

WellWatcher Sapphire

PT gauge



Rated to 10,000 psi
[68,947 kPa]



Rated to 110 degC
[230 degF]

APPLICATIONS

- Long-term production and reservoir monitoring
- Pressure buildup surveys
- Injection monitoring
- Intelligent completions

BENEFITS

- Delivers continuous pressure and temperature measurements without well intervention
- Improves long-term measurement accuracy with excellent sensor and electronic stability
- Provides high system reliability from rigorous testing

FEATURES

- Long-term, reliable, permanent in-well reservoir monitoring
- Compact gauge design for optimal well integration
- Advanced cable connector technology
- Multiple-gauge installation on a single cable with standard 1-s sampling rate
- Compatibility with WellWatcher Neon* DTS, DAS, and PT gauge system
- Flow rate and fluid density measurements in specific applications
- Hermetically sealed gauge housing fully welded with inert gas filling
- Availability of Intelligent Well Interface Standardization (IWIS)—compliant and vendor-specific subsea card

Permanent gauge systems are part of the WellWatcher* permanent monitoring systems portfolio, which offer a complete range of downhole real-time reservoir and production monitoring solutions. Since Schlumberger pioneered permanent downhole pressure gauges with a first installation in 1972, more than 11,000 permanent gauges have been installed worldwide. Continual performance improvement over the years has yielded the most reliable track record in the industry.

Data quality

Permanent WellWatcher Sapphire* PT gauges are engineered to deliver accurate, stable pressure measurements for long-term reservoir and production monitoring applications.

Performance is validated in a controlled test cell where drift stability is measured at simulated reservoir pressure and temperature conditions—not merely at ambient temperature and atmospheric conditions.

During this measurement period, the gauges are also subjected to power on-off cycles and temperature cycling to simulate the most demanding operating conditions. The WellWatcher Sapphire gauge is qualified for a 10-year life cycle at maximum pressure and temperature conditions. It has a measured drift stability better than ± 3 psi at 10,000 psi and 230 degF [± 21 kPa at 68,947 kPa and 110 degC].

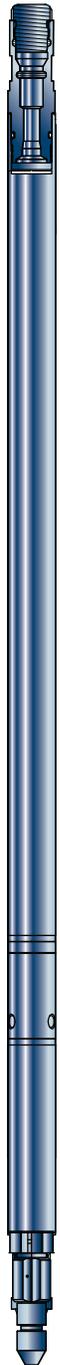
Qualification testing

The WellWatcher Sapphire gauge design is qualified through accelerated aging tests at elevated temperature and pressure cycles. The gauge assemblies also undergo repeated shock and vibration testing at rigorous levels to meet the environmental qualification for well testing in production or injection.

Designed for reliability

The long-term reliability of the WellWatcher Sapphire gauges is a result of its design, which features fully welded assemblies, subsea monitoring and control electronic technology, and corrosion-resistant alloys. Also furthering the gauge technology is the excellent reliability at system level achieved with the Schlumberger proprietary advanced connector technology. The WellWatcher Sapphire gauge is rated to 10,000 psi and is equipped with the Sealtite* downhole dry-mate connector, providing two independent seals including an improved metal-to-metal seal. For multiple-gauge application, a fully welded Y block allows efficient deployment up to six gauges on a unique cable.

For an incremental level of reliability when dictated by demanding downhole conditions such as sour fluids or below packer applications, the gauge could be equipped with the Intellitite* downhole dual-seal dry-mate connectors upon request. This premium connector provides three independent seals, including two fully redundant metal-to-metal seals, and is fully pressure-testable using a microleak detection system. For multidrop applications, gauges are designed as a fully welded Y block for a minimized number of connections.



*WellWatcher Sapphire
PT gauge.*

WellWatcher Sapphire

WellWatcher Sapphire PT Gauge Specifications

Sensor metrological performance

Sensor type	Sapphire sensor
Calibrated working pressure range, psi [kPa]	Atmospheric to 10,000 [68,947]
Calibrated working temperature range, degC [degF] [‡]	25 to 110 [77 to 230]
Other calibrated ranges [§]	Available on request
Initial pressure accuracy, psi [kPa]	< ±3 [20.7]
Pressure resolution, psi [kPa]	0.02 [0.14] at 5-s sample rate
Pressure drift stability, psi [kPa]	< ±3 [20.7]/year over full scale
Max initial temperature accuracy, degC [degF]	±0.5 [±0.9]
Temperature resolution, degC [degF]	±0.004 [±0.0072] at 5-s sample rate
Temperature drift stability, degC [degF]	< ±0.1 [±0.18]/year at 100 [212]

Physical characteristics

Max. housing diameter, in [mm]	0.75 [19]
Intellitite connector EDMC-R, true redundant metal-to-metal seal	Optional (customization request is required)
Sealite connector metal-to-metal seal	Yes (standard)
Multigauge connections options	Fully welded Y block/assembly
Gauge pressure port reading options	Tubing, annulus, control line
Gauge pressure port reading connection	Optional (axial or radial)
Service	H ₂ S per ISO 15156 (with Intellitite connector option)
Collapse pressure, psi [kPa]	11,000 [75,842]
Storage and shipping temperature, degC [degF]	-40 to 75 [-40 to 167]

Well integration

Max. number of gauges per single cable	Six at 1-s sampling rate
Max. cable length, ft [m]	32,800 [10,000]
Max. distance between gauges, ft [m]	3,281 [1,000]

Qualification test data

Long-term qualification test equivalent life cycle	10 years at 10,000 psi [68,948 kPa] and 302 degF [110 degC]
Vibration	10 to 2,000 Hz at up to 4 g _n along any axis
Shock	400 impacts at 250 g _n (2-ms half sine, 4 axes) and 6 drop impacts at 500 g _n (2-ms half sine, 6 axes)

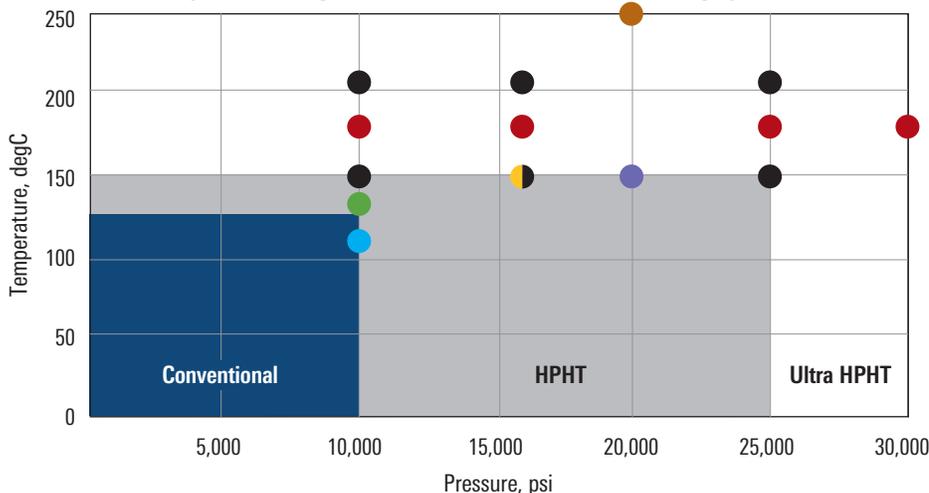
[‡]Can be exposed to higher temperatures up to 150 degC [302 degF] for periods of less than 24 hours.

[§]Lower temperature calibration may be required for injector well.

Worldwide quality service

WellWatcher systems are supported and deployed by a specialized entity of engineers and technicians highly trained on permanent monitoring systems and intelligent completion technology. A dedicated support center for project preparation and job execution contributes to delivering consistent, best-in-class service worldwide.

Pressure and Temperature Ratings for WellWatcher* Permanent Monitoring Systems Downhole Gauges



- WellWatcher Quartz* premium high-temperature, high-resolution PT gauge
- WellWatcher Quartz LT* high-resolution PT gauge
- WellWatcher Sapphire* PT gauge
- WellWatcher eQuartz* ESP-immune high-temperature, high-resolution PT gauge
- WellWatcher Quartz Extend* AC-powered high-resolution dual-sensor PT gauge
- WellWatcher Quartz Extend* DC-powered high-resolution dual-sensor PT gauge
- WellWatcher TruOptic* high-temperature fiber-optic pressure gauge

The graph shows the environmental applications in which WellWatcher system downhole gauges are most appropriate. The WellWatcher Sapphire gauge is suitable for temperatures as high as 110 degC and pressures as high as 10,000 psi.

slb.com/WellWatcher