SAFEMASTER S
Frequency Monitor
UH 6937

Translation
of the original instructions

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0272174

Contents

Before installing, operating or maintaining this device, these instructions must be carefully read and understood.

The installation must only be done by a qualified electrican!

Do not dispose of household garbage!
The device must be disposed of in compliance with nationally applicable rules and requirements.

Storage for future reference

To help you understand and find specific text passages and notes in the operating instructions, we have important information and information marked with symbols.

Symbol and Notes Statement

DANGER:
Indicates that death or severe personal injury will result if proper precautions are not taken.

WARNING:
Indicates that death or severe personal injury can result if proper precautions are not taken.

CAUTION:
Indicates that a minor personal injury can result if proper precautions are not taken.

INFO:
Referred information to help you make best use of the product.

ATTENTION:
Warns against actions that can cause damage or malfunction of the device, the device environment or the hardware / software result.

General Notes

The product hereby described was developed to perform safety functions as a part of a whole installation or machine. A complete safety system normally includes sensors, evaluation units, signals and logical modules for safe disconnections. The manufacturer of the installation or machine is responsible for ensuring proper functioning of the whole system. DOLD cannot guarantee all the specifications of an installation or machine that was not designed by DOLD. The total concept of the control system into which the device is integrated must be validated by the user. DOLD also takes over no liability for recommendations which are given or implied in the following description. The following description implies no modification of the general DOLD terms of delivery, warranty or liability claims.

Designated Use

The UH 6937 Frequency Monitor serves the secure recognition and/ or supervision of over- and under-frequencies or for the supervision of a set frequency window. The detection of the frequency is enabled via the frequency measuring inputs: E1a, E1b, E2L, E2H, E3L and E3H. The frequency (revolution) ranges, the supervisory function and other parameters are to be set by the user on the front display and can be adjusted to suit a variety of applications.
When used in accordance with its intended purpose and following these operating instructions, this device presents no known residual risks. Non-observance may lead to personal injuries and damages to property.

Safety Notes

Risk of electrocution!
Danger to life or risk of serious injuries.

- Disconnect the system and device from the power supply and ensure they remain disconnected during electrical installation.
- The device may only be used for the applications described in the mutually applicable operating instructions / data sheet. The notes in the respective documentation must be heeded. The permissible ambient conditions must be observed.
- Note the VDE and local regulations, particularly those related to protective measures.

Risk of fire or other thermal hazards!
Danger to life, risk of serious injuries or property damage.

- The device may only be used for the applications described in the mutually applicable operating instructions / data sheet. The notes in the respective documentation must be heeded. The permissible ambient conditions must be observed. In particular, the current limit curve must be heeded.
- The device may only be installed and put into operation by experts who are familiar with this technical documentation and the applicable health and safety and accident prevention regulations.

Functional error!
Danger to life, risk of serious injuries or property damage.

- The device may only be used for the applications described in the mutually applicable operating instructions / data sheet. The notes in the respective documentation must be heeded. The permissible ambient conditions must be observed.
- The device may only be installed and put into operation by experts who are familiar with this technical documentation and the applicable health and safety and accident prevention regulations.
- The unit should be panel mounted in an enclosure rated at IP 54 or superior. Dust and dampness may lead to malfunction.

Installation fault!
Danger to life, risk of serious injuries or property damage.

- Make sure of sufficient protection circuitry at all output contacts for capacitive and inductive loads.

Attention!

- The safety function must be triggered during commissioning.
- Any continuously repeated switching over of the speed modus (always immediately after the expiry of the switchover time period) can lead to the situation, that the equipment starts to function similarly as in the ‘Muting Mode’ (i.e. the speed monitoring function is overridden and the output relays remain permanently on).
- The adjusted parameters must be filled in the „Formular for documentation of the setting parameters“.
- Opening the device or implementing unauthorized changes voids any warranty

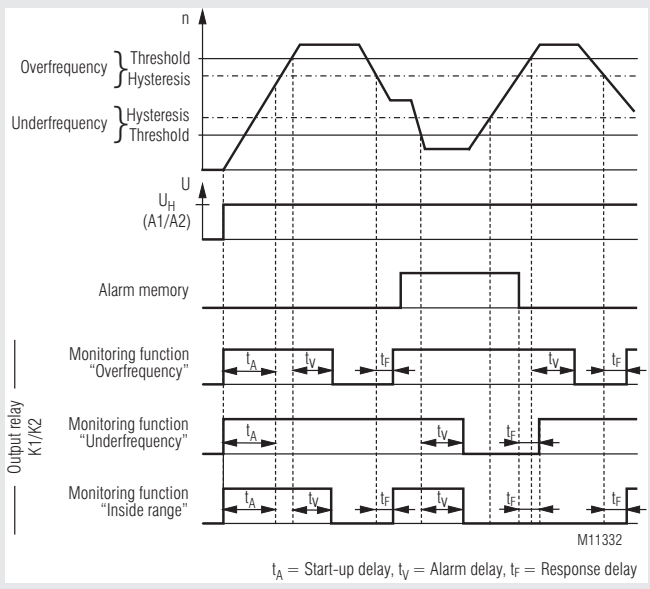
SAFEMASTER S
Frequency Monitor
UH 6937

0273539

Product Description

The frequency monitor UH 6937 provides safe frequency monitoring of AC voltages. It is used to monitor the output frequency of inverters or the rotor frequency of slipring motors. An other application area is the monitoring of motors in crane plants. Using the front side display the parameters can be easily and comfortably adapted to the individual application or changed when necessary.

Function Diagram



t_A = Start-up delay, t_V = Alarm delay, t_F = Response delay

Your Advantage

- For safety applications up to PL e / Cat. 4 and SIL 3
- 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
- For inverters up to 1200 Hz
- Possible languages: english, german, french

Features

- **According to**
  - **Performance Level (PL) e und category 4 to EN ISO 13849-1**
  - **SIL-Claimed Level (SIL CL) 3 to IEC/EN 62061**
  - **Safety Integrity Level (SIL 3) to IEC/EN 61508**
  - **Safety Integrity Level (SIL) 3 to IEC/EN 61511**
- Over-, underfrequency or window monitoring of single or 3-phase in AC systems
- Integrated user friendly frontside display
  - Comfortable, menu guided configuration
  - For set point and actual value of Hz
- Fast reaction time by measuring duration of cycle of input frequency
- Universal measuring inputs for AC-voltages of 8 ... 280 V for single-phase monitoring as well as 16 ... 690 V for single- and 3-phase monitoring
- Suitable for inverters
  - Variant /0_ _ : 1 ... 700 Hz
  - Variant /1_ _ : 1 ... 1200 Hz
- Adjustable hysteresis
- Adjustable reset delay function from 0 ... 100 s
- Adjustable start up time delay from 0 ... 100 s
- Adjustable alarm delay from 0.1 ... 100 s
- Manual or auto-reset
- galvanic separation between measuring input, auxiliary voltage and output contacts
- 2-channel function
- Forcibly guided output contacts
- LED-indicators and 2 semiconductor monitoring output
- Width 45 mm
- With pluggable terminal blocks for easy exchange of devices
- Variant /_ _1:
  - it is possible to set a variety of response parameters by means of a 4 bit selection facility from an overriding control unit;
  - analog output (2V to 10V) corresponding to the current speed;
  - the possibility of overriding the speed by a supervisory function (muting);
  - adjustable switchover time from 0 ... 100 s

Approvals and Markings

CE · TÜVRheinland CERTIFIED Functional Safety Type Approved www.tuv.com ID 0600000000 · c UL us LISTED Canada / USA

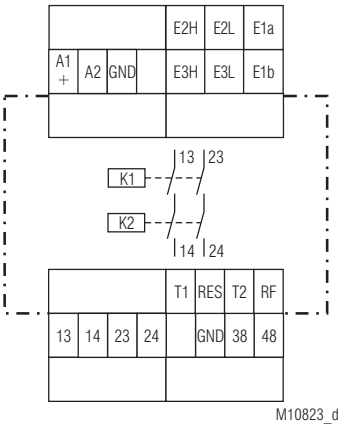
Applications

Safe frequency monitoring of AC voltages

- Safe monitoring of the outputfrequency of inverters
- Safe monitoring of the rotorfrequency of slipring motors
- Safe control / monitoring of motorts in crane applications

With correct connection it is possible to realise with the UH 6937 the safety functions STO (Safe Torque Off), SOS (Safe Operating Stop), SLS (Safely Limited Speed), SSM (Safe Speed Monitor) and SSR (Safe Speed Range) according to EN 61800-5-2. The actual realisation of the safety functions has to be validated in each application of the product for safety aspects.

Circuit Diagrams



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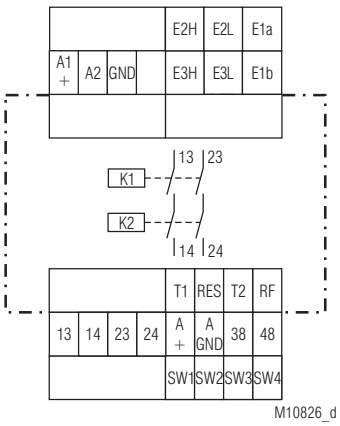


UH6937/_ _1

Connection Terminals

Terminal designation	Signal designation
A1+	DC24V
A2	0V
E1a, E1b, E2L, E2H, E3L, E3H	Frequency measuring inputs
GND	Reference potential for semiconductor monitoring output and control outputs
13, 14, 23, 24	Forcibly guided NO contacts for release circuit
38, 48	Semiconductor-monitoring output
T1, T2	Control output
RES, RF, SW1, SW2, SW3, SW4	Control input
A +, A GND	Analogue output

Functions

The auxiliary voltage is connected to terminals A1-A2. he equipment can be configured via the display and the setting keys on the front plate. Terminals E1a, E1b, E2L, E2H, E3L and E3H form the measuring input.
For low voltages the measuring voltage is connected to E1a-E2L and E1b-E3L and for higher voltages to E1a-E2H and E1b-E3H (see section technical data).
When monitoring single phase AC voltage, it is recommended to connect the terminals E1a-E2L or E1a-E2H directly to the inverter, the terminals E1b-E3L or E1b-E3H directly to the motor connection terminals. Seperate wires in separate cables with space to each other have to be used for each of the frequency inputs. When monitoring 3-pase AC voltages it is recommended to wire these terminals directly to the motor connection terminals.
The input frequency is compared to the setting value. As the device measures the cycle duration the fastest frequency measurement is possible.
Should the over-frequency function be set, then the output relay will switch to the alarm mode, when the set response parameter is over-exceeded longer than the parametered alarm-delay function (t_V). Should the frequency fall again below the response parameter, minus the set hysteresis, the output relay will be activated after the expiry of the reset-delay time period (t_F) and return to its pre-set permitted supervisory state.
As regards the under-frequency function, the output relay will switch to the alarm mode, when the set response parameter is under-exceeded longer than the parametered alarm-delay function (t_V) time period. As soon as the frequency return to the range governed by the response parameter, plus the set hysteresis, then the output relay will again return to the pre-set permitted state after the expiry of the reset-delay time period (t_F).

Functions

In the „internal window function mode“, the output relay will switch to the alarm setting when the frequency exceed the pre-set permitted range of the response parameter. Once the frequency again return within the range of both the upper- and lower response parameters, minus and/or plus the pre-set hysteresis values (upper response parameter minus- and/or the lower response parameter plus -the relative hysteresis values), then the output relay will again switch back to the pre-set permitted range after the expiry of the reset-delay time period (t_F).
In the „external window function mode“, the monitoring function acts inversely to the „internal window function“. Should the manual reset function be activated, then the output relay continues to remain in the alarm setting when the frequency return to the pre-set permitted range. A resetting of the saved parameter is possible when the reset input is activated or the auxiliary voltage is shutdown. When a start-up delay time period (t_A) is set, then the set start-up delay time period will initially expire as soon as the auxiliary voltage of the equipment is switched-on and the ‘RF’ feedback circuit is closed. The start-up delay time period will also expire after a reset of the manual reset mode. During this time period, a frequency evaluation is disabled and the output relays remain at the pre-set permitted setting. The start-up delay function can, for example override an alarm message during the start-up stage of a generator or electric motor. Should, after a reset (in the manual reset mode), the feedback circuit not be closed, then the equipment will go into a safe error state.
With correct connection it is possible to realise with the UH 6937 the safety functions STO (Safe Torque Off), SOS (Safe Operating Stop), SLS (Safely Limited Speed), SSM (Safe Speed Monitor) and SSR (Safe Speed Range) according to EN 61800-5-2. The actual realisation of the safety functions has to be validated in each application of the product for safety aspects.

Indicators

LED ON:	green	On, when supply connected
	green-flashing	Parameterization mode
	red-flashing	Parameterization error
LED K1/K2:	green	Relay K1 and K2 energized
	yellow	Muting (Relay K1 and K2 energized)
LED ERR:	red	Internal failure
	red-flashing	External failure
LED t:	green-flashing	(K1/K2; light up) Delay times runoff t_A or t_U
	yellow-flashing	(K1/K2 does not light up) Delay times runoff t_F
	yellow-flashing	(K1/K2 light up) Delay times runoff t_V
DISPLAY:		Status indication Alarms / diagnostics Parameterization

Frequency measuring input
The measuring input is divided up in to voltage ranges (AC 8 ... 280 V on E1a-E2L und E1b-E3L and AC 16...690 V on E1a-E2H and E1b-E3H). If the measuring voltage is always higher then AC 16 V, the higher range should be used. A special dimensioned measuring input with low pass characteristic avoids the measuring of the pulse frequency. In addition the input sensitivity is adapted to the voltage-/frequency-characteristic of inverters.
Plesae make sure that the frequency measuring inputs are connected to the same single or 3-phase voltage system.

Manual reset, automatic reset
In the manual reset mode, a reset-input function is provided for acknowledging error messages (overfrequency and underfrequency. Should a 'T1' status engage the input for longer than 1 second, then a reset will be conducted in the equipment. A renewed reset is however possible if the reset signal at the reset input is briefly interrupted. In the automatic reset mode, the input will be ignored because the above mentioned error message will be automatically reset.

Semiconductor outputs
The Semiconductor Output: 38 will indicate the status of the Relays: K1 / K2. When the relays are energized, then the Semiconductor Output: 38 is switched on. The Semiconductor Output: 48 will report errors within the equipment. Should an error actually exist, then the Semiconductor Output: 48 will be switched on.
The semiconductor outputs are not safety related. They can be used for monitoring purposes.

Setting the frequency thresholds
For the monitoring functions: „internal window monitoring function" and in the „external window monitoring function", a minimum difference between the lower- and the upper -threshold of 5% is to be anticipated at the upper frequency threshold, in addition to the already set hysteresis parameter. This is internally verified during the setting of the speed threshold and an error message will be displayed in case of any erroneous setting and/or the setting will not be permitted by the display. The maximum settable lower frequency threshold can be calculated as follows:

Monitoring function: „Internal window monitoring":
Maximum lower threshold =
upper frequency threshold - (5% + 2 x hysteresis) x upper frequency threshold
Example:
Upper frequency threshold 100 Hz, hysteresis 2 %
Maximum lower frequency threshold =
100 Hz - (0.05 + 2 x 0.02) x 100 Hz = 91 Hz

Monitoring function: „External window monitoring:
Maximum frequency threshold =
upper frequency threshold - 5 % x upper frequency threshold
Example:
Upper frequency threshold 100 Hz, any required hysteresis
maximum lower frequency threshold =
100 Hz – 0.05 x 100 Hz = 95 Hz

Feedbak circuit
The feedback contacts of external contactors are monitored on terminal RF. The terminal RF gets the test signal from T2 via normally open contacts of the contactors which are connected to terminals 14 and 24. The normally closed contact have to be closed to start the device. If no contact extension or reinforcement is used, the terminals RF and T2 have to br bridged.

Start up time delay t_A
The start-up delay time period expires when switching-on the auxiliary voltage of the equipment, once the 'RF' feedback circuit is closed. In addition, the start-up delay time period will also expire after a reset in the manual reset mode. During this time period, no frequency evaluation is conducted. The LED 't' will flash and the output contacts: 13 to 14 and 23 to 24 will remain closed during this time period. As a result of the start-up delay time period, an alarm message can, for example be overridden during the start-up time period of a generator or electric motor. Should however, after a reset (in the manual reset mode), the feedback circuit not be closed, then the equipment will go into a safe error state.

Alarm delay t_v
The alarm-delay time period will expire when the equipment has recognised, that the frequency exceed the permitted range. Only after the expiry of the alarm-delay time period, will the output contacts :13 to 14 and 23 to 24 be switched off. When the frequency again enter the permitted range during the alarm-delay time period, then the alarm-delay function is terminated. The LED 't' will flash during the time period.

Notes

Reset delay time t_F
The reset-delay time period represents the time during after which the output contacts: 13 to 14 and 23 to 24 are switched on (when the frequency is within a permitted range). Should the frequency again enter the alarm state during the runoff of the reset-delay time period (when the speed exceed the required range), the reset-delay time period will be terminated. The LED 't' will flash during the same time period.
The start-up delay time period will override the reset-delay time period, i.e. when the output contacts are on by the start-up delay mode, then the reset-delay time period will be overridden (output contacts: 13 to 14 and 23 to 24 are closed). Even after an expiry of the start-up delay time period, the reset-delay time period will not be initiated.

Display
In normal operating mode, all settings can be checked at any time by pressing the UP or DOWN keys.
Additionally, the frequency is displayed. However, this frequency does not correspond to the device's accuracy and is only designed for diagnostic purposes.
In the case of wiring errors and system failures corresponding diagnostic messages are displayed on the display.

Parameterization using the display
See attached form page 49.

Change tracking
To detect non permitted changes of the settings, the menue item change tracking is available. This setting allows to activate a counter once, which is then incremented with each confirmed change of the settings. After activation of this function the user cannot reset the counter or disable this function again.
Only at variant /_ _ 1

Digital selection via the software Inputs: SW1 to SW4
Four various frequency modes with different response parameters, can be configured via the software Inputs: SW1 to SW4 (see Table). The electric power supply for the inputs should be between 10V DC and 26.4V DC to GND. A switchover configuration can also be undertaken during the operating mode. Should a frequency mode be altered whilst operating, then the switchover time period (t_U) will commence, provided the output relays are switched on through the switchover, and the start-up delay time period has expired. During this time period, no speed evaluation will be conducted and the output relays remain energized (closed). Should during the switchover time period the speed modus again be altered, then the switchover time will not again be initiated. After the expiry of the switchover time period, the monitoring function will be continued at the currently set frequency mode). The switchover time period, for example can affect the overriding of an alarm message during the start-up stage- or the braking stage -of a generator or electric motor.

SW1	SW2	SW3	SW4	Mode
0	0	1	1	Frequency mode 1
0	1	1	0	Frequency mode 2
1	0	0	1	Frequency mode 3
1	1	0	0	Frequency mode 4

Caution !

Any continuously repeated switching over of the frequency modus (always immediately after the expiry of the switchover time period) can lead to the situation, that the equipment starts to function similarly as in the 'Muting Mode' (i.e. the frequency monitoring function is overridden and the output relays remain permanently on).

Muting function
The frequency monitoring function can be overridden on the display and by an appropriate activation of the software Digital Inputs: SW1 to SW4. For this purpose, the muting function should be activated when parametering on the display. Once this function is activated, then it will continue to be possible to continue to switch over between the frequency moduses: 1 to 3, as described above. Should a selection be made of the frequency mode 4 (muting) via the 'SW' software inputs, then no further frequency monitoring will be conducted. The output relays remain permanently on and the start-up delay function (t_A), the switchover time period function (t_U), the reset-delay function (t_F) and the alarm-delay function (t_V) will all be reset.

Analogue output A+ and A GND
The analogue output 2-10 V shows the actual measured frequency. The maximum value of the analogue output (10 V) is equal to the adjusted upper frequency threshold. The minimum value of the analogue output (2 V) is equal to the adjusted lower frequency threshold. The scaling is frequency linear.
In the monitoring function „underfrequency" the maximum value of the analogue output is equal to the highest possible setting value of the device (Variant UH 6937/0_ _ = 600 Hz and UH 6937/1_ _ = 1000 Hz).
In the monitoring function „overfrequency" the minimum value of the analogue output is equal to 0 Hz.
If the muting function is selected, the maximum value of the analogue output is equal to the maximum setting value of the device (Variant UH 6937/0_ _ = 600 Hz and UH 6937/1_ _ = 1000 Hz) and the minimum value is equal to 0 Hz.
In the case of a failure the analogue output goes to 0V.
The analogue output is not safety related. It can be used for diagnosis.

Switchover time period t_U
The switchover time period expires when the frequency mode is altered during operations at the Software Inputs: SW1 to SW4, the output contacts are closed, no start-up delay function is running and the Switchover Time Period: 'tU' has not already been initiated and/or is running. During this time period, no frequency monitoring is conducted and the output contacts remain on.

The parameterization menü has follow structure: Illustration shows the factory setting [4]
Changing parateters see formular on page 49.

1.	Parameterization			
	1.1	Monitoring function		
		Overfrequency	x	
		Underfrequency	-	
		Inside range	-	
		Outside range	-	
		Esc		OK
	1.2	Limits		
		Frequency mode 1		[1]
		upper limit		[2]
		400.0 Hz		
		lower limit		[3]
		200.0 Hz		
		Frequency mode 2		
		upper limit		
		400.0 Hz		
		lower limit		
		200.0 Hz		
		Frequency mode 3		
		upper limit		
		400.0 Hz		[1]
		lower limit		
		200.0 Hz		
		Frequency mode 4		
		upper limit		
		400.0 Hz		
		lower limit		
		200.0 Hz		
		Esc		OK
	1.3	Hysteresis		
		5 %		
		Esc		OK
	1.4	Time Delay		
		Start-up delay		
		0.0 s		
		Response delay		
		0.0 s		
		Alarm delay		
		0.1 s		
		Changeover bridging		[1]
		0.0 s		
		Esc		OK
	1.5	Alarm memory		
		Alarm memory	x	
		Automatic reset	-	
		Esc		OK
	1.6	Muting function		
		activate	-	
		deactivate	x	
		Esc		OK
	Esc			OK

2.	Display settings			
	2.1	Languages		
		english	x	
		deutsch	-	
		français	-	
		Esc		OK
	2.2	Contrast		
		50	%	
		Esc		OK
	2.3	Backlight		
		OFF	-	
		10 s	x	
		1 min	-	
		5 min	-	
		Esc		OK
	2.4	Status indicator		
		Manual	x	
		10 s	-	
		1 min	-	
		5 min	-	
		Esc		OK
	Esc			OK
3.	Factory settings			
		Parameters		
		Display settings		
		Parameter + display settings		
	Esc			OK
4.	Change tracking			
		activate		
	Esc			OK
Esc				OK

[1] only available at variant /_ _1.
[2] not available at monitoring function „underfrequency“.
[3] not available at monitoring function „overfrequency“.
[4] Customers specific variants have other factory settings. They are available on request.

Technical Data

Frequency Measuring Input

Voltage range
E1a-E2L, E1b-E3L: AC 8 ... 280 V
E1a-E2H, E1b-E3H: AC 16 ... 690 V
(dependent to frequency see characteristic)
Input frequency:
Variante /0_ _: < 700 Hz
Variante /1_ _: < 1200 Hz
Galvanic separation: Frequency measuring input to auxiliary voltage and output contacts
Response value
Variant /0_ _: adjustable from 1 Hz ... 600 Hz
Variant /1_ _: adjustable from 1 Hz ... 1000 Hz
Pulse frequency inverters
Variant /0_ _: ≥ 1 kHz
Variant /1_ _: ≥ 2 kHz
Measuring accuracy: < ± 2 %
Stability of the setting threshold at variation of auxiliary voltage and temperature: < ± 1 %
Hysteresis: adjustable from 2 ... 10 % of the set response value
Reaction time of frequency monitoring: Duration of 1 cycle (inverse value of adjusted frequency) + 10 ms + adjusted response delay
Alarm delay t_V: adjustable from 0.1 ... 100 s
Start up time delay t_A: adjustable from 0 ... 100 s
Reset delay t_F: adjustable from 0 ... 100 s
Switchover time period t_U: adjustable from 0 ... 100 s
Accuracy of the adjustable times: < ± 5 %
Time between connection of auxiliary supply and ready to mesure: approx. 1.5 s (with start up delay is 0)

Auxiliary circuit (A1-A2)

Auxiliary voltage U_H (galvanic separation to measuring input): DC 24 V
The power supply shall meet the requirements of SELV / PELV.
Voltage range: 0.8 ... 1.1 U_H
Nominal consumption: typ. 3.2 W
Short-circuit protection: Internal PTC
Overvoltage protection: Internal VDR
Duty-cycle Reset button: > 1.2 s

Output

Contacts: 2 NO contacts
Contact type: Relay forcibly guide
Thermischer Strom I_{th}: 8 A
(see current limit curve)
Switching capacity
to AC 15: 3 A / AC 230 V IEC/EN 60 947-5-1
to DC 13: 2 A / DC 24 V IEC/EN 60 947-5-1
to DC 13: 4 A / DC 24 V at 0.1 Hz
Electrical life
at 5 A, AC 230 V cos φ = 1: > 2.2 x 10^5 switch. cycl. IEC/EN 60 947-5-1
Short circuit strength
max. fuse rating: 10 A gG / gL IEC/EN 60 947-5-1
Mechanical life: 20 x 10^6 switching cycles
Semiconductor monitoring output: DC 24 V, 50 mA, plus switching
Analogue output: 2 ... 10 V, max. 10 mA

Technical Data

General Data

Nominal operating mode: continuous operation
Temperature range
operation: - 20 ... + 60°C
storage: - 20 ... + 70°C
Altitude: < 2.000 m
Clearance and creepage distance
rated impuls voltage /
pollution degree:
measuring input to the remainder: 6 kV / 2 IEC 60 664-1
output to the remainder: 4 kV / 2 IEC 60 664-1
EMC IEC/EN 61 326-3-1, IEC/EN 62 061
Interference suppression: Limit value class B EN 55 011
Degree of protection:
Housing: IP 40 IEC/EN 60 529
Terminals: IP 20 IEC/EN 60 529
Housing: Thermoplastic with V0 behaviour according to UL subject 94
Vibration resistance: Amplitude 0,35 mm frequency 10 ... 55 Hz IEC/EN 60 068-2-6
Climate resistance: 20 / 060 / 04 IEC/EN 60 068-1
Terminal designation: EN 50 005
Wire connection: DIN 46 228-1/-2/-3/-4
Wire fixing: captive slotted screw
Mounting: DIN-rail IEC/EN 60 715
Weight: approx. 320 g

Dimensions

Width x height x depth: 45 x 107 x 121 mm

Standard Type

UH 6937.02PS/61 DC 24 V
Article number: 0066820
- Output: 2 NO contacts
- Auxiliary voltage U_H: DC 24 V
- Width: 45 mm

Ordering Example

UH 6937 .02 _ _ /_0_ /61 DC 24 V

- DC 24 V: Nominal voltage
- /61: UL-approval
- /_0_: 0 = Standard; 1 = with different frequency mode and analogue output
- _ _: Max. response value 0 = 600 Hz; 1 = 1000 Hz
- _ _: Type of terminals PS (plug in screw): pluggable terminal blocks, with screw terminals
- .02: Contacts
- UH 6937: Type

UL-Data

The safety functions were not evaluated by UL. Listing is accomplished according to requirements of Standard UL60947, "general use applications"

Standards:
- ANSI/UL 60947-1, 5th Edition (Low-Voltage Switchgear and Controlgear Part1: General rules)
- ANSI/UL 60947-5-1, 3th Edition (Low-Voltage Switchgear and Controlgear Part5-1: Control circuit Devices an Switching Elements - Electro-mechanical Control Circuits Devices)
- CAN/CSA-C22.2 No. 60947-1-13, 2nd Edition (Low-Voltage Switch-gear and Controlgear - Part1: General rules)
- CAN/CSA-C22.2 No. 60947-1-14, 1st Edition (Low-Voltage Switch-gear and Controlgear - Part5-1: Control circuit Devices an Switching Elements - Electromechanical Control Circuits Devices)

Nominal voltage U_N:
DC 24 V: Device must be supplied with a Class 2 or a voltage / current limited power supply.

Switching capacity:
Semiconductor monitoring outputs: 24Vdc, 50mA, pilot duty

Switching capacity
Relay output
device free-standing:
Ambient temperature 60°C: Pilot duty B300, Q300
8A 250Vac G.P.
8A 24 Vdc

Device mounted without distances heated by devices with same load:
Ambient temperature 55°C: Pilot duty B300, Q300
5A 250Vac G.P.
5A 24 Vdc

Ambient temperature 60°C: Pilot duty C300, Q300
4A 250Vac G.P.
4A 24 Vdc

Voltage range
E1a-E2L, E1b-E3L: AC 8 ... 280 V
E1a-E2H, E1b-E3H: AC 16 ... 600 V

Wire connection
Ambient temperature
60°C, 4A bzw. 55°C, 5A: min. 75°C aluminum or copper conductors

Ambient temperature
60°C, 8A: min. 90°C aluminum or copper conductors

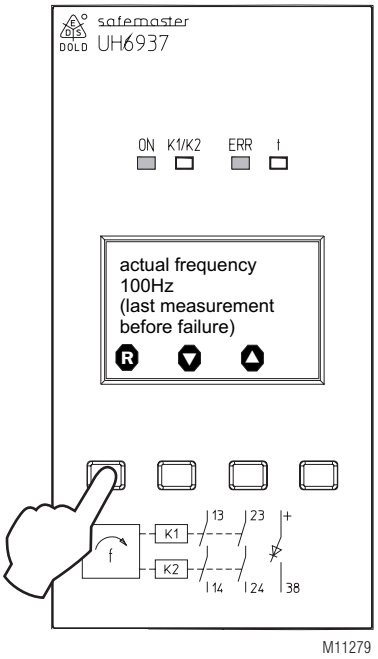
Technical data that is not stated in the UL-Data, can be found in the technical data section.

Troubleshooting

Failure	Potential cause
LED „ON" does not light up	- Power supply A1+/A2 not connected
LED „ON" flashes red	- Parameterization error (detailed description on display)
LED „ERR" flashes red	- External failure (detailed description on display)
LED „ERR" continuously on	- Device failure (if the failure still exists after restart, replace device)

Fault handling

When faults are detected on or in the device they are indicated on the display by an appropriate message. If a reset of the device is necessary due to the fault, at first the alarm and the associated diagnostic message have to be acknowledged. Then, the left key has to be pressed for approx. 3 sec. to initiate a reset of the device.



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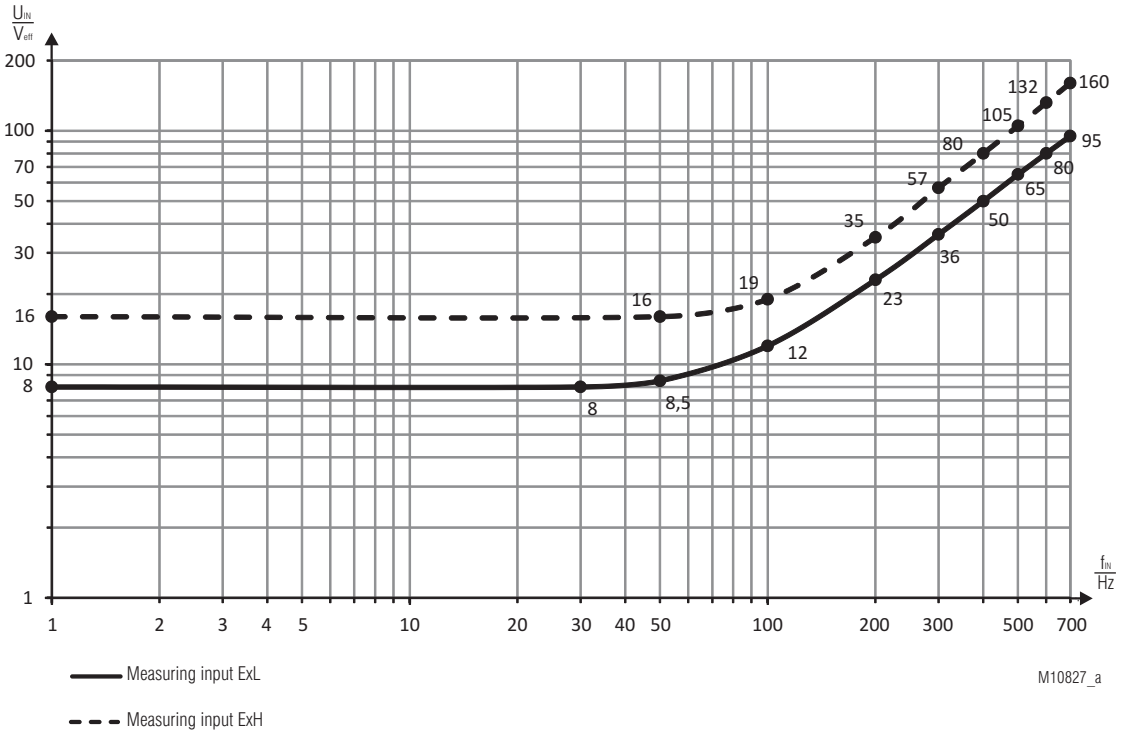
If a system failure is detected again after restart the device must be replaced and sent back to manufacturer.

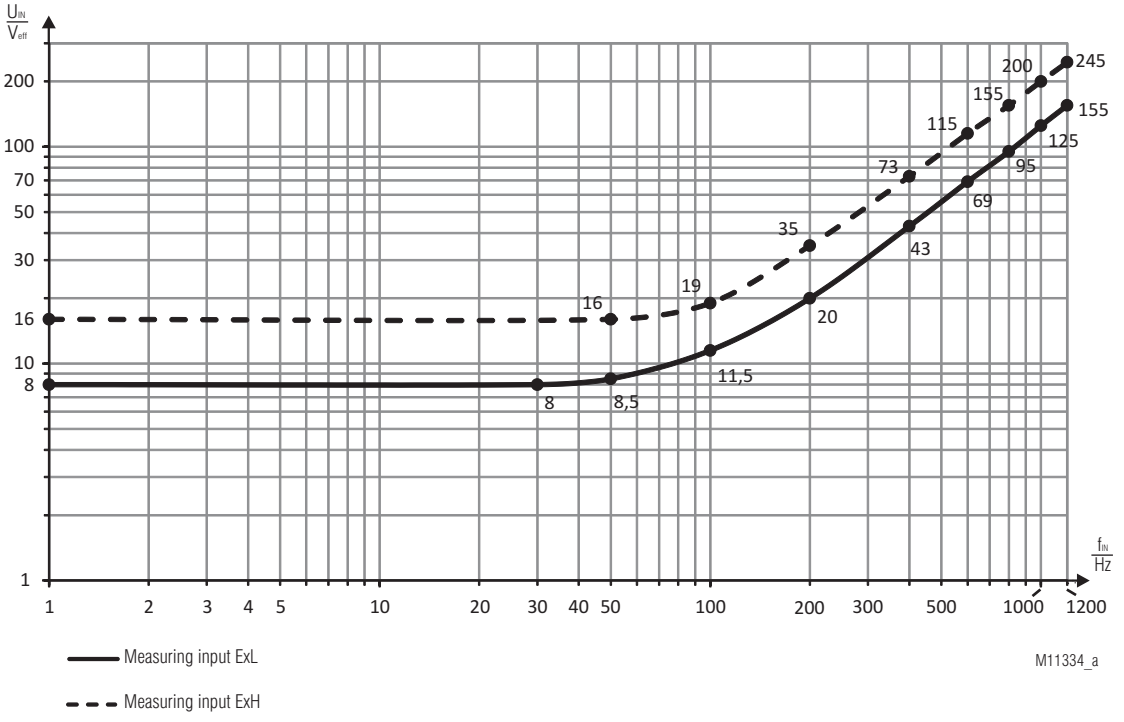
Maintenance and repairs

- The device contains no parts that require maintenance.
- In case of failure, do not open the device but send it to manufacturer for repair.

Characteristic

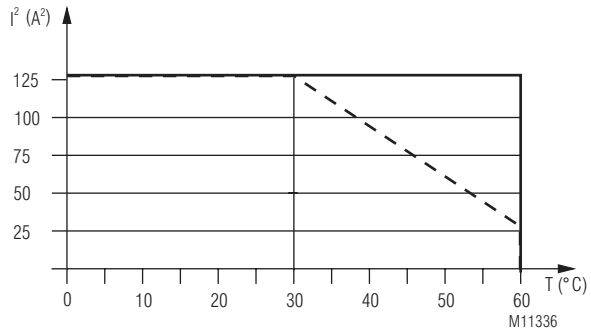


Min. voltage at measuring input for variant /0_ _



Min. voltage at measuring input for variant /1_ _

Characteristic



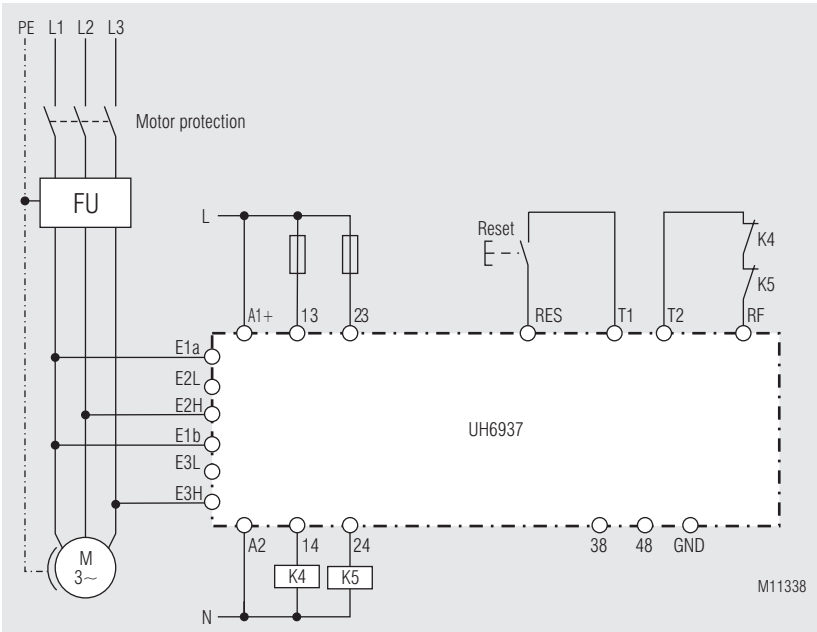
device free-standing
max. current at 60°C over
2 contact path = 8A ≙ $2x8^2A^2 = 128A^2$

device mounted without distance heated by
devices with same load,
max. current at 60°C over
2 contact path = 4A ≙ $2x4^2A^2 = 32A^2$

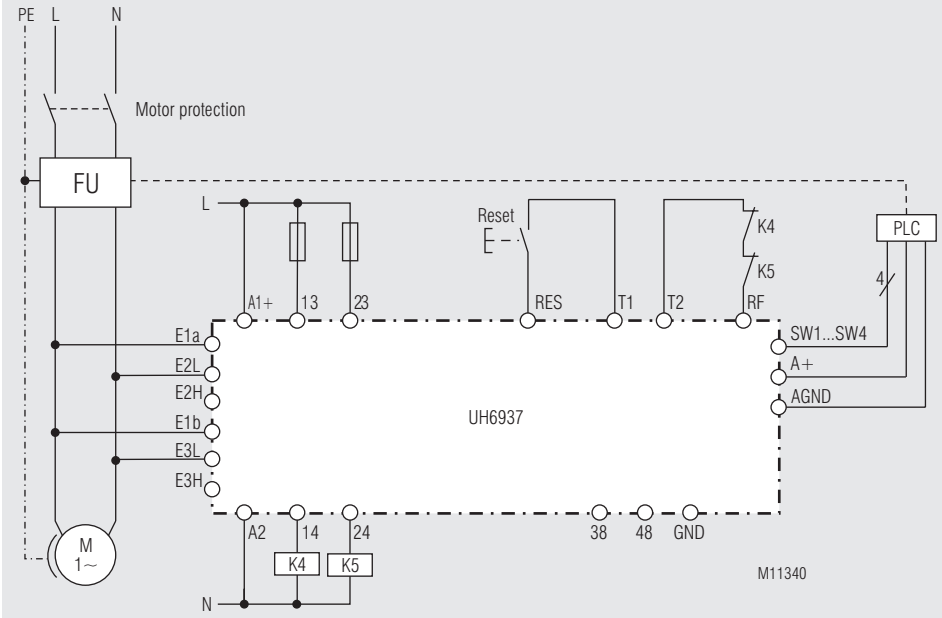
$$\Sigma I^2 = I_1^2 + I_2^2$$

I_1, I_2 - current in contact paths

Quadratic total current limit curve



Inverter monitoring function, 3-phase, suited up to SIL3, Performance Level e, Cat. 4



Inverter monitoring function, single-phase with variant UH6937/_ _1, suited up to SIL3, Performance Level e, Cat. 4