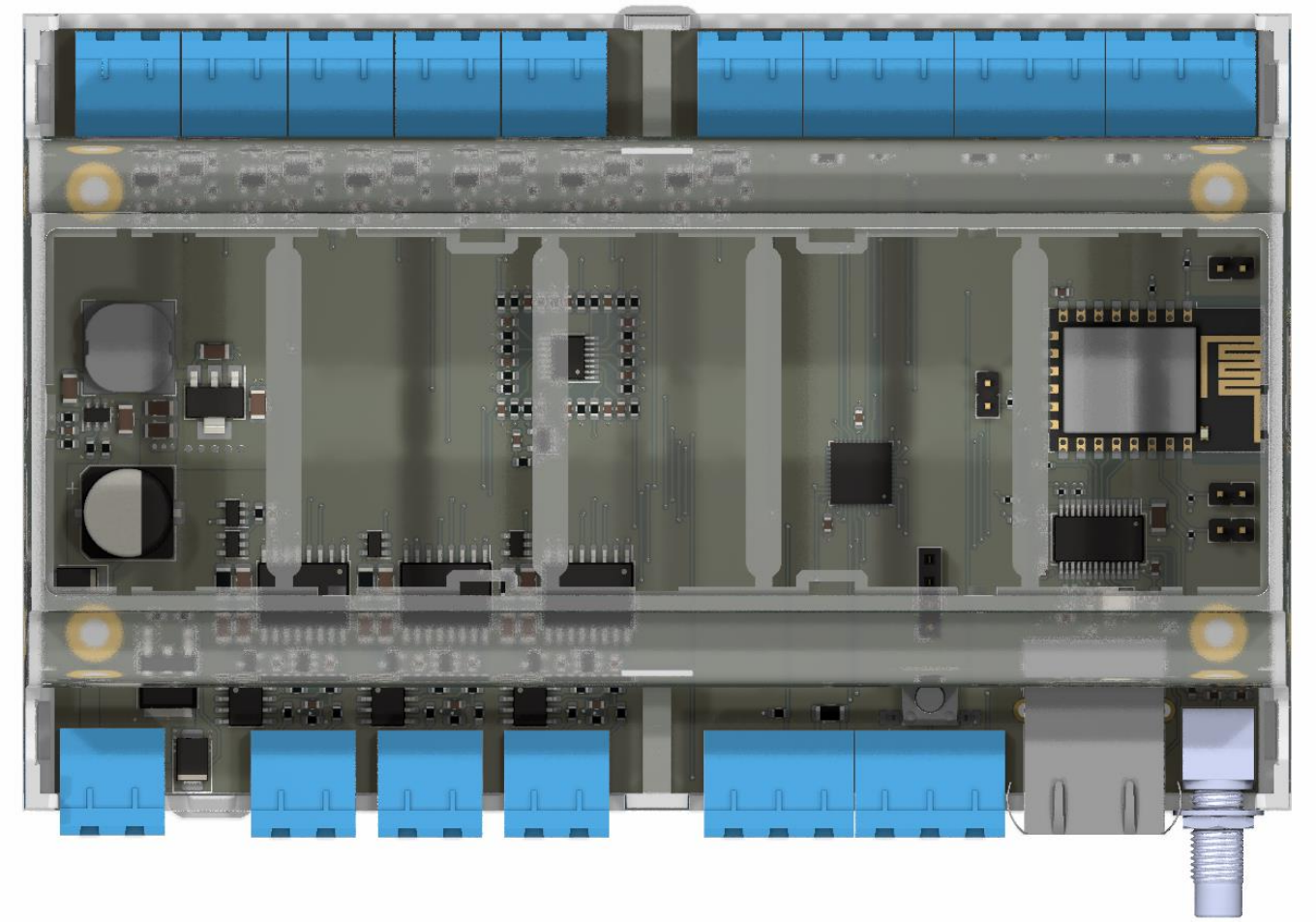
OPERATIONS AND MAINTENANCE MANUALS

MODULE YC-OB-D5

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2. Technical Data	Page 7
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1. General Information

The module is equipped with 6 inputs for precision resistance measurement, includes 3 general-purpose precision voltmeters, and 4 inputs for current measurement (4-20mA).



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
Measuring devices with current output (4-20mA) (liquid level sensors).	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.
- 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

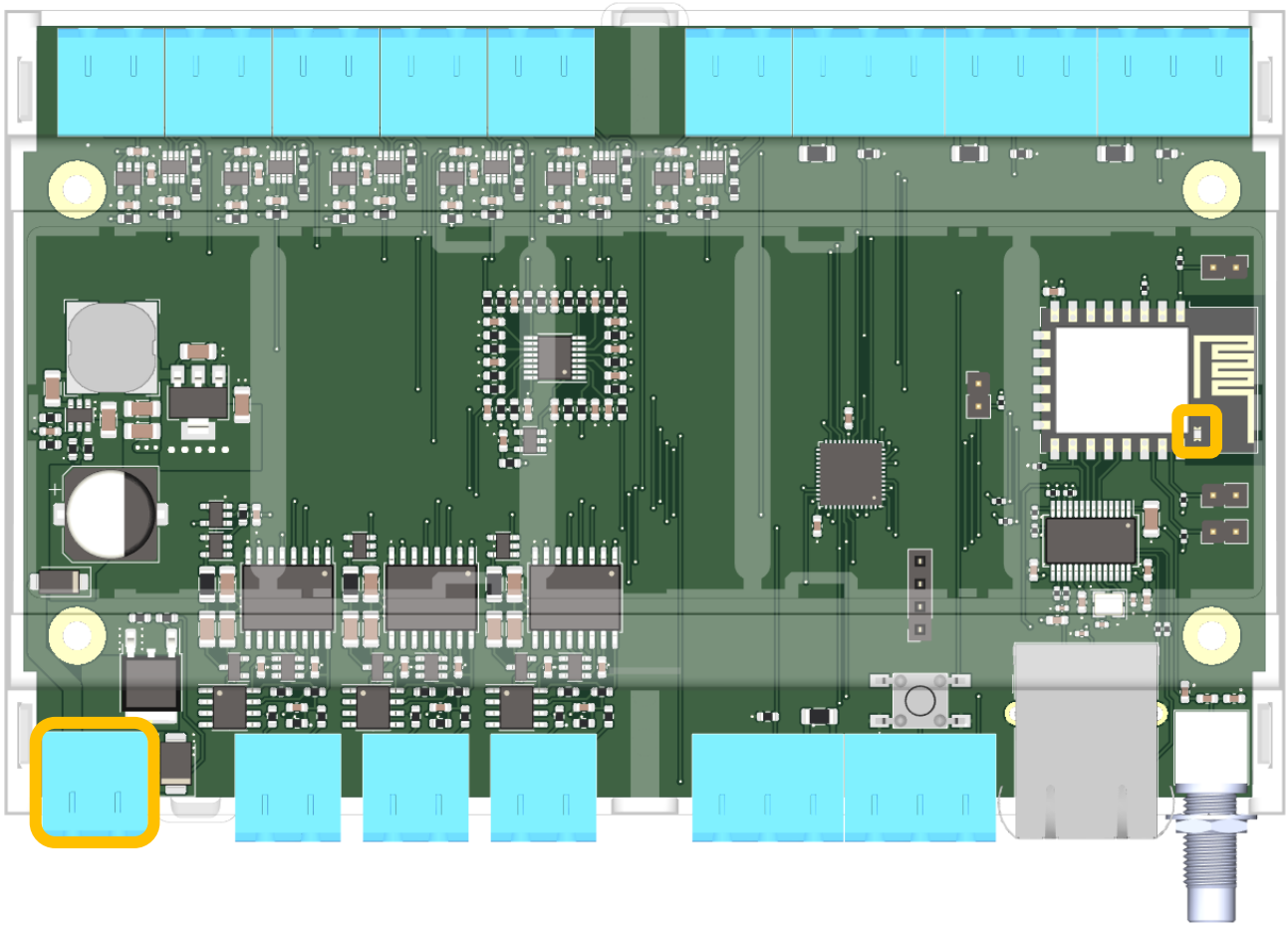
GENERAL DATA	
Module dimensions (h x d x l)	65.2 mm x 89.8 mm x 142.8 mm
Ambient temperature	-10°C to 50°C
Ambient humidity	75%
POWER SUPPLY	
Supply voltage – min.	9 V
Supply voltage – max.	33 V
Current consumption – idle, typ.	0.05 A
COMMUNICATION	
Interfaces	Ethernet, UART TTL, Wi-Fi
Inputs	3 x Voltage measurements 4 x Current measurements 6 x Resistance measurements
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

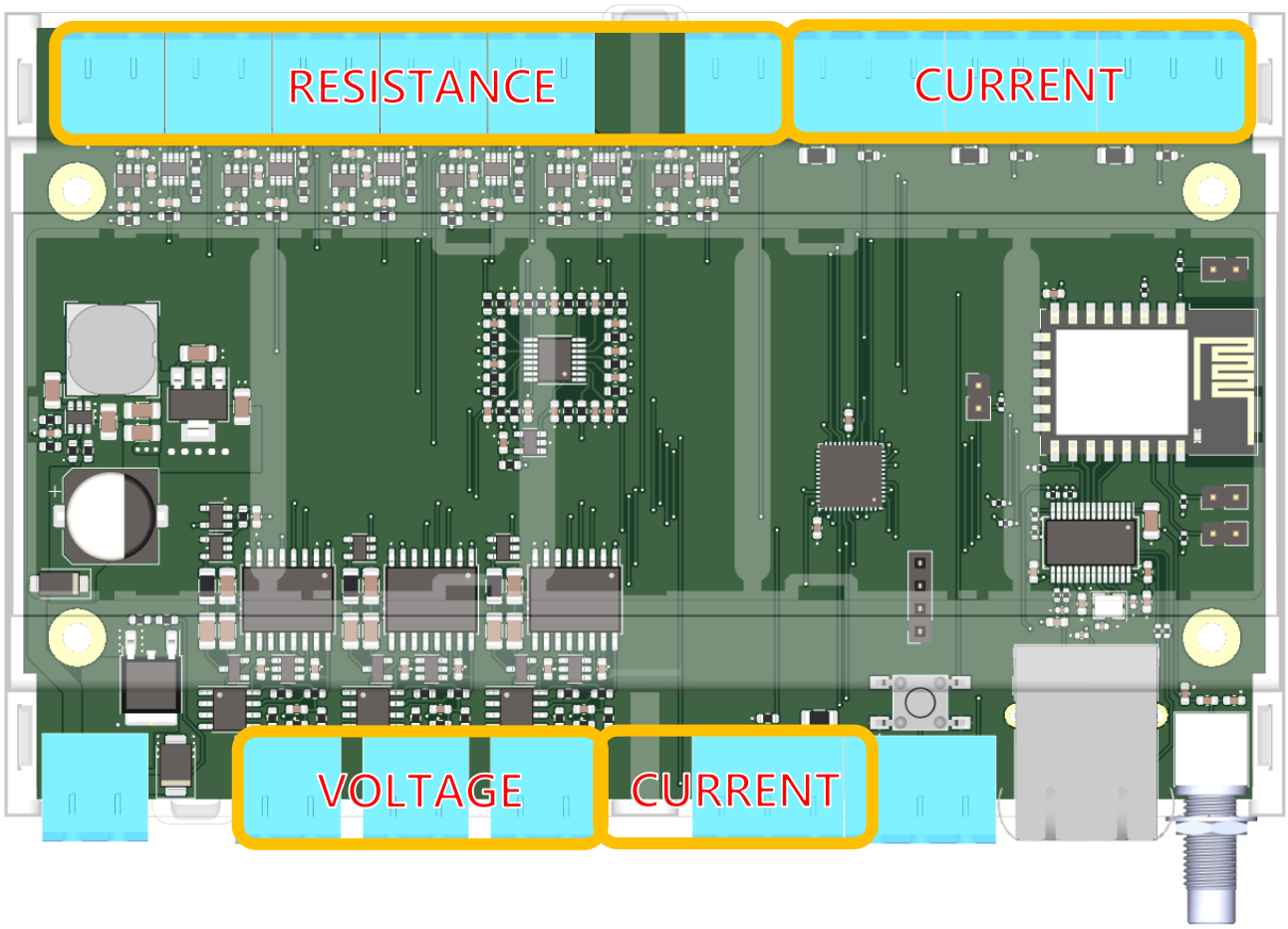
LIGHT	DESCRIPTION
BLINKS	Module works normally.
FIXED OR NONE	Indicates problem of the module or power supply.



- 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	PARAMETERS	DESCRIPTION
Resistance 1	Ohm meter input in the range of 0 - 300 Ohms	Inputs to any measuring unit operating in the variable resistance domain (0 - 300 Ohms).
Resistance 2	Ohm meter input in the range of 0 - 300 Ohms	Inputs to any measuring unit operating in the variable resistance domain (0 - 300 Ohms).
Resistance 3	Ohm meter input in the range of 0 - 300 Ohms	Inputs to any measuring unit operating in the variable resistance domain (0 - 300 Ohms).
Resistance 4	Ohm meter input in the range of 0 - 300 Ohms	Inputs to any measuring unit operating in the variable resistance domain (0 - 300 Ohms).
Resistance 5	Ohm meter input in the range of 0 - 300 Ohms	Inputs to any measuring unit operating in the variable resistance domain (0 - 300 Ohms).
Resistance 6	Ohm meter input in the range of 0 - 300 Ohms	Inputs to any measuring unit operating in the variable resistance domain (0 - 300 Ohms).
Voltage 1	Voltmeter input in range 0 – 50 V	Input measuring voltage (0 – 50 V).
Voltage 2	Voltmeter input in range 0 – 50 V	Input measuring voltage (0 – 50 V).
Voltage 3	Voltmeter input in range 0 – 50 V	Input measuring voltage (0 – 50 V).
Current 1	Amperemeter input in range 0 – 30 mA	Input measuring current (0 – 30 mA).
Current 2	Amperemeter input in range 0 – 30 mA	Input measuring current (0 – 30 mA).
Current 3	Amperemeter input in range 0 – 30 mA	Input measuring current (0 – 30 mA).
Current 4	Amperemeter input in range 0 – 30 mA	Input measuring current (0 – 30 mA).

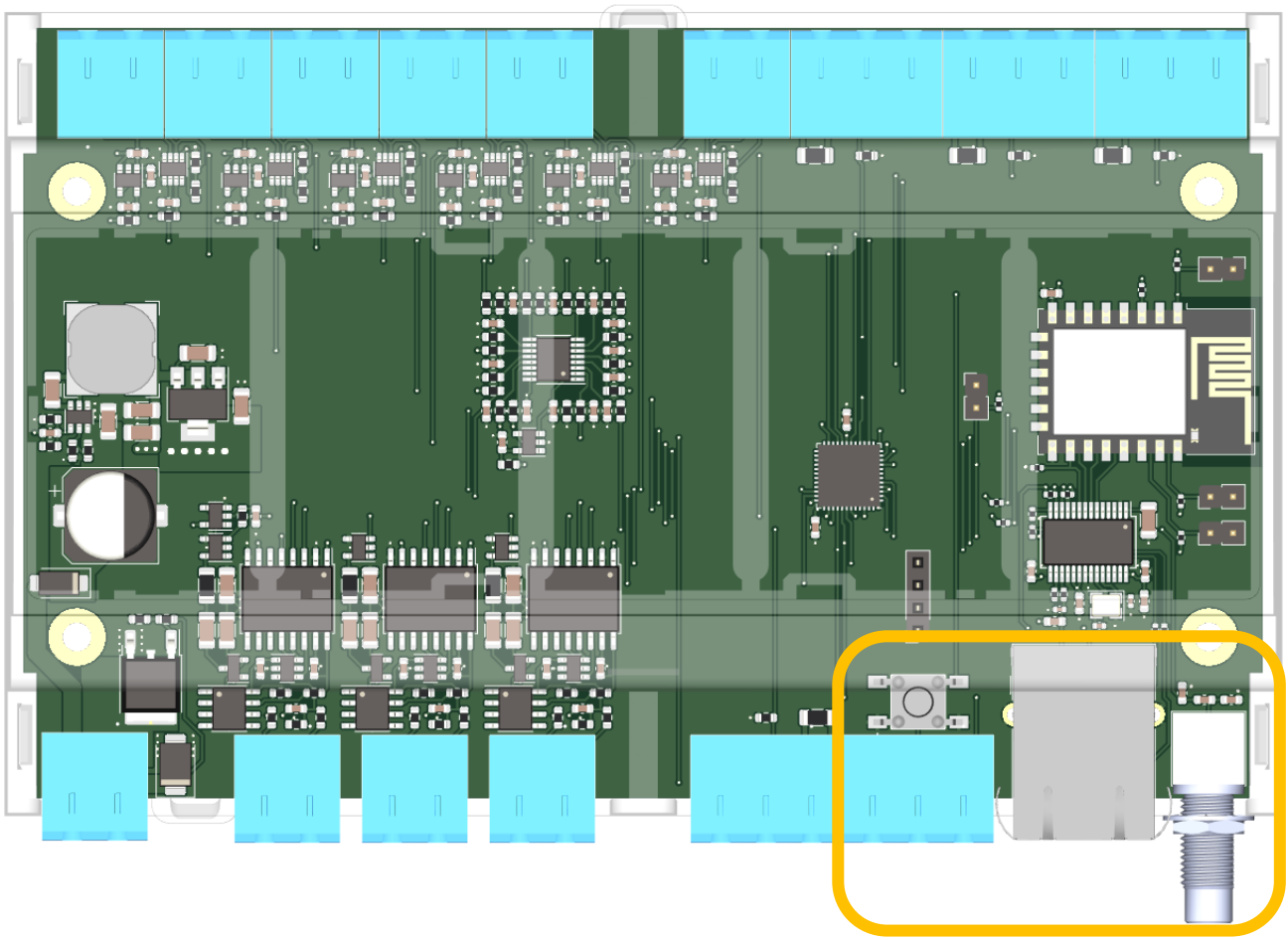

RESISTANCE
CURRENT
VOLTAGE
CURRENT

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 SPI bus. SPI was also used to communicate with the ENC2j50 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 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) 5V 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 / Potentiometer inputs	0	4	0	0	0	0
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.

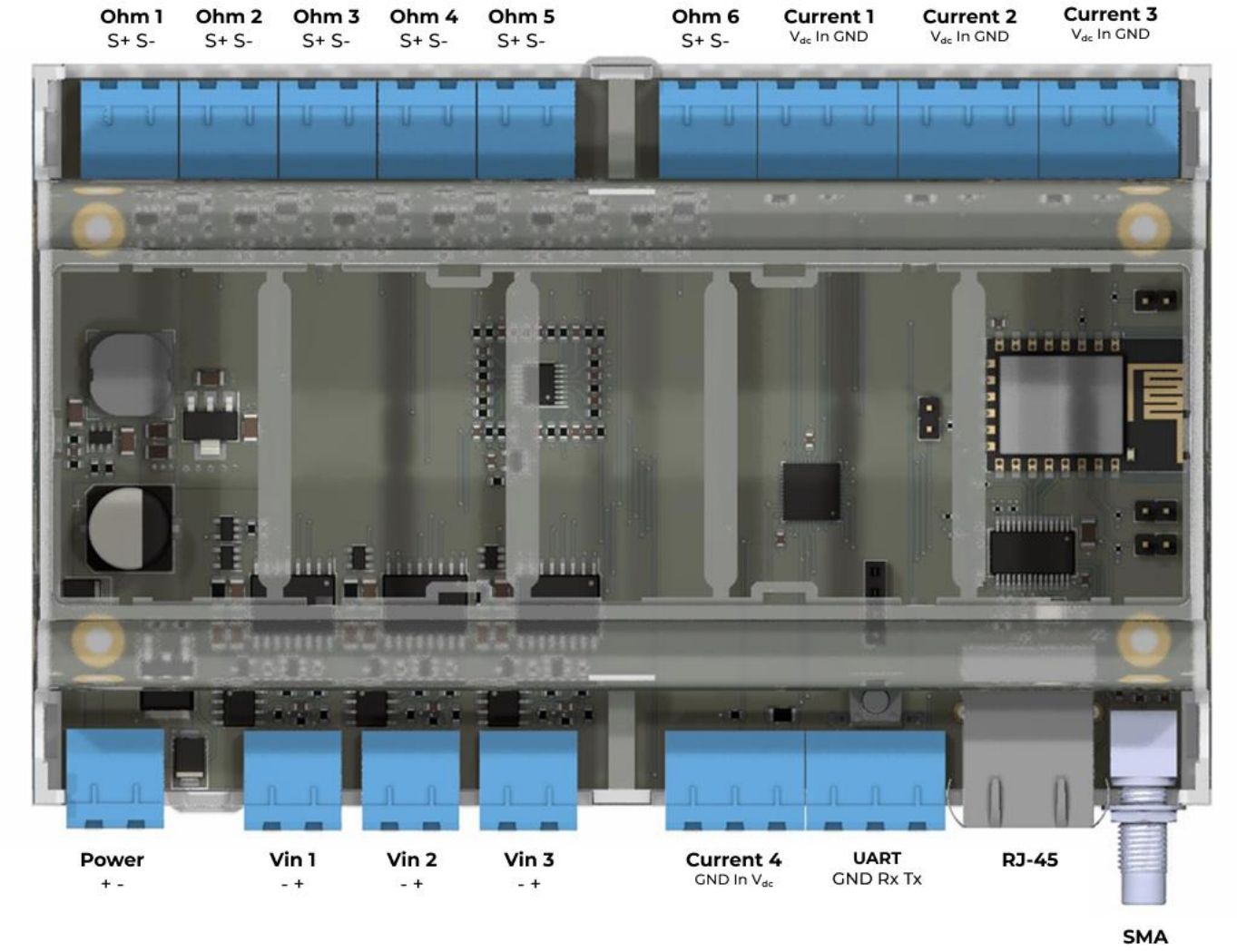
3. Interface with Contact-Based Devices:

- 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



POWER TERMINAL BLOCK	
Connection method	Screw
Wire gauge min.	28 AWG
Wire gauge max.	12 AWG
Contact material	Copper Alloy
Contact plating	Nickel

VOLTAGE INPUT 1-3	
Input type	High impedance, isolated
Isolation voltage	75 V[1]
Input impedance	105 kOhm – 120 kOhm
Input voltage range	0 V – 50 V
Resolution	0.05 V
Maximum error	0.25 V
CURRENT INPUT 1-4	
Input type	High impedance, isolated
Isolation voltage	75 V[2]
Input impedance	105 kOhm – 120 kOhm
Input current range	0 mA – 30 mA
Resolution	0.03 mA
Maximum error	0.15 mA
RESISTANCE INPUT 1-6	
Input type	2-wire resistance measurement
Measurement current - typical	1 mA
Input resistance range	0 Ohm – 300 Ohm
Maximum error	3%

[1] The difference between negative terminals of power input and voltage measurements input.

[2] The difference between negative terminals of power input and voltage measurements input.

4. PARTS LIST

Item	Qty	Reference(s)	Value	Footprint
1	1	C101	100p	Capacitor_SMD:C_0603_1608Metric
2	24	C102, C104, C201, C203, C205, C301, C303, C305, C401, C403, C405, C501, C503, C505, C601, C603, C605, C701, C703, C705, C801, C901, C1001, C1101	1n	Capacitor_SMD:C_0603_1608Metric
3	24	C103, C105, C202, C204, C302, C304, C402, C404, C502, C504, C602, C604, C702, C704, C1204, C1304, C1404, C1503, C1504, C1505, C1506, C1509, C1511, C1516	100n	Capacitor_SMD:C_0603_1608Metric
4	1	C106	EEEFT1H331GP	Capacitor_SMD:CP_Elec_10x10.5
5	1	C107	10u 50V	Capacitor_SMD:C_1206_3216Metric
6	1	C108	100n 50V	Capacitor_SMD:C_1206_3216Metric
7	1	C109	100p 6V3	Capacitor_SMD:C_0603_1608Metric
8	2	C110, C111	22u 6V3	Capacitor_SMD:C_1206_3216Metric
9	6	C1201, C1202, C1301, C1302, C1401, C1402	1u 100V	Capacitor_SMD:C_1206_3216Metric
10	3	C1203, C1303, C1403	10u 6V3	Capacitor_SMD:C_1206_3216Metric
11	6	C1205, C1206, C1305, C1306, C1405, C1406	10n	Capacitor_SMD:C_0603_1608Metric
12	2	C1501, C1502	18p	Capacitor_SMD:C_0402_1005Metric
13	3	C1507, C1508, C1510	10u	Capacitor_SMD:C_1206_3216Metric
14	2	C1514, C1515	10n	Capacitor_SMD:C_0402_1005Metric
15	1	D101	SK16	Diode_SMD:D_SMA
16	1	D102	SM6T30A	Diode_SMD:D_SMB
17	3	D1201, D1301, D1401	BAT54S	Package_TO_SOT_SMD:SOT-23
18	4	F801, F901, F1001, F1101	C1F-5	Fuse:Fuse_1206_3216Metric
19	1	FB1502	Ferrite_Bead	Capacitor_SMD:C_0603_1608Metric
20	4	H101, H102, H103, H104	MountingHole	MountingHole:MountingHole_3.2mm_M3_Pad_TopBottom
21	10	J102, J201, J301, J401, J501, J601, J701, J1201, J1301, J1401	TBP01R1-508-02BE	libs:CUI_TBP01R1-508-02BE
22	5	J103, J801, J901, J1001, J1101	TBP01R1-508-03BE	libs:CUI_TBP01R1-508-03BE
23	1	J1502	Conn_Coaxial	Connector_Coaxial:SMA_Amphenol_132203-12_Horizontal
24	1	J1503	RJ45_Amphenol_RJMG1BD3B8K1ANR	Connector_RJ:RJ45_Amphenol_RJMG1BD3B8K1ANR
25	1	L101	SRN1060-100M	Inductor_SMD:L_Bourns-SRN1060
26	1	Q101	IRFR7546TRPBF	Package_TO_SOT_SMD:TO-252-2
27	1	R101	110k	Resistor_SMD:R_0603_1608Metric
28	1	R102	150k	Resistor_SMD:R_0603_1608Metric
29	7	R103, R108, R109, R802, R902, R1002, R1102	10k	Resistor_SMD:R_0603_1608Metric
30	13	R104, R203, R204, R303, R304, R403, R404, R503, R504, R603, R604, R703, R704	10	Resistor_SMD:R_0603_1608Metric
31	2	R105, R106	3k3	Resistor_SMD:R_0603_1608Metric
32	1	R107	91k	Resistor_SMD:R_0603_1608Metric
33	2	R110, R112	13k	Resistor_SMD:R_0603_1608Metric
34	4	R111, R1206, R1306, R1406	68k	Resistor_SMD:R_0603_1608Metric

35	18	R201, R205, R206, R301, R305, R306, R401, R405, R406, R501, R505, R506, R601, R605, R606, R701, R705, R706	1k8 0.1%	Resistor_SMD:R_0603_1608Metric
36	6	R202, R302, R402, R502, R602, R702	1k	Resistor_SMD:R_0603_1608Metric
37	4	R801, R901, R1001, R1101	100R	Resistor_SMD:R_0603_1608Metric
38	3	R1201, R1301, R1401	18R 1206	Resistor_SMD:R_1206_3216Metric
39	6	R1202, R1203, R1302, R1303, R1402, R1403	10R	Resistor_SMD:R_0603_1608Metric
40	3	R1204, R1304, R1404	12k	Resistor_SMD:R_0603_1608Metric
41	3	R1205, R1305, R1405	120k	Resistor_SMD:R_0603_1608Metric
42	5	R1501, R1510, R1511, R1514, R1515	3k3	Resistor_SMD:R_0402_1005Metric
43	3	R1502, R1512, R1513	NM	Resistor_SMD:R_0402_1005Metric
44	2	R1503, R1504	1k	Resistor_SMD:R_0402_1005Metric
45	1	R1505	2k 1%	Resistor_SMD:R_0402_1005Metric
46	4	R1506, R1507, R1508, R1509	50R 1%	Resistor_SMD:R_0402_1005Metric
47	1	R1516	10k	Resistor_SMD:R_0402_1005Metric
48	1	SW101	2-1977223-4	libs:219772234
49	1	U101	SN74LVC1G14DBV	Package_TO_SOT_SMD:SOT-23-5
50	1	U102	MAX11617	Package_SO:QSOP-16_3.9x4.9mm_P0.635mm
51	1	U103	MCP601-xOT	Package_TO_SOT_SMD:SOT-23-5
52	1	U104	AP63200WU	Package_TO_SOT_SMD:TSOT-23-6
53	6	U201, U301, U401, U501, U601, U701	TL081HIDBVR	Package_TO_SOT_SMD:SOT-23-5
54	6	U202, U302, U402, U502, U602, U702	INA350ABSIDDFR	Package_TO_SOT_SMD:SOT-23-8
55	3	U1201, U1301, U1401	MCP1416	Package_TO_SOT_SMD:SOT-23-5
56	3	U1202, U1302, U1402	PAI131M61	Package_SO:SOIC-16W_7.5x10.3mm_P1.27mm
57	3	U1203, U1303, U1403	MCP1501-33ESN	Package_SO:SOIC-8_3.9x4.9mm_P1.27mm
58	3	U1204, U1304, U1404	ADS7867	Package_TO_SOT_SMD:TSOT-23-6
59	1	U1501	ENC28J60x-SS	Package_SO:SSOP-28_5.3x10.2mm_P0.65mm
60	1	U1502	ESP32-PICO-D4	Package_DFN_QFN:QFN-48-1EP_7x7mm_P0.5mm_EP5.3x5.3mm
61	1	U1503	AMS1117-3.3	Package_TO_SOT_SMD:SOT-223-3_TabPin2
62	1	U1504	ESP-12E	RF_Module:ESP-12E
63	1	Y1501	ABM8-25.000MHZ-B2-T	Crystal:Crystal_SMD_3225-4Pin_3.2x2.5mm

5. DRAWINGS

