Type 2870-2874 Conductivity/Resistivity Electrodes

			
3-2870	3-2872	3-2873	3-2874

Product description

The type 2870-2874 contact conductivity electrodes are ideally suited for measuring resistivity/conductivity of liquids ranging from pure and ultrapure water to seawater, rinse water and chemical solutions.

The 2870-2873 conductivity probes are two-electrode flow-through cell design coaxially arranged made of 316L stainless steel material, PTFE insulator and Polypropylene process connection. A platinum RTD (Pt1000) located within the electrode allows for optimal temperature sensing. With a reversible process connection, these electrodes are designed to provide installation versatility in submersible and in-line configurations.

The 2874 conductivity probes have a two-electrode parallel path flow through cell design made of CPVC body, 316L stainless steel electrodes, PTFE insulator and 316L stainless steel thermowell to allow for optimal temperature sensing.

Constructed of high-precision, extremely accurate stainless tubing, the GF 287X electrodes deliver outstanding measurement accuracy and repeatability.

Units with and without certificate of calibration are available. The calibrated electrodes meet a ±1% cell constant accuracy.

Features

- Process connection
  - ¾" NPT Polypropylene (standard for 0.01, 0.1 and 1.0 cell)
  - ¾" NPT 316L SS (standard for 10.0 cell)
  - ¾" NPT 316L SS (optional for 0.01, 0.1 and 1.0 cell)
- New three-hole flow-through design for facilitated installation
- Passivated 316L SS electrodes material
- In-line or submersible mounting for all cell constants
- Option for NIST traceable certified cell constant ±1%

Applications

- Pure Water Treatment
  - Microfiltration
  - Ultrafiltration
  - Reverse Osmosis
  - Ion Exchange
  - Deionization
  - Distillation
- Boiler Condensate
- Semiconductor Water Production
- USP Purified Water
- Rinse Water
- TDS (Total Dissolved Solids)
- Salinity
- WFI Water Production

Specifications

Types 3-2870 (0.01 cm^{-1} cell), 3-2872 (0.1 cm^{-1} cell), 3-2873 (1.0 cm^{-1} cell), 3-2874 (10.0 cm^{-1} cell)

General			
Operating Range			
3-2870	Conductivity	0.055 µS/cm to 100 µS/cm at 25 °C (77 °F)	
	Resistivity	10 kΩ·cm to 18.2 MΩ·cm at 25 °C (77 °F)	
	TDS	0.02 to 50 ppm	
3-2872	Conductivity	1 µS/cm to 1000 µS/cm	
	Resistivity	1 MΩ·cm to 1 KΩ·cm	
	TDS	0.5 to 500 ppm	
3-2873	Conductivity	10 µS/cm to 10,000 µS/cm at 25 °C (77 °F)	
	TDS	5 to 5,000 ppm	
3-2874	Conductivity	100 µS/cm to 200,000 µS/cm at 25 °C (77 °F)	
	TDS	50 to 100,000 ppm	
Nominal Cell Constant			
Cell Constant Accuracy		± 2%	
Certified Cell Constant		± 1%	
Conductivity Repsonse Time			
3-287X	< 5 s for 90% of change at 25 °C (77 °F)		
Temperature			
Temperature Compensation		Pt1000	
Temperature range	2870, 2872, 2873	-20 to 80 °C (- 4 to 176 °F)	
	2874	-20 to 95 °C (- 4 to 203 °F)	
Temperature Accuracy		0.3 °C	
Temperature Response, τ		0.01 cm^{-1} cell	< 40 s for 90% of change
		0.1 cm^{-1} cell	< 47 s for 90% of change
		1.0 cm^{-1} cell	< 89 s for 90% of change
		10.0 cm^{-1} cell	< 15 s for 90% of change
Cable length			
Standard		4.6 m (15 ft) and 7.6 m (25 ft)	
Maximum		30 m (100 ft.) with 3-9900 and 3-9950 direct conductivity resistivity modules. 4.6 m (15 ft.) with 3-2850 conductivity electronics.	

Do not splice cable. If longer cable is needed, contact GF Piping Systems.

Wetted Materials		
2870, 2872, 2873	Electrodes	316L Stainless Steel (1.4408, DIN 17440)
	Body	¾" NPT Polypropylene
	Process Connection	¾" NPT Polypropylene
	Insulator Material	PTFE
	O-Rings	EPR (EPDM)
2874	Electrodes	316L Stainless Steel (1.4404, DIN 17440)
	Body	CPVC
	Process Connection	¾" NPT 316L Stainless Steel
	Insulator Material	PTFE
	O-Rings	EPR (EPDM)

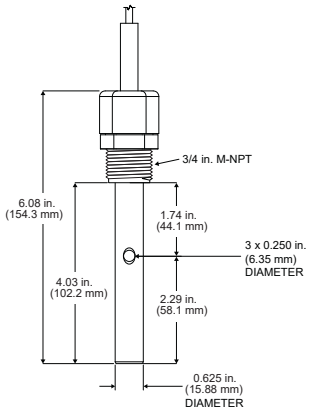
Maximum Temperature/Pressure Rating	
2870, 2872, 2873 Fittings	
Standard Polypropylene	6.4 bar at 95 °C (93 psi at 203 °F)
(3-2870.391) ¾" NPT 316SS	13.8 bar at 120 °C (200 psi at 248 °F)
Proof Pressure in accordance with DIN 16962-5 standard and PED (Pressure Equipment Directive, 2014/68/EG)	
2874 Fitting	
¾" NPT 316L SS	6.9 bar at 95 °C (100 psi at 203 °F)

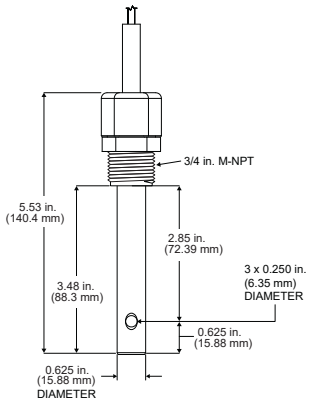
Shipping Weight	
2870-A115	0.25 kg (0.54 lb.)
2870-A125	0.32 kg (0.69 lb.)
2872-A115	0.18 kg (0.40 lb.)
2872-A125	0.25 kg (0.56 lb.)
2873-A115	0.21 kg (0.47 lb.)
2873-A125	0.28 kg (0.62 lb.)
2874-A515	0.27 kg (0.60 lb.)
2874-A525	0.34 kg (0.75 lb.)

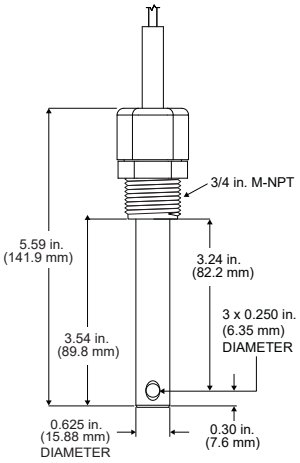
Standards and Approvals
CE, UKCA, RoHS compliant
China RoHS (Go to www.gfps.com for details)
Manufactured under ISO 9001, ISO 14001 and ISO 45001

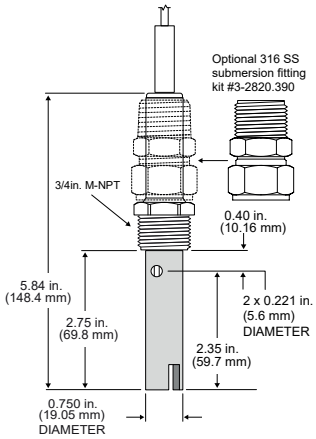
Dimensions

3-2870	3-2872	3-2873	3-2874

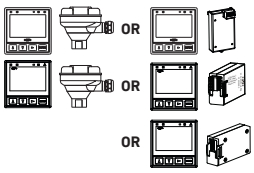
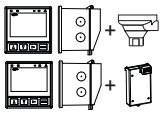
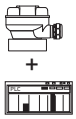
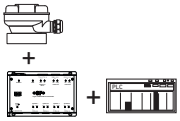
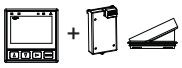




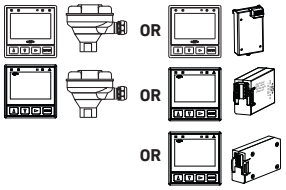
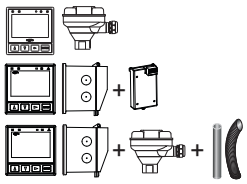
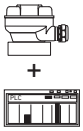
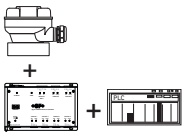




System Overview

Panel Mount	Pipe, Tank, Wall Mount	4 to 20 mA Output*	Automation System	Field (Integral) Mount*
In-Line Installation				
GF Instruments with 2850 Sensor Electronics - 9900 or with 3-9900.394 Direct Conductivity/Resistivity Module - 9950 with 9950.394 Direct Conductivity/Resistivity Module or with 3-9950.394-2 Dual Channel Conductivity Module	GF Instruments with 2850 Sensor Electronics - 9900 and Rear Enclosure or with 3-9900.394 Direct Conductivity/Resistivity Module and Rear Enclosure	Type 2850 Sensor Electronics with - Customer Supplied Programmable Logic Controller or - Programmable Automation Controller	Type 2850 Sensor Electronics with - 0486 Profibus Concentrator and - Customer Supplied Programmable Logic Controller or - Programmable Automation Controller	GF Instrument - 9900 with 3-9900.394 Direct Conductivity/Resistivity Module and Angle Adapter
				
Type 287X Conductivity Electrodes				

All Sold Separately

Panel Mount	Pipe, Tank, Wall Mount	4 to 20 mA Output*	Automation System
Submersible Installation			
GF Instruments with 2850 Sensor Electronics - 9900 or with 3-9900.394 Direct Conductivity/Resistivity Module - 9950 with 9950.394 Direct Conductivity/ Resistivity Module or with 3-9950.394-2 Dual Channel Conductivity Module	GF Instruments with 2850 Sensor Electronics - 9900 and Rear Enclosure or with 3-9900.394 Direct Conductivity/Resistivity Module, Rear Enclosure and customer supplied pipe extension or conduit with 3/4 in. FNPT threads	Type 2850 Sensor Electronics with - Customer Supplied Programmable Logic Controller or - Programmable Automation Controller	Type 2850 Sensor Electronics with - 0486 Profibus Concentrator and Customer Supplied Programmable Logic Controller or - Programmable Automation Controller
			
Type 287X Conductivity Electrodes			

All Sold Separately

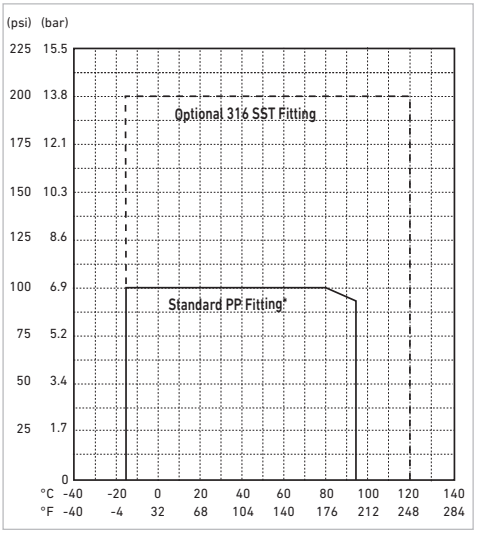
If the required distance between the measurement point and the display is greater than 100 ft, use 3-2850-61 (S^3L).

Measurements above 10 MΩ·cm and/or below 20 °C, the maximum cable length should not exceed 15 ft. (4.6 m).

Pressure-temperature diagram

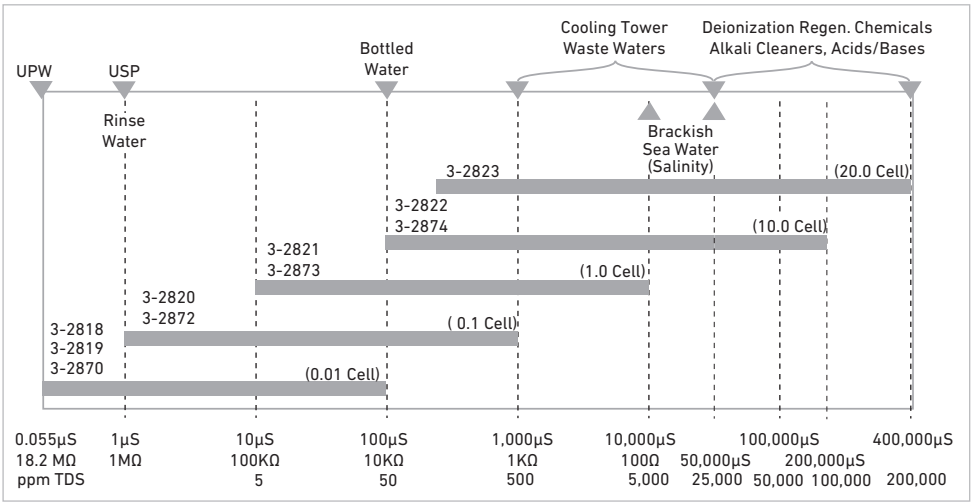
Note

The pressure-temperature diagrams are specifically for the GF sensor. During system design the specifications of all components must be considered. In the case of a metal piping system, a plastic sensor will reduce the system specification.



Maximum pressure rating above 80 °C is in accordance with DIN 16962-5 standard and PED (Pressure Equipment Directive, 2014/68/EG Art.3, Sec.3).

Operating Range Chart



Application Tips

- GF advises all conductivity sensors be installed in a piping system in a mounting position that minimizes air bubbles and where the solution will circulate inside and out of the outer tube.
- When used in a tank application the liquid levels must be high enough to cover vent hole on sensor body.
- Threads can be reversed in the field.
- Install sensors in an area that will remain free of air bubbles and sediment build-up.
- Conductivity measurement is affected if the metal electrodes become coated by the process media.

Ordering Information

Ordering Notes

1. When using the type 3-2850 conductivity electronics, the maximum cable length probe to electronics should not exceed 15 ft. (4.6 m)
2. When used with the 9900 and 9950 conductivity modules, sensors are limited to 30 m (100 ft) maximum.*
3. Sensors with cable lengths of up to 30 m (100 ft) are available - consult factory.
4. Use PN 3-2870.390 for a replacement submersible threaded connection.

* Calibrate the temperature to offset the resistance of the cable.

TEST CERTIFICATE

Code:	159 002 000
Sensor Part Number:	3-2870-A115C
Serial Number:	62201220270
Cell Constant:	0.01005
Temp. Element:	RTD Pt1000
Test Date:	01/23/2022

Example of cell constant certificate of calibration.

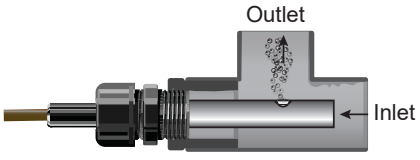
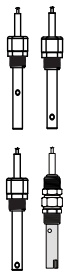


Figure 1

Please refer to Wiring, Installation, and Accessories sections for more information.

Mfr. Part No.	Code	Cell Constant	Description
3-2870-A115	159 001 999	0.01 cm^{-1}	k=0.01 cm^{-1}, ¾ in. NPT fitting, polypro, 15-ft cable, no certificate
3-2870-A115C	159 002 000	0.01 cm^{-1}	k=0.01 cm^{-1}, ¾ in. NPT fitting, polypro, 15-ft cable, with certificate
3-2870-A125	159 002 001	0.01 cm^{-1}	k=0.01 cm^{-1}, ¾ in. NPT fitting, polypro, 25-ft cable, no certificate
3-2870-A125C	159 002 002	0.01 cm^{-1}	k=0.01 cm^{-1}, ¾ in. NPT fitting, polypro, 25-ft cable, with certificate
3-2872-A115	159 002 003	0.1 cm^{-1}	k=0.1 cm^{-1}, ¾ in. NPT fitting, polypro, 15-ft cable, no certificate
3-2872-A115C	159 002 004	0.1 cm^{-1}	k=0.1 cm^{-1}, ¾ in. NPT fitting, polypro, 15-ft cable, with certificate
3-2872-A125	159 002 005	0.1 cm^{-1}	k=0.1 cm^{-1}, ¾ in. NPT fitting, polypro, 25-ft cable, no certificate
3-2872-A125C	159 002 006	0.1 cm^{-1}	k=0.1 cm^{-1}, ¾ in. NPT fitting, polypro, 25-ft cable, with certificate
3-2873-A115	159 002 009	1.0 cm^{-1}	k=1.0 cm^{-1}, ¾ in. NPT fitting, polypro, 15-ft cable, no certificate
3-2873-A115C	159 002 010	1.0 cm^{-1}	k=1.0 cm^{-1}, ¾ in. NPT fitting, polypro, 15-ft cable, with certificate
3-2873-A125	159 002 011	1.0 cm^{-1}	k=1.0 cm^{-1}, ¾ in. NPT fitting, polypro, 25-ft cable, no certificate
3-2873-A125C	159 002 012	1.0 cm^{-1}	k=1.0 cm^{-1}, ¾ in. NPT fitting, polypro, 25-ft cable, with certificate
3-2874-A515	159 002 014	10.0 cm^{-1}	k=10.0 cm^{-1}, ¾ in. NPT fitting 316L SS, 15 ft. cable, no certificate
3-2874-A525	159 002 015	10.0 cm^{-1}	k=10.0 cm^{-1}, ¾ in. NPT fitting 316L SS, 25 ft. cable, no certificate



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
3-2850-61	159 001 400	Universal junction box, conductivity electronics, digital (S^3L) output
3-2850-62	159 001 401	Universal junction box, conductivity electronics, 4 to 20 output
3-2850-63	159 001 402	Universal junction box, conductivity electronics, dual digital (S3L) outputs
3-2820.390	198 840 223	¾ in. NPT fitting, 316 SS for use with 2874 for submersible mounting
3-2870.390	159 002 007	¾ in. NPT fitting, polypropylene replacement for use with 2870, 2872 and 2873
3-2870.391	159 002 008	¾ in. NPT fitting, 316 SS for use with 2870, 2872 and 2873
3-2870.392	159 002 016	¾ in. NPT Extended fitting polypropylene

Note: GF recommended sensors that require extended cable lengths can be ordered from the factory.

3-2870.099 Rev F
06/2024-A

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