



Expertises Dynamiques  
Machines et Structures



## Monitoring system Rack 19"



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## FEATURES

- Independent four (4) channel modules with preconfigured application for relative/absolute vibration, airgap and magnetic field protection and monitoring
- Up to 32 Processing Channels in 19" 3HU rack (24 channels with 32x relay logic controller module)
- Up to 64 Processing channels in 19" 6HU rack (56 channels with 32x relay logic controller module)
- Individual Alert and Danger Programming per channel
- 1x 4-20mA output per Channel
- Raw signal output on BNC for external analysis on front per channel
- Integrated individual power supply for each sensor terminal
- Build in signal conditioning accepting various sensor types as Proximity Probes, Accelerometers, Velocimeters, Airgap Sensors, Stator core and bar vibrations, magnetic field of poles and other process parameters, software selectable
- Powered by +24VDC
- Optional local or external 4.3" display for bargraph and numerical presentation
- Modbus RTU or optional Profibus DP
- Ethernet 100Mbit Interface for configuration and connection to Condition Monitoring Software CMS-500

## DESCRIPTION

The PMS-300 Process Monitoring System has been designed to be modular and flexible in rack-based design to suit most requirements for protection and monitoring of critical machinery. The system offers two (2) reference and up to 64 sensor inputs. The integrated BNC terminals on the front provides raw signal for external analysis. Various predefined Software applications are available for each individual module for protection and monitoring of the following parameters:

- Relative Shaft Vibration Monitoring
- Absolute Bearing Vibration Monitoring
- Endwinding Vibration monitoring
- Structural Vibration Monitoring
- Airgap Monitoring
- Magnetic field Monitoring
- Other process parameters

One 4-20mA current loop output per channel, common Relays outputs as well as Modbus RTU or Profibus DP communication interface allows an easy integration into existing control systems. An optional relay logic controller up to 32 relays can be added to provide flexible relay management.

## PHYSICAL 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:



Back:





## GENERAL SPECIFICATION

###	PER ACQUISITION MODULE	###	###	PER ACQUISITION MODULE	###
	4x Sensor Input Terminals		Type	4 Channels simultaneous	
	Sensor Power Supply	4x +/-24VDC, 200mA, individually fused	Resolution	16bit	
	Sensor Interface		Max Sampling Rate	200kS/s per Channel	
	- Voltage	+/-24V	Precision	<1% of FS	
	- Current	(0)4-20mA, 250 Ohm	Temp. Characteristic	+/-2ppm / °C @ FS	
	- ICP	4mA const. Current		10uV / °C offset drift	
	Digital Outputs (24V), external Relays		Internal Memory	64 MB SDRam	
	Connector Type	15pol D-Sub HD female	Storage Capacity:	16GB	
	1x System OK	24VDC, 20mA max.	Calculation Parameters		
	4x Sensor OK	24VDC, 20mA max per Channel	Depending to Predefined Application Firmware as Peak, peak-peak, Smax, RMS, minimum, mean, 1st Harmonic & Phase, 2nd Harmonic & Phase		
	4x Alert	24VDC, 20mA max per Channel			
	4x Danger	24VDC, 20mA max per Channel	COMMUNICATION INTERFACES		
	4x Analogue Outputs (4-20mA)		RS485	Modbus RTU	
	Max Load	500Ohm	Optional	Profibus DP	
	Short Circuit Proof	yes	Ethernet, 100MBit	for Configuration & Comm. Versus CMS-500	
	Resolution	12bit			
	<b>### COMMON FOR ALL ACQUISITION MODULES ###</b>		<b>### COMMON FOR ALL ACQ. MODULES ###</b>		
	2x Reference Input	Digital (0..+24V) or Proximity Probe (0..-24V)	POWER SUPPLY		
	Digital Inputs (24V)		Supply voltage	+24VDC +/-10%	
	ModeOTP	Selection of 2nd Alarm Threshold	Current consumption depends on sensor and module configuration		
	Reset	Reset Latched Alarms (if activated)	ENVIRONMENTAL CHARATERISTICS		
	RotD	Indication of Rotation direction (for e.g. airgap applications)	Temperature range		
	Relay Outputs		- Operating temperature	0°C to +55°C	
		1x System OK	- Storage temperature	-20°C to + 70°C	
		1x Sensor OK	PHYSICAL CHARACTERISTICS		
		1x Alert	Mounting	19" rack 3HU or 6HU.	
		1x Danger	Terminals	Input and output via Push-in terminals	
	Contact Type	SPDT (NO / NC)	Dimensions		
	Contact Specifications	250VAC, 220VDC, 1A	19" 3HU WxDxH:	440 x 240 x 133.25 mm	
			19" 6HU WxDxH:	440 x 240 x 266.7 mm	

### ORDERING INFORMATION

Process Monitoring System (3HU Version) Including 2x Ref & DI input card, 24VDC PowerSupply, 4xRelay	Type: PMS-300, P/N: 20.300.001
Process Monitoring System (6HU Version) Including 2x Ref & DI input card, 24VDC PowerSupply, 4xRelay	Type: PMS-300, P/N: 20.300.002
4 Channel Process Monitoring Module (MB) 4 Sensor Inputs, 4x 4-20mA output, 13x DO, 4xBNC, Modbus RTU	Type: PMS-314, P/N: 20.314.001
4 Channel Process Monitoring Module (PB) 4 Sensor Inputs, 4x 4-20mA output, 13x DO, 4xBNC, Profibus DP	Type: PMS-314, P/N: 20.314.002



## FUNCTIONAL DESCRIPTION

### Relative Vibration Monitoring (according to ISO 7919)

- Start triggered continuous acquisition
- Predefined sampling rates/s: 512, 1024, 2048, 4096
- Selectable FFT resolution: 0.25, 0.5, 1, 2 Hz
- Predefined calculated parameter:
  - Smax in  $\mu\text{m}$  peak (Requires 2 Proximity Probes, 90°)
  - Displacement ( $\mu\text{m}$  peak)
  - Displacement ( $\mu\text{m}$  peak to peak)
  - Shaft position ( $\mu\text{m}$  mean) used for Sensor Check
- One calculated parameter selectable on 4..20mA output
- 1X, 2X and nX built-in harmonic and phase calculation
- Digital LP, BP and HP filters (configurable per channel)

### Absolute Vibration Monitoring (according to ISO 10816)

- Start triggered continuous acquisition
- Predefined sampling rates/s: 512, 1024, 2048, 4096
- Selectable FFT resolution: 0.25, 0.5, 1, 2 Hz
- Predefined calculated parameters:
  - Vibration velocity (mm/s RMS)
  - Bias voltage (mean value) for sensor OK
- One calculated parameter selectable on 4..20mA output
- 1X, 2X and nX built-in harmonic and phase calculation
- Single and double integration
- Digital LP, BP and HP filters (configurable per channel)

### Airgap / Runner Clearance Monitoring

- Start/Stop triggered continuous acquisition (Calculation over one Revolution)
- Predefined sampling rates/s: 4096
- Predefined calculated parameters:
  - Minimum value per revolution
- Minimum value per revolution on 4..20mA output
- Digital LP, BP and HP filters (configurable per channel)

### Endwinding Monitoring – Endwinding and statorbar vibration

- Start triggered continuous acquisition
- Predefined sampling rates/s: 512, 1024, 2048, 4096
- Selectable FFT resolution: 0.5, 1, 2 Hz
- Predefined calculated parameters as:
  - Mean value ( $\mu\text{m}$ )
  - Displacement ( $\mu\text{m}$  peak to peak)
  - Displacement at network frequency peak
  - Displacement at xth of the network frequency peak
- One parameter selectable on 4..20mA output
- Digital LP, BP and HP filters (configurable per channel)

### Magnetic flux monitoring (hydro application)

- Start/Stop triggered continuous acquisition (Calculation over one revolution)
- Predefined sampling rates/s: 4096
- Predefined calculated parameters:
  - Max positive field in tesla
  - Max negative field in tesla
  - Asymmetric monitoring of positive and negative pole signals
- One parameter selectable on 4..20mA output

The above acquisition modes can be combined with pre-defined settings for each module as follows:

- 4x Relative vibration monitoring
- 4x Absolute vibration monitoring
- 2x Relative vibration monitoring and 2x Absolute vibration monitoring
- 4x Airgap/Runner clearance monitoring
- 4x Endwinding / Statorbar vibration monitoring
- 2x Magnetic flux and 2x Airgap monitoring
- 4x Expert modes – free combination of all available parameters



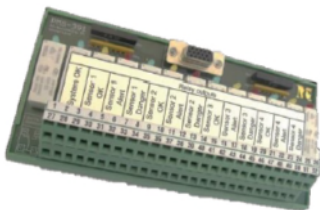
## Relay module

The PMS-391 is a relay extension module designed for PMS-314 and PMM-300 processing modules. The relay module can be connected to processing modules via a 15 poles high density D-Sub cable. Every relay module is designed with 13 individual relays:

- 1x for system ok
- 4x sensor ok (one relay per channel)
- 4x alert (one relay per channel)
- 4x danger (one relay per channel)

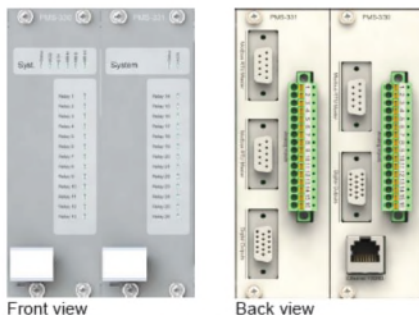
The contact type of each relay is SPDT (NO/NC) with switching capacity at 250Vac/10A or 30VDC/5A.

### 6.1.1 Module overview:



## Interface Card

PMS-330 and PMS-331 cards are compatible with PMS-300 product family:



PMS-330 is designed with the following features:

Feature	PMS-330	Extension PMS-331
Digital output – compatible with PMS-391	13x	26x
Analogue inputs for process parameters (+/-10V or 4..20mA)	8x	16x or 4x RTD
Modbus master for 3 <sup>rd</sup> party product data acquisition	1x	3x
Modbus slave	Available, via PMS-300 bus	
States and vibration parameters input from PMS-314 cards	All available parameters on the rack	

PMS-330 card is able to:

1. Transfer operating parameter to CMS-500
2. Trigger free configurable digital output (compatible with PMS-391)

To transfer data to CMS-500, the following operating parameter interfaces are available:

- Analogue inputs (4..20mA/0..10V or RTD using PMS-331 extension card)
- 3<sup>rd</sup> party Modbus slaves
- Modbus table from one master (f.ex. SCADA)

Relays can be configured with any combination of any parameters available in any PMS-314 modules of the rack.

PMS-330 can be configured via PMx-300 configuration software:

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## CMS-500 Software

The CMS-500 is a Windows compatible data storage and visualization software, based on a client-server architecture. The CMS-500 is designed for multiple plants and multiple user rights.

The CMS-500 server is able to record the raw and trending data of each specific PMx-300 module. The CMS-500 client allows recovering these informations for monitoring and analysis. The following diagram presents the overview of the whole data transfer concept for each PMx-300 module to the CMS-500 database:

### APPLICATIONS

- Windmills, Hydroelectric machines and large electrical motors Condition Monitoring Software.

### Features

- Machine/Plant Mimic Presentation
- Multi-User Functionalities
- Multi-Instrument / Multi-Machine/Plant Data handling.
- Client / Server Architecture
- Data Storage in SQL Database
- Built in Database Replication for Data Safety and Data Merging of Multiple Databases.
- Real Time Raw and Trend data presentation
- Historical Trend Data and Event based Data Storage and Visualization
- Event Management and Logger



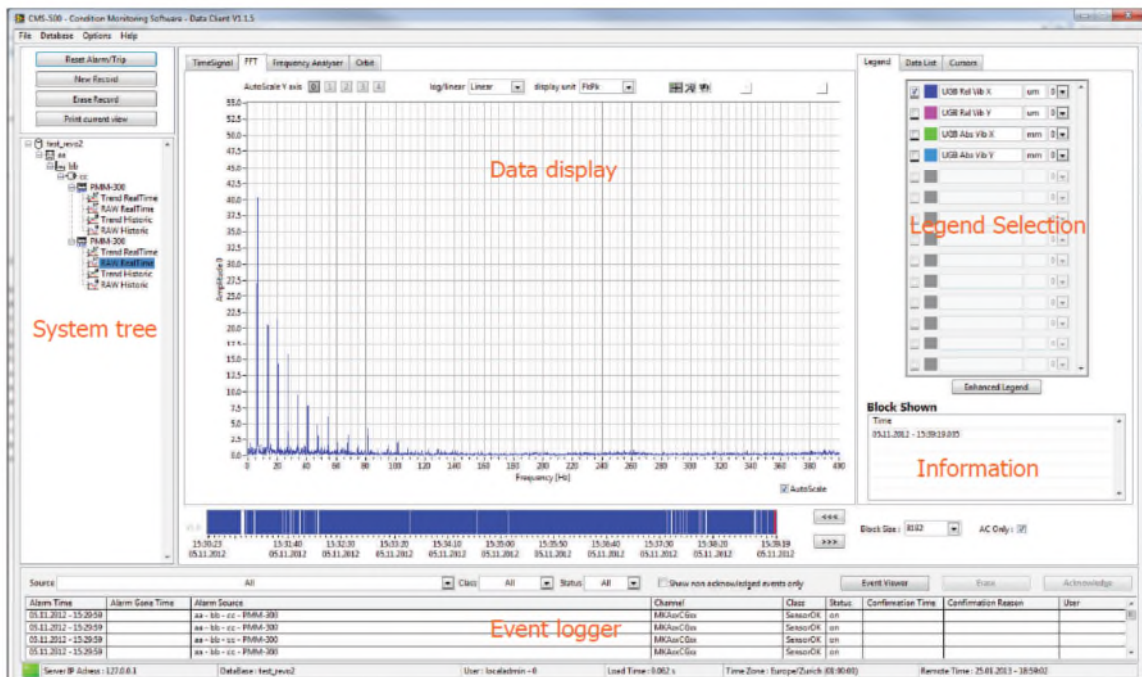
### DESCRIPTION

The CMS-500 Condition Monitoring Software is the ideal solution for a plant monitoring system, providing visualization of the acquired data of the PMx-300 monitoring system series as well as information about Alerts, Dangers and sensor faults.

The data is stored from multiple instruments and from multiple units into the same database. CMS-500 Software package allows to merge multiple databases into one single database through the build in database replication.

The CMS-500 Condition Monitoring Software includes two independent software:

- CMS-500 Data Server
- CMS-500 Data Client



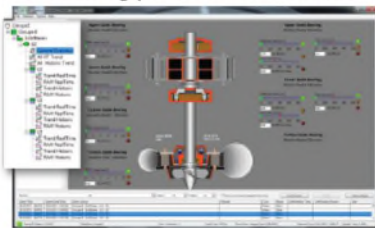


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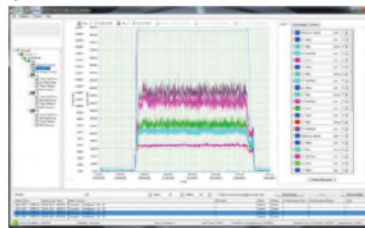


The CMS-500 client is also able to display long term trending values and machine overview with misc. bargraphs.

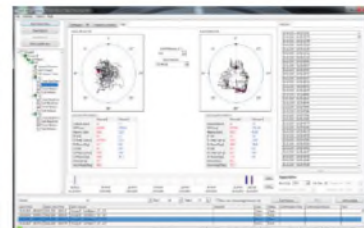
The following picture shows some examples of screenshots:



Overview



Trending



Orbites



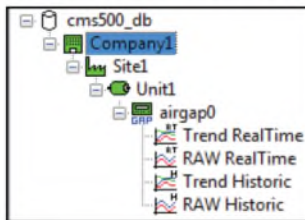


### CMS-500 Data Client

The CMS-500 Data Client is connected through TCP/IP LAN to the PostgreSQL Database, which allows to connect multiple Data Clients from different locations (LAN / WAN). Depending on the logged in user, only data defined by the access level are visualised.

### Data Structure

The measurement units are structured into three different categories: Company, Site and Units, which allows an easy manipulation of different instruments connected to different machines in different locations.

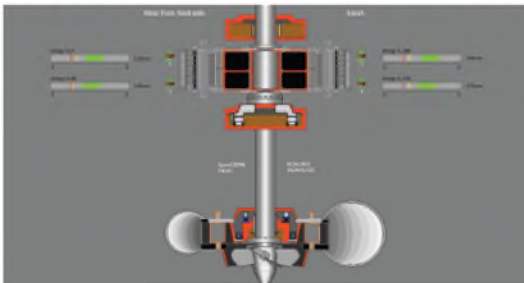


### Data Visualization

The data visualization depends on the type of instrument connected to the machine. In general there are five visualization options as follows:

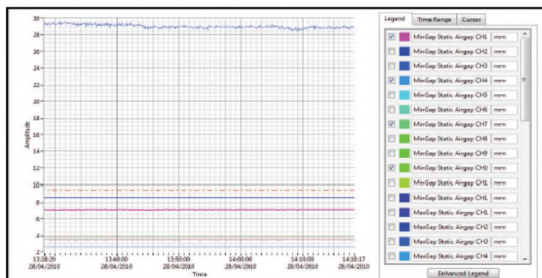
### Machine Mimic View

An individual screen is available per machine, showing the machine and the state of each connected sensor to the data acquisition and monitoring unit.



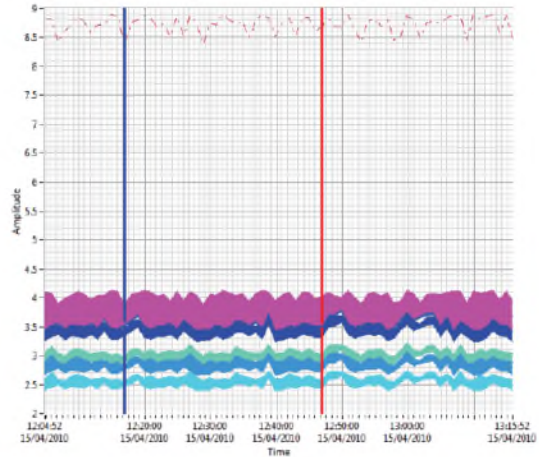
### Short Term Trend of overall current values

When a PMS-200 instrument is connected to the CMS-500 Data Server and the machine is running, all processed overall current values can be displayed in a trend graph in real time for a period of around 2 to 3 hours.



### Historical Long Term Trend

For a long term display and in order to reduce the amount of data, minimum, maximum and average values are used to allow data reduction and avoid loss of information.

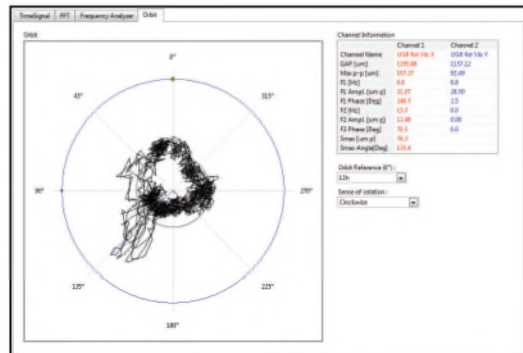


### Real Time Raw Data

In addition to the processed overall current values, real time raw data is available for the same limited time as the short term trend data.

For diagnostic purposes, following raw data are available on a simultaneous and continuous basis e.g.:

- Polar view of the Air Gap
- Air Gap time signal (Pole profile) over one or several revolutions.
- Vibration time signal
- Orbit of X/Y Proximity Vibration Sensors
- FFT
- Cascade
- Shaft center position

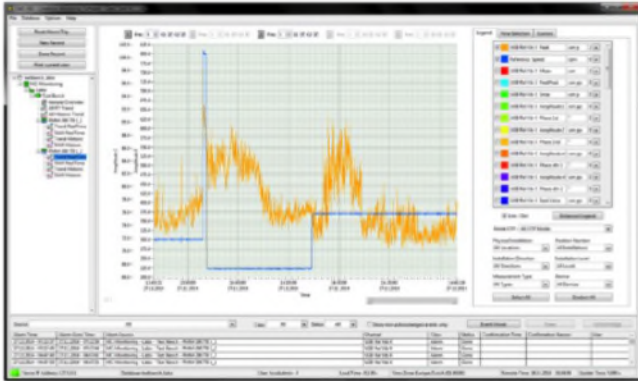


### Event based Raw Data Storage

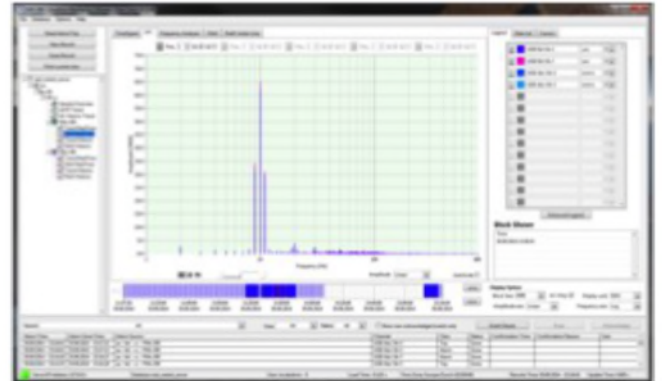
In case of alarm (alert or danger), the measured raw data are stored for a defined time or number of revolutions before and after the event occurs. External command of event data storage based on time and date is also available



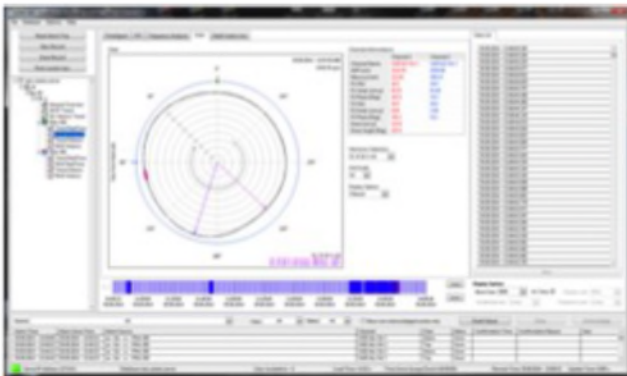
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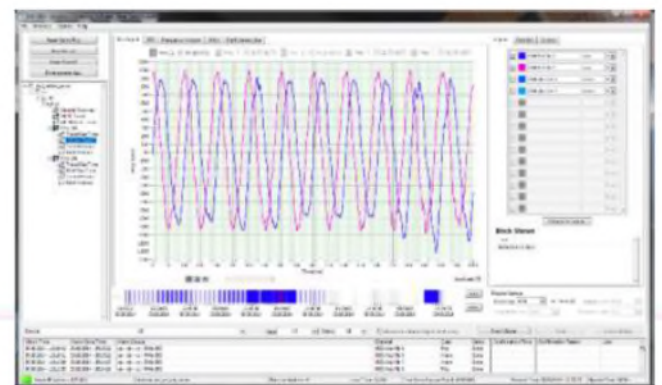
Trend



FFT



Orbits



Raw signals