



icountLaserCM30 icountAviationCM30

Particle Contamination Monitor (PCM)

EMA-T31748 Rev.A

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Overview

The icountLaserCM30 (LCM30) and icountAviationCM30 (ACM30) are Particle Contamination Monitors (PCMs) that automatically count and size individual solid particles suspended in a liquid using a light extinction principle. The PCM has a robust enclosure making it suitable for a wide range of environments and applications from laboratory to field-based testing. With an intuitive operation that is simple to use, the PCM also has an easily attached/detached clip-on rechargeable battery pack, making it a mobile instrument for both online and offline measurements. The Parker PCM range of products provide a cost-effective solution to liquid management and contamination control.

The majority of hydraulic breakdowns are caused by contamination. PCMs are routinely used as part of an oil analysis programme to monitor the cleanliness level of hydraulic fluids. Other systems may be monitored such as the cleanliness of fuel to protect pumps and injectors. PCMs are also used to assess the performance and effectiveness of filters and/or the need for cleaning using filtration.

Cleanliness can be defined using Air Cleaner Fine Test Dust (ACFTD) as reference material. ACFTD is characterised by optical microscopes and dust particles are reported in micrometres (μm), sized by their longest dimension – known as chord length. ISO Medium Test Dust (ISO MTD) is an alternative reference material – however, this has been characterised by a scanning electron microscope (SEM) that effectively measures projected area which is equated to the equivalent diameter of a spherical particle and reported as $\mu\text{m(c)}$. Various cleanliness standards are in use in the hydraulic industry based on ACFTD and/or ISO MTD, and use an index scale for reporting counts as codes. Parker PCMs can be calibrated with ACFTD or ISO MTD to report a variety of cleanliness standards referencing ' μm ' or ' $\mu\text{m(c)}$ ' particle sizes.

Target cleanliness levels are long-established for given applications and are normally specified by Original Equipment Manufacturers (OEMs). The user can determine and monitor contamination levels as part of a proactive or predictive maintenance approach in order that hydraulic failures can be reduced. Lower oil consumption; increased uptime and machine availability mean that operating costs can be reduced.

Further information can be found in '[Guide to Contamination Standards](#)' located in Appendix B of this manual.

Safety Information

This equipment is only to be operated by persons trained in the use and handling of pressurised hydraulic systems. Local laws and regulations for installation, operation and servicing of pressurised hydraulic systems must be adhered to. Prior to operating the unit and hoses should be inspected for damage. If any damage is found, consult with Parker accordingly.



EXPLOSION

An Explosion notice is used to warn of the risk of injury from high pressure system. The PCM operates at a maximum pressure of 420 bar (6000 psi).



CAUTION

A Caution notice is used to emphasise that particular care is required to avoid the danger of personal injury or other hazard.



LASER WARNING

A Laser notice is used to warn of the danger of exposure to invisible laser radiation. Direct exposure to beam should be avoided.



CHECK

Notes call attention to information that is especially significant to understanding and operating the equipment. There may be a need to check the orientation or tightness of connections, for example.



SAFETY EQUIPMENT

Some operations require special attention to safety, such as the use of safety glasses and / or protective gloves.

General

- This operational manual should be read in full before operating the PCM.
- High pressure fluid systems can cause personal injury.
- The maximum operating pressure of the PCM must not be exceeded.
- Appropriate safety measures must be taken when handling both combustible and flammable liquids.
- No liquids outside of those defined in the technical specification should be used.
- When testing aggressive phosphate esters the appropriate product variant (LCM30 FFKM) must be used.
- The warranty will be invalidated if the PCM is opened or disassembled.

Environment

- Mains power supply must not be used when operating outdoors.
- All IP bungs should be fitted to the PCM when operating outdoors.
- The USB-B COMMs port must not be connected to when operating outdoors.
- The printer cover should not be removed when operating outdoors.
- Only products displaying IP54 can be used outdoors.
- Products displaying IP5X must not be used outdoors.

Handling

- The PCM must be operated in upright position.
- The shoulder strap must be used when lifting and transporting the PCM.
- Prior to moving the PCM all hydraulic hoses must be secured to either the hose tidy or case mounted pump (CMP) to prevent liquid spillage.
- Battery contacts must not be short-circuited.

Operating

- Any excess liquid should be immediately wiped from the surface of the PCM and surrounding work area using a damp, soft cloth.
- Extreme care must be taken when connecting or disconnecting P1 (red - inlet) and P2 (yellow - outlet) to pressurised systems.
- The printer cover must not be removed during printing.

Laser information

This product contains an invisible infrared 5mw laser light source and must not be dismantled. This may result in dangerous exposure to laser radiation.



DANGER

INVISIBLE LASER RADIATION WHEN OPEN.

AVOID DIRECT EXPOSURE TO BEAM.

The internal protective housing label which is mounted on the laser module contains the following information:

'This product is a Class 1 laser product which complies with both USA21 CFR 1040.10 & 1040.11 and (BS) EN 608285-1'

Conformity

This device complies with:

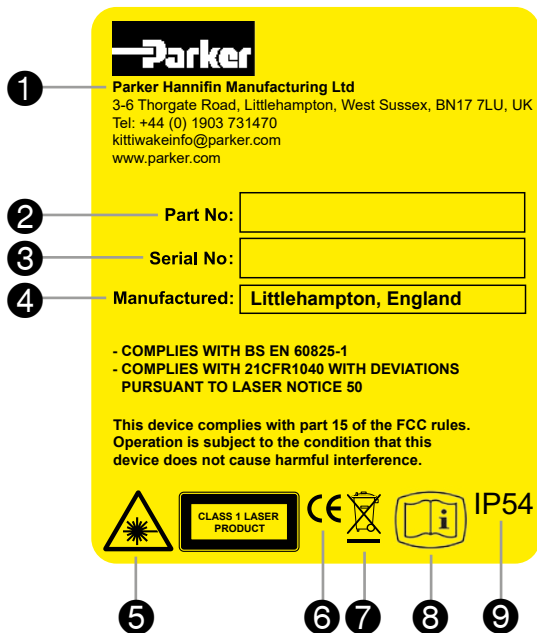
- [CE](#) Machinery Directive (2006/42/EC)
- ElectroMagnetic Compatibility (EMC) Directive (2014/30/EU)
- BS EN 60825-1
- 21CFR1040 with deviations pursuant to laser notice 50
- Part 15 of the FCC rules.

Exclusion of Liability

Parker has made every endeavour to ensure the accuracy of the content of this document however errors cannot be ruled out. Consequently, we accept no liability for such errors as may exist or for any damage or loss whatsoever which may arise as a result of such errors. All details are subject to technical modifications. Technical specifications are subject to change without notice.

Labelling

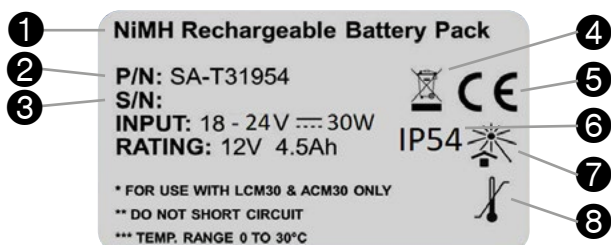
On the rear of unit



KEY

- 1** Name and address of manufacturer
- 2** Part number
- 3** Serial number
- 4** Place of manufacture
- 5** Laser warning symbol
- 6** CE marking
- 7** Waste electrical and electronic equipment (WEEE) directive
- 8** Refer to electronic manual
- 9** Ingress protection rating

On the battery pack



KEY

- 1** Nickel Metal Hydride (NiMH)
- 2** Part number
- 3** Serial number
- 4** Waste electrical and electronic equipment (WEEE) directive
- 5** CE marking
- 6** Ingress protection rating
- 7** Keep away from sunlight
- 8** Limited operating temperature range

Principles of Operation

The LCM30 and ACM30 are Particle Contamination Monitors (PCMs) that automatically count, and size individual solid particles suspended in a liquid using optical light extinction principle.

Sampling

A syringe pump **8** is used to draw liquid through the measurement flowcell **3**. The syringe pump samples from a bypass loop contained within the instrument and delivers a precise volume of liquid at a controlled flow rate. The instrument can be connected directly to operating equipment (online) or fitted with a secondary pump to sample liquid offline. The motor-controlled changeover valve **7**, **6** allows a new test to be started and fresh fluid to be drawn through the measurement flowcell **3** on the return stroke of the syringe pump **8**.

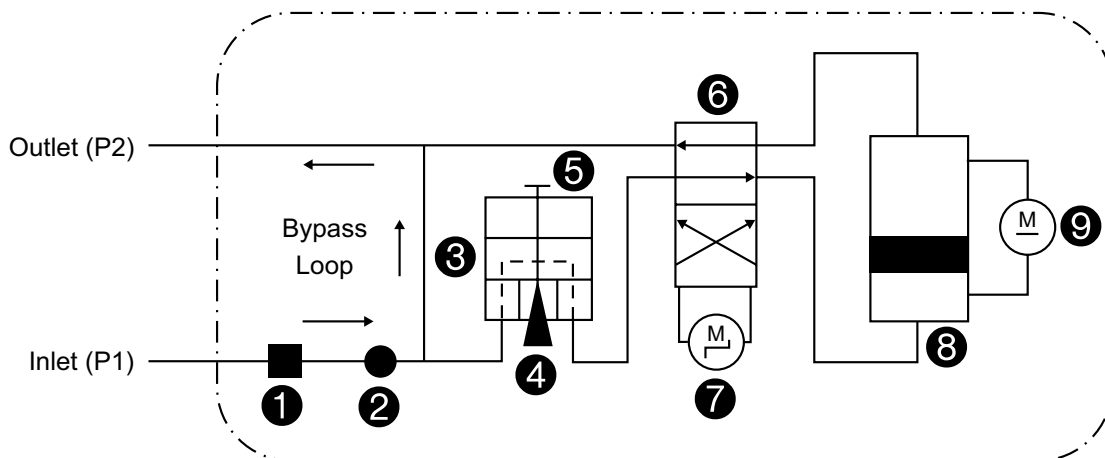
Measurement cell

The liquid under test passes through the measurement flowcell **3** fitted with optically transparent windows. The flow probe **2**, checks fluid is consistently flowing during measurement. Solid particles flowing within the liquid interrupt a focused laser **4** beam that crosses the measurement cell causing a momentary reduction in the signal recorded by a photo diode **5** on the opposite side of the cell. The extent of this reduction is determined by signal processing and is proportional to the “size” of the particle. During measurement the temperature is measured **1** and, in some versions, moisture content is also measured **1**.

Signal processing

There are 6 different measurement channels where thresholds are set during calibration. The threshold settings increase through the channels and correspond to increasing particle sizes. Each measurement channel records a cumulative particle count. At the end of a test sequence either a cumulative or differential particle count per liquid volume (mL) can be displayed for each measurement channel. Particle counts can also be shown as a contamination code, of which there are several industrial standards, in a form of a shorthand description.

Online Sampling Hydraulic Schematic



Principles of Operation

Key features of these portable PCMs:

ISO 11943: Section 9 or ISO 21018-4

Meets the requirements of Energy Institute test method IP564 (ACM30 only)

Compatible with aggressive phosphate esters (LCM30 FFKM only)

< 90 seconds test time

Storage of up to 1000 test results

Multi standard cleanliness reporting (ISO 4406, NAS 1638, NavAir, SAE, AS4059 & GOST 17216)

Integral thermal printer

Integrated RH% moisture sensor and temperature

8 reported particle sizes (6 measured)

RS232 Data Transfer over USB-B

Easy to use rechargeable 'Clip On' battery pack for field use

Compatible with aggressive phosphate esters

Available variants:

Variant Name	Count Reporting	Dust	Moisture Sensor	Seals	LCM30 Case Mounted Pump	ACM30 Case Mounted Pump	Channels	Trace Heating	IP 564
ACM302024	/mL	ISO MTD	NO	Viton	-	YES	6	-	YES
LCM302021	/100 mL	ACFTD	YES	Viton	-	-	8	-	-
LCM302021TH	/100 mL	ACFTD	YES	Viton	-	-	8	YES	-
LCM302022	/100 mL	ISO MTD	YES	Viton	-	-	8	-	-
LCM302027	/100 mL	ACFTD	YES	Viton	YES	-	8	-	-
LCM302028	/100 mL	ISO MTD	YES	Viton	YES	-	8	-	-
LCM302064	/100 mL	ISO MTD	NO	FFKM*	-	-	8	-	-
LCM302065	/100 mL	ACFTD	NO	FFKM*	-	-	8	-	-

*Perfluoroelastomer

Detailed Product Information

Technical Specification

Particle Size Reporting Channels ⁱ	(LCM30 only) MTD: >4, >6, >14, >21, >25e ⁱⁱ , >30, >38 and >70e ⁱⁱⁱ µm(c) ACFTD: >2, >5, >10, >15, >20e ⁱⁱ , >25, >50 and >100e ⁱⁱⁱ µm (ACM30 only) MTD: >4, >6, >14, >21, >25 and >30 µm(c)
Reporting Contamination Standards ^{iv}	ISO 4406 Code 0 to 22 NAS 1638 0 to 12 GOST 17216 00 to 17 SAE AS 4059F Table 1: 00 to 12 SAE AS 4059F Table 2: 000 to 12 NavAir 01-1A-17 Codes 0 to 6
Energy Institute Test Method	(ACM30 only) IP564 determination of the level of cleanliness of aviation turbine fuel
Repeatability ^v	<7% of measured counts for MTD particles size 4, 6 and 14 µm(c)
Coincidence Error List	Typically, 23,000 particles / mL
Measurement Volume & Flow Rates	14mL at 10mL/min for single test 42mL at 10mL/min for IP564 test (ACM30 only)
Calibration	MTD: Calibration in accordance with ISO 11943: Section 9 or ISO 21018-4 ACFTD: Match calibrated to a gravimetrically calibrated Master PCM using reference material
Test Time	< 90 seconds in both single and multi-test mode < 6 minutes for IP564 test (ACM30 only)
Test Modes	Single Multiple – interval and test number defined by user IP564 (ACM30 only) - automated single flush and three repeat tests, average result displayed
Moisture Sensor	Compatible with mineral oils only (LCM30 only) Relative Humidity (%RH) ±5% RH Stability: +-2% RH typical at 50% RH in one year Temperature (°C) -25 to +150°C ±0.9%

ⁱ Further information on reporting particle sizes can be found in [Appendix B](#).

ⁱⁱ The number of particles >25 µm (MTD) and >20 µm (ACFTD) are not measured by this device. These estimated values (indicated by the letter 'e' on the display) have been calculated based on a linear interpolation using the following formulae:

$$\text{MTD Linear Interpolation: } 25\mu\text{m}_{\text{count}} = 21\mu\text{m}_{\text{count}} + (30\mu\text{m}_{\text{count}} - 21\mu\text{m}_{\text{count}}) \frac{25\mu\text{m} - 21\mu\text{m}}{30\mu\text{m} - 21\mu\text{m}}$$

$$\text{ACFTD Linear Interpolation: } 20\mu\text{m}_{\text{count}} = 15\mu\text{m}_{\text{count}} + (25\mu\text{m}_{\text{count}} - 15\mu\text{m}_{\text{count}}) \frac{20\mu\text{m} - 15\mu\text{m}}{25\mu\text{m} - 15\mu\text{m}}$$

ⁱⁱⁱ The number of particles >70 µm (MTD), >100 µm (ACFTD) and in the ranges 50–100 µm and 100 – 200 µm (GOST) are not measured by this device. These estimated values (indicated by the letter 'e' on the display) have been calculated using the following formulae:

$$\text{MTD: } >70\text{e } \mu\text{m} = >38 \mu\text{m} \times 0.06816$$

$$\text{ACFTD: } >100\text{e } \mu\text{m} = >50 \mu\text{m} \times 0.06816$$

$$\text{GOST: } 50\text{--}100\text{e } \mu\text{m} = >50 \mu\text{m (ACFTD)} \times 0.93184$$

$$\text{GOST: } 100\text{--}200\text{e } \mu\text{m} = >50 \mu\text{m (ACFTD)} \times 0.06816$$

^{iv} The instrument only uses the shorthand in these standards for reporting contamination levels.

^v 95% confidence level using an MTD distribution with a concentration of 6mg/L.

Operating Environment

Fluid Compatibility	Mineral oils and petroleum based fluids Aggressive fluid (LCM30 FFKM only)
Working Viscosity	2 to 100 cSt 2 to 200 cSt when used with LCM30 Case Mounted Pump 2 to 500 cSt when used with Single Point Sampler
Environmental Temperature	+5°C to +40°C when connected with mains power +5°C to +30°C when fitted with rechargeable battery pack, operating outside of these temperatures could result in less tests per charge When operating at low temperature the trace heating variant (LCM302021TH) may be required (consult Parker)
Fluid Temperature	+5°C to +80°C
Ingress Protection	IP54 IP5X when fitted with Case Mounted Pump
Maximum Working Pressure	420 bar
Flow Rate	Minimum: 12 mL/min Flow unlimited when using single point sampler (refer to page 25) LCM30 Case Mounted Pump 30 mL/min ACM30 Case Mounted Pump 30 mL/min
Inlet and Outlet Fittings	M16 x 2 Test Coupling or 5/8" BSF HSP (LCM30 FFKM only)

Electrical

Instrument External Power	Input Voltage: 10 to 24V +-10% DA Max Current: 3A max.
Trace Heated Hose (THH)	12V DC 5A max 24V DC 2.5A max
Rechargeable Battery	Nickel Metal Hydride (NiMH) Output voltage: 12V Capacity: 4.5Ah
Rechargeable Battery Pack	Input Voltage: 18V DC Max Power: 30W Charge Time: 4 hours for full charge Number of Tests: Typically >250 tests on single charge - dependant on variant and operating conditions
Regional Plugs	UK (Type G) EU (Type C) US (Type B) Australasia (Type I)

Interface

Data Communication Port	USB-B
Menu Structure and Layout	Intuitive menu structure
Case Mounted Pump (CMP)	Automatic CMP operation when test enabled
Trace Heated Hose (THH)	THH operation via handset
Printer	Thermal printer

Materials

Outer Mouldings	Mouldings: Structural foam ABS Paint: Polyurethane
Material Wetted Flow Path	Nylon with Kevlar Reinforcement Microbore Hose Brass Viton Perfluoroelastomer (LCM30 FFKM only) Polyoxymethylene (Delrin) Zinc Plated Mild Steel Stainless Steel 302, 303 and 316 Soda-lime Glass

Exporting Test Results

RS232 Command Protocol

The PCM has been developed with an updated RS232 Command Protocol enabling a vast array of functionality. For guidance and advice please contact the local Parker Sales Company (see www.parker.com).

Interpreting Test Results

There are many published articles suggesting how to set up and implement oil analysis programmes. Typically the measurements taken by PCMs are compared to the target cleanliness levels for given applications which are normally specified by Original Equipment Manufacturers (OEMs). It is worth remembering that OEM cleanliness levels are a great place to start, but they are set according to warranty anticipations and these may not take into account every application.

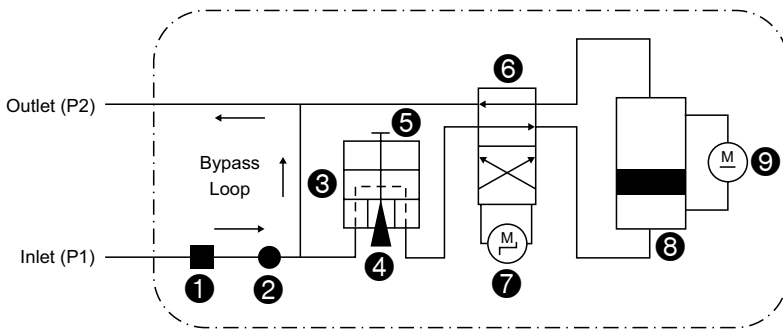
There are various standards in use in the hydraulic industry and most of these use an index scale for reporting counts as codes. Using ISO 4406, for example, a count of 1868677 particles is given the code '21'. Parker's 'Guide to Contamination Standards' is located in [Appendix B](#) of this manual.

Cautionary alert and alarm limits can be established based on the OEM, or established industry best practice targets, and are usually set one or two codes below target. Given the difference between codes, the actual particle counts may be trended to indicate potential failure and decision making. As contamination worsens, remedial work, such as identifying potential ingress points, as in breathers of filling points for example, should be checked. Filtration may be necessary to remove and bring contamination under control or even a full drain, flush and fill. By better understanding the cleanliness codes, appropriate targets can be set and the particle counts routinely monitored so overall reliability goals may be met.

Parker's latest 'Guide to Contamination Standards' can be found at Parker.com. For further guidance and advice please contact the local Parker Sales Company (see www.parker.com).

icountLaserCM30

Online Sampling Hydraulic Schematic



KEY

- 1 Moisture and temperature sensor
- 2 Flow probe
- 3 Flowcell
- 4 Laser diode
- 5 Photo diode
- 6 Changeover valve
- 7 Stepper motor
- 8 Dual direction syringe pump
- 9 DC motor

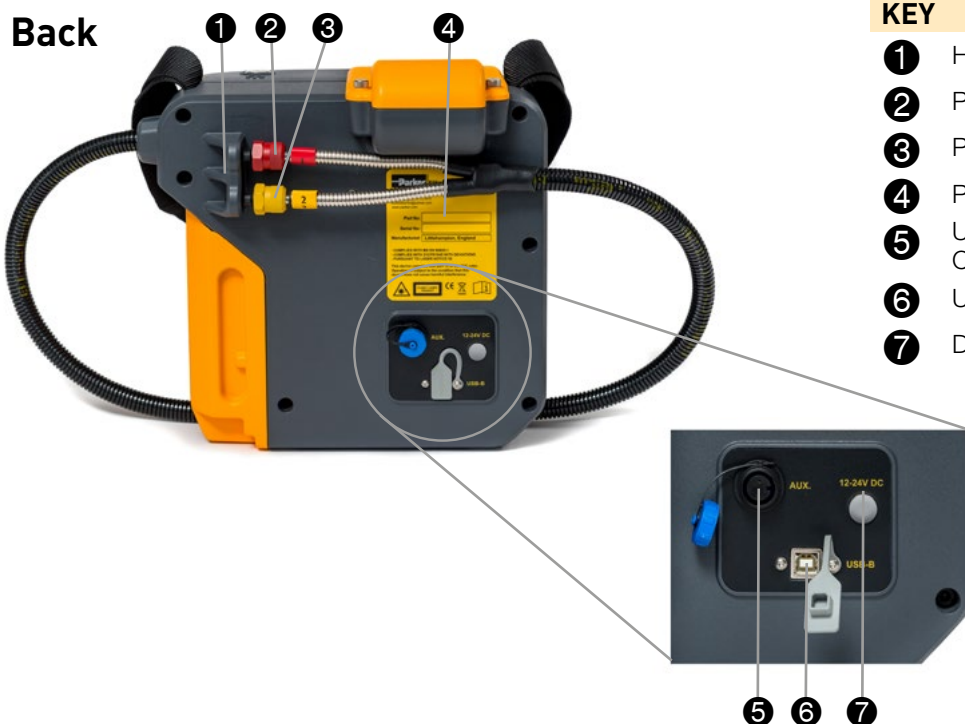
Front



KEY

- 1 Shoulder Strap
- 2 On/Off
- 3 Printer Cover and IP Bung
- 4 Hydraulic Hose
- 5 Handset
- 6 Rechargeable Battery Pack

Back

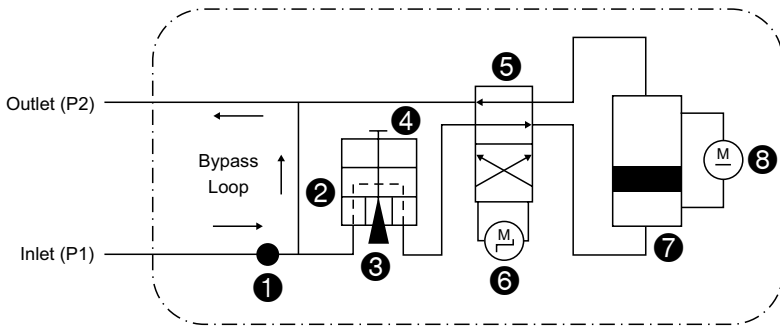


KEY

- 1 Hose Tidy
- 2 P1 Inlet - Red
- 3 P2 Outlet - Yellow
- 4 Product Label
- 5 Universal Bottle Sampler (UBS) COMMS
- 6 USB-B COMMS
- 7 DC Power Socket and IP Bung

icountLaserCM30 FFKM (aggressive phosphate ester compatible)

Online Sampling Hydraulic Schematic



KEY

- ① Flow probe
- ② Flowcell
- ③ Laser diode
- ④ Photo diode
- ⑤ Changeover valve
- ⑥ Stepper motor
- ⑦ Dual direction syringe pump
- ⑧ DC motor

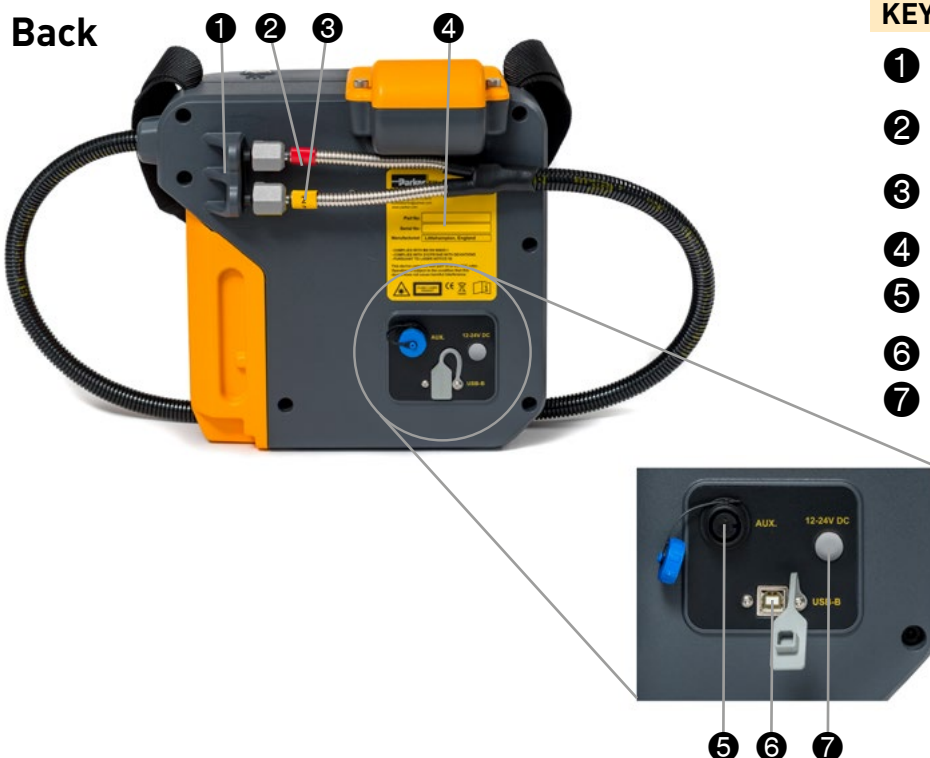
Front



KEY

- ① Shoulder Strap
- ② On/Off
- ③ Printer Cover and IP Bung
- ④ Hydraulic Hose
- ⑤ Handset
- ⑥ Rechargeable Battery Pack

Back

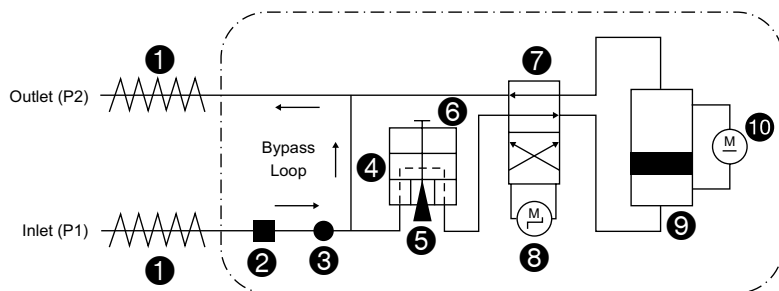


KEY

- ① Hose Tidy
- ② 5/8" BSF HSP P1 Inlet - Red
- ③ 5/8" BSF HSP P2 Outlet - Yellow
- ④ Product Label
- ⑤ Universal Bottle Sampler (UBS) COMMS
- ⑥ USB-B COMMS
- ⑦ DC Power Socket and IP Bung

icountLaserCM30 with Trace Heated Hose

Online Sampling with Trace Heated Hose Hydraulic Schematic



KEY

- ① Heating element
- ② Moisture and temperature sensor
- ③ Flow probe
- ④ Flowcell
- ⑤ Laser diode
- ⑥ Photo diode
- ⑦ Changeover valve
- ⑧ Stepper motor
- ⑨ Dual direction syringe pump
- ⑩ DC motor

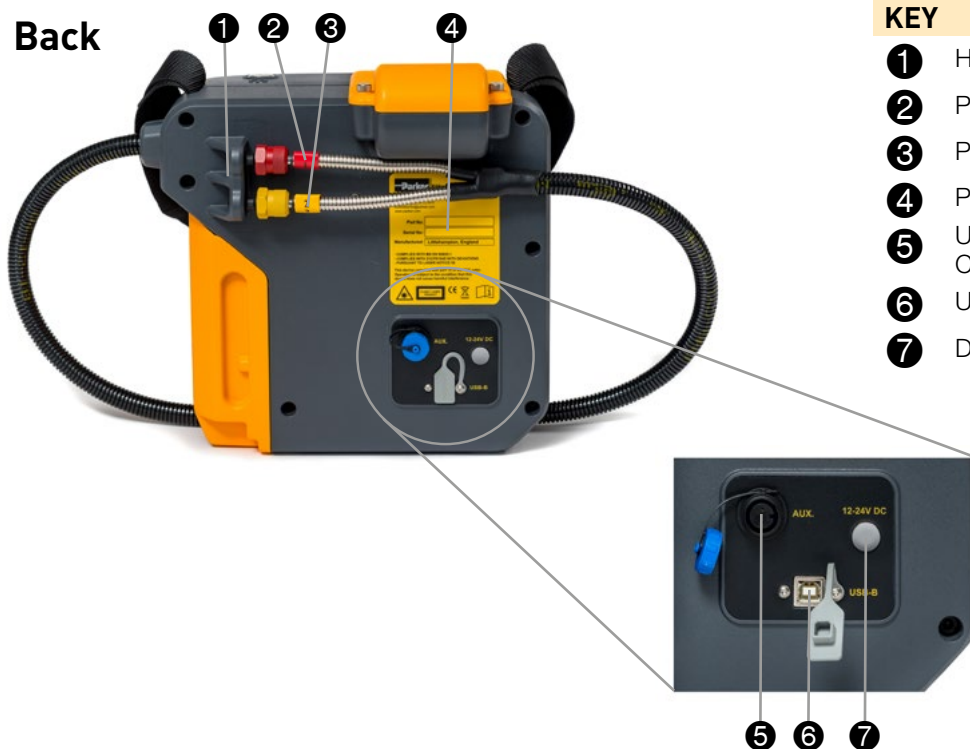
Front



KEY

- ① Shoulder Strap
- ② On/Off
- ③ Printer Cover and IP Bung
- ④ Trace Heated Hydraulic Hose
- ⑤ Handset
- ⑥ Rechargeable Battery Pack

Back

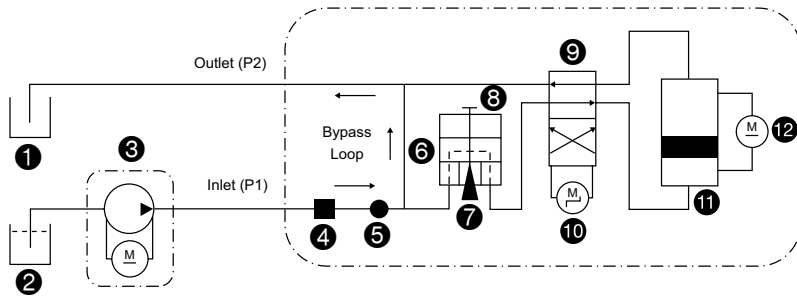


KEY

- ① Hose Tidy
- ② P1 Inlet - Red
- ③ P2 Outlet - Yellow
- ④ Product Label
- ⑤ Universal Bottle Sampler (UBS) COMMS
- ⑥ USB-B COMMS
- ⑦ DC Power Socket and IP Bung

icountLaserCM30 with Case Mounted Pump

Offline Sampling with Case Mounted Pump (CMP) Hydraulic Schematic



KEY

- 1 Waste container
- 2 Test sample
- 3 Case mounted pump (CMP)
- 4 Moisture and temperature sensor
- 5 Flow probe
- 6 Flowcell
- 7 Laser diode
- 8 Photo diode
- 9 Changeover valve
- 10 Stepper motor
- 11 Dual direction syringe pump
- 12 DC motor

Front



KEY

- 1 Shoulder Strap
- 2 On/Off
- 3 Printer Cover and IP Bung
- 4 Handset
- 5 Hydraulic Hose
- 6 Rechargeable Battery Pack

Back

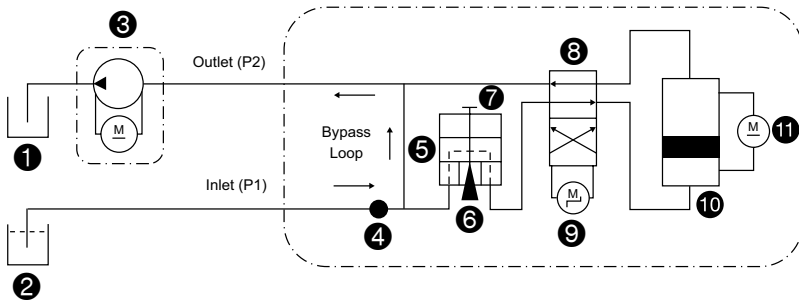


KEY

- 1 Case Mounted Pump (CMP)
- 2 P2 Outlet - Yellow
- 3 P1 Inlet - Red
- 4 Outlet (Bottle Sampling)
- 5 Inlet (Bottle Sampling)
- 6 Product Label
- 7 Universal Bottle Sampler (UBS) COMMS
- 8 USB-B COMMS
- 9 DC Power Socket and IP Bung

icountAviationCM30

Offline Sampling Hydraulic Schematic



KEY

- 1 Waste container
- 2 Test sample
- 3 Case mounted pump (CMP)
- 4 Flow probe
- 5 Flowcell
- 6 Laser diode
- 7 Photo diode
- 8 Changeover valve
- 9 Stepper motor
- 10 Dual direction syringe pump
- 11 DC motor

Front



KEY

- 1 Shoulder Strap
- 2 On/Off
- 3 Printer Cover and IP Bung
- 4 Handset
- 5 Hydraulic Hose
- 6 Rechargeable Battery Pack

Back



KEY

- 1 Product Label
- 2 Case Mounted Pump (CMP)
- 3 Blanking Hose
- 4 P1 Inlet - Red
- 5 Outlet (Bottle Sampling)
- 6 Inlet (Bottle Sampling)
- 7 P2 Outlet - Yellow
- 8 Universal Bottle Sampler (UBS) COMMS
- 9 USB-B COMMS
- 10 DC Power Socket and IP Bung

Handset



KEY

- ① LCD Backlit Display
- ② Function Keys
- ③ Directional Arrow Keys
- ④ Shortcut Key to Home Screen
- ⑤ Shortcut Key to Start Test Screen

Before Starting



Case Contents

1	Particle Contamination Monitor
1	Rechargeable Battery Pack
2	Printer Paper Roll (1 x fitted / 1 x spare)
1	USB Cable
1	Flash Drive Memory Stick
1	QuickStart Guide
1	Power Supply & Regional Power Cable
1	Calibration Certificate

NOTE: The original packaging must not be disposed of as this is required to return the PCM safely to a Parker Service Centre (see www.parker.com) for re-calibration and/or servicing.

Powering The PCM

The PCM is powered either by mains power or a rechargeable battery pack (supplied).

Mains Power



Battery Power

Fitting and removing the pre-charged battery pack can easily be done by hand:



+5°C to +30°C, operating outside of these temperatures could result in less tests per charge.

Charging the Battery

Battery pack is to be charged from the supplied power supply only.



- Charging (Permanent light)
- Fully Charged (No Light)

Battery Status

Icon	Status
	Low
	Very Low
	Empty

NOTE: The battery pack is not charged while fitted onto the PCM and can only be charged when removed.

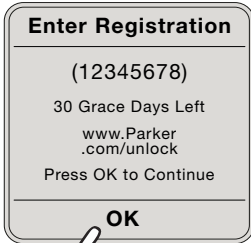
NOTE: Additional battery packs can be purchased separately (see [Accessories / Parts List](#)).

Powering On The PCM For The First Time



To help improve our service it is recommended to register the PCM as soon as possible. Registration must be completed within 30 days of initial power on for continued use of the PCM.



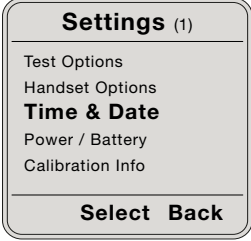








Registering



Without Registering



Setting Time & Date

	Description	Visual
Step 1	<p>From the Settings menu use the   keys to highlight Time & Date and then press Select.</p> <p>Note: <i>The selection is shown in larger text.</i></p>	
Step 2	<p>Time and date settings will be displayed.</p> <p>Select Set to edit.</p>	
Step 3	<p>Use the   keys to select parameter.</p> <p>To alter time and date use the numerical keys on the keypad. Use the   keys to change date format to either of the following:</p> <p>dd/mm/yy mm/dd/yy yy/mm/dd</p> <p>The following date separators can be chosen by using the   keys:</p> <p>' / ' (forward slash) ' - ' (hyphen) ' . ' (full stop or period) ' ' (space)</p> <p>Select Done to save changes and exit edit mode.</p> <p>Select Reset to revert to default settings or Cancel to exit edit mode.</p> <p>Note: <i>All parameters set will be saved even when the unit is powered off.</i></p>	

Connection


The Parker System 20 Sensor is an inline manifold enabling a safe and simple method of connecting an LCM30 to an online pressurised hydraulic system (2 bar minimum system pressure, 2 to 100 cSt working viscosity).



See [Accessories / Parts List](#) for System 20 Sensor variants.



The LCM30 is supplied filled with hydraulic oil and will require flushing prior to use.



	Description	Visual
Step 1	Ensure the System Sensor 20 is installed correctly, with the arrow in the direction of fluid flow.	
Step 2	Disconnect hydraulic hoses from LCM hose tidy.	
Step 3	Unscrew red (inlet - P1) and yellow (outlet - P2) protection caps from the System 20 Sensor. Loosely connect LCM30 P1 to the System 20 Sensor inlet.	
Step 4	Loosely connect LCM30 P2 to the System 20 Sensor outlet.	

	Description	Visual
Step 5	At the same time tighten (finger-tight) P1 and P2.	
		
	Note: It is recommended that the LCM30 is connected to the System 20 Sensor for a minimum of 5 minutes to allow the fluid condition to stabilise before starting a test.	
Step 6	When disconnecting the LCM30 from the System 20 Sensor, P1 and P2 must be undone at the same time.	

Single Point Sampler

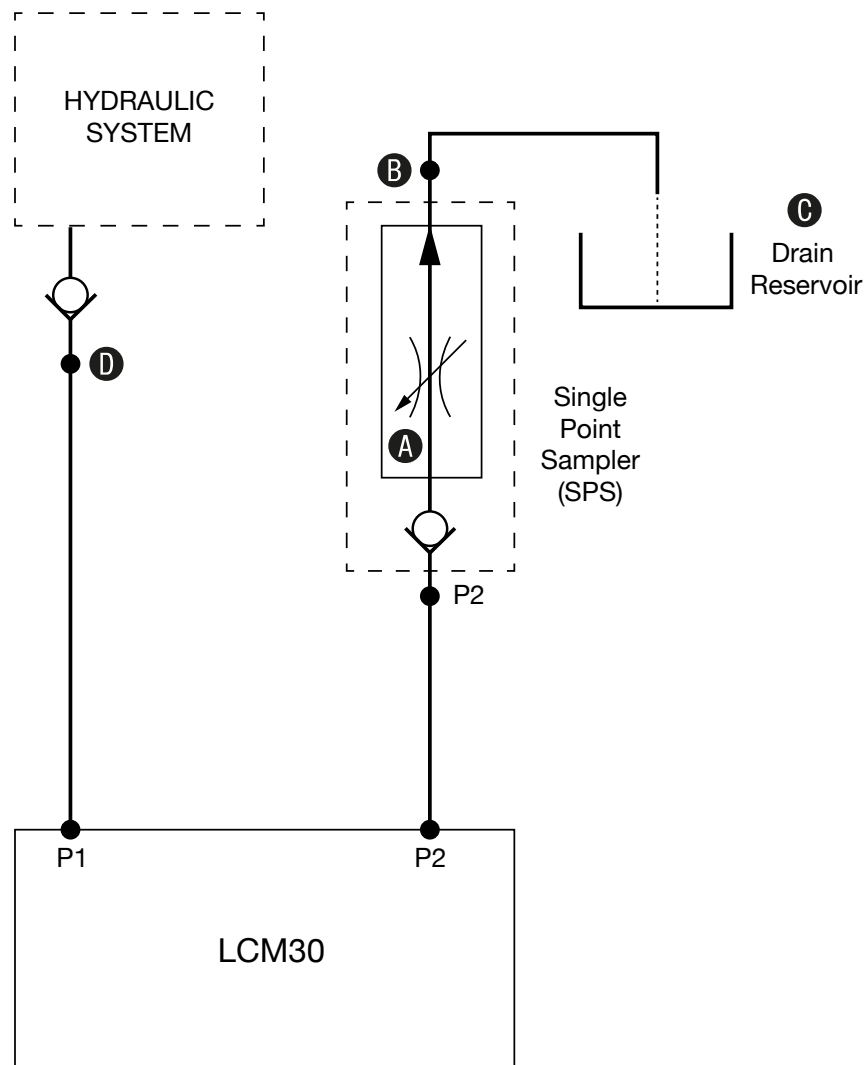
(For use with LCM30 only)

The Single Point Sampler (SPS) is a lightweight, compact and simple to use device enabling the LCM30 to be connected to an online pressurised hydraulic system via a single test point.

See [Accessories / Parts List](#) for Single Point Sampler variants.



The LCM30 is supplied filled with hydraulic oil and will require flushing prior to use.



Single Point Sampler



Ensure SPS valve **A** is closed and connected to LCM30 before connecting to hydraulic system.

Connecting LCM30 to SPS

- Ensure SPS valve **A** is closed.
- Connect LCM30 P2 to SPS P2 (yellow cap).
- Connect SPS **B** to drain reservoir **C**.
- Connect LCM30 P1 to hydraulic system **D**.
- Operate by slowly opening SPS valve **A** until oil flows continuously into drain reservoir **C**.
- Switch on LCM30 and perform a Flow Check via the Tools menu. If flow rate 'good' continue with test. If the flow rate 'low' increase oil flow by turning SPS valve **A** anticlockwise and then repeat Flow Check. Replicate steps until flow rate is 'good'.

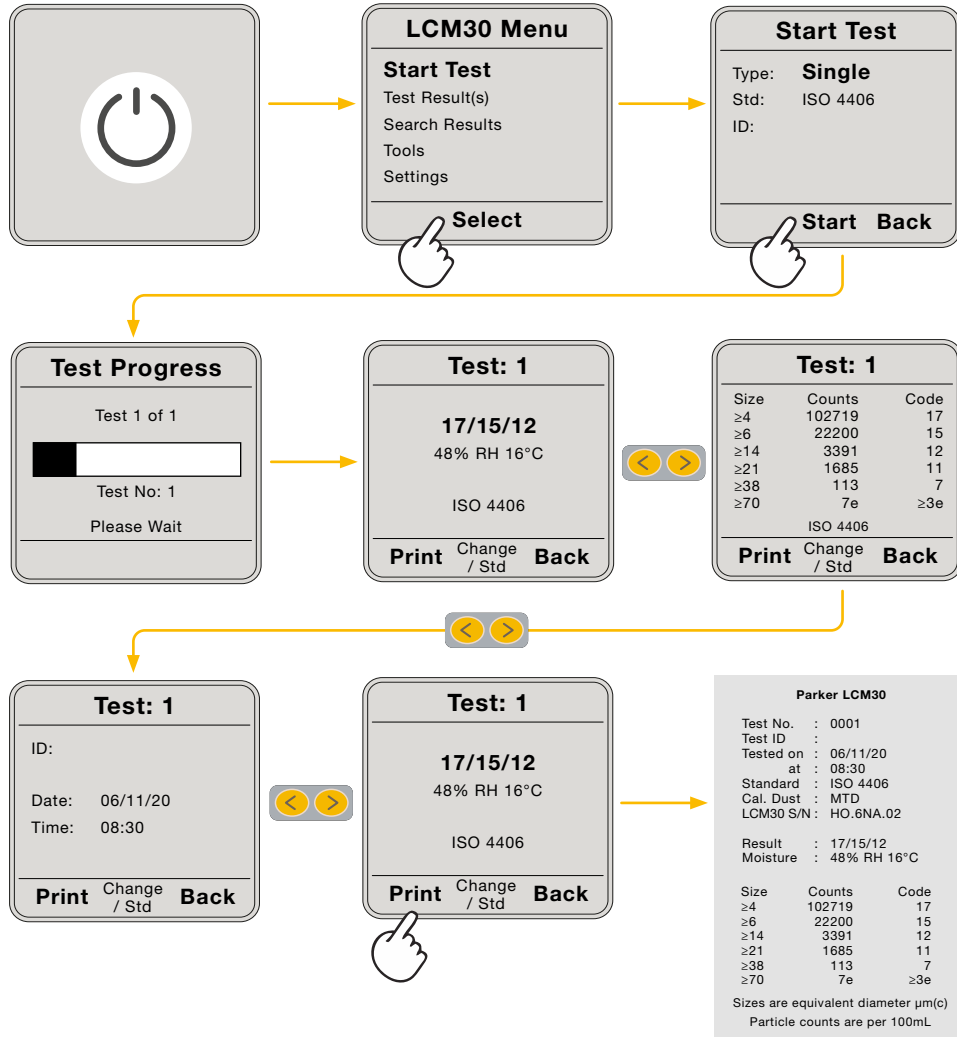
Disconnecting LCM30 from SPS

- Ensure SPS valve **A** is open.
- Disconnect LCM30 P1 from hydraulic system **D**.
- Disconnect LCM30 P2 from SPS.

Quick Test

Default test settings can be set under Settings / Test Options

For further detail on testing (including multiple and IP564) see [Start Test](#)






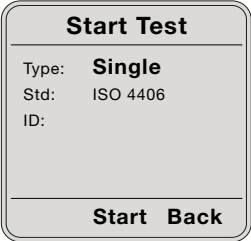








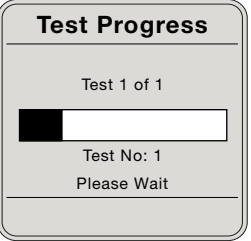




Menu Navigation

START TEST

Single Test

Default test settings can be set under [Settings / Test Options](#)






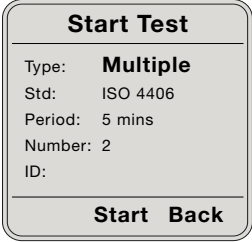







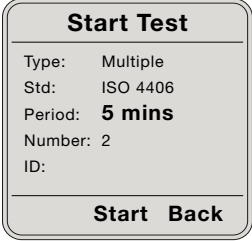
	Description	Visual
Step 1	<p>From the main menu use the   keys to highlight Start Test and then press Select.</p> <p>Note: The selection is shown in larger text.</p>	
Step 2	<p>Select Single Test Type by using the   keys.</p> <p>Note: The last Test Type will be selected by default.</p>	
Step 3	<p>Use the   keys to select Test Standard.</p> <p>Use the   keys to scroll through active reporting standards.</p> <p>Note: Default reporting standards can be changed under Settings / Test Options / Standards</p>	
Step 4	<p>Use the   keys to select Test ID.</p> <p>Enter Test ID using the characters on the keypad.</p> <p>When finished, select Start to start test.</p> <p>Note: A Test ID is not required to start a test.</p> <p>Note: The Test ID will be used until a new Test ID is entered.</p>	
Step 5	<p>Testing starts immediately with a Test Progress bar, Test n of n and Test No. displayed.</p> <p>Please wait for test to complete.</p> <p>Note: If a test is unsuccessful refer to the Error Codes section for guidance.</p>	







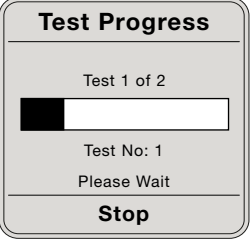


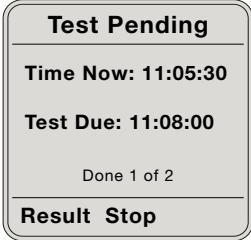
	Description	Visual																					
<p>Step 6</p>	<p>Testing is complete when results are shown. Test Number, contamination codes, particle counts, Test ID, date and time can all be viewed by using the   keys.</p> <p>Test results can be printed by selecting Print.</p> <p>Note: Test Numbers are automatically assigned by the instrument.</p> <p>Note: Automatic printing can be set as default under Settings / Test Options / Result Reporting</p> <p>Note: Default date format can be set under Settings / Time & Date</p>	<div data-bbox="1161 241 1412 483"> <p>Test: 1</p> <hr/> <p>17/15/12 47%RH 18°C</p> <p>ISO 4406</p> <p>Print Change / Std Back</p> </div> <div data-bbox="1161 510 1412 752"> <p>Test: 1</p> <table border="1"> <thead> <tr> <th>Size</th> <th>Count</th> <th>Code</th> </tr> </thead> <tbody> <tr> <td>≥4</td> <td>102719</td> <td>17</td> </tr> <tr> <td>≥6</td> <td>22200</td> <td>15</td> </tr> <tr> <td>≥14</td> <td>3391</td> <td>12</td> </tr> <tr> <td>≥21</td> <td>1685</td> <td>11</td> </tr> <tr> <td>≥38</td> <td>113</td> <td>7</td> </tr> <tr> <td>≥70</td> <td>7e</td> <td>≥3e</td> </tr> </tbody> </table> <p>ISO 4406</p> <p>Print Change / Std Back</p> </div> <div data-bbox="1161 779 1412 1012"> <p>Test: 1</p> <hr/> <p>ID: RUN 1</p> <p>Date: 13/05/20 Time: 08:47</p> <p>Print Change / Std Back</p> </div>	Size	Count	Code	≥4	102719	17	≥6	22200	15	≥14	3391	12	≥21	1685	11	≥38	113	7	≥70	7e	≥3e
Size	Count	Code																					
≥4	102719	17																					
≥6	22200	15																					
≥14	3391	12																					
≥21	1685	11																					
≥38	113	7																					
≥70	7e	≥3e																					



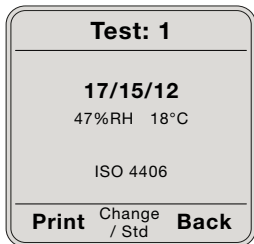
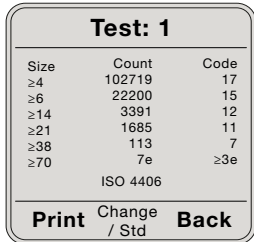
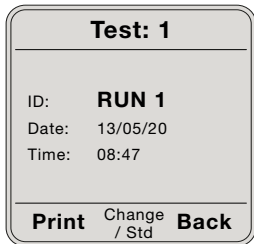
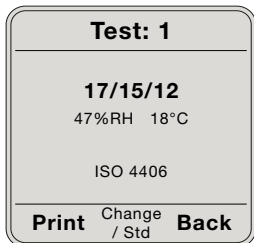
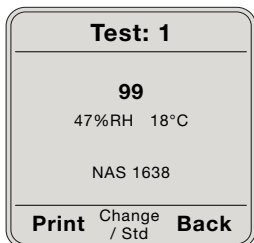
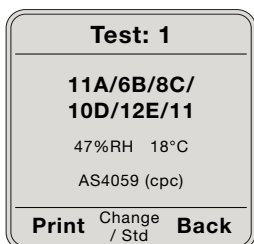
	Description	Visual
<p>Step 7</p>	<p>Test results can be viewed in different standards by selecting Change / Std.</p> <p><i>Note: Default reporting standards can be changed under Settings / Test Options / Standards</i></p> <p><i>Note: If a test is unsuccessful refer to the Error Codes section for guidance.</i></p>	<div data-bbox="1161 241 1414 483"> <p>Test: 1</p> <hr/> <p>17/15/12 47%RH 18°C</p> <p>ISO 4406</p> <p>Print <small>Change / Std</small> Back</p> </div> <div data-bbox="1161 517 1414 759"> <p>Test: 1</p> <hr/> <p>99 47%RH 18°C</p> <p>NAS 1638</p> <p>Print <small>Change / Std</small> Back</p> </div> <div data-bbox="1161 792 1414 1034"> <p>Test: 1</p> <hr/> <p>Class 99 47%RH 18°C</p> <p>AS4059 (cpc)</p> <p>Print <small>Change / Std</small> Back</p> </div>

Multiple Test

Default test settings can be set under *Settings / Test Options*



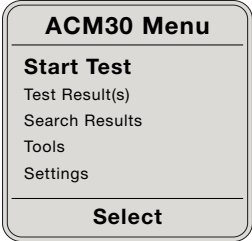






	Description	Visual
Step 1	<p>From the main menu use the   keys to highlight Start Test and then press Select.</p> <p>Note: <i>The selection is shown in larger text.</i></p>	 <p>LCM30 Menu</p> <p>Start Test</p> <p>Test Result(s)</p> <p>Search Results</p> <p>Tools</p> <p>Settings</p> <p>Select</p>
Step 2	<p>Select Multiple Test Type by using the   keys.</p> <p>Note: <i>The last Test Type will be selected by default.</i></p>	 <p>Start Test</p> <p>Type: Multiple</p> <p>Std: ISO 4406</p> <p>Period: 5 mins</p> <p>Number: 2</p> <p>ID:</p> <p>Start Back</p>
Step 3	<p>Use the   keys to select Test Standard.</p> <p>Use the   keys to scroll through reporting standards.</p> <p>Note: <i>Default reporting standards can be changed under Settings / Test Options / Standards</i></p>	 <p>Start Test</p> <p>Type: Multiple</p> <p>Std: ISO 4406</p> <p>Period: 5 mins</p> <p>Number: 2</p> <p>ID:</p> <p>Start Back</p>
Step 4	<p>Use the   keys to select Test Period.</p> <p>Use the number keys to enter a Test Period (time frame between start of test and start of subsequent test).</p> <p>Note: <i>For continuous testing without any time delay between consecutive tests, select a Test Period of 0 mins.</i></p> <p>Note: <i>The last Test Period will be selected by default.</i></p> <p>Note: <i>100 minutes is the maximum Test Period.</i></p>	 <p>Start Test</p> <p>Type: Multiple</p> <p>Std: ISO 4406</p> <p>Period: 5 mins</p> <p>Number: 2</p> <p>ID:</p> <p>Start Back</p>

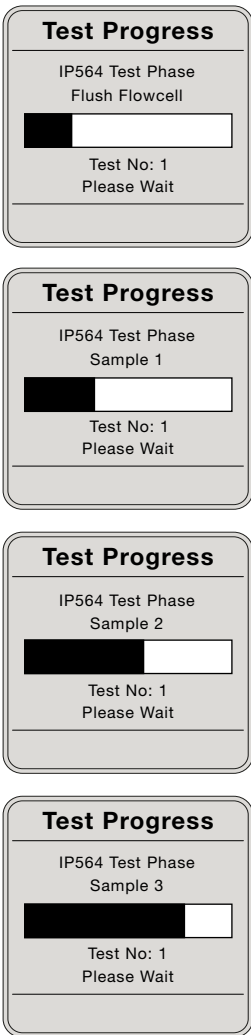
	Description	Visual
Step 5	<p>Use the   keys to select Test Number.</p> <p>Use the number keys to enter a Test Number (total number of consecutive tests).</p> <p>Note: <i>The last Test Number will be selected by default.</i></p> <p>Note: <i>99 is the maximum number of consecutive tests.</i></p>	
Step 6	<p>Use the   keys to select Test ID.</p> <p>Enter Test ID using the characters on the keypad.</p> <p>When finished, select Start to start test.</p> <p>Note: <i>The Test ID will be stored until a new Test ID is entered.</i></p> <p>Note: <i>A test can start without the need for a Test ID.</i></p>	
Step 7	<p>Testing starts immediately, a Test Progress bar, Test n of n and Test No. are displayed.</p> <p>Please wait for all tests to complete. To stop the test sequence, press Stop. The current test will be the last and any remaining tests will be aborted.</p> <p>Note: <i>If a test is unsuccessful refer to the Error Codes section for guidance.</i></p>	
Step 8	<p>The Test Pending screen will appear after each test showing current time, due time for next test, current test number and total number of tests in sequence.</p> <p>Note: <i>If a Test Period of 0 mins is selected the Test Pending screen will not be displayed as consecutive tests will be run without time delay.</i></p> <p>Note: <i>Press Stop to cancel testing.</i></p> <p>Note: <i>All previous test results can be displayed by pressing Result and using the   keys to scroll – Multiple Test mode will continue in background.</i></p>	



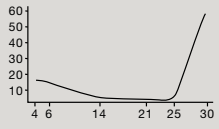
	Description	Visual
<p>Step 9</p>	<p>Testing is complete when results are shown. Test Number, contamination codes, particle counts, Test ID, date and time can all be viewed by using the   keys.</p> <p>Test results can be printed by selecting Print.</p> <p>Note: Test Numbers are automatically assigned by the instrument.</p> <p>Note: Automatic printing can be set as default under Settings / Test Options / Standards</p> <p>Note: Default date format can be set under Settings / Time & Date</p>	  
<p>Step 10</p>	<p>Test results can be viewed in different standards by selecting Change / Std.</p> <p>Note: Default reporting standards can be changed under Settings / Test Options / Standards</p>	  

IP564 Test (ACM30 variant only)

Default test settings can be set under *Settings / Test Options*








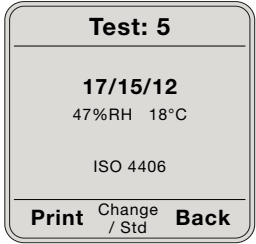
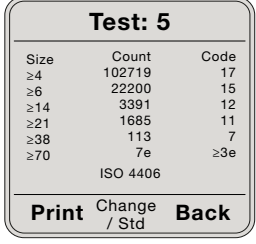

	Description	Visual
Step 1	<p>From the main menu use the   keys to highlight Start Test and then press Select.</p> <p>Note: <i>The selection is shown in larger text.</i></p>	
Step 2	<p>Select IP564 Test Type by using the   keys.</p> <p>Note: <i>The last Test Type will be selected by default.</i></p>	
Step 3	<p>Use the   keys to select Test ID.</p> <p>Enter Test ID using the characters on the keypad.</p> <p>When finished, select Start to start test.</p> <p>Note: <i>A Test ID is not required to start a test.</i></p> <p>Note: <i>The Test ID will be used until a new Test ID is entered.</i></p>	

	Description	Visual
Step 4	<p>Testing starts immediately with the IP564 test phase, Test Progress bar and Test No. displayed.</p> <p>IP564 Test Phases:</p> <p>Flush Flowcell Sample 1 Sample 2 Sample 3</p> <p>Please wait for all test phases to complete.</p> <p>Note: Please refer to the IP 564 test method for test specifics.</p> <p>Note: If a test is unsuccessful refer to the Error Codes sections for guidance.</p>	

	Description	Visual																												
<p>Step 5</p>	<p>Testing is complete when results are shown. The average of the 3 test samples are displayed as per IP564 test method.</p> <p>Test Number, contamination codes, particle counts, % by Volume graph, % by Volume table, Test ID, date and time can all be viewed by using the   keys.</p> <p>Test results can be printed by selecting Print.</p> <p>Note: Test Numbers are automatically assigned by the instrument.</p> <p>Note: Automatic printing can be set as default under Settings / Test Options / Result Reporting</p> <p>Note: Default date format can be set under Settings / Time & Date</p>	<div data-bbox="1166 244 1417 483"> <p>Test: 1</p> <hr/> <p>19/16/14</p> <p>IP564</p> <p>Print Back</p> </div> <div data-bbox="1166 506 1417 745"> <p>Test: 1</p> <table border="1"> <thead> <tr> <th>Size</th> <th>Count</th> </tr> </thead> <tbody> <tr> <td>≥4</td> <td>4969.76</td> </tr> <tr> <td>≥6</td> <td>590.29</td> </tr> <tr> <td>≥14</td> <td>82.30</td> </tr> <tr> <td>≥21</td> <td>63.52</td> </tr> <tr> <td>≥25</td> <td>53.35</td> </tr> <tr> <td>≥30</td> <td>52.69</td> </tr> </tbody> </table> <p>IP564</p> <p>Print Back</p> </div> <div data-bbox="1166 768 1417 1008"> <p>% by Volume</p>  <p>Print Back</p> </div> <div data-bbox="1166 1030 1417 1270"> <p>% by Volume</p> <table border="1"> <thead> <tr> <th>Size</th> <th>Vol</th> </tr> </thead> <tbody> <tr> <td>≥4-6</td> <td>16%</td> </tr> <tr> <td>≥6-14</td> <td>14%</td> </tr> <tr> <td>≥14-21</td> <td>3%</td> </tr> <tr> <td>≥21-25</td> <td>3%</td> </tr> <tr> <td>≥25-30</td> <td>0%</td> </tr> <tr> <td>≥30</td> <td>64%</td> </tr> </tbody> </table> <p>Print Back</p> </div> <div data-bbox="1166 1292 1417 1532"> <p>Test: 1</p> <hr/> <p>ID: RUN 1</p> <p>Date: 13/05/20</p> <p>Time: 08:47</p> <p>Print Back</p> </div>	Size	Count	≥4	4969.76	≥6	590.29	≥14	82.30	≥21	63.52	≥25	53.35	≥30	52.69	Size	Vol	≥4-6	16%	≥6-14	14%	≥14-21	3%	≥21-25	3%	≥25-30	0%	≥30	64%
Size	Count																													
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Size	Vol																													
≥4-6	16%																													
≥6-14	14%																													
≥14-21	3%																													
≥21-25	3%																													
≥25-30	0%																													
≥30	64%																													









Test Result(s)

Default test settings can be set under *Settings / Test Options*

	Description	Visual																					
<p>Step 1</p>	<p>From the main menu use the   keys to highlight Test Result(s) and then press Select.</p> <p>Note: <i>The selection is shown in larger text.</i></p>	 <p>LCM30 Menu</p> <p>Start Test Test Result(s) Search Results Tools Settings</p> <hr/> <p>Select</p>																					
<p>Step 2</p>	<p>The last test result will always be displayed.</p> <p>Select a different test by using the   keys.</p> <p>Test Number, particle counts, Test ID, date and time can all be viewed by using the   keys.</p> <p>Test results can be printed by selecting Print.</p> <p>Note: <i>Automatic printing can be set as default under Settings / Test Options / Result Reporting</i></p> <p>Note: <i>Default date format can be set under Settings / Time & Date</i></p>	 <p>Test: 5</p> <hr/> <p>17/15/12 47%RH 18°C</p> <p>ISO 4406</p> <hr/> <p>Print Change / Std Back</p>  <p>Test: 5</p> <table border="1"> <thead> <tr> <th>Size</th> <th>Count</th> <th>Code</th> </tr> </thead> <tbody> <tr> <td>≥4</td> <td>102719</td> <td>17</td> </tr> <tr> <td>≥6</td> <td>22200</td> <td>15</td> </tr> <tr> <td>≥14</td> <td>3391</td> <td>12</td> </tr> <tr> <td>≥21</td> <td>1685</td> <td>11</td> </tr> <tr> <td>≥38</td> <td>113</td> <td>7</td> </tr> <tr> <td>≥70</td> <td>7e</td> <td>≥3e</td> </tr> </tbody> </table> <p>ISO 4406</p> <hr/> <p>Print Change / Std Back</p>  <p>Test: 5</p> <hr/> <p>ID: RUN 1 Date: 13/05/20 Time: 08:47</p> <hr/> <p>Print Change / Std Back</p>	Size	Count	Code	≥4	102719	17	≥6	22200	15	≥14	3391	12	≥21	1685	11	≥38	113	7	≥70	7e	≥3e
Size	Count	Code																					
≥4	102719	17																					
≥6	22200	15																					
≥14	3391	12																					
≥21	1685	11																					
≥38	113	7																					
≥70	7e	≥3e																					

Search Results



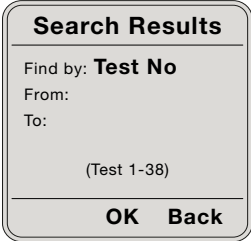






Default test settings can be set under *Settings / Test Options*

	Description	Visual
<p>Step 1</p>	<p>From the main menu use the   keys to highlight Search Results and then press Select.</p> <p><i>Note: The selection is shown in larger text.</i></p>	 <p>The screenshot shows a menu titled "LCM30 Menu" with options: Start Test, Test Result(s), Search Results, Tools, and Settings. A "Select" button is at the bottom.</p>
<p>Step 2</p>	<p>Test results can be searched by Test No, Date or ID</p> <p>Select required search field by using the   keys.</p> <p>Use the   keys and keypad to enter the search criteria.</p> <p><i>Note: The available search range is displayed.</i></p>	 <p>The first screenshot shows "Search Results" with "Find by: Test No", "From:", "To:", and "(Test 1-38)".</p> <p>The second screenshot shows "Search Results" with "Find by: Date", "From: / /", "To: / /", and "24/02/20 - 13/05/20".</p> <p>The third screenshot shows "Search Results" with "Find by: ID", "ID:", and "(38 Saved Tests)".</p>

	Description	Visual
<p>Step 3</p>	<p>Test results can be viewed in different standards by selecting Change / Std.</p> <p><i>Note: Default reporting standards can be changed under Settings / Test Options / Standards</i></p>	<div data-bbox="1161 241 1414 483"> <p>Test: 5</p> <hr/> <p>17/15/12 47%RH 18°C</p> <p>ISO 4406</p> <hr/> <p>Print Change / Std Back</p> </div> <div data-bbox="1161 506 1414 748"> <p>Test: 5</p> <hr/> <p>99 47%RH 18°C</p> <p>NAS 1638</p> <hr/> <p>Print Change / Std Back</p> </div> <div data-bbox="1161 770 1414 1012"> <p>Test: 5</p> <hr/> <p>11A/6B/8C/ 10D/12E/11 47%RH 18°C</p> <p>AS4059 (cpc)</p> <hr/> <p>Print Change / Std Back</p> </div>









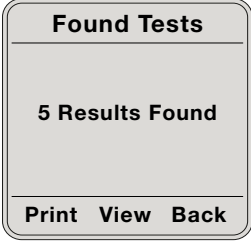
By Test Number

Default test settings can be set under *Settings / Test Options*

	Description	Visual
Step 1	To search by Test No select by using the   keys.	
Step 2	Use the   keys and keypad to enter the search criteria. Select OK to search. Note: <i>The available search range is displayed.</i> Note: <i>To search for a single test, only the From search field is required.</i>	
Step 3	The total number of found test results will be displayed. Select Print to print all test results. Press View to view all test results and use the keys   to scroll through tests. Note: <i>Only the tests found within the search criteria will be available for printing and viewing.</i>	










By Test Date

Default test settings can be set under *Settings / Test Options*

	Description	Visual
Step 1	To search by Test Date select by using the   keys.	
Step 2	Use the   keys and keypad to enter the search criteria. Select OK to search. Note: <i>The available search range is displayed.</i> Note: <i>To search for tests recorded on a specific day, only the From search field is required.</i>	
Step 3	The total number of found test results will be displayed. Select Print to print all test results. Press View to view all test results and use the keys   to scroll through tests. Note: <i>Only the tests found within the search criteria will be available for printing and viewing.</i>	






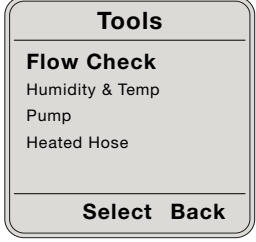
Search by ID

Default test settings can be set under *Settings / Test Options*

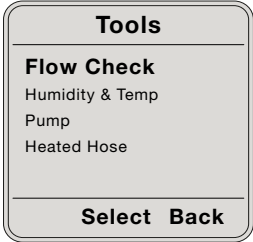

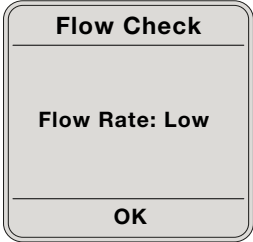
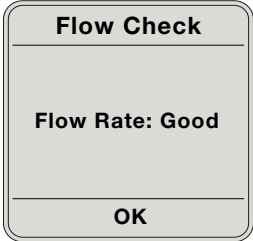
	Description	Visual
Step 1	To search by Test ID select by using the   keys.	
Step 2	Use the   keys and keypad to enter the search criteria. Select OK to search. Note: <i>The total numbers of saved tests are displayed.</i> Note: <i>If the ID search field is blank, only tests without test IDs will be found.</i>	
Step 3	The total number of found test results will be displayed. Select Print to print all test results. Press View to view all test results and use the keys   to scroll through tests. Note: <i>Only the tests found within the search criteria will be available for printing and viewing.</i>	

Tools

NOTE: Tool options will vary dependent on product functionality.

	Description	Visual
<p>Step 1</p>	<p>From the main menu use the   keys to highlight Tools and then press Select.</p> <p>Note: The selection is shown in larger text.</p>	 <p>LCM30 Menu</p> <p>Start Test Test Result(s) Search Results Tools Settings</p> <p>Select</p>
<p>Step 2</p>	<p>Tools available will be dependent on product variant.</p> <p>Use the   keys to select the required Tool and then press Select.</p> <p>Note: The selection is shown in larger text.</p>	 <p>Tools</p> <p>Flow Check Humidity & Temp Pump Heated Hose</p> <p>Select Back</p>

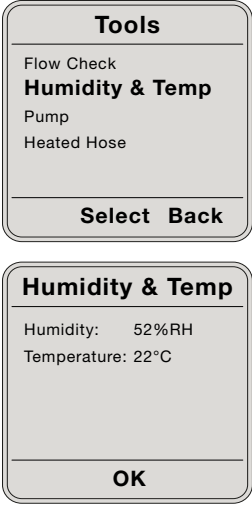
Flow Check *(Available with all variants)*

	Description	Visual
Step 1	<p>Selecting the Flow Check tool will initiate the flow check.</p> <p><i>Note: The flow check will be complete within 30 seconds.</i></p>	 
Step 2	<p>The purpose of the Flow Check is to ensure there is sufficient liquid flow through the bypass loop in order to perform a consistent and stable particle count.</p> <p>A Flow Check is performed automatically at the start of every test – insufficient liquid flow will result in an aborted test.</p> <p><i>Note: This is a manual Flow Check tool that can be performed independently of initiating a test. Flow Check is complete when the results screen is displayed.</i></p> <p>Select OK to return to the Tools menu.</p> <p>Good Flow Rate indicates that the unit has sufficient flow through the bypass loop (refer to schematic).</p> <p>Low Flow Rate indicates that there is insufficient flow and the unit is unable to operate. Ensure the bypass loop (refer to schematic) flow rate is greater than 15 mL/min.</p>	 

Checking Humidity & Temperature

(Not available on LCM30 FFKM and ACM30)

Temperature units can be set under [Settings / Test Options / Result Reporting](#)


	Description	Visual
Step 1	<p>Selecting the Humidity & Temp tool will display the relative humidity and temperature of the fluid in the bypass loop (refer to schematic).</p> <p>Select OK to return to the Tools menu.</p> <p>Note: <i>Measurements are taken every 1 second.</i></p> <p>Note: <i>Data for information only and is not a requirement for initiating a test.</i></p>	 <p>The top screenshot shows a 'Tools' menu with options: Flow Check, Humidity & Temp, Pump, and Heated Hose. A 'Select Back' button is at the bottom.</p> <p>The bottom screenshot shows the 'Humidity & Temp' screen with the following data: Humidity: 52%RH, Temperature: 22°C. An 'OK' button is at the bottom.</p>

Pump (Case Mounted Pump variants only)

When commencing a test with a Case Mounted Pump fitted, the pump is automatically initiated even if the Tools / Pump function has not been set.

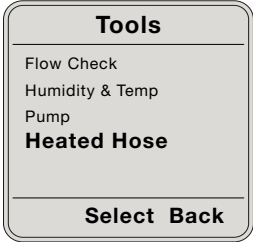
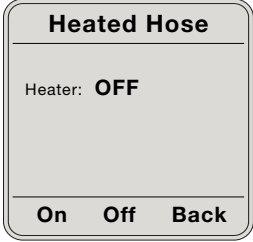

However, the automatic pump function can be disabled via [Settings / Test Options / Pump Options](#)

On test activation Start Test the pump will automatically perform a Flush cycle (60 mL/min) for approximately 10 seconds. A Test cycle (30 mL/min) will follow and the test sequence will begin. The pump will automatically turn off on test completion.






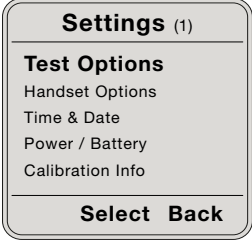

	Description	Visual
<p>Step 1</p>	<p>Selecting the Pump tool will enable the user to manually operate the Case Mounted Pump outside the test environment.</p> <p>The pump can be operated by using the  keys and alternating between Stopped, Flush and Test.</p> <p>Select Back to return to the Tools menu.</p> <p>Note: Flush speed delivers approximately 60mL/min of fluid through the bypass loop (refer to schematic).</p> <p>Note: Test speed delivers approximately 30mL/min of fluid through the bypass loop (refer to schematic).</p>	<div data-bbox="1166 555 1422 792"> <p>Tools</p> <p>Flow Check Humidity & Temp Pump Heated Hose</p> <p>Select Back</p> </div> <div data-bbox="1166 815 1422 1052"> <p>Pump</p> <p>Pump: Fitted User: Enabled Speed: Stopped</p> <p>Use keys < or > Pump Stopped</p> <p>Back</p> </div> <div data-bbox="1166 1075 1422 1312"> <p>Pump</p> <p>Pump: Fitted User: Enabled Speed: Flush</p> <p>Use keys < or > Pump Running</p> <p>Back</p> </div> <div data-bbox="1166 1335 1422 1572"> <p>Pump</p> <p>Pump: Fitted User: Enabled Speed: Flush</p> <p>Use keys < or > Pump Running</p> <p>Back</p> </div>

Heated Hose *(For trace heated hose power options consult with Parker)*










The heated hose is for use in cold operating conditions.

	Description	Visual
Step 1	<p>Selecting the Heated Hose tool will enable the user to manually operate the Trace Heated Hose.</p> <p>The heated hose can either be turned On or Off using the keypad.</p> <p>Select Back to return to the Tools menu. The heated hose will remain 'On' when exiting the Tools menu.</p> <p>Note: <i>The Trace Heated Hose will turn off when the main unit is turned off and will require turning back on when the unit is powered up again.</i></p>	 <p>The screenshot shows a menu titled "Tools" with the following options: Flow Check, Humidity & Temp, Pump, and Heated Hose. The "Heated Hose" option is highlighted. At the bottom of the menu, there is a "Select Back" button.</p>
		 <p>The screenshot shows a menu titled "Heated Hose" with the text "Heater: OFF". At the bottom of the menu, there are three buttons: "On", "Off", and "Back".</p>
		 <p>The screenshot shows a menu titled "Heated Hose" with the text "Heater: ON". At the bottom of the menu, there are three buttons: "On", "Off", and "Back".</p>










Settings

	Description	Visual
Step 1	<p>From the main menu use the   keys to highlight Settings and then press Select.</p> <p>Note: <i>The selection is shown in larger text.</i></p>	
Step 2	<p>Available settings will be displayed.</p> <p>Use the   keys to select the required Setting and then press Select.</p> <p>Note: <i>There are two screens displaying the Settings menus.</i></p>	 




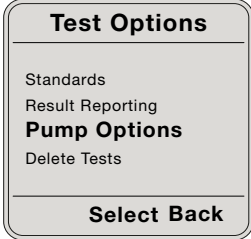


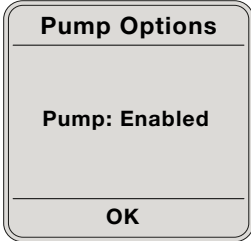
Test Options / Standards

	Description	Visual
Step 1	<p>From the Settings menu use the   keys to highlight Test Options and then Standards. Press Select after highlighting each menu heading.</p> <p><i>Note: The selection is shown in larger text.</i></p>	 
Step 2	<p>Available test standards are displayed.</p> <p>Us the   keys to select standard and   keys to either turn 'On' or 'Off'.</p> <p>Changes will affect both future and previous test results.</p> <p>Select OK to save changes and return to the Test Options menu.</p> <p><i>Note: Test standards will differ between product variants.</i></p> <p><i>Note: All parameters set will be saved even when the unit is powered off.</i></p>	

Test Options / Result Reporting

	Description	Visual
<p>Step 1</p>	<p>From the Settings menu use the   keys to highlight Test Options and then Result Reporting. Press Select after highlighting each menu heading.</p> <p><i>Note: The selection is shown in larger text.</i></p>	 
<p>Step 2</p>	<p>Use the   keys to select parameter and   keys to select option.</p> <p>Auto Print: Automatic printing following a test can be set to either 'Off' or 'On'</p> <p>Counts Per: Results can be displayed as either counts per 100mL or counts per 1mL.</p> <p>Temperature: Temperature units can be displayed as either °C or °F.</p> <p>Decimal: Either a full stop (period) or comma can be selected to indicate a decimal place.</p> <p>Select OK to save changes and return to the Test Options menu.</p> <p><i>Note: All parameters set will be saved even when the unit is powered off.</i></p>	



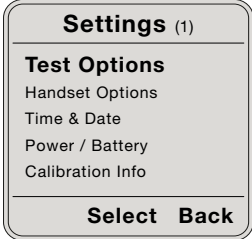



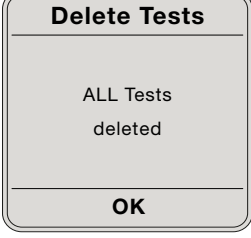
Pump Options

	Description	Visual
Step 1	<p>From the Settings menu use the   keys to highlight Handset Options and then press Select.</p> <p>Note: <i>The selection is shown in larger text.</i></p>	 
Step 2	<p>Use   the keys to select either 'Enabled' or 'Disabled'</p> <p>Select OK to save changes and return to the Test Options menu.</p> <p>Note: <i>When set to Enabled the pump will be automatically initiated when a test is started.</i></p> <p>Note: <i>When set to Disabled the pump will not operate when a test is started.</i></p> <p>Note: <i>All parameters set will be saved even when the unit is powered off.</i></p>	

Test Options / Delete Tests









Test data can be permanently deleted from the PCM memory.

NOTE: The unit can store up to 1000 test results. It is not necessary to delete tests if this is exceeded as the oldest result is overwritten.



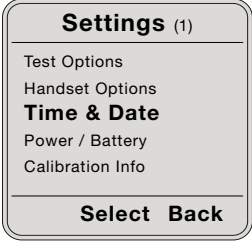








	Description	Visual
Step 1	<p>From the main menu use the   keys to highlight Test Options and then Delete Tests. Press Select after highlighting each menu heading.</p> <p>Note: The selection is shown in larger text.</p>	 
Step 2	<p>Select Yes to delete all tests and then confirm deletion by selecting Yes. Deletion is complete when All tests deleted is displayed.</p> <p>Note: It is not possible to delete individual tests.</p>	  

Handset Options








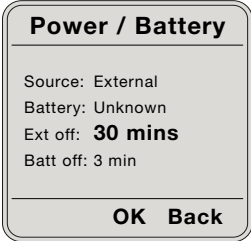
Customising Backlight, Contrast and Sound Options

	Description	Visual
Step 1	<p>From the Settings menu use the   keys to highlight Handset Options and then press Select.</p> <p>Note: <i>The selection is shown in larger text.</i></p>	
Step 2	<p>Available handset parameters will be displayed.</p> <p>Use the   keys to select parameter and   keys to change setting.</p> <p>Select OK to save changes and return to the Settings menu.</p> <p>Select Reset to revert to default settings.</p> <p>Note: <i>The contrast has a range between 2 (light) to 16 (dark).</i></p> <p>Note: <i>All parameters set will be saved even when the unit is powered off.</i></p>	




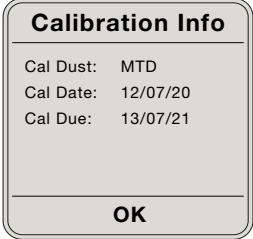
Time & Date

	Description	Visual
Step 1	<p>From the Settings menu use the   keys to highlight Time & Date and then press Select.</p> <p>Note: <i>The selection is shown in larger text.</i></p>	
Step 2	<p>Time and date settings will be displayed.</p> <p>Select Set to edit.</p>	
Step 3	<p>Use the   keys to select parameter.</p> <p>To alter time and date use the numerical keys on the keypad. Use the   keys to change date format to either of the following:</p> <p>dd/mm/yy mm/dd/yy yy/mm/dd</p> <p>The following date separators can be chosen by using the   keys:</p> <p>' / ' (forward slash) ' - ' (hyphen) ' . ' (full stop or period) ' ' (space)</p> <p>Select Done to save changes and exit edit mode.</p> <p>Select Reset to revert to default settings or Cancel to exit edit mode.</p> <p>Note: <i>All parameters set will be saved even when the unit is powered off.</i></p>	



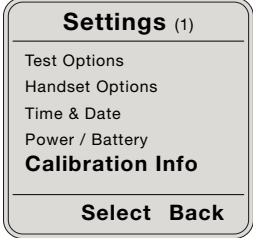


Power / Battery

	Description	Visual
Step 1	<p>From the Settings menu use the   keys to highlight Power / Battery and then press Select.</p> <p>Note: <i>The selection is shown in larger text.</i></p>	
Step 2	<p>The current power source will be displayed either External or Battery.</p> <p>External indicates that the unit is powered with mains power – refer to Section Powering The PCM.</p> <p>A battery status will also be displayed:</p> <p>Good = Battery charge good. Low = Charge when convenient. Very Low = Charge battery immediately. Unknown = Battery not fitted or PCM evaluating battery status.</p> <p>Auto power off can be set for both External and Battery power.</p> <p>Use the   keys to select parameter and use the   keys to toggle between available settings.</p> <p>Ext off: 15 mins / 30 mins / 60 mins / Never</p> <p>Batt off: 3 mins / 10 mins / 15 mins</p> <p>Select OK to save changes and return to the Settings menu.</p> <p>Note: <i>Mains power will take precedence when a battery pack fitted.</i></p> <p>Note: <i>When mains power is supplied the battery will not be charged - refer to Section Powering The PCM for charging.</i></p> <p>Note: All parameters set will be saved even when the unit is powered off.</p>	

Calibration Info

	Description	Visual
Step 1	<p>From the Settings menu use the   keys to highlight Calibration Info and then press Select.</p> <p><i>Note: The selection is shown in larger text.</i></p>	
Step 2	<p>Calibration data is displayed.</p> <p>Select OK to return to the Settings menu.</p>	

Product Info

	Description	Visual
<p>Step 1</p>	<p>From the Settings menu use the   keys to highlight Product Info and then press Select.</p> <p>Product Info is located on the second Setting menu page.</p> <p><i>Note: The selection is shown in larger text.</i></p>	 
<p>Step 2</p>	<p>Product Info data is displayed.</p> <p>Select OK to return to the Settings menu.</p>	

Maintenance

The PCM must not be disassembled. No user-serviceable parts are contained within. Contact the local Parker Service Centre (see www.parker.com) for maintenance and re-calibration queries.





Cleaning

A damp, soft cloth should be used to clean the exterior of the PCM. Aggressive chemicals must not be used to clean the PCM. Any liquid spills should be immediately wiped from the surface of the PCM.

Changing the Printer Roll

The printer paper roll is easy to replace and requires no tools.

NOTE: Do not remove printer cover when operating outdoors.

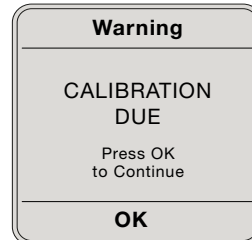
	Description	Visual
Step 1	Unscrew the pins and remove the printer cover.	
Step 2	Push the green lever up. Remove the empty paper roll.	
Step 3	Insert a new printer roll and turn the roller until paper exits between the thermal head and the roller.	
Step 4	Push the green lever back down. Feed the paper through the printer cover and tighten the pins. The printer is now ready to print.	

Servicing / Re-calibration

The PCM automatically monitors calibration due dates and a reminder message will be displayed at Power On:

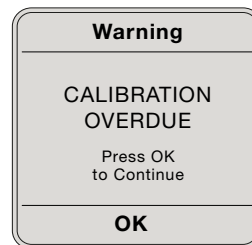
When calibration is due within 4 weeks:

Step 1



When calibration date has passed:

Step 2



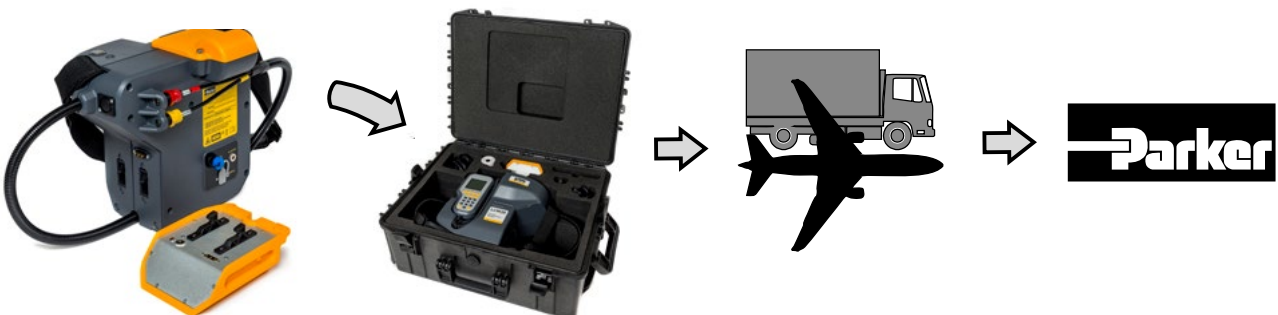
Any service or repair work must be carried out by a Parker approved Service Centre (see www.parker.com). Contact the local Parker Sales Company (see www.parker.com) for re-calibration details. The recommended period between re-calibration is 12 months.

Shipping Note

Return the PCM to a Parker Service Centre (see www.parker.com) in the original Transit Packaging Case for any service, calibration or warranty claims. If the case is not available, contact the local Parker Sales Company (see www.parker.com).



Please ensure the PCM is free from fluid. Failure to comply may result in a leak causing internal damage and extra cost. If the PCM has become faulty and a flush cannot be completed, please contact local Parker Service Centre (see www.parker.com) for advice.



Error Codes

Code	Description	Cause	Action
1. Unknown Fault	Unknown fault	Unknown	1. Turn the PCM Off/On and repeat test 2. Consult with Parker if issue persists
2. User Abort	User aborted test	Unknown	1. Turn the PCM Off/On and repeat test 2. Consult with Parker if issue persists
3. Pump Trip	Motor drawing excessive current	1. Oil too viscous 2. Syringe jammed 3. Motor fault - excess current drawn 4. Battery excessively low	1. Turn the PCM Off/On and repeat test 1. Use less viscous fluid sample 2. Use external power 3. Recharge battery or fit new battery pack Consult with Parker if issue persists
4. Laser too Hot	Laser too hot at the beginning of test	1. Excess fluid temperature 2. Excess environmental temperature	1. Turn the PCM Off/On and repeat test 1. Allow PCM to cool down and ensure operating within specified temperature limits Consult with Parker if issue persists
5. No Light	No laser light detected at beginning of test	1. Oil too dark. 2. Electronic hardware fault	1. Turn the PCM Off/On and repeat test 1. Try clearer fluid sample Consult with Parker if issue persists
6. Light Level Bad	Insufficient laser light detected during test	1. Oil too dark 2. Electronic hardware fault	1. Try clearer fluid sample Consult with Parker if issue persists
7. Light Deviation	Unstable laser light during test	1. Oil clarity unstable 2. Electronic hardware fault	1. Turn PCM Off/On and repeat test 1. Repeat test ensuring system fluid stable Consult with Parker if issue persists
8. Inadequate oil flow	Insufficient flow rate through bypass loop	1. Inadequate differential pressure across P1 and P2 2. Air lock in monitor blocks 3. High viscosity oil	1. Turn the PCM Off/On and repeat test 1. Ensure sufficient flow through PCM 2. Flush system to evacuate air lock 3. Use lower viscosity fluid 4. Utilise trace heated hose if fitted Consult with Parker if issue persists
9. Valve Fault	Unable to orientate internal control valve into correct position	1. Excess system pressure 2. High viscosity fluid sample 3. Valve fault	1. Ensure system pressure and viscosity within specified limits 2. Repeat test Consult with Parker if issue persists
10. Syringe Stalled	Piston spindle not turning	1. Oil too viscous 2. Syringe jammed 3. Motor fault	1. Turn the PCM Off/On and repeat test 1. Use less viscous fluid sample Consult with Parker if issue persists
11. Syringe Speed Deviation	Piston speed deviation outside of limits during test	1. Variable fluid viscosity during test 2. Variable system pressure during test	1. Turn the PCM Off/On and repeat test 1. Ensure stability of system pressure and viscosity during test Consult with Parker if issue persists
12. Syringe Speed too Slow	Overall piston speed during test too slow	1. Variable fluid viscosity during test 2. Variable system pressure during test	1. Turn the PCM Off/On and repeat test 1. Ensure stability of system pressure and viscosity during test Consult with Parker if issue persists

Error Codes (cont.)

Code	Description	Cause	Action
13. Syringe Speed too Fast	Overall piston speed during test too fast	1. Variable fluid viscosity during test 2. Variable system pressure during test	1. Turn the PCM Off/On and repeat test 2. Ensure stability of system pressure and viscosity during test 3. Consult with Parker if issue persists
14. Oil Volume too Small	Measured fluid volume too small	Multiple	1. Turn the PCM Off/On and repeat test 2. Consult with Parker if issue persists
15. Oil Volume too Large	Measured fluid volume too large	Multiple	1. Turn the PCM Off/On and repeat test 2. Consult with Parker if issue persists
16. Counter Duration too short	Measurement time too short	Multiple	1. Turn the PCM Off/On and repeat test 2. Consult with Parker if issue persists
17. Counter Duration too long	Measurement time too long	Multiple	1. Turn the PCM Off/On and repeat test 2. Consult with Parker if issue persists
18. Test Time too Long	Test time too long	Multiple	1. Turn the PCM Off/On and repeat test 2. Consult with Parker if issue persists
19. Timeout	PCM operation timed out	Multiple	1. Turn the PCM Off/On and repeat test 2. Consult with Parker if issue persists
20. Hardware Counter Fault	Measurement channel fault	Hardware channel fault	1. Turn the PCM Off/On and repeat test 2. Consult with Parker if issue persists

Reference

Accessories / Parts List

To order accessories and parts, contact local Parker Sales Company (see www.parker.com).

Accessory Part Number	Description
ACC6NA001	CM30 BATTERY PACK
ACC6NA002	CM30 EMPTY BATTERY PACK
ACC6NA003	CM30 POWER ADAPTER
ACC6NA004	UBS CM30 CONTROL CABLE
ACC6NA005	LCM30 CMP HOSE KIT
ACC6NA006	CM30 SPARE PRINTER ROLLS X5
ACC6NA007	CM30 USB COMMS LEAD
ACC6NA008	US PLUG
ACC6NA009	EU PLUG
ACC6NA010	UK PLUG
ACC6NA011	AU PLUG
ACC6NA012	CM30 IP BUNG SET
ACC6NE000	ACM30 SAMPLE HOSE KIT

Hydraulic Connection Parts

System 20 Sensor Variants

Part #	Size	Flow Range (L/min)	Fluid Type
STI0144100	0	6 to 25	Mineral Oil
STI1144100	1	2 to 100	Mineral Oil
STI2144100	2	80 to 380	Mineral Oil
STI0148100	0	6 to 25	Aggressive Fluid
STI1148100	1	2 to 100	Aggressive Fluid
STI2148100	2	80 to 380	Aggressive Fluid

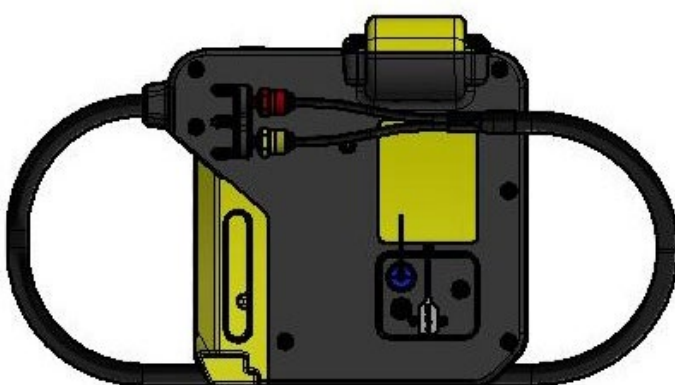
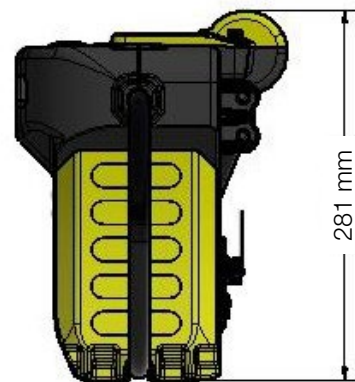
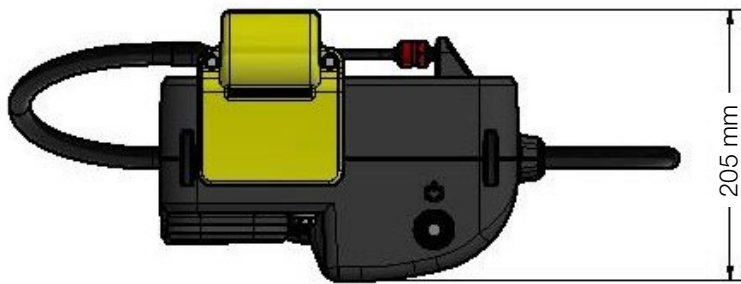
Single Point Sampler Variants

Part #	Fluid Type
SPS2021	Mineral Oils
SPS2061	Aggressive Phosphate Esters

Appendix A

Technical Drawings

icountLaserCM30



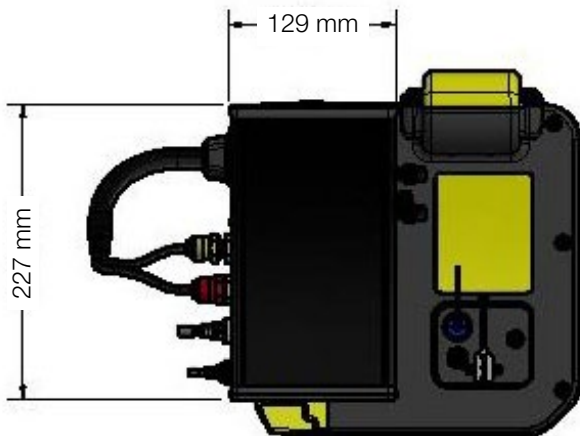
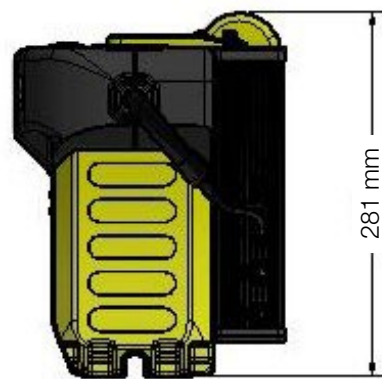
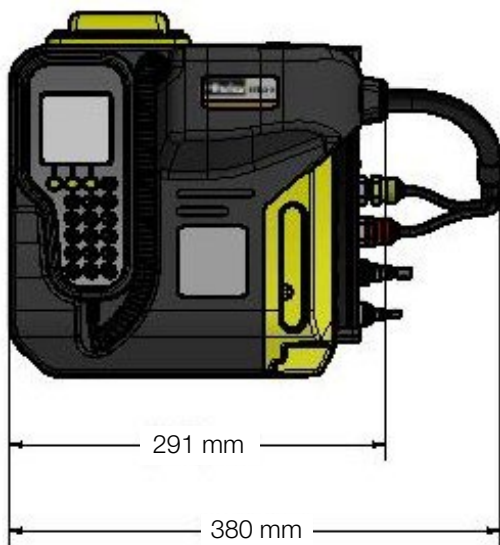
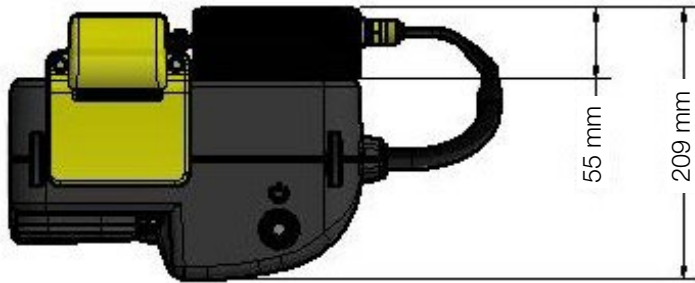
Weight <7.5kg



NOTE: Reference dimensions only.

Technical Drawings

icountLaserCM30 with Case Mounted Pump

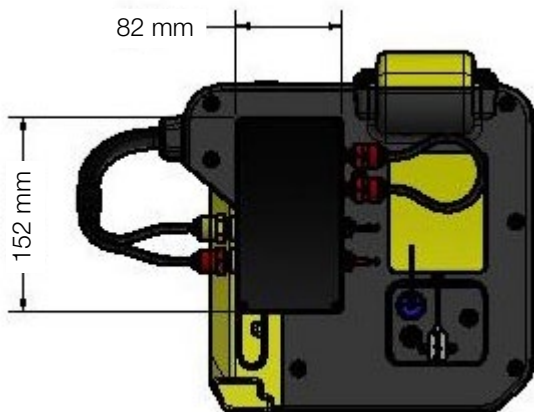
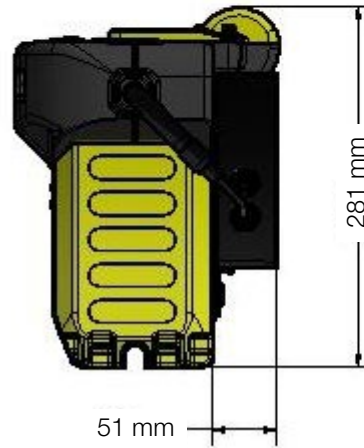
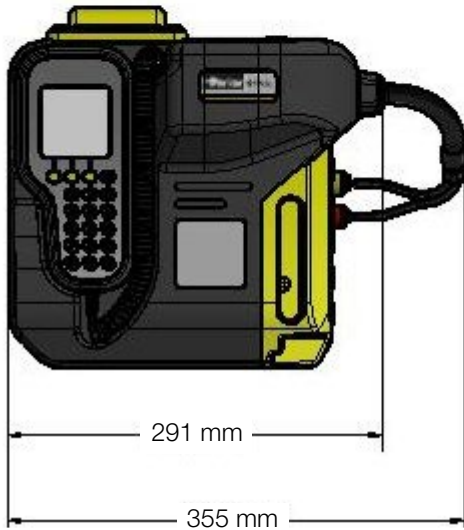
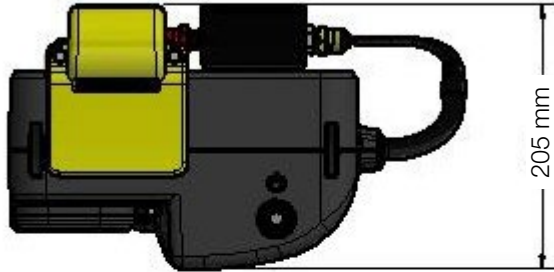


Weight <9kg

NOTE: Reference dimensions only.

Technical Drawings

icountAviationCM30



Weight <8.5kg

NOTE: Reference dimensions only.

Appendix B

Guide to Contamination Standards

Introduction

This guidebook is aimed at engineers, technicians and quality control personnel involved in contamination control. Its purpose is to make available accepted and widely-used cleanliness specification levels for liquid samples.

The tables in this guide allow users of Automatic Particle Counters (APC) or Particle Contamination Monitors (PCM) to see the relationship between raw particle counts at various sizes and the reporting code numbers of various contamination standards.

Brief History


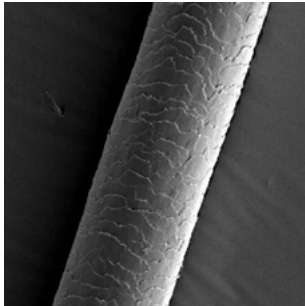
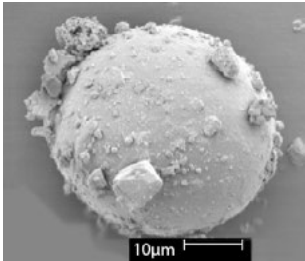
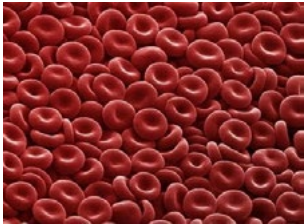

Following accelerated innovation during the 1960s within the aviation industry, demand was created for detection, measurement, and classification of particulates to meet the new requirement of cleanliness introduced by OEMs. One of the first cleanliness standards introduced into industry was the National Aerospace Standards (NAS) 1638, Determination of Filtration Rating and Efficiency (1964), in which a 14-class contamination coding system covering particle sizes $>5\ \mu\text{m}$ to $>100\ \mu\text{m}$. NAS 1638 was replaced with AS4059, which became ISO 11218. These standards led to the development of ISO 4406 which classified particle sizes $>5\ \mu\text{m}$ to $>100\ \mu\text{m}$. ISO 4406 was revised in 1999 into the form familiar today utilising three different particle sizes $>4\ \mu\text{m}(c)$, $>6\ \mu\text{m}(c)$ and $>14\ \mu\text{m}(c)$.

During the 1960s Air Cleaner Fine Test Dust (ACFTD) had been standardised and used for calibration purposes and a calibration standard introduced: ISO 4402. ACFTD was characterised by counting and measuring particles using an optical microscope. Optical measurements were based on the longest dimension (also known as longest chord length) of the particle and reported in μm . In 1992 the supply of ACFTD was dwindling and it was decided to develop a more robust calibration procedure. This came in 1999 in the form of ISO 11171. The main advantages of ISO 11171 being the sizing calibration; statistical data evaluation and defined performance limits. As part of the sizing calibration, a particle suspension of ISO Medium Test Dust (ISO 12103-A3 or ISO MTD), known as SRM2806x, with a particle size and distribution certified by NIST (National Institute of Standards and Technology) was required. Due to technological advances in microscopy, scanning electron microscope (SEM) became more accessible and provided a superior understanding of particle topography. ISO MTD was therefore characterised using an SEM and effectively measured an area equivalent diameter of particles. In conjunction with the release of ISO 11171 the suffix (c) was applied after the unit of measure to indicate that the instrument utilised projected area equivalent to the diameter of a spherical particle and reported as $\mu\text{m}(c)$. This is different to the direct linear measurement (chord length) seen with ACFTD particle size classification. Therefore, particle sizes were reported as being either ' μm ' or ' $\mu\text{m}(c)$ ' depending on the calibration standard followed i.e. ISO 11171, ISO 11943, ISO 21018-4 or ISO 4402 etc.

Contamination basics

Solid contaminants in fluid systems vary in size, shape, form and quantity. The most damaging contaminants in hydraulic systems are normally between 6 and 14 microns, and therefore cannot be seen by the naked eye.

The table below gives an indication of the relative sizes of common objects.

Object	Typical Size	Image
Grain of table salt	100 µm	
Diameter of human hair	70 µm	
Limit of human visibility (naked eye)	40 µm	
Milled flour	25 µm	
Red blood cells	8 µm	
Bacteria	2 µm	

NOTE: One micron (µm) equals one thousandth of a millimetre (1µm = 0.001mm).

ISO codes (hydraulic fluid contamination)

ISO standard 4406 provides a way of summarising the distribution of contaminants in a fluid by counting the particles per 100ml sample of hydraulic fluid: the figures are **cumulative**. To make the numbers less cumbersome, they are converted to number codes, as in the following table.

Each code measures a “channel” of representative particle sizes that are particularly associated with wear and damage in hydraulic systems: these are 4µm(c), 6µm(c) and 14µm(c).

For example, 700 000 particles larger than 4µm(c) corresponds to **ISO 20** (as 700 000 is more than 500 000 but fewer than 1 000 000). In the same way, 140 000 particles larger than 6µm(c) corresponds to **ISO 18**; and 7 000 particles larger than 14µm(c) corresponds to **ISO 13**. So this fluid would be reported as **20 / 18 / 13**.

When the raw data in one of the size ranges results in a particle count of fewer than 20 particles, the scale number for that size range is labelled with the symbol ‘≥’.

ISO code number	Number of particles per 100ml sample	
	More than	Up to and including
24	8 000 000	16 000 000
23	4 000 000	8 000 000
22	2 000 000	4 000 000
21	1 000 000	2 000 000
20	500 000	1 000 000
19	250 000	500 000
18	130 000	250 000
17	64 000	130 000
16	32 000	64 000
15	16 000	32 000
14	8 000	16 000
13	4 000	8 000
12	2 000	4 000
11	1 000	2 000
10	500	1 000
9	250	500
8	130	250
7	64	130
6	32	64
5	16	32
4	8	16
3	4	8
2	2	4
1	1	2

Suggested acceptable contamination levels

ISO code numbers	Type of system	Typical components	Sensitivity
23 / 21 / 17	Low pressure systems with large clearances	Ram pumps	Low
20 / 18 / 15	Typical cleanliness of new hydraulic oil straight from the manufacturer. Low pressure heavy industrial systems or applications where long-life is not critical	Flow control valves Cylinders	Average
19 / 17 / 14	General machinery and mobile systems Medium pressure, medium capacity	Gear pumps/motors	Important
18 / 16 / 13	World Wide Fuel Charter cleanliness standard for diesel fuel delivered from the filling station nozzle. High quality reliable systems General machine requirements	Valve and piston pumps/ motors Directional and pressure control valves	Very important
17 / 15 / 12	Highly sophisticated systems and hydrostatic transmissions	Proportional valves	Critical
16 / 14 / 11	Performance servo and high pressure long-life systems e.g. Aircraft machine tools, etc.	Industrial servovalves	Critical
15 / 13 / 09	Silt sensitive control system with very high reliability Laboratory or aerospace	High performance servovalves	Super critical

NOTE: The three figures of the ISO code numbers represent ISO level contamination grades for particles of $>4\mu\text{m}(c)$, $>6\mu\text{m}(c)$ and $>14\mu\text{m}(c)$ respectively.

ISO codes (fuel contamination)

ISO 4406 is used to measure contamination in fuel, as well as in hydraulic systems (see [page 4](#)). The only difference is that particle counts are usually expressed as **per millilitre**, rather than per 100mL, so the raw counts are generally 100 times lower.

ISO code number	Number of particles per mL	
	More than	Up to and including
22	20 000	40 000
21	10 000	20 000
20	5 000	10 000
19	2 500	5 000
18	1 300	2 500
17	640	1 300
16	320	640
15	160	320
14	80	160
13	40	80
12	20	40
11	10	20
10	5	10
09	2.5	5
08	1.3	2.5
07	0.64	1.3

Typical reporting: particle sizes

Hydraulic fluid	ISO MTD	4µm(c)	6µm(c)	14µm(c)	21µm(c)	38µm(c)	70µm(c)
	ACFTD	2µm	5µm	15µm	25µm	50µm	–
Fuel	ISO MTD	4µm(c)	6µm(c)	14µm(c)	21µm(c)	25µm(c)	30µm(c)

Industry conventionally reports raw particle counts as **per 100ml** for hydraulic fluids, and **per mL** for fuel, though this is not part of any standard.

NAS 1638 table

The NAS 1638 cleanliness standard was developed for aerospace components in the US and is still widely used for industrial and aerospace fluid power applications and in the UK North Sea industries.

The figures are differential counts, and the NAS class is usually reported as a single figure representing the maximum allowed particle counts (i.e. worst case) for designated particle size ranges.

Size range		5–15 µm	15–25 µm	25–50 µm	50–100 µm	>100 µm
NAS classes (based on maximum contamination limits, particles per 100mL)	00	125	22	4	1	0
	0	250	44	8	2	0
	1	500	89	16	3	1
	2	1 000	178	32	6	1
	3	2 000	356	63	11	2
	4	4 000	712	126	22	4
	5	8 000	1 425	253	45	8
	6	16 000	2 850	506	90	16
	7	32 000	5 700	1 012	180	32
	8	64 000	11 400	2 025	360	64
	9	128 000	22 800	4 050	720	128
	10	256 000	45 600	8 100	1 440	256
	11	512 000	91 000	16 200	2 880	512
12	102 4000	182 400	32 400	5 760	1 024	

NAV AIR 01-1A-17 table

The Navy Standard for Hydraulic Fluids used for aircraft hydraulic systems is defined in the Aviation Hydraulics Manual (1989), Table 2-1, Navy Standard for Particulate Cleanliness.

NAVY STANDARD FOR HYDRAULIC FLUIDS – USED FOR AIRCRAFT HYDRAULIC SYSTEMS

Particle Contamination Level by Class							
Particle size in µm	0	1	2	3	4	5	6
	Number of particles per 100ml						
5–10	2 700	4 600	9 700	24 000	32 000	87 000	128 000
10–25	670	1 340	2 680	5 360	10 700	21 400	42 000
25–50	93	210	380	780	1 510	3 150	6 500
50–100	16	28	56	110	225	430	1000
>100	1	3	5	11	21	41	92

ISO/NAS/SAE code comparison table

The comparisons relate to particle count data only. To confirm to any particular standard reference should be made to the recommended experimental procedure.

ISO/DIS 4406 BS 5540-4 codes	Defence Std. 05-42		NAS 1638	SAE 749
	Table A	Table B		
13 / 11 / 08			2	
14 / 12 / 09			3	0
15 / 13 / 10			4	1
16 / 14 / 09		400F		
16 / 14 / 11			5	2
17 / 15 / 09	400			
17 / 15 / 10		800F		
17 / 15 / 12			6	3
18 / 16 / 10	800			
18 / 16 / 11		1300F		
18 / 16 / 13			7	4
19 / 17 / 11	1 300	2000		
19 / 17 / 14			8	5
20 / 18 / 12	2 000			
20 / 18 / 13		4400F		
20 / 18 / 15			9	6
21 / 19 / 13	4 400	6300F		
21 / 19 / 16			10	
22 / 20 / 13	6 300			
22 / 20 / 17			11	
23 / 21 / 14	15 000			
23 / 21 / 18			12	
24 / 22 / 15	21 000			
25 / 23 / 17	100 000			

PPM Conversion table

Percent contamination vs. PPM (parts per million)

Percent	PPM
100%	1 000 000
10%	100 000
1%	10 000
0.1%	1 000
0.01%	100
0.001%	10

Volume

1 litre	= 1 000 mL
1 PPM	= 1 μ L in 1 litre

Example 1

400 PPM in 1 litre	= 400 μ L
--------------------	---------------

Example 2

A reading of 250 PPM equates to a quantity of absorbed water in a 400 litre capacity system of 0.1 litre.

Appendix C



EU DECLARATION OF CONFORMITY

We:

Parker Hannifin Manufacturing Ltd.
3-6 Thorgate Road
Littlehampton
West Sussex
BN17 7LU
United Kingdom

Declare that this DOC is issued under the sole responsibility of the manufacturer:

Product name/s:	icountLaserCM30 icountAviationCM30
Model number/s:	LCM3020xxxx ACM3020xxxx

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

- Machinery Directive (2006/42/EC)
- ElectroMagnetic Compatibility (EMC) Directive (2014/30/EU)

The following harmonised standards and technical specifications have been applied:

- EN ISO 12100:2010 - Safety of machinery. General principles for design. Risk Assessment and risk reduction.
- EN 61010-1:2010 - Safety requirements for electrical equipment for measurement, control, and laboratory use - Part 1: General requirements
- EN 55011:2016 + A1:2017 - Industrial, scientific and medical equipment - Radio-frequency disturbance characteristics - Limits and methods of measurement
- EN 61326-1:2013 - Electrical equipment for measurement, control and laboratory use - EMC requirements - Part 1: General requirements

I hereby declare that the equipment named above has been tested and found to comply with the relevant sections of the above referenced specifications. The unit complies with the relevant essential requirements of the Directives.

The person named below is responsible for compiling the Technical Documentation

Place of issue: Littlehampton, England
Date of issue: 25 January 2021

Andrew Baldwin
Engineering Manager

DOC-T32111 REV.-

CM30 Declaration of Conformity

Appendix D

Parker Worldwide

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Hendrik Ido Ambacht

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CH – Switzerland, Etoy

Tel: +41 (0)21 821 87 00

CZ – Czech Republic,

Prague

Tel: +420 284 083 111

DE – Germany, Kaarst

Tel: +49 (0)2131 4016 0

DK – Denmark, Ballerup

Tel: +45 43 56 04 00

ES – Spain, Madrid

Tel: +34 902 330 001

FI – Finland, Vantaa

Tel: +358 (0)20 753 2500

FR – France, Contamine s/Arve

Tel: +33 (0)4 50 25 80 25

GR – Greece

Tel: +30 69 44 52 78 25

HU – Hungary, Budaörs

Tel: +36 23 885 470

IE – Ireland, Dublin

Tel: +353 (0)1 466 6370

IL – Israel

Tel: +39 02 45 19 21

IT – Italy, Corsico (MI)

Tel: +39 02 45 19 21

KZ – Kazakhstan, Almaty

Tel: +7 7273 561 000

NO – Norway, Asker

Tel: +47 66 75 34 00

PL – Poland, Warsaw

Tel: +48 (0)22 573 24 00

PT – Portugal

Tel: +351 22 999 7360

RO – Romania, Bucharest

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RU – Russia, Moscow

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SE – Sweden, Borås

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SL – Slovenia, Novo Mesto

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TR – Turkey, Istanbul

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UK – United Kingdom, Warwick

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ZA – South Africa, Kempton Park

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North America

CA – Canada, Milton, Ontario

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CN – China, Shanghai

Tel: +86 21 2899 5000

HK – Hong Kong

Tel: +852 2428 8008

IN – India, Mumbai

Tel: +91 22 6513 7081-85

JP – Japan, Tokyo

Tel: +81 (0)3 6408 3901

KR – South Korea, Seoul

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MY – Malaysia, Shah Alam

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NZ – New Zealand, Mt Wellington

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SG – Singapore

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TH – Thailand, Bangkok

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TW – Taiwan, Taipei

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BR – Brazil, Sao Jose dos Campos

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CL – Chile, Santiago

Tel: +56 22 303 9640

MX – Mexico, Toluca

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European Product Information Centre

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SE, SK, UK, ZA)