

## Electronic Control Unit SLE 3 Operation Manual

en-US

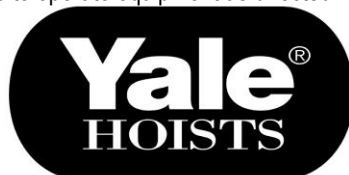
**Before installing hoist, fill in the information below.  
Refer to the Hoist and Motor data plates.**

Model No. \_\_\_\_\_  
 Serial No. \_\_\_\_\_  
 Purchase Date \_\_\_\_\_  
 Voltage \_\_\_\_\_  
 Rated Load \_\_\_\_\_

**Follow all instructions and warnings for inspecting, maintaining and operating this product.**

The use of any hoist presents some risk of personal injury or property damage. That risk is greatly increased if proper instructions and warnings are not followed. Before using this hoist, each operator should become thoroughly familiar with all warnings, instructions and recommendations in this manual. Retain this manual for future reference and use.

Forward this manual to operator. Failure to operate equipment as directed in manual may cause injury.



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# 1 General information

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## 1 General information

### 1.1 General information on these operating instructions

These operating instructions serve as safety manual in the sense of the safety standards for functional safety of the **SLE 3** electronic control unit for the manufacturer's hoists. They are aimed at the manufacturers, operators, commissioning engineers and service personnel of hoists.

They contain requirements and information on intended use of the safety-based control unit.

They must be available to the technical personnel of the machine manufacturer or machine operator during the complete period of use and be followed at all times for assembly, electrical installation, configuration, commissioning, maintenance and diagnosis.

The safety instructions must be followed.

The section "**Safety instructions**" in the manual for the hoist contains further requirements, and the section "**Electrical installations**" provides further information and explanations, which must also be followed.

### 1.2 Contents of the manual

This manual contains information on the following subjects:

- Safety instructions
- Product and functional description
- Installation
- Commissioning and settings
- Testing
- Maintenance
- Error and warning messages, faults
- Decommissioning
- Technical data
- Approvals

The necessary expertise needed for planning and use of protective devices is **not** given or imparted in this manual.

### 1.3 Approvals / Test marks

See section "**Technical data**".

### 1.4 Disclaimer / Loss of warranty

The fundamental requirement for safe operation and achievement of the specified product properties and performance features is:

- Compliance with this manual




Non-compliance will lead to a loss of liability and the warranty for the device and hoist.

# 1 General information

## 1.5 Information about safety messages

### 1.5.1 Explanation of signal words and symbols

The following signal words are used in safety messages.

Signal word	Meaning
 <b>DANGER</b>	Indicates a hazardous situation which, if not avoided, will result in death or serious injury.
 <b>WARNING</b>	Indicates a hazardous situation which, if not avoided, could result in death or serious injury.
 <b>CAUTION</b>	Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.
<b>NOTICE</b>	Indicates possible material or environmental damage.

### 1.5.2 Safety instructions

The fundamental hazards and required safety measures are listed in section “**General safety notes**”.

### 1.5.3 Section safety messages

Section safety messages relate to an entire section and are laid out as follows.





#### SIGNAL WORD

Type and source of hazard


Possible consequences if disregarded

➤ Measures to prevent the hazard

### 1.5.4 Safety alert symbols

Symbol	Meaning
	General hazard
	Electric shock hazard
	Suspended load hazard
	Hand injury hazard

### 1.5.5 Additional symbol

Symbol	Meaning
	Important note

# 1 General information

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## 1.6 Target audience and responsibilities

### Owner

Whoever uses and employs the product or has it operated by suitable trained personnel is considered to be the owner (employer/company).

### Trained personnel

Trained personnel are persons who have been instructed and trained in the duties with which they are entrusted and the risks which may arise from incorrect behavior, have been advised on the necessary protective devices, precautions, applicable regulations, accident prevention regulations and prevailing conditions and have proven their ability.

### Qualified person

A qualified person is a person who by possession of a recognized degree, certificate, or professional standing, or who by extensive knowledge, training, and experience, successfully demonstrates the ability to solve/resolve problems relating to the subject matter, the work, or the project.

### Electrical qualified person

An electrical qualified person is defined as:

One who has received training in and has demonstrated skills and knowledge in the construction and operation of electric equipment and installations and the hazard involved.

## 1.7 Misuse

### ⚠ WARNING

The device may **only** be used according to the instructions and information in this manual.

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## 1.8 Commissioning / Operation / Documentation

### ⚠ WARNING

The **SLE 3** only achieves its safety function when it has been programmed accordingly. The commissioning of a hoist must be documented. This documentation must also contain the overload cut-off point. The signature of the **qualified person** and the operator is needed after commissioning (section "**Commissioning and testing**").

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# 1 General information

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## 1.9 Standards and directives

Hoists in which SLE control equipment is installed are subject to the following directives

- Machinery Directive 2006/42/EC and
- EMC Directive 2014/30/EU

The SLE 3 was built in accordance with the following valid European standards and regulations:

- IEC / EN 60204-32 – Safety of machinery – Electrical equipment of machines – Part 32: Requirements for hoisting machines
- EN 14492-2 – Cranes – Power driven winches and hoists – Part 2: Power driven hoists
- ISO / EN 13849-1 – Safety of machinery – Safety-related parts of control systems – Part 1: General principles for design

## 1.10 Intended use

### The SLE 3

- may only be used for control of a manually controlled single hoist from the manufacturer.
- is intended for industrial installations and may only be used in accordance with the information in the technical documentation and the information on the rating plate.
- contains a safety-related overload cut-off that can, with due regard to the corresponding standards specifically applicable to the machines / systems, be used for the above-mentioned machines and systems in conjunction with a load sensor (see section “**Load sensor**” for specification) up to category 2, PL d, according to EN13849-1:2006.
- is a configurable device that only performs the safety functions after setting of the safety-related parameter “Overload cut-off point”; this parameter may only be changed by a **qualified person**.
- is used in the control equipment as a central safety device for overload protection.
- is used in the hoist control equipment to actuate the motor.
- monitors the temperature of the motor by means of a thermistor (PTC).
  
- The circuit diagrams and schematic circuit diagrams delivered with the hoist must be observed and implemented in control equipment built by the customer.
- When integrating the control, equipment delivered by the manufacturer in a general control system or higher-level PLC, the product standards for hoists and the technical specifications regarding the functionality, signal sequence and timing of the device must be followed.
- The plant manufacturer is responsible for the overall system.

All faults and warnings that are indicated must be corrected immediately. If this is not possible, the device, and therefore also the hoist it controls, must be taken out of service until the fault has been corrected.

Any other use of the device or changes to the device itself, also during assembly and installation, will lead to the loss of all warranty claims against the manufacturer.



## 2 General safety notes

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## 2 General safety notes



The product is constructed according to the state of the art and recognized safety rules. However, during use danger to the life and limb of the user or a third party can arise, or adverse effects can affect the product and other property.

You must follow the safety instructions:

- National and international directives and regulations must be followed for assembly, commissioning, operation and period tests, in particular the Machinery Directive 2006/42/EC, safety rules and country-specific safety regulations.
- The manufacturer and operator of the machine / system must coordinate and observe all applicable safety regulations with the responsible authorities on their own responsibility.
- Detailed instructions for commissioning and tests are described in section 5.

### 2.1 Installation requirements

For applications with the device, observe the following guidelines on electrical installation.

- Switch cabinet assembly, protection at least IP54.
- Implement wiring according to EN 60204-32.
- The load sensor cable must be shielded. Connect the shield to earth potential. Observe the information in the section "**Installation**".
- The fuse may not exceed the value in the table "Technical data".



Sensor cables must be installed separately of main power cables, e.g. in spatially separate ducts or bundles.

#### 2.1.1 Protective conductor

##### WARNING



With a missing protective conductor, an electric shock hazard exists. Material damage, severe injuries or death can result.

- Connect the external protective earth system (PE) close to the terminals of the phase conductor using a protective conductor for each mains connection.

Without a protective earth connection, malfunctions can arise during operation. The protective earth connection facilitates protective equipotential bonding for protection against electric shocks, as well as functional equipotential bonding for the avoidance of electrical interference effects on electronic systems.

### 2.2 Residual hazards

#### **Unexpected start-up:**

- Is prevented after the power supply is restored.
  - The actuation control must also ensure this.
- Physical injuries, e.g. crushing, severed limbs or even death.  
The safety instructions are to be followed and applied!

#### **Direct contact with the power supply:**

Deadly touch voltages can arise:

- from faulty wiring
- from not disconnecting the power supply when working on the control equipment

Physical injuries can remain, e.g. ventricular fibrillation, skin burns.

The electrical qualified person must take this into consideration and take suitable precautions.

#### **Failure of one of the downstream power elements**

- Downstream power elements are not monitored by the **SLE 3**.
  - Failure is to be prevented by the designer of the control equipment by suitable choice.
- In the event of failure, the operator must have the power element replaced immediately by a **qualified person**.

## 3 Product and functional description

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### 3 Product and functional description

#### 3.1 Description

The **SLE 3** is an electronic control unit for hoists. The device can be used to control pole-changing or frequency-controlled drives. It contains a safety-related overload cut-off for hoists in conjunction with a load sensor. It is a configurable system that only performs the overload protection function after parameterization and storage of the safety-relevant parameter (overload cut-off point) in that the lifting movement is switched off safely.

The device also carries out other, non-safety related control and monitoring functions:

- Temperature monitoring for hoist and travel motors
- Display of system states via signaling relays
- Control of the lifting movements with motor management

Counting of operating time

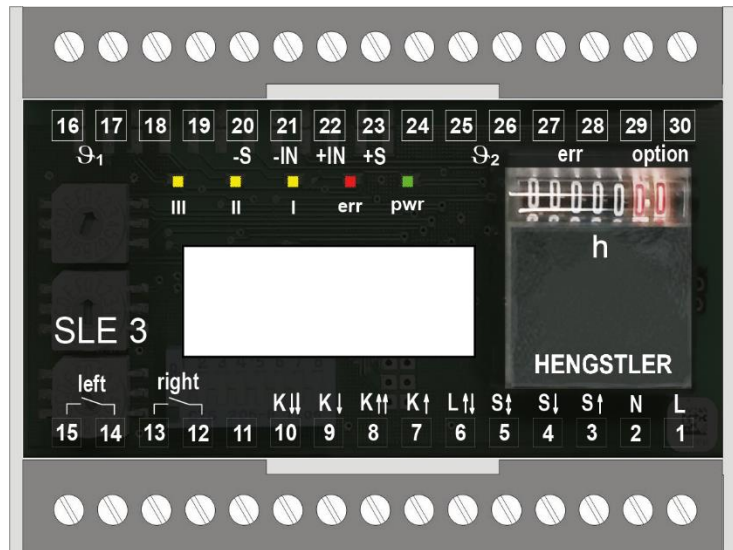
#### 3.2 Load sensor

The **SLE 3** processes signals from passive DMS load sensors (see technical data). The load sensor is a safety-relevant component. Due to this, only load sensors approved by the manufacturer may be used. In the event of a defective load sensor, a sensor of the same type must always be ordered and fitted. The load sensors are specified by the manufacturer appropriately for the respective hoist and load and assigned internally. *Pay attention to the section “**Device and sensor replacement**” when replacing a load sensor.*

**Fitting an unapproved load sensor will cancel the warranty and approval of the device!**

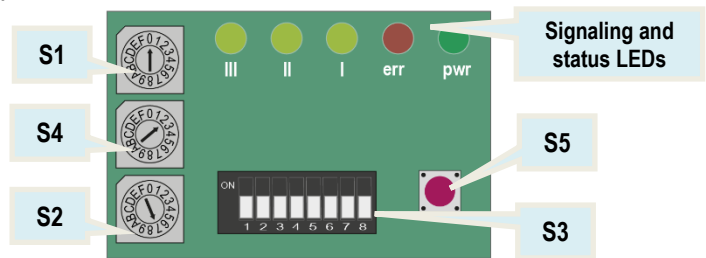
### 3 Product and functional description

#### 3.3 Front view



- S1:** Selector switch motor management
- S4:** Setting cut-off point, rough
- S2:** Setting cut-off point, fine
- S3:** DIP switch: to activate the testing bay functions, relay operation and motor management
- S5:** Enter button: e.g. crane test

Display board



#### ⚠ WARNING

The setting of the stored cut-off point may only be changed by a qualified person. Unauthorized changes will void the warranty!

### 3 Product and functional description

#### 3.4 Block diagram SLE 3

##### Legend

##### Supply

- 1: Power supply
- 2: Power supply reference point

##### Actuation

- 3: Safety input lift
- 4: Safety input lower
- 5: Input fast

##### Relay outputs hoist

- 6: Switching voltage of the relay
- 7: Safety output lift slowly
- 8: Safety output lift fast
- 9: Safety output lower slowly
- 10: Safety output lower fast

##### Relay outputs cross travel

- 12...15 Relay outputs to switch off the travel motors if temperature too high

##### ϑ1

- 16, 17: Thermistor input hoist motor ϑ1

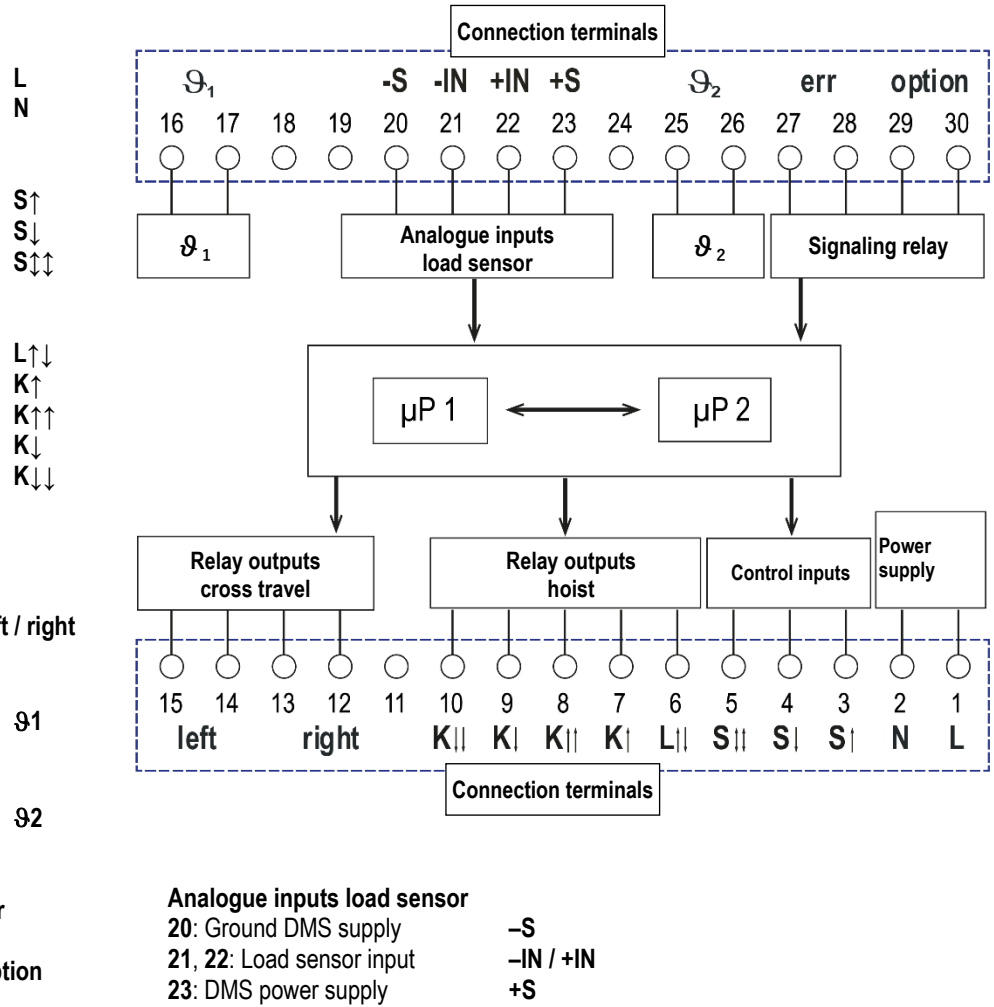
##### ϑ2

- 25, 26: Thermistor input travel motor ϑ2

##### Signaling relay

- 27, 28: Signaling relay err

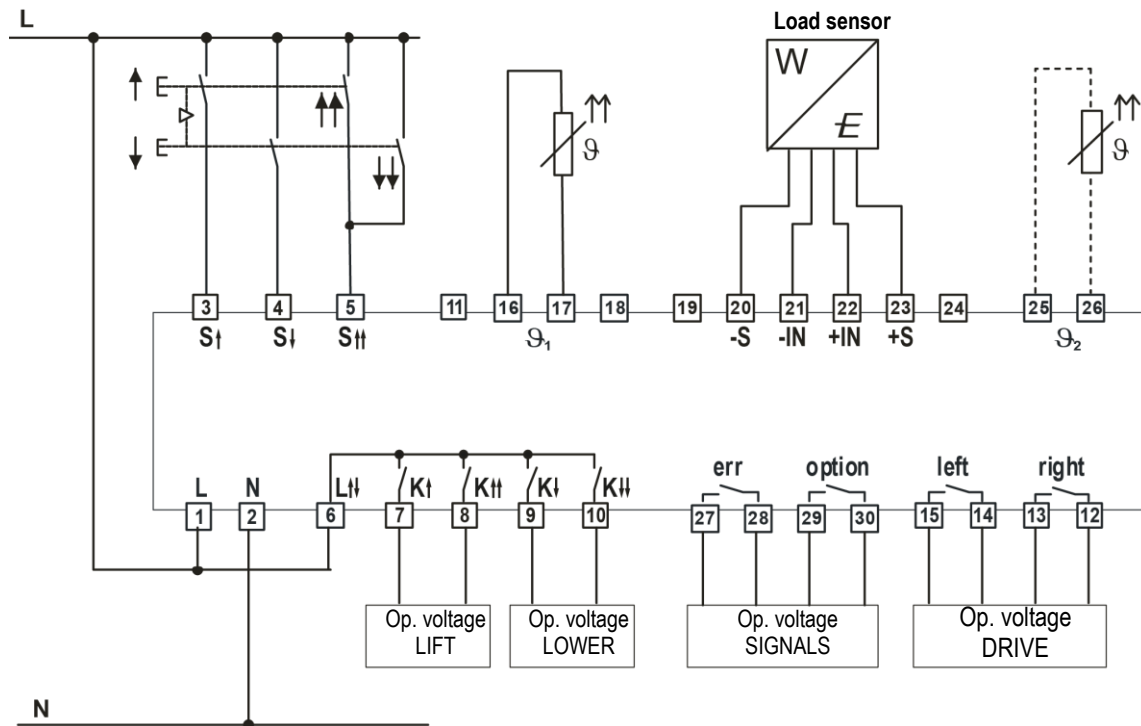
- 29, 30: Signaling relay option



- Analogue inputs load sensor**
- 20: Ground DMS supply -S
- 21, 22: Load sensor input -IN / +IN
- 23: DMS power supply +S

### 3 Product and functional description

#### 3.5 Schematic circuit diagram



#### 3.6 Safety functions

##### 3.6.1 Overload cut-off

The overload cut-off is designed according to Performance Level d, Category 2 in accordance with ISO 13849-1.

As shown in the schematic circuit diagram, the DMS load sensor is supplied with power (10 VDC) via the connections +S and -S. The load-proportional signal voltage ("load signal") of the DMS sensor is connected at the connections +IN and -IN (mV).

The overload cut-off switches off in the following cases:

- If the signal voltage between the connections IN+ and IN- exceeds the cut-off threshold setting while **S↑** is active, the **SLE 3** detects "overload" and switches the outputs **K↑** and **K↑↑** off. The outputs are blocked until no overload is detected any more.
- If the signal voltage between the connections IN+ and IN- exceeds the cut-off threshold setting while the outputs **K↓** and **K↓↓** are active or when stationary, the **SLE 3** detects "overload" after a time of 800 ms and blocks the outputs **K↑** and **K↑↑** until no overload is detected any more.

As a result of internal filter functions, the maximum response time of the cut-off when lifting a load from the ground is 500 ms. For the total response time, the elasticity of the crane system must also be taken into consideration.

"Overload" is acknowledged when the load on the hooks drops below 82.5% of the maximum lifting capacity and the safety input **S↓** is active for a time of at least 2 seconds.

**Switching of the outputs **K↓** and **K↓↓** is possible when an overload has been detected!**

## 3 Product and functional description

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### 3.6.2 Sensor errors

The load signal (+IN/-IN) from the DMS sensor is processed internally in the SLE 3 on two channels and monitored permanently.

The following three types of sensor errors are detected

- broken cable
- short circuit
- differential error between the internal measuring amplifiers in the device – internal error.



See section “**Error messages**” on error diagnosis and correction.

In all three cases of sensor errors the output relays **K**↑ and **K**↑↑ are switched off in dependence on the actuation of the safety inputs **S**↑ and **S**↑↑ and indicated as error code by the device LEDs.

The maximum response time for cut-off of the outputs is:

- when input **S**↑ active = 850 ms
- when input **S**↑ not active = 1950 ms

A sensor error is acknowledged when:

- the cause of the error no longer exists **and**
- the sensor signal is within the function limits **and** lift **S**↑ is not actuated.

#### **WARNING**

**It remains possible to carry out the downwards movement (switching of the outputs **K**↓ and **K**↓↓) in the case of an overload or sensor error so that a suspended load can be put down if necessary!**

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## 3.7 Control and monitoring functions

### 3.7.1 Actuation

The safety inputs **S**↑, **S**↓ and the input **S**↑↑ are read in relation to **N**.

**S**↑ and **S**↓ are kept in the device on two channels in both controllers and evaluated according to Category 2 Performance Level d.

Actuation of **S**↑↑ is only recognized if the corresponding direction **S**↑ or **S**↓ is active at the same time.

If **S**↑ or **S**↓ is actuated from idle state, the **SLE 3** switches the respective safety output **K**↑ or **K**↓ after a maximum delay time of 300 ms.

### 3.7.2 Relay outputs

The relay outputs switch the voltage connected to  $L\uparrow\downarrow$  through to the downstream actuators (e.g. contactor). The control voltage at  $L\uparrow\downarrow$  must correspond to the power supply at  $L$ .

The safety outputs  $K\uparrow$  and  $K\uparrow\uparrow$  are actuated by a safe internal circuit according to Category 2 Performance Level d. This circuit switches the safety outputs  $K\uparrow$  and  $K\uparrow\uparrow$  off in the case of an error or overload.

The safety outputs  $K\downarrow$  and  $K\downarrow\downarrow$  are also actuated by a safe internal circuit according to Category 2 Performance Level d.

This circuit switches the safety outputs  $K\downarrow$  and  $K\downarrow\downarrow$  off in the event of an error (e.g. excessively high temperature at the hoist motor).

The safety output  $K\uparrow\uparrow$  or  $K\downarrow\downarrow$  is only active in conjunction with the safety output  $K\uparrow$  or  $K\downarrow$  respectively.

### 3.7.3 Motor management

The term motor management relates to the off-times for the lifting and lowering movements. The off-times for the **example** of lifting are explained below:

#### Starting at slow speed $t_a$ :

If  $S\uparrow$  and  $S\uparrow\uparrow$  are actuated together,  $K\uparrow$  is switched on first. At the end of the off-time  $t_a$ ,  $K\uparrow\uparrow$  is switched on.

#### Stopping at slow speed $t_b$ :

If  $K\uparrow$  and  $K\uparrow\uparrow$  are active, the output  $K\uparrow\uparrow$  is switched off first at the end of actuation of  $S\uparrow$  and  $S\uparrow\uparrow$ . Actuation of  $K\uparrow$  is also stopped at the end of the deceleration time  $t_b$ .

#### Off-time for slow ( $t_s$ ) and fast ( $t_f$ ) speed:

If  $S\uparrow$  or  $S\uparrow\uparrow$  becomes inactive,  $K\uparrow$  and  $K\uparrow\uparrow$  are also no longer actuated. If  $S\uparrow$  or  $S\uparrow\uparrow$  is switched on again directly afterwards,  $K\uparrow$  or  $K\uparrow$  and  $K\uparrow\uparrow$  is only actuated again at the end of the off-time for the slow  $t_s$  or fast  $t_f$  speed.

#### Off-time for reversal of direction $t_r$ :

When the actuation reverses direction, the hoist is first stopped and the corresponding safety output is actuated at the end of the off-time  $t_r$ .

The length of the follow-up and off-times is set with the switch S1 and the DIP switch S3\_1.

### **▲ WARNING**

**Changes to the settings of S1 and S3\_1 may only be carried out by a qualified person!**





















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### 3 Product and functional description

#### Motor management table

This table shows the relationship between the settings and times:

Motor type	S1	S3	ts [ms]	tf [ms]	tr [ms]	ta [ms]	tb [ms]
Unknown	 0		600	1250	1250	500	500
12/2H33	 1		250	500	500	0	250
12/2H42	 2		250	500	500	0	250
12/2H62	 3		250	500	500	0	250
12/2H71	 4		400	750	750	300	300
12/2H72	 5		400	750	750	300	300
12/2H73	 6		400	750	750	400	400
12/2H91 12/2H92	 7		600	1250	1250	500	500
Ex-Motor A-xxx	 A		400	750	750	0	0
Frequency- controlled	 F		0	0	0	0	0

Motor management parameters for motors from Yale and third-party motors

- F = Setting for operation with a frequency inverter
- In setting 8 ... E, the highest setting, as in item 7, is retained



#### Operation with frequency inverter

When working with a frequency inverter, the switch **S1** is set to "F" and the switch **S3\_1** to "on".

### 3.7.4 Operating time counter

The operating time counter integrated in SLE counts the total number of hours of operation in which the hoist motor is actuated.

### 3.7.5 Temperature monitoring for hoist and travel motors

#### Thermistor input 91

The temperature of the hoist motor is monitored by default. When the motor thermistor (input 91) is actuated, an error is indicated by the device LEDs and all lifting movements (outputs **K↓**, **K↓↓** and **K↑**, **K↑↑**,) are blocked.

The load can only be moved again after cooling of the hoist motor.

#### Thermistor input 92

The travel motor thermistor (PTC) is connected to input 92 (if two or more travel motors, for all). When a travel motor thermistor responds, the **SLE 3** switches the relay outputs **left/right** off and reports this via the device LED (as warning) that the travel motor(s) can no longer be actuated.

When the motor has cooled down, the error is acknowledged automatically by the **SLE 3** and **left/right** is switched on again.

- All thermistors must correspond to the specifications of DIN 44080.
- All thermistors can be replaced with resistors of ~300 Ω if the motors used do not have thermistors.

**NOTE:** The hoist or cross travel motor is then no longer protected against overheating.

**Please observe the section “Technical data”!**



If there is no thermistor connected to 92, the warning signal can be suppressed by switching the slide switch **S3\_2** on.

The relay outputs **left/right** are switched irrespective of this.

### 3 Product and functional description

#### 3.7.6 Signaling relays

**▲ WARNING**

The signaling relays "err" and "option" are used to output error messages and must **not** be used for safety-relevant functions.

The signaling relays may only be parameterized by an **electrical qualified person**.

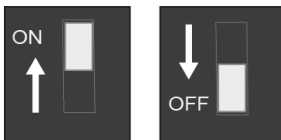
Both relays can be parameterized as normally-closed or normally-open contacts:

Relay	Normally-open	Normally-closed
option	S3_7 off	S3_7 on
err	S3_6 off	S3_6 on

"err" is switched in every error state that stops a **lifting movement**.

"option" is freely parameterizable. Parameterization is dependent on the switch position S3:

DIP switch:



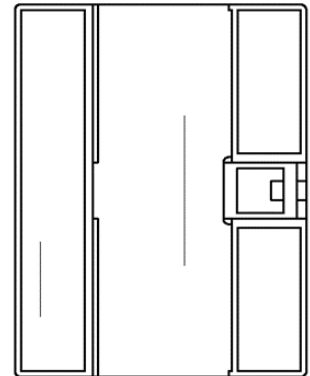
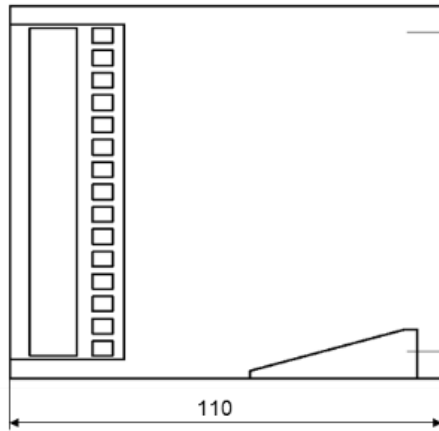
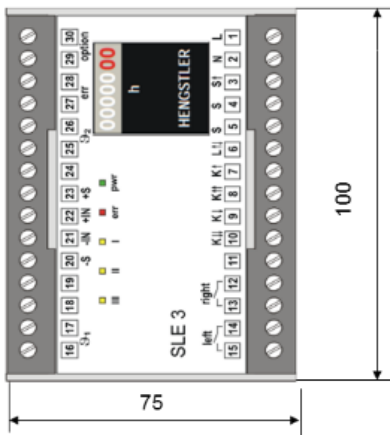
Switch S3_3	Switch S3_4	Switch S3_5	The option relay
0	0	0	does not switch
1	0	0	switches on overload
0	1	0	switches on overheating
1	1	0	switches on sensor error
0	0	1	switches on all errors that prohibit lifting and lowering
1	0	1	Switch-off pulse on overload: option relay switches off for 500 ms and then on again
0	1	1	switches at 95% of nominal load
1	1	1	not used

The settings are made during initial commissioning in the factory.

## 4 Installation

### 4 Installation

#### 4.1 Dimensions



3.94 × 4.33 × 2.95 in. (W x H x D)

#### 4.2 Attachment possibilities

- Snap-on attachment on 1.38 in top hat rail (EN 50022-35)
- Screw attachment enclosure bottom (M4) using pull-out slide

#### 4.3 Cable connection

See section **“Technical data”**.

#### 4.4 Cables

Install sensor cables (load sensor, temperature sensor) and power lines separately of each other. (Example: Installation in different ducts or spatially separate bundles)  
The lengths of the cables for sensors and digital control signals may not exceed the maximum values specified in the section **“Technical data”**.

#### 4.5 Mounting

Mounting in a switch cabinet, at least IP54.

### 5 Commissioning, tests, settings and maintenance

#### **⚠ WARNING**

Commissioning, testing, setting and maintenance work may only be carried out by a qualified person in accordance with this manual.

**The manual for the hoist contain further safety instructions and information on the electrical equipment, which must also be observed.**

---

#### 5.1 Commissioning and regular tests

The commissioning engineer must have all necessary information on the plant and the device available to him.

The test must extend to perfect interaction of the device with the controls of the hoist, the safe state and assembly according to state work regulations and equipment-specific safety rules (directives, product standards, BG rules/information).

The test results are to be documented in writing in a report, which is to be signed by the tester. The report is to be kept at the installation site of the machine/plant.

There are the following types of tests:

##### a) **Tests before initial commissioning and after changes (acceptance tests)**

A test must be carried out before initial commissioning of the **SLE 3** and after changes to the **SLE 3** or components or units involved in the safety function.

A change is considered as all changes to the circuit, the control system, the configuration and the parameters of the **SLE 3** and components or units involved in the safety function. The aim of the tests is to establish that the requirements regarding the hoist are fulfilled when using the **SLE 3** and that the components and units involved in the safety function work perfectly in interaction with the **SLE 3**. The type of use / attachment of the **SLE 3** and the follow-up of the plant must also be tested.

##### Acceptance test: overload cut-off:

Lifting of a **test load** of 110% of the maximum lifting capacity. The device must detect the overload and switch off the lifting movement at the latest after the load has been lifted completely from the floor. According to DIN EN 14492-2, an overload may not be lifted further than a distance of the maximum nominal lifting speed multiplied by 1 s.

##### b) **Regular tests**

The purpose of regular testing is to systematically uncover and correct safety shortcomings (e.g. in the case of changes or manipulations) in the protective devices of the plant after commissioning. According to § 3, par. 3 of the Industrial Safety Regulation, the type, scope and times must be determined and stipulated by the user on an equipment-specific basis. A test period of at least once a year has proven to be appropriate. The test intervals can also be shorter in the case of multi-shift operation, heavy duty or unfavorable environmental conditions or due to national regulations.

This test also includes testing of the overload cut-off point with a test load of 110% of the maximum lifting capacity, safety testing for perfect functioning of the **SLE 3**, inspection of the components, correct and proper attachment of the **SLE 3** and testing of the interaction of the **SLE 3** with the components and units involved in the safety function. The test also includes checking whether the specified limit value for the follow-up is not exceeded.

# 5 Commissioning, tests, settings and maintenance

## 5.2 Change to the cut-off point

**⚠ WARNING**

If, when lifting the test load during initial commissioning, an overload is not detected or the maximum lifting capacity cannot be lifted, a new cut-off point must be saved in the device. This change may only be made by an electrical qualified person with the help of the **testing bay function**. The permissible setting range must be observed here.

### Permissible setting range of the overload cut-off point:

Overload cut-off points between 12 and 30 mV can be set with the SLE 3. This corresponds to a HEX switch setting from the minimum value: S4 = 4 and S2= B (minimum value) to the maximum value: S4 = C and S2 = 2.



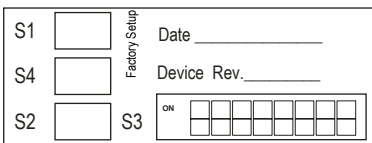
If the sensor value at 110% of the maximum lifting capacity is greater or smaller than the permissible range and a load sensor fault can be ruled out, a larger or smaller load sensor must be used.

## 5.3 Settings

### 5.3.1 Testing bay function

**⚠ WARNING**

The testing bay function involves the setting and saving of an overload cut-off point in the SLE 3. Errors in the activation sequence or when saving a new overload cut-off point can lead to dangerous situations up to falling of the load. The testing bay function may therefore **only** be used by **an electrical qualified person**.



Label on the inside of the front panel

**Changes to the cut-off point must be documented in this manual in the section “Documentation of changes to the cut-off point” and in the crane logbook, stating the reason, and signed by the setter and operator. The new cut-off point must also be noted on the label in the cover (see figure).**

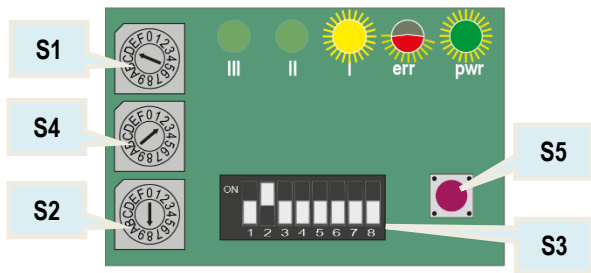
### Preparations for activation of the testing bay function:

The following preparations should be made or organized before activating the testing bay function:

- Get a test load of 110% of the maximum lifting capacity ready.
- Get a load weighing the maximum lifting capacity ready.
- Carefully take off the front panel (device cover) of the SLE 3 with the help of a screwdriver and put in a safe place.

## 5 Commissioning, tests, settings and maintenance




































































### 5.3.2 Activating the testing bay function



The testing bay function can only be activated in stationary state and with no overload on the hook.

**Note the position of the switch S1.**

**The first 3 steps must be carried out in the order described within a maximum time of 16 seconds, otherwise the testing bay function cannot be activated or not finished completely.**

1. Set <b>S3</b> DIP switch 8 to "On". Lifting / Lowering is blocked					
2. Set <b>S1</b> on D					
	III	II	I	err	pwr
3. Press <b>S5</b> until all LEDs light up permanently					
4. Set <b>S3</b> DIP switch 8 to "OFF". The red and all yellow LEDs flash: The testing bay function is now active for 30 minutes. Lifting / Lowering is enabled					
5. Correct the offset of the load sensor: → No load on the hook → Press the button <b>S5</b> until the red LED stops flashing					
6. Set <b>S4</b> = C, <b>S2</b> = F					
7. Lift 110% overload at slow speed and simultaneously turn <b>S4</b> to the left until <b>II</b> and "err" light up					
8. Turn <b>S4</b> one switch position to the right and put down the overload					
9. Lift 110% overload at slow speed and simultaneously turn <b>S2</b> to the left until <b>II</b> and "err" light up					
10. Put down the 110% overload					
11. Test the cut-off point found. Lift 110% overload again. The load may not be picked up from the floor completely. <b>II</b> and "err" light up					
12. Put down the 110% overload					
13. Lift the maximum lifting capacity					
14. Lower the maximum lifting capacity					
15. Save the new overload cut-off point by pressing the button <b>S5</b> until the 3 yellow LEDs stop flashing. Saving is indicated by fast flashing					
16. Set <b>S1</b> back to the previously noted switch position, note the changes and confirm the settings by signing on the enclosure cover.					
17. Restart the device.					

**When the crane test is finished, put the front panel (device cover) back on to the SLE 3 to protect the electronic components against dust and foreign bodies.**

### 5.4 Crane test

#### ⚠ WARNING

When commissioning a hoist, a so-called crane test must be carried out according to manual. To enable this test, the function "Crane test", which increases the overload cut-off point, can be activated.

**The function "Crane test" may only be activated by a qualified person in the presence of a crane expert for the purposes of carrying out the test.**

The crane runway and crane bridge are tested with a load of 125%. To enable this test, the function "Crane test" can be activated. After activation of the function, the cut-off point is set on 137.5% of the maximum lifting capacity for 30 minutes. (125% + 10%)

#### 5.4.1 Activation of the function "Crane test":

The crane test can only be activated in stationary state and with no overload on the hook. The DIP switches S3 must correspond to the setting shown in the enclosure cover.

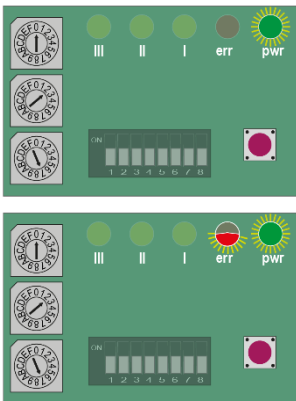
##### Preparation:

Carefully take off the front panel of the SLE 3 (transparent enclosure cover) with the help of a screwdriver.

##### Activation procedure:

The following steps must be carried out within a time of **12 seconds**; the function "Crane test" is then active:

1. Press the button **S5** for longer than **3 seconds** and then let it go again
2. After a **pause** of **1 second**, press the button **S5** again for longer than **3 seconds** until the red LED begins to flash.



**If an error occurs during the activation procedure for the crane test, the red LED flashes three times. After this error indication, the crane test can be activated again.**

#### 5.4.2 Deactivation of the crane test

The function "Crane test" is deactivated by:

- restarting the device
- pressing the button S5 until the red LED goes out

**As soon as the crane test is finished, put the front panel (device cover) back on to the SLE 3 to protect the electronic components against dust and foreign bodies.**



## 5 Commissioning, tests, settings and maintenance

### 5.5 Documentation of changes to the cut-off point

**⚠ WARNING**

After testing of the new cut-off point, it must be documented in the cover of the device, in the following table and in the crane logbook with signatures and confirmed.

**Failure to document a change in the cut-off point will lead to immediate loss of the warranty and is grossly negligent.**

Setting	Reason for change	Operator's signature	Service technician's signature																				
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There is a page with a table as shown above at the end of this manual. This page can be taken out (or copied) and used to document changes to the settings of the SLE 3 in the test book.

## 5 Commissioning, tests, settings and maintenance

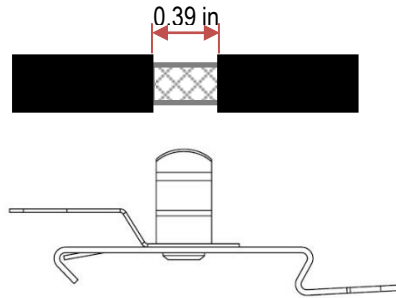
### 5.6 Device or sensor replacement

#### ⚠ WARNING

When replacing a device and/or sensor, the original state of the installation as on delivery of the hoist must be restored. This means in particular that all cables must be installed exactly and reconnected and earthed exactly as specified ex works.

The sensor cable, delivered in a length of 16.4 ft, must be shortened accordingly. Correct grounding of the cable shield at the shield clamp is particularly important.

#### Grounding cable shield:



#### ⚠ WARNING

After replacement of a device or load sensor by a **qualified person**, the commissioning procedure (see section “**Commissioning and testing**”) must be repeated completely and the reading of the operating time counter of the replaced device must be recorded in the crane logbook.

### 5.7 Maintenance

All screw terminals must be checked for tightness during every maintenance assignment, at the latest **annually**, and tightened if necessary.

### 5.8 Wear parts

The **SLE 3** does not have any wear parts. If a device is defective, it must be replaced with an equivalent one. Here it must be ensured that the device has the following properties:

- equal or higher-order hardware version
- equal or higher-order software version
- equal or higher-order temperature range of application

These properties are to be found on the rating plate of the respective device.  
(See section “**Technical data**”)

The device can be procured directly from the manufacturer or one of his sales partners.  
The section “**Device and sensor replacement**” must be followed for installation.

## 6 Error and warning messages, faults

### 6 Error and warning messages, faults

#### WARNING

Testing of the electrical installation may only be carried out by an **electrical qualified person**.  
Changes to the overload cut-off point or a device replacement may only be carried out by a **qualified person**.

#### 6.1 Operation


The detailed description of errors is to be found in the "Service instructions of the manual".






Internal tests are carried out when the power supply is switched on. The LEDs "pwr", "err", "I", "II", "III" light up during this test.  
The SLE 3 is ready for operation when only the LED "pwr" is still on.

Symbols

 LED is off

 LED flashes

 LED lights up

III	II	I	err	pwr	Cause	Consequence	Correction
					Device is ready for operation		

## 6 Error and warning messages, faults

### 6.2 Error state indicators

The **SLE 3** constantly carries out internal tests and tests on the connected sensors and monitors the plausibility of external and internal switch states. If the **SLE 3** detects a problem, an error or error state is set and lifting or lifting and lowering is blocked. The possible errors and their indication are described in the following table and must be corrected before further operation is possible.

III	II	I	err	pwr	Cause	Consequence	Correction
○	○	☀	☀	☀	<b>Sensor error:</b> Broken cable, short circuit	Lifting blocked	<ul style="list-style-type: none"> <li>Check load sensor connection: screw terminals for tightness (-S, -IN, +IN, +S), correct wire assignment per circuit diagram</li> </ul> <ul style="list-style-type: none"> <li>Measure sensor supply voltage (+S / -S): set point value 9.5...10.5 V</li> <li>Measure the output voltage of the connected sensor (-IN / -S, +IN / -S): value approx. 5 V</li> <li>Measure the sensor values at the disconnected sensor: set point values: between wires RED / BLACK: 350 ... 400 Ω between wires BROWN / ORANGE: 346 ... 356 Ω</li> </ul>
○	☀	○	☀	☀	<b>Overload</b>	Lifting blocked	<ul style="list-style-type: none"> <li>Put down the overload and reduce the load</li> <li>Correct the cut-off threshold (during commissioning, with test load)</li> </ul>
○	☀	☀	☀	☀	<b>Overheating 1 or thermistor error</b>	Lifting and lowering blocked	<ul style="list-style-type: none"> <li>Let the motor cool down → the error state is acknowledged automatically</li> <li>Check the wiring of the thermistor</li> <li>Check the thermistor resistance with the motor cold: <ul style="list-style-type: none"> <li>If the measured resistance is 150...750Ω, the thermistor input is defective and the device must be replaced.</li> <li>If the resistance is greater or smaller, the thermistor is defective and the motor must be replaced.</li> </ul> </li> </ul>
☀	○	○	☀	☀	Offset correction error	Lifting blocked	<ul style="list-style-type: none"> <li>Existing device: check the load sensor → see above</li> <li>New device: carry out offset calibration</li> <li>If the error occurs in testing bay mode, then check the load sensor wiring</li> </ul>
☀	○	☀	☀	☀	Lifting and lowering actuated at the same time	Lifting and lowering blocked	<ul style="list-style-type: none"> <li>Error in the wiring.</li> <li>Check the control cables to the terminals 3, 4 and 5 at the SLE</li> </ul>
☀	☀	○	☀	☀	Internal error	Lifting blocked	<ul style="list-style-type: none"> <li>Check the voltage at terminal 6</li> <li>Restart the device</li> <li>If the error occurs again after a restart, the device must be replaced</li> </ul>
○	○	○	○	○	No power supply available, device fuse defective	Device does not work	<ul style="list-style-type: none"> <li>Check the power supply of the device</li> </ul>

## 6 Error and warning messages, faults

### 6.3 Warning messages

A warning detected and indicated by the device does not lead to any restrictions in the lifting movements. The warning is indicated by three LED indicators (flashing) on the front side. A warning can lead to impairment of the travel motion.

III	II	I	err	pwr	Cause	Correction
					Crane test mode is active. Test load for the crane test can now be lifted.	<ul style="list-style-type: none"> <li>The crane test mode can be deactivated by restarting the device or pressing the button S5.</li> </ul>
					Error occurred while activating the testing bay function or the crane test.	Revert the settings to the Hex and DIP switches and start activation from the beginning again.
					<b>Overheating 2 or thermistor error</b>	<ul style="list-style-type: none"> <li>Let the motor cool down →the error state is acknowledged automatically</li> <li>Check the wiring of the thermistor</li> <li>Check the thermistor resistance with the motor cold:               <ul style="list-style-type: none"> <li>If the measured resistance is 150...750Ω, the thermistor input is defective and the device must be replaced.</li> <li>If the resistance is greater or smaller, the thermistor is defective and the motor must be replaced.</li> </ul> </li> </ul>
					Overload cut-off point. Setting was manipulated.	<ul style="list-style-type: none"> <li>Set the overload cut-off point on the smallest-possible value.</li> </ul>
					The set overload cut-off point is greater than the greatest-possible cut-off point.	<ul style="list-style-type: none"> <li>Set the overload cut-off point on the smallest-possible value.</li> </ul>
					The set overload cut-off point is smaller than the smallest-possible cut-off point.	<ul style="list-style-type: none"> <li>Set the overload cut-off point on the smallest-possible value.</li> </ul>
					Testing bay mode active: offset correction not carried out	<ul style="list-style-type: none"> <li>Carry out sensor offset correction</li> </ul>
					Testing bay mode active: offset correction carried out	

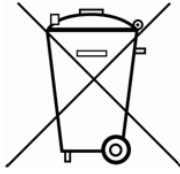
#### WARNING

**If an error cannot be corrected, the service department of the manufacturer or one of his sales partners must be contacted.**

## 7 Decommissioning

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### 7 Decommissioning



The operator is responsible for decommissioning of the plant and thus of the SLE 3.

Electronic components and electric and electronic scrap are special waste. Country-specific environmental laws must be obeyed when disposing of the device. The local authorities will provide relevant information.

The SLE 3 does not have any batteries or rechargeable batteries.

## 8 Technical data

### 8 Technical data

<b>Supply</b>		
<b>Voltage variants</b>	AC voltage: 24 V 50 / 60 Hz 42 V 50 / 60 Hz 48 V 50 / 60 Hz 110/120 V 50 / 60 Hz 230 V 50 / 60 Hz	DC voltage: 24 V DC Residual ripple: ±5 %
Voltage tolerance	90 ... 115 %	
Power consumption at rated voltage	9 VA	
Fuse protection control current circuit	6.3 A, slow blow	
<b>Actuation</b>		
Galvanic isolation	Yes	
Signal level input inactive	< 40 %	of the supply
Signal level input active	> 70 %	
<b>Relay outputs</b>		
<b>Control relays</b> per EN 13849-1, Cat. 2	4	
Utilization category - EN 60947-5-1,	AC15: 250 V / 2 A (inductive load $\cos \varphi=0.7$ ), 5 A (resistive load) DC13: 30 V / 2 A At +158°F (optional) AC15: 250 V / 1.5 A (inductive load $\cos \varphi=0.7$ ), 3 A (resistive load)	
<b>Signaling relays / Temperature monitoring relay</b>	4, volt-free	
Utilization category - EN60947-5-1,	AC15: 250 V / 2 A (inductive load $\cos \varphi=0.7$ ), 5 A (resistive load) DC13: 30 V / 2 A At +158°F (optional) AC15: 250 V / 1.5 A (inductive load $\cos \varphi=0.7$ ), 3 A (resistive load)	
<b>Inputs load sensor</b>		
Load sensor type	Passive DMS sensor, full bridge	
Supply DMS sensor	<b>+S</b>	10 V DC ± 5 %
	<b>-S</b>	0 V DC
Load signal input	<b>+IN</b>	2 mV / V,
	<b>-IN</b>	350 Ω
Measurement range	0...20 mV	
Max. error of measurement at 77°F referred to the smallest-possible cut-off point	±3 %	
Overload cut-off point	Parameterizable	
<b>PTC inputs 91 / 92</b>		
Maximum total initial resistance	Max. 1500 Ω (IEC/EN 60947-8)	
Pick-up resistance	2800 ... 3500 Ω	
Maximum release resistance:	1650 Ω	
<b>Environmental conditions</b>		
Insulation strength	Clearances and creepage distances per IEC/EN 60664 Rated insulation voltage 250 V AC Pollution degree 2 Protection class II Overvoltage categories III	

## 8 Technical data

Impact, vibrations	EN 60068-2-27 10 g – 11 ms EN 60068-2-6 0.118 in at 2...9 Hz; 0.5 g at 9...200 Hz
EMC	EN 61000-6-2-7 Immunity for devices intended to perform functions in safety-related systems (functional safety) at industrial sites EN 61000-6-3 Emission standard for residential, commercial and light-industrial environments
Temperature range operation	-4°F ... +131°F (standard) -4°F ... +158°F (optional)
Storage	-40°F ... +176°F
Dimensions	3.94 × 4.33 × 2.95 in (W x H x D)
Protection	IP 20, EN 60 529
Connection terminals	30 box terminals with captive plus-minus screws Per box terminal: 1 × AWG12 solid or 1 × AWG14 stranded wire with wire ferrules or 2 × AWG16 stranded wire, with wire ferrules Tightening torque of the screw terminals 0.4 lbr ft
Attachment	Top hat rail EN 50022
Weight	1.1 lb
Mounting position	Horizontal, vertical
Maximum cable length	
- Digital control signals	328 ft
- Temperature inputs	164 ft
- Sensor inputs (shielded)	16 ft
Safety parameter values per ISO 13849-1	
SLE 3	
Performance level	d
PFH	5.28 E-07
MTTFd	100 years
DC	84 %
Category	2
Response time	850 ms
Requirements for sensors:	
Performance level	c
PFH	< 1.08 E-06
MTTFd	>= 100 years
Category	1
Requirements for the contactor:	
Performance level	c
PFH	< 1.32 E-06
B10d	> 1,300,000 (assumed cycles/year: 150,000)
Category	1



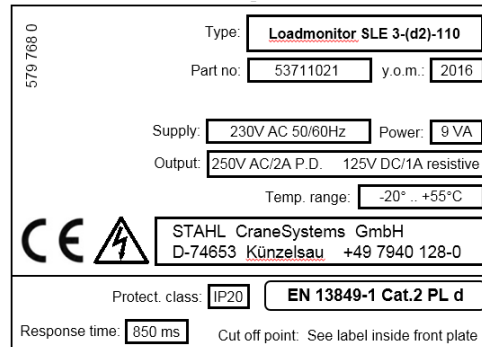
## 8 Technical data

### 8.1 Rating plates

The type designation is to be found on the rating plate. The hardware and software versions are also to be found on the rating plate.

#### Rating plate for countries without UL and CSA approval requirement:

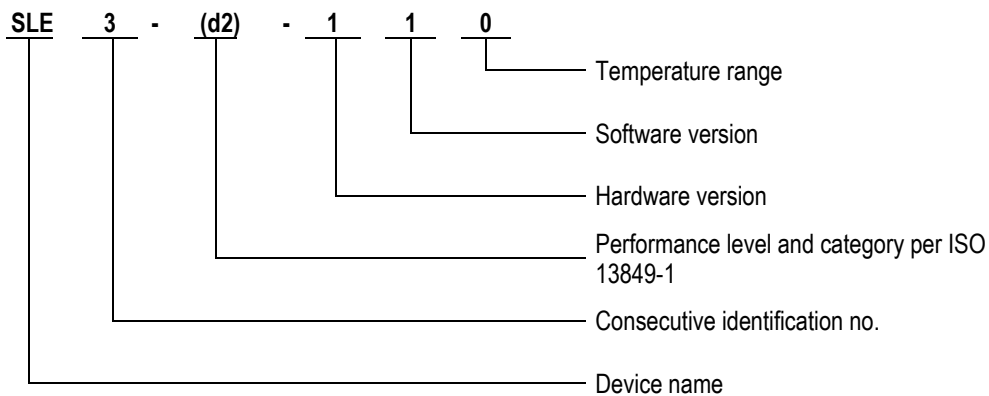
Example:



#### Rating plate for countries with UL and CSA approval requirement:

There is currently not yet UL/CSA approval for the SLE 3.

### 8.2 Type designation



# Annex

Changes to the SLE 3 device setting – Serial number: .....

Setting	Reason for change	Operator's signature	Service technician's signature
S1 <input type="text"/> <small>Factory Setup</small> Date _____ S4 <input type="text"/> <small>Factory Setup</small> Device Rev. _____ S2 <input type="text"/> S3 <small>ON</small> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>			
S1 <input type="text"/> <small>Modified Setup</small> Date _____ S4 <input type="text"/> <small>Modified Setup</small> Device Rev. _____ S2 <input type="text"/> S3 <small>ON</small> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>			
S1 <input type="text"/> <small>Modified Setup</small> Date _____ S4 <input type="text"/> <small>Modified Setup</small> Device Rev. _____ S2 <input type="text"/> S3 <small>ON</small> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>			
S1 <input type="text"/> <small>Modified Setup</small> Date _____ S4 <input type="text"/> <small>Modified Setup</small> Device Rev. _____ S2 <input type="text"/> S3 <small>ON</small> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>			
S1 <input type="text"/> <small>Modified Setup</small> Date _____ S4 <input type="text"/> <small>Modified Setup</small> Device Rev. _____ S2 <input type="text"/> S3 <small>ON</small> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>			
S1 <input type="text"/> <small>Modified Setup</small> Date _____ S4 <input type="text"/> <small>Modified Setup</small> Device Rev. _____ S2 <input type="text"/> S3 <small>ON</small> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>			
S1 <input type="text"/> <small>Modified Setup</small> Date _____ S4 <input type="text"/> <small>Modified Setup</small> Device Rev. _____ S2 <input type="text"/> S3 <small>ON</small> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>			

ba-o.4.1.3-us-3.1-ys | A11867701 Rev AC



# Annex

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## Notes

# WARRANTY

## LIMITATION OF WARRANTIES, REMEDIES AND DAMAGES

### INDEMNIFICATION AND SAFE OPERATION

Buyer shall comply with and require its employees to comply with directions set forth in instructions and manuals furnished by Seller and shall use and require its employees to follow such instructions and manuals and to use reasonable care in the use and maintenance of the goods. Buyer shall not remove or permit anyone to remove any warning or instruction signs on the goods. In the event of personal injury or damage to property or business arising from the use of the goods, Buyer shall within 48 hours thereafter give Seller written notice of such injury or damage. Buyer shall cooperate with Seller in investigating any such injury or damage and in the defense of any claims arising therefrom.

If Buyer fails to comply with this section or if any injury or damage is caused, in whole or in part, by Buyer's failure to comply with applicable federal or state safety requirements, Buyer shall indemnify and hold Seller harmless against any claims, loss or expense for injury or damage arising from the use of the goods.

### CMCO Warranty (HOISTS)

- A. Columbus McKinnon Corporation ("Seller") warrants to the original end user ("Buyer") that: (a) for a period of one (1) year from the date of Seller's delivery of the goods (collectively, the "Goods") to the carrier, the electrical components of the Goods will be free from defects in workmanship and materials; and (b) for a period of three (3) years from the date of Seller's delivery of the goods (collectively, the "Goods") to the carrier, the mechanical components of the Goods will be free from defects in workmanship and materials.
- B. IN THE EVENT OF ANY BREACH OF SUCH WARRANTY, SELLER'S SOLE OBLIGATION SHALL BE EXCLUSIVELY LIMITED TO, AT THE OPTION OF SELLER, REPAIR OR REPLACEMENT, F.O.B. SELLER'S POINT OF SHIPMENT, OF ANY GOODS THAT SELLER DETERMINES TO HAVE BEEN DEFECTIVE OR, IF SELLER DETERMINES THAT SUCH REPAIR OR REPLACEMENT IS NOT FEASIBLE, TO A REFUND OF THE PURCHASE PRICE UPON RETURN OF THE GOODS TO SELLER. NO CLAIM AGAINST SELLER FOR ANY BREACH OF (i) SUCH WARRANTY WITH RESPECT TO THE ELECTRICAL COMPONENTS OF ANY GOOD SHALL BE VALID OR ENFORCEABLE UNLESS BUYER'S WRITTEN NOTICE THEREOF IS RECEIVED BY SELLER WITHIN ONE (1) YEAR FROM THE DATE OF SELLER'S DELIVERY TO THE CARRIER AND (ii) SUCH WARRANTY WITH RESPECT TO THE MECHANICAL COMPONENTS OF ANY GOOD SHALL BE VALID OR ENFORCEABLE UNLESS BUYER'S WRITTEN NOTICE THEREOF IS RECEIVED BY SELLER WITHIN ONE (1) YEAR FROM THE DATE THE DATE ANY ALLEGED CLAIM ACCRUES. EXCEPT FOR THE WARRANTY SET FORTH ABOVE, SELLER MAKES NO OTHER WARRANTIES WITH RESPECT TO THE GOODS, WHETHER EXPRESSED OR IMPLIED, INCLUDING ANY WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, QUALITY AND/OR THOSE ARISING BY STATUTE OR OTHERWISE BY LAW OR FROM ANY COURSE OF DEALING OR USE OF TRADE, ALL OF WHICH ARE HEREBY EXPRESSLY DISCLAIMED.

- C. IN NO EVENT SHALL SELLER BE LIABLE TO BUYER OR ANY THIRD PARTY WITH RESPECT TO ANY GOOD, WHETHER IN CONTRACT, TORT OR OTHER THEORY OF LAW, FOR LOSS OF PROFITS OR LOSS OF USE, OR FOR ANY INCIDENTAL, CONSEQUENTIAL, SPECIAL, DIRECT OR INDIRECT DAMAGES, HOWSOEVER CAUSED. SELLER'S MAXIMUM LIABILITY TO BUYER WITH RESPECT TO THE GOODS SHALL IN NO EVENT EXCEED THE PRICE PAID BY BUYER FOR THE GOODS THAT ARE THE SUBJECT OF THE APPLICABLE CLAIM.
- D. Seller shall not be liable for any damage, injury or loss arising out of the use of the Goods if, prior to such damage, injury or loss, such Goods are: (1) damaged or misused following Seller's delivery to the carrier; (2) not maintained, inspected, or used in compliance with applicable law and Seller's written instructions and recommendations; or (3) installed, repaired, altered or modified (a) with any part or accessory other than those supplied by Seller or (b) without compliance with such laws, instructions or recommendations.
- E. This warranty is limited and provided only to the original end user. **Each Good must be registered within sixty (60) days of receipt of each product to establish eligibility.** Please register at [www.cmworks.com/hoist-warranty-registration](http://www.cmworks.com/hoist-warranty-registration) or submit registration card via US mail.
- F. Any action against Seller for breach of warranty, negligence or otherwise in connection with the electrical components of any Good must be commenced by Buyer within one (1) year after: (a) the date any alleged claim accrues; or (b) the date of delivery of the Goods to Buyer, whichever is earlier. Any action against Seller for breach of warranty, negligence or otherwise in connection with the mechanical components of any Good must be commenced by Buyer within one (1) year after the date any alleged claim accrues.
- G. This warranty is contingent upon Buyer's proper maintenance and care of the Goods, and does not extend to normal wear and tear. Seller reserves the right, at its option, to void this warranty in the event of Buyer's use with the Goods of parts or accessories other than those supplied by Seller.

### **WARNING**

**Alterations or modifications of equipment and use of non-factory repair parts can lead to dangerous operation and injury.**

#### TO AVOID INJURY:

- Do not alter or modify equipment.
- Do use only factory replacement parts.



**USA:** Ph: (800) 888.0985 • (716) 689.5400 • Fax: (716) 689.5644 • [www.cmworks.com](http://www.cmworks.com)

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