LaserCM

Portable Particle Counter

Fluid Condition Monitoring

Brochure: CM010GB1

anything Parker Possible™

LaserCM

Portable Particle Counter

TYPICAL APPLICATIONS

- Construction Machinery
- Industrial Plant
- Hydraulic Equipment & System Manufacturers
- Research & Testing Institutes
- Offshore & Power Generation
- Marine
- Military Equipment Applications

Parker LaserCM Portable Particle Counter.

With 12 years experience in manufacturing the world's best selling white light portable particle counter — CM20, the progression to the LaserCM with its opto-mechanical, continuous wave single point source laser (SPSL) is both a natural and customer driven development.

TYPICAL APPLICATIONS

SPECIFICATION

Automatic Particle Counters (APC's), have been widely used for many years in condition monitoring of hydraulic fluids. However, it is only recently that APC's have become flexible enough to enable the instruments to be taken out of the laboratory and used on-line in order to obtain the most credible form of results.

Unusually, the move from fixed laboratory use, to portable field use has not been at the expense of accuracy or user flexibility, but has actually enabled the instruments to be used over a wider range of applications and situations.

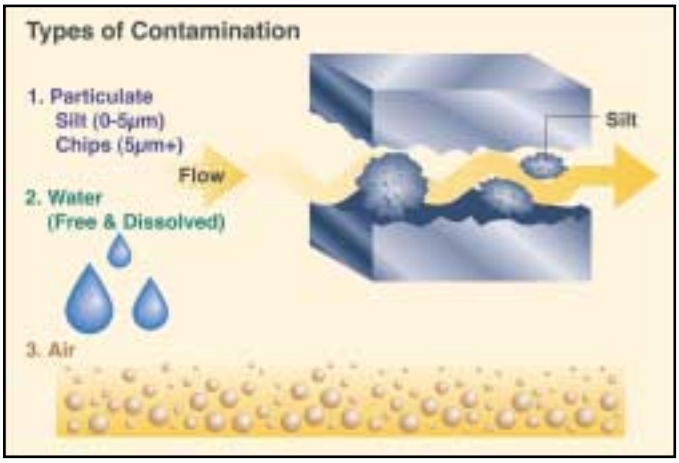
The most common monitoring technique used in APC's is that of light obscuration or light blockage. Here, a focused light source is projected through a moving column of oil, (in which the contaminants being measured are contained), causing an image of the contaminant to be projected on to a photo diode cell, (changing light intensity to an electrical output).

The electrical output of the photo diode cell will vary in accordance with the size of the particles contained in the column of oil; the larger the particle, the bigger the change in the photo diode electrical output.

On-line APC's must be able to test the oil sample at whatever cleanliness it is delivered to the machine. Parker therefore had to develop technology to ensure the on-line APC was able to test a sample without the conventional laboratory technique which requires dilution - a practice that would have been simply impossible with a portable unit.

By careful design and window sizing, gravimetric levels as high as 310mg of dirt per litre, (equivalent to up to 4 million particles >5 micron per 100 ml), can be achieved without making the instrument susceptible to counter saturation.

These high saturation point on-line APC's, whilst losing none of the accuracy of their laboratory counterparts, enable particle counting to be carried out quickly and accurately.



Core technology that proves itself in LaserCM

The LaserCM portable particle counter features microprocessor controlled optical scanning for accurate contaminant measurement with a calibration range from ISO 7 to ISO 22 with no counter saturation.

How does LaserCM work?

– The particles are measured by a photo diode that converts light intensity to a voltage output which is recorded against time.

– As the particle moves across the window the amount of light lost is proportional to the size of the particle. This reduction in voltage is measured and recorded.

– This "voltage" lost relates directly to the area of the particle measured, is changed into a "positive" voltage and then in turn changed into a capacitance value.

– This value is counted and stored in the LaserCM computer in one of 6 channels according to particle size.

– Readouts are displayed on the hand-held LCD in the accepted ISO and NAS standards ready for hard copy printing or RS232 computer download.

– The on-board computer allows storage of up to 300 test results.

LaserCM

Portable Particle Counter

Features:

- Instant, accurate results achieved with a 2 minute test cycle.
- Data entry allows individual equipment footprint record.
- Data graphing selectable via the integral printer.
- Auto 300-test cycle logging via LCD handset input.
- RS232 serial port computer interface.
- Limit level output to control peripheral equipment such as off-line filtration via internal relay limit switches.
- Auto-testing allows for the conducting of automatic sequencing tests on flushing systems for example.
- Bar code swipe wand to allow handset data loading.
- Worldwide service and technical support.

Operating any of the Parker CM20 and LaserCM models is as simple as pressing the start button and turning the dial. After that the test procedure is automatic and in the case of the LaserCM takes no more than 2 minutes to complete.

LaserCM Makes The Difference In Industry

Fully accredited to BS EN 60825:1992 and IEC 60825-1 (safety of laser products) Standards, accredited to USA Standards and achieving full ISO certification. LaserCM offers users advanced laser technology, a fast, dynamic and on-line 2 minute system test cycle. A LaserCM Aggressive Fluids model is also available, suitable for monitoring corrosive fluids such as phosphate ester based lubricants used in commercial aviation.

MTD Calibration

Laser CM20 MTD Calibration variants are certified via a primary ISO 11171 calibrated automatic particle counter. All MTD Laser CM20's achieve ISO 4406:1999 criteria, via ISO 11943.

WHY ON-SITE FLUID CONTAMINATION MONITORING?

- Certification of fluid cleanliness levels.
- Early warning instrument to help prevent catastrophic failure in critical systems.
- Immediate results with laboratory accuracy.
- To comply with customer cleanliness requirements and specifications.
- New equipment warranty compliance.
- New oil cleanliness testing.

CUT DOWN THE COST OF MACHINE DOWNTIME CAUSED THROUGH SYSTEM CONTAMINATION...

The message to industry remains the same.
As does the core technology of the Parker range of 6 Channel portable, automatic particle counters (APC's).

Laser technology cuts the test time in half.

As an oil sample is drawn through the LCM, once it is connected dynamically in-line, particles are measured by a Single Point Source Laser (SPSL) as they pass in front of the Viewing Cell (window). A resultant capacitance value is then counted and stored in the on-board computer in one of the 6 micronic channels.
>2µ, >5µ, >15µ, >25µ, >50µ and >100µ according to particle size and the result displayed on the hand-held LCD in the accepted ISO or NAS standards.

The improved portable particle counter hand set includes:

- 50mm LCD display with back light selection and contrast control.
- Highly re-programmed and engineered design.
- IP 65 rated.
- Tactile and audible feedback.
- Membrane button switch panel.
- Special features accessed through single touch key operations.
- Super-grip chemical resistant for greater fluid contact compatibility i.e. Skydrol/Mineral petroleum based fluids etc.

16-column printer for hard copy data. A feature of the LaserCM is the on-board printout data graphing option developed to support predictive maintenance procedures.

Laser CM Test

ON LINE TEST

TEST NUMBER 022

	D M Y
Date	04-03-02
Time	15-52
ISO:	20/15/09

Count / 100ml

>2µ	820721
>5µ	31564
>15µ	314
>25µ	64
>50µ	14
>100µ	0

NOTES

ISO 4406 - 1991
(MTD calibration comes under ISO 4406 - 1999 revised standards)

Laser CM Test

ON LINE TEST

TEST NUMBER 022

	D M Y
Date	04-03-02
Time	15-52
NAS CLASS:	7

Count / 100ml

2/5µ	789157
5/15µ	31250
NAS CLASS	7
15/25µ	250
NAS CLASS	3
25/50µ	50
NAS CLASS	3
50/100µ	14
NAS CLASS	4
>100µ	0
NAS CLASS	0

NOTES

Correlation to NAS 1638

LaserCM provides a particle count in 6 micronic channels to ISO or NAS standards

LaserCM

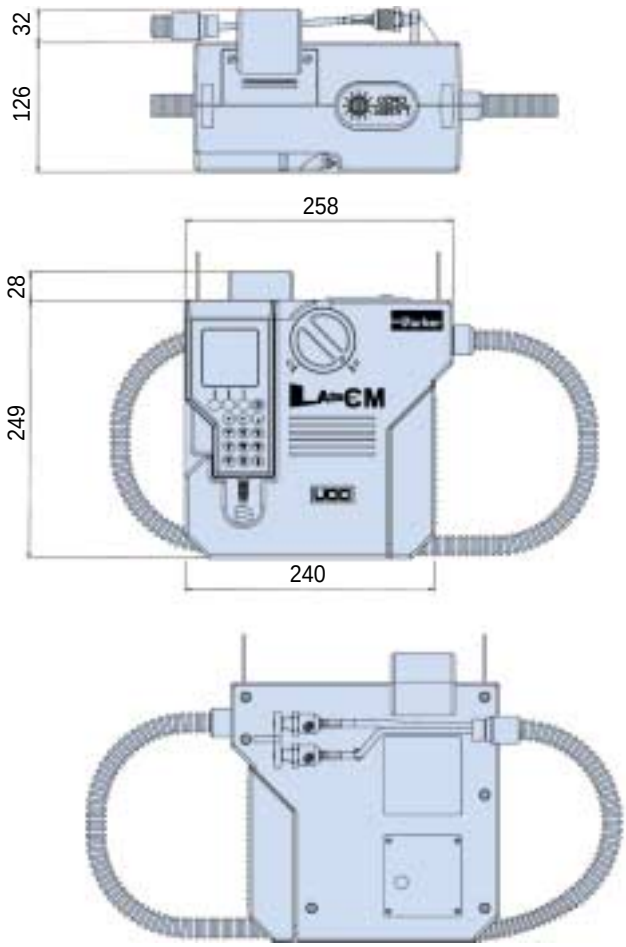
Portable Particle Counter

SPECIFICATION

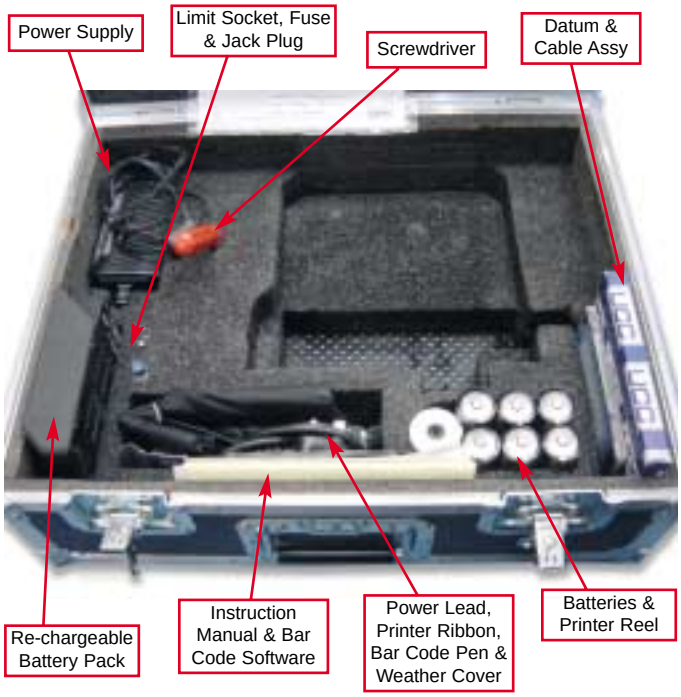
Description	LaserCM (LCM20.2021)	LaserCM (LCM20.2061)
A) Lexan, structural foam and ABS case B) Parylene coated	A	B
ABS handheld display	●	●
Mechanical composition – Brass, plated steel, Stainless steel and aluminium	●	●
Fluorocarbon Seals	●	
Perfluoroelastomer seals		●
Nylon hoses (kevlar braided microbore)	●	●
Stainless steel armoured hose ends	●	●
1.2m fluid connection hose	●	●
System 20 Sensors.Higher with Single Point Sampler	●	●
Rechargeable battery pack	●	●
12Vdc power supply	●	●
Fast blow fuse	●	●
Unique optical scanning system	●	●
Bonded glass optical window enclosed in SS plate	●	●
Micron channels analysis (2+,5+,15+,25+,50+ & 100+)	●	●
Analysis range ISO 7 to 22 incl. (NAS 0 to 12)	●	●
32 character dot matrix LCD. Alpha numeric keypad	●	●
Data retrieval	●	●
Calibration to ISO standards*	●	●
Viscosity range 2 to 100 cSt. 500 cSt.with SPS	●	●
Operating temp.+5 to +80°C	●	●
Ambient temp.+5 to +40°C	●	●
2 minute test completion time	●	●
Memory store – 300 test memory	●	●
12Vdc regulated power supply input	●	●
Battery operated 6 x 1.5 D cells	●	●
Phosphate Ester group compatibility		●
Mineral oil & petroleum based fluid compatibility	●	●
Up to 420 bar (6000 psi)	●	●
Integral 16 column printer	●	●
RS232 computer interface	●	●
Astra board case weight – (Kg)	5	5
Unit weight – (Kg)	8	8
DATUM software and cable link pack	●	●
Weather protector cover	●	
CE certified	●	●
Auto logging	●	●

*Note: In compliance with international standards, all Parker portable particle counters can meet the ISO Medium test dust standards. The LaserCM's, in addition to the complete range of Condition Monitoring products, are capable of achieving certification to ISO 4406:1999 and with traceability to ISO 11171 for SRM 2806, via ISO 11943.

Part Number	Description	
LCM20.2021	Laser 6 Channel data entry handset (incl. aluminium case and kit)	
LCM20.2022	Laser 6 Channel (MTD Calibration)	
LCM20.2023	Laser 6 Channel + Bar Code Pen	
LCM20.2024	Laser 6 Channel (MTD Calibration + Bar Code Pen)	
LCM20.2061	Laser 6 Channel for use with Aggressive Fluids	
LCM20.2062	Laser 6 Channel (Aggressive Fluids + MTD Calibration)	
LCM20.2063	Laser 6 Channel (Aggressive Fluids + Bar Code Pen)	
LCM20.2064	Laser 6 Channel (Aggressive Fluids – MTD Calibration + Bar Code)	
B.84.729	12Vdc power supply	Please state these part numbers for any spares
B.84.609	Re-chargeable battery pack	
B.84.702	Printer paper (5 rolls)	
P.843702	Printer ribbon	
P.849613	Weather protector cover	
B.84.779	Datum software pack	
B.84.708	Cable and adaptor	



COMMISSIONING KIT



CUT DOWN THE COST OF MACHINE DOWNTIME CAUSED THROUGH SYSTEM CONTAMINATION... ...

The message to industry remains the same. As does the core technology of the Parker Filtration range of 6 Channel 'CM' portable, automatic particle counters (APC's).

LaserCM provides an ISO Standard 3 part contamination number or a NAS1638. 0-12 Standard

Laser technology cuts the test time in half.

As an oil sample is drawn through the LCM, once it is connected dynamically in-line, particles are measured by a Single Point Source Laser (SPSL) in the case of the LaserCM or an in-candescent source with the white light CM20 as they pass in front of the Sampling Viewing Cell (window). A resultant capacitance value is then counted and stored in the on-board computer in one of the 6 micronic channels. >2µ, >5µ, >15µ, >25µ, >50µ and >100µ according to particle size and the result displayed on the hand-held LCD display in the accepted ISO or NAS standards.

By careful design and window sizing, gravimetric levels as high as 28.6mg of dirt per litre, (equivalent to up to 4 million particles >2µ per 100ml) can be achieved without making the instrument susceptible to counter saturation. Such a high saturation point on-line APC as the CM, while losing none of the accuracy of a laboratory counterpart enables particle counting to be carried out quickly and accurately at whatever cleanliness level is present in the system.

There's an integral 16-column printer for hard copy data. A feature of the LaserCM is the on-board printout data graphing option developed to support predictive maintenance procedures.

The NEW improved portable particle counters hand set now includes:

- 50mm Back light selection LCD display with contrast control.
- Highly re-programmed and engineered design.
- Colour coded IP 65 rated
- Tactile and audible feedback
- Easy find membrane button switch panel.
- Special features accessed through single touch key operations
- Super-grip chemical resistant for greater fluid contact compatibility i.e. Skydrol / Mineral petroleum based fluids etc.

Laser CM Test

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NOTES

Correlation to NAS 1638

6 Channel CM20

CM20.9021 and 9061 models

THE PROVEN TECHNOLOGY

Contamination control of hydraulic systems is essential. A fact proven many times over by Parker Filtration in answering the demands of the industry for effective fluid condition monitoring. With at least 80% of hydraulic system failures the result of oil contamination,equipment downtime due to unplanned maintenance is always expensive and equipment efficiency and personnel safety become issues for consideration.

With CM20 6 channel portable particle counters, further consideration becomes unnecessary. CM's microprocessor controlled optical scanning and LCD read out identifies particle quantities per 100 millilitres.

On-board battery pack, 12Vdc input, integral printer and 6 channel analysis are standard features. Auto-testing allows for the conducting of automatic sequencing test via handset control

CM20.9021 Data Entry Monitor

The **CM20.9021 Data Entry** monitor has the 32-character two-line dot matrix LCD and full alpha numeric facility and, at the touch of a button, a data retrieval facility to select up to 30 pre-identified test results from the 300 scrolling test memory. As well as analysis in a range from ISO 7 to ISO 24 (NAS 0 to 12 inclusive), on-board printer and RS232 download serial port.

CM20.9061 Aggressive Fluids Monitor

The **CM20.9061 Aggressive Fluids** monitor with its red valve and handset button has been developed to be suitable for aggressive or corrosive fluids such as phosphate ester based lubricants. Requiring re-specification of CM20 internal components such as EPDM oil seals, Parylene coated / Stainless Steel, in other respects this CM20 is manufactured to the same comprehensive standards as the Data Entry model.

An Operator Can Choose From 2 'White Light' 6 Channel CM20's

Connecting directly into a system via a proven System 20 In-line Sensor or one of the Single Point Samplers' a machine operator can carry out a unique and automatic 4-minute test procedure, half that time with a LaserCM! Without having to shut down the machine before or during testing. An operator can choose from 2 CM20 portable particle counters. Each providing the same high level of optimum accuracy and quality, built-in at every stage of manufacture to ISO 9001, CE, RFI and EMC approval with each model offering the user some specific advantages and industry applications.

CM20.9021 - The Data Entry Model

CM20.9061 - The Aggressive Fluids Model

To support the fluid condition monitoring program and provide the link between a CM20 or a LaserCM and a computer management system - Datum Data management software is available. The program is the easy to install, easy to use way to log and interrogate CM test results for trend analysis and predictive maintenance.

The Universal Bottle Sampler (UBS)

Providing The Dynamic Link To All Portable Particle / Water Counters

The new UBS off-line, already the proven,efficient answer to oil bottle sampling via a CM monitor has been upgraded with the incorporation of microprocessor technology to recognise and adjust to the connecting monitor including the new LaserCM.

Features:

- Lightweight design for portability.
- Fast / slow running speeds for varying viscosity oils.
- Viscosities range 2 to 250 cSt.
- Typical class 2 sample bottle kits available

Simple To Use UBS

The oil sample is drawn into the UBS Off-line where it is secured, free from further contamination, in a bottle together with a clean waste bottle by a peristaltic, self-priming pump. Simple operation and efficient testing are assured once the UBS Off-line is connected to any of the CM monitors and powered up using it's own power source.
The oil sample requires agitation and de-gassing before carrying out the contamination test. Vacuum chamber and pump options are available. (Standard with UBS. 9002)

The UBS Off-line connects directly to the CM. An oil sample is first agitated and de-gassed using a vacuum chamber.

New Software Upgrade For Datum Data Management

New DATµm

A major upgrade for the CM data management software brings Datum right up to date with the developing range of fluid condition monitoring products. Datum is dedicated software that now provides the link between a CM20, LaserCM, System 20's EM20 or the H_2Oil - water in oil monitor and your computer management system.

Features:

- Windows* based, Icon driven program
- Full graphic output.
- Tables/results download and hard copy
- Trend analysis and predictive maintenance
- Auto test communication allows Datum to control particle counter testing and water in oil monitoring
- Certification creator using downloaded data
- Customer customised fields

The Single Point Sampler

Making The Connection With A Single Point Sampler.

The lightweight Single Point Sampler (SPS) has been developed to provide CM monitor users with greater particle counting flexibility. Designed with an easy-to-use,fingertip operated flow control valve, the SPS enables compensated flow systems to be tested for contamination where flow ranges are outside System 20 Sensor specifications or where pipe diameters do not allow a System 20 Sensor to be installed.

Operations:

The SPS fits onto the downstream P2 side of the CM monitor, connecting via a self-sealing quick connection Minimess coupling. The SPS enable the user to adjust the flow rate through the monitor and once set, a pressure compensated flow control system automatically compensates for pressure changes and maintains its setting even if the work load changes.

In-line Dynamic Connection Into A System With System 20 Sensors

3 lightweight industrial System 20 sensors have been developed by Parker Filtration for simultaneous measurement of flow, pressure and temperature, using hand held monitors.

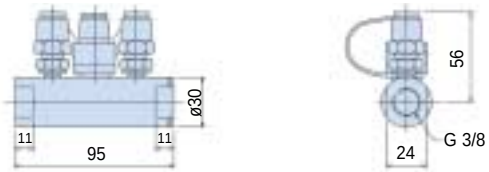
Operations:

Covering a wide range of flow rates, fluid types and applications, System 20 sensors are designed to be used with both types of System 20 Monitors, all CM20 & LCM20 portable Contamination Monitors, and the water in oil monitor,- H_2Oil.
Specially developed System 20 Sensors are available for use with CM20. 9061 'aggressive fluids' contamination monitors.

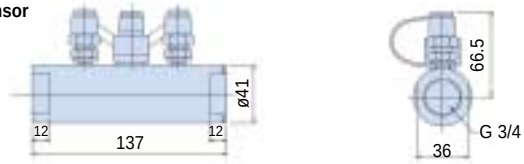
Now an operator can monitor a system without having to shut it down first.

INSTALLATION

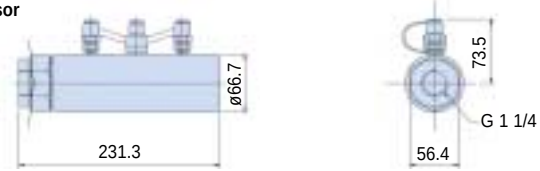
Size 0 Sensor



Size 1 Sensor



Size 2 Sensor



System 20 Analogue Monitors

Predictive maintenance is the key to cost effective plant maintenance and with proven System 20 In-line Sensors installed, system faults can be predicted and system condition monitored regularly by connecting one of the System 20 Analogue Monitors.

Operations:

System 20 Analogue Monitors are designed to connect directly to a system 20 In-line Sensor. There are 4 types available (standard high pressure 0-420 bar and medium pressure 0-160 bar) featuring 3 dayglo dial gauges to monitor flow, pressure and temperature of oil or water systems.

The System 20 Electronic Monitor (EM20) is also available to provide effective system condition monitoring with test data storage and data management download features.

Permanent Contamination Monitoring of a System with MCM20

The Parker Filtration solution to permanent contamination monitoring. Proven as a portable particle counter able to operate in any condition, MCM20 and its principles are now available to users where continuous, permanent installed monitoring is required.

The MCM20.2021 utilises the latest laser diode method of particle counting as per our standard LCM20. The unit is enclosed in a metal casing with access to the hydraulic connection, DC input power, fuse holder and PC/PLC connection ports located on the front panel.

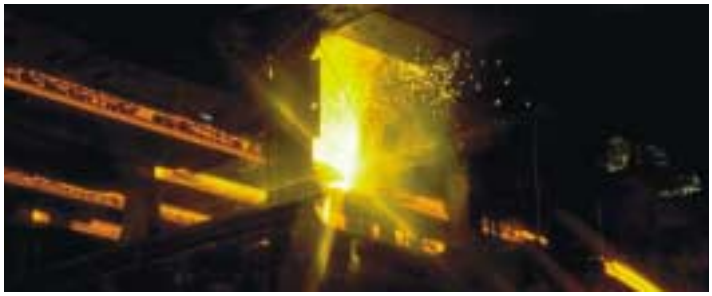
The internal workings are manufactured onto a removable chassis for ease of service and calibration.

Operating protocols will be made available with full user instructions for the user defined PC/PLC control program.

For example in applications where computer controlled pre-set test programmes operate to provide instant system condition checks as well as trend analysis from a simple data formatting programme.

Here's what the MCM20 can do ...

- Continuous on-line particle counting with MCM20 ensures constant system monitoring within defined parameters.
- MCM20 can be pre-set to carry out contamination tests at specific intervals.
- MCM20 connects permanently to a System 20 sensor
- Simple data formatting programme for trend analysis.



H_2Oil

On-line Monitoring of Water in Oil

Why on-line monitoring of water in oil?

- When machinery is operating in a dirty environment it is impossible to keep contamination out.
- Particle or water ingress is inevitable especially if a dirty environment or working condition is unavoidable. So when there is a tough job to do, a reliable, robust instrument is essential and durability trails and field tests have proved Parker's Fluid Condition Monitoring equipment is up to it every time.
- Fluid purity must be an objective in terms of monitoring contamination and water content, viscosity index and system condition, to ensure machinery life expectancy is extended to the maximum.

Optional oil delivery kit for customer off-line oil sampling

The Parker Filtration H2Oil - on-line monitoring of water content in oil

Portable H_2Oil is a 2 channel non-dispersive absorption spectrometer, designed to measure the level of absorbed water content polluting the oil in a sample. With its fold away handle and secured hoses that dynamically connect to an in-line System 20 Sensor or Single Point Sampler, H_2Oil features a re-chargeable 12 Vdc power-pack, on-board diagnostic computer and printer for effective logging and data retrieval.

FEATURES:

- Accurate measurement of low levels of absorbed water contamination in oil.
- On-line operation at 420 bar.
- Results displayed as percentage water content or parts per million
- RS 232 download facility.
- Optional oil delivery kit for customer off-line oil sampling.
- 0 - 3000 ppm absorbed water detection.

H_2Oil operation is simple, automatic and accurate

An ecological disaster that could have been avoided with predictive knowledge.

" ... Motor tanker Braer grounded off Shetland Isles due to serious water contamination of the common diesel oil supply to both main engine and generator."

The report of the Chief Inspector of Marine Accidents, investigating on behalf of the Department of Transport, into the engine failure and subsequent grounding of the Braer found that the stopping of the main engine at approximately 04.40 hours followed by the loss of all main electrical power was due "to serious sea water contamination of the common diesel oil supply to both main engine and generator".

H_2Oil with its' 90 second test would have been more satisfactory than the "oil tasting" procedure adopted on board at the time to check for salt water contamination of the oil.

And in the air, another success!

The H_2Oil has been used in a special application for the Chinese Military, whereby a special "Selectable" unit was produced to read very low levels of water (0 to 50 PPM or 0 to 0.005%) in Kerosene Aviation Fuel (Jet A1).

This gave the end user the ability to read in resolutions of either 1, 2, 5 or 10 PPM, ideal for such low levels of water detection

H_2Oil Calibration Statement

The production H_2Oil Monitors are matched to a Master H_2Oil which is calibrated to the Karl Fischer Titrator.

This Titrator is tested using Hydranal - Water Standard 1.00, Riedel-de Haen Code No.34828. This water content is analysed according to ISO 760:1978.

ISO 760 can be used to control Karl Fischer Coulometers according to ISO.9001 (EN 29001, BS 5750) Section 4.11.

MS100

Moisture Sensor

Fluid Condition Monitoring

Brochure: CM017GB1

anything Parker Possible™

MS100 Moisture Sensor

Cost Effective Moisture Detection

TYPICAL APPLICATIONS

- Pulp and Paper Plants
- Marine Hydraulics
- Power Transmission & Distribution
- Oil Reclamation
- Industrial Hydraulics

In-Line Moisture Measurement of Hydraulic & Lubricating Oils.

Parkers NEW MS100 Moisture Sensor offers fast, reliable and accurate in-line detection of moisture in fluids. The MS100 transducer type technology has been especially designed with the preventative maintenance programme environment in mind.

The industry accepted sensing cell device will monitor and report Relative Humidity (RH), moisture content in oils. The water content measurement technique offers the end user benefits over the current standard form of water content reporting (PPM).

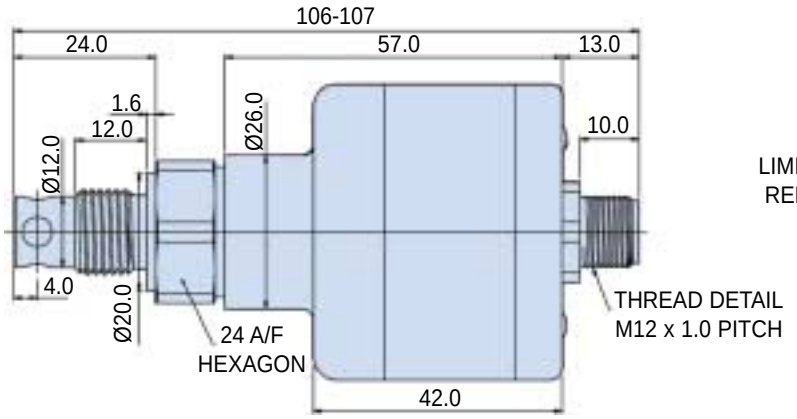
The MS100 will provide the user with reliable data on the rate of water take up, as the fluid absorbs water. The device can report % RH water content as increases are detected giving the user information on how close to the fluids real saturation point has been reached.

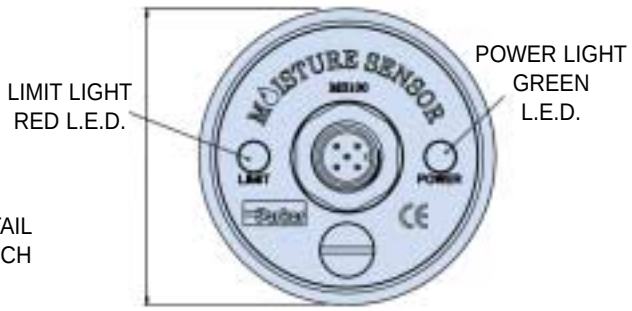
This allows for real time preventative maintenance to be undertaken and corrective actions to be made. By knowing that the water contamination is still within the oils absorbing range, less than 100%, reclaiming fluid properties before additive damage occurs can initiate calculable cost savings.

Water enters hydraulic and lubricating systems from a variety of sources. Atmospheric ingressions of water vapour, as well as internal heat exchanger leaks, create unfavourable operating conditions. The NEW MS100 Moisture Sensor eliminates the guesswork by providing real time condition monitoring. It is designed to work well in petroleum/synthetic hydraulic and lubricating oil applications.

TYPICAL APPLICATIONS

SPECIFICATION





Pressure:
Maximum allowable operating pressure (MAOP): 420 bar (6000 psi)

Operating Temperature:
Maximum: 85°C (185°F) – dependent on seal material
Minimum: -15°C (-5°F)

Flow through sensor cell:
Installed in active flowstream

Fluid compatibility:
Mineral oils and petroleum-based phosphate ester – Skydrol option available

Viscosity Range:
Unlimited

Thread Form Connections:
See Ordering Information

Outputs:
0 - 5 Vdc (0.85 – 4.05 Vdc Dynamic range)

Maximum alarm output lead:
0.5 Amps (maximum continuous lead)

Supply Voltage:
8 - 30 Vdc/30mA

Calibration Accuracy:
+/- 2% RH

Compensated Thermal Stability:
+/- 1% RH (+10 to 80°C)

Materials:
Stainless Steel 303

Sensor Size/Weight:
107mm x ø50mm/0.3 Kg

IP Rating:
IP68 (with specified moulded cable)

- Unrivalled pressure rating: Up to 420 Bar (6,000 PSI).
- Results are reported as a “% saturation” (%RH) of water in the oil.
- Green and Red LED’s for local performance operation.
- Red LED illuminates at selectable % saturation points (end user adjustable*).
- Optional panel meter/bar graph indicator also available for easy and remote identification.
- Easy installation into an actual oil flowstream.
- Temperature compensated for detection cell thermal stability.
- Various thread options available.
- Easier, more accessible cable connection.

Interpreting the data

Oil type: Texaco Rando 46
Saturation point: 400ppm @ 65ºC (150ºF)
At the above operating condition, the meter displays 100% saturation. As the meters scale indicates a reduction in the saturation percentage, there is also a corresponding reduction in PPM at a constant temperature. In the example above, a meter reading of 50% saturation could be interpreted as 200ppm at 65º (150ºF)

Sensor

*Using only the sensor as a go/no-go device, a Red LED will indicate when the oils water concentration reaches 80% saturation and trigger a corresponding voltage output. The unit also features an analogue output proportional to % Saturation with a dynamic range of 0.85 to 4.05 volts.

Example: <0.85V = Under
0.85V = 0% Saturation
2.45V = 50% Saturation
4.05V = 100% Saturation
4.06V to 4.3V = Emulsified water condition
>4.3V = Over

MS100 Moisture Sensor

Cost Effective Moisture Detection

VISUAL INDICATORS SPECIFICATIONS

Bar Graph Indicator

Construction:	Housing – Nylon 6/6, Window – Acrylic, Bezel/Board supports – ABS, Pins – Phosphor bronze
Power Supply:	11 – 30 Vdc
Signal Input: (By dipswitch configuration)	Off – Differential up to 5V A – Single Signal (Ref. 0V) up to 5V B – Single Signal (Ref. 1V) up to 6V
Cut out size:	45.6mm x 45.6mm
Fixing:	Push fit panel thickness 0.9mm to 3.2mm
Sealing:	Designed to IP50 standard. (Front face may be silicon sealed after LED configuration)
Scale:	Supplied 0 to 100% in horizontal Other scales, in volume, consult Parker Hannifin
Scaling Factors:	10% to 100% range. Fully adjustable
Lamp Intensity:	4mcd each
Front Viewing:	Polarised
Weight:	29gms

Process Indicator

Display:	
Primary Display:	Red/Green, 7 segment LED, 5 digits, height 18.5mm
Physical:	
Dimensions:	DIN 48 x 96mm, 110mm total length
Mounting:	Front panel mounting (mounting bracket supplied)
Panel Cutout:	45+0.5mm x 92+0.5mm, panel thickness max 12mm
Environmental:	
Power Supply:	90 to 264 VAC 50/60Hz (electrically separated from all inputs and outputs) or 20 to 50 VAC/22 to 55 VDC
Temperature:	Operation: 0°C to +55°C (32°F to 131°F) Storage: -20°C to +80°C (-4°F to 176°F)
Approvals:	
Ratings:	Frontpanel IP 66
General:	Overvoltage category II, Contamination level 2, UL, CUL (CE)
Outputs:	
OUT1, OUT2 NPN:	Open Collector; 30 VDC max; 100 mA max; response time <75 µs
OUT1, OUT2 Relay:	SPDT Changeover; 240 VAC / 3A or 115 VAC/ 5A; pull-in time approx. 8ms
Linear Output:	
Output Range:	0 to 20 mA, 4 to 20 mA, 0 to 5V, 1 to 5V, 0 to 10V, 2 to 10V
Option:	
Accuracy:	±0.25% (mA at 250 Ohm, V at 2kOhm); Linear Deviation ±0.5%
Resolution:	8 bits in 250 ms (10 bits in 1000 ms typ.)
Updating:	Approx. 4 updates per second

ORDERING INFORMATION

Moisture Sensor Only (Viton Seals)	
MS100-1	G¼" BSPP with Bonded Seal
MS100-2	G¼" BSPP with Integral Seal
MS100-3	R¼" BSPT
MS100-4	¼" NPT
MS100-5	9/16-18 UNF 2A (SAE J514)

Moisture Sensor Only (EPDM Seals)	
MS100-1E	G¼" BSPP with Bonded Seal
MS100-2E	G¼" BSPP with Integral Seal
MS100-3E	R¼" BSPT
MS100-4E	¼" NPT
MS100-5E	9/16-18 UNF 2A (SAE J514)

"T" Mount Adaptors with various thread form options available (Contact Parker)

Indicators	
PBG.8341.A	Bar Graph Indicator
DDU.1001*	Process Indicator (22 to 55Vdc)
DDU.1002	Process Indicator (90 to 264 Vac)

Power Supply	
S.970400	12V UK Power Supply

Cables	
P.9732PVC-02	M12 IP68 PVC Coated 2m Cable
P.9732PVC-05	M12 IP68 PVC Coated 5m Cable
P.9732PVC-10	M12 IP68 PVC Coated 10m Cable
P.9732PUR-02	M12 IP68 PUR Coated 2m Cable
P.9732PUR-05	M12 IP68 PUR Coated 5m Cable
P.9732PUR-10	M12 IP68 PUR Coated 10m Cable

SPECIFICATION AND ORDERING

	LaserCM (LCM20.2021)	LaserCM (LCM20.2061)	6 Channel CM (CM20.9021)	6 Channel CM (CM20.9061)	H2Oil (WOM.9100)
Noryl, structural foam					•
Lexan, structural foam and ABS case	•	•	•	•	
ABS handheld display	•	•	•	•	
Silicone rubber keypad					•
Fluorosilicone keypad	•	•	•	•	
Mechanical composition – Brass, plated steel, Stainless steel and aluminium	•	•	•	•	•
Fluorocarbon Seals	•		•		•
EPDM seals		•		•	
Nylon hoses (kevlar braided microbore)	•	•	•	•	•
Stainless steel armoured hose ends	•	•	•	•	
1.2m fluid connection hose	•	•	•	•	•
1m extension hose	•	•	•	•	•
Up to 380 l/min (100 US GPM) with System 20 Sensors. Higher with Single Point Sampler	•	•	•	•	•
Rechargeable battery pack	•	•	•	•	•
12Vdc power supply	•	•	•	•	
Fast blow fuse	•	•	•	•	•
Unique optical scanning system	•	•	•	•	•
Bonded glass optical window enclosed in SS plate	•	•	•	•	•
Micron channels analysis (2+,5+,15+,25+,50+ & 100+)	•	•	•	•	
PPM or % (0 to 3000)					•
Analysis range ISO 7 to 22 incl. (NAS 0 to 12)	•	•			
ISO 7 to 24 incl.			•	•	
32 character dot matrix LCD. Alpha numeric keypad	•	•	•	•	
24 character					•
Data retrieval	•	•	•	•	•
Calibration to ISO standards*	•	•	•	•	•
Viscosity range 2 to 100 cst. 500 cst. with SPS	•	•	•	•	•
Operating temp. +5 to +80°C	•	•	•	•	•
Ambient temp. +5 to +40°C	•	•	•	•	•
4 min test completion			•	•	
2 minute test completion time	•	•			•
Memory store – 500 test memory					•
Memory store – 300 test memory	•	•	•	•	
12Vdc regulated power supply input	•	•	•	•	
Battery operated 6 x 1.5 d cells	•	•	•	•	
Phosphate Ester group compatibility		•		•	
Mineral oil & petroleum based fluid compatibility	•		•		•
Up to 420 bar (6000 psi) System 20	•	•	•	•	•
Integral 16 column printer	•	•	•	•	•
RS232 computer interface	•	•	•	•	•
Astra board case weight – (Kg)	5	5	5	5	5
Unit weight – (Kg)	8	8	8	8	6
DATUM software and cable link pack	•	•	•	•	•
Weather protector cover	•		•		
CE certified	•	•	•	•	•
Computer controlled					
Auto logging	•	•	•	•	•
Commissioning kit includes:					
6 off batteries	•	•	•	•	
2 off spare paper rolls	•	•	•	•	•
Spare printer ribbon	•	•	•	•	
Spare light source			•	•	
Fuse	•	•	•	•	•
Screwdriver	•	•	•	•	•
12v jack plug for dc supply	•	•	•	•	
3 language manual	•	•	•	•	•
Spare battery					•
Battery charger					•
Re-chargeable battery pack	•	•	•	•	
Calibration certificate	•	•	•	•	
Handset cover				•	
Operation manual	•	•	•	•	•

*Note: In compliance with international standards, all Parker portable particle counters can meet the ISO Medium test dust standards. The LaserCM's, in addition to the complete range of Condition Monitoring products, are capable of achieving certification to ISO 4406:1999, and with tracability to ISO 11171 for SRM 2806. Note: A CM20 trace heating option for cold climate testing can be specified.

See below for part numbers	Single Point Sampler	UBS Offline	System 20 Analogue
Fluorocarbon Seals	•	•	•
EPDM seals	•	•	
Hose - Nylon (Kevlar graded microbore)			•
Up to 380 l/min (100 US GPM) with System 20 sensor			•
Up to 420 Bar (6000 psi) System 20	•		•
Viscosity range 2 - 250 cst		•	•
Viscosity range 2 - 500 cst	•		
Operating temp +5 to + 80°C	•	•	
Operating temp -10 to + 110°C			•
Test time 2m15s / 4m15s (Flush 2m)		•	
12Vdc power supply		•	
ABS moulding			•
St.steel and aluminium construction	•		
Extruded aluminium construction		•	
Unit weight - (kg)	0.5	4	1.4
Mineral oil and petroleum based compatibility	•	Fluorocarbon Seal	•
Phosphate Ester group compatibility	•	EPDM Seals	
CE certified	•	•	•
Military approved	•	•	•
Manual operation	•	•	
Bottle pack	•	•	
De-gassing chamber		•	
Manual	•	•	•
Sample Tube pack		•	
Interface cable to LCM20, H2Oil etc.		•	
Hose coupling	•		
Extension hose	•		

	Part Number	Description
CM20's	**LCM20.2021**	Laser 6 Channel data entry handset (incl. aluminium case and kit
	LCM20.2022	Laser 6 Channel (MTD Calibration)
	LCM20.2023	Laser 6 Channel + Bar Code Pen
	LCM20.2024	Laser 6 Channel (MTD Calibration + Bar Code Pen)
	LCM20.2061	Laser 6 Channel as above for use with Aggressive Fluids
	LCM20.2062	Laser 6 Channel (Aggressive fluids - MTD Calibration)
	LCM20.2063	Laser 6 Channel (Aggressive fluids + Bar Code Pen)
	LCM20.2064	Laser 6 Channel (Aggressive fluids - MTD Calibration + Bar Code
	CM20.9021	White Light 6 Chnl Data Entry Handset (incl. case and kit)
	CM20.9022	White Light 6 Chnl (MTD Calibration)
	CM20.9061	White Light 6 Chnl as above for use with Aggressive Fluids
	CM20.9062	White Light 6 Chnl (Aggressive Fluids - MTD Calibration)
	MCM20.2021	Permanent 6 Channel Autoremote
	B.84.729	12V dc power supply
	B.84.609	Re-chargeable battery pack
	B.84.702	Printer paper (5 rolls)
	P.843702	Printer ribbon
	B.84.501	Spare replacement lamps (4 off – CM20 only)
	P.849613	Weather protector cover
H2 Oil	**WOM.9100**	H2Oil (Incl. aluminium case and kit)
	B.91.701	Printer paper (5 rolls)
	S.840134	Oil delivery unit
SPS	**SPS.2021**	Single Point Sampler (standard)
	SPS.2061	Single Point Sampler (aggressive fluids)
UBS Offline	**UBS.9002**	Universal bottle sampler (incl. aluminium case and kit)
	UBS.9003	Universal bottle sampler
	UBS.9004	Aggressive universal bottle sampler
	UBS.9005	Aggressive universal bottle sampler incl. aluminium case kit
	S.840054	Power supply and socket
	S.890005	De-gassing kit and pump
	B.89.603	De-gassing chamber
	B.89.910	Sample bottle kit (100 bottle pack)
System 20 Sensors	**STI.O144.**	100Industrial size 0 sensor
	STI.1144.	100Industrial size 1 sensor
	STI.2144.	100Industrial size 2 sensor (Mobile Sensors can be specified)
System 20 Monitors	**STM.6211.110**	l/min dual scale oil analogue monitor
	STM.6611.110	US GPM dual scale oil analogue monitor
	STM.6211.120	l/min dual scale water analogue monitor
	STM.6611.120	US GPM dual scale water analogue monitor
Datum	**B.84.779**	Datum software pack
	B.84.708	Cable and adaptor

Changes to ISO Standards

The impact on Filter Performance reporting and the Contamination Code.

The recent changes to ISO contamination and filtration standards were brought about to solve accuracy, tracability, and availability issues. It is important to remember that both real world hydraulic system cleanliness levels and actual system filter performance remain unchanged.

However, the reporting of cleanliness levels and filter performance has changed due to the new particle counter calibration and multi-pass test procedures.

The New Calibration Method.

ISO 11171 is the new particle counter calibration method and utilises calibration fluid made from ISO Medium Test Dust (ISO MTD) suspended in MIL-H-5606. The calibration fluid is traceable to the National Institute of Standards and Technology (NIST) and is designated by NIST as Standard Reference Material (SRM) 2806. ISO 11171 is replacing ISO 4402 which is based on obsolete AC Fine Test Dust (ACFTD)

It is important to note that the ISO 11171 calibration method is based on a distribution of particles measured by their equivalent area diameter, whereas ISO 4402 is based on distribution of particles measured by their longest chord. Also, the NIST work utilised scanning electron microscopy for particles below 10µm in size, whereas sizing distribution on ACFTD utilised optical microscopy.

The charts to the right show the approximate particle size relationship between the calibration methods.

Chart 1 - ISO Comparison

Former two-digit ISO 4406:1987 5µm / 15µm 14 / 11
Former three-digit ISO 4406:1987 2µm / 5µm / 15µm 17 / 14 / 11
New three-digit ISO 4406:1999 4µm (c) / 6µm (c) / 14µm (c) 18 / 14 / 11

Chart 2 - Particle Size Comparison

ACTFD size (per ISO 4402:1991) µm	NIST size (per ISO 11171:1999) µm (c)
1	4.2
2	4.6
3	5.1
5	6.4
7	7.7
10	9.8
15	13.6
20	17.5
25	21.2
30	24.9
40	31.7

Laboratory Analysis Service

The Par-Test service is a complete laboratory analysis performed on a small quantity of fluid supplied by the customer.
Provision of a sampling bottle of known cleanliness and a pre-addressed bottle container, both of which are designed to be suitable for mailing, is part of the service.

Most contaminant in hydraulic or lube oil systems are invisible

Damage causing particles range from 5 to 40 micrometers in size, but the limit of human visibility is only 40 micrometers. Harmful particulate matter is often invisible, even in very high concentration. Also, acids, water and other fluid oxidation by-products cannot be easily detected by human senses. Some other means must be used to monitor fluid conditions.

Fluid analysis is the only method to check fluid conditions

Fluid analysis services may be as simple as a sample batch comparison. Or, a full laboratory treatment may be used to indicate the sources and quantity of contamination. In either case, important test results are achieved. Parker offers both types of services to fit your specific needs.

Par-Test™—Complete Laboratory Analysis

Par-Test is a complete laboratory analysis, performed on a small quantity of fluid. The test results are very comprehensive, including the following critical analysis:

- Spectrochemical analysis of over 20 wear metals and additives.
- Particle count reported over five size ranges. The particle count is expressed as an ISO cleanliness code. It is also plotted on a graph for better comparisons.
- Viscosity at 40°C is reported in centistokes.
- Water content is expressed as a % of volume. Many hydraulic systems may tolerate up to 300 ppm (.03%) of water contamination. Some bearing or lube oil systems must strictly limit water content.
- Analysis recommendations summarises Par-Test results and indicates what action should be taken to prevent any potential problems.
- Fast turnaround—test results are mailed back to you within 24-48 hours after receiving your fluid sample.

Par-Test: Concise and complete

The Par-Test report you receive is neatly organised. You may quickly analyse the test results — or compare them to a previous sample. Using the same “unit number” on your sample information form will allow up to four test results listed on a single Par-Test report form. Par-Test belongs in your regular maintenance program. Comprehensive and accurate fluid analysis will help you prevent major hydraulic or lube oil system problems. Order Par-Test today (see below details) and see how easy and complete—fluid analysis can be.

ORDERING INFORMATION

Par-Test™ Laboratory Fluid Analysis

The purchase price for the Par-Test sample kits includes the pre-cleaned and sealed sample bottle, mailing tube with a pre-addressed label, sample information data sheet (to be completely filled out by the end user), and the complete laboratory analysis.

Please allow 24-48 hours of laboratory time plus mailing/shipping time to receive your test results.

Description	Part Number
Plastic Bottle	S04397
Glass Bottle	S04398

Par Test Charts

PAR :TEST — Fluid Analysis

anything Parker Possible.

PARKER NO.	CLIENT NO.	UNIT NO.
1000.	27	4714

OTHER 295 — LOCATION **RETURN**

FILTER MANUF **PARKER** — PUMP MODEL **LINE TRUCK** — FLUID MANUF — FLUID TYPE — NUMBER COPIES 2 — TYPE NUMBER 2

MICRON RATING **10NOM**

SAMPLE DATA

LAB#	DATE TAKEN/ TESTEN	DATE FILTER SERVICE
9261	30JUN89	
	02JUL89	
9262	28JUL89	
	30JUL89	
9263	20AUG89	
	22AUG89	

SPECTROCHEMICAL ANALYSIS VALUES EXPRESSED IN PARTS PER MILLION (PPM) BY WEIGHT

	IRON	CHROMIUM	LEAD	COPPER	TIN	ALUMINIUM	NICKEL	SILVER	MANGANESE	SILICON	BORON	SODIUM	MAGNESIUM	CALCIUM	BARIUM	PHOSPHORUS	ZINC	MOLYBOENUM	TITANIUM	VANADIUM	CADMIUM
	3	0	0	2	0	0	0	0	0	9	0	0	2	29	291	339	233	0	0	0	0
	2	0	0	2	0	0	0	0	0	9	0	0	4	24	25	156	244	0	0	0	0
	1	1	0	1	0	0	0	0	0	7	0	0	1	29	24	133	207	0	0	0	0

PHYSICAL PROPERTY DATA

	VIS 40ºC (VIS 104 ºF)	VIS 100ºC (VIS 212 ºF)	WATER 100% Vol
	32.7	N/A	0
	32.8	N/A	0
	32.3	N/A	0

LAB#	ANALYSIS RECOMMENDATIONS ISO	RATING
9261	20/	17
9262	19/	14
9263	16/	12

PARTICLES PER 100 MILLILITER GREATER THAN INDICATED SIZE

>5	>15	>25	>50	>100
667,488	67,608	15,440	872	88
315,466	12,052	2,496	296	8
41,758	2,280	664	112	16

LAB# ANALYSIS RECOMMENDATIONS

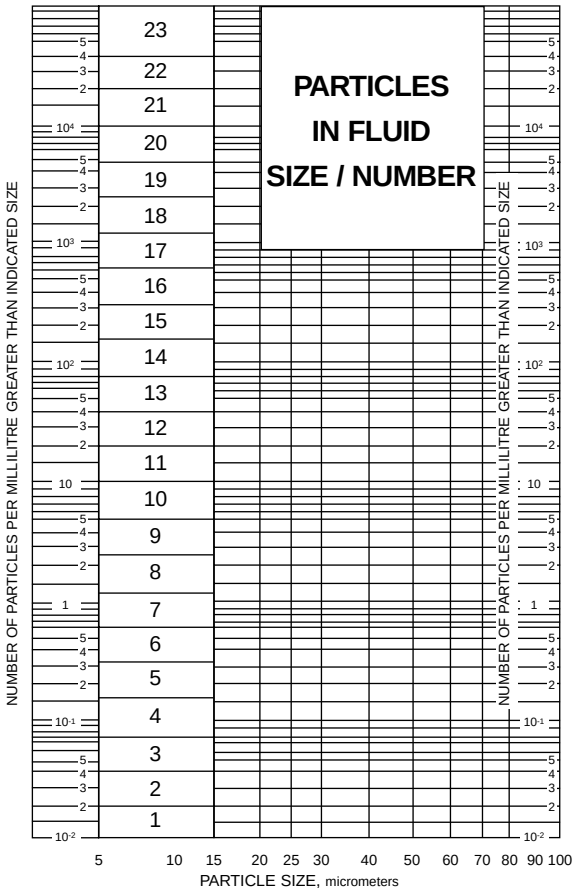
9261 EXTREME LEVELS OF CONTAMINATION INDICATE POSSIBLE WEAR PROBLEMS. HIGHER PRESSURE SYSTEMS(.1500 PSI) SHOULD RECEIVE IMMEDIATE FILTRATION ATTENTION. SAMPLE AGAIN WITHIN 30 DAYS

LAB# ANALYSIS RECOMMENDATIONS

9262 EXTREME LEVEL OF CONTAMINATION INDICATE POSSIBLE WEAR PROBLEMS. HIGHER PRESSURE SYSTEMS (>1500 PSI) SHOULD RECEIVE IMMEDIATE FILTRATION ATTENTION. SAMPLE AGAIN WITHIN 30 DAYS

9263 CLEANLINESS LEVEL SUITABLE FOR MOST SYSTEMS. SERVO CONTROLS REQUIRE CLEANER FLUID. CONTINUE REGULAR PREVENTIVE MAINTENANCE. SAMPLE AGAIN IN 2 - 3 MONTHS.

Since remedial advice is based on test results provided by others, and since corrective action, if any is performed by others, remedial advice is rendered without warranty or liability of any kind.



Viscosity Conversion Chart

cSt (centistrokes)	SUS (Saybolt Universal Seconds)
10	46
20	93
25	116
30	139
32.4	150
40	185
50	232
70	324
90	417

Comparisons are made at 100ºF (38ºC).
for other Viscosity Conversion Approximations, use the formula: $cSt = \frac{SUS}{4.635}$

Cleanliness Level Correlation Table

ISO Code	Particles/Millilitre ≥ 5 Micrometers	≥ 15 Micrometers	ACFTD Gravimetric Level, mg/L	NAS 1638 (1964)	Disavowed "SAE" Level (1963)
26/23	640,000	80,000	1000		
25/23	320,000	80,000			
23/20	80,000	10,000	100		
21/18	20,000	2,500		12	
20/18	10,000	2,500			
20/17	10,000	1,300		11	
20/16	10,000	640	10		
19/16	5,000	640	10		
18/15	2,500	320		9	6
17/14	1,300	160		8	5
16/13	640	80	1	7	4
15/12	320	40		6	3
14/12	160	20		5	2
14/11	160	20		5	2
13/10	80	10	0.1	4	1
12/9	40	5		3	0
11/8	20	2.5		2	
10/8	10	2.5			
10/7	10	1.3		1	
10/6	10	.64	0.01		

For more information: Contact Parker Filtration's Condition Monitoring Centre: Tel: +44 (0) 1842 763299.
Fax: +44 (0) 1842 756300. Email: fluidpower@ucc.co.uk