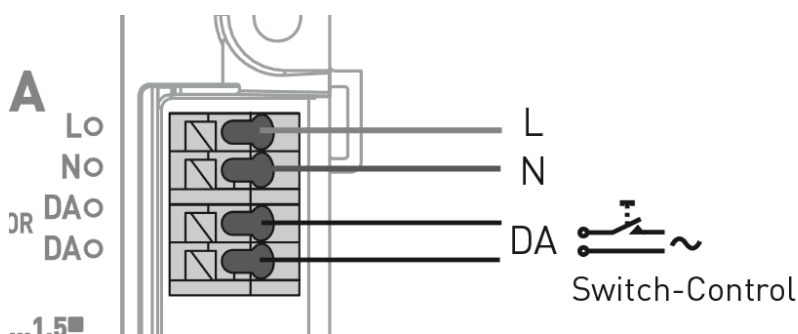# User Guide
SWITCH-CONTROL TECHNOLOGIES FOR LED DRIVERS
SWITCH-CONTROL, SWITCH-CONTROL 2, PUSH TO FADE AND DIRECT CONTROL

Switch-Control / Push to Fade is a protocol for controlling the light with a mains rated retractive (push to make) switch, while Direct Control does the same in single luminaire without the mains voltage.

CONNECTION OF SWITCH-CONTROL / PUSH TO FADE

Switch-Control and Push to Fade operate by connecting the mains voltage to the DALI input terminals. Therefore please ensure that all the components connected in this line are mains rated and protected according to all applicable safety requirements. The support of DALI operation is disabled for the time of Switch-Control operation and re-enabled with a mains reset.
The maximum number of drivers & switches per circuit and the maximum wire lengths are presented in the table below. Ensure all drivers and other loads are connected to the same mains phase.

In case of any odd behavior occuring during operation with Switch-Control / Switch-Control 2 / Push to Fade, always refer to the pages 3-4 for troubleshooting.

	Switch-Control	Switch-Control 2	Push to Fade
Maximum number of LED drivers per circuit	30	60	30
Maximum wire length	25 meters [1][2]	Driver technology does not restrict the wire length[2]	25 meters[1][2]
Maximum number of switches per circuit	Limited by total wire length [1] (see above)	Driver technology does not restrict the number of switches[2]	Limited by total wire length [1] (see above)
On / Off fade time	Instant light on / off	Instant light on / off	Fading at light on / off (0 --> 100 % ~1 s)

1) The maximum wire length from the switch to the driver in Switch-Control is 25 m. The wire length can be extended to 200 m by connecting a capacitor (1 µF, min. 275 VAC RMS and X2 rated, according to IEC 60384-14) across the Switch-Control input.
2) The X2 rated capacitor is also used in any Switch-Control / Switch-Control 2 / Push to Fade installation in case of unintentional behavior of lights due to installation environment. See page 4 for more details.
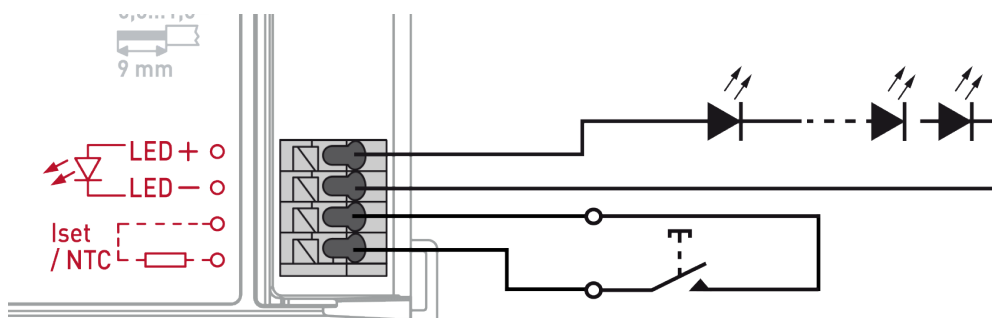
SWITCH-CONTROL 2

Helvar Switch-Control 2 brings technological updates to the original Switch-Control. While the functional logic and principles stay the same, Switch-Control 2 allows unlimited installation wiring length. In addition, the amount of controllable drivers is increased to as high as up to 60 drivers, ensuring even more flexible use of Helvar drivers in any installation.

PUSH TO FADE

Push to Fade is similar solution to Switch-Control, with an additional fading between on/off states for smooth lighting comfort and athmospheric experience in various applications such as spotlights and panels in hospitality and residential lighting.
Note: Push to Fade is not compatible to be installed in the same circuit with Switch-Control or Switch-Control 2 devices.

CONNECTION OF DIRECT CONTROL

Helvar's innovative Direct Control (patent pending) behaves much like the Switch-Control, but in this case the control can be implemented in a more straightforward way without using the mains voltage. Only a simple retractive (push to make) switch connected into the Iset / LED-Iset terminal and enabling the Direct Control from the Helvar Driver Configurator tool are needed. DALI usage is **not supported** at the same time with Direct Control operation.
Direct Control is aimed for simple implementation of luminaire-based switches, such as pull cord or local dimming push button, so only one single switch is supported per one LED driver.

	Direct Control
Maximum number of LED drivers per circuit	Single driver
Maximum wire length	10 meters
Maximum number of switches per circuit	Limited by total wire length

SWITCH-CONTROL / DIRECT CONTROL OPERATION LOGIC

Switch active less than 50 ms	**No operation.** This is a protection against short interruptions and disturbances in the control cables.
Switch active 100-350 ms	**Short press (ON/OFF function);** toggle operation between ON and OFF, At switch ON the light returns to the previous level before OFF;
Switch active for longer than 450 ms	**Press and hold (Fade UP/DOWN);** after switch ON the first dimming direction is always to dim down; if you press and hold from OFF the light goes to min level and starts fading up; the dimming direction is always changed when Switch-Control / Direct Control is released.

The Switch-Control / Direct Control fade is using DALI commands UP and DOWN with a fixed fade rate of 5 sec from min level to max level.

PUSH TO FADE OPERATION LOGIC

Switch active less than 500 ms	**Short press (ON/OFF function);** toggle operation between ON and OFF, At switch ON the light returns to the previous level before OFF;
Switch active for longer than 500 ms	**Press and hold (Fade UP/DOWN);** after switch ON the first dimming direction is always to dim down; if you press and hold from OFF the light goes to min level and starts fading up; the dimming direction is always changed when Push to Fadeis released.

SETTING POWER ON TO LAST LEVEL

With Switch-Control and Direct Control

Default setting of "power on to last level" is **deactivated** unless stated otherwise in the LED driver datasheet.

Following sequence will either **activate or deactivate** "Power on to last level" functionality:
- 1 x long switch (20- 25 sec.)
- 3 x short switch (100-350 ms)
- 1 x long switch (20- 25 sec.)

The timing windows are defined in a precise manner, so the usage of a timer / stop watch is recommended. Approximately a 2 seconds delay is allowed between the switches.
Note! When **activating** the light must be switched ON.
When **deactivating** the light must be switched OFF.

With Push to Fade

The power on to last level functionality is always **activated**.
A preset light level can be set, to which the LED driver will always return to when lights are switched ON. To activate or deactivate:
- Activate: double click (two pushes of a button within 500 ms of each other), when the lights are on at desired light level. Light flashes two times to indicate that the level is set.
- Deactivate: double click (two pushes of a button within 500 ms of each other) when the lights are turned off.

If the mains break is shorter than 450 ms, the ligths will continue with no change in the current state. If the mains break is longer than 450 ms, the lights will return to the same light level that was on before the break, or if the preset level is activated, then to the preset level. If the lights were switched OFF before the mains break, they will always remain OFF after the mains return.

RESET OF SWITCH-CONTROL & PUSH TO FADE
Due to differences in the cable-inductances of individual luminaires the intensity of the various drivers might occasionally go out of sequence with time. In this case there are different techniques available to synchronise the light levels.

1) Press and hold the Switch-Control until all lights are ON. Then Switch all lights OFF with a short press. This will bring all lights back into synchronisation again. In Push to Fade solution, the press should be >15 seconds.

2) In driver models where applicable (described in the end of the datasheet in the "Use of Switch-Control functionality section") there is also an option to carry out the synchronisation by just pressing and holding the Switch-Control switch for 10 seconds without interruption.

3) In Switch-Control / Direct control solutions, a mains power reset may also act act as a synchronisation procedure. Switching the mains OFF and ON will perform a total Switch-Control reset of the drivers, that go into the default factory state as long as "power on to last level " is **not** activated.

SWITCH-CONTROL / DIRECT CONTROL FOR THE CONTROL OF COLOUR TEMPERATURE AND INTENSITY IN IC DRIVER RANGE

Intensity control
- Switching the light on and off
  - Short press → Switch the lights ON/OFF, ON level is always with last level setting of intensity and colour temperature
- Changing the intensity
  - Long press after switching the light ON → Light dims always first down, then next long press lights fades up. Next long press would dim the light down again.
  - Long press when the light is switched OFF→ Light switches ON to minimum level, then starts to fade up.

Colour temperature control
- Long press, dimming direction has to be up
    - Hold the button when the light is switched ON → First the light goes to full intensity
    - Hold the button still down → After certain amount of time from the start of the push, the colour temperatures jumps to coldest colour temperature
        - Switch-Control: 10 seconds
        - Direct Control: 7 seconds
    - Continue holding the button pressed → Colour temperature changes from cold to warm and then continues cycling between these
    - Releasing the button sets the new colour temperature.
    or
    - Press and hold button when the light is switched OFF → The light switches ON and fades slowly from min. to max. level. Hold the button for additional 7/10 seconds and the colour temperature starts to change (as described above).

RESET OF SWITCH-CONTROL IN IC DRIVERS

The intensity and/or CCT values of the various drivers might go out of sequence with time due to differences in the cable-inductances of individual luminaires. In this case press and hold the Switch-Control until all lights are ON. Then perform a normal colour temperature setting as described above. This will bring all lights back into synchronisation again.
You can as an alternative synchronisation carry out a power reset. Switching the mains OFF and ON will perform a reset of both light intensity and colour temperature to the default factory setting providing ˝power on to last level ˝ is deactivated.

APPLICATION LIMITATIONS AND TROUBLESHOOTING

Switch-Control / Switch-Control 2 / Push To Fade
- In any installation where the lighting is behaving in unwanted manner (e.g. sudden unwanted changes in dimming level) due to the installation environment (e.g. induced voltages to the cables or other disturbancies due to installation environment), the X2 rated capacitor should be connected across the Switch-Control input (1 μF, min. 275 VAC RMS and X2 rated, according to IEC 60384-14)). See picture below of the capacitor placement.
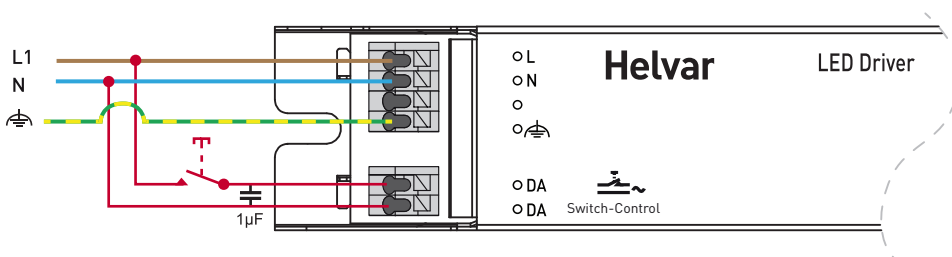
- Cable length in a Switch-Control 2 installation is not restricted by the driver technology, but it must be always ensured that the actual installation fulfills the relevant national legislation regulations regarding short-circuit current to ensure proper fuse or MCB operation in case of a fault condition.
- Switch-Control / Switch-Control 2 / Push to Fade circuits shall not be operated with push-buttons that include internal indicator bulbs / lights sources (glow switch).
- Push to Fade is not compatible to be installed in the same circuit with Switch-Control or Switch-Control 2 devices.

Direct Control
- Due to the legislation, one Direct Control circuit shall consist of only one LED driver. Connecting multiple drivers is prohibited,.
- In SELV60 LED drivers, Direct Control circuit is a SELV60 circuit. In non-isolated LED drivers, Direct Control circuit is not a SELV60 circuit, and mains-rated switch must be used.
- DALI bus should not be used at the same time with Direct Control, to avoid the situation of conflicting commands coming from two inputs into LED driver.