ProMinent® Electronic Metering Pumps mikro g/5

Microprocessor-controlled precision ultra-low flow metering pump for laboratory and industrial use.

The ProMinent mikro g/5 is a solenoid-driven microprocessor-controlled, precision packed-plunger type metering pump suitable for all metering tasks in the microliter range. A high degree of reliability is afforded by the self-monitoring of the electronic circuit and the identification of faults.

All possible and actual functions are displayed on the LCD readout. A large range of optional control capabilities enable the pump to be matched to almost any metering tasks in laboratory and industrial applications. Operation is identical to the ProMinent gamma/4 and gamma/5 pumps.

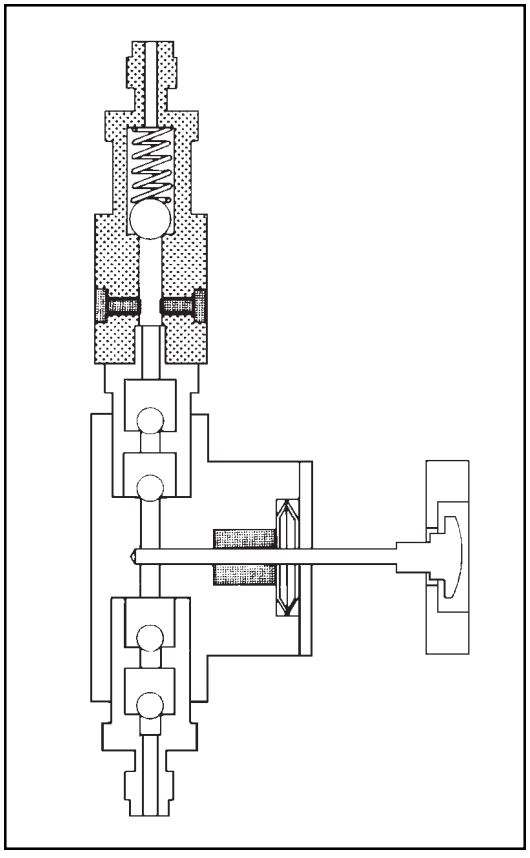
Power end, mikro g/5

The patented power end unit consists of a rugged, fiberglass-reinforced, corrosion-resistant plastic housing (enclosure rating NEMA 4X (IP65), microprocessor control, long-stroke solenoid, hydraulic control valve for continuous and uniform stroke movement, and the stroke length adjusting mechanism.

The capacity can be infinitely adjusted by varying the stroke length using the micrometer adjusting knob from 100% to 2% (1:50), and the stroking rate is infinitely adjustable by a precision quartz control which enables the frequency to be adjusted from 1 to 50 strokes/min. (1:50), providing overall turndown capability in the 1:2500 range.

Liquid end, type SS or TT

The SS liquid end is made of 316 stainless steel and the TT type is made of PTFE. These are supplied in three sizes: 50, 200 and 500 µL/stroke, with ceramic oxide plungers, self-adjusting pure white PTFE packing, graphite-loaded PTFE packing or bal seal packing. Double ball valves of ruby/ceramic and an integral backpressure valve, ensure a steady state accuracy with metering repeatability better than ±0.5%, regardless of the pressure within a range between zero and the maximum back-pressure of the pump. The capacity ranges from 1 to 500 µL/stroke or 0.1 to 1500 mL/h against maximum backpressures of 87, 261 or 580 psig (6, 18 or 40 bar).



Multi-Functional Process Matching by Microprocessor Control

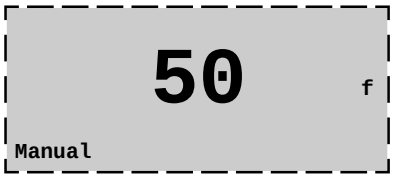
The ProMinent mikro g/5 metering pumps can be customized to meet the requirements of the process. The basic model provides manual and external contact control. Appropriate control versions and options can be added as required.

THE BASIC VERSION

Setting range

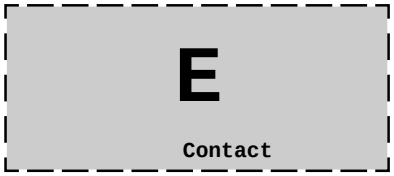
Continuous operation – "Manual"

The capacity can be manually adjusted by using the micrometer adjusting knob to change the stroke length from 100% to 2%, and by using a keypad to change the stroking rate "f" from 50 to 1 stroke/min. The number of selected strokes per minute is displayed, and the stroke frequency is quartz controlled.



External pacing – "Contact"

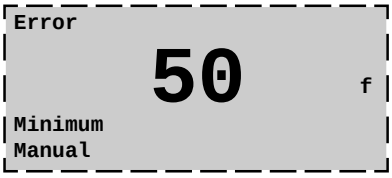
The mikro g/5 series can be paced externally (e.g., by means of a pulse-type water meter for proportional chemical feed). The pulse signals are fed into the contact input of the pump by way of an optional control cable. Every pulse from a water meter or pulse controller produces one pump stroke. Overstroking the pump is not possible. LCD display shows "E" for external contact pacing.



Ensure fluid flow

Chemical tank float switch – "Minimum"

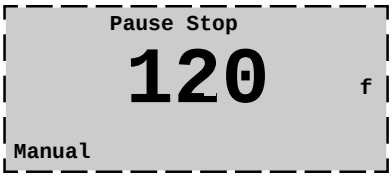
The chemical level in the suction tank may be monitored by connecting the 2-stage ProMinent float switch to the level socket. An early warning is generated when the minimum level is reached. The "Minimum" indication flashes, the red LED comes on and the optional fault indicating relay is energized, but the metering pump continues to operate. Only when the level in the chemical tank has dropped another 30 mm does the pump switch off and the "Error" and "Minimum" displays come on. The optional fault indicating relay remains energized.



Remote pause

Remote on/off control – "Pause"

The mikro g/5 can be switched on and off, voltage-free, by means of the pacing cable. The switching function operates on the quiescent current principle – contact open, pump stationary, indication "Pause" and "Stop".



Problem identification

Autodiagnosis

The electronic control circuit of the mikro g/5 monitors itself continuously. Any fault of the microprocessor stops the pump and issues an alarm (with fault annunciating relay option). The LCD readout flashes and the red LED lights.

Lighting

The backlit LCD screen makes the display easy to read, even in poorly lit locations.

CE Approved

CSA® Available (Standard in Canada)

The mikro g/5 metering pumps are registered according to DIN-VDE 0700 and protected against radio inter-ference class B according to DIN-VDE 0871.

Control Versions and Options

All control versions and options can be freely selected and incorporated to suit your specific needs.

Analog control

With this option, the stroking rate of the mikro g/5 is directly proportional to the analog signal. The stroking rate is varied between 0 and 100% corresponding to the 0/4-20 mA signal. The maximum possible number of strokes per minute is adjustable. When under analog control by the 4-20 mA signal, the pump is switched off and an alarm signal is generated if input signals less than 4 mA (e.g. cable breakage) occur. Other input signals (0-1 V, 0-10 V, 0-60 mV) can be specified when ordering using the identity code.

Pulse multiplier/divider

This feature is used to "tune" the mikro g/5 pump to contact generators of any kind (e.g., pulse-type water meter), and thereby eliminate the need for a costly external control unit. The following functions can be selected by means of the keypad.

Pulse step-up (multiply) and step-down (divide)

By simply entering a factor in the 0.01...9999 range, the step-up or step-down ratio is set.

For example:

Step-up Factor:
9999 1 pulse = 9999 pump strokes
4 1 pulse = 4 pump strokes

Step-down Factor:
1 1 pulse = 1 pump stroke
0.25 4 pulses = 1 pump stroke
0.01 100 pulses = 1 pump stroke

Predetermining counter – "N ↔"

The pulse multiplier/divider feature may be used as a predetermining counter for batch applications. Up to 9999 strokes can be predetermined. The LCD screen displays the number of strokes yet to be completed. The countdown starts by a voltage-free contact on the optional external control cable or by pressing the "P" key. Large batches are also possible, for example 59,994 strokes may be performed by providing six contacts (6 x 9999) in memory mode.

Memory – "Mem."

Should the pump receive contact signals faster than the selected stroking rate, these pulses can be stored in the gamma's memory (to a maximum limit of 65,535) and worked off at the preset stroking rate.

Stroke counter – "N"

This feature totalizes pump strokes that have been performed. The counter resets itself to 1 and a cursor appears on the LCD screen when 9,999 strokes have been accumulated. This totalizer can be used in manual, contact and analog modes.

Timer

The optional integrated timer function allows up to 31 variable on-off times to be programmed daily, or over the course of a 7-day period. The "on-time" can be selected between 1 minute and 24 hours. This could be used, for instance, in the automatic metering of components in laboratory testing. The screen below shows the time as 12:00 p.m. on a 24-hour clock.

Relay outputs

This is employed to transmit alarm messages or for remote control (e.g., to pace a second ProMinent metering pump synchronously). Selectable as:

Fault annunciating relay

For low tank level (flow switch), loss of flow (flow monitor), system faults and fuse/power supply failure.
Function: relay drops out with an alarm condition.

Pacing relay

A contact closure is issued with every pump stroke (contact duration 150 ms). This allows a second ProMinent metering pump to be paced synchronously.

Alarm relay

For low tank level (flow switch), loss of flow (flow monitor) and system faults.
Function: relay pulls in when an alarm condition exists.

Timer relay

Function: relay pulls in to indicate when the pump is running. Only available with 7-day timer.

Technical Data: mikro g/5 Metering Pumps

Pump version	Maximum pressure* psig	(bar)	Capacity at maximum pressure µL/min. min-max	mL/h min-max	µL/ stroke min-max	Suction lift ft.	(m)
400150	580	(40)	1 - 2,500	0.06 - 150	1 - 50	20	(6)
180600	261	(18)	4 - 10,000	0.24 - 600	4 - 200	20	(6)
061500	87	(6)	10 - 25,000	0.60 - 1,500	10 - 500	13	(4)

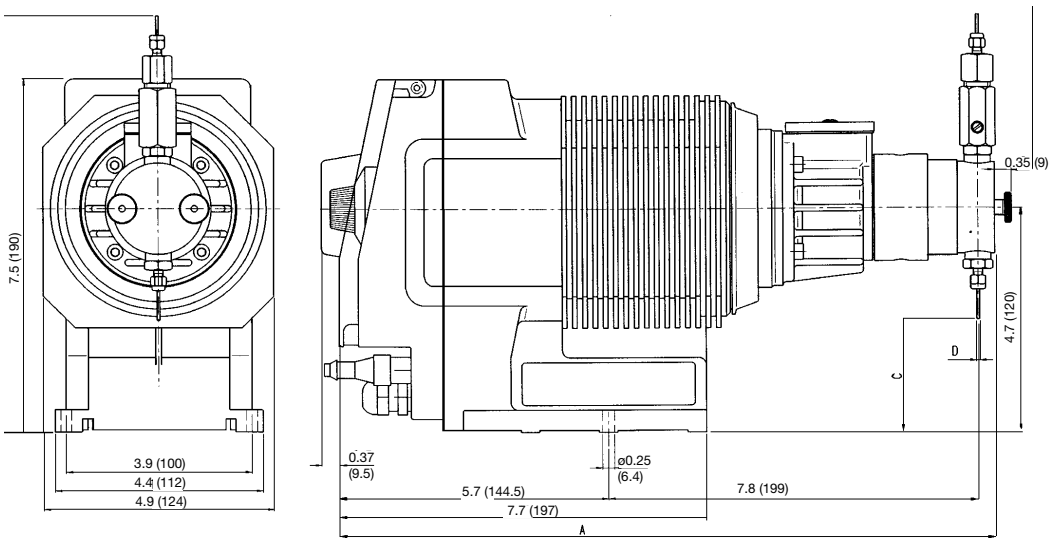
*With TT (Teflon) liquid end, maximum pressure on any pump is 145 psig (10 bar).

Pump version	SS Swagelok tubing connections inch	(mm)	TT tubing connections inch	(mm)	SS version shipping weight lbs.	(kg)	TT version shipping weight lbs.	(kg)
400150	1/16	(1.58)	1/16	(1.75)	2.7	(5.9)	2.7	(5.9)
180600	1/16	(1.58)	1/16	(1.75)	2.7	(5.9)	2.7	(5.9)
061500	1/8	(3.2)	1/8	(3.2)	2.7	(5.9)	2.7	(5.9)

Scope of supply: pump with power cable and plug, 1.6 ft. (0.5 m) PTFE suction and discharge lines.

Dimensions - inch (mm)

mikro g/5		A	B	C	D
400150	SS	13.86 (352)	8.82 (224)	2.36 (60)	0.062 (1.58)
	TT	13.86 (352)	8.94 (227)	2.64 (67)	0.069 (1.75)
180600	SS	13.86 (352)	8.82 (224)	2.36 (60)	0.062 (1.58)
	TT	13.86 (352)	8.94 (227)	2.64 (67)	0.069 (1.75)
061500	SS	13.94 (354)	9.92 (252)	1.73 (44)	0.125 (3.175)
	TT	13.94 (354)	9.25 (235)	2.24 (57)	0.126 (3.2)



Identity code ordering system for ProMinent® mikro g/5 metering pumps

Series:
MG5a mikro g/5a

Pump version:
400150
180600
061500

Liquid end materials:
SS1 316 SS with virgin white PTFE packing
SS2 316 SS with graphite-loaded PTFE packing
SS3 316 SS with bal seal packing
TT1 PTFE + 25% carbon with pure white PTFE packing
TT2 PTFE + 25% carbon with graphite-loaded PTFE packing
TT3 PTFE + 25% carbon with bal seal packing

Valve springs:
0 without springs
1 with 2 springs, 316 SS (1.45 psig)

Transparent, hinged dust cover version:
0 standard, without lock, with logo
1 with lock, with logo

Electrical connection: (with 6 ft. (2 m) power cord)
A 230 V ± 15% 50/60 Hz Euro plug
D 115 V ± 15% 50/60 Hz N. American plug
U 230 V ± 15% 50/60 Hz N. American plug (6-15 P NEMA configuration)

Control type: *(Note: May be ordered without illumination upon request.)*
2 Option type with LCD illumination

Control version:**
0 manual + pulse (1:1) + remote pause
1 Same as "0" + analog, 0-20 mA and 4-20 mA
2 Same as "0" + analog 0-60 mV, 0 - 1 V, 0-10 V

Pulse multiplier/divider:
0 without pulse control
1 with pulse control

7 Day, 31 event timer/RS interface:
0 without timer
1 with timer

Switching mode relay:
0 without relay
1 fault annunciating relay, drops out
2 pacing relay, pulls in
3 fault annunciating relay, pulls in
4 timer relay, pulls in

MG5a 400150 SS3 0 0 D 2 0 1 1 0

ProMinent®

Specifications: mikro g/5

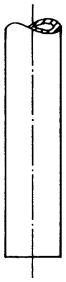
Maximum stroke length:	0.394" (10.0 mm)
Plunger diameter:	300120 = 0.098" (2.5 mm); 120480 = 0.197" (5 mm); 014200 = 0.315" (8 mm)
Materials of construction Housing:	Glass-filled Luranyl™ (PPE)
Liquid end options:	PTFE, 316 SS
Enclosure rating:	NEMA 4 (IP 65), transparent front cover standard
Insulation class:	F
Check valves:	Double ball (ruby/ball/ceramic seat)
Repeatability of the metering:	When used according to the operating instructions <±0.5%
Standard production test:	**100% tested for capacity at maximum pressure**
Capacity test criteria:	-5% to +15%
Power cord:	6 foot (2 m)
Relay cable (optional):	6 foot (2 m), SPDT relay
Ambient temperature range:	14°F (-10°C) to 113°F (45°C)
Max. fluid operating temperatures:	Material / Constant / Short Term PTFE 122°F (50°C) 248°F (120°C) 316 SS 122°F (50°C) 248°F (120°C)
Power supply:	115 V version ±10%, 50/60 Hz; 230 V version ±10%, 50/60 Hz
Average power consumption:	115 VAC, 50/60 Hz: 23 W 230 VAC, 50/60 Hz: 31 W
Peak current draw:	115 VAC, 50/60 Hz: 0.54 A 230 VAC, 50/60 Hz: 0.28 A
Remote pause, Contact input Voltage level with open contact:	Approximately +5 VDC supply voltage
Impedance:	10 kOhm
Controlling Contact:	With voltage-free contact or semiconductor sink logic control (not source logic) with a residual voltage of <700 mV, the contact load is approximately 0.5 mA at +5VDC. (*Note:* Semiconductor contacts that require >700 mV across a closed contact should not be used.)
Max. stroke rate:	50 strokes/min
Max. pulse frequency:	40 pulses/sec
Necessary contact duration:	20 ms
Analog - Current input burden:	Approximately 70 Ohm
Max. allowable input current:	50 mA
Service factor:	1.15 *Note:* capacities are the same on 50 or 60 Hz power.
Warranty:	Two years on drive; one year on liquid end.
Industry standards:	CSA approval available at additional cost in U.S., standard in Canada. TUV-GS (Germany), DIN VDE 0700, and DIN VDE 0871 class B noise suppression standard. CE approved.
Built-in backpressure valve setting:	36 psig (2.5 bar)

ProMinent® mikro g/5
Special Accessories

Description	Part No.

Valves and suction/discharge lines

Suction and discharge line (priced per foot)



1052/4

	Max. working pressure psig	(bar)	
PTFE 1.75 mm o.d. (1/16") x 1.15 mm i.d. (1/32")	174	(12)	037414
PTFE 3.2 mm o.d. (1/8") x 2.4 mm i.d. (3/32")	116	(8)	037415
316 SS 1.58 mm o.d. (1/16") x 0.9 mm i.d. (1/32")	580	(40)	1020384
316 SS 3.175 mm o.d. (1/8") x 1.5 mm i.d. (1/16")	580	(40)	1020385

Max. working pressure at 94°F (20°C) provided the media is compatible and the line is correctly connected

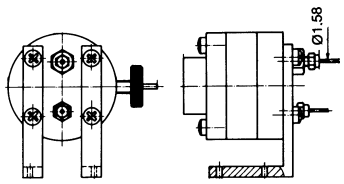
Nipple

1795/4

Pipe nipple of 316 SS for mikro g/5 for joining PTFE 1/16" and 1/8" tubing

Nipple 1/16"	1.58 mm o.d. x 0.9 mm i.d., 25 mm long	402315
Nipple 1/8"	3.175 mm o.d. x 1.5 mm i.d., 30 mm long	402316
Reducing nipple 1/8" to 1/16", 3.175 to 1.58 mm o.d., 45 mm long		402317

Mechanical pulsation dampener



Mechanical spring-loaded diaphragm-type pulsation dampener, with spring-loaded outlet valve, 14.5 psig (1 bar) and pressure relief screw. Suitable for metering pumps with capacities of up to 1.6 gph (6 L/h), dampening range 14.5 to 87 psig (1 to 6 bar).

Union-type connectors:

Inlet 1/16"	Outlet 1/16"	920040
Inlet 1/8"	Outlet 1/16"	920041

ProMinent® mikro g/5 Control cables

Description	Part No.

External control cables

Universal control cable

For metering pump control via contact closure (pulse), standard process signal (analog), and voltage-free contact for remote pause control.

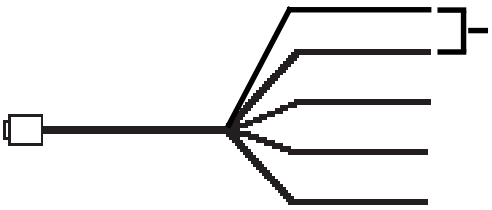
For gamma/b and gamma/a with 5-pole round plastic connector and 5-wire cable with loose end.

Universal control cable, 5-pole round connector, 5-wire, 6 ft. (2 m)	1001300
Universal control cable, 5-pole round connector, 5-wire, 16.4 ft. (5 m)	1001301
Universal control cable, 5-pole round connector, 5-wire, 32.8 ft. (10 m)	1001302

ON/OFF Control

ON/OFF control requires a potentially free contact. When the contact is closed between the BLACK & BROWN wires, the pump will run. When the contact is open, the pump will stop.

Note: If ON/OFF control is the only control feature being used, WHITE, BLUE & GREY wires are not used and should be cut.



BROWN: Remote On/Off (+)

BLACK: Common

GREY: Not used

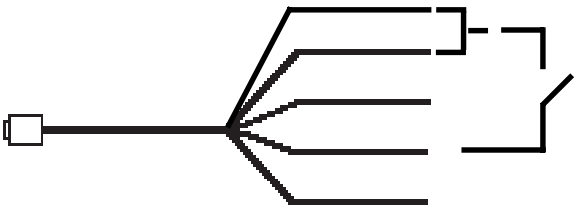
WHITE: Pulse (+)

BLUE: Analog (+)

Pulse Control

Pulse control will allow the pump to run in proportion off of a pulsing potentially free contact closure.

Note: BROWN and BLACK wires have to be connected together via an ON/OFF contact or shorted together. GREY wire is not used and should be cut.



BROWN: Remote On/Off (+)

BLACK: Common

GREY: Not used

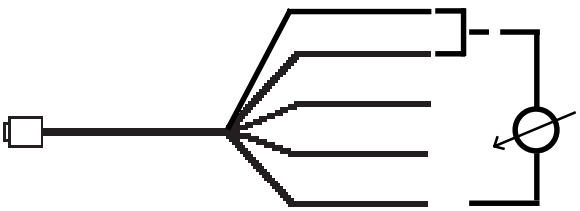
WHITE: Pulse (+)

BLUE: Analog (+)

Analog Control

Analog control runs in proportion to an analog signal such as 4 - 20 mA.

Note: BROWN and BLACK wires must be connected together via an ON/OFF contact or shorted together. The BLACK wire is negative and the BLUE wire is positive. GREY wire is not used and should be cut.



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