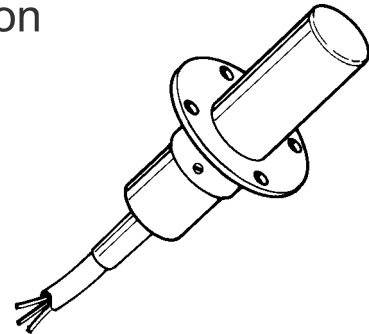


One-part sensor for monitoring air flows with integrated evaluation electronics. The calorimetrically working devices makes possible maintenance-free operation due to its teach-in function.

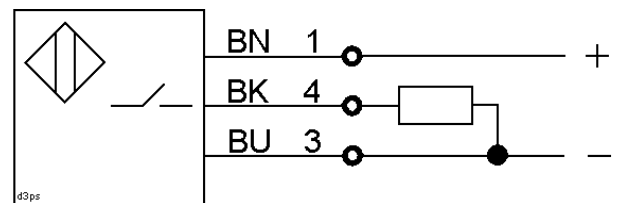
Teach - In  
function



## Technical Data

<b>Type</b>	<b>FKM 231.13 G</b>
Art.-No.	8043A
Output	PNP n. o.
Adjusting range	1 - 16 m/s
Set limit value	3 m/s
Response time	2 – 10 s
Readiness delay	30 s
Supply voltage	24 V DC
Load current max.	0 - 200 mA
Short circuit protection	yes
No load current	< 40 mA
Voltage drop	< 2 V
Switching hysteresis	max 15 %
Ambient temperature	-10 to +60 °C
Protection class	IP 67
Connection	2 m cable
Function display	Duo-LED red/green
Housing material	Plastic PBT
<b>Further available designs:</b>	<b>Type:</b>
without PNP normally close output	FKM 231.12 G

## Diagram of Connections

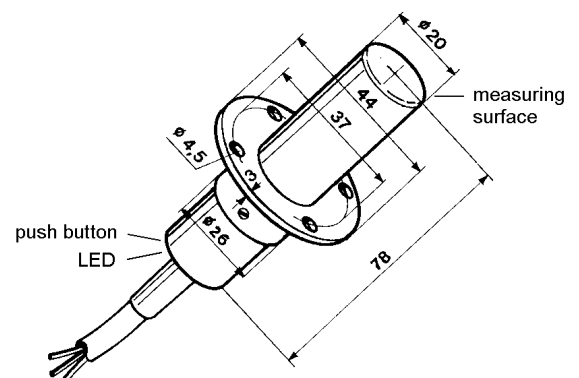


The flow limit set to 3 m/s by the factory is preferred in the ranges of building technology and mechanical engineering, however it can be adapted to the application requirements by its TEACH-IN push-button.

**TEACH-IN:** Expose the air flow controller to the flow in question for at least 5 minutes. Keep push-button pressed for 3 seconds, until the LED gives green blinking light. Now the sensor stores the new flow limit value permanently and independent from the mains supply. In order to avoid that normal changes in the flow during operation result in wrong switchings half the value of the flow in question is stored as limit value. Example: flow value 10 m/s, stored limited value approx. 5 m/s.

**Operation:** After applying the service voltage (LED flashes green light) the output simulates existing flow for 30 seconds. After this delay the switching output indicates the real flow condition. The normally-open version switches through (LED gives green light) when the flow limit value is exceeded and opens when the value falls below the limit value (LED gives red light) (inverted behaviour of the switching output in case of the normally-close version).

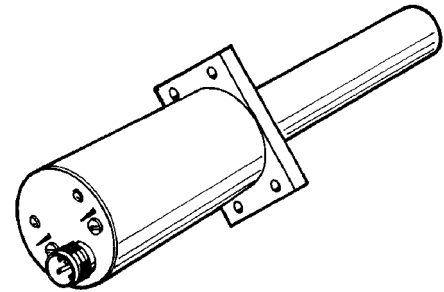
**Installation:** The air flow controller is installed in such way that the flow can reach the plane measuring surface (Ø20mm) from any direction. For proper temperature compensation 30 mm of the cylindrical part up to the measuring surface must be exposed to the same ambient temperatures. Quick changes of temperature can result in short-time wrong switchings. A mounting flange is included in the scope of the delivery. Alternatively you can use customary clips or cable unions M32 (PG 21).



This air flow controller controls two independently adjustable limit values upto a flow velocity of 30 m/s. Short-circuit-proof normally open and normally close outputs as well as two-colour LEDs indicate when the values exceed or fall below the desired range. So troubles such as flow failure, hose rupture and required exchange of filter can be monitored in installations of inflow technique.

**Normally open** (LED and potentiometer at the left, 20 pitches): output connected through and given green light at min. flow existing; red LED flow failure.

**Normally close** (LED and potentiometer at the right, 20 pitches): output connected through and LED giving green light at value fallen below the max. flow; red LED = flow too high.

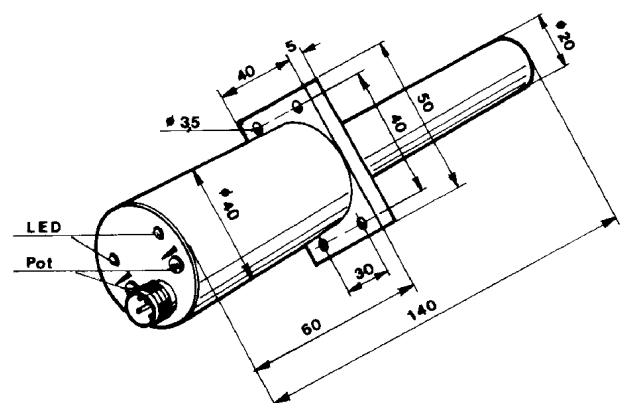
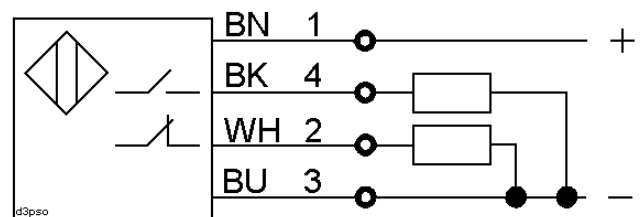


## Technical Data

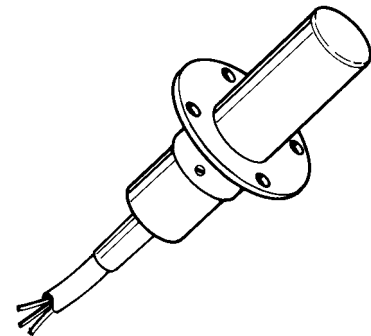
<b>Type</b>	<b>FKM 230.18 GS4</b>	
Art.-Nr.	8041A	
Output	PNP n. o. + n. c.	
Adjusting range normally open	1 - 30 m/s	
Adjusting range normally close	8 - 30 m/s	
Measuring principle	calorimetric	
Response time	< 10 s	
Readiness delay	30 s	
after applying the supply voltage both outputs are connected	during this time both LEDs give green intermittent light.	
Supply voltage	24 V DC +10 / -15%	
Ripple voltage	max. 15%	
Load current max.	0 - 400 mA	
Short-time load current	4 A / 100 ms	
Short circuit protection	yes, pulsing	
No-load current	50 mA	
Voltage drop	1,5 V	
Switching hysteresis	0,5 - 2 m/s	
Ambient temperature	-10 ... +60 °C	
Protection class	IP 65	
Connection	plug Lumberg M12	
Function display	2 LEDs 2-colour	
Housing material	sensor part	plastic
	electronic part with flange	aluminium
Weight	200 g	

The air flow controller is mounted in such a way that the air can flow onto the plane measuring surface (diameter 20 mm) from random direction. For effective temperature compensation the cylindrical part must be exposed to the same ambient temperatures 30 mm upto the measuring surface. Quick changes of temperature can result in misswitchings for a short time.

## Diagram of Connections



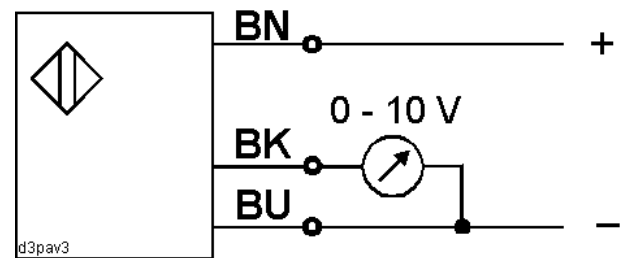
The air flow controller is mounted into the flow to be controlled as a stationary sensing unit with the flange or a PG 29 union. The air flow produces an output signal which is proportionate to the velocity. The heated flow sensors are arranged below the face of the hermetically closed casing of insulating material. Thanks to the calorimetric measuring principle with electronic evaluation maintenance-free operation is possible.



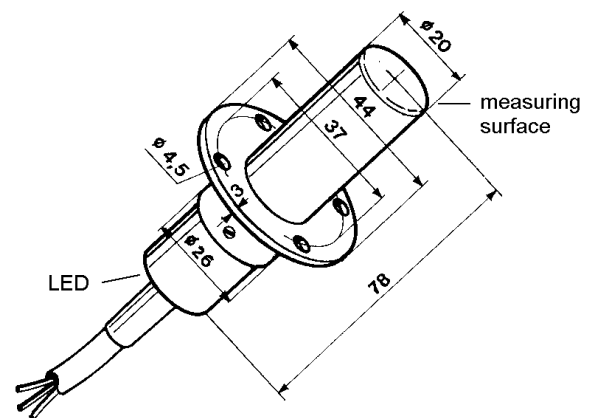
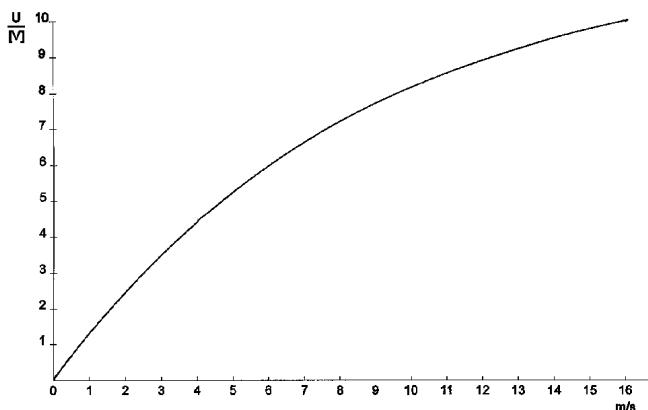
### Technical Data

<b>Type</b>	<b>FKM 230.19</b>
Art.-No.	8027A
Output	0 - 10 V ( $R_L \geq 10\text{ K}$ )
Measuring range	0 - 16 m/s
Resolution	0,01 m/s
Exactitude	+/- 5 %
Temperature error	0,5 %/K
Response time	15 s (t 90)
Starting time	5 min
Supply voltage	24 V DC +10 % / -15 %
Power absorption	60 mA
Ambient temperature	0 to +50 °C
Protection class	IP 67
Connection	2 m cable
Function display	LED
Housing material	plastic

### Diagram of Connections



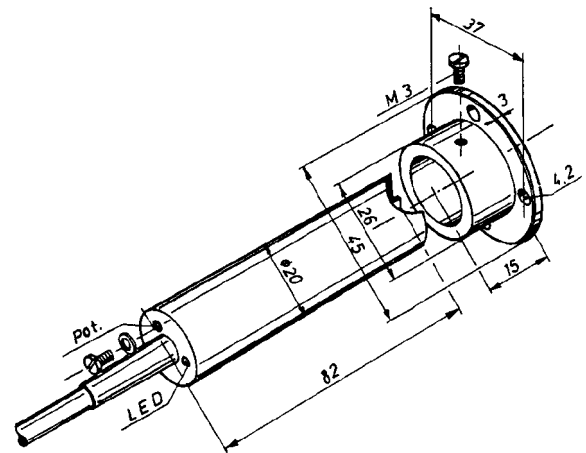
Output voltage/flow rate standard



One-part sensor for controlling air and gaseous flows with integrated evaluation electronic. The air flow controller is mounted into the flow to be controlled as a stationary sensing unit with the flange or a PG 21 union.

The calorimetrically working unit with integrated evaluation electronic offers maintenance-free operation.

The sensor is available as switching unit with different output variations for controlling a limit flow value as well as with analogous output.



### Switching Output with S. C. P.

Type	Art.-No.	Connection technology
<b>FKM 130.10 G</b>	8005A	NPN n. c., 3 wire
<b>FKM 130.11 G</b>	8006A	NPN n. o., 3 wire
<b>FKM 130.12 G</b>	8007A	PNP n. c., 3 wire
<b>FKM 130.13 G</b>	8008A	PNP n. o., 3 wire

### Switching Output without S. C. P.

Type	Art.-No.	Connection technology
<b>FKM 130.10</b>	8001A	NPN n. c., 3 wire
<b>FKM 130.11</b>	8002A	NPN n. o., 3 wire
<b>FKM 130.12</b>	8003A	PNP n. c., 3 wire
<b>FKM 130.13</b>	8004A	PNP n. o., 3 wire

### Analogous Output

Type	Art.-No.	Output
<b>FKM 130.19</b>	8009A	0 - 10 V

The value of 3 m/s adjusted in the factory is preferred in the branches of building technology and constructional engineering, however it can be set subsequently to values between 1 and 10 m/s.

After applying the supply voltage the FKM 130 needs a start-up time delay of 3 minutes. After this delay the switching output (red LED) indicates the real condition of flow. The normally open version switches through and the red LED gives light when the limit value for flow is exceeded and opens if the flow falls below the set value (inverse behaviour of normally close versions).

A mounting flange is included in the scope of supply. Alternatively suitable clips or a PG 29 cable union can be used for pressure-tight assembly. The sensor must protrude approx. 25 mm (1 inch) into the air duct. The ceramic vane should be parallel to the air flow. Small deviations in vane orientation do not affect operation. Quick changes of temperature can result in misswitchings for a short time.

### Technical Data (Switching Output)

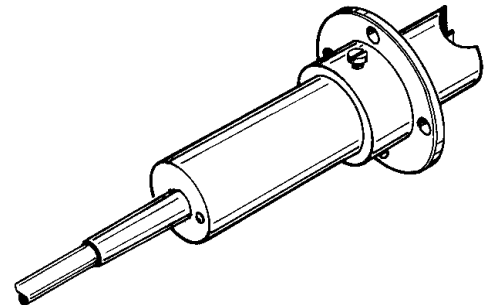
Adjusting range	1 - 10 m/s
Set limit value	3 m/s
Response time	max. 15 s
Starting time	3 min
Supply voltage	24 V DC
Load current max.	0 - 200 mA
Short circuit protection	yes
No load current	50 mA
Voltage drop	2 V
Switching hysteresis	max 30 %
Ambient temperature	-10 ... +60 °C
Protection class	IP 65
Connection	2 m cable
Function display	LED
Housing material	plastic

### Technical Data (Analogous Output)

Output	0 - 10 V ( $R_L \geq 10 \text{ K}\Omega$ )
Measuring range	0 - 16 m/s
Response time	15 s ( $t_{90}$ )
Starting time	5 min
Supply voltage	24 V DC
Power absorption	40 mA
Ambient temperature	0 ... +50 °C
Protection class	IP 65
Connection	2 m cable
Function display	LED
Housing material	plastic

All types also available with hermetically closed casing:  
**M2compact FKM 230**

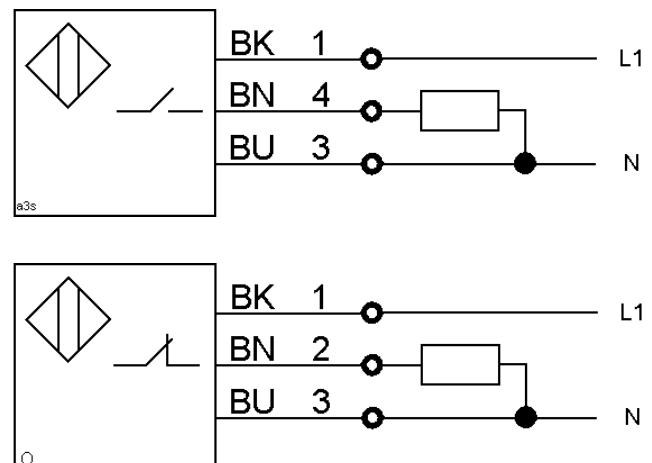
One-part sensor for controlling air and gaseous flows with integrated evaluation electronic. The air flow controller is mounted into the flow to be controlled as a stationary sensing unit with the flange or a M32 (PG 21) union. The calorimetrically working unit with integrated evaluation electronic offers maintenance-free operation.



### Technical Data

Type	Art.-No.	Connection technology
<b>FKM 130.52</b>	8019A	115 V AC n. c.
<b>FKM 130.53</b>	8020A	115 V AC n. o.
<b>FKM 130.82</b>	8022A	230 V AC n. c.
<b>FKM 130.83</b>	8023A	230 V AC n. o.
Adjusting range	1 - 10 m/s	
Set limit value	3 m/s	
Response time	max. 15 s	
Starting time	3 min	
Supply voltage	115 V AC	
Load current max.	0,5 - 300 mA	
Short circuit protection	no	
No load current	20 mA	
Voltage drop	6 V	
Switching hysteresis	max 30 %	
Ambient temperature	-10 to +60 °C	
Protection class	IP 65	
Connection	2 m cable	
Function display	LED	
Housing material	plastic	

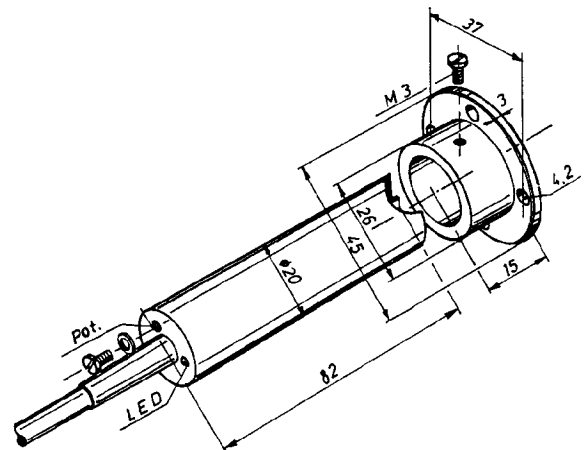
### Diagram of Connections



The value of 3 m/s adjusted in the factory is preferred in the branches of building technology and constructional engineering, however it can be set subsequently to values between 1 and 10 m/s.

After applying the supply voltage the FKM 130 needs a start-up time delay of 3 minutes. After this delay the switching output indicates the real condition of flow. The normally open version switches through and the LED gives light when the limit value for flow is exceeded and opens if the flow falls below the set value (inverse behaviour of normally close versions).

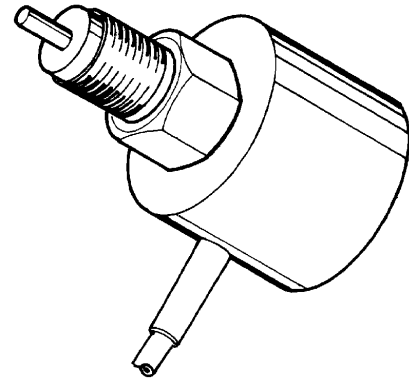
A mounting flange is included in the scope of supply. Alternatively suitable clips or a M32 (PG 21) cable union can be used for pressure-tight assembly. The sensor must protrude approx. 25 mm (1 inch) into the air duct. The ceramic vane should be parallel to the air flow. Small deviations in vane orientation do not affect operation. Quick changes of temperature can result in misswitchings for a short time.



The flow sensor controls liquid media and indicates flow failure resp. deviation from a free adjustable flow velocity. The sturdy stainless steel casing serves for heat transfer in the calorimetric measuring principle. The integrated electronic unit makes possible:

- simple commissioning
- safe detection of condition
- maintenance-free operation

LEDs show the required safety margin for operation, i. e. if the difference between the flow existing and the limit value set renders possible a trouble-free operation



## Technical Data

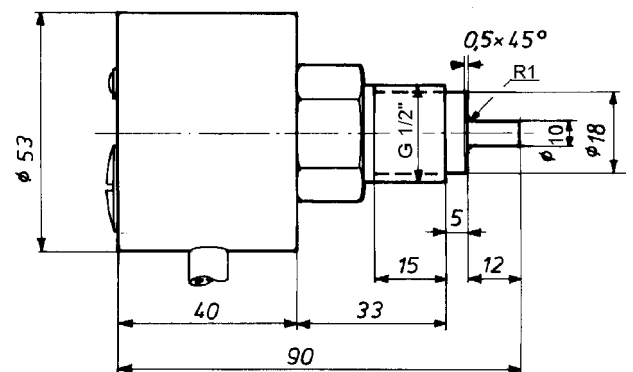
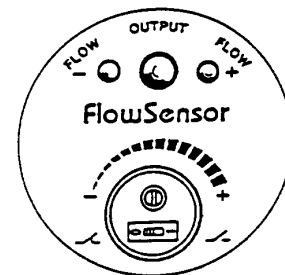
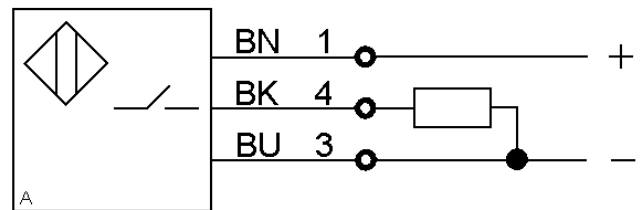
<b>Type</b>	<b>FKE 604.18 G</b>
Art.-No.	8382A
Output	PNP n. o. / n. c. switchable
Adjusting range	30 - 3000 mm/s
Pressure resistance	100 bar
Response time	approx. 1 to 15 s
Readiness delay	45 s
Supply voltage	20 - 36 V DC
Load current max.	0 - 400 mA
Short circuit protection	yes, pulsing
no load current	max. 80 mA
Voltage drop	2,5 V
Ambient temperature	0 to +80 °C
storage temperature	-40 to +100 °C
Protection class	IP 67
Connection	2 m cable
Indication of safety margin for operation ( flashing LED )	+30 % LED green -30 % LED red at approx. 300 mm/s
Housing material	sensor stainless steel V2A 1.4305 electronic unit plastic

LED green Flow +	LED red Flow -	LED yellow = output +24 V dependent on switch position n. c.	Flow
●		●	ok., with operation safety margin
○		●	ok., near to switchpoint
	○	●	low, near to switchpoint
	●	●	failure
indication see above		○	output pulsing in case of overload
●	●		readiness delay after application of service voltage

● = LED steady light    ○ = LED flashing

## Diagram of Connections

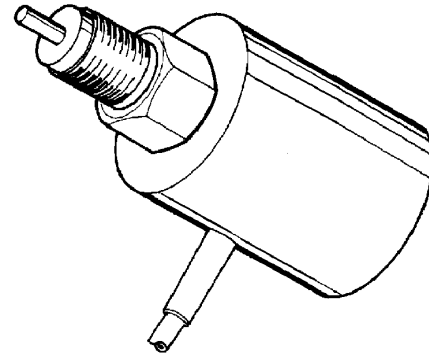
DC 3-Draht PNP Schließer



The flow sensor controls liquid media and indicates flow failure resp. deviation from a free adjustable flow velocity. The sturdy stainless steel casing serves for heat transfer in the calorimetric measuring principle. The integrated electronic unit makes possible:

- simple commissioning
- safe detection of condition
- maintenance-free operation

LEDs show the required safety margin for operation, i. e. if the difference between the flow existing and the limit value set renders possible a trouble-free operation



## Technical Data

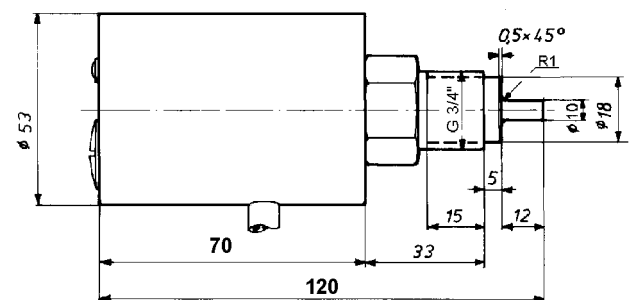
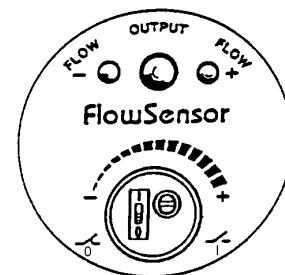
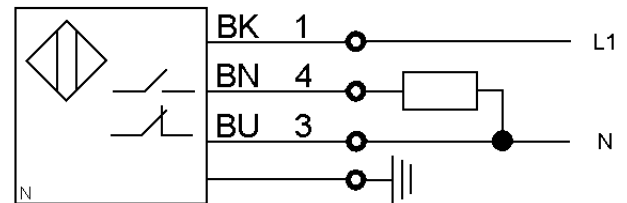
<b>Type</b>	<b>FKF 704.86 G</b>
Art.-No.	8393A
Output	n. o. / n. c. switchable
Adjusting range	30 - 3000 mm/s
Pressure resistance	100 bar
Response time	approx. 1 to 15 s
Readiness delay	45 s
Supply voltage	230 V AC
Power frequency	45 - 65 Hz
Load current max.	0,5 - 400 mA
Short circuit protection	yes, pulsing
no load current	max. 80 mA
Voltage drop	2 V
Ambient temperature	0 to +80 °C
storage temperature	-40 to +100 °C
Protection class	IP 67
Connection	2 m cable
Indication of safety margin for operation ( flashing LED )	+30 % LED green -30 % LED red at approx. 300 mm/s
Housing material	sensor stainless steel V2A 1.4305 electronic unit plastic

LED green Flow +	LED red Flow -	LED yellow = output +24 V dependent on switch position		Flow
		n. c.	n. o.	
●			●	ok., with operation safety margin
○			●	ok., near to switchpoint
	○	●		low, near to switchpoint
	●	●		failure
indication see above		○	○	output pulsing in case of overload
●	●		●	readiness delay after application of service voltage

● = LED steady light    ○ = LED flashing

## Diagram of Connections

AC 3-Draht Öffner + Schließer programmierbar



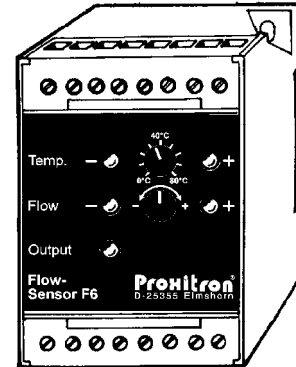
The flow sensor monitors water and oil circuits in cooling, lubrication and hydraulic plants as well as filling processes in food industry. The control unit for the external flow sensor FA indicates deviations from the adjustable values for flow velocity and temperature.

### Technical Data

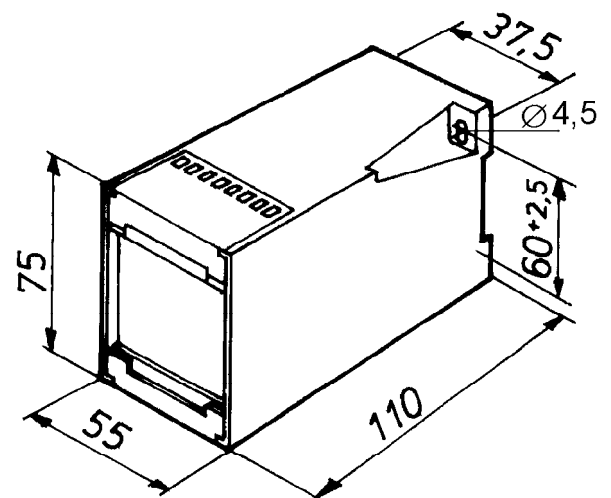
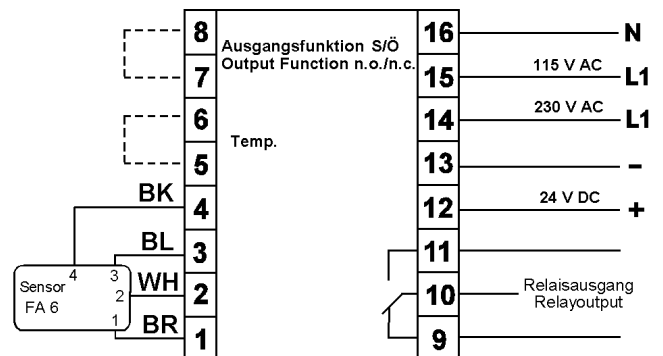
<b>Type</b>	<b>FSP 604.6 R</b>	
Art.-No.	8383B	
Flow range ( adjustable )	30 - 3000 mm/s	
Temperature range ( adjustable )	0 - 80 °C	
Supply voltage	terminal 16/14	230 V AC
	terminal 16/15	115 V AC
	terminal 12/13	24 V DC
Power frequency	45 - 65 Hz (at AC)	
Power absorption	max. 5 VA	
Readiness delay	45 s	
Output	Relay changeover contact	
Relay contact load max.	5A / 240 V AC	
Relay function in case of flow	Terminals 7/8 open: relay dropped (9/10 closed) Terminals 7/8 connected: relay pulled up (9/10 open)	
Temperature control and indication operate permanently. By closing of terminals 5/6 temperature control additionally acts upon the relay. Exceeding the limit value for temperature has the same effect as if the flow value falls below the limit value.		
Temperature hysteresis	5 K	
Ambient temperature	-20 to +70 °C	
Protection class	IP40, terminals IP 20	
Connection	self-opening terminals as per DIN 461990 upto 4 mm <sup>2</sup>	
Indication of function relay pulled-up	LED yellow	
Indication of operational margin	+30 % LED green gives intermittent light -30 % LED red gives intermittent light	
Casing	plastic casing for rail as per DIN 46277 / EN 50022 or 2 boreholes as per DIN 46121	

The sensor of series FA... is screwed into a pipe tee and connected with the control unit by a connection cable. Green and red LEDs indicate the states of operation for flow and temperature. If the values of flow or temperature come close to the limit values, a LED giving intermittent light indicates if the value falls below the operational margin. Due to this early warning simple adjustment at site is possible.

Sensor FA\_6 data sheet F31E



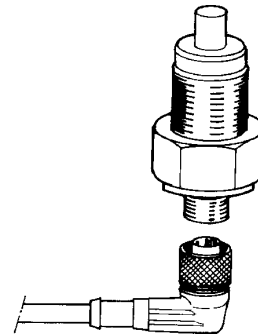
### Diagram of Connections



The sensors of series FA are applied for flow and temperature control of liquid media together with an control unit FSP 6

### Sensors

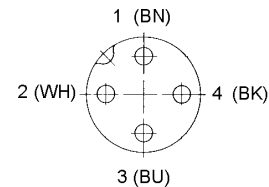
Type	Art.-No.	Thread
<b>FAC 601</b>	8373A	G 1/4"
<b>FACN 601</b>	8370A	NPT 1/4"
<b>FAE 601</b>	8384A	G 1/2"
<b>FAEN 601</b>	8368A	NPT 1/2"
<b>FAF 601</b>	8371A	G 3/4"
<b>FAFN 601</b>	8367A	NPT 3/4"



### Technical Data

Storage temperature	-40 ... +100 °C
Protection class	IP 67
Connection	plug S4 ( M12 x 1 )
Pressure resistance	100 bar
Casing material	stainless steel V2A (1.4305)

### Diagram of Connections

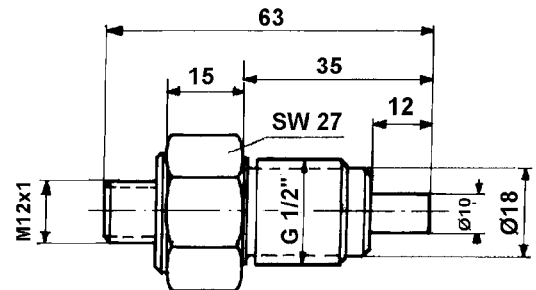


### Accessories (not included in the scope of supply)

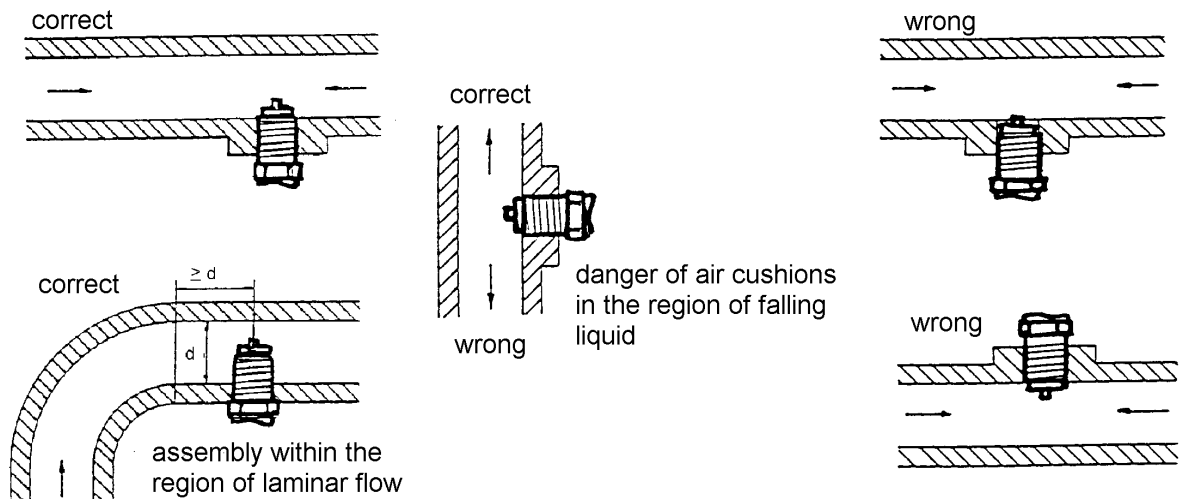
Connection cable with injection-moulded angle coupling		
Length	Type	Art.-No.
2 m	<b>ST 041-2</b>	9841D
5 m	<b>ST 041-5</b>	9841E
Cable box for cable 4 x 0,5 mm <sup>2</sup>		
Type	Art.-No.	
<b>ST 040</b>	9841A	

Control unit FSP 6 data sheet F30E

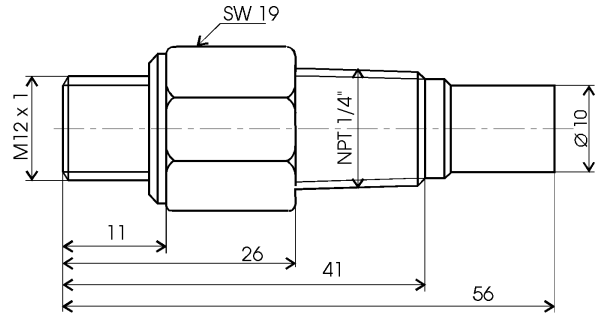
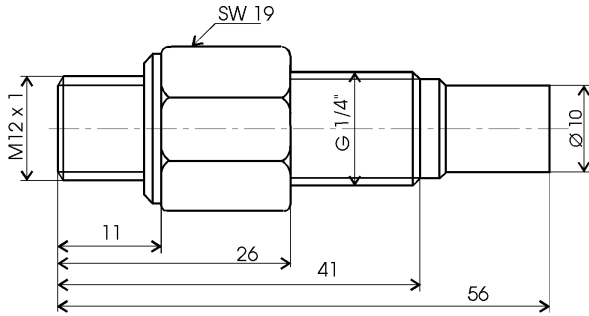
### Dimensions (in mm) FAE 601



### Assembly



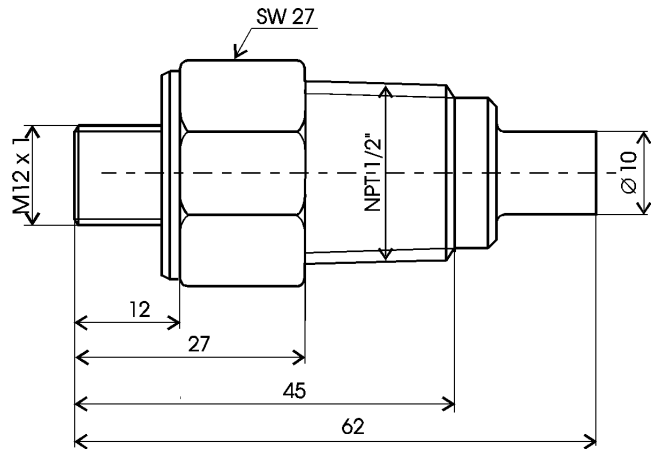
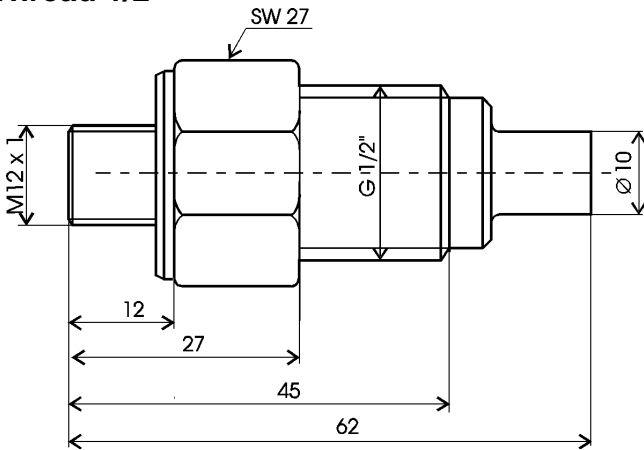
**Thread 1/4"**



<b>Type</b>	<b>FAC 601</b>
<b>Art.-No.</b>	<b>8373A</b>

<b>Type</b>	<b>FACN 601</b>
<b>Art.-No.</b>	<b>8370A</b>

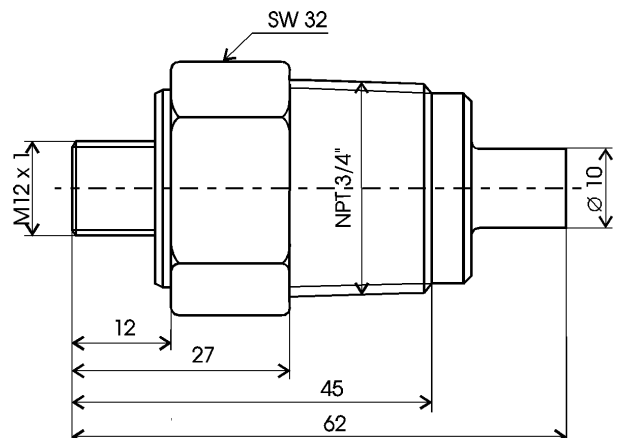
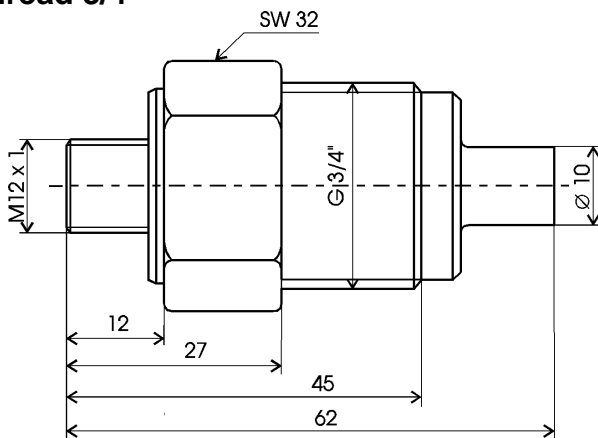
**Thread 1/2"**



<b>Type</b>	<b>FAE 601</b>
<b>Art.-No.</b>	<b>8384A</b>

<b>Type</b>	<b>FAEN 601</b>
<b>Art.-No.</b>	<b>8368A</b>

**Thread 3/4"**



<b>Type</b>	<b>FAF 601</b>
<b>Art.-No.</b>	<b>8371A</b>

<b>Type</b>	<b>FAFN 601</b>
<b>Art.-No.</b>	<b>8367A</b>