

BQ351
MODBUS IO DEVICE
USER MANUAL

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About Device

BQ351 is an Modbus IO device with 8 relay output and 8 digital input. Device supports Modbus RTU over RS485.

Holding register, Input Register and Coils commands of Modbus RTU is supported.

Device Modbus address can be set by user. Also baudrate of device is adjustable. But 8 Bit , No Parity and 1 Stop bit si fixed. Device addresses between 1 and 14 can be set from switches on device. Also you can set address greater than 14; but you must use device manager program for this.

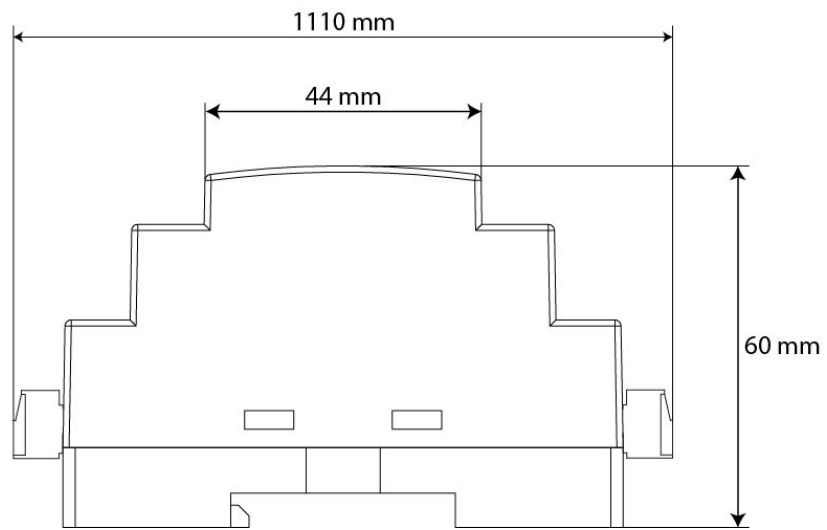
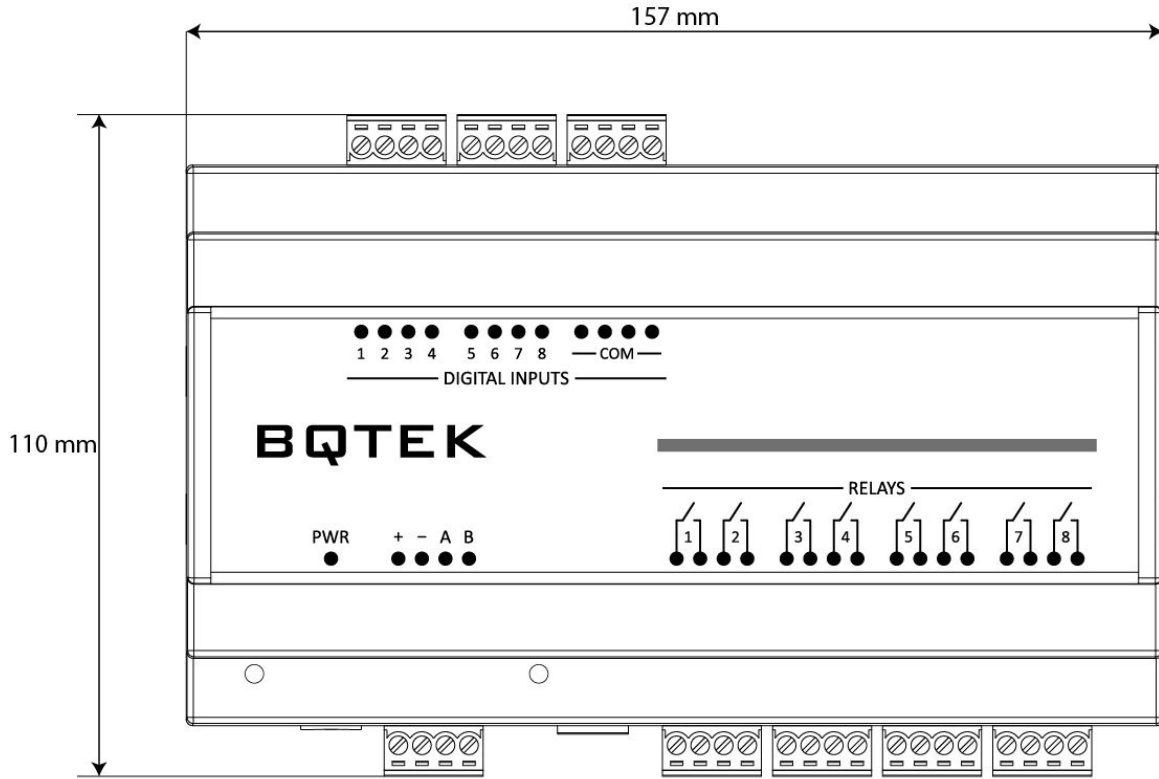
Device Properties

Product Code	BQ351
Product Name	Modbus Digital IO Device 16 Channel (8 Relay, 8 Digital Input)
Relay Output	8 Panasonic Relay 5A 277V AC / 3A 30V DC Capacity
Digital Input	8 Dry Contact Digital Input
Power Need	24V DC
Enclosure	Rail Type 157 x 90 x 60 mm (Also suitable for wall mounth)
Terminal	Plug-in terminal (3.81mm)
Protocol	Modbus RTU over RS485

Factory defaults for communication is 9600 Baud, 8 Bit, No Parity, 1 Stop Bit and Modbus address is 1. You can change modbus address with DIP switch or with Modbus Device Manager Software. Also this default 9600 baud can be adjustable.

Device Layout

You can see device layout at the picture below. Terminals are screw type terminals. You can also find descriptions about device connections on the device enclosure.



Power Supply

Device works with 24V DC power. When all relays are on max current is about 350mA. Connect + and - terminals to power supply.

RS485

A and B terminals are for RS485 communication. Please obey RS485 cabling rules and use suitable cable for RS485

Dip Switch

Dip switches are for device settings mode and for adjusting and address. Please read this document for usage of dip switch.

Relay Outputs

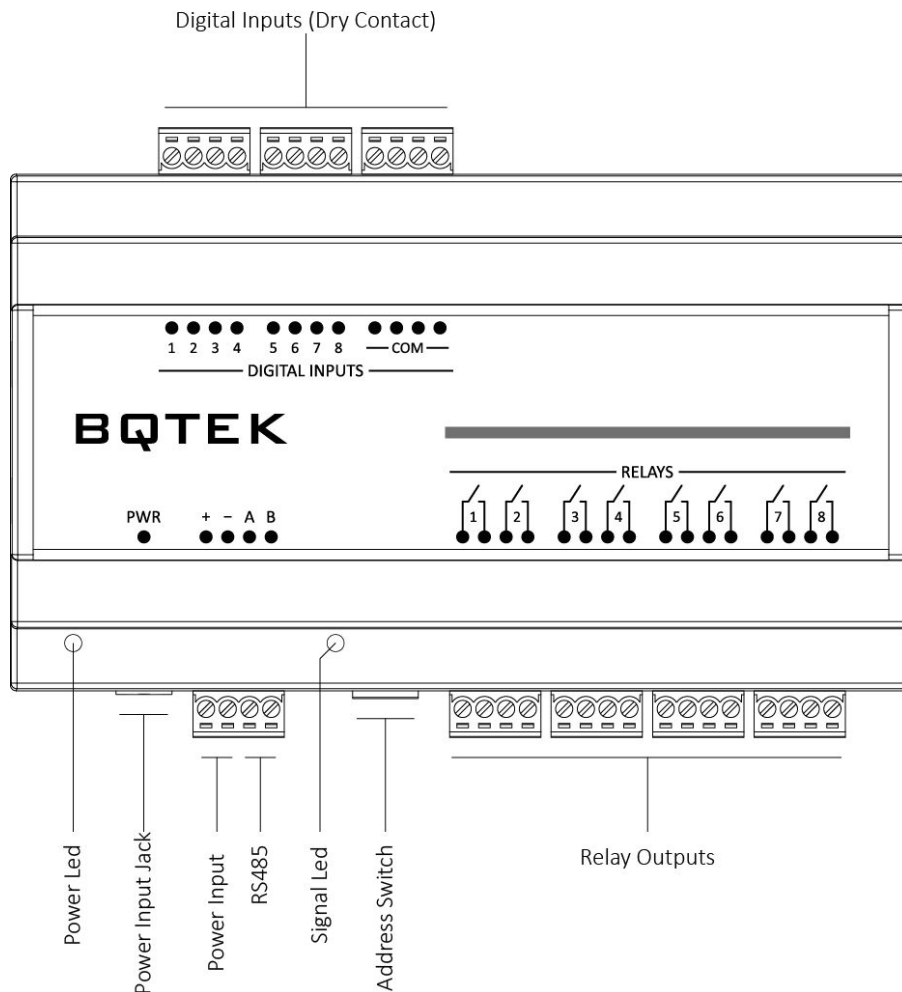
Device has 8 relay output. Relays have only Normally Open (NO) contacts. Relays are Panasonic ALDP124 relays in device. This relays are for 5A 277V AC / 3A 30V DC Capacity. Please review ALDP124 documents from panasonic for detailed information. For extra capacity and for capacitive and inductive loads use external relays. Relay outputs are normally open contacts of relays.

Digital Inputs

Device has 8 digital input. Digital inputs are dry contact. If COM pin out and digital input pin is short circuit it shows inpu is ON

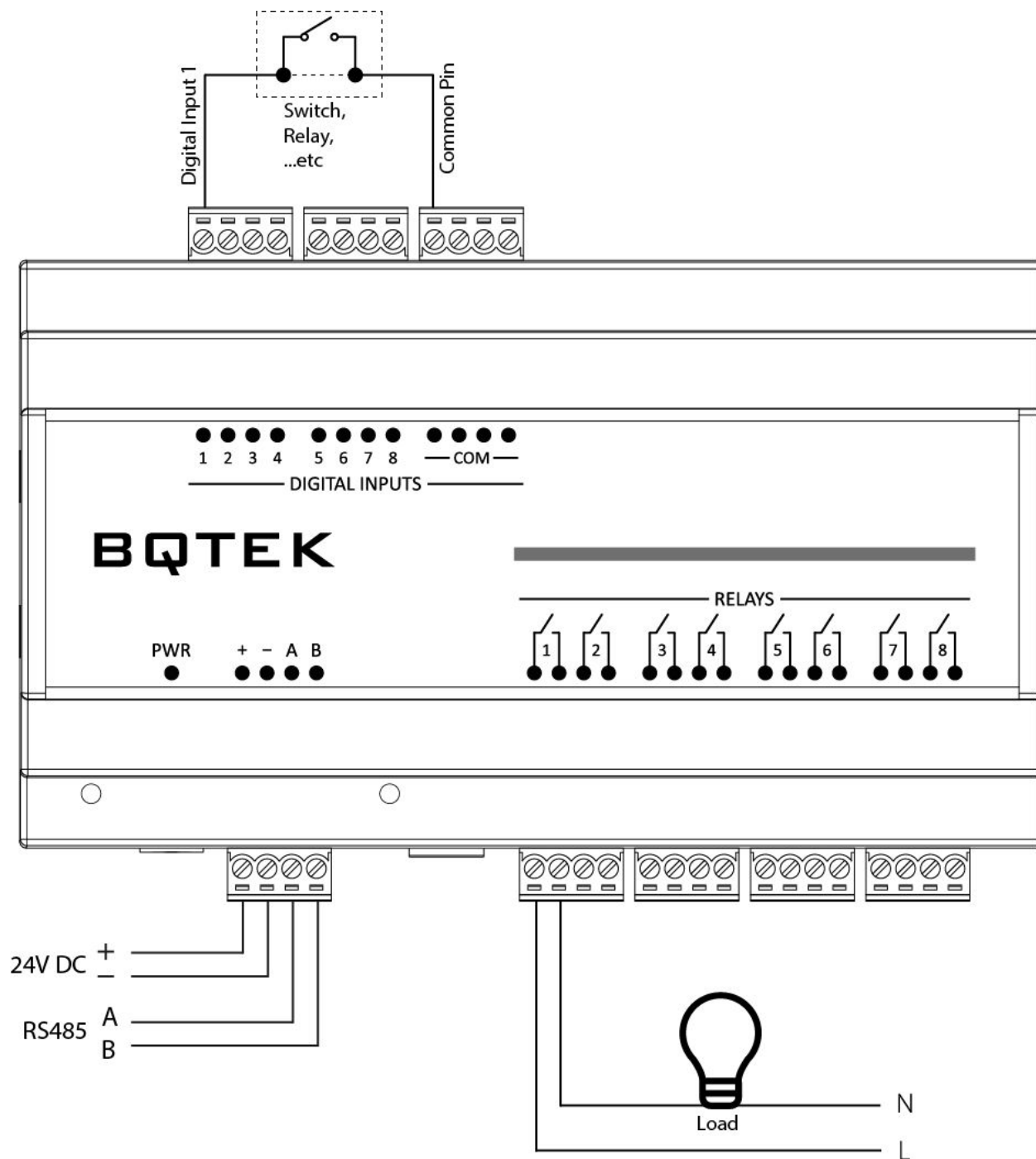
Leds

Power led shows device is working. Busy led means there is an communication over RS485. Each relay led means status of relay. Also in device settings mode Power led and busy light is on together during power on. Detailed information about settings are explained next pages in document.



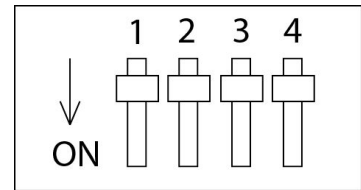
Sample Connection

You can see a sample connection in picture below.



DIP Switch and Address Settings

You can change device modbus address between 1-14 with DIP switch on device. Address greater than 14 can be set from Modbus Device manager software. Making changes and applying changes also needs DIP switch settings.



DIP Switch Modes

Description	1	2	3	4
Settings Mode (Changing device settings from RS485)	OFF	OFF	OFF	OFF
Address 1	ON	OFF	OFF	OFF
Address 2	OFF	ON	OFF	OFF
Address 3	ON	ON	OFF	OFF
Address 4	OFF	OFF	ON	OFF
Address 5	ON	OFF	ON	OFF
Address 6	OFF	ON	ON	OFF
Address 7	ON	ON	ON	OFF
Address 8	OFF	OFF	OFF	ON
Address 9	ON	OFF	OFF	ON
Address 10	OFF	ON	OFF	ON
Address 11	ON	ON	OFF	ON
Address 12	OFF	OFF	ON	ON
Address 13	ON	OFF	ON	ON
Address 14	OFF	ON	ON	ON
Get Address from Settings (Apply Settings that made from RS485)	ON	ON	ON	ON

Device default baudrate is 9600 baud. (8bit, No Parity, 1 Stop) Adjust any address between 1..14 and easily start to use. For other baudrates and addresses read the document.

Supported Modbus Commands

Device supports listed commands below. These are standard Modbus RTU commands. Most PLC, HMI and Scada applications supports this commands.

Command Description	Command (HEX)
Read Holding Register	03
Read Input Register	04
Read Coils	01
Read Discrete Inputs	02
Write Multiple Register	10
Write Single Register	06
Write Multiple Coil	0F
Write Single Coil	05

Writing 1 value will Set relay ON and writing 0 value Sets relay OFF. You can find register and coil addresses in this document.

Register - Coil Table

Global Modbus specifications says first address is 1 but sometimes some PLC or scada applications accept 0 as first modbus register address. Our documents are prepared for based 1. If your plc accept 0 based register addresses; you can decrease -1 from the addresses below.

Relay ID	Register Number	Coil Number
Relay 1	1	1
Relay 2	2	2
Relay 3	3	3
Relay 4	4	4
Relay 5	5	5
Relay 6	6	6
Relay 7	7	7
Relay 8	8	8

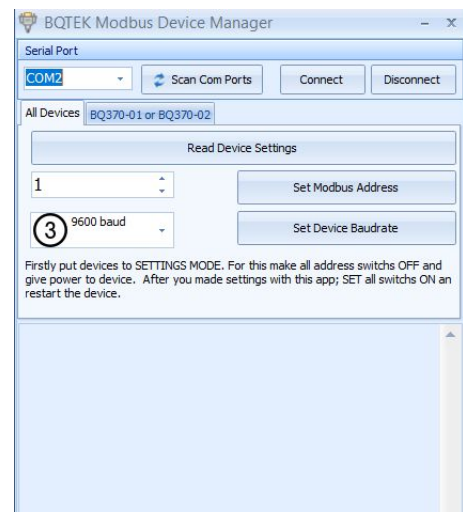
Input ID	Register Number	Coil Number
Input 1	9	9
Input 2	10	10
Input 3	11	11
Input 4	12	12
Input 5	13	13
Input 6	14	14
Input 7	15	15
Input 8	16	16

Device Settings with “Modbus Device Manager”

Device default baudrate is 9600 baud. (8 Bit, No parity, 1 Stop)
You can adjust device address from DIP switch and you can start using device with 9600 baud easily.

But sometimes you can need other baudrates or you can need addresses greater than 14. In this situation you can change device settings with RS485.

For this you must put device to “Settings Mode”. After than you can change device settings with our “Modbus Device Manager” application. Also experts users can use Modbus RTU protocol for changing settings instead of Modbus Device Manager. Expert users can reach detailed information about our web page or can contact with us.



Settings Mode

For making settings from “Modbus Device Manager”; you must put device settings mode. Power off device and put all DIP switches to “OFF” position. Now you can give power to device. You will see power and busy led is ON together; this shows device is in “Settings Mode”

Now connect RS485 to computer and use “Modbus Device Manager” application for reading or changing device settings.

After making changes you must exit from “Settings Mode” For this set all DIP switches ON position and reset the power of device.

Supported baudrates are 2400, 4800, 9600, 14400, 19200, 28800 and 38400 baud.

If you dont have RS485 port on your computer you can use USB-RS485 converter devices for this.
Also as explained before experts users can change settings from RS485 with Modbus RTU commands.
You can find information about this in our web page.