VX-100 User Manual

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1 Safety

1.1 Safety notes

Read these operating instructions carefully before working with the radio system. This applies especially to the installation, commissioning, and maintenance of the radio system.

Always inspect the equipment before use. This includes checking switches, joysticks, mechanical parts, and display for any damage. If any damage is found these issues should be corrected before use. Please contact Vision Remote for further guidance.

It is recommended that the carrying harness is used when the VX-100 RU is operated. This will keep the operator`s hands free to safely use switches, joysticks, and the touch display.

Only the VX-100 Battery is accepted for use in VX-100 RU.

1.2 Operator authorization and responsibility

The VX-100 system utilizes user access control. All logon of users can be password restricted so any unauthorized use can be eliminated.

It is possible to select different applications different users have access to.

This means that certain users have the option to run several machines while others may have limited access to only one machine.

Ensure that your user session is terminated before shutting down for any breaks, lunch or at the end of the day.

The operator has responsibility for operating the machine in control in a safe manner. This means the operator should always have visible view of the machine and the surrounding area .

1.3 Safety instructions for Installation and Operation

- Inspect the VX-100 system for damage before installation or operation starts
- Do not use outside temperature range
- Do not immerse in water
- Never use or charge damaged batteries
- Only charge batteries by use of charging methods approved by Vision Remote AS
- Only to be installed and used by qualified personnel
- The VX-100 system shall be mounted in a compass safe distance of more than 5 meters

Vision Remote AS denies all responsibility for damage caused to equipment or personnel due to misuse of this equipment.

1.4 Modification of Equipment

Any changes or modifications to any of the equipment not approved by Vision Remote AS may void warranty and/or any third-party approvals.

2 Definitions

VX-100	Industrial radio remote control system approved for use in potentially explosive atmospheres requiring equipment group II (gas /dust environments).

3 General system information

3.1 VX-100 System description

The VX-100 system consists of the following main units:

- VX-100 RU - Remote Unit
- VX-100 BU - Base Unit
- VX-100 VLAP - Vision Link Access Point
- VX-100 Barrier
- VX-100 EXJB – Junction Box
- VX-100 Battery

In addition, the following accessories are available:

- VX-100 Battery Charger Dual
- VX-100 Docking Station, Passive
- VX-100 Docking Station, Active
- VX-100 Carrying harness
- VX-100 Carrying hook
- VX-100 VisionLink cable
- VX-100 Protection sleeve

Figure 3-1: Some of the main units of VX-100 system: VX-100 RU, VX-100 BU and VX-100 VLAP

Vision Remote VX-100 is a radio remote system designed for control of cranes, winches, pumps etc. in environments with potential explosive atmosphere. The product combines a traditional radio remote control with a rugged computer-based system with a multi-touch screen. Figure 3-2 below shows the VX-100 system principles.

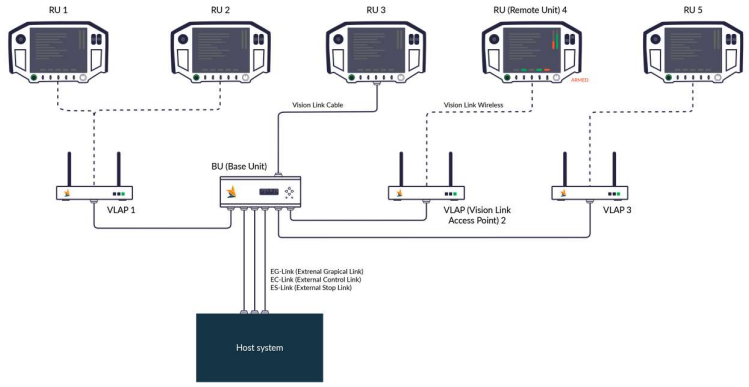


Figure 3-2: VX-100 system concept

The VX-100 RU is carried by an operator near the machinery to be controlled. The user can select the appropriate application which has been tailored for this machine.
Tactile switches and touch screen functions on the VX-100 RU are configurable in SW. This means the same unit may be used for a range of different machinery. The unit is also capable of displaying video streams from strategically located cameras.
The VX-100 RU is connected by wireless link and/or cable to the VX-100 BU, which has an interface to the host system, which again controls the various motors and actuators.
Up to three VX-100 VLAP's may be connected to each VX-100 BU to extend the wireless coverage and/or range. Several VX-100 RU's may be 'paired' for use with the same VX-100 BU. The system will handle one armed VX-100 RU pr. VX-100 VLAP. This means up to three VX-100 RU units can be armed at the same time. If one of the armed VX-100 RU activates the stop function the system will be put into a safe state.

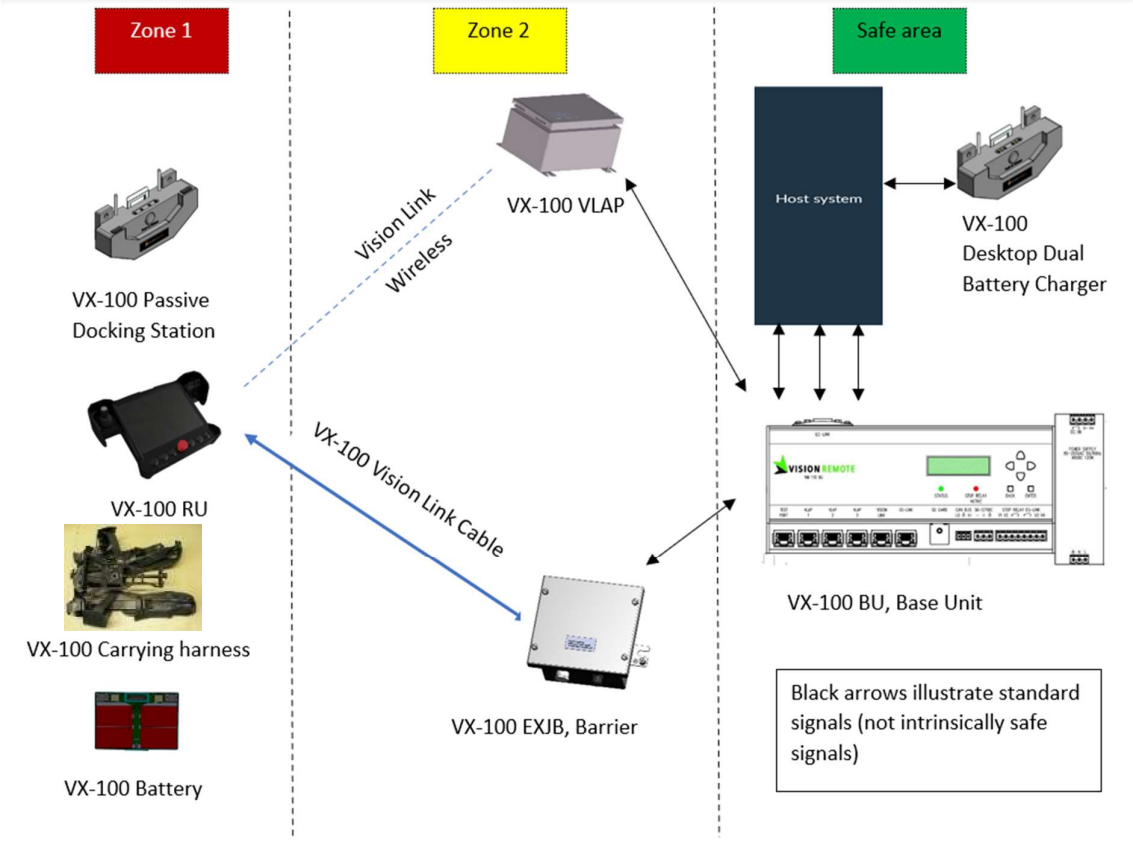


Figure 3-3: Typical VX-100 system arrangement

3.2 Security Features

The VX-100 radio communication signals are encrypted using several safety keys to protect against tampering from a hostile third party. It is also protected against spurious communication errors and interference using state of the art technology.

3.3 Design of the transmitter

The VX-100 RU is designed to be a universal radio remote control. This flexibility makes it easy to meet many customers' demands.

This is achieved by allowing the customer to design their own graphical user interface (GUI) on the display. This gives the customer virtually limitless options to create a look and feel to fit the machine. It is possible to create different applications to run several machines from the same VX-100 RU.

Furthermore, the VX-100 RU can be configured with different switches, joysticks, potentiometers, and encoders for functions that requiring physical movements. All of these are protected by the surrounding handle, so any unintended activation will not occur due to placing the unit upside down.

For more information on configuration possibilities, please contact Vision Remote.

3.4 VX-100 System Safety Features

The system is designed for compatibility with relevant directives for use on land, ships and offshore. The system has built-in safety functions according to ISO 13849 and IEC 62745. This includes a Stop function and redundant communication channels.

The VX-100 RU has several built-in safety features like tilt, shock, and zero-g/free-fall sensors. These sensors can prevent any unintended movements of machinery due to accidents.

When the VX-100 RU is armed and in control of a machine an excessive tilt motion (45° sideways or down, or 60° up from the horizontal position) of the unit will disable user inputs, while a force trigging either shock or zero-g/free-fall will put the system into a safe state.

When the VX-100 RU is placed in a docking station the tilt sensor is disabled.

If a shock or zero-g/free-fall has trigged a STOP activation, follow instructions in chapter 3.12.

In addition, the VX-100 RU also has two vibration motors for haptic feedback, speaker for audio feedback, ambient light sensor for controlling the back light of the display.

3.5 VisionLink communication

The VX-100 system communication consists of two separate channels. These are the C-link and G-link. Combined these are referred as a VisionLink. The C-link is a highly reliable channel with long range but limited data rate, while the G-link is a channel with much higher data rate but limited range.

These channels also include fall back functionality so if one fails communication still runs but refresh rate for the graphical user interface will be lower. If both radio links fail while the system is armed the system will enter a safe state.

This is even applicable when running via cable interface, but of course the range is now limited by the length of the cable.

The RSSI-signals (0-100%) for both C-link and G-link is transferred to the host system via EC-link and EG-link. The PLC can monitor the signal levels and send information to be displayed on the VX-100 RU display.

3.6 STOP function.

The VX-100 BU is designed to fulfill IEC 62745 GSS/ATS and EN ISO 13849 CAT. 3 PLd when the VX-100 RU is armed.

When the VX-100 system is up and running without any errors the STOP-relays will be energized.

Any loss of communication between VX-100 RU, VX-100 BU and VX-100 VLAP while system is armed will cause the system to go into a safe state, meaning the STOP-relays will be de-energized and opened. This can for instance be if the transmitter is out of radio range or runs out of battery.

For systems that utilize the EC-link and/or EG-link to communicate with an PLC or a host system and communication is lost, power-loss or internal failures will also put the system into a safe state.

If this happen, the system will enter a BLOCKED state. Resolving communication issues, re-arming transmitter or manually releasing the blocked situation using menu system on VX-100 BU is required before STOP relays will re-energize. After this is done the system will be operative again.

Please note that only the VX-100 RU initiating STOP can release the blocked situation remotely.

3.7 Pairing of units

The VX-100 system structure allows for pairing of units using a service application. This allows a unconfigured/blank VX-100 RU to be paired with the VX-100 BU by downloading configuration and application files using the VisionLink cable.

If the customer has upgraded/redesigned the configuration/application of a system, any previous paired units will lose their access to the machine. To regain control the VX-100 RU must download the updated application by using the service application.

Pairing using radio communication is not possible.

Both the VX-100 RU and VX-100 BU can support many units. The customer can either have one remote controlling several machines, several remotes controlling one machine or anything between.

This makes the VX-100 system very versatile and suitable for many different operations.

3.8 VX-100 System Status codes

The VX-100 system has several built-in status notifications displayed with the use of LEDs and LCD-display.

The VX-100 RU has two status LEDs. One bi-colored integrated in the ON/OFF switch and one tri-colored LED on the upper side of the display. The VX-100 VLAP has a bi-colored status LED while the VX-100 BU has 1 bi-colored LED, 1 yellow LED and a 2x16 segment LCD-display for status information. Together these can be used to give a quick indication of the system status.

3.8.1 VX-100 RU

Switch Status LED	
Green	Communicating with base unit
Amber	Not communicating with base unit
Red	STOP triggered or other error during armed situation

Display Status LED	
Green - Flashing	Charging
Green - Solid	Fully Charged
Red - Flashing	Low Battery
Red - Solid	Charging error
Blue	System running - No errors

3.8.2 VX-100 BU

Status LED	
Green	System status OK
Amber	System initializing
Red	System fault
Stop relay LED	
Yellow	STOP relays active. System OK
No light	STOP relays not active

LCD-display

Messages displayed on the LCD display will give a direct notification of the status of the VX-100 system.

Status Display	
Idle	System OK
Armed	System armed
Enabled	System Enabled
Fatal	System faulty
No data	No data from PLC
Bad data	Unexpected data format from PLC

3.8.3 VX-100 VLAP

Status LED	
Green	System status OK
Green flashing	System armed
Amber	System initializing
Red	System fault

3.9 Activating VX-100 RU.

- Insert battery or use VisionLink cable
- Turn on VX-100 RU by pressing ON/OFF switch for 1 sec.
- Select user (If more than one user defined)
- Select application to control desired machine
- Arm remote

Ensure that the STOP-switch is released before trying to arm and take control of a machine.

3.10 De-activating VX-100 RU.

- Disarm VX-100 RU
- Close current application running

3.11 Transfer of control between several VX-100 RU units

- Disarm VX-100 RU in control*
- Arm remote to take over control**

*Some system configurations allow several remotes armed at the same time

**Steps for activating the transmitter considered done.

3.12 Re-Activating system after STOP

- Release STOP switch
- Confirm pop-up message
- Arm remote

4 Battery and Battery Charging

4.1 Safety instructions:

- Only use specified battery with the VX-100 RU
- Only use dedicated charger to charge batteries
- Only charge batteries in dry environments
- Only charge batteries in temperatures between 0°C to 45°C.
- Never use or charge a damaged battery
- Disconnect power before cleaning chargers
- Keep contacts free of dirt and other contaminants like water and salt-spray
- Do not short-circuit, damage, open or expose the batteries to fire
- Recycle or dispose old batteries according to respective regulations

4.2 VX-100 Battery

The VX-100 RU uses a Lithium-ceramic rechargeable battery pack with a smart battery management module. The battery is designed to be intrinsically safe. Actions are taken to protect for over-charge, over-discharge, short circuit, over-temperature, and over-current situations.

Operating time with normal use is typically 6 hours. Running applications which requires a lot of processing, like HD-video or in conditions requiring a lot of LCD backlight may reduce operating time.

Recommended storage temperature for the batteries is -20°C to 25°C.

The battery provides a minimum of 6 months shelf life with initial charge of 40%, when stored at 25°C.

Given normal storage and usage the battery delivers 90% or more of its initial capacity after 500 charge/discharge cycles.

The battery status is indicated in upper right corner of the display on the remote unit. In addition, the battery status (0-100% charge) is transferred to the host system via EC-link and EG-link.
It is recommended a low battery warning is given on the display when battery level is below 10%. Time to shut down from 10% charge is more than 10 minutes. This should be enough time to safely change the battery or start charging using cable or unit placed in docking station with charge functionality.
If the battery voltage is too low, the battery is inoperable or damaged there will be no LED indication.

4.3 Battery Charging

There are 3 ways of charging the battery used for the VX-100 RU.

- Charging using a dedicated table charger (battery removed from remote unit)
- Charging using VisionLink cable connected to VX-100 RU
- Charging while VX-100 RU docked in VX-100 Docking Station Active

Charging the battery with a dedicated table charger will fully charge an empty battery in less than 4 hours. Charging using the VisionLink cable is active even if the VX-100 RU is turned off.

Charging the battery using the VisionLink cable while operating the VX-100 RU will take quite a few hours due to limitation of power delivered by the VX-100 Barrier and depending on the CPU load and backlight settings.

Charging the battery using the VisionLink cable while the VX-100 RU is switched off will take approximately 6 hours due to limitation of power delivered by the VX-100 Barrier.

4.4 Replacing battery

The VX-100 RU`s battery is replaced by accessing the battery installed in the battery compartment on the bottom side of the unit.

- Release the two retaining clips
- Remove battery
- Replace battery
- Secure battery by ensuring the retaining clips are locked in position

The battery can be replaced in hazardous area (Zone 1).

NOTE: Ensure gasket is in place and in good condition!

5 Installation

5.1 General installation notes

- Only qualified personnel with knowledge of the electrical system of the machine should install the VX-100 system
- During installation, the entire system/components shall be turned OFF
- During installation please handle the equipment with normal ESD precautions as connections may be done directly on the PCBs. Discharge tools and yourself before any work is done
- If the unit is mounted in an environment with excess vibrations, it`s recommended to fit rubber dampeners to isolate the units.

- All HSE regulations for the technicians must be followed according to local legislation

5.2 Location classes:

The equipment is designed for compliance with the following areas and locations according to IACS and DNV-GL terms for installation of Control and Monitoring Systems on ships:

VX-100 RU:	Portable, Open decks, Control rooms
VX-100 BU:	Control rooms, accommodation, general power distribution zone
VX-100 VLAP:	Open decks (not for mounting in masts)
VX-100 Barrier	Control rooms, accommodation, general power distribution zone
VX-100 EXJB:	Open decks, Control rooms
VX-100 Battery charger:	Control rooms

Note: The VX-100 units must be placed at a safe distance from the steering magnetic compass of at least 5m.

5.3 Earthing and Cables

Ensure that VX-100 BU, power supply and Ethernet cables are connected to protective earth.

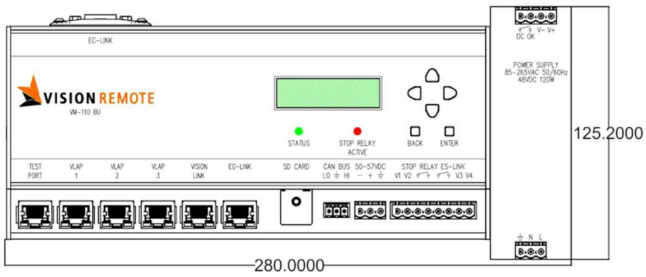
- Only use screened Ethernet cables. All Ethernet cables must be Cat.5e or Cat.6 (S/FTP) or better.
- Maximum length, all Ethernet cables: 100 m

  For VisionLink cable this is the overall length of the cable from the VX-100 BU to the VX-100 RU
- For the VisionLink cable a special cable delivered MUST be used. Maximum length 20 m
- Note that cables may be subject to local installation requirements and approvals.

5.4 Installation of VX-100 BU

The VX-100 BU and power supply are designed for fitting on a DIN-rail inside a cabinet. This can either be an enclosure delivered from Vision Remote AS or installed inside customers enclosure/rack. Access to the VX-100 BU is not necessary during normal operation. The VX-100 BU is not designed for installation on ships bridge, open decks, in masts or on vibrating machinery.

If access to the VX-100 BU while powered is on is required, this is considered as a service function. If enclosure is opened during this operation, please handle the equipment with normal ESD precautions. Discharge tools and yourself before any work is done.



5.4.1 VX-100 BU Connections

The VX-100 BU has six RJ-45 connectors, three terminal blocks, one connection for serial bus and one MicroSD-card slot.

Connector	Description
Test port	RJ45 to test equipment
VLAP1-3	RJ45 connections for up to 3 VX-100 VLAP units
VisionLink	RJ45 cable port for VisionLink connection
EG-link	Ethernet to host system
EC-link	Anybus-module to host system
ES-link	Connections for 2 stop relays. V1-V4 are over-voltage protectors used when inductive loads are connected.
MicroSD-slot	MicroSD-slot for file loading and storage
CAN-bus	For future use
Power supply	100-240VAC/50Hz/120W
	Pin 1 In: PE Pin 2 In: N Pin 3 In: L
	Pin 1 Out: DC ok NO relay (optional) Pin 2 Out: DC ok NO relay (optional) Pin 3 Out: 0VDC Pin 4 Out: 50-57VDC
Supply VX-100 BU	50-57VDC/120W Pin 1: - Pin 2: + Pin 3: PE

Ensure good connection to local ground (see recommended wiring in TD-0020).

Note: Ethernet cables must be grounded at cabinet entry.

5.5 Installation of VX-100 VLAP

The VX-100 VLAP is designed for installation in an outdoor environment/open deck (not in masts).

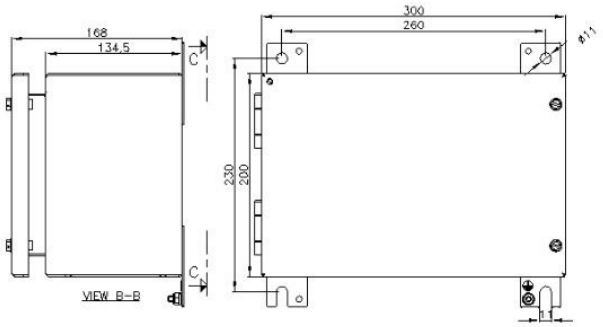
It is recommended that VX-100 VLAP is mounted of a height of at least 2,5m to ensure good wireless coverage

The unit has antennas for both C-link and G-link. It is recommended to mount the unit on a wall or ceiling facing the operational area. As a rule of thumb ensure that there are no objects restricting the view between the VX-100 VLAP and VX-100 RU.

Special precautions shall be taken to prevent corrosion on connection facilities. It is recommended to waterproof antenna connectors with vulcanization tape.

Please note that connection facilities shall be designed so that the electrical conductors cannot be readily loosened or twisted. This can be achieved by using appropriate strain reliefs. Cable gland must be tightened to the correct torque according to installation guide for the installed cable gland

Please visit https://hubbellcdn.com/installationmanuals/HKE_AI_451_321_CABLE%20GLANDS.pdf and find the latest installation guide for the 321-series cable gland



5.5.1 VX-100 VLAP Connections

The VX-100 VLAP has two RJ-45 connectors and three terminal blocks.

Connector	Description
Ethernet in (RJ45)	PoE Power, Ethernet and RS-485 communication from VX-100 BU*
Ethernet in (Screw terminals)	PoE Power, Ethernet and RS-485 communication from VX-100 BU*
Ethernet Out	Ethernet communication to WiFi access point
External status LED	Connections to external two-color LED
12VDC out	12VDC supply for access point Pin 1: 0VDC

	Pin 2: 12VDC
Status LED Connections	Pins for external status LED

*Use either RJ45 or screw terminals for connecting VX-100 VLAP

5.5.2 Terminal connections

RJ-45 / Screw terminal

Pin	Signal	Color
1	RX, DC+	White/Orange
2	RX, DC+	Orange
3	TX, DC-	White/Green
4	Spare	Blue
5	Spare	White/Blue
6	TX, DC-	Green
7	RS-485+	White/Brown
8	RS-485-	Brown

Pinout according to TIA-568B

Terminal	Signal	Color
1	RX, DC+	White/Orange
2	RX, DC+	Orange
3	TX, DC-	White/Green
4	Spare	Blue
5	Spare	White/Blue
6	TX, DC-	Green
7	RS-485+	White/Brown
8	RS-485-	Brown
9	GND	Screen
10	GND	Screen

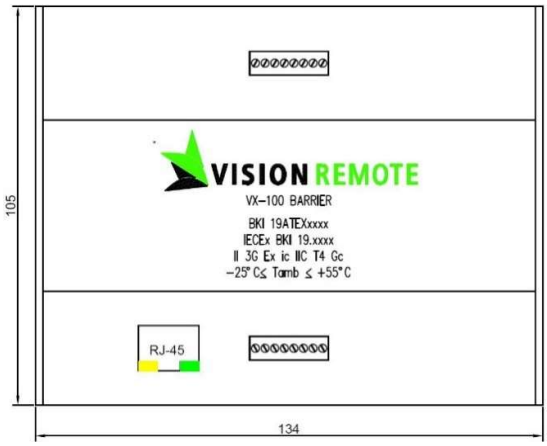
5.6 Installation of VX-100 Barrier

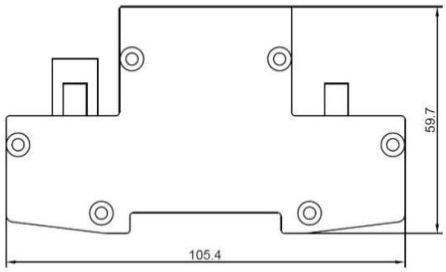
The VX-100 Barrier is designed for installation in an indoor environment.

Special precautions shall be taken to prevent corrosion on connection facilities.

Please note that connection facilities shall be designed so that the electrical conductors cannot be readily loosened or twisted. This can be achieved by using appropriate strain reliefs.

Picture is only informative; the marking info is according to the certification of VX-100 series.





5.6.1 VX-100 Barrier Connections

The VX-100 Barrier has one RJ-45 connector and two terminal blocks.

Connector	Description
Ethernet in (RJ45)	PoE Power and Ethernet from VX-100 BU*
Ethernet in (Screw terminals)	PoE Power and Ethernet from VX-100 BU*
Ethernet out + Power Out	Intrinsic safe Ethernet and power to VX-100 RU

*Use either RJ45 or screw terminals for connecting VX-100 Barrier

5.6.2 Terminal connections

5.6.3 IN - RJ-45 / Screw terminals

Pin	Signal	Color
1	RX, DC+	White/Orange
2	RX, DC+	Orange
3	TX, DC-	White/Green
4	Spare	Blue
5	Spare	White/Blue
6	TX, DC-	Green
7	RS-485+	White/Brown
8	RS-485-	Brown

Pinout according to TIA-568B

Pin	Signal	Color
1	GND	White/Blue
2	GND	Blue
3	TX-, PoE	Orange
4	TX+, PoE	White/Orange
5	RX-, PoE	Green
6	RX+, PoE	White/Green
7	GND	White/Brown
8	GND	Brown
9	GND	Screen
10	GND	Screen

5.6.4 OUT - Screw terminals

Pin	Signal	Color
1	GND	Screen
2	GND	Screen
3	TX-	Black
4	TX+	Red
5	RX-	Brown
6	RX+	Orange
7	GND	Coax Screen
8	GND	Coax Screen
9	POWER+	Coax Core
10	POWER+	Coax Core

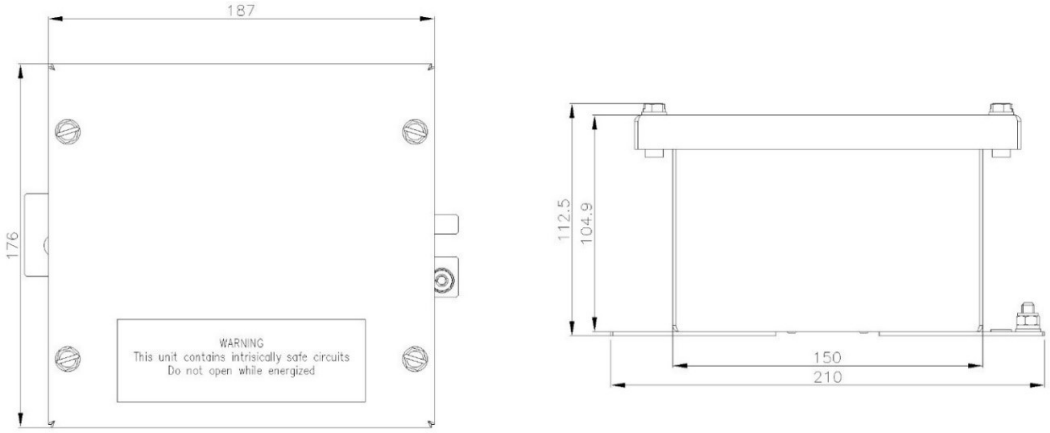
5.7 Installation of VX-100 EXJB

The VX-100 EXJB contains a VX-100 Barrier installed in an IP66 rated enclosure making it suitable for installation in an outdoor environment. See chapter 5.6 for how to connect to the input of the VX-100 Barrier. The VX-100 EXJB is equipped with an output connector suitable for mating with the VX-100 Visionlink cable.

Special precautions shall be taken to prevent corrosion on connection facilities.

Please note that connection facilities shall be designed so that the electrical conductors cannot be readily loosened or twisted. This can be achieved by using appropriate strain reliefs. Cable gland must be tightened to the correct torque according to installation guide for the installed cable gland

Please visit https://hubbellcdn.com/installationmanuals/HKE_AI_451_321_CABLE%20GLANDS.pdf and find the latest installation guide for the 321-series cable gland



6 Maintenance and Service

The VX-100 system is designed for use in tough environments and does not require any special maintenance, but there is always a good idea to take precautions to reduce the risk of any failures. Please follow the maintenance guidelines below to achieve maximum service life and reliability of the system.

- Please clean using a damp cloth and mild soap!
- Do not use any strong solvents for cleaning the VX-100 RU as the display glass may be stained!
- Never use high-pressure cleaner or sharp objects to clean the units!
- Inspect the units for damage regularly. Pay special attention to seals on joysticks and switches. Do not continue to operate if any damage is discovered!
- There are no serviceable parts inside any of the units

If any service is found to be necessary, please contact Vision Remote AS for further guidance.

6.1 Spare parts

Spare parts can be ordered through Vision Remote AS. Please refer to the serial number of units which need service. The serial number is found on a marking label on your unit.

7 Troubleshooting

Problem	Possible Cause	Remedy
Transmitter dead	• Depleted battery • No battery inserted	• Insert, charge or change battery • Try operation with VisionLink cable
Low operation time	• Battery not fully charged • Battery defective	• Charge battery • Replace battery
Short radio range	• Antenna blocked • Antenna cables loose • Frequency collision	• Relocate VX-100 VLAP • Change frequency • Consider redundant VX-100 VLAP
Confirmed interference problems	• Several systems on same frequencies	• Change frequencies used on equipment. Contact Vision Remote AS for guidance

8 Technical Data

8.1 VX-100 RU

Dimensions	415x226x97,5mm (WxHxD)	
Weight	Approx. 4,6 kg - Depending on configuration	
Material	Polyurethane with ESD properties	
IP rating	66/65 – Depending on configuration	
Temperature range	Operating -25 - +55°C	
	Storage -30 - +70°C	
Display	Size:10,1”	
	Resolution: 1920x1200	
	Contrast: >800:1	
	Touch: PCAP multi-touch	
Frequency	C-link: 434.040-434.775MHz 433.075-434.775MHz (*)	G-link: 2,412-2,484/ 4,900-5,850GHz

	868.025-870.975MHz	
Channel spacing	25KHz	20/40MHz
Radio Power C-link	<10mW (434MHz)** <5mW (869MHz)	
Radio Power G-link	2,4GHz/15+-2dBm typ.	5,8GHz/15+-2dBm typ.
Antennas	Internal	
Operating range	C-link: Typical 200m	
	G-link: Typical 50m	
Battery	VR-EXPR0007 - VX-100 Battery	
Operating time	Up to 6 hours	

(*) Frequency range restricted due to spectrum regulations for Short Range Devices for CEPT member countries and the EU. However, the VX-100 system is also capable of a wider range (433.075-434.775 MHz).

(**) Other frequency bands are available. Contact Vision Remote for further guidance

8.2 VX-100 BU

Dimensions	280x125x114mm (WxHxD) (including power supply)	
Weight	1,1 kg	
Material	Aluminum housing	
IP rating	20	
Temperature range	Operating 0 - +55°C	
	Storage -30 - +70°C	
Safety Level Functions	EN ISO 13849 CAT. 3 PLc*	*When remote armed
Safety Level Stop Function	IEC 62745 GSS/ATS	*When remote armed
	EN ISO 13849 CAT. 3 PLd*	
Stop relay	2x5A/250VAC (**) Duplicated monitored	Non-inductive loads up to 48V/2A do not require using overvoltage protectors
Stop activation delay time	Active stop	<175ms
	Passive stop	<500ms
Power supply	100-240VAC 50/60Hz - 120W	

Note (**): Relay contacts are protected by an internal 5AT fuse (TR5 time lag fuse). Additional external fuse dimensioned for actual load is recommended. See installation drawing, TD-0021, for connection details.
To preserve contact life breaking current should be reduced for DC-voltages above 48VDC (110VDC/0.65A, 220VDC/0.2A).

8.3 VX-100 VLAP

Dimensions	300x263x172mm (WxHxD) (Excl. external antennas)	
Weight	Approx. 3 kg	
Material	Stainless steel	
IP rating	66	
Frequency	C-link: 434.040-434.775MHz 433.075-434.775MHz (*) 868.025-870.975MHz	G-link: 2,412-2,484/ 4,900-5,850GHz
Channel spacing	25KHz	20/40MHz
Radio Power C-link	<10mW (434MHz)** <5mW (869MHz)	
Radio Power G-link	2,4GHz/18dBm	5,8GHz/23dBm
Antennas	C-link	External TNC connector
	G-link	2x External RP-SMA connectors
Temperature range	Operating -25 - +55°C	
	Storage -30 - +70°C	
Operating range	C-link: Typical 200m	
	G-link: Typical 50m	
Power supply	PoE PD 802.3af 37-57VDC	

(*) Frequency range restricted due to spectrum regulations for Short Range Devices for CEPT member countries and the EU. However, the VM-110 system is also capable of a wider range (433.075-434.775 MHz) for operation outside for this area.

(**) Other frequency bands are available. Contact Vision Remote for further guidance

8.4 VX-100 Battery

Dimensions	170,6x239,4x20mm (WxHxD)
Weight	Approx. 1,3 kg
Material	Polyurethane with ESD properties
IP rating	IP66 when inserted into VX-100 RU
Temperature range	Operating -25 - +55°C
	Storage -30 - +70°C
Battery voltage nominal/max	7,5VDC/8.7VDC

8.5 VX-100 Barrier

Dimensions	134x105x59,7mm (WxHxD)
Weight	Approx. 1 kg
Material	Aluminum housing
IP rating	20

Temperature range	Operating -25 - +55°C
	Storage -30 - +70°C
Power supply	PoE PD 802.3af 37-57VDC

8.6 VX-100 EXJB

Dimensions	187x176x112,5mm (WxHxD)
Weight	Approx. 2 kg
Material	Stainless steel
IP rating	66
Temperature range	Operating -25 - +55°C
	Storage -30 - +70°C
Power supply	PoE PD 802.3af 37-57VDC

8.7 Compliance information

8.7.1 CE Compliance

See: DD-0001 VX-100 EU Declaration of Conformity

8.7.2 Maximum transmit power and frequencies:

VX-100 Wireless Link	Max Power	Frequency range
G-Link (WiFi) for RU	17.5 mW	13 overlapping channels each 20 MHz wide and spaced at 5 MHz. Centered at 2.412 to 2.472 MHz.
	62.4 mW	165 overlapping channels each 20 or 40 MHz wide and spaced at 5 MHz. Centered at 5180 to 5825 MHz.
C-Link for RU/VLAP 434MHz	10 mW	434.040-434.775MHz (CEPT ERC Recommendation, band g3)
C-Link for RU/VLAP 869MHz	5 mW	868.025-870.975MHz(CEPT ERC Recommendation, band h1.8)

Other C-link frequency bands are available. Contact Vision Remote for further guidance

Notes:

- The G-link (Wi-Fi) conforms to IEEE 802.11a/b/g/n.
- The 5150 to 5350 MHz frequency range is restricted to indoor use only. Outdoor operation in this range is strictly prohibited.
- C-Link frequency range is restricted by equipment configuration for EU/EFTA area
- The equipment is intended to be used in all EU and EFTA countries.

8.7.3 Maritime and offshore regulations

The VX-100 system has been tested for compliance with environmental requirements for use on ships according to DNVGL-CG-0339 (Environmental test specification for electrical, electronic and

programmable equipment and systems) and DNVGL-OS-D202 (Offshore Standard: Automation, safety and telecommunication systems).

Test reports are available on request from Vision Remote AS.

9 Disposal

Vision Remote AS strive to ensure that our product has a life-cycle that has as low environmental footprint as possible. This is valid from development stages, through production and final into end of life of the products.

Please use local laws for environmental disposal of electronic equipment.

10 Warranty

All units delivered from Vision Remote are thoroughly tested before delivery. If any damage to units are discovered when receiving the shipment, please contact carrier immediately. Vision Remote AS does not cover any damage caused by transport.

As a general warranty all units are delivered with 1-year warranty for workmanship and material defects. Warranty valid 1-year from delivery date.

The warranty covers repairs done at Vision Remote AS premises.

Any excessive misuse, mishandling, modifications, intentional damage, unauthorized repairs of the units can void warranty.

11 IECEx/ATEX

This is a Schedule chapter of the document. Do NOT change without approval from the certification body.

EX markings must be done according to the IS Certification of VX-100

11.1 Grouping and Classification of intrinsically safe apparatus and associated apparatus:

Unit	ATEX marking
VX-100 RU	II 2G Ex ib IIC T4 Gb
VX-100 BU	Not protected
VX-100 VLAP	II 3G Ex ec ic mc IIC T4 Gc
VX-100 Barrier	II (2)G [Ex ib Gb] mc IIC
VX-100 EXJB	II 3(2)G Ex ec [ib Gb] mc IIC T4 Gc
VX-100 Battery	II 2G Ex ib IIC T4 Gb
VX-100 Battery Charger Dual	Not protected

11.2 EX markings:

EX markings of the equipment must be done according to the IECEx/ATEX certificates

ATEX certification (directive 94/9/EC) applies to EX equipment used in Europe, but it is also recognized in most countries in Africa and Asia. ATEX certification is carried out by BKI in Hungary.

ATEX certificate nr: BKI20ATEX0015

IECEx certification is known as "worldwide" EX approval, but is only recognized
legally in Australia and New Zealand without any national certificate. The test reports
IECEx (Ex TR) is accepted in more than 30 IECEx member states, which base their certificate national in Ex TR. IECEx certification is carried out by BKI in Hungary.

IECEx certificate nr.: IECEx BKI 20.0004

11.3 Warning info

- Units that are not classified should be placed in a safe area or in an enclosure that provides the required protection.
- The non-protected units must be positioned in a safe area or be protected by other methods if to be used in hazardous area (E.g. Exde).
- The units must not be used in areas for which they are not approved.
- Damaged marking of equipment is not allowed to use in the hazardous area. In case the marking is not readable or deficient the user must contact Vision Remote AS for repair or service
- *Warning for Remote Unit:* ***Use only replaceable battery pack Vision Remote VR-EXPR0007***
- VX-100 Battery can be removed/replaced in zone 1 if explosive atmosphere is present
- Damaged VX-100 Battery is not usable in the hazardous location.
- Not allowed to repair any elements of VX-100 product family in any not certified repair center. For repair activity the user must contact to Vision Remote AS.

Information in this document is subject to change without further notice.

Vision Remote AS
Wessels veg 95
7502 Stjørdal
Norway

Tel.: +47 99 254 999

post@visionremote.no
www.visionremote.no