

# S0-55

## communication unit for substation automation systems

The unit performs all necessary protocol conversion to establish efficient communication between stations IED devices and local or remote supervising centers.

In power substation the S0-55 integrates IED devices for effective connection with remote supervision control centers or local HMI workstation. The integration covers operating of protocol transmission, all required protocol conversions and database creating of object variables.

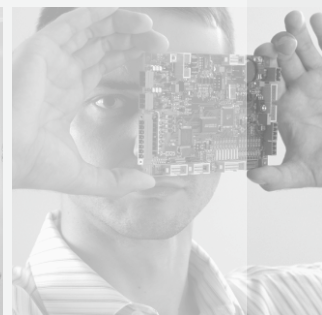
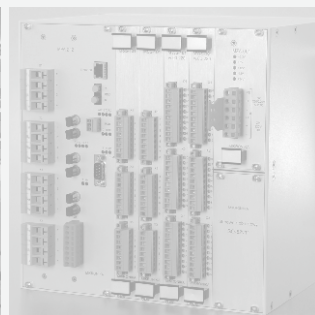
The S0-55 can also enable indications, measurements and station automation functions. The station automation includes e.g. controls with interlocking, control sequences, regulation of transformers tap changer. To perform these functions the unit bases on variables acquired from other equipment. The S0-55 supervises station equipment continuously.

The time synchronization of bay controllers, protections and other devices is essential for the system operation. Our unit assures precise time synchronization by various time stamp sources, established by transmission protocol, GPS timer, NTP/SNTP standards.

The reliability of the above tasks performance is extremely important for distributed bay controllers to create stations virtual RTU. Units construction enables proper design of hardware and communication network redundancy.

The communication unit can operated in single, redundant or multiple configuration.

The required transmissions can run in the star, ring or mixed network topology according to various standards, eq. PN-EN 60870-5-101, 102, 103, 104, DNP3.0 and PN-EN 61850 standard. Transparent data retransmission is also possible.



# Features

- co-operation with digital protections and bay controllers in 750/500/400/220/110/15kV switchgears
- ability to connect digital protections and bay controllers to SCADA /NMS/EMS systems
- simultaneous co-operation with several dispatch centres
- possibility to operate two independent object's LAN for bay controllers, protection devices and other IED
- protocols and IP addresses conversion
- possibility to establish the transparent device connection for communication in dedicated protocol
- data recording mode in the case of transmission channel failure
- ability to perform station automation functions, bay interlocking, sequences, regulators
- ability to read the archived event log by means of maintenance channel
- supervising of operation correctness of all connected devices
- self-diagnostic of equipment and transmission channels
- starcoupler function
- scalable, redundant construction depending on the needs
- internal Ethernet switch

## Multichannel and multiprotocol transmission:

- versatile protocols: DNP 3.0, PN-EN 60870-5-101/103/104, Modbus, SPA, in MASTER and SLAVE modes; PN-EN 61850, SNMP
- up to 80 serial asynchronous channels, speed range 50-115kBd, definable for each channel separately, expendable to 520 channels
- 3x PHY for one processing unit
- SMS messages and alarms by integrated GSM modem
- transparent transmission thanks to UDP protocol layer
- transmission carrier on request: PLC, modems, wires, fiber optic, wireless
- galvanically isolated interfaces: RS-232, RS-485, Ethernet 100BaseTP/FX, GPRS

## Communication with dispatch system and remote centers

- ability to define a set of double receiving and transmitting channels, operated in main and reserve mode with automated switching and supervising of unused channel.
- concurrent multiprotocol and multichannel transmission with the ability to define the scope of transmitted data and controls for each channel

## Source of time synchronization and accuracy stamp

- host system - synchronization function is based on protocol data, accuracy 1ms for transmission losses less than 1min
- integrated or external GPS/GLONASS timer with 40μs accuracy
- NTP/SNTP protocol, 1ms accuracy
- IRIG-B protocol, 10μs accuracy
- time service for slave devices: NTP server, IEEE 1588 Precision time protocol, IEC 60870-5-xxx protocols, IRIG-B

## Communication with station equipment

- ability to connect digital protection devices of various types and protocols
- co-operation with other devices for data acquisition by means of RS-232, RS-485, fiber optic, current loop
- operation in redundant ring or star LAN configuration
- mixed configurations ability, bay controllers are operated by redundant object ring and protection devices are connected by star net
- different information types from various devices can be linked into one chosen transmission protocol





# Construction

The unit is housed in the 6U/19" rack or enclosed, ruggedized enclosure containing processor modules, a set of interface modules, power supply module, optional binary input modules. The modules quantity, type and configuration is composed according to the application. A dedicated software is used for module parameterization as well as for the communication channel and data base configuration. All engineering services, including software upgrade, can be performed remotely by Ethernet or other available communication channels.

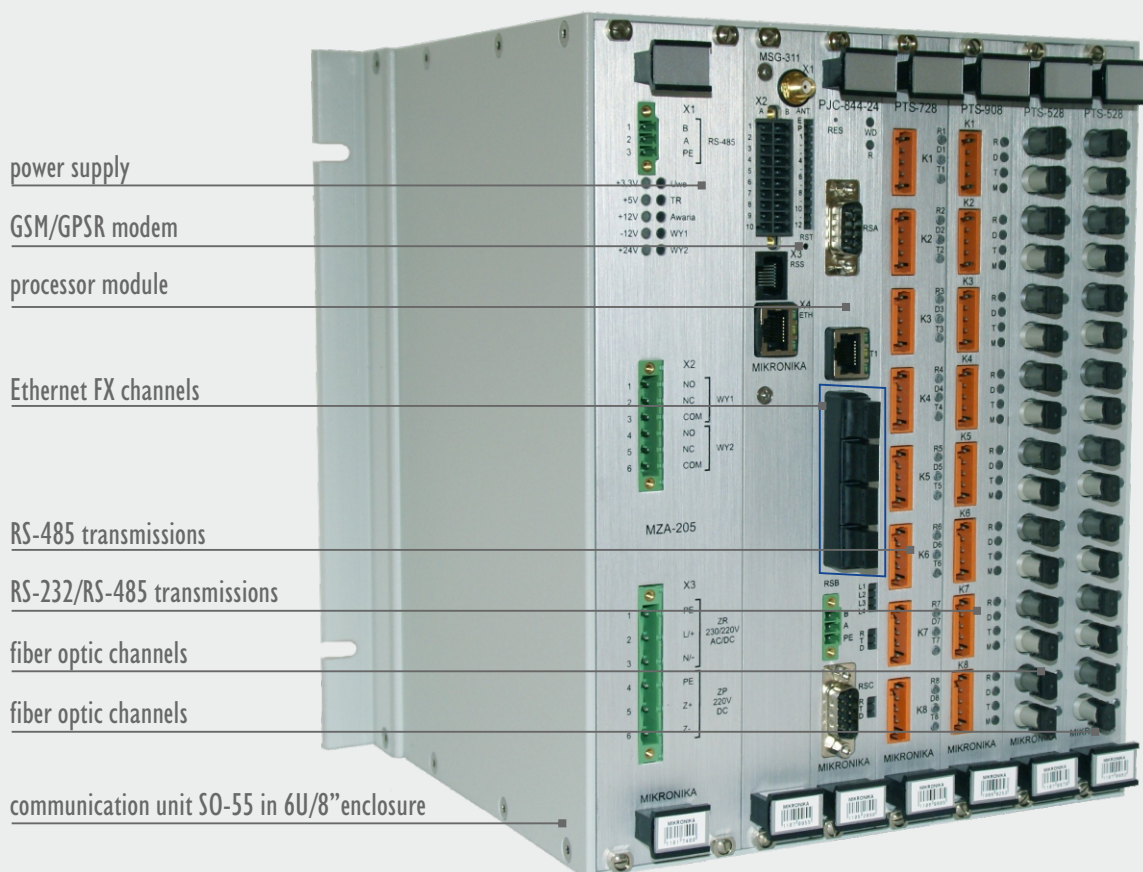
The www-server can be implemented for remote or local supervision, controls and settings evaluation as well as current statuses and database objects presentation. The unit can be equipped with a GSM/GPRS modem to send SMS alarm messages.

Fast and economic development of transmission modules is possible thanks to applied hardware and software solutions. The SO-55 configuration can be easily adapted for newly installed protection devices, recorders or other equipment.

Available modules:

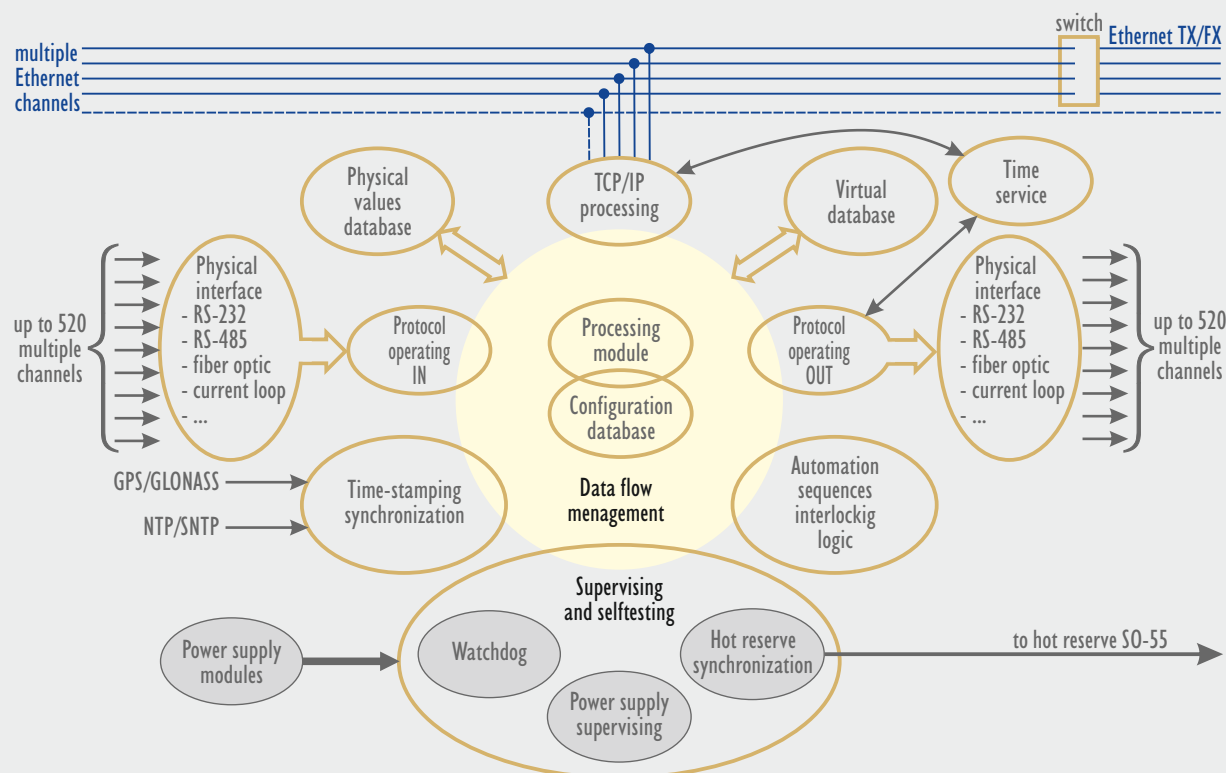
- PJC-8xx processor unit with real-time system and database, up to 4 Ethernet TP/FX 100Mb, 2x RS-232, 1x RS-485
- PTS-528 8x multimode 62.5/125um fiber-optic channels, up to 2km distance
- PTS-518 8x multimode POF 1mm fiber-optic channels, up to 40m distance
- PTS-608 8x isolated RS-232 channels, up to 12m distance
- PTS-656 6x isolated full standard RS-232 channels, up to 12m distance
- PTS-728 8x isolated RS-485 channels, up to 1200m distance
- PTS-758 4x isolated RS-485 channels up to 1200m distance and 4x isolated RS-232 channels up to 12m distance
- PTS-804 4x singlemode 9/125um fiber-optic channels
- PTS-908 8x programable transmission channels type, RS-485 up to 1200 distance or RS-232 up to 12m distance
- MLK-001 Dial-up modem
- MSG-3x1 GSM/GPRS modem
- MZA-205 AC/DC redundant power supply

The construction of SO-55 is based on the same family of modules used also in other constructions, like BCU SO-52vII units, cooling controllers, PQ analysers and others produced by Mikronika. The features of communications are also the same in all.



# Internal structure

The transmission physical interface of SO-55 communication unit is featured by a set of pluggable modules, according to object requirements. All received data are loaded into the internal data base of physical values. The virtual data base contain all results of internal calculations and objects variables. The protocol operating in, the protocol operating out, the processing module and others internal features are configured by means of p-Config software. The configurations files are stored in data base. Supervising and selftesting module controls hardware and software watchdog operation, main and reserve power supply supervision and hot reserve synchronization.



## Modules

### Central processor unit module PJC-8xx

FEATURES	PJC-822-2	PJC-824-2	PJC-844-2I	PJC-844-22	PJC-844-23	PJC-824-3	PJC-844-33
ethernet object channels	2	4	4	4	4	4	4
type of Ethernet	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	I	I	I	I	I	I	I
RS-232 channels	I	I	I	I	I	I	I
service RS-232 channels	I	I	I	I	I	I	I
service ETH 100TP channel	I	I	I	I	I	I	I

Where: MM - standard multimode fiber-optic, single mode available on request

### Functionality

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

## Serial fiber optic transmission module PTS-xxx

FEATURES	PTS-514	PTS-518	PTS-524	PTS-528	PTS-802	PTS-804
fiber optic mode	multimode	multimode	multimode	multimode	singlemode	singlemode
fiber optic type	Imm	Imm	62.5/125um	62.5/125um	9/125um	9/125um
connectors type	VLF*	VLF*	ST	ST	ST	ST
channels no	4	8	4	8	2	4

\* VLF - Versatile Link Family from HP, Imm POF

### Functionality:

- PTS-5xx - gives an opportunity to configure each of 8 fiber optic channels in positive or negative mode.
- PTS-80x - features singlemode fiber optic channels. Every channel is equipped with three LEDs to signalize transmission status.

## Serial transmission module PTS-xxx

FEATURES	PTS-604	PTS-608	PTS-656	PTS-724	PTS-728	PTS-758	PTS-908
transmission type	RS-232	RS-232	full RS-232	RS-485	RS-485	RS-232/485	RS-232/485
connectors type	press clamp	press clamp	D-SUB	press clamp	press clamp	D-SUB	press clamp
channels no	4	8	6	4	8	8(4/4)*	8**

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

\*\*Programable transmission type RS-232 or RS-485

### Functionality:

- PTS-60x - serial RS-232 transmission; LEDs to signal the transmission status.
- PTS-65x - serial full standard RS-232 transmission; LEDs to signal the transmission status.
- PTS-72x - to handle RS-485 or RS-422 transmission; LEDs to signal the transmission status.
- PTS-75x - supports 4 x RS-232 and 4 x RS-485/RS-422 transmission. The RS-485 mode is controlled software or automatically.
- PTS-90x - the modules are designed to establish serial RS-232 or RS-485 software selectable transmission channels.

Remarks: all serial transmission are galvanically isolated.

## Modem module MLK-xxx / MSG-xxx

MLK-xxx is designed to connect trough Dial-up line and MSG-xxx to connect trough GSM/GPRS network any devices.

FEATURES	MLK-001	MLK-101	MSG-101	MSG-121	MSG-301	MSG-311
modem transmission	Dial-up	Dial-up	GSM/GPRS	GSM/GPRS	GSM/GPRS	GSM/GPRS
RS-232 service channel	-	-	-	-	I	I
RS-232 channel	I	I	I	I	I	I
RS-485 channel	-	-	I	I	I	I
binary inputs	-	-	-	-	3	3
opto-MOS control outputs	-	-	-	-	I	I
front panel	6U	3U	3U	6U	3U	6U

## Power supply module MZA-xxx

FEATURES	MZA-205	MZA-205-I	MZA-210	MZA-210-2	MZA-210-3	MZA-502	MZA-502-3
main supply voltage	220V DC	110V DC	230V AC/DC	48V DC	24V DC	230V AC/DC	48V 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
parallel operation	No	No	Yes	Yes	Yes	Yes	Yes
available transmission type	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
control outputs	2	2	I	I	I	I	I

### 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.



# Technical data

## Construction

compliant standards	CE	internal modem	GSM/GPRS (optionally)
enclosure	“6U” type, subrack	internal recorder	4GB
modules	pluggable	transmission channels	RS-485, RS-232, fiber-optic
montage	19” rack or case	network connections	100MB FX, 100MB TP

## Power supply

main supply Up voltage	220V DC or 110/48/24V DC
reserve supply Ur voltage	230/220V AC/DC or 110/48/24V DC or battery 24V DC
Ur/Up acceptable fluctuations	class AC3/DC3 (-20 to +15 %)
power consumption	typical 20VA*

\* - power consumption depends on module type quantity

## Basic communication features

available physical serial channels	up to 64
available logical serial channels	up to 520
available Ethernet interfaces	up to 5

## Electromagnetic compatibility (EMC)

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 I,2/50 - 8/20μs	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=1s, class A
interrupts in voltage	PN-EN 61000-4-11	100% for t=1s, class B
electromagnetic emission	PN-EN 61000-6-4	30MHz ≤ f ≤ 1GHz, class B

## Dielectric strength

Parameter	Standard	Level
galvanic isolation	PN-EN 60255-5	2,5kV/1min/RMS
voltage surge	PN-EN 60255-5	5kV/1.2/50μs

## Operation and storage

Parameter	Standard	Test level
standard operation temperature: -5°C to 55°C	PN-EN 60688 group III	(-5°C to 55°C), 96-hour test
operation temperature: -25°C to 70°C (*)		(-25°C to 70°C), 96-hour test
transport temperature: -40°C to 70°C	PN-EN 60870-2-2, class CT2	
storage temperature: -25°C to 55°C	PN-EN 60870-2-2, class C2	
protection against water and dust permeating	PN-EN 60529:2006	IP 51
humidity	PN-EN 60870-2-2 class Cm	10 - 95 %
vibrations	PN-EN 60870-2-2 class Cm	half-sinusoid duration time 11 [ms] max. acceleration 300 [m/s <sup>2</sup> ]

\* for “B” type construction