ADDITIONAL INSTALLATION AND OPERATING MANUAL

# Series MNK, MNK-B

# SAFERUN® Pump Condition Monitoring System


**Keep for future use!**

This operating manual must be strictly observed before transport, installation, operation and maintenance!



**9230-070-en** Revision 01 Edition 11/2009

RICHTER
Process Pumps & Valves

# List of contents



# Relevant documents

This **Additional Installation and Operating Manual** is only valid together with the Installation and Operating Manuals:
MNK Permanent grease lubrication 9230-001-de
or
MNK Oil bath lubrication 9230-002-de or
MNK-B Close-coupled design 9230-005-de

- EC-Txpe Examination SAFERUN®
- EC-Txpe Examination can
- Test and Assessment Report
- Declaration of conformity

# 1 About this document

The pump can also be put into operation without the pump condition monitoring system being connected.

## 1.1 Manufacturer

Richter Chemie-Technik GmbH
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D-47906 Kempen
Telephone : +49 (0) 2152 146-0
Fax: +49 (0) 2152 146-190
E-mail : richter-info@idexcorp.com
Internet: http://www.richter-ct.com

## 1.2 Function

This operating manual provides you with the necessary information for quick commissioning and safe operation. Therefore, please read it before commissioning.

## 1.3 Target group

This operating manual is aimed at trained and skilled staff. The contents of this manual must be made accessible to the skilled staff.

## 1.4 Symbols used

**General danger symbol!** People may be in danger.

**EU Community symbol!** Explosion-protected equipment must be marked for work in potentially explosive areas.

**Note:**
Some of the functions described here are not available or only to a certain extent in the versions supplied in the pilot phase. These functions will be enabled in stages by the manufacturer by means of updates of the operating software.

➢ **Action step**

This arrow identifies a single action step.

♦ **List**

A preceding hash sign identifies a list without any compulsory sequence.

## 1.5 Name plate

The name plates (polyester film) are glued permanently to the housing:

**Examples of name plates:**

**SAFERUN® transformer**


**Fig. 1**

**SAFERUN® can unit**


**Fig. 2**

# 2 Safety

## 2.1 Authorised personnel

Actions described in this operating manual may only be performed by trained and skilled personnel authorised by the plant operator.

Interventions above and beyond this may only be undertaken by personnel authorised by the manufacturer for safety or warranty reasons.

## 2.2 Intended use

The SAFERUN® (condition monitoring system) serves to monitor the operating condition of magnetic drive centrifugal pumps of the series MNK of Richter Chemie-Technik GmbH.

The system is not designed as an alternative to plant measuring facilities and must therefore not be used as a substitute for safety-relevant measuring or monitoring systems!

The manufacturer assumes no liability for consequential damage which could occur as a result of evaluation errors of the system or misinterpretations of the fault messages displayed.

## 2.3 Warning against misuse

This unit may create application-specific hazards if not used properly or as intended. The manufacturer is not liable for any damage arising from incorrect operation or misuse.

## 2.4 General safety notes

The SAFERUN® corresponds to the state of the art in compliance with the usual regulations and directives. The notes on safety in this operating manual, the national installation standards (e.g. the VDE regulations in Germany) and the applicable safety provisions, operating safety ordinances and accident prevention regulations are to be observed by the user.

## 2.5 CE conformity

The SAFERUN® is CE-compliant with the:

- EMC Directive (C89/336/EEC)
- Low Voltage Directive (73/23/EEC)

## 2.6 Explosion protection

The SAFERUN® satisfies the requirements in accordance with RL 94/9/EC (ATEX 95):

Gas explosion protection:

- EN 60079-0:2006 (general provision)
- EN 670079-11:2007 (intrinsic safety)

Dust explosion protection:

- EN 61241-0:2006 (general provision)
- EN 61241-11:2006 (intrinsic safety "iD")

Markings:

Gas explosion protection: (Group II; category 2G)

⟨Ex⟩ II 2 G Ex ib IIB T4 **...** T6

Dust explosion protection: (Group II; category 2D)

⟨Ex⟩ II 2 D Ex ibD 21 T130 °C

- EC type examination certificate for SAFERUN® can (BVS 07 ATEX E 055 X)
- EC type examination certificate for SAFERUN® transformer (BVS 07 ATEX E 054 X)

## 2.7 Notes on safety for potentially explosive areas

⟨Ex⟩ Observe the explosion-specific safety notes for applications in potentially explosive areas. They are part of this operating manual and are enclosed with every unit together with the EC type examination certificate.

## 2.8 Notes on the environment

The protection of the natural basis for life is one of the most urgent tasks. We have therefore introduced an environmental management system with the aim of continuously improving the company's environmental protection.

Help us to satisfy these requirements and observe the notes on the environment in this operating manual:

- section "Storage and transport"
- section "Disposal"

# 3 Product description

## 3.1 Function

**Note:**
see **Section 1.4**.

The system reports changes in the operating condition permitting conclusions to be drawn about the operation of the pumps in relation to the admissible ranges of operation specified by the manufacturer. The messages are to be understood as assistance for the operator to avoid critical conditions which, over a prolonged period, can result in damage or even failure of the pump.

The system records the torque acting on the magnetic drive of the pump and compares it continuously with reference values; any values exceeded or undershot are reported as an event.

Messages are displayed by coloured LEDs in the back plate. Approx. max. 2,000 data records are stored in a non-volatile memory and can be read out via the radio interface with an appropriately equipped handheld unit (PDA: option).

The connection cable used to supply power serves, at the same time, to output and analog current signal to other instruments. The value of the output current corresponds to the operating point of the pump. The output current depends on the parameters.

Owing to the integrated HART capability of the system, additional information (temperature, speed, torque, output signal i in mA) can be transmitted to a master process system for further processing. The requirements placed on the power supply are listed in the Annex (Technical specifications).

## 3.2 Design

The SAFERUN® consists of a sensor unit (SAFERUN® can) integrated in the pump and the SAFERUN® transformer mounted externally. Both are linked by a detachable cable connection. The SAFERUN® transformer is mounted, as a standard feature, on the side on the pump bracket. Optionally, it is possible to install the SAFERUN® transformer separate from the pump using a correspondingly longer cable connection (accessories).

The power supply to the system is provided by a suitable external energy source (e.g. by a certified feed and signal isolator in a 3-wire circuit with circuits of the ignition protection class "Intrinsically safe").

The SAFERUN® transformer may only be connected to the original SAFERUN® can from Richter.

The scope of delivery comprises:

- SAFERUN® transformer
- Attachment unit (holding plate with screws)
- SAFERUN® can unit
- Plug connection
- Documentation, such as operating manual, specific safety notes on potentially explosive areas and, where applicable, other certificates.


**Fig. 3**

### 3.2.1 User interface and connections

**SAFERUN® transformer**

**1** Communication window for radio connection
**2** Status display "Direction of rotation"
**3** Status display "System fault"
**4** Status "Operating point“
**5** Status display "Sudden change in condition"
**6** Connection for power supply
**7** Cable and plug connection to the SAFERUN® can unit

**SAFERUN® transformer**


**Fig. 4**

**SAFERUN® can unit**

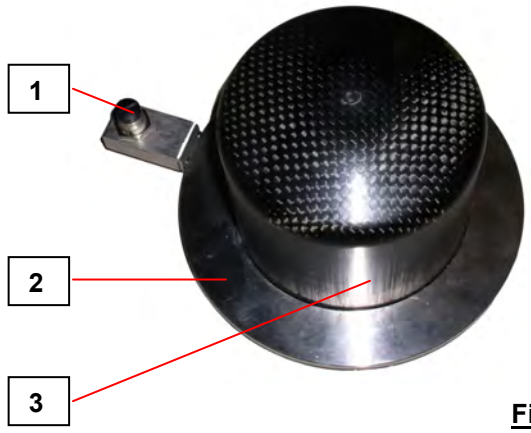



**Fig. 5**

**1** Jack for connection to the SAFERUN® transformer (terminals 1-5)

**2** Sensor unit

**3** Can

### 3.2.2 Operation

The status display and operation of the system can be performed via:

- coloured LEDs on site
- handheld unit (PDA) with suitable radio interface
- HART protocol
- the service program via the built-in serial interface (special cable required).

## 3.3 Storage and transport

Standard A: Pump is ordered with SAFERUN®.

Standard B: SAFERUN® transformer is retrofitted as SAFERUN® can unit is standard.

The consignment is to be inspected for completeness and any possible in-transit damage immediately after the goods have been received.

If any damage is discovered, the unit must not be put into operation.

Make sure during in-house transport that no damage occurs.

If the unit is not installed immediately after delivery, it must be properly stored (see "Installation and Operating Manual for the MNK and MNK-B").

# 4 Installation

## 4.1 General notes

The SAFERUN® is certified as intrinsically safe electrical equipment in category 2 due to EC type examination certificates of a "notified body":

- for installation in zone 1 and 2 of the potentially explosive area
- with intrinsically safe electric circuits in category 2 with protection level "ib" of the potentially explosive area.

Non-hazardous operation is only guaranteed if the operating manual and the relevant safety and EN standards or VDE regulations are observed.

The SAFERUN® transformer may only be connected to the original SAFERUN® can from Richter.

## 4.2 Installation notes

As a standard feature, the SAFERUN® is attached directly to the pump with a holding plate.

➢ The SAFERUN® can unit is introduced into the bracket like the standard can unit. The plug connection of the SAFERUN® can unit is located on the left as standard (as viewed from the direction of the motor).

➢ The holding plate with the SAFERUN® is attached on the left on the bracket or on the bearing pedestal as standard.

➢ The protective cap of the SAFERUN® can unit is unscrewed and instead the plug of the SAFERUN® is screwed onto the jack.

Even if all connection points of the system are secured against exceeding the admissible limit values, the connection cable should not be screwed on or off during operation.

Optionally, the unit can also be positioned and installed somewhere else to satisfy the needs of the customer (maximum cable length 5m).

In this case the SAFERUN® is installed directly in the plant on site. All even, readily visible surfaces which permit assignment to the pump and the bolting of the holding plate (see diagram: attachment distance a = 95 mm), are suitable as an installation base.

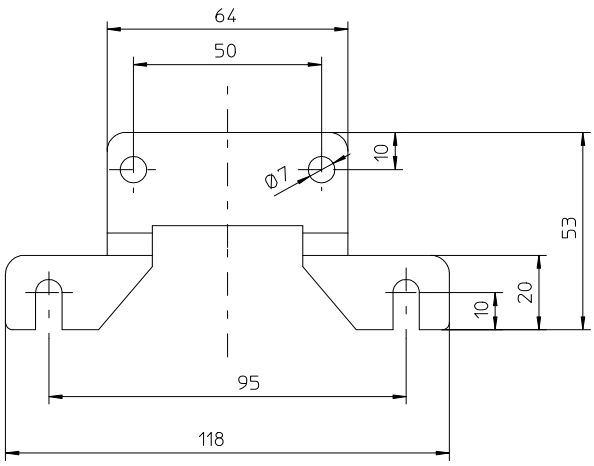



**Fig. 6**

# 5 Connecting to the power supply

## 5.1 Preparing the connection

**Observe notes on safety!**
**Only connect in the de-energised state.**

The national installation standards and regulations (e.g. the VDE regulations in Germany) as well as the applicable safety provisions and accident prevention regulations are to be observed.

In potentially explosive areas the relevant regulations, EC declarations of conformity and EC type examination certificates for the SAFERUN® can unit (BVS 07 ATEX E 055 X) and the SAFERUN® transformer (BVS 07 ATEX E 054 X) are to be observed and guaranteed.

The SAFERUN® transformer may only be connected to the original SAFERUN® can from Richter Chemie-Technik.

## 5.2 Power supply

The pump condition monitoring system SAFERUN® can be used in 2 versions:

- SAFERUN® used in a non-potentially explosive area (see **Section 5.2.1**).
- SAFERUN® used in a potentially explosive area (see **Section 5.2.2**).

### 5.2.1 Non-potentially explosive area

In a non-potentially explosive area the SAFERUN® can be optionally supplied from an external power source (DC 16V …32V) or a certified supply isolator (3-wire circuit) with intrinsically safe circuits.

Caution: If the SAFERUN® is supplied once only briefly with a non-intrinsically safe power source, the safety-relevant markings and the explosion protection on the name plate are to be made illegible.

Subsequent operation of the SAFERUN® in a potentially explosive area is no longer permitted for safety reasons relating to the explosion-relevant components which guarantee the explosion protection in the explosion i-circuits.

### 5.2.2 Potentially explosive area

For the intrinsically safe supply of the SAFERUN® transformer, appropriate certified electrical equipment (3-wire circuit) must be used in the ignition protection class "Intrinsically safe", e.g.:

- Type : KFD2-STC4-Ex1 (BAS 99 ATEX 7960)
  Pepperl+Fuchs
  or
- Type: 9160-11-11 (DMT 03 ATEX E 010 X)
  Stahl
  or
- Type: ST500 Ex (TÜV 97 ATEX 1150)
  Martens

With the use of this appropriate certified explosion-protected equipment, the safe electrical isolation of the intrinsically safe supply or feed and signal circuit from the non-intrinsically safe circuits (e.g. mains current and output circuit) to DIN VDE 0106 part 101 and the observance of protection class II are guaranteed.

The outside diameters of the connection cables are to be selected so that they are 6 mm to 9 mm in order to ensure a sealing effect of the cable fitting, e.g. IP65 (EN 60529).

For the intrinsically safe power supply of the SAFERUN® it is recommended to use a shielded installation cable. The cable shield may be laid, depending on the shield concept of the operator, on one side or both sides either to the ground potential or to terminal 9 "Shield".

## 5.3 Terminal diagram

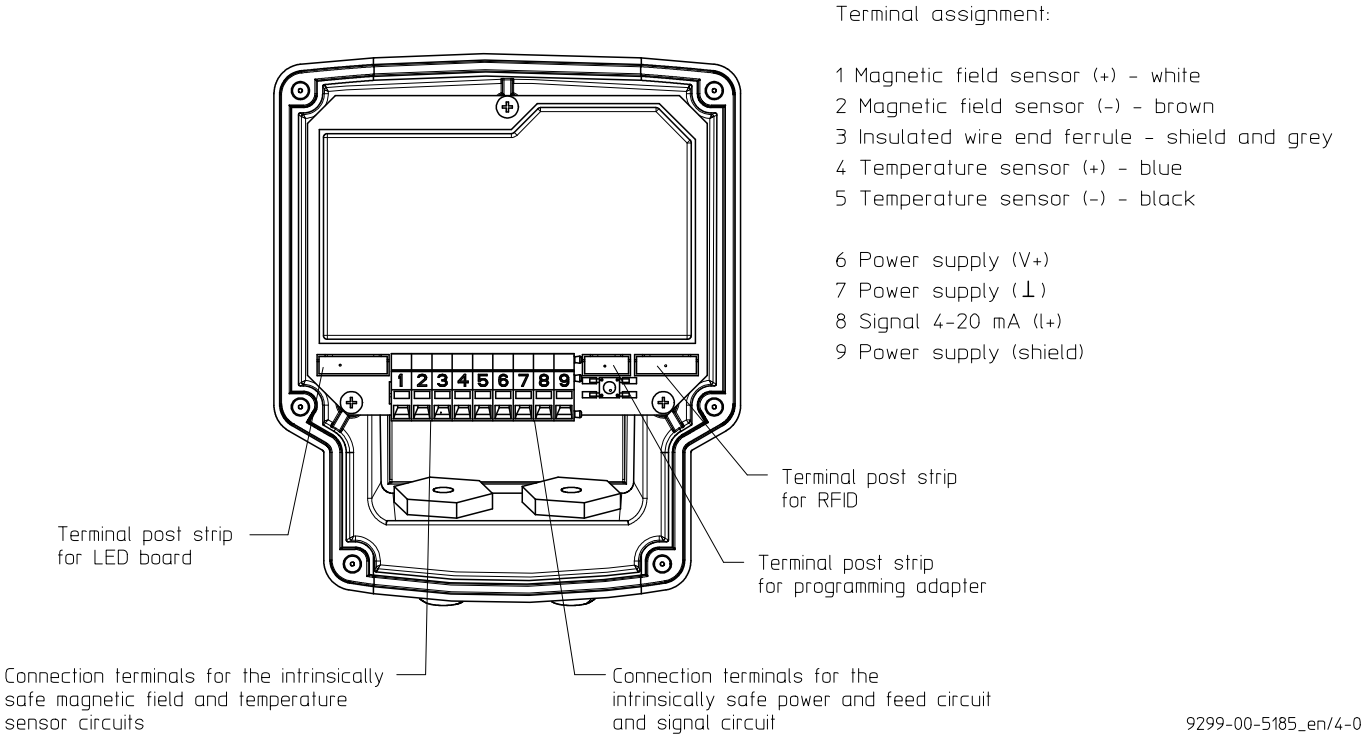



**Fig. 7**

## 5.4 Circuit diagram

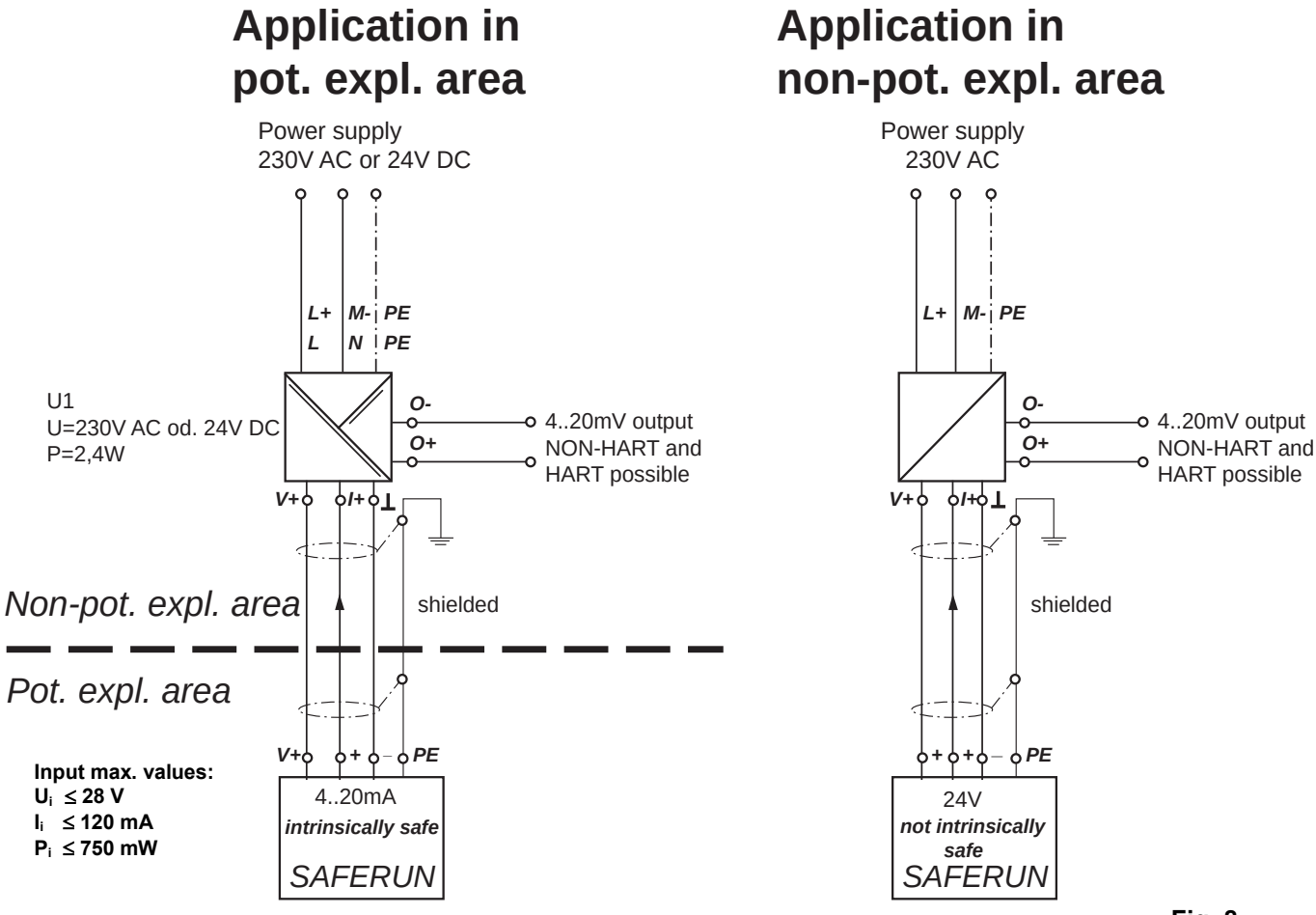



**Fig. 8**

# 6 Commissioning with the integrated display and control unit

The system is tested and subjected to basic calibration as standard ex works together with the relevant pump. Tap water is used as the medium conveyed.

Standard A: MNK with SAFERUN® can insert without transformer
Standard B: with SAFERUN® order incl. transformer

Should, during rating, no information have been provided on the medium, the density of the water is chosen as the basic setting.

## 6.1 Adaptation to other media

If the pump conveys a fluid other than water, it is usually necessary to correct the basic calibration. Adaptation can be performed using two methods:

- Allowance of the density of the medium or
- The two-point method

  Both methods require the transfer of data, which can take place in two different ways:

**Wireless via radio signals:**

The data are transferred via the RFID transponder integrated in the back plate using a mobile unit (PDA) with a suitable writing/reading module (CFC reader), which, in the explosion-protected version, permits communication in the potentially explosive area.

**Via the internal serial interface:**

The RS232 interface mounted directly on the pc board of the ignition protection class "Intrinsically safe" can also be used for transferring data to the SAFERUN®.

Access to the serial interface is only possible with the housing opened and using a special service cable (PROG-CABLE-SAFERUN®) (canNOT be used in the potentially explosive area, i.e. can only be used in the "Safe area"!).

Special service software is also necessary for communications.
As the use of the RS232 interface requires special unit-specific know-how, the calibration data should only be performed in this way by the manufacturer.

### 6.1.1 Allowance of the density of the medium

**Note:**
see **Section 1.4**.

If the data of the medium at operating temperature are known during the rating of the pump, its density and already be allowed for during the configuration of the system at the works.
The value entered is then taken into account during operation to determine the performance data.

The density value can be changed at a later date.

NOTE: The influence of the temperature on the density or the viscosity of the medium is not allowed for with this method.

This simple method for correcting the basic calibration to suit another medium is generally a good compromise for most applications (e.g. fluctuating operating data).

### 6.1.2 Two-point correction

**Note:**
see **Section 1.4**.

If higher demands are placed on the accuracy of the SAFERUN®, the so-called two-point method can be applied, which permits a simple, quick and comprehensive correction on site. For this purpose, two conditions must be satisfied:

- The pump must be able to be operated at two different operating points (throttle positions) and
- both values must be able to be determined on site.

## 6.2 Condition monitoring and event display

**Note:**
see **Section 1.4**.

The monitoring mode is the normal mode of the SAFERUN®. In this mode the following conditions can be detected and displayed by the system:

### Operation within the recommended operating limits:

**Direction of rotation:**
- Is determined every time the pump is put into operation.

**Qmin reached:**
- Basic setting: $Q/Q_{opt}$ = 8%

**Qmin undershot:**
- The minimum flow rate $Q_{min}$ recommended by the manufacturer is undershot; continuous operation in this condition can result in damage to parts of the pump.

**Qmax reached:**
- Basic setting: $Q/Q_{opt}$ = 120%

**Qmax exceeded:**
- The maximum value of the flow rate $Q_{max}$ recommended by the manufacturer is exceeded; continuous operation in this condition can result in damage to the pump.

**Zero conveyance/Lack of lubrication:**
- At this operating point safe operation of the pump can no longer be guaranteed; in this case the flushing circuit and the lubrication of the bearings may be suddenly interrupted by overheating and evaporation of the enclosed medium.

**Sudden condition change:**
- Basic setting: Fluctuations of more than 20% of the design torque ($Q_{opt}$)

**Drive stoppage:**
- In operation with overloaded magnetic drive …not admissible --- switch off immediately.

### 6.2.1 LEDs

**Start:**

All displays come on
Cold start 5 seconds
Warm start 3 seconds
Self-test: If error, error position flashes (A-G or temperature sensor)

**Temperature sensor**

- **flashing** Line interrupted
- **fast flashing** Short circuit or off

**Sudden load change**

- **flashing** Shortly before max. loading of the magnetic drive
- **fast flashing** Drive stoppage

**Direction of rotation**

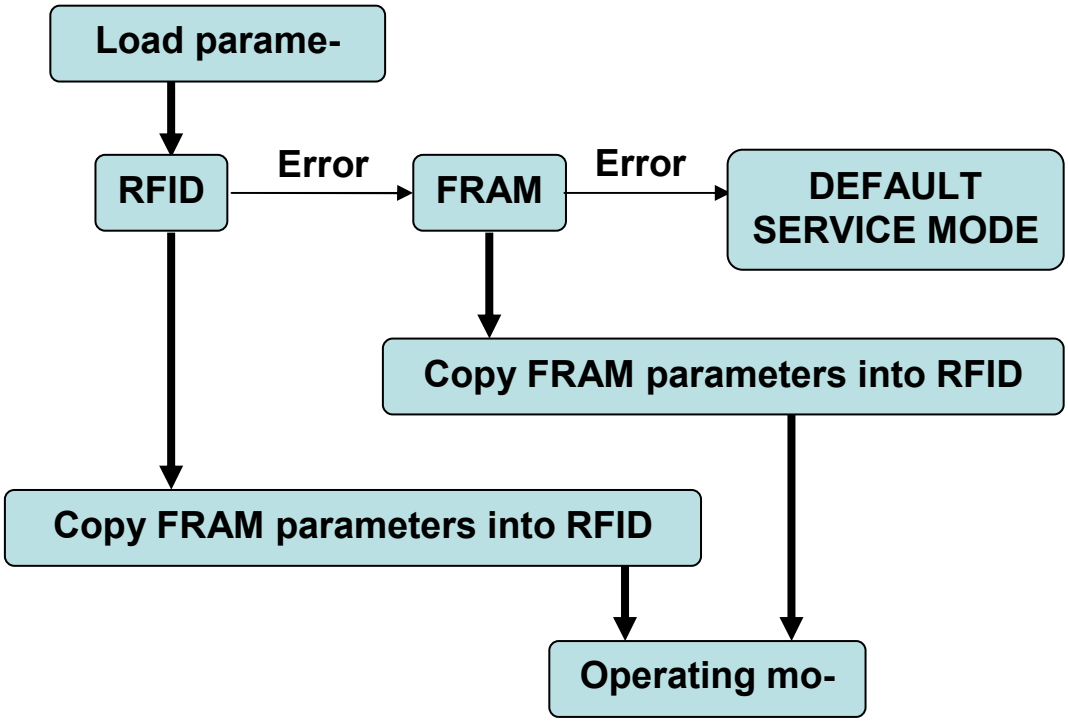
- **both flashing** No connection Cable missing
- **both come on** Pump at standstill
- **green comes on** Clockwise
- **red comes on** Counterclockwise

**Fig. 9**


**Flash when there is an error:**

| | | |
|---|---|---|
| **A** | RAM | Main memory defective |
| **B** | ROM | Firmware defective |
| **C** | Clock | System time is wrong |
| **D** | FRAM | Data loss/defective |
| **E** | RFID | Data loss/defective, not connected |
| **F** | Parameters | not present or defective |
| **G** | **flashing** | Performance curves not available |
| **G** | **faster flashing** | Value error |

### 6.2.2 Loading parameters




### 6.2.3 Legend of designations

| | |
|---|---|
| **RAM** | Main memory |
| **ROM** | Contains firmware |
| **CLOCK** | Current time |
| **FRAM** | Non-volatile memory for parameters and event logger |
| **RFID** | Non-volatile memory for parameters and data logger |

### 6.2.4 Event display

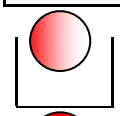
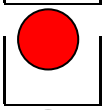
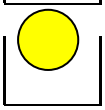
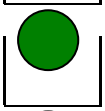
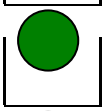
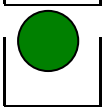
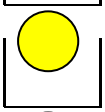
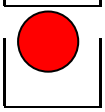
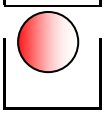
**Note:**
see **Section 1.4**.

**The following applies when the pump runs clockwise:**

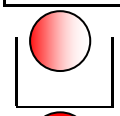
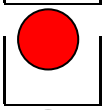
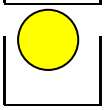
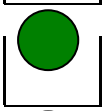
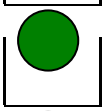
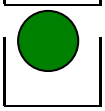
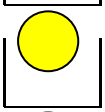
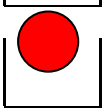
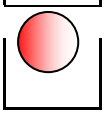
| | |
|---|---|
| **Green:** | Safe operation |
| **Yellow:** | Caution, limit range |
| **Red:** | Warning of risk |
| **Flashing red:** | Switch off immediately! |

For description, see **Section 6.2.1**.

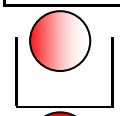
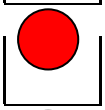
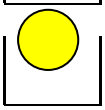
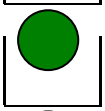
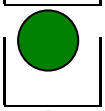
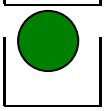
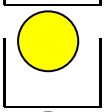
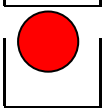
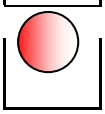
### 6.2.5 Normal operation with density known

| LED | Range from | Range to | mA from | mA to | % from | % to | % diff. |
|---|---|---|---|---|---|---|---|
|  | 0.8x MdMax | drive stoppage | 20 | | 100.00 | | |
|  | 1.04 Qmax | 0.8 MdMax | 19 | 20 | 93.75 | 100.00 | 6.25 |
|  | Qmax | 1.04x Qmax | 18 | 19 | 87.50 | 93.75 | 6.25 |
|  | 2 / 3 | Qmax | 14 | 18 | 62.50 | 87.50 | 25.00 |
|  | 1 / 3 | 2 / 3 | 10 | 14 | 37.50 | 62.50 | 25.00 |
|  | 4% Qmax+Qmin | 1 / 3 | 6 | 10 | 12.50 | 37.50 | 25.00 |
|  | Qmin | 4% Qmax+Qmin | 5 | 6 | 6.25 | 12.50 | 6.25 |
|  | Qzero | Qmin | 4 | 5 | 0.00 | 6.25 | 6.25 |
|  | Pump standstill | Qzero | | 4 | | 0.00 | |

### 6.2.6 Customer operation with density known

| LED | Range from | Range to | mA from | mA to | % from | % to | % diff. |
|---|---|---|---|---|---|---|---|
|  | 0.8x MdMax | Drive stoppage | 20 | 21 | 100.00 | | |
|  | 0.04x Qmax+KdMax | 0.8 MdMax | 19 | 20 | 93.75 | 100.00 | 6.25 |
|  | KdMax | 0.04x Qmax+KdMax | 18 | 19 | 87.50 | 93.75 | 6.25 |
|  | 2 / 3 | KdMax | 14 | 18 | 62.50 | 87.50 | 25.00 |
|  | 1 / 3 | 2 / 3 | 10 | 14 | 37.50 | 62.50 | 25.00 |
|  | KdMin | 1 / 3 | 6 | 10 | 12.50 | 37.50 | 25.00 |
|  | KdMin-4% Qmax | KdMin | 5 | 6 | 6.25 | 12.50 | 6.25 |
|  | Qzero | KdMin-4% Qmax | 4 | 5 | 0.00 | 6.25 | 6.25 |
|  | Pump standstill | Qzero | 3.8 | 4 | | 0.00 | |

### 6.2.7 Customer operation with unknown media

| LED | Range from | Range to | mA from | mA to | % from | % to | % diff. |
|---|---|---|---|---|---|---|---|
|  | 0.8x MdMax | Drive stoppage | 20 | | 100.00 | | |
|  | 0.04x Qmax+KdMax | 0.8 MdMax | 19 | 20 | 93.75 | 100.00 | 6.25 |
|  | KdMax | 0.04x Qmax+KdMax | 18 | 19 | 87.50 | 93.75 | 6.25 |
|  | 2 / 3 | KdMax | 14 | 18 | 62.50 | 87.50 | 25.00 |
|  | 1 / 3 | 2 / 3 | 10 | 14 | 37.50 | 62.50 | 25.00 |
|  | KdMin | 1 / 3 | 6 | 10 | 12.50 | 37.50 | 25.00 |
|  | KdMin-4% (Pmax-P0) | KdMin | 5 | 6 | 6.25 | 12.50 | 6.25 |
|  | KdMin-8% (Pmax-P0) | KdMin-4% (Pmax-P0) | 4 | 5 | 0.00 | 6.25 | 6.25 |
|  | Pump standstill | KdMin-8% (Pmax-P0) | | 4 | | 0.00 | |

# 7 Maintenance and fault rectification

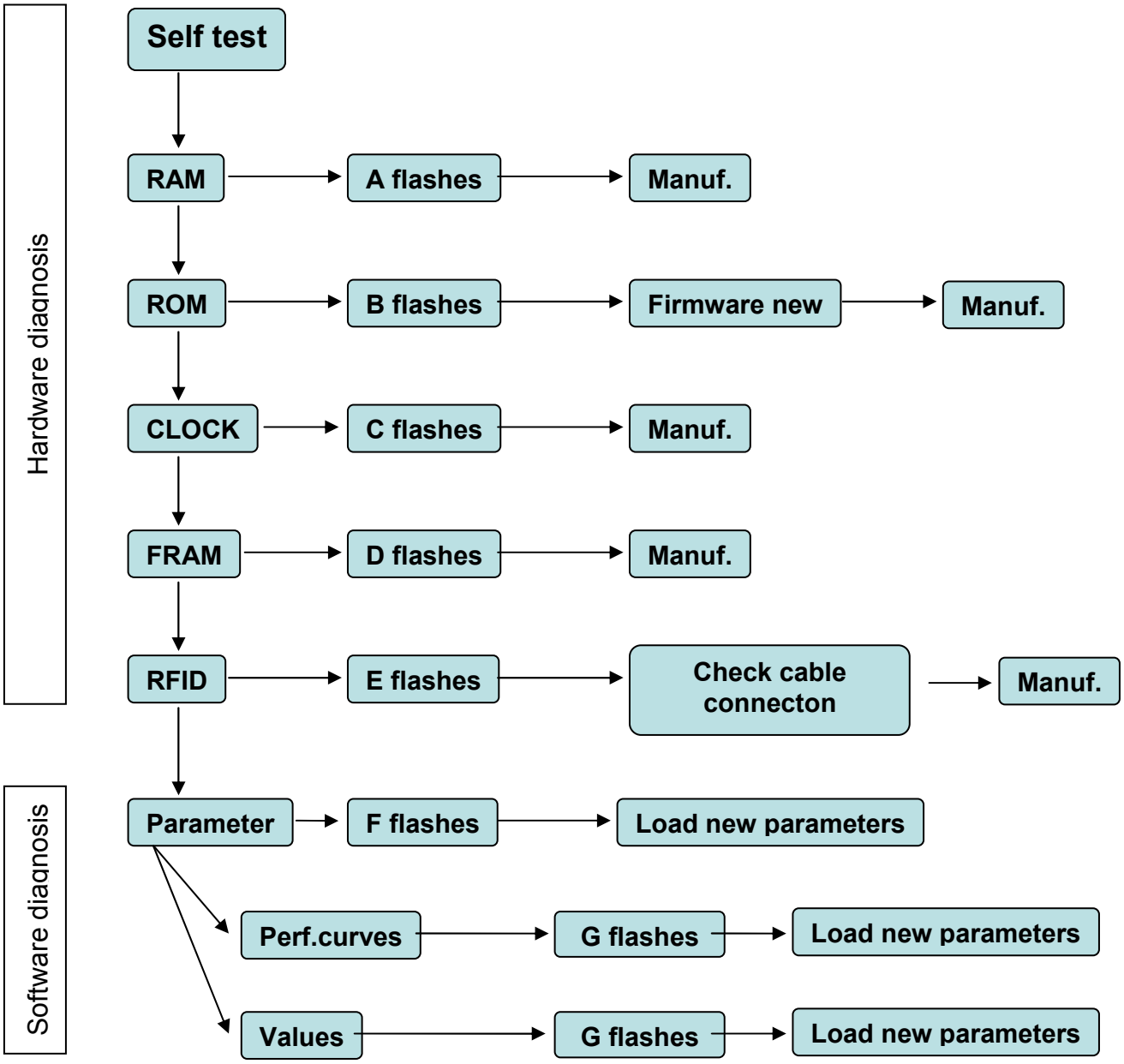
## 7.1 Maintenance

The SAFERUN® does not require any special maintenance if used correctly in normal operation.

## 7.2 Fault rectification

**Note** see Section 1.4

For description, see **Fig. 9** and **Section 6.2.3**.




**Parameters ➔FRAM/RFID identical**

## 7.3 Repairing the unit

The SAFERUN® may only be repaired by the manufacturer, Richter Chemie-Technik.

If it is necessary to replace individual electronic components, e.g. back plate or flat-ribbon cable, this may be only done if replaced by original spare parts from Richter Chemie-Technik; under certain circumstances recalibration may become necessary.

# 8 Dismantling

Before dismantling, the SAFERUN® must be de-energised in accordance with the applicable local regulations (e.g. VDE).

## 8.1 Dismantling steps

Observe the chapters "Installation" and "Connecting to the power supply" and perform the steps described there analogously in reverse sequence.

## 8.2 Return and disposal

When returning the unit for an inspection, please enclose as detailed a description as possible of the fault and the specific application.

**WEEE directive 2002/96/EC**

This unit is not subject to the WEEE directive 2002/96/EC and the national laws (in Germany e.g. ElektroG). Take the unit directly to a specialised recycling company and do not use the municipal collection points for this.

Proper disposal prevents a negative impact on people and the environment and permits the reuse of valuable raw materials.

Materials: see section "Technical specifications“.

# 9 Annex

## 9.1 Technical specifications

### GENERAL DATA

| | |
|---|---|
| Manufacturer | Richter Chemie-Technik GmbH |
| Unit | Condition monitoring system |
| Type | 4764-19-0020/02 |
| Technical documentation | BTA 9230-020-de. |
| Design | Unit for mounting on pumps or for wall mounting (cable of special length required) |
| IP protection class (EN 60529) | ≥IP 65 |
| Housing material | ABS, modified (surface resistance ≤ $10^6$ Ω) |
| Tension spring terminals | Max. line cross section 1.5 $mm^2$ |

### POWER SUPPLY (non-potentially explosive area)

| | |
|---|---|
| Power supply | DC 16 ... 30 V |
| Cable connection | 3-wire, with shield |

### POWER SUPPLY (potentially explosive area)

| | |
|---|---|
| Supply and feed circuit and signal circuit (from 3-wire circuit) | Of ignition protection class "Intrinsically safe" with the max. input values:<br>$U_i \leq 28$ V; $I_i \leq 120$ mA; $P_i \leq 750$ mW |
| Ignition protection class: (gas explosion protection)<br>(dust explosion protection) | Ⓔx II 2 G Ex ib IIB T4...T6<br>Ⓔx II 2 D Ex ibD 21 T 130 °C |
| Max. adm. ambient temperature range | for applications in T6 : - 20 °C ≤ $T_a$ ≤ 40 °C and<br>for applications in T4 : - 20 °C ≤ $T_a$ ≤ 60 °C |
| Cable connection | 3-wire, with shield |

### INPUTS

| | |
|---|---|
| **Sensor unit** | SAFERUN® can, type 9237-31-3201/3 |
| Magnetic field sensor (max. values) | $U_o \leq 5.88$ V and $I_o \leq 11.88$ mA and $P_o \leq 17.46$ mW |
| Temperature sensor (max. values) | $U_o \leq 5.88$ V and $I_o \leq 15.94$ mA and $P_o \leq 23.28$ mW |
| Cable | 5-wire, twisted with shield, max. length = 5m |

| | |
|---|---|
| **Radio transmission (RFID)** | RFID transponder (passive) |
| Frequency range | 13.56 MHz (HF) |
| Memory | 256 kbit EEPROM |
| Transmission rate | 106 kbps |
| Writing/reading range | up to 30 mm |
| Mobile writing/reading units | PDA with CFC reader (RFx10-Ex/AM)<br>(also available in non-potentially explosive design) |

| | |
|---|---|
| **Serial interface (programming adapter)** | RS232 (only accessible by opening the housing) |
| Connection cable | PROG-CABLE- SAFERUN® with USB 1.1 connection |
| Communication unit | PC or laptop with USB connection |
| Special feature | Power supply is possible via integrated set-up transformer |
| Note on explosion protection | Not suitable for use in potentially explosive area |

### OUTPUTS

**Note** see Section 1.4

| | |
|---|---|
| Analog | 4 ... 20 mA |
| HART | Temperature, speed, performance, flow rate |

## 9.2 Dimensions

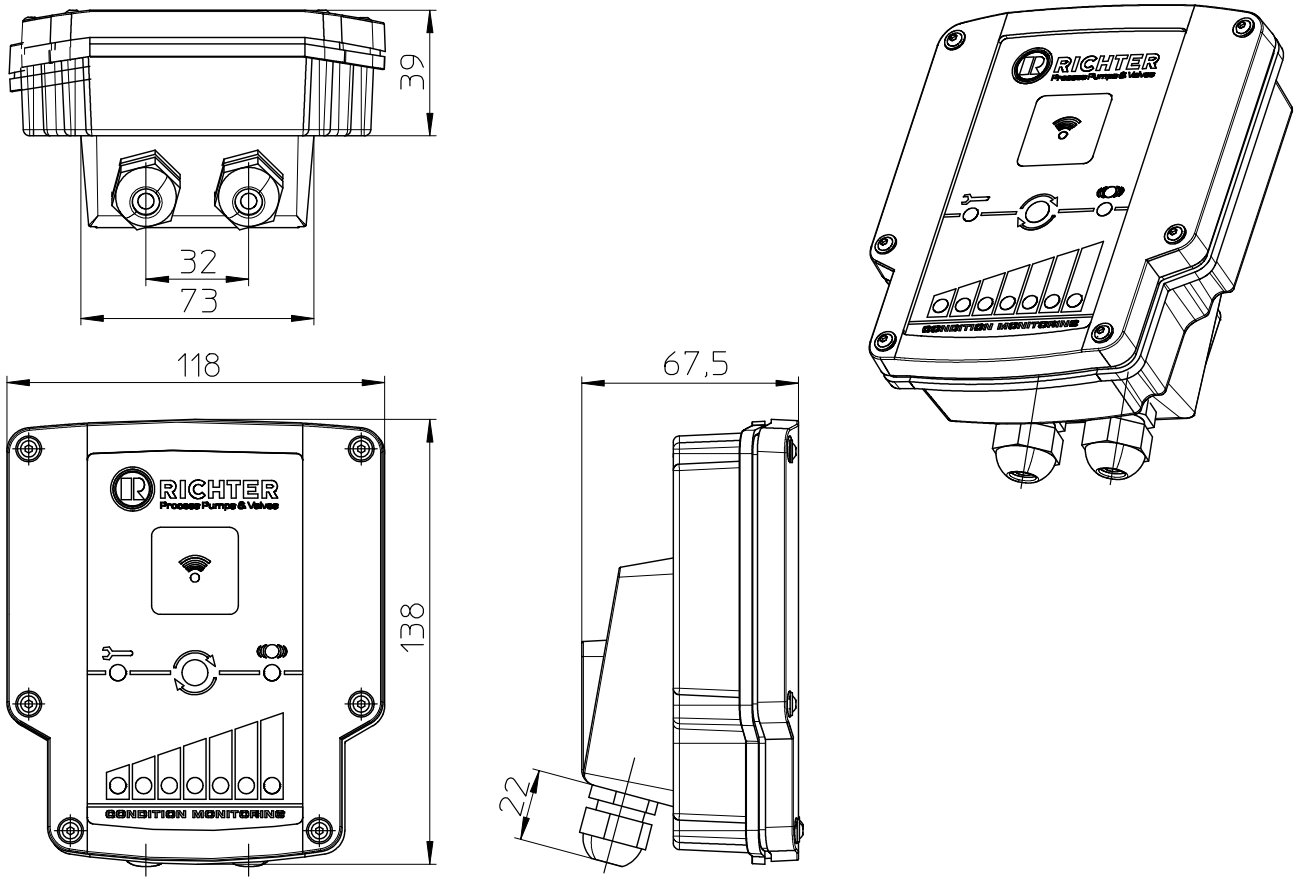



**Fig. 10**

## 9.3 Industrial property rights

Products of Richter Chemie-Technik are subject to industrial property and patent rights.

## 9.4 Trademarks

All trademarks used as well as trade and company names are the property of their legal owners/authors.