

## General

Double diaphragm metering pumps of the Memdos GMR series can be supplied as single or duplex metering pumps. The pumps are used to meter large quantities at relatively low back pressures. They are frequently used in waste-water treatment to meter pH-regulating chemicals or flocculents. The metering pumps are available in three sizes as single metering pumps for 2000 to 4000 l/h. Different metering heads can be connected to the duplex metering pumps. The metering heads are then operating in a reciprocating mode and the quantity metered is set for both heads at the same time.

## Designs

Standard designs are: Single metering pump with left-hand metering head arrangement.

Type designation GMR      Symbol 

Duplex metering pumps with two metering heads.

Type designation ZGMR      Symbol 

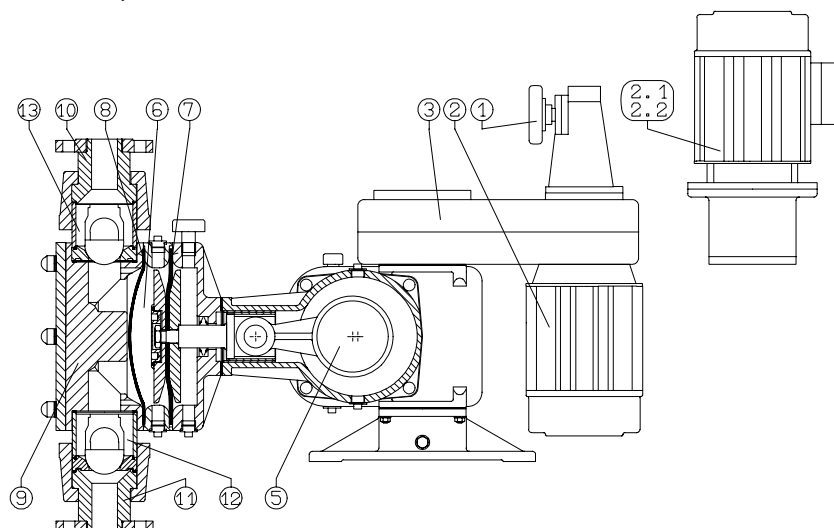
## Metering head

The characteristic feature is the duplex diaphragm (7+8). The eccentric (5) guides the diaphragm (7) almost following the sine wave over the constant stroke. Since the large supporting disks always carry the whole surface of the diaphragm (7) in the maximum eccentric positions, a piston-like displacement effect is achieved. This results in a very high metering accuracy for diaphragm metering pumps independent of the back pressure. The front supporting disk for the suction stroke must not get into touch with the medium because of chemical resistance and the possible abrasivity. Therefore, a second diaphragm (8) is provided, which has a merely separating function and is therefore neutral in respect to forces. The medium side of the EPDM separating diaphragm (8) is coated with PTFE.

A precisely dimensioned glycerin filling (6) acts as hydraulic push rod and thus the distance between the two diaphragms remains constant. Also the rear diaphragm chamber is partly filled with glycerin for lubrication purposes. The suction (12) and discharge valves (13) are single-ball valves. The suction (11) and discharge connections (10) are available in plastic or stainless steel design.

## Legend

- 1 Handwheel for speed adjustment
- 2 Motor
  - 2.1 DC motor
  - 2.2 three-phase AC motor
- 3 Belt gearbox
- 5 Eccentric
- 6 Glycerin filling
- 7 Rear diaphragm
- 8 Front diaphragm
- 9 Metering head
- 10 Discharge connection
- 11 Suction connection
- 12 Suction valve
- 13 Discharge valve



## Drive

There are three possibilities to drive the eccentric (5):

1. By means of a variable speed belt drive (3). The control range is 1:6.5. The drive may only be adjusted while *the motor is rotating* (2).
2. By means of a DC motor (2.1) with thyristor controller. Motors equipped with a tachometer feedback may have a control range of 1:100.
3. By means of a three phase AC motor (2.2). The speed of this motor can be controlled within a range of 1:20 via also available frequency inverters.

### Additional components

Upon request, the Memdos GMR can be equipped with an inductive probe which samples the crankshaft to count the strokes. For diaphragm rupture detection, the front glycerin chamber can be monitored by means of a conductivity probe.

A reversible servomotor can be supplied for the gearbox adjustment which is required for the remote control of the metered quantity or for a process-dependent open-loop or closed-loop control, with the GMR acting as final control element. The actual speed, and thus the metered quantity, is proportionally converted into an analog direct voltage signal by means of a

tachogenerator.

The signal can be directly transmitted to indicators. For operation in control mode, the signal must be amplified e.g. 0-20 mA.

#### Important

Ensure that control circuits are connected such that the automatic stroke adjustment only works when the drive motor is rotating.

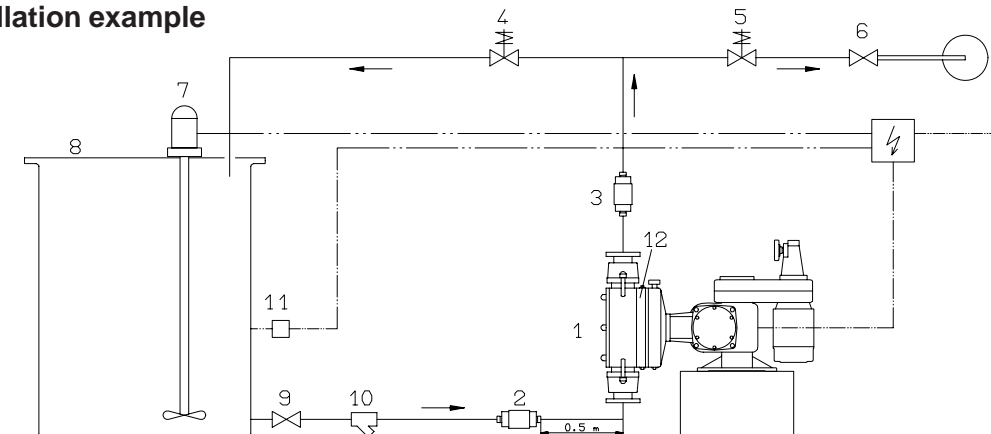
Upon request, a variable d.c. main drive is available instead of the variable speed belt drive. This can be adjusted from 0 to 100%. The motor is controlled via a thyristor controller. The speed is remotely indicated by means of a tachometer or an I x R compensation.

### Technical data

Memdos GMR		2000	3000	4000
Pressure	bar	4	3	2
Pump capacity	ml/stroke	463	694	926
Driven by continuous control	Flow rate	l/h	310...2000	460...3000
	Stroke freq.	min <sup>-1</sup>	11...72	11...72
Driven by three-phase AC or DC motor with 2850 min <sup>-1</sup>	Flow rate	l/h	1600	2400
	Stroke freq.	min <sup>-1</sup>	58	58
Drive power	kW	2.2	2.2	2.2
Diaphragm diameter	mm	212	252	252
Stroke length	mm	23	26	32
Suction lift	mbar	120	120	120
Max. supply pressure ( $\Sigma$ static + dynamic)	mbar	500	500	500
Max. temperature	°C	40	40	40
Weight	Plastic metering head	kg	145	165
	Stainless steel head	kg	155	195

For higher or lower capacities, d. c. motors can be equipped with thyristor controllers (refer to MB 4 20 02), and three-phase a. c. motors can be connected to frequency inverters (refer to MB 4 70 01).

### Installation example



### Legend

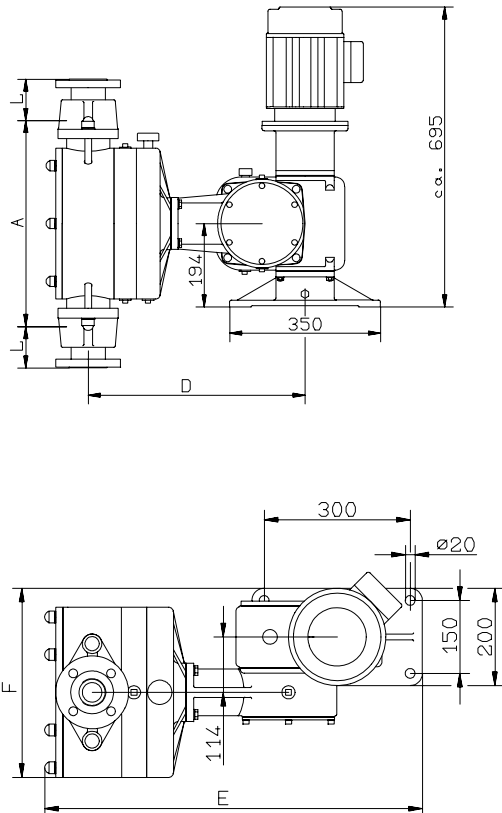
1. Metering pump GMR	MB 1 06 01	8. PE tank	MB 1 20 01
2. Pulsation dampener f. suction pipe	MB 1 27 01	9. Ball valve	
3. Pulsation dampener f. discharge pipe	MB 1 27 01	10. Dirt trap (filter)	MB 1 22 02
4. Relief valve	MB 1 25 01	11. Dry run protection	MB 4 10 00
5. Backpressure valve	MB 1 25 01	12. Diaphragm failure monitoring	Part No. 41028906
6. Injection nozzle	MB 1 23 01	Use shown fittings when required.	
7. Agitator	MB 1 36 01		

**Dimensions**

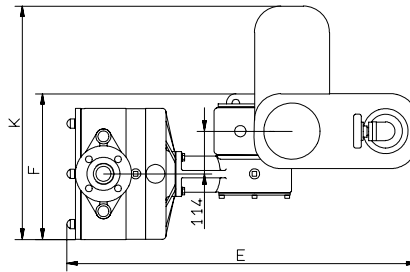
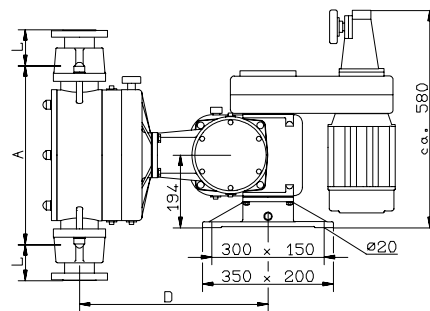
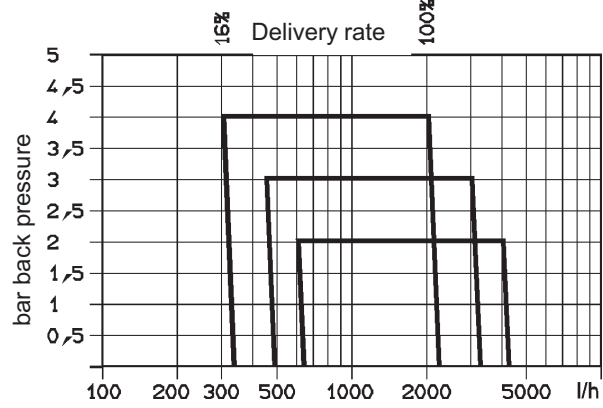
GMR		2000	3000	4000	
Metering head made of:	Plastic	A	410	480	480
		D	492	504	504
		E	923	935	935
		F	358	388	388
		G	589	600	600
		H	589	600	600
		K	593	623	623
	Stainless steel	A	410	480	480
		D	472	484	484
		E	868	880	880
		F	358	388	388
		G	534	545	545
		H	534	545	545
		K	593	623	623

For dimension L see table 5, Connections.

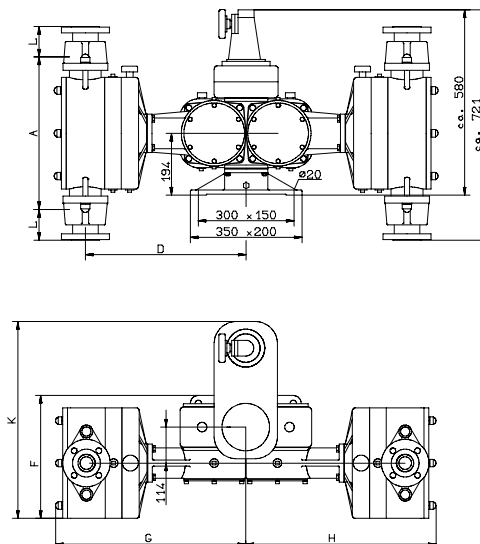
**Dimension drawings Simplex pumps**



**Delivery rate characteristics (in control mode)**



**Dimension drawing Duplex pump**

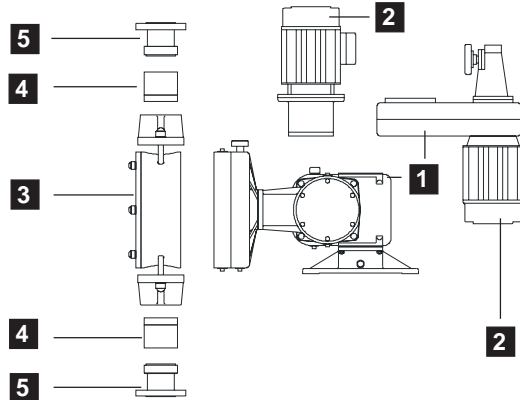


**Selection tables**

In order to offer a great variety of metering pumps to the user, the metering pumps have been divided into the most important functional groups. The pump can be individually assembled. The pump must be equipped with the following units:

- 1** Gearbox      **2** Motor      **3** Metering head
- 4** Valves      **5** Connections

The numbers at the metering pump drawing refer to the corresponding selection tables.



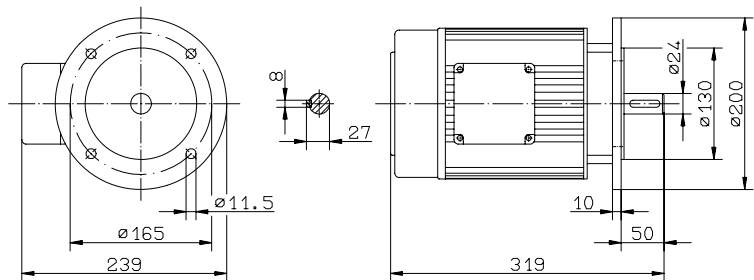
<b>1</b> Gearbox									
Simplex pump GMR				Duplex pump ZGMR					
Drive with:	2000	3000	4000	2000 2000	2000 3000	2000 4000	3000 3000	3000 4000	4000 4000
3-ph. AC motor	32179	32180	32181	32182	32183	32184	32185	32186	32187
Gearbox	32344	32345	32346	32347	32348	32349	32350	32351	32352

<b>2</b> Electrical drives										
Motor type	Power [kW]	Size	Design	Speed [1/min]	Voltage [V]	Frequency [Hz]	Current [A]	IP	ISO-class	Part No.
3-ph. AC motor	2.2	90L	V1	2850	400	50	4.9	54	F	78897
	2.2	90L	V1	2850	400	50	4.9	55	F	78898
3-ph. AC motor with gearbox (500...3600 min-1)	2.2	100L	Special	1410	400	50	5.2	54	F	32214
	2.2	100L	Special	1410	400	50	5.2	55	F	32215
DC motor *	2.4	100L	V18	2850	200	-	-	44	F	32218

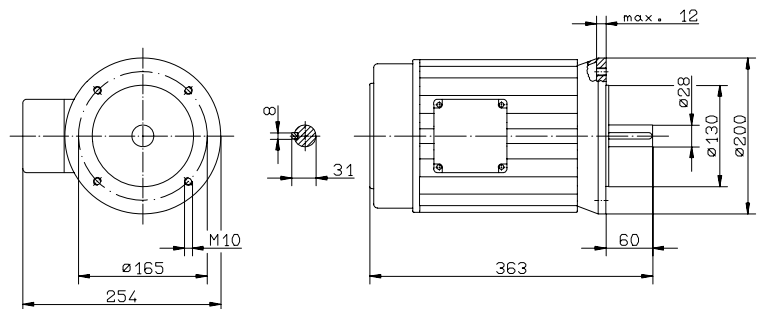
\* Also available with tachogenerator

**Dimension drawing**

Motor size 90L



Motor size 100L

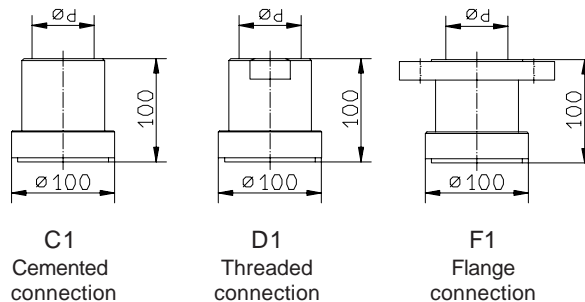


<b>3</b> Metering heads		
Pump size	PP	1.4571
GMR 2000	32138	32157
GMR 3000	32188	32204
GMR 4000	32188	32204

<b>4</b> Valves			
PP housing		1.4571 housing	
Valve-spring retainer of PVDF		Valve-spring retainer of 1.4571	
Hastelloy spring			
Sealing material			
Hypalon	Viton	Hypalon	Viton
24072	24073	24071	29961

<b>5</b> Connections					
GMR	DN	Fig.	d	PVC	1.4571
2000 (3000)*	40	C1	50	21548	-
		D1	G 11/2	32159	25255
		F1	-	27100	27101
2000, 3000 and 4000	50	C1	63	21529	-
		D1	G 2	29888	27046
		F1	-	27103	27104

\* Pressure loss calculation required!



### Ordering example

A metering pump is required for metering lime slurry.

#### Given operating data:

Lime slurry : 3800l/h  
 Back pressure : 3 bar  
 Temperature : 20 °C  
 Mains voltage : 400/230V, 50Hz  
 Manual power adjustment.

#### Selection of the metering pump:

The chemical permits the use of the standard material PP and Hypalon seals.

The plastic flange connection DN 50 is selected for both, the suction and the discharge side.

The 4000 l unit is able to operate at a max. pressure of 2 bar. When having a pressure of 3 bar, the duplex pump ZGMR 2000/2000 is selected.

The metering pump consists of:

	Table	Part No.
Gearbox	<b>1</b>	32347
Motor	<b>2</b>	32214
Metering head	<b>3</b>	32138
Suction valve	<b>4</b>	24072
Discharge valve	<b>4</b>	24072
Connections	<b>5</b>	27103