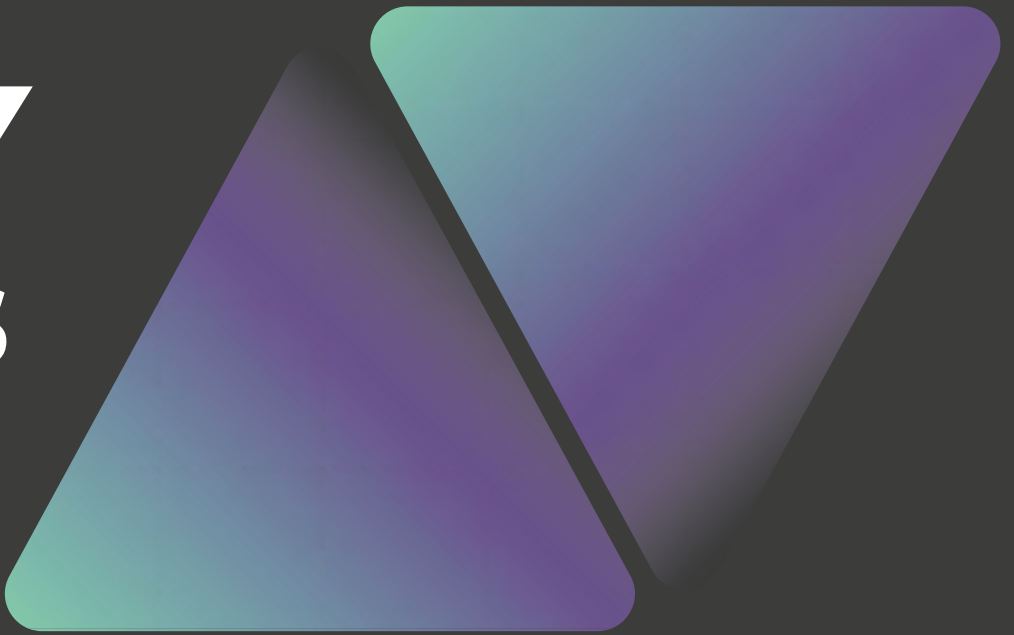
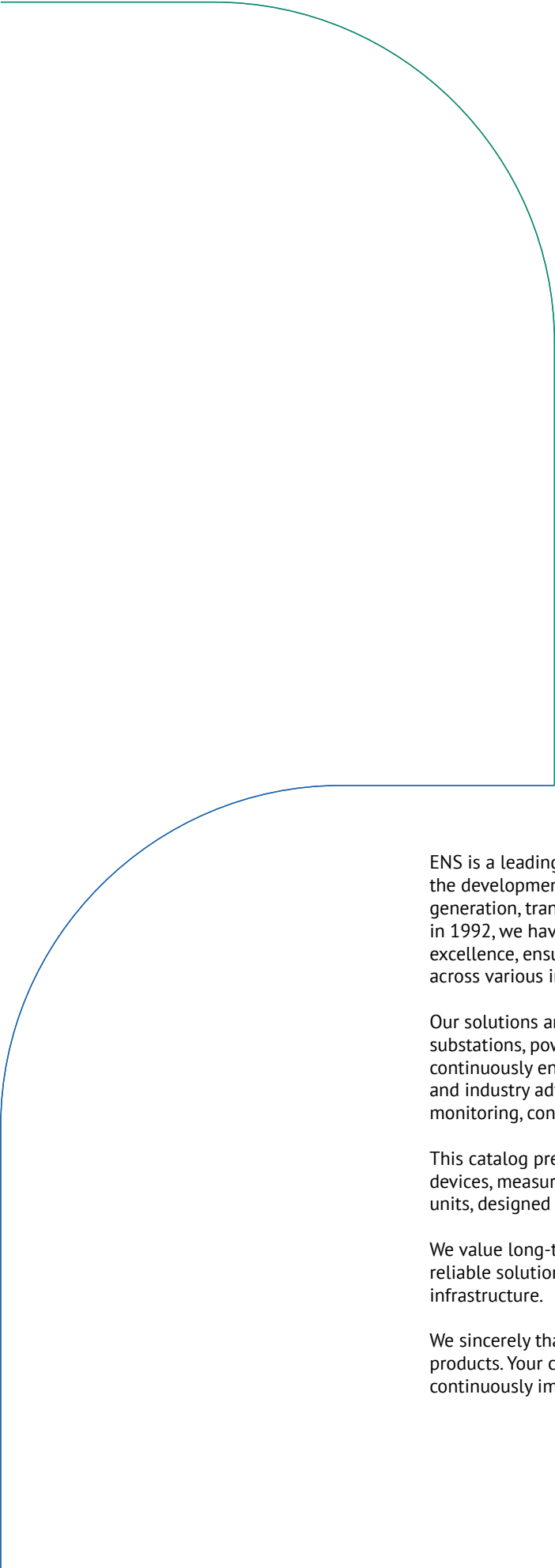




ens



**Product
catalog
2026**



ENS is a leading R&D and manufacturing company specializing in the development and production of electronic devices for power generation, transmission, and distribution. Since our founding in 1992, we have been committed to innovation and technical excellence, ensuring the reliability and efficiency of power systems across various industries.

Our solutions are widely used in automated control systems for substations, power plants, and industrial energy facilities. We continuously enhance our products based on customer feedback and industry advancements, delivering high-precision devices for monitoring, control, and measurement.

This catalog presents our latest range of intelligent electronic devices, measuring instruments, I/O modules, and remote terminal units, designed to meet the demands of modern power systems.

We value long-term partnerships and are committed to delivering reliable solutions that enhance the efficiency and safety of energy infrastructure.

We sincerely thank our customers and partners for their trust in our products. Your confidence in ENS solutions drives us to innovate and continuously improve.

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ENIP-2

multifunctional measuring devices

ENIP-2 is a highly accurate Intelligent Electronic Device (IED) designed for measuring three-phase electric network parameters at substations, power plants, industrial facilities, and distribution grids. Its accuracy and performance fully meet the requirements of automated control systems.

ENIP-2 measures all harmonic components (True RMS) and separates the basic harmonic. It supports up to five interfaces for data transmission, configuration, and firmware updates. The IED integrates seamlessly with any vendor's equipment using standard protocols, including IEC 61850 (GOOSE, MMS), Modbus (RS-485, Ethernet), IEC 60870-5-101/104, SNMP, and SNTP. A USB port allows configuration and firmware updates without external power.

For signal processing, ENIP-2 includes built-in I/O and supports up to 10 external I/O modules (e.g., ENMV-1). Measurement data can be displayed via the ENMI HMI module.

ENIP-2 is offered in four implementations:

- Standard - the main line of transducers for wide applications at power facilities;
- Panel - transducers with HMI;
- Compact - for remote control and monitoring of 6-20 kV switchgear;
- PMU - for WAMS and precise frequency measurement.

Each version differs in functionality, interfaces, I/O configurations, protocols, and design.



ENIP-2 Standard

The ENIP-2 Standard is designed for easy installation with DIN-rail mounting. A sealing cover can be used to restrict access to terminals if needed.

Different ENIP-2 Standard modifications vary in interface configurations and I/O sets, including discrete inputs/outputs (DI, DO) and analog outputs (AO).

Modification	RS-485	Ethernet	DI, DO, AO
Minimum	1 or 2	-	-
Minimum plus	2	-	+
Optimum	3	1	+
Maximum	2	2	+

Minimum

One or two RS-485 ports. The second RS-485 port can be used either as a redundant data transmission channel or for connecting external devices.

Minimum plus

Includes a set of digital inputs, digital inputs/outputs, or analog outputs, plus 10 LED indicators for status display.



Optimum

Three RS-485 ports and one 100Base-TX.

Maximum

Two RS-485 ports and two 100Base-TX/FX (RSTP, PRP).

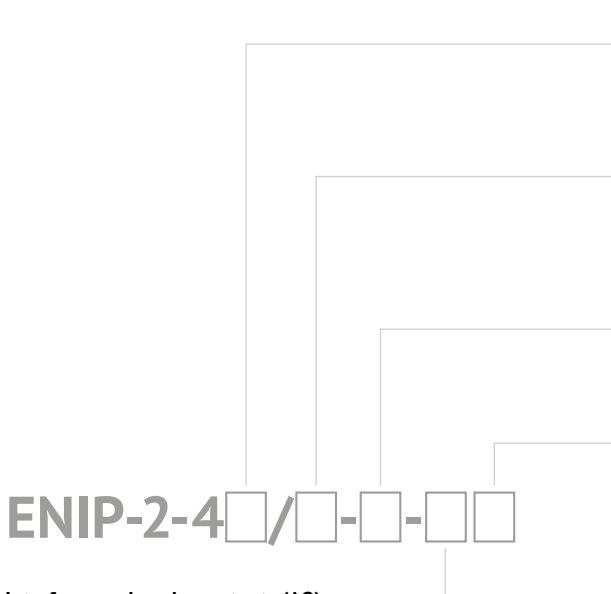


Specification

Rated current and voltage	1 or 5 A; 57.7/100, 230/400, 400/690 V (phase /line)
Voltage measurement accuracy	Full Scale: $\pm 0.2\%$ Readings: $\pm 0.2\%$ ($0.2U_f \leq U \leq 1.5U_f$), $\pm 0.75\%$ ($0.05U_f \leq U < 0.2U_f$)
Current measurement accuracy	Full Scale: $\pm 0.2\%$ Readings: $\pm 0.2\%$ ($0.1I_f \leq I < 2I_f$), $\pm 0.75\%$ ($0.02I_f \leq I < 0.1I_f$), $\pm 2.0\%$ ($0.01I_f \leq I < 0.02I_f$)
Power (active, reactive, apparent) measurement accuracy	Full Scale: $\pm 0.5\%$ Readings: $\pm 0.5\%$ ($0.2I_f \leq I \leq 2I_f$, $0.2U_f \leq U \leq 1.5U_f$)
Frequency measurement accuracy	± 10 mHz
Measurement time / update time	50 msec (sliding window) / 20 msec, configurable averaging period
Additional measured and computable parameters	cos, tg, angles (phase and average), active and reactive energy, U_0 , U_1 , U_2 , K_{2U} , K_U , I_0 , I_1 , I_2 , K_{2I} , K_I , THD
Digital signals	up to 32 processed signals: statuses of built-in digital inputs and outputs, statuses of inputs and outputs of external ENMV-1 modules, logical expressions, GOOSE subscriptions, diagnostic signals
Digital inputs	0, 4 or 8 inputs (wet or dry contact, debounce filtering), U_r / U_{max} : 24/250 VDC, 110/150 VDC, 220/250 VDC
Digital outputs	0 or 3 outputs: 300 VDC/250 VAC, 0.1 A
Logical expressions	up to 32 expressions in 32 functions (AND, OR, CMP, TIMER, VALID)
Analog outputs	4 customized outputs, signal range: ± 5 mA, ± 20 mA, ± 24 mA, 0...5 mA, 0...20 mA, 0...24 mA, 4...20 mA
Event logging	digital signals, history, event log
Extension modules	display modules: ENMI-2, ENMI-3, ENMI-4m, ENMI-4e, ENMI-7; digital inputs/outputs (up to 10 modules): ENMV-1, ESX231, ITS2
Interfaces and protocols	1, 2 or 3 \times RS-485 (600...115200 baud): Modbus RTU, IEC 60870-5-101; USB; 1 or 2 \times 100Base-TX, 2 \times 100Base-FX LC MM; IEC 61850 (ed. 2), IEC 60870-5-104, IEC 60870-5-101 (UDP), Modbus TCP, Modbus RTU, SNMP, web-console, RS-485 tunneling via TCP/IP; PRP, RSTP for 2 Ethernet ports modifications
Real-time clock	500 μ s (error less than 5 s per day without sync); Time sync: IEC 60870-5-101, IEC 60870-5-104, SNTP
Power supply	18...36 VDC, 40...160 VDC, 120...370 VDC or 100...265 VAC (45...55 Hz), up to 13 VA (19 VA with ENMI)
Operating conditions	$-40...+70$ $^{\circ}$ C
Design	75 \times 100 \times 110 mm (IP40)
Mounting	DIN-rail TH35 mounting



Ordering Information



Rated current

1 – 1 A
5 – 5 A

Rated voltage

100 – 57.7 (100) V
400 – 230 (400) V
690 – 400 (690) V

Power supply voltage

220 – 120...370 VDC or 100...265 VAC
110 – 40...160 VDC
24 – 18...36 VDC

Digital inputs operating voltage

(220) – 220 VDC
(110) – 110 VDC
if not specified – 24 VDC or without inputs

Interfaces and analog outputs (AO)

A2E0-41 – 2 × RS-485, 4 × AO
A3E4-41 – 3 × RS-485, 1 × 100Base-TX, 4 × AO
A2E4x2-41 – 2 × RS-485, 2 × 100Base-TX, 4 × AO
A2E4x2FX-41 – 2 × RS-485, 2 × 100Base-FX MM, 4 × AO
A2E4x2FS-41 – 2 × RS-485, 2 × 100Base-FX SM, 4 × AO

Interfaces, digital inputs (DI), digital outputs (DO)

A1E0-01 – 1 × RS-485
A2E0-01 – 2 × RS-485
A2E0-11 – 2 × RS-485, 4 × DI, 3 × DO
A2E0-21 – 2 × RS-485, 8 × DI
A3E4-11 – 3 × RS-485, 1 × 100Base-TX, 4 × DI, 3 × DO
A3E4-21 – 3 × RS-485, 1 × 100Base-TX, 8 × DI
A2E4x2-11 – 2 × RS-485, 2 × 100Base-TX, 4 × DI, 3 × DO
A2E4x2-21 – 2 × RS-485, 2 × 100Base-TX, 8 × DI
A2E4x2FX-11 – 2 × RS-485, 2 × 100Base-FX MM, 4 × DI, 3 × DO
A2E4x2FX-21 – 2 × RS-485, 2 × 100Base-FX MM, 8 × DI
A2E4x2FS-11 – 2 × RS-485, 2 × 100Base-FX SM, 4 × DI, 3 × DO
A2E4x2FS-21 – 2 × RS-485, 2 × 100Base-FX SM, 8 × DI

Options and accessories

IEC 61850-8-1 activation – [ES61850.enip](#)

RS-485 splitter – [EX...](#)

Surge protection devices for RS-485 – [ESP485-...](#)

Surge protection devices for Ethernet – [ESP-LAN](#)

Sealing cover – [PC1015](#)

USB 2.0 cable, male A to male B, 1 m – [USB-A-B](#)

Certification

Conformance to IEC 61850 – UCAiug Level A Certificate IEC 61850 Ed.1, Ed.2 (DNV GL)

Conformance to LVS EN 61010-1:2011 (EN 61010-1:2010), EN 61000-4-3, EN 61000-4-4, EN 61000-4-5, EN 61000-4-6, EN 61000-4-8, EN 61000-4-11.

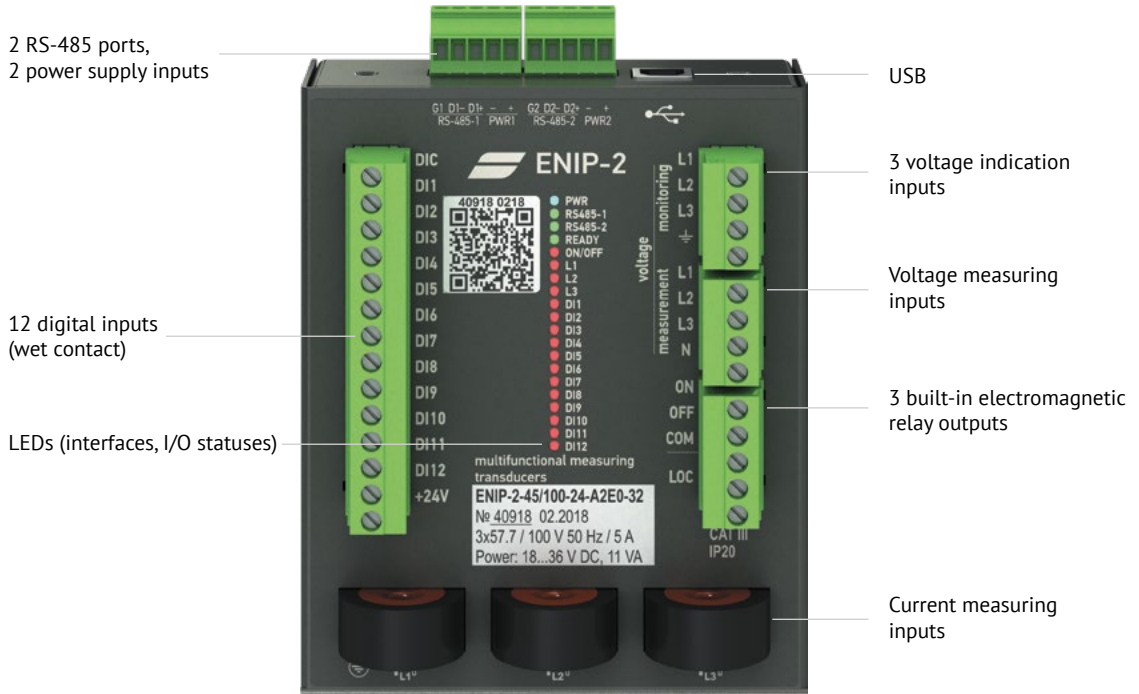


ENIP-2 Compact

ENIP-2 Compact is designed for medium-voltage switchgear cells, where compact size and extensive I/O functionality are essential.

It features digital inputs, relay outputs, and two redundant 24 VDC power inputs for increased reliability. Additionally, it includes three analog inputs for voltage presence monitoring.

Basic



Minimal



Specification

Measurements	Please, see page 4 + plus 3 voltage indication inputs (1...300 VAC)
Digital signals	up to 32 processed signals: statuses of built-in digital inputs and outputs, statuses of digital inputs and outputs of external modules ENMV-1, logical expressions, diagnostic signals
Digital inputs	12 (dry or wet contact 24 VDC), debounce filter
Digital outputs	3 outputs: 250 V, 6A DC / AC
Logical expressions	up to 32 expressions in 32 functions (AND, OR, CMP, TIMER, VALID)
Event logging	I/O history, event log
Extension modules	display modules: ENMI-2, ENMI-3, ENMI-4m, ENMI-7; digital inputs/outputs (up to 10 modules): ENMV-1, ESX231, ITS2
Interfaces and protocols	2 × RS-485 (600...115200 baud): Modbus RTU, IEC 60870-5-101; USB
Real-time clock	500 µs (error less than 5 s per day without sync); Time sync: IEC 60870-5-101
Power supply	18...36 VDC, 11 W
Operating conditions	-40...+70 °C
Design	136 × 100 × 67 mm, IP20
Mounting	DIN-rail TH35 mounting, or special bracket (please see Options and Accessories)

Ordering Information

ENIP-2-/-24-A2E0-12

Connection type
1 – single-phase (Minimal)
4 – three-phase (Basic)

Rated current
1 – 1 A
5 – 5 A

Rated voltage
0 – without measuring inputs voltage
100 – 57.7 V (L-L 100 V)
400 – 230 V (L-L 400 V)

Options and accessories

RS-485 splitter – [EX...](#)

Surge protection devices for RS-485 – [ESP485-...](#)

Bracket for ENIP-2-...-32 – [RM6-KP](#)

USB 2.0 cable, male A to male B, 1 m – [USB-A-B](#)



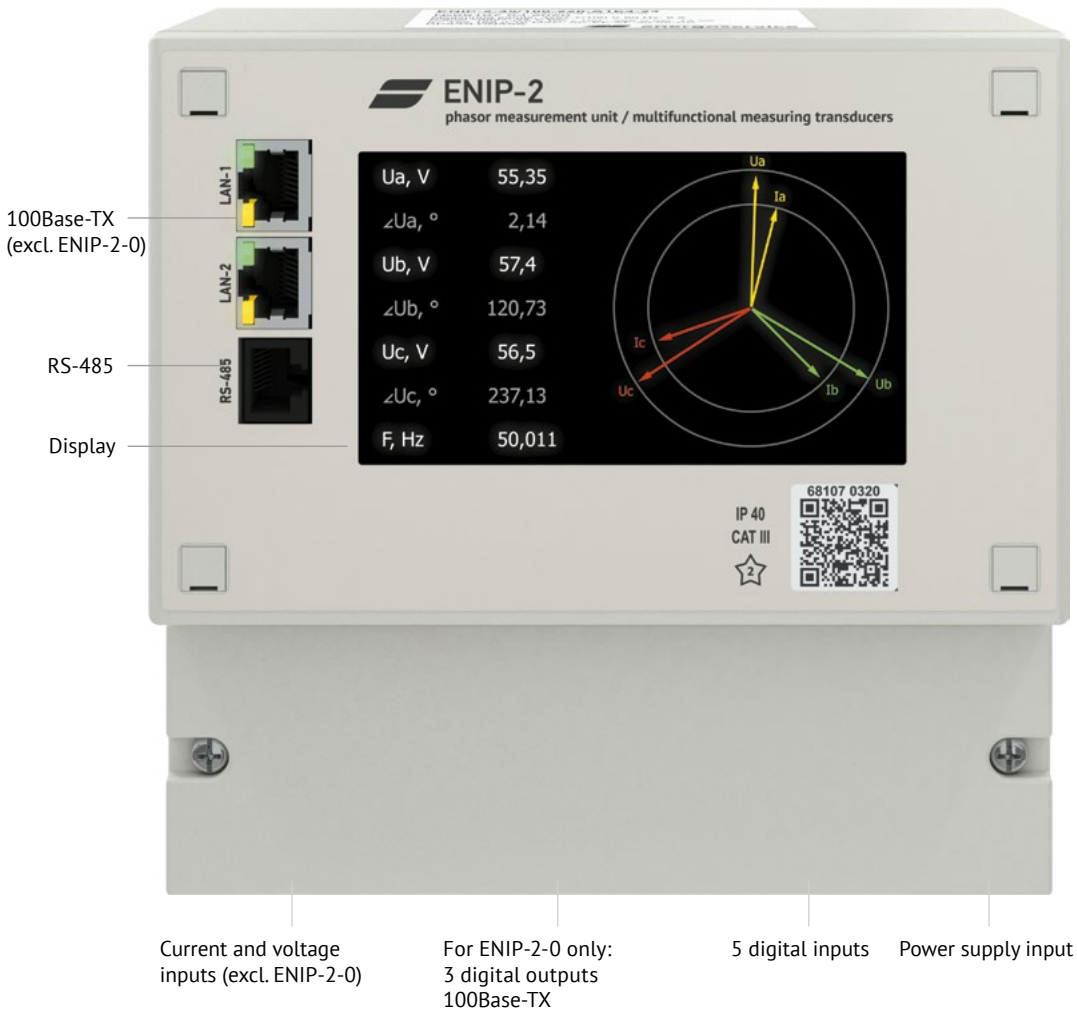
ENIP-2 PMU

ENIP-2 Phasor Measurement Unit (PMU) is designed for integration into Wide Area Measurement Systems (WAMS), enabling power grid monitoring and the detection and prevention of instabilities.

It measures first harmonic voltage and current at a high rate, assigning a precise timestamp (synchrophasor) to each measurement. Time synchronization is ensured via global positioning systems (GPS, GLONASS), which is critical for PMU accuracy.

ENIP-2 PMU complies with IEEE C37.118.1 standards for both P (Protection) and M (Measurement) classes. Proprietary signal processing algorithms minimize the impact of electromagnetic transients and higher harmonics, ensuring high measurement accuracy.

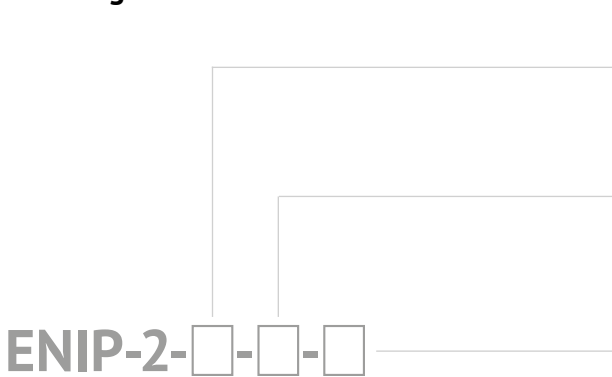
Featuring a color touchscreen display, the ENIP-2 PMU can be installed as a panel-mounted device or within specialized WAMS cabinets.



Specification

Synchrophasors of the voltages and currents (main harmonic), frequency	rated power frequency 50/60 Hz (operating range 45-55/55-65 Hz), the measurements in accordance with C37.118.1 (class P and M), TVE < 1%, FE ≤ 0.001 Hz, RFE ≤ 0.1 Hz/sec, datarate – 1/2/5/10/25/50/100
The parameters of three-phase power grid (main harmonic, RMS)	Please, see page 4
Time sync	IEEE 1588v2 PTP, RS-485 (IRIG-A/B) or built-in GPS/GLONASS-receiver; accuracy: 1 μs with time sync (error less than 0.4 s per day without sync)
Interfaces and protocols	1 × RS-485 (IRIG A/B) 1 or 2 × 100Base-TX: C37.118.2, IEC 60870-5-104, IEC 60870-5-101 (UDP), Modbus TCP, Modbus RTU (UDP)
Digital inputs/outputs	5 (dry contact, 24 V DC); 3 digital outputs (U _{max} 300 VDC/250 VAC, I _{max} 100 mA) – only for ENIP-2-0
Display	4,3" TFT color touch screen, 480 × 272
Options	built-in GPS/GLONASS-receiver; 8 GB storage
Power supply	18...36 VDC or 120...370 VDC / 100...265 VAC (45...55 Hz), 13 VA
Operating conditions	-20...+70 °C
Design	160 × 165 × 83 mm, IP40

Ordering Information



The type of input the measured signals

41/100	– 1 A, 57.7 (100) V
45/100	– 5 A, 57.7 (100) V
45/400	– 5 A, 230 (400) V
0	– 100Base-TX (IEC 61850-9-2LE)

Power supply voltage

220	– 120...370 VDC or 100...265 VAC
24	– 18...36 VDC

Interfaces and options

only ENIP-2-4...

A1E4-23 – 1 × RS-485, 1 × 100Base-TX, GPS/GLONASS

A1E4x2-13 – 1 × RS-485, 2 × 100Base-TX, IEEE 1588v2 PTP

only ENIP-2-0...

A1E4x2-13 – 1 × RS-485, 2 × 100Base-TX, IEC 61850-9-2

Options and accessories

Outdoor GPS/GLONASS antenna – [GPS-P](#)

Mounting brackets for GPS/GLONASS antenna – [GPS-KP...](#)

Surge protection devices for Ethernet – [ESP-LAN](#)

Additional 8 GB memory for registration and storage – [SD8G.pmu](#)



ENIP-2 Panel

ENIP-2 Panel is a multifunctional measuring transducer with an HMI, designed for installation in switchgear cells, panels, and cabinets.

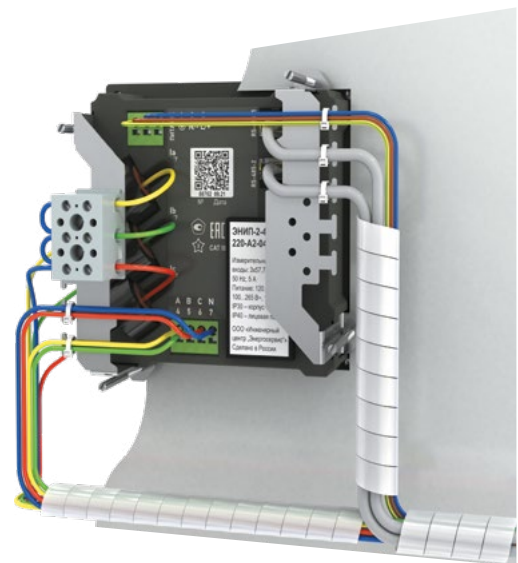
It features a 4.3" TFT color touchscreen display (480 × 272), where measurements and other data are shown. The display modes can be controlled via the touchscreen interface or buttons.

Unlike other versions in the ENIP-2 series, the ENIP-2 Panel offers universal measuring inputs, allowing connection of current circuits with rated values of 1 A and 5 A, and voltage circuits with rated values of 57.7 V, 230 V, and 400 V (phase). This eliminates the need to choose input signal values when ordering.

The rear of the device has current and voltage measuring inputs, power supply terminals, and RJ45 interface sockets.

If it is necessary to provide a screw connection of current circuits, the device is supplemented by an organizer bracket with a thermally/transit screw terminal. The ENIP-2 Panel is primarily designed for panel installation but can also be mounted on a DIN rail with additional accessories.

The device can connect from one to ten ENMV-1 or other modules via RS-485 ports to process digital and analog signals and output control commands.



ESM

smart meters

ESM Smart Meter operates as a revenue meter (IEC 62052-11), a power quality analyzer (IEC 61000-4-30), and a multifunctional measuring device.

As a revenue meter, ESM measures four-quadrant active and reactive energy and stores power demand and energy readings based on time-of-use (TOU) tariffs in its built-in memory.

As a power quality analyzer, ESM complies with Classes A and S of IEC 61000-4-30:2008. It provides real-time data and automatically generates power quality reports.

As a multifunctional measuring device, ESM offers measurement data through standard communication protocols for integration with automation systems. It supports IEC 61850 (ed. 2), certified with UCAiug Level A by DNV GL (KEMA).

Similar to ENIP-2, ESM can connect to ENMV-1 modules for digital input and output. ENMI display modules are used for visualization of the data.



ESM is available in three modifications, each differing in the type of connection to the measuring circuits. However, all modifications offer the same set of functions, ensuring consistent performance across different configurations.

ESM-HV

Connects to conventional electromagnetic current and voltage transformers, as well as directly to the voltage circuits 230 V, 400 V.



ESM-ET

Connects to electronic current and voltage transformers: Rogowski coils, low-power current transformers, and voltage dividers.



ESM-SV

Connects to the process bus of the digital substation for receiving sampled values of current and voltage (IEC 61850-9-2) from digital current and voltage transformers or merging units (see ENMU on page 16).



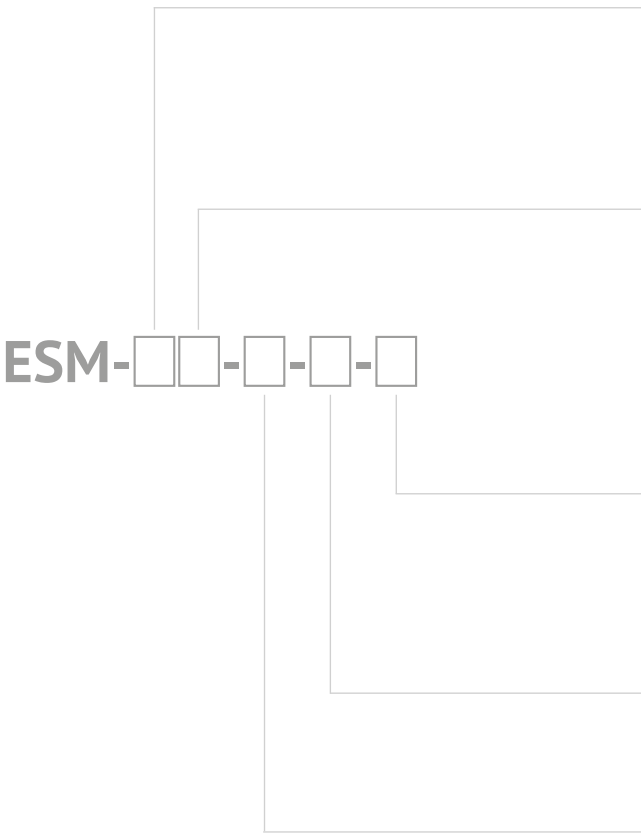
ESM with ENMI-4m(e) display module

Specification

	ESM-HV	ESM-ET	ESM-SV
Connection type	to conventional instrument current and voltage transformers	to electronic instrument current and voltage transformers	to process bus network: 3 × 100Base-TX, PRP up 4 SV (SV240, SV256, SV288)
Rated current and voltage	I_f : 1 A (I_{max} 10 A) (starts from 0.001I) U_f : 57.7 (100) V; 230 (400) V; 400 (690) V	I: 150 mV; 200 mV; 225 mV; 333 mV; 1 V; 1.625 V; 2 V; 4 V U: 200 mV; 333 mV; 1 V; 1.625 V; 2 V; 3.25 V; 4 V	according IEC 61850-9-2
TOU revenue metering	in accordance with IEC 62052-11, IEC 62053-22, IEC 62053-23		
Energy class (active / reactive)	0.2S / 0.5 or 0.5S / 1	0.5S / 1	0.2S / 0.5
Time of use (TOU) metering	programmable TOU records (255 seasons, 255 days, 8 tariff zones per day)		
Power loads profile	daily – 366 records, monthly – 120 records with configurable intervals (period from 1 s to 12 hours): profile 1 – 5094 records, profile 2 – 1536 records		
Storage of readings	total and time-of-use (TOU) data, with the following storage periods: since reset – at the beginning and for the current day (previous 30 days), at the beginning and for the current month (previous 12 months), at the beginning and for the current year (previous 10 years); data storage for up to 20 years without an external power supply		
Power quality monitoring	in accordance with GOST 32144-2013, GOST 30804.4.7-2013 (class I), GOST R 8.655-2009, GOST R 51317.4.15-2012, GOST 33073-2014 (reports), EN 50160 (reports)		
in accordance with IEC 61000-4-30	class A	class S	class A
Measured parameters and accuracy	The parameters of three-phase power grid: RMS, 1...50 harmonics		
Measurement accuracy	% Reading: voltage RMS (phase, line-to-line, average), and harmonics from 1 to 50: ± 0.1%, currents (phase and average) ± 0.1%, power (active, reactive, apparent) ± 0.5%		
	Frequency ± 0.01 Hz, power factor (phase and average) ± 0.1 °		
Fault Recorder	recording of instantaneous values: three current, three voltage (phase or linear); sampling 7.2 kHz; configurable trigger; recording time – 10 seconds of pre-history + 60 seconds of event		
Digital signals	up to 64 processed signals: statuses of inputs and outputs of up to 4 external ENMV-1 modules, logical expressions, GOOSE subscriptions, diagnostic signals		
Extension modules	display modules: ENMI-2, ENMI-4m, ENMI-4e, ENMI-7; digital inputs/outputs: up to 10 external modules (ENMV-1, ESX231, ITS2)		
Interfaces and protocols	2 × RS-485: Modbus RTU, IEC 60870-5-101, DLMS/COSEM; USB; 2(4) × 100Base-TX or 2 × 100Base-TX, 2 × 100Base-FX MM/SM (PRP, RSTP); IEC 61850 (ed. 1 and ed. 2), IEC 60870-5-104, Modbus TCP, DLMS/COSEM, FTP, SNMP, web-console		
Power supply	18...36 VDC, 40...160 VDC, 120...370 VDC or 100...265 VAC (45...55 Hz), up to 12 VA (19 VA with ENMI)		
Operating conditions	–40...+70 °C		
Design	75 × 100 × 110 mm (IP40); transparent sealing cover; for ESM-ET and ESM-SV – lockable plug-out protection for RJ45 (RJ45PG) is optionally		
Mounting	DIN-rail TH35 mounting		



Ordering Information



Connection type

HV – conventional CT and VT
ET – electronic CT and VT
SV – according IEC 61850-9-2

Rated input values

ESM-HV – voltage phase (line)

100 – 57.7 (100) V
400 – 230 (400) V
690 – 400 (690) V

ESM-ET

– current, V: **1** – 0.15, **2** – 0.2, **3** – 0.225, **4** – 0.333,
5 – 1.0, **6** – 1.625, **7** – 2, **9** – 4
– voltage, V: **2** – 0.2, **4** – 0.333, **5** – 1.0,
6 – 1.625, **7** – 2.0, **8** – 3.25, **9** – 4

TOU revenue metering and PQM

ESM-HV

02A – energy class (active/reactive) 0.2S/0.5; PQM class A

05A – energy class (active/reactive) 0.5S/1.0; PQM class A

ESM-ET

05S – energy class (active/reactive) 0.5S/1.0; PQM class S

ESM-SV

02A – energy class (active/reactive) 0.2S/0.5; PQM class A

Interfaces

A2E2 – 2 × RS-485, 2 × 100Base-TX

A2E4 – 2 × RS-485, 4 × 100Base-TX

A2E2FX2 – 2 × RS-485, 2 × 100Base-TX, 2 × 100Base-FX MM

A2E2FS2 – 2 × RS-485, 2 × 100Base-TX, 2 × 100Base-FX SM

Power supply voltage

220 – 120...370 VDC or 100...265 VAC

110 – 40...160 VDC

24 – 18...36 VDC

Options and accessories

IEC 61850-8-1 activation – [ES61850.esm](#)

RS-485 splitter – [EX...](#)

Surge protection devices for RS-485 – [ESP485-...](#)

Surge protection devices for Ethernet – [ESP-LAN](#)

RJ45 plug lock-in and key – [RJ45PG](#), [RJ45PGK](#)

USB 2.0 cable, male A to male B, 1 m – [USB-A-B](#)

Certification

Conformance to Directive 2014/35/EU (LVD) and Directive 2014/30/EU (EMC).



ECIT

digital instrument transformers

ECIT is a series of single-phase combined instrumental digital current and voltage transformers with the following features and advantages:

- ECIT's primary sensors are free from saturation, residual magnetization, and ferroresonance, ensuring accurate current measurements across the entire electrodynamic range.
- ECIT provides high accuracy across a wide range of currents and voltages: 0.5/3P accuracy class in voltage measurements and 0.5S/5PR400(500) accuracy class in current measurements.
- ECIT ensures minimal angular error between current and voltage phasors, enhancing the performance of digital protection relays and control systems.
- ECIT uses a specialized digital filter to compute synchrophasors for current (measurement time: 11 to 16 ms), taking into account the characteristics of the Rogowski coil.
- ECIT publishes two sampled value streams and one synchrophasor (SP) stream to the process bus. The use of the SP stream reduces network load and improves the performance of protection Intelligent Electronic Devices (IEDs).

Sampled Values and Integration

ECIT publishes sampled values (4000, 4800, 12000, and 14400 samples per second) for current and voltage in accordance with IEC 61850-9-2. These values are transmitted to the local Ethernet network ("process bus") and used by digital relay protection terminals, electricity meters, and power quality systems.

Process Bus Connectivity

ECIT connects to a substation's process bus with RSTP or PRP redundancy or directly to measurement and protection devices.

Protection Features

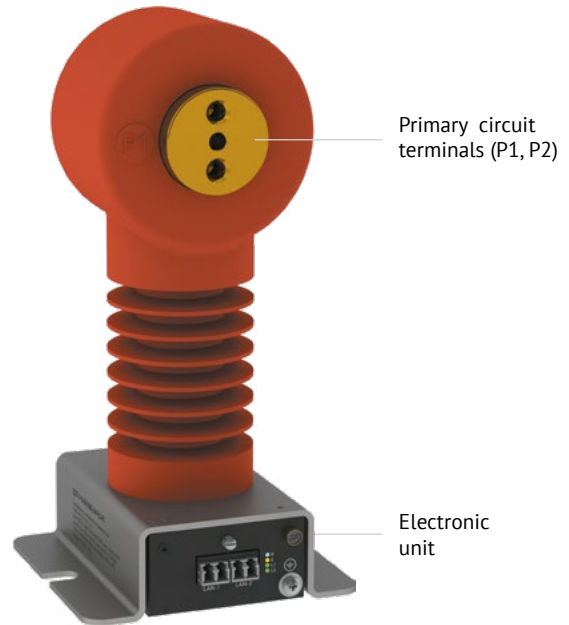
ECIT includes built-in overcurrent protection with outputs via GOOSE signals or digital outputs (Trip). Synchrophasor data enables advanced protection systems like PDIS, PDIF, and centralized protection in medium-voltage switchgear.

Custom ECIT models rated for up to 35 kV and 800 A, 2500 A, or 4000 A are available upon request.



Specification

Rated primary voltage of application	up to 15 kV
Rated primary current of application	1000 A
Rated primary voltage	(3...16)/√3 kV
Highest voltage for equipment	17.5 kV
Rated power frequency withstand voltage	42 kV
Rated lightning impulse withstand voltage	75 kV
Rated primary current	50 A
Rated continuous thermal current	1000 A
Rated short-time thermal current	20 kA/1 s
Rated dynamic current	51 kA
Voltage accuracy class	0.5/3P
Current accuracy class	0.5S/5PR400
Interfaces	2 × 100Base-TX or 2 × 100Base-FX (LC, MM), RS-485
Redundancy	RSTP, IEC 62439-3 PRP
Protocols	IEC 61850-9-2 (2 × SV (14400 (4800) or 12000 (4000) Hz), 1 × SP (50/100/200/400...4800 fps)), IEEE C37.118.2 (1...400 fps), IEC 61850-8-1 GOOSE, IEC 60870-5-104, Modbus TCP, web-console
Digital input	125 VAC 0.5 A, 24 VDC 1 A, switching time 5 ms
Time sync	Ethernet: PTPv2 (IEC 61850-9-3) RS-485: IRIG-A/B or 1PPS
Fault Recorder	up to 10 records (1+4 s) current and voltage signals sampling 2400 or 2000 Hz
Power supply	18...36 VDC (10 W)
Operating conditions	-25...+40 °C, RH – up to 98 % (+25 °C), 84...106.7 kPa, 1000 m MSL
Design	143 × 136 × 270 mm, ≤ 5 kg



Ordering Information

ECIT-1-15-50(1000)-24--R1

Interfaces

TX2 – 2 × 100Base-TX

FX2 – 2 × 100Base-FX MM



ENMU

merging units

ENMU is a digital substation merging unit, which also functions as a synchronized phasor measurement unit (PMU) and fault event recorder.

It digitizes input current and voltage signals, publishing up to four IEC 61850-9-2 sampled value (SV) streams for protection, measurement, energy metering, and power quality monitoring, with high-sample-rate streams for enhanced accuracy.

ENMU supports IEEE C37.118, providing synchronized phasor measurements at up to 100 measurements per second. It measures phase voltage, current, sequence components, active and reactive power, frequency, and rate of frequency change. Each measurement is timestamped with $\pm 1 \mu\text{s}$ accuracy, ensuring precise monitoring and analysis of grid stability and power quality in real-time.

ENMU records fault events by capturing oscillograms of current and voltage signals, along with digital input states. It allows configurable pre- and post-event recording and stores data for later analysis in standard formats.

Variants with built-in digital I/O allow remote monitoring and control via IEC 61850-8-1 (MMS, GOOSE), expandable with external I/O modules like ENMV-1.

Dual interfaces for SV streams and IEC 61850-8-1 support IEC 62439-3 PRP redundancy for increased reliability.

ENMU is synchronized with precise time using the IEEE 1588v2 PTP protocol, ensuring high accuracy for time-dependent measurements.





Specifications

Analog inputs / accuracy	4 voltage inputs: 2...200% U_n (57.7 V), 0.2%; 4 inputs CT measuring: 1...200% I_n (1/5 A), 0.2%; 3 inputs CT protection: 10...4000% I_n (1/5 A), 5%; IEC 61869-13: 0.2, 0.2DR5-200, 6TPM40, $T_p = 120$ ms
Digital inputs	16 inputs: 220 VDC, adjustable thresholds; 6 inputs: 24 VDC
Digital outputs	6...12 × DO EMR, 3 × DO TRIP or DO SSR: DO EMR – 400 VAC 6 A, 220 VDC 0.45 A, 6 ms DO SSR – 400 VAC 1.35 A, 5 ms DO TRIP – 250 VAC 10(40) A, 1 ms
Fault recorder	sampling rate up to 14,4 kHz, 8 GB storage, FTP access
Interfaces and protocols	USB + please see ordering information; IEC 61850-9-2 (2 × SV 4000/4800 Hz (protection), 2 × SV 12800/14400 (measuring)), IEC 61850-8-1 (ed. 1), IEEE C37.118.2, IEC 60870-5-104, IEC 60870-5-101, IEEE 1588v2 PTP (time sync)
Power supply	120...370 VDC or 100...265 VAC (47...63 Hz), 30 VA
Operating conditions and design	-40...+70 °C; 303 × 254 × 100 mm, IP20

Ordering Information

Rated values

1/100 – 1 A / 57.7(100) V
5/100 – 5 A / 57.7(100) V

ENMU-□-□-220-□-□

Digital inputs/outputs

not specified – none
6/2 – 6 DI 24 V, 2 DO EMR
16/8 – 16 DI 220 V, 5 DO EMR, 3 DO TRIP
16/10 – 16 DI 220 V, 7 DO EMR, 3 DO SSR
22/12 – 16 DI 220 V, 6 DI 24 V, 9 DO EMR, 3 DO SSR

Interfaces group 1

E3 – 3 × 100Base-TX
FX2E1 – 2 × 100Base-FX LC MM, 1 × 100Base-TX

Interfaces group 2

not specified – none
FX2E1A2C1 – 2 × 100Base-FX MM,
1 × 100Base-TX, 2 × RS-485, 1 × CAN
E3A2C1 – 3 × 100Base-TX, 2 × RS-485, 1 × CAN

Certification

Conformance to Directive 2014/35/EU (LVD) and Directive 2014/30/EU (EMC).



ENMI

display modules

ENMI is designed for use in automated process control and metering systems to display information received from ENIP-2, ESM, ENMV-1, and other compatible devices.

The ENMI modifications vary in display technologies, information presentation formats, interfaces, and housing types. One of the housings features a special docking adapter, allowing ENIP-2 or ESM to be integrated with ENMI into a single unit.

One ENMI can poll multiple devices, and likewise, several ENMI units can be used to display data from a single device.

Depending on the modification, ENMI connects to the polled devices via RS-485 or Ethernet 100Base-TX.



ENMI-2

Seven-segment LED indicators, brightness control button, RS-485 interface.



120 × 120 × 49 mm

ENMI-3

Seven-segment LED indicators, push-button controls, two sizes, RS-485 interface..



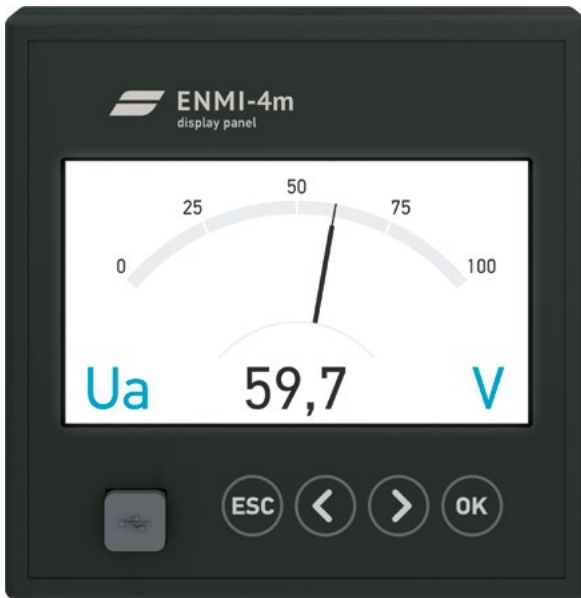
120 × 120 × 49 mm



96 × 96 × 86 mm

ENMI-4m, ENMI-4e

Color display, touch and push-button controls, RS-485 (ENMI-4m) or 100Base-TX (ENMI-4e) interface.



120 × 120 × 49 mm

Modules are available in two mounting dimensions with two different display sizes (4.3" and 7").



ENMI-6

Color touch-screen display for WAMS, diagnostics via SNMP, Ethernet 100Base-TX interface.



120 × 120 × 49 mm

ENMI-7

Monochrome OLED display, push-button controls, RS-485 interface.



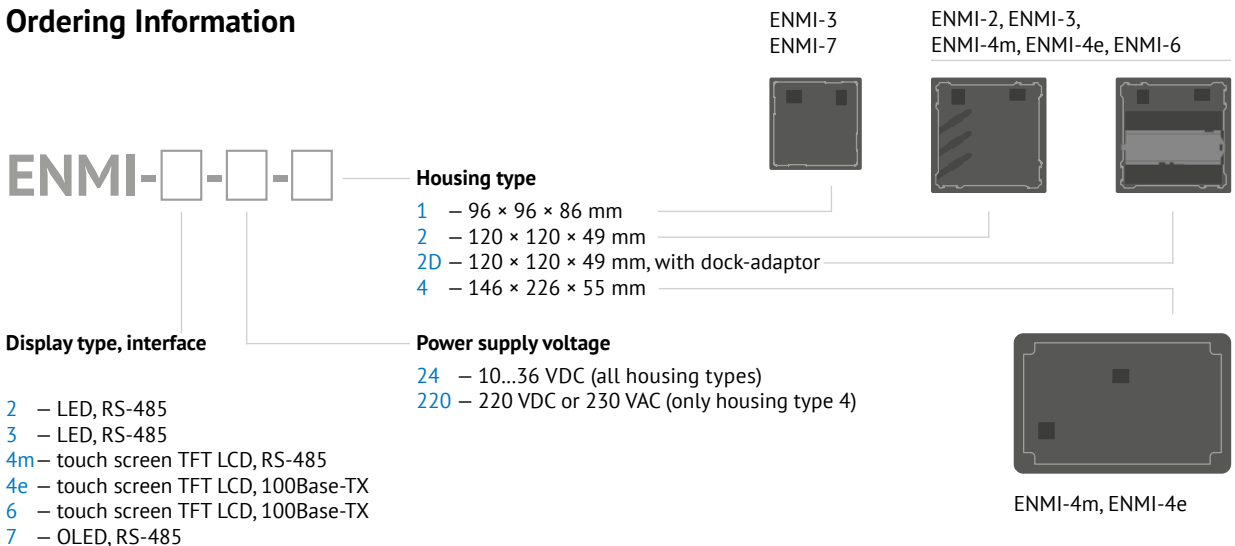
96 × 96 × 86 mm



Specifications

	ENMI-2	ENMI-3	ENMI-4m, ENMI-4e		ENMI-6	ENMI-7
Type of display	LED 2 lines of 3 digits	LED 3 lines of 4 digits	TFT, touch screen 4.3" 480 × 272	7" 800 × 480	TFT 4.3" 480 × 272, touch screen	OLED 2.42" 128 × 64, monochrome
Interfaces	RS-485 Modbus RTU	RS-485 Modbus RTU	RS-485 (4m) / 100Base-TX (4e) Modbus RTU / TCP		100Base-TX SNMP, Modbus TCP, NTP	RS-485 Modbus RTU
Power supply	10...36 VDC, 10 W	10...36 VDC, 10 W	10...36 VDC, 3 W	10...36 VDC, 120...370 VDC or 100...265 VAC (45...55 Hz), 10 W	10...36 VDC, 5 W	10...36 VDC, 2 W
Operating temperature	-40...+55 °C	-40...+55 °C	-20...+55 °C	-20...+55 °C	-20...+55 °C	-40...+55 °C

Ordering Information



Options and accessories

Straight patch cord RJ45-RJ45 – [CCR...](#)

RS-485 splitter – [EX5RJX](#)

IP54 for front panel – [IP54.enmi](#)

Bracket organizer – [P-KP, PDIN-KP](#)

USB 2.0 cable, male A to male B, 1 m – [USB-A-B](#)

Certification

Conformance to LVS EN 61010-1:2011 (EN 61010-1:2010),
EN 61000-4-3, EN 61000-4-4, EN 61000-4-5,
EN 61000-4-6, EN 61000-4-8, EN 61000-4-11.



ENMV

I/O modules

ENMV-1 modules provide discrete and analog signal input-output and are designed for use in automated control systems within the energy and industrial sectors. The electrical characteristics of the signal circuits and interfaces of ENMV-1 are designed for operation in complex electromagnetic environments. These modules can be used independently or to complement the functionality of measuring devices such as ENIP-2 and ESM.

The series includes:

ENMV-1 – discrete and analog input-output modules;
ENMV-3 – DC analog input modules for WAMS.

ENMV-1 discrete inputs support both «wet» and «dry» contacts, perform debounce filtering. The discrete outputs provide telecontrol and can be configured to trigger based on logical expressions.

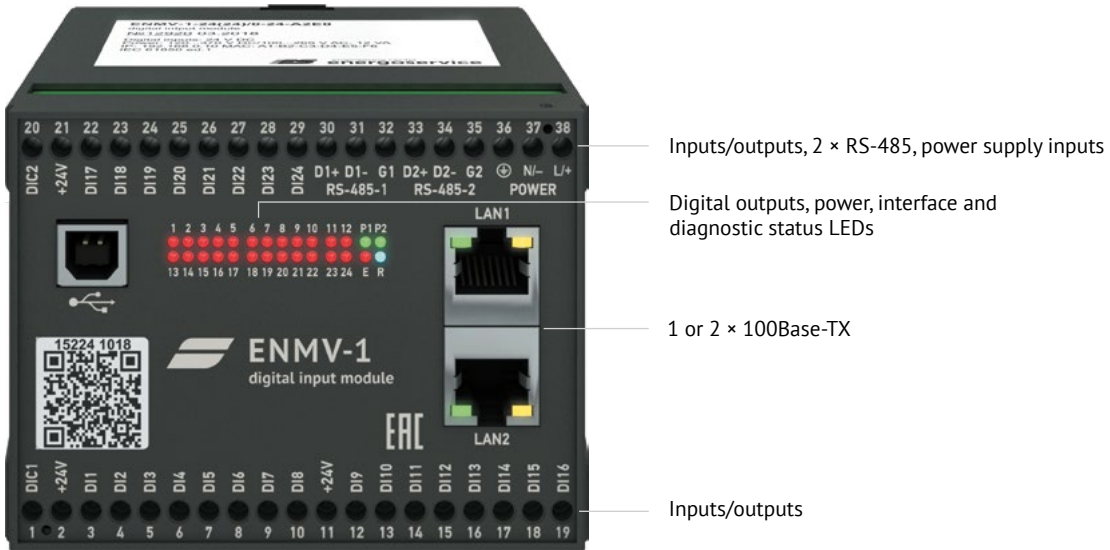
Changes in the states of discrete signals, along with time stamps, are recorded in non-volatile memory. The event log stores the last 1,000 changes.

ENMV-3 measures direct voltage and current in generator excitation circuits at power plants, and integrates into WAMS supplementing phasor measurement data.



ENMV-1 with four interfaces

- 2 × RS-485, 2 × 100Base-TX
- digital input and output, analog input, temperature

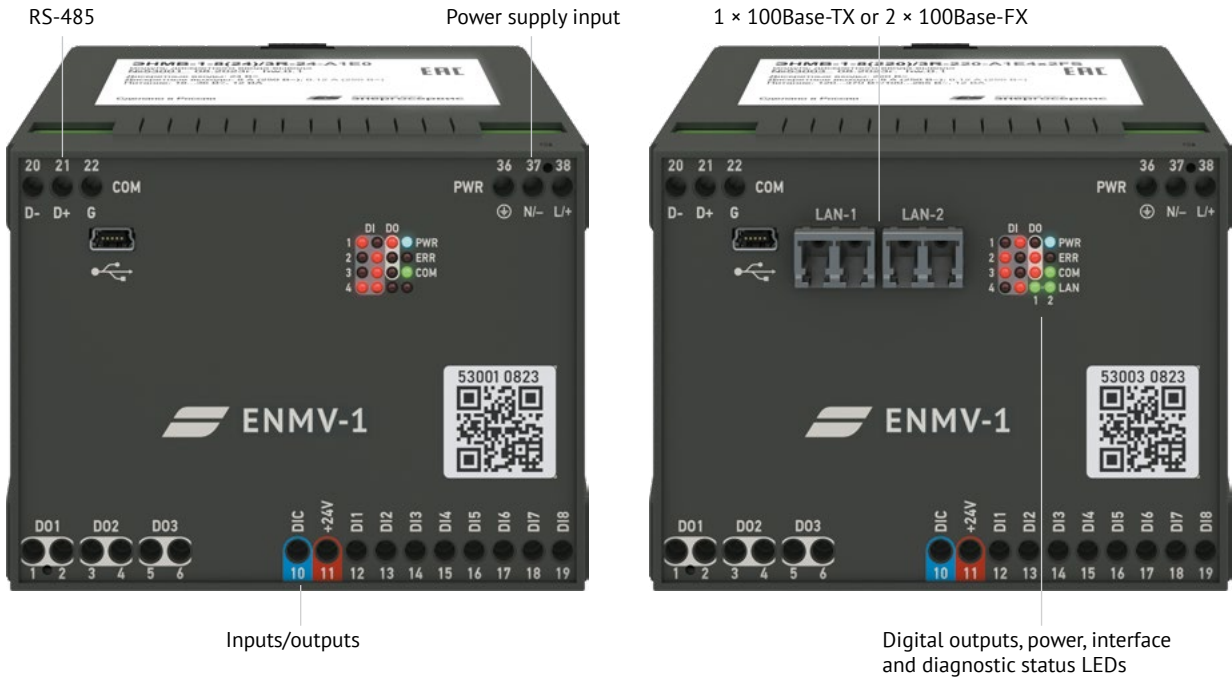


Specifications

ENMV-1-□	24/0	16/3R	16/6	0/20	0/22	8X8/0	8P2T/0
Number of digital inputs (dry/wet contacts: 24/110/220 VDC)	24	16	16	-	-	8	-
Number of digital outputs 300 VDC/0.12 A, 250 VAC/0.12 A	-	-	6	20	20	-	-
Number of digital outputs 250 VDC/3.4 A	-	-	-	-	2	-	-
Number of digital outputs 250 VAC/8 A, 250 VDC/0.2 A	-	3	-	-	-	-	-
Number of analog inputs ±250 V, ±10 V, ±200 mV, ±75 mV, ±20 mA, ±5 mA	-	-	-	-	-	8	-
Number of analog inputs 0...20 mA, ±20 mA, 0...5 mA, ±5 mA, 4...20 mA	-	-	-	-	-	-	8
Number of thermocouples type K, thermal resistance Pt	-	-	-	-	-	-	2
Interfaces and protocols	2 × RS-485: Modbus RTU, IEC 60870-5-101 1(2) × 100Base-TX (RSTP, PRP): IEC 61850 (ed. 2), IEC 60870-5-104, Modbus TCP, RS-TCP, SNMP						
Time sync	IEC 60870-5-101, IEC 60870-5-104, SNTP						
Power supply	18...36 VDC, 40...160 VDC, 120...370 VDC, 100...265 VAC (45...55 Hz), 12 VA						
Operating conditions	-40...+70 °C						
Design	75 × 100 × 110 mm, IP40						
Mounting	DIN-rail TH35 mounting						

ENMV-1 with three interfaces

- 1 × RS-485, 2 × 100Base-FX or 1 × 100Base-TX
- digital input and output, analog input

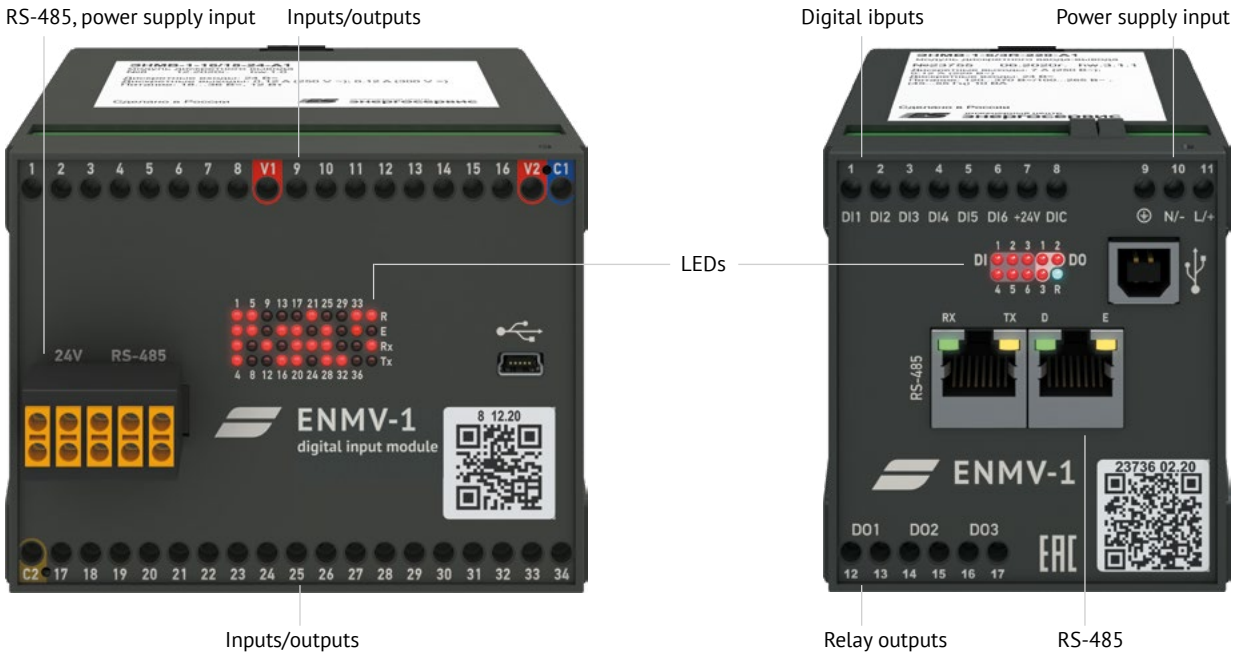


Specifications

ENMV-1-□	8/3R	8/6	16/0	0/18	8P/0	8X/0	4X/4P	1W8/2
Number of digital inputs (dry/wet contacts: 24/110/220 VDC)	8	8	16	-	-	-	-	8
Number of digital outputs 300 VDC/0.12 A, 250 VAC/0.12 A	-	6	-	18	-	-	-	2
Number of digital outputs 250 VAC/8 A, 250 VDC/0.2 A	3	-	-	-	-	-	-	-
Number of analog inputs 4...20 mA, 0...5(20) mA, ±5(20) mA	-	-	-	-	8	-	-	-
Number of analog inputs ±250 V, ±10 V, ±200 mV, ±75 mV, ±20 mA, ±5 mA	-	-	-	-	-	8	4	-
Number of analog outputs 4...20 mA, 0...5(20,24) mA, ±5(20,24) mA	-	-	-	-	-	-	4	-
1-wire port, up to 30 sensors	-	-	-	-	-	-	-	1
Interfaces and protocols	1 × RS-485: Modbus RTU, IEC 60870-5-101 1 × 100Base-TX or 2 × 100Base-FX MM/SM (PRP, RSTP): IEC 61850-8-1 (ed. 2), IEC 60870-5-104, Modbus TCP, RS-TCP, SNMP							
Time sync	IEC 60870-5-101, IEC 60870-5-104, SNTP							
Power supply	18...36 VDC, 40...160 VDC, 120...370 VDC, 100...265 VAC (45...55 Hz), 12 VA							
Operating conditions	-40...+70 °C							
Design	75 × 100 × 110 mm, IP40							
Mounting	DIN-rail TH35 mounting							

ENMV-1 with single interface

- 1 × RS-485
- digital input and output, analog input



Specifications

ENMV-1-□	32/0	24/6	16/12	16/18	8/24	0/36	16P/0	6/3R
Number of digital inputs (dry/wet contacts: 24/110/220 VDC)	32	24	16	16	8	-	-	6
Number of digital outputs 300 VDC/0.12 A, 250 VAC/0.12 A	-	6	12	18	24	36	-	-
Number of digital outputs 250 VAC/8 A, 250 VDC/0.2 A	-	-	-	-	-	-	-	3
Number of analog inputs 0...20 mA, ±20 mA, 0...5 mA, ±5 mA, 4...20 mA	-	-	-	-	-	-	16	-
Interfaces and protocols	1 × RS-485: Modbus RTU, IEC 60870-5-101							
Time sync	IEC 60870-5-101							
Power supply	18...36 VDC, 40...160 VDC, 12 W							
Operating conditions	-40...+70 °C							
Design	75 × 100 × 124 mm (6/3R – 75 × 70 × 110 mm), IP40							
Mounting	DIN-rail TH35 mounting							

ENMV-3

- 2 × 100Base-TX
- DC circuit measurement
- 6 kV isolation between measurement inputs



Specifications

Measuring inputs	Input AI-1: 10 V, 1000 V Input AI-2: 5 mA, 20 mA, 75 mV, 200 mV, 10 V
Full-scale error	±0.1 %
Interfaces and protocols	2 × 100Base-TX (PRP, RSTP): IEEE C37.118.2, IEC 60870-5-104, IEC 60870-5-101, SNMP
Time sync	2 × 100Base-TX: IEEE 1588v2 PTP RS-485: PPS, IRIG-A/B
Power supply	18...36 VDC, 120...370 VDC, 100...265 VAC (45...55 Hz), 10 VA
Operating conditions	–40...+70 °C
Design	109 × 188 × 35 mm, IP20
Mounting	DIN-rail TH35 mounting

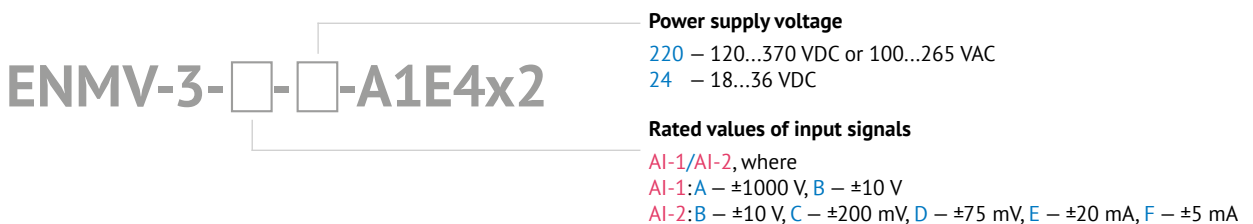
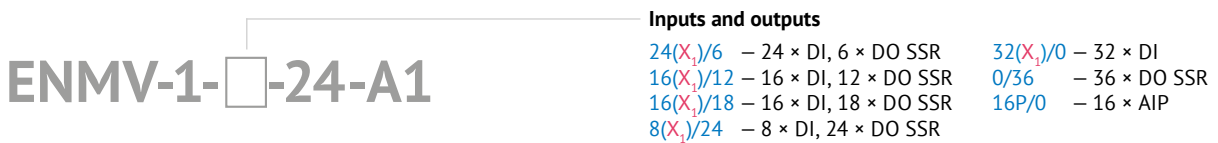
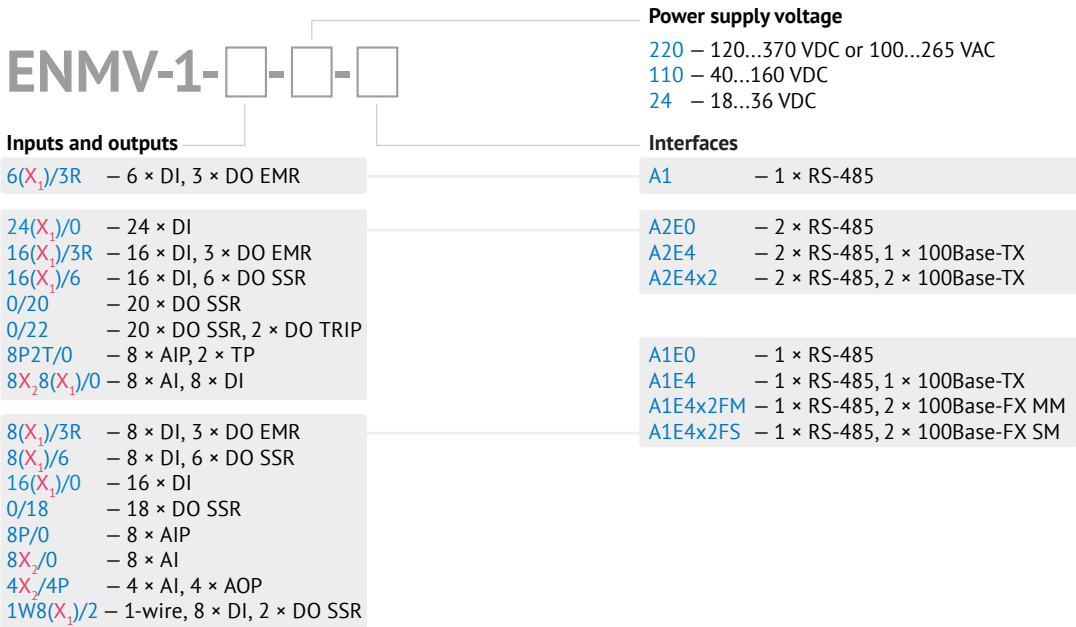
Ordering Information

Designations: **DI** – digital inputs, **X₁** – DI voltage: **24** – 24 VDC (wet/dry), **110** – 110 VDC (wet), **220** – 220 VDC (wet); **DO EMR** – digital outputs 250 VAC 8 A, 250 VDC 0.2 A; **DO SSR** – digital outputs 300 VDC 0.12 A, 250 VAC 0.12 A; **DO TRIP** – digital outputs 250 VDC 3.4 A;

AI – analog inputs, **X₂** – AI input range: **A** – ±250 V, **B** – ±10 V, **C** – ±200 mV, **D** – ±75 mV, **E** – ±20 mA, **F** – ±5 mA;

AIP – configurable analog input: 4...20 mA, 0...5(20) mA, ±5(20) mA; **TP** – inputs for thermocouples and thermal resistance;

AOP – configurable analog output: 4...20 mA, 0...5(20,24) mA, ±5(20,24) mA.



Options and accessories

IEC 61850-8-1 activation – [ES61850.enmv](#)

Detachable terminal (except 1W, 6/3R) – [PLUG.enmv](#)

RS-485 splitter – [EX...](#)

Surge protection – [ESP485-...](#), [ESP-LAN](#)

Sealing cover – [PC1015](#), [PC0715](#)

1-Wire sensors – [TS-1W-55/70](#), [HPTS-1W-5](#)

Rain, wind and solar radiation protection screen – [TS-SRS2](#)

USB 2.0 cable – [USB-A-B](#), [USB-A-Bmini](#)



ESX231

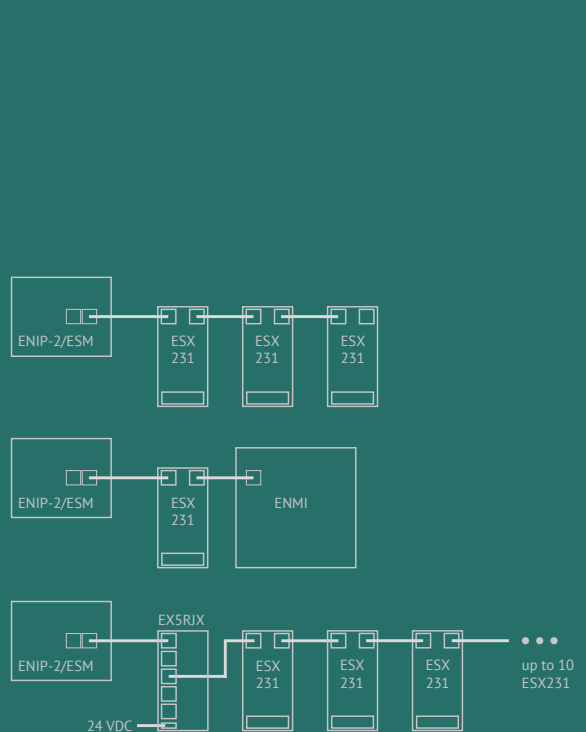
compact I/O modules

The ESX231 series consists of compact I/O modules for digital and analog signals. The ESX231 can be used as independent components in a distributed automated control system or as cost-effective additional modules for ENIP-2 and ESM measuring devices.

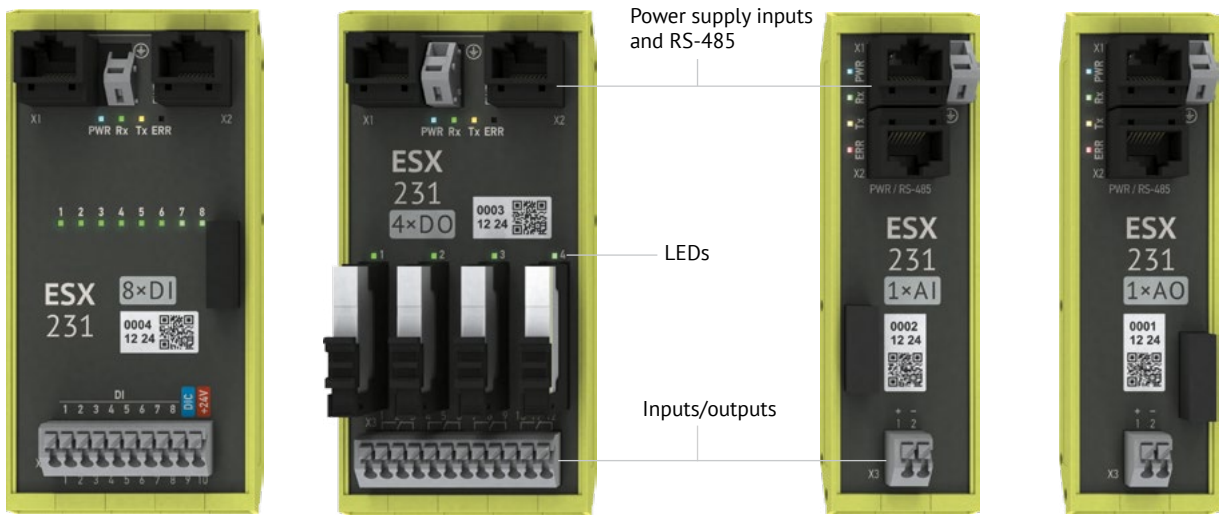
The RS-485 port is split into two RJ45 sockets with pinout (interface + power supply), similar to ENIP-2 (RS-485-2) and ESM (COM-2). Patch cords can be used to connect ESX231 devices.

The internal power supply of ENIP-2 and ESM allows powering up to three ESX231 modules or one ESX231 module with ENMI. The communication line between ENIP-2 (or ESM) and powered devices should be no longer than 20 meters.

If a larger number of ESX231 modules need to be connected or the line length exceeds 20 meters, external power must be supplied – for example, by using the EX5RJX splitter.



The ESX231 series includes four I/O modules: digital input, digital output, analog input and analog output. Digital input modules feature status indication for input and output states. Digital output modules support hot-swapping, allowing replacement without dismantling the device.



Specifications

	ESX231-□			
	8/0	0/4R	1X/0	0/1P
Number of digital inputs (DI) dry/wet contacts: 24/110/220 VDC	8	-	-	-
Number of digital outputs (DO EMR) 250 VAC 6 F, 250 VDC 0.2 A, 30 VDC 6 A	-	4	-	-
Number of analog inputs (AI) ±12 V, ±200 mV, ±75 mV, ±20 mA, ±5 mA	-	-	1	-
Number of analog outputs (AOP) 4...20 mA, 0...5(20,24) mA, ±5(20,24) mA	-	-	-	1
Interfaces and protocols	1 × RS-485: Modbus RTU, IEC 60870-5-101			
Power supply	18...36 VDC, 2 W	18...36 VDC, 2 W	18...36 VDC, 2 W	22...26 VDC, 3 W
Operating conditions	-40...+70 °C			
Design, mm	57 × 113 × 42	57 × 113 × 56	34 × 113 × 42	34 × 113 × 42
Mounting	DIN-rail TH35 mounting, IP20			

Ordering Information

ESX231-□-24-A1

Inputs and outputs

8(X₁)/0 – 8 × DI
0/4R – 4 × DO EMR
1X₂/0 – 1 × AI
0/1P – 1 × AOP

Designations: X₁ – DI operating voltage: **24** – 24 VDC (external/internal), **110** – 110 B= (external), **220** – 220 B= (external); X₂ – AI operating range: **B** – ±12 BV **C** – ±200 mV, **D** – ±75 mV, **E** – ±20 mA, **F** – ±5 mA.



ENLZ

short-circuit and earth fault controllers

ENLZ devices are used for the localization of short circuits and earth faults in cable distribution power grids. ENLZ in pair with the sensors detects short circuits and measures synchrophasor of zero-sequence currents and voltages. ENLZ transmits data for centralized processing to the control center of DSO.

The algorithm for the localization of earth faults is based on the analysis of the amplitudes and phases of the zero-sequence current and voltage phasors, measured by ENLZ at section boundaries of the distribution network.

Equipped with six optical inputs for short-circuit sensors, and two analog inputs, one ENLZ provides monitoring data for two cable lines. To measure $3I_0$ and $3U_0$, ENLZ connects to zero-sequence current transformer (SCSS), and instrument voltage transformer with $3U_0$ winding through a VMT step-down voltage transformer.

ENLZ uses ENCM-3 remote terminal unit for time synchronization from GPS/GLONASS. ENCM-3 transmits data from ENLZ to a data processing center via Ethernet or cellular network (4G/3G/2G).

When a short circuit occurs in one of the monitored bays, ENLZ devices receive and time-record signals from short-circuit current indicators (OCTT). Recorded events are sent to the SCADA data collection server via the data collection device as telemetering. ES Graph software analyzes $3I_0$ synchrophasors at the time of damage in the monitored network. By comparing the signals from pairs of SCSS sensors at the beginning and end of the cable line, the damaged network section is determined.





2 analog inputs, RS-485, power supply input

USB

clamps to connect the optic fiber of the short-circuit sensor

Specifications

Analog inputs	current: 0,5...70 A (through SCSS current sensor) voltage: 2...200 V (through VMT voltage transformer)
Optic inputs	6 optic inputs, POF 980/1000 μm, wavelength 400...1000 nm, d – 2.2 mm
Interfaces and protocols	RS-485: IEC 60870-5-101
Power supply	18...36 VDC or 120...370 VDC / 100...265 VAC (45...55 Hz), 6 VA
Operating conditions and design	from -40 to +70 °C, 75 × 100 × 120 mm (IP40), DIN-rail TH35 mounting

Ordering Information

ENLZ-1-□/6-□-A1

Analog inputs

I2 – two current inputs
U2 – two voltage inputs
I1U1 – current input + voltage input

Power supply voltage

220 – 100...265 VAC (45...55 Hz) or 120...370 VDC
24 – 18...36 VDC

Options and accessories

- RS-485 splitter – [EX...](#)
- Threshold current sensor with optical output – [OCTT](#)
- Summation current sensor, splittable – [SCSS](#)
- Plastic optical fiber – [CPOF](#)
- Voltage transformer – [VMT](#)
- USB 2.0 cable, male A to male B mini, 1 m – [USB-A-Bmini](#)



ENCS-2

time sync modules

Accurate time synchronization is critical for substation automation systems, ensuring precise event logging, fault detection, and seamless coordination between protection and control devices. Without reliable synchronization, discrepancies in time-stamped data can lead to misinterpretation of events, affecting grid stability and operational efficiency.

ENCS-2 receives GPS/GLONASS time signals, serving as a precise time synchronization source for measuring devices, smart meters, I/O modules, phasor measurement units, merging units, servers, and workstations.

It supports multiple time synchronization protocols, including IRIG, NMEA 0183, PPS, PTPv2, SNTP, and IEC 60870-101, as well as communication interfaces such as RS-232, RS-485, and Ethernet.

For network applications, ENCS-2 supports Precision Time Protocol (PTP) to ensure accurate and stable time distribution.

It can function as a PTP time server over Ethernet, enabling seamless synchronization across industrial automation and energy management systems.

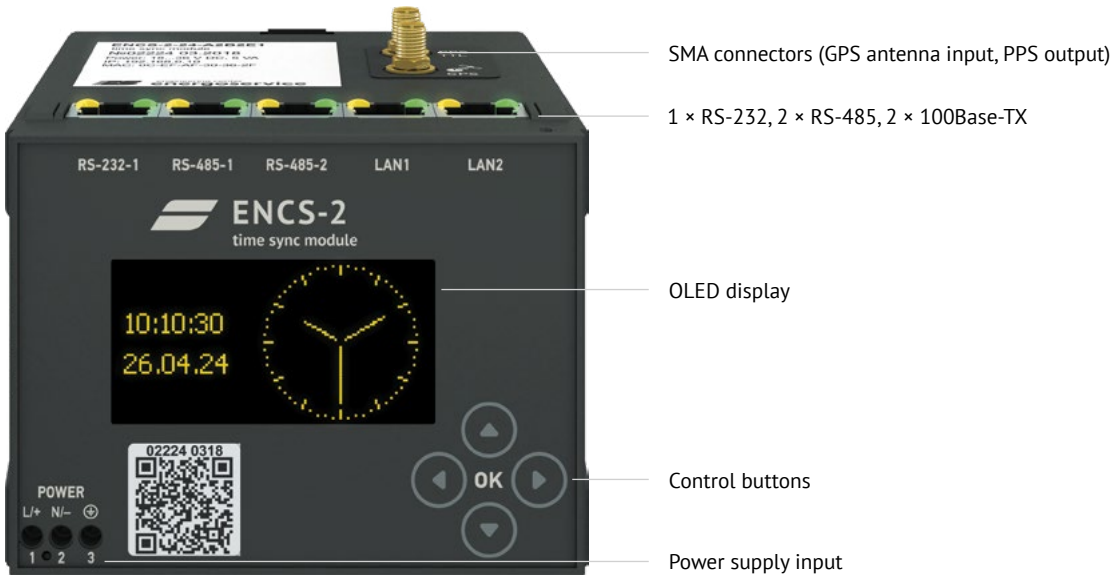
For devices connected to the digital substation process bus, ENCS-2 provides synchronization via PTPv2, fully compliant with IEC/IEEE 61850-9-3 (Power Utility Profile).

The front panel features an OLED display, control buttons, various interfaces, and a PPS output for accurate time pulse transmission.

ENCS-2 operates with a GPS/GLONASS antenna, which is ordered separately. GPS-P antenna, including a cable and mounting brackets, is available as an accessory.

ENCS-2 offers high reliability and a long service life, ensuring stable operation in demanding environments.





Specifications

Timing accuracy (UTC)	1PPS and IRIG: ± 150 ns; SNTP: ± 100 mcs; PTPv2: ± 250 ns
Timing error in the absence of satellites	ENCS-2: ± 20 ms/day ENCS-2T: ± 1 ms/day
Interfaces and protocols	2 \times 100Base-TX (PRP or 2 MAC): PTPv2 (IEC/IEEE 61850-9-3), SNTP, SNMP; RS-232-1, RS-485-1: NMEA 0183, IEC 60870-5-101; RS-485-2: IRIG-A(B), 1PPS
Event logging	Timing functions: satellites signal receiving statuses, ports statuses, clock correction, PTP correction, BMCA operation Common events: power up, firmware update, changing settings, authorization
Power supply	18...36 VDC, 55...176 VDC, or 120...370 VDC / 100...265 VAC (45...55 Hz), 10 VA
Operating conditions and design	$-40...+70$ $^{\circ}$ C, 83 \times 100 \times 110 mm, IP40, DIN-rail TH35 mounting

Ordering Information

ENCS-2 -

Modification

not specified – with crystal oscillator
T – with oven controlled crystal oscillator (OCXO)

Power supply voltage

220 – 100...265 VAC (45...55 Hz) or 120...370 VDC
110 – 55...160 VDC
24 – 18...36 VDC

Options and accessories

IEEE 1588v2 PTP support – [PTPv2.encs2](#)
Outdoor GPS/GLONASS antenna – [GPS-P](#)
Mounting brackets for GPS/GLONASS antenna – [GPS-KP...](#)



ENCS-3m

ENCM-3

remote terminal units



ENCS-3m and ENCM-3 Remote Terminal Units (RTUs) enable data communication between power facilities and control centers.

ENCS-3m is a high-performance RTU with up to 14 interfaces, designed for automation of power plants and substations, while ENCM-3 is a compact RTU with four interfaces, optimized for 6–20 kV substations and switchgear in distribution networks.

ENCM-3 features digital and analog I/Os and is ideal for distribution network automation. ENCS-3m offers enhanced connectivity and processing capabilities, making it suitable for complex automation systems.

Both RTUs operate in real-time, collecting data from up to 240 devices via RS-485, RS-232, and Ethernet interfaces. The acquired data is aggregated and transmitted to automation systems with minimal delay.

All RTU versions meet industry standards for electromagnetic compatibility (EMC), operate in extreme environmental conditions (-40 to +70°C, up to 95% humidity), and are built for long-term, uninterrupted operation with a minimum service life of 25 years.

Key Features:

- Multi-protocol support: IEC 61850-8-1 (client/server, MMS/GOOSE), IEC 60870-5-101/104, Modbus RTU/TCP, DNP3, SNMP, SPA-Bus, and proprietary protocols
- Real-time data processing with logic operations and arithmetic calculations.
- Event logging with non-volatile memory.
- Protocol conversion & serial tunneling for direct access to devices via RS-232/485.
- Synchronization via GPS/GLONASS, PTPv2, or SNTP.
- Redundancy support: PRP/RSTP for network resilience.
- Optional built-in 3G/2G module for remote connectivity.



ENCS-3m

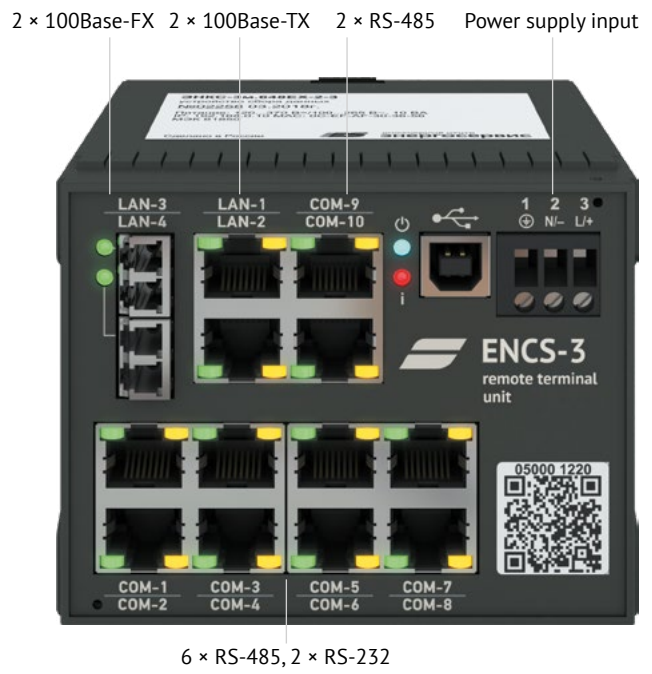
Remote terminal unit has ten asynchronous serial ports, and two or four Ethernet ports with support for RSTP and PRP redundancy according to IEC 62439-3. To be compatible with low-speed data links, some ports can be configured to exchange at 100 baud.

ENCS-3m...-1, ENCS-3m...-2

- 2 x Ethernet
- 4G/3G/2G
- time sync from a built-in GPS/GLONASS receiver
- «warm» redundancy (Master-Slave exchange via CAN)

ENCS-3m...-3, ENCS-3m...-4, ENCS-3m...-5

- 4 x Ethernet, including two fiber optic
- «warm» redundancy (Master-Slave exchange via Ethernet)
- files reading and transmission



ENCM-3

Remote terminal unit is equipped with three serial ports and one Ethernet port.

ENCM-3...-000

It is the basic modification has no additional inputs and outputs.

GPS/GLONASS RS-485, RS-232, 100Base-TX USB



Power supply input Cellular antenna

ENCM-3 supports data transmission in cellular networks and receives GPS/GLONASS signals.

ENCM-3...-400(800)

4(8) digital inputs

4 digital inputs



4 digital inputs

ENCM-3...-430

4 digital inputs; 3 digital outputs 3/0.35/0.2 A (30/110/220 VDC), 6 A (250 VAC).

3 digital inputs



4 digital inputs

ENCM-3...-421(422)

1(2) analog inputs, 4 digital inputs, 2 digital outputs (3/0.2 A 30/220 VDC, 6 A 250 VAC)

1 or 2 analog inputs, 2 digital outputs



4 digital inputs



Optionally, all ENCM-3 modifications can be equipped with a super boost capacitor power buffer, ensuring the

transmission of the latest signals and measurements after a main power supply shutdown.

ENCM-3...-640

6 digital inputs; 4 digital outputs (0.1 A 300 VDC / 250 VAC).

6 digital inputs



4 digital outputs

ENCM-3...-612

6 digital inputs, input for NTC resistance sensors, PWM output (24 VDC, 250 W) for engine control (smooth start, straight/reverse)

6 digital inputs



Input for NTC resistance sensors, PWM output for engine control

ENCM-3...-1242

12 digital inputs, 3 digital outputs (8 A 250 VAC, 0.2 A 250 VDC), input for NTC resistance

sensors, PWM output (24 VDC, 250 W) for engine control (soft start, straight/reverse)

6 digital inputs

6 digital inputs



3 digital outputs

Input for NTC resistance sensors, PWM output for engine control



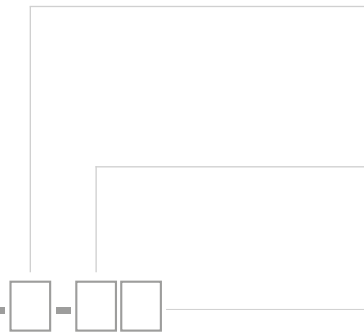
Specifications

	ENCS-3m...-1(2)	ENCS-3m...-3	ENCS-3m...-4(5)	ENCM-3
Interfaces	6(8) × RS-485, 4(2) × RS-232, 2 × 100Base-TX (PRP, RSTP), CAN	8 × RS-485, 2 × RS-232, 4 × 100Base-TX (PRP, RSTP)	8 × RS-485, 2 × RS-232, 2 × 100Base-TX, 2 × 100Base-FX LC SM (2 × 100Base-FX LC MM) (PRP, RSTP)	2(3) × RS-485, 1(0) × RS-232, 1 × 100Base-TX
Cellular	4G/3G/2G, 1 sim	n/a	n/a	4G/3G/2G, 2 sim
Data polling	up to 240 devices (up to 64 TCP-sockets)	up to 240 devices (up to 48 TCP-sockets)	up to 240 devices (up to 48 TCP-sockets)	up to 64 devices (up to 48 TCP-sockets)
	up to 8192 measurement values, 4096 digital signals, 2048 commands			
	IEC 61850-8-1 (option), IEC 60870-5-101/103/104, DNP 3.0, Modbus RTU/TCP, SNMP; ENIP-2, ENMV-1, EMAX/TMAX, SE NSX, Sepam, SPA-Bus, DLMS/COSEM			
Upstream exchange	up to 16 connections Ethernet and 3G: IEC 60870-5-104, IEC 61850-8-1 (option), Modbus TCP, SNMP	up to 16 connections Ethernet: IEC 60870-5-104, IEC 61850 (option), Modbus TCP, SNMP		up to 14 connections Ethernet and 4G/3G: IEC 60870-5-104, IEC 61850 (option), Modbus TCP, SNMP
	up to 10 connections RS-485, RS-232: IEC 60870-5-101, Modbus RTU			up to 3 connections RS-485, RS-232: IEC 60870-5-101, Modbus RTU
Built-in inputs and outputs	n/a	n/a	n/a	please, see ENCM-3 ordering information
Event logging	status of digital inputs and outputs, diagnostic messages; software upgrade, configuration update, power supply events			status of digital inputs and outputs
Time sync	PTPv2 (ordinary clock), SNTP (client/server), IEC 60870-5-101/104, a built-in GPS/ GLONASS receiver (option GT)	SNTP (client/server), IEC 60870-5-101/104		SNTP (client/server), IEC 60870-5-101/104, a built-in GPS/ GLONASS receiver (option GT)
Logical expressions	logical functions: AND, OR, XOR, CMP, RS FF, TIMER			
Power supply	18...36 VDC, 42...176 VDC, 120...370 VDC, 100...265 VAC (45...55 Hz), 10 VA	18...36 VDC, 40...160 VDC, 120...370 VDC, 100...265 VAC (45...55 Hz), 10 VA	18...36 VDC, 40...160 VDC, 120...370 VDC, 100...265 VAC (45...55 Hz), 10 VA	10(18)...36 VDC, 55...176 VDC, 120...370 VDC, 100...265 VAC (45...55 Hz), 13 VA Power buffer – optional
Operating conditions	-40...+70 °C	-40...+70 °C	-40...+70 °C	-40...+70 °C
Design	75(83) × 100 × 110 mm, IP40	75 × 100 × 110 mm, IP40	75 × 100 × 110 mm, IP40	75 × 70 × 110 (119) mm, 75 × 100 × 110 (119) mm, 75 × 170 × 110 (119) mm, IP40
Mounting	DIN-rail TH35 mounting	DIN-rail TH35 mounting	DIN-rail TH35 mounting	DIN-rail TH35 mounting



Ordering Information

ENCS-3m-



Power supply voltage

24 – 18...36 VDC
 110 – 42...160 VDC
 220 – 120...370 VDC or 100...265 VAC

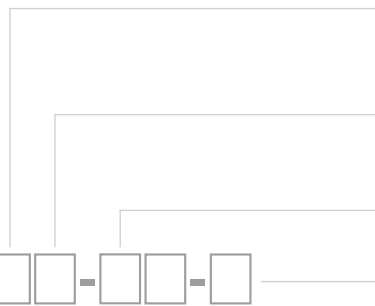
Interfaces

1 – 6 × RS-485, 4 × RS-232, 2 × 100Base-TX
 2 – 8 × RS-485, 2 × RS-232, 2 × 100Base-TX
 3 – 8 × RS-485, 2 × RS-232, 4 × 100Base-TX
 4 – 8 × RS-485, 2 × RS-232, 2 × 100Base-TX, 2 × 100Base-FX SM
 5 – 8 × RS-485, 2 × RS-232, 2 × 100Base-TX, 2 × 100Base-FX MM

ENCS-3m...-1(2) optional:

not specified – NA
 G – 4G/3G/2G, 1 sim
 GT – 4G/3G/2G, 1 sim, GPS/GLONASS

ENCM-3-



Optional

not specified – NA
 G – 4G/3G/2G, 2 sim
 T – GPS/GLONASS
 GT – 4G/3G/2G, 2 sim, GPS/GLONASS

Designations:

DI – digital inputs, AI – analog inputs,
 DO EMR – digital outputs 250 VAC 6 A, 30/110/220 VDC
 3/0.35/0.2 A, DO SSR – digital outputs 300 VDC 0.1 A,
 AI NTC – input for NTC resistance sensors 10 kΩ,
 PWM – PWM output (24 VDC, 250 W) for engine control
 (smooth start, straight/reverse)

Power supply voltage

220 – 120...370 VDC or 100...265 VAC
 110 – 55...176 VDC
 24 – 10...36 VDC

Power buffer

-- NA
 C – super boost capacitor power buffer

Interfaces

A2B1E1 – 2 × RS-485, 1 × RS-232, 1 × 100Base-TX
 A3E1 – 3 × RS-485, 1 × 100Base-TX

Inputs and outputs

000 – NA
 400 – 4 × DI dry contact
 800 – 8 × DI dry contact
 430 – 4 × DI dry contact, 3 × DO EMR
 640 – 6 × DI wet contact (24 VDC), 4 × DO SSR
 421 – 4 × DI dry contact, 2 × DO EMR, 1 × AI ±20 mA
 422 – 4 × DI dry contact, 2 × DO EMR, 2 × AI 0...20 mA
 612 – 6 × DI wet contact (24 VDC), 1 × AI NTC 10 kΩ,
 PWM (24 VDC, 250 W)
 1242 – 12 × DI wet/dry contact (24 VDC), 3 × DO EMR, 1 × AI
 NTC 10 kΩ, PWM (24 VDC, 250 W)

Note:

Modifications ENCM-3...-612, -1242 are available only
 with power supply 24 VDC (18...36 VDC)

Options and accessories

IEC 61850-8-1 activation for ENCS-3m – [ES61850.encs3](#)

IEC 61850-8-1 activation for ENCM-3 – [ES61850.encm3](#)

RS-485 splitter – [EX...](#)

Surge protection devices for RS-485 – [ESP485-...](#)

Surge protection devices for Ethernet – [ESP-LAN](#)

Outdoor GPS/GLONASS antenna – [GPS-P](#)

Mounting brackets for GPS/GLONASS antenna – [GPS-KP...](#)

4G/3G/2G antenna – [4G...](#)

Certification

Conformance to IEC 61850 – UCAiug Level A Certificate IEC
 61850 Ed.2 (DNV GL)



WAMS

synchrophasors acquisition and real-time data analysis

Wide Area Measurement System (WAMS) uses measurements of voltage and current synchrophasors and provides state assessment and dynamic properties of power systems. WAMS data allows power system operators to identify power system conditions and monitor its dynamics. Real-time data provide an instantaneous overview of the power system, allowing the operator to detect the abnormal conditions and to determine their source.

To build the best performance WAMS it is necessary to cover main power facilities such as power stations and substations and equip them with phasor measurement units (PMU ENIP-2, see page 8), phasor data concentrators (PDC ES-PDC), and timing systems for global synchronization (ENCS-2).

Phasor data concentrators are installed at power plants to collect data from phasor measurement units and stream it to data processing centers. ES-PDC is software running on rugged industrial PCs.

ES-PDC supports data exchange via IEEE C37.118.2, calculates the values of additional electrical quantities on the fly, and records cyclic and emergency archives of a configurable depth.

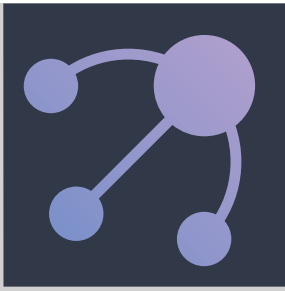
ES Phasor is a data analysis software for information that arrives at WAMS data centers. ES Phasor provides low-frequency oscillation monitoring and detects their sources.

ES Phasor analyses both online and offline data. Online analysis provides high process performance with a given accuracy. More detailed research is carried out by analyzing offline data.

The analysis of WAMS data requires a large amount of computing, and with ES Phasor software the process is rationalized: the plan of computation is presented in the form of a generalized scheme and formed at the level of the user, and then assigned «performers» for each stage. By this scaling of computing resources, the software performs fast processing of WAMS data.



ES-PDC



The ES-PDC software is supplied as pre-installed on industrial computers, corresponding to the project requirements.

Specifications

- data acquisition from up to 40 PMUs, up to 6 upstreaming channels. Minimum processing delay – receiving and uploading of the PMU frames less than 1 second.
- Additional measured and computable parameters: $U_1, U_2, U_0, U_{AB}, U_{BC}, U_{CA}, I_1, I_2, I_0, P, Q, S, P_1, P_2, P_0, Q_1, Q_2, Q_0, S_1, S_2, S_0, P_A, P_B, P_C, Q_A, Q_B, Q_C, S_A, S_B, S_C, \Phi_A, \Phi_B, \Phi_C, \Phi$.
- Cyclical data archive up to 180 days: 1 TB for 10 × PMU, 2 TB for 20 × PMU, 4 TB for 40 × PMU.
- Emergency data archive with adjustable length and number of emergency records recorded. Archives are synchronized between ES-PDC.
- Exchange protocols and data formats: IEEE C37.118.2, IEC 60870-5-104, SOAP (HTTP), FTP; CSV, COMTRADE (IEEE/IEC C37.111-2013).
- Optional computing modules.

Ordering Information

ES-PDC--L1

Storage

- 1000 – 1 TB: 10 PMU × 180 days
- 2000 – 2 TB: 20 PMU × 180 days
- 4000 – 4 TB: 40 PMU × 180 days

Certification

ES-PDC is certified to the requirements of the Russian Power System Operator.



ES Phasor



ES Phasor is a software solution for synchrophasor data analysis with the following capabilities:

- online and offline data analysis using methods based on comparative analysis of amplitude-phase characteristics of oscillating components (mod signals) and energy oscillation assessment (DEF – dissipation energy flow);
- analysis of low-frequency oscillations based on current and voltage synchrophasors, frequency, active and reactive power;
- visualization of analysis results as a map of controlled objects (power stations and transmission lines) with highlighted oscillation sources, energy flow directions (incoming/outgoing), and their values.

CABINETS

typical and customized cabinets for automation systems

The application of typical cabinets allows to reduce the time of design, installation, and commissioning of automated systems.

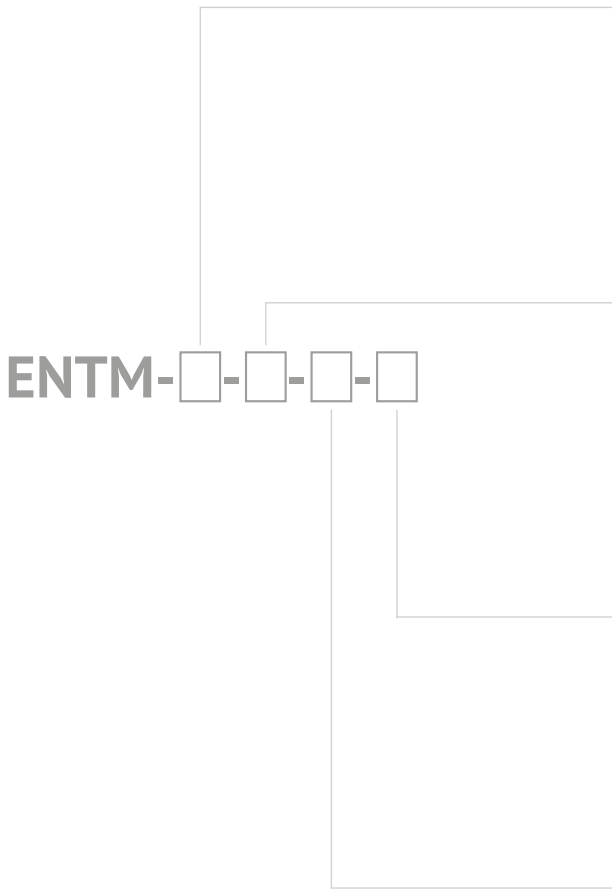
Typical cabinets include microprocessor devices presented in this catalog, as well as proven third-party components.

Typical and customized cabinets assembled at our factory meet the requirements for safety and electromagnetic compatibility at power facilities.



The next page shows a product line of typical cabinets. To order a customized cabinet, please build your order code using the formula below or send the documentation on sales@ens.ru.

Ordering Information



Set of signals processed

- Plx** – number (x) of measuring devices (ENIP-2, ESM, etc)
- DPx** – number (x) of display modules
- Dlx(24)** – number (x) of digital inputs 24 VDC
- Dlx(220)** – number (x) of digital inputs 220 VDC
- DOx** – number (x) of digital outputs (300 VDC/0.12 A, 250 VAC/0.12 A)
- DORx** – number (x) of digital outputs (220 VAC/6 A, 220 VDC/0.1 A)
- Alx** – number (x) of analog inputs
- Tx** – number (x) of temperature sensors

Interfaces

- Ax** – number (x) of RS-485
- Bx** – number (x) of RS-232
- Ex** – number (x) of Ethernet 100Base-TX
- Fx** – number (x) of Ethernet 100Base-FX
- G1** – cellular 3G, 1 sim
- G2** – cellular 4G, 2 sim
- GR** – 3G/4G router
- T1** – RTU with GPS/GLONASS support
- T2** – cabinet equipped with ENCS-2 (GPS/GLONASS)
- R** – redundancy RTU

Operating conditions and design

- XY** – specify climate conditions and required IP

Power supply

- DC24** – 24 VDC
- AC230** – 230 VAC
- DC220** – 220 VDC
- UPS** – with UPS
- x2** – two power feeding

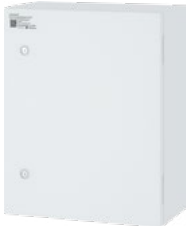
Example of a combined code for power supply:

- DC220AC230UPS** – 220 VDC, 230 VAC, UPS
- AC230UPS** – 230 VAC, UPS
- AC230x2UPS** – two power feeding 230 VAC, UPS
- DC24x2** – two power feeding 24 VDC

Typical cabinets

Data acquisition and transmission

ENTM-1.0



Data acquisition and transmission, centralized I/O

ENTM-1.1



ENTM-1.2



Centralized I/O

ENTM-2.1(2.2)



ENCM-3-...-800

8 × DI 24 VDC

2 × RS-485, 1 × RS-232,
1 × 100Base-TX,
cellular

100...265 VAC,
10 VA (without external load)

IP54
500 × 400 × 220 mm

ENCM-3-...-430

1 × ENMV-1-24/0 (ENTM-1.1)
3 × ENMV-1-24/0 (ENTM-1.2)

27 × DI 24 VDC (ENTM-1.1)
75 × DI 24 VDC (ENTM-1.2)
3 × DO, 6 A 250 VAC, 0.2 A 220VDC

2 × RS-485, 1 × RS-232,
1 × 100Base-TX,
cellular, GPS/GLONASS

2 × 120...264 VAC, UPS 600 VA, up to
150 VA (without external load)

IP54
600 × 600 × 250 mm (ENTM-1.1)
800 × 600 × 300 mm (ENTM-1.2)

20 × ENMV-1-24/0 (ENTM-2.1)
220 VDC, 2 A power module (ENTM-2.1)
16 × ENMV-1-0/20 (ENTM-2.2)

22 × DI 24 VDC (ENTM-2.1)
456 × DI 220 VDC (ENTM-2.1)
320 × DO, 6 A 250 VAC, 0.1 A 220VDC
(ENTM-2.2)

2 × RS-485

100...265 VAC,
up to 720 VA

IP54
2200 × 800 × 600 mm



Measurements

WAMS

Time sync

ENTM-2.3



20 × ENIP-2 + ENMI-3

measurements for 20 feeders/bays
158 × DI 24 VDC

2 × RS-485
100Base-TX

2 × 100...265 VAC, up to 440 VA

IP54
2200 × 800 × 600 mm

ENTM-2.4



4 × PMU ENIP-2
2 × ES-PDC
ENCS-2
ENMI-6

PMU for 4 feeders/bays
18 × DI 24 VDC

2 × 100Base-FX (SM, SC)
1 × GPS/GLONASS

2 × 100...265 VAC, UPS 1000 VA,
up to 340 VA

IP54
2200 × 800 × 600 mm

ENTM-1.5(2.5)



2 × ENCS-2
2 × switch L2
ENMI-6

GPS/GLONASS

4 × RS-485, 2 × RS-232
2 × 100Base-TX
2 × 100Base-FX SC SM

2 × 100...265 VAC,
up to 55 VA

IP54
600 × 600 × 250 mm (ENTM-1.5),
2200 × 800 × 600 mm (ENTM-2.5)



Options and Accessories

Expand the capabilities of devices and simplify their maintenance with options and accessories.

The full list is on enip2.com.





+ IEC 61850

ES61850.encs3

IEC 61850-8-1 activation
for ENCS-3m



+ IEC 61850

ES61850.encm3

IEC 61850-8-1 activation
for ENCM-3



+ IEC 61850

ES61850.enip

IEC 61850-8-1 activation
for ENIP-2 Standard



+ IEC 61850

ES61850.esm

IEC 61850-8-1 activation
for ESM



+ IEC 61850

ES61850.enmv

IEC 61850-8-1 activation
for ENMV-1



+ PTPv2

PTPv2.encs2

IEEE 1588v2 PTP activation
for ENCS-2



IP54.enmi

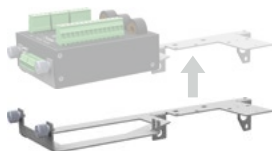
IP54 for front panel
of ENMI



+ SD 8GB

SD8G.pmu

Additional 8 GB memory
for PMU ENIP-2



RM6-KP

Bracket for ENIP-2-...-32,
stainless steel 1.5 mm



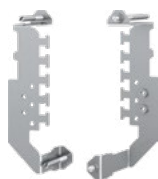
PLUG.enmv

Detachable terminal
for ENMV-1 (except 1W, 6/3R)



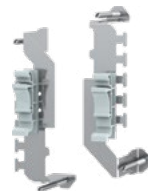
PC1015

Sealing cover
for ENIP-2 Standard or ENMV-1



P-KP

Bracket organizer
for ENIP-2 Panel or ENMI
for panel mounting



PDIN-KP

Bracket organizer for mounting
of ENIP-2 Panel, ENMI
on DIN-rail TH35



PXT-KP

Bracket organizer with terminals
for ENIP-2 Panel
for transiting/terminating current wires





EX3TBS

RS-485 splitter
for 3 connections
(IP54, screw)



EX4TB

RS-485 splitter
for 4 connections
(screw, DIN-rail TH35)



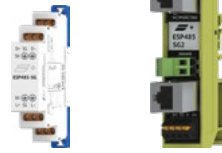
EX4(6)RJ(S), EX5RJX, EX6RJT

RS-485 splitter
for 4, 5 or 6 connections
(RJ45, screw/push-in, DIN-rail TH35)



ESP485-1, ESP485-2

Surge protection for RS-485,
1 or 2 line (screw, DIN-rail TH35)



ESP485-SG, ESP485-SG2

Surge protection for RS-485 line with
protection of signal ground (RJ45, screw/
push-in, DIN-rail TH35)



TR120RJ

RS-485 Terminator
(RJ45, 120 Ohm)



ESP-LAN

Surge protection for Ethernet
10/100/1000 Base-TX
(RJ45, screw/push-in, DIN-rail TH35)



EMP-GN

Surge protection for GPS/GLONASS
antenna feeder (DIN-rail TH35)



ITS2

Non-contact temperature sensor
(RJ45, DIN-rail TH35)



TS-1W-55/70-5 (TS-1W-55/125-5)

1-Wire temperature sensors
-55...+70 °C (-55...+125 °C), 5 m



HPTS-1W-5

1-Wire humidity, pressure
and temperature sensor, 5 m



TS-SRS2

Rain, wind and solar radiation
protection screen for 1-Wire sensors





GPS-P

Outdoor GPS/GLONASS-antenna,
D111 mm, h50 mm, G3/4, G3/4, TNC-f



GPS-P. □

GPS-P with feeder,
length, m: 10 ... 150
SMA-m



GPS-P. □ MP

GPS-P with feeder
and surge protection EMP-GN
SMA-m



GPS-KP-LITE

Mounting bracket for GPS/GLONASS
antenna, stainless steel,
83 × 60 × 82 mm



GPS-KP-MINI

Mounting bracket for GPS/GLONASS
antenna, stainless steel,
125 × 60 × 186 mm



GPS-KP

Mounting bracket for GPS/GLONASS
antenna, painted steel,
h × 300 mm × G3/4,
h 300, 500 or 1000 mm



4G.S3

4G/3G/2G antenna
SMA connector, 3 m feeder,
screw fastening



4G.M3

4G/3G/2G antenna
SMA connector, 3 m feeder,
magnetic base



CCRJ05, CCRJ10, CCRJ30

Straight patch-cord RJ45-RJ45,
length 0.5/1.0/3.0 m



RJ45PG, RJ45PGK

Lockable plug-out protection for RJ45
connector, key for for RJ45PG



USB-A-B, USB-A-Bmini

USB 2.0 cable, male A to male B
(male B mini), 1 m

Solutions

If you're looking for reliable and effective solutions, explore these automation system applications:

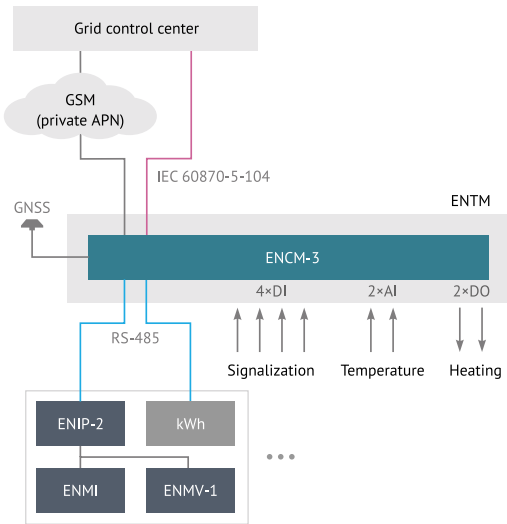
- remote monitoring and control of distribution networks;
- power station and substation automation;
- digital substations and smart grids;
- smart metering and power quality monitoring;
- wide area measurement and control systems.

Whether you're building a new system or retrofitting an existing one, our products support standard industrial protocols and offer simple configuration, ensuring seamless integration into projects and systems of any complexity.



Remote monitoring and control of distribution networks

Monitoring and Control of Small Power Facilities

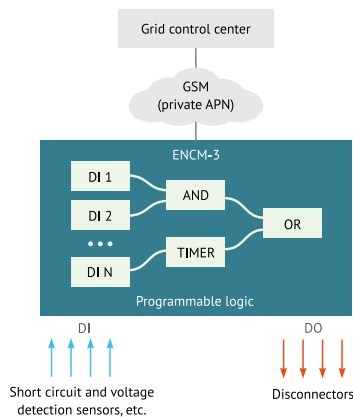


ENCM-3 is designed for monitoring and control of small power facilities. It processes data using built-in digital and analog inputs and provides control via built-in digital outputs.

The system is scalable and can be expanded with ENIP-2, ESM, and ENMV-1 modules. ENCM-3 also enables remote access to revenue meters and other devices by tunneling RS-485/232.

For precise on-site time synchronization, ENCM-3 features a built-in GLONASS/GPS receiver.

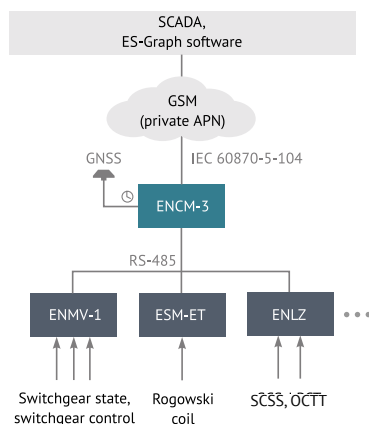
Automation of Switching Equipment



ENCM-3 is designed for DMS (Distribution Management Systems) and is installed in the control cabinet of switching equipment for overhead transmission lines (e.g., reclosers, load switches, disconnectors), providing remote control and monitoring capabilities.

With programmable logic expressions, ENCM-3 acts as a programmable logic controller (PLC), simplifying the automation of switching equipment, such as autoreclosing.

Fault Localization



This solution is designed for DMS (Distribution Management Systems). ENLZ receives status data from short-circuit current indicators and measures 3I0 and 3U0 synchrophasors. ESM-ET measures network parameters, while ENMV-1 processes digital signals and controls switching devices.

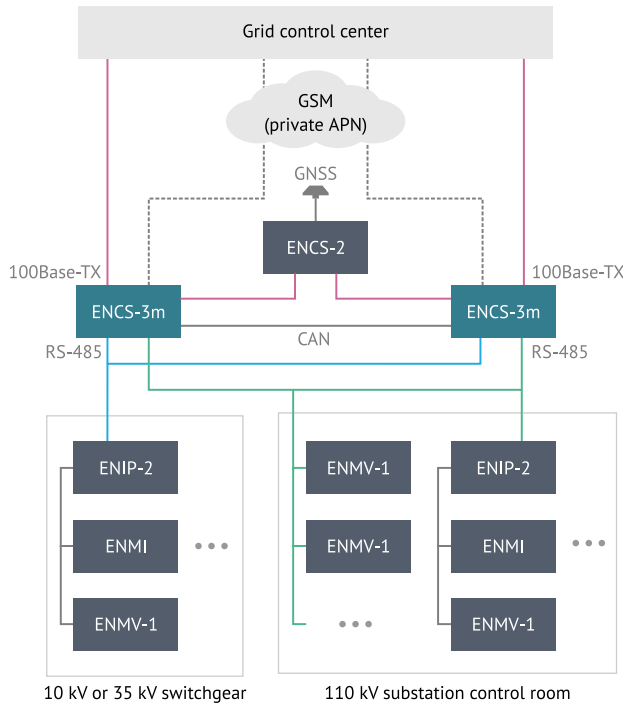
ENCM-3 synchronizes devices and ensures communication with the power grid control center.

The software ES-Graph analyzes the collected data to identify and locate damaged sections of the cable power grid.



Substation monitoring and control

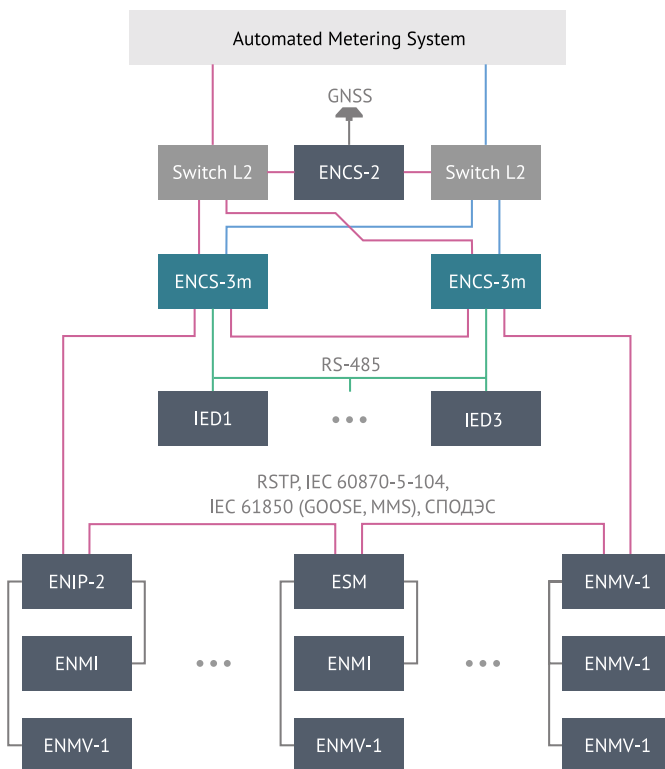
Substation Monitoring and Data Acquisition System



ENIP-2 measures network and feeder (bay) parameters, while ENMI displays the measurement data. ENMV-1 controls switching equipment and processes digital signals at the substation.

ENCS-3m, as the RTU, polls devices via RS-485 and transmits data to the upper control level. ENCS-2 ensures precise timing for all connected devices.

Substation Monitoring, Data Acquisition, and Energy Metering System

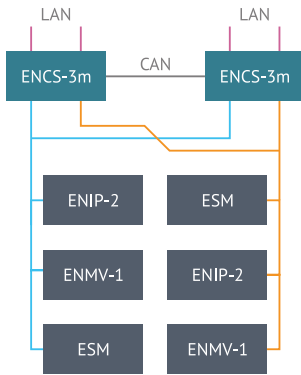


ESM performs power metering, monitors power quality, and provides measurement and network parameters. ENMV-1 controls the switching equipment, processes digital signals, and determines the on-load tap-changer position of the transformer.

ENCS-3m, as the RTU, polls devices via the local network and transmits data to the upper control level. ENCS-2 ensures precise timing for all connected devices.

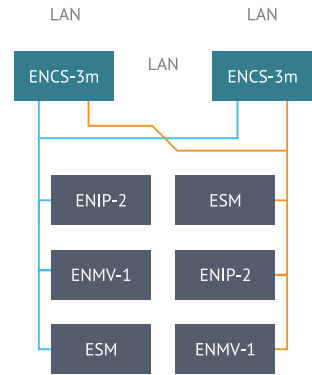


RTU Redundancy Solutions for ENCS-3m



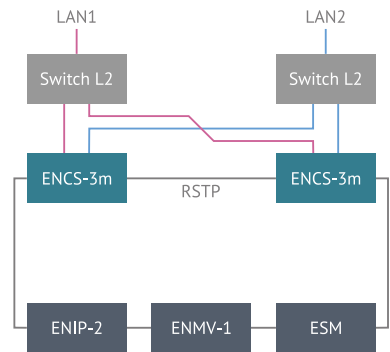
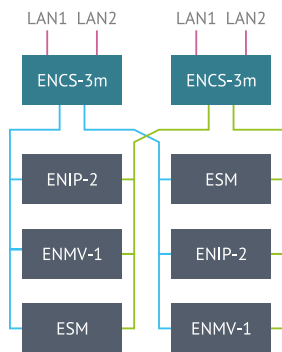
«Warm» Redundancy (Master-Slave configuration)

In this configuration, two ENCS-3m RTUs are coupled in a Master-Slave setup. The devices communicate via CAN (ENCS-3m...1(2)) or Ethernet (ENCS-3m...3(4,5)). Only one RTU is active at any given time, polling the devices and communicating with the upper control level. The active RTU continuously reports its status to the inactive RTU, which will take over the polling and communication functions in the event of a failure or loss of connection with the polled devices.

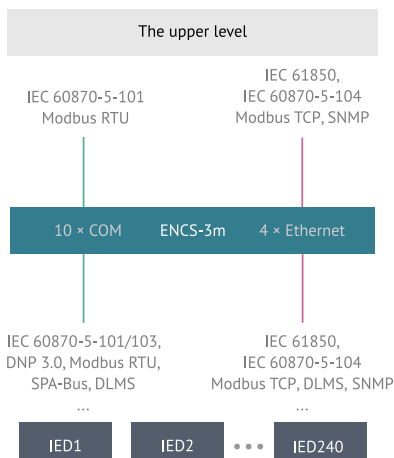


«Hot» Redundancy

For higher reliability, «hot» redundancy uses two or more ENCS-3m RTUs polling the same devices through independent interfaces. If data acquisition is via RS-485, then ENCS-3 RTUs poll the same devices through independent ports. The polled devices must have the required number of free RS-485 ports or an Ethernet connection with the necessary number of free TCP sockets.



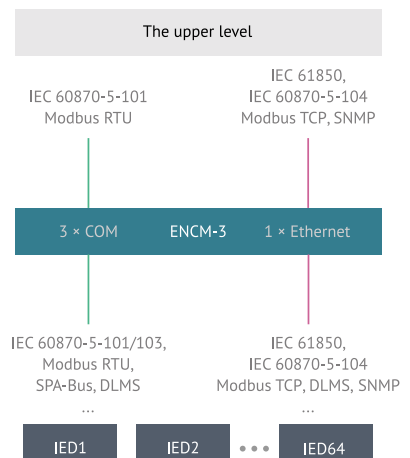
Protocol Conversion with ENCS-3m and ENCM-3



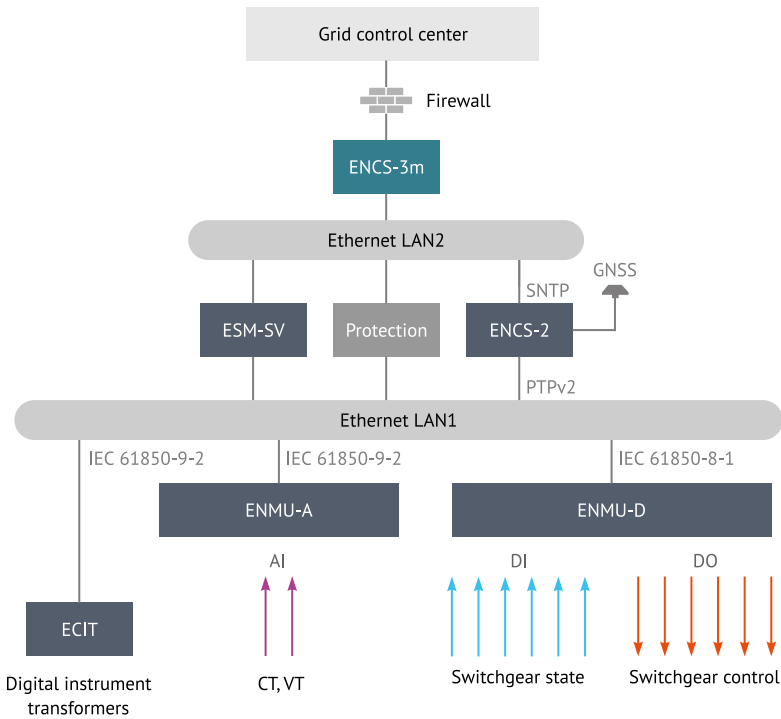
Many facilities rely on legacy devices with limited interfaces and proprietary data exchange protocols. ENCS-3m and ENCM-3 act as protocol converters, allowing these devices to be integrated into the facility's automated system.

These RTUs (Remote Terminal Units) collect data via serial ports and Ethernet interfaces, supporting both standard and proprietary protocols. The acquired data is then transmitted to upper-level devices or servers via serial ports or Ethernet (PRP, RSTP) using standard protocols, including IEC 61850-8-1.

This solution provides flexibility for integrating older equipment into modern automation systems while maintaining compatibility with various devices and protocols.



Digital Substation



For the digital substation architecture, we offer the following products:

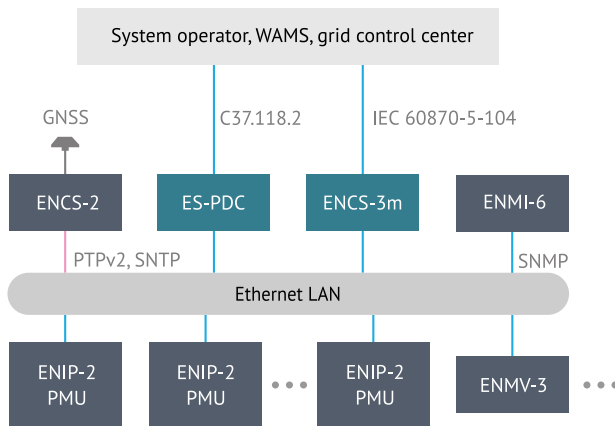
The ENMU (Merging Unit) is responsible for publishing SV (Sampled Values) and GOOSE messages, as well as controlling switching equipment. Additionally, the ENMU calculates synchronized current and voltage phasors for precise monitoring.

The ESM-SV operates as a revenue meter, power quality analyzer, and multifunctional measuring device, providing a comprehensive solution for measurement and monitoring. It receives SV data from the ENMU and/or ECIT (digital instrument transformer).

The ENCS-3m (RTU) communicates with upper control levels using IEC 61850-8-1 or IEC 60870-5-104 protocols. It facilitates data acquisition for transmission to the power grid control center.

The ENCS-2 ensures time synchronization for all devices in the system. For high reliability and accuracy, it is recommended to use multiple ENCS-2 units, supporting SNTP, IEEE 1588 PTPv2, and BMCA (Best Master Clock Algorithm) for robust time synchronization across the digital substation.

Wide Area Measurement Systems (WAMS)



ENIP-2 PMU performs phasor current and voltage measurements or calculates grid parameters.

ENMV-3 provides DC circuit measurement in generator excitation circuits.

ES-PDC aggregates and transmits data via IEEE C37.118.2, records cyclic and emergency archives of a configurable depth, and can solve additional application tasks.

ENCS-3m transmits data to the upper level via IEC 60870-5-104.

ENMI-6 is an optional module, used when diagnostic data about system errors needs to be displayed for on-site personnel.

ENCS-2 provides timing for all devices.



Purchase, Warranty and Support

Our products and components undergo rigorous quality control at every stage, from development to serial production.

We offer a 5-year warranty on ENIP-2, ESM, ENMI, ENMV, ENCS-2, ENCS-3m, ENCM-3, and ENMU, ensuring long-term reliability.


We are committed to providing high-quality technical support, ensuring customer satisfaction.

To help our users, we regularly organize free technical seminars, both online and offline, offering valuable learning opportunities.


For more information about our products and solutions, please visit www.enip2.com.

If you have any questions or would like to place an order, please feel free to contact us!



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enip2@ens.ru, www.enip2.com

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