icount Particle Monitoring
ACM20, ACM20 Z2, IPD and IBS
Aviation fuel + hazardous zones monitoring
Parker Hannifin Corporation
ENGINEERING YOUR SUCCESS.

A global Fortune 300 company with customers in 48 countries, Parker Hannifin is the world’s leading supplier of hydraulic, pneumatic, and electro-mechanical systems and components. Customers rely on Parker for engineering excellence, world-class manufacturing and outstanding customer service to provide comprehensive application solutions that are second to none.

- More than USD 12.1 billion in sales
- 298 plants worldwide
- 12,000 distributors
- 449,000 customers
- Serving 1,200 distinct markets
- Listed as PH on the New York Stock Exchange

Let Parker become part of your design team. Whether you need to develop new products, redesign existing applications, or design completely new systems, Parker offers unparalleled engineering expertise.

Fluid contamination monitoring
Parker Filtration continues, through technical expertise and proven products, to retain a world class position as an innovator in designing and manufacturing fluid contamination monitoring and analysis equipment ensuring our customers can maintain the cleanliness of their hydraulic systems.

More recently Parker Filtration’s CMC development engineers have been working successfully on designing and manufacturing a ‘family’ of icount contamination analyzers, particle detectors and bottle samplers intended to provide accurate and repeatable monitoring of contamination in AvTur and other hydrocarbon fuels in accordance with the Energy Institute (EI) Method IP564.
icountACM20 Lab Unit
Aviation Fuel Contamination Monitoring

A unique product with pedigree


Development work carried out by the CMC engineers, in conjunction with Exxon Mobil Aviation, highlighted the need for an alternative test method to determine the levels of dispersed contamination in Jet fuel. 5 years of field testing and development of the already established and successful icountLCM20 Hydraulic Laser Particle Counter saw the introduction of the Parker icountACM20 with enhanced software providing the user with a better understanding of the contamination present in a sample.

As the benchmark particle counter for use in measuring the levels of contamination in fuels, the icountACM20, as per the UK’s Energy Institute Test Method IP564, has now been included in the DEFSTAN 91-91 Issue 6 Jet Fuel Specification as a report only test alongside the current Gravimetric test method (IP423 or ASTM D5452) and Clear & Bright Visual test method (IP216 or ASTM D2276).

Contact Information:

Parker Hannifin
Hydraulic Filter Division Europe

European Product Information Centre
Freephone: 00800 27 27 5374
(from AT, BE, CH, CZ, DE, EE, ES, FI, FR, IE, IT, PT, SE, SK, UK)
filtrationinfo@parker.com
www.parkerhfde.com

Product Features:

- Energy Institute Test Method IP 564.
- 2-minute test procedure.
- Fully manufactured by Parker with 20 years experience in the Particle Counter Measuring market.
- Laser optical scanning analysis.
- Multi-standard ISO cleanliness reporting.
- On-board, rear-mounted pump enables monitoring possibilities. For example: Fuel storage/vehicle tanks and fuel storage drums.
- Latest averaging software as standard.
- Downloader software.

Note: For information on icountPD for aviation fuels see page 369
icountACM20 Lab Unit
Aviation Fuel Contamination Monitoring

Features & Benefits

Test Time:
2 minutes

Repeat Test Time:
Every 2 minutes (Manual testing), every 6 minutes (automatic)

Principle of Operation:
Optical scanning analysis and measurement of actual particles and inference to water presence

Primary Output:
≥4µ(c), ≥6µ(c), ≥14µ(c), ≥21µ(c), ≥25µ(c), ≥30µ(c) counts per ml

Secondary Diagnostic Output:
% Volume Distribution, via graphical display on handset and printout

International codes:
ISO 7-22 in accordance with ISO 4406-1999

Data entry:
32 character two line dot matrix LCD. Full alpha numeric entry facility on keypad

Data retrieval:
Memory access gives test search facility for up to 300 saved tests

Calibration:
In accordance with Parker Calibration Procedure CM20-N, which complies to ISO11171:1999, Clause 6 (Omitting Annex F)

Re-calibration:
Every 12 months by a dedicated Parker Service Centre (Consult Parker) as required under strict EI methods

Max. working pressure:
420 bar

Operating Temperature:
+5°C to +30°C

Memory store:
300 test capacity

Computer compatibility:
Interface via RS 232 connection @ 9600 baud rate (USB serial cable to RS232 option available)

Laboratory sampling:
Utilizes on-board rear mounted pump

Portability:
Only 8 kg, icount ACM20 has its own battery pack and carry case with wheels 13kg total weight

Power requirement:
12VDC input, 6 x 'D' Cell batteries or rechargeable battery pack

Printer facility:
Integral 16 column printer for hard copy data

Certification:
Complies with all relevant EC declarations of conformity

FACT: icountACM20 is fully compliant with the EI (Energy Institute) test method

Applications

The Parker icount ACM20 Portable Particle Counter has been developed from existing technology for monitoring contamination in AvTur and other hydrocarbon fuels, in accordance with the Energy Institute (EI) Method IP 564.

In addition, the ACM can also be used to monitor various fuels from existing sampling points in locations from refineries, pipelines, distribution terminals, airport fuel supply systems all the way through to the point of uplift into aircraft*.

* Hot works permit required for online sampling (ATEX Zone 2 unit available). Page 14.

Fuel Testing Laboratories – DEFSTAN 91-91 Issue 6
In order to better understand dispersed contamination in jet fuel, particle counting is now included alongside existing laboratory techniques

- Bottle Sampling - Energy Institute (EI) - IP 564
  Laboratory determination of the level of dispersed contamination in aviation kerosine using an Automatic Particle Counter (APC)

- Replace Clear & Bright and Gravimetric
  With the introduction of the icount ACM20, all subjectivity surrounding Clear & Bright and Gravimetric methods can be removed

- Also for use on petroleum based hydraulic applications (Skydrol compatible available)
  Suitable for use with mineral oil and petroleum based fluid as per standard hydraulic particle counter, reporting fluid cleanliness to ISO 4406:1999

Parker
Specification

Construction:
ABS structural foam and injection moulded case
Hand-held display - ABS
Keypad fluoroisicone rubber

Mechanical Components:
Brass, plated steel, stainless steel and aluminium

Seals:
Fluorocarbon

Hoses:
Nylon (Kevlar braided microbore), St. steel armoured ends

Flow Rate:
25 - 28ml/min (dictated by CMP) 100ml/min with additional flush button

Fluid Compatability:
Hydrocarbon Fuel, Mineral Oil. For other fluids consult Parker

Fuse:
1.25 amp fast blow fuse included for overload protection (spare supplied)

icountACM20 Technology:
Patented flow cell, light obscuration

Repeatability/Accuracy:
As per or better than ISO 11171

Coincidence:
40,000 particles per ml

Viscosity Range:
1 - 100 centistokes

icountACM20 Weight:
8 kg

Monitor Carrying Case:
Astra Board case

Carrying Case Weight:
5 kg

icountACM20 - rear view

Field Monitoring - icountACM202022
For use in non-hazardous areas, the icountACM202022 is designed for online sampling of hydrocarbon fuels and hydraulic systems, utilising existing "quick connect" sampling points such as the Millipore Adaptor.

Input Power Socket (note that you will have to remove the plastic dust cap to access the 12Vdc power socket).
A fast blow 1.25A fuse and the RS232 connection are located behind the removable cover plate. The RS232 interface is provided to download all test data stored in the instrument. See the ParSmart Downloader software for more information.

Ordering Information

Standard products table - icount ACM20

<table>
<thead>
<tr>
<th>Product number</th>
<th>Supersedes</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACM202022UK</td>
<td>N/A</td>
<td>icountACM20 (UK)</td>
</tr>
<tr>
<td>ACM202022US</td>
<td>N/A</td>
<td>icountACM20 (US)</td>
</tr>
<tr>
<td>ACM202022EUR</td>
<td>N/A</td>
<td>icountACM20 (EURO)</td>
</tr>
<tr>
<td>ACM202024UK</td>
<td>N/A</td>
<td>icountACM20 with lab kit - UK (DEFSTAN 9191)</td>
</tr>
<tr>
<td>ACM202024US</td>
<td>N/A</td>
<td>icountACM20 with lab kit - US (DEFSTAN 9191)</td>
</tr>
<tr>
<td>ACM202024EUR</td>
<td>N/A</td>
<td>icountACM20 with lab kit - EURO (DEFSTAN 9191)</td>
</tr>
<tr>
<td>ACC6N000</td>
<td>B84794</td>
<td>1 meter process cable</td>
</tr>
<tr>
<td>ACC6N006</td>
<td>B84816</td>
<td>Parsmart downloader software</td>
</tr>
<tr>
<td>ACC6N019</td>
<td>N843950</td>
<td>icountACM20 transit Case</td>
</tr>
<tr>
<td>ACC6N003</td>
<td>B84746</td>
<td>Vapour/waste bottle assembly</td>
</tr>
<tr>
<td>ACC6N029</td>
<td>B84745</td>
<td>Throttle kit</td>
</tr>
<tr>
<td>ACC6N020</td>
<td>B84545</td>
<td>Millipore adaptor kit</td>
</tr>
<tr>
<td>ACC6N013</td>
<td>B84609</td>
<td>Re-chargeable battery pack</td>
</tr>
<tr>
<td>ACC6N008</td>
<td>B84617</td>
<td>UK power supply</td>
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<tr>
<td>ACC6N010</td>
<td>B84620</td>
<td>US power supply</td>
</tr>
<tr>
<td>ACC6N009</td>
<td>B84631</td>
<td>Euro power supply</td>
</tr>
<tr>
<td>ACC6N020</td>
<td>B84632</td>
<td>UK Offline kit</td>
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<tr>
<td>ACC6N021</td>
<td>B84642</td>
<td>Euro Offline kit</td>
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<td>ACC6N022</td>
<td>B84652</td>
<td>US Offline kit</td>
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<td>SBERM52067</td>
<td>N/A</td>
<td>500ml verification fluid</td>
</tr>
<tr>
<td>ACC6N015</td>
<td>B84702</td>
<td>Printer reel (x5)</td>
</tr>
<tr>
<td>ACC6N014</td>
<td>N8430702</td>
<td>Printer ribbon (x1)</td>
</tr>
</tbody>
</table>

Note 1: Part numbers featured with bold highlighted codes will ensure a ‘standard’ product selection.
Note 2: Alternate displayed part number selection will require you to contact Parker Filtration for availability.
Note 3: Selected spare parts - for a full list contact Parker.
* Hot works permit required for online sampling.
DEFSTAN 91-91 Issue 6
Defence Standard 91-91 is the specification for aviation turbine fuel, which the United Kingdom Civil Aviation Authority (CAA) has agreed is under the technical authority of the Director of the Defence Fuels Group.

IP 564
Laboratory determination of the level of dispersed contamination in aviation kerosene using an Automatic Particle Counter (APC). This standard describes a method for determining the level of dispersed contamination in aviation kerosene fuels, specifically dirt particles and water droplets in the range from ≥4μ(c) to ≥30μ(c).
This method relates specifically to Aviation fuels but the equipment can be used on all fuels, petroleum and mineral based fluids.

Note:
The mandatory implementation date for IP 564 test method “Determination of the level of cleanliness of aviation turbine fuel - laboratory automatic particle counter” is July 1st 2009. It is the specification authorities intention to replace current test methods with particle counting at the earliest opportunity.

IP 564 Procedure
Step 1
The apparatus shall be set up in accordance with Parker’s operating instructions.

Step 2
Test Portion Preparation:
Decant a minimum of 450ml of the field sample into a clean test portion container.

Step 3
Prior to starting a test, tumble the test portion end over end for 60 seconds to ensure any settled particles are redistributed.

Step 4
Turn on the Case Mounted Pump and flush for 60 seconds. Do not press the fast flush button. While flushing, enter the test identifier (see manual).

Step 5
Following the flush, start a test by turning the blue valve in the direction indicated. Perform a further 3 tests. (4 in total).
For use in explosive and hazardous areas

icountACM20 Z2 is designed to be used to monitor various fuels from existing sampling points in hazardous locations such as refineries, pipelines, distribution terminals, airport fuel supply systems all the way through to the point of uplift into aircraft. With Zone 2 classification, the icount ACM20 Z2 is the world's only ATEX approved particle counter.

Contact Information:

Parker Hannifin
Hydraulic Filter Division Europe

European Product Information Centre
Freephone: 00800 27 27 5374
(from AT, BE, CH, CZ, DE, EE, ES, FI, FR, IE, IT, PT, SE, SK, UK)
filtrationinfo@parker.com

www.parkerhfde.com

Product Features:

- Assembled in an approved and certified stainless steel enclosure to comply with ATEX Directive 94/9/EC.
- Can be used in explosive and hazardous areas, including offshore and mining applications.
- ATEX Zone II
- Certified to CE Ex II 3 G Ex nR/nL IIC T6
- “A” Class product defined for the Aviation market.
- ATEX approved Handset and keypad.
- Suitable for use with mineral oil and petroleum based fluid as per ACM20/LCM20 particle counters.
icountACM20 Z2
ATEX Approved Portable Particle Counter

Features & Benefits

Test Time:
2 minutes.

Repeat Test Time:
Every 2 minutes (Manual testing) Every 6 minutes (Automatic).

Principle of Operation:
Optical scanning analysis and measurement of actual particles and inference to water presence.

Primary Output:
≥4μ(c), ≥6μ(c), ≥14μ(c), ≥21μ(c), ≥25μ(c), ≥30μ(c) counts per ml.

Secondary Diagnostic Output:
% Volume Distribution, via graphical display on handset.

International codes:
ISO 7-22 in accordance with ISO 4406-1999

Data entry:
32 character two line dot matrix LCD. Full alpha numeric entry facility on keypad.

Data retrieval:
Memory access gives test search facility for up to 300 saved tests.

Calibration:
In accordance with Parker Calibration Procedure CM20-N, which complies to ISO11171:1999, Clause 6 (Omitting Annex F).

Re-calibration:
Every 12 months by a dedicated Parker Service Centre (Consult Parker).

Max. working pressure:
420 bar.

Operating Temperature:
+5°C to +80°C.

Memory store:
300 test (scrolling memory) capacity.

Computer compatibility:
Interface via RS 232 connection @ 9600 baud rate.

Portability:
15 kg. ACM20 has its own battery pack and carry case with wheels.

Power requirement:
Rechargeable battery powered or via the 12vDC input.

System connection:
Via Millipore adaptor with flow restriction through supplied needle valve.

Certification:
Complies with all relevant EC declarations of conformity.

Printer facility:
No printer. Data download only.

Online Commission Kit

a – icountACM20 Zone II Particle Counter
b – Battery Charger
c – Process Cable
d – User Manual
e – Downloader Software
f – Throttle Kit
g – Millipore Adaptor Assembly
h – Aluminium Case
i – Bottle Assembly
Specification

Construction:
Unit: Stainless Steel
Carrying case: ABS
Hand-held display: ABS
Keypad: polyester membrane
Mechanical components:
Brass, plated steel, stainless steel and aluminium
Seals: Fluorocarbon
Hoses: Nylon (Kevlar braided microbore)
Fluid compatibility:
All fuels. For other fluids consult Parker
Internal rechargeable battery:
Note: ONLY to be charged outside of the hazardous area, with the unit switched off
Fuse:
1.25A fast blow fuse included for overload protection
Return to Parker Hannifin if fuse is blown
icountACM20 2032 technology:
Unique optical scanning system

Applications in Fuels

- **Oil Refinery**
  - To count and verify the levels of dispersed contamination in accordance with specification limits. (Consult Parker CMC).

- **Distribution Terminals/Hubs**
  - For use on receipt and outbound supply. Also to provide filtration performance, tank cleanliness and product quality checks.

- **Storage**
  - Settling times can be reduced by monitoring with the ACM by ensuring that levels of dispersed contamination are below acceptable levels.

- **Airport Fuel Farm**
  - Monitoring of fuels into storage, through the fuel farm, hydrant system and during uplift into wing.

- **Pipeline Commissioning**
  - Fast real time monitoring of pipelines following pigging and cleaning processes.

- **Oil and Gas Platforms**
  - Used to monitor the filtration performance, system cleanliness and quality of delivered product.

Using icountACM20 Z2

icountACM20 Z2 is designed to be used to monitor various fuels from existing sampling points in hazardous locations from refineries, pipelines, distribution terminals, airport fuel supply systems all the way through to the point of uplift into aircraft. With Zone II classification, the icountACM20 Z2 is the worlds only ATEX approved particle counter.
icountACM20 Z2
ATEX Approved Portable Particle Counter

Installation Details

Ordering Information

<table>
<thead>
<tr>
<th>Standard products table - icountACM20 Z2</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Product number</strong></td>
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<tr>
<td>ACM202032UK</td>
</tr>
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<td>ACM202032US</td>
</tr>
<tr>
<td>ACM202032EUR</td>
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<tr>
<td>ACM202034UK</td>
</tr>
<tr>
<td>ACM202034US</td>
</tr>
<tr>
<td>ACM202034EUR</td>
</tr>
<tr>
<td>ACC6NE023</td>
</tr>
<tr>
<td>ACC6NE024</td>
</tr>
<tr>
<td>ACC6NE024</td>
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<tr>
<td>ACC6NE027</td>
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<tr>
<td>ACC6NE028</td>
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<td>ACC6NE003</td>
</tr>
<tr>
<td>ACC6NE029</td>
</tr>
<tr>
<td>ACC6NE001</td>
</tr>
</tbody>
</table>
Applications in hydraulics

Solutions in the offshore industry.
In addition, the icountACM20 Z2 can be used in many hydraulic system applications as detailed below.

In many industries, worker awareness needs to be maintained at a high level to ensure the safety of their operation. This is particularly relevant to offshore oil-drilling and gas-drilling crews, given the interactive and hazardous nature of their work. The Zone II ACM portable particle analyser is a tried and tested technology designed, proven and approved as a fluid contamination monitor that crews are using and trusting in such hazardous and demanding environments.

- Certified to CE Ex II 3 G Ex nR/nL IIC T6
- Can be used in explosive and hazardous areas, including Offshore and Mining.
- Primary Output. Six cumulative particle size channels ranging from ≥4μm(c) to ≥30μm(c) and numbers per ml in accordance with ISO4406-1999.

icountACM20 Z2 – operational in oil refineries and fuel fields.
Already operational in oil refineries and designed to be used inside commercial airfield fuel locations and at the point of upload of fuel into the aircraft, icountACM20 Z2 has an impressive success record in this approval sensitive area of operation.

With a number of safety features designed in as operational standards, the icountACM20Z2 can be taken to the point of use, connected in moments and reporting in little more than 2 minutes to ISO approved standards.

- Assembled in an approved and certified stainless steel enclosure to comply with ATEX Directive 94/9/EC and EN50 021 requirements.
- ‘A’ Class product defined for the aviation market.
- Designed for on-line operation, connecting to the process line via existing Millipore™ fittings, already in use for other industry equipment.

Applications in other hazardous environments.
- Railroad equipment manufacturer - Warranty protection.
- Power generation stations - Preventative maintenance.
- Mobile equipment - Roll-off cleanliness testing.
- Mining operations - Service tool.
- Steel mills - Preventative maintenance.
icountACM20 Z2
ATEX Approved Portable Particle Counter

### Average Particle Counts in AV System

The table below gives estimated counts found in a typical aviation fuel distribution system, and is given as guidance, in which API/EI filtration equipment is installed.

<table>
<thead>
<tr>
<th>Location</th>
<th>Flow Stage</th>
<th>ISO Code - 4406 1999</th>
</tr>
</thead>
<tbody>
<tr>
<td>Receipt into Microfilter</td>
<td>MF</td>
<td>High Count Code</td>
</tr>
<tr>
<td>Expect 2,500 counts per ml</td>
<td>≥4μ(c)</td>
<td>18</td>
</tr>
<tr>
<td>or cleaner @ 4μ(c)</td>
<td>≥6μ(c)</td>
<td>15</td>
</tr>
<tr>
<td>or cleaner @ 4μ(c)</td>
<td>≥14μ(c)</td>
<td>10</td>
</tr>
<tr>
<td>Receipt into FWS (After MF)</td>
<td>FWS</td>
<td>High Count Code</td>
</tr>
<tr>
<td>Expect 500 counts per ml</td>
<td>≥4μ(c)</td>
<td>16</td>
</tr>
<tr>
<td>or cleaner @ 4μ(c)</td>
<td>≥6μ(c)</td>
<td>13</td>
</tr>
<tr>
<td>or cleaner @ 4μ(c)</td>
<td>≥14μ(c)</td>
<td>9</td>
</tr>
<tr>
<td>Receipt into Storage (After FWS/MF)</td>
<td>Airport storage</td>
<td>High Count Code</td>
</tr>
<tr>
<td>Expect 100 counts per ml</td>
<td>≥4μ(c)</td>
<td>14</td>
</tr>
<tr>
<td>or cleaner @ 4μ(c)</td>
<td>≥6μ(c)</td>
<td>10</td>
</tr>
<tr>
<td>or cleaner @ 4μ(c)</td>
<td>≥14μ(c)</td>
<td>7</td>
</tr>
<tr>
<td>FWS out of storage</td>
<td>FWS</td>
<td>High Count Code</td>
</tr>
<tr>
<td>Expect 500 counts per ml</td>
<td>≥4μ(c)</td>
<td>16</td>
</tr>
<tr>
<td>or cleaner @ 4μ(c)</td>
<td>≥6μ(c)</td>
<td>13</td>
</tr>
<tr>
<td>or cleaner @ 4μ(c)</td>
<td>≥14μ(c)</td>
<td>9</td>
</tr>
<tr>
<td>After FWS into Hydrant</td>
<td>FWS</td>
<td>High Count Code</td>
</tr>
<tr>
<td>Expect 100 counts per ml</td>
<td>≥4μ(c)</td>
<td>14</td>
</tr>
<tr>
<td>or cleaner @ 4μ(c)</td>
<td>≥6μ(c)</td>
<td>10</td>
</tr>
<tr>
<td>or cleaner @ 4μ(c)</td>
<td>≥14μ(c)</td>
<td>7</td>
</tr>
<tr>
<td>After Monitor Into Aircraft</td>
<td>To Hydrant/Refueller</td>
<td>High Count Code</td>
</tr>
<tr>
<td>Expect 100 counts per ml</td>
<td>≥4μ(c)</td>
<td>14</td>
</tr>
<tr>
<td>or cleaner @ 4μ(c)</td>
<td>≥6μ(c)</td>
<td>10</td>
</tr>
<tr>
<td>or cleaner @ 4μ(c)</td>
<td>≥14μ(c)</td>
<td>7</td>
</tr>
</tbody>
</table>

Note: Figures will vary from location to location.
Key: MF=Microfilter (API/EI 1590)
      FWS=Filter Water Separator (API/EI 1581)
Independent monitoring of system contamination trends

The icountPD Particle Detector from Parker represents the most up to date technology in particle detection. The design dynamics, attention to detail and moulding compactness of the permanently mounted, on-line particle detector module, combined with on-board, laser based, leading-edge technology, brings to all industries a truly revolutionary, particle detector as a remarkable cost effective market solution to fluid management and contamination control.

Product Features:

- Independent monitoring of system contamination trends.
- Warning LED or digital display indicators for Low, Medium and High contamination levels.
- Visual indicators with power and alarm output warnings.
- Moisture %RH indicator (optional).
- Continuous performance for prolonged analysis.
- Fuel, Hydraulic and phosphate Ester fluid compatible construction.
- Self diagnostic software.
- Full PC/PLC integration technology such as:- RS232 and 0-5Volt, 4-20mA, CAN(J1939) (Contact Parker for other options).
- Set up and Data logging support software included.

Contact Information:

Parker Hannifin
Hydraulic Filter Division Europe

European Product Information Centre
Freephone: 00800 27 27 5374
(from AT, BE, CH, CZ, DE, EE, ES, FI, FR, IE, IT, PT, SE, SK, UK)
filtrationinfo@parker.com

www.parkerhfde.com
Features & Benefits

**Diagnostic Self Check Start-up Time:**
Customer selectable 5-900 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)

**Particle / % RH 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)

**Calibration:**
By recognised on-line methods, confirmed by the relevant International Standard Organisation 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:**
Mineral M16x2 test Points
Aggressive: 5/8” BSF test Points
Fuel: No test Points 1/8 BSP (Female) Ports (Plugged)

**Required Flow Range through the icountPD:**
40 to 140 ml/min (Optimum Flow = 60ml/min)

**Online Flow Range via System 20 Inline Sensors (Hydraulic systems only):**
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:**
0.4 bar (Minimum)

**Viscosity Range:**
1-500 cSt

**Temperature:**
Operating Environment -20°C to +60°C (-4°F to +140°F)
Storage -40°C to +80°C (-40°F to +176°F)
Operating Fluid 0°C to +85°C (+32°F to +185°F)

**Working pressure:**
2 to 420 bar (30-6000 PSI)

**Moisture sensor calibration (Not offered with the fuel version):**
±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

**Certification:**
IP66 rated
EMC/RFI – EN61000-6-2:2001
EN61000-6-3:2001

**Materials:**
User friendly Abs construction.
Stainless Steel hydraulic block.

**Dimensions:**
182mm x 155mm x 86mm (7.2” x 6.1” x 3.4”)

**Weight:**
1.3kg (2.9lb)

**Seals:**

icountPD for use with aviation fuels

**Field Data - Major International Airport**

<table>
<thead>
<tr>
<th>Test</th>
<th>&gt;4µ</th>
<th>&gt;6µ</th>
<th>&gt;14µ</th>
<th>&gt;21µ</th>
<th>&gt;4µ</th>
<th>&gt;6µ</th>
<th>&gt;14µ</th>
<th>&gt;21µ</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>81058.3</td>
<td>62126.1</td>
<td>17817.6</td>
<td>6066.2</td>
<td>Test 5</td>
<td>1226.1</td>
<td>261.5</td>
<td>2.4</td>
</tr>
<tr>
<td>2</td>
<td>87834.5</td>
<td>74763.0</td>
<td>35454.1</td>
<td>18044.4</td>
<td>Test 6</td>
<td>1085.7</td>
<td>210.9</td>
<td>1.3</td>
</tr>
<tr>
<td>3</td>
<td>51383.4</td>
<td>32796.9</td>
<td>4424.8</td>
<td>1213.4</td>
<td>Test 7</td>
<td>1037.9</td>
<td>198.7</td>
<td>1.3</td>
</tr>
</tbody>
</table>

First 3 measurements represent fuel from a previous cargo followed by a regular clean delivery, thus demonstrating the range of fuel cleanliness being experienced at this particular location.
Dimensions / Installation Details

Typical Applications

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

Monitoring of the hydraulics, enabling the vehicles to function to their best capability under load conditions through pistons, servo valves, control rams and gear pumps.

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

To monitor the cleanliness of the equipment throughout the production line, from the machine tool controlled hydraulics through to contamination of fluid transfer. Ensuring the integrity of the fluid is maintained throughout the refining process.

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

With continuous monitoring the optimum level is achieved in the least amount of time.

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

To increase efficiency of your equipment by continuously monitoring the cleanliness level of the hydraulic fluid.

- **Fuel Contamination Detection**
  - Fuel Storage Tanks
  - Vehicle fuel tanks
  - Uploading fuel into an aircraft

24/7 detection of particulate levels in most fuels including aviation fuel - Jet A-1 fuel specification.

Maximum Torque 5Nm
icountPD
Online Particle Detector

M12 Communication cable: wiring configuration

<table>
<thead>
<tr>
<th>Pin</th>
<th>4-20mA option connections</th>
<th>0-5v/0-3v option connections</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>NOT USED</td>
<td>NOT USED</td>
</tr>
<tr>
<td>2</td>
<td>RS232 Ground (Pin 5**)</td>
<td>RS232 Ground (Pin 5**)</td>
</tr>
<tr>
<td>3</td>
<td>Channel A, ISO 4μm(c)*</td>
<td>Channel A, ISO 4μm(c)*</td>
</tr>
<tr>
<td>4</td>
<td>Channel B, ISO 6μm (c)* or NAS (if selected)</td>
<td>Channel B, ISO 6μm (c)* or NAS (if selected)</td>
</tr>
<tr>
<td>5</td>
<td>RX232 Receive (Pin 3**)</td>
<td>RX232 Receive (Pin 3**)</td>
</tr>
<tr>
<td>6</td>
<td>RS232 Transmit (Pin 2**)</td>
<td>RS232 Transmit (Pin 2**)</td>
</tr>
<tr>
<td>7</td>
<td>Moisture sensor channel (if fitted)</td>
<td>Moisture sensor channel (if fitted)</td>
</tr>
<tr>
<td>8</td>
<td>Channel C, ISO 14μm (c)*</td>
<td>Channel C, ISO 14μm (c)*</td>
</tr>
</tbody>
</table>

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.

Optional – refer to the “icountPD part number specifier” section in this manual.

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

Limit relay alarm levels

The icountPD can be specified with 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 on or off an external device.

M12 Supply and Relay (if fitted) cable

<table>
<thead>
<tr>
<th>Pin</th>
<th>Current loop options connections</th>
<th>0-5v/0-3v option connections</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Product supply 9-40Vdc</td>
<td>Product supply 9-40Vdc</td>
</tr>
<tr>
<td>2</td>
<td>4-20mA Supply 12-20Vdc</td>
<td>0-5 / 0-3V Supply 12-24Vdc</td>
</tr>
<tr>
<td>3</td>
<td>Relay (Normally Closed)*** (if fitted)</td>
<td>Relay (Normally Closed)*** (if fitted)</td>
</tr>
<tr>
<td>4</td>
<td>Relay (Normally Open)*** (if fitted)</td>
<td>Relay (Normally Open)*** (if fitted)</td>
</tr>
<tr>
<td>5</td>
<td>NOT USED</td>
<td>NOT USED</td>
</tr>
<tr>
<td>6</td>
<td>NOT USED</td>
<td>0-5V / 0-3V Supply 0 Vdc</td>
</tr>
<tr>
<td>7</td>
<td>Main supply 0Vdc</td>
<td>Product supply 0Vdc</td>
</tr>
<tr>
<td>8</td>
<td>Relay (Common)*** (if fitted)</td>
<td>Relay (Common)*** (if fitted)</td>
</tr>
</tbody>
</table>

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

Parker Hannifin recommend that the mating M12 connector cables are screened. These cables are available from Parker Hannifin – ordering information section.

*** Optional – refer to ordering information section.

(Limit Relay Wiring Instructions)

NORMALLY OPEN
NORMALLY CLOSED
COMMON

![Limit Relay Wiring Diagram]
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

<table>
<thead>
<tr>
<th>mA</th>
<th>ISO</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td>6</td>
<td>2</td>
</tr>
<tr>
<td>7</td>
<td>3</td>
</tr>
<tr>
<td>8</td>
<td>4</td>
</tr>
<tr>
<td>9</td>
<td>5</td>
</tr>
<tr>
<td>10</td>
<td>6</td>
</tr>
<tr>
<td>11</td>
<td>7</td>
</tr>
<tr>
<td>12</td>
<td>8</td>
</tr>
<tr>
<td>13</td>
<td>9</td>
</tr>
<tr>
<td>14</td>
<td>10</td>
</tr>
<tr>
<td>15</td>
<td>11</td>
</tr>
<tr>
<td>16</td>
<td>12</td>
</tr>
<tr>
<td>17</td>
<td>13</td>
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<tr>
<td>18</td>
<td>14</td>
</tr>
<tr>
<td>19</td>
<td>15</td>
</tr>
<tr>
<td>20</td>
<td>16</td>
</tr>
<tr>
<td>21</td>
<td></td>
</tr>
</tbody>
</table>

ISO V MILLIAMP (MA)

<table>
<thead>
<tr>
<th>NAS</th>
<th>mA</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>1</td>
<td>1.0</td>
</tr>
<tr>
<td>2</td>
<td>2.0</td>
</tr>
<tr>
<td>3</td>
<td>3.0</td>
</tr>
<tr>
<td>4</td>
<td>4.0</td>
</tr>
<tr>
<td>5</td>
<td>5.0</td>
</tr>
<tr>
<td>6</td>
<td>6.0</td>
</tr>
<tr>
<td>7</td>
<td>7.0</td>
</tr>
<tr>
<td>8</td>
<td>8.0</td>
</tr>
<tr>
<td>9</td>
<td>9.0</td>
</tr>
<tr>
<td>10</td>
<td>10.0</td>
</tr>
<tr>
<td>11</td>
<td>11.0</td>
</tr>
<tr>
<td>12</td>
<td>12.0</td>
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<td>14</td>
<td>14.0</td>
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<td>15</td>
<td>15.0</td>
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<td>16</td>
<td>16.0</td>
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<td>17</td>
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<td>18</td>
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<tr>
<td>19</td>
<td>19.0</td>
</tr>
<tr>
<td>20</td>
<td>20.0</td>
</tr>
</tbody>
</table>

NAS V MILLIAMP (MA)

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, are available from Parker.

The following tables can be used to relate the analogue output to an ISO or NAS 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

<table>
<thead>
<tr>
<th>ISO</th>
<th>0-5Vdc</th>
<th>0-3Vdc</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>&lt;0.2</td>
<td>&lt;0.15</td>
</tr>
<tr>
<td>0</td>
<td>0.3</td>
<td>0.2</td>
</tr>
<tr>
<td>1</td>
<td>0.5</td>
<td>0.3</td>
</tr>
<tr>
<td>2</td>
<td>0.7</td>
<td>0.4</td>
</tr>
<tr>
<td>3</td>
<td>0.9</td>
<td>0.5</td>
</tr>
<tr>
<td>4</td>
<td>1.1</td>
<td>0.6</td>
</tr>
<tr>
<td>5</td>
<td>1.3</td>
<td>0.7</td>
</tr>
<tr>
<td>6</td>
<td>1.5</td>
<td>0.8</td>
</tr>
<tr>
<td>7</td>
<td>1.7</td>
<td>0.9</td>
</tr>
<tr>
<td>8</td>
<td>1.9</td>
<td>1.0</td>
</tr>
<tr>
<td>9</td>
<td>2.1</td>
<td>1.1</td>
</tr>
<tr>
<td>10</td>
<td>2.3</td>
<td>1.2</td>
</tr>
<tr>
<td>11</td>
<td>2.5</td>
<td>1.3</td>
</tr>
</tbody>
</table>

Table relating NAS codes to Voltage output

<table>
<thead>
<tr>
<th>ISO</th>
<th>0-5Vdc</th>
<th>0-3Vdc</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>&lt;0.4</td>
<td>&lt;0.2</td>
</tr>
<tr>
<td>0</td>
<td>0.6</td>
<td>0.3</td>
</tr>
<tr>
<td>1</td>
<td>0.9</td>
<td>0.5</td>
</tr>
<tr>
<td>2</td>
<td>1.2</td>
<td>0.7</td>
</tr>
<tr>
<td>3</td>
<td>1.5</td>
<td>0.9</td>
</tr>
<tr>
<td>4</td>
<td>1.8</td>
<td>1.1</td>
</tr>
<tr>
<td>5</td>
<td>2.1</td>
<td>1.3</td>
</tr>
<tr>
<td>6</td>
<td>2.4</td>
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<td>7</td>
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<td>3.0</td>
<td>1.9</td>
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<td>2.1</td>
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<td>10</td>
<td>3.6</td>
<td>2.3</td>
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<tr>
<td>11</td>
<td>3.9</td>
<td>2.5</td>
</tr>
<tr>
<td>12</td>
<td>4.2</td>
<td>2.7</td>
</tr>
<tr>
<td>13</td>
<td>4.5</td>
<td>2.9</td>
</tr>
</tbody>
</table>

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

OVERRANGE
ERROR
Digital display parameters (ISO 4406/NAS 1638)

Start up
1. Once the icountPD has been connected to a regulated power supply, the product logo is displayed for approximately five seconds as the icountPD performs a self system diagnostic check.
2. The icountPD then automatically starts monitoring using factory default test parameters.

Digital display indication
The digital display will show the actual measured codes, the channel (μ) size and the user definable limits. Note that the channel size and limits will alternate between the two.
The Moisture Sensor reading (%RH) will also be shown – if the Moisture Sensor option is fitted.
The order of trigger for both 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.

Error detection:
In the unlikely event of a 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 are detailed in the IcountPD User Manual).

Moisture sensor output settings
The Moisture Sensor is an option that can be included when ordering 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.

<table>
<thead>
<tr>
<th>Saturation</th>
<th>4–20mA</th>
<th>0–3Vdc</th>
<th>0–5Vdc</th>
</tr>
</thead>
<tbody>
<tr>
<td>5%</td>
<td>4.8</td>
<td>0.15</td>
<td>0.25</td>
</tr>
<tr>
<td>25%</td>
<td>8</td>
<td>0.75</td>
<td>1.25</td>
</tr>
<tr>
<td>50%</td>
<td>12</td>
<td>1.50</td>
<td>2.50</td>
</tr>
<tr>
<td>75%</td>
<td>16</td>
<td>2.25</td>
<td>3.75</td>
</tr>
<tr>
<td>100%</td>
<td>20</td>
<td>3.00</td>
<td>5.00</td>
</tr>
</tbody>
</table>
Auxiliary Flow Device - P/N S840074

The pressure compensated, Flow control device (Part Number S840074) has been developed to give the icountPD user greater flexibility. The Flow control device will enable testing where flow ranges are outside the icountPD specifications (40 – 140 ml/min), or where pipe diameters do not allow the icountPD to be installed.

The Flow control device fits onto the downstream (outlet) side of the icountPD, connecting through a manifold block, via a self-sealing quick connection test point and is fitted with a differential pressure valve. This Flow control device automatically compensates for pressure and viscosity changes, whilst maintaining its setting even as the workload changes.

Simply position the valve to match the viscosity of the oil you are testing.

The chart can be used to determine the valve position:

<table>
<thead>
<tr>
<th>Valve Position</th>
<th>cSt Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>up to 100</td>
</tr>
<tr>
<td>3.8</td>
<td>90 - 200</td>
</tr>
<tr>
<td>4.2</td>
<td>190 - 320</td>
</tr>
<tr>
<td>5</td>
<td>310 - 500</td>
</tr>
</tbody>
</table>

Example:
If the fluid you wish to analyse has a viscosity of 50cSt under normal operating conditions then the control knob on the Flow Control Device should be set to valve position ‘3’

The flow device will now automatically control the flow rate through the icountPD to within its working range of 40-140ml/min.

Note: The Flow control device will still operate correctly even with the high pressure side at 200bar and the return back to an open system of 0 bar (DP = 200bar)

Auxiliary Flow Device - P/N ACC6NN019

This simple to use flow control device fits onto the downstream (outlet) side of the icountPD and is fitted with a differential pressure valve that adjust the system flow to a range inside the icountPD specifications. Contact Parker for more details.

Icount PD – Oil Cleanliness Indicator (icount PD OCI)

- New and under development in the detection of contaminates distribution in various Aviation fuels.
- Portable monitoring tool providing fluid qualification to ISO 4406:1999 standards.
- Supplements the icount ACM20 product portfolio.
- Quick, simple to use monitoring tool for sampling fluids from containers, fuel bunkers and holding tanks.
- Field solution to Laboratory methods for the detection of solid contamination and free water inference.
icountPD
Online Particle Detector

Hydraulic Connection Diagram

Dimensions

Actuator
- Manual flow rate adjustable via control knob

Mounting Type
- 4 off mounting holes to suit M6 screws (not supplied)

Mounting position
- Any

Weight
- 1.7kg (3.7lb)

Fluid Temperature
- 5°C to +80°C (+41°F to 176°F)

Ambient storage temperature
- -20°C to +40°C (-4°F to +104°F)

Viscosity range
- 20cSt to 500cSt (If lower than 20cSt contact Parker)

Differential pressure range
- 5 to 315 bar

Maximum pressure
- 315 bar

Flow direction
- ‘IN’ to ‘OUT’ flow control function

Port thread detail
- 1/8” BSPP (test points not supplied)

Internal Seals
- Fluoroelastomer

This application shows uploading fuel into an aircraft with the icountPD in use to monitor as a ‘go/no go’ device.
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, but note that this program is not currently supplied with the Windows Vista™ operating system. These two ways of communicating with icountPD are described in the following section.

icountPD Setup Utility software (supplied)

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

The commands used with this product are made up of Read, Set and Start / Stop commands.

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

Example:

[SDF dd/mm/yy] - sets the date format.
[RDF] - reads the product date format.

All commands are sent in ASCII characters, and the protocol accepts both upper and lower case characters as the examples below:

SDF
SdF

Note: A full list of commands are detailed in the user manual.
icountPD
Online Particle Detector

Ordering Information

Standard Products Table

<table>
<thead>
<tr>
<th>Part number</th>
<th>Fluid type</th>
<th>Calibration</th>
<th>Display</th>
<th>Limit relay</th>
<th>Communications</th>
<th>Moisture sensor</th>
<th>Cable connector kit</th>
<th>Future option</th>
</tr>
</thead>
<tbody>
<tr>
<td>IPD12212130</td>
<td>Mineral</td>
<td>MTD</td>
<td>LED</td>
<td>No</td>
<td>RS232 / 4-20mA</td>
<td>No</td>
<td>M12 - 8 pin</td>
<td>N/A</td>
</tr>
<tr>
<td>IPD12222230</td>
<td>Mineral</td>
<td>MTD</td>
<td>LED</td>
<td>Yes</td>
<td>RS232 / 4-20mA</td>
<td>Yes</td>
<td>M12 - 8 pin</td>
<td>N/A</td>
</tr>
<tr>
<td>IPD12312130</td>
<td>Mineral</td>
<td>MTD</td>
<td>Digital</td>
<td>No</td>
<td>RS232 / 4-20mA</td>
<td>No</td>
<td>M12 - 8 pin</td>
<td>N/A</td>
</tr>
<tr>
<td>IPD12322230</td>
<td>Mineral</td>
<td>MTD</td>
<td>Digital</td>
<td>Yes</td>
<td>RS232 / 4-20mA</td>
<td>Yes</td>
<td>M12 - 8 pin</td>
<td>N/A</td>
</tr>
</tbody>
</table>

Product Configurator

<table>
<thead>
<tr>
<th>Key</th>
<th>Fluid type</th>
<th>Calibration</th>
<th>Display</th>
<th>Limit relay</th>
<th>Communications</th>
<th>Moisture</th>
<th>Cable connector kit</th>
</tr>
</thead>
<tbody>
<tr>
<td>IPD</td>
<td>1</td>
<td>Mineral</td>
<td>MTD</td>
<td>Yes</td>
<td>RS232 / 4-20mA</td>
<td>1</td>
<td>M12 - 8 pin</td>
</tr>
<tr>
<td>IPD2</td>
<td>2</td>
<td>Phosphate ester</td>
<td>MTD</td>
<td>No</td>
<td>RS232 / 4-20mA</td>
<td>2</td>
<td>Deutsch 12-pin DT Series connector</td>
</tr>
<tr>
<td>IPDR</td>
<td>3</td>
<td>Aviation fuel (4 channel)</td>
<td>AS4059</td>
<td>No</td>
<td>RS232 / 0-5V</td>
<td>3</td>
<td>M12, 8 pin plug connector</td>
</tr>
</tbody>
</table>

Accessories

<table>
<thead>
<tr>
<th>Part number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACC6NN003</td>
<td>1 metre hose length</td>
</tr>
<tr>
<td>ACC6NN004</td>
<td>2 metre hose length</td>
</tr>
<tr>
<td>ACC6NN005</td>
<td>5 metre hose length</td>
</tr>
<tr>
<td>ACC6NN007</td>
<td>3/8 BSP fitting</td>
</tr>
<tr>
<td>ACC6NN009</td>
<td>1/2 BSP fitting</td>
</tr>
<tr>
<td>ACC6NN010</td>
<td>1/2 BPT fitting</td>
</tr>
<tr>
<td>ACFTD</td>
<td>Single point sampler</td>
</tr>
<tr>
<td>SPS2061</td>
<td>Flow control device</td>
</tr>
<tr>
<td>SPS2061</td>
<td>Flow control valve</td>
</tr>
<tr>
<td>ACC6NN013</td>
<td>12 volt regulated power supply</td>
</tr>
<tr>
<td>ACC6NN014</td>
<td>Contact Parker</td>
</tr>
<tr>
<td>ACC6NN015</td>
<td>2 x 5 metre M12 - 8 pin cable kit*</td>
</tr>
<tr>
<td>ACC6NN016</td>
<td>Deutsch connector kit</td>
</tr>
<tr>
<td>ACC6NN017</td>
<td>RS485 to USB cable kit</td>
</tr>
<tr>
<td>ACC6NN018</td>
<td>M12 - 8 pin to RS232 engineers tool</td>
</tr>
</tbody>
</table>

* M12 Cable kit consists of two 5 metre cables to enable all output options (Communications cable and Relay/Power Supply cable)
* * Note that the aggressive fluid hoses are provided as a single hose, not in pairs.

<table>
<thead>
<tr>
<th>Part number</th>
<th>Supersedes</th>
<th>Size</th>
<th>Flow range l/min</th>
<th>Fluid type</th>
<th>Port threads</th>
<th>Reverse Flow capability</th>
</tr>
</thead>
<tbody>
<tr>
<td>STI1014.100</td>
<td>STL1014.100</td>
<td>0</td>
<td>6-25</td>
<td>Mineral</td>
<td>3/8</td>
<td>Yes</td>
</tr>
<tr>
<td>STI1114.100</td>
<td>STL1114.100</td>
<td>1</td>
<td>20-100</td>
<td>Mineral</td>
<td>3/4</td>
<td>Yes</td>
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<tr>
<td>STI2114.100</td>
<td>STL2114.100</td>
<td>2</td>
<td>80-380</td>
<td>Mineral</td>
<td>11/4</td>
<td>Yes</td>
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<td>STI1014.101</td>
<td>STL1014.101</td>
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<td>6-25</td>
<td>Aggressive</td>
<td>3/8</td>
<td>Yes</td>
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<tr>
<td>STI1114.101</td>
<td>STL1114.101</td>
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<td>20-100</td>
<td>Aggressive</td>
<td>3/4</td>
<td>Yes</td>
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<tr>
<td>STI2114.101</td>
<td>STL2114.101</td>
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<td>STS5217210</td>
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<td>80-380</td>
<td>Mineral</td>
<td>11/4</td>
<td>No</td>
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icountPD Z2
ATEX Approved Online Particle Detector

For use in explosive and hazardous areas

The icountPD Particle Detector from Parker represents the most up to date technology in solid particle contamination analysis. This compact, permanently mounted laser-based ATEX approved particle detector module is designed for use in Zone 2 areas and is housed in a robust Stainless Steel IP69K approved enclosure that provides a cost effective solution to fluid management and contamination control.

Product Features:

- Independent monitoring of system contamination trends.
- Assembled in an approved and certified Stainless Steel enclosure to comply with ATEX Directive 94/9/EC.
- Can be used in explosive and hazardous areas.
- ATEX Zone 2.
- Certified to CE Ex II 3GD,Ex nA IIIC T4 Gc,Ex tc IIIC Dc SIRA 09ATEX4340X and IECEx SIR 09.0137X (-30°C<Ta<+60°C).
- Moisture & %RH indicator (optional).
- Warning limit relay outputs for low, medium and high contamination levels.
- Continuous performance for prolonged analysis.
- Self diagnostic software.
- Full PC/PLC integration technology such as:- RS232 and 0-5Volt, 4-20mA, CAN(J1939) (Contact Parker for other options.
- Set up and Data logging support software included.

Contact Information:

Parker Hannifin
Hydraulic Filter Division Europe

European Product Information Centre
Freephone: 00800 27 27 5374
(from AT, BE, CH, CZ, DE, EE, ES, FI, FR, IE, IT, PT, SE, SK, UK)
filtrationinfo@parker.com
www.parkerhfde.com
icountPD Z2
ATEX Approved Online Particle Detector

Features & Benefits
Diagnostic Self Check Start-up Time:
Customer selectable 5-900 seconds
Measurement Period:
5 to 180 seconds
Reporting interval through RS232:
0 to 3600 seconds
Limit Relay Output:
Changes occur +/- 1 ISO code at set limit (Hysteresis ON) or customer set (Hysteresis OFF)
Particle / % RH 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)
Principle of operation:
Laser diode optical detection of actual particulates.
Reporting Codes:
ISO 7 – 21, NAS 0 – 12, (AS 00 – 12 Contact Parker)
Principle of operation:
Laser diode optical detection of actual particulates.
Reporting Codes:
ISO 7 – 21, NAS 0 – 12, (AS 00 – 12 Contact Parker)
Calibration:
By recognised on-line methods, confirmed by the relevant International Standard Organisation procedures.
Calibration Recommendation:
24 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:
Size: 066
Connection: EO 24 cone end

Required Flow Range through the icountPD:
40 to 140 ml/min (Optimum Flow = 60ml/min)
Online Flow Range via System 20 Inline Sensors (Hydraulic systems only):
Size 0 = 8 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:
0.4 bar (Minimum)
Viscosity Range:
1-500 cSt
Temperature:
Operating Environment -30°C to +60°C (-22°F to +140°F)
Storage -40°C to +80°C (-40°F to +176°F)
Operating Fluid +5°C to +80°C (+41°F to +176°F)
Working pressure:
2 to 420 bar (30-6000 PSI)
Moisture sensor calibration (Not offered with the fuel version):
±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
Certification:
IP69K rating
EMC/RFI – EN61000-6-3:2007
EN61000-6-2:2005
Materials:
Stainless Steel case construction.
Stainless Steel hydraulic block.
Dimensions:
260mm x 114mm x 110mm
Weight:
2.6kg
Seals:
Fluorocarbon seals.

Ordering Information
Product Configurator

<table>
<thead>
<tr>
<th>Key</th>
<th>Fluid type</th>
<th>Calibration</th>
<th>Display</th>
<th>Limit relay</th>
<th>Communications</th>
<th>Moisture</th>
<th>Cable connector kit</th>
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</thead>
<tbody>
<tr>
<td>IPD</td>
<td>Mineral</td>
<td>MTD</td>
<td>LED</td>
<td>Yes</td>
<td>RS232 / 4-20mA</td>
<td>Yes</td>
<td>M12, 8 pin plug connector</td>
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<tr>
<td>IPDZ</td>
<td>Phosphate ester</td>
<td>MTD</td>
<td>LED</td>
<td>Yes</td>
<td>RS232 / 0-5V</td>
<td>Yes</td>
<td>M12, 8 pin plug connector</td>
</tr>
<tr>
<td>IPDR</td>
<td>Aviation fuel (4 channels)</td>
<td>AS4059</td>
<td>Digital</td>
<td>Yes</td>
<td>RS232 / CAN-bus</td>
<td>Yes</td>
<td>M12, 8 pin plug connector</td>
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</table>

Consult Parker Filtration

Standard Products Table

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<thead>
<tr>
<th>Part number</th>
<th>Fluid type</th>
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<th>Display</th>
<th>Limit relay</th>
<th>Communications</th>
<th>Moisture sensor</th>
<th>Cable connector kit</th>
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<tr>
<td>IPDZ12122230</td>
<td>Mineral</td>
<td>MTD</td>
<td>None</td>
<td>Yes</td>
<td>RS232 / 4-20mA</td>
<td>Yes</td>
<td>M12, 8 pin plug connector</td>
</tr>
<tr>
<td>IPDZ12121230</td>
<td>Mineral</td>
<td>MTD</td>
<td>None</td>
<td>Yes</td>
<td>RS232</td>
<td>Yes</td>
<td>M12, 8 pin plug connector</td>
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<tr>
<td>IPDZ12123230</td>
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<td>MTD</td>
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<td>Yes</td>
<td>RS232 / 0-5V</td>
<td>Yes</td>
<td>M12, 8 pin plug connector</td>
</tr>
<tr>
<td>IPDZ12125230</td>
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<td>MTD</td>
<td>None</td>
<td>Yes</td>
<td>RS232 / CAN-bus</td>
<td>Yes</td>
<td>M12, 8 pin plug connector</td>
</tr>
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</table>

Accessory Part Numbers

<table>
<thead>
<tr>
<th>Description</th>
<th>Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single Point Sampler</td>
<td>SP122221</td>
</tr>
<tr>
<td>Internal Flow device</td>
<td>SP02221</td>
</tr>
<tr>
<td>Power supply</td>
<td>ACC00013</td>
</tr>
<tr>
<td>2 x 10 metre M12, 8-pin plug and socket Ulrat cable kit</td>
<td>ACC00021</td>
</tr>
<tr>
<td>Smoke to USB converter</td>
<td>ACC00011</td>
</tr>
</tbody>
</table>

Note: For System 20 Sensor part numbers see page 380.
In the lab or in the field monitoring

Parker Filtration’s icountBS is a unique and complete solution providing customers with laboratory fluid bottle sampling using proven on-board, laser based technology. IcountBS is a next generation product from Parker’s fluid particle analysis and monitoring programme and provides an effective alternative to external laboratory services.

Contact Information:

Parker Hannifin
Hydraulic Filter Division Europe

European Product Information Centre
Freephone: 00800 27 27 5374
(from AT, BE, CH, CZ, DE, EE, ES, FI, FR, IE, IT, PT, SE, SK, UK)
filtrationinfo@parker.com

www.parkerhfde.com

Product Features:

- Quick sample bottle analysis with variable test time options from 15 seconds and volume capacities from 10ml.
- Repeatable and re-producible result performance to ISO4406:1999 and NAS1638 particle count distributions.
- On-board compressor and ‘shop’ air capability.
- Environmentally controlled front-loading bottle chamber.
- Design concept allowing for portability. DC and rechargeable battery pack power option built in.
- 6 fixed channel size analysis.
- Fluid resistant touch type screen panel.
- On-board thermal printer.
- 500 test memory (fully downloadable).
The complete solution - industrial design combined with state of the art technology

The icountBS - Bottle Sampler from Parker with its innovative industrial design has been developed for customers looking for state of the art technology, attention to detail and the compactness of a permanent laboratory particle analysis model.

Combine this with on-board, laser based, leading edge technology to bring to all industries a truly revolutionary Particle Counter.

The icountBS is a product from the next generation of Parker’s fluid particle analysis and monitoring innovations.

The IBS features an easy to use interactive touch screen, environmentally controlled pressurized bottle chamber for air bubble suppression via an internal compressor pump, with automated door locking mechanism, sample tube cleaning sleeve minimizing contamination cross over, and an internal thermal printer.

The icountBS benefits from Parkers knowledge and experience of providing bottle analysis equipment to the market over the last 20 years.

This experience comes from selling market leading innovative solutions and by having front line condition monitoring products for all sectors of fluid analysis opportunities. The unit was at every stage developed with the customers voice in mind.
icountBS - Bottle Sampler Features & Benefits

• Quick sample bottle analysis with variable test time options from 15 seconds and volume capacities from 10ml.

• Repeatable and re-producible result performance to ISO4406:1999 and NAS1638 particle count distributions. For other calibration standards consult Parker CMC.

• On-board compressor and ‘shop’ air capability.

• Design concept allowing for portability. DC and rechargeable battery pack power options built in.

• Cost-effective and economical alternative solution to external laboratory services.

• 6 fixed channel size analysis.

• Fluid resistant touch type screen panel.

• Sample tube self cleaning sleeve minimizing contamination cross over.

• Internal thermal printer.
Analysing the test results

I have my results what do I do next?
Solid contaminants in fluid power systems vary in size, shape, form and quantity. The most harmful contaminants are normally between 6 microns and 14 microns. The ISO code is the preferred method of reporting quantity of contaminants. The ISO code number corresponds to contamination levels relating to three sizes.
The first scale number represents the number of particles larger than 4 μm(c) per 100 milliliters of fluid, the second number for particles larger than 6 μm(c) per 100 milliliters of fluid and the third number for particles larger than 14 μm(c) per 100 milliliters of fluid.
For example: An ISO code 20/18/14 indicates that there are between 500,000 and 1,000,000 particles larger than 4μm(c), and between 130,000 and 250,000 particles larger than 6 μm(c), and between 4,000 and 8,000 particles larger than 14μm(c).

icountBS reporting and data
In addition to the ‘raw data’ printout of ISO compliant data from the icountBS’s on-board printer, icount Mini-lab offers the user the advantage of a 2-page report providing hard copy data on ISO/NAS individual counts and average contamination results.

FACT *Did you know the best human eye can only see particles above 40μ(c)?

Component Cleanliness Guide
Suggested acceptable contamination levels for typical hydraulic systems

<table>
<thead>
<tr>
<th>Target contamination class to ISO 4406: 1999</th>
<th>Suggested maximum particle level</th>
<th>Sensitivity</th>
<th>Type of system</th>
<th>Typical components</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 μm(c) 6 μm(c) 14 μm(c)</td>
<td>4 μm(c) 6 μm(c) 14 μm(c)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15 13 9</td>
<td>16,000 4,000 250</td>
<td>Super critical</td>
<td>Silt-sensitive control systems with very high reliability. Laboratory or aerospace</td>
<td>High performance servo valves</td>
</tr>
<tr>
<td>17 15 11</td>
<td>64,000 16,000 1,000</td>
<td>Critical</td>
<td>High performance servo and high pressure long life systems, e.g. aircraft, machine tools etc.</td>
<td>Industrial servo valves</td>
</tr>
<tr>
<td>18 16 13</td>
<td>130,000 32,000 4,000</td>
<td>Very important</td>
<td>High quality reliable systems. General machine requirements</td>
<td>Piston pumps, proportional valves, compensated flow controls</td>
</tr>
<tr>
<td>20 18 14</td>
<td>500,000 130,000 8,000</td>
<td>Important</td>
<td>General machinery and mobile systems. Medium pressure, medium capacity</td>
<td>Vane pumps, spool valves</td>
</tr>
<tr>
<td>21 19 15</td>
<td>1,000,000 250,000 16,000</td>
<td>Average</td>
<td>Low pressure heavy industrial systems, or applications where long life is not critical</td>
<td>Gear pumps, manual and poppet valves, cylinders</td>
</tr>
<tr>
<td>23 21 17</td>
<td>4,000,000 1,000,000 64,000</td>
<td>Main protection</td>
<td>Low pressure systems with large clearances</td>
<td>Ram pumps</td>
</tr>
</tbody>
</table>

Notes:
Tables have been generated by organisations in various industries.
Some of the tables are defined in cumulative counts, e.g. ‘>6μm’ and others are represented as differential counts e.g. ‘6-14μm’.
All μm(c) refer to MTD distributions. All μm references will refer to ACFTD distributions.
All standards are in counts per 100ml and provide easy methods for converting particle counts into limits that are simple to interpret. By noting the requirements of the standard, particle counts can be accurately converted to contamination levels.
## icountBS Product Specification

<table>
<thead>
<tr>
<th>Principle of Operation</th>
<th>Laser based light obscuration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calibration Dust</td>
<td>MTD or ACFTD</td>
</tr>
<tr>
<td>Dimensions</td>
<td>H=530 x W=190 (210 Door clearance) x D=410 (mm) H=20.9in x W=7.5in x 16.9in</td>
</tr>
<tr>
<td>Weight</td>
<td>18Kg</td>
</tr>
<tr>
<td>Mechanical Composition</td>
<td>Stainless steel 316, plated mild steel and aluminium</td>
</tr>
<tr>
<td>Plastics Composition</td>
<td>Precision polyurethane RIM mouldings and ABS plastic</td>
</tr>
<tr>
<td>Environmental Operating Temperature (Fully Tested)</td>
<td>+5°C to + 60°C (41°F to 140°F)</td>
</tr>
<tr>
<td>Operating % RH range</td>
<td>20 – 85% (Tested at 30°C, no condensation)</td>
</tr>
<tr>
<td>Storage Temperature</td>
<td>-40°C to + 90°C (-40°F to 194°F)</td>
</tr>
<tr>
<td>Storage RH range</td>
<td>10 – 90% (Tested at 30°C (86°F), no condensation)</td>
</tr>
<tr>
<td>Channel Sizes</td>
<td>MTD - ≥4μ(c),≥6μ(c),≥14μ(c),≥21μ(c),≥38μ(c), ≥70μ(c) ACFTD - ≥2μ,≥5μ,≥15μ,≥25μ,≥50μ,≥100μ</td>
</tr>
<tr>
<td>Analysis Range</td>
<td>ISO 7 to 21, NAS 0 to 12</td>
</tr>
<tr>
<td>Calibration Standard</td>
<td>ISO MTD and ACFTD calibration to traceable ISO Standards. (Contact Parker CMC for further details).</td>
</tr>
<tr>
<td>Fluid Management</td>
<td>Maximum single sample = 100ml Minimum single sample = 10ml</td>
</tr>
<tr>
<td>Possible Test Configurations</td>
<td>User selectable from single test up to 5 tests per run (eg.1x100ml up to 5 x50ml per run)</td>
</tr>
<tr>
<td>Pre-Test Flush Volume</td>
<td>Minimum = 10ml, Maximum = 100ml</td>
</tr>
<tr>
<td>Viscosity Range</td>
<td>1-400 cSt</td>
</tr>
<tr>
<td>Fluid Compatibility</td>
<td>Mineral oils, petroleum and hydrocarbon based fluids (consult manufacturer) and some esters (consult manufacturer).</td>
</tr>
<tr>
<td>Sample Bottle Size</td>
<td>Non specific. Max size = Ø75 (2.95in) x (H) 150 mm (5.9in). Max Volume = 250ml</td>
</tr>
<tr>
<td>Memory Storage</td>
<td>500 Tests (capacity warning after 450 tests)</td>
</tr>
<tr>
<td>Output Display</td>
<td>Backlight 256 Colour STN Transmissive</td>
</tr>
<tr>
<td>Output Display Resolution</td>
<td>320 x 3(R.G.B)(H) x 240(W) dots</td>
</tr>
<tr>
<td>Display Active Area</td>
<td>115(H) x 86(W) mm 4.5in (H) x 3.4 in (W)</td>
</tr>
<tr>
<td>Data Input</td>
<td>Via icon driven oil resistive touch screen</td>
</tr>
<tr>
<td>Printer</td>
<td>Thermal dot-line printing</td>
</tr>
<tr>
<td>Printer Paper</td>
<td>Ø50mm – (57mm x 25mm) Ø 1.97in – (2.24in x 0.98in)</td>
</tr>
<tr>
<td>Test Certification</td>
<td>Fully traceable Calibration &amp; Certificate of Conformity</td>
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<tr>
<td>Power Supply</td>
<td>12Vdc@ 6.60Amps, 80 watts max.</td>
</tr>
<tr>
<td>Battery Power</td>
<td>2 Hours (recommended to be fully charged every 3 months)</td>
</tr>
<tr>
<td>Battery Stand-By Time</td>
<td>1 month (then 1 hour of operation)</td>
</tr>
<tr>
<td>Battery Fuse</td>
<td>6.3 Amps (anti-surge)</td>
</tr>
<tr>
<td>Air pressure Source</td>
<td>3.5 bar (51 PSI) internal Mini-compressor or 7 Bar (101 PSI) shop air</td>
</tr>
</tbody>
</table>

![icountBS Product Specification Image](image-url)
icountBS – Bottle Sampler
Ordering Information

<table>
<thead>
<tr>
<th>Key</th>
<th>Fluid Type</th>
<th>Calibration</th>
<th>Future Option</th>
<th>Future Option</th>
<th>Future Option</th>
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<th>Power Supply Region</th>
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<th>Future Option</th>
<th>Future Option</th>
<th>Future Option</th>
<th>Future Option</th>
<th>Power Supply Region</th>
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<td>2</td>
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<td>0</td>
<td>0</td>
<td>0</td>
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<td>0</td>
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<table>
<thead>
<tr>
<th>Part Number</th>
<th>Accessories</th>
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<tbody>
<tr>
<td>ACC6NW001</td>
<td>2 x 250ml sample bottle pack</td>
</tr>
<tr>
<td>ACC6NW002</td>
<td>100 x 250ml sample bottles (50 packs of 2)</td>
</tr>
<tr>
<td>ACC6NW003</td>
<td>Vapour / Waste bottle</td>
</tr>
<tr>
<td>ACC6NW005</td>
<td>Printer paper reel (x1)</td>
</tr>
<tr>
<td>ACC6NW006</td>
<td>UK power supply</td>
</tr>
<tr>
<td>ACC6NW007</td>
<td>USA power supply</td>
</tr>
<tr>
<td>ACC6NW008</td>
<td>European power supply</td>
</tr>
<tr>
<td>ACC6NW009</td>
<td>1 meter waste tube (Clear)</td>
</tr>
<tr>
<td>ACC6NW010</td>
<td>1 meter vapour hose (Blue)</td>
</tr>
<tr>
<td>ACC6NW011</td>
<td>USB memory stick</td>
</tr>
<tr>
<td>ACC6NW012</td>
<td>IBS CD manual</td>
</tr>
<tr>
<td>ACC6NW020</td>
<td>IBS transit case</td>
</tr>
<tr>
<td>SERMISCO49</td>
<td>Verification fluid</td>
</tr>
</tbody>
</table>

New icountABS coming soon
A new aviation fuel bottle sampler based on the icountBS with a method of operation which complies with IP564 methodology will be available soon. Consult Parker for more details.
Introducing the icount ‘Mini-lab’ – The effective way of utilising your icountBS

How clean is your hydraulic system?
Contamination Control is only an oil sample away with our easy, 3-Step fluid analysis service.

Step 1
Obtain your sample of hydraulic oil.

Step 2
Take the 2 minute off-line oil sample test.

Step 3
View your results and run a report immediately.

Kit comprises: icountBS. Flat-pack trolley. 30 sample bottles. Optional Laptop/software/printer and cables
Improving aftermarket support for condition monitoring products.

CMC Service Centres
Global Support for CMC products

Parker’s fluid Condition Monitoring Service Centres can be found currently in 10 locations around the globe, on almost every continent. Our experience and expertise in fluid condition monitoring and analysis ensure we are THE authority within our industry.

Each location offers first class aftermarket support for Condition Monitoring products, giving:

- Direct Contact for End Users.
- Quick and confident technical support to assist you in maintaining an efficient and trouble free monitoring process.
- Faster turn around for annual calibration verification, resulting in the product not having to come back to the country of manufacture.

Parker also offers on the icountACM20 laboratory unit:

- A six monthly field use verification sample for confident product performance.
- An extended two year warranty, giving confidence in product readiness.

Visit www.parkerhfde.com/condition/service/ to find your nearest location and contact details.

Parker returns policy and calibration procedure

Each product returned to an approved Parker Service Centre will have the following:

- A visual inspection of all case components. If any components from the support case require replacing, please notify the Service Centre at the time of return.
  Parker holds no responsibility for case contents and will only replace parts if required or deemed necessary.
- An external inspection of the complete assembly. The particle counter will be thoroughly checked for signs of damage or misuse and if necessary an estimate of the cost of repair will be provided.
- Full functionality test. This includes visual inspection of internal parts and their operation.
- Replacement of any defective or damaged parts. No corrective work will be carried out on the product returned without the authorization from the end user.

Recalibration (with a Certificate valid for 12 months)

Each unit is calibrated to the relevant ISO standards. The recalibration procedure does not include the replacement of any damaged components that have been deemed defective through negligence or misuse.
At Parker, we’re guided by a relentless drive to help our customers become more productive and achieve higher levels of profitability by engineering the best systems for their requirements. It means looking at customer applications from many angles to find new ways to create value. Whatever the motion or control technology need, Parker has the experience, breadth of product and global reach to consistently deliver. No company knows more about motion and control technology than Parker.

Parker’s Motion & Control Technologies

AEROSPACE
Key Markets
- Aerospace
- Aircraft engines
- Business & general aviation
- Commercial transports
- Land-based weapon systems
- Military aircraft
- Missiles & launch vehicles
- Regional transports
- Unmanned aerial vehicles

Key Products
- Flight control systems & components
- Fluid conveyance systems
- Hydraulic systems & components
- Inert nitrogen generating systems
- Pneumatic systems & components
- Wheels & brakes

CLIMATE CONTROL
Key Markets
- Agriculture
- Air conditioning
- Food, beverage & dairy
- Life sciences & medical
- Precision cooling
- Processing
- Transportation

Key Products
- CO2 controls
- Electronic controllers
- Filter drivers
- Hand shut-off valves
- Hose & fittings
- Pressure regulating valves
- Refrigerant distributors
- Safety relief valves
- Solenoid valves
- Thermostatic expansion valves

ELECTROMECHANICAL
Key Markets
- Aerospace
- Factory automation
- Life science & medical
- Machine tools
- Packaging machinery
- Paper machinery
- Plastic machinery & converting
- Primary metals
- Semiconductor & electronics
- Textile
- Wire & cable

Key Products
- AC/DC drives & systems
- Electric actuators, gantry robots & slides
- Electrohydraulic actuation systems
- Electromechanical actuation systems
- Human machine interface
- Linear motors
- Slapper motors, servo motors, drives & controls
- Structural extrusions

FILTRATION
Key Markets
- Food & beverage
- Industrial machinery
- Life sciences
- Marine
- Mobile equipment
- Oil & gas
- Power generation
- Process
- Transportation

Key Products
- Analytical gas generators
- Compressed air & gas filters
- Condition monitoring
- Engine air, fuel & oil filtration & systems
- Hydraulic, lubrication & coolant filters
- Process, chemical, water & microfiltration filters
- Nitrogen, hydrogen & zero air generators

FLUID & GAS HANDLING
Key Markets
- Aerospace
- Agriculture
- Bulk chemical handling
- Construction machinery
- Food & beverage
- Fuel & gas delivery
- Industrial machinery
- Mobile
- Oil & gas
- Transportation
- Welding

Key Products
- Brass fittings & valves
- Diagnostic equipment
- Fluid conveyance systems
- Industrial hose
- PTFE & PFA hose, tubing & plastic fittings
- Rubber & thermoplastic hose & couplings
- Tube fittings & adapters
- Quick disconnects

HYDRAULICS
Key Markets
- Aerospace
- Aerial lift
- Agriculture
- Construction machinery
- Forestry
- Industrial machinery
- Mining
- Oil & gas
- Power generation & energy
- Truck hydraulics

Key Products
- Diagnostic equipment
- Hydraulic cylinders & accumulators
- Hydraulic motors & pumps
- Hydraulic systems
- Hydraulic valves & controls
- Power take-offs
- Rubber & thermoplastic hose & couplings
- Steel tubes & adapters
- Quick disconnects

PNEUMATICS
Key Markets
- Aerospace
- Compressor & material handling
- Factory automation
- Life science & medical
- Machine tools
- Packaging machinery
- Transportation & automotive

Key Products
- Air preparation
- Brass fittings & valves
- Manifolds
- Pneumatic accessories
- Pneumatic actuators & grippers
- Pneumatic valves & controls
- Quick disconnects
- Rotary actuators
- Rubber & thermoplastic hose & couplings
- Structural extrusions
- Thermoplastic tubing & fittings
- Vacuum generators, caps & sensors

PROCESS CONTROL
Key Markets
- Chemical & refining
- Food, beverage & dairy
- Medical & dental
- Microelectronics
- Oil & gas
- Power generation

Key Products
- Analytical sample conditioning products & systems
- Fluoropolymer chemical delivery fittings, valves & pumps
- High purity gas delivery fittings, valves & regulators
- Instrumentation fittings, valves & regulators
- Medium pressure fittings & valves
- Process control manifolds

SEALING & SHIELDING
Key Markets
- Aerospace
- Chemical processing
- Consumer
- Energy, oil & gas
- Fluid power
- General industrial
- Information technology
- Life sciences
- Military
- Semiconductors
- Telecommunications
- Transportation

Key Products
- Dynamic seals
- Elastomeric O-rings
- EMI shielding
- Exhusted & precision-cut, fabricated elastomeric seals
- Homogeneous & inserted elastomeric shapes
- High temperature metal seals
- Metal & plastic retained composite seals
- Thermal management
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