



RTS/GPS-2xx

real time source

Highly reliable real time sources RTS/GPS-2xx are designed to perform synchronization of SCADA/NMS systems which require precise information about the time. They may be also installed in telecommunication and industrial automation systems as well as commercial networks.

The device uses the GPS or GLONASS satellite signal to create a time source of precision better than $1\mu\text{s}$. In the case of a GPS signal outage the source provides the time with precision $50\mu\text{s}$ for at least 24h.

The RTS/GPS-2xx device may be equipped with the CSAC atomic frequency source which enables to maintain the difference between the provided time and the GPS time within 600ns/day or $220\mu\text{s/year}$.

Devices from the RTS/GPS-2xx family provide the information about the time in a user-selected format:

- IPPS signal on an output line,
- IRIG standard,
- NMEA standard,
- NTP/SNTP server protocol,
- PN-EN 61588 (PTP) protocol.

The user may select the following standards: NTP/SNTP, PN-EN 61850, PN-EN 61588, Modbus, NMEA, IRIG. The device is equipped with the following interfaces: RS-485, RS-232 (service), OPTO - NMEA, Ethernet UTP, 2x Ethernet FX, output $0\div 5\text{V}$ or $\pm 5\text{V}$ for IRIG.

The source is equipped with a set of binary inputs and outputs which enable generation and/or recording an external synchronization pulses. The 230V AC analog inputs block is used to measure the frequency of a network.

Monitoring and configuration of selected operation parameters are enabled by the LCD screen with a keyboard. A full configuration of the device is performed using a free configuration software.



Description of the device

The RTS/GPS-2xx source is manufactured in several versions. The one with required functionalities may be selected from the table comprising available versions of the device.

When the module is turned on, the central unit reads the configuration and starts the synchronization procedure with an external or the internal time source. After obtaining a full synchronization with the source, the device switches into the normal operation mode.

Until a full synchronization, some functions may not operate or operate in a limited way. In case of diagnostic purposes or if high precision of time is not essential, the device may operate in the not synchronized mode. In such a case, functions of the device are performed basing on the internal RTC clock. This mode may be useful while testing the device without the GPS/GLONASS antenna connected or without a time source. Then precision of time may decrease up to 2 seconds a day. The synchronization method is defined during the configuration of the device.

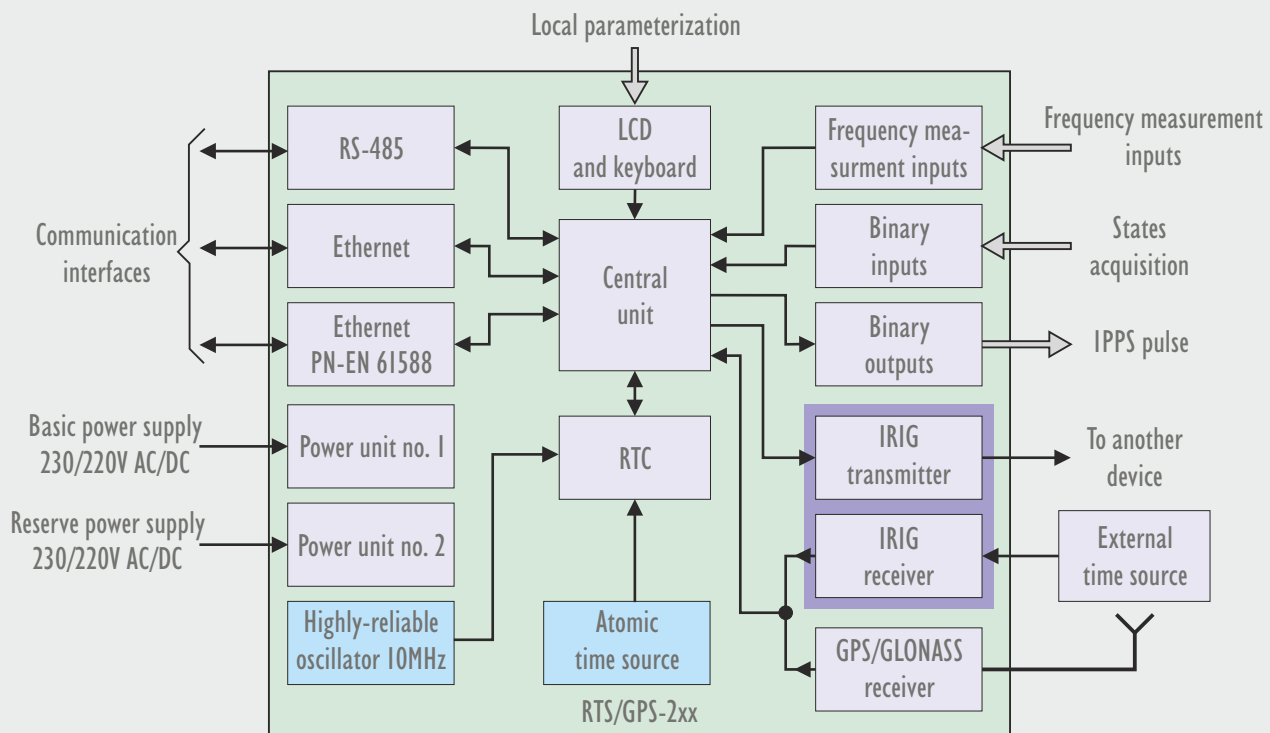
The device is equipped with binary inputs which may acquire external signals and define their precise time parameters. The device is also equipped with binary outputs which may be used for synchronization or triggering external devices and circuits. The 230VAC analog input is used for precise measurements of the network frequency.

The functionalities above enable testing the operation and synchronization of substation automation systems.

The device is equipped with two independent power supplies, in order to increase the reliability of operation.

Block diagram

The figure below presents functional blocks of the RTS/GPS-2xx device and their mutual connection.

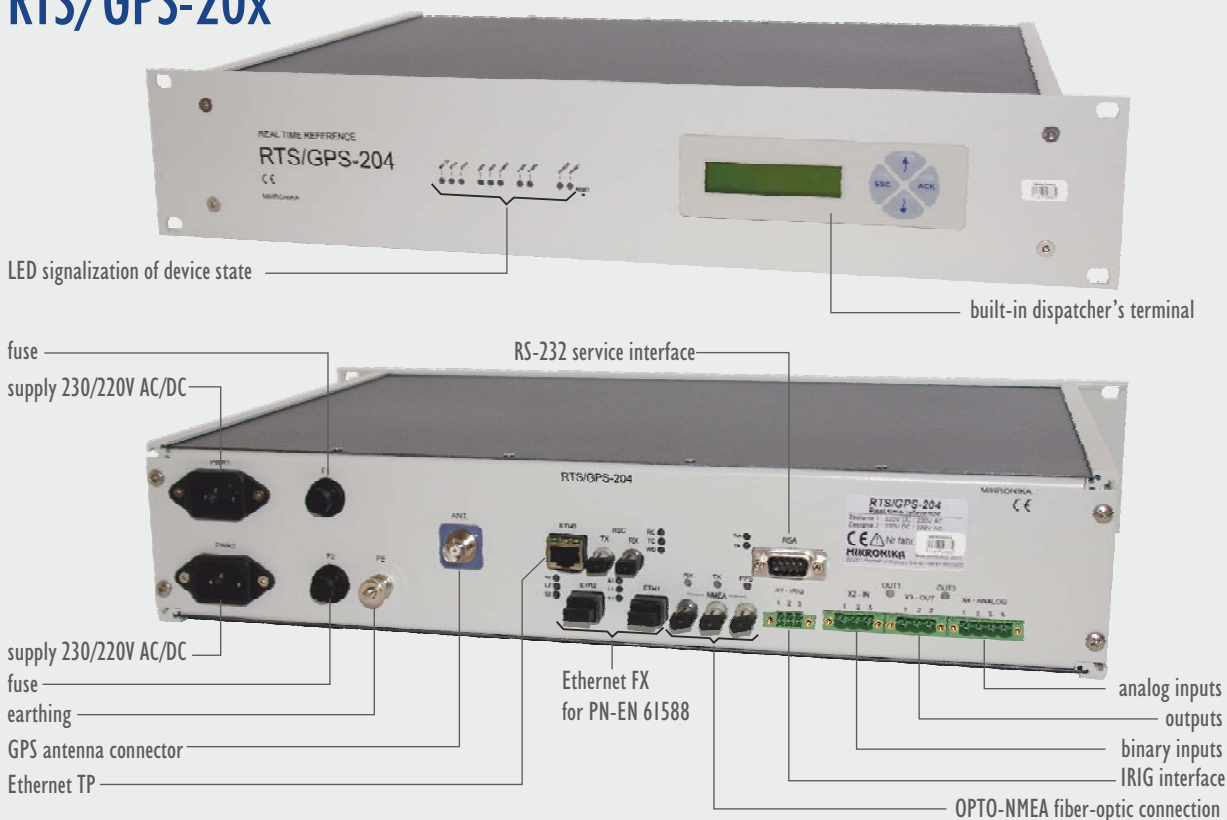


SYNCHRONIZATION OPTIONS	$\Delta t/24H$	$\Delta t/year$	Notes
GLONASS/GPS	1 us	1 us	Standard
External time source	?	?	Depening on the source precision
Highly-reliable oscillator	50us	18ms	Standard
Atomic source	600ns	220us	Option

Features

- time source: GPS, GLONASS, IRIG external time source
- precision of the provided time better than 1 μs
- providing the time after an outage of the source signal
- sustaining the synchronization with a highly-reliable oscillator or an atomic clock
- redundant power supply 2 x 230/220V AC/DC
- communication interfaces: 1 x RS-485, 1 x OPTO-NMEA, 1 x voltage input/output for IRIG, 2 x Ethernet FX to support PN-EN 61588, 1 x Ethernet to support remaining network protocols, 1 x RS-232 (service)
- supported communication protocols: MODBUS, NMEA, NTP/SNTP, PN-EN 61588 (PTP), PN-EN 61850, SNMP, HTTP, TELNET, IRIG
- 2 binary inputs 24V DC and 2 binary outputs 230V AC/DC, 2 analog inputs 230V AC for network frequency measurements

RTS/GPS-20x



Available versions of RTS/GPS-2xx

FEATURE	RTS/GPS-	-201	-202	-203	-204	-205	-206	-207
LCD + keyboard		YES	YES	YES	YES	YES	YES	YES
RS-232 (service)		YES	YES	YES	YES	YES	YES	YES
IRIG		YES	NO	NO	YES	YES	NO	YES
Number and type of Ethernet channels		1 x UTP	1 x UTP	1 x UTP	1 x UTP	1 x UTP	1 x UTP	1 x UTP
Number and type of Eth. IEC-61588 channels		0	2 x LC	2 x LC	2 x LC	2 x LC	0	2 x LC
Internal time source		NO	GPS	GLONASS	GPS	GLONASS	GPS	GPS
Binary inputs		NO	YES	YES	YES	YES	NO	YES
Binary outputs		YES	YES	YES	YES	YES	NO	YES
Analog inputs		YES	YES	YES	YES	YES	NO	YES
Redundant power supply		YES	YES	YES	YES	YES	YES	YES
Time base after source outage		OCXO	OCXO	OCXO	OCXO	OCXO	OCXO	CSAC

Technical data

PARAMETER	VALUE
Supplying voltage according to PN-EN 60870-2-1	230V AA3 F3 / 220V DC3 EC
Maximal power consumption	7W
Operation temperature	+5...+40°C or -5...+45°C(*)
Relative humidity	5 ... 85% or 5 ... 95% (*)
Casing	RACK-type, height 2U
GPS/GLONASS module type	GT-80/MNP-M7
Maximal time deviation after time source signal outage in outage period up to 24 hours	50µs
	600ns (*)
Maximal time deviation after time source signal outage in outage period up to one year	18ms
	220µs (*)
Binary inputs – X2	
Maximal voltage	40V DC
Switching voltage	ca. 15V DC
Maximal current of a single input, with 24V	4mA
Measurement precision of time of start/end and length of pulse	100ns
Maximal length of a single measured pulse	4 x 10 ⁹ µs
Binary outputs – X3	
Maximal connection voltage of output no. 1 (clamps 1, 3)	220V AC/DC
Maximal connection voltage of output no. 2 (clamps 2, 3)	220V AC/DC
Maximal current of outputs no. 1 (clamps 1, 3)	1,5A
Maximal current of outputs no. 2 (clamps 2, 3)	1,5A
Typical switch-on delay of output no. 1 (clamps 1, 3)	15ms
Typical switch-off delay of output no. 1 (clamps 1, 3)	120µs
Typical switch-on delay of output no. 2 (clamps 2, 3)	15ms
Typical switch-off delay of output no. 2 (clamps 2, 3)	120µs
Length of generated pulses	1 ÷ 4 x 10 ⁹ µs
Period of generated pulses	2 ÷ 4 x 10 ⁹ µs
Resolution of setting pulses length and period	1µs
Number of pulses in one pulse string	1 ÷ 4 x 10 ⁹
Range of programmable time of repeating a string of pulses, every	00:00:01 ÷ 23:59:59 hh:mm:ss
Repetitiveness/irregularity of pulses in time	ca. 100ns
Analog inputs – X4	
Resolution	16 bit
Range of input voltage	7 ÷ 280V AC
Range of frequency measurement	45 ÷ 55Hz
Frequency measurement precision (with averaging from 50 periods)	0,001Hz
Frequency measurement precision (with averaging from 500 periods)	0,0001Hz
Voltage measurement class in the range to 200V AC	0,02%
Voltage measurement class in the range to 280V AC	0,15%
Input/ output IRIG	
Input voltage fluctuation range	0÷5V or ±5V
Input current	±300mA
OPTO-NMEA interface	
Type of connector / multimode fiber-optic	3 x ST / fiber-optic 62,5/125µm
Ethernet FX	
Type of connector / multimode fiber-optic	LC / fiber-optic I310nm

(*) Option available on special request