Data Sheet
DS-TMF-FM-eng
May, 2003

Models 5881, 5882, 5891, 5892

Brooks Mass Flow Meters and Mass Flow Controllers Flomega™, for Liquid Flow Applications

- **Very low liquid flow from 1 to 1000 grams/hour**
- **Unique thru-flow patented sensor and in-line valve design**
- **Assured process accuracy and repeatability**
- **Long-term reliability, CE certified**
- **Reduced maintenance**
- **Improved safety**
- **Designed, developed, manufactured and supplied by the first ISO-9001 Quality Certified M&C company in the world: Brooks Instrument**

Model 5881, Flomega, Mass Flow Controller for Liquid Flow Application

OPTIONS

- **Zone I certified: ATEX approved Ex II 2 GD EEx d IIB T6 ... T4 T100ºC**
- **Zone II certified: ATEX approved Ex II 3 GD EEx nV II T4 T75ºC**
- **SANITARY (steriliseable) sensor, designed for food- and pharmaceutical applications**

Description

The patented FLOMEGA thru-flow liquid mass flow meter design is the heart of the system. All models are self-contained with signal conditioning electronics and housed in weather-proof IP-65 certified enclosures. In addition the Flomega liquid controller also includes an integrally mounted control valve and controller electronics.

Flomega liquid mass flow meter for accurate measurement and in addition as liquid mass flow controller has been especially designed to measure and control very low flows of liquid from 1 to 1000 grams/hour.

FEATURES

- Continuous mass flow measurement and control for difficult low liquid flowranges
- Superiour thru-flow design mass flow sensor
- Enhanced performance
- High accuracy and repeatability
- Stand-alone modular design
- Jumper selectable input/output signal configuration
- Closed system
- certified for use in hazardous area Zone I or Zone II
- Sanitary designed sensor

BENEFITS

- Eliminates the necessity of batch processing
  Higher productivity
  Lower costs
- Virtually insensitive to process temperature, pressure, density or viscosity changes (specific heat value dependent).
- High reliability
  Ensures proper process recipe
- Verify and calibrate other instruments and provides consistent process results
- Packaged in rugged enclosure
  Insensitive to mounting position
- Easy installation
- Safe with toxic and volatile liquids
- Can be used in many industrial applications
- Applicable for food and pharmaceutical applications where sterilisation is important

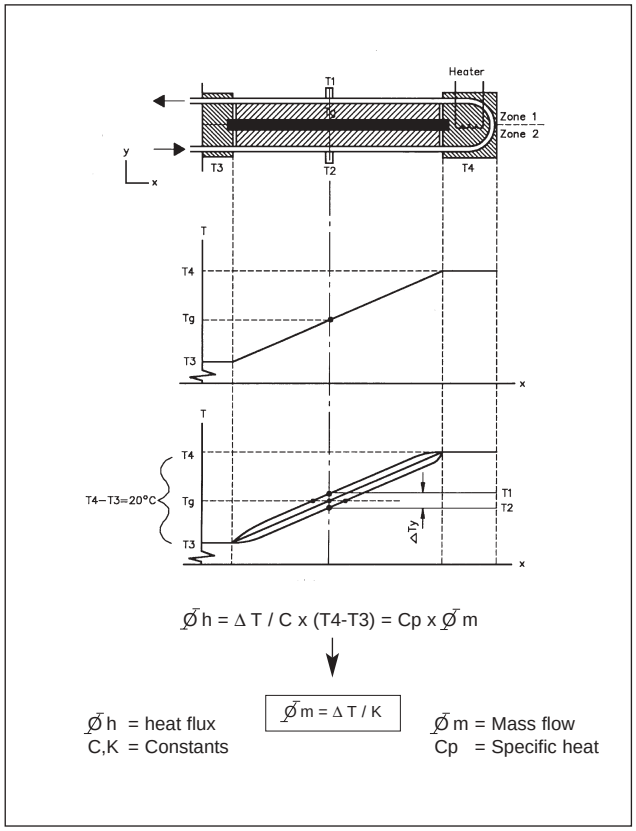


Figure 1

PROVEN SENSOR AND CONTROLLER TECHNOLOGY

Flomega is based on a proven thermodynamic measurement principle. Brooks Instrument developed a thru-flow (no by-pass) mass flow meter especially for low-flow liquid applications. In this meter, (see fig. 1) the heat is transferred perpendicular to the fluid flow. The temperature difference T1-T2 reflects the heat current and is proportional to the liquid flow. The result is a linear and fast responding mass flow meter.

The Flomega liquid mass flow controller consists of the same unique meter design, a in-line control valve and control electronics. This stand alone unit is capable in accurately controlling low liquid flows. The in-line valve has been designed to reduce dead volume as much as possible, to ensure trouble-free operation. It avoids gas being trapped in the valve construction and improves the ability to purge.

EASE OF INSTALLATION

The Flomega liquid mass flow meter and liquid mass flow controller are mounted in rugged enclosures suitable for operation in harsh conditions. All models are stand-alone instruments and are easy to service and can be installed in any mounting position.

Please refer to the installation and operating manual for details.

Fittings are available for connection to different line sizes.

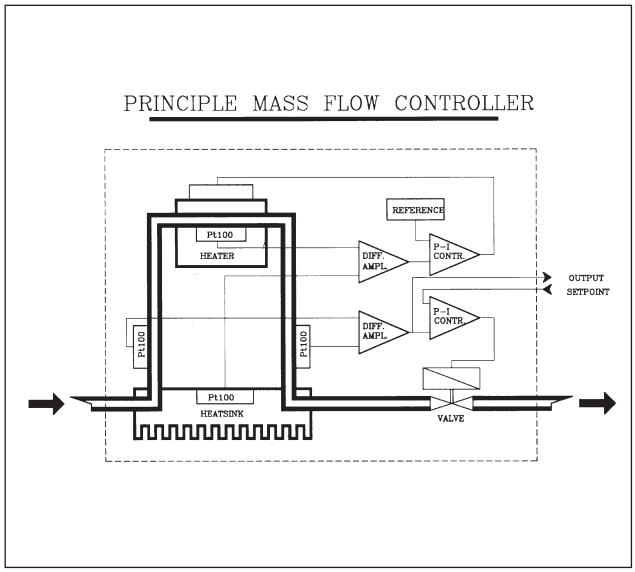


Figure 2

EASE OF OPERATION

Because of the unique sensor and valve design manual degassing during operation is not needed. In order to release the entrained gas in the valve compartment during start-up the Flomega electronics has been equipped with a valve override purge option, which removes gas very quickly. A vertical-upward position of the Flomega is also beneficial for this reason. No special precautions during operation are needed.

Reconfiguring the valve to new process conditions is hardly required, because the Flomega can be applied over a large range of process conditions. When needed, tuning the control valve is a simple task. For ease of maintenance, the orifice can be adjusted in the field. The adjustment can be performed without disassembling the unit.

PERFORMANCE SPECIFICATIONS

Accuracy incl. linearity ± 0,5% full scale measured at calibration conditions

Repeatability

	Models	Applicable flowrange	
		from 100% to 50% of max. f.s.	less than 50% of max. f.s.
	5881/91	± 0,2% of rate	± 0,2% f.s.*
	5882/92	± 0,2% of rate	± 0,4% of rate

* The measured repeatability is (technically) limited by the current calibration method using an highly accurate balance (weighscale)

Process temperature effects ± 0,03% F.S./°C

Ambient temperature effects ± 0,1 % F.S./°C

Specification

Flowranges

	Brooks FLOMEGA™		
Models	**Min. full scale Flowrate***	**Max. full scale Flowrate**	**Units**
5881/91	15**	100	gr/hour
5882/92	200	1000	gr/hour

* To be specified at ordering (factory selectable) (water equivalent flowranges)
** Down to 15 gr/hour minimum full scale is possible
@ ± 1% f.s. accuracy and ± 0,4% f.s. repeatability
Flowranges from > 30 gr/h are within specified accuracy

Rangeability	50:1 (depending on f.s. Value)
Viscosity limits	Up to 200 cP (limited by max. diff. pressure)
Ambient temperature range	0 - 65°C
Process temperature range	0 to 100°C (Model 5882/92 : max. 90°C)
Pressure limits	100/400 bar versions
Max pressure difference	• Model 5881: 20 bar • Model 5882: 40 bar
Pressure drop sensor	• Model 5891: 10 mbar @ 100 gram/hour water • Model 5892: 150 mbar @ 1000 gram/hour water
Setpoint input/ flow signal output	0 (4) -20 mA*, or 0-5Vdc.*
Power supply	+ 15Vdc or 24Vdc* ± 10% max. current 660 mA
Warm-up time	Performance within specifications: 60 minutes (Within ± 1,5% F.S. accuracy: 15 minutes)
Response time	(to within 2% of final value for a 2-100% command change, at a constant operating pressure) • Models: 5881/91: 5 seconds • Models: 5882/92: 7 seconds
Mounting insensitivity	Not affected by mounting position*
Certification	CE certified
Protection grade	IP 65 weather proof
Optionally available	• Hazardous locations ATEX approved • Zone I, EEx d IIB T4 ... T6 • Zone II, EEx nV II T4

* To be specified at ordering

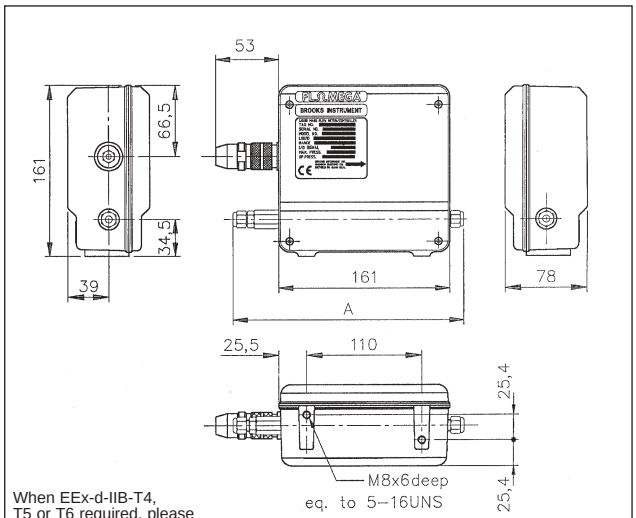
Physical specifications

Mechanical connections	• Standard: 1/16” or 1/8” tube connections • Optional: 1/4” tube compression, 1/4” NPT (F), 1/4” VCR or 1/4” B.VCO fittings
Inlet filter	Material: stainless steel Mess size: 40 micron
Materials of construction	• All wetted materials: stainless steel. For seals: Viton, PTFE, EPDM, Buna or kalrez • All stainless steel construction (including welded adapters) for SANITARY sensor
Housing materials	Cast aluminium
Electrical connections	12-pole circular connector

* Refer to Installation and operating manual FLOMEGA for installation guide lines

Weight	less than 3,5 kg

DIMENSIONS



When EEx-d-IIB-T4, T5 or T6 required, please contact factory for detailed dimensional drawing.

Connections	A	A with filter
5/16”-24 UNF	143,5 mm	175 mm
1/16” Tube Compression	176,5 mm	208 mm
1/8” Tube Compression	188 mm	220 mm
1/4” Tube Compression	188 mm	220 mm
1/4” NPT(F)	208 mm	240 mm

BROOKS LOCAL- AND WORLDWIDE SUPPORT

Brooks Instrument provides sales- and service facilities around the world, ensuring quick delivery from local stock, timely repairs, and local based sales and service facilities.

Our dedication to customer service and support extends to our direct sales force, who are well trained, experienced and equipped. These flow specialists provide consultation and support, assuring succesful applications of the Brooks flow measurement and control products.

Calibration facilities are available in virtually all local sales- and service offices. The primary standard calibration equipment to calibrate the mass flow products is certified by the Dutch Weights and Measures Authorities (NMi) and traceable to the relevant international standards.

ORDERING INFORMATION

BASE MODEL NUMBER	DESCRIPTION
5881/D	MASS FLOW CONTROLLER (MAX. 100 GRAMS/HOUR WATER EQUIVALENT)
5891/D	MASS FLOW METER (MAX. 100 GRAMS/HOUR)
5882/D	MASS FLOW CONTROLLER (MAX. 1000 GRAMS/HOUR WATER EQUIVALENT)
5892/D	MASS FLOW METER (MAX. 1000 GRAMS/HOUR)
	MATERIALS OF CONSTRUCTION
1A	ST.ST./VITON
1B	ST.ST/BUNA
1C	ST.ST/PTFE (STAKED KALREZ VALVE SEAT AND SENSOR O-RINGS) P>14 BAR
1D	ST.ST/PTFE (MOLDED KALREZ VALVE SEAT AND SENSOR O-RINGS) P<14 BAR
1E	ST.ST/KALREZ (MOLDED KALREZ VALVE SEAT) P<14 BAR
1F	ST.ST/KALREZ (STAKED KALREZ VALVE SEAT) P>14 BAR
9Z	SPECIFY
	RATINGS
1	100 BAR
2	14 BAR
3	400 BAR
9	SPECIFY
	INPUT/OUTPUT SIGNALS
A	4-20 mA
B	0-20 mA
C	0-5 Vdc
Z	SPECIFY
	MECHANICAL CONNECTIONS
1	5/16" - 24 UNF THREADS
2	1/16" - TUBE COMPRESSION FITTINGS (ONLY 5881/5891) (MAX. 100 BAR)
3	1/8" - TUBE COMPRESSION FITTINGS (MAX. 400 BAR)
4	1/4" - TUBE COMPRESSION FITTINGS (MAX. 400 BAR)
5	1/4" - NPT(F) (MAX. 400 BAR)
6	1/4" - VCO FITTINGS FOR SANITARY SENSOR ONLY (MAX. 400 BAR)
7	1/4" VCR (MAX. 100 BAR)
9	SPECIFY
	INTERCONNECTION CABLE
0	NONE
A	WEATHERPROOF MATING CONNECTOR
B	3 m. INTERCONNECTION CABLE **
C	6 m. INTERCONNECTION CABLE **
	** THIS CABLE IS PROVIDED WITH A MATING 15-PINS D-TYPE
	CONNECTOR FOR CONNECTION WITH THE READ-OUT ELECTRONICS,
	19" RACK 0152/0154 MODELS.
Z	SPECIFY
	OPTIONS
0	NONE (=WITH "BROOKS" LABELS)
4	SANITARY SENSOR PROVIDED WITH 1/4" VCO FITTINGS
	EX-PROOF
0	NONE
D	ATEX ZONE I (EEx d IIB T4 ... T6)
F	ATEX ZONE II (EEx nV II T4)
	POWER SUPPLY INPUT
0	+15 Vdc
1	+24 Vdc
5891/D 1A 1A 3A 0 1 =	**TYPICAL MODEL NUMBER**

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