



## FPS2800B12C4

### Oil Property Sensor

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

### Description

The FPS2800B12C4 is an oil property sensor that will directly and simultaneously measure the viscosity, density, dielectric constant and temperature of low conductivity fluids. Relying on tuning fork technology, the sensor monitors multiple physical properties that enables the OEM to determine the quality, condition and contaminant loading of fluids such as engine oil, transmission, hydraulic and gear oils. 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 based protocol provides easy to connect interface to main host controller. A simple four pins connector allows for cost effective mounting options.

### Features

- Rugged construction for high pressure and high flow environments
- On-board microprocessor for real-time data analysis with 12-24 volts supply
- Highly reliable and long term stability

### Applications

- Engine, transmission and hydraulic oils for on and off-highway vehicles

**Ordering Information**

Description	Part Number
FPS2800B12C4	FPP800A110

**Specifications**

**Maximum Ratings**

Ratings	Symbol	Value
Supply voltage (peak) (note 1)	Vcc	60 Vdc
Inrush current @12V (note 2)	I <sub>max</sub>	2A ATO or minifuse
Ambient operating temperature (electronics) (note 3)	T <sub>e</sub>	-40 to +125 °C
Ambient operating temperature (fluid) (note 3)	T <sub>f</sub>	-40 to +125 °C
Storage temperature (note 4)	T <sub>stg</sub>	-50 to +150 °C
Operating pressure (note 5)	P	25 Bars
Vibration (peak) (note 1)		20 Grms

Note 1: Peak conditions: less than 10% of the operating time.

Note 2: Inrush current depend on the installation. Please contact TE for more information.

Note 3: Ambient Operating Temperature: Service temperature range at which the sensor and its electronics can operate securely.

Note 4: Storage Temperature: Temperature range at which the sensor can be stored with no risk of damage.

Note 5: Elevated pressure ratings are available. Please contact TE for more information

**Metrological Characteristics**

(@Vcc=12Vdc, T=100°C, for a Cannon Instrument S60 fluid, unless otherwise noted)

Multi-parametric measurement range	Symbol	Minimum	Typical	Maximum	Unit
Viscosity (dynamic)	η	0.5	15	50	mPa-s (cP)
Viscosity (dynamic) Accuracy for viscosity > 10cP		-5	+/- 2	+5	% value
Viscosity (dynamic) Accuracy for viscosity < 10cP			+/- 0.2		cP
Density	ρ	0.65	0.85	1.5	gm/cc
Density Accuracy		-3	+/- 1	+3	% value
Dielectric constant	ε	1	2	6	
Dielectric constant Accuracy		-3	+/- 1	+3	% value
Fluid temperature	T	-40		150	°C
Temperature Accuracy			2		°C

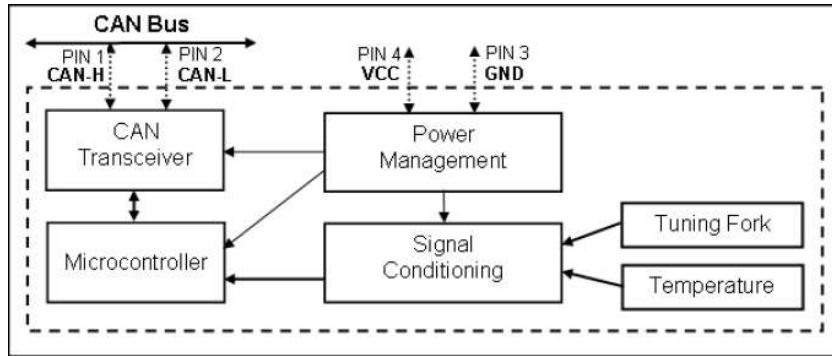
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## Electrical Characteristics

(@Vcc=12Vdc, T=100°C, unless otherwise noted)

Electrical characteristics	Symbol	Minimum	Typical	Maximum	Unit
Supply voltage	Vcc	9	12	36	Vdc
Supply current (steady state)	Iavg		70	100	mA



Block Diagram

## Transmission Data

Viscosity	Minimum	Typical	Maximum
Data range (cP)	0.0		1003.9
Limits (DATA)	0x0000		0xFAF9
Resolution (cP per bit)		0.015625	
Update period (s)		30	
Density	Minimum	Typical	Maximum
Data range (gm/cc)	0.000		1.9608
Limits (DATA)	0x0000		0xFAF1
Resolution (gm/cc per bit)		0.00003052	
Update period (s)		30	
Dielectric constant	Minimum	Typical	Maximum
Data range (-)	0.00		7.842
Limits (DATA)	0x0000		0xFAF1
Resolution (per bit)		0.00012207	
Update period (s)		30	
Temperature	Minimum	Typical	Maximum
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 damage	6
RTD – sensor temperature over temperature conditions	7
Internal – system error	8

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

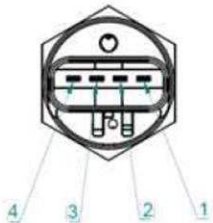
**FPS2800 Standard SPN and Standard PGN**

Parameter	SPN	PGN	Byte position	Length (byte)
Dynamic viscosity	5055	64776	1	2
Density	5056	64776	3	2
Dielectric constant	5068	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

**Connecting & Mechanical Packaging**

**PINOUT Assignment**



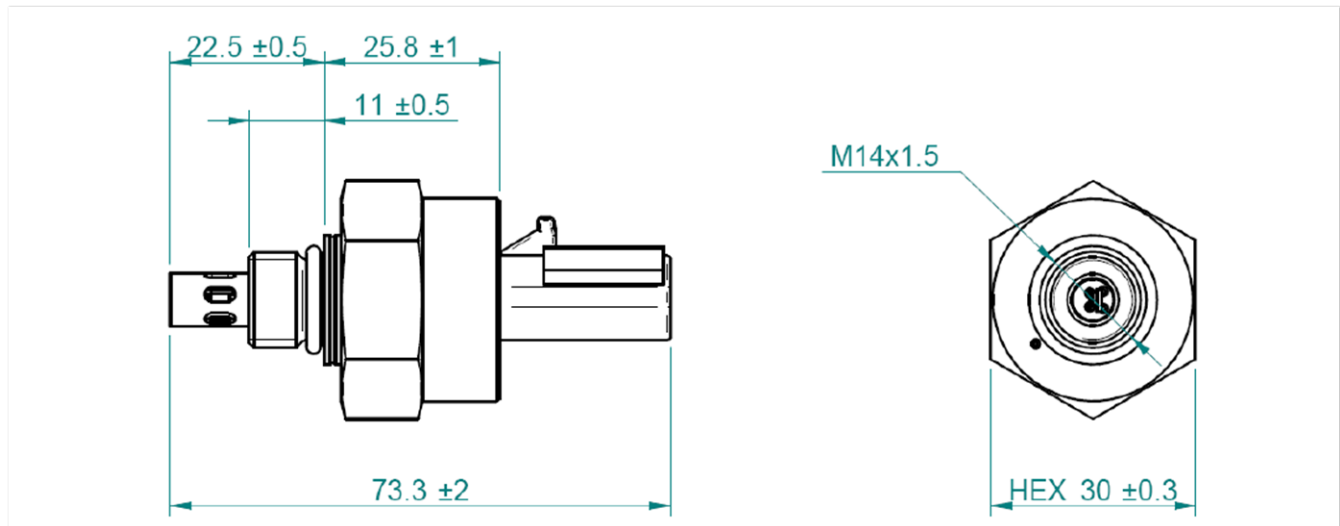
N <sub>0</sub>	Function
1	CAN_H
2	CAN_L
3	GND – Ground
4	VCC – Voltage Supply

**MECHANICAL CHARACTERISTICS: FPS2800B12C4 PACKAGE OUTLINE**

All dimensions are millimeters (mm). Mating connector type is FCI female receptacle ref. 54200409 (blacksealed).

Sensor body is stainless steel.

M14 O'ring provided for hermetical mounting.

**Resistance to Physical and Chemical Stresses**

- FPS2800B12C4 contains circuits to protect its inputs and outputs against Electrostatic discharges (ESD) up to  $\pm 15$  kV (air discharge)
- FPS2800B12C4 is protected against EMC interferences
- 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, water, oxidized oil, a non-exhaustive list

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## Ordering Information

Part Number for the Generic Version is FPP800A110.

\* Without specification, each order will be delivered with the Generic version of the FPS2800B12C4 (Calibration point at medium viscosity and medium temperature).

### NORTH AMERICA

Tel +1 800 522 6752  
[customercare.hmpt@te.com](mailto:customercare.hmpt@te.com)

### EUROPE

Tel +31 73 624 6999  
[customercare.tlse@te.com](mailto:customercare.tlse@te.com)

### ASIA

Tel +86 0400 820 6015  
[customercare.shzn@te.com](mailto:customercare.shzn@te.com)

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