Process Monitoring Module

PMM-300

FEATURES

- Standalone 5 channels protection & monitoring system
- Predefined acquisition modes
- Multiple sensors input
- Individual Alert and Danger alarm threshold setting
- Built-in interfaces (4..20mA, modbus RTU, relays, BNC...)
- Connection with database CMS-500

Monitoring solution

- Endwinding monitoring
- Air gap monitoring
- Magnetic flux monitoring
- Roller bearing monitoring
- Axial thrust position
- Shaft & bearing vibration

Related applications

- Hydrogenerators
- Pumps, fan, cooling towers...
- Windturbines
- Gearless millsdrives
- Turbogenerators
- Gas & steam turbines

DESCRIPTION

Standalone 5 channel (4x dynamic signals and 1x reference signal) Process Monitoring Module (PMM) designed for the protection and monitoring of rotating machines.
The universal signal conditioning allows to connect proximity probes, piezoelectric sensors, airgap sensors and magnetic flux sensors directly without additional hardware interface.
The individual alarm and danger thresholds are configurable for each channel at 2 OTP modes (selection via digital input) or at 16 modes (selection via modbus / profibus interface).
The architecture is open with built-in 4x4..20mA output, modbus RTU, digital outputs and relays. The profibus interface is available as option.
The BNC terminals provide 1:1 raw signals for external analysis.
The Ethernet interface allow via TCP/IP to configure the system and to connect it to the CMS-500 and real time software. The system is supplied with real time software for real time data visualisation.

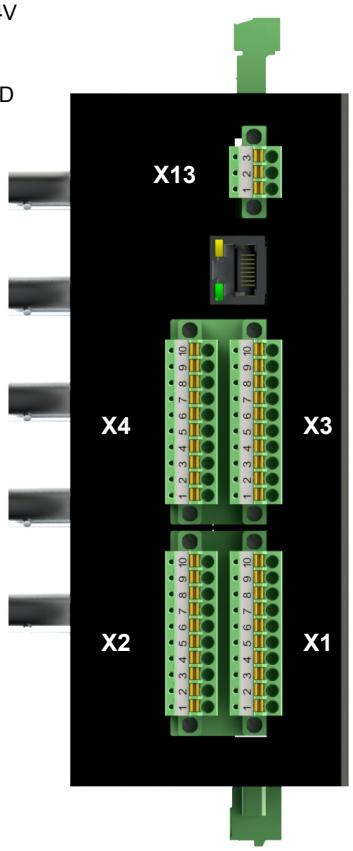
GLOBAL SPECIFICATION

ELECTRICAL CHARACTERISTICS

Supply voltage	+24VDC ±10%
Current consumption	Standalone : 125mA Max (sensors/relay,...) : 1.22A
4x Sensor input terminals	
Sensor power supply	4x ± 24VDC, 300mA fused
Sensor interface	
- Voltage (differential)	± 24VDC
- Voltage (single ended)	± 24VDC
Current	(0)4..20mA, 250Ω
Constant current source	4mA
1x Reference signal input terminals	
Sensor power supply	1x ± 24VDC, 300mA
Sensor interface	
- Digital sensor input	0..+24V
- Analogue sensor input	0..-24V
4x Digital input terminals	
Contact type & specifications	SPDT (NO/NC), 10A240VDC or 8A/30VDC
System ok	For the system
Sensor ok	Common for all sensors
Alert	Common for all sensors
Danger	Common for all sensors

X13 : Power supply

1	+24V
2	0V
3	GND



X1 : Sensor 1-2

1	S1 +24V
2	S1 0V
3	S1 -24V
4	S1 Signal input
5	S1 0V
6	S2 +24V
7	S2 0V
8	S2 -24V
9	S2 Signal input
10	S2 0V

X2 : Sensor 3-4

1	S3 +24V
2	S3 0V
3	S3 -24V
4	S3 Signal input
5	S3 0V
6	S4 +24V
7	S4 0V
8	S4 -24V
9	S4 Signal input
10	S4 0V

X3 : Keyphazor & DI

1	K1 +24V
2	K1 0V
3	K1 -24V
4	K1 Signal input
5	K1 0V
6	K2 +24V
7	K2 0V
8	K2 Signal input
9	Digital input (+24V)
10	Digital input (Sig)

X4 : Digital inputs

1	ModeOTP (+24V)
2	ModeOTP (Sig)
3	RotD (+24V)
4	RotD (Sig)
5	Save (+24V)
6	Save (Sig)
7	ResetAlarm (+24V)
8	ResetAlarm (Sig)
9	RestartSystem (+24V)
10	RestartSystem (Sig)

GLOBAL SPECIFICATION

ELECTRICAL CHARACTERISTICS

13x Digital output (15 pol D-Sub HD female)

Voltage output (per channel)	+24VDC, 20mA max
System ok	1x for the system
Sensor ok	4x individual per channel
Alert	4x individual per channel
Danger	4x individual per channel

4x Relays output terminals

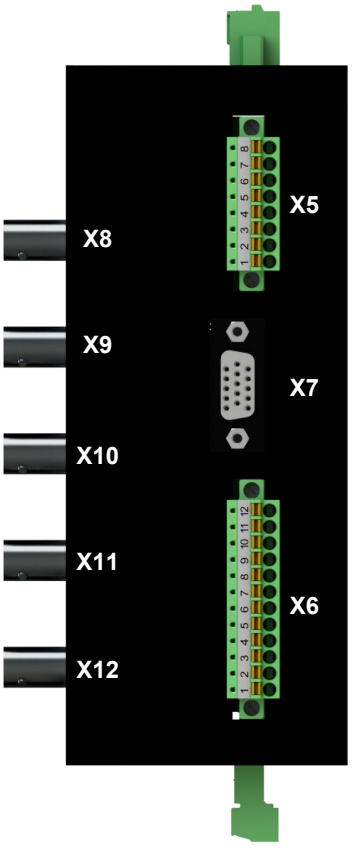
Contact type & specifications	SPDT (NO/NC), 10A240VDC or 8A/30VDC
System ok	For the system
Sensor ok	Common for all sensors
Alert	Common for all sensors
Danger	Common for all sensors

4x Analogue output terminals

Current output	4..20mA
Max load	500Ω
Protection	Short circuit proof
Resolution	12bit

5x RAW output

BNC connector	1:1 buffered output for each channel and reference signal
Protection	Short circuit proof



X5 : Analogue outputs

1	CH1 (+)
2	CH1 (-)
3	CH2 (+)
4	CH2 (-)
5	CH3 (+)
6	CH3 (-)
7	CH4 (+)
8	CH4 (-)

X6 : Relay outputs

1	NO (System OK)*
2	C (System OK)*
3	NC (System OK)*
4	NO (Sensor OK)*
5	C (Sensor OK)*
6	NC (Sensor OK)*
7	NO (Alert)
8	C (Alert)
9	NC (Alert)
10	NO (Danger)
11	C (Danger)
12	NC (Danger)

*Fail safe

X7 : 24V Digital outputs

1	System OK
2	S1 Sensor OK
3	S1 Alert
4	S1 Danger
5	S2 Sensor OK
6	S2 Alert
7	S2 Danger
8	S3 Sensor OK
9	S3 Alert
10	S3 Danger
11	S4 Sensor OK
12	S4 Alert
13	S4 Danger
14	GND
15	GND

Raw signal outputs (BNC)

X8	Keyphazor raw signal
X9	Sensor 1 raw signal
X10	Sensor 2 raw signal
X11	Sensor 3 raw signal
X12	Sensor 4 raw signal

GLOBAL SPECIFICATION

ANALOGUE INPUTS DETAILS

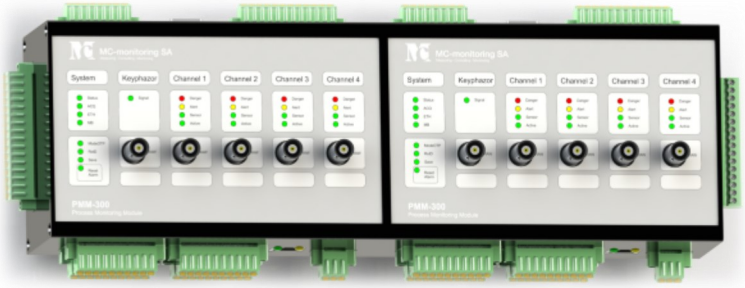
Mode name	Description	Electrical specifications
+/-10V Single Ended	Voltage input mode with measurement on IN*x*+ referenced to the IN*x*- which is internally tied to 0V.	IN*x*+ range: -10V to +10V AMR[1)]: +/-15V IN*x*- range: 0V ARM[1)]: +/-0.5V
+/-10V Differential	Voltage input mode with differential measurement between IN*x*+ and IN*x*- which are both floating.	IN*x*+ range: -10V to +10V AMR[1)]: +/-15V IN*x*- range: -10V to +10V AMR[1)]: +/-15V
0(4)-20mA Single Ended	Current input mode with measurement across IN*x*+ and IN*x*- which is internally tied to 0V. The internal reading shunt resistor value is 250Ω +/-10 Ω	IN*x*+ range: 0 to 20mA AMR[1)]: +/-100mA IN*x*- range: 0mA AMR[1)]: +/-100mA
0(4)-20mA Differential	Current input mode with differential measurement across IN*x*+ and IN*x*- which are both floating. The internal reading shunt resistor value is 250Ω +/-10 Ω	IN*x*+ to IN*x*- range: 0 to 20mA AMR[1)]: +/-100mA
ICP® 4mA input	Specific mode for ICP-type piezo sensors	INx+ range: 0 to 24V INx- range: 0V

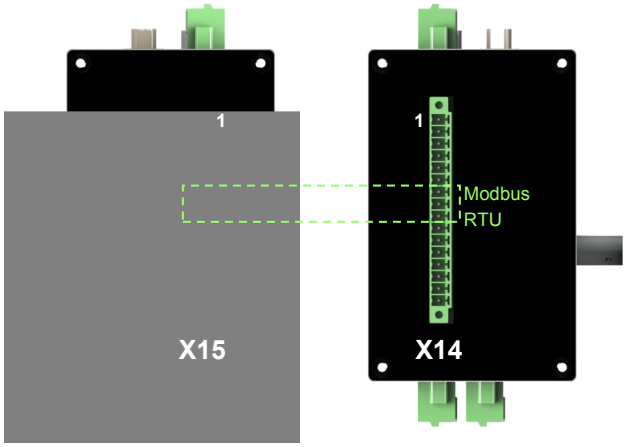
[1)]AMR: Absolute maximum ratings: if the applied voltage or current exceeds the absolute maximum ratings it may damage the input

COMMUNICATION INTERFACES

RS485	Modbus RTU
Ethernet, 100Mbit	Configuration & CMS-500
Interconnection bus	Available to connect up to 8x PMM-300 + 1x PMM-320[2)]

[2)]PMM-320: Display module for PMM-300, see PMM-320 datasheet for further information





Interconnection Bus

1	Interconnection Bus
2	
3	
4	
5	
6	
7	Modbus RTU RS485 (+)
8	Modbus RTU RS485 (-)
9	Modbus RTU RS485 (GND)
10	Interconnection Bus
11	
12	
13	
14	
15	
16	

MEASUREMENTS

CHARACTERISTICS

Acquisition

Type	4 channel true simultaneous
Resolution	16bit
Max. sampling rate	200kS/s per channel
Accuracy	< 1% of FS
Temperature deviation	±2ppm/°C at FS, 10µV/°C offset drift
Internal memory	64MB SDRam
Storage capacity	16GB

Acquisition	Signal processing	Monitoring parameters	Alarms	Interface
4x Relative Vibration (according to ISO 7919)				
s/s : 1024, 2048, 4096 Hz	**Filtering**	Smax (µm pk), on CH1 & CH3	1x monitoring parameter per channel, every 1s	**Analogue output**
Start triggered continuous acquisition	BP: 0.25 - 1600 Hz (-3dB) order 2-4	Displacement (µm pk)	2x modeOTP (DI)	• 4x 4..20mA (one value per channel)
	HP: 0.25 - 1600 Hz (-3dB) order 2-8	Displacement (µm pk-pk)	16x modeOTP (MB/PB)	**Ethernet (interface with CMS-500)**
	LP: 0.25 - 1600 Hz (-3dB) order 2-8	Shaft position (µm mean)		• RT raw : every revolution
	Integration	Harmonic & phase : (X1, X2, Xth-1, Xth-2, °, pk, pk-pk, TRMS)		• RT trend : every 1s
	n/a			• Historical raw : on event
				• Historical trend : every 5s
				Modbus / Profibus
				• All monitoring parameters
4x Absolute Vibration (according to ISO 10816)				
s/s : 1024, 2048, 4096 Hz	**Filtering**	TRMS (g, mm/s, µm) acc. ISO2954	1x monitoring parameter per channel, every 1s	**Analogue output**
Start triggered continuous acquisition	BP: 0.25 - 1600 Hz (-3dB) order 2-4	Bias voltage (mean value)	2x modeOTP (DI)	• 4x 4..20mA (one value per channel)
	HP: 0.25 - 1600 Hz (-3dB) order 2-8	Harmonic & phase : (X1, X2, Xth-1, Xth-2, °, pk, pk-pk, TRMS)	16x modeOTP (MB/PB)	**Ethernet (interface with CMS-500)**
	LP: 0.25 - 1600 Hz (-3dB) order 2-8			• RT raw : every revolution
	Integration			• RT trend : every 1s
	1x : 2.5 - 400 Hz			• Historical raw : on event
	2x : 2.5 - 400 Hz			• Historical trend : every 5s
				Modbus / Profibus
				• All monitoring parameters
4x AirGap monitoring				
s/s : 4096 Hz	**Filtering**	Min value per revolution (µm, mm)	1x monitoring parameter per channel, every revolution	**Analogue output**
Start / Stop triggered continuous acquisition	n/a		2x modeOTP (DI)	• 4x 4..20mA (one value per channel)
(calculation over one	**Integration**		16x modeOTP (MB/PB)	**Ethernet (interface with CMS-500)**
From 80RPM	n/a			• RT raw : every revolution
				• RT trend : every 1s
				• Historical raw : on event
				• Historical trend : every 5s
				Modbus / Profibus
				• All monitoring parameters

Acquisition	Signal processing	Monitoring parameters	Alarms	Interface
4x Endwinding monitoring				
s/s : 1024, 2048, 4096 Hz	**Filtering**	Mean value (µm)	1x monitoring parameter per channel, every 1s	**Analogue output**
Start triggered continuous acquisition	BP: 0.25 - 1600 Hz (-3dB) order 2-4	Wide band displacement (µm pk-pk)	2x modeOTP (DI)	• 4x 4..20mA (one value per channel)
	HP: 0.25 - 1600 Hz (-3dB) order 2-8	Displacement @ 1x network frequency (µm TRMS/pk/pk-pk)	16x modeOTP (MB/PB)	**Ethernet (interface with CMS-500)**
	LP: 0.25 - 1600 Hz (-3dB) order 2-8	Displacement @ nx network frequency (µm TRMS/pk/pk-pk)		• RT raw : every revolution
	Integration			• RT trend : every 1s
	1x : 2.5 - 400 Hz			• Historical raw : on event
	2x : 2.5 - 400 Hz			• Historical trend : every 5s
				Modbus / Profibus
				• All monitoring parameters
Magnetic flux monitoring				
s/s : 4096 Hz	**Filtering**	Max positive field (T)	1x monitoring parameter per channel, every revolution	**Analogue output**
Start / Stop triggered continuous acquisition	BP: 0.25 - 1600 Hz (-3dB) order 2-4	Max negative field (T)	2x modeOTP (DI)	• 4x 4..20mA (one value per channel)
(calculation over one revolution)	HP: 0.25 - 1600 Hz (-3dB) order 2-8	Max. deviation at opposite pole (T)	16x modeOTP (MB/PB)	**Ethernet (interface with CMS-500)**
	LP: 0.25 - 1600 Hz (-3dB) order 2-8			• RT raw : every revolution
	Integration			• RT trend : every 1s
	n/a			• Historical raw : on event
				• Historical trend : every 5s
				Modbus / Profibus
				• All monitoring parameters
2x Roller bearing monitoring CH1 & CH3 : bearing condition (in connection with SCD-200, according to DIN 3832) CH2 & CH4 : absolute vibration (according to ISO 10816)				
s/s : 4096 Hz	**Filtering**	**CH2 & CH4**	1x monitoring parameter per channel, every 1s	**Analogue output**
Start triggered continuous acquisition	n/a	TRMS (g, mm/s, µm) acc. ISO2954	2x modeOTP (DI)	• 4x 4..20mA (one value per channel)
	Integration	Bias voltage (mean value)	16x modeOTP (MB/PB)	**Ethernet (interface with CMS-500)**
	n/a	**CH1 & CH3**		• RT raw : 10s every 5min
		BCU		• RT trend : every 1s
				• Historical raw : on event
				• Historical trend : every 10s
				Modbus / Profibus
				• All monitoring parameters
				• 8x process parameters via MB/PB for interface with CMS-500
2x Relative Vibration (according to ISO 7919) and 2x absolute vibration (according to ISO 10816)				
s/s : 1024, 2048, 4096 Hz	**Filtering**	**CH1 & CH3**	1x monitoring parameter per channel, every 1s	**Analogue output**
Start triggered continuous acquisition	BP: 0.25 - 1600 Hz (-3dB) order 2-4	Smax (µm pk), on CH1	2x modeOTP (DI)	• 4x 4..20mA (one value per channel)
	HP: 0.25 - 1600 Hz (-3dB) order 2-8	Displacement (µm pk/pk-pk)	16x modeOTP (MB/PB)	**Ethernet (interface with CMS-500)**
	LP: 0.25 - 1600 Hz (-3dB) order 2-8	Shaft position (µm mean)		• RT raw : every revolution
	Integration	Harmonic & phase : (X1, X2, Xth-1, Xth-2, °, pk, pk-pk, TRMS)		• RT trend : every 1s
	n/a	**CH2 & CH4**		• Historical raw : on event
		TRMS (g, mm/s, µm) acc. ISO2954		• Historical trend : every 5s
		Bias voltage (mean value)		**Modbus / Profibus**
		Harmonic & phase : (X1, X2, Xth-1, Xth-2, °, pk, pk-pk, TRMS)		• All monitoring parameters

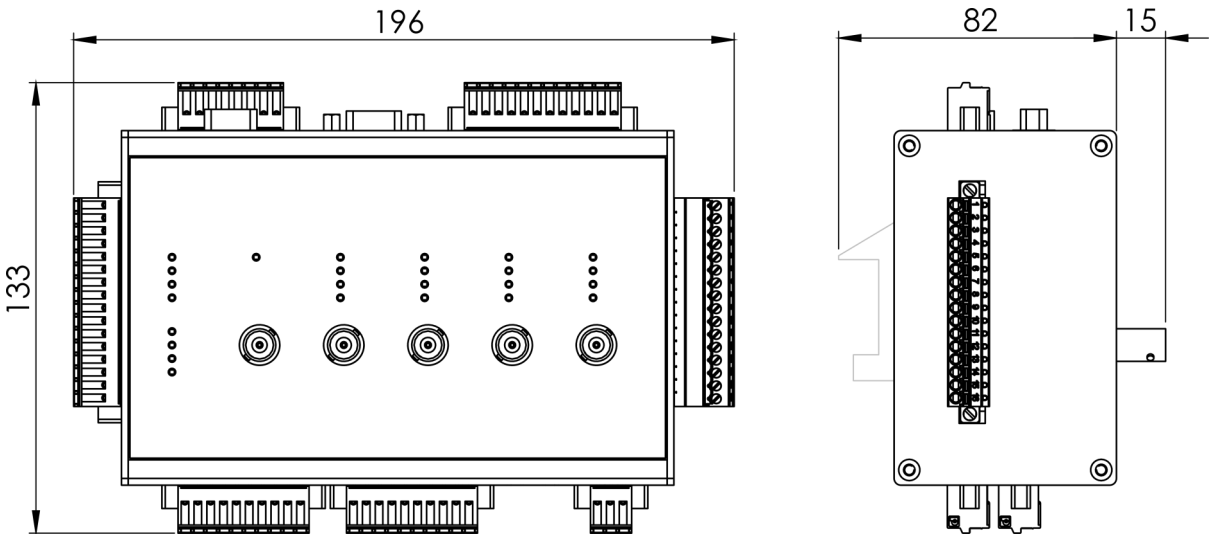
GLOBAL SPECIFICATIONS

ENVIRONMENTAL CHARACTERISTICS	
Temperature range	
Operation	0°C to +55°C
Storage	-20°C to +70°C
EMC	EN/IEC 61326-1
Environmental testing	
Dry heat testing	IEC-60068-2-2
Damp heat steady state	IEC-600-68-2-78
PHYSICAL CHARACTERISTICS	
Mounting	DIN 35mm rail mount
Terminals	Input and output via push-in terminals

ORDERING INFORMATION

Part type	Ordering code	Description
PMM-300	20.310.001	PMM-300 with Modbus RTU
	20.310.002	PMM-300 with optional Profibus DP
PMM-320	20.320.000	Display module for PMM-300 (optional)

MECHANICAL DRAWING



Due to the continual development of our products we reserve the right to modify the specifications without notification

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