Description

Micro controller operated Flow Meter to monitor and display flow rates and temperature. Once correctly adjusted it can also be used for mass flow measurements. Factory pre-set for air and water.

rail-mounted version

front panel mounted version

surface mounted version

FM1

Features

- Menu driven (keypads)
- LC display (2 x 16 digits) of:
  - actual flow rate, volume flow or mass flow, medium temperature:
  - bargraph status indication of limit contacts, actual flow rate/ quantity or medium temperature
  - directions for parameter assignment, configuration, diagnosis and error correction;
  - base value indication
- Two scalable analogue outputs
- Peak memory (MIN + MAX)
- Two freely selectable limit contacts
- Quantity-related pulse output
- Versions for rail, front panel and surface mounting

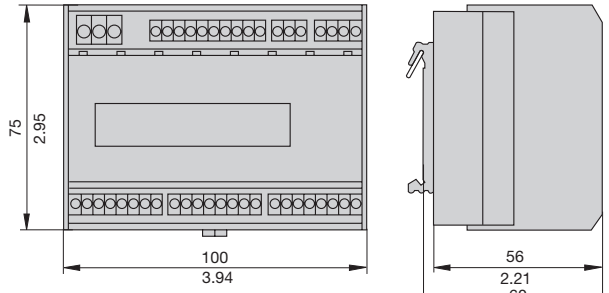
Ordering information

Type							
FM1							Flow Meter, in rail-mounted housing (standard software version)
FM1-FH							Flow Meter, in surface mounted housing (IP64)
FM1-ST							Flow Meter, in front panel mounted housing (IP65)
		Input voltage					
		U1					DC 19...32 V
			Signal outputs				
			R2				2 relay outputs (2 limit values)
			T4				4 transistor outputs (2 limit value + 2 status, or 2 limit value + 1 status + 1 pulse output (menu-selected))
				Analogue outputs			
				V1			0/1- 5 V
				V2			0/2-10 V
				C1			0/4-20 mA (self-powered, physically isolated)
					Specification of medium		
					xxx		
FM1	-	U1	R2	V1	-	...	ordering example

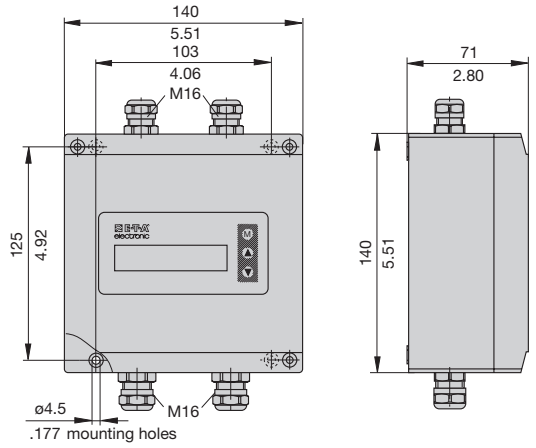
This is a metric design and millimeter dimensions take precedence ($\frac{mm}{inch}$)

Dimensions

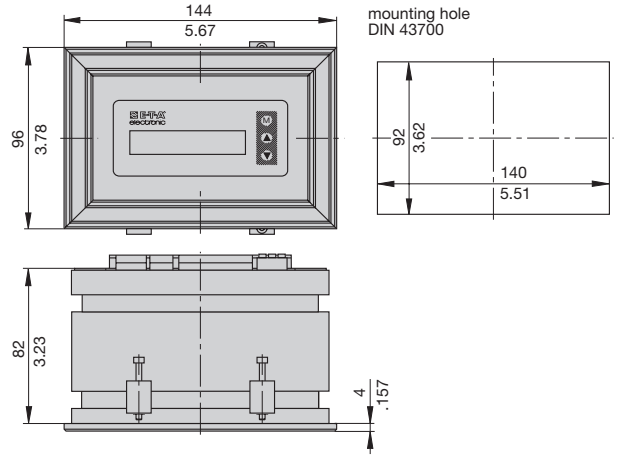
FM1 (rail-mounted housing)



FM1-FH (surface mounted housing)



FM1-ST (front panel mounted housing)



Technical data

Flow Meter FM1			with CST/CSF calorimetric monitoring heads	with TST turbine type sensors
General data				
Media			gases, liquids (oil etc.)	gases, clean and particle-free liquids
Measuring functions			flow rate/volume flow/mass flow/temperature	flow rate, volume flow
Display			2 x 16-digit LC display	
Parameter assignment, calibration by:			keypads	
Temperature range (electronic control unit) in circulating air			+10 °C...+50 °C *)	
Electrical data				
Input voltage			DC 24 V (19...32 V)	
Power consumption			DC 200 mA**)	DC 110 mA
Analogue outputs (flow and temperature) (temperature N/A with TST heads)			0/4-20 mA or 0/2-10 V or 0/1-5 V	
Signal outputs	2 relay outputs (2 limit values)		2 change over contacts AC/DC 50 V / 1 A / 50 W	
	4 transistor outputs (2 limit values + 2 status, or 2 limits values + 1 status + 1 pulse output)		open collector outputs DC 36 V/150 mA/1.5 W	
Flow measurement				
Measuring range (display range)		water	0.05...3 m/s (0...4 m/s)	0.1...5 m/s (0...5 m/s)
(display range)		air	0.1...20 m/s (0...100 m/s)	1...20 m/s (0...20 m/s)
Accuracy (related to the velocity available at sensor)		water	see failure diagram	± 1% of final value, ± 3 % of measured value
		air	see failure diagram	± 1% of final value, ± 3 % of measured value
Repeatability (1)		water	≤ 1 % of measured value (5 % to 100 % of final value)	≤ 0.5 % of measured value (5 % to 100 % of final value)
		air	≤ 1 % of measured value	≤ 0.5 % of measured value
Temperature drift (electronic control unit) (4)		water	0.35 %/°K of final value	none
		air	0.1 %/°K of final value	none
Response delay		water (2)	2.5 s	1 s
		air (3)	3 s	1 s
Temperature measurement	measuring range		-40 °C...+130 °C	N/A
	accuracy		± 1 % of measuring range	N/A
Mechanical data (electronic control unit)				
Degree of protection		rail-mounted:	IP20	
		surface mounted:	IP65	
		front panel mounted:	IP65	
Materials		rail-mounted:	acrylic vinyl/styrene/polycarbonate; heat sink aluminium	
		surface mounted:	aluminium/acrylic	
		front panel mounted:	aluminium black coated; display polyester foil	
Housing dimensions (LxWxH)			see dimension diagrams (overleaf)	
Mass		rail-mounted:	485 g	
		mounted:	1250 g	
		front panel mounted:	900 g	
Cables		voltage supply	3 x 0.75 mm² (AWG18)	
		to monitoring head	LifYCY 4 x 2 x 0.2 mm² (AWG 24)	LifYCY 3 x 0.35 mm² (AWG 22)
		analogue outputs	2 x LifYCY 2 x 0.25 mm² (AWG 24)	2 x LifYCY 2 x 0.25 mm² (AWG 24)
		limit value output	2 x LifYCY 3 x 0.38 mm² (AWG 22)	2 x LifYCY 3 x 0.38 mm² (AWG 22)
Max. cable length to monitoring head			200 m	200 m

*) With output C1 the max. admissible ambient temperature for the rail-mounted version is limited to +40 °C.

**) With output C1, power consumption may be up to 300 mA ±10 %.

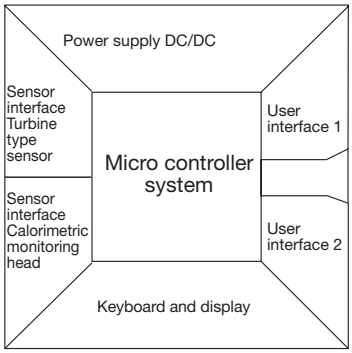
(1) of the set value, at constant temperature and flow conditions, and stable thermal conductivity.

(2) Delay with the switch point set to 1 m/s and the flow at 2 m/s, after a sudden complete stop.

(3) Delay with the switch point set to 10 m/s and the flow at 20 m/s, after a sudden complete stop.

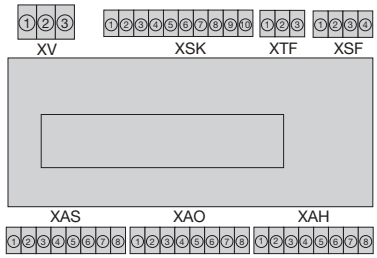
(4) Warm-up time to full accuracy: 15 minutes.

Block diagram



Input voltage:	DC 19…32 V	
Keyboard/display:	keypads LC display 2 x 16 digits	
User interface 1:	relay outputs: transistor outputs:	2 limit values 2 limit values + 1 error indication + 1 busy or pulse output (software selected)
User interface 2:	analogue outputs current or voltage	
Controller system:	signal processing I/O - controlling monitoring parameter memory	
Sensor interfaces:	calorimetric monitoring head and turbine type sensor	

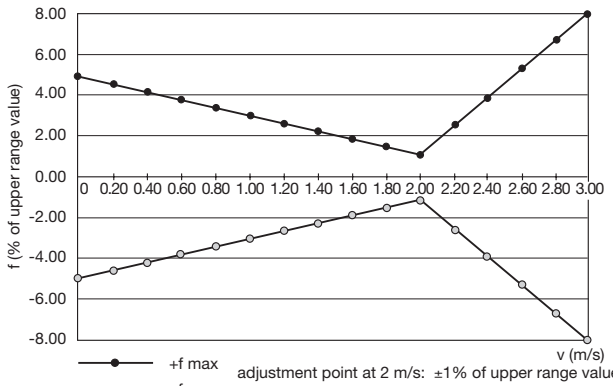
Connection diagram



Wire size:	0.14 mm² to 1.5 mm² single or stranded conductor
Strip length:	6.5 mm
Clamping screw:	M2 (nickel-plated brass)
Contact material:	pre-tinned tin bronze

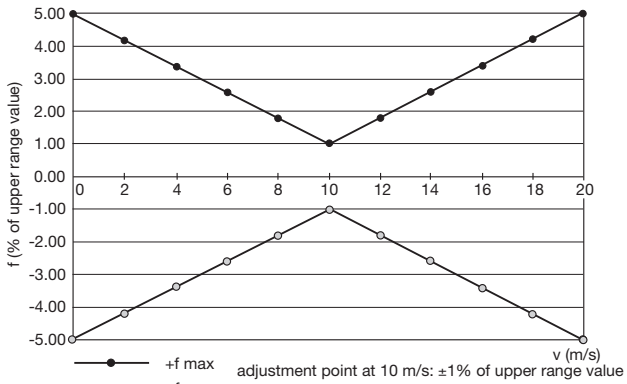
XV:	power supply
XSK:	calorimetric monitoring head
XTF:	keyboard release
XSF:	turbine-type sensor
XAS:	not released for user
XAO:	analogue outputs
XAH:	signal outputs

Failure diagram for water



adjustment point at 2 m/s: ±1% of upper range value.
Other accuracy values or adjustment points upon request (see type FM1-CC).

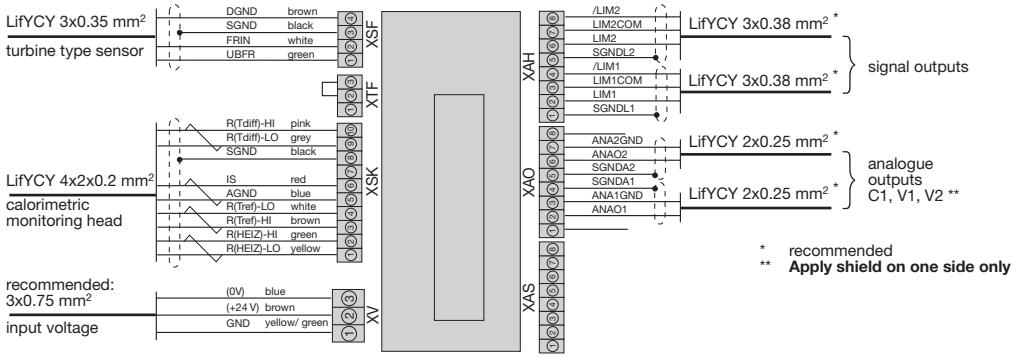
Failure diagram for air



adjustment point at 10 m/s: ±1% of upper range value
Other accuracy values or adjustment points upon request (see type FM1-CC).

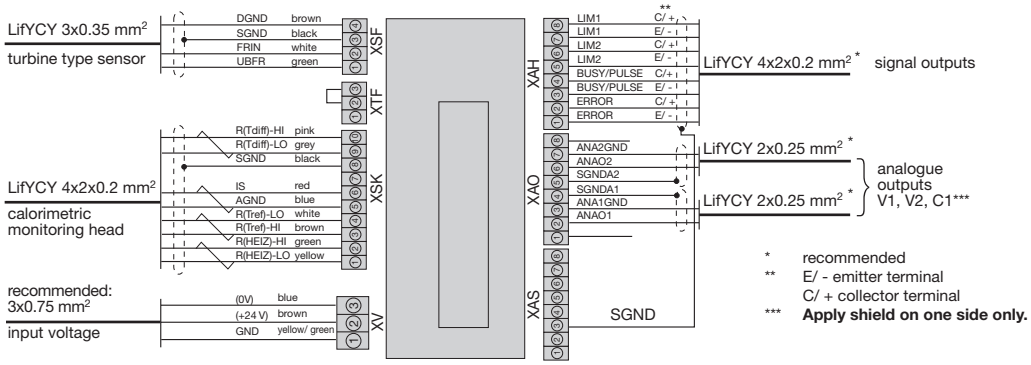
Connection diagrams

FM1 with relay outputs



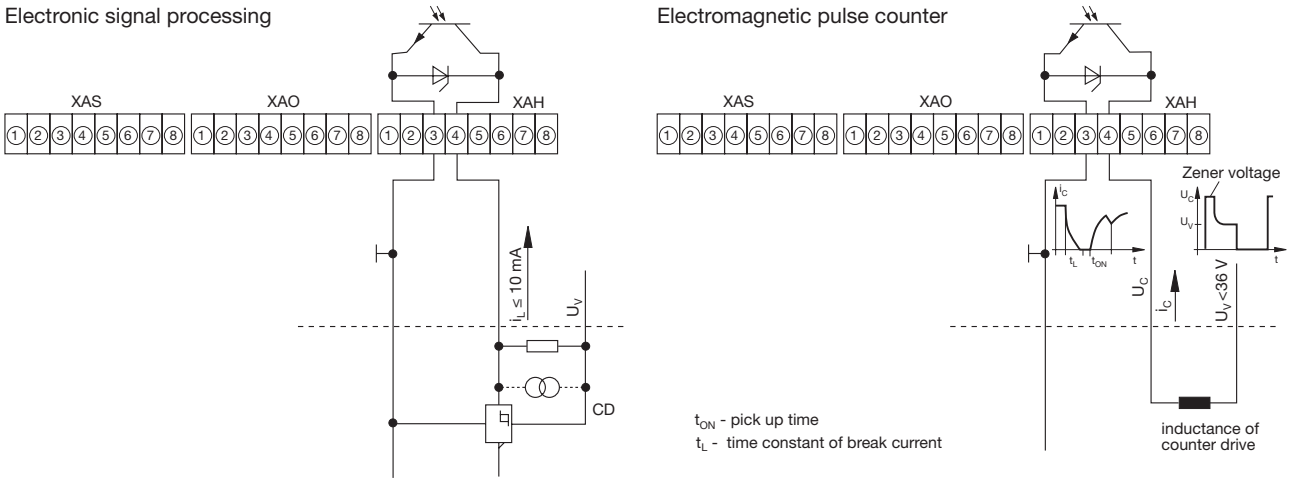
* recommended
** **Apply shield on one side only**

FM1 with transistor outputs



* recommended
** E/ - emitter terminal
C/ + collector terminal
*** **Apply shield on one side only.**

FM1 - Recommended connection of pulse output



t_{ON} - pick up time
t_L - time constant of break current

All dimensions without tolerances are for reference only. In the interest of improved design, performance and cost effectiveness the right to make changes in these specifications without notice is reserved. Product markings may not be exactly as the ordering codes. Errors and omissions excepted.

Description

Thread-mounted calorimetric monitoring head for Flow Meter FM1, suitable for general industry applications.

Features

- Suitable for installation in welding bushes
- Medium temperature -40 °C...+130 °C
- Material: stainless steel 1.4571/AISI 316 Ti, or Hastelloy alloy C4 2.4610

Thread-mounted calorimetric monitoring head

CST-...

Ordering information

Type No.								
CST	Thread-mounted monitoring head with calorimetric sensors							
	Process connection							
	01	thread size G1/2A (FM1-standard)						
		Medium						
		A	air					
		W	water					
			Material of areas exposed to medium					
			M1	stainless steel 1.4571/AISI 316 Ti (standard)				
			M2	nickel-based alloy Hastelloy alloy C4 2.4610				
				Length of shank/thread				
				L10	36 mm (standard)			
					Electrical connection			
					E10	round connector with tinned contacts (plug and cable to separate order)		
						Certification		
						T0	without certificate (standard)*)	
							Specification of medium	
							xxx	
CST	- 01	W	M1	L10	E10	T0	- ...	ordering example

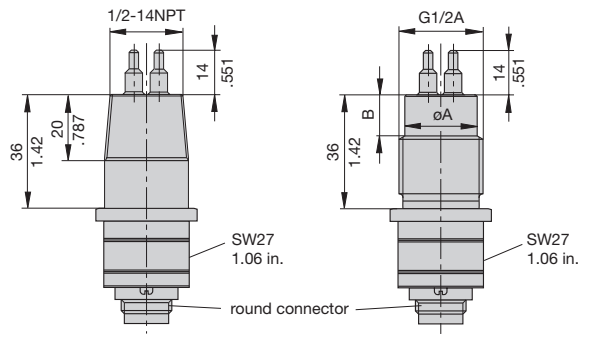
*) for detailed information please see section 0.

Technical data

Type of head	thread-mounted
Nominal thread dia.	G1/2A
Length of shank	36 mm
Length of sensor	14 mm
Suitable for	all media, depending on material resistance
Temperatue range *) (of medium)	-40...+130 °C
Temperature drift of monitoring head	± < 0.05 %/°K/measuring range (in the range between +20 °C and +80 °C)
Measuring ranges	air: 0...20 m/s water: 0...3 m/s
Pressure resistance (1)	100 bar / 1470 PSI
Degree of protection	connector(2): IP67
Material	stainless steel 1.4571/AISI 316 Ti Hastelloy alloy C4 2.4610
Cable to electronic control unit	LifYCY 4x2x0.2 mm² (AWG 24)

(1) Admissible operating pressure DIN 2401, measured at max. temperature (= max. medium temperature)
(2) with mating connector
*) max. +85 °C in the connector area

Dimensions



	øA		B	
	mm	inch	mm	inch
G1/2A	18	.709	10	.394

This is a metric design and millimeter dimensions take precedence (mm / inch)

Cable types 15/18 with connectors

Do + Ka type 15
Do + Ka type 18

Do + Ka type 15-ST
Do + Ka type 18-ST

Description

Cable between Flow Meter FM1-xxx and calorimetric monitoring head type CST.

- Connection to monitoring head by means of 8-pole round connector
- Connection to FM1-xxx by means of 10-pole clamping connector (XSK)

Technical data

Cable type 15 and 15-ST	
Features:	highly flexible, paired, fully shielded, electrical and thermal properties at +20 °C
Conductor resistance:	< 92 Ω/km
Insulation resistance:	> 200 MΩ/km
Operating voltage:	max. 100 V AC
Withstand voltage:	AC 800 V
Max. load:	0.5 A
Temperature range:	-10 °C...+80 °C (processing and operation) -30 °C...+80 °C (transport and storage)
Cable type 18 and 18-ST	
Features:	non-halogenous, highly flexible, cold- and heat resistant, paired, fully shielded, electrical and thermal properties at +20 °C
Conductor resistance:	< 80 Ω/km
Insulation resistance:	> 200 MΩ/km
Operating voltage:	< 300 V AC
Withstand voltage:	1500 V / 50 Hz / 1 min
Max. load:	3 A
Temperature range:	-60 °C...+200 °C

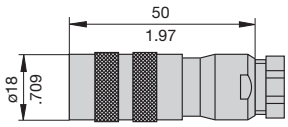
Ordering information

Typ	between calorimetric monitoring heads **CST** and **FM1, FM1-FH**
Do + Ka type 15	**PVC** insulated cable, type LifYCY 4x2x0.2 mm² (AWG 24) 8-pole round connector + 10-pole clamping connector
Do + Ka type 18	**silicone** insulated cable, type 4x2x0.2 mm² (AWG 24) 8-pole round connector + 10-pole clamping connector
	Available cable lengths
	...m 2 m, 3 m, 5 m, 8 m, 10 m, 15 m, 20 m, 25 m, 30 m, 40 m, 50 m, 60 m, 70 m, 80 m, 90 m, 100 m, 110 m, 120 m, 130 m, 140 m, 150 m, 160 m, 170 m, 180 m, 190 m, 200 m
Do + Ka type 15 - 2 m	ordering example

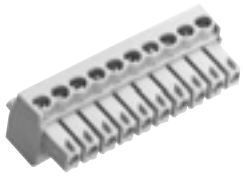
Type	between calorimetric monitoring heads **CST** and **FM1-ST**
Do + Ka type 15-ST	**PVC** insulated cable, type LifYCY 4x2x0.2 mm² (AWG 24) 8-pole round connector + 10-pole clamping connector
Do + Ka type 18-ST	**silicone** insulated cable, type 4x2x0.2 mm² (AWG 24) 8-pole round connector + 10-pole clamping connector
	Available cable lengths
	...m 2 m, 3 m, 5 m, 8 m, 10 m, 15 m, 20 m, 25 m, 30 m, 40 m, 50 m, 60 m, 70 m, 80 m, 90 m, 100 m, 110 m, 120 m, 130 m, 140 m, 150 m, 160 m, 170 m, 180 m, 190 m, 200 m
Do + Ka type 15-ST - 2 m	ordering example

Accessories

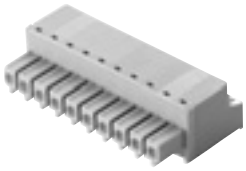
8-pole round connector
(without cable, for individual wiring by customer)
0Z112Z003124



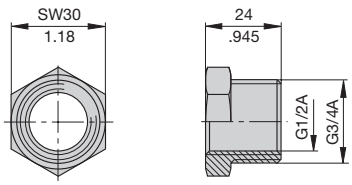
10-pole clamping connector for cable types 15 and 18
(without cable, for individual wiring by customer)
0Z112Z000167



10-pole clamping connector for cable types 15-ST and 18-ST
(without cable, for individual wiring by customer)
0Z112Z000205



Reducing piece
from G3/4 to G1/2
Material: stainless steel 1.4571/AISI Ti 316
0Z032Z000149



This is a metric design and millimeter dimensions take precedence (mm / inch)

Caution: Standard warranty cover will be invalidated if the correct E-T-A monitoring head/control unit connecting cable is not used.

Description

Extended calorimetric monitoring head for Flow Meter FM1, suitable for use in air-conditioning systems (variable immersion depth).

Caution:
- Calibration to flow velocity, therefore do not use with FM1-CA.
- Fix with locking set 01 (see accessories).

Features

- Medium temperature range: -40 °C...+130 °C
- Material: stainless steel 1.4571/AISI 316 Ti

Monitoring head CSF

CSF-01
variable immersion depth

Ordering information

Type									
CSF	Extended monitoring head with calorimetric sensors								
	Monitoring head design								
	01	Monitoring head with variable immersion depth							
		Medium							
		A	air						
		W	water						
			Material of areas exposed to medium						
			M1	stainless steel 1.4571/AISI 316 Ti					
				Process connection					
				00	without flange; see accessoires for cable gland**)				
					Length of shank/thread				
					L43	188 mm (standard with process connection 00) other lengths upon request			
						Electrical connection			
						E10	round connector with tinned contacts (plug and cable to separate order)		
							Certification		
							T0	without certificate standard *)	
								Specification of medium	
								xxx	
CSF	**-**	**01**	**A**	**M1**	**00**	**L43**	**E10**	**T0**	**- ...** ordering example

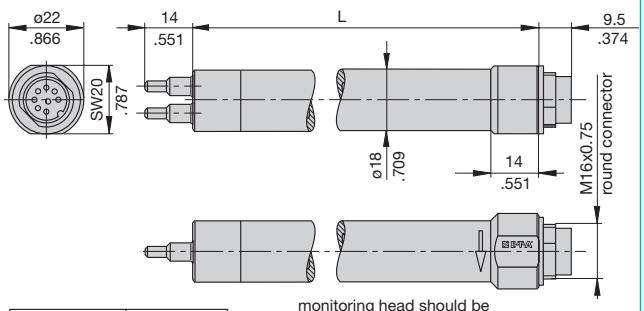
*) for detailed information please see section 0.
**) see next page.

Technical data

Type of head	push-in
Nominal shank dia.	18 mm
Length of shank	188 mm (standard)
Length of sensor	14 mm
Suitable for	air (please enquire for other gases)
Temperature range*) (of medium)	-40...+130 °C / stainless steel
Temperature drift of sensor	± < 0.05 %/°K/measuring range (in the range between +20 °C and +80 °C)
Measuring ranges:	air: 0...20 m/s (atmospheric pressure) water: 0...3 m/s
Pressure resistance (1) of sensor DIN 2401	100 bar / 1470 PSI
Pressure resistance of installation	depending on threaded installation bush 2 bar/16 bar (29.4 PSI/235.2 PSI), see next page
Degree of protection	connector(2): IP67
Material	stainless steel 1.457/AISI 316 Ti
Cable to electronic unit	LifYCY 4x2x0.2 mm² (AWG 24)

(1) Admissible operating pressure DIN 2401, measured at max. temperature (= max. medium temperature)
(2) with mating connector
*) max. +85 °C in the connector area

Dimensions



Type	L	
	mm	inch
CSF-...L43...	188	7.40
CSF-...L30...	300	11.81
CSF-...L40...	400	15.75

This is a metric design and millimeter dimensions take precedence (mm / inch)

Cable types 15/18 with connectors

Do + Ka type 15
Do + Ka type 18

Do + Ka type 15-ST
Do + Ka type 18-ST

Description

Cable between Flow Meter FM1-xxx and calorimetric monitoring head type CSF.

- Connection to monitoring head by means of 8-pole round connector
- Connection to FM1-xxx by means of 10-pole clamping connector (XSK)

Technical data

Cable type 15 and 15-ST
Features: highly flexible, paired, fully shielded, electrical and thermal properties at +20 °C

Conductor resistance:	< 92 Ω/km
Insulation resistance:	> 200 MΩ/km
Operating voltage:	max. 100 V AC
Withstand voltage:	AC 800 V
Max. load:	0.5 A
Temperature range:	-10 °C...+80 °C (processing and operation) -30 °C...+80 °C (transport and storage)

Cable type 18 and 18-ST
Features: non-halogenous, highly flexible, cold- and heat resistant, paired, fully shielded, electrical and thermal properties at +20 °C

Conductor resistance:	< 80 Ω/km
Insulation resistance:	> 200 MΩ/km
Operating voltage:	< 300 V AC
Withstand voltage:	1500 V / 50 Hz / 1 min
Max. load:	3 A
Temperature range:	-60 °C...+200 °C

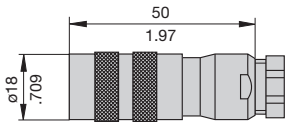
Ordering information

Typ	between calorimetric monitoring heads **CSF** and **FM1, FM1-FH**
Do + Ka type 15	**PVC** insulated cable, type LifYCY 4x2x0.2 mm² (AWG 24) 8-pole round connector + 10-pole clamping connector
Do + Ka type 18	**silicone** insulated cable, type 4x2x0.2 mm² (AWG 24) 8-pole round connector + 10-pole clamping connector
	Available cable lengths
	...m 2 m, 3 m, 5 m, 8 m, 10 m, 15 m, 20 m, 25 m, 30 m, 40 m, 50 m, 60 m, 70 m, 80 m, 90 m, 100 m, 110 m, 120 m, 130 m, 140 m, 150 m, 160 m, 170 m, 180 m, 190 m, 200 m
Do + Ka type 15 - 2 m	ordering example

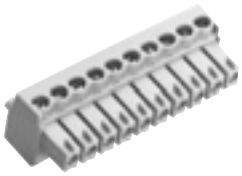
Type	between calorimetric monitoring heads **CSF** and **FM1-ST**
Do + Ka type 15-ST	**PVC** insulated cable, type LifYCY 4x2x0.2 mm² (AWG 24) 8-pole round connector + 10-pole clamping connector
Do + Ka type 18-ST	**silicone** insulated cable, type 4x2x0.2 mm² (AWG 24) 8-pole round connector + 10-pole clamping connector
	Available cable lengths
	...m 2 m, 3 m, 5 m, 8 m, 10 m, 15 m, 20 m, 25 m, 30 m, 40 m, 50 m, 60 m, 70 m, 80 m, 90 m, 100 m, 110 m, 120 m, 130 m, 140 m, 150 m, 160 m, 170 m, 180 m, 190 m, 200 m
Do + Ka type 15-ST - 2 m	ordering example

Accessories

8-pole round connector
(without cable, for individual wiring by customer)
0Z112Z003124

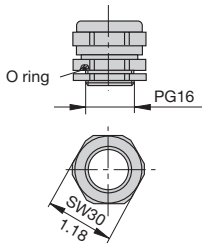


10-pole clamping connector for cable types 15 and 18
(without cable, for individual wiring by customer)
0Z112Z000167

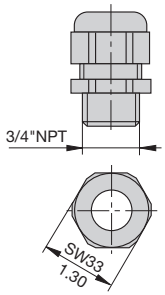


10-pole clamping connector for cable types 15-ST and 18-ST
(without cable, for individual wiring by customer)
0Z112Z000205

PG16 nickel-plated brass
(standard)
0Z122Z000128

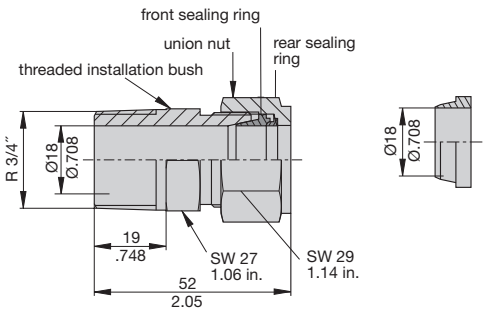


NPT3/4" moulded, black
0Z122Z000131



Threaded installation bush
0Z122Z000196

Teflon sealing ring
0Z122Z000197

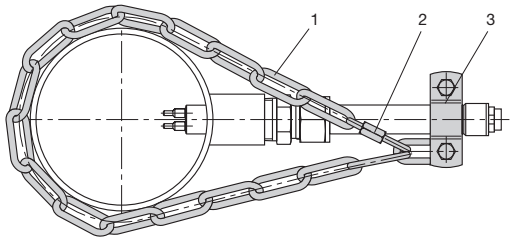


Suitable up to 25 bar/2.5 M Pascal if used with stainless steel CSF-01 monitoring head.
(Observe instructions for installation.)

Caution: Stainless steel ring is designed to cut into monitoring head.
Pressure resistant to 25 bar/367.5 PSI.
Teflon ring can only be used from 0 to 2 bar (29.4 PSI).

Please observe user manual!

Locking set 01
0Z122Z000204



1 chain 4 x 32 DIN 5685 (approx. 1 m)
2 catch for chain NG 5
3 clip with screw and nuts DN15 to DIN 11850

This is a metric design and millimeter dimensions take precedence (mm / inch)

Caution: Standard warranty cover will be invalidated if the correct E-T-A monitoring head/control unit connecting cable is not used.

Flange-mounted calorimetric monitoring head

CSF-03
Tri-Clamp®

Description

Flange-mounted calorimetric monitoring head for Flow Meter FM1. Recommended for food-processing (Tri-Clamp®).

Features

- Medium temperature range: -40 °C...+130 °C
- Material: stainless steel 1.4571/AISI 316 Ti

Technical data

Type of head	flange-mounted monitoring head
Process connection	DIN 32676 Tri-Clamp® DN 1
Shank dia.	18 mm
Length of shank	15 mm
Length of sensor	14 mm
Suitable for	all media, depending on material resistance
Temperature range *) (of medium)	-40 °C...+130 °C
Temperature drift of monitoring head	± < 0.05 %/°K/measuring range (in the range between +20 °C and +80 °C)
Measuring range	water: 0...3 m/s
Pressure resistance (1)	40 bar/588 PSI
Degree of protection	connector(2) IP67
Material	stainless steel 1.4571/AISI 316 Ti
Cable to electronic control unit	LifYCY 4x2x0.2 mm² (AWG 24)

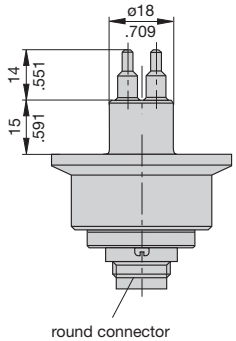
(1) Admissible operating pressure DIN 2401, measured at max. temperature (= max. medium temperature)
(2) with mating connector
*) max. +85 °C in the connector area

Ordering information

Type		
CSF	flange-mounted monitoring head with calorimetric sensors	
	Monitoring head design	
	03	monitoring head with flange DIN 32676
	Medium	
	W	water
	Material of areas exposed to medium	
	M1	stainless steel 1.4571/AISI 316 Ti
	Prozcess connection	
	91	flange DIN 32676-Tri-Clamp® DN1
	Length of shank/thread	
	L90	15 mm (standard)
	Electrical connection	
	E10	round connector with tinned contacts (plug and cable to separate order)
	Certification	
	T0	without certificate (standard) *)
	Specification of medium	
	xxx	
CSF - 03 W M1 91 L90 E10 T0 - ...		ordering example

*) for detailed information please see section 0.

Dimensions



This is a metric design and millimeter dimensions take precedence (mm / inch)

Description

Cable between Flow Meter FM1-xxx and calorimetric monitoring head type CSF-03.

- Connection to monitoring head by means of 8-pole round connector
- Connection to FM1-xxx by means of 10-pole clamping connector (XSK

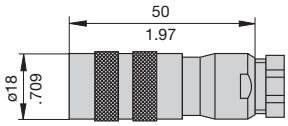
Cable types 15/18 with connectors

Do + Ka type 15
Do + Ka type 18

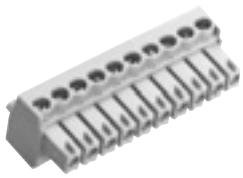
Do + Ka type 15-ST
Do + Ka type 18-ST

Accessories

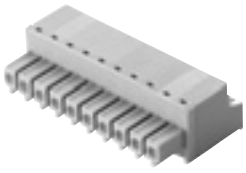
8-pole round connector
(without cable, for individual wiring by customer)
0Z112Z003124



10-pole clamping connector for cable types 15 and 18
(without cable, for individual wiring by customer)
0Z112Z000167



10-pole clamping connector for cable types 15-ST and 18-ST
(without cable, for individual wiring by customer)
0Z112Z000205



This is a metric design and millimeter dimensions take precedence ($\frac{mm}{inch}$)

Caution: Standard warranty cover will be invalidated if the correct E-T-A monitoring head/control unit connecting cable is not used.

Technical data

Cable type 15 and 15-ST	
Features:	highly flexible, paired, fully shielded, electrical and thermal properties at +20 °C
Conductor resistance:	< 92 Ω/km
Insulation resistance:	> 200 MΩ/km
Operating voltage:	max. 100 V AC
Withstand voltage:	AC 800 V
Max. load:	0.5 A
Temperature range:	-10 °C...+80 °C (processing and operation) -30 °C...+80 °C (transport and storage)
Cable type 18 and 18-ST	
Features:	non-halogenous, highly flexible, cold- and heat resistant, paired, fully shielded, electrical and thermal properties at +20 °C
Conductor resistance:	< 80 Ω/km
Insulation resistance:	> 200 MΩ/km
Operating voltage:	< 300 V AC
Withstand voltage:	1500 V / 50 Hz / 1 min
Max. load:	3 A
Temperature range:	-60 °C...+200 °C

Ordering information

Typ	between calorimetric monitoring heads **CSF** and **FM1, FM1-FH**
Do + Ka type 15	**PVC** insulated cable, type LifYCY 4x2x0.2 mm² (AWG 24) 8-pole round connector + 10-pole clamping connector
Do + Ka type 18	**silicone** insulated cable, type 4x2x0.2 mm² (AWG 24) 8-pole round connector + 10-pole clamping connector
	Available cable lengths
	...m 2 m, 3 m, 5 m, 8 m, 10 m, 15 m, 20 m, 25 m, 30 m, 40 m, 50 m, 60 m, 70 m, 80 m, 90 m, 100 m, 110 m, 120 m, 130 m, 140 m, 150 m, 160 m, 170 m, 180 m, 190 m, 200 m
Do + Ka type 15 - 2 m	ordering example

Type	between calorimetric monitoring heads **CSF** and **FM1-ST**
Do + Ka type 15-ST	**PVC** insulated cable, type LifYCY 4x2x0.2 mm² (AWG 24) 8-pole round connector + 10-pole clamping connector
Do + Ka type 18-ST	**silicone** insulated cable, type 4x2x0.2 mm² (AWG 24) 8-pole round connector + 10-pole clamping connector
	Available cable lengths
	...m 2 m, 3 m, 5 m, 8 m, 10 m, 15 m, 20 m, 25 m, 30 m, 40 m, 50 m, 60 m, 70 m, 80 m, 90 m, 100 m, 110 m, 120 m, 130 m, 140 m, 150 m, 160 m, 170 m, 180 m, 190 m, 200 m
Do + Ka type 15-ST - 2 m	ordering example

Monitoring head with turbine-type sensor

TST-..HM2

Description

Thread mounted monitoring head with turbine-type sensor for Flow Meter FM1. Recommended for high medium temperature applications. The unit consists of the turbine HM2 and a pre-amplifier which is connected with the HM2 by means of a 2 m cable.

Features

- Medium temperature 0 °... +250 °C

Technical data

Type of head	thread-mounted monitoring head
Nominal thread dia.	G1/2A
Length of shank	36 mm
Length of sensor	19 mm
Suitable for	water air
Temperature range Medium: Monitoring head (to medium): (to electrical connection): Preamplifier:	 0...+250 °C air *) 0...+250 °C 0...+250 °C -10...+50 °C
Measuring range air: water:	1...20 m/s 0.1...5 m/s
Pressure resistance (1)	10 bar/147 PSI (please enquire for higher pressure)
Degree of protection Monitoring head/cable Monitoring head/cable connector Preamplifier	 IP68 IP67 IP65
Material fitting Materials of wetted parts - housing and turbine: - bearings: jewel bearing pivot bearing	stainless steel 1.4571/AISI 316 Ti chrome nickel/molybdenum steel VUA sapphire Nivadur
Cable to electronic control unit	LifYCY 3 x 0.35 mm² (AWG 24)

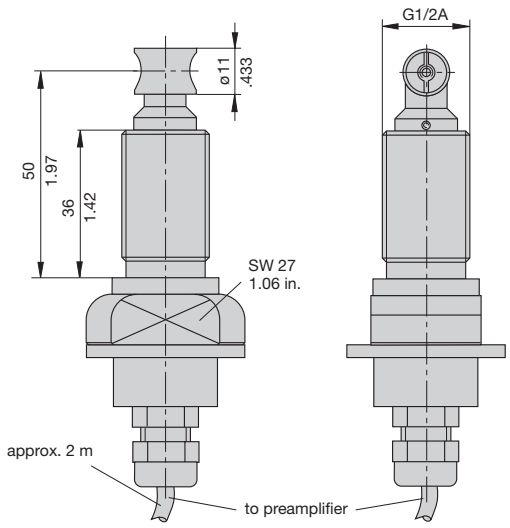
(1) Admissible operating pressure to DIN 2401, measured at max. temperature (= max. medium temperature)
(2) with mating connector
*) Please observe that ice build up on the sensor at water temperatures ≤ 0 °C will destroy the sensor.

Ordering information

Type						
TST	thread-mounted monitoring head with turbine-type sensor					
	Process connection					
	01	G1/2A thread				
		Application range - Material of the area exposed to medium				
		HM2	+250 °C, air 20 m/s, water 5 m/s - stainless steel, jewel bearing, hardened tips, incl. 2 m connecting cable to the pre-amplifier			
			Length of shank/thread			
			L10	36 mm (standard)		
				Accuracy		
				0	±1 % of final value, ±3 % of measured value (standard)	
					Electrical connection to FM 1	
					E10	round connector with tinned contacts (plug and cable to separate order)

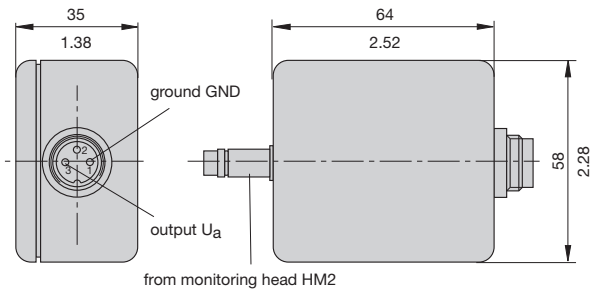
TST -	01	HM2	L10	0	E10	ordering example

Dimensions of monitoring head TST-..HM2



This is a metric design and millimeter dimensions take precedence (mm / inch)

Preamplifier for monitoring head TST-..HM2



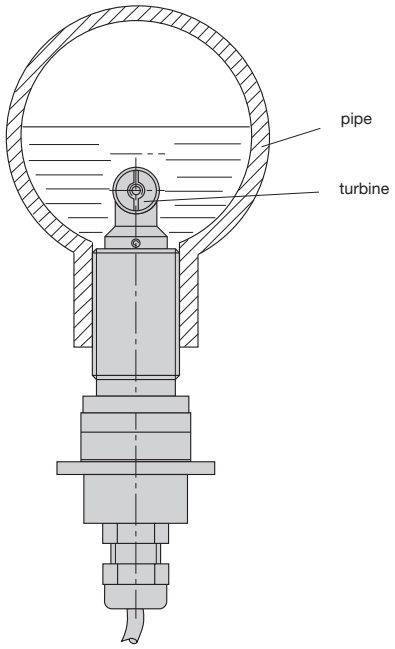
Description

Electronic flow meters with mechanical sensing rely upon a turbine mounted in the pipeline. The rotational speed of the turbine in the flowstream is proportional to the flow rate. Turbine rotation is remotely measured by an inductive proximity switch and transmitted as a frequency signal to the electronic control unit.

Mechanical sensing by means of turbine-type sensors is recommended:

- where temperatures may be above the temperature range of the calorimetric heads (>130 °C),
- where the media may change,
- where the properties (thermal conductivity) of the medium may vary significantly,
- for media with air bubbles,
- where an immediate response to flow rate changes is required.

Monitoring head with turbine-type sensor



Advantages of mechanical flow rate sensing

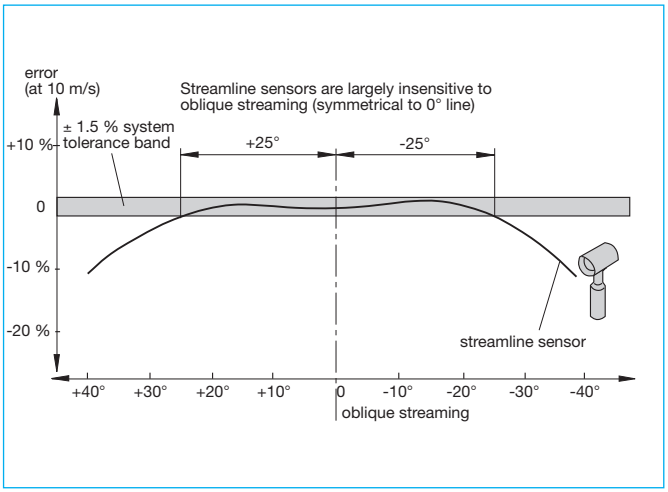
- Wide medium temperature range: 0 °C to +250 °C, independent of temperature variations
- Short reaction time

Limitations:

- not suitable for media with solid particles
- can be overloaded only to a limited extent
- measuring signals depend on the viscosity of the medium
- shock-sensitive

Installation of monitoring head

Flow monitoring is often necessary in places that are not accessible and where practical difficulties may prevent the correct alignment of the sensors with respect to flow direction. The special aerodynamic shape of the E-T-A sensors reduces this danger. The following diagram clearly shows that the “streamlined” E-T-A sensors have a very good alignment angle.



Cable type 16 with connectors

Description

Cable between turbine-type monitoring head TST and Flow Meter FM1.

- Connection to monitoring head by means of 3-pole round connector
- Connection to FM1 by means of 4-pole clamping connector (XSK)

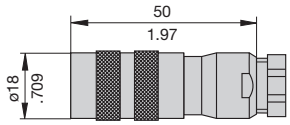
Technical data

Cable type 16
Features: highly flexible, paired, fully shielded, electrical and thermal properties at +20 °C

Conductor resistance:	< 92 Ω/km
Insulation resistance:	> 200 MΩ/km
Operating voltage:	max. 100 V AC
Withstand voltage:	800 V ~
Max. load:	0.5 A
Temperature range:	-10 °C...+80 °C (processing and operation) -30 °C...+80 °C (transport and storage)

Accessories

3-pole round connector
(without cable, for individual wiring by customer)
0Z112Z000138



4-pole clamping connector
(without cable, for individual wiring by customer)
Y 306 245 03

Ordering information

Type		between monitoring head **TST and FM1**
Do + Ka type 16		**PVC** insulated cable, type LifYCY 3x0.35mm² (AWG 18) 3-pole round connector + 4-pole clamping connector
	Available cable lenghts	
	...m	2 m, 3 m, 5 m, 8 m, 10 m, 15 m, 20 m, 25 m, 30 m, 40 m, 50 m, 60 m, 70 m, 80 m, 90 m, 100 m, 110 m, 120 m, 130 m, 140 m, 150 m, 160 m, 170 m, 180 m, 190 m, 200 m
Do + Ka type 16	**- 2 m**	ordering example

This is a metric design and millimeter dimensions take precedence (mm / inch)

Caution: Standard warranty cover will be invalidated if the correct E-T-A monitoring head/control unit connecting cable is not used.

Description

Thread-mounted monitoring head with turbine-type sensor for Flow Meter FM1.

Features

- Medium temperature range:
  TST-..WM1 water: +5...+80 °C
  TST-..AM1 air: -30...+140 °C

Monitoring heads with turbine-type sensor

TST-...-AM1/WM1

Ordering information

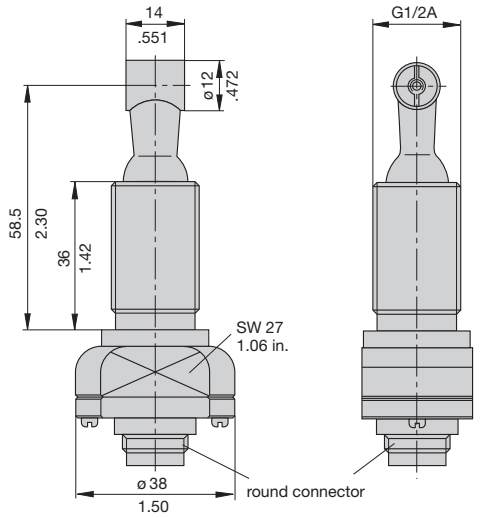
Type						
TST	thread-mounted monitoring head with turbine-type sensor					
	Process connection					
	01 G1/2A thread					
		Application range - Material of the area exposed to medium				
		AM1 +140 °C, air 20 m/s; PSU, beryllium support, hardened tips				
		WM1 +80 °C, water 5 m/s PSU, beryllium support, hardened tips				
			Length of shank/thread			
			L10 36 mm (standard)			
				Accuracy		
				0 ±1 % of final value, ±3 % of measured value (standard)		
					Electrical connection	
					E10 round connector with tinned contacts (plug and cable to separate order)	
TST -	**01**	**AM1**	**L10**	**0**	**E10**	ordering example

Technical data

Type of head	thread-mounted TST-AM1	TST-WM1
Length of shank	36 mm	
Length of sensor	28.5 mm	
Suitable for	air	water
Temperature range *) (of medium)	-30...+140 °C	+5...+80 ° C
Measuring range air:	1...20 m/s	
water:	0,1...5 m/s	
Pressure resistance (1)	10 bar/147 PSI	
Degree of protection connector (2)	IP67	
Material fitting	stainless steel 1.4571/AISI 316	
Materials of wetted parts		
- turbine housing PSU:	TK-PSU, polysulfone, Udel	
- turbine:	aluminium	
- bearings: jewel bearing	Berivac (bronze-beryllium-alloy)	
pivot bearing	Nivadur	
Cable to electronic unit	LifYCY 3 x 0.35 mm² (AWG 24)	

(1) Admissible operating pressure DIN 2401, measured at max. temperature (= max. medium temperature)
(2) with mating connector
*) max. +85 °C in the connector area

Dimensions of monitoring heads TST-..-AM1/WM1



This is a metric design and millimeter dimensions take precedence (mm / inch)

Description

Electronic flow meters with mechanical sensing rely upon a turbine mounted in the pipeline. The rotational speed of the turbine in the flow stream is proportional to the flow rate. Turbine rotation is remotely measured by an inductive proximity switch and transmitted as a frequency signal to the electronic control unit.

Mechanical sensing by means of turbine-type sensors is recommended:

- where temperatures may be above the temperature range of the calorimetric heads (>130 °C),
- where the media may change,
- where the properties (thermal conductivity) of the medium may vary significantly,
- for media with air bubbles,
- where an immediate response to flow rate changes is required.

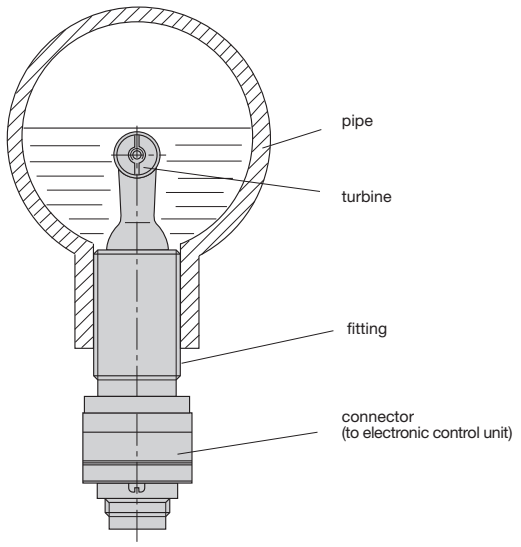
Advantages of mechanical flow rate sensing

- Wide medium temperature range:
  water: +5...+80 °C
  air: -30...+140 °C
  independent of temperature variations
- Short reaction time

Limitations:

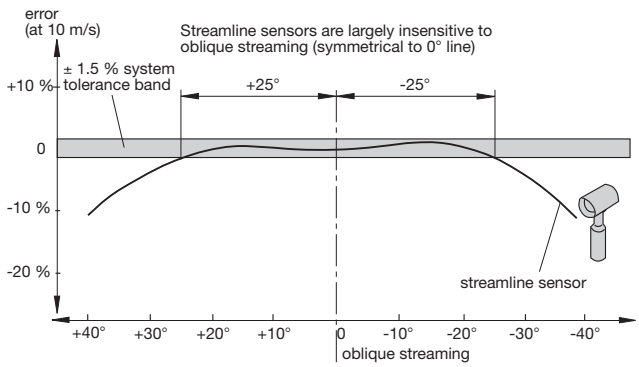
- not suitable for media with solid particles
- can be overloaded only to a limited extent
- measuring signals depend on the viscosity of the medium
- shock-sensitive

Monitoring head with turbine-type sensor



Installation of monitoring head

Flow monitoring is often necessary in places that are not accessible and where practical difficulties may prevent the correct alignment of the sensors with respect to flow direction. The special aerodynamic shape of the E-T-A sensors reduces this danger. The following diagram clearly shows that the “streamlined” E-T-A sensors have a very good alignment angle.



Description

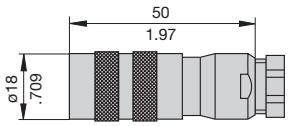
Cable between turbine-type monitoring head TST and Flow Meter FM1.

- Connection to monitoring head by means of 3-pole round connector
- Connection to FM1 by means of 4-pole clamping connector (XSK)

Cable type 16 with connectors

Accessories

3-pole round connector
(without cable, for individual wiring by customer)
0Z112Z000138



4-pole clamping connector
(without cable, for individual wiring by customer)
Y 306 245 03

This is a metric design and millimeter dimensions take precedence ($\frac{mm}{inch}$)

Caution: Standard warranty cover will be invalidated if the correct E-T-A monitoring head/control unit connecting cable is not used.

Technical data

Cable type 16
Features: highly flexible, paired, fully shielded, electrical and thermal properties at +20 °C

Conductor resistance:	< 92 Ω/km
Insulation resistance:	> 200 MΩ/km
Operating voltage:	max. 100 V AC
Withstand voltage:	800 V ~
Max. load:	0.5 A
Temperature range:	-10 °C...+80 °C (processing and operation) -30 °C...+80 °C (transport and storage)

Ordering information

Type		between monitoring head **TST** and **FM1**
Do + Ka type 16		**PVC** insulated cable, type LifYCY 3x0.35 mm² (AWG 22) 3-pole round connector + 4-pole clamping connector
		Lieferbare Kabellängen
	...m	2 m, 3 m, 5 m, 8 m, 10 m, 15 m, 20 m, 25 m, 30 m, 40 m, 50 m, 60 m, 70 m, 80 m, 90 m, 100 m, 110 m, 120 m, 130 m, 140 m, 150 m, 160 m, 170 m, 180 m, 190 m, 200 m
Do + Ka type 16	- 2 m	ordering example