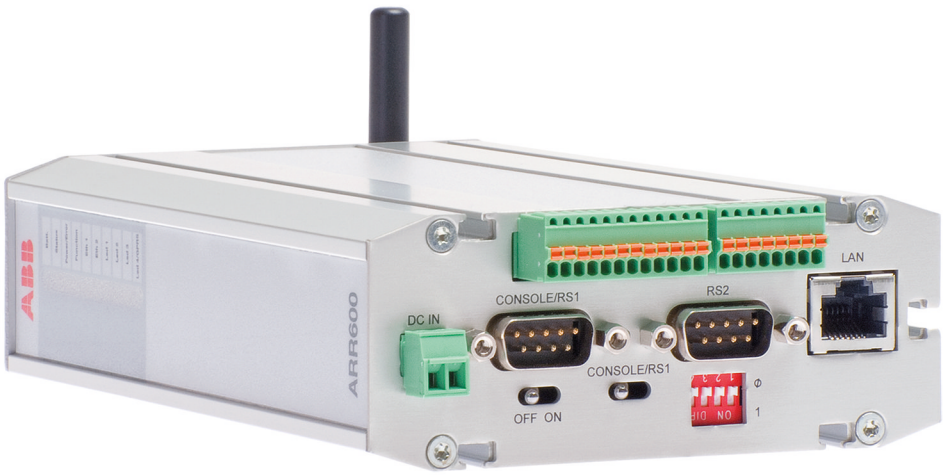
Wireless I/O Gateway
ARR600
Product Guide



Contents

1. Description

Wireless I/O Gateway ARR600 provides wireless monitoring and control of field devices via cellular network from a central site or a control center. The devices offer industrial quality connectivity for the IEC 60870 and Modbus based protocols. Field applications can be connected and controlled via built-in digital and analog I/O's. Wireless I/O Gateway ARR600 exhibits integrated communication capability and seamless integration to the SCADA systems.

Wireless I/O Gateway ARR600 is a member of ABB's Arctic product family and part of its 600 Wireless Gateway product series.

With Wireless I/O Gateway ARR600, conventional IEC60870-101 devices can be attached to a modern TCP/IP based IEC 60870-5-104 control system. This is made possible by the protocol conversion from IEC 60870-5-101 to IEC 60870-104. ARR600 also supports Modbus RTU to Modbus TCP protocol conversion.

By using Wireless I/O Gateway ARR600, Ethernet and serial devices can be attached to a TCP/IP based control system. DNP3 serial devices can also be attached to a DNP3 TCP SCADA system. In this case, the DNP3 protocol is transferred to TCP/IP communication (transparent serial gateway mode).

Wireless I/O Gateway ARR600 can be utilized for various industrial and utility applications to maximize the benefits.

- Built-in I/O capability enables the remote monitoring and control of the switching devices
- Integrated protocol conversion enables connecting the legacy serial-based devices into a TCP/IP based supervisory control system (SCADA)
- Ideal for retrofitting by allowing the user to extend the life cycle of existing serial-based substation devices due to the integrated protocol converter
- Remote access to the field devices means less site visits for operations and maintenance
- Industrial grade TCP/IP router: several serial and TCP/IP based field devices can be integrated into a central supervisory and control system (SCADA)
- Optimizing the cost of communication by using public cellular networks

2. Complete communication system

Wireless I/O Gateway ARR600 is part of a complete communication system that consists of Arctic 600 series gateways and a central M2M Gateway ARM600 communication server. The M2M gateway is an essential part of the total communication solution and offers features that are needed to build a reliable end-to-end communication system.

- Static IP addressing for Arctic 600 series devices – Possibility to use operator independent standard SIM cards
- VPN Concentrator – Secure communication between a central location and remote sites
- Arctic Patrol – Centralized device management application for the Arctic 600 series devices monitoring and controlling
- Firewall – A network security system to control the incoming and outgoing network traffic

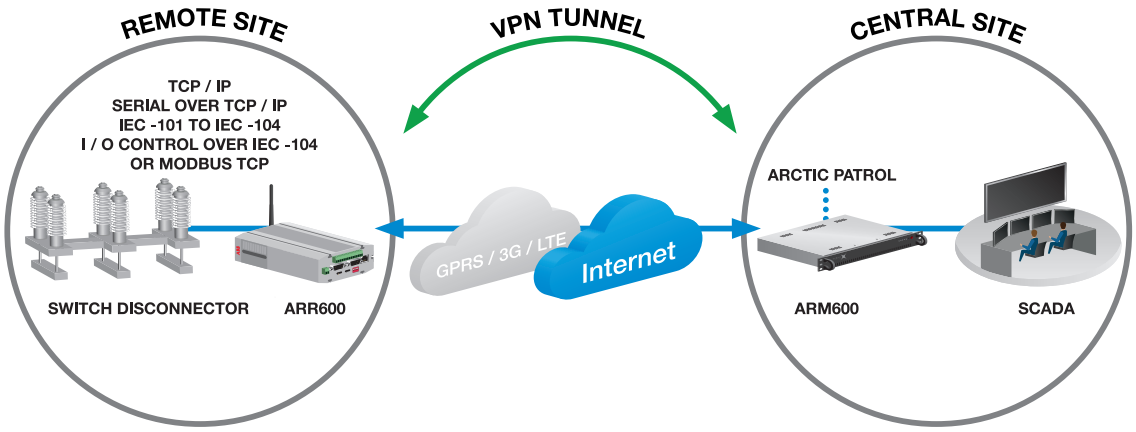


Figure 1. Communication system overview with Wireless I/O Gateway ARR600 and disconnector control

3. Application

Wireless I/O Gateway ARR600 can be used in the feeder automation and substation applications to automate distribution network in cooperation with the other ABB grid automation equipment. Further, the devices can be used in secondary substations for monitoring of transformers as well as other monitoring and control applications.

ARR600 can be used in various industrial applications.

- Generic remote I/O interface for an upper-level system, for example, for directly controlling a load-break switch
- Connecting IEC-101 or Modbus RTU protocol based meters and fault passage indicators into an upper-level system
- Providing a fast, reliable and secure wireless link between Ethernet devices, such as COM600 Substation Management Unit and 615 series protection relays
- Enables remote service and maintenance opportunities by allowing the service personnel to remotely access any type of field devices. For example, these field devices can securely report the condition monitoring information, which allows planning of preventative maintenance.
- Backup connectivity for any communication link

Key features

- Digital I/O and analog input interfaces
- Support for multiple communication protocols for controlling of I/O ports
- Protocol converter for multiple communication protocols
- Enables always-on TCP/IP routing and serial over TCP/IP based two-way communication
- Arctic Patrol connectivity supervision of the communication
- Secure communication maintained with VPN and Firewall

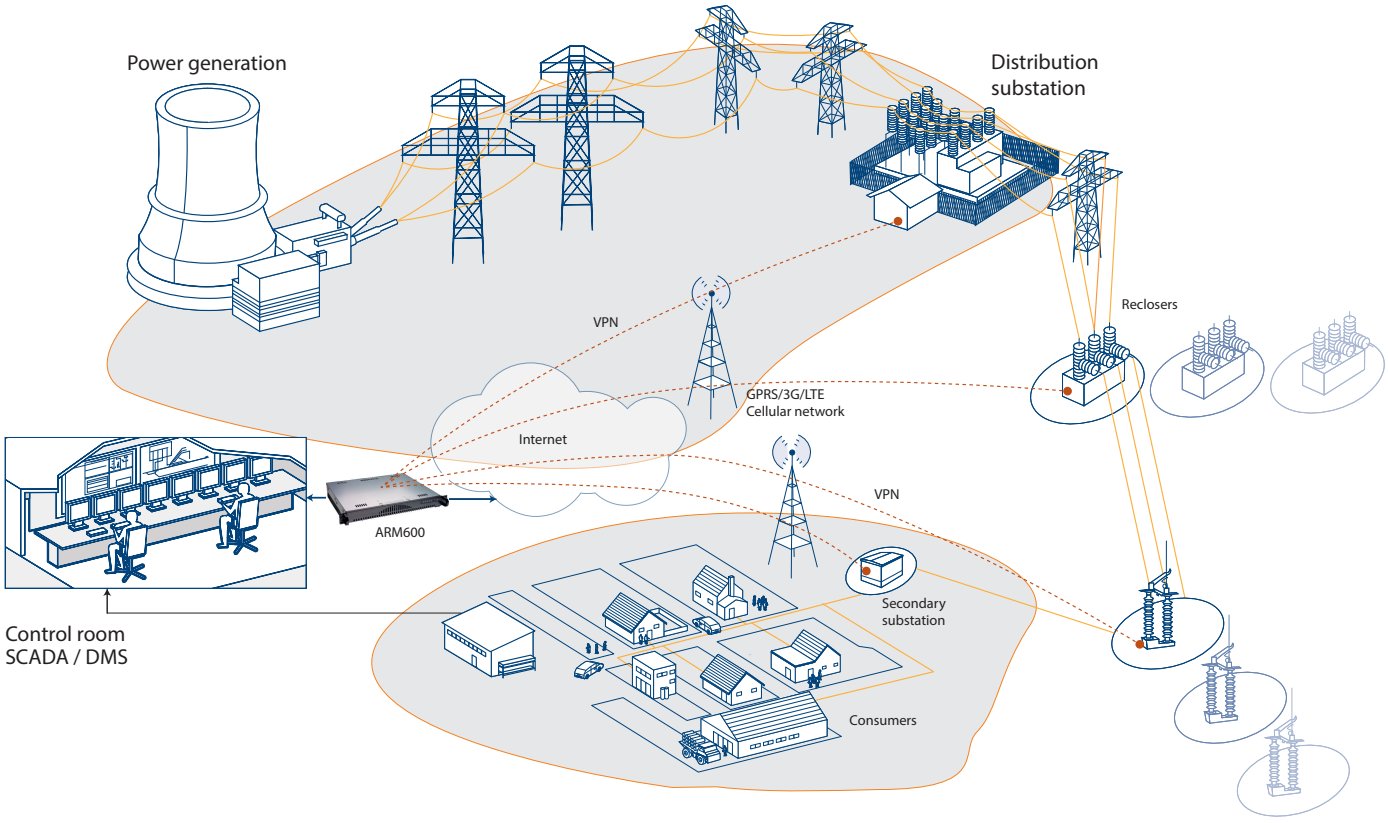


Figure 2. Communication solution in distribution automation overview

4. Physical interfaces

Wireless I/O Gateway ARR600 has two I/O variants called IO-1 and IO-2. IO-1 has 8 binary inputs and 2 binary outputs while IO-2 has 6 binary inputs, 4 binary outputs and 2 analog inputs.

ARR600 has two serial ports (RS-232, RS-485) and one LAN port (RJ-45) for device connectivity.

For communication to an upper-level system, ARR600 supports 4G (LTE) connectivity, but is also compatible with GPRS and 3G..

LED panel description

The LED panel of the device contains ten LEDs to indicate the complete operational status of the device.

Figure 3. LEDs

1 Batt.
2 Status
3 Power/Error
4 Function
5 Eth 1
6 Eth 2
7 Led 1
8 Led 2
9 Led 3
10 Led 4/Cellular

Table 1. Description of available LEDs

LED	Label	State	Description
1	Batt	-	LED unassigned
2	Status	On	VPN connection is up
		Flashing	VPN connection is starting
		Off	VPN connection is disabled
3	Power/Error	On	Operating power is turned on
		Off	Operating power is turned off
4	Function	On	Device is starting
		Flashing	Device is operating normally
		Off	Device is not operational
5	Eth 1	On	Ethernet link is up
		Flashing	Ethernet link is transferring data
		Off	Ethernet link down
6	Eth 2	-	LED reserved for future use
7	Led 1	-	LED reserved for future use
8	Led 2	-	LED reserved for future use
9	Led 2	-	LED reserved for future use
10	Led 4/Cellular	On	This LED is controlled by the internal communication module logic. For more information, see **Tools/Modem info** on the Web HMI.
		Flashing	This LED is controlled by the internal communication module logic. For more information, see **Tools/Modem info** on the Web HMI.
		Off	Cellular connection is inactive

Front panel

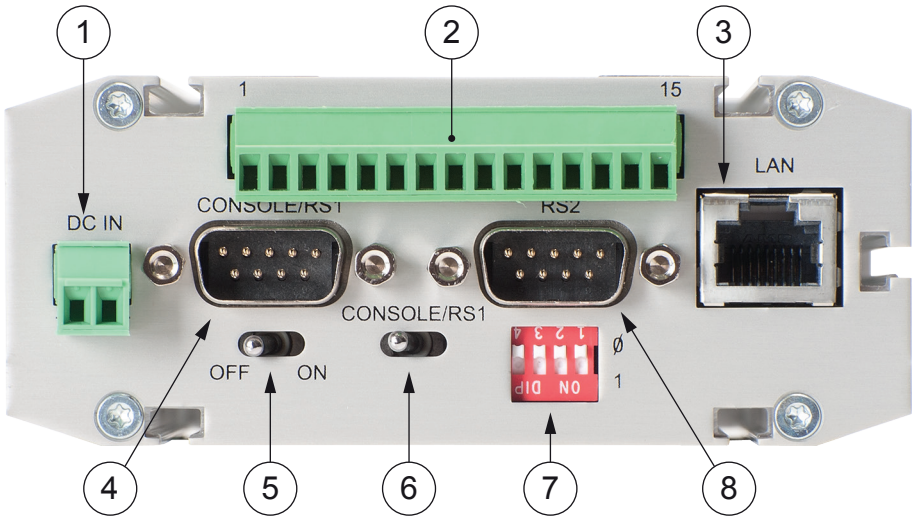


Figure 4. Front panel with IO-1

1 Power supply 12...48 VDC
2 IO-1 digital I/O connector (only in certain product models)
3 LAN/WAN port
4 Console/application serial port
5 Power switch
6 Console/serial port switch
7 DIP switches
8 Application serial port

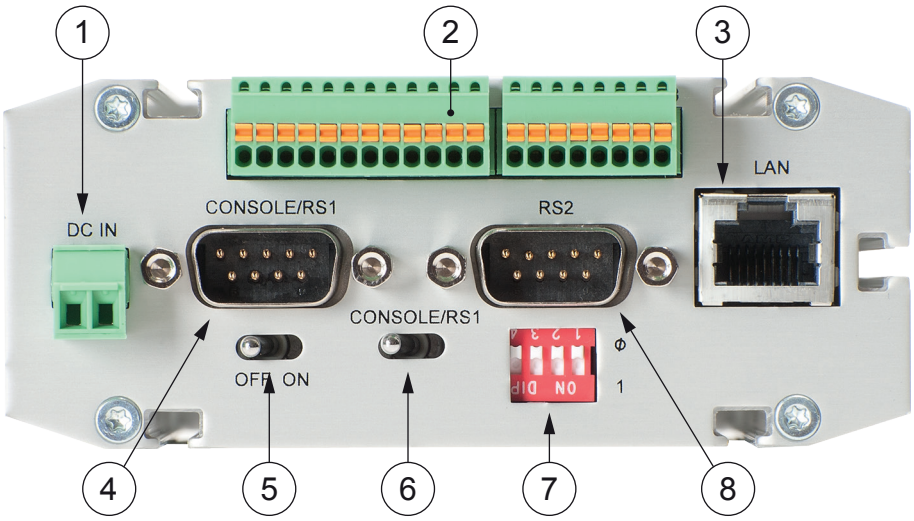


Figure 5. Front panel with IO-2

1 Power supply 12...48 VDC
2 IO-2 digital and analog I/O connector (only in certain product models)
3 LAN/WAN port
4 Console/application serial port
5 Power switch
6 Console/serial port switch
7 DIP switches
8 Application serial port

Back panel

Figure 6. Back panel

1 Protective earth screw
2 Antenna connector SMA (female)
3 SIM card slot

Antenna panel description
The SIM card slot and antenna connector can be found on the antenna panel.

5. Communication

Wireless I/O Gateway ARR600 provides a complete solution for integrating the remote serial (RS-232/RS-485) or Ethernet devices with a central management system over a GPRS, 3G or LTE connection. Several interfaces are available for field device connectivity: digital inputs and outputs, analog inputs, serial and Ethernet ports. Industrial protocols IEC-104 and Modbus TCP are supported for the SCADA connectivity. With the Wireless I/O Gateway ARR600 protocol conversion feature, conventional IEC-101 and Modbus serial devices can be connected in a reliable way to modern TCP/IP based IEC-104 and Modbus TCP control systems.

ARR600 provides a secure and reliable communication solution with support for secure VPN communication, static IP routing, an intelligent self-testing system, NAT, port forwarding and a firewall for monitoring IP traffic and blocking unwanted connections.

The inputs and outputs can be accessed and controlled with IEC-104 and Modbus TCP protocols.

More information is available in the Technical data section of this product guide or technical manual available at abb.com/substationautomation.

6. Technical data

Table 2. Dimensions

Description	Value
Width × Height × Depth	108 × 45 × 175 mm (without antenna)
Weight	590...610 g

Table 3. Hardware

Description		Value
Processor environment	Processor	32 bit RISC
	Memory	128 MB Flash
		128 MB RAM
Power	Power supply	12…48 VDC, limited (<240 VA) power source that fulfills the requirements of standard IEC 60950-1 or IEC 62368-1
	Power consumption	ARR600A3261NA: <7W or <66W if DC output loaded ARR600A3262NA: <7W or <36W if DC output loaded
Other	Internal clock	Real time
Approvals		CE
Environmental conditions	Temperature range	-30...+70°C (operating)
		-40...+85°C (storage)
	Humidity	5...85% RH (non condensing)
	Protection class	IP30

Table 4. Supported protocols

Master protocol	Slave protocol
IEC 60870-5-104	IEC 60870-5-101
IEC 60870-5-104	Modbus RTU/ASCII, Modbus TCP
Modbus TCP	Modbus RTU/ASCII
TCP/IP, UDP/IP (DNP3)	Serial gateway - serial port data stream (such as DNP3)

Table 5. Supported protocols for I/O controlling

Master protocol
IEC 60870-5-104
Modbus TCP
SNMP

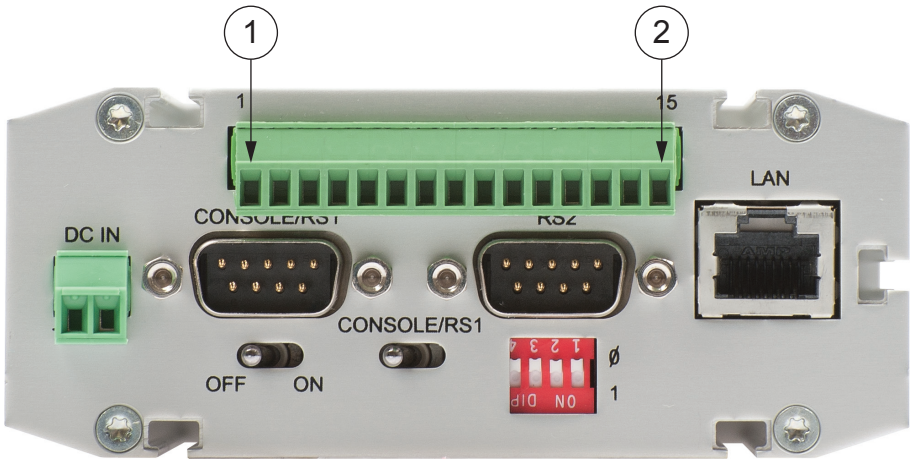


Figure 7. I/O connector pin numbering for IO-1

1 Pin 1
2 Pin 15

Table 6. I/O connector pins for IO-1 (8DI+2DO)

Pin	Symbol	Description
1	V+	Vcc out
2	DI_1	Digital input, 5...60 V
3	DI_2	Digital input, 5...60 V
4	DI_3	Digital input, 5...60 V
5	DI_4	Digital input, 5...60 V
6	DI_5	Digital input, 5...60 V
7	DI_6	Digital input, 5...60 V
8	DI_7	Digital input, 5...60 V
9	DI_8	Digital input, 5...60 V
10	DI_COM	Digital inputs reference input
11	DO_1A	Digital output pole 1, 0...60 V, 100 mA
12	DO_1B	Digital ouput pole 2
13	DO_2A	Digital output pole 1, 0...60 V, 100 mA
14	DO_2B	Digital output pole 2
15	GND	GND output

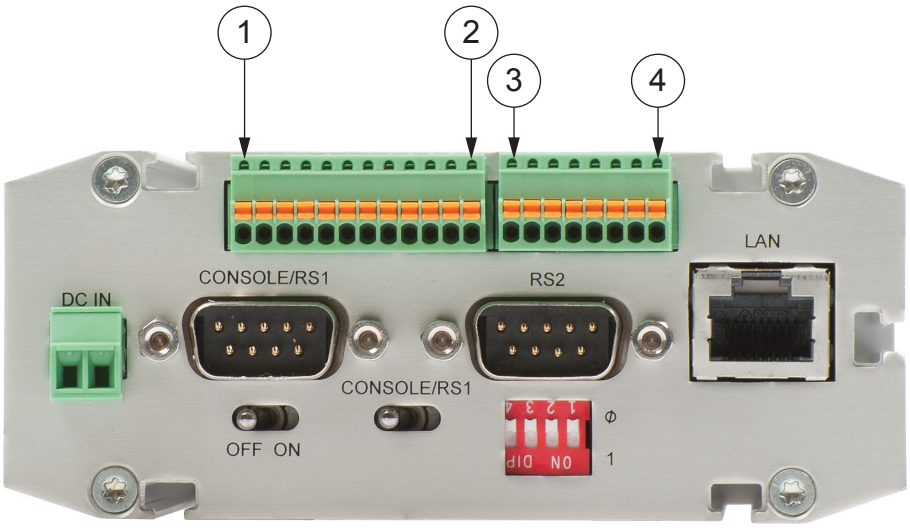


Figure 8. I/O connector pin numbering for IO-2

1 DIO pin 1
2 DIO pin 12
3 AIO pin 1
4 AIO pin 8

Table 7. I/O connector pins for IO-2 (6DI+4DO+2AI)

Pin/connector	Type	Description
AIO_1	Analog input	Positive pin of analog input 1, 4...20 mA, ±1.5 mA (-10...+55°C, 4...20 mA)
AIO_2	Analog input	Negative pin of analog input 1
AIO_3	Analog input	Positive pin of analog input 2, 4...20 mA, ±1.5 mA (-10...+55°C, 4...20 mA)
AIO_4	Analog input	Negative pin of analog input 2
AIO_5	Analog input	Not connected
AIO_6	Analog input	Not connected
AIO_7	Vcc output +	DC supply output +
AIO_8	Vcc output +	DC supply output -
DIO_1	Digital input	5...60 V
DIO_2	Digital input	5...60 V
DIO_3	Digital input	5...60 V
DIO_4	Digital input	5...60 V
DIO_5	Digital input	5...60 V
DIO_6	Digital input	5...60 V
DIO_7	Common	Common pin of the digital inputs
DIO_8	Digital output	Digital output pole 1, 0...60 V, 100 mA
DIO_9	Digital output	Digital output pole 1, 0...60 V, 100 mA
DIO_10	Digital output	Digital output pole 1, 0...60 V, 100 mA
DIO_11	Digital output	Digital output pole 1, 0...60 V, 100 mA
DIO_12	Digital output	Common pin of the digital outputs

Table 8. Network interfaces

Description		Value
Ethernet ports	Ethernet/LAN	10/100 Base-T. Shielded RJ-45
		1.5 kV isolation transformer
		Ethernet IEEE 802-3, 802-2
Serial ports	Serial 1/Console	RS-232 DTE
		Male DB-9 connector
		IEC 60870-5-101 protocol support
		Full serial and modem signals
		300...460 800 bps
		Data bits: 7 or 8
		Stop bits: 1 or 2
		Parity: None, Even, Odd
		Flow control: None, RTS/CTS
		Protection: 15 kV ESD and short circuit
		Console: RS-232, 19200 bps, 8 data bits, 1 stop bit, no parity (8N1)
	Serial 2	RS-232 DTE, RS-422, RS-485 (selectable)
		Male DB-9 connector
		IEC 60870-5-101 protocol support
		Full serial and modem signals
		300...460 800 bps
		Data bits: 7 or 8
		Stop bits: 1 or 2
		Parity: None, Even, Odd
		Flow control: None, RTS/CTS
		Protection: 15 kV ESD and short circuit

Table 9. Electromagnetic compatibility tests

Description		Reference
Emission tests according to the test specification IEC 61850-3 (Edition 2.0 2013-12)	Radiated disturbance	CISPR 16-2-3
	Conducted disturbance	CISPR 16-2-1
Immunity tests according to the test specification IEC 61850-3 (Edition 2.0 2013-12)	Electrostatic discharge (ESD)	EN 61000-4-2 (2008-12)
	Radiated radiofrequency electromagnetic field	EN 61000-4-3 (2006-02)
	Electrical fast transient (EFT)	EN 61000-4-4 (2012-04)
	Surge	EN 61000-4-5 (2005-11)
	Conducted radiofrequency electromagnetic field	EN 61000-4-6 (2008-10)
	Power frequency magnetic field	EN 61000-4-8 (2009-09)

Table 10. RoHS and REACH compliancy

Description	Reference
Directive	RoHS directive 2002/95/EC
	REACH directive 2006/1907/EC

7. Mounting

The devices have been equipped with mounting arrangements that are specially designed for DIN rail mounting. A set of DIN rail mounting clips is recommended to be used when mounting. The device should be mounted preferably inside a robust, locked and weatherproof control cabinet.

As the device uses a cellular radio for data transmission, the surrounding environment can negatively affect the efficacy of these radio signals. Therefore, if a device with the antenna is mounted on the antenna connector, the unit should not be placed in a location where the radio signal might be shadowed, and therefore deteriorated by nearby obstacles or enclosures.

The large metallic surfaces, racks or walls with metallic structures (cabling, concrete iron, and so on) may degrade the antenna performance to a very high extent. In this case, it is highly recommended to use the optional external antenna with appropriate cable. This allows for better positioning of the devices, antennas and thus optimal performance.

Another restriction to the positioning of the device during installation is that it should be mounted in such a way that the required environmental conditions that are set in the Technical data section of this product guide are met.

8. Ordering data

The product label contains basic information about the unit such as product name, serial number and Ethernet MAC address.

The product label is found at the bottom of the device.

Table 11. Ordering data

Description	ARR600A3261NA	ARR600A3262NA
Radio IF	LTE	LTE
Data speed max	See the mobile data reference guide (2NGA001029).	See the mobile data reference guide (2NGA001029).
LAN/WAN	1	1
RS-232/RS-485	2	2
SIM card	1	1
Supply voltage	12...48 VDC	12...48 VDC
Modbus RTU to Modbus TCP conversion	x	x
IEC-101 to IEC-104 conversion	x	x
DNP3 serial over TPC/IP	x	x
IO-1 (8DI+2DO)	x	-
IO-2 (6DI+4DO+2AI)	-	x
Supported protocols for I/O controlling	IEC-104, Modbus TCP, SNMP	IEC-104, Modbus TCP, SNMP

9. Accessories and ordering data

Table 12. Accessories

Description	Order code
DIN rail mounting kit	2RCA028234
3G puck antenna (SMA male)	2RCA037240
I/O connector (IO-1 variants)	2RCA037243
I/O connector (IO-2 variants) analog input connector	2RCA037244
I/O connector (IO-2 variants) digital input connector	2RCA037245
Power supply (excluding power cord)	2RCA037246
Accessory kit	2RCA037645
Power cord (European plug)	2RCA037647
SMA(m)/FME(m) adapter[1)]	2RCA037659
Laird LTE antenna 700...2700 MHz (SMA male)	2RCA037660
European power supply (including 2RCA037246 and 2RCA037647)	2RCA041790
I/O connector kit (IO-2 variants) (including 2RCA037244 and 2RCA037245)	2RCA041792

1) Needed for single SIM Arctic products, if the third party antenna's connector type is FME female

10. Tools

The devices can be configured using a graphical user interface via a Web based browser. A conventional console interface is also provided. Software updates or configuration adjustments for the devices can be made remotely by uploads over the network from the central control center.

11. References

The abb.com/substationautomation portal provides information on the entire range of distribution automation products and services.

12. Document revision history

Document revision/date	Product version	History
A/2015-12-18	A	First release
B/2017-06-07	3.3	Content updated
C/2017-09-22	3.4	Content updated to correspond to the product version
D/2019-04-24	3.4.7	Content updated to correspond to the product version
E/2021-05-31	3.4.7	Content updated
F/2021-12-10	3.4.7	Content updated
G/2022-06-20	3.4	Content updated

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