PROGNOST®-SILver

SIL 3 Machine Protection for Rotating Equipment

Meets your needs – for all machinery

*PROGNOST®-SILver is a flexible and fast platform for
integrated asset protection. It offers everything operators
and instrumentation professionals call for:*

*condition monitoring - machine protection - diagnostic based
SIL 3 certified emergency shutdown device*

All this in one rack

PROGNOST®-SILver Protection Analyses

PROGNOST®-SILver comes with the DNA of millions

of monitored operating hours of reciprocating

compressors based on specialized analyses.
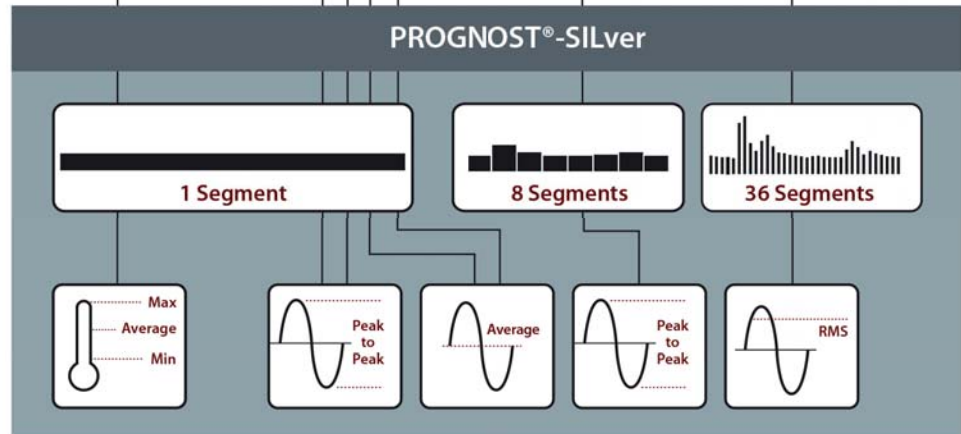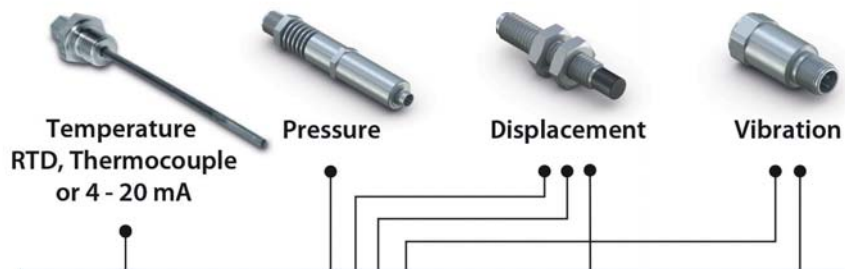
PROGNOST®-SILver for signal acquisition and SIL 3 Machine Protection of all Rotating Equipment
This system is designed to provide machinery protection while maximizing production uptime. This hardware incorporates a smart modular concept that enables you to gradually replace or expand your existing system for additional protection tasks. It also allows users of previous PROGNOST®-SILver racks to re-use their existing PROGNOST® input cards.

Focus on reciprocating equipment
Reliable monitoring of reciprocating machinery faces a list of challenges. PROGNOST Systems started to create dedicated solutions 30 years ago with the invention of the, still today, industry standard of segmented signal analyses. PROGNOST®-SILver comes with the DNA of millions of monitored operating hours of reciprocating compressors based on specialized analyses. Signal plausibility checks, proven reliable monitoring, and protection analyses guarantee no false trips and no missed detects.

Segmented vibration analyses for reciprocating compressors
PROGNOST Systems invented segmented vibration analysis and determined that the best approach is to subdivide the 360° of one revolution into 36 segments of 10° crank angle each. This is the most accurate proportion of an average impact width related to one revolution.

Crosshead slide: RMS vibration in 36 segments
Crosshead slide vibrations provide information about machine integrity. Reciprocating machinery has specific vibration characteristics that need to be factored in to avoid false alarms. Vibration signals must be evaluated using the most accurate analysis. For reciprocating machinery, only RMS (Root Mean Square) analysis has proven reliable because it considers not only amplitude, but also the energy content, of an impact.

Piston rod position: Peak-to-Peak in 8 segments
The piston rod position is monitored and analyzed in 45° crank angle increments of every revolution to detect critical conditions of the piston rod and packing. A transfer of the average piston rod position to the DCS for rider ring monitoring is also available at the same time.
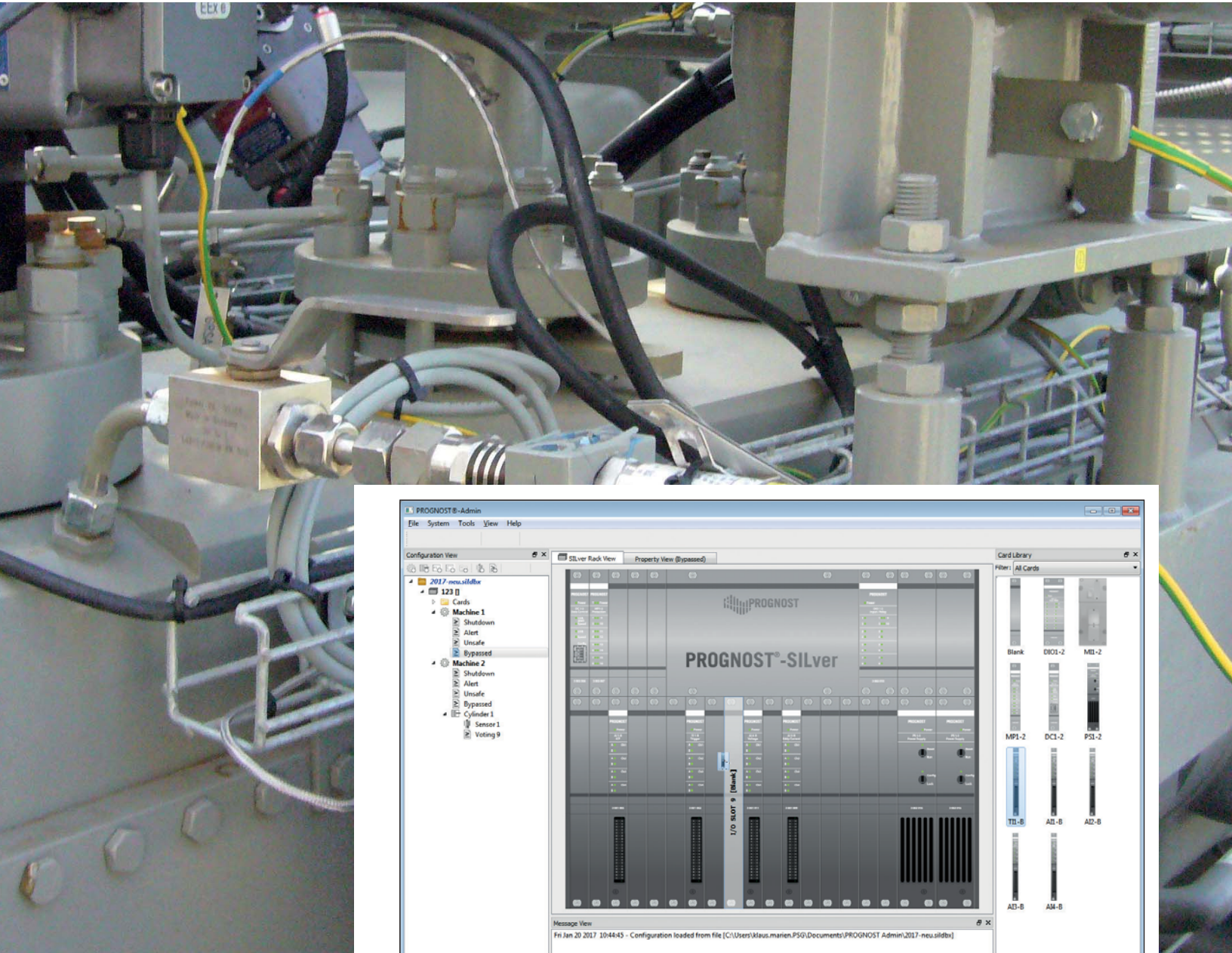
Further analyses
• Plunger position peak-to-peak
• Gap protection
• Cylinder pressure peak-to-peak (differential pressures)
• Radial shaft vibration peak-to-peak
• Axial shaft position peak and average
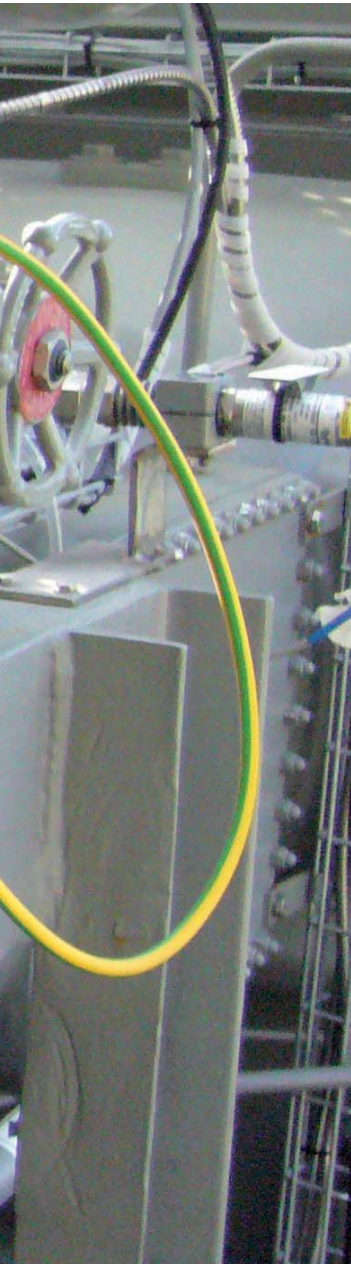• Vibration RMS and peak
• Temperature average

Broad certification of PROGNOST®-SILver
Meeting the latest and most rigorous industry standards provides neutral, third-party confirmation of our product performance promise. PROGNOST®-SILver holds, besides others, the following certificates: IEC61508:2010 (SIL 3), ATEX, IECEx, US/CSA, KOSHA, GOST-R-Ex. The number of certificates grows steadily; please refer to our website to see the full list.

Configuration Features

User-friendly rack configuration with PROGNOST®-Admin

- User friendly, self-explaining, intuitive usage
- Dedicated configuration rights avoid unauthorized access
- Configuration secured by hardware lock and password
- Drag and drop configuration of machines, sensors, cards, analyses, voting logic, and much more.

SIL 3-certified voting logic

PROGNOST®-SILver offers an unparalleled variety of voting options. PROGNOST®-Admin, the easy to use hardware configuration tool included with the system, allows you to use simple drag and drop features to set up highly sophisticated, multi-level voting schemes.

- Voting configuration with pre defined functional blocks
- Alarm logic up to five logic levels
- Voting options: 1 out of X, 2 out of X, all out of X and exactly 1 out of X
- Voting results can factor into other voting groups
- Voting logic triggers relay outputs
- Alarm logic can factor in any status value (e.g. sensor, signal, analyses, digital input, voting results)
- Bypass on machine and sensor level

Seamless integration of existing instrumentation

Sensors and wiring are costly components of monitoring system retrofits or expansions. PROGNOST®-SILver is flexible enough to allow you to use existing sensors and save money.
The possibility to mix Exi and Non-Ex signals (e.g. motor winding temperatures or motor current signals) in one protection rack, without the need for barriers, yields the highest cost efficiency.
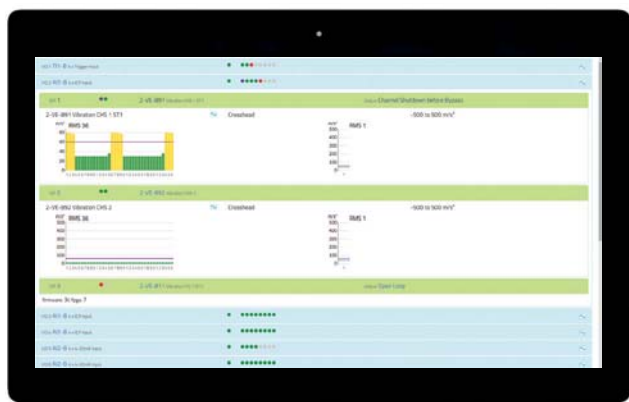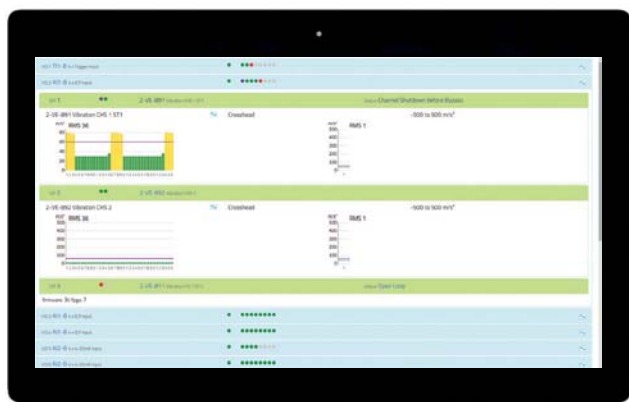
National and international naming

The multilingual approaches of PROGNOST®-SILver, as well as PROGNOST®-Admin, allows the naming of machines, components, TAGs, loops, etc., in almost any language.

Individual analysis period setting

Different machines require different settings. PROGNOST®-SILver can be configured so that all analyses perfectly match individual machine requirements.

Technical upgrades exhibit all the advantages of our ongoing product development initiatives. On this page, we will introduce you to important innovations and enhancements which will help you carry out your monitoring tasks faster and more efficiently.

Integrated Display (PROGNOST®-DP1-2) for PROGNOST®-SILver

The integrated display allows quick access to relevant data of the PROGNOST®-SILver system. It is mounted in the top center section of the rack. The PROGNOST®-SILver status page is displayed on the screen to have real-time information where you need it.

Benefits

- Display of relevant data of the PROGNOST®-SILver system
- Real-time local machinery status information readily available from the enclosure including field sensor and loop failures for system health checks
- Drill-down feature allows users to access additional details about each tag directly from the touch screen display
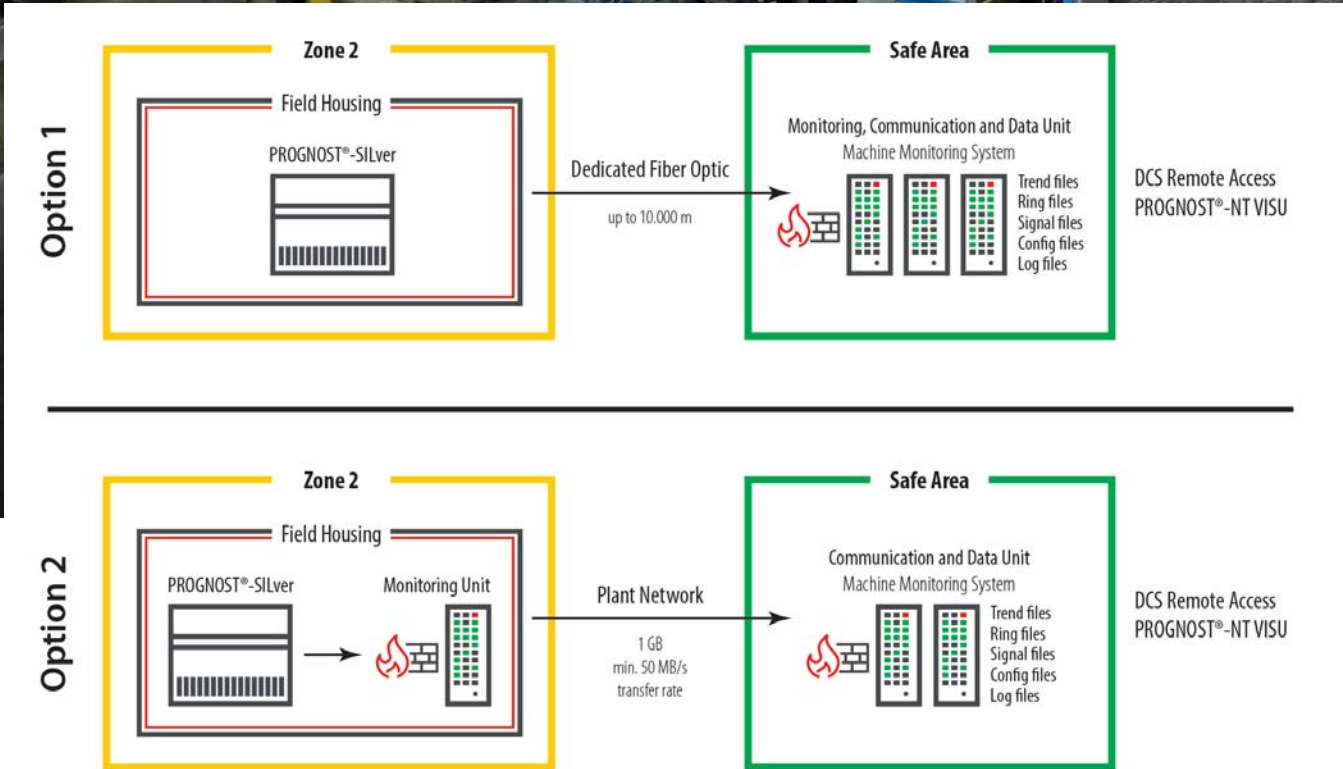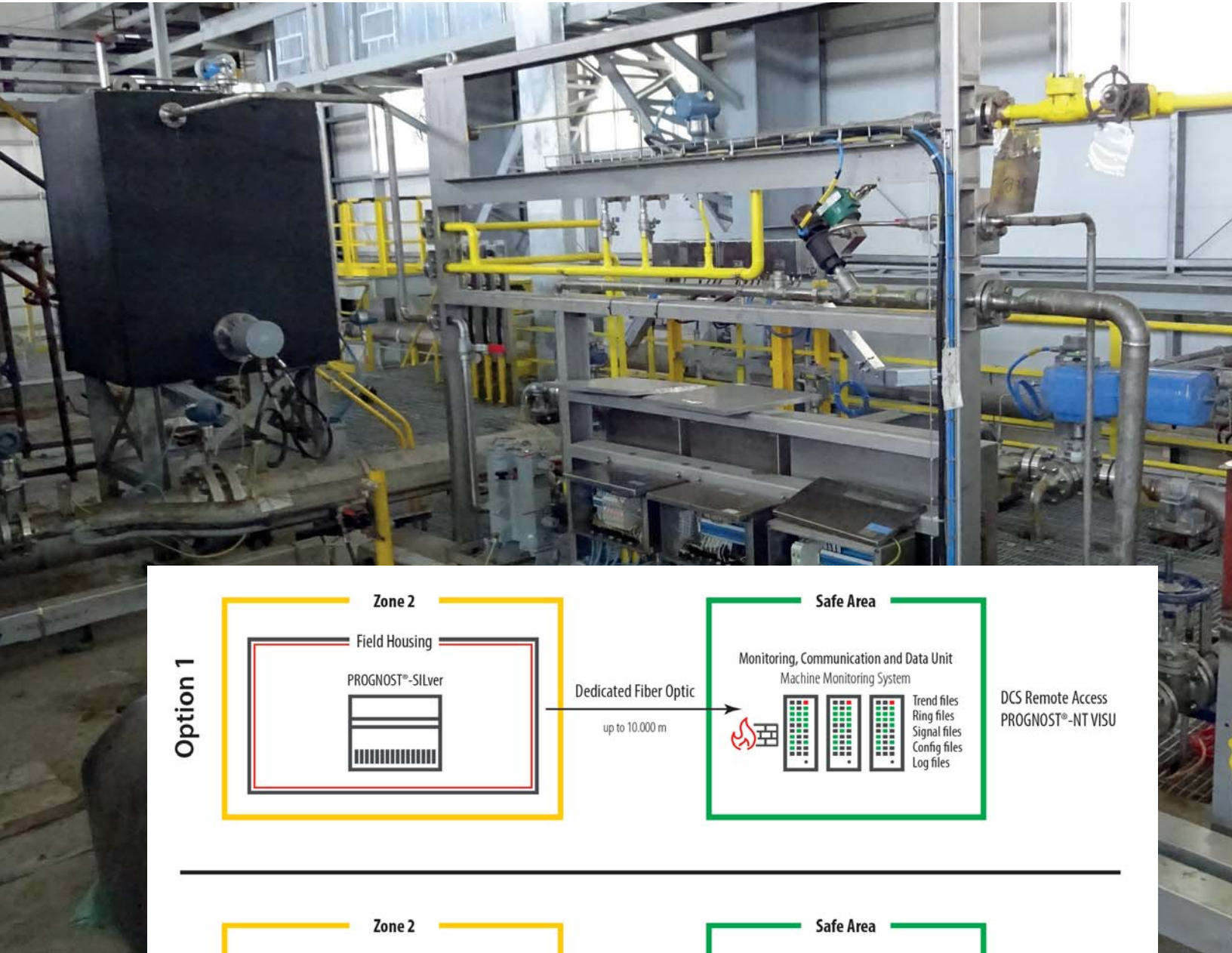
Display Options

- PROGNOST®-SILver rack: Name and serial number
- Power supply PS1-2: LED status, current position of configuration switch, output voltage
- Data communication card DC1-2: LED status, serial number, firmware version
- Input cards TI/AI1-4/AI6-2: Type of card, rack slot and channel position, loop description, TAG number, LED channel status (open loop, short cut, etc.), LED status, sensor orientation, min. max. measuring range, analyses 1 type, analyses 2 type, signal bar graph for each segment (8 and 36), alert and shutdown limits for each segment (8 and 36), alert and shutdown limits for one segmented analyses, firmware version, serial number.
- Machine protection card MP1-2: LED status, machine LED status (alert, shutdown, unsafe, bypassed etc.), machine status, system temperature information, firmware version, serial number

- Digital Input/Output card DIO1-2: Rack slot position, LED status, LED input and output status, I/O description, I/O TAG number, configured status (failure, latching condition), firmware version, serial number

Technical Data

- Industrial fan-less HMI Touch Screen
- Display size: 7"
- Independent power supply
- All connection plugs are on the back of the display for ease of integration
- Embedded OS Ubuntu 18.04
- Degree of protection: IP54 (front), IP20 (back)
- Ambient temperature (operation): 0 °C … 50 °C

Software Maintenance and Upgrade

Option 1

Zone 2	Safe Area
Field Housing	**Monitoring, Communication and Data Unit**
PROGNOST®-SILver	Machine Monitoring System

Dedicated Fiber Optic
up to 10.000 m

Trend files
Ring files
Signal files
Config files
Log files

DCS Remote Access
PROGNOST®-NT VISU

Option 2

Zone 2	Safe Area
Field Housing	**Communication and Data Unit**
PROGNOST®-SILver Monitoring Unit	Machine Monitoring System

Plant Network
1 GB
min. 50 MB/s
transfer rate

Trend files
Ring files
Signal files
Config files
Log files

DCS Remote Access
PROGNOST®-NT VISU

Significantly reduced project costs

Field data digitization and significantly reducing wiring costs is now possible by placing the PROG-NOST-SILver rack into the hazardous area close to the asset monitored. (i.e. Zone 2; Class 1 Division 2). Not only does this lower the cost per loop, but also eliminates the need for free standing cabinets in precious controlled environment. For max. 45°C (113 °F) ambient temperature PROGNOST®-SILver installed inside the certified field enclosure can be operated in hazardous area even without cooling (see different options available).

Direct and short sensor wiring to the PROGNOST®-SILver field enclosure combined with Ethernet and fibre optics to the one central communication unit allows for the most powerful, yet cost effective plantwide monitoring solution resulting into SIL certified machinery protection with gapless, high resolution data available at all times.

30 relay outputs with SIL 3 certification

The sole task of machine protection systems (MPS) is to avoid major secondary damage. In case of demand, the MPS must shutdown your machine reliably. To execute alarms, PROGNOST®-SILver can accomodate up to 3 DIO cards with 30 SIL 3 certified relay outputs on board which can be individually assigned to any ALERT, SHUTDOWN, UNSAFE status or voting logic output of the system.

With PROGNOST®-SILver, you do not need an additional ESD or Safety PLC since all relays are on board and certified for operation in Zone 2.

Digital inputs for signal processing from the DCS

PROGNOST®-SILver takes in up to 24 digital inputs from the DCS system. This enables the system to trigger commands such as "Bypass machine" or "Bypass channel", as well as "Reset shutdown inputs". You get maximum flexibility without compromising SIL compliance during all machine operation situations.

**Intrinsically safe channels in 17 slots**

PROGNOST®-SILver is the only protection hardware that offers 68 safe and SIL-certified inputs (mix of intrinsically safe (IS) and none intrinsically safe loops possible). A single PROGNOST® rack takes in signals from extensive instrumented production assets or from various machines in parallel. For you, this means both large capacity and high cost-efficiency.

No barriers required

PROGNOST®-SILver has intrinsically safe Exi inputs on board for all channels. The Galvanic isolation per channel provides high interference resistance.

Data recording for root cause analyses
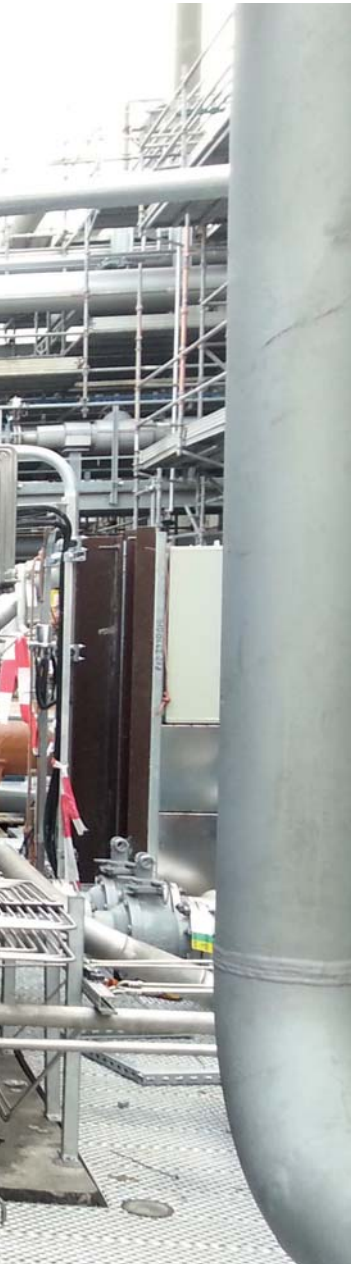
Signal analyses after emergency shutdown
While critical machines usually demand a full condition monitoring system, such as PROGNOST®-NT, less critical machines in many cases only call for a machine protection system.

But what happens after the protection device initiated a shutdown?
*How can you determine the root cause of the problem?*

Users of PROGNOST®-SILver get the answers from diagnostic specialists. Support is available on demand in case of an emergency shutdown or any other operation-critical situation. This unique

service requires an optionally available recording function. After retrieving data from the affected machine, the PROGNOST Customer Support team will communicate initial findings and, if requested, follow with a written report including detailed conclusions.

This meaningful failure analysis is based on:
- Ring buffer with transient recordings of all online signals before and during the shutdown Trends of the monitored parameters, and
- A protocol with all status information such as alarms per machine, per sensor, and per PROGNOST®-SILver card
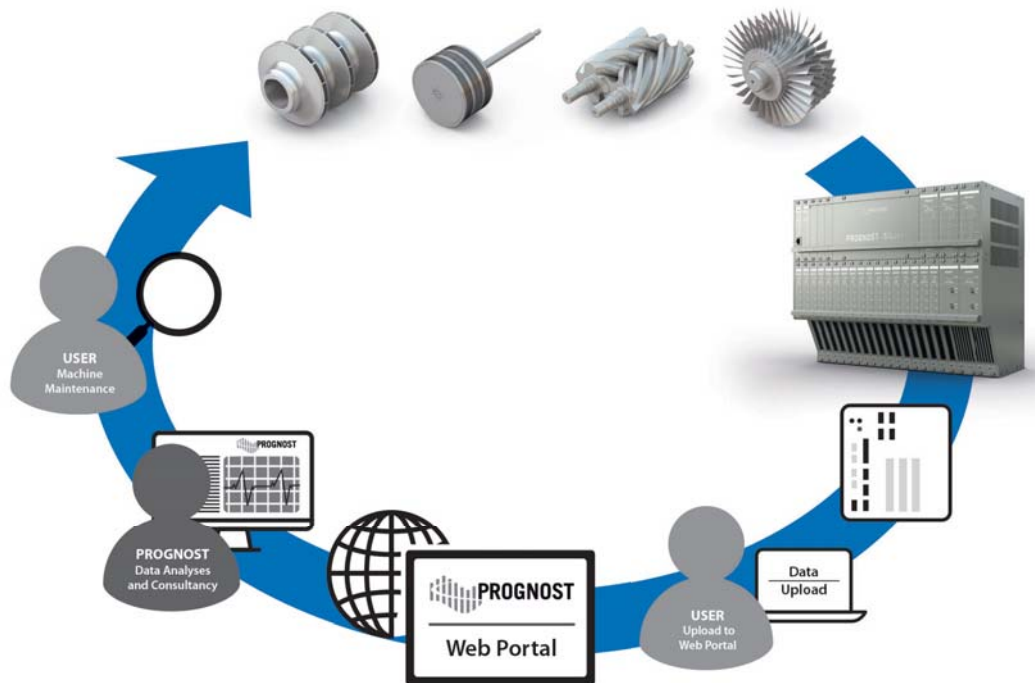
Development and production of the worlds´ best Online Monitoring Systems for Predictive Maintenance

PROGNOST Systems offers intelligent monitoring systems for Rotating Equipment, especially for reciprocating compressors and gearboxes, of extruder trains. Our solutions include automated machinery diagnostics, SIL-certified machine protection and performance monitoring. Especially developed solutions for Predictive Maintenance of reciprocating and centrifugal machinery detect impending failures very early and assign the affected components. Operation-critical damages are avoided and maintenance measures can be performed efficiently.

Our customers are excited about the possibilities to diagnose failures at their machinery and to get a user-friendly tool at the same time which enables them to move from preventive to Predictive Maintenance procedures. The PROGNOST Customer Support is sharing its 30 years experience as a email or phone 10/5 to 24/7 service. Our global Sales and Services network in 40 countries provides timely responses to any question and requirement – in your timezone and your local language.

We personally support all PROGNOST® users for reaching their ultimate goal:

Reliable protection and monitoring of Rotating Equipment

Your PROGNOST Systems Team

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