icountLCM20

GB

icountLCM20 Condition Monitoring Handbook

P849101_CM20_GB_Rev2

www.parker.com/hfde

Contents

Laser Information

This product contains an invisible infrared 5mW laser. Any dismantling of the product may result in dangerous exposure to laser radiation.

The serial number label is found on back of the product and contains the following information:

CLASS I LASER
PRODUCT

COMPLIES WITH BS EN 60825-1
COMPLIES WITH 21CFR1040 WITH
DEVIATIONS
PURSUANT TO LASER NOTICE 50

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

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

Overview

The icountLCM20 Contamination Monitor from Parker represents the most up-to-date technology in solid particle contamination analysis, and is the first truly portable monitor.

The icountLCM20 is a complex instrument, but at the same time has reliability, simplicity and ease-of-operation designed-in. This handbook guides you through how to set up this instrument and how to make consistent and reliable measurements.

The LCM20 is available with a case-mounted pump (CMP) to provide an autonomous pressure feed of test fluid. The minor differences in operation from the standard icountLCM20 are described on page <?>. Another variant, the 'Dual fluids monitor' (icountLCM202062) is designed for use in civil aviation hydraulic servicing operations and is described on page 39.

With a typical test taking only two minutes, the icountLCM20 is ideal for use as your standard fluid contamination monitoring instrument. The real benefits to be gained from the icountLCM20 are achieved through regular use, particularly as an effective comparator and for tracking contamination build-up over time.

Above all, the icountLCM20 has been designed for practical use in hydraulic oil applications.

Technical specifications

Feature	Specification
Principle of operation	Optical scanning analysis and measurement of actual particulates
Fluid compatibility	Mineral oil and petroleum based fluids. For other fluids consult Parker
Test time	2 minutes; repeat test time every 2 minutes
Particle counts	**MTD**: >4, >6, >14, >21, >38 and >70 microns **ACFTD**: >2, >5, >15, >25, >50 and >100 microns **GOST**: >2–5, >5–10, >10–25, >25–50, >50–100 and >100–200 microns
Analysis range	ISO 7 to 22 inclusive; NAS 0 to 12 inclusive; GOST 00–17 inclusive
Data entry	32 character two line dot matrix LCD. Full alphanumeric entry facility on keypad
Calibration	By recognised on-line methods confirmed by the relevant International Standard Organisation procedures. **MTD** – Via a certified primary ISO 11171 automatic particle counter using ISO 11943 principles, with particle distribution reporting to ISO 4406:1999. **ACFTD** – Conforming to ISO 4402 principles with particle distribution reported to ISO 4406:1996 with the additional 2µ channel included for reference. Consult Parker for recalibration
Certification	This product complies with all relevant EC declarations of conformity
Working Viscosity	2–100 centistokes (500cSt with Single Point Sampler)
CMP Max. Viscosity Range	200 Centistokes (100cSt when reporting in GOST standard and using Heated Bath)
Oil temp. range	+5°C to +80°C
Operating temp. range	+5°C to +40°C
Max. working pressure	2.5 bar when using Case Mounted Pump; up to 420 bar when CMP not used
Max. flow rate	35ml/min when using Case Mounted Pump; when CMP not used, 400 l/min with System 20 Sensors, higher with Single Point Sampler (Consult Parker)
System connection	Via System 20 In-line Sensors or the Single Point Sampler
Memory store	300 test (scrolling memory) capacity
Integral printer	16-column printer for hard copy data
Computer compatibility	Interface via RS232 connection at 9600 baud rate
Power	Replaceable battery pack: requires 6 x 1.5V D cells. Rechargeable battery pack: requires transformer supply voltage of 9–12Vdc at 1.5A, 9mm jack plug with positive centre connection: 
Battery performance	Replaceable battery pack: maximum 25 tests before replacement Rechargeable battery pack: maximum 40 tests before recharging
Fuse	1.25A fast blow fuse included for overload protection (spare supplied)
icountLCM20 cover	Weatherproof cover
Construction	Case: ABS Hand-held display: ABS Keypad: fluorosilicone rubber Carrying case: Astraboard Mechanical components: Brass, plated steel, stainless steel and aluminium Seals: Viton Hoses: Nylon (Kevlar braided microbore). Stainless steel armoured ends

Hose length	Fluid connection hose: 1.2 metres (1 metre extensions can be used) Hand-held display cable length: 1 metre. CMP standard hose length: 0.26 metre
Repeatability/Accuracy	Better than 5% (typical)
Portability	icountLCM20, 8kg; LCM with CMP 8.15kg. Carrying case 5kg approx.
Commissioning kit	6-off D cell batteries; 1-off print rolls (shrink wrapped); 2-off printer ribbons; 'ParSmart Downloader' software plus cable; weather protector cover; 12Vdc power supply; Rechargeable battery pack

Contamination Standards

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

Failsafe features

Special features are incorporated into the icountLCM20 control program to ensure effective testing.

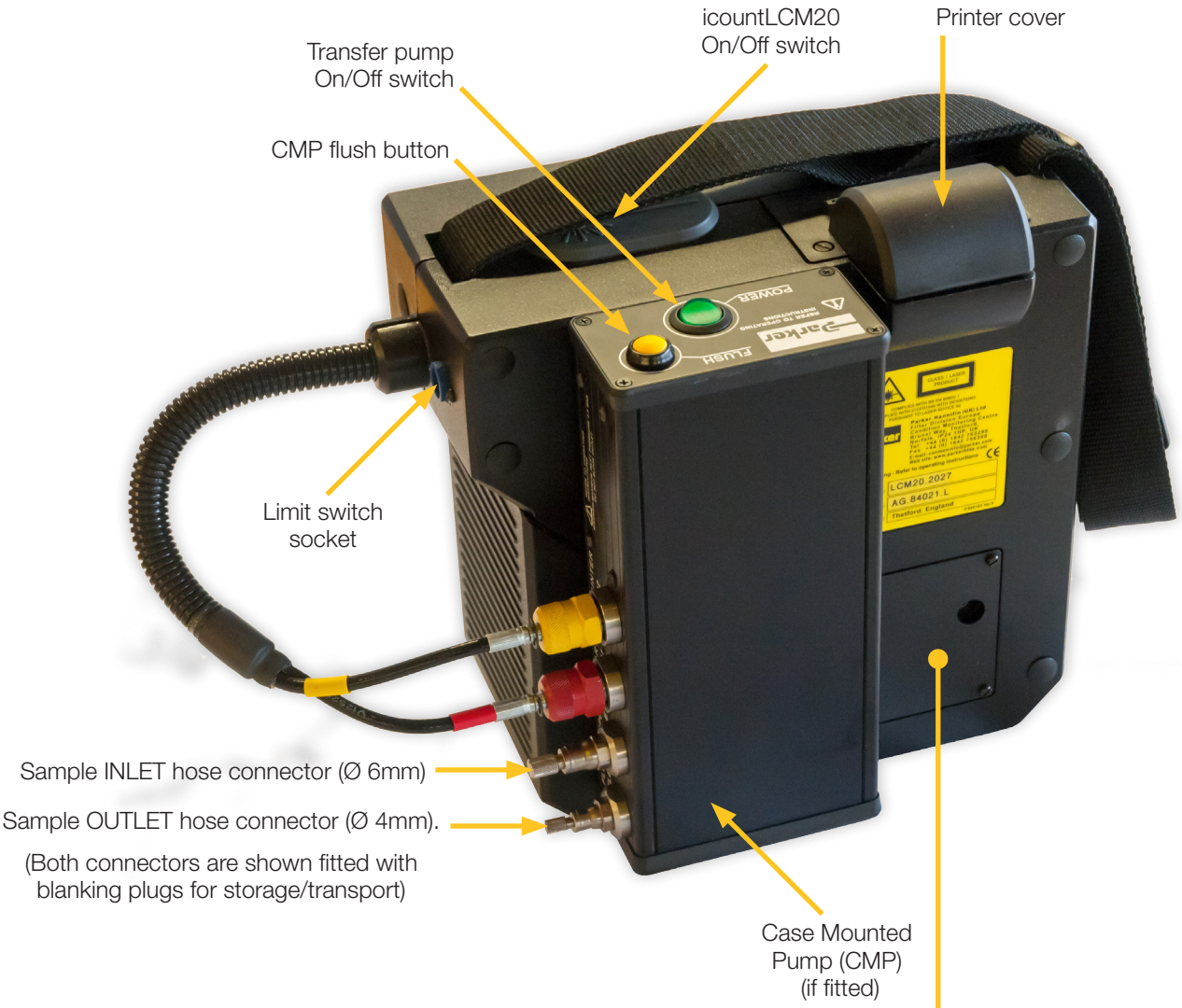
Circuitry	Incorporates an internal diagnostic program to ensure integrity of results
Adequate flow	Flow test facility ensures adequate flow
Adverse conditions	On-board trace heating (optional extra) supports testing in adverse conditions

Data management

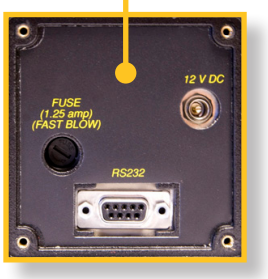
The 'ParSmart Downloader' software is supplied to allow test results to be downloaded onto a computer.

icountLCM20 – front view

icountLCM20 – rear view



Peripherals and serial interface



Two peripheral sockets and a fuse are located behind the removable cover plate.

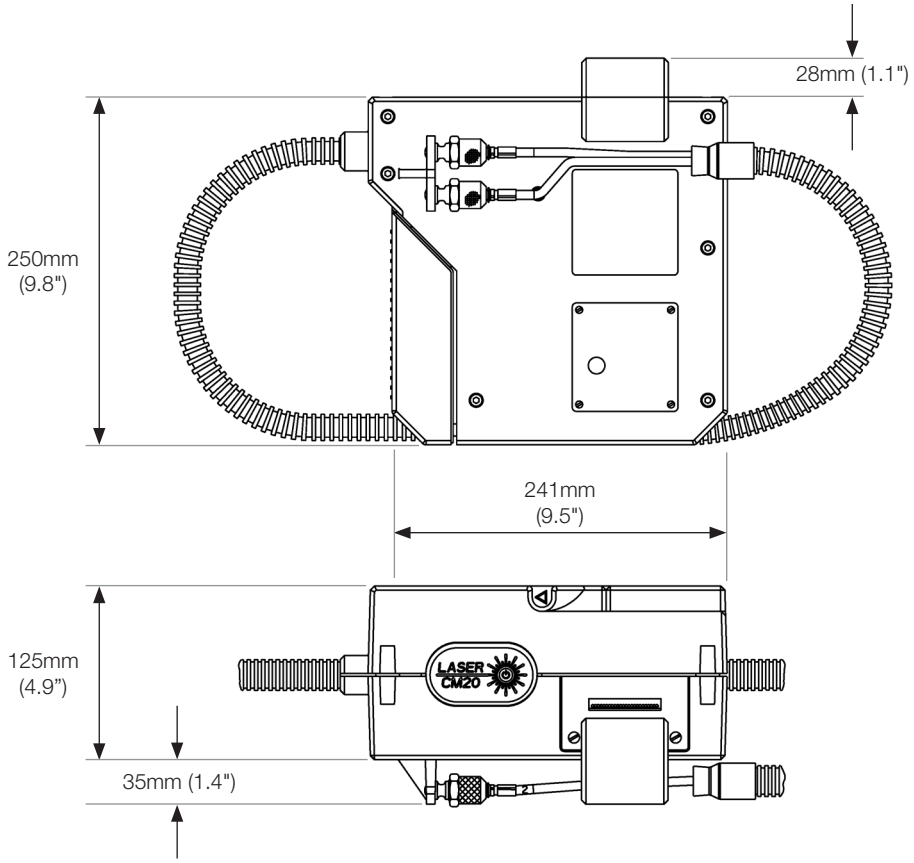
A fast-blow 1.25A fuse is accessible from its screw-in holder.

A 9-way RS232 interface is provided to download test data stored in the instrument using the 'ParSmart Downloader' software provided.

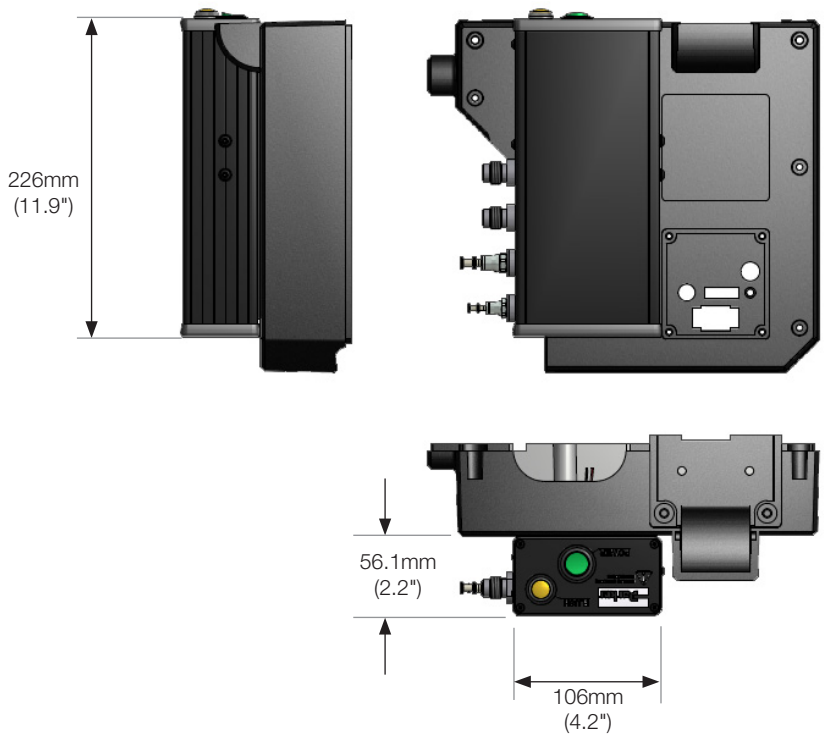
The 12Vdc power socket may be covered by a dust cap – remove before use.

Dimensions

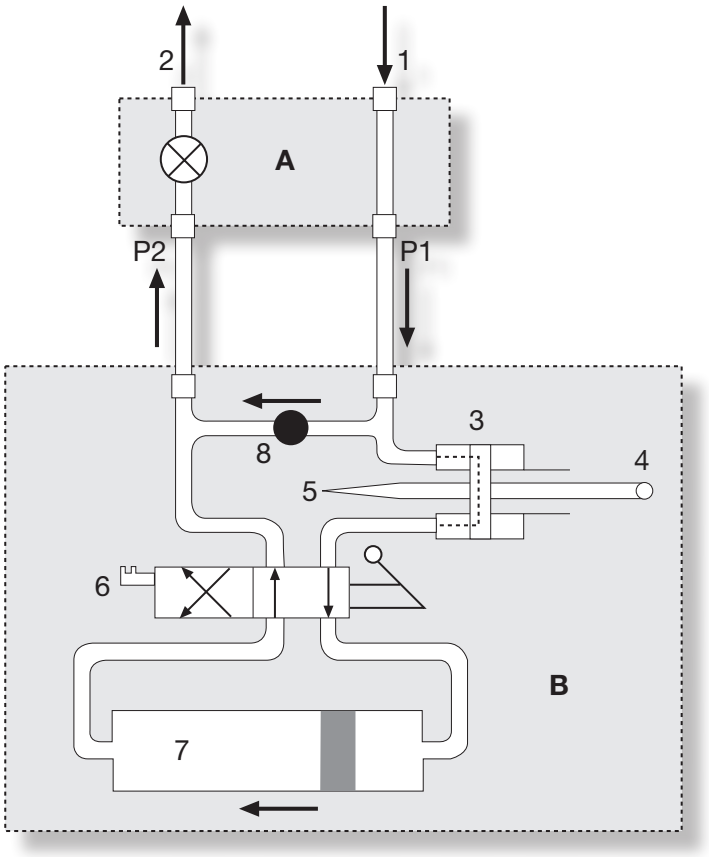
LCM20 (Case Mounted Pump not fitted)



LCM20CMP (with Case Mounted Pump)



Fluid flow schematic



A. CMP (Case Mounted Pump) unit, if fitted	
1	Sample Pipe Inlet
2	Sample Pipe Outlet
B. Main unit	
3	Monitor block
4	Laser Diode
5	Optical Scanner
6	Main Control Valve
7	Dual Direction Syringe Pump
8	Flow Probe Device

Operation checklist

Always ensure:

- Sensors are installed correctly
- Sensor connectors are tight but not over-tightened
- There is adequate oil flow
- There are steady-state pressure conditions
- Oil viscosity is within the working range
- Trend monitoring is performed under similar working conditions
- Hoses are correctly stowed and blanking plugs are fitted to avoid fluid spillage
- You have sufficient paper supplies for hard copy printer
- The icountLCM20 is handled with care – it is an instrumentation product
- Spares are reordered well in advance
- The icountLCM20 is calibrated according to Parker recommendations.

Getting started

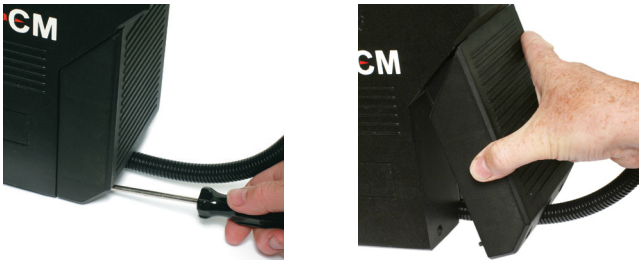
Powering the icountLCM20

The icountLCM20 may be powered via:

- a re-chargeable battery pack. This is supplied as an accessory with its battery charger – see 'Ordering information' on page 40.
- a replaceable battery pack. The battery compartment requires six LR20 ALKALINE batteries. LR20 batteries are readily available and are also known as Type D or 13A batteries.

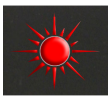
Charging the rechargeable battery pack

Step 1 Loosen two screws and remove the rechargeable battery compartment.



Step 2 Attach the mains plug to a mains socket and switch on.


= Off (no light)


= Charging (Flashing Light)


= Fully Charged (Solid Light)

Step 3 Replace the battery compartment and tighten the two screws.

NOTE: When the Particle Counter displays a Low Battery Warning, you should recharge the batteries immediately. Battery packs in storage or fitted to units should be recharged every three months. The capacity of the battery pack is severely reduced if batteries are left in a discharged condition for long periods

Using the replaceable battery pack

Step 1 Remove the battery compartment.

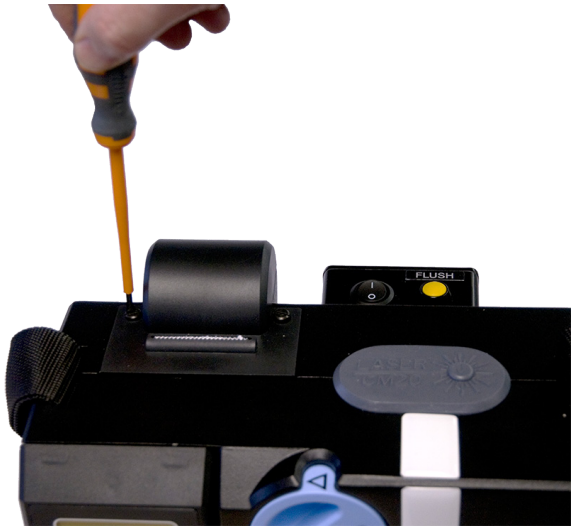
Step 2 Insert a complete set of fresh batteries in the direction shown.

CAUTION: The batteries shown are LR20 Alkaline non-rechargeable type. DO NOT ATTEMPT TO RECHARGE. If unsure, please contact Parker Hannifin for advice.

Step 3 Replace the battery compartment.

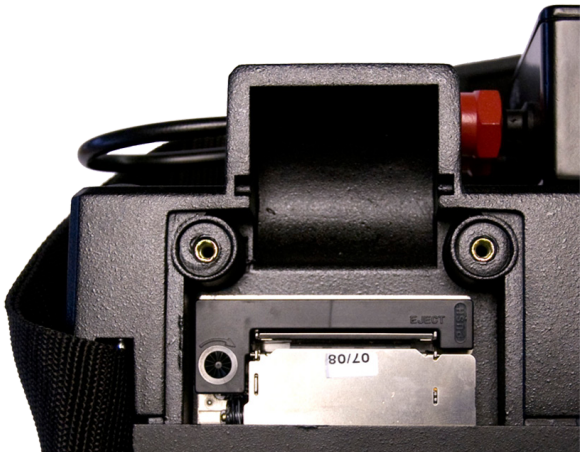
Installing paper and ribbon into the printer

Step 1 Unscrew the two retaining screws and remove the printer cover and paper reel.



Step 2 Place the new or replacement ribbon cassette in the printer.

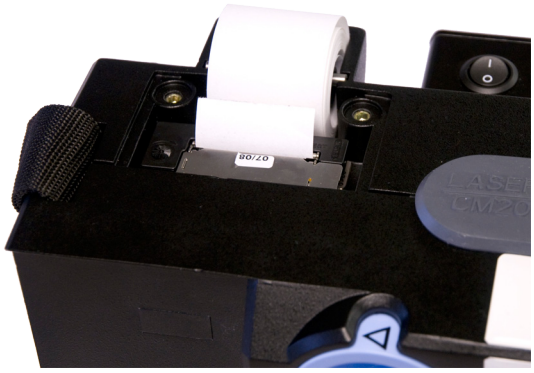
Press down until the cassette is sitting squarely, checking that the ribbon is not twisted.



Step 3 Feed the end of the paper reel under the printer cassette and printer roller.

Step 4

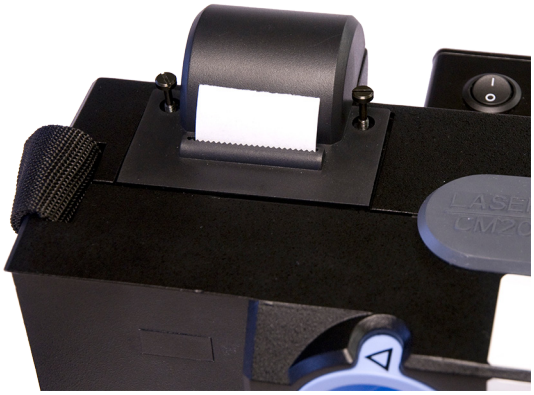
Press on the hand-held unit until the paper appears through the printer's paper feed slot.



Step 5

Feed the paper through the the paper slot in the cover (using the paper feed button on the hand-held unit).

Refit the cover to the icountLCM20 by fastening the two screws.

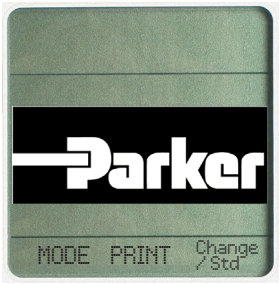


Setting the correct time

Step 1

Press

Step 2 Remove the handset. The start-up screen is displayed.



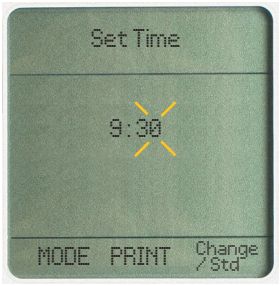
Step 3

Press and hold MODE 5s.

Confirm Yes or No and press MODE.

Step 4 Set the time from the numeric keypad using the 24-hour clock.
For example, to enter 9:30 am:

Press 0 9 3 0.

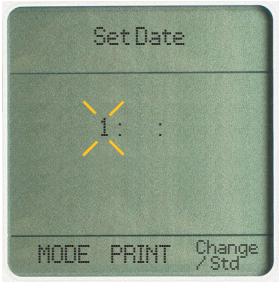


Step 5

MODE to confirm the time.

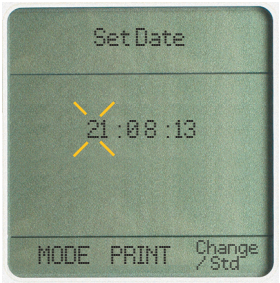
Setting the correct date

Step 1 The Set Date screen is shown after you have set the time.



Step 2 Enter the correct date from the numeric keypad. For example, to enter 21st August 2013:

2 1 0 8 1 3



Step 3 MODE to confirm the date.

Preparation and guidelines for testing

General guidelines

- The following guidelines summarise best practice in order to guarantee accurate, repeatable results, and should be adhered to for all fluid sampling using the icountLCM20.
- Handle the icountLCM20 with care; it is a precise instrumentation product.
- Ensure hoses and sampling pipes are fitted and where applicable tightened correctly.
- Replace the sampling pipes regularly.
- Cap the ends of sampling pipes after use to prevent dirt ingress.
- Discard all waste fluid – do not recycle any fluid once it has been through the icountLCM20.
- Use consistent sampling methods.
- For trend monitoring, ensure samples are taken under similar working conditions
- Re-calibrate the unit annually.

CAUTION: Only turn the valve when starting a test and only when the valve turn symbol (⊘ or ⊘) is shown on the display, or ISO4406 (all channels) screens are displayed.

1m of inlet sample pipe is provided. This should be cut down to the minimum convenient length for sampling (this will reduce the risk of dirt build-up along the length of pipe).

Sampling methods

The icountLCM20 is capable of sampling fluid in two ways:

ONLINE DIRECT

This refers to sampling directly from a system at full working pressure (up to 420bar), using a single high pressure point and pressure compensated flow device (not supplied).

In most cases this may not be possible therefore offline methods should be used.

OFFLINE (BOTTLE SAMPLING)

This refers to the method of taking a sample in a clean glass bottle from a sampling point and performing a test using the case mounted pump.

It is important to be aware of differences that can arise from these two sampling methods.

Operation - Offline Bottle Sampling when using Heated Bath

NOTE: The LCM20 CMP contains mineral oil and may need to be flushed prior to use.

Conditioning sample bottles

Bottles used for sampling must be conditioned prior to use. This is best done using the fluid to be sampled, as follows:

Step 1	Fill the bottle a half full with the sampling fluid.
Step 2	Screw the cap on and then shake vigorously for 30 seconds.
Step 3	Unscrew the cap and drain the bottle.
Step 4	Repeat steps 1 to 3 two further times (i.e. a total of three times).
Step 5	The sample bottle is now ready for use.

Prior to testing

Prior to any testing of any bottled fluid (including verification fluid), the fluid should be heated and de-gassed to ensure a good test.

Please follow the procedure below, depending on the temperature of the oil and the water.

	Water temperature in ultrasonic bath		
Oil temperature	**Cold**	**Ambient**	**45˚C**
Cold	45 mins	40 mins	20 mins
Ambient and Hot	40 mins	30 mins	15 mins

1. Fill two conditioned sample bottles with fluid you wish to test to more than ¾ (just above the neck).

2. Switch on the ultrasonic bath by pressing the On/Off switch on the front and ensure the temperature of the water is 45˚C (inducated by the green light on the bath).



3. Tumble the bottles end-over-end for 60 seconds at a rate of one full bottle rotation every second.

4. Stand the sample bottles in the ultrasonic bath and ensure the water level is over the inner lip of the tank.

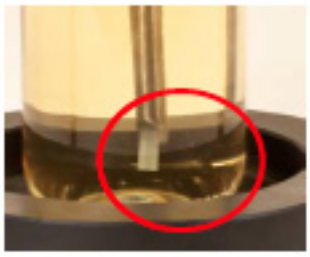
5. Ensure the oil is at the correct temperature and run the ultrasonics on the bath for 5 minutes by adjusting the timer and pressing the  button.

6. Remove the first sample bottle from the ultrasonic bath and dry the outside of the bottle, as any excess water may contaminate the sample when the lid is removed.
7. Re-tumble the sample bottle end-over-end for a further 60 seconds at a rate of one full bottle rotation every second.

8. Remove the lid and place the sample bottle in the bottle stand and clamp the bottle in place by pushing the top plate down. Ensure the metal centralizing tube does not touch the bottom of the bottle.

9. Connect the sample hoses to the 'INLET' and 'OUTLET' connections of the LCM20CMP. These are push-fit connections.

10. Feed the inlet hose through the centralising tube until it is visible but not touching the bottom of the bottle.



11. Ensure the outlet hose is connected to a suitable waste container (not supplied).

Conditioning the transfer pump

To avoid large volumes of air passing through the LCM20, or cross contamination which can give incorrect readings, the transfer pump should be conditioned before recording the results. To do this, run a minimum of two tests on the first sample bottle.

To run the transfer pump, switch on the LCM20 and press the green power button:

NOTE: Press and hold down the FLUSH button to speed up the pump. (The FLUSH button should only be used during priming/flushing and not during a test).

Once the pump is conditioned with the test fluid, it is recommended to run a minimum of three tests on the second sample bottle.

NOTE: Do not leave the pump running when not connected to the oil sample.

Operation – Offline Bottle Sampling – Without Heated Bath

NOTE: The LCM20CMP contains mineral oil and may need to be flushed prior to use

Conditioning sample bottles

Bottles used for sampling must be conditioned prior to use. This is best done using the fluid to be sampled, as follows:

1. Fill the bottle half full with the sample fluid.
2. Screw the cap on and then shake vigorously for 30 seconds.
3. Unscrew the cap and drain the bottle.
4. Repeat steps 1 to 3 two further times (i.e. a total of three times).
5. The sample bottle is now ready for use.

Prior to testing

Prior to any testing of any bottled fluid (including verification fluid) the fluid should be de-gassed to ensure a good test.

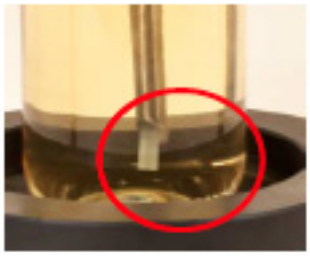
1. Fill two conditioned sample bottles with fluid you wish to test to more than ¾ (just above the neck).

2. Tumble the sample bottles end over end for 60 seconds at a rate of 1 full bottle rotation every 1 second.

NOTE: It is recommended the sample is degassed. (Degasser not supplied)

3. Connect the sample hoses to the 'INLET' and 'OUTLET' connections of the LCM20CMP. These are push-fit connections.

4. Connect to inlet hose into the bottle, ensuring tube is not touching the bottom of the bottle.



5. Ensure the outlet hose is connected to a suitable waste container (not supplied).

Conditioning the transfer pump

To avoid large volumes of air passing through the LCM20CMP, or cross contamination which can give incorrect readings, the transfer pump should be conditioned before recording the results. To do this, run a minimum of 2 tests on the first sample bottle.

To run the transfer pump, switch on the LCM20CMP and press the green power button:

NOTE: Press and hold down the FLUSH button to speed up the pump. (The FLUSH button should only be used during priming/flushing and not during a test).

Once the pump is conditioned with the test fluid, it is recommended to run a minimum of three tests on the second sample bottle.

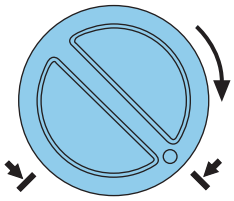
NOTE: Do not leave the pump running when not connected to the oil sample.

Running a test

1. Switch on the LCM20CMP

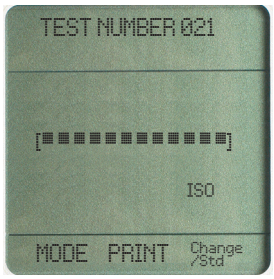
2. Press –Change/Std to select the required test standard (ISO, NAS or GOST). This determines the format of the test data that is stored.
3. Check the display.

   You can proceed if the valve turn symbol (or) is displayed.
4. Turn the valve 90° in the indicated direction. The valve position can be checked from the top of the monitor or from the front of the monitor.



CAUTION: Only turn the valve when starting a test and only when the valve turn symbol (or) is displayed.

Testing commences immediately.



Each test takes approximately two minutes. A progress bar is shown on the display indicating how far the test has progressed. During each test, the appropriate test number is displayed.

NOTE: Due to the testing procedure, a small amount of fluid maybe discharged upon completion of a test. This may take a few minutes, please ensure the waste tube remains connected to the waste container.

5. When complete, switch the Green Power button off.
6. Now repeat the steps for any other bottles required for testing.

Basic operation – Online

The icountLCM20 is now ready to check the cleanliness of the hydraulic oil in your system. You can take readings at full working pressure (max. 420 bar).

NOTE: The icountLCM20 is supplied filled with hydraulic oil and may need to be flushed prior to use.

Step 1 Disconnect the hydraulic hoses from the 'hose tidy'.

Step 2 The icountLCM20 is designed for use in connection with System 20 size 0, 1 and 2 Industrial Sensors or the Single Point Sampler. The sensors have the following dimensions:

Size	Diameter
0	30.0mm
1	41.0mm
2	66.7mm

NOTE: 'Dual fluids monitors' must be connected to a special System 20 Sensor or Single Point Sampler. See page 45.

Step 3 Ensure that the Sensor is installed with the arrow matching the direction of flow.

Working viscosity is 2–100 cSt. **Ensure a minimum working pressure of 2 bar**

Ensure adequate oil flow through the sensor:

Size	Flow rate
0	12 litres per minute
1	40 litres per minute
2	160 litres per minute

Unscrew protection caps 1 and 2 only.

Step 4 Connect red hose 1 loosely to the sensor inlet.

Step 5 Connect yellow hose 2 loosely to the sensor outlet.

Step 6 Simultaneously tighten both couplings finger-tight.

The icountLCM20 is now connected to the fluid to be checked.

NOTE: Parker Hannifin recommend that the icountLCM20 is connected to the operating system sensor for five minutes to allow the fluid condition to stabilise before starting a test.

We also recommended that you carry out an independent flow check if there is high viscosity oil and low flow through the System 20 sensor, or the unit is being operated without the trace heating option in cold ambient temperatures.

Flowrate test

Step 1

Press

Step 2

Press and hold ◀ 5 seconds.

Step 3

The flow test begins and the display shows:

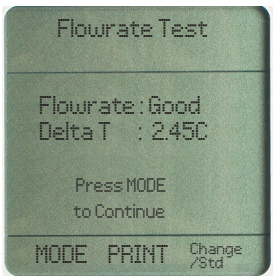
30 seconds for flow test completion.

Step 4

Check the ΔT (Delta T value – the change in temperature).

ΔT ≤ 3.60C ✓

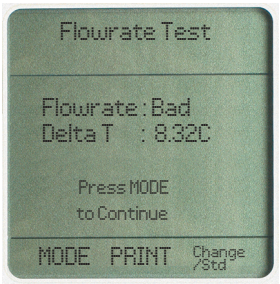
ΔT ≥ 3.60C ✗



Step 5

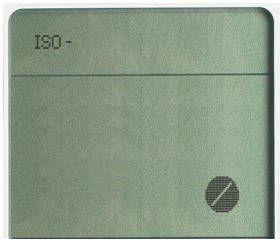
A ΔT value of more than 3.60°C, gives a “Bad” flowrate result.

The flow rate through the System 20 sensor should be increased or the system oil temperature raised. Repeat from step 2.



Step 6

Press Change/Std to select the test standard (ISO, NAS, GOST or SAE).



Step 7

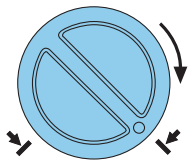
Wait for the valve turn symbol ⊘ or ⊘ to be displayed.

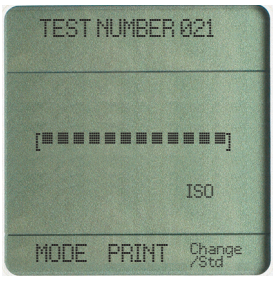
Step 8

Turn the valve control knob in the direction indicated.

CAUTION: Only turn the valve control knob when starting a test and only when the valve turn symbol:

⊘ or ⊘ is displayed.





Testing starts immediately

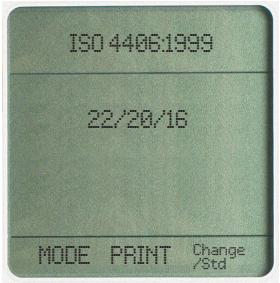
A progress bar shows when the test is complete.

2 minutes for test completion.

ISO mode

Step 1 During a test, an interim count is shown.

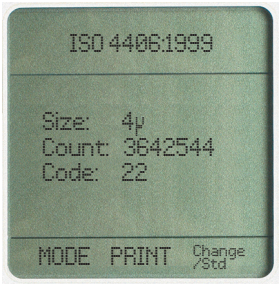
When the test is complete, the ISO code is automatically displayed.



Step 2 **Particle count**

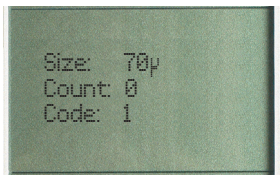
All particle counts are indicated per 100ml sample.

Press MODE to display the particle count, starting with the smallest channel (i.e. particle size group) in the test.

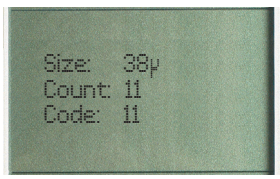


Step 3

Each press of ▶ displays the counts for the next channel, up to the largest particle size group for that test.



Press ◀ to display the particle count for a previous channel size.



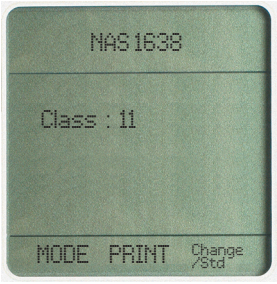
NAS, GOST or SAE mode

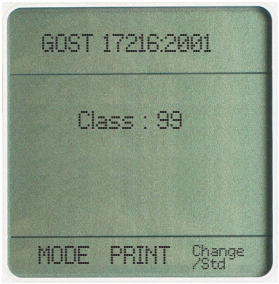
NOTE: GOST is only available when using ACFTD.

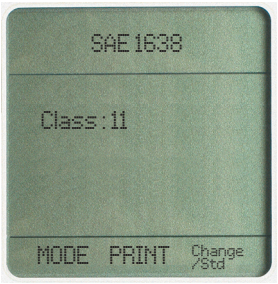
Step 1

Press Change/Std to choose NAS, GOST or SAE mode.

The NAS, GOST or SAE class code is displayed on screen.





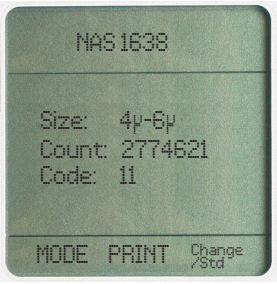


Step 2 **Particle counts**

All particle counts are based on 100ml samples.

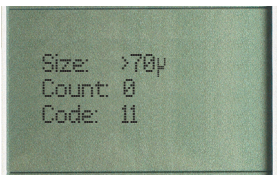
Press MODE to display the particle count, starting with the smallest channel (i.e. particle size group) in the test.

(This example is for a NAS test.)

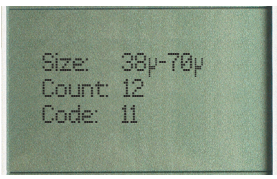


Step 3

Each press of ▶ displays the counts for the next channel, up to the largest particle size group for that test.



Press ◀ to step backwards and display the particle count for the previous channel size.



Entering a test ID code

You can enter a test ID (identification) code of up to 32 characters to go with a test number.

Step 1

Press MODE three times.

PLEASE ENTER A TEST ID CODE is displayed.

Step 2

Each key on the keypad has four characters associated with it (like a mobile phone).

Press each key repeatedly, up to four times, to obtain the desired character.

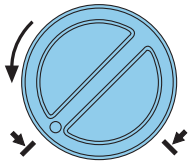
For example, the ABC 1 button produces first 1, then A, B and C with each key press.

If you make a mistake, press ◀ to delete the last character.

Step 3

When you have finished entering the test ID code, turn the valve control knob.

The test ID code is recorded and the test begins.



Step 4

The test ID code is permanent until changed. To change the code, start typing a new code.

The test ID code is printed with the test number on each test printout.

Printing test results

Step 1	Press PRINT once to print out the most recent result.
Step 2	The printer prints the test number, unit number, date and time, with the appropriate standards code (ISO, NAS or GOST), followed by the particle counts for each range of particle size.

To print the results of all tests completed to date:

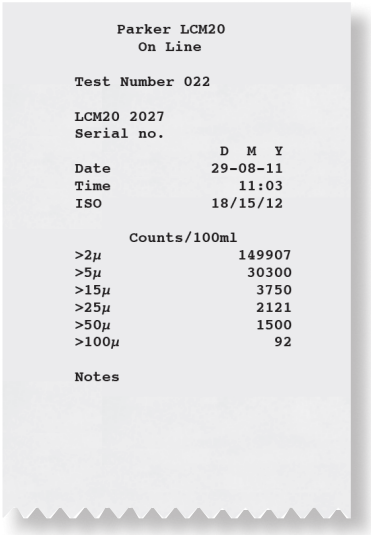
Press the print button twice

PRINT PRINT

Press PRINT a third time to cancel printing.

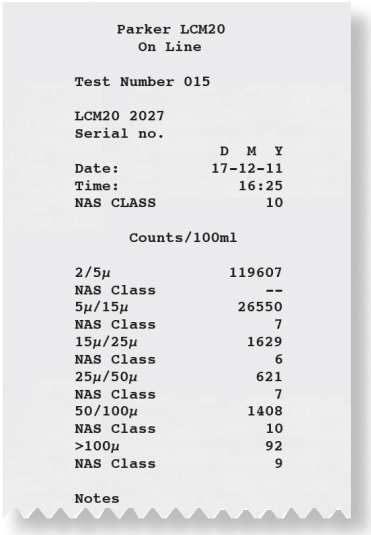
Example test printouts

ISO mode



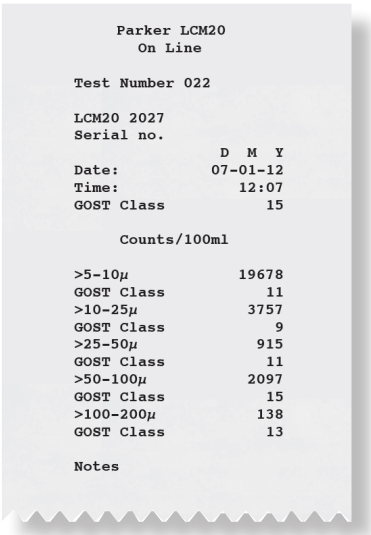
```
      Parker LCM20
        On Line

Test Number 022

LCM20 2027
Serial no.
                 D  M  Y
Date            29-08-11
Time              11:03
ISO             18/15/12

       Counts/100ml
>2µ                149907
>5µ                 30300
>15µ                 3750
>25µ                 2121
>50µ                 1500
>100µ                  92

Notes
```

NAS mode



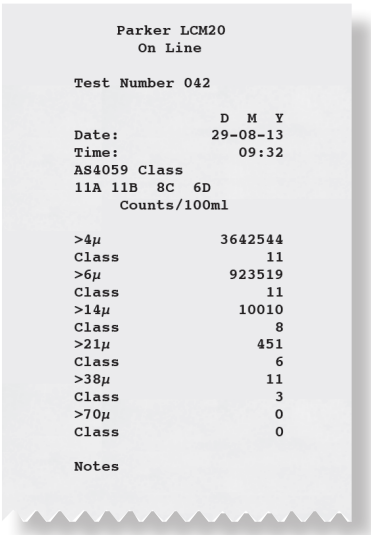
```
      Parker LCM20
        On Line

Test Number 015

LCM20 2027
Serial no.
                 D  M  Y
Date:           17-12-11
Time:             16:25
NAS CLASS            10

       Counts/100ml

2/5µ               119607
NAS Class              --
5µ/15µ              26550
NAS Class               7
15µ/25µ              1629
NAS Class               6
25µ/50µ               621
NAS Class               7
50/100µ              1408
NAS Class              10
>100µ                  92
NAS Class               9

Notes
```

GOST mode



```
      Parker LCM20
        On Line

Test Number 022

LCM20 2027
Serial no.
                 D  M  Y
Date:           07-01-12
Time:             12:07
GOST Class            15

      Counts/100ml

>5-10µ             19678
GOST Class            11
>10-25µ             3757
GOST Class             9
>25-50µ              915
GOST Class            11
>50-100µ            2097
GOST Class            15
>100-200µ            138
GOST Class            13

Notes
```

SAE mode



```
      Parker LCM20
        On Line

Test Number 042

                 D  M  Y
Date:           29-08-13
Time:             09:32
AS4059 Class
11A 11B  8C  6D
     Counts/100ml

>4µ                3642544
Class                   11
>6µ                 923519
Class                   11
>14µ                10010
Class                    8
>21µ                  451
Class                    6
>38µ                   11
Class                    3
>70µ                     0
Class                    0

Notes
```

NOTE: If the test count is outside the range for a particular standard, then '00' (below range) or '- -' (above range) is displayed.

Viewing and printing a stored test by ID code or test number

Step 1

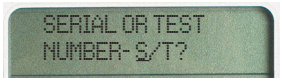
Press and hold 1 2 seconds.

Step 2

Press ◀ to select Y

Step 3

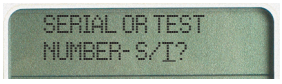
Press MODE



Step 4

Press ▶ to select T.

Press MODE to confirm T (Test number).



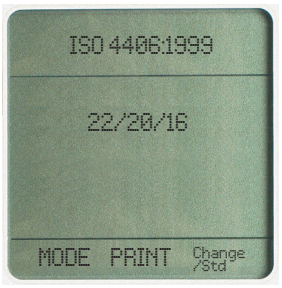
Step 5

Press MODE

Enter the test number required (test 012 in this example).

Step 6

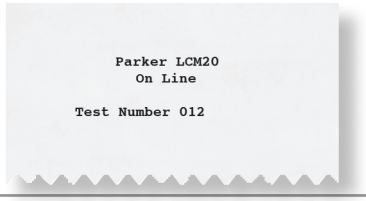
Press MODE to view the test.



Step 7

Press PRINT to print the test.

To print test 012 through to test 001, press PRINT



Step 8

To view and print more results select Y. Select N to return to the idle screen.

Press MODE to confirm.

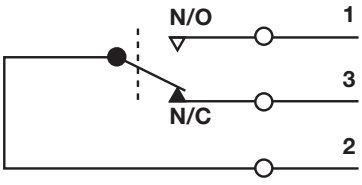
Printing a stored test as a graph

To print a range of stored test results as a graph by ID code or test number:

Step 1	Press and hold DEF 2 for  2 seconds. Press ◀ to select Y	TREND PRINTOUT Y/N?
Step 2	Press MODE Choose S to select a test by serial number, or T to select a test by test number.	SERIAL OR TEST NUMBER- S/T?
Step 3	Press ▶ to select T (Test number).	SERIAL OR TEST NUMBER- S/T?
Step 4	Press MODE. Enter the first test number required.	ENTER FIRST TEST NUMBER: _
Step 5	Press MODE. Enter the last test number required. A maximum of 30 tests may be printed as graphs from one request.	ENTER LAST TEST NUMBER: _
Step 6	Press MODE to start the graph printout.	GENERATING TREND PLEASE WAIT ...
Step 7	Once completed, the following message is shown: To view and print more graphs, select Y. Select N to return to the idle screen.	PRINT MORE TRENDS Y/N?

Alarm levels

The icountLCM20 includes a built-in limit switch relay which can be triggered when a preset alarm level is reached. The relay contacts can be used to switch on or off an external device connected to the limit switch socket. The socket connections are:



The contact rating is 5A at 220V ac or dc.

NOTE: the user is responsible for selecting an appropriately rated connector and cable for the externally controlled device.

Editing alarm levels (MTD)

Alarm levels are set individually for the first three particle size channels.

Step 1	Press and hold 9 for 2 seconds.	EDIT ALARM LEVEL Y/N?
Step 2	Press ◀ to confirm Y	EDIT ALARM LEVEL Y/N?
Step 3	Enter the code level for the first channel above which the alarm is to be triggered. Press MODE to repeat this process for the other two channels.	4μ LIMIT 21
Step 4	When codes for all three particle size channels have been entered, the display shows:	LIMIT LEVELS SET

Activating alarm level testing

When activated, if any of the pre-set alarm levels are exceeded during a manual or automatic test, the alarm relay is triggered, activating any externally connected device.

Step 1	Press and hold 3 for 2 seconds.	LEVEL TESTING Y/N?
Step 2	Press ◀ to select Y	LEVEL TESTING Y/N?
Step 3	Press MODE. Press ◀ to select Y. The unit runs indefinitely whether the alarm has been triggered or not. Press MODE to select N. The unit stops running tests when the alarm is triggered.	CONTINUOUS Y/N?

Operating the limit switch relay manually

You can manually operate the limit switch relay for test purposes, for example before running a test.

Step 1	Press and hold 8 for 2 seconds.	
Step 2	Press ◀ to select Y	
Step 3	Press MODE. The limit switch relay is energised (i.e. contact is made between pins 1 and 2 of the level test relay socket). Choose N in step 2 to turn off the relay.	

Automatic testing

The automatic testing function is used to run a series of tests at predefined time intervals. Note that automatic testing cannot be used when the icountLCM20 is connected to the Offline Bottle Sampler.

Step 1	Press and hold 4 JKL for 2 seconds. Press ◀ to select Y	AUTOMATIC TESTING Y/N?
Step 2	Press MODE. Enter the start time required.	ENTER TEST START TIME: 13:48
Step 3	Press MODE. Enter the test interval (the number of minutes between each test).	TEST INTERVAL (6-999 min): _
Step 4	Press MODE. Enter the number of tests to be run.	ENTER NUMBER OF TESTS TO RUN: _
Step 5	Press MODE. Press ◀ to select Y if a printout of each test result is required.	PRINT RESULTS Y/N?
Step 6	Press MODE. Press ◀ to select Y to start testing.	START TESTING Y/N?
Step 7	Press MODE. Testing starts when the two times become equal.	TIME NOW: 13:42 START AT: 13:45
Step 8	This screen is displayed just before the test takes place. This is followed immediately by the test. Interim counts are displayed as the test progresses.	TEST NUMBER 020 FLUSHING TEST NUMBER 020 COUNTING
Step 9	Press MODE to terminate the current test cycle. When all tests are complete the following screen is displayed.	WAITING... MODE TO ABORT AUTOMATIC TESTING COMPLETE
Step 10	Press MODE to return to the idle screen.	

Adjusting screen brightness

The icountLCM20 is supplied with factory default settings for backlight and brightness settings. These settings can be altered using hot key functions as follows:

Press and hold MNO 5 and press ◀ to brighten the screen

Press and hold MNO 5 and press ▶ to darken the screen

Press and hold STU 7 and press ▶ to switch backlighting on

Press and hold STU 7 and press ◀ to switch backlighting off

NOTE: When the icountLCM20 is switched off, the backlight function is reset to off. If you require the backlight the next time icountLCM20 is switched on, you will need to reactivate it.

Saving screen brightness settings

Once the screen brightness has been set to the required level, you can save the setting by pressing and holding ◀ and ▶ simultaneously and following the on-screen instructions.

Calibration

Each time the unit is switched on, the next calibration due date is checked. If the calibration due date is within four weeks, the following message is displayed:

(This example is for a calibration due date of 25th July 2013)

To ignore the message for now and continue with testing, press MODE.

If the calibration due date is passed, a message is displayed:

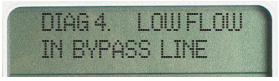
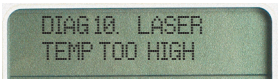
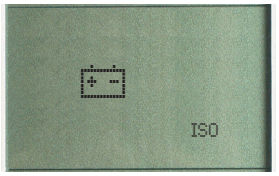
To ignore the message for now and continue with testing, press MODE.

Reference

Diagnostic codes

Explanations of icountLCM20 diagnostic codes and possible remedies are given in the following table.

DIAGNOSTIC CODE 1		
a. At beginning of test 	Oil is too dark or it is cloudy.	Check sample of oil visually. This can be done as follows: **Dark oils:** Wet your thumb and forefinger in the oil and press together. Release and look at your thumb. If you can see through the film of oil it should work in the icountLCM20. If you cannot, then you may have problems. (This is most common with engine oils or very highly contaminated oils above ISO 24). **Emulsions:** Put sample in a clear container and hold up to the light. This will show cloudy or clear. If cloudy, check the type of oil and change until the oil is clean, then retry icountLCM20.
b. at the end of the test 	Unstable fluid opacity may be caused by aeration, water sludge or an amount of cold oil passing through icountLCM20.	Allow machine to work up to operating temperature before performing condition monitoring. Run tests with a stable system and ensure that a minimum line pressure of 2 bar is available at the monitor to reduce the possibility of aeration.
DIAGNOSTIC CODE 2		
The changeover valve and syringe pump are out of phase 	a. Control knob turned, either before monitor switched on, before valve symbol displayed on handset or during a test. b. Time taken to turn valve fully to next position is too long (20 seconds). c. Microswitch setting fault.	Switch off the monitor, then switch on and wait for monitor to reset its position (diagnostic screen 6 is displayed). Return to Parker for repair.
DIAGNOSTIC CODE 3		
Uncontrolled power down 	a. Power to monitor has been disrupted by removing power supply without switching monitor off. b. Battery power too low. Battery level warning ignored. c. Battery contact disconnected by excessive vibration. d. External power supply connected (12Vdc) while unit is on.	Wait for monitor to reset itself. Replace batteries with 6 x 1.5V Alkaline D Cells (or recharge battery pack if a rechargeable pack is fitted). Relocate monitor on a sound surface (May also be hung from a carrying strap). Leave unit to re-set itself.

DIAGNOSTIC CODE 4		
Insufficient flow rate of oil from P1 hose into monitor block to fill syringe pump. Results are suspect and not made available. 	a. Inadequate differential pressure across P1 and P2 connections to provide sufficient bypass flow. b. Air lock in monitor block or high viscosity slug of oil in bypass hoses.	i) Select smaller sized sensor ii) Reduce viscosity of system oil by increasing test temperature where possible. iii) Use Single Point sampler connected to P1. Purge the system pressure with P2 hose disconnected from system. **Care should be taken to allow oil to discharge safely and should only be performed by a competent operator.** Re-test and if fault reoccurs, return monitor to Parker for repair.
DIAGNOSTIC CODE 5		
Test time too short or too long. Results are suspect and are not made available.  	a. Malfunction of Opto-Tacho control, causing flow to stop before particle counting phase completed. Pump drive slipping or failed. b. Differential pressure too high due to lack of control of flow through icountLCM20.	Use SPS or sensor to control flow through icountLCM20.
DIAGNOSTIC CODE 6		
Unit trying to reset from last error. 	Displayed after switching on, while monitor is resetting itself from the previous error condition.	**Leave the icountLCM20 alone until it has reset.** If it does not reset, or switches itself off, contact Parker.
DIAGNOSTIC CODE 7 AND ABOVE		
  	All faults which can only be rectified by Parker and are normally software related.	
	Displayed if the monitor block has reached a temperature above 60°C.	Remove icountLCM20 from system connections and allow to cool down. If unit does not reset, contact Parker.
LOW BATTERY		
	Replace or recharge batteries. The icountLCM20 will not complete a measurement if power is insufficient.	

Dual fluids monitor – icountLCM202062

To expand further the applications possible with Parker's icountLCM20 particle counting technology, Parker offers a version of the icountLCM20, using **Perfluoroelastomer seal technology**, which is the only sealing elastomer universally accepted by the Civil Aviation hydraulic manufacturers.

Calibrated in accordance with ISO procedures, the **icountLCM202062** offers the user all the features and benefits of the thoroughly proven icountLCM20 technology accepted throughout the world.

Using the icountLCM202062, civil aviation hydraulic servicing operations can now match the cost and time saving already demonstrated in the military aviation industries.

FEATURES:

- Perfluoroelastomer seals throughout
- Totally compatible with aggressive phosphate esters (e.g. SKYDROL LD4/500B), as well as mineral or synthetic-based fluids.
- Red control valve knob and handset keys – the icountLCM202062 is easily distinguished from standard icountLCM20 units
- High Technology, fused optical windows for high particle definition
- Available with complete range of sample extraction options (e.g. System 20 Sensors or the Single Point Sampler)
- 5/8" BSF HSP Hose fitting
- Parylene treated for additional protection.

CAUTION: Any oil splashed onto the unit should be removed immediately, to avoid damage over time.

NOTE: If you have doubts about fluid/seal compatibility, consult Parker.

WARNING: DO NOT USE THE CASE MOUNTED PUMP WITH AGGRESSIVE PHOSPHATE ESTERS BASED FLUIDS.

Ordering information

Part number	Description	Qty
LCM202022	LCM20 6-channel, MTD calibrated	
LCM202027	LCM20 6-channel with CMP (Case Mounted Pump), including carrying case and kit, ACFTD calibrated	
LCM202028	LCM20 6-channel with CMP (Case Mounted Pump), MTD calibrated	
LCM202062	LCM20 6-channel, agressive fluid, MTD calibrated	
ACC6NE015	Printer paper (to suit paper reel 44mm wide x 45mm diameter). 5 rolls	
ACC6NE014	Printer ribbon	
ACC6ND000	Data transfer link package	
SPS2021	Single Point Sampler	
ACC6NE013	Rechargeable battery pack	
ACC6ND002	Weather protector cover	
ACC6NE008	UK power supply	
ACC6NE009	Euro power supply	
ACC6NE010	US power supply	
ACC6NN031	CMP tubes	
ACC6NN033	Blanking plugs (4mm and 6mm)	

System 20 sensors

INDUSTRIAL SENSORS – SIZES 0, 1 AND 2

Part number	Size	Flow range	Thread	Qty
STI.0144.100	0	6–25 l/min	G $\frac{3}{8}$	
STI.0344.100	0	0.5–7 US GPM	$\frac{3}{4}$ UNF	
STI.1144.100	1	20–100 l/min	G $\frac{3}{4}$	
STI.1344.100	1	5–26 US GPM	SAE 1 $\frac{3}{16}$ – 12UN-2B	
STI.2144.100	2	80–380 l/min	G1 $\frac{1}{4}$	
STI.2344.100	2	21–100 US GPM	SAE 1 $\frac{5}{8}$ – 12UN-2B	

Parker Worldwide

AE – UAE, Dubai
Tel: +971 4 8875600
parker.me@parker.com

AR – Argentina, Buenos Aires
Tel: +54 3327 44 4129

AT – Austria, Wiener Neustadt
Tel: +43 (0)2622 23501-0
parker.austria@parker.com

AT – Eastern Europe,
Wiener Neustadt
Tel: +43 (0)2622 23501 970
parker.easteurope@parker.com

AU – Australia, Castle Hill
Tel: +61 (0)2-9634 7777

AZ – Azerbaijan, Baku
Tel: +994 50 2233 458
parker.azerbaijan@parker.com

BE/LU – Belgium, Nivelles
Tel: +32 (0)67 280 900
parker.belgium@parker.com

BR – Brazil, Cachoeirinha RS
Tel: +55 51 3470 9144

BY – Belarus, Minsk
Tel: +375 17 209 9399
parker.belarus@parker.com

CA – Canada, Milton, Ontario
Tel: +1 905 693 3000

CH – Switzerland, Etoy
Tel: +41 (0) 21 821 02 30
parker.switzerland@parker.com

CN – China, Shanghai
Tel: +86 21 5031 2525

CZ – Czech Republic, Klecany
Tel: +420 284 083 111
parker.czechrepublic@parker.com

DE – Germany, Kaarst
Tel: +49 (0)2131 4016 0
parker.germany@parker.com

DK – Denmark, Ballerup
Tel: +45 43 56 04 00
parker.denmark@parker.com

ES – Spain, Madrid
Tel: +34 902 33 00 01
parker.spain@parker.com

FI – Finland, Vantaa
Tel: +358 (0)20 753 2500
parker.finland@parker.com

FR – France, Contamine s/Arve
Tel: +33 (0)4 50 25 80 25
parker.france@parker.com

GR – Greece, Athens
Tel: +30 210 933 6450
parker.greece@parker.com

HK – Hong Kong
Tel: +852 2428 8008

HU – Hungary, Budapest
Tel: +36 1 220 4155
parker.hungary@parker.com

IE – Ireland, Dublin
Tel: +353 (0)1 466 6370
parker.ireland@parker.com

IN – India, Mumbai
Tel: +91 22 6513 7081-85

IT – Italy, Corsico (MI)
Tel: +39 02 45 19 21
parker.italy@parker.com

JP – Japan, Fujisawa
Tel: +(81) 4 6635 3050

KR – South Korea, Seoul
Tel: +82 2 559 0400

KZ – Kazakhstan, Almaty
Tel: +7 7272 505 800
parker.easteurope@parker.com

LV – Latvia, Riga
Tel: +371 6 745 2601
parker.latvia@parker.com

MX – Mexico, Apodaca
Tel: +52 81 8156 6000

MY – Malaysia, Subang Jaya
Tel: +60 3 5638 1476

NL – The Netherlands,
Oldenzaal
Tel: +31 (0)541 585 000
parker.nl@parker.com

NO – Norway, Ski
Tel: +47 64 91 10 00
parker.norway@parker.com

NZ – New Zealand, Mt Wellington
Tel: +64 9 574 1744

PL – Poland, Warsaw
Tel: +48 (0)22 573 24 00
parker.poland@parker.com

PT – Portugal, Leca da Palmeira
Tel: +351 22 999 7360
parker.portugal@parker.com

RO – Romania, Bucharest
Tel: +40 21 252 1382
parker.romania@parker.com

RU – Russia, Moscow
Tel: +7 495 645-2156
parker.russia@parker.com

SE – Sweden, Spånga
Tel: +46 (0)8 59 79 50 00
parker.sweden@parker.com

SG – Singapore
Tel: +65 6887 6300

SK – Slovakia, Banská Bystrica
Tel: +421 484 162 252
parker.slovakia@parker.com

SL – Slovenia, Novo Mesto
Tel: +386 7 337 6650
parker.slovenia@parker.com

TH – Thailand, Bangkok
Tel: +662 717 8140

TR – Turkey, Istanbul
Tel: +90 216 4997081
parker.turkey@parker.com

TW – Taiwan, Taipei
Tel: +886 2 2298 8987

UA – Ukraine, Kiev
Tel +380 44 494 2731
parker.ukraine@parker.com

UK – United Kingdom,
Warwick
Tel: +44 (0)1926 317 878
parker.uk@parker.com

US – USA, Cleveland
Tel: +1 216 896 3000

VE – Venezuela, Caracas
Tel: +58 212 238 5422

ZA – South Africa,
Kempton Park
Tel: +27 (0)11 961 0700
parker.southafrica@parker.com

www.parkerhfde.com

European Product Information Centre
(24-hour)

Freephone: +00800 27 27 5374

(from AT, BE, CH, CZ, DE, EE, ES, FI, FR, IE, IT, PT, SE, SK, UK)

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