

SO-52v11_xx

remote terminal unit

The SO-52v11_xx family features an answer to the issue of reliable telemetry and automation in substation bays of all voltage levels and industry technological processes.

SO-52v11_xx Remote Terminal Unit family performs telemetry and automation functions in bays of any voltage level in power substations. It also controls technological processes in industry automation.

The RTU supervises and controls the breakers, isolators, earth switches and performs accurate measurements of currents, voltages, phases, powers and energies. The RTU operates automation functions of interlocking and control sequences, based on indications and variables received from other bays.

The RTU are linked to the supervision system by Ethernet 10/100Base TX/FX or serial fiber optic channels. The devices can be equipped with wireless radio- transmission or GSM/GPRS module. The versatile set of RS-485 /RS-232 and multimode fiber optic serial channels is used to establish the connections with protection devices, measuring converters and other IED equipment. The communication channels feature various standardized or specific protocols, eg. DNP 3.0, PN-EN 61850, PN-EN 60870-5-101, PN-EN 60870-5-103, PN-EN 60870-5-104. The SO-52v11_xx RTU can also support transmission according to PRP (Parallel Redundancy Protocol).

The controllers are housed in the ruggedized cubicle and subracks containing a redundant power supply module, binary input modules, analog inputs, controls, measure and communication modules. The modules quantity, type and configuration is selected according to application.

All the engineering services can be performed remotely by Ethernet or other available communication channels.



Features

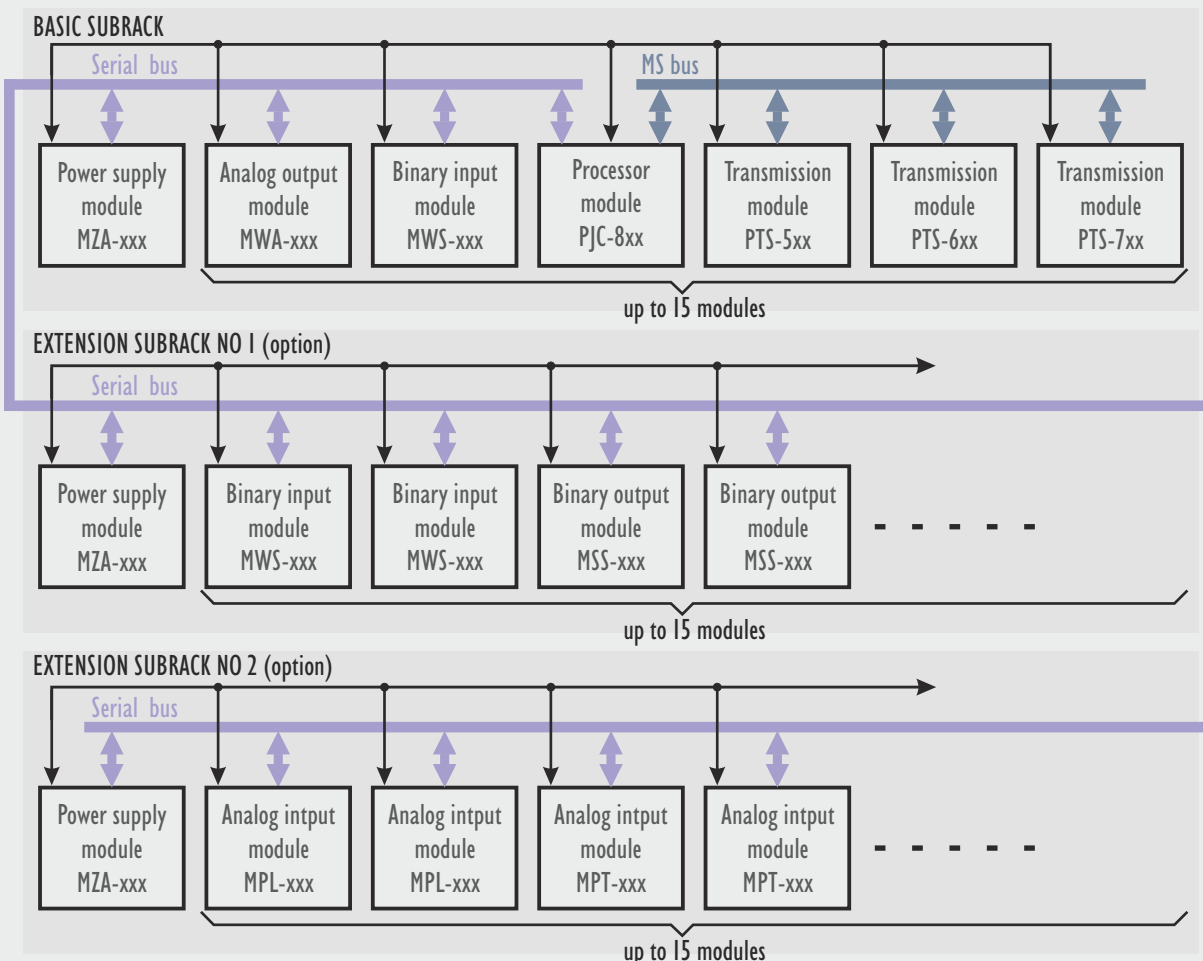
- multichannel and multiprotocol transmission
 - DNP3.0; PN-EN 60870-5-101/104
 - PN-EN 60870-5-103
 - PN-EN 61850 KEMA certified implementation
- centralised or distributed interlocking
- tools to edit the logic of control sequences and automation
- automatic & logic creation according to PN-EN 61131
- event log stored in non-volatile memory
- one bit/two bit BCD code input definition
- "select before operation" command mode
- server SNTP/NTP
- time synchronization and events time-stamping
 - GPS interface; 40us resolution
 - transmission protocol synchronization; 1ms resolution

Transmission

- twisted pair or multimode /single mode Ethernet 10/100 TP/FX; protocols TCP/IP, PPP, UDP, PRP
- available options:
 - wireless 430MHz or 860MHz, dedicated band
 - telephone modem PSTN, leased line or GSM/GPRS
 - up to 4 FX100 multimode or singlemode fiber optic transmission channels
- serial transmission channels; isolated RS-485 or RS-232, up to 64 channels
- fiber optic: multimode POF 1mm or 62.5/125µm; 50/125µm or singlemode 9/125µm, up to 64 channels

Modular structure

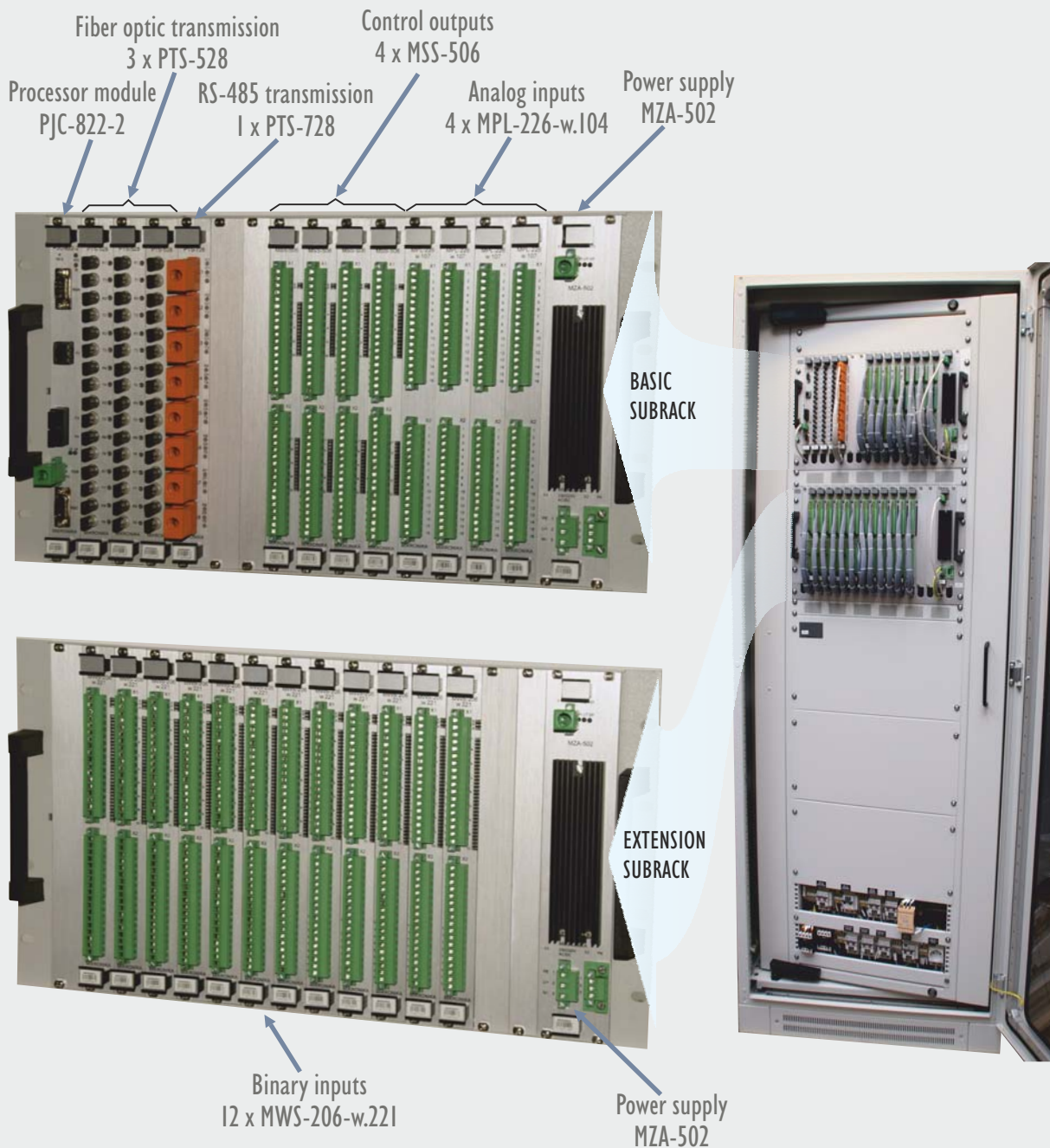
The construction of the SO-52v11_xx RTU family is based on the modular architecture. The set of pluggable modules is selected to perform the required functionality. Standard and specialized features are parametrized by pConfig configuration tool. The CPU module is plugged in 19" basic subrack. One or two additional extension subracks can be applied. Up to 15 various modules and power supply can be plugged in single 19" type subrack.



An example of the SO-52v11_xx RTU configuration

The basic and extension subracks are housed in ruggedized cubicle. The number and configuration of plugged-in modules depend on the application. The RTU can be configured to integrate controls and measurements with interlocking. The operating terminal is located on control room's synoptic table and the rest of modules are plugged in specialized enclosure:

FEATURES	MODULE	AVAILABLE RESOURCES
binary inputs	12 x MWS-206-w.221	384 inputs /220V DC
control outputs	4 x MSS-506	128 outputs
voltage measurements	4 x MPL-226-w.104	32 inputs / 57.7/100V
current measurements		32 inputs / 5A
fiber optic transmission	3 x PTS-528	24 channel, multimode 62.5/125um
RS-485 transmission	1 x PTS-728	8 channels
Ethernet transmission	1 x PJC-822-2	2 channels 100Mb FX and 1 channel 100Mb TX
power supply	MZA-502	each subrack powered separately



Available IN/OUT/measure max quantity for one subrack

The below IN/OUT capacity could be obtained, assuming that up to 10 modules of the same type were inserted.

FEATURES	MODULE TYPE	MAX QUANTITY
binary inputs 220V	MWS-206	320 inputs
binary inputs 48V	MWS-436	640 inputs
controls 5A/220V DC	MSS-326	100 outputs
signalization 0.2A/220V DC	MSS-236	120 outputs
measurements 57,7/100V	MPL-2xx/3xx	160 analog inputs
measurements 1A/5A	MPL-2xx/3xx	160 analog inputs
measurements 4-20mA	MPL-5xx	320 analog inputs
analog outputs 4-20mA	MWA-136	120 analog outputs

Technical data

Basic features

enclosure	Subrack 19" type	Binary inputs	24/48/110/220V DC; 230V AC
voltage measurements	0-57.7/100/230/500V	Binary output types	0.15/0.25A/5A/220V DC* or AC
current measurements	0-20mA/ 0-1A or 0-5A	Analog outputs	0-20mA, ± 20 mA, ± 10 V
continuous voltage overloads	3x nominal range	Internal recorder	4GB
overvoltages recording	$U_{nw} \leq 500$ V	Transmission channels	RS-485, RS-232, Fiber-optic
current overloading	4x I_n , continuously	Network connections	100MB FX, 100MB TP
	30x I_n for 1 sec.	Modem	GSM/GPRS (optionally), PSTN
	75x I_n for 10ms (peak)		

* - 6.3A make/break option available for 220V DC, L/R ≤ 40 ms

Main and reserve supply

main supplying voltage U_p	230/220V AC/DC or 110/48/24V DC
reserve supplying voltage U_r	230/220V AC/DC or 110/48/24V DC or battery 24V DC
range of acceptable fluctuations for U_r and U_p	class AC3/DC3 (-20 to +15 %)
power consumption	depending on RTU equipment

Electromagnetic compatibility

PARAMETER	STANDARD	TEST LEVEL
electrostatic discharges (ESD)	PN-EN 61000-4-2 level 4	15kV - air, 8kV - contact, class A
resistance to electromagnetic field	PN-EN 61000-4-3 level 4	10V/m 80MHz, 80MHz..1GHz 80%, class A
surge resistance 1,2/50 - 8/20 μ s	PN-EN 61000-4-4 level 4	4.0 kVp
resistance to wire disturbances	PN-EN 61000-4-5 level 4	class A
resistance to fast transient states	PN-EN 61000-4-6 level 4	± 4.0 kV, class A
resistance to magnetic field	PN-EN 61000-4-8	class A
voltage dips	PN-EN 61000-4-11	60% for $t = 1$ s, class A
voltage interruptions	PN-EN 61000-4-11	100% for $t = 1$ s, class B
electromagnetic emission	PN-EN 61000-6-4	30MHz $\leq f \leq 1$ GHz, class B

Dielectric strength

PARAMETER	STANDARD	TEST LEVEL
galvanic isolation	PN-EN 60255-5	2,5kV/1min/RMS
voltage surge	PN-EN 60255-5	5kV/1.2/50 μ s

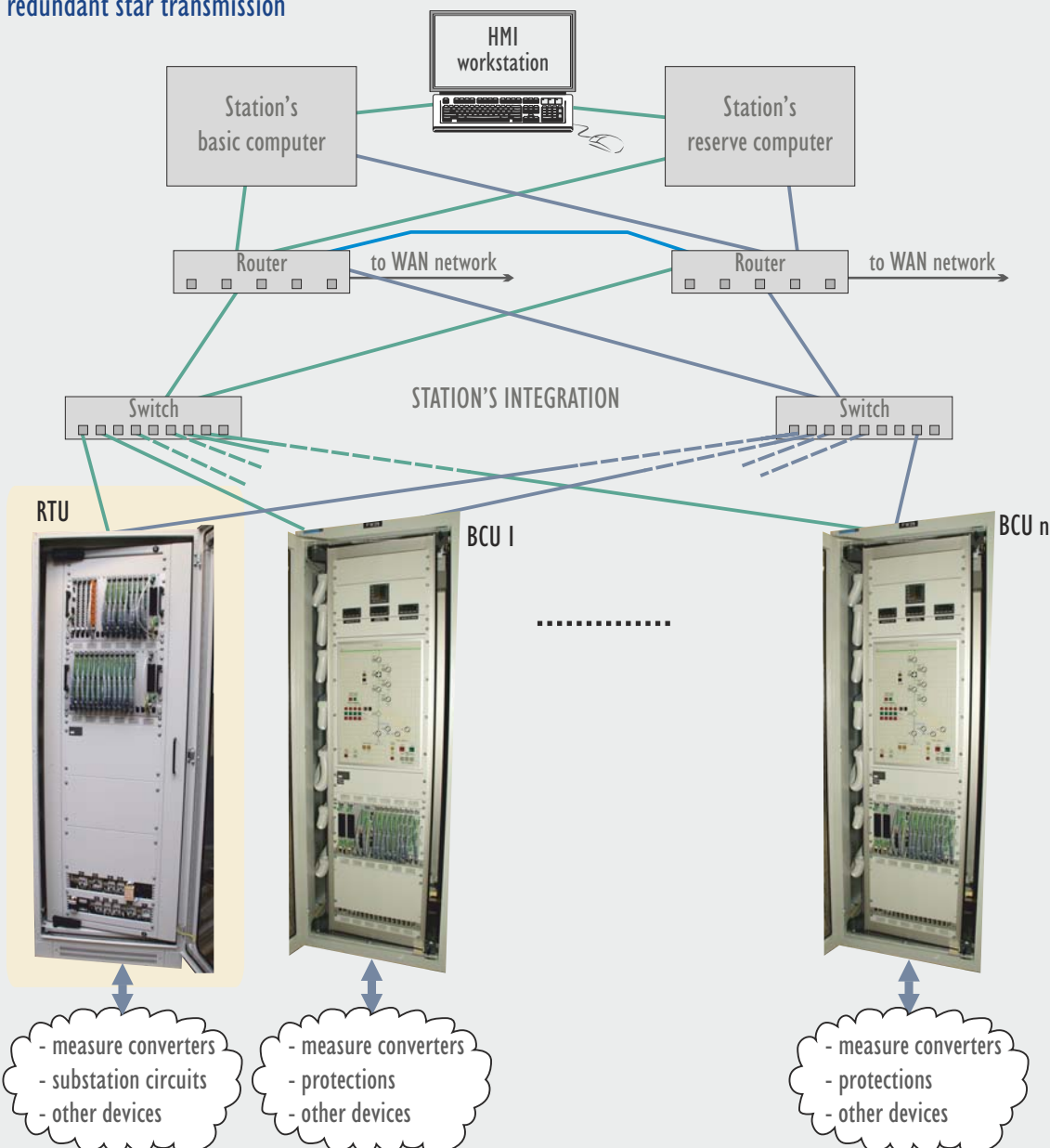
Operation and storage

PARAMETER	STANDARD	TEST LEVEL
operation temperature: -25 $^{\circ}$ C to 70 $^{\circ}$ C (*)	PN-EN 60688 group III	(-25 $^{\circ}$ C to 70 $^{\circ}$ C) , 96-hour test
transport temperature: -40 $^{\circ}$ C to 70 $^{\circ}$ C	PN-EN 60870-2-2, class CT2	
storage temperature: -40 $^{\circ}$ C to 70 $^{\circ}$ C	PN-EN 60870-2-2, class C3	
protection against water and dust permeating	PN-EN 60529:2006	IP 51
humidity	PN-EN 60870-2-2 class Cm	5 - 95 %
vibrations	PN-EN 60870-2-2 class Cm	half-sinusoid duration time II [ms] max. acceleration 300 [m/s 2]

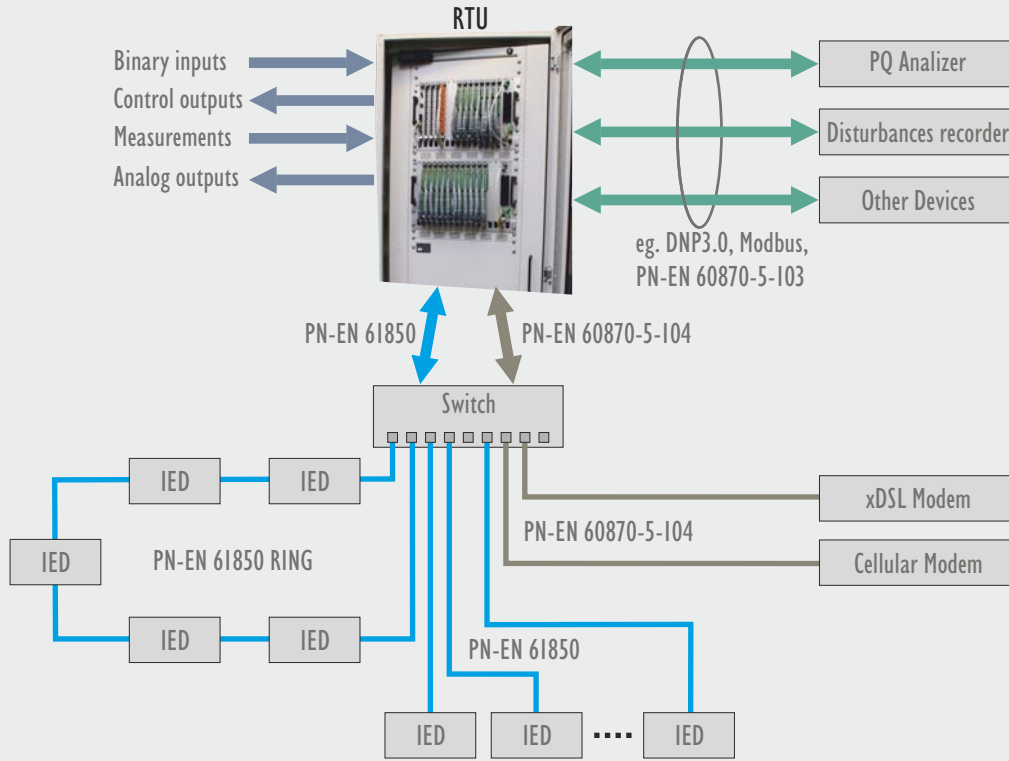
(*) - for "B" type construction

Example of substation application, station network

The redundant star transmission



RTU Substation, versatile communication



Input/output modules

Binary input module MWS-xxx

FEATURES	MWS-156	MWS-206	MWS-206-B	MWS-206-BH	MWS-306	MWS-406	MWS-416
inputs number	24	32	32	32	20	48	64
structure (groups x inputs q.)	3x8	4x8	4x8	4x8	5x4	6x8	8x8
ext. wiring testing	Yes	No	No	No	Yes	No	No
nominal input voltage*	220V DC	220V DC	220V DC	220V DC	220V DC	48V DC	48V DC
burnishing/hysteresis	No/No	No/No	Yes/No	Yes/Yes	No/No	No/No	No/No

Where: * binary input modules with nominal voltage:

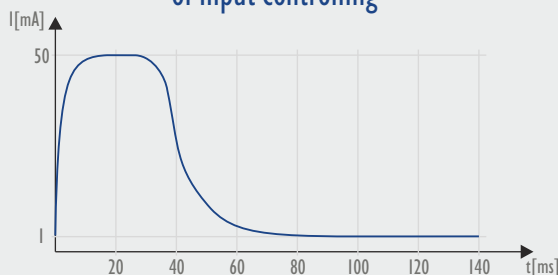
- 220V DC - may be capable to the following voltages: 220, 110, 48, 24 V DC and 230V AC

- 48V - may be capable to the following voltages: 48, 24 V DC

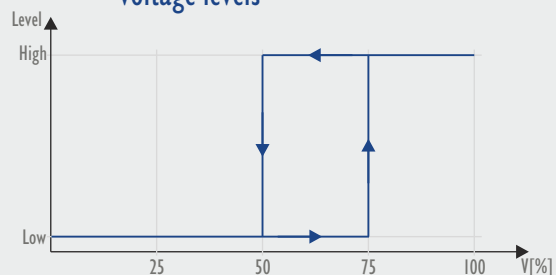
Functionality

- hysteresis or burnishing option
- available AC input options
- events time-stamping 1ms
- meters pulse accumulating

“Burnishing” - increased current in the initial phase of input controlling

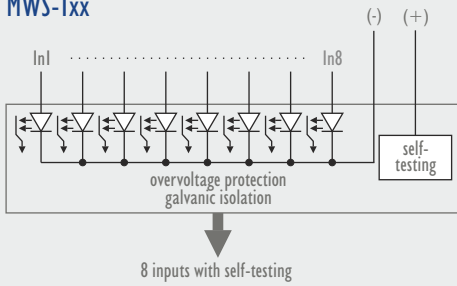


Hysteresis - configurable switch-on/switch-off voltage levels

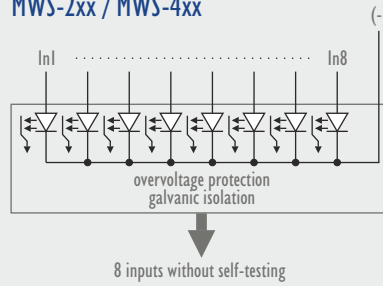


Inputs structure (one group)

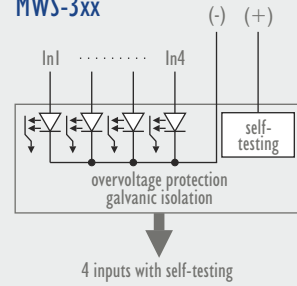
MWS-1xx



MWS-2xx / MWS-4xx



MWS-3xx



Caution: common (-) for above structure. (+) voltage required for self-testing.

Control output module MSS-xxx

FEATURES	MSS-216	MSS-236	MSS-246	MSS-266	MSS-276	MSS-326	MSS-346	MSS-406	MSS-506	MSS-601
outputs number	12	12	12	12	12	10	10	12	32	16
outputs structure	selectable							1 of 12	4x8	1 of 16
continuity testing	Yes	No	No	No	No	Yes	No	No	No	No
relay contact type	NO	NO	NO	NO/NC	NO/NC	NO	NO	NO	NO	NO
make/break DC current*	0.25A	0.25A	-	0.25A	-	5A	-	5A	0.15A	5A
max load current 230V AC	-	-	0.5A	-	0.5A	-	5A	-	-	-

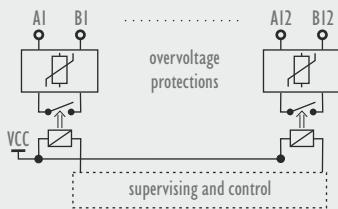
* DC current for 220V DC and L/R ≤ 40ms

Functionality

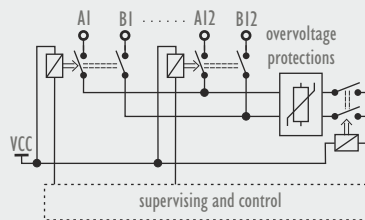
- specialised modules for controls and indications
- protection against control faults caused by component failure, software error, transmission disturbance etc.
- continuity checking
- select before operation mode
- arming relay

Outputs structure

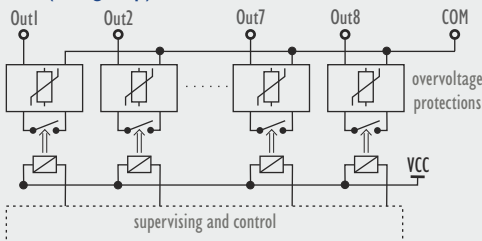
MSS-2xx



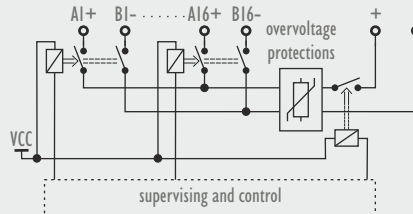
MSS-4xx



MSS-5xx (one group)



MSS-601



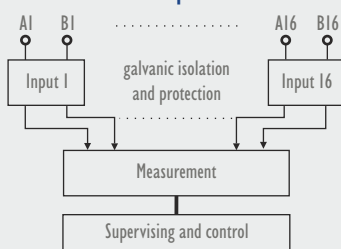
Analog measurement module MPL-xxx

FEATURES	MPL-2xx	MPL-3xx	MPL-5xx
number of inputs	8 or 16	16	32
inputs structure	separately	separately	4 groups x 8 inputs
connectors type	SCREW/D-SUB	SCREW	D-SUB
low voltage measurement $\pm 5V/\pm 10V$ DC	Yes	Yes	Yes
voltage measurement 100V AC	Yes	Yes	No
voltage measurement 230V AC	Yes	Yes	No
low current measurement $\pm 20mA$	Yes	Yes	Yes
current measurement 1A	Yes	Yes	No
current measurement 5A	Yes	Yes	No
current measurement 20A	No	No	No
current measurement 100A	No	No	No
accuracy	0.2%	0.2%	0.2%
sampling resolution	14 bit	14 bit	16 bit

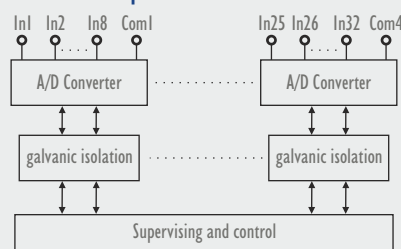
Functionality

- **MPL-2xx/MPL-3xx:** up to 16 galvanic isolated analog inputs; each input can be adapted to measure voltage or current
- **MPL-5xx:** up to 32 analog inputs in 4 galvanic isolated groups of 8 inputs

MPL-2xx/3xx inputs structure



MPL-5xx inputs structure



Analog output module MWA-xxx

FEATURES	MWA-106-11	MWA-136-02	MWA-146-01
number of outputs	24	12	12
connectors type	SCREW	D-SUB	SCREW
range	0-20mA	+/-20mA	+/-20mA or +/-10V
accuracy	0.2%	0.2%	0.2%

Functionality

- to perform analog controlling and signalling by means of current or voltage signals

Specialized modules

Combined input / output modules

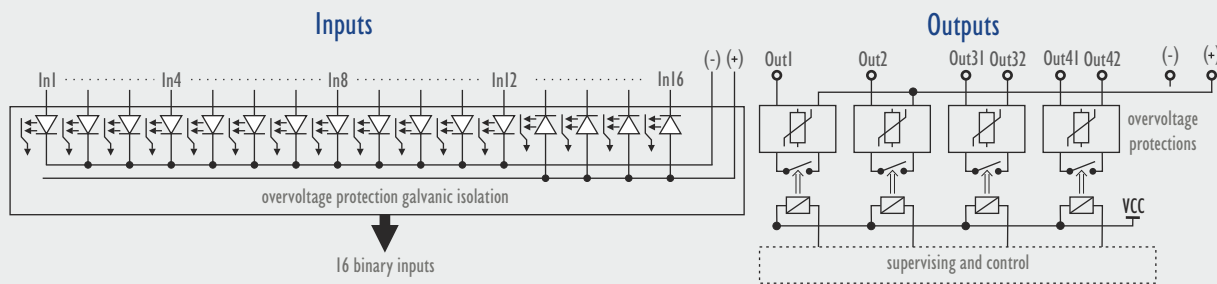
FEATURES	STP-106	STP-106-1	STP-116
digital inputs /range	16 / 24V DC	16 / 110V DC	16 / 24V DC
inputs structure	12(+), 4(-)*	12(+), 4(-)*	16(+)*
control outputs	4	4	4

Where: * (+) - common minus polarity, (-) - common plus polarity

Functionality

- 16 binary inputs, optionally: 12 inputs stimulated (+) and 4 inputs stimulated (-) or all 16 inputs stimulated (+)
- 4 control outputs, 2 independently selectable, 2 with common contact

Input/output diagram



Specialized analog input / output modules

FEATURES	MPT-106	MTI-101	MIA-101
digital inputs /range	-	-	8 / 24V DC
inputs structure	-	-	2 groups of 4 inputs
temperature measurements	8 x PT100	4 x PT100	-
analog measurements	or 8 x 4-20mA	4 x 4-20mA	-
analog outputs	-	-	6 x 4-20mA
accuracy	0.2%	0.2%	0.2%
connector type	SCREW	SCREW	SCREW

Functionality

MPT-106 temperature measurements

- temperature measurements from 8 resistance sensors PT100, PT1000, Ni/CD option - the module is also able to measure direct currents 4-20mA signals in selected channels
- temperature measurements: from -200°C to 600°C
- low current inputs: 4-20mA

CPU modules

Central processor unit module PJC-8xx

FEATURES	PJC-822-2	PJC-824-2	PJC-844-21	PJC-844-22	PJC-844-23	PJC-824-3	PJC-844-33
number of add. chanels ETH	2	4	4	4	4	4	4
type of Ethernet channels	100FX/MM	100FX/MM	100FX/MM	100FX/MM	100FX/MM	100TP	100TP
USB 2.0	No	No	Yes	Yes	Yes	No	Yes
DSP processor	No	No	Yes	No	Yes	No	Yes
power on/off switch	No	No	No	Yes	Yes	No	Yes
RS-485 channels							
RS-232 channels							
service RS-232 channels							
service ETH 100TP channel							

Where: MM - multimode fiber-optic, single mode available

Functionality

The module realizes the function of a central processing unit (CPU). It performs all functions related to data collecting information processing and communication.

Transmission extension modules

Serial transmission module PTS-xxx

FEATURES	PTS-518	PTS-528	PTS-608	PTS-728	PTS-758	PTS-804	PTS-908
transmission type	Fiber optic	Fiber optic	RS-232	RS-485	RS-232/485	Fiber optic	RS-232/485
fiber optic mode	multimode	multimode	-	-	-	singlemode	-
fiber optic type	Imm	62.5/125um	-	-	-	9/125um	-
connectors type	VLF	ST	press clamp	press clamp	D-SUB	ST	press clamp
channels no	8	8	8	8	8(4/4)*	4	8**

Where: * 4 channels RS-232 transmission and 4 channels RS-485 transmission

**Programable transmission type (RS-232 or RS-485) in current channel

Functionality

- PTS-5xx - gives an opportunity to configure each of 8 fiber optic channels in positive or negative mode.
- PTS-60x - is designed to establish serial RS-232 transmission. Channels are equipped with LEDs to signal the transmission status.
- PTS-72x - the module can handle RS-485 or RS-422 transmission. Channels are equipped with LEDs to signal the transmission status.
- PTS-75x - supports 4 x RS-232 and 4 x RS-485/RS-422 transmission channels. The transmission in the RS-485 mode is software or automatically controllable.
- PTS-80x - features singlemode fiber optic channels. Every channel is equipped with three LEDs to signalize transmission status.
- PTS-90x - the modules are designed to establish serial RS-232 or RS-485 software selectable transmission channels.

Power supply module MZA-xxx

Power supply module MZA-xxx

FEATURES	MZA-205	MZA-205-I	MZA-210	MZA-210-2	MZA-210-3	MZA-502	MZA-502-3	MZA-502-4
main supply voltage	220V DC	110V DC	230V AC/DC	48V DC	24V DC	230V AC/DC	48V DC	24V DC
reserve supply voltage	230V AC/DC	230V AC/DC	-	-	-	-	-	-
output current	5V/6A	5V/6A	5V/6A	5V/6A	5V/6A	5V/16A	5V/10A	5V/10A
parallel operation	No	No	Yes	Yes	Yes	Yes	Yes	Yes
transmission type	RS-485	RS-485	RS-485	RS-485	RS-485	RS-485	RS-485	RS-485
power on/off switch	No	No	No	No	No	No	Yes	No
control outputs	2	2	1	1	1	1	1	1

Functionality

Supply module of various features to power the bay controller. A possibility to connect redundant 230/220 AC/DC voltage with automatic switching function of main supply to reserve.



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