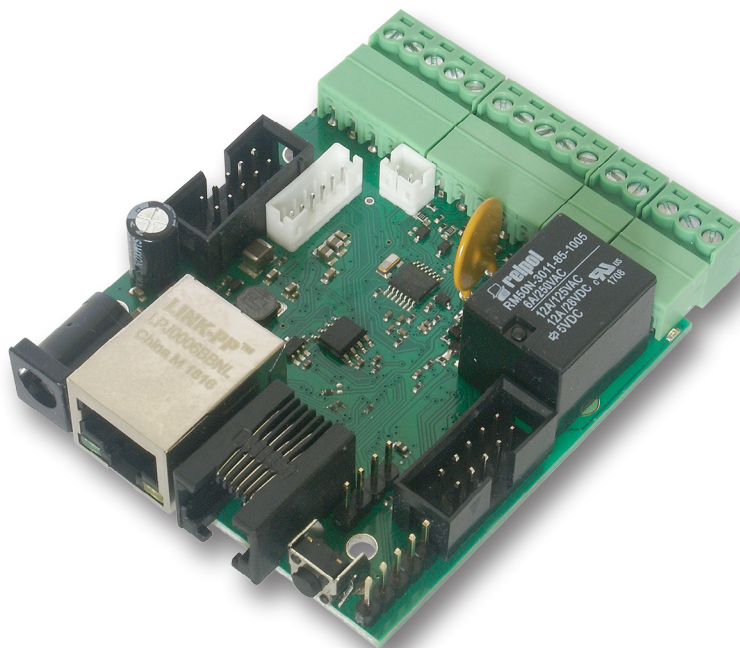


LEDATS.PL

LAN Controller V3.5



Manual

LAN Kontroler

Lan Controller v3.5 is a completely new version of device produced from 2011y.

The most important change is the addition of a transmission encryption chip. SHA-256 Hash coding system gives the possibility to use the https protocol, and enables the authentication of outgoing mail, i.e. sending e-mails by popular, public e-mail servers.

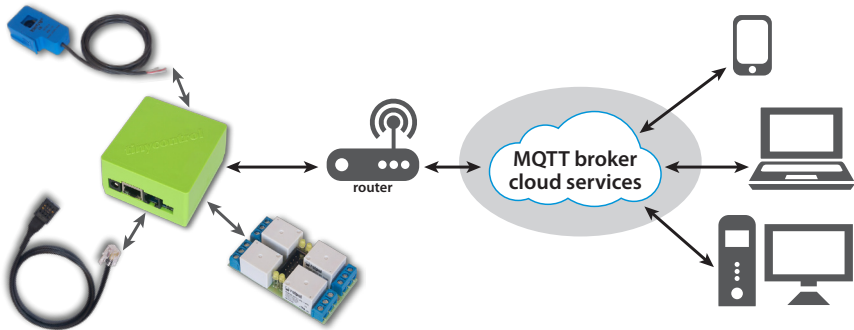
In relation to version 3.0, the processor has been changed to a version with a faster 108MHz clock and more RAM and Flash memory.

Analog inputs INPA1 and INPA2 have an extended voltage range 5V / 55V, inputs INPA3 and INPA4 as previously 3.3V / 33V. This allows you to work with a more sensitive measuring range also for sensors whose signal reaches 5V.

The battery connector supporting the register supply allows to realize the RTC clock and to remember the state of the outputs before the power reset.

The device operates as a web server, on which readings of various types of sensors are presented: temperature, humidity, voltage, current, events and allows remote control of up to 10 outputs.

Communication between device hardware and web browser is done with XML files, thanks to which it is possible to design your own user interface that meets only specific functionalities in a way that is much better suited to individual needs than the universal interface. We hope that thanks to this the device will gain new applications.



The device communicates with computers and the Internet using universal protocols: *HTTP* and *SNMP* and *MQTT*, thanks to which it is possible to control the outputs from the application in the phone, even when the device is in the local network.

We are developing for users free (up to 5 devices) server mqtt.ats.pl.

It allows remote collection and preview in the form of a graph of data sent by the Lan Controller, as well as setting the calendar of actions and events performed between different devices autonomously after the conditions sent by the sensors.

The device was designed and manufactured in Poland.

Example of applications

- **in industry:** machines, technological lines, working environment monitoring;
- **in markets:** refrigerators remote monitoring;
- **in offices and workplaces:** cooperation with access systems, observation of environmental conditions;
- monitoring and resetting of internet devices (for ISP watchdog)
- **at home:** for heaters automation, lighting according dust sensor or scheduler, garden watering systems;
- **at home:** for controlling temperature in heating installations, heat pumps, solar installations;
- **renewable energy:** measurements of productivity of PV installations, battery charging, AC power consumption and production measurements;
- **in farms and garden:** monitoring and controlling greenhouses, watering, food dispensing machines for animals.

Our original solution that completes the functionality of Lan Controller v3.3 is:

MQTT Server: mqtt.ats.pl

Access is **free** for non-professional users up to 5 devices.

Server is intended for 4 core function (for this moment):

- collecting data coming from Lan Controller sensors and present them on charts: **Charts, Listings,**
- setting filters for incomings data for purpose of sending MQTT topics: **Format/Filter/Topic** (for example for controlling out's of one device based on sensor readings of other Lan Controller),
- control according to big capacity Scheduler: **Manage tasks,**
- control of Lan Controller from **smart phone app** or **website** - function work properly independently from place in network.

Ultimately server will support other devices which use MQTT protocol.

We invite you to visit our website

www.tinycontrol.eu

There you will find the firmware updates and information about the new possibilities.

Monitoring, Controlling, Restarting - FEATURES:

- 4 analogue inputs with switching gain: INPA1 and INPA2 measurement from 1 mV to 55V, INPA3 and INPA4 measurement from 1 mV to 33 V. For measuring voltages, DC current, AC current (additional sensors), 4-20 mA sensors, thermocouples, distance sensors, light photoresistors and many others,
- 2 analog inputs: INPA5 and INPA6 up to 3,3V - for DC voltage, DC current or other physical quantities by voltage output sensors,
- digital buses: 1wire - up to 6 DS18B20 temperature sensors, I2C - supported AM2320 humidity sensor, Bosch BME280 (temperature/humidity/pressure), OLED display, RTC time module,
- 4 logical inputs, as state (high, low) sensors (open, close, PIR) and for pulse counters from energy meters,
- 1 relay on board, (NZ,C,NO) 10A/240V,
- 1 transistor output, same voltage as supply, for loads up to 1A,
- 4 outputs OC standard (transistors), for switching relays or small power loads
- 4 PWM outputs, works as PWM, on/off and servos control*
- UART port for communication with: Duraluxe inverter (energy from PV panels), SDS011 PM10/PM2.5 dust sensor, CO2 sensors: MH-Z16 i MH-Z19,
- communication option for GSM module - controlling outputs by SMS,
- temperature and voltage measurement on the board,
- modern and convenient web interface with a drop down menu, support for java scripts (also to be loaded by the user),
- the ability to upload your own website,
- the ability to configure your own status panel, upload your own background and settings
- display of necessary readings or buttons,
- logging as "administrator" for configuration and "user" for status preview,
- advanced Even Config with checking if 2 conditions are fulfilled,
- support for: SNMP, HTTP GET/POST request or all MQTT protocols,
- free access (up to 5 devices) to mqtt.ats.pl cloud for collecting, computing and visualization of data,
- remote controlling of outputs from Internet and mobile devices even if LAN Controller is behind router,
- support for encrypted https connection as well as authentication of outgoing mail,
- battery connector supporting the state of registers and RTC time in the case of power failure.

* option possible in future.

Lan Controller is innovative device for remote controlling and measuring by LAN network and internet.

Because of many measurement features, many configuration possibilities and embedded automatization area of application is only limited by user imagination. But it cause that our company as a producer is not able to test all possible configurations and it could happen that ones of setting will not work according to your expectations. In all such cases please mail to info@tinycontrol.pl

But in first place we ask to read this manual carefully.

As a rich source of information also serves user forum: <http://tinycontrol.pl/forum/>

You are invited to use and share your experience!

FACTORY SETTINGS

- IP address of the module: **192.168.1.100**
- **administrator: admin** password: **admin**
- **user: user** password: **user**

TECHNICAL SPECIFICATIONS

- supply voltage: 8 ÷ 55 V DC
- power consumption: 0,5W - without an attached relays
- PoE supply: YES, passive (PoE max. <55 V)
- Protection from wrong supply polarization: YES
- interface: Ethernet 100 Mbit/s
- relay: 255 V AC 10 A
- operating temperature: -20 to +85 °C
- weight: 50 g
- dimensions: 67 x 68 x 39 mm + DIN socket (can be mounted on DIN rail)

INPUT / OUTPUT:

- **2 ANALOG INPUTS INPA1, INPA2 WITH AMPLIFIER - 2 input voltage ranges:**

The scope of of measured voltage for a range of 5 V

gain=1 from 0 to 5000 mV

gain=10 from 0 to 500 mV

gain=50 from 0 to 100 mV

The scope of of measured voltage for a range of 55 V

gain=1 from 0 to 55000 mV

gain=10 from 0 to 5500 mV

gain=50 from 0 to 1100 mV

for voltages between $0 \div 10$ mV, the measurement is not sure.

- **2 ANALOG INPUTS INPA3, INPA4 WITH AMPLIFIER - 2 input voltage ranges:**

The scope of of measured voltage for a range of 3.3 V

gain=1 from 0 to 3300 mV

gain=10 from 0 to 330 mV

gain=50 from 0 to 60 mV

The scope of of measured voltage for a range of 33 V

gain=1 from 0 to 33000 mV

gain=10 from 0 to 3300 mV

gain=50 from 0 to 600 mV

for voltages between $0 \div 5$ mV, the measurement is not sure.

- **2 ANALOG INPUT WITHOUT GAIN INPA5, INPA6:**

range of measured voltage of $0.1 \div 3.3$ V

- **1 DIGITAL INPUT in standard 1-WIRE and I2C (connector 6P6C RJ12):**

measurement 6 temperature probes DS18B20 and the temperature and humidity sensor AM2320

- **4 LOGIC INPUT:**

VLow - max 1,1 V

VHigh - min 1,5 V, max 12 V

- **1 RELAY:**

10 A / 240 V AC, 15 A / 24 V DC

3 styki: NZ, NO, C

- **1 TRANSISTOR OUTPUT:**

giving adequate voltage to control receivers with current consumption up to 1A

- **4 OUTPUT OUT1÷OUT4 (connector IDC10-2):**

OC output of 100 mA, controlled downside to switching relays, transistors, etc.

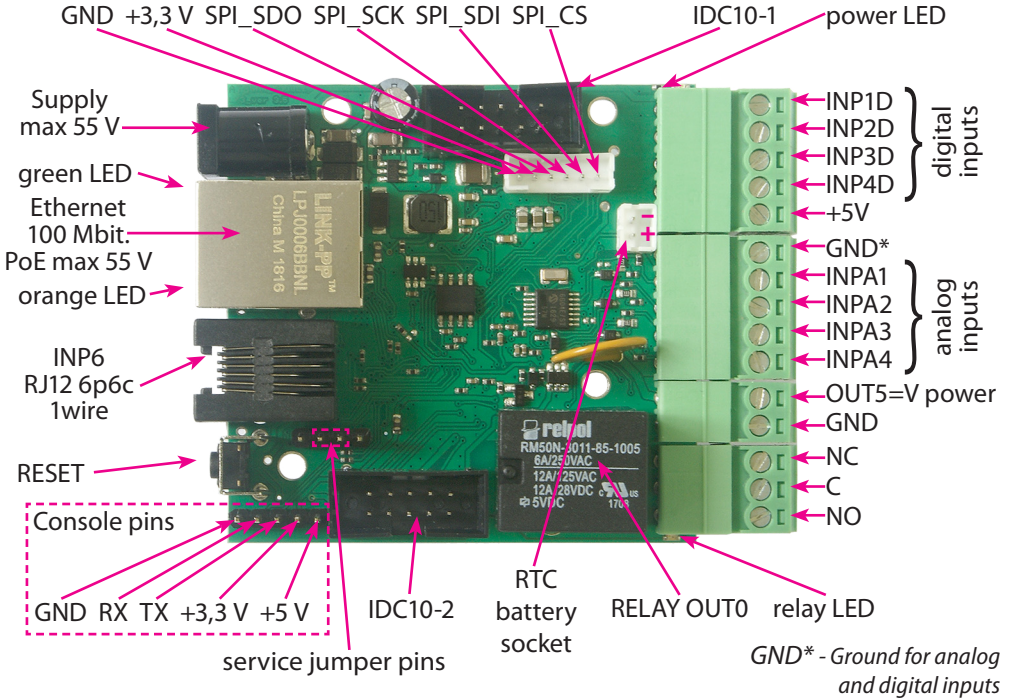
- **4 PWM OUTPUT:**

the output frequency range of 50 Hz to 100 kHz

- **UART - serial - console preview functioning of the Lan Controller system:**

Transmission parameters: 115200 bitrate, 8 N 1

PINS and COMPONENTS DESCRIPTION



PIN/Component	Description
Power	Power supply 8V ÷ 55V DC
power LED	LED indicator on – power on board
relay LED	LED indicator on – relay active
green LED	LED indicator on – eth link active
orange LED	LED indicator on – data transmitted
IDC10-1	Outputs PWM1÷3 / serial port RxTx
IDC10-2	Additional outputs transistor OC standard, for example, relays INPA5, INPA6 – additional analog inputs
INP1D÷INP4D	Logical inputs Low=0~0,8V, High=0,8V~20V Also supports a pulse counter
+5V	Only for sensors supply
GND*	Ground for analog and digital inputs
INPA1, INPA2	Analog inputs; voltage 5V or 55V
INPA3, INPA4	Analog inputs; voltage 3.3V or 33V
OUT5	Transistor output (+), voltage = power supply, max 1A
GND	Ground for transistor output (-)
NC	Relay OUT0, normally closed contact
C	Relay OUT0, common contact
NO	Relay OUT0, normally open contact

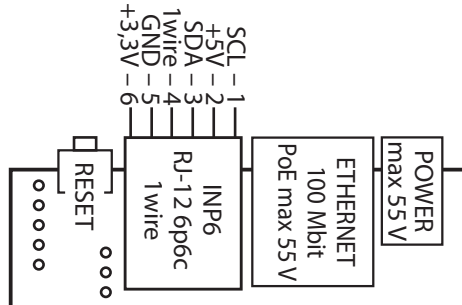
RESET BUTTON

Pressing for about 0.5 seconds to change state relays, and hold for longer - up to around five seconds will change all settings (both network and configuration) on the factory reset. Confirmation of the settings is fast switching on and off the relay (click-click), not to be confused with the change of status and exclusion of the relay after a reboot.

login as an administrator: user: admin password: admin
IP: 192.168.1.100

DESCRIPTION OF CONNECTORS:

RJ12 6P6C (1-wire bus, I2C), IDC10-1, IDC10-2:



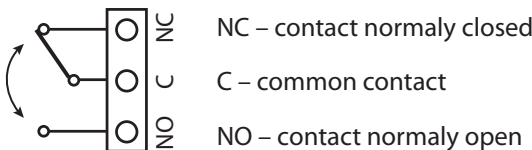
IDC10-2

OUT1 - 10		9 - POWER
OUT2 - 8		7 - PWM0
OUT3 - 6		5 - GND
OUT4 - 4		3 - +5V
INPA6 - 2		1 - INPA5

IDC10-1

GPIO1 - 10		9 - +5V
GPIO2 - 8		7 - UART_RX
PWM3 - 6		5 - GND
PWM2 - 4		3 - +3,3 V
PWM1 - 2		1 - UART_TX

Outputs connection - relay OUT0:



CAUTION: Although the relays are able to switch alternating voltage 255VAC 10A, the same Lan Controller does not meet the safety requirements for connection to dangerous voltages for unauthorized persons (unsecured plugs, no ground). Such a system can make a person authorized and properly secure the device in a closed box, eg. Electricity. It is safer to also use external relays eg. DIN rail switching high voltage and only the controlled from Lan Controller.

IDC10-2 socket: Connection OUT1÷OUT4

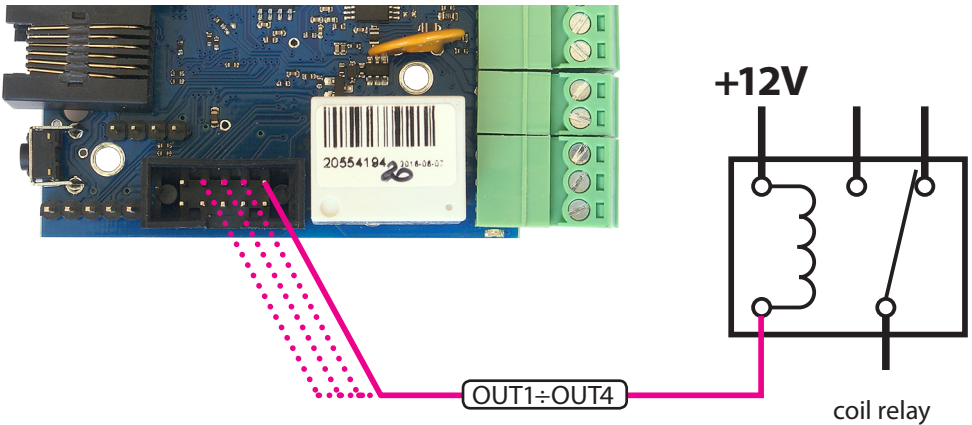
OUT1÷OUT4 are open collector, it means that the switching means connecting mass of the system.

So, it can be actuated, for example relays, motors of low power (fans), connecting on the one hand to the output OUT "-" (mass), and on the other hand, "+" supply.

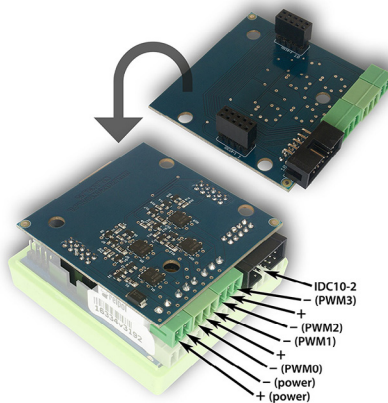
For relays with 12V coils or fans use an external 12V power supply.

In the case of the finished plate 4-ch relay can plug them supplied with them tape outlet IDC10-2. The relays are then fed from the internal 5V.

CAUTION: For relays with more power switched due to the higher power consumption, it is recommended to use an external power supply, for example, 12V or 24V. + 5V voltage from the Lan Controller board is also used to power sensors and should not be charged more strongly than 300mA.



Connecting the PWM outputs on transistor circuit extension (optional)

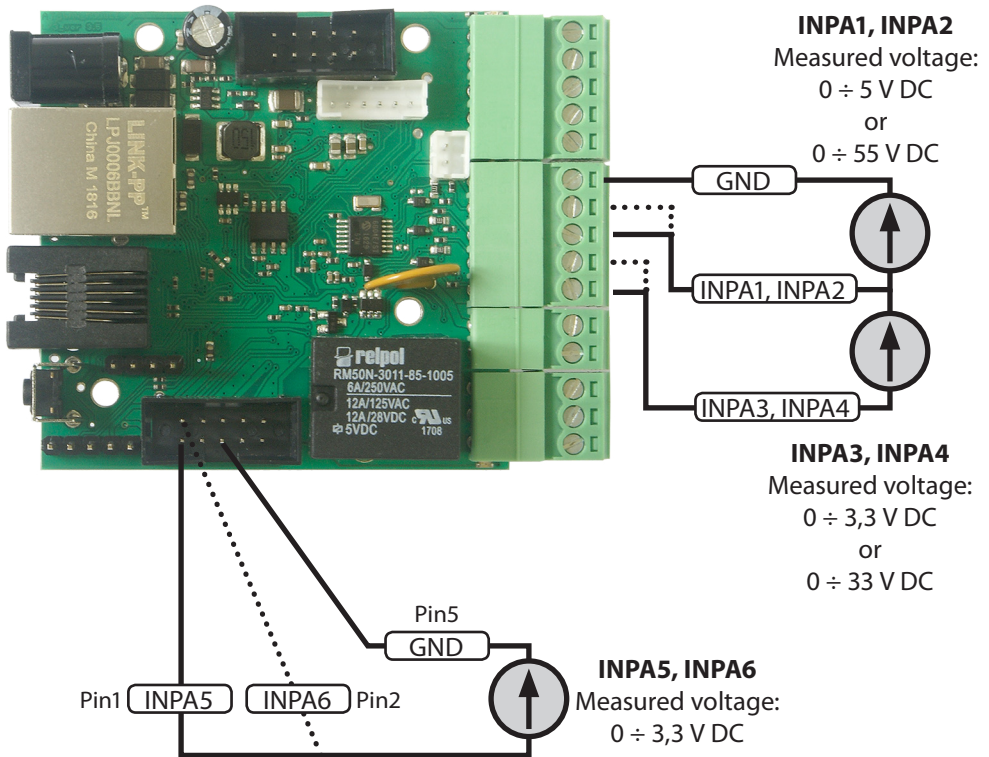


SENSORS CONNECT

1. Measurement of DC voltage at the inputs INPA1÷INPA6

To enable the measurement to be in the "Input" to choose for INPA1 and INPA2 range $V_{in} = 5V$ or $55V$, for INPA3 and INPA4 range $V_{in} = 3.3V$ or $33V$ and possibly small signal strengthening GAIN.

For INPA5 and INPA6 can turn on only 3.3V range.



2. Measurement of the DC voltage through resistive divider

If you need to measure the voltage higher than 55V (to INPA1 and INPA4), 33V (to INPA3 and INPA4) or 3.3V (on INPA5, INPA6) use a resistive divider. U voltage dividers connected to the terminals should be safe, or properly protected against accidental shock hazard.

WARNING: The supply voltage of long cables exposed to lightning, for example, the photovoltaic system can result in the transfer of electrical charge on the sensitive input Lan Controller and can cause damage.

EXAMPLE

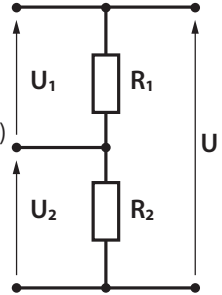
U – Input voltage for the measurement

U_2 – the voltage at the input INPA1÷INPA4 or INPA5, INPA6

for the measurement of up to 33 V at the input INPA5 or INPA6 (max. 3.3 V) should be used divider:

$R_1 = 9\text{ k}\Omega$, $R_2 = 1\text{ k}\Omega$,

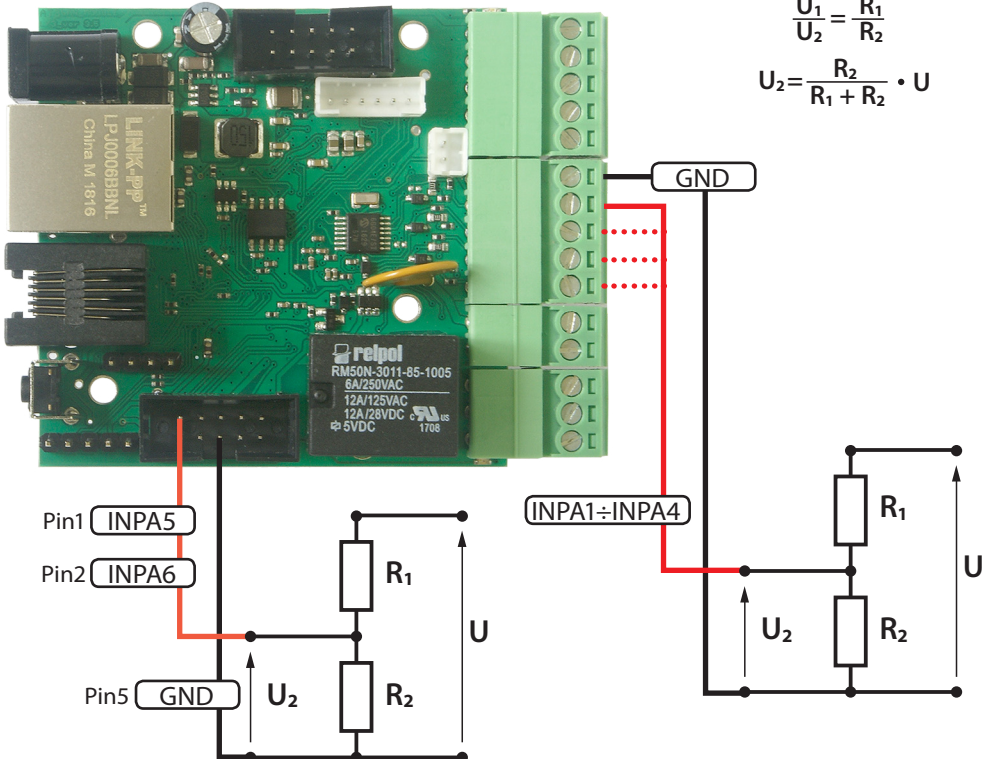
As a result of the multiplier enter of sharing: U / U_2



$$U = U_1 + U_2$$

$$\frac{U_1}{U_2} = \frac{R_1}{R_2}$$

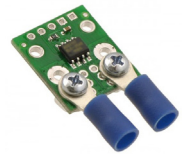
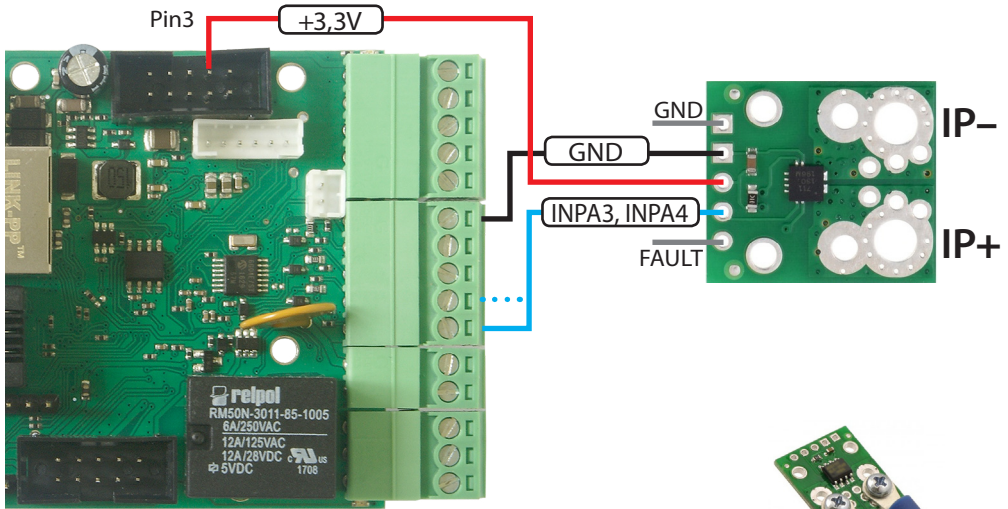
$$U_2 = \frac{R_2}{R_1 + R_2} \cdot U$$



3. Connection the current sensor ACS711ex

The sensor can measure DC currents to 15A or 30A (depending on the version of the sensor). It can be connected to all analog inputs: INPA3 and INPA4.

Power supply: + 3.3V (pin 3 of the output IDC10-1).



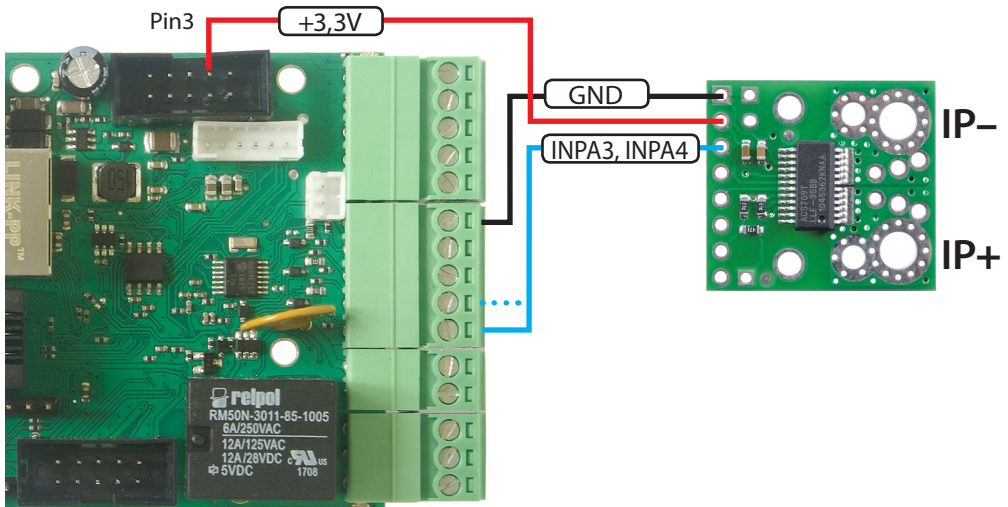
Recommended installation of cables

4. Connection the current sensor ACS709

The sensor can measure DC currents to 75A.

It can be connected to all analog inputs: INPA3 and INPA4.

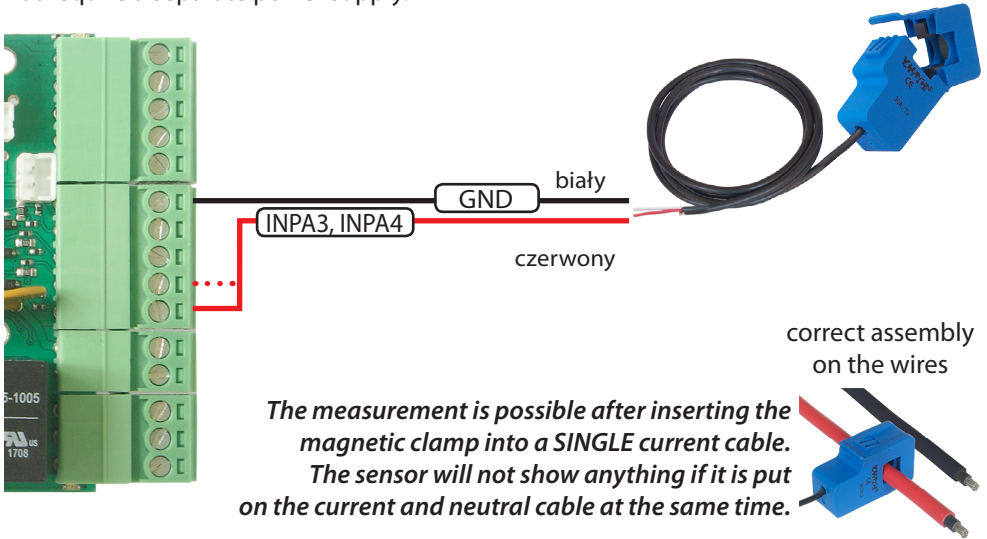
Power supply: + 3.3V (pin 3 of the output IDC10-1).



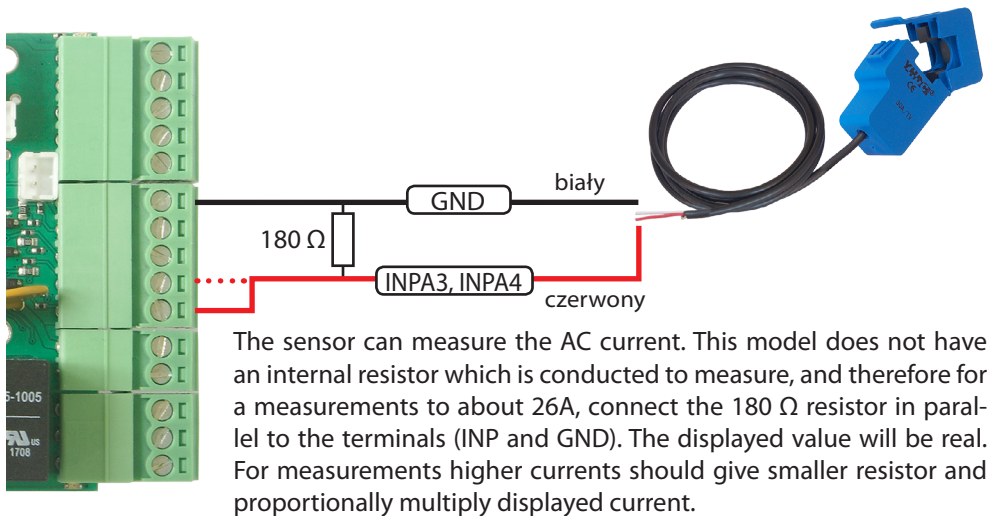
NOTE: The sensors can also be connected to the INPA1 and INPA2 inputs, but then we obtain a lower accuracy of the measurement.

5. Connection of the AC sensor SCT 013 030

The sensor can measure AC currents up to 30A with a resolution of about 50mA, but for a power supplies of low PF, measurement inaccuracies can be significant. The sensor does not require a separate power supply.



6. Connection of the AC sensor SCT 013 000

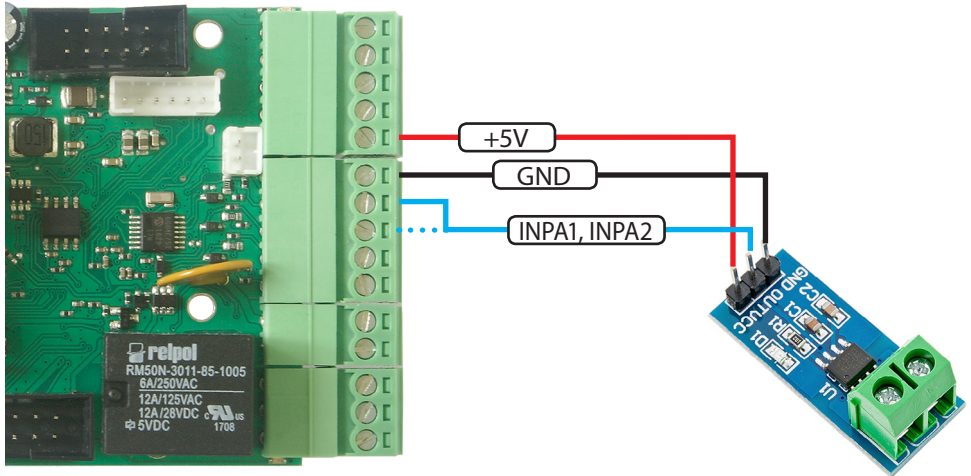


For example: to increase the range x3 (78A) must be used resistor 60,4 Ω
to increase the range x4 (104A), use a resistor of 45,3 Ω

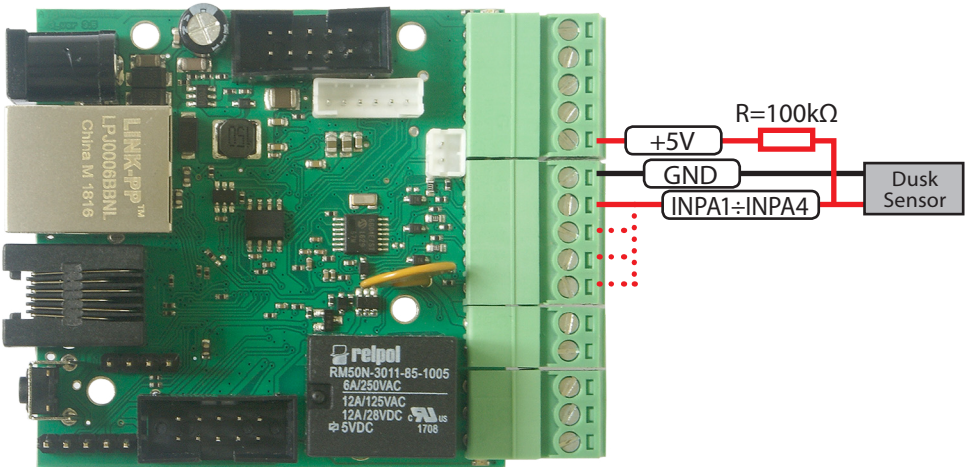
NOTE: The sensors can also be connected to the INPA1 and INPA2 inputs, but then we obtain a lower accuracy of the measurement.

7. Connection of 5V power/output sensors (on the example of ACS712)

The extended input voltage INPA1 and INPA2 up to 5 V allows to connect many analog sensors with 5V power supply and output signal up to 5V.

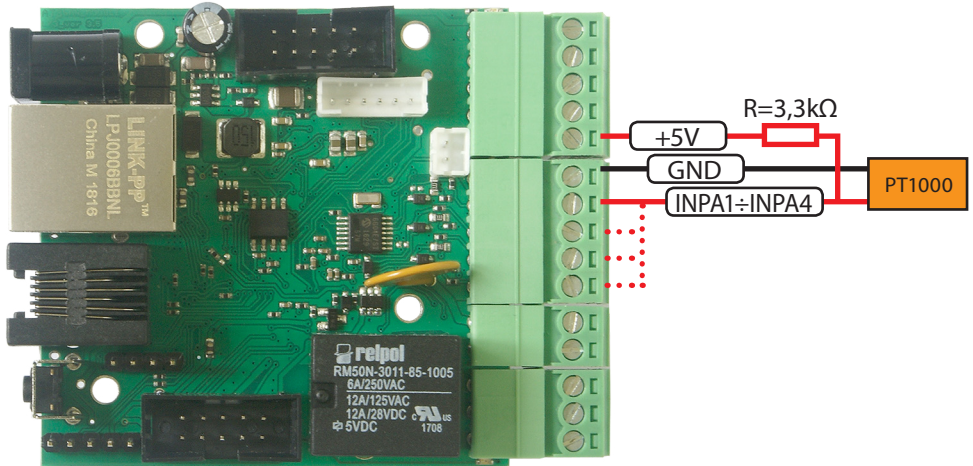


8. Connection of the dusk sensor



To enable the measurement to be in the "Input" choose for INPA1÷ NPA4 range of 3.3V. The day indicated voltage is close to 0, but with nightfall will grow significantly, up to about 2,9V in total darkness. This allows enough freely determine the point of switching night lighting.

9. Connection the PT1000 temperature sensor

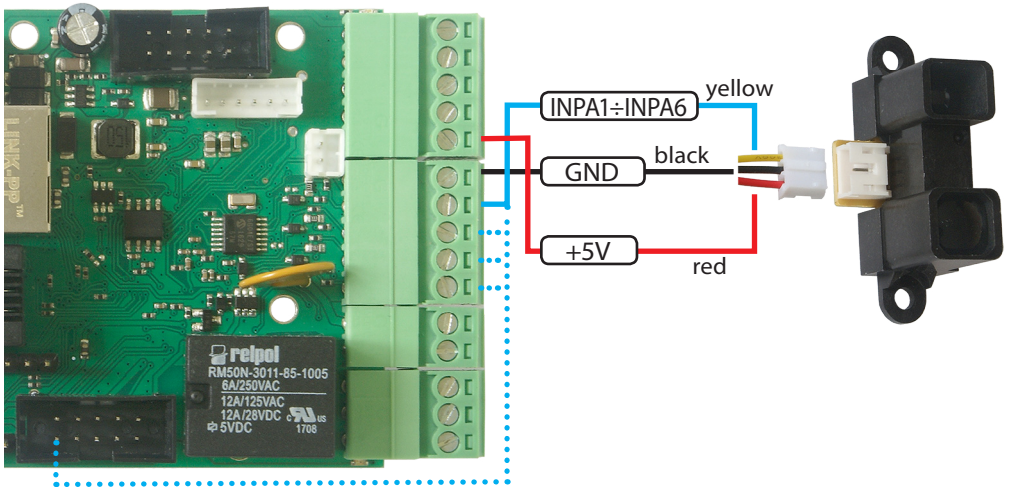


To enable the measurement to be in the "Input" to choose for INPA1÷INPA4 measurement PT1000.

Attention:

PT1000 analog sensor require calibration due to cable resistance.

10. Connection distance sensor



Sharp GP2Y0A02YK0F sensor allows measurements of distances in the range of 20 to 150 cm by using infrared reflection.

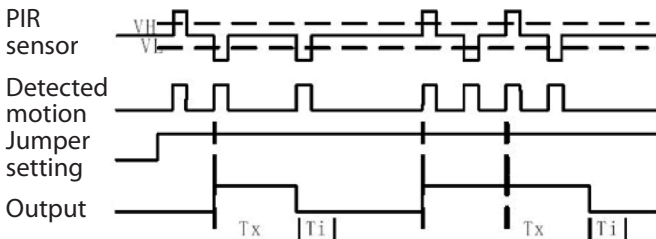
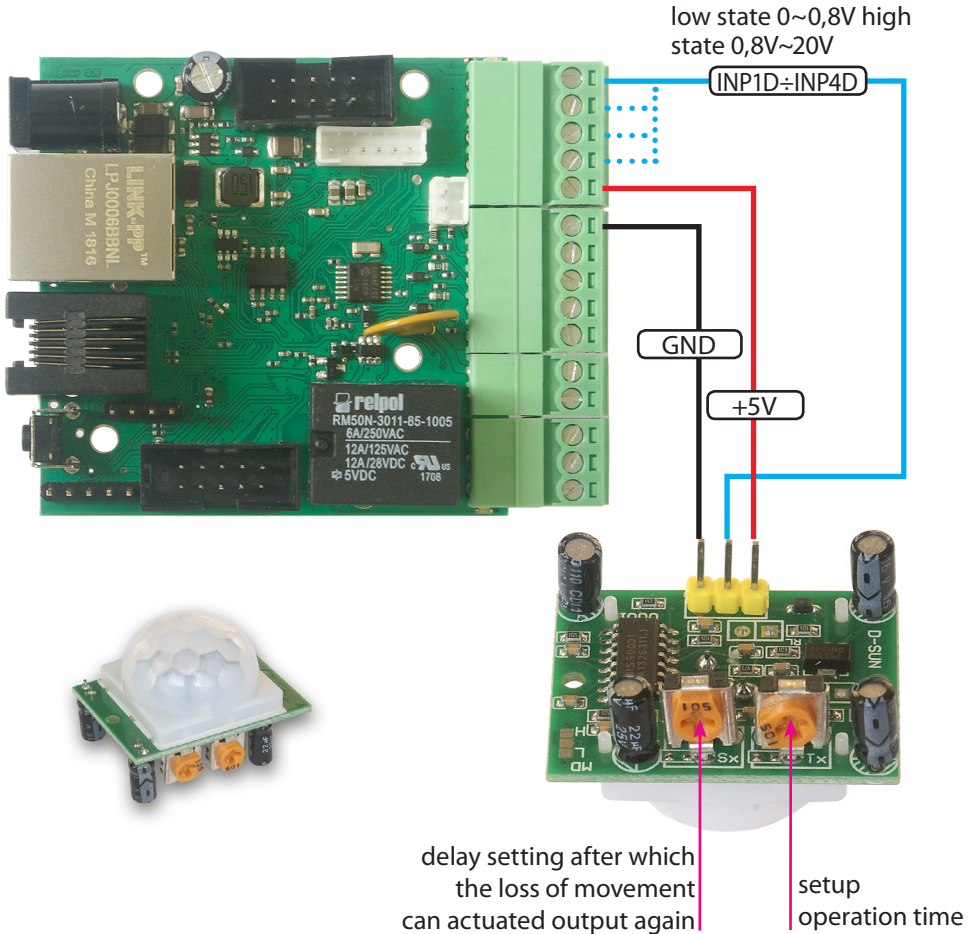
It can be connected to the inputs INPA1÷INPA6, set to 3.3V.

For a + 5V power supply output voltage will be highest for 20 cm (about 2,9V) and will decrease as the distance.

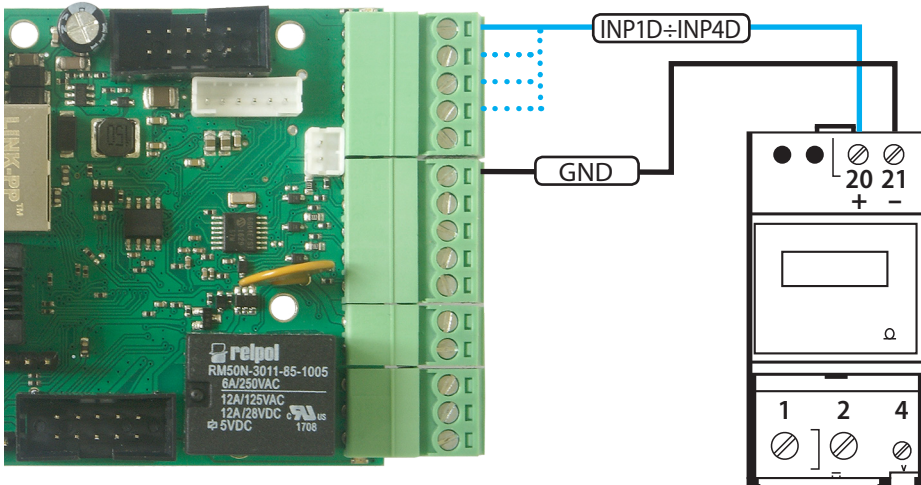
11. Connection of PIR motion/presence sensor

The sensor uses a analysis of the infrared radiation. Low state logic output is a state of rest, a state indicating the activity is high.

The detector can be adequately linked to + 5V, GND, and one of the digital inputs INP1D÷ INP4D, and then set its negation.



12. Energy measurement by means counter with pulse output



The outputs of the counter: "S-" is connected to GND, and the "S+" to logic inputs INP1D÷INP4D. In the "Power / Energy" choose the correct input on the menu, and then in the window below, enter conversion imp / kWh, which is characterized by a connected counter.

Lan Controller V3 software update

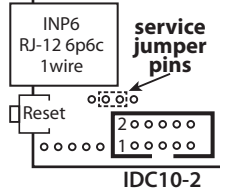
1. Download the new version of the firmware from the:

<https://tinycontrol.pl/en/documentation-and-firmware/>

2. Prepare any **tftp client** software (eg. *tftp32*) to send the downloaded file to Lan Controller being in „**bootloader**” mode. For this purpose, in the Lan Controller menu „**Firmware upgrade**” select **Bootloader Start** and run the tftp client.

3. Watch progress of file loading and whether has successfully been updated. After restarting Lan Controller is ready for operation.

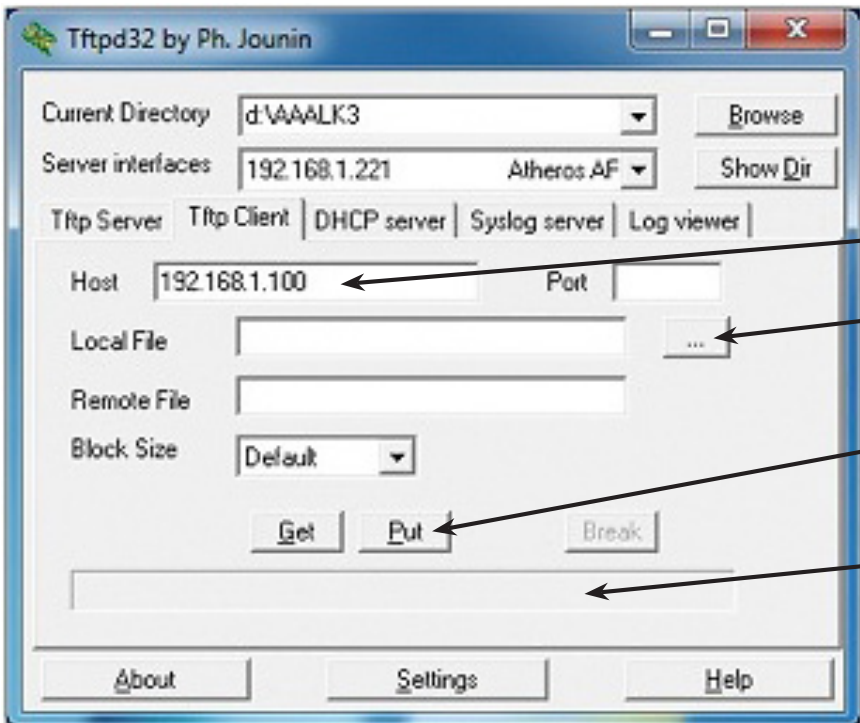
An alternative way of switching Lan Controller into „bootloader” mode (if we can not log in to the Lan Controller): 1. disconnect the power supply, 2. short pins „**service jumper pins**”, 3. connect the power supply - Lan Controller starts in bootloader mode and will wait for the file.



Upgrade using the *tftp32* or *tftp64* programs (WINDOWS)

http://tftp32.jounin.net/tftp32_download.html

When the program starts, select computer interface (Server interfaces) is connected to Lan Controller and select service **Tftp Client**. In the **Host (1)** enter the address of our Lan Controller. Then, when Lan Controller is in bootloader mode, by pressing button (2) next to **Local File**, select the file to upgrade the firmware (the *.bin* extension). Press button **Put (3)** - after a moment should appear below the progress bar of the file upload (**box 4**). After the message about successfully uploaded files can be reset Lan Controller.



NOTES

Contents of the instructions is regularly checked and if necessary corrected. If the observations errors or inaccuracies, please contact us. It can not be ruled out that, despite best efforts, however, some discrepancies arose. To get the latest version, please contact us or distributors.

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