d-LIST
Line Type Heat Detector

Manual

SCU 800-03
SCU 800/16
SEC 15

Valid as of:

Firmware version V2.00

CONTENT

1 CONVENTIONS

> ⇨ **Important**: Notes in a text box of this type are of utmost importance to correct and successful installation and operation of the system. These notes must be adhered to at all times.

☞ Font format for further reading.

Font format for abbreviations.

Font format for important information.

1.1 ABBREVIATIONS

BR	Pin header, male
CBO	Connection box
CC	Connection cable (CC 15)
CCM	Cable conection module
CLB2	Two-pole flexible flat cable female crimp connector
DQ	Data (sensor cable)
EMI	Electro magnetic interference
END	End cap
EEPROM	Electrically erasable programmable read only memory
ESD	Electrostatic Discharge
GND	Ground (electrical)
GUI	Graphical user interface
IP	Ingress protection
KL	Terminal
LED	Light-Emitting Diode
NC	Normally Closed (relays)
NO	Normally Open (relays)
PC	Personal computer
PLC	Programmable Logic Controller
RAM	Random access memory
REL	Relay
ROM	Read only memory
SECcon	Prefabricated sensor cable connector
SCADA	Supervisory Control and Data Acquisition
SCON	Shield connector
SCU	Sensor Control Unit (SCU 800)
SEC	Sensor cable (SEC 15)
SLMB	Single line monitoring board
ST	Connector receptacle
TA	Push button
UCM	Universal connection module
UCM-ESD	Universal connection module for external sensors
UCM-SEC	Universal connection module for sensor cables
VK	Cables between control unit and PC

2 SAFETY AND GENERAL INFORMATION

2.1 SAFETY

Read ***before*** installing the product. Retain and follow all product safety and operating instructions. Always refer to the documentation supplied with the equipment, whether printed or in electronic format. Observe all warnings in the operating manual.

SCU:

> ⇨ **Important:** To avoid damage to the control unit and to the sensor cable, disconnect the power cable before adding or removing cables or printed circuit boards.
>
> When working on an open unit provisions against **ESD** must be applied, such as an earthing mat with wrist strap.
>
> Connections may only be made while the unit is ***switched off***.

Appropriate shipping, handling, and storage, as well as professional installation, commissioning and operation are all required to assure safe functioning of the equipment.
Never pour any liquid into the housing of the equipment. Short circuits and fire could result.
Do not drop the equipment.
The control unit's service temperature ranges from ***-10 °C*** to ***+60 °C***. Avoid exposure to moisture.

Get the equipment checked by service personnel, if

- moisture has penetrated into the equipment.
- it does not work well, or it does not work according to the user's manual.
- it was dropped or damaged.
- it shows obvious signs of breakage.

Sensor cable:

> ⇨ **Humidity:** The sensor cable ends must always be protected from humidity, i.e. the cable ends must be sealed while storing or mounting the cable.

> ⇨ **Bending:** The minimum bending radius of the sensor cable is ***25 cm***. This limit must be adhered to at all times.

> ⇨ **Installation temperature:** Ambient temperature, as well as the cable's intrinsic temperature, should be above ***+10 °C*** or ***+45 °F***.

In case of doubt contact your supplier.

2.2 WARRANTY

All parts of the d-LIST sensor cable systems have been manufactured with greatest precision and the highest degree of care. Nevertheless, the possibility of a malfunction occurring during operation can not be ruled out entirely.

In the event of a problem contact the authorised installer or the supplier of your system.

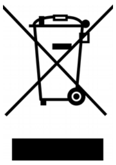
The two year warranty period begins with the date of delivery. All parts, that become defective because of a demonstrable flaw in their manufacture or material, will be replaced or repaired free of charge during this period. Such cases will not extend the original warranty period, nor will a new warranty period be granted for the replaced or repaired parts.

Beyond these regulations, the current “General Conditions for the Supply of Products and Services of the Electrical and Electronics Industry”, issued by ZVEI, the Zentralverband Elektrotechnik- und Elektronikindustrie e.V., are applicable.

2.3 STANDARDS AND CONFORMITY

The **SCU 800** and **SEC 15** sensor cable have been tested according to applicable European guidelines and other relevant standards as outlined in the Declaration of Conformity, and are marked with the CE sign.

WEEE



A product carrying this symbol may not be treated as household waste. By ensuring correct disposal, you will help to prevent potential negative consequences for the environment and human health.

For more detailed information, please contact your waste disposal service.

RoHS

All products and components follow the RoHS guidelines and requirements.

2.4 DOCUMENTATION STRUCTURE

The documentation for the installation, commissioning and maintenance of d-LIST systems consists of two manuals.

1. d-LIST manual 60T280:

   This manual describes all the steps required to install and commission a d-LIST system.
   - ☞ SYSTEM DESCRIPTION: A description of the d-LIST system with its major components, **SCU 800** operation modes and functionality
   - ☞ INSTALLATION: Installation of the sensor cable, connection boxes and the **SCU 800**
   - ☞ SENSOR CABLE CONNECTIONS
   - ☞ SCU CONNECTIONS AND SETTINGS: **SCU 800** main-, **LED**- and relay-board connections, as well as their jumper and switch settings
   - ☞ INDICATORS AND OPERATION: **LED**-display and operation
   - ☞ COMMISSIONING
   - ☞ INSPECTION AND MAINTENANCE: Inspection and maintenance information

2. ***LISTp800*** manual 60T281:

   LISTp800 graphical user interface (**GUI**) for **SCU 800** systems, including configured-mode commissioning (☞ 3.3) and maintenance of d-LIST systems.

Further documentation:

1. **SCU 800** data sheet 60V041
2. **SEC 15** data sheet 60V040
3. External sensor data sheet 60V039
4. Service case data sheet 60V057
5. Commissioning protocol 60T015
6. **SCU 800** sensor list 60T081
7. Inspection sheet 60T028
8. Maintenance report 60T005
9. ***LISTp800*** manual 60T281

2.5 VALIDITY

This document is valid as of the following versions:

SCU 800 firmware	V2.00
SCU main board	06
LED board	02
Relay board REL800/16	05

The version number of the software is printed on the **ROM**. Version numbers of circuit boards are printed in square brackets next to the serial number.

3 SYSTEM DESCRIPTION

d-LIST is a temperature measurement and heat detection system based on a sensor cable with integrated temperature sensors, which can be used in the harshest environmental conditions due to its sealed construction and high temperature resolution.

A d-LIST system consists of a control and evaluation unit **SCU 800** with two sensor cable ports and **SEC 15** sensor cable.

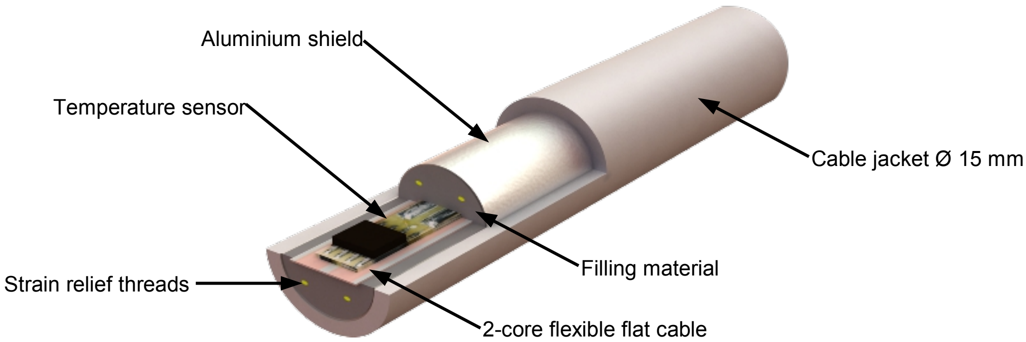
The **SEC 15** sensor cable has addressable temperature sensors mounted on a 2-core flexible flat cable. The digital temperature transmission allows maximum cable lengths of ***250 m***, respectively ***99 sensors*** for each of the two sensor cable ports.

Sensor spacing is application dependent and freely selectable. The sensor cable may also be branched, as long as certain limitations are respected (☞ 3.1). The temperature sensor's fixed addresses allow an exact physical location of each sensor.

Each sensor's position is indicated by a contiguous numerical imprint on the sensor cable jacket ☞ Imprints (☞4.1).

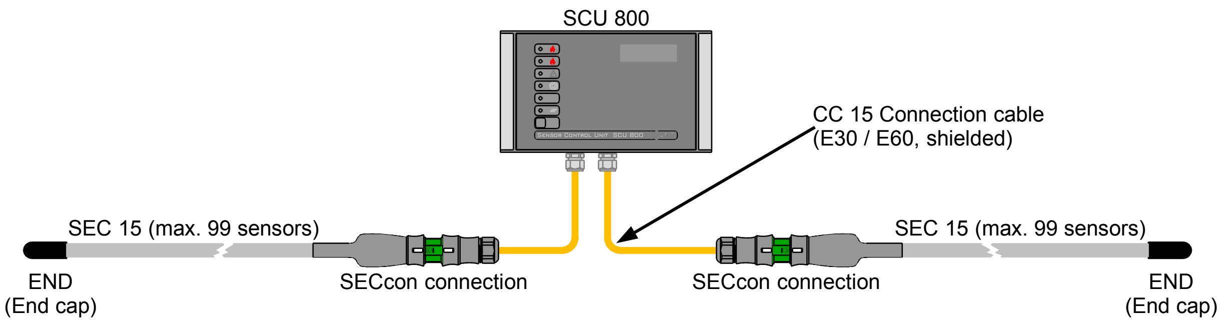
> ⇨ **Note:** A d-LIST system requires ***at least ten*** sensors for a correct differential temperature evaluation.

An aluminium shield screens the cable from **EMI**. The jacket-material is flame-retarding and halogen-free. The operating temperature range of the d-LIST sensor cable is specified from ***-40°C*** to ***+85°C***.



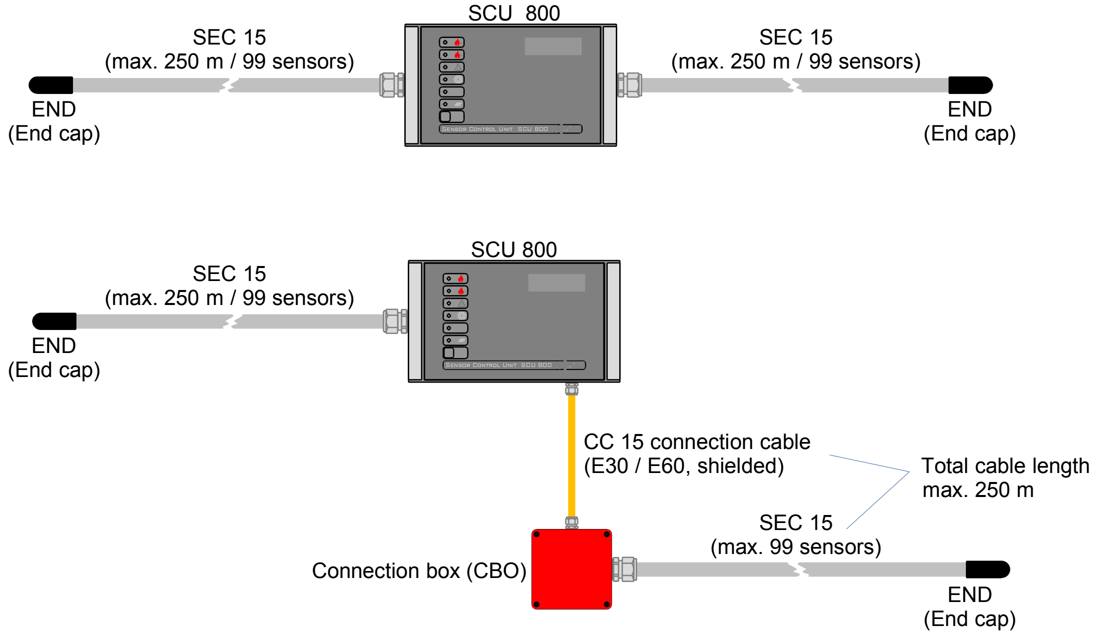
Following sensor cable connection types are available:

- **SECcon:**
  Sensor cable prefabricated with connectors (☞ 5.1)



- Branching not possible.
- 250 m maximum total cable length per sensor cable port (SEC 15 + CC 15).
- 99 sensors maximum per sensor cable port.
- Sensor cable is delivered prefabricated.
- Quick connection on site, no special tools required.

- Crimped connections:
  The sensor cable is fitted with crimp- and shield-connectors, which are connected to the **SCU** either directly (☞ 6.1.1), or via connection cables and connection modules (☞ 5.2.5).



Two variants are available for this connection type:

- Prefabricated sensor cable:
  Crimp contacts and shield connectors are already fitted to the sensor cable.
  - Sensor cable branching is possible, if length limitations as listed below are met.
  - 250 m maximum total cable length per sensor cable port (**SEC 15** + **CC 15**).
  - 99 sensors maximum per sensor cable port.
  - Sensor cable is delivered prefabricated.
  - Quick connection on site, no special tools required.

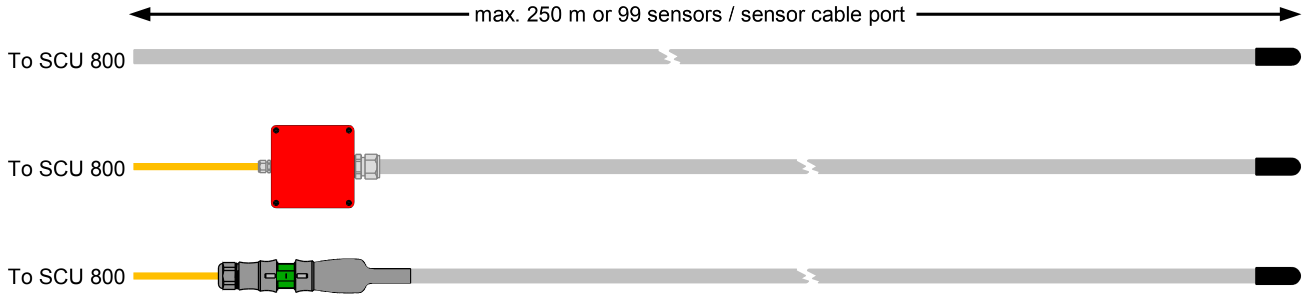
- Crimping on site:
  Stripping and crimping of the sensor cable takes place on site.
  - Sensor cable branching is possible, if length limitations as listed below are met.
  - 250 m maximum total cable length per sensor cable port (**SEC 15** + **CC 15**).
  - 99 sensors maximum per sensor cable port.
  - Connections can be made as required, allowing for flexible installation.
  - Special tools are required.

The **SCU** supplies power to the d-LIST sensor cable (5V DC), performs cyclic addressing of the connected sensors, reads measured temperature values and evaluates the data according to various criteria (☞ 3.4.1).

3.1 CABLE LENGTHS

⇨ **Definition:**
Total cable length specifies the sum of all cable lengths connected to one sensor cable port.
Total cable length = SEC 15 Sensor cable + CC 15 connection cable

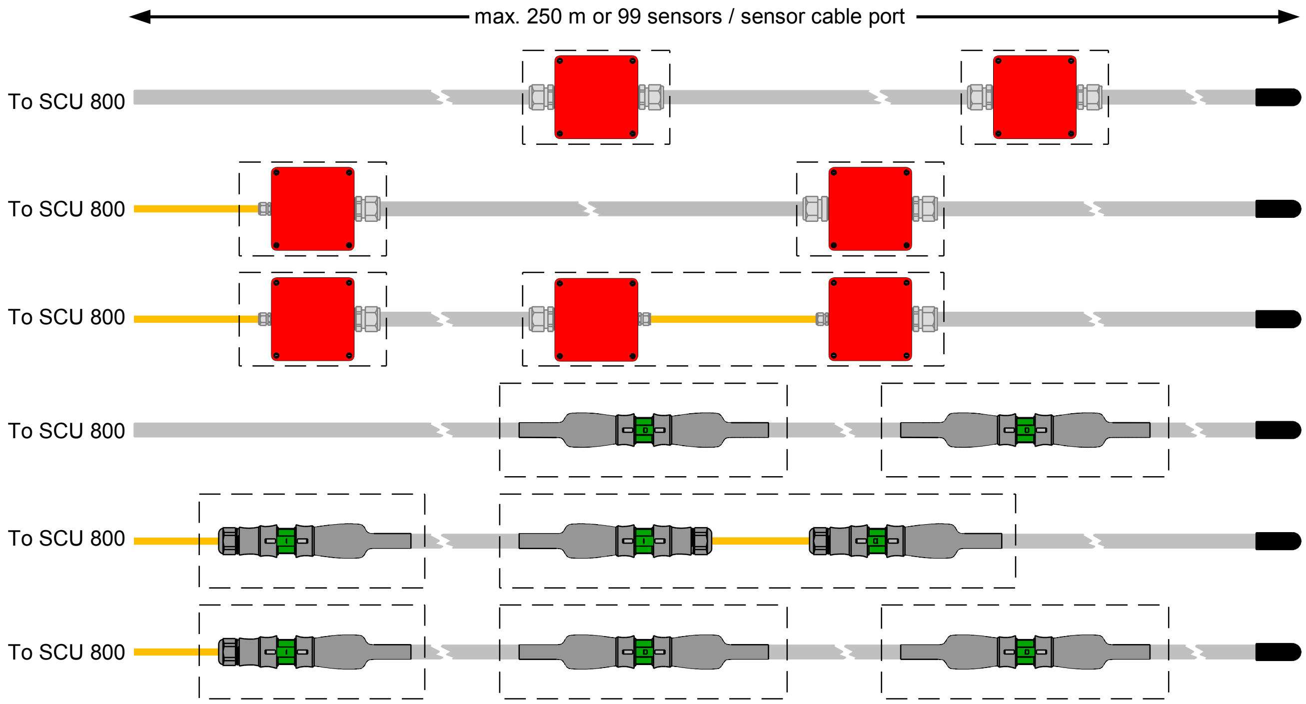
The maximum values for total cable length of ***250 m or 99 sensors*** per sensor cable port apply for all system topologies ***without branching***.



Segmenting the sensor cable at one **SCU** sensor cable port is permissible, as long as the above mentioned limits are not exceeded. The number of ***interconnections*** is ***limited to ten***. Interconnections are shown below with each dashed box equalling one interconnection.

⇨ **Note:**
Do ***not*** use more than ***ten*** sensor cable interconnections per sensor cable port.
The following combinations must be seen as one interconnection:

- One **CBO** connection box with two sensor cables connected.
- One **SECcon** pair connecting two sensor cables.
- Two **CBO** connection boxes with **CC** connection cable in between.
- Two **SECcon** pairs with **CC** connection cable in between.
- **CBO** or **SECcon** to **SCU** with **CC** connection cable in between.

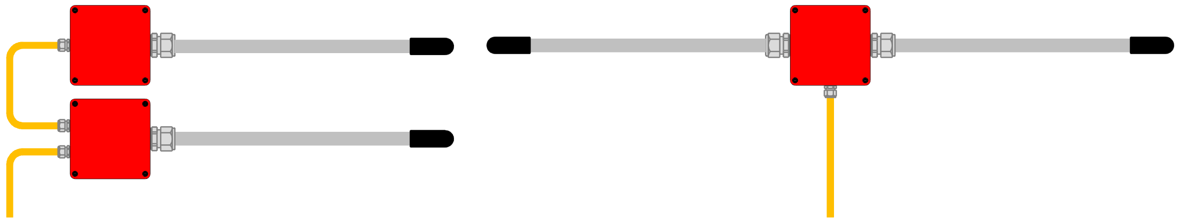


3.1.1 BRANCHING

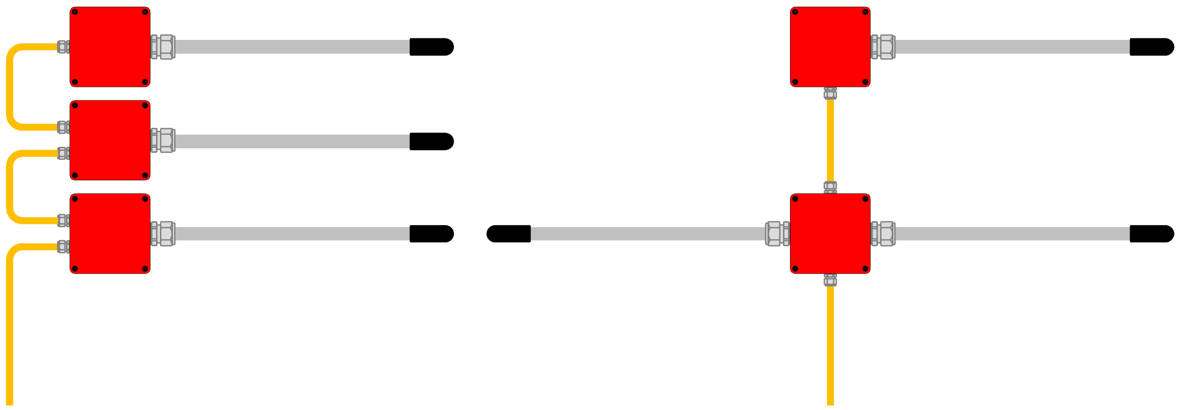
The sensor cable's bus-topology with addressable sensors allows branching within certain physical limitations as follows. Other configurations may, but do not necessarily have to function.

⇨ **Note:** Sub-branches are ***not*** allowed.

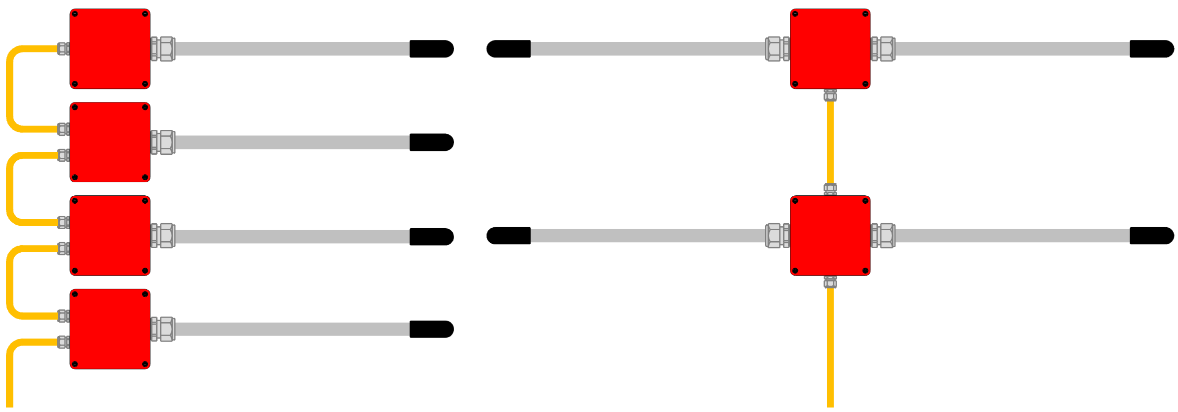
Total cable length per sensor cable port for 2 branches = 200 m



Total cable length per sensor cable port for 3 branches = 160 m



Total cable length per sensor cable port for 4 branches = 120 m

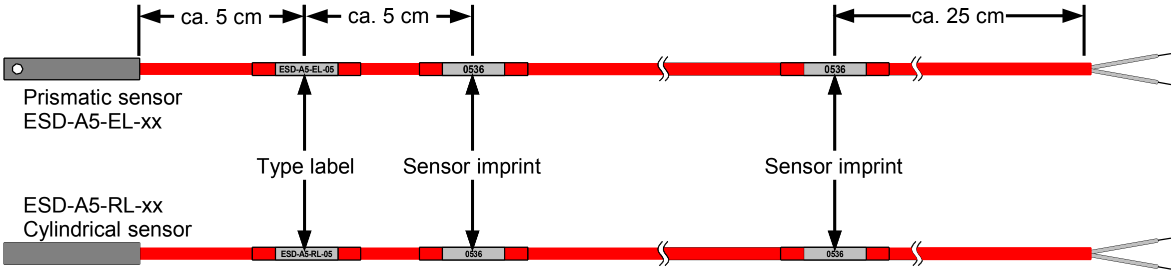


⇨ **Important:** The adaptor element should be activated for each branch ≤ 30 m and with ≤ 15 sensors (☞ 5.2.5).

3.2 EXTERNAL SENSORS

External sensors can be used to monitor temperature critical points in an installation.

The temperature sensor is fitted in a stainless steel casing. Prismatic sensor casings can be screwed onto an object, while sensors in cylindrical casings can be used as feelers. Sensor and cable are hermetically sealed by a thermally conductive potting compound.

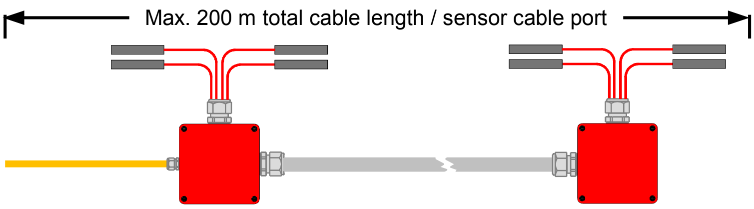


External sensors are connected to the d-LIST bus using **UCM-ESD** connection modules (☞ 5.2.5.2).

⇨ **Definition:** ***Total cable length*** specifies the sum of all cable lengths connected to one sensor cable port.

Total cable length ***= SEC 15 Sensor cable***
+ CC 15 connection cable
+ length of each external sensor's connection lead

The combination of external sensors with a sensor cable reduces the total cable length to ***200 m*** and ***99 sensors*** at one sensor cable port, including up to ***four*** external sensors connected to ***either*** end of the sensor cable.



Following limitations regarding total cable length apply for installations operated exclusively with external sensors:

Number of sensors	***Total cable length***
Up to 50 sensors	100 m
51 to 99 sensors	50 m

⇨ **Note**: Adaptor elements should be activated for each external sensor (☞ 5.2.5).

3.3 OPERATION MODES

The **SCU** can be used in auto-configured or in configured-mode operation.

3.3.1 AUTO-CONFIGURED OPERATION

Auto-configured operation uses standard parameters and is initiated with the control elements inside the **SCU**. Sensors are allocated to the two sensor cable ports for signalisation (☞ 7.2.1). This operation mode is ***only suitable*** for the **SCU 800-03**.

> ⇨ **Note**: These settings conform to a system response behaviour according to ***EN 54-5***, ***class A1***.

3.3.2 CONFIGURED-MODE OPERATION

Setting up the **SCU** for configured-mode operation requires ***LISTp800*** **GUI**.
Sensors can be sorted to project requirements and up to ***64 alarm sections*** defined, to allow zonal signalling with relays and / or data protocols. Individual thresholds for each zone and other project specific settings are also possible.

> ⇨ **Note:** Configured-mode operation requires **SCU** software version ***V2.00*** or higher and at least ***LISTp800*** version ***V0.7.588***. Trained personnel may program the **SCU**, as described in the ***LISTp800*** manual ***60T281***.

Data exchange protocols have the added advantage of being able to transmit measuring point specific information regarding alarms. Temperatures and system information are also available. Refer to the respective protocol descriptions for further information.

In configured-mode operation, the **SCU** may also be integrated into a networked system with either a LISTcontroller master, or connection to superordinate equipment via protocol (**SCADA** system, **PLC**, etc.) (☞ 6.1.3).

Converters for Ethernet, optical fibre, etc. are available on request for connection to superordinate equipment.

3.4 THE SCU'S METHOD OF OPERATION

3.4.1 MEASUREMENT AND EVALUATION

The **SCU** retrieves temperatures from the sensors in defined intervals (measuring cycles). During a measuring cycle all sensors are addressed, temperature values retrieved and evaluated. The standard measuring cycle interval for an ***EN 54-5*** response behaviour is ***ten*** seconds.

Each sensor's value gets checked for plausibility after checksum verification. If four consecutive measurements are invalid, a fault signal is set (☞ 6.1.2.2).

All valid measurements are evaluated against two alarm criteria:

	Maximum temperature	***Differential temperature***
Default value	50 °C	2,8 K
Alarm trigger	The measured temperature is higher than the maximum value.	The differential value is higher than the threshold.

The differential temperature is calculated according to an algorithm, which compensates for natural temperature variations (e.g. day, night, seasons).

⇨ **Note**: An alarm is triggered only if a pre-signal was set in the previous measuring cycle.

In case of an alarm the following **LED** and relay assignment applies for the **SCU 800-03**, irrespective of the operation mode (☞ AUTO-CONFIGURED OPERATION ***or*** ☞ CONFIGURED-MODE OPERATION):

- Alarms on sensor cable port K1 set **LED** A and alarm relay **REL**1.
- Alarms on sensor cable port K2 set **LED** B and alarm relay **REL**2.

In case of an event, which sets a zonal relay in a **SCU 800/16**, the following correlation exists between the **LED** / main board relays and the relays on the relay board:

- Events (alarm, pre-signal or fault), which activate relay outputs 1 to 8, set the alarm relay **REL**1 and activate **LED** A.
- Events (alarm, pre-signal or fault), which activate relay outputs 9 to 16, set the alarm relay **REL**2 and activate **LED** B.

⇨ **Note**: Alarms can only be reset, once the values fall 0.5 °C below the respective threshold.

3.4.2 COMMUNICATION INTERFACES

The **SCU** has one serial port, which is switch-able between RS232 and RS485.

Switching takes place on **ST**4 of the main board (☞ 6.1.3.2).

3.5 EN 54-5 RESPONSE BEHAVIOUR

The d-LIST line-type heat detector, consisting of the control unit **SCU 800-03** and the sensor cable **SEC 15**, conforms to ***EN 54-5 class A1*** with the following settings:

Description	***Standard setting***
General SCU settings (☞ ***LISTp800*** manual 60T281)	
Measuring cycle interval	00:00:10
Reference value adjustment	1
Co-incidence detection (double-knock)	off
HSM – High Sensitivity Mode	off
Do not set fault when disabling sensors	off

Alarm thresholds (☞ ***LISTp800*** manual 60T281)	
Differential temperature threshold	2.8
Absolute (maximum) temperature threshold	50.0

4 INSTALLATION

⇨ **Important:** To avoid damage to the **SCU** and to the sensor cable, disconnect the power cable before adding or removing cables.

Connections may only be made while the unit is ***switched off***.

4.1 SENSOR CABLE

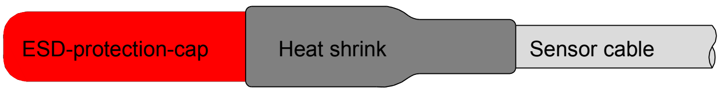
⇨ **Humidity:** The sensor cable must always be protected from humidity, i.e. the cable ends must be sealed while storing or mounting the cable.

⇨ **Bending:** The minimum bending radius of the sensor cable is ***25 cm***. This limit must be adhered to at all times.

⇨ **Installation temperature:** Ambient temperature, as well as the cable's intrinsic temperature, should be above ***+10 °C*** or ***+45 °F***.

⇨ **Protection caps:** Sensor cables are delivered with **ESD**-protection or protection caps, depending on the connection type. This protection may not be removed until the connection of the sensor cable takes place.

ESD-protection:



Prefabricated sensor cables must be installed, so that the red **ESD**-protection-cap is situated at the **SCU** or the connection box. The **ESD**-protection-cap also protects the crimp- and shield-connectors.

Sensor cable delivered on cable spools always has the **ESD**-protection on the innermost sensor cable winding.

A short-circuit connector is mounted under the **ESD**-protection-cap.

Fixings:

Various fixings, e.g. self-locking clamps, cable ties, pipe brackets, etc., may be used to install the sensor cable, so that project requirements are met. Document 60V082 shows various options, that can be supplied.

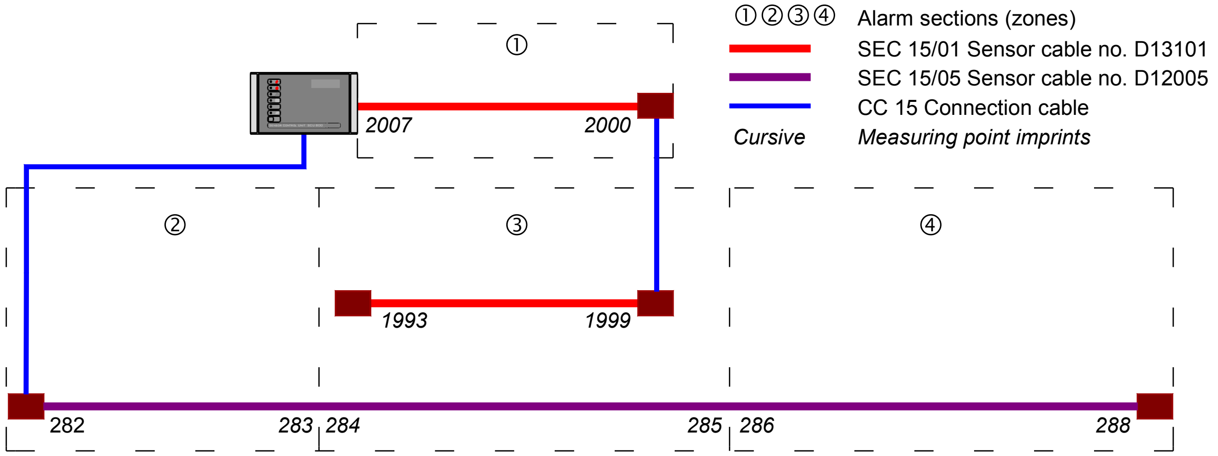
- Distance between fixings: recommended ca. 0,75 m; maximum ca. 1,00 m
- Fixing next to connection box: ca. 0,30 m
- Fixing next to end caps: ca. 0,10 m

⇨ **Note:** Applicable national or local regulations may specify differing mounting schemes.

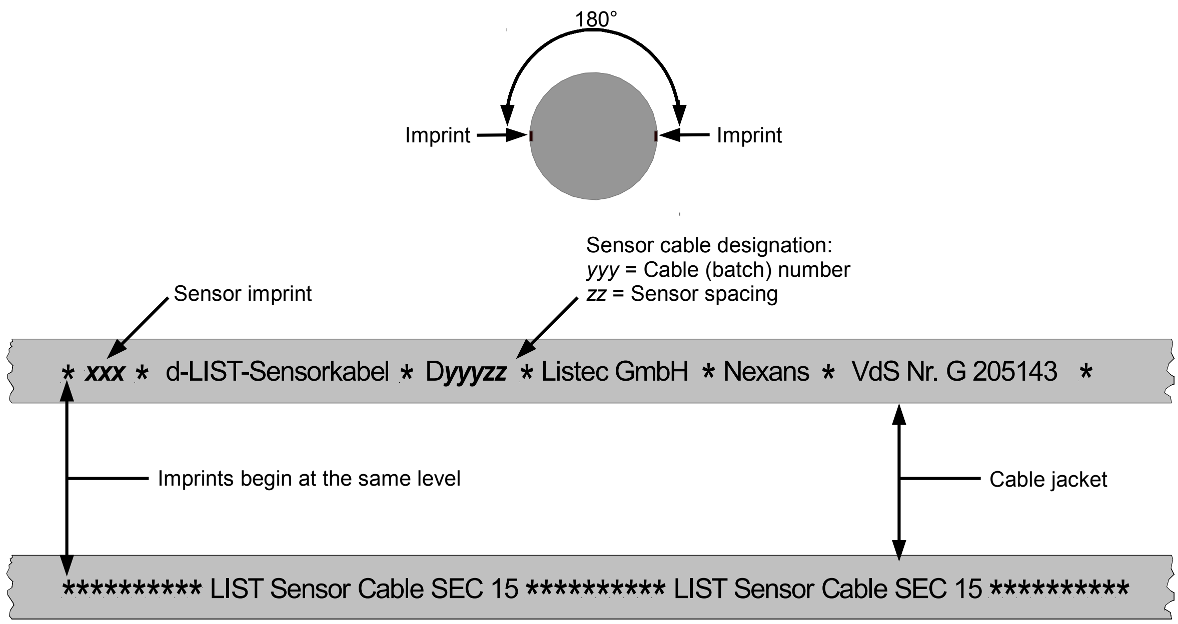
Imprints:

It is of no importance, whether the sensor cable is installed with ascending or descending imprints, since a logical order may be programmed later.

It is recommended, that imprints at the ends of sensor cable sections be noted on a plan or drawing. Imprints at zone borders and other important points should also be noted as per the example below. This information is needed for system configuration.



Sensors are marked by two imprints on opposing sides of the sensor cable to facilitate quick location.



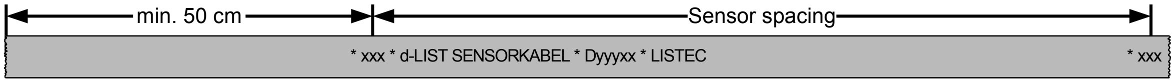
Pre- and post-runs:

The manufacturing process requires the sensor cable to be manufactured with pre- and post-runs. These can be up to ***24 m*** long and do not contain sensors. Pre- and post-runs are ***not*** part of the length(s) shown on the delivery notes.

When installing the cable, proceed as follows:

1. Use the delivery note or spool label to determine the imprint of the first sensor. Sensors are always located under the sensor imprint.

2. Cut and seal the sensor cable at least ***50 cm*** before the first sensor. The same applies for the end of the sensor cable.



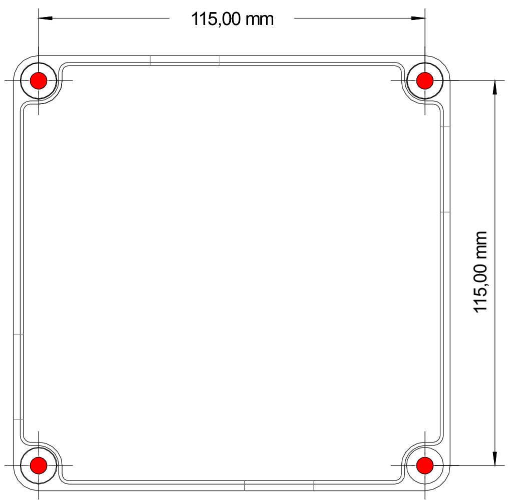
3. Sensor cable ends should extend at least ***30 cm*** over connection points in a **SCU** or connection box.

⇨ **Important:**
Open cable ends must be sealed immediately.
Cut the cable at least ***50 cm*** from sensor imprints.
Use suitable cutters to cut the sensor cable.

4.2 CONNECTION BOXES

Sensor cables can also be connected to a **SCU** with **CC 15** connection cable. The change from a sensor cable to the connection cable may occur in a connection box **CBO**.

⇨ **Note:** Use the correct mounting holes to ensure proper ingress protection (**IP**).



⇨ **Important:** Close all unused openings with supplied plugs.
Use the supplied O-rings on glands and plugs.

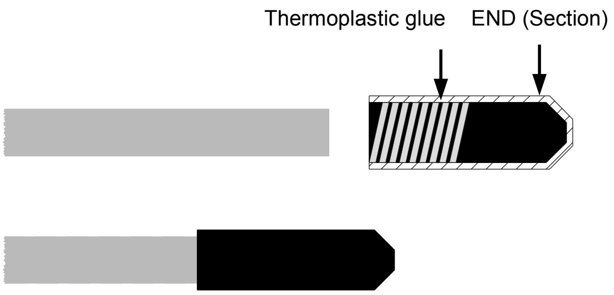
Dimensions: ☞ APPENDIX: DIMENSIONS: CBO 5-SEC AND CBO 5-ESD-T

4.3 END CAP

Unconnected cable ends must be sealed with **END** end caps.

Procedure:

1. Use suitable cutters to cut off the sensor cable end straight and clean.
2. Push the end cap completely over the sensor cable.
3. Use a heat-gun to shrink the **END** cap (Shrink temperature of approximately ***120 °C***).



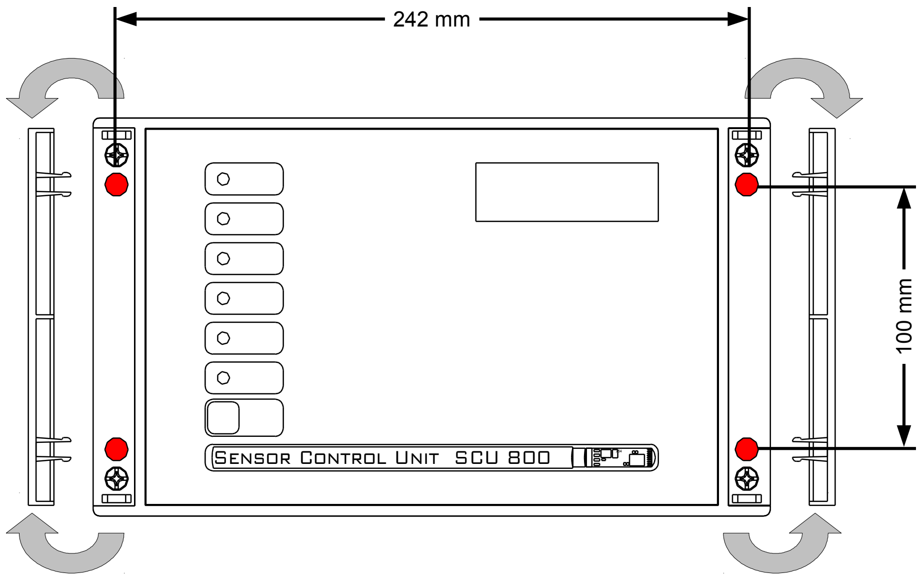
4.4 SCU 800

⇨ **Important:** Use the correct mounting holes to ensure proper ingress protection. Provide enough space for the insertion of cables through the cable glands supplied with the **SCU**. The ***minimum bending radius*** of each cable must be adhered to at all times.

Mounting:

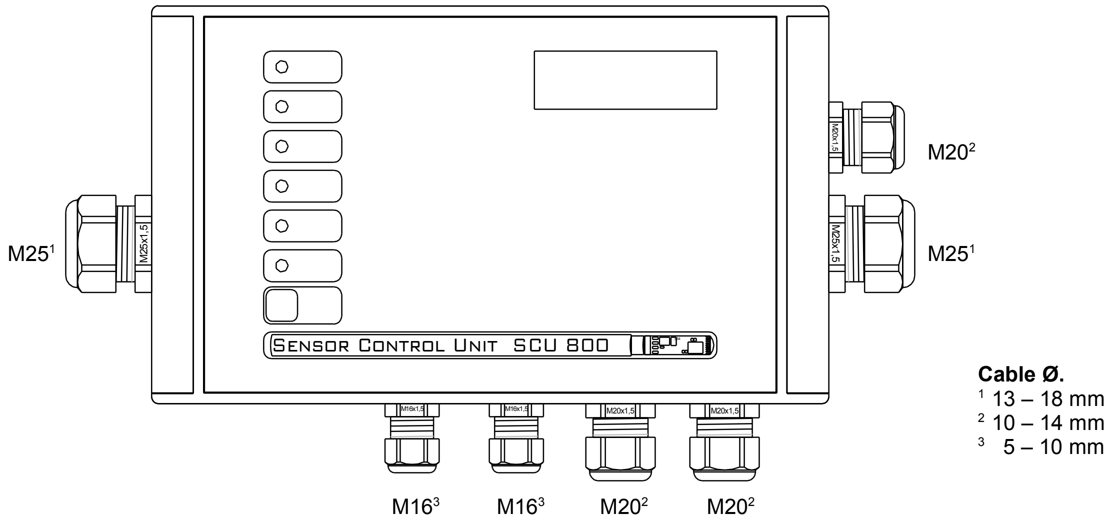
1. Remove both screw-covers.
2. Use the ● mounting holes.

⇨ **Note:** It is ***not*** necessary to remove the lid from the **SCU** during installation.



Cable glands:

⇨ **Important:** All cable glands and plugs must be fitted with the supplied O-rings. Close all unused openings with the supplied plugs.



Dimensions: ☞ APPENDIX: DIMENSIONS: SCU 800

5 SENSOR CABLE CONNECTIONS

Following connection types are possible:

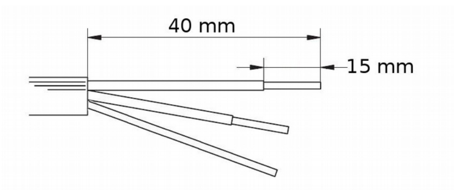
- Prefabricated sensor cable with **SECcon** connectors:
  Sensor cables are delivered with pre-fitted connectors and only the **CC 15** connection cable remains to be fitted on site (☞ 5.1).
- Connections directly in the **SCU** or in connection boxes:
  - Prefabricated:
    Crimped sensor cable- and shield-connectors are pre-fitted on the sensor cable. After removal of the **ESD**-protection (☞ 4.1) the connections are made on a connection module (☞ 5.2.5) or directly in the **SCU** (☞ 6.1.1).
  - Without connectors:
    All stripping, crimping and dressing is made on site (☞ 5.2).

5.1 SECCON CONNECTIONS

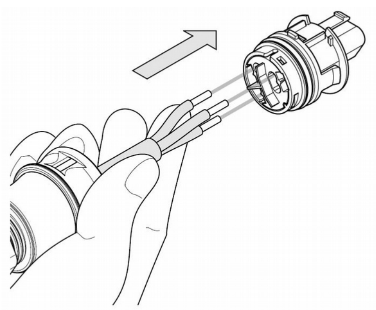
SECcon connectors are used to connect the sensor cable to a **CC 15** connection cable, which leads to the **SCU**. The opposite side of the sensor cable is either terminated with another **SECcon** connector, or sealed with an **END** end cap. **SECcon** connectors and the end caps are pre-fitted to the sensor cable.

5.1.1 CONNECTION CABLE

Fit the supplied **SECcon** female connector to one end of the **CC 15** connection cable:

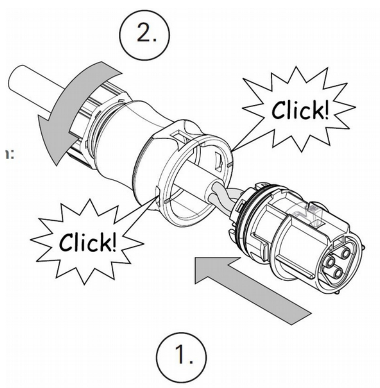


1. Strip the connection cable and wires as shown.
2. Open the **SECcon** connector and place the housing over the **CC 15** connection cable.



3. Insert the wires into the spring clamps.

DQ	red	Terminal 1
GND	blue	Terminal 2
Shield	shield	Terminal ⏚

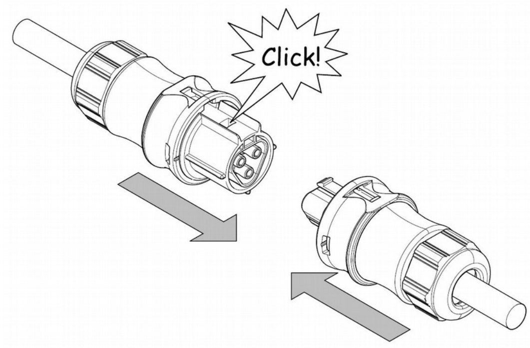


4. Close the **SECcon** housing as indicated in ①.
5. Lock the strain relief nut ②
   (Typical torque 4 + 1 Nm).

6. Connect the opposite end of the connection cable to the **SCU** (☞ 6.1.1).

7. Remove the **SECcon** protection cap from the connector on the sensor cable. Use the same procedure as shown in ☞ 5.1.2.

8. The connection between sensor- and connection cable is established once the two connectors are plugged and locked.

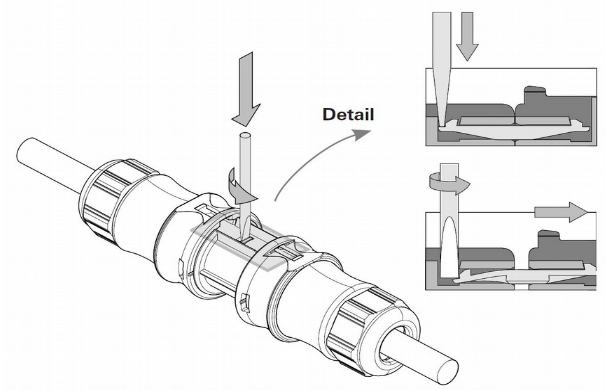


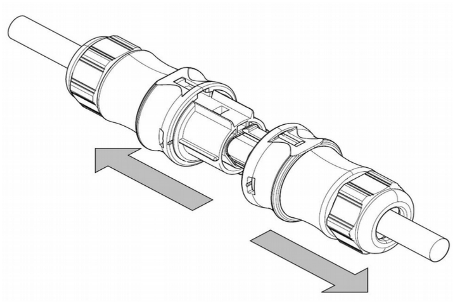
See ☞ APPENDIX: OPENING SECCON for instructions to open **SECcon** connectors.

5.1.2 UNLOCK SECCON CONNECTIONS

⇨ **Important:** Do not open the connection while the **SCU** is switched on.

A **SECcon** connection can be opened as indicated below.





5.2 CRIMP CONNECTIONS

5.2.1 CUTTING

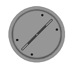
Use a suitable cutter to cut the sensor cable at the required position.

5.2.2 STRIPPING

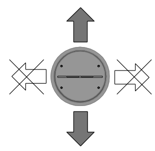
Strip the sensor cable ends using the following procedure:

1. Score the sensor cable jacket with a suitable cable-knife approximately ***20 cm*** from the end.

2. Check the orientation of the flexible flat cable.



3. Break the cable jacket by bending the sensor cable at the score, taking into account the orientation of the flat cable.



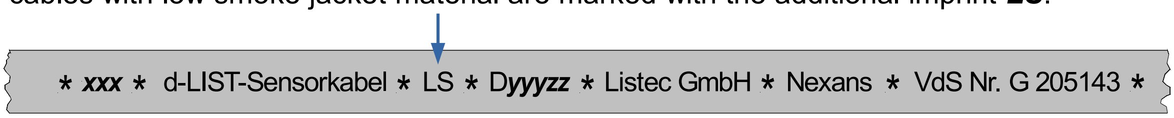
4. Pull off the jacket and shield carefully.

5. Cut off the strain-relief threads.

6. Cut off the end of the flexible flat cable at a right angle.

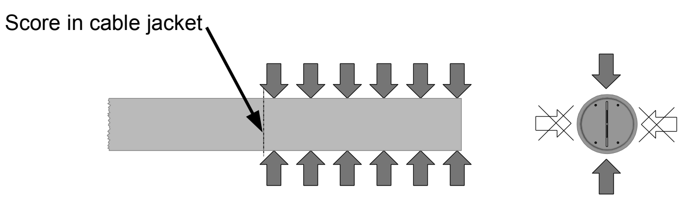
5.2.2.1 STRIPPING LS SENSOR CABLES

Sensor cables with low smoke jacket material are marked with the additional imprint ***LS***.



The material used in this type of sensor cable sticks to the flexible flat cable, therefore requiring an intermediate step in between checking the orientation (2nd step above) and breaking the cable jacket (3rd step above).

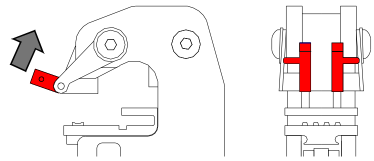
Use adjustable joint pliers to apply light pressure to the sensor cable at the edges of the flexible flat cable. Apply pressure repeatedly from the score to the end of the sensor cable to loosen the filler material from the flexible flat cable. Now break the jacket and pull it off as shown in steps 3 and 4 above.



5.2.3 CRIMPING

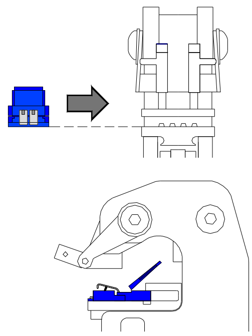
The sensor cable is connected to circuit boards using **CLB2** crimp connectors. The connectors are crimped with a LIST crimping tool (Refer to the crimping tool manual for further information).

Crimping procedure:

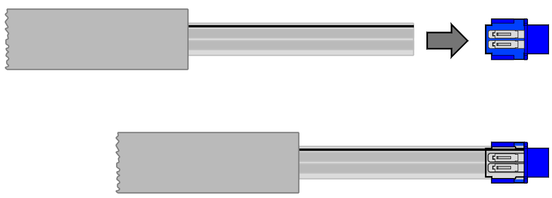


1. LIST crimping tool:

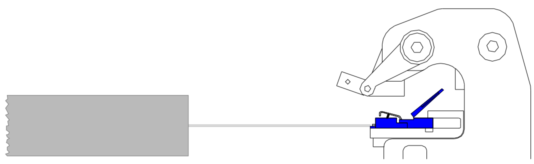
   Deactivate both outer press plates by moving them to the top of the tool.



2. **CLB2** crimp connector:
   - Open the lid of the **CLB2** connector so that the contacts are exposed.
   - Insert the **CLB2** from the side of the tool.
   - Both contacts must must be positioned over the two middle fingers of the anvil.



3. Insert sensor cable:
   - Fully insert the flexible flat cable into the **CLB2** contacts.

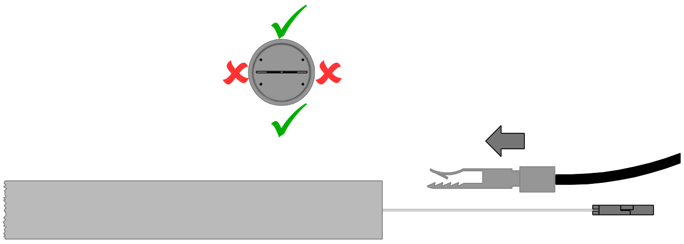


4. Crimping:
   - Close the crimping tool completely by pressing the tool handle.
   - The ratchet releases automatically, once the tool is fully closed.

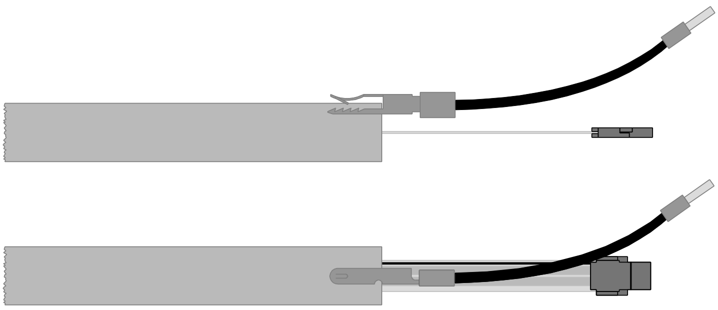
5. Close the **CLB2** lid.

5.2.4 SHIELD CONNECTOR

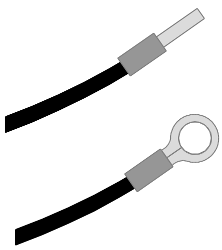
The **SCON** shield connector fits over the cable jacket and under the aluminium shield.



⇨ **Note**: The shield connector must be pushed up all the way to the cable jacket.
Take care not to damage the flexible flat cable when fitting the shield connector.



Shield connector types:



- **SCON 15/1:** Terminated with a ferrule for connection to **UCM** and **CCM** modules (☞ 5.2.5).
- **SCON 15/0:** Terminated with a ring lug for connection in a **SCU** (☞ 6.1.1).

5.2.5 CONNECTION MODULES

Following connection modules are used in connection boxes:

- **UCM-SEC** is used in a **CBO 5-SEC** connection box.
- **UCM-ESD** is used in a **CBO 5-ESD-T** connection box.
- **CCM 150-A** may be used in various connection boxes fitted with DIN rails.

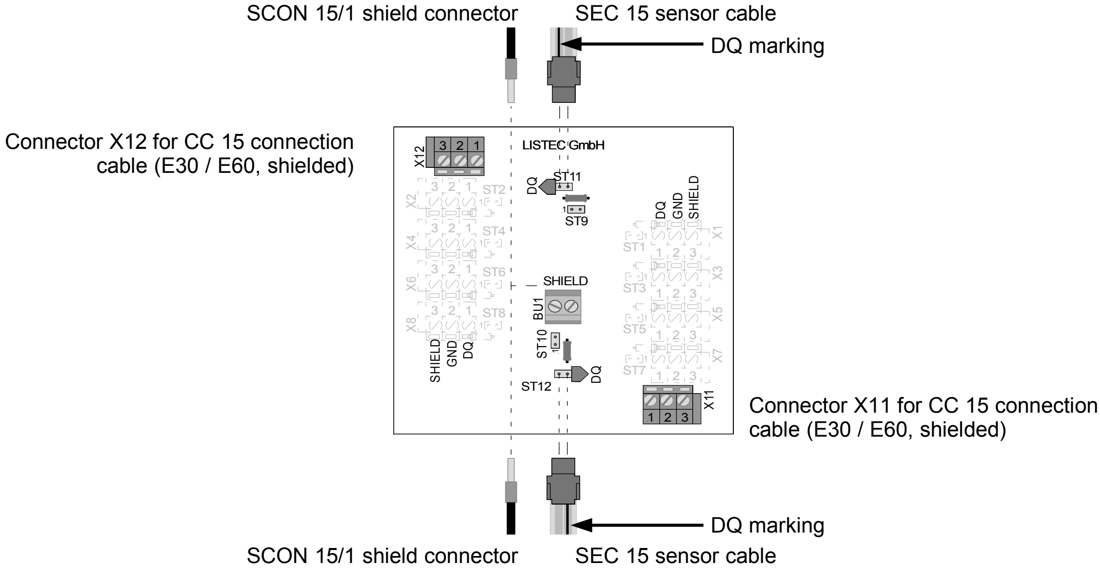
⇨ **Important:** Note the flexible flat conductor's orientation, when connecting sensor cable to connection modules. Ensure correct seating of the connectors in the strain relief (latching level) (☞ 6.1.1).

⇨ **Note:** Sensor cable branches with activated adaptor elements may not be longer than ***30 m***, or contain more than ***20 sensors***. Sub-branches are ***not*** allowed. Remove the jumper(s) ❶ to activate the adaptor(s).

⇨ **Note:** All signals on connection modules are connected in parallel.

5.2.5.1 UCM-SEC

Connection module for two sensor cables in a **CBO 5-SEC** connection box.

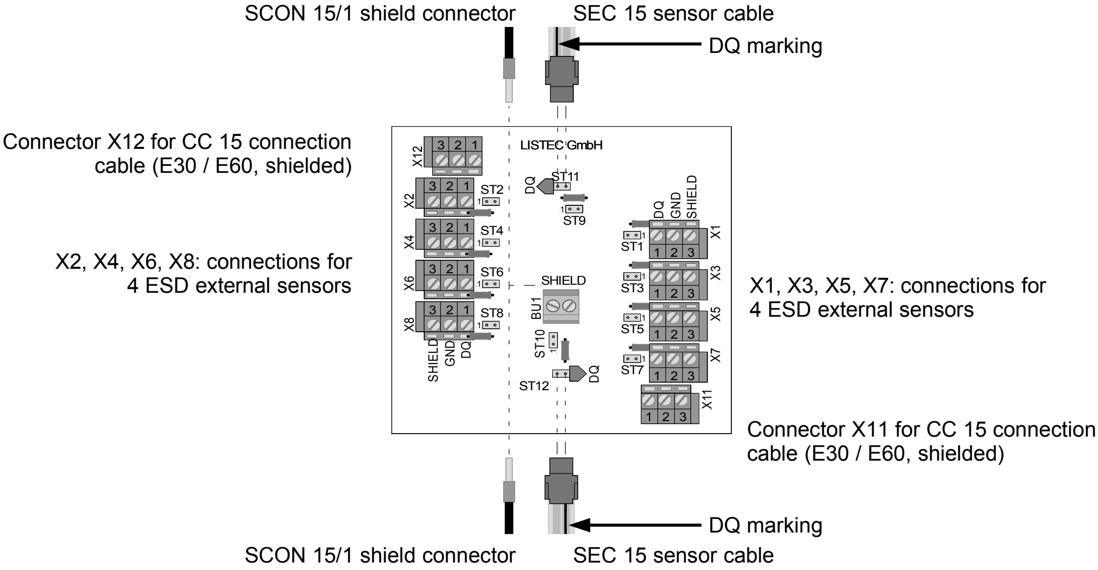


Cable	*Connector*	*Signal Colour [terminal]*			*Adaptor element ❶*
		DQ	***GND***	***SHIELD***	
SEC 15	ST11	Marking		Shield connector [BU1]	ST9
SEC 15	ST12	Marking		Shield connector [BU1]	ST10
CC 15	X11	red [1]	blue [2]	Shield [3]	
CC 15	X12	red [1]	blue [2]	Shiled [3]	

5.2.5.2 UCM-ESD

Connection module, offering three connection options in a **CBO 5-ESD-T** connection box:

- For up to eight **ESD** external sensors.
- For up to four **ESD** external sensors plus one **SEC 15** sensor cable.
- For up to two **SEC 15** sensor cables.

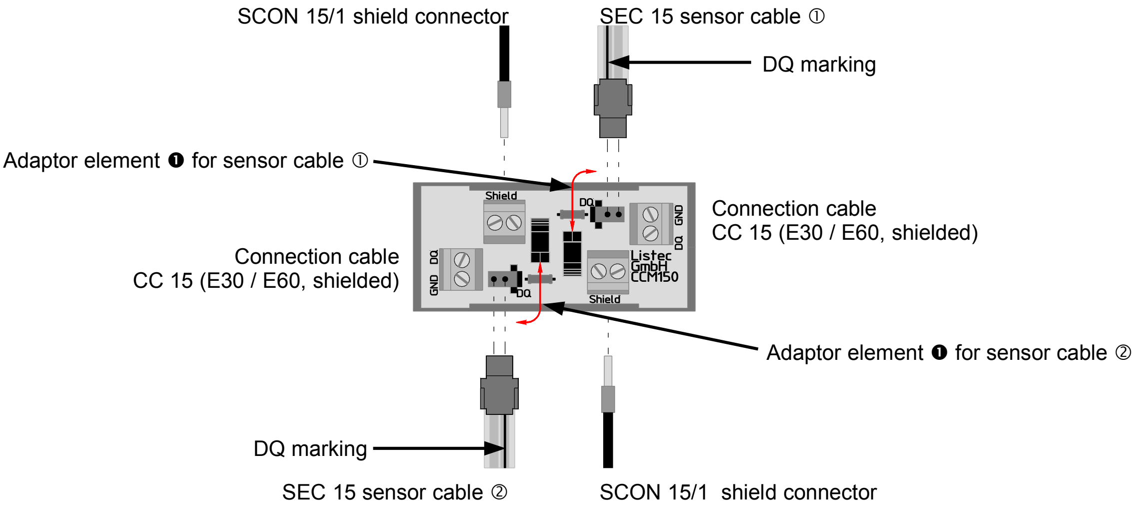


Cable	Connector	Signal Colour [terminal]			Adaptor element ❶
		DQ	GND	SHIELD	
SEC 15	ST11	Marking		Shield connector [BU1]	ST9
SEC 15	ST12	Marking		Shield connector [BU1]	ST10
ESD external sensors	X1	white [1]	brown [2]	Shield [3]	ST1
	X2	white [1]	brown [2]	Shield [3]	ST2
	X3	white [1]	brown [2]	Shield [3]	ST3
	X4	white [1]	brown [2]	Shield [3]	ST4
	X5	white [1]	brown [2]	Shield [3]	ST5
	X6	white [1]	brown [2]	Shield [3]	ST6
	X7	white [1]	brown [2]	Shield [3]	ST7
	X8	white [1]	brown [2]	Shield [3]	ST8
CC 15	X11	red [1]	blue [2]	Shield [3]	
CC 15	X12	red [1]	blue [2]	Shield [3]	

⇨ **Note:** Removing the jumper ❶ activates the respective adaptor element.

5.2.5.3 CCM 150-A

Connection module for connection boxes with DIN rails.



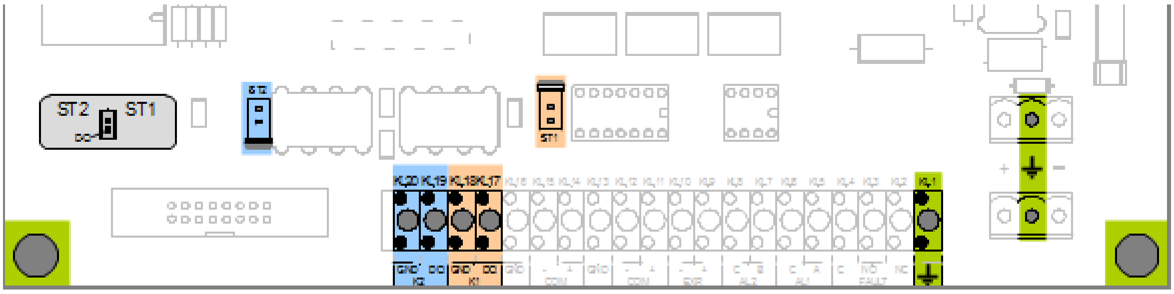
Cable	***Signal Colour***		
	DQ	***GND***	***Shield***
SEC 15	Marking		Shield connector
CC 15	red	blue	Shield

⇨ **Note:** Removing the jumper ❶ activates the respective adaptor element.

6 SCU CONNECTIONS AND SETTINGS

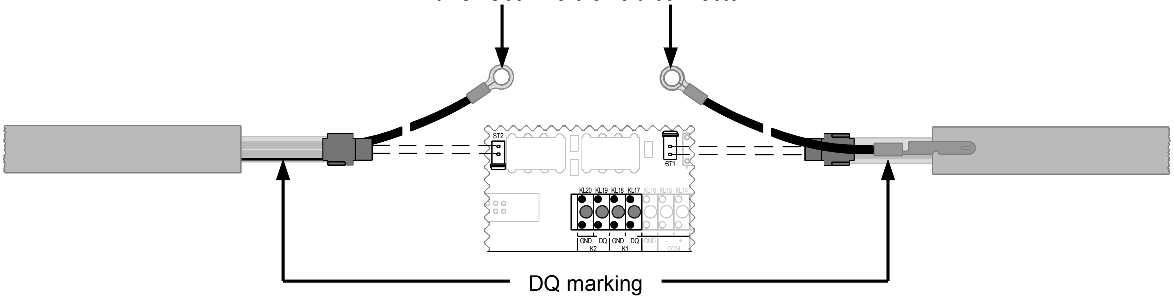
6.1 SCU 800 MAIN BOARD

6.1.1 SENSOR CABLE



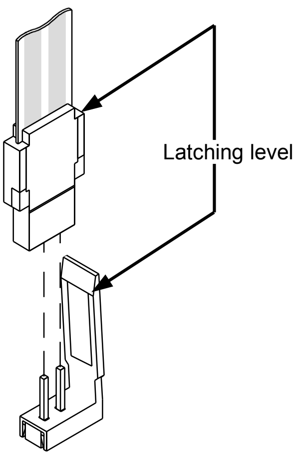
Sensor cable port	*Sensor cable direct connection*	*Sensor cable over CC 15 connection cable*
K1	ST1	KL 17 (DQ)
		KL 18 (GND)
K2	ST2	KL 19 (DQ)
		KL 20 (GND)
Earthing ☞ 6.1.4.3	PCB mounting holes	KL1 or ST3 / ST7 Pin 2

⇨ **Important**: Note the flexible flat conductor orientation when connecting the sensor cable (see label next to **ST**2).

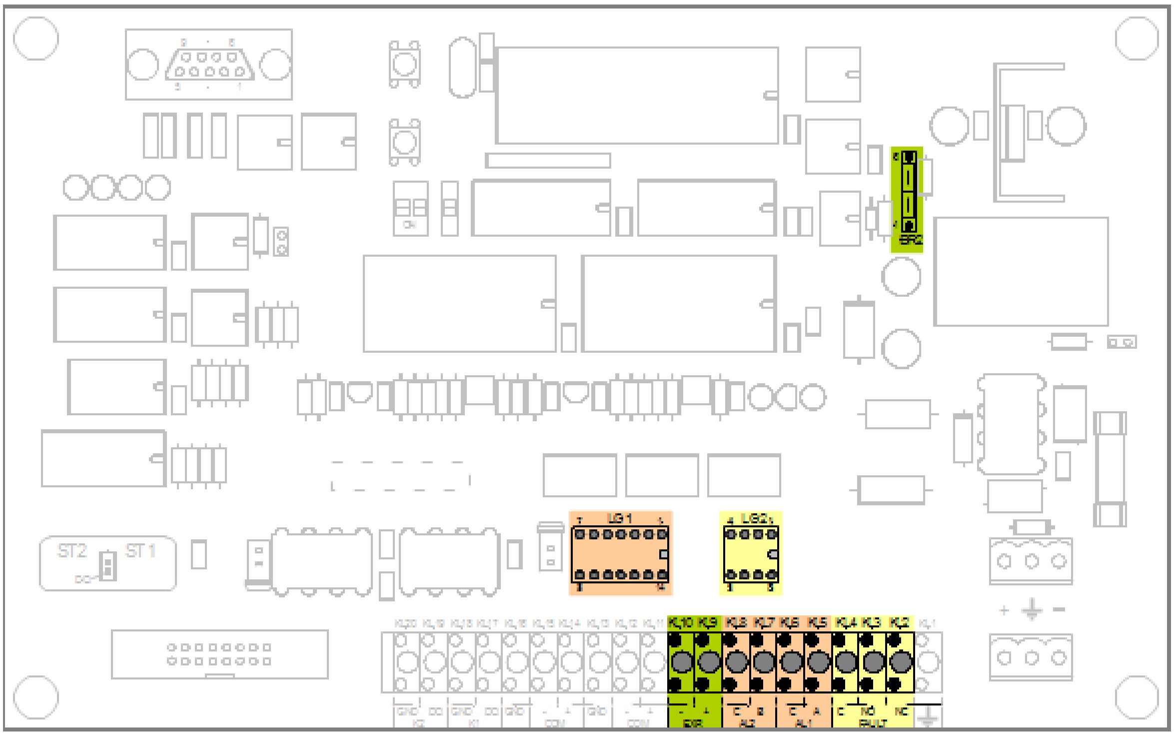


Strain relief:

⇨ **Important**: Ensure correct seating of the connector in the strain relief (latching level).



6.1.2 RELAYS AND RESET

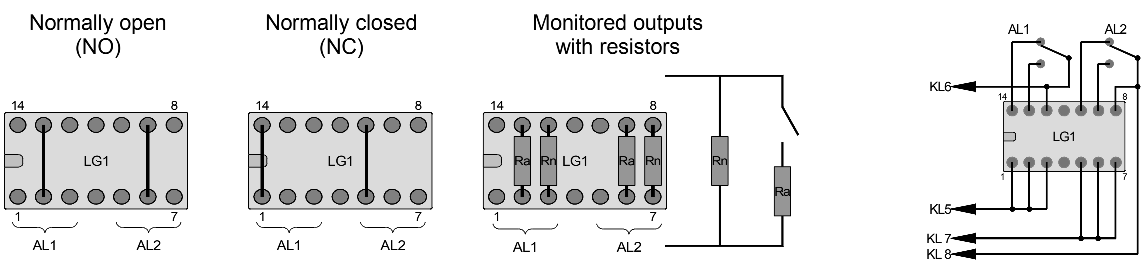


Designation	***Terminals/ IC-socket / component***		***Section (page)***
Alarm relays	KL5 – KL8 / LG1		☞ 6.1.2.1 (31)
Fault relay	KL2 – KL4 / LG2		☞ 6.1.2.2 (32)
External reset	KL9 – KL 10 / BR2		☞ 6.1.2.4 (33)

> ⇨ **Note:** Observe maximum relay output switching voltage and current ratings of 48 V DC / 32 V AC at 250 mA with a purely resistive load.

6.1.2.1 ALARM RELAYS

- Signal alarms on exceeding maximum or differential thresholds.
- Relay output coding with IC-socket LG1:

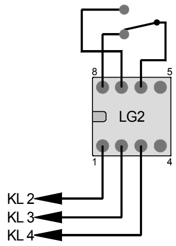


Relay	***Terminal designation***		***Terminal***
REL1	AL1	A	KL5
		C	KL6

Relay	***Terminal designation***		***Terminal***
REL2	AL2	B	KL7
		C	KL8

6.1.2.2 FAULT RELAY

- Signals unit and / or sensor cable faults.
- All three relay contacts are available on terminals.
- Fail safe operation (relay contact closes when the unit is powered down).
- Relay output coding with IC-socket LG2:

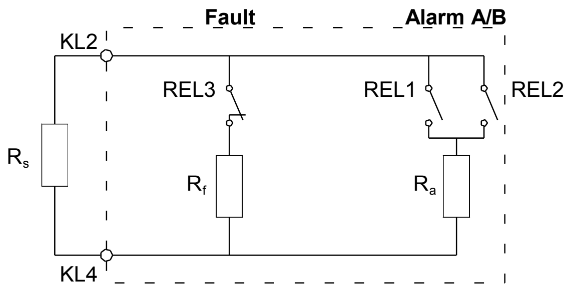


Relay	***Terminal designation***		***Terminal***
REL3	FAULT	NC	KL2
		NO	KL3
		C	KL4

6.1.2.3 SINGLE RELAY-OUTPUT

The **SLMB** piggyback module combines alarm A/B and fault relay-outputs to a single alarm- and fault-signal, using monitoring resistors. This allows the **SCU** to be connected to a single fire-panel input.

The **SLMB** (part no. M00281) and monitoring resistors are optional for the **SCU** and must therefore be ordered separately. Resistor values must meet the fire-panel's specifications.



R_s = Resulting monitoring resistance
R_a = Alarm resistor
R_f = Fault resistor

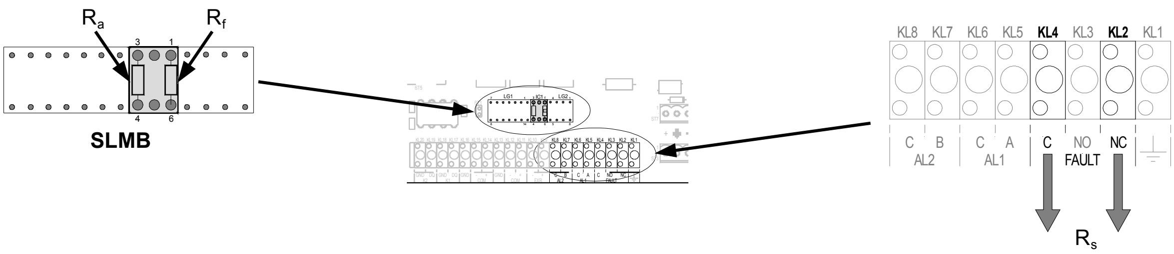
Depending on the **SCU**'s alarm and fault status, the resulting monitoring resistance R_s can be calculated as follows:

- Normal operation (no fault, no alarms): $R_s = R_f$
- Fault (no alarms): $R_s = \infty$
- Alarm (relay A and / or B) (no fault): $R_s = \frac{R_a \cdot R_f}{(R_a + R_f)}$
- Fault and alarm (relay A and / or B): $R_s = R_a$

Installation**:**

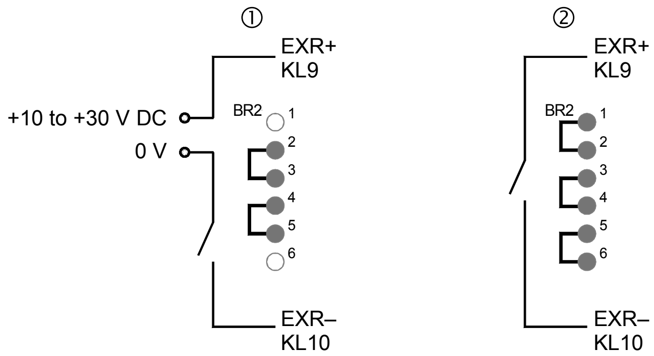
1. Remove power from the **SCU**.
2. Remove all resistors from the **SCU** main board's sockets LG1 and LG2.
3. Place the **SLMB** on the IC-sockets LG1 and LG2. Ensure that all pins are correctly seated.

4. Populate the IC-socket on the **SLMB** with the required alarm- (R_a) and fault- (R_f) resistors.
5. **KL2** and **KL4** are now used as a common alarm- and fault-output (Do ***not*** use terminals 3, and 5 to 8).
6. Power up the **SCU**.



6.1.2.4 EXTERNAL RESET

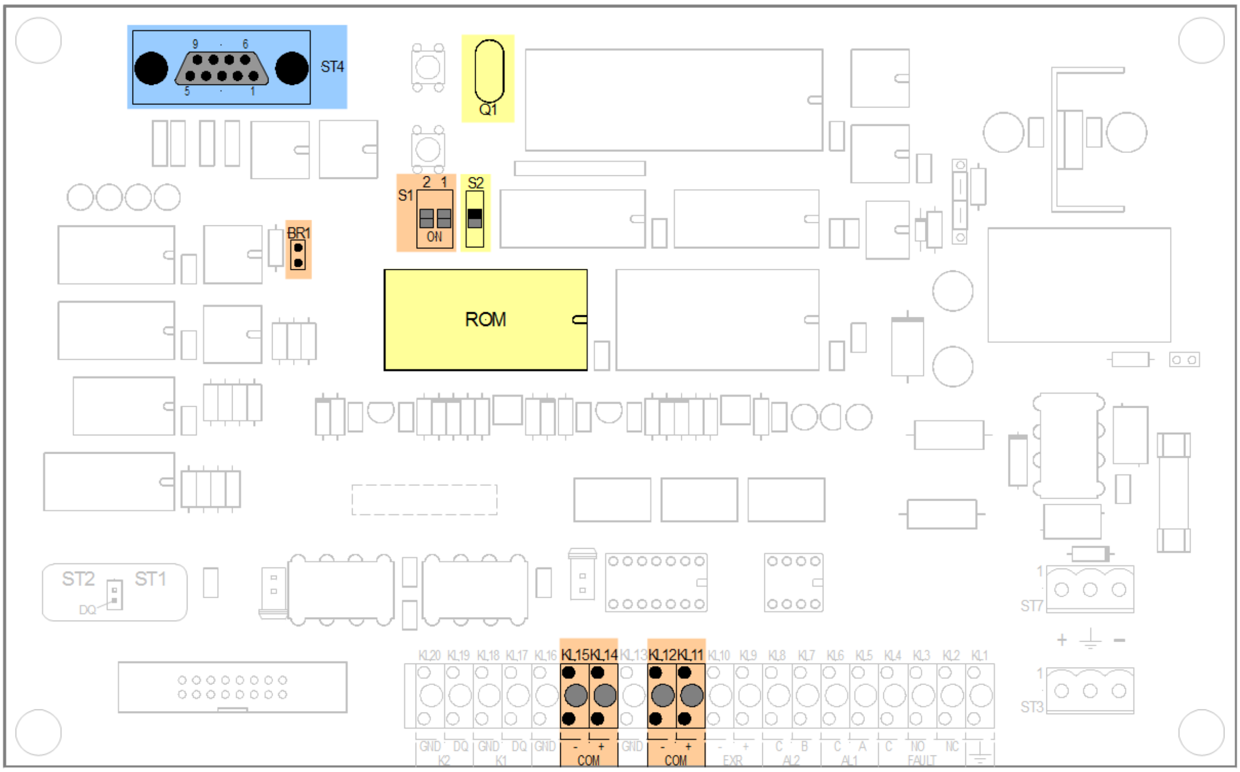
- External reset input from superordinate equipment.
- Input type is selected with **BR**2:
  - ① Contact using external voltage source from 10 to 30 V DC (default setting).
  - ② Contact using internal voltage source.



Terminal designation		***Terminal***
EXR	+	KL9
	–	KL10

⇨ **Warning:** Do not use an external power supply, if internal power ② is selected.

6.1.3 COMMUNICATION



Description	*Switch / Terminal / Component*	*Section (page)*
Protocol switch	S2	☞ 6.1.3.1 (34)
RS232	ST4	☞ 6.1.3.2 (35)
RS485	S1 / KL11 – KL 16 / BR1	☞ 6.1.3.3 (35)

The **SCU** has one serial port, which will switch from RS485 to RS232 by plugging the appropriate RS232 connection cable into **ST**4 (☞ 6.1.3.2 R232).
All protocols are available on both serial interfaces.

6.1.3.1 PROTOCOL SWITCH

Switch S2 must always be set towards **ROM** (default setting).

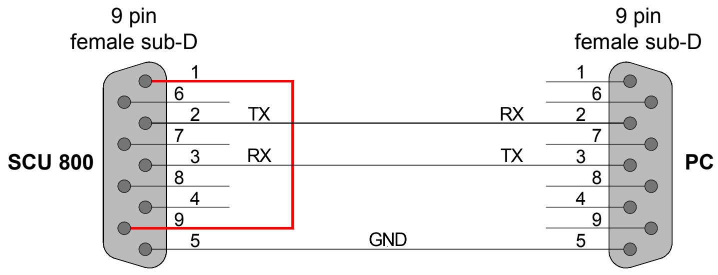
As of firmware version 2.00 switching between protocols is automatic, therefore requiring no user intervention.

6.1.3.2 R232

The RS232 interface is activated by a jumper in the RS232 connection cable.

Connector: ST4 – 9 pin Sub-D male

Connection cable:



Interface configuration: 9600 Baud, 8 Bit, No Parity, 1 Stop Bit

> ⇨ **Note**: Pins 1 and 9 must be jumpered on the **SCU** end of the connection cable to activate the RS232 interface.

6.1.3.3 RS485

The RS485 interface is active as long as there is no RS232 connection cable connected.

Connectors: The terminals are doubled up for signal loop-through.

Terminal designation		***Terminal***
COM	+	KL11
	–	KL12
	+	KL14
	–	KL15

Interface configuration: Depends on the protocol in use(☞ Protocol manual).

Baud rate[1]	***S1-1***	***S1-2***
1200	ON	ON
2400	OFF	ON
4800	ON	OFF
9600[2]	OFF	OFF

[2]Default setting

[1]The following rules apply for the baud rate setting:

Power up **SCU**: Baud rate is read from **EEPROM**.

Toggle S1: Changing the baud rate with S1 is only possible while the **SCU** is switched on. Changes are saved to **EEPROM**.

> ⇨ **Note**: Changing the position of S1 while the **SCU** is switched off has no effect on the baud rate setting.

RS485 bus:

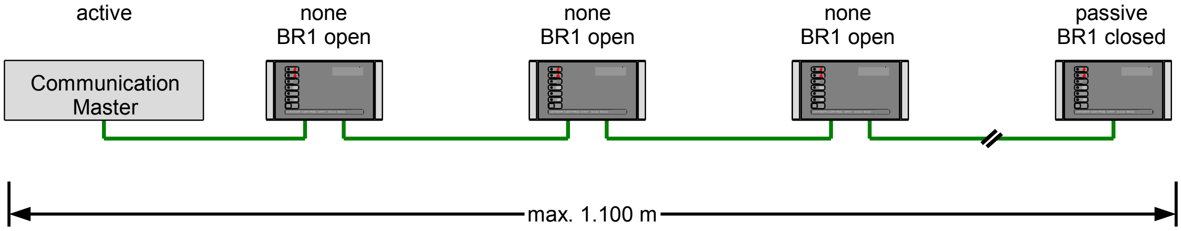
Maximum length: 1.100 m without repeaters.

Cabling: Twisted-pair cable with 120 Ω impedance.
Star-type wiring topologies are ***not*** allowed.

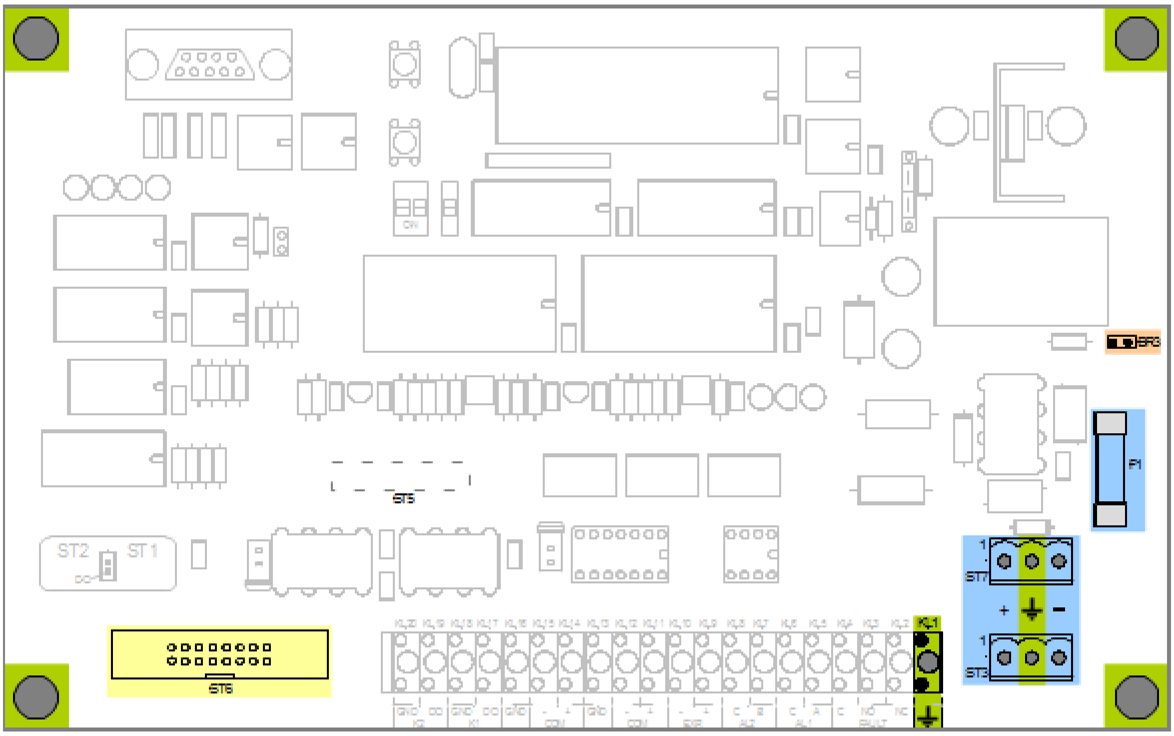
Termination:

Active	Always at the communication master (i.e. at the LISTcontroller, **PLC** or **PC**).
Passive	Jumper **BR**1 enables the resistor for passive termination. Must always be set in the **SCU** at the end of the RS485 bus.
None	Jumper **BR**1 open.

Termination:



6.1.4 OTHER CONNECTIONS AND SETTINGS



Description	Switch / Terminal / Component		Section (page)
LED board	ST6		☞ 6.1.4.1 (37)
Power supply	ST3 / ST7 / F1		☞ 6.1.4.2 (37)
Earthing	KL1 ST3 & ST7: Pin 2 4 PCB mounting holes		☞ 6.1.4.3 (38)
Electrostatic discharge	BR3		☞ 6.1.4.4 (38

6.1.4.1 FRONT PANEL

The **LED**- or relay-board in the lid of the SCU housing must be connected to **ST**6.

> ⇨ **Important:** The control unit cannot be used without a **LED**- or relay-board. A fault signal will be set, if neither one of these boards is connected.

6.1.4.2 POWER SUPPLY

- Connector **ST**7 can be used to supply further **SCU**s.
- Fuse F1: 315 mA (fast-acting).

Connector		Pin	Signal
ST3 / ST7	+	1	21 to 29 V DC
	⏚	2	Earth
	–	3	0 V

> ⇨ **Note:** Connect the power supply on completion of ***all*** other connections.

6.1.4.3 EARTHING

Earting point	*Earthing for*
ST3 / ST7: Pin 2	Power supply, CC 15 connection cable
KL1	CC 15 connection cable
4 PCB mounting holes	Sensor cable: SCON 15/0 shield connector

6.1.4.4 ELECTROSTATIC DISCHARGE

BR3 should be closed when using the system in static electrical fields greater than 5kV DC at distances below 1 m. This prevents the electronics from getting charged up, which may cause destruction of the control unit. ***Under normal conditions BR3 should remain open***.

6.1.4.5 TEST CONNECTOR

ST5 is used for factory tests only.

6.2 LED BOARD

SCU 800-03 control units are fitted with a **LED** board in the lid of the housing. The **LED** board contains indicator **LED**s (☞ 7.1) and a reset button, which is deactivated on delivery.

- **ST**1 on the **LED** board must be connected to **ST**6 on the **SCU** main board.
- **BR**1 on the **LED** board activates (**BR**1 closed) or deactivates (**BR**1 open = default) the front panel reset button (↶).

⇨ **Note**: In most cases, resetting may only take place from the fire panel and by authorised persons.

6.3 RELAY BOARD

SCU 800/16 control units are fitted with a REL800/16 relay board in the lid of the housing. The relay board contains indicator **LED**s (☞ 7.1) and a reset button (deactivated on delivery), 16 zonal relays and one fault relay, which is switched in parallel to the fault relay on the main board. The relay board is used to signal zonal alarms, pre-signals and / or faults to superordinate equipment.

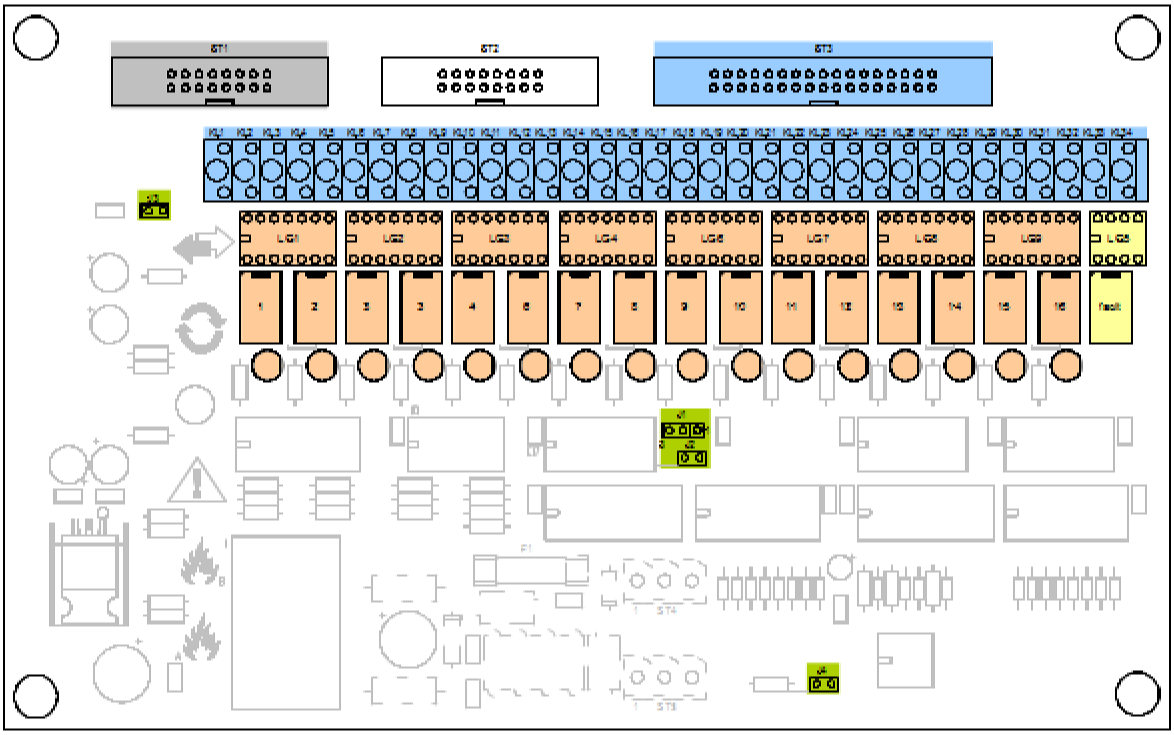
> ⇨ **Note:** When using controllers with the relay board, it is imperative that the sensors are sorted and assigned to zones, which correlate to the respective relays. This can only be achieved in configured-mode by commissioning with ***LISTp800***.

Following relays are set on the **SCU** main board when used with a REL800 relay board:

- Events (alarm, pre-signal or fault) which activate relay outputs 1 to 8 set the alarm relay **REL**1 and activate **LED** A.
- Events (alarm, pre-signal or fault) which activate relay outputs 9 to 16 set the alarm relay **REL**2 and activate **LED** B.

> ⇨ **Note:** Do ***not*** use the alarm relays on the main board, if a REL800 relay board is fitted in the **SCU**.

Following drawing shows the positions of connectors and jumpers on the relay board:



Remark	***PCB designator / position***		***Chapter (page)***
Main board connection	ST1		☞ 6.3.1 (40)
Section relay output selection	1 – 8 = LG1 – LG4 / 9 – 16 = LG6 – LG9		☞ 6.3.2 (40)
Fault relay output selection	Fault / LG5		☞ 6.3.3 (41)
Relay outputs	KL1 – KL34 / ST3		☞ 6.3.4 (41)
Settings	J1 – J4		☞ 6.3.5 (42)

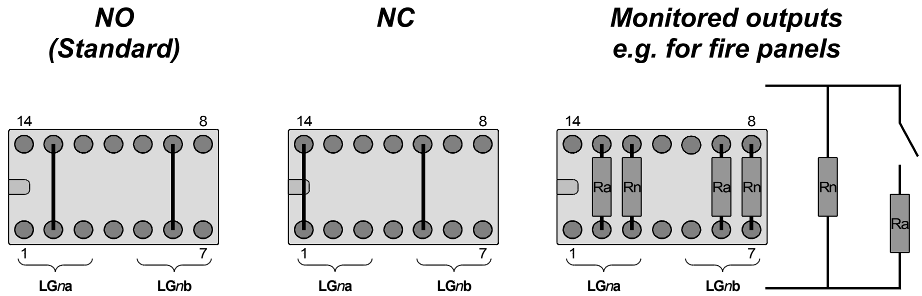
6.3.1 MAIN BOARD CONNECTION

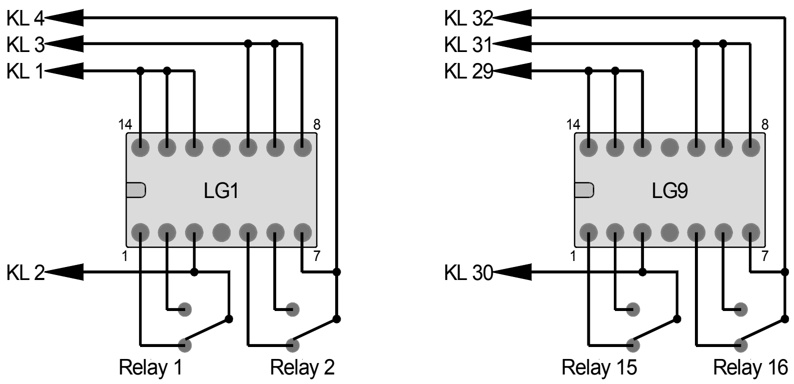
- **ST**1: Data and power connection from the **SCU** main board (**ST**6).
- **ST**2: Reserved for future use.

6.3.2 SECTION RELAY OUTPUT SELECTION

Relays for sections (zones) have two contacts each. The contact types can be coded on IC-sockets by using jumpers or resistors.

One IC socket is used for coding two relay outputs: Lg*n*a and Lg*n*b, where *n* = socket number.





⇨ **Note**: Definition of relay function and allocation takes place during configuration (☞ ***LISTp800*** manual 60T281).

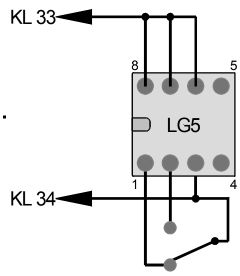
Contact-doubling can be activated on the REL 800/16 (☞ 6.3.5), causing two relays being set per alarm. If configured, relays 1 and 9 are set on an alarm in section 1, relays 2 and 10 are set on an alarm in section 2, etc.

6.3.3 FAULT RELAY OUTPUT SELECTION

The fail-safe fault relay signals faults in the **SCU** or the sensor cable.

Its outputs are connected to the terminals through IC-Socket LG5, which can either be populated with resistors or jumpers, depending on system requirements.

The schematic shows the relay contact position for a powered-up **SCU** without fault.



6.3.4 RELAY OUTPUTS

All relay outputs are available on terminals **KL**1 to **KL**34 and the 34-way header **ST**3.

Following table shows the correlation between relays, IC-sockets and output terminals/pins:

Relay output	***IC-Socket***	***Contact[(1)]***	***Terminal (KL) or ST3 pin***	***Relay output***	***IC-Socket***	***Contact[(1)]***	***Terminal (KL) or ST3 pin***
1	LG1a	W	1	9	LG6a	W	17
		C	2			C	18
2	LG1b	W	3	10	LG6b	W	19
		C	4			C	20
3	LG2a	W	5	11	LG7a	W	21
		C	6			C	22
4	LG2b	W	7	12	LG7b	W	23
		C	8			C	24
5	LG3a	W	9	13	LG8a	W	25
		C	10			C	26
6	LG3b	W	11	14	LG8b	W	27
		C	12			C	28
7	LG4a	W	13	15	LG9a	W	29
		C	14			C	30
8	LG4b	W	15	16	LG9b	W	31
		C	16			C	32

FAULT	LG5	W	33
		C	34

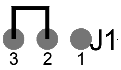
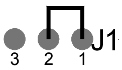
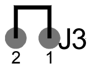
[(1)]W = working contact / C = common

⇨ **Note:** Observe maximum relay output switching voltage and current ratings of 48 V DC / 32 V AC at 250 mA with a purely resistive load.

⇨ **Important**: Irrespective of the programmed function, relays 1 to 16 are de-energized in normal operation.
To be fail-safe, the fault relay is energized while the **SCU** is switched on and no faults are present.

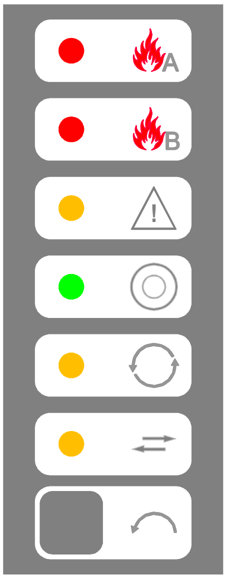
6.3.5 SETTINGS

Following settings are possible on the REL 800/16 relay board.

J1: Contact-doubling	Without contact-doubling *(default setting)*  	With contact-doubling ☞ 6.3.2 SECTION RELAY OUTPUT SELECTION 
J2:	Always open  	
J3: Front panel reset	Button is not active *(default setting)*  	Button is active 
J4: Electrostatic discharge	Closed when using the system in electrical fields greater than 5kV DC at distances below 1 m. This prevents the electronics from getting charged up, which may cause destruction of the control unit. ***Under normal conditions J4 should remain open.***	

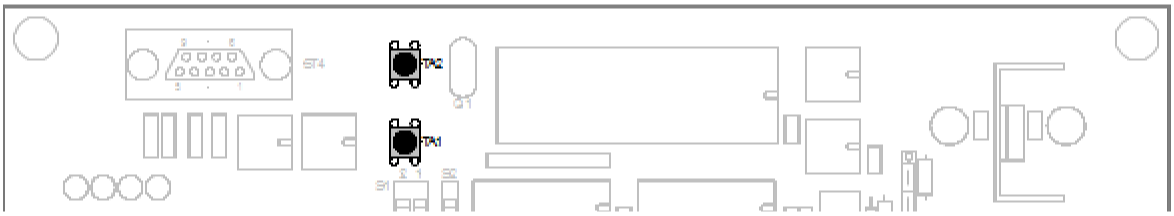
7 INDICATORS AND OPERATION

7.1 INDICATORS



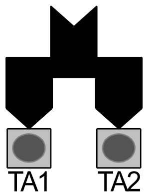
ALARM A:	Fire alarm on sensor cable port K1.
ALARM B:	Fire alarm on sensor cable port K2.
FAULT:	Unit or sensor cable fault.
POWER:	Power present and internal fuse o.k.
MEASUREMENT:	Temperature retrieval from sensor cable.
DATA TRANSFER:	Data transfer on the serial interface.
RESET:	Resets the unit after alarm or fault.

7.2 OPERATION



7.2.1 AUTO-SEEK

Automatically detects all sensors connected to both sensor cable ports. Sensors are not sorted by their position in the sensor cable(s).



- Press **TA**1 and **TA**2 simultaneously.
- All **LED**s other than the alarm **LED**s light up.
- Automatic recognition and registration of all active sensors.
- Sensors connected to cable port K1 are allocated to Zone 1 (alarm relay **AL**1 / **LED** A).
- Sensors connected to cable port K2 are allocated to Zone 2 (alarm relay **AL**2 / **LED** B).
- Automatic transition to monitoring mode.

⇨ **Warning:** Selecting this function will delete a current sensor cable configuration, zones and all messages, as well as reset all parameters to the default values.

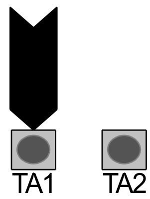
7.2.2 TEST

During inspection:
Compare a formerly configured number of sensors with the number of currently active sensors.

During commissioning:
Compare the number of active (recognised) sensors to the number of sensors noted on plans, while installing the sensor cable (☞ 4.1 ***Imprints***). It is recommended to connect and test sensor cable branches individually, so that possible faults can be isolated. Connect all sensor cables, once individual cables have been tested and found to be correct.

- Press **TA**1.
- The number of active sensors are indicated by the “data transfer” **LED**:
  - Tens: slow blinking
  - Units: quick blinking

  Example: 5 x slow, 3 x quick blinks = total of 53 active sensors

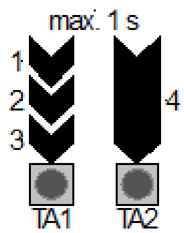


7.2.3 SAVING THE CONFIGURATION

The **SCU**’s configuration is stored in **RAM** after an auto-seek. Should the power supply be interrupted, the last known configuration from the **EEPROM** will be used when the **SCU** is powered up again. If the configuration does not correspond to the connected sensors, a fault signal will be set. The configuration should therefore always be saved to the **EEPROM**.

Pauses in the sequence may not be longer than one 1 second:

- Press **TA**1 3x, and then
- press **TA**2 1x.

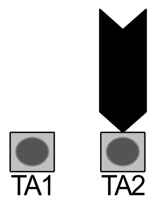


The data transfer **LED** will blink very quickly for one second to confirm the procedure.

7.2.4 RESET

Alarms and fault signals can be reset. This button has the same function as the front panel reset button and the external reset input (☞ 6.1.2.4).

- Press **TA**2



8 COMMISSIONING

8.1 AUTOMATIC COMMISSIONING

The **SCU** can automatically recognise all connected sensors and register these for monitoring (= auto-configured operation: ☞ 3.3.1). No extra software or equipment is required for this configuration.

> ⇨ **Note**: All settings conform to a system response behaviour according to EN 54-5, class A1.

The unit is commissioned with buttons **TA**1 and **TA**2, using the following procedure:

1. ☞ 7.2.1 AUTO-SEEK: Automatic recognition of all active sensors.
2. ☞ 7.2.2 TEST: Compare expected and recognised number of sensors.
3. ☞ 7.2.3 SAVING THE CONFIGURATION

> ⇨ **Important:** The final configuration must be saved, to prevent configuration loss and resultant fault signals.

4. It is recommended, that the first and last sensor on each physical cable branch be tested, so that correct signalling to superordinate equipment is ensured.

8.2 CONFIGURED SYSTEMS

Logic sorting and grouping of sensors into zones, and assigning these zones to relays is only possible with the graphical configuration tool ***LISTp800***.

This configuration type is explained in the ***LISTp800*** manual 60T281.

9 INSPECTION AND MAINTENANCE

The inspection of a d-LIST system is a quick functional test, which can be performed by briefed personnel.

Maintenance of a d-LIST system can be performed by trained personnel only.

9.1 INSPECTION

Form 60T028 outlines the procedure and may also be used to document the inspection.

> ⇨ **Note:** Deviations should be reported to the responsible maintenance service.

This form can be adapted to project specific conditions. The project name, position, unit name/number, the number of configured measuring points and the **SCADA**-connection can be pre-specified.

The following points are checked during an inspection:

- The state of all **LED**s.
- The number of active sensors.
- Sensor cable fixings.
- **SCU** and connection box cable glands.

9.2 MAINTENANCE

> ⇨ **Note**: Maintenance can only be performed by trained personnel utilising ***LISTp800***.

Please refer to the ***LISTp800*** manual 60T281 and the Maintenance report 60T005 for further information.

APPENDIX: PART NUMBERS

Part number	*Designation*	*Remark*
G00231	SCU 800-03 control unit	Control unit with 2 alarm- and 1 fault-relay, LIST-protocol
G00233	SCU 800/16 control unit	Control unit with 16 zonal alarm- and 1 fault-relay, LIST-protocol
G00300	CBO 5-SEC connection box	For two SEC 15 sensor cables incl. UCM-SEC connection module
G00530	CBO 5-ESD-T connection box	For max. 8 ESD external sensors incl. UCM-ESD connection module

SPARES

SCU 800		
M00402	SCU 800 housing	Incl. hinges, front panel foil, plugs, lid-screws & -covers
M00189	SCI 800 main board	Main board for SCU 800-03 / SCU 800/16
M00192	LED-IB 800 indicator board	Indicator board with LEDs for SCU 800-03
M00225	REL 800/16 relay board	Relay board with 16 relays for SCU 800/16
M00415	Cable-gland accessory bag	All cable glands for SCU 800: M25, M20, M16 (with O-Rings)
M00416	Connector accessory bag	Incl. jumpers, SCON 15/0 shield-, CLB2 crimp-, and power connectors
M00439	Cable-gland plug accessory bag	Incl. cable-gland plugs: 2x M25, 3x M20, 2x M16 (with O-Rings)

SENSOR CABLE		
M00315	SCON 15/0	Sensor cable shield connector for SCU 800
M00316	SCON 15/1	Sensor cable shield connector for UCM or CCM 150-A
Z00315	CLB 2 crimp connector	Female 2-way crimp connector for flexible flat cable (100 pcs.)
Z00503	END end cap	Heat-shrinkable cap to seal the end of SEC 15 or SEC 20 sensor cable
G00396	N15 repair set	Heat-shrinkable cable sleeve with flexible flat cable, shield connector, CLB 2 crimp connectors, and sealing material for the connection of two SEC 15 sensor cables

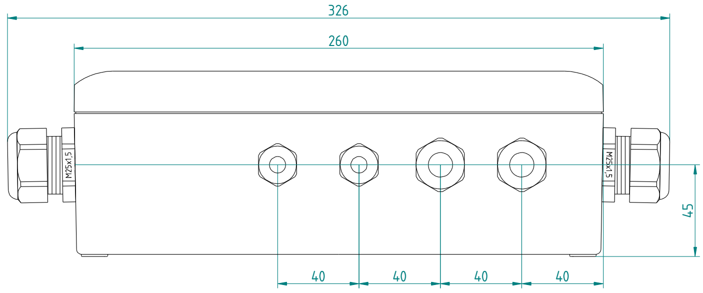
CONNECTION BOXES		
M00409	CBO 5-SEC accessory bag	Cable glands, CLB 2 crimp connectors, fixing material
M00422	CBO 5-ESD-T accessory bag	Cable glands, seals, plugs, fixing material
M00258	UCM-ESD connection module	For 8 ESD external sensors, or 4 ESD external sensors and 1 SEC 15 sensor cable
M00259	UCM-SEC connection module	For 2 SEC 15 sensor cables
Z00320	Clincher PCB latch	CLB crimp connector to printed circuit board latch (100 pcs.)

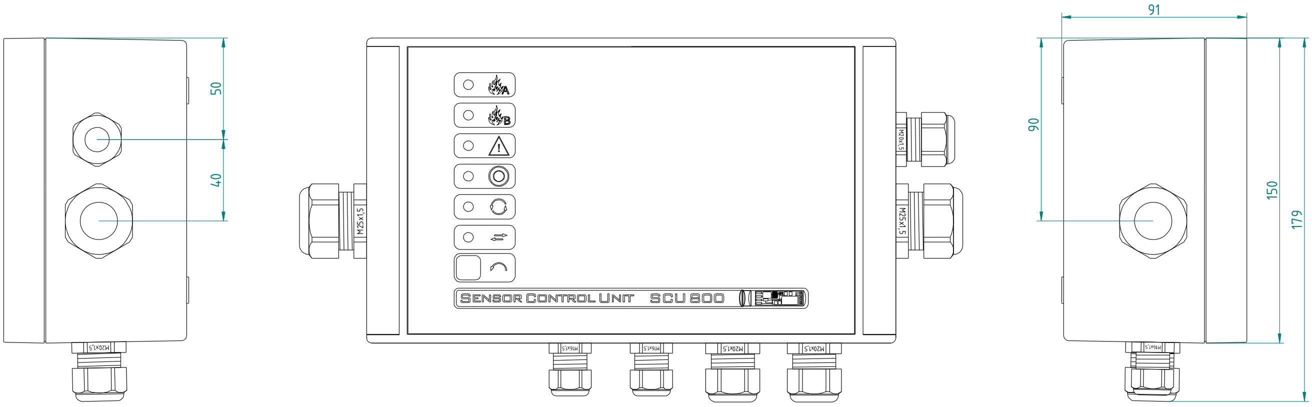
TOOLS		
M00172	VK232-S8-PC-03 connection cable	PC to SCU 800 RS232 connection cable
Z00347	CLCT crimping tool	LIST crimping tool for flexible flat cable CLB crimp connectors
A00427	LIST cable cutter	For SEC 15 and SEC 20 sensor cables
G00432	SC 15/20 service case	For SEC 15 and SEC 20 commissioning and repairs: LIST crimping-, and standard tools plus consumables in a service case.

APPENDIX: DIMENSIONS

SCU 800

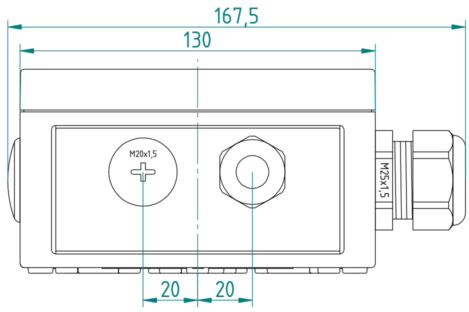
Case material: Aluminium
Ingress protection: IP 65
Colour: Grey (RAL 7040)

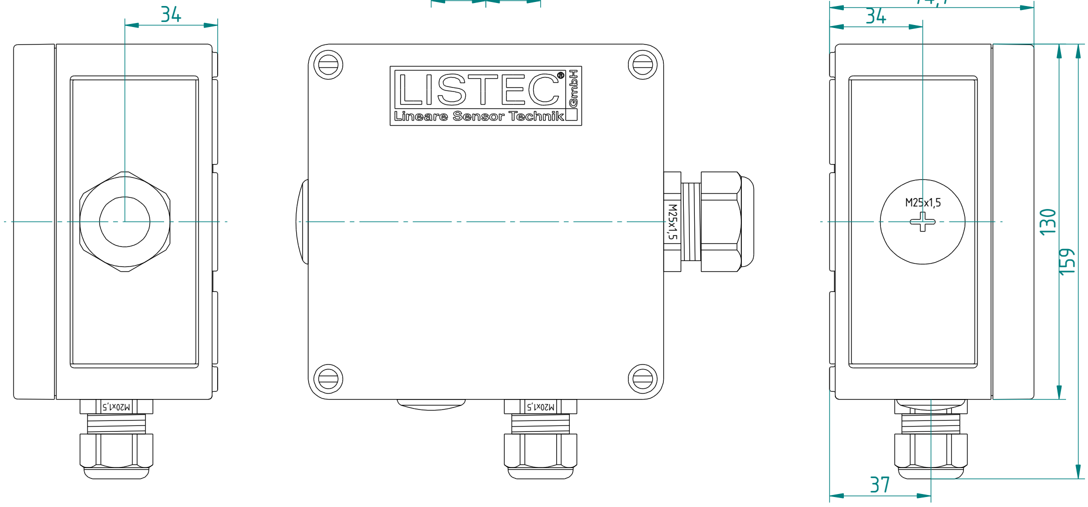




CBO 5-SEC AND CBO 5-ESD-T

Case material: Glas fibre reinforced Polycarbonate
Ingress protection: IP 66
Colour box: Grey (similar to RAL 7035)
Colour cover: Red (similar to RAL 3020)



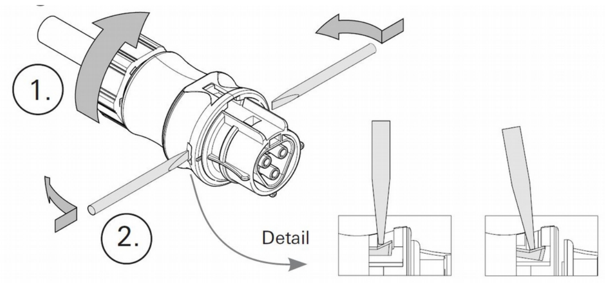


Attention:
Unused holes must remain sealed
with the fitted plugs.

Installation:
Provide sufficient space for connection
cable bending radius (25 cm for SEC 15).

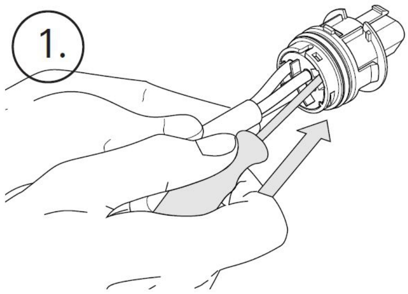
Opening SECcon connectors:

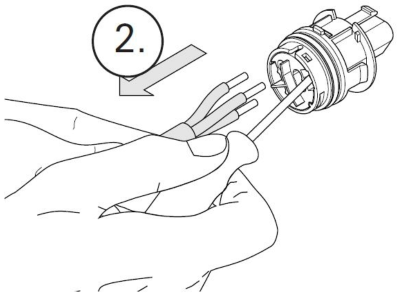
1. Loosen gland nut.
2. Use two screwdrivers to disengage the housing's latches and separate it from the connector body.



Unlocking spring clamps:

Use a 3,5 mm de-burred DIN 5264 A screwdriver to unlock wires from spring clamps.





Subject to change without prior notice!