MODEL-BASED VOLTAGE & CURRENT SYSTEMS
SENSOR-TO-RECOMMENDATION AUTONOMY
RUL REPAIR/REPLACE DECISION SUPPORT
INTEGRATED FAILURE MANAGEMENT

S200 Switchroom Mounted Condition Monitoring, Energy Monitoring and Energy Optimization System

Signar, LLC Plymouth Meeting PA USA
info@signar.com 267-632-6303 www.signar.com

Monitor your energy consumption and equipment condition 24x7 with the Faraday Predictive S200 system, and enable Condition-Based Maintenance in your organisation.

Designed to be mounted inside your motor starter cabinet, the S200 provides you with a continuous, 24x7, assessment of your equipment health including mechanical, electrical and operational aspects, using a Model-Based Voltage and Current (MBVI) technique.

By simply measuring the voltage and current drawn by the motor driving your equipment it can identify a wide range of specific failure modes, and assess the degree to which the equipment is suffering from these effects.

It also measures energy consumption and identifies a range of energy wasting parameters, assessing the amount of energy wasted by each one, allowing you to take cost-justified action to reduce energy consumption. Faults identified include:

- Mechanical Unbalance/misalignment
- Bearing problems
- Foundation looseness
- Transmission looseness or rubbing
- Motor rotor bars
- Motor stator problems
- Electrical odd harmonics
- Electrical even harmonics
- Any other spectrum peak beyond the normal expected values

In addition it provides information on the electrical parameters including:

- Active power, reactive power and power factor
- Voltage balance
- Current balance
- Voltage THD
- Current THD

If more detailed machine specific information is available, such as individual bearing type codes, the number of vanes on a pump, or the ratios of transmission systems, then the system will automatically identify any problems associated with these, and report on them specifically. But if you don't have this information, the unit will still function well using generic fault parameters instead.

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The Faraday Predictive S200 series of Permanently installed condition and energy monitoring units

What is it?

The S200 is a compact unit, approx. 100mm x 80mm x 75mm, designed to fit inside your electrical cabinets. It measures the voltage and current drawn by the motor, and from this is able to identify a wide range of developing faults in the motor and/or the driven equipment. It also monitors power consumption, and assesses the energy being wasted by each developing fault, allowing you to create a cost-benefit case for intervention based on energy saving grounds.

Why do I want it?

To give you a continuous assessment of the condition of your equipment, allowing you to keep a close eye on critical equipment, avoid doing unnecessary maintenance work, and avoiding unexpected breakdowns. The S200 can help you plan and schedule work efficiently.

It can also help you to optimise energy consumption on your equipment.

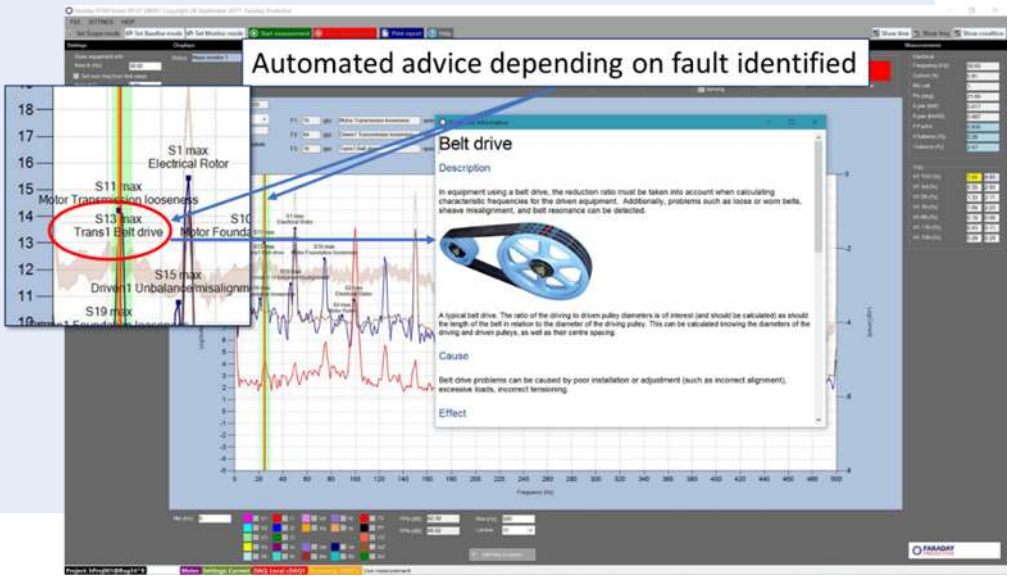
How do I use it? / How and where is it installed

The S200 is installed either right inside your motor starter cabinet if there is sufficient space, or in an adjacent or nearby electrical compartment or cabinet if your switchgear is particularly compact. The unit comes with Current Transformers to measure the current drawn by the motor, which can be mounted either directly on the feeds to the motor, or on the secondary signal cables from existing CTs feeding the motor protection system where fitted. Each unit has its own local processing unit and local database, which in turn communicates via Ethernet to a central database, allowing you to view the status of the equipment remotely.

What outputs will it give me / How and where do I see the answers

The outputs from each unit are viewed via the Faraday Predictive B20 software system, which pulls together the data from all the S200 units you have installed, allowing you to view them in one place. The system gives overviews of condition on one or all of your assets, provides alerts if faults are detected, provides trend graphs showing the progress of deterioration, and provides an overview of the condition of the equipment itself, and of the electricity supply. It also provides a forecast of overall condition for one month and three months into the future. For each fault identified, it will provide information on the nature of the fault, how and why the system has identified it, the likely impact of the fault, and the recommended corrective action. Specifically you can view:

- Overviews of condition of all assets (tree structure and summary)
- Overview of condition of individual asset – showing status of each relevant fault category for this type of equipment, and the quality of the electricity supply
- Simple traffic light (Green-Amber-Red) assessment of equipment condition now, 1 month in future and 3 months in future
- Trend plots for each developing fault, and for each available parameter (eg active power consumption, or supply frequency)
- Time-domain plots of actual voltage and current waveforms.
- Frequency domain plots of the fault energy spectrum, with automatic identification and labelling of significant peaks in the spectrum



This information can be viewed on your desktop PC, or a tablet or mobile phone, provided they can be connected to the network where the software is mounted, which can be either on your network server or on our cloud server. In this case, you can view all the data via browser, avoiding the need to install special software on your own network at all, and simplifying the IT aspects of the installation.

How can diagnostic support be provided

The units are designed to provide easy to understand outputs, however there is a wealth of information available, and in-depth interpretation of the data can provide much greater insights into the behaviour of your equipment, allowing better decisions on the best course of action. Faraday Predictive provide training courses for you and your staff, which can be tailored to your specific requirements (eg for shop floor staff who are looking at the equipment, or for maintenance planners, or for reliability engineers looking for the ultimate in analysis and interpretation). Typical training courses for diagnostic staff are two days.

In addition, Faraday Predictive can also provide diagnostic support via our support contracts, which give you regular reports and feedback on the condition of your equipment with recommendations on the best course of action.

What faults does it detect?

The table below shows the standard fault types that can be recognised by the S200.

- ***Generic*** faults are those that are detected when there is no special information entered about the equipment apart from its nominal voltage, nominal current and nominal rotational speed.
- ***Specific*** faults are those that can be identified when the appropriate information has been entered into the system – typically, rotating element bearing type code numbers, number of vanes on a pump or fan impeller, and the numbers of teeth on each gear in a gearbox, or the pulley diameters and separation distance for belt drives.

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Fault type	Equipment type: Motor specific	Motor generic	Generator specific	Generator generic	Top 6 KPI: Motor Fault	Electrical Supply problems	Mechanical Rotating Fault	Mechanical Static Fault	Operational Fault inc Blocked Filter	Other
Electrical Rotor	x	x	x	x	Motor Fault					
Electrical Stator	x	x	x	x	Motor Fault					
Electrical Odd Harmonics	x	x	x	x		Electrical Supply problems				
Electrical Even Harmonics	x	x	x	x		Electrical Supply problems				
Motor Rotor Bars	x	x	x	x	Motor Fault					
Motor Unbalance/Misalignment	x		x							
Generic unbalance / misalignment		x		x						
Motor Bearing 1	x		x							
Motor Bearing 2	x		x							
Motor Journal 1	x		x							
Generic Bearing		x		x						
Motor Foundation / Looseness	x		x							
Generic Foundation / Looseness		x		x						
Motor Transmission Looseness	x		x							
Generic Transmission Looseness		x		x						
Motor Resonance	x		x							
Trans 1 Belt Drive	x		x							
Trans 1 Gearbox	x		x							
Driven 1 Unbalance / Misalignment	x		x							
Driven 1 Bearing 1	x		x							
Driven 1 Bearing 2	x		x							
Driven 1 Journal 1	x		x							
Driven 1 Foundation Looseness	x		x							
Driven 1 Transmission Looseness	x		x							
Driven 1 Resonance	x		x							
Driven 1 Impeller 1	x		x							
Trans 2 Belt Drive	x		x							
Trans 2 Gearbox	x		x							
Driven 2 Unbalance / Misalignment	x		x							
Driven 2 Bearing 1	x		x							
Driven 2 Bearing 2	x		x							
Driven 2 Journal 1	x		x							
Driven 2 Foundation Looseness	x		x							
Driven 2 Transmission Looseness	x		x							
Driven 2 Resonance	x		x							
Driven 2 Impeller 1	x		x							
Power Factor	x	x	x	x						
Voltage Balance	x	x	x	x		Electrical Supply problems				
Current Balance	x	x	x	x		Electrical Supply problems				
Voltage THD	x	x	x	x		Electrical Supply problems				
Current THD	x	x	x	x		Electrical Supply problems				
Active Power: Nominal Power										
Any other spectral fault with Peak exceeding zone of goodness										

Further fault types can be identified by expert analysis of the spectral outputs.

What's in the box?

- S200 unit
- Current Transformers (LV) as required complete with cables and connectors to plug in to S200 unit
- Voltage tapping signal cables with special connector terminals to fit S200 inputs
- Power supply 100-240vAC – 5vDC
- Power connecting cables – 5V barrel and 240v IEC7 connectors

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