

APPLICATION GUIDE

RAPTR 2



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Introduction

The **RAPTR 2** product family offers single channel light recipes or multichannel products which enable dynamic light recipes. Both offers are designed for increased yield and flower quality. RAPTR 2 is dimmable, creating the possibility to reduce energy usage per gram of biomass and prepared for energy trading to improve your environmental control.

RAPTR 2 offers the following light recipes

- 1 channel BW4 or BW4a
- 2 channel T48 (BW4-BP8)

RAPTR 2 has a wireless control interface which can be connected to 0-10V control systems via the use of 0-10V FLUENCE transmitter dongle. For multichannel dynamic light FLUENCE recommends the GWCS lighting control system, this to enable exact light control (LED control beyond channel control) supported via the user-interface.

- Three proven light recipes specific for cannabis cultivation
- Wireless control which stays flexible in light grouping even after installation
- Well balanced, 1-channel dim 10-100%
- Dynamic 2-channel setpoint control
- Supported by GWCS control system
- Clear Glass or Quad Beam optics for optimal light distribution and lighting design
- 277-400V AC input voltage and 1050W input power

This Application Guide describes all the important technical and safety information of the FLUENCE RAPTR 2 as a supporting document for this product family.

This document should be used in combination with other relevant control and commissioning Application Guides covering your specific lighting project.

Product Information

Technical specifications

	Control Type	Beam Shape	Static behavior (not controlled)			Dynamic behavior (Wireless controlled)		
			Photon flux Typical	Power Max	Efficacy typical ¹	Efficacy ^{1,2} at 50% dim	Photon flux Range ³	Efficacy ¹ at 50% dim, DR Only
			($\mu\text{mol/s}$)	(W)		($\mu\text{mol/J}$)	($\mu\text{mol/s}$)	($\mu\text{mol/J}$)
RP2i-BW4-QB-EV-WC1-B	Wireless	QB	2800	1050	2.7	2.8	280-2800	-
RP2i-BW4-CG-EV-WC1-B	Wireless	CG	2800	1050	2.7	2.8	280-2800	-
RP2i-T48-QB-EV-WC2-B	Wireless	QB	2700-3500	1050	2.6-3.6	2.9	270-3500	4.1
RP2i-T48-CG-EV-WC2-B	Wireless	CG	2700-3500	1050	2.6-3.6	2.9	270-3500	4.1
RP2i-BW4a-QB-EV-WC1-B	Wireless	QB	2900	1050	2.8	3.0	290-2900	-
RP2i-BW4a-CG-EV-WC1-B	Wireless	CG	2900	1050	2.8	3.0	290-2900	-

Note: The products have the option to tune the photon flux between 10% and 100%. The efficacy depends on the spectral setting and total power.

1. Efficacy typical, Rated average lifetime and Max. case temperature, at $T_{\text{ambient}} = 25\text{ }^{\circ}\text{C} / 77\text{ }^{\circ}\text{F}$.
2. Based on 50% photon flux, in factory setting
3. Maximum photon flux is limited by the maximum power of the driver and depends on spectral setting

Naming Convention

RP	2i	BW	4a	CG	EV	W	C2	B
Product family	Power setting	Spectrum	Light recipe	Distribution	Voltage (range)	Wireless	Number of Channels	Packing (Bulk)

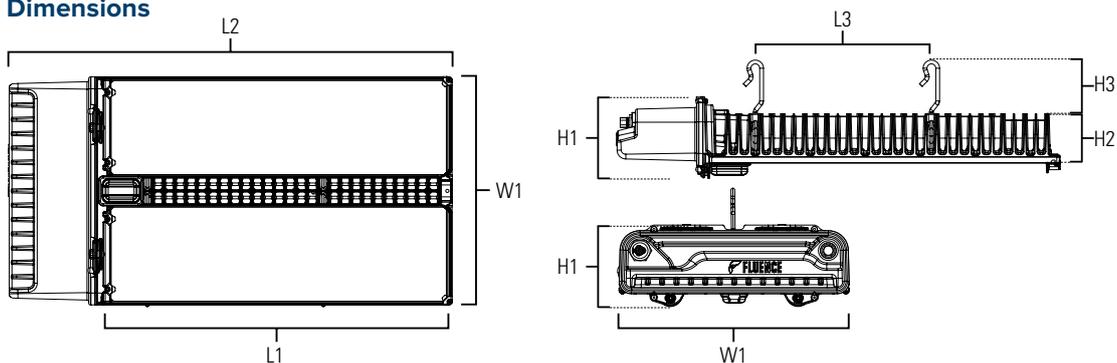
Product Information

Technical specifications

Specifications		
Optical		
Rated average lifetime ^{1,2}	50,000 hours, Q90	
Electrical		
Input voltage ³ 1050 W Products	277 – 400 VAC	
Power factor	0.98, at max load and nominal input voltage range	
Inrush current	Negligible	
Total Harmonic Distortion	< 10% max load and nominal input voltage range	
Earth Leakage Current	< 3.5 mA	
Standby Power ⁴	< 1.0 W	
Controls	Wireless	
Dimming Range	10% - 100%	
Environment		
Ambient storage temperature	-40 - 85 °C (T _{storage})	-40 - 185 °F (T _{storage})
Ambient operating temperature	0 - 40 °C (T _{operating})	32 - 104 °F (T _{operating})
Max. case temperature ¹	75 °C (T _{case})	167 °F (T _{case})
Cooling	Passively air-cooled	
Relative humidity	5 - 95% RH, no condensation allowed during storage, operation and application	
Ingress protection rating	IP66, Wet Location	
Photobiological hazard⁵		
Radiation hazard - Retinal Blue	Risk Group 2	
All other radiation hazards ⁶	Exempt group	

Note: IP66 covers 100kPa = 1 bar water pressure. To avoid damaged gaskets Signify advises NOT to clean this product with waterpower jets.

Dimensions



Product name	Product dimensions (mm)							Product weight
	L1	L2	L3	W1	H1	H2	H3	
RP2i – RAPTR 2 1050W								
BW4a	530 (20.9")	703 (32.5")	279 (11")	364 (14.3")	130 (5.12")	79 (3.11")	80 (3.15")	15.5 (33.0 lbs)
BW4/T48	652 (25.7")	825 (27.7")	279 (11")	364 (14.3")	130 (5.12")	79 (3.11")	80 (3.15")	17.0 (37.5 lbs)

¹ Efficacy typical, Rated average lifetime and Max. case temperature, at Tambient = 25 °C / 77 °F.

² All measured lifetimes are industry standard measurements indicating average length of operation and not a performance claim specific to any individual product.

³ Input Voltage is product specific and mentioned on product name and label.

⁴ If in combination with GWCS Control System and being in Standby.

⁵ For more information about photobiological hazards see page 6.

⁶ Near ultraviolet hazard, Retinal thermal hazard and Infrared radiation hazard.

Product Information

Important

Influencing factors of light output

As ambient temperature increases, both the photon flux and the photon flux maintenance will decrease. Pollution or damage of optics will also impact the light output.

Thermal protection

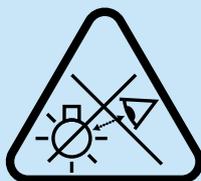
The RAPTR 2 module has a built-in thermal protection device. The ambient operating temperature is between 0°C and 40°C (32 - 104 °F).

If the temperature of the module becomes too high - at around 45°C (113 °F) ambient - the module will dim, resulting in a lower photon flux. The module will dim deeper gradually with increasing ambient temperature. After returning to normal ambient operating temperature, the photon flux will tune up to nominal photon flux.

Photobiological hazard

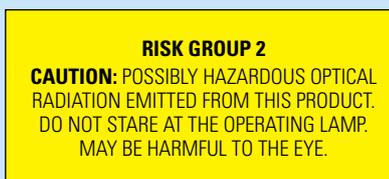
biological safety of lamps and lamp systems (IEC 62471).

This International Standard describes the photobiological safety of lamps and lamp systems including luminaires.



Risk Group 2:

Do not stare at the operating light source. The philosophical basis for this classification is that the lamp does not pose a hazard due to the aversion response to very bright light sources or due to the thermal discomfort.



Wear protective glasses which filter out blue radiation (400 - 500nm), if directly looking into the light source cannot be avoided. The amount of blue light must be reduced by a factor of 10 (OD1) to 100 (OD2). Protective glasses with OD2 classification are recommended. (OD stands for Optical Density)

Light source not replaceable

The light source of this module is not replaceable. If the product becomes damaged or the light source reaches its end-of-life, the whole module needs to be replaced and disposed as electronic waste.

Not for outdoor use

Modules are not suited for outdoor use and are not intended to be installed in stairways and travel paths.

Contamination of the light emitting surface

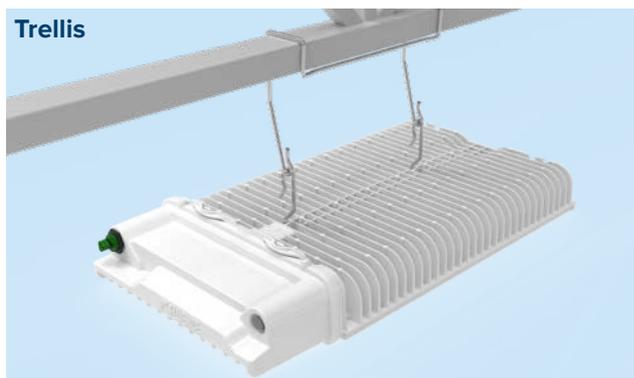
Contamination of the emitting surface by general use, cleaning agents, crop spray robots, crop spray equipment, sprinklers or fog systems, can lead to irreparable damage of the emitting surface, which is not covered by the warranty. See chapter 'Crop protection and cleaning products' for advice.

Installation of the System

The RAPTR 2 modules can be fitted very easily without the need for any tools and have been designed with the input and feedback of growers and installers, to achieve a simple and quick installation.

Trellis

The RAPTR 2 modules can be installed by means of the use of the existing trellis girders, parallel to and right underneath the rectangular steel profile. The width and height of the rectangular steel profile must be known to choose the correct trellis mounting bracket. There are four types of mounting brackets. Type (A) is in the box and intended for hanging the module onto the other mounting brackets which are intended for specific applications. Type (B) is the bracket for centered mounting on a C-profile. Type (C) is for centered mounting on a trellis, see Accessory information. The brackets for trellis mounting, type (C) is available in 2 variants: a type (C) for a 50-mm (1.97") wide trellis rectangular profile and a type (C) for a 60-mm (2.36") wide trellis rectangular profile.



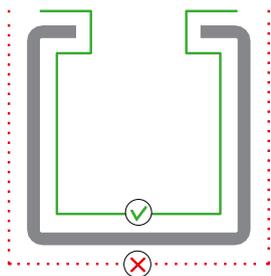
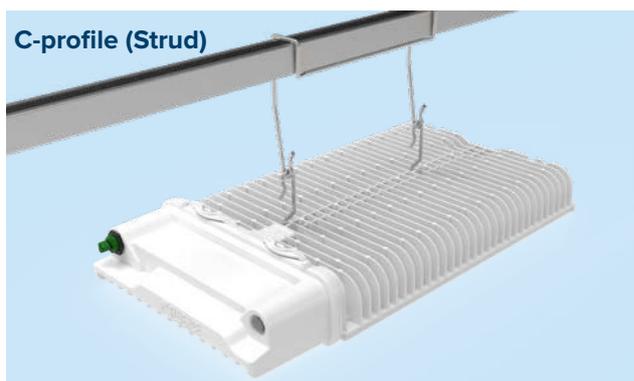
The installation steps for mounting are similar for all bracket types. As an example, they are explained for mounting on a C-profile (strud), with bracket type (B), in subchapter Installation steps.

The minimal required distance between adjacent modules is 5 cm (2").

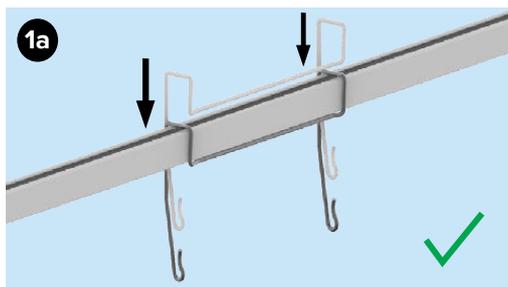
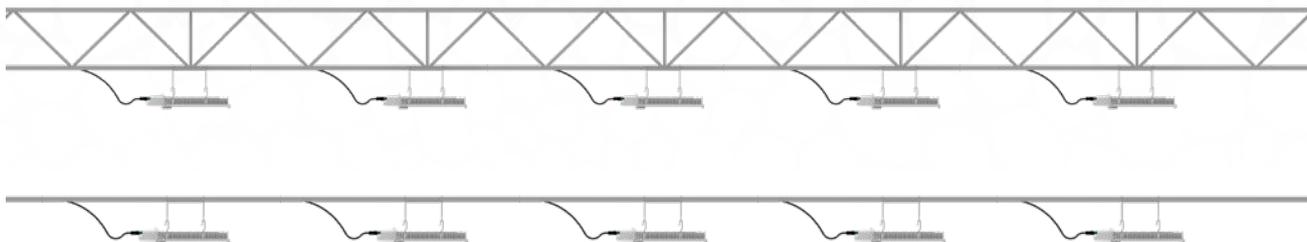
The minimal required distance between modules and materials such as walls, ceilings and movable partitions is 20 cm (8"). Bracket types (B) and (C) are designed in such a way, that the distance between the bottom side of the profile and top side of the module is equal to 20 cm (8").

C-profile (Strud)

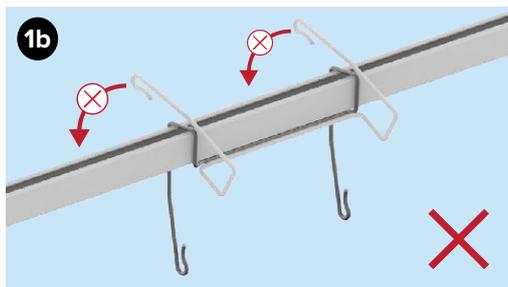
Mount 40x40 mm (1.58" x 1.58") C-profiles (struds) to the greenhouse structure at the required height. During assembly use a fixation which uses the inside of the C-profile (solid green line). Make sure that the deflection of the mounting profile is max 10 mm (0.4"). **Pay attention to hooks mounted around the profile (dotted red line), as they could interfere with brackets type (B).** Use the specific bracket (B) to mount the modules on the C-profile! The minimal required distance between adjacent modules is 5 cm (2"). The minimal required distance between module and materials such as walls, ceilings and movable partitions is 20 cm (8").



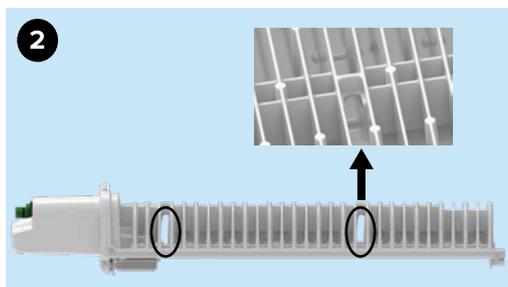
Installation Steps



1a) Hook bracket (B) to the C-profile by pressing in the direction as depicted by the 2 arrows in Fig.1a. Make sure that bracket (B) is firmly enclosing the profile, by assuring that the wire is clamped underneath the profile. Bracket (B) is used as an example, the same way of working holds for type (C).

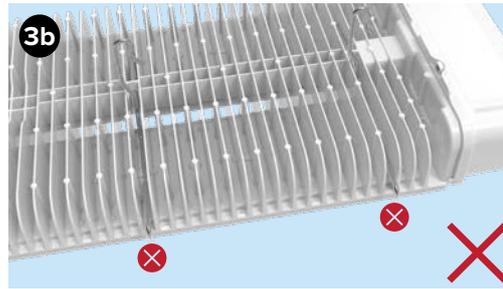
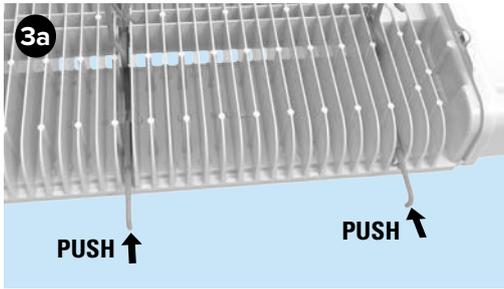


1b) **IMPORTANT: Do not apply force on the arms of the bracket.** This could lead to deformation of the bracket, an insufficient fixation to the profile and a potential safety risk.

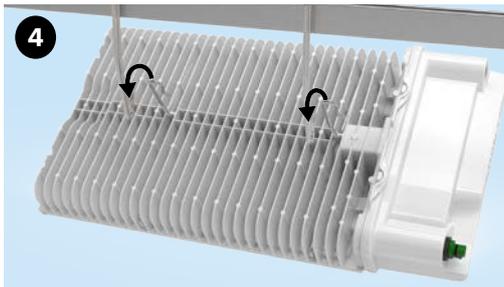


2) The module has two standard brackets (A) included, to install by means of both mounting features in Fig.2 and 3a. Push the bracket end firmly inside the mounting feature with the palms of your hands, as shown with both arrows in Fig.3a.

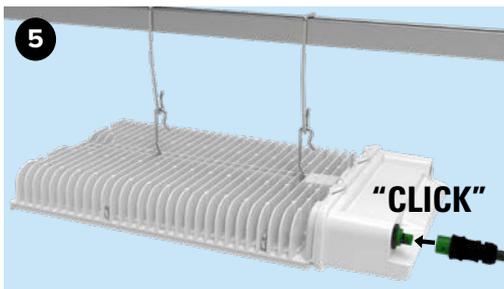
Installation Steps



3a/b) Do not use the hook to push, use only the bracket end to push the brackets. Make sure the bracket (A) is firmly clamped inside the mounting feature. The bracket end must not be protruding as shown in Fig.3b.



4) Hold the module firmly with two hands and position both hooks of brackets (A) over both hooks of bracket (B).

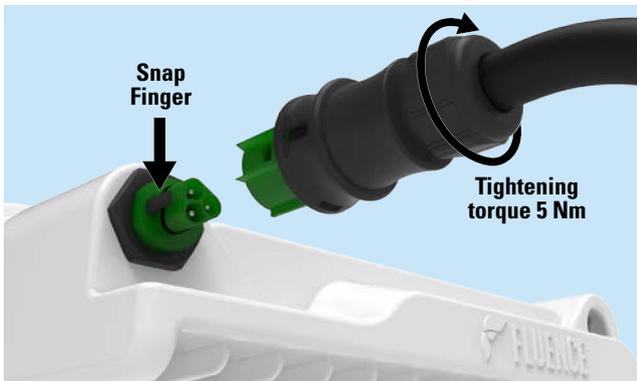
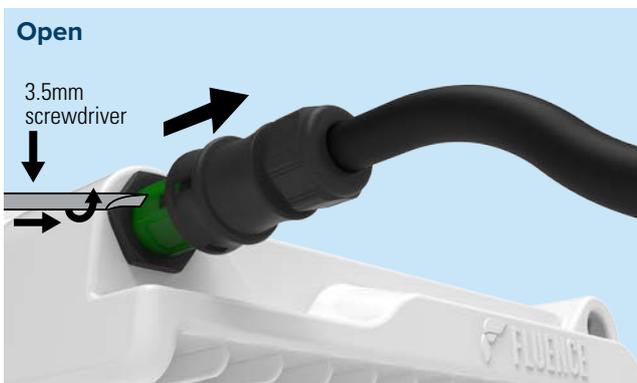
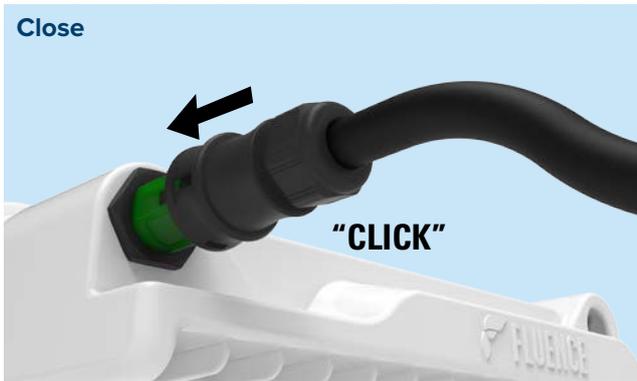


5) Connect the female connector of the main power cable <CLICK> and connect this main power cable to the power grid. Make sure to relieve the stress from the cable connections, by introducing a loop (see install pictures at the top of page 7). Always mount the RAPTR 2 module horizontal so that the light direction is downwards.

Mounting Options



Installation Steps



Use of the connector

The female RST20i 3-pole connector of the main power cable and the male RST20i 3-pole connector of the RAPTR 2 module lock automatically when plugged together and give clear feedback on the correct end position. Plug and push both connectors until it clicks.

Ensure that it clicks to guarantee a correct electrical connection and ingress protection. The connectors are not for current interruption, never connect or disconnect the connectors under load!

For unlocking the female connector of the main power cable and the male connector of the RAPTR 2 module, press and twist the snap finger by means of a flathead 3.5mm screwdriver.

Wiring connectors and custom cables

The housing of the female connector has been designed in three parts. In case of assembling a field installable main power cable assembly, use cable diameters between

10-14 mm (0.4" - 0.55").

Make sure the screw connection is tightened with a torque of 5 Nm (3.7 ft lb.). Always keep ingress protection IP66 in mind, this also needs to be secured during assembly and operation. IP66 protection from the electrical cabinets containing electrical components and cabling, to the final connection between both male-female Wieland RST20i 3-pole connectors.

Follow the assembly instructions, which are available from the connector supplier Wieland Electric GmbH

www.wieland-electric.com

For Line to Line or Line to Neutral voltage configurations, several options are presented with respect to the pins of the female connector of the main power cable and the male RST20i-3pole connector of the RAPTR 2 module.

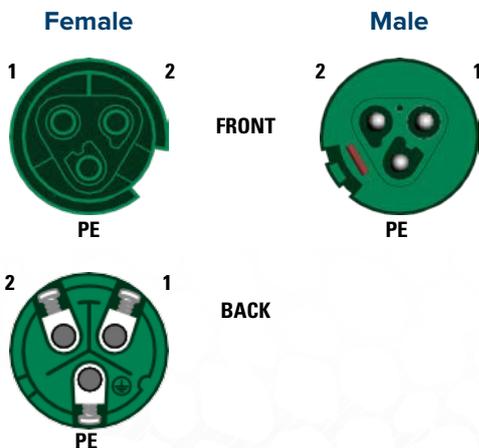
Pin	Line to Line voltage ¹			Line to Neutral voltage		
1	L1	L1	L2	L1	L2	L3
2	L2	L3	L3	N	N	N
PE	PE	PE	PE	PE	PE	PE

Legend

L=Line

N=Neutral

PE=Protective Earth



¹ To avoid residual light (glow effect) in standby mode it is strongly advised to switch off the luminaires using contactors / switches.

Examples of max. number of connected modules

There are several options for connecting the RAPTR 2 modules to the mains and determining the maximum number of connected modules, which depend on the power consumption of the module, the number of circuit breakers, the circuit breaker type (1-pole/2-pole/3-pole or 4-pole), the tripping current of the circuit breakers, the cross-section (mm² or AWG) and material of the cable conductors, the total length of the cable conductors and the use of an earth leakage protection (RCD)¹.

Examples for the maximum number of connected modules, are presented below. Always check the maximum allowed/ protected cable length¹. These tables only give indication about the maximum allowed connected RAPTR 2 modules.

The RAPTR 2 modules as well as the GWCS Control System must be installed and/or the installation must be supervised by a certified installer in accordance with the local or international electrical code and standards.

Mains Voltage (V) AC	Power (W)	System	Max # of modules per phase pair							
			16A C-type		20A B-type		32A B-type		40A B-type	
			1x3P	3x2P	1x3P	3X2P	1x3P	3X2P	1x3P	3X2P
277 V	1050	L-N	-	-	4	-	6	-	5	-
347 V	1050	L-N	-	-	5	-	8	-	10	-
400 V	1050	L-L	2	4	3	6	5	9	7	12

Note: If 40A circuit breakers are considered, a minimum cable cross section of 4 mm² (12 AWG) is required.

¹ A multiplication factor of $\sqrt{3}$ can be used for determining the maximum protected cable length, if short circuit between Line-Protective Earth or Line-Earth is not possible (IEC60364).

Legend:

- L = Line
- N = Neutral
- 2P = 2 Pole breaker type
- 3P = 3 Pole breaker type
- RCD = Residual-Current Device
- NA = Not Applicable

Important

Turn off and disconnect the power before installation.

Installation must be performed by a qualified electrician in accordance with all national and local electrical and construction codes and regulations.

- DO NOT attempt to install or use until you have read and understood the installation instructions of this product contained in the Quick Installation Guide, this Application Guide and safety labels.
- Make sure that power cords are routed in a manner that will prevent incidental damage.
- Use wet-rated (IP66) junction boxes which are also suitable for the power cords used in the application.
- Make sure all junction boxes are mounted to a rigid structure.
- Use a strain-relief or power cord grip if needed.
- Use a cord grip suitable for use with three conductor and type of cord suitable for the trade size of the junction box provided by others, if needed.
- DO NOT connect to live power until installation is complete.
- DO NOT modify or alter the product; doing so will void the warranty.
- Operation of this equipment in a residential environment could cause radio interference.

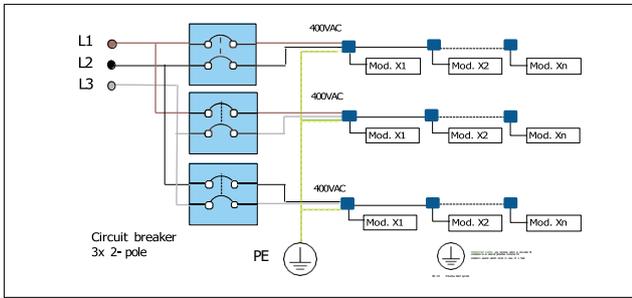
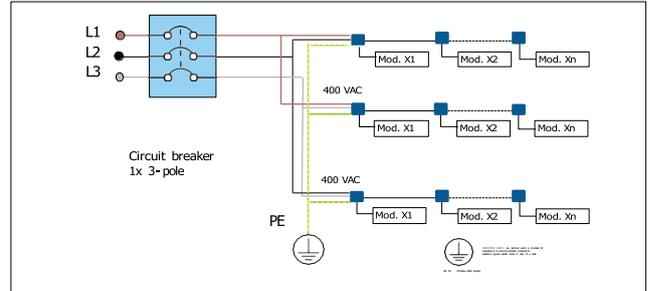
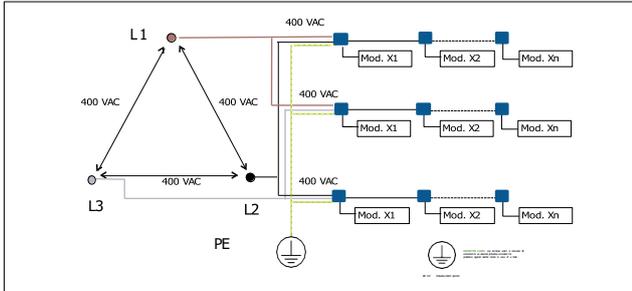
Light direction

Always mount the RAPTR 2 module horizontal so that the light direction is downwards.

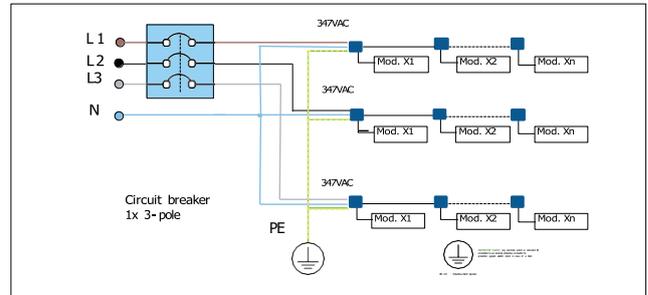
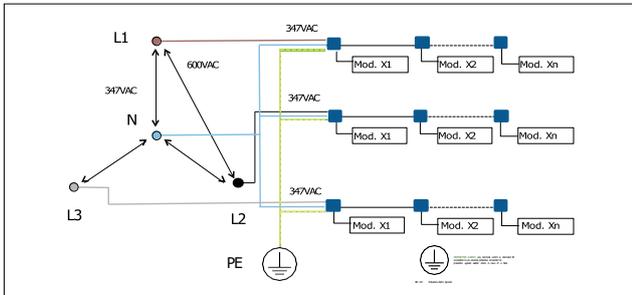


Connection Examples

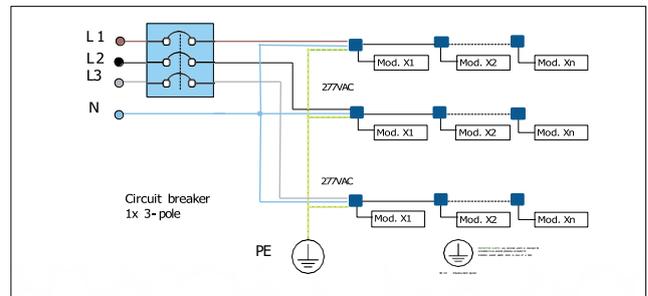
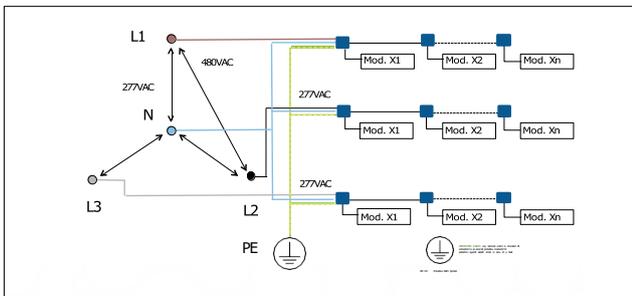
L-L 400 V¹



L-N 347 V



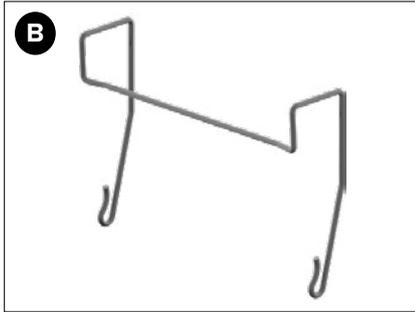
L-N 277 V



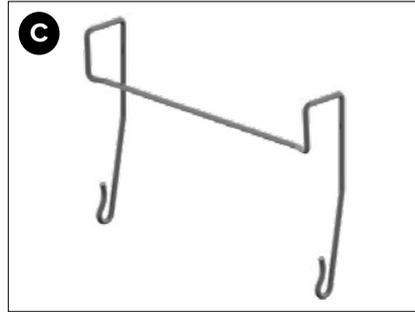
¹ To avoid residual light (glow effect) in standby mode it is strongly advised to switch off the luminaires using contactors / switches.

Accessory Information

Mounting bracket for module



FLU BRACKET C 40x40²



**FLU BRACKET TRE 50x30³ /
FLU BRACKET TRE 60x40⁴**

Note: Bracket types (B) and (C) are designed in such a way that the vertical distance between the bottom side of the profile and top side of the module is equal to approximate 20 cm (8").

Legend:

FLU = Fluence
C = C- profile
TRE = Trellis

² Galvanized steel wire $\phi 6.0$ mm. Suitable for C-profiles (struds); 40 x 40 mm (1.57" x 1.57").

³ Galvanized steel wire $\phi 6.0$ mm. Suitable for trellis rectangular steel profiles; 50 x 25 mm (1.97" x 0.98") & 50 x 30 mm (1.97" x 1.18").

⁴ Galvanized steel wire $\phi 6.0$ mm. Suitable for trellis rectangular steel profiles; 60 x 30 mm (2.36" x 1.18") & 60 x 40 mm (2.36" x 1.57").

Female Connector



FLU toplighting female connector

Main power cable



Ordering Data

RAPTR 2

Product description	12 NC	MOQ (Pcs)
RP2i-BW4-QB-EV-WC1-B	9290 039 65277	2
RP2i-BW4-CG-EV-WC1-B	9290 039 65279	2
RP2i-BW4a-QB-EV-WC1-B	9290 039 65379	2
RP2i-BW4a-CG-EV-WC1-B	9290 039 65380	2
RP2i-T48-QB-EV-WC2-B	9290 039 65281	2
RP2i-T48-CG-EV-WC2-B	9290 039 65283	2

Accessories

Product description	12 NC	MOQ (Pcs)
Mounting bracket for module		
FLU A BRACKET C 40x40 ²	9124 017 02511	20
FLU A BRACKET TRE 50x30/25 Center ³	9124 017 02507	20
FLU A BRACKET TRE 60x40/30 Center ⁴	9124 017 02508	20
AC Power Cable - Americas		
AC Cable,Wieland Grn w/L7-15P,6FT (Bulk Pack)	912401656069	10
AC Cable,Wieland Grn w/L7-15P,6FT (Single Pack)	912401701602	1
AC Cable,Wieland Grn w/Leads,6FT (Bulk Pack)	912401656071	10
AC Cable,Wieland Grn w/Leads,6FT (Single Pack)	912401701601	1
AC Power Cable - EMEA		
RST2013 G Dca pigtail power cable 90 cm	912401702496	50
AC Connector - EMEA		
FLU toplighting female connector	9124 017 02499	100

Multi Packaging Fluence RAPTR 2

Series	Box dimensions	Pcs per box	Pallet dimensions	Pcs per pallet
BW4a	0.775 m x 0.38 m x 0.22 m (30.5" x 15" x 8.66")	2	1.2 m x 0.8 m x 1.25 m (47.2" x 31.5" x 49.2")	30
BW4 / T48	0.90 m x 0.38 m x 0.22 m (35.4" x 15" x 8.66")	2	1.2 m x 1.0 m x 1.25 m (47.2" x 39.4" x 49.2")	30

Legend:

RP	= RAPTR
Zi	= Power setting
BW/T	= Spectrum
EV	= Voltage Range
W	= Wireless
C1	= 1 Channel Control
C2	= 2 Channel Control
CG	= Clear Glass
QB	= Quadro Beam
B	= Bulk
FLU	= Fluence
C	= C-profile (strud)
TRE	= Trellis
MOQ	= Minimum Order Quantity

² Galvanized steel wire ø6.0 mm. Suitable for C-profiles; 40 x 40 mm.

³ Galvanized steel wire ø6.0 mm. Suitable for trellis rectangular steel profiles; 50 x 25 & 50 x 30 mm.

⁴ Galvanized steel wire ø6.0 mm. Suitable for trellis rectangular steel profiles; 60 x 30 & 60 x 40 mm.

Crop protection and cleaning products

Use of cleaning agents, crop protection products and other chemicals

Fluence RAPTR 2 products are engineered to meet the highest standards in daily usage and are compatible with the most commonly used crop protection products and cleaning products in the field. However, there are some crop protection products and cleaning agents that may damage the protective surfaces of the RAPTR products and should be avoided.

Please ensure that you take the following instructions into account when cleaning the RAPTR 2 products, your facility, or when using crop protectors.

Contamination of the light emitting surface

To keep the maximum amount of light for your crop and the optimal performance of your light source during the entire lifetime, you must clean your RAPTR 2 products on a regular basis. Keeping the optics clean will enable you to get the maximum yield and quality of your crop. Cleaning is also required to maximize the useful life of your RAPTR 2 product.

Contamination of the lens plate will reduce the light output of the RAPTR 2 product. A seemingly limited amount of dirt can already cause a significant reduction in light output, even up to 15%. By cleaning the light emitting surface regularly, reduction of the light output can be prevented. Dirt on the light emitting surface absorbs light which will lead to an increase in the temperature of the product. This has a negative impact on the lifetime of the product. By cleaning the light emitting surface, the useful lifetime of your RAPTR 2 product will be optimal. Overdue or inadequate cleaning maintenance may void the warranty obligations of Signify.

Cleaning RAPTR 2 products

Turn off and disconnect the power before cleaning the product. Use a soft damp cloth to remove dust or dirt from the RAPTR 2 product.

Do not use rough or coarse-grained materials, scouring pads, bleach or solvents.

The use of a non-approved cleaning product or solvent could scratch or damage the RAPTR 2 product.

Do not wipe the RAPTR 2 product with a dirty cloth as this may leave a residue, scratch the lenses glass plate or reduce the light output.

IP66 covers 100 kPa = 1 bar water pressure. To avoid damaged gaskets Signify advises NOT to clean this product with waterpower jets.

By cleaning the light emitting surface, the useful lifetime of your RAPTR 2 product will be optimal. Overdue or inadequate cleaning maintenance may void the warranty obligations of Signify.

Important

- Plan regular inspections for your RAPTR 2 LED products. Be aware, seemingly low levels of contamination on the lens plate that may not be directly visible from a larger distance, already have a negative impact on performance.
- Clean the optics on a regular basis according to the cleaning instructions.
- For wireless RAPTR 2 LED products it is very important that (in case the module is taken from the trellis) after cleaning the module is returned at exact the same position as before cleaning, as they are assigned to a fixed group.

Compliance with international standards

The **RAPTR 2** module has been tested for and complies with the following international standards:

Test	Stress type	Standard
Mechanical integrity	Static cable pull	
	Dynamic cable pull	
	Bump test	IEC 68-2-29 Eb
	Vibration variable test	IEC 68-2-6
Endurance	Cold temperature storage	IEC 68-2-1 Ab
	High temperature storage	IEC 68-2-2 Bb
	Damp heat (temp. humidity)	IEC 68-2-30 Db
	Temperature shock	IEC 68-2-14 Nb
	Ingress protection	IEC 60529 IP66
Quality / Environment	Environmental standard	ISO 14001
	Hazardous substances	RoHS
EMC		EN 55015
	Generated disturbances to the environment	FCC part 15B Class A
		ANSI C63.4: 2014
	Emission	IEC 61000-3-2
		IEC 61000-3-3
	Immunity	IEC 61547
RF	Radio disturbance	ETSI EN 301 489-17 v3.2.4
		ETSI EN 300 328: v2.2.2
		FCC Part 15.247, 15.209
		RSS-247
Safety		IEC 60598
		IEC 62471
		UL8800
		CSA c22.2 No. 250.0-08
Approval marks		ENEC
		CE
		RCM
		UKCA
		cULus
		PSE
	FCC	



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