

TR40, TR42 Room Sensors and Displays

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Description

The TR40 and TR42 series of room sensors and displays are designed to operate with Trend IQX controllers.

All models have an integral temperature sensor and variants are available that also include sensors for relative humidity and/or CO₂ concentration. The TR42 features a monochrome backlit LCD display which can be configured to show sensor readings and allow user control of fan speed, occupancy and temperature setpoint.

Up to 7 devices can be connected to the controller by a two wire Sylk™ bus which carries both data and power.

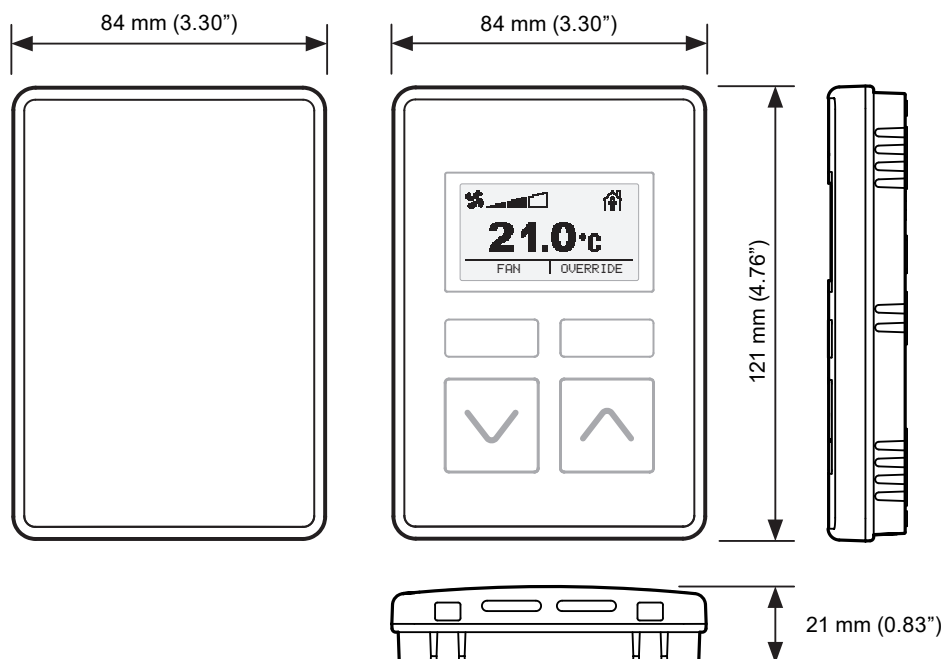
Features

- Single power/data connection to controller reduces wiring.
- Temperature sensing plus versions with humidity and/or CO₂
- Operates in either °C or °F.
- Common backplate and connections allows easy upgrade from TR40 to TR42.

TR42 only

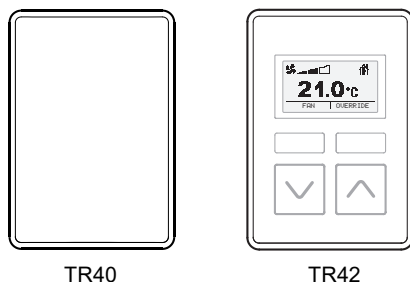
- Backlit LCD display with temperature, humidity, CO₂, fan speed, occupancy and setpoint display options.
- Setpoint, fan speed, and occupancy override functions.

Physical



FUNCTIONALITY

This range comprise two main types of device – the TR40 Room Sensor and the TR42 Room Display:



TR40

TR42

All TR40 and TR42 variants have integral sensors that provide measurement of ambient temperature, while selected variants also include sensors for measuring humidity and/or CO₂ levels:

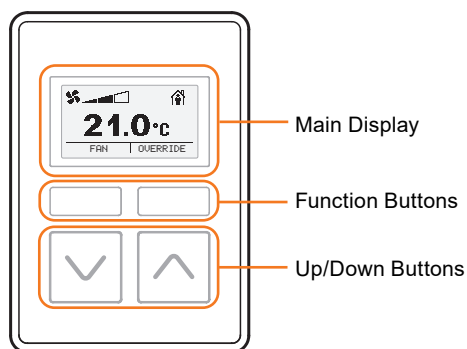
Variant	Temp	Humidity	CO ₂
-D1	Y		
-H-D1	Y	Y	
-C-D1	Y		Y
-HC-D1	Y	Y	Y

Output values from these sensors can be read by the connected controller.

The TR42 additionally features a display that can show sensor values and, in conjunction with the various control buttons, can be used to view and change system operation (e.g. temperature setpoint, fan speed and occupancy).

DISPLAY AND BUTTONS (TR42 only)

The TR42's front panel contains a backlit monochrome LCD matrix display together with four touch control buttons:



Main Display

Function Buttons

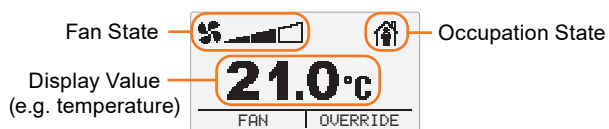
Up/Down Buttons

Main Display

The display is used present a range of different information and, where required, provide the user with selectable options to change certain settings.

In normal operation (i.e. no buttons being pressed), the display's 'home' screen can be configured to display:

- a value (e.g. temperature, humidity and CO₂ values),
- the current fan state, and
- the current occupation state.



Display Value: Shows the current value for any of the following:

- temperature in either °C or °F (up to 1 decimal place)
- humidity in %
- CO₂ concentration in ppm (parts per million)
- temperature setpoint in either °C or °F
- device name

It can also be configured to scroll through any settings that are visible in the MORE menu, or to display nothing.

In normal operation the display backlight will be off, but will turn on when any button is pressed. About 1 minute after the last button press the backlight will turn off and the display will return to the home screen.

Note: The text (or icons) on the bottom line of the display indicate the purpose of the function buttons.

Fan State: Shows the current fan state as provided by the controller. The programmed fan configuration mode determines if and how this is displayed (see Fan State & Control for further details).

Occupation State: Shows the current occupied/unoccupied state as provided by the controller, or as overridden by the user. The programmed occupation state determines if and how this is displayed (see Occupation State & Control for further details).

Function Buttons

The TR42 has two function buttons which invoke the function indicated by the label (or icon) displayed above them.

Depending on the device configuration, the buttons can have the following primary functions on the home screen:

Label	Description
FAN	Select fan control mode
OVERRIDE	Override the current occupation state
MORE	Display the MORE menu

Within control screens and menus the buttons can have the following secondary functions:

Label	Description
HOME	Return to the home screen
EDIT	Enter edit mode for the displayed item
DONE	Exit edit mode and save the current setting
CANCEL	Exit edit mode without saving

Up / Down Buttons

The and buttons have various functions according to the current display mode and configuration:

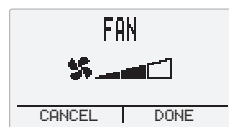
Display	Function
Home Screen	Raise or lower the current setpoint (if this feature is enabled). Press both buttons simultaneously to display the MORE menu.
Edit Mode	Adjust the currently displayed value or step through the available settings.

Fan State & Control

The home screen can be configured to show the current fan state/speed in the top left corner of the display. Fan operation can be configured for the following modes:

Fan Control Mode	State	Display Icon
Disabled		(blank)
2 State	Auto	AUTO
	On	ON
3 State	Auto	AUTO
	On	ON
	Off	OFF
5 State	Auto	AUTO
	Off	OFF
	Low	
	Medium	
	High	

If fan control is enabled, the FAN function button will be displayed on the home screen, allowing the user to override the current fan state:



The fan state can then be changed by using the and buttons. The function keys will now be labelled CANCEL (keep the existing state) and DONE (save the new state).

Occupancy State & Control

The home screen can be configured to show the current occupancy state in the top right corner of the display:

Occupancy State	Display Icon
Disabled	(blank)
Unoccupied	
Occupied	
Override / Unoccupied	
Override / Occupied	

If occupation override control is enabled, the OVERRIDE function button will be displayed on the home screen, allowing the user to override the occupancy.

The occupancy state can then be changed by using the and buttons. The function keys will now be labelled CANCEL (keep the existing state) and DONE (save the new state).

When override is invoked, it can be configured to automatically cancel the override after a preset time or a specific network bypass time:

- Preset times: 1, 2, 3, 4, 5, 6, 7, 8, 12, 16, 20 or 24 hours,
- Network bypass: 1 to 9999 minutes.

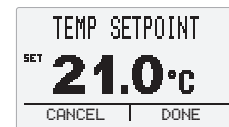
The user can also manually cancel the override at any time.

Setpoint Adjustment

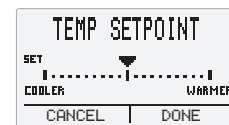
If setpoint adjustment is enabled, pressing either the or buttons from the home screen enables the user to adjust the temperature setpoint to a desired level between preset low and high limits.

The setpoint adjustment screen can be displayed in either of the following formats:

- numerical (specific temperature setting in °C or °F):



- graphical (cooler/warmer adjustment):



The setpoint can be configured as an absolute temperature value or as an offset value of $\pm 5^{\circ}\text{C}$ (or $\pm 9^{\circ}\text{F}$).

The setpoint can be changed (in 1° or 0.5° increments) by using the and buttons. The function keys will now be labelled CANCEL (keep the existing setpoint) and DONE (save the new setpoint).

MORE Menu

The MORE menu lists a number of additional display values and settings and can be accessed using the MORE function button (if displayed) or by pressing both the and buttons simultaneously.

Once the menu is displayed, use the and buttons to step through the list. The following table shows the full list of menu items available; each item can be separately configured to be shown or hidden:

Menu Item	Function
TEMPERATURE	Displays the current temperature.
HUMIDITY	Displays the current humidity level.
CO2	Displays the current CO2 concentration.
TEMP UNITS	Displays the current temperature units and allows the user to change them. (e.g. DEG C or DEG F)
LANGUAGE	Displays the current language mode and allows the user to change it. (e.g. ENGLISH or INTERNATIONAL)
DEVICE NAME	Displays the device name

Note: If no items are selected to be visible to the user, then the MORE menu will not be accessible. Any items that are visible in this list will be displayed by the scrolling option in the home screen.

Where a displayed item is editable, the right-hand function button is labelled EDIT. Selecting EDIT enables the value to be changed using the and buttons. The function keys will then be labelled CANCEL (press to keep the current value) and DONE (press to save the new value).

Language Mode

The TR42 can be configured to show function button labels, MORE menu items and certain display names in one of the following modes:

- ENGLISH - displayed as English text,
- INTERNATIONAL - displayed as icons.

Display Function	ENGLISH Text	INTERNATIONAL Icon
Function Keys	FAN	
	OVERRIDE	
	MORE	...
	HOME	
	EDIT	
	DONE	
	CANCEL	
Fan Control	FAN	
Override Control	OVERRIDE	
Setpoint Control	TEMP SETPOINT	
More Menu Items	TEMPERATURE	
	HUMIDITY	
	CO2	
	TEMP UNITS	
	LANGUAGE	
	DEVICE NAME	

Settings Menu

Pressing both function buttons simultaneously for 5 seconds invokes the settings menu, which allows an installer to view and make changes to certain system parameters.

Note: Only configured parameters will be visible in the menu.

The Settings menu can be password protected to prevent access by unauthorised users.

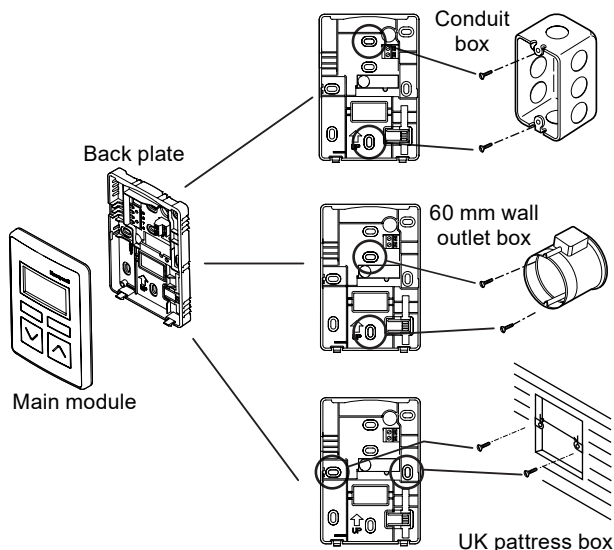
HARDWARE

Enclosure

The enclosure consists of a plastic back plate with a plastic clip-on main module. The back plate has several mounting holes enabling it to be used with a standard UK electrical back box, a standard US or Danish utility conduit box, 60 mm wall outlet box or screwed directly to a wall.

Note: Dry lining wall boxes are not recommended as they prevent flush fitting.

Space must be left around the unit for airflow and access to remove the main module.



Communication & Power

The TR40 and TR42 connect to the controller's Sylk bus which provides both data communications and power.

Up to 14 devices may be connected to the Sylk bus. This limit is determined by the range of device addresses. However, the practical number of devices will be limited by the power demand of each device (see Power Demand on page 5).

Connection & Cabling

Connection to the TR40 and TR42 is via a screw terminal connector, located on the back plate. Two pins on the rear of the main module then mate with this connector when the module is clipped on to the back plate.

Connection to the Sylk bus uses unscreened twisted pair cable and is polarity independent. Multiple devices may be connected using either daisy-chain or star topology. The maximum recommended cable length between the controller and any one device depends on the choice of cable.

For further details of cabling please refer to the TR40/42 Installation Instructions (62-0467), supplied with the modules and downloadable from the Trend PNet e-library.

Power Demand

The number of devices that can be connected to the Sylk bus is typically limited by the power demand of each device. The table below shows the demand for each type of TR device expressed as a percentage of the full current available on the bus:

Version	Percentage of full current	Maximum number on Sylk bus*
TR40-D1, -H-D1	9%	7**
TR40-C-D1, -HC-D1	18.2%	5
TR42-D1, -H-D1	12.8%	7
TR42-C-D1, -HC-D1	20.8%	4

*Assumes all devices are of the same type and with 50 mA full current available from the controller. **Maximum on bus.

Address Switch

Multiple devices on the Sylk bus must be uniquely identified with an address between 1 and 15. The controller is always identified as address 0.

The address is set using four DIP switches that are accessible from the rear of the main module.

Note: IQVISION currently supports the use of addresses in the range 1 to 10 only.

Backup

Configuration settings downloaded to the module are stored using non-volatile memory.

FIRMWARE

The firmware in the TR40 and TR42 controls basic functionality and Sylk bus communication. It also provides a number of parameters that enable data to be read from the device and, in the case of TR42 variants, allow customisation of the display and control functions.

All parameters are configured via the Sylk Device and Sylk Params objects in the station of the connected controller. The IQX controller is configured using IQVISION - see the IQX Configuration Manual (TE201447) for further details.

Sylk Device Settings

Parameter	Function / Settings
Device Name	A name of up to 20 used to identify the device within the controller station and displayed wherever Device Name is viewable on the TR42. Up to 20 alphanumeric characters and must start with a letter. Spaces are not permitted but can include underscores.
Device Name Viewable By Tenant	Specifies the viewing options for the Device Name. NO = visible in the Settings menu only. YES = visible in the Settings menu, MORE menu and home screen scrolling option.
Language	Sets the appearance of display (see Language Mode on page 4): English = displayed as English text International = displayed as icons
Language Viewable Editable By Tenant	Specifies the viewing/editing options for the Language mode. NO = visible/editable in the Settings menu only. YES = visible/editable in the Settings menu and MORE menu.
Display Unit	Sets the scale/units for the temperature value displayed on the TR42 (°F or °C). <i>Note: This does not affect the temperature value provided by ROOMTEMP OUT.</i>
Unit Viewable/editable by Tenant	Specifies the viewing/editing options for the temperature Display Unit. NO = visible/editable in the Settings menu only. YES = visible/ editable in the Settings menu and MORE menu.
Home Screen Options	Sets the value to be displayed on the home screen from: Temperature, Humidity, Co2, Temp Setpoint, Scrolling Screen, Device Name, Blank Screen. <i>Note: The Scrolling Screen option cycles through the following values if they are selected for display in the MORE menu: Temperature, Humidity, Co2, Temp Setpoint, Device Name.</i>
Occupancy Status Param	Links to the Occupancy Status parameter.
Enable Password Protection	Enables password protection when accessing the Settings menu: NO = no protection, all users can gain access. YES = correct entry of the Password is required to gain access.
Password	A 4-digit number (0000 to 9999) that must be entered to access the Settings Menu.

Sylk Params Settings

Type	Parameter	Function / Settings
Occupancy Status	in	Sets the occupancy state and also the occupancy icon: 0 = Occupied, 1 = Unoccupied, 255 = not displayed.
Occupancy Override Command	OUT	The current override state invoked by the OVERRIDE button: 255 = no override, 1= override (unoccupied), 2= override (occupied)
	Override Type	Sets the duration of the override or disables it: Time Override in Hours (Bypass) = use specified Override Time, Use Network Bypass Time Only = use value from BypassTime, Disabled in Wall Module = override disabled (button not visible)
	Override Time	Sets the duration of the override in hours: 1, 2, 3, 4, 5, 6, 7, 8, 12, 16, 20 or 24
BypassTime	in	Sets a time duration between 1 and 9999 minutes when the Override Type is set to 'Use Network Bypass Time Only'.

Sylk Params Settings (continued)

Type	Parameter	Function / Settings
ROOMTEMP	paramPermissions	Specifies the viewing options for the temperature value. Contractor Only = visible in the Settings menu only. Tenant Read Only = visible in the Settings menu, MORE menu and the home screen scrolling option.
	OUT	Value from the temperature sensor in degrees, to 2 decimal places.
	temperatureUnit	Sets the temperature scale for the OUT value (°F or °C). <i>Note: This does not affect the value displayed on the TR42.</i>
	Tr4XConfig: Number Of Decimals	Sets the number of decimal places used on the display (0 or 1). <i>Note: This does not affect the value provided by ROOMTEMP OUT.</i>
	Tr4XConfig: Default Sensor Offset Value	Applies an optional offset to the temperature value, up to ± 5.0 (when temperatureUnit = °C) or ± 9.0 (when temperatureUnit = °F). <i>Note: This is applied to both the displayed temperature and the value provided by ROOMTEMP OUT.</i>
HUMIDITY	paramPermissions	Specifies the viewing options for the humidity value. Contractor Only = visible in the Settings menu only. Tenant Read Only = visible in the Settings menu, MORE menu and the home screen scrolling option.
	OUT	Value from the humidity sensor in percent, to 2 decimal places
	tR4XConfig: Number Of Decimals	Sets the number of decimal places used on the display (0 or 1). <i>Note: This does not affect the value provided by HUMIDITY OUT.</i>
	tR4XConfig: Default Sensor Offset Value	Applies an optional offset to the humidity sensor value, ± 9.0 . <i>Note: This is applied to both the displayed humidity and the value provided by HUMIDITY OUT.</i>
CO2	paramPermissions	Specifies the viewing options for the CO ₂ concentration. Contractor Only = visible in the Settings menu only. Tenant Read Only = visible in the Settings menu, MORE menu and the home screen scrolling option.
	OUT	Value from the CO ₂ sensor in parts per million (ppm).
Fan Command	in	Sets the fan state icon to the required state. Use the values defined by the fanState and fanStatusValues parameters.
	OUT	A value corresponding to the current Fan Control state (see Fan StateValues)
	fanStates	2 State (Auto / On), 3 State (Auto / On / Off), 5 State (Auto / Off / Low / Medium / High)
	fanStatusValues	A value (0 to 255) returned to OUT for the chosen fan state. By default: Off = 0, On = 1, Auto = 2, Low = 3, Medium = 4, High = 5.
NetworkSetpoint	paramPermissions	Specifies the viewing/editing options for the temperature setpoint. Contractor Only = visible/editable in the Settings menu only. Tenant Read Write = visible/editable in the Settings menu, MORE menu and by pressing up/down. Also visible only in the home screen scrolling option.
	in	Overrides the temperature setpoint to a specific value.
	OUT	The current temperature setpoint value set by the user (or by 'in' value).
	tR4XConfig: DisplayType	Selects the setpoint display to Numerical or Graphical (see Setpoint Adjustment on page 3).
	tR4XConfig: SetpointType	Sets the adjustment behaviour of the OUT value between the specified Low Limit and High Limit values: Absolute = specific temperature value Relative = temperature offset (in ± 10 equal steps)
	tR4XConfig: Wiresheet Unit	Sets the setpoint scale for the OUT value (°F or °C). <i>Note: This does not affect the value provided by ROOMTEMP OUT.</i>
	tR4XConfig: Increment/Decrement	Sets the setpoint adjustment to either 1° or 0.5° intervals.
	tR4XConfig: Low Limit	Sets the minimum level for an absolute setpoint: 10.0 to 65.0 (in °C), 50.0 to 149.0 (in °F), or minimum relative adjustment -5.0 to 0 (in °C), -9.0 to 0 (in °F).
	tR4XConfig: High Limit	Sets the maximum level for an absolute setpoint: 10-65 (in °C), 50-149 (in °F), or maximum relative adjustment 0 to +5 (in °C), 0 to +9 (in °F).

COMPATIBILITY

Controllers: IQX12 range.

Note: The TR40 and TR42 are not compatible with Trend wallbus devices or IQeco or IQ4 controllers.

FIELD MAINTENANCE

The TR40 and TR42 require no routine maintenance.

DISPOSAL

COSHH (Control of Substances Hazardous to Health - UK Government Regulations 2002) ASSESSMENT FOR DISPOSAL OF TR40, TR42. No parts affected.

RECYCLING

All plastic and metal parts are recyclable. The printed circuit board may be sent to any PCB recovery contractor to recover some of the components for any metals such as gold and silver.



WEEE Directive:

At the end of their useful life the packaging and product should be disposed of by a suitable recycling centre.

Do not dispose of with normal household waste.
Do not burn.

INSTALLATION

The TR40 and TR42 are designed to be mounted on a standard electrical back box or front panel using two screws. The installation involves:

- Mounting the unit
- Connecting to the controller Sylk bus (for power and data).
- Configuring the IQX controller
- Configuring the required Sylk parameters
- Testing operation

Full printed instructions for mounting and electrical connections are included with the TR40 and TR42, and also available for download from the Trend PNet e-library (<http://partners.trendcontrols.com>) - see TR40/42 Installation Instructions (62-0467).

Instructions for configuring the IQX controller for use with the TR40 and TR42 are available for download only - see IQX Configuration Manual (TE201447).

ORDER CODES

TR40-D1	Wallmodule for IQX with integral temperature sensor.
TR40-C-D1	Wallmodule for IQX with integral temperature and CO2 concentration sensors.
TR40-H-D1	Wallmodule for IQX with integral temperature and humidity sensors.
TR40-HC-D1	Wallmodule for IQX with integral temperature, humidity and CO2 concentration sensors.
TR42-D1	LCD Wallmodule for IQX with integral temperature sensor.
TR42-C-D1	LCD Wallmodule for IQX with integral temperature and CO2 concentration sensors.
TR42-H-D1	LCD Wallmodule for IQX with integral temperature and humidity sensors.
TR42-HC-D1	LCD Wallmodule for IQX with integral temperature, humidity and CO2 concentration sensors.

SPECIFICATION

ELECTRICAL

Display (TR42 only)	
Type	Backlit monochrome LCD matrix.
Backlight Function	On when buttons press, off 1 minute after last button press
Sylk Bus	
Cable type	Unscreened twisted pair.
Bus length	60 m (200 ft) max.
Address range	1 to 15 (1 to 10 supported by IQVISION).
Number of devices	10 maximum (device dependant - see Power Demand on page 5)
Temperature Sensor (all variants)	
Range	0 to 52°C (32 to 125°F)
Accuracy	±0.2°C at 25°C (±0.36 °F at 77°F)
Humidity Sensor (-H-D1, -HC-D1 variants only)	
Range	5 to 95 %RH (non c-condensing)
Accuracy	±3 %RH from 20 to 80 %RH
CO ₂ Concentration Sensor (-C-D1, -HC-D1 variants only)	
Range	0 to 2000 ppm (TR42 can display up to 9999 ppm)
Accuracy	±(30 ppm + 3% of measured value).
Calibration	Factory calibrated. Uses automatic background calibration. No calibration required for the life of the product.

Note: CO₂ sensor meets CEC Title 24 requirement of ±75 ppm accuracy at 600 ppm and 1000 ppm ambient levels. For proper CO₂ operation install only in places that see at least 4 hours of continuous unoccupied time per week.

Setpoint Control (TR42 only)	
Range	10 to 65°C (55 to 150°F), configurable.
Adjustment interval	1° or 0.5°.

MECHANICAL

Dimensions (WxHxD)	84 x 121 x 21 mm (3.30 x 4.76 x 0.83")
Material	
Main module	ABS, Polyac PA-765, UV Stabilised
Back plate	ABS
Colour	White
Weight	0.103kg (0.23 lbs)
Protection	IP30
Connections	2 part connector with 2 screw terminals for 0.33 to 0.82 mm ² (22 to 18 AWG) cross section area cable.

ENVIRONMENTAL

Ambient Limits	
Storage	-40 to +65.5°C (-40 to 150°F)
Operating	0 to 52°C (32 to 125°F)
Humidity	5 to 95% RH, non-condensing
Approvals:	CE, UL94-V0 plastic enclosure; FCC Part 15, Class B.

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