# Product description

The 478 is for controlling DALI ballasts, LED drivers, emergency devices and load interface units (except for the 490 Blinds Controller). The flexible control inputs route an input address/group command, as a broadcast, to its corresponding DALI channel output. The 478 operates in one of two modes to support the connection of controls:

- **Normal mode**: No device addressing is required. Helvar compatible presence sensors can be connected in addition to DALI compatible control gear. The sensors provide local occupancy control for the DALI channels' output to which they are connected. Do not connect controls other than those listed (see 'Sensors' on page 7) to the DALI outputs (DALI channels 1–8). This mode provides support for emergency devices only when using the DALI control input.

- **Toolbox mode** (Default): This allows a DALI output channel to act as a power supply, so that any DALI compatible control gear or Helvar DIGIDIM controls can be connected. No automatic addressing takes place, so all the devices connected on the DALI output channel must be programmed using Helvar's Toolbox software. Output levels received on the control inputs are broadcast on the corresponding output channel to provide local override. The 'Toolbox mode' option is available from the control panel. For more information, see 'Set Toolbox mode' on page 10.
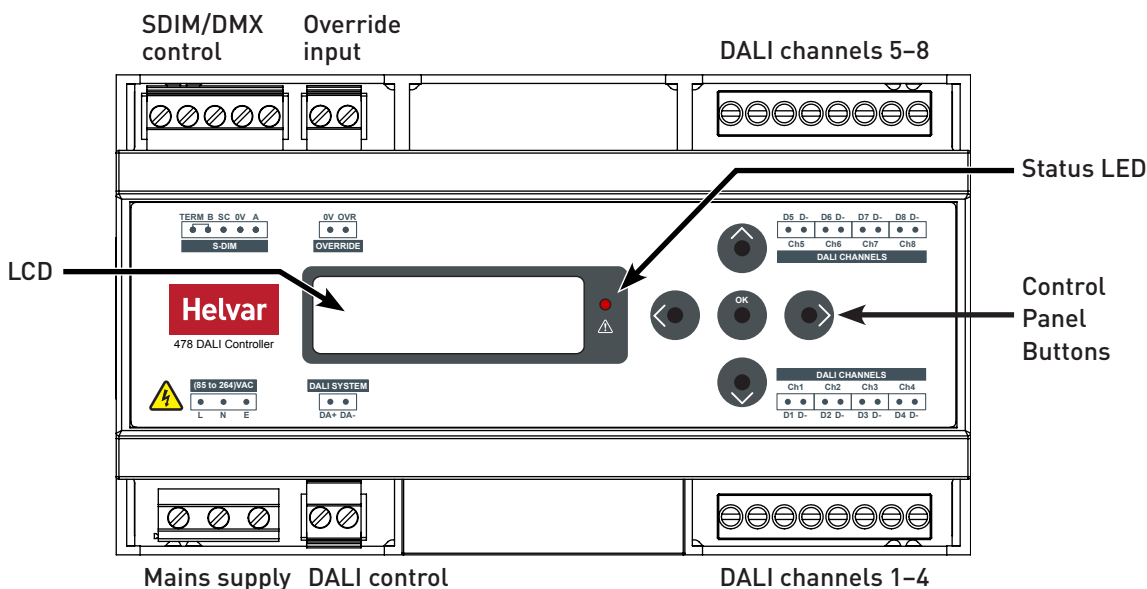
DALI channels

The 478 can control up to 8 DALI channels, each of up to 64 devices (limited by current consumption).

Control inputs

The 478 can be controlled using DALI, SDIM or DMX, and an override input.

NOTE: DALI AND SDIM/DMX MUST NOT BE CONNECTED SIMULTANEOUSLY.

LCD display and control panel buttons

The front of the module has an LCD and five buttons to set basic configuration parameters and provide basic control of channel levels.

> **Note**: The content of this manual refers to the operation of a 478 with firmware version 2.4 or later.

Contents

Mounting, environmental and clearance requirements

Mounting

- Attach the 478 to a DIN rail in a covered mounting rack or other protected location. Observe orientation shown in step 1.

Environment

- The ambient temperature must be between 0 °C and +40 °C.
- Air humidity must be between 0 % and 90 % (noncondensing).
- The area must be adequately ventilated.
- Do NOT install this product in a damp location.

Clearance

- For effective ventilation, ensure that there is adequate space around the unit.
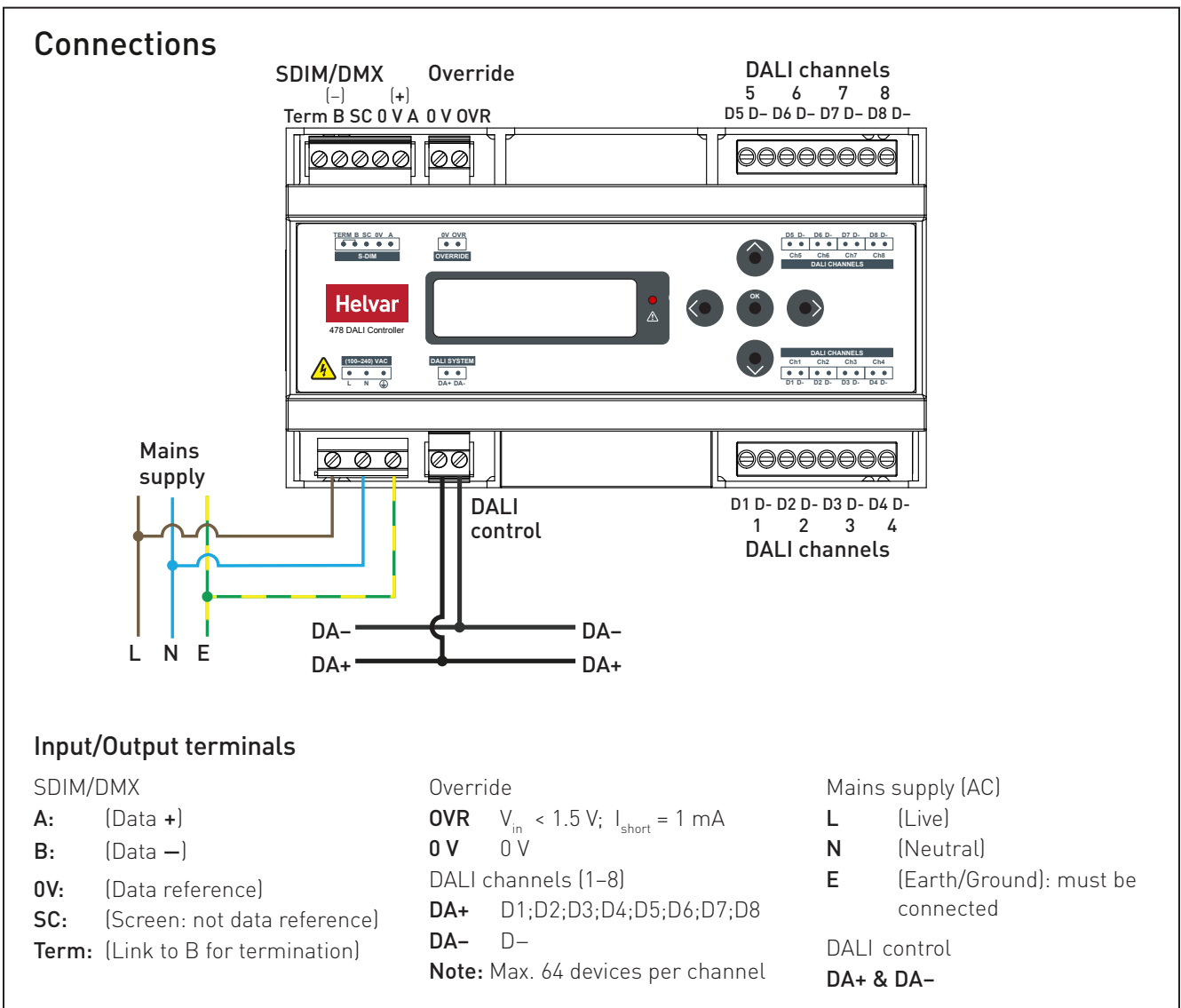- The ventilation grilles must NOT be obstructed.

WARNING: **BEFORE ATTACHING THE 478 AND MAKING ANY CONNECTIONS, MAKE SURE THAT THE MAINS SUPPLY IS ISOLATED.**

CAUTION: **The 478 may be controlled by either DALI or SDIM/DMX. However, DALI and SDIM/DMX must NOT be connected at the same time.**
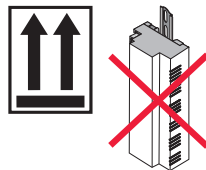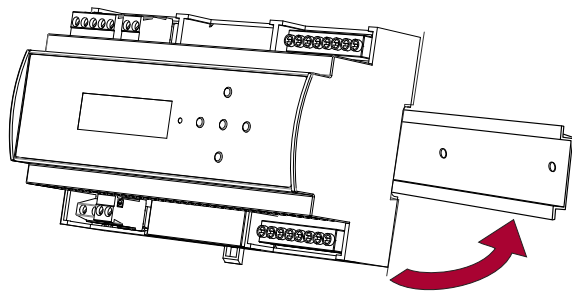
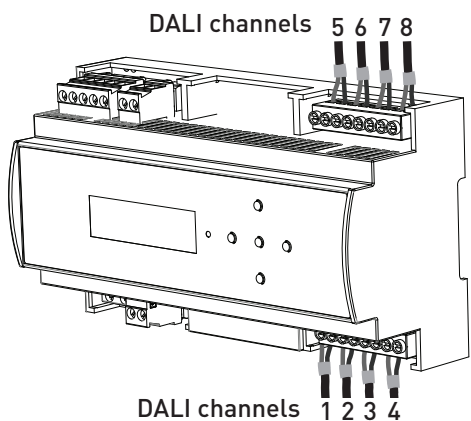# Installation

Installation steps

1. Attach the 478 to a DIN rail
2. Connect DALI channel wiring
3. Connect control wiring (DALI or SDIM/DMX)
4. Connect Override input wiring *(optional)*
5. Connect mains wiring and power on the 478
6. Set SDIM/DMX mode & base address
    (if using SDIM/DMX control)
7. Configure the 478 using Designer or Toolbox software

Connections

Input/Output terminals

SDIM/DMX

A:	(Data **+**)
B:	(Data **—**)
0V:	(Data reference)
SC:	(Screen: not data reference)
Term:	(Link to B for termination)

Override

OVR	V_{in} < 1.5 V; I_{short} = 1 mA
0 V	0 V

DALI channels (1–8)

DA+	D1;D2;D3;D4;D5;D6;D7;D8
DA–	D–

Note: Max. 64 devices per channel

Mains supply (AC)

L	(Live)
N	(Neutral)
E	(Earth/Ground): must be connected

DALI control

DA+ & DA–

1. Attach the 478 to a DIN rail

2. Connect DALI channels wiring

DALI channels **5 6 7 8**

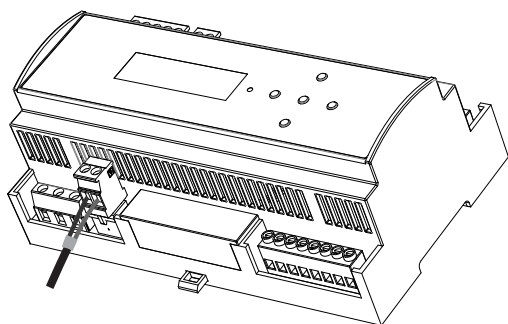DALI channels **1 2 3 4**

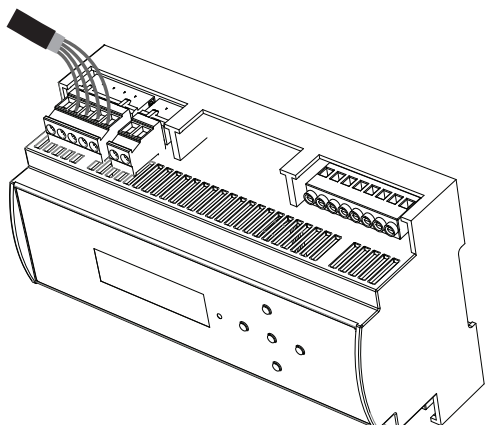# 3. Connect control wiring: DALI or SDIM/DMX

Choose DALI (3a) or SDIM/DMX (3b).
DO NOT CONNECT SDIM/DMX AND DALI AT THE SAME TIME.

3a.   DALI

3b.   SDIM/DMX

SDIM/DMX wiring to next device

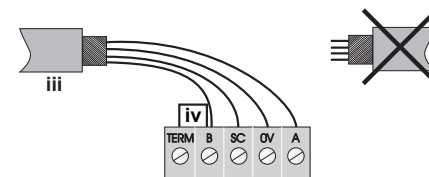| TERM | B | SC | 0V | A |
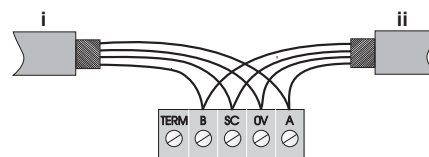
i   = SDIM or DMX Data Cable (from previous device)
ii = SDIM or DMX Data Cable (to next device)
Note: Keep unscreened wire lengths to a minimum.

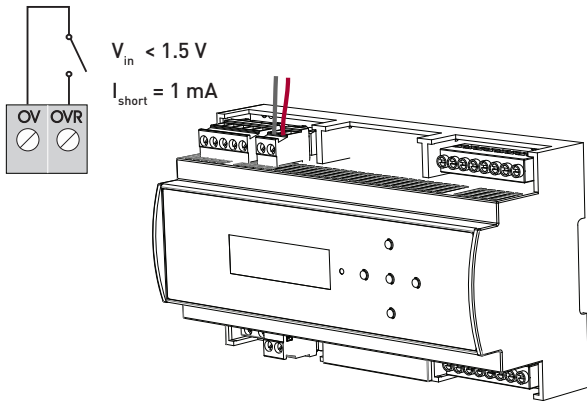### SDIM/DMX termination

| TERM | B | SC | 0V | A |

iii = SDIM or DMX Data Cable (from previous device)
iv = Link for Termination (if unit is at end of SDIM/DMX cable line)
Note: Keep unscreened wire lengths to a minimum.

4. Connect override wiring *(optional)*

$V_{in} < 1.5\ V$

$I_{short} = 1\ mA$

OV OVR

Channel level override function

- Wire a volt-free contact between the '0 V' and 'OVR' terminals.
- Switch closure sets the light output of the DALI channels to their override level, regardless of external control signals. For example, the override could be activated by contact closure on an alarm system.
- Set override levels using Designer, or using the control panel buttons and the LCD.
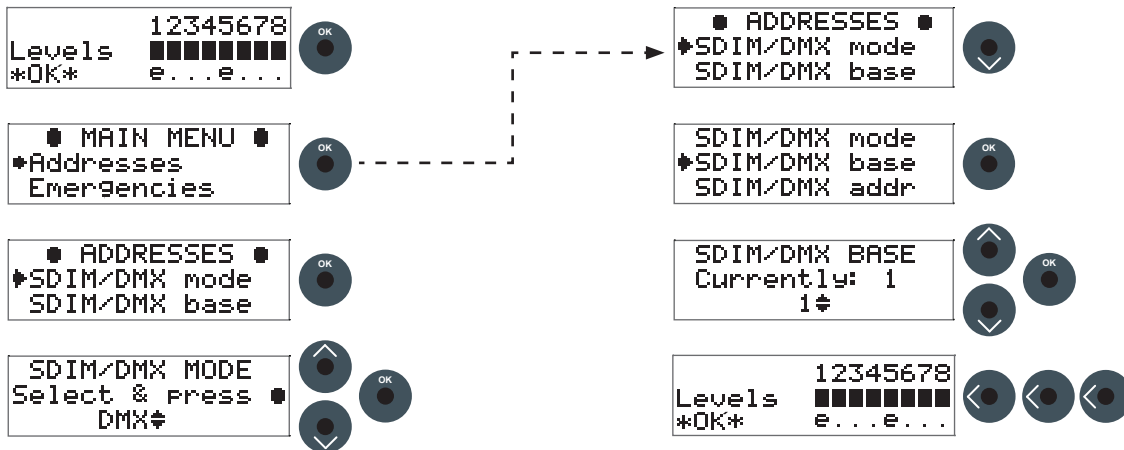- Set override level for all channels, or set different override levels for each channel.

5. Connect mains wiring and power on the 478

L N ⏚

85 VAC – 264 VAC, 45 Hz – 65 Hz
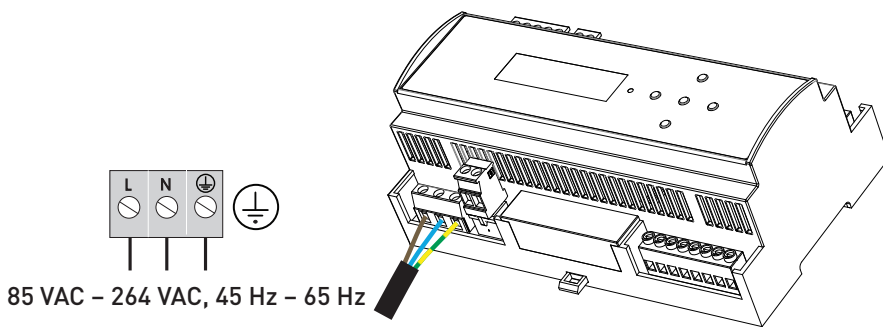
6. Set SDIM or DMX mode and base address *(if using SDIM or DMX control)*

Set SDIM or DMX base address

Use the control panel buttons to set the SDIM or DMX base address, as shown below.

```
            12345678
Levels    ████████
*OK*      e...e...
```

```
 ● MAIN MENU ●
♦Addresses
 Emergencies
```

```
 ● ADDRESSES ●
♦SDIM/DMX mode
 SDIM/DMX base
```

```
SDIM/DMX MODE
Select & press ●
      DMX♦
```

```
 ● ADDRESSES ●
♦SDIM/DMX mode
 SDIM/DMX base
```

```
SDIM/DMX mode
♦SDIM/DMX base
 SDIM/DMX addr
```

```
SDIM/DMX BASE
Currently:  1
       1♦
```

```
            12345678
Levels    ████████
*OK*      e...e...
```

7. Configure the 478 using Designer or Toolbox software

Designer

If the 478 is connected to a router-based system (Helvar 905, 910 or 920 router), connect a PC to the router, and configure the 478 using Designer.

Toolbox

You can configure the 478 using a Windows PC (running Helvar's Toolbox software, v. 2.3.3 or later) connected via USB or serial cable to the DALI network. Use a 510 USB interface, or other Helvar serial interface.
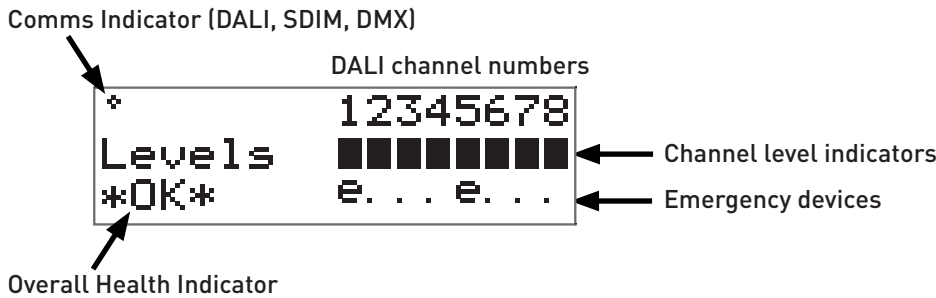
Configuration

We recommend configuring the 478 with Designer or Toolbox.

You can also use the LCD and the control panel buttons to adjust the DALI channel outputs directly, and configure options for all and individual channels.

Note that the 478 is intended for controlling DALI ballasts, drivers and load interface units (except for the 490 Blinds Controller). Do not connect controls to the DALI outputs (DALI channels 1–8), other than Helvar compatible sensors (see 'Sensors' on page 7), unless you selected Toolbox mode.

The following figure illustrates the main display screen on the LCD:

Comms Indicator (DALI, SDIM, DMX)

DALI channel numbers

Channel level indicators

Emergency devices

Overall Health Indicator

The Comms Indicator in the top left-hand corner of the main display screen indicates SDIM or DMX activity or DALI power/activity:

- For SDIM/DMX it is normally off, and flashes on intermittently to indicate SDIM or DMX activity.
- If DALI power is on, then the Comms Indicator is on. It flashes to indicate DALI control activity.

The Overall Health Indicator in the bottom right corner shows whether there are faults in one or more channels:

- If there are faults, it shows 'Fault' (and the Status LED flashes).
- If there are no faults, it shows 'OK'.

The main display screen appears:

- When the 478 is powered on.
- After 60 seconds of inactivity on the control panel .
- After exiting the control panel options.

Use the control panel buttons to:

- Set DALI channel levels
- Navigate the system menus to adjust module settings

Adjust channel levels using the buttons

This section describes how to use the control panel buttons to adjust the DALI lighting level. During the process, the LCD shows a status summary of all devices that are present on each of the channels that you select: first the nonemergency devices, and then the emergency devices.

a. Adjust individual channels

From the main display screen, press the RIGHT button or the LEFT button.

Channel 1 will flash, and the LCD will show the following information about the nonemergency devices present on this channel: how many devices there are (top left corner), how many have failed (top right corner), how many lamps are blown (bottom left corner) and how many devices are missing (bottom right corner).
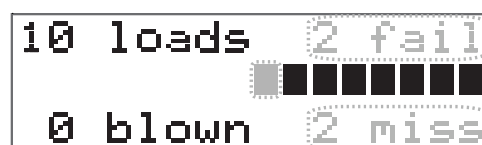
Press the RIGHT button to step through individual channels as required.

The selected channel will flash, and the LCD will show the same status information about the nonemergency devices present on that channel.

Use the UP and DOWN buttons to adjust the level of the selected channel as required.

Press the RIGHT button after channel 8 to display the status information about the emergency devices on channel 1. If no emergency devices are present on that channel, the main display screen will indicate so.

```
10 emerg   1 fail
 0 blown   0 miss
           e...e...
```

Press the RIGHT button to step through individual channels as required.

b. Adjust all channels

Complete all the steps mentioned in the preceding section.
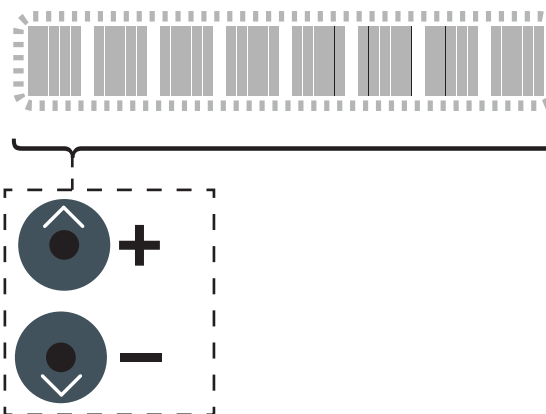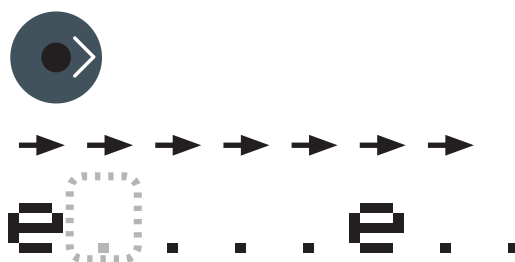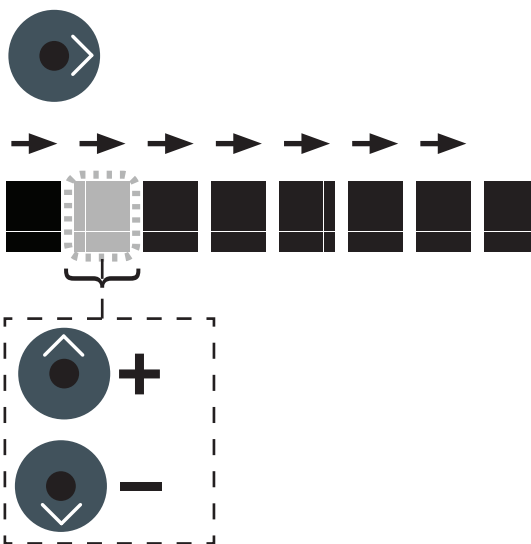
Go to channel 8 (emergency devices).

Press the RIGHT button.

ALL channels are selected.

Use the UP and DOWN buttons to adjust the level of all the channels as required.

c. Return to the main display screen

To return to the main display screen, press the OK button.

OK

```
         12345678
Levels   ████████
*OK*     e...e...
```

Module Menu Options

Most options can be adjusted using Designer or Toolbox.

You can also use the control panel buttons of the unit to access, navigate and adjust the menu options.

Access the menu

To access the menu from the main display screen, press the OK button.

Adjust parameters

Use the UP, DOWN, RIGHT, LEFT and OK buttons on the control panel to navigate, adjust and confirm parameters.

Exit the menu

To exit the menu and return to the main display screen, use the LEFT button.

Main menu

This table lists the main options available from the control panel.

Full options details are in the next section.

Addresses	Set SDIM, DMX and DALI addresses, including base addresses, and SDIM/DMX mode.
Emergencies	Turn emergency channels on and off.
Sensors	Set presence sensor options
Unit Details	View module serial number, firmware version, and various other service-related information.
Recall scene	Recall a DALI scene.
Save as scene	Save levels as a DALI scene.
Default scenes	Reset DALI scenes to default settings.
Groups	Group and ungroup DALI channels.
Min fade time	Set minimum fade times for DALI channels.
Power on level	Set DALI power-on levels for DALI channels.
Failure level	Set (or disable) DALI failure levels for DALI channels.
Override level	Set (or disable) override levels for DALI channels.
Minimum level	Set DALI minimum load levels for DALI channels.
Switch-on level	Set switch-on levels for SDIM/DMX channels.
Hysteresis	Activate/Deactivate SDIM hysteresis for SDIM channels.
Toolbox mode	Sets Toolbox mode, which requires that all the devices connected on the DALI output channel are programmed with Helvar's Toolbox software.
LCD contrast	Adjust the LCD contrast level.
Factory reset	Reset all settings to factory defaults.
Use password	Apply password lock to settings (except to 'Unit details' and 'Enter password' items).
Enter password	Allow changes to settings when password lock is applied (see 'Use password')

Menu Options Details

Addresses

The digital interface (DALI or SDIM/DMX) receives control messages from devices in the system.

You can set any address to any channel.

Note: The base address is the first channel address, from which the remaining addresses are allocated (unless changed manually in the Address submenu).

Submenu items	Options	
SDIM/DMX mode	DMX or SDIM (Default)	
SDIM/DMX base	SDIM Base:	1–247 (Default: 1)
	DMX base:	1–505
	Disabled:	The address will not be re-allocated
SDIM/DMX addr	Channel:	1–8
	SDIM Address:	1–254; Disabled (Default: 1)
	DMX Address:	1–512; Disabled (Default: 1)
	Disabled:	The address will not be re-allocated
DALI base	DALI Base:	1–57 (Default: 1)
	Disabled:	The address will not be re-allocated
DALI addresses	Channel:	1–8
	Address:	1–64; Removed; Disabled
	Removed:	Next time you connect it to a controller program or router, the DALI address will be re-allocated
	Disabled:	The address will not be re-allocated. Select this if the channel is unused.

Emergencies

When the unit detects an emergency light on a channel, it enables an emergency channel on the DALI system side. If there are no emergency ballasts connected on that channel, you can turn this setting off manually with the DOWN button from the 'Emergencies' screen. Subsequently, you can turn it on again with the UP button.

Sensors

The following Helvar presence sensors can be connected to this unit as long as their firmware versions are 6.37 or later: 311 Ceiling PIR Detector, 312 Multisensor, 313 Low-Profile Microwave Detector, 314 Tilting Microwave Detector, 315 iDim Sense, 317 High-Bay Presence/Absence Detector, and 318 Wall-Mounted PIR Presence/Absence Detector.

Submenu items	Options
Enable/On time	The time that the lights are to stay on after the last movement is detected and before the 'Transition Time' is triggered. You can enter any time between 0 min ('PIR disabled') and 4 h 15 min.
Exit delay	The time that the lights are to stay on before motion detection resumes. Movement during this period will not turn the lights on. This allows time for a person to manually turn the lights off and then leave the area without causing the lights to turn on. You can set any time between 0 min ('Off') and 4 h 15 min.
Transition time	Time that follows the 'On time' (see above). If the unit gets a trigger from the sensors before the 'Transition time' (see below) has lapsed, it will set the 'On time'. Otherwise, it will turn off the lights. You can set any time between 0 min ('Off') and 4 h 15 min.
Check presence	Allows the unit to turn the lights on automatically. You can turn this setting on or off as required.
Check absence	Allows the unit to turn the lights off automatically. You can turn this setting on or off as required.

Submenu items	Options
PIR walk test	A 20 s period in which a fixed level is used to verify sensor operation. You can turn this setting on or off as required.
PIR status	Indicates whether the timer is enabled and, if so, it shows the time that remains until the unit goes to the next stage.
Retrigger test	Allows you to perform a test that triggers the same action as if sensor detected presence.

Unit Details

Submenu items	Options
Details (Read-only)	Serial number and firmware version
Mode	Mode, power and data information
	If DALI power is on, a tick appears next to the DALI power field.
	DALI or SDIM/DMX shows the last detected mode when the module was reset.
User mode (Read-only)	'Normal'

Recall scene

Recall a scene previously stored (temporarily if connected to a Helvar router system).

Scenes are sets of lighting levels and can make use of any combination of channels.

This option is always available, even when password protection is applied to other options.

Range: scenes 1–16

Save as scene

The levels which are currently active for all channels of the dimmer are applied to this scene. You can recall stored scenes in the 'Recall scene' menu (see above).

Range: scenes 1–16

Default scenes

Default lighting scenes can be applied to the dimmer channels.

Default scene levels are: scene 1 = 100 %; scene 2 = 75 %; scene 3 = 50 %; scene 4 = 25 %.

In addition, the following default scenes are available when a presence sensor is used: scene 14 = 10 %, presence sensor min.; scene 15 = off, presence sensor off; scene 16 = 100 %, presence sensor on.

Note: Lighting levels are NOT changed automatically once you apply default scenes. However, once you recall a scene, lighting is set to the levels for that scene.

Groups

Assign channels to DALI groups. Any channel can be assigned to any group.

Options:

Group: 1–16

Selected: ✓ (Up button);

Not selected: x (Down button).

Min fade time

Set the minimum time it takes to change between minimum and maximum lighting levels.

Options:

Channel: 1–8, ALL

Fade time: 0: 20 ms

                    1: 150 ms

                    2: 500 ms

                    3: 1 s (Default)

Power on level

Set the level each channel will go to when the unit is powered on, with DALI connected.

Note: Power-on levels for SDIM are set in the router, and not using the control panel.

Options:

Channel:	1–8;
	ALL
Power on level:	0 % – 100 %;
	Last
	(Default in DALI mode:100 %)

Failure level

Set channel levels for situations where the DALI bus goes low, such as when it is short-circuited or the DALI PSU is turned off.

Options:

Channel:	1–8;
	ALL
Failure level:	0 % 100 %;
	**** (= do not apply Failure level);
	(Default: 100 %)

Override level

If the override input connection is short-circuited, e.g. by contact closure on an alarm system, all channels are set to their override level, regardless of external control signals.

Options:

Channel:	1–8;
	ALL
Override level:	0 % 100 %;
	**** (= do not apply override level);
	(Default: 100 %)

Minimum level

Set the minimum DALI lighting level that the channel will achieve when turned on, no matter what scene is called or level is set.

For example, if you set a minimum level of 50 % and call scene 4 (at 25 % level), the channel output level will be 50 %.

For SDIM/DMX, the level set here is actually the switch-on level, and the channel will not turn on unless it receives a command to go to or above this level. See 'Switch-on level' (below).

The minimum level is 1 % by default. If you set the minimum level to 100 %, this forces the dimming curve into switch mode. When using SDIM or DMX control, in switch mode, the 'Switch-on level' will apply. When using DALI control, in switch mode, 0 % = OFF, and 1 % or more = 'Loads at 100 %'.

Options:

Channel:	1–8;
	ALL
Minimum level:	0.1 %;
	1 % – 100 %;
	(Default: 0.1 %)

Switch-on level

Set the switch-on levels for SDIM/DMX channels.

Options:

Channel:	1–8;
	ALL (Default)
Switch-on level:	0 % – 64 %;
	(Default: 2 %)

Hysteresis

Note: Hysteresis is supported only when controlled by SDIM.

This setting affects the level at which the channel turns off. When hysteresis is on, the switch-off level is 80 % of the switch-on level. At or below the switch-off level, the channel will be off. For example, if the switch-on level is 50 %, and the signal rises to this level or above, the channel turns on; then, if the signal falls to 40 % or below, the channel turns off.

By default on the dimmer:

- When hysteresis is on and the signal rises to 2 %, the lighting for that channel turns on; when it falls to 0 %, the channel turns off.
- When hysteresis is off (default setting) and the signal rises to 2 %, the lighting for that channel turns on; when it falls to 1 %, the channel turns off.

Options:

Channel:	1–8;
	ALL
On:	✓ (up button);
Off:	x (down button)
	(Default: x)

Set Toolbox mode

When this mode is enabled, each DALI output channel only acts as a power supply. Any DALI compatible control gear or Helvar DIGIDIM controls can be connected to the unit. However, all the devices on the outputs must be configured separately with Helvar's Toolbox software, as no automatic addressing takes place in this mode.

Note: When programming DALI channel outputs, the control input should be temporarily disconnected.

In addition, output levels received on the control inputs are broadcast on the corresponding output channel to provide local override.

Options:

Channel:	1–8;
	ALL
On:	✓ (up button);
Off:	x (down button)
	(Default: ✓)

LCD Contrast

Set the LCD display contrast: 0 % –100 % (default: 40 %)

Note 1:   At 0 %, the text is just visible.

Note 2:   The display adjusts as you raise or lower the contrast value, but you must press OK to select that contrast level.

Factory reset

Reset the module to the original settings (defaults).

Note: Restoring factory settings returns all connected lighting to default levels immediately.

Press and hold OK for 10 seconds until a '✓ **Done**' message appears.

Use password

Note: The password is disabled by default.

You can use the factory-set password (58) for the module. Note that you must wait for 1 minute after choosing to use the password before the password lock functions.

If the password is enabled, you must enter the correct password. Otherwise you can only use the following functions/menus:

- Change dimmer levels
- View technical information about the module
- Recall a scene
- Enter the password

If you chose to use the password, after 1 minute of inactivity, the LCD goes to standby and the 'Enter password' menu appears in 'Main Menu'.

'**Use password**' disables the functionality of the remaining menus. You can access the menus, but you cannot change any settings unless you enter the password (58).

A key ( ) is displayed in the bottom right of the screen when you enter the menu, to indicate that you cannot enter any settings.

Options:

Use password: (password is 58)

> ✓ (up button);
>
> x (down button)
>
> (Default: x = no)

Press OK to confirm new selection, and a '✓ **Done**' message appears.

The password lock will be applied after a period of 60 seconds from this message appearing.

Enter password

If the password is enabled and you wish to use all of the functions of the module, you must enter the correct password. The password is 58.
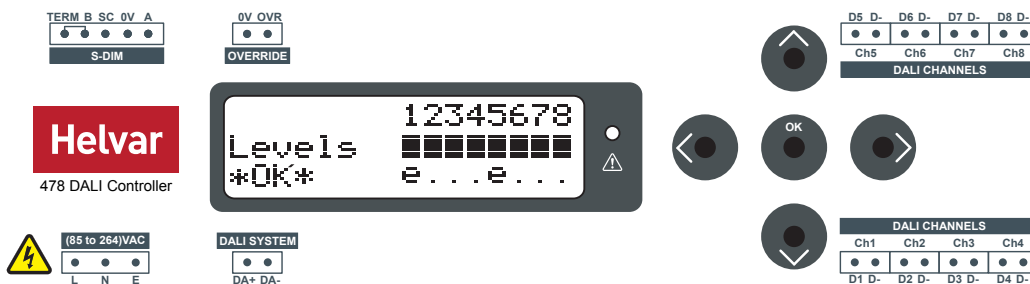
Status messages

Status messages are displayed on the bottom row of the LCD display.

The status LED will flash red to indicate the states listed below (except the 'OK' state).

The status LED lights red for a second when the 478 is powered on.

No DALI channel selected

If no DALI channel is selected, the messages 'OK' or 'Fault' are displayed.

Message	Reason
OK	The 478 unit and the DALI channels are working properly.
Fault	Fault with one or more DALI channels: see messages under 'DALI channel selected' on page 12.
No emergency ballast found	No emergency ballast could be detected on the selected channel.

DALI channel selected

If a DALI channel is selected, these messages are displayed:

Message	Reason
DALI BUS SHORTED	**Either:**
	DALI channel terminals are short circuited;
	Or:
	Too many devices have been connected to a channel (and too much current is being demanded from the 478).

Note: The 478 also reports DALI lamp failure on the DALI control input. If no devices are connected to an output, it will report back DALI lamp failure. This makes it easy to detect disconnected outputs.

Technical Data

Connections

Mains supply:	Solid core: up to 4 mm² Stranded: 2.5 mm²
DALI:	Wire section: 0.5 mm² – 2.5 mm² Max. length: 300 m @ 1.5 mm²
SDIM/DMX:	0.22 mm² – 1.5 mm² low-loss RS485 type (multistranded, twisted and shielded)
Cable rating:	Mains, relay and DALI cables (including outputs) must be mains rated.

Power supply

Mains supply:	100 VAC – 240 VAC (nominal) 85 VAC – 264 VAC (absolute) 45 Hz – 65 Hz
External MCB protection:	Max. 6 A The external power supply must be protected.
Isolation:	Between mains supply, DALI outputs, DALI system, and SDIM/Override connectors. DALI channels are not isolated from each other.
Standby power:	No standby mode – DALI power provided for DALI channels.
Max. total losses:	7 W
DALI consumption:	2 mA (DALI system input)

Inputs

Control:	DALI, SDIM or DMX
Override (OVR):	Wired override input
User interface:	5 push buttons for configuration

Outputs

DALI:	8 output channels
Max. load per output:	128 mA (up to 64 devices, limited by current consumption)

Mechanical data

Material:	Polycarbonate/ABS mix, UL94 V-0
IP rating:	IP 00 (For installation in a restricted access location only.)
Mounting:	DIN rail mounting
Weight:	250 g
Module dimensions:	9 module width: 160 mm × 90 mm × 62 mm

Operating conditions

Ambient temperature:	0 °C to +40 °C
Relative humidity:	Max. 90 %, noncondensing
Storage temperature:	−10 °C to +70 °C

Conformity and standards

DALI:	EN 62386
SDIM:	Helvar SDIM protocol
DMX:	DMX512-A protocol
EMC emission:	EN 55015
EMC immunity:	EN 61547
Safety:	EN 61347-2-11
Environment:	Complies with WEEE and RoHS directives.

Software compatibility

Designer:	4.2.18 or higher
Toolbox:	2.3.3 or higher