

IXrouter3

Installation manual

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Introduction

Thank you for purchasing the IXrouter3. The IXrouter is the standard and most supported hardware for IXON's IXON Cloud. The IXrouter makes it convenient to remotely connect to your equipment, while the built-in firewall keeps your equipment safe from outside threats.

Configuration is as easy as inserting a USB flash drive, which contains your configuration file, into the IXrouter's USB port. The configuration file can be generated from the [Tools] page on the IXON Cloud.

Technical support

If for any reason you need technical assistance, please have a look at our easy-to-read and exhaustive online support articles and guides (support.ixon.cloud), send us an e-mail (support@ixon.cloud), or give us a call at +31 85 744 11 05. Our technical support is available from 8:00 to 17:00 Central European Time, Monday through Friday, and will answer your questions as soon as possible.

If you have a comment, question, or suggestion about any of our products, services, or manuals, don't hesitate to let us know.

Product overview

Seamlessly integrated with the IXON Cloud, the IXrouter is the fastest and safest way to connect your machine to the cloud.

Product family

The IXrouter3 is available in several variations. No matter your situation, you can always connect your machine to the cloud.

Article no.	Ethernet (Global)	3G (Global)	4G-G (Global)	4G-A* (America)	4G-C (China)	Wi-Fi (Global)
IX2400	✓					
IX2401	✓	✓				
IX2405	✓		✓			
IX2403	✓			✓		
IX2404	✓				✓	
IX2410	✓					✓
IX2415	✓		✓			✓

Antenna and SIM card

The 3G, 4G, and Wi-Fi models require antennas, purchased separately.

SIM cards for the 3G, 4G models can be purchased through a telecom provider.

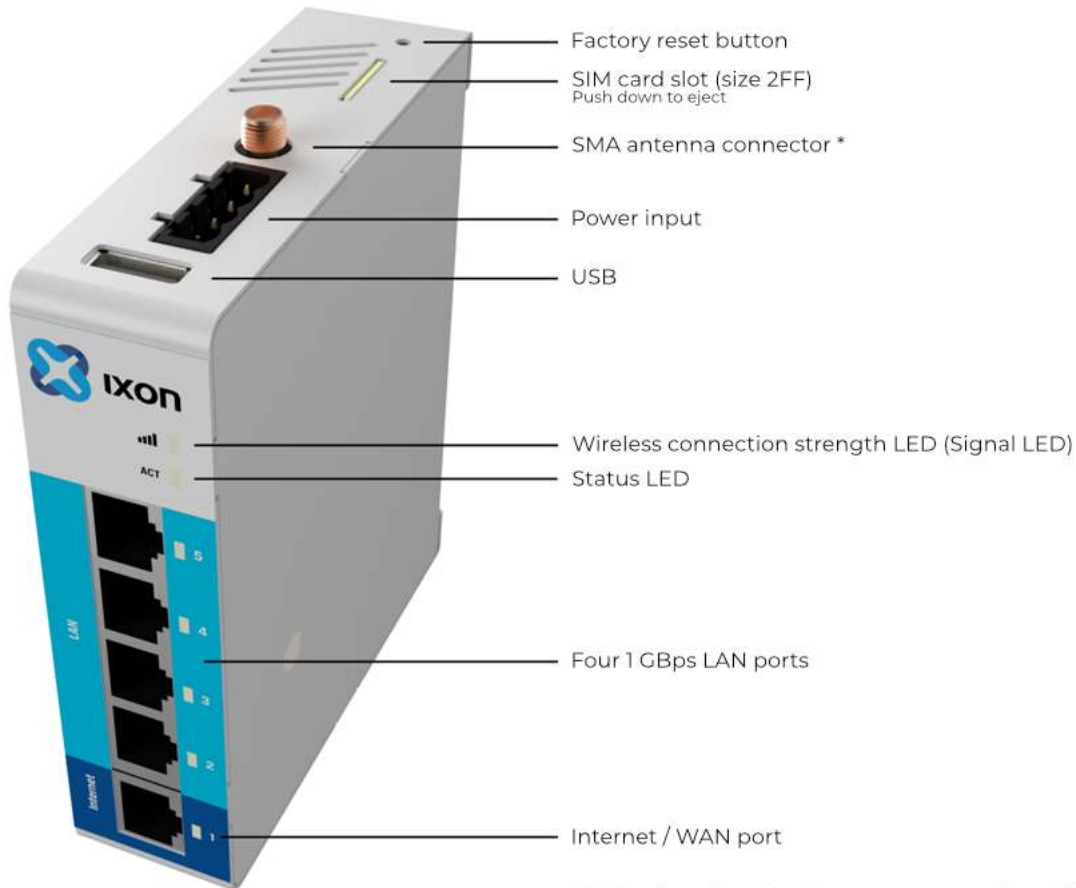
What's in the box?

The following list describes the contents of the package:

- IXON IXrouter3
- 4GB USB flash drive used for configuration
- Female 4-pin plug-in connector with screw connection
(model Weidmuller BL 5.08/04/180 SN BK BX or equivalent)

Hardware overview

The IXrouter3 is created with performance and a multitude of hardware capabilities in mind.



* The function and number of antenna connectors varies per IXrouter variant:
 Ethernet only - no connector
 3G - 1x SMA connector
 4G - 2x SMA connector (MAIN, DIV)
 Wi-Fi - 1x RP-SMA connector
 4G & Wi-Fi - 1x SMA (4G) and 1x RP-SMA connector (Wi-Fi)

i 4G SMA connectors

IXrouter3 4G variants have 2 SMA antenna connectors. The one closest to the power connector is the MAIN. The other connector is the DIV. Always connect an antenna to the MAIN. Connecting an antenna to the DIV is optional.

i 4G & Wi-Fi SMA connectors

The 4G & Wi-Fi variant has 2 SMA antenna connectors. The one closest to the power connector is for 4G. The other connector is for Wi-Fi.

Label

The label can be found on the left side of the IXrouter.

Product number	PN	IX2412	
Serial number	SN	IXrouter 3.0 4G Wifi 16056316	
Media Access Control (MAC) address	MAC	C0:D3:91:31:00:21	
International Mobile Equipment Identity (IMEI) number. (3G and 4G variants only)	IMEI	861107030732243	
Power supply information	Supply	12-24 VDC 2A	
QR code containing the Serial Number			
	Contains FCC ID QQQWF111 & XMR201605EC25A		
	    IXON		
	Vierlingsbeekseweg 52a, 5825AX Overloon, The Netherlands		

Certification information

Specifications

The specifications below are applicable for all IXrouter3 variants. The 3G, 4G, and Wi-Fi variants each have additional specifications, listed separately.

Power supply (recommended)	12-24 VDC +/- 20% LPS 2A
Power consumption	10W max, about 2.5-5W* idle
Operating temperature	-20°C to +65°C
Relative humidity	10 to 95% non-condensing
Operating altitude	Up to maximum 2000m
Storage temperature	-20°C to +65°C
Storage humidity	10 to 95% non-condensing
Storage altitude	Up to maximum 3000m
Ethernet ports	Five 1 Gbps (4x LAN, 1x WAN)
USB	USB 2.0
Processor	MIPS 800 MHz
Digital Input	Yes
Degree of protection	IP20
Mounting	DIN rail
Size	95 x 116 x 28mm (excl. DIN rail clip)
Weight	270-310 gram
Certifications	CE, cULus Listing, FCC Verification, REACH
Warranty	2 years

3G additional specifications:

Protocols and frequencies	UMTS/HSPA+ - 800, 850, 900, 1900, 2100 MHz GSM/GPRS/EDGE - 850, 900, 1800, 1900 MHz
Class	5 bands GPRS/EDGE Class 12
Speed	HSPA+ - Max.14.4Mbps (DL)/Max.5.76Mbps (UL) UMTS - Max.384Kbps (DL)/Max.384Kbps (UL) EDGE - Max.236.8Kbps (DL)/Max.236.8Kbps (UL) GPRS - Max.85.6Kbps (DL)/Max.85.6Kbps (UL) CSD - 14.4Kbps
SIM size	Standard SIM card (size 2FF)
FCC ID	XMR201510UC20

* Variant dependent: Ethernet only (2.5W), other variants (5W)

LTE additional specifications:

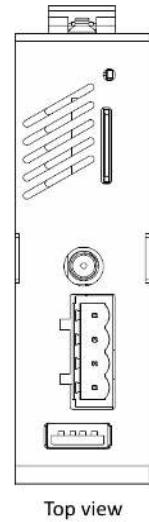
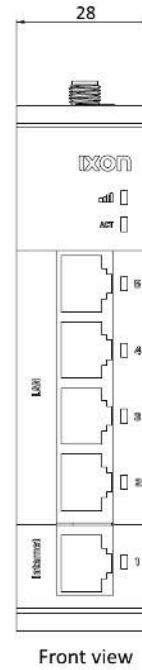
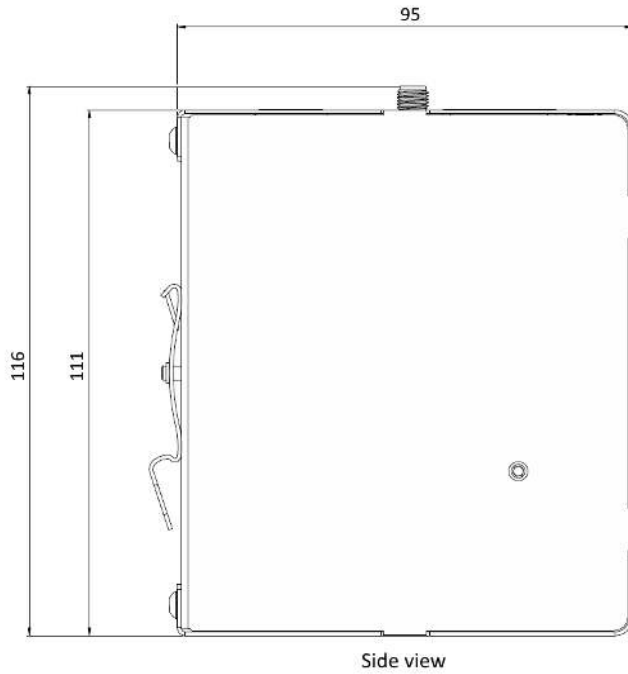
4G-G protocols and frequencies (Global)	FDD-LTE - B1, B2, B3, B4, B5, B7, B8, B12, B13, B18, B19, B20, B25, B26, B28 TDD-LTE - B38, B39, B40, B41 WCDMA - B1, B2, B4, B5, B6, B8, B19 GSM/GPRS/EDGE - 850, 900, 1800, 1900 MHz
4G-A* protocols and frequencies (America)	FDD-LTE - B2, B4, B12 WCDMA - B2, B4, B5 GSM/GPRS/EDGE - 850, 1900 MHz
4G-C protocols and frequencies (China)	FDD-LTE - B1, B3, B8 TDD-LTE - B38, B39, B40, B41 TD-SCDMA - B34, B39 WCDMA - B1, B8 GSM/GPRS/EDGE - 900, 1800 MHz
Speed	LTE-FDD - Max.100Mbps (DL)/Max.50Mbps (UL) LTE-TDD - Max.61Mbps (DL)/Max.18Mbps (UL) DC-HSPA+ - Max.42Mbps (DL)/Max.5.76Mbps (UL) TD-SCDMA - Max.4.2Mbps (DL)/Max.2.2Mbps (UL) WCDMA - Max.384Kbps (DL)/Max.384Kbps (UL) EDGE - Max.236.8Kbps (DL)/Max.236.8Kbps (UL) GPRS - Max.85.6Kbps (DL)/Max.85.6Kbps (UL) CSD - 14.4Kbps
SIM size	Standard SIM card (size 2FF)
FCC ID (4G-G only)	XMR201903EG25G
FCC ID (4G-A only)	XMR201605EC25A

Wi-Fi additional specifications:

WI-FI IEEE 802.11 version	b/g/n
WI-FI modes	Station (Client) Mode and Access Point
Speed	72Mbps
FCC ID	XPYLILYW1

Dimensions

The IXrouter3 is designed to be easily installed on a standard DIN rail. The small size of the IXrouter3 allows you to make efficient use of space. (Unit of measurement: millimeter.)



Installation



Install in an enclosure

These devices are open-type and are meant to be installed in an enclosure which is only accessible with the use of a tool and suitable for the environment.

When designing the layout of your system, always separate the devices that generate high voltage and high electrical noise from the low-voltage, logic-type devices such as the IXrouter3.

Also consider the heat-generating devices and locate the electronic-type devices in the cooler areas of your cabinet. Reducing the exposure to a high-temperature environment will extend the operating life of the IXrouter3.

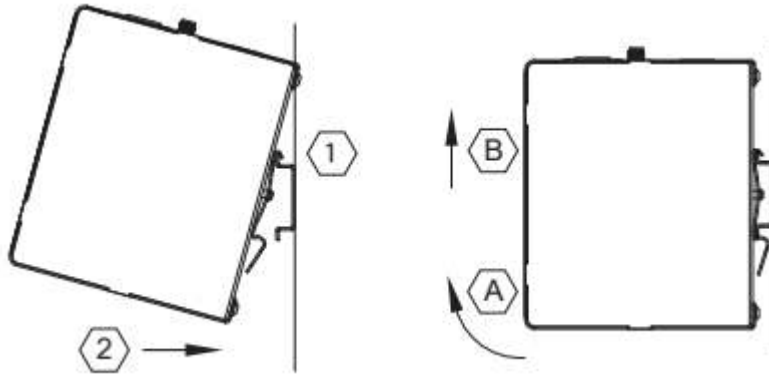
Consider also the routing of the wiring for the devices in the panel. Avoid placing low-voltage signal wires and communications cables in the same tray with AC power wiring and high-energy, rapidly-switched DC wiring.

The IXrouter3 is designed to be cooled using natural convection. For proper cooling, you must provide a clearance of at least 25 mm above and below the device. Also, allow at least 25 mm of depth between the front of the device and the inside of the enclosure.

Because IXON's IXrouter3 is essentially a small computer, the IXrouter3 can be used for many different purposes. You can, for example, access, program and control industrial machines around the globe. Do not use the IXrouter3 unless you've received proper training or have proper knowledge about the IXrouter3 and its capabilities. It is expected that the user is knowledgeable about networking settings and is aware of the potential consequences on i.e. security.

Installing and removing from DIN rail

The IXrouter3 can be easily installed on a standard DIN rail. (1) Hang the device on the rail and (2) push the unit down until you feel a click. To remove the unit, (A) pull/rotate the device up and (B) lift off the rail.



Installing a SIM card

The SIM card slot suits a standard SIM card (size 2FF).

To insert, push the SIM card into the slot until you feel a click. This is approximately 1 mm inside the device. Release the card and the card will stay in the device. The end of the SIM card should be aligned with the outside of the enclosure.

To remove, push the SIM card firmly into the slot until you hear a click. Releasing will cause the SIM card to partially eject, allowing you to easily take out the card.

Power supply

The IXrouter3 must be powered by a IEC/UL/EN/60950-1 certified Limited Power Supply (LPS) or for the United States a Class 2 power supply. The LPS power supply is not included in this package.

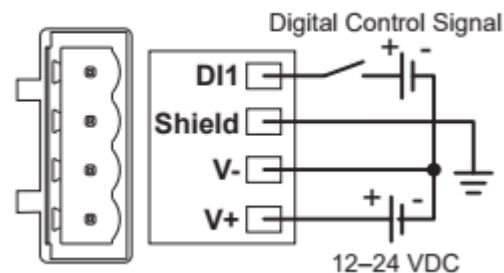
Power supply	12-24 VDC +/- 20% LPS 2A
Internal voltage protection	29V max
Input protection	Protected against polarity inversion
Isolation	1.5 kV

Wiring

Proper grounding and wiring of all electrical equipment is important to help ensure the optimum operation of the IXrouter3 and to provide additional electrical noise protection for your application.

The IXrouter3 comes with a female 4-pin plug-in connector with screw connection (type: Weidmuller BL 5.08/04/180 SN BK BX). The optimal wire diameter is 1.5mm² (16AWG - 12AWG).

Wire size range	18 – 12 AWG
Wire strip length	7 mm
Terminal screw torque	0.4 N m
Max wire length	3 m
Min ground conductor	16 AWG



Digital input

By default the Digital Input is not configured and doesn't need to be wired. The digital input provides a way to locally manage the IXrouter3's VPN connection (ON/OFF). The wiring is depicted in the image above. View our online article for information on how to configure the Digital Input: support.ixon.cloud/hc/articles/360002554011.

Type	Optocoupler
Voltage range	0-29 VDC
Voltage range (OFF state)	0-3 VDC
Voltage range (ON state)	7-29 VDC
Current voltage (ON state)	2-5 mA (typically)

Shield

Connect the Shield pin of the IXrouter with the protective earth conductor (PE), min. core diameter Cu 1.5 mm².

Operation

Configure the IXrouter3

To configure your IXrouter3, log in to your IXON Cloud account and navigate to the [Tools] page. Here you can generate an IXrouter configuration file by following a few simple steps. You can then download the configuration file, which must be copied onto a USB flash drive. After supplying power to the IXrouter, insert this USB flash drive in the USB port. The IXrouter3 will register itself to IXON's IXON Cloud and set up a secure VPN connection. You can further configure the IXrouter via the IXON Cloud (<https://connect.ixon.cloud>).

 **More info**

For a more extensive manual we recommend viewing our online step-by-step guides: <https://support.ixon.cloud/hc/sections/360000257812>.








LED status indicators

The IXrouter3 has two LEDs for router status: one signal LED (3G, 4G, Wi-Fi signal) and one activity LED.









The IXrouter3 requires approximately **2 minutes** to boot up and set up a secure connection.



Signal LED

	Blinking blue	Initializing cellular module
	Blinking red 1 pulse	No reception or unable to connect to network <i>(APN or SSID may be incorrect)</i>
	Blinking red 2 pulses	PIN invalid or PUK required <i>(a phone is required to unlock SIM card with PUK)</i>
	Blinking red 4 pulses	SIM card is invalid or missing
	Constant red	Connected, poor reception
	Constant purple	Connected, medium reception
	Constant blue	Connected, good reception

Activity LED

	Constant red	Booting up <i>(may take 1-2 min)</i> or not yet registered
	Blinking red 1 pulse	Waiting for internet access
	Blinking red 3 pulses	LAN/WAN conflict <i>(conflicting subnets)</i>
	Blinking red 4 pulses	Removed from the platform <i>(re-insert USB flash drive to register again)</i>
	Blinking red 5 pulses	Previously registered to the IXON Cloud <i>(remove from the IXON Cloud and register again)</i>
	Blinking blue 1 pulse	Connecting to the IXON Cloud
	Blinking blue 2 pulse	Setting up a VPN connection
	Constant blue	Active VPN connection to the IXON Cloud

i More info

For a list of most common causes and troubleshooting tips we recommend viewing our online article: <https://support.ixon.cloud/hc/articles/360002302011>

Reset to factory default**! Warning!**

This action cannot be undone! All settings will be reset to factory default.

The IXrouter3 can be reset to the factory default settings by pressing and holding the reset button on top for 5 seconds. The ACT LED will blink while the reset button is pressed. Upon release of the button, the ACT LED will rapidly blink if the button was pressed long enough to trigger a reset. Wait for the IXrouter3 to restart. You can then configure the IXrouter3 again.

i Remove previous registration

If the IXrouter3 was previously registered on the IXON Cloud you'll have to remove it from the IXON Cloud before you can register it again.

Connectivity requirements (for local IT)

The IXrouter uses an outgoing port to establish a secure connection to our IXON Cloud. This means there is no need to open any incoming ports in your firewall.

Overview

Below is an overview of the outgoing ports and protocols that the IXrouter utilizes.

Port	Transport	Application
443, 8443 ⁽¹⁾	TCP	HTTPS, MQTT (TLS), OpenVPN
53 ⁽²⁾	TCP & UDP	DNS

(1) Port 8443 is only used when stealth mode is active for connectivity via a censored internet connection (i.e. when located in China). More info: <https://support.ixon.cloud/hc/articles/360001088912>

(2) DNS requests are often handled by local DNS servers. In those cases the listed DNS port can be ignored.

Servers and DNS requests

Via these outgoing ports the IXrouter connects to different IXON servers: REST API, MQTT, and OpenVPN servers. The IP addresses of these servers, as well as the amount of servers, may change over time and are thus not pre-defined. What is pre-defined is the domain of these servers. This domain will always end with ".ixon.net" (i.e. am01.ixon.net). The IXrouter attempts to resolve these addresses by doing DNS requests. If it can't perform DNS requests, it can't connect to our servers.

MAC or IP address filter

The local IT department may choose to only grant specific devices internet access, based on the MAC address or IP address of the device. The MAC address can be obtained from the label on the side of the IXrouter. The IP address can be set to a static IP address (guide: <https://support.ixon.cloud/hc/articles/360002960372>). However, by default the IP address is set to be assigned dynamically via DHCP.

Compliance

Applicable European directives

The IXrouter3 is in conformity with the provisions of the following European Directives.

Directive	Description
EMC Directive 2014/30/EU	Product safety
Radio Equipment Directive 2014/53/EU	Use of the radio spectrum
RoHS Directive 2015/863	Restriction of hazardous substances
REACH Directive 1907/2006	Regulation and registration of chemicals
WEEE Directive 2012/19	Waste of electronic equipment

Applicable safety standards

The IXrouter3 was tested and passed the following standards.

Standard	Description
EN 55032:2012/AC:2013	Electromagnetic Compatibility of Multimedia Equipment
EN 301 489-1 V1.9.2 (2011-09)	EMC Standard for Radio Equipment and Services, Part 1: Common technical requirements
EN 301 489-3 V1.4.1 (2002-08)	EMC Standard for Radio Equipment and Services, Part 3: Specific conditions for Short-Range devices.
EN 61000-6-1:2007	Electromagnetic compatibility (EMC) - Part 6-1: Generic standards - Immunity for residential, commercial and light-industrial environments
EN 61000-6-3:2007/A1:2011/AC:2012	Electromagnetic compatibility (EMC) - Part 6-3: Generic standards - Emission standard for residential, commercial and light-industrial environments
EN 61000-6-2:2005/AC:2005	Electromagnetic compatibility (EMC) - Part 6-2: Generic standards - Immunity for industrial environments
EN 61000-6-4:2007 + A1:2011	Electromagnetic compatibility (EMC) - Part 6-4: Generic standards - Emission standard for industrial environments

EN 61000-4-2:2009	Electrostatic discharge immunity test
EN 61000-4-3:2006 + A1:2008 + A2:2010	Radiated, Radio-frequency, Electromagnetic Field Immunity Test 80-1000 MHz
EN 61000-4-4:2012	Burst Immunity Test
EN 61000-4-5:2014 + A1:2017	Surge Immunity Test
EN 61000-4-6:2014	Immunity to Conducted Disturbances, Induced by Radio-frequency Fields
IEC 60950-1:2006 + A1:2009 + A2:2013	Information Technology Equipment Safety, Part 1: General Requirements - Edition 2
EN 62368-1:2014/AC:2015	Audio/video, information and communication technology equipment - Part 1: Safety requirements
EN 50581:2012	Restriction of the use of certain hazardous substances (RoHS) in electrical and electronic equipment
UL 60950-1	Information Technology Equipment Safety, Part 1: General Requirements - Edition 2
CSA C22.2 No. 60950-1-07 + Amendment 1 and Amendment 2	Information Technology Equipment Safety, Part 1: General Requirements - Edition 2

FCC compliance

The base equipment (an unintentional radiator) has been tested and complies with the limits for a Class B digital device, pursuant to part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the manufacturer's instruction manual, may cause interference with radio and television reception.

However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or TV reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and the receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

- Consult the dealer or an experienced radio/TV technician for help.


Notice

Changes or modifications of this equipment not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

The IXrouter3 contains different FCC certified modules, depending on the variant.

Article no.	Enclosed module	FCC IDs
IX2400	-	-
IX2401	3G	XMR201510UC20
IX2405	4G (Global)	XMR201903EG25G
IX2403	4G (America)	XMR201605EC25A
IX2404	4G (China)	-
IX2410	Wi-Fi	XPYLILYW1
IX2415	4G (Global) & WI-Fi	XPYLILYW1

Additional information for variants with wireless capabilities

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

- This device may not cause harmful interference.
- This device must accept any interference received, including interference that may cause undesired operation.

The antenna(s) used with this transmitter must be installed with a separation distance of at least 20cm from all persons and must not be co-located or operated in conjunction with any other antennas or transmitters. Only those antenna(s) tested with the wireless transmitters or similar antenna(s) with equal or lesser gain may be used

Certifications

The IXrouter3 has been certified for:

- **CE** certification (for more information, see our Declaration of Conformity).
- **FCC** verification
- **cULus** listing (ID #E492721)



The IXrouter3 4G-A has additionally been certified for:

- **AT&T** certification 

For USA and Canada, see our Declaration of Conformance.

All supporting documents can be found on our support website:

<https://support.ixon.cloud/hc/articles/360002350232>