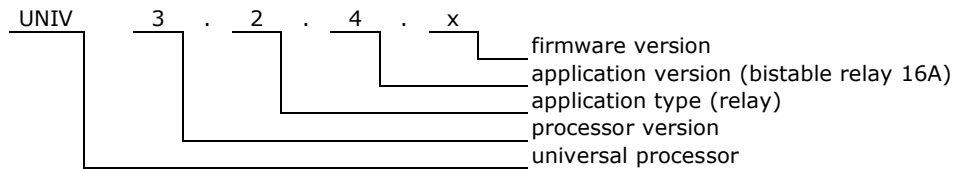


### 1. Features

- Controller of 6 bistable 16A relays. These relays take energy only when switching from one state to the other
- 1-coil relay with sockets are used
- Module available in two versions:
  - utilizing relays with inrush current up to 30A
  - utilizing relays with inrush current up to 320A
- Operation voltage 16-24V DC
- Current consumption from the bus 8.3mA
- 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

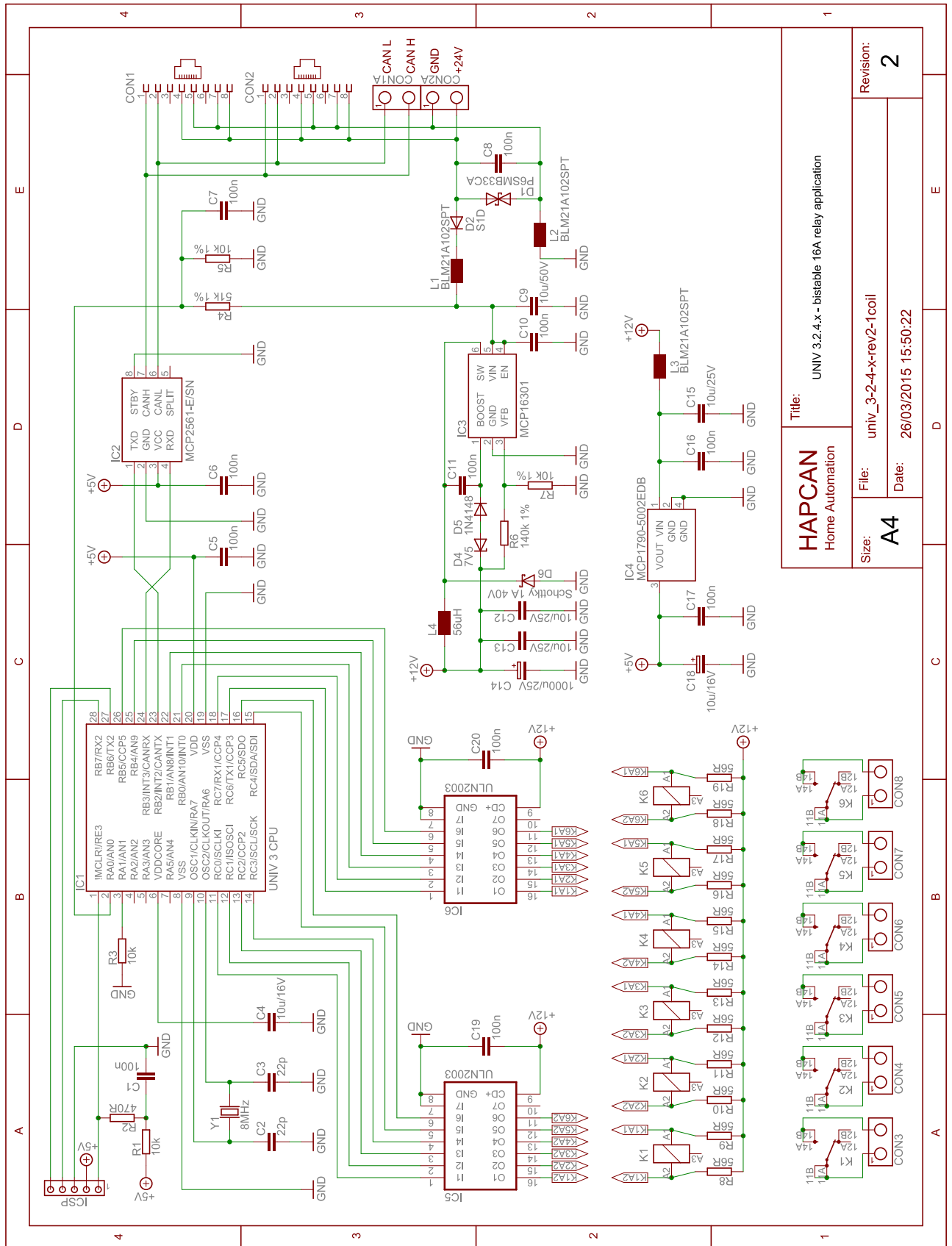
Parameter	Symbol	Value	Unit
Power supply voltage	$U_s$	16-24	V DC
Current consumption (power consumption)	$I_s$	8.3 @ 24V (200mW) 11 @ 16V (176mW)	mA
Maximum current consumption (during relay switching with coil resistance 220 $\Omega$ , switching time: $t_s \approx 40ms$ )	$I_{smax}$	160 @ 24V	mA
Bus connector type		2x RJ45	

#### Relay side

Parameter	Symbol	Relay type				
		SCHRACK RT314A12	SCHRACK RTS3LA12	SCHRACK RTS3TA12	SCHRACK RTX3-1AT-B012	OMRON G5RL-U1-E-12DC
Coil voltage	$U_{COIL}$	12V DC				
Coil resistance	$R_{COIL}$	360 $\Omega$	360 $\Omega$	360 $\Omega$	220 $\Omega$	240 $\Omega$
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 165A/20ms	30A/4s 200A/20ms 320A/200us	150A
Connector type	-	Terminal block (solid cable 4mm <sup>2</sup> , stranded 2,5mm <sup>2</sup> )				

**4. Hardware**

**4.1. Schematic**



<b>HAPCAN</b> Home Automation		Title: UNIV 3.2.4.x - bistable 16A relay application	
Size: <b>A4</b>	File: univ_3-2-4-x-rev2-1coil	Revision: <b>2</b>	
	Date: 26/03/2015 15:50:22		

Figure 1. Schematic of bistable relay application UNIV 3.2.4.x – version with 1-coil relay

**4.2. Wiring**

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

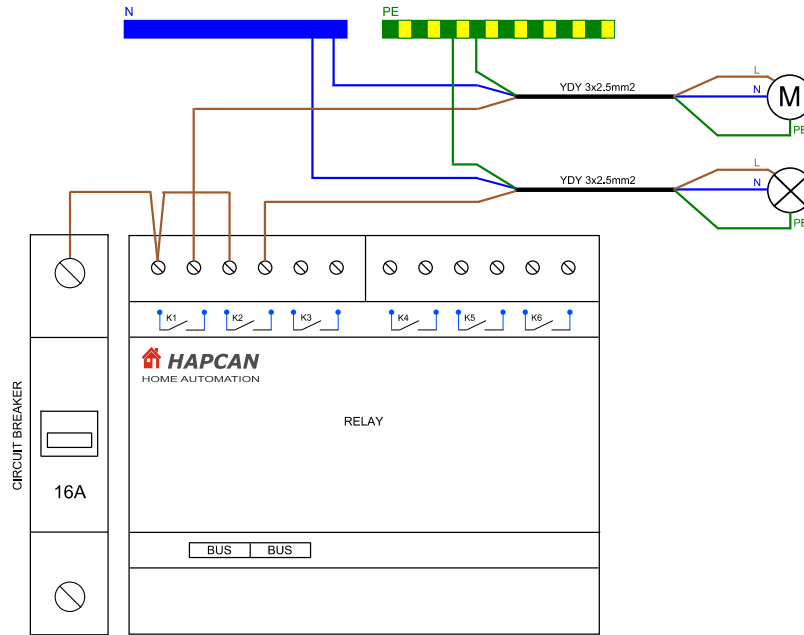
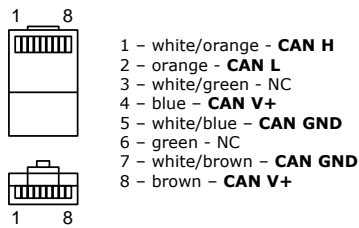


Figure 2. Relay wiring.

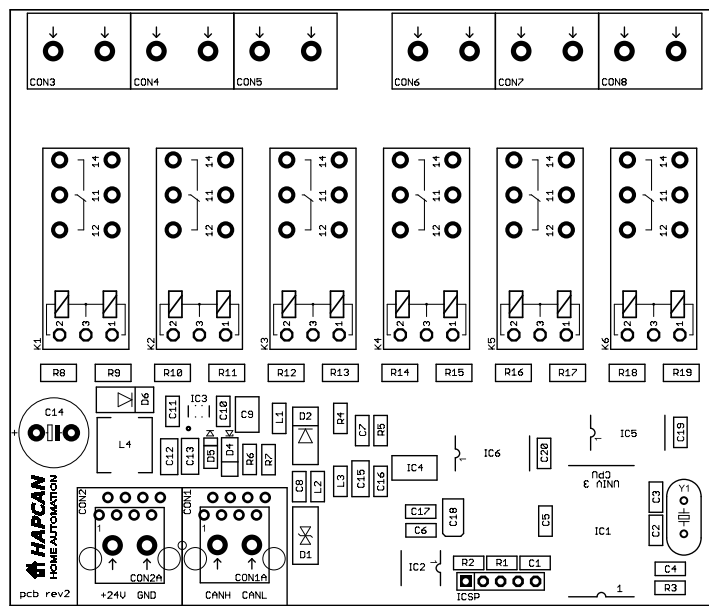


Note that if module is first or last on the bus, the terminator (resistor 120 Ohm) must be plugged into one of BUS ports.

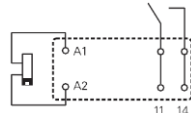
Figure 3. RJ45 bus connector wiring.

**4.3. Assembly schematic**

- Printed circuit board *PCB UNIV 3.2.(3-4).x* for UNIV 3.2.4.x module
- PCB dimensions: 103mm x 86.5mm

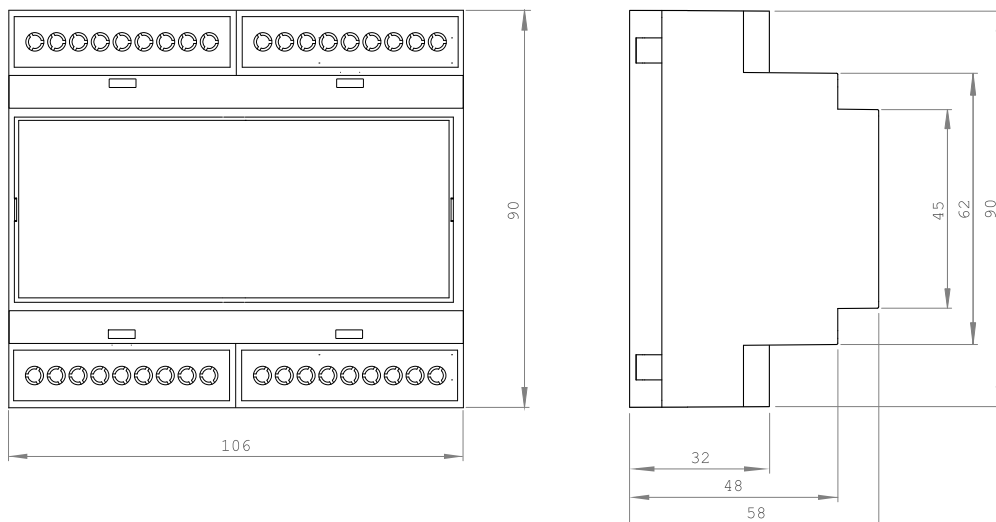


#### 4.4. Components

Designator	Type	Footprint	Description
C1, C5, C6, C7, C8, C10, C11, C16, C17, C19, C20	100nF/50V ±10%	0805	Ceramic capacitor
C2, C3	22pF/50V ±10%	0805	Ceramic capacitor
C4	10uF/16V ±10%	0805	Ceramic capacitor
C9	10uF/50V ±10%	1206, 1210	Ceramic capacitor
C12, C13, C15	10uF/25V ±10%	1206	Ceramic capacitor
C14	1000uF/25V	ø10, raster 5mm	Electrolytic capacitor tht
C18	10uF/16V ±10%	SMA, SMB	Tantalum capacitor
R1, R3	10k	0805	Resistor
R2	470 Ohm	0805	Resistor
R4	51k 1%	0805	Resistor
R5, R7	10k 1%	0805	Resistor
R6	140k 1%	0805	Resistor
R8, R9, R10, R11, R12, R13, R14, R15, R16, R17, R18, R19	56 Ohm	1206	Resistor
L1, L2, L3	BLM21A102SPT	0805	Choke Murata
L4	DER0705-56	7.6mm x7.6mm	Choke Ferrocore
Y1	8MHz	HC49-S	Quartz crystal
D1	P6SMB33CA	DO-214	Transil diode
D2	100V 1A	DO-214	Rectifying diode
D4	Zenera 7V5 0.5W	MiniMELF	Zener diode
D5	1N4148	0805	Rectifying diode
D6	MBRS140T3G	DO-214	Shottky diode
IC1	UNIV 3 CPU	SOIC-28	HAPCAN universal processor
IC2	MCP2561-E/SN	SOIC-8	CAN transceiver Microchip
IC3	MCP16301T-I/CHY	SOT-23-6	DC/DC converter Microchip
IC4	MCP1790-5002EDB	SOT-223	Voltage regulator Microchip
IC5, IC6	ULN2003	SOIC-16	Darlington transistors arrays
CON1, CON2	95501-2881	8pin RJ45	Connector RJ45 Molex
CON3, CON4, CON5, CON6, CON7, CON8	AK710/2-7.5-V-green	raster 7.5mm	Terminal block PTR Messtechnik
K1, K2, K3, K4, K5, K6	Finder 95.15.2		Relay socket Finder
K1, K2, K3, K4, K5, K6	RT314A12 SCHRACK contacts 16A/250V coil 12V/33mA	L29xW12,7xH16	Bistable 1-coil relay 

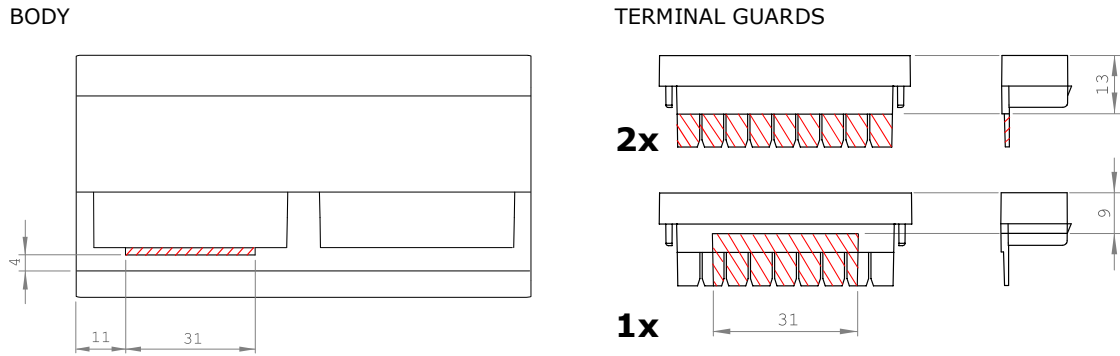
#### 4.5. Enclosure

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



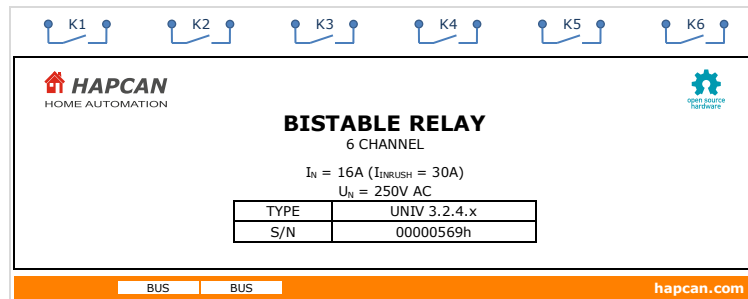
**4.6. Mechanical processing**

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.

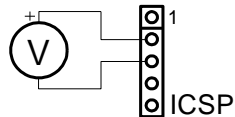


Figure 4. CPU voltage measurement

**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.

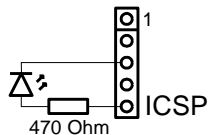


Figure 5. Checking the CPU clock

**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	General correction	September 2013
univ_3-2-4-x_c_pl.pdf	rev1	Enclosure change	May 2014
univ_3-2-4-x_d_pl.pdf	rev2	Module with only 1-coil relays placed on sockets. Power supply change.	March 2015