

Leonova Emerald Basic Package

Technical Data Sheets

Package Features include:

- The instrument has been engineered to meet the demands industrial facilities by meeting IP65/NEMA 4X standards, thus offering an extremely rugged and reliable instrument for plant route readings.
- The Emerald offers Easy-to-Understand condition information – the data is displayed as green, yellow, red results that can easily be interpreted by the maintenance personnel.
- Data logging with Condmaster® software
- ISO 2372 and ISO 10816 vibration monitoring - Overall vibration measurements for determining machine health.
- Speed/RPM and Temperature Measurements
- Stethoscope function
- Replaceable battery packs ensure no issues with battery needing to be charged while readings are being taken
- Notes and Comments are easy and quick to add by using the optional boom headset and microphone for voice recording of them during round readings.
- Recommended annual calibration at a cost of \$759.99 USD. Includes a certificate of calibration good for 12 months.
- Instrument and software can have new functions installed at any time. This allows you to expand the functionality of the instrument without having to buy new.



Leonova[®]

EMERALD

Technical data sheets
2019-03



Leonova Emerald Basic Package includes:

- 1 x EME400, Leonova Emerald HDm/HDc Platform
- 1 x EME133, VIB ISO 10816 + Spectrum, Emerald Function
- 1 x CHA03, Battery Charger Dia/Eme
- 1 x CAB94, Communication/Charging Cable, USB-USB
- 1 x CAB83, Vib Measuring Cable 1.5m Straight
- 1 x SLD144S-UNF, VIB Transducer 2Hz-10kHz, Side-Entry
- 1 x TRX40, Magnetic Base for Transducers
- 1 x TTP10, Tach/Temp Probe with TTP11 adapter
- 1 x TAD16, Reflecting Tape, sheets
- 1 x CAS28, Soft-sided Carrying Case w/should strap
- 1 x CM-E101, Condmaster LITE edition
- See Condmaster 2026 Editions Overview PDF

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Patents: DE#60304328.3 - US#7,054,761 - US#7,167,814 - US#7,200,519 - US#7,301,616 - US#7,313,484 - US#7,324,919 - US#7,711,519 - US#7,774,166 - DE#60336383.0 - US#7,949,496 - DE#60337804.8 - GB#1474662 - GB#1474663 - DE#60338365.3 - ZA#2011/04946 - SE#0951017-3 - DE#60341502.4 - GB#1474659 - SE#1000631-0 - US#8,762,104 - US#8,812,265 - US#8,810,396 - CN#ZL200980155994.1 - CN#ZL201080019737.8 - KZ#020791 - RU#020791 - AU#2009330744 - RU#021908 - KZ#021908 - US#9,200,980 - US#9,213,671 - CN#ZL201180006321.7 - KZ#022630 - RU#022630 - US#9,279,715 - US#9,304,033 - KZ#024339 - RU#024339 - CN#ZL201380007381.X - AU#2015203801 - AU#2013215672 - RU#201491377 - CN#ZL2012800347548 - US#6,873,931 - DE#602013021988.5 - DK/FI/FR/IT/NL/NO/ES/GB#2810027 - SE#13744257.0 - AU# 2015203361 - RU# 027452 - GB# 2505984 - US# 9,772,219



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Leonova Emerald® – Platform



Leonova Emerald® is a handheld machine condition analyser designed for use in harsh environments. Following functions are always included for unlimited use:

- Data logging with Condmaster® Ruby.
- Shock pulse method SPM HDm/HDc and/or SPM LR/HR.
- ISO 2372 vibration monitoring.
- One-channel vibration monitoring.
- Speed and temperature measurements.
- Stethoscope function.
- Measuring point identification with CondID® memory tags.
- Manual recording and checkpoints.

The main Leonova functions are user-selected, see TD-375. With synchronous measurement, enveloping, true zoom and up to a 12 800 line spectrum over DC up to 20 kHz, Leonova Emerald® has full vibration analysis capacity. SPM has also incorporated the evaluation tables of the new ISO 10816 standards for broadband measurement of vibration velocity, acceleration, and displacement. For single-rotor balancing, an easy-to-use graphical guide calculates balancing weights and their position.

Part numbers

EME400	Leonova Emerald, SPM HDm/HDc
EME403	Leonova Emerald, SPM LR/HR
EME405	Leonova Emerald, SPM HDm/HDc and LR/HR
BATT02-Std	Optional battery pack
16644	Battery adapter unit
CHA01	Battery charger incl. AC adapter, Euro-plug
CHA02	Battery charger incl. AC adapter, UK-plug
CHA03	Battery charger incl. AC adapter, US-plug
CHA04	Battery charger incl. AC adapter, AU-plug
93484	Car charger cable 12V
CAB94	Communication cable, USB-miniUSB
16675	Belt clip, complete
16646	Shoulder strap
CAS28	Carrying case, soft with modular insert, 370x200x270 mm
CAS35	Carrying case/trolley case with two wheels, plastic with foam insert, 560x350x230 mm
81468	Code lock, TSA approved, for CAS35

Parts of the Leonova system are specified on the technical data sheets (TD) listed below:

Instrument specifications	TD-373
User-selected functions	TD-375
Shock pulse method SPM HD	
frequency & time-domain analysis	TD-435
SPM Shock pulse method dBm/dBc	TD-440
SPM Shock pulse method LR/HR	TD-436
SPM Spectrum®	TD-441
Vibration monitoring ISO 2372	TD-446
Vibration monitoring ISO 10816 with spectrum	TD-442
Recording	TD-444
Vibration Premium	TD-366
HD ENV	TD-512
FFT with symptoms	TD-367
HD Order tracking	TD-439
Vibration Supreme	TD-445
HD ENV	TD-512
EVAM Evaluated Vibration	TD-438
HD Order tracking	TD-439
HD Analysis	TD-515
Vibration Supreme	TD-445
Shock pulse method SPM HD	TD-435
Balancing, single plane	TD-443
Leonova Service Program	TD-437
Transducers and measuring cables	TD-377
Tachometer/Temperature probe	TD-380

Spare parts

16686	Protection foil display
14661	Wrist strap
81469	Silica gel (moisture absorbent) for CAS35
90362	AC adapter, Euro-plug, 100-240 V AC
90380	AC adapter, UK-plug, 100-240 V AC
90379	AC adapter, US-plug, 100-240 V AC
90528	AC adapter, Australia plug, 100-240 V AC
16574	Battery charger
PRO52	Leonova Service Program
71971	Leonova Emerald User guide

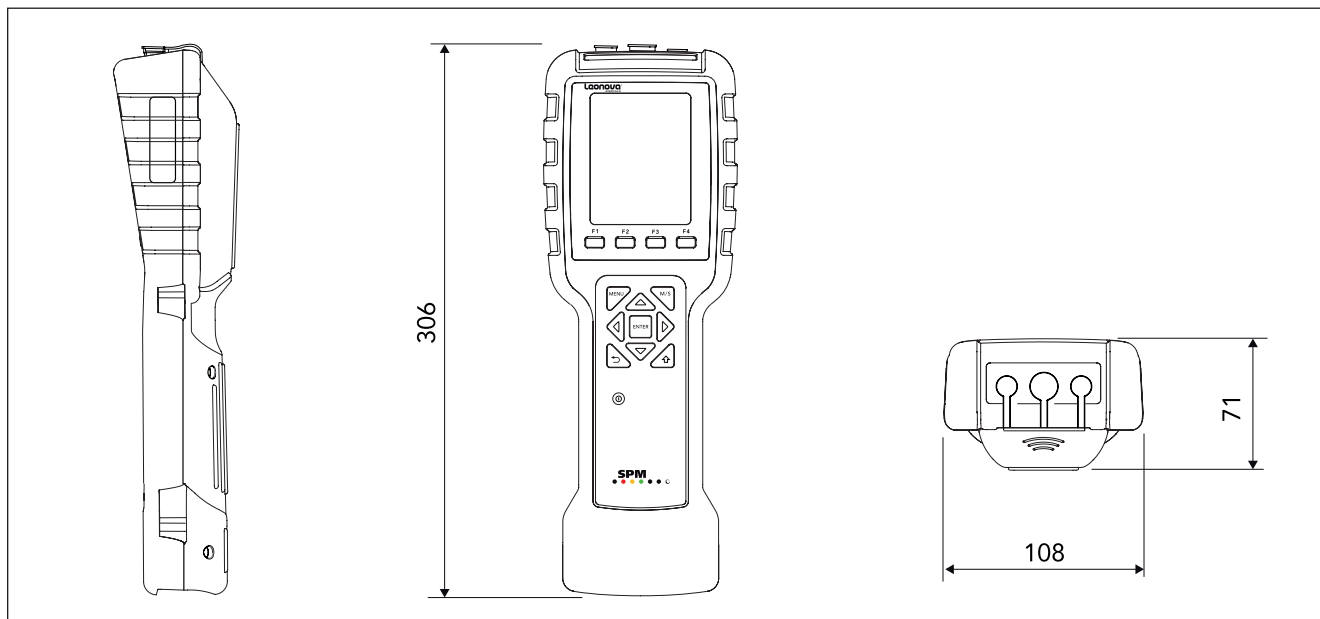
Patents: www.spminstrument.com/patents



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Leonova Emerald® – Instrument specifications



Technical specifications

Housing:	ABS/PC/TPE, IP65
Dimensions:	306 x 108 x 71 mm
Weight:	860 g
Keypad:	Sealed, snap action
Display:	TFT colour, 240 x 320 pixels, 3.5 inch, adjustable backlight
Main processor:	400 MHz ARM
Memory:	256 MB RAM, 512 MB Flash, SD card 1 GB
Operating system:	Microsoft Windows® CE
DSP processor:	375 MHz floating point
Communication:	USB 2.0
Power supply:	Rechargeable Lithium-Ion battery pack, 5200 mAh or power adapter
Battery power:	For min. 18 hours normal use (20°C)
Operating temperature:	-20 to 55 °C (-4 to 122 °F), non condensing
Charging temperature:	0 to 45 °C (32 to 113 °F)
General features:	Language selection, battery status indication, transducer line test, metric or imperial units
Meas. point identification:	NFC transponder for communication with CondID™ tags, read/write distance max. 50 mm (2 inch)

Output/input

Headphones/microphone:	3.5 mm stereo plug
Communication:	Mini USB

Temperature measurement

Input:	TTP10 Tachometer/Temp. probe
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Stethoscope

Transducer types:	Shock pulse and vibration transducers
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Settings:	Filter, volume and gain
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Vibration monitoring

Vibration channels:	1
Dynamic range:	< 120 dB, 24 bit A/D converter
Frequency range:	0 (DC) to 20 kHz
Resolution:	Max. 12 800 lines
Vibration transducer input:	< 24 Vpp. Transducer supply of 2,5 mA for IEPE (ICP) type can be set On/Off
Transducer types:	Any transducers (disp., vel. or acc.) with voltage output
Measuring techniques:	ISO 2372, ISO 10816, HD ENV, FFT with symptoms, EVAM Evaluated Vibration Analysis, balancing

Bearing monitoring

Measuring range:	SPM HD: -30 to 110 dBsv (44000 transducer) dBm/dBc: -9 to 99 dBsv LR/HR: -19 to 99 dBsv
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Resolution:	0,2 dB / HD, 1 dB / dBm/dBc and LR/HR
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Transducer types:	SPM 40000, 42000, 44000, probe and quick connector transducers, DuoTech
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Tachometer input

Measuring range:	1 to 150 000 PPM
Resolution:	1 pulse
Accuracy:	± (1 pulse + 0.01% of reading)
Transducer types:	SPM TTP10, TTL pulses, Keyphasor® and proximity switch NPN/PNP.
Output:	TTL output for stroboscope and 12 VDC



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Leonova Emerald® – User selected functions



To obtain the optimal performance range and instrument price for their purpose, Leonova users can select any or

all of the condition diagnosis and maintenance functions below. Platform functions are always included.

Platform

- SPM HDm/HDc and/or SPM LR/HR
- RMS vibration, ISO 2372
- Speed measurement
- Temperature measurement
- Stethoscope function
- Measuring point identification with CondID® memory tags
- Recording
- Manual recording, free quantity
- Check points, free text
- Recording of vocal comments
- Supports up to 6400 lines, 10 kHz

Optional functions

Module in Ruby

EME195	SPM HD Expert, freq. and domain analysis	MOD195
EME197	Shock pulse method HDm/HDc	(Platform)
EME130	Shock pulse method dBm/dBc	MOD130
EME131	Shock pulse method LR/HR	MOD131
EME132	SPM Spectrum	MOD132
EME133	Vibration ISO 10816 with spectrum	MOD133
EME134	Vibration Premium HD ENV FFT spectrum with symptoms 6400 lines, 10 kHz HD Order tracking Time signal Post trigger	MOD135
EME193	Vibration Supreme HD ENV EVAM evaluated vibration analysis 12800 lines, 20 kHz + all functions in EME134	MOD197
EME140	HD Analysis Vibration Supreme SPM HD Expert	MOD140
EME109	Balancing, single plane	



Leonova Emerald® – Recording function



Recording is an Leonova function included in the platform. It allows the user to measure and record measuring results over longer periods of time, up to 50 hours. The recording function is an analysis tool which can show the interaction of various condition parameters over time.

Leonova has three channels on three separate connectors, for:

- shock pulse measurement
- speed and temperature measurement
- vibration (one channel).

Simultaneous measurement can be done on up to two channels.

The recording function for a single quantity, e. g. temperature, is accessed and set up from the default file saved under the respective technique window. To record different quantities at the same time, a measuring point file with all the different techniques activated is required.

Under 'Total' in the recording window, the desired number of measurements is input, alternatively the total recording time in minutes.

Under 'Time between measurements' the interval is input in minutes. 0 minutes means 'as fast as possible'.

The measuring sequence is set by opening the list of available measuring techniques with NEW and selecting techniques in any order. A technique can be used more than once in the sequence.

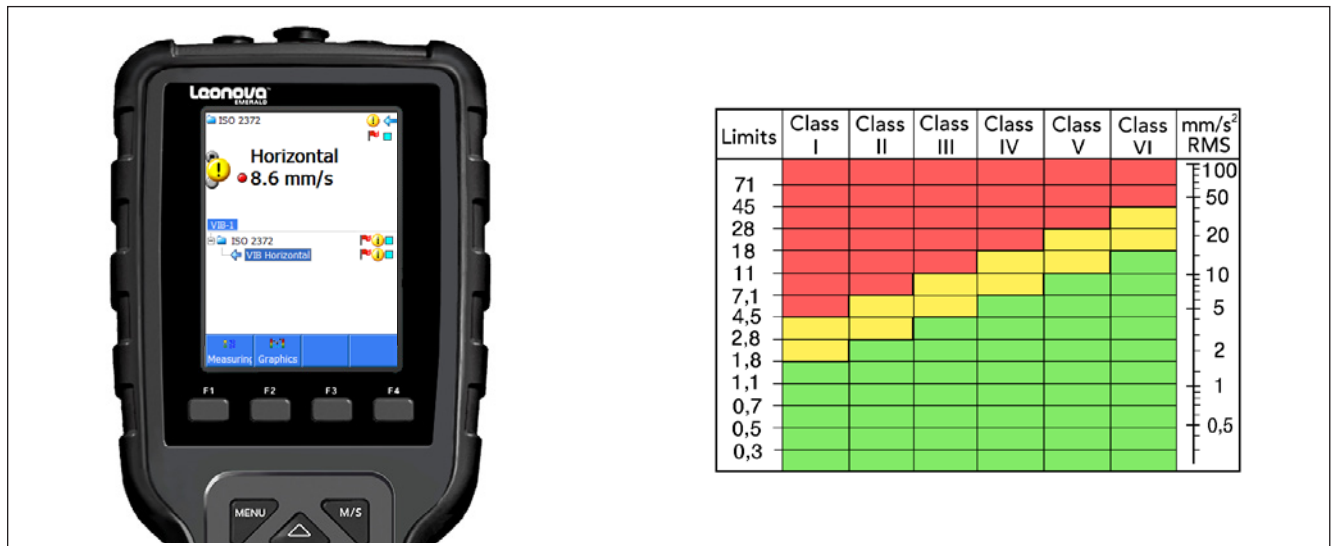
Recording is started with the M/S key and can be terminated with the 'Cancel' key (F4).

Leonova displays the number of measurements taken and powers down when all are recorded. The batch is then saved by the user and can be transferred to Condmaster.

The Recording function is part of the platform, always included for unlimited use.



Leonova Emerald[®] – Vibration ISO 2372



Broadband vibration measurement is the most widely used and cost-efficient method for the diagnosis of general machine condition. There are two ISO recommendations concerning this type of machine condition monitoring; the much used ISO 2372 and the more recent ISO 10816, which is a ongoing replacement of the older standard.

In Leonova, vibration measurement according to ISO 2372 is a platform function, always included for unlimited use.

The features are:

- Machine condition is diagnosed on the basis of broadband measurements returning an RMS value of vibration velocity in the frequency range of 10 to 1000 Hz. This is called vibration severity.
- Machines are grouped into six vibration classes.
- A table of limit values is presented for each vibration class, differentiating between acceptable vibration (green range), unsatisfactory vibration (yellow range), and vibration that will cause damage unless reduced (red range).

- Measurements are made in three direction (horizontal, vertical, axial). The highest value returned determines machine condition.
- Default limit values for the change from green to yellow and from yellow to red are set automatically when one of the six machine classes is input under the measuring point data.

ISO 10816 is offered as an option, see TD-442.

Technical specifications

Measurement quantities: Velocity, RMS value in mm/s over 10 to 1000 Hz

Transducer type: Vibration transducer SLD144 or IEPE* (ICP[®]) type transducers with voltage output

* Integral Electronic PiezoElectric

Leonova Emerald® – Vibration ISO 10816 with spectrum



Vibration Velocity RMS		Group 4 Integrated Driver		Group 3 External Driver		Group 2 Motors 160 ≤ H < 315 mm		Group 1 Motors H ≥ 315 mm	
		Rigid	Flexible	Rigid	Flexible	Rigid	Flexible	Rigid	Flexible
18	0.71								
11	0.43								
7.1	0.28								
4.5	0.18								
3.5	0.14								
2.8	0.11								
2.3	0.09								
1.4	0.06								
0.71	0.03								

Broadband vibration measurement is the most widely used and cost-efficient method for the diagnosis of general machine condition.

There are two ISO recommendations concerning machine condition monitoring by this type of measurement; the much used ISO 2372 and the more recent ISO 10816, which is an ongoing replacement of the older standard.

With Leonova, ISO 2372 measurement is a platform function, always included for unlimited use.

ISO 10816 is an option with ordering numbers EME 133 (unlimited use).

Features of ISO 10816 are:

- Measurements are made in three directions (horizontal, vertical, axial).
- Machine condition is generally diagnosed on the basis of broadband vibration measurements returning an RMS value. ISO 10816 keeps the lower frequency range flexible between 2 and 10 Hz, depending on the machine type. The upper frequency is 1000 Hz.
- ISO 10816 operates with the term vibration magnitude, which, depending on the machine type, can be an RMS value of vibration velocity, acceleration or displacement. If two or more of these parameters are measured, vibration severity is the one returning the relative highest RMS value. For certain machines, ISO 10816 also recognizes peak-to-peak values as condition criteria.
- The standard consists of several parts, each treating a certain type of machines, with tables of limit values differentiating between acceptable vibration (green range), unsatisfactory vibration (yellow range), and vibration that will cause damage unless reduced (red range).

In Leonova, ISO part, machine group and foundation type are input using a multiple choice guide which displays the various ISO definitions and leads to the limit values.

Exceeding the requirements of the ISO standard, Leonova Emerald also provides a 1600 line spectrum.

Technical specifications

Measurement quantities: Velocity, acceleration, and displacement

Spectrum unit: Velocity, mm/s or inch/s

Transducer type: Vibration transducer SLD144 or IEPE* (ICP®) type transducers with voltage output

Quick mode: Yes, can be set on/off

* Integral Electronic PiezoElectric

Settings

Direction: Horizontal, vertical, axial

Part: 2, 3, 4, 5, 6

Group: 2, 3, 4, 5, 6

Support: Rigid, Flexible

Part numbers

EME133 Vibration ISO10816 with spectrum, unlimited use



Leonova Emerald® – Services



The service program Leonova.exe is part of the basic function package for Leonova Emerald. It is used to:

- Print and save balancing reports
- Upgrade a Leonova software package
- Make and reload safety copies of the Leonova files (file extension.lsc)

The operation of the service program is very simple: connect Leonova to the PC, put it in communication mode, then click on the desired service function. Follow the guidance on the screen.

For example, a safety copy of the Leonova file can be sent to SPM Instrument for technical advice. Upon reload, you choose which part of your safety copy should be reloaded.

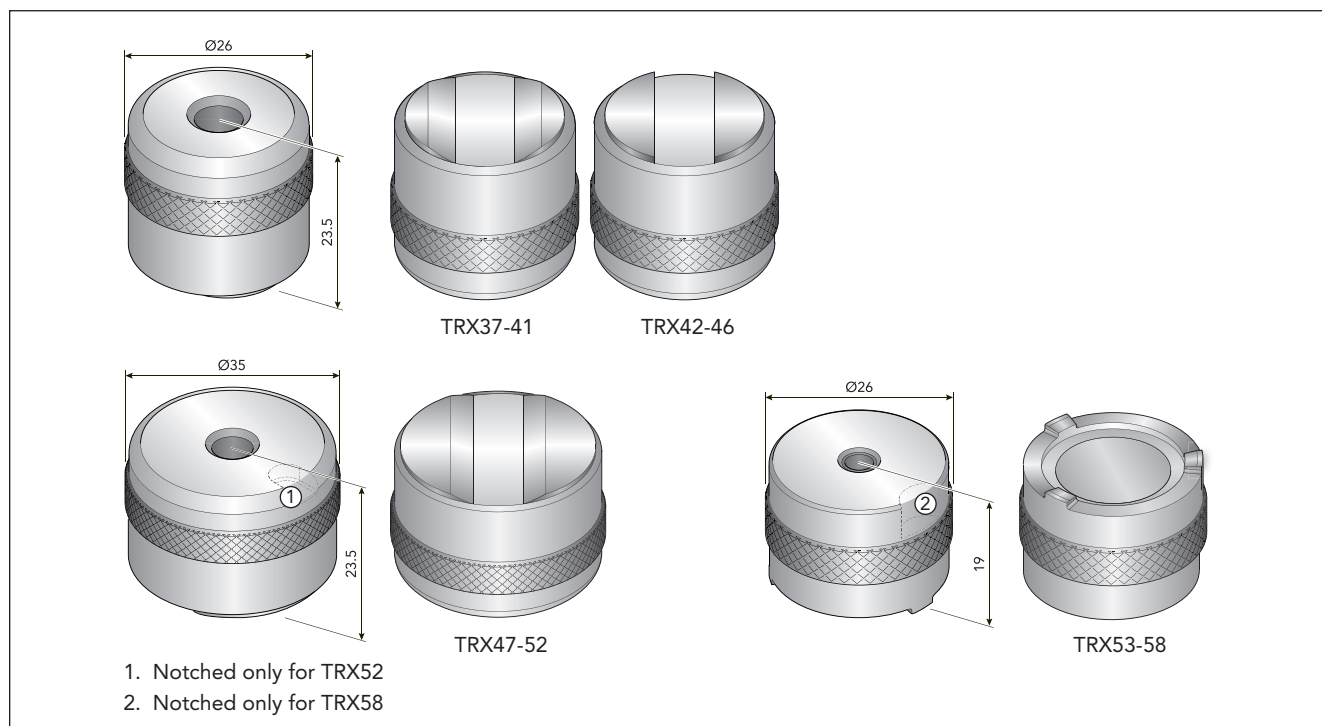
The file 'Leonova.txt' can contain Leonova functions that are new for the instrument. It is coded to fit the individual instrument and ordered via the local SPM Instrument distributor.

Part numbers

PRO52 Leonova Service Program



Magnetic mounting bases



Two-rail, 25 mm diameter, 13 kg (29 lbs) pull strength

The two rail type magnetic mounting bases are usually utilized on curved surfaces, such as motor and compressor housings, although they are also suitable for flat surfaces.

TRX37	Magnetic mounting base, M6
TRX38	Magnetic mounting base, M8
TRX39	Magnetic mounting base, M10
TRX40	Magnetic mounting base, UNF 1/4
TRX41	Magnetic mounting base, UNC 5/16

Flat, 25 mm diameter, 13 kg (29 lbs) pull strength

The flat magnetic mounting bases are optimal for smooth, flat surfaces.

TRX42	Magnetic mounting base, M6
TRX43	Magnetic mounting base, M8
TRX44	Magnetic mounting base, M10
TRX45	Magnetic mounting base, UNF 1/4
TRX46	Magnetic mounting base, UNC 5/16

Two-rail, 35 mm diameter, 25 kg (55 lbs) pull strength

The two rail type magnetic mounting bases are usually utilized on curved surfaces, such as motor and compressor housings, although they are also suitable for flat surfaces. A large diameter enables magnetic mounting on two heat sinks for an electric motor, for example.

TRX47	Magnetic mounting base, M6
TRX48	Magnetic mounting base, M8
TRX49	Magnetic mounting base, M10
TRX50	Magnetic mounting base, UNF 1/4
TRX51	Magnetic mounting base, UNC 5/16
TRX52	Magnetic mounting base for triaxial transducers, UNF 10-32

Three-rail, 25 mm diameter, 10 kg (22 lbs) pull strength

The three rail type magnetic mounting base are usually utilized on curved or uneven surfaces.

TRX53	Magnetic mounting base, M6
TRX54	Magnetic mounting base, M8
TRX55	Magnetic mounting base, M10
TRX56	Magnetic mounting base, UNF 1/4
TRX57	Magnetic mounting base, UNC 5/16
TRX58	Magnetic mounting base for triaxial transducers, UNF 10-32

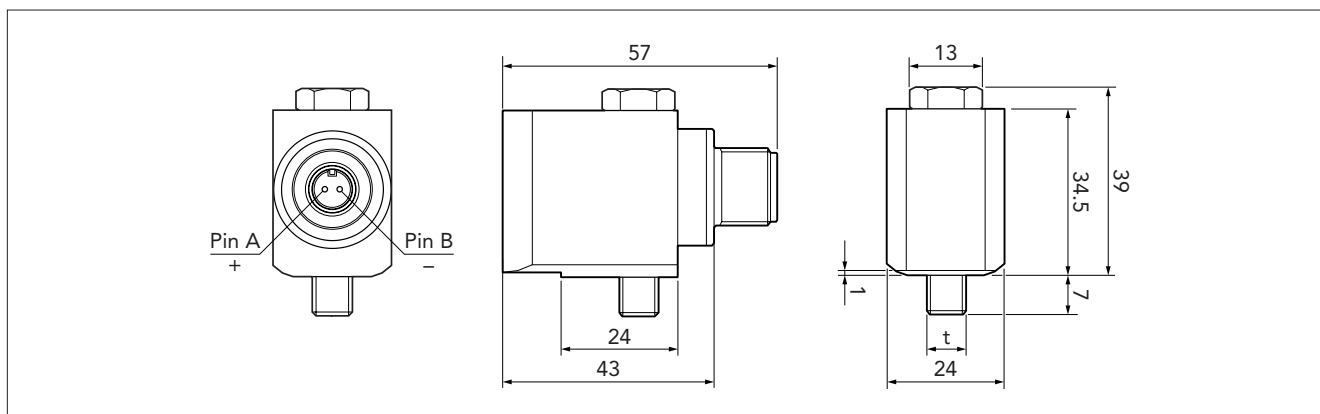
Technical specifications

Material:	stainless steel
Temperature:	up to 100 °C
Grip:	knurled edge

Options

16065	Mounting disc for 26 mm diameter magnetic mounting base (TRX37-46 and TRX53-58)
18033	Mounting disc for 35 mm diameter magnetic mounting base (TRX47-52)

Vibration transducer, SLD144S



The vibration transducer SLD144S is a piezo-electric accelerometer of compression type with side entry and built-in electronics, designed for vibration monitoring of industrial machinery. The electrical signal is isolated from the transducer housing.

The transducer is installed on a flat machine surface and connected via a twisted pair cable with a 2-pin connector. The flat machine surface must be min. 30 mm in diameter (min. 16 mm in diameter when using mounting base 15757, 15802, or 17769). The transducer has a captured bolt for installation. For vibration transducers with top entry, see TD-635.

Technical specifications

Nominal sensitivity,	
main axis:	10 mV/m/s ² * =100 mV/g
Transverse sensitivity:	max. 10%
Base strain sensitivity:	0.01 m/s ² /μ strain typical
Linear frequency range:	2 Hz to 10 kHz (± 1 dB)
Max. peak acceleration:	600 m/s ² = 60 g
Settling time:	3 sec
Bias point:	10 to 13 V (typical 12V)
Temperature range:	-40° to +125 °C (-40° to 257 °F)
Power requirements:	24 V, 2 to 5 mA
Isolation:	case isolated, > 10 Mohm
Casing:	stainless acid-proof steel Sandvik 1802, EN:1.4523
Sealing:	IP66/67
Thread (t):	M6x1.0, M8x1.25 or UNF 1/4"-28
Torque limit:	10 Nm (7.4 lbf·ft)
Weight:	200 grams (7 oz)
Connection:	2-pin connector, MIL-C-5015 style
Cable length:	max. 100 m (328 ft)
Cable capacitance:	210 pF/m

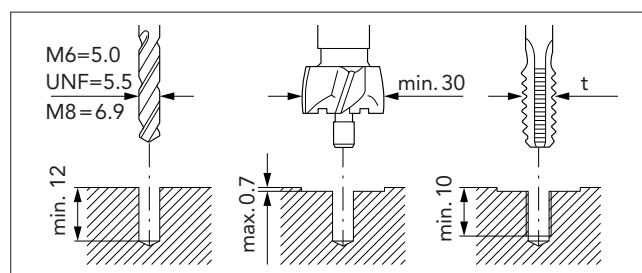
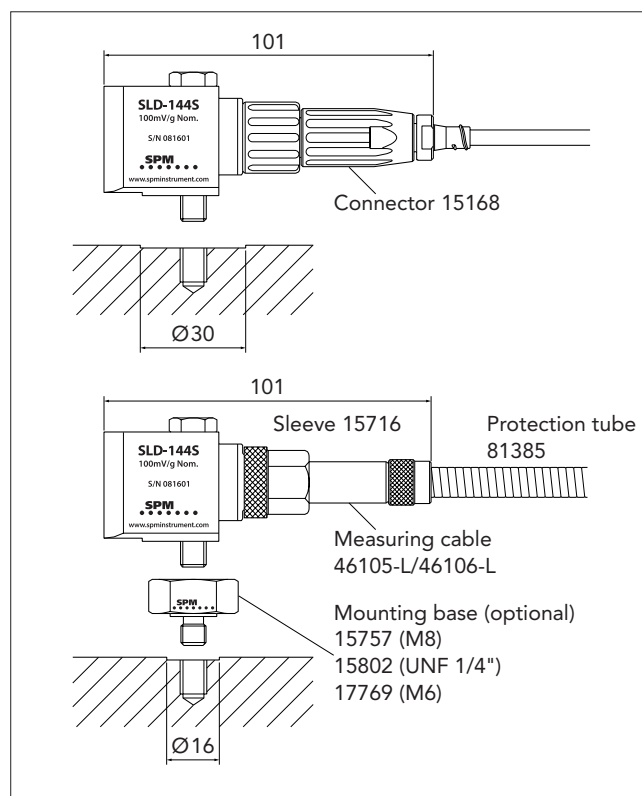
* Individual value given on the calibration chart.

ARTICLE NO: SLD144S - XXX
A B

A. Part number SLD144S
B. Thread (t) M6, M8, or UNF

SERIAL NO: XXXXX
Year Week Number

Installation examples



Installation tools

- 81393 Holder for counterbore
- 81394 Pilot for M6 and UNF 1/4"-28
- 81395 Pilot for M8
- 81396 Counterbore, diameter 30 mm

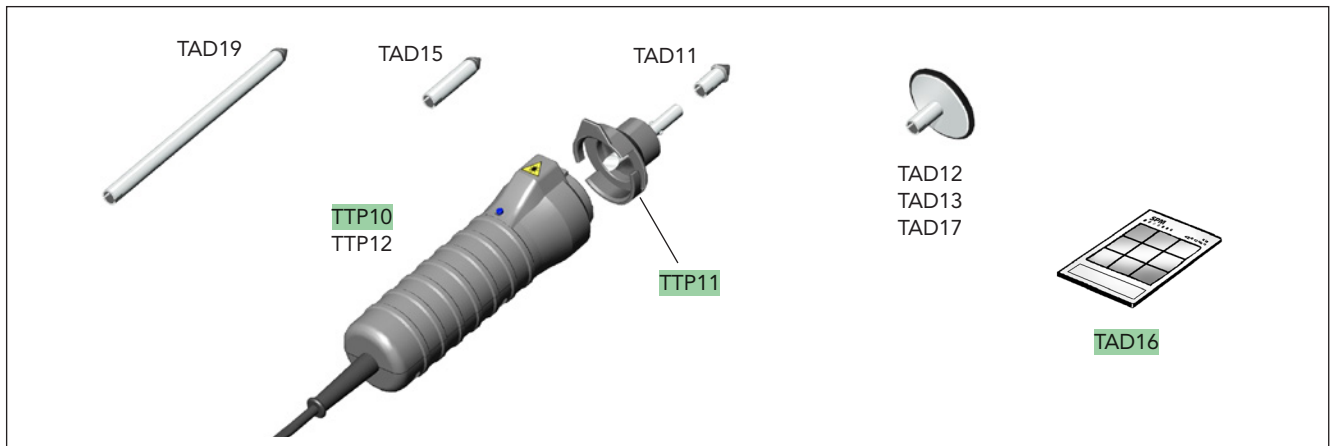


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Tachometer and Temperature Probe TTP10 / TTP12



The Tachometer and Temperature Probe TTP10/12 is used together with Leonova Diamond® and Emerald® instruments for optical or contact measurement of the rate of rotation and for contact measurement of peripheral speed. It also has a built-in temperature sensor.

Optical measurement of the rate of rotation

A laser light beam is directed against a reflecting tape on the rotating object, from a distance of 30-2000 mm and from an angle of 5-75°.

Contact measurement of rpm

The contact adapter TTP11 with a rubber tipped contact center, TAD-11/15/19, is attached onto the probe and then held against the center of a shaft end or a wheel.

Contact measurement of peripheral speed

The contact adapter TTP11 with contact wheel is held against the circumference of a shaft, a belt, etc. The speed is read out in units, depending on which contact wheel is used: TAD-12/13/17.

Temperature measurement

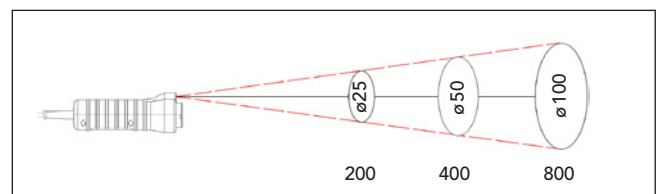
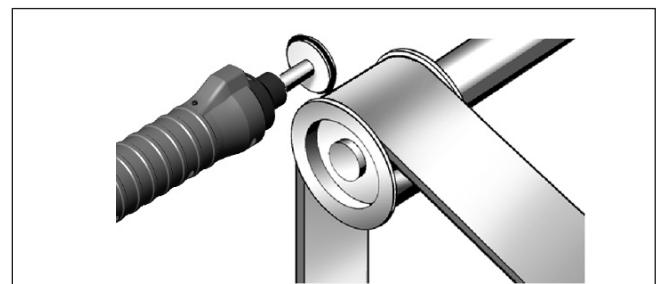
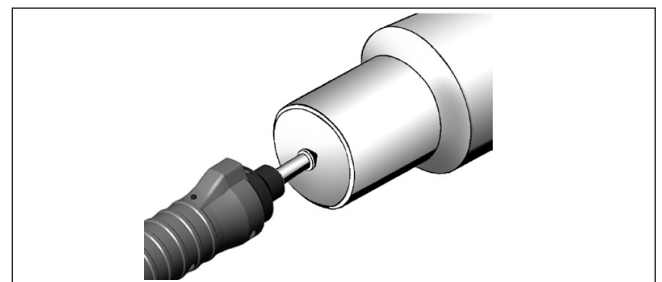
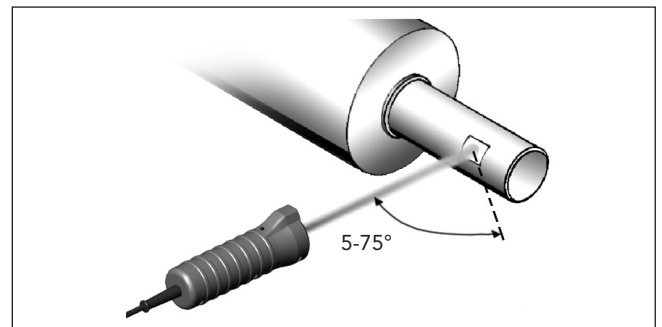
The Tachometer and Temperature Probe TTP10/12 is also used together with Leonova Diamond/Emerald for temperature measurements with a thermopile element in the range -20 to +300 °C.

Part numbers

TTP10	Tachometer and Temperature Probe, incl. TTP11 and cable, spiral 1-2 m
TTP12	Tachometer and Temperature Probe, incl. TTP11 and cable, straight 5 m
TAD11	Contact center, rpm, short, 30 mm
TAD15	Contact center, rpm, long, 60 mm
TAD19	Contact center, rpm, extra long, 170 mm
TAD12	Contact wheel m/min.
TAD13	Contact wheel yd./min
TAD17	Contact wheel ft./min
TAD16	Reflecting tape for thin shafts, 5 sheets
TTP11	Contact adapter (spare part)
CAB100	Cable, spiral (spare part for TTP10)

Technical specifications

Measuring range, rpm	max. 100 000 (pulses) optical
Measuring distance, rpm	30 to 2000 mm
Indicator, rpm	blue LED
Measuring range, temp.	-20 to +300 °C



Measuring accuracy, temp.	± 2,5° C*
Dimensions	137 x 50 mm, 179 x 50 mm incl. TTP11
Operating temperature	0 to + 40 °C
Weight	160 g (TTP10), 300 g (TTP12)
D:S	8:1

* If RF emission is present at 625MHz to 655MHz, the accuracy is possibly reduced to ±2.5°C – 10% of full scale

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Headset with microphone



EAR16/17/18 are specially selected headsets for Leonova Diamond/Emerald, providing excellent sound reproduction even in noisy environments. The headphones are equipped with microphone for voice recording of comments to the measuring points.

- Individually sprung headband wires of stainless sprung steel provide an even distribution of pressure around the ears. Steel headband wires retain their resilience better than plastic through a wide temperature range.
- Low, two-point fasteners and easy height adjustment with no protruding parts.
- Soft, wide foam and fluid-filled sealing rings with built-in pressure-equalizing channels provide low pressure, effective sealing and ideal comfort.
- Connection cord, 0.75 to 1.4 m, of soft spiral polyurethane with a 3.5 mm stereo plug.

The headsets are tested and approved in accordance with PPE directive 89/686/EEC and EMC directive 89/336/EEC to meet the demands for CE labelling.

Headset with headband, EAR16

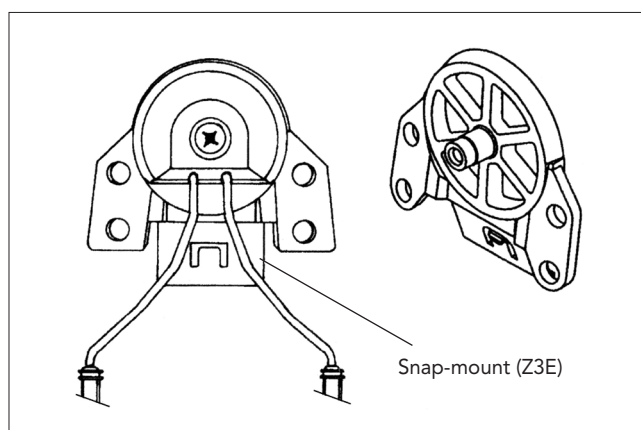
EAR16 is a headset with two parallel connected earphones and a microphone. It has a collapsible headband for convenient storage when you are not using the headset.

Headset, EAR18

EAR18 is a headset with two parallel connected earphones and a microphone. It has a neckband for use with or without helmet. A soft headband with velcro is optional.

Headset for helmet, EAR17

The headset with microphone EAR17 is a headset with two parallel connected earphones and a microphone. The headset fits most safety helmets available in the market today. The headphones have standard snap-mounts (Z3E) and are adapted to a specific helmet by simple manipulation.



To mount the headphone, snap the helmet attachment into the slot on the helmet. Note! The cups can be set in three positions: working position, ventilation position and parking position. When in use, the cups must be placed in working position. Press the wires inward until you hear a click on both sides. Make sure that the cup and the headband wire in working position are not pressing on the helmet lining or the edge of your hard hat so that leakage can occur. Parking position should not be used if the cups are damp inside after an intense period of use.

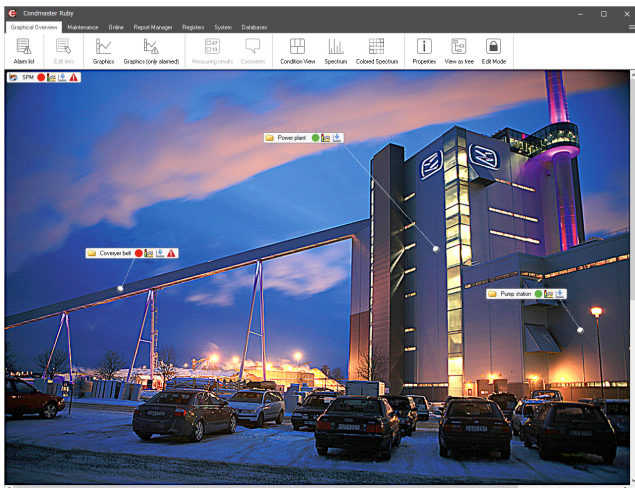
Part numbers

EAR16	Headset with headband
EAR17	Headset with helmet brackets
EAR18	Headset with neckband
EAS11	Hygiene set (consists of two sets of attenuating cushions and snap-in sealing rings.)
91015	Headband with velcro for EAR18

***Available to add to your package. Ask your SPM representative for pricing.**



Condmaster® RUBY



Technical Data sheets 2026



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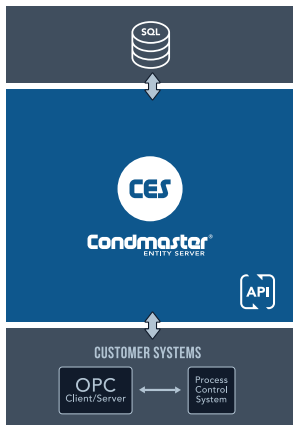
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Condmaster Entity Server (CES)



Condmaster Entity Server handles centralized license, database, and user administration, and also supports external user directories such as Microsoft Azure AD and Active Directory Federation Services. This backend centralization means simplified identity management for admins and a streamlined user login experience.

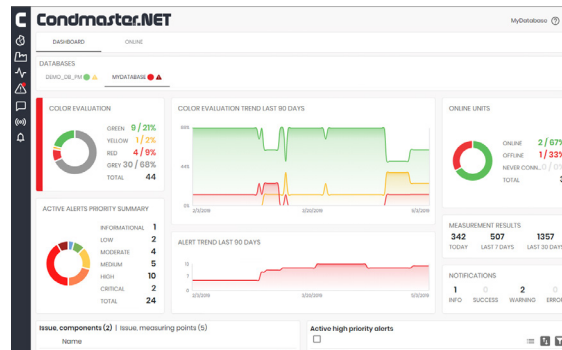
CES Admin Portal is where you perform many of your initial configurations when setting up your condition monitoring system. It is here you activate and manage your license, manage database connections, users, user groups, and perform some of the general system settings, etc.

Condmaster® Ruby

A comprehensive analysis, diagnostics, and troubleshooting software communicating with our portable instruments and online systems for condition monitoring.

Addressing the growing need for interoperability and real-time data integration in the Industry 4.0 age, Condmaster adds options that further simplify the exchange of data with automation assets, IIoT devices, and control systems in smart manufacturing. Condmaster Ruby has an easy-to-implement, Industry 4.0-friendly REST API enabling other resources to access Condmaster data for further processing or analysis.

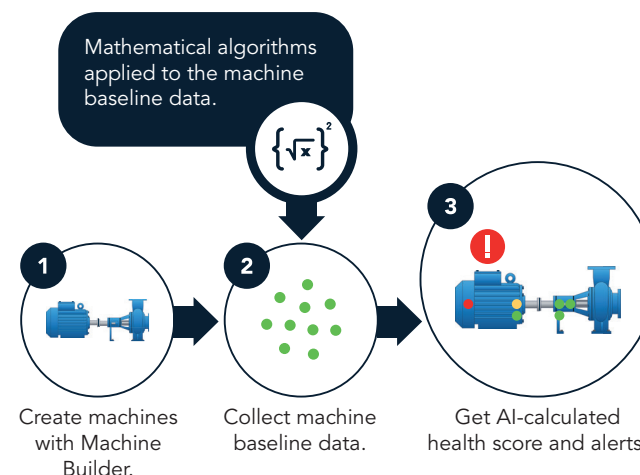
Condmaster.NET



Condmaster.NET is a web application and app for iOS and Android that allows users to access measuring data via web browsers. It presents an intuitive overview of color evaluation and alerts and offers basic analysis functionality. Application-specific, customized dashboards can be created to visualize and monitor process data.

Quickly assess the condition of critical assets, view status, alerts, and issues across all measuring points, components, and machines, and perform fundamental analysis using spectrums, time signals, trends, and alerts.

The Decision Support System (DSS)



DSS provides users with predictions about machine damage and general machine health. The overall purpose of the DSS is to relieve maintenance personnel from having to deal with vast amounts of measurement data to analyze and find insights into root causes and problem-solving. Instead, the DSS uses artificial intelligence, statistical analysis, and other algorithms to mine this data for information, automatically detecting the patterns that most warrant maintenance efforts.

In Condmaster Ruby, these standalone features form DSS:

- Machine Builder
- Signal Quality Test
- Machine baseline
- Health score
- Alerts
- Entity rules

Machine Builder

Complete machines can be created from a component library. The feature generates suitable measuring points, measurement assignments, and machine fault symptoms. Assembled machines are added to the Graphical Overview as illustrations with associated color zones.

Signal Quality Test

Signal Quality Test is a background process that continuously checks for ski slopes and bias problems. The function can also identify issues with faulty or incorrectly connected transducers. The main purpose is to determine if the signal is of good quality.

Machine baseline

Machine baseline is where normal machine behavior can be determined. The machine baseline data, collected during a learning phase, can be used to automatically calculate deviations and potentially raise alerts for the machine fault symptoms and condition parameters.

Health score

Health score is calculated by applying mathematical algorithms to the collected baseline data. The health score is presented in blue-green-yellow-orange-red-dark red colors for a detailed evaluation. The health score corresponds to a normalized floating-point value from 0 to 1, where 0.2 – visualized in green – represents the normal condition of the machine baseline.

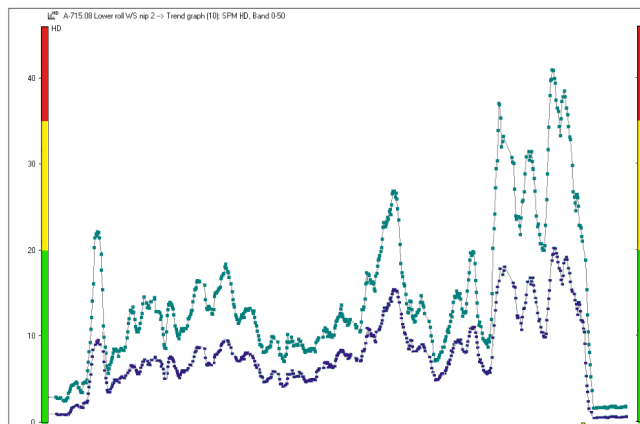
Alert management

Alert management informs users about deviating machine conditions, highlighted DSS predictions, and other device events. Alerts offer flexible handling of actions based on the condition and criticality of the machine, which includes setting priority levels and status indications on individual alerts.

Entity rules

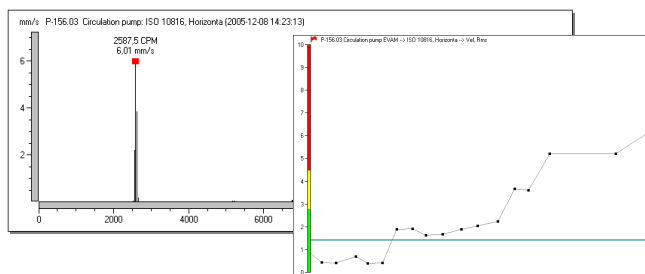
Entity rules is a feature that is used as a hub for expanding and customizing Condmaster with event-driven functions, as well as creating custom integrations with other IIoT systems. With Entity rules, it is possible to monitor a variety of events and automatically invoke actions based on these events.

HDm/HDc



The SPM HD® method is a patented further development of the Shock Pulse Method (SPM) in being less sensitive to interference from other signals and therefore unique in its ability to measure from very low rpm (0.1 - 20.000 RPM range). The scalar decibel value HDm represents the highest shock pulses found during the measuring cycle, and is the primary value for determining the severity of bearing damage, and also to trigger alerts. HDC, also a scalar dB value, is useful to determine lubrication conditions.

ISO2372, ISO10816



Broadband vibration measurement is the most widely used and cost-efficient method for the diagnosis of general machine condition. There are two ISO recommendations concerning this type of machine condition monitoring; the much used ISO 2372 and the more recent ISO 10816, which is a ongoing replacement of the older standard.

Features of ISO 10816 are:

- Measurements are made in three direction (horizontal, vertical, axial).
- Machine condition is generally diagnosed on the basis of broadband vibration measurements returning an RMS value. ISO 10816 keeps the lower frequency range flexible between 2 and 10 Hz, depending on the machine type. The upper frequency is 1000 Hz.
- ISO 10816 operates with the term vibration magnitude, which, depending on the machine type, can be an RMS value of vibration velocity, acceleration or displacement. If two or more of these parameters are measured, vibration severity is the one returning the relative highest RMS value. For certain machines, ISO 10816 also recognises peak-to-peak values as condition criteria.

RPM measurement

RPM measurement stands for Revolutions Per Minute measurement, and it refers to the process of determining how many full rotations a rotating component (such as a shaft, motor, or gear) completes in one minute. SPM Instrument offers several methods for measuring rotational speed (RPM) as an integral part of its condition monitoring systems. RPM measurement is essential for correctly evaluating bearing and vibration data, especially when using technologies such as SPM HD and HD Order Tracking.

Temperature measurement

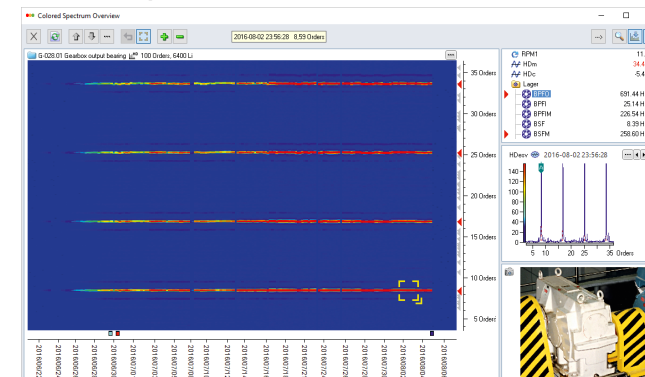
Temperature measurement is a critical component of SPM Instru-

ment's condition monitoring solutions, providing essential data to assess machine health and prevent failures. SPM integrates temperature monitoring across both portable and online systems to enhance predictive maintenance strategies. By incorporating temperature data alongside vibration and shock pulse measurements, SPM Instrument enables comprehensive condition assessments. This integration allows for early detection of issues such as overheating, lubrication failures, or misalignments, thereby supporting proactive maintenance and reducing downtime.

User-defined measurement

User-defined measurement is a flexible feature that allows users to integrate and monitor custom process parameters beyond standard measurements such as vibration, shock pulse, temperature, and RPM. These measurements can include variables like pressure, flow, load, or other analog signals relevant to specific applications. It offer a high level of flexibility, enabling broader and more tailored condition monitoring with SPM Instrument systems, and can be integrated with existing systems using OPC or analog inputs to collect data from installed sensors.

Colored Spectrum Overview (CSO)

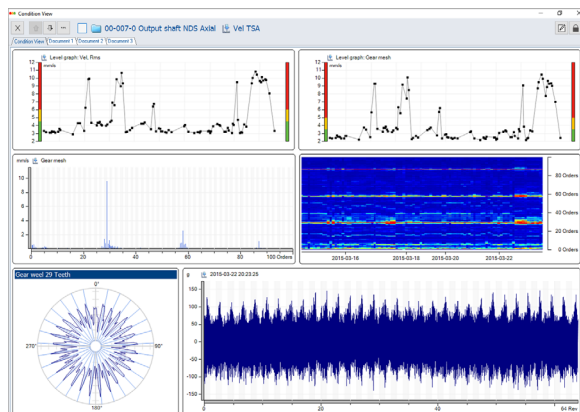


The purpose of Colored Spectrum Overview is to simplify the process of identifying in spectrums the patterns and trends which indicate damages. It clearly distinguishes between signals that are always present in the machine and signals caused by developing damages. The module function provides a good overall picture of the machine condition development. Among many features in

Colored Spectrum Overview are:

- Zooming possibilities in x, y and z axes.
- Logarithmic or power spectrum.
- Symptoms activation to simplify damage identification.

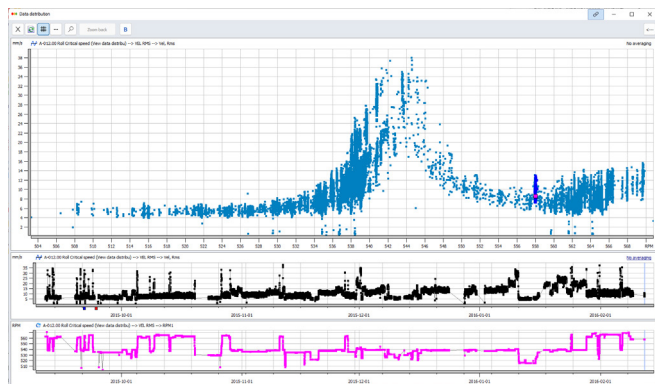
Condition View



Condition View is a powerful tool that combines multiple graph types and measuring assignments in a single window to show current machine condition, recent condition development, or maintenance actions, for example, to clarify or justify planned maintenance activities. It provides a valuable overview of the most interesting condition data and any complementary information for a particular measuring point.

For one or more measuring points, you can freely combine trend graphs, spectrums, time signals, Colored Spectrum Overview graphs, circular plots, and more as desired.

Data distribution



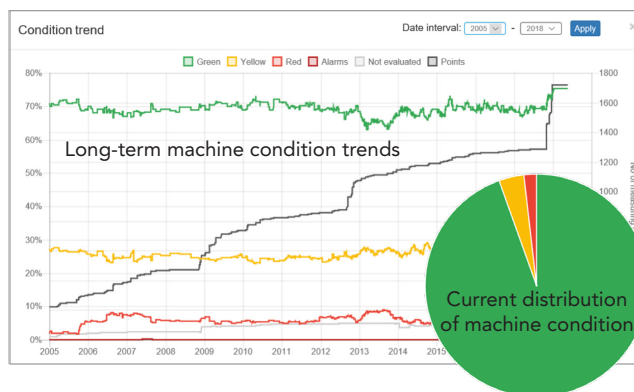
Data distribution is a powerful tool for discovering and analyzing relationships between different variables. This, in turn, is valuable for streamlining work with process optimization and alert limits.

For example, analyzing how the resonance frequencies of a pump or a roll in a paper machine vary with differences in the RPM or other parameters related to the process, such as flow (for a pump), can provide valuable insights to get the most out of your assets.

Online

The online module in Condmaster Ruby connects with Ethernet-compatible systems, including Airius sensors and the CMS online system, to monitor bearings, vibrations, and analog/digital signals. It supports advanced measurement, filtering, and alert functions, ensuring relevant and accurate monitoring. Results are evaluated in Condmaster Ruby and presented using color-coded diagnostics. Module MOD187 also enables Seamless and Time Signal Recording, offering precise, automated condition analysis based on standards and machine data.

Plant performer



Plant performer visualizes technical and economic KPIs (Key Performance Indicators) within the OEE/TEEP area. It demonstrates the benefits of condition monitoring and communicates its technical and economic impact to all levels of the organization. Data entered in Condmaster Ruby is used to monitor machine performance, condition, and maintenance costs. Statistics are shown in lists, charts, or timelines with filtering options. Data can be exported between databases and integrated via API. API examples include MTBF, vibration levels, operating condition, and total loss of contribution.

SAP and AMOS links

The SAP and AMOS links in Condmaster Ruby enable direct communication with SAP/AMOS systems. When an alert is triggered, the user clicks a button to send it to SAP/AMOS, which returns a work order number. Once the task is completed, a comment is sent back to Condmaster, the alert is cleared, and the comment is logged. No extra data input is needed, and standard messages like "Bearing replaced" can be used. Specific functions must be set up in SAP/AMOS, but Condmaster only provides protocol descriptions, not the actual implementations.

LinX

When running the Intellinova Standard/Compact online system, Condmaster offers LinX to handle filtering of the measurement results received from the Commander Unit. The purpose is to dispense with insignificant information. It serves as a middleware platform that enables communication between different software systems, both internal and external. By using Linx, we can streamline workflows, reduce manual data handling, and ensure that critical data is transferred reliably between systems.

For example, Linx is used to:

- Connect Condmaster Ruby with other business systems such as ERP, maintenance management systems (CMMS), or cloud platforms.
- Automate tasks, such as transferring machine condition data, generating reports, or sending alerts based on predefined conditions.
- Facilitate custom integrations for customers who require specific data flows or formats.

Voice recording

For each measurement, the user can input a comment as text or voice recording. When implemented, the function 'Recording' can be used to automatically record a stated number of measuring results or measure over a stated time.