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Signet 2350 Temperature Sensor

3-2350.090-1 Rev. 12 01/19
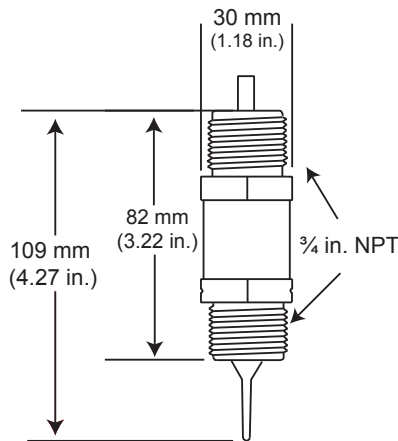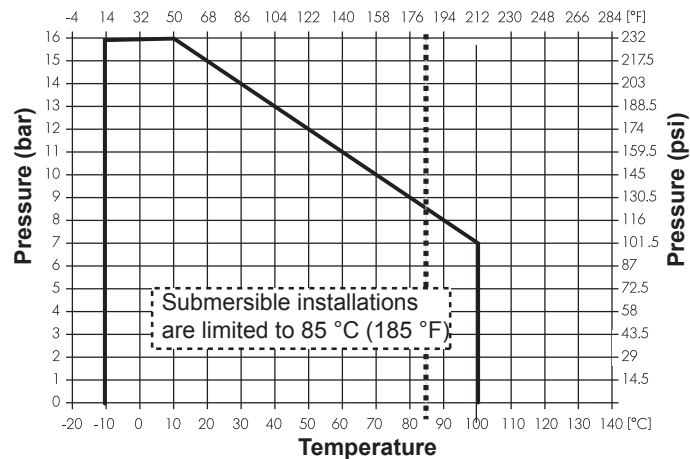
Product Manual

Description

The Signet 2350 Temperature Sensor has a one-piece injection molded PVDF body that is ideal for use in high purity applications. It also outlasts metal sensors in aggressive liquids and eliminates the need for costly custom thermowells. These sensors are available with Digital (S^3L) or field-scaleable 4 to 20 mA output. Dual threaded ends (¾ in. NPT) allow submersion in process vessels, or in-line installation with conduit connection. Integral adapters (sold separately) may be used to create a compact assembly with field mount style of the 9900 Transmitter.

Dimensions

30 mm (1.18 in.)

82 mm (3.22 in.)

109 mm (4.27 in.)

¾ in. NPT

- **English**
- **Deutsch**
- **Français**
- **Español**
- **中文**

Pressure/Temperature Graph

Application Limits

Submersible installations are limited to 85 °C (185 °F)

Pressure (bar) / Pressure (psi) vs Temperature

Warranty Information

Refer to your local Georg Fischer Sales office for the most current warranty statement.

All warranty and non-warranty repairs being returned must include a fully completed Service Form and goods must be returned to your local GF Sales office or distributor. Product returned without a Service Form may not be warranty replaced or repaired.

Signet products with limited shelf-life (e.g. pH, ORP, chlorine electrodes, calibration solutions; e.g. pH buffers, turbidity standards or other solutions) are warranted out of box but not warranted against any damage, due to process or application failures (e.g. high temperature, chemical poisoning, dry-out) or mishandling (e.g. broken glass, damaged membrane, freezing and/or extreme temperatures).

Product Registration

Thank you for purchasing the Signet line of Georg Fischer measurement products.
If you would like to register your product(s), you can now register online in one of the following ways:
- Visit our website **www.gfsignet.com.**
  Under **Service and Support** click on
  Product Registration Form
- If this is a pdf manual (digital copy), **click here**

Safety Information

1. Prior to installation or removal:
   - Depressurize and vent system
   - Drain below sensor level
2. Confirm chemical compatibility before use.
3. Do not exceed maximum temperature/pressure specifications.
4. Wear safety goggles or faceshield during installation/service.
5. Do not alter product construction.
6. Dispose of properly; DO NOT INCINERATE!

⚠️	**Caution / Warning / Danger** Indicates a potential hazard. Failure to follow all warnings may lead to equipment damage, injury, or death
⚡	**Electrostatic Discharge (ESD) / Electrocution Danger** Alerts user to risk of potential damage to product by ESD, and/or risk of potential of injury or death via electrocution.
	Personal Protective Equipment (PPE) Always utilize the most appropriate PPE during installation and service of Signet products.
	Pressurized System Warning Sensor may be under pressure, take caution to vent system prior to installation or removal. Failure to do so may result in equipment damage and/or serious injury.
	Hand Tighten Only Overtightening may permanently damage product threads and lead to failure of the retaining nut.
🚫	**Do Not Use Tools** Use of tool(s) may damage product beyond repair and potentially void product warranty.

Specifications

General
Compatibility .... Signet 8900 Multi-Parameter Controller
Signet 9900 Transmitter
9950 Dual Channel Transmitter
Wetted material .... PVDF

Measurement range
In-line installation.................. -10 °C to 100 °C (14 °F to 212 °F)
Submersible installation........ -10 °C to 85 °C (14 °F to 185 °F)
Response time, τ .... 10 seconds
Process connection .... 3/4 in. NPT male thread
Rear connection .... 3/4 in. NPT male thread
Cable type .... 3 cond + shield, 22 AWG
Standard cable length........... 4.6 m (15 ft)
Shipping weight .... 0.22 kg (0.5 lb)

Electrical
Power requirements
  (S^3L) models .... 5 VDC ±10%, <1.5 mA
  4 to 20 mA models .... 12-24 VDC ±10%
Short circuit & reverse polarity protected
Digital (S^3L) output................ Serial ASCII, TTL level 9600 bps
  Accuracy .... ±0.5 °C (±0.9 °F)
  Repeatability .... ±0.1 °C (±0.2 °F)
  Resolution .... 0.01 °C (0.02 °F)
  Update rate .... <100 ms
4 to 20 mA output
  Accuracy .... ±32 µA
  Repeatability .... ±0.1 °C (±0.2 °F)
  Resolution .... <5 µA
  Factory Span..................... 0 °C to 100 °C, field-scaleable.
  Max loop impedance......... 50 Ω @ 12 V
                                  325 Ω @ 18 V
                                  600 Ω @ 24 V
  Update rate .... <100 ms

Environmental
  Relative humidity............... 0 to 95% (Non-condensing)
  Storage temperature .... -55 °C to 100 °C (-67 °F to 212 °F)

Standards & Approvals
CE
RoHS Compliant
Manufactured under ISO 9001 for Quality, ISO 14001 for Environmental Management and OHSAS 18001 for Occupational Health and Safety.
♻ China RoHS (Go to www.gfsignet.com for details)
FC Declaration of Conformity according to FCC Part 15.
This device complies with Part 15 of the FCC rules.
Operation is subject to the following two conditions:
(1) This device may not cause harmful interference, and,
(2) This device must accept any interference received, including interference that may cause undesired operation.
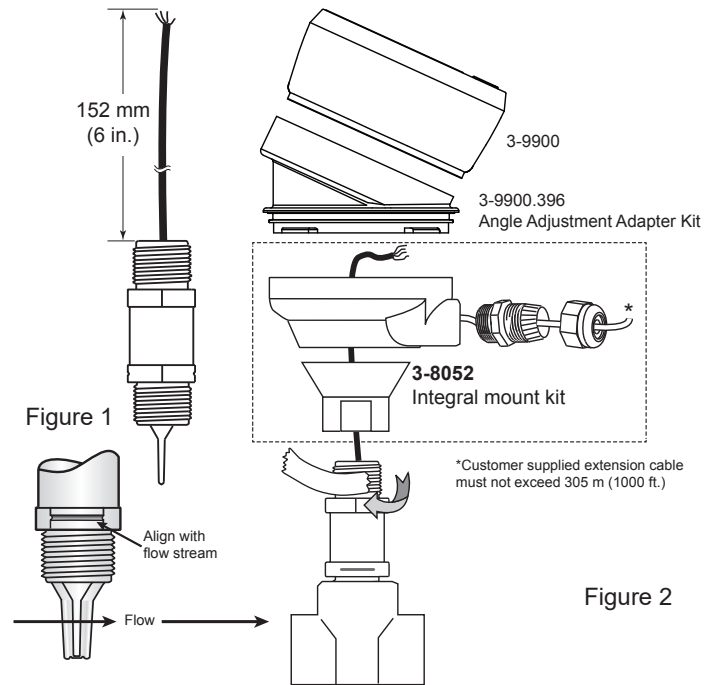
Installation

The compact integral assembly can be installed using the following directions:

2350-1 Integral Assembly Sensor Modification

- Modify sensor part number 3-2350-1 per figure 1.
- Apply sealant or PTFE tape to the process connection threads per figure 2, after inspecting threads to ensure integrity. Do not install a sensor with damaged threads.
- Thread the sensor into the 3-8052 mounting kit.
- Tighten the sensor 1½ turns past finger tight into the process connection.
- Make sure the flow alignment indicator is in correct position in the pipe. Damage to the sensor tip can occur if the sensor tip is installed improperly.
- Install 9900 Transmitter (refer to 9900 manual for wiring information).
- The 3-8052 Integral kit includes:
  - ³/₄ in. NPT process connection
  - 3-9000.392-1 liquid tight connector, ¹/₂ in. NPT

152 mm (6 in.)

3-9900

3-9900.396 Angle Adjustment Adapter Kit

3-8052 Integral mount kit

*Customer supplied extension cable must not exceed 305 m (1000 ft.)

Figure 1

Align with flow stream

Flow

Figure 2

2350-3 In-line Remote Assembly

The optional 3-8052-1 Integral Junction box with ¾ in. process connection offers a convenient terminal point to extend the 2350 cable over distances greater than 4.6 m (15 ft).
- The kit includes:
  - ¾ in. NPT process connection
  - Conduit base and cap with junction terminals
  - 3-9000.392-1 liquid tight connector, ½ in. NPT

To extend the wires longer than 4.6 m (15 ft):
- Modify sensor 3-2350-1 or 3-2350-3 as described in figure 1.
- Terminate the three wires to the terminal board located in the cap assembly.
- Add customer-supplied wire to extend the cable.
- Terminate to the transmitter or the 4 to 20 mA input device.
- Apply sealant or PTFE tape to the process connection threads per figure 3, after inspecting threads to ensure integrity. DO NOT install a sensor with damaged threads.
- Tighten the sensor 1½ turns past finger tight into the process connection.

3-8052-1 Integral junction box, 3/4 in. NPT

*Customer supplied extension cable must not exceed 305 m (1000 ft.)
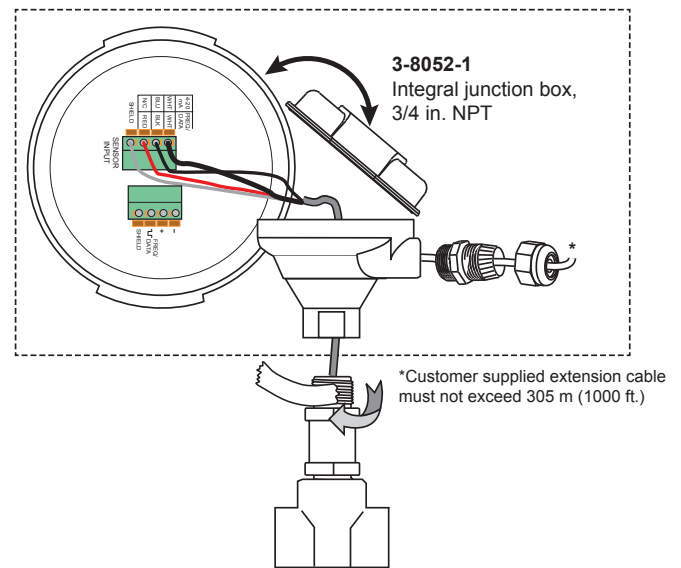
2350-1 or 2350-3 Submersible Installation

- Use the 2350-1 or 2350-3 sensor with 4.6 m (15 ft) cable.
- Mount the sensor to an extension pipe or watertight conduit using thread sealant.
- Use a cable gland at the top of the extension to prevent moisture intrusion/accumulation inside the pipe.
- For additional defense against possible accumulation of condensation at the back seal area of the sensor, fill the lower 75 mm to 100 mm (3 in. to 4 in.) of conduit or extension pipe with a flexible sealant such as silicone.

NOTE:
The 8050-1 or the 8052-1 junction boxes can be useful accessories for this installation option.

• 3-8052-1 junction box recommended.

Fill with 3 to 4 in. of sealant

Figure 3

⚠ CAUTION!

The fluid temperature must not exceed 85 °C (185 °F) in submersible installations.

Digital (S³L) Wiring

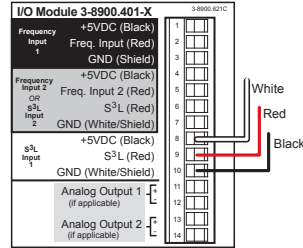- All models of the 2350 provide Digital (S³L) output when powered with 5 VDC.
- Connecting the SHIELD to a direct Earth ground may reduce electrical noise interference.
- The maximum Digital (S³L) cable length is dependent upon the instrument to which the sensor is connected. Consult the instrument manual for details.
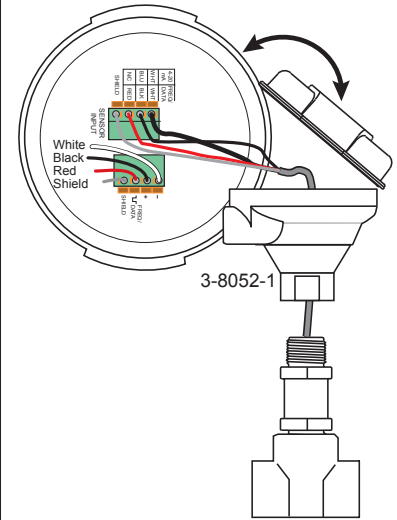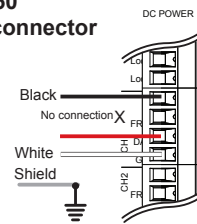- Connect the 2350 cable directly to Digital (S³L) I/O terminals.


3-9900 S³L connector

Shield
Optional Earth ground
White
Red
Black
SHLD
GND
DATA
V+

3-8052
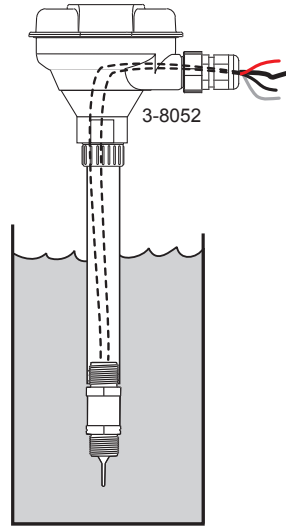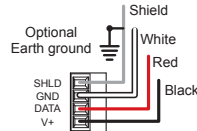
3-8900 I/O Module Connector

I/O Module 3-8900.401-X   3-8900.621C

Frequency Input 1	+5VDC (Black)	1
	Freq. Input (Red)	2
	GND (Shield)	3
Frequency Input 2 OR S³L Input 2	+5VDC (Black)	4
	Freq. Input 2 (Red)	5
	S³L (Red)	6
	GND (White/Shield)	7
S³L Input 1	+5VDC (Black)	8
	S³L (Red)	9
	GND (White/Shield)	10
Analog Output 1 (if applicable)		11, 12
Analog Output 2 (if applicable)		13, 14

White
Red
Black

3-9950 S³L connector

DC POWER

Black
No connection
White
Shield

+V
FREQ
DATA
GND

3-8052-1

White
Black
Red
Shield

- When the 2350 includes a junction box, connect the 2350 terminals to any Digital (S³L) I/O port as shown.

4 to 20 mA Loop Wiring

- The 2350-3 provides a 4 to 20 mA loop output when powered with 12 to 24 VDC.
- Connecting the SHIELD to a direct Earth ground may reduce electrical noise interference.
- Red wire is not used, do not remove the heat shrink. See 4 to 20 mA Span Adjustment, page 5.

Current Loop With No Junction Box

3-8050.521
3-8052

Black (Loop +)
Red
White (Loop -)
Shield

+ / − Power Supply DC 12 - 24 V

Optional Earth Ground

Loop Input +
Loop Input -

4 to 20 mA loop monitor
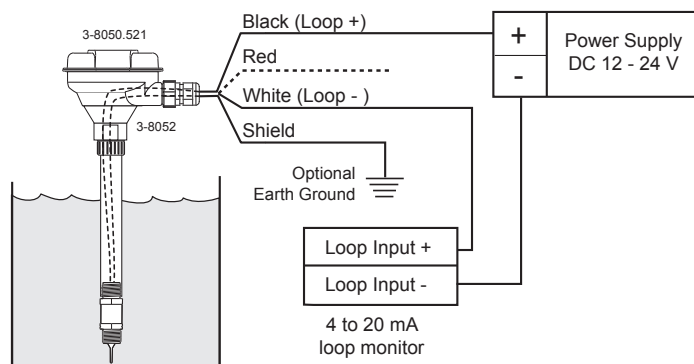
- Connect the 2350 cable directly to a loop device as shown.

Current Loop With Junction Box

Power Supply DC 12 - 24 V   + −
Black

Loop Input   +
Loop Input   −
White

3-8052-1
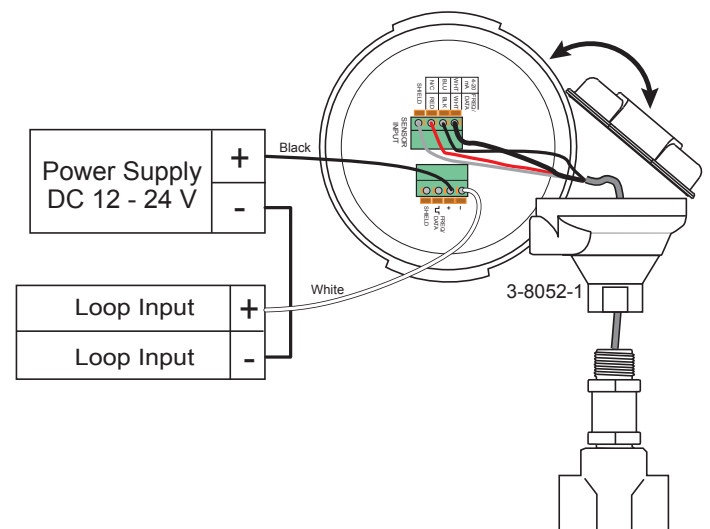
- When the 2350 includes a junction box, connect the 2350 terminals to a loop device as shown.

4 to 20 mA Span Adjustment

The 4 to 20 mA endpoint values are independent of one another and may be adjusted in the field. For example, to reduce the 20 mA endpoint value from the factory setting of 100 °C, but to allow the 4 mA endpoint to remain at 0 °C, perform only the steps listed below.

NOTE: The RED wire, which is not connected during normal 4 to 20 mA operation, assumes an important role in the following procedures.

Wire Nut

⚠ **WARNING!**
Not protecting the red wire may cause the 4 to 20 mA span to be reset.
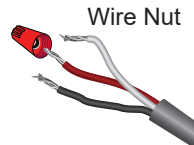
To adjust the 4 mA endpoint in the field:
• Carefully remove the heat shrink tube protecting the red wire.
• Expose the sensor to the temperature desired to correspond with 4 mA
   -10 °C to 100 °C (submersible: -10 °C to 85 °C).
   (Be sure to allow sufficient time for the sensor to reach equilibrium.)
• With power applied as described on page 4, connect the RED wire to the WHITE wire for 15 seconds.
   (After about 10 seconds the output will drop to 3.6 mA and remain there until the RED wire is disconnected.)
• Disconnect the RED wire from the WHITE wire; the 4 mA endpoint has been adjusted.
• **NOTE:** The output will act as a switch if the 4 and 20 mA endpoints are set very near to the same value.

To adjust the 20 mA endpoint in the field:
• Expose the sensor to the temperature desired to correspond with 20 mA -10 °C to 100 °C (submersible: -10 °C to 85 °C).
   (Be sure to allow sufficient time for the sensor to reach equilibrium to this temperature.)
• With power applied as described in on page 4, connect the RED wire to the BLACK wire for 15 seconds.
   (After about 10 seconds the output will rise to 22 mA and remain there until the RED wire is disconnected.)
• Disconnect the RED wire from the BLACK wire; the 20 mA endpoint has been adjusted.
NOTE: The output will act as a switch if the 4 and 20 mA endpoints are set very near to the same value.
• Minimum span is ±2% of maximum range.
• After adjusting the 4 to 20 mA span, protect the red wire by installing the provided wire nut.
• For easier re-spanning use the Signet 0252 Configuration Tool.

To restore the factory setting:
• Disconnect power to the sensor. Wait 10 seconds for circuit to discharge.
• Connect the RED wire to the WHITE wire.
• Apply power as described on page 4, but with the RED wire connected to the WHITE wire for 15 seconds.
   (After about 10 seconds the output will drop to 3.6 mA and remain there until the RED wire is disconnected.)
• Disconnect the RED wire from the WHITE wire; factory settings have been restored.

Mfr. Part No.	Factory Span
3-2350-3	4 to 20 mA = 0 °C to 100 °C

Notes

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Notes
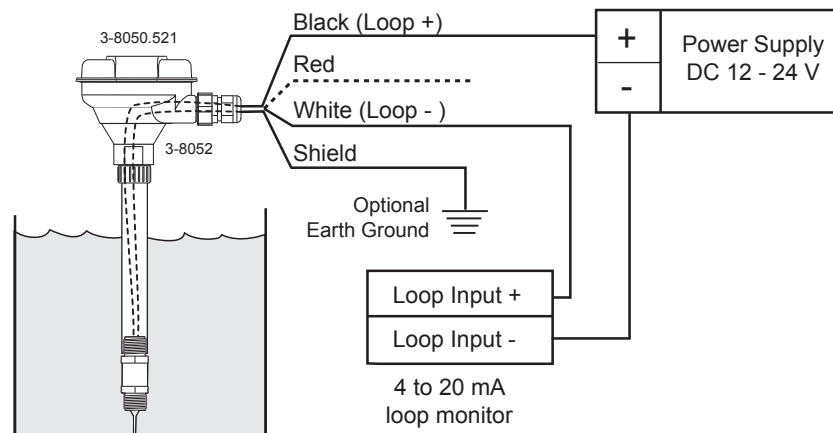
Ordering Information

Mfr. Part No.	Code	Description
3-2350-1	159 000 021	Temperature sensor, (S³L) output, ¾ in. NPT, 4.6 m (15 ft) cable
3-2350-3	159 000 920	Temperature sensor, 4 to 20 mA output, ¾ in. NPT, 4.6 m (15 ft) cable

Accessories

Mfr. Part No.	Code	Description
3-8050-1	159 000 753	Universal mount junction box
3-8052	159 000 188	¾ in. Integral mounting kit
3-8052-1	159 000 755	¾ in. NPT mount junction box
3-9000.392-1	159 000 839	Liquid tight connector kit, NPT (1 piece)
3-9000.392-2	159 000 841	Liquid tight connector kit, PG13.5 (1 piece)
3-9900.396	159 001 701	Angle Adjustment Adapter Kit
5523-0322	159 000 761	Cable, 3 conductor + shield, 22 AWG, black/red/white/shield
3-0252	159 001 808	Configuration Tool
	contact factory	Custom cable length available