

# RMF SYSTEMS

PURE POWER



## CONTAMINATION MONITORING CENTER



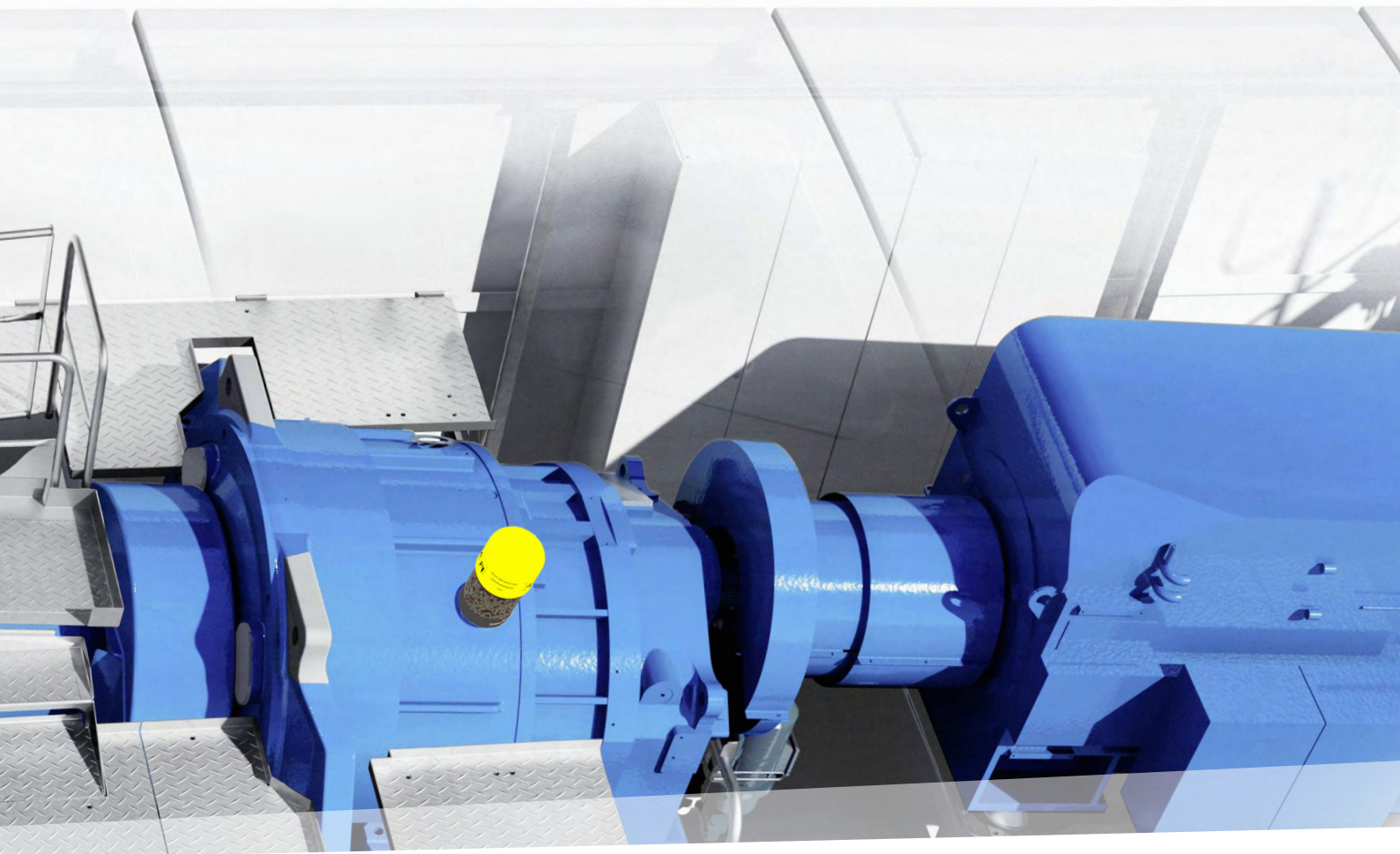
# Contamination Monitoring Center

## WHERE CAN IT BE USED?

- ▶ Renewable energy
- ▶ Gearbox applications
- ▶ Automotive industry
- ▶ Paper industry
- ▶ Offshore systems
- ▶ Lubrication systems
- ▶ Marine thrusters
- ▶ Test Benches

RMF SYSTEMS CONTAMINATION MONITORING CENTER (CMC) COMBINES TECHNOLOGY TO ENABLE SAMPLING ON LOW PRESSURE HYDRAULIC AND LUBRICATION SYSTEMS WHERE AERATION CAN BE AN ISSUE. THE CMC SUPPRESSES THE AIR BUBBLES SO THEY ARE NO LONGER COUNTED AS PARTICLES. IT ALSO ALLOWS FOR CONTINUOUS PARTICLE MONITORING ON SYSTEMS WHERE NO OIL PRESSURE IS EVIDENT.

The CMC can be installed in most low pressure hydraulic and lubrication systems ranging from zero bar pressure to a max of 50 bar on the inlet of the system. A further option can be installed on systems with a max of 0,5 bar on inlet of CMC pump and a max of 6 bar on system return. These two options give the user the versatility to install the CMC in a variety of different system applications. Utilizing the best particle counter in its class as standard, the CMC delivers simplicity, practicality & accuracy for the most demanding of applications. Proven optical technology and algorithms ensure consistent monitoring of your system, providing peace of mind for your operators.



The CMC comes with an optional CMS complete with RS485/232 MODBUS & CANBUS (J1939 typical) protocols for remote control. CMS Communication & motor power needs to be completed by the customer during installation. The cable for motor power is not supplied. Optionally the CMC can be equipped with an Oil Quality Sensor (OQS), used for measuring oil degradation.

#### DESIGNED WITH YOU IN MIND...

The CMC is specifically configured to provide customers the versatility they require for existing systems or those in development. The built-in motor/pump assembly and automatic particle counter (CMS) can be wired to directly, allowing control through a wide range of communication protocols and logic controllers. A small footprint makes it the ideal solution for installation on new or retrofit applications. A wide range of operating voltages allow us to support a global market, and emerging technologies.

The CMC can give you reliable feedback about solid particle contamination levels, water level (%RH), oil degradation and temperature. Making it the most advanced diagnostic centre for hydraulic and lubrication fluids.

#### WHEN SHOULD IT BE USED?

- ▶ Entrained air or turbulent flows
- ▶ Higher viscosity fluids
- ▶ Un-pressurized systems

#### WHY SHOULD IT BE USED?

- ▶ Reliable & accurate performance.
- ▶ Allows for pro active maintenance
- ▶ Certifying test benches
- ▶ Easy to retro-fit.
- ▶ Exceptional communication & 4.000 test memory.
- ▶ Alarms for contamination levels
- ▶ Alarm for water
- ▶ Alarm for temperature

# CMC Specification

## AUTOMATIC PARTICLE COUNTER

In-line contamination monitor	CMS with keypad and backlit display and relays.
Particle Sizing & Channels	As CMS: >4, 6, 14, 21, 25, 38, 50, 70 $\mu\text{m(c)}$ to ISO 4406 1999 Standard
Moisture Sensing (RH%)	Available with or without moisture sensor
Communication Protocols	PLC compatible. RS485, RS232 & CanBus (J1939 typical)
Software	RMF View (Supplied with product)
Re-calibration	Defined by customer Quality Controls

## CONTROL, COMMUNICATION & INTERFACE

On/off & Stop/Start signals (Remote)	Start/Stop signalling & test set up user defined.
Hydraulic Hoses (External)	Customer to source their own
Circuit Flow Rate	40 ml/min to 400 ml/min (viscosity dependant)
Electric Motor	110VAC, 230VAC, 400VAC, 690VAC
Weight	13 Kg
USBi Comms Junction Box	Optional , order with CMS

## OPERATIONAL PARAMETERS

Fluid Comptability / Corrosion Resistance	Hydrocarbon based & Synthetic hydraulic fluids
Min Inlet Pressure	positive pressure
Max Inlet pressure	50 bar (pump option dependant)
Min Outlet Pressure	Atmosphere
Max Outlet pressure	6 bar (pump option dependant)
Max. Fluid Temperature (Continuous)	80 °C
Min Fluid Temperature (Continuous)	Viscosity dependant. Not greater than 1.000 cSt
Min Temperature (Start Up)	Viscosity dependant. Not greater than 1.000 cSt $\approx$ 25 °C ISO VG 320
Max. Viscosity	1.000 cSt
Min. Viscosity	10 cSt
Min. Start Up Ambient Temperature	-40 °C
Max. Continuous Ambient Temperature	50 °C
Power Consumption	0.25 kW max

**OIL QUALITY SENSOR**

Material	Stainless Steel AISI304
Analogue output	4 - 20 mA
Communications	RS485, Modbus and CANbus
Dimensions	90 mm x 37 mm
Fluid compatibility	Mineral & Synthetic oil
Fluid temperature	-20 C °to 120 C °
Max fluid pressure	20 bar
Power supply	9 - 30VDC
Protection class	IP67
Repeatability	3%
Weight	160 g
Output connection	6 PIN Lumberg
Mechanical connection	1/2" BSP Thread
Seals	FPM

**OIL QUALITY DISPLAY**

Material	Polycarbonate
Analogue output	4 - 20 mA
Dimensions (LxWxH)	120 mm x 66 mm x 42 mm
Weight	300 g
Keypad	Polyester
Mounting	Integrated flanges
Power	9 - 30 VDC
Average power consumption	0.4 W
Power consumption	30 mA continuous
Analog output	4-20 mA
Digital output	RS485: 9600 baud half duplex
Display	20 Segment Tri-colour LED
	13 Green LEDs
	4 Amber LEDs
	3 Green LEDs
	Power LED
	Oil/Temp Selection button
	Oil/Temp Selection LEDs
Temperature range	-20 °C to 120 °C
Oil quality	0 to 20

# Main Dimensions

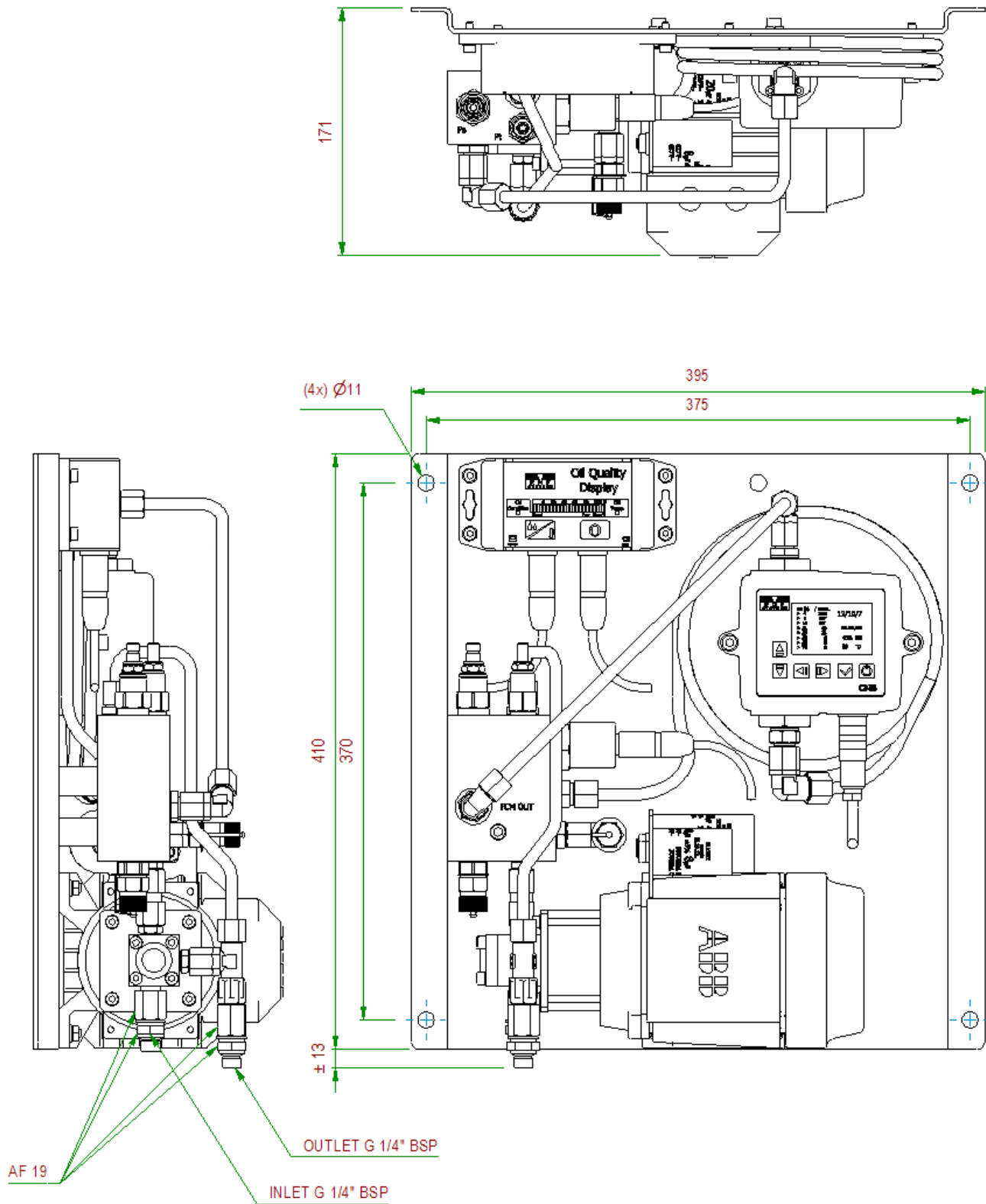


Figure 1: Main dimensions

# Hydraulic Diagram

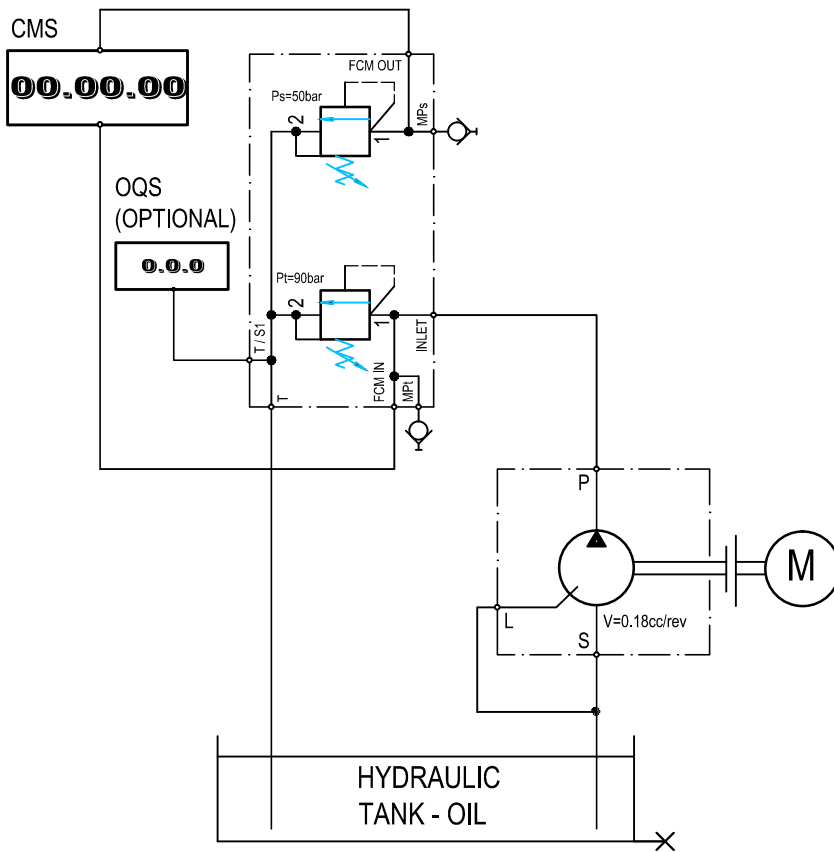


Figure 2: Diagram CMC without drain

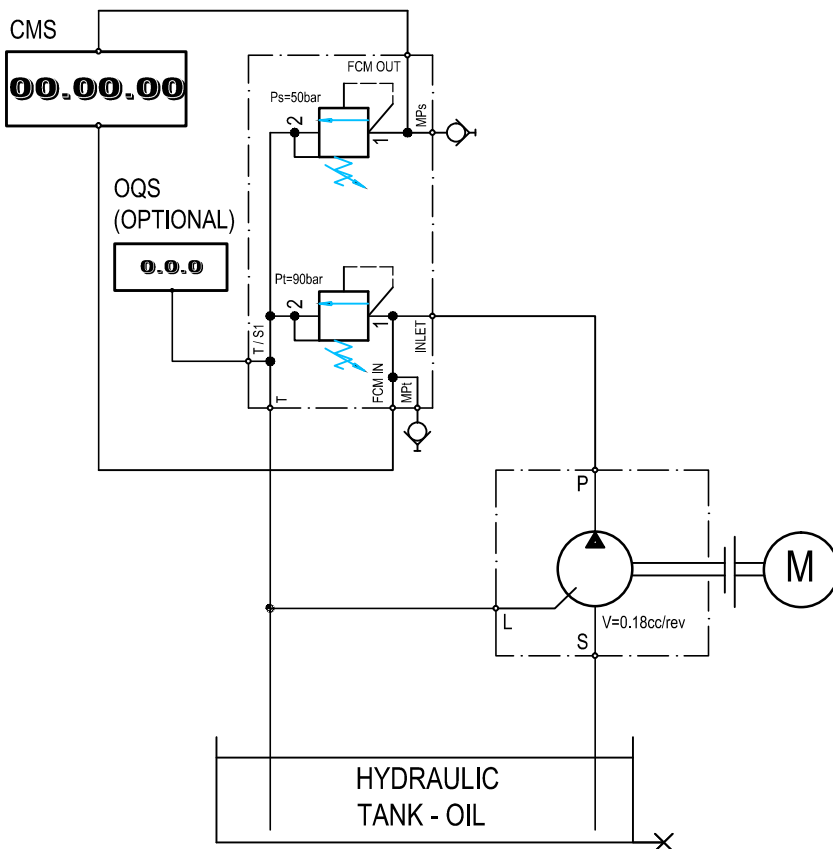


Figure 3: Diagram CMC with drain



# Contamination Monitoring Sensor

## OPTIONAL ADDITIONS

THE CMS IN-LINE CONTAMINATION MONITOR AUTOMATICALLY MEASURES AND DISPLAYS PARTICULATE CONTAMINATION, MOISTURE AND TEMPERATURE LEVELS IN VARIOUS HYDRAULIC FLUIDS. IT IS DESIGNED SPECIFICALLY TO BE MOUNTED DIRECTLY TO SYSTEMS WHERE ONGOING MEASUREMENT OR ANALYSIS IS REQUIRED, AND WHERE SPACE AND COSTS ARE LIMITED.

- ▶ 8 channel contamination measurement & display
- ▶ Measures and displays:  
ISO 4406:1999  
NAS 1638  
AS 4059E  
ISO 11218
- ▶ Moisture and temperature sensing
- ▶ Data logging and 4.000 test result memory
- ▶ Manual, automatic and remote control functionality
- ▶ Multicolour LED and remote alarm signaling
- ▶ Robust die cast aluminium construction
- ▶ CMS view software (included)
- ▶ Previous ten results viewing capability

SPECIFICATION			
Formats	ISO 4406:1999		
	NAS 1638		
	AS4059E Table 2		
	AS4059E Table 1		
	ISO 11218		
Accuracy	± ½ code on the ISO 4406 standard. Across range ± 1 code		
Calibration	Each unit individually calibrated with ISO Medium Test Dust (MTD) based on ISO 11171 (1999) on equipment certified by IFTS.		
Hydraulic Fluid Compatibility	Mineral oil & petroleum based fluids (consult RMF Systems for other fluids)		
Flow Rate	20 - 400 ml/minute		
Viscosity range	To 1.000 centistokes		
Fluid temperature	-25 °C to +80 °C		
Maximum pressure	400 bar		
Electrical Supply	Voltage 9-36V DC		
Seal material	Viton (FKM/FPM)		
Test time	Adjustable 10 - 3.600 seconds, factory set to 120 seconds		
Moisture sensing	% RH (Relative Humidity) ± 3%		
Temperature measurement	± 3 °C		
IP rating	IP 65/67 versatile		
SUPPLY CURRENT	12 V	24 V	36 V
Basic unit	70 mA	40 mA	30 mA
With - K (keyboard)	150 mA	80 mA	60 mA



# USBi

THE AUXILIARY COMMUNICATION DEVICE IS AVAILABLE TO ORDER WITH THE CMS. THIS USB INTERFACE ALLOWS COMMUNICATION VIA A LAPTOP (RS485 TO RS232 CONVERTER). USBI CAN TRANSMIT POWER TO THE CMS ELECTRICAL CIRCUIT USING A DC POWER ADAPTER. THE USBI HAS THE ADDITIONAL BENEFIT OF SUPPLYING POWER VIA THE USB CABLE. THE DEVICE COMES WITH A DC POWER ADAPTER AND 3M TWISTED PAIR CABLE AS STANDARD.

## USBI SPECIFICATION

The CMS-USBi provides a complete plug-and-play solution for connecting a PC to the CMS. It plugs in directly to a computer using a USB cable, and to the CMS using a pre-wired connector. It can be used simply for the initial customer configuration of the CMS before installation, or for a regular/permanent PC connection where this is needed for data downloading/control.

The following functions are provided:

- ▶ USB to RS485 adaptor with Microsoft certified (WHQL) drivers
- ▶ 5V:12V DC:DC converter. This allows the CMS to be powered from the USB connector, if desired, removing the need for a separate power supply (in case the computer is always connected).
- ▶ Pre-wired CMS connector on 3m flying lead
- ▶ CMS signals brought out to user-accessible terminal block. This allows external alarms, PLCs or a start button to be easily connected.
- ▶ DC connector for optional external power supply (where USB power is not always available, i.e. when operation is required without a computer connection).
- ▶ LED Indicators indicating Transmit (Tx) and Receive (Rx) data.



# Oil Quality Sensor

## OPTIONAL ADDITIONS

THE OIL QUALITY SENSOR (OQS) FROM RMF SYSTEMS PUTS YOU IN CONTROL WITH REAL-TIME MONITORING OF CONTAMINATION AND WATER INGRESS. EXPENSIVE OIL CHANGES ARE NOW BASED ON OIL CONDITION, NOT ON HISTORICAL SCHEDULE.

The requirement to implement an effective monitoring and maintenance programme for lubricants in critical plant machinery has never been greater. With the escalating price of crude oil and the vast improvements that are being seen in the quality of lubricants available today, it is more important than ever for organisations to ensure that they are maximising the service life of the oil used. Monitoring oil condition is clearly fundamental to understanding the optimal time to change. Change too early and the cost is significant, change too late and the costs can be even greater!

The sensor is a live, highly flexible and cost effective condition based monitoring solution, designed to be permanently mounted within any lubrication system on any type of machine. Over 30 times more sensitive to oil contamination than any other dielectric constant measuring sensor, it provides real-time monitoring of water ingress and oxidation levels.

### Environmental

Strict schedule based maintenance programmes have several downsides. Environmental experts argue that the greatest of these is the preventable waste. The Oil Quality Sensor (OQS) real-time monitoring sensor makes extending the oil service life effortless.

### Market leading

The Oil Quality Sensor (OQS) is 30 times more sensitive to oil contamination than any other dielectric constant measuring sensor.

### Intelligent

The OQS measures the energy loss component of oil permittivity. All contaminants such as metallic particles, soot, water, oxidation, glycol and particularly burnt fuel dilution increase this measured value.



### Universal

- ▶ Reliably measures contamination in all industrial equipments, including;
- ▶ Diesel and petrol engines
- ▶ Compressors
- ▶ Industrial gear reducers
- ▶ Wind turbines
- ▶ Generator sets
- ▶ Hydraulic systems

### OQS facts

- ▶ Robust execution
- ▶ Resistant to high fluid temperatures, -20 °C to 120 °C
- ▶ Resistant to fluid pressures up to 20 bar

### Benefits

- ▶ Reduced maintenance cost
- ▶ Extended oil change intervals
- ▶ Scheduled downtime intervals for increased productivity
- ▶ Reduced waste oil cost
- ▶ Improved equipment reliability
- ▶ Low cost investment tool
- ▶ Reduced carbon foot print
- ▶ Reduces total cost of ownership

# Oil Quality Display

The Oil Quality Display is a simple device which allows you to read the condition and temperature of the oil from a sensor without a PC. This enables you to set up the display box on site and then be able to switch between the oil condition and temperature readings as required. With it being IP67 rated (when connected) you do not need to worry about the need to keep it in a dry place. Also with it being made from Polycarbonate it is a strong durable product which cannot be damaged easily.



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“This truly is a **revolution** in oil condition monitoring. Until today, sensors could only give a very rough indication of oil condition. With our **state of the art** technology you know the exact condition of your oil at all times, so you know when to conduct a service”

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Gerben Gerken  
Manager RMF Systems

# Ordering code

## CONTAMINATION MONITORING CENTER

YOUR CMC ORDERING CODE							
TABLE 1	TABLE 2	TABLE 3	TABLE 4	TABLE 5	TABLE 6	TABLE 7	TABLE 8
CMC							

TABLE 1 - BASIC CONFIGURATION	CODE
Contamination Monitoring Center	CMC

TABLE 2 - MOUNTING OPTIONS	CODE
Plate mounted	1
Cabinet mounted (with a transparent door)	2

TABLE 3 - WORKING PRESSURES	CODE	
MAIN SAFETY	WORKING PRESSURES	
90 bar	50 bar (standard)	AA
50 bar	30 bar	BB

TABLE 4 - PUMP CONFIGURATION	CODE
With drain, up to 50 bar inlet, atmosphere outlet (standard)	1
No drain, 0 - 0,5 bar max. inlet, 3 bar max. outlet	2
Separate drain, up to 50 bar inlet, 3 bar max outlet, atmosphere drain (0 - 0,5 bar max.)	3

TABLE 5 - E-MOTOR OPTIONS	CODE
230/400 VAC 50Hz / 3 Phase	0
255/460 VAC 60Hz / 3 Phase	
230 VAC 50Hz / 1 Phase	A
690 VAC 50Hz / 3 Phase	H
200/346 VAC 50/60Hz / 3 Phase	P

TABLE 6 - THREADED CONNECTION OPTIONS	CODE
1/4" BSP male thread (standard)	1
1/4" BSP female thread	2
7/16" UNF male thread	3

TABLE 7 - SMART OPTIONS (FOR DETAILS, SEE ORDERING CODES CMS OR QQS)	CODE
No options	1
RMF full option (standard) CMS installed	2
RMF OQS/OQD installed	3
RMF OQS/OQD and full option (standard) CMS installed	4
RMF CMS-0-M-K-R-G1	5
RMF CMS-W-M-0-R-G1	6
RMF CMS-0-M-0-R-G1	7
RMF OQS/OQD and CMS-0-M-0-R-G1	8
RMF OQS/OQD and CMS-W-M-0-R-G1	9
RMF OQS/OQD and CMS-0-M-K-R-G1	0

TABLE 8 - ELECTRICAL OPTIONS	CODE
No options (standard)	1
Control box	3

# Details

## CONTAMINATION MONITORING SENSOR

YOUR CMS ORDERING CODE						
TABLE 1	TABLE 2	TABLE 3	TABLE 4	TABLE 5	TABLE 6	TABLE 7
CMS				R		FC1

TABLE 1 - BASIC CONFIGURATION	CODE
Contamination Monitoring System	CMS

TABLE 2 - SENSOR OPTIONS	CODE
Moisture sensor option (mineral oil only)	W
No sensor option	0

TABLE 3 - FLUID COMPATIBILITY	CODE
Mineral fluid compatibility	M
<b>WITH ANODISED OUTER CASE (NOT AVAILABLE WITH WATER SENSOR)</b>	
Offshore and selected water based fluids	N
Phosphate ester and aggressive fluids	S

TABLE 4 - KEYBOARD AND DISPLAY	CODE
6 key keypad and 128 x 64 pixel back lit graphical display	K
No keypad and display	0

TABLE 5 - RELAYS	CODE
Two fully customisable "alarm" relay outputs to set upper and lower limits for the test results and indicates these via a "multicolour" front panel LED indicator and/or remote devices.	R

TABLE 6 - PORT OPTIONS	CODE
Test point M16 x 2 (standard)	G1
1/8" BSP	G2
1/4" BSP	G3

TABLE 7 - EXTRA OPTIONS	CODE
Flow control valve assembled	FC1

RELATED PRODUCTS - TO BE ORDERED SEPERATELY	CODE
CMS remote display unit with keypad (same port size as CMS unit)	CMS-RDU
CMS to PC USB connector unit	CMS-USBi

### WARRANTY AND RECALIBRATION

The CMS is guaranteed for 12 months from date of receipt and is recommended to be recalibrated every 12 months. Return to RMF Systems for recalibration.

# Details

## OIL QUALITY SENSOR

YOUR OQS ORDERING CODE					
TABLE 1	TABLE 2	TABLE 3	TABLE 4	TABLE 5	TABLE 6
OQS	1	08	0	SC	4

TABLE 1 - BASIC CONFIGURATION	CODE
Oil Quality Sensor	OQS

TABLE 2 - MATERIAL CASE	CODE
Stainless steel (standard)	1

TABLE 3 - THREADED CONNECTION OPTIONS	CODE
G1/2" BSP male thread	08
Alternative connections on special request	

TABLE 4 - SEALING OPTIONS	CODE
DIN 3852-11 Form E / ISO 1179-2 Viton (standard)	0

TABLE 5 - OUTPUT CONNECTION OPTIONS	CODE
Straight circular connector	SC
Lumberg M16x0,75 (6-pin IP67) (standard)	
Note: the connector is not included in the supply	

TABLE 6 - COMMUNICATIONS OPTIONS	CODE
Smart version - Protocol for RS485 2w / Modbus / Canbus / 4 - 20 mA	4

ACCESSORIES (ORDER SEPARATELY)	CODE
Display without data logger	OQD-N-1
Display with data logger	OQD-D-1
USB communication cable with external power supply	OQC-PC-2
OQS to OQD cable	OQC-02-1
OQS/OQD to bare ends cable	OQC-02-2



## We're Here To Help You

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