



DE Kurzbetriebsanleitung

4 Schalterpunkt für Temperatur einstellen

► Zum Aufruf aus dem Anzeigemodus: [MODE] 3 x betätigen.

Menü	LED-Bandanzeige
<b>Schalterpunkt für die Temperaturüberwachung einstellen</b>	
1. Zehnerstelle des Temperaturwerts einstellen:	
► [SET] 3 s betätigen und halten, bis die Schalterpunkt-LED zunächst gelb blinkt und anschließend wieder konstant gelb leuchtet.	
► Schalterpunkt in 20-°C-Schritten erhöhen: [SET] betätigen.	
► Schalterpunkt in 20-°C-Schritten senken: [MODE] betätigen.	
2. Schalterpunkt speichern: [ENTER] 1 x betätigen, bis LED-Band 2 x kurz blinkt.	
3. Einerstelle des Temperaturwerts einstellen:	
► [SET] 3 s betätigen und halten, bis die Schalterpunkt-LED zunächst gelb blinkt und anschließend wieder konstant gelb leuchtet.	
► Schalterpunkt in 2-°C-Schritten erhöhen: [SET] betätigen.	
► Schalterpunkt in 2-°C-Schritten senken: [MODE] betätigen.	
4. Schalterpunkt speichern: [ENTER] betätigen.	
► LED-Band blinkt 2 x kurz grün. Gerät wechselt in den Anzeigemodus.	

5 Erweiterte Einstellungen

Menüfolge „Erweiterte Einstellungen“ starten/verlassen

„Erweiterte Einstellungen“ starten:  
► [MODE] mind. 4 s betätigen, bis im LED-Band alle LEDs grün leuchten und das LED-Band 2 x kurz grün blinkt.

„Erweiterte Einstellungen“ verlassen:  
► Automatisch: Touchpads mind. 30 s nicht betätigen.  
► Manuell: [MODE] + [SET] 1 x gleichzeitig betätigen.

5.1 Auf vorletzte Einstellungen (Pre-Settings) zurücksetzen

Menü	LED-Bandanzeige
<b>Auf vorletzte Einstellungen zurücksetzen:</b> LEDs 11...6 blinken nacheinander gelb.	
Auf zuletzt gespeicherte Einstellung zurücksetzen: ► [SET] mind. 3 s betätigen, bis LEDs 11...6 nacheinander schnell grün blinken.	
► Einstellungen speichern: [ENTER] betätigen.	

5.2 Auf Werkseinstellungen (Factory Settings) zurücksetzen

Menü	LED-Bandanzeige
<b>Auf Werkseinstellung zurücksetzen:</b> LEDs 11...1 blinken nacheinander gelb.	
Auf Werkseinstellungen zurücksetzen: ► [SET] mind. 3 s betätigen, bis LEDs 11...1 nacheinander schnell grün blinken.	
► Einstellungen speichern: [ENTER] betätigen.	
► LED-Band blinkt 2 x kurz grün. Folgemenu erscheint.	

5.3 Ausgang FLOW: NO/NC umstellen

Menü	LED-Bandanzeige
<b>Anzeige der aktuellen (aktiven) Ausgangsfunktion:</b> NO (Schließer) NC (Öffner)	
<b>A Ausgang FLOW von NO auf NC umstellen</b> LEDs 5...7 aus (NO), LEDs 4 und 8 blinken grün.	
Ausgangsfunktion von NO auf NC umstellen: ► [SET] mind. 3 s gedrückt halten, bis LEDs 4 und 8 zunächst schneller grün blinken und anschließend wieder konstant grün leuchten.	
► [SET] betätigen.	
► Ausgangsfunktion speichern: [ENTER] betätigen.	
► LED-Band blinkt 2 x kurz grün. Folgemenu erscheint.	
<b>B Ausgang FLOW von NC auf NO umstellen</b> LEDs 4...8 grün (NC), LEDs 4 bis 8 blinken grün.	
Ausgangsfunktion von NC auf NO umstellen: ► [SET] 3 s gedrückt halten, bis grüne LEDs 4 bis 8 zunächst schneller grün blinken und anschließend wieder konstant grün leuchten.	
► [SET] betätigen.	
► Ausgangsfunktion speichern: [ENTER] betätigen	
► LED-Band blinkt 2 x kurz grün. Folgemenu erscheint.	

5.4 Ausgang TEMP: NO/NC umstellen

Menü	LED-Bandanzeige
<b>Anzeige der aktuellen (aktiven) Ausgangsfunktion:</b> NO (Schließer) NC (Öffner)	
<b>A Ausgang TEMP von NO auf NC umstellen</b> LEDs 5...7 aus (NO), LEDs 4 und 8 blinken grün.	
Ausgangsfunktion von NO auf NC umstellen: ► [SET] mind. 3 s gedrückt halten, bis LEDs 4 und 8 zunächst schneller grün blinken und anschließend wieder konstant grün leuchten.	
► [SET] betätigen.	
► Ausgangsfunktion speichern: [ENTER] betätigen	
► LED-Band blinkt 2 x kurz grün. Folgemenu erscheint.	
<b>B Ausgang TEMP von NC auf NO umschalten</b> LEDs 4...8 blinken grün (NC).	
Ausgangsfunktion von NC auf NO umstellen: ► [SET] 3 s gedrückt halten, bis LEDs 4...8 zunächst schneller grün blinken und anschließend wieder konstant grün leuchten.	
► [SET] betätigen.	
► Ausgangsfunktion speichern: [ENTER] betätigen.	
► LED-Band 2 x kurz grün blinkt. Folgemenu erscheint.	

LED-Anzeigen – Diagnosemeldungen

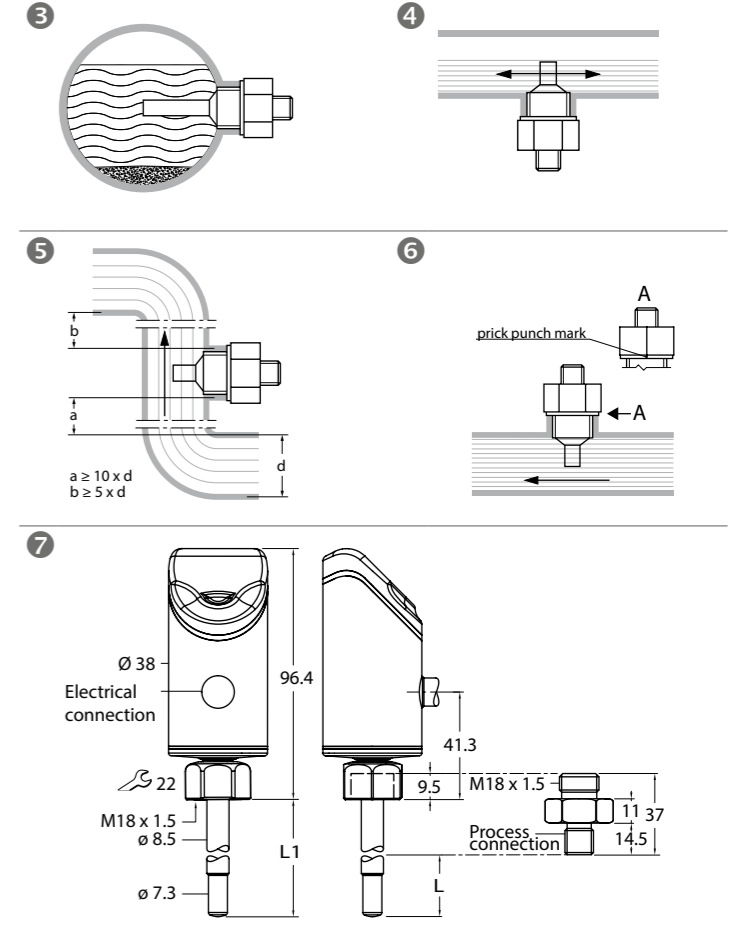
FLOW	TEMP	FLT	LED-Bandanzeige	Fehler
blinkt gelb	-	-		Strömungsgeschwindigkeit oberhalb des Anzeigebereichs
blinkt gelb	-	-		Strömungsgeschwindigkeit unterhalb des Anzeigebereichs
-	blinkt gelb	-		Medientemperatur oberhalb des Anzeigebereichs
-	blinkt gelb	-		Medientemperatur unterhalb des Anzeigebereichs
blinkt gelb	-	rot		Kurzschluss Transistorausgang Out 1
-	blinkt gelb	rot		Kurzschluss Transistorausgang Out 2
-	-	rot		Genereller Fehler (Abschaltung aller Ausgänge, manueller Reset nötig)

Reparieren

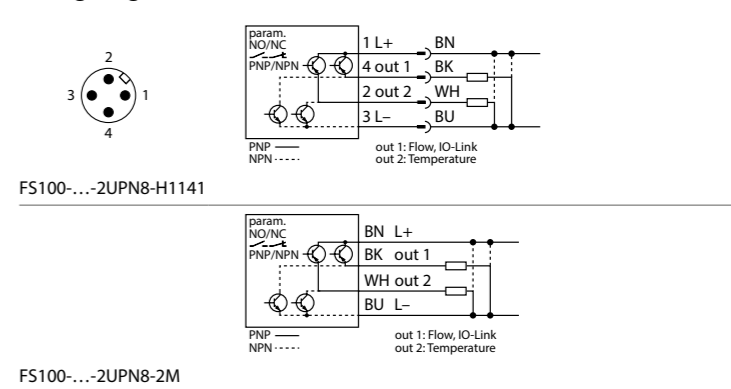
Das Gerät ist nicht zur Reparatur vorgesehen. Defekte Geräte außer Betrieb nehmen und zur Fehleranalyse an Turck senden. Bei Rücksendung an Turck beachten Sie unsere Rücknahmebedingungen.

Entsorgen

Die Geräte müssen fachgerecht entsorgt werden und gehören nicht in den normalen Hausmüll.



Wiring Diagram



Technische Daten

Elektrische Daten – allgemein

Einsatzbereich	FS1...-...L: Flüssigkeiten
Umgebungstemperatur	-25...+85 °C
Medientemperatur	-25...+85 °C
Druckfestigkeit	300 bar
Betriebsspannung	10...33 VDC
Leistungsaufnahme	≤ 1,5 W
Ausgangsfunktion	Öffner/Schließer programmierbar, PNP/NPN, IO-Link
Ausgang 1	Strömung: Schaltausgang oder IO-Link
Ausgang 2	Temperatur: Schaltausgang
Schaltstrom	0,25 A
Schutzart	IP6K6K/IP6K7/IP6K9K gemäß ISO 20653
Elektromagnetische Verträglichkeit (EMV)	EN 60947-5-9: 2007
Schockfestigkeit	50 g (11 ms), EN 60068-2-27
Vibrationsfestigkeit	20 g, EN 60068-2-6

UL-Anforderung: Die minimale Temperaturrate der Anschlussleitung zur Feldverdrahtung beträgt 105 °C (221 °F).

Arbeitsbereiche

<b>Strömungsüberwachung – FS1...-300L</b>	
Arbeitsbereich	1...300 cm/s
<b>Temperaturüberwachung</b>	
Messbereich	-25...+85 °C
Schaltpunktgenauigkeit	3 K bei v > 5 cm/s

Werkseinstellungen

FS1...	
Anzeigemodus	MAX/MIN-Modus
Schalterpunkt Strömung	70 %
MIN-Teach	auf Minimum
MAX-Teach	auf Maximum
Schalterpunkt Temperatur	60 °C
Auto-Detection-Funktion (PNP/NPN)	ein

# Flow Sensors FS100...-2UPN8-...

## Additional documents

In addition to this document, the following documents can be found on the Internet at [www.turck.com](http://www.turck.com): (for access via QR code, refer to the back of the device):

- Data sheet
- Operating instructions

## For your safety

### Intended use

These devices are designed solely for use in industrial areas.

The compact flow sensors of the FS100 series are used to monitor flow velocities. Typical applications include monitoring cooling circuits (e.g. in welding applications) and protecting pumps from running dry. Based on the calorimetric operating principle, the devices can also be used to measure the media temperature.

The devices must be used only as described in these instructions. Any other use is not in accordance with the intended use. Turck accepts no liability for any resulting damage.

### General Safety Instructions

- The device must be mounted, installed, operated, parameterized and maintained only by trained and qualified personnel.
- The devices only meet the EMC requirements for industrial areas and are not suitable for use in residential areas.
- The sensors are not safety devices. Do not use the devices to ensure human or machine safety.

## Product description

### Device overview

See Fig. 1: Front view.

### Functions and operating modes

The compact flow sensors FS100...-2UPN8 monitor the flow speed of liquid media (type FS1...-... L-) as well as the media temperature for exceeding or falling below adjustable limit values. The devices show the recorded flow and temperature values on the front via status LEDs and an LED bar. The two switching outputs can be used as either NO (normally open) or NC (normally closed). Through the auto detection feature, the sensor automatically detects and activates the relevant type of output (PNP/NPN).

## Installing

### General installation instructions

- ▶ For optimum monitoring, mount the sensor so that the probe of the sensor is fully immersed in the medium:
  - > If the medium flows horizontally and deposits or gases (e.g. bubbles) are expected: Mount the sensor horizontally (Fig. 3).
  - > If the medium flows in a horizontal direction, and the flow channel is not completely filled with the medium: Mount the sensor from below (Fig. 4).
  - > If the medium flows in a vertical direction: Only mount the sensor in risers.
- ▶ Observe minimum clearances from potential interference (pumps, valves, flow straighteners, pipe bends, changes in cross sections (Fig. 5)
- ▶ Ensure that the tip of the probe does not touch the opposite interior wall of the flow channel.

### Special installation instructions

- ▶ Only mount Turck sensors of the FS series with thread adapters of the FL-F series.
- ▶ Fit one of the two seals (supplied) between the thread adapter and the process connection (e.g. socket).
- ▶ Screw the thread adapter with a seal to the process connection (torque max. 100 Nm).
- ▶ Guide the probe through the thread adapter and fasten the sensor (coupling nut M18 x 1.5) hand tight to the thread adapter.
  - > For a standard flow range (3...300 cm/s): The probe can be fitted in any direction in the medium (around 360°).
  - > For an extended flow range (1...300 cm/s): Fit the probe so that the flow direction is aligned to the mark, tolerance range ± 45° (Fig. 6).
- ▶ Screw the M18 x 1.5 coupling nut onto the thread adapter (torque max 40 Nm).
- ▶ Option: Turn the sensor head within the 340° range to ensure optimum operability and readability.
- ▶ If the thread adapter is removed and refitted, use a new seal (spare seal supplied).
- ▶ Re-assign the teach values of the sensor after it has been removed and reinstalled.

## Connection

### Connecting plug devices

- ▶ Connect the connection cable coupling to the sensor connector.
- ▶ Connect the connection cable to the power source as shown in the wiring diagram (see "Wiring Diagram").

### Connecting cable devices

- ▶ Connect the sensor connection cable to the power source or the processor as shown in the wiring diagram (see "Wiring Diagram").

## Commissioning

The device automatically becomes operational once the power supply is switched on.

## Operation

### WARNING

The housing in the sensor area can heat up to above 75 °C (167 °F).

### Burns through hot housing surfaces!

- ▶ Protect the housing against contact with flammable substances.
- ▶ Secure the housing against unintentional contact.

## LED status indicators – operation

LED	Display	Meaning
PWR	Green	Device is ready for operation
	Flashing green	IO-Link communication active (inverted: T <sub>on</sub> : 900 ms/T <sub>off</sub> : 100 ms)
FLOW	Yellow	NO switching output: Switching point exceeded (HIGH level) NC switching output: Switching point undershot (HIGH level)
	Off	NO switching output: Switching point undershot (LOW level) NC switching output: Switching point exceeded (LOW level)
TEMP	Yellow	NO switching output: Switching point exceeded (HIGH level) NC switching output: Switching point undershot (HIGH level)
	Off	NO switching output: Switching point exceeded (LOW level) NC switching output: Switching point exceeded (LOW level)
LOC	Yellow	Device is locked
	Flashing yellow	Locking/unlocking process active
	Off	Device unlocked
FLT	Red	Error, see "LED Indicators – Diagnostic Messages"

## LED indicator bar – flow monitoring

Display of the LED colors in the LED indicator bar: GN YE Flashing

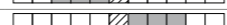
### Quick teach mode

Green LEDs: Indicate the flow deviation as a proportion of the set switching point (yellow LED).

Flow speed below the switching point:



Flow speed above the switching point:



### MAX/MIN mode

Green LEDs: Indicate the flow speed as a proportion of the indication range (0...11 LEDs: 0...100%).

Yellow LED: Indicates the set switching point as a proportion of the indication range.

Flow speed below the switching point:



Flow speed above the switching point:



## LED indicator bar – temperature monitoring

▶ To display the temperature, activate and hold [Set] in display mode.

### Temperature monitoring

Yellow LEDs: Indicate the media temperature as a proportion of the indication range (0...11 LEDs: -40...+180 °C/-40...+356 °F).  
Green LED: Indicates the set switching point as a proportion of the indication range.

Temperature below the switching point:



Temperature above the switching point:



## Setting

To prevent unintended entries the device is automatically locked after switching on and after 5 min without actuation (in setting mode after 30 min).

### Locking the device (LOC)

- ▶ Activate [MODE] and [SET] and hold for 3 s.
- ▶ LOC LED first flashes and then turns a steady yellow.

### Unlocking the device (uLOC)

- ▶ Activate and hold [ENTER] until all the LEDs in the LED bar turn green and the LED bar briefly flashes green twice.

- ▶ Swipe the touch pads with your finger – in the order [MODE], [ENTER], [SET] – until all the LEDs (3 x 3) in the LED bar are flashing green.

- ▶ Release the touch pads.
- ▶ LOC LED flashes first and then goes out.

## Setting options – Devices with switching output for flow monitoring (Fig. 2)

- Flow switching point: Quick Teach  
**Quick Teach:** Current flow speed is directly taught in as the Flow switching point
- Flow switching point: MAX/MIN Teach  
**MAX/MIN Teach:** Set Flow switching point as a percentage of an adjustable MAX/MIN indication range
- Indication range: MAX/MIN Teach  
**MAX/MIN teach:** Teach in the upper and lower limit values for the flow monitoring indication range
- Temp switching point  
Set the Temp switching point in increments of 2 °C from -40...+180 °C
- Advanced settings  
Reset to last setting  
Reset to factory settings  
Change Flow output over to NO/NC  
Change Temp output over to NO/NC

## 1 Quick teach – setting current flow speed as switching point

- Menu**
- Operate the flow speed in the application at the desired limit value.
  - In display mode: Activate [ENTER] once.
    - ▶ DeltaFlow active: LED bar flashing yellow: System has not yet stabilized. Wait until the LED bar is flashing green.
    - ▶ Once the LED bar is flashing green, the system has stabilized: Activate [ENTER] for 3 s until only LED 6 is flashing yellow. The current flow speed is taught in as the switching point.
  - Option: Change the switching point incrementally by ±10 %.
    - ▶ Increase the switching point incrementally by 10 % of the measuring range end value: Activate [SET].
    - ▶ Reduce the switching point incrementally by 10 % of the measuring range end value: Activate [MODE].
  - Store the switching point: Activate [ENTER].
    - ▶ LED bar briefly flashes green twice.
- LED Indicator Bar**
- 

## 2 MAX/MIN teach – setting the switching point for flow

▶ To open from display mode: Activate [MODE] once.

- Menu**
- ### Setting the switching point for flow monitoring
- Activate [SET] for 3 s and hold until the switching point LED first flashes yellow and then changes to a constant yellow again.
  - Set the switching point:
    - ▶ Increase the switching point incrementally by 9.1 %: Activate [SET].
    - ▶ Reduce the switching point incrementally by 9.1 %: Activate [MODE].
  - Store the switching point: Activate [ENTER].
    - ▶ LED bar briefly flashes green twice. The next menu appears.
- LED Indicator Bar**
- 

## 3 MAX/MIN teach – Setting the indication range for flow

▶ To open from display mode: Activate [MODE] twice.

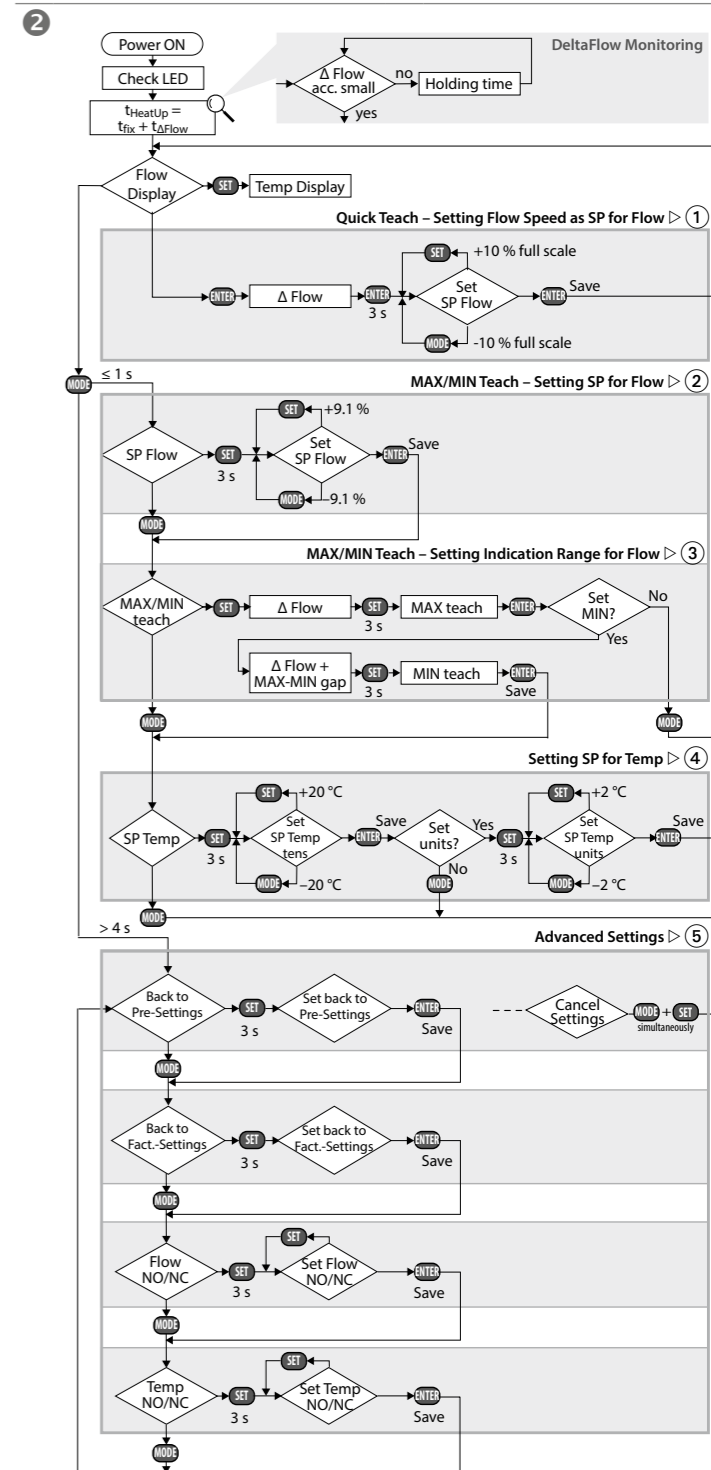
- Menu**
- ### Setting the indicated range for the flow
- Set the upper limit value: Operate the flow speed in the application at the upper limit value and activate [SET] once.
    - ▶ DeltaFlow active: LED 11 in the LED bar flashes yellow. System not yet stabilized. Wait until the LED is flashing green.
    - ▶ Once LED 11 in the LED bar is flashing green, the system has stabilized: Activate [SET] for 3 s until LED 11 is a steady green.
    - ▶ Store the upper limit value: Activate [ENTER] once: LED bar briefly flashes green twice.
  - Set the lower limit value: Operate the flow speed in the application at the lower limit value.
    - ▶ The system checks the MAX/MIN gap: LED moves to position 1 and flashes yellow: MAX/MIN gap OK.
    - ▶ LED does not move to position 1 and flashes yellow: MAX/MIN gap too small. Reduce the flow speed.
    - ▶ DeltaFlow active: LED 1 in the LED bar flashing yellow: System has not yet stabilized. Wait until the LED is flashing green.
    - ▶ Once LED 1 in the LED bar is flashing green, the system has stabilized: Activate [SET] for 3 s until LED 1 in the LED bar is a steady green.
    - ▶ Store the lower limit value: Activate [ENTER] once. LED bar briefly flashes twice. The next menu appears.
- LED Indicator Bar**
- 



FS100-300L...-2UPN8-...  
Compact Flow Sensors  
Quick Start Guide

100002082 2010  
Additional  
information see

[turck.com](http://turck.com)



EN Quick Start Guide

4 Setting the switching point for temperature

► To open from display mode: Activate [MODE] three times.

Menu	LED Indicator Bar
<b>Setting the switching point for temperature monitoring</b>	
1. Set the tens digit of the temperature value:	
► Activate [SET] for 3 s and hold until the switching point LED first flashes yellow and then changes to a constant yellow again.	
► Increase the switching point in increments of 20 °C: Activate [SET].	
► Reduce the switching point in increments of 20 °C: Activate [MODE].	
2. Store the switching point: Activate [ENTER] once until the LED bar flashes twice briefly.	
3. Set the units digit of the temperature value:	
► Activate [SET] for 3 s and hold until the switching point LED first flashes yellow and then changes to a constant yellow again.	
► Increase the switching point in increments of 2 °C: Activate [SET].	
► Reduce the switching point in increments of 2 °C: Activate [MODE].	
4. Store the switching point: Activate [ENTER].	
► LED bar briefly flashes green twice. The device switches to the display mode.	

6 Advanced settings

Starting/Exiting "Advanced Settings" menu sequence

Start "Advanced Settings":

- Activate [MODE] for at least 4 s until all LEDs in the LED bar turn green and the LED bar briefly flashes green twice.

Exit "Advanced Settings":

- Automatically: Do not activate the touch pads for at least 30 s.
- Manually: Activate [MODE] + [SET] simultaneously once.

5.1 Resetting to pre-settings

Menu	LED Indicator Bar
<b>Resetting to pre-settings</b>	
LEDs 11...6 will flash yellow one after the other	
Reset to last saved setting:	
► Activate [SET] for at least 3 s until LEDs 11...6 quickly flash green one after the other	
► Save settings: Activate [ENTER].	
► LED bar briefly flashes green twice. The next menu appears.	

5.2 Resetting to factory settings

Menu	LED Indicator Bar
<b>Reset to factory settings:</b>	
LEDs 11...1 will flash yellow one after the other	
Resetting to factory settings:	
► Activate [SET] for at least 3 s until LEDs 11...1 quickly flash green one after the other	
► Save settings: Activate [ENTER].	
► LED bar briefly flashes green twice. The next menu appears.	

5.3 FLOW output: changing NO/NC

Menu	LED Indicator Bar
<b>Display of the current (active) output function:</b>	
NO (normally open)	
NC (normally closed)	
<b>A Changing FLOW output from NO to NC</b>	
LEDs 5...7 off (NO), LEDs 4 and 8 will flash green.	
Change output function from NO to NC:	
► Activate and hold [SET] for at least 3 s until LEDs 4 and 8 first flash green quickly and then return to a steady green.	
► Activate [SET].	
► LEDs 4...8 are green (NC).	
► Save the output function: Activate [ENTER].	
► LED bar briefly flashes green twice. The next menu appears.	
<b>B Change FLOW output from NC to NO</b>	
LEDs 4...8 green (NC), LEDs 4 to 8 will flash green.	
Change output function from NC to NO:	
► Activate and hold [SET] for at least 3 s until green LEDs 4 to 8 first flash green quickly and then return to a steady green.	
► Activate [SET].	
► LEDs 5...7 off (NO)	
► Save the output function: Activate [ENTER].	
► LED bar briefly flashes green twice. The next menu appears.	

5.4 TEMP output: changing NO/NC

Menu	LED Indicator Bar
<b>Display of the current (active) output function:</b>	
NO (normally open)	
NC (normally closed)	
<b>A Changing TEMP output from NO to NC</b>	
LEDs 5...7 off (NO), LEDs 4 and 8 will flash green.	
Change output function from NO to NC:	
► Activate and hold [SET] for at least 3 s until LEDs 4 and 8 first flash green quickly and then return to a steady green.	
► Activate [SET].	
► LEDs 4...8 are green (NC).	
► Save the output function: Activate [ENTER].	
► LED bar briefly flashes green twice. The next menu appears.	
<b>B Changing TEMP output from NC to NO</b>	
LEDs 4...8 will flash green (NC).	
Change output function from NC to NO:	
► Activate and hold [SET] for at least 3 s until LEDs 4...8 first flash green quickly and then return to a steady green.	
► Activate [SET].	
► LEDs 5...7 off (NO).	
► Save the output function: Activate [ENTER].	
► LED bar briefly flashes green twice. The next menu appears.	

LED indicators – diagnostic messages

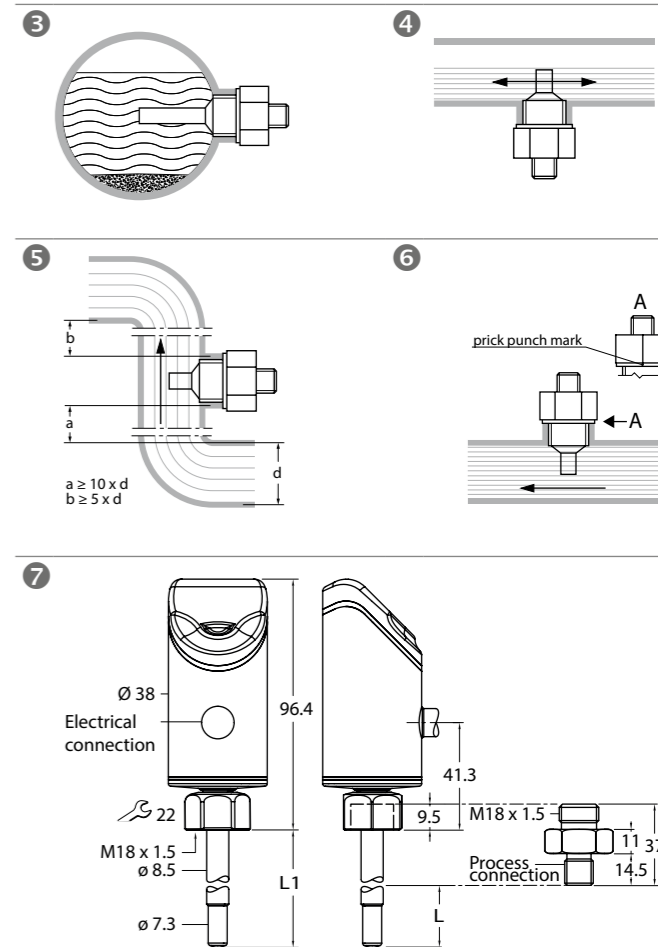
FLOW	TEMP	FLT	LED Indicator Bar	Error
Flashing yellow	-	-		Flow speed above the indication range
Flashing yellow	-	-		Flow speed below the indication range
-	Flashing yellow	-		Media temperature above the indication range
-	Flashing yellow	-		Media temperature below the indication range
Flashing yellow	-	Red		Short circuit in transistor output Out 1
-	Flashing yellow	Red		Short circuit in transistor output Out 2
-	-	Red		General error (shuts down all outputs, manual reset required)

Repair

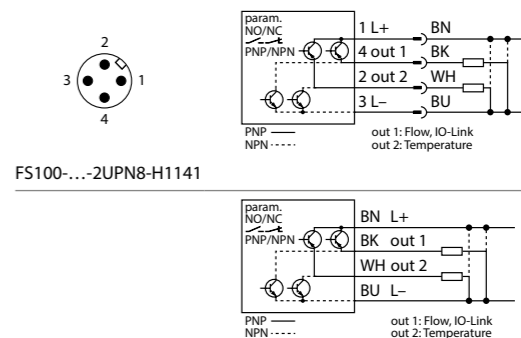
The device is not intended for repair. Take defective devices out of operation and send them to Turck for fault analysis. Refer to our return acceptance conditions when returning the device to Turck.

Disposal

The devices must be disposed of correctly and must not be included in normal household garbage.



Wiring Diagrams



Technical Data

Electrical data – general

Application area	FS1...-...L: liquid media
Ambient temperature	-25...+85 °C
Medium temperature	-25...+85 °C
Pressure resistance	300 bar
Operating voltage	10...33 VDC
Power consumption	≤ 1.5 W
Output function	NO/NC programmable, PNP/NPN, IO-Link
Output 1	Flow: switching output or IO-Link
Output 2	Temperature: switching output
Switching current	0.25 A
Protection class	IP6K6K/IP6K7/IP6K9K acc. to ISO 20653
Electromagnetic compatibility (EMC)	EN 60947-5-9: 2007
Shock resistance	50 g (11ms), EN 60068-2-27
Vibration resistance	20 g, EN 60068-2-6

UL condition: Minimum temperature rating of the cable to be connected to the field wiring terminals, 105 °C (221 °F).

Operating range

<b>Flow monitoring – FS1...-300L</b>	
Operating range	1...300 cm/s
<b>Temperature monitoring</b>	
Measuring range	-25...+85 °C
Switching point accuracy	3 K at v > 5 cm/s

Factory Settings

FS1...	
Indication mode	MAX/MIN Mode
Switching point flow	70 %
MIN Teach	Minimum
MAX Teach	Maximum
Switching point temperature	60 °C
Auto Detection Function (PNP/NPN)	active