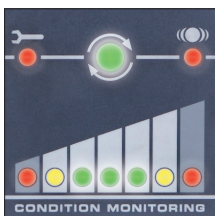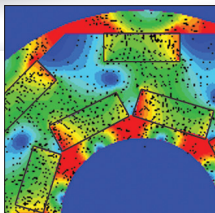# Richter SAFERUN®

Pump condition monitoring to ATEX

NEW
TABLET APP

Speed-independent
performance monitoring

SIL1 certified

Integrated explosion protection

Temperature monitoring

Evaluation by tablet / PC

RICHTER
Process Pumps & Valves

IDEX
FLUID & METERING

Condition monitoring with integrated explosion protection for MNK magnetic drive pumps

The SAFERUN® pump monitoring system continuously monitors and meters the operating data of the MNK magnetic drive pump.

SAFERUN® consists of two components, the SAFERUN® CMS-T transducer and the SAFERUN® CMS-S can system.

The sensors integrated in the can measure torque, power, speed and temperature during operation. They are protected in the double can, so that a selection of the probe tip material can be dispensed with in case of aggressive fluids.

The current operating point is displayed by the SAFERUN® transducer with traffic-light LEDs as installed. The metering and operating data are also saved in a data memory (history log) for later analysis. Other pump-specific data, e.g. the operating hour counter, can be displayed by a Tablet PC. SAFERUN® is completely assembled and parameterised for the respective pump at the Richter factory.

Function

The pump performance is compared with the curve at the current speed, and the pump condition is displayed by traffic-light LEDs, the output by a 4-20 mA signal.

All the measurements can also be indicated via HART®. The HART® signals can be converted in up to 3 analog outs 4-20 mA by means of a loop converter installed in the control cabinet.

When SAFERUN® is used as a temperature monitor to ATEX standard, the temperature instead of the performance can be displayed as a 4-20 mA signal.

All the operating data is also stored in the history log by the SAFERUN® transducer, and is also available without power.

Customer benefits

- Integrated explosion protection by SIL1-certified performance and temperature monitor – no additional sensors are required for constant fluid properties

- Transparency on site thanks to the traffic-light LED display at the current pump operating point directly at the pump

- Increased plant availability, monitoring of operating conditions and avoidance of unplanned cost/outages (e.g. because of drive stoppage)

- Cost benefits by avoiding wet sensor technology as the SAFERUN® sensor is integrated in the double can

The SAFERUN® pump monitoring system
① SAFERUN® CMS-T transducer
② SAFERUN® CMS-S can system
③ Sensor cable connects can system and transducer
④ Intrinsically safe power supply
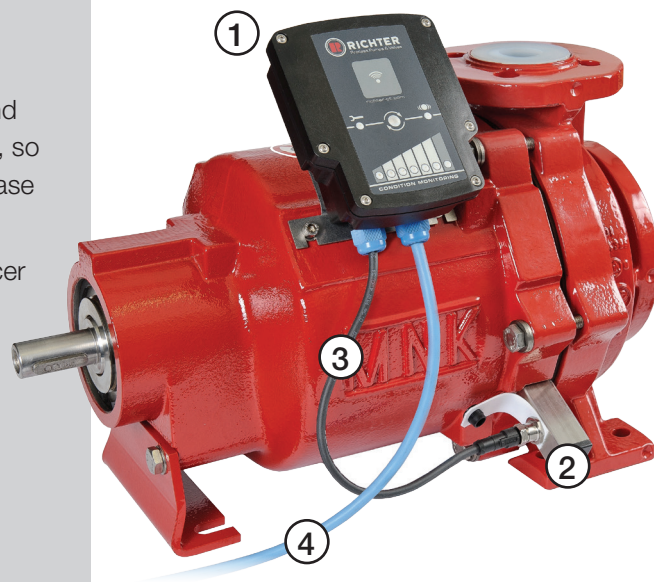
Parameterisation
SAFERUN® is parameterised at Richter with the fluid data from the pump data sheet, and is immediately ready for operation on site. If the pump is used for a process with fluctuating fluid properties, it can be simply parameterised again using the tablet after the initial run-in phase.

① SAFERUN® transducer CMS-T
② SAFERUN® holder
③ SAFERUN® RFID Head

Speed-independent performance monitoring by speed-dependent factory parametrisation
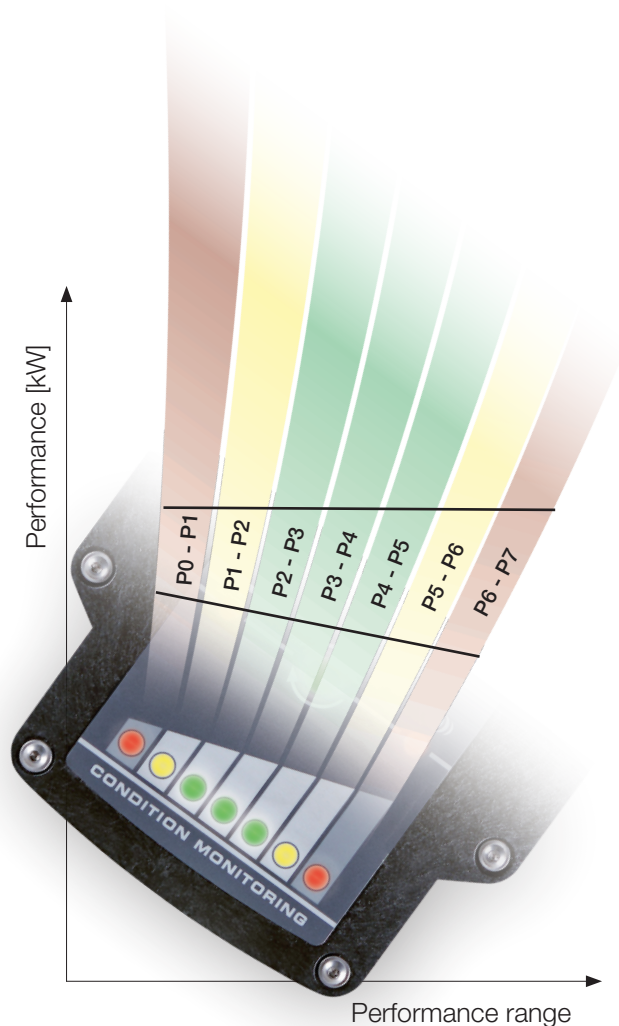
The advantage for the customer as against a conventional motor load monitor is that the specific pump performance curve and the fluid data are saved in SAFERUN®. Consequently an assessment can be made of the pump's performance range independently of the speed.

Conti mode / Constant density

The power consumption of centrifugal pumps is proportional to the density. The pump monitoring runs based on the water performance curve under consideration of the SAFERUN-stored density references.

Batch mode / Variable density and viscosity

During the start up the pump is repeatedly run through the whole batch. Stored operating points are plotted in the SAFERUN® app. The user adjusts the operating limits to the speed-torque characteristic of the batch process. The operator's settings are the optimal pump protection. Also in this mode the system works for different speeds.

SAFERUN®-Transducer CMS-T

RFID

Service message

Operation display

Load changes/ drive stoppage

Min. delivery rate undercut

Safe operating range

Max. delivering rate exceeded

Options
- 5 m sensor cable for on-site fastening
- Tablet with RFID head und SAFERUN® app
- HART® loop converter

P0 - P1 P1 - P2 P2 - P3 P3 - P4 P4 - P5 P5 - P6 P6 - P7

Performance [kW]

Performance range

SAFERUN® RFID memory contents

Parameters *(189 entries)*

Examples:
- Manufacturer's data
- Medium data
- Performance data
- Cumulative times / values
- Results / fault warnings
- Output mA / HART®

Actual Log *(10 entries)*

Examples:
- date
- time
- temperature
- speed and direction of rotation
- torque
- power
- flow (calculated)

History Log *(1983 entries)*

Examples:
- date
- time
- temperature
- speed and direction of rotation
- power
- display of readings in per cent
- flow (calculated)

32768 Bytes

3

SAFERUN® App

The SAFERUN® app can be run on all Windows-based computers from Version 7, and is optimised for a state-of-the-art touchscreen. An industrial version tablet is recommended.

The data is transmitted for SAFERUN® through the RFID interface. The saved data permits accurate analysis of operation at any time, and supports the operator during optimisation of the app. Specific pump data such as the operating hours and energy consumption can be metered. Naturally the limits set and the medium data for the process pumps can be modified for optimum monitoring.

Options

- Languages: German and English
- Specific unit of measure (SI units, US/UK units)
- Time zones: GMT and local
- User administration: admin, service, master, user
- Reading and saving of the parameters through the wireless RFID connection
- Compact display of the parameters in text form
- Display of the current states in text and chart form (line and bar charts)
- Visualisation of the history log in various charts for analysis
- Matching of parameters to a specific customer process

Illustrated examples

1) Main menu
Access to the various sub-options:
Reading data memory, meaning of the LEDs and LED combinations, operating manual etc.

2) Short information
Presentation of the main parameters in list form.
Pump data, medium data etc.

3) Performance chart
Presentation of the history data in the performance chart:
The coloured display shows the user at a glance the zones in which the pump has been run, to date and now.

4) Output signal distribution
Chronological presentation of the operating ranges:
Division into the various ranges and the pump operating time in the various zones.

Main menu
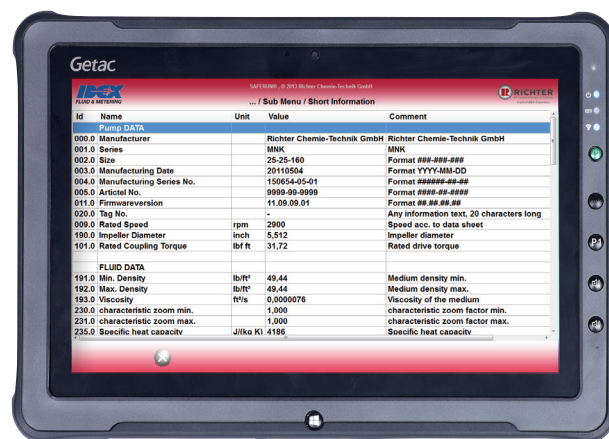
Short information (real example)

Performance chart (real example)

Output signal distribution (real example)

RICHTER
Process Pumps & Valves

Connectivity

The data captured by SAFERUN® and the PLC evaluated signals provide the user with important process information that can be used to disconnect or signal analysis as needed.
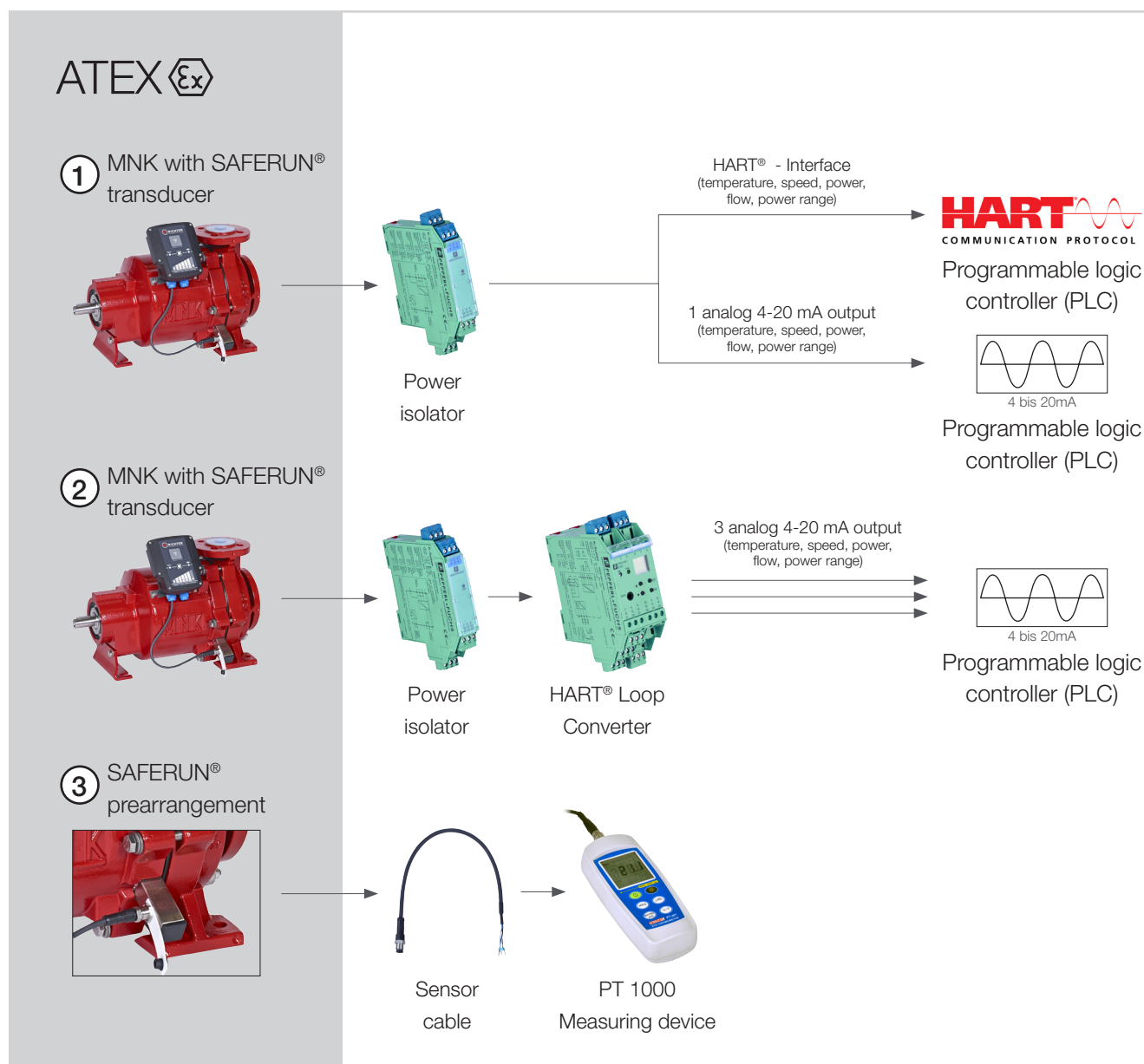
Connection option 1:

The SAFERUN® system is supplied intrinsically safe through a suitable power isolator with the necessary voltage. Thus both the analog 4-20 mA output and the HART® output can be used. The relayed readings can then be evaluated according to requirements by the user.

Connection option 2:

In addition to the power isolator comes a downstream HART® Loop Converter for use. It allows the conversion of the HART® digital signals in up to three analog 4-20 mA signals which then also can be further processed according to the requirements.
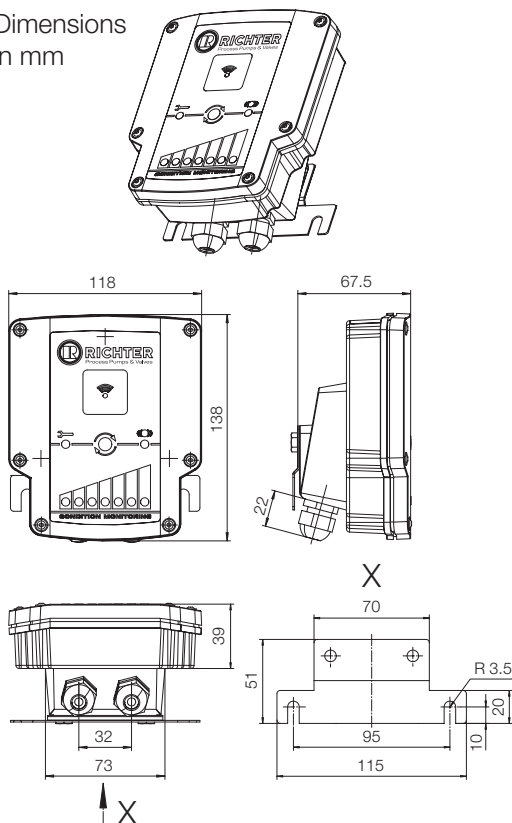
Connection option 3:

SAFERUN® is operated with a sensor cable connecting can system and PT 1000 measuring device. The user can directly link the in SAFERUN® integrated temperature sensor measuring to the temperature inside the pump.

ATEX ⟨Ex⟩

① MNK with SAFERUN® transducer

Power isolator

HART® - Interface
(temperature, speed, power, flow, power range)

1 analog 4-20 mA output
(temperature, speed, power, flow, power range)

HART
COMMUNICATION PROTOCOL

Programmable logic controller (PLC)

4 bis 20mA

Programmable logic controller (PLC)

② MNK with SAFERUN® transducer

Power isolator

HART® Loop Converter

3 analog 4-20 mA output
(temperature, speed, power, flow, power range)

4 bis 20mA

Programmable logic controller (PLC)

③ SAFERUN® prearrangement

Sensor cable

PT 1000 Measuring device

Technical Data

Dimensions in mm

118	67.5
138	22

SAFERUN® CMS-T transducer	
IP protection class (EN 60529)	IP 65
Housing material	ABS, modified (surface resistance ≤ 10^6 Ω)
Spring-cage terminals	max. line cross-section 1.5 mm^2
Cable connection	3-core, with shield
Sensor cable	0.3 m optionally 5 m
Ambient temperature	-20 °C to +60 °C (-5 °F to +140 °F)
Ignition protection class	category 2G (gas): II 2 G Ex ib IIC T4...T6 category 2D (dust): II 2 D Ex ibD 21 T 130 °C
Ambient temperature range	category 2G (gas): T6: -20 °C ≤ T_a ≤ +40 °C T4: -20 °C ≤ T_a ≤ +60 °C category 2D (dust): -20 °C ≤ T_a ≤ +60 °C
Power supply With isolator (3-line circuit) in the ignition protection class „Intrinsic safety ia or ib"	
Input voltage Ui	28 VDC
Input amperage Ii	50 mA-120 mA
Maximum input power Pi	750 mW
Maximum internal capacity Ci	38 nF
Maximum internal inductivity Li	negligible
History log	
DateTime	Date and time at the time of measurement
Temp	Temperature in °C
RPM	Speed in rpm
Power	Pump power in kW
Percent	Percentage of the output signal 4-20 mA (0-100 %)
Outputs	
Analog	4 ... 20 mA
HART	Temperature, speed, power, mA, %
Max. measurement deviation, Max. range coverage	Temperature: ±3 [°C] (-50 to 300) Speed: ±3 [rpm] (0,1200 to 3600) Power: ±3 % (depends on pump size)
HART driver	Generic HART DTM
HART subordinate commands	Universal commands
HART supported boards	Point-to-point
HART variables	Primary: Temperature (°C) Secondary: Speed (rpm) Tertiary: Power (kW)

Optional:

Tablet / Laptop
with Windows 7
and USB port

RFID head
with holder

Presented by:

RICHTER
Process Pumps & Valves

IDEX
FLUID & METERING
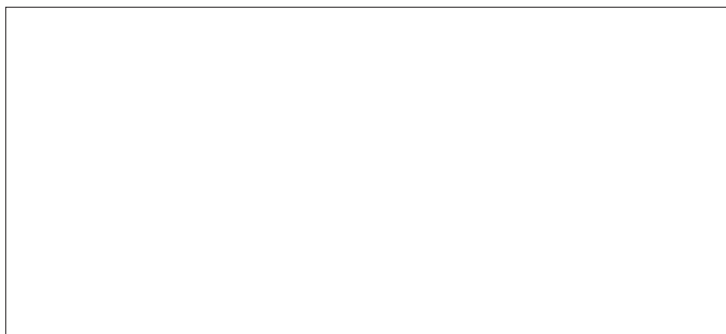
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