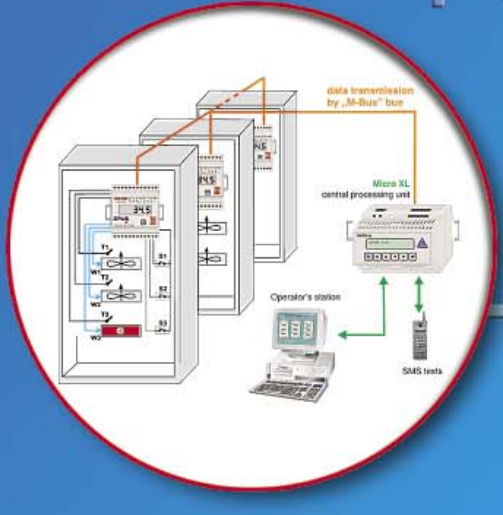
ZPAS-CONTROL M-BUS

System of supervising climatic conditions in power industry enclosures, in data-telecommunication cabinets and on industrial facilities



2003

Content

ZPAS-Control M-Bus

CHARACTERISTICS

ZPAS-Control M-Bus system is a software based on elements of digital system of automatics. It allows for designing effective, cheap and reliable regulating and measuring systems. It is designated for application in professional management systems of climatic conditions in the data and telecommunication enclosures, enclosures for power industry, outdoor cabinets and on industrial facilities.

AREAS OF APPLICATION

1) Data and telecommunication enclosures and enclosures for power industry:
   - monitoring and controlling internal climatic conditions in the cabinets,
   - monitoring accommodations in which the cabinets are installed with possibility of enriching the system with smokiness, vibration, movement, humidity, door being open sensors. Also installation of other sensoring elements is possible.

2) Outdoor cabinets:
   - control of internal climatic conditions and other parameters influencing the work of the installed appliances in the cabinets placed in open area,
   - informing the network's operator about irregularities in work of the system and localising failures.

3) Synoptic displays equipped with „ZPAS-Control" programmers:
   - possibility of upgrading the system at a low cost (Micro PLC basic central processing unit is already installed in the display),
   - simple upgrading of the system through connecting appropriate number of I/O modules by means of M-Bus data transmissions line.

4) Other areas of application:
   - Openness and freedom of configuration allows to apply ZPAS-Control M-Bus system in an intelligent building, heat engineering industries, sewage systems, at municipal housing estates and many others areas.

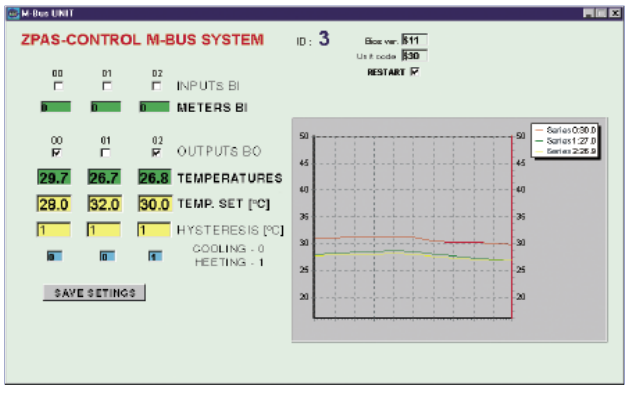
CONSTRUCTION OF THE SYSTEM

Designing systems of automatics based on ZPAS-Control M-Bus system is easy thanks to application of universal hardware elements and software modules designed for controlling and regulating through typical controlling equipment. The system comprises central units, data transmission convectors, facility modules, sensors (temperature, humidity, smokiness, movement vibrations, access sensors) as well as hardware modules. Communication between central processing unit and peripherals (listed above) is based on standard data „M-Bus" enlarged by managing possibility.

Basic parameters of „M-Bus" data transmission bus:
- optional topology of cabling (the medium is 2 pair twisted pair cable),
- connection of up to amount of 250 appliances in one exchange,
- protecting data bus against change of poles,
- power supply of end appliances directly from „M-Bus" data transmission bus.

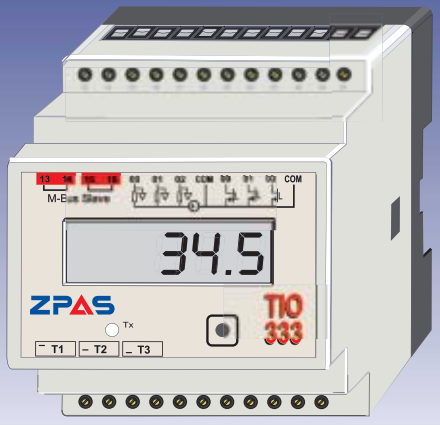
SOFTWARE

ZPAS-Control M-Bus system is accompanied by attractive software with graphic interface working under control of Windows operating system. It is adjusted to compatibility with different superordinated systems of SCADA type. Regardless of them it allows to create operating panels adjusted to individual user's requirements.



Basic configuration

TIO 333 temperature controller

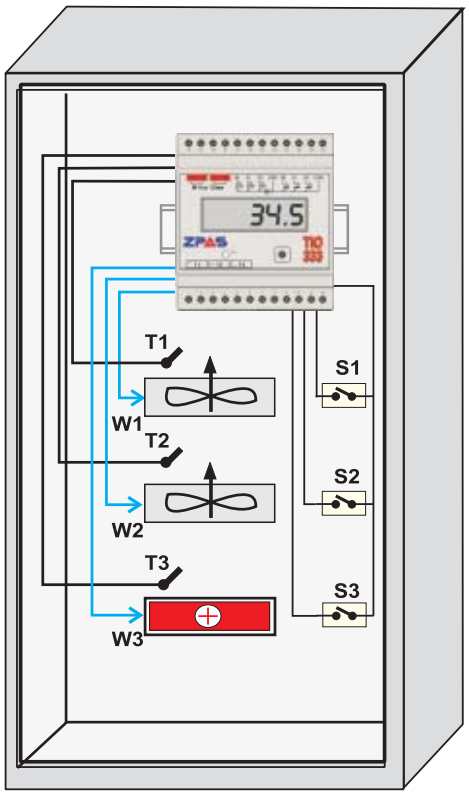


DESCRIPTION OF FUNCTIONS

ZPAS-Control M-Bus system in basic configuration enables continuous measurement of three temperatures in range between -55 to +125 °C by means of DST temperature sensors (the length of the conduct - max. 10 m) connected to the programmed TIO 333 temperature controller. The producer provides software of the TIO 333 temperature controller for such a configuration (setting up the temperature values as well as hysteresis with accuracy of 1 °C).

Hardware controller (P2 relay or TRIAC 2 power module) designed to control elements like fan, heater and or others required by the customer can be connected to two-state outputs of the TIO 333 temperature controller (three outputs - transistorised keys, max. 30 V, 500 mA). The controller is supplied by 15 ÷ 30 V DC power feeder.

Configuration of the system in its basic version makes it possible to enlarge construction of the system through adding consecutive modules according to the catalogue or according to project prepared on customer's request.



INDEX OF REQUIRED ELEMENTS

Symbol	Element's name	Quantity
TIO-333	TIO 333 temperature controller	1
DST	DST temperature sensor	3
TRIAC 2, P2	Triac 2 or P2 hardware controller	1
Z24VDC/1.5	24 V DC / 1.5 A power supplier	1

S1 - signalling device of the door being open
S2 - signalling device of smokiness
S3 - signalling device of vibrations and humidity

T1 - temperature sensor 1
T2 - temperature sensor 2
T3 - temperature sensor 3

W1 - controlling output 1
W2 - controlling output 2
W3 - controlling output 3

Configuration with data transmission to PC

DESCRIPTION OF FUNCTIONS

Enlarging basic configuration by:

- M-Bus Master 10 (60) data transmission convector providing signal conversion between RS232 interface and M-Bus transmission bus and
- LMC software for personal computer (graphic panel),

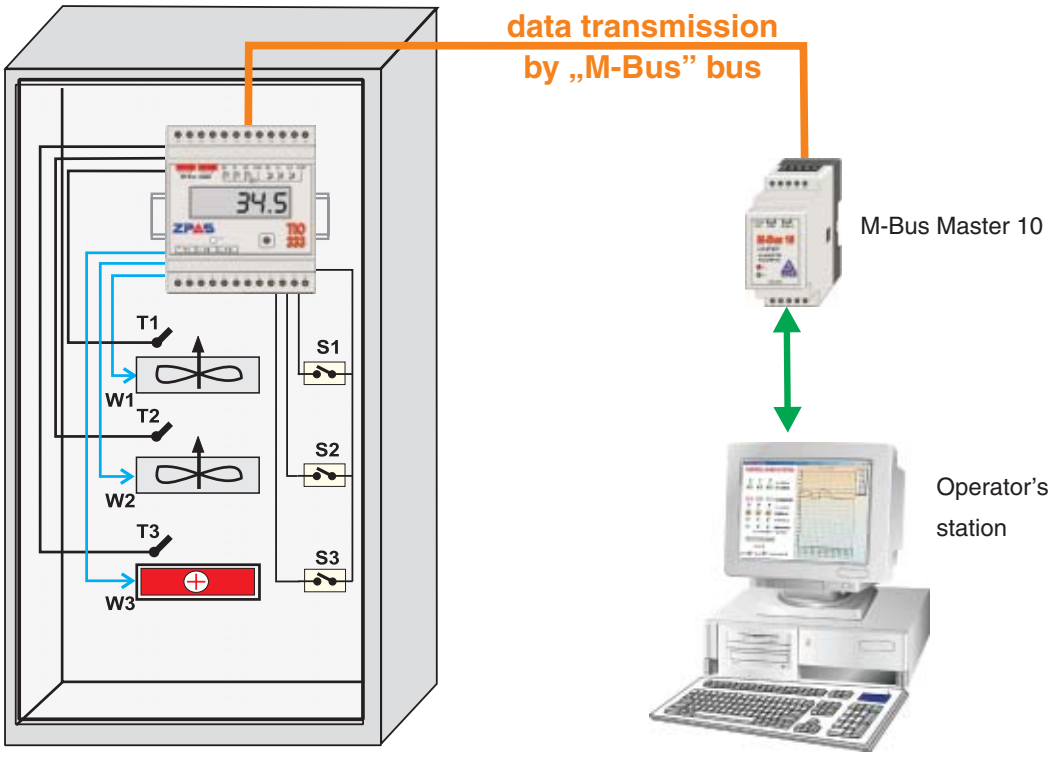
we additionally achieve:

- possibility of multiple programming of the demanded temperature values as well as hysteresis (precision of regulation up to 1 °C) by means of attached PC with LMC software,
- possibility to supply TIO 333 controller directly from „M-Bus“ data transmission bus,
- possibility to attach three two-state signalling devices (example microswitch, smokiness sensor, movement sensor, humidity sensor, vibration sensor and others) with registration of their activity on a graphic panel,
- possibility of graphic visualisation of the appliances at work (the states of inputs and outputs) as well as registration of the temperatures on the charts.

Configuration of the system in such a version that allows for its further enlargement through adding subsequent modules according the catalogue or to the project prepared on customer's request.

INDEX OF REQUIRED ELEMENTS

Symbol	Element's name	Quantity
M10i	M-Bus Master 10	1
TIO-333	TIO 333 temperature controller	1
DST	DST temperature sensor	3
TRIAC 2	Triac 2	1
Z24VDC/1.5	24 V DC / 1.5 A power supplier	1
PANEL-GRAF	LMC graphic panel software	1



S1 - signalling device of the door being open
S2 - signalling device of smokiness
S3 - signalling device of vibrations and humidity

T1 - temperature sensor 1
T2 - temperature sensor 2
T3 - temperature sensor 3

W1 - controlling output 1
W2 - controlling output 2
W3 - controlling output 3

Configuration with the programmer and GSM data transmission

DESCRIPTION OF FUNCTIONS

Enlarging basic configuration by:

- Micro XL programmer (central unit),
- data transmission GSM module and
- LMC Logic Master Control software (graphic panel),

we additionally achieve:

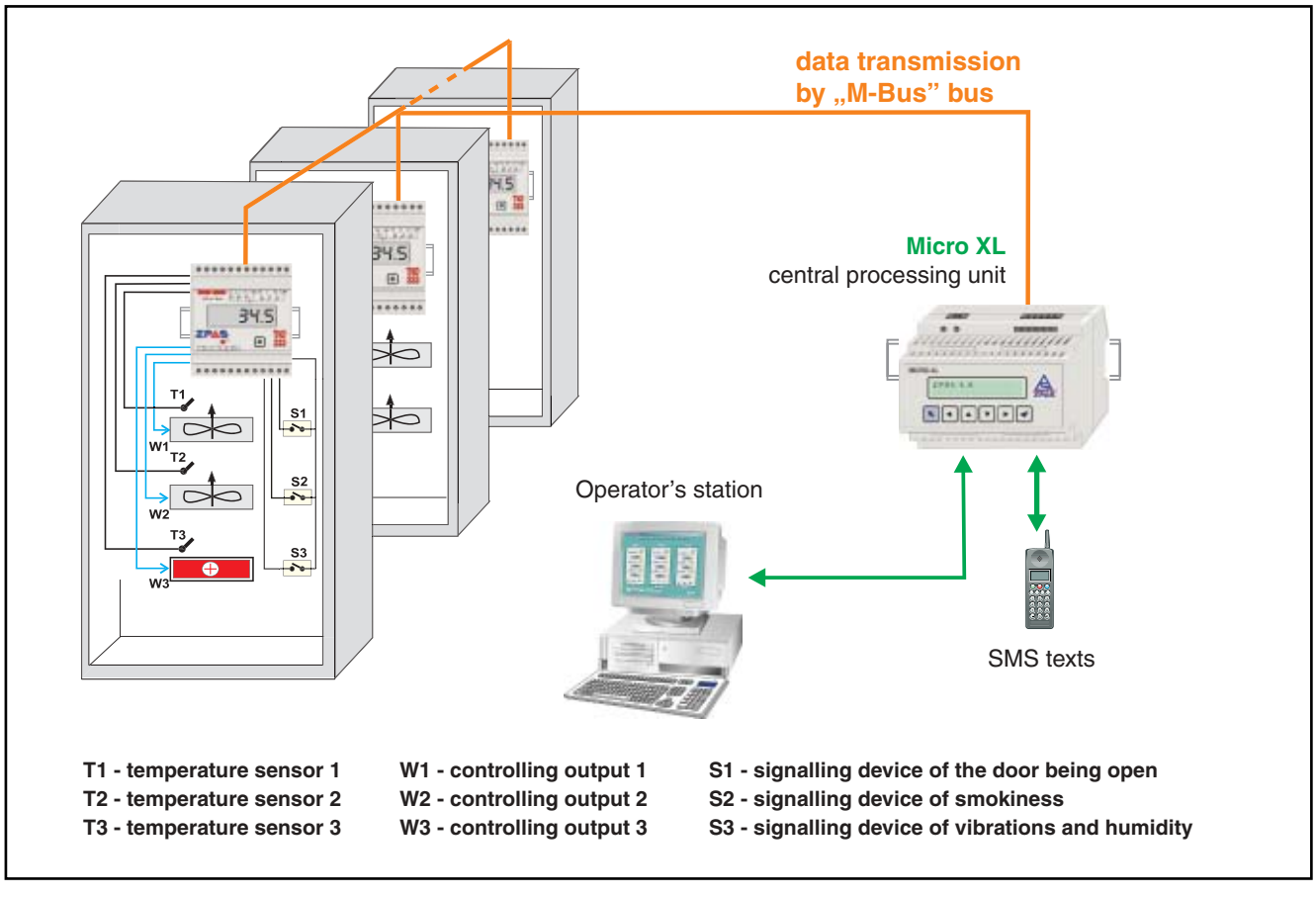
- possibility of multiple programming of the demanded temperature values as well as hysteresis (precision of regulation up to 1 °C) by means of attached PC, directly from Micro XL programmer, through cell phone or GSM modeme,
- possibility to connect up to three two-state signalling devices (example microswitch, smokiness sensor, movement sensor, humidity sensor, vibration sensor and others) with registration of their activity on a graphic panel,
- possibility of graphic visualisation of the appliances at work (the states of inputs and outputs) as well as registration of the temperatures on the charts,
- possibility to store data - long term registration of the parameters with possibility of them being imported into the data base within a PC,
- possibility to get connected to the facilities from any place on earth via GSM cell phone or stationary telephone connection. It allows for monitoring and remote management of the facilities,

INDEX OF REQUIRED ELEMENTS

Symbol	Element's name	Quantity
MICRO-XL-2	Micro XL programmer	1
TIO-333	TIO 333 temperature controller	1
DST	DST temperature sensor	3
TRIAC 2	Triac 2	1
Z24VDC/1.5	24 V DC / 1.5 A power supplier	1
TWIST SET	GSM modem	1
PANEL-GRAF	LMC graphic panel software	1

- previewer of registered charts allowing for mathematical working and creating new channels on the basis of already existing records,
- possibility to configure archive data from different periods which allows to analyse changes in technological process in the long run,
- software, providing graphic representation in Windows environment, adjusted to co-operation with different superordinated systems. It allows to create own operator's panels adjusted to particular needs.

Configuration of the system in such a version that allows for its further enlargement through adding subsequent modules according the catalogue or to the project prepared on customer's request.



T1 - temperature sensor 1
T2 - temperature sensor 2
T3 - temperature sensor 3

W1 - controlling output 1
W2 - controlling output 2
W3 - controlling output 3

S1 - signalling device of the door being open
S2 - signalling device of smokiness
S3 - signalling device of vibrations and humidity

Configuration with the use of existing programmer

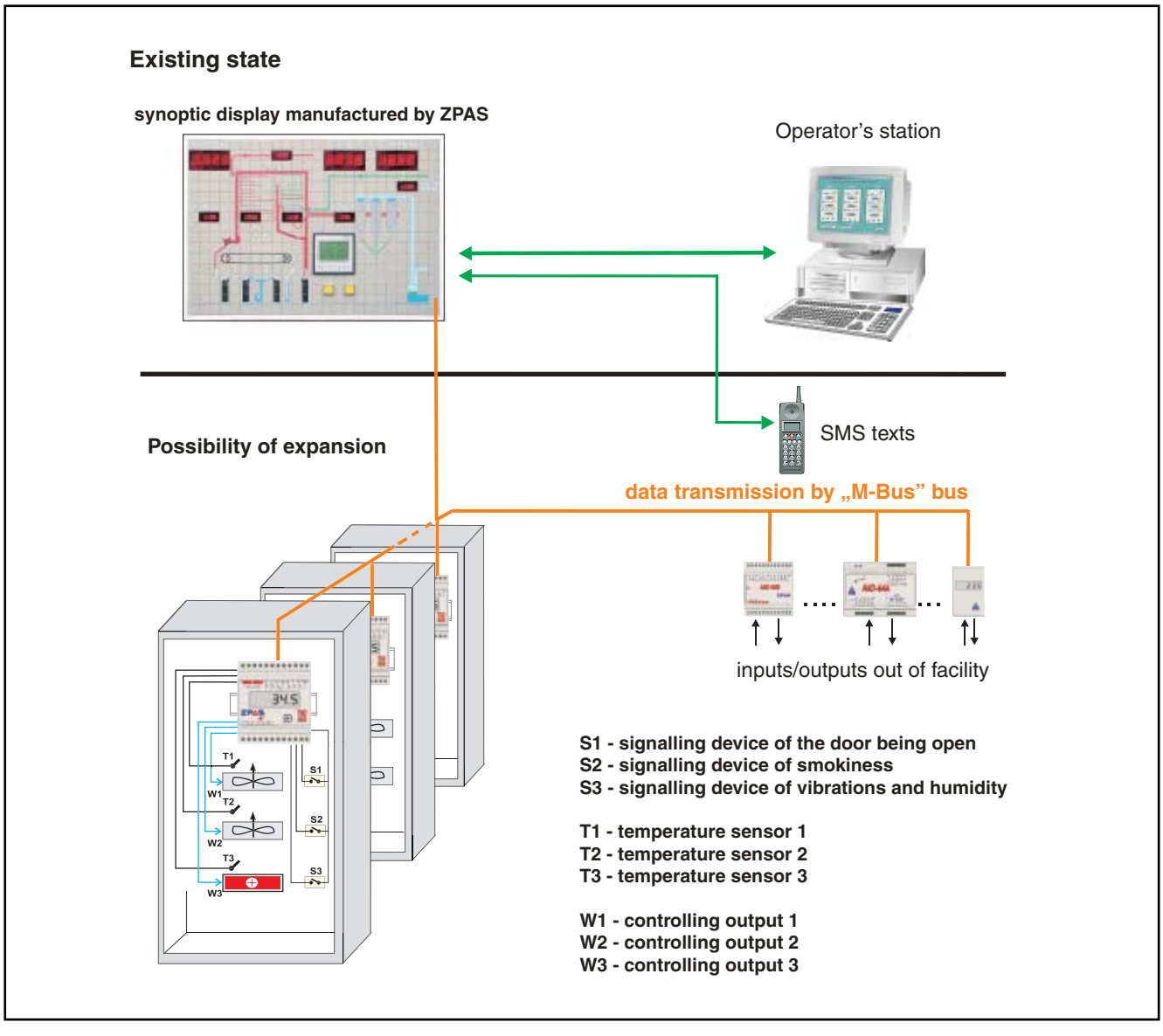
DESCRIPTION OF FUNCTIONS

On the facilities where Micro LCD or Micro XL programmer are already installed (example in synoptic displays manufactured by ZPAS SA), there is possibility of free enlargement of the system without a need of purchasing the programmer. Besides it is possible to collect information about work of appliances from the synoptic display widening in this way possibility to monitor the system.

Configuration of the arrangement in this version allows for further enlargement of the arrangement through adding subsequent modules according to the catalogue or prepared on customer's request.

INDEX OF REQUIRED ELEMENTS

Symbol	Element's name	Quantity
TIO-333	TIO 333 temperature controller	1
DST	DST temperature sensor	3
TRIAC 2	Triac 2	1
Z24VDC/1.5	24 V DC / 1.5 A power supplier	1
TWIST SET	GSM modem	1
PANEL-GRAF	LMC graphic panel software	1



Other configurations

There is possibility of optional configuration of the system
- technical support at ZPAS SA, telephone +48-74-8720115, e-mail: dm@zpas.com

Micro XL central processing unit

DIMENSIONS:
105 x 90 x 60 mm to be installed on TS 35 rail

POWER SUPPLY:
20 ÷ 35 V DC, 20 ÷ 24 V AC, I_{max} = 150 mA

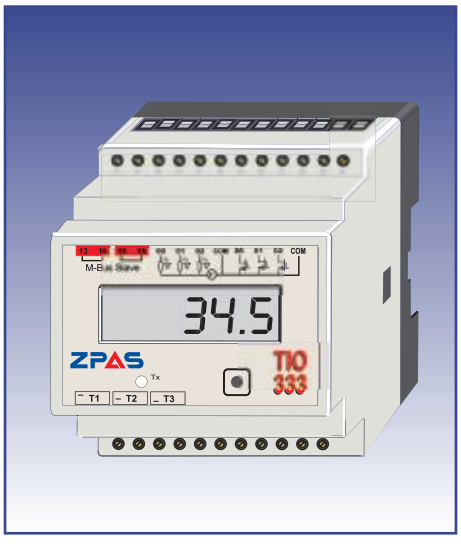
MEMORY:
RAM 1MB, EEPROM 192 KB, EPROM 512 KB

COMMUNICATION PORTS:
- one connector in I^2C standard for LED64 intelligent matrix on synoptic display, Micro LCD etc.,
- two CAN connectors for fast I/O appliances + three RS232 connectors,
- or one M-Bus Master connector for an appliance accounting thermal and electrical energy + two RS232 serial interfaces for local communication and connecting modem or transmission converters.

COMMUNICATIONAL PROTOCOLS:
- MODBUS RTU of SLAVE and MASTER version for industrial programmers,
- M-Bus of Master version according to CEN/TC 176 WG4 and EN 1434-3 norm to meters of thermal and electrical energy,
- GAZ-MODEM to draw data from resolvers and gas correctors,
- POZYTON to LZM/LZQM meters of electrical energy according to IEC 1107 norm,
- AT commands GSM to GSM modems for SMS texts and data transmission by cell contact.

CHARACTERISTICS:
Modular programmable programmer.

TIO 333 temperature controller



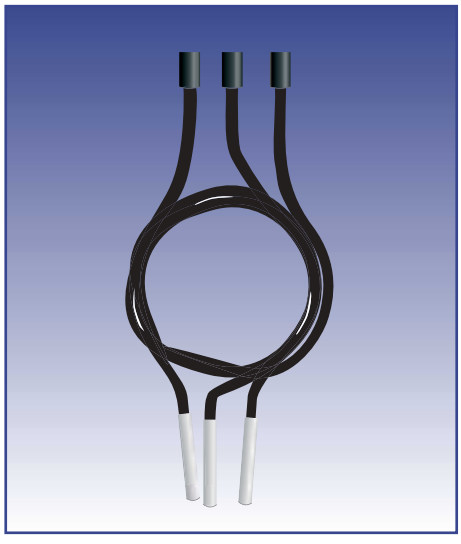
DIMENSIONS:
69 x 90 x 60 mm to be installed on TS 35 rail

POWER SUPPLY:
By „M-Bus" bus or from power supplier up to 24 V DC

INPUTS/OUTPUTS:
- 3 inputs for digital temperature sensors of DST type (DS18B20)
- 3 two-state inputs (sygnalling of functioning):
  type: contact inputs; voltage on the open contact: cca 5 V; current of closed contact: cca 0.1 mA; resistance of ON contact - below 1 k| ; resistance of OFF contact - above 20 k| .
- 3 two-state outputs (triac for example):
  type: transistorised keys; kind of output: turn on / turn off or PWM (8 bits); maximal voltage on the key: 30 V; maximal current of the key: 0,5 A; protection of the key: polymer fuse.

TRANSMISSION LINE:
- electrical standard: M-Bus SLAVE;
- protocol: MODBUS-RTU;
- drawn current: does not exceed 4 mA;
- answer current: 18 ÷ 20 mA;
- overvoltage protection: TRANSIL diode 43 V, 600 W/ms;
- input/output separation of from line;
- polarity of lines: free.

CHARACTERISTICS:
Facility module for dissipated systems of automatics.



DST temperature sensor

MEASUREMENT RANGE:
from -55 °C up to +125 °C; hysteresis: 1 °C; precision of the set-up of the temperature: 1 °C; precision of the reading of the temperature: 0.1 °C

WAYS OF PROGRAMMING THE SENSOR:
1) Programming by means of TIO 333 controller as well as by Micro XL central processing unit.
2) Programming by means of: TIO 333 controller, M-Bus Master 10 transmission convector and PC with LMC software.

DIMENSIONS:
Maximal length of the conduit: 10 m

CHARACTERISTICS:
Digital, programmable DST temperature sensor to TIO 333 controller.

M-Bus Master 10 transmission converter

POWER SUPPLY:
10 ÷ 30 V DC

CURRENT INTAKE:
0,1 A / 24 V DC; 0,2 A / 12 V DC

MAXIMAL AMOUNT OF LOAD INTENSITY:
10 M-Bus standard receivers

POWER SUPPLY PARAMETERS OF M-Bus LINE:
- at no transmission: 16 mA max.
- voltage on the M-Bus clamps at no transmission: 30 V

DIMENSIONS:
34 x 90 x 60 mm

GALVANIC SEPARATION:
M-Bus - power supply of the converter: no separation
M-Bus - RS232 interface: 100 V AC/DC
Power supply of the convector through RS232 connection (M-Bus SLAVE): 100 V AC/DC

PROTECTION OF M-Bus LINE:
TRANSIL diode 43 V, 600 W/ms

RS232 TRANSMISSION CONNECTION:
drawer type - BH10

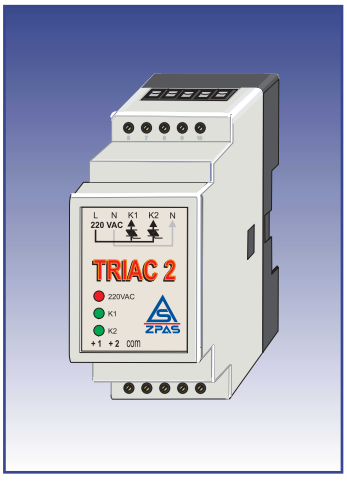
TRANSMISSION RATE:
300 up to 19200 baud

NORMATIVE CONDITIONS OF RELATION:
CEN/TC 176 WG 4

CHARACTERISTICS:
Transmission converter between RS232 and M-Bus.

APPLICATION:
Supervising transmission line of M-Bus standard through RS 232 interface from PC computer, from Micro XL or Micro LCD programmer.

TRIAC 2 hardware controller

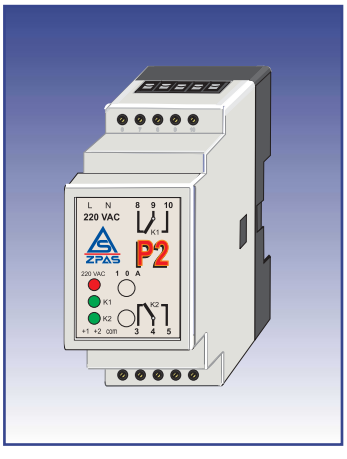


APPLICATION:
Turning on the appliances from 230 V AC network by means of contactless element (triac) through separated low voltage signal of key type.

BASIC PARAMETERS:

- Power supply: 230 V AC
- Number of channels: 2
- Output current: 2 A / channel
- Protection: common fuse
- Controlling signal: transistorised key
- Separation: from output and power supply
- Dimensions: 34 x 90 x 60 mm

P2 relay



APPLICATION:
Controlling double, independent switch contact of the relay by low voltage key (0-10 mA).

BASIC PARAMETERS:

- Power supply: 230 V AC
- Number of channels: 2
- Contact parameters: 6 A / 250 V AC
- Controlling signal: low voltage keys 0 ÷ 10 mA
- Separation between power supply, contacts and controlling.
- Dimensions: 34 x 90 x 60 mm

Power suppliers

RECOMENDED TYPES OF POWER SUPPLIER:
Power supplier 2 x 24 V DC / 0.6 A
Power supplier 24 V DC / 1.5 A
UPS 24 V DC / 1.5 A with 7 VAh battery

GSM modem

CHARACTERICTICS AND APPLICATION:
Dual band GSM modem with V 24 RS232 port built in allowing data and SMS texts sending. Adjusted to any GSM sell operator.

BASIC PARAMETERS:

- Power supply: 5 ÷ 24 V AC
- Work temperature range: -20 ÷ +55 °C
- Possibility to plug in an external antenna.

Avaliable elements of the system

Element's name	Symbol
Central processing units	
MICRO-XL unit v.0 (2 x RS232, RAM 512 kB)	MICRO-XL-0
MICRO-XL unit v.1 (3 x RS232, RAM 1024 kB, M-Bus Master 8)	MICRO-XL-1
MICRO-XL unit v.2 (as MICRO-XL1 + SMS + GAZ-MODEM) **- see page 8**	MICRO-XL-2
MICRO-LCD terminal	MIC-LCD
Building Management System elements	
Sensor of outdoor temperature	CZ
Sensor of indoor temperature	CP
I/O module 3T, 3DI, 2DO without DST	CTIO-332
I/O module 3T, 3DI, 3DO without DST (TIO 333 temperature controller) **- see page 8**	TIO-333
DST temperature sensor for TIO and CTIO **- see page 9**	DST
Impulse resolver 8DI	AIO-080
I/O Module 4AI, 4DI, 4DO (4-20 mA)	AIO-444
I/O Module 4DI, 8DO	AIO-048
I/O Module 8AI, 4DO (4-20 mA)	AIO-804
Option - Pt 1000 for AIO (4-20 mA)	4xPt 1000
Converter PWM/A (0-10 V, 4-20 mA)	PWM/A
Power module 2 x TRIAC (TRIAC 2 hardware controller) **- see page 10**	TRIAC 2
Power module 2 x relay (P2 relay) **- see page 10**	P-2
M-Bus transmission converters	
M-Bus Master 60	M60i
M-Bus Master 10 **- see page 9**	M10i
M-Bus Slave - RS232	S3i
M-Bus Master 400	M400
M-Bus Supervisor	M-SUP
Transmission converters	
RS485 insulated	RS485i
RS485 uninsulated	RS485
CL 20/RS232 insulated	CL20
Power suppliers	
Power supplier 2 x 24 V DC / 0.6 A **- see page 10**	Z24VDC/0.6
Power supplier 24 V DC / 1.5 A **- see page 10**	Z24VDC/1.5
UPS 24 V DC /1.5 A with 7 VAh battery **- see page 10**	UPS24VDC
Software	
LMC - graphic panels	PANEL-GRAF
LMC - Logic Master Control	LMC
Others	
Voltage transmitter 230 V AC / 0-20 mA	P220
GSM modem **- see page 10**	TWIST SET
External telephone modem	56K
Microswitch	83401S
Vibration sensor	
Smokiness sensor	OSD 23
Movement sensor	
Humidity sensor - hygrostat	MFR 012i

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