

FPS2800B12C4 – Fluid Property Sensor Module



- Fully integrated, stand-alone module combines sensor and processing electronics
- Accurate, repeatable temperature, viscosity, density and dielectric constant
- Factory calibrated with NIST traceable fluids
- Digital output as per J1939, CAN2.0B standard or CAN2.0A featuring high-resolution parameter readings

DESCRIPTION

The FPS2800B12C4 is a novel fluid property sensor that will directly and simultaneously measure the viscosity, density, dielectric constant and temperature of fluids. Relying on patented tuning fork technology, the sensor monitors the direct and dynamic relationship between multiple physical properties to determine the quality, condition and contaminant loading of fluids such as engine oil, fuel, transmission and brake fluid, hydraulic and gear oils, refrigerants and solvents. The multi-parametric analysis capability improves fluid characterization algorithms. The FPS provides in-line monitoring of fluids for a wide range of OEM and aftermarket installations including fluid reservoirs, process lines and pressurized high flow conduits (e.g., engine oil gallery) for applications that include on and off highway vehicles, HVAC&R, compressors, industrial equipment and turbines. A universal digital CAN J1939 compliant protocol provides easy to connect interface to main Host controller. A simple 4 pin connector allows for cost effective mounting options.

FEATURES

- Rugged construction for high pressure and high flow environments
- Proprietary corrosion and contaminant resistant coating for wetted parts
- On-board microprocessor for real-time data analysis with 12 - 24 volts supply
- Highly reliable and long term stability

APPLICATIONS

- On and Off Highway Vehicles
- HVAC&R
- Compressors
- Industrial Equipments
- Turbines

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PERFORMANCE SPECS

MAXIMUM RATINGS

| Ratings | Symbol | Value | Unit |
|--|-----------|-------------|-------------|
| Supply Voltage (Peak) | V_{cc} | 60 | V_{dc} |
| Ambient Operating Temperature (electronics)* | T_e | -40 to +125 | $^{\circ}C$ |
| Ambient Operating Temperature (fluid)* | T_f | -40 to +150 | $^{\circ}C$ |
| Storage Temperature** | T_{sta} | -50 to +150 | $^{\circ}C$ |
| Input Current @12Vdc (In rush) | I_{max} | < 200 | mA |
| Operating Pressure | P | 25 (Note 1) | Bars |
| Vibration (Peak) | | 20 | Grms |

Peak conditions: less than 10% of the operating time.

NOTE: 1 Elevated pressure ratings are available, contact MEAS France for specs.

* Ambient Operating Temperature: Service temperature range at which the sensor and its electronics can operate securely.

** Storage Temperature: Temperature range at which the sensor can be stored with no risk of damage.

METROLOGICAL CHARACTERISTICS

(@ $V_{cc}=12V_{dc}$, $T=100^{\circ}C$, unless otherwise noted)

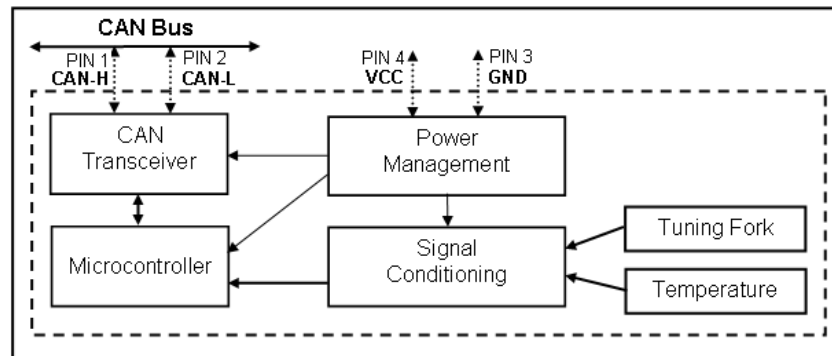
| Multi-Parametric Measurement Ranges | Symbol | Min | Typ | Max | Unit |
|--|------------|------|---------|------|-------------|
| Viscosity (dynamic) | μ | 0.5 | 15 | 50 | mPa-s (cP) |
| Viscosity (dynamic) Accuracy for viscosity > 10 mPa-s (cP) | | -5 | +/-2 | +5 | % Value |
| Viscosity (dynamic) Accuracy for viscosity < 10 mPa-s (cP) | | | +/- 0.2 | | mPa-s (cP) |
| Density | ρ | 0.65 | 0.85 | 1.50 | gm/cc |
| Density Accuracy | | -3 | +/-1 | +3 | % Value |
| Dielectric Constant | ϵ | 1.0 | 2.0 | 6.0 | - |
| Dielectric Constant Accuracy | | -3 | +/- 1 | +3 | % Value |
| Fluid Temperature | T | -40 | | 150 | $^{\circ}C$ |
| Temperature Accuracy | T | | 0.1 | | $^{\circ}C$ |

ELECTRICAL CHARACTERISTICS

(@ $V_{cc}=12V_{dc}$, $T=100^{\circ}C$, unless otherwise noted)

| Electrical Characteristics | Symbol | Min | Typ | Max | Unit |
|-------------------------------|-----------|-----|--------|-----|------|
| Supply Voltage | V_{cc} | 9 | 12(24) | 36 | Vdc |
| Supply Current (steady state) | I_{avg} | | 40(30) | 100 | mA |

BLOCK DIAGRAM



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TRANSMISSION DATA

| Viscosity | Min | Typ | Max |
|----------------------------|------------|------------|------------|
| Data Range (mPa-s) | 0.0 | | 1003.9 |
| Limits (DATA) | 0x0000 | | 0xFAF9 |
| Resolution (mPa-s per bit) | | 0.015625 | |
| Update period (s) | | 30 | |
| Density | Min | Typ | Max |
| Data Range (gm/cc) | 0.000 | | 1.9608 |
| Limits (DATA) | 0x0000 | | 0xFAF6 |
| Resolution (gm/cc per bit) | | 0.00003052 | |
| Update period (s) | | 30 | |
| Dielectric Constant | Min | Typ | Max |
| Data Range (-) | 0.00 | | 7.842 |
| Limits (DATA) | 0x0000 | | 0xFAF1 |
| Resolution (- per bit) | | 0.00012207 | |
| Update period (s) | | 30 | |
| Temperature | Min | Typ | Max |
| Data Range (°C) | -273.0 | | +1735 |
| Limits (DATA) | 0x0000 | | 0xFB00 |
| Resolution (°C per bit) | | 0.03125 | |
| Update period (s) | | 30 | |

SELF DIAGNOSTIC

| Status message code | Bit position |
|---|---------------------|
| Tuning Fork – impedance below normal or shorted to ground | 1 |
| Tuning Fork – impedance above normal or sensor damaged | 2 |
| Tuning Fork – ASIC over temperature conditions | 3 |
| Fit – simplex algorithm failed to converge | 4 |
| RTD – resistance below normal or shorted to ground | 5 |
| RTD – resistance above normal or sensor damaged | 6 |
| RTD – sensor temperature over temperature conditions | 7 |
| Internal – system error | 8 |

Diagnostic bit is set to '1' when error is detected

FPS2800 STANDARD SPN AND STANDARD PGN

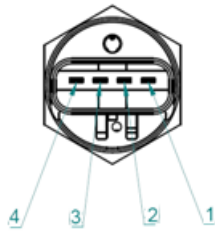
| Parameter | SPN | PGN | Byte Position | Length (byte) |
|------------------------|------------|------------|----------------------|----------------------|
| Dynamic Viscosity | 5055 | 64776 | 1 | 2 |
| Density | 5056 | 64776 | 3 | 2 |
| Dielectric Constant | 5468 | 64776 | 7 | 2 |
| Oil Temperature Sensor | 175 | 65262 | 3 | 2 |
| Status code message | N/A | 65329 | 1 | 1 |

No delay is required between command write and data read.
CAN transmission Baudrate = 250kbps

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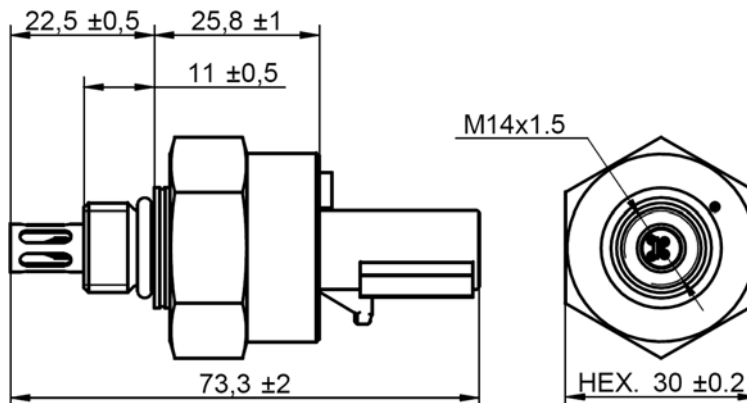
CONNECTING & MECHANICAL PACKAGING

PINOUT ASSIGNMENT (SUBJECT TO FURTHER CONFIRMATION)



| N _o | Function |
|----------------|----------------------|
| 1 | CAN_H |
| 2 | CAN_L |
| 3 | GND – Ground |
| 4 | VCC – Voltage Supply |

MECHANICAL CHARACTERISTICS: FPS2800B12C4 PACKAGE OUTLINE



All dimensions are millimeters (mm). Mating connector type is FCI female receptacle ref. 54200409 (black-sealed). Sensor body is stainless steel.
M14 Viton O’ring provided for hermetical mounting.

NOTE: For installation details, please refer to the MEAS France FPS Installation Guide – FPC013.

FPS OPTIONAL PARTS

The FPS can be provided with

- A CAN Viewer Software which allows to visualize the measured values with a PC
- A CAN-USB interface, which enables communication between PC and FPS
- An FCI Mating connector with pigtail wires

These parts should be ordered on purchase.

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RESISTANCE TO PHYSICAL AND CHEMICAL STRESSES

- FPS2800B12C4 contains circuits to protect its inputs and outputs against Electrostatic discharges (ESD) up to $\pm 25\text{kV}$ (air discharge)
- FPS2800B12C4 is protected against EMC interferences (SAE J1114)
- FPS2800B12C4 is protected against reverse polarity
- FPS2800B12C4 is cross wire protected
- Additional tests under harsh chemical conditions demonstrate good operation in presence of 5% nitric acid, soot, fuel, water, oxidized oil, a non-exhaustive list

NOTE: This FPS and its use may be covered by one or more patents, including US Patents 6,957,565; 6,873,916; 6,494,079; 6,336,353; 7,043,969 and other pending US and worldwide patents.

联系方式



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