GRM302

Portable filtration rig with contamination monitor (ICM unit)

User Guide

www.mpfiltri.co.uk

200.159-EN

Safety Warning

Hydraulic systems contain dangerous fluids at high pressures and temperatures. Installation, servicing and adjustment is only to be performed by qualified personnel.
Do not tamper with this device.

Contents

1 Introduction

The GRM302 is a mobile filtration unit which is designed for hydraulic fluid cleaning applications. The unit is designed to control particulate contamination to within the defined limits described in ISO4406 and relevant to the filtration size being utilised. This unit is designed for filtration of unpressurised systems by a competently trained engineer or a trainee under supervision with basic knowledge of hydraulic equipment and fittings.

Please Note The GRM302 is designed for use with ISO VG 32 or equivalent mineral oils working at a working temperature of 20°C +. When operating at lower temperatures and/ or using more viscous oils the performance of the unit will be reduced. Please contact MP Filtri UK for details on compatible fluids. We also recommend that the unit is not altered in any way without prior permission from MP Filtri UK - such as the addition of quick release couplings or change of hoses, as this could affect the performance of the unit.

In complicance with Machinery Directive 2006/42/EC

- Pre-filling of housings - Where the housings of hydraulic pumps and motors require pre-filling with fluid prior to start up, a readily accessable and marked means for pre-filing shall be provided and be located to ensure that air is not trapped in the housings.
- Cleanliness level of fluid - The cleanliness level of hydraulic fluids, expressed in accordance with ISO4406, shall be suitable for the most contaminant-sensitive component in the system. Note 1: Commercial hydraulic fluids might not exhibit the required cleanliness level when delivered. Note 2: Contamination of the fluid can affect the electrical conductivity of the fluid.

- Filling points - All filling points for fluids shall be clearly and permanently marked. Filling points should be fitted with sealed and captive covers to prevent the ingress of contaminants when closed. Contamination during filling shall be prevented by filtration or other means. Where this requirement is not feasible, maintenance and service information shall be provided.
- Filtration - Filtration shall be provided to maintain the required cleanliness level of the hydraulic fluid expressed in accordance with ISO4406. If the required cleanliness cannot be achieved with a main filter system (i.e. pressure or return line filter), a separate off-line filtration system may be used.
- Identification statement (reference to this international standard) It is strongly reccommended to manufacturers who have chosen to conform to this International Standard that the following statement be used in test reports, catalogues and sales litereature: "Hydraulic systems and their components are in accordance with ISO4413:2010 Hydraulic fluid power - general rules and safety requirements for systems and their components."
  This product complies with the BS EN ISO4413:2010 Hydraulic Fluid Power - General rules and safety requirements for systems and their components.

Applications

- Pre-filtering and transferring oil systems
- Filtering and continuous cleaning of systems
- Removal of free water from hydraulic systems[1]
- Filter and monitor systems to a desired ISO4406/ NAS1638/ AS4059 Rev E cleanliness level

[1] For standard 30L/m unit only (spin on type elements).

Benefits

- Extended oil life
- Less frequent oil disposal
- Decrease equipment deterioration
- Improve system productivity

The ICM measures and quantifies the numbers of solid contaminants in hydraulic, lubrication and transmission applications.
The ICM is designed to be an accurate instrument for permanently installed applications utilising mineral oil as the operating fluid.
The unit can operate using any of the international standard formats ISO 4406:1999, NAS 1638, AS 4059E and ISO 11218.
The ICM incorporates a serial data connection for comprehensive remote control and monitoring.
The integrated data logger records up to 4000 test results internally, for use where a computer cannot be permanently connected.
Simple switched inputs and alarm outputs are provided as alternative means of controlling the testing and signalling the results.
The "full colour" front panel led provides a basic indication of the cleanliness level.
The graphical LCD and keypad allow direct local display of the results in any selected format.
ICM-W models also perform a measurement of % saturation of Water in oil (RH), and fluid temperature (°C).

Figure 1

2 Specification

Motor	0.75 kW electric motor with 5 bar bypass across pump
Power supply	Standard options available 110V, 240V and 415V, other supply options are available, please contact MP Filtri
Connection Rating	110V 16A 3 pin, 240V 13A 3 pin BS1363.
Flow rate	30L/min
Control	Electric control box
Indicator	Delivery line visual indicator with combined electric cut out switch to show change of filters is required.
Fluid compatibility	Mineral oil compatible - please contact sales team for queries about other fluids
Hoses	Flexible hoses - 2m long suction and outlet hoses with 1m lances
Mounting	Portable heavy duty trolley and wheels
Inlet	Inlet (pump protection) filtration - plastic washable 173µm
Filtration	Delivery filtration "spin -on" type, bypass set at 1.75 bar. Water removal element available see section 4 for all filtration options
Viscosity	150 cSt maximum fluid viscosity

Ambient working temperature	0°C Min to 35°C Max
Noise	75dB next to unit
Dimensions	860mm(H) x 500mm(W) x 560mm(D)
Weight	55kg with oil in the trolley

For ICM specification please see ICM brochure
As a policy of continual improvement, MP Filtri reserve the right to alter the specification without prior notice.

2.1 Warranty and Recalibration

Warranty	The GRM302 is guaranteed for 12 months from date of receipt.

3 Operating Instructions

3.1 Before operation

– Ensure that the operator is wearing appropriate personal protection equipment when operating the GRM302.
– The GRM302 should be situated on a sturdy base and not at an angle.

Figure 1

– Check for any damage to the unit such as a kink in the hoses, product is not to be used if this is the case.

Figure 2

- Check that all fittings are tight.
- Check that the motor voltage corresponds with the supply voltage.
- Check filter element and seal compatibility with the fluid.
- Ensure any anti-whip fixing are securely attached to the drum/ reservoir.
- Ensure inlet and outlet hoses are held securely by any anti-whip fixings.
- Ensure the outlet hose is located higher than the inlet hose and sufficient fluid is available.
- The area of operation should be clearly marked; for example with cones.

Figure 3

- The area around where the GRM302 will be operated should be made safe; i.e. any potential hazards removed.
- The operator should identify the location of the isolation of the mains power in case of need for emergency stop.
- The operator should identify the emergency stop of the power supply used, in case of need.

– Please note the operator is responsible for meeting all COSHH requirements when using this product.

3.2 415V Version Installation

With the 415V units the direction of flow needs to be determined to be correct through the pumps and filters.

1. The inlet lance needs to be positioned in the oil reservoir below the level of the oil.
2. The outlet lance needs to be positioned in the oil reservoir above the level of the oil.
3. After the initial operation checks have been completed the unit can be turned on.
4. If there is a flow of oil the GRM302 can be used.
5. If there is no flow then there is reverse flow and the outlet lance is currently acting as the inlet.
6. If this is the case the GRM302 should be moved to a suitable location (after isolating the power supply) and a qualified electrician should swap the cables connected to the L1 and L2 pins in the plug. Then repeat the above checks to test the flow.

   Note: Reverse flow through the filters will damage them and they will have to be replaced immediately.

3.3 During operation

– If all checks pass then press the green ‘on’ button.
– Monitor the outlet filter indicator during normal operation and change the element when the visual indicator turns to

red. The unit should be switched off and the power supply isolated BEFORE following the instructions in ‘Product Maintenance’.
– See 4 for the recommended filter and duration of cleaning for the required application.

3.4 After operation

– Before stopping the GRM302 pull the inlet hose out of the fluid and allow the pump to clear most of the oil out of the pipes, then stop the pump and isolate the power supply.
– Following this, allow fluid to drain for at least 1 minute and replace the lances in the lance holder before transporting the GRM302 to a new location.
– If a different oil is used, filters should always be replaced- before filters are replaced the new oil should be flushed through the GRF to waste for at least 30 seconds.

3.5 Product Maintenance

Tools required for product maintenance
Specialist Tools: Boa constrictor strap can be purchased from MP Filtri UK (please note this is a filter removal tool only)
MP Part Number: 12.156
Standard Tools Spanners: sizes 37mm and 40mm
– Always switch the unit off and disconnect the unit from its power supply prior to changing the filter elements or opening the control box.
– Using the boa constrictor strap remove the element by positioning as shown in the image below and then rotating in a clockwise direction when looking from above.

Figure 4

WARNING: DO NOT USE BOA CONSTRICTOR TO TIGHTEN FILTER

- Filter to be retightened to hand tight by rotating in an anti-clock-wise direction when looking from above.
- Clean up any spilt oil on the unit.
- Hoses are to be replaced as soon as any damage is identified.

4 Filters

Outlet filtration options available:

- CS150 A Series 3, 6, 10 and 25 micron absolute
- CS150 P Series 10 and 25 micron nominal P10 is standard supply for initial filling applications

GRM302 Water removal options available:

- CW150 P series 10 and 25 micron nominal removing 0.79 litres of water while filtering oil at 10 or 25 micron nominal filtration

Figure 1

5 System Cleaning Recommendation

The following table is a guide to typical system cleaning

Typical hydraulic applications	Cleanliness class required		Outlet filter required	
Component types	ISO4406 code	NAS1638	Type	Element types
High performance servo-valves	15/13/9	3	3 micron absolute	A03
Industrial servo-valves	16/14/10	5	3 micron absolute	A03
Piston pumps, proportional valves, compensated flow controls	17/15/11	6	6 micron absolute	A06
Vane pumps, spool valves	18/6/13	7	6 or 10 micron absolute	A06, A10
Gear pumps, manual and poppet valves	19/17/14	8	10 or 16 micron absolute	A10, A16
Ram pumps	20/18/15	9	25 micron absolute	A25

Reservoir capacity (litres)	400	600	800	1000	1200
Cleaning time (hours)	2	3	4	6	8

Notes:

1. The clean up rates are based on an initial contamination level of ISO4406 23/21/19 (NAS1638 Class12).
2. More than one filter element may be required to obtain the cleanliness code stated above.

Figure 1

6 Six Steps to Better Fluid Handling

- Utilising the GRM302 series filtration units

1 Pre-filter new oils before using them

Most new oils are heavily contaminated with dirt and moisture. Regardless of how it is packaged (Bulk or Drums). It must be filtered first through a filtration unit. This single practise alone can reduce contamination significantly.

2 Off-line units can dialysis oils

Most people only use their filtration units to transfer oils, but they should also be used to clean the oil inside hydraulic reservoirs, gear boxes, turbines and other machinery. This is usually called offline, kidney loop or dialysis filtration. This is an extremely effective and simple way to reduce contamination. Make up a schedule, keep your filtration unit in circulation on your equipment, in addition to using it for cleaning new oils and for transferring oil. A portable filtration unit should be every oil handlers primary tool for their job.

3 Make oil handling safer, cleaner and better

A lot of plants and factories have portable filtration units, but they are rarely used to their full potential, due to lack of basic maintenance. If you provide your oil handlers with safe,

clean, easy to use and effective oil handling products, they will use them more. The benefits include more productivity, higher profitability, less labour and part costs, less oil consumption and disposal costs, less injuries and oil spills.

4 Use only absolute rated filter elements

When ordering your filtration unit, request absolute filtration elements. The sole purpose of a filtration unit is to remove as much dirt as possible from the oil. MP Filtri absolute elements are 99.5% efficent, and have greater dirt holding capacity and larger effective filtering area than nominal elements. In short, they will last longer, hold more dirt and filter effectively.

5 Once a year inspect your oil handling equipment

Check the filter indicators are working. Check the hoses for deterioration. Inspect the seals and connections making sure that there are no leaks. Check the mechanical structure to ensure it is in good working order and a piece of equipment your oil handlers will want to use.

6 Regularly sample your oils

Periodic and accurate analysis of your oils will indicate how well the machinery is operating. It indicates what maybe going wrong before the machine breaks down, resulting in loss of production and therefore high costs. After better oil handling has begun and savings realised, it becomes more apparent that frequent and accurate oil analysis is needed.

7 Misuse of product

- The product should be connected to the mains supply and not wired directly to the mains.
- The product is not a pipe cleaning tool and therefore shouldn't ever be connected to a system. It is only to be used in un-pressurised systems.
- Pipes should never be allowed to lie along the floor when the GRM302 is in use.
- During operation the GRM302 should never be left unattended.
- During operation the GRM302 is to remain stationary, it shouldn't be moved. If it is required for the unit to be moved then the pump should be stopped first.
- The operator should follow all standard operating procedures previously set at the operating location as well as the procedures required by the GRM302.
- The GRM302 is not suitable for use in an explosive environment or an ATEX zone.
- Over tightening of filter can damage filter thread causing possible leakage.
- The product is designed to protect itself should it be used outside of its fluid viscosity specification. As such if the viscosity of the fluid is too high the internal breaker will activate and stop the unit from operating.

8 Disposal

- Packaging - All GRM302 products are sent in PVC shrinkwrap and this should be recycled with other plastics.
- Filters and GRM302 - Should be fully drained and disposed of according to EU waste framework directive and ISO44001 Environmental Management.

9 Remote Control

The GRM302 can be controlled using the remote control facility included in the LPA-View software package, installed on a computer. Alternatively customers can use their own software running on a computer.
Since the GRM302 includes a built-in datalogging memory, operators can make use of the remote control facility in one of two ways:

- Direct Online Operation
  The ICM is permanently connected to a computer while tests are carried out. The operator can set parameters, type a label and initiate the test. They can then monitor the progress of each test. Each test result is displayed and downloaded into the test database as it is completed.
- Disconnected Operation
  Here the ICM operates as a stand alone item, performing tests on a schedule or under external command from a control system. If a permanent record of the results is needed, an operator can connect a computer and use LPA-View to download the accumulated test data. The ICM can hold up to 4000 tests in the memory.

9.1 Computer Connection

The connection is made using an RS485 adaptor connected to the computer. Either a USB:RS485 or a RS232:RS485 converter can be used, depending on the the interface available on the computer. The ICM-USBi is separately available as a pre-wired solution for USB (all modern laptops and PCs). Make the connection, start LPA-View running and then apply power to the ICM.

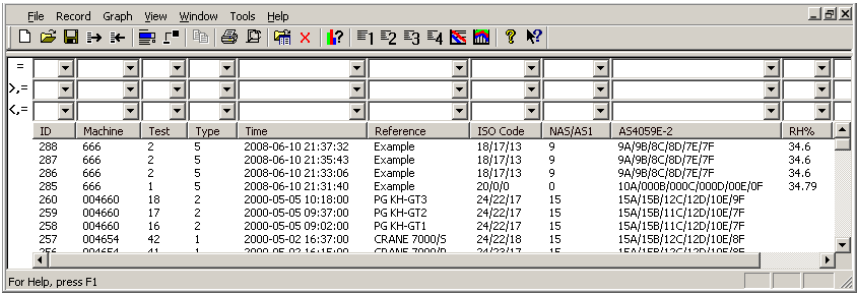


Figure 1 LPA View

To access the Remote Device facility in LPA View, press the Remote Control button on the toolbar.
The *Connect* dialogue will then appear.

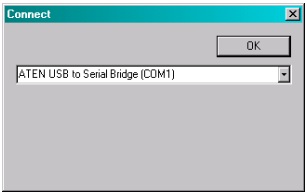


Figure 2 The Connect dialogue

The first time that this is done, the correct communications port (COM port) on the computer has to be selected, as detailed below.

– The program scans the computer for available ports, and puts them in a list to choose from - this list is in the box above the Connect button. Press the arrow on the right hand side of this box and choose the connection on your computer.
– All working communication ports of the computer are available for selection. Select the one used to connect the ICM, then press OK. If you are unsure which port is correct, the device name should be next to the COM port number. When communication has been established successfully, the remote

control dialogue will appear. After a successful connection, the COM port will be remembered for next time and will appear preselected in the dialogue.

10 PC Software Operation

The *Remote Control* dialogue allows an operator to manually control the ICM from a laptop, using the LPA-View software. It can also be used to download test results that have accumulated during autonomous (disconnected) operation.

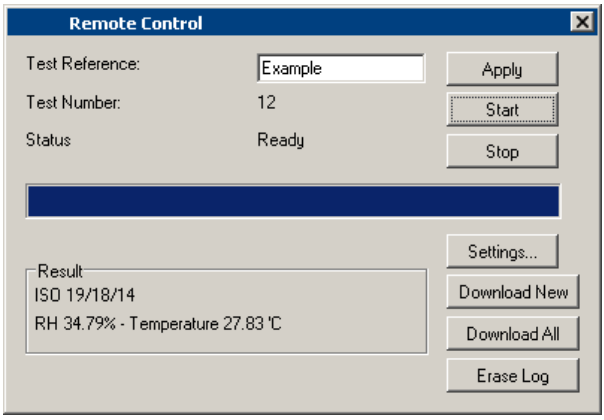


Figure 1 The Remote Control dialogue[2]

To perform a test, first optionally edit the *Test Reference* and press *Apply* to set the new value. This is a descriptive label which can be used to identify or group the test later (along with the test number and test time/date). An example would be a machine number or customer name. The *Test Reference* can be up to 15 characters in length.

When connected the ICM *status* should show "Ready". The operator can then press the *Start* button to begin the test. The *progress bar* shows how much of the test has been completed.

[2] Some items may be missing depending on the options fitted to the GRM302.

The test can be abandoned at any time by pressing the *Stop* button. If the *Start* button is pressed during a test, then the current test is abandoned and a new one started.
When the test has finished, the *Result* area will display the contamination level in the set format and water content and temperature if "W" option.
After a test the *Test Number* is automatically incremented and the *status* of the test is displayed. If the status is *Ready* then the operator can press the *Start* button again to begin a new test. It is also possible to configure the ICM to *automatically* begin another test, after an optional delay. In this case the status will be *Testing* or *Waiting*.
The ICM incorporates a data logger, so previous test results can be downloaded into the test database using the *Download New* and *Download All* buttons. The difference between these is that *Download New* only transfers results that have never been downloaded before. *Download All* transfers all results that are stored in the ICM. *Erase Log* deletes the test results from the memory of the ICM.
When the user has finished operating the ICM the dialogue can be dismissed using the *close* control (the "X" at the top right corner of the dialogue) or by pressing the *Esc* key.
Pressing the *Settings...* button brings up the *Remote Device Settings* dialogue.

11 Settings

The ICM can be reconfigured using the *Remote Device Settings* dialogue. This is normally done as part of the installation or commissioning process.

After making any changes, pressing the OK button will update the ICM with the new settings. Or press Cancel to leave the settings as they were.

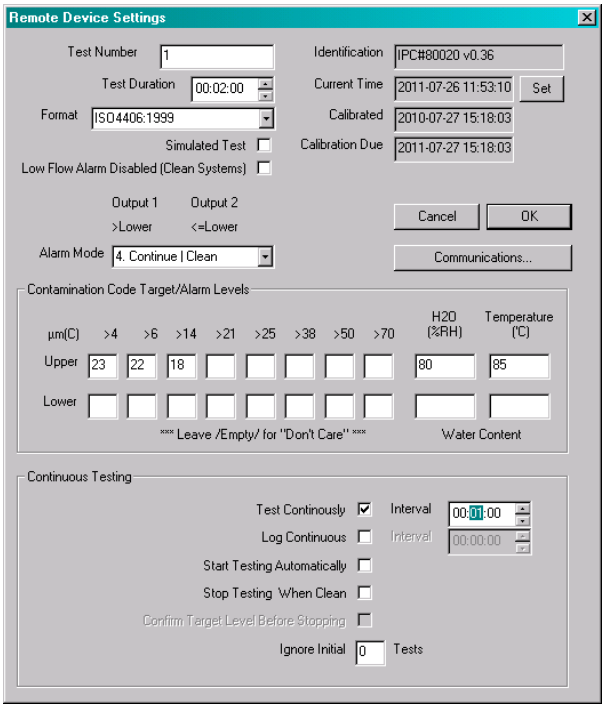


Figure 1 Remote Device Settings dialogue[3]

[3] Some items may be missing depending on the options fitted to the ICM.

For the GRM302 the ICM will be set to use continuous testing and alarm mode 4 so that the GRM302 will run and stop when the set alarm levels are reached. Alarm mode 4 is the mode for the GRM302 and so this should not be changed. See section 11.1 for setting up.
Please note that the ICM must be powered up for the GRM302 to run.

11.1 Continuous Testing

In the *Continuous Testing* area are settings which control how the ICM decides when to perform and log a test. Selecting *Test Continuously* makes the ICM automatically repeat the test, according to the specified *Test Interval*. Setting an interval longer than the test duration results in the test being repeated upon each expiry of that interval. For example, setting a *Test Duration* of 1 minute, and a *Test Interval* of 10 minutes, results in a 1 minute test performed every 10 minutes. Setting the interval to a value less than the Test Duration (for example zero) results in a new test being started immediately a test finishes.
Log Continuous controls whether tests are logged during continuous testing. This is to avoid the test log being cluttered by potentially large numbers of unwanted test results. If *Log Continuous* is not selected, then only the "final" test in a sequence is logged (see Alarm Modes section and "Stop Testing When Clean" below).[4]
If continuous logging *is* used, then the *Log Interval* can be set to control the proportion of tests that are actually logged. For

[4] This feature is intended for a "Filter Trolley" type application where system runs a pump until the oil is sufficiently clean. Typically only the final "clean" result requires logging.

example the ICM could be set to test every 10 minutes, but only log a result hourly. The log interval, test interval and test duration are distinct parameters that work together to control the test and data logging. So that, for example, a test duration of 2 minutes, a test interval of 10 minutes, and a log interval of 1 hour could be set. This would result in 2 minute long tests, repeated every 10 minutes, with a test logged hourly.
Stop Testing When Clean is a feature intended for cleaning rigs or "filter trolley" type applications. The ICM continues testing until the fluid is "clean", at which point an alarm is signalled and testing stops.
Confirm Target Level Before Stopping This helps to ensure that a test sequence is not terminated too soon, when there are still a few large particles in the system. When selected, two successive "clean" results are needed before testing halts.

11.2 Alarms

The ICM has two switched "alarm" outputs that can be used to signal external equipment in various ways, according to the test results and the alarm settings. There is also a multi- colour front panel light which indicates how the result compares to the set alarm thresholds.
The alarm settings are comprehensive and flexible, allowing the ICM to be used in many different scenarios.

11.2.1 Alarm Levels

The various alarm thresholds are set in the *Contamination Code Target / Alarm Levels* area of the dialogue.

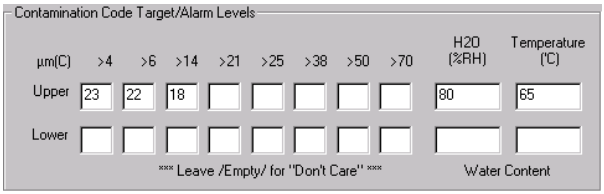


Figure 2 ISO4406:1999 Alarm Levels

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.

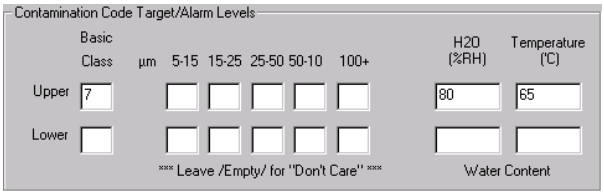
In the example Figure 2 the Upper Alarm is exceeded if the 4µm count is greater than ISO code 23, or the 6µm greater than ISO code 22, or the 14µm count greater than code 18, or the water content is greater than 80% RH, or the temperature is greater than 65°C. The lower alarm is never triggered since all the settings are empty.

ISO4406:1999 Alarm Levels

ISO4406:1999 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 ISO4406:1999 test *Format* and then entering values as required. As an extension to ISO4406:1999 it is also possible to specify codes for the other

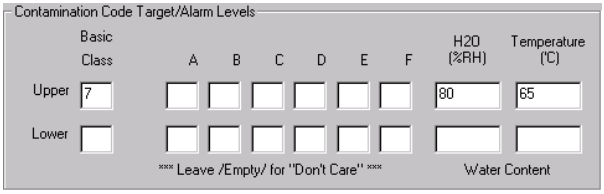
measured sizes too. If this is not needed then the entries can be left blank.

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.

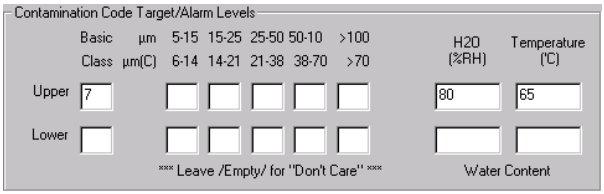
AS4059E Table 2 Alarm Levels



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 and F.

AS4059E Table 1 / ISO11218 Alarm Levels



These two standards are similar except for terminology and reporting format. The actual numeric sizes and class thresholds are the same.

11.2.2 Alarm Mode

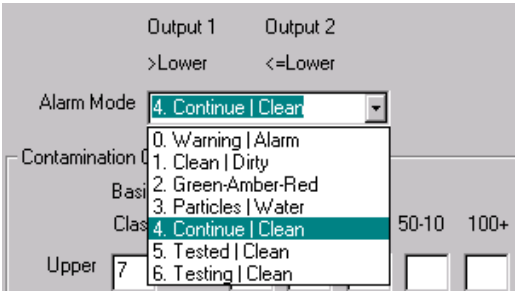


Figure 3 Alarm Modes

Alarm Mode 4: Continue-Clean

	Output 1	Output 2

Turns on When	>Lower	≤Lower
Intended Function	Continue Testing	Stop Testing / Clean

This is used for a "cleaning" application where a signal is needed to stop testing (for example to stop a pump or signal an external controller).

12 Installation

12.1 Installation Procedure

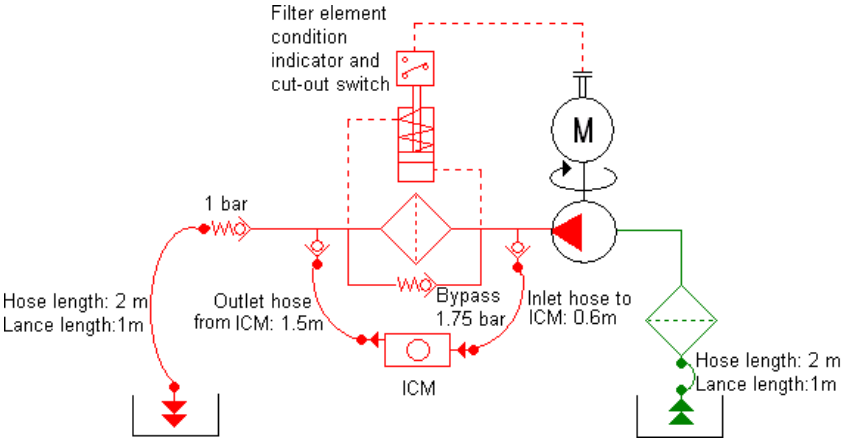


Figure 1 GRM302 Schematic

The GRM302 is set up to have the samples taken from before the filter and returning to the test point after the filter. If the sampling is to be done after the filter then another test point to retun to and a check valve will need to be fitted. The check valve reduces any effect of air on the ICM readings.

- The ICM should be in a vertical orientation, with the oil flowing upwards through it.
- Check flow in acceptable range. There needs to be a differential pressure of >1bar placed across the GRM302, such that a flow of fluid is generated within the range of the unit.
- Connect hoses.

- ⋆ There must be no extra restriction placed in the drain hose. Do not have a pipe going to a restrictor to control flow. Any such restrictor must be mounted directly to the GRM302 drain fitting.[5]
- ⋆ Fluid flow must be from the bottom fitting to the top, following the direction of flow arrow on the product labelling, i.e. the bottom fitting is the inlet and the top fitting is the outlet.

[5] This is because any length of pipe between the GRM302 and a downstream restrictor can act as an accumulator. Any pressure pulsations (for example from a pump) in the feed to the ICM are then translated into pulsations in flow rate, sometimes leading to flow reversals in time with the pulsations. If the flow is very low this can sweep the same particle backwards and forwards through the sensing volume multiple times, confusing the results.

13 Fault Finding

The GRM302 does not start	Check that the ICM is powered up and press the green start button on the ICM to begin a test.

13.1 LED Flashing / Fault Codes

Unexpected results obtained from sample	Check that the minimess hose has been fully connected at both the system and ICM ends. Confirm that the flow through the ICM is within the range of the unit. High water / aeration levels.
Remote Device dialogue not responding to buttons being pressed.	Check that correct COM port has been selected in the Remote Device dialogue. Disconnect power supply to ICM and then reconnect it.

If the ICM has been subjected to excessive contamination and a blockage is suspected, a flush with a suitable solvent may clear the blockage.
The standard ICM is fitted with Viton seals, so Petroleum Ether or Iso Propyl alcohol may be used for this purpose, in conjunction with the MP Filtri Bottle Sampling Unit.
DO NOT USE ACETONE

14 Cycle Time and Flow Rate Considerations

The set *Test Duration* is the amount of time for which particle counts are accumulated, before the test result is updated. The default of 120 seconds is likely to be suitable for most applications. However it is possible to set other values.
A shorter time enables the unit to respond more quickly to variations in cleanliness. This may be desired in order to reduce the product test time in a production line situation.
A longer test time enables the unit to average out variations in cleanliness and produce a more stable result. This is especially true for the larger particle sizes. In clean systems there are very few of these, so a large amount of fluid needs to be sampled in order to count a statistically significant number.
Another factor is the flow rate. This can be traded off with cycle time, since a higher flow allows the same amount of fluid to be sampled in a shorter time.
"Very Clean" Systems – Longer test times / higher flows needed.
"Normal" or "Dirty" Systems – Shorter test times or lower flows are acceptable.
This relationship is shown in Figure 1.

[6] This means >20 particles counted as per ISO 4406:1999

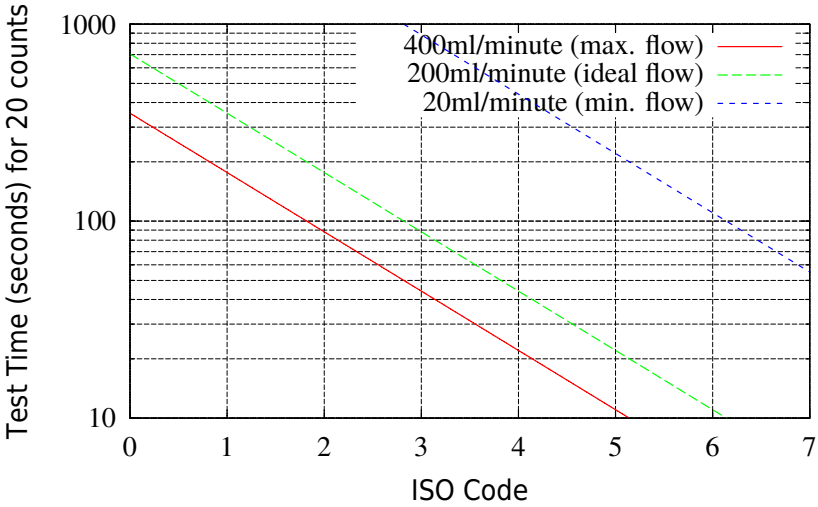


Figure 1 Test Time needed for Reliable Indication[6] by ISO code

15 Electrical and Hydraulic diagrams

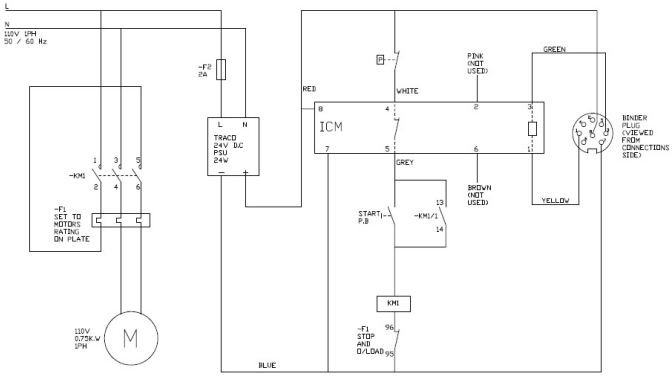


Figure 1 Electrical wiring diagram for GRM302 110V

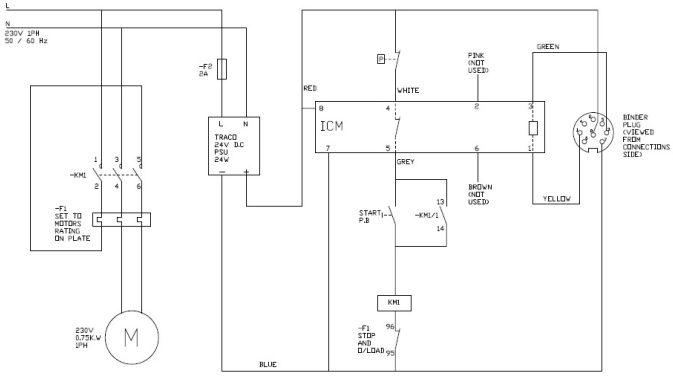


Figure 2 Electrical wiring diagram for GRM302 240V

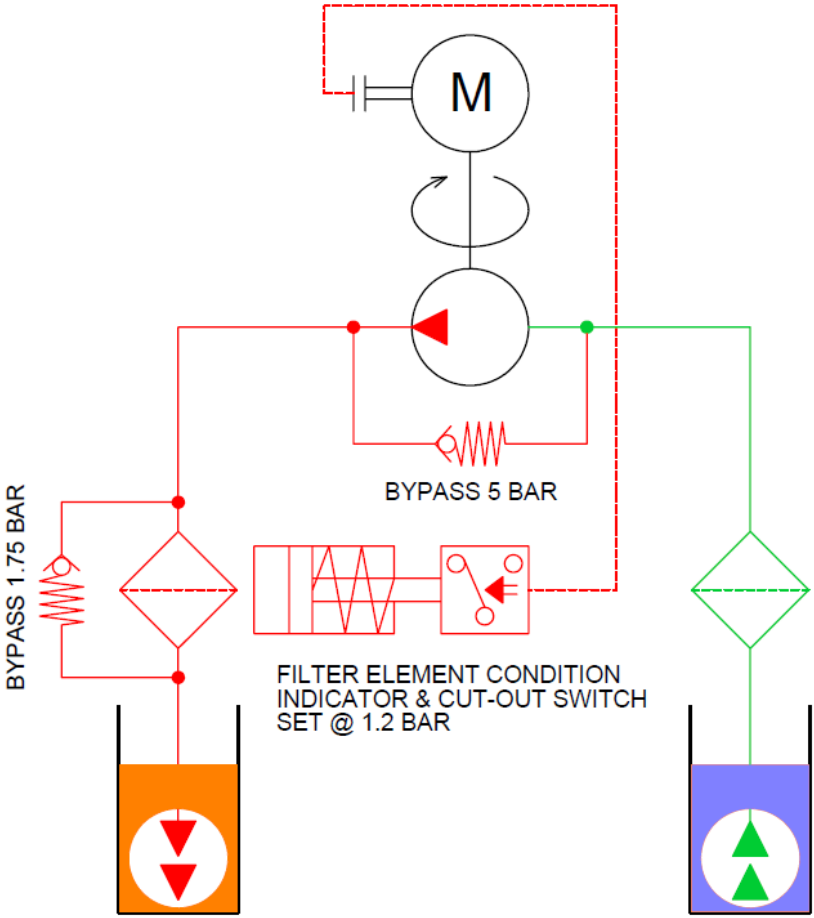


Figure 3 Hydraulic diagram for GRM302

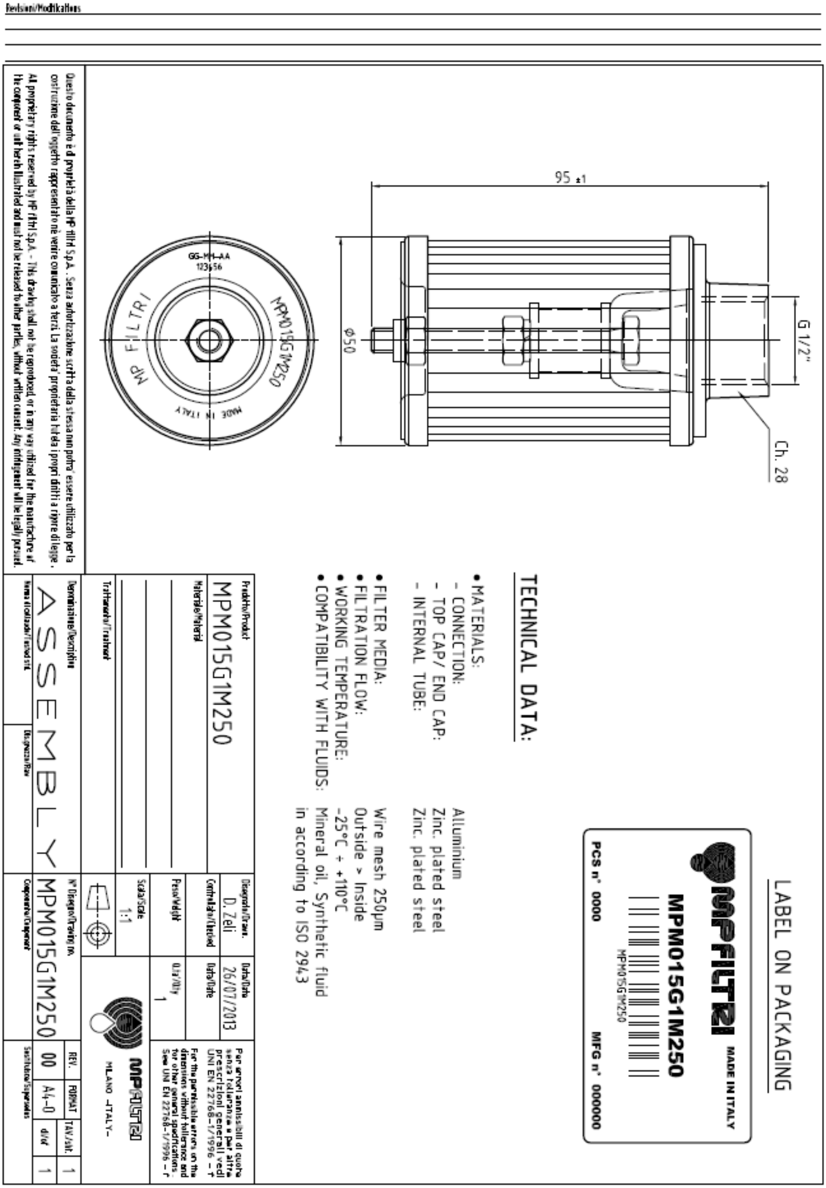

TECHNICAL DATA:
• MATERIALS:
- CONNECTION: Alluminium
- TOP CAP/ END CAP: Zinc. plated steel
- INTERNAL TUBE: Zinc. plated steel
• FILTER MEDIA: Wire mesh 250μm
• FILTRATION FLOW: Outside > Inside
• WORKING TEMPERATURE: -25°C ÷ +110°C
• COMPATIBILITY WITH FLUIDS: Mineral oil, Synthetic fluid in according to ISO 2943
LABEL ON PACKAGING
MPM015G1M250
MADE IN ITALY
PCS n° 0000
MFG n° 000000
95 ±1
Ø50
G 1/2"
Ch. 28
MPM015G1M250
ASSEMBLY
D. Zeli
26/07/2013
1:1
A4-0
MILANO -ITALY-

Figure 4

Produced by MP Filtri UK

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