



CoPilot®

HARDWARE INSTALLATION AND SETUP GUIDE

Keep it all in check.



RJG
MOLD SMART

*Training and Technology
for Injection Molding*

Print Date

08.10.2021

Rev

v5.0

Copilot® © RJG, Inc. All rights reserved.

Contents

5 Introduction

- 5 Disclaimer
- 5 Compliance
- 5 Privacy
- 5 Alerts

7 Product Description

7 Application Processor AP4.0

- 7 Technical Specifications
- 7 Notice
- 7 Product Dimensions
- 8 Connections

9 Lynx Hardware

- 9 Modules
- 10 Junctions
- 11 Machine Interface Sensors

12 In-Mold Cavity Pressure Sensors

- 12 Single- and Multi-Channel Sensors
- 12 Strain Gage and Piezoelectric Sensors
- 12 Button or Flush-Mount Sensors

12 In-Mold Cavity Pressure Sensor Adapters

13 In-Mold Temperature Sensors

- 13 Type J and K Type K Sensors
- 13 Single- and Multi-Channel Sensors

13 Temperature Sensor Adapters

14 Optional Equipment

- 14 Temperature Control Unit (TCU) Interface Assembly
- 14 Flowmeter

15 Installation

15 Installation Overview

- 15 Component Installation Order
- 16 Lynx Hardware Layout—Hydraulic Machines
- 18 Lynx Hardware Layout—Electric Machines

20 Application Processor AP4.0

- 20 Mounting Requirements
- 21 Power Requirements
- 21 Networking

22 Lynx Hardware Installation

- 22 Module Installation
- 27 Junction Installation
- 29 Machine Interface Sensor Installation
- 32 Optional Equipment Installation
- 34 Serial/USB Interface Installation for TCU
- 35 Flowmeter Installation
- 36 Mold Sensor Installation



Contents

37 Maintenance and Troubleshooting

37 Warranty and Disclaimer

37 RJG, Inc. Standard 1-Year Warranty

37 Product Disclaimer

37 Preventative Maintenance

37 Service

37 Disposal

38 AP4.0 Troubleshooting

39 Common Errors

39 Standard Troubleshooting for Missing or Incorrect Inputs

39 Helpful Hints

39 Cable Installation

40 Sequence Signal-Machine Manufacturer Terminology Cross Reference

41 Knowledge Base

41 Customer Support

43 Appendix

43 Valve Gate Installation

43 Introduction

44 Requirements

45 Wiring

46 Single-Action Solenoid Valve Gate Wiring for Four (4) Gates

47 Dual Solenoid Systems

47 Dual Solenoid Valve Gate Wiring for Four (4) Gates

48 Dual Solenoid Valve Gate Wiring for Eight (8) Gates

50 Valve Gate Pre-Fill Control Wiring with Parallel OR2-M Modules

51 Inject Enable and V→P Wiring

51 Inject Enable

51 V→P

53 CoPilot® System Hardware Installation Checklist



Introduction

Read, understand, and comply with all following instructions.

Disclaimer

Inasmuch as RJG, Inc. has no control over the use to which others may put this material, it does not guarantee that the same results as those described herein will be obtained. Nor does RJG, Inc. guarantee the effectiveness or safety of any possible or suggested design for articles of manufacture as illustrated herein by any photographs, technical drawings, and the like. Each user of the material or design or both should make his own tests to determine the suitability of the material or any material for the design as well as the suitability of the material, process, and/or design of his own particular use. Statements concerning possible or suggested uses of the material or designs described herein are not to be construed as constituting a license under any RJG, Inc. patent covering such user or as recommendations for use of such material or designs in the infringement of any patent.

Compliance

The CoPilot® system has been designed and tested in accordance with the following standards:

- EN 61326-1:2020
EMC Requirements for electrical equipment for measurement, control, and laboratory use. Intended for use in industrial locations.
- IEC 61010-1:2010
Safety requirements for electrical equipment for measurement, control, and laboratory use.

The CoPilot system conforms to European Conformity (CE) requirements and is eligible for sale in the European Union (EU).



Privacy

Designed and developed by RJG, Inc. Manual design, format, and structure copyright 2021 RJG, Inc. Content documentation copyright 2021 RJG, Inc. All rights reserved. Material contained herein may not be copied by hand, mechanical, or electronic means, either whole or in part, without the express written consent of RJG, Inc. Permission will normally be granted for use in conjunction with inter-company use not in conflict with RJG's best interests.

Alerts

The following alert types are used as needed to further clarify or highlight information presented in this manual:



TERM

A definition or clarification of a term or terms used in the text.



NOTE *A note provides additional information about a discussion topic.*



CAUTION *A caution is used to make the operator aware of conditions that can cause damage to equipment and/or injury to personnel.*





Product Description

The CoPilot software is pre-installed on the Application Processor AP4.0. The AP4.0 receives data from the Lynx™ sensor interface ports which are connected to Lynx hardware on the injection molding machine. The following details the AP4.0 and Lynx hardware required for the CoPilot software.

Application Processor AP4.0

The Application Processor AP4.0 is a quad-core, low-power, industrial computer designed for processor-intensive tasks with integrated RJG Lynx technology. The AP4.0 case is constructed of cast metal. A single 24 V DC power supply/cable provides the AP4.0 and integrated Lynx sensor interface with 24 V DC power.

Technical Specifications

The Lynx sensor interface ports are insulated and sealed to withstand temperature, shock, and moisture commonly found in injection molding environments. The AP4.0 processor supplies the Lynx sensor interface ports with power.

Industrial Ethernet	
Lynx Ports	2
USB Ports	3
Power Supply	24 V DC

Environmental

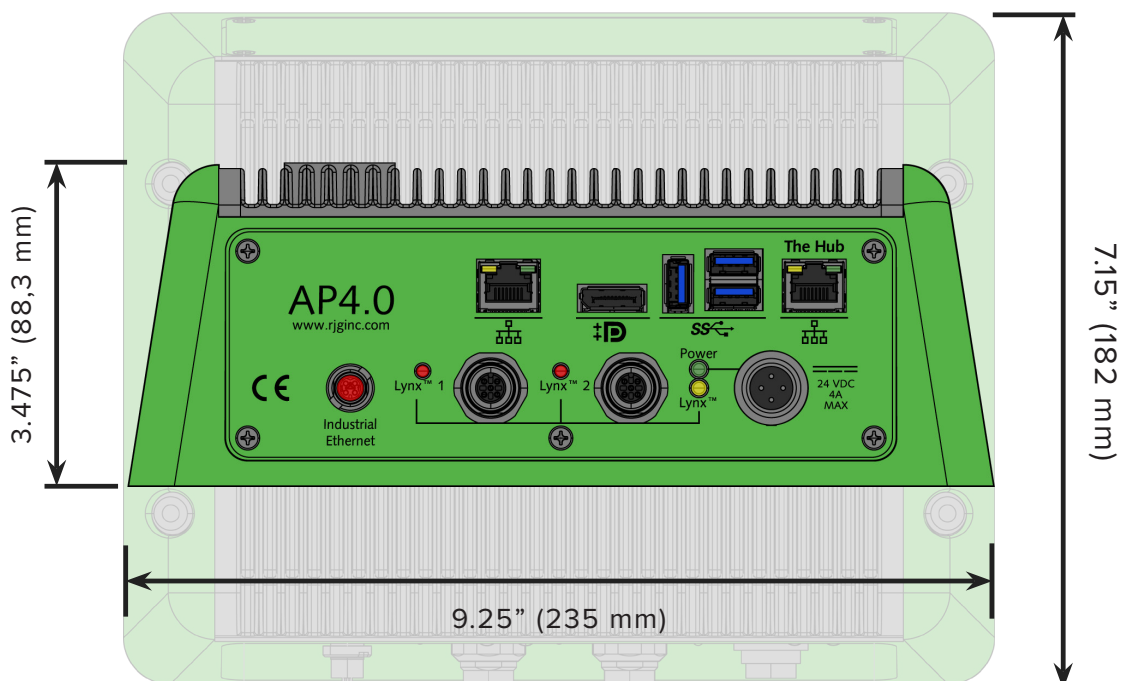
The AP4.0 is intended for indoor use only.

Humidity	90% RH non-condensing	
Temp. Range	32–122 °F	0–50 °C
Altitude Limit	9,842'	3,000 m

Notice

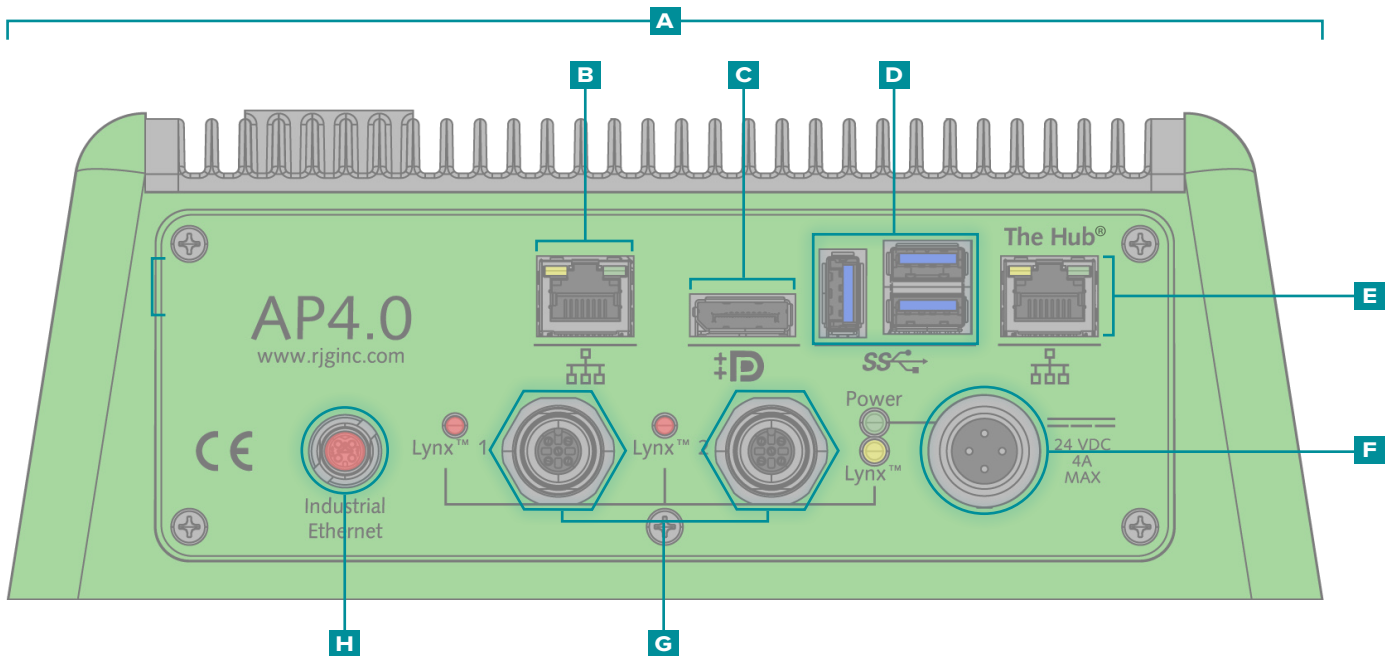
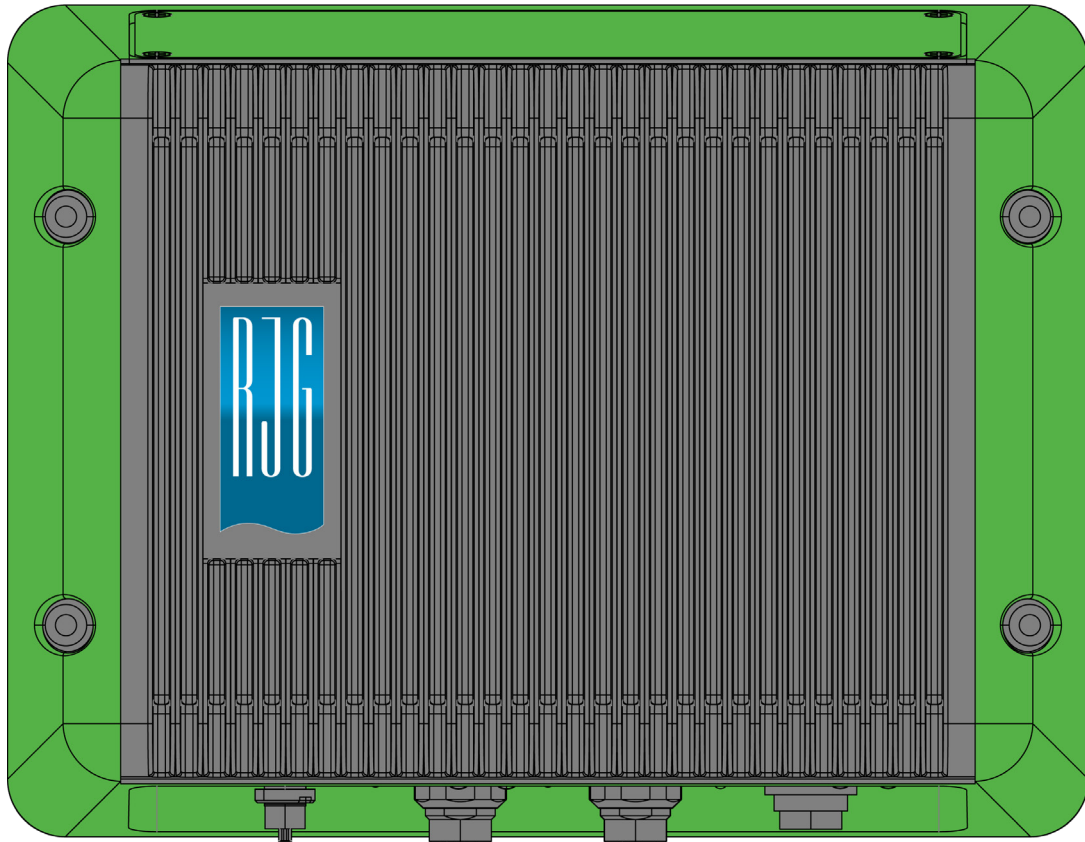
Protection provided by the equipment may be impaired if the equipment is used with accessories not provided or recommended by the manufacturer, or is used in a manner not specified by the manufacturer. The AP4.0 contains no operator-serviceable parts.

Product Dimensions



Product Description (continued)

Connections



A	Cast Metal Case	E	The Hub® Networking Port
B	OPC/UA Port	F	24 V DC Power Port
C	DP++ Port (with passive adapter cable)	G	Lynx Ports 1 & 2
D	USB 3.0 Ports (x3)	H	Industrial Ethernet Port



Product Description (continued)

Lynx Hardware

Lynx devices gather raw data about the machine's sequences, pressures, injection unit position, and other parameters during the injection molding process. Lynx devices are digital and contain electronics that enable automatic identification when connected to the CoPilot system.

Modules

Modules are shielded, DIN-rail-mounted, and wired directly to the machine.

Sequence Module

The Sequence Input Module **A** ID7-M-SEQ is a DIN-rail-mounted module which is wired directly to the molding machine in order to collect 24 V DC timing signals for use with the CoPilot software.

Input Module

The **B** IA1-M-V is an analog input module that accepts 0–5 or 0–10 V DC signals from electric molding machines to obtain injection pressure and screw position for CoPilot software integration.

Relay Module

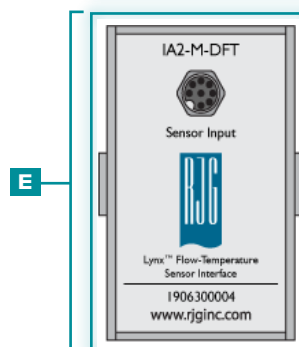
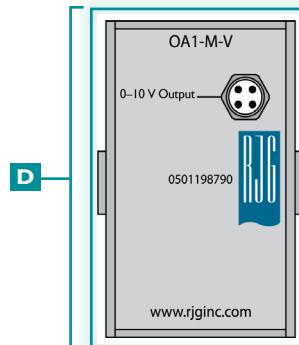
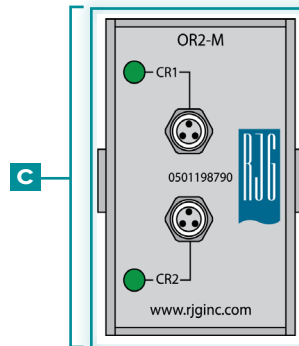
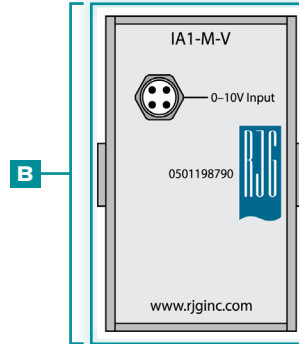
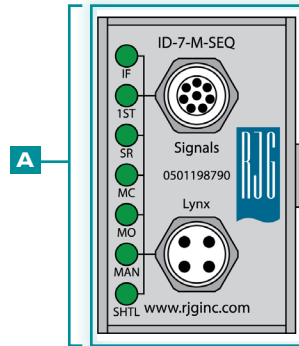
The **C** OR2-M module provides a normally-open or normally-closed contact for part sorting or control outputs. The OR2-M has two channels that can be assigned for sorting and/or control output.

Output Module

The **D** OA1-M-V is an analog output module wired to the molding machine in order to output a 0–10 V DC signal as an external machine transfer (V→P) for CoPilot software when an OR2-M cannot be used.

Flowmeter Interface Module (Optional)

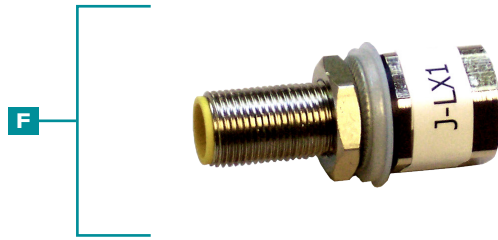
The **E** IA2-M-DFT is an analog, dual-output module that provides all the inputs and outputs needed to interface the CoPilot system to Smartflow®'s TracerVM™ and TracerVM™ with User Interface line of flowmeters.



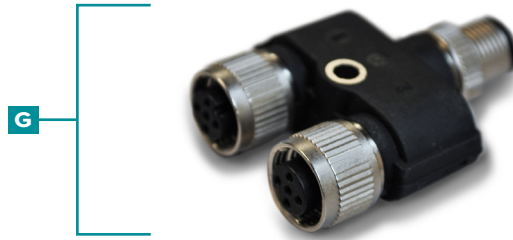
Product Description (continued)

Junctions

The **F** J-LX1 is a single Lynx feed-through junction which connects the shielded, DIN-rail-mounted modules inside the machine panel to the AP4.0.



The **G** J-LX2-CE is a Lynx two-port junction which connects modules, machine interface sensors, and junctions to the AP4.0 (used for hydraulic installations).



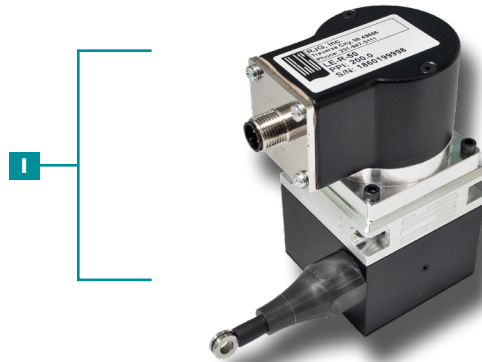
The **H** J-LX5-CE is a Lynx five-port junction which connects modules, machine interface sensors, and junctions to the AP4.0 (for installations which use an optional proximity or limit switch for mold closed signals).



Product Description (continued)

Machine Interface Sensors

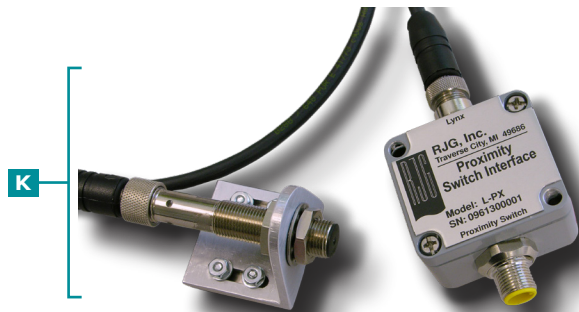
The **I** **LE-R-50-REVB** is a Lynx 50” stroke/velocity sensor that monitors screw position and speed, and interfaces machines to the AP4.0 in order for the CoPilot software to calculate injection velocity, shot volume, cushion, and plasticizing rates.



The **J** **LS-H-1/4NPT-3K/5K** is a Lynx hydraulic sensor which interfaces hydraulic machines to the AP4.0 in order to calculate injection pressure.



The **K** **L-PX** is a Lynx proximity switch used to derive the mold closed signal when one is not available from the machine sequence module.

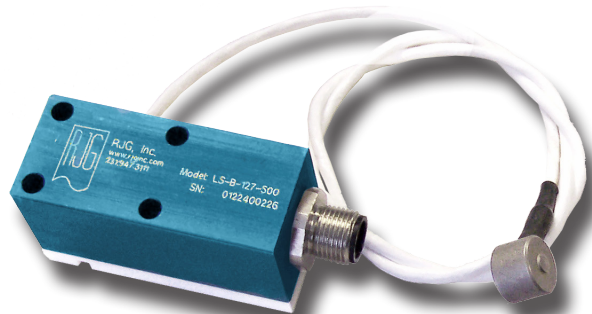


Product Description (continued)

In-Mold Cavity Pressure Sensors

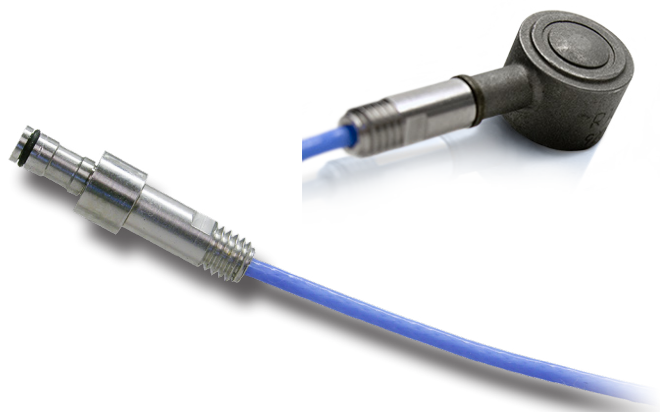
Cavity pressure sensors are placed inside the mold behind ejector pins, behind transfer pins, or are flush-mounted, and detect the plastic pressure conditions inside the related cavity/cavities. Cavity pressure sensors may be single- or multi-channel, strain gage or piezoelectric, and button or flush-mount type.

RJG, Inc. offers a wide array of digital single- and multi-channel strain gage and piezoelectric cavity pressure sensors for each application. In order to choose the correct sensor for each application, a sensor location strategy is vital—visit www.rjginc.com/technology/sensors/choosing for information on choosing a sensor.



Single- and Multi-Channel Sensors

Single-channel sensors either have or require an adapter for each sensor that is connected to the AP4.0. Multi-channel sensors can connect multiple sensors to a single plate or adapter plate, which then connects to a sensor adapter, which connects to the AP4.0.



Strain Gage and Piezoelectric Sensors

Strain gage sensors use a wheatstone bridge to determine the amount of plastic force exerted while piezoelectric sensors use a quartz crystal to determine plastic pressure forces.

Button or Flush-Mount Sensors

Button-type sensors are placed under ejector or transfer pins, while flush-mount sensors contact the plastic in the cavity, and can be contoured/textured to match the cavity surface.



In-Mold Cavity Pressure Sensor Adapters

Each sensor requires an adapter to connect to the AP4.0. Some sensor adapters can connect a single sensor to the AP4.0, while others can connect multiple sensors to the AP4.0; some sensor adapters are mold-mountable, while some sensor adapters are surface-mountable (away from the mold).



Product Description (continued)

In-Mold Temperature Sensors

Temperature sensors are placed inside the mold or are flush-mounted, and detect the temperature conditions inside the mold or cavity/cavities. Temperature sensors may be Type J or Type K, single- or multi-channel, and are flush-mount type.

Type J and K Type K Sensors

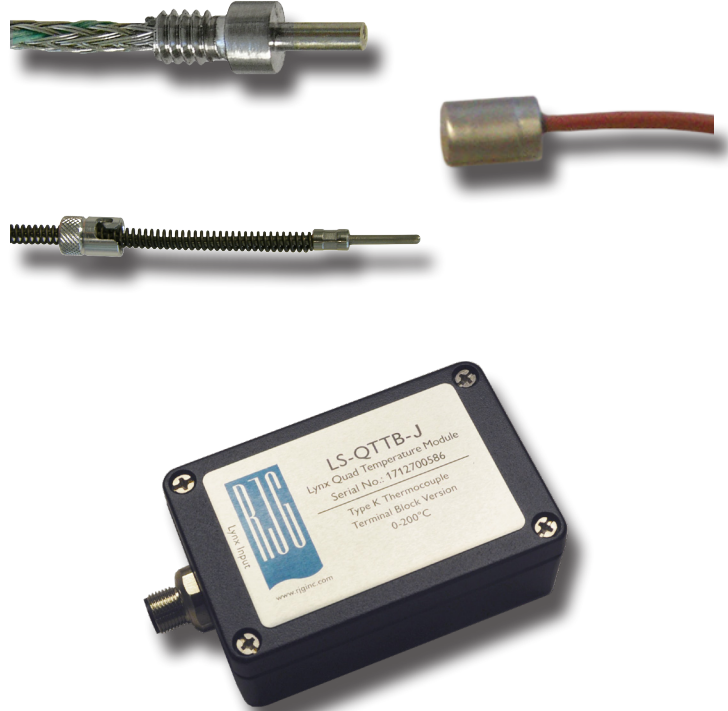
Temperature sensors may be Type J or Type K, though all temperature sensors purchased from RJG, Inc. are Type K.

Single- and Multi-Channel Sensors

Temperature sensors may be single- or multi-channel. RJG, Inc. offers only multi-channel temperature sensor adapters, which can connect up to four temperature sensors to the AP4.0 via a single connection.

Temperature Sensor Adapters

Each sensor must be connected to an adapter, which is then connected to the AP4.0. The temperature sensor adapters offered by RJG, Inc. are four-channel, Type J or Type K, and mold-mountable.



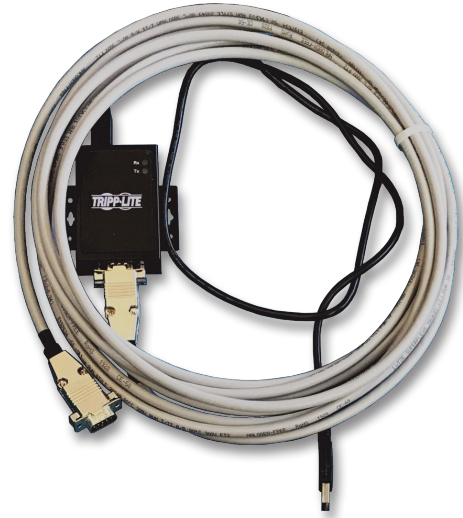
Product Description *(continued)*

Optional Equipment

Optional equipment can be purchased in order to connect auxiliary molding equipment to the CoPilot system.

Temperature Control Unit (TCU) Interface Assembly

The CoPilot System/TCU Interface Cable Assembly C-TCU-USB includes the serial-to-USB interface and all cabling required to connect a temperature control unit (TCU) to the CoPilot System application processor AP4.0.



Flowmeter

The Smartflow's TracerVM or Smartflow's TracerVM with User Interface line of flowmeters can be used with the Lynx digital flow-temperature interface module IA2-M-DFT, which provides all the inputs and outputs needed to interface the flowmeter and CoPilot system.



Installation

Installation Overview

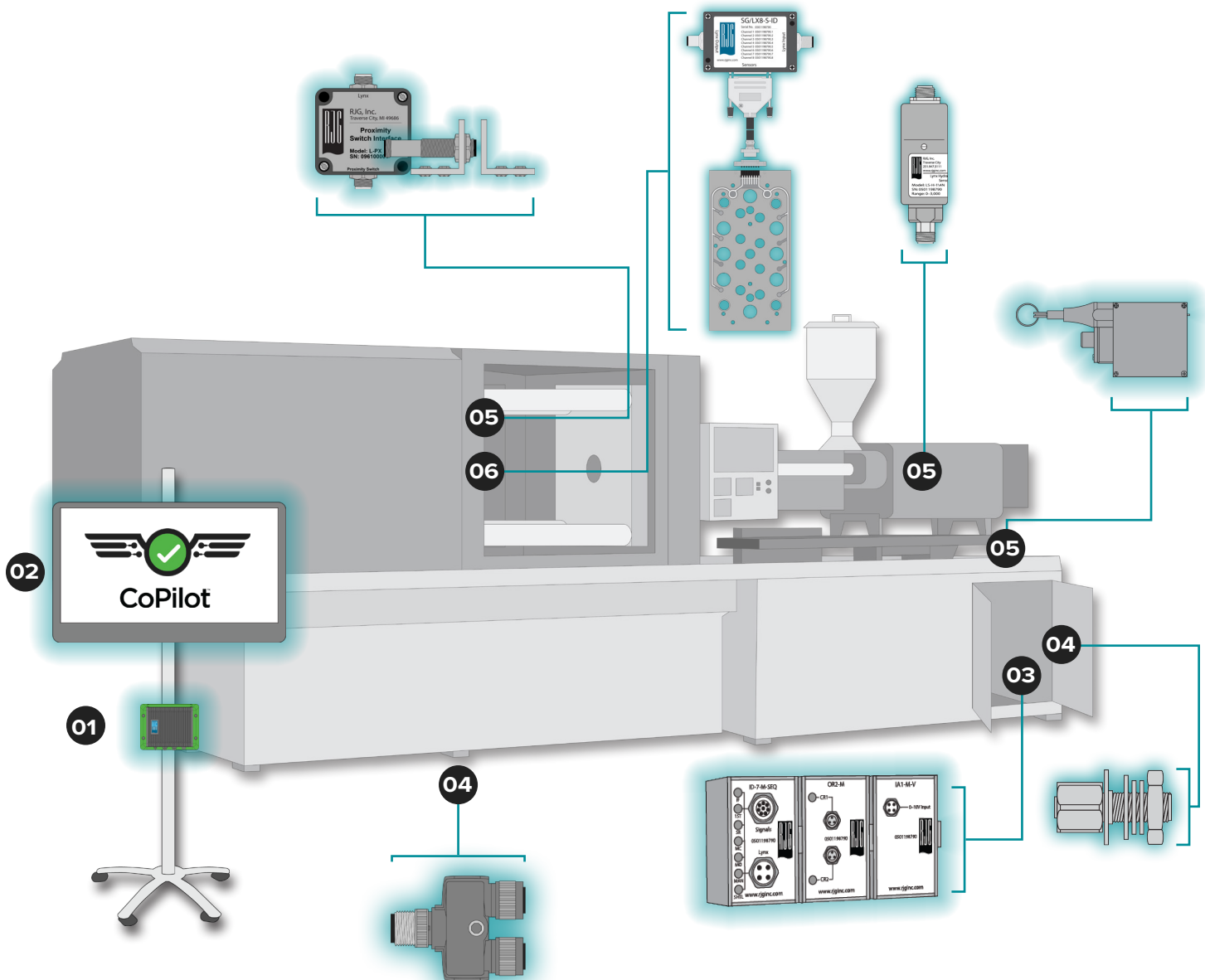
Read all instructions before installing hardware components. Contact RJG, Inc. Customer Support for any questions regarding installation. Follow all installation instructions, notes, and cautions.



CAUTION Always disconnect, lock out, and tag out all power sources before making electrical connections. Failure to comply will result in injury or death to personnel and damage or destruction of equipment.

Component Installation Order

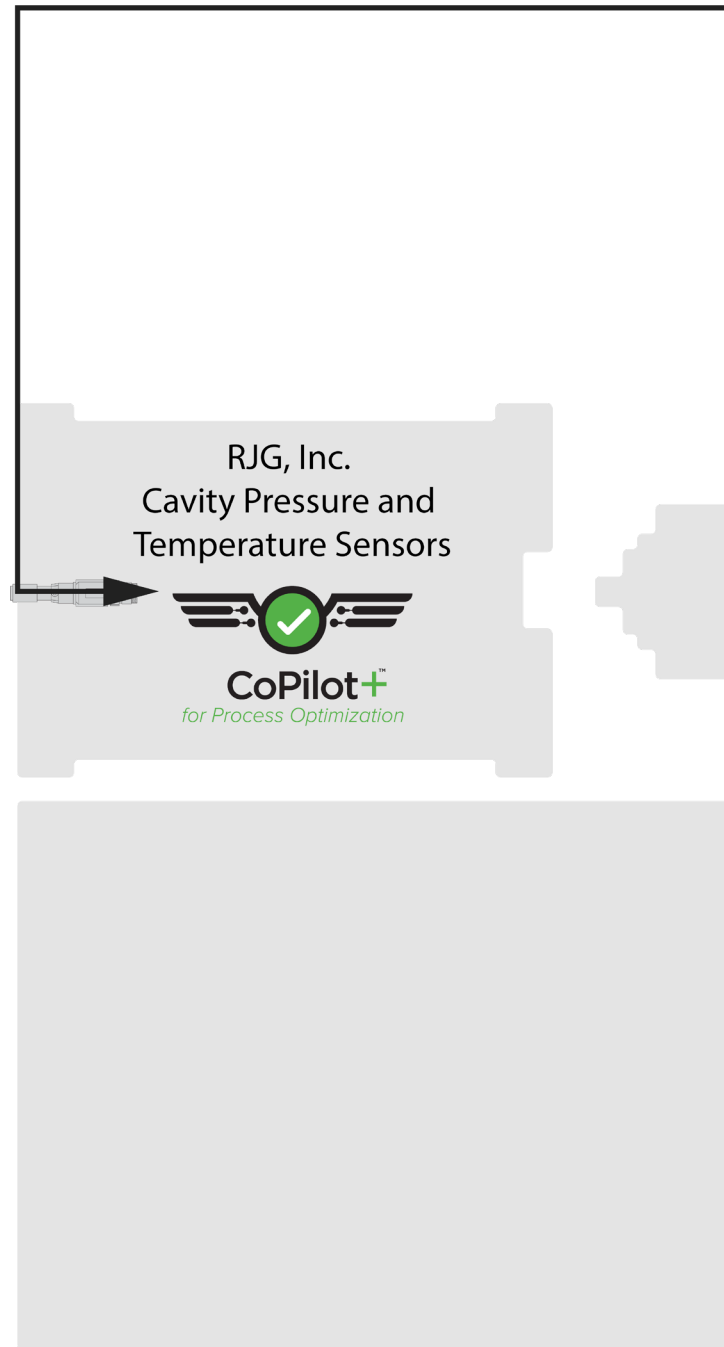
- 01 Install Application Processor AP4.0
- 02 Install Touch Screen
- 03 Install Lynx Modules
- 04 Install Lynx Junctions
- 05 Install Lynx Machine Interface Sensors
- 06 Install Mold Sensors



Installation (continued)

Lynx Hardware Layout—Hydraulic Machines

STANDARD EQUIPMENT		QTY
A	AP4.0— <i>Application Processor</i>	1
B	PS-AP40-24V— <i>AP4.0 Power Supply/ Cable</i>	1
C	Touch Screen Computer	1
D	Touch Screen Cables— <i>One DP++, One USB</i>	2
E	LE-R-50— <i>Lynx 50" Stroke/Velocity Encoder</i>	1
F	CE-LX5-4M-F90— <i>Lynx Four-Meter 90° Cable</i>	1 ³
G	CE-LX5-2M— <i>Lynx Two-Meter Cable</i>	1 ²
H	CE-LX5-4M— <i>Lynx Four-Meter Cable</i>	1 ³
I	J-LX1— <i>Lynx Single Feed-Through</i>	1
J	ID7-M-SEQ— <i>Lynx Sequence Module</i>	1
K	C-ID7-M-3M— <i>Shielded Cable for ID7-M-SEQ</i>	1 ¹
L	OR2-M— <i>Lynx Relay Module OR OA1-M-V—Lynx Analog Output Module</i>	1 ⁵
M	C-OR2-M-3M— <i>Shielded Cables for OR2-M</i>	2 ^{1.5}
N	LS-H-1/4NPT-3K/5K— <i>Lynx 3,000/5,000 psi Hydraulic Pressure Sensor</i>	1
O	CE-LX5-2M— <i>Lynx Two-Meter Cable</i>	1
P	J-LX5— <i>Lynx Five-Port Junction Box</i>	1
OPTIONAL EQUIPMENT		QTY
U	L-PX— <i>Lynx Proximity Switch</i>	1 ^{1.4}



¹ Item not shown.

² For standard installation; use of L-PX requires a quantity of 3.

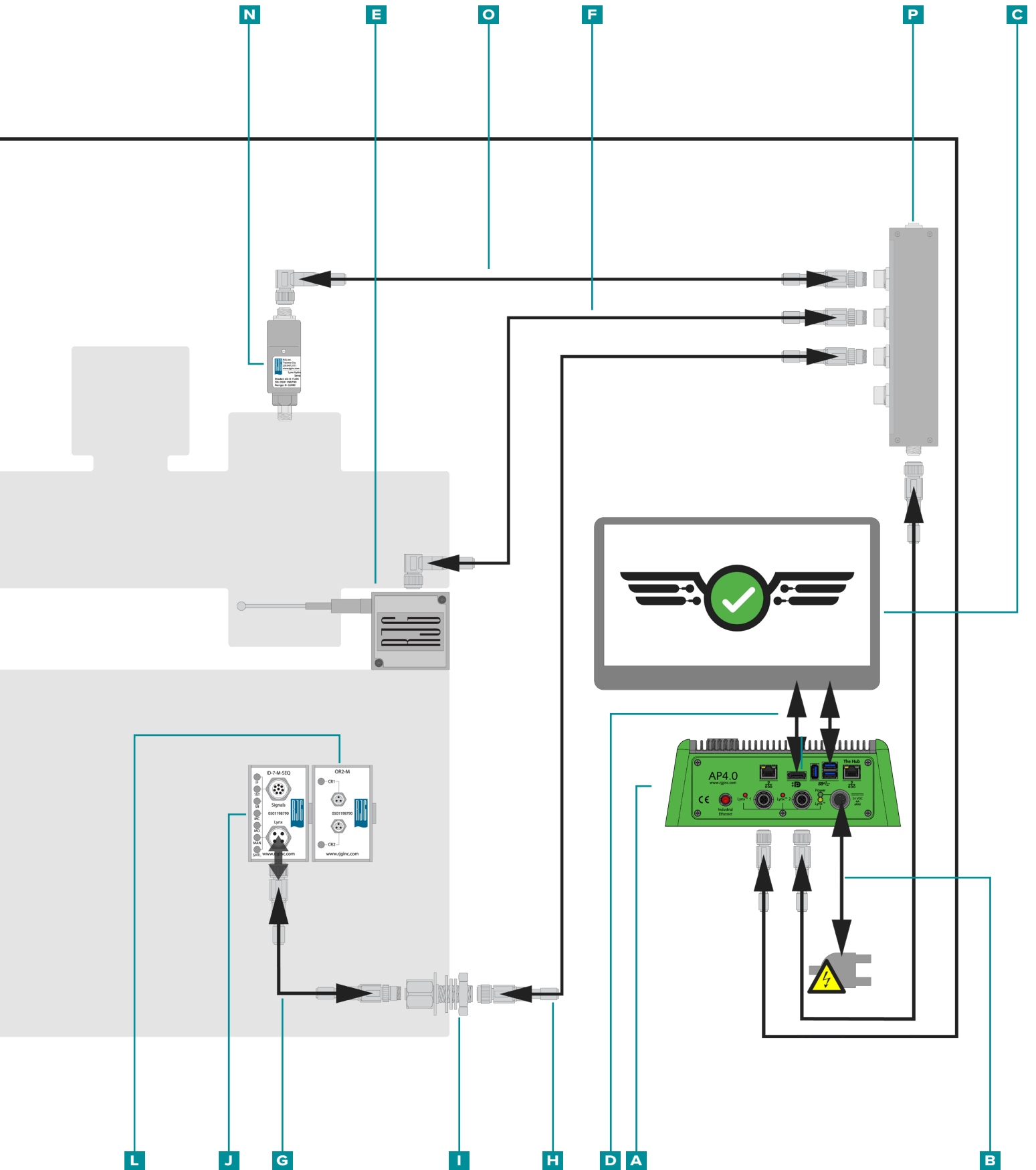
³ For standard installation; use of L-PX requires a quantity of 2.

⁴ Only used if mold closed signal is not available from the ID7-M-SEQ sequence module.

⁵ OA1-M-V used for control (V→P) if OR2-M cannot be utilized.



Installation (continued)



Installation (continued)

Lynx Hardware Layout—Electric Machines

STANDARD EQUIPMENT		QTY
A	AP4.0—Application Processor	1
B	PS-AP40-24V—AP4.0 Power Supply/ Cable	1
C	Touch Screen Computer	1
D	Touch Screen Cables—One DP++, One USB	1
E	LE-R-50—Lynx 50" Stroke/Velocity Encoder	1
F	CE-LX5-4M-F90—Lynx Four-Meter 90° Cable	1 ³
G	CE-LX5-2M—Lynx Two-Meter Cable	1 ²
H	CE-LX5-4M—Lynx Four-Meter Cable	1 ³
I	J-LX1—Lynx Single Feed-Through	1
J	ID7-M-SEQ—Lynx Sequence Module	1
K	C-ID7-M-3M—Shielded Cable for ID7-M-SEQ	1 ¹
L	OR2-M—Lynx Relay Module OR OA1-M-V—Lynx Analog Output Module	1 ⁵
M	C-OR2-M-3M—Shielded Cables for OR2-M	2 ^{1.5}
N	IA1-M-V—Lynx Analog Input Module	1
O	C-IA1-M-3M—Shielded Cable for IA1-M-V	1 ¹
P	J-LX5—Lynx Five-Port Junction Box	1
OPTIONAL EQUIPMENT		QTY
U	L-PX—Lynx Proximity Switch	1 ^{1.4}

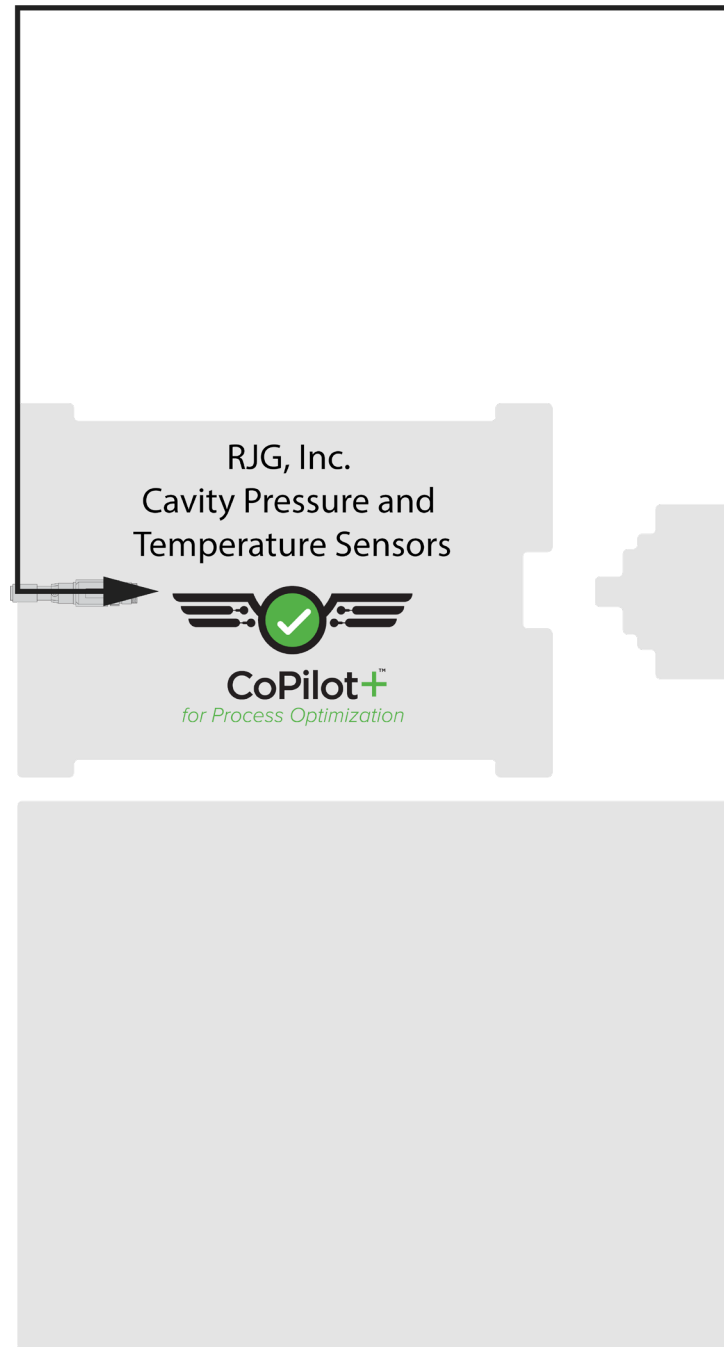
¹ Item not shown.

² For standard installation; use of L-PX requires a quantity of 3.

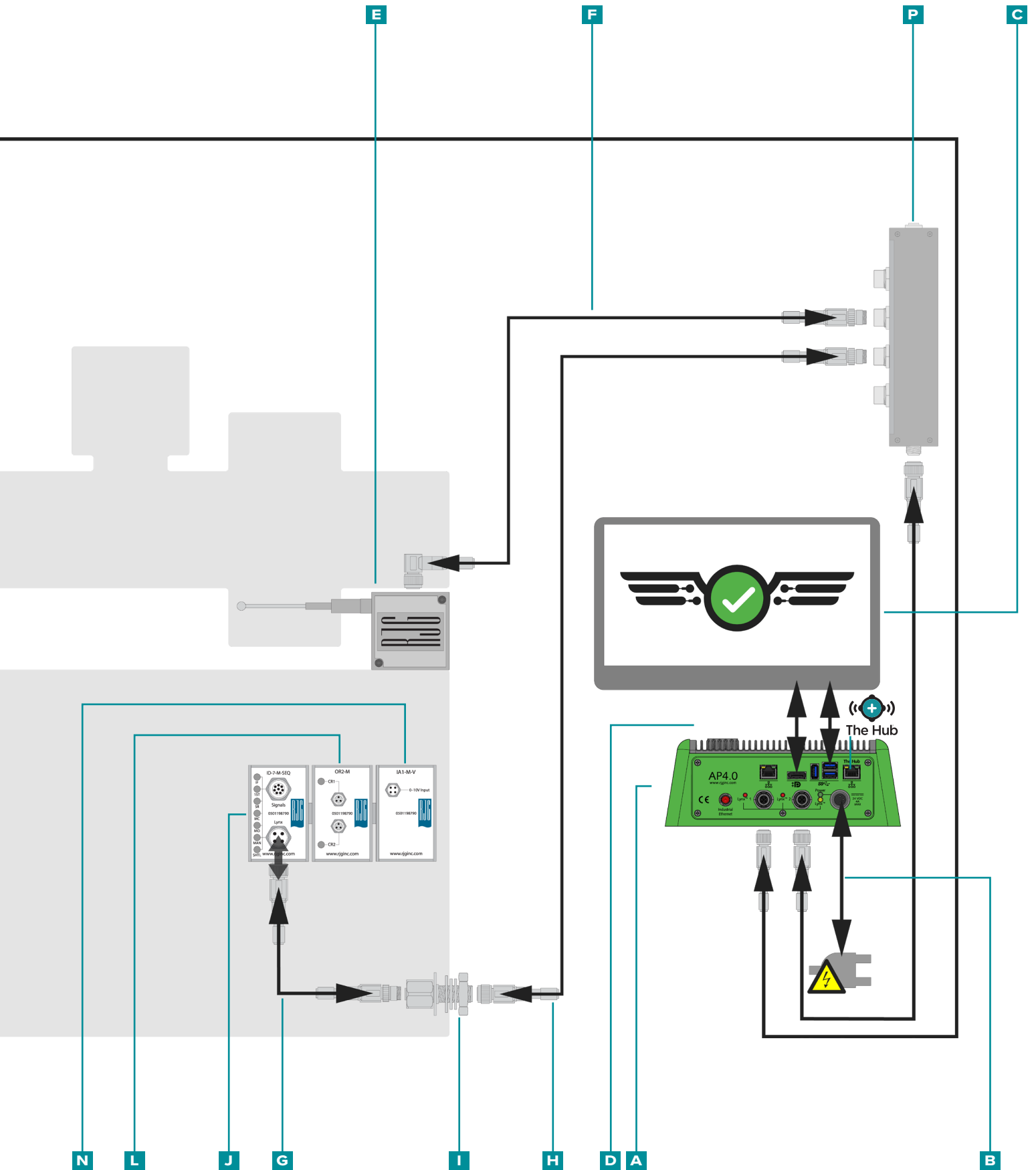
³ For standard installation; use of L-PX requires a quantity of 2.

⁴ Only used if mold closed signal is not available from the ID7-M-SEQ sequence module.

⁵ OA1-M-V used for control (V→P) if OR2-M cannot be utilized.



Installation (continued)



Installation (continued)

Application Processor AP4.0

Mounting Requirements

1. Location

Determine a mounting location that will be convenient for installation, use, and maintenance.

Mount to a solid surface.

Mount away from sources of

- static such as hopper, dryer, or material feed lines.
- vibration.
- humidity, contamination, or corrosion (such as water and hydraulic lines).

2. Clearances

Do not mount in an enclosed location.

- Top—6" (150 mm)
- Sides—6" (150 mm)
- Front—6" (150 mm)
- Bottom—12" (300 mm)



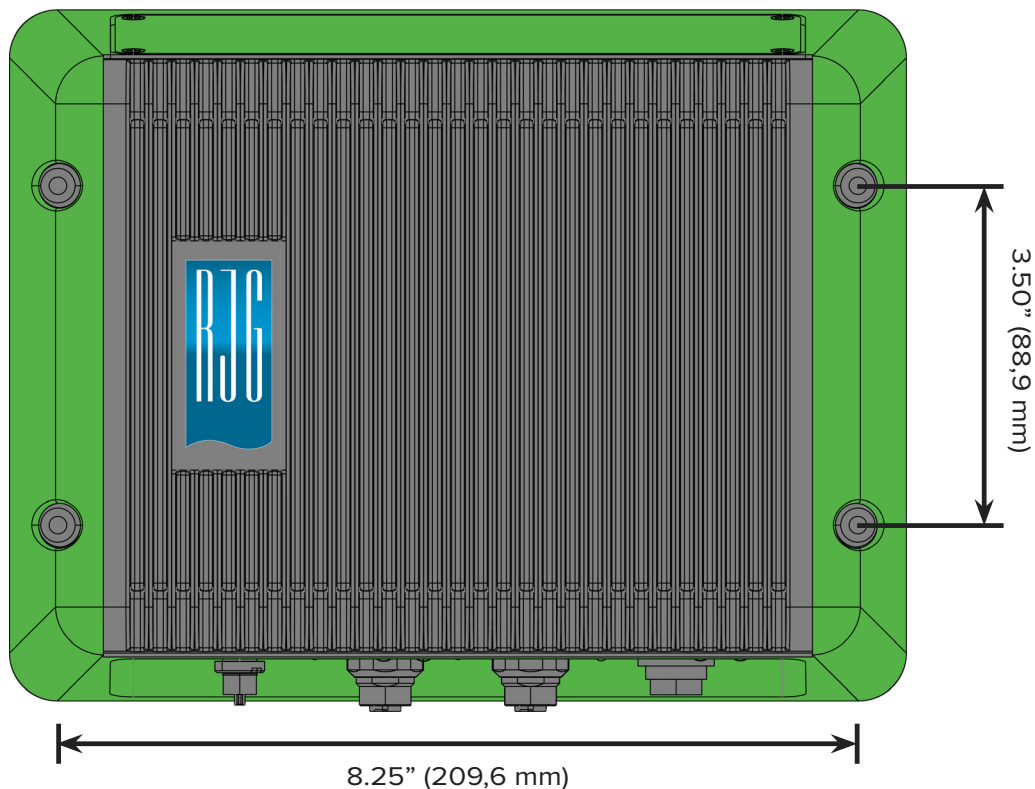
CAUTION Connectors must face down to prevent contamination. Failure to comply will result in damage to or destruction of equipment.

3. Securing

Mount only using the supplied mounting holes.



NOTE DO NOT drill holes in the AP4.0 case.



Installation *(continued)*

Power Requirements

Wire power to the AP4.0. Power is supplied by a 24 V DC power supply and cable included with the AP4.0. A licensed electrician must check all wiring to ensure that all power and grounds are wired correctly.



CAUTION *Always disconnect, lock out, and tag out all power sources before making electrical connections. Failure to comply will result in injury or death to personnel and damage or destruction of equipment.*

Insert the power supply's cable connector into the AP4.0 power port.



CAUTION *Use only the supplied power supply; failure to comply will result in personal injury or death and damage or destruction of equipment.*



CAUTION *The ground connection of the power receptacle must be made to an adequate earth ground to eliminate possible radio frequency noise and interference, and to ensure a safe operation. Failure to comply will result in personal injury or death and damage or destruction of equipment.*



NOTE *Power must be from supplied from a source separate from the injection molding machine.*

Networking

The AP4.0 provides two ethernet ports. Port 1 is for OPC/UA networking; Port 2 is for networking the CoPilot with The Hub.



NOTE *DO NOT run the ethernet cable near any sources of static such as the hopper, dryer, or material feed lines.*



NOTE *Always use an RJ45S shielded ethernet cable.*



Installation (continued)

Lynx Hardware Installation

Module Installation



CAUTION Before beginning ID7-M-SEQ installation, disconnect and lockout/tag-out any and all power to the molding machine. Failure to comply will result in personal injury or death, and damage or destruction of equipment.

ID7-M-SEQ Sequence Module

1. Mount the module.

Mount the ID7-M-SEQ module to a solid surface—such as the molding machine frame—using the supplied 1.38” (35 mm) DIN rail. A clearance height of 6” (152,4 mm) from the face of the module is recommended.



NOTE Modules and connecting cables must be located away from any static sources, such as feeder tubes and material hoppers.

2. Wire the module.



NOTE The following required signals may be obtained from a machine output card.

Confirm the machine’s sequence output card can supply a reliable 24 V signal.

The CoPilot software requires injection, screw run, and mold clamped signals. Injection signals may be supplied by injection forward, injection forward and first stage, first stage, or first and second stage. Screw run signal may be supplied by screw recovery or analog screw RPM. Mold clamped signal may be supplied by mold clamped, or by a proximity or limit switch (refer to “L-PX Lynx Proximity Switch” on page 33).

Input for all signals 24 V ON; 0 V OFF. Maximum Input Voltage 36 V; Minimum Trigger-On Voltage 18 V.

Wire the machine sequence signals to the module cable C-ID7-M-3M using one of the following acceptable combination of signals (**A**, **B**, **C**, **D**, **E** OR **F**):



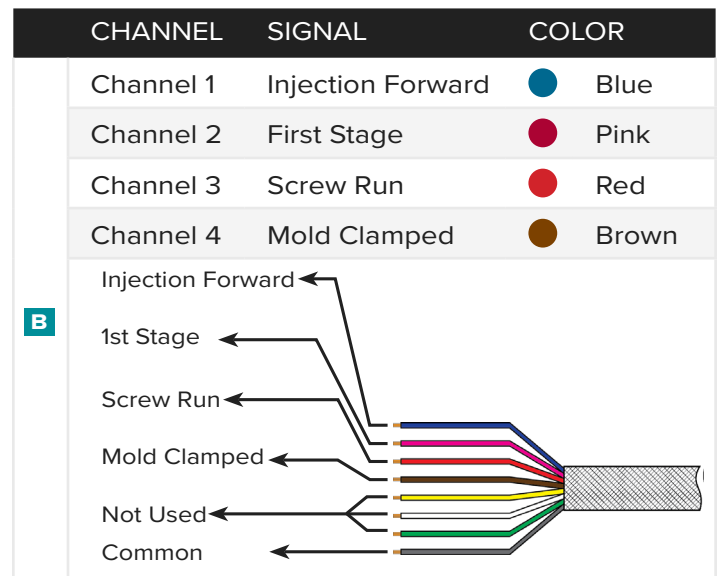
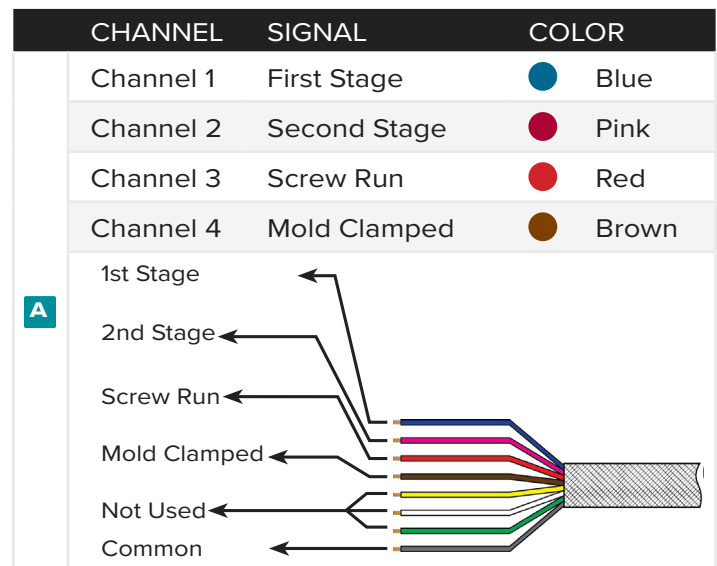
NOTE Signal combination A is recommended, followed by B, with the remaining being acceptable, but not optimal.



NOTE Note the signals which are wired to the machine for future software setup and use.

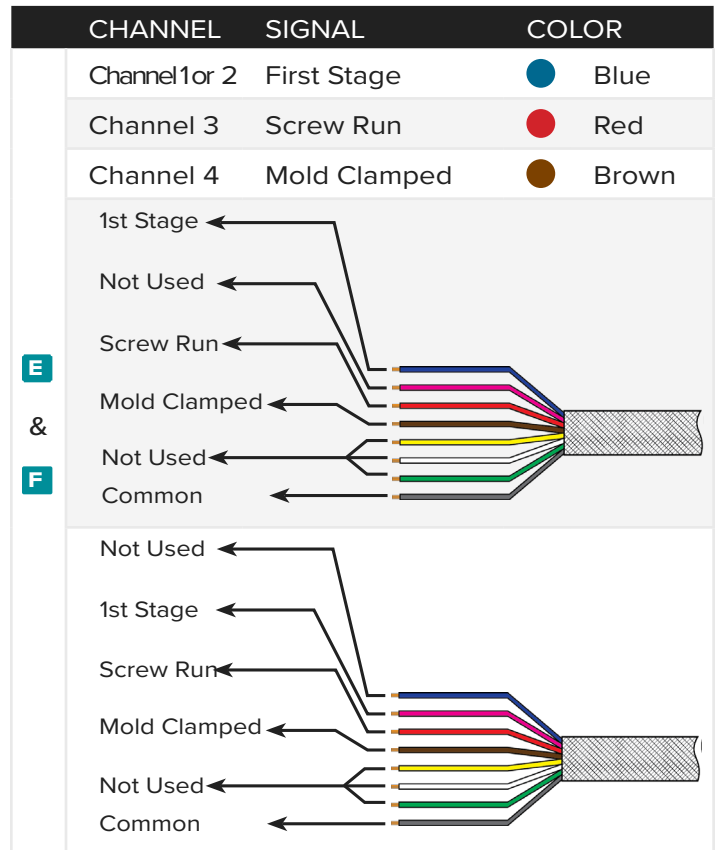
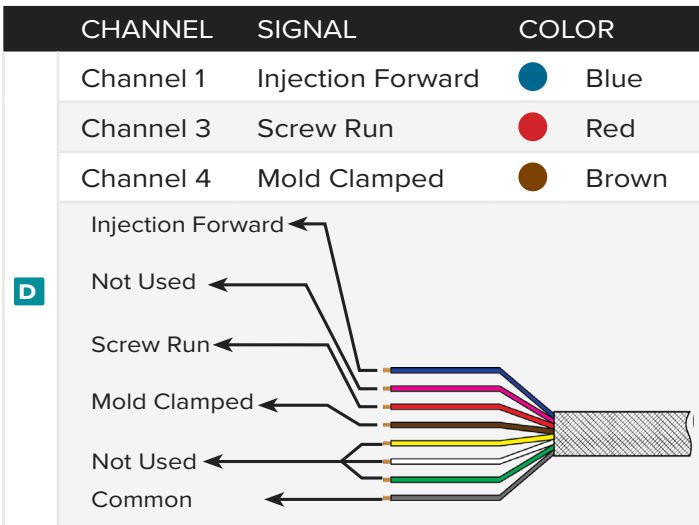
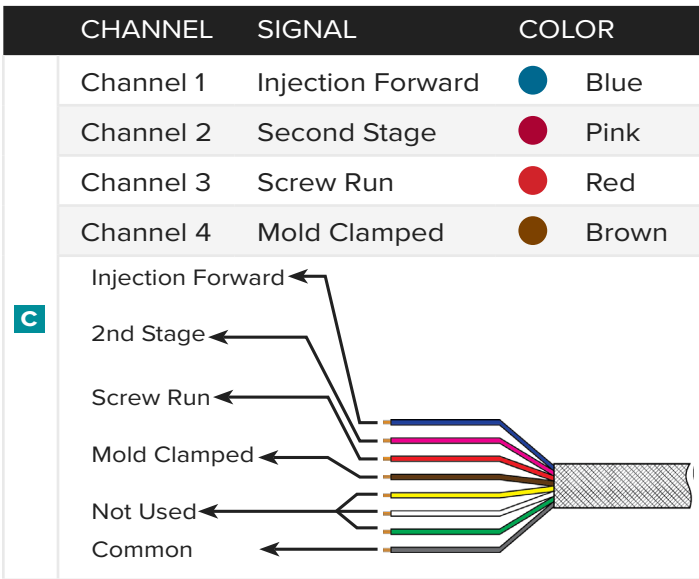
FOR ALL WIRING SIGNAL COMBINATIONS

Using the C-ID7-M-3M cable, attach the common wire (grey) from the ID7-M-SEQ to the common terminal on the machine output card. Attach the appropriate input wires from the ID7-M-SEQ to the output terminals on the machine output card.



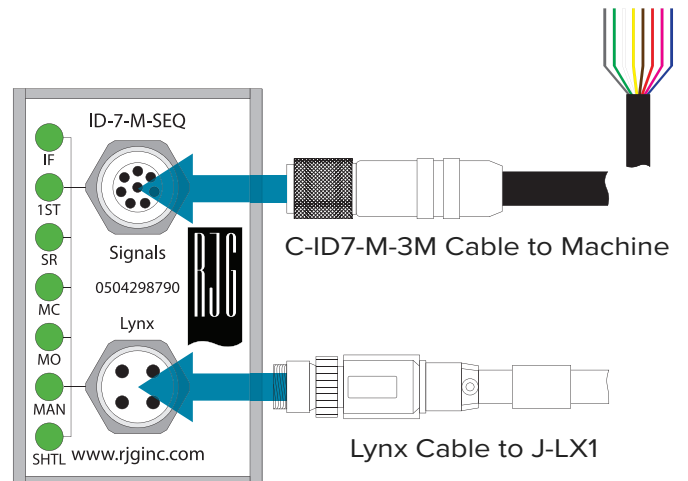
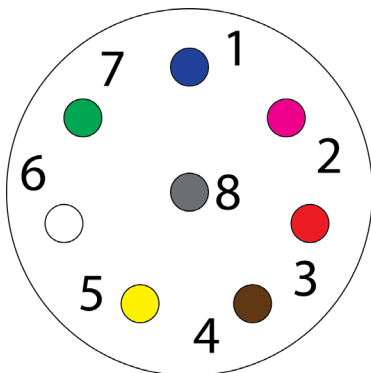
Installation (continued)

ID7-M-SEQ Sequence Module Installation (continued)



3. Connect the module to the CoPilot system.

Connect the C-ID7-M-3M cable to the ID7-M-SEQ module. Using the CE-LX5-2M Lynx cable, connect the ID7-M-SEQ to the JLX-1 junction.



Installation (continued)

IA1-M-V Analog Input Module

The IA1-M-V module is used to obtain injection pressure and/or screw position from electric molding machines.

CAUTION Before beginning IA1-M-V installation, disconnect and lockout/tag-out any and all power to the molding machine. Failure to comply will result in personal injury or death, and damage or destruction of equipment.

1. Mount the modules.

Mount the IA1-M-V module using the supplied DIN rail next to the installed OR2-M module (connect a IA1-M-V module to the OR2-M module using the integrated side connectors).

A clearance height of 6" (152,4 mm) from the face of the module is recommended.

NOTE Modules and connecting cables must be located away from any static sources, such as feeder tubes and material hoppers.

2. Wire the module.

NOTE The following required signals may be obtained from a machine output card.

Wire the following machine sequence signals to the module cable C-IA1-M-3M:

INPUT	FUNCTION	COLOR
0–10V	+ Signal	● Blue
0 V DC Common	- Signal	○ White

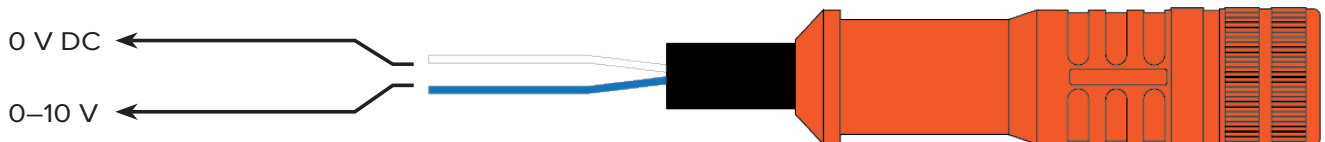
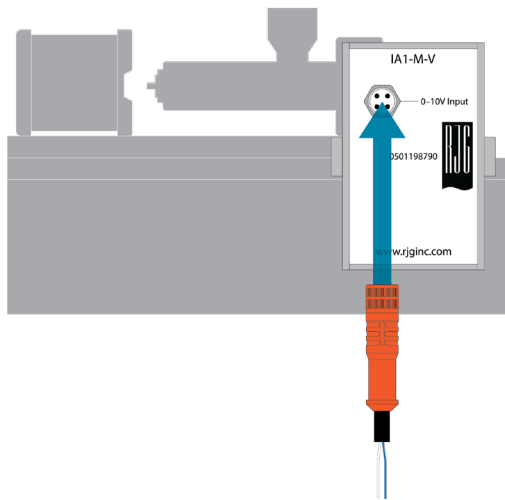
Attach 0 V DC (white) wire to the Common terminal of the injection molding machine 0–10 V I/O card.

Attach 0–10 V (blue) wire to the output terminal of the injection molding machine 0–10 V I/O card.

NOTE Note the signals which are wired to the machine for future software setup and use.

3. Connect the module to the machine.

Connect the C-IA1-M-3M cable to the IA1-M-V module.



Installation (continued)

OR2-M Dual Relay Output Module

CAUTION Before beginning OR2-M installation, disconnect and lockout/tag-out any and all power to the molding machine. Failure to comply will result in personal injury or death, and damage or destruction of equipment.

1. Mount the module.

Mount the OR2-M module using the supplied DIN rail next to the installed ID7-M-SEQ module (connect the OR2-M and ID7-M-SEQ modules using the integrated side connectors).

A clearance of 6" (152,4 mm) from the face of the module is recommended.

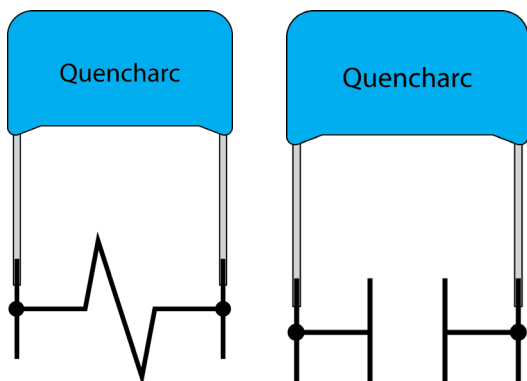
NOTE Modules and connecting cables must be located away from any static sources, such as feeder tubes and material hoppers.

2. Wire the module.

To utilize the CoPilot software part sorting and control signals, the OR2-M is interfaced to a machine's or robot's input card; the machine can then be configured to stop if excessive reject parts are being made, or the robot can be configured to save only good parts. Determine the input voltage required by the machine/robot to facilitate desired action (most machines/robots require 24 V DC).

CAUTION Always apply the appropriate backups provided by the machine or robot manufacturer.

RJG, Inc. recommends the use of the included **quench-arcs** with dry contacts, preferably installed across the load. However, they may also be placed across the contacts by attaching to the cable pigtails.



Preferred Method (left) and Alternate Method (right).

Quench-arcs
Quench-arcs increase relay life and reduce electromagnetic interference (EMI) emissions. It is preferred that the quench-arcs are attached across the load. However, the quench-arcs may alternately be placed across the contacts by attachment to the cable pigtails.

Wire the following machine signals to the module cable C-OR2-3M:

NOTE Refer to "Appendix" on page 43 for inject enable, V→P, and valve gate wiring.

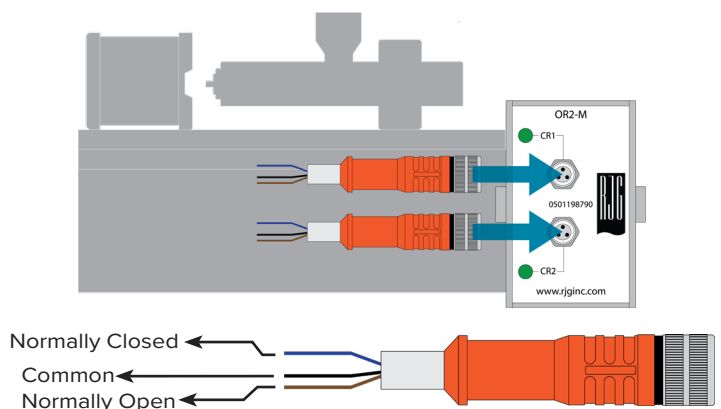
RELAY	SIGNAL	COLOR
CR1	Normally Open	Brown
CR1	Common	Black
CR1	Normally Closed	Blue
CR2	Normally Open	Brown
CR2	Common	Black
CR2	Normally Closed	Blue

Contact Rating 1A 30 V DC

Attach the Common wire for contact relay 1 (CR1) to the 24 V DC power source of the machine controller/robot; attach the Normally Open wire for CR1 to the 24 V DC machine/robot input/output (I/O) card input terminals.

3. Connect the module to the machine/robot.

Connect the C-OR2-3M cable to the OR2-M module.



Installation (continued)

OA1-M-V Analog Output Module



CAUTION Before beginning OA1-M-V installation, disconnect and lockout/tag-out any and all power to the molding machine. Failure to comply will result in personal injury or death, and damage or destruction of equipment.

1. Mount the module.

Mount the OA1-M-V module using the supplied DIN rail next to the installed ID7-M-SEQ module (connect the OA1-M-V and ID7-M-SEQ modules using the integrated side connectors).

A clearance of 6" (152,4 mm) from the face of the module is recommended.







NOTE Modules and connecting cables must be located away from any static sources, such as feeder tubes and material hoppers.

2. Wire the module.



CAUTION Always apply the appropriate backups provided by the machine or robot manufacturer.

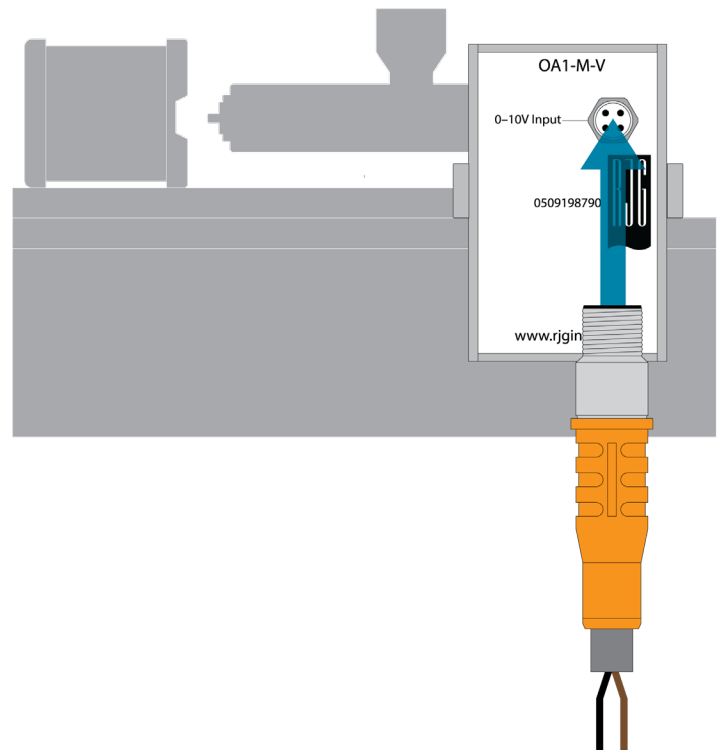
Wire the following machine signals to the module cable C-OA1-M-3M:

OUTPUT TYPE	SIGNAL	COLOR
0–10 V DC	Positive Signal (+)	 Brown
0 V DC	Negative Signal (-)	 Black
No Connection	N/A	 Blue
No Connection	N/A	 White

Using the C-OA1-M-3M cable, attach 0–10 V DC (brown) wire to the output terminal of the injection molding machine 0–10 V I/O card. Using the C-OA1-M-3M cable, attach 0 V DC (black) wire to the Common terminal of the injection molding machine 0–10 V I/O card.

3. Connect the module to the machine.

Connect the C-OA1-3M cable to the OA1-M-V module.



Installation (continued)

Junction Installation



CAUTION Before beginning J-LX1 installation, disconnect and lockout/tag-out any and all power to the molding machine. Failure to comply will result in personal injury or death and damage or destruction of equipment.

1. Measure and cut junction mounting location.

The J-LX1 is a feed-through junction that connects the DIN rail modules ID7-M-SEQ, OR2-M, and IA1-M-V* to the CoPilot system. A Lynx cable connects the modules and the junction. Note the installation location for the DIN rail modules and measure, mark, and cut a mounting location for the junction in the machine panel.

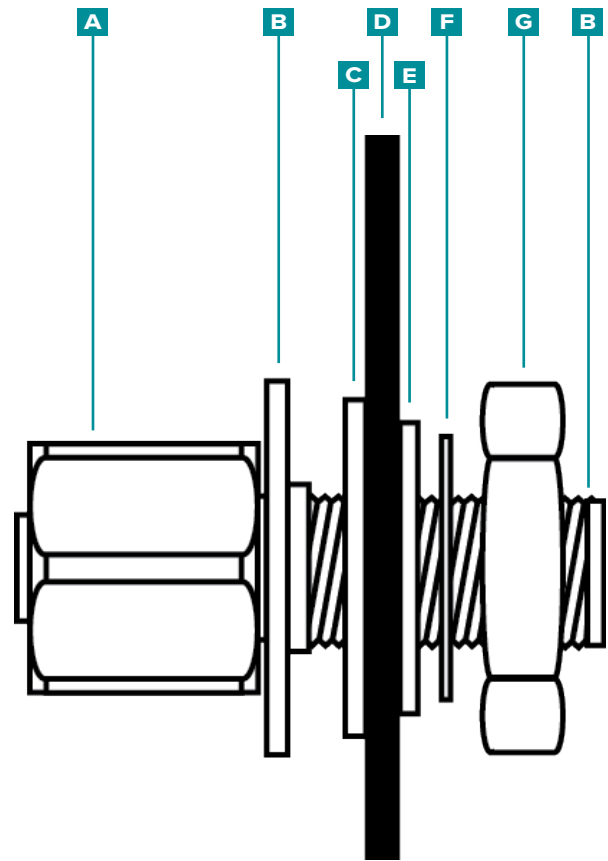
**if installed.*

2. Install junction.

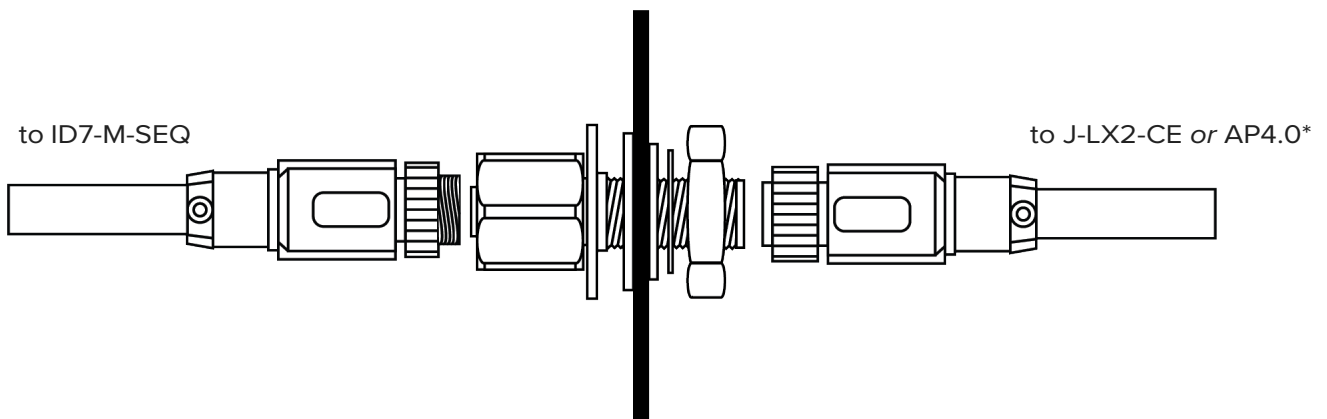
Ensure all power is disconnected and perform all lockout/tag-out procedures.

- Remove and retain the **G** nut from the junction.
- Remove and retain **F** steel washer and **E** rubber washer from junction.
- Insert junction from the inside of the machine through the mounting location to the outside of the machine.
- Install **E** rubber washer on junction.
- Install **F** steel washer on junction.
- Install **G** nut on junction; tighten to secure.

Refer to figure at right for installation.



A Female Socket	E Rubber Washer
B Thin Shoulder Washer	F Steel Washer
C Thin Plastic Washer	G Nut
D Machine Panel	H Male Connector



*J-LX2-CE for hydraulic installations, AP4.0 for electric installations



Installation (continued)

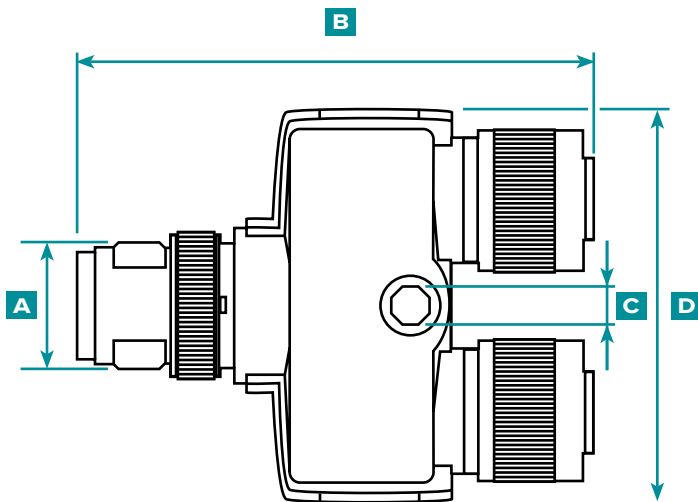
J-LX2-CE Lynx Two-Port Junction (Hydraulic Installations)

CAUTION Before beginning J-LX2-CE installation, disconnect and lockout/tag-out any and all power to the molding machine. Failure to comply will result in personal injury or death, and damage or destruction of equipment.

CAUTION Route and secure any cables to prevent abrasion, pinching, or pulling during operation. Junction must be placed in a location that will not cause a trip or snag hazard. Failure to comply will result in personal injury or damage to equipment.

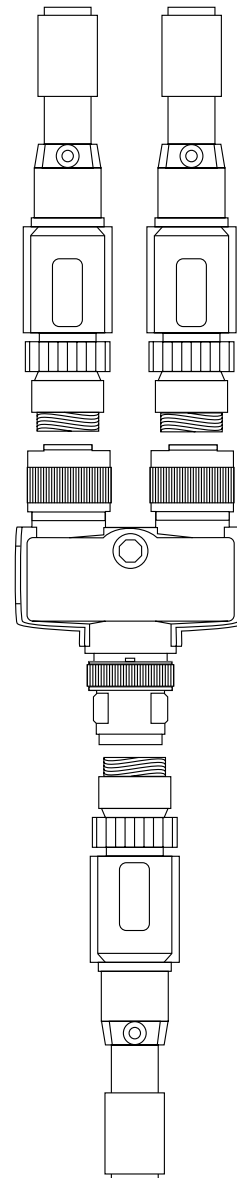
Mount the junction.

CAUTION Mount the junction to prevent damage from excessive heat. Failure to comply will result in damage to equipment.



A	M12	
B	2.035"	51,7 mm
C	0.165"	4,2 mm
D	1.535"	39 mm

to L-SH-1/4NPT-3K to LE-R-50



to AP4.0



Installation (continued)

Machine Interface Sensor Installation

LE-R-50-REVB Lynx Stroke/Velocity

The LE-R-50-REVB monitors standard screw position and speed on injection molding machines where the functions are not available from the machine.



CAUTION Before beginning LE-R-50-REVB sensor installation, disconnect and lockout/tag-out any and all power to the molding machine. Failure to comply will result in personal injury or death, or damage to equipment.

1. Mount the sensor.



NOTE The stroke sensor cable must enter the cable bushing straight to eliminate wear on the cable and prevent erroneous readings.

Mount the LE-R-50-REVB on the molding machine injection unit sled using the two included 10-24 x 2" cap screws.



CAUTION Screw travel must not exceed 50" (1270 mm). Failure to comply will result in inaccurate readings, personal injury, and damage to equipment.

A Preferred Mounting Installation:

Mount the stroke sensor on the injection unit sled near the back of the unit so that the sensor will detect the movement of the screw but not the sled. Refer to figure on page 30.

B Alternate 1 Mounting Installation:

Mount the stroke sensor on the molding machine near the back of the injection unit sled. The sensor will detect the movement of the screw, but also the movement of the sled; this will also cause loss of some usable length. Refer to figure on page 30.

C Alternate 2 Mounting Installation:

Mount the stroke sensor on the injection unit sled near the front of the unit. The sensor will detect the movement of the screw, but not the sled; however, the sensor must remain 6–8" (152,4–203,2 mm) away from barrel heaters. Refer to figure on page 30.

2. Install Lynx cable on sensor.

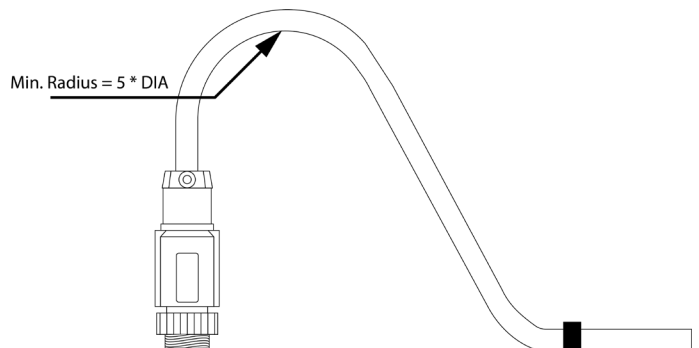
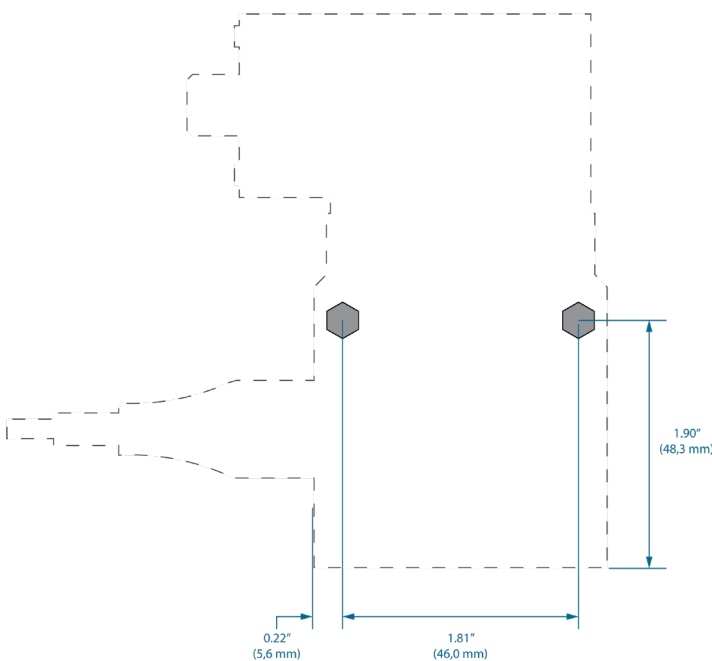
Connect CE-LX5-4M-F90 Lynx cable to sensor.



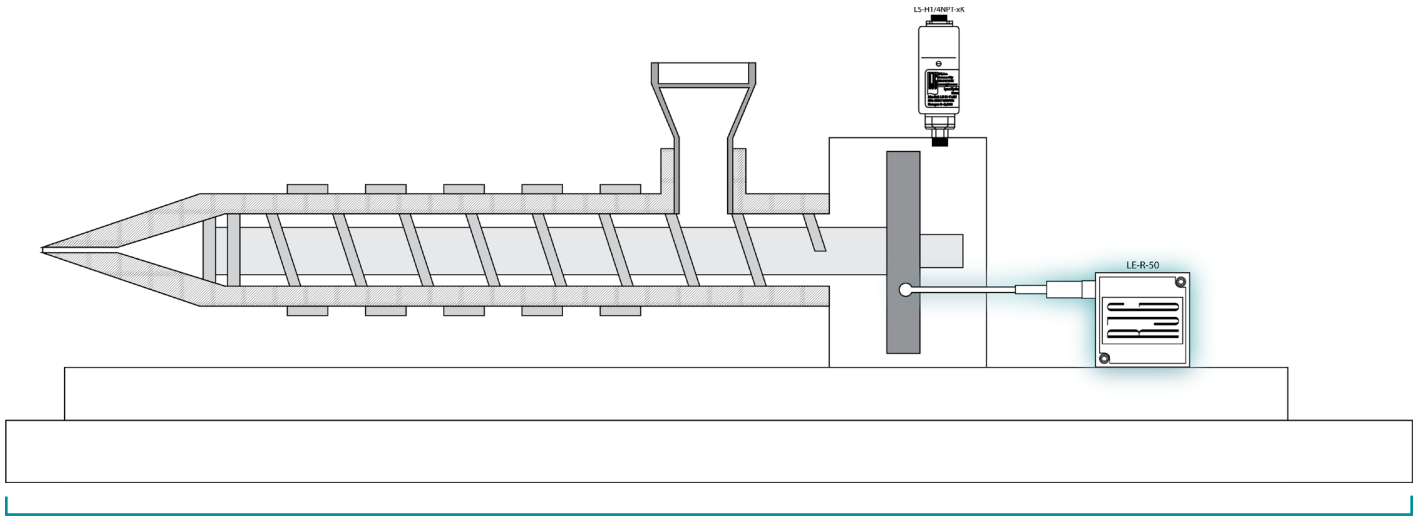
NOTE Strain-relieve cable so movement of sled does not place strain on connector.

3. Install Lynx cable on AP4.0 or J-LX2-CE

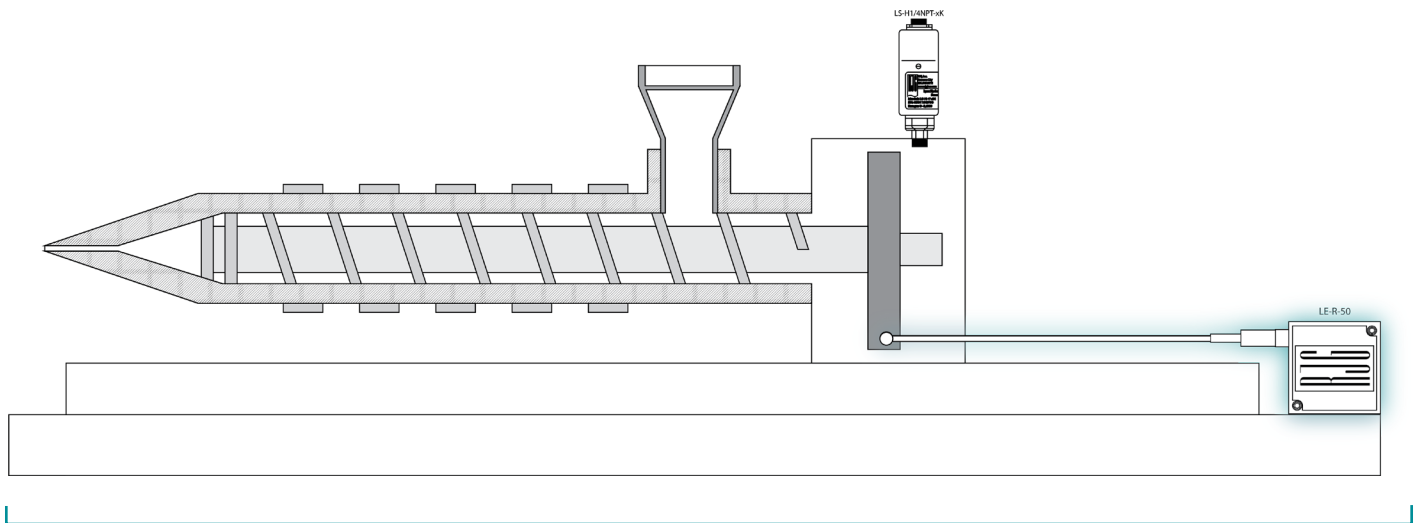
Connect CE-LX5-4M-F90 Lynx cable to AP4.0 (electric machines). Connect CE-LX5-4M-F90 Lynx cable to J-LX2-CE Lynx Two-Port Junction Box (hydraulic machines).



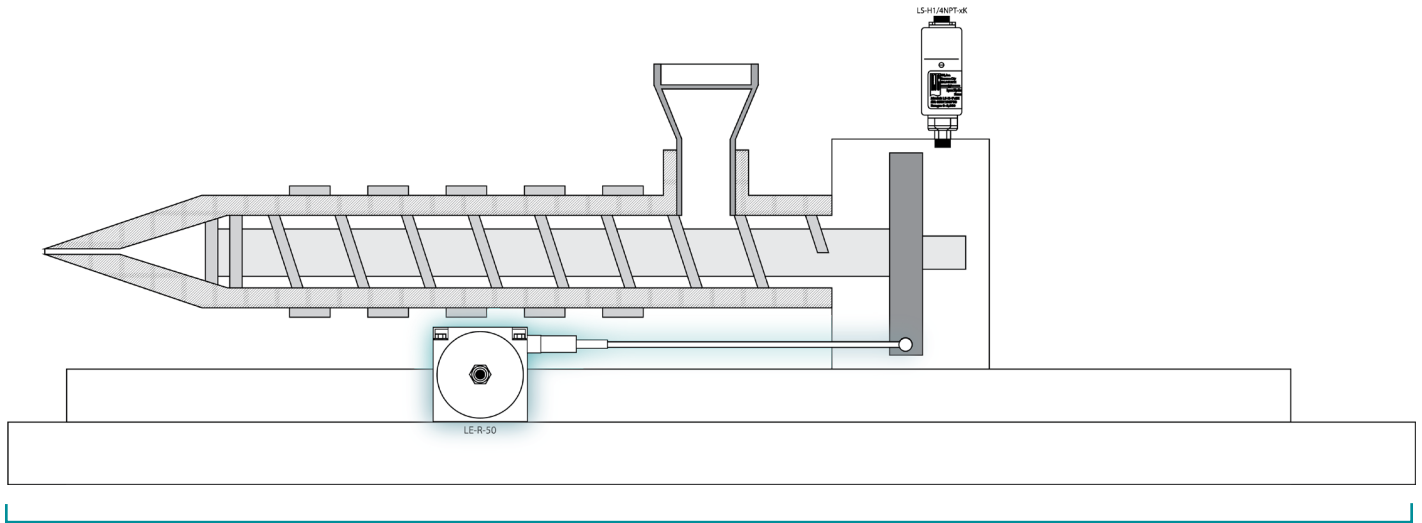
Installation (continued)



A



B



C



Installation (continued)

LS-H-1/4NPT-3K/5K Lynx Hydraulic Sensor

The LS-H-1/4NPT-3K/5K Lynx hydraulic sensor measures injection and back pressure, which build at the cylinder ram. The sensor has a 1/4" BSPT male adapter to a 1/4" NPT female fitting which attaches to the molding machine's hydraulic system.

CAUTION Before beginning LS-H-1/4NPT-3K/5K Lynx hydraulic sensor installation, disconnect, lock out, and tag out any and all power to the molding machine. Failure to comply will result in personal injury or death and damage or destruction of equipment.

CAUTION Before beginning LS-H-1/4NPT-3K/5K Lynx hydraulic sensor installation, relieve hydraulic pressure from the molding machine. Failure to comply will result in personal injury or death and damage or destruction of equipment.

1. Install sensor on machine.

The LS-H-1/4NPT-3K/5K 1/4"NPT female adapter may be installed directly to the molding machine; in some cases, an adapter may be required to install the sensor.

Male BSPT/Female NPTF Adapter:

SPECIFICATIONS	
Tube Fitting Part No.	1/4X1/4F3HG
PT Female NPT	1/4
T3 Male BSPT	1/4
C6 Hex (in.)	3/4
L (mm)	3/4
Standard Material	Steel

Male Metric/Female PT Adapter:

SPECIFICATIONS	
Tube Fitting Part No.	M12-1/4F8OHG
	M14-1/4F8OHG
PT Female NPTF	1/4-18
	1/4-18
T8 Port THD Metric STR	M12X1.5
	M14X1.5
C1 Hex (in.)	3/4
	3/4
D Drill (in.)	0.196
	0.281
L (in.)	1.24
	1.24
LL (in.)	0.85
	0.85
Standard Material	Steel
	Steel

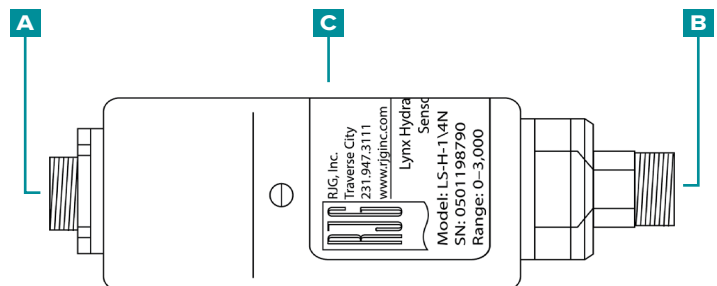
2. Install Lynx cable on sensor.

Connect CE-LX5-4M-F90 Lynx cable to sensor.

3. Install Lynx cable on J-LX2-CE.

Connect CE-LX5-4M-F90 Lynx cable to Lynx port on the J-LX2-CE Lynx Two-Port Junction Box.

- A** Lynx Connection
- B** Hydraulic Connection
- C** LS-H-1/4NPT-3K/5K Hydraulic Pressure Sensor



Installation (continued)

Optional Equipment Installation

J-LX5-CE Lynx Five-Port Junction (Optional)

The Lynx five-port junction is used only if a proximity or limit switch is used to derive a mold closed signal.

CAUTION Before beginning J-LX5-CE installation, disconnect and lockout/tag-out any and all power to the molding machine. Failure to comply will result in personal injury or death, and damage or destruction of equipment.

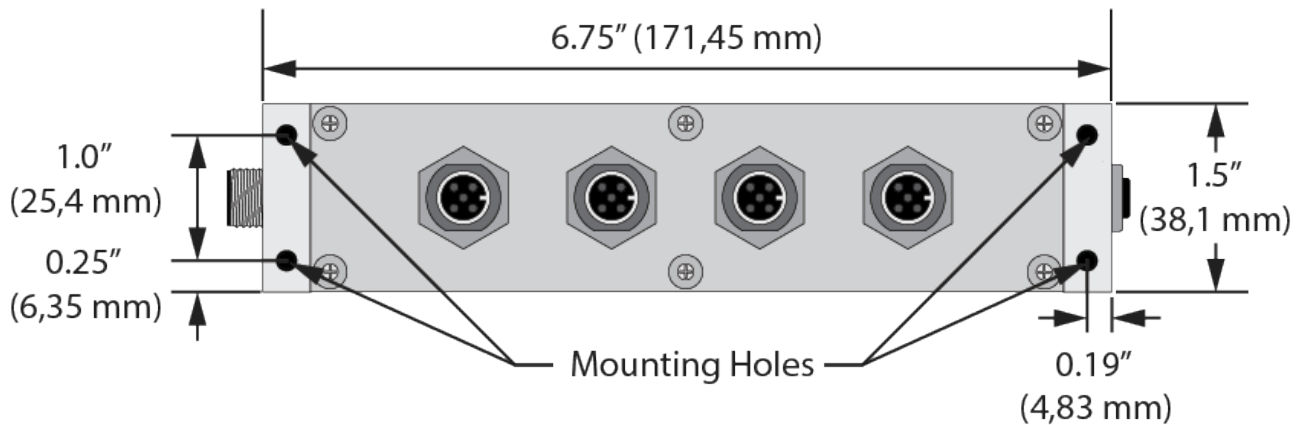
Mount the junction.

The J-LX5-CE may be mounted on the moving or stationary platen or mold half, or other convenient location on the machine using #6 -32 X 1.75" socket

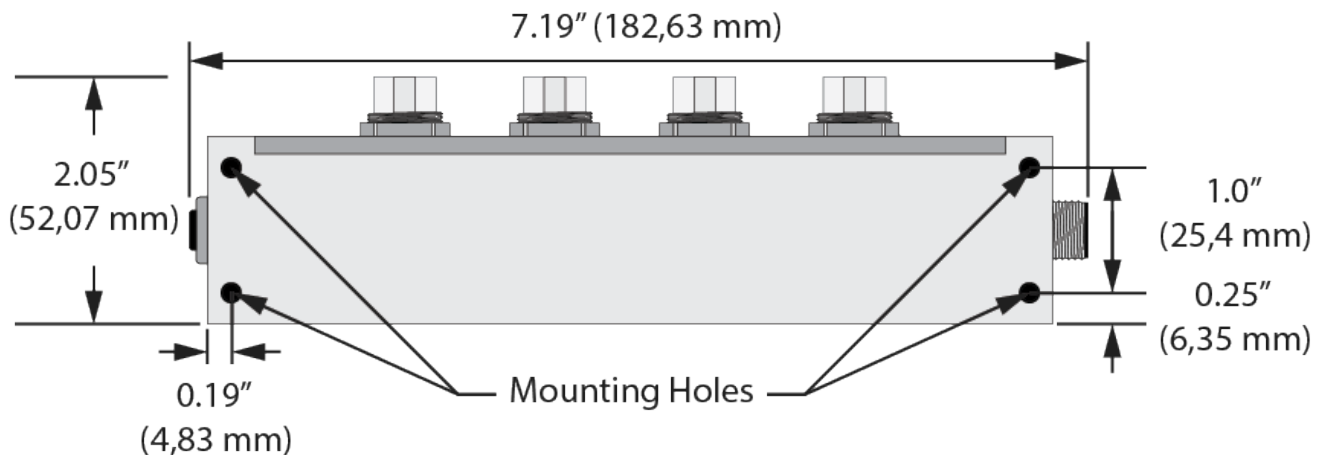
CAUTION The J-LX5-CE has a maximum operating temperature 185 °F (85 °C); mount junction to prevent damage from excessive heat. Failure to comply will result in damage to equipment.

CAUTION Route and secure any cables to prevent abrasion, pinching, or pulling during operation. Junction must be placed in a location that will not cause a trip or snag hazard. Failure to comply will result in personal injury or damage to equipment.

TOP



SIDE



Installation (continued)

L-PX Lynx Proximity Switch

The L-PX Lynx proximity switch is used to derive a mold closed signal only when one is not available from the ID7-M-SEQ machine sequence module.

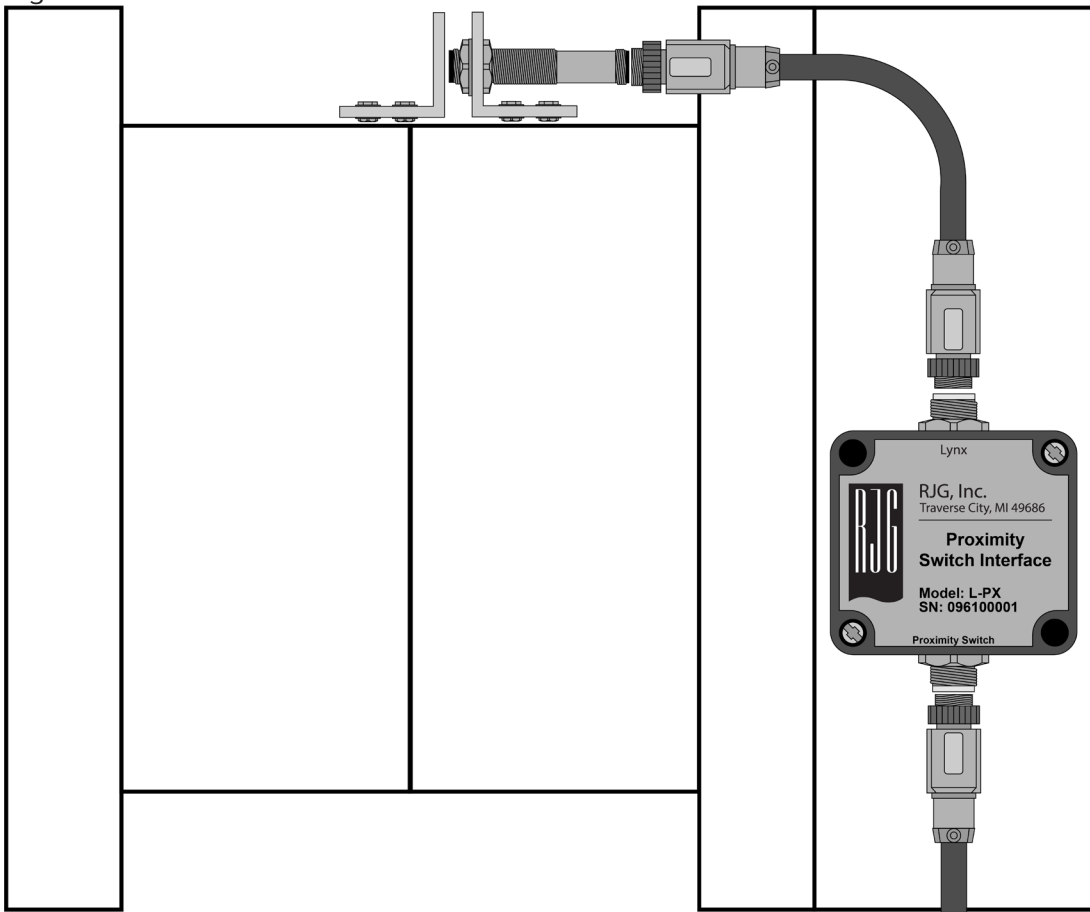
NOTE *The injection molding machine must be in Manual mode, with the mold closed to perform installation.*

CAUTION *Before beginning L-PX Lynx proximity switch installation, disconnect, lock out, and tag out any and all power to the molding machine. Failure to comply will result in personal injury or death and damage or destruction of equipment.*

1. Install proximity switch on machine.

Use the included magnets to determine correct installation position; remove magnets prior to permanent installation.

Position the proximity sensor/bracket and interface on the non-moving half.



CAUTION *Install the proximity switch so that the switch and/or cable does not become damaged by the ejector plate or mold during operation.*

Position the target bracket on the moving half; adjust the target bracket as close as possible to the proximity sensor (less than 0.1" (25,4 mm) distance).

2. Install Lynx cable on switch.

Connect CE-LX5-4M Lynx cable to switch.

3. Install Lynx cables on switch interface.

Connect CE-LX5-4M Lynx cables to each sides of switch interface.

4. Install Lynx cable on J-LX-5-CE.

Connect CE-LX5-4M Lynx cable to Lynx port on the J-LX5-CE Lynx Five-Port Junction Box.



Installation (continued)

Serial/USB Interface Installation for TCU

1. Determine Serial/USB TCU Interface mounting location.

Keep the interface away from excessive heat, vibration, and moisture.

2. Mount Serial/USB TCU Interface.

Mount the interface using the integrated mounting locations.

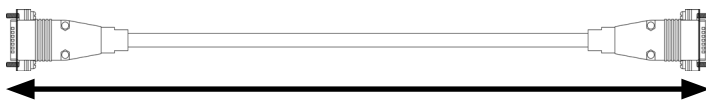
3. Attach cables to the TCU, Serial/USB TCU Interface, and AP4.0.

Attach Serial Cable to TCU and Serial/USB TCU Interface; attach USB cable to Serial/USB TCU Interface and AP4.0.

SERIAL/USB INTERFACE		
Operating Temperature	32–104° F	0–40° C
Storage Temperature	14–131° F	-10–55° C
BTUs	15.4 BTU/Hr	
Power Source (4.5W)	AP4.0 USB Port	

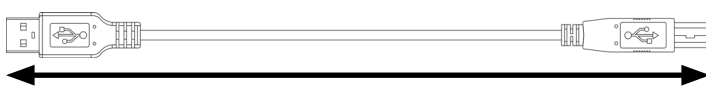
Refer to CoPilot Software User Guide—available for download online at www.rjginc.com—for software setup and use information.

SERIAL CABLE (TCU to USB INTERFACE)



20.0' (6,10 m)

USB CABLE (USB INTERFACE TO AP4.0)



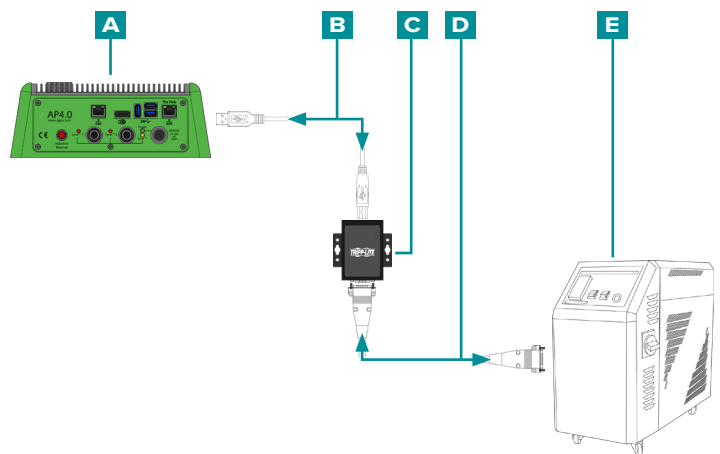
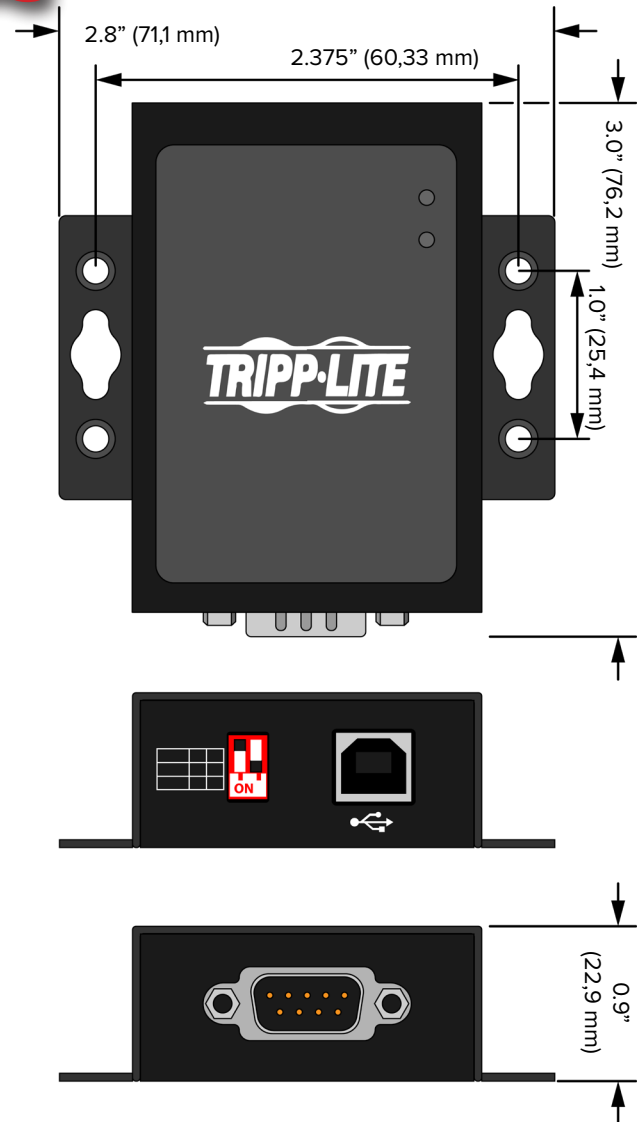
6.0' (1,83 m)

- A** CoPilot System Application Processor AP4.0
- B** USB Cable
- C** Serial/USB TCU Interface
- D** Serial Cable
- E** TCU

SERIAL/USB INTERFACE



CAUTION DO NOT change dip switch positions. Failure to comply will result in TCU communication interruptions.



Installation *(continued)*

Flowmeter Installation

Refer to the product manual to install flowmeters—available for download online at www.rjginc.com.



Installation *(continued)*

Mold Sensor Installation

Refer to the product manual and installation drawings to install mold sensors—available for download online at www.rjginc.com.



Maintenance and Troubleshooting

Warranty and Disclaimer

RJG, Inc. Standard 1-Year Warranty

RJG, Inc. is confident in the quality and robustness of the AP4.0 and associated power supply, and so are offering a one year warranty on the named equipment. RJG's AP4.0 and associated power supply are guaranteed against defects in material and workmanship for one year from the original date of purchase. The warranty is void if it is determined that the AP4.0 and/or associated power supply was subjected to abuse or neglect beyond the normal wear and tear of field use, or in the event the AP4.0 and/or associated power supply has been opened by the customer.

Product Disclaimer

RJG, Inc. is not responsible for the improper installation of this, or other, equipment RJG manufactures.

Proper RJG equipment installation does not interfere with original equipment safety features of the machine. Safety mechanisms on all machines should never be removed.

Preventative Maintenance

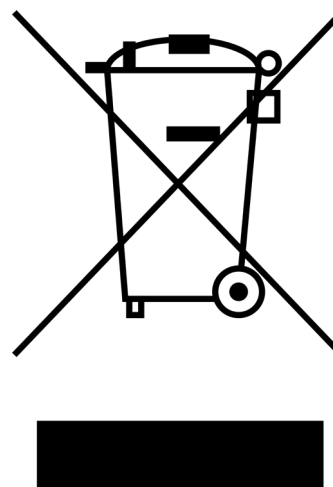
Periodically inspect the AP4.0, power cable, and all connected cables to detect possible damages. If damage is found, cease equipment use and contact a qualified servicer or RJG, Inc. at (231) 947-3111

Service

The AP4.0 and related components contain no user-serviceable parts. Only qualified personnel may service the AP4.0 and related components.

Disposal

Contact RJG or an RJG representative to discard the AP4.0 or supporting components.

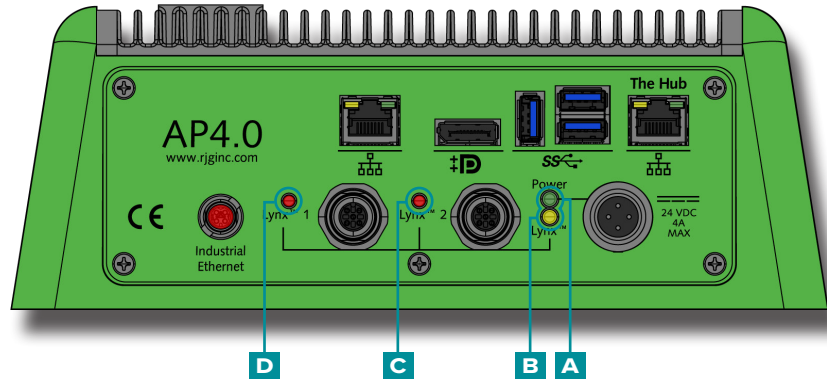


Maintenance and Troubleshooting (continued)

AP4.0 Troubleshooting

The AP4.0 has four LEDs that indicate power supply to:

- A** the AP4.0 as a whole (one ● green);
- B** the Lynx sensor interface board (one ● yellow);
- C** Lynx port 2 (individually (one ● red)); and
- D** Lynx port 1 (individually (one ● red)).



Use the following table to troubleshoot the AP4.0 and attached Lynx devices.

CONDITION	Lynx Port 1	Lynx Port 2	Lynx Board	AP4.0	TROUBLESHOOTING
AP4.0, Lynx, and Lynx Ports 1/2 Power On	●	●	●	●	System is operating as expected.
No Power to AP4.0	○	○	○	○	Check AC power, power supply connections
Power to AP4.0 Only	○	○	○	●	Contact RJG Customer Support for assistance; refer to “Customer Support” on page 41.
AP4.0, Lynx, and Lynx Port 2 Power On, Lynx Port 1 Over Current	○	●	●	●	Unplug Lynx cable from Lynx Port 1; power should return after 15 seconds. Troubleshoot cable/sensor short.
AP4.0, Lynx, and Lynx Port 1 Power On, Lynx Port 2 Over Current	●	○	●	●	Unplug Lynx cable from Lynx Port 2; power should return after 15 seconds. Troubleshoot cable/sensor short.
AP4.0 and Lynx, Power On, Lynx Ports 1 & 2 Over Current	○	○	●	●	Unplug Lynx cables from Lynx Port 1 & 2; power should return after 15 seconds. Troubleshoot cables/sensors shorts.



Maintenance and Troubleshooting (*continued*)

Common Errors

Standard Troubleshooting for Missing or Incorrect Inputs

Expected inputs do not appear on the sequence module, analog input module, or analog output modules (or in the CoPilot software).

1. Verify:

- module wiring is correct
- the inputs are connected to modules through Lynx cables
- Lynx cables are connected to junction(s)
- Lynx cables from junction(s) are connected to Lynx sensor interface ports

2. Disconnect then re-connect inputs.

3. Disconnect, re-connect, and restart AP4.0.

Helpful Hints

Cable Installation

When running wires along the machine, make sure cables will not be near a pinch point.

Avoid running cables near motors, servos, and load cells or along power conduits.

Secure cables well without crimping the cable itself.

Allow for enough slack (without crushing) of the cable if there is a need for range of motion.

Do not exceed 65' (20 m) total cable length between a sensor, module, or junction and the AP4.0.



Maintenance and Troubleshooting (continued)

Sequence Signal-Machine Manufacturer Terminology Cross Reference

RJG TERM	MANUFACTURER	TERM 1	TERM 2	TERM 3
Injection Forward (IF)	Arburg	Inject		
	Demag			
	Engel	Injection Drain	Injection Unit Forward	
	Fanuc	Injection		
	Mitsubishi			
	Nissei	Filling	1st Stage	
	Sumitomo	Screw Injects	Inject Start	
	Van Dorn	Fill		
	Other			
Screw Run (SR)	Arburg	Dose	Dosage	Screw Rotate
	Demag			
	Engel	Screw Rotation		
	Fanuc	Screw Rotation		
	Mitsubishi	Coloring		
	Nissei	Screw Rotation		
	Sumitomo	Screw Rotate	Start Screw Rotate	
	Van Dorn			
	Other	Charge	Plasticize	Plastication
Mold Clamped (MC)	Arburg	Mold Clamped		
	Demag	Mold Closed		
	Engel	Mold Closed		
	Fanuc	Clamp Press Build Up		
	Mitsubishi			
	Nissei	Clamp Completion		
	Sumitomo	Mold Close End		
	Van Dorn	Clamp Close		
	Other	Die Closed		



Maintenance and Troubleshooting (*continued*)

Knowledge Base

For further information, visit

<https://www.rjginc.com/know-how/knowledge-base>

RJG's searchable virtual help library.

Topics include Machine Interface, eDART Data Manager, Networking, Sensor Communication, Extracting eDART Data, Advanced System Overview, Microsoft Windows, Valve Gate, System Utilities Software, Hardware, and other product-related issues.

Customer Support

Contact RJG's Customer Support team by phone or email:

RJG, Inc. Customer Support

P: 800.472.0566 (Toll Free)

P: +1.231.933.8170

email: globalcustomersupport@rjginc.com

www.rjginc.com/support





Appendix

Valve Gate Installation

Introduction

The CoPilot system valve gate tool controls valve gates directly while monitoring and controlling other functions. Valve gate control increases process capability by more precisely regulating pressures, flow lines, or knit lines, or by allowing reduced clamp tonnage through alternate filling and packing.

Relay output modules (OR2-M) must be installed to operate (open/close) the gates. Outputs must then be set up within the CoPilot software to open and close each gate independently using pressure, position, time, temperature, or the operation of other valve gates.



CAUTION *Always set the appropriate backups on machine and/or external valve gate controller; RJG is not responsible for any damage caused by the lack of user-set backups. The CoPilot software valve gate control tool closes valve gates on the end of injection.*



Appendix (continued)

Valve Gate Installation (continued)

Requirements

The CoPilot system requires the following inputs and outputs for successful valve gate control operation:

Lynx Device	Input	Function	Required
Sequence Input Module (ID7-M-SEQ)	Injection Forward	Master sequence for start at cycle and opening and closing gates.	Yes
	Screw Run	Stroke direction, zero and material variation information.	Yes
	Mold Clamped	Gate close backup. Accurate cycle time and integration limit.	Yes
	Machine in Manual	User configuration determines whether valve gates are prevented from opening, or forced to open during purges.	No*
	Valve Pressure Supply	When ON this signals the CoPilot system that the hydraulic or air pressure to operate the gates is working. When OFF the CoPilot system cannot operate the valves and displays a user notification.	No*
Stroke Velocity Encoder (LE-R-30)	Screw position and speed	Used to sequence valves open or closed on volume.	Yes
Injection Pressure	Hydraulic, nozzle pressure, or analog input	Measures injection pressure, sets backups, and detects viscosity variations.	No*
Cavity Pressure Sensor(s)	Cavity Pressure	Controls valve gates by cavity pressure; results can be monitored.	

Lynx Device	Output	Function	Required
Dual Relay Output Module (OR2-M)	Velocity to Pressure (V2P Transfer) Contact Closure	External transfer to the machine to switch from velocity control to pressure control once all of the valves have closed.	Yes
	Inject Enable Contact Closure	The CoPilot system will open the contact if a failure occurs fails, which should stop the machine from injecting before mold damage can occur.	No*
Open Valve Relay Output	Contact closure to valve solenoid**	Each contact closure operates one valve solenoid.	Yes

* While listed as not required, these are recommended for successful valve gate implementation.

** RJG does not currently supply the solenoid, or the air or hydraulic supply.



Appendix (continued)

Valve Gate Installation (continued)

Wiring

Two (2) valve gates often can be controlled with one (1) OR2-M module; refer to the included diagrams for the best wiring practices for these systems. A maximum of 14 output devices (currently OR2-M modules or analog output modules OA1-M-V) can be connected to each Lynx port on the AP4.0.

i **NOTE** *As each set of contacts is wired, record the valve gate to which it belongs by serial number and “signal” number (side 1 or side 2 of the module).*

! **CAUTION** *The Valve Gate power source must be interrupted by the machine’s emergency stop; this is the responsibility of the installer and failure comply may result in serious injury, death, and damage or destruction of equipment.*

The function that is performed when the relay in the OR2-M module becomes energized can be set in the CoPilot software for each valve gate—the system can be set up to open or close the valve gate when energized. This output is assigned in the CoPilot software process setup.

When Contact Closes, Gate Will	On Failure, Gate Will	Wire to Relay Contacts	“Location” Selection
Open	Close	Normally Open	OPEN GATE
Open	Open	Normally Closed	CLOSE GATE

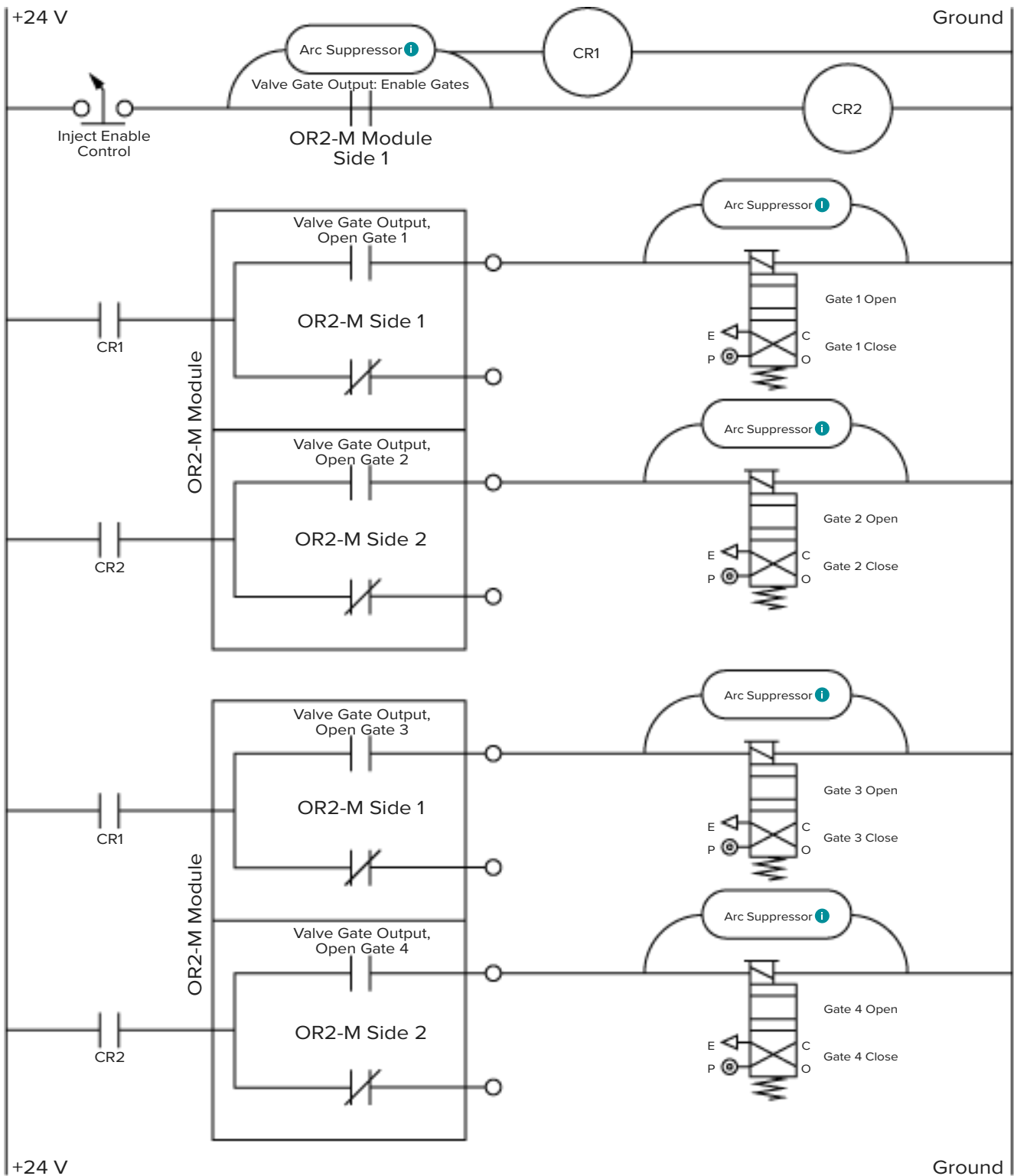
Appendix (continued)

Valve Gate Installation (continued)

Single-Action Solenoid Valve Gate Wiring for Four (4) Gates



CAUTION The Valve Gate power source must be interrupted by the machine's emergency stop; this is the responsibility of the installer and failure comply may result in serious injury, death, and damage or destruction of equipment.



Appendix (continued)

Valve Gate Installation (continued)

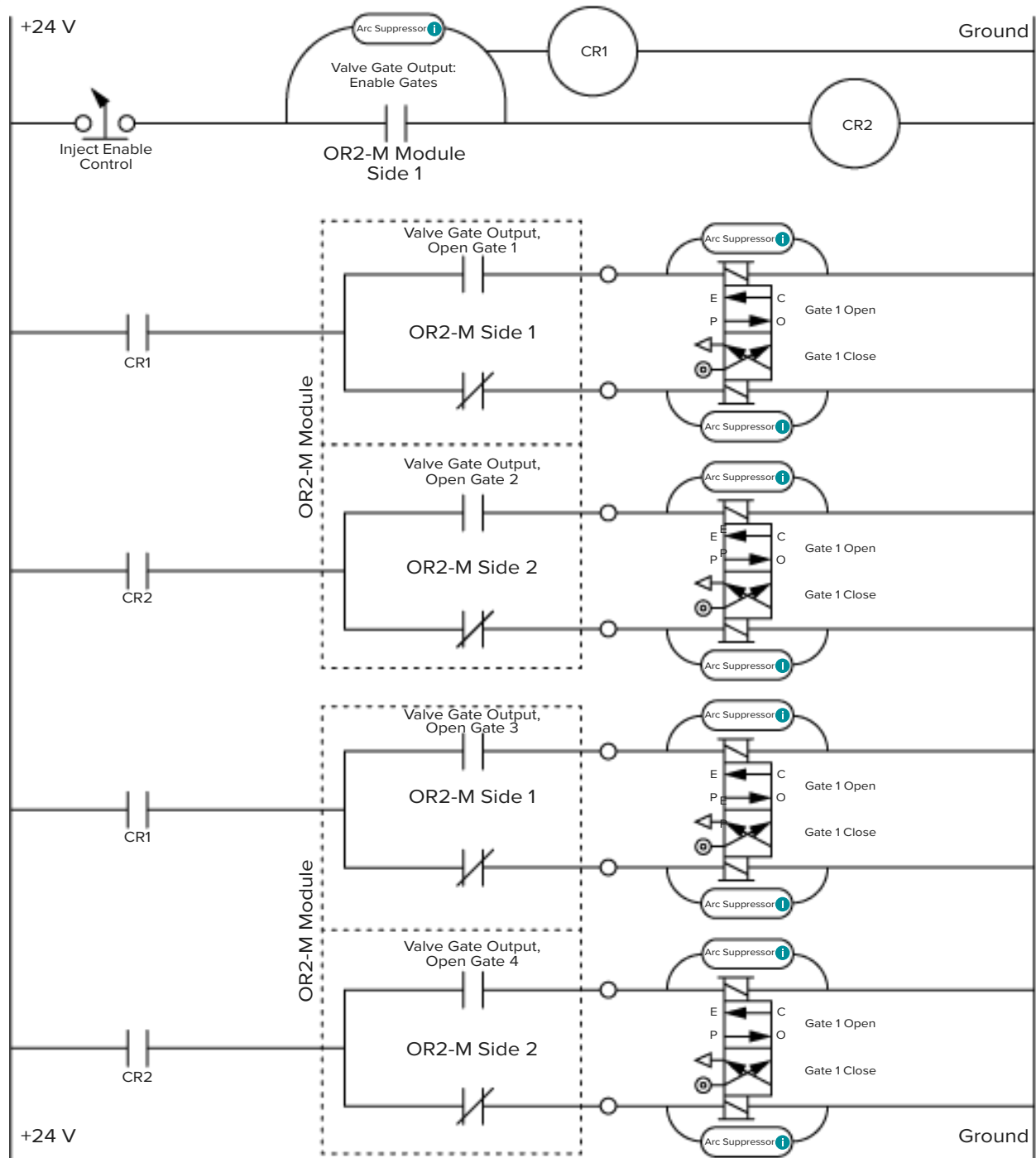
Dual Solenoid Systems

Some valve gate actuation systems have two solenoids per gate: one to open the gate and one to close it. Refer to the included diagrams for the best wiring practices of dual solenoid systems.

Dual Solenoid Valve Gate Wiring for Four (4) Gates



CAUTION The Valve Gate power source must be interrupted by the machine's emergency stop; this is the responsibility of the installer and failure comply may result in serious injury, death, and damage or destruction of equipment.



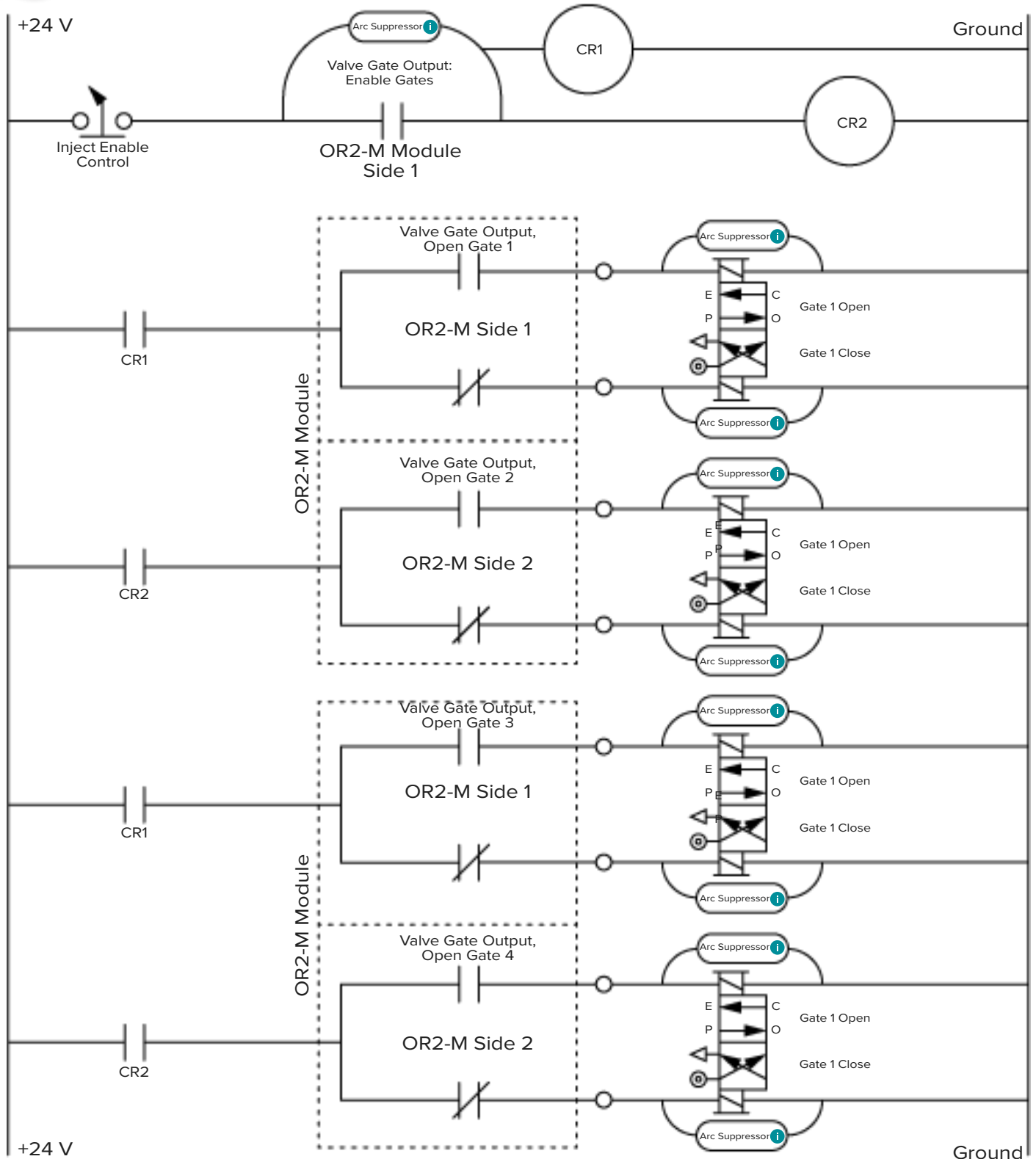
Appendix (continued)

Valve Gate Installation (continued)

Dual Solenoid Valve Gate Wiring for Eight (8) Gates



CAUTION The Valve Gate power source must be interrupted by the machine's emergency stop; this is the responsibility of the installer and failure comply may result in serious injury, death, and damage or destruction of equipment.



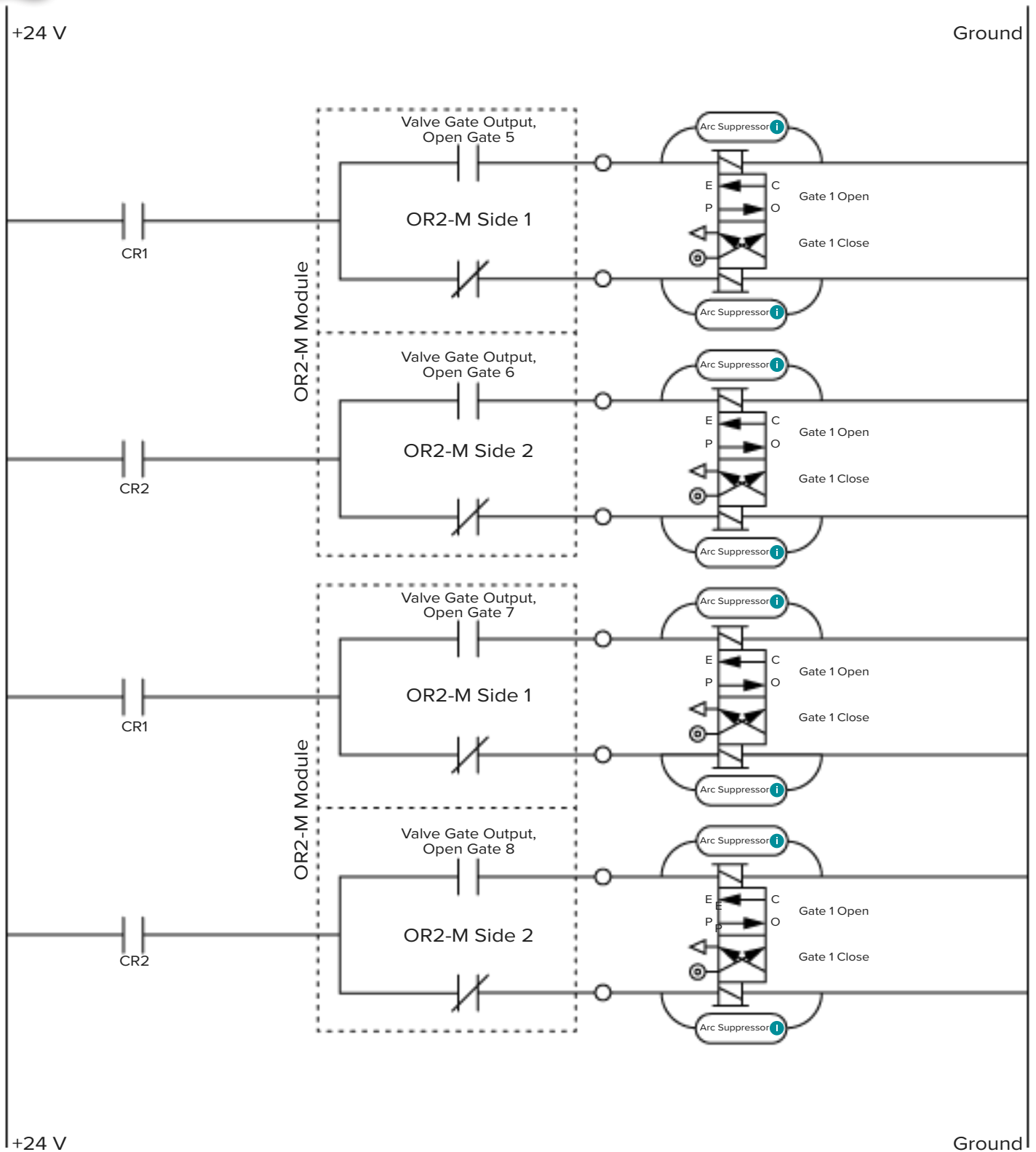
Appendix (continued)

Valve Gate Installation (continued)

Dual Solenoid Valve Gate Wiring for Eight (8) Gates (continued)



CAUTION The Valve Gate power source must be interrupted by the machine's emergency stop; this is the responsibility of the installer and failure comply may result in serious injury, death, and damage or destruction of equipment.



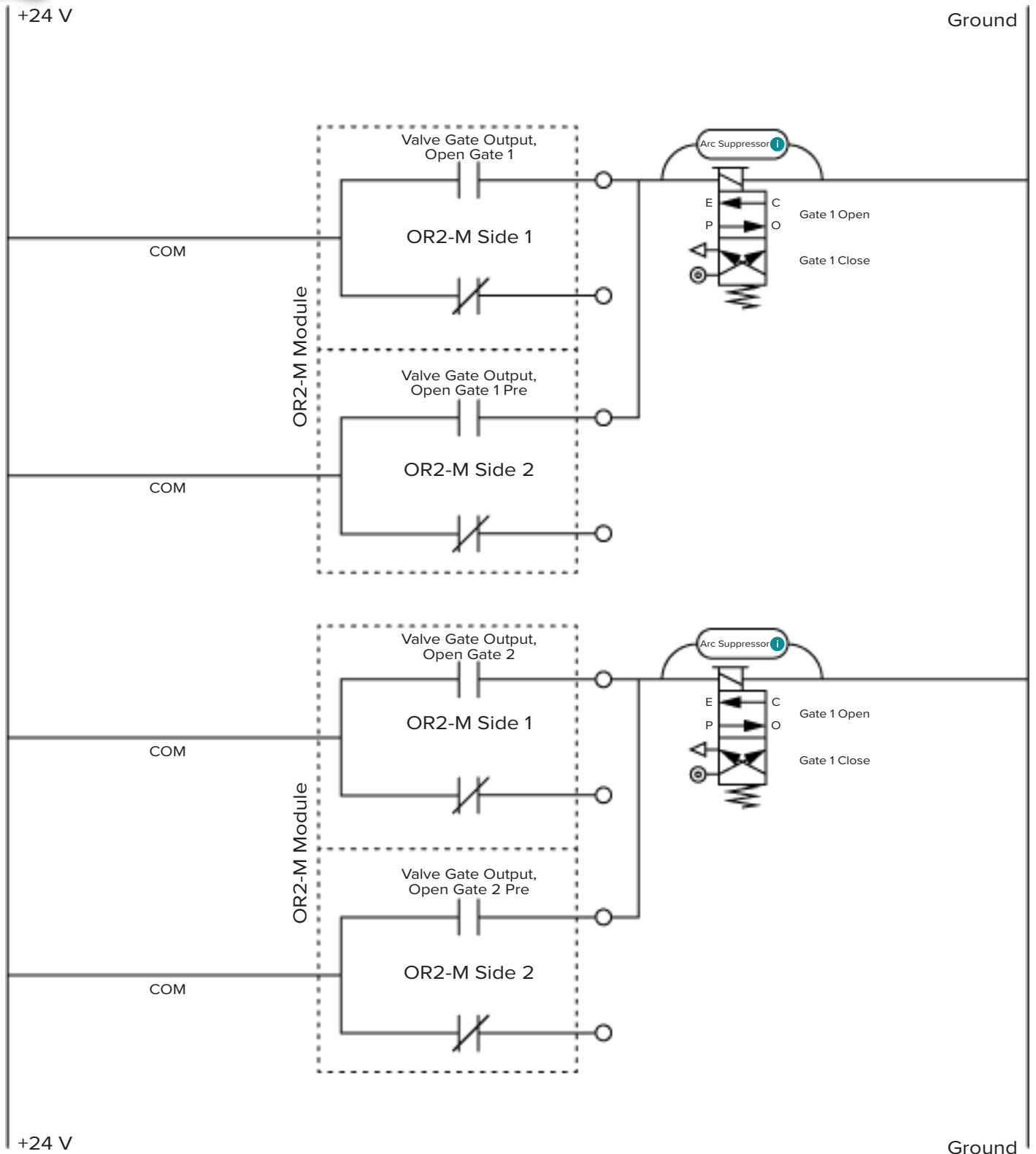
Appendix (continued)

Valve Gate Installation (continued)

Valve Gate Pre-Fill Control Wiring with Parallel OR2-M Modules



CAUTION The Valve Gate power source must be interrupted by the machine's emergency stop; this is the responsibility of the installer and failure comply may result in serious injury, death, and damage or destruction of equipment.



Appendix (continued)

Inject Enable and V→P Wiring

Inject Enable

The inject enable feature deactivates injection when a control sensor is not present, or is in error, or when the CoPilot system is down or a job is not started.

A control sensor is any sensor used for valve gate, V→P transfer, or basic three-stage control.

When inject enable deactivates injection, a notification is provided to the user indicating that the inject enable feature has been activated. To enable injection after the inject enable deactivates injection,

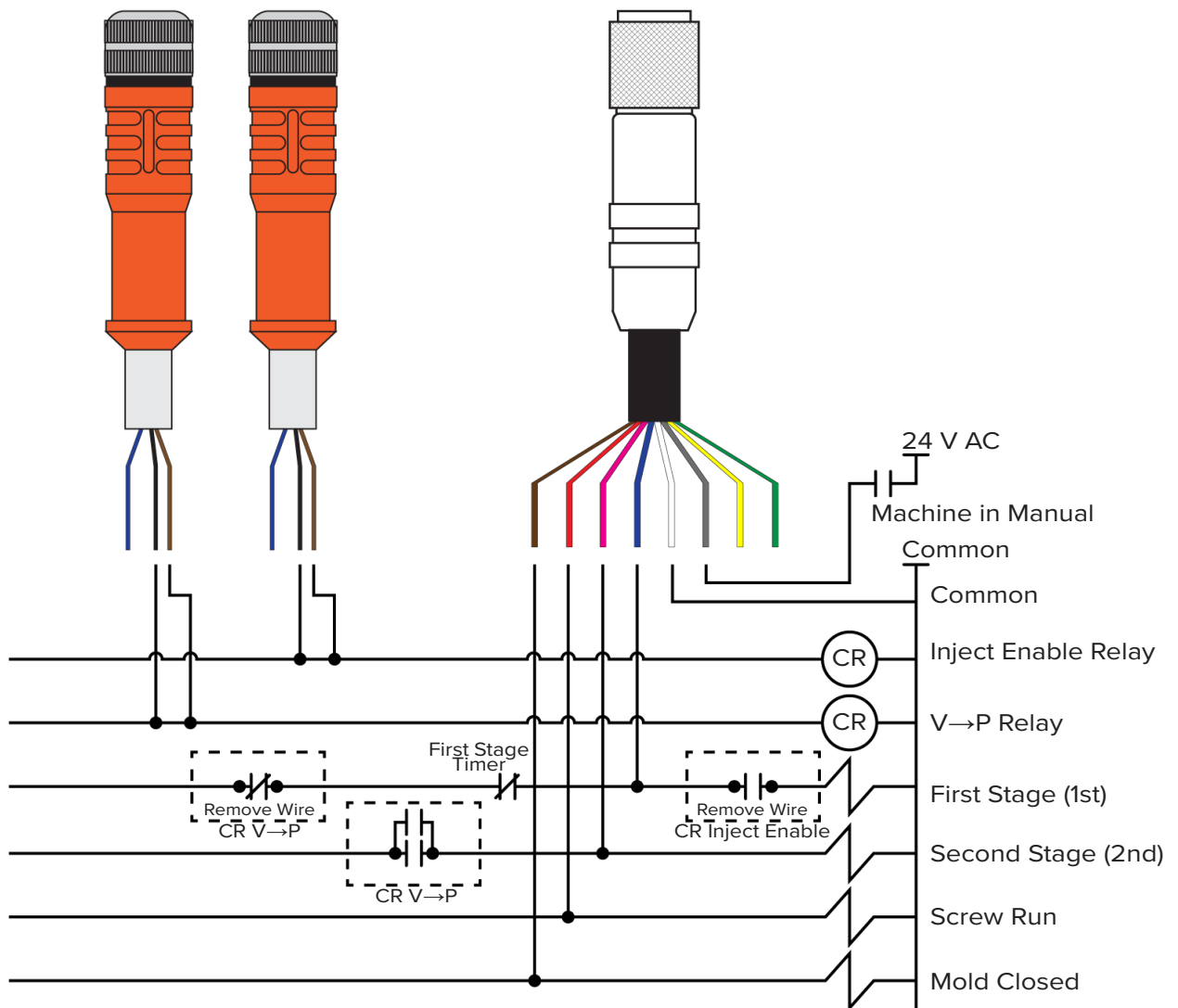
Users can manually enable injection in order to purge the machine, or perform other machine maintenance tasks.

In order to use the inject enable feature, an OR2-M module must be wired to the machine and set up in

the CoPilot software. The connection must be made on the logic side of the inject enable contacts, and the inject enable normally-open contact relay must be wired in series with the first stage (1st) solenoid (assuming that the ID7-M-SEQ module is wired in the preferred method shown on page 22).

V→P

The VP feature provides a control to velocity-to-pressure (V→P) transfer the machine based on cavity pressure or time after fill begins. In order to use the VP feature, an OR2-M module must be wired to the machine and set up in the CoPilot software.







CoPilot® System Hardware Installation Checklist

Use the following checklist to complete the application processor AP4.0 and Lynx™ hardware installation required for use of the CoPilot software. Refer to the CoPilot Hardware Installation and Setup Guide for complete, detailed instructions, warnings, and notes for installation and setup of the AP4.0 and Lynx hardware—available for download online at www.rjginc.com.

Molding Machine Information

MAKE

YEAR

MODEL

SERIAL NO.

AP4.0 Mounting, Power, and Networking

Refer to pages 20 & 21 in the CoPilot Hardware Installation and Setup Guide.

- Mounting**
Mount the AP4.0 to a solid surface with the Lynx sensor interface ports facing down to prevent fluids from entering a port or connection, with faceplate visible for easy location of Lynx port connectors located on the bottom of the AP4.0, using supplied mounting holes. Secure bolts tightly.
- Power**
Provide power to the AP4.0 24 V DC power supply from a 100–240 V AC (50–60 Hz) source separate from machine. Insert the power supply's cable (PS-AP50W-12V) connector into the AP4.0 power port. RJG recommends that an uninterruptible power supply (UPS) is placed between the input power and AP4.0 power connection.
- Networking**
The AP4.0 ethernet port 2 is provided for networking the CoPilot with The Hub®; if a The Hub system is used, insert a shielded Cat5e or Cat6 ethernet cable into port 2 for networking.
- Video Connection**
Attach the touchscreen cable to the DP++ connection on the AP4.0.
- USB Keyboard Connection (Optional)**
A standard USB keyboard can be attached to the AP4.0; the keyboard must not have programmable functions. Ensure connector is firmly installed in the receptacle.
- USB Mouse Connection (Optional)**
A standard USB mouse can be attached to the AP4.0; ensure connector is firmly installed in the receptacle.

Touchscreen Mounting, Power, and Networking

- Mounting**
Mount touchscreen within 6.0' (1.8 m) of machine controller but visible from cell entrances, main aisles, or floor overhead for visual screen alerts using the built in mounting brackets on back of monitor. Secure bolts tightly. Ensure touchscreen to AP4.0 connections are secure and without strain if the moveable swing arm is utilized.
- Power**
Power touchscreen from 100–240 V AC (50–60 Hz) source separate from machine. RJG recommends that an uninterruptible power supply (UPS) is placed between the input power and touchscreen power connection.
- Video Connection**
Attach the touchscreen cable to the DP++ connection on the touchscreen.
- USB**
Attach the USB connection to the USB touchscreen and the AP4.0.



Machine Modules

Refer to pages 22–26 in the CoPilot Hardware Installation and Setup Guide

-
- Mounting**
Securely mount a sufficient length of 0.89" (35 mm) DIN Rail for all the DIN Rail Mount sensors needed for machine. Mount modules on DIN rail and slide together so integrated amphenol connectors are securely inserted.
-

Machine Sequence

Module ID7-M-SEQ

SERIAL NO. _____

- Wiring**
THE COPILOT SOFTWARE REQUIRES FOUR MACHINE SEQUENCE SIGNALS;
REFER TO PAGES 22 & 23 IN COPILOT HARDWARE INSTALLATION AND SETUP GUIDE.
Using the C-ID7-M-3M cable, attach the common wire (grey) from the ID7-M-SEQ to the common terminal on the machine output card. Attach the appropriate input wires from the ID7-M-SEQ to the output terminals on the machine output card.

Signals Interfaced

(2 of 3 required)

- Injection Forward
- First Stage
- Second Stage/Pack
- Screw Run (required)
- Mold Closed (required)
- Mold Closing
- Mold Opening
- Machine in Manual
- Machine in Semi Auto
- Machine in Auto

Notes (terminal name/ID, special card req'd, unique connector, etc.)

- Cabling**
Attach the C-ID7-M-3M cable to the ID7-M-SEQ.



Machine Modules (continued)

Refer to pages 24–26 in the CoPilot Hardware Installation and Setup Guide

Analog Input Module

IA1-M-V

SERIAL NO. _____

- Wiring**
Using the C-IA1-M-3M cable, attach 0 V DC (white) wire to the Common terminal of the injection molding machine 0–10 V I/O card.
- Wiring**
Using the C-IA1-M-3M cable, attach 0–10 V (blue) wire to the output terminal of injection molding the machine 0–10 V DC I/O card.

Analog Input wired for:

- Cabling**
Attach the C-IA1-M-3M cable to the IA1-M-V.

Dual-Output Relay Module

OR2-M

SERIAL NO. _____

- Wiring**
Using a C-OR2-M-3M cable, attach the common wire (black) for contact relay 1 (CR1) to the 24 V DC power source of the machine controller/robot; attach the normally open wire (brown) for CR1 to the 24 V DC machine/robot input/output (I/O) card input terminals.

CR1 wired for:

- Wiring**
Using a C-OR2-M-3M cable, attach the common wire (black) for contact relay 2 (CR2) to the 24 V DC power source of the machine controller/robot; attach the normally open wire (brown) for CR2 to the 24 V DC machine/robot input/output (I/O) card input terminals.

CR2 wired for:

- Cabling**
Attach the C-OR2-M-3M cable (s) to the OR2-M.

Analog Output Module

OA1-M-V

SERIAL NO. _____

- Wiring**
Using the C-OA1-M-3M cable, attach 0 V DC (black) wire to the Common terminal of the injection molding machine 0–10 V I/O card.
- Wiring**
Using the C-OA1-M-3M cable, attach 0–10 V DC (brown) wire to the output terminal of injection molding the machine 0–10 V DC I/O card.

Analog Output wired for:

- Cabling**
Attach the C-OA1-M-3M cable to the OA1-M-V.



Junctions JLX-1 & JLX-2-CE or JLX-5

Refer to pages 27, 28, & 32 in the CoPilot Hardware Installation and Setup Guide.

- Mounting**
Install JLX-1 feed through in machine panel.
 - Cabling**
Attach Lynx cable between JLX-1 and ID7-M-SEQ. Tighten cable collar so that it is tight and secure.
 - Mounting**
Install JLX-2-CE or JLX-5.
 - Cabling**
Attach Lynx cable between JLX-2-CE or JLX-5 and AP4.0. Tighten cable collar to secure.
-

Machine Interface Sensors

LE-R-50-REVB

Refer to pages 29 & 30 in the CoPilot Hardware Installation and Setup Guide.

- Mounting**
Mount the unit on the injection sled near the back of the injection unit so that it detects movement of screw and not movement of the sled. Ensure that screw travel does not exceed 50" (1,27 m). The cable must enter the cable bushing straight to prevent wear on the cable.
 - Cabling**
Attach Lynx sensor cable to LE-R-50-REVB and JLX-2-E or JLX-5, and tighten to secure. Strain-relief cable so movement of the sled will not put strain on connector. Install guard over or run cable so that it cannot be accidentally stepped on or snagged during operation or maintenance of machine.
-

LS-H-1/4NPT-3/5K

Refer to page 31 in the CoPilot Hardware Installation and Setup Guide. Ensure that machine power is off and that the hydraulic system is depressurized before proceeding.

- Mounting**
Attach the male quick-disconnect fitting to machine's hydraulic system so that it accesses the injection and back pressures building at the cylinder of the ram. If applicable, attach the hydraulic sensor to the male quick disconnect fitting. Ensure it is secure.
 - Cabling**
Attach Lynx sensor cable to LS-H-1/4NPT-3/5K and JLX-2-E or JLX-5, and tighten to secure. Strain-relief cable so movement of the sled will not put strain on connector. Install guard over or run cable so that it cannot be accidentally stepped on or snagged during operation or maintenance of machine.
-



LOCATIONS / OFFICES

USA	RJG USA (HEADQUARTERS) 3111 Park Drive Traverse City, MI 49686 P +01 231 947-3111 F +01 231 947-6403 sales@rjginc.com www.rjginc.com	ITALY	NEXT INNOVATION SRL Milano, Italy P +39 335 178 4035 sales@it.rjginc.com it.rjginc.com
MEXICO	RJG MEXICO Chihuahua, Mexico P +52 614 4242281 sales@es.rjginc.com es.rjginc.com	SINGAPORE	RJG (S.E.A.) PTE LTD Singapore, Republic of Singapore P +65 6846 1518 sales@swg.rjginc.com en.rjginc.com
FRANCE	RJG FRANCE Arnithod, France P +33 384 442 992 sales@fr.rjginc.com fr.rjginc.com	CHINA	RJG CHINA Chengdu, China P +86 28 6201 6816 sales@cn.rjginc.com zh.rjginc.com
GERMANY	RJG GERMANY Karlstein, Germany P +49 (0) 6188 44696 11 sales@de.rjginc.com de.rjginc.com	KOREA	CAEPRO Seoul, Korea P +82 02-2113-1870 sales@ko.rjginc.com www.caepro.co.kr
IRELAND/ UK	RJG TECHNOLOGIES, LTD. Peterborough, England P +44(0)1733-232211 info@rjginc.co.uk www.rjginc.co.uk		