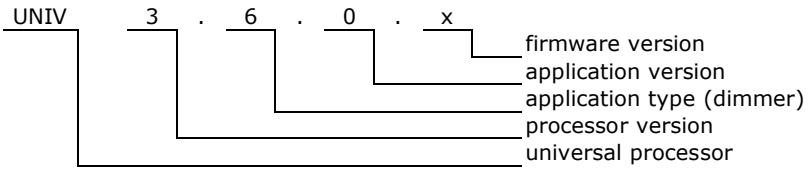
1. Features

- Light dimmer for maximum load 250W
- - Phase controlled (trailing edge)
- RC - Suitable for resistive and capacitive loads:
  - incandescent lamps (classic and halogen 230V) – maximum load 250W
  - dimmable electronic transformers – maximum load 250W
  - LED dimmable LED 230V lamps – maximum load 50W
- It has electronic thermal protection
- Blow fuse for overload and short-circuit protection
- Operation voltage 10-24V.
- Maximum current consumption from the bus 8mA.
- For DIN rail mounting.
- Dimensions 90x58x36 mm (2 mod)
- Operating of module depends on firmware uploaded into it.
- Schematic and PCB design can be downloaded from hapcan.com site

WARNING. MAINS VOLTAGES ARE ACCESSIBLE WHEN THE COVER IS REMOVED. ENSURE ANY EXTERNAL WIRING IS CARRIED OUT SAFELY. IN ANY DOUBT CONSULT A SUITABLY QUALIFIED PERSON. PLEASE TAKE CARE WITH MAINS ELECTRICITY.

2. Application version



3. Technical data

Bus side

Parameter	Symbol	Value	Unit
Power supply voltage	U_S	10-24V	V
Maximum current consumption	I_{SMAX}	8	mA
Bus connector type	2x RJ45 connectors		

Load side

Parameter	Symbol	Value	Unit
Power supply voltage	U_N	230	V AC
Power supply frequency	f_N	50	Hz
Maximum load			
Classical and halogen 230V lamps, low voltage lamps with electronic transformer	P_{LOAD}	250	W
LED 230V lamps		50	
Voltage regulating range	U_φ	0 – U_N	V
Standby power consumption	P_0	<1	W
Quick acting fuse 5x20mm		1.25	A
Connector type	Terminal block (solid cable 4mm^2, stranded 2,5mm^2)		

4. Hardware

4.1. Schematic

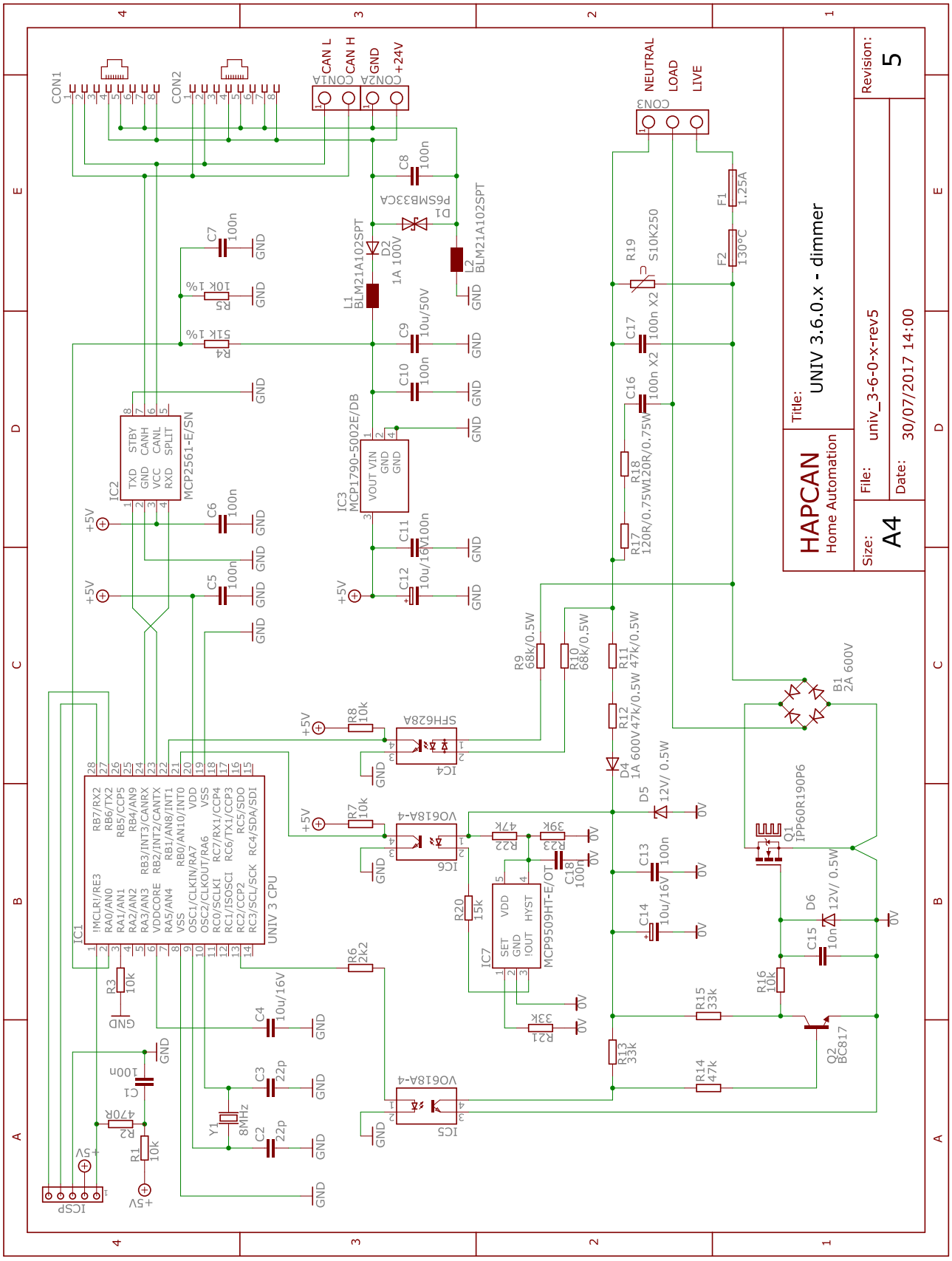


Figure 1. Schematic of UNIV 3.6.0.x module

4.2. Wiring

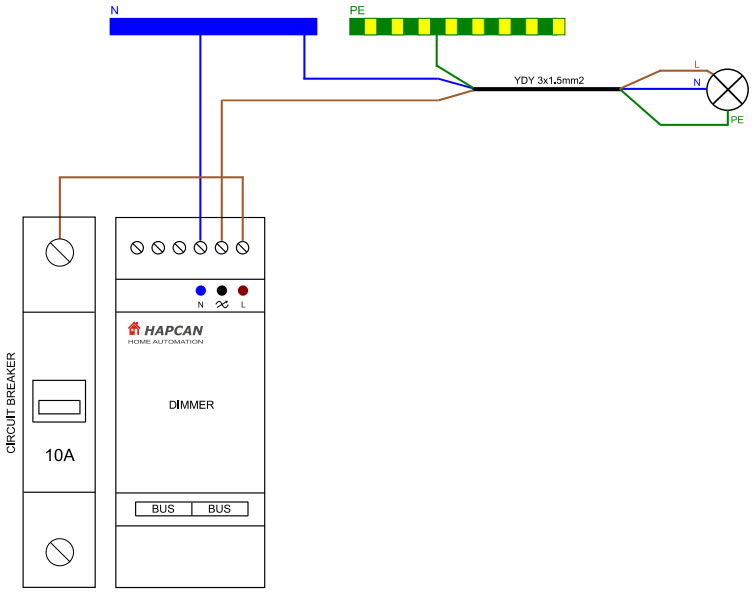
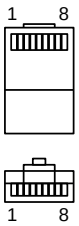


Figure 2. Wiring diagram



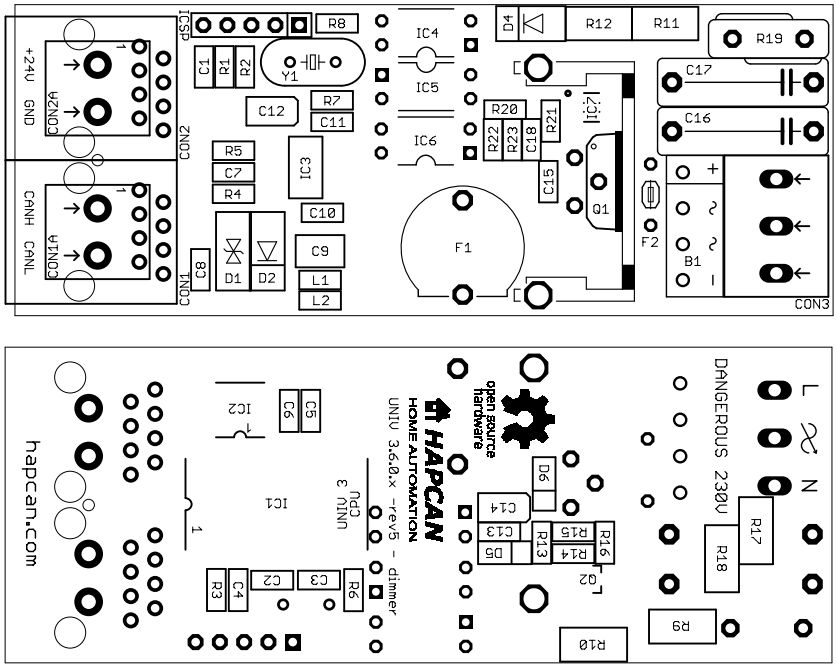
1 – white/orange - **CAN H**
2 – orange - **CAN L**
3 – white/green - NC
4 – blue – **CAN V+**
5 – white/blue – **CAN GND**
6 – green - NC
7 – white/brown – **CAN GND**
8 – brown – **CAN V+**

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 boards *PCB UNIV 3.6.0.x* for UNIV 3.6.0.x module
- PCBs dimensions: 86.5mm x 33mm

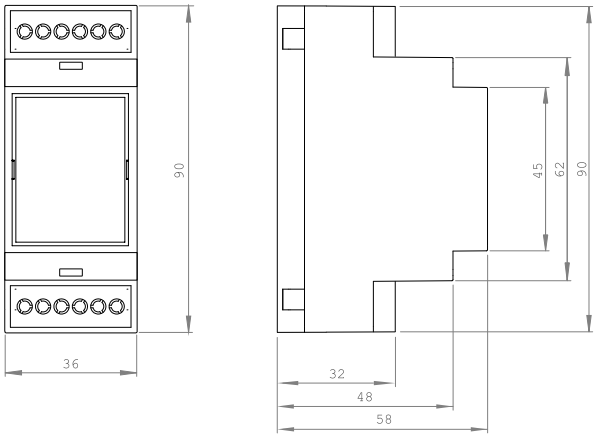


4.4. Components

Designator	Type	Footprint	Description
C1, C5, C6, C7, C8, C10, C11, C13, C18	100nF/50V ±10%	0805	Capacitor
C2, C3	22pF/50V ±10%	0805	Capacitor
C4	10uF/16V ±10% X5R	0805	Capacitor
C9	10uF/50V ±10%	1206, 1210	Capacitor
C12, C14	10uF/16V ±10%	SMA, SMB	Tantalum capacitor
C15	10nF/50V ±10%	0805	Capacitor
C16, C17	100nF/275VAC X2	Raster 15mm	Polypropylene capacitor
R1, R3, R7, R8, R16	10k	0805	Resistor
R2	470 Ohm	0805	Resistor
R4	51k 1%	0805	Resistor
R5	10k 1%	0805	Resistor
R6	2k2	0805	Resistor
R9, R10	68k/0.75W	2010	Resistor
R11, R12	47k/0.75W	2010	Resistor
R17, R18	120 Ohm /0.75W	2010	Resistor
R20	15k	0805	Resistor
R13, R15, R21	33k	0805	Resistor
R14, R22	47k	0805	Resistor
R23	39k	0805	Resistor
R19	S10K250	Raster 7.5mm	Varistor
L1, L2	BLM21A102SPT	0805	Murata choke
Y1	8MHz	HC49-S	Quartz crystal
D1	P6SMB33CA	DO-214	Transil diode
D2	S1B	DO-214	Rectifying diode
D4	SM4005	MELF	Rectifying diode
D5, D6	12V/ 0.5W	MINIMELF	Zener diode
IC1	UNIV 3 CPU	SOIC-28	HAPCAN universal processor
IC2	MCP2561-E/SN	SOIC-8	Microchip CAN transceiver
IC3	MCP1790-5002EDB	SOT-223	Microchip Voltage regulator
IC4	SFH628A	DIL-04	Photocoupler Vishay
IC5, IC6	VO618A-4	DIL-04	Photocoupler Vishay
IC7	MCP9509HT-E/OT	SOT-23-5	Microchip temperature sensor
Q1	IPP60R190P6	TO-220	MOSFET transistor Infineon
Q2	BC817	SOT-23	Transistor
H	HS003		Heatsink Stonecold
M	M3x10mm		Bolt and nut
B1	KBP206G	15x10x4, raster 3,75mm	Rectifying bridge
F1	PTF/45	Raster 10mm	Fuse holder Stelvio Kontek
F1	1,25A quick acting	5x20mm	Fuse
F2	TZ-P130/2	6x6,5x2,8mm	Termal fuse Proffuse
CON1, CON2	95501-2881	L18xW15xH11	Molex RJ45 connector
CON3	AK700/3-5.0-V-GREEN-BR	L15xW10.5xH19 raster=5mm	PTR Messtechnik Terminal block

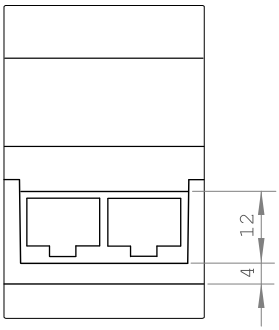
4.5. Enclosure

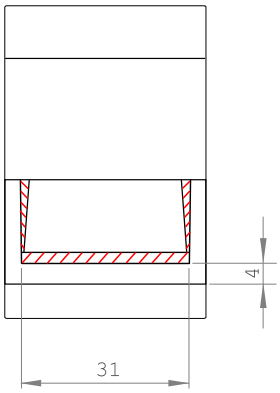
- Gainta D2MG enclosure (2 modules wide)
- Dimensions: 90mm x 58mm x 36mm



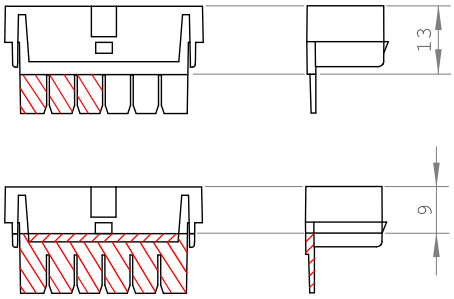
4.6. Mechanical processing
Striped parts must be removed.

BODY

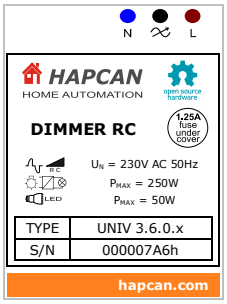




TERMINAL GUARDS



4.7. Labels
Editable labels version is available on hapcan.com site.



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.

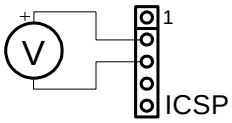


Figure 4. CPU voltage measurement

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.

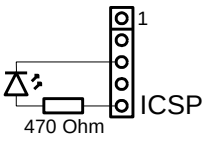


Figure 5. Checking the CPU clock

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 website.

6. License

7. Document version

File	Hardware Revision	Description	Date
univ_3-6-0-x_a_pl.pdf	rev5	Initial version	May 2015
univ_3-6-0-x_b_pl.pdf	rev5	Updated components in 4.1 and 4.4	July 2017