

General

The MEMDOS E / DX combines the properties of the MEMDOS series working reliably for many years with the latest requirements in metering technology. Due to an improved flexibility and the further development of individual components, it can be integrated even more efficiently in metering processes. Heads and diaphragms are the same as for the existing pumps so that the continuity of spare parts keeping and service is ensured.

Two models of the MEMDOS are available, each with or without microprocessor control. The smaller version can be used for capacities from 0...4 to 0...160 l/h and the larger version for capacities from 0...160 to 0...380 l/h. Pressures are admissible between 4 and 10 bar, depending on the size.

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 metering capacity, either the stroke length can be adjusted mechanically or the speed of the three-phase motor can be controlled by means of a separate frequency converter.

The microprocessor-based MEMDOS DX is used if the pump is to be integrated in controls or automatic control systems. The intelligence of the MEMDOS DX is derived from the well-proved series of MAGDOS DE/DX solenoid metering pumps.

It allows the adaption to a large number of different control signals and system monitoring equipment. It controls the chemical supply in two ways, for example: tank level control with alarm signal and low level indication. 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.

Depending on the version, the MEMDOS DX can be adjusted continuously between 0 and 142 strokes/min. for internal control. A single stroke follows each contact. In addition, the stroke frequency can be changed by pulse division or multiplication.

Metering head

MEMDOS pumps can be equipped with a PVC, PP or stainless steel head. Other materials are available upon request.

The diaphragms are made of chemically and mechanically resistant materials. EPDM with a protective PTFE coat (Teflon) and a textile reinforcement are vulcanized onto a large-surface insertion part.

Suction and discharge valve are fitted with two valve balls each for double sealing.



For media with a viscosity of more than approx. 400 mPa*s spring-loaded single-ball valves should be used (opening pressure approx. 0.1 bar).

Separating chamber

The diaphragm flanges have been designed so that, in the case of a diaphragm rupture due to wear, no chemical enter the gear but is routed downwards through a drain pipe. A leakage probe according to data sheet MB 1 31 01 can be fitted in order to detect the failure and cause the pump to stop.

Drive

To operate the pump three-phase or a.c. motors can be used for MEMDOS E pumps. The intelligent MEMDOS DX pumps with control unit are always equipped with a single-phase a.c. motor.

The gearbox is made of light but inherently stable and high-alloyed cast aluminum. It contains a single-stage worm wheel set running in an oil bath just as the roller bearings. Metering happens while the push rod is displaced by means of an eccentric. The suction stroke is caused by the resetting of the spring.

To set the metering capacity by manual stroke adjustment, the spring-loaded diaphragm rod is locked at the corresponding position. Thus an adjustment range of 1:10 is possible.

Control unit

In general the following functions are possible with the control unit:

- Indication of operating states and menu guidance on 3-digit LC display.
- Operating panel with four pressure-sensitive keys and three LEDs.
- Internal control of stroke frequency, continuously adjustable between 0...142 strokes/min., depending on the gear reduction.
- External control by
 - a) voltage-free contacts (mechanical or semiconductors).
 - b) analog 0...20 and 4...20 mA signal.
- External pump stop by voltage-free opening contact.
- Warning alarm relay with voltage-free changeover contact (signaling of (almost) low level, life zero error with 4...20 mA, remote switchoff).
- Pulse multiplication for contact control with factor 2 / 4 / 8 / 16 / 32 / 64.
- Pulse division for contact control with divisor 2 / 4 / 8 / 16 / 32 / 64.
- Chemical tank level control with alarm signal and main alarm (pump stops).

Technical data

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

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

²⁾ Not suitable for 60Hz operation.

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

⁴⁾ At 60 Hz operation the values increase by factor 1.2.

Additional fittings

The precision and operational life of metering pumps can be increased considerably if the appropriate fittings are used.

These are among others:

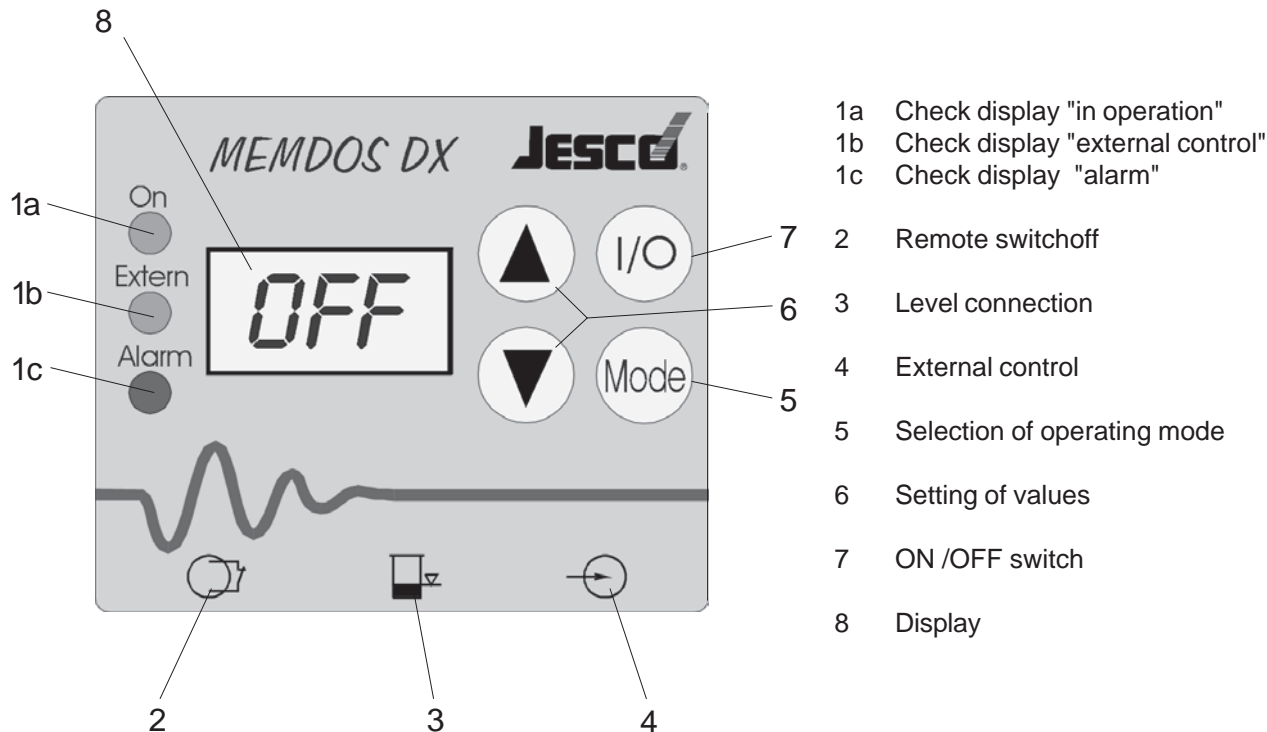
- Double diaphragms which indicate a diaphragm failure and allow metering to be continued for a some time.
- Pulsation dampeners for suction and discharge side.
- ATE servomotors for automatic metering capacity adjustment.
- Approximation initiators for indicating individual strokes.
- Leakage probe for detecting leaking in the case of a diaphragm failure.
- Application-oriented suction lines, also with level control for the medium to be metered.
- Relief valves as safety valves to protect pump and system.

Technical data of the control unit

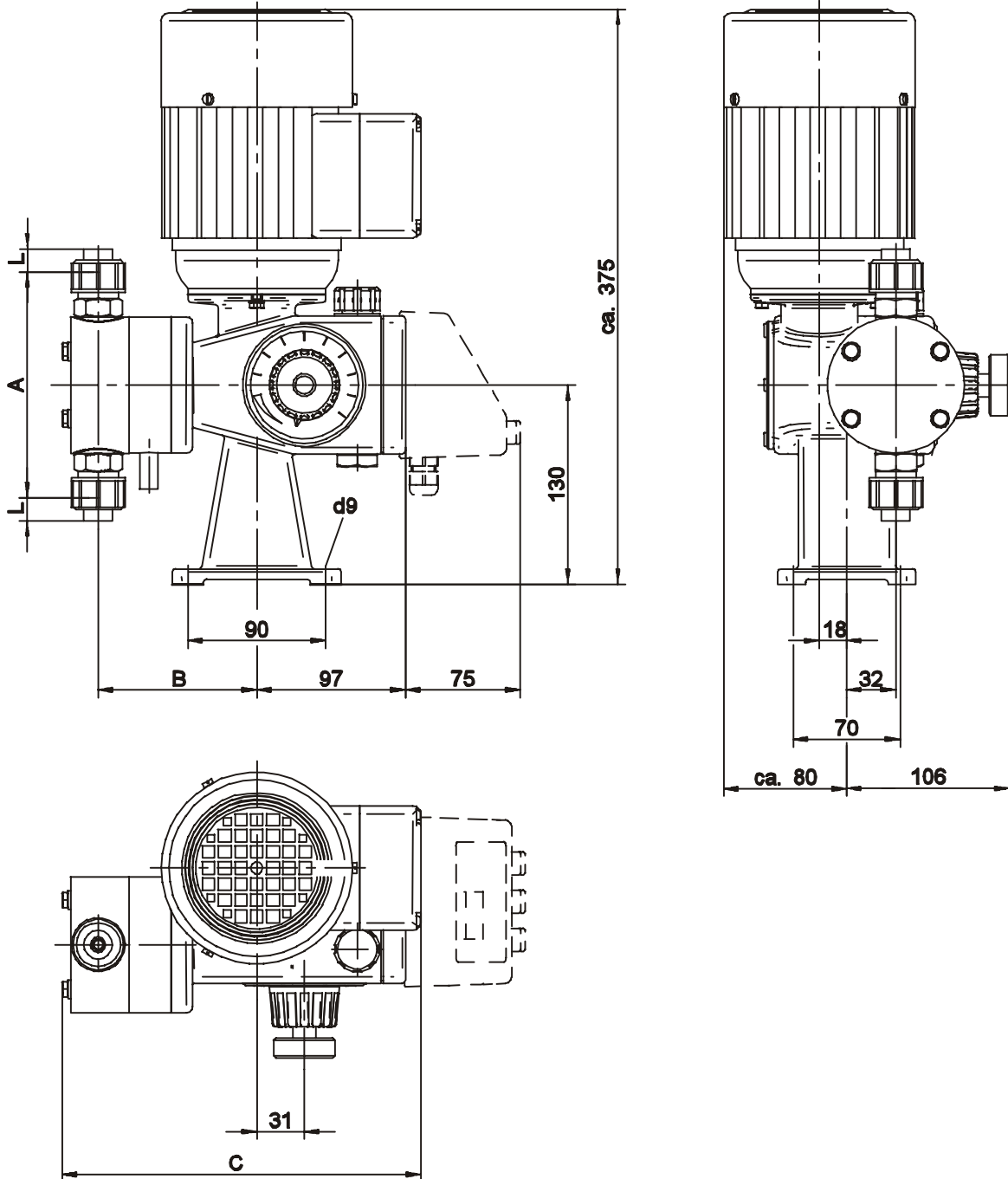
Mains voltage	95...264V AC, 48...63 Hz
Electrical connection	Safety plug with 2.5 m cable
Power consumption (without motor)	10 W
Insulation class	F
Protective class	IP 65 *
Pulse for contact activation	min. 30 ms
Voltage at pulse input	5V DC (must be voltage-free for contact making)
Multiplication / 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.

Operating panel



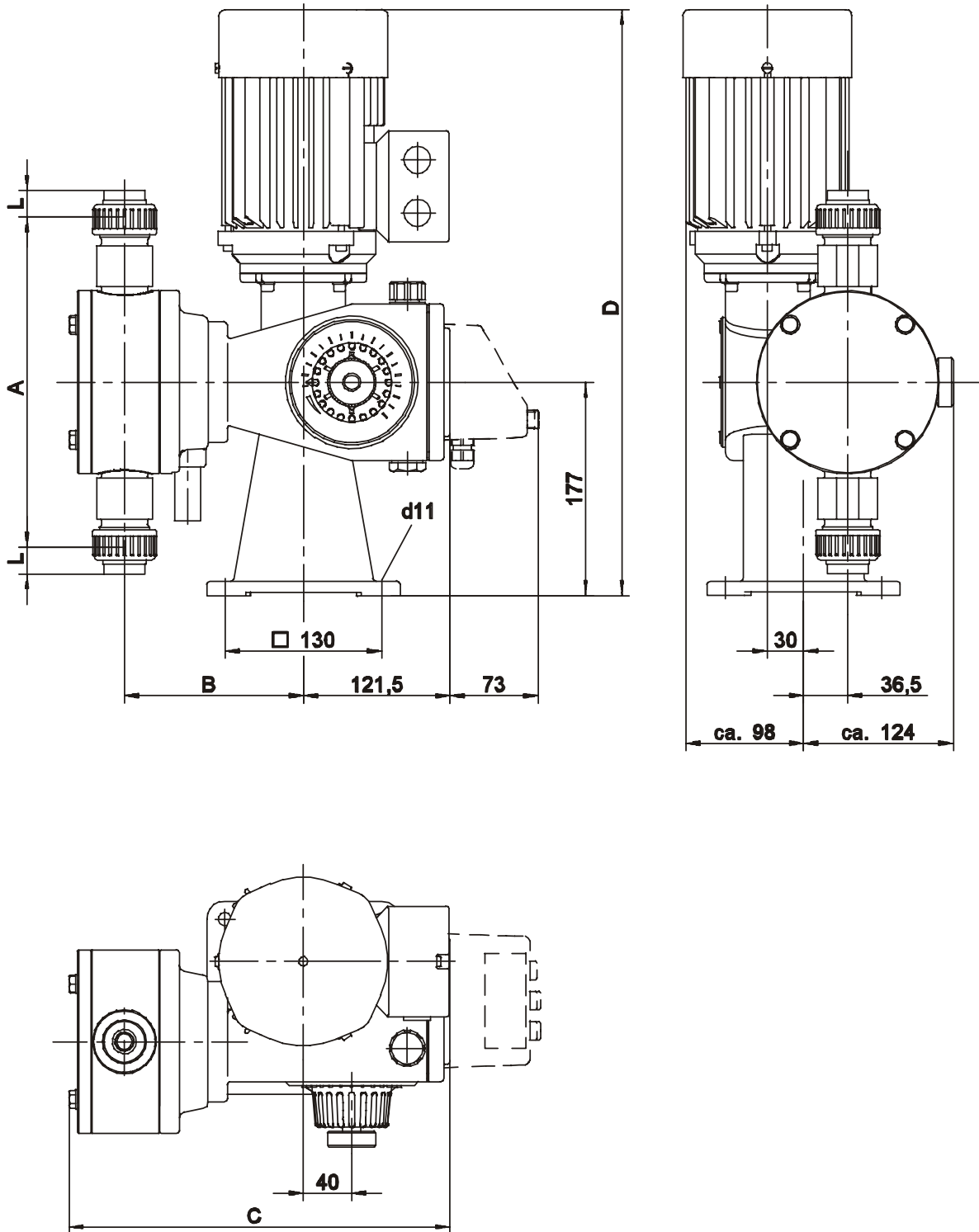
Dimensions MEMDOS E / DX 4...156



Type	A	B	C
4 ... 26	108	95	222
50 ... 76	147	103	234
110 ... 156	243	117	259

Diaphragm Metering Pump MEMDOS E / DX

Dimensions MEMDOS E / DX 160...380

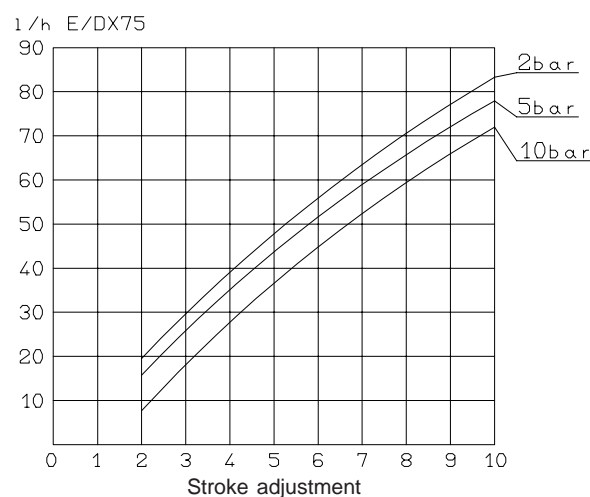
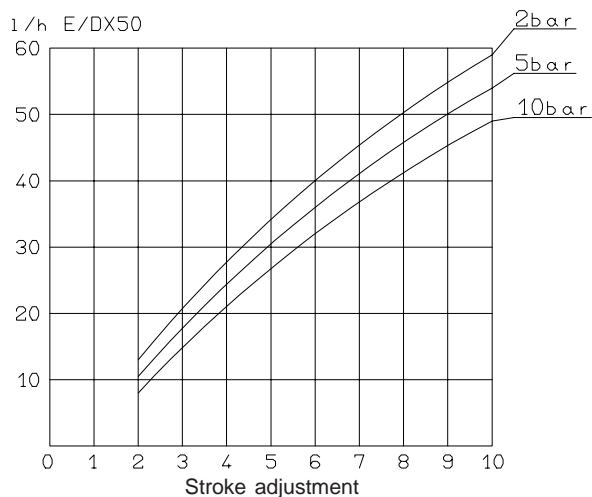
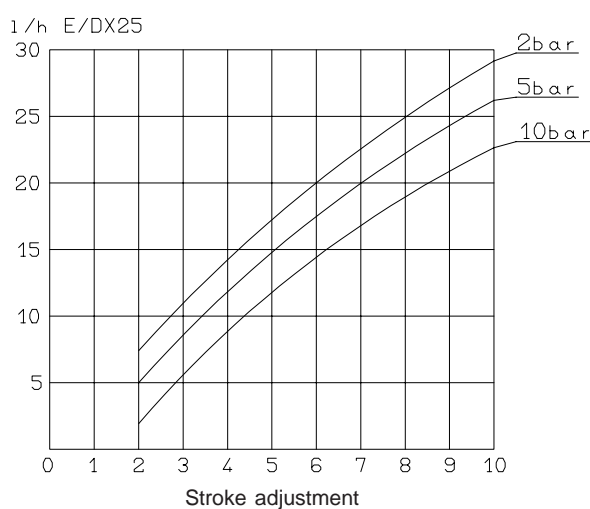
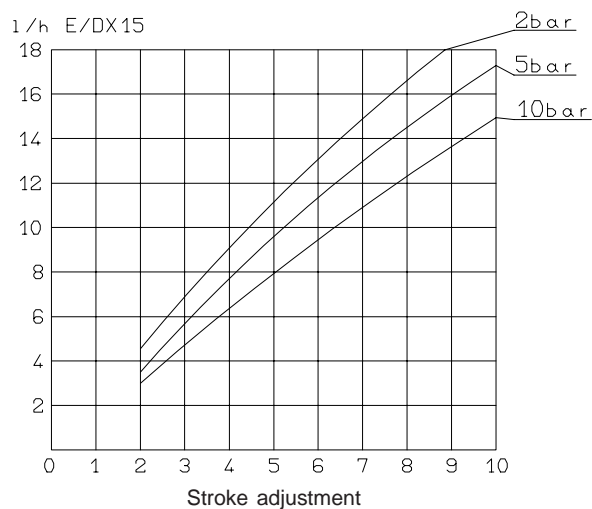
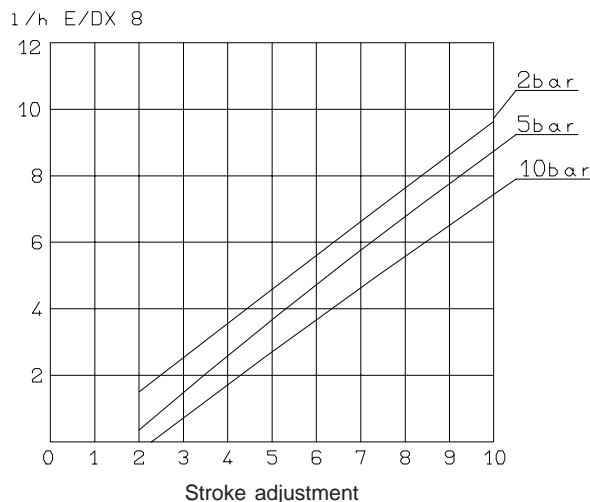
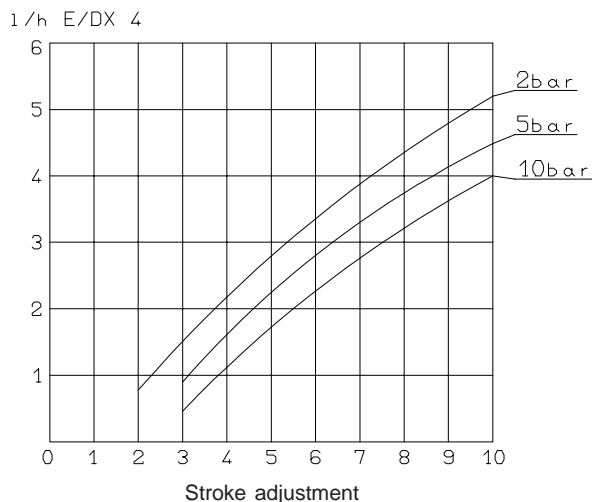


Types	A	B	C	D
E 160...260	278	148	317	approx. 469
DX 160...260	278	148	317	approx. 486
E 300...380	318	153.5	320	approx. 469
DX 300...380	318	153.5	320	approx. 486

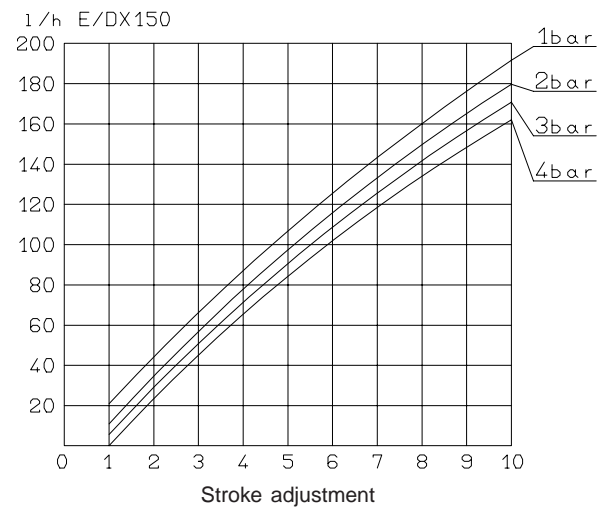
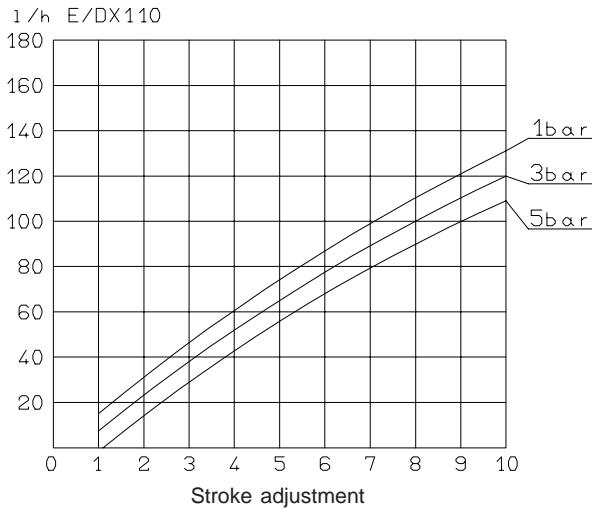
Performance curves MEMDOS 4...156

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.

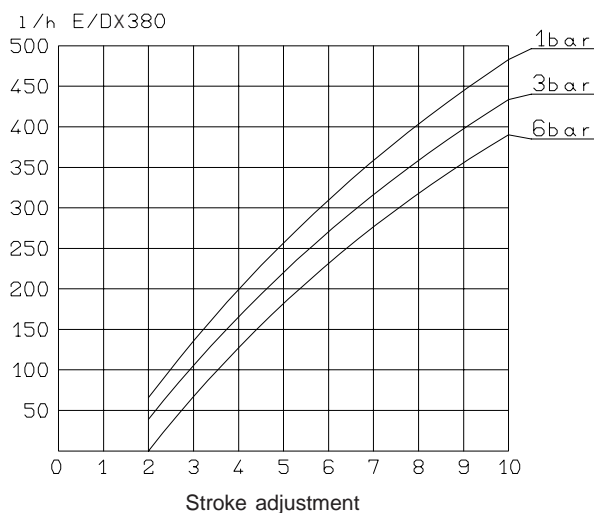
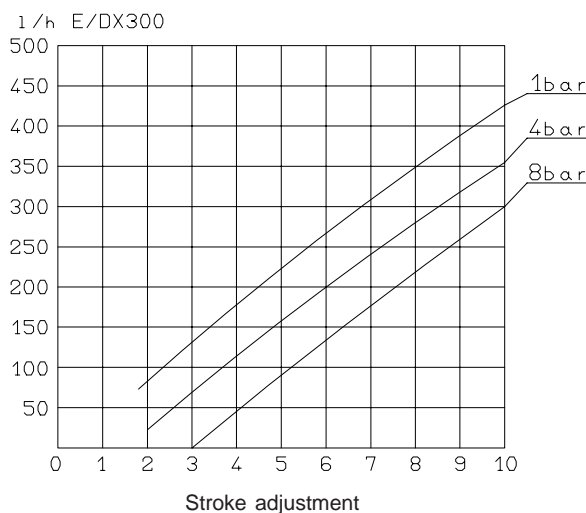
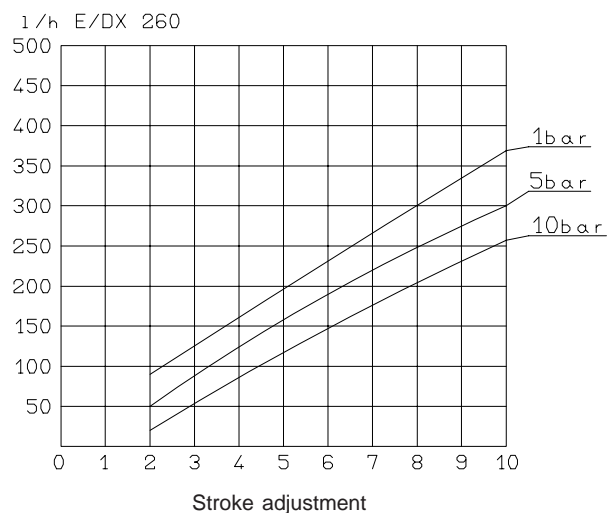
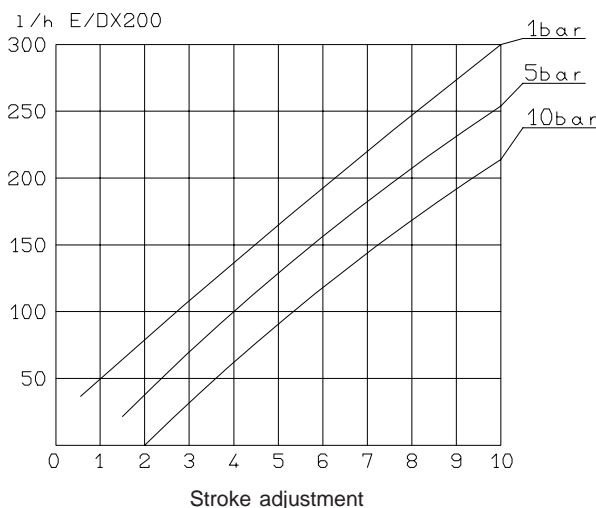
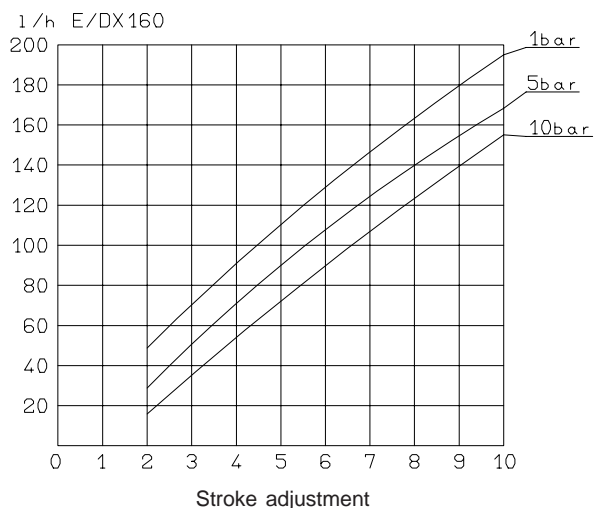


Diaphragm Metering Pump MEMDOS E / DX

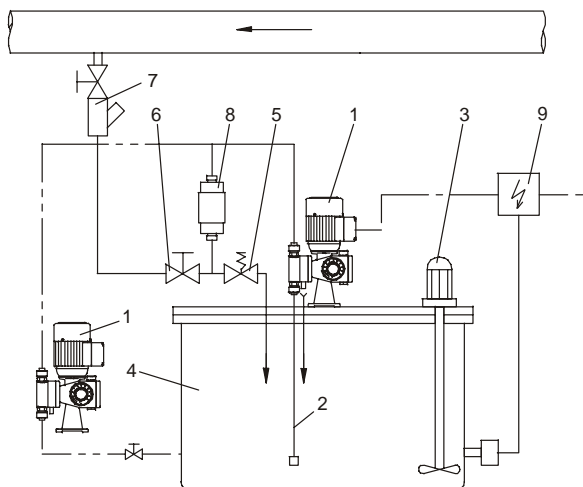


Performance MEMDOS E / DX 160...380

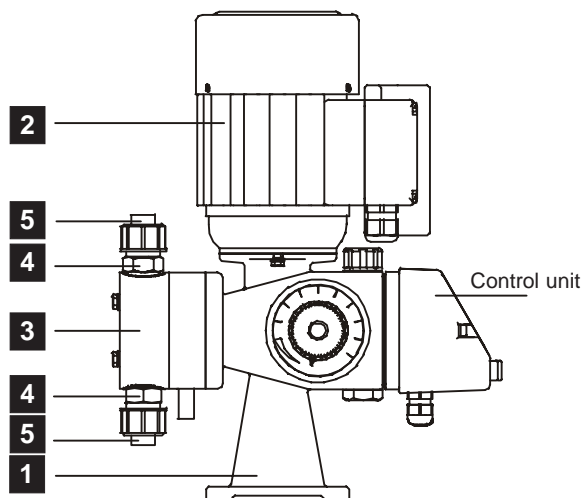
The flow rate depends on the viscosity of the medium and the hydraulic installation conditions. The performance curves refer to water at 20° C and a suction lift of 0.5m.



Installation example



Selection tables



Legend

- | | |
|---------------------------|--------------|
| 1 Metering pump E / DX | MB 1 04 20 |
| 2 Suction line | MB 1 22 01 |
| 3 Electric agitator | MB 1 36 01 |
| 4 Tank | MB 1 20 01 |
| 5 Relief valve | MB 1 25 01 |
| 6 Diaphragm shutoff valve | MB 1 24 01 |
| 7 Injection nozzle | MB 1 23 01 |
| 8 Pulsation dampener | MB 1 27 01 |
| 9 Switchbox | upon request |

In order to be able to offer the user a variety of pumps, these have been divided into the main functional groups. They can thus be assembled according to the user's individual requirements.

- | | | |
|-----------------|----------------------|---------------|
| 1 Drive | 2 Motor | 3 Head |
| 4 Valves | 5 Connections | |

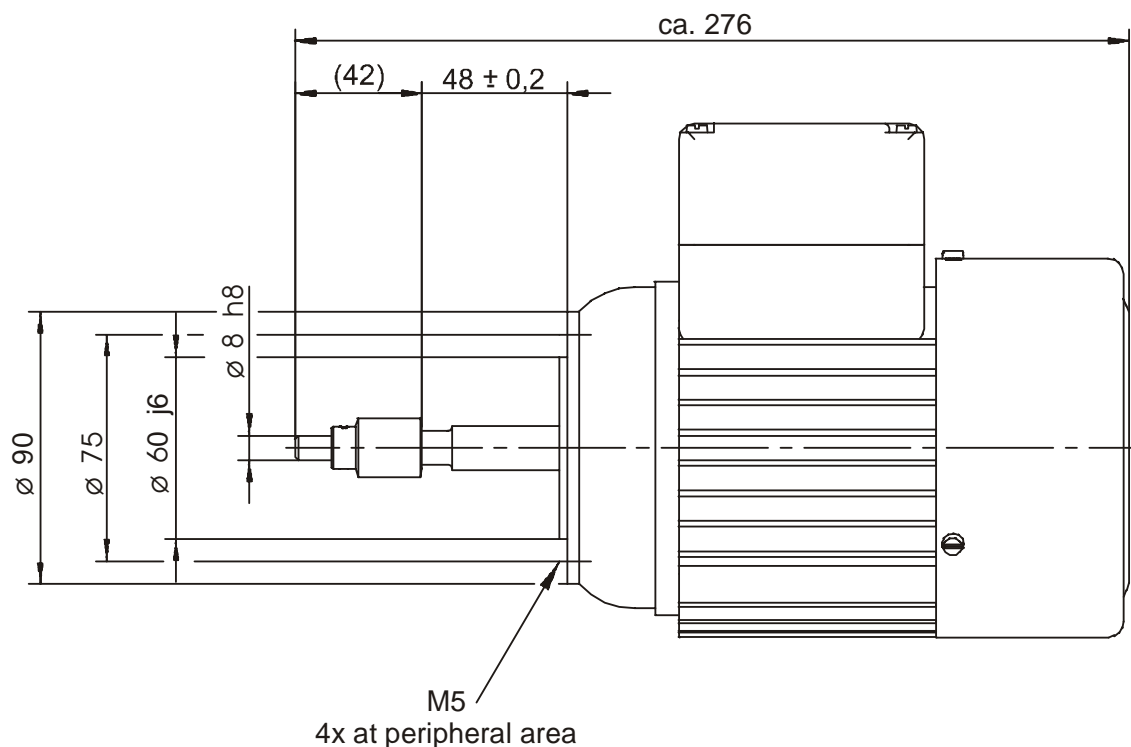
The numbers on the pump drawing refer to the relevant selection tables.

1		
Pump type	manual	
	E	DX
E / DX 4	34892	34960
E / DX 8	34893	34963
E / DX 15	34880	34961
E / DX 25	34889	34962
E / DX 26	35225	35241
E / DX 50	34872	34964
E / DX 75	34890	34965
E / DX 76	35226	35242
E / DX 110	34881	34967
E / DX 150	34891	34968
E / DX 156	35227	35243
E / DX 160	35047	35048
E / DX 200	34943	34969
E / DX 260	34944	34970
E / DX 300	34945	34971
E / DX 380	34946	34972

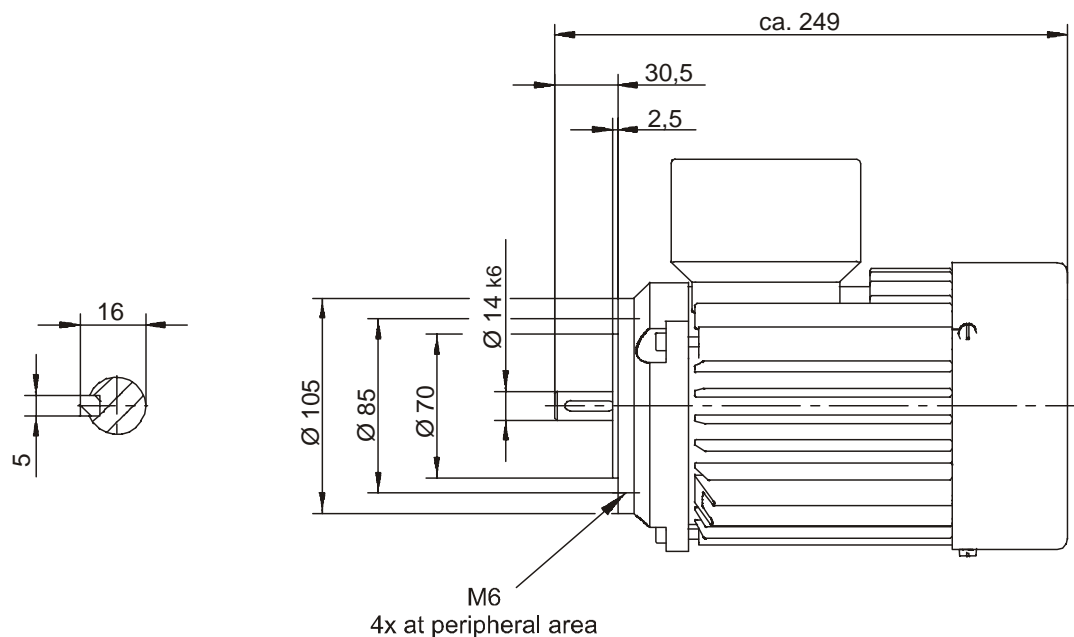
2				
Pump type	Motor type	Transformation	Pump type	Part No.
E / DX 4...156	Three-phase current 400 / 230 V, Bg 63 0,05 kw, 50 Hz, IP 55, ISO-F	55:1	E4	27522
		30:1	E8	31431
		15:1	E15 / 50	27697
		12:1	E26	35237
		10:1	E25	34884
	400 / 230 V, Bg 63 0,25 kW, 50 Hz, IP 55, ISO-F	55:1	E4*	32827
		30:1	E8*	32826
		15:1	E15* / 50* / 110	32531
		12:1	E26* / 76 / 156	35238
		10:1	E25* / 75 / 150	34913
	A.C. 230 V, Bg 63 0,05 kW, 50 Hz, IP 55, ISO-F	55:1	E/DX4	35082
		30:1	E/DX8	35083
		15:1	E/DX15	35084
		12:1	E/DX26	35239
		10:1	E/DX25	34914
230 V, Bg 63 0,12 kW, 50 Hz, IP 55, ISO-F	15:1	E/DX50 / 110	34917	
	12:1	E/DX76 / 156	35240	
	10:1	E/DX75 / 150	34915	
E / DX 160...380	Three-phase current 400 / 230 V, Bg 71 0,37 kW, 50 Hz, IP 55, ISO-F		E 160 - 380	79048
	A.C. 230 V, Bg 71 0,25 kW, 50 Hz, IP 55, ISO-F		E/DX 160 - 380	79057

* with frequency converter operation

Motor MEMDOS E / DX 4...156



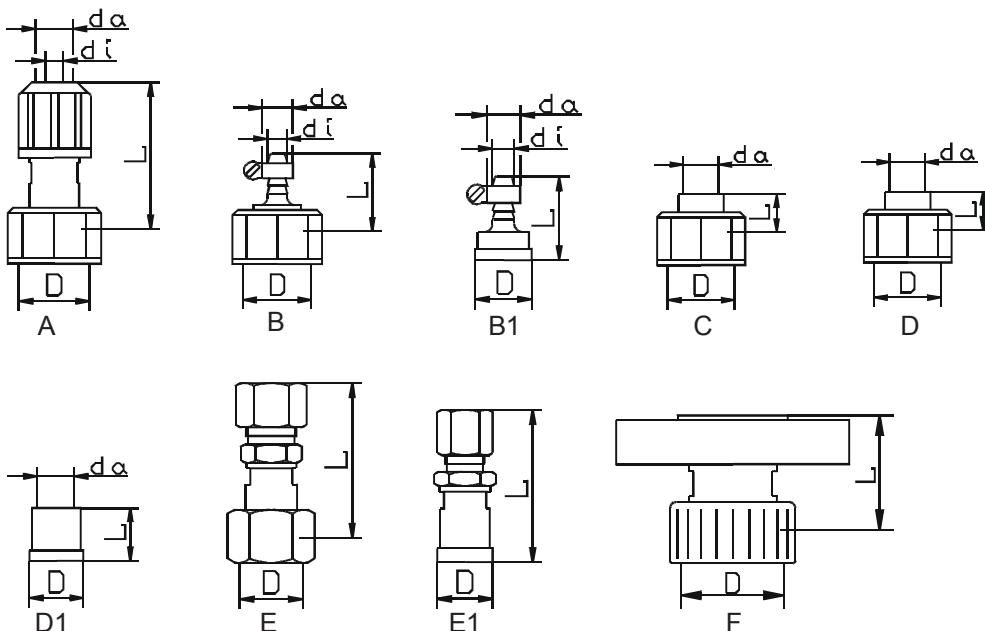
Motor MEMDOS E / DX 160...380



3					
Pump type	diameter	Diaphragm		Head	
		PVC	PVDF	PP	1.4571
E / DX 4	52	34882	34898	–	34899
E / DX 8	52	34882	34898	–	34899
E / DX 15	52	34882	34898	–	34899
E / DX 25	52	34882	34898	–	34899
E / DX 26	52	34882	34898	–	34899
E / DX 50	64	34873	–	–	34901
E / DX 75	64	34873	–	–	34901
E / DX 76	64	34873	–	–	34901
E / DX 110	90	–	–	34979	32890
E / DX 150	90	–	–	34979	32890
E / DX 156	90	–	–	34979	32890
E / DX 160	120	–	–	34722	23728
E / DX 200	120	–	–	34722	23728
E / DX 260	120	–	–	34722	23728
E / DX 300	150	–	–	34953	34952
E / DX 380	150	–	–	34953	34952

4										
Pump type		E / DX 4...26 DN 4			E / DX 50...76 DN 6			E / DX 110...380 DN 10		
Housing material		PVC	PVDF	1.4571	PVC		1.4571	PP		1.4571
Seal material		Viton	PTFE	PTFE	Viton	Hypalon	AF	Viton	Hypalon	AF
Double-ball valves	Suction valve	20890	28111	24029	18185	18187	26967	26842	26841	29694
	Discharge valve	20891	28112	24030	18186	18188	26968	27357	27356	29695
Spring-loaded valves	Suction valve	25087	29385	25089	25162	25161	28775	25707	26845	29696
	Discharge valve	25088	29384	25090	27517	27516	28776	27354	27353	29697

5										
Pump type E / DX	DN	Fig.	D	di	da	L	Part-No.			
							PVC	PP	PVDF	1.4571
4 8 15 25 26	4	A	G 5/8	4	6	28	20975	-	29387	-
		E		-	6	45	-	-	-	-
	6	A		6	8	30	25176	-	-	-
		A		6	9	34	34925	-	-	-
		A		6	12	55	32980	-	28124	-
		B		6	12	30	23092	-	-	23093
		C		-	10	15	23087	-	-	-
		C		-	12	15	23089	-	-	-
		D		-	G 1/4	20	23088	-	29179	22999
		E		-	10	20	-	-	-	23090
E	-	12	20	-	-	-	23091			
50 75 76	6	A	G 3/4	6	8	30	28159	-	-	-
		A		6	9	34	34926	-	-	-
		A		6	12	55	34922	-	-	-
		B		6	12	30	23342	-	-	-
		B1	d20	6	12	29	-	-	-	23426
		C	G 3/4	-	10	15	25167	-	-	-
				-	12	15	27518	-	-	-
				-	16	17	25625	-	-	-
				-	G 1/4	20	25165	-	-	-
				D1	d20	-	G 1/4	25	-	-
E1	-	8	54	-	-	-	27519			
110 150 156 160 200 260 300 380	10	C	G1 1/4	-	16	22	27672	27664	-	-
		D		-	G 3/8	22	25930	33797	-	27037
	15	B		16	24	50	25936	35649	-	25935
		C		-	20	22	25937	35490	-	-
		D		-	G 1/2	22	25943	34689	-	25944
		F		-	-	53	25956	-	-	25957
		20		C	-	25	22	33318	33319	-
	D			-	G 3/4	22	-	-	-	27689



Order examples

Case 1

45 l/h of flocculant of watery consistency are to be metered into a settling tank.

The level of the supply tank is maximally 3m above the pump. Metering takes place against free discharge.

Solution:

PVC, Hypalon, EPDM and glass are resistant materials. Due to the positive supply (from above) and the free discharge (no backpressure), a backpressure valve must be fitted.

A MEMDOS E, size I, 0...50 l/h, with three-phase motor is chosen.

The pump consists of the following modules:

1 Drive	34872
2 Three-phase current	27697
3 PVC metering head	34873
4 PVC double-ball valves, Hypalon	
Suction valve	18187
Discharge valve	18188
5 Connections	
Suction side	19175
Discharge Side	19175

Case 2

150 l/h of a coloring substance are to be added proportionally to a process line. An analog 4...20 mA signal or 6000 contacts per hour are available as flow-proportional signal. The system pressure is 6 bar. No aggressive medium is used. The viscosity is, however, 500 mPa*s.

Solution:

PVC, Hypalon, EPDM and glass are resistant materials. As the viscosity exceeds 400 mPa*s, spring-loaded valves are required.

Due to the type of control, a MEMDOS DX 200 (0...208 l/h) is chosen.

As the pump is able to carry out 95 strokes/min., 5700 metering strokes are maximally possible per hour. This is insufficient compared to the incoming 0...6000. Therefore the pump is set so that it is activated by the analog signal.

It consists of the following modules.

1 Drive	34969
2 A.C.	79057
3 PP metering head	23722
4 PP spring-loaded valves , Hypalon	
Suction valve	26845
Discharge valve	27353
5 Connections	
Suction side	25937
Discharge Side	25937

Note:

If only contact making can be used, the pump must be selected as follows:

With the help of pulse division function, divisor 2, the aforementioned pump would have to carry out max. $6000/2=3000$ strokes. As a result the flow rate would be reduced to $208/5700 \times 3000=109$ l/h < 150 l/h. In this case, a MEMDOS DX 300 with 292 l/h at 8 bar would be appropriate, which can process 5700 contacts with its possible strokes per minute. With 3000 contacts the pump delivers $292/5700 \times 3000=154$ l/h by 8 bar and about 10 % more by 6 bar.

A precise adjustment is possible using the stroke length adjustment knob.

General

Metering pumps which are used as final control element in automatic control loops or controlled systems are equipped with electrical servomotors allowing to adjust the stroke length by means of sensing contacts or controllers with relay output.

Such pumps are identified by suffixing the letters ATE to the type designation:

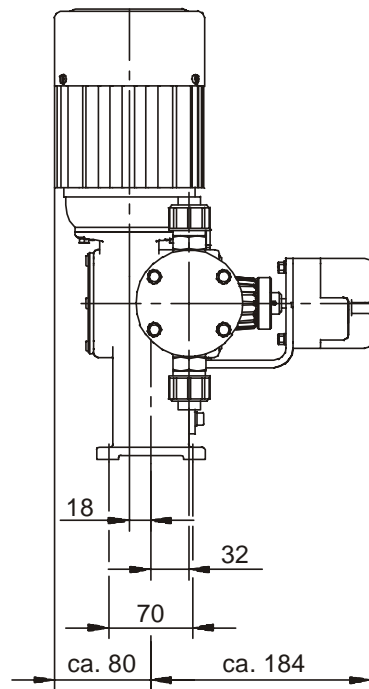
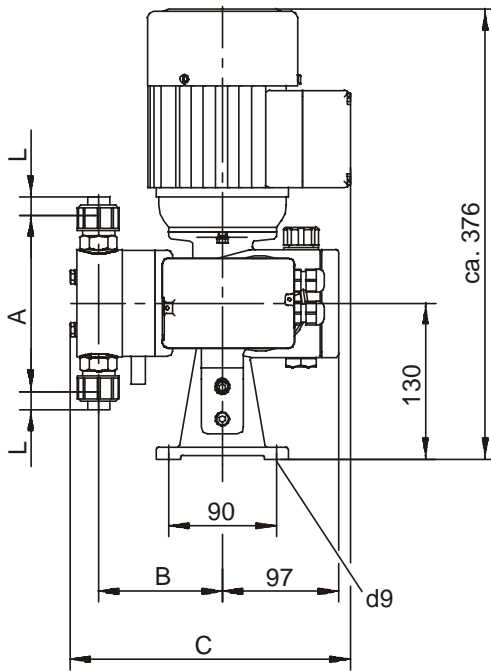
Example: E 150 - ATE

The non-linearity of the performance curves of diaphragm metering pumps is maintained despite the linear mechanics of the stroke adjustment. For this reason, the performance curves of the metering pump must be taken into account in control systems without feedback of the metered result (proportional metering).


Technical data

Pump type	Memdos E 4 ... 156		Memdos E 160 ... 380	
	KNG 2.60	KNG 2.60 ST	KNG 2.100	KNG 2.120 ST
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 tu=40°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 tu=40°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			

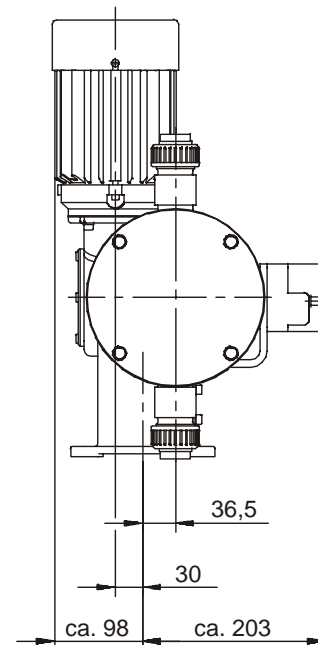
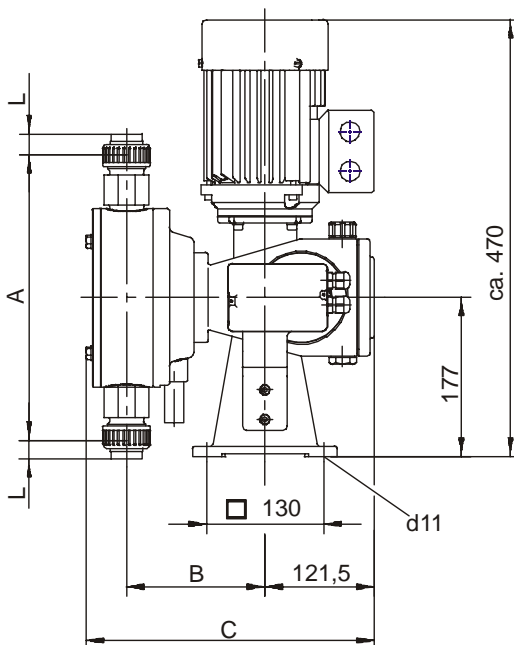
Dimensions E4 ... 156



Dimension L see MB 1 04 02 / 12

Type	A	B	C
4 ... 26	108	100,5	222
50 ... 76	147	103	234
110 ... 156	272	108	255

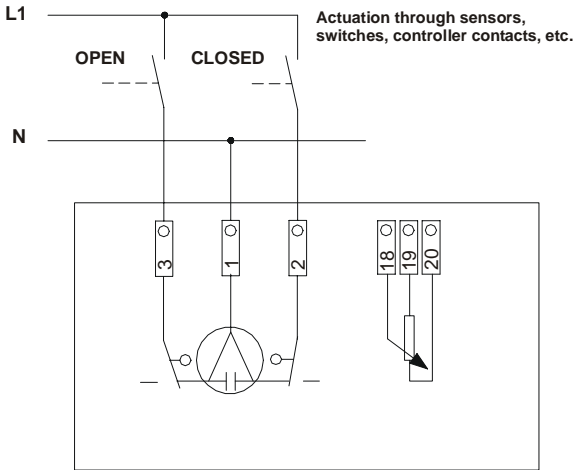
Dimensions E160 ... 380



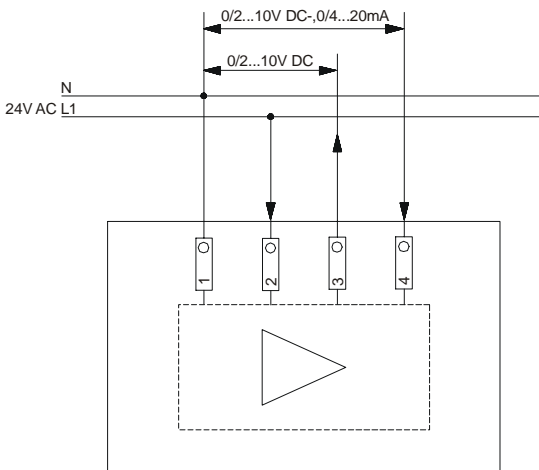
Dimension L see MB 1 04 02 / 12

Type	A	B	C
E160...260	272	149,5	317
E300...380	324	152,5	320

Wiring diagram KNG 2.60 / 2.120



Wiring diagram KNG 2.60 / 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 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

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