



# Operating instructions

## Motor-Diaphragm Dosing Pumps Types MEMDOS E/DX



Operating instructions  
MEMDOS E/DX  
Lutz-Jesco GmbH, 2003

Address:  
Lutz-Jesco GmbH  
Am Bostelberge 19  
D-30900 Wedemark  
PO Box 10 01 64  
D-30891 Wedemark

Tel.: +49 (0) 51 30 58 02-0  
Fax: +49 (0) 51 30 58 02 68  
E-Mail: [info@jesco.de](mailto:info@jesco.de)  
Internet: [www.jesco.de](http://www.jesco.de)

24h-Hotline:

## Content

<b>1. Safety</b>	<b>5-7</b>
1.1 General	5
1.2 Warnings used in this Operating Manual	5
1.3 Qualification and training of personnel	5
1.4 Hazards due to non-compliance with safety instructions	5
1.5 Safe operation	5
1.6 Safety instructions for the owner/operator	5-6
1.7 Safety instructions for inspection, maintenance and installation work	6
1.8 Unauthorized modification and production of spare parts	6
1.9 Impermissible modes of operation	6
1.10 Dosing of chemicals	6-7
1.11 Scope of delivery	7
<b>2. General, purpose</b>	<b>7-8</b>
<b>3. Functional</b>	<b>8</b>
<b>4. Technical data</b>	<b>8-10</b>
4.1 Technical data	8
4.2 Technical data of the control unit for MEMDOS DX	9
4.3 Motor data	9
4.4 Technical data ATE (optional at MEMDOS E)	10
<b>5. Performance curves</b>	<b>11-12</b>
<b>6. Type codes</b>	<b>13-14</b>
<b>7. Installation</b>	<b>15-19</b>
7.1 General notes of instruction	15
7.1.1 Installation of MEMDOS E with ATE-servomotor	15
7.2 Installation location	16
7.3 Drain pipe	16
7.4 Injection fitting assembly	16-17
7.5 Electrical connection	17-18
7.5.1 Circuit diagrams ATE-servomotors	18
7.6 Installation example	19
<b>8. Operating</b>	<b>19-21</b>
8.1 Operating panel MEMDOS DX	19
8.2 Switchon / off	20
8.3 Selection of operating mode	20
8.4 Alarm	20-21
8.5 Factory setting	21
<b>9. Stroke length adjustment</b>	<b>21</b>
<b>10. Start up</b>	<b>21-22</b>
10.1 Start up of MEMDOS E with ATE-servomotor	22

<b>11. Maintenance</b> .....	<b>22-25</b>
11.1 Lubrication .....	22
11.2 Maintenance of bearings .....	22
11.3 Replacing the diaphragm... ..	22-23
11.4 Circuit diagram electronic MEMDOS DX .....	24-25
<b>12. Explosion-proof dosing pumps</b> .....	<b>25</b>
12.1 General .....	25
12.2 Special conditions .....	25
12.3 Dosing of flammable media .....	25
<b>13. Spare parts</b> .....	<b>25</b>
<b>14. Troubleshooting</b> .....	<b>26</b>
<b>15. Certificate of conformity</b> .....	<b>27-29</b>

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## 1. Safety

### 1.1 General

This Operating Manual contains basic information to be noted during installation, operation and maintenance. It is therefore essential that the Manual be read by the fitter before installing and commissioning the pump/system, as well as by the relevant operating personnel / owner of the pump/system. It must remain accessible at the pump/system for reference at all times.

In addition to the general safety instructions set out under this main heading Safety, the special safety precautions set out under the other main headings must also be observed, for instance in conjunction with private use.

### 1.2 Warnings used in this Operating Manual

This Operating Manual contains warnings which may endanger persons, the environment and the pump/system if they are disregarded. These warnings are identified by the hazard symbol



safety mark in accordance with DIN 4844-W9

The following symbol is used in conjunction with electric power



safety mark in accordance with DIN 4844-W8

The word

**Caution**

appears in conjunction with safety instructions which may endanger the machine and its operation if disregarded.

Markings which are affixed directly to the pump, such as

- Direction of rotation arrow
- Markings for fluid connections

### Note

Draws attention to supplementary information to make the work easier and ensure troublefree operation.

### 1.3 Qualification and training of personnel

The personnel employed for operation, maintenance, inspection and installation must be suitably qualified for this work. The areas of responsibility, competence and supervision of the personnel must be precisely defined by the owner. Personnel who do not have the requisite know-how must be duly trained and instructed. If necessary, this can also be undertaken by the manufacturer/supplier on behalf of the pump's owner. In addition, the owner must also ensure that the relevant personnel are fully familiar with and have understood the contents of the Operating Manual.

### 1.4 Hazards due to non-compliance with the safety instructions

Failure to comply with the safety instructions may endanger not only persons, but also the environment and the pump/system. Non-compliance with the safety instructions can lead to the loss of all entitlement to damages.

The following hazards in particular may arise:

- Failure of major pump/system functions.
- Failure of specified methods for maintenance and repair.
- Danger to persons due to electrical, mechanical and chemical effects.
- Danger to the environment due to leakage of hazardous substances.

### 1.5 Safe operation

The safety instructions contained in this Operating Manual must be observed. The owner is responsible for ensuring compliance with local safety regulations.

### 1.6 Safety instructions for the owner/operator

- If hot or cold machine parts are a source of danger, precautions must be taken by the customer to prevent contact.
- Guards on moving parts must not be removed when the machine is in operation.

- Leakages (e.g. at the shaft seal) of hazardous substances (e.g. explosive, toxic, hot substances) must be discharged in such a way as to exclude all danger to persons and the environment. Statutory regulations must be observed.
- Danger due to electric power must be excluded (for further details, refer to the VDE regulations and the regulations of the local public utilities).
- Separate regulations must be observed if the dosing pumps are operated in explosion-hazard areas. The explosion hazard must be defined (classification of zones) and appropriate equipment selected by the owner. Further information can be found in section 7.1 (Installation), section 7.5 (Electrical connection) and section 12 (Explosion-proof dosing pumps).

### **1.7 Safety instructions for inspection, maintenance and installation work**

The owner must ensure that all maintenance, inspection and installation work is undertaken by authorized and duly qualified skilled personnel who have also studied the Operating Manual in depth.

The pump must always have come to a complete stop before starting any work on the pump. The procedure specified in the Operating Manual for shutting down the pump/system must be observed without fail.

Pumps or units in contact with potentially harmful media must be decontaminated.

All safety mechanisms and guards must be refitted and reactivated as soon as the work is complete.

Particular care must be taken when repairing dosing pumps which are used in explosion-hazard areas. Due to the risk of sparking, care must be taken to prevent metal parts or tools knocking against one another. The dosing pump should preferably be moved out of the explosion-hazard area in order to be repaired.

The points set out in the section Installation and commissioning must be observed before starting the pump/system.

### **1.8 Unauthorized modification and production of spare parts**

The machine may only be modified or converted in consultation with the manufacturer. Genuine spare parts and accessories authorized by the manufacturer ensure greater safety. Liability for damage or loss may be extinguished if other parts are used.

### **1.9 Impermissible modes of operation**

The operational safety of the pump supplied can only be guaranteed when it is used in conformity with its intended use as specified in our contract documents, especially the letter confirming the order. The limit values specified in these documents must never be exceeded.

### **1.10 Dosing of chemicals**



- When working on dosing installations, the local safety rules must be observed (e.g. wear personal protective clothes).
- Before working on the dosing pump and plant, disconnect it from the mains supply and protect it against reconnection. Before the power supply is switched on again, the dosing lines must be connected so that any chemical left in the dosing head cannot spurt out.
- The dosing head of the pump as well as connections and lines of the plant may be under pressure. Working on the dosing plant requires special safety precautions and may only be carried out by instructed technical personnel.
- Before startup, all screwed connections must be checked for correct tightness and, if necessary, must be tightened up using appropriate tools.
- If connections at the dosing head are unscrewed during operation for venting or other reasons, leaking chemical must be removed professionally. This is the only way to avoid the danger of physical injury and corrosion at the dosing pump. Leaking chemical might also destroy the diaphragm at its mounting points.

- When changing the chemical, check whether the materials used for the dosing pump and the other plant parts are chemically resistant. If there is the danger of a chemical reaction between different media, a thorough cleaning first is mandatory.
- To operate the pump mount the fan shell in order to ensure sufficient cooling of the motor.
- Protective class of the control unit is only reached if ports are protected by caps or serial plug-in connectors are used.

**Note**

Under certain operating conditions, the drive motor of the DX version might warm up considerably. To avoid unintentional contact, provide an appropriate device.



- Adjustment works in the interior of the ATE drive (optional at MEMDOS E) must be carried out carefully. Connections and internal limit switches might be "alive".
- Additional limit switches might be "alive" even with the auxiliary voltage switched off (ATE-drive).



- After installation works at the ATE servomotor or before startup remount the cover.

### 1.11 Scope of delivery

**Note**

Please unpack the dosing pump and ordered accessories carefully in order not to miss small parts. Immediately compare the scope of delivery to the delivery note. If there are any discrepancies, try to find out the reason.

For the transportation of the dosing pumps, no special fittings are required. It is, however, advisable to choose a transportation method, which is appropriate for the weight of the dosing pumps (e.g. wagon). During transportation without oil, the dosing pump should be lying. Otherwise it must be tightened to the transportation device.

### 2. General, purpose

The MEMDOS E/DX may only be used in accordance with the specifications in the Technical Data. Local regulations must be observed. Suitable materials must be selected. The operating manual must be consulted for installation, commissioning and maintenance of the dosing pump.

Dosing pumps are produced according to highest quality standards and have a long service life. Nevertheless some parts are subject to wear (e.g. diaphragm, valve seats, valve balls). To ensure long operating life, visual checks are required regularly. Operating and maintenance personnel must be able to access the pump easily.

The MEMDOS E can be operated in explosion-hazard areas of zone 1 if the corresponding drive is taken into account. Further information can be found in the operating manual.

Diaphragm dosing pumps from the MEMDOS series are used in industry, in the process engineering sector, as well as in water and wastewater processing.

Two models of the MEMDOS E/DX are available:

1. 0...4 bis 0...160 l/h

and

2. 0...160 bis 0...380 l/h

- If no control is required for constant metering, the motor is connected directly to the terminal box. In this case, MEMDOS E pumps are used. Three-phase and a.c. motors are available. To change the dosing capacity, either the stroke length can be adjusted from 0 to 100% or the speed of the three-phase motor can be controlled by means of a separate frequency converter. The MEMDOS E is optionally available with remote electrical adjustment of the stroke length (ATE).
- The "intelligent" MEMDOS DX is used if the pump is to be integrated in controls or automatic control systems. MEMDOS DX allows the adaption to a large number of different control signals and system monitoring equipment. The signals required for external activation of the pump can be simple voltage-free closing contacts from water meters or controllers or analog 0(4)...20 mA signals. For control by contacts (pulse control) the stroke frequency can be changed using pulse division or multiplication. For internal control (own stroke), the MEMDOS DX can be adjusted continuously between 0 and max. 142 strokes/min, depending on the version.

### 3. Functional

The gear contains a single-stage worm wheel set running in an oil bath just as the roller bearings. Dosing happens while the push rod is displaced by means of an eccentric. The suction stroke is caused by the resetting of the spring. The stroke length is adjusted by limiting return travel of the poppet using a manually adjustable eccentric as stop. An adjustment range from 0 to 100% is possible.

## 4. Technical data

### 4.1 Technical data

Types	MEMDOS E / DX 4...156											MEMDOS E / DX 160...380					
	4	8	15	25 <sup>2)</sup>	26 <sup>1)</sup>	50	75 <sup>2)</sup>	76 <sup>1)</sup>	110	150 <sup>2)</sup>	156 <sup>1)</sup>	160	200	260 <sup>2)</sup>	300	380 <sup>2)</sup>	
Capacity at max. pressure <sup>4)</sup>	l/h	4	7.5	15	23	23	48	72	72	107	160	160	156	208	263	292	393
Stroke volume	ml/str	2.6			8.5			19			36.5			51.2	54.5		
Max. pressure	bar	10					5		4		10			8		6	
Stroke freq. <sup>4)</sup>	1/min	26	48	95	142	142	95	142	142	95	142	142	71	95	120	95	120
Diaphragm-ø	m m	52			64			90			120			150			
Stroke length	m m	6			9			10									
Suction lift	mbar	900			800			700			600			450			
Max. ambient temperature <sup>3)</sup>	°C	40															
Capacity E (3~)	W	50					250					370					
Capacity DX (1~)	W	50					120					250					
Weight plastic	kg	7.4			7.6			10.2			18.0			19.0			
Memdos E		8.0			9.2			18.2			26.0			31.0			
Weight SS	kg	8.2			8.4			11.0			22.0			23.0			
Memdos DX		8.8			10.0			19.0			30.0			35.0			

<sup>1)</sup> Special sizes for 60 Hz operation. Flow rate and stroke frequency data refer to 60Hz operation.

<sup>2)</sup> Not suitable for 60Hz operation.

<sup>3)</sup> Ambient temperature for PVC metering head 40°C and for PP or stainless steel metering heads 60°C (for a short time 80°C).

<sup>4)</sup> At 60 Hz operation the values increase by factor 1.2.

#### 4.2 Technical data of the control unit for MEMDOS DX

Mains voltage	95...264V AC, 48...63 Hz
Electrical connection	Safety plug with 2.5 m cable
Power consumption (without motor)	10 W
Insulation class	F
Protective class	IP 65 *
Pulse for contact activation	min. 30 ms
Voltage at pulse input	5V DC (must be voltage-free for contact making)
Multiplication / division of contacts	1 / 2 / 4 / 8 / 16 / 32 / 64
Load for 0(4)...20 mA input	150 Ohm
Voltage at level connection	5V DC (level probe w. break contact for alarm empty)
Alarm relay, voltage-free changeover contact	250V AC, 2.5 A or 30V DC, 2.5A
Remote pump switchoff	by voltage-free break contact (on site)
Max. admissible ambient temperature	40°C
Digital display	3-digit display for stroke frequency and level state
LEDs for functional display, 3 off	green = in operation, red = trouble, green = external control
Pressure-sensitive keypad	4 keys for programming and operation
Weight	0.8 kg

\* if ports protected by caps or with serial plug-in connectors.

#### 4.3 Motor data

##### Electrical motor data MEMDOS DX

DX	4...156	160...380
Standard motor, Type	ABF 63/4B-7R	EB20RW71A4
Speed [min.- <sup>1</sup> ]	1390	1400
Voltage [V]	1x230	1x230
Nominal current [A]	1.3	2.3
Power, P2 [kW]	0.12	0.25
Frequency [Hz]	50	50
Protection class	IP 55	IP 55
Isolation class	F	F

##### Electrical motor data MEMDOS E

E	4...25	50...156	160...380
Standard motor, Type	AF63/4A-7R	AF63/4C-7R	K21R7164
Speed [min.- <sup>1</sup> ]	1400		1430
Voltage [V]	230/400		230/400
Nominal current [A]	0.86/0.5	1.5/0.9	1.75/1.0
Power, P2 [kW]	0.05	0.25	0.37
Frequency [Hz]	50		50
Protection class	IP 55		IP 55
Isolation class	F		F

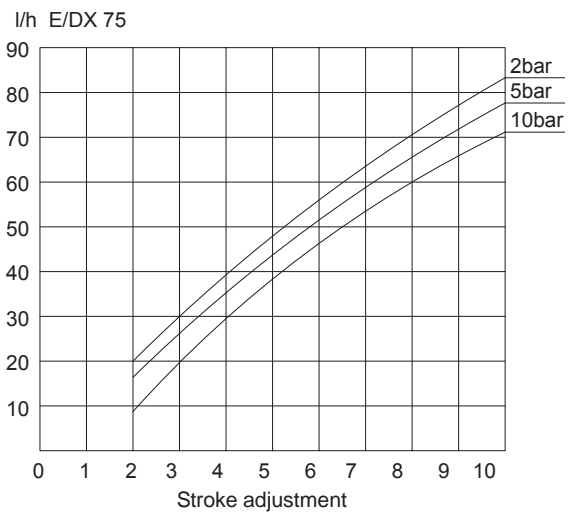
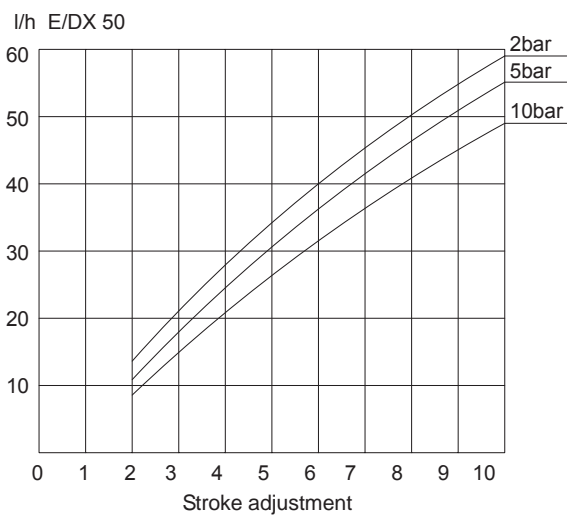
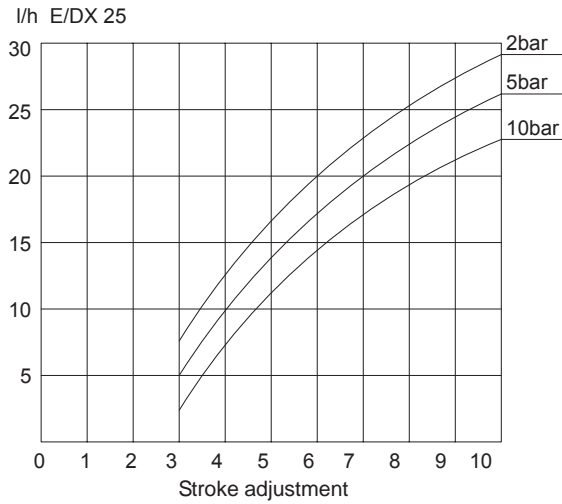
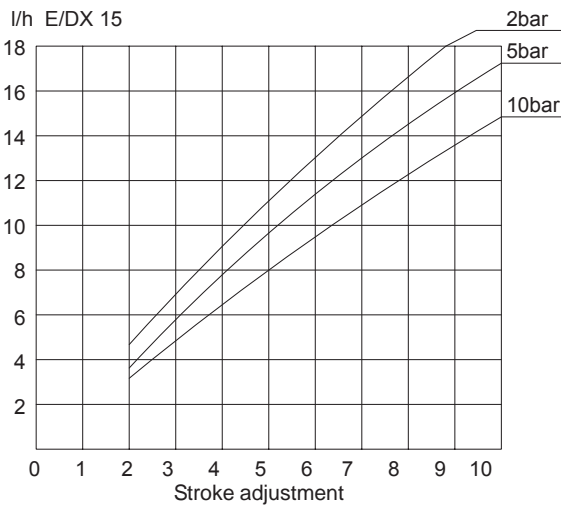
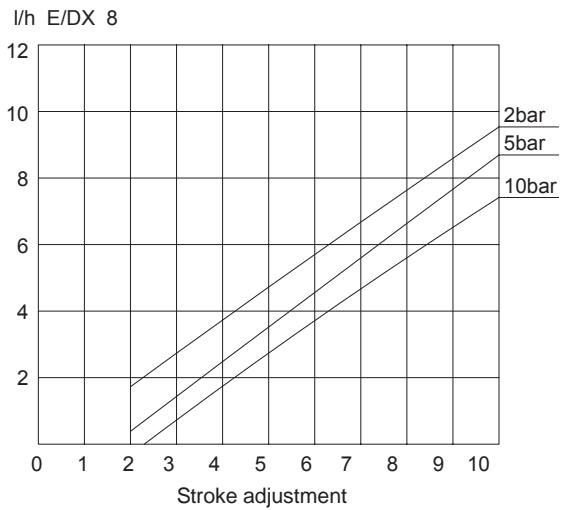
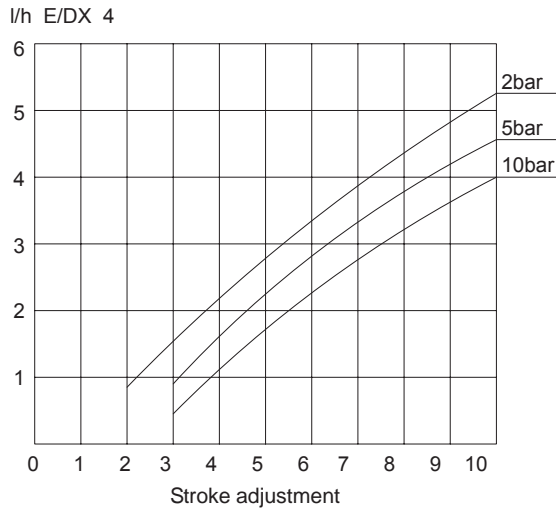
#### 4.4 Technical data ATE (optional at MEMDOS E)

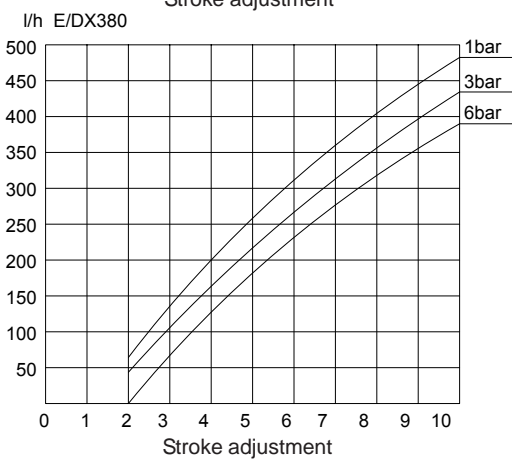
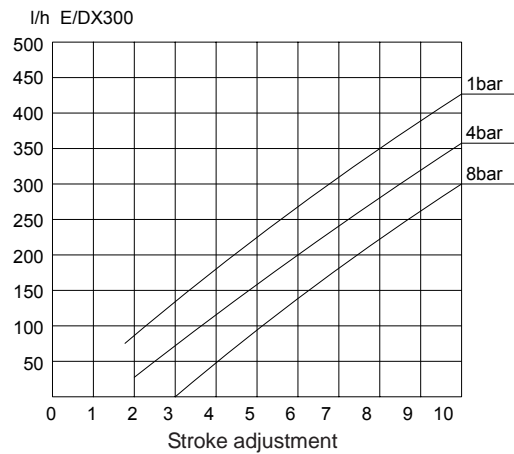
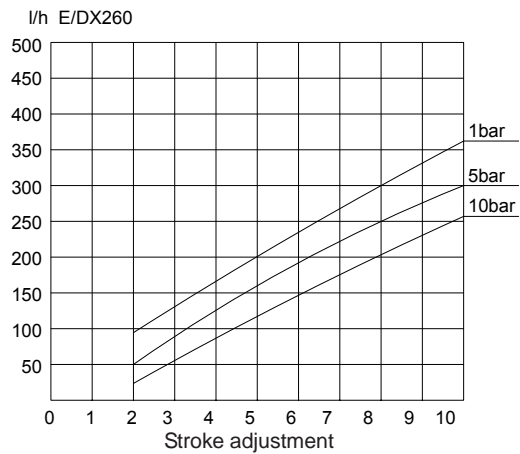
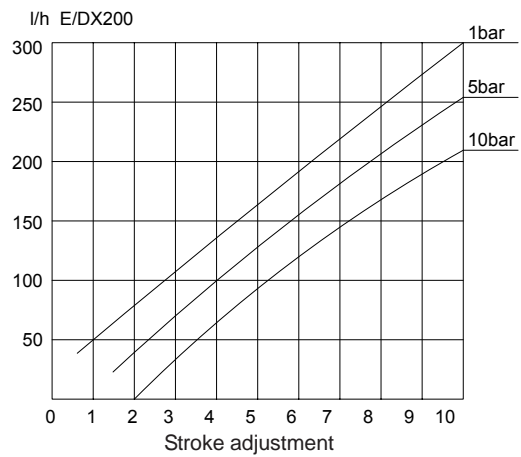
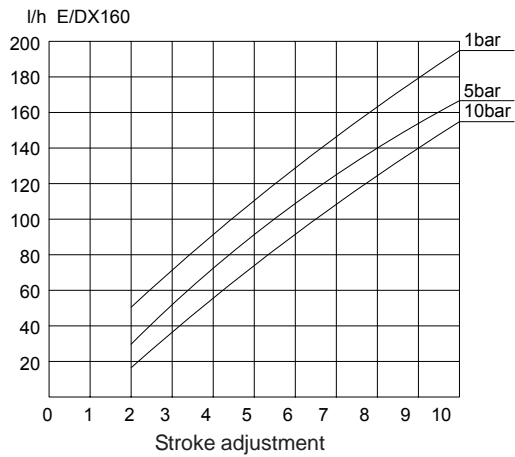
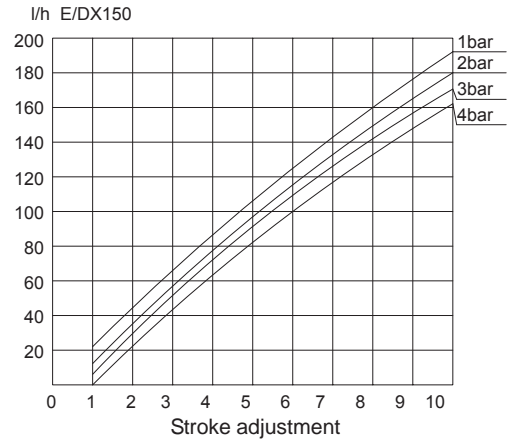
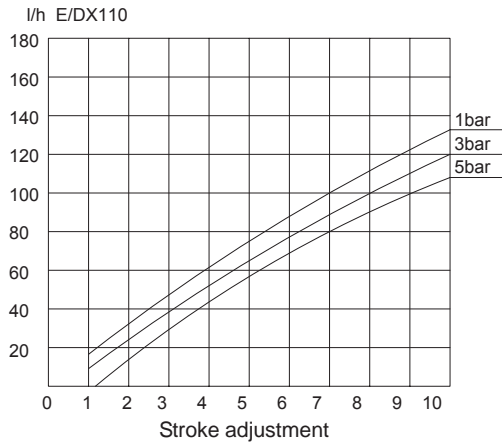
Pump type	Memdos E 4 ... 156		Memdos E 160 ... 380	
Servomotor	KNG 2.60	KNG 2.60 ST	KNG 2.100	KNG 2.120 ST
Part No.	79073	79082	79080	79098
Mechanical design	Reversible servomotor with self-locking step-down gear. Connections led out via cables (900 mm). Angle of rotation limited by two internal limit position switches.			
Use	For controllers with switching output (3-point step control).	For controllers with continuous output 0/2...10V or 0/4...20 mA (switchable).	For controllers with switching output (3-point step control).	For controllers with continuous output 0/2...10V or 0/4...20mA (switchable)
Torque	8 Nm		10 Nm	
Voltage	230VAC +/-10% 50/60 Hz	24 VAC +/-10% 50/60 Hz	230 VAC +/-10% 50/60 Hz	24 VAC +/-10% 50/60 Hz
Input impedance at voltage input	-	100 kOhm	-	100 kOhm
Burden at current input	-	500 Ohm	-	500 Ohm
Power consumption	4 VA	7.5 VA	4 VA	7.5 VA
Regulating time / bevel	180s (150s) / 270° = 0...100%		360s (300s) / 270° = 0...100%	
Load limit of the voltage output	-	max. 0.5 A	-	max. 0.5 A
Position repeating signal for remote display max.	0...1000 Ohm 2Watt at $t_u=40^\circ\text{C}$	0-10 VDC for control with 0...10 V and 0...20 mA. 2...10 VDC for control with 2...10 V and 4...20 mA.	0...1000 Ohm 2Watt at $t_u=40^\circ\text{C}$	0-10 VDC for control with 0...10 V and 0...20 mA. 2...10 VDC for control with 2...10 V and 4...20 mA.
Type of protection	IP 54			
Ambient temperature	-10 to +60° C			
Weight	0.6 kg			

### 5. Performance curves

The flow rate depends on the viscosity of the medium and the hydraulic installation conditions. The performance curves refer to water at 20° C and a suction lift of 0.5m.

Output valid for 50 Hz; at 60 Hz higher by factor 1.2.





### 6. Type codes (Size I)

Capacity/ Nominal size	Head	Capacity adjustment	Electrical drive	Suction valve Discharge valve	Suction connection	Discharge connection
0004 - 4 0008 - 8 0015 - 15 0025 - 25 0050 - 50 0075 - 75 0110 - 110 0150 - 150	C - PVC P - PP V - PVDF S - stainl.steel 1.4571 Z - special material	M - Man.-adj. E - El.-adj. (ATE) Z - Special-adj.	Three-phase-motor 0,05 kW E 4 ... E 50: A - 400/50/55/F standard motor E 75 ... E 150: Three-phase-motor 0,25 kW B - 400/50/55/F standard motor	Double-ball valves with seals made of: 1 - Hypalon 2 - Viton 3 - PTFE 4 - AF Spring-loaded single ball valves with seals of: 5 - Hypalon 6 - Viton 7 - PTFE 8 - AF 9 - Special valve	Tubing connection A - d 4/6 B - d 6/12 Hose liner E - d 6 G - d 9 Cemented connection J - d 10 K - d 12 L - d 16 Threaded connection N - G 1/4 O - G3/8 Screw connection (Ermeto) R - d 8 T - d 10 Flanged connection V - DN 15	C - 6/8 D - 6/9 H - d 16
E 4 ... E 150: N - 400/50/55/F explosion-proof, increased safety E Ex e II T3 O - 400/50/55/F explosion-proof, air-tight E Ex de II C T4 R - 230/50/55/F A.C. motor. Type of circuit: S 601			Z - special drive DX 4 ... DX 25: T - 230/50/55/F A.C. motor 0,05 kW S601 DX 50 ... DX 150: U - 230/50/55/F A.C. motor 0,12 kW S601			

Frames indicate the Standard version, e.g.:

For order example and explanation see general "Match Code System" page.

### Type codes (Size II)

Capacity/ Nominal size	Head	Capacity adjustment	Electrical drive	Suction valve Discharge valve	Suction connection	Discharge connection
0160 - 160 0200 - 200 0260 - 260 0300 - 300 0380 - 380	P - PP S - st. Steel 1.4571 Z - special material	M - Man.-adj. E - El.-adj. (ATE) Z - special-adj.	Three-phase-motor 0,37 kW C - 400/50/55/F standard motor	Double-ball valves with seals made of: 1 - Hypalon 2 - Viton 4 - AF  Spring-loaded single ball valves with seals made of: 5 - Hypalon 6 - Viton 8 - AF  9 - Special valve	Hose liner G - d 9 H - d 16 Cemented connection L - d 16 M - d 20 F - d 25 Threaded connection O - G 3/8 P - G 1/2 Q - G 3/4 Flanged connection V - DN 15, PN 16 Z - special connection	
N - 400/50/55/F explosion-proof, increased safety E Ex e II T3						
O - 400/50/55/F explosion-proof, air-tight E Ex de II C T4						
A.C. motor W - 230/50/55/F Type of circuit S 601 0.25 kW ( Standard motor for DX 160 ... 380 )			Z - Special drive (other electrical data)			
Frames indicate the Standard version, e.g.: <input type="text" value="P-PP"/>						
For order example and explanation see general "Match Code System" page.						

## 7. Installation

### 7.1 General notes of instruction

For the selection of a dosing pump when designing a plant as well as for the installation and operation, the local rules must be observed. This applies to the selection of suitable pump materials, the handling of the chemicals and the electrical installation.

Before installing the pump in explosion-hazard areas, the dosing pump must be checked to ensure that it meets with the minimum requirements imposed by the applicable explosion protection regulations. For this purpose, the data on the rating plate of the dosing pump must be compared with the local requirements.

At the same time the technical data of the dosing pump (see chapter 4) must be taken into consideration, and the plant must be designed correspondingly (e.g. pressure loss in lines depending on nominal diameter and length).

The designer and the user are responsible to make sure that the whole plant including the dosing pump is constructed so that neither plant equipment nor buildings are damaged severely in the case of chemical leakage due to the failure of wear parts (e.g. diaphragm rupture) or burst tubing. If the chemical plant represents a potential source of danger, the installation must be carried out so that no unreasonably high consequential damages occur even if the dosing pump fails. Therefore we recommend to install leakage probes and containment tanks.

Dosing pumps are produced according to highest quality standards and have a long service life. Nevertheless some parts are subject to wear (e.g. diaphragm, valve seats, valve balls). To ensure long operating life, visual checks are required regularly. Operating and maintenance personnel must be able to access the pump easily. Periodic maintenance protects the dosing pump against shutdowns.

To increase the dosing accuracy and to ensure the functional reliability, we recommend to use additional fittings. These include backpressure valves, relief valves, leakage probes, low level indicators and especially pulsation dampers to prevent pressure surges, as shown in the installation examples (chapter 7.6).

Always use appropriate tools for the installation of plastic connecting parts. To avoid damage, never apply excessive force. Plastic parts (especially PVC parts) can be screwed and unscrewed more easily if the thread is lubricated with silicone grease before.

#### Note

For this purpose, the compatibility with the chemical to be metered must be checked.

#### 7.1.1 Installation of MEMDOS E with ATE-servomotor

The ATE servomotor is connected to the pump and adjusted in the factory.

For installation a sufficient mounting space of at least 150 mm must be provided for later maintenance works.

The electrical connection of the ATE drive must correspond to the local rules and may only be carried out by technical personnel.

The circuit diagrams (chapter 7.5.1) show the two basically realizable possibilities of connection.

Cable type and cable cross section must be chosen according to the motor data.

The cable passage to the motor terminal box must be made professionally. We recommend gland screw connections with traction relief.

The required protection class must be ensured by professional installation of the electrical connections.

#### Caution

Please take into account that the ATE drive can only be controlled with the main motor running, i.e.: the ATE drive must be locked electrically. Otherwise the adjusting eccentric wears out frequently or is destroyed.

## 7.2 Installation location

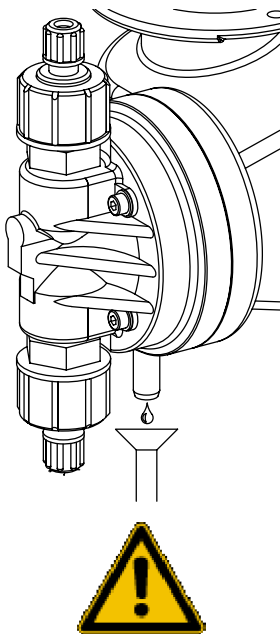
### Caution

Ambient temperatures exceeding 40°C are not permitted. Radiant heat of apparatus and heat exchangers must be shielded so that the dosing pump can still dissipate its own heat sufficiently. Exposure to direct sunlight must be avoided. If the dosing pump is installed outside, provide a roof to protect it against weather.

Mount the pump so that the suction and discharge valve are in vertical position. To ensure that the pump stands firm, fasten it with screws on an appropriate foundation.

The system piping must not exert any force on the connections and valves of the metering pump. To avoid incorrect metering after the process is finished, provide an electric and hydraulic interlocking system.

## 7.3 Drain pipe



### Caution

Drainage or leakage from the separating chamber must be routed with a certain downward slope to the containment tank. By no means must the drain pipe be returned directly to the chemical through the tank cover because otherwise effervescent media might enter the pump gear. The drain pipe may only be routed to a collecting tank free of gases (with a downward slope) or to a collecting funnel - also with

a downward slope - above which the pipe ends at a sufficient distance. Leakage can be returned via the funnel through the tank cover. Besides, possible leakage can be seen at the funnel.

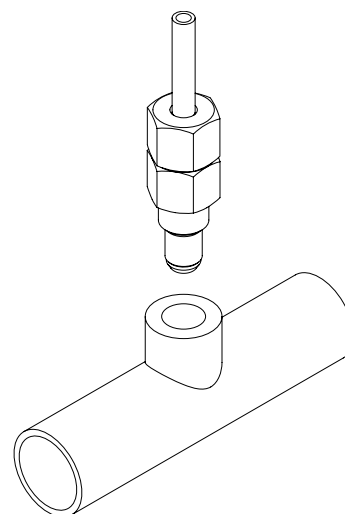


### Caution

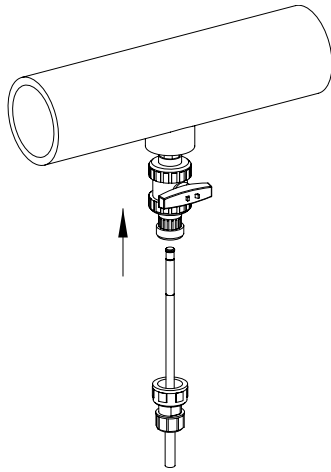
If a leakage monitor is installed in the explosion-hazard area, the electrical connection must be intrinsically safe. The drive motor must be electrically interlocked to prevent additional medium escaping if a leak occurs.

## 7.4 Injection fitting assembly

Injection fittings are used to mix the metered medium into a main stream and simultaneously fulfil a non-return function. The injection fitting is usually installed in the main line from above. Installation from below is only recommended in the case of media with a tendency to crystallize, in order to ensure that air bubbles are not entrapped. For this type of installation, it is advisable to select a form in which the injection fitting can be sealed off when removed.



Extractable injection fitting from down below



### 7.5 Electrical connection

- The electrical connection of the dosing pump must be made according to the local rules and may only be carried out by technical personnel.
- Cable type and cable cross section of the supply lines must be selected according to the motor data.
- The cable passage to the motor terminal box must be made professionally. We recommend gland screw connections with traction relief.
- The required protection class must be ensured by professional installation of the electrical connections.

**Caution**

- Dosing pumps with explosion-proof motors must be installed and commissioned by specialists qualified to work with equipment destined for use in potentially explosive atmospheres. The user is responsible for ensuring that the explosion-proof motors are connected correctly.
- Both the motor and the pump must be grounded to prevent electrostatic discharges.

### Electrical connection data (other types upon request)

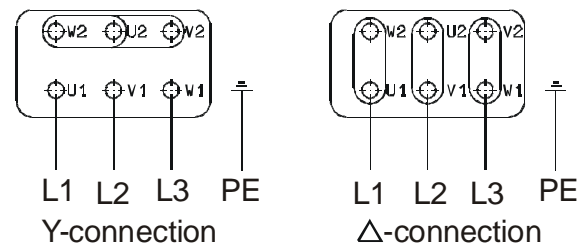
Pump size	Voltage [Volt]	Power [Watt]	Current [A]
MEMDOS E4 ... 50	400/230 3~ 50 Hz	50	0.50/0.87
MEMDOS E/DX 4 ... 26	230 1~ 50 Hz	50	0.70
MEMDOS E50 ... 156	400/230 3~ 50 Hz	250	0.90/1.55
MEMDOS E/DX50 ... 156	230 1~ 50 Hz	120	1.15
MEMDOS E160 ... 380	400/230 3~ 50 Hz	370	1.06/1.84
MEMDOS E/DX160 ... 380	230 1~ 50 Hz	250	2.25

### Circuit diagram of the drive motor

**Caution**

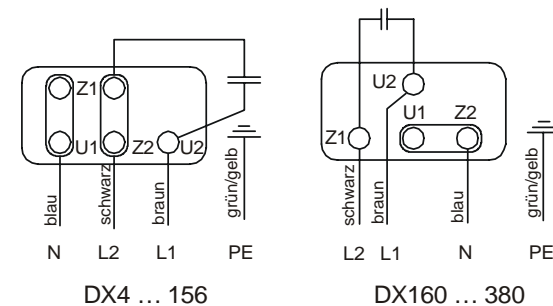
To avoid early wear of the gear drive adhere to the correct rotation direction of the motor by all means: looking at the fan wheel, counterclockwise.

#### - MEMDOS E



(Standard allocation)

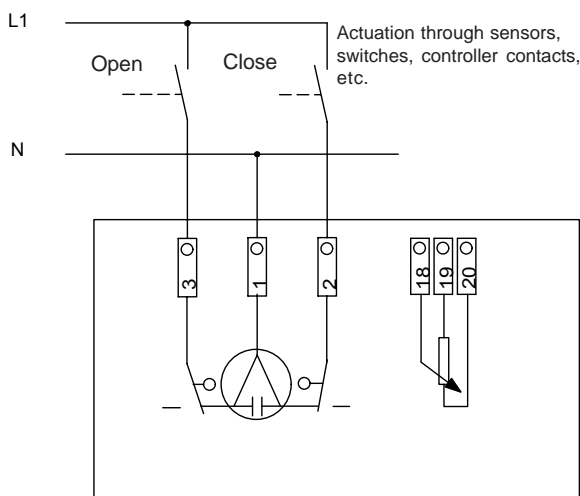
#### - MEMDOS DX



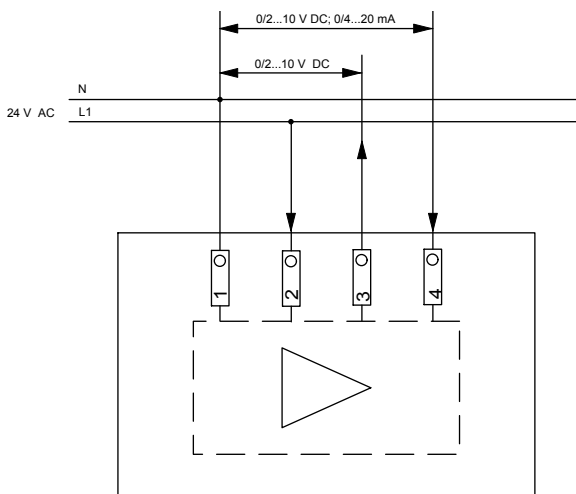
- Special versions  
For other special versions please refer to the corresponding separate circuit diagrams.
- The electrical connection of the MEMDOS DX is shown and described in chapter 11.4 Circuit diagram electronic MEMDOS DX.

### 7.5.1 Circuit diagrams ATE-servomotors

Type KNG 2.60 / 2.120



Type KNG 2.60 St / 2.120 St



### Setting of coding switch KNG 2.60 / 2120 ST

x = Any switch position

#### 1. Voltage input

0-10V at terminals 1 and 4

ON		x	x		x	x	x	x
OFF		x	x		x	x	x	x
	1	2	3	4	5	6	7	8

2-10V at terminals 1 and 4

ON		x	x		x	x	x	x
OFF		x	x		x	x	x	x
	1	2	3	4	5	6	7	8

#### 2. Current input

0-20 mA at terminals 1 and 4

ON		x	x		x	x	x	x
OFF		x	x		x	x	x	x
	1	2	3	4	5	6	7	8

4-20 mA et terminals 1 and 4

ON		x	x		x	x	x	x
OFF		x	x		x	x	x	x
	1	2	3	4	5	6	7	8

#### 3. Direction of rotation

0°- 270° (default setting)

ON	x		x	x	x	x	x	x
OFF	x		x	x	x	x	x	x
	1	2	3	4	5	6	7	8

270°-0°

ON	x		x	x	x	x	x	x
OFF	x		x	x	x	x	x	x
	1	2	3	4	5	6	7	8

#### 4. Output voltage

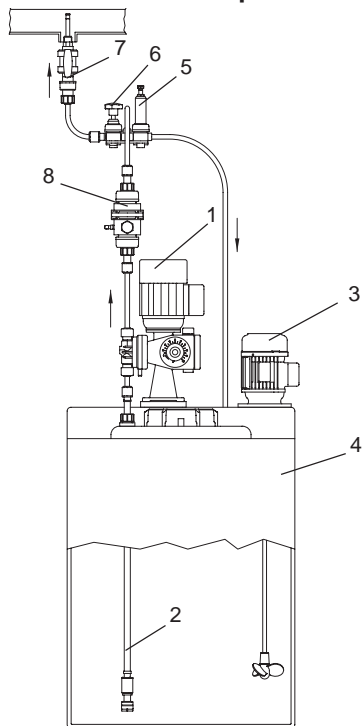
0-10V at terminals 1 and 3

ON				x			x	x
OFF				x			x	x
	1	2	3	4	5	6	7	8

2-10V at terminals 1 and 3

ON				x			x	x
OFF				x			x	x
	1	2	3	4	5	6	7	8

## 7.6 Installation example



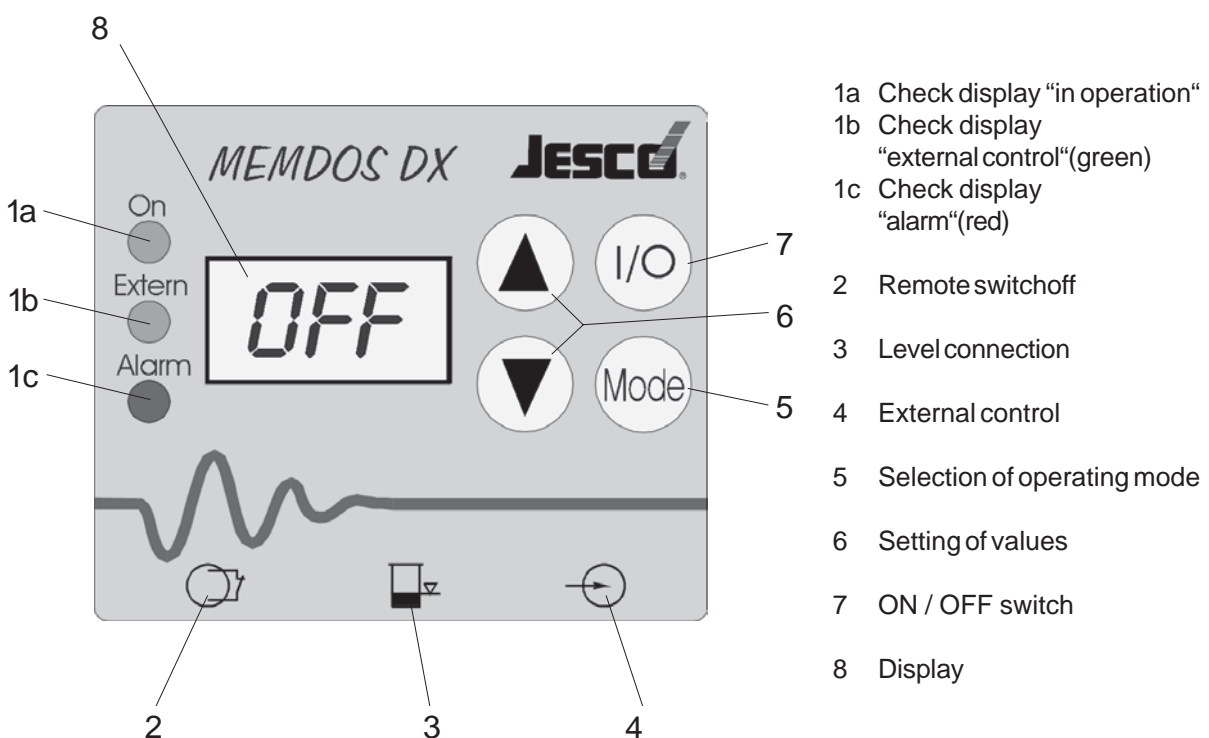
### Explanation

- 1 Dosing pump
- 2 Suction line
- 3 Electric agitator
- 4 Chemical tank
- 5 Relief valve
- 6 Diaphragm shutoff valve
- 7 Injection fitting
- 8 Pulsation dampener

## 8. Operating

### 8.1 Operating panel MEMDOS DX

The operating panel has two green LEDs for operation and external control, one red LED for alarm, one 3-digit multifunctional display and four keys for settings. The inputs for remote switchoff, low level indication and external control are located below the display.



- 1a Check display "in operation"
- 1b Check display "external control"(green)
- 1c Check display "alarm"(red)
- 2 Remote switchoff
- 3 Level connection
- 4 External control
- 5 Selection of operating mode
- 6 Setting of values
- 7 ON / OFF switch
- 8 Display

## 8.2 Switchon / off

The pump is switched on / off using the I/O key. While disconnected the display shows OFF. By opening the contact for remote switchoff the pump is also turned off. The Extern LED is on.

## 8.3 Selection of operating mode

The following operating modes can be set by simultaneously pressing the **Mode** and ▲ or ▼ keys:

- **Manual control** (internal operation)
- **Pulse control** (external operation)
- **Analog control** (control signal 0/4...20mA)

Key	Display	Description
Mode +	INT	manual control
▶ ▼	1.64	pulse control
▶ ▼	1.32	pulse control
▶ ▼	1.16	pulse control
▶ ▼	1.8	pulse control
▶ ▼	1.4	pulse control
▶ ▼	1.2	pulse control
▶ ▼	64.1	pulse control
▶ ▼	32.1	pulse control
▶ ▼	16.1	pulse control
▶ ▼	8.1	pulse control
▶ ▼	4.1	pulse control
▶ ▼	2.1	pulse control
▶ ▼	1.1	pulse control
▶ ▼	4.20	analog control
▶ ▼	0.20	analog control

### Manual control

The pump delivers a constant flow of chemical per unit time, regardless of the process.

Proceed as follows to set this mode:

1. Simultaneously press the **Mode** and ▼ or ▲ keys until INT is displayed.
2. Release the Mode key. The momentary stroke frequency is displayed (strokes/min)
3. Use the ▼ and ▲ keys to change the stroke frequency.

### Pulse control

The pump delivers a constant flow of chemical per input pulse. Up to 64 pulses are buffer-stored if the pulse rate exceeds the processing speed. To set the pulse multiplication / division, simultaneously

press the **Mode** and ▼ or ▲ keys until one of the following values is displayed:

- 1.1 for a ratio of 1:1, i.e. the pump executes one dosing stroke after each pulse.
- 1.2 to 1.64 for pulse multiplication or
- 2.1 to 64.1 for pulse division

The **Extern** indicator lights up.

Example:

1.64 ⇒ The pump executes 64 dosing strokes after each pulse.

64.1 ⇒ The pump executes one dosing stroke after 64 pulses.

The following settings are possible: 1, 2, 4, 8, 16, 32 and 64.

### Analog control

The pump delivers a flow of chemical proportional to the input signal. To set this operating mode, simultaneously press the **Mode** and ▲ or ▼ keys until one of the following values is displayed:

- 0.20 for 0-20 mA signal or
- 4.20 for 4-20 mA signal

The stroke frequency corresponding to the current is displayed when the **Mode** key is released. The **Extern** indicator lights up. If the current is greater than 20 mA (display: OVL) or less than 4 mA (display: E-I) the alarm indicator lights up, the fault relay switches and the pump stops. The stroke frequency of the pump is proportional to the input signal.

### 8.4 Alarm

The pump allows to control the metering process. An alarm is indicated visually in the display and forwarded by the warning alarm relay.

**Low level alarm signaling:** The Alarm LED blinks and the alarm relay is actuated. The display shows the actual stroke frequency.

**Low level main alarm:** The Alarm LED is on and the alarm relay is actuated. The pump stops. The display shows E-L.

**Internal error:** The pump carries out a self-check which switches off the pump, if no stroke has been carried out two seconds after startup of motor (e.g. in the case of excessively high backpressure) or if the stroke sensor does not work (display E-2). The alarm is reset by removing the mains plug.

The functions of the two indicators and built-in fault relay can be seen in the following table:

Zustand	LED 1 Green ON	LED 2 Green Extern	LED Red	Fault output	Display
Pump running	○	⊗	⊗	blue - black	Number of strokes
Pump off (via On/Off switch)	⊗	⊗	⊗	blue - brown	OFF
Pump off (via external contact)	⊗	○	⊗	blue - brown	OFF
Power supply off	⊗	⊗	⊗	blue - brown	<input type="text"/>
Level alert	○	⊗*	○(flashes)	blue - brown	Number of strokes
Level alarm	○	⊗*	○	blue - brown	E - L
Pump faulty (proximity switch)	○	⊗*	○	blue - brown	E - 2
Pump faulty (current < 4 mA)	○	⊗	○	blue - brown	E - 1

\* ) LED 2 lights up in operating modes 1.1 - 1.64; 0...20 mA and 4... 20 mA

Explanation: ⊗ = does not light up  
○ = lights up

### 8.5 Factory setting

These settings should only be made if the electronic unit is replaced.

**Max. number of strokes:** Keep the keys Mode and I/O pressed while applying voltage and set the maximum number of pump strokes using keys ▼ and ▲. After releasing the Mode key, normal operation starts.

**Alarm relay:** If the keys Mode and ▲ are pressed while applying voltage (display RE0), the relay is currentless in the case of error and OFF, when pressing the keys Mode and ▼, the relay pulls up in the case of error (display RE1).

### 9. Stroke length adjustment

**Caution**

**The stroke length must not be adjusted when the pump is at a standstill !**

Proceed as follows to adjust the stroke length:

1. Turn the screw securing the adjusting knob anticlockwise (to the left) to release it.
2. Set the stroke length to the required value in accordance with the delivery characteristics (chapter 5).
3. Retighten the screw without changing the set stroke length.

### 10. Start up

1. Before starting the dosing pump all works mentioned in "Installation" (chapter 7) must be carried out. Fill the pump with the oil supplied. At the same time the safety instructions must be observed.
2. The dosing pump *MEMDOS E* is switched on by a control to be installed externally.  
The *MEMDOS DX* has its own control system. Electrical connection and the control system versions are explained in chapter 8, MEMDOS DX operating elements.
3. The manual capacity adjustment must be set to maximum stroke to improve priming. During first priming no backpressure should be applied. For this purpose we recommend to install a relief valve on the discharge side of the dosing pump.
4. A previously installed priming aid must be filled with chemical first. If the pump is not priming, remove the discharge valve and fill water or chemical (if not dangerous!) into the dosing head. Remount valve and start priming.
5. If a venting facility is available as separate unit, open it and wait until liquid escapes. Then close it again. In the case of effervescent liquids allow the liquid to escape permanently (approx. 1 drop for 1...3 strokes).

6. When correct operation is achieved, set to required output by means of the adjusting knob (refer to chapter 9) or the electrical remote adjustment. For approximation refer to the performance curves (chapter 5). Depending on the installation and the chemicals used, these values may differ and must be checked under operating conditions.
7. The manufacturer of the metering equipment is not responsible for damages due to excessive or low flow rates resulting from faulty pump settings or incorrect and insufficient installation of peripheral fittings.

### 10.1 Start up of MEMDOS E with ATE-servomotor

Switch on the main drive motor of the metering pump. With an electrical interlocking system, only then can the ATE drive be adjusted.

To check the direction of rotation send short control pulses to the ATE servomotor.

If the direction of rotation is wrong, the supply lines (terminals 2 and 3 in the case of direct controls) are reversed.

The ATE servomotor must be moved to the final positions in order to check the limit stop mechanism of the integrated limit switches. When leaving the factory, the angle of rotation is 270°. If required, the angle of rotation and thus the maximum flow rate can be restricted. To achieve this, the upper trigger cam is shifted by the required value.

## 11. Maintenance

### 11.1 Lubrication

The diaphragm dosing pump MEMDOS E/DX requires little maintenance. The gear of the pump is lubricated with gear oil of viscosity class ISO-VG 460 according to DIN 51519 (corresponds to SAE 140 according to DIN 51512). The enclosed first filling must be renewed after approximately 500 operating hours. Further oil changes should be carried out every 5,000 operating hours. The filling capacity is about 0.25 l for gears of MEMDOS E/DX up to size 150 and about 0.7 l for gears of MEMDOS E/DX up to size 380. The actually required quantity of gear oil can be determined by checking the min.-max. markings of the oil-measuring stick.



### Caution

DX version: To avoid damaging of the approximation initiator, the pump must be switched off before removing the oil gauge.

### 11.2 Maintenance of bearings

The upper bearing of the pinion shaft is a sealed and permanently lubricated ball bearing. This function is simultaneously assumed by the motor bearing on the output side of the size I MEMDOS E/DX pumps (up to E/DX 150). The other rolling bearings in the gearbox and the plain bearings of the diaphragm rod are lubricated by the gear oil. The oil also dissipates the heat generated.

All bearings must be examined for wear after 5000 hours of operation. The service life of the rolling bearings depends on the loads to which they are subjected. The bearings must be replaced after 5000 hours of operation if the dosing pump is operated at maximum load.

### 11.3 Replacing the diaphragm

In the case of a rupture the diaphragm can be replaced as follows:

1. The chemical contained in the metering line is drained so that the metering lines become pressureless. Please observe the aforementioned safety instructions for this purpose.
2. The flow rate of the metering pump is set to zero while the motor is running. Thus the diaphragm is moved to its front end position.
3. The head is removed using an appropriate tool.
4. Grasped at the edge, the diaphragm can now be turned out counterclockwise.
5. Before installing the new diaphragm the diaphragm flange section must be cleaned of the chemical. Otherwise the diaphragm might be attacked from the rear side.
6. The new diaphragm is turned in clockwise until it sits close (grease screw thread).

7. The stroke adjustment is now set to maximum while the motor is running.
8. Now the head is remounted by tightening it carefully with the screws.  
Screws must be tightened crosswise, e.g. top left – bottom right – top right – bottom left. The diaphragm is not properly sealed if the tightening torque is too low. If it is too high, the dosing head will be damaged. Required tightening torque for dosing head screws:

Diaphragm- $\emptyset$	Torque +/- 10%
52	125 Ncm
64	2 Nm
90	6 Nm
120	6 Nm
150	10 Nm

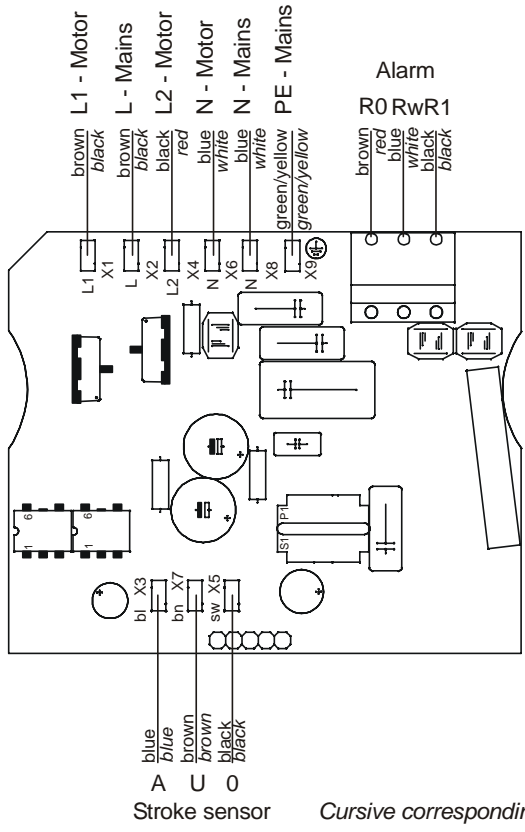
9. After connecting the metering lines, the pump is started as described in chapter 10, startup.
10. If the diaphragm wear is excessively high, try to find out the reason. For this purpose, please refer to chapter 14. Troubleshooting.

## 11.4 Circuit diagram electronic MEMDOS DX

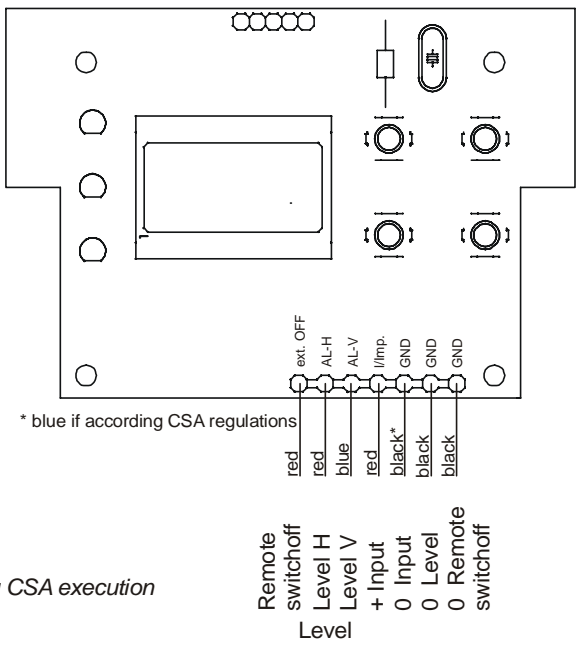
**Note**

When exchanging the electronic unit, only remove the plug connectors not the cable!

**DO NOT PULL AT THE CABLE !**



Standard configuration:  
In operation mode R1 and Rw closed  
In case of failure R0 and Rw closed



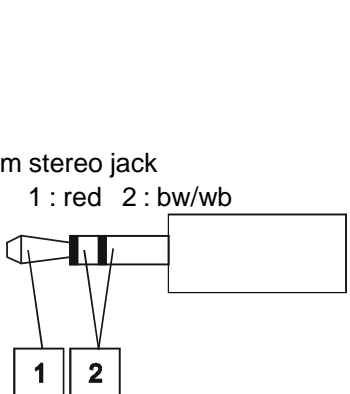
R0 Break contact  
R1 Make contact  
Rw Change over contact

Boards are connect with the backside together.

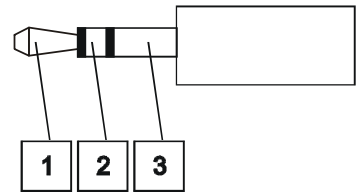
### Extern

Diagram for the input connector.

Remote switchoff:  
3.5 mm mono jack  
1 : brown      2 : white



Low level indication:  
3.5 mm stereo jack  
1 : Low level main alarm red  
2 : Low level alarm white  
3 : 0 (ground) black

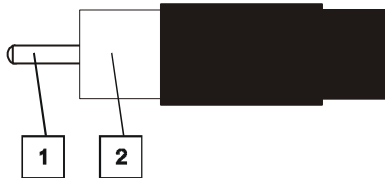


External control:

Phono jack (cinch)

1 : Middle contact = input (+) brown

2 : Outer contact = 0 (ground) white



External control:

CSA - variant

3pin plug with cable

1 : Input (+,brown)

2 : 0 (ground, blue)

3 : Not used



Protective class of the control unit is only reached if ports are protected by caps or serial plug-in connectors are used.

## 12. Explosion-proof dosing pumps

### 12.1 General

The MEMDOS E explosion-proof dosing pump is a motor-driven, explosion-proof diaphragm dosing pump of equipment category 2, group II.

In combination with an explosion-proof motor (Ex II 2 G E Ex e II T3 or Ex II 2 G E Ex d/de IIB/IIC T4) it is used to meter liquids in potentially explosive areas of zone I. The pump bears the Ex identification "Ex II 2 G c k T4 03 ATEX D085".

#### Caution

The pump must not be used to meter gaseous media or solids.

### 12.2 Special conditions

Compliance with the minimum requirements for the zone classification must be ensured when using the dosing pump in potentially explosive areas. Both the pump itself and the motor must meet with the minimum requirements.

### 12.3 Dosing of flammable media

All metal parts in the intake and delivery piping must be grounded to prevent electrostatic discharges when dosing explosive liquids.

Stainless steel is recommended for the dosing head.

Dosing pumps with diaphragms measuring more than 90 mm in diameter are equipped with special conductive diaphragms to prevent static charging. Only the original diaphragm may be fitted when ordering replacement parts.

## 13. Spare parts

Genuine spare parts from Lutz-Jesco must be used. Wear parts for the MEMDOS MR are available as a set of spare parts containing the following:

- Pump diaphragm
- Valve balls
- Valve seats
- all valve seals

Pump size	Material dosing head / valves	Part No.
4 ... 26	PVC/PVDF Viton®	29750
	PVC/PVDF PTFE	29791
	PVC/PVDF EPDM	33698
	1.4571 PTFE	29751
50 ... 76	PVC Hypalon®	28274
	PVC Viton®	28275
	1.4571 AF	28276
110 ... 156	PP Hypalon®	28300
	PP Viton®	28301
	1.4571 AF	28302
160 ... 260	PP Hypalon®	28308
	PP Viton®	28309
	1.4571 AF	28310
300 ... 380	PP Hypalon®	28316
	PP Viton®	28317
	1.4571 AF	28318

## 14. Troubleshooting

TYPE OF FAULT	POSSIBLE CAUSE	RECOMMENDED ACTION
Pump not delivering.	Valves leaking.	Clean and remove air from valves. (See also startup of pump.) Tighten screw connections.
	Valves incorrectly installed.	Reassemble valves. Ensure that the valve balls of suction and discharge valve are located above the valve seats.
	Suction filter, foot valve or suction pipe leaking or blocked.	Clean and seal suction line.
	No stroke movement.	Return spring broken. Replace spring. Consider density of the chemical! Suction lift too high.
Pump delivering too little or irregularly.	Valves blocked or leaking.	Clean and re-seal valves.
Pump delivering too much.	Pressure on suction side too high (pump siphoning).	Install backpressure valve in discharge line.
Frequent diaphragm ruptures.	Diaphragm was not screwed into diaphragm rod as far as stop.	Screw in new diaphragm as far as stop.
	Injection nozzle blocked.	Clean injection nozzle; fit larger one, if necessary.
	Pressure peaks because metering line is too long or too narrow.	Change line or install pulsation dampener. For increased safety install relief valve (see installation example).
Pump very noisy.	Roller bearing defective.	Replace roller bearing.
	No or little oil in gearbox.	Refill oil, as described in section "maintenance".
Motor hums and doesn't start.	Wrong connection.	Check electrical wiring.
	Capacitor defective, wrong size or incorrectly connected.	Connect capacitor correctly or replace.
	Pressure too high.	Check process.
Indication of alarm states by red LEDs near display.	Low level alarm signaling, Low level main alarm, internal error.	Check functions as described in chapter 7 (MEMDOS DX control unit).

If the problem cannot be corrected on the basis of the above data, return the pump to the factory or contact our Technical Sales Service for further measures. Repairs will be carried out immediately.

15. Certificate of confirmity

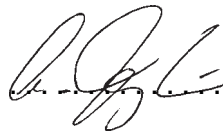
## EC – Declaration of Conformity

We, **Lutz-Jesco GmbH**  
**Am Bostelberge 19**  
**D – 30900 Wedemark**

hereby certify  
that the product described in the following complies with the relevant fundamental safety  
and sanitary requirements and the EC regulations mentioned below due to the concept  
and design of the version sold by us.

If the product is modified without our consent, this declaration loses its validity.

Product description:	Diaphragm Dosing Pump
Model designation:	Minidos A, Memdos TM, Memdos M, Memdos ML, Memdos E, Memdos MR., Memdos GMR
Relevant EC regulations:	EC Low-Voltage Directive (73/23/EEC) EC Directive Relating to Machinery (89/392/EEC) amended by 93/44/EEC
Applied harmonized standards, especially:	EN 292 – 1 and EN 292 – 2, Safety of Maschines prEN 809, Pumps and Pump Devices for Liquids, Safety Requirements

Date, Signature of Manufacturer: 2003/02/02 .....  .....

Information on the signer: Mr. Lucjan Gogolin, Head of Technical Office

This declaration is no assurance of characteristics in the sens of the product liability law.  
The safety notes in the operating instructions must be observed.

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that the product described in the following complies with the relevant fundamental safety  
and sanitary requirements and the EC regulations mentioned below due to the concept  
and design of the version sold by us.


If the product is modified without our consent, this declaration loses its validity.

Product description: Diaphragm Metering Pump

Model designation: Memdos DX

Relevant EC regulations: EC Low-Voltage Directive (73/23/EEC)  
EC Directive Relating to Machinery (89/392/EEC)  
amended by 93/44/EEC  
EC Electromagnetic Compatibility Directive  
(89/336/EEC) amended by 93/31/EEC

Applied harmonized standards, especially: EN 292 – 1 and EN 292 – 2, Safety of Machines  
prEN 809, Pumps and Pump Devices for Liquids,  
Safety Requirements  
EN 50081 Parts 1 and 2, EN 50082 Parts 1 and 2,  
Electromagnetic Compatibility, Emission of Noise  
and Noise Immunity

Date, Signature of Manufacturer: 2003/02/02 ...  .....

Information on the signer: Mr. Lucjan Gogolin, Head of Technical Office

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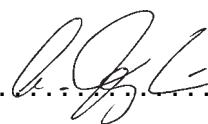
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**D – 30900 Wedemark**

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that the product described in the following complies with the relevant fundamental safety  
and sanitary requirements and the EC regulations mentioned below due to the concept  
and design of the version sold by us.

If the product is modified without our consent, this declaration loses its validity.

Product description:	Explosion proofed Diaphragm Metering Pump
Model designation:	Memdos E, Memdos MR
Relevant EC regulations:	EC Low-Voltage Directive (73/23/EEC) EC Directive Relating to Machinery (98/37/EC) EC Directive for Equipment and protective systems intended for use in potentially explosive atmospheres (94/9/EC)
Applied harmonized standards, especially:	EN 292–1 and EN 292–2, Safety of Maschines EN 809, Pumps and Pump Devices for Liquids, Safety Requirements EN 13463–1, Non-electrical equipment for potentially explosive atmospheres

Date, Signature of Manufacturer: 2003/07/01 ...  .....

Information on the signer: Mr. Lucjan Gogolin, Head of Technical Office

This declaration is no assurance of characteristics in the sens of the product liability law.  
The safety notes in the operating instructions must be observed.