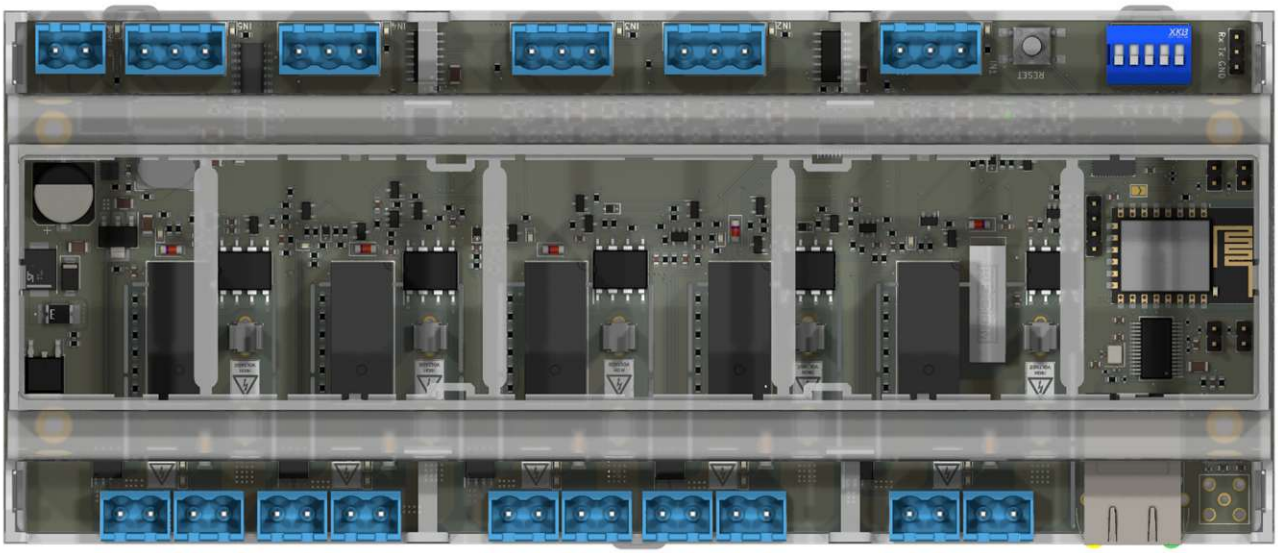
OPERATIONS AND MAINTENANCE MANUALS

MODULE YC-OB-D7

1. General Information

The module reads input states (short-circuit through an external relay) and controls AC loads via built-in relays. It features an internal safety fuse and switches the input phase to the connected outputs.



SUPPORTED DEVICES	YC-OB-D1	YC-OB-D2	YC-OB-D3	YC-OB-D4	YC-OB-D5	YC-OB-D6	YC-OB-D7	YC-OB-D8
DC lighting.	Yes	Yes*	Yes*	Yes*	No	No	No	Yes*
DC motors.	No	Yes	No	No	No	No	No	No
Servomechanisms.	No	Yes	No	No	No	No	No	No
High-current devices (pumps, cranes, heaters).	No	Yes***	Yes**	Yes	No	No	Yes	Yes***
Buttons, switches, contact switches.	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes
Measuring devices with resistance output (thermistors, liquid level sensors).	No	No	No	No	Yes	No	No	No
Measuring devices with voltage output (thermocouples, battery testing).	No	No	No	No	Yes	No	No	No
Other devices with documented interface via TTL inputs (BMS, navigation, others).	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
AC lighting.	No	No	No	No	No	No	Yes	No

Single-phase, three-phase AC motors.	**No**	No	No	No	No	No	Yes	No
AC devices.	**No**	No	No	No	No	No	Yes	No

* - without dim

** - up to 5 A

*** - up to 10 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.
- Each module (mother board) contains a UNOR3 connector and a number of inputs and outputs whose type, and number, depend on the type.
- During a malfunction, the use of a universal connector makes it possible to use microprocessors readily available worldwide, or to quickly replace the damaged processor with a spare.
- Each 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)	65.2 mm x 89.8 mm x 213.8 mm
Ambient temperature	-10°C to 50°C
Ambient humidity	75%
Weight	250g
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	5 x Button / Logic
Outputs	5 x 16 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

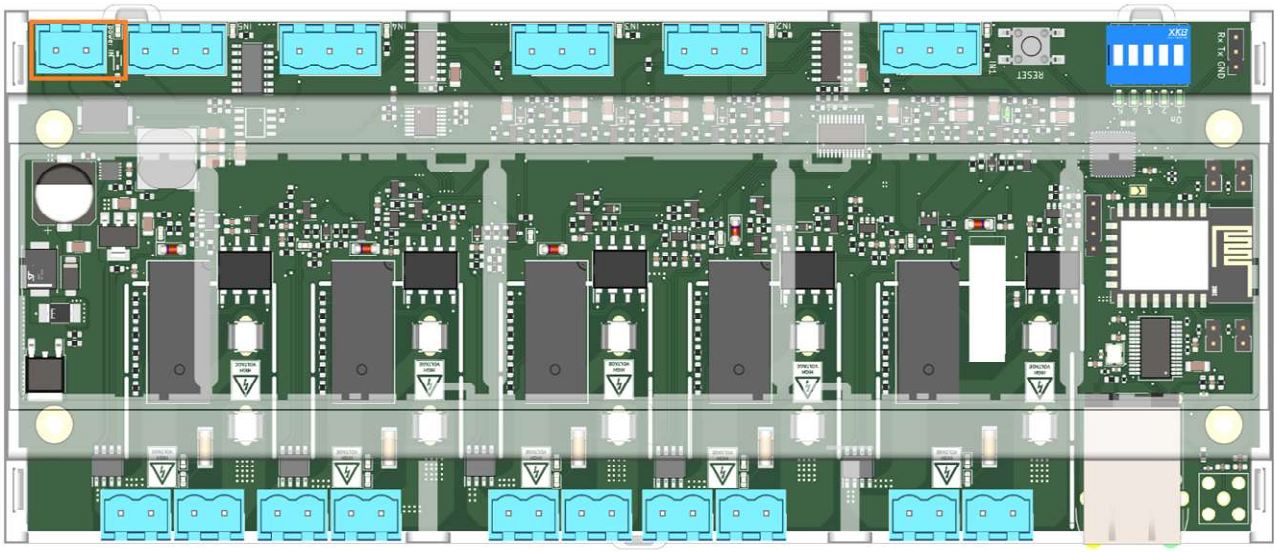
INPUTS & OUTPUTS

POWER SUPPLY

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

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

LIGHT	DESCRIPTION
WHITE	Power supply indication.

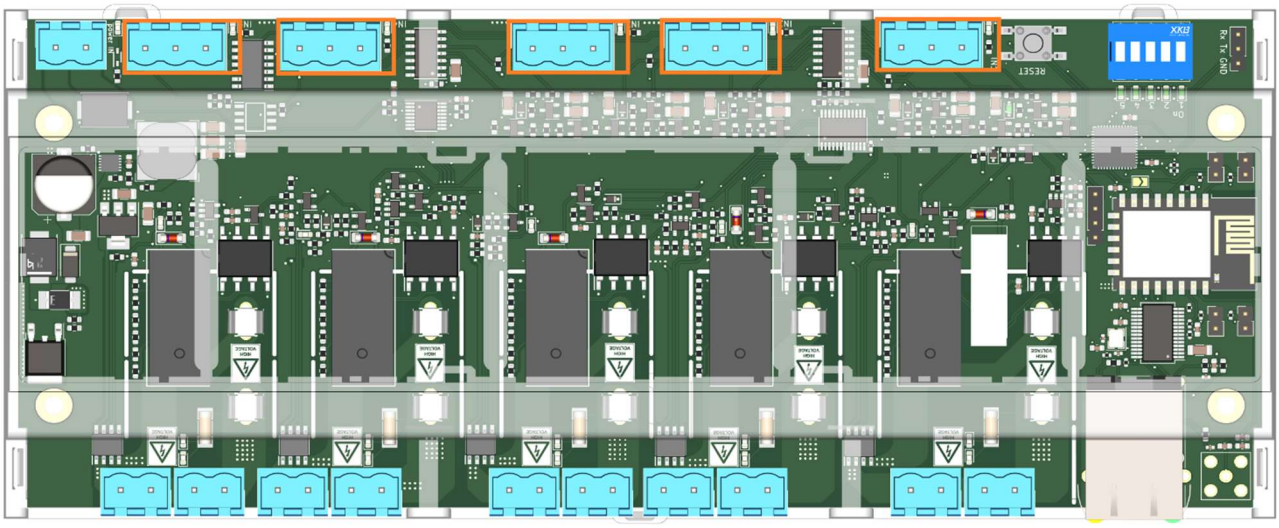


- Module must be powered by 9 VDC to 33 VDC stabilized power supply (SELV) with short circuit protection. Connecting higher voltage or voltage not matching the load's voltage may cause damage to the device.

INPUTS

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

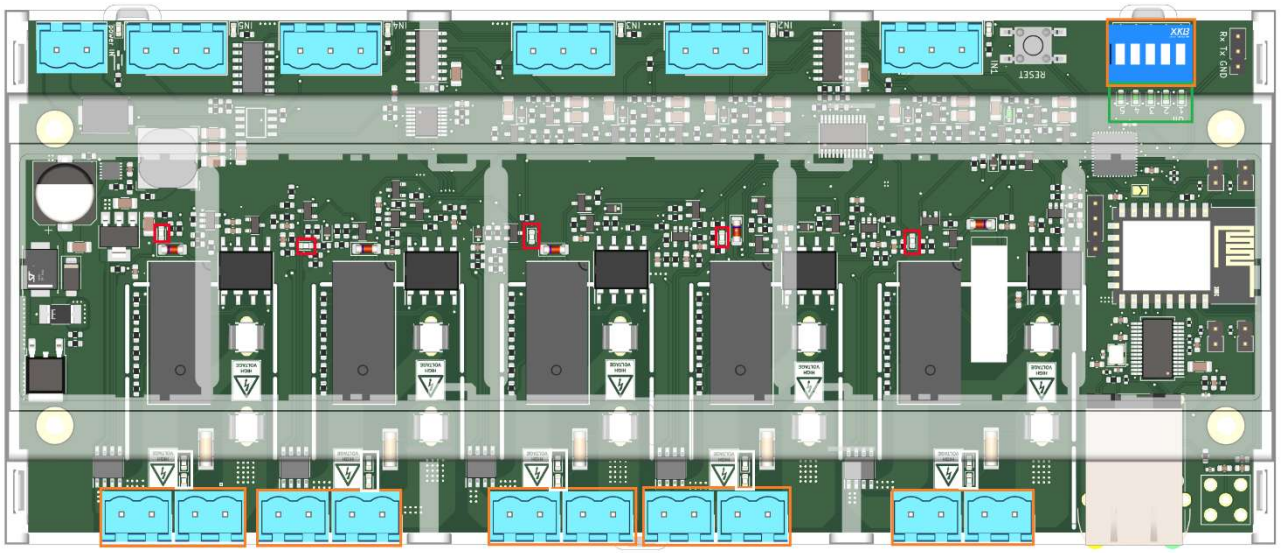
LIGHT	DESCRIPTION
BLUE	Logic "1" indication.



OUTPUTS

CONNECTORS	PARAMETERS	DESCRIPTION
RELAY 1 - 5	16 A AC maximum current.	AC load output via RELAY.
DIP Switch	Auto/On	Auto: Normal Mode. The relay is controlled by the system logic. On: Manual Override. The relay output is forced ON

LIGHT COLOR	DESCRIPTION
GREEN	Channel is active.
RED	Channel has been overloaded or shorted.
WHITE	Voltage indicator for the L1in to L5in terminals.

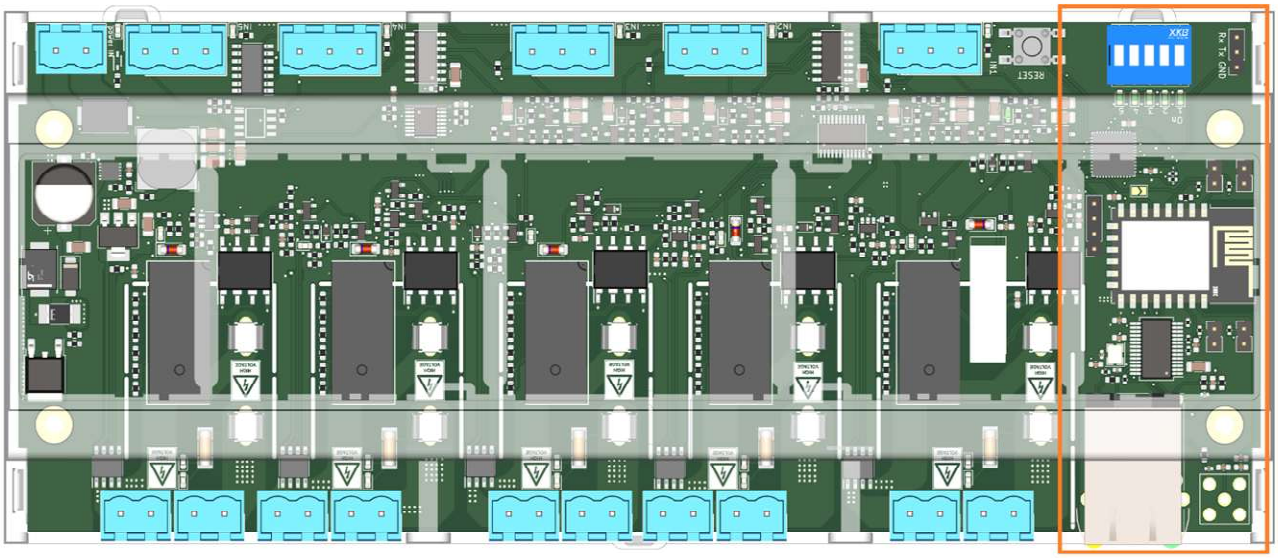


COMMUNICATION

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 ENC28j60 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 Wii-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
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
Duplex modes	Full & half
SPI interface	Clock speed up to 20 MHz
Buffer	8 kB Transmit/Receive packet dual port SRAM

FEATURES

MODULES	YC-OB-D1	YC-OB-D2	YC-OB-D3	YC-OB-D4	YC-OB-D5	YC-OB-D6	YC-OB-D7	YC-OB-D8
Button / Logic inputs	8	4	8	8	0	12	**5**	8
Button / Logic override switches	No	No	Yes	Yes	No	No	**Yes**	Yes
Output status LED indicator	Yes	Yes	Yes	Yes	No	No	**Yes**	Yes
Voltage/current measurement inputs	0	0	0	0	7	0	**0**	0
Voltage/current measurement outputs	8	4	8	8	0	0	**5**	8
Resistance measurement inputs	0	0	0	0	6	0	**0**	0
Temperature sensor inputs	0	0	0	0	6	0	**0**	0
LED outputs	8	0	0	0	0	0	**0**	0
Motor outputs	0	2	0	0	0	0	**0**	0
10A AC 5A DC relay outputs	0	0	8	0	0	0	**0**	0
40A DC switch outputs	0	0	0	8	0	0	**0**	0
10A DC switch outputs	0	0	0	0	0	0	**0**	8
16A 230V AC RELAY outputs	0	0	0	0	0	0	**5**	0
Hardware Bypass Mode	No	No	No	No	No	No	No	Yes

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.

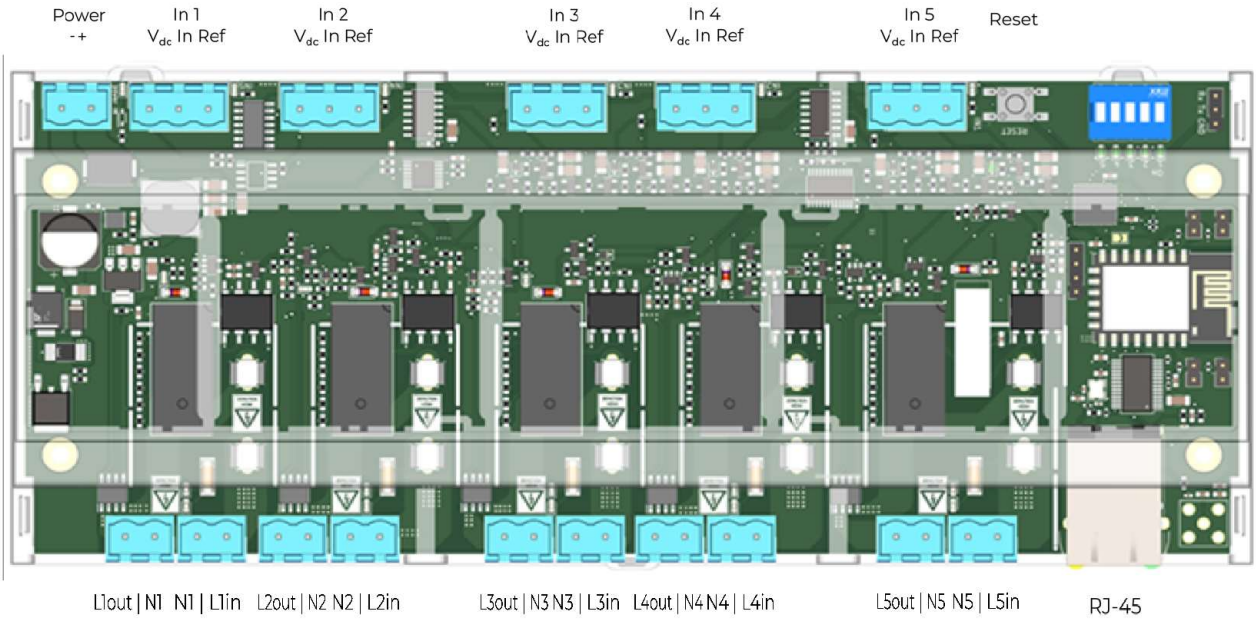
3. Interface with Contact-Based Devices:

- 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 1-5	
Input type	3.3 V logic input with pull-up
Pull-up resistance	20 – 60 kOhm
DIP SWITCH 1-5	
DIP SWITCH type	DS-05
Switch type	ON/OFF
16A AC RELAY 1-5	
RELAY type	G5PZ-1A4-E_DC5
Rated switching voltage AC	230 V
Rated load AC	16A
Max. switching voltage	250 VAC

4. PARTS LIST

Item	Qty	Reference(s)	Value	Footprint
1	1	C1	EEEFT1H331GP	Capacitor_SMD:CP_Elec_10x10.5
2	3	C2, C207, C507	100n 63V	Capacitor_SMD:C_1206_3216Metric
3	21	C3, C12, C13, C14, C15, C16, C17, C18, C19, C20, C21, C27, C28, C101, C403, C404, C405, C406, C409, C411, C416	100n	Capacitor_SMD:C_1206_3216Metric
4	3	C4, C5, C6	22u 10V	Capacitor_SMD:C_1206_3216Metric
5	5	C7, C8, C9, C10, C11, C104	1n 500v	Capacitor_SMD:C_1210_3225Metric
6	5	C22, C23, C24, C25, C26	4n7	Capacitor_SMD:C_0603_1608Metric
7	1	C29	100n 100V	Capacitor_SMD:C_1206_3216Metric
8	2	C30, C31	10n	Capacitor_SMD:C_0603_1608Metric_Pad1.08x0.95mm
9	5	C32, C33, C34, C35, C36	47n	Capacitor_THT:C_Rect_L11.5mm_W5.2mm_P10.00mm_MKT
10	15	C201, C202, C203, C204, C205, C206, C208, C209, C210, C211, C212, C213, C501, C503, C504	1n 50V	Capacitor_SMD:C_1206_3216Metric
11	2	C207, C507	100n 50V	Capacitor_SMD:C_1206_3216Metric
12	2	C401, C402	18p	Capacitor_SMD:C_0402_1005Metric
13	3	C407, C408, C410	10u	Capacitor_SMD:C_1206_3216Metric
14	2	C414, C415	10n	Capacitor_SMD:C_0402_1005Metric
15	1	D1	SM15T68A	DIOM8059X265N
16	1	D2	SK16	Diode_SMD:D_SMA
17	5	D3, D4, D5, D6, D7	LED_R	LED_SMD:LED_0603_1608Metric
18	5	D8, D9, D10, D11, D12	LED_B	LED_SMD:LED_0603_1608Metric
19	1	D13	IR26-21C_L110_TR8	LED_SMD:LED_1206_3216Metric
20	5	D14, D15, D16, D17, D18	LL4148	Diode_SMD:D_MiniMELF
21	10	D19, D20, D21, D22, D23, D24, D25, D26, D27, D28	LED_O	LED_SMD:LED_0603_1608Metric
22	1	D101	8.0SMDJ40CA	DIONM7959X262N
23	10	D201, D202, D205, D206, D302, D501, D602, D802, D902, D1002	BAT54J	Diode_SMD:D_SOD-323F
24	5	D203, D204, D207, D208, D503	BAT54C	Package_TO_SOT_SMD:SOT-23
25	5	D301, D601, D801, D901, D1001	BAT54A	Package_TO_SOT_SMD:SOT-23

26	5	D304, D604, D804, D904, D1004	LED_G	LED_SMD:LED_0603_1608Metric
27	1	F1	1812L110_33MR	1812L010DR
28	1	FB1	Ferrite_Bead	Capacitor_SMD:C_0603_1608Metric
29	5	IC1, IC2, IC3, IC4, IC5	ACS71240LLCBTR-025B3	SOIC127P600X175-8N
30	5	IC6, IC7, IC8, IC9, IC10	AMC1200SDUBR	SOP254P1040X485-8N
31	1	IC11	LR12LG-G	SOIC127P600X175-8N
32	1	IC12	74HC14D,653	SOIC127P600X175-14N
33	10	J1, J2, J3, J4, J5, J6, J7, J8, J9, J10	6,91314E+11	SHDRRA2W100P0X508_1X2_1216X1200X850P
34	1	J12	Conn_01x03	Connector_PinSocket_2.54mm:PinSocket_1x03_P2.54mm_Vertical
35	1	J13, J14, J15, J16, J17	TBP01R1-508-02BE	CUI_TBP01R1-508-02BE
36	5	J201, J202, J203, J204, J501	TBP01R1-508-03BE	CUI_TBP01R1-508-03BE
37	1	J402	Conn_Coaxial	Connector_Coaxial:SMA_Amphenol_132203-12_Horizontal
38	5	K1, K2, K3, K4, K5	G5PZ-1A4-E_DC5	G5PZ1A4EDC5
39	1	L1	SRN1060-100M	Inductor_SMD:L_Bourns-SRN1060
40	1	PS1	RFB-0505S	RFB0505S
41	1	Q101	IRFR7546TRPBF	Package_TO_SOT_SMD:TO-252-2
42	5	Q201, Q202, Q203, Q204, Q501	BC857	Package_TO_SOT_SMD:SOT-23
43	5	Q301, Q601, Q801, Q901, Q1001	BSS84	Package_TO_SOT_SMD:SOT-23
44	5	Q302, Q602, Q802, Q902, Q1002	BC817-40	Package_TO_SOT_SMD:SOT-23
45	1	R1	64k9	Resistor_SMD:R_0603_1608Metric
46	1	R2	24k9	Resistor_SMD:R_0603_1608Metric
47	11	R3, R64, R67, R68, R71, R72, R75, R76, R79, R80, R83	100k	Resistor_SMD:R_0603_1608Metric
48	5	R4, R5, R6, R7, R8, R10, R11, R12, R13, R14, R16, R17, R18, R19, R20, R22, R23, R24, R25, R26, R28, R29, R30, R31, R32, R65, R69, R73, R77, R81, R102, R305, R605, R805, R905, R1005	33k	Resistor_SMD:R_0603_1608Metric
49	5	R9, R15, R21, R27, R33	169R	Resistor_SMD:R_0603_1608Metric
50	5	R34, R35, R36, R37, R38	100R	Resistor_SMD:R_0603_1608Metric
51	5	R39, R53, R54, R55, R56, R57, R84, R85,	10k	Resistor_SMD:R_2512_6332Metric

		R86, R87, R88, R89, R90, R91, R92, R93, R94, R95, R96, R97, R98, R100, 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, R301, R302, R306, R416, R503, R504, R509, R512, R515, R517, R601, R602,R606, R801, R802, R806, R901, R902, R906, R1001, R1002, R1006		
52	5	R40, R41, R42, R43, R44,	2M	Resistor_SMD:R_MELF_MMB-0207
53	5	R59, R60, R61, R62, R63	15k	Resistor_SMD:R_0603_1608Metric
54	12	R66, R70, R74,R78,R82,R310,R403,R404, R610,R810,R910,R1010	1k	Resistor_SMD:R_0603_1608Metric
55	1	R99	150k	Resistor_SMD:R_0603_1608Metric
56	1	R101	6k	Resistor_SMD:R_0603_1608Metric
57	5	R103, R104, R105, R106, R107	470	Resistor_SMD:R_0603_1608Metric
58	26	R108, R109, R110, R111, R112, R113, R201, R202, R219, R220, R307, R308, R401, R410, R411, R414, R415, R501, R607, R608, R807, R808, R907, R908, R1007, R1008	3k3	Resistor_SMD:R_0603_1608Metric
59	4	R114, R117, R118, R119	50R 1%	Resistor_SMD:R_0603_1608Metric
60	1	R405	2k 1%	Resistor_SMD:R_0402_1005Metric
61	8	R205, R208, R223, R226, R402, R412, R413, R505	50R 1%	Resistor_SMD:R_0402_1005Metric
62	5	R211, R213, R229, R231, R511	2k	Resistor_SMD:R_0603_1608Metric
63	1	SW1	2-1977223-4	219772234
64	5	SW2	DS-05	DS-05NINIGI
65	1	U1	LMR38025S5QDRRRQ1	SON50P300X300X80-13N-D
66	5	U2, U3, U4, U5, U6	MCP601-xOT	Package_TO_SOT_SMD:SOT-23-5
67	10	U7, U8, U9, U10, U11, U12, U13, U14, U15, U16	01000020Z	01000020Z
68	1	U101	PCAL6416APW	Package_SO:TSSOP-24_4.4x7.8mm_P0.65mm

69	1	U102	MAX11617	Package_SO:QSOP-16_3.9x4.9mm_P0.635mm
70	2	U201, U501	LM339DR	Package_SO:SOIC-14_3.9x8.7mm_P1.27mm
71	5	U202, U203, U204, U205, U502	TLVH431	Package_TO_SOT_SMD:SOT-23
72	1	U401	ENC28J60x-SS	Package_SO:SSOP-28_5.3x10.2mm_P0.65mm
73	1	U402	ESP32-PICO-D4	Package_DFN_QFN:QFN-48-1EP_7x7mm_P0.5mm_EP5.3x5.3mm
74	1	U403	AMS1117-3.3	Package_TO_SOT_SMD:SOT-223-3_TabPin2
75	1	U404	ESP-12E	RF_Module:ESP-12E
76	1	Y401	ABM8-25.000MHZ-B2-T	Crystal_SMD_3225-4Pin_3.2x2.5mm
77	1	Z1	BZT52B5V1S_RRG	SODFL2612X110N