



Install XL HD

Software Version 2.21

Audience: This guide is for the electrician installing the Vorne XL HD Productivity Appliance™.

Purpose: To accomplish:

- Mounting XL HD
- Connecting XL HD to the network, and
- Obtaining signals from the manufacturing process.

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Important User Information

XL products are not designed or intended for control applications and **MUST NOT** be used for control applications under any circumstances. There are fundamental differences in the design methodology of a control product such as a Programmable Logic Controller (PLC) and a non-control product such as an XL device. Outputs (e.g., relays) are provided for annunciation only, and **MUST NOT** be used for control purposes.

This product is designed and intended for use solely in indoor industrial applications and **MUST** be installed by a qualified electrician.

This product is designed and intended for use solely in a secure, private network environment.

It is the responsibility of all persons applying this product to a given installation and/or application to carefully review the installation and/or application to evaluate and ensure the suitability of this product for the intended application.

This documentation, including any examples, diagrams, and drawings, is intended to provide information for illustrative purposes only. Because of the differences and varying requirements of different installations and applications, Vorne Industries, Inc. cannot assume responsibility or liability for actual use, including use based on any examples, diagrams, and drawings.

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MULTIPLE POWER SOURCES: This product has more than one source of power. Relay outputs may be at mains potential from a secondary power source. Always disconnect power from all power sources before installing or servicing the XL device, and before opening the user access plate.



SHOCK HAZARD: To avoid risk of shock, always disconnect all sources of power before installing or servicing the XL device, and before opening the user access plate. Do not reapply power until the access plate has been reinstalled and securely closed. Failure to follow these precautions could result in personal injury or death due to electric shock.



ATTENTION: This product must be operated at or below Pollution Degree 2 (an environment where only non-conductive pollution occurs except for occasional and temporary conductivity caused by condensation) and Over Voltage Category II (circuits directly connected to local-level distribution).

Contact Information

Corporate Office

Address: Vorne Industries, Inc.
1445 Industrial Drive
Itasca, IL 60143-1849, USA

Phone: +1.630.875.3600

Fax: +1.630.875.3609

Website: www.vorne.com

Sales and Support (USA and Canada)

We are available Monday through Friday from 8:00 AM to 6:00 PM CST (UTC-6:00).

Main Phone: +1.630.875.3600

Sales Email: sales@vorne.com

Support Email: support@vorne.com

Sales and Support (European Union & UK)

Upon completion of EMC Testing, XL HD will be sold internationally. Within the EU and UK, Vorne products are distributed by the following companies:

Company Name	Office Location
Action Coaching International	Koningin Astridlaan 74, 2820 Bonheiden, Belgium
LineView Solutions	Innovation Campus, 33 Greenhill, Blackwell, Bromsgrove, B60 1BL United Kingdom
TQMSoft	ul. Bociana 22a, 31-231 Kraków, NIP 676-11-58-054, Poland

Sales and Support (International)

Upon completion of EMC Testing, XL HD will be sold internationally. Vorne has an extensive network of international partners. More information can be found at: <https://www.vorne.com/about-us/xl-partners.htm>.

Preparing to Install XL HD

1) Everything You Need

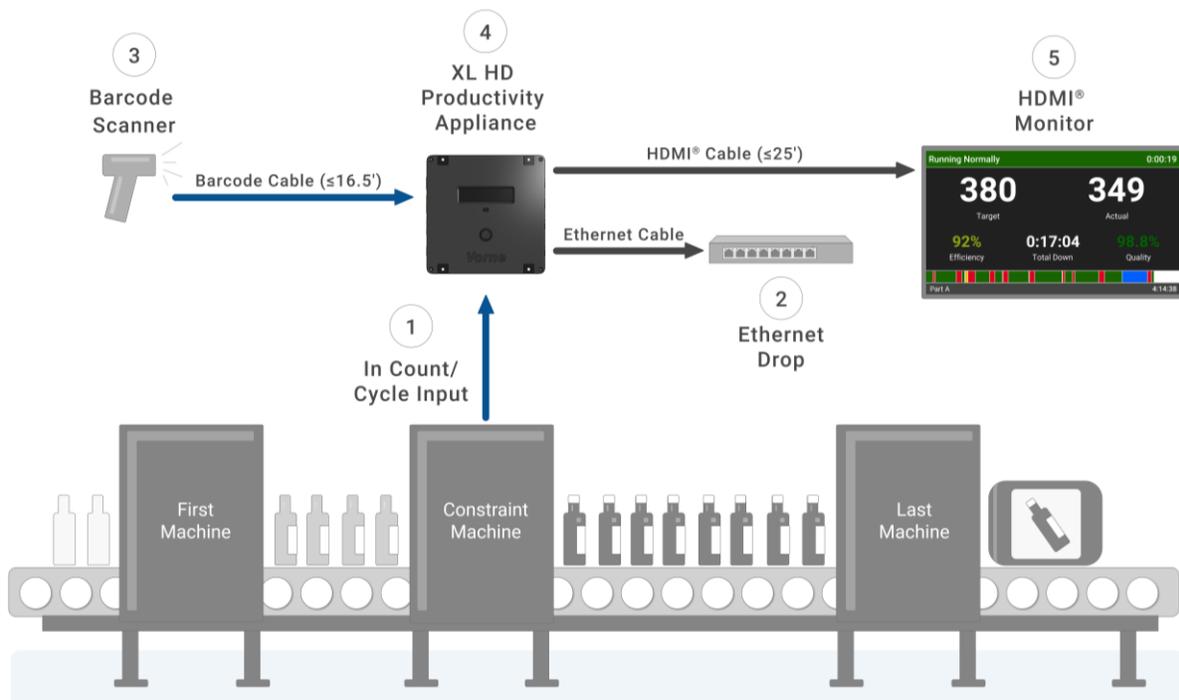
Provided by Vorne

Item	Description
XL HD Productivity Appliance™	Your XL device, which includes digital I/O, production monitor, data warehouse, web server, and browser-based reporting platform.
24V Power Supply	24VDC desktop power supply with pre-wired M12 connector. Note: Model varies by availability. All models function the same for XL HD. Allowable supplies: GST25A24-P1J, GST40A24-P1J, GSM40A24-P1J, GTM96300-3624-T3
Ferrite Cable Clamp	Cylindrical ferrite clamp for ethernet. (Included only for products sold within the European Union)
Circular Connectors	Field Installable M12 connectors for: <ul style="list-style-type: none">▪ Digital Inputs (3) <i>note:</i> each connector can support up to (2) digital inputs▪ Relay Output (1)

Provided by You

Item	Description
Digital Inputs	For most applications, XL requires at least one pulsing 5-24V DC digital input. This input is used by XL to calculate counts and to track cycles. (see next section for more information) If the process does not have the capability to provide a pulsing count signal, XL can receive a run/down signal. Refer to the Deploy XL: Manual Run Detection document for more information. To help you select the appropriate sensor(s) for your application, reference our Tech Note
Ethernet Cable	CAT5 or better Ethernet cable. Straight-through or crossover. Connects to network access point.
Mounting Hardware	Refer to Step 1 – Mount the Device for more information.
2D USB Barcode Scanner	Operators use a 2D barcode scanner to scan down reasons and start new part runs. The 2D barcode scanner can also be used to scan the start of changeovers and/or to log rejects. The XL HD uses the USB 2.0 standard. The industry-standard maximum length for USB 2.0 passive cables is 5 meters (~16.5 ft.). Vorne sells 2D USB barcode scanners for various environments.
HDMI® Monitor	Standard HDMI®-supported monitor.
HDMI® Monitor Cable	The XL HD uses the HDMI® standard for video transmission. The industry standard for HDMI®-compliant cables is 7.5 meters (~25 ft.). It is recommended to avoid HDMI® 2.1 or newer cables (i.e., those specified as 4k or 8k), as these cables are even more limited with a maximum of 3 meters.

2) Identify Installation Locations



There are five locations to determine before starting the installation:

1. **Digital inputs** - used to connect XL to your process (more in next section).
2. **Ethernet drop** - used to access the XL web page interface.
3. **2D USB barcode scanner** - used by operators to enter down reasons. Place the 2D USB barcode scanner near where the operator restarts the process after a stop (note: we do not recommend exceeding the USB industry standard ~16.5' length).
4. **XL HD Productivity Appliance™** - determine location with greatest ease of wiring.
5. **HDMI® Monitor** - determine the optimum location for viewing across the manufacturing process (note: we do not recommend exceeding the industry standard ~25' length).

Identify Signal Requirements

Signal requirements can vary greatly based on specific application, but most will use 1 or 2 sensors total. See below for requirements and options.

Type	Required	Description
In Count	Yes	Counts pieces entering the process; often combined with Cycle Input
Cycle Input	Yes	Measures cycles and to detect slow cycles, small stops, and Down Time; can be a standalone counter or combined with one other input (typically In Count)
Out Count (Good or Reject)	Optional, but required to track OEE Quality	Counts pieces exiting the process; can be configured as either Good Count or Reject Count, but not both; can be taken from a single or multiple points of the manufacturing process.
End of Line Count	Optional	A standalone counter typically used to count packaged product at the end of the manufacturing process; not used in quality measurement

Connect XL to Your Process



HD Front View with Labeled Connections

1) Mount the Device

A mounting diagram has been included in your documentation for convenience. The XL HD is designed to be mounted to a stable (vibration-free), permanent flat vertical surface (e.g., a concrete wall or control cabinet panel).

- Mounting hardware must have a rated maximum capacity (working load) of not less than 25 pounds per fastener (11 kilograms).
- Mounting hardware must be appropriate for the environment; for example, type 304L stainless steel for severe environments. Please note: Use zinc-plated or black oxide hardware when using stainless steel to prevent galvanic corrosion.
- Mounting hardware must be attached to the mounting surface through each of the four mounting holes of the XL HD, each measuring a nominal 0.2" (5.1 mm) in diameter.

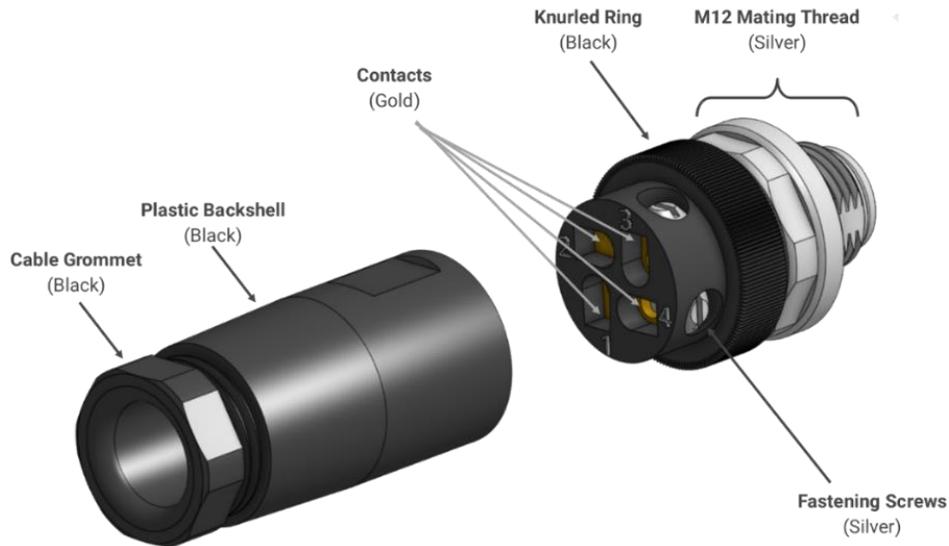
Attachment points to the support structure should be at the same spacing as the width of the XL HD mounting holes.



WARNING: Make sure that the mounting hardware meets the above specifications. Failure to follow this warning could result in damage to property, personal injury, or death.

2) Locate Connectors

Though the wiring may vary slightly, M12 Connectors are used to connect Digital Inputs, the Power input, and the Relay Output (optional).



To wire a connector, remove the plastic backshell and thread wires through to contacts. Follow the specified Contact Pairings below and replace backshell. Screw the grommet at the back of the M12 connector until the wire is compressed.



HD Side View with Labeled Connections

3) Connect Digital Inputs

Digital Inputs Overview

XL uses either Sinking (NPN) or Sourcing (PNP) digital inputs. If providing multiple digital inputs, all must be either sinking or sourcing. The maximum signal frequency is 4,000 Hz.

Example signals: photoelectric sensors, proximity switches, relays, PLC (Programmable Logic Controller) outputs, or other devices that are physically appropriate for their manufacturing environment.

Refer to [Appendix B](#) for digital input specifications.

Connecting Instructions

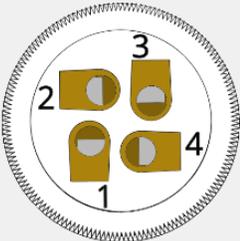
1. Wire M12 connectors using directions in [Step 2](#).
2. Match up notch on M12 connector to notch on panel connector and screw M12 mating thread clockwise into panel connector.
3. Repeat for any additional inputs.

Wiring Instructions

Note: Digital Input connectors are designed to allow two inputs per connector for six total inputs. This would be achieved by doubling the GND and +24V wires and wiring the second input into Contact 4.

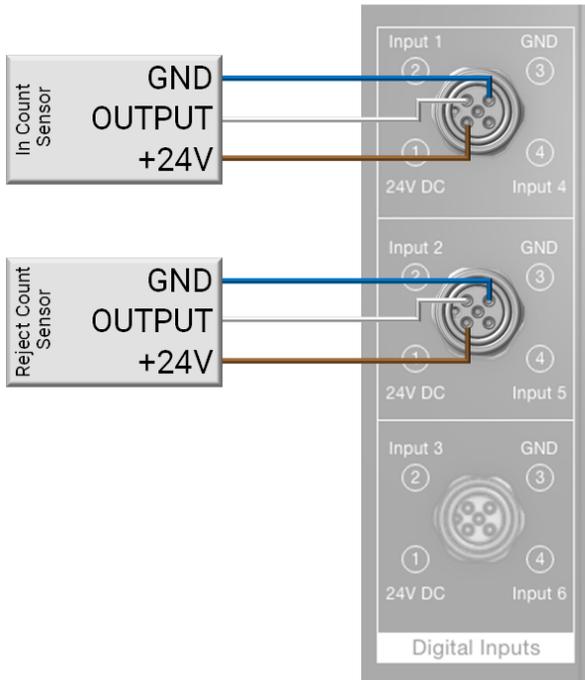
We recommend using all three provided connectors for a single output before trying to add a second output to any connector.

The wire colors listed below are *typical* sensor wire colors. Actual sensor wire colors may vary.

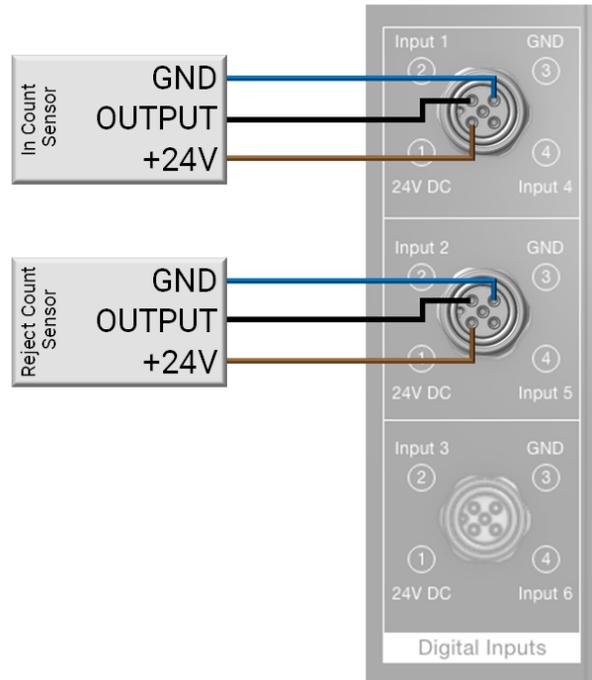
Input Type	Contact Description	Connector Contacts
Sinking (NPN)	<ul style="list-style-type: none"> ▪ +24V (brown wire) Contact 1 ▪ Input 1 (white wire) Contact 2 ▪ GND (blue wire) Contact 3 	
Sourcing (PNP)	<ul style="list-style-type: none"> ▪ +24V (brown wire) Contact 1 ▪ Input 1 (black wire) Contact 2 ▪ GND (blue wire) Contact 3 	
PLC	<ul style="list-style-type: none"> ▪ First Input Contact 2 ▪ GND Contact 3 ▪ Second Input Contact 4 	

Digital Input Wiring Diagrams

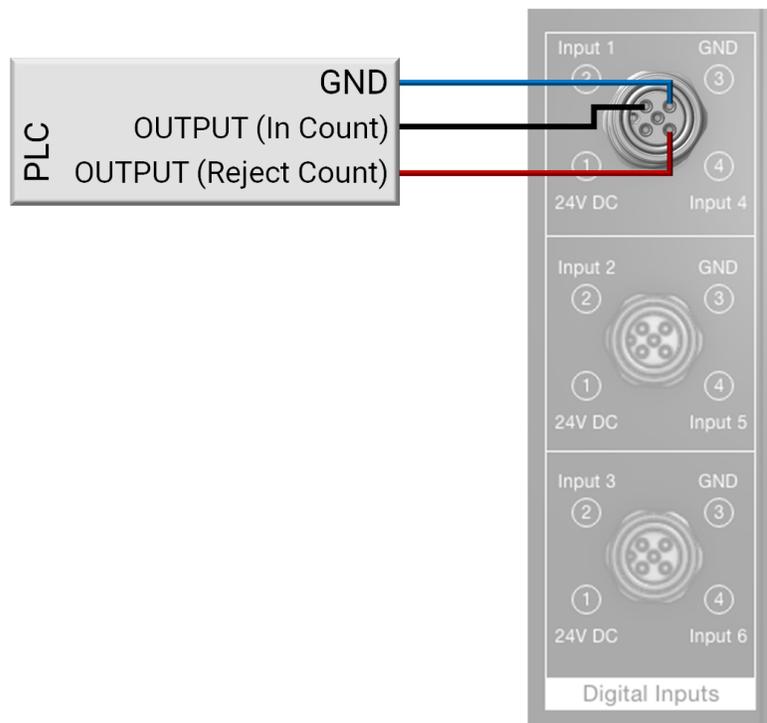
Sinking (NPN) Outputs



Sourcing (PNP) Outputs



PLC Outputs



4) Connect 2D USB Barcode Scanner

The XL HD device is designed to interface to 2D barcode scanners with a USB port. Though optional, this is highly recommended. The following instructions are based on XL Barcode Kits from Vorne.

1. Locate USB Port and plug scanner in.

5) Connect Ethernet Port

The XL HD device includes a 10/100 Ethernet port, which is used to connect the XL HD device to your local network. This port supports Auto-MDIX (automatic crossover), so either a straight-through or crossover cable can be used.

1. Gently plug one end of the Ethernet cable into the RJ45 jack on the XL HD device.
2. Plug the other end of the Ethernet cable into your local network drop.

6) Connect Monitor (not supplied)

The XL HD device is intended to be integrated with an HDMI®-compatible monitor for regular use.

1. Plug one end of the HDMI® cable (≤16.5') into the HDMI® port on XL HD device.
2. Plug the other end of the HDMI® cable into the HDMI® 1 port on monitor.
3. Plug in power to monitor (we'll connect power to XL HD device in Step 7).
4. Use the monitor remote to select HDMI® 1 as the monitor input.

7) Apply Power & Test Barcode Scanner

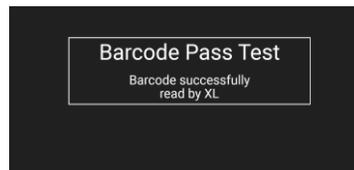


ATTENTION: This product is suitable for connection to a TN-S power distribution system (AC Hot and AC Neutral lines with a separate protective grounding conductor).



ATTENTION: Refer to [Appendix B – Specifications](#) for power requirements.

1. Match up notch on pre-wired M12 24v power connector to notch on panel connector.
2. Secure M12 connector to the XL HD by screwing the mating thread clockwise into panel connector.
3. Plug other end of 24V power supply into working outlet.
4. After powering up the unit, you will hear a beep as the scanner wakes up. Scan the barcode below and look for the “Barcode Pass” message on your monitor or OLED screen.



Appendix A – Relay Output



WARNING: XL products are not designed or intended for control applications, and **MUST NOT** be used for control applications under any circumstances. Outputs (e.g., relays) are provided for annunciation only, and **MUST NOT** be used for control purposes.



CAUTION: Keep mains-connected wiring (including relay output wiring) separate from signal and I/O wiring.



WARNING: Verify that all sources of power have been completely disconnected from the XL device before wiring to Relay Output.

Relay Output Operation

The relay output is intended to alert operators to down time, and to prompt them to scan a reason for a down event.

The relay behavior can be configured in the **Settings > Relay Output** page in the XL Web Page Interface. The relay can be configured as follows:

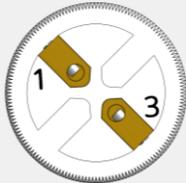
- When down time is detected, turn the relay on immediately. Turn off when a reason is scanned.
- When down time is detected, turn the relay on only after the process is running. Turn off when a reason is scanned, or a new down event is started.

Relay Output Wiring

The relay output must only be used with a **resistive load**.

The current per relay contact must **not exceed 1 Amp**, and the voltage per relay contact must **not exceed 30 VDC**.

1. Wire M12 Relay Output connector using directions in [Step 2](#).
2. Match up notch on M12 connector to notch on panel connector.
3. Secure M12 connector to the XL HD by screwing the mating thread clockwise into panel connector.

Connector Type	Contact Description	Connector Contacts
Relay Output (optional)	<ul style="list-style-type: none">▪ Relay Common – 1▪ Normally Open - 3	

Appendix B – Specifications

General Specifications

Item	Specification
Display Configuration	Integrated OLED, HDMI® Out
Dimensions - W x H x D	7.75 x 7.75 x 2.0 in (20 x 20 x 5 cm)
Weight	5 lb (2.3 kg)
Power	15 W

Operating Conditions

Item	Specification
Power	24 V DC (+/- 15%), 15 W
Ambient Temperature	32°F to 122°F (0°C to 50°C)
Relative Humidity	5% to 95% Non-Condensing

Inputs and Outputs

Digital Inputs are configured through the XL web page interface by navigating to **Settings > Connections > Digital Inputs**. Refer to the [Configure XL](#) guide for step-by-step instructions.

Item	Specification
High Speed Inputs	(6) Digital Inputs, 5 to 24 VDC, port is configurable as Sink or Source via browser Low Speed (50 Hz max) or High Speed (4,000 Hz max) configurable via browser
Digital Input Connectors	M12 Field Installable Circular Connectors
Relay Output	M12 Field Installable Circular Connector (1) SPST Relay, 30 VDC at 1A (max), Resistive load only
+24 VDC Power Out	Supplies 100 mA (max) for sensors

Communication Ports

Communication ports are configured through the XL web page interface by navigating to **Settings > Connections > Network**.

Item	Specification
Ethernet	(1) IEEE 802.3, 10/100 Mbps, Auto-MDIX, RJ-45
USB	(1) 2.0 USB-A Host, 500 mA current @ 5 VDC (2.5 W) The XL HD uses the USB 2.0 standard. The industry-standard maximum length for USB 2.0 passive cables is 5 meters (~16.5 ft.). Vorne sells 2D USB barcode scanners for various environments.
HDMI®	(1) HDMI® / DVI 1.0, 1920x1080@30Hz, Supports CEC and EDID The XL HD uses the HDMI® standard for video transmission. The industry standard for HDMI®-compliant cables is 7.5 meters (~25 ft.). It is recommended to avoid HDMI® 2.1 or newer cables (i.e., those specified as 4k or 8k), as these cables are even more limited with a maximum of 3 meters.

Vorne Industries
1445 Industrial Drive
Itasca, IL 60143-1849
USA