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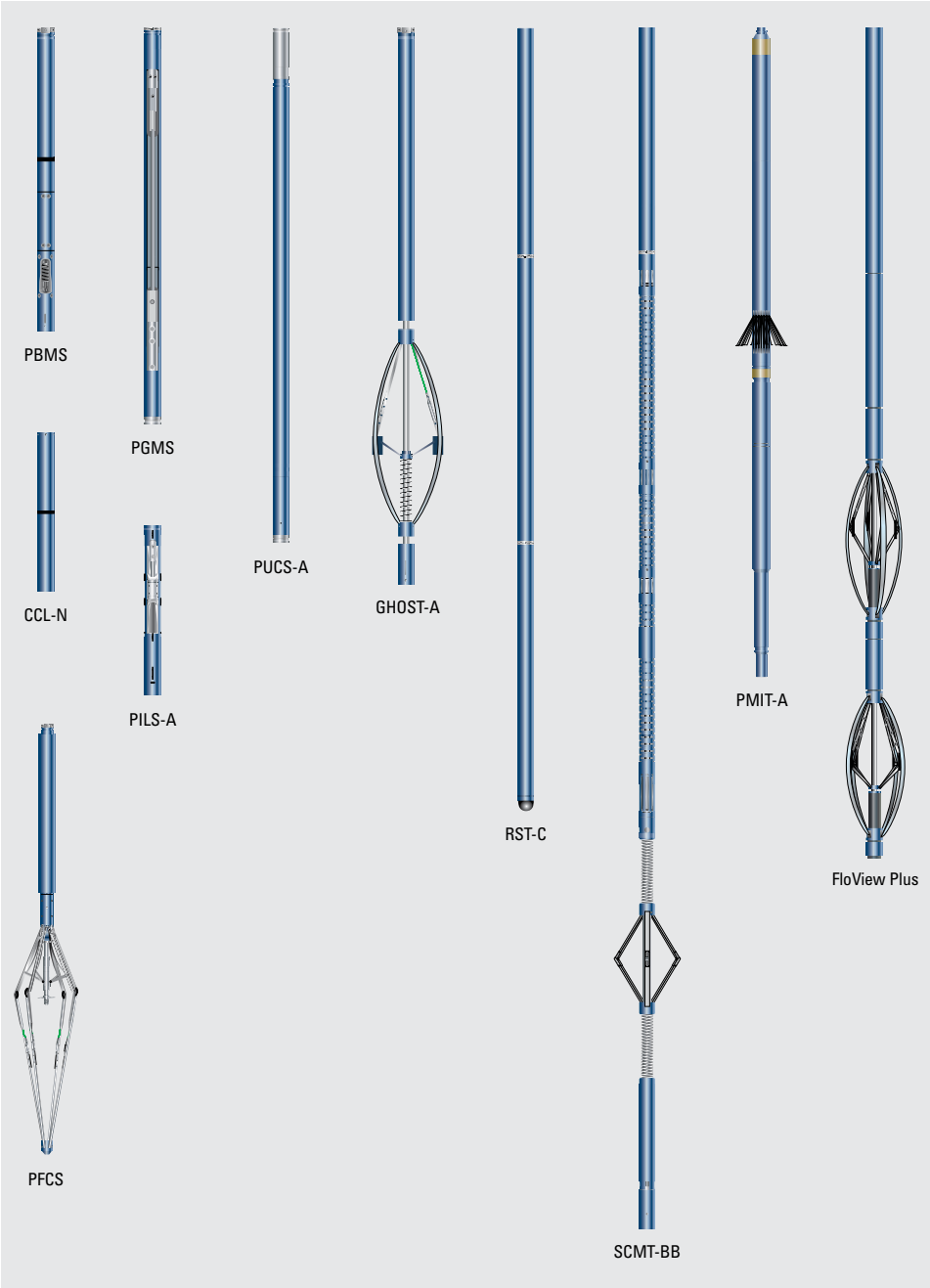
# PS Platform

## Production services platform

### APPLICATIONS

- Three-phase production logging
- Vertical and deviated wells
- Formation stimulation evaluation
- Depth correlation
- Reservoir and production monitoring
- Transient analysis
- Short periods of multiple-layer testing

The PS Platform* production services platform performs in vertical, horizontal, or any angle of borehole deviation to provide three-phase flow profiles and production monitoring or diagnostic information. Measurement capability is in either real-time or memory mode.




*Basic and additional services for the PS Platform production services platform.*

# PS Platform

The following tools and their measurements constitute the basic PS Platform platform string:

- Platform Basic Measurement Sonde (PBMS) houses the gamma ray and casing collar locator (CCL) for correlation and also measures pressure (with either a Sapphire* or quartz pressure gauge) and temperature.
- Flow-Caliper Imaging Sonde (PFCS) measures the average fluid velocity, water and hydrocarbon holdups, and bubble counts from four independent probes. It also provides dual-axis (x-y) caliper measurements and relative-bearing measurements. The bubble count image is used to identify the first fluid entry.
- Gradiomanometer* specific gravity profile tool (PGMS) measures the average density of the wellbore fluid, from which the water, oil, and gas holdups are derived. Accelerometer measurements provide deviation correction for the measured fluid density.

Additional services can be combined with the basic PS Platform platform:

- PS Platform Inline Spinner (PILS) can be used in high-flow-rate environments to determine fluid velocity.
- UNIGAGE* pressure gauge system (PUCS) is run if data from two pressure gauges (Sapphire and quartz gauges) are required.
- GHOST* gas holdup optical sensor tool uses optical sensing technology to directly detect and quantify gas in multiphase flows.
- FloView Plus* holdup measurement tool for highly deviated and horizontal wells is an imaging tool that helps identify the flow regime and measures holdup.
- RSTPro* reservoir saturation tool provides sigma, carbon/oxygen (C/O) ratio, water flow, three-phase holdup, and spectrometry logging.
- SCMT* slim cement mapping tool is a $1^{11}/_{16}$-in sonic tool that produces an eight-segment cement map and conventional 3-ft cement bond log (CBL) and 5-ft Variable Density* log (VDL) displays.
- PS Platform Multifinger Imaging Tool (PMIT) makes internal casing or tubing condition measurements from multiple caliper measurements around the casing or tubing.

Typical PS Platform production logging platform toolstrings are configured for the well position and number of production phases:

- Vertical well configuration
  - Single- or two-phase production or single-phase injection: Basic toolstring with optional PGMS
  - Three-phase production: Basic toolstring with GHOST tool and PGMS
- High-angle or horizontal well configuration
  - Single-phase production: Basic toolstring
  - Two- or three-phase production: Basic toolstring with FloView Plus or GHOST tool

**Measurement Specifications**

| | PBMS | PFCS | PGMS | GHOST Tool | RSTPro Tool | SCMT Tool |
|---|---|---|---|---|---|---|
| Output | Gamma ray, CCL, pressure (Sapphire or CQG* crystal quartz gauge), temperature, relative bearing, tool acceleration | Fluid velocity, caliper | Fluid density | Gas holdup, bubble size, caliper, relative bearing | Sigma, porosity, C/O ratio, spectrometry, WFL* water flow log, TPHL* three-phase fluid holdup log | CBL amplitude, Variable Density log, cement map |
| Logging speed | Depends on the application | Variable | Depends on the application | Depends on the application | Depends on the application | 1,800 ft/h [549 m/h] |
| Range of measurement | Sapphire gauge: 1 to 10,000 psi [6,895 Pa to 69 MPa]<br>High-pressure Sapphire gauge: 1,000 to 1,500 psi [6.9 to 103 MPa]<br>CQG gauge: 14.5 to 15,000 psi [0.1 to 103 MPa]<br>Temperature: Ambient to 302 degF [150 degC] | Spinner: 0.5 to 200 rps<br>Caliper: 2 to 11 in [5.08 to 27.94 cm] (diameter) | 0 to 2.0 g/cm³ | Gas holdup: 0 to 100%<br>Caliper: 2 to 9 in [5.08 to 22.86 cm] | Sigma: 0 to 60 cu [0 to 6.0/m]<br>Capture mode: 0 to 60% (uncorrected) | VDL window length: 1,200 ms<br>Firing center accuracy: 20 kHz |
| Vertical resolution | Point of measurement | Point of measurement | 15 in [38.10 cm] | Point of measurement | 15 in [38.10 cm] | CBL: 3 ft [0.91 m]<br>VDL: 5 ft [1.52 m]<br>Cement map: 2 ft [0.61 m] |
| Accuracy | Sapphire gauge: ±6 psi [±41,370 Pa] (accuracy), 0.1 psi [689 Pa] (resolution)<br>High-pressure Sapphire gauge: ±13 psi [±89,632 Pa] (accuracy), 0.2 psi [1,379 Pa] at 1-s gate time (resolution)<br>CQG gauge: ±(1 psi [6,894 Pa] + 0.01% of reading) (accuracy), 0.01 psi [69 Pa] at 1-s gate time (resolution)<br>Temperature: ±1.8 degF [±1 degC] (accuracy), 0.01 degF [0.018 degC] (resolution) | Caliper: ±0.2 in [±5.1 mm] (accuracy), 0.04 in [1.0 mm] on diameter (resolution) | ±0.04 g/cm³ (accuracy), 0.002 g/cm³ (resolution) | Gas holdup between 2% and 98%: ±1% (otherwise without probe protector: ±5%, with probe protector: ±7%)<br>Caliper: ±0.20 in [±5.1 mm] | Based on formation, casing, and borehole characteristics | CBL: 2% (repeatability) |
| Depth of investigation | Borehole | Borehole | Borehole | Borehole | 10 in [25.40 cm] | CBL and cement map: Casing to cement bond |
| Mud type or weight limitations | None | None | Measurement not valid in horizontal wells | None | None | None |
| Special applications | Exceeds NACE standards for $H_2S$ resistance | | | | | |

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## Mechanical Specifications

| | PBMS | PFCS | PGMS | GHOST Tool | RSTPro Tool | SCMT Tool |
|---|---|---|---|---|---|---|
| Temperature rating† | 302 degF [150 degC] | 302 degF [150 degC] | 302 degF [150 degC] | 302 degF [150 degC] | 302 degF [150 degC] | 302 degF [150 degC] |
| Pressure rating | 15,000 psi [103 MPa] | 15,000 psi [103 MPa] | 15,000 psi [103 MPa] | 15,000 psi [103 MPa] | 15,000 psi [103 MPa] | 10,000 psi [69 MPa] |
| Borehole size—min. | 2⅜ in [6.03 cm]‡ | 2⅜ in [6.03 cm]‡ | 2⅜ in [6.03 cm]‡ | 2 in [5.08 cm]‡ | RST-C: 1 13/16 in [4.60 cm]<br>RST-D: 2⅞ in [7.30 cm] | 2⅜ in [6.03 cm]‡ |
| Borehole size—max. | No limit | 11 in [27.94 cm] | No limit | 9 in [22.86 cm] | RST-C: 7⅝ in [19.37 cm]<br>RST-D: 9⅝ in [24.45 cm] | 7 in [17.78 cm] |
| Outside diameter | 1.6875 in [4.29 cm] | 1.6875 in [4.29 cm] | 1.6875 in [4.29 cm] | 1.71 in [4.34 cm] | RST-C: 1.71 in [4.34 cm]<br>RST-D: 2.51 in [6.37 cm] | 1.6875 in [4.29 cm] |
| Length | 8.27 ft [2.52 m] | 5.14 ft [1.57 m] | 4.8 ft [1.46 m] | 7.1 ft [2.16 m] | RST-C: 23.0 ft [7.01 m]<br>RST-D: 22.2 ft [6.77 m] | 11 ft [3.35 m] |
| Weight | 38.3 lbm [17.4 kg] | 19.7 lbm [8.9 kg] | 29.5 lbm [13.4 kg] | 28.4 lbm [12.9 kg] | RST-C: 101 lbm [46 kg]<br>RST-D: 208 lbm [94 kg] | 50 lbm [23 kg] |

† For high-temperature applications, ask your Schlumberger representative for the individual tool specifications.
‡ Minimum tubing size

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