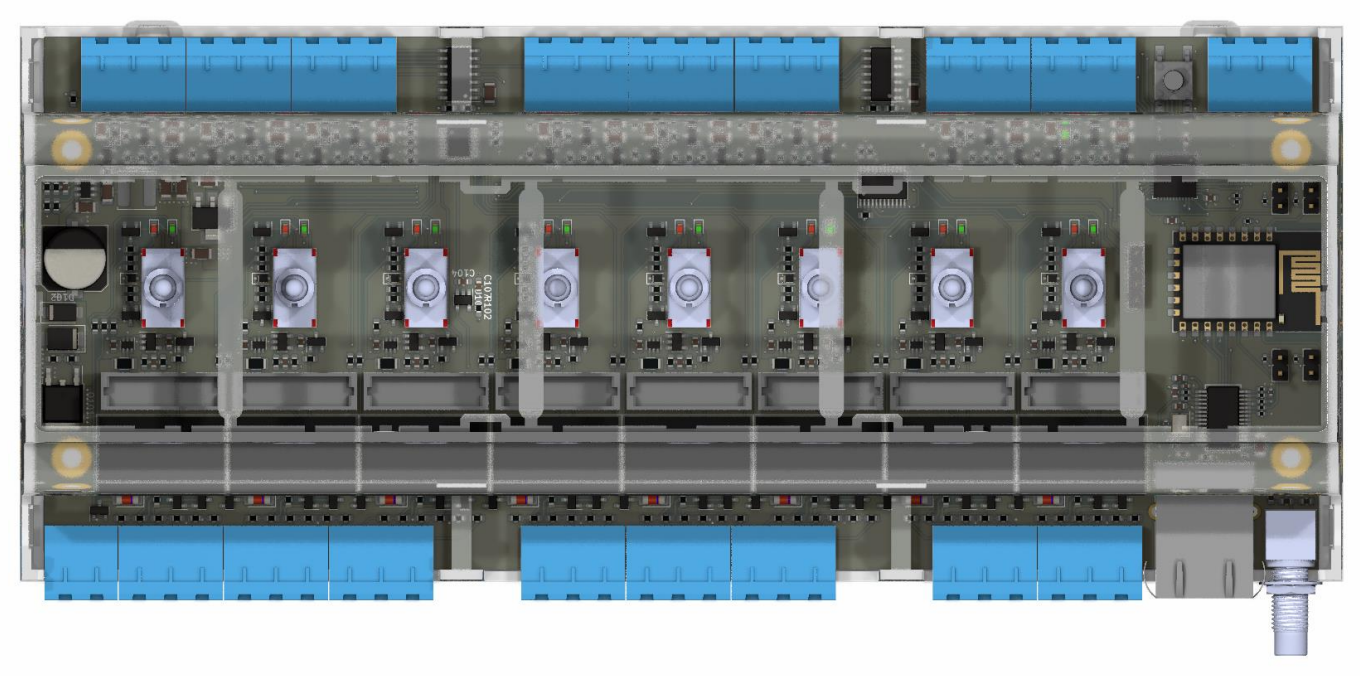
OPERATIONS AND MAINTENANCE MANUALS

MODULE YC-OB-D3

1. General Information	**Page 2**
2. Technical Data	**Page 6**
3. Manual	**Page 14**
4. Parts List	**Page 19**
5. Drawings	**Page 22**

1. General Information

The module reads input states (short-circuit through an external relay) and issues output states through a built-in relay.



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

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.

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

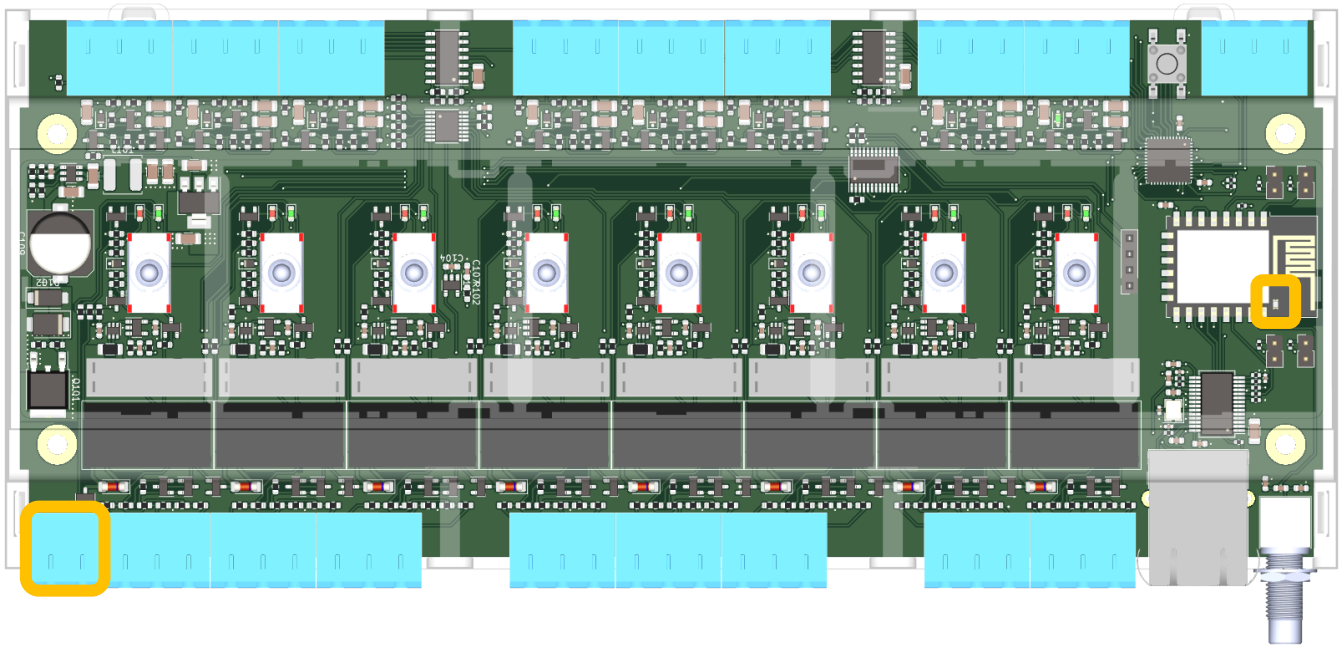
GENERAL DATA	
Module dimensions (h x d x l)	65.2 mm x 89.8 mm x 213.8 mm
Ambient temperature	-10°C to 50°C
Ambient humidity	75%
POWER SUPPLY	
Supply voltage – min.	9 V
Supply voltage – max.	33 V
Current consumption – idle, typ.	0.07 A
COMMUNICATION	
Interfaces	Ethernet, UART TTL, Wi-Fi
Inputs	8 x Button / Logic
Outputs	8 x 5 A Relay
POWER TERMINAL BLOCK	
Connection method	Screw
Wire gauge min.	28 AWG
Wire gauge max.	12 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

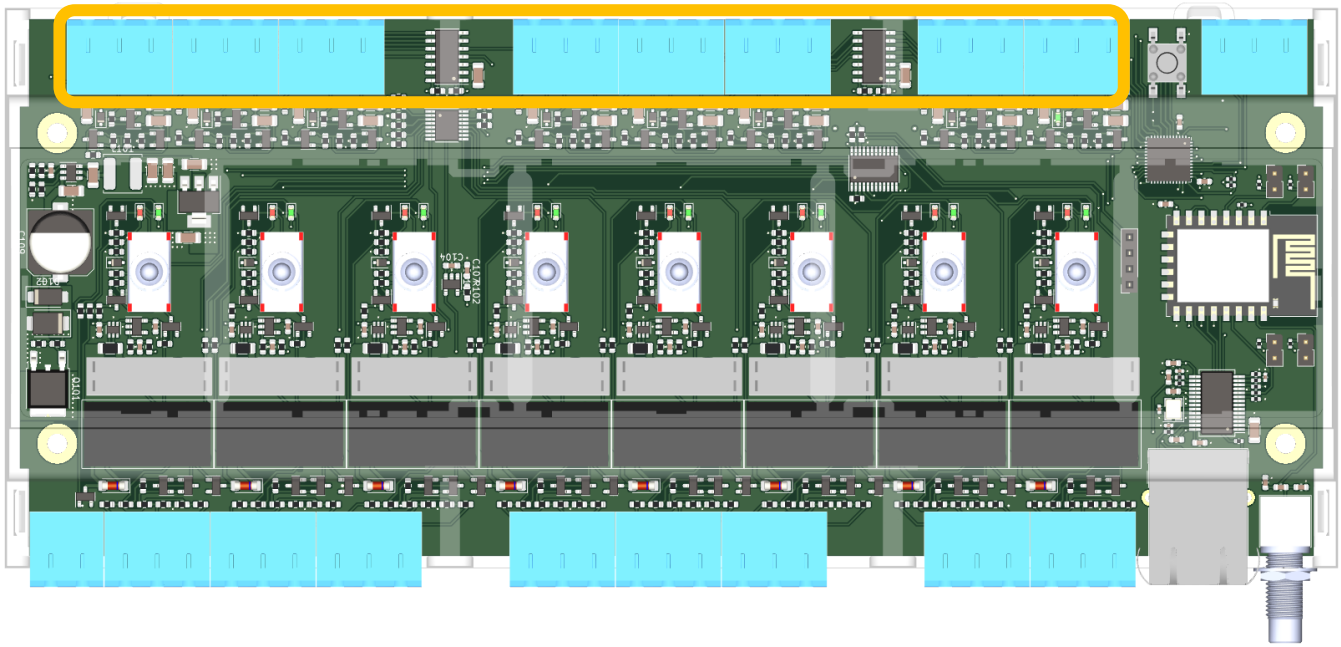
LIGHT	DESCRIPTION
BLINKS	Module works normally.
FIXED OR NONE	Indicates problem of the module or power supply.



- 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

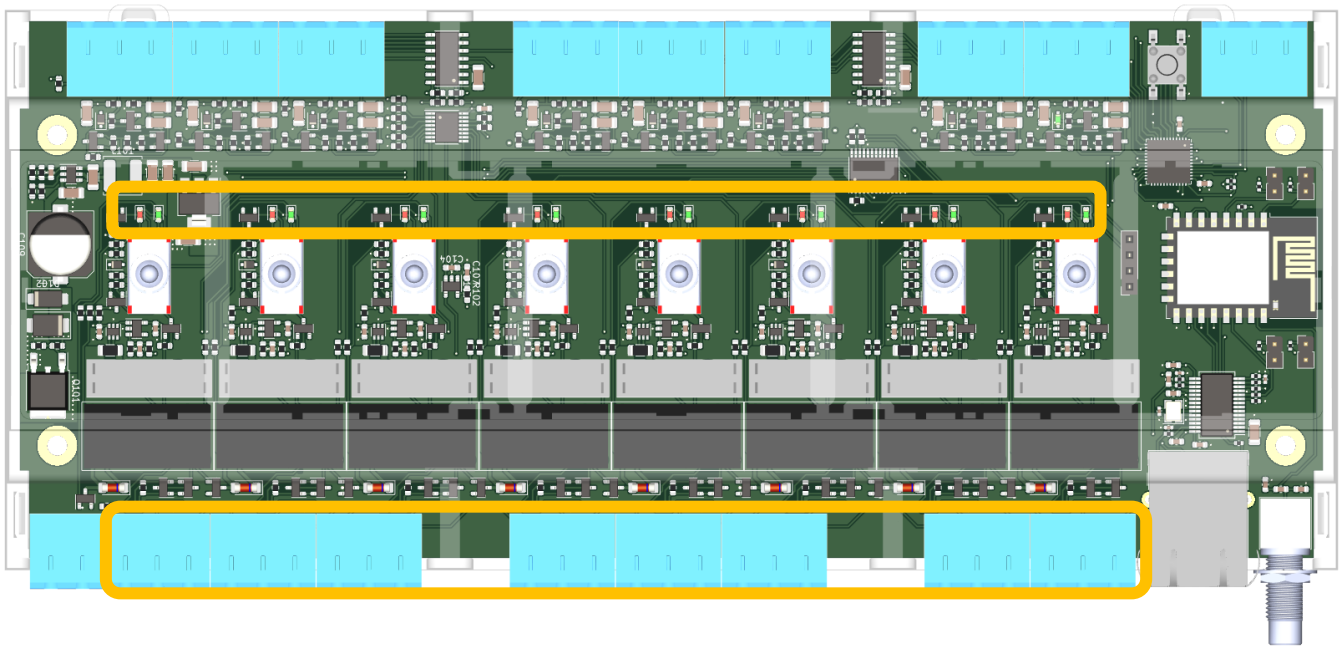
CONNECTORS	DESCRIPTION
Input 1 - 8	Open/short between Vdc and IN 2,5V to VDC for logic “1”



OUTPUTS

CONNECTORS	PARAMETERS
RELAY 1 - 8	NO and NC contacts, 5A VDC, 10A VAC.

LIGHT COLOR	DESCRIPTION
GREEN	Channel is active.
RED	Chennel fuse is burned or not present.
NONE	Channel is inactive.

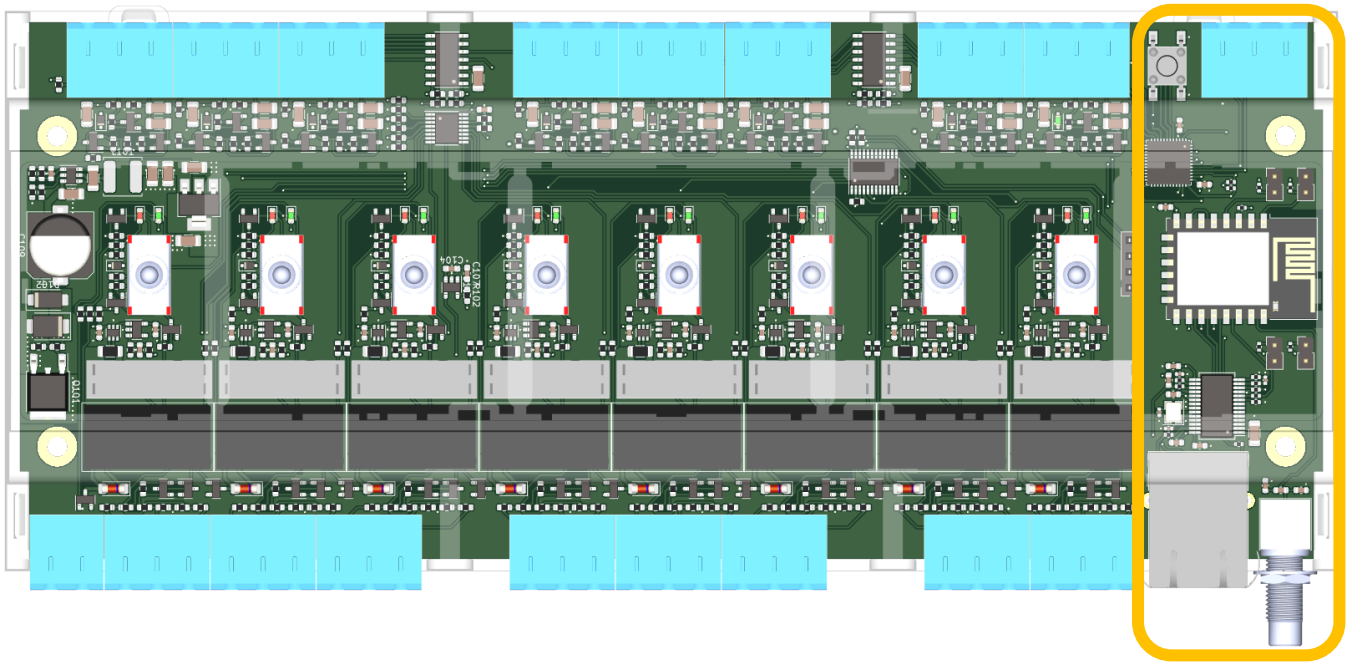


COMMUNICATION

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: Atmega1284 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 ENC2j50 chip responsible for Ethernet. An I2C bus has been provided on the connector pin for communication with additional peripherals in the future.

Each chip has a built-in wifi 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
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 10/100Mbit 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 AC 5A DC 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.

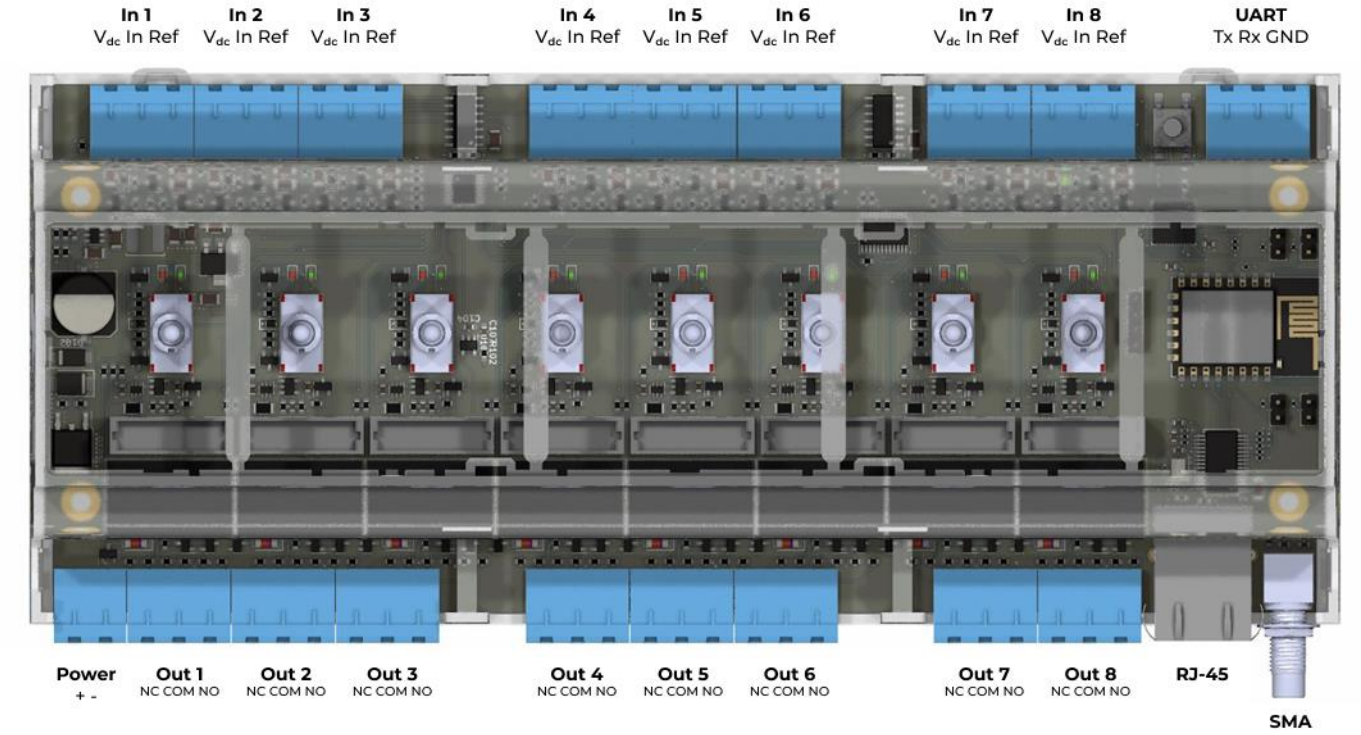
3. Interface with Contact-Based Devices:

- 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



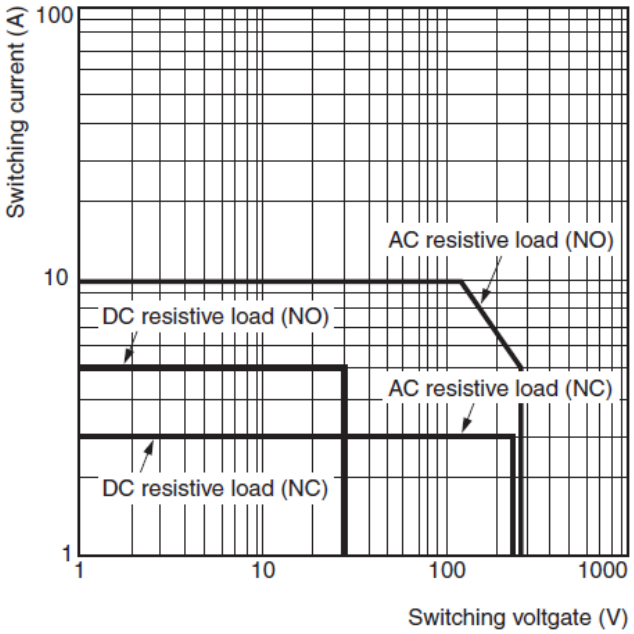
POWER TERMINAL BLOCK	
Connection method	Screw
Wire gauge min.	28 AWG
Wire gauge max.	12 AWG
Contact material	Copper Alloy
Contact plating	Nickel
INPUT/OUTPUT TERMINAL BLOCK	
Connection method	Screw
Wire gauge min.	28 AWG
Wire gauge max.	12 AWG
Contact material	Copper Alloy
Contact plating	Nickel
BUTTON INPUT 1-8	
Input type	3.3 V logic input with pull-up
Pull-up resistance	20 – 60 kOhm
LEVER SWITCH 1-8	
Mechanical resistance	40 000 make-and-break cycles
Contact resistance	10 mOhm initial @ 2-4VDC, 100 mA for both silver and gold plated contacts
Insulation resistance	1 000 MOhm
Dielectric strength	1 000 Vrms @sea level
10A RELAY 1-8	
Relay type	Electromechanical, isolated relay[1]
Insulation voltage	250 V
Rated load NO @ 125V AC	10 A

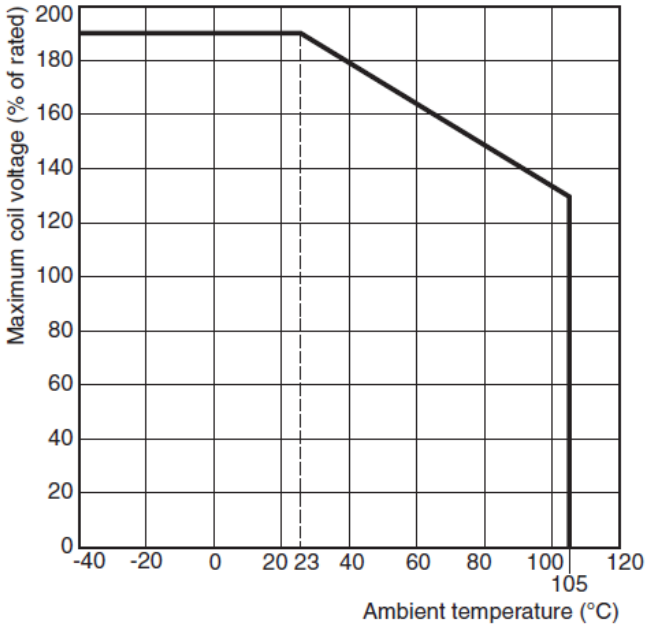
[1] NO, NC and COM all available to the user.

Rated load NC @ 125V AC	3 A
Rated switching Voltage DC	30 V
Rated load NO @ 30V DC	5 A
Rated load NC @ 30V DC	3 A
Power consumption	0.4 W
Operate time	10 ms max.
Release time	5 ms max.
Impulse withstand voltage	8 kV (1.2 x 50 us)
Must operate voltage	75% max.
Must release voltage	5% to 25%
Max voltage	190%
Rated carry current	10 A (NO)/3 A(NC)
Max. switching voltage	277 VAC, 30 VDC
Max. switching current AC	10A (NO)/3 A (NC)
Max. switching current DC	5A (NO)/3 A (NC)
Contact resistance	100 mOhm
Insulation resistance	1 000 MOhm
Durability mechanical	10 000 000 operations, 18 000 per hour
Durability electrical @ 30 V DC	NO – 100 000 operations, 5A, operation on of 1 sec., off for 1 sec. NC – 100 000 operations, 3A, operation on of 1 sec., off for 1 sec.
Failure rate	10 mA at 5 VDC

Maximum switching capacity

Ambient temperature vs. Maximum coil voltage


Switching current (A)
100
10
1
1
10
100
1000
Switching voltgate (V)
AC resistive load (NO)
DC resistive load (NO)
AC resistive load (NC)
DC resistive load (NC)


Maximum coil voltage (% of rated)
200
180
160
140
120
100
80
60
40
20
0
-40
-20
0
20
23
40
60
80
100
105
120
Ambient temperature (°C)

4. PARTS LIST

Item	Qty	Reference(s)	Value	Footprint
1	32	C101, C301, C302, C303, C403, C404, C405, C406, C409, C411, C416, C601, C602, C603, C701, C702, C703, C801, C802, C803, C901, C902, C903, C1001, C1002, C1003, C1101, C1102, C1103, C1303, C1304, C1305	100n	Capacitor_SMD:C_0603_1608Metric
2	1	C102	10u 50V	Capacitor_SMD:C_1206_3216Metric
3	3	C103, C207, C507	100n 50V	Capacitor_SMD:C_1206_3216Metric
4	1	C104	1n	Capacitor_SMD:C_0603_1608Metric_Pad1.08x0.95mm_HandSolder
5	1	C105	100p 6V3	Capacitor_SMD:C_0603_1608Metric
6	2	C106, C108	22u 6V3	Capacitor_SMD:C_1206_3216Metric
7	1	C107	100n	Capacitor_SMD:C_0603_1608Metric_Pad1.08x0.95mm_HandSolder
8	1	C109	EEEFT1H331GP	Capacitor_SMD:CP_Elec_10x10.5
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	2	C401, C402	18p	Capacitor_SMD:C_0402_1005Metric
11	3	C407, C408, C410	10u	Capacitor_SMD:C_1206_3216Metric
12	2	C414, C415	10n	Capacitor_SMD:C_0402_1005Metric
13	1	D101	SM6T30A	Diode_SMD:D_SMB
14	1	D102	SK16	Diode_SMD:D_SMA
15	16	D201, D202, D205, D206, D302, D501, D502, D505, D506, D602, D702, D802, D902, D1002, D1102, D1303	BAT54J	Diode_SMD:D_SOD-323F
16	8	D203, D204, D207, D208, D503, D504, D507, D508	BAT54C	Package_TO_SOT_SMD:SOT-23
17	8	D301, D601, D701, D801, D901, D1001, D1101, D1302	BAT54A	Package_TO_SOT_SMD:SOT-23
18	8	D303, D603, D703, D803, D903, D1003, D1103, D1412	LL4148	Diode_SMD:D_MiniMELF
19	8	D304, D604, D704, D804, D904, D1004, D1104, D1414	LED_G	LED_SMD:LED_0603_1608Metric
20	8	D305, D605, D705, D805, D905, D1005, D1105, D1401	LED_R	LED_SMD:LED_0603_1608Metric
21	8	F301, F601, F701, F801, F901, F1001, F1101, F1404	178.6164.0001	Fuse:Fuseholder_Blade_ATO_Littelfuse_Pudenz_2_Pin
22	1	FB402	Ferrite_Bead	Capacitor_SMD:C_0603_1608Metric
23	4	H101, H102, H103, H104	MountingHole	MountingHole:MountingHole_3.2mm_M3_Pad_TopBottom
24	17	J102, J201, J202, J203, J204, J301, J501, J502, J503, J504, J601, J701, J801, J901, J1001, J1101, J1403	TBP01R1-508-03BE	libs:CUI_TBP01R1-508-03BE
25	1	J103	TBP01R1-508-02BE	libs:CUI_TBP01R1-508-02BE
26	1	J402	Conn_Coaxial	Connector_Coaxial:SMA_Amphenol_132203-12_Horizontal
27	1	J404	RJ45_Amphenol_RJMG1BD3B8K1ANR	Connector_RJ:RJ45_Amphenol_RJMG1BD3B8K1ANR
28	8	K301, K601, K701, K801, K901, K1001, K1101, K1403	G5Q-14 DC5	Relay_THT:Relay_SPDT_Omron-G5Q-1
29	1	L101	VLS6045EX-100M-H	Inductor_SMD:L_TDK_VLS6045EX_VLS6045AF
30	1	Q101	IRFR7546TRPBF	Package_TO_SOT_SMD:TO-252-2

31	24	Q201, Q202, Q203, Q204, Q303, Q304, Q501, Q502, Q503, Q504, Q603, Q604, Q703, Q704, Q803, Q804, Q903, Q904, Q1003, Q1004, Q1103, Q1104, Q1401, Q1402	BC857	Package_TO_SOT_SMD:SOT-23
32	8	Q301, Q601, Q701, Q801, Q901, Q1001, Q1101, Q1304	BSS84	Package_TO_SOT_SMD:SOT-23
33	8	Q302, Q602, Q702, Q802, Q902, Q1002, Q1102, Q1305	BC817-40	Package_TO_SOT_SMD:SOT-23
34	8	Q305, Q605, Q705, Q805, Q905, Q1005, Q1105, Q1405	BC846	Package_TO_SOT_SMD:SOT-23
35	54	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, R503, R504, R506, R507, R509, R510, R512, R514, R515, R516, R517, R518, R521, R522, R524, R525, R527, R528, R530, R532, R533, R534, R535, R536	10k	Resistor_SMD:R_0603_1608Metric
36	1	R102	10	Resistor_SMD:R_0603_1608Metric_Pad0.98x0.95mm_HandSolder
37	1	R105	30k	Resistor_SMD:R_0603_1608Metric
38	1	R106	150k	Resistor_SMD:R_0603_1608Metric
39	13	R109, R110, R111, R112, R113, R201, R202, R219, R220, R501, R502, R519, R520	3k3	Resistor_SMD:R_0603_1608Metric
40	1	R114	91k	Resistor_SMD:R_0603_1608Metric
41	2	R117, R119	13k	Resistor_SMD:R_0603_1608Metric
42	1	R118	68k	Resistor_SMD:R_0603_1608Metric
43	8	R205, R208, R223, R226, R505, R508, R523, R526	NM	Resistor_SMD:R_0603_1608Metric
44	8	R211, R213, R229, R231, R511, R513, R529, R531	2k	Resistor_SMD:R_0603_1608Metric
45	40	R301, R302, R303, R304, R306, R601, R602, R603, R604, R606, R701, R702, R703, R704, R706, R801, R802, R803, R804, R806, R901, R902, R903, R904, R906, R1001, R1002, R1003, R1004, R1006, R1101, R1102, R1103, R1104, R1106, R1306, R1307, R1309, R1310, R1311	10k	Resistor_SMD:R_0603_1608Metric
46	8	R305, R605, R705, R805, R905, R1005, R1105, R1414	33k	Resistor_SMD:R_0603_1608Metric
47	16	R307, R308, R607, R608, R707, R708, R807, R808, R907, R908, R1007, R1008, R1107, R1108, R1312, R1313	3k3	Resistor_SMD:R_0603_1608Metric
48	64	R309, R312, R313, R314, R315, R316, R317, R319, R609, R612, R613, R614, R615, R616, R617, R619, R709, R712, R713, R714, R715, R716, R717, R719, R809, R812, R813, R814, R815, R816, R817, R819, R909, R912, R913, R914, R915, R916, R917, R919, R1009, R1012, R1013, R1014, R1015, R1016, R1017, R1019, R1109, R1112, R1113, R1114, R1115, R1116, R1117, R1119, R1308, R1401, R1402, R1403, R1404, R1406, R1407, R1408	100k	Resistor_SMD:R_0603_1608Metric
49	8	R310, R610, R710, R810, R910, R1010, R1110, R1416	1k	Resistor_SMD:R_0603_1608Metric
50	8	R311, R611, R711, R811, R911, R1011, R1111, R1305	5m 1/2W	Resistor_SMD:R_1206_3216Metric
51	8	R318, R618, R718, R818, R918, R1018, R1118, R1405	1k	Resistor_SMD:R_0603_1608Metric
52	5	R401, R410, R411, R414, R415	3k3	Resistor_SMD:R_0402_1005Metric

53	3	R402, R412, R413	NM	Resistor_SMD:R_0402_1005Metric
54	2	R403, R404	1k	Resistor_SMD:R_0402_1005Metric
55	1	R405	2k 1%	Resistor_SMD:R_0402_1005Metric
56	4	R406, R407, R408, R409	50R 1%	Resistor_SMD:R_0402_1005Metric
57	1	R416	10k	Resistor_SMD:R_0402_1005Metric
58	1	SW101	2-1977223-4	libs:219772234
59	8	SW301, SW601, SW701, SW801, SW901, SW1001, SW1101, SW1301	1MS3T1B1M2QES	libs:Switch-1MS3T1B1M2QES
60	1	U101	PCAL6416APW	Package_SO:TSSOP-24_4.4x7.8mm_P0.65mm
61	1	U102	MAX11617	Package_SO:QSOP-16_3.9x4.9mm_P0.635mm
62	1	U103	AP63200WU	Package_TO_SOT_SMD:TSOT-23-6
63	9	U104, U301, U601, U701, U801, U901, U1001, U1101, U1303	MCP601-xOT	Package_TO_SOT_SMD:SOT-23-5
64	2	U201, U501	LM339DR	Package_SO:SOIC-14_3.9x8.7mm_P1.27mm
65	8	U202, U203, U204, U205, U502, U503, U504, U505	TLVH431	Package_TO_SOT_SMD:SOT-23
66	8	U302, U602, U702, U802, U902, U1002, U1102, U1301	INA186A1	Package_TO_SOT_SMD:SOT-363_SC-70-6
67	1	U401	ENC28J60x-SS	Package_SO:SSOP-28_5.3x10.2mm_P0.65mm
68	1	U402	ESP32-PICO-D4	Package_DFN_QFN:QFN-48-1EP_7x7mm_P0.5mm_EP5.3x5.3mm
69	1	U403	AMS1117-3.3	Package_TO_SOT_SMD:SOT-223-3_TabPin2
70	1	U404	ESP-12E	RF_Module:ESP-12E
71	1	Y401	ABM8-25.000MHZ-B2-T	Crystal:Crystal_SMD_3225-4Pin_3.2x2.5mm

5. DRAWINGS

