Type 2850 Cond./Res. Sensor Electronics and Integral Systems with Sensor



Universal Mount
Sensor electronics



3/4" FNPT Mount
Sensor electronics



2850 Integral Conductivity System
for in-line installations

Product description

The type 2850 Conductivity/Resistivity Sensor Electronics are available in various configurations for maximum installation flexibility. The universal mount version is for pipe, wall, or tank mounting and enables single or dual (digital versions only) inputs using any standard GF conductivity/resistivity sensor. The threaded j-box version can be used with these same GF sensors for submersible sensor mounting. It is also available as a combined integral system configuration for in-line mounting and includes a conductivity electrode in a choice of 0.01, 0.1, 1.0, 10.0 or 20.0 cm-1 cell constants.

The 2850 is ideal for applications with a conductivity range of 0.055 to 400,000 µS or a resistivity range of 18.2 MΩ to 10 kΩ.

The 2850 is available with a digital (S^3L) output, or a single 4 to 20 mA. The digital (S^3L) output version can be paired with the 9900 or the 9950 Transmitter to extend the distance between the measuring points to 120 m (400 ft).

The 9950-10/-11 Six-Channel Transmitter allows for up to six 2850 (S^3L) output conductivity sensors to be used. To optimize 9950-10/-11 I/O module selection, you can utilize 2850-63 for two conductivity sensors at a time.

The two-wire 4 to 20 mA output version is available with eight 4 to 20 mA output ranges for each electrode cell constant. Each range can be inverted and is field selectable.

EasyCal is a standard feature that automatically recognizes conductivity test solution values for simple field calibration. A certification tool is available for validation of the sensor electronics according to USP requirements.

Features

- Test certificate supplied with all 2881-2884 sensors
- Custom cell constant programmed into all integral conductivity systems at the factory
- All 2850 Sensor electronics are built with NEMA 4X / IP65 enclosures
- Integral mount systems for quick and easy installation
- Compact design for maximum installation flexibility
- Extends the distance between the measuring point and the 9900/9950's to 120 m (400 ft)
- Digital (S^3L) interface or two-wire 4 to 20 mA output
- EasyCal with automatic test solution recognition
- For use with ALL GF conductivity electrodes

Applications

- Water Treatment & Water Quality Monitoring
- Reverse Osmosis
- Deionization
- Demineralizer, Regeneration & Rinse
- Scrubber, Cooling Tower and Boiler Protection
- Aquatic Animal Life Support Systems

U.S. Patent No.: 7,550,979 B2

06/2026-A 3-2850-3.099 Rev I
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Technical Details

General		
Compatible Electrodes	All GF Conductivity Sensors	
Materials		
NPT Mount Junction Box for Integral Mount	PBT	
Universal/Remote Mount	PBT, PVC-C	
EasyCal - Automatic Recognition of the Following Conductivity Values		
	146.93 µS, 1408.8 µS, 12856 µS (@25 °C) (Test solutions Per ASTM D1125-95)	
	10 µS, 100 µS, 200 µS, 500 µS, 1000 µS, 5000 µS, 10,000 µS, 50,000 µS, 100,000 µS (@ 25 °C) (Standard test solutions)	
Electrical		
Power	12 to 24 VDC ±10%, regulated for 4 to 20 mA output (typically called "Loop Powered")	
	5 to 6.5 VDC ±5% regulated recommended (provided by the GF 9900, 9950, 0486), 3.0 mA max for Digital (S^3L) output (Reverse polarity and short circuit protected)	
Digital (S^3L) Output: Serial ASCII, TTL level 9600 bps		
Accuracy	Conductivity	± 2% of reading
	Temperature	< 0.2 °C
Resolution	Conductivity	0.1% of reading
	Temperature	< 0.2 °C
Update Rate	Conductivity and Temperature	< 600 ms
Available Data via Digital (S^3L) Output		
	Raw conductivity	
	Calibrated conductivity	
	Calibrated temperature-compensated conductivity	
	Temperature	
Max. Temperature/Pressure Rating		
Operating Temperature	-10 °C to 85 ° C	14 °F to 185 °F
Storage Temperature	-20 °C to 85 ° C	-4 °F to 185 °F
Relative Humidity	0 to 95%, non-condensing	
Enclosure	NEMA 4X/IP65	
Current Output		
Field-selectable ranges		
Factory Set Span (Integral mount only)	0.01 cell (2881)*	4 to 20 mA = 0 to 100 µS/cm
	0.10 cell (2882)*	4 to 20 mA = 0 to 1000 µS/cm
	1.0 cell (2883)*	4 to 20 mA = 0 to 10'000 µS/cm
	10.0 cell (2884)*	4 to 20 mA = 0 to 200'000 µS/cm
	20.0 cell (2823)**	4 to 20 mA = 0 to 400'000 µS/cm
Max. Loop Resistance	50 Ω @ 12 VDC	
	325 Ω@ 18 VDC	
	600 Ω @ 24 VDC	
Accuracy	± 2% of output span	
Resolution	7 µA	
Update Rate	< 600 ms	
Error Indication	22 mA	
Pure Water Compensation	When using 0.01-cm cell and raw conductivity value < 0.5 µS, the 2850 auto-switches to compensate for non-linear temperature effects found in this low conductivity (high resistivity) range.	

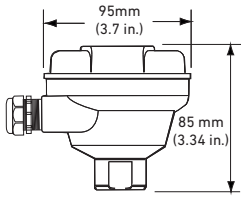
* Test certificate supplied with all sensors. Custom cell constant programmed into the electronics.
** Special Order

Shipping Weight			
3-2850-5X	NPT Mount Junction Box System	0.75 kg	1.75 lb
3-2850-6X	Universal Mount System	0.75 kg	1.75 lb
3-2850-5X-81	Field (Integral) Mount Systems	0.26 kg	0.57 lb
3-2850-5X-82	Field (Integral) Mount Systems	0.24 kg	0.52 lb
3-2850-5X-83	Field (Integral) Mount Systems	0.24 kg	0.53 lb
3-2850-5X-84	Field (Integral) Mount Systems	0.24 kg	0.52 lb

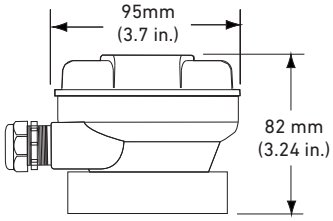
Standards and Approvals
CE, UKCA, FCC
RoHS compliant, China RoHS
Manufactured under ISO 9001, ISO 14001 and ISO 45001

Dimensions

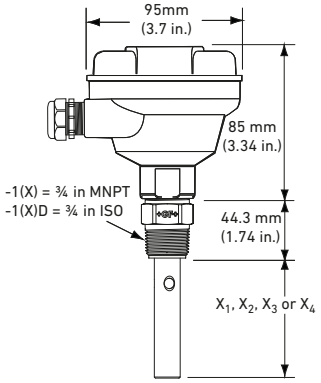
2850-5X NPT
Mount Junction Box Systems



2850-6X
Universal Mount Systems

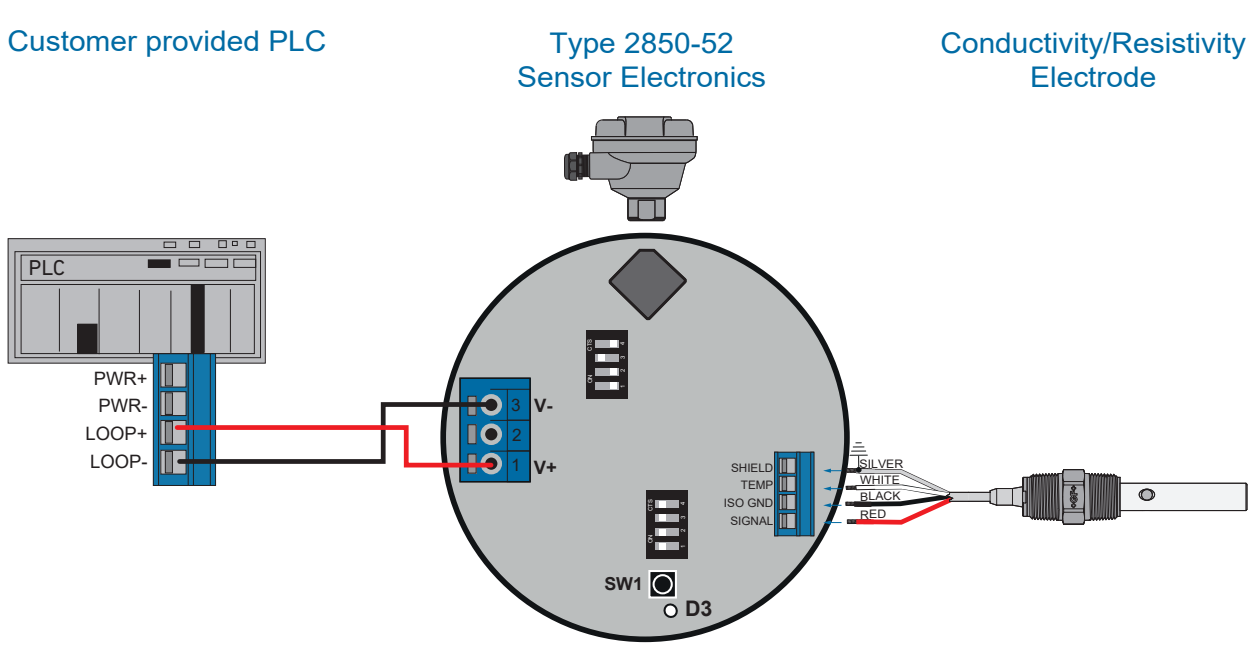


2850-5X-8X-1(X)(D)
NEW Field (Integral) Mount Systems

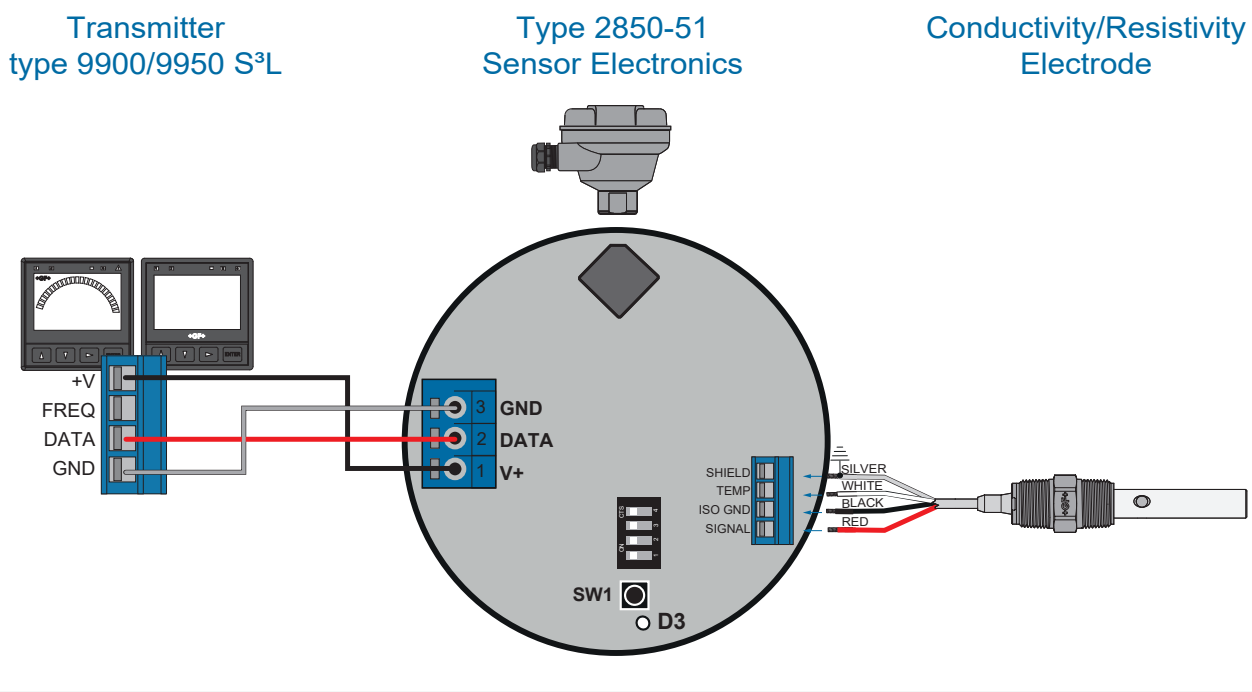


Sensor	Insertion Depth
X1 (2881)	73.7 mm (2.90 in.)
X2 (2882)	35.8 mm (1.41 in).
X3 (2883)	41.9 mm (1.65 in.)
X4 (2884)	69.9 mm (2.75 in.)

Wiring to 4 to 20 mA Loop Output



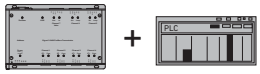
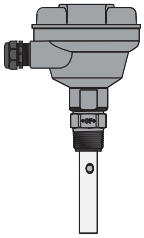
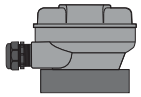
Wiring to 9900/9950 Transmitter (S³L)



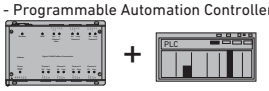
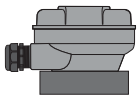
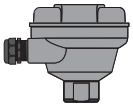
*Note: Under normal operation, the shield wire does not need to be connected. However, in noisy environments, the shield should be connected to improve noise immunity.

System Overview

In-Line Installation

Panel, Wall Mount	4 to 20 mA Output	Automation System
GF Instruments - 9900 - 9950 	- Customer Supplied Programmable Logic Controller, or - Programmable Automation Controller 	- 0486 Profibus Concentrator and Customer Supplied Programmable Logic Controller or - Programmable Automation Controller 
Type 2850 Conductivity Integral System (2881-2883), or 2850 Universal Mount with any GF conductivity probe 		
Fittings - Customer Supplied 3/4 in. NPT or ISO threads		All sold separately

Submersible Installation

Panel, Wall Mount	4 to 20 mA Output	Automation System
GF Instruments - 9900 - 9950 	- Customer Supplied Programmable Logic Controller, or - Programmable Automation Controller 	- 0486 Profibus Concentrator and Customer Supplied Programmable Logic Controller or - Programmable Automation Controller 
Type 2850 Universal Mount or NPT Mount Sensor Electronics with any GF conductivity probe 		
Submersible Fittings - Customer Supplied 3/4 in. NPT or ISO threads		All sold separately

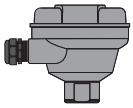
* The 2850 (S³L) signal can be used for distances over 30 m (100 ft). The 2850 has a limited sensor cable input length of 4.6 m (15 ft).

Note:

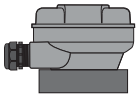
The 9900/9950 (with Direct Conductivity/Resistivity module) can run all conductivity sensors with 30 m (100 ft) of cable.

Application Tips

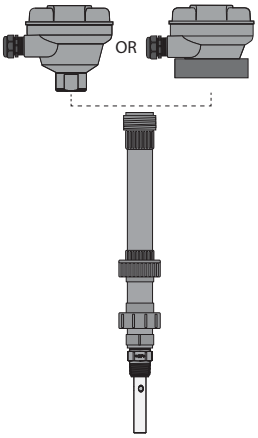
- Maximum distance between sensor and 2850 electronics is 4.6 m (15 ft).

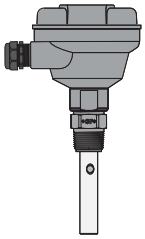


-5X 3/4" FNPT Mount Sensor Electronics

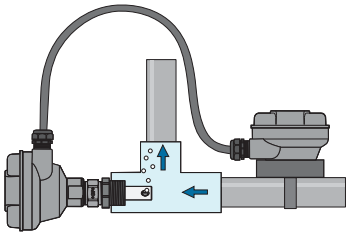


-6X Universal Mount Sensor Electronics





Integral System includes the 2850 sensor electronics and a choice of Conductivity/ Resistivity electrode.



Universal Sensor Electronics assembly allows sensors without the 3/4" rear thread to be used.

Field Selectable Ranges for 4 to 20 mA Operation

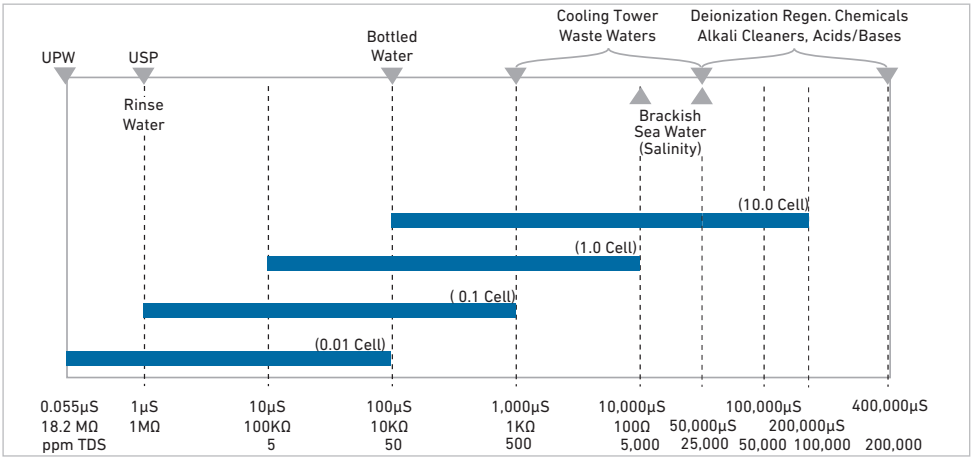
The chart below indicates the field selectable ranges in which the 2850 sensor electronics can be set via internal switches. All ranges can be inverted if required. Types listed below are compatible Conductivity/Resistivity electrodes.

0.01 Cell	0.10 Cell	1.0 Cell	10.0 Cell	20.0 Cell
Type 2881	Type 2882	Type 2882	Type 2884	Type 2823 (Special Order)
10 to 20 MΩ	0 to 2 µS	0 to 20 µS	0 to 200 µS	0 to 400 µS
2 to 10 MΩ	0 to 5 µS	0 to 50 µS	0 to 500 µS	0 to 1'000 µS
0 to 2 MΩ	0 to 10 µS	0 to 100 µS	0 to 1'000 µS	0 to 2'000 µS
0 to 1 MΩ	0 to 50 µS	0 to 500 µS	0 to 5'000 µS	0 to 10'000 µS
0 to 5 MΩ	0 to 100 µS	0 to 1'000 µS	0 to 10'000 µS	0 to 200'000 µS
0 to 10 MΩ	0 to 200 µS	0 to 2'000 µS	0 to 50'000 µS	0 to 100'000 µS
N/A	0 to 500 µS	0 to 5'000 µS	0 to 100'000 µS	0 to 200'000 µS
N/A	0 to 1'000 µS	0 to 10'000 µS	0 to 200'000 µS	0 to 400'000 µS

The 4 to 20 mA output ranges shown in this chart can be inverted using the internal switch Resistivity. Ranges are in BOLD
Note: The 2819-2823 series Integral Systems must be ordered through special order products.

Operating Range Chart

The 2850 is capable of measuring conductivity and resistivity values over a wide range. Below is a chart of GF Conductivity/ Resistivity electrodes (listed in each range box) that is recommended for the specified measurement range.



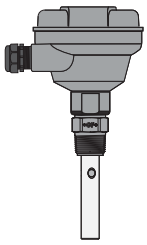
Ordering Information

Ordering Notes

1. All 2850 units can be used with any GF Conductivity/Resistivity electrode
2. Integral systems are only offered with type 2881-2884 electrodes. 2818-2823 and 2870-2874 require a special order sensor.
3. Dual channel units are only available in the 3-2850- 63 universal mount junction box/remote mount configuration and with digital (S³L) output for use with the 9950-10/-11.

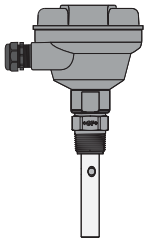
Conductivity Integral Systems with CPVC Process Connection

Mfr. Part No.	Code	Description
Digital (S³L) output		
3-2850-51-81	159002156	Integral 2850 system, Digital (S³L) output, 0.01 cell, CPVC NPT
3-2850-51-82	159002157	Integral 2850 system, Digital (S³L) output, 0.1 cell, CPVC NPT
3-2850-51-83	159002158	Integral 2850 system, Digital (S³L) output, 1.0 cell, CPVC NPT
3-2850-51-84	159002159	Integral 2850 system, Digital (S³L) output, 10.0 cell, CPVC NPT
3-2850-51-81D	159002160	Integral 2850 system, Digital (S³L) output, 0.01 cell, CPVC ISO
3-2850-51-82D	159002161	Integral 2850 system, Digital (S³L) output, 0.1 cell, CPVC ISO
3-2850-51-83D	159002162	Integral 2850 system, Digital (S³L) output, 1.0 cell, CPVC ISO
3-2850-51-84D	159002163	Integral 2850 system, Digital (S³L) output, 10.0 cell, CPVC ISO
4 to 20 mA output		
3-2850-52-81	159002164	Integral 2850 system, 4 to 20 mA output, 0.01 cell, CPVC NPT
3-2850-52-82	159002165	Integral 2850 system, 4 to 20 mA output, 0.1 cell, CPVC NPT
3-2850-52-83	159002166	Integral 2850 system, 4 to 20 mA output, 1.0 cell, CPVC NPT
3-2850-52-84	159002167	Integral 2850 system, 4 to 20 mA output, 10.0 cell, CPVC NPT
3-2850-52-81D	159002168	Integral 2850 system, 4 to 20 mA output, 0.01 cell, CPVC ISO
3-2850-52-82D	159002169	Integral 2850 system, 4 to 20 mA output, 0.1 cell, CPVC ISO
3-2850-52-83D	159002170	Integral 2850 system, 4 to 20 mA output, 1.0 cell, CPVC ISO
3-2850-52-84D	159002171	Integral 2850 system, 4 to 20 mA output, 10.0 cell, CPVC ISO



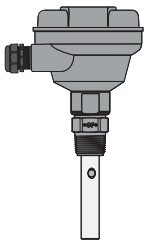
Conductivity Integral Systems with Polypropylene Process Connection

Mfr. Part No.	Code	Description
Digital (S^3L) output		
3-2850-51-81P	159002172	Integral 2850 system, Digital (S^3L) output, 0.01 cell, Polypropylene NPT
3-2850-51-82P	159002173	Integral 2850 system, Digital (S^3L) output, 0.1 cell, Polypropylene NPT
3-2850-51-83P	159002174	Integral 2850 system, Digital (S^3L) output, 1.0 cell, Polypropylene NPT
3-2850-51-81PD	159002175	Integral 2850 system, Digital (S^3L) output, 0.01 cell, Polypropylene ISO
3-2850-51-82PD	159002176	Integral 2850 system, Digital (S^3L) output, 0.1 cell, Polypropylene ISO
3-2850-51-83PD	159002177	Integral 2850 system, Digital (S^3L) output, 1.0 cell, Polypropylene ISO
4 to 20 mA output		
3-2850-52-81P	159002178	Integral 2850 system, 4 to 20 mA output, 0.01 cell, Polypropylene NPT
3-2850-52-82P	159002179	Integral 2850 system, 4 to 20 mA output, 0.1 cell, Polypropylene NPT
3-2850-52-83P	159002180	Integral 2850 system, 4 to 20 mA output, 1.0 cell, Polypropylene NPT
3-2850-52-81PD	159002181	Integral 2850 system, 4 to 20 mA output, 0.01 cell, Polypropylene ISO
3-2850-52-82PD	159002182	Integral 2850 system, 4 to 20 mA output, 0.1 cell, Polypropylene ISO
3-2850-52-83PD	159002183	Integral 2850 system, 4 to 20 mA output, 1.0 cell, Polypropylene ISO



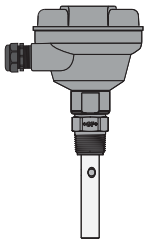
Conductivity Integral Systems with PVDF Process Connection

Mfr. Part No.	Code	Description
Digital (S^3L) output		
3-2850-51-81V	159002184	Integral 2850 system, Digital (S^3L) output, 0.01 cell, PVDF NPT
3-2850-51-82V	159002185	Integral 2850 system, Digital (S^3L) output, 0.1 cell, PVDF NPT
3-2850-51-83V	159002186	Integral 2850 system, Digital (S^3L) output, 1.0 cell, PVDF NPT
3-2850-51-81VD	159002187	Integral 2850 system, Digital (S^3L) output, 0.01 cell, PVDF ISO
3-2850-51-82VD	159002188	Integral 2850 system, Digital (S^3L) output, 0.1 cell, PVDF ISO
3-2850-51-83VD	159002189	Integral 2850 system, Digital (S^3L) output, 1.0 cell, PVDF ISO
4 to 20 mA output		
3-2850-52-81V	159002190	Integral 2850 system, 4 to 20 mA output, 0.01 cell, PVDF NPT
3-2850-52-82V	159002191	Integral 2850 system, 4 to 20 mA output, 0.1 cell, PVDF NPT
3-2850-52-83V	159002192	Integral 2850 system, 4 to 20 mA output, 1.0 cell, PVDF NPT
3-2850-52-81VD	159002193	Integral 2850 system, 4 to 20 mA output, 0.01 cell, PVDF ISO
3-2850-52-82VD	159002194	Integral 2850 system, 4 to 20 mA output, 0.1 cell, PVDF ISO
3-2850-52-83VD	159002195	Integral 2850 system, 4 to 20 mA output, 1.0 cell, PVDF ISO



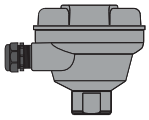
Conductivity Integral Systems with PEEK Process Connection

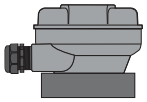
Mfr. Part No.	Code	Description
Digital (S^3L) output		
3-2850-51-81K	159002196	Integral 2850 system, Digital (S^3L) output, 0.01 cell, PEEK NPT
3-2850-51-82K	159002197	Integral 2850 system, Digital (S^3L) output, 0.1 cell, PEEK NPT
3-2850-51-83K	159002198	Integral 2850 system, Digital (S^3L) output, 1.0 cell, PEEK NPT
3-2850-51-81KD	159002199	Integral 2850 system, Digital (S^3L) output, 0.01 cell, PEEK ISO
3-2850-51-82KD	159002200	Integral 2850 system, Digital (S^3L) output, 0.1 cell, PEEK ISO
3-2850-51-83KD	159002201	Integral 2850 system, Digital (S^3L) output, 1.0 cell, PEEK ISO
4 to 20 mA output		
3-2850-52-81K	159002202	Integral 2850 system, 4 to 20 mA output, 0.01 cell, PEEK NPT
3-2850-52-82K	159002203	Integral 2850 system, 4 to 20 mA output, 0.1 cell, PEEK NPT
3-2850-52-83K	159002204	Integral 2850 system, 4 to 20 mA output, 1.0 cell, PEEK NPT
3-2850-52-81KD	159002205	Integral 2850 system, 4 to 20 mA output, 0.01 cell, PEEK ISO
3-2850-52-82KD	159002206	Integral 2850 system, 4 to 20 mA output, 0.1 cell, PEEK ISO
3-2850-52-83KD	159002207	Integral 2850 system, 4 to 20 mA output, 1.0 cell, PEEK ISO



Note: Integral systems are shipped with a sensor and 2850 combined. Other 2850 systems are available with type 288X electrodes upon request. See individual electrode product pages for more information.

Mfr. Part No.	Code	Output
2850 Sensor Electronics with EasyCal		
NPT mount junction box (¾ inch threaded) for standpipe or integral mounting, single input only		
3-2850-51	159 001 398	One input/one digital (S^3L) output
3-2850-52	159 001 399	One input/one 4 to 20 mA output
Universal mount junction box for remote mount, single or dual input*		
3-2850-61	159 001 400	One input/one digital (S^3L) output for use with 9900 or
3-2850-62	159 001 401	9950
3-2850-63	159 001 402	One input/one 4 to 20 mA output
		Dual digital (S^3L) outputs





*For use when remote sensor mounting is desired. Compatible with ALL GF conductivity electrodes. See individual electrode product pages for more information.

Additional ordering information

Additional possible configurations are listed below. For variants, combinations, and orders, please contact the local GF sales company.

Example Part Number

3-2850-51-21-T	**Output**		**Cell Constant**		**Sensor Material**
3-2850-		**-**		**-**	
Output					
Digital (S^3L)	**51**				
4 to 20 mA	**52**				
Cell Constant					
K= 0.01 - Long sensor length			**19**		
K= 0.1 - Long sensor length			**20**		
K= 1.0 - Long sensor length			**21**		
Sensor Body and Process Connection Material					
3/4" 316 L Stainless Steel					**S**
3/4" Titanium					**T**

Accessories and Replacement Parts

Mfr. Part	Code	Description
3-2850.101-1	159 001 392	Plug-in NIST traceable recertification tool, 1.0 µS simulated, for use with 9900, 9950, 2850 and the 2850 4-20 mA output
3-2850.101-2	159 001 393	Plug-in NIST traceable recertification tool, 2.5 µS simulated, for use with 9900, 9950, 2850 and the 2850 4-20 mA output
3-2850.101-3	159 001 394	Plug-in NIST traceable recertification tool, 10.0 µS simulated, for use with 9900, 9950, 2850 and the 2850 4-20 mA output
3-2850.101-4	159 001 395	Plug-in NIST traceable recertification tool, 18.2 MΩ simulated, for use with 9900, 9950, 2850 and the 2850 4-20 mA output
3-2850.101-5	159 001 396	Plug-in NIST traceable recertification tool, 10.0 MΩ simulated, for use with 9900, 9950, 2850 and the 2850 4-20 mA output
5523-0322V	159 001 807	**Sensor cable (per ft), 3 cond. plus shield, 22 AWG

** Although a customer can extend the cable of a conductivity sensor, GF does not recommend this, and offers extended cable lengths from the factory.