UNIMA-KS

Development & production of control equipment
Visualization, measurement and regulation SW
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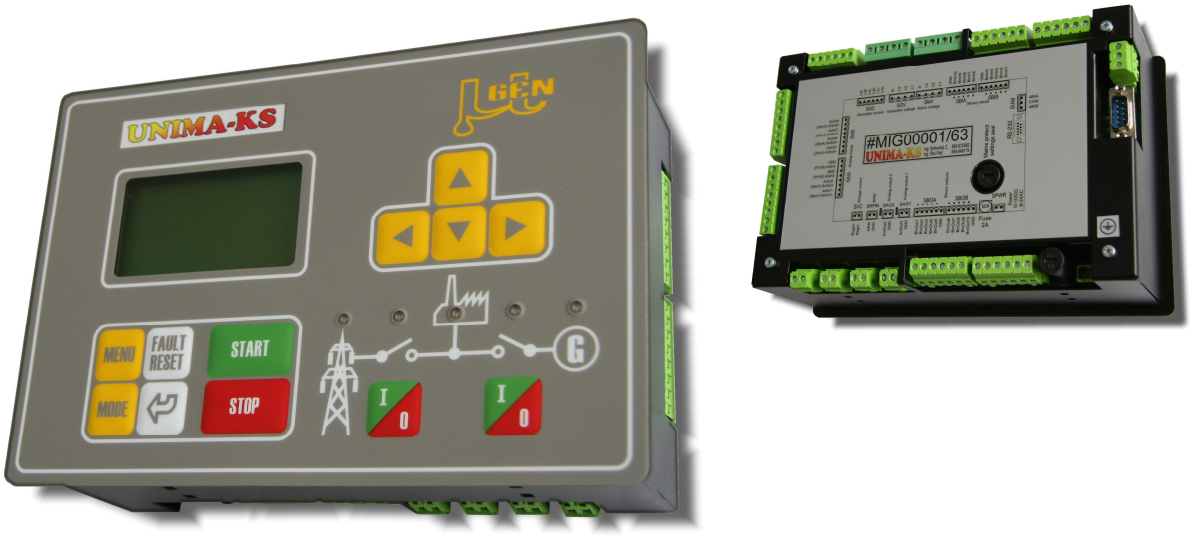
Specification HW of control system

MicroGEN AP



November 2014
HW V2

1. Operating Conditions

To enjoy the faultless operation it is necessary to observe the fundamental operating conditions which are defined in the following sections:
a) Proper connecting of Input/Output connectors
b) CU-power supply which meets the allowed tolerances
c) Proper parameter setting of the master SW
d) Observance of the operating temperature in surroundings of up to 60°C

2. Using

Control system is designed to control motor-generator sets with phasing generators to the distribution network, supports different modes of cooperation with the network contains network protection, generator and motor protections.
With user-defined functions (gates, flip-flops, analog members, PID controllers, control blocks for three-way valves, etc.) is possible the basic firmware easily extended with additional functionality (see documentation "ManagerAP a mapping function") ..

Using communication bus can be connected to control system expansion modules of inputs and outputs, speed controller USC, UIS voltage regulator, ignition UIS1÷4. All these components can be parameterized by one service program "ManagerAP" over a single connection to the control system. CU have these devices exchange the necessary information, so in addition to the communication bus is not necessary to further interconnection components.

2.1 Firmware CHP

In version "CHP" MS is designed for management of cogeneration units.

2.2 Firmware SYN

In version “SYN” MS is designed as a synchronization unit

2.3 Firmware MVE

In version "MVE" MS is designed for control of small hydro power plants.

3. Mechanical Design

CU is placed in an independent metal enclosure having dimensions 220x150mm, height 80mm. The size of assembly hole is 210x140mm. Connectors for connection of all signals are placed along the rear part of CU periphery.

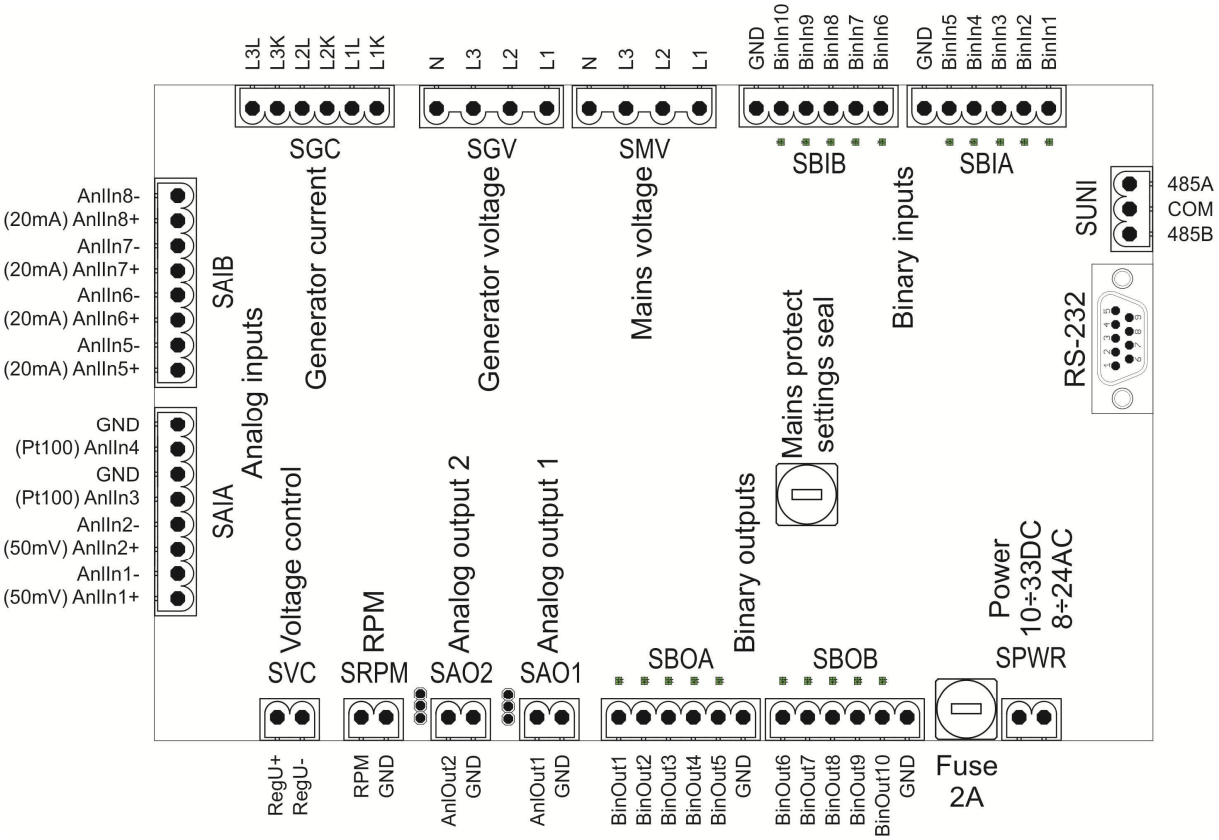
Front panel of CU include keyboard and graphics display 128x64pixels.

4. Electrical Design

CU is connected to the switch board by means of connectors PA256 (spacing 5,08) and BLZ7,62/90 (spacing 7,62). The CU is energized either with DC voltage of 10-33V or with AC voltage of 8-24V.

CANNON-connector is used for connection of CU to PC (monitoring, setting, diagnostics).

Connector lay-out:



4.1 Connector SBOA (binary outputs the open collectors)

Pin	Name	Description
SBOA.1	BinOut1	Configurable physical binary outputs
SBOA.2	BinOut2	
SBOA.3	BinOut3	
SBOA.4	BinOut4	
SBOA.5	BinOut5	
SBOA.6	GND	

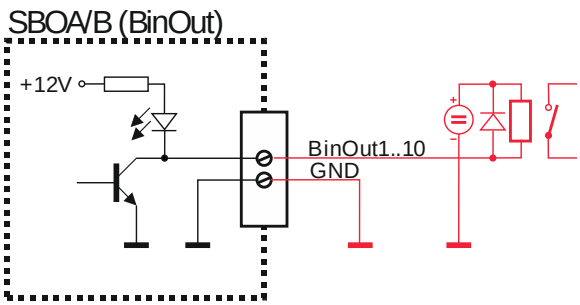
Connector span: 5,08mm
Max. conductor cross-sect.: 2,5mm^2
El. Parameters of output : Open collector 50mA/60V DC

4.2Connector SBOB ((binary outputs the open collectors+ PWM)

Pin	Name	Description
SBOB.1	BinOut6	Configurable physical binary outputs
SBOB.2	BinOut7	
SBOB.3	BinOut8	
SBOB.4	BinOut9	Configurable physical binary output or PWM
SBOB.5	BinOut10	Configurable physical binary output or PWM
SBOB.6	GND	Common contact

Connector span: 5,08mm
Max. conductor cross-sect.: 2,5mm^2
El. parameters of output : Common collector 50mA/60V DC

Spare internal wiring diagram:



4.3Connector SBIA (binary inputs)

Pin	Name	Description
SBIA.1	BinIn1	Configurable physical binary inputs
SBIA.2	BinIn2	
SBIA.3	BinIn3	
SBIA.4	BinIn4	
SBIA.5	BinIn5	
SBIA.9	GND	Common contact

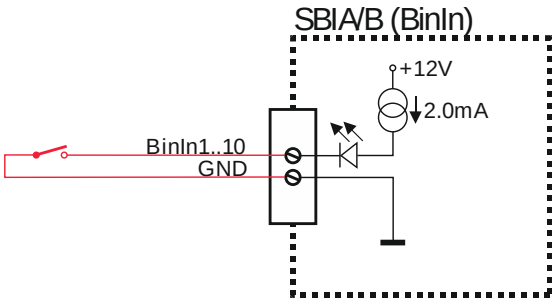
Connector span: 5,08mm
Max. conductor cross-sect.: 2,5mm^2
El. parameters of inputs : - Isolated input with line control Rv=3K3
- Uout =12V/5V output voltage
- Uext =+/- 50V max. ext. voltage (which does not harm input)

4.4Connector SBIB (binary inputs)

Pin	Name	Description
SBIB.1	BinIn6	Configurable physical binary inputs
SBIB.2	BinIn7	
SBIB.3	BinIn8	
SBIB.4	BinIn9	
SBIB.5	BinIn10	
SBIB.9	GND	Common contact

Connector span: 5,08mm
Max. conductor cross-sect.: 2,5mm^2
El. parameters of inputs : - Isolated input with line control Rv=3K3
- Uout =12V/5V output voltage
- Uext =+/- 50V max. ext. voltage (which does not harm input)

Spare internal wiring diagram:

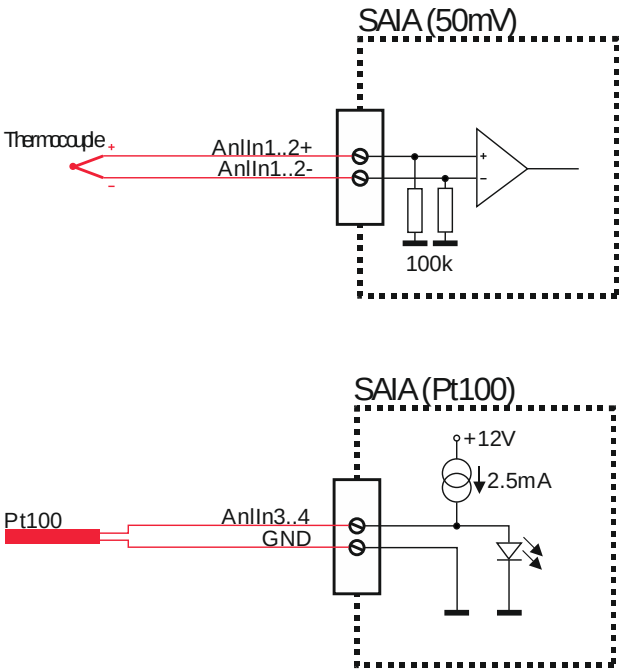


4.5Connector SAIA (analogical inputs 50mV and Pt100)

Pin	Name	Description
SAIA.1	AnlIn1+	Configurable physical analogical inputs 50mV
SAIA.2	AnlIn1-	
SAIA.3	AnlIn2+	
SAIA.4	AnlIn2-	
SAIA.5	AnlIn3	Configurable physical analogical inputs Pt100
SAIA.6	GND	
SAIA.7	AnlIn4	
SAIA.8	GND	

Connector span: 5,08mm
Max. conductor cross-sect.: 2,5mm^2
Electrical parameters: Convertor resolution 13 bits, symmetric measuring

Spare internal wiring diagram:

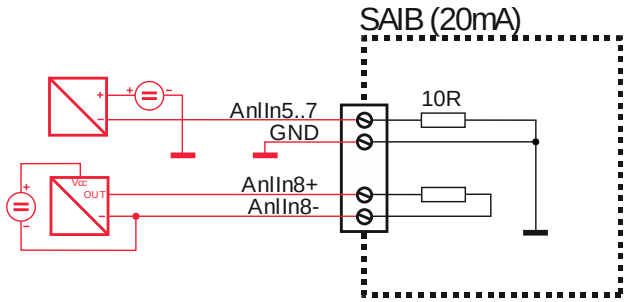


4.6Connector SAIB (analogical inputs 20mA)

Pin	Name	Description
SAIB.1	AnlIn5	Configurable physical analogical inputs 20mA
SAIB.2	GND	
SAIB.3	AnlIn6	
SAIB.4	GND	
SAIB.5	AnlIn7	
SAIB.6	GND	
SAIB.7	AnlIn8+	Configurable physical analogical input 20mA (differential)
SAIB.8	AnlIn8-	

Connector span: 5,08mm
Max. conductor cross-sect.: 2,5mm^2
Electrical parameters: Convertor resolution 13 bits, symmetric measuring

Spare internal wiring diagram:

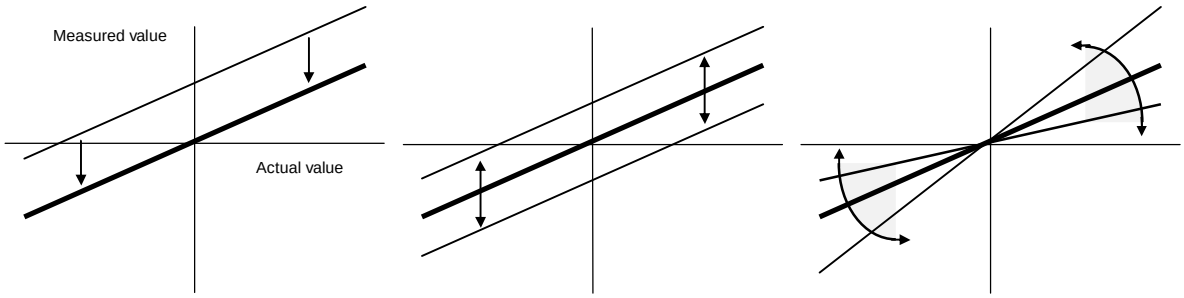


4.7Analogue Inputs Calibration

All analogue inputs (20mA, Pt100, actuator position….) can be calibrated digitally without interference with CU (trimmer setting).

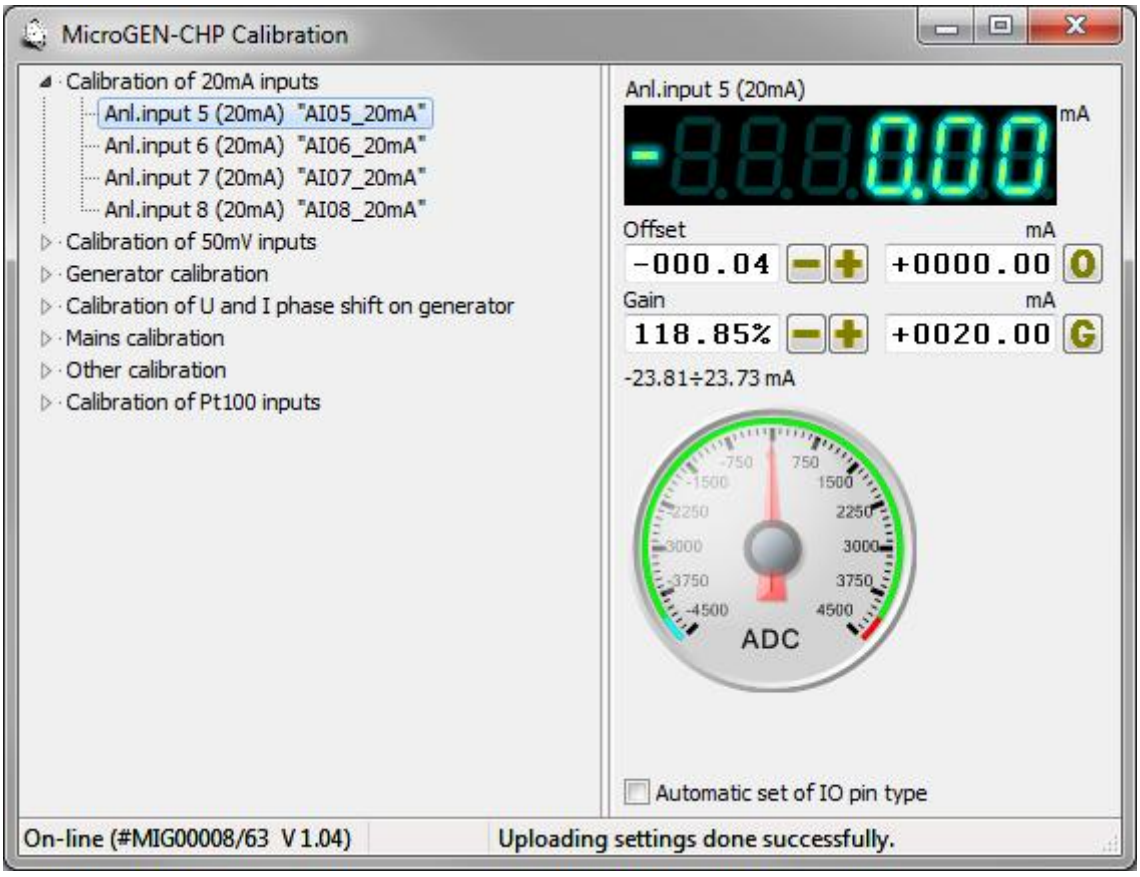
Calibration is carried out by service SW ManagerAP. The selected parameter can be accurately set to desired value using press buttons for offset change and amplitude change:

Offset resetting Offset change Amplitude change



Recommended procedure for calibrating:

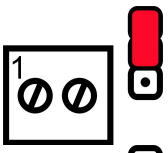
a) Disconnecting of the calibrated input (zero setting)
b) Offset zero setting by “O” (eventually offset correction using “+” and “-”
c) Connecting the input to the defined value
d) Setting of the required value using buttons “+” and “–“ for gain correcting (or using “G” button after enter of defined value)



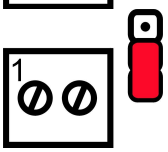
4.8Connector SAO1 (analogical output 1)

Pin	Name	Description
SAO1.1	AnlOut1	Configurable physical analogical output 10V/20mA
SAO1.2	GND	

Connector span: 5,08mm
Max. conductor cross-sect.: 2,5mm^2
El. parameters of output : Through shorting jumper optional output 10V/20mA, Voltage output shows a max. output current of 5 mA



Position of the shorting jumper for selection output 10V

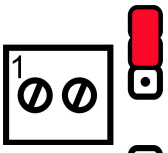


Position of the shorting jumper for selection output 20mA

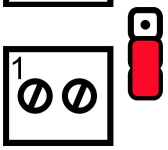
4.9Connector SAO2 (analogical output 2)

Pin	Name	Description
SAO2.1	AnlOut2	Configurable physical analogical output 10V/20mA
SAO2.2	GND	

Connector span: 5,08mm
Max. conductor cross-sect.: 2,5mm^2
El. parameters of output : Through shorting jumper optional output 10V/20mA, Voltage output shows a max. output current of 5 mA

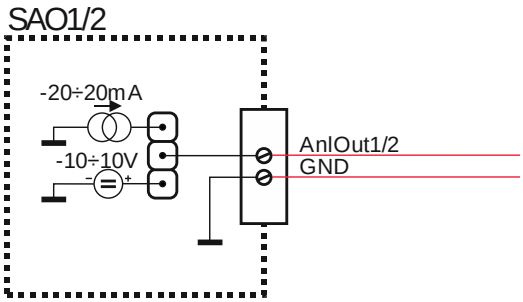


Position of the shorting jumper for selection output 10V



Position of the shorting jumper for selection output 20mA

Spare internal wiring diagram:

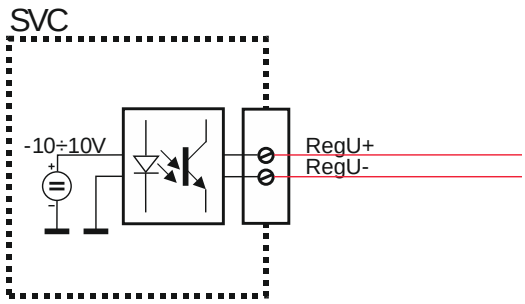


4.10Connector SVC (voltage regulation)

Pin	Name	Description
SVC.1	RegU+	Output for direct control over the voltage regulator
SVC.2	RegU-	

Connector span: 5,08mm
Max. conductor cross-sect.: 2,5mm^2
Insulation strength 2,5kV

Spare internal wiring diagram:



4.11Connector SRPM (rpm measuring)

Pin	Name	Description
SRPM.1	RPM	Input for measuring rotation speed of the aggregate. In case of connecting of the speed governor USC or ignition UIS the data transfer is possible (another sensor for doing this is needless)
SPRM.2	GND	

Connector span: 5,08mm
Max. conductor cross-sect.: 2,5mm^2
El. Parameters: Hysteretic comparator toggle on ±0.5V

4.12Connector SGV (generator voltage)

Pin	Name	Description
SGV.1	L1	Inputs for connection of the generator three phase voltage
SGV.2	L2	
SGV.3	L3	
SGV.4	N	

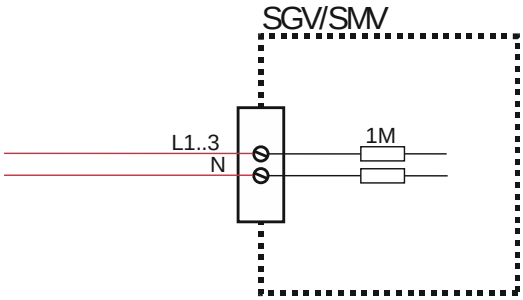
Connector span: 7,62mm
Max. conductor cross-sect.: 2,5mm^2
Max.voltage: 600V
Rated impulse: 6kV
Classifications: EC001284, EC0026370

4.13Connector SMV (net voltage)

Pin	Name	Description
SMV.1	L1	Inputs for connection of the net three phase voltage
SMV.2	L2	
SMV.3	L3	
SMV.4	N	

Connector span: 7,62mm
Max. conductor cross-sect.: 2,5mm^2
Max.voltage: 600V
Rated impulse: 6kV
Classifications: EC001284, EC0026370

Spare internal wiring diagram:

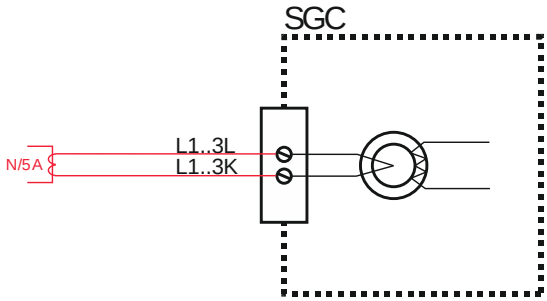


4.14Connector SGC (generator current)

Pin	Name	Description
SGC.1	L1K	Inputs for connection of the generator three phase current
SGC.2	L1L	
SGC.3	L2K	
SGC.4	L2L	
SGC.5	L3K	
SGC.6	L3L	

Connector span:	3,81mm
Max. conductor cross-sect.:	1,5mm^2
Max.current:	5A
Permanent curr.overload:	6A
Short.curr.overload:	8A
Standard references:	EN60998-1; EN60998-2-1

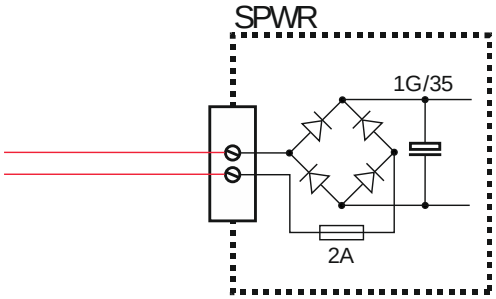
Spare internal wiring diagram:



4.15Connector SPWR (power supply)

Pin	Name	Description
SPWR.1	POWER	Supply voltage 10÷33V DC or 8÷24V AC. Next to the supply connector is situated a safety-fuse 2A.
SPWR.2		

Connector span: 5,08mm
Max. conductor cross-sect.: 2,5mm^2



4.16Connector SUNI (Communication RS-485 UnimaBUS)

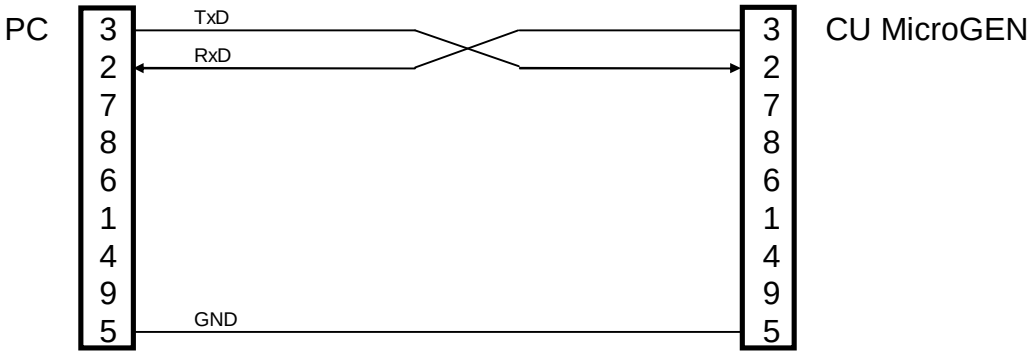
Pin	Name	Description
SUNI.1	485A	Communication interfacing RS-485 for connecting of other devices UNIMA-KS (Speed governor USC, ignition UIS, voltage regulator UVR, expansion modules e.t.c.)
SUNI.2	COM	
SUNI.3	485B	

Connector span: 5,08mm
Max. conductor cross-sect.: 2,5mm^2

4.17Connector CANNON (RS-232)

Pin	Name	Description
CAN.2	RxD	Communication interfacing RS-232 for CU to PC (visualization, setting, calibration with Manager-program). For connection can be also used the net-cable and ethernet-sockets.
CAN.3	TxD	
CAN.5	GND	

Cable connection to connect CU to PC:



5. I/O expansion

5.1Expansion modules

With communication RS-485 can increase the number of inputs and outputs binary and analogue expansion modules. Expansion modules are always 8-input (8-output).

The expansion module digital inputs and outputs can combine inputs / outputs (each pin is independently configurable as input or output).

The expansion module analogue inputs can be independently configured input type (50mV, 1V, 10V, 20mA, 100ohm, Pt100, Pt1000).

Expansion module analogue output is fixed 8x10V.

The control system can be connected up to 7 of the input modules (whether digital or analogue, when the binary module configured to at least one input can be considered as the input), and up to eight output modules. Each module must have the same address as the control system and unique slot number (1 to 15).

Each module contains its own configurable PLC, each module can send to the control system 8 digital and 8 analogue information (based on binary inputs can be created one analogue information, that the control system can reads)

5.2Read information from neighbor devices

In the control system can be mapped and signals from peripheral devices (speed controller USC, UVR voltage regulator, ignition UIS etc.), it is theoretically possible to extend the inputs and outputs of the control system available inputs and outputs on the speed controller, voltage or ignition. Each device can read up to 8 signals from surrounding devices other than expansion modules.

6. Configuration

Vizualization, configuration and parametrization of CU is done by ManagerAP service program.

More in following documents

- ManagerAP user manul.pdf
- ManagerAP mapping and functions.pdf