



Install XL HD

Software Version 2.19

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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SHOCK HAZARD: 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 faceplate. Do not reapply power until the faceplate 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.
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Sales and Support (USA and Canada)

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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

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)
XL Documentation	Includes: <ul style="list-style-type: none">▪ Mounting Diagram for the person responsible for mounting▪ Install XL HD (<i>this manual</i>) for the electrician installing XL HD▪ Configure XL for the person responsible for configuring and maintaining XL▪ Meet XL for the person who wants a deeper understanding of the XL platform
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)

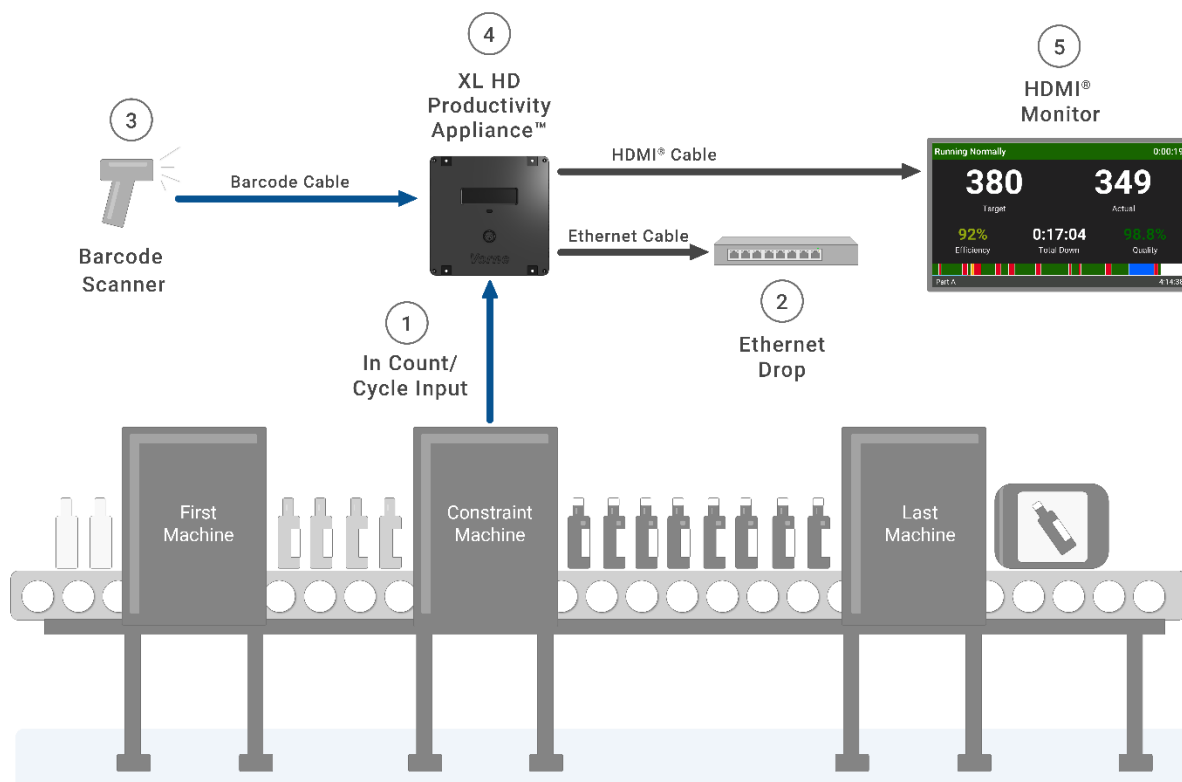
Provided by You

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 Appendix B for more information.

Optional, but Highly Recommended

Item	Description
2D USB Barcode Scanner	In most applications, the operator uses 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 (counts and reasons). Vorne sells 2D USB barcode scanners for various environments.
Monitor Cable	Standard HDMI® Cable of desired length to connect XL HD to monitor. (note: we do not recommend exceeding standard 50' length)
Monitor	Standard HDMI®-supported Monitor.

Identify Installation Locations



There are five locations to determine before starting the installation. Determine where the following will be located:

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.
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 standard 50' length).

Identify Signal Requirements

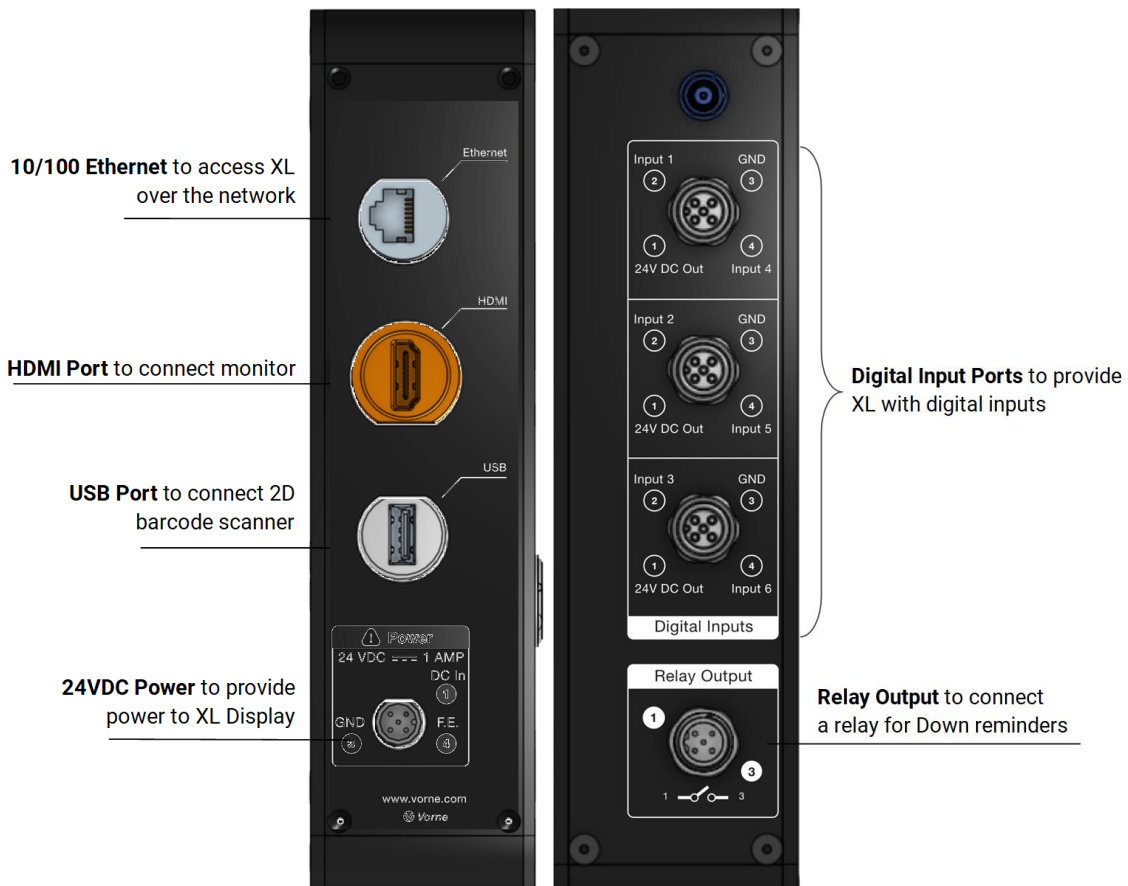
Signal requirements can vary greatly based on specific application, but most will use 1 or 2 sensors total. See below for requirements and options.

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 <i>one</i> 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



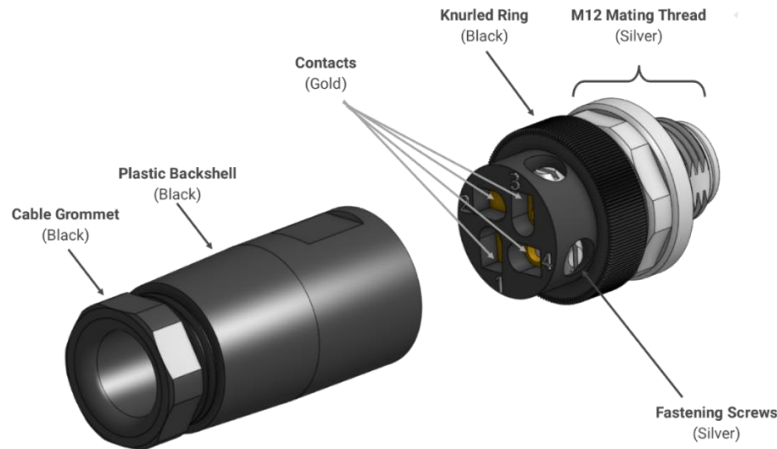
HD Side Views with Labeled Connections

Step 1 – Mount the Device

Mounting instructions are located in [Appendix B](#). You may choose to mount the device first, or you may wish to configure and connect the device to your process first.

Step 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.

M12 Connectors - Connection-Specific Specifications

Wire colors listed below are typical wire colors. Actual wire colors may vary.

Note: Digital Input connectors are designed to allow two Outputs per connector for six total inputs. This would be achieved by doubling the GND and +24V wires and wiring the second output into Contact 4. We recommend using all three provided connectors for a single output before trying to add a second output to any connector.

Connector Type	Contact Pairings	Connector Contacts
Digital Input - Sinking (NPN)	<ul style="list-style-type: none"> +24V (brown wire) – 1 Output (white wire) – 2 GND (blue wire) – 3 	
Digital Input - Sourcing (PNP)	<ul style="list-style-type: none"> +24V (brown wire) – 1 Output (black wire) – 2 GND (blue wire) – 3 	
Digital Input - PLC	<ul style="list-style-type: none"> Output 1 (black wire) – 2 GND (blue wire) – 3 Output 2 (black wire) – 4 	
Relay Output (optional)	<ul style="list-style-type: none"> Normally Open - 1 Relay Common - 3 	

Step 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 C](#) 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.

Note: Digital Input connectors are designed to allow two Outputs per connector for six total inputs. This would be achieved by doubling the GND and +24V wires and wiring the second output into Contact 4. We recommend using all three provided connectors for a single output before trying to add a second output to any connector.

Step 4 – Connect 2D USB Barcode Scanner

(optional, but highly recommended)

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

1. Locate USB Port and plug scanner in. You should hear a beep as the scanner wakes up. We will test your scanner in a later step.

Step 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.

Step 6 – Connect Monitor

(not supplied)

The XL HD device is intended to be integrated with an HDMI®-compatible monitor, but it is not required.

1. Plug one end of the HDMI® cable 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 10).
4. Use the monitor remote to select HDMI® 1 as the monitor input.

Step 7 – Apply Power



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).

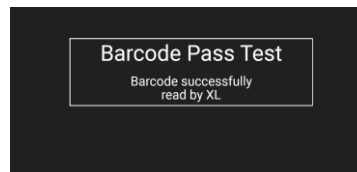


ATTENTION: Refer to [Appendix C – Specifications](#) for power requirements.

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.

Step 8 – Test 2D USB Barcode Scanner

Scan this barcode to test the 2D USB barcode scanner and its connection to XL. The barcode scanner will beep, and the XL scoreboard will show the text “Barcode Pass” for 5 seconds:



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 > Connections > 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.

Appendix B – Mounting 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.

Appendix C – 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) SPDT 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 > Ethernet**.

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)
HDMI	(1) HDMI® / DVI 1.0, 1920x1080@24Hz Max, Supports CEC and EDID

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