Waveguide Access Point WGA631

Product Guide

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1. Description

WaveGuide Access Point WGA631 is a communication adapter for wireless local area networks (LANs) using waveguide technology. The adapters are attached to the waveguide tubes of the switchgear to provide communication for protection and control devices supporting the Ethernet based IEC 61850-8-1 protocol including the standard's GOOSE services.

2. Application

WGA631 enables in combination with the waveguide tube interference-free wireless Ethernet communication between IEDs in switchgear. WGA631 acts as a converter between the galvanic connection and the wireless 5 GHz signal for the WaveGuide IEC 61850 station bus communication. The unit can be used in both gas (GIS) and air (AIS) insulated switchgear. The WGA631 unit is placed next to the IED in the low voltage compartment of the switchgear. The mounting and integration of the waveguide tube in the switchgear is done by the switchgear manufacturer. The WGA631 unit is equipped with three galvanic RJ-45 interfaces which enable the connection of up to three IEDs located in the same low voltage compartment to one WGA631 unit. However, only one coaxial antenna cable is needed to connect the WGA631 to the waveguide tube. Furthermore, WGA631 does not require any communication mapping

WGA631 contributes to a reduced need for wiring between switchgear and speeds up the commissioning phase of the switchgear. The communication system can be extended if needed by extending the waveguide tube and adding WGA631 units.

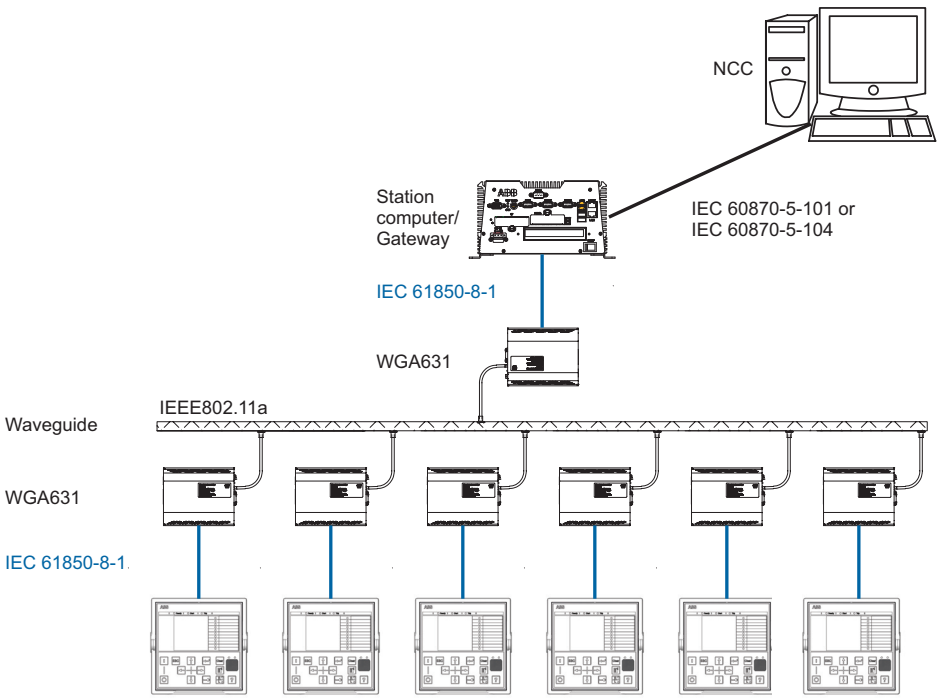


Fig. 1 WGA631 application example

3. Technical data

Dimensions

Width	141.5 mm
Height	71.0 mm
Depth	200.0 mm
Weight	1.25 kg

Power supply

Description	Value
U_{aux} nominal	110...230 V AC 110...220 V DC
U_{aux} variation	70...110% of U_n (77...253 V AC) 70...110% of U_n (77...242 V DC)
Power consumption	~5 W

Connectors

Interface	Type
Waveguide connector	R-SMA cable connector [1)]
Ethernet connector	RJ-45 galvanic LAN connector

1) For example, Telegärtner R-SMA, J01150R0001

Communication

Protocol type	IEC 61850

Degree of protection by enclosure

Front side	IP 20
Top	IP 40
Rear side	IP 40

Environmental conditions and tests

Environmental conditions	
Operating temperature range	-10...+55ºC (continuous)
Transport and storage temperature range	According to IEC 60068-2-48 Test values: • -20...+70°C

Environmental tests	
Dry heat test (humidity <50%)	According to IEC 60068-2-2 Test values: • 96 h at +65ºC • Start-up at +55ºC
Dry cold test	According to IEC 60068-2-1 Test values: • 96 h at -40ºC • Start-up at -40ºC

Electromagnetic compatibility tests

Power supply module	
The EMC immunity test level meets the requirements listed below:	
1 MHz burst disturbance test, class IV: • Common mode • Differential mode	According to IEC 61000-4-4 4 kV 2 kV
Fast transient disturbance tests:	According to IEC 61000-4-4 4 kV
Surge immunity test:	According to IEC 61000-4-5 4 kV, line-to-earth 2 kV, line-to-line
Electromagnetic emission tests: • Conducted, RF emission (mains terminal) • Radiated RF emission	According to EN 55011 EN 55011 (0.15...30 MHz) IEC 61000-4-3 (80 MHz..,.1 GHz, 10 V/m)

Enclosure	
The EMC immunity test level meets the requirements listed below:	
Electrostatic discharge test, class IV: • For contact dischargeCommon mode • Differential mode	According to IEC 61000-4-4 +/- 8 kV +/- 8 kV
Radio frequency interference tests: • Conducted, common mode • Radiated, amplitude-modulated	 According to IEC 61000-4-6 10 V (rms), f = 150 kHz...80 MHz According to IEC 61000-4-3 10 V/m (rms), f = 80...3000 MHz

Ethernet and WGA port	
The EMC immunity test level meets the requirements listed below:	
Fast transient disturbance test, class III	According to IEC 61000-4-4 2 kV
Radio frequency interference tests: • Conducted, common mode	According to IEC 61000-4-6 and IEC 60255-22-6 10 V (rms), f = 150 kHz...80 MHz

Mechanical tests

Vibration tests (sinusoidal)	According to DNV Standard for Certification No. 2.4, April 2001

EMC compliance

Complies with the EMC directive 89/336/EEC

Product safety

Complies with the LV directive 73/23/EEC

RoHS compliance

Complies with the RoHS directive 2002/95/EC

System requirements for the WINBOX tool

Hardware requirements
10 MB free hard disk space
RJ-45 interface for configuration with WINBOX
RS-232 interface for configuration via script file download.

Supported operating systems
Microsoft Windows 2000, SP4 or later
Microsoft XP Professional Edition, SP2 or later
Microsoft Windows Server 2003

Default IP address configuration

Description	Value
LAN-IP1	192.168.0.1
LAN-IP2	192.168.0.2
LAN-IP3	192.168.0.3
WLAN-IP	192.168.1.1

4. Physical interfaces

1. RJ-45 Ethernet connector 1
2. Service port
3. RJ-45 Ethernet connector 2
4. RJ-45 Ethernet connector 3
5. Earthing screw
6. Coaxial waveguide interface
7. Auxiliary power supply connector
8. Power-up LED
9. Start-up LED
10. LAN and diagnostic LEDs
11. DIN rail mounting

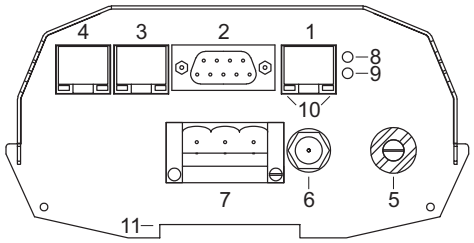
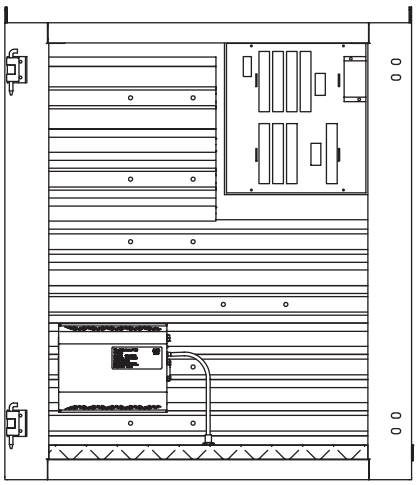


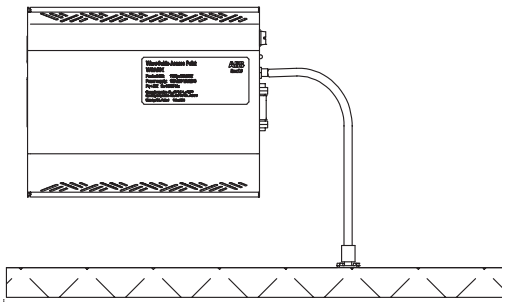
Fig. 2 Physical interfaces

5. Mounting methods

WGA61 can by means of a standardized (EN 50022, DIN 46277, BS 5584) 35 mm top-hat mounting rail be mounted either horizontally or vertically in the low voltage compartment of the switchgear. However, horizontal mounting is recommended as it offers the best passive cooling of the unit. The clamps on the backside of WGA631 enable disassembly of the unit if needed. The WGA631 unit should be placed near the IED in order to minimize the length of the CAT 7 cable and the coaxial antenna cable.

Fig. 3 Horizontal mounting in the low-voltage compartment of the switchgear

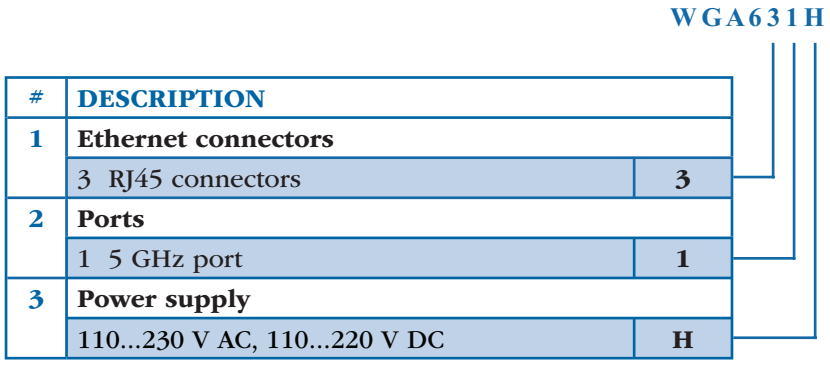




6. Selection and ordering data

The type and serial number label identifies the Waveguide Access Point unit. The label is placed the upper part of the unit. The order number consists of a string of codes generated from the hardware modules of the unit.

Use the ordering key information in Fig. 4 to generate the order number when ordering.



#	DESCRIPTION	
1	**Ethernet connectors**	
	3 RJ45 connectors	**3**
2	**Ports**	
	1 5 GHz port	**1**
3	**Power supply**	
	110...230 V AC, 110...220 V DC	**H**

Fig. 4 Ordering key

7. Accessories and ordering data

The delivery of the WGA631 only includes the actual communications adapter. Accessories like cables, antennas and connectors are not supplied by ABB. Furthermore, the waveguide tube that connects the switchgear and enables interference free wireless communication must be produced and integrated in the switchgear by the switchgear manufacturers. Waveguide tube drawings can be downloaded from the inside.abb.com/substationautomation web portal.

Waveguide tube drawings

Document	Document ID
Waveguide tube - Variants for different switchgear types	1VB8001475
Waveguide tube – End cover	1VB8001476
Waveguide tube - Details of the hole for the antenna interface	1VB8001478

8. Tools

All WGA631 units are delivered with the same set of preconfigured IP addresses for the galvanic RJ-45 interfaces and the wireless coaxial interface. The IP addresses can be changed using the Winbox configuration tool. Winbox further enables the configuration of WGA631 as either a Master (AP-bridge) or a Client in slave mode (wds-slave).

The Winbox tool can be downloaded from the WGA631 unit's flash memory or from the inside.abb.com/substationautomation web portal. WGA631 can in addition to the Winbox configuration tool be configured with the unit's RS-232 interface and a terminal program such as the open source "TeraTerm" software or any other RS-232 terminal program for script file download.

Tools

Tool	Version	Document ID
Winbox WGA631 configuration tool	1.0	1MRS756597

9. Terminal diagram

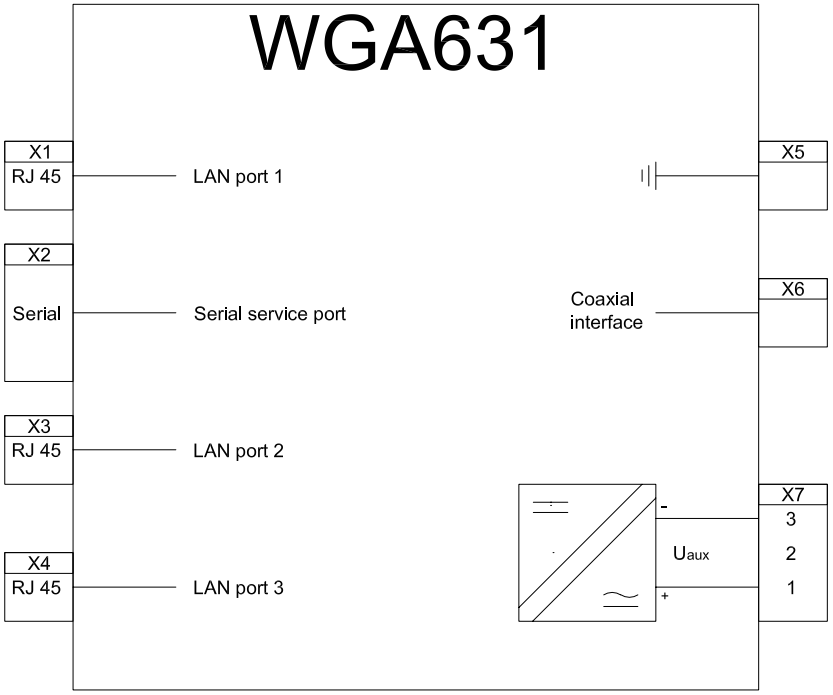


Fig. 5 Terminal diagram

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