TechGroup

Product Group Flow Monitoring.

Product Category Process Control.

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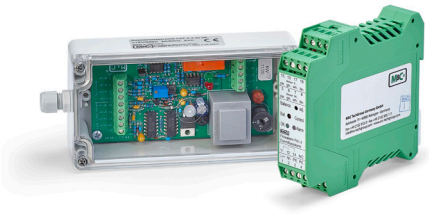

FA1.1, FA1.4

Electronic Controller Series FA®

Versions FA-1.1, FA-1.4, K-FA
for flow monitoring sensors series FA® and for liquid alarm sensor series KS®, versions KS2, KS3

Special Features

- **For wall- or rail-mounting**
- **3 operating modes**
- **With line-break monitoring**
- **With 1 potential-free change-over contact in "safety-first" design**
- **LEDs for displaying operational and fault status**
- **Automatic control of the LED brightness inside the optical flow alarm sensor**

Application

The M&C electronic controllers series FA® are required for the operation of the flow monitoring sensors FA-1/2/3bi and FA1-H (see data sheets "Optical Bi-Stable Flow Alarm Sensors Series FA®" and "Optical Flow Monitoring Series FA®") as well as the liquid alarm sensors KS2 and KS3 (not KS2.Ex, KS3.Ex).

Description

The M&C electronic controllers series FA® are available for wall- or rail-mounting.

Three operating modes are available, which are defined via the electrical connection:

- Electronic controller for flow monitoring in bistable design in combination with the forked photoelectric sensor FA-1/2/3bi.
- Electronic controller for flow monitoring in monostable design in combination with the forked photoelectric sensor FA-1/2/3bi or FA2-H.
- Electronic controller for liquid alarm sensors KS2 and KS3 or for operation in combination with the external pre-amplifiers K-FA and K-FA-H (see datasheet "Optical Flow Monitoring Series FA®"). This operation mode is used when the cable lengths between forked photoelectric sensor FA... and electronics FA-1... are more than 10 m [≈ 32.8 ft] long or when strong electrical interference signals via the sensor cable influence the evaluation.

For safe operation, line break monitoring is integrated, and for reliable alarm signalling a potential-free change-over contact in "safety-first" design is available. This contact has a switch-on and -off delay to avoid unintended alarm signals due to pulsating gas flow.

There are also two LEDs for displaying the operating and malfunction status.

The electronic controllers FA-1... are calibrated to the forked photoelectric sensors FA... and the measuring glasses of the flow meters FM-1/10/40 at the factory.

In addition, the brightness of the FA... forked photoelectric sensor is automatically controlled depending on the ambient and operating conditions (light conditions, temperature, aging of the LEDs, contamination of the measuring glass, etc.).

When operating a bistable flow monitoring system, the flow rate set by the FA... forked photoelectric sensor is detected when the flow exceeds or falls below the setpoint (MIN or MAX).

With a monostable flow monitoring system, the only thing detected is whether the float is either in the light beam of the forked photoelectric sensor FA... or above or below it.

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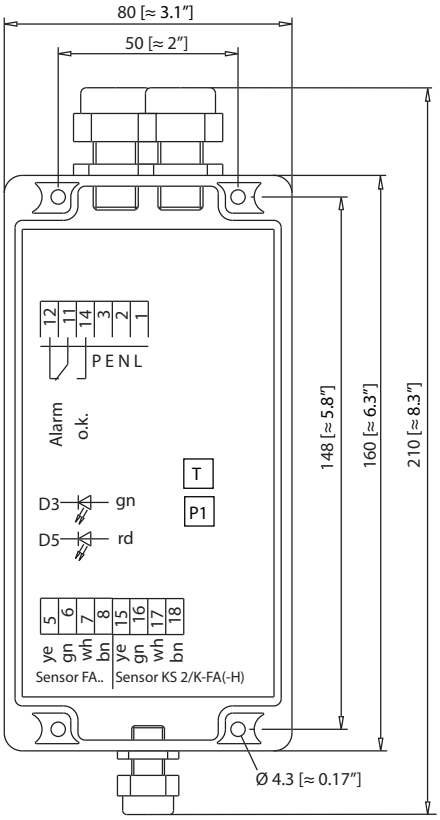
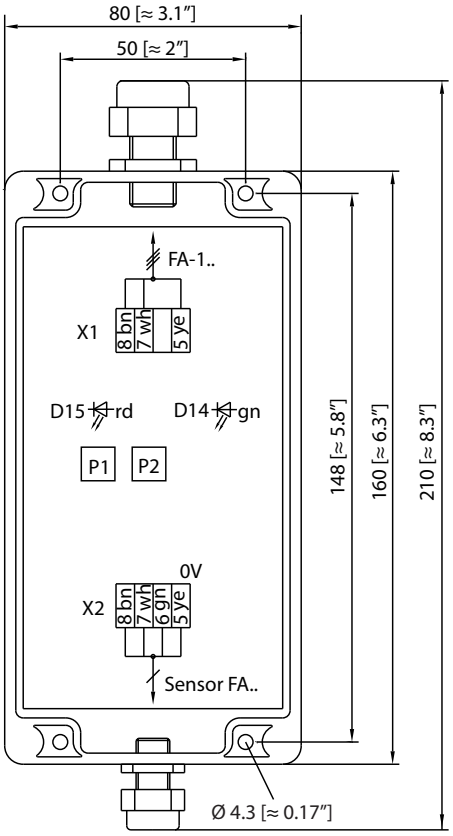
Dimensions

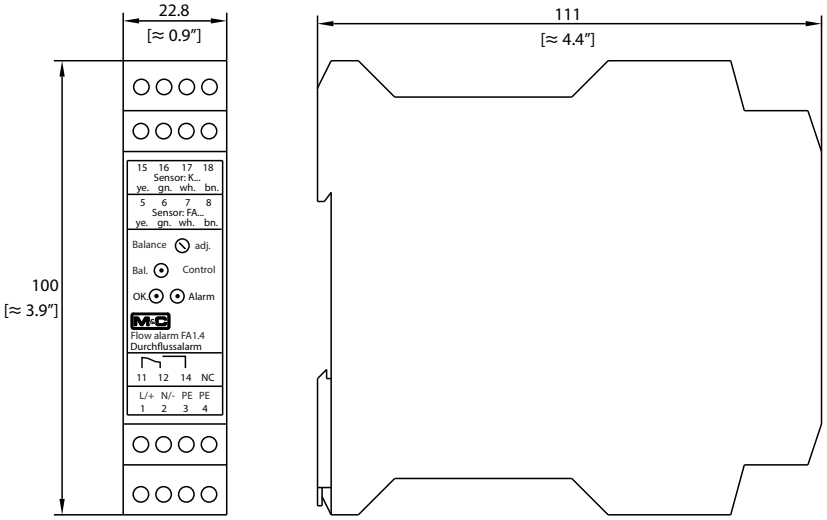
FA-1.1 in wall-mounting housing



Pre-amplifier K-FA



FA-1.4 rail-mounting housing



Dimensions in mm [inches]

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Technical Data

Electronic Controller Type	FA-1.1	FA1.4	K-FA**
Part No. 230 V, 50/60 Hz 115 V, 50/60 Hz 24 V DC 24 V AC	 02E7300* 02E7300* 02E7300d 02E7300b	 02E7110 02E7110a 02E7110d 02E7110d	02E4020
Mounting	Wall-mounting housing	Rail-mounting housing EN 50022	Wall-mounting housing
Sensor input	1		
Function mono-/bistable / KS2, KS3	All, selectable by assignment		Mono- or bistable selectable
Power consumption	2 VA	1 VA	
Alarm relay (MC/NC/NO) contact rating	250 V DC/AC AC = 500 VA, DC = 50 W, 3 A	250 V AC/DC AC = 500 VA, DC = 45 W, 2 A	
Switch-on and -off delay of alarm relay	2 s		
Cable entry	1 x clamping range 3 - 6.5 mm 2 x clamping range 5 - 10 mm		1 x clamping range 3 - 6.5 mm 2 x clamping range 5 - 10 mm
Electrical connections	Terminals max. 2.5 mm^2		
Sensitivity adjustment sensor FA...	After removing the lid at the potentiometer	In the front side of the housing at the potentiometer	
Distance between sensor and electronic FA-...	Max. 10 m [≈ 32.8 ft]		> 10 m [≈ 32.8 ft], max. 200 m [≈ 656.2 ft]
Line breakage detection	Yes		
Housing protection type	IP65, EN 60529	IP20, EN 60529	IP65, EN 60529, IP20
Housing material	Polycarbonate	Polyamide	Polycarbonate
Ambient temperature	-25 to +60 °C [-13 to 140 °F]		
Electrical standard	EN 61010		
Dimensions (H x W x D)	55 x 80 x 160 mm [≈ 2.2" x 3.1" x 6.3"]	100 x 22.8 x 111 mm [≈ 3.9" x 0.9" x 4.4"]	55 x 80 x 160 mm [≈ 2.2" x 3.1" x 6.3"]
Weight	0.31 kg [≈ 0.8 lb]	0.18 kg [≈ 0.4 lb]	0.3 kg [≈ 0.7 lb]

* Switchable power consumption 230 V, 50/60 Hz /115 V, 50/60 Hz, factory-set: 230 V, 50/60 Hz

** To be used in combination with electronic controller FA-1.1 or FA-1.4 if the cable length between the flow alarm sensor and the electronic controller exceeds 10 m [≈ 32.8 ft]

FA-1/2/3, bi

Optical Bi-Stable Flow Alarm Sensors Series FA®

Version FA-1/2/3, bi-forked light barrier

Special Features

- **Easy mounting without dismantling the measuring glass**
- **Also for very low flow quantities**
- **Even for non-metallic or very small floating balls**
- **Easy adjustment of any alarm setpoint**

Application

The patented forked light barrier FA-1/2/3, bi is used in analytical technology for flow-monitoring in float-type flow meters with measuring tubes made of transparent material, e.g. Duran® glass. Thanks to optical scanning, very low flow quantities can be detected even in flow meters with non-metallic or very small (1 mm) floating balls.

A special sensor head FA2-H is supplied for temperatures up to +180 °C [356 °F]. The sensor head contains a light guide on the right and left side via which the incident and emergent light is conducted by the transmitter/receiver located externally in a separate adapter in the "cold area".

Description

The patented M&C forked light barrier FA-1/2/3, bi consists of a compact aluminium body with a fixed, open prism and a pressure screw. This makes positioning of the sensor FA-1/2/3, bi on the flow meter's measuring glass very easy; it is not necessary to disassemble the measuring glass. Three basic versions cover a measuring glass diameter range from 5 to 55 mm [≈ 0.2" to 2.2"].

Within the sensor's body, a mechanically protected, high-intensity LED is mounted on the left side as a light source and two photo-transistors are mounted on the opposite side as receivers.

The standard 3 meter long connection cable exits on the left side adjacent to the pressure screw. The LED emitters' light beam is incident on the photo-transistors through the flow measuring glass. As soon as a floating ball breaks the light beam, one or both of the photo-transistors are blanked out.

The necessary FA-1... electronic controllers analyze this status change accordingly. The bi-stable operation of the FA-1... electronic controllers ensures detection of the set flow rate in the event of measured values falling below or exceeding this setpoint with the sensor in any position. The mono-stable operation of the FA-1... electronic controller indicates only whether the floating body is located in the light beam of the light barrier, above or below it.

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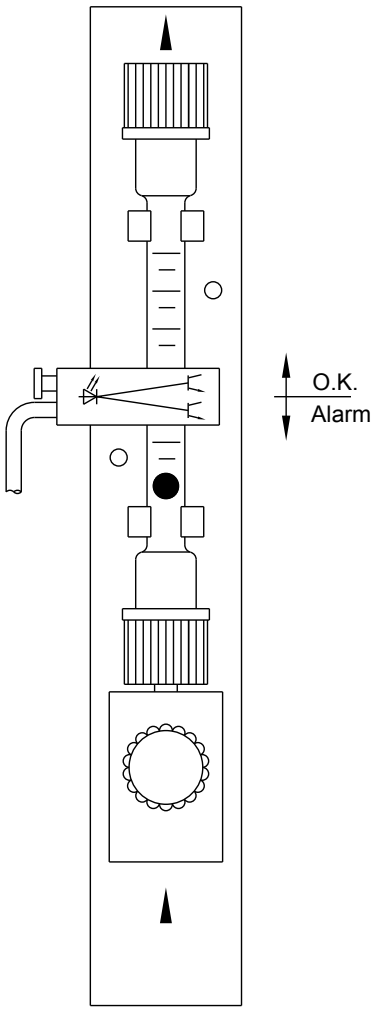
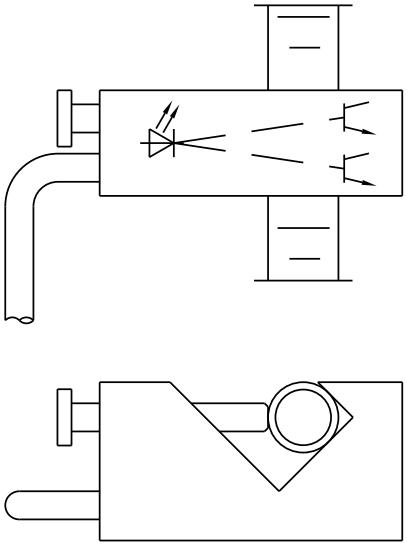
FA-1,bi to flow meter FM10



Optical bi-stable flow alarm sensors series FA



Technical Data

Flow Alarm Sensors Type	FA-1,bi	FA-2,bi	FA-3,bi
Part No.	02E1000	02E2000	02E3000
Measuring tube	5 to 14 mm [≈ 0.2" to 0.6"]	13 to 27 mm [≈ 0.5" x 1.1"]	26 to 55 mm [1" x 2.2"]
Dimensions (W x D x H)	35 x 23 x 15 mm [≈ 1.4" x 0.9" x 0.6"]	63 x 40 x 22 mm [2.5" x 1.6" x 0.9"]	103 x 75 x 25 mm [≈ 4.1" x 3" x 1"]
Weight	50 g [≈ 0.1 lb]	100 g [≈ 0.2 lb]	200 g [≈ 0.4 lb]
Operating temperature	-25 to +60 °C [-13 to 140 °F]		
Storage temperature	-25 to +70 °C [-13 to 158 °F]		
Electrical connection	3 m [≈ 9.8 ft] connection cable standard; 4.5 mm ø, 4 core (each additional meter of sensor connection cable => Part No: 02E9000, max. 10 meters [≈ 32.8 ft]) (>10 meters = with pre-amplifier K-FA.. max. 200 meters [≈ 656.2 ft]		
Mounting	With clamping screw		
Function	Bi-stable and mono-stable		
Power supply voltage	From FA... electronic controller		
Protection type	IP65 EN 60529		
Material	Aluminium-anodized, epoxy, PVC cable, semi-conductors		

Duran® is a registered brand name for borosilicate glass produced by the German company DWK Life Sciences GmbH..

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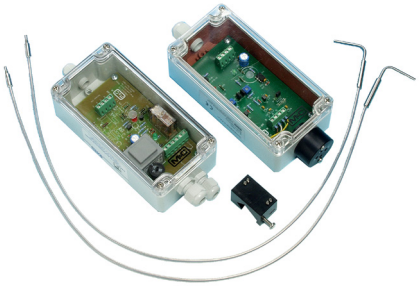


FA1-H, 2 x F01, K-FA-H, FA-1.1

Optical Flow Monitoring Series FA®

Versions FA1-H for temperatures up to 180 °C [356 °F] with 2 light guides for monostable functioning

Special Features

- **Easy mounting of the sensor head at the flow meter without dismantling the measuring glass tube**
- **Also applicable for very low flow quantities**
- **Even suitable for non-metallic or very small floats**
- **Easy adjustment of any MIN alarm set-point**

Application

The optical flow monitoring unit with light guides is used in gas analysis on heated flow meters with temperatures > 60 °C [140 °F]. The measuring glass tubes must be transparent. Thanks to optical scanning, very low flow quantities can be recorded even in the case of flow meters with non-metallic or very small (1 mm [≈ 0.04"]) floats.

Description

The M&C flow monitoring unit FA1-H consists of 4 sub-assembly modules:

1. the patented sensor head FA1-H,
2. the 2 light guides FO... for monostable function,
3. the K-FA-H pre-amplifier and
4. the electronic controller FA-1.1 or FA-1.4**

– ** see data sheet "Electronic Controller Series FA®" –

The sensor head FA1-H is attached to the FM1-H flow meter by means of a pressure screw with its stationary open prism to the measuring glass tube. Assembly is simple and does not require any dismantling of the measuring glass tube. The FO1 light guide is supplied in a standard length of 600 mm [≈ 2.0 ft]. Light guide FO3 (900 mm [≈ 3.0 ft] long) and FO2 (1200 mm [≈ 3.9 ft] long) can be supplied for greater length requirements.

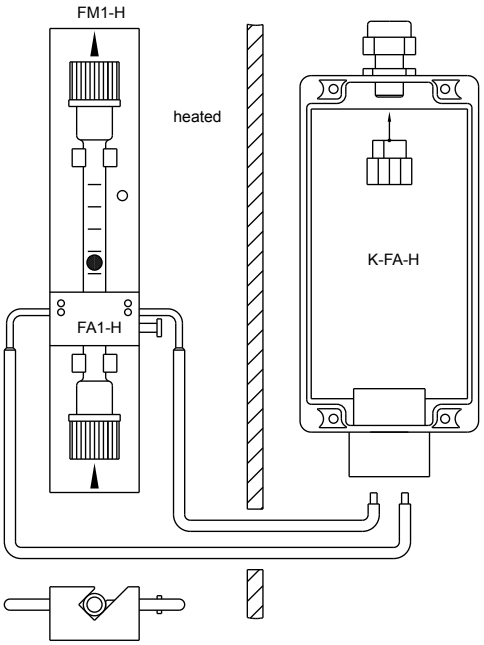
The angled light-guide ends are fixed inside the FA1-H sensor head with one pressure screw each. Two light guides FO are needed for the monostable function.

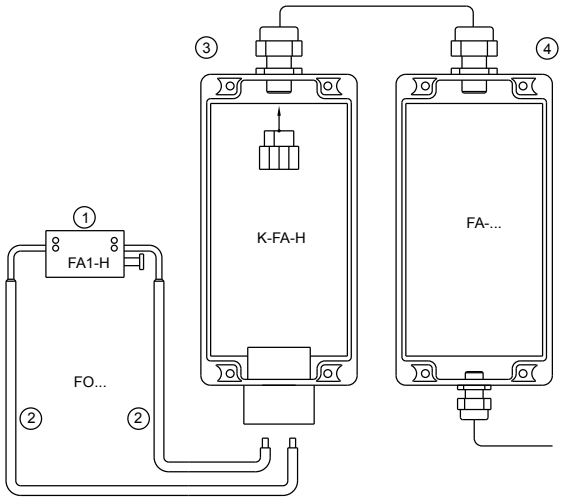
When using the pre-amplifier K-FA-H, a distance of 200 meters [≈ 656.2 ft] between the flow meter and the electronic controller FA-1 [see datasheet "Electronic Controller Series FA®"] is possible without any problems.

The LED emitters' light beam passes through the FO light guides and is detected by the photo-transistor through the FM1-H flow meter measuring glass tube. As soon as the float blocks the light beam, the photo-transistor does not detect the light beam anymore. The FA-1 electronic controller analyzes this changed status accordingly.

The monostable version ensures a MIN alarm function at the lowest sensor setting position.

Flow monitoring FA1-H on flow meter FM1-H





① 1 x sensor head FA1-H
② 2 x light guides FO1/FO2/FO3 for monostable function
③ 1 x K-FA-H pre-amplifier
④ 1 x electronic controller FA-1.1 or FA-1.4

Technical Data

	Sensor Head FA1-H*	Light Guide FO1	Light Guide FO3	Light Guide FO2	Pre-Amplifier K-FA-H
Part No.	02E4001	02E4060	02E4063	02E4065	02E4010
Function monostable	1 x	2 x			1 x
Measuring tube	5 to 14 mm [≈ 0.2" to 0.6"]				
Light guide length		600 mm [≈ 2.0 ft]	900 mm [≈ 3.0 ft]	1200 mm [≈ 3.9 ft]	
Dimensions (W x D x H)	24 x 40 x 24 [≈ 0.9"x 1.6"x 0.9"]	ø 6 mm [≈ ø 0.2"]			80 x 160 x 55 [3.2"x 6.3"x 2.2"]
Weight	90 g [≈ 0.2 lb]	230 g [≈ 0.51 lb]	330 g [≈ 0.7 lb]	420 g [≈ 0.9 lb]	560 g [≈ 1.2 lb]
Material	Anodized aluminium	Glass fiber, SS 316Ti, brass-chromed			Polycarbonate
Assembly	Fixed with clamping screw				Wall-mounting
Cable entry					Terminal range 5 - 10 mm
Electrical connection					Terminals 2.5 mm²
Supply voltage					12V DC internal from FA-1..
Electrical standard					EN 61010
Operating temperature	-25 to +180 °C [-13 to 356 °F]				-25 to +60 °C [-13 to 140 °F]
Storage temperature	-25 to +70 °C [-13 to 158 °F]				
System of protection	IP65 EN 60529				

(* Other mounting designs for the light guides on request.)

Separate Electronic Controller Required for the K-FA-H Pre-Amplifier

Electronic controller	FA-1.1	FA-1.4
Part No. 230 V, 50/60 Hz	02E7300*	02E7110
Part No. 115 V, 50/60 Hz	02E7300*	02E7110a
Part No. 24 V DC	02E7300d	02E7110d
Part No. 24 V AC	02E7300b	02E7110d

Switchable power consumption 230 V, 50/60 Hz / 115 V, 50/60 Hz, adjusted at works: 230 V, 50/60 Hz
Technical data: see data sheet "Electronic Controller Series FA®" for information on FA-1.1..., FA-1.4, K-FA

Complete Flow Monitoring Unit FA1-H-.. :

Complete Flow Monitoring Unit	Type Part No.	FA1-H-6 02E4270	FA1-H-9 02E4273	FA1-H-12 02E4275
Consisting of :				
Sensor FA1-H	(02E4001)	1 x		
Light guide FO1, 600 mm [≈ 2.0 ft] long	(02E4060)	2 x		
Light guide FO3, 900 mm [≈ 3.0 ft] long	(02E4063)		2 x	
Light guide FO2, 1200 mm [≈ 3.94 ft] long	(02E4065)			2 x
Pre-amplifier with adapter K-FA-H	(02E4010)	1 x		
Electronic controller FA-1.1 / 230 V/115 V	(02E7300)	1 x		

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