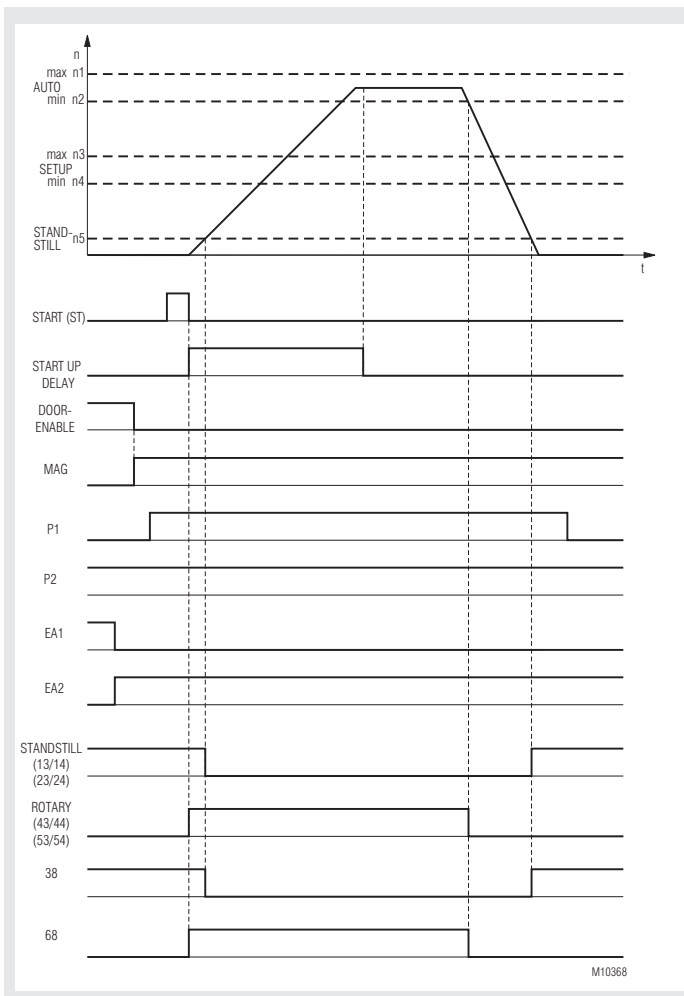




### Function Diagram



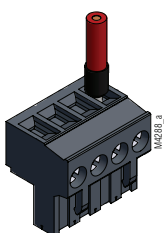
### Your Advantages

- Three in one
  - safe speed monitoring in automatic and set up operation
  - safe standstill monitoring
  - safe integrated gate monitoring
- For safety applications up to PL e / Cat 4 and SIL 3
- Space and cost saving, no external safe gate monitoring required
- Simple and time saving setup without PC
- Comfortable, menu guided configuration via frontside display
- Reducing interruption time in production by extensive diagnostic functions
- Easy to integrate in existing drive applications
- Suitable for all common motor feedback systems and proximity sensors
- Copy parameter settings in other units by pressing only a push button
- Higher safety by 2-channel mode selector, external connection
- With adjustable ratio between 2 sensors e.g. to detect a broken shaft
- Possible languages: english, german, french, italian, spanish

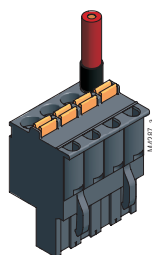
### Features

- According to
  - Performance Level (PL) e und category 4 to EN ISO 13849-1: 2008
  - SIL-Claimed Level (SIL CL) 3 to IEC/EN 62061
  - Safety Integrity Level (SIL 3) to IEC/EN 61508
- According to EN 60204
- Device setting on menu-driven display or via RJ45 (FCC Western-Modular 8P8C) with connection cable (copy function)
- Change tracking
- Adjustable operation mode
  - Automatic mode: Monitoring of automatic rotational speed window and standstill speed.
  - Setup mode: Monitoring of setup rotational speed window. Standstill is permanently enabled.
- Single or 2-channel safety gate monitoring
- Integrated user friendly display for parameters and operation status
  - for set point and actual value of U/min or m/min
  - set point display also as frequency value
  - with numerous diagnostic features
- Adjustable start up delay (0 ... 999 s)
- Adjustable time delay for standstill detection (13/14, 23/24) (0 ... 999 s)
- Adjustable monitoring time for feedback circuit RF1 (0,5 ... 999 s)
- Monitoring of an release magnet
- Monitoring of feedback circuits
- Activation of the output path 43/44, 53/54 with on/off pushbutton with short circuit detection or automatic making function
- Adjustable PNP- or NPN-sensors
- Connection of different encodern possible (sin/cos, TTL, HTL)
- 2-channel function
- Forcibly guided contacts
- LED-indicators and 2 semiconductor monitoring output
- With pluggable terminal blocks for easy exchange of devices
  - with screw terminals
  - or with cage clamp terminals
- Width 45 mm

### Options with Pluggable Terminal Blocks



Terminal block  
with screw terminals  
(PS / plug in screw)

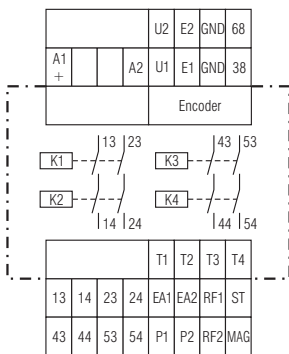


Terminal block  
with cage clamp terminals  
(PC / plug in cage clamp)

### Approvals and Marking



## Circuit Diagram



M10325\_a UH 5947.04

## Application

This device is designed for machinery and installations where hazards to people and property may be caused by the movement of machines or parts.

The device permanently monitors for standstill (output circuit 13/14, 23/24) and rotational speed (output circuit 43/44, 53/54). For the rotational speed monitoring, it is possible to choose between automatic and setup mode.

If properly connected, the UH5947 can be used to implement the safety functions STO (safe torque off), SOS (safe operation stop), SLS (safely limited speed), SSM (safe speed monitoring), SSR (safe speed range), as well as SDL (safe door locking) as per standard EN 61800-5-2.

## Functions

The device can be configured from the display and keys on the front plate or via RJ45 using a suited connection cable (see accessories) by means of the copy function.

Following measuring sensors can be used to sense the rotational speed:

- Two NPN or PNP proximity sensors (special version with NAMUR sensors) connected to the inputs E1 and E2. The proximity sensors (NAMUR sensors) are supplied with 24VDC from the speed relay to the terminal U1 and U2 (special version NAMUR 8.2V DC).
- Encoders (sin/cos, TTL, HTL) connected to the RJ45 interface via cable adapter (optionally available). The powersupply for the encoder is not provided by the speed monitor. Feedback influences should not occur.
- Combination from encoder and one proximity or NAMUR sensor for special version.

## Indicator

|          |                |  |
|----------|----------------|--|
| DEVICE:  | green          | → Run                                    |
|          | green-flashing | → Parameterization mode                  |
|          | red-flashing   | → Parameterization error                 |
|          | red            | → Device fault                           |
| K1/K2:   | green          | → Output contact 13/14, 23/24 closed     |
|          | green-flashing | → Stop monitoring feedback loop 2 failed |
| K3/K4:   | green          | → Output contact 43/44, 53/54 closed     |
|          | green-flashing | → Stop monitoring feedback loop 1 failed |
| SF:      | OFF            | → no failure                             |
|          | red            | → (external) failure                     |
| DISPLAY: |                | → Status indication                      |
|          |                | → Alarms / diagnostics                   |
|          |                | → Parameterization                       |

## Notes

### ATTENTION - AUTOMATIC START!



According to IEC/EN 60 204-1 part 9.2.5.4.2 and 10.8.3 it is not allowed to restart automatically after emergency stop. Therefore the machine control has to disable the automatic start after emergency stop.

## Technical Data

### Input

**Nominal voltage  $U_N$ :** AC/DC 110 ... 240 V, DC 24 V

### Voltage tolerance

AC/DC: 0.8 ... 1.2  $U_N$   
DC: 0.9 ... 1.1  $U_N$

### Nominal frequency (AC):

50 / 60 Hz

### Frequency range (AC):

45 ... 65 Hz

### max. residual ripple (DC):

48 %

### Nominal consumption

AC/DC: < 6.5 W

DC: < 5 W

**Min. Off-time:** 150 ms

**Measuring accuracy:** ± 2 %

**Hysteresis:** 6.25 %

### Initiators

**Input current:** DC 24 V (provided by the device)

**Output:** as option PNP or NPN

**Voltage on E1 and E2:** min. DC 10 V

**Min. pulse duration e. g.**

**on and off time:** 75 μs

**Setting range:** 1 Hz ... 2 kHz

### Encoder

**Version:** with 2 signal paths (A, B) and their

inverted signals ( $\bar{A}$ ,  $\bar{B}$ )

**Output:** as option TTL, HTL or sin/cos

( $U_A = 1 V_{PP}$ )

When RJ45: Encoder is selected in setup routine under item 1.3 (sensor selection) a defined failure behaviour is necessary (high resistive outputs) in the case of missing powersupply or internal encoder failure. A forced dynamisation ( $t < 24$  h) is necessary during longer standstill periods.

**Setting range:** 1 Hz ... 400 kHz

### Special Version NAMUR

**Supply voltage:** DC 8,2 V (provided by the device)

**Input current:** max. 10 mA

### Response value

Low: typ. 1,6 mA

High: typ. 1,8 mA

Broken wire: ≤ 0,15 mA

Short circuit: > 6,0 mA

### Min. pulse duration e. g.

**on and off time:** 75 μs

**Setting range:** 1 Hz ... 2 kHz

### Output

### Contacts

2 safe relay groups with each

2 NO contacts in series

Relay positive guide

max. 5 A

(see quadratic total current limit curve)

### Switching capacity

to AC 15

NO contact: 3 A / AC 230 V IEC/EN 60 947-5-1

to DC 13

NO contact: 1 A / DC 24 V IEC/EN 60 947-5-1

to DC 13

NO contact: 4 A / 24 V at 0.1 Hz

### Electrical life

at 5 A, AC 230 V  $\cos \varphi = 1$ : ≥ 1 x 10<sup>6</sup> switching cycles IEC/EN 60 947-5-1

### Short circuit strength

**max. fuse rating:** 4 A gL IEC EN 60 947-5-1

**Mechanical life:** ≥ 50 x 10<sup>6</sup> switching cycles

### Semiconductor

**monitoring output:** 2 piece; 20 mA DC 24 V, plus switching

**Technical Data****General Data****Nominal operating mode:** continuous operation**Temperature range**

Operation: 0 ... + 60 °C

Storage: - 20 ... + 70 °C

**Altitude:** < 2.000 m**Clearance and creepage distance**

rated impuls voltage /

pollution degree: 4 kV / 2 IEC 60 664-1

**EMC**

Electrostatic discharge: 8 kV (Luftentladung) IEC/EN 61 000-4-2

HF irradiation: 10 V/m IEC/EN 61 000-4-3

Fast transients: 2 kV IEC/EN 61 000-4-4

Surge voltage: 1 kV IEC/EN 61 000-4-5

interference suppression: Grenzwert Klasse B EN 55 011

**Degree of protection:** IP 20 IEC/EN 60 529**Housing:** thermoplastic with VO behaviour acc. to UL subject 94**Vibration resistance:** Amplitude 0,35 mm

frequency 10 ... 55 Hz, IEC/EN 60 068-2-6

**Climate resistance:** 0 / 060 / 04 IEC/EN 60 068-1**Terminal designation:** EN 50 005**Wire connection:** DIN 46 228-1/-2/-3/-4**Plug in with screw terminals**

max. cross section

for connection: 1 x 0,25 ... 2,5 mm<sup>2</sup> solid or stranded ferruled (isolated) or 2 x 0,25 ... 1,0 mm<sup>2</sup> solid or stranded ferruled (isolated)

Insulation of wires

or sleeve length: 7 mm

**Plug in with cage clamp terminals**

max. cross section

for connection: 1 x 0,25 ... 2,5 mm<sup>2</sup> solid or stranded ferruled (isolated) or 2 x 0,25 ... 1,5 mm<sup>2</sup> stranded twin ferruled (isolated)

Insulation of wires

or sleeve length: 10 mm

**Wire fixing:** captive slotted screw or cage clamp terminals**Mounting:** DIN rail IEC/EN 60 715**Weight:** approx. 420 g**Dimensions****Width x height x depth:** 45 x 107 x 121 mm**Safety Related Data****Values according to EN ISO 13849-1:**

|                       |      |                 |
|-----------------------|------|-----------------|
| Category:             | 4    |                 |
| PL:                   | e    |                 |
| MTTF <sub>d</sub> :   | 122  | a (year)        |
| DC <sub>avg</sub> :   | 97,5 | %               |
| d <sub>op</sub> :     | 365  | d/a (days/year) |
| h <sub>op</sub> :     | 24   | h/d (hours/day) |
| t <sub>Zyklus</sub> : | 3600 | s/Zyklus        |
|                       | ± 1  | /h (hour)       |

**Values according to IEC EN 62061 / IEC EN 61508:**

|                     |          |                 |
|---------------------|----------|-----------------|
| SIL CL:             | 3        | IEC EN 62061    |
| SIL                 | 3        | IEC EN 61508    |
| HFT <sup>1)</sup> : | 1        |                 |
| DC <sub>avg</sub> : | 97,5     | %               |
| SFF                 | 98,87    | %               |
| PFH <sub>D</sub> :  | 3,02E-09 | h <sup>-1</sup> |
| T <sub>i</sub> :    | 20       | a (year)        |

<sup>1)</sup> HFT = Hardware-Failure Tolerance

The values stated above are valid for the standard type.

Safety data for other variants are available on request.

The safety relevant data of the complete system has to be determined by the manufacturer of the system.

**UL-Data**

The safety functions were not evaluated by UL. Listing is accomplished according to requirements of Standard UL 508, "general use applications"

**Nominal voltage U<sub>N</sub>:** DC 24V  
AC/DC 110...240V (single or double phase)  
50 / 60 Hz**Ambient temperature:** 0 ... +60°C**Switching capacity**

Semiconductor outputs: 24Vdc, 20mA, pilot duty

**Switching capacity**U<sub>N</sub> = DC 24 V: Pilot duty B300  
5A 250Vac resistive only  
2A 24Vdc resistive only

Device must be supplied with a voltage / current limited power supply (max. 4 A)

**Switching capacity**U<sub>N</sub> = AC/DC 110 ... 240 V:  
Ambient temperature 60°C: Pilot duty B300  
2A 250Vac resistive onlyAmbient temperature 40°C: Pilot duty B300  
5A 250Vac resistive only**Wire connection:**60°C / 75°C copper conductors only  
Plugin screw terminal: AWG 28 - 12 Sol/Str Torque 0.5 Nm  
Plugin cage clamp terminal: AWG 24 - 12 Sol/Str  
Plugin twin cage clamp terminal: AWG 24 - 16 Sol/Str

Technical data that is not stated in the UL-Data, can be found in the technical data section.

### Standard Type

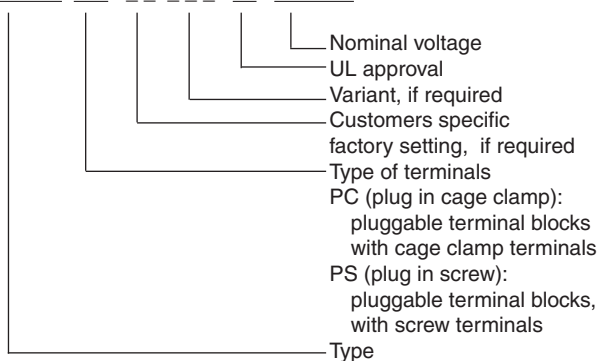
|                           |   |
|---------------------------|---|
| UH 5947.04PS/61           | DC 24 V   |
| Article number:           | 0063476   |
| • Safety output:          | 2 NO contacts for standstill monitoring<br>2 NO contacts for monitoring of speed range (window) |
| • Nominal voltage $U_N$ : | DC 24 V   |
| • Width:                  | 45 mm   |

### Variants

|                      |   |
|----------------------|---|
| UH 5947.04__/001/61: | NAMUR-version   |
| UH 5947.04__101/61:  | Sensor selection „E1+E2“:<br>The semiconductor outputs give out the incoming signal of E1 with a ratio 1:2.<br>Other sensor selection:<br>The semiconductor outputs have no function. |
| UH5947.04__/200/61:  | The transistor outputs 38 and 68 are continuously on when the unit is on operation and are switched off as soon as a failure is detected  |

### Order reference for variants

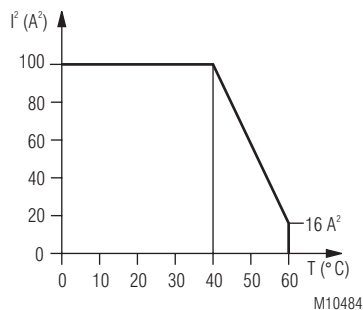
UH 5947.04 PS / \_ \_ \_ \_ \_ / 61 DC 24 V



### Accessories

|               |   |
|---------------|---|
| OA5947/100:   | Connection cable for copy function and adaptor  |
| KY5947 H1/S1: | 15 pole adaptor to connect an encoder or for controllers of Siemens/Heidenhain with corresponding PIN arrangement (see remarks for accessories in operating manual) |
| KY5947 H2/S4: | 25 pole adaptor to connect an encoder or for controllers of Siemens/Heidenhain with corresponding PIN arrangement (see remarks for accessories in operating manual) |

### Characteristics

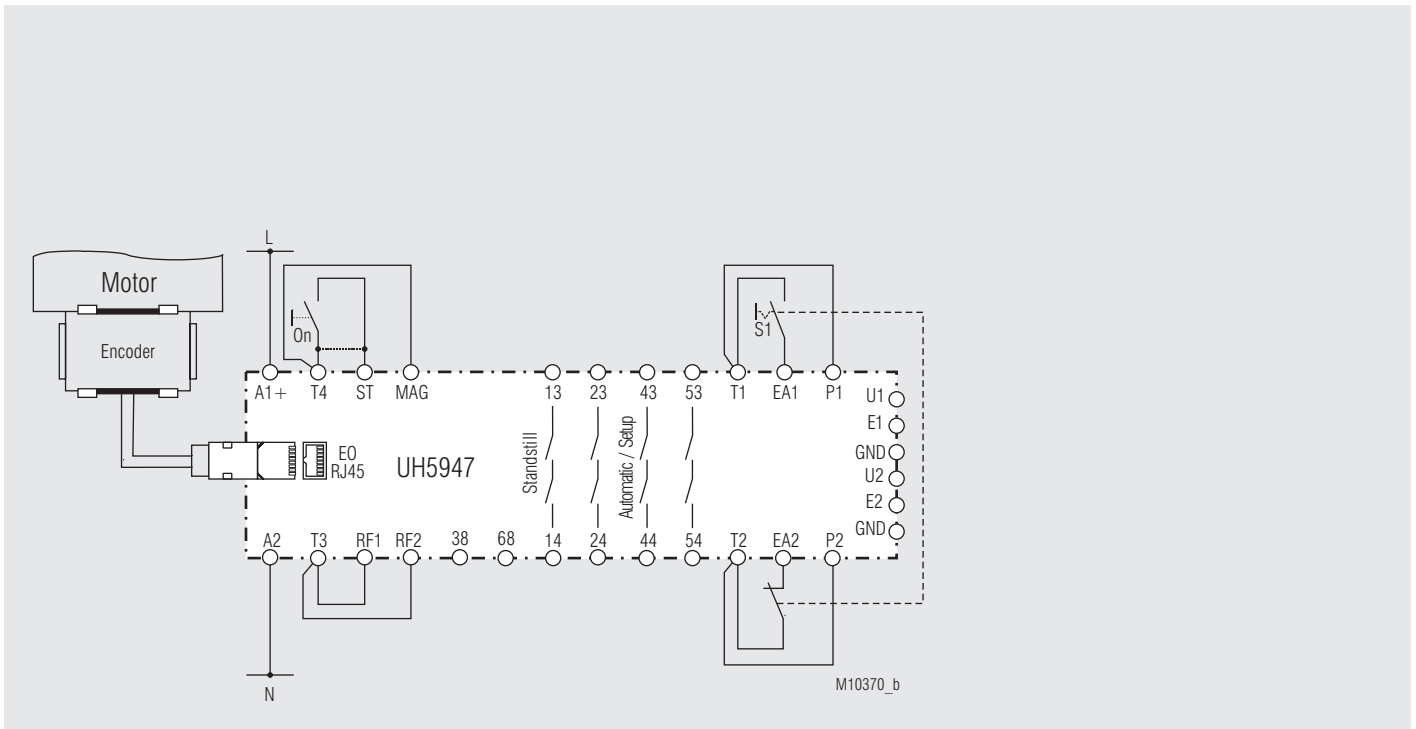


Max. zulässiger Strom bei 60°C über  
4 Kontaktreihen =  $2A \hat{=} 4 \times 2^2 A^2 = 16A^2$

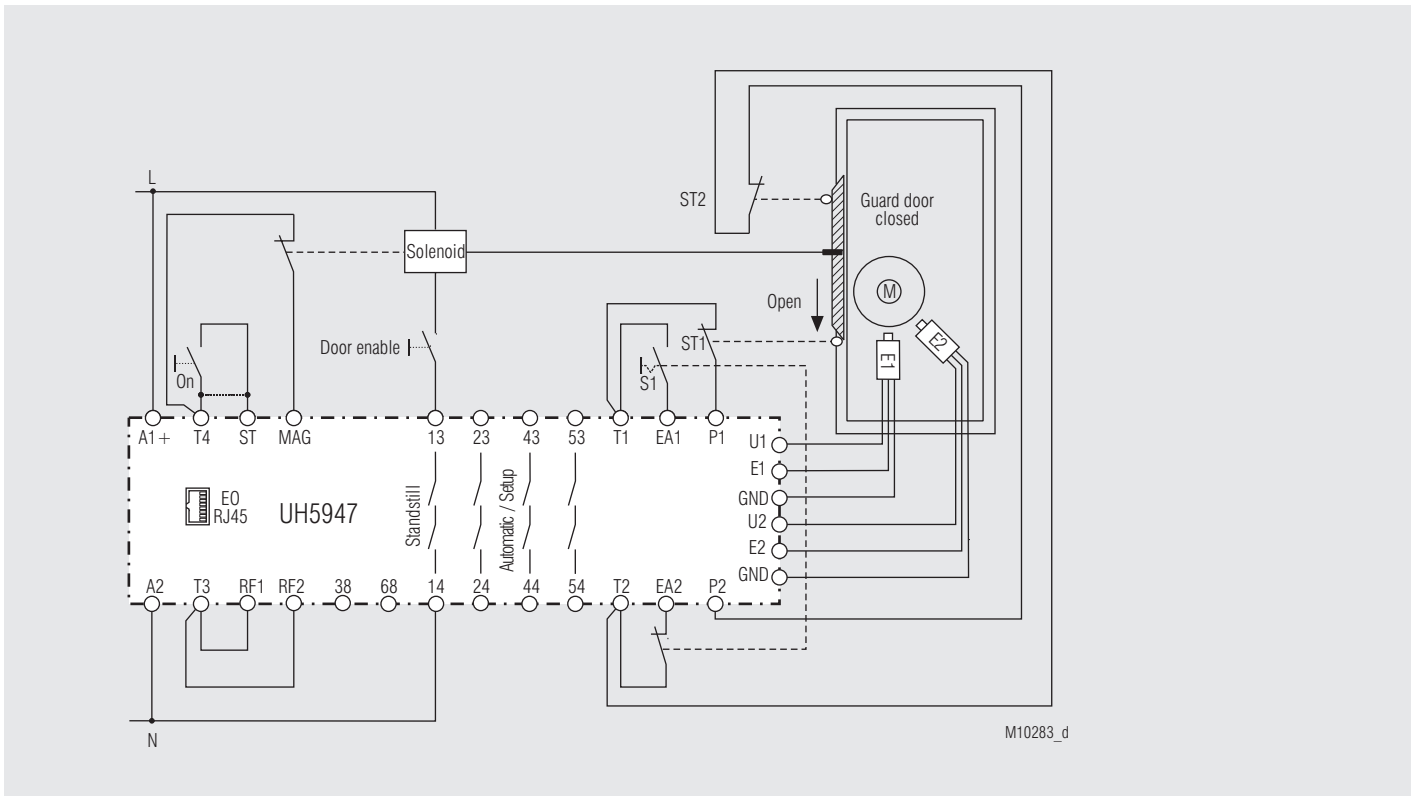
$$I^2 = I_1^2 + I_2^2 + I_3^2 + I_4^2$$

$I_1, I_2, I_3, I_4$ - Strom in den Kontaktpfaden

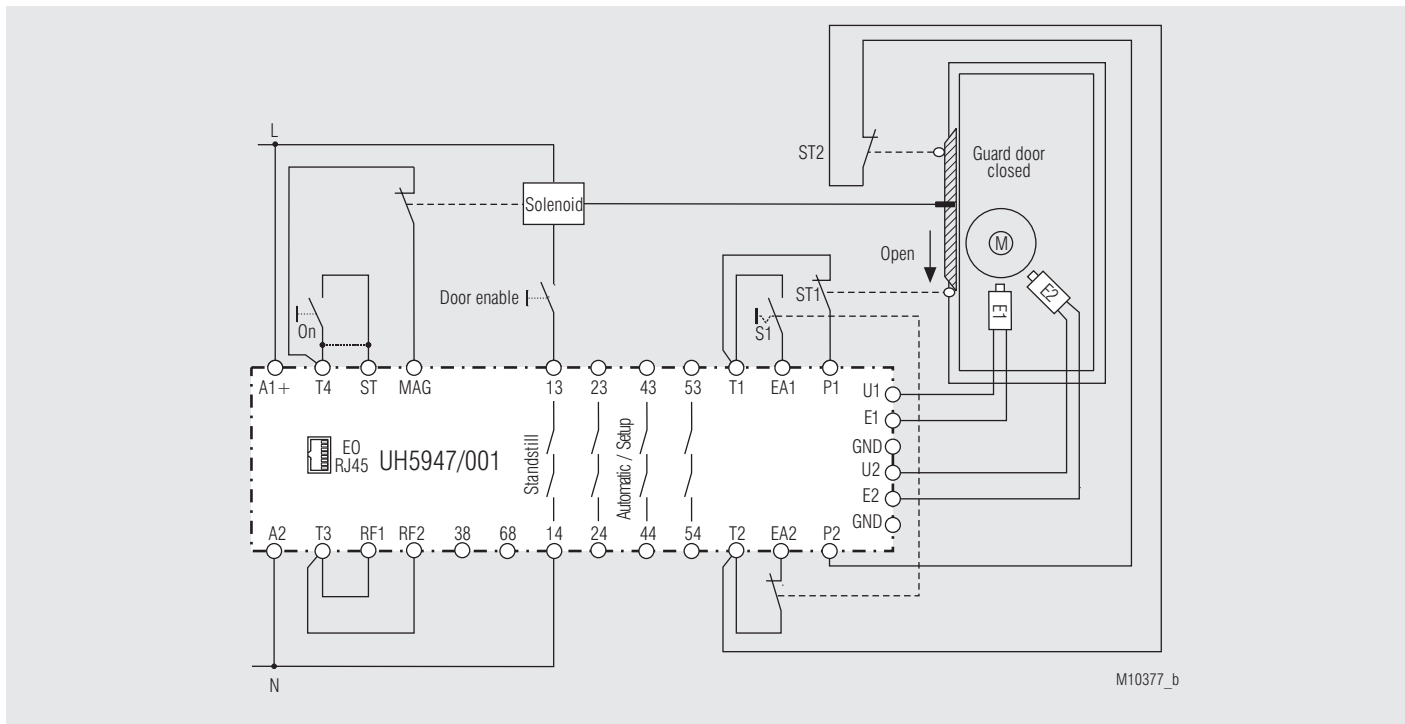
quadratic total current limit curve



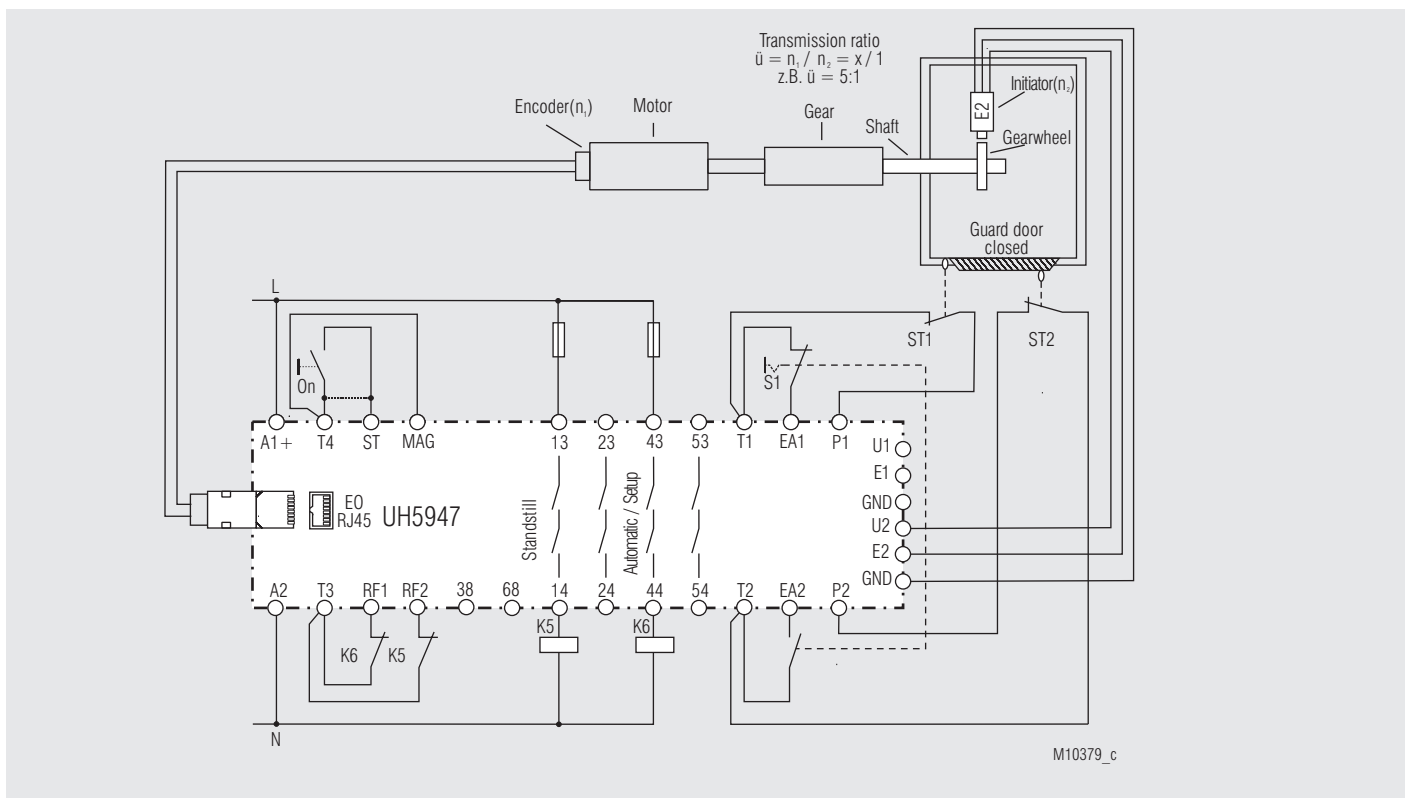
Rotational speed and standstill monitoring with suitable encoder, automatic mode; for manual start: ON/OFF pushbutton to T4/ST; for automatic start: jumper to T4/ST; suited up to SIL3, Performance Level e, Cat. 4 (Requirement for Cat. 4 is, that during longer periods of standstill a forced dynamisation ( $t < 24$  h) has to be carried out).



Two-channel rotational speed and standstill monitoring by means of two NPN or PNP proximity sensors; automatic mode; safety gate monitoring active; for manual start: ON/OFF pushbutton to T4/ST; for automatic start: jumper to T4/ST; suited up to SIL3, Performance Level e Cat. 4 (Requirement for Cat. 4 is, that during longer periods of standstill a forced dynamisation ( $t < 24$  h) has to be carried out).



Rotational speed and standstill monitoring by means of encoder and two NAMUR-sensor; automatic mode; safety gate monitoring active; for manual start: ON/OFF pushbutton to T4/ST; for automatic start: jumper to T4/ST; suited up to SIL3, Performance Level e; Cat. 4



Rotational speed and standstill monitoring by means of encoder and one NPN or PNP proximity sensor; setup mode; gear ratio set; safety gate monitoring active; for manual start: ON/OFF pushbutton to T4/ST; for automatic start: jumper to T4/ST; suited up to SIL3, Performance Level e, Cat. 4 (Requirement for Cat. 4 is, that during longer periods of standstill a forced dynamisation ( $t < 24$  h) has to be carried out).