Installation and commissioning manual

Waveguide Access Point WGA631







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Conformity

This product complies with the directive of the Council of the European Communities on the approximation of the laws of the Member States relating to electromagnetic compatibility (EMC Council Directive 2004/108/EC) and concerning electrical equipment for use within specified voltage limits (Lowvoltage directive 2006/95/EC). This conformity is the result of a test conducted by ABB in accordance with Article 10 of the directive in agreement with the product standards EN 50263 and EN 60255-26 for the EMC directive, and with the product standards EN 60255-6 and EN 60255-27 for the low voltage directive. The IED is designed in accordance with the international standards of the IEC 60255 series.

Safety information



Non-observance can result in death, personal injury or substantial property damage.



Only a competent electrician is allowed to carry out the electrical installation.



National and local electrical safety regulations must always be followed.



The device contains components which are sensitive to electrostatic discharge. Unnecessary touching of electronic components must therefore be avoided.

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Section 1 Introduction

1.1 This manual

Installation and Commissioning Manual contains instructions on how to install and commission WGA631. The manual provides procedures for mechanical and electrical installation as well as configuration. The chapters are organized in the chronological order in which WGA631 should be installed and commissioned.

1.2 Intended audience

This manual addresses the personnel responsible for installing and configuring WGA631 and the related software.

1.3 Product documentation

1.3.1 Document revision history

Document revision/date	Product version	History		
A/06.08.2008	1.0	First release		
B/23.06.2009	1.1	Second release		



Download the latest documents from the ABB web site <u>http://</u>www.abb.com/substationautomation.

1.3.2 Related documentation

Name of the document	Document ID
WGA631 WINBOX tool	1MRS756597
Waveguide tube drawings	1VB8001475 1VB8001476 1VB8001478

1.4 Document symbols and conventions

1.4.1 Safety indication symbols

This publication includes the following icons that point out safety-related conditions or other important information:



The electrical warning icon indicates the presence of a hazard which could result in electrical shock.



The warning icon indicates the presence of a hazard which could result in personal injury.



The caution icon indicates important information or warning related to the concept discussed in the text. It might indicate the presence of a hazard which could result in corruption of software or damage to equipment or property.



The information icon alerts the reader to relevant facts and conditions.



The tip icon indicates advice on, for example, how to design your project or how to use a certain function.

Although warning hazards are related to personal injury, it should be understood that operation of damaged equipment could, under certain operational conditions, result in degraded process performance leading to personal injury or death. Therefore, comply fully with all warning and caution notices.

1.4.2 Document conventions

The following conventions are used for the presentation of material:

- Abbreviations in this manual are spelled out in the section "Glossary". In addition, the section contains descriptions on several terms.
- Dialog box elements are shown in bold, for example: Click **OK** to confirm.

Section 2 WGA631 overview

2.1 Overview

WGA631 is a waveguide access point which is used to connect IEDs over the TCP/ IP network by using the same Ethernet link.

- LAN/WLAN connectivity with IEC 61850-8-1 protocol for IEDs with an RJ-45 LAN interface
- Auxiliary power supply
- Disturbance recorder file upload via IEC 61850
- Configuration via the serial interface, TCP/IP-based Telnet connection or the Windows-based WINBOX configuration tool.



Figure 1: Example of a typical system setup

2.2 Product version history

Product version	Release date	Product history
1.0	06.08.2008	Product released

2.3 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

2.4 Authorization

The user name and password settings are predefined for the WGA631 unit.

Table 1:	Login information	
Description		Value
ABB Login		admin
Password		<empty></empty>

2.5

System requirements for the WINBOX tool

- Windows 2000, Windows XP or Windows Server 2003 operating system
- 10 MB free hard disk space
- RJ-45 interface for configuration with WINBOX
- RS-232 interface for configuration via script file download.

Section 3 Mounting requirements

Coax connectors and fixing threads are necessary components for a waveguide system inside a switchgear.



Follow the mounting requirements to set up the system properly.



Figure 2: Waveguide tube coax connectors and fixing threads, 1VB8001475



Figure 3:

Details for coax connector, 1VB8001478



Figure 4: End cover for the waveguide tube, 1VB8001476

3.1 Horizontal displacement

The wireless communication system works properly with the horizontal displacement of Z < 5 mm between the waveguide tubes. Larger gaps are not allowed because the transmitting power should be limited to 0 dBm.



Figure 5: Horizontal displacement

3.2 Vertical displacement

The wireless communication system works properly with the vertical displacement of Y < 5 mm between the waveguide tubes. Larger offsets are not allowed because the transmitting power should be limited to 0 dBm.



Figure 6: Vertical displacement

3.3 Angle-related displacement

The wireless communication system works properly with the angle displacement of $< 10^{\circ}$ between the two waveguide sections. Larger angles are not allowed because the transmitting power should be limited to 0 dBm.



Figure 7: Angle-related displacement

3.4 Horizontal distance between two waveguide tubes

The wireless communication system works properly with the deviation of X < 5 mm for the distance between the waveguide tubes. Larger gaps are not allowed because the transmitting power should be limited to 0 dBm.



Figure 8: Horizontal distance between two waveguide tubes

Section 4 Mounting

4.1 Mounting WGA631

- Install the WGA631 unit on the DIN rail system. The clamp on the backside of WGA631 allows also the disassembly of the unit by pushing it to the DIN rail under an angle of 90°.
- 2. Place WGA631 near the IED.



Pay attention to the length of the CAT 7 and the antenna cable during the installation.

Section 5 Connecting

5.1 Connecting the RJ-45 LAN cable

- 1. Connect the RJ-45 LAN cable, that is CAT 7, between the IED and WGA631.
- Connect the LAN cable to the LAN connector, for example, to Port 1 of WGA631. The other end of the cable is connected to the IED's Ethernet communication port.

5.2 Connecting auxiliary power and earthing

1. Connect the auxiliary power. The voltage range for the external power connection U_{aux} is 110-220 V DC / AC.



Figure 9: Screw terminal of U_{aux} connection

 Table 2:
 Screw terminal connectors

Screw terminal	AC	DC
1	L	+
2		
3	Ν	-

2. Connect the earth of the WGA631 unit to the protective earth of the low voltage compartment.



The earthing screw on the right side of the screw terminal is available for the protective earth conductor.

 Connect solid, low-impedance operational earthing to the earthing surface inside the low voltage compartment. The cross-section of the earth wire must be at least 2.5 mm².

Section 6 Configuring

See the IED manual for the IED's communication properties before connecting to the Ethernet adapter. You also need basic understanding of the Ethernet and TCP/ IP technology to configure the network.

6.1 Configuring via WINBOX

WGA631 fulfils the typical features for standard routers. In this case only the preferred configuration of WDS is used for the waveguide network technology to get the full functionality for substation automation communication.

WGA631 can be configured either as a Master (AP-bridge) or a Client in slave mode (wds-slave).

A point-to-point WLAN link is used to connect two networks in AP-bridge or wdsslave mode. For example, as an Ethernet bridge, WGA631 connects two Ethernet networks. The WDS-bridge mode in the waveguide application is used for transparent and fast transmission of all Ethernet packets and also for all GOOSE messages which are transmitted as VLAN-tagged packets. All clients can be configured as standard modules; only the physical and wireless IP addresses have to be adjusted. Each IED can be connected to a client router to communicate in the system. All routers work in the same physical network and communicate in the same wireless network.



Figure 10: Example configuration with one master and client

6.1.1 Installing and starting WINBOX

The WINBOX tool is stored on the WGA631 web interface. The tool is also available on the ABB web site.

- 1. Copy the winbox.exe file to the local hard disk.
- 2. Double-click the winbox.exe file to start the WINBOX tool.
- 3. Connect WGA631 to the service PC via an Ethernet cable.

6.1.2 Connecting to WGA631

1. Start the WINBOX tool.

🔳 WinBox Lo	ader v2.2.10	
Connect To:	00:0C:42:1E:85:99	Connect
Login:	admin	
Password:		Saus
	🗖 Keep Password	
	Secure Mode	Remove
	Load Previous Session	Tools
Note:	ABB	
Address 🛆	User Note	



The WINBOX mask enables connection to the WGA631 unit via the Ethernet.
 Click to search for WGA631 units with an Ethernet interface.



Figure 12: Available Ethernet units

The list shows all the available Ethernet units in the connected segment.

- 3. Select the WGA631 unit to be configured.
- 4. Click **Connect** to open the configuration window.

6.1.3 Configuring address and interface lists

- 1. Click **Interfaces** to check that the required interfaces ether1-3 and wlan1-3 are available.
- 2. Click **IP** and **Addresses** to check that the IP addresses are available.

admin@00:0C:42	:1E:85:9	9 (ABB) - WinBox א	/2.9.51					
C ⁴								
Interfaces	-	Interface List						×
Wireless	+	/ %	rei l					
PPP		Name (Tune		MTIL Ty Bate	Bx Bate	Ty Pac By [ac
Bridge	R	bridge1	Bridge		1500 7.3 kbps	4.0 kbps	3	3
IP	R	ether1	Ethernet		1500 7.3 kbps	4.0 kbps	3	3
n Des fore	R	ether2	Ethernet		1500 4.3 kbps	0 bps	3	0
Houting	B	e-swlan1	Wireless (Athens A	B5413)	1500 4.5 kbps	0 bps	6	0
Ports	DR.	A 4-bwds1	WDS	,	1500 4.3 kbps	0 bps	3	0
Queues								
Drivers								
System	Þ							
Files								
Lon								
SNMP								
Ulana								
D r	116	Address List				X		
Hadius								
Tools	° ≖					_		
New Terminal		Address /	Network E	Broadcast	Interface			
Telnet		÷192.168.0.2/24	192.168.0.0 1	192.168.0.25	5 ether2			
Password		+ 192.168.0.3/24	192.168.0.0	192.168.0.25	i5 ether3			
Certificate		192.168.1.1/24	192.168.1.0 1	192.168.1.25	15 wlan1			
Make Supput if								
Manual								
manual								
Exit								
5								

Figure 13: Verifying interfaces and IP addresses

• If the IP addresses are not visible, click +.

Interfaces Interface List X PPP Nation Tope MTU To Rate To Report Bridge Nation Tope MTU To Rate To Report Bridge Nation Tope MTU To Rate To Report Bridge Nation Tope MTU To Rate Tope Nation R 4 ends Element 1500 35 kbps 0 ends 4 R 4 ends Element 1500 35 kbps 0 po 5 0 R 4 ends Element 1500 35 kbps 0 po 5 0 Pots DRA exward Viceless Rhibro: AR5413 1500 47 kbps 1465 bps 2 2 Owners DRA exward WDS 1500 168 kps 2 2 2 Owners New Terminal Kaddress List X X X X Tahod Resound Network	■ admin@00:0C:42:11	E:B5:99 (ABB) - Win	Вох v2.9.51				
PPP Name Type NTU Tx Rate Reveal Top 2 To	Interfaces Wireless	Interface List	× =				×
Svin" Uses Raduu Image: Constraint of the state of	PPP Bridge IP P Routing P Ports Queues Drivers System P Files Log SNMP	Name R bridge1 R ¢pether1 R ¢pether2 R ¢pether3 R ¢swilan1 DRA ♦swids1	Type Bridge Bridge Ethornet Ethornet Ethornet Wireless (Atheros AR5413) WDS	MTU Tx Rate 1500 7.3 kbps 1500 2.8 kbps 1500 3.5 kbps 1500 3.5 kbps 1500 1.5 kbps 1500 1.6 kbps	Rx Rate 2.6 kbps 1426 bps 0 bps 1465 bps 1465 bps	Tx Pac Rx Pa 3 6 5 5 6 2	4 2 0 2 2
Certificato Make Suport II Manual Eixit Eixit	Sixim Users Radius Tools New Terminal Teinet Password	Address	Network Broadcas	t Interface	×		
	Certificate Make Supout.rif Manual Exit						

Figure 14: Displaying missing IP addresses

3. Insert the network settings for the available Ethernet interfaces ether1-3.



Figure 15: Configuring Ethernet interface



Make sure that the IP address has the suffix /24 which represents the subnet mask information. The first 24 bits of the IP address indicate the subnetwork 255.255.255.0.

- 4. Click **OK** to close the window.
- 5. Click +.
- 6. Configure the WLAN interface.



Figure 16: Configuring WLAN interface

For example, the IP address range can be 192.168.x.y.

- x = 0 Ethernet interface subnet for ether1
- x = 1 WLAN interface subnet

```
y^{[1]} = 1 ether1
y^{[1]} = 1 wlan1
```

If several IP addresses are configured, all available addresses are listed in the address list.

admin	n@00:0C:	42:1E	85:99 (ABB) -	WinBox v	2.9.51			
0								
Inter	rfaces	- [📲 Address L	ist				×
Wire	eless		• - /	- 50 P	9			
PPP	,				Mahurah	Description	Interfere	
Bride	ne .		+ddress ++ 192.1	68.0.1/24	192.168.0.0	192.168.0.255	ether1	_
IP		N	÷192.1	68.0.2/24	192.168.0.0	192.168.0.255	ether2	
- IF	Co	-	÷192.1	68.0.3/24	192.168.0.0	192.168.0.255	ether3	
Hou	iong		132.1	00.1.1724	132.108.1.0	132.168.1.200	WIGHT	
Ports	\$							
Que	ues							
Drive	ers							
Syste	tem							
Files	•							
Log								
SNM	ИP							
User	rs							
Radi	lius							
Tool	ls	Þ						
New	v Terminal							
Teln	het							
Parr	eword							
Certi	ificate							
Mak	in Cupout	őf						
Man Man	te stapout							
Man E D	nuai	_						
E st								
~								
ö								
ler								
D								
Ř								
ž								

Figure 17: List of several configured IP addresses

6.1.4 Adding and configuring bridge

6.1.4.1 Adding bridge

- 1. Click **Bridge**.
- 2. Click + to add a new bridge.
- 3. In the **Name** box, type a name for the new interface.

^[1] This is the last number of the IP address.



Figure 18: Adding a new bridge

4. Click **OK** or **Apply** to confirm.

6.1.4.2 Configuring bridge

- 1. Double-click an existing bridge, for example, **bridge1**.
- 2. Select the **STP** tab.
- 3. Under Protocol Mode, click stp.

📲 Bridge					
Bridges Ports Fill	ters Broute NAT Host	s			
+ - \star 🗙					
Name	A MAC Address	Mode			
R bridge1	00:00:42:1E:85:99	stp		1	
88 Interface 	idge1>		×		
General STP 9	itatus Traffic		ОК		
- Protocol Mode -		[Cancel		
🔿 nonej 💿 stp	🔿 rstp		Applu		
Prior	ity: 8000	hex			
	00.00.20		Disable		
Max Message A(ge: 100:00:20		Comment		
Forward Dea	aly: 00:00:15		Сору		
Transmit Hold Cou	nt: 6		Bemove		
Ageing Tin	ne: 00:05:00				
disabled runn	iing				

Figure 19: Selecting stp protocol mode

- 4. In the **Priority** box, type a value, for example 8000, for test purposes.
- 5. Click **OK** to confirm.

6.1.4.3 Configuring ports

- 1. Click **Ports** to configure the port and to add bridge ports to the interface.
- 2. Select the bridge port.
- 3. Select the **Ports** tab.
- 4. Click + to add a new port.
- 5. In the **Interface** list, click the correct interface, for example ether1.
- 6. In the Bridge list, click bridge1.Leave the values in the Priority and Path Cost boxes as shown in the figure.

Bridge Bridges Ports	Filters Broute NAT H	osts			2
Interface ether1 General Statu Interface: Bridge: Priority: Path Cost: Edge: Point To Point: External FDB: disabled	▲ Bridge bridge1 ether1 bridge1 80 10 auto auto auto	Priority (h 80	Path Cost 10 X OK Cancel Apply Disable Comment Copy Remove	Root Pat 0 0 50	Role designated port designated port root port designated port



7. Click **OK** or **Apply** to confirm.

Bridg	e				_				×
Bridges	Ports	Filters	Broute	NAT	Hosts	\$			
		(2)	-						
			-						
Inte	erface	Δ	Bridge			Priority (h	Path Cost	Root Pat	Role
eth	ier1		bridge1			80	10	0	designated port
eth	er2		bridge1			80	10	0	designated port
eth	ier3		bridge1			80	10	0	designated port
I wla	an1		bridge1			80	10	0	disabled port

Figure 21: Example of bridge configuration



Repeat steps 3-7 to configure more Ethernet or WLAN ports.

6.1.5 Configuring wireless interface

- 1. Click Wireless.
- 2. Click the **Wireless** tab.
- 3. In the **Mode** list, click **ap bridge** to set the master's mode. Apply the WLAN settings according to the figure.

Interface <wlan1></wlan1>	×
General Wireless Data Rates Advanced WDS	ОК
Radio Name: 00026F47F06A	Cancel
Mode: ap bridge	Apply
SSID: 🔽 ABB	Disable
Band: 5GHz	Comment
Frequency: 5180	Scan
Scan List:	Freq. Usage
Security Profile: default	Align
Frequency Mode: manual txpower	Sniff
Country: no_country_set	Snooper
Antenna Gain: 0 de	3i
DFS Mode: none]
Proprietary Extensions: post-2.9.25]
Default AP Tx Rate:	200
Default Client Tx Rate:	200
Default AuthenticateDefault ForwardHide SSID	
disabled running searching for network	

Figure 22: WLAN settings for the WGA631 master

📲 Interface <wlar< th=""><th>1></th><th></th><th>×</th></wlar<>	1>		×
General Wireless	Data Rates Advanced WDS	L.,	OK
Radio Nam	e: 00026F47F06A		Cancel
Mod	e: wds slave	-	Apply
SSI	D: 🔽 ABB		Disable
Ban	d: 5GHz	-	Comment
Frequenc	y: 5180	-	Scan
Scan Lis	st:		Freq. Usage
Security Profil	e: default	-	Align
Frequency Mod	e: manual txpower	-	Sniff
Countr	y: no_country_set	- I	Snooper
Antenna Gai	n: 0 c	1Bi	
DFS Mod	e: none	-	
Proprietary Extension	s: post-2.9.25	-	
Default AP Tx Rat	e: 🗖 🚺 t	ps	
Default Client Tx Rat	e: 🗖 t	ps	
	 Default Authenticate Default Forward Hide SSID 		
disabled running	searching for network		

Figure 23: WLAN settings for the WGA631 client

4. Click the **Data rates** tab page to set the data rates of the wireless interface.

Interface <wlan1></wlan1>	×
Wireless Data Rates Advanced WDS Nstreme	OK
- Rate	Cancel
- Supported Rates B	Apply
T1Mbps 2Mbps 5.5Mbps 11Mbps	Disable
- Supported Rates A/G	Comment
6Mbps 9Mbps 12Mbps 18Mbps 24Mbps 36Mbps 48Mbps 754Mbps	Coon
- Basic Rates B	Fred Lleade
🗖 1Mbps 🔲 2Mbps 🔲 5.5Mbps 🔲 11Mbps	Alian
- Basic Rates A/G	Spiff
I 6Mbps I 9Mbps I 12Mbps I 18Mbps □ 24Mbps □ 36Mbps □ 48Mbps ▼ 54Mbps	Spooper
	Jhooper
disabled running searching for network	



5. Click the **WDS** tab to set the parameters.

Interface <wlan1></wlan1>	×
Advanced WDS Nstreme Tx Power Status	OK
WDS Mode: dynamic	Cancel
WDS Default Bridge: bridge1	Apply
WDS Default Cost: 100	Disable
WDS Cost Range: 50-150	Comment
WDS Ignore SSID	Scan
	Freq. Usage
	Align
	Sniff
	Snooper
disabled Jrunning searching for network	

Figure 25: Setting WDS

6. Click the **Tx Power** tab to set the parameters.



Figure 26: Setting Tx power

6.2 Configuring via serial interface

6.2.1 Configuring serial interface

1. Connect WGA631 to the serial line RS-232 interface of the service PC via a null-modem cable and start the serial line tool.

🛄 Tera Term - COM2 ¥T				
File Edit Setup Control	V Tera Term: Serial port	setup	×	<u>ال</u>
	Port:	COM1 -	ок	
	Baud rate:	115200 💌		
	Data:	8 bit 💌	Cancel	R
	Parity:	none 🔹		
	Stop:	1 bit 💌	Help	
	Flow control:	none		
	Transmit del	ay ec/char 1 m	sec/line	
				_



2. Open the terminal settings, for example with TeraTerm, and enter the correct parameters.

Table 3:	Example of the terminal program RS-232 settings		
Description		Value	
Port		1	
Baud rate		115200	
Data		8 bit	
Parity		none	
Stop		1 bit	
Flow control		none	

6.2.2 Logging in

1. Switch on the WGA631 unit to display the serial line prompt.

File Edit Setup Control Window Help admin Password: MMM MMM KKK TITITITIT KKK	
admin Password: MMM MMM KKK TTTTTTTTT KKK	
MMM MMM KKK TTTTTTTTT KKK	
MMMM KKK TITITITITIT KKK MMM MMM MMM III KKK KKK KKK MMM MMM MMM III KKK KKK RRR 000000 TTT III KKK KKK MMM MMM MMM III KKKKK RRR RR 000 000 TTT III KKK MMM MMM III KKK RRR RR 000 000 TTT III KKK KKK MMM MMM III KKK KRR RRR 0000000 TTT III KKK KKK	
MikroTik RouterOS 2.9.51 (c) 1999-2007 http://www.mikrotik.com/	
(1 messages not shown) jan/01/2000 00:03:00 system,error,critical login failure for user ip address via local	
jan/01/2000 00:03:39 system,error,critical login failure for user ip address via local	
jan/01/2000 00:04:13 system,error,critical login failure for user tip address vi a local	
Jan/01/2000 00:06:24 system,error,critical login failure for user ladmin via loc al	
Jan/01/2000 00:01:51 System, error, critical login failure for user ip autress via jan/01/2000 00:11:51 System, error, critical login failure for user tadmin via loc al	
jan/01/2000 00:12:16 system,error,critical login failure for user ip address via local	
jan/01/2000 00:49:47 system,error,critical login failure for user tadmin via loc al [admin00RB] >	- 1

Figure 28: Entering user name and password

- 2. At the command prompt, type **admin** as the ABB Login and press **Enter**.
- 3. Leave the password empty and press Enter.
- 4. Download the Script-file configuration in WDS-Mode with predefined IP addresses.
 - 4.1. File.
 - 4.2. Send.
 - 4.3. Select the script file, for example WGA631_script_file_XY.txt, from a folder or hard disk.

The terminal program allows you to control the downloading procedure. The final description gives an overview of the current configuration.

6.2.3 Default IP addresses

Table 4:

Default IP address configuration

LAN/WLAN	IP address
LAN-IP1	192.168.0.1
LAN-IP2	192.168.0.2
LAN-IP3	192.168.0.3
WLAN-IP	192.168.1.1



IP addresses can be changed.

Section 7 Technical data

7.1 Dimensions

Table 5:

WGA631 dimensions and weight

Dimension	Value
Width	141.5 mm
Height	71 mm
Depth	200 mm
Weight	1.25 kg







WGA631 dimensions

7.2

Interfaces

Table 6: WGA631 interfaces

Description	Value
Power supply	110…220 V DC (-30% / +10%) 110…230 V AC Pq < 5 W
Storing temperature	-20+70 °C / -4+158 °F
Operating temperature	-10+55 °C / +14+131 °F
Waveguide connector type	R-SMA Cable connector ¹⁾
Ethernet connector type	RJ-45 galvanic LAN connector
Protocol type	IEC 61850

1) For example, Telegärtner R-SMA, J01150R0001

7.3 Environmental conditions and tests

Table 7: Environmental conditions

Environmental tests

Description	Value
Service temperature range	-10+55 °C / 14131 °F (continuous)
Transport and storage temperature range	-20+70 °C / -10158 °F according to IEC 60068-2-48

Table 8:

Description	Value
Dry heat test	According to IEC 60068-2-2 Test values: • 96 h at +65 °C • Start-up at +55 °C
Dry cold test	According to IEC 60068-2-1 Test values: • 96 h at -40 °C • Start-up at -40 °C

7.4 Electromagnetic compatibility tests

Table 9: Power Supply module

Description	Value
1 MHz burst disturbance test, class IV	According to IEC 61000-4-4
Common mode	4 kV
Differential mode	2 kV
Fast transient disturbance tests, class IV	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	According to EN 55011
Conducted, RF-emission (Mains term.)	EN 55011 (0.1530 MHz)
Radiated RF-emission	IEC 61000-4-3 (80 MHz1 GHz, 10 V/m)

Table 10: Enclosure		
Description	Value	
Electrostatic discharge test, class IV	According to IEC 61000-4-2	
For contact discharge	+/- 8 kV	
For air discharge (without LED) +/- 8 kV		
Radio frequency interference tests		
Conducted, common mode	According to IEC 61000-4-6 10 V (rms), f = 150 kHz80 MHz	
Radiated, amplitude-modulated	According to IEC 61000-4-3 10 V/m (rms), f = 803000 MHz	

Table 11:Ethernet and WGA port

Description	Value
Fast transient disturbance tests, class III	According to IEC 61000-4-4 2 kV
Radio frequency interference testsConducted, common mode	According to IEC 61000-4-6 and IEC 60255-22-6 10 V (rms), f = 150 kHz80 MHz
CE approval	Complies with the EMC directive 89/336/EEC and the LV directive 73/23/EEC

Table 12:	Standard tests

Mechanical tests	
Vibration tests (sinusoidal)	According to DNV

Table 13:

Power consumption

Description	Value
Running	~ 5 W

Section 8 Ordering data

The order code for the waveguide access point is WGA631.

The WINBOX configuration tool can be downloaded from the ABB intranet.

Section 9 Applicable standards and regulations

IEC 61850-6 IEC 61850-7-2 IEC 61850-7-3 IEC 61850-7-4 IEC 61850-8-1 IEEE 802.11a

Section 10 Glossary

CAT 7	Cable standard for Ethernet and other interconnect technologies that can be made to be backwards compatible for example with traditional CAT 5 Ethernet cable.
DIN rail	A standardized 35 mm wide metal rail with hat-shaped cross section.
EMC	Electromagnetic compatibility
Ethernet	A large, diverse family of frame-based computer networking technologies that operate at many speeds for LANs interconnecting computing devices. Ethernet is a trademark of Xerox Corporation, Inc. and defined in the IEEE 802.3 standard in which computers access the network through a CSMA/CD protocol.
GOOSE	Generic Object Oriented Substation Event
IEC	International Electrotechnical Commission
IEC 61850	International standard for substation communication and modelling.
IED	Intelligent Electronic Device
IP	Internet Protocol
IP address	Internet protocol address is a set of four numbers between 0 and 255, separated by periods. Each server connected to the Internet is assigned a unique IP address that specifies a location for the TCP/IP protocol.
LAN	Local area network
LED	Light-emitting diode
LON	Local operating network
LV	Low voltage
PC	Personal Computer; Polycarbonate
RJ-45	Galvanic connector type.
RS-232	Serial interface standard.
TCP/IP	Transmission Control Protocol / Internet Protocol
Telnet	An Internet protocol that lets the user log onto a remote computer using a username and password.
VLAN	Virtual LAN
WDS	Wireless distribution system

WGA631	Waveguide access point
WINBOX	Windows-based software for configuring and monitoring WGA631.
WLAN	Wireless LAN



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