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

icountPD
Online Particle Detector

Parker

ENGINEERING **YOUR** SUCCESS.

icountPD

The icountPD from Parker represents the most up-to-date technology in solid particle detection.

The design dynamics, attention to detail, and small size of the permanently mounted, on-line particle detector brings a truly innovative product to all industry. The laser based, leading-edge technology is a cost effective market solution to fluid management and contamination control.

3 Versions Available

Standard icountPD is designed for test stand, flushing skids, filter carts and other industrial applications.

icountPDR is designed for mobile equipment or any outside use other than hazardous environment.

icountPDZ is intended for applications that require a zone 2 safety such as off-shore platforms or any other hazardous environment.

For Zone 1 applications the standard icountPD can be used within a NEMA7 enclosure.

Features and benefits of the icountPD include:

- Independent monitoring of system contamination trends.
- Early warning LED or digital display indicators for Low, Medium and High contamination levels.
- Moisture % RH LED indicator (optional).
- Cost effective solution in prolonging fluid life and reducing machine downtime.
- Visual indicators with power and alarm output warnings.
- Continuous performance for dependable analysis.
- Hydraulic, phosphate ester & fuel fluid compatible construction.
- Self diagnostic software.
- Fully integrated PC/PLC integration technology such as:
  RS232 and 0-5 Volt, 4-20mA, and CANBUS J1939.

Typical Applications

Mobile Equipment
- **Earth Moving Machinery**
- **Harvesting**
- **Forestry**
- **Agriculture**

Industrial Equipment
- **Production Plants**
- **Fluid Transfers**
- **Pulp & Paper**
- **Refineries**

Power Generation
- **Wind Turbines**
- **Gearboxes**
- **Lubrication Systems**

Maintenance
- **Test Rigs**
- **Flushing Stands**

icountPD

Features and Benefits

Diagnostic self check start-up time	5 seconds
Measurement period	5 to 180 seconds
Reporting interval through RS232	0 to 3600 seconds
Digital LED display update time	Every second
Limit relay output	Changes occur +/- 1 ISO code at set limit (Hysteresis ON) or customer set (Hysteresis OFF)
4-20mA output signal	Continuous
Principle of operation	Laser diode optical detection of actual particulates
Reporting codes	ISO 7 – 21, NAS 0 – 12, (AS 00 – 12 contact Parker) Icount will also report less than ISO 7, subject to the statistical uncertainty defined in ISO4406:1999, which is shown in the RS232, reporting results as appropriate e.g ">6"
Calibration	By recognized on-line methods, confirmed by the relevant International Standards Organization procedures
Calibration recommendation	12 months
Performance	+/- 1 ISO Code (dependant on stability of flow)
Reproducibility / Repeatability	Better than 1 ISO Code
Power requirement	Regulated 9 to 40Vdc
Maximum current draw	150mA
Hydraulic connection	M16 x 2 hydraulic test points (5/8" BSF for aggressive version)
Flow range through the device	40 to 140 ml/min (optimum flow = 60ml/min)
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)
Required differential pressure across Inline Sensors	5.8 psi (0.4 bar) minimum
Viscosity range	10 to 500 cSt
Temperature	Operating environment: -4°F to +140°F (-20°C to +60°C) Storage: -40°F to +176°F (-40°C to +80°C) Operating fluid: +32°F to +185°F (0°C to +85°C)
Working pressure	30 to 6,000 PSI (2 to 420 bar)
Moisture sensor calibration	±5% RH (over compensated temperature range of +10°C to +80°C)
Operating humidity range	5% RH to 100% RH
Moisture sensor stability	±0.2% RH typical at 50% RH in one year
Certification	IP66 rated EMC/RFI – EN61000-6-2:2001 EN61000-6-3:2001
Materials	User friendly construction Stainless Steel hydraulic block Viton seals
Dimensions	7.2" x 6.1" x 3.4" (182mm x 155mm x 86mm)
Weight	2.9 lbs. (1.3 kg)

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Dimensions / Installation Details

Communications Cable

1.9" (49)

0.6" (16)

Supply and Limit Relay Cable

3.4" (86)

1.5" (37)

2.4" CTRS (60 CTRS)

4.3" (110)

7.2" (182)

0.8" (21)

2.0" (52)

6.1" (155)

*Limit Relay Wiring Instructions

NORMALLY OPEN
NORMALLY CLOSED
COMMON

NO — Pin #2
NC — Pin #3
C — Pin #8

2 mounting locations to suit M5 socket head cap screw. (Screw pack supplied with icountPD)

icountPD flange thickness = 0.4" (10mm)

Maximum Torque 5Nm
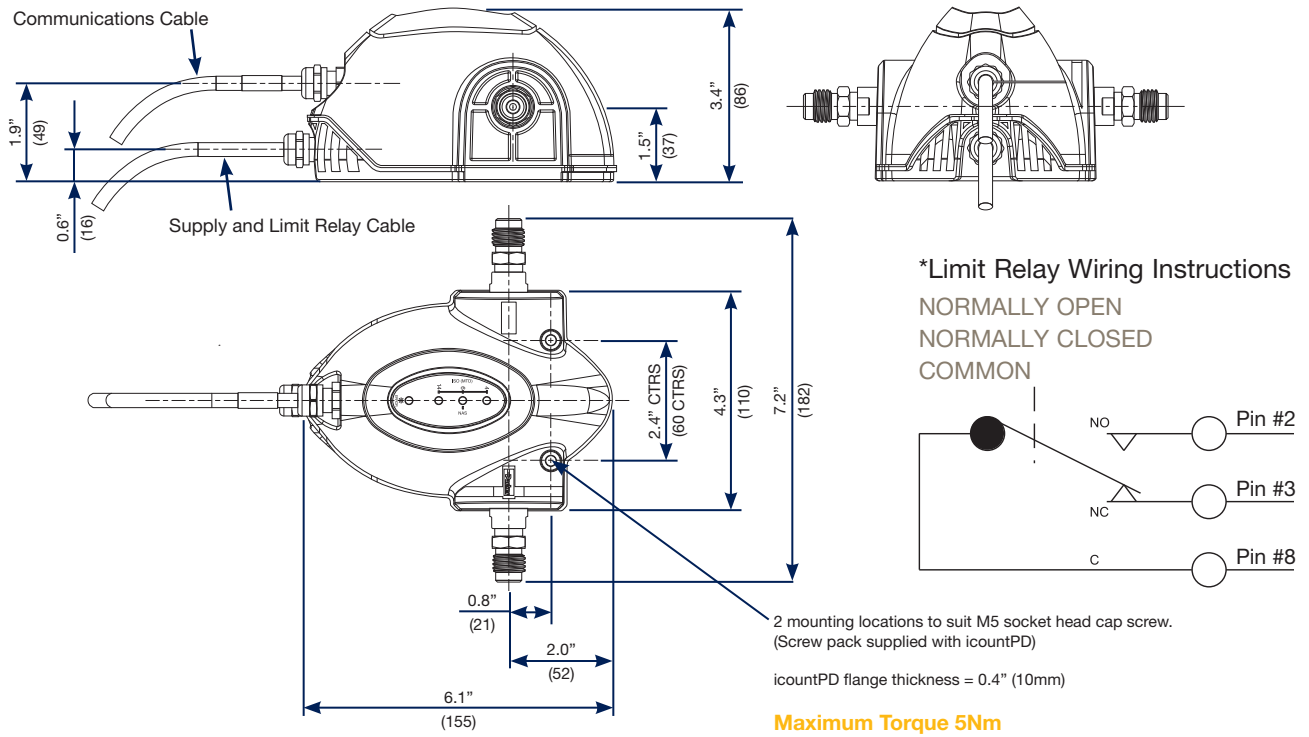
M12 Communication Cable: Wiring Configuration for Standard iPD

Pin	4-20mA option connections	0-5V/0-3V option connections
1	NOT USED	NOT USED
2	RS232 Ground (pin 5**)	RS232 Ground (pin 5**)
3	Channel A, ISO 4µm (c)*	Channel A, ISO 4µm (c)*
4	Channel B, ISO 6µm (c)* or NAS (if selected)	Channel B, ISO 6µm (c)* or NAS (if selected)
5	RS232 Receive (Pin 3**)	RS232 Receive (Pin 3**)
6	RS232 Transmit (Pin 2**)	RS232 Transmit (Pin 2**)
7	Moisture sensor channel (if fitted)	Moisture sensor channel (if fitted)
8	Channel C, ISO 14µm (c)*	Channel C, ISO 14µm (c)*

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.

* Optional – refer to the icountPD part number specifier section in the manual.

** A standard USB serial adaptor can be used with the recommended 9-way D-type connector to convert RS232 to USB.

*M12 Limit Relay & Alarm Levels: Wiring Configuration

| Pin	Current loop option connections	0-5V/0-3V option connections
1	Product supply 9-40Vdc	Product supply 9-40Vdc
2	4-20mA supply 12-20Vdc	0-5 / 0-3V supply 12-24Vdc
3	Relay (Normally Closed)*** (if fitted)	Relay (Normally Closed)*** (if fitted)
4	Relay (Normally Open)*** (if fitted)	Relay (Normally Open)*** (if fitted)
5	NOT USED	NOT USED
6	NOT USED	0-5 / 0-3V supply 0Vdc
7	Main supply 0Vdc	Product supply 0Vdc
8	Relay (Common)*** (if fitted)	Relay (Common)*** (if fitted)

Note: If the moisture sensor is fitted without either option, then the output is RS232.

Parker recommends that the mating M12 connector cables are screened. These cables are available from Parker through the ordering information section.

*** Optional – refer to ordering information section.

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Variable mA Output Settings
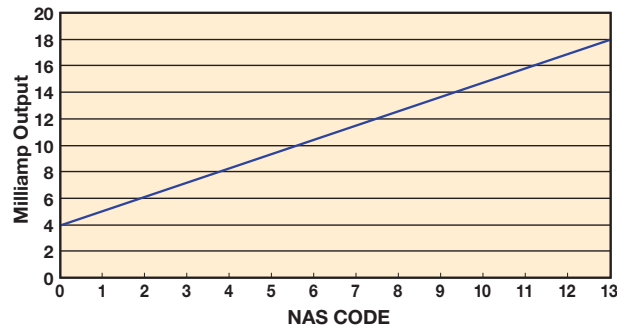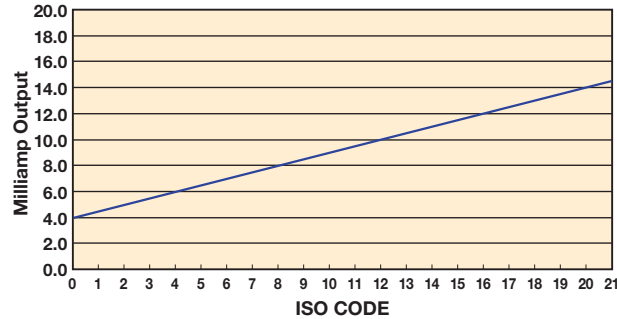
The following table can be used to equate the analogue output to an ISO or NAS Code.

Example: ISO code 12 is equal to 10mA.

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

mA	NAS
4	00
5	0
6	1
7	2
8	3
9	4
10	5
11	6
12	7
13	8
14	9
15	10
16	11
17	12
18	**
19	**
20	ERROR

4-20mA output settings

ISO Setting

mA current = (ISO Code / 2) +4
eg. 10mA = (ISO 12 / 2) +4
or
ISO Code = (mA current - 4) *2
eg. ISO 12 = (10mA -4) *2

NAS Setting

mA current = NAS Code +5
eg. 15mA = NAS 10 +5
or
NAS Code = mA current -5
eg. NAS 10 = 15mA – 5

Variable Voltage Output Settings

The variable voltage output option has the capability of two different voltage ranges: a 0-5Vdc range as standard, and a user-selectable 0-3Vdc range.

The full list of commands on how to change the voltage output is available from Parker.

The following tables can be used to relate the analog output to an ISO or NAS code.

For example, in a 0-5Vdc range, ISO code 16 is eaual 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

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

Table relating NAS codes to voltage output

ISO	Err	00	0	1	2	3	4	5	6	7	8	9	10	11	12	Err
0-5Vdc	<0.4	0.6	0.9	1.2	1.5	1.8	2.1	2.4	2.7	3.0	3.3	3.6	3.9	4.2	4.5	>4.6
0-3Vdc	<0.2	N.S.	0.3	0.5	0.7	0.9	1.1	1.3	1.5	1.7	1.9	2.1	2.3	2.5	2.7	>2.8

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Display Parameters (ISO 4406/NAS 1638)

Digital display indication

The digital display will show the actual measured codes, the channel (μ) size and the user defineable limits. Visible display of the channel size and user definable limits will alternate.

The moisture sensor reading (%RH) will also be shown – if the moisture sensor option is fitted.

The order of trigger for both of the codes and moisture sensor option is:
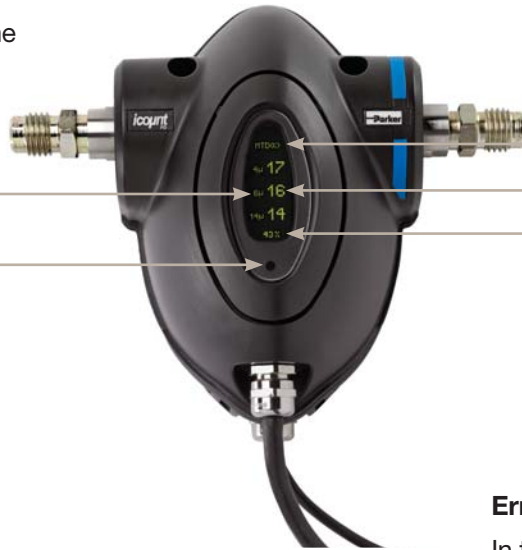
• Solid digit(s) = code(s) that are at or below the set point (limit)

• Flashing digit(s) = code(s) that are above the set point (limit)

The display for ISO4406 and NAS1638 are identical. The ISO display is shown below.

Channel sizes/limits

Automatic light sensor

MTD calibrated

Measured ISO codes

Moisture sensor reading

Error detection

In the unlikely event of an error occurring, the digital display on the icountPD will simply display the actual error code only – i.e. ERROR 13 (a full list of error codes is detailed in the icountPD user manual).

Moisture sensor output settings

The moisture sensor is an option that can be included when specifying the icountPD. The moisture sensor reports on the saturation levels of the fluid passing through the icountPD sensing cell. The output is a linear scale, reporting within the range of 5% saturation to 100% saturation.

LED display indication

The LED display uses 3 sets of LED for the indication of ISO 4406 and NAS1638 code figures. Individual code lights will trigger based on the customer settings.

The order of trigger will be:

• Solid green = one ISO code, or better, below the set point (limit)

• Blinking green = ISO code at the set point (limit)

• Solid red = one ISO code above the set point (limit)

• Blinking red = two ISO codes, or more, above the set point (limit)

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

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Auxiliary Flow Device - P/N ACC6NN019

This simple to use flow control device fits on the downstream (outlet) side of the icountPD and is fitted with a differential pressure valve that adjusts the system flow to a range inside the icountPD specifications.

Note: The flow control device will still operate correctly even with the high pressure side at 2900 psi (200 bar) and the return back to an open system of 0 psi (0 bar) (DP = 2900 psi, 200 bar). Minimum system pressure of 150 psi (2.5 bar) needed to function properly.

P/N ACC6NN019

Communication Options

The icountPD may be configured using the icountPD Setup Utility. For more direct control of the device using its communications protocol, you may also use the Microsoft Windows® HyperTerminal program (this program is not currently supplied with the Windows Vista™ operating system, and is not available in Windows 7).

Communication protocol

The communication protocol for the serial communication link is to be used with Microsoft Windows HyperTerminal. The settings are as follows:

```
Baud rate . . . . . . . . 9600
Data bits  . . . . . . . . 8
Parity . . . . . . . . . . . None
Stop bits  . . . . . . . . 1
Flow control . . . . . . None
```

Note: A full list of commands is detailed in the user manual.

Optional Accessories					
	Part Number				
Description	Mineral/Fuel	Phosphate Esters	IPD	IPDR	IPDZ
1 Meter Hose Length	ACC6NN001	ACC6NN002	X		
2 Meter Hose Length	ACC6NN003	ACC6NN004	X		
5 Meter Hose Length	ACC6NN005	ACC6NN006	X		
1/4" BSP Test point	ACC6NN007	ACC6NN008	X		
1/8" BSP Test point	ACC6NN009	ACC6NN010	X		
1/8" NPT Test point	ACC6NN011	ACC6NN012	X		
Single Point Sampler	SPS2021	SPS2061	X	X	X
External Flow Device	ACC6NN019		X	X	X
Power Supply	ACC6NN013		X	X	X
5 meter, M12, 8-pin plug and socket cable kit*	ACC6NN014	ACC6NN015	X		
Deutsch 12-pin connector kit	ACC6NN016		X	X	
RS232 to USB converter	ACC6NN017		X	X	X
12" long M12 8-way RS232 & power cable kit	ACC6NN018		X		X
M12, 12 way cable	ACC6NN024			X	

* Cable Kit consists of two 5 meter cables to enable all output options (Communications cable and Relay/Power Supply cable).

icountPD

Online Particle Detector

BOX 1	BOX 2	BOX 3	BOX 4	BOX 5	BOX 6	BOX 7	BOX 8
IPD	1	2	2	2	2	1	30

BOX 1: Basic Assembly

Symbol	Description
IPD	Standard Particle Detector
IPDR	Particle Detector - Robust Construction
IPDZ	Particle Detector - Hazardous (Zone 2)

BOX 2: Fluid Type[1, 2]

Symbol	Description
1	Mineral Oil
2	Phosphate Ester **(iPD, iPDR only)**
3	Aviation Fuel (4 channel) **(iPD, iPDZ only)**

BOX 3: Calibration

Symbol	Description
2	MTD

BOX 4: Display

Symbol	Description
1	None **(iPDR, iPDZ only)**
2	LED **(iPD only)**
3	Digital **(iPD only)**

BOX 5: Limit Relay

Symbol	Description
1	No **(iPDR only)**
2	Yes

BOX 6: Communication[3, 4]

Symbol	Pressure Setting
2	RS232 / 4-20mA
3	RS232 / 0-5V **(iPD, iPDR only)**
5	RS232 / CAN-bus (J1939)

BOX 7: Moisture

Symbol	Description
1	No
2	Yes

BOX 8: Cable Connector[5]

Symbol	Description
10	Deutsch DT Series **(iPD, iPDR only)**
30	M12, 8-pin plug connector **(iPD, iPDZ only)**
40	M12, 12-pin plug connector **(iPDR only)**

Notes:

1. When "3" is selected in Box 2, "1" must be selected in Box 7.
2. Aviation Fuel option can also be used for diesel fluids.
3. For iPD and iPDR units, when "5" is selected in Box 6, "10" must be selected in Box 8.
4. Contact Parker for additional communication options (RS485, GPRS, LAN, WiFi, Sat, etc.)
5. The required connecting cables are available as a kit. The kit consists of two 5 meter cables (Communications cable and Relay/Power Supply cable) to enable all output options. See Accessory table on page 7 for applicable part number.

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