



Rhino PMS-300

Process Monitoring System

FEATURES

- Modular 19" rack-based protection & monitoring system
- Up to 32 channels/3HU extendable to 64 channels/6HU
- 2-channels for reference signals
- Predefined acquisition modes
- Multiple sensor type input
- Individual Alert and Danger threshold settings
- Built-in interface (4..20mA, modbus RTU, relays, BNC,...)
- Up to 4x Third party MB slave for operating parameters
- Connection to CMS-500 software



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

The PMS-300 Process Monitoring System is a modular 19" rack-based system designed for the protection & monitoring of rotating machines.

In its 3HU version, 1 slot is available for the reference module card PMS-340, 8 slots for the 4-channel processing module cards PMS-314 & relays controller PMS-330/PMS-331. The system is also available in 6HU if additional channels and/or redundant power supply are required. BNC terminals are available on the front for external analysis.

The reference signal card PMS-340 acquires and distributes common information to/from all PMS-314 on the rack. Such information is typically: reference signals (2 channels), modeOTP selection and digital monitoring parameters via modbus.

For each channel, the Processing Modules System PMS-314 provides analogue (4..20mA) and digital output (alarm, danger, sensor ok, system ok) based on calculated parameters and alarm settings.

Ethernet interface is also available for configuration and communication to realtime and CMS-500 software packages.

The relay controllers PMS-330/PMS-331 allow relays configuration by logical combination and transferral of operating parameters to CMS-500 (via analogue inputs or modbus interface).

GLOBAL SPECIFICATIONS

PMS-300 - KEY FEATURES

Standalone “all-in-one” multi-channel Protection & Monitoring System (PMS)

19” rack based system with the following characteristics

- Up to 8 x 4 channel processing modules in one 3HU rack
- Up to 16 x 4 channel processing modules in one 6HU Rack, with optional true redundant power supply
- Common dual channel phase reference signals
- Common Modbus RTU interface, Profibus DP as option
- Common digital input for synchronous and transient mode selection and other signals (rotation direction, save, reset of alarms)
- Common relays for system ok, sensor ok, alert and danger

Common hardware for the following acquisition modes

- Shaft vibration monitoring, according to ISO-7919
- Bearing vibration monitoring, according to ISO-10816
- Airgap and runner clearance monitoring
- Endwinding and statorbar vibration monitoring
- Magnetic flux monitoring

Individual “Alert” & “Danger” alarm level setting for each channel at 8 operating modes (synchronous, transitory,...)selectable per digital input or up to 16 operating modes selectable per Modbus/Profibus interface

Built-in advanced monitoring functionalities such as

- Input digital filters LP, BP and HP
- Custom Harmonic and phase calculation
- Single and double numeric integration

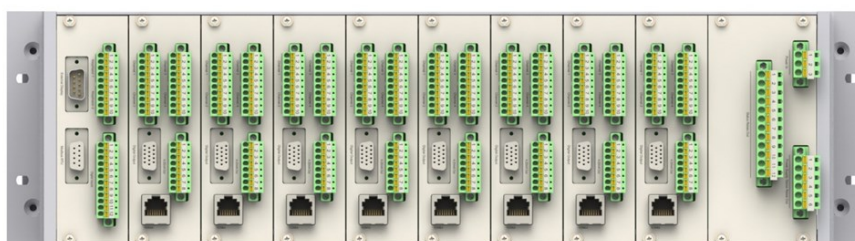
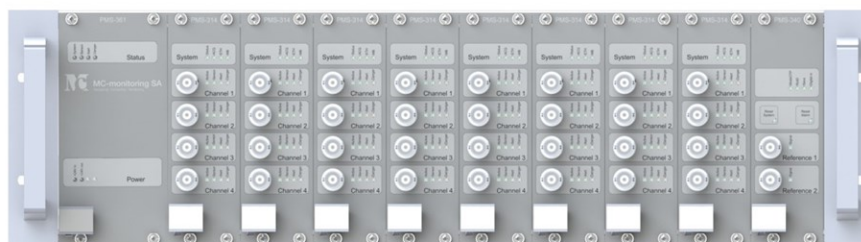
PMS-300 - HARDWARE DESCRIPTION

Modules

- One Reference module (PMS-340)
- Up to 16 x 4 channel processing modules (PMS-314)
- One power supply module (PMS-361)

All the BNC connectors present on the front side allow the user to directly access the raw signals of each connected sensor. All Processing Modules (PMS-314) are hot plug capable

PMS-300 FRONT & BACK VIEW



GLOBAL SPECIFICATIONS

PMS-340 - REFERENCE MODULE

Interface	Digital or analogue reference sensor, TTL compatible, with self-resettable fused power supply ($\pm 24\text{VDC}$) Modbus RTU with predefined communication tables for all available parameters and optional Profibus DP interface (V.0)
Digital inputs	+24V logic level for modeOTP, Save, RotD and Reset Alarm
Outputs	BNC 1:1 buffered signal output for each reference signals, short circuit proof
Additional features	External display interface Push button for system reset and reset "latched" alarms LEDs for modeOTP, rotation direction, save, reset system, reset alarm and reference signal 1 & 2

PMS-361 - POWER SUPPLY MODULE

Input power supply	18-72VDC
Output power supply	150W (6,25A @ 24V) or 300W (12,5A @ 24V) with 6HU rack
Global status relay outputs	250VAC/10A or 30VDC/5A for system ok, sensors ok, alert and danger
Power supply status relay outputs	250VAC/10A or 30VDC/5A
Additional features	Power supply connections terminals LEDs for common system ok, common sensor ok, common alert (orange) and danger (red)



GLOBAL SPECIFICATIONS

PMS-330 - INTERFACE CARD

Digital output - compatible with PMS-391	13x 24VDC/20mA max config. logic combination
Analogue inputs for process parameters (+/-10V or 4..20mA)	8x
Modbus master	4x32 channels of external third party slave
Modbus slave	Available via PMS-300 bus
States and vibration parameters input from PMS-314 cards	All available parameters on the rack

PMS-330



PMS-330 - ANALOGUE INPUTS

Mode name	Description	Electrical specifications
+/-10V Single Ended	Voltage input mode with measurement on INx+ referenced to the INx- which is internally tied to 0V.	INx+ range: -10V to +10V AMR ¹⁾ : +/-24V
+/-10V Differential	Voltage input mode with differential measurement between INx+ and INx- which are both floating.	INx+ range: -10V to +10V AMR ¹⁾ : +/-24V INx- range: -10V to +10V
0(4)-20mA Single Ended	Current input mode with measurement across INx+ and INx- which is internally tied to 0V. The internal reading shunt resistor value is 250Ω +/-10 Ω	INx+ range: 0 to 20mA AMR ¹⁾ : +/-100mA INx- range: 0mA AMR ¹⁾ : +/-100mA
0(4)-20mA Differential	Current input mode with differential measurement across INx+ and INx- which are both floating. The internal reading shunt resistor value is 250Ω +/-10 Ω	INx+ to INx- range: 0 to 20mA AMR ¹⁾ : +/-100mA

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

GLOBAL SPECIFICATIONS

PMS-320 - DISPLAY FUNCTIONS

Compatibility	PMS-314 via Sub-D cable to PMS-300 backplane
	Automatic configuration
	Max. 8 modules
Global view	
Global status overview	System ok Sensors ok Alarm & danger
Modules status overview	Modules availability System ok Sensor ok Alarm & danger
Module view	
Channel 1..4 data visualization	Description Alarm & danger Monitoring parameters
Channel 1..4 bargraphs	Colour : Green : No alarm Yellow : Alarm Red : Danger Alarm & danger position Scale
Functionality	Reset Alarm Channel inhibit

PMS-320



PMS-320 - SCREEN CHARACTERISTICS

Type	Touchscreen 4.1" (420x272 pixels) 24-bits true colour Interface : finger / stylus pen
Screen protection	Automatic screen off
Local LED's indication	1x Power supply check 1x System ok 1x Configuration check 1x CPU activity 1x Modbus activity

For further information : see PMS-320 datasheet

GLOBAL SPECIFICATIONS

PMS-314 - 4 CHANNEL PROCESSING MODULE

Sensors input (individual software selectable signal conditioning)	• $\pm 24V$ input (differential) • $\pm 24V$ input (single ended) • 4mA constant current source for piezo sensors • 4mA constant current source for ICP® • 4..20mA current loop
Selectable frequency range	• 400 to 1600 Hz
Sensor power supply (individual power supply self resettable fused)	• +24VDC, 300mA / -24VDC, 100mA
Digital outputs	+24V logic level for system ok and for each channel: sensor ok, alert and danger (max. 250mA all outputs)
Analogue output	4..20mA current loop for each channel, software configurable, SCP, 12 bits resolution, 500 Ω
Additional features	RS485 : Modbus RTU / Profibus (option) Ethernet interface with all MC-monitoring software via TCP/IP protocols BNC 1:1 buffered output LEDs for system status, acquisition, ethernet communication, modbus communication and individually per channel: sensor active, sensor ok, alert (orange) and danger (red) Hot-swappable module exchange
Analogue to digital converter	Analogue to digital converter
Type	True simultaneous 4-channel
Resolution	16bits
Accuracy	<1% of FS
Temperature deviation	$\pm 2\text{ppm}/^\circ\text{C}$ @ FS, 10 $\mu\text{V}/^\circ\text{C}$ offset drift

PMS-314 - ANALOGUE INPUTS

Mode name	Description	Electrical specifications
+/-24V Single Ended	Voltage input mode with measurement on INx+ referenced to the INx- which is internally tied to 0V.	INx+ range: -24V to +24V AMR ¹⁾ : +/-24V
+/-24V Differential	Voltage input mode with differential measurement between INx+ and INx- which are both floating.	INx+ range: -24V to +24V AMR ¹⁾ : +/-24V INx- range: -24V to +24V
0(4)-20mA Differential	Current input mode with differential measurement across INx+ and INx- which are both floating. The internal reading shunt resistor value is 250 Ω +/-10 Ω	INx+ to INx- 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

GLOBAL SPECIFICATIONS

PMS-314 - 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

PMS-314 - PHYSICAL CHARACTERISTICS

Mounting	19" rack 3HU or 6HU
Terminals	Input and output via push-in terminals

PMS-314 - MEASUREMENTS

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 CH1-2 & CH3-4	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)	8x 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 n/a	Up to 9 user configurable calculation : Harmonic extraction (magnitude & phase) Frequency band value (RMS) Rest subtraction		• RT trend : every 1s • 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)	8x modeOTP (DI)	• 4x 4..20mA (one value per channel)
	HP: 0.25 - 1600 Hz (-3dB) order 2-8	Up to 9 user configurable calculation :	16x modeOTP (MB/PB)	Ethernet (interface with CMS-500)
	LP: 0.25 - 1600 Hz (-3dB) order 2-8	Harmonic extraction (magnitude & phase) Frequency band value (RMS) Rest subtraction		• RT raw : every revolution
	Integration 1x : 2.5 - 1600 Hz 2x : 2.5 - 1600 Hz			• RT trend : every 1s • Historical raw : on event • Historical trend : every 5s Modbus / Profibus • All monitoring parameters
4x AirGap monitoring				
s/s : 4096 Hz	Filtering	Min value (µm, mm)	1x monitoring parameter per channel, every 1s	Analogue output
Start triggered continuous acquisition	n/a		8x modeOTP (DI)	• 4x 4..20mA (one value per channel)
	Integration n/a		16x modeOTP (MB/PB)	Ethernet (interface with CMS-500) • 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)	8x 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 - 1600 Hz			• Historical raw : on event
	2x : 2.5 - 1600 Hz			• Historical trend : every 5s
				Modbus / Profibus
				• All monitoring parameters
AMT Pole Analysis				
s/s : 1024, 2048, 4096 Hz	Filtering	CH1 - CH3	1x monitoring parameter per channel, every revolution	Analogue output
Start / Stop triggered continuous acquisition (calculation over one revolution)	BP: 0.25 - 1600 Hz (-3dB) order 2-4	Min (pole signature T/°C)	8x modeOTP (DI)	• 4x 4..20mA (one value per channel)
	HP: 0.25 - 1600 Hz (-3dB) order 2-8	Max (pole signature T/°C)	16x modeOTP (MB/PB)	Ethernet (interface with CMS-500)
	LP: 0.25 - 1600 Hz (-3dB) order 2-8	Deviation (Max delta pole signature T/°C)		• RT raw : every revolution
	Integration	Mean (pole signature average T/°C)		• RT trend : every 1s
	n/a	CH4		• Historical raw : on event
		Min (Mingap mm)		• Historical trend : every 5s
		Max (Mingap mm)		Modbus / Profibus
		Deviation (Mingap delta max mm)		• All monitoring parameters
		Mean (Mingap average mm)		
2x Relative Vibration (according to ISO 7919) and 2x absolute vibration (according to ISO 10816)				
s/s : 1024, 2048, 4096 Hz	Filtering	CH1 & CH2	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	8x 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	Up to 9 user configurable calculation : Harmonic extraction (magnitude & phase) Frequency band value (RMS) Rest subtraction		• RT trend : every 1s
	n/a			
		CH3 & CH4		• Historical raw : on event
		TRMS (g, mm/s, µm) acc. ISO2954		• Historical trend : every 5s
		Bias voltage (mean value)		Modbus / Profibus
		Up to 9 user configurable calculation : Harmonic extraction (magnitude & phase) Frequency band value (RMS) Rest subtraction		• All monitoring parameters

Acquisition	Signal processing	Monitoring parameters	Alarms	Interface
Axial thrust				
s/s : 1024, 2048, 4096 Hz	Filtering	SPAP/DPAP* (µm) on CH1-2 & CH3-4	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)	8x 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	Up to 9 user configurable calculation : Harmonic extraction (magnitude & phase) Frequency band value (RMS) Rest subtraction		• RT trend : every 1s
	n/a			• Historical raw : on event • Historical trend : every 5s
		*Single/Double Probe Axial Position		Modbus / Profibus • All monitoring parameters
Differential expansion				
s/s : 1024, 2048, 4096 Hz	Filtering	STDE or DTDE* (µm), on CH1-2 & CH3-4	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)	8x 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	Up to 9 user configurable calculation : Harmonic extraction (magnitude & phase) Frequency band value (RMS) Rest subtraction		• RT trend : every 1s
	n/a			• Historical raw : on event • Historical trend : every 5s
		*Single/Double Taper Differential Expansion		Modbus / Profibus • All monitoring parameters

PMS-314



ORDERING INFORMATION

Part type	Ordering code	Description
PMS-300	20.300.001	PMS-300 (3H), incl. : • 1x PMS-340 • 1x PMS-361
PMS-300	20.300.002	PMS-300 (6H), incl. : • 1x PMS-340 • 1x PMS-361
PMS-314	20.314.001	PMS-314 Modbus RTU
PMS-314 PB	20.314.002	PMS-314 profibus DP
PMS-330	20.330.001	Interface card OP parameters
PMS-320	20.321.000	Display module for PMS-300 (optional)

MECHANICAL DIMENSIONS

Rack 19“(440) x 240 x 3HU(133.25)
(W x D x H) [mm]

Front:



Back:

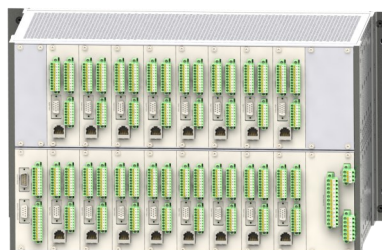


Rack 19“(440) x 240 x 6HU(266.7)
(W x D x H) [mm]

Front:



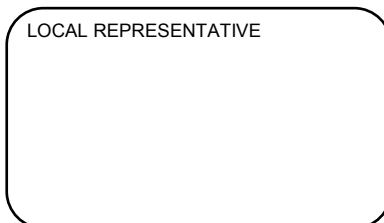
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MC-monitoring Quality certifications



LOCAL REPRESENTATIVE



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