is highlighted.

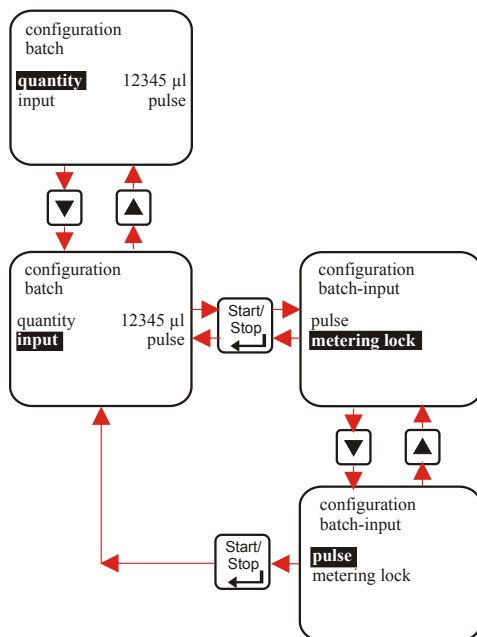
In this way, set all the digits. Once the last digit has been set, the cursor jumps to the units shown on the right of the display (µl/ml/l/G).

- Select the desired unit using the Up or Down key.
- Press the START/STOP key.

The unit is applied and the view returns to the batch configuration.

2.10.4.3.12.2 "Input" Batch Configuration (E60)

As the batch pulse input, either the input of the metering lock or the pulse input can be selected. (The respective primary function thus is no longer possible: see section 2.10.4.3.12.3). The configuration menu is selected as described in section 2.10.4.3.12.



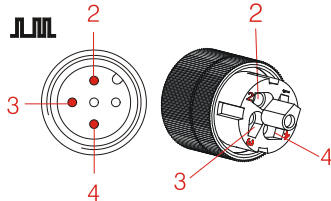
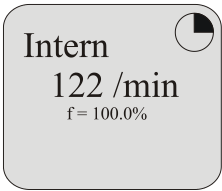
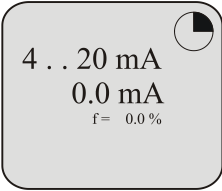
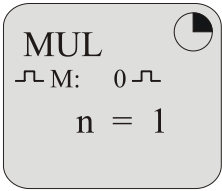
- Select “Input” using the Up or Down key.
- Press the START/STOP key.

The display switches to the batch input menu.

- Select the desired function using the Up or Down key. (metering lock / pulse)
- Press the START/STOP key.

The input function is applied immediately and the pump returns to the batch configuration.

2.10.4.3.12.3 Input / Function Table (E60)

Connector assignments:			
Operation mode	Metering lock (Menu see 2.10.4.3.5)	Metering monitoring (input) (Menu see 2.10.4.3.11)	Batch (Input) (Menu see 2.10.4.3.12)
Internal: 	metering lock <input type="checkbox"/>	Pin (2 + GND 4)	Pin (3 + GND 4)
	(inactive)	Pin (3 + GND 4)	Pin (2 + GND 4)
	metering lock <input checked="" type="checkbox"/>	Pin (2 + GND 4)	not possible
	(active)	not possible	Pin (2 + GND 4)
External current: 	metering lock <input type="checkbox"/>	Pin (2 + GND 4)	Pin (3 + GND 4)
	(inactive)	Pin (3 + GND 4)	Pin (2 + GND 4)
	metering lock <input checked="" type="checkbox"/>	Pin (2 + GND 4)	not possible
	(active)	not possible	Pin (2 + GND 4)
External pulse 	metering lock <input type="checkbox"/>	Pin (3 + GND 4)	not possible
	(inactive)	not possible	Pin (3 + GND 4)
	metering lock <input checked="" type="checkbox"/>	not possible	not possible
	(active)	not possible	not possible

2.10.5 Calibration

NOTE: The metering pump must only be calibrated after the hydraulic installation has been completed.

The system must be vented. (Venting see section 4.4.2)

The system pressure must be created.

If monitoring with an oval gear meter is performed, then the oval gear meter must be activated before calibration.



CAUTION: Particular caution is required when handling chemical metering media! Always observe the product data sheet of the metering mediums to prevent chemical reactions and injury!

- Fill the metering medium into the measuring cylinder up to the maximum mark.

NOTE: The maximum volume of the measuring cylinder must not exceed 1/50 of the metering pump output.

- Start the calibration menu:

NOTE: During this process, the suction tube must not change its position. The calibration of the metering pump is only valid for the currently set stroke length setting. After changing the stroke length, the calibration must be performed again.

- During operation or in “Standby” status, activate the key function “MENU/EXIT“ (by pressing the Up and Down keys simultaneously).

The main menu appears and the “Operation mode” menu item is highlighted.

- Select the “Calibration” operation mode using the Up or Down key.
- Press the START/STOP key.

The pump switches to calibration mode and stops the running operation.

- Select the “Start” calibration selection using the Up or Down key.
- Press the START/STOP key.

The complete calibration needs 1 minute. In this time, the following strokes are generated: 122 Strokes / 50 Hz or 144 Strokes / 60 Hz. During this operation you can see the remaining strokes on the display.

NOTE: By activating the ‘Menu/Exit’ function, the running calibration can be interrupted.

At the end of the automatic calibration, the suctioned-off quantity (difference between the output quantity and the remaining quantity) can be entered by pressing the “Up“ or “Down“ keys.

- Move the comma using the Up or Down key.
(depending on the output size of the desired quantity)

- Press the START/STOP key.

The comma is set and the first digit is highlighted.

- Set the first digit using the Up or Down key.
- Press the START/STOP key.

The first digit is set, and the second digit is highlighted.

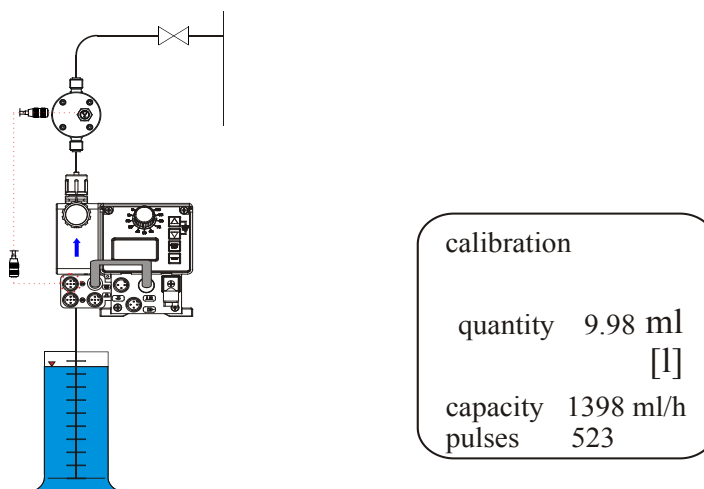
In this way, set all the digits. Once the last digit has been set, the cursor jumps to the units shown on the right of the display (ml/ or g for gallon setting).

- Select the desired unit using the Up or Down key.
- Press the START/STOP key.

The unit is applied and the view returns to the main menu.

2.10.5.3 Calibration Using an Oval Gear Meter

NOTE: Before using the oval gear meter in the calibration process, it must be activated (✓) in the menu (see section 2.10.4.3.9).



In the calibration process with an oval gear meter, the delivered oval gear meter pulses are shown.

The pulses shown are stored and are available in the operating data capture (see section 2.10.6).

At the same time, the counted pulses in the metering monitoring serve as a comparison criterion between the pulses determined here and the pulses accumulated during the metering.

If “0” pulses are shown at the end of the calibration, then the connection to the oval gear meter has been interrupted or is faulty.

In this case, check the connection or the oval gear meter and perform the calibration again.

If only pulses in the range up to 60 are shown, then metering monitoring with an oval gear meter is only possible to a limited extent or not at all.

In this case, check whether the oval gearwheels are fouled or are in some cases jamming, whether the oval-gearwheel meter is of the recommended size, or install an oval gearwheel meter with a higher pulse rate (e.g. the OGM^{PLUS} from our range of accessories).

2.10.5.3.1 Oval Gear Meter, Type OGM^{PLUS}

Using an OGM^{PLUS}, there is the possibility of performing an automatic calibration.

Once the calibration has been completed, the metering quantity is automatically set and displayed. This indicated quantity can be confirmed or modified as described in section 2.10.5.3.

2.10.5.4 "Manual" Calibration

- Press the START/STOP key.

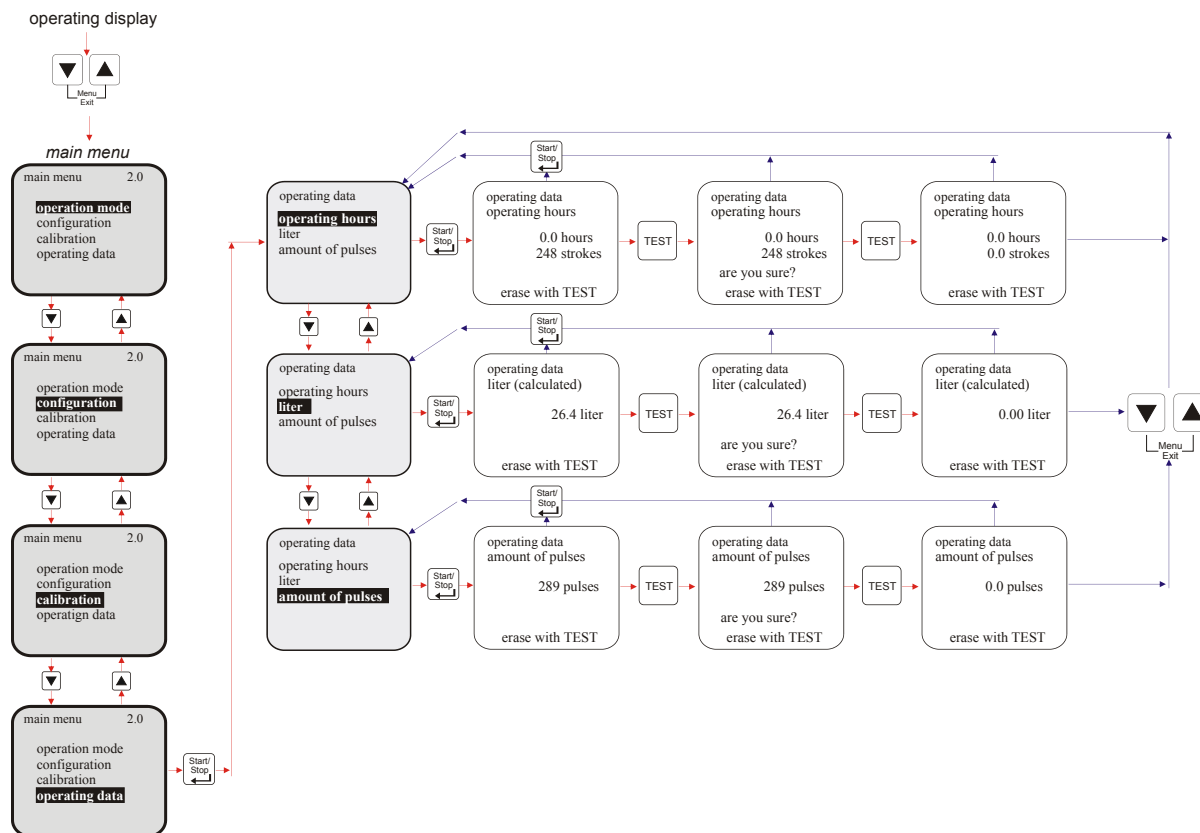
The already existing calibration data can be entered manually, without performing the calibration using a measuring cylinder, etc.

2.10.6 Operating Data

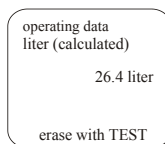
This option permits the output and resetting of the operating data:

- Operating hours
- Liters
- Number of pulses

2.10.6.1 Overview



NOTE: Since, in operation without the oval gear meter, the output in liters is calculated from the strokes, the function to delete either of these two values always has an effect on the other value.



NOTE: When using an oval gear meter, the output in liters is indicated as measured and not shown as a calculated value.

2.10.6.1.1 Selecting

- During operation or in “Standby” status, activate the key function “MENU/EXIT“ (by pressing the Up and Down keys simultaneously).

The main menu appears with the “operation mode“ menu item highlighted.

- Select the “Operating data” operation mode using the Up or Down key.
- Press the START/STOP key.

By pressing the “Up“ or “Down“ keys, the following options can be selected.

- Operating hours
- Liters
- Number of pulses

2.10.6.1.2 Selecting / Displaying / Deleting

The consumption data is selected as described in section 2.10.6.1.1.

- Select the desired data using the Up and Down keys (operating hours, liters or number of pulses).
- Press the START/STOP key.

The previously selected consumption data is displayed.

- Press the START/STOP key to return to the previous display (selection).

or

- Press the TEST key to reset the selected consumption data to zero.

After pressing the Test key, a safety question “Are you sure?“ appears.

- Press the START/STOP key to return to the selection display, without erasing the data.

or

- Press the Test key to definitively erase the selected consumption data.
- Press the START/STOP key to return to the previous selection display.
- Press the Menu/Exit function to return to the main menu.

SECTION 3 - OPERATION**List of Contents**

	PARA. NO.
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Theory of Operation.....	3.2
Capacity in Relation to Stroke Length.....	3.3

3.1 Preparation for Operation

- a. Fill the container with solution.



WARNING: TO AVOID POSSIBLE SEVERE PERSONAL INJURY, USE EXTREME CARE TO AVOID CONTACT WITH THE MATERIAL. CONSULT YOUR CHEMICAL SUPPLIER FOR INSTRUCTIONS IN THE PREPARATION OF SOLUTIONS AND THE HANDLING OF CHEMICALS.

- b. Start the pump, turn the mechanical stroke adjustment to 100% and wait until the line is primed completely as seen through the tubing. A priming valve at the side of the pump head will aid in priming. Keep the speed (stroke frequency) high and adjust the required dosage by the mechanical stroke adjustment. If the installation is flow proportional and the pump is controlled by a 4 - 20 mA signal, do the adjustment of dosage in local mode.
- c. The mechanical stroke adjustment is a knob with a notch as a pointer to read the graduation directly from 0% to 100%. Adjust only when the pump is running.

3.1.1 Metering Capability

The reproducible metering accuracy is ± 3 % of full scale over 5:1 range with the manually adjustable stroke length knob. Stroke length setting from 20 % and below is not recommended.

With the E60/E60^{Plus} or M60/M60^{Plus} control option, the frequency of the stroke can be adjusted infinitely from 0 to 144 spm (60 Hz) or 0 to 122 spm (50 Hz) in percent, strokes/minute, or GPH/LPH by pressing the up or down buttons on the front keypad. (see section 2.10.4.3.11.2)

3.1.2 Strength of Solution

Appropriate dilution of the solution will modify the concentration and therefore the feed rate. This will increase or decrease the amount of solution to be pumped per unit time. Adjusting the solution concentration can match the feed rate with the pump's capabilities and enhance the metering repeatability.

3.1.3 Calibrating the Pump

Perform the calibration on the suction side of the pump against actual back pressure. Proceed as follows when using any of the following calibration columns:

100 ML	AAC2543
250 ML	AAC2546
500 ML	AAC2549

- a. Fill up the calibration column over the “0” line.
- b. Close the suction valve and open the valve to the calibration column.
- c. Re-set the stopwatch to zero, start the pump and watch the liquid level as it goes down.
- d. As soon as the liquid level hits the “0” line, start the stopwatch.
- e. Keep an eye on the liquid level and the stopwatch.
- f. After exactly **one minute** read the graduation level.
- g. The number corresponding to the graduation is the flow in GPH or ML/MIN.

If the flow rate for one minute is too small and does not show very well in the column graduation, do the test for a longer time period. Use the ML/min graduation to get the flow. Divide it by the run time in minutes to get milliliters per minute (ML/MIN). Multiply ML/MIN by 0.01585 to get GPH.

3.2 Theory of Operation

Chem-Ad Series B is a mechanically actuated diaphragm metering pump driven by a synchronous motor. A flat diaphragm between the pump head and the pump housing moves backward and forward that produces the pumping action through two ball checks inside the pumping chamber. An eccentric moves the diaphragm forward and a spring pushes it back toward a stop. The stop position is adjusted by turning the stroke control knob. At zero stroke, the stop is all the way in, preventing the diaphragm plunger from returning against the cam. At full stroke the stop is retracted, allowing the diaphragm plunger to ride the full lobe of the cam, which corresponds to the full capacity of the pump.

3.3 Capacity in Relation to Stroke Length

3.3.1 Capacity vs. Stroke Length

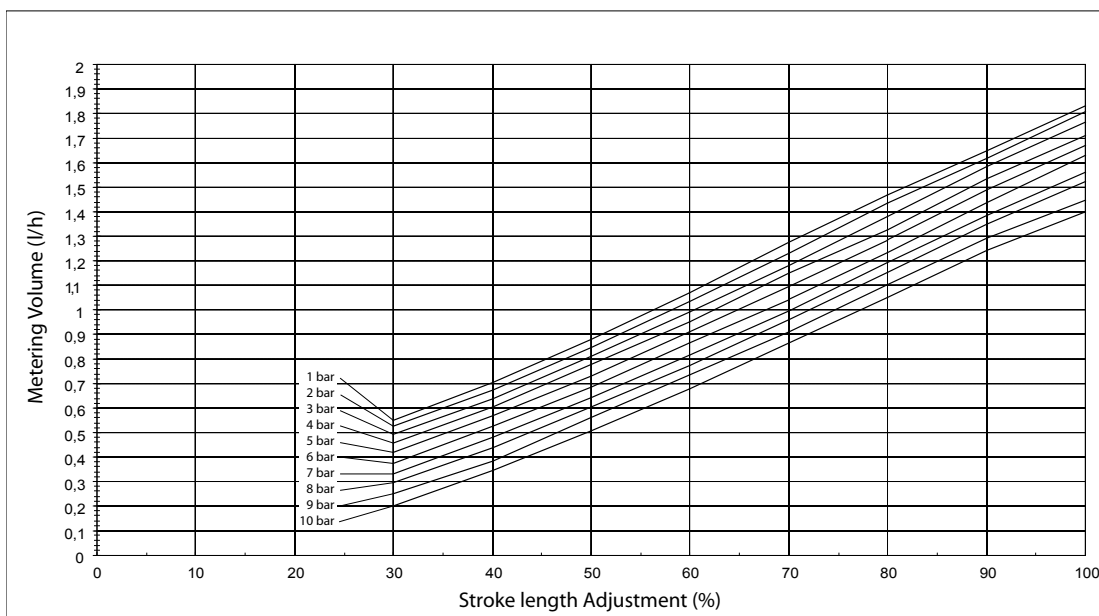
The following graphs represent the flow for different stroke length settings and back pressures. When using these graphs, the capacity is within +15% to -5% of rated value with water at 68° F (20° C). For metering accuracy, it is recommended that the lowest stroke length setting is 30%.

For USA Version pump, running at 60Hz, in order to get the equivalent capacity in gallons per hour, multiply by 0.3118 the reading in liters per hour taken from these graphs. The maximum back pressure of USA Version pump is 120 PSI (8 Bar).

- Series B1

USA Version – capacity 0.44 GPH at 60 Hz., 120 PSI

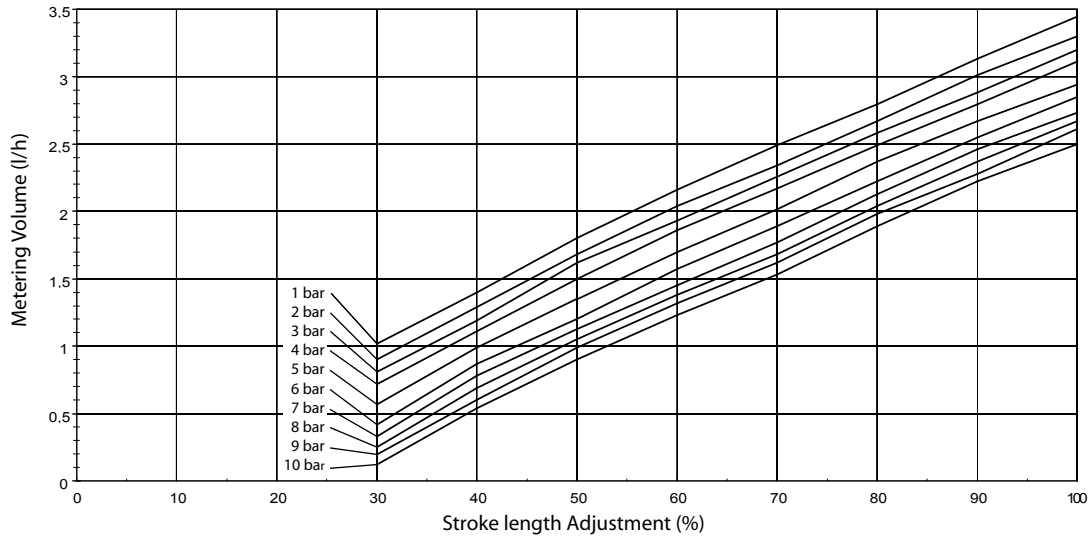
EURO Version – capacity 1.4 L/H at 50 Hz, 10 Bar



- Series B2

USA Version – capacity 0.79 GPH at 60 Hz., 120 PSI

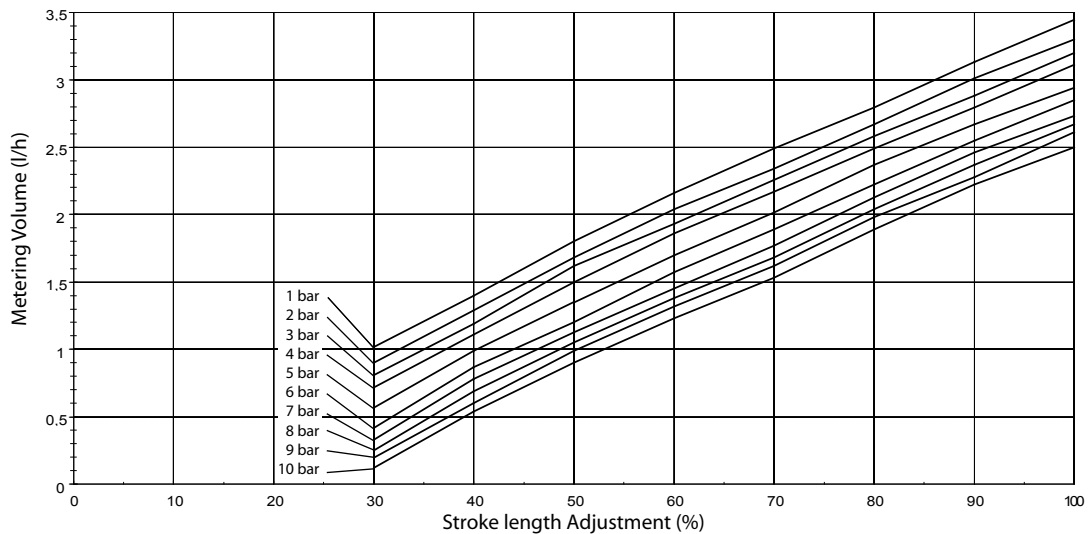
EURO Version – capacity 2.5 L/H at 50 Hz, 10 Bar



- Series B3 and B4

USA Version – capacity 1.52 GPH at 60 Hz., 50 PSI and 1.36 GPH at 60 Hz 120 PSI

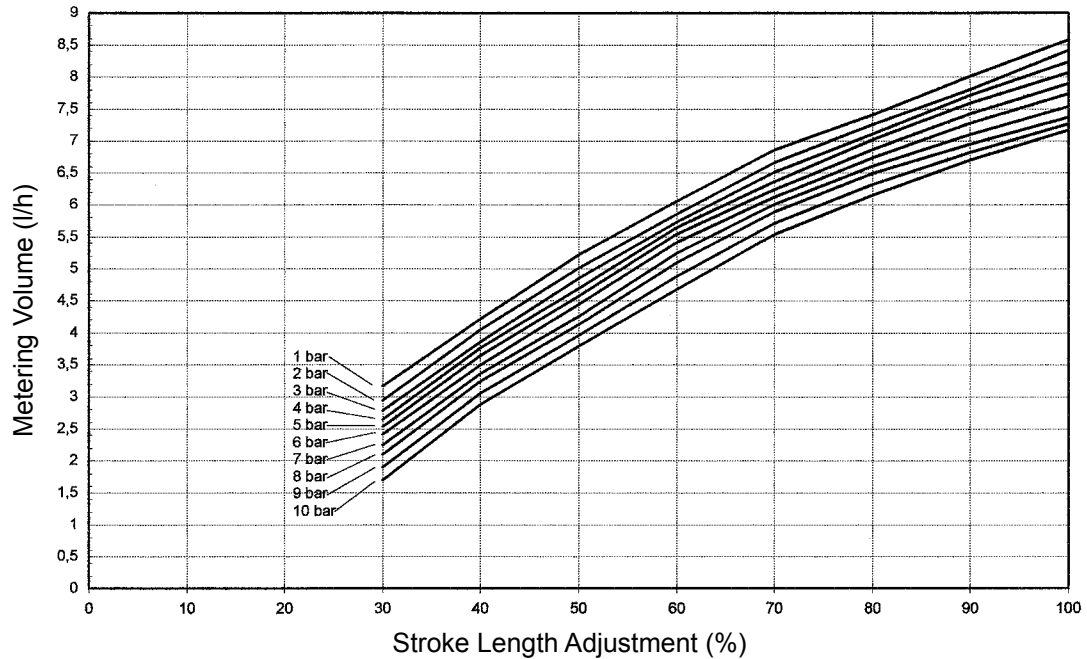
EURO Version – capacity 4.8 L/H at 50 Hz, 4 Bar and 4.3 L/H at 50 Hz, 10 Bar



- Series B5

USA Version – capacity 2.28 GPH at 60 Hz., 120 PSI

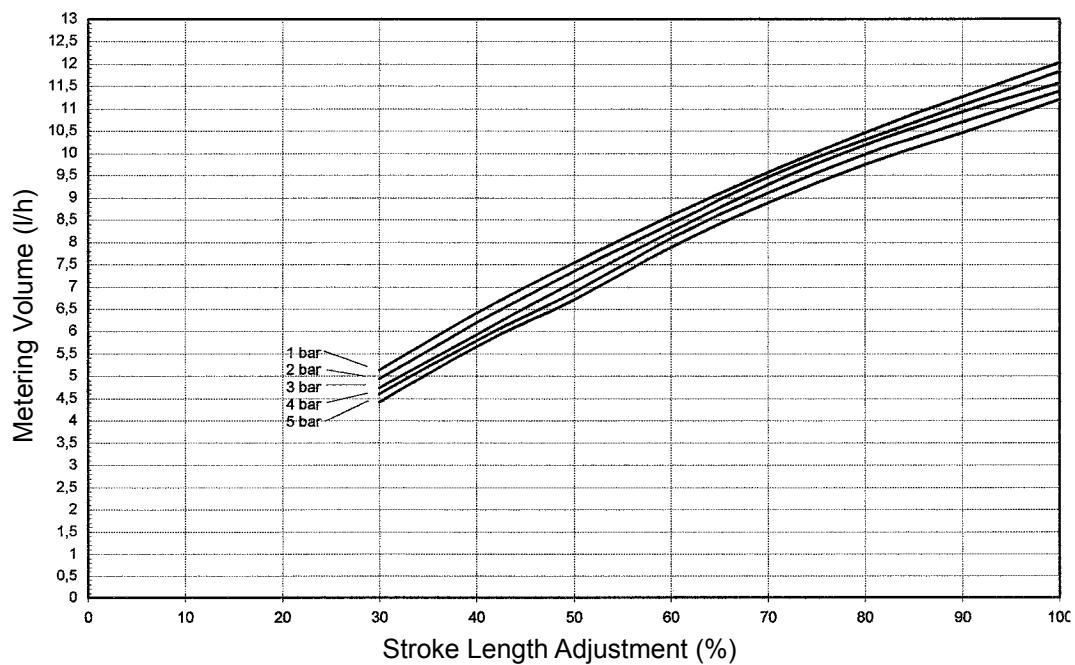
EURO Version – capacity 7.2 L/H at 50 Hz, 10 Bar



- Series B6

USA Version – capacity 3.55 GPH at 60 Hz., 60 PSI

EURO Version – capacity 11.2 L/H at 50 Hz, 5 Bar



SECTION 4 - SERVICE

List of Contents

	PARA. NO.
General Information.....	4.1
Periodic Cleaning.....	4.2
Periodic Preventive Maintenance	4.3
Corrective Maintenance	4.4
Troubleshooting	4.5
Warning Summary	1 Page

NOTE: This Instruction Book assumes that the customer has the right tools that are necessary to service the pump safely and efficiently. The customer must also know how to use them properly. There are certain notes, cautions, and warnings included in the book; each one is there for a specific purpose. **NOTES** provide added information that will help complete a particular procedure. **CAUTIONS** are given to prevent an error that could damage the pump. **WARNINGS** remind the user to be especially careful in those areas where carelessness can cause personal injury.



WARNING: TO AVOID POSSIBLE SEVERE PERSONAL INJURY OR EQUIPMENT DAMAGE FROM BEING SPRAYED WITH LIQUID UNDER PRESSURE, PRIOR TO DISASSEMBLY OF PIPE CONNECTIONS, REFER TO DETAILED INSTRUCTION ON RELIEVING PRESSURE AND DRAINING. SEE SECTION 4.4.2

4.1 General Information

4.1.1 Routine Maintenance

Routine maintenance of the metering pump consists of two operations:

- Periodic cleaning: To remove contaminants and deposits formed on parts in contact with the solutions.
- Periodic preventive maintenance: To disassemble, inspect, clean, and replace recommended parts.

4.1.2 Corrective Maintenance

This is performed (as required, at unscheduled intervals) to correct a discrepant operating or non-operating condition. A troubleshooting table (refer to Table 4.2) lists possible fault conditions and corrective actions as a guide for service personnel.

4.2 Periodic Cleaning

4.2.1 Cleaning Pumping Head Parts

If difficulty is encountered in pumping the solution where hard water is known to have been used in the preparation of the solution, remove the pumping head parts for cleaning (refer to Paragraph 4.4.1 for head removal). The effects of hard water are indicated by a white coating on all parts in contact with the solution. This coating is most easily removed by soaking the parts in 5% hydrochloric acid, commonly obtainable in a drug store. The commercial grade of hydrochloric acid—known as muriatic acid—is also suitable for this purpose. Where the above condition is known to exist, pump the acid solution to the pump head for approximately five minutes as periodic preventive maintenance.



WARNING: TO AVOID POSSIBLE SEVERE PERSONAL INJURY, USE EXTREME CARE TO AVOID CONTACT WITH THE MATERIAL. CONSULT YOUR CHEMICAL SUPPLIER FOR INSTRUCTIONS IN THE PREPARATION OF SOLUTIONS AND HANDLING OF THE CHEMICAL.

4.2.2 Cleaning Clogged Solution Tube

Where solution joins water being treated and that water contains considerable hardness, there may be deposit formed inside the solution tube at the point of application. In time, this deposit can completely plug this tube and the deposit must be removed. The best method is by dissolving the deposit as described in paragraph 4.2.1. Where this condition is known to exist, clean the solution tube as a part of routine maintenance.

4.3 Periodic Preventive Maintenance

To minimize unscheduled shut down and ensure maximum service life, perform periodic maintenance at specified intervals while the equipment is in satisfactory condition. Table 4.1 lists the interval, maintenance operation, and the preventive maintenance kits required. Before starting the work, ensure that the appropriate preventive maintenance kits are in stock. Refer to Section 6 - Preventive Maintenance Kits and Spare Parts List for the appropriate maintenance kit.

NOTE: Although all parts are designed for long service life, it is recommended that routine maintenance be performed to safeguard unexpected downtime.

Table 4.1 - Scheduled Maintenance Index

INTERVAL	MAINTENANCE OPERATION	PM KIT
Quarterly, shorter intervals if running 24 hours a day	Inspect suction and discharge connections for leaks: Refer to Figure 4.1 Union Nuts (2, 3) Drain Hole (A) on pump head (if there is a leak the diaphragm is cracked) Head Screws (17), torque to 26-36 inch-lbs (3-4 Nm)	If parts are needed: Refer to Section 6 for PM Kits. Order the Connection Kit (USA or EURO Version).
Every 4000 hours of operation	Change the diaphragm.	B1- AAB2926 B2 - AAB2929 B3 & B4 - AAB2932 B5 & B6 - AAB2935
Annually	Change all valve sets and cylinder/piston assembly.	Refer to Section 6 for PM Kits Order the Head Kit. For spring loaded valves, do not order the Head Kit; order the Valve Kit, Priming Valve, bellows, and supporting ring individually.

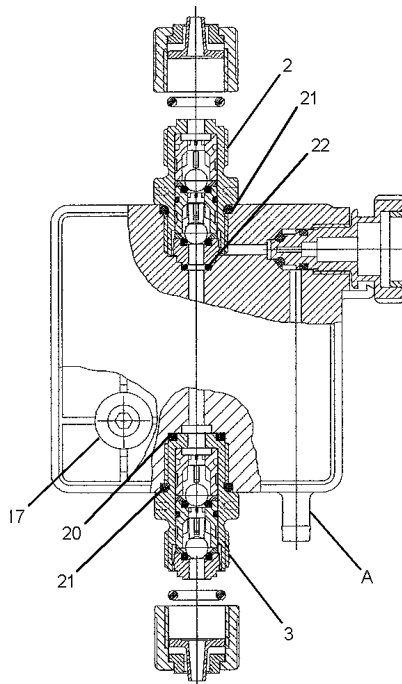


Figure 4.1 - Parts to Check for Leaks

4.4 Corrective Maintenance



WARNING: TO AVOID CONTACT WITH THE MATERIAL AND POSSIBLE SEVERE PERSONAL INJURY WHEN SERVICING HEADS AND/OR VALVES, FOLLOW THE PROCEDURES IN THIS SECTION FOR DISASSEMBLY.



WARNING: USE EXTREME CARE TO AVOID CONTACT WITH THE MATERIAL AND POSSIBLE SEVERE PERSONAL INJURY. WHEN HANDLING HAZARDOUS MATERIAL, OBSERVE ALL SAFETY PRECAUTIONS RECOMMENDED BY THE MATERIAL MANUFACTURER/SUPPLIER.



CAUTION: To prevent possible equipment damage, the solution must never be allowed to freeze in the pump. If freezing conditions are present when pump is shut-off, drain the pump head and all solution lines prior to shut-off.

Corrective maintenance is performed as required to correct a discrepant operating or non-operating condition. A troubleshooting table is provided to guide service personnel in diagnosing and correcting most common troubles.

Routine maintenance procedures include the elimination of solution leaks when they are found, to avoid corrosion damage. Flush away spilled solution with water and wipe the parts clean and dry.

Maintain gasketed joints in good condition. Keep an adequate supply of gaskets and O-rings available so that repair of leaks can be accomplished without delay. It is a good practice to discard used gaskets and O-rings, replacing them with new material each time a joint is broken.

4.4.1 Removing Pump From Service and Replacement of Valves, Pump Head, Diaphragm, and Casing Bellows



WARNING: USE EXTREME CARE TO AVOID CONTACT WITH THE MATERIAL AND POSSIBLE SEVERE PERSONAL INJURY WHEN USING HAZARDOUS MATERIAL. OBSERVE ALL SAFETY PRECAUTIONS AND WEAR APPROPRIATE PROTECTIVE CLOTHING AND EYE PROTECTION WHEN HANDLING HAZARDOUS MATERIAL.

Procedures for the assembly and disassembly of parts for pump maintenance are referenced in the following paragraph.

4.4.2 Draining System of Hazardous Material

WARNING: TO AVOID POSSIBLE SEVERE PERSONAL INJURY FROM BEING SPRAYED BY LIQUID UNDER PRESSURE, ALLOW THE SYSTEM TO DRAIN FULLY BEFORE ATTEMPTING TO DISASSEMBLE PIPING AND REMOVING VALVES AND/OR HEAD.

- a. Disconnect power from the pump or unplug the pump.
- b. Close the discharge shutoff valves.
- c. For flooded suction, close the suction shutoff valve to prevent the backflow of liquid when suction lines are disconnected.
- d. Open the suction drain valve and drain the suction line of liquid.
- e. Open the discharge drain valve to relieve pressure and drain the line.
- f. The tubing connections can now be disconnected.

4.4.3 Replacement of the Suction and Discharge Valves

WARNING: TO AVOID POSSIBLE SEVERE PERSONAL INJURY, USE EXTREME CARE TO AVOID CONTACT WITH LIQUID PRESENT IN THE HEAD. ALLOW THE SUCTION VALVE TO FALL INTO A SUITABLE CONTAINER AND CATCH THE LIQUID.



WARNING: TO AVOID POSSIBLE SEVERE PERSONAL INJURY, USE EXTREME CARE TO AVOID CONTACT WITH THE LIQUID PRESENT BETWEEN THE DISCHARGE DRAIN VALVE AND THE UNIT BELOW. FLUSH ANY SPILLED LIQUID IMMEDIATELY.

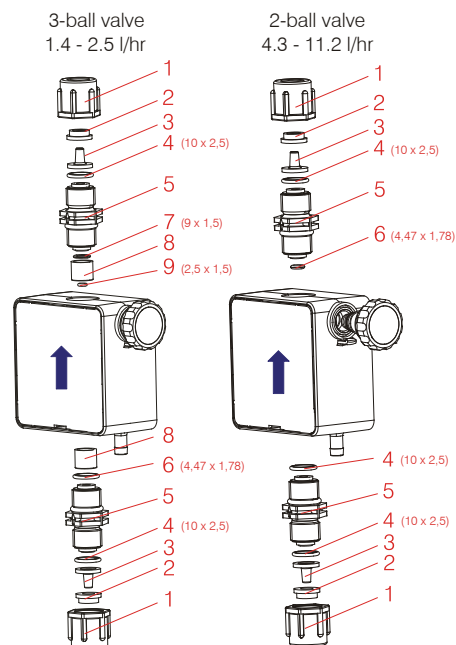
- a. Disconnect the discharge and suction connections per paragraph 4.4.2.
- b. Unscrew the suction and the discharge valves.
- c. Wash the valves thoroughly with water to remove any chemical.

- d. The valves can be disassembled to check for any dirt trapped inside by removing the bottom seat. They can be re-used after cleaning and if there is no evidence of defect. Refer to Figure 4.2 for the valve assembly drawing.



CAUTION: Use a small pair of pliers and carefully remove the seat with a gentle twist, then pull up. Be careful not to mar the seat's outside diameter. Position the valve vertically upward to prevent the parts from falling.

- e. Inspect all the parts for any defect. Replace the whole valve if any part is defective. They are available as a complete assembly in the PM Kit.
- f. For re-assembly look for the direction of the arrow. The arrow must point upward.
- g. To install the discharge valve, position the O-ring (9,6) at the bottom of the pump head discharge opening.
- h. Position the O-ring (7) at the valve shoulder and screw it in hand tight; watch for the direction of the arrow.
- i. To install the suction valve, position two O-rings onto the valve, one at the valve shoulder (4) and the other at the valve seat (6,4). Watch for the direction of the arrow.

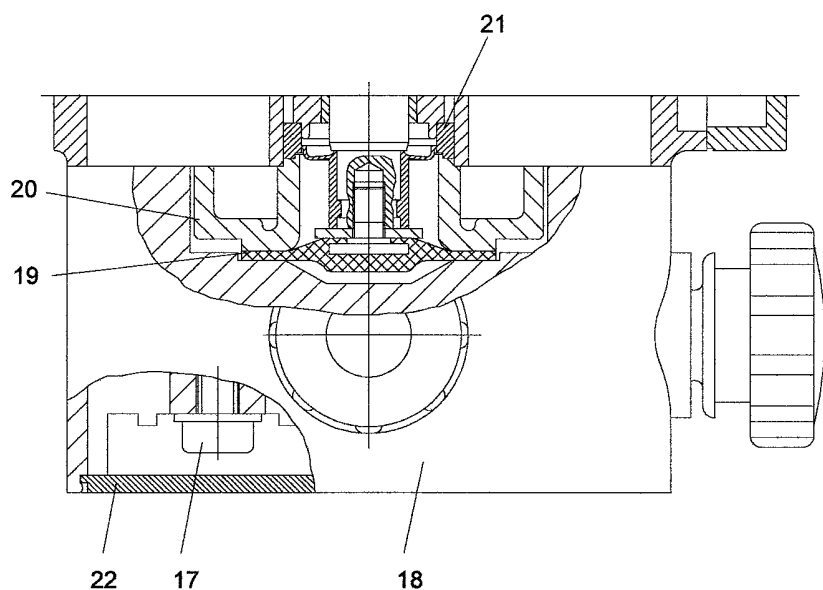


Item No.	Description
1	Union nut
2	Clamping piece
3	Tapered part
4	O-ring, Ø 10 x 2.5
5	Suction/pressure valve
6	O-ring
7	O-ring, Ø 7 x 1.5 (on valve 3-ball version)
8	Metering cartridges (on valve 3-ball version)
9	O-ring, Ø 2.5 x 1.5 (on valve 3-ball version)

Figure 4.2 - Suction and Discharge Valve Assemblies

4.4.4 Replacement of Diaphragm and Pump Head

- a. Drain the pump head of chemical and disconnect all the tubing lines per paragraph 4.4.2
- b. Remove the suction and discharge valves of the re-circulating line per paragraph 4.4.3
- c. Remove the cover (22) and loosen four head screws (17). Refer to Figure 4.3.
- d. Remove pump head (18) and set aside.
- e. Unscrew the diaphragm unit (19) including connecting piece (20) and back-up ring.
- f. Replace the intermediate diaphragm (21) from the plunger.
- g. Screw in a new diaphragm unit (19) gently until it stops; hand-tight only.
- h. The leak connection must be pointing downward.
- i. Install the head and tighten diagonally to 26-36 inch-lbs (3-4 Nm).
- j. The head screws (17) must be re-torqued to 26-36 inch-lbs (3-4 Nm) after running the pump for 24 hours.



Item No.	Description
17	Head screws
18	Pump head
19	Diaphragm
20	Connecting piece
21	Intermediate Diaphragm
22	Cover

Figure 4.3 - Diaphragm and Pump Head

4.4.5 Setting the Mechanical Stroke Adjustment Calibration

The pump is calibrated at the factory in accordance with the characteristic curves shown in paragraph 3.3, Capacity in Relation to Stroke Length, and at maximum back pressure. The stroke adjustment basic setting can be determined as follows:

- a. Turn the pump on and make sure that the flow of liquid in the discharge line (tubing) can be seen clearly.
- b. Place the knob to 100% and turn clockwise until resistance is felt.

NOTE: Turn the knob only when the pump is running.

- c. If no resistance is felt, remove the knob at setting “0” and repeat procedure “b”.
- d. Pull the knob off and re-attach it with the notch set at “0”.
- e. Check the metering output.

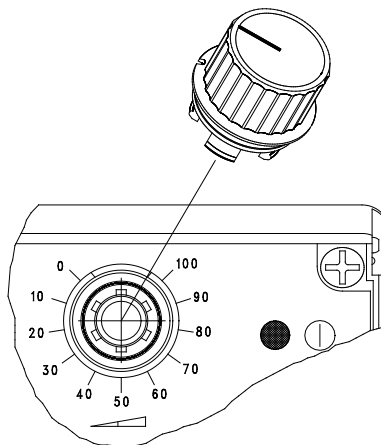


Figure 4.4 - Mechanical Stroke Adjustment Calibration

4.4.6 Gearbox

The mechanical components in the drive mechanism are not serviceable. It is grease-lubricated and does not require any maintenance. However, it can be opened and inspected by removing the motor through the back end and the electrical face at the front.

4.5 Troubleshooting

The troubleshooting procedures are limited to fault isolation for a defective item. Potential problems that could be at fault and recommendations for corrective actions are listed in Tables 4.2, 4.3, and 4.5. There are faults that can be fixed by the customer and faults that can only be fixed by person with electronic knowledge. In such a case, the whole electronic board must be replaced.

Table 4.2 - Troubleshooting

FAULT CONDITION	POSSIBLE CAUSE	CORRECTIVE ACTION
METERING PUMP DOES NOT WORK, NO DISPLAY INDICATOR	Incorrect voltage, no power or fuse blown. Main cable damage or plug defective..	Check power supply and cable.
PUMP DOES NOT PRIME EVEN WITHOUT BACK PRESSURE, MAXIMUM STROKE, AND SPEED.	Suction and discharge valves leak, stuck due to dirt or dry.	Remove and rinse the valves.
	Gas accumulates at the pump head and suction line.	Check for cavitation. Install a vented riser if flooded suction. (see section 6.3.4) Dilute the liquid, especially Sodium Hypochlorite.
	Suction and discharge shut-off valves closed.	Open valves.
	Strainer is clogged.	Clean strainer.
	There is leakage in suction line.	Check and repair leaks.
NO FEED RATE ON POINT OF APPLICATION, THOUGH PUMP IS PUMPING.	Pressure is too high.	Check the pressure at the main line.
	Suction valve is leaking or dirty	Clean suction valve.
	Pressure relief valve is relieving (if equipped) or defective.	Adjust pressure relief valve to proper relief pressure. Change or repair the pressure relief valve if defective.
METERING HEAD IS LEAKING AND LIQUID IS EMERGING BETWEEN THE HEAD AND INTERMEDIATE PLATE.	Metering head is loose.	Tighten the head screws diagonally to 26-36 inch-lbs (3-4 Nm).
	Diaphragm rupture.	Replace diaphragm
LIQUID IS LEAKING THROUGH THE INTERMEDIATE PLATE DRAIN LINE	Diaphragm rupture.	Replace diaphragm
PUMP NOT WORKING	Metering lock in operation (PIN #3 and #4 of connector II must be bridged).	Attatch jumper plug to connector II. Clean contacts of plug

Table 4.2 - Troubleshooting (Cont'd)


FAULT CONDITION	POSSIBLE CAUSE	CORRECTIVE ACTION
PUMP HAS NO SUCTION DESPITE VENTING AND MAX. STROKES.	Deposits, adhesions or drying-out of the valves.	Rinse the metering head through the suction tube, if necessary remove and clean or replace the valves
LOW-LEVEL INDICATOR  APPEARS ON THE DISPLAY DESPITE A FULL CONTAINER.	Float of the suction pipe is jammed.	Unjam the float.
	Suction pipe plug or strapping plug is loose or not plugged in.	Tighten the plug, clean the contacts, check whether the strapping plug is plugged in.
	Suction pipe cable is faulty.	Replace the empty report device.
METERING PUMP DOES NOT WORK.	Dirt in suction or discharge valve.	Remove and clean the valve.
	Metering volume too low.	Increase the stroke length setting.
	Back pressure too high.	Check discharge lines./
	Operating with 4-20 mA signal the current is interrupted.	Establish the signal current.
	Metering system blocked.	Internal fault, replace electronic board.
	Metering without request being made.	Internal fault, replace electronic board.

Table 4.3 - Metering Warning Messages (Display)





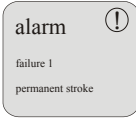

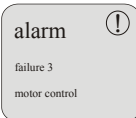
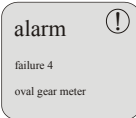
Display	Meaning	Effect	Cause	Remedy
	Reserve report (flashing)	Pump continues running	Low-level advance warning advice	Refill the metering medium
	Empty report	Pump is stopped	Empty report active	Refill the metering medium
	Metering lock (only possible if this is configured)	Pump is stopped	No external enable of the pump	Activate external enable or deactivate the metering lock in the configuration menu. (see section 2.10.4.3.11.5)
	Indicator in operation mode 4-20 mA flashes standard signal monitoring responds	Pump is stopped	Standard signal is under 3 mA or cable to standard signal connection is broken	Check the standard signal or cable
--.-	Standard signal is above 23.0 mA	Pump runs in continuous operation	Standard signal exceeds the display range	Reduce the standard signal

Table 4.4 - Alarm Messages (Display)

Display	Meaning	Effect	Cause	Remedy
	Motor is running uncontrolled in continuous operation	Over dosage	Power electronic failure	Replace PC-board
	Motor is not running despite of rotating dosing symbol	No metering	Backpressure too high	Reduce pressure open valve
			Valve closed at pressure side	
			Motor overheated /damaged	Cool off the motor, or change
			Power electronic failure	Replace PC-board
	Motor in continuous operation without request	Continuous metering	Hall sensor fault	Send in pump
			PC-board fault	Control hall sensor connection
			Plug connection from gear to PC-board interrupted	
	Error in evaluating the metering monitoring or	Pump meters too little or too much	Tube fault	Check the tubes
			Diaphragm fault	Check the diaphragm
			Backpressure too high or too low	Check the backpressure

WARNING LABEL

The following warning labels are attached to the equipment.

--

AAA2520: This equipment may handle HAZARDOUS materials, which can cause severe personal injury.

Use appropriate protective clothing and eye protection.

To prevent spraying of liquid DO NOT disconnect discharge tube/main connection without first relieving pressure and draining line.

Tighten coupling nuts by hand—DO NOT use wrench.

For safety precautions refer to the MSDS for the material being handled and the equipment instruction book for further important details and precautions.

To avoid possible severe personal injury from electrical shock, disconnect power source before servicing.



CHEM-AD[®] XL SERIES B



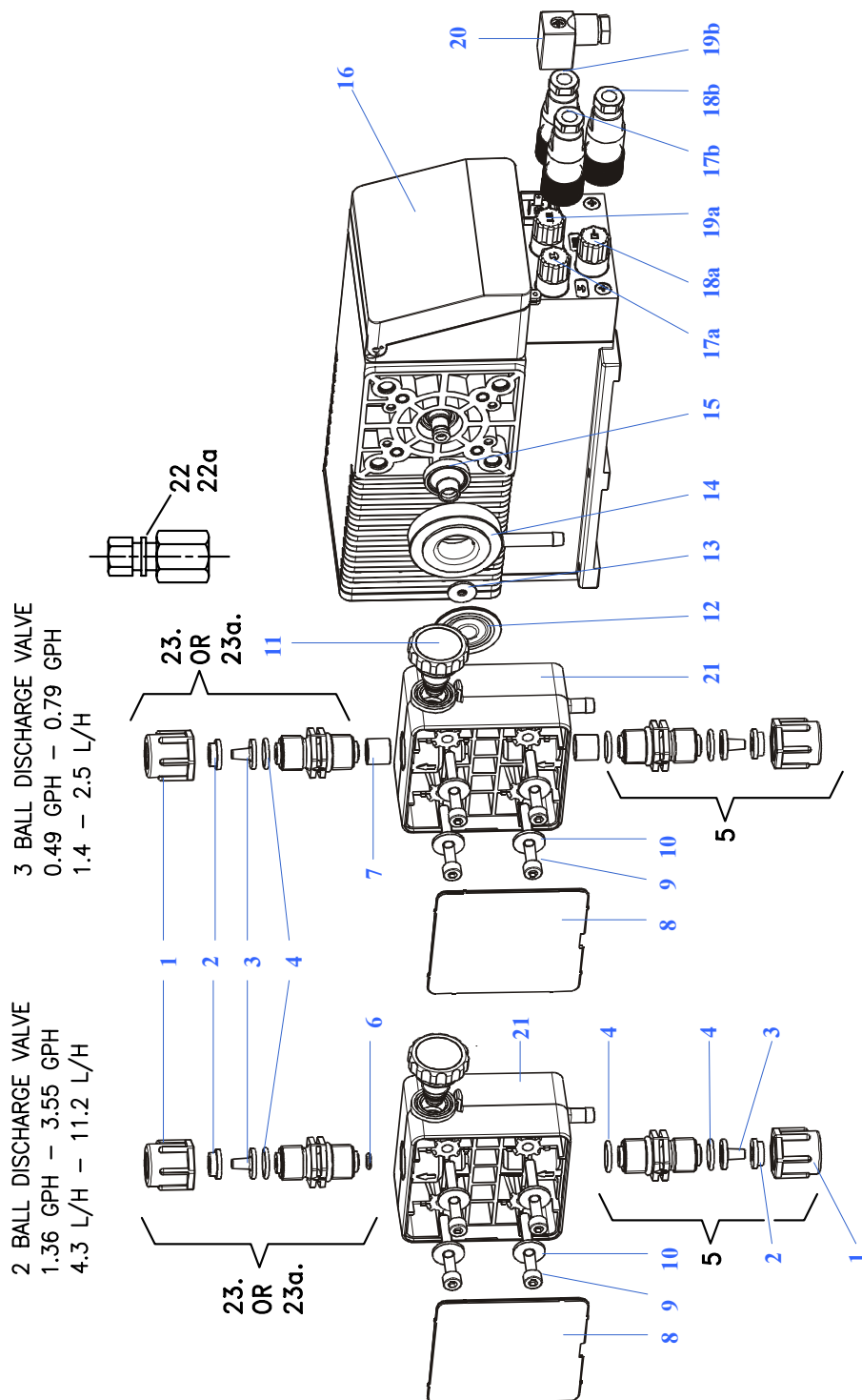
SECTION 5 - ILLUSTRATIONS

List of Contents

DWG. NO.

Parts

Chem-Ad Series B440.600.000.110A-D



NOTE: FOR PARTS LIST, SEE DWGS. 440.600.000.110B,C&D.

CHEM-AD METERING PUMP SERIES B - PARTS

440.600.000.110A

ISSUE 2 6-06

CHEM-AD® XL SERIES B

KEY NO.	PART NO.	DESCRIPTION
1	AAB2872	UNION NUT, 3/8"
2	AAB2866	THRUST PIECE, 4/6 PE/PTFE
	AAB2875	THRUST PIECE, 6/8 PE/PTFE
	AAB2878	THRUST PIECE, 6/12 PVC-FABRIC
	AAB4660	THRUST PIECE, 6/10 PE
	AAC1213	THRUST PIECE, PVC 4x3
2a	AAC2414	THRUST PIECE, 3/8" OD x 1/4" ID, SS
3	AAB2881	CONNECTION NIPPLE, 4/6
	AAB2884	CONNECTION NIPPLE, 6/8 PVDF
	AAB4663	CONNECTION NIPPLE, 6/10 PE
	AAC1210	CONNECTION NIPPLE, PVC 4x3
3a	AAC2417	CONNECTION NIPPLE, 3/8" OD x 1/4" ID, SS
4	AAB2869	O-RING FOR SUCTION AND PRESSURE VALVE, FPM
	AAB4654	O-RING FOR SUCTION AND PRESSURE VALVE, EDPM
	AAB4657	O-RING FOR SUCTION AND PRESSURE VALVE, KALREZ
5	AAB2863	SUCTION VALVE WITHOUT VALVE SPRING (1.4 l/h - 11.2 l/h), GLASS, FPM
	AAB4630	SUCTION VALVE WITHOUT VALVE SPRING (1.4 l/h - 11.2 l/h), CERAMIC, FPM
	AAB4633	SUCTION VALVE WITHOUT VALVE SPRING (1.4 l/h - 11.2 l/h), 1.4401, EPDM
	AAB4636	SUCTION VALVE WITHOUT VALVE SPRING (1.4 l/h - 11.2 l/h), PTFE, KALREZ
	AAB4639	SUCTION VALVE WITHOUT VALVE SPRING (1.4 l/h - 11.2 l/h), GLASS, KALREZ
6	AAB2914	O-RING, FPM
	AAB4669	O-RING, EPDM
	AAB4672	O-RING, KALREZ
7	AAC9482	VALVE CARTRIDGE, V3, SERIES B
8	AAB2923	COVER PLATE
9	AAB2920	SCREW
10	AAB2917	WASHER
11	AAB2911	VENT SCREW
12	AAC5074	DIAPHRAGM, 1.4 l/h, 0.4mm, PTFE
	AAC5077	DIAPHRAGM, 2.5 l/h, 0.4mm, PTFE
	AAC5080	DIAPHRAGM, 4.3 l/h + 4.8 l/h, 0.4mm, PTFE
	AAC5083	DIAPHRAGM, 7.2 l/h + 11.2 l/h, 0.4mm, PTFE
13	AAB2941	SUPPORTING DISK, 1.4 l/h
		SUPPORTING DISK, 2.5 l/h
	AAB2944	SUPPORTING DISK, 4.3 / 4.8 l/h
	AAB2947	SUPPORTING DISK, 7.2 l/h
	AAB2950	SUPPORTING DISK, 11.2 l/h

WHEN ORDERING MATERIAL ALWAYS SPECIFY MODEL AND SERIAL NUMBER OF APPARATUS

CHEM-AD METERING PUMP SERIES B - PARTS LIST

440.600.000.110B

ISSUE 2 6-06

CHEM-AD® XL SERIES B

KEY NO.	PART NO.	DESCRIPTION
14	AAB2953	INTERMEDIATE PLATE, 1.4 l/h
	AAB2956	INTERMEDIATE PLATE, 2.5 l/h
	AAB2959	INTERMEDIATE PLATE, 4.3 / 4.8 l/h
	AAB2962	INTERMEDIATE PLATE, 7.2 l/h
	AAB2962	INTERMEDIATE PLATE, 11.2 l/h
15	AAB2908	BELLOWS
16	AAB2887	TRANSPARENT ENCLOSURE COVER
17a	AAB2890	JUMPING CONNECTOR EMPTY SIGNAL INPUT
17b	AAB2899	4-PIN PLUG (3 PIN), EMPTY SIGNAL / PULSE INPUT
18a	AAB2893	COVER CAP
18b	AAB2902	4-PIN PLUG, SPECIAL CODING, EMPTY SIGNAL / PULSE OUTPUT
19a	AAB2896	JUMPING CONNECTOR PULSE / CURRENT INPUT
19b	AAB2905	5-PIN E30/E32 CURRENT / PULSE INPUT
20	AAC9479	CONTACT BOX, 3-TERMINAL
21	AAB2965	PUMP HEAD, PVDF, 1.4 l/h
	AAB2968	PUMP HEAD, PVDF, 2.5 l/h
	AAB2971	PUMP HEAD, PVDF, 4.3 / 4.8 l/h
	AAB2974	PUMP HEAD, PVDF, 7.2 l/h
	AAB2974	PUMP HEAD, PVDF, 11.2 l/h
	AAB2977	PUMP HEAD, PP, 1.4 l/h
	AAB2980	PUMP HEAD, PP, 2.5 l/h
	AAB2983	PUMP HEAD, PP, 4.3 / 4.8 l/h
	AAB2986	PUMP HEAD, PP, 7.2 l/h
	AAB2986	PUMP HEAD, PP, 11.2 l/h
	AAC2525	PUMP HEAD, SS, 1.4 l/h
	AAC2528	PUMP HEAD, SS, 2.5 l/h
	AAC2531	PUMP HEAD, SS, 4.3 / 4.8 l/h
	AAC2534	PUMP HEAD, SS, 7.2 l/h
	AAC2534	PUMP HEAD, SS, 11.2 l/h
22	AAC2423	CONNECTOR, STRAIGHT, 3/8" OD x 1/4" ID, PVDF
22a	AAC2420	CONNECTOR, STRAIGHT, 3/8" OD x 1/4" ID, PP

WHEN ORDERING MATERIAL ALWAYS SPECIFY MODEL AND SERIAL NUMBER OF APPARATUS

CHEM-AD METERING PUMP SERIES B - PARTS LIST

440.600.000.110C

ISSUE 2 6-06

CHEM-AD® XL SERIES B

KEY NO.	PART NO.	DESCRIPTION
23	AAB2860	PRESSURE VALVE WITH VALVE SPRING, 1.4 l/h - 2.5 l/h, GLASS, FPM
	AAB4618	PRESSURE VALVE WITH VALVE SPRING, 1.4 l/h - 2.5 l/h, CERAMIC, FPM
	AAB4621	PRESSURE VALVE WITH VALVE SPRING, 1.4 l/h - 2.5 l/h, 1.4401, EPDM
	AAB4624	PRESSURE VALVE WITH VALVE SPRING, 1.4 l/h - 2.5 l/h, PTFE, KALREZ
	AAB4627	PRESSURE VALVE WITH VALVE SPRING, 1.4 l/h - 2.5 l/h, GLASS, KALREZ
	AAB2860	PRESSURE VALVE WITH VALVE SPRING, 4.3 l/h - 11.2 l/h, GLASS, FPM
	AAB4618	PRESSURE VALVE WITH VALVE SPRING, 4.3 l/h - 11.2 l/h, CERAMIC, FPM
	AAB4621	PRESSURE VALVE WITH VALVE SPRING, 4.3 l/h - 11.2 l/h, 1.4401, EPDM
	AAB4624	PRESSURE VALVE WITH VALVE SPRING, 4.3 l/h - 11.2 l/h, PTFE, KALREZ
	AAB4627	PRESSURE VALVE WITH VALVE SPRING, 4.3 l/h - 11.2 l/h
23a	AAB2863	PRESSURE VALVE WITHOUT VALVE SPRING, 1.4 l/h - 11.2 l/h, GLASS, FPM
	AAB4630	PRESSURE VALVE WITHOUT VALVE SPRING, 1.4 l/h - 11.2 l/h, CERAMIC, FPM
	AAB4633	PRESSURE VALVE WITHOUT VALVE SPRING, 1.4 l/h - 11.2 l/h, 1.4401, EPDM
	AAB4636	PRESSURE VALVE WITHOUT VALVE SPRING, 1.4 l/h - 11.2 l/h, PTFE, KALREZ
	AAB4639	PRESSURE VALVE WITHOUT VALVE SPRING, 1.4 l/h - 11.2 l/h, GLASS, KALREZ

WHEN ORDERING MATERIAL ALWAYS SPECIFY MODEL AND SERIAL NUMBER OF APPARATUS

CHEM-AD METERING PUMP SERIES B - PARTS LIST

440.600.000.110D

ISSUE 0 6-06



CHEM-AD[®] XL SERIES B



SECTION 6 - PREVENTIVE MAINTENANCE KITS AND ACCESSORIES**List of Contents**

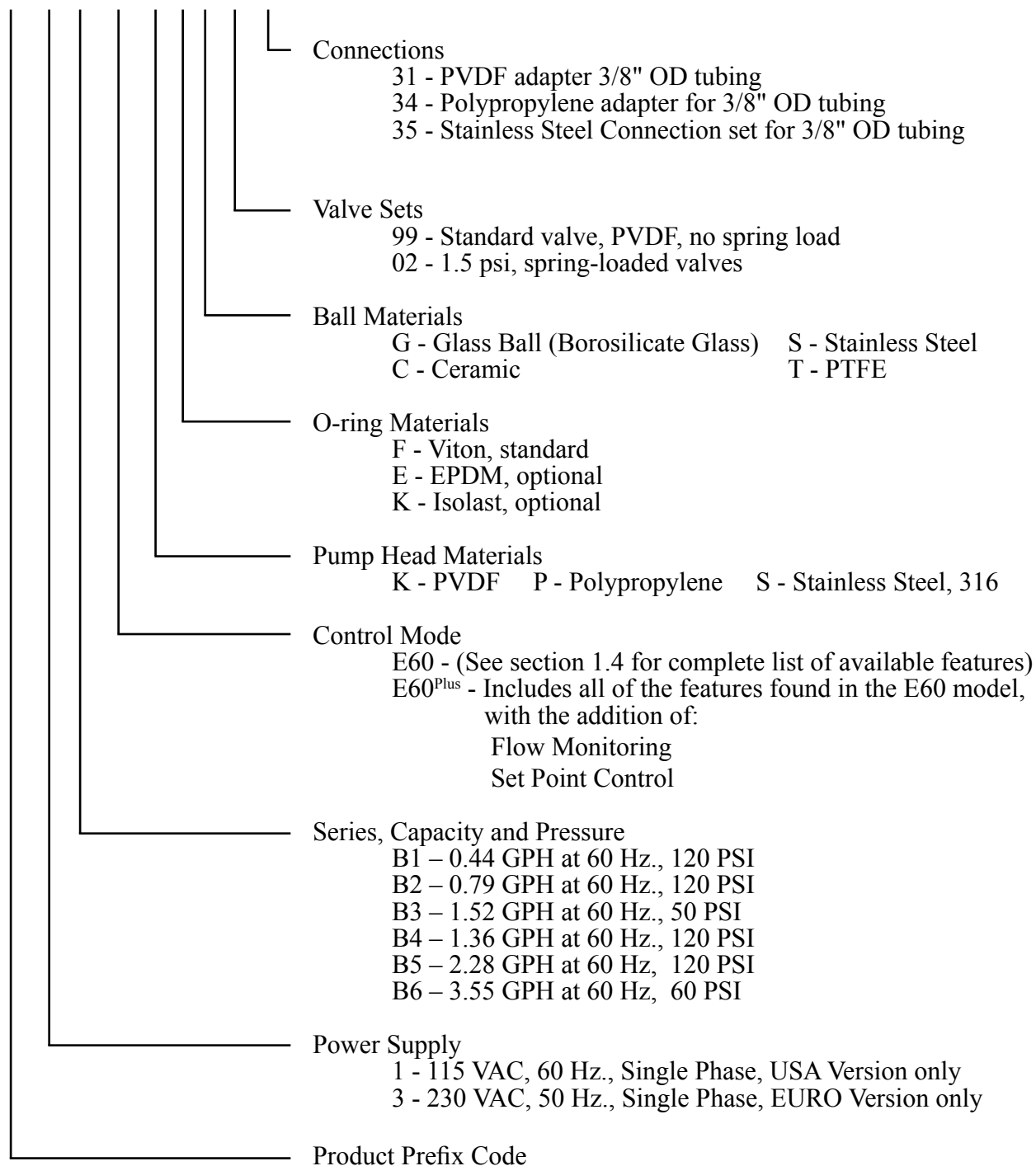
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6.1 Configuration Code

To order the correct maintenance kit or spare parts the configuration of the pump must be known. The configuration number is also the ordering code of that particular pump. Every pump has a data plate attached to it and there you will find a configured alpha numeric code starting with “CM” and followed by thirteen (13) numbers or letters. See samples that follow.

6.1.1 USA Version

CM 1 A4 E60 K F G 99 31



6.1.2 EURO Version

CM 3 A4 M60 K F G 99 33

Connections

- 21 – Connection set, 4/6, 6/8, 6/12 (mm ID/mmOD)
- 02 – Connection set for stainless steel pipe, 6 mm OD
- 32 – Connection set for stainless steel pipe, 8 mm OD

Valve Sets

- 99 - Standard valve, PVDF, no spring load
- 02 - 1.5 psi, spring-loaded valves

Ball Material

- G - Glass Ball (Borosilicate Glass) S - Stainless Steel
- C - Ceramic T - PTFE

O-ring Materials

- F - Viton (std.) E - EPDM (opt.) K - Isolast (opt.)

Pump Head Materials

- K - PVDF P - Polypropylene S - Stainless Steel, 316

Control Mode

- M60 - (See section 1.4 for complete list of available features)
- M60^{Plus} - Includes all of the features found in the M60 model, with the addition of:
 - Flow Monitoring
 - Set Point Control

Series, Capacity and Pressure

- B1 – 1.4 LPH at 50 Hz., 10 BAR
- B2 – 2.5 LPH at 50 Hz., 10 BAR
- B3 – 4.8 LPH at 50 Hz., 4 BAR
- B4 – 4.3 LPH at 50 Hz., 10 BAR
- B5 – 7.2 LPH at 50 Hz, 10 PSI
- B6 – 11.2 LPH at 50 Hz, 10 PSI

Power Supply

- 1 - 115 VAC, 60 Hz., Single Phase, USA Version only
- 3 - 230 VAC, 50 Hz., Single Phase, EURO Version only

Product Prefix Code

6.2 Maintenance Kit

The Maintenance Kits consist of all the parts necessary to perform regular required maintenance for the pump for convenient ordering. Refer to Figure 6.1 for a diagram of the parts that comprise each particular kit.

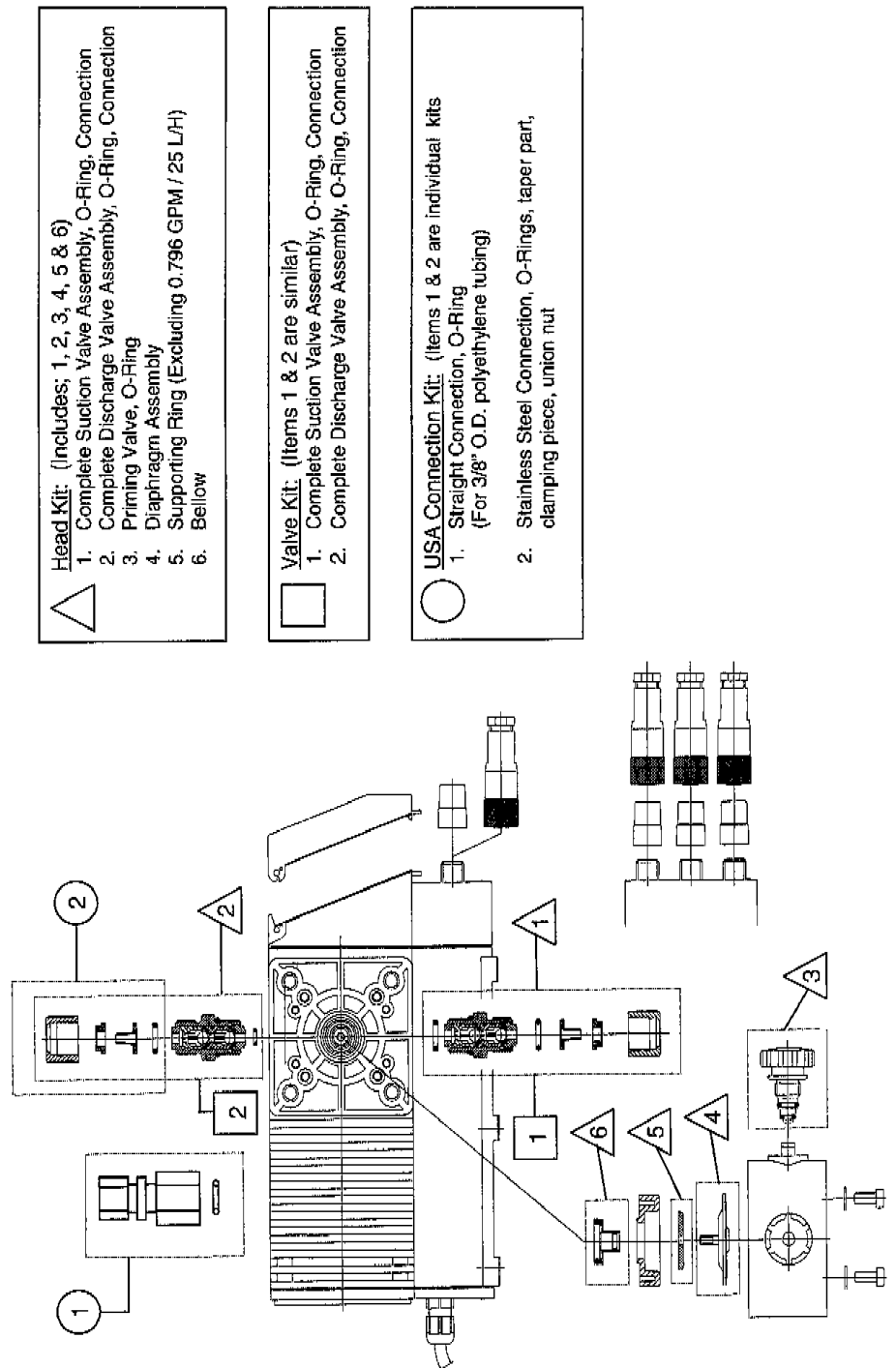


Figure 6.1 - Maintenance Kit Parts Reference

6.2.1 Head Kits

NOTE: Order one (1) kit per pump

6.2.1.1 Head Kit - On Pumps With PVDF Head Material

Descriptions - See Figure 6.1	USA Version Pump	Metric Version Pump
Head Kit for 0.44 GPH (1.4 l/h), Series B, includes connections, PVDF material, VITON* O-ring and GLASS ball	AAC3089	AAC1927
Head Kit for 0.44 GPH (1.4 l/h), Series B, includes connections, PVDF material, EPDM O-ring and GLASS ball	AAC3101	AAC3149
Head Kit for 0.44 GPH (1.4 l/h), Series B, includes connections, PVDF material VITON O-ring and CERAMIC ball	AAC3104	AAC3146
Head Kit for 0.44 GPH (1.4 l/h), Series B, includes connections, PVDF material, EPDM O-ring and CERAMIC ball	AAC3107	AAC3143
Head Kit for 0.44 GPH (1.4 l/h), Series B, includes connections, PVDF material, ISOLAST** O-ring and PTFE ball	AAC3110	AAC3140
Head Kit for 0.79 GPH (2.5 l/h), Series B, includes connections, PVDF material, VITON O-ring and GLASS ball	AAC3113	AAC1930
Head Kit for 0.79 GPH (2.5 l/h), Series B, includes connections, PVDF material, EPDM O-ring and GLASS ball	AAC3116	AAC3137
Head Kit for 0.79 GPH (2.5 l/h), Series B, includes connections, PVDF material, VITON O-ring and CERAMIC ball	AAC3119	AAC3134
Head Kit for 0.79 GPH (2.5 l/h), Series B, includes connections, PVDF material, EPDM O-ring and CERAMIC ball	AAC3122	AAC3131
Head Kit for 0.79 GPH (2.5 l/h), Series B, includes connections, PVDF material, ISOLAST O-ring and PTFE ball	AAC3125	AAC3128

*Viton is a registered trademark of E.I. Dupont Co.

**Isolast is a registered trademark of Busak + Shamban

6.2.1.1 Head Kit - On Pumps With PVDF Head Material (Cont'd)

Descriptions - See Figure 6.1	USA Version Pump	Metric Version Pump
Head Kit for 1.36 GPH and 1.52 GPH (4.3 l/h and 4.8 l/h) Series B, includes connections, PVDF material, VITON O-ring and GLASS ball	AAC3167	AAC1933
Head Kit for 1.36 GPH and 1.52 GPH (4.3 l/h and 4.8 l/h) Series B, includes connections, PVDF material, EPDM O-ring and GLASS ball	AAC3170	AAC3212
Head Kit for 1.36 GPH and 1.52 GPH (4.3 l/h and 4.8 l/h) Series B, includes connections, PVDF material, VITON O-ring and CERAMIC ball	AAC3173	AAC3215
Head Kit for 1.36 GPH and 1.52 GPH (4.3 l/h and 4.8 l/h) Series B, includes connections, PVDF material, EPDM O-ring and CERAMIC ball	AAC3176	AAC3218
Head Kit for 1.36 GPH and 1.52 GPH (4.3 l/h and 4.8 l/h) Series B, includes connections, PVDF material, ISOLAST O-ring and PTFE ball	AAC3179	AAC3221
Head Kit for 2.28 GPH (7.2 l/h), Series B, includes connections, PVDF material, VITON O-ring and GLASS ball	AAC3182	AAC3224
Head Kit for 2.28 GPH (7.2 l/h), Series B, includes connections, PVDF material, EPDM O-ring and GLASS ball	AAC3185	AAC3227
Head Kit for 2.28 GPH (7.2 l/h), Series B, includes connections, PVDF material, VITON O-ring and CERAMIC ball	AAC3188	AAC3230
Head Kit for 2.28 GPH (7.2 l/h), Series B, includes connections, PVDF material, EPDM O-ring and CERAMIC ball	AAC3191	AAC3233
Head Kit for 2.28 GPH (7.2 l/h), Series B, includes connections, PVDF material, ISOLAST O-ring and PTFE ball	AAC3194	AAC3236
Head Kit for 3.55 GPH (11.2 l/h), Series B, includes connections, PVDF material, VITON O-ring and GLASS ball	AAC3197	AAC3239
Head Kit for 3.55 GPH (11.2 l/h), Series B, includes connections, PVDF material, EPDM O-ring and GLASS ball	AAC3200	AAC3242
Head Kit for 3.55 GPH (11.2 l/h), Series B, includes connections, PVDF material, VITON O-ring and CERAMIC ball	AAC3203	AAC3245
Head Kit for 3.55 GPH (11.2 l/h), Series B, includes connections, PVDF material, EPDM O-ring and CERAMIC ball	AAC3206	AAC3248
Head Kit for 3.55 GPH (11.2 l/h), Series B, includes connections, PVDF material, ISOLAST O-ring and PTFE ball	AAC3209	AAC3251

6.2.1.2 Head Kit - On Pumps With POLYPROPYLENE Head Material

Descriptions - See Figure 6.1	USA Version Pump	Metric Version Pump
Head Kit for 0.44 GPH (1.4 l/h), Series B, includes connections, POLYPROPYLENE material, VITON O-ring and GLASS ball	AAC3254	AAC3293
Head Kit for 0.44 GPH (1.4 l/h), Series B, includes connections, POLYPROPYLENE material, EPDM O-ring and GLASS ball	AAC3257	AAC3296
Head Kit for 0.44 GPH (1.4 l/h), Series B, includes connections, POLYPROPYLENE material, VITON O-ring and CERAMIC ball	AAC3260	AAC3299
Head Kit for 0.44 GPH (1.4 l/h), Series B, includes connections, POLYPROPYLENE material, EPDM O-ring and CERAMIC ball	AAC3263	AAC3302
Head Kit for 0.44 GPH (1.4 l/h), Series B, includes connections, POLYPROPYLENE material, ISOLAST O-ring and PTFE ball	AAC3266	AAC3305
Head Kit for 0.79 GPH (2.5 l/h), Series B, includes connections, POLYPROPYLENE material, VITON O-ring and GLASS ball	AAC3269	AAC3308
Head Kit for 0.79 GPH (2.5 l/h), Series B, includes connections, POLYPROPYLENE material, EPDM O-ring and GLASS ball	AAC3272	AAC3311
Head Kit for 0.79 GPH (2.5 l/h), Series B, includes connections, POLYPROPYLENE material, VITON O-ring and CERAMIC ball	AAC3275	AAC3314
Head Kit for 0.79 GPH (2.5 l/h), Series B, includes connections, POLYPROPYLENE material, EPDM O-ring and CERAMIC ball	AAC3278	AAC3317
Head Kit for 0.79 GPH (2.5 l/h), Series B, includes connections, POLYPROPYLENE material, ISOLAST O-ring and PTFE ball	AAC3281	AAC3320

6.2.1.2 Head Kit - On Pumps With POLYPROPYLENE Head Material (Cont'd)

Descriptions - See Figure 6.1	USA Version Pump	Metric Version Pump
Head Kit for 1.36 GPH and 1.52 GPH (4.3 l/h and 4.8 l/h), Series B, includes connections, POLYPROPYLENE material, VITON O-ring and GLASS ball	AAC3284	AAC3323
Head Kit for 1.36 GPH and 1.52 GPH (4.3 l/h and 4.8 l/h), Series B, includes connections, POLYPROPYLENE material, EPDM O-ring and GLASS ball	AAC3287	AAC3326
Head Kit for 1.36 GPH and 1.52 GPH (4.3 l/h and 4.8 l/h), Series B, includes connections, POLYPROPYLENE material, VITON O-ring and CERAMIC ball	AAC3290	AAC3329
Head Kit for 1.36 GPH and 1.52 GPH (4.3 l/h and 4.8 l/h), Series B, POLYPROPYLENE material, EPDM O-ring and CERAMIC ball	AAC3332	AAC3368
Head Kit for 1.36 GPH and 1.52 GPH (4.3 l/h and 4.8 l/h), Series B, POLYPROPYLENE material, ISOLAST O-ring and PTFE ball	AAC3335	AAC3371
Head Kit for 2.28 GPH (7.2 l/h), Series B, includes connections, POLYPROPYLENE material, VITON O-ring and GLASS ball	AAC3338	AAC3374
Head Kit for 2.28 GPH (7.2 l/h), Series B, includes connections, POLYPROPYLENE material, EPDM O-ring and GLASS ball	AAC3341	AAC3377
Head Kit for 2.28 GPH (7.2 l/h), Series B, includes connections, POLYPROPYLENE material, VITON O-ring and CERAMIC ball	AAC3344	AAC3380
Head Kit for 2.28 GPH (7.2 l/h), Series B, includes connections, POLYPROPYLENE material, EPDM O-ring and CERAMIC ball	AAC3347	AAC3383
Head Kit for 2.28 GPH (7.2 l/h), Series B, includes connections, POLYPROPYLENE material, ISOLAST O-ring and PTFE ball	AAC3350	AAC3386
Head Kit for 3.55 GPH (11.2 l/h), Series B, includes connections, POLYPROPYLENE material, VITON O-ring and GLASS ball	AAC3353	AAC3389
Head Kit for 3.55 GPH (11.2 l/h), Series B, includes connections, POLYPROPYLENE material, EPDM O-ring and GLASS ball	AAC3356	AAC3392
Head Kit for 3.55 GPH (11.2 l/h), Series B, includes connections, POLYPROPYLENE material, VITON O-ring and CERAMIC ball	AAC3359	AAC3395
Head Kit for 3.55 GPH (11.2 l/h), Series B, includes connections, POLYPROPYLENE material, EPDM O-ring and CERAMIC ball	AAC3362	AAC3398
Head Kit for 3.55 GPH (11.2 l/h), Series B, includes connections, POLYPROPYLENE material, ISOLAST O-ring and PTFE ball	AAC3365	AAC3401

6.2.1.3 Head Kit - On Pumps With STAINLESS STEEL Head Material

Descriptions - See Figure 6.1	USA Version Pump	Metric Version Pump
Head Kit for 0.44 GPH (1.4 l/h), Series B, includes connections, STAINLESS STEEL housing and ball with VITON O-ring	AAC3404	AAC3434
Head Kit for 0.44 GPH (1.4 l/h), Series B, includes connections, STAINLESS STEEL housing and ball with EPDM O-ring	AAC3407	AAC3437
Head Kit for 0.44 GPH (1.4 l/h), Series B, includes connections, STAINLESS STEEL housing and ball with ISOLAST O-ring	AAC3410	AAC3440
Head Kit for 0.79 GPH (2.5 l/h), Series B, includes connections, STAINLESS STEEL housing and ball with VITON O-ring	AAC3413	AAC3443
Head Kit for 0.79 GPH (2.5 l/h), Series B, includes connections, STAINLESS STEEL housing and ball with EPDM O-ring	AAC3416	AAC3446
Head Kit for 0.79 GPH (2.5 l/h), Series B, includes connections, STAINLESS STEEL housing and ball with ISOLAST O-ring	AAC3419	AAC3449
Head Kit for 1.36 GPH and 1.52 GPH (4.3 l/h and 4.8 l/h) , Series B, includes connections, STAINLESS STEEL housing and ball with VITON O-ring	AAC3422	AAC3452
Head Kit for 1.36 GPH and 1.52 GPH (4.3 l/h and 4.8 l/h), Series B, includes connections, STAINLESS STEEL housing and ball with EPDM O-ring	AAC3425	AAC3455
Head Kit for 1.36 GPH and 1.52 GPH (4.3 l/h and 4.8 l/h), Series B, includes connections, STAINLESS STEEL housing and ball with ISOLAST O-ring	AAC3428	AAC3458
Head Kit for 2.28 GPH (7.2 l/h), Series B, includes connections, STAINLESS STEEL housing and ball with VITON O-ring	AAC3431	AAC3461
Head Kit for 2.28 GPH (7.2 l/h), Series B, includes connections, STAINLESS STEEL housing and ball with EPDM O-ring	AAC3464	AAC3488
Head Kit for 2.28 GPH (7.2 l/h), Series B, includes connections, STAINLESS STEEL housing and ball with ISOLAST O-ring	AAC3467	AAC3491
Head Kit for 3.55 GPH (11.2 l/h), Series B, includes connections, STAINLESS STEEL housing and ball with VITON O-ring	AAC3470	AAC3494
Head Kit for 3.55 GPH (11.2 l/h), Series B, includes connections, STAINLESS STEEL housing and ball with EPDM O-ring	AAC3473	AAC3497
Head Kit for 3.55 GPH (11.2 l/h), Series B, includes connections, STAINLESS STEEL housing and ball with ISOLAST O-ring	AAC3476	AAC3500

6.2.1.3 Head Kit - On Pumps With STAINLESS STEEL Head Material (Cont'd)

Descriptions - See Figure 6.1	USA Version Pump	Metric Version Pump
Head Kit for 3.55 GPH (11.2 l/h), Series B, includes connections, STAINLESS STEEL housing and ball with VITON O-ring	AAC3479	AAC3503
Head Kit for 3.55 GPH (11.2 l/h), Series B, includes connections, STAINLESS STEEL housing and ball with EPDM O-ring	AAC3482	AAC3506
Head Kit for 3.55 GPH (11.2 l/h), Series B, includes connections, STAINLESS STEEL housing and ball with ISOLAST O-ring	AAC3485	AAC3509

6.2.2 USA Connection Kit

Connection for:	Descriptions	Part Number
Suction & Discharge, 1/4" ID x 3/8" OD polyethylene tubing	Connector, straight, G3/8 to 3/8" OD tubing, PVDF with VITON O-ring	AAC2423
	Connector, straight, G3/8 to 3/8" OD tubing, PVDF with EPDM O-ring	AAC5096
	Connector, straight, G3/8 to 3/8" OD tubing, PVDF with ISOLAST O-ring	AAC5099
	Connector, straight, G3/8 to 3/8" OD tubing, POLYPROPYLENE with VITON O-ring	AAC2420
	Connector, straight, G3/8 to 3/8" OD tubing, POLYPROPYLENE with EPDM O-ring	AAC3512
	Connector, straight, G3/8 to 3/8" OD tubing, POLYPROPYLENE with ISOLAST O-ring	AAC3515
Suction & Discharge STAINLESS STEEL Kit consists of: Union Nut, G3/8 Clamping piece Tapered Part O-ring, Viton, EPDM, Isolast	Stainless Steel Connection Kit with VITON O-ring	AAC3518
	Stainless Steel Connection Kit with EPDM O-ring	AAC3521
	Stainless Steel Connection Kit with ISOLAST O-ring	AAC3524

6.2.3 Metric Connection Kit

Descriptions	Part Number
Complete set of Connector, straight, G3/8, PVDF with VITON O-ring 4 mm ID x 6 mm OD hose 6 mm ID x 8 mm OD hose	AAC3527
Connector, straight, G3/8 to 4 mm ID x 6 mm OD hose, PVDF with EPDM O-ring	AAC3533
Connector, straight, G3/8 to 4 mm ID x 6 mm OD hose, PVDF with ISOLAST O-ring	AAC3536
Connector, straight, G3/8 to 4 mm ID x 6 mm OD hose, POLYPROPYLENE with VITON O-ring	AAC3539
Connector, straight, G3/8 to 4 mm ID x 6 mm OD hose, POLYPROPYLENE with EPDM O-ring	AAC3542
Connector, straight, G3/8 to 4 mm ID x 6 mm OD hose, POLYPROPYLENE with ISOLAST O-ring	AAC3545
Connector, straight, G3/8 to 6 mm ID x 8 mm OD hose, PVDF with EPDM O-ring	AAC3551
Connector, straight, G3/8 to 6 mm ID x 8 mm OD hose, PVDF with ISOLAST O-ring	AAC3554
Connector, straight, G3/8 to 6 mm ID x 8 mm OD hose, POLYPROPYLENE with VITON O-ring	AAC3557
Connector, straight, G3/8 to 6 mm ID x 8 mm OD hose, POLYPROPYLENE with EPDM O-ring	AAC3560
Connector, straight, G3/8 to 6 mm ID x 8 mm OD hose, POLYPROPYLENE with ISOLAST O-ring	AAC3563
Connector, straight, G3/8 to 6 mm ID x 12 mm OD hose, PVDF with VITON O-ring	AAC3566
Connector, straight, G3/8 to 6 mm ID x 12 mm OD hose, PVDF with EPDM O-ring	AAC3569
Connector, straight, G3/8 to 6 mm ID x 12 mm OD hose, PVDF with ISOLAST O-ring	AAC3572
Connector, straight, G3/8 to 6 mm ID x 12 mm OD hose, POLYPROPYLENE with VITON O-ring	AAC3575
Connector, straight, G3/8 to 6 mm ID x 12 mm OD hose, POLYPROPYLENE with EPDM O-ring	AAC3578
Connector, straight, G3/8 to 6 mm ID x 12 mm OD hose, POLYPROPYLENE with ISOLAST O-ring	AAC3581
Stainless Steel Connection Kit with VITON O-ring with EPDM O-ring with ISOLAST O-ring	AAC3584 AAC3587 AAC3590

6.2.4 Valve Kits - USA and EURO Versions

6.2.4.1 Valve Kit Without Spring, PVDF Housing Material

Descriptions - See Figure 6.1	USA Version Pump	Metric Version Pump
Complete Valve assembly, Series B, no spring, includes connections, PVDF housing with GLASS BALL and VITON O-ring	AAC3593	AAB2863
Complete Valve assembly, Series B, no spring, includes connections, PVDF housing with GLASS BALL and EPDM O-ring	AAC3596	AAC3614
Complete Valve assembly, Series B, no spring, includes connections, PVDF housing with GLASS BALL and ISOLAST O-ring	AAC3599	AAB4639
Complete Valve assembly, Series B, no spring, includes connections, PVDF housing with CERAMIC BALL and VITON O-ring	AAC3602	AAB4630
Complete Valve assembly, Series B, no spring, includes connections, PVDF housing with CERAMIC BALL and EPDM O-ring	AAC3605	AAC3617
Complete Valve assembly, Series B, no spring, includes connections, PVDF housing with PTFE BALL and ISOLAST O-ring	AAC3608	AAB4636
Complete Valve assembly, Series B, no spring, includes connections, PVDF housing with STAINLESS STEEL BALL and EPDM O-ring	AAC3611	AAB4633

6.2.4.2 Valve Kit Without Spring, POLYPROPYLENE Housing Material

Descriptions - See Figure 6.1	USA Version Pump	Metric Version Pump
Complete Valve assembly, Series B, no spring, includes connections, POLYPROPYLENE housing with GLASS BALL and VITON O-ring	AAC3620	AAC3638
Complete Valve assembly, Series B, no spring, includes connections, POLYPROPYLENE housing with GLASS BALL and EPDM O-ring	AAC3623	AAC3641
Complete Valve assembly, Series B, no spring, includes connections, POLYPROPYLENE housing with GLASS BALL and ISOLAST O-ring	AAC3626	AAC3644
Complete Valve assembly, Series B, no spring, includes connections, POLYPROPYLENE housing with CERAMIC BALL and VITON O-ring	AAC3629	AAC3647
Complete Valve assembly, Series B, no spring, includes connections, POLYPROPYLENE housing with CERAMIC BALL and EPDM O-ring	AAC3632	AAC3650
Complete Valve assembly, Series B, no spring, includes connections, POLYPROPYLENE housing with PTFE BALL and ISOLAST O-ring	AAC3635	AAC3653

6.2.4.3 Valve Kit Without Spring, STAINLESS STEEL Housing Material

Descriptions - See Figure 6.1	USA Version Pump	Metric Version Pump
Complete Valve assembly, Series B, no spring, includes connections, STAINLESS STEEL housing and ball, VITON O-ring	AAC3656	AAC3665
Complete Valve assembly, Series B, no spring, includes connections, STAINLESS STEEL housing and ball, EPDM O-ring	AAC3659	AAC3668
Complete Valve assembly, Series B, no spring, includes connections, STAINLESS STEEL housing and ball, ISOLAST O-ring	AAC3662	AAC3671

6.2.4.4 Spring-Loaded Valve Kit, PVDF Housing Material

Descriptions - See Figure 6.1	USA Version Pump	Metric Version Pump
Complete Valve assembly, Series B, no spring, includes connections, PVDF housing with GLASS BALL and VITON O-ring	AAC3593	AAB2863
Complete Valve assembly, Series B, no spring, includes connections, PVDF housing with GLASS BALL and EPDM O-ring	AAC3596	AAC3614
Complete Valve assembly, Series B, no spring, includes connections, PVDF housing with GLASS BALL and ISOLAST O-ring	AAC3599	AAB4639
Complete Valve assembly, Series B, no spring, includes connections, PVDF housing with CERAMIC BALL and VITON O-ring	AAC3602	AAB4630
Complete Valve assembly, Series B, no spring, includes connections, PVDF housing with CERAMIC BALL and EPDM O-ring	AAC3605	AAC3617
Complete Valve assembly, Series B, no spring, includes connections, PVDF housing with PTFE BALL and ISOLAST O-ring	AAC3608	AAB4636
Complete Valve assembly, Series B, no spring, includes connections, PVDF housing with STAINLESS STEEL BALL and EPDM O-ring	AAC3611	AAB4633

6.2.4.5 Spring-Loaded Valve Kit, POLYPROPYLENE Housing Material

Descriptions - See Figure 6.1	USA Version Pump	Metric Version Pump
Complete Valve assembly, Series B, no spring, includes connections, POLYPROPYLENE housing with GLASS BALL and VITON O-ring	AAC3620	AAC3638
Complete Valve assembly, Series B, no spring, includes connections, POLYPROPYLENE housing with GLASS BALL and EPDM O-ring	AAC3623	AAC3641
Complete Valve assembly, Series B, no spring, includes connections, POLYPROPYLENE housing with GLASS BALL and ISOLAST O-ring	AAC3626	AAC3644
Complete Valve assembly, Series B, no spring, includes connections, POLYPROPYLENE housing with CERAMIC BALL and VITON O-ring	AAC3629	AAC3647
Complete Valve assembly, Series B, no spring, includes connections, POLYPROPYLENE housing with CERAMIC BALL and EPDM O-ring	AAC3632	AAC3650
Complete Valve assembly, Series B, no spring, includes connections, POLYPROPYLENE housing with PTFE BALL and ISOLAST O-ring	AAC3635	AAC3653

6.2.4.6 Spring-Loaded Valve Kit, STAINLESS STEEL Housing Material

Descriptions - See Figure 6.1	USA Version Pump	Metric Version Pump
Complete Valve assembly, Series B, 1.5 psi spring load, includes connections, STAINLESS STEEL housing and ball, VITON O-ring	AAC3737	AAC3746
Complete Valve assembly, Series B, 1.5 psi spring load, includes connections, STAINLESS STEEL housing and ball, EPDM O-ring	AAC3740	AAC3749
Complete Valve assembly, Series B, 1.5 psi spring load, includes connections, STAINLESS STEEL housing and ball, ISOLAST O-ring	AAC3743	AAC3752

6.2.5 Electrical Components

6.2.5.1 Motor 115 VAC, 60 Hz

Pump Series	Capacity - GPH	Power Rating - Watts	Part No.
B1	0.44	12	AAC5141
B2	0.79		
B3	1.52		
B4	1.36	20	AAC5138
B5	2.28	30	AAC5144
B6	3.35		

6.2.5.2 Motor 230 VAC, 50 Hz

Pump Series	Capacity - LPH	Power Rating - Watts	Part No.
B1	1.4	12	AAC5156
B2	2.5		
B3	4.8		
B4	4.3	20	AAC5153
B5	7.2	30	AAC5159
B6	11.2		

6.2.5.3 Electronic Board and Accessories - 115 VAC, 60 Hz

Pump Series	Description	Part No.
All Sizes	Front plate and electronic board	AAD1223
B1, B2, B3	Capacitor - 1.2 μ F	AAD1226
B4	Capacitor - 2.2 μ F	AAD1220
B5, B6	Capacitor - 2.7 μ F	AAD1229
All Sizes	Fuse - 115 V, 400 mA	AAC7124

6.2.5.4 Electronic Board and Accessories - 230 VAC, 50 Hz

Pump Series	Description	Part No.
All Sizes	Front plate and electronic board	AAD1250
B1, B2, B3	Capacitor - 0.33 μ F	AAD1253
B4	Capacitor - 0.56 μ F	AAD1247
B5, B6	Capacitor - 0.82 μ F	AAD1256
All Sizes	Fuse - 250 V, 250 mA	AAC7133

6.3 Accessories

6.3.1 Suction Lance Assembly With Double Empty Signal Report Without Return Connection

NOTE: Check the height of the container to be used and order the suction pipe assembly that is more or less six inches higher than the container.

Length	Tube, O-ring and ball material	Part Number
21.25 inches/ 540 mm	PVC, Viton, Glass Ball	AAB5194
29.5 inches/ 750 mm		AAB5197
38 inches/ 970 mm		AAB5203
44.3 inches/1125 mm		AAB5206

Includes the following features:

- a. Check valve
- b. Suction Strainer
- c. Level pre-warning Contact
- d. Empty Signal Contact, normally close
- e. Hose Connection (4/6mm, 6/8mm)

Material and Specifications:

- a. Tube Diameter, 16 mm
- b. Connection Cable, 3-pin plug with 1 ½ ft cable
- c. Turn-on voltage, 48V AC/DC maximum
- d. Current, 0.5 amps.
- e. Rupturing Capacity, 8 W/ 8VA

6.3.2 Suction and Discharge Lines and Fittings

Tubing Size and Material	Maximum Pressure	Part Number
PVC Duo Hose, 6/10 mm x 2 m (6 1/2 ft.) Thrust piece, PVDF Taper part, PVDF Union nut, G3/8, PVDF	120 psi (8 bar)	AAB5632 AAC2411 AAC2408 AAB2872
U.S. tubing 3/8" OD x 1/4" ID polyethylene tubing 1/4" OD x 0.040" thick	165 psi at 70° F 125 psi (8 bar)	RP684818 RP684447
1/4" OD tubing to 1/4" NPT male Straight polypropylene fitting 90° elbow polypropylene fitting		U28045 U28046
1/4" OD tubing to NPT, female PVDF PVC		U23492 U22615
3/8" OD tubing to 1/4" NPT male Adapter, straight, PVC Adapter, 90° elbow Coupling nut (required one per adapter)		P39233 P39235 PXB39234
Metric Tubing 4/10 mm, PVC-fabric 6/10 mm, PVC-fabric 4/6 mm, Polyethylene tubing 6/8 mm, Polyethylene tubing	360 psi (24 bar) 345 psi (23 bar) 150 psi (10 bar) 120 psi (8 bar)	RP9184471 RP9184477 RP9114435 RP9114451

6.3.3 Wall Mounting Bracket

Description	Part Number
Wall bracket with mounting hardware, ABS	AAC7594
Wall bracket only, ABS	AAC4696

6.3.4 Vented Riser Kit

Description	Part Number
Vented Riser Installation Kit	AAC8744

6.3.5 Foot Valve and Strainer

NOTE: Position the foot valve strainer vertical and at the lowest point of the container.

If agitation is used, use rigid pipe to prevent tubing to become entangled with the propeller.

Order rigid pipe adapter U22615 (1/4" NPT) PVC or U23492 (1/4" NPT) PVDF.

Suction lance is recommended for rigid piping installation. must be fastened securely on top of the storage tank.

Material	Connection	Poppet	O-rings	Part Number
PVC valve holder and Polypropylene screen	1/4" ID x 3/8" OD	Kynar	Viton	U23044
PVDF valve holder and Polypropylene screen	1/4" ID x 3/8" OD	Kynar	Kalrez	U28746
*PVC in-line filter with polypropylene screen and fine filter media	Outlet and inlet connections - 1/4" ID x 3/8" OD and 1/2" FNPT	----	Viton	AAC8753

6.3.6 Back Pressure Valve

Housing Material	Connections	Maximum Flow	Pressure Range & Temperature Limits	Diaphragm & O-ring	Part Number
PVC	1/4" NPT inlet and outlet	5.5 gph	25 to 170 psi 35 - 120° F	TFE-faced Hypalon O-ring	U25775
Kynar			25 to 170 psi 35 - 180° F	TFE-faced Viton O-ring	U25778
Kynar			25 to 170 psi 35 - 180° F	TFE-faced Isolast O-ring	U27400

6.3.7 Pressure Relief Valve

Housing Material	Connections	Maximum Flow	Pressure Range & Temperature Limits	Diaphragm & O-ring	Part Number
PVC	1/4" NPT inlet and outlet	5.5 gph	25 to 170 psi 35 - 120° F	TFE-faced Hypalon O-ring	U25776
Kynar			25 to 170 psi 35 - 180° F	TFE-faced Viton O-ring	U25777
Kynar			25 to 170 psi 35 - 180° F	TFE-faced Isolast O-ring	U27401

6.3.8 Degassing Valve

NOTE: De-gas valve, AAC5822, is compatible with both U.S. and metric connections.

The de-gas valve kit is available for Chem-Ad series B2 through B6 pump capacities ONLY. It is not available as an optional accessory for series B1.

Description	Part Number
De-gas Valve Installation Kit	AAC5822

6.3.9 MultiFunction Valve

NOTE: For U.S. connection (3/8" OD x 1/4" ID polyethylene tubing) order two pieces of thrust piece, AAC5663 and use the union nut and taper piece supplies with the valve.

6/12 mm tubing connection sets are supplied with the valve.

The valve connects directly to the top of the discharge valve, G3/8.

Housing and O-ring Material	Pressure Relief Range	Part Number
PVDF Housing Viton O-ring	15-17 psi (1-5 bar)	AAB5248
	75 - 150 psi (5-10 bar)	AAB5251
PVDF Housing EPDM O-ring	15-17 psi (1-5 bar)	AAB5254
	75 - 150 psi (5-10 bar)	AAB5257
Polypropylene Housing Viton O-ring	15-17 psi (1-5 bar)	AAB5263
	75 - 150 psi (5-10 bar)	AAB5266
Polypropylene Housing EPDM O-ring	15-17 psi (1-5 bar)	AAB5269
	75 - 150 psi (5-10 bar)	AAB5662

6.3.10 Main Connections

Connections	Material	Flow Capacity GPH	Part Number
3/8" OD tubing	PVC	5.5	U21846
3/8" OD tubing	Kynar	5.5	U24769

6.3.11 Calibration Column

Flow Rate	Capacity	End Connections	Part Number
0-1.5 GPH	100 mL	1/2" FNPT	AAC2543
0-4 GPH	250 mL	1/2" FNPT	AAC2546
0-8 GPH	500 mL	3/4" FNPT	AAC2549

6.3.12 Electrical Cable Assemblies

Description	Part Number
Connection cable assembly, 16.4 ft/ 5 M length	
For empty signal input with straight 4-pin plug	AAB6112
For pulse input with straight 4-pin plug	AAB6115
For pulse or current input, with straight 5-pin plug	AAB6118
For empty signal or stroke signal output with straight 4-pin plug	AAB6121

6.3.13 Signal and Alarm Cable Connectors

Description	Part Number
Connector I, 4-pin, empty signal input and empty pre-warning input	AAB2899
Connector II, 5-pin, 0/4-20mA input or pulse input	AAB2905
Connector III, 4-pin, empty signal output and pulse signal output	AAB2902

6.3.14 E60^{Plus} Upgrade Kits and Accessories

NOTE: E60^{Plus} upgrade kits, AAC9446 and AAC9443, include (1) OGM^{PLUS} kit and (1) ICP.

The OGM^{PLUS} kits, AAC8783 and AAC8798, include (1) OGM^{PLUS}, (1) mounting bracket, (1) connection cable, and (2) connection sets. All other components listed are individual replacement parts only.

Description	Part Number
E60 ^{Plus} Upgrade Kit (U.S. Connection)	AAC9446
M60 ^{Plus} Upgrade Kit (Metric Connection)	AAC9443
OGM ^{PLUS} Kit (U.S. Connection)	AAC8783
OGM ^{PLUS} Kit (Metric Connection)	AAC8798
Intelligent Control Pack (ICP)	AAC8774
Connection Cable (From OGM to ICP)	AAC8780
OGM ^{PLUS} (U.S. and Metric)	AAC8840
OGM ^{PLUS} Mounting Bracket	AAC8855
OGM ^{PLUS} Connection Set (U.S.)*	AAC8813
OGM ^{PLUS} Connection Set (Metric)*	AAC8825

* order 2 sets per OGM.