CONTAMINATION MONITORING PRODUCTS

INSTALLATION, SERVICE AND MAINTENANCE MANUAL

CML4

COMPACT PORTABLE CONTAMINATION MONITOR

EN

PASSION TO PERFORM

MP FILTRI®

PRODUCT OVERVIEW

CML4 - Compact Portable Contamination Monitor

A compact and portable contamination monitor that delivers a fast, accurate assessment of contamination in the field, making it a perfect solution for the mobile, construction and plant hire sectors.

Easy to master, the new CML4 features cutting-edge contamination control technology for anyone wishing to protect their critical systems.

The CML4 features a metering pump which enables analysis of both pressurised and unpressurised systems, delivering comprehensive contamination checks on any machine in any condition.

Features and Benefits

- High-resolution 7” (178 mm) touchscreen display
- Real-time contamination results at-a-glance
- High-speed sample times
- Unpressurised and pressurised sampling up to 420 bar
- Work-all-day battery that can handle up to 140 tests on a single charge
- Portable at just 8.5 kg (18.5 lbs)
- Easy to master - operators can get up and running in minutes
- Enables proactive maintenance
- Measures and displays the following international standard formats: ISO 4406, NAS 1638, AS 4059E&G Tables 1 and 2, ISO 11218, GBT 14039, GJB 420B, GOST 17216, ISO 11218
- Moisture and temperature sensors
- Data logging and 4000 test result memory
- CMP View software (included on Data stick)
- Bluetooth printer (optional equipment)
- Full accessories kit included

Product Presentation

The CML4 measures and quantifies the solid contaminants in hydraulic applications. The unit is designed to be an accurate instrument for applications using mineral oil as the operating fluid.

The unit can operate using any of the international standard formats ISO 4406, NAS 1638, AS 4059E&G Tables 1 and 2, ISO 11218, GBT 14039, GJB 420B, GOST 17216

The CML4 incorporates a connector for power as well as separate USB connections for connection to a personal computer for remote monitoring; settings access; and direct download to a USB memory stick.

The integrated data logger records up to 4000 test results internally, for use where a computer cannot be permanently connected.

The instrument utilises the light extinction principle whereby a specially collimated precision LED light source is used to illuminate the test media. This light is then captured via a photodiode module. When a particle passes through the beam it reduces the amount of light received by the diode, and from this change in condition, the size of the particle can be deduced and subsequently counted.

Product features

Metering pump

The CML4 is equipped with a high-performance metering pump, which delivers an accurate and consistent flow. It is suitable for both low and high viscosity liquids (≤ 400 cSt).

Moisture sensor

The CML4 measures water content using a capacitive RH (relative humidity) sensor. The result is expressed as percentage of saturation. 100% RH corresponds to the point at which free water exists in the fluid, i.e. the fluid is no longer able to hold the water in a dissolved solution. This is also normally the point at which significant damage occurs in a hydraulic system, making RH% an ideal measurement scale that is independent of the fluid characteristics.

The water saturation point (100% RH) is temperature dependent, so the temperature is measured at the same time. This enables results to be compared meaningfully.

The temperature measured is that of the fluid passing through the unit.

Note: This may differ from that of the hydraulic system, depending on flow rate, pipe length and ambient temperature.
It is not intended to be an accurate indication of system temperature, but to provide a reference for the RH measurement at the point of sample. Nevertheless, experience has shown the temperature measured is within a few degrees of that of the hydraulic system, in most applications.

PRODUCT OVERVIEW

Data logger

The CML4 includes a built-in data logger, which adds the facility to log and timestamp test results in the internal memory, even when not connected to a computer

- Each log entry is time-stamped and contains the CML4 serial number, so that it can be identified later
- The CML4 memory has space for around 4000 log entries. When full, the oldest log entry is overwritten

Data transfer via USB stick

All versions of the CML4 allow direct download to a USB data stick. With the CML4 powered ON, plug the USB data stick into the USB connector on the side of the unit.

The USB data stick icon appears on the right-hand side of the screen when the data stick is plugged in. The arrow icon pointing to the icon is visible when the CML4 tries to write the log file to the data stick. A successful download is denoted by a green tick emblem. If the download fails, a red cross icon will appear. If this error is present, the data stick may need to be re-formatted (formatting should be done to FAT32).

The icon will remain visible until the USB data stick is removed, at which point all the icons associated with the USB download function disappear.

The USB data stick provided with the unit is pre-formatted for the transfer. Other USB data sticks may need to be re-formatted (FAT32 or FAT32Ex filesystems, this is normal for file transfers between Windows systems and devices).

Optional Bluetooth printer

The CML4 can be used with an optional Bluetooth printer. Once connected, results will be printed as soon as the printer button is pressed.

Fluid compatibility product versions

M version: Mineral oils and synthetic fluids.

DECALARATION OF CONFORMITY

EC Declaration of Conformity

The products included in this Declaration are all variants of the following:

- With or without moisture sensor
- Compatible with mineral oil/ synthetic fluids
- With or without external bluetooth printer (optional equipment)
- With USB download
- With touchscreen display

For part codes see the Designation & Ordering Code (section 6.2 on page 39-40).

Product Manufacturer:
MP Filtri UK
Keep House
Conference Way
Vale Park South
Evesham
Worcestershire
WR11 1LB
01386 258500
sales-uk@mpfiltri.com

The products described are in conformity with the following directives:

2014/30/EU Electromagnetic Conformity

Certification Testing that has been carried out is in accordance with:

- DEF STAN 00-35 Part 3 issue 4 Environmental Test Methods
- BS EN 60068 range of standards covering environmental conditions
- BS EN 60529: 1992 + A2:2013 Degrees of Protection provided by enclosures (IP Code)
- BS EN 62262:2002 Degrees of Protection Provided for Electrical Equipment against External Mechanical Impacts (IK Code)
- BS EN 60721-3-4: 1995 Part 3: Classification of Groups of Environmental Parameters and their severities, Section 3.4

Date: June 2025

Signed:
Kris Perks (Managing Director) on behalf of MP Filtri UK Ltd

TABLE OF CONTENTS

1 General warnings and information for the operator

1.1 General safety warnings

Do not operate, maintain or carry out any procedure before reading this manual. Any individual operating the unit shall wear the following Personal Protective Equipment:

- Protective eyewear
- Safety shoes
- Gloves
- Overalls (or other suitable protective clothing)

Before carrying out any machine installation procedures and/or before use, one should scrupulously follow the instructions listed in this manual. Moreover, it is necessary to comply with the current regulations related to occupational accident prevention and safety in the workplace.

Notices aimed at the prevention of health hazards for personnel operating the machine are highlighted in this document with signs having the following meaning:

It relates to important information concerning the product, its use or part of this documentation to which special attention must be paid — NOTE

It means that failure to comply with the relevant safety regulations may result in mild injury or property damage. — CAUTION

It means that failure to comply with the relevant safety regulations may result in death, serious injury or serious property damage. — DANGER

Failure to comply with the relevant safety regulations may result in death, serious injury or serious property damage.

GENERAL WARNINGS

To allow rapid identification of the employees who must read this manual, the definition has been used with the following meaning:

OPERATOR	This is any individual whose task is to use the machine for production purposes. The operator is aware of all the measures taken by the machine manufacturer in order to eliminate any source of injury risk in the workplace and takes into account the operational constraints.

The unit shall be taken out of service and/or dismantled in accordance with the current regulations in force in the country where the machinery is installed

CAUTION

1.2 Dangers and hazards that cannot be eliminated

- Risk of hydraulic injection injury
- Burn risk because of high temperatures
- Accidental oil leaks with consequent risk of slipping
- Hose breakage and resulting lubricant loss
- With oil temperatures exceeding 40/45 °C (100/115 °F), it is vital to be extremely careful when handling the unit. Avoid direct contact with hot oil.

AFTER USE - ALL EQUIPMENT SHOULD BE ALLOWED TO COOL PRIOR TO HANDLING

1.3 Personal protective equipment

When operating the unit, personnel must be wearing safety shoes, gloves and goggles/safety glasses. In general, the PPEs to be used according to the activities on the machinery are listed in the following table:

ACTIVITY	PPE
Ordinary operation	Shoes, gloves, safety glasses, overall 

1.4 Precautions related to product handling of the liquid crystal touchscreen display

- If the LCD panel breaks, be careful not to get the liquid crystal to touch your skin.
- If the liquid crystal touches your skin or clothes, please wash it off immediately by using soap and water
- Avoid any strong mechanical shock which can break the glass.

2 Transportation and storage

2.1 Transportation and handling conditions

The unit is shipped in a cardboard box with appropriate protective packaging and these should be recycled accordingly where possible.

The packed weight of the CML4 and accessories is 12 kg (26.5 lbs)

2.2 Storage

The unit should be stored in a suitable location away from the production area when not in use.
The unit should be stored with the caps provided on the ports. This location should not impede any other production or personnel.

3 Warranty, Limitations and Disclaimers

MP Filtri warrants that the products that it manufactures and sells will be free from defects in material, workmanship & performance for a period of 12 months from the date of shipment.

Hardware/Firmware

Should the hardware prove defective during the warranty period, MP Filtri, at its discretion, will either repair the defective product or replace it with an equivalent product in exchange for the defective unit without charge for parts, labour, carriage and insurance.

Software

MP Filtri warrants that software will operate substantially in accordance with its functional specification for 12 months from date of shipment provided that the integrity of the operating environment has not been compromised through misuse, inappropriate handling, abnormal operating conditions, neglect or damage (unintentional or otherwise) or the introduction of third party product (software or hardware) that in any way conflicts with the MP Filtri product.

Eligibility

This warranty extends to the original purchaser only or to the end-user client of a MP Filtri authorised affiliate.

How to obtain service?

To obtain service under the terms of this warranty, the customer is required to notify MP Filtri before the expiration of the warranty period and to return the item in accordance with MP Filtri product return policy. Any product returned for warranty repair must be accompanied by a full fault report specifying the symptoms and the conditions under which the fault occurs. Should MP Filtri incur additional cost as a result of a failure to complete the appropriate paperwork, an administrative charge may be levied.

Exclusions

This warranty shall not apply to any defect, failure or damage caused by improper use or improper or inadequate care. MP Filtri shall not be obligated to provide service under this warranty if:

a) Damage has been caused by a failure to make a full and proper inspection of the product (as described by the documentation enclosed with the product at the time of shipment) on initial receipt of the product following shipment;

b) Damage has been caused by the attempts of individuals, other than MP Filtri staff to repair or service the product;

c) Damage has been caused by the improper use or a connection with incompatible equipment or product including software applications.

Charges

Under cover of this warranty, MP Filtri will pay the carriage and insurance charges for the shipment of defective product back to site of manufacture and for its return to the client's original site of despatch except when:
a) MP Filtri product return policy has not been followed.

b) Product failure is caused by any of the exclusions described above, when the customer will be liable for the full cost of the repair (parts and labour) plus all carriage and insurance costs to and from MP Filtri premises.

c) The product is damaged in transit and a contributory cause is inadequate packaging. It is the customer's responsibility to ensure that the packaging used to return equipment to MP Filtri is the same, or has equivalent protective qualities, to that used to ship the product to the customer in the first instance. Any damage resulting from the use of inadequate packaging will nullify MP Filtri

WARRANTY

obligations under this warranty. Should the customer's product be damaged in transit following a repair at MP Filtri site, a full photographic record of the damage must be obtained (packaging and the product) to support any claim for recompense. Failure to present this evidence may limit MP Filtri obligations under this warranty.

THIS WARRANTY IS GIVEN BY MP FILTRI IN LIEU OF ANY OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO ANY IMPLIED WARRANTY OF MERCHANTABILITY, NON INFRINGEMENT OR FITNESS FOR A PARTICULAR PURPOSE. MP FILTRI LTD SHALL NOT BE LIABLE FOR ANY SPECIAL, INDIRECT, INCIDENTAL OR CONSEQUENTIAL DAMAGES OR LOSSES (INCLUDING LOSS OF DATA), WE SPECIFICALLY DISCLAIM ANY AND ALL WARRANTIES TO CUSTOMERS OF THE CUSTOMER. THE CUSTOMER'S SOLE REMEDY FOR ANY BREACH OF WARRANTY IS THE REPAIR OR REPLACEMENT, AT MP FILTRI DISCRETION, OF THE FAILED PRODUCT.

MP Filtri Ltd maintains a policy of product improvement and reserves the right to modify the specifications without prior notice.

3.1 Warranty on Recalibration

The CML4 is guaranteed for 12 months upon receipt of the product, subject to it being used for the purpose intended and operated in accordance with this User Guide.
MP Filtri will only verify the accuracy of the CML4 if the unit is recalibrated every 12 months.

Please ensure that the test results in the Log are downloaded to CMP View before the CML4 is despatched, in case action taken by MP Filtri during the service / recalibration causes the Log to be cleared.

NOTE

It is requested that only the CML4, not the support case or any other ancilliaries, be returned for recalibration.
MP Filtri will not be held responsible for any items returned as such.
Ensure that the CML4 is packed appropriately for transportation.

3.2 Download Area

Please scan the QR codes below to get updated electronic version of the related document.

CONTAMINATION MONITORING PRODUCTS General catalogue

Download PDF

Scan or click me!

CMP View Software Quick Guide

Select your language and download PDF

Scan or click me!

CMP View Software Software multilingual

Download Software

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4.Technical Specification

4.1 Performance

Technology	LED Based Light Extinction Automatic Optical Contamination Monitor
Particle Sizing	>4, 6, 14, 21, 25, 38, 50, 70 µm
Reporting Standards	ISO 4406; NAS 1638; AS4059 Rev E, Table 1; AS4059 Rev E, Table 2 AS4059 Rev G, Table 1; AS4059 Rev G, Table 2; GBT 14039 GJB 420 B; GOST 17216, ISO 11218
Calibration	Each unit individually calibrated with ISO Medium Test Dust (MTD) in accordance with ISO 21018 - Part 1 and Part 4
Moisture & Temperature Measurement	% saturation (RH) and fluid temperature (°C / °F)
Accuracy	± 1/2 code for 4, 6, 14µm(c) ± 1 code for larger sizes

4.2 Electrical interface

Supply Voltage	18-19V
Supply Current	2.1-3.0A
Power Consumption	Charging state: ~40W max Idle state: 3W max Note: Power consumption level can vary dependant on fluid properties
Data Storage	Approximately 4000 timestamped tests in the integral memory
Display	7” (178mm) Capacitive touch-screen display with on board QWERTY keyboard 1024x600 pixels
Communication Options	USB, Wifi

TECHNICAL SPECIFICATION

4.3 Physical attributes

Dimensions	Width: 352mm / 13.8”. Height: 149mm / 5.8” (not including handle). Depth: 297mm / 11.7”
Weight	8.5 kg / 18.5 lbs
Hydraulic Connections	Online mode: (High pressure) M16 x 2 (test point) Offline mode: (Low pressure) Quick-release coupling Outlet quick-release coupling (standard)
Seal Material	NBR, Viton

4.4 Fluid characteristics

Fluid compatibility	M version - mineral oils, synthetic fluids and diesel
Viscosity	≤ 400 cSt
Fluid temperature	Minimum: +5 °C (41 °F) Maximum: +80 °C (176 °F)
Operating pressure	Offline: Minimum 2 bar (29 PSI) Online: Maximum 420 bar (6091 PSI)

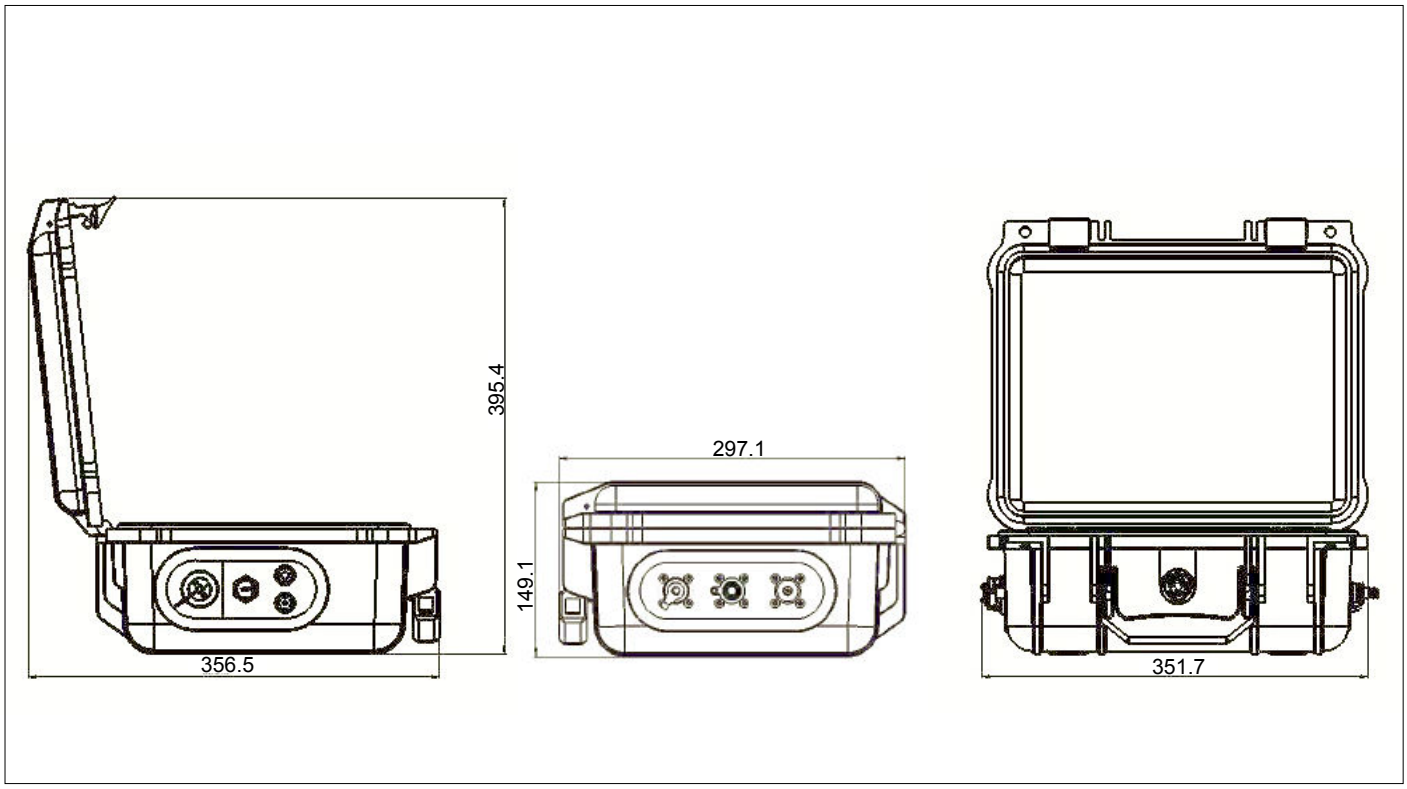
4.5 Environment

Ambient working temperature	Minimum: -10 °C (14 °F) Maximum: +60 °C (140 °F)
IP Rating	IP65 (Lid closed), IP54 (Lid open)

4.6 Wetted Parts

C46400 Cu Alloy
316 Stainless steel
PTFE
FR4
Sapphire
FPM

4.6 Dimensions



4.7 Designation & Ordering code

AUTOMATIC CONTAMINATION MONITOR CML4

Configuration example: CML4 | W | 0 | M | 00 | 1

Series
CML4 Light extinction Contamination monitor

Moisture Sensor
W With moisture and temperature sensor

Design Reference
0 Standard option

Fluid compatibility
M Mineral oil and synthetic fluids

Design Reference
00 Std option with full accessory kit and carry bag

Country Plug Type
1 UK (Type G)
2 US (Type B)
3 EU (Type F)
4 CN/AUS (Type I)

5. Product Installation and General Operation

5.1 Installation

Each CML4 supplied consists of the following:

- 1 x CML4
- 1 x M16x2 Microbore pressure hose, 1500mm long + pouch
- 1 x 2000 mm Quick release waste hose + pouch
- 1 x 1L Waste container
- 1 x Power cable and regional adaptors (UK/EU/US/CN/AUS)
- 1 x USB Stick with digital copies of product user guides, CMP View software, accessory products, drivers and product brochures
- 2 x Hard copy certificate of calibration
- 1 x Carry bag
- 1x 1500 mm quick-release offline hose and pouch (Low pressure)
- 1x USB C to USB A cable

Pressurised system
(online) mode
(high pressure)
M16 x2 test point

Offline suction inlet
quick-release coupling

Waste Outlet
quick-release coupling

Power switch

DC charging port

USB C Connection port

USB data stick download port

5.1.1 Physical procedure

Identify appropriate safe sample points and waste disposal routes.

Do NOT connect the system at this point. See section 6.4 for a detailed walkthrough.

CAUTION

Do NOT connect the waste hose to a pressurized system. This will cause the CML4 to malfunction and could cause internal damage. There must be no extra restriction placed on the waste hose, this must be vented to atmosphere.

NOTE

5.1.2 Electrical interface

The power on/off button is located at the side of the unit, see Section 6.1.

Pressing this will cause the CML4 to switch ON and startup screen will show on the display, see Figure 6.2.

The charging port for the internal lithium ion battery is located directly below the power switch.
To engage the power connector, you must align the white arrow on the cable connector with the white line at the top of the chassis plug on the device itself.
Engage this fully and then rotate approximately 60° clockwise.
Reverse this action to remove the power charge cable.

The CML4 is designed as a standalone portable unit. However, if you wish to connect the product to a computer and use the product with CMP View software then this can be done via a USB A to USB C cable (this is provided with the unit).

The cable is plugged in to the USB connector (See section 5.1). The other end of the cable can then be connected to a PC that has MP Filtri's bespoke CMP View software loaded for communication/log download/remote control.

Please go to: https://www.mpfiltri.co.uk/FilesProdotti/CMPViewSoftwareQuickStartGuideEN.pdf for further information on using the CMP View software.

There is also an option to expedite the log download direct to a USB data stick. An FAT32 formatted memory stick can be plugged to the 'A type' connector located on the side of the unit, to the left of the PC connection.

To ensure IP rating of the product is always met, caps for the USB connection MUST be reconnected after use

NOTE

5.2 General operation

5.2.1 Physical checks

- Oil leaks on and around the unit
- Fatigue in hoses and pipework that might then leak when under system pressure

5.2.2 Front panel operation and calibration due date

When the unit is first turned ON, the flash screen shown in figure 6.1 (below) will appear.

The due date for recalibration of the product is stated in the center of the screen. This can also be found in the settings page of the unit.

To progress to the main user screen, select the arrow in the bottom right corner of the screen.

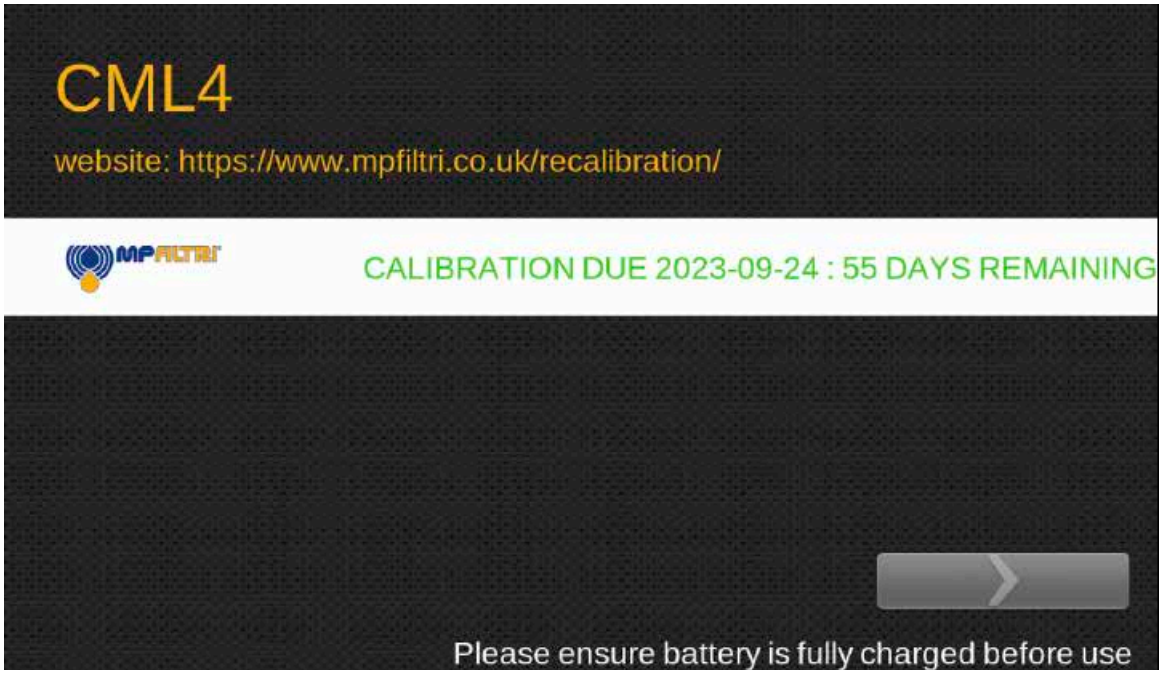


Figure 6.1 - CML4 Flash Screen

PRODUCT OPERATION

5.2.3 Home screen

Note: upon initial start-up, the home screen will be blank until tests have been completed.
Once test results are present in the product memory, the home screen will be laid out in the following manner.

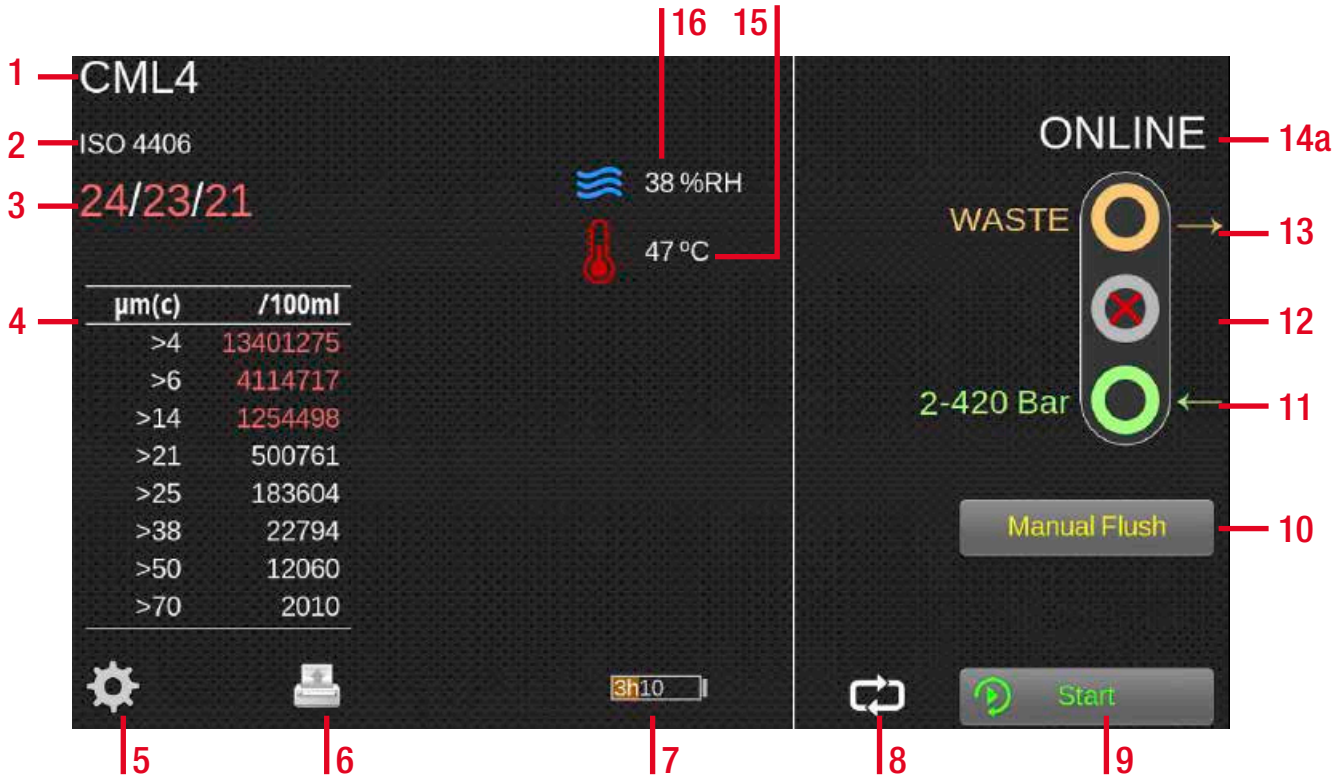


Figure 6.2 - CML4 Home Screen

Items:

1. Test reference
2. Test format
3. Last test result
4. Detailed results viewer
5. Settings
6. Printer
7. Battery charge status
8. Continuous/single test mode
9. Test start/stop button
10. Manual flush operation button
11. Online inlet port (Pressurised system Mode)
12. Offline inlet port (Unpressurised system Mode)
13. Outlet port
14a. Online testing mode
14b. Offline testing mode
15. Temperature result
16. RH result

5.2.4 Test reference

Home screen - Item 1. Programming of the test reference can be done by pressing the test reference icon. Here you can change the test reference as required, up to 31 characters. (Fig 6.3)

To confirm any changes, you must select “OK” with the green tick icon. To ignore any changes made; either select “CANCEL” via the red X icon, alternatively, the home screen icon in the bottom left corner can also be used (Home screen - Item 16, figure 6.2).

Figure 6.3 - Test Reference Screen

5.2.5 Test format

Home screen - Item 2. Selecting the test format icon will open a new screen, (fig. 6.4), where the result format can be changed.
When changing the format, the desired format must be selected and then the tick icon in the bottom right corner pressed to confirm.

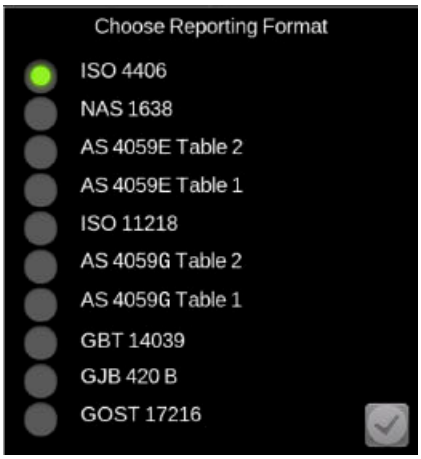


Figure 6.4 - Reporting Format Screen

5.2.6 Last test result

Home screen - Item 3. This is where the last test result is shown.
If no tests have been carried out since the unit has been turned on, then -/-/- will be displayed.

5.2.7 Detailed results viewer

Home screen - Item 4. This area shows the detailed counts information for the last test result. (Fig 6.5)

Figure 6.5 - Detailed Results

5.2.8 Settings

Home screen - Item 5. Selecting the Settings Icon (Fig 6.6) will open the options screen. The sub-menu of the options screen can be viewed at section 6.3

Figure 6.6

5.2.9 Printer

Home screen - Item 6. Tapping the printer icon (Fig 6.7) will print the last test result in the result format currently displayed on the screen. The printer operates via Bluetooth and is an optional extra. For more information on setting up the printer please go to Section: 6.5

Figure 6.7

5.2.10 Battery status charge

Home screen - Item 7. The charge percentage level (Fig 6.8) is shown here in the top right corner of the home screen. The colour of the battery matches that of the LED:

Figure 6.8

Green - More than 70% level of charge remaining
Yellow - Between 20-70% charge
Red - Below 20% charge

The graphic also shows an estimated time associated with the charge remaining in the battery.

5.2.11 Continuous test

Home screen - Item 8. A continuous test is allowed in online mode only by pressing the related icon (Fig 6.9)

Figure 6.9

5.2.12 Test type toggle mode

Home screen - Items 9-14. The CML4 toggles between online and offline mode by simply tapping this area. Select the Offline icon to activate a sample for an unpressurised system. (Fig 6.10)

Select the Online icon to choose the online test. Press on the continuous / single test Mode Icon to choose your preferred test type. (Fig 6.12).

Figure 6.10

Figure 6.11

Figure 6.12

5.2.13 Test start/stop operation

Figure 6.13

Home screen - Item 9. Selecting this icon will start and a sample/test. (Fig 6.13)

During a test the icon will 'fill' to show how much of the sample volume has been performed.

5.2.14 Manual flush operation

Figure 6.14

Home screen - Item 10. Selecting this icon will allow a free flow of fluid through the unit.

This allows for any previously tested fluids to be purged from the hoses and the unit itself, thus reducing the risk of cross contamination as well as providing relevant fluid that is more indicative of what is occurring within the system at the time of test.

It is recommended, when using the unit from a fully contaminated hydraulic system to a fully clean hydraulic system to run a manual flush for around 8-10 minutes.

A manual flush must be performed if the auto flush is not selected. Failure to flush/purge fluid from the unit and hoses will result in anomalous results and can affect the cleanliness reading achieved during the test.

NOTE

5.2.14.1 Normal test

Pressing the start button will operate the test procedure.

Figure 6.15

Figure 6.16

5.2.14.2 Continuous test

Continuous test is allowed in online mode only by pressing the related icon (Fig 6.17 / 6.18)

Figure 6.17

Figure 6.18

5.2.15 Temperature result

Home screen - Item 15. The last temperature result taken will be displayed here (Fig 6.19). The temperature / water sensor can be enabled/ disabled in the settings screen as detailed in section 6.3.1.

Pressing the temperature result, will alternate the reading between degrees Centigrade and Fahrenheit.

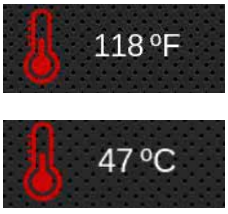


Figure 6.19

5.2.16 RH result

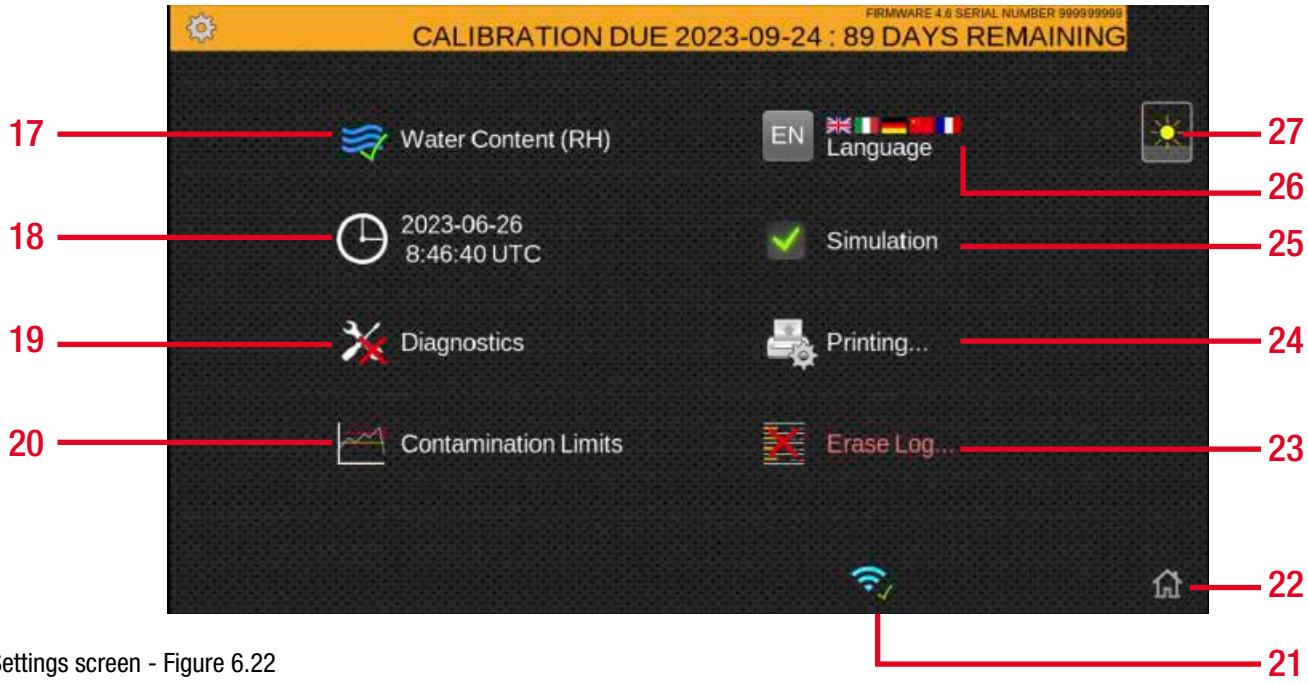
Home screen - Item 16. The last RH test result will be displayed here (Fig 6.20). The temperature / water sensor can be enabled/ disabled in the settings screen as detailed in section 6.3.1

Figure 6.20

5.3 Settings menu

Home Screen - Item 5. Selecting this icon will bring up the settings screen. This will allow you to modify settings in further detail.

Figure 6.21



Settings screen - Figure 6.22

Items:

17. RH test enabled
18. Time settings
19. Diagnostics
20. Contamination tolerance limits
21. Wifi enabled
22. Home
23. Erase log
24. Printer settings
25. Simulation enabled
26. Language
27. Brightness

PRODUCT OPERATION

5.3.1 Water content (%RH)

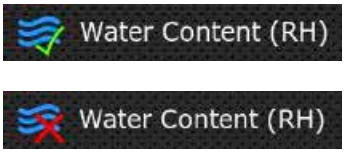


Figure 6.23

Settings Menus - Item 17. Tapping this icon will either enable or disable the RH sensor. This will remain the same until it is selected again and will not default back when the unit is turned off.

If the icon has a green tick (Fig 6.23), then the RH option is enabled and if a red X is showing then the RH option is disabled and will not show on the test result.

5.3.2 Time settings

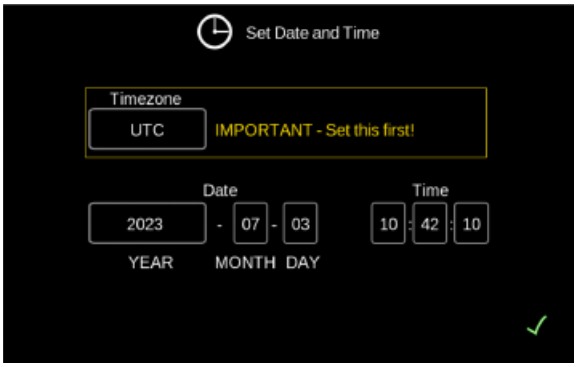


Figure 6.24

Settings Menus - Item 18. Pressing this icon allows the date and time to be set. It is important to always set the Timezone first (Fig 6.24).

5.3.3 Diagnostics

Figure 6.25

Settings Menus - Item 19. This icon is to view the diagnostics screen (Fig 6.25). This is not accessible by end user and is only for MP Filtri personnel during calibration / repair.

5.3.4 Contamination tolerance limits

Figure 6.26 - Detailed Results

Settings Menus - Item 20. This icon allows access to setting of the alarm levels associated with the selected reporting format.
Alarms can be set on combinations of cleanliness codes, water content and temperature. The available codes, and their interpretation, vary according to the set test format. For example, it is possible to set a threshold of “NAS 11” or “ISO 18/16/15” or “AS4059E 8B-F”, etc.

In general, there are upper and lower limits that can be set for the cleanliness level, also for water content and temperature if applicable. An alarm, if enabled, will become active if any of the associated (upper/lower) limits are exceeded.
However, if a field is left empty (blank) this is interpreted as a “don’t care” setting.
Alarms are colour coded: The result is coloured:
- Green if not greater than the lower limit, or else it is
- Yellow if not greater than the upper limit, or else it is
- Red

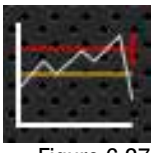


Figure 6.27

ISO 4406 / GBT 14039 alarm levels

ISO4406 represents cleanliness using codes for the number of particles greater than 4, 6 and 14 µm. These codes can be used as limits for the alarms by selecting the ISO 4406 test format and then entering values as required (fig. 6.28).

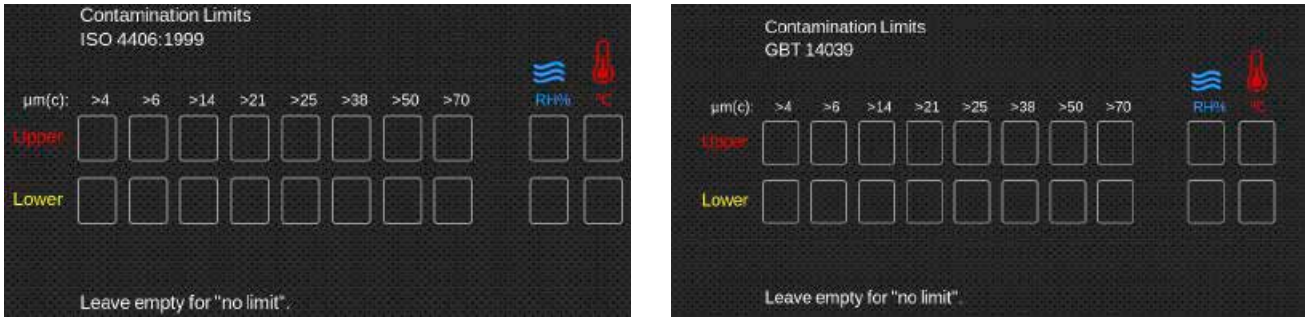


Figure 6.28

NAS1638 alarm levels

NAS1638 can be used by selecting this as the test format. The headings and boxes for the available settings change appropriately. NAS1638 represents the overall cleanliness level as a single code, this being the highest of the individual codes generated for each defined particle size. Hence, we have the option of setting a limit on this overall contamination class (the Basic Class), or we can set individual limits on any combination of the classes for the defined particle size ranges (fig. 6.29).

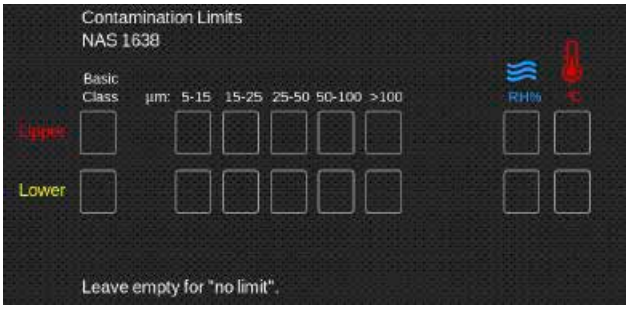
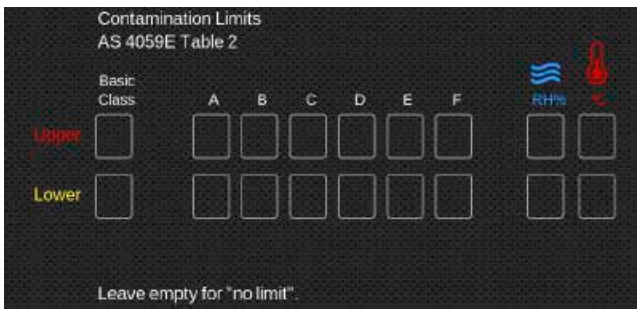


Figure 6.29

AS4059E Table 2 / AS4059G Table 2 alarm levels

AS4059E Table 2 uses letters instead of numbers to indicate the particle size range, so the settings are labelled appropriately. The standard specifies ways to represent a cleanliness level using only a subset of the available particle sizes, for example B-F. The user can achieve this by only entering settings for the sizes desired, leaving the others empty. So, a limit of AS4059 7B-F could be represented simply by entering a value of 7 for B, C, D, E, F.

AS4059G Table 2 is identical except the letters have been replaced by the numerical particle size values (fig. 6.30).



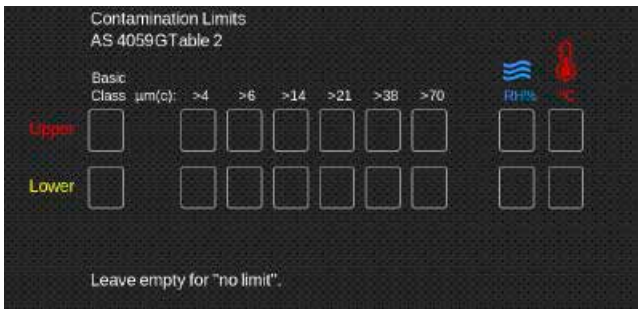


Figure 6.30

AS4059E Table 1 / ISO 11218 / AS4059F Table 1 / GJB 420 B alarm levels

These four standards are similar except for terminology and reporting format. The actual numeric sizes and class thresholds are the same. Should an alarm exceed the programmed level, the corresponding format will show in the appropriate code/class (fig. 6.31)

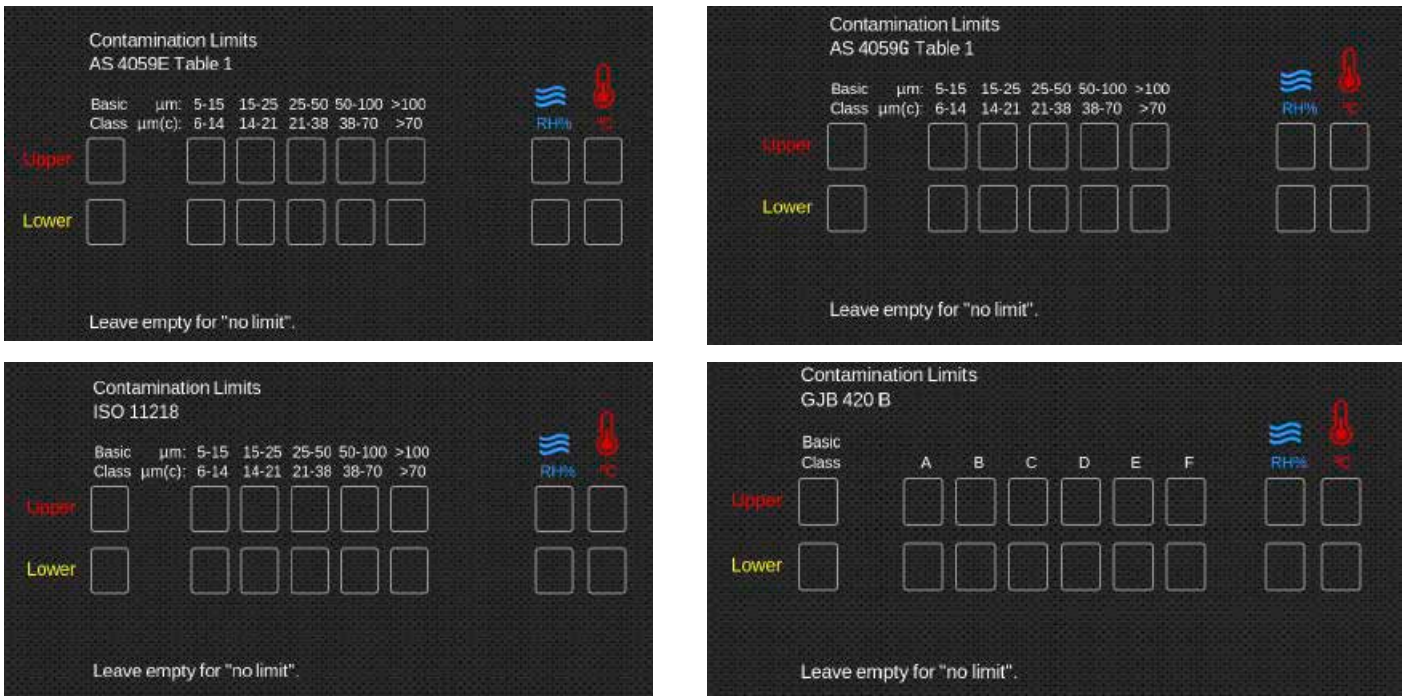


Figure 6.31

5.3.5 Historical results and trend monitoring

To gain access to historical data, connect your CML4 device to a PC or Mac via the USB C cable port. You can also connect via a USB data stick with results exported from your machine.

Download MP Filtri's CMP View software from mpfiltri.com/download.

Once the CML4 is connected to the software you can view historical data and trend monitoring.

To connect to the software and master its functionality, see our training video at: https://youtu.be/Exvv343EAfI

CMP View - figure 6.33

5.3.7 Wifi

Settings Menus - Item 21. Click on the Wifi icon (Fig 6.35) to connect to your local wireless internet network. The IP address allocated to the network can be used to view live data when the CML4 is in operation.

Figure 6.35

5.3.8 Home icon

Settings Menus - Item 22. This icon shows in all screens (Fig 6.36). Selecting this at any point will revert the unit to the home screen.

Figure 6.36

5.3.9 Erase logs

Settings Menus - Item 23. Pressing the Erase Logs / Delete History icon will erase all records held within the CML4 memory.

Figure 6.37

Before proceeding with the deletion, the unit will ask for confirmation, (fig.6.38)

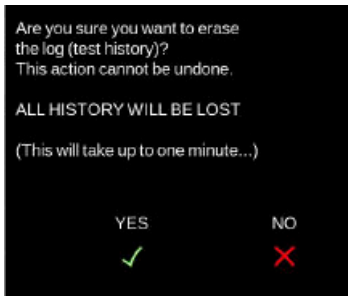


Figure 6.38

It is important to ensure/verify that your log results have been downloaded and saved prior to deleting from the unit. Once the test history has been deleted from the unit, it cannot be reversed, all history will be lost.

NOTE

5.3.10 Printer

Settings Menus - Item 24. This icon enables the user to modify the printer settings. Selecting the icon will bring up a new screen where each option can be selected or deselected (fig. 6.39).

Figure 6.39

These settings will save when the tick is pressed in the bottom right hand corner.

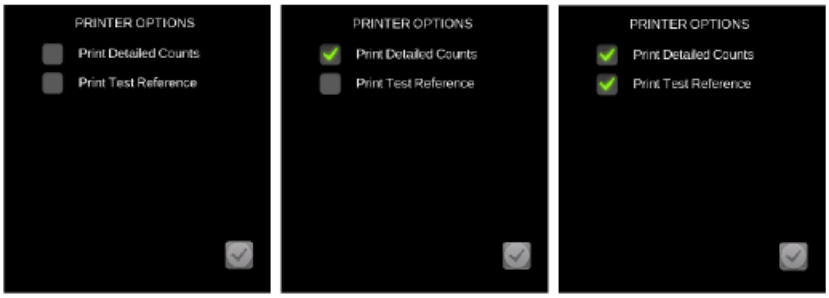


Figure 6.40

5.3.11 Simulation

Settings Menus - Item 25. The simulation icon is mainly for demonstration purposes. If there is a tick present, then the simulation mode is enabled and when the test start icon is selected on the home screen the test process will run as a simulation on the screen. No physical operation of the internal components will occur. Please note, this will stay enabled if the product is turned off.

Note: if the unit is accidentally left in Simulate mode, a warning will flag on the top right-hand side of the user screen

Figure 6.41

5.3.12 Language

Figure 6.42

Settings Menus - Item 26. The CML4 is equipped with multiple languages, the default language is set to English (Fig 6.42). To alter to a preferred language, press the language icon, a selection window will open.

Select the language required, the window will close, and the language will automatically change to your selection.

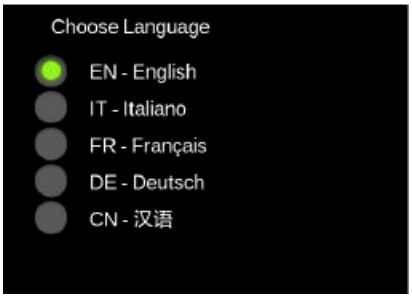


Figure 6.43

5.3.13 Brightness slider

Figure 6.44

Settings Menus - Item 27.
Sliding your finger up and down the icon (Fig 6.44) will respectively increase and decrease the display brightness. Tapping the icon will change the brightness to the point where it is tapped.

PRODUCT OPERATION

5.4 Sampling Procedure

5.4.1 Offline mode (unpressurised)

Step 1: Connect the waste hose (Fig 6.45) to a waste receptacle (Fig 6.46) and then connect to the CML4 waste outlet quick-release attachment.

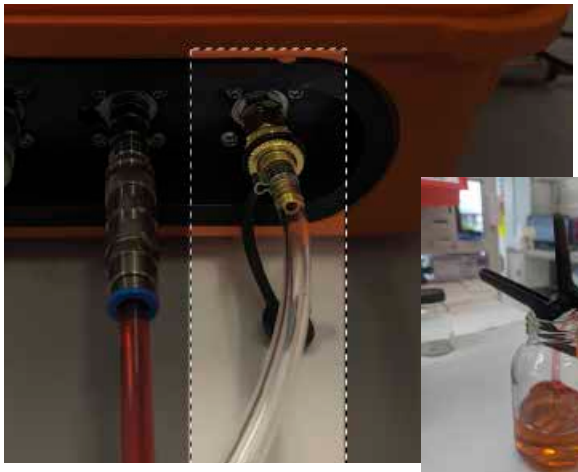


Figure 6.45

Figure 6.46

Step 2: Connect the suction hose onto the CML4 low pressure inlet quick-release attachment (Fig 6.47)

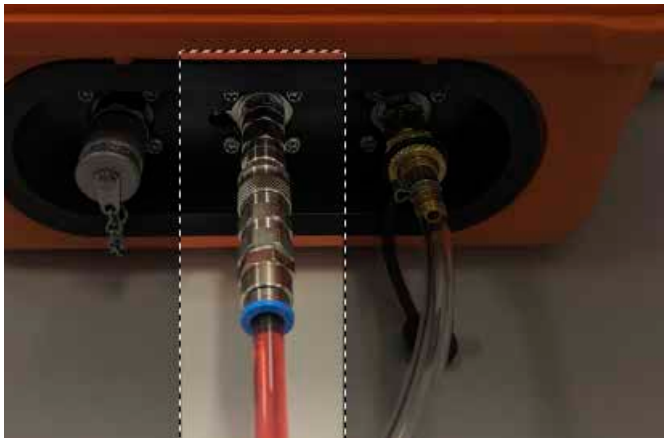


Figure 6.47

Ensure only one inlet hose is connected when testing. Do not conduct tests with more than one inlet hose connected

NOTE

Step 3: The CML4 is now ready to take samples from low-pressure offline systems. To begin sampling switch to offline mode on your device (See 14b on CML 4 Home screen overleaf) and press start.

Figure 6.48

Step 4: The results will appear on the main screen. You can also print off a hard copy with the optional bluetooth printer.

5.4.2 Online Mode

Step 1: Connect the waste hose (Fig 6.49) to a waste receptacle (Fig 6.50) and then connect to the CML4 waste outlet quick-release attachment.

Figure 6.49

Figure 6.50

Step 2: Connect the suction hose to the CML4 high pressure inlet first. THEN connect to the high pressure test point on the system. Please refer to the safety instructions in Section 1.1 (Page 8)

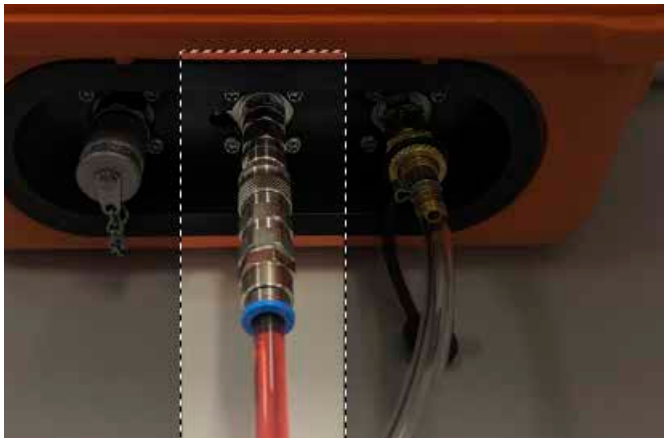


Figure 6.51

Ensure only one inlet hose is connected when testing. Do not conduct tests with more than one inlet hose connected

NOTE

Step 3: The CML4 is now ready to take samples from pressurised systems. To begin sampling switch to online mode on your device and press start (Fig 6.52). Press on the Continuous/Single test Mode Icon (fig 6.53) to choose your preferred test type.

Figure 6.53

Figure 6.52

Step 4: The results will appear on the main screen.
You can also print off a hard copy with the optional bluetooth printer.

PRODUCT OPERATION

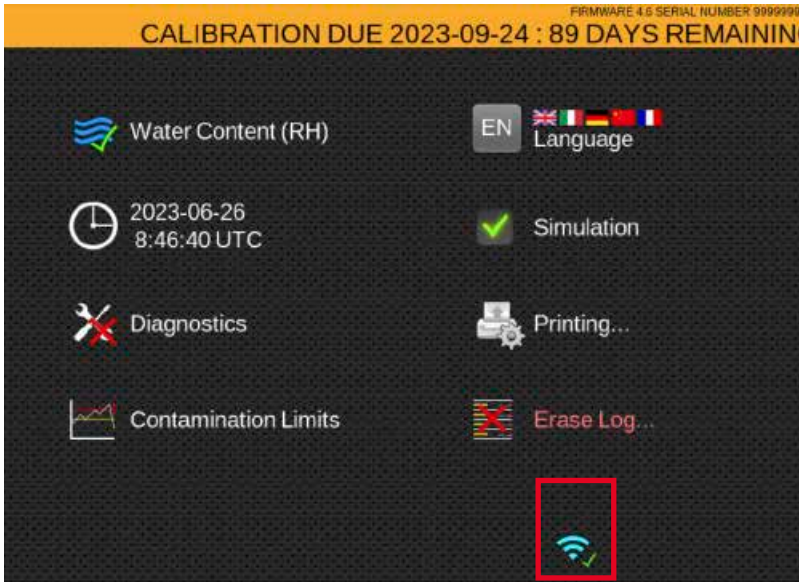
6.5 Connecting the printer to the CML4

Step 1:

To pair the thermal Bluetooth printer - Turn on the CML 4.

Step 2:

Go to the ‘Settings’ screen and make sure the Wifi icon has a green tick. See red box below.



PRODUCT OPERATION

Step 3:

Press the ‘on’ button on the printer until it starts buzzing. See red box below.

Step 4:

The LED button on the printer should now switch to green. This indicates that the printer is on and is automatically pairing with the CML4. See the red box below. Once the LED colour changes to blue, the printer is now paired with the CML4 and is ready for use.

.

5.6 CML4 removal and product maintenance

When disconnecting the CML4 from the system ensure the system pressure is shut off from the CML4. Ensure hydraulic system is unpressurised.

- Press manual flush button to flush unit
- For online mode: Disconnect the high-pressure hydraulic hose from the M16x2 test point on the system. For offline mode: Disconnect the related hose from container
- Disconnect the hose from the particle analyser High pressure (online) test point connector or Low pressure (offline) quick-release coupling.
- Allow any fluid to drain from the hose into the waste container.
- NOTE: Ensure any spillages are cleaned up and that all fluids are disposed of in accordance with local legislations
- Wipe away any residual oil from around the connectors in the CML4 bulkhead and then replace the caps

5.7 Disposal

All CML4 products are sent in a cardboard box with appropriate protective packaging and these should be recycled accordingly where possible.

Fluids used with the CML4 should be fully drained and disposed of according to EU waste framework directive and ISO 14001 Environmental Management.

6 Spares

6.1 Accessories

Bluetooth Printer: MP Filtri item number: 482.016000

Wireless, Bluetooth 4.0, Direct heat printer with no expensive ink replacement required. Compact, quiet, high-speed printing.

6.2 Spares

Description (Product types)	Ordering Code
Calibration Verification Fluid (requires use of Bottle Sampling device)	PCCF
M16x2 microbore pressure hose, plated steel, 600 mm (M versions)	95.Y30Y30X261060
M16x2 microbore pressure hose, plated steel, 1500 mm (M versions)	95.Y30Y30X261150
Waste Hose (M versions), 2000mm - Brass/FKM	SK0014S30
Offline Hose Assembly	481.027000
Pouch for inlet pressure/offline hose and waste hose	7.106
M16x2 M to F Coarse Screen Filter (M and N versions)	SK0040
1 Litre - Square (for use with CB0001)	SK0013
Bluetooth Portable Printer	482.016000
1m USB A to C Cable	443.074000
USB stick with all user guides and CMP View Software	13.055001
19V, 3A Power Adapter	61.034000
UK Lead for Power Adapter	8.031
EU Lead for Power Adapter	8.032
US Lead for Power Adapter	8.030
CN/AUS Lead for Power Adapter	8.072
Thermal printer paper 57x33mm	63.083000
CML Carry Bag	10.011

7 Troubleshooting / FAQ

7.1 Misuse of product

- The product should be connected to a power supply within the rating of the product and not wired directly to the mains
- This product should be connected to a hydraulic line; this must be within the pressure range of the unit (2 to 420 bar) (>29 to 6091 psi).
- Connection hoses should never be allowed to lie along the floor when the CML4 is installed and in use
- The operator should follow all standard operating procedures previously set at the operating location as well as the procedures required by the manufacturer
- The CML4 is not suitable for use in an explosive environment or an ATEX zone
- Over-tightening of test points/ hoses can damage threads causing the unit to fail

7.2 Fault finding

Unexpected results obtained from sample

- Check that the microbore pressure hose has been fully connected at both the system and CML4 ends.
- High water / aeration levels
- Antifoam additive package within sample fluid
- Remote Device dialogue not responding to buttons being pressed
- Check that correct COM port has been selected in the Remote Device dialogue.
- Check USB driver has been installed.
- Disconnect power supply to CML4 and then reconnect it.

If the CML4 has been subjected to excessive contamination and a blockage is suspected, a flush with a suitable fluid (such as hydraulic mineral oil) may clear the blockage.

DO NOT USE ACETONE

TROUBLESHOOTING

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