

2.4 Plunger Metering Pumps

2.4.5 Plunger Metering Pump Makro/ 5

Powerful, built to last with a plunger

Capacity range of single head pump: 38 – 6,014 l/h, 320 – 6 bar

The plunger metering pump Makro/ 5 can virtually be used throughout the low-pressure range and its modular construction enables it to be outstandingly adapted to the performance requirements of the respective application.

The plunger metering pump Makro/ 5 (M5ka) together with the Makro/ 5 hydraulic diaphragm and diaphragm metering pumps, form a range of drive mechanisms with stroke lengths of 20 and/or 50 mm. A wide range of power end versions is available for use in areas at risk from explosion with ATEX certification.

Your benefits

Process reliability:

- Metering reproducibility is better than $\pm 0.5\%$ within the 10 – 100% stroke length range under defined conditions and with correct installation

Excellent flexibility:

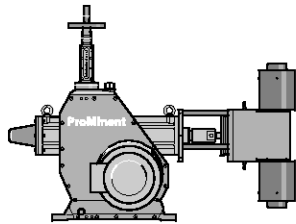
- The modular construction with single and double head versions permits a wide range of applications, with the double head designs being operated in push-pull mode
- It is possible to combine up to 4 metering units, even with different pump capacities, in multiple pump systems
- 5 different gear ratios are available
- Customised designs are available on request

Technical Details

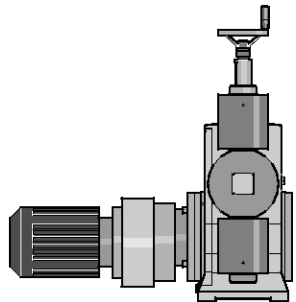
- Stroke length: 0-50 mm, Rod force: 10,000 N
- Stroke length adjustment range: 0 – 100%
- Stroke length adjustment: manually by means of a manual adjustment wheel and scaled display in 0.5% increments (optionally with electric control drive)
- Metering reproducibility is better than $\pm 0.5\%$ within the 10 – 100% stroke length range under defined conditions and with correct installation. Observe the information in the operating instructions
- High-performance ceramic-coated stainless steel plunger
- Wetted materials: Stainless steel 1.4571, special materials are available on request
- A wide range of power end versions is available: Three-phase standard motors, motors for use in areas at risk from explosion and different flange designs for use in customer-specific motors
- Degree of protection: IP 55
- Salt water-resistant, acrylic resin-coated cast aluminium housing
- Provide suitable overload protection in all plunger metering pumps during installation for safety reasons

Field of application

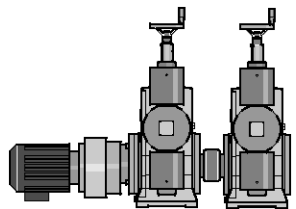
- Volume-proportional metering of chemicals/additives in water treatment
- Metering of reactants and catalysts in the chemical industry
- Level-dependent metering of additives in industrial production engineering



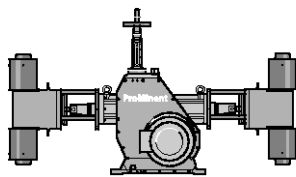
pk_2_075
Makro/ 5 M5Ka



pk_2_076
Makro/ 5 M5Ka



pk_2_077
Makro/ 5 M5Ka externally mounted pump



pk_2_078
Makro/ 5 double head pump





2.4 Plunger Metering Pumps

Makro/ 5 Pump Control

Stroke length variable speed drive Makro/ 5

Variable speed drive consisting of actuator with motor actuator and integrated microprocessor controller for stroke length adjustment via a standard signal. Actuating time approx. 100 sec. for 100% stroke length, equipped with 2 limit switches for min./max. position, IP rating: IP 52. Electrical connection 230 V ($\pm 10\%$), 50/60 Hz, approx. 40 W, mech. stroke position indicator present at drive Makro/ 5.

Special voltage/higher IP ratings/Ex protection on request.

Includes:

Standard current input 0/4-20 mA (corresponds to stroke length 0-100%); internal switch for manual/automatic operation, key switch for stroke adjustment in manual operation mode. Actual value output 0/4-20 mA for remote display.

Frequency converter for speed control in metal housing, IP rating 54

Frequency converter installed in protective housing IP 54 with integrated control unit and main switch suitable for the motor output stated in the following.

Externally controllable with 0/4-20 mA or 0-10V corresponding to 0-50 (60) Hz output frequency.

Integrated control unit with numerous functions, such as toggling external/internal control. With internal control, frequency setting is via arrow keys, error message on multi lingual display etc.

Including evaluator for temperature monitoring of the motor (thermistor protection).

Stroke sensor with namur signal

Mounted on the crank drive of the Makro/5 gearbox. For precise detection of each metering stroke, consisting of actuating cams and inductive proximity switch, switching signal according to Namur. Combined with electronic preselection counters suitable for batch metering or proportional metering in connection with the proportional control.

Retrofitting is only possible on factory premises.

Approved for ex-proof operation with IP rating EEx ia II C T6.

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Technical Data

Type M5Ka	With 1500 rpm motor at 50 Hz				With 1800 rpm motor at 60 Hz				Suc- tion lift	Con- nection, suc- tion/ discharge side	Shipping weight	Plun- ger Ø
	Delivery rate at max. back pressure		Max. stroke rate		Delivery rate at max. back pressure		Max. stroke rate					
	bar	l/h	ml/ stroke	Strokes/ min	psi	l/h	gph (US)	Strokes/ min				
3200038	320	38	11	60	4,640	44	12	71	3.0	Rp 1/4-8	300	17
3200048	320	48	11	75	4,640	56	15	89	3.0	Rp 1/4-8	300	17
3200066	320	66	11	103	4,640	78	21	123	3.0	Rp 1/4-8	300	17
3200085	320	85	11	133	4,640	101	27	159	3.0	Rp 3/8-10	300	17
3200100	320	100	11	156	-	-	-	-	3.0	Rp 3/8-10	300	17
2400070	240	70	21	60	3,480	82	22	71	3.0	Rp 3/8-10	300	23
2400088	240	88	21	75	3,480	104	27	89	3.0	Rp 3/8-10	300	23
2400121	240	121	21	103	3,480	144	38	123	3.0	Rp 3/8-10	300	23
2160157	216	157	21	133	3,132	187	49	159	3.0	Rp 3/8-10	300	23
1700184	170	184	21	156	-	-	-	-	3.0	G 1-15	300	23
1400120	140	120	35	60	2,030	142	38	71	3.0	G 1-15	302	30
1400151	140	151	35	75	2,030	179	47	89	3.0	G 1-15	302	30
1400207	140	207	35	103	2,030	247	65	123	3.0	G 1-15	302	30
1270267	127	267	35	133	1,842	319	84	159	3.0	G 1 1/4-20	302	30
1000314	100	314	35	156	-	-	-	-	3.0	G 1 1/4-20	302	30
0800214	80	214	63	60	1,160	253	67	71	3.0	G 1 1/4-20	303	40
0800268	80	268	63	75	1,160	318	84	89	3.0	G 1 1/4-20	303	40
0800368	80	368	63	103	1,160	439	116	123	3.0	G 1 1/4-20	303	40
0700476	70	476	63	133	1,015	569	150	159	3.0	G 1 1/2-25	303	40
0560558	56	558	63	156	-	-	-	-	3.0	G 1 1/2-25	303	40
0500335	50	335	98	60	725	396	105	71	3.0	G 1 1/2-25	303	50
0500419	50	419	98	75	725	497	131	89	3.0	G 1 1/2-25	303	50
0500576	50	576	98	103	725	687	181	123	3.0	G 1 1/2-25	303	50
0450744	45	744	98	133	653	889	235	159	3.0	G 2-32	303	50
0350872	35	872	98	156	-	-	-	-	3.0	G 2-32	303	50
0350483	35	483	141	60	508	571	151	71	3.0	G 1 1/2-25	311	60
0350604	35	604	141	75	508	716	189	89	3.0	G 1 1/2-25	311	60
0350829	35	829	141	103	508	989	261	123	3.0	G 2-32	311	60
0301071	30	1,071	141	133	435	1,280	338	159	3.0	G 2-32	311	60
0251257	25	1,257	141	156	-	-	-	-	3.0	G 2-32	311	60
0250658	25	658	192	60	363	778	206	71	3.0	G 2-32	311	70
0250822	25	822	192	75	363	975	258	89	3.0	G 2-32	311	70
0251129	25	1,129	192	103	363	1,348	356	123	3.0	G 2-32	311	70
0231458	23	1,458	192	133	334	1,743	460	159	3.0	G 2 1/4-40	311	70
0181710	18	1,710	192	156	-	-	-	-	3.0	G 2 1/4-40	311	70
0160970	16	970	284	60	232	1,147	303	71	3.0	G 2 1/4-40	317	85
0161212	16	1,212	284	75	232	1,438	380	89	3.0	G 2 1/4-40	317	85
0161665	16	1,665	284	103	232	1,988	525	123	3.0	G 2 1/4-40	317	85
0162150	16	2,150	284	133	232	2,570	679	159	3.0	G 2 3/4-50	317	85
0162522	16	2,522	284	156	-	-	-	-	3.0	G 2 3/4-50	317	85
0121343	12	1,343	393	60	174	1,589	420	71	3.0	G 2 3/4-50	331	100
0121678	12	1,678	393	75	174	1,991	526	89	3.0	G 2 3/4-50	331	100
0122305	12	2,305	393	103	174	2,752	727	123	3.0	G 2 3/4-50	331	100
0122977	12	2,977	393	133	174	3,558	940	159	3.0	G 2 3/4-50	331	100
0103491	10	3,491	393	156	-	-	-	-	3.0	G 2 3/4-50	331	100
0062269	6	2,269	664	60	87	2,684	709	71	3.0	G 2 1/2-65	350	130
0062837	6	2,837	664	75	87	3,366	889	89	3.0	G 2 1/2-65	350	130
0063896	6	3,896	664	103	87	4,652	1,229	123	3.0	G 2 1/2-65	350	130
0065031	6	5,031	664	133	87	6,014	1,589	159	3.0	G 2 1/2-65	350	130
0066000	6	6,000	664	156	-	-	-	-	3.0	G 2 1/2-65	350	130

2.4 Plunger Metering Pumps

Identity Code Ordering System for M5Ka

M5Ka	Drive type				
	H	Main drive			
	A	Add-on power end			
	D	Double main drive			
	B	Double add-on power end			
	Type*				
	3200038	1400120	0500335	0250658	0121343
	3200048	1400151	0500419	0250822	0121678
	3200066	1400207	0500576	0251129	0122305
	3200085	1270267	0450744	0231458	0122977
3200100	1000314	0350872	0181710	0103491	
2400070	0800214	0350483	0160970	0062269	
2400088	0800268	0350604	0161212	0062837	
2400121	0800368	0350829	0161665	0063896	
2160157	0700476	0301071	0162150	0065031	
1700184	0560558	0251257	0162522	0066000	
Liquid end material					
SS	Stainless steel				
Sealing material*					
T	PTFE				
Displacement body					
S	Stainless steel plunger, chromium dioxide-coated				
Liquid end version					
0	No valve springs				
1	With valve springs				
Hydraulic connection					
0	Standard connection				
4	SS union nut and insert				
Version					
0	With ProMinent® logo, no frame				
2	No ProMinent® logo, no frame				
A	With ProMinent® logo, with frame, simplex				
B	With ProMinent® logo, with frame, duplex				
C	With ProMinent® logo, with frame, triplex				
D	With ProMinent® logo, with frame, quadruplex				
M	Modified				
Electrical power supply					
S	3 ph. 230/400 V 50/60 Hz (WBS)				
R	Variable speed motor 4-pole 230/400 V				
V (0)	Motor with integrated frequency converter				
P	3 ph. 230/400 V 60 Hz (Exe, Exd)				
L	3 ph. 230/400 V 50 Hz (Exe, Exd)				
V (2)	Motor with integrated frequency converter (Exd)				
5	No motor, with IEC 100 gearbox				
6	No motor, with IEC 112 gearbox				
0	No motor, no gearbox				
Enclosure rating					
0	IP 55 (Standard) ISO class F				
1	Exe version ATEX-T3				
2	Exd version ATEX-T4				
A	ATEX power end				
Stroke sensor					
0	No stroke sensor				
1	With stroke sensor (Namur)				
Stroke length adjustment					
0	Stroke length adjustment, man.				
3	230 V 0-20 mA stroke controller				
4	230 V 4-20 mA stroke controller				
5	115 V 0-20 mA stroke controller				
6	115 V 4-20 mA stroke controller				
G	Control drive 230 V 0-20 mA Exde				
H	Control drive 230 V 4-20 mA Exde				
Application					
0	Standard				
3	Temperature up to -20 °C				

* Digits 1 - 3=back pressure [bar]; digits 4 - 7=feed rate [l/h]



2.4 Plunger Metering Pumps

Materials in Contact With the Medium

	Liquid end	Suction/ pressure connector	Valve seat/ seals	Valve balls	Plunger
Makro 5/50 HK ...DN 8-DN 10	Stainless steel 1.4571/1.4404	1.4571/1.4404	SS/PTFE	Oxide ceramics	Stainless steel/ ceramic
Makro 5/50 HK ...DN 15-DN 25	Stainless steel 1.4571/1.4404	1.4581	PTFE/PTFE	Stainless steel 1.4401	Stainless steel/ ceramic
Makro 5/50 HK ...DN 32-DN 65	Stainless steel 1.4571/1.4404	1.4581/1.4404	PTFE/PTFE	Stainless steel 1.4404 (plate/spring)	Stainless steel/ ceramic

The permissible priming pressure on the suction side is approx. 50% of the max. permissible back pressure.

Motor Data

Identity code specification		Power supply			Remarks
S	3-phase, IP 55	220 – 240 V/380 – 420 V 250 – 280 V/440 – 480 V	50 Hz 60 Hz	3 kW	
R	3-phase, IP 55	230 V/400 V	50/60 Hz	3 kW	with PTC, speed control range 1:5
V0	3-phase, IP 55	400 V ±10 %	50/60 Hz	3 kW	Variable speed motor with integrated frequency converter
L1	3-phase, II 2G Ex e IIC T3 Gb	220 – 240 V/380 – 420 V	50 Hz	3.6 kW	
L2	3-phase, II 2G Ex de IIC T4 Gb	220 – 240 V/380 – 420 V	50 Hz	4 kW	with PTC, speed control range 1:5
P1	3-phase, II 2G Ex e IIC T3 Gb	250 – 280 V/440 – 480 V	60 Hz	3.6 kW	
P2	3-phase, II 2G Ex de IIC T4 Gb	250 – 280 V/440 – 480 V	60 Hz	4 kW	with PTC, speed control range 1:5
V2	3-phase, II 2GDc Ex de IIB T4 Gb, IP67	400 V ±10 %	50/60 Hz	4 kW	Ex-variable speed motor with integrated frequency converter

Motor data sheets can be requested for more information. Special motors or special motor flanges are available on request. The motors are designed in compliance with the Ecodesign Directive 2009/125/EC.

Information for use in areas at risk from explosion

Only use pumps with the appropriate labelling in line with the ATEX Directive 2014/34/EU in premises at risk from explosion. Ensure that the explosion group, category and degree of protection specified on the label corresponds to or is better than the conditions prevalent in the intended field of application.

