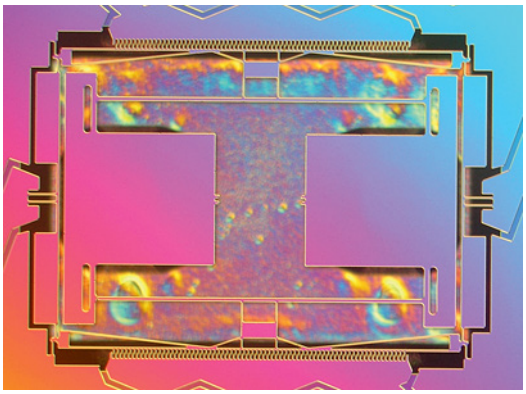




RPS/DPS 8000

High accuracy resonant pressure sensor

Since 1972, Druck has manufactured precision pressure sensors with a capability to meet critical applications in industrial, aerospace, oil and gas, and research environments. Today, Druck is part of Baker Hughes and has continually worked to develop and improve on the performance of our pressure sensors to meet our customers' requirements.

The RPS/DPS 8000 is the first product to incorporate the TERPS technology over 10 years ago. TERPS is a resonant silicon pressure sensor technology platform that provides an order of magnitude greater accuracy and stability than current pressure measurement technologies. The TERPS technology also extends the pressure range capability to high pressures and, by incorporating true pressure media isolation, greatly improves its suitability for use in harsh environments.

In addition to providing the performance and packaging improvements available with TERPS, the RPS/DPS 8000 product line takes advantage of best practices to offer a wide range of pressure and electrical connections to enable a level of customization for your specific requirements never before available in the performance class of this sensor.

The combination of the power of the TERPS technology and the quality, reliability and flexibility of the RPS/DPS 8000 Series offers a truly unique solution for high accuracy and high stability pressure measurement requirements.

Features

- High Precision, ±0.01% FS over compensated temperature range
- High Stability, ±100 ppm FS/year
- Wide temperature range, up to -55°C to +125°C (-40° to 257°F)
- Media isolated construction, suitable for use in harsh environments
- Multiple output configurations, RS-232, RS-485, USB 2.0, CANbus, frequency and diode (TTL)
- Wide selection of pressure and electrical connections to suit specific requirements

Specifications

Measurement

Base pressure ranges

- 0 to 2 bar (0 to 29 psi) absolute
- 0 to 7 bar (0 to 101 psi) absolute
- 0 to 14 bar (0 to 203 psi) absolute
- 0 to 20 bar (0 to 290 psi) absolute
- 0 to 35 bar (0 to 507 psi) absolute
- 0 to 70 bar (0 to 1015 psi) absolute
- 0 to 100 bar (0 to 1450 psi) absolute
- 0 to 200 bar (0 to 2900 psi) absolute

Calibrated ranges

Any zero-based range between 1 and 200 bar (14.5 to 2900 psi) can be specified. (Performance will be of the full scale of the base pressure range selected.) Barometric ranges are available in the RPS/DPS 8100 series. The lowest calibrated pressure is 35 mbar absolute.

Overpressure

1.5X FS

Sensor failure pressure

2.0X FS

Pressure containment

- Ranges to 7 bar (100 psi), 70 bar (1,000 psi)
- Ranges to 100 bar (1,000 psi), 200 bar (3,000 psi)
- Ranges to 200 bar (3,000 psi), 700 bar (10,000 psi)

Supply and output

Electronics option	Supply voltage (V DC)	Output	Current consumption[2] (mA)
1	5 to 32	Frequency and diode TTL[1,3,4]	3.5
F	5 to 32	RS485	<16.5 quiescent, 32 max
G	5 to 32	RS232	<16.5 quiescent, 32 max
C	7.5 to 30	CANbus	25 quiescent, 32 max
V	4.8 to 5.2	USB 2.0	20 quiescent

1. Jitter less than 20 ns

2. Full temperature range

3. Square wave pressure signal, 25 kHz nominal, 4–10 kHz span

4. Forward voltage diode, 0.5 to 0.7 V @ 25°C (77°F), typically -2 mV/°C nominal

Response time

- TTL output: <25 ms for pressure change from 10% to 90% FS
- RS232/RS485/USB output: Dependent on the output update rate which is set by the user with a minimum of 10 ms (see manual K0473 for details)
- CANbus: Dependent on the output update rate which is set by the user with a minimum of 10 ms while maintaining specification (see manual K0533 for details).

Supply response

TTL/RS232/RS485/USB: Accurate to specification within 500 ms of power up, over all operating temperatures

CANbus: Accurate to specification within 10 min of power-up

Electrical protection

RS232/485/CANbus/TTL:Connecting Vsupply and GND between any combinations of pins on the connector will not damage the unit

Insulation

RS232/485/CANbus/TTL: 100 Mohm @ 500 Vdc between all pins and case.

Performance

There are two levels of performance specification:

- Standard
- Improved

Specifications include combined effects of non-linearity, hysteresis, repeatability and temperature errors over the compensated temperature range, and over the base pressure range of 35 mbar to the full scale pressure.

Accuracy code	Precision
A1 - Standard	0.02% FS
A2 - Improved	0.01% FS

- For frequency and diode output, the above accuracies are achievable by using a polynomial curve fit algorithm and coefficient data supplied with sensor.
- Sensors are calibrated against standards traceable to UKAS operating to better than 100 ppm.

Compensated temperature ranges

There are three compensated temperature ranges available:

- -10 to +50°C
- -40 to +85°C
- -40 to +125°C (TTL, RS-485 & CANbus only)
- -55 to +125°C
  (TTL, RS-485 and CANbus only, ranges >2 bar)

Temperature effects

All temperature effects are included in the accuracy statement.

Long term stability

±0.01% FS/annum

Note: Unless otherwise specified, specifications are at the reference conditions of 25°C (77°F) ±5°C (±9°F) and 1 bar (14 psi).

Orientation (g) sensitivity

Less than 0.2 mbar/g

Physical specifications

Storage temperature range

As compensated temperature range.

Operating temperature range

As compensated temperature range.

Pressure media

Fluids compatible with 316L stainless steel and Hastelloy C276

Not suitable for media that has an oxygen concentration >21% or other strong oxidizing agents. This product contains materials or fluids that may degrade or combust in the presence of strong oxidizing agents.

Ingress protection

See electrical connector section

Vibration

- BS EN 60068-2-6 (2008) sine sweeps 5 Hz to 2 kHz, levels to 20gn
- BS EN 60068-2-64 random 10 Hz to 2kHz to 4gn RMS for 1 hour each axis
- Less than 0.02% FS effect at any time

Shock

DO-160E 9 (Figure 7.2) 20 gn 11 ms terminal saw-tooth profile

Humidity

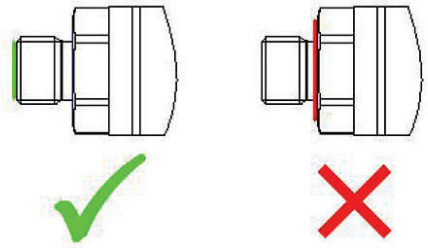
MIL-STD-810D method 507.2 procedure III
(aggravated humidity environment, 65°C, 95% RH)

Pressure connector

See ordering information.

Please ensure that only the intended sealing face is used when mounting the sensor. Failure to comply with this requirement may affect performance or calibration accuracy.

Male threaded pressure connectors must not be sealed or constrained against the face at the base of the thread. The forward cone or flat face should always be used, as indicated below.



Electrical connector

Code no.	Description	Max operating temp. range		IP rating
		°C	°F	
0	No connector	-55 to +125	-67 to +257	-
1	Cable gland	-40 to +80	-40 to +176	65
2	Raychem cable	-55 to +125	-67 to +257	65
3	Polyurethane depth	-40 to +80	-40 to +176	68
4	Hytrel depth	-40 to +80	-40 to +176	68
6	Bayonet MIL -C-26482	-55 to +125	-67 to +257	*
C	1/2 NPT conduit	-40 to +80	-40 to +176	65
G	M12 X 15-pin	-55 to +125	-67 to +267	*
H	PTFE cable (orange)	-55 to +125	-67 to +267	54
U	USB-C socket	-40 to +85	-40 to +185	-

* Hermetically sealed connectors with a maximum leak rate of 1 x 10^{-6} cc/s at 1 atmosphere. High IP rated mating connectors are available.

Certifications

- CE Marked
- RoHS
- EMC Standards:
  - EN 61000-6-1:2019 Immunity – Residential and Commercial
  - EN 61000-6-2:2019 Immunity – Heavy Industrial
  - EN 61000-6-3:2021 Emissions – Residential and Commercial
  - EN 61000-6-4:2019 Emissions – Light Industrial
  - EN 61326-1:2021 Measurement, control and laboratory equipment
  - EN 61326-2-3:2021 Particular requirements for pressure transducers

Connection details

Electrical Connection	Connection	Function			
		Frequency & Diode	RS485	RS232	Digital – CANbus
Flying leads	RED	SUPPLY +VE	+VE SUPPLY	+VE SUPPLY	SUPPLY +VE
	YELLOW	FREQ	RS485 B	Rx	CAN Hi
	GREEN	+VE TEMP	RS485 A	Tx	CAN Lo
	BLUE	GROUND	GROUND	GROUND	SUPPLY -VE
	WHITE/ORANGE	EEPROM	RS485 RT	-	-
	BLACK	-VE TEMP	-	-	CAN 0V

Electrical Connection	Connection	Function			
		Frequency & Diode	RS485	RS232	Digital – CANbus
Polyurethane cable	RED	SUPPLY +VE	+VE SUPPLY	+VE SUPPLY	SUPPLY +VE
	YELLOW	FREQ	RS485 B	Rx	CAN Hi
	BLUE	+VE TEMP	RS485 A	Tx	CAN Lo
	WHITE	GROUND	GROUND	GROUND	SUPPLY -VE
	ORANGE	EEPROM	RS485 RT	-	-
	BLACK	-VE TEMP	-	-	CAN 0V

Electrical Connection	Connection	Function			
		Frequency & Diode	RS485	RS232	Digital – CANbus
PU & Hytrel Cables (Depth)	RED	SUPPLY +VE	+VE SUPPLY	+VE SUPPLY	SUPPLY +VE
	YELLOW	FREQ	RS485 B	Rx	CAN Hi
	BLUE	+VE TEMP	RS485 A	Tx	CAN Lo
	WHITE	GROUND	GROUND	GROUND	SUPPLY -VE
	ORANGE	EEPROM	RS485 RT	-	-
	BLACK	-VE TEMP	-	-	CAN 0V
	SCREEN	-	-	-	-

Electrical Connection	Connection	Function			
		Frequency & Diode	RS485	RS232	Digital – CANbus
Raychem Cable	RED	SUPPLY +VE	+VE SUPPLY	+VE SUPPLY	SUPPLY +VE
	WHITE	FREQ	RS485 B	Rx	CAN Hi
	GREEN	+VE TEMP	RS485 A	Tx	CAN Lo
	BLUE	GROUND	GROUND	GROUND	SUPPLY -VE/CAN 0V
	BLACK	EEPROM	RS485 RT	-	-
	SCREEN	-	-	-	-

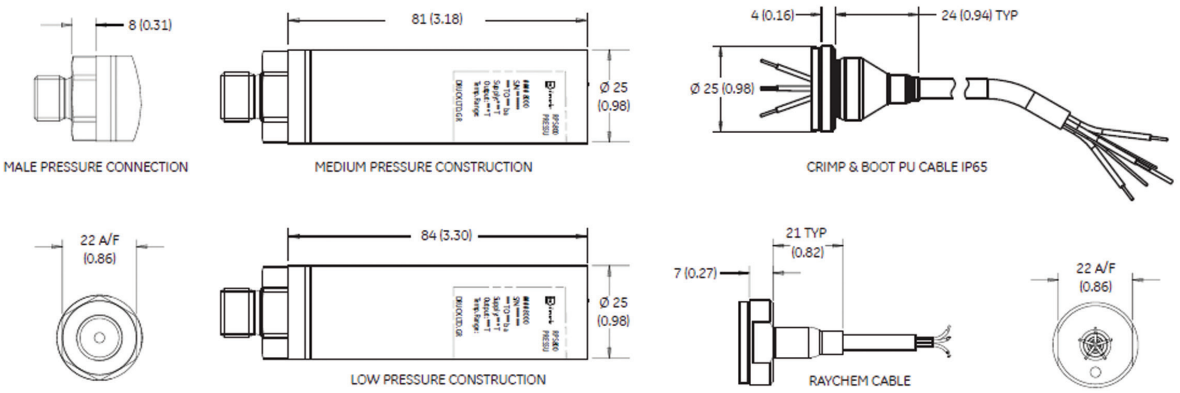
Electrical Connection	Connection	Function			
		Frequency & Diode	RS485	RS232	Digital – CANbus
Bayonet (MIL-C-26482)	A	SUPPLY +VE	+VE SUPPLY	+VE SUPPLY	SUPPLY +VE
	B	FREQ	RS485 B	Rx	CAN Hi
	C	+VE TEMP	RS485 A	Tx	CAN Lo
	D	GROUND	GROUND	GROUND	SUPPLY -VE
	E	EEPROM	RS485 RT	-	-
	F	-VE TEMP	-	-	CAN 0V

Electrical Connection	Connection	Function			
		Frequency & Diode	RS485	RS232	Digital – CANbus
1/2" NPT Conduit with Plyurethane cable	RED	SUPPLY +VE	+VE SUPPLY	+VE SUPPLY	SUPPLY +VE
	YELLOW	FREQ	RS485 B	Rx	CAN Hi
	BLUE	+VE TEMP	RS485 A	Tx	CAN Lo
	WHITE	GROUND	GROUND	GROUND	SUPPLY -VE
	ORANGE	EEPROM	RS485 RT	-	-
	BLACK	-VE TEMP	-	-	CAN 0V

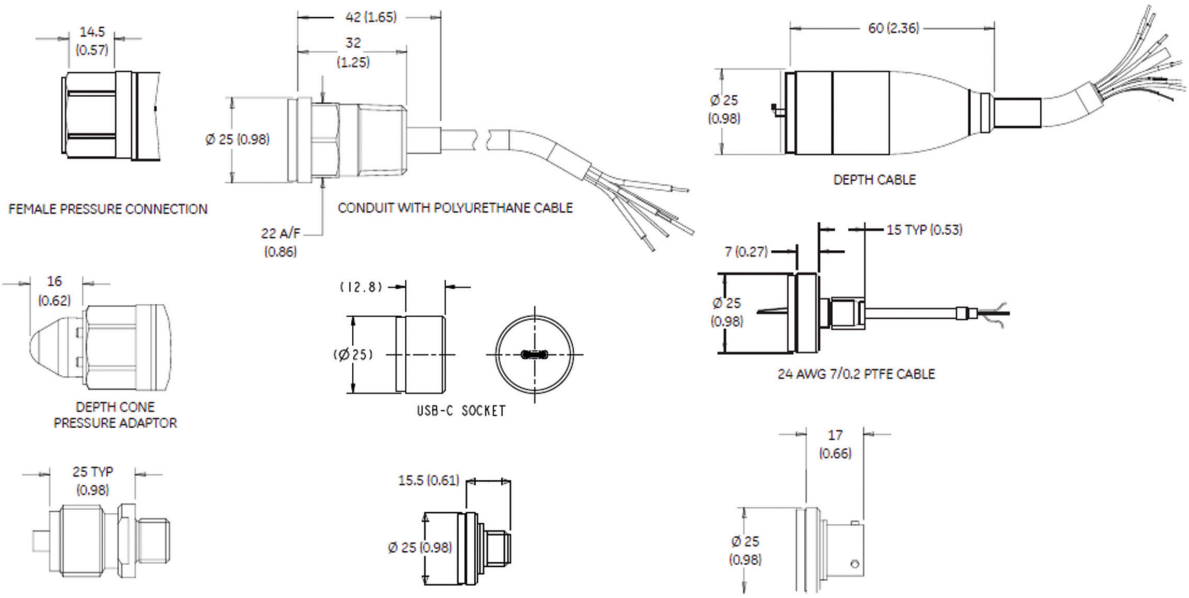
Electrical Connection	Connection	Function			
		Frequency & Diode	RS485	RS232	Digital – CANbus
M12 x 1	1	SUPPLY +VE	+VE SUPPLY	+VE SUPPLY	-
	2	FREQ	RS485 B	Rx	SUPPLY +VE
	3	GROUND	GROUND	GROUND	CAN Hi
	4	+VE TEMP	RS485 A	Tx	CAN Lo
	5	EEPROM	-	-	SUPPLY -VE/CAN 0V

Electrical Connection	Connection	Function			
		Frequency & Diode	RS485	RS232	Digital – CANbus
Orange PTFE Cable	RED	SUPPLY +VE	+VE SUPPLY	+VE SUPPLY	SUPPLY +VE
	YELLOW	FREQ	RS485 B	Rx	CAN Hi
	GREEN	+VE TEMP	RS485 A	Tx	CAN Lo
	BLUE	GROUND	GROUND	GROUND	SUPPLY -VE
	BLACK	EEPROM	RS485 RT	-	-
	WHITE	-VE TEMP	-	-	CAN 0V
	SCREEN	Tranducer Body	Tranducer Body	Tranducer Body	Tranducer Body

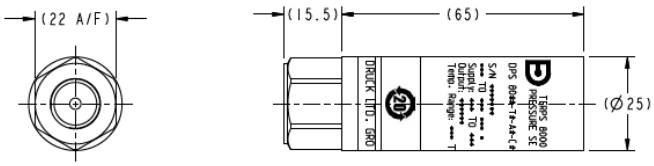
Dimensional drawings



Core construction ranges greater than 104 bar except electronics options F, G & V



DPS8000 core construction (electronics options F, G & V)



Notes:

1. All dimensions are nominal lengths and are subject to change.
2. All dimensions are in millimeters (inches).
3. Other pressure and electrical connectors may be available, please contact Druck.

Ordering information

1. Select model code

Main product variant

RPS Resonant pressure sensor - frequency and diode output (Note 1)

DPS Digital pressure sensor - digital output (Note 1)

Diameter, material and isolation

80 25 mm stainless steel oil isoliated

Electrical connect

0 No electrical connector (flying leads) (Note 6)

1 Polyurethane cable IP65

2 Raychem cable

3 Polyurethane cable (depth) IP68

4 Hytrel cable (depth) IP68

6 MIL-C-26482 (6-pin shell size 10)

C 1/2" NPT conduit with polyurethane cable (non-exd only)

G M12x1 5-pin

H Orange PTFE cable

U USB-C socket (Note 3)

Electronics option (Note 8)

1 Frequency and diode (TTL)

F RS485

G RS232

C CANbus

V USB 2.0 (Note 4)

Compensated temperature range

TA -10 to +50 °C

TB -40 to +85 °C

TC -40 to +125 °C (Note 2)

TD -55 to +125 °C(Note 2 & Note 7)

Accuracy

A1 - Standard 0.02%

A2 - Improved 0.01%

Calibration

CC Full thermal calibration

Hazardous area approval

H0 None

Pressure connector

PA G1/4 female (Note 5)

PB G1/4 male flat

PC G1/4 male 60° internal cone

PD G1/8 male 60° internal cone

PE 1/4 NPT female (Note 5)

PF 1/4 NPT male

PG 1/8 NPT male

PH M20x1.5

PJ M14x1.5 60° internal cone

PK M12x1 internal cone

PL 7/16-20 UNJF male 74 degree external cone

PN G1/2 male (Note 5)

PQ G1/4 quick connect

PR 1/2 NPT male

PT G1/4 male flat long

PV 7/16-20 UNF female

PW Depth cone (G1/4 female)

PX 7/16-20 UNF male flat

PY 3/8-24 UNJF

RA 1/4 VCR female

RF 1/4 VCR male (Note 5)

RPS 80 4 1 - TA - A2 - CC - H0 - PA (Typical model code)

Ordering information (cont.)

Note 1: RPS variants require electronics option code ‘1’. DPS variants require electronics option code ‘F’, ‘G’, ‘C’ or ‘V’. Note 2: Text goes here

Note 2: Requires electronics option code ‘1’, "F" or ‘C’ and Electrical Connector Codes ‘0’, ‘2’, ‘6’, ‘G’, or ‘H’.

Note 3: Only available with USB electronics option.

Note 4: Only available with USB-C socket connector.

Note 5: Choose one of these connectors for pressure ranges above 104 bar.

Note 6: Flying lead length >200 mm

Note 7: Available on ranges > 2 bar only.

Note 8: Maximum cable length: (1) Frequency & Diode - 10 m, (G) RS485 - 1000 m, (F) RS232 - 10 m, (C) CANbus - 1000 m. Integer values only, e.g. 1m (3 ft) cable. Minimum cable length is 1m (3 ft) if cable is supplied.

2. State pressure range and units (e.g., 0 to 20 bar, 0 to 100 psi):

Unit options are:

Symbol	Description
bar	bar
mbar	millibar
psi	pounds/sq. inch
Pa	Pascal
hPa	hectoPascal
kPa	kiloPascal
MPa	megaPascal
mmH2O	mm water
cmH2O	cm water
mH2O	metres water
inH2O	inches water
ftH2O	feet water
mmHg	mm mercury
inHg	inches mercury
kgf/cm2	kg force/sq. cm
atm	atmosphere
Torr	torr

3. State cable lengths and units e.g., 1 m cable, 3 ft cable (only required on certain electrical connectors):

Note 8: Maximum cable length: (1) Frequency & Diode - 10 m, (G) RS485 - 1000 m, (F) RS232 - 10 m, (C) CANbus - 1000 m. Integer values only, e.g. 1m (3 ft) cable. Minimum cable length is 1m (3 ft) if cable is supplied.

Typical order examples:

RPS 8011-TA-A1-CC-H0-PA, 0-7 bara, 5 m cable

DPS 806F-TB-A2-CC-H0-PL, 0-1,000 psia

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