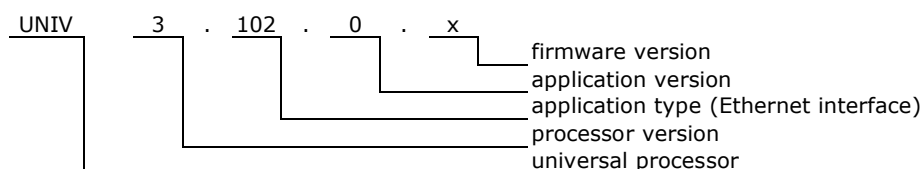


1. Features

- Ethernet interface for HAPCAN system.
- Uses Tibbo miniature programmable Ethernet EM500 module
- 512kB build into Tibbo module and 1MB external flash memory for firmware; 200 bytes of EEPROM space for data storage
- Supports 10/100BaseTX
- Supports auto-MDIX
- Build in Real Time Clock
- Operation voltage 10-24V
- Current consumption 60mA
- For DIN rail mounting.
- Dimensions 90x58x36 mm (2 mod)
- Operating of module depends on firmwares uploaded into it (Tibbo and UNIV 3 firmwares)



2. Application version



3. Technical data

Bus side

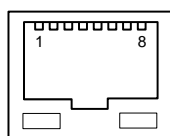
Parameter	Symbol	Value	Unit
Power supply voltage	U_s	10-24V	V
Current consumption	I_s	150@10V, 60@24V	mA
Bus connector type	2x RJ45 connectors		

Ethernet port side

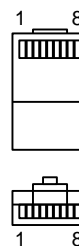
Parameter	Unit
Connector	RJ45 auto-MDIX
Status LEDs	Bright LEDs flashing means active 10/100BaseTX link. Flashing patterns depend on firmware installed in Tibbo

4. Hardware

4.1. Wiring



1 - Tx+ 5 - NC
2 - Tx- 6 - Rx-
3 - Rx+ 7 - NC
4 - NC 8 - NC



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, resistor 120ohm must be connected between pins CAN H and CAN L.

Figure 1. RJ45 10/100 BaseTX Ethernet connector.

Figure 2. RJ45 bus connector.

4.2. Schematic

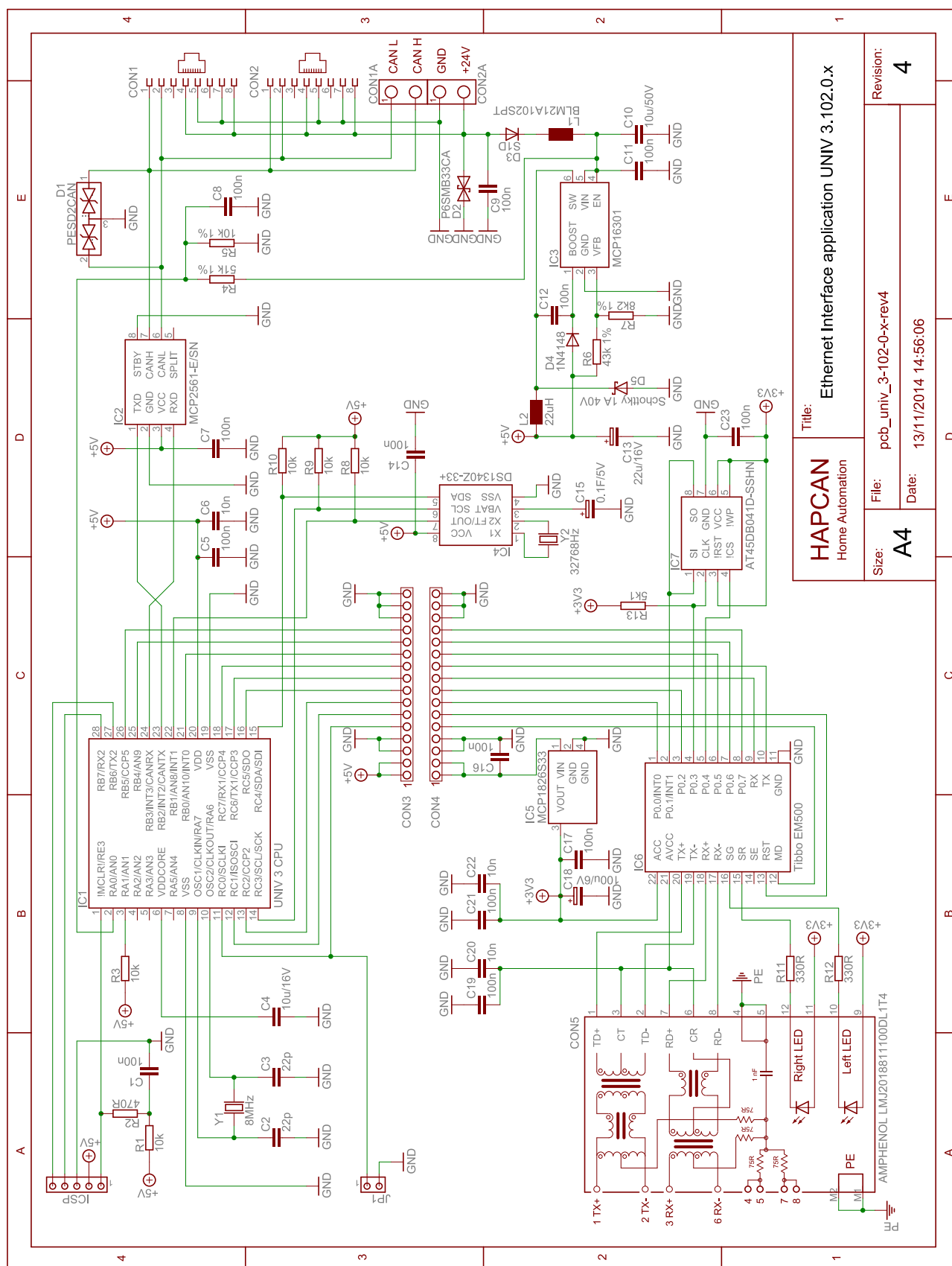
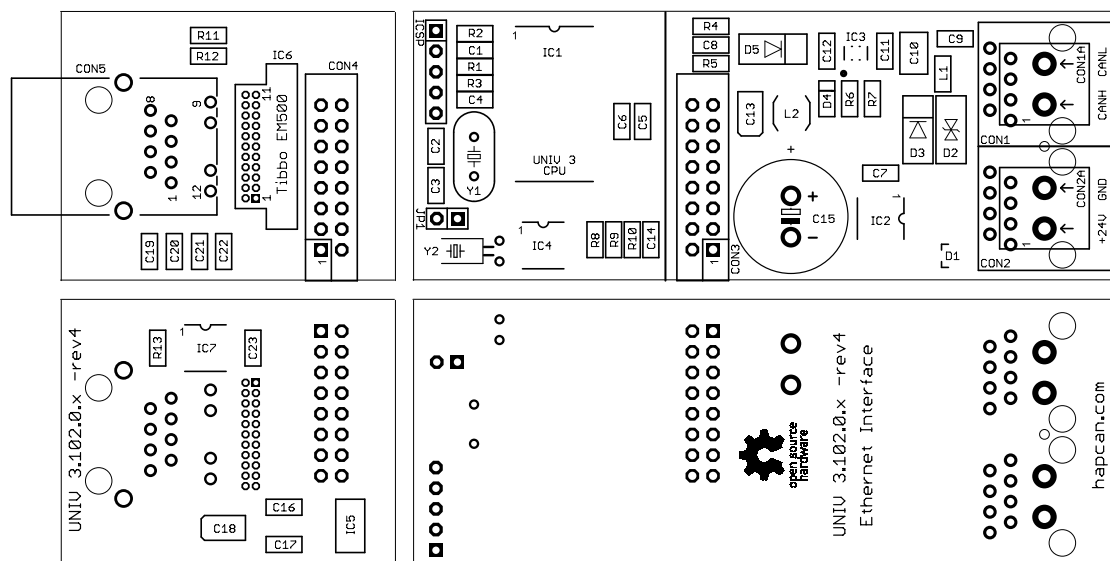


Figure 3. Schematic of UNIV 3.102.0.x application

4.3. Assembly schematic

- Printed circuit boards for UNIV 3.102.0.x application
- PCBs dimensions: 86.5mm x 33mm i 41mm x 33mm

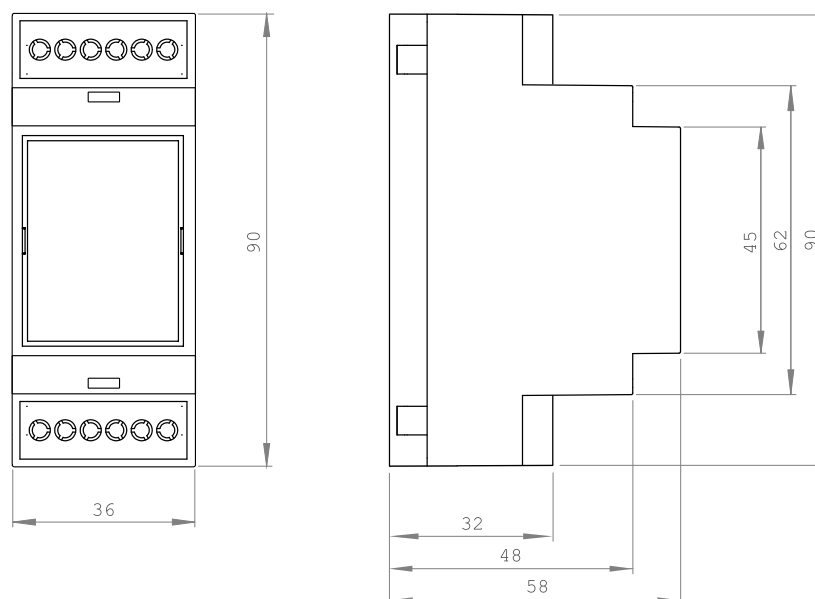


4.4. Components

Designator	Type	Footprint	Description
C1, C5, C7, C8, C9, C11, C12, C14, C16, C17, C19, C21, C23	100nF/50V	0805	Capacitor
C2, C3	22pF/50V	0805	Capacitor
C4	10uF/16V (X5R)	0805	Capacitor
C6, C20, C22	10nF/50V	0805	Capacitor
C10	10uF/50V	1206, 1210	Capacitor
C13	22uF/16V	SMA, SMB	Tantalum capacitor
C15	0.1F/5V	5/14	Super capacitor
C18	100uF/6.3V	SMA, SMB	Tantalum capacitor
R1, R3, R8, R9, R10	10k	0805	Resistor
R2	470 Ohm	0805	Resistor
R4	51k 1%	0805	Resistor
R5	10k 1%	0805	Resistor
R6	43K 1%	0805	Resistor
R7	8k2 1%	0805	Resistor
R11, R12	330 Ohm	0805	Resistor
R13	5k1	0805	Resistor
L1	BLM21A102SPT	0805	Choke
L2	22uH	DL16	Choke
Y1	8MHz	HC49-S	Quartz crystal
Y2	32768Hz	fi3/12	Quartz crystal
D1	PESD2CAN	SOT-23	Transil diode
D2	P6SMB33CA	DO-214	Transil diode
D3	S1D	DO-214	Diode
D4	1N4148	0805	Diode
D5	MBRS140T3	DO-214	Schottky diode 40V 1A
IC1	UNIV 3 CPU	SOIC-28	HAPCAN universal processor
IC2	MCP2561-E/S	SOIC-8	CAN Transceiver
IC3	MCP16301	SOT-23-6	Voltage regulator
IC4	DS1340Z-33+	SOIC-8	Real Time Clock
IC5	MCP1826S33	SOT-223-3	Voltage regulator
IC6	EM500	EM500	Tibbo Ethernet module
IC7	AT45DB041-SSHN	SOIC-8	Flash memory
CON1, CON2	RJ45	L18xW15xH11	Connector
CON3/4	2x8pin	Raster 2.54mm	Pin header
CON5	LMJ2018811100DL1T4	LMJ2018811100DL1T4	RJ45 connector with LEDs & trafo
JP1	2pin	Raster 2.54mm	Pin header

4.5. Enclosure

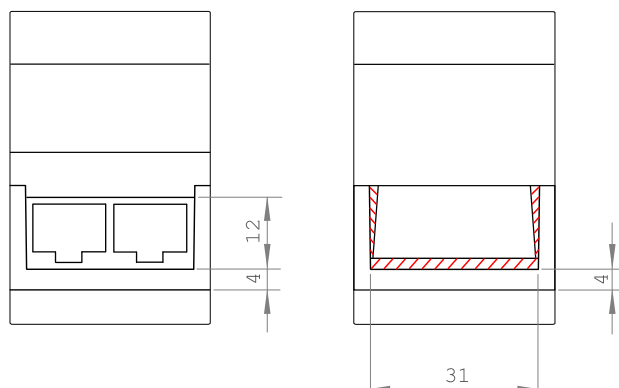
- Gainta D2MG rail mounting enclosure (2 modules wide)
- Dimensions: 90mm x 58mm x 36mm



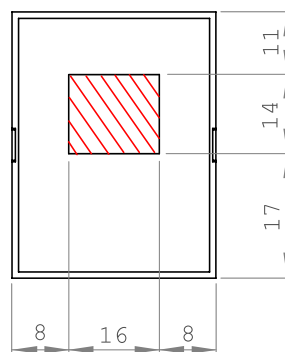
4.6. Mechanical processing

Striped parts must be removed.

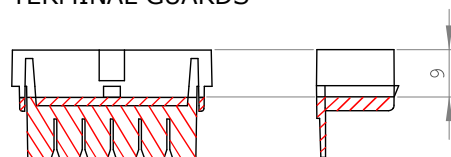
BODY



FRONT PANEL

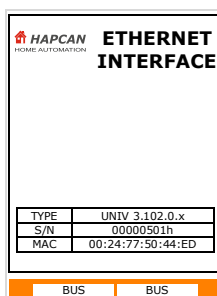


TERMINAL GUARDS



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.

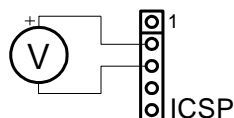


Figure 4. CPU voltage measurement

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 0.5 second on - 0.5 second off. If the processor is in programming mode, the LED lights up only once for 50ms.

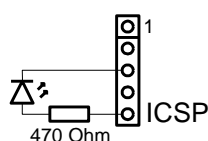


Figure 5. Checking the CPU clock

5.3. Firmware uploading

The device requires uploading of two firmwares for proper operation - one for the Tibbo EM500 module and another for the processor. First, upload the firmware for Tibbo EM500 module, then using the already operating EM500 module, upload the firmware to the processor. The uploading procedure is described in separate documentation (descriptions of individual firmware versions) for download at hapcan.com site.

6. License



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7. Document version

File	Description	Date
univ_3-102-0-x_a.pdf	Original version	June 2012
univ_3-102-0-x_b.pdf	Correction of 4.1 & 4.3.3	July 2012
univ_3-102-0-x_c.pdf	Correction of 4.1 & 4.3.3	November 2012
univ_3-102-0-x_d.pdf	General update	November 2013
univ_3-102-0-x_e.pdf	Hardware revision 3 and new enclosure	February 2014
univ_3-102-0-x_f.pdf	Hardware revision 4	November 2014