

INTELLINOVA

$$\frac{1}{2}a_0 + \sum_{n=1}^{\infty} a_n \cos(n\omega t) + b_n \left( \frac{e^{in\omega t} + e^{-in\omega t}}{2} \right)$$
$$\frac{1}{2}a_0 + \sum_{n=1}^{\infty} a_n \left( \frac{a_n}{2} + \frac{b_n}{2} \right)$$

*"It is wiser to find out  
than to suppose"*

Mark Twain, 1835-1910

$$\sin(n\omega t) = \frac{e^{in\omega t} - e^{-in\omega t}}{2i}$$
$$= \frac{a_n}{2} e^{in\omega t} + \left( \frac{b_n}{2i} \right) e^{-in\omega t}$$



## Condition Monitoring the Intelligent Way

Intellinova® is an online condition monitoring system where well-proven methods and modern technology meet to ensure the highest possible uptime of critical assets.

### Increased productivity

In all industries, ensuring machinery uptime is vital to meet increasing demands on productivity and 24/7 availability requirements. An online condition monitoring and diagnosis system is an asset management tool that will keep constant watch over your equipment, maximizing the level of plant availability and performance. A multifunctional backbone of any condition monitoring program, Intellinova implements far-sighted solutions, ensuring a durable and scalable system.

### Customer defined solutions

Intellinova is distinguished by its great flexibility and ease of use, enabling fast implementation of customer defined solutions. Accuracy and reliability are also trademarks of this high performance system. The system combines complex measuring techniques and advanced

data processing with a user friendly interface and a variety of options for individual system customization. The result is a highly flexible, high performance system delivering easily understood condition information that will help you make the most informed maintenance decisions.

### Cost effectiveness

The impact of a well-implemented condition monitoring system can be dramatic. With operational efficiency and cost effectiveness in mind, we designed a rugged system, made for rough industrial environments and long-term use. Day after day, you can trust Intellinova to provide up-to-date information on the mechanical condition of your machinery. Around the clock, condition information is made available to maintenance staff no matter what their location.



## IntelliLogic®

With the sophisticated IntelliLogic features, there will be no wading through endless amounts of measurement data. Instead it results in meaningful, evaluated and reliable condition information transferred straight to the control room, ready for decisions on condition based maintenance actions.

## Measurement and Filtering

The sophisticated and highly flexible measurement and alarm management handled by IntelliLogic includes conditional and triggered measurements, guaranteeing that measurement is carried out only when required. An array of filtering options on multiple levels, which are all user defined, ensures only relevant and quality assured information is presented to the user and saved to the database.

## Alarms

IntelliLogic offers a wide range of options for alarm settings. The system handles alarms based on user defined alarm limits, on running condition or on machine condition statistics. Band alarms and averaging of measurement results enable easy alarm management and improved alarm reliability. Random high readings caused by resonance or sources of disturbance can be filtered out, minimizing the number of false alarms.

## Graphical Overview

The visual heart of the software is the Graphical Overview in Condmaster®Nova. In the overview, machine and measuring point folders can be arranged as preferred. User selected photographs of the plant or individual machine components can be attached for instant recognition of monitored equipment.





## Have It Your Way With IntelliLogic®

Around-the-clock measurement yields large amounts of data. IntelliLogic, the collective name for Intellinova's advanced programming logic, will help limit the amount of measurement data. A wide range of options enables you to set the system up to measure only the right things and only at the right time, to discard what is insignificant and to raise only well-justified alarms.

### Rule Based Evaluation

When disturbances may influence individual measuring points, making condition evaluation more complex, Rule Based Evaluation is very useful to help make an accurate assessment of the current condition. RBE can also be used as an action support tool, providing guidance on appropriate corrective measures for certain situations. Rule Based Evaluation is an excellent tool in Production Integrated Maintenance (PIM).

### Flexible Condition Evaluation

Flexible criteria is a very powerful feature for machinery running under variable operating conditions, such as shifts in load, rpm, pressure or temperature, e.g. extruders in chemical industries. It enables the setup of various condition evaluation schemes, taking different operating conditions into account.

### Symptoms

Symptom values are used for trending purposes and a large number of pre-programmed symptoms make it easy to pinpoint machine fault signatures such as gear mesh, imbalance or misalignment in spectrum graphs. Alarms may be set on individual symptom values or trends and are triggered in ample time for planned maintenance activities.

### Trending

Trending options make it easy to observe changing operating condition. Readings may be averaged to further simplify analysis and spectra from individual measuring points can be compared in various ways, e.g. in band alarms. Trending of symptom values presents graphs of evaluated condition and reduces the need to study spectra and time signals.

## Condition Monitoring on Your Terms

Implementing Intellinova is easy. The reward is easily accessible, live condition information, delivered how and where you want it.

### Powerful Software for Overview and Control

Condmaster®Nova collects and stores measuring results delivered from all SPM measuring devices, handheld and online, for evaluation and presentation. The software is modular and system functionality can be tailored to your specific needs.

Condmaster®Nova has a user friendly Microsoft®Windows interface, enabling users to quickly move around in the system and navigate from measurement data to alarms to spectrums etc. This advanced software also features a new and improved measuring point register, new alarm management and unrivalled language support, covering some fifteen languages. The software contains an extensive bearing catalogue and evaluation models for shock, vibration and lubrication analysis. Green – yellow – red colour coding applied at every level, from plant to individual measuring point, enables fast overview.

### OPC™ Data Access

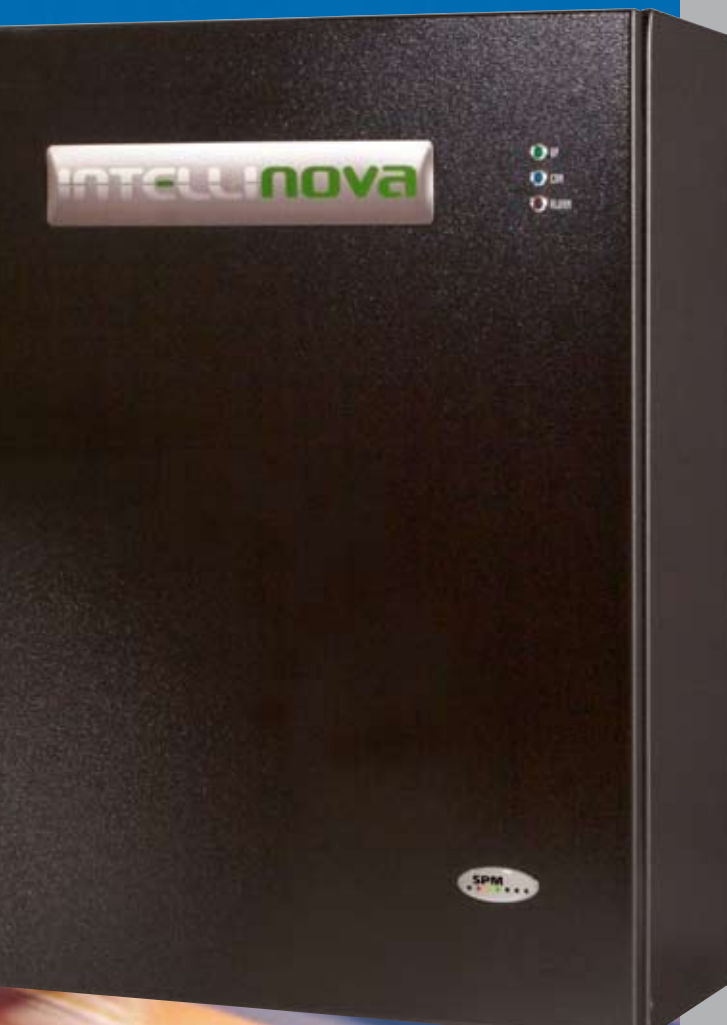
Intellinova implements OPC Data Access, through which data can be transferred from Intellinova to any OPC compliant application. Continuously or upon request, the Intellinova OPC server communicates real-time measurement data to your PLC, DCS or SCADA system, your databases or spreadsheets. Intersystem communication in industrial automation has never been easier.

### Web Access and SMS

Up-to-date information on the health of critical machinery can be sent to the appropriate maintenance personnel via SMS or e-mail. A web module supplies Condmaster®Nova access via Internet, simplifying for maintenance staff to access detailed condition information.



$$\frac{1}{2} a_0 + \sum_{n=1}^{\infty} \left( a_n + \frac{b_n}{2i} \right) e^{in\theta}$$



## SPM Product Compatibility

Intellinova is compatible with other SPM systems and portable equipment and may therefore be integrated with existing solutions, sharing the same database.

## Wireless Ethernet

The system communicates via TCP/IP over standard Ethernet connection and can be connected to an existing local area network (LAN). As the Intellinova units operate independently, any number may be installed.

## LinX and FSS

The system communication software LinX is dedicated to triggering, controlling and filtering measurements and data. LinX handles all messages between the database and one or more Intellinova units. The Field Service Software (FSS), offering advanced field service and support capabilities, makes Intellinova a robust and maintenance friendly system. FSS is also the graphical user interface to LinX.

## IntelliCheck

IntelliCheck is a system self-diagnostic feature that checks the system functionality and transducer lines automatically for malfunctions.

## Alarm Export

User selected alarms can be exported to e.g. CMMS systems as text files or SQL database tables. They are then locked from deletion in Condmaster®Nova until a message from the receiving system deletes the alarm and sets a comment on the Condmaster®Nova measuring point stating what has been done.

## Reliability In a Box

At the heart of Intellinova is the Commander Unit, carefully architected to fit the given task.

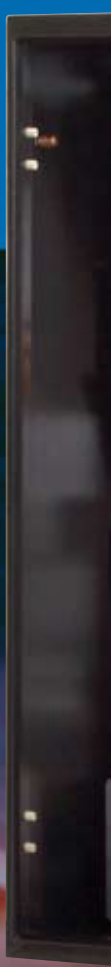
The Commander Unit controls and communicates with the plugged-in monitoring units, accommodating up to 32 channels for shock pulse or vibration measurement. It may also be equipped with monitoring units for analog signals in or out. Four rpm inputs and four digital status outputs are standard equipment.

A powerful Digital Signal Processor (DSP) enables very fast measurement and signal conditioning, yielding extremely high levels of accuracy and repeatability.

The Commander and monitoring units are connected to the diagnostic software Condmaster®Nova, where channel configuration and measuring technique selection are also done. The Commander Unit may be used offline or connected to Condmaster®Nova. When used offline, SPM will supply Intellinova configuration as requested. An SD memory card on board the unit is used for backup and buffering of measurement data, guaranteeing no data loss in case of network errors.







$$\sum_{n=1}^{\infty} \frac{1}{2^n} a_n + \sum_{n=1}^{\infty} \frac{b_n}{2^n} e^{i n \theta}$$

# Reliability Driven by Technology





## Reliability Driven by Technology

Cost efficient and well-proven measuring techniques detect common machine problems and can be combined as required.

### Bearing Monitoring Unit

The Bearing Monitoring Unit measures shock pulses according to the True Shock Pulse Method® and supports SPM Spectrum™ for bearing analysis.

### Vibration Monitoring Unit

The Vibration Monitoring Unit supports broad band measurement according to ISO 2372 and ISO 10816. It also handles FFT with symptoms and EVAM® (Evaluated Vibration Analysis Method), including enveloping, time synchronous averaging and two-channel simultaneous vibration measurement. Orbit analysis and run up/coast down measurement are also features of this multifunctional monitoring unit.

### Analog Monitoring Unit

The Analog Monitoring Unit is used for continuous monitoring of analog signals.

### Analog Output Unit

The Analog Output Unit converts digital measurement values into 4-20 mA analog signals for use by DCS, SCADA or other process control systems.



## Reliable Methods for Every Application

Where there is a problem, there is a solution. The measuring methods in Intellinova enable an application-centered approach – combine them as required to create the perfect monitoring system for your machinery. Intellinova is a work-horse, appropriate for the vast majority of standard and high-demand applications. Below are but a couple of examples where Intellinova is the ideal condition monitoring solution.

### Container Cranes

Condition monitoring on container cranes is complicated. To obtain reliable readings, consistency is of the essence. Measurements need to be carried out at very specific moments in time, when conditions for load, rpm, rotational direction and trolley travelling direction etc. are met. Typically, the True Shock Pulse Method® and SPM Spectrum™ is used for condition measurement and analysis of the gear box and crane motor bearings, usually in combination with vibration measurements.

The True Shock Pulse Method examines the mechanical state and lubrication condition of rolling element bearings, detecting problems such as installation faults and poor lubrication. SPM Spectrum uses FFT analysis and enveloping to efficiently verify the source of high shock pulse readings, such as bearings, damaged gears or disturbance like metallic clatter or scraping.

### Wind Turbines

Wind turbines are particularly exposed when it comes to vibration and disturbances. Variable operating conditions, such as wind velocity, power generation, rpm, temperature etc. affect measuring results as well as condition evaluation. This requires the possibility to adjust alarm levels to the current situation. Intellinova handles such fluctuations with great precision. A typical windmill setup involves shock pulse measurement with SPM Spectrum on gear boxes and on generator and main shaft bearings. To detect misalignment, unbalance, loose parts and other common vibration symptoms, supplementary measurements with EVAM® (Evaluated Vibration Analysis Method) can be implemented.

With access to machine specific data and information on the vibration behaviour of the machine under normal



operating condition, EVAM is a sophisticated analysis tool for verifying the root cause of vibration problems.

### **Two-channel Simultaneous Vibration Monitoring**

With two channel simultaneous vibration measurement, machine movement can be studied in two dimensions, observing the difference between the phase angles measured on the two channels. Two-channel measurements can be used to diagnose problems such as misalignment, imbalance and structural looseness.

Condmaster®Nova displays the RMS values for DISP, VEL and ACC for the two channels, respectively. For each measurement, three graphs are available: spectrum, phase spectrum and time signal.

### **Orbit Analysis**

Orbit analysis is a tool used to detect failures like rubs, unbalance, misalignment or oil whip in journal bearing machines. Simultaneous measurement with two vibration transducers supplies a descriptive graph of the shaft centerline movements.

### **Run up/Coast down**

Run up/coast down measurement is a method for diagnosing and solving resonance problems. It records the changes in vibration while the machine is run up to operating speed or after it has been shut off and is slowing down. This root cause analysis tool shows machine frame vibration characteristics, resonance frequencies and the reaction at critical speeds. Results can be displayed as waterfall, Nyquist or Bode diagrams.



## Try a New Management Strategy

Condition monitoring is a management strategy for coping with a highly competitive industrial economy. Over time, condition monitoring will dramatically reduce maintenance costs and have a significant influence on productivity.

### Benefits of Condition Monitoring

With Intellinova, the full potential of condition monitoring is realized. You will have full control of the state of your plant assets. You can quickly assess the current condition of important machinery and plan for overhauls and necessary replacements to be made during scheduled stops.

A planned stop is normally at least three times faster at a third of the cost. The potential benefits are clear and tangible:

- Reduced need for emergency stock of spare parts
- More efficient use of machinery and man hours
- Reduction of catastrophic failures
- Increased production output

Against this backdrop, an online condition monitoring system will quickly earn its keep.

### Plant Performer™ Decision Support

For a clear view of your operations and more efficient decision-making, statistical data can be pulled from the system with the Plant Performer module in Condmaster®Nova.

Plant Performer enables strategic analysis of the economical impact of maintenance. It visualizes the scope of the condition monitoring program, providing a statistical overview of monitored equipment. The information is presented in easily understood pie or bar charts. Statistical assignments are user defined and may include database or machine condition statistics and technical Key Performance Indicators, such as:

- Overall vibration for a department or a machine type
- Loss of contribution due to production downtime
- Operating condition for all electrical motors

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