STR1160000H

RS-485

smart programmable controller

Ver. 1.3.2014

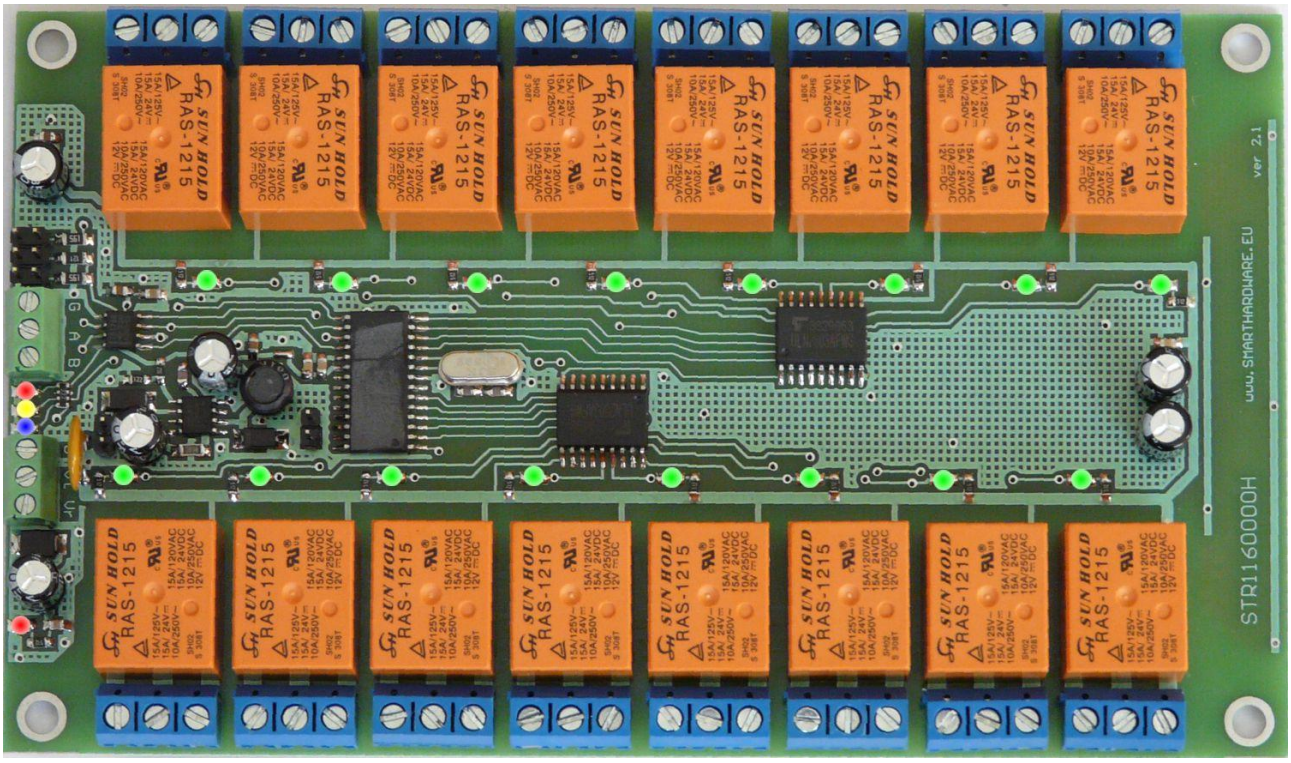
Software ver.1.4.2014

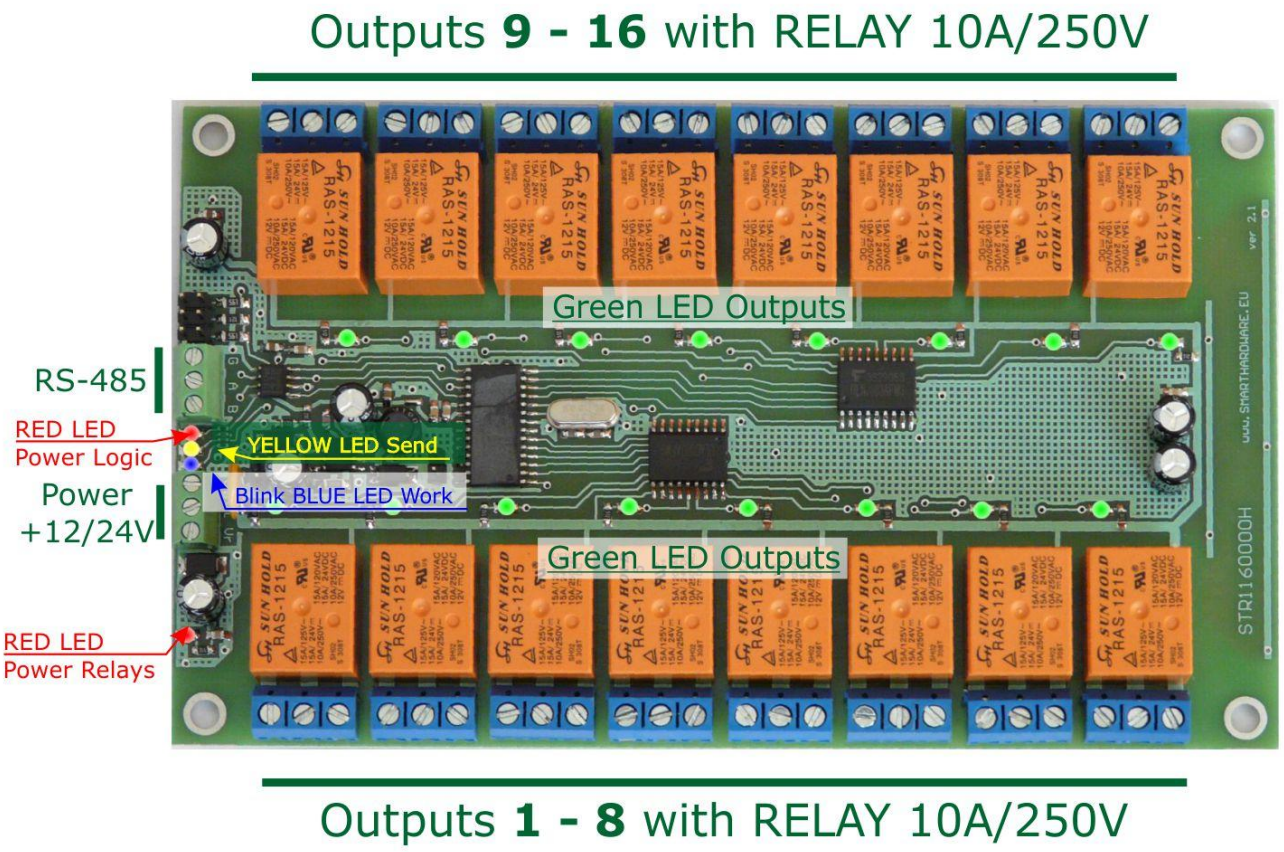
1. Features

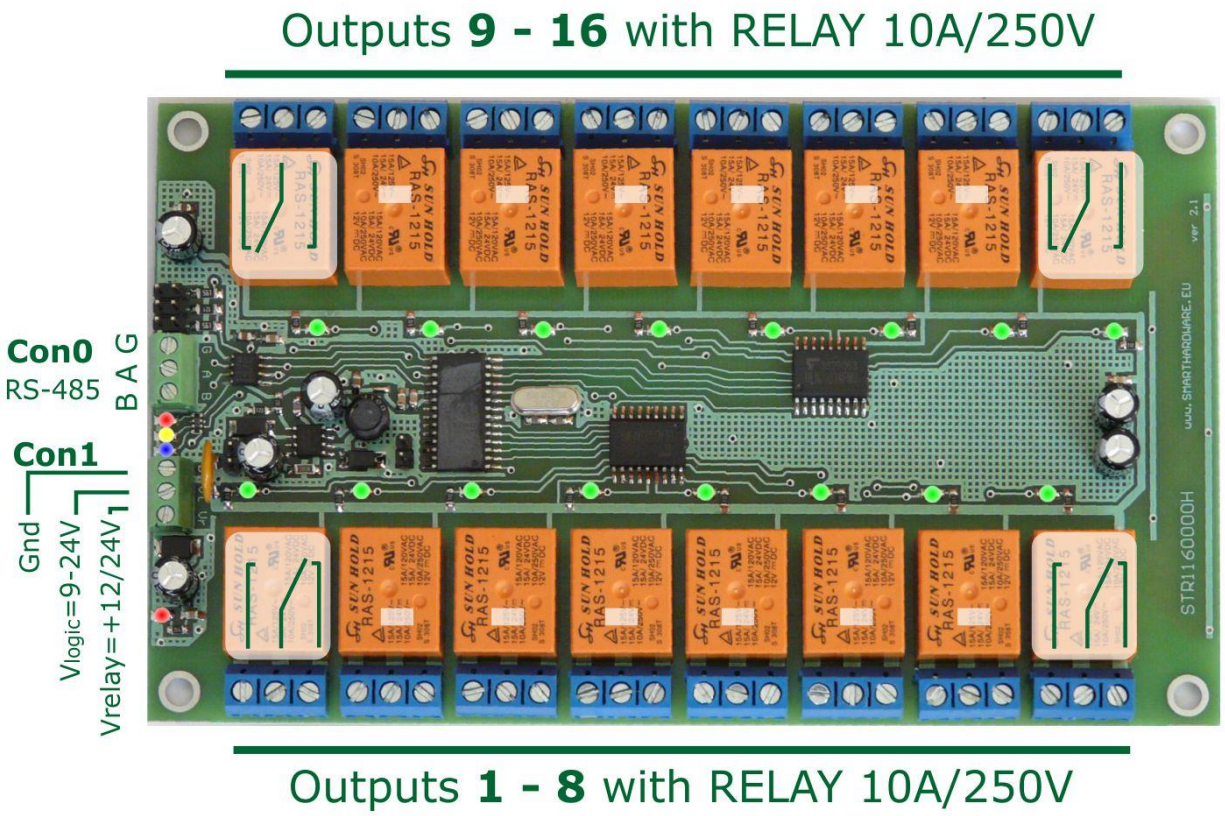
RS-485 smart management line. **Wide range of baud rate speeds (300 – 115200).** **Fully reprogrammable on the fly without restart.** **Runtime Counter – 4 bytes** **User Data RAM – 4 bytes** **User Data EEPROM – 4 bytes**			
Outputs	**16**	RELAYS 12/24V - 250V/10A	
Power Supply	**Logic**	+9-24V	**Icc max =** 30mA
	Relays	+12V(0.5A)/+24V(0.26A)	
Dimensions	162 x 95 x 20 mm	**Dimensions for installation**	152 x 86 mm
Weight	235 gr.		

v 2.1

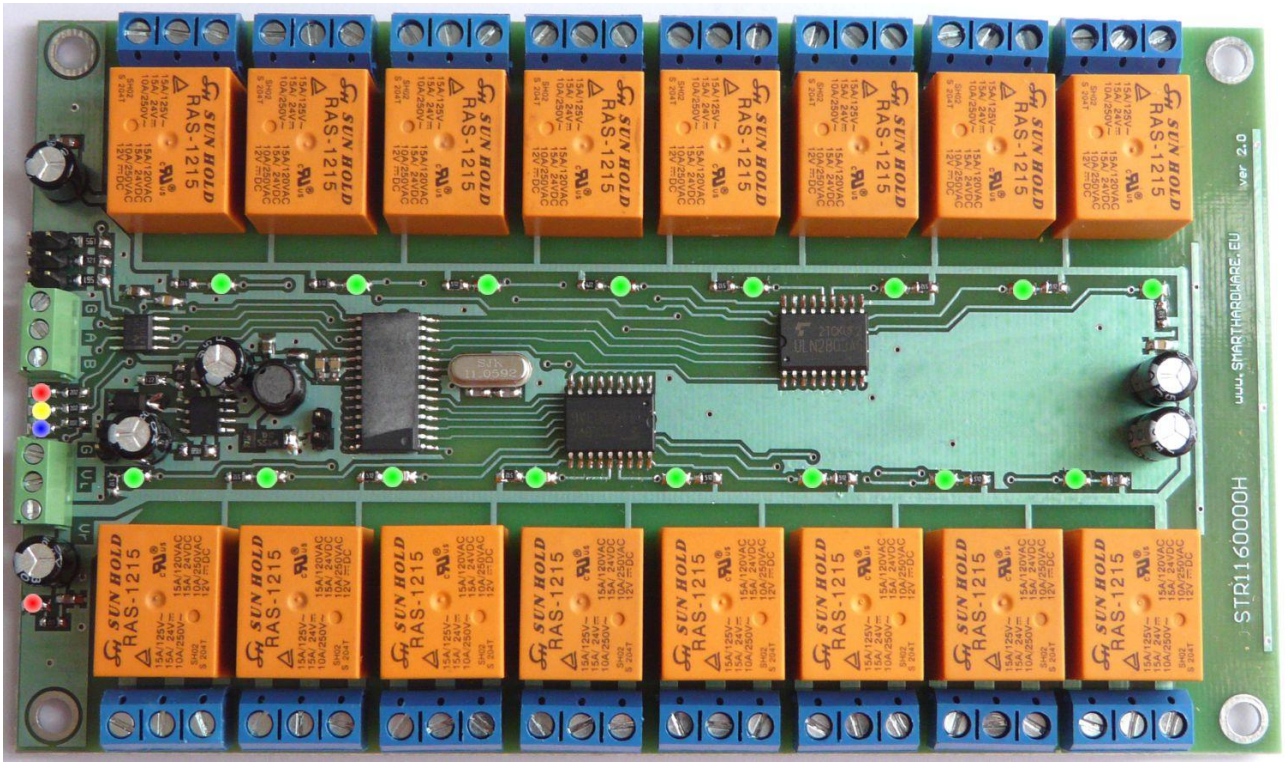
Compared to version v2.0 was added protection for reversal of the power supply of controller.

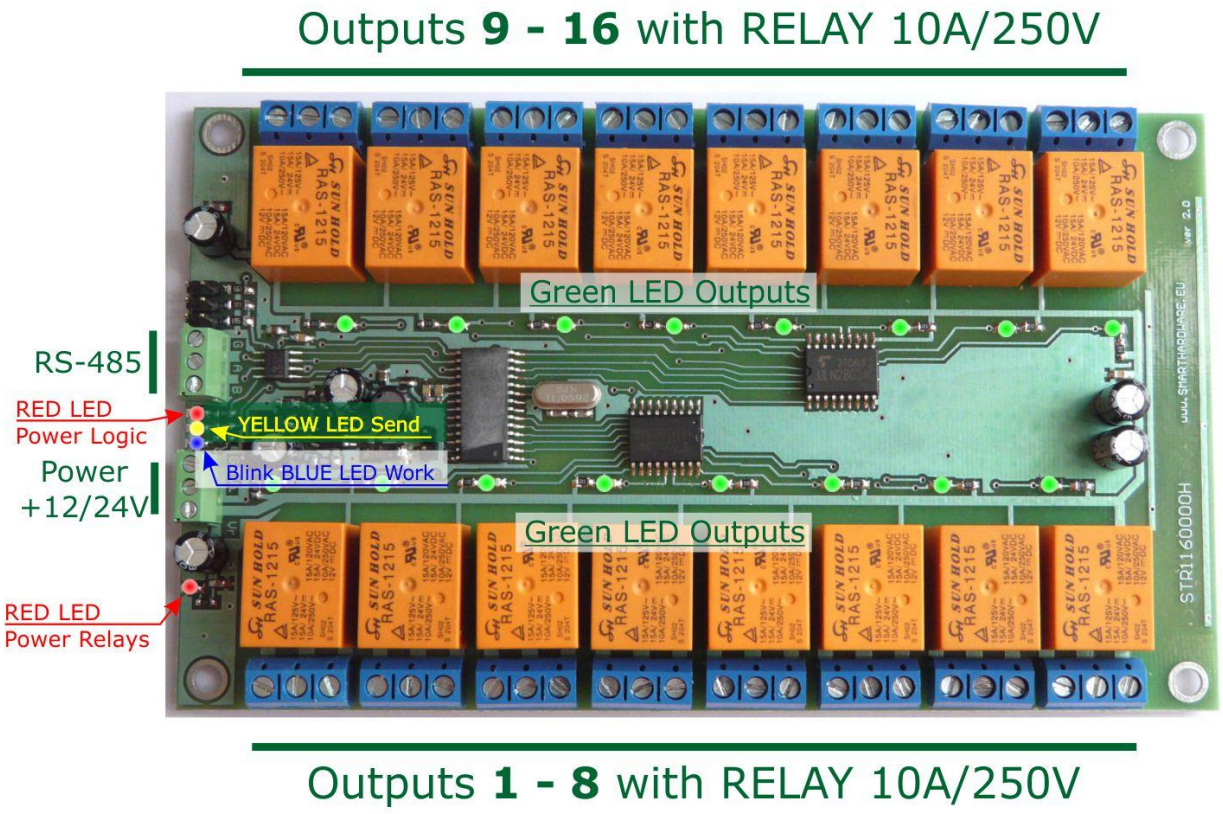



Outputs 9 - 16 with RELAY 10A/250V
Green LED Outputs
RS-485
RED LED
Power Logic
YELLOW LED Send
Blink BLUE LED Work
Power
+12/24V
Green LED Outputs
RED LED
Power Relays
Outputs 1 - 8 with RELAY 10A/250V


Outputs **9 - 16** with RELAY 10A/250V
Con0
RS-485
B A G
Con1
Gnd
Vlogic=9-24V
Vrelay=+12/24V
STR1160000H
Outputs **1 - 8** with RELAY 10A/250V

v 2.0

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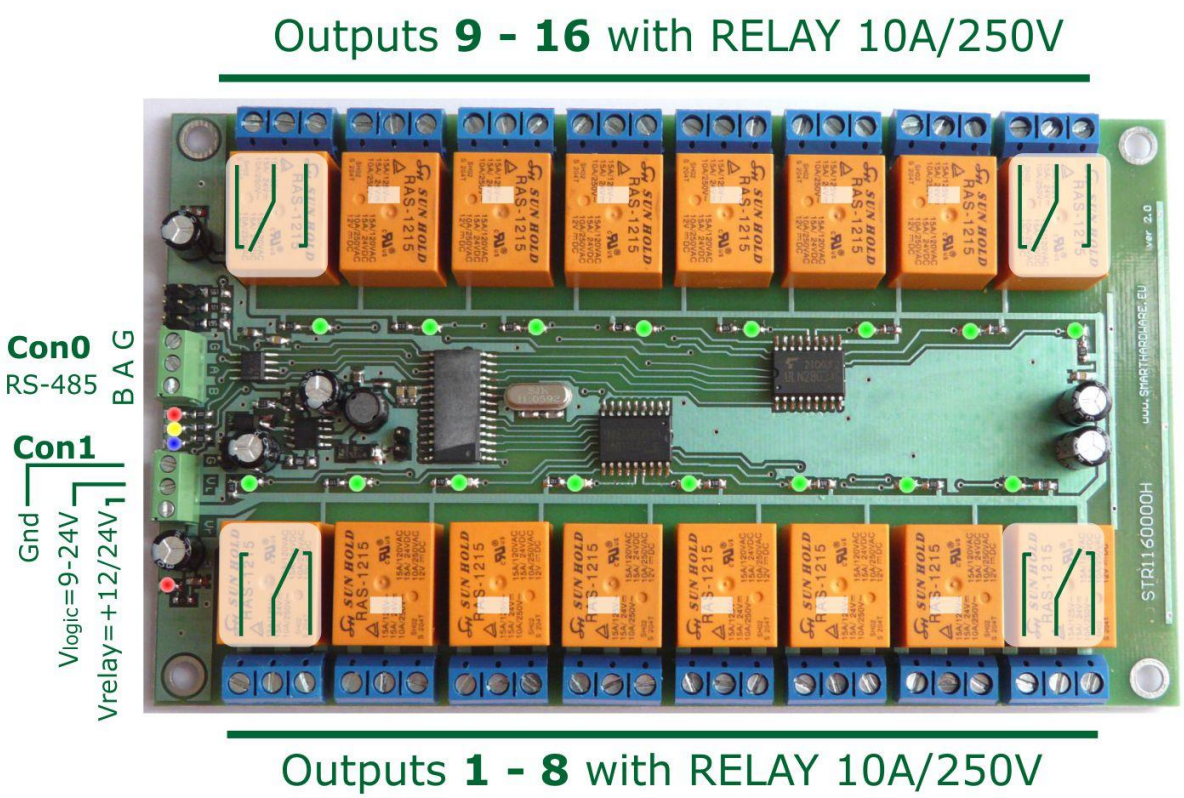
Outputs 1 - 8 with RELAY 10A/250V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Con0
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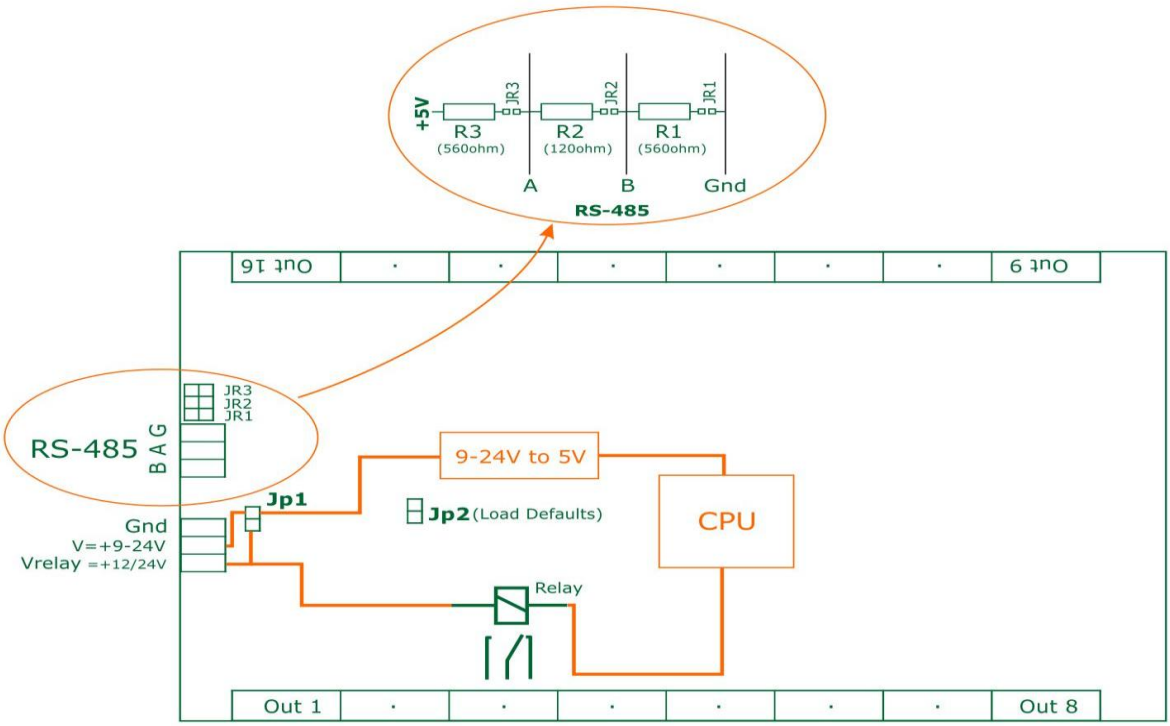

2. Power

This controller comes with 12 or 24 volts relays. You can power the relays and logic independently. But usually jumper **Jp1** is installed and power is single. Power is according to the relays - +12/24V.

Jp2 is used to load all default parameters.

Disconnect power. Put jumper. Connect power. The blue LED will light constantly. Now controller waits to remove jumper. Remove jumper. The controller will continue in normal mode. The blue LED will flash briefly.

Check the PDF file with commands for a full explanation – page 3.

IMPORTANT: Do not change jumpers for power, when voltage for power is applied to the controller. The controller is powered by a switching converter for 5V. It might pulses, from switching the jumper to erase the software built into the microcontroller.

Jumpers should be switched ONLY when the controller is powered down!

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3. RS-485 line

This controller manages the RS-485 line intelligently.

Controller can perform one command while receiving second command.

Unlike any other similar controllers, it checks the correct information, which returns as result. When controller transmits, simultaneously read the information transmitted from RS-485 line. Each byte is compared for validity. When an error is detected, transmission is terminated. This helps to quickly release the line. In case of a short circuit on the line, the transmitter is protected against overload.

Baud rate (300 – 115200)

At any time you can set new speed. The next command already is taken on new speed. There is no need to reboot the controller.

R1, R2, R3 for RS485 line

By default, this controller comes with a transmitter **SN75176**. This transmitter has an input 1 unit load (12k ohms). By default, the line must be terminated with two resistors of 120 ohms at both ends. You can connect up to 32 controllers.

R1 and R3 must be calculated according line. Into account, must take the resistance of the wires.

By default, R1=R3=560 ohms. R2=120 ohms. When jumper set, resistor connected to line.

How to calculate the values of R1 and R3 with 120 ohm resistors at both ends.

Example: 10 controllers and 5 V supply.

Each RS-485 node has a load impedance of 12K ohms. 10 nodes in parallel give a load of 1200 ohms. Additionally, the two 120 ohms termination resistors result in another 60 ohms load, for a total load of 57 ohms (1200 and 60 in parallel). Clearly the termination resistors are responsible for a majority of the loading. In order to maintain at least 200mV between the B and A line, we need a bias current of 3.5 mA (200mV/57=3.5mA) to flow through the load. To create this bias from a 5V supply a total series resistance of 1428 ohms or less is required. Subtract the 57 ohms that is already a part of the load, and we are left with 1371 ohms. Placing half of this value as a pullup to 5V and half as a pulldown to ground gives a maximum bias resistor value of 685 ohms for each of the two biasing resistors. **R1=R3=680 ohms.**

How to calculate the values of R1 and R3 **WITHOUT** 120 ohm resistors at both ends.

Example: 32 controllers and 5 V supply.

Each RS-485 node has a load impedance of 12K ohms. 32 nodes in parallel give a total load of 375 ohms. In order to maintain at least 200 mV across 375 ohms we need a current of 0.53 mA. To generate this current from a 5V supply requires a total resistance of 9375 ohms maximum. Since 375 ohms of this total is in the receiver load, our bias resistors must add to 9K ohms or less. Notice that very little bias current is required in systems without termination.
R1=R3=4.3K ohms.

Bias resistors can be placed anywhere in the network or can be split among multiple nodes. The parallel combination of all bias resistors in a system must be equal to or less than the calculated biasing requirements.

We produce these controllers. For your convenience we can solder other resistors. We can leave blank the space and you can solder the resistors that you need. Size is 1206.

3. Outputs

Outputs are implemented with relays SUN RAS-1215(2415), 10A/250V.

4. Commands

Check the PDF file with commands for a full explanation. This controller supports the following commands (in HEX):
1, 2, 3, 4, 10, 14, 17, 18, 19, 20, 21, 22, 23, 26, 32, 33, 84, 94, 97, 99

http://smarthardware.eu/manual/str1xxxxxx_com.pdf

5. Method of connecting to network. Principle of operation.

When operating, the controller uses a buffer of 40 bytes maximum for each command. While performing a command, it may receive next. Before receiving the last byte of the second command, the first must be finished. If not, then the second will be ignored.

When a command is sent to reprogram something, must be borne in mind, that one byte programming take time approximately 4 milliseconds.

There are built-in protections for the pause between two bytes. The time between two commands can be arbitrary. After receiving the first byte of the command, the maximum time to the next byte must be less than 300 ms. If this time is greater, all received bytes are rejected and the receiving buffer is cleared.

How to connect the controller to network.

1. Set (on/off) jumpers for resistor for RS-485 line
2. Power the controller
3. Connect controller to RS-485 line
4. Program new controller number
5. Program new outputs number for direct access
6. **Controller is ready for use**
7. You can connect next controller …..

You can use any transmitter for the management of this controller. It is enough to maintain the required speed and input impedance is complies with the network.

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