Fluid property sensor

Continuously validation of fluid quality

aerospace
climate control
electromechanical
filtration
fluid & gas handling
hydraulics
pneumatics
process control
sealing & shielding

Parker

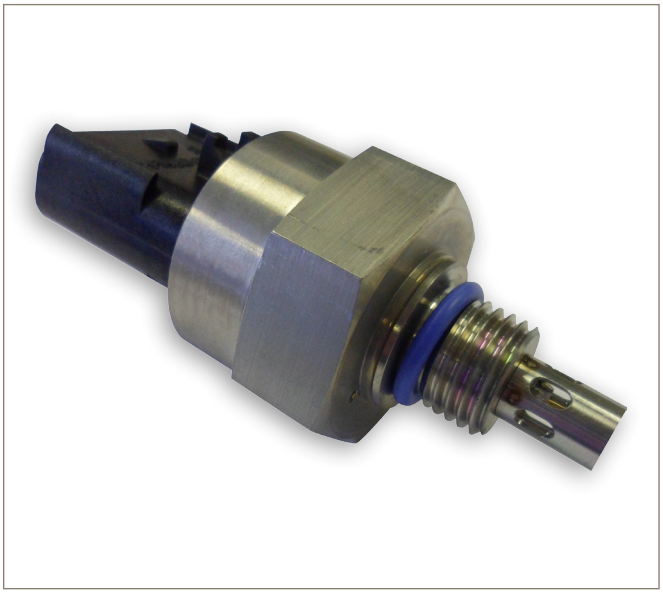
ENGINEERING YOUR SUCCESS.

Modern mobile equipment calls for a hydraulic fluid ensuring profitable and reliable operation

Description:

The FPS 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, gears 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.



Important note

The Parker FPS does not use a “fingerprint” principle. Sensors using a “fingerprint” principle require up-front calibration in the fluid type subject to future analysis. This calibration can take up to 200 hours, during which time the aging of the oil can start and hence the calibrated reference is not accurate. When a different oil is applied, sensors using the “fingerprint” principle require new calibration. Parker’s PFS sensor directly measures the important fluid properties without the need for calibration in-advance.

Advantages

- Continuously measurement of important fluid properties
- Early detection of fluid aging
- No up-front calibration required
- On board processor with real-time data analysis with 5, 10 or 24 volts supply

Maximum ratings

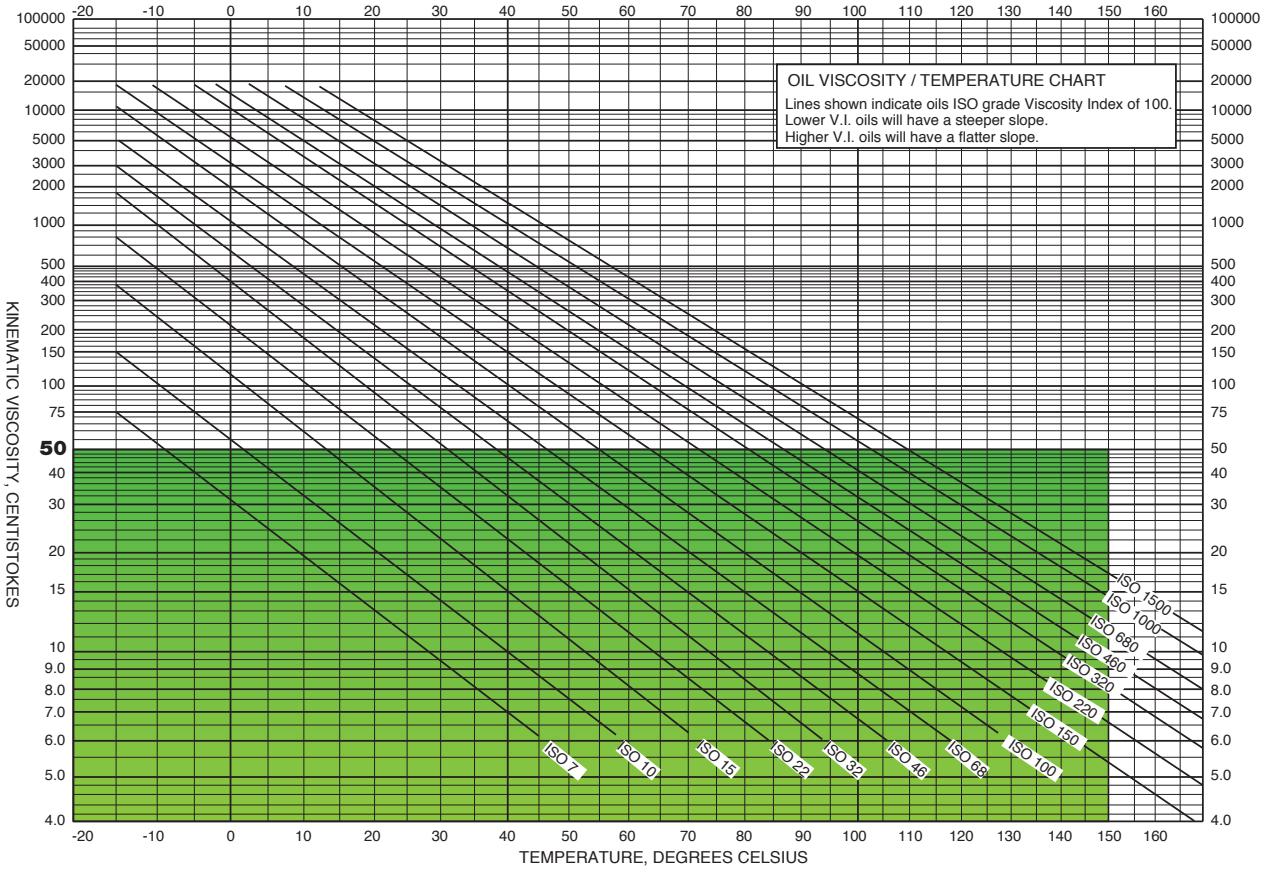
Ratings	Symbol	Value	Unit
Supply Voltage (Peak)	Vcc	60	Vdc
Ambient Operating Temperature (electronics)*	Te	-40 to +125	°C
Ambient Operating Temperature (fluid)*	Tf	-40 to +150	°C
Storage Temperature**	Tstg	-50 to +150	°C
Input Current @12Vdc (In rush)	Imax	<200	mA
Operating Pressure	P	25 (Note 1)	Bars
Vibration (Peak)		20	Grms

Peak conditions: less than 10% of the operating time.
NOTE: 1 Elevated pressure ratings are available, contact Parker filtration 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

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

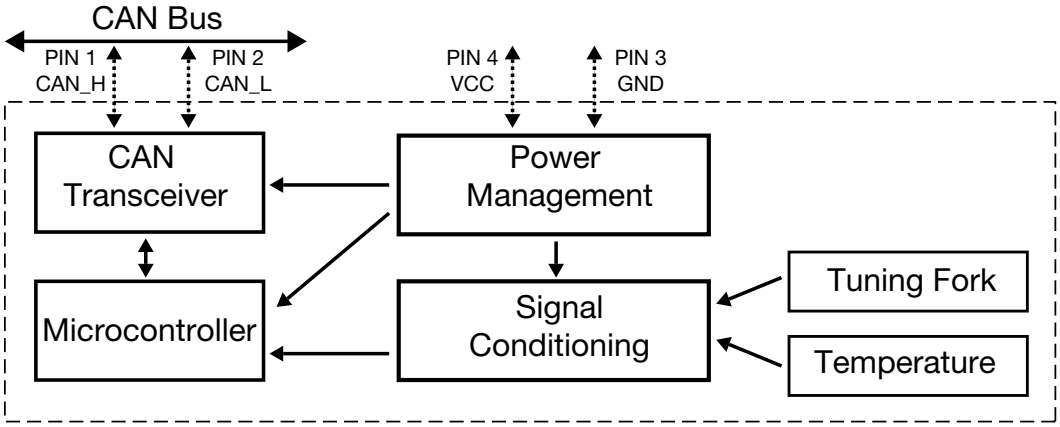
Multi-Parametric Measurement Ranges	Symbol	Min	Typ	Max	Unit
Viscosity (dynamic)	μ	0.5	15	50	mPa-s (cP)
Viscosity (dynamic) Accuracy for viscosity > 10 mPa-s (cP)		-5	+/-2	+5	% Value
Viscosity (dynamic) Accuracy for viscosity < 10 mPa-s (cP)			+/-0.2		mPa-s (cP)
Density	ρ	0.65	0.85	1.50	gm/cc
Density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



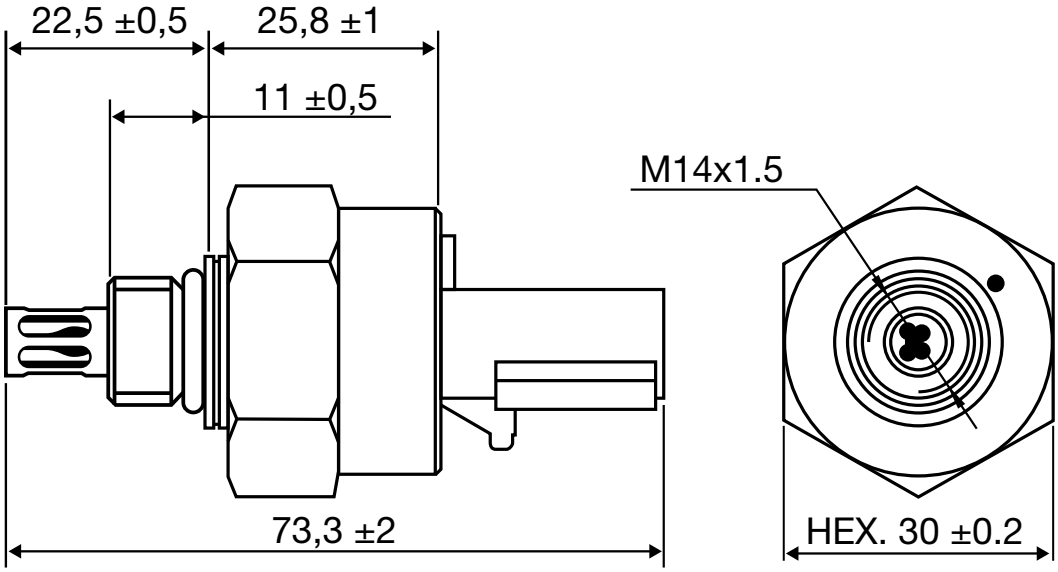
ISO oil viscosity chart with reccomended temperature and viscosity range.

Specification

Block diagram



Dimensions



All dimensions are millimeters (mm). Communication cable ACC6NF004. Sensor body is stainless steel.
NOTE: For installation details, please refer to the Parker FPS Installation Guide.

Product usage FPS without data diplay

Connect FPS with master system controller
- Parker software to be installed on master controller
- Part numbers FPS2000 + ACC6NF004

Product usage FPS with data diplay

FPS as stand-alone sensor with remote controller
- Parker software installed on MD3 controller
- Part numbers FPS2000, ACC6NF005 and ACC6NN050

Transmission signals

CAN_H & CAN_L limiting values

Parameter	Conditions	Min	Typ	Max	Unit
DC voltage at CAN_L	-	-36	-	+36	V
DC voltage at CAN_H	-	-36	-	+36	V
Transient voltage on CAN_H & CAN_L	-	-200	-	+200	V

DC bus transmitter

(R_L=60Ω)

Parameter	Conditions	Min	Typ	Max	Unit
High level input voltage	Output recessive	0.6V_{CC}	-	V_{CC} + 0.3	V
Low level input voltage	Output dominant	-0.3	-	0.2 V_{CC}	V
High level input current	-	-200	-	+30	µA
Low level input current	-	-100	-	-600	µA
Recessive bus voltage (CAN_H - CAN_L)	No load	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	V_{CC}=3.3V	2.45	-	V_{CC}	V
CAN_L output voltage	-	0.5	-	1.25	V
Difference between output voltage at CAN_H & CAN_L	Dominant	1.5	-	3.0	V
	Dominant; R_L=45Ω	1.5	-	-	V
	Recessive; no load	-120	-	+12	mV
Short circuit CAN_H current	V_{CAN_H} = -2V	-200	-	+250	mA
	V_{CAN_H} = -36V	-	-100	-	mA
Short circuit CAN_L current	V_{CAN_H} = 37V	-200	-	+250	mA

DC bus receiver

(CAN_H & CAN_L externally driven; -2V< CAN_H & CAN_L<7V; unless otherwise specified)

Parameter	Conditions	Min	Typ	Max	Unit
Differential input voltage (recessive)	Output recessive	0.6V_{CC}	-	V_{CC} + 0.3	V
Differential input voltage (dominant)	Output dominant	-0.3	-	0.2 V_{CC}	V
Differential input hysteresis	-	-200	-	+30	µA
CAN_H, CAN_L input resistance	-	-100	-	-600	µA
Differential input resistance	No load	2	-	3	V

Requirements: >10Ω @500 VDC

Timing

Parameter	Conditions	Min	Typ	Max	Unit
Bit Time*	Bus load 250 Kbit/s	3.999	4	4.001	µs
CAN_H, CAN_L slew rate	-	-	7	-	V/µs
Sampling Delay	Bus load 250 Kbit/s		81%		TBit

Different Bit time available upon request

Electrical characteristics

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

Electrical Characteristics	Symbol	Min	Typ	Max	Unit
Supply Voltage	Vcc	5	12	20	Vdc
Supply Current (steady state)	Iavg		40	100	mA

Transmission data

Viscosity	Min	Typ	Max
Limits (mPa-s)	0.0		1003.9
Limits (DATA)	0x0000		0xFAF9
Resolution (mPa-s)		0.015625	
Resolution (DATA)		1	
Update period (s)		30	
Density	**Min**	**Typ**	**Max**
Limits (gm/cc)	0.000		1.9608
Limits (DATA)	0x0000		0xFAF6
Resolution (gm/cc)		0.00003052	
Resolution (DATA)		1	
Update period (mn)		30	
Dielectric Constant	**Min**	**Typ**	**Max**
Limits (-)	0.000		7.842
Limits (DATA)	0x0000		0xFAF1
Resolution (-)		0.00012207	
Resolution (DATA)		1	
Update period (mn)		30	
Temperature	**Min**	**Typ**	**Max**
Limits (°C)	-273.0		+1735
Limits (DATA)	0x0000		0xFB00
Resolution (°C)		0.03125	
Resolution (DATA)		1	
Update period (mn)		30	

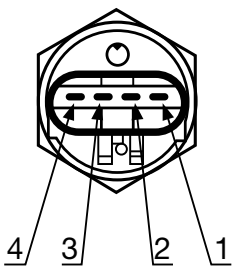
FPS2000 standard SPN and standard PGN

Parameter	SPN	PGN
Kinematic Viscosity	5055	64776
Density	5056	64776
Dielectric Constant	5468	64776
Oil Temperature Sensor	175	65262

No delay is required between command write and data read.

Connecting & mechanical packaging

Pinout assignment (subject to further confirmation)



N0	Function
1	CAN_H
2	CAN_L
3	GND - Ground
4	VCC -Voltage Supply

Resistance to physical and chemical stress

The PFS2000 is protected against:
- EMC interferences (SAE J1114)
- Reverse polarity
- Electrostatic discharges (ESD) up to +/- 25kV (air discharge)
- Cross wire connection

The PFS2000 is tested under harsh chemical conditions and demonstrate good operation in presence of 5% nitric acid, soot, fuel, water and oxidized oil. For specific questions related to fluid compatibility please consult Parker Filtration.

Ordering information

FPS connected to system controller

Description	Partnumber
FPS sensor	FPS2000
Communication cable	ACC6NF004

FPS connected to system controller

Description	Partnumber
FPS sensor	FPS2000
iCount FPS data display with 4,5 mtr cable	ACC6NF005
iCount IQAN run software	ACC6NN050

MD3 controller

Example of visual presentation of measurements

Parker Worldwide

Europe, Middle East, Africa

AE – United Arab Emirates, Dubai
Tel: +971 4 8127100
parker.me@parker.com

AT – Austria, Wiener Neustadt
Tel: +43 (0)2622 23501-0
parker.austria@parker.com

AT – Eastern Europe, Wiener Neustadt
Tel: +43 (0)2622 23501 900
parker.easteurope@parker.com

AZ – Azerbaijan, Baku
Tel: +994 50 2233 458
parker.azerbaijan@parker.com

BE/LU – Belgium, Nivelles
Tel: +32 (0)67 280 900
parker.belgium@parker.com

BY – Belarus, Minsk
Tel: +375 17 209 9399
parker.belarus@parker.com

CH – Switzerland, Etoy
Tel: +41 (0)21 821 87 00
parker.switzerland@parker.com

CZ – Czech Republic, Klecany
Tel: +420 284 083 111
parker.czechrepublic@parker.com

DE – Germany, Kaarst
Tel: +49 (0)2131 4016 0
parker.germany@parker.com

DK – Denmark, Ballerup
Tel: +45 43 56 04 00
parker.denmark@parker.com

ES – Spain, Madrid
Tel: +34 902 330 001
parker.spain@parker.com

FI – Finland, Vantaa
Tel: +358 (0)20 753 2500
parker.finland@parker.com

FR – France, Contamine s/Arve
Tel: +33 (0)4 50 25 80 25
parker.france@parker.com

GR – Greece, Athens
Tel: +30 210 933 6450
parker.greece@parker.com

HU – Hungary, Budapest
Tel: +36 1 220 4155
parker.hungary@parker.com

IE – Ireland, Dublin
Tel: +353 (0)1 466 6370
parker.ireland@parker.com

IT – Italy, Corsico (MI)
Tel: +39 02 45 19 21
parker.italy@parker.com

KZ – Kazakhstan, Almaty
Tel: +7 7272 505 800
parker.easteurope@parker.com

NL – The Netherlands, Oldenzaal
Tel: +31 (0)541 585 000
parker.nl@parker.com

NO – Norway, Asker
Tel: +47 66 75 34 00
parker.norway@parker.com

PL – Poland, Warsaw
Tel: +48 (0)22 573 24 00
parker.poland@parker.com

PT – Portugal, Leca da Palmeira
Tel: +351 22 999 7360
parker.portugal@parker.com

RO – Romania, Bucharest
Tel: +40 21 252 1382
parker.romania@parker.com

RU – Russia, Moscow
Tel: +7 495 645-2156
parker.russia@parker.com

SE – Sweden, Spånga
Tel: +46 (0)8 59 79 50 00
parker.sweden@parker.com

SK – Slovakia, Banská Bystrica
Tel: +421 484 162 252
parker.slovakia@parker.com

SL – Slovenia, Novo Mesto
Tel: +386 7 337 6650
parker.slovenia@parker.com

TR – Turkey, Istanbul
Tel: +90 216 4997081
parker.turkey@parker.com

UA – Ukraine, Kiev
Tel +380 44 494 2731
parker.ukraine@parker.com

UK – United Kingdom, Warwick
Tel: +44 (0)1926 317 878
parker.uk@parker.com

ZA – South Africa, Kempton Park
Tel: +27 (0)11 961 0700
parker.southafrica@parker.com

North America

CA – Canada, Milton, Ontario
Tel: +1 905 693 3000

US – USA, Cleveland
Tel: +1 216 896 3000

Asia Pacific

AU – Australia, Castle Hill
Tel: +61 (0)2-9634 7777

CN – China, Shanghai
Tel: +86 21 2899 5000

HK – Hong Kong
Tel: +852 2428 8008

IN – India, Mumbai
Tel: +91 22 6513 7081-85

JP – Japan, Tokyo
Tel: +81 (0)3 6408 3901

KR – South Korea, Seoul
Tel: +82 2 559 0400

MY – Malaysia, Shah Alam
Tel: +60 3 7849 0800

NZ – New Zealand, Mt Wellington
Tel: +64 9 574 1744

SG – Singapore
Tel: +65 6887 6300

TH – Thailand, Bangkok
Tel: +662 186 7000-99

TW – Taiwan, Taipei
Tel: +886 2 2298 8987

South America

AR – Argentina, Buenos Aires
Tel: +54 3327 44 4129

BR – Brazil, Sao Jose dos Campos
Tel: +55 800 727 5374

CL – Chile, Santiago
Tel: +56 2 623 1216

MX – Mexico, Apodaca
Tel: +52 81 8156 6000

Catalogue FDHB829UK

EMEA Product Information Centre
Free phone: 00 800 27 27 5374
(from AT, BE, CH, CZ, DE, DK, EE, ES, FI, FR, IE, IL, IS, IT, LU, MT, NL, NO, PL, PT, RU, SE, SK, UK, ZA)

US Product Information Centre
Toll-free number: 1-800-27 27 537

Your local authorized Parker distributor