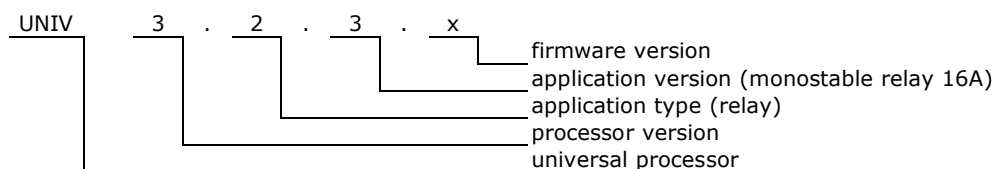


### 1. Features

- Controller of 6 monostable 16A relays.
- Operation voltage 16-24V DC
- Maximum current consumption from the bus 160mA
- For DIN rail mounting.
- Dimensions 90x106x53 mm (6 mod)
- Operating of module depends on firmware uploaded into it.
- Schematic and PCB design can be downloaded from [hapcan.com](http://hapcan.com) site



### 2. Application version



### 3. Technical data

#### Bus side

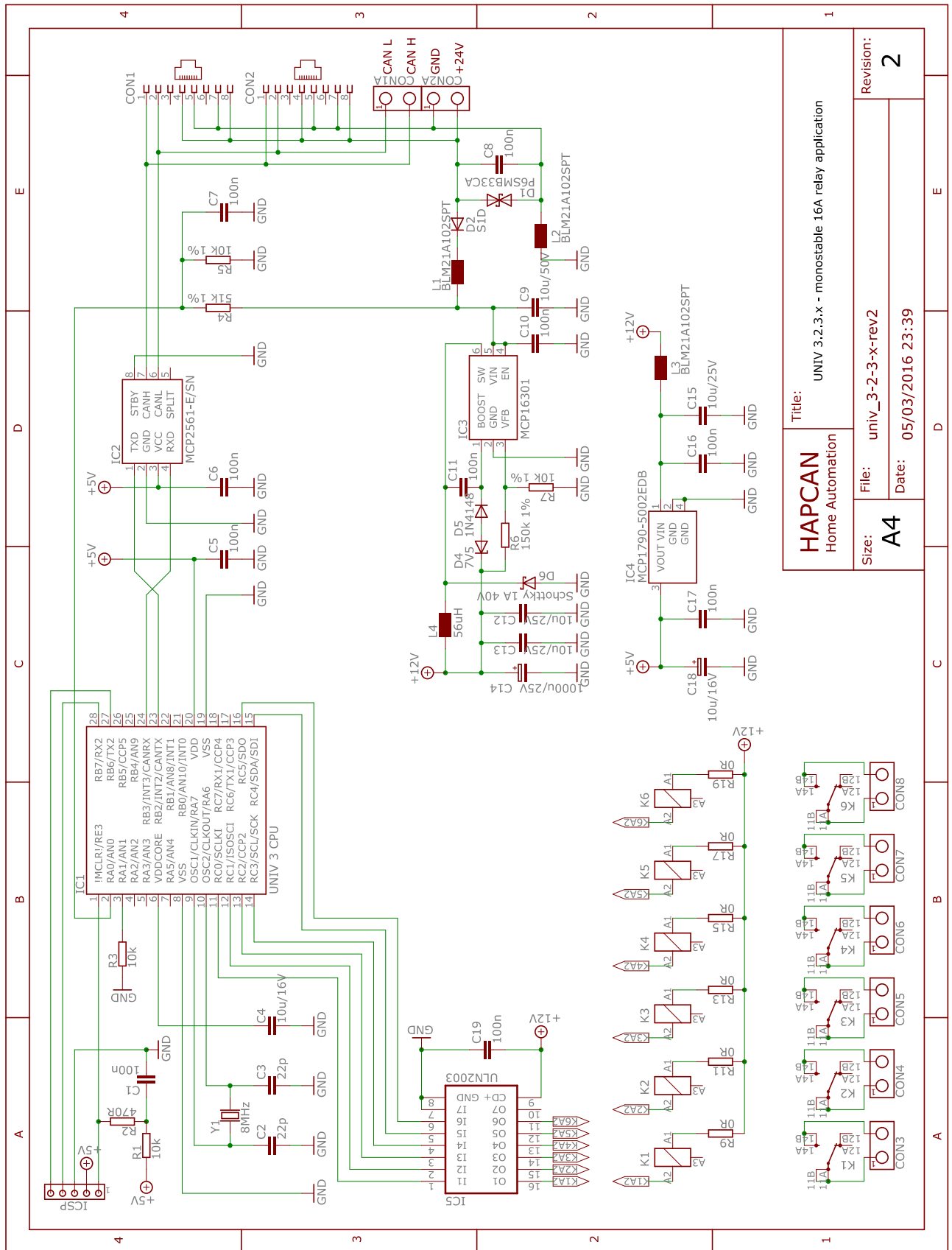
Parameter	Symbol	Value	Unit
Power supply voltage	$U_s$	16-24	V DC
Current consumption (power consumption)	$I_s$	6 @24V (144mW) 8 @16V (128mW)	mA
Maximum current consumption (when 6 relays are switched on)	$I_{smax}$	110 @24V (2,64W) 160 @16V (2,56W)	mA
Bus connector type		2x RJ45	

#### Relay side

Parameter	Symbol	Relay type			
		SCHRACK RT314012	SCHRACK RTS3L012	SCHRACK RTS3T012	OMRON G5RL-1-E-HR-12DC
Coil voltage	$U_{COIL}$	12V DC			
Coil resistance	$R_{COIL}$	360 $\Omega$	360 $\Omega$	360 $\Omega$	360 $\Omega$
Nominal contacts voltage	$U_N$	250V AC / 30V DC			
Nominal continuous current	$I_N$	16A			
Maximum inrush current	$I_{INRUSH}$	30A/4s	30A/4s 120A/20ms	30A/4s 120A/20ms 800A/200 $\mu$ s	100A
Connector type	-	Terminal block (solid cable 4mm <sup>2</sup> , stranded 2,5mm <sup>2</sup> )			

**4. Hardware**

**4.1. Schematic**



<p><b>HAPCAN</b> Home Automation</p>		<p>Title: UNIV 3.2.3.x - monostable 16A relay application</p>	
		<p>File: univ_3-2-3-x-rev2</p>	<p>Revision: 2</p>
<p>Size: A4</p>	<p>Date: 05/03/2016 23:39</p>		

Figure 1. Schematic of monostable relay application UNIV 3.2.3.x

### 4.2. Wiring

**⚠ WARNING.** This module must be connected only to **one phase** of mains.

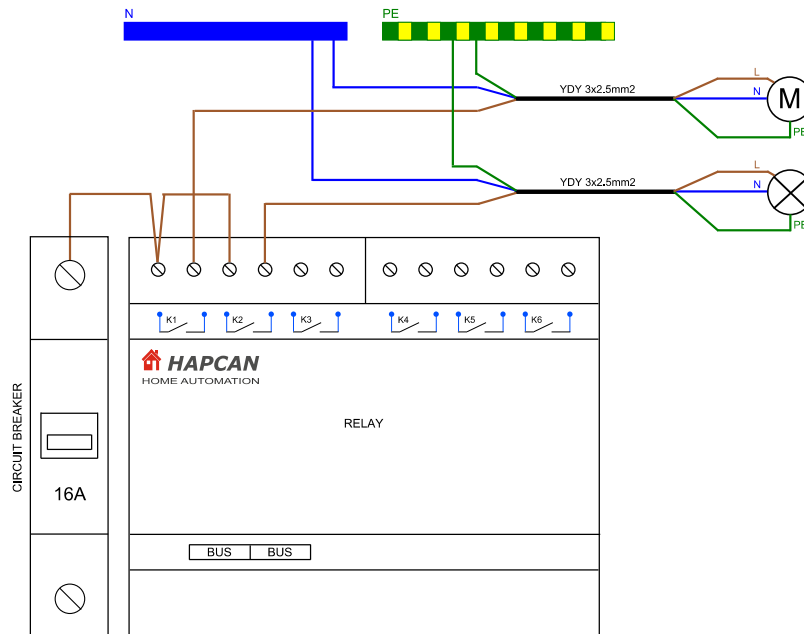
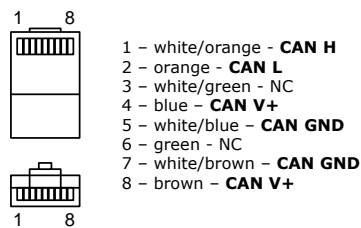


Figure 2. Relay wiring.

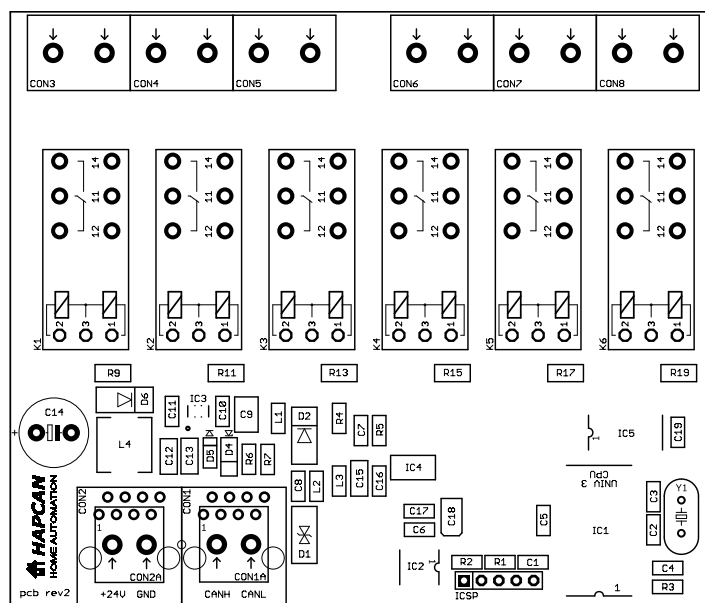


Note that if module is first or last on the bus, the terminator (resistor 120 Ohm) must be plugged into one of BUS ports.

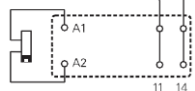
Figure 3. RJ45 bus connector wiring.

### 4.3. Assembly schematic

- Printed circuit board *PCB UNIV 3.2.(3-4).x* for UNIV 3.2.3.x module
- PCB dimensions: 103mm x 86.5mm

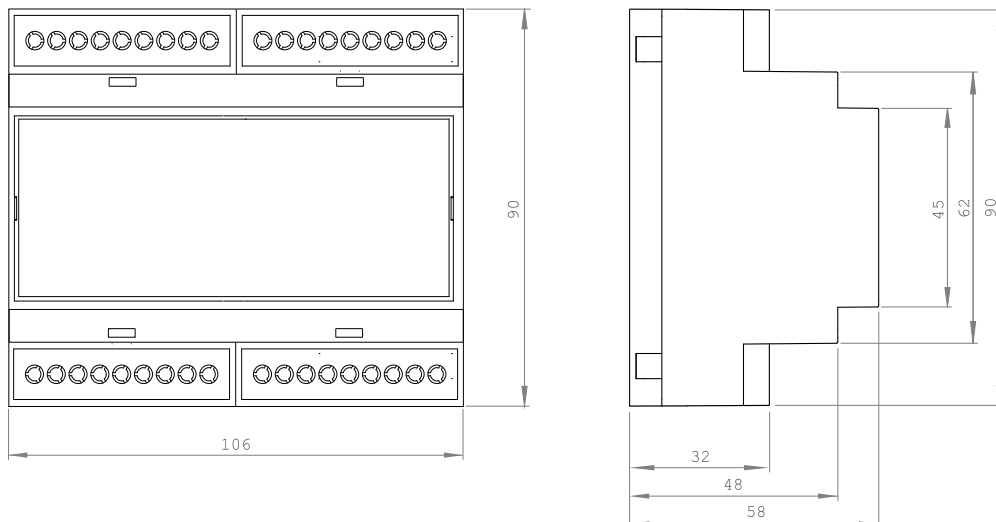


#### 4.4. Components

Designator	Quantity	Type	Footprint	Description
C1, C5, C6, C7, C8, C10, C11, C16, C17, C19	10	100nF/50V ±10%	0805	Ceramic capacitor
C2, C3	2	22pF/50V ±10%	0805	Ceramic capacitor
C4	1	10uF/16V ±10%	0805	Ceramic capacitor
C9	1	10uF/50V ±10%	1206, 1210	Ceramic capacitor
C12, C13, C15	3	10uF/25V ±10%	1206	Ceramic capacitor
C14	1	1000uF/25V	ø10, raster 5mm	Electrolytic capacitor tht
C18	1	10uF/16V ±10%	SMA, SMB	Tantalum capacitor
R1, R3	2	10k	0805	Resistor
R2	1	470 Ohm	0805	Resistor
R4	1	51k 1%	0805	Resistor
R5, R7	2	10k 1%	0805	Resistor
R6	1	140k 1%	0805	Resistor
R9, R11, R13, R15, R17, R19	6	0 Ohm	1206	Resistor
L1, L2, L3	3	BLM21A102SPT	0805	Choke Murata
L4	1	DER0705-56	7.6mm x7.6mm	Choke Ferrocere
Y1	1	8MHz	HC49-S	Quartz crystal
D1	1	P6SMB33CA	DO-214	Transil diode
D2	1	100V 1A	DO-214	Rectifying diode
D4	1	Zenera 7V5 0.5W	MiniMELF	Zener diode
D5	1	1N4148	0805	Rectifying diode
D6	1	MBRS140T3G	DO-214	Shottky diode
IC1	1	UNIV 3 CPU	SOIC-28	HAPCAN universal processor
IC2	1	MCP2561-E/SN	SOIC-8	CAN transceiver Microchip
IC3	1	MCP16301T-I/CHY	SOT-23-6	DC/DC converter Microchip
IC4	1	MCP1790-5002EDB	SOT-223	Voltage regulator Microchip
IC5	1	ULN2003	SOIC-16	Darlington transistors arrays
CON1, CON2	2	95501-2881	8pin RJ45	Connector RJ45 Molex
CON3, CON4, CON5, CON6, CON7, CON8	6	AK710/2-7.5-V-green	raster 7.5mm	Terminal block PTR Messtechnik
K1, K2, K3, K4, K5, K6	6	Finder 95.15.2		Relay socket Finder
K1, K2, K3, K4, K5, K6	6	RT314012 SCHRACK contacts 16A/250V coil 12V/33mA	L29xW12,7xH16	Monostable relay 

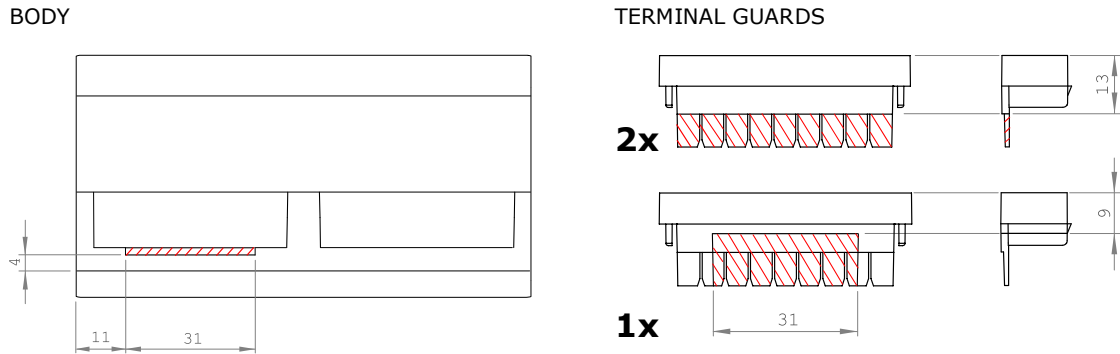
#### 4.5. Enclosure

- Gainta D6MG enclosure (6 modules wide)
- Dimensions: 90mm x 58mm x 106mm



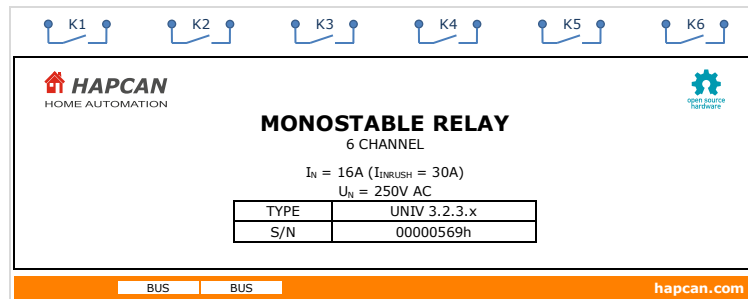
**4.6. Mechanical processing**

Striped parts must be removed.



**4.7. Label**

Editable label version is available at [hapcan.com](http://hapcan.com) website.



**5. Commissioning**

**5.1. CPU voltage measurement**

After verifying the correctness and quality of the soldering, the bus voltage should be connected while measuring the processor voltage. To do this, connect a voltmeter to pins 2 and 3 of the ICSP connector. Processor supply voltage should be about 5V.

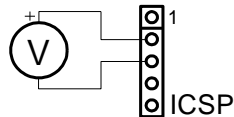


Figure 4. CPU voltage measurement

**5.2. Checking the CPU clock**

Proper operation of the CPU can be checked by temporarily connecting the LED to pins 3 and 5 of the ICSP connector. When device is powered, the LED should light up four times in the sequence 1 second on - 1 second off - 1 second on. The LED lights up only once for 50ms, if the processor is in programming mode.

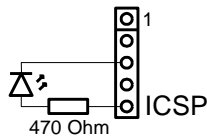


Figure 5. Checking the CPU clock

**5.3. Firmware uploading**

The device requires a firmware uploading for proper operation. It can be done with HAPCAN Programmer software. Both, firmware and HAPCAN Programmer can be downloaded from [hapcan.com](http://hapcan.com) website.

## 6. License



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## 7. Document version

File	Hardware Revision	Description	Date
univ_3-2-4-x_a_pl.pdf	rev1	Original version	July 2013
univ_3-2-4-x_b_pl.pdf	rev1	Changing enclosure	May 2014
univ_3-2-4-x_c_pl.pdf	rev2	Module with only 1-coil relays placed on sockets. Power supply change.	March 2016