SIEMENS

Intelligent maintenance ensures sustainable investment

Efficient condition monitoring for machines and processes

SIPLUS CMS

SIPLUS CMS –
Systematically more availability

You want to avoid unpleasant surprises involving downtimes and the associated costs?

You want to know how your system is doing? And about the mechanical wear on

your machine? Are you looking for assured investment protection? Then opt for a

far-sighted solution and increase the availability of your machines and plants – with

SIPLUS CMS. Our Condition Monitoring Systems (CMS) facilitate detection of damage

to machinery and equipment early on and allow targeted maintenance planning.

Permanent monitoring of machine and plant states

High system availability is the most effective lever for increasing productivity. The less downtime, the better. This is why it is important to identify potential sources of error early and to perform scheduled maintenance at the right time within the production cycle.

Our SIPLUS CMS Condition Monitoring Systems are ideal for monitoring mechanical components. You have all your machines and the entire system constantly in view. This facilitates predictive maintenance, allowing you to plan and implement maintenance operations in due time.

After prolonged operating periods without interruptions, significant irregularities resulting from wear or other damage-related causes can be detected early on with the help of documented trend histories.

Foreseeable problems can be corrected at an early stage - before resulting in major damage or even total failure, with the often costly consequences.

Used worldwide - in the service of productivity

SIPLUS CMS proves its worth day after day in applications all around the world, and in many industries contributes to a significant increase in machine and plant availability due to the permanent monitoring of levels of vibration in machines, bearings and gear units – which in turn makes a huge contribution to increasing productivity.

- Automotive industry
- Chemicals
- Renewable energies
- Mechanical engineering
- Metals and mining
- Food and beverages
- Oil and gas
- Pharmaceuticals
- Water and wastewater
- Pulp and paper

Cross-industry applications complete the system
- Integration in automation systems (TIA, PCS 7)
- Simple connection to SCADA systems (WinCC or other)
- Remote service
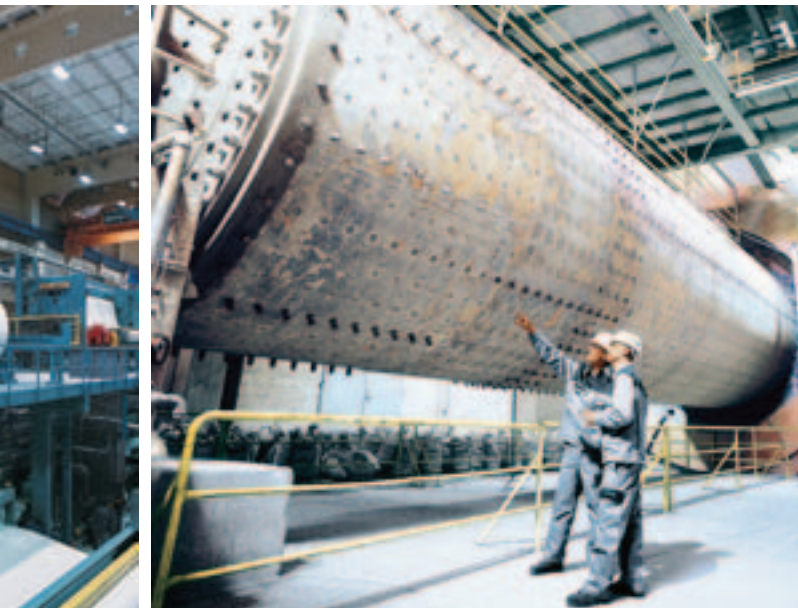
A short history of maintenance
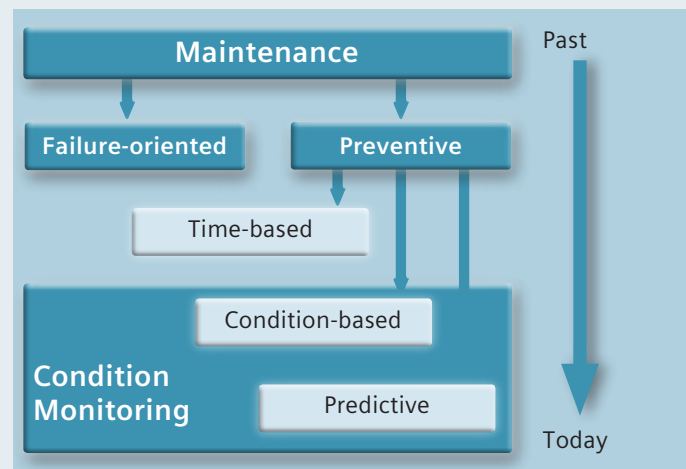
Energy efficiency - through predictive maintenance

Mechanical wear, imbalances, defective bearings and other damage scenarious can cause machinery to increase its energy consumption. SIPLUS CMS facilitates the early detection of such deficiencies which are then signaled via the SIMATIC Maintenance Station, for example. This allows appropriate maintenance measures to be taken to ensure restoration of the system's scheduled energy efficiency levels.

Convincing advantages at a glance

Lower costs	More efficiency	Better planning	Part of Totally Integrated Automation
Customized systems	Optimized utilization of resources	Higher productivity	Transparency
• Simple design	• Effective spare part inventories	• Longer life cycles	• Maintenance Station
• Easy system integration	• Device diagnostics	• Planned standstills	• Process data recording
• Open standards	• Planned maintenance	• Longer service intervals	• Quality assurance
• Web tools	• Simple cabling	• High availability	• Mechanical wear
• Expandability	• Ruggedness/ stability	• Investment protection	• Worldwide service/support

SIPLUS CMS –
From compact and simple, to modular and powerful

Made-to-measure solutions: Depending on your needs, you have a choice of three different condition monitoring systems: from compact and easy to modular to powerful.

SIPLUS CMS1000 –
The compact and simple solution
SIPLUS CMS1000 offers a simple approach - with no expert knowledge required.

- Characteristic value based monitoring
  - RMS (machine vibration)
  - DKW (bearing monitoring)
- Traffic light display of machine status

SIPLUS CMS2000 –
The modular and configurable solution
SIPLUS CMS2000 is an easy to configure, Web-based system.

- Detailed damage detection using frequency-selective diagnostics
- Raw data recording and ouput to SIPLUS CMS X-Tools
- Trend recording and analysis
- Monitoring of process variables
- Expandable with temperature modules from the SIMOCODE series
- Otherwise, same functionality as SIPLUS CMS1000
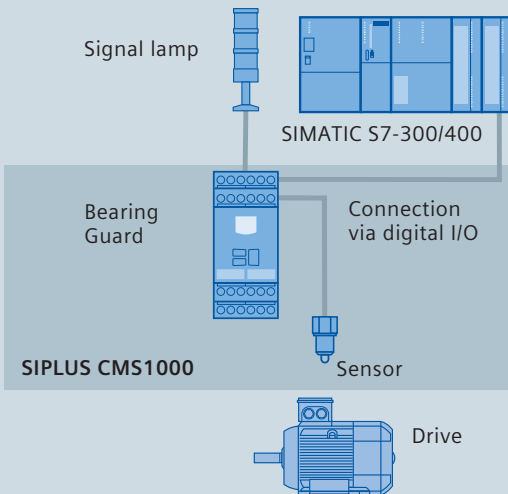
SIPLUS CMS4000 –
The powerful solution
SIPLUS CMS4000 is a scalable and freely configurable analysis system for detailed and comprehensive diagnostics and condition monitoring.

- Configurable analysis models with know-how protection
- Easy integration into existing automation systems
- Recording of process signals
- Otherwise, same functionality as SIPLUS CMS2000

CMS System	SIPLUS CMS1000	SIPLUS CMS2000	SIPLUS CMS4000
Monitoring of	Motors, generators, fans, pumps, etc. for imbalance, misalignment, bearings, etc.		
Analysis procedures			
Characteristic values	Bearing monitoring: DKW, based on K(t) to VDI 3832 Vibration monitoring: RMS based on DIN ISO10816-3		
	–	–	CREST factor, … application-specific characteristic values
Vibration analysis	–	Parameterable	Configurable
	–	FFT, envelope curve, fingerprint comparison, trend analysis	
	–	–	Orbit analysis, free configuration of additional analysis procedures
Monitoring function			
	Configurable limits for DKW and RMS: warnings, alarms		
	–	Configurable alarm bands for frequency spectra	
	–	Limit monitoring of analog inputs	
	–	Temperature monitoring	
	–	–	Creation of custom monitoring algorithms
Recording function			
	–	Raw data recording: manual or event-triggered, snapshot of the FFT, characteristic values, long-term trend recording	
	–	–	Flight recorder for process data
Visualization			
	Traffic light display via binary outputs		Software SIPLUS CMS X-Tools
	Local display	With web browser Firefox ® (registered trademark Mozilla)	

SIPLUS CMS1000 –
Simple and compact condition monitoring: switch-on, teach-in, monitor

SIPLUS CMS1000 consists of a compact Bearing Guard and a rugged, industrial-grade vibration acceleration sensor. The compact system is characterized by its ease-of-use: switch on, teach in, start monitoring - and profiting!

Design
- Compact Bearing Guard for evaluating vibration measurements
- Local display and control buttons for status messages and entering limit values
- MEMS sensor to accurately detect the vibration acceleration of the machine or bearing
- Pre-assembled cables in a variety of lengths for sensor connection

Functionality
- Roller bearing diagnostics, based on K(t) method
- Machine monitoring with RMS
- Monitoring of limits for warnings and alarms
- Switching of floating outputs in case of limit violations
- Operating and fault messages on local display
- Teach-in of the roller bearing's initial status

Advantages at a glance
- Simple roller bearing monitoring
- Monitoring for imbalance, alignment errors, set-up problems
- Traffic light display to signal the diagnostic status
- Complete diagnostics at a glance
- No expert know-how required
- Fast and safe wiring
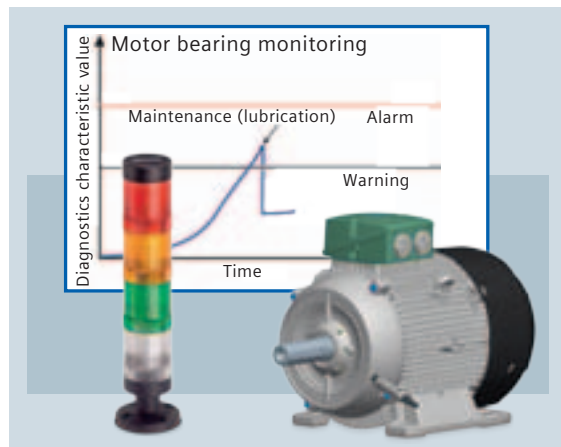
SIPLUS CMS2000 –
Modular condition monitoring: switch on, configure, diagnose
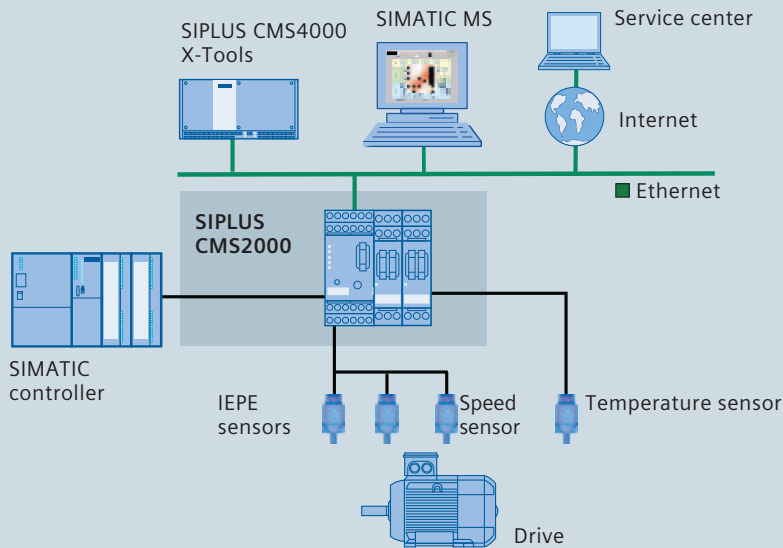
Visualization and parameterization of SIPLUS CMS2000 can be performed without additional software using a Web browser. This greatly simplifies the work of service personnel - both locally and during remote operation. SIPLUS CMS2000 is modularly expandable - with SIMOCODE modules.

Design
Basic unit
- Integrated diagnostic software
- 2 IEPE interface for vibration sensors
- 2 analog inputs
- 1 speed input
- 2 digital inputs, 3 digital outputs

Expansion modules
- SIMOCODE temperature modules: max. 2
- Other modules available soon

Construction design
- DIN rail mounting
- Removable terminal blocks (screw terminals)

Functionality
- Characteristic values (bearing and vibration monitoring)
- Frequency-selective analysis using FFT, envelope curve
- Trend analysis
- Limit monitoring of frequency bands, process variables, temperature
- Recording with time stamp of trend values, raw data, frequency spectra, message archive

- Easy damage localization through fingerprint comparison
- Display of system and status messages
- Raw data diversion for additional diagnostics
- Web server and e-mail notification
- Time synchronization via LAN
- Diagnostics suppression via inhibit input

Advantages at a glance
- Configuration and visualization via Web browser
- Monitoring from single machines up to complex drive lines
- No additional software required for parameterization and visualization
- Proactive maintenance due to detailed and early damage localization
- Fast overall diagnostics at a glance
- Event-driven notification to the service center
- Expert analysis based on raw data

SIPLUS CMS4000 –
Powerful condition monitoring system for complex analysis and measurement tasks
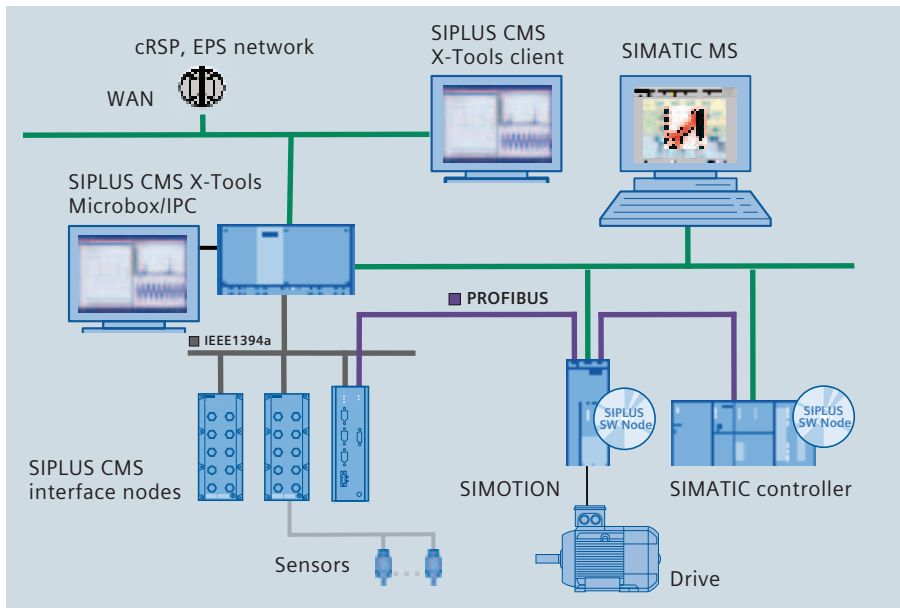
SIPLUS CMS4000 is the diagnostic system for monitoring both individual machine components and complex systems. Regardless of how sophisticated or dynamic your production processes are, the system grows with your needs and provides you with exactly the features you require.

Design

- Connection of up to 30 interface nodes (IFN) for the detection of vibration acceleration and analog signals
- Bus technology: IEEE1394a (Firewire) for transmitting measurements to a PC (e.g. Microbox), larger range using FO repeaters (500 m)
- Standard PC as a platform for system software X-Tools
- System software SIPLUS CMS X-Tools

X-Tools system software functionality

- Process data acquistion via software nodes directly from SIMATIC S7, SIMATIC TDC and SIMOTION
- Process data acquistion via PROFIBUS SPY of all bus nodes, with no bus load
- Library of standard function blocks for FFT, envelope curve analysis, input filters, etc.; mathematical and communication functions
- Graphical creation of diagnostic models
- Multi-user support and authorization management
- Client-server design, can be remotely operated
- Runs on both standard and industrial PCs
- Data communication with automation and diagnostic systems (TCP/IP, OPC UA, SMTP) to WinCC, PCS 7, SIMATIC Maintenance Station
- Interface for data communication with SIPLUS CMS2000
- Runs under Windows XP, Windows Server 2003, Windows 7 (each 32-bit)
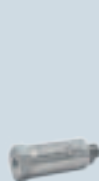
Advantages at a glance

- Open software design for sector-specific expansions
- Creation and protection of custom analyzing models based on off-the-shelf function blocks
- Optimized for reaction-free integration into existing and new automation systems
- Quality assurance of production processes using flight recorder functions
- Detailed analysis, diagnostics, visualization and archiving
- Continuous monitoring of roller bearings, gear units, fans, pumps, machinery – down to low-frequency tower vibrations
- Meets the requirements of Germanischer Lloyd and Allianz for wind farm turbines
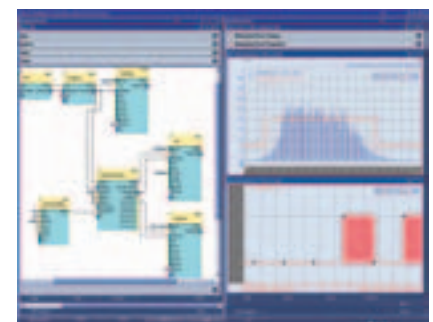
FFT diagnostics model with alarm bands

SIPLUS CMS – Technical Specifications

Order No.	CMS1000 6AT8001* [1]		CMS2000 6AT8002* [1]		CMS4000 6AT8000* [1]	
Monitoring of	Motors, generators, fans, pumps, etc. for imbalance, misalignment, roller bearings, ...					
Memory	No trend memory		1 GB e.g. for trend history of the characteristic values, raw data, spectra		Memory dependent (e.g. hard drive)	
Data output	None		Raw data as WAV file for additional diagnostics (e.g. for X-Tools) downloaded via browser		All process and system data in CSV and Diadem format	
Maximum number and type of connectable sensors	1 MEMS sensor 1 speed sensor		2 IEPE vibration sensors, Sensor see CMS4000 1 speed sensor (digital) 6 temperature sensors		180 sensors, IEPE or analog	
Communication	Binary signals		Binary signals Web services (HTTP, E-mail)		IEEE1394a from IFN to Industrial PC/ IFN; PROFIBUS Spy for reaction-free detection of process signals; software nodes for recording process data directly from SIMATIC/SIMOTION	
System						
Operator control	Operator panel keys		Web browser / SIPLUS CMS X-Tools		Software SIPLUS CMS X-Tools	
Construction design	Compact		Modular		Modular and scalable	
Power supply	115 – 240 V or 24 V DC		24 V DC		24 V DC	
Power loss	Typ. 3.5 W		Typ. 2.6 W		Typ. 4.6 W	
Self-monitoring	–		Sensor inputs, firmware, electronics		Sensor inputs, firmware, electronics, software, hardware nodes	
Measuring inputs			**Basic unit**	**Temperature module**	**IFN VIB-ACC**	**IFN analog input**
Measuring application	Vibration acceleration		Vibration acceleration	Temperature measurement	Vibration acceleration	Analog signals
Number of measuring channels	1		2	3	6	6
Input signal	Differential voltage signal		IEPE standard	Pt100, Pt1000, KTY, NTC	IEPE standard	+/–10 V
Frequency range	1 to 6.5 kHz		10 Hz to 10 kHz	–	0.1 Hz to 40 kHz	0 Hz to 40 kHz
Sampling frequency max.	20 kHz		46 kHz	500 ms refresh	195 kHz	195 kHz
Speed input	+/–10 V or 4 – 20 mA or digital 24 V DC pulse		Digital 24 V DC pulse	–	1 x +/–10 V	Adjustable
Analog inputs	–		2 x +/–10 V or 2 x 4 – 20 mA	–	Via IFN analog input	
Digital inputs	1 x 24 V DC, 500 mA		2 x 24 V DC, 500 mA	–	Via IFN analog input	
Outputs						
Relay / switch output	2 x relays 24 V, max. 4 A		3 x electr. 24 V, 500 mA	–	Via controller	
Constructional design	**Bearing Guard**	**Sensor**	**Basic unit**	**Temperature module**	**IFN VIB-ACC / IFN AI**	**Sensor**
Housing	Plastic	Stainless steel	Plastic	Plastic	Aluminum	Stainless steel
Dimensions (H x W x D) mm	106 x 45 x 86	25.4 x 64.3 x 25.4	45 x 106 x 124	22.5 x 101 x 124	210 x 86 x 95	18 x 42.2 x 18
Mounting	DIN rail	Screws / bonding	DIN rail	DIN rail	DIN rail	Screws / bonding
Weight	Approx. 300 g	Approx. 100 g	Approx. 300 g	Approx. 150 g	Approx. 1 230 g	Approx. 50 g
Environmental conditions / standards						
Ambient operating temperature	−25 ... +60 °C	−40 ... +120 °C	−20 ... +65 °C	−20 ... +60 °C	−40 ... +65 °C	−54 ... +121 °C
Relative humidity	5 to 95 % no condensation	5 to 95 % no condensation	5 to 95 % no condensation	5 to 95 % no condensation	5 to 95 % no condensation	5 to 95 % no condensation
Degree of protection	IP20	IP67	IP20	IP20	IP67	IP68
Certification	CE	CE	CE, UL, CSA, C-TICK	CE, UL, CSA, C-TICK	CE	CE, UL, CSA

1) Current ordering information as well as the terms of sale and delivery can be found in Catalog CA 01 and on the Internet at siemens.com/industrymall

Subject to technical change / improvement

Additional information

on SIPLUS CMS Condition Monitoring Systems available on the Internet at:
siemens.com/siplus-cms

on SIMOCODE is available on the Internet at:
siemens.com/simocode

Technical Assistance
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