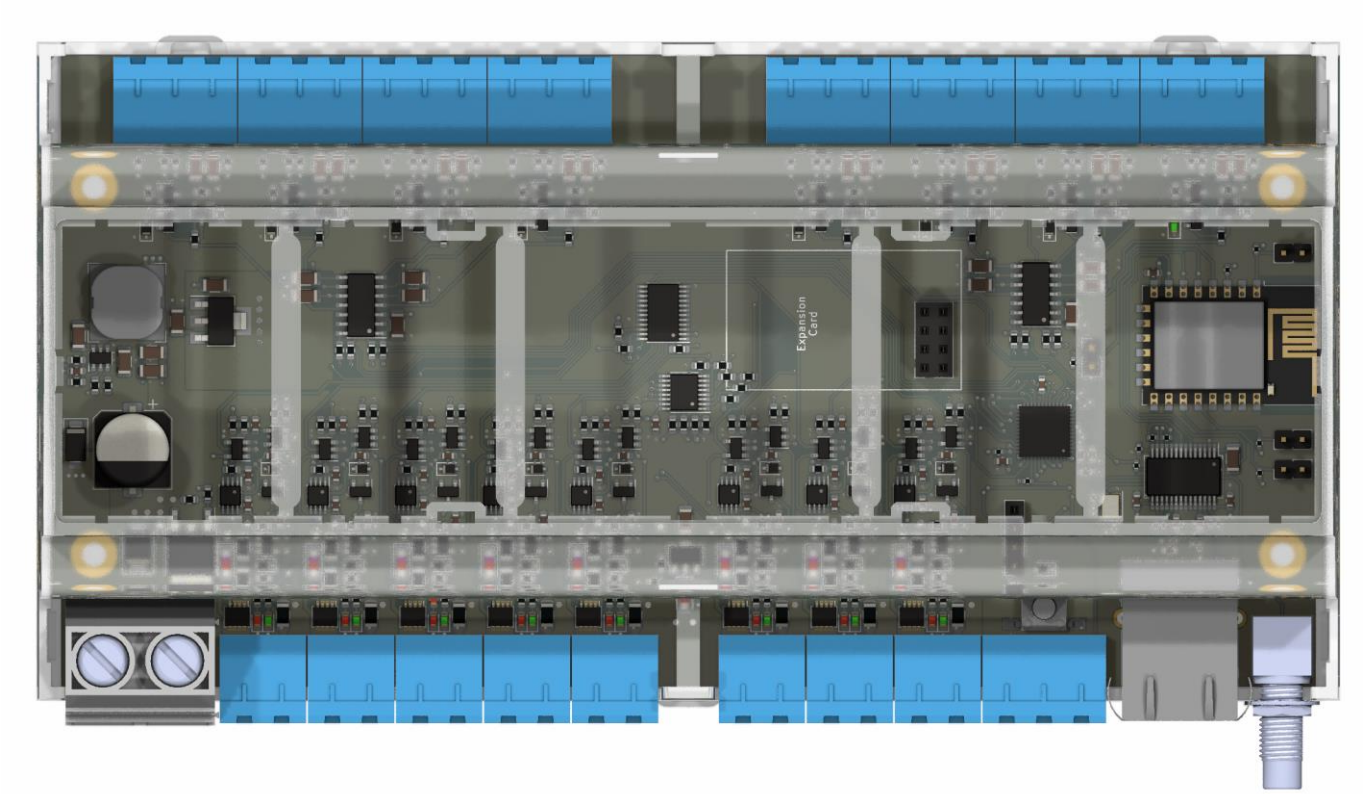
OPERATIONS AND MAINTENANCE MANUALS

MODULE YC-OB-D1

1. General Information	Page 2
2. Technical Data	Page 7
3. Manual	Page 16
4. Parts List	Page 20
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1. General Information

The module supports DC-powered lighting and electrical switches.



SUPPORTED DEVICES	YC-OB-D1	YC-OB-D2	YC-OB-D3	YC-OB-D4	YC-OB-D5	YC-OB-D6
DC lighting	Yes	Yes*	Yes*	Yes*	No	No
DC motors.	No	Yes	No	No	No	No
Servomechanisms.	No	Yes	No	No	No	No
High-current devices (pumps, cranes, heaters).	No	No	Yes**	Yes	No	No
Buttons, switches, contact switches.	Yes	Yes	Yes	Yes	No	Yes
Measuring devices with resistance output (thermistors, liquid level sensors).	No	No	No	No	Yes	No
Measuring devices with voltage output (thermocouples, battery testing).	No	No	No	No	Yes	No
Other devices with documented interface via TTL inputs (BMS, navigation, others).	Yes	Yes	Yes	Yes	Yes	Yes

* - without dim

** - up to 5 A

- A smart yacht system can be built based on a network of modules that allow control both from one central point and from multiple points using the logic contained in the modules themselves.
- The module can operate without connection with central unit or an instance of a control application, but it is highly recommended to ensure such communication.
- This module contains a SPIGPIO pinout that allows it to be extended with additional functions.

COMPLIANCE WITH DIRECTIVES

Directive GPS 2001/95/WE

Directive EMC 2014/30/UE

Directive RED 2014/53/UE

Directive RoHS 2011/65/UE

Directive RoHS 2018/736

IMPORTANT INFORMATION



READ THIS DATASHEET BEFORE ATTEMPTING TO INSTALL THE DEVICE

Read the contents of the datasheet before installation. Failure to follow the recommendations in the datasheet and other requirements of diligence appropriate to the nature of the equipment may: prove hazardous to life/health, cause damage to the equipment or the installation to which it is connected, result in damage to other property, or violate other applicable regulations. The manufacturer of the equipment, Yacht Concept sp. z o.o., assumes no liability for damages (property and non-property) resulting from installation and/or use of the equipment not in accordance with the datasheet and/or due care in handling the equipment in question.



WATCH THE PARAMETERS

The device's power supply, permissible load or other characteristic parameters must comply with the device's specifications.



DO NOT MODIFY

Do not modify this device in any way not included in this datasheet.



OTHER DEVICES

The manufacturer, Yacht Concept sp. z o.o. will not be held responsible for any damage or loss of warranty privileges for other connected devices if the connection is not compliant with their datasheets.



TECHNICAL SUPPORT

If you have any technical questions or comments on the operation of the device, contact Yacht Concept technical support.



NOT A TOY

The product is not intended for children or pets.

SAFETY INFORMATION



ELECTRICITY

Dangers of life caused by electricity.



PROPER USAGE

The components of the system (individual devices) are designed for operation on yachts. Incorrect connection or use may cause fire or electric shock.



INSTALLATOR

Any work related to the installation of the device, especially work involving interference with the electrical system, can only be performed by a person with the appropriate qualifications or authorizations.



POWER SUPPLY

When installing the device, make sure to disconnect the power supply voltage in the circuit in which this device is connected or in the vicinity of which the installation takes place.



MOISTNESS

To avoid risk of electrical shock, do not operate the device with wet or moist hands. Do not use in damp or wet locations, near a bathtub, sink, shower, swimming pool, or anywhere else where water is present.



CONNECTORS BRIDGE

Do not connect inputs or outputs by bridges to achieve higher current. This may result in exceeding the maximum current and destroying the device.

2. TECHNICAL DATA

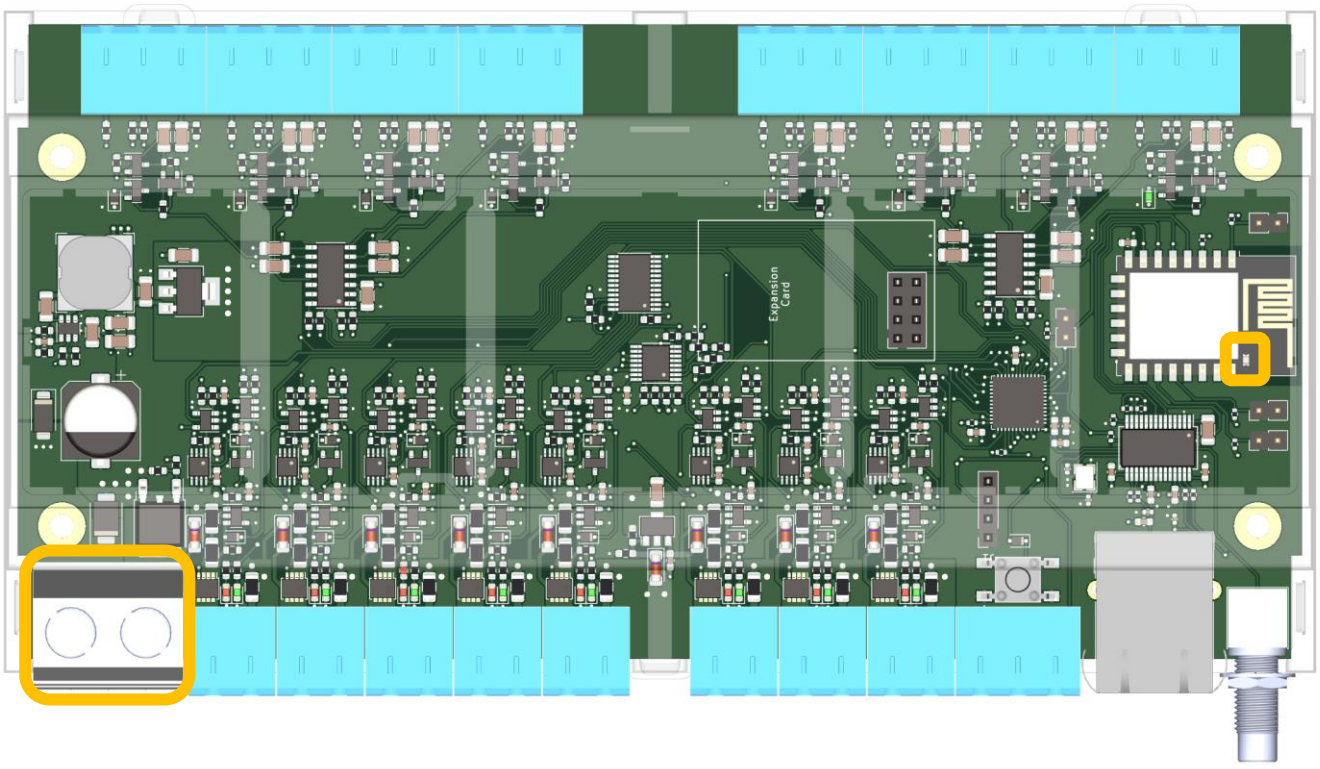
GENERAL DATA	
Module dimensions (h x d x l)	65.3 mm x 89.8 mm x 177.8
Ambient temperature	-10°C to 50°C
Ambient humidity	75%
POWER SUPPLY	
Supply voltage – min.	9 V
Supply voltage – max.	33 V
Current consumption – idle, typ.	0.08 A
Current consumption – max.	32 A
POWER METER	
Power – min.	0 W
Power – max.	120 W
Tolerance	5%
COMMUNICATION	
Interfaces	Ethernet, UART TTL, Wi-Fi
Inputs	8 x Button / Logic
Outputs	8 x LED PWM
POWER TERMINAL BLOCK	
Connection method	Screw
Wire gauge min.	20 AWG
Wire gauge max.	6 AWG
INPUT/OUTPUT TERMINAL BLOCK	
Connection method	Screw
Wire gauge min.	28 AWG
Wire gauge max.	12 AWG

INPUTS & OUTPUTS

POWER SUPPLY

CONNECTORS	PARAMETERS	DESCRIPTION
Power In	9 V DC – 33 V DC	Module power input

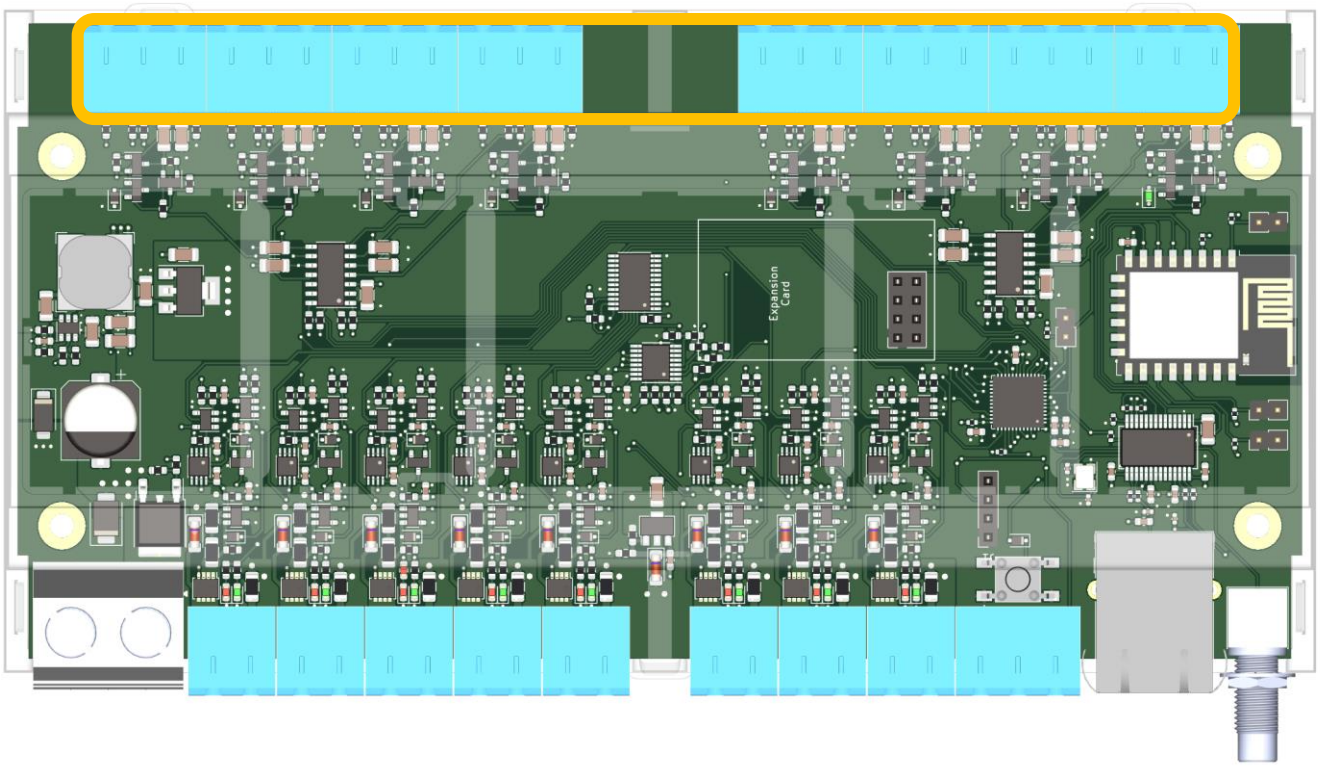
LIGHT	DESCRIPTION
BLINKS	Module works normally.
FIXED OR NONE	Indicates problem of the module or power supply.



- Module must be powered by 9 VDC to 33 VDC stabilized power supply with short circuit protection. Connecting higher voltage or voltage not matching the load's voltage may cause damage to the device.

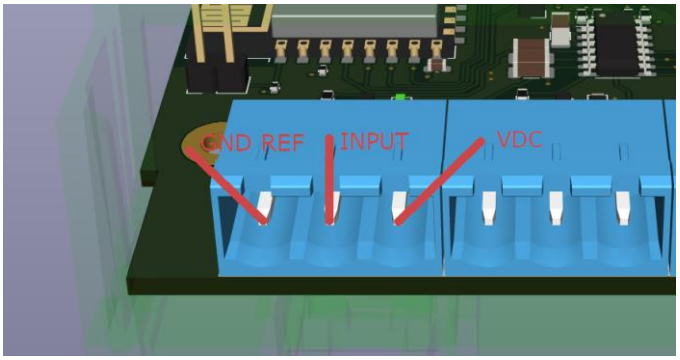
INPUTS

CONNECTORS	DESCRIPTION
Input 1 - 8	Open/short between Vdc and IN 2,5V to VDC for logic "1"



- The logical 1 (True) is VDC Voltage, logical 0 is unconnected or GND.

Pinout

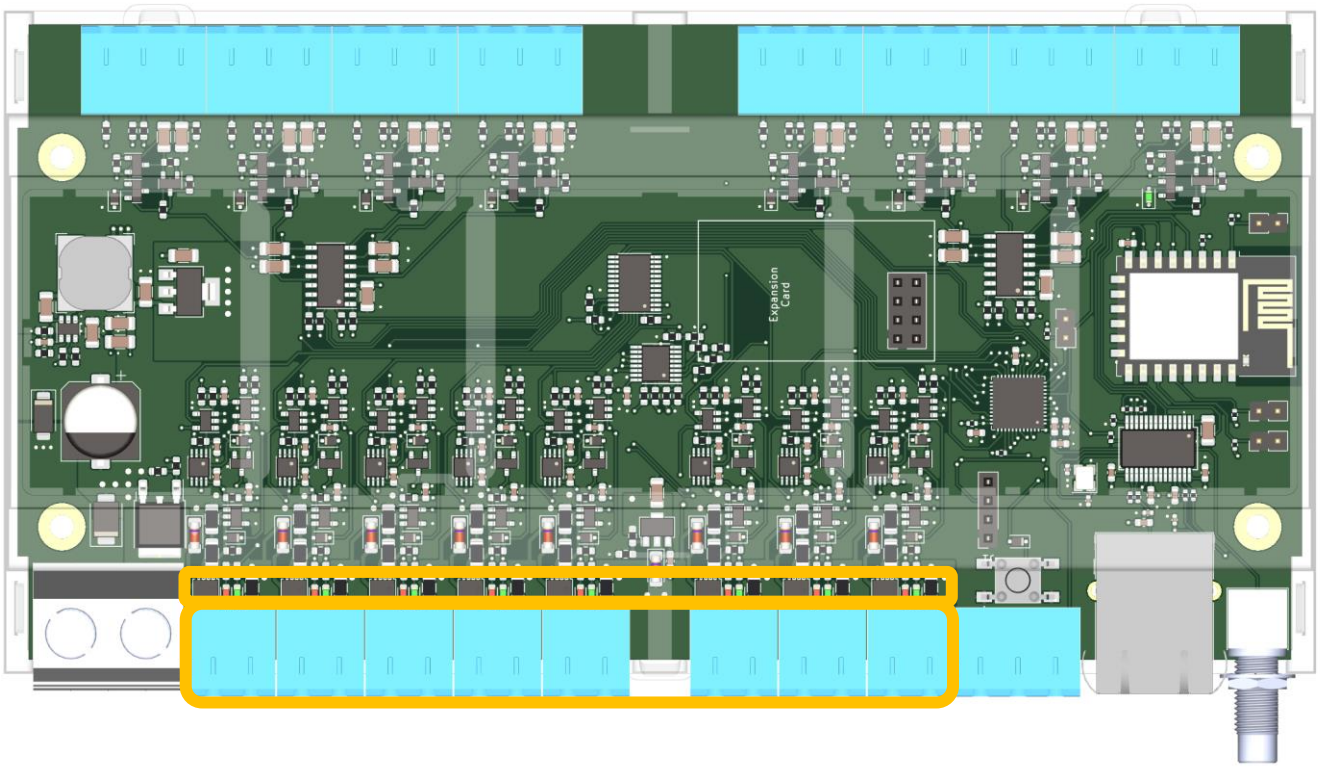


- Use GND REF to connect ground of device that controlling module. Not needed for switch.

OUTPUTS

CONNECTORS	PARAMETERS	DESCRIPTION
LED 1 - 8	PWM signal of supply voltage, adjustable 100Hz – 20kHz frequency and fill factor (0-100%) of 12 bits resolution. Maximum current 4A.	Can power up lights sources or loads up to 4A.

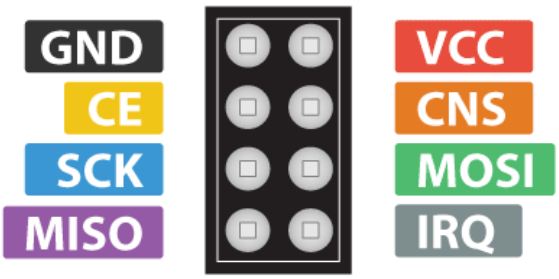
LIGHT COLOR	DESCRIPTION
GREEN	Channel is active and the light intensity corresponds to output PWM value.
RED	Channel has been overloaded or shorted.
NONE	Channel is inactive.



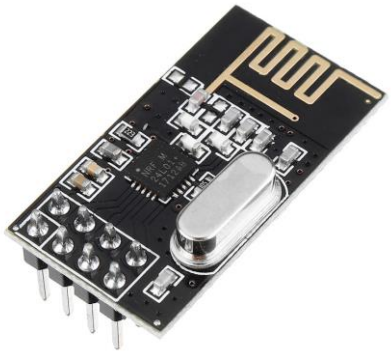
EXPANSION MODULES

nRF

This module has a connector for a card that expands its functions.



Pinout scheme

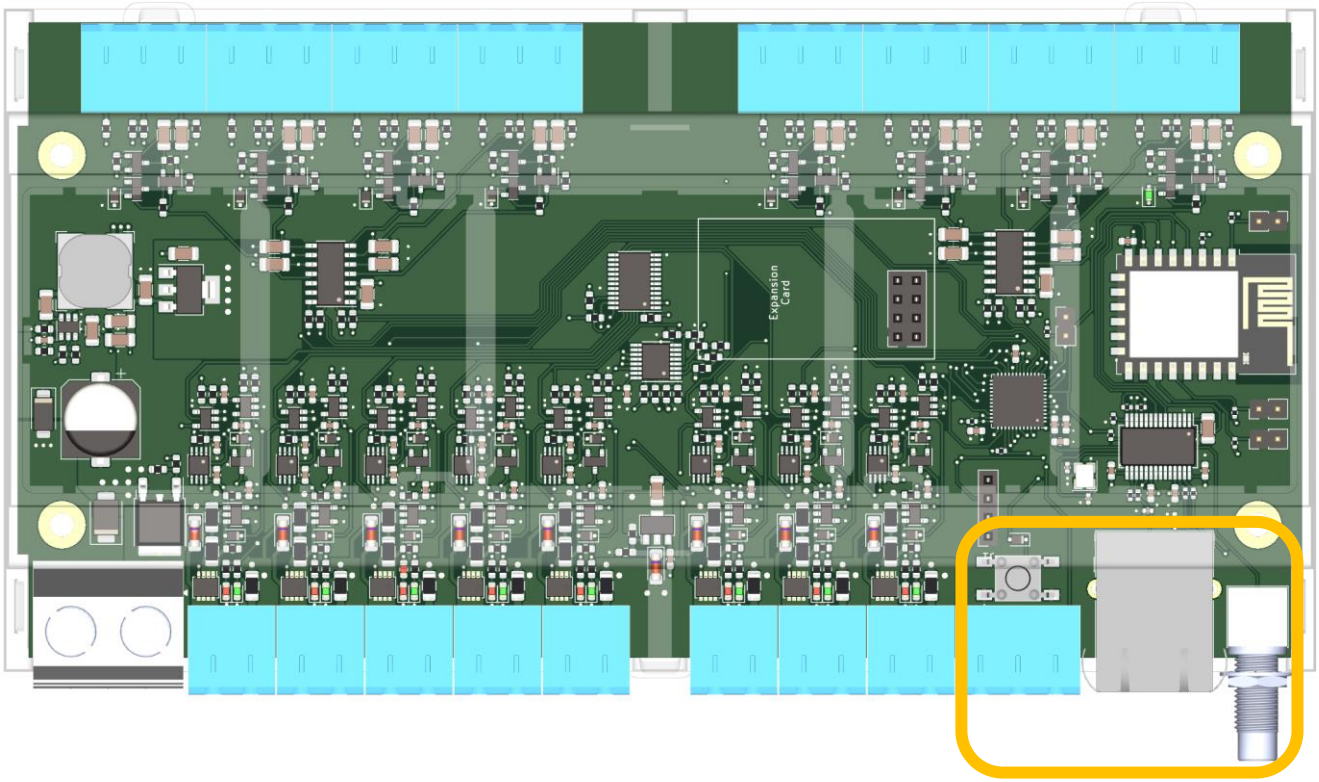


Example nRF24L01 module

The nRF24L01 is a wireless transceiver module, meaning each module can both send as well as receive data. They operate in the frequency of 2.4GHz. Each module has an address range and each module can communicate with others modules hence it is possible to have multiple wireless units communicating with each other in a particular area. Hence mesh networks or other types of networks are possible using nRF24L01 modules.

The nRF24L01 modules are versatile and provide communication with many different systems. One of the most widely used standards with which this expansion card is compatible is the Mi-Light system.

COMMUNICATION



The element responsible for the logic of the performed actions, and for communication with the central unit is the communication chip, which is mounted on each module. The circuit consists of 2 processors: ESP32 communicating with peripherals, and ESP8266 responsible for Ethernet network communication, and Wi-Fi wireless communication.

The microprocessors communicate with each other using the I2C bus. SPI was also used to communicate with the ENC2j60 chip responsible for Ethernet. An SPI bus has been provided on the ICSP pin for communication with additional peripherals in the future.

Each chip has a built-in Wi-Fi antenna for general-purpose use, or in cases where connecting a cable network is not possible. The chip itself can also serve with other Wi-Fi compatible devices.

WIRELESS COMMUNICATION

Wi-Fi

Each communication board has a built-in Wi-Fi modem based on the ESP8266 chip. The wireless network can be used for:

- Installation of modules in places where there is no cable network.
- Install software updates and scripts.
- Communication with other devices via API (Including light bulbs and smart sockets)

WI-FI	
Interfaces	Wi-Fi, nRF
Inputs	nRF socket
Protocols	802.11 b/g/n
Frequency range	2.4 GHz – 2.5 GHz (2 400 MHz – 2483.5 MHz)
Tx power	802.11 b: +20 dBm 802.11 g: +17 dBm 802.11 n: +14 dBm
Rx sensitivity	802.11 b: -91 dBm (11 Mbps) 802.11 g: -75 dBm (54 Mbps) 802.11 n: -72 dBm (MCS7)
Security	WPA/WPA2
Encryption	WEP/TKIP/AES
Network protocols	IPv4, TCP/UDP/HTTP

WIRED COMMUNICATION

Ethernet

Each communication system has an Ethernet interface operating in the 10Mbit standard. Through this interface, all communication of the modules with each other and with the central application takes place.

Ethernet	
Connector	RJ-45
Standard	802.3
Base-T Networks	10/100
Duplex modes	Full & half
SPI interface	Clock speed up to 20 MHz
Buffer	8 kB Transmit/Receive packet dual port SRAM

UART TTL

Each module has terminals for RS232 (TTL) 3.3V protocol. The connector is used for installing software in modules, and for communication with other peripheral devices using the API. With the help of an appropriate adapter, you can use any communication standard such as: RS232, RS485, Modbus.

UART TTL	
Connector	3 x push-in (TX, RX, GND)
Operation mode	Asynchronous
Voltage levels	0 V – 3.3 V
Data transfer	9 600 bps - 921 600 bps

FEATURES

MODULES	YC-OB-D1 LED IP	YC-OB-D2 SHUTTER IP	YC-OB-D3 CONTACT IP	YC-OB-D4 RELAY IP	YC-OB-D5 SENSOR IP	YC-OB-D6
Button / Logic inputs	**8**	0	8	8	0	12
Button / Logic override switches	**No**	No	Yes	Yes	No	No
Output status LED indicator	**Yes**	Yes	Yes	Yes	No	No
Voltage/current measurement inputs	**8**	4	0	0	7	0
Resistance measurement inputs	**0**	0	0	0	6	0
Temperature sensor inputs	**0**	0	0	0	6	0
LED outputs	**8**	0	0	0	0	0
Motor outputs	**0**	2	0	0	0	0
10A relay outputs	**0**	0	8	0	0	0
40A switch outputs	**0**	0	0	8	0	0

The modules according to the table have different features. Below are the specifications of the various inputs and outputs that support the features. Before installation, read the data sheet carefully and follow the recommendations.



READ IMPORTANT INFORMATION



READ SAFETY INFORMATION



FOLLOW THE PARAMETERS

3. MANUAL

INPUTS USAGE SCENARIOS

1. Interface with External Logic Signal Devices:

- Description: For devices that output a distinct logic signal.
- Connection:
    - Connect the signal output from the external device to the "In" terminal of the circuit.
    - Connect the ground of the external device to the "Ref" terminal of the circuit.

2. Interface with Ground-Shorting Devices:

- Description: For devices that communicate by alternately shorting their output to ground or leaving it open.
- Connection:
    - Connect the output of the device to the "In" terminal of the circuit.
    - Additionally, short the top pin (adjacent to the "In" terminal) to the "In" terminal. This ensures a defined voltage level when the device output is open.

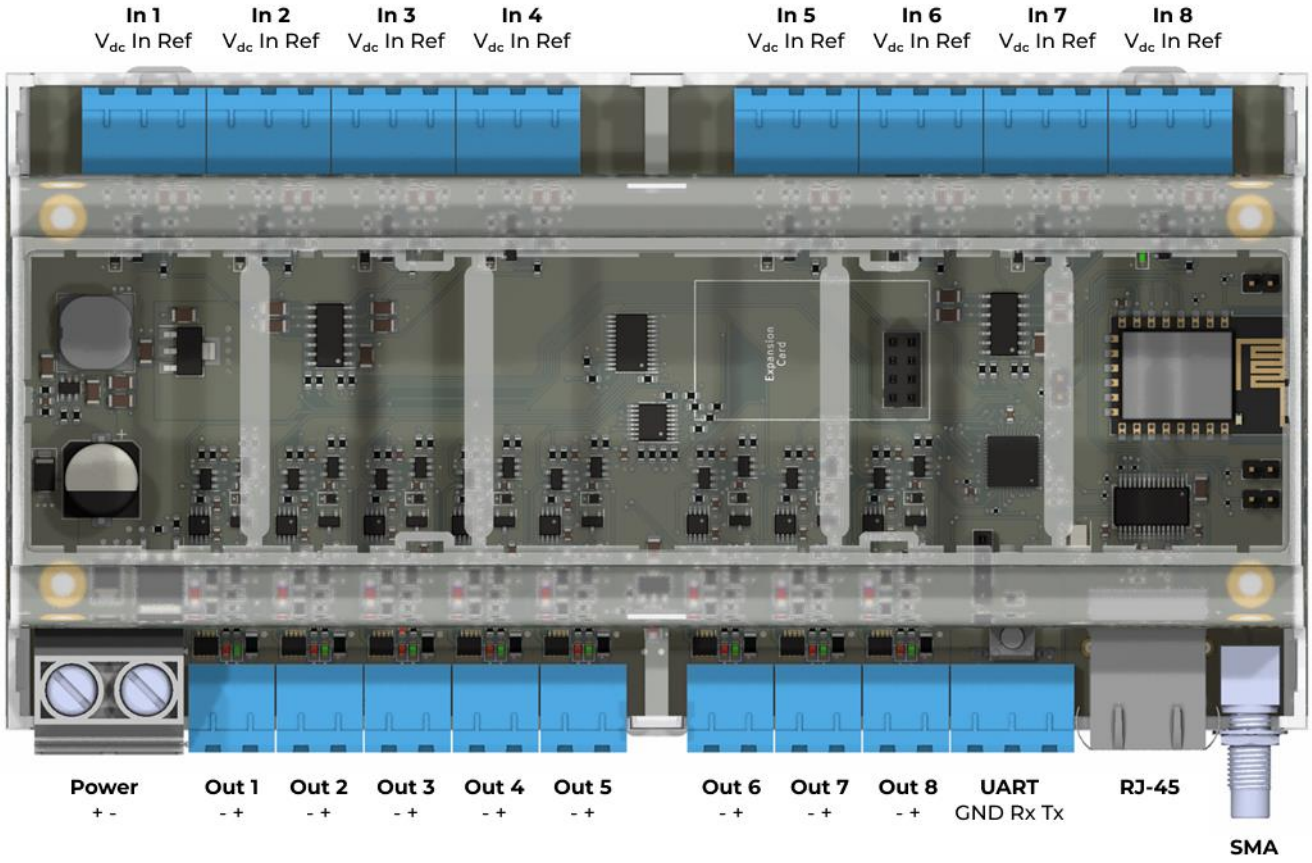
3. Interface with Contact-Based Devices:

- Description: For devices that use two contacts which either establish a connection (short) or break it (open).
- Connection:
    - Connect one of the contacts to the "+VDC" terminal of the circuit.
    - Connect the other contact to the "In" terminal of the circuit. The circuit will then interpret the connection status of the contacts based on the voltage at the "In" terminal.

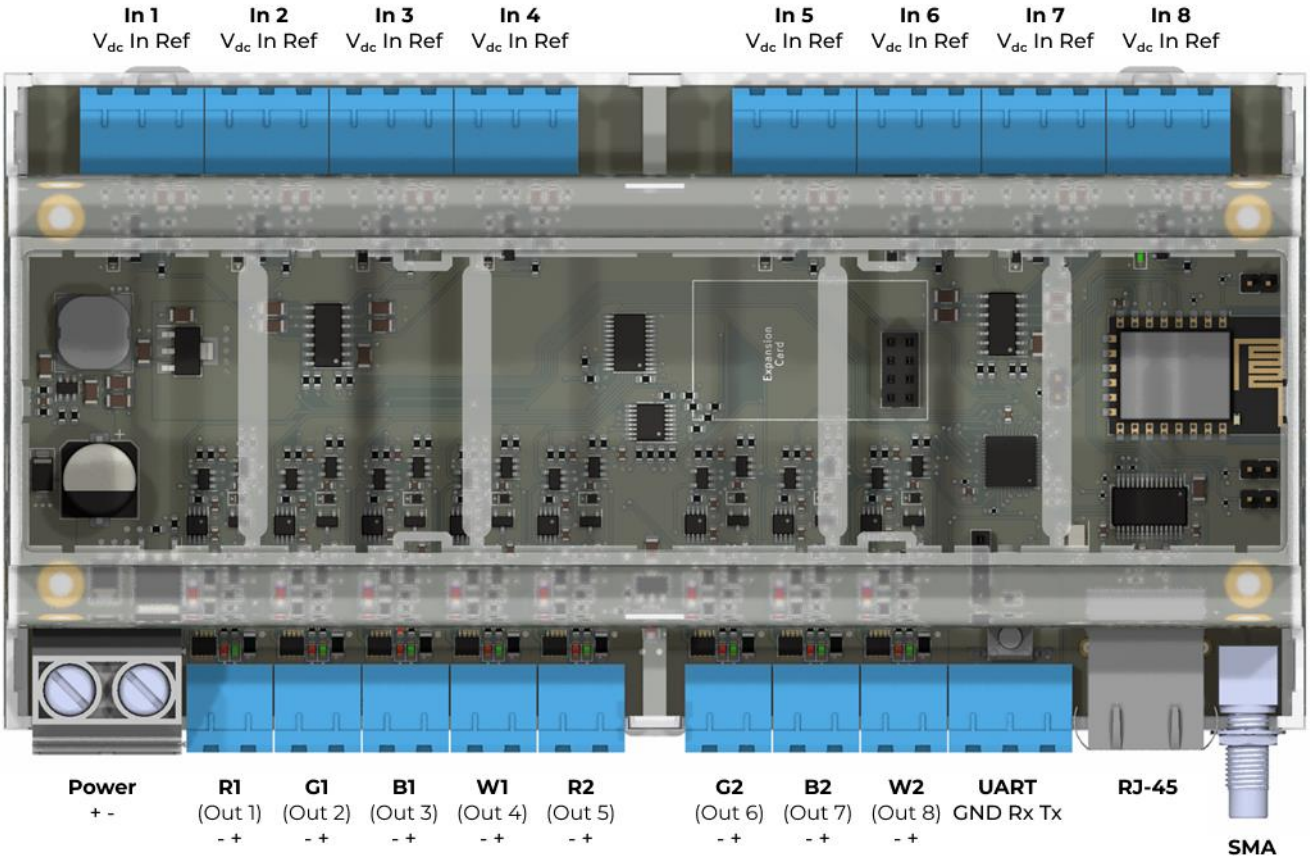
Note:

Ensure that external devices comply with the voltage specifications of the circuit to prevent damage and ensure accurate operation. Proper grounding practices should be followed to minimize noise and interference.

INPUTS & OUTPUTS SCHEME STANDARD MODE



INPUTS & OUTPUTS SCHEME RGBW MODE



POWER TERMINAL BLOCK	
Connection method	Screw
Wire gauge min.	20 AWG
Wire gauge max.	6 AWG
Contact material	Copper Alloy
Contact plating	Tin
INPUT/OUTPUT TERMINAL BLOCK	
Connection method	Screw
Wire gauge min.	28 AWG
Wire gauge max.	12 AWG
Contact material	Copper Alloy
Contact plating	Nickel
INPUT 1-8	
Input type	VDC or GND (Unconnected) logic
OUTPUT 1-8	
Output type	Low side semiconductor switch
Output current - max	4 A[1]
Output voltage	Equal to input voltage
PWM switching frequency	100 Hz – 20 kHz
PWM steps	255

[1] The upstream power supply current limit must be observed.

4. PARTS LIST

Item	Qty	Reference(s)	Value	Footprint
1	1	C1	100n 50V	Capacitor_SMD:C_0603_1608Metric_Pad1.08x0.95mm_HandSolder
2	1	C2	1u 25V	Capacitor_SMD:C_1206_3216Metric
3	24	C101, C301, C303, C403, C404, C405, C406, C409, C411, C416, C601, C603, C701, C703, C801, C803, C901, C903, C1001, C1003, C1101, C1103, C1201, C1203	100n	Capacitor_SMD:C_0603_1608Metric
4	1	C102	10u 50V	Capacitor_SMD:C_1206_3216Metric
5	3	C103, C207, C507	100n 50V	Capacitor_SMD:C_1206_3216Metric
6	1	C104	EEEFT1H331GP	Capacitor_SMD:CP_Elec_10x10.5
7	1	C105	100p 6V3	Capacitor_SMD:C_0603_1608Metric
8	2	C106, C108	22u 6V3	Capacitor_SMD:C_1206_3216Metric
9	24	C201, C202, C203, C204, C205, C206, C208, C209, C210, C211, C212, C213, C501, C502, C503, C504, C505, C506, C508, C509, C510, C511, C512, C513	1n 50V	Capacitor_SMD:C_1206_3216Metric
10	8	C302, C602, C702, C802, C902, C1002, C1102, C1202	10n	Capacitor_SMD:C_0603_1608Metric
11	8	C304, C604, C704, C804, C904, C1004, C1104, C1204	1u	Capacitor_SMD:C_0603_1608Metric
12	8	C305, C605, C705, C805, C905, C1005, C1105, C1205	1n	Capacitor_SMD:C_0603_1608Metric
13	2	C401, C402	18p	Capacitor_SMD:C_0402_1005Metric
14	3	C407, C408, C410	10u	Capacitor_SMD:C_1206_3216Metric
15	2	C414, C415	10n	Capacitor_SMD:C_0402_1005Metric
16	1	D1	LL4148	Diode_SMD:D_MiniMELF
17	1	D101	SM6T30A	Diode_SMD:D_SMB
18	1	D102	SK16	Diode_SMD:D_SMA
19	16	D201, D202, D205, D206, D303, D501, D502, D505, D506, D603, D703, D803, D903, D1003, D1103, D1203	BAT54J	Diode_SMD:D_SOD-323F
20	8	D203, D204, D207, D208, D503, D504, D507, D508	BAT54C	Package_TO_SOT_SMD:SOT-23
21	8	D301, D601, D701, D801, D901, D1001, D1101, D1201	LED_G	LED_SMD:LED_0603_1608Metric
22	8	D302, D602, D702, D802, D902, D1002, D1102, D1202	LED_R	LED_SMD:LED_0603_1608Metric
23	8	D305, D605, D705, D805, D905, D1005, D1105, D1205	GL1A	Diode_SMD:D_MiniMELF
24	8	F301, F601, F701, F801, F901, F1001, F1101, F1201	C1F-5	Fuse:Fuse_1206_3216Metric
25	1	FB402	Ferrite_Bead	Capacitor_SMD:C_0603_1608Metric
26	4	H101, H102, H103, H104	MountingHole	MountingHole:MountingHole_3.2mm_M3_Pad_TopBottom
27	1	J101	VP026584000AG	libs:VP026584000AG
28	9	J102, J201, J202, J203, J204, J501, J502, J503, J504	TBP01R1-508-03BE	libs:CUI_TBP01R1-508-03BE
29	8	J301, J601, J701, J801, J901, J1001, J1101, J1201	TBP01R1-508-02BE	libs:CUI_TBP01R1-508-02BE
30	1	J402	Conn_Coaxial	Connector_Coaxial:SMA_Amphenol_132203-12_Horizontal
31	1	J403	Conn_02x04_Odd_Even	Connector_PinSocket_2.54mm:PinSocket_2x04_P2.54mm_Vertical

32	1	J404	RJ45_Amphenol_RJMG1BD3B8K1ANR	Connector_RJ:RJ45_Amphenol_RJMG1BD3B8K1ANR
33	1	L101	SRN1060-100M	Inductor_SMD:L_Bourns-SRN1060
34	1	Q102	IRFR7546TRPBF	Package_TO_SOT_SMD:TO-252-2
35	8	Q201, Q202, Q203, Q204, Q501, Q502, Q503, Q504	BC857	Package_TO_SOT_SMD:SOT-23
36	8	Q301, Q601, Q701, Q801, Q901, Q1001, Q1101, Q1201	2N7002	Package_TO_SOT_SMD:SOT-23
37	8	Q302, Q602, Q702, Q802, Q902, Q1002, Q1102, Q1202	BUK9M10-30EX	Package_TO_SOT_SMD:LFPAK33
38	1	R1	240	Resistor_SMD:R_0603_1608Metric_Pad0.98x0.95mm_HandSolder
39	1	R2	2k	Resistor_SMD:R_0603_1608Metric_Pad0.98x0.95mm_HandSolder
40	62	R101, R103, R107, R108, R115, R116, R203, R204, R206, R207, R209, R210, R212, R214, R215, R216, R217, R218, R221, R222, R224, R225, R227, R228, R230, R232, R233, R234, R235, R236, R305, R503, R504, R506, R507, R509, R510, R512, R514, R515, R516, R517, R518, R521, R522, R524, R525, R527, R528, R530, R532, R533, R534, R535, R536, R605, R705, R805, R905, R1005, R1105, R1205	10k	Resistor_SMD:R_0603_1608Metric
41	2	R102, R114	91k	Resistor_SMD:R_0603_1608Metric
42	3	R104, R117, R119	13k	Resistor_SMD:R_0603_1608Metric
43	1	R105	30k	Resistor_SMD:R_0603_1608Metric
44	1	R106	150k	Resistor_SMD:R_0603_1608Metric
45	12	R109, R110, R111, R113, R201, R202, R219, R220, R501, R502, R519, R520	3k3	Resistor_SMD:R_0603_1608Metric
46	1	R112	3k3	Resistor_SMD:R_0603_1608Metric_Pad0.98x0.95mm_HandSolder
47	1	R118	68k	Resistor_SMD:R_0603_1608Metric
48	8	R205, R208, R223, R226, R505, R508, R523, R526	NM	Resistor_SMD:R_0603_1608Metric
49	8	R211, R213, R229, R231, R511, R513, R529, R531	2k	Resistor_SMD:R_0603_1608Metric
50	32	R301, R303, R304, R308, R601, R603, R604, R608, R701, R703, R704, R708, R801, R803, R804, R808, R901, R903, R904, R908, R1001, R1003, R1004, R1008, R1101, R1103, R1104, R1108, R1201, R1203, R1204, R1208	1k	Resistor_SMD:R_0603_1608Metric
51	8	R302, R602, R702, R802, R902, R1002, R1102, R1202	100k	Resistor_SMD:R_0603_1608Metric
52	8	R306, R606, R706, R806, R906, R1006, R1106, R1206	6k8	Resistor_SMD:R_0603_1608Metric
53	8	R307, R607, R707, R807, R907, R1007, R1107, R1207	180R	Resistor_SMD:R_0603_1608Metric
54	16	R309, R310, R609, R610, R709, R710, R809, R810, R909, R910, R1009, R1010, R1109, R1110, R1209, R1210	10m 1/2W	Resistor_SMD:R_1206_3216Metric
55	8	R311, R611, R711, R811, R911, R1011, R1111, R1211	100R	Resistor_SMD:R_0603_1608Metric
56	5	R401, R410, R411, R414, R415	3k3	Resistor_SMD:R_0402_1005Metric
57	3	R402, R412, R413	NM	Resistor_SMD:R_0402_1005Metric
58	2	R403, R404	1k	Resistor_SMD:R_0402_1005Metric
59	1	R405	2k 1%	Resistor_SMD:R_0402_1005Metric
60	4	R406, R407, R408, R409	50R 1%	Resistor_SMD:R_0402_1005Metric
61	1	R416	10k	Resistor_SMD:R_0402_1005Metric

62	1	SW101	2-1977223-4	libs:219772234
63	1	U1	LM317LIPK	Package_TO_SOT_SMD:SOT-89-3
64	1	U101	PCAL6416APW	Package_SO:TSSOP-24_4.4x7.8mm_P0.65mm
65	1	U102	MAX11617	Package_SO:QSOP-16_3.9x4.9mm_P0.635mm
66	1	U103	AP63200WU	Package_TO_SOT_SMD:TSOT-23-6
67	2	U201, U501	LM339DR	Package_SO:SOIC-14_3.9x8.7mm_P1.27mm
68	8	U202, U203, U204, U205, U502, U503, U504, U505	TLVH431	Package_TO_SOT_SMD:SOT-23
69	8	U301, U601, U701, U801, U901, U1001, U1101, U1201	SN74LVC2G132DCTR	Package_SO:SSOP-8_2.95x2.8mm_P0.65mm
70	8	U302, U602, U702, U802, U902, U1002, U1102, U1202	TS3021A	Package_TO_SOT_SMD:SOT-23-5
71	8	U303, U603, U703, U803, U903, U1003, U1103, U1203	MCP1416	Package_TO_SOT_SMD:SOT-23-5
72	8	U304, U604, U704, U804, U904, U1004, U1104, U1204	INA180A1	Package_TO_SOT_SMD:SOT-23-5
73	1	U401	ENC28J60x-SS	Package_SO:SSOP-28_5.3x10.2mm_P0.65mm
74	1	U402	ESP32-PICO-D4	Package_DFN_QFN:QFN-48-1EP_7x7mm_P0.5mm_EP5.3x5.3mm
75	1	U403	AMS1117-3.3	Package_TO_SOT_SMD:SOT-223-3_TabPin2
76	1	U404	ESP-12E	RF_Module:ESP-12E
77	1	Y401	ABM8-25.000MHZ-B2-T	Crystal:Crystal_SMD_3225-4Pin_3.2x2.5mm

5. DRAWINGS

