

## VFS 1-12

Vortex Flowsensor standard - Direct, 1-12 l/min



TM03 8211 0608

Fig. 1 VFS 1-12 sensor

### Technical overview

VFS is a series of combined flow and temperature sensors (two-in-one) based on the principle of vortex shedding behind a bluff body. The VFS sensors are designed for high-volume production and are fully compatible with wet, aggressive media. The VFS sensor utilises MEMS sensing technology in combination with a novel packaging concept using corrosion-resistant coating on the MEMS sensing element. This makes the VFS sensor very robust and ideal for high-volume OEM applications. QTTM is a special version of the VFS sensors, where a composite insert for the flow ranges of 1-12 and 2-40 l/min, creates a compact and cost-effective flow and temperature measuring system which can be integrated closely into the customer's own pipework.

The trademark Grundfos Direct Sensors™ is owned and controlled by the Grundfos group.

### Applications

- thermal management in solar heating systems
- cooling and temperature control (e.g. manifold systems within machine tools)
- floor heating/radiant and valvesystems
- monitoring of pumps, valves and filters
- flow rate detection for pump controls
- industrial process flow control
- burner control in domestic gas boilers

### Features

- flow range: 1-12 l/min in 42 % glycol mixture at 30 °C
- designed for harsh environments
- based on vortex shedding
- voltage output (ratiometric, ideal for use with microprocessor and PLC)
- compact and well-proven design
- MEMS sensing technology
- approved for potable water: WRAS, KTW, W270, ACS.

### Benefits

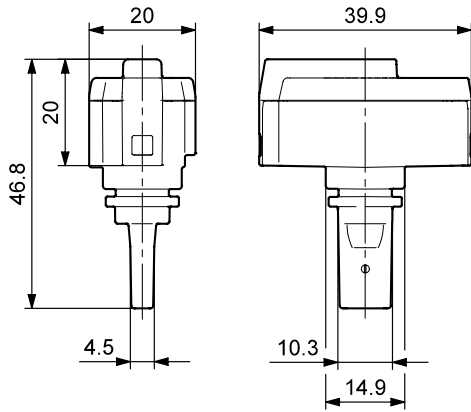
- no moving parts
- flow and temperature sensor in one package (two in-one sensor)
- fast temperature response (direct media contact)
- compatible with wet, aggressive media
- cost-effective and robust construction.

### Specifications

Flow	
Range (water)	1 to 12 l/min
Range (Tyfocur LS (30 - 100°C))	1 to 12 l/min
Accuracy ( $\pm 1\sigma$ ) (0 to 100 °C)	$\pm 5\%$ FS
Response time (63.2 %)	< 1 sec.
Resolution	0.05 l/min
Temperature	
Range	0 to 100 °C
Accuracy ( $\pm 1\sigma$ ), 25 to 80 °C	$\pm 1\text{ °C}$
Accuracy ( $\pm 1\sigma$ ), 0 to 100 °C	$\pm 2\text{ °C}$
Response time (63.2 % at 50 % FS flow)	appr. 1/4 sec.
Resolution	0.4 °C
Media and environment	
Media types	The sensor is compatible with liquids (kinematic viscosity $\leq 4\text{ mm}^2/\text{s}$ )
Media temperature (operation)	0 to 100 °C
Media temperature (peak)	-25 to 120 °C
Ambient air temp. (operation)	-25 to 60 °C
Ambient air temp. (peak)	-55 to 90 °C
Humidity	0 - 95 % (relative), non-condensing
System burst pressure	> 16 bar
Electrical data	
Power supply	5 V DC ( $\pm 5\%$ ). Grounding of the sensor supply is recommended (PELV)
Output signals	Ratiometric
Flow signal	0.5 - 3.5 V (Zero at 0.25 V)
Temperature signal	0.5 - 3.5 V
Power consumption	< 50 mW
Load impedance	> 10 k $\Omega$
Sensor materials	
Sensing element	Silicon-based MEMS sensor
Seal (sensor to housing)	EPDM rubber
Housing	Composites (PPS, PA66)
Flow pipe	PPA 40-GF
Wetted materials	Corrosion-resistant coating EPDM, PPS, PPA 40-GF
Environmental standards	
Enclosure class	IP20
Temperature cycling	IEC 68-2-14
Vibration (non-destructive)	20 - 2000 Hz, 10G, 4h
Electromagnetic compatibility	EN 61326-1
Dimensions	
Sensing element	47 x 40 x 20 mm, see drawing
Flow pipe	82 x 39 x 25 mm

If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

**Dimensions (in mm)**



**Fig. 2** Dimensional sketches of sensing element

TM003 8136 0607



**Fig. 3** VFS 1-12 sensor components

TM03 2017 1808

**Type key**

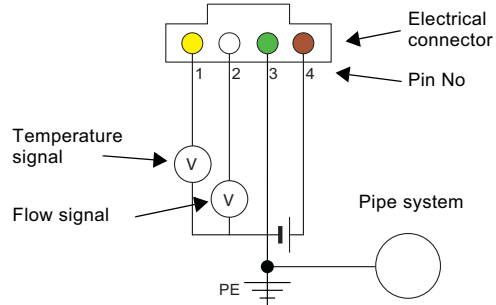
The sensor is labelled with a type designation.

	96695806	- XX	- XXX	XXXXX
Product number				
Revision				
Production year and week				
Consecutive number				

For more information, see  
<http://www.grundfos.com/directsensors>.

<b>96846910</b> 0608	<b>GB</b>
Repl.	

**Electrical connections**



**Fig. 4** Electrical connections

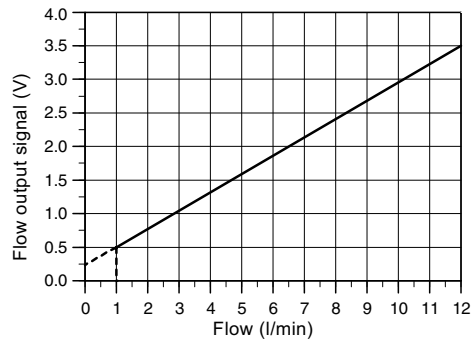
TM03 8203 1908

Pin configuration	Colour
1 Temperature signal (0.5 to 3.5 V relative to pin 3)	Yellow
2 Flow signal (0.25 to 3.5 V relative to pin 3)	White
3 GND (0 V)	Green
4 Power supply (+5V DC), PELV	Brown

**Power supply requirements**

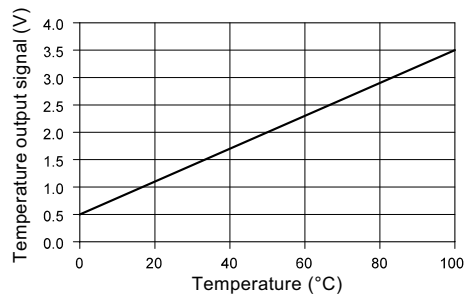
- 5 Vdc
- separated from hazardous live circuitry by double or reinforced insulation
- power limitation: 150 VA; current limitation: 8 A.

**Sensor output signals**



**Fig. 5** Flow response

TM03 2465 2108



**Fig. 6** Temperature response

TM03 8149 0607

Subject to alterations.

## Grundfos Direct Sensors™ VFS 2-40

Vortex flow sensor, 2-40 QT l/min



TM03 8211 0808

Fig. 1 VFS 2-40 QT sensor

### Technical overview

VFS is a series of combined flow and temperature sensors (two-in-one) based on the principle of vortex shedding behind a bluff body. The VFS sensors are designed for high-volume production and are fully compatible with wet, aggressive media. The VFS sensor utilises MEMS sensing technology in combination with a novel packaging concept using corrosion-resistant coating on the MEMS sensor element. This makes the VFS sensor very robust and ideal for high-volume OEM applications. QT is a special version of the VFS sensors where a composite insert for the flow ranges of 1-12 and 2-40 l/min creates a compact and cost-effective flow and temperature measuring system, which can be integrated closely into the customer's own pipework.

The trademark Grundfos Direct Sensors™ and QT™ are trademarks owned and controlled by the Grundfos group.

### Applications

- thermal management in solar heating systems
- cooling and temperature control (ex. manifold systems within machine tools)
- floor Heating/Radiant and valvesystems
- monitoring of pumps, valves and filters
- flow rate detection for pump controls
- industrial process flow control
- burner control in domestic gas boilers

### Features

- flow range: 2-40 l/min in 40 % glykole mixture at 20 °C
- designed for harsh environments
- based on vortex shedding
- voltage output (ratiometric, ideal for use with microprocessor and PLC)
- compact and well-proven design
- MEMS sensing technology
- approved for potable water: WRAS, KTW, W270, ACS.

### Benefits

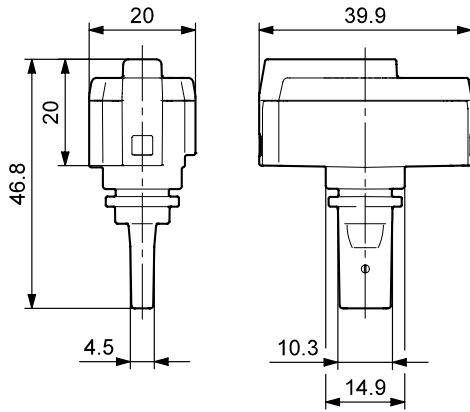
- no moving parts
- flow and temperature sensor in one package (two in-one sensor)
- fast temperature response (direct media contact)
- compatible with wet, aggressive media
- cost-effective and robust construction.

### Specifications

Flow	
Range	2 to 40 l/min
Accuracy ( $\pm 1\sigma$ ), 0 to 100 °C	$\pm 5\%$ FS (typical 3%)
Response time (63.2%)	< 1 sec.
Resolution	0.05 l/min
Temperature	
Range	0 to 100 °C
Accuracy ( $\pm 1\sigma$ ), 25 to 80 °C	$\pm 1\%$ °C
Accuracy ( $\pm 1\sigma$ ), 0 to 100 °C	$\pm 2\%$ °C
Response time (63.2% at 50% FS flow)	appr. 1/4 sec.
Resolution	0.4 °C
Media and environment	
Media types	The sensor is compatible with liquids (kinematic viscosity $\leq 4$ mm <sup>2</sup> /s).
Media temperature (operation)	0 to 100 °C
Media temperature (peak)	-25 to 120 °C
Ambient air temp. (operation)	-25 to 60 °C
Ambient air temp. (peak)	-55 to 90 °C
Humidity	0 - 95% (relative), non-condensing
System burst pressure	> 16 bar
Electrical data	
Power supply	5 V DC ( $\pm 5\%$ ). Grounding of the sensor supply is recommended (PELV)
Output signals	Ratiometric
Flow signal	0.5 - 3.5 V (zero at 0.25 V)
Temperature signal	0.5 - 3.5 V
Power consumption	< 50 mW
Load impedance	> 10 k $\Omega$
Sensor materials	
Sensing element	Silicon-based MEMS sensor
Seal (sensor to housing)	EPDM rubber
Housing	Composites (PPS, PA66)
Flow pipe	PPA 40-GF
Wetted materials	Corrosion-resistant coating EPDM, PPS, PPA 40-GF
Environmental standards	
Enclosure class	IP44 (Not overmoulded IP20)
Temperature cycling	IEC 68-2-14
Vibration (non-destructive)	20 - 2000 Hz, 10G, 4h
Electromagnetic compatibility	EN 61326-1
Dimensions	
Sensing element	47 x 40 x 20 mm, see drawing
Flow pipe	82 x 39 x 25 mm

If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

**Dimensions (in mm)**



**Fig. 2** Dimensional sketches of sensing element

TM003 8136 0607



**Fig. 3** VFS 2-40 sensor components

TM03 2017 1808

**Type key**

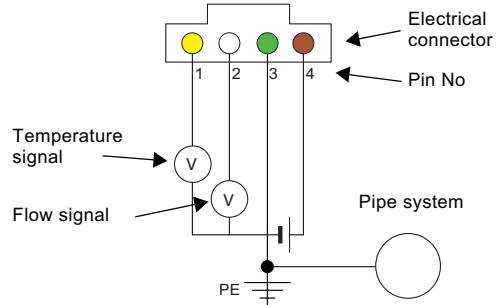
The sensor is labelled with a type designation.

96642108	- XX	- XXX	XXXXX
Product number			
Revision			
Production year and week			
Consecutive number			

For more information, see  
<http://www.grundfos.com/directsensors>.

<b>96846911</b> 0708	<b>GB</b>
Repl.	

**Electrical connections**



**Fig. 4** Electrical connections

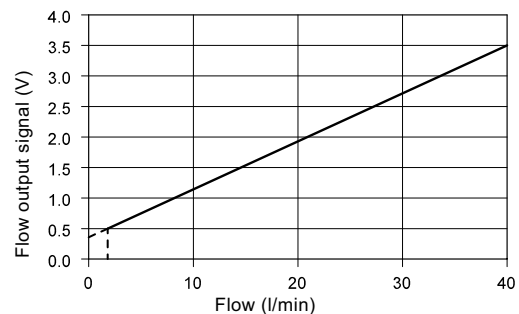
TM03 8203 1908

Pin configuration	Colour
1 Temperature signal (0.5 to 3.5 V relative to pin 3)	Yellow
2 Flow signal (0.5 to 3.5 V relative to pin 3)	White
3 GND (0 V)	Green
4 Power supply (+5V DC), PELV	Brown

**Power supply requirements.**

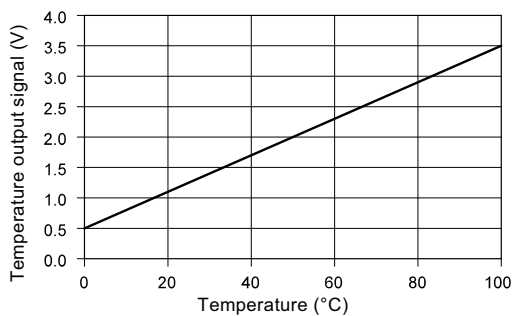
- 5 Vdc
- separated from hazardous live circuitry by double or reinforced insulation
- power limitation: 150 VA; current limitation: 8 A.

**Sensor output signals**



**Fig. 5** Flow response

TM03 8216 0807



**Fig. 6** Temperature response

TM03 8149 0607

Subject to alterations.

## VFS 1-20

Vortex flow sensor, 1-20 l/min



TM03 8208 0807

Fig. 1 VFS 1-20 sensor

### Technical overview

Grundfos Direct Sensors™, type VFS, is a series of combined flow- and temperature sensors (two-in-one) based on the principle of vortex shedding behind a bluff body. The VFS sensors are designed for high-volume production and are fully compatible with wet, aggressive media. The VFS sensor utilises MEMS sensing technology in combination with a novel packaging concept using corrosion-resistant coating on the MEMS sensor element. This makes the VFS sensor very robust and ideal for high-volume OEM applications. VFS sensors are available for flow ranges of 1.3-20, 2-40, 5-100 and 10-200 l/min.

The trademark Grundfos Direct Sensors™ is owned and controlled by the Grundfos group.

### Applications

- Burner control in domestic gas boilers
- Thermal management in solar heating systems
- Industrial process flow control
- Flow rate detection for pump controls
- Monitoring of pumps, valves and filters
- Cooling and temperature control
- Domestic hot-water systems.

### Features

- Flow ranges: 1.3-20, 2-40, 5-100 and 10-200 l/min.
- Based on vortex shedding
- Voltage output (ratiometric, ideal for use with microprocessor and PLC)
- Compact and robust design
- Approved for potable water: WRAS, NSF, KTW, W270, ACS.

### Benefits

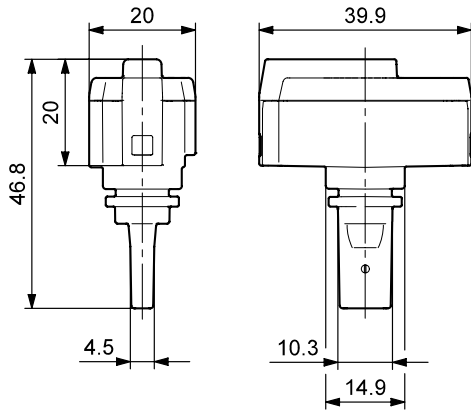
- No moving parts
- Flow and temperature sensor in one package (two-in-one sensor)
- Fast temperature response (direct media contact)
- Compatible with wet, aggressive media
- Cost-effective and robust construction.

### Specifications

<b>Flow</b>	
Range	1.3 to 20 l/min
Accuracy ( $\pm 1\sigma$ ), 0 to 100 °C	$\pm 1.5$ % FS
Response time (63.2 %)	< 1s
Resolution	0.05 l/min
<b>Temperature</b>	
Range	0 to 100 °C
Accuracy ( $\pm 1\sigma$ ), 25 to 80 °C	$\pm 1$ °C
Accuracy ( $\pm 1\sigma$ ), 0 to 100 °C	$\pm 2$ °C
Response time (63.2 % at 50 % FS flow)	< 1s
Resolution	0.5 °C
<b>Media and environment</b>	
Media types	Liquids. The sensor is compatible with aggressive media.
Media temperature (operation)	0 to 100 °C
Media temperature (peak)	-25 to 120 °C
Ambient air temp. (operation)	-25 to 60 °C
Ambient air temp. (peak)	-55 to 90 °C
Humidity	0 - 95 % (relative), non-condensing
Burst pressure	> 16 bar
<b>Electrical data</b>	
Power supply	5 V DC ( $\pm 5$ %). Grounding of the sensor supply is recommended (PELV)
Output signals	Ratiometric
Flow signal	0.35 - 3.5 V
Temperature signal	0.5 - 3.5 V
Power consumption	< 50 mW
Load impedance	> 10 k $\Omega$
<b>Sensor materials</b>	
Sensor element	Silicon-based MEMS sensor
Seal (sensor to housing)	EPDM rubber
Housing	Composites (PPS, PA66)
Flow pipe	PPA 40-GF
Wetted materials	Corrosion-resistant coating EPDM, PPS, PPA 40-GF
<b>Environmental standards</b>	
Enclosure class	IP44 (Not overmoulded IP20)
Temperature cycling	IEC 68-2-14
Vibration (non-destructive)	20 - 2000 Hz, 10G, 4h
Electromagnetic compatibility	EN 61326-1
<b>Dimensions</b>	
Sensor element	47* 40* 20 mm
Flow pipe	82* 39* 25 mm

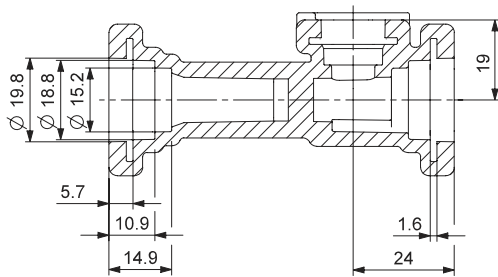
If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

**Dimensions (in mm)**



TM00 38136 0607

**Fig. 2** Dimensional sketches of sensor element



TM03 8205 0807

**Fig. 3** Dimensional sketch of flow pipe

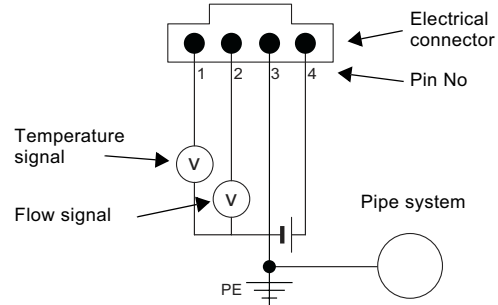
**Type key**

The sensor is labelled with a type designation.

	96577493	- XX	- XXX	XXXXX
Product number				
Revision				
Production year and week				
Consecutive number				

<b>96702082</b> 0108	<b>GB</b>
Repl. 96702082 1207	

**Electrical connections**



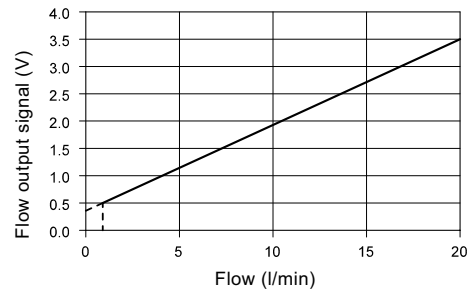
TM03 8203 0807

**Fig. 4** Electrical connections

Pin configuration	Colour
1 Temperature signal (0.5 to 3.5 V relative to pin 3)	Yellow
2 Flow signal (0.5 to 3.5 V relative to pin 3)	White
3 GND (0 V)	Green
4 Power supply (+5V DC), PELV	Brown

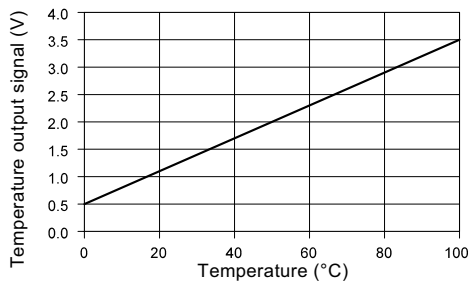
The sensors shall be powered with 5Vdc which is separated from hazardous live by double or reinforced insulation at the source of the supply with a power limitation of 150VA and current limitation of 8A.

**Sensor output signals**



TM03 8206 0807

**Fig. 5** Flow response



TM03 8149 0607

**Fig. 6** Temperature response

For more information, see <http://www.grundfos.com/directsensors>.

Subject to alterations.

## VFS 2-40

Vortex flow sensor, 2-40 l/min



TM03 8210 0807

Fig. 1 VFS 2-40 sensor

### Technical overview

Grundfos Direct Sensors™, type VFS, is a series of combined flow- and temperature sensors (two-in-one) based on the principle of vortex shedding behind a bluff body. The VFS sensors are designed for high-volume production and are fully compatible with wet, aggressive media. The VFS sensor utilises MEMS sensing technology in combination with a novel packaging concept using corrosion-resistant coating on the MEMS sensor element. This makes the VFS sensor very robust and ideal for high-volume OEM applications. VFS sensors are available for flow ranges of 1.3-20, 2-40, 5-100 and 10-200 l/min.

The trademark Grundfos Direct Sensors™ is owned and controlled by the Grundfos group.

### Applications

- Burner control in domestic gas boilers
- Thermal management in solar heating systems
- Industrial process flow control
- Flow rate detection for pump controls
- Monitoring of pumps, valves and filters
- Cooling and temperature control
- Domestic hot-water systems.

### Features

- Flow ranges: 1.3-20, 2-40, 5-100 and 10-200 l/min.
- Based on vortex shedding
- Voltage output (ratiometric, ideal for use with microprocessor and PLC)
- Compact and robust design
- Approved for potable water: WRAS, NSF, KTW, W270, ACS.

### Benefits

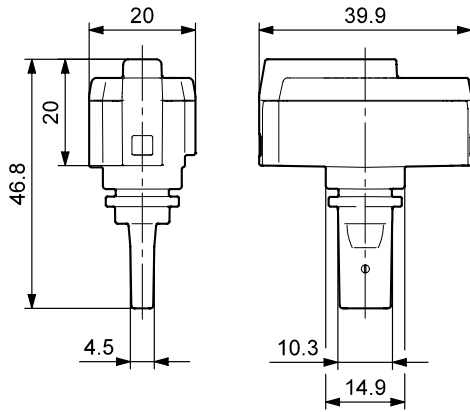
- No moving parts
- Flow and temperature sensor in one package (two-in-one sensor)
- Fast temperature response (direct media contact)
- Compatible with wet, aggressive media
- Cost-effective and robust construction.

### Specifications

<b>Flow</b>	
Range	2 to 40 l/min
Accuracy ( $\pm 1\sigma$ ), 0 to 100 °C	$\pm 1.5$ % FS
Response time (63.2 %)	< 1 s
Resolution	0.1 l/min
<b>Temperature</b>	
Range	0 to 100 °C
Accuracy ( $\pm 1\sigma$ ), 25 to 80 °C	$\pm 1$ °C
Accuracy ( $\pm 1\sigma$ ), 0 to 100 °C	$\pm 2$ °C
Response time (63.2 % at 50 %FS flow)	< 1 s
Resolution	0.5 °C
<b>Media and environment</b>	
Media types	Liquids. The sensor is compatible with aggressive media.
Media temperature (operation)	0 to 100 °C
Media temperature (peak)	-25 to 120 °C
Ambient air temp. (operation)	-25 to 60 °C
Ambient air temp. (peak)	-55 to 90 °C
Humidity	0 - 95 % (relative), non-condensing
Burst pressure	> 16 bar
<b>Electrical data</b>	
Power supply	5 V DC ( $\pm 5$ %). Grounding of the sensor supply is recommended (PELV)
Output signals	Ratiometric
Flow signal	0.35 - 3.5 V
Temperature signal	0.5 - 3.5 V
Power consumption	< 50 mW
Load impedance	> 10 k $\Omega$
<b>Sensor materials</b>	
Sensor element	Silicon-based MEMS sensor
Seal (sensor to housing)	EPDM rubber
Housing	Composites (PPS, PA66)
Flow pipe	PPA 40-GF
Wetted materials	Corrosion-resistant coating EPDM, PPS, PPA 40-GF
<b>Environmental standards</b>	
Enclosure class	IP44 (Not overmoulded IP20)
Temperature cycling	IEC 68-2-14
Vibration (non-destructive)	20 - 2000 Hz, 10G, 4h
Electromagnetic compatibility	EN 61326-1
<b>Dimensions</b>	
Sensor element	47* 40* 20 mm
Flow pipe	88* 39* 25 mm

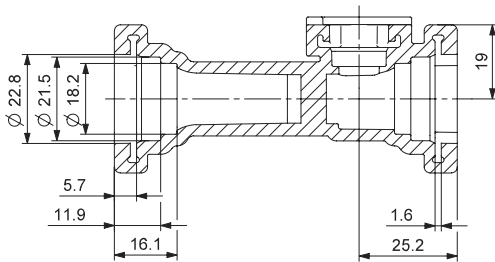
If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

**Dimensions (in mm)**



TM00 38136 0607

**Fig. 2** Dimensional sketches of sensor element



TM03 8204 0807

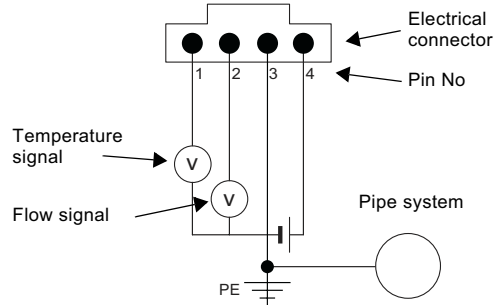
**Fig. 3** Dimensional sketch of flow pipe

**Type key**

The sensor is labelled with a type designation.

	96579954	- XX	- XXX	XXXXX
Product number				
Revision				
Production year and week				
Consecutive number				

**Electrical connections**



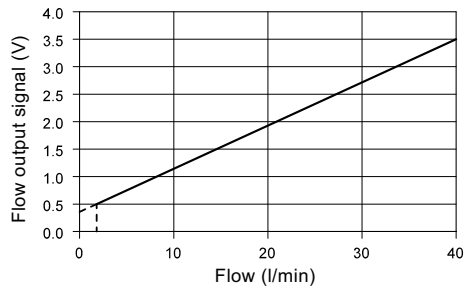
TM03 8203 0807

**Fig. 4** Electrical connections

Pin configuration	Colour
1 Temperature signal (0.5 to 3.5 V relative to pin 3)	Yellow
2 Flow signal (0.5 to 3.5 V relative to pin 3)	White
3 GND (0 V)	Green
4 Power supply (+5V DC), PELV	Brown

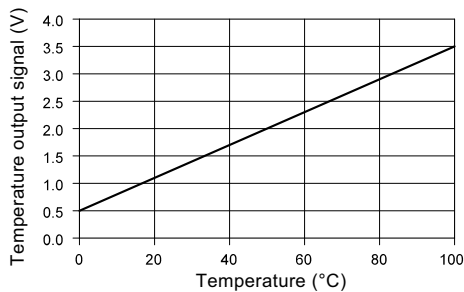
The sensors shall be powered with 5Vdc which is separated from hazardous live by double or reinforced insulation at the source of the supply with a power limitation of 150VA and current limitation of 8A.

**Sensor output signals**



TM03 8216 0807

**Fig. 5** Flow response



TM03 8149 0607

**Fig. 6** Temperature response

For more information, see <http://www.grundfos.com/directsensors>.

96702083 0108	GB
Repl. 96702083 1207	

Subject to alterations.

## VFS 5-100

Vortex flow sensor, 5-100 l/min



TM03 8211 0807

Fig. 1 VFS 5-100 sensor

### Technical overview

Grundfos Direct Sensors™, type VFS, is a series of combined flow- and temperature sensors (two-in-one) based on the principle of vortex shedding behind a bluff body. The VFS sensors are designed for high-volume production and are fully compatible with wet, aggressive media. The VFS sensor utilises MEMS sensing technology in combination with a novel packaging concept using corrosion-resistant coating on the MEMS sensor element. This makes the VFS sensor very robust and ideal for high-volume OEM applications. VFS sensors are available for flow ranges of 1.3-20, 2-40, 5-100 and 10-200 l/min.

The trademark Grundfos Direct Sensors™ is owned and controlled by the Grundfos group.

### Applications

- Burner control in domestic gas boilers
- Thermal management in solar heating systems
- Industrial process flow control
- Flow rate detection for pump controls
- Monitoring of pumps, valves and filters
- Cooling and temperature control
- Domestic hot-water systems.

### Features

- Flow ranges: 1.3-20, 2-40, 5-100 and 10-200 l/min.
- Based on vortex shedding
- Voltage output (ratiometric, ideal for use with microprocessor and PLC)
- Compact and robust design
- Approved for potable water: WRAS, NSF, KTW, W270, ACS.

### Benefits

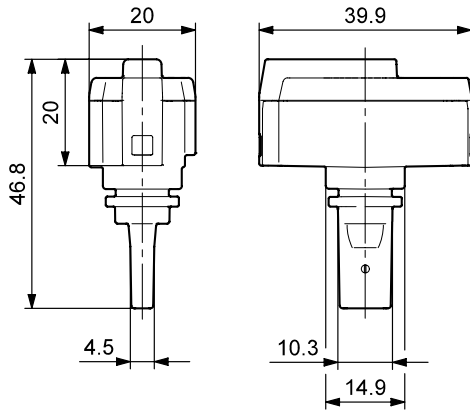
- No moving parts
- Flow and temperature sensor in one package (two-in-one sensor)
- Fast temperature response (direct media contact)
- Compatible with wet, aggressive media
- Cost-effective and robust construction.

### Specifications

<b>Flow</b>	
Range	5 to 100 l/min
Accuracy ( $\pm 1\sigma$ ), 0 to 100 °C	$\pm 1.5$ % FS
Response time (63.2 %)	< 1 s
Resolution	0.25 l/min
<b>Temperature</b>	
Range	0 to 100 °C
Accuracy ( $\pm 1\sigma$ ), 25 to 80 °C	$\pm 1$ °C
Accuracy ( $\pm 1\sigma$ ), 0 to 100 °C	$\pm 2$ °C
Response time (63.2 % at 50 % FS flow)	< 1 s
Resolution	0.5 °C
<b>Media and environment</b>	
Media types	Liquids. The sensor is compatible with aggressive media.
Media temperature (operation)	0 to 100 °C
Media temperature (peak)	-25 to 120 °C
Ambient air temp. (operation)	-25 to 60 °C
Ambient air temp. (peak)	-55 to 90 °C
Humidity	0 - 95 % (relative), non-condensing
Burst pressure	> 16 bar
<b>Electrical data</b>	
Power supply	5 V DC ( $\pm 5$ %). Grounding of the sensor supply is recommended (PELV)
Output signals	Ratiometric
Flow signal	0.35 - 3.5 V
Temperature signal	0.5 - 3.5 V
Power consumption	< 50 mW
Load impedance	> 10 k $\Omega$
<b>Sensor materials</b>	
Sensor element	Silicon-based MEMS sensor
Seal (sensor to housing)	EPDM rubber
Housing	Composites (PPS, PA66)
Flow pipe	PPA 40-GF
Wetted materials	Corrosion-resistant coating EPDM, PPS, PPA 40-GF
<b>Environmental standards</b>	
Enclosure class	IP44 (Not overmoulded IP20)
Temperature cycling	IEC 68-2-14
Vibration (non-destructive)	20 - 2000 Hz, 10G, 4h
Electromagnetic compatibility	EN 61326-1
<b>Dimensions</b>	
Sensor element	47* 40* 20 mm
Flow pipe	129* 37* 32 mm

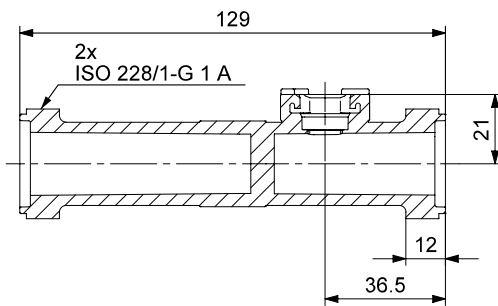
If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

**Dimensions (in mm)**



TM00 38136 0607

**Fig. 2** Dimensional sketches of sensor element



TM03 8219 0807

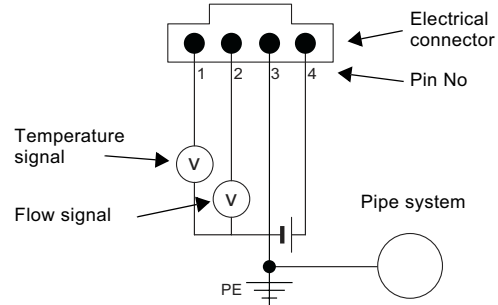
**Fig. 3** Dimensional sketch of flow pipe

**Type key**

The sensor is labelled with a type designation.

	<b>96605097</b>	<b>- XX</b>	<b>- XXX</b>	<b>XXXXX</b>
Product number				
Revision				
Production year and week				
Consecutive number				

**Electrical connections**



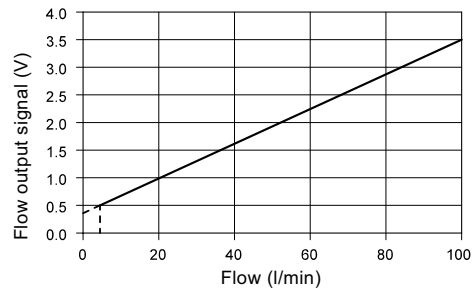
TM03 8203 0807

**Fig. 4** Electrical connections

Pin configuration	Colour
1 Temperature signal (0.5 to 3.5 V relative to pin 3)	Yellow
2 Flow signal (0.5 to 3.5 V relative to pin 3)	White
3 GND (0 V)	Green
4 Power supply (+5V DC), PELV	Brown

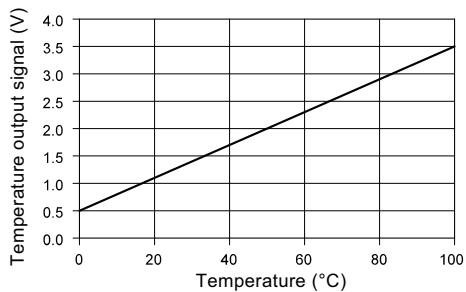
The sensors shall be powered with 5Vdc which is separated from hazardous live by double or reinforced insulation at the source of the supply with a power limitation of 150VA and current limitation of 8A.

**Sensor output signals**



TM03 8217 0807

**Fig. 5** Flow response



TM03 8149 0607

**Fig. 6** Temperature response

For more information, see <http://www.grundfos.com/directsensors>.

<b>96702084</b> 0108	<b>GB</b>
Repl. 96702084 1207	

Subject to alterations.

## VFS 10-200

Vortex flow sensor, 10-200 l/min



TM03 8209 0807

Fig. 1 VFS 10-200 sensor

### Technical overview

Grundfos Direct Sensors™, type VFS, is a series of combined flow- and temperature sensors (two-in-one) based on the principle of vortex shedding behind a bluff body. The VFS sensors are designed for high-volume production and are fully compatible with wet, aggressive media. The VFS sensor utilises MEMS sensing technology in combination with a novel packaging concept using corrosion-resistant coating on the MEMS sensor element. This makes the VFS sensor very robust and ideal for high-volume OEM applications. VFS sensors are available for flow ranges of 1.3-20, 2-40, 5-100 and 10-200 l/min.

The trademark Grundfos Direct Sensors™ is owned and controlled by the Grundfos group.

### Applications

- Burner control in domestic gas boilers
- Thermal management in solar heating systems
- Industrial process flow control
- Flow rate detection for pump controls
- Monitoring of pumps, valves and filters
- Cooling and temperature control
- Domestic hot-water systems.

### Features

- Flow ranges: 1.3-20, 2-40, 5-100 and 10-200 l/min.
- Based on vortex shedding
- Voltage output (ratiometric, ideal for use with microprocessor and PLC)
- Compact and robust design
- Approved for potable water: WRAS, NSF, KTW, W270, ACS.

### Benefits

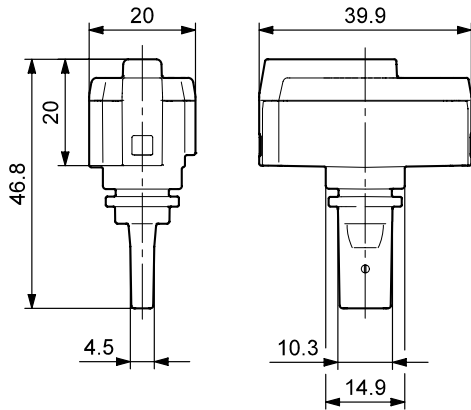
- No moving parts
- Flow and temperature sensor in one package (two-in-one sensor)
- Fast temperature response (direct media contact)
- Compatible with wet, aggressive media
- Cost-effective and robust construction.

### Specifications

Flow	
Range	10 to 200 l/min
Accuracy ( $\pm 1\sigma$ ), 0 to 100 °C, >20 l/min	$\pm 1.5$ % FS
Response time Start up flow / no flow (90 %)	<1.0 s
Resolution	1.0 l/min
Temperature	
Range	0 to 100 °C
Accuracy ( $\pm 1\sigma$ ), 25 to 80 °C	$\pm 1$ °C
Accuracy ( $\pm 1\sigma$ ), 0 to 100 °C	$\pm 2$ °C
Response time (63.2 % at 50 % FS flow)	< 1.0 s
Resolution	0.5 °C
Media and environment	
Media types	Liquids. The sensor is compatible with aggressive media.
Media temperature (operation)	0 to 100 °C
Media temperature (peak)	-25 to 120 °C
Ambient air temp. (operation)	-25 to 60 °C
Ambient air temp. (peak)	-55 to 90 °C
Humidity	0 - 95 % RH, non-condensing
Burst pressure	> 16 bar
Electrical data	
Power supply	5 V DC ( $\pm 5$ %). Grounding of the sensor supply is recommended (PELV)
Output signals	Ratiometric
Flow signal	0.35 - 3.5 V
Temperature signal	0.5 - 3.5 V
Power consumption	< 50 mW
Load impedance	> 10 k $\Omega$
Sensor materials	
Sensor element	Silicon-based MEMS sensor
Seal (sensor to housing)	EPDM rubber
Housing	Composites (PPS, PA66)
Flow pipe	PPA 40-GF
Wetted materials	Corrosion-resistant coating EPDM, PPS, PPA 40-GF
Environmental standards	
Enclosure class	IP20
Temperature cycling	IEC 68-2-14
Vibration (non-destructive)	20 - 2000 Hz, 10G, 4h
Electromagnetic compatibility	EN 61326-1
Dimensions	
Sensor element	47 x 40 x 20 mm, see drawings
Flow pipe	137 x 45 x 41 mm

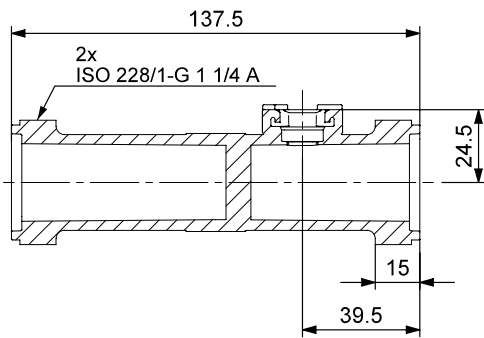
If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

**Dimensions (in mm)**



**Fig. 2** Dimensional sketches of sensor element

TM00 38136 0607



**Fig. 3** Dimensional sketch of flow pipe

TM03 8220 0807

**Type key**

The sensor is labelled with a type designation.

	<b>96642106</b>	<b>- XX</b>	<b>- XXX</b>	<b>XXXXX</b>
Product number				
Revision				
Production year and week				
Consecutive number				

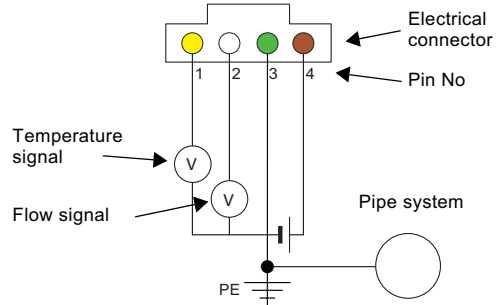
For more information, see  
<http://www.grundfos.com/directsensors>.

<b>96702086</b> 0508	<b>GB</b>
Repl. 96702086 0108	

Grundfos Sensor A/S  
Poul Due Jensens Vej 7. DK-8850 Bjerringbro. Denmark  
Telephone: +45 87 50 14 00

[www.grundfos.com](http://www.grundfos.com)

**Electrical connections**



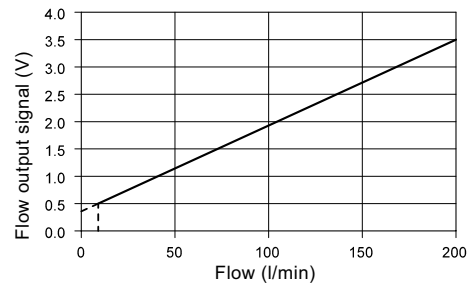
**Fig. 4** Electrical connections

TM03 8203 0807

Pin configuration	Colour
1 Temperature signal (0.5 to 3.5 V relative to pin 3)	Yellow
2 Flow signal (0.5 to 3.5 V relative to pin 3)	White
3 GND (0 V)	Green
4 Power supply (+5V DC), PELV	Brown

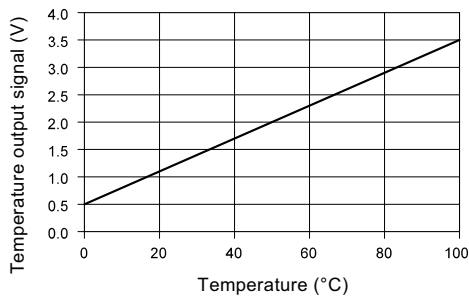
The sensors shall be powered with 5 Vdc which is separated from hazardous live by double or reinforced insulation at the source of the supply with a power limitation of 150 VA and current limitation of 8 A.

**Sensor output signals**



**Fig. 5** Flow response

TM03 8218 0807



**Fig. 6** Temperature response

TM03 8149 0607

Subject to alterations.