

Roxar HS Series Gauges

Downhole pressure and temperature measurement



Emerson's Roxar HS series gauges provide the critical pressure and temperature data needed to update drainage models, manage production rates, and optimize reservoir performance.

Best fit for collecting data

- Replacement of periodic wireline surveys
- Confirmation of the fault sealing mechanisms
- Confirmation of integrity
- Well start-up and production management
- Drawdown management
- Optimizing gas lift
- Production testing
- Fracturing and perforating pressure monitoring

High accuracy real world performance

- Cost effective
- Highly stable accurate and precise measurements
- Suitable for the harshest and hottest deep well environments

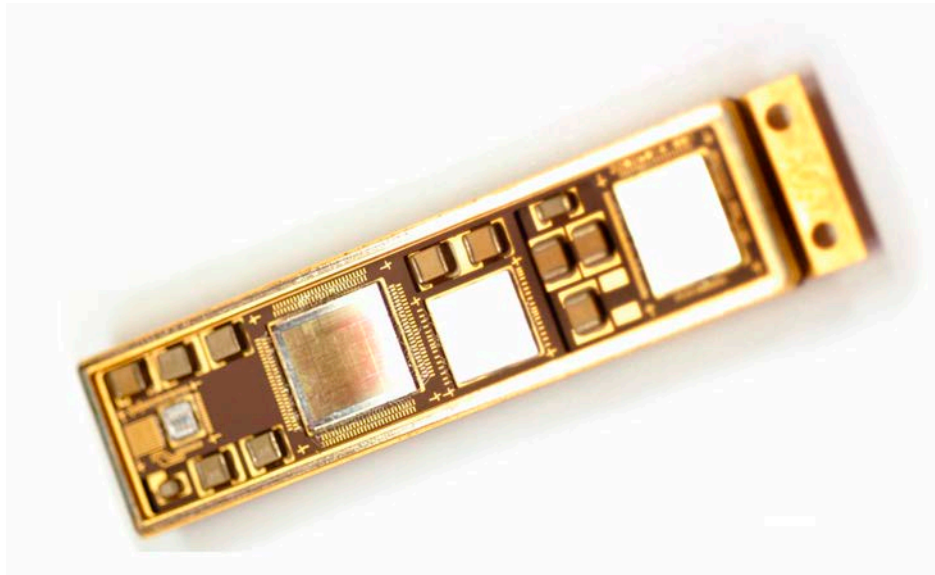
Operating principle

All gauges make use of quartz crystal sensors for measurement which provides accurate low drift readings of the bottom hole temperature and pressure. Quartz crystal is widely accepted as the de facto standard sensor technology for long term accuracy and stability in permanent reservoir monitoring applications.

Quartz crystal technology

Quartz crystals are widely used for precision measurements with excellent accuracy, resolution, and long-term stability. A quartz crystal resonates at a specific frequency dependent upon both pressure and temperature. The Roxar HS gauge uses two quartz crystals to measure pressure, temperature and to provide temperature compensation of the pressure measurement.

Figure 1: Silicon-On-Insulator (SOI) Technology in Roxar HS Gauge



Silicone-On-Insulator (SOI) technology

The Roxar HS gauge series makes use of Silicon-On-Insulator (SOI) electronics which enables operation at 437 °F (225 °C) well beyond the traditional temperature limits of standard high temperature hybridized electronics. The SOI technology provides a much more rugged platform and enhances the physical capabilities with a significant reduction in size and weight, better resistance to shock and vibration, and increased data rates.

An SOI device has a buried oxide layer, which isolates the components from the substrate and virtually eliminates leakage paths. The buried oxide layer also reduces the parasitic junction capacitance allowing higher frequency operation. With virtually no leakage paths, the SOI devices can operate at lower power and for significantly extended lifetimes at normal, high, and ultra-high temperatures.

Figure 2: Components joined by EB Welding



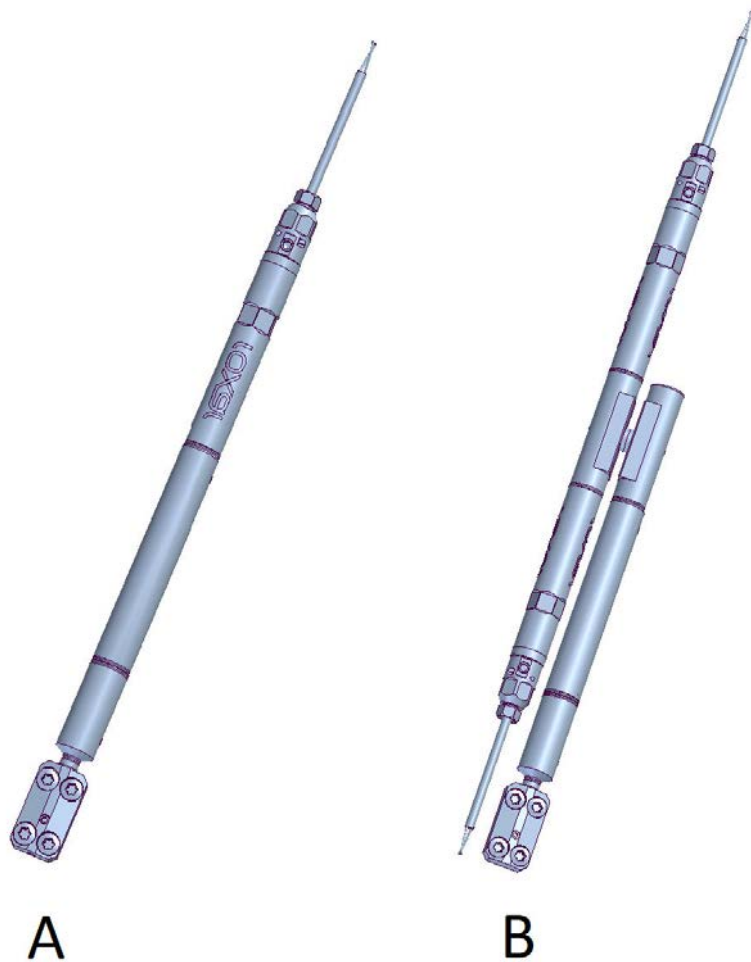
Assembly technology

All wetted parts of the Roxar HS gauge series are made of Incoloy™ 718 or Incoloy 625+. Emerson assembles the gauges from modular components which are joined through Electron Beam (EB) welding to eliminate potential leak paths. EB welding is a fusion welding process in which a beam of high-velocity electrons is applied to the materials to be joined, melting the two faces together with no material added. The qualified EB welding process results in a joint that withstands the pressure and temperature cycling and harsh environmental conditions downhole.

The high integrity cable head is used for the critical connection between the gauge and the Tubing Encapsulated Conductor (TEC). Redundant metal-to-metal seals and proprietary mechanisms ensure a pressure tight assembly, and Emerson performs on-site pressure testing to verify correct sealing.

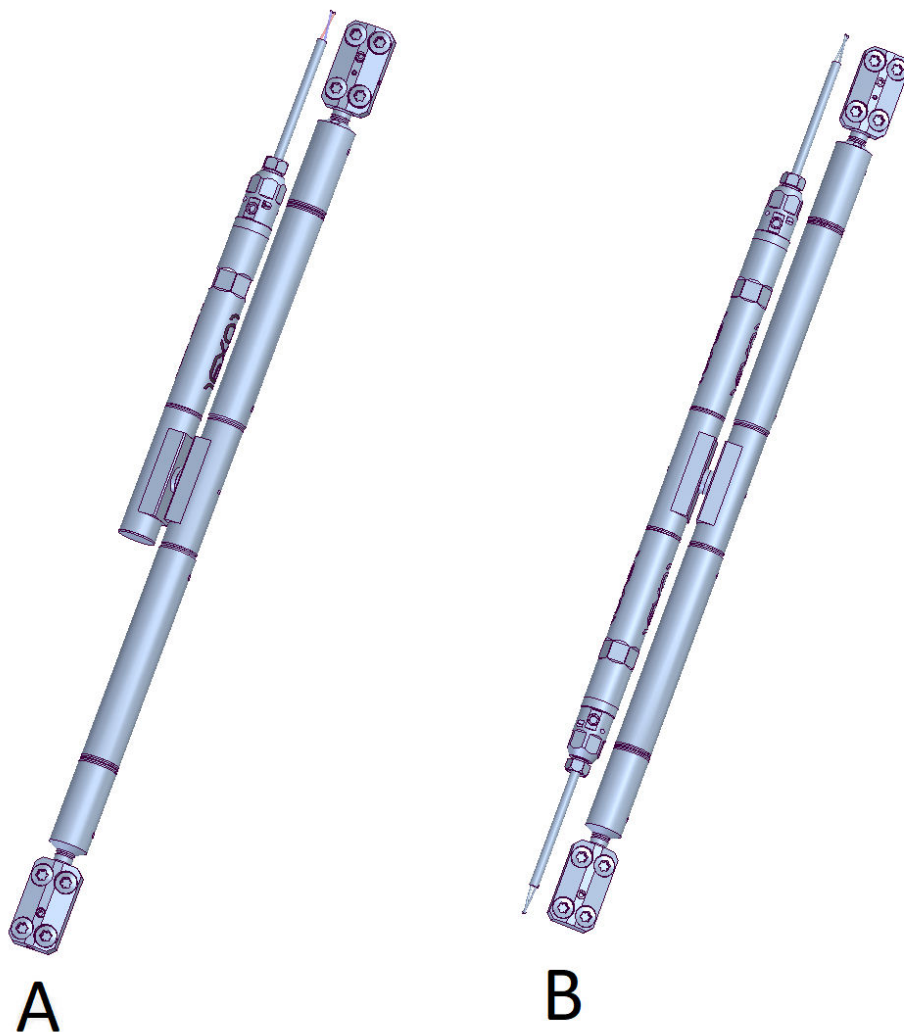
Gauge configurations

Figure 3: Single end and single drop off configurations



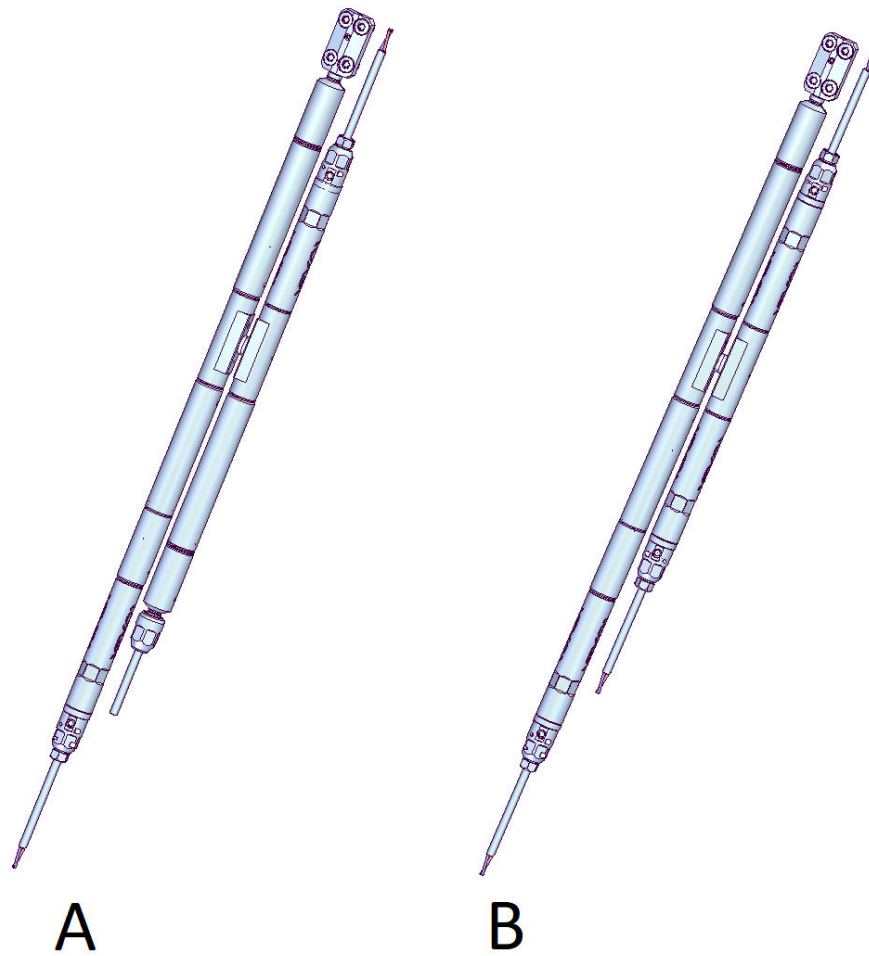
- A. *Single end*
- B. *Single drop off*

Figure 4: Dual end and dual drop off configurations



- A. Dual end
- B. Dual drop off

Figure 5: Triple end with auxiliary and dual drop off with auxiliary configurations



- A. Triple end with auxiliary
- B. Dual drop off with auxiliary

Specifications

HS Gauge performance characteristics

Characteristic	Units (Imperial and SI)
HS Series maximum working pressure ⁽¹⁾	25,000 psi (1,724 bar)
HS Series maximum working temperature ⁽¹⁾	437 °F (225 °C)
Initial pressure accuracy	<± 0.02% full scale
Temperature accuracy	18 °F (<±0.1 °C)
Pressure resolution (for standard calibration)	0.013 psi (0.0009 bar)
Temperature resolution	0.002988 °F (0.0017 °C)
Pressure reproducibility	0.15 psi (0.01 bar)
Temperature reproducibility	0.09 °F (0.05 °C)
Long-term pressure stability	2 psi (0.14 bar) per year
Long-term temperature stability	<0.18 °F (<0.1 °C) per year
Maximum sample rate	10 samples per second/gauge
Maximum number of gauges per TEC	32 at dual-conductor, 8 at mono-conductor
Power requirement	Nominal 70 mA at 10 VDC

(1) A range of HS Gauges are available that are manufactured and calibrated to be suitable for operation at the quoted or specified pressure and temperature conditions. See ordering information - part number suffixes for pressure and temperature specifications.

Note

HS gauges must only be used with the Roxar Downhole Network Controller (DHNC) card manufactured by Emerson.

HS Gauge physical properties

Property	Description
Material of wetted parts	Inconel 718 (HS) / Inconel 625+ (HSX)
Electronics	Silicone-On-Insulator
Mechanical shock tests performed	100 g, 11 ms half sinus and 1,000 g at 0.5 ms Or in accordance with AWES: 100 g peak, 0.5 ms half sine
Random vibration test performed	Exceeding 20 g at 20 – 20,000 Hz Or in accordance with AWES: Exceeding 10 g at 20 – 20,000 Hz
Sour service compatibility	NACE MR-0175 compliant

Gauge physical dimensions (imperial units)

Gauge configuration	Diameter (in)	Length (in)	Width (in)	Height (in)
Single end	1	17.24	N/A	N/A
Single drop off	N/A	20.57	2.30	1
Dual end	N/A	24.41	2.30	1
Dual drop off	N/A	24.43	2.30	1
Dual drop off with AUX	N/A	28.02	2.30	1
Triple end	N/A	24.43	2.30	1
Triple drop off with AUX	N/A	28.02	2.30	1

Gauge physical dimensions (International System of Units (SIU))

Gauge configuration	Diameter (mm)	Length (mm)	Width (mm)	Height (mm)
Single end	25.2	438	N/A	N/A
Single drop off	N/A	522.5	58.4	25.2
Dual end	N/A	620	58.4	25.2
Dual drop off	N/A	620.5	58.4	25.2
Dual drop off with AUX	N/A	711.8	58.4	25.2
Triple end	N/A	620.5	58.4	25.2
Triple drop off with AUX	N/A	711.8	58.4	25.4

Ordering information for Roxar HS Series Gauges

The following table provides the components required for the Roxar HS or Roxar HSX gauge configuration.

Use the suffix in [Part number suffix for pressure and temperature specifications \(imperial units\)](#) and [Part number suffix for pressure and temperature specifications \(SI units\)](#) to order the appropriate parts for your installation.

Part number	Description	Type	Material wetted parts
ROX000090377	Gauge tbg slim	Single end	UNS N07718
ROX000090416	Gauge ann slim	Single end	UNS N07718
ROX000129943	Gauge dual tbg-ann slim	Dual end	UNS N07718
ROX000123757	Gauge dual tbg-tbg slim	Dual end	UNS N07718
ROX000129942	Gauge dual ann-ann slim	Dual end	UNS N07718
ROX000137157	Gauge dual ann-hyd slim	Dual end	UNS N07718
ROX000183682	Gauge triple tbg-ann-hyd	Triple end	UNS N07718
ROX000245807	Gauge triple hyd-tbg-hyd	Triple end	UNS N07718
ROXA20058231	Gauge triple ann-aux-hyd	Triple end	UNS N07718
ROX00275149	Gauge triple ann-aux-hyd	Triple end	UNS N07718
ROX00123752	Drop off gauge tbg	Single drop off	UNS N07718
ROX00129938	Drop off gauge ann	Single drop off	UNS N07718
ROX020090463	Drop off gauge dual tbg-ann	Dual drop off	UNS N07718
ROX020090556	Drop off gauge dual tbg-tbg	Dual drop off	UNS N07718
ROX020090580	Drop off gauge dual ann-ann	Dual drop off	UNS N07718
ROXA20058133	Drop off gauge dual tbg-aux	Dual drop off	UNS N07718
ROXA20058198	Drop off gauge dual ann-aux	Dual drop off	UNS N07718
ROX000181254	HSX gauge dual tbg-ann	Dual end	UNS N07716 ⁽¹⁾
ROX000181256	HSX drop off gauge dual tbg-ann	Dual drop off	UNS N07716
ROXA20051139	Gauge MC dual tbg-ann slim 125 KSI	Dual end	UNS N07718

(1) Other HS gauge configurations available upon request.

Part number suffix for pressure and temperature specifications (imperial units)

Gauges are manufactured and calibrated to be suitable for operation based upon project requirements, or for the quoted or specified pressure and temperature conditions. Customized calibrations are also available on request.

Suffix	Pressure range (psi)	Temperature range (Fahrenheit)
LP125	14.5 psi to 15,000 psi	68 °F to 257 °F
LP150	14.5 psi to 15,000 psi	68 °F to 302 °F
LP177	14.5 psi to 15,000 psi	68 °F to 350 °F
HP150	14.5 psi to 20,000 psi	68 °F to 302 °F
HP200	14.5 psi to 20,000 psi	68 °F to 392 °F
HP225	14.5 psi to 20,000 psi	68 °F to 437 °F
UHP205	14.5 psi to 25,000 psi	68 °F to 400 °F

Part number suffix for pressure and temperature specifications (SI units)

Suffix	Pressure range (bar)	Temperature range (Celsius)
LP125	1 bar to 1,035 bar	20 °C to 125 °C
LP150	1 bar to 1,035 bar	20 °C to 150 °C
LP177	1 bar to 1,035 bar	20 °C to 177 °C
HP150	1 bar to 1,400 bar	20 °C to 150 °C
HP200	1 bar to 1,400 bar	20 °C to 200 °C
HP225	1 bar to 1,400 bar	20 °C to 225 °C
UHP205	1 bar to 1,724 bar	20 °C to 205 °C

For more information: www.emerson.com

©2021 Roxar AS. All rights reserved.

The Emerson logo is a trademark and service mark of Emerson Electric Co. Roxar is a trademark of Roxar AS. All other marks are property of their respective owners.

Roxar supplies this publication for informational purposes only. While every effort has been made to ensure accuracy, this publication is not intended to make performance claims or process recommendations. Roxar does not warrant, guarantee, or assume any legal liability for the accuracy, completeness, timeliness, reliability, or usefulness of any information, product, or process described herein. All sales are governed by our terms and conditions, which are available on request. We reserve the right to modify or improve the designs or specifications of our products at any time without notice. For actual product information and recommendations, please contact your local Roxar representative.

Roxar products are protected by patents. See <http://www.emerson.com/en-us/automation/brands/roxar-home/roxar-patents> for details.