



# PRODUCT CATALOG





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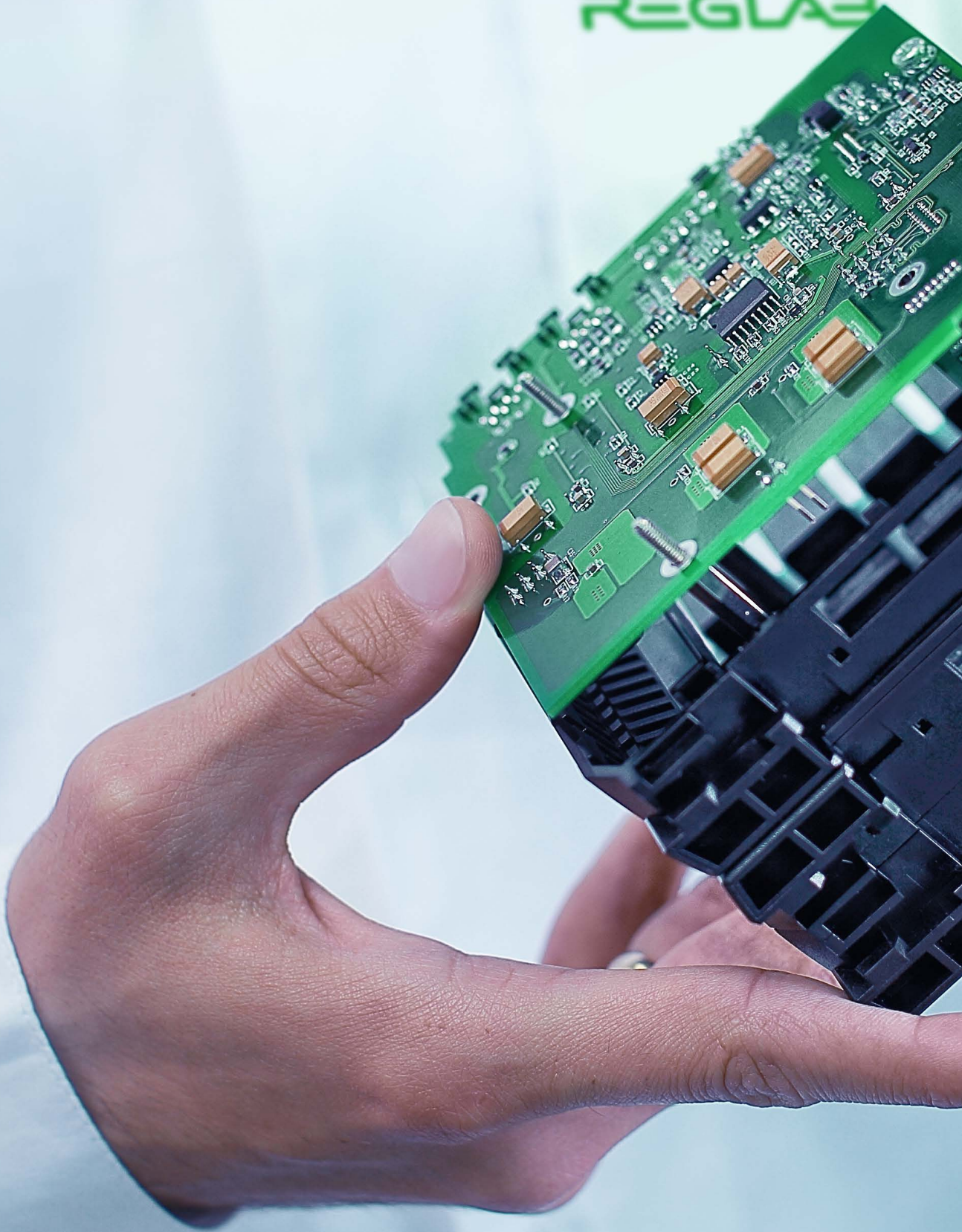
## **REGUL RX00 PROGRAMMABLE LOGIC CONTROLLER**

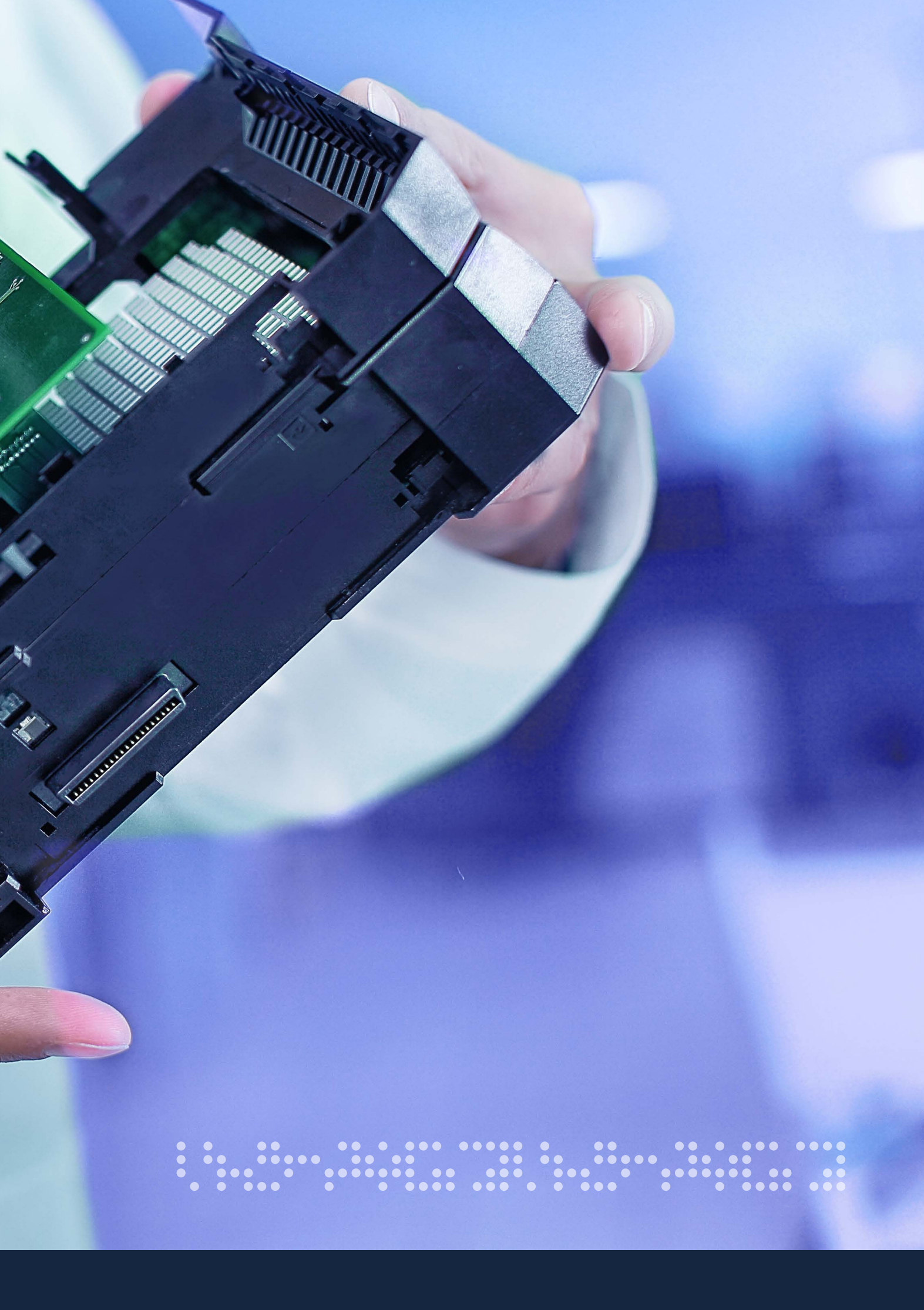
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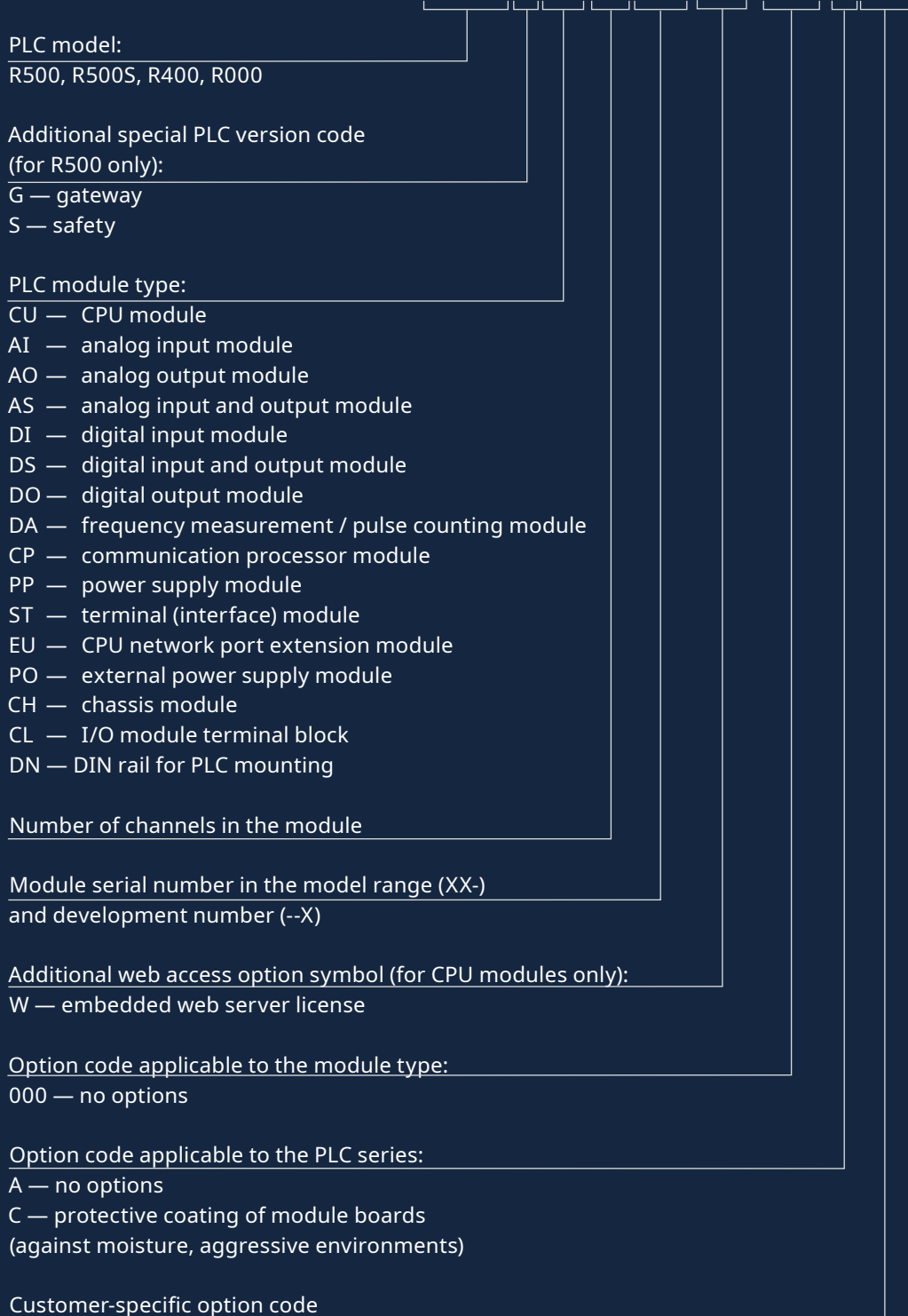




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# REGUL RX00 CONTROLLER PART NUMBER STRUCTURE

## RX00 S AI 08 881 (X)-000-AAA



# REGUL R500 PROGRAMMABLE LOGIC CONTROLLER



Included in the Register of Russian Industrial Products under No. 140\1\2023.



The REGUL R500 PLC is designed to build responsible, fault-tolerant and distributed APCS in various industries.



## MAIN CHARACTERISTICS

### Purpose



important ACS requiring high reliability (with support for various CPU and remote I/O rack redundancy schemes)



highly accurate measurements (specialized low-error measurement modules)



fault-tolerant control systems for fast-changing technological processes (redundant control systems with lowest application cycle and specialized modules for high-speed measurement of physical parameters)



distributed APCS

## Features

- support for hot redundancy of CPU, power supply, and I/O modules
- dual high-speed internal data bus
- different PLC redundancy schemes (100% redundancy and power supply and CPU redundancy)
- hot swapping for any controller module (without power or application program shutdown)
- discrete rack (extension with one additional module is available)
- connection of remote I/O racks to the CPU rack using "double redundancy ring", "star," or mixed topologies
- power independent memory (up to 3 GB for user archives)
- web-visualization availability
- Astra.IDE design software supporting all IEC 61131-3 standard languages and CFC

## Available communications

### Embedded communication protocols:

- HART v6, v7
- IEC 60870-5-101 (Master / Slave)
- IEC 60870-5-104 (Master / Slave)
- Modbus RTU (Master / Slave, extension is available)
- Modbus TCP (Master / Slave, extension is available)
- OPC DA, OPC UA
- Profibus DP v0, v1 Master
- RegulBus, SQL, FTP, SNMP v3, SysLog
- Foundation Fieldbus H1
- additional protocols, including non-standard ones, can be implemented according to the customer's requirements

### Interface support:

- USB host 2.0
- DVI video output
- RS-232
- RS-485
- Ethernet 100/1000 Mbps, RJ-45 (full duplex) up to 4 ports per CPU module
- Ethernet 100/1000 Mbps, FO (single-mode, multi-mode) up to 2 ports per CPU module

Construction



modern module design



flexible remount terminal blocks



quick mount on 105 mm DIN-rail



passive cooling

Technical specifications

Minimal application cycle time	1 ms / 10 ms in redundancy configuration
CPU switching time from Active to Stand-By	5 ms
Time synchronization accuracy	up to 50 $\mu$ s
Power supply voltage	85...264 VAC / 120...370 VDC, 18...36 VDC
Operating temperature range	from -40 to + 60 °C

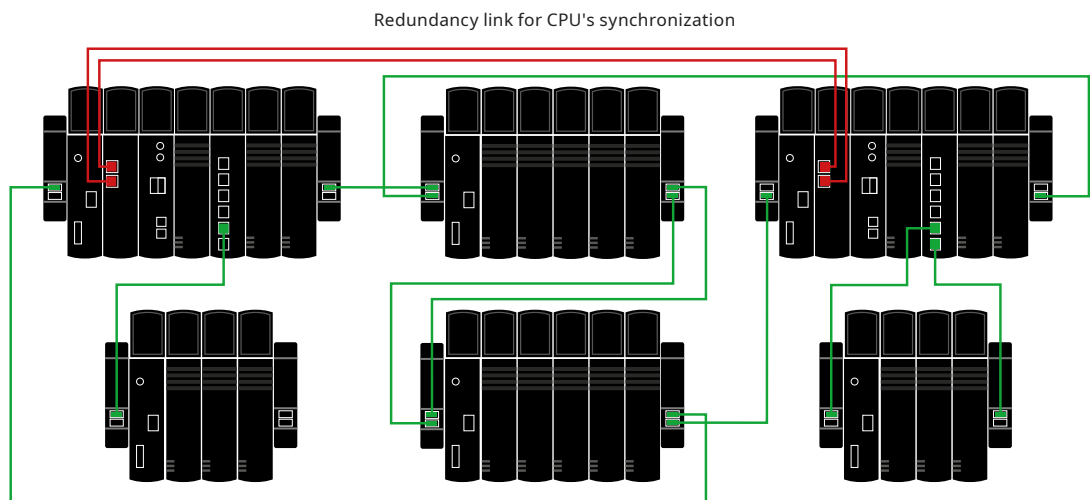
Part number structure  
see at page 6

Noise immunity  
see at page 42

## REGUL R500 PLC HARDWARE CONFIGURATION

- PLC redundancy with the CPU mounted in the same or different racks
- remote I/O racks
- up to 10 km link between racks (by fiber optic link)

Figure 1.  
Example of REGUL R500 racks connection



## REGUL R500 PLC CONFIGURATION

The REGUL R500 PLC allows distributed configuration of racks. Up to 20 racks (electrically isolated units) can be configured within a single controller. Each rack must have a unique address, which is configured via an 8-position DIP switch located on the terminal module (ST). The PLC racks can be connected in any order, but the OUT interface connectors on the internal PLC data bus (RegulBus) must always be connected to the IN interface connectors.

The REGUL R500 PLC supports configurations with a dual internal data bus and either a single or dual internal power bus. In CPU redundancy configurations, a dual RegulBus is required.

**The REGUL R500 rack includes modules of the following types:**

**(ST) Terminal modules** must be included in each PLC rack. They are mounted at both ends of the rack to secure it to the DIN rail and to protect the lateral electrical connectors of the chassis. Terminal modules of the corresponding modification can support the extension of the PLC internal data bus (IN and OUT modules) via copper or fiber optic lines between racks. When using fiber optic communication, third-party SFP modules must be installed in the terminal modules. In PLC configurations with rack expansion, all terminal modules in all crates must support the RegulBus extension function.

**(CU) CPU modules.** CU modules are available in various types and modifications, offering a range of functional options.

**(AI, AO, AS / DI, DA, DO) I/O modules.** I/O modules feature a wide range of models and support processing of analog signals (including HART), digital signals (including NAMUR), TC/RTD signals, and pulse signals (including incremental encoder signals and PWM output signals).

**(PP) Power supply modules.** Each rack must include at least one power supply module. The number of power supply modules is determined based on the internal power consumption of the rack. To ensure redundant power supply, an increased number of power supply modules should be installed. Guidelines for selecting chassis and PP modules that support two independent power buses are provided in the REGUL R500 PLC System Manual.

**(CP) Communication processor modules** receive and process digital signals via RS-485 and Ethernet interfaces and such protocols as Modbus RTU/TCP, IEC 60870-5-101/104, RegulBus, NVL, SQL, FTP, SNMP, Profibus DP v0/v1 Master, and Foundation Fieldbus H1. CP modules can be installed in remote PLC racks. These modules are responsible solely for establishing the physical connection to external devices, while all device driver processing is handled by CU modules. The bandwidth of Ethernet CP modules is limited by the segment size of the PLC internal bus allocated for data transmission through such modules.

**(EU) CPU network port extension modules.** EU modules are used to expand the number of Ethernet interfaces available to CU modules of series 151/161/171/181. Each CU module may be connected to no more than two EU modules. Data processing for devices connected via the EU modules is performed by the corresponding CU module. EU modules can only be installed in the same rack, positioned to the right of the corresponding CU module.

**(PO) External power supply modules.** PO modules supply 24 VDC power (up to 70 mA per channel) for external analog current sensor circuits.

These modules are typically installed adjacent to AI modules.

**(CH) Chassis modules.** A chassis module must be installed in the rack for each PP, CU, I/O, CP, PO, and EU module.

Chassis modules provide the active data and power buses of the PLC and enable hot swapping of any of these modules within the rack. One chassis module is sufficient for a single REGUL R500 PLC rack. Chassis modules are not included with the PLC modules and must be ordered separately.

**(DIN) DIN-rail.** CH modules are mounted on a DIN rail with a height of 105 mm. The DIN rail can be installed on a mounting panel or inside a 19" cabinet. Standard DIN rail widths are 600, 800, or 1000 mm. CH modules for CU types I and III have a width of 80 mm, while other CH and ST modules are 40 mm wide.

The installation location of the module type in the rack does not matter, except for terminal modules, which must always be mounted on both ends of the rack, and EU modules, which must always be mounted next to CU modules of series 151/161/171/181.

Two redundant CU or PP modules can be installed in one rack. To enhance reliability, it is recommended to do the following:

- reserve PP modules in each crate;
- install redundant CU and I/O modules in separate racks;
- use chassis and interface modules with support for two power buses.

Figure 2. Example of a REGUL R500 PLC rack configuration



**Types of central processor units**

Central processor unit	CU 00 021	CU 00 031	CU 00 052	CU 00 062	CU 00 072	CU 00 151	CU 00 161	CU 00 171	CU 00 181
CPU type	II		I			III			
Frequency, GHz, number of microprocessor cores	1 (1 core)		1.33 (2 cores) 1.93 (4 cores)			1.33 (2 cores) 1.93 (4 cores)			
RAM, MB	512		2000			2000			
Flash memory, base modification, GB	1		from 16			8			
Flash memory, extension option, GB	-		Up to 64			Up to 64			
RS-232 / RS-485, pcs.	1 / 1								
Ethernet, 100 Mbps, pcs.	2 (RJ-45)	2 (SFP)	-	-	-	-	-	-	-
Ethernet 100/1000 Mbps, pcs.	-	-	4 (RJ-45)	2 + 2 (SFP)	2 + 2 (SFP)	4 (RJ-45)	2 + 2 (SFP)	2 + 2 (SFP)	4 (RJ-45)
DVI video output, DVI, pcs.	-	-	-	-	1	-	-	1	1
USB, 2.0**	-		2	2	2	2	2	2	2
SDHC-card slot, pcs.	1 (32 GB, FAT32)								
Web visualization option	Yes								
EU module connection	No		No			Yes			
GLONASS receiver	No		Optional			Optional			
Typical PLC's bus cycle	5 ms for each rack		1 ms for each rack			up to 1 ms by 350 I/O modules up to 3 ms by 1000 I/O modules			
Minimal application cycle time	10 ms / 20 ms (in a redundant configuration)		5 ms / 10 ms (in a redundant configuration)			5 ms / 10 ms (in a redundant configuration)			
Battery replacement by user	No					Yes			
RegulBus co-processor	No					Yes			
Compatible CH module	CH 02 032			CH 02 022, CH 02 023			CH 02 022, CH 02 023		

\* The battery in the CU module only powers the internal clock when external power is off. If the CU module is powered on with a faulty battery, the date and time can be set manually. Time synchronization is also possible via NTP or the built-in GPS/GLONASS receiver.

\*\* An external USB flash drive (up to 32 GB), touch screen display, or keyboard/mouse can be connected via USB.

## REGUL R500 CONTROLLER MODULES

(W) - web visualization support, C - protective coating

Part number	Module characteristics	Note
<b>CPU modules</b>		
R500 CU 00 021(W)-000-AAA R500 CU 00 021(W)-000-CAA	<ul style="list-style-type: none"> <li>1 GHz, 512 MB RAM, 1 GB Flash, RS-232, RS-485, 2xEthernet RJ-45</li> </ul>	Single slot, type II
R500 CU 00 031(W)-000-AAA R500 CU 00 031(W)-000-CAA	<ul style="list-style-type: none"> <li>1 GHz, 512 MB RAM, 1 GB Flash, RS-232, RS-485, 2xEthernet SFP</li> </ul>	
R500 CU 00 052(W)-000-AAA R500 CU 00 052(W)-000-CAA	<ul style="list-style-type: none"> <li>1.33 GHz (2 cores), 2 GB RAM, 1x16 GB Flash, RS-232, RS-485, 4xEthernet RJ-45, 2xUSB</li> </ul>	Dual slot, type I
R500 CU 00 052(W)-001-AAA R500 CU 00 052(W)-001-CAA	<ul style="list-style-type: none"> <li>1.33 GHz (2 cores), 2 GB RAM, from 60 GB Flash, RS-232, RS-485, 4xEthernet RJ-45, 2xUSB</li> </ul>	
R500 CU 00 052(W)-002-AAA R500 CU 00 052(W)-002-CAA	<ul style="list-style-type: none"> <li>1.93 GHz (4 cores), 2 GB RAM, from 16 GB Flash, RS-232, RS-485, 4xEthernet RJ-45, 2xUSB</li> </ul>	
R500 CU 00 052(W)-003-AAA R500 CU 00 052(W)-003-CAA	<ul style="list-style-type: none"> <li>1.93 GHz (4 cores), 2 GB RAM, from 60 GB Flash, RS-232, RS-485, 4xEthernet RJ-45, 2xUSB</li> </ul>	
R500 CU 00 052(W)-004-AAA R500 CU 00 052(W)-004-CAA	<ul style="list-style-type: none"> <li>1.33 GHz (2 cores), 2 GB RAM, from 16 GB Flash, RS-232, RS-485, 4xEthernet RJ-45, 2xUSB, GLONASS</li> </ul>	
R500 CU 00 052(W)-005-AAA R500 CU 00 052(W)-005-CAA	<ul style="list-style-type: none"> <li>1.33 GHz (2 cores), 2 GB RAM, from 60 GB Flash, RS-232, RS-485, 4xEthernet RJ-45, 2xUSB, GLONASS</li> </ul>	
R500 CU 00 052(W)-006-AAA R500 CU 00 052(W)-006-CAA	<ul style="list-style-type: none"> <li>1.93 GHz (4 cores), 2 GB RAM, from 60 GB Flash, RS-232, RS-485, 4xEthernet RJ-45, 2xUSB, GLONASS</li> </ul>	
R500 CU 00 052(W)-007-AAA R500 CU 00 052(W)-007-CAA	<ul style="list-style-type: none"> <li>1.93 GHz (4 cores), 2 GB RAM, from 60 GB Flash, RS-232, RS-485, 4xEthernet RJ-45, 2xUSB, GLONASS</li> </ul>	
R500 CU 00 062(W)-000-AAA R500 CU 00 062(W)-000-CAA	<ul style="list-style-type: none"> <li>1.33 GHz (2 cores), 2 GB RAM, from 16 GB Flash, RS-232, RS-485, 2xEthernet RJ-45, 2xEthernet SFP, 2xUSB</li> </ul>	
R500 CU 00 062(W)-001-AAA R500 CU 00 062(W)-001-CAA	<ul style="list-style-type: none"> <li>1.33 GHz (2 cores), 2 GB RAM, from 60 GB Flash, RS-232, RS-485, 2xEthernet RJ-45, 2xEthernet SFP, 2xUSB</li> </ul>	
R500 CU 00 062(W)-002-AAA R500 CU 00 062(W)-002-CAA	<ul style="list-style-type: none"> <li>1.93 GHz (4 cores), 2 GB RAM, from 16 GB Flash, RS-232, RS-485, 2xEthernet RJ-45, 2xEthernet SFP, 2xUSB</li> </ul>	
R500 CU 00 062(W)-003-AAA R500 CU 00 062(W)-003-CAA	<ul style="list-style-type: none"> <li>1.93 GHz (4 cores), 2 GB RAM, from 60 GB Flash, RS-232, RS-485, 2xEthernet RJ-45, 2xEthernet SFP, 2xUSB</li> </ul>	
R500 CU 00 062(W)-004-AAA R500 CU 00 062(W)-004-CAA	<ul style="list-style-type: none"> <li>1.33 GHz (2 cores), 2 GB RAM, from 16 GB Flash, RS-232, RS-485, 2xEthernet RJ-45, 2xEthernet SFP, 2xUSB, GLONASS</li> </ul>	
R500 CU 00 062(W)-005-AAA R500 CU 00 062(W)-005-CAA	<ul style="list-style-type: none"> <li>1.33 GHz (2 cores), 2 GB RAM, from 60 GB Flash, RS-232, RS-485, 2xEthernet RJ-45, 2xEthernet SFP, 2xUSB, GLONASS</li> </ul>	
R500 CU 00 062(W)-006-AAA R500 CU 00 062(W)-006-CAA	<ul style="list-style-type: none"> <li>1.93 GHz (4 cores), 2 GB RAM, from 16 GB Flash, RS-232, RS-485, 2xEthernet RJ-45, 2xEthernet SFP, 2xUSB, GLONASS</li> </ul>	
R500 CU 00 062(W)-007-AAA R500 CU 00 062(W)-007-CAA	<ul style="list-style-type: none"> <li>1.93 GHz (4 cores), 2 GB RAM, from 60 GB Flash, RS-232, RS-485, 2xEthernet RJ-45, 2xEthernet SFP, 2xUSB, GLONASS</li> </ul>	
R500 CU 00 072(W)-000-AAA R500 CU 00 072(W)-000-CAA	<ul style="list-style-type: none"> <li>1.33 GHz (2 cores), 2 GB RAM, from 16 GB Flash, RS-232, RS-485, 2xEthernet RJ-45, 2xEthernet SFP, 2xUSB, DVI</li> </ul>	

(W) - web visualization support, C - protective coating

Part number	Module characteristics	Note
<b>CPU modules</b>		
R500 CU 00 072(W)-001-AAA R500 CU 00 072(W)-001-CAA	<ul style="list-style-type: none"> <li>1.33 GHz (2 cores), 2 GB RAM, from 60 GB Flash, RS-232, RS-485, 2xEthernet RJ-45, 2xEthernet SFP, 2xUSB, DVI</li> </ul>	Dual slot, type I
R500 CU 00 072(W)-002-AAA R500 CU 00 072(W)-002-CAA	<ul style="list-style-type: none"> <li>1.93 GHz (4 cores), 2 GB RAM, from 16 GB Flash, RS-232, RS-485, 2xEthernet RJ-45, 2xEthernet SFP, 2xUSB, DVI</li> </ul>	
R500 CU 00 072(W)-003-AAA R500 CU 00 072(W)-003-CAA	<ul style="list-style-type: none"> <li>1.93 GHz (4 cores), 2 GB RAM, from 60 GB Flash, RS-232, RS-485, 2xEthernet RJ-45, 2xEthernet SFP, 2xUSB, DVI</li> </ul>	
R500 CU 00 072(W)-004-AAA R500 CU 00 072(W)-004-CAA	<ul style="list-style-type: none"> <li>1.33 GHz (2 cores), 2 GB RAM, from 16 GB Flash, RS-232, RS-485, 2xEthernet RJ-45, 2xEthernet SFP, 2xUSB, DVI, GLONASS</li> </ul>	
R500 CU 00 072(W)-005-AAA R500 CU 00 072(W)-005-CAA	<ul style="list-style-type: none"> <li>1.33 GHz (2 cores), 2 GB RAM, from 60 GB Flash, RS-232, RS-485, 2xEthernet RJ-45, 2xEthernet SFP, 2xUSB, DVI, GLONASS</li> </ul>	
R500 CU 00 072(W)-006-AAA R500 CU 00 072(W)-006-CAA	<ul style="list-style-type: none"> <li>1.93 GHz (4 cores), 2 GB RAM, from 16 GB Flash, RS-232, RS-485, 2xEthernet RJ-45, 2xEthernet SFP, 2xUSB, DVI, GLONASS</li> </ul>	
R500 CU 00 072(W)-007-AAA R500 CU 00 072(W)-007-CAA	<ul style="list-style-type: none"> <li>1.93 GHz (4 cores), 2 GB RAM, from 60 GB Flash, RS-232, RS-485, 2xEthernet RJ-45, 2xEthernet SFP, 2xUSB, DVI, GLONASS</li> </ul>	
R500 CU 00 151(W)-000-AAA R500 CU 00 151(W)-000-CAA	<ul style="list-style-type: none"> <li>1.33 GHz (2 cores), RegulBus co-processor, 2 GB RAM, 1x8 GB Flash, RS-232, RS-485, 4xEthernet RJ-45, 2xUSB</li> </ul>	Dual slot, type III
R500 CU 00 151(W)-001-AAA R500 CU 00 151(W)-001-CAA	<ul style="list-style-type: none"> <li>1.33 GHz (2 cores), RegulBus co-processor, 2 GB RAM, 1x16 GB Flash, RS-232, RS-485, 4xEthernet RJ-45, 2xUSB</li> </ul>	
R500 CU 00 151(W)-002-AAA R500 CU 00 151(W)-002-CAA	<ul style="list-style-type: none"> <li>1.33 GHz (2 cores), RegulBus co-processor, 2 GB RAM, 1x32 GB Flash, RS-232, RS-485, 4xEthernet RJ-45, 2xUSB</li> </ul>	
R500 CU 00 151(W)-003-AAA R500 CU 00 151(W)-003-CAA	<ul style="list-style-type: none"> <li>1.33 GHz (2 cores), RegulBus co-processor, 2 GB RAM, 1x64 GB Flash, RS-232, RS-485, 4xEthernet RJ-45, 2xUSB</li> </ul>	
R500 CU 00 151(W)-004-AAA R500 CU 00 151(W)-004-CAA	<ul style="list-style-type: none"> <li>1.93 GHz (4 cores), RegulBus co-processor, 2 GB RAM, 1x8 GB Flash, RS 232, RS-485, 4xEthernet RJ-45, 2xUSB</li> </ul>	
R500 CU 00 151(W)-005-AAA R500 CU 00 151(W)-005-CAA	<ul style="list-style-type: none"> <li>1.93 GHz (4 cores), RegulBus co-processor, 2 GB RAM, 1x16 GB Flash, RS-232, RS-485, 4xEthernet RJ-45, 2xUSB</li> </ul>	
R500 CU 00 151(W)-006-AAA R500 CU 00 151(W)-006-CAA	<ul style="list-style-type: none"> <li>1.93 GHz (4 cores), RegulBus co-processor, 2 GB RAM, 1x32 GB Flash, RS-232, RS-485, 4xEthernet RJ-45, 2xUSB</li> </ul>	
R500 CU 00 151(W)-007-AAA R500 CU 00 151(W)-007-CAA	<ul style="list-style-type: none"> <li>1.93 GHz (4 cores), RegulBus co-processor, 2 GB RAM, 1x64 GB Flash, RS-232, RS-485, 4xEthernet RJ-45, 2xUSB</li> </ul>	
R500 CU 00 151(W)-008-AAA R500 CU 00 151(W)-008-CAA	<ul style="list-style-type: none"> <li>1.33 GHz (2 cores), RegulBus co-processor, 2 GB RAM, 1x8 GB Flash, RS 232, RS-485, 4xEthernet RJ-45, 2xUSB, GLONASS</li> </ul>	
R500 CU 00 151(W)-012-AAA R500 CU 00 151(W)-012-CAA	<ul style="list-style-type: none"> <li>1.93 GHz (4 cores), RegulBus co-processor, 2 GB RAM, 1x8 GB Flash, RS 232, RS-485, 4xEthernet RJ-45, 2xUSB, GLONASS</li> </ul>	
R500 CU 00 161(W)-000-AAA R500 CU 00 161(W)-000-CAA	<ul style="list-style-type: none"> <li>1.33 GHz (2 cores), RegulBus co-processor, 2 GB RAM, 1x8 GB Flash, RS 232, RS-485, 2xEthernet RJ-45, 2xEthernet SFP, 2xUSB</li> </ul>	
R500 CU 00 161(W)-001-AAA R500 CU 00 161(W)-001-CAA	<ul style="list-style-type: none"> <li>1.33 GHz (2 cores), RegulBus co-processor, 2 GB RAM, 1x16 GB Flash, RS-232, RS-485, 2xEthernet RJ-45, 2xEthernet SFP, 2xUSB</li> </ul>	
R500 CU 00 161(W)-002-AAA R500 CU 00 161(W)-002-CAA	<ul style="list-style-type: none"> <li>1.33 GHz (2 cores), RegulBus co-processor, 2 GB RAM, 1x32 GB Flash, RS-232, RS-485, 2xEthernet RJ-45, 2xEthernet SFP, 2xUSB</li> </ul>	
R500 CU 00 161(W)-003-AAA R500 CU 00 161(W)-003-CAA	<ul style="list-style-type: none"> <li>1.33 GHz (2 cores), RegulBus co-processor, 2 GB RAM, 1x64 GB Flash, RS-232, RS-485, 2xEthernet RJ-45, 2xEthernet SFP, 2xUSB</li> </ul>	

(W) - web visualization support, C - protective coating

Part number	Module characteristics	Note
<b>CPU modules</b>		
R500 CU 00 161(W)-004-AAA R500 CU 00 161(W)-004-CAA	<ul style="list-style-type: none"> <li>1.93 GHz (4 cores), RegulBus co-processor, 2 GB RAM, 1x8 GB Flash, RS-232, RS-485, 2xEthernet RJ-45, 2xEthernet SFP, 2xUSB</li> </ul>	Dual slot, type III
R500 CU 00 161(W)-005-AAA R500 CU 00 161(W)-005-CAA	<ul style="list-style-type: none"> <li>1.93 GHz (4 cores), RegulBus co-processor, 2 GB RAM, 1x16 GB Flash, RS-232, RS-485, 2xEthernet RJ-45, 2xEthernet SFP, 2xUSB</li> </ul>	
R500 CU 00 161(W)-006-AAA R500 CU 00 161(W)-006-CAA	<ul style="list-style-type: none"> <li>1.93 GHz (4 cores), RegulBus co-processor, 2 GB RAM, 1x32 GB Flash, RS-232, RS-485, 2xEthernet RJ-45, 2xEthernet SFP, 2xUSB</li> </ul>	
R500 CU 00 161(W)-007-AAA R500 CU 00 161(W)-007-CAA	<ul style="list-style-type: none"> <li>1.93 GHz (4 cores), RegulBus co-processor, 2 GB RAM, 1x64 GB Flash, RS-232, RS-485, 2xEthernet RJ-45, 2xEthernet SFP, 2xUSB</li> </ul>	
R500 CU 00 161(W)-008-AAA R500 CU 00 161(W)-008-CAA	<ul style="list-style-type: none"> <li>1.33 GHz (2 cores), RegulBus co-processor, 2 GB RAM, 1x8 GB Flash, RS-232, RS-485, 2xEthernet RJ-45, 2xEthernet SFP, 2xUSB, GLONASS</li> </ul>	
R500 CU 00 161(W)-012-AAA R500 CU 00 161(W)-012-CAA	<ul style="list-style-type: none"> <li>1.93 GHz (4 cores), RegulBus co-processor, 2 GB RAM, 1x8 GB Flash, RS-232, RS-485, 2xEthernet RJ-45, 2xEthernet SFP, 2xUSB, GLONASS</li> </ul>	
R500 CU 00 171(W)-000-AAA R500 CU 00 171(W)-000-CAA	<ul style="list-style-type: none"> <li>1.33 GHz (2 cores), RegulBus co-processor, 2 GB RAM, 1x8 GB Flash, RS-232, RS-485, 2xEthernet RJ-45, 2xEthernet SFP, 2xUSB, DVI</li> </ul>	
R500 CU 00 171(W)-001-AAA R500 CU 00 171(W)-001-CAA	<ul style="list-style-type: none"> <li>1.33 GHz (2 cores), RegulBus co-processor, 2 GB RAM, 1x16 GB Flash, RS-232, RS-485, 2xEthernet RJ-45, 2xEthernet SFP, 2xUSB, DVI</li> </ul>	
R500 CU 00 171(W)-002-AAA R500 CU 00 171(W)-002-CAA	<ul style="list-style-type: none"> <li>1.33 GHz (2 cores), RegulBus co-processor, 2 GB RAM, 1x32 GB Flash, RS-232, RS-485, 2xEthernet RJ-45, 2xEthernet SFP, 2xUSB, DVI</li> </ul>	
R500 CU 00 171(W)-003-AAA R500 CU 00 171(W)-003-CAA	<ul style="list-style-type: none"> <li>1.33 GHz (2 cores), RegulBus co-processor, 2 GB RAM, 1x64 GB Flash, RS-232, RS-485, 2xEthernet RJ-45, 2xEthernet SFP, 2xUSB, DVI</li> </ul>	
R500 CU 00 171(W)-004-AAA R500 CU 00 171(W)-004-CAA	<ul style="list-style-type: none"> <li>1.93 GHz (4 cores), RegulBus co-processor, 2 GB RAM, 1x8 GB Flash, RS-232, RS-485, 2xEthernet RJ-45, 2xEthernet SFP, 2xUSB, DVI</li> </ul>	
R500 CU 00 171(W)-005-AAA R500 CU 00 171(W)-005-CAA	<ul style="list-style-type: none"> <li>1.93 GHz (4 cores), RegulBus co-processor, 2 GB RAM, 1x16 GB Flash, RS-232, RS-485, 2xEthernet RJ-45, 2xEthernet SFP, 2xUSB, DVI</li> </ul>	
R500 CU 00 171(W)-006-AAA R500 CU 00 171(W)-006-CAA	<ul style="list-style-type: none"> <li>1.93 GHz (4 cores), RegulBus co-processor, 2 GB RAM, 1x32 GB Flash, RS-232, RS-485, 2xEthernet RJ-45, 2xEthernet SFP, 2xUSB, DVI</li> </ul>	
R500 CU 00 171(W)-007-AAA R500 CU 00 171(W)-007-CAA	<ul style="list-style-type: none"> <li>1.93 GHz (4 cores), RegulBus co-processor, 2 GB RAM, 1x64 GB Flash, RS-232, RS-485, 2xEthernet RJ-45, 2xEthernet SFP, 2xUSB, DVI</li> </ul>	
R500 CU 00 171(W)-008-AAA R500 CU 00 171(W)-008-CAA	<ul style="list-style-type: none"> <li>1.33 GHz (2 cores), RegulBus co-processor, 2 GB RAM, 1x8 GB Flash, RS-232, RS-485, 2xEthernet RJ-45, 2xEthernet SFP, 2xUSB, DVI, GLONASS</li> </ul>	
R500 CU 00 171(W)-012-AAA R500 CU 00 171(W)-012-CAA	<ul style="list-style-type: none"> <li>1.93 GHz (4 cores), RegulBus co-processor, 2 GB RAM, 1x8 GB Flash, RS-232, RS-485, 2xEthernet RJ-45, 2xEthernet SFP, 2xUSB, DVI, GLONASS</li> </ul>	

(W) - web visualization support, C - protective coating

Part number	Module characteristics	Note
<b>CPU modules</b>		
R500 CU 00 181(W)-000-AAA R500 CU 00 181(W)-000-CAA	<ul style="list-style-type: none"> <li>1.33 GHz (2 cores), RegulBus co-processor, 2 GB RAM, 1x8 GB Flash, RS-232, RS-485, 4xEthernet RJ-45, 2xUSB, DVI</li> </ul>	Dual slot, type III
R500 CU 00 181(W)-001-AAA R500 CU 00 181(W)-001-CAA	<ul style="list-style-type: none"> <li>1.33 GHz (2 cores), RegulBus co-processor, 2 GB RAM, 1x16 GB Flash, RS-232, RS-485, 4xEthernet RJ-45, 2xUSB, DVI</li> </ul>	
R500 CU 00 181(W)-002-AAA R500 CU 00 181(W)-002-CAA	<ul style="list-style-type: none"> <li>1.33 GHz (2 cores), RegulBus co-processor, 2 GB RAM, 1x32 GB Flash, RS-232, RS-485, 4xEthernet RJ-45, 2xUSB, DVI</li> </ul>	
R500 CU 00 181(W)-003-AAA R500 CU 00 181(W)-003-CAA	<ul style="list-style-type: none"> <li>1.33 GHz (2 cores), RegulBus co-processor, 2 GB RAM, 1x64 GB Flash, RS-232, RS-485, 4xEthernet RJ-45, 2xUSB, DVI</li> </ul>	
R500 CU 00 181(W)-004-AAA R500 CU 00 181(W)-004-CAA	<ul style="list-style-type: none"> <li>1.93 GHz (4 cores), RegulBus co-processor, 2 GB RAM, 1x8 GB Flash, RS-232, RS-485, 4xEthernet RJ-45, 2xUSB, DVI</li> </ul>	
R500 CU 00 181(W)-005-AAA R500 CU 00 181(W)-005-CAA	<ul style="list-style-type: none"> <li>1.93 GHz (4 cores), RegulBus co-processor, 2 GB RAM, 1x16 GB Flash, RS-232, RS-485, 4xEthernet RJ-45, 2xUSB, DVI</li> </ul>	
R500 CU 00 181(W)-006-AAA R500 CU 00 181(W)-006-CAA	<ul style="list-style-type: none"> <li>1.93 GHz (4 cores), RegulBus co-processor, 2 GB RAM, 1x32 GB Flash, RS-232, RS-485, 2xEthernet RJ-45, 4xEthernet RJ-45, 2xUSB, DVI</li> </ul>	
R500 CU 00 181(W)-007-AAA R500 CU 00 181(W)-007-CAA	<ul style="list-style-type: none"> <li>1.93 GHz (4 cores), RegulBus co-processor, 2 GB RAM, 1x64 GB Flash, RS-232, RS-485, 4xEthernet RJ-45, 2xUSB, DVI</li> </ul>	
R500 CU 00 181(W)-008-AAA R500 CU 00 181(W)-008-CAA	<ul style="list-style-type: none"> <li>1.33 GHz (2 cores), RegulBus co-processor, 2 GB RAM, 1x8 GB Flash, RS-232, RS-485, 4xEthernet RJ-45, 2xUSB, DVI, GLONASS</li> </ul>	
R500 CU 00 181(W)-012-AAA R500 CU 00 181(W)-012-CAA	<ul style="list-style-type: none"> <li>1.93 GHz (4 cores), RegulBus co-processor, 2 GB RAM, 1x8 GB Flash, RS-232, RS-485, 4xEthernet RJ-45, 2xUSB, DVI, GLONASS</li> </ul>	
<b>Analog input modules</b>		
R500 AI 08 022-000-AAA R500 AI 08 022-000-CAA	<ul style="list-style-type: none"> <li>0/4...20 mA + HART, 8 channels, per-channel galvanic isolation, individual ADC and HART modem per channel, error 0.1%</li> </ul>	Terminal block with 36 contacts ordered separately
R500 AI 08 031-000-AAA R500 AI 08 031-000-CAA	<ul style="list-style-type: none"> <li>RTD/TC, 8 channels, common galvanic isolation, error 0.1%</li> </ul>	
R500 AI 08 042-000-AAA R500 AI 08 042-000-CAA	<ul style="list-style-type: none"> <li>0/4...20 mA, -10/0...+10 V, 8 channels, per-channel galvanic isolation, error 0.025%, two power bus support</li> </ul>	-
R500 AI 08 052-000-AAA R500 AI 08 052-000-CAA	<ul style="list-style-type: none"> <li>0/4...20 mA, -10/0...+10 V, 8 channels, per-channel galvanic isolation, error 0.1%</li> </ul>	Terminal block with 36 contacts ordered separately
R500 AI 08 131-000-AAA R500 AI 08 131-000-CAA	<ul style="list-style-type: none"> <li>RTD/TC, 8 channels, per-channel galvanic isolation, error 0.1%</li> </ul>	
R500 AI 08 142-000-AAA R500 AI 08 142-000-CAA	<ul style="list-style-type: none"> <li>0/4...20 mA, -10/0...+10 V, 8 channels, per-channel galvanic isolation, sensor power supply function, error 0.025%, two power bus support</li> </ul>	
R500 AI 08 242-000-AAA R500 AI 08 242-000-CAA	<ul style="list-style-type: none"> <li>0/4...20 mA, -10/-5/0...+5/10 V, 8 channels, signal sampling rate 100 μs, per-channel galvanic isolation, error 0.025%, two power bus support</li> </ul>	Terminal block with 36 contacts ordered separately. The module cannot be used with the type II CPU
R500 AI 08 342-000-AAA R500 AI 08 342-000-CAA	<ul style="list-style-type: none"> <li>0/4...20 mA, -10/-5/0...+5/10 V, 8 channels, signal sampling rate 100 μs, per-channel galvanic isolation, sensor power supply function, error 0.025%, two power bus support</li> </ul>	

(W) - web visualization support, C - protective coating

Part number	Module characteristics	Note
R500 AI 16 012-000-AAA R500 AI 16 012-000-CAA	<ul style="list-style-type: none"> <li>0/4...20 mA, 16 channels, common galvanic isolation, error 0.1%</li> </ul>	Terminal block with 36 contacts ordered separately
R500 AI 16 081-000-AAA R500 AI 16 081-000-CAA	<ul style="list-style-type: none"> <li>4...20 mA + HART, 16 channels (2 groups of 8 channels), group galvanic isolation, error 0.1%</li> </ul>	
<b>Digital input modules</b>		
R500 DI 16 021-000-AAA R500 DI 16 021-000-CAA	<ul style="list-style-type: none"> <li>220 VAC/VDC, 16 channels, per-channel galvanic isolation</li> </ul>	Terminal block with 36 contacts ordered separately
R500 DI 16 032-000-AAA R500 DI 16 032-000-CAA	<ul style="list-style-type: none"> <li>NAMUR, 16 channels, group galvanic isolation</li> </ul>	
R500 DI 32 012-000-AAA R500 DI 32 012-000-CAA	<ul style="list-style-type: none"> <li>24 VDC, 32 channels (4 groups of 8 channels, common "-" or "+"), group galvanic isolation</li> </ul>	
R500 DI 32 011-000-AAA R500 DI 32 011-000-CAA	<ul style="list-style-type: none"> <li>24 VDC, 32 channels (4 groups of 8 channels, common "-"), group galvanic isolation</li> </ul>	
<b>Frequency measurement / pulse counting modules</b>		
R500 DA 03 011-000-AAA R500 DA 03 011-000-CAA	<ul style="list-style-type: none"> <li>3 channels 1 Hz...500 kHz, 6 channels DI 24 VDC, 6 channels DO 24 VDC, 0.5 A</li> </ul>	Terminal block with 36 contacts ordered separately
R500 DA 03 021-000-AAA R500 DA 03 021-000-CAA	<ul style="list-style-type: none"> <li>3 channels 1 Hz...500 kHz, 1 pulse generator channel 1 Hz...10 kHz, 6 channels DI 24 VDC, 6 channels DO 24 VDC, 0.5 A, availability of autonomous operation in electronic safety device mode</li> </ul>	
<b>Analog output modules</b>		
R500 AO 08 011-000-AAA R500 AO 08 011-000-CAA	<ul style="list-style-type: none"> <li>0/4...20 mA, 8 channels, per-channel galvanic isolation, error 0.1%</li> </ul>	Terminal block with 20 contacts ordered separately
R500 AO 08 021-000-AAA R500 AO 08 021-000-CAA	<ul style="list-style-type: none"> <li>0/4...20 mA + HART, 8 channels, per-channel galvanic isolation, error 0.1%</li> </ul>	
R500 AO 08 031-000-AAA R500 AO 08 031-000-CAA	<ul style="list-style-type: none"> <li>0/4...20 mA, -10/0...+10 V, 8 channels, per-channel galvanic isolation, error 0.1%</li> </ul>	Terminal block with 36 contacts ordered separately
<b>Analog input and output module</b>		
R500 AS 08 011-000-AAA R500 AS 08 011-000-CAA	<ul style="list-style-type: none"> <li>6 AI 0/4...20 mA, -10/0...+10 V, 2 AO 0/4...20 mA, -10/0...+10 V, per-channel galvanic isolation, error 0.1%</li> </ul>	Terminal block with 36 contacts ordered separately
<b>Digital output modules</b>		
R500 DO 16 021-000-AAA R500 DO 16 021-000-CAA	<ul style="list-style-type: none"> <li>220 VAC, 2 A / 220 VDC, 0.27 A, 16 channels, per-channel galvanic isolation</li> </ul>	Terminal block with 36 contacts ordered separately
R500 DO 32 012-000-AAA R500 DO 32 012-000-CAA	<ul style="list-style-type: none"> <li>solid-state relays, 24 VAC/DC, 0.5 A, 32 channels (4 groups of 8 channels), group galvanic isolation</li> </ul>	
R500 DO 32 041-000-AAA R500 DO 32 041-000-CAA	<ul style="list-style-type: none"> <li>solid-state relays, 24 VDC, 0.5 A, 32 channels (2 group of 16 channels), group galvanic isolation, circuit failure detection control, up to 4 channels in pulse width modulation mode (up to 30 kHz)</li> </ul>	

(W) - web visualization support, C - protective coating

Part number	Module characteristics	Note
<b>Digital input and output module</b>		
R500 DS 32 012-000-AAA R500 DS 32 012-000-CAA	<ul style="list-style-type: none"> <li>24 DI (3 groups of 8 channels) 24 VDC, 8 DO, solid-state relays, (1 group), 24 VDC, 0.5 A, group galvanic isolation</li> </ul>	Terminal block with 36 contacts ordered separately
<b>Communication processor modules</b>		
R500 CP 01 031-000-AAA R500 CP 01 031-000-CAA	<ul style="list-style-type: none"> <li>RS-485 (Profibus DP v0, v1 Master), 1 channel</li> </ul>	-
R500 CP 02 021-000-AAA R500 CP 02 021-000-CAA	<ul style="list-style-type: none"> <li>Ethernet 100BASE-T (Modbus TCP, IEC 60870-5-104), 2 ports</li> </ul>	-
R500 CP 04 011-000-AAA R500 CP 04 011-000-CAA	<ul style="list-style-type: none"> <li>RS-485 (Modbus RTU, IEC 60870-5-101), 4 ports</li> </ul>	Terminal block with 20 contacts ordered separately
R500 CP 06 111-000-AAA R500 CP 06 111-000-CAA	<ul style="list-style-type: none"> <li>RegulBus (PLC bus extension module), 6 RJ-45 ports</li> </ul>	The module uses the R500 CH 02 811 chassis
R500 CP 04 041-000-AAA R500 CP 04 041-000-CAA	<ul style="list-style-type: none"> <li>FOUNDATION Fieldbus H1, 4 ports</li> </ul>	-
<b>CPU network port extension modules</b>		
R500 EU 04 021-000-AAA R500 EU 04 021-000-CAA	<ul style="list-style-type: none"> <li>4xEthernet RJ-45</li> </ul>	The module uses the R500 CH 02 041 chassis; for CU modules, the R500 CH 02 023 chassis must be used
R500 EU 04 031-000-AAA R500 EU 04 031-000-CAA	<ul style="list-style-type: none"> <li>4xEthernet SFP</li> </ul>	
<b>External power supply module</b>		
R500 PO 08 041-000-AAA R500 PO 08 041-000-CAA	<ul style="list-style-type: none"> <li>24 VDC, 70 mA (per channel), 8 channels, per-channel galvanic isolation</li> </ul>	Terminal block with 36 contacts ordered separately
<b>Power supply modules</b>		
R500 PP 00 011-000-AAA R500 PP 00 011-000-CAA	<ul style="list-style-type: none"> <li>24 VDC, 75 W</li> </ul>	-
R500 PP 00 021-000-AAA R500 PP 00 021-000-CAA	<ul style="list-style-type: none"> <li>24 VDC, 75 W, galvanic isolation between external and internal power circuits</li> </ul>	-
R500 PP 00 031-000-AAA R500 PP 00 031-000-CAA	<ul style="list-style-type: none"> <li>220 VAC/VDC, 75 W, galvanic isolation between external and internal power circuits</li> </ul>	-
R500 PP 00 051-000-AAA R500 PP 00 051-000-CAA	<ul style="list-style-type: none"> <li>24 VDC, 75 W, smart, advanced diagnostics, support for power bus selection</li> </ul>	-
<b>Chassis and terminal blocks</b>		
R500 CH 01 011-000-AAA R500 CH 01 011-000-CAA	<ul style="list-style-type: none"> <li>for I/O modules and power supplies (one data bus, one power bus)</li> </ul>	-
R500 CH 02 011-000-AAA R500 CH 02 011-000-CAA	<ul style="list-style-type: none"> <li>redundant chassis for I/O and power supplies modules (two data buses, one power bus)</li> </ul>	-

(W) - web visualization support, C - protective coating

Part number	Module characteristics	Note
<b>Chassis and terminal blocks</b>		
R500 CH 02 022-000-AAA R500 CH 02 022-000-CAA	<ul style="list-style-type: none"> <li>redundant chassis for dual slot CPU, type I or III (two data buses, two power buses)</li> </ul>	-
R500 CH 02 023-000-AAA R500 CH 02 023-000-CAA	<ul style="list-style-type: none"> <li>redundant chassis for dual slot CPU, type III (two data buses, two power buses)</li> </ul>	-
R500 CH 02 032-000-AAA R500 CH 02 032-000-CAA	<ul style="list-style-type: none"> <li>redundant chassis for single slot CPU, type II (two data buses, two power buses)</li> </ul>	-
R500 CH 02 041-000-AAA R500 CH 02 041-000-CAA	<ul style="list-style-type: none"> <li>redundant chassis for EU modules (two data buses, two power buses)</li> </ul>	-
R500 CH 02 811-000-AAA R500 CH 02 811-000-CAA	<ul style="list-style-type: none"> <li>redundant chassis for I/O and power supplies modules (two data buses, two power buses, additional internal self-diagnostics)</li> </ul>	-
R500 CL 20 001	<ul style="list-style-type: none"> <li>terminal block for R500 I/O modules, 20 contacts (black)</li> </ul>	-
R500 CL 36 001	<ul style="list-style-type: none"> <li>terminal block for R500 I/O modules, 36 contacts (black)</li> </ul>	-
<b>Terminal modules</b>		
R500 ST 00 001	<ul style="list-style-type: none"> <li>without RegulBus extension</li> </ul>	-
R500 ST 01 013-000-AAA R500 ST 01 013-000-CAA	<ul style="list-style-type: none"> <li>with single RegulBus extension (IN), two power buses, RJ-45 connector</li> </ul>	-
R500 ST 01 023-000-AAA R500 ST 01 023-000-CAA	<ul style="list-style-type: none"> <li>with single RegulBus extension (OUT), two power buses, RJ-45 connector</li> </ul>	-
R500 ST 02 013-000-AAA R500 ST 02 013-000-CAA	<ul style="list-style-type: none"> <li>with redundant RegulBus extension (IN), two power buses, RJ-45 connector</li> </ul>	-
R500 ST 02 023-000-AAA R500 ST 02 023-000-CAA	<ul style="list-style-type: none"> <li>with redundant RegulBus extension (OUT), two power buses, RJ-45 connector</li> </ul>	-
R500 ST 02 113-000-AAA R500 ST 02 113-000-CAA	<ul style="list-style-type: none"> <li>with redundant RegulBus extension (IN), two power buses, SFP connector</li> </ul>	SFP module ordered separately
R500 ST 02 123-000-AAA R500 ST 02 123-000-CAA	<ul style="list-style-type: none"> <li>with redundant RegulBus extension (OUT), two power buses, SFP connector</li> </ul>	
<b>DIN rails for PLC (height 105 mm)</b>		
R500 DN 060	<ul style="list-style-type: none"> <li>L=600 mm</li> </ul>	-
R500 DN 080	<ul style="list-style-type: none"> <li>L=800 mm</li> </ul>	-
R500 DN 100	<ul style="list-style-type: none"> <li>L=1000 mm</li> </ul>	-
<b>Regul data transfer protocol gateway</b>		
R500G CU 00 021-000-AAA	<ul style="list-style-type: none"> <li>RS-232, RS-485, 2xEthernet RJ-45</li> </ul>	-
R500G CU 00 031-000-AAA	<ul style="list-style-type: none"> <li>RS-232, RS-485, 2xEthernet SFP</li> </ul>	-





REGLAB



# REGUL R500S (R500 SAFETY) PROGRAMMABLE LOGIC CONTROLLER FOR ESD SYSTEMS



Included in the Register of Russian Industrial Products under No. 140\1\2023.



The REGUL R500S PLC is designed for use in emergency shutdown systems (ESD, F&GDS, HIPPS, etc.).



## MAIN CHARACTERISTICS

### ● Purpose



special ESD system solution for dangerous technological processes



designed in the Russian Federation



complies with functional SIL3 safety integrity level according to GOST R IEC 61508, as confirmed by an international certificate and calculated reliability parameters

For hazardous facilities, it is crucial to ensure the protection of personnel, technological equipment, and the environment in the event of an emergency. To achieve this, a dedicated emergency shutdown (ESD) system — independent of the main control system — must be built.

ESD systems and the controllers they are based on are subject to extremely stringent requirements under both Russian and international standards, including those related to software. As a result, conventional PLCs are not suitable for use in such systems.

The REGUL R500S controller is based on the platform of an existing mass-produced controller, but it is a completely new design developed in compliance with the GOST R IEC 61508 standard.

Compliance of the REGUL R500S controller hardware with the SIL3 safety integrity level is ensured by the following solutions:

- component redundancy for each channel within I/O modules
- I/O module redundancy (double or triple)
- deep self-diagnostics that allows detection of internal failures and guarantees the transition of the entire process control system to a predefined safe state
- each I/O module is equipped with a built-in certified microprocessor that handles primary signal processing or final output logic, depending on the module type, and includes an independent hardware watchdog timer
- two redundant internal PLC power buses. The I/O modules can connect to two external power lines to supply power to external circuits. Continuous self-diagnostics of the power supply is provided. In the event of a power bus failure, diagnostic information is immediately available to the personnel. At the same time, the R500S continues to operate and perform safety functions, enabling the personnel to address and resolve the issue
- dual data bus for data transfer between the CPU and I/O modules in the case of CPU redundancy

To enhance the self-diagnostic coverage level in the REGUL R500S controller, a wide range of tools is available to the system developer for monitoring the parameters of measurement and control circuits:

- monitoring of field sensors power, including short circuit and overload protection
- monitoring of the external analog signal circuit for open and short circuits (depending on the module type), and diagnostic by signal range
- monitoring of the external digital signal circuit for open and short circuits (digital input modules according to the NAMUR specification)
- digital output modules with current control in the circuit

Such deep predictive diagnostics enables timely detection and accurate identification of failures, which in turn provides the personnel with sufficient time to eliminate the malfunction.

To ensure uninterrupted operation of process equipment, the REGUL R500S controller supports the use of redundant I/O modules (redundant assemblies) consisting of two or three modules of the same type. This redundancy significantly reduces the number of safe failures — failures not caused by an actual emergency at the facility, but rather by malfunctions within the ESD system itself, including both field devices and controller components. This enables quick replacement of redundant elements without interrupting the technological process. The creation of redundant assemblies is supported at the development environment level.

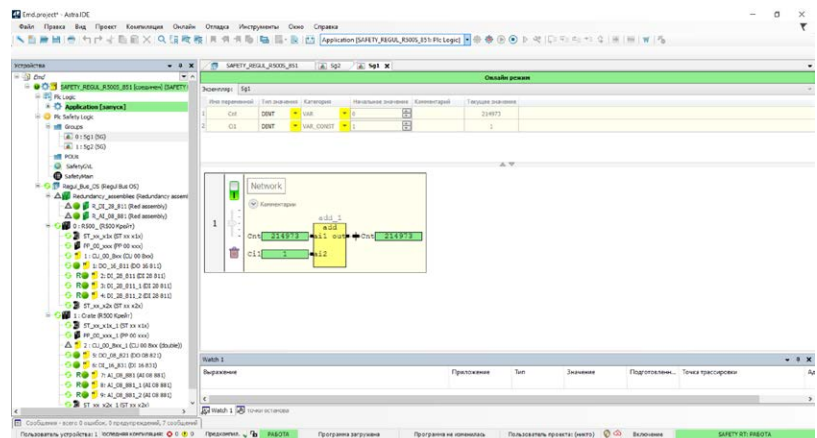
For assemblies consisting of two digital input/output modules, logical functions such as "AND" and "OR" can be applied. In the case of three-module assemblies, a majority voting logic — "2 out of 3" — is also available. For analog input modules, it is possible to select a minimum, maximum, or median value when combining signals (for three modules). The signal processing logic in redundant assemblies takes into account the diagnostic results of individual modules.

The presence of two independent data buses in the controller, along with support for CPU module redundancy, enables the implementation of SIL3 High Availability level systems based on this controller. In systems built according to the 1oo2D architecture, any single failure will not result in an automatic command to switch the system to a safe state. These systems are used in high-risk facilities with continuous technological processes.

REGUL R500S controller software:

- the PLC operation is controlled by a specialized operating system certified for use in equipment with a functional safety level up to SIL3;
- the built-in system software, including a secure data transfer protocol between the CPU and I/O modules, was developed by RegLab in full compliance with GOST R IEC 61508 requirements;
- the development environment, also a RegLab product, is built on the Astra.IDE platform. It has its own built-in Safety editor and compiler, designed in full compliance with GOST R IEC 61508 requirements

Figure 3. Screenshot of the Astra.IDE software interface



All developed software is verified using certified static analysis tools to ensure compliance with the MISRA C:2012 standard.

● **Part number structure**  
see at page 6

● **Noise immunity**  
see at page 42

## REGUL R500S PLC CONFIGURATION

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The REGUL R500S PLC allows distributed configuration of racks. Multiple racks (electrical isolated units) can be configured within a single controller. Each rack must have a unique address, which is configured via an 8-position DIP switch located on the terminal module (ST). The PLC racks can be connected in any order, but the OUT interface connectors on the internal PLC data bus (RegulBus) must always be connected to the IN interface connectors.

The REGUL R500S PLC supports configuration with dual internal data and power buses. In CPU redundancy configurations, a dual RegulBus is required.

**The REGUL R500 PLC modules can also be used as part of the REGUL R500 PLC. The R500S rack includes modules of the following types:**

**(ST) Terminal modules** must be included in each PLC rack. The REGUL R500S PLC modules are used. They are mounted at both ends of the rack to secure it to the DIN rail and to protect the lateral electrical connectors of the chassis. Terminal modules of the corresponding modification can support the extension of the PLC internal data bus (IN and OUT modules) via copper or fiber optic lines between racks. When using fiber optic communication, third-party SFP modules must be installed in the terminal modules.

**(CU) CPU modules.** CU modules are available in various types and modifications.

**(AI, AO, DI, DO) I/O modules** support the processing of analog signals (including HART) and digital signals (including NAMUR).

**(PP) Power supply modules.** At least one module must be included in each rack. The number of power supply modules is determined based on the internal power consumption of the rack. To enhance reliability, it is strongly recommended to install an excessive number of power modules in each rack.

**(CP) Communication processor modules.** The REGUL R500 PLC modules are used. CP modules receive and process digital signals via RS-485 and Ethernet interfaces and Modbus RTU/TCP, IEC 60870-5-101/104, RegulBus, NVL, FTP, and SNMP protocols. CP modules can be installed in remote PLC racks. These modules are responsible solely for establishing the physical connection to external devices, while all device driver processing is handled by CU modules. The bandwidth of Ethernet CP modules is limited by the segment size of the PLC internal bus allocated for data transmission through such modules.

**(EU) CPU network port extension modules.** The EU modules further expand the number of CU 00 852 Ethernet interfaces. Each CU module may be connected to no more than two EU modules. Data processing for devices connected via the EU modules is performed by the corresponding CU module. EU modules can only be installed in a rack to the right of CU 00 851 modules

**Attention!** Data received via CP modules using standard protocols is not safe. According to IEC 61508/61511 standards, this data may not be used in the safety algorithms of the REGUL R500S PLC, although technically such a possibility exists.

**(CH) Chassis modules.** A chassis module must be installed in the rack for each PP, CU, I/O, CP, and EU module. Chassis modules provide the active data and power buses of the PLC and enable hot swapping of any of these modules within the rack. One chassis module is sufficient for a single REGUL R500S PLC rack. Chassis modules are not included with the PLC modules and must be ordered separately.

**(DIN) DIN-rail.** CH modules are mounted on a DIN rail with a height of 105 mm. The DIN rail can be installed on a mounting panel or inside a 19" cabinet. Standard DIN rail widths are 600, 800, or 1000 mm. CU 00 852 modules have a width of 80 mm, while other CH and ST modules are 40 mm wide.

The installation location of the module type in the rack does not matter, except for terminal modules, which must always be mounted on both ends of the rack, and EU modules, which must always be mounted next to CU modules.

Two redundant PP modules can be installed in one rack. Redundant REGUL R500S PLC CU modules must be mounted in separate racks to ensure protection against common-cause failures.

When redundancy is required for I/O modules, they must be mounted either within the same rack or across multiple racks. Wherever redundant I/O modules are used, they must be configured as a redundant assembly. Redundant I/O modules can also be mounted in racks with double CPU modules.

## Types of central processor units

Central processor unit	CU 00 821	CU 00 831	CU 00 852
Frequency, GHz, number of service microprocessor cores	1 (1 core)		1.33 (2 core)
Frequency, MHz, number of safety microprocessor cores	220 (2 core)		330 (2 core)
RAM, MB	512		2000
Flash memory, GB	1		4
RS-232 / RS-485, pcs.	1 / 1		
Ethernet 100 Mbps, pcs.	2 (RJ-45)	2 (SFP)	-
Ethernet 100/1000 Mbps, pcs.	-	-	4 (RJ-45)
USB 2.0**	-		2
SDHC-card slot, pcs.	1		-
EU module connection	No		Yes
Minimum PLC bus cycle	10 ms for each rack		0.5 ms for each rack
Minimum application cycle time	50 ms		30 ms
Number of I/O R500S modules, not more than, pcs.	30		60
Typical number of PLC channels, including redundant ones, pcs.	375		750
Battery replacement by user	No		Yes
RegulBus co-processor	No		Yes
Compatible CH module	CH 02 032		CH 02 022, CH 02 023

\* The battery in the CU module only powers the internal clock when external power is off.

If the CU module is powered on with a faulty battery, the date and time can be set manually. Time synchronization is also possible via NTP.

\*\* An external USB flash drive (up to 32 GB) can be connected via USB.

## REGUL R500S CONTROLLER MODULES

C - protective coating

Part number	Module characteristics	Note
<b>CPU modules</b>		
R500S CU 00 821-000-AAA R500S CU 00 821-000-CAA	<ul style="list-style-type: none"> <li>RS-232, RS-485, 2xEthernet RJ-45</li> </ul>	Single slot
R500S CU 00 831-000-AAA R500S CU 00 831-000-CAA	<ul style="list-style-type: none"> <li>RS-232, RS-485, 2xSFP</li> </ul>	
R500S CU 00 852-000-AAA R500S CU 00 852-000-CAA	<ul style="list-style-type: none"> <li>RS-232, RS-485, 4xEthernet RJ-45, 2xUSB</li> </ul>	Dual slot
<b>Analog input modules</b>		
R500S AI 04 841-000-AAA R500S AI 04 841-000-CAA	<ul style="list-style-type: none"> <li>0...20, 4...20 mA, 4 channels, per-channel galvanic isolation, two ADCs per channel (work in pairs), sensor power supply from the module</li> </ul>	Terminal block with 20 contacts ordered separately
R500S AI 04 861-000-AAA R500S AI 04 861-000-CAA	<ul style="list-style-type: none"> <li>0...+5 V, -5 V...+5 V, 0...+10 V, -10...+10 V, 4 channels, per-channel galvanic isolation, two ADCs per channel (work in pairs), sensor power supply from the module</li> </ul>	
R500S AI 08 851-000-AAA R500S AI 08 851-000-CAA	<ul style="list-style-type: none"> <li>0...+5 V, -5V...+5V, 0...+10 V, -10...+10 V, 8 channels, per-channel galvanic isolation, two sensor power inputs, common sensor power supply</li> </ul>	Terminal block with 36 contacts ordered separately
R500S AI 08 881-000-AAA R500S AI 08 881-000-CAA	<ul style="list-style-type: none"> <li>0/4...20 mA + HART, 8 channels, per-channel galvanic isolation, two sensor power inputs, common sensor power supply</li> </ul>	
<b>Analog output modules</b>		
R500S AO 04 831-000-AAA R500S AO 04 831-000-CAA	<ul style="list-style-type: none"> <li>4...20 mA, 0...+10 V, -10...+10 V, 4 channels, per-channel galvanic isolation</li> </ul>	Terminal block with 20 contacts ordered separately
<b>Digital input modules</b>		
R500S DI 16 831-000-AAA R500S DI 16 831-000-CAA	<ul style="list-style-type: none"> <li>NAMUR, 24 VDC external power supply, 16 channels, common galvanic isolation</li> </ul>	Terminal block with 36 contacts ordered separately
R500S DI 28 811-000-AAA R500S DI 28 811-000-CAA	<ul style="list-style-type: none"> <li>24 VDC, 28 channels (4 groups of 7 channels), group galvanic isolation</li> </ul>	
<b>Digital output modules</b>		
R500S DO 16 811-000-AAA R500S DO 16 811-000-CAA	<ul style="list-style-type: none"> <li>24 VDC, 0.6 A, 16 channels (2 groups by 8 channels), common galvanic isolation</li> </ul>	Terminal block by 36 contacts ordered separately
<b>Power supply modules</b>		
R500 PP 00 051-000-AAA R500 PP 00 051-000-CAA	<ul style="list-style-type: none"> <li>24 VDC, 75 W, smart, support for power bus selection</li> </ul>	-

C - protective coating

Part number	Module characteristics	Note
<b>Chassis</b>		
R500 CH 02 023-000-AAA R500 CH 02 023-000-CAA	<ul style="list-style-type: none"> <li>redundant chassis for dual slot CPU (two data buses, two power buses)</li> </ul>	-
R500 CH 02 032-000-AAA R500 CH 02 032-000-CAA	<ul style="list-style-type: none"> <li>redundant chassis for single slot CPU (two data buses, two power buses)</li> </ul>	
R500 CH 02 811-000-AAA R500 CH 02 811-000-CAA	<ul style="list-style-type: none"> <li>redundant chassis for I/O and power supplies modules (two data buses, two power buses, additional internal self-diagnostics)</li> </ul>	
<b>Terminal blocks</b>		
R500S CL 20 001	<ul style="list-style-type: none"> <li>for I/O modules, 20 contacts (yellow)</li> </ul>	-
R500S CL 36 001	<ul style="list-style-type: none"> <li>for R500 I/O modules, 36 contacts (yellow)</li> </ul>	
<b>Terminal modules</b>		
R500 ST 02 013-000-AAA	<ul style="list-style-type: none"> <li>with redundant RegulBus extension (IN), two power buses, RJ-45 connector</li> </ul>	-
R500 ST 02 023-000-AAA	<ul style="list-style-type: none"> <li>with redundant RegulBus extension (OUT), two power buses, RJ-45 connector</li> </ul>	
R500 ST 02 113-000-AAA	<ul style="list-style-type: none"> <li>with redundant RegulBus extension (IN), two power buses, SFP connector</li> </ul>	SFP-module ordered separately
R500 ST 02 123-000-AAA	<ul style="list-style-type: none"> <li>with redundant RegulBus extension (OUT), two power buses, SFP connector</li> </ul>	
<b>DIN-rails</b>		
R500 DN 060	<ul style="list-style-type: none"> <li>L=600 mm</li> </ul>	-
R500 DN 080	<ul style="list-style-type: none"> <li>L=800 mm</li> </ul>	-
R500 DN 100	<ul style="list-style-type: none"> <li>L=1000 mm</li> </ul>	-

# BUILDING EMERGENCY SHUTDOWN SYSTEMS BASED ON THE REGUL R500S CONTROLLER

Each controller module individually corresponds to the SIL3 safety integrity level. Therefore, to build an ESD system with such a safety level, it is sufficient to use a single-channel controller without module redundancy.

The only redundant module in this case is the power supply module. Each such module is configured to connect to one of the two internal power buses.

The REGUL R500S offers redundant I/O module assemblies to ensure protection against safe failures. To facilitate the use of redundant assemblies, special terminal panels can be employed to perform signal splitting/combining, provide explosion protection via installed intrinsic safety barriers, or convert signal types/levels. Terminal panels can either split a signal from a single sensor to multiple R500S modules or combine several output signals from R500S modules into a single control signal.

When using redundant input module assemblies, the application program provides the developer with access to both the individual data from each module and the resulting technological parameter value. This value is obtained through sampling and comparison of the module readings. The sampling algorithm itself can be configured by the user and includes settings such as the decision-making scheme (1oo3, 2oo3), reliability limits, signal safety criteria (which signal is considered safer: higher or lower, 0 or 1), etc.

For redundant assemblies of discrete output modules, diagnostics of external switching equipment failures can be implemented by alternately disconnecting the parallel contacts in actuator control circuits. In such schemes, alternating switching with a long cycle time (hours) enables timely detection of contact sticking and helps reduce the rate of undetected dangerous failures.

The use of a safety data channel in the REGUL R500S controller for data exchange between controllers, as well as between modules within the PLC, enables the use of standard communication tools while ensuring the separation of safety-critical data from non-safety-related data.

Figure 4. Single-channel configuration

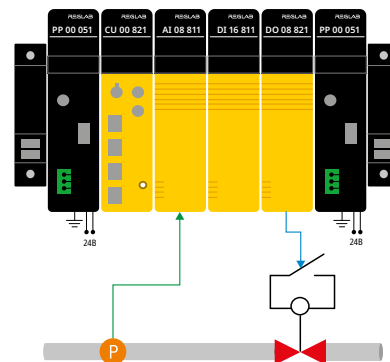


Figure 5. Regul RS00S input modules redundant sssembly

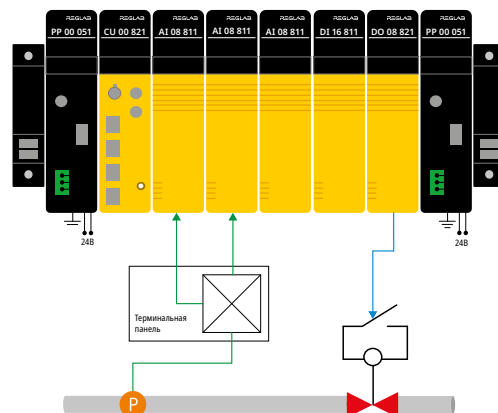
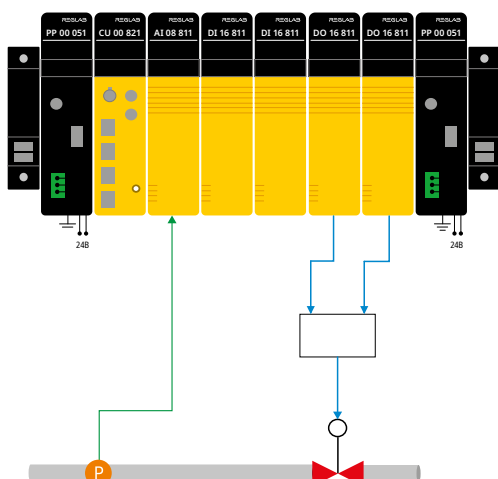


Figure 6. Regul RS00S output module redundant assembly



In general, the same rules for rack configuration and interconnection apply to the REGUL R500S controller as to the REGUL R500 controller. The use of terminal modules with SFP connectors allows expansion racks to be installed up to 10 km away from the central processor rack (depending on the type of SFP module used), bringing measurement and control modules closer to the technological facility. This reduces the length of signal lines and increases the overall reliability of the system.

As part of the REGUL R500S controller, all I/O modules and communication modules from the REGUL R500 controller range can be used. Information from these modules can be used to obtain additional diagnostic data or to transfer data to and from the DCS controller or at the SCADA system level. However, the architecture of the REGUL R500S controller is designed in such a way that data from the REGUL R500 controller module, when operating as part of it, is guaranteed not to be used in the security algorithm.

For continuous production and technological processes, the shutdown of which leads to significant time and financial losses, the REGUL R500S controller architecture allows the development of redundant control systems operating according to the 1oo2D scheme.

In contrast to classical redundancy, both central

processors in this configuration act as masters, and the qualified decision to bring the technological object to a safe state can be made by either of the central processors. However, any safe failure of the controller will not lead to a shutdown of the technological process; instead, there will be a degradation of the controller from the 1oo2D scheme to a single-channel ESD controller. This gives the operating personnel time to perform all necessary actions for repairing and replacing the failed equipment.

Thanks to the REGUL R500S controller platform, the developer has access to all the numerous schemes for building a redundant system as with the REGUL R500 controller, namely full redundancy, redundancy of only the central processor modules with their placement in different racks.

Figure 7. R500S Configuration with Full Module Redundancy

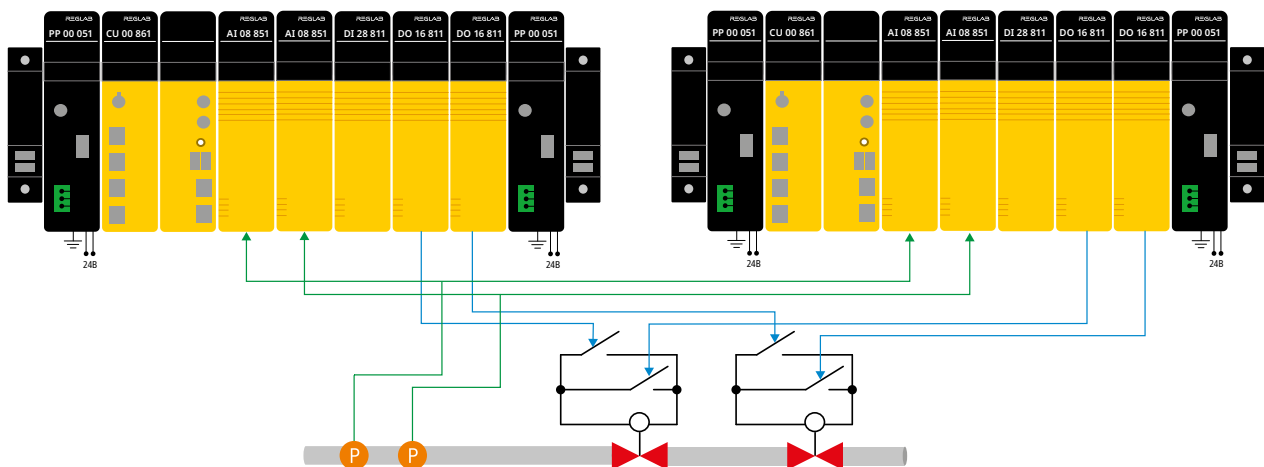
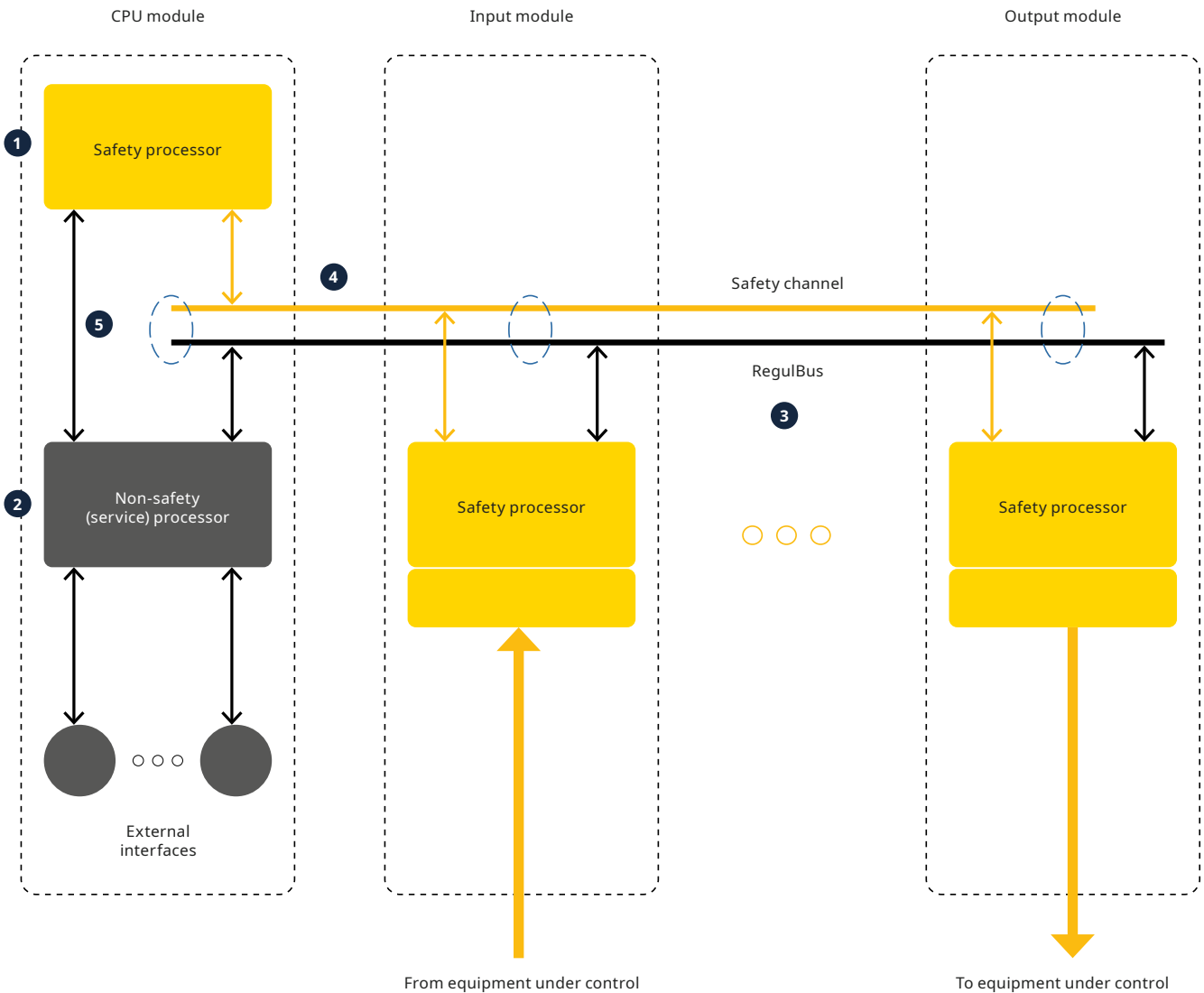


Figure 8. Regul RS00S PLC architecture



- Safety subsystem
- Non-safety subsystem
- 1 Safety processor
- 2 Non-safety processor
- 3 Non-safety system RegulBus
- 4 Safety system bus ("black channel", over RegulBus, FSOE)
- 5 Non-safety communication channel between processors

Channel 5 is duplex. Transfer (recording) of data from the non-safety part to the safety part of Regul R500S is possible, but this procedure in online mode is prohibited by IEC 61508.

Data from safety modules can be transferred to the non-safety processor.

# REGUL R400 PROGRAMMABLE LOGIC CONTROLLER



Included in the Register of Russian Industrial Products under No. 1401\1\2023.



The REGUL R400 controller is a combination of human-machine interface and central processor unit.

It operates with all I/O modules of controllers REGUL RX00 series controllers.

## MAIN CHARACTERISTICS

### ● Purpose

The REGUL R400 controller is designed for local and distributed automation systems with visualization support.

### ● Functional availability



7" capacitive touch screen



film keyboard



IP66 front panel protection rating against penetration of solid objects and water



extended operating temperature range



ability to create a user archive on the built-in solid-state drive



connection of REGUL RX00 series controller expansion racks



web visualization



Astra.IDE design software supporting all IEC 61131-3 standard languages

**Technical specifications**

Screen size	7"
Screen resolution	800 x 480 px
RAM	2 GB
Flash memory	4 GB
Interfaces:	
• RS-485	1
• USB host	2
• Ethernet	2
Power supply voltage	18...36 VDC
Operating temperature range	from -20 to +60 °C

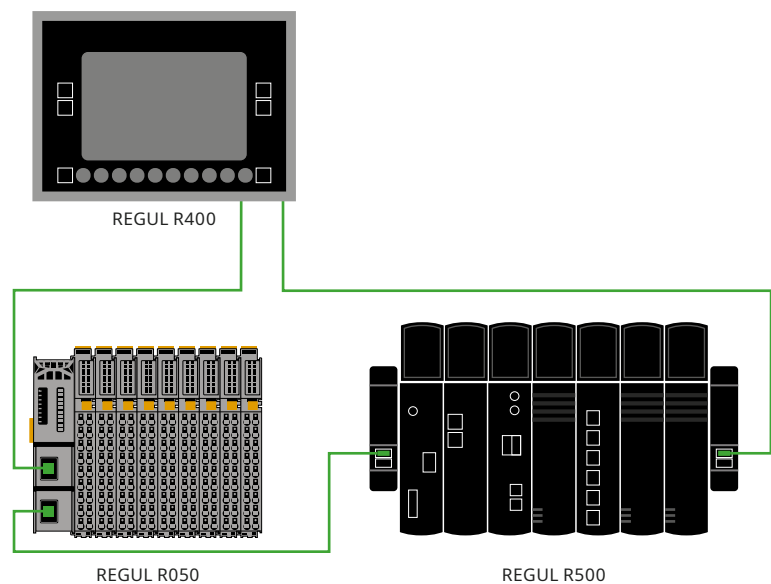
**Part number structure**  
see at page 6

**Noise immunity**  
see at page 42

## REGUL R400 CONTROLLER MODULES

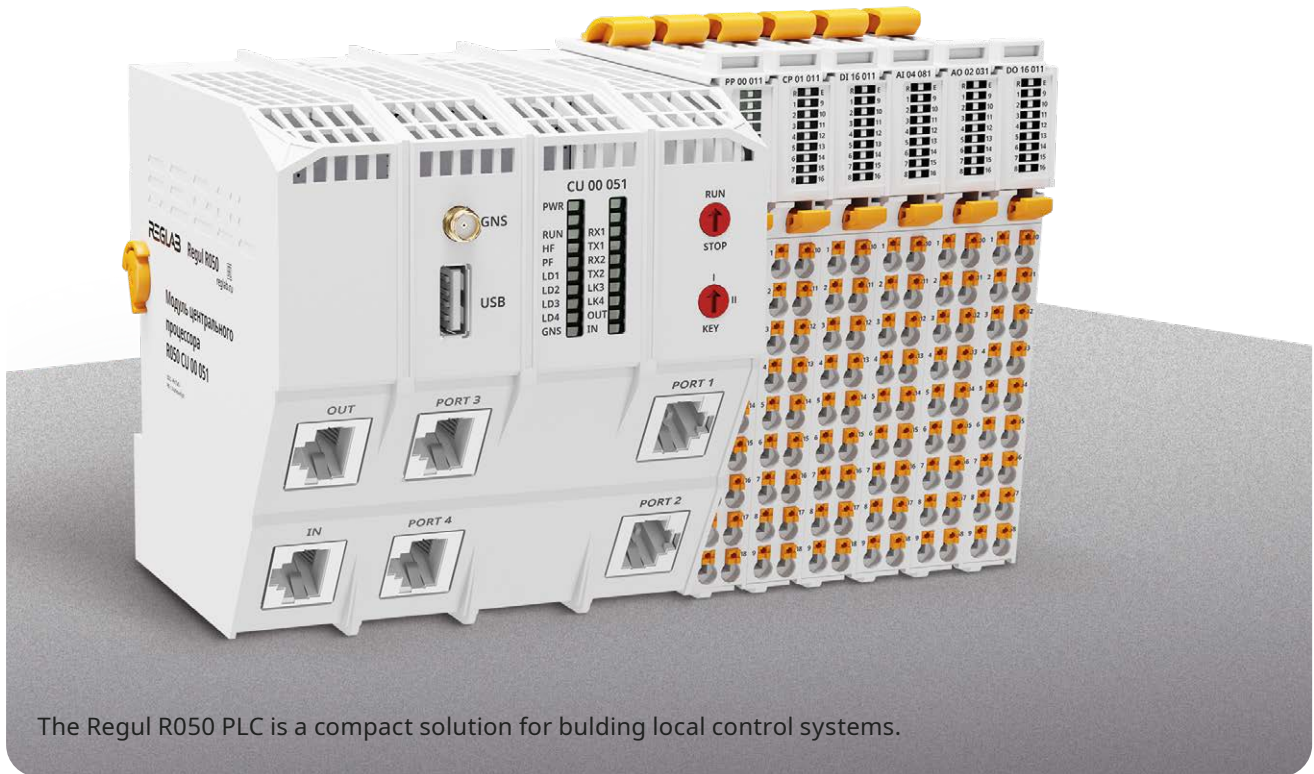
Part number	Module characteristics	Note
<b>CPU modules</b>		
R400 CU 00 071-000-AAA	<ul style="list-style-type: none"> <li>7" operator panel, capacitive touch screen, 800x480 resolution, embedded CPU, 1.46 GHz, 2 GB RAM, 4 GB Flash, 2xUSB host 2.0, RS-485, 2xEthernet RJ-45, 2xRegulBus</li> </ul>	-
R400 CU 00 071(W)-000-AAA	<ul style="list-style-type: none"> <li>7" operator panel, capacitive touch screen, 800x480 resolution, embedded CPU, 1.46 GHz, 2 GB RAM, 4 GB Flash, 2xUSB host 2.0, RS-485, 2xEthernet RJ-45, 2xRegulBus, web visualization support</li> </ul>	-

Figure. 9. REGUL R400 controller hardware configuration



- remote I/O racks
- "star", "ring", or mixed topologies

# REGUL R050 PROGRAMMABLE LOGIC CONTROLLER



The Regul R050 PLC is a compact solution for building local control systems.

## MAIN CHARACTERISTICS

### ● Purpose



local automation systems for industrial and administrative facilities



geographically distributed systems (telecontrol) and monitoring systems



distributed remote racks for field signal input/output within REGUL R400 or non-redundant REGUL R500 configurations

## Features

- redundant power supply support for the internal PLC bus
- high-speed internal data bus (for inter-rack communication)
- discrete rack expandable by one module and mounted on a 35 mm DIN rail
- connection of remote I/O stations to the central processor unit using "ring", "star", or "bus" topology
- 0.5 GB non-volatile memory for user archives
- Astra.IDE design software supporting all IEC 61131-3 standard languages and CFC

## Available communications

### Embedded communication protocols:

- HART v6, v7
- IEC 60870-5-101 (Master / Slave)
- IEC 60870-5-104 (Master / Slave)
- Modbus RTU (Master / Slave, extension is available)
- Modbus TCP (Master / Slave, extension is available)
- OPC DA, OPC UA
- RegulBus, SQL, FTP, SNMP v3, SysLog
- additional protocols, including non-standard ones, can be implemented upon customer request

### Interface embedded:

- USB host 2.0
- RS-232
- RS-485
- Ethernet 100 Mbps RJ-45 (full duplex) — up to 4 ports in CPU
- Ethernet 100 Mbps FO (Single-mode, Multi-mode) — up to 2 ports in CPU

## Construction



quick mount  
on 105 mm DIN rail



passive  
cooling

• **Technical specifications**

Minimal application cycle time	10 ms
Time synchronization accuracy	up to 50 $\mu$ s
Power supply voltage	18...36 VDC
Operating temperature range	from -40 to +60°C

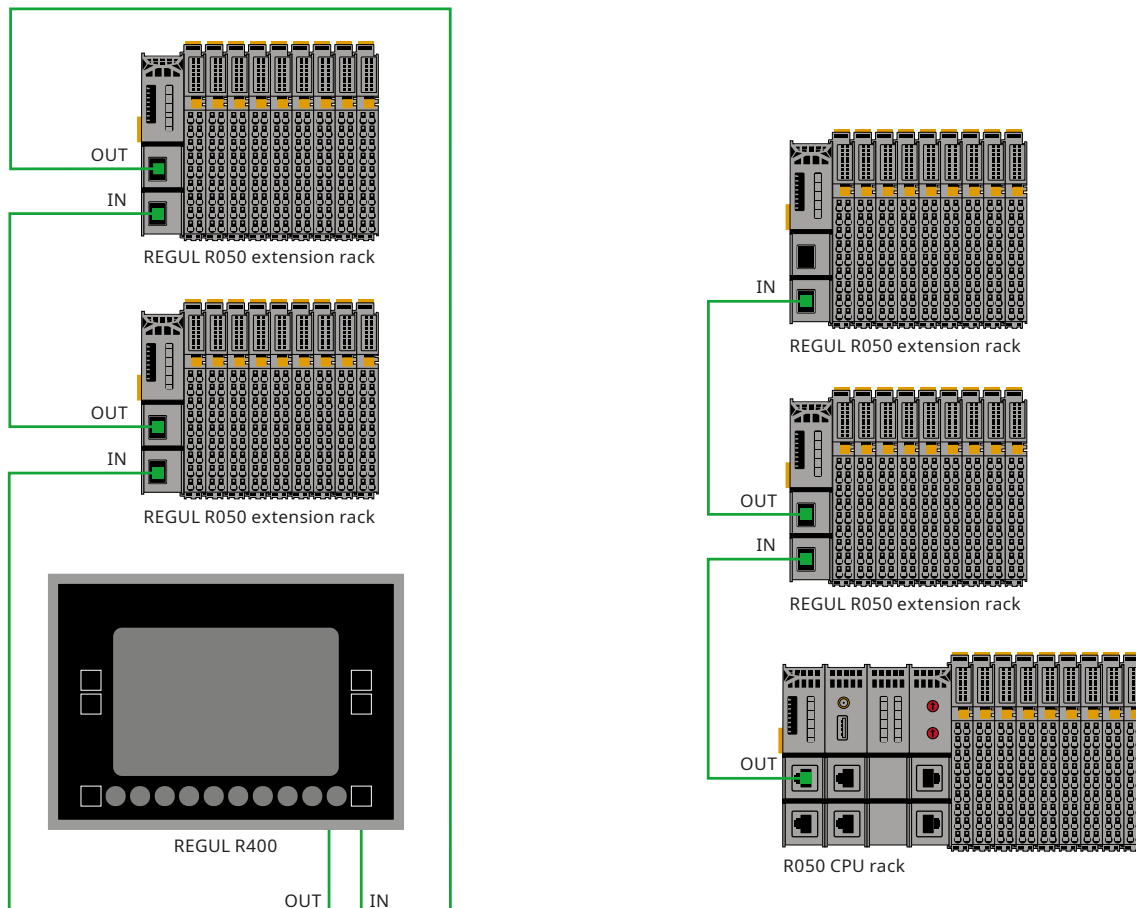
• **Part number structure**  
see at page 6

• **Noise immunity**  
see at page 42

## REGUL R500 PLC HARDWARE CONFIGURATION

- remote I/O racks
- up to 10 km link between racks (by fiber optic link)

Figure 10. Examples of REGUL R050 racks connection



## REGUL R050 PLC CONFIGURATION

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The REGUL R050 PLC allows distributed configuration of racks. Each rack must have a unique address, which is configured via an 8-position DIP switch located on the terminal module (ST). The PLC racks can be connected in any order, but the OUT interface connectors on the internal PLC data bus (RegulBus) must always be connected to the IN interface connectors.

**The REGUL R050 rack includes modules of the following types:**

**(ST) Terminal modules** must be included in each extension rack on the left. The ST module supports extension of the internal PLC bus (IN and OUT connectors) via twisted pair or fiber optic line between racks. When using fiber optic communication, third-party SFP modules must be installed in the ST modules. Each ST module also includes a power supply module (PP) and plug to protect the electrical contacts of the rightmost module in the extension rack.

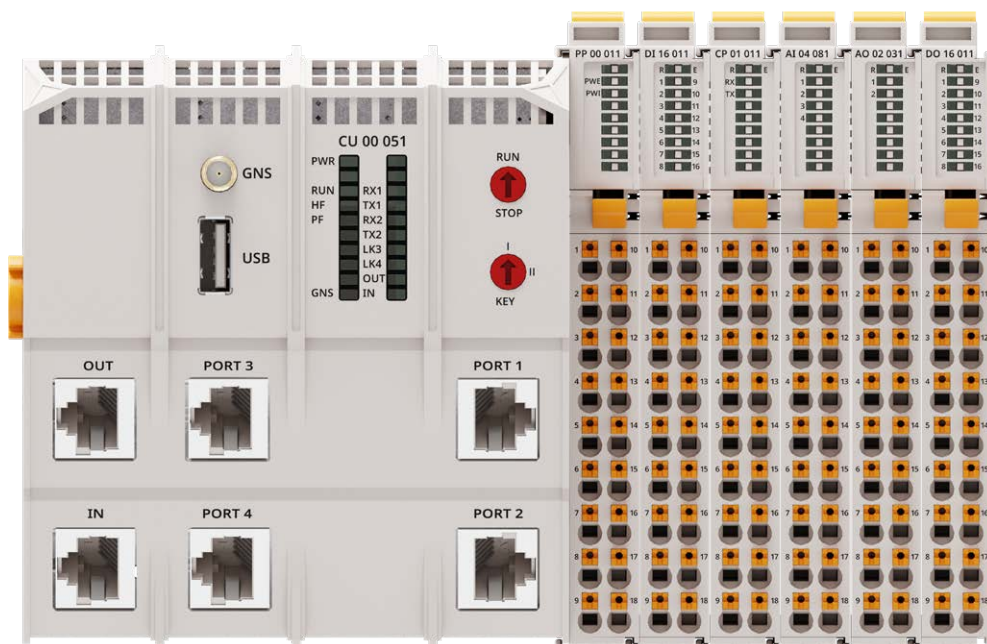
**(PP) Power supply modules.** The power supply modules are included in the terminal module or CP modules. To ensure redundancy of the internal power supply input for the PLC rack, an increased number of power modules can be used. The R050 internal power bus within a single rack is a unified, galvanic coupled element.

**(CU) CPU modules.** CU modules are available in various types and modifications and can be equipped with various options. The CU module package also includes a power supply module (PP) and plug to protect the electrical contacts of the rightmost module in the CU module rack.

**(AI, AO, DI, DA, DO) I/O modules** have a broad nomenclature and are capable of processing analog signals (including HART support), digital signals (including NAMUR support), TC/RTD signals, and pulse signals.

**(CP) Communication processor modules.** CP modules receive and process digital signals via RS-485 interfaces and Modbus RTU and IEC 60870-5-101 protocols. CP modules can be installed in remote PLC racks. These modules are responsible solely for establishing the physical connection to external devices, while all device driver processing is handled by CU modules.

Figure 11. Examples of REGUL R050 rack connection



Types of central processor units

Central processor unit	CU 00 031	CU 00 041	CU 00 051
CPU type	II		
Frequency, GHz, number of microprocessor cores	1 (1 core)		
RAM, MB	512		
HDD, GB	1		
<ul style="list-style-type: none"> <li>RS-232 / RS-485, pcs.</li> </ul>	1		
<ul style="list-style-type: none"> <li>RS-485, pcs.</li> </ul>	1		
<ul style="list-style-type: none"> <li>Ethernet, 100 Mbps, pcs.</li> </ul>	2 (RJ-45)		
<ul style="list-style-type: none"> <li>USB 2.0**</li> </ul>	2		
<ul style="list-style-type: none"> <li>GLONASS</li> </ul>	1 (optional)		
<ul style="list-style-type: none"> <li>RegulBus (1xIN, 1xOUT)</li> </ul>	-	2 (SFP)	2 (RJ-45)
Typical PLC bus cycle	5 ms per rack		
Minimal application cycle time	10 ms		
Typical number of PLC channels per application cycle for 200 ms	Up to 800		
Battery replacement by user*	Yes		

\* The battery in the CU module only powers the internal clock when external power is off. If the CU module is powered on with a faulty battery, the date and time can be set manually. Time synchronization is also possible via NTP or the built-in GPS/GLONASS receiver.

\*\* An external flash drive up to 32 GB in size can be connected via USB.

## REGUL R050 CONTROLLER MODULES

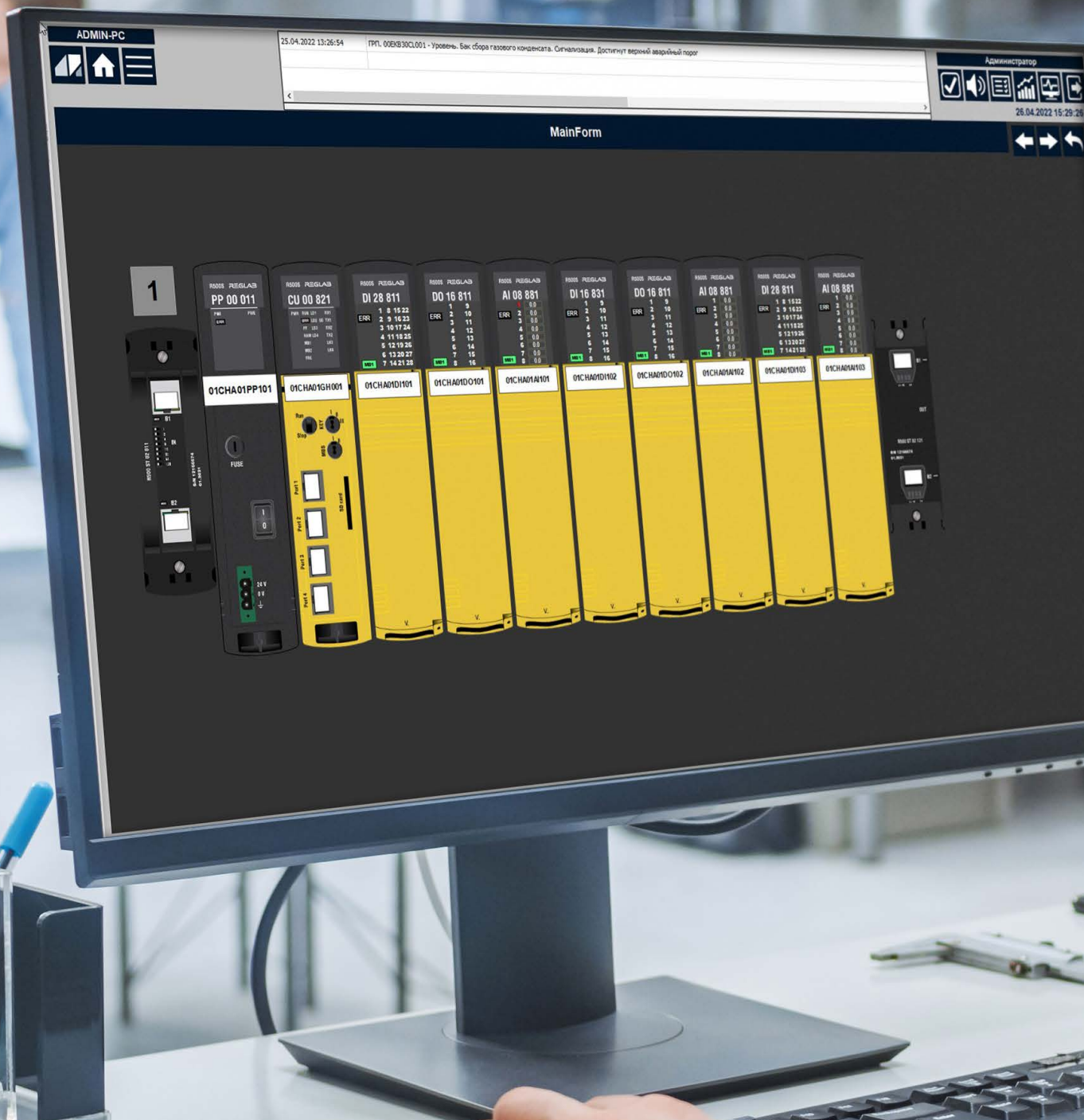
Part number	Module characteristics	Note
<b>CPU modules</b>		
R050 CU 00 031-000-AAA	<ul style="list-style-type: none"> <li>1 GHz, 512 MB RAM, 1 GB Flash, RS-232/485, RS-485, 2xEthernet RJ-45, complete with R050 PP 00 011-000-AAA and plug</li> </ul>	Type II
R050 CU 00 031-001-AAA	<ul style="list-style-type: none"> <li>1 GHz, 512 MB RAM, 1 GB Flash, RS-232/485, RS-485, 2xEthernet RJ-45, 2xUSB, complete with R050 PP 00 011-000-AAA and plug</li> </ul>	
R050 CU 00 031-002-AAA	<ul style="list-style-type: none"> <li>1 GHz, 512 MB RAM, 1 GB Flash, RS-232/485, RS-485, 2xEthernet RJ-45, 2xUSB, GLONASS, complete with R050 PP 00 011-000-AAA and plug</li> </ul>	
R050 CU 00 041-000-AAA	<ul style="list-style-type: none"> <li>1 GHz, 512 MB RAM, 1 GB Flash, RS-232/485, RS-485, 2xEthernet RJ-45, 2xRegulBus SFP (IN/OUT), complete with R050 PP 00 011-000-AAA and plug</li> </ul>	Type II SFP-module ordered separately
R050 CU 00 041-001-AAA	<ul style="list-style-type: none"> <li>1 GHz, 512 MB RAM, 1 GB Flash, RS-232/485, RS-485, 2xEthernet RJ-45, 2xRegulBus SFP (IN/OUT), 2xUSB, complete with R050 PP 00 011-000-AAA and plug</li> </ul>	
R050 CU 00 041-002-AAA	<ul style="list-style-type: none"> <li>1 GHz, 512 MB RAM, 1 GB Flash, RS-232/485, RS-485, 2xEthernet RJ-45, 2xRegulBus SFP (IN/OUT), 2xUSB, GLONASS, complete with R050 PP 00 011-000-AAA and plug</li> </ul>	
R050 CU 00 051-000-AAA	<ul style="list-style-type: none"> <li>1 GHz, 512 MB RAM, 1 GB Flash, RS-232/485, RS-485, 2xEthernet RJ-45, 2xRegulBus RJ-45 (IN/OUT), complete with R050 PP 00 011-000-AAA and plug</li> </ul>	Type II
R050 CU 00 051-001-AAA	<ul style="list-style-type: none"> <li>1 GHz, 512 MB RAM, 1 GB Flash, RS-232/485, RS-485, 2xEthernet RJ-45, 2xRegulBus RJ-45 (IN/OUT), 2xUSB, complete with R050 PP 00 011-000-AAA and plug</li> </ul>	
R050 CU 00 051-002-AAA	<ul style="list-style-type: none"> <li>1 GHz, 512 MB RAM, 1 GB Flash, RS-232/485, RS-485, 2xEthernet RJ-45, 2xRegulBus RJ-45 (IN/OUT), 2xUSB, GLONASS, complete with R050 PP 00 011-000-AAA and plug</li> </ul>	
<b>Analog output module</b>		
R050 AO 02 011-000-AAA	<ul style="list-style-type: none"> <li>0/4...20 mA, 2 channels, per-channel galvanic isolation, error 0.1%</li> </ul>	-
<b>Analog input modules</b>		
R050 AI 04 011-000-AAA	<ul style="list-style-type: none"> <li>0/4...20 mA, 4 channels, common galvanic isolation, error 0,3%</li> </ul>	-
R050 AI 08 011-000-AAA	<ul style="list-style-type: none"> <li>0/4...20 mA, 8 channels, common galvanic isolation, error 0,3%</li> </ul>	
R050 AI 02 131-000-AAA	<ul style="list-style-type: none"> <li>RTD/TS, -400...+400 mB, 1...1000 Ω, 2 channels, per-channel galvanic isolation, error 0.1%</li> </ul>	
R050 AI 04 061-000-AAA	<ul style="list-style-type: none"> <li>-10/-5/0...+5/10 V, 4 channels, per-channel galvanic isolation, error 0.1%</li> </ul>	
R050 AI 04 081-000-AAA	<ul style="list-style-type: none"> <li>4...20 mA + HART, 4 channels, common galvanic isolation, error 0.3%</li> </ul>	

Part number	Module characteristics	Note
<b>Digital input modules</b>		
R050 DI 08 011-000-AAA	<ul style="list-style-type: none"> <li>• 24 VDC, 8 channels, common "minus", common galvanic isolation</li> </ul>	-
R050 DI 16 011-000-AAA	<ul style="list-style-type: none"> <li>• 24 VDC, 16 channels (2 groups by 8 channels), common "minus", group galvanic isolation</li> </ul>	
R050 DI 08 031-000-AAA	<ul style="list-style-type: none"> <li>• NAMUR, 8 channels, common galvanic isolation</li> </ul>	
<b>Frequency measurement / pulse counting module</b>		
R050 DA 01 011-000-AAA	<ul style="list-style-type: none"> <li>• 1 channel 1 Hz...500 kHz (error 0.01%), 2 channels DI 24 VDC, 2 channels DO 24 VDC, 0.5 A</li> </ul>	-
<b>Digital output modules</b>		
R050 DO 08 011-000-AAA	<ul style="list-style-type: none"> <li>• solid-state relays, 24 VAC/DC, 0.5 A, 8 channels, common galvanic isolation</li> </ul>	-
R050 DO 16 011-000-AAA	<ul style="list-style-type: none"> <li>• solid-state relays, 24 VAC/DC, 0.5 A, 16 channels (2 groups of 8 channels), group galvanic isolation</li> </ul>	
R050 DO 08 021-000-AAA	<ul style="list-style-type: none"> <li>• 220 VDC, 0.3A / 220 VAC, 2 A, 8 channels, per-channel galvanic isolation</li> </ul>	
<b>Communication processor module</b>		
R050 CP 01 011-000-AAA	<ul style="list-style-type: none"> <li>• RS-485 (Modbus RTU, IEC 60870-5-101), 1 port</li> </ul>	-
<b>Power supply modules</b>		
R050 PP 00 011-000-AAA	<ul style="list-style-type: none"> <li>• 24 VDC, 24 W (internal bus), 240 W (external bus)</li> </ul>	-
<b>RegulBus extension terminal modules</b>		
R050 ST 00 011-000-AAA	<ul style="list-style-type: none"> <li>• 2xRegulBus RJ-45 (IN/OUT)</li> </ul>	-
R050 ST 00 111-000-AAA	<ul style="list-style-type: none"> <li>• 2xRegulBus SFP (IN/OUT)</li> </ul>	SFP-module ordered separately

# REGUL RX00 CONTROLLER NOISE IMMUNITY

The equipment complies with GOST 30804.6.2-2013 / IEC 61000-6-2:2005 standards						
Test method	Port	Test type	Test parameters values		Test severity level/ performance criterion	
			RX00	R050	RX00	R050
<b>GOST IEC 61000-4-8-2013</b> Immunity to power frequency magnetic fields	Housing port	Long (60 seconds) Briefly (3 seconds)	100 A/m 1000 A/m	100 A/m 1000 A/m	5/A	5/A
<b>GOST R 50649 94 / GOST IEC 61000-4-9-2013</b> Immunity to pulsed magnetic field	Housing port		1000 A/m	1000 A/m	5/A	5/A
<b>GOST 30804.4.2-2013</b> Immunity to electrostatic discharg	Housing port	Contact Air	± 4 kV ± 8 kV	± 4 kV ± 8 kV	2/A 3/A	2/V 3/V
<b>GOST 30804.4.3-2013 / GOST IEC 61000-4-3-2016</b> Immunity to RF electromagnetic field	Housing port	AM 1kHz, 80% (80-6000) MHz	10 V/m	3 V/m	3/A	2/A
<b>GOST 30804.4.4-2013 / GOST IEC 61000-4-4-2016</b> Immunity to nanosecond impulse noise	Power supply port	Under the "wire-to-wire" scheme	± 2 kV	± 1 kV	3/A	2/V
	Analog / digital / inputs / outputs	Under the "wire-to-ground" scheme	± 1 kV	± 0.5 kV	3/A	2/V
<b>GOST R 51317.4.5-99 / GOST IEC 61000-4-5-2016</b> Immunity to microsecond impulse noise	Power supply port	Under the "wire-to-wire" scheme Under the "wire-to-ground" scheme	± 1 kV ± 2 kV	± 0.5 kV ± 1 kV	2/A 3/A	1/V 2/V
	Analog / digital / inputs / outputs					
<b>GOST R 51317.4.6-99</b> Immunity to conducted interference induced by radio frequency electromagnetic fields in the frequency range from 0.15-80 MHz	Power supply port	Through communication device (0.15-80) MHz	10 V	3 V/m	3/A	2/A
	Analog / digital / inputs / outputs	Through EM injection clamps (0.15-80) MHz	10 V	3 V/m	3/A	2/A
<b>GOST 30804.4.11-2013 / GOST IEC 61000-4-29-2016</b> Immunity to dips and sort-term power interruptions	Power supply port (for DC and AC power supply)	Power supply interruptions	0% Unom. 100 ms	-	3 (grade)	
		Power supply dips	40% Unom. 500 ms	-		
		Power supply dips	70% Unom. 500 ms	-		
		Power supply surges	120% Unom. 500 ms	-		

Test method	Port	Test type	Test parameters values		Test severity level/ performance criterion	
			RX00	R050	RX00	R050
<b>GOST R 51317.4.12-99/ GOST IEC 61000-4-12-2016</b> Immunity to ringing waves	Power supply port	Under the "wire-to-wire" scheme Under the "wire-to-ground" scheme	±1 kV	±0.5 kV	2/A	1/A
	Analog / digital / inputs / outputs		±2 kV	±1 kV	3/A	2/A
<b>GOST R 51317.4.14-2000/ GOST IEC 61000-4-14-2016</b> Immunity to voltage fluctuations	Power supply port (when powered from an AC network)		±12% Unom.	±12% Unom.	2/A	2/A
<b>GOST R 51317.4.16-2000</b> Immunity to conducted interference in the frequency range from 0 to 150 kHz	Power supply port	50 Hz (long) 50 Hz (briefly) 15-150 Hz 150 Hz — 1.5 kHz 1.5-15 kHz 15-150 kHz	30V	30V	4/A	4/A
	Analog / digital / inputs / outputs		100V	100V		
<b>GOST IEC 61000-4-18-2016</b> Immunity to damped vibration	Power supply port	Under the "wire-to-ground" scheme	±1 kV	±0.5 kV	2/A	1/A
	Analog / digital / inputs / outputs	Under the "wire-to-wire" scheme	±2 kV	±1 kV	3/A	2/A



ADMIN-PC

25.04.2022 13:26:54 ГРП1\_006X30C1.001 - Уровень. Бак сбора газового конденсата. Сигнализация. Достигнут верхний аварийный порог

Администратор  
26.04.2022 15:29:26

MainForm

1	01CHA01PP101	01CHA01GH001	01CHA01D101	01CHA01D0101	01CHA01A101	01CHA01D102	01CHA01A102	01CHA01D103	01CHA01A103	
	RU00S REGLAB PP 00 011	RU00S REGLAB CU 00 821	RU00S REGLAB DI 28 811	RU00S REGLAB DO 16 811	RU00S REGLAB AI 08 881	RU00S REGLAB DI 16 831	RU00S REGLAB DO 16 811	RU00S REGLAB AI 08 881	RU00S REGLAB DI 28 811	RU00S REGLAB AI 08 881
	ERR 1 0 15 22 2 9 16 23 3 10 17 24 4 11 18 25 5 12 19 26 6 13 20 27 7 14 21 28	ERR 1 0 15 22 2 9 16 23 3 10 17 24 4 11 18 25 5 12 19 26 6 13 20 27 7 14 21 28	ERR 1 0 15 22 2 9 16 23 3 10 17 24 4 11 18 25 5 12 19 26 6 13 20 27 7 14 21 28	ERR 1 0 15 22 2 9 16 23 3 10 17 24 4 11 18 25 5 12 19 26 6 13 20 27 7 14 21 28	ERR 1 0 15 22 2 9 16 23 3 10 17 24 4 11 18 25 5 12 19 26 6 13 20 27 7 14 21 28	ERR 1 0 15 22 2 9 16 23 3 10 17 24 4 11 18 25 5 12 19 26 6 13 20 27 7 14 21 28	ERR 1 0 15 22 2 9 16 23 3 10 17 24 4 11 18 25 5 12 19 26 6 13 20 27 7 14 21 28	ERR 1 0 15 22 2 9 16 23 3 10 17 24 4 11 18 25 5 12 19 26 6 13 20 27 7 14 21 28	ERR 1 0 15 22 2 9 16 23 3 10 17 24 4 11 18 25 5 12 19 26 6 13 20 27 7 14 21 28	ERR 1 0 15 22 2 9 16 23 3 10 17 24 4 11 18 25 5 12 19 26 6 13 20 27 7 14 21 28





# ASTRA.IDE SOFTWARE



The Astra.IDE software is included in the Register of Russian Software, entry No. 14356



## Astra.IDE

The Astra.IDE software enables hardware configuration of the REGUL controller family (R500, R500S, R400, R050).

### Features

- embedded visualization development kit
- configuration of main PLC parameters
- development and modification of application programs
- redundancy configuration
- project upload and download
- step-by-step application debugging
- monitoring of PLC operation

### Programming languages

Astra.IDE supports application development in accordance with the IEC 61131-3 standard:

- FBD - functional block diagram
- LD - ladder diagram
- ST - structured text
- SFC - sequential function chart
- CFC - continuous flow chart

### Astra.IDE screenshot examples

Figure 12. Configuration example

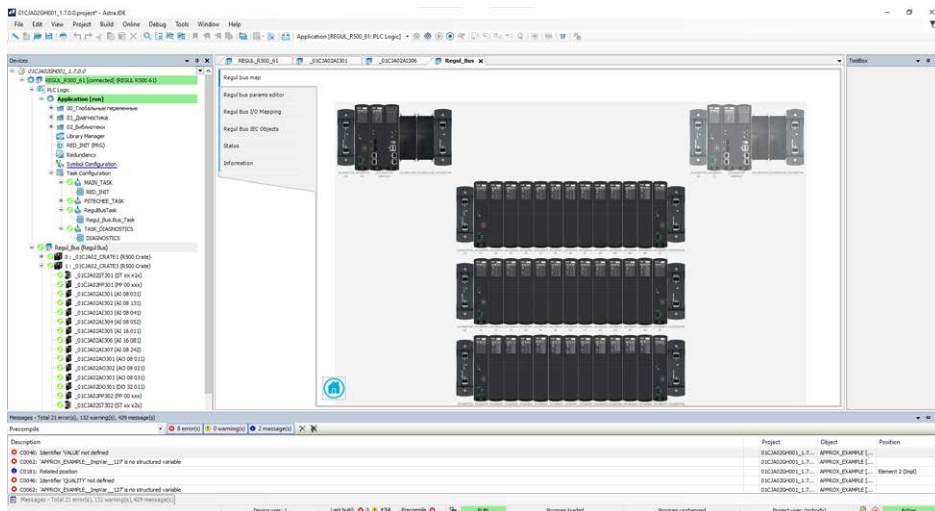


Figure 13.  
Application example

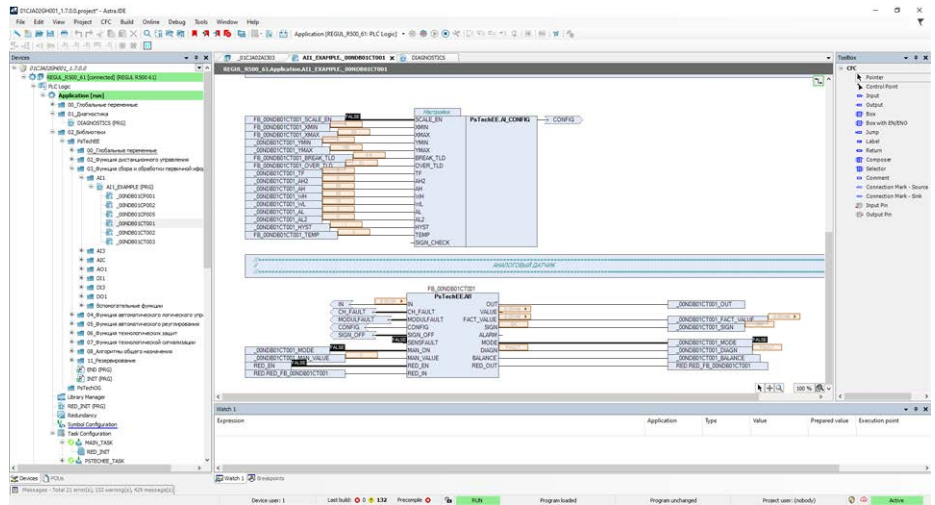


Figure 14.  
Module property designer

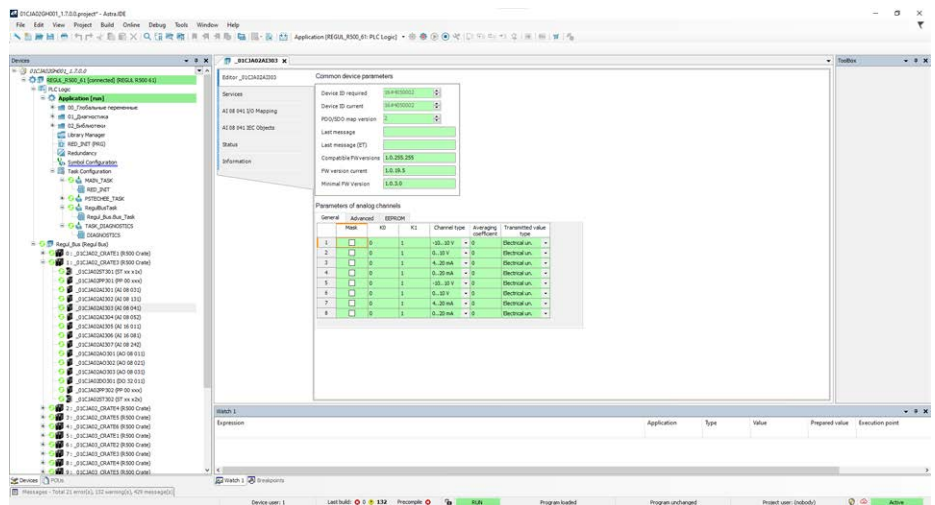
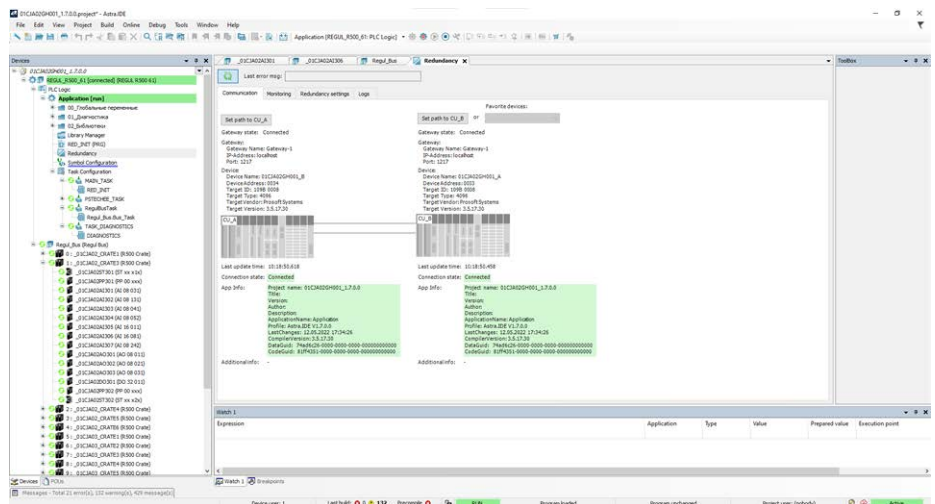


Figure 15.  
PLC redundancy designer



# ASTRAREGUL INTEGRATED CONTROL SYSTEM



The AstraRegul integrated control system is included in the Register of Russian Software, entry No. 15886.



Included in the Register of Russian Industrial Products under No. 949\1\2023.



## AstraRegul

The AstraRegul ICS is a modular project design platform for developing APCS of any scale and complexity.

### ASTRAREGUL ICS MAIN APPLICATION AREAS



distributed control systems (DCS)



rotary equipment vibration monitoring and diagnostics



safety instrumented systems (SIS)



high-speed technological process control (from 5 ms cycle)

### ICS COMPONENTS

The ICS comprises both software and hardware components. The hardware components include:



R050, R500, and R500S REGUL PLCs



history servers



ICS engineer workstations



terminal panels



time synchronization servers



AMS workstations (using PACTware)



I/O servers



operator workstations



network equipment (switches, routers, firewalls, etc.)

Communication between ICS components is carried out via redundant channels using standard Ethernet-based protocols. The software components include operating systems with pre-installed drivers and utilities that support the proper functioning of both the hardware components and the AstraRegul software.

The AstraRegul ICS is built on the R050, R500, and R500S REGUL PLCs



The REGUL R500 PLC is designed to build responsible, fault-tolerant, and distributed APCS in various industries.

The REGUL R500S PLC is designed for use in emergency shutdown systems at hazardous industrial facilities and complies with the SIL3 safety integrity level.

The REGUL R050 PLC is a compact solution for building local control systems.

## MAIN FUNCTIONS

- data polling and processing
- process control
- redundancy
- archiving
- event recording
- report generation
- software and hardware diagnostics
- cyber security and functional safety
- human-machine interface

## ASTRAREGUL ICS ADVANTAGES

### Scalability

The AstraRegul ICS offers the following scalability characteristics within a single domain:

- up to 40 I/O servers
- up to 25 workstations per I/O server or redundant pair of servers
- up to 50 PLC CPUs

### Reliability

- the high reliability of the ICS is ensured through the hardware and software component redundancy
- the estimated mean time between failures (MTBF) for any PLC module is at least 150,000 hours
- the average time to restore system functionality by replacing any hardware ICS component from the spare parts kit is no more than 1 hour

### High performance

The REGUL PLC features a single high-speed internal data bus, RegulBus, which enables a data exchange cycle of 1 ms.



**From 10 ms**

Application cycle time



**Up to 1 000 000 changes / second**

I/O server performance



**From 10 ms**

Switching time between active and standby CPU modules



**up to 750 000 changes / second**

History server performance

### Cross-platform

The AstraRegul ICS is a cross-platform solution that allows the design of APCS based on Windows and Linux operating systems.

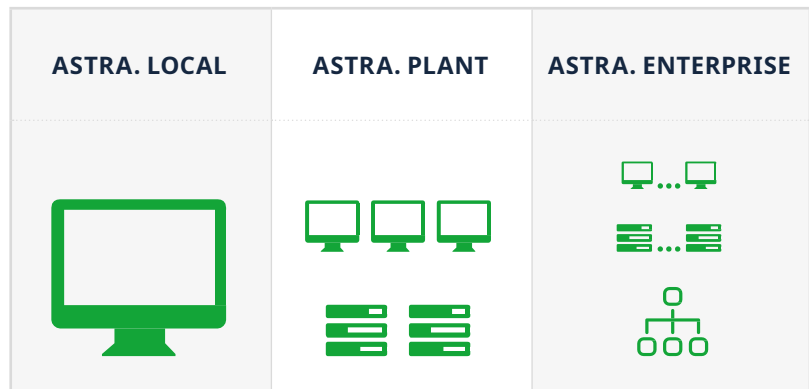


## TYPICAL ARCHITECTURES

The ICS has three typical architectures.

Each architecture requires its own licensing kit.

All licenses are valid indefinitely.



Purpose	Architecture	Peer-to-peer, without redundancy	Client-server, redundancy support	Client-server, redundancy support
	Typical application	Local OWS or operator panels	APCS for facilities with two redundant servers within a single domain	Distributed multi-level system with more than two servers within a single domain
Functions	Event and alarm log, trends	Yes	Yes	Yes
	Calculations (embedded language Om or JavaScript)	Yes	Yes	Yes
	Object-oriented model	Yes	Yes	Yes
	Data and event archiving	Astra.Historian or external SQL-server	Astra.Historian or external SQL-server	Astra.Historian
	Providing historical data to third-party applications (from Astra.Historian only)	OPC HDA, OPC UA, SQL		
	Upgrade to next level system	Yes	Yes	No
	WEB-access	Yes (one client)	Yes	Yes
Client connections to external servers (DA, A&E, HDA)	Astra.Local	No	No	No
	Astra.Plant client	No	Yes, only for one pair of redundant servers	No
	Astra.Enterprise client	No	No	Yes, no limits

## DEVELOPMENT

- support protocols OPC DA, OPC UA, IEC101/104, Modbus TCP/RTU, SQL, HART, and other protocols
- support for IEC 61131-3 programming languages
- the graphical mnemonic diagram editor includes the Astra.Om programming language, which enables the description of executable elements such as procedures and formulas within scripts
- JavaScript language support
- ability to connect ActiveX components (.NetFramework,.NetCore)
- preinstalled libraries for developing APCS projects across various industries and ability to create custom user libraries
- ability to debug using a virtual controller
- support for multi-user development
- support for multi-monitor workstations
- ability to provide web-access
- integration with MES and ERP systems

## CYBER SECURITY

- user authorization systems with differentiation access rights
- user action logging
- monitoring of application project integrity and its components
- configuration of packet filters and "white" IP addresses for access
- use of firewalls
- use of antivirus software compatible with the ICS

Figure 16. Security subsystem



# SCREENSHOT EXAMPLES

Figure 17.  
Mnemosheme

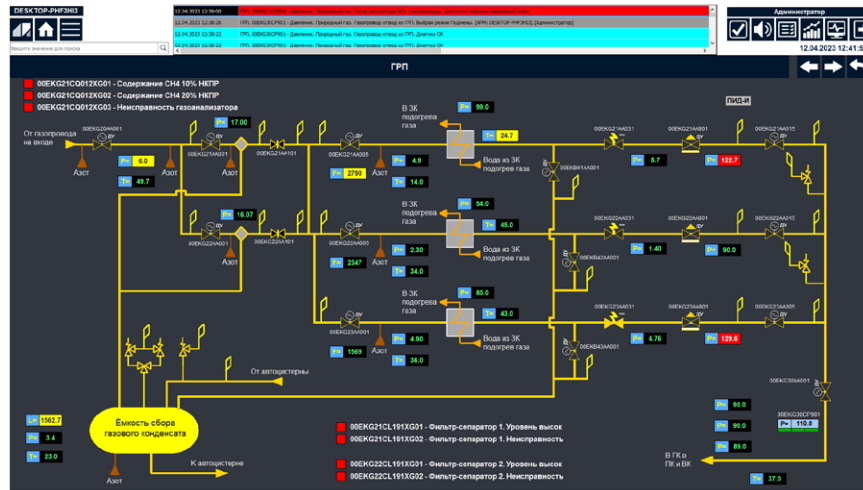


Figure 18.  
Control windows

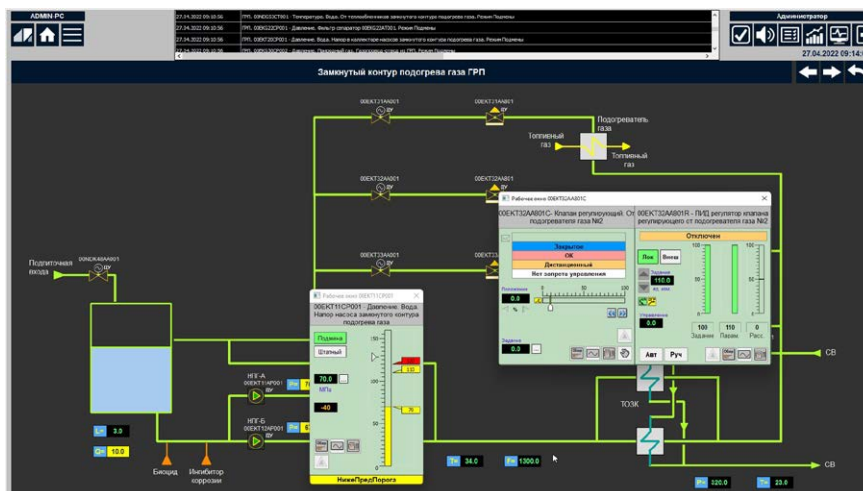
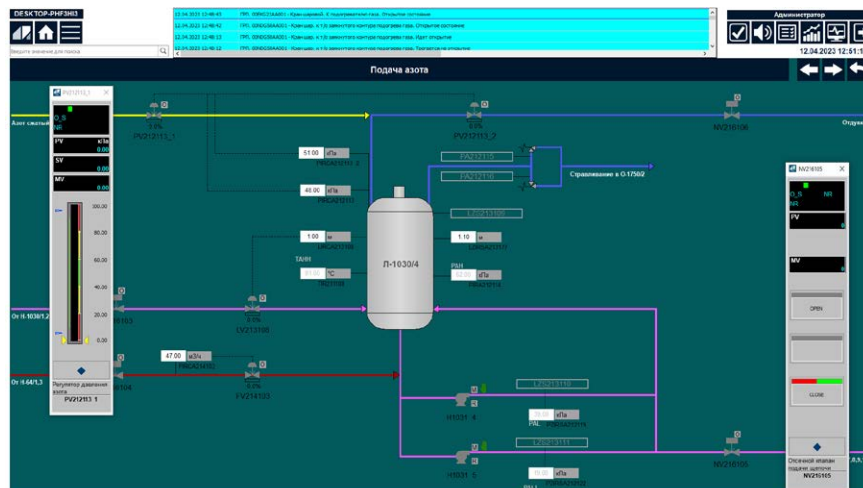


Figure 19.  
Mnemosheme







## ASTRAREGUL LICENSE TYPES

### ● Astra.Local - Local OWS

Astra.Historian, PostgreSQL, or MS SQL can be used to archive data.

Web access is available through the built-in Astra.WEBportal (one client with read-only access).

**Drivers in the package:** Modbus RTU/TCP Master, Modbus RTU/TCP Slave, IEC 101/104 Master, IEC 101/104 Slave, OPC DA Client, OPC UA Client, OPC DA Server, OPC UA Server, SNMP Manager, SQL, Syslog Server/Client, and MQTT.

Part number	Software module	Note
LCL-N150	● Astra.Local license, 150 tags	-
LCL-N300	● Astra.Local license, 300 tags	-
LCL-N500	● Astra.Local license, 500 tags	-
LCL-N1k	● Astra.Local license, 1k tags	-
LCL-N1k5	● Astra.Local license, 1k5 tags	-
LCL-N3k	● Astra.Local license, 3k tags	-
LCL-N5k	● Astra.Local license, 5k tags	-
LCL-N15k	● Astra.Local license, 15k tags	-
LCL-N50k	● Astra.Local license, 50k tags	-
LCL-N-UP300	● Astra.Local. Upgrade from 150 to 300 tags	-
LCL-N-UP500	● Astra.Local. Upgrade from 300 to 500 tags	-
LCL-N-UP1k	● Astra.Local. Upgrade from 500 to 1k tags	-
LCL-N-UP1k5	● Astra.Local. Upgrade from 1k to 1k5 tags	-
LCL-N-UP3k	● Astra.Local. Upgrade from 1k5 to 3k tags	-
LCL-N-UP5k	● Astra.Local. Upgrade from 3k to 5k tags	-
LCL-N-UP15k	● Astra.Local. Upgrade from c 5k to 15k tags	-
LCL-N-UP50k	● Astra.Local. Upgrade from c 15k to 50k tags	-
LCL-N-Plant-500	● Upgrade Astra.Local, 500 tags Up to Plant.Server 500 tags & 1 Client Full	-
LCL-N-Plant-1k	● Upgrade Astra.Local, 1k tags Up to Plant.Server 1k tags & 1 Client Full	-
LCL-N-Plant-1k5	● Upgrade Astra.Local, 1k5 tags Up to Plant.Server 1k5 tags & 1 Client Full	-
LCL-N-Plant-3k	● Upgrade Astra.Local, 3k tags Up to Plant.Server 3k tags & 1 Client Full	-
LCL-N-Plant-5k	● Upgrade Astra.Local, 5k tags Up to Plant.Server 5k tags & 1 Client Full	-
LCL-N-Plant-15k	● Upgrade Astra.Local, 15k tags Up to Plant.Server 15k tags & 1 Client Full	-
LCL-N-Plant-50k	● Upgrade Astra.Local, 50k tags Up to Plant.Server 50k tags & 1 Client Full	-

### ● Astra.Plant - Client-server architecture

A maximum of two servers (one redundant pair) is allowed within a single domain.

Astra.Historian, PostgreSQL, or MS SQL can be used to archive data.

Web access is available through the built-in Astra.WEBportal.

**Drivers in the package:** Modbus RTU/TCP Master, Modbus RTU/TCP Slave, IEC 101/104 Master, IEC 101/104 Slave, OPC DA Client, OPC UA Client, OPC DA Server, OPC UA Server, SNMP Manager, SQL, Syslog Server/Client, MQTT, IEC 61850 Client, and TEM-104 Master.

Part number	Software module	Note
PLN-SRV500	<ul style="list-style-type: none"> <li>Plant.Server, 500 tags</li> </ul>	-
PLN-SRV1k	<ul style="list-style-type: none"> <li>Plant.Server, 1k tags</li> </ul>	-
PLN-SRV1k5	<ul style="list-style-type: none"> <li>Plant.Server, 1k5 tags</li> </ul>	-
PLN-SRV3k	<ul style="list-style-type: none"> <li>Plant.Server, 3k tags</li> </ul>	-
PLN-SRV5k	<ul style="list-style-type: none"> <li>Plant.Server, 5k tags</li> </ul>	-
PLN-SRV15k	<ul style="list-style-type: none"> <li>Plant.Server, 15k tags</li> </ul>	-
PLN-SRV50k	<ul style="list-style-type: none"> <li>Plant.Server, 50k tags</li> </ul>	-
PLN-SRV100k	<ul style="list-style-type: none"> <li>Plant.Server, 100k tags</li> </ul>	-
PLN-SRV150k	<ul style="list-style-type: none"> <li>Plant.Server, 150k tags</li> </ul>	-
PLN-SRV-UP1k	<ul style="list-style-type: none"> <li>Plant.Server. Upgrade from 500 to 1k tags</li> </ul>	-
PLN-SRV-UP1k5	<ul style="list-style-type: none"> <li>Plant.Server. Upgrade from 1k to 1k5 tags</li> </ul>	-
PLN-SRV-UP3k	<ul style="list-style-type: none"> <li>Plant.Server. Upgrade from 1k5 to 3k tags</li> </ul>	-
PLN-SRV-UP5k	<ul style="list-style-type: none"> <li>Plant.Server. Upgrade from 3k to 5k tags</li> </ul>	-
PLN-SRV-UP15k	<ul style="list-style-type: none"> <li>Plant.Server. Upgrade from 5k to 15k tags</li> </ul>	-
PLN-SRV-UP50k	<ul style="list-style-type: none"> <li>Plant.Server. Upgrade from 15k to 50k tags</li> </ul>	-
PLN-SRV-UP100k	<ul style="list-style-type: none"> <li>Plant.Server. Upgrade from 50k to 100k tags</li> </ul>	-
PLN-SRV-UP150k	<ul style="list-style-type: none"> <li>Plant.Server. Upgrade from 100k to 150k tags</li> </ul>	-
A-CL-F	<ul style="list-style-type: none"> <li>Plant/Enterprise.Client Full</li> </ul>	<p>A client license allows connection to two servers (one redundant server pair) using one of three methods: direct, terminal, or web- access.</p> <p>Web access is provided through read-only clients.</p> <p><b>ATTENTION!</b> For more than three simultaneous web-connections, it is recommended to allocate a dedicated computer for the web-server and Astra.WEBportal.</p>
A-CL-RO10	<ul style="list-style-type: none"> <li>Plant.Client. Up to 10 clients with read-only access</li> </ul>	
A-CL-RO25	<ul style="list-style-type: none"> <li>Plant.Client. Up to 25 clients with read-only access</li> </ul>	
A-CL-RO50	<ul style="list-style-type: none"> <li>Plant.Client. Up to 50 clients with read-only access</li> </ul>	
A-CL-RO100	<ul style="list-style-type: none"> <li>Plant.Client. Up to 100 clients with read-only access</li> </ul>	
A-CL-ROUP25	<ul style="list-style-type: none"> <li>Plant.Client. Upgrade read-only clients from 10 to 25</li> </ul>	
A-CL-ROUP50	<ul style="list-style-type: none"> <li>Plant.Client. Upgrade read-only clients from 25 to 50</li> </ul>	

**🕒 Astra.Enterprise - Client-server architecture**

The total number of tags per domain, the number of physical servers, and the number of client connections are licensed. Astra.Historian can be used to archive data. Web access is available through the built-in Astra.WEBportal.

**Drivers in package:** Modbus RTU/TCP Master, Modbus RTU/TCP Slave, IEC 101/104 Master, IEC 101/104 Slave, OPC DA Client, OPC UA Client, OPC DA Server, OPC UA Server, SNMP Manager, SQL, Syslog Server/Client, MQTT, IEC 61850 Client, TEM-104 Master, BACnet, S7 Client, Ethernet/IP, FINS Client.

Part number	Software module	Note
EP-IOSRV	<ul style="list-style-type: none"> <li>• License for one additional I/O server on one PC</li> </ul>	For Enterprise only. The license also includes Astra.WEBportal
EP-1k5	<ul style="list-style-type: none"> <li>• Astra.Enterprise. 1k5 tags, up to 2 x I/O SRV, 1 Client Full</li> </ul>	-
EP-3k	<ul style="list-style-type: none"> <li>• Astra.Enterprise. 3k tags, up to 2 x I/O SRV, 1 Client Full</li> </ul>	-
EP-5k	<ul style="list-style-type: none"> <li>• Astra.Enterprise. 5k tags, up to 2 x I/O SRV, 1 Client Full</li> </ul>	-
EP-15k	<ul style="list-style-type: none"> <li>• Astra.Enterprise. 15k tags, up to 4 x I/O SRV, 1 Client Full</li> </ul>	-
EP-25k	<ul style="list-style-type: none"> <li>• Astra.Enterprise. 25k tags, up to 4 x I/O SRV, 1 Client Full</li> </ul>	-
EP-50k	<ul style="list-style-type: none"> <li>• Astra.Enterprise. 50k tags, up to 6 x I/O SRV, 1 Client Full</li> </ul>	-
EP-100k	<ul style="list-style-type: none"> <li>• Astra.Enterprise. 100k tags, up to 8 x I/O SRV, 1 Client Full</li> </ul>	-
EP-200k	<ul style="list-style-type: none"> <li>• Astra.Enterprise. 200k tags, up to 10 x I/O SRV, 1 Client Full</li> </ul>	-
EP-300k	<ul style="list-style-type: none"> <li>• Astra.Enterprise. 300k tags, up to 12 x I/O SRV, 1 Client Full</li> </ul>	-
EP-500k	<ul style="list-style-type: none"> <li>• Astra.Enterprise. 500k tags, up to 14 x I/O SRV, 1 Client Full</li> </ul>	-
EP-1M	<ul style="list-style-type: none"> <li>• Astra.Enterprise. 1M tags, up to 24 x I/O SRV, 1 Client Full</li> </ul>	-
EP-2M	<ul style="list-style-type: none"> <li>• Astra.Enterprise. 1M tags, up to 40 x I/O SRV, 1 Client Full</li> </ul>	-
EP-UP3k	<ul style="list-style-type: none"> <li>• Astra.Enterprise. Upgrade from 1k5 to 3k tags, up to 2 x I/O SRV, 1 Client Full</li> </ul>	-
EP-UP5k	<ul style="list-style-type: none"> <li>• Astra.Enterprise. Upgrade from 3k to 5k tags, up to 2 x I/O SRV, 1 Client Full</li> </ul>	-
EP-UP15k	<ul style="list-style-type: none"> <li>• Astra.Enterprise. Upgrade from 5k to 15k tags, up to 4 x I/O SRV, 1 Client Full</li> </ul>	-
EP-UP25k	<ul style="list-style-type: none"> <li>• Astra.Enterprise. Upgrade from 15k to 25k tags, up to 4 x I/O SRV, 1 Client Full</li> </ul>	-
EP-UP50k	<ul style="list-style-type: none"> <li>• Astra.Enterprise. Upgrade from 25k to 50k tags, up to 6 x I/O SRV, 1 Client Full</li> </ul>	-
EP-UP100k	<ul style="list-style-type: none"> <li>• Astra.Enterprise. Upgrade from 50k to 100k tags, up to 8 x I/O SRV, 1 Client Full</li> </ul>	-

Part number	Software module	Note
EP-UP200k	<ul style="list-style-type: none"> <li>Astra.Enterprise. Upgrade from 100k to 200k tags, up to 10 x I/O SRV, 1 Client Full</li> </ul>	-
EP-UP300k	<ul style="list-style-type: none"> <li>Astra.Enterprise. Upgrade from 200k to 300k tags, up to 12 x I/O SRV, 1 Client Full</li> </ul>	-
EP-UP500k	<ul style="list-style-type: none"> <li>Astra.Enterprise. Upgrade from 300k to 500k tags, up to 14 x I/O SRV, 1 Client Full</li> </ul>	-
EP-UP1M	<ul style="list-style-type: none"> <li>Astra.Enterprise. Upgrade from 500k to 1M tags, up to 24 x I/O SRV, 1 Client Full</li> </ul>	-
EP-UP2M	<ul style="list-style-type: none"> <li>Astra.Enterprise. Upgrade from 1M to 2M tags, up to 40 x I/O SRV, 1 Client Full</li> </ul>	-
A-CL-F	<ul style="list-style-type: none"> <li>Enterprise.Client Full</li> </ul>	<p>A client license allows connection to two servers (one redundant server pair) using one of three methods: direct, terminal, or web-access.</p> <p>Web-access is provided through read-only clients.</p> <p><b>ATTENTION!</b> For more than three simultaneous web-connections, it is recommended to allocate a dedicated computer for the web-server and Astra.WEBportal.</p>
A-CL-RO10	<ul style="list-style-type: none"> <li>Enterprise.Client. Up to 10 clients with read-only access</li> </ul>	
A-CL-RO25	<ul style="list-style-type: none"> <li>Enterprise.Client. Up to 25 clients with read-only access</li> </ul>	
A-CL-RO50	<ul style="list-style-type: none"> <li>Enterprise.Client. Up to 50 clients with read-only access</li> </ul>	
A-CL-RO100	<ul style="list-style-type: none"> <li>Enterprise.Client. Up to 100 clients with read-only access</li> </ul>	
A-CL-RO250	<ul style="list-style-type: none"> <li>Enterprise.Client. Up to 250 clients with read-only access</li> </ul>	
A-CL-ROUNL	<ul style="list-style-type: none"> <li>Enterprise.Client. Unlimited number of read-only clients</li> </ul>	
A-CL-ROUP25	<ul style="list-style-type: none"> <li>Enterprise.Client. Upgrade read-only clients from 10 to 25</li> </ul>	
A-CL-ROUP50	<ul style="list-style-type: none"> <li>Enterprise.Client. Upgrade read-only clients from 25 to 50</li> </ul>	
A-CL-ROUP100	<ul style="list-style-type: none"> <li>Enterprise.Client. Upgrade read-only clients from 50 to 100</li> </ul>	
A-CL-ROUP250	<ul style="list-style-type: none"> <li>Enterprise.Client. Upgrade read-only clients from 100 to 250</li> </ul>	
A-CL-ROUPUNL	<ul style="list-style-type: none"> <li>Enterprise.Client. Upgrade read-only clients from 250 to an unlimited number</li> </ul>	

## 🟢 Astra.Enterprise - Client-server architecture

Part number	Software module	Note
HIST-100	• Astra.Historian, 100 tags	-
HIST-200	• Astra.Historian, 200 tags	-
HIST-300	• Astra.Historian, 300 tags	-
HIST-500	• Astra.Historian, 500 tags	-
HIST-700	• Astra.Historian, 700 tags	-
HIST-1k	• Astra.Historian, 1k tags	-
HIST-2k	• Astra.Historian, 2k tags	-
HIST-3k	• Astra.Historian, 3k tags	-
HIST-5k	• Astra.Historian, 5k tags	-
HIST-7k	• Astra.Historian, 7k tags	-
HIST-10k	• Astra.Historian, 10k tags	-
HIST-15k	• Astra.Historian, 15k tags	-
HIST-20k	• Astra.Historian, 20k tags	-
HIST-30k	• Astra.Historian, 30k tags	-
HIST-50k	• Astra.Historian, 50k tags	-
HIST-100k	• Astra.Historian, 100k tags	-
HIST-200k	• Astra.Historian, 200k tags	-
HIST-300k	• Astra.Historian, 300k tags	-
HIST-500k	• Astra.Historian, 500k tags	-
HIST-1M	• Alpha.Historian, 1M tags	-
HIST-2M	• Alpha.Historian, 2M tags	-
HIST-UP200	• Astra.Historian. Upgrade from 100 to 200 tags	-
HIST-UP300	• Astra.Historian. Upgrade from 200 to 300 tags	-
HIST-UP500	• Astra.Historian. Upgrade from 300 to 500 tags	-
HIST-UP700	• Astra.Historian. Upgrade from 500 to 700 tags	-
HIST-UP1k	• Astra.Historian. Upgrade from 700 to 1k tags	-
HIST-UP2k	• Astra.Historian. Upgrade from 1k to 2k tags	-
HIST-UP3k	• Astra.Historian. Upgrade from 2k to 3k tags	-
HIST-UP5k	• Astra.Historian. Upgrade from 3k to 5k tags	-
HIST-UP7k	• Astra.Historian. Upgrade from 5k to 7k tags	-
HIST-UP10k	• Astra.Historian. Upgrade from 7k to 10k tags	-
HIST-UP15k	• Astra.Historian. Upgrade from 10k to 15k tags	-
HIST-UP20k	• Astra.Historian. Upgrade from 15k to 20k tags	-
HIST-UP30k	• Astra.Historian. Upgrade from 20k to 30k tags	-
HIST-UP50k	• Astra.Historian. Upgrade from 30k to 50k tags	-
HIST-UP100k	• Astra.Historian. Upgrade from 50k to 100k tags	-

Part number	Software module	Note
HIST-UP200k	<ul style="list-style-type: none"> <li>Astra.Historian. Upgrade from 100k Up to 200k tags</li> </ul>	-
HIST-UP300k	<ul style="list-style-type: none"> <li>Astra.Historian. Upgrade from 200k Up to 300k tags</li> </ul>	-
HIST-UP500k	<ul style="list-style-type: none"> <li>Astra.Historian. Upgrade from 300k Up to 500k tags</li> </ul>	-
HIST-UP1M	<ul style="list-style-type: none"> <li>Astra.Historian. Upgrade from 500k Up to 1M tags</li> </ul>	-
HIST-UP2M	<ul style="list-style-type: none"> <li>Astra.Historian. Upgrade from 1M Up to 2M tags</li> </ul>	-

### License Security Keys

Part number	Software module	Note
A-KEY-USB	<ul style="list-style-type: none"> <li>Hardware security key</li> </ul>	-
A-KEY-SOFT	<ul style="list-style-type: none"> <li>Software security key</li> </ul>	-
A-KEY-MOVE	<ul style="list-style-type: none"> <li>License transfer service between hardware and software key</li> </ul>	-

### Communication protocols (additional packages)

Part number	Software module	Note
DRV-ENERG	<ul style="list-style-type: none"> <li>Additional driver package IEC 61850 Client, RP 570 Master, and TEM-104 Master</li> </ul>	For Astra.Local only
DRV-INDUSTRY	<ul style="list-style-type: none"> <li>Additional driver package BACnet, S7 Client, Ethernet/IP, and FINS Client</li> </ul>	For Astra.Local / Astra.Plant only
A-DRV-OPCDA-CL	<ul style="list-style-type: none"> <li>External (additional Windows PC) OPC DA Client license</li> </ul>	For Astra.Local / Plant / Enterprise only
A-DRV-OPCDA-SRV	<ul style="list-style-type: none"> <li>External (additional Windows PC) OPC DA Server license</li> </ul>	For Astra.Local / Plant / Enterprise only
DRV-HART-COM	<ul style="list-style-type: none"> <li>REGUL HART Communication license, enabling direct access to field smart sensors and actuators connected to REGUL RX00 modules via HART. PACTware is required to interact with field devices, along with the necessary DTM files from the field device manufacturers</li> </ul>	Supplied complete with its own hardware security key

### WEB-access - Separate server license for WEB-access

Part number	Software module	Note
A-WEB-PORTAL	<ul style="list-style-type: none"> <li>License for WEB-access to Plant and Enterprise servers (a separate web server (IIS, Apache, etc.) must be installed to publish data via the web. Additional separate read-only client licenses are required.</li> </ul>	For Plant / Enterprise only

### Development tools

Part number	Software module	Note
A.Studio	<ul style="list-style-type: none"> <li>IO Server and Historian project development and configuration package</li> </ul>	-
Astra.IDE	<ul style="list-style-type: none"> <li>PLC project development and configuration package</li> </ul>	-







# REGLAB

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