



icountPDZ2 User Manual

B.84.833_IPDZ2M_EN Rev 6

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 fluid & gas handling
 hydraulics
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 process control
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Overview

Parker Hannifin's IPD Z2 is an on-line laser particle detector. This mineral based hydraulic fluid contamination detector is designed for use in ATEX category 3 areas and is housed in a stainless steel IP69K approved enclosure.

The unit has two size 06L EO 24° cone-end fluid connections that allow the fuel to be transferred through the unit for analysis. The electrical supply and communication is made via two M12 Ultra Lock IP69K approved connectors.

Conditions for safe use

- To ensure compliance with the certification, users are **NOT** permitted to open the unit under any circumstances. Doing so will invalidate the unit's calibration and it would **NOT** be suitable for Hazardous area use.
- The ground of the electrical circuit of this equipment is connected directly to its metal enclosure, therefore the enclosure shall be connected to earth or GND via a bonding point or alternatively via the power supply screen connection of the connector.

Laser Information

This product contains an infrared 5mW laser.

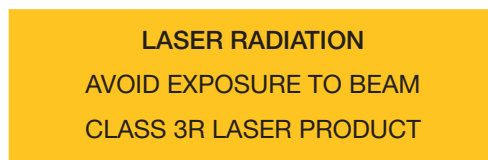
Any dismantling of the product may result in dangerous exposure to laser radiation.

The following laser information is on a label on the top surface of the product:



CAUTION: Users are not required to access the laser radiation source and should never do so.

The internal laser warning label is mounted on the laser module and contains the following information:



EC Declaration of Conformity

EU Declaration of Conformity

Manufacturer: Parker Hannifin Manufacturing Ltd. (Parker Kittiwake)
 3-6 Thorgate Road Tel: +44 (0) 1903 731470
 Littlehampton Fax: +44 (0) 1903 731480
 West Sussex kittiwakesales@parker.com
 BN17 7LU www.kittiwake.com
 United Kingdom www.parker.com

This declaration of conformity is issued under the sole responsibility of the manufacturer.

Hereby declares that the following apparatus:

Product Name:	IPD Z2 Icount Particle Detector
Model Number:	IPDZ2

The object of the declaration described above is in conformity with the relevant Union harmonisation legislation:

Are in conformity with the following Directives and standards:

Electromagnetic Compatibility EMC Directive 2004/108/EC	
EN61000-6-3:2007	Electromagnetic compatibility – Part 6-3: Generic standards – Emission standard for residential, commercial and light-industrial environments
EN61000-6-2:2005	Electromagnetic compatibility (EMC) – Part 6-2: Generic standards – Immunity for industrial environments



Code of Federal Regulation

CFR47:2010	Code of federal regulations Pt 15 subpart B Radio frequency devices (Class A) – unintentional Radiators method
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Hazardous area Directives, Standards and Notified body:

Equipment and protective Systems Intended for use in Potentially Explosive Atmospheres. Directive 2014-34-EU(ATEX)	
EN60079-0: 2009	Electrical apparatus for explosive gas atmospheres. General requirements
EN60079-15:2005	Explosive Atmospheres. Equipment protection by type of protection "n"
EN60079-31:2009	Explosive atmospheres. Equipment dust ignition protection by enclosure "t"

Product Certification numbers and Product Marking Codes:

ATEX:	Certificate: Sira09ATEX4340X	  0359 II 3GD, Ex nA IIC T4 Gc Ta = (-30°C ≤ Ta ≤ +60°C) Ex tc IIIC T135°C Dc
IECEX:	Certificate: IECEX SIR 09.0137X	Ex nA IIC T4 Gc Ta = (-30°C to +60°C) EX tc IIIC T135°C Dc

Manufacturers Signature:

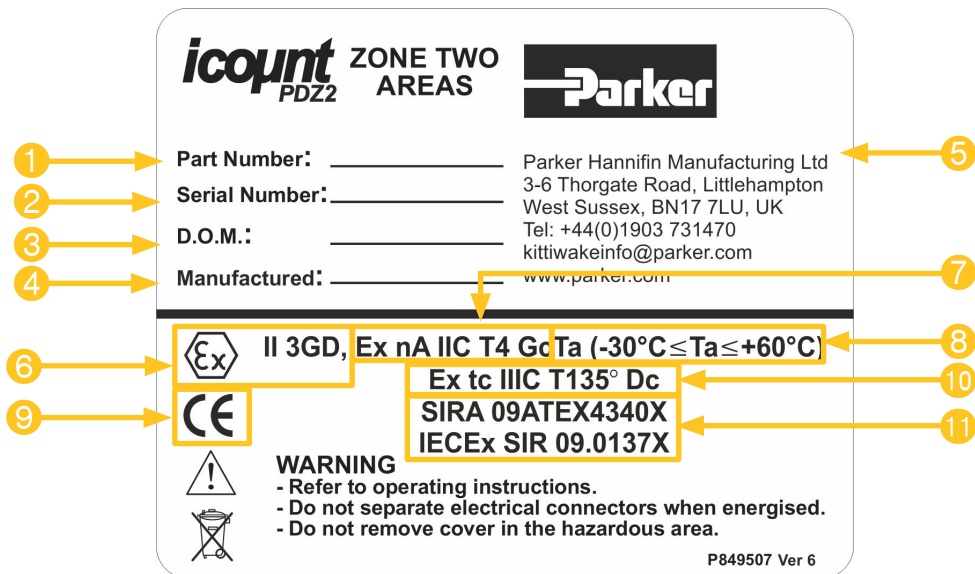


Andrew Baldwin
 Business Unit Engineering Manager, Parker Kittiwake.

Date: August 2016

Product identification label

The identification label attached to the enclosure (an example is given below) is explained in the table that follows:



Item	Field	Values
①	Part Number	icountPDZ2
②	D.O.M.	Date of manufacture
③	Serial Number	The serial number consists of eight digits, for example: GD6NN001 (‘GD’ encodes the month and year; ‘6NN’ is the product group; the last three digits are entered sequentially through a month, reverting to ‘001’ at the beginning of each month)
④	Manufactured	Country of manufacture (United Kingdom)
⑤	Name and address of manufacturer	Parker Hannifin Manufacturing Ltd 3-6 Thorgate Road, Littlehampton West Sussex, BN17 7LU, UK
⑥	ATEX certification number	Ex = European mark II = Non-mining 3 = Equipment category (Zone 2/22) GD = Type of explosive atmosphere (G = Gas, D = Dust)
⑦	ATEX/IECEX category 3 certificate coding (Gas)	Ex = Explosion protected nA = Type ‘n’ (non-sparking) IIC = Gas group T4 = Temperature class (4 = maximum surface temperature of 135°C) Gc = Equipment protection level (G = Gas, c = Zone 2)
⑧	Ta (Ambient operating temperature)	Between -30°C and +60°C
⑨	CE Conformity marking	CE
⑩	ATEX/IECEX category 3 certificate coding (Dust)	Ex = Explosion protected tc = Protection by enclosure IIIC = Equipment grouping typical dust material T135° = Maximum operating temperature Dc = Equipment protection level (D = Dust, c = Zone 2)
⑪	Certificate Numbers	SIRA 09ATEX4340X IECEX SIR 09.0137X

Introduction

Parker Hannifin's icountPDZ2 represents the most up-to-date technology in solid particle contamination analysis. The icountPDZ2 is a compact, permanently-mounted laser-based particle detector module that provides a cost-effective solution to fluid management and contamination monitoring.

Principles of operation

The icountPDZ2 measures particle contamination continuously and updates the output options and limit relay every second.

Unlike the Parker CM20, LCM20 or MCM20, the unit does not perform a 'one-off' test. This means that even if the Measurement Period is set to 60 seconds, the output and limit relay all report the presence of dirt in the oil in just a few seconds – it does not wait until the end of the Measurement Period before reporting the result.

The icountPDZ2 has just one setting to control the accuracy, stability and sensitivity of the measurements and that is the 'Measurement Period'. This can be set from 5 seconds to 180 seconds. The longer the Measurement Period, the more contaminant is measured, averaging out any spikes seen on a smaller sample. The shorter the Measurement Period, the more sensitive the icountPDZ2 is to small slugs of contaminant, but it can also reduce the performance on clean systems. Thus, the user can select how sensitive the icountPDZ2 is to spikes of contaminant, and how quickly it responds to contamination levels above the set point ('limits').

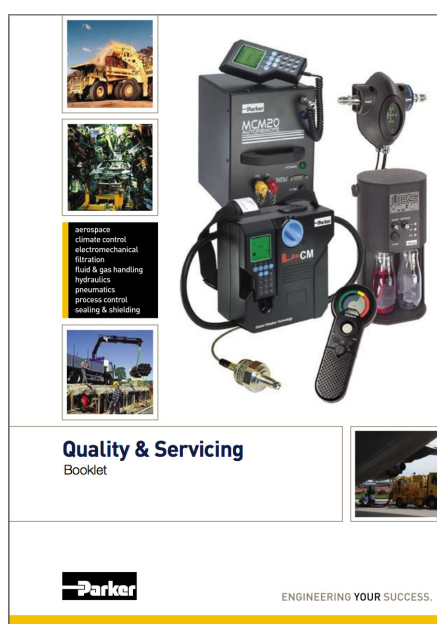
With a Measurement Period of 100 seconds, the results will be for the last 100ml of oil that has flowed through the icountPDZ2, updated on a second-by-second basis, giving an effectively continuous readout of the level of contamination.

Calibration recommendations

NOTE: Any servicing or repair work must be carried out by a Parker ATEX approved service centre.

Contact your local Parker Hannifin Sales Company for recalibration details. The recommended period between recalibration is 12 months.

Please refer to the Parker Hannifin Quality and Servicing booklet (FDCB272UK), supplied on CD.



Benefits

- Independent monitoring of system contamination trends
- Calibration by recognised online principles confirmed by relevant International Organization for Standardization (ISO) procedures
- Indicators for Low, Medium and High contamination levels
- A low cost solution to prolonging fluid life and reducing machine downtime
- Self-diagnostic software
- Mineral fluid-compatible construction
- Fully PC/PLC integration technology such as: RS232, 0–3V/0–5V, 4–20mA and CAN-bus (SAE J1939) – see the ‘Product Configurator’, page 37, for communication options
- Manufactured from stainless steel and certified to SIRA 09ATEX4340X IECEx SIR 09.0137X.

Technical specification

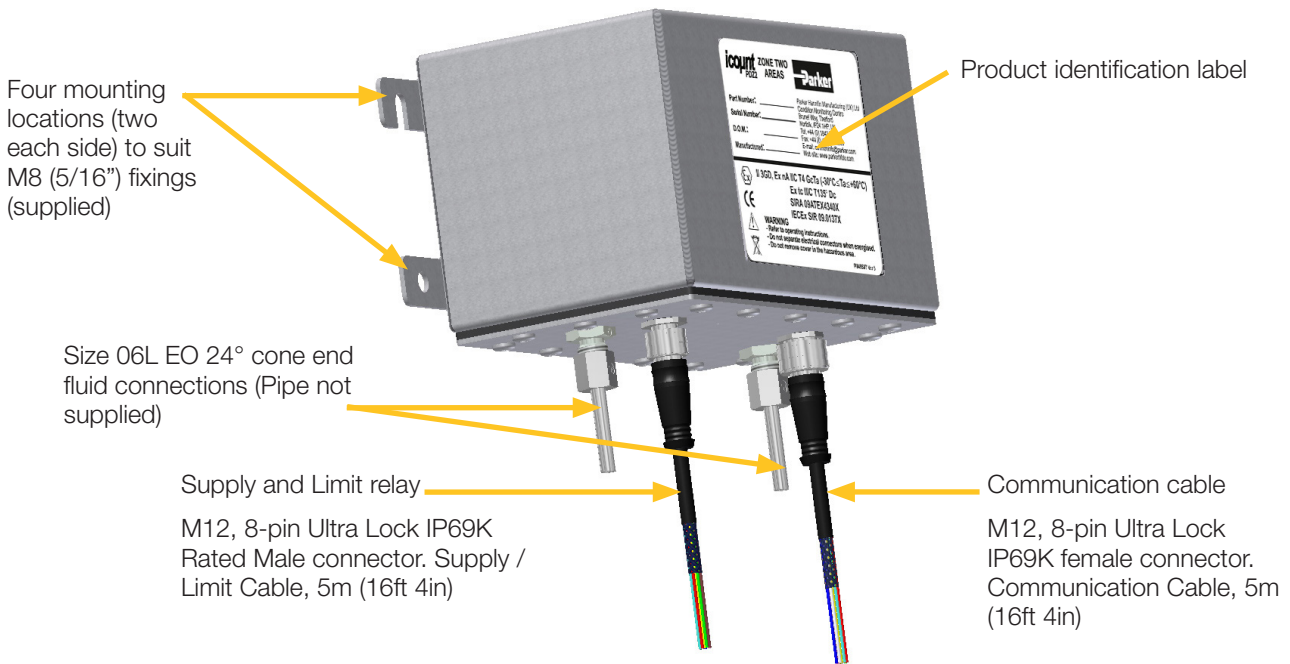
Feature	Specification
Product start-up time	5 seconds minimum
Measurement period	5–180 seconds
Reporting interval	0–3600 seconds via RS232 communication
Principle of operation	Laser Diode optical detection of actual particulates
International codes	ISO 7 – 22
Calibration	By recognised online methods confirmed by the relevant ISO procedures. MTD – Via a certified primary ISO 11171 automatic particle detector using ISO 11943 principles, with particle distribution reporting to ISO 4406:1996
Recalibration	Contact Parker Hannifin
Working pressure	2–420 bar (30–6000 PSI)
Flow range through icountPDZ2	Note: Flow may be bi-directional 40–140 ml/min (optimum flow 60 ml/min) (0.01 – 0.04 USGPM (optimum flow 0.016 USGPM))
Online flow range via System 20 sensors	Size 0 = 6 to 25 l/min (2–7 USGPM) Size 1 = 24 to 100 l/min (6–26 USGPM) Size 2 = 170 to 380 l/min (45–100 USGPM)
Ambient storage temperature	–40°C to +80°C (–40°F to +176°F)
Environment operating temperature	–30°C to +60°C (–22°F to 140°F)
Fluid operating temperature	+5°C to +80°C (+41°F to 176°F)
Computer compatibility	Parker recommends the use of a 9-way D-type connector. This can be connected to a USB port using a USB-serial adaptor. Note that these connectors/adaptors are NOT supplied with icountPDZ2 units: contact Parker Hannifin for advice.
Moisture sensor calibration	±5% RH (over compensated temperature range of +10°C to +80°C; +50°F to +176°F)
Operating humidity range	5% RH to 100% RH
Moisture sensor stability	±0.2% RH typical at 50% RH in one year
Power requirement	Regulated 9–40Vdc
Current rating	Typically 120mA
Certification	IP69K rating EC Declaration of Conformity (see page 4).
Analogue output options (specified when ordering)	
Variable current	4–20mA
Variable voltage	0–5Vdc, 0–3Vdc (user selectable)
CAN-bus	to SAE J1939 (e.g. <i>Parker IQAN</i>)
Moisture sensor stability	±0.2% RH typical at 50% RH in one year

Software default settings

Standard defaults	
Comms echo	OFF
Verbose errors	OFF
STI Sensors used	OFF (Do not set to 'ON' – contact Parker Hannifin for details)
Reporting standards	ISO
Particle limits	14 / 13 / 12 / 09
Measurement period	60 seconds
Reporting interval	30 seconds
Power-on mode	AUTO
Auto start delay	5 seconds
Date format	dd/mm/yy

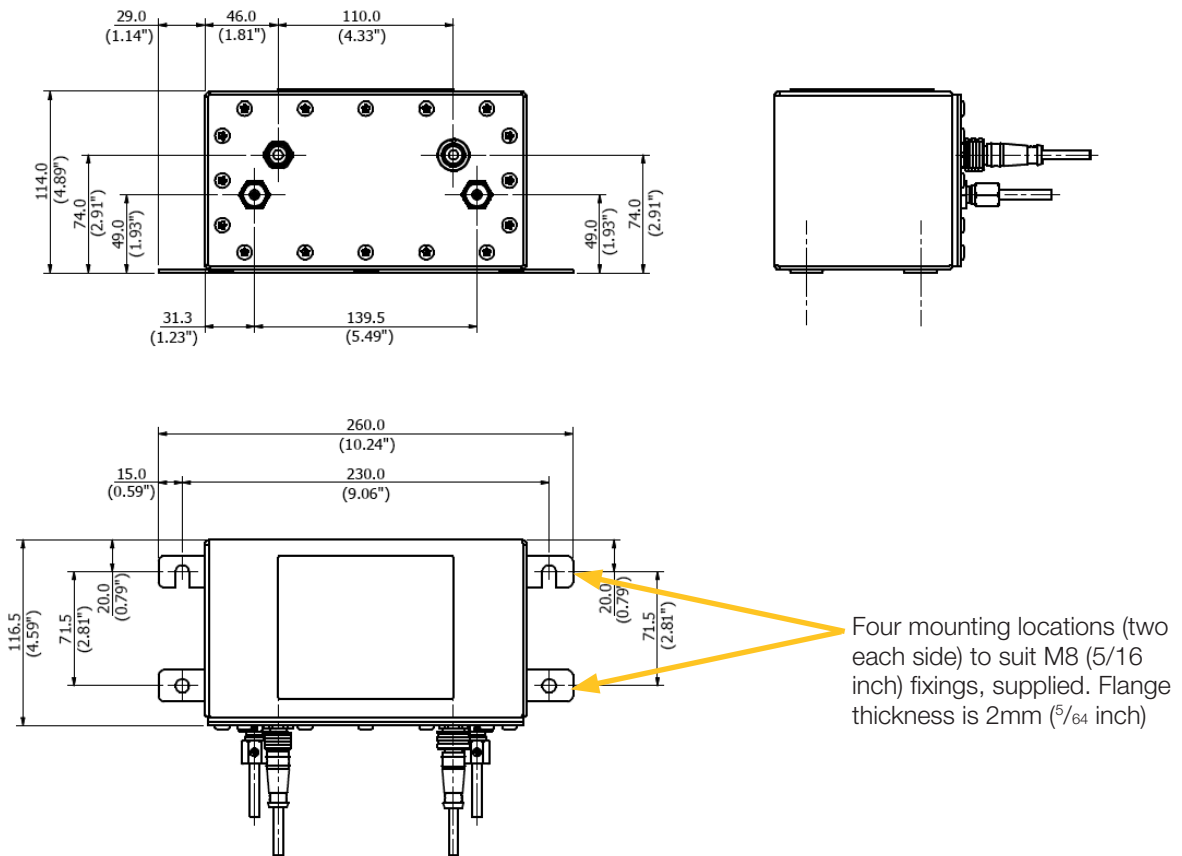
Default if options fitted	
Relay hysteresis	ON
Relay operation for particle limits	ON
0–5V/0–3V output voltage range	0–5V
Moisture sensor limit	70%

Product features



Dimensions for installation

Dimensions are given in mm (inches)



Connections

Hydraulic connection

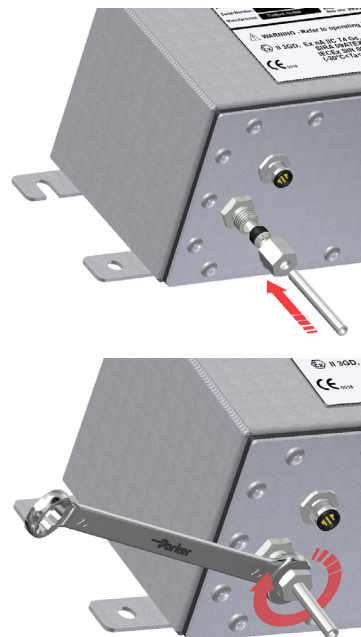
Our recommendation is to position the icountPDZ2 as close to the system output as possible whilst controlling the flow to the optimum 60ml/min. This then provides the highest pressure conditions, plus the oil in this position is indicative of the reservoir's oil condition.

The IPDZ2 is supplied with two size 06L EO 24° cone-end hydraulic connections.

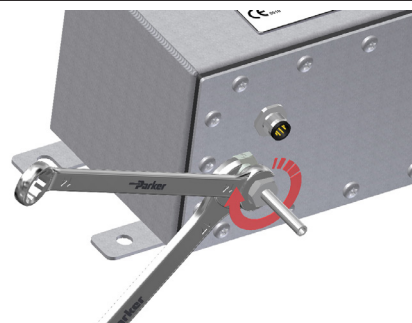
For hydraulic connection, ensure that the hydraulic/pipe connection fitting is compatible with the size 06L EO 24° cone bulkhead fitting.

Assembling the EO nut fitting

- Step 1** Press the tube-end firmly into the assembly core.
- Turn back the nut for easy tube insertion and fit the nut hand tight, then tighten the fitting until you feel a sharp increase in resistance.

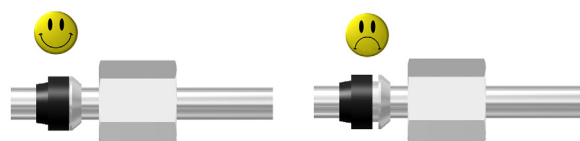


- Step 2** Ensure the bulkhead fitting is held with a 17mm spanner and tighten (approximately 1 to 1½ turns).



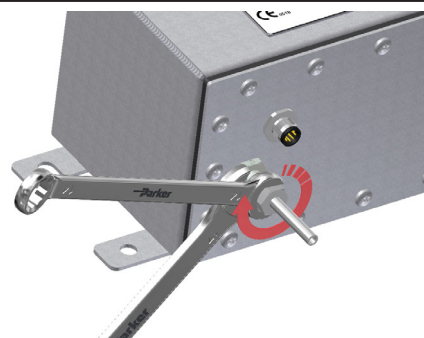
- Step 3** Now remove the pipe and nut to check assembly.
- The gap between sealing ring and retaining ring must be closed.** A little relaxation (approximately 0.2mm) is allowed.

If the gap is not closed: Check all components, including the tube.



- 4 Assemble the fitting until wrench-tight (without spanner extension).

Tighten the fitting firmly by a minimum 1/6 (max 1/4) turn (i.e. 1 to 1½ flats)



Flow control

A pressure compensated, flow control device (Parker Hannifin part number S840074) has been developed to give the icountPDZ2 user greater flexibility. The flow control device enables testing where flow ranges are outside the icountPDZ2 specifications (i.e. 40–140 ml/min), or where pipe diameters do not allow the icountPDZ2 to be installed.

REQUIRED DIFFERENTIAL PRESSURE RANGE 5–315 BAR

The flow control device fits onto the downstream (outlet) side of the icountPDZ2, connecting through a manifold block via a self-sealing quick connection test point.

The differential pressure valve automatically compensates for pressure and viscosity changes, whilst maintaining its flow setting even as the workload changes.

The table below is used to select the appropriate valve position:

Valve position	cSt range
3	20–100
3.8	90–200
4.2	190–320
5	310–500



System 20 sensor connection

Online flow range via System 20 inline sensors:

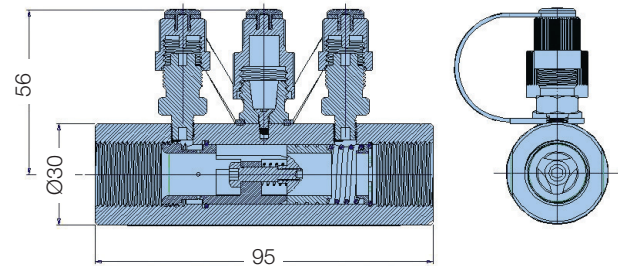
Size 0	6 to 25 l/min (optimum flow = 15 l/min)
Size 1	24 to 100 l/min (optimum flow = 70 l/min)
Size 2	170 to 380 l/min (optimum flow = 250 l/min)

The required differential pressure across inline sensors is 0.4 bar (minimum)

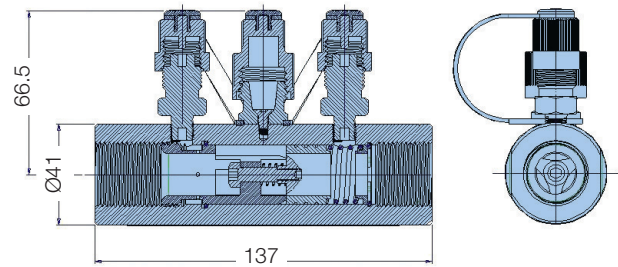
Refer to the 'Sensor part numbers' section on page 46 before ordering System 20 sensors.

See 'Inline Sensor Monitors' (Parker Hannifin Brochure CM013GB1) for more information on System 20 sensors.

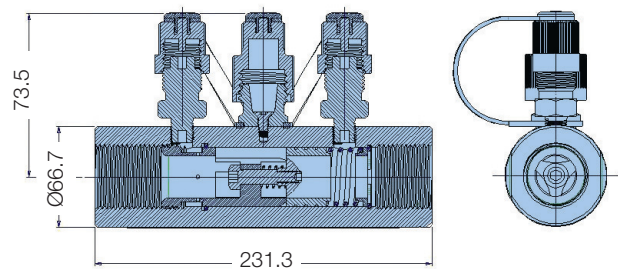
Size 0 Sensor



Size 1 Sensor



Size 2 Sensor



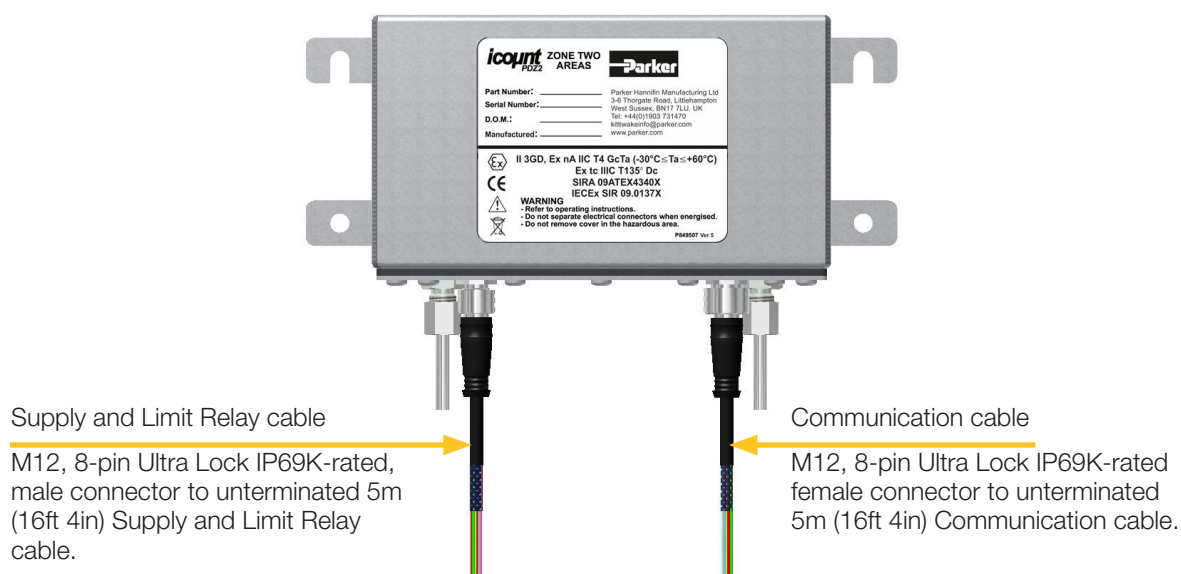
(All dimensions are in millimetres)

IMPORTANT NOTE: P1 and P2 of the System 20 sensors MUST be connected to the icountPDZ2 test points. Ensure that the icountPDZ2 command 'SSU' is set to 'Yes' when connecting to icountPDZ2 – refer to 'Communication protocol' section of this manual for a list of user commands.

Contact Parker Hannifin if you require further advice in connecting icountPDZ2 to your system.

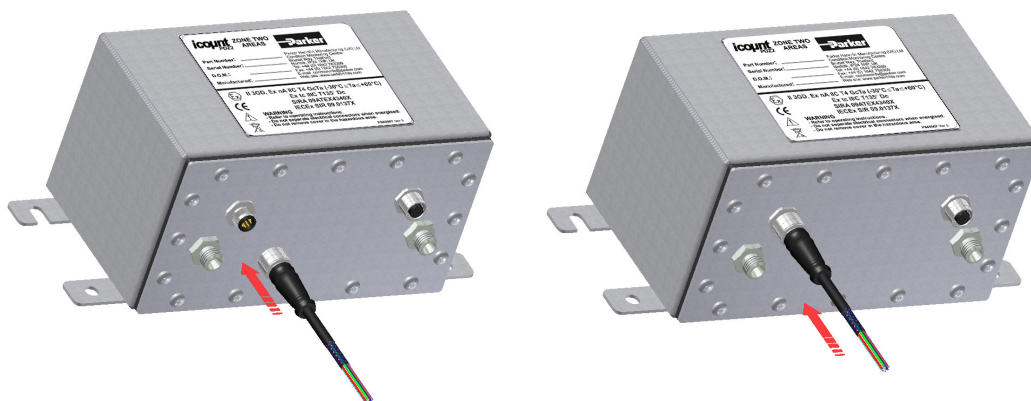
Electrical connections

The M12 8-pin Ultra Lock connection system uses innovative push-to-lock technology to make a quick but secure connection. The unique O-ring radial seal is operator-independent, so there is no chance of over-tightening or under-tightening.



IMPORTANT NOTE: The IP69K Ingress Protection is only valid when using the M12 Ultra Lock mating connector cable (supplied).

CONNECTING/DISCONNECTING



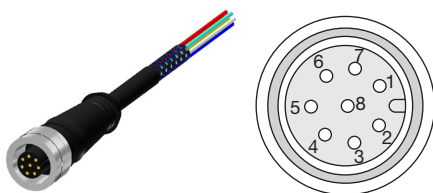
Ensure that the locating pin and slot are correctly aligned (to avoid damaging the pins) and push home firmly to connect. To disconnect, pull the Ultra Lock's metal collar back to release the cable lock and pull the cable boot out squarely.

WIRING DIAGRAMS

Wiring diagrams are provided (on pages 15–17), showing how a digital multimeter may be connected to the Communication cable and the Supply and Limit Relay cable, for both voltage and current options. The connections for an optional moisture sensor (if fitted) are also shown.

A diagram for connecting the icountPDZ2 to an external CAN-bus network is given on page 18.

Communication cable connector

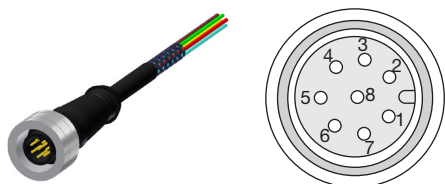


Pin configuration diagram
M12, 8-pin Ultra Lock IP96K female connector, end view

Pin number (Wire colour recommended)	No options fitted	4–20mA option fitted	0–5V/0–3V option fitted	CAN-bus option fitted
1 (White)	NOT USED	Channel C, ISO 14µm(c)	Channel C, ISO 14µm(c)	NOT USED
2 (Brown)	RS232 Ground (* Pin 5)	RS232 Ground (* Pin 5)	RS232 Ground (* Pin 5)	RS232 Ground (* Pin 5)
3 (Green)	NOT USED	Channel A, ISO 4µm(c)	Channel A, ISO 4µm(c)	CAN+ (Hi)
4 (Yellow)	NOT USED	Channel B, ISO 6µm(c)	Channel B, ISO 6µm(c)	CAN– (Lo)
5 (Grey)	RS232 Receive (* Pin 3)	RS232 Receive (* Pin 3)	RS232 Receive (* Pin 3)	RS232 Receive (* Pin 3)
6 (Pink)	RS232 Transmit (* Pin 2)	RS232 Transmit (* Pin 2)	RS232 Transmit (* Pin 2)	RS232 Transmit (* Pin 2)
7 (Blue)	NOT USED	Channel D, ISO 30µm(c)	Channel D, ISO 30µm(c)	CAN Ground
8 (Red)	NOT USED	NOT USED	NOT USED	NOT USED

** Parker Hannifin recommends the use of a 9-way D-type socket with RS232, using the pin configurations given in the above table.*

Supply and Limit relay cable connector

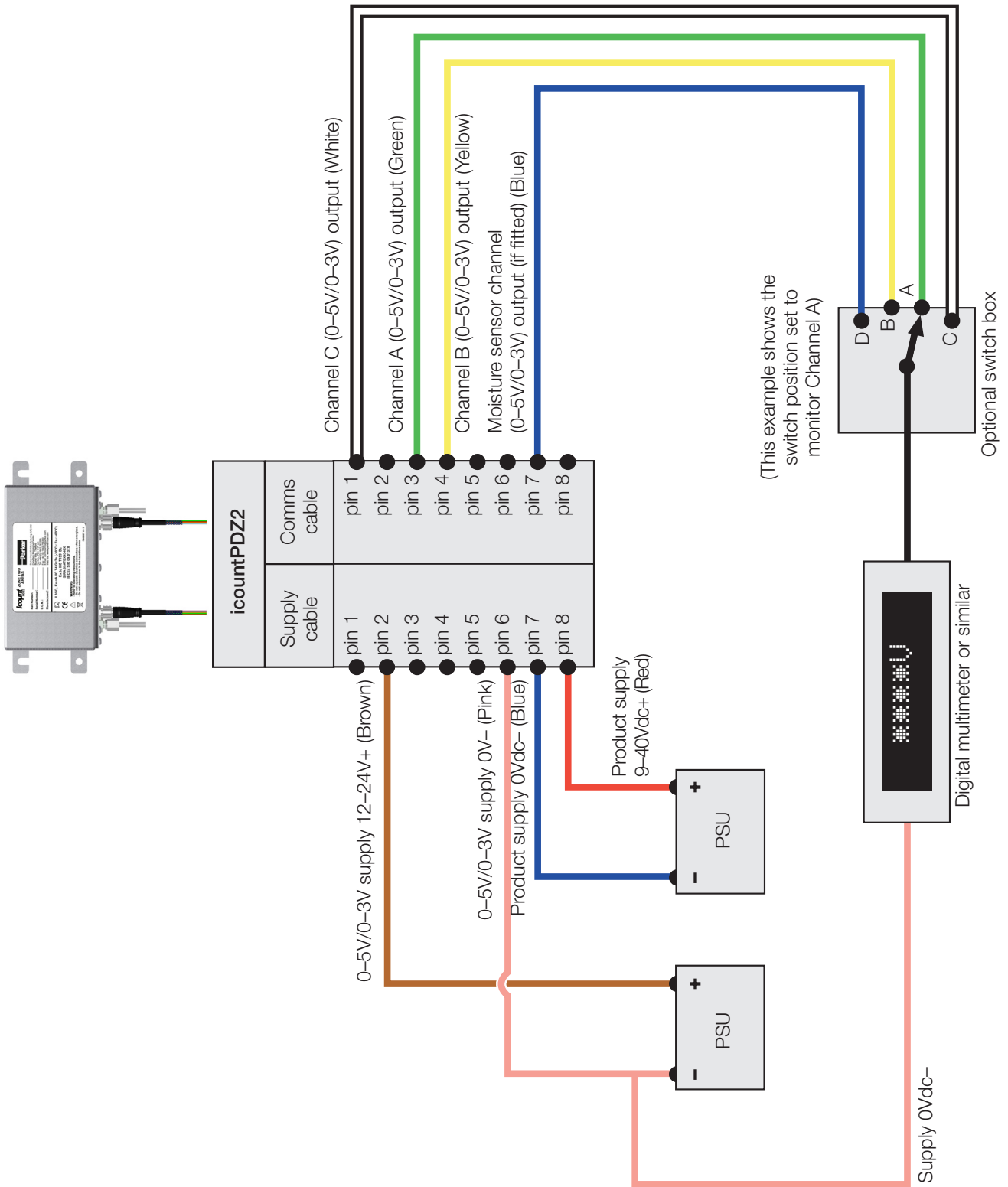


Pin configuration diagram
M12, 8-pin Ultra Lock IP69K-rated, male connector, end view

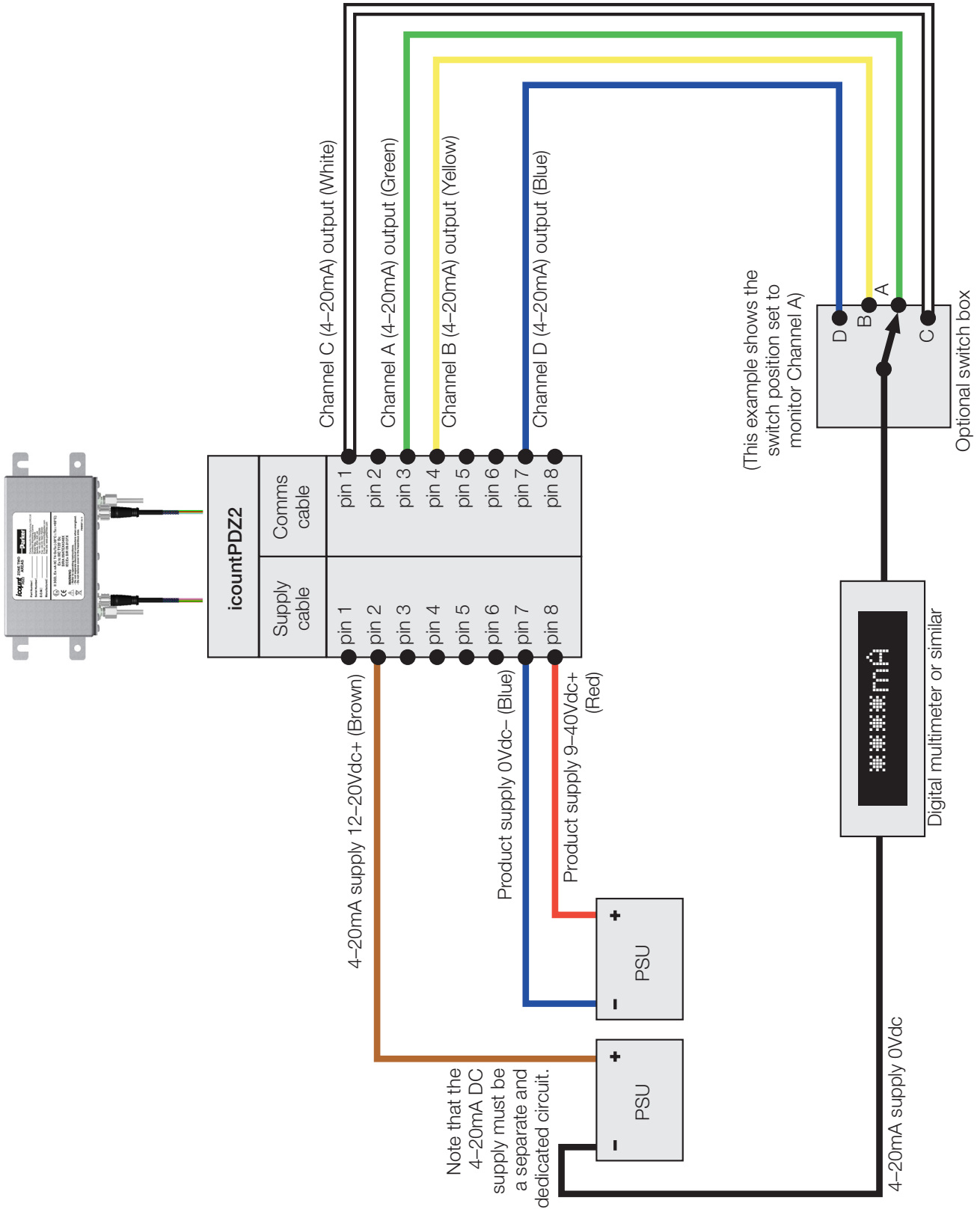
Pin number (Wire colour recommended)	No options fitted	4–20mA option fitted	0–5V/0–3V option fitted	CAN-bus option fitted
1 (White)	Relay Normally Closed (if fitted)	Relay Normally Closed (if fitted)	Relay Normally Closed (if fitted)	NOT USED
2 (Brown)	NOT USED	4–20mA Supply 12–20Vdc	0–5 / 0–3V Supply 12–24Vdc	NOT USED
3 (Green)	Relay Common (if fitted)	Relay Common (if fitted)	Relay Common (if fitted)	NOT USED
4 (Yellow)	Relay Normally Open (if fitted)	Relay Normally Open (if fitted)	Relay Normally Open (if fitted)	NOT USED
5 (Grey)	NOT USED	NOT USED	NOT USED	NOT USED
6 (Pink)	NOT USED	NOT USED	0–5V / 0–3V Supply 0 Vdc	NOT USED
7 (Blue)	Product supply 0Vdc	Product supply 0Vdc	Product supply 0Vdc	Product supply 0Vdc
8 (Red)	Product supply 9–40Vdc	Product supply 9–40Vdc	Product supply 9–40Vdc	Product supply 9–40Vdc

IMPORTANT NOTE: *It is the responsibility of the end user to ensure that the cable's braided screen is terminated to a suitable earth bonding point.*

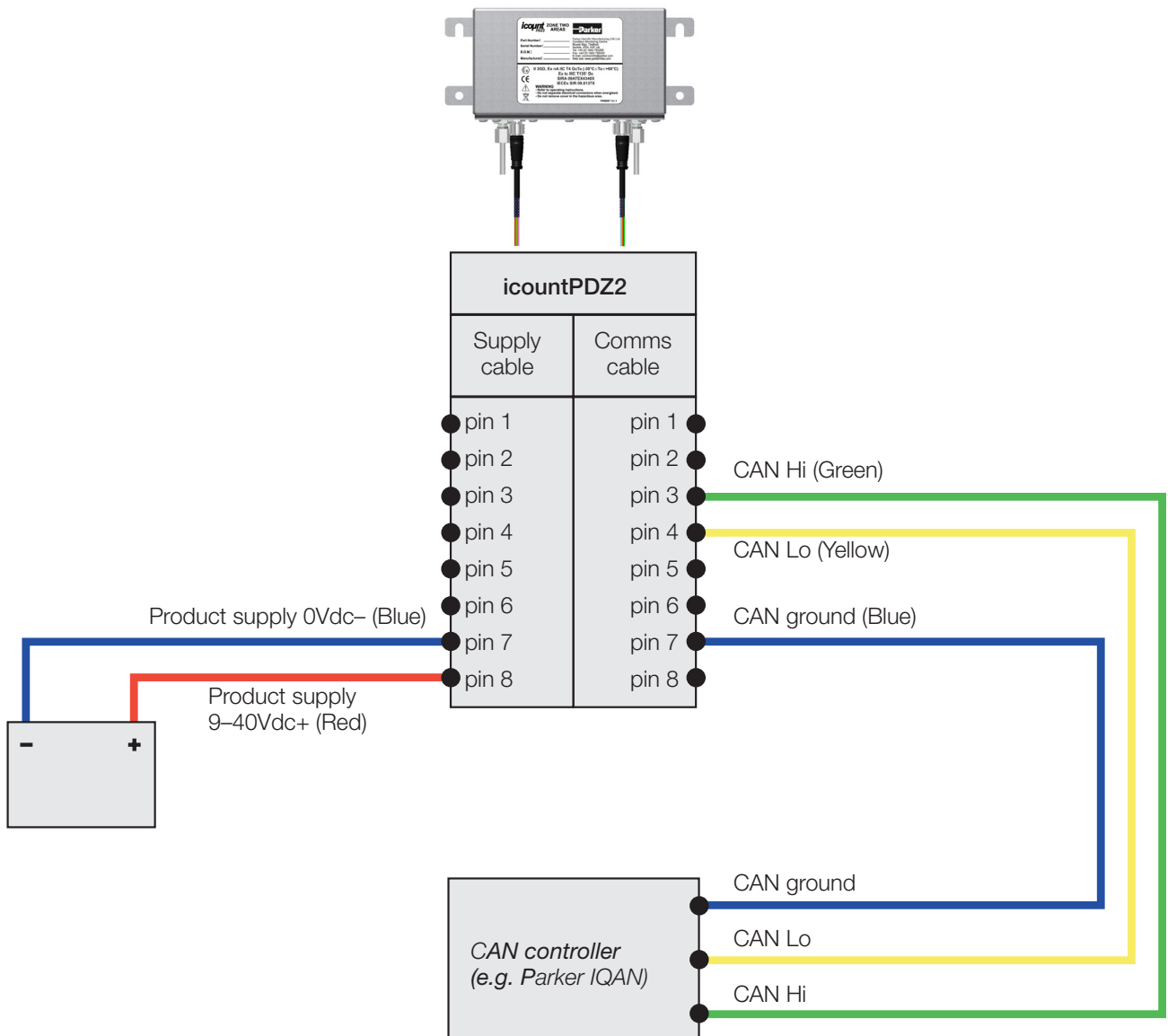
M12, 8-pin connector: 0-5V/0-3V voltage measurement



M12, 8-pin connector: 4–20mA current measurement



CAN-bus (SAE J1939) connections



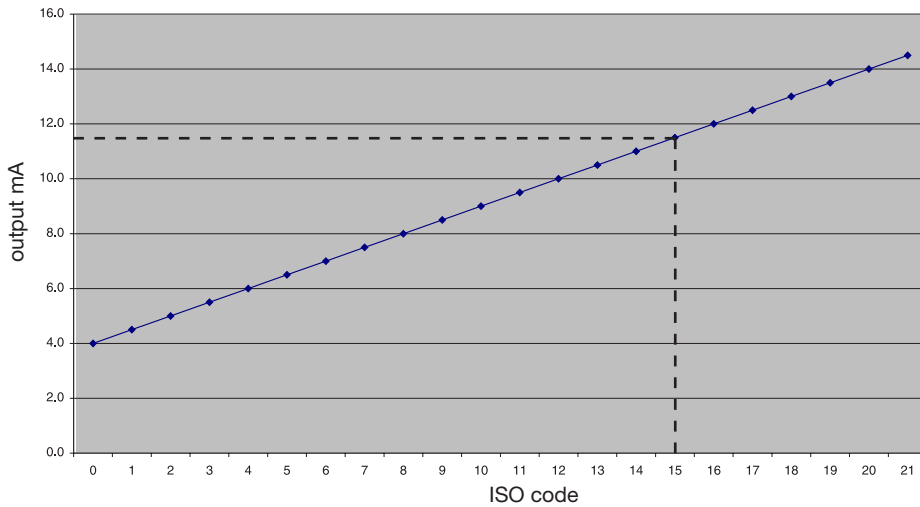
Variable current output settings

ISO setting

The following table can be used to relate an analogue output (in mA) to an ISO code. For example, an output of 10mA is equal to an ISO code 12.

mA	4.0	4.5	5.0	5.5	6.0	6.5	7.0	7.5	8.0	8.5	9.0	9.5	10.0	10.5	11.0	11.5	12.0
ISO	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
cont.	mA	12.5	13.0	13.5	14.0	14.5	15.0	15.5	16.0	16.5	17.0	17.5	18.0	18.5	19.0	19.5	20
	ISO	17	18	19	20	21	22	*	*	*	*	*	*	*	Over-range	ERROR	

ISO v output mA



The actual calculation is as follows:

$$\text{ISO code} = (\text{output in mA} - 4) \times 2$$

e.g. $(11.5\text{mA} - 4) \times 2 = 7.5 \times 2 = \text{ISO } 15$

* = Saturation (i.e. above ISO code 22)

Variable voltage output settings

The variable voltage output option is capable of two different voltage ranges: a 0–5Vdc range as standard, and a user-selectable 0–3Vdc range. The ‘Full list of commands’ section of this manual (page 30–32) gives information on how to change the voltage output range.

The following tables can be used to relate the analogue output to an ISO code.

For example, in a 0–5Vdc range, ISO code 16 is equal to an output of 3.5Vdc. In a 0–3Vdc range, ISO code 8 is equal to an output of 1.0Vdc.

Table relating ISO codes to Voltage output

ISO	Err	0	1	2	3	4	5	6	7	8	9	10	11
0–5Vdc	<0.2	0.3	0.5	0.7	0.9	1.1	1.3	1.5	1.7	1.9	2.1	2.3	2.5
0–3Vdc	<0.15	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0	1.1	1.2	1.3

cont.

ISO	12	13	14	15	16	17	18	19	20	21	22	Err
0–5Vdc	2.7	2.9	3.1	3.3	3.5	3.7	3.9	4.1	4.3	4.5	4.7	>4.8
0–3Vdc	1.4	1.5	1.6	1.7	1.8	1.9	2.0	2.1	2.2	2.3	2.4	>2.45

CAN-bus output option

If you plan to use the icountPDZ2 with a CAN-bus (SAE J1939) network, you can order this output option when specifying the unit. Refer to the ‘Product configurator’ (page 37) in the Reference section of this manual. The CAN option provides an interface to external CAN-bus networked systems – for example, to the *Parker IQAN*.

Moisture sensor output settings

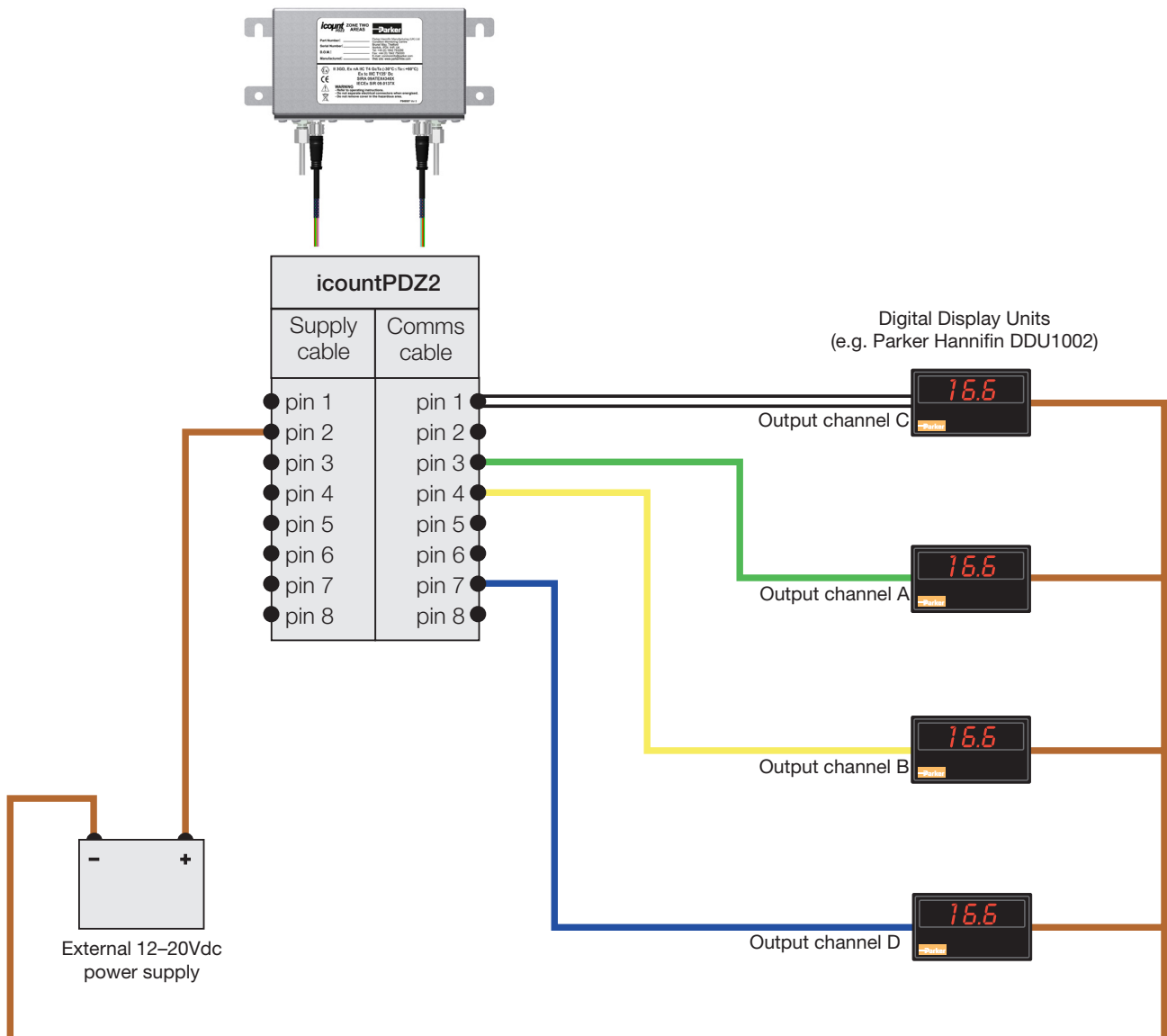
The Moisture sensor is an option that can be included when specifying the icountPDZ2. Refer to the ‘Product configurator’ (page 46) in the Reference section of this manual.

The Moisture sensor reports on the saturation levels of the fluid passing through the icountPDZ2 sensing cell. The output is a linear scale, reporting within the range of 5% saturation to 100% saturation.

Table relating Saturation levels in the sensing cell to icountPDZ2 outputs

Saturation	4–20mA	0–3Vdc	0–5Vdc
5%	4.8	0.15	0.25
25%	8	0.75	1.25
50%	12	1.50	2.50
75%	16	2.25	3.75
100%	20	3.00	5.00

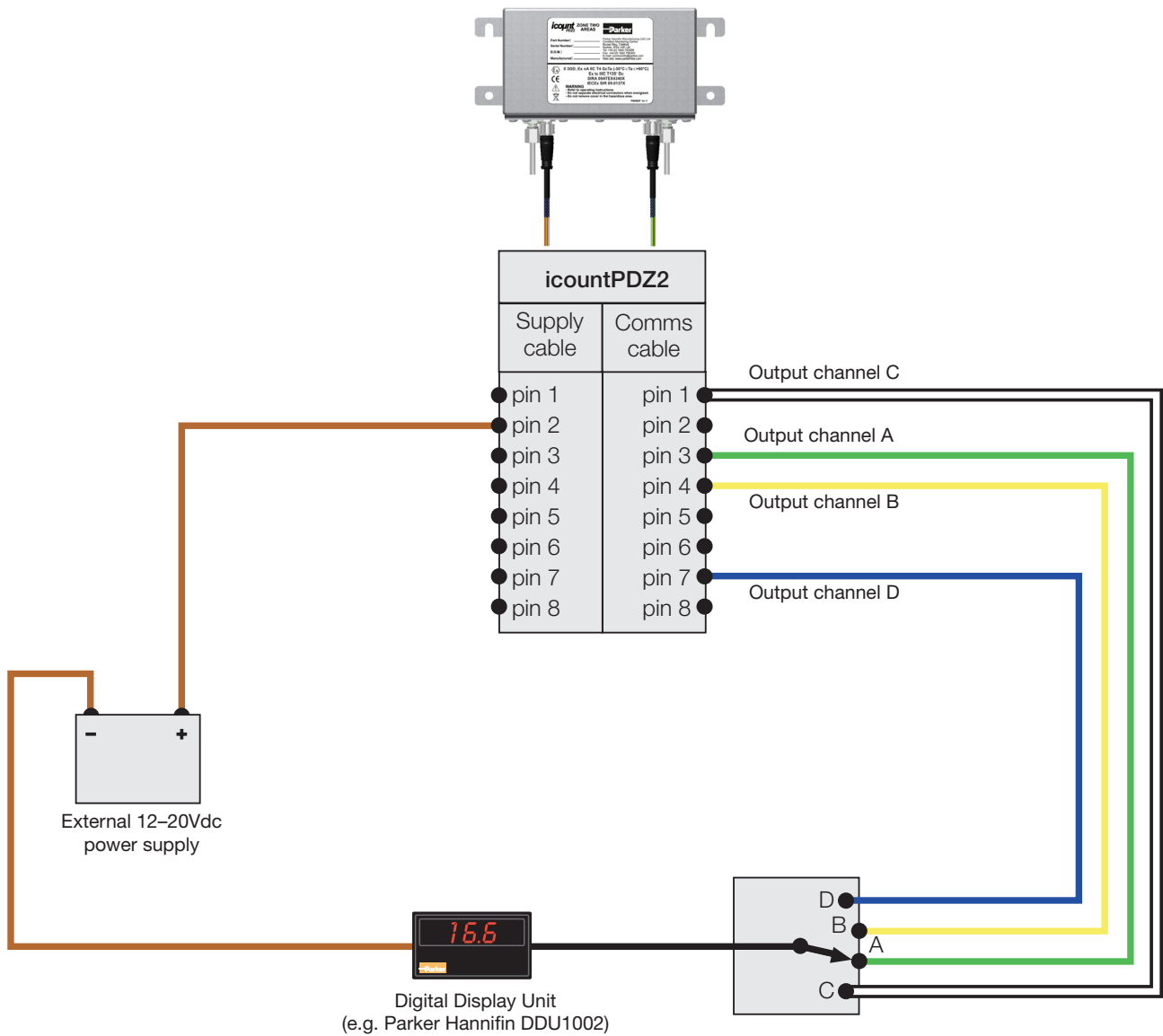
Digital Display Unit connection



The above diagram shows how a set of Parker Hannifin DDUs can be used to display Channels A, B, C and D.

DIGITAL DISPLAY UNITS AVAILABLE

Part number	Description
DDU1001	Process indicator, 22–55Vdc
DDU1002	Process indicator, 90–264Vdc



The above diagram shows how a single DDU can be used to display Channels A, B, C and D, by using a switch to display each channel in turn.

RS232 connection

Communication can be established between icountPDZ2 and a PC using an RS232 serial connection with the **Parker Utility Setup Tool**, the **Parker Terminal** utility, or via Microsoft Windows® **HyperTerminal**.

Please note that **HyperTerminal** is not supplied with Windows Vista™, but the **Parker Utility Setup Tool** and **Parker Terminal** can be used with this operating system. Both Parker programs are supplied on the icountPD CD.

PC connection

The RS232 wires need to be connected to a 9-way D-type connector (not supplied as standard). For the connector pin termination and wire colour, refer to the 'Communication cable connector' section of this manual (page 15).

The device can then be either connected direct to PC serial port (Figure 1) or connected via an RS232-to-USB adaptor cable (Figure 2).

An RS232 to USB convertor can be supplied by Parker Hannifin (part number ACC6NN017).

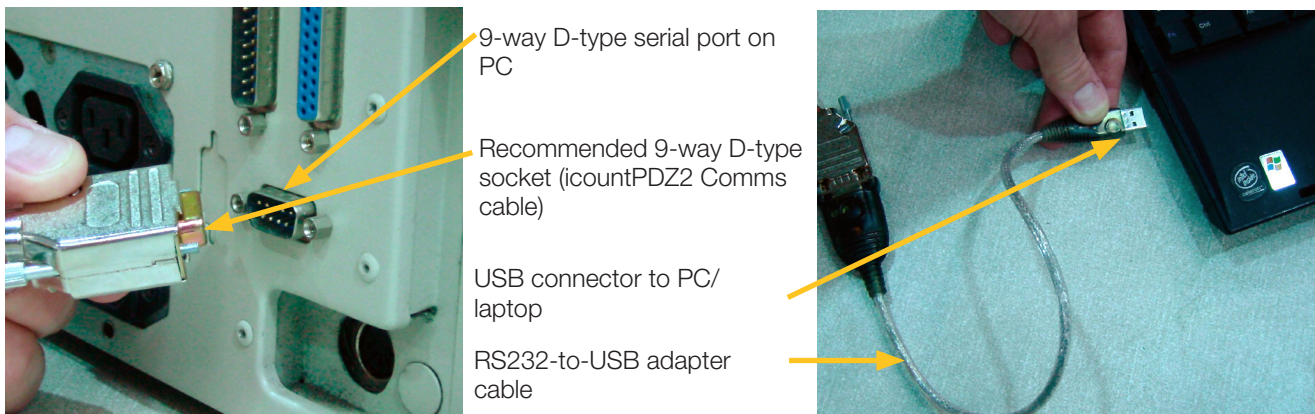


Figure 1

Figure 2

NOTE: The 9-way D-type connector, RS232-to-USB adaptor cable and installation software are not supplied as standard with the icountPDZ2.

Software

The icountPDZ2 may be configured using the icountPD Setup Utility, supplied on CD.

For more direct control of the device using its communications protocol, you may use the **Parker Terminal** program: both Parker programs are supplied on the icountPDZ2 CD. You may also use Microsoft Windows® **HyperTerminal** program, but note that this program is not currently supplied with the Windows Vista™ operating system.

icontainsPD Setup Utility software

PC Installation

The icountPD Setup Utility and Parker Terminal software is available on the CD supplied with the icountPDZ2. The software can be run directly from the CD or copied to a PC hard drive.

Using the icountPD Setup Utility

Check that the icountPDZ2 is connected to power and the communication cable is connected to the PC via the RS232 plug.

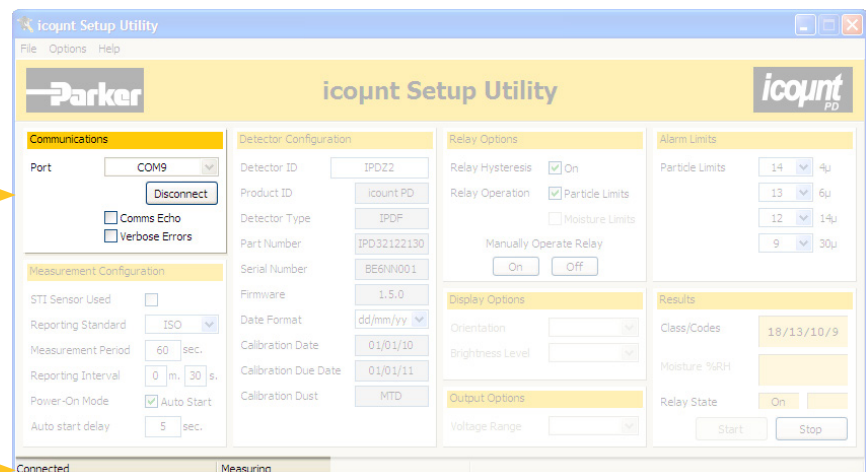
Place the CD in your PC drive and wait for the selection screen to appear. On starting the software, the icountPD Setup Utility screen appears.

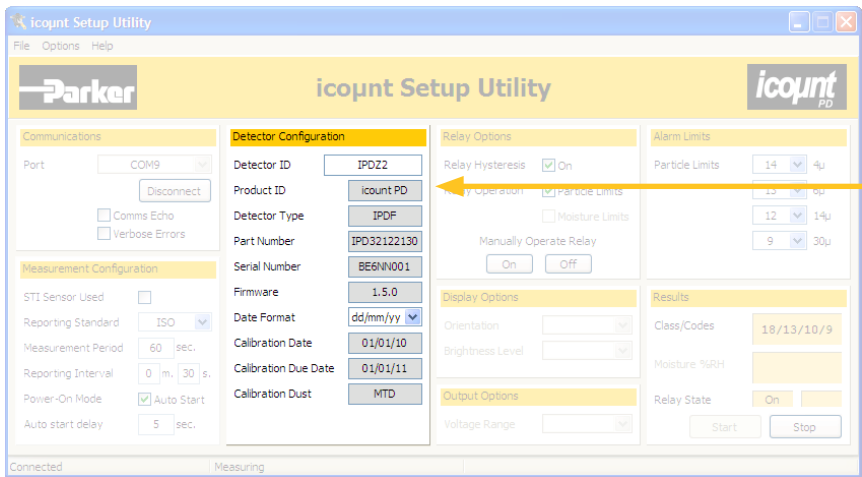
Step 1A:

With the icountPDZ2 connected to power and the RS232 connected to the PC, select the appropriate communication port.

Step 1B:

Note the status of the icountPDZ2.





Step 2:

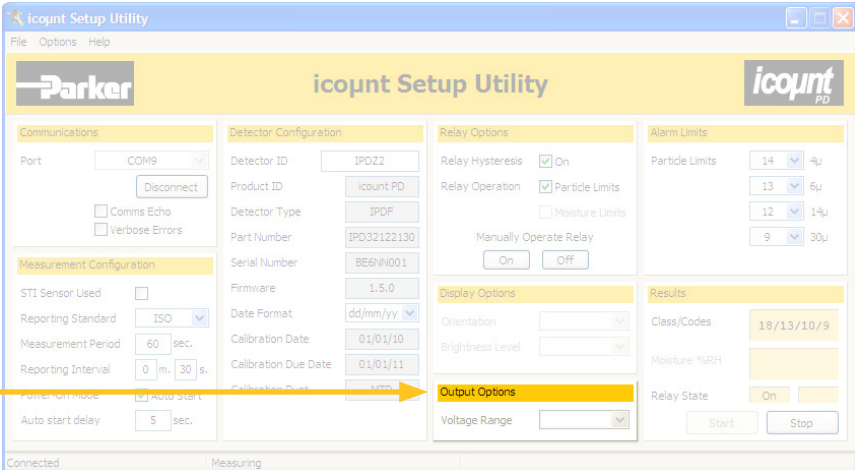
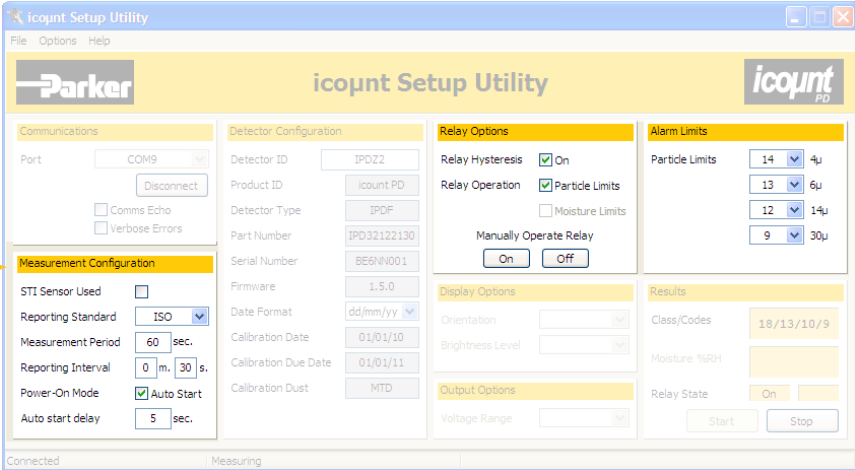
Set the values for 'Detector ID' and 'Date Format'.

The remaining detector information is preset by Parker Hannifin and cannot be changed.

Step 3:

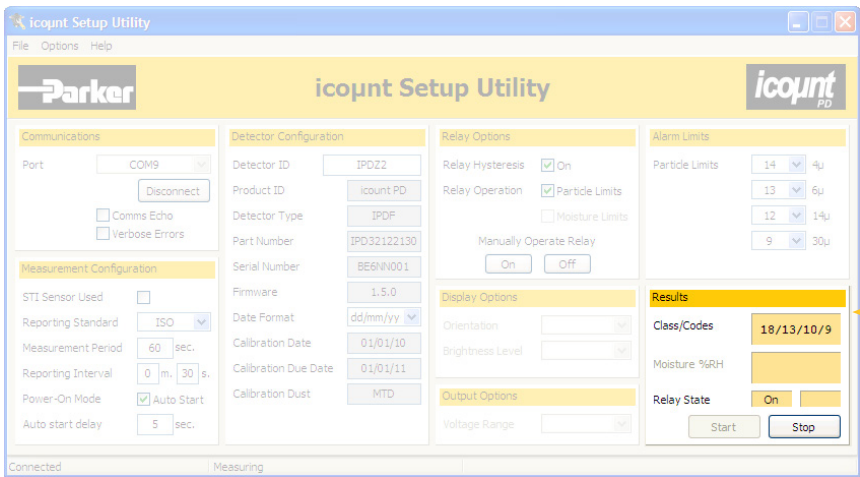
Set the values in 'Measurement Configuration', 'Relay Options' and 'Alarm Limits'.

Ensure that 'STI Sensor Used' is not ticked (contact Parker Hannifin for details).



Step 4:

Set the Voltage Range (0-5V, 0-3V or J1939) in 'Output Options' according to the options fitted.



Step 5:

Setup values are verified as valid in 'Results'.

Click 'Start' to start verification and 'Stop' to stop.

Microsoft Windows® HyperTerminal connection

An alternative way of achieving communication with icountPDZ2 is to use the HyperTerminal program supplied with Microsoft Windows (but not always installed on the PC or laptop's hard disk – check the installation disk, or contact your organisation's IT department if the program is not present). **Please note that HyperTerminal is not supplied with Windows Vista™, but the Parker Terminal utility can be used with this operating system.**

The standard communication settings (used in STEP 4) are as follows:

Baud Rate	9600
Data bits	8
Parity	None
Stop bits	1
Flowcontrol	None



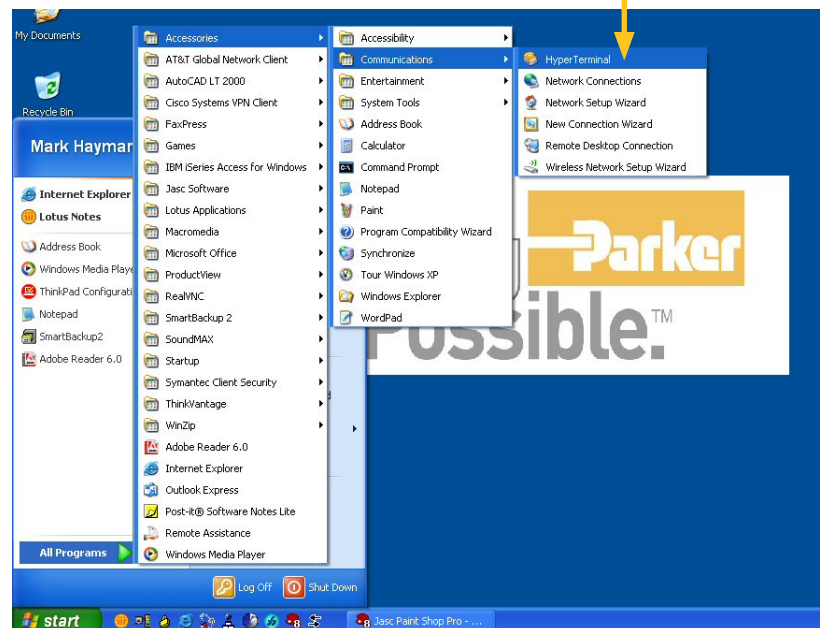
Step 1:

Click 'Start'

Step 2:

Select 'HyperTerminal'.

- (from All Programs
- ▶ Accessories
- ▶ Communications
- ▶ HyperTerminal)

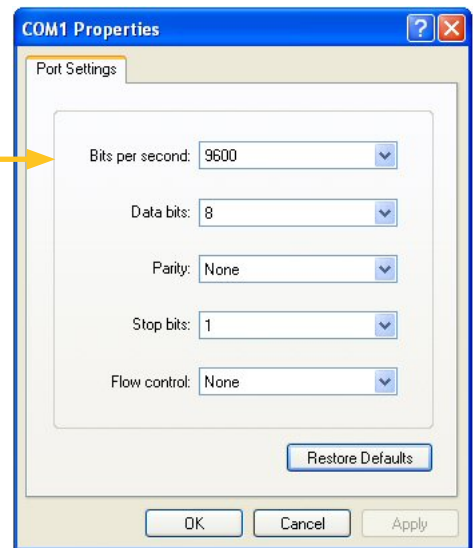


Step 3:

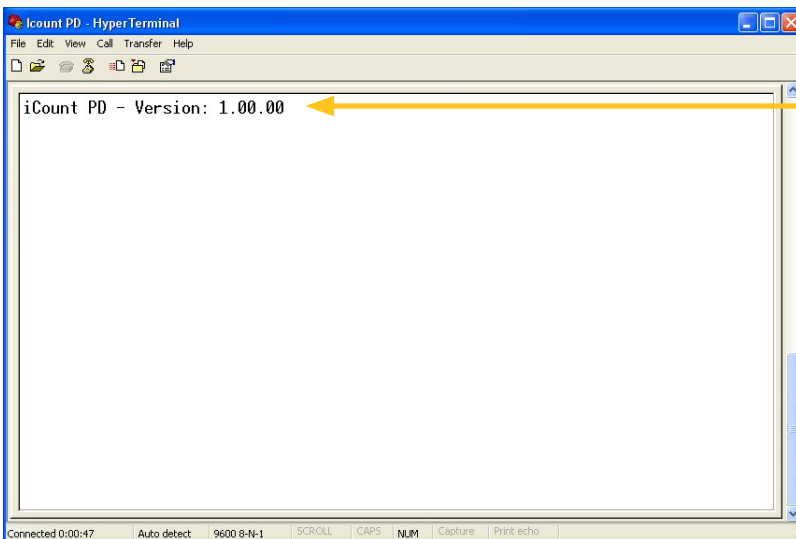
Click and type the connection name you wish to use to identify this session



Step 4:
Select the appropriate USB port.



Step 5:
Enter the communication settings (as in the 'standard communications settings' table, on the previous page).



Step 6:
Once the icountPDZ2 is connected to power, the product identification is displayed. This confirms that communication to icountPDZ2 has been established and the unit is now ready for operation.

Communication protocol

The commands used with the icountPDZ2 are either made up of Set, Read or Start/Stop commands.

- Set commands allow the value or values of parameters to be changed
- Read commands allow the value or values of parameters to be read
- Start/Stop commands allow the user to start and stop tests.

Example:

[SDF dd/mm/yy] sets the date format

[RDF] reads the product format date

All commands are sent in ASCII characters, and the protocol accepts both upper and lower case characters. For example, all of the following codes are equivalent:

SDF = Sdf = SDf = sdf = sdf

NOTE: The use of a '=' after a command, for example [SDF = dd/mm/yy], is optional.

Certain commands are for expert use only and can be accessed via a password system. Should an unauthorized person attempt to access these commands the icountPDZ2 returns the error code for 'Invalid Command'.

A list of error codes is given on page 33.

Most-used commands

Common User Read commands		
Command	Description	icountPDZ2 response
RDU	Read calibration dust	Calibration dust displayed (MTD)
RLT	Read ISO limits	Limits displayed
RRS	Read reporting standard	ISO

Common User Set commands		
Command	Description	User response
SLT	Set limits i.e. 'SLT 14 13 12 9'	SLT ## ## ## ## (for ISO)
SRS	Set reporting standard	SRS iso
SRI	Set reporting interval 0 to 3600 seconds 0 = No reporting	SRI #####

NOTE: The reporting interval (SRI) controls how often the icountPDZ2 sends results over the RS232.

User Start/Stop commands		
Command	Description	Response
STR or START	Start testing	'OK' displayed
STP or STOP	Stop testing	'OK' displayed

Full list of commands

User Read Commands		
Command	Description	icountPDZ2 response
RCD	Read the last C alibration D ate	Last calibration date displayed
RCE	Read C ommunication E cho	'ON' or 'OFF' displayed
	<i>Comms Echo ON allows the icountPDZ2 to communicate in two directions (Hyperterminal)</i>	
	<i>Comms Echo OFF allows the icountPDZ2 to communicate in one direction (Setup Utility)</i>	
RDD	Read the next calibration D ue D ate	Next calibration due date displayed
RDF	Read D ate F ormat	Date format displayed (e.g. dd/mm/yy)
RDI	Read D etector I D	Detector ID displayed
RDS	Read D etector S tatus	IPD status displayed (e.g. RUNNING)
RDU	Read the calibration D ust U nit	Calibration dust displayed (i.e. MTD or ACFTD)
REN	Read last E rror N umber	Last error number displayed
RER	Read last E rror text R eport	Last error text displayed
REV	Read the E rror V erbose mode	Error verbose mode displayed
	<i>Error Verbose ON displays the full description of the error code (i.e. Error 40 – expected On or Off)</i>	
	<i>Error Verbose OFF displays just the error code (i.e. Error 40)</i>	
RFN	Read F ault N umber	Fault number displayed
RJE	Read J 1939 Status	'ON' or 'OFF' displayed
RLR	Read the L ast contamination R esult	Last contamination result displayed
RLT	Read contamination L imit T hreshold	Contamination limits displayed
RML	Read M oisture sensor L imit ¹	Moisture limit displayed
RMP	Read M easurement P eriod	Measurement period displayed
RMV	Read the last M oisture sensor V alue ¹	Last moisture result displayed
ROF	Read O ptions F itted	ROF = ABCDEFGHIJ (see list of options below)
RON	Read O ption N ame	List of options A = Alarm relay option B = LED display option C = OLED display option D = Moisture sensor option E = 4–20mA current loop option F = 0–3/0–5V option G = J1939 option H = reserved I = reserved J = reserved
RPD	Read the P ower on hold-off D elay	Power hold-off delay displayed
RPI	Read P roduct I dentifier	icountPDZ2 displayed
RPM	Read the P ower on M ode	'AUTO' or 'MANUAL' displayed
RPN	Read the icountPDZ2 P art N umber	Parker part number displayed
RPT	Read P roduct T ype	IPDH
RPV	Read P rotocol V ersion	Protocol version displayed
RRI	Read R eporting I nterval	Reporting interval displayed
RRS	Read R eporting S tandard	'ISO' or 'NAS' displayed
RSB	Read Software Build number	Software build number displayed
RSH	Read limit relay S witch H ysteresis ²	'ON' or 'OFF' displayed
RSL	Read S tandards L ist	ISO, NAS

RSN	Read Serial Number	Serial number displayed
RSS	Read limit relay Switch State ²	'ON' or 'OFF' displayed
RSU	Read STI Sensor Used	'YES' or 'NO' displayed
RSV	Read Software Version displayed	Software version displayed
RVM	Read the Voltage Maximum range ³	Voltage range displayed
RWC	Read Warning limit relay for Contamination ²	'ON' or 'OFF' displayed
RWM	Read Warning limit relay for Moisture ^{1,2}	'ON' or 'OFF' displayed

¹ Command requires a Moisture Sensor to be fitted to icountPDZ2

² Command requires a Limit Relay to be fitted to icountPDZ2

³ Command requires a 0–5V option to be fitted to icountPDZ2

User Set Commands

Command	Description	icountPDZ2 response
SCE	Set Communication Echo	SCE on SCE off

Comms Echo ON allows icountPDZ2 to communicate in two directions (Hyperterminal)

Comms Echo OFF allows icountPDZ2 to communicate in one direction (Setup Utility)

SDF	Set Date Format	SDF dd/mm/yy SDF mm/dd/yy SDF yy/mm/dd
SDI	Set Detector ID	SDI ##### (14 characters maximum, spaces not allowed)
SEV	Set the Error Verbose mode	SEV on SEV off

Error Verbose ON displays the full description of the error code (i.e. Error 40 – Expected On or Off)

Error Verbose OFF displays just the error code (i.e. Error 40)

SJE	Set J1939 Status	SJE On/Off (can only set On)
SLT	Set contamination Limit Threshold	SLT ## # # (for ISO) SLT ## (for NAS)
SML	Set Moisture sensor Limit ¹	SML ###
SMP	Set Measurement Period	SMP ### (### = 5 to 180 seconds)

The Measurement period sets the number of seconds the detector uses to determine the contamination levels. So if this is 60 seconds, the unit will use the last 60 seconds of oil to determine the contamination level. (See the 'Component cleanliness guideline' chart in the Reference section of this manual.)

SPD	Set the Power on hold-off Delay	SPD ### (### = 0 to 900 seconds)
------------	--	-------------------------------------

The Power-on hold-off delay command allows the user to delay the start of the icountPDZ2 operation.

SPM	Set the Power on Mode	SPM auto SPM manual
------------	------------------------------	------------------------

With the Power-on Mode set to 'Auto' icountPDZ2 starts testing automatically when the power is connected using the last setup parameters. With the Power-on Mode set to 'Manual' icountPDZ2 becomes idle and requires the user to manually start testing.

SRI	Set Reporting Interval	SRI mm:ss (0 to 3600 seconds (i.e. 0–1 hour); note that 0 = No reporting)
------------	-------------------------------	--

The Reporting Interval controls how often icountPDZ2 sends results over the RS232

SRS	Set Reporting Standard	SRS iso SRS nas
SSH	Set limit relay Switch Hysteresis ²	SSH on SSH off
SSS	Set limit relay Switch State ²	SSS on SSS off
SSU	Set STI Sensor Used	SSU yes SSU no
SVM	Set the Voltage Maximum range ³	SVM # (3 = 0–3Vdc output 5 = 0–5Vdc output)
SWC	Set Warning limit relay for Contamination _{2, 4}	SWC on SWC off
SWM	Set Warning limit relay for Moisture ^{1, 2, 4}	SWM on SWM off

¹ Command requires a Moisture sensor to be fitted to the icountPDZ2

² Command requires a Limit Relay to be fitted to the icountPDZ2

³ Command requires a 0–5Vdc option to be fitted to the icountPDZ2

⁴ If the Limit Relay has been turned OFF for both Contamination monitoring and Moisture sensing, the Limit Relay will not operate, but the alarm status is not affected.

If the Limit Relay has been turned ON for both Contamination monitoring and Moisture sensing, the Limit Relay will operate when any alarm condition is reached.

Error codes

If a command does not follow the protocol, an explanatory error code is returned.

Depending on the setting of **SEV** (**S**et the **E**rror **V**erbose mode), either the error code, or the error code and message are displayed.

For example, with **SEV OFF** (Error Verbose off) just the error code (e.g. **Error 40**) is returned. With **SEV ON** (i.e. Error Verbose on) both the error code and message (e.g. **Error 40 - Expected On or Off**) are returned.

Messages corresponding to the error codes are given in the following table:

Code	Message
Error 0	No error
Error 1	Unknown command
Error 2	Characters after command ignored
Error 3	Command ignored – unit is busy
Error 5	Unexpected character found
Error 6	Symbol too long
Error 7	Bad command format
Error 8	Unknown value
Error 9	Invalid date format
Error 10	Invalid date
Error 13	Option not fitted
Error 14	String too short
Error 15	String too long
Error 17	No test result
Error 18	Number expected
Error 19	Number too long
Error 20	Number out of range
Error 30	Interval shorter than duration
Error 40	Expected On or Off
Error 41	Expected Disabled or Enabled
Error 43	Expected Auto or Manual
Error 45	Expected Yes or No

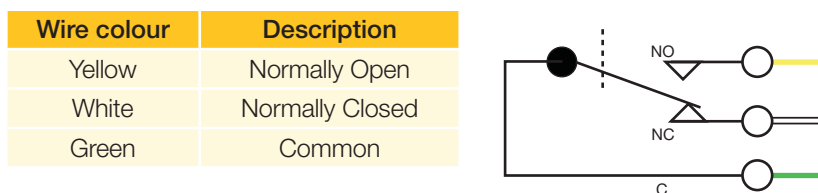
Reference

Optional wiring configuration

Supply and Limit Relay cable wiring configuration

The icountPDZ2 can be specified to include a built-in limit switch relay which can be triggered when a preset alarm level is reached. The relay contacts can be used to switch an external device on or off.

These wires within the icountPDZ2 Supply and Limit Relay cable may be identified by their colour: Yellow, White and Green, and are connected according to the diagram below.



The contact rating is 5A at 5–24Vdc

IMPORTANT NOTE: It is the responsibility of the end user to ensure that the cable's braided screen is terminated.

Optional Limit Relay hysteresis

Hysteresis is a property of systems (usually physical systems) that do not instantly follow the forces applied to them, but react slowly, or do not return completely to their original state.

To set Relay Limits, refer to the 'Communication Protocol – User Commands' section in this manual.

Hysteresis feature ON

The relay will energise when any channel is one code above the set limit and will only de-energize when all channels are one code below the set limit.

Hysteresis feature OFF

The relay will energise when any channel is one code above the set limit and will only de-energize when all channels are on the set limit.

EXAMPLE ISO SCENARIO

An icountPDZ2 has been connected to a hydraulic fluid transfer system. With the icountPDZ2 limit relay switched off (Normally Closed), the limits set to ISO 20/18/13 and the relay cable electrically connected to a Parker 10MFP Filtration Trolley. The icountPDZ2 will activate the 10MFP as soon as the set limits are breached. The ten test results below show the effect of having the hysteresis on or off:

	Hysteresis feature ON 10MFP Trolley status		Hysteresis feature OFF 10MFP Trolley status	
Test 1 result – 20/16/13	OFF		OFF	
Test 2 result – 21/16/13		ON		ON
Test 3 result – 20/16/13		ON	OFF	
Test 4 result – 18/17/14		ON		ON
Test 5 result – 18/16/13		ON	OFF	
Test 6 result – 17/16/11		ON		ON
Test 7 result – 17/16/11	OFF		OFF	
Test 8 result – 18/17/13	OFF		OFF	
Test 9 result – 19/17/14		ON		ON
Test 10 result – 19/17/13		ON	OFF	

ON = Relay activated, OFF = Relay not activated

NOTE: Electrical connection to a 10MFP Filtration Trolley requires the use of a relay

EXAMPLE NAS SCENARIO

An icountPDZ2 has been connected to a hydraulic system on a wind turbine. The icountPDZ2 limit relay is switched off (Normally Closed), the limits set to NAS 9 and the relay cable is connected to a Parker Guardian Filtration Unit. The icountPDZ2 activates the Guardian Filtration Unit as soon as the set limit is breached. The ten test results below show the effect of having the hysteresis on or off:

	Hysteresis feature ON Guardian Unit status		Hysteresis feature OFF Guardian Unit status	
Test 1 result = 9	OFF		OFF	
Test 2 result = 9	OFF		OFF	
Test 3 result = 10		ON		ON
Test 4 result = 9		ON	OFF	
Test 5 result = 10		ON		ON
Test 6 result = 8	OFF		OFF	
Test 7 result = 7	OFF		OFF	
Test 8 result = 10		ON		ON
Test 9 result = 9		ON	OFF	
Test 10 result = 10		ON		ON

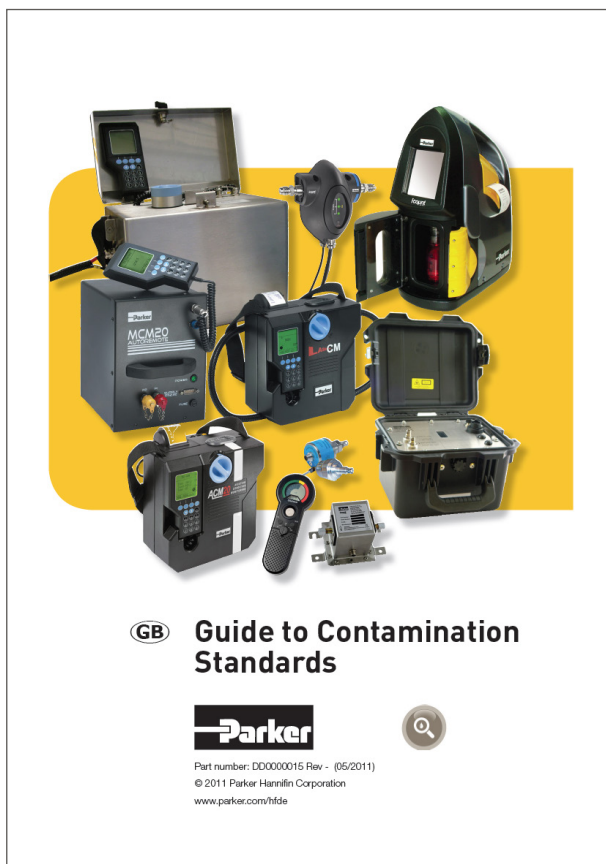
ON = Relay activated, OFF = Relay not activated

NOTE: Electrical connection to a Guardian Filtration unit requires the use of a relay

Contamination Standards



See the Parker 'Guide to Contamination Standards' (DD0000015) – available on your CD. This publication makes available industry-recognized cleanliness specifications for both hydraulic fluid and fuel samples.

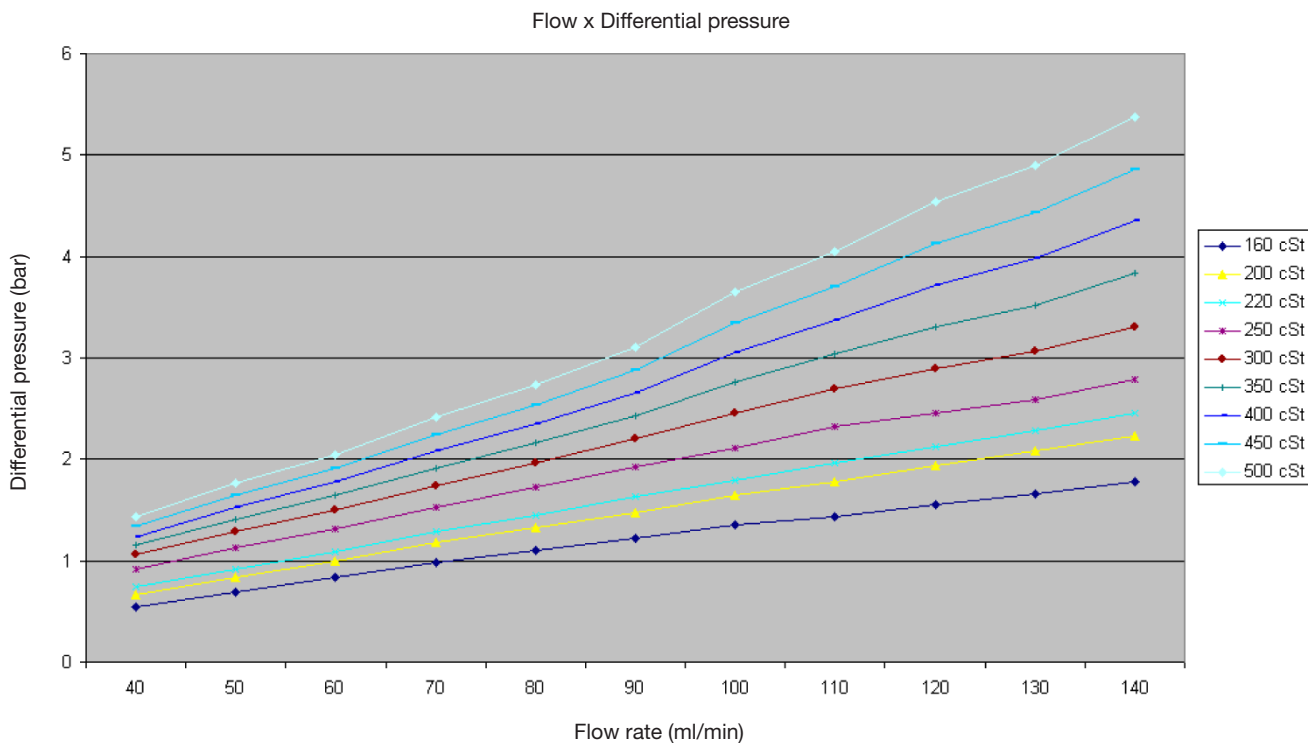
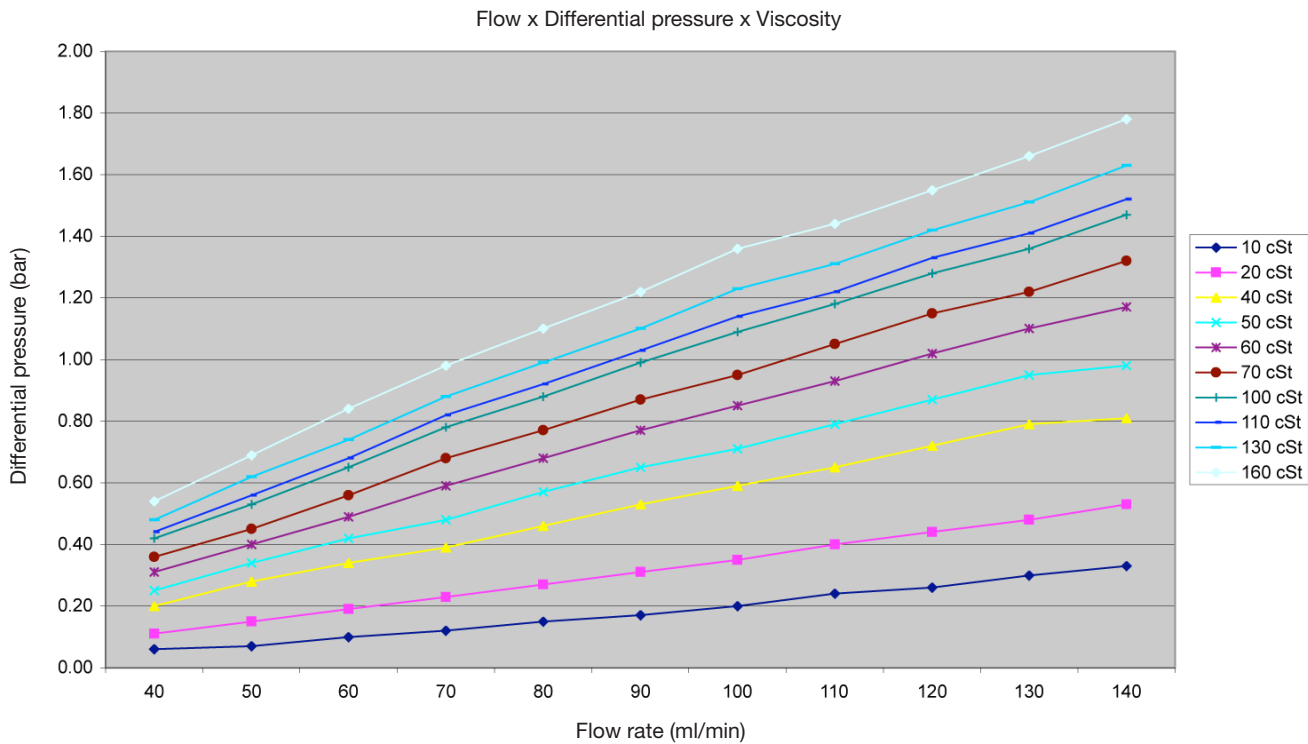


Viscosity charts

The following charts indicate the differential pressure required to run a successful test at the appropriate flow rates.

Example: If the fluid you wish to analyse has a relative viscosity to 60 cSt, to generate the optimum flow rate 60ml/min a differential pressure of 0.5bar is required.

If the fluid you wish to analyse has a relative viscosity of 400 cSt, a 4 bar differential pressure would result in 130 ml/min.



icountPD-CAN version, SAE J1939 technical note

List of Default settings: These commands are now read/write by end-users through RS232 communication from the icountPD to **HyperTerminal** (or similar terminal emulation program).

These commands have been added to support user configuration of the CanBus J1939 option of the icountPD product. They are only accessible from icountPD software version 1.6.1 or later. If you require these options, please return your product to Parker Hannifin Manufacturing (UK) Ltd for the upgrade.

Command	Mnemonic	Default state	Definition
RJP 0	ENA	0x00	Protocol enable/disable
RJP 1	PTR	0x0A	Parameter Transmission Rate (Default 1s)
RJP 2	PS	0x00	PGN PS (Default to PGN 65280)
RJP 3	SA	0x00	Source address (Default to 0) (0–255 available)
RJP 4		0	N/A
RJP 5		0	N/A
RJP 6	PF	0xFF	PGN PF (Default to 65280)
RJP 7	SPNL	0xF7	SPN Low Byte (Default SPN 2551)
RJP 8	SPNH	0x09	SPN High Byte (Default SPN 2551)
RJP 9	IND	0x02	Industry Group (Default 2 = Agriculture/Forestry)

NOTE: It is advisable to make a note of any changes you make for future reference.

To **SET** the above states, launch HyperTerminal and with the unit reporting, enter **SJP** followed by the setting option you wish to change, **0** to **9**.

For example: To change the Source Address, enter **SJP 3** followed by your choice of source address between 0 and 255.

GENERAL INFORMATION:

SAE J1939 protocol, 29-bit identifier, bus speed 250 kbit

OIL CLEANLINESS CLASS AND RELATIVE HUMIDITY

PGN	65280
Priority	6
TR	1s
ID (source addr.)	0 (default)

DATA

STA Byte 1

Data length	1 byte
Resolution	1/bit
Scaling offset	0
Unit	None

STA is the error check which reports whether a J1939 option is fitted. This is read by the main icountPD software but it can also be read via HyperTerminal by the user using the **ROF** (Read Options Fitted) command.

ENA Byte 2

Data length	1 byte
Resolution	1/bit
Scaling offset	0
Unit	None

ENA is the error check which reports whether the J1939 is set to Enable. This is read and set by the main icountPD software but it can also be read via HyperTerminal by the end user using the **RJP 0** command; if enabled this will return a 1. If for some reason it returns a 0, you can change it to 1 by entering the command **SJP 0 1**.

Contamination report channels**CHA 4 μ , Byte 3**

Data length	1 byte
Resolution	1/bit
Scaling offset	0
Unit	4 μ

CHB 6 μ , Byte 4

Data length	1 byte
Resolution	1/bit
Scaling offset	0
Unit	6 μ

CHC 14 μ , Byte 5

Data length	1 byte
Resolution	1/bit
Scaling offset	0
Unit	14 μ

CHD 30 μ , Byte 6

Data length	1 byte
Resolution	1/bit
Scaling offset	0
Unit	30 μ

This channel is used for 30 μ channel on fuel

%RH, Byte 7

Data length	1 byte
Resolution	1/bit
Scaling offset	0
Unit	%RH

N/A, Byte 8

Data length	not used
Resolution	not used
Scaling offset	not used
Unit	not used

SPNL**SPN low byte**

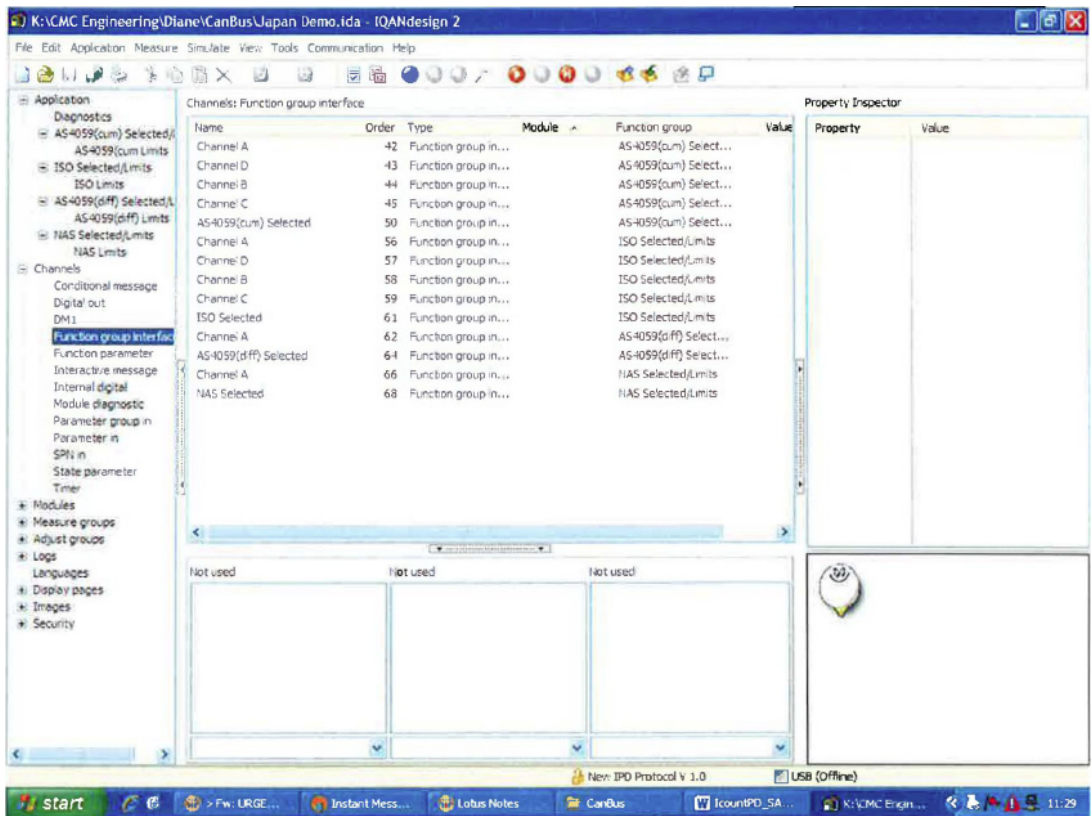
Under normal operation the product is restricted to SPN2551 (proprietary group B). This register is not acted on until the SPNH register is loaded.

SPNH**SPN high byte**

Under normal operation the product is restricted to SPN2551 (proprietary group B). Loading this register causes the SPN to be set to 12-bit value given by SPNL:SPNH.

If the IPD is set to report a standard other than ISO – for example, NAS or AS4059 (cum) or (diff) – the J1939 PCB is sent the appropriate command from the main icountPD software to transmit the revised data.

The bytes for single-channel contamination data, for NAS and AS4059 (diff), are reported on the 4 μ channel, byte 3 – as shown in the following application file screen:



Example IQAN screen

NOTE: The CanBus termination resistor is built onto the PCB so an additional termination resistor should not be required when connecting to a Management Information System such as Parker's IQAN.

Ordering Information

STANDARD PRODUCTS TABLE

Part Number	Fluid type	Calibration	Display	Limit Relay	Communications	Moisture sensor	Cable connector kit
IPDZ12122230	Mineral	MTD	None	Yes	RS232 / 4–20mA	Yes	M12, 8-pin plug connector
IPDZ12121230	Mineral	MTD	None	Yes	RS232	Yes	M12, 8-pin plug connector
IPDZ12123230	Mineral	MTD	None	Yes	RS232 / 0–5V	Yes	M12, 8-pin plug connector
IPDZ12125230	Mineral	MTD	None	Yes	RS232 / CAN-bus	Yes	M12, 8-pin plug connector

PRODUCT CONFIGURATOR

Key	Fluid type		Calibration		Display		Limit Relay		Comms		Moisture sensor		Cable connector kit	
IPD	1	Mineral	1	ACFTD	1	None	1	No	1	RS232	1	No	00	No
IPDZ	2	Phosphate ester	2	MTD	2	LED	2	Yes	2	RS232 / 4–20mA	2	Yes	10	Deutsch 12-pin DT series connector
IPDR	3	Aviation fuel (4 channels)	3	AS4059	3	Digital			3	RS232 / 0–5V			30	M12, 8-pin plug connector
					4	GSM			4	RS232 / RS485				
					5	RS232 / CAN-bus			5	RS232 / CAN-bus				

IPDZ2 OPTIONS NOT CONFIGURABLE

Key	Fluid type	Calibration	Display	Limit Relay	Comms	Moisture sensor	Cable connector kit	
IPDZ			2	LED	4	RS232 / RS485	00	No
			3	Digital			10	Deutsch 12-pin DT series connector
			4	GSM				

ACCESSORY PART NUMBERS

Description	Part number
Single Point Sampler	SPS2021
External flow device	S840074
Power supply	ACC6NN013
2 x 10 metre M12, 8-pin plug and socket Ultra Lock cable kit	ACC6NN021
RS232 to USB converter	ACC6NN017

SENSOR PART NUMBERS

Product number	Supersedes	Size	Flow range (l/min)	Fluid type	Port thread (inches)
STI0144100	STI.0144.100	0	6–25	Mineral fluid	3/8
STI1144100	STI.1144.100	1	20–100	Mineral fluid	3/4
STI2144100	STI.2144.100	2	80–380	Mineral fluid	1 1/4

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