FPS2800B12C4 fluid characteristic sensor module

- **Measuring temperature, viscosity, density and dielectric constant precisely and**
- **Highly integrated single module, including sensor and electronic processing module section repeatedly**
- **Calibration is performed using a NIST (National Institute of Standards and Technology) calibrated fluid**
- **According to J1939, CAN2.0B standard or CAN2.0A digital output, it has the function of reading parameters with high resolution.**

description

The FPS2800B12C4 is an innovative fluid characteristic sensor that directly and simultaneously measures viscosity, density, dielectric constant, and temperature. Through patented tuning fork technology, it detects direct and dynamic relationships between multiple physical properties of fluids such as engine oil, fuel, transmission fluid, brake fluid, hydraulic oil, gear oil, refrigerant, and solvents. This multi-parameter analysis capability enhances the operational principles of fluid characteristics. The FPS provides OEMs and aftermarket users with online fluid detection capabilities, widely applicable to fluid storage, processing lines, pressurized high-speed conduits (e.g., chemical supply and processing loops), and other fields in transportation vehicles, special-purpose equipment, refrigeration systems, HVAC, compressors, industrial machinery, and turbines. Utilizing a universal digital CAN J1939 protocol, it enables easy connection to main controllers. A simple 4-pin connector installation saves user costs.

feature

- High strength structure, can be used in high pressure and high flow rate environment
- A unique corrosion and anti-pollution coating to protect moist parts
- Built-in microprocessor for real-time data analysis, optional 5, 12 or 24 v power supply voltage
- Excellent long-term stability and reliability

apply

- Transport vehicles, special operation vehicles
- HVAC
- compression engine
- commercial installation
- turbine

performance parameter

maximum rating

metric	sign	numeric value	unit
Power supply voltage (peak)	V_{cc}	24	V_{dc}
Environmental working temperature (electrical part)	Te	-40 to +125	°C
Environmental operating temperature (fluid)	Tf	-40 to +150	°C
storage temperature	T_{stg}	-50 to +150	°C
Input current @12Vdc (peak)	I_{avg}	< 200	mA
working pressure	P	25 (Note 1)	Bars
Vibration (peak)		20	Grms

Peak condition: less than 10% of working time **Note: 1 If you need to increase the value, please contact MEAS France.**

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Computational features

(@Vcc=12V $_{dc}$, T = 100 ° C, unless otherwise stated)

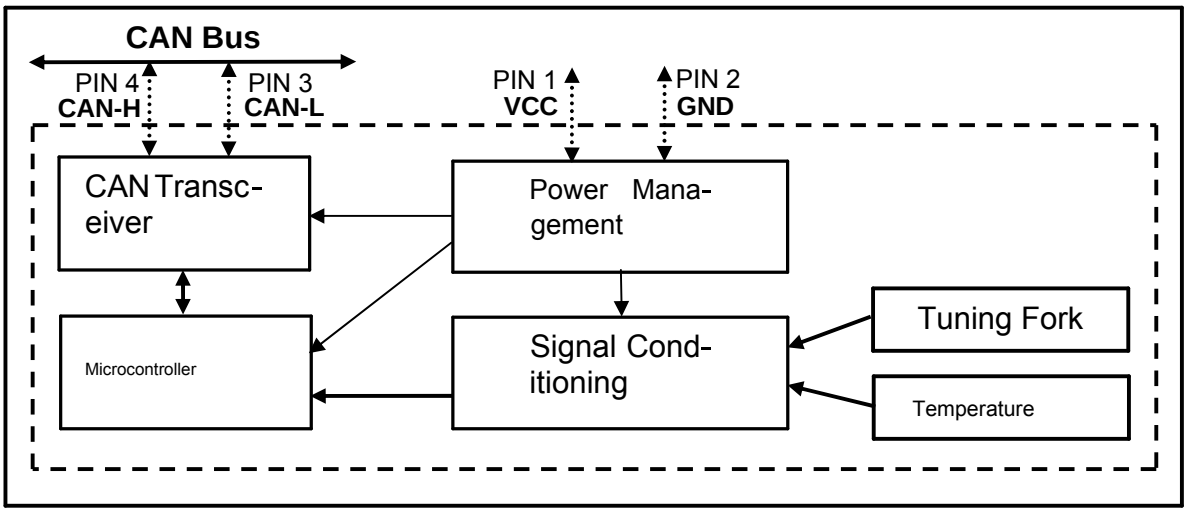
Multi-parameter measurements	sign	least value	representative value	crest value	unit
Viscosity (dynamic)	μ	0.5	15	50	mPa-s (cP)
Viscosity (dynamic) precision (viscosity> 10 mPa-s (cP))		-5	+/-2	+5	% Value
Viscosity (dynamic) precision (viscosity <10 mPa-s (cP))			+/- 0.2		mPa-s (cP)
density	ρ	0.65	0.85	1.50	gm/cc
Density accuracy		-5	+/-2	+5	% Value
dielectric constant	ε	1.0	2.0	6.0	-
Dielectric constant accuracy			TBD		% Value
fluid temperature	T	-40		150	°C
Temperature precision	T		0.1		°C
Access characteristics	**sign**	**least value**	**representative value**	**crest value**	**unit**
Output refresh rate	t		60		Second

Electrical properties

(@Vcc=12V $_{dc}$, T = 100 ° C, unless otherwise stated)

Electrical properties	sign	least value	representative value	crest value	unit
supply voltage	V_{Batt}	5	12	20	Vdc
Power current (steady state)	I_{avg}		40	100	mA

assumption diagram



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Transmission Signal

CAN_H and CAN_L limits

parameter	condition	least value	representative value	crest value	unit
CAN_L's DC voltage	-	-36	-	+36	V
CAN_H's DC voltage	-	-36	-	+36	V
Instantaneous voltage of CAN_H and CAN_L	-	-200	-	+200	V

DC Bus Transceiver

(R_L=60Ω)

parameter	condition	least value	representative value	crest value	unit
high level input voltage	Output implicit	0.7Vcc	-	Vcc+0.3	V
low level input voltage	Output explicit	-0.3	-	0.3Vcc	V
High level input current	-	-200	-	+30	μA
Low level input current	-	-100	-	-600	μA
Recessive bus voltage (CAN_H-CAN_L)	non-loaded	2	-	3	V
Off state output leakage current	-2V<C_H&L<7V	-2	-	+2	mA
	-5V<C_H&L<36V	-10	-	+10	mA
CAN_H output voltage	Vcc = 4.75 to 5.5 V	3.00	-	4.50	V
	Vcc = 4.50 to 4.75 V	2.75	-	4.50	V
CAN_L Output voltage	-	0.5	-	2.0	V
The difference in output voltage between CAN_H and CAN_L	dominance	1.5	-	3.0	V
	Visible; R_L =45Ω	1.5	-	-	V
	Implicit; no load	-500	-	+50	mV
Short circuit current of CAN_H	V_{CAN_H} = -5 V	-	-	-200	mA
	V_{CAN_H} = -36 V	-	-100	-	mA
Short circuit current of CAN_L	V_{CAN_L} = 36 V	-	-	200	mA

DC Bus Receiver

(External drive CAN_H and CAN_L; -2V <CAN_H and CAN_L <7V; unless otherwise stated)

parameter	condition	least value	representative value	crest value	unit
Differential input voltage (implicit)	-	-1.0	-	+0.5	V
Differential input voltage (explicit)	-	0.9	-	5.0	V
Differentiated input hysteresis	-	-	150	-	mV
CAN_H, CAN_L input resistance	-	5	-	25	kΩ
Differentiated input resistance	-	20	-	100	kΩ

Essential conditions:>10MΩ @ 500 VDC

FPS2800B12C4 Fluid Characteristic Sensor Module

reckon by time

parameter	condition	least value	representative value	crest value	unit
Second time Bit Time*	Total bus load 250 Kbit/s	3.999	4	4.001	μs
Edge slope of CAN_H, CAN_L	-	-	7	-	V/μs
Sampling delays	Total bus load 250 Kbit/s		81%		TBit

* Different binary times can be used as needed

Data Transmission

dynamic viscosity	least value	representative value	crest value
Limit (mPa-s)	0.0		1003.9
Limits (DATA)	0x0000		
Resolution (mPa-s)		0.0156625	
Resolution (DATA)		1	
regeneration time (mn)		TBD	
density	**least value**	**representative value**	**crest value**
Limit (gm/cc)	0.000		1.9608
Limits (DATA)	0x0000		
Resolution (gm/cc)		0.00003052	
Resolution (DATA)		1	
regeneration time (mn)		TBD	
dielectric constant	**least value**	**representative value**	**crest value**
the limit (-)	0.00		7.842
Limits (DATA)	0x0000		
definition (-)		0.00012207	
Resolution (DATA)		1	
regeneration time (mn)		TBD	
temperature	**least value**	**representative value**	**crest value**
the limit (°C)	-273.0		+1735
Limits (DATA)	0x0000		0xFB00
definition (°C)		0.03125	
Resolution (DATA)		1	
regeneration time (mn)		TBD	

FPS2800 STANDARD SPN and STANDARD PGN

There must be no delay between instruction writing and data reading. Dynamic viscosity: SPN and PGN TBD

Density: SPN and PGN TBD

Dielectric constant: SPN and PGN TBD

Oil temperature sensor: SPN and PGN TBD

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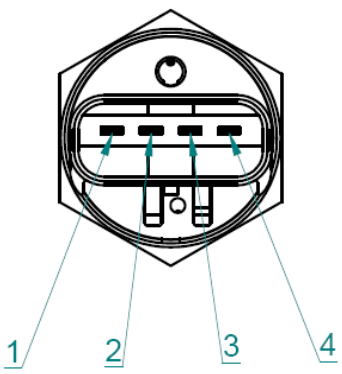
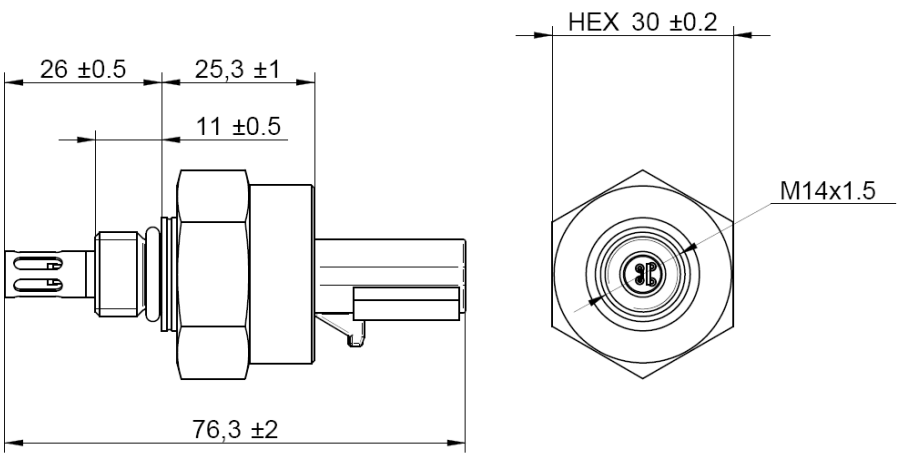
Connection and Mechanical Packaging

Lead distribution (to be confirmed)



N_0	function
1	VDD – power supply voltage
2	GND– landing
3	CAN_L
4	CAN_H

Mechanical properties: FPS2800B12C4 external packaging diagram



All dimensions are in millimeters (mm). The interface type is FCI female connector (ref. 54200409, black sealing). The sensor body is made of stainless steel. **Note: For detailed installation information, please refer to the FPS Installation Manual-FPC013 from MEAS France.**

Physical and Chemical Stress Resistance

- The FPS2800B12C4 has a protective circuit against electrostatic discharge (ESD) (range: ±15kV, air discharge).
- The FPS2800B12C4 is resistant to electromagnetic interference (EMC interferences (SAE J1114)).
- The FPS2800B12C4 has anti-polarity functionality.
- The FPS2800B12C4 has cross wiring protection.
- Other tests show that it can still maintain good operation under harsh chemical conditions such as 5% nitric acid, carbon accumulation, fuel oil, water and oxidized oil.

Note: This FPA product and its applications contain one or more patents, including U.S. Patents 6,957,575; 6,873,916; 6,494,079; 6,336,353; 7,043,969 and other pending U.S. and foreign patents.

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