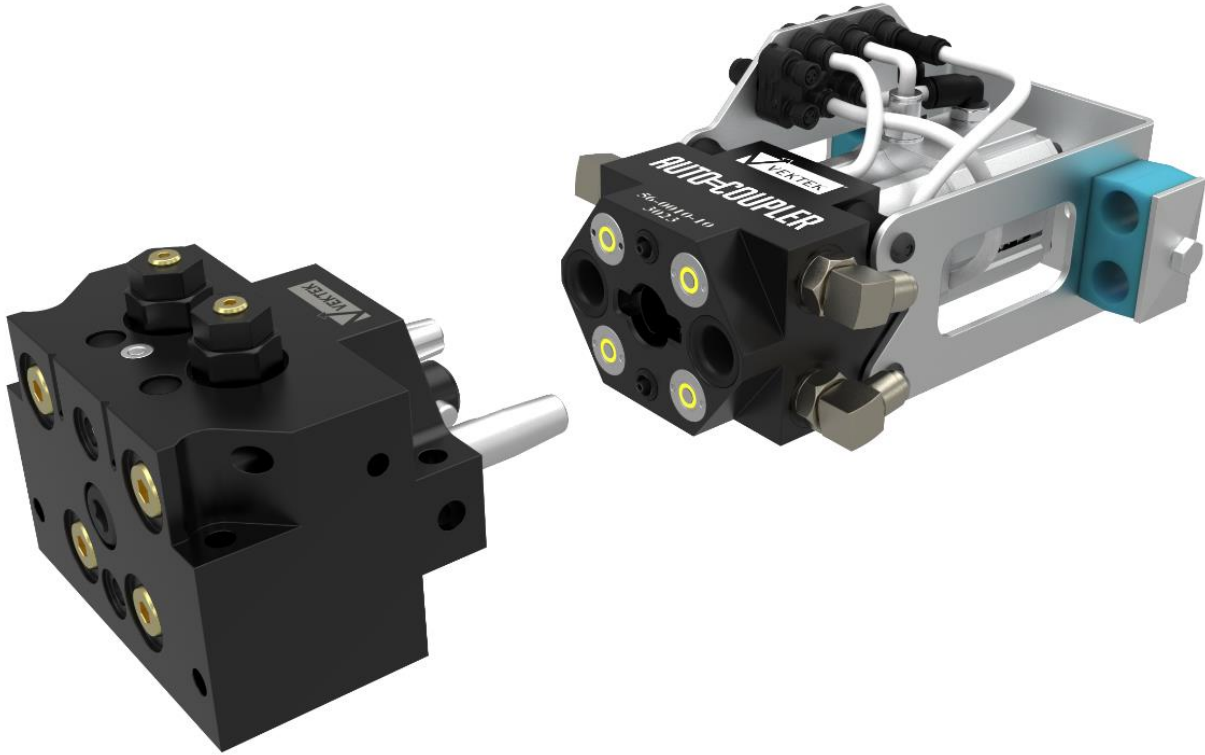


AUTO-COUPLER



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Emporia, KS 66801
1-800-992-0236
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Auto-coupler

56-0010-00

56-0010-10

56-0010-11



The Productivity Devices Company

PL-5650 REV. A IAW ECN-5109

PAGE 1 of 19

Vektek, LLC reserves the right to change specifications without notice as a part of our ongoing product improvement process.

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PL5650 Rev. B IAW ECN-5195

Auto-Coupler Contents:

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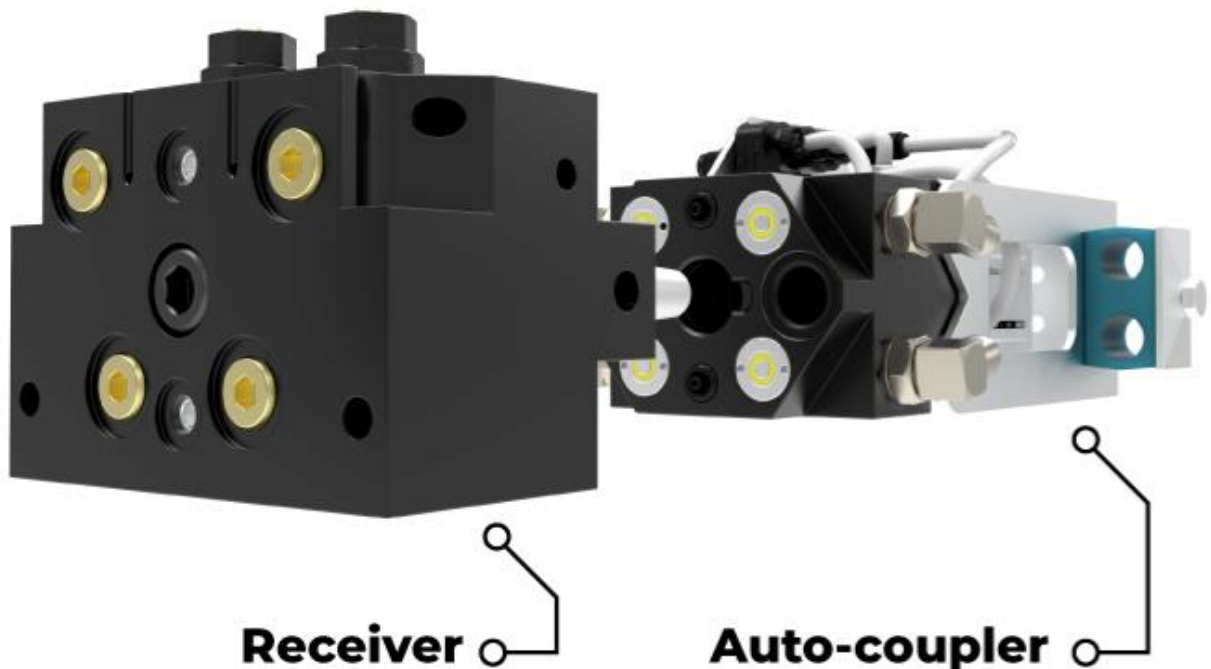
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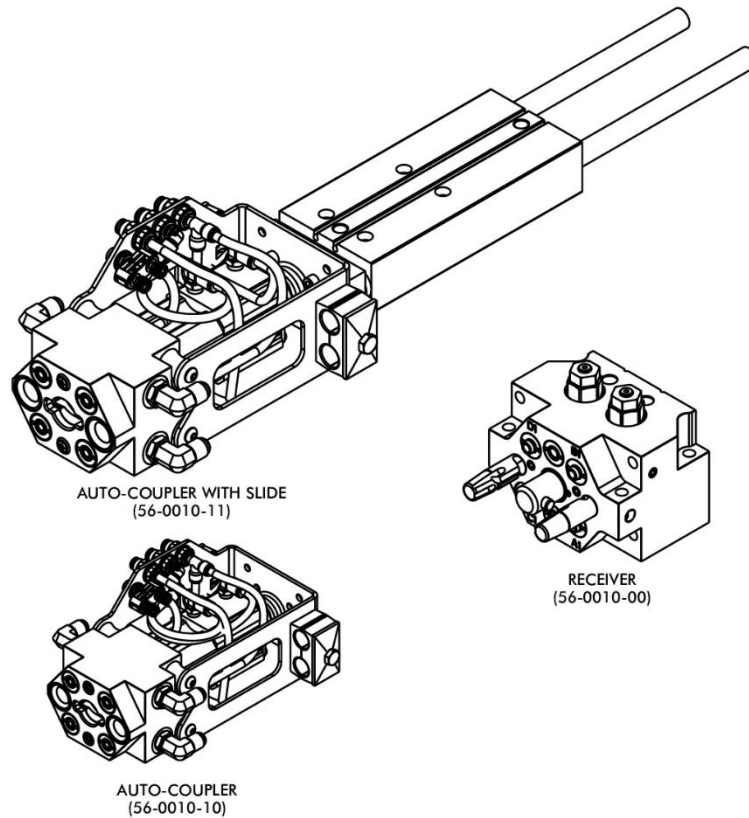
Overview

The AUTO-COUPLER is a solution designed to automate the process of coupling and uncoupling hydraulic circuits on a palletized work holding fixture. The RECEIVER, like a pallet decoupler, is the part of the system that is located on the fixture or pallet. Once the AUTO-COUPLER is in position on the RECEIVER using an air slide or a robotic arm, the pneumatic engagement mechanism locks and holds the hydraulic forces from the high-pressure connections without any forces pushing on the fixture. After the AUTO-COUPLER is locked to the RECEIVER the system is ready to pass hydraulic fluid from the pump to the fixture or .

The AUTO-COUPLER is what transfers the fluid power from the power supply to the RECEIVER. It uses pneumatic power and valves to couple and lock in place and includes an integrated air blow off system to clean off the coupling elements before locking. Once locked into place the AUTO-COUPLER utilizes proximity switches to signal that the system is ready to pass hydraulic power through to the fixture. Once pressure has been made on the or fixture, the AUTO-COUPLER can be unlocked and retracted so that the pallet can move into place for machining.

The RECEIVER can accommodate two separate double acting circuits with two independent air passages for pneumatic part sensing. For easy servicing the RECEIVER also has accessible cartridge PO check valves and 25-micron filtration. Two pressure relief valves are built in to protect each circuit. It can be manifold mounted on the back side, bottom, or can be hard plumbed using the SAE 6 ports.





Auto-Coupler Pre-installation Checklist *(what to know before getting started)*

- ☐ Location where the Receiver will be mounted on the or fixture?
- ☐ How will the Auto-Coupler get into position for coupling? (Air slide or robot?)
- ☐ If an air slide is being used, what is the length of slide required?
- ☐ What will be used to control the Auto-Coupler and Pneumatic control valves?
- ☐ Will 90-150 PSI air pressure be available?
- ☐ Is the hydraulic power supply selected?
- ☐ Are P-Block center valves being used?
- ☐ How will the hydraulic valves be controlled?

Installing the Receiver

Mounting Considerations

The Receiver should be mounted in the most accessible location for the Auto-Coupler to reach it and couple. The Receiver can be mounted vertically or horizontally depending on what is most convenient.

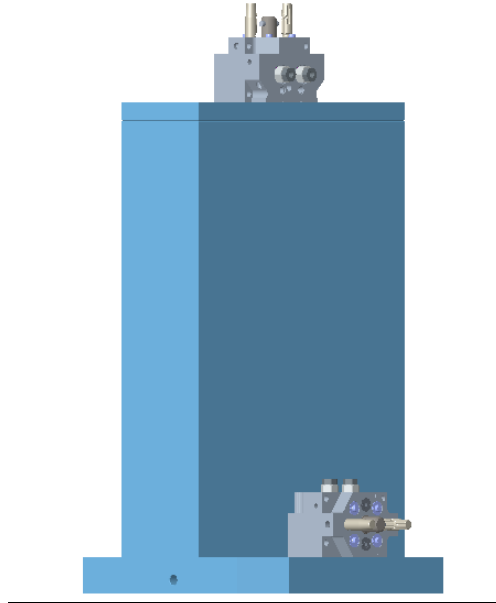


Figure 2: Receiver Placement

Mounting Pattern: Mount the Receiver using 4x 5/16" or 4x 8mm bolts oriented so the coupling elements are readily accessible to couple with the Auto-Coupler. Mating surface must be flat within 0.003 in with a maximum 63 μ m Ra surface finish. For more mounting details instruction sheet IS5650 is available on request.

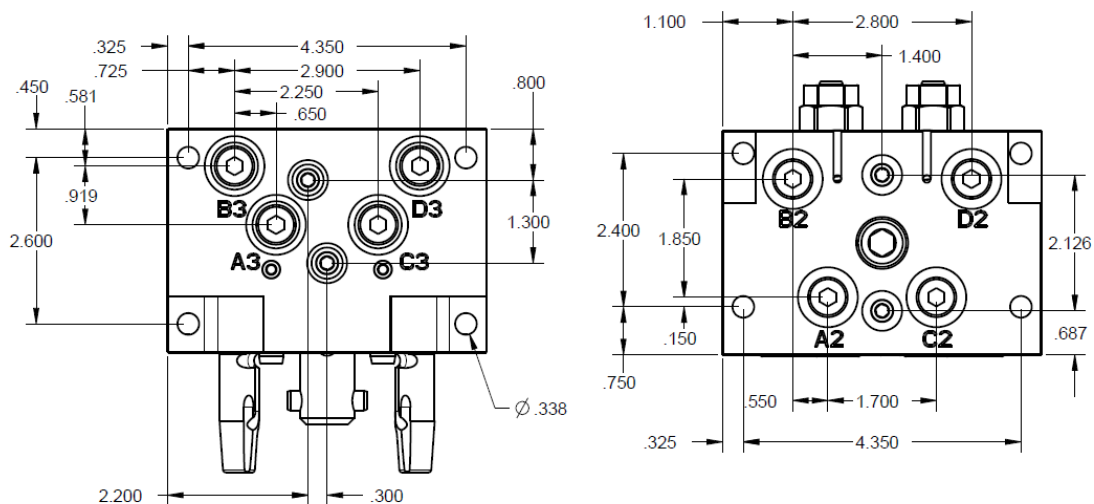


Figure 3: Receiver Mounting Dimensions

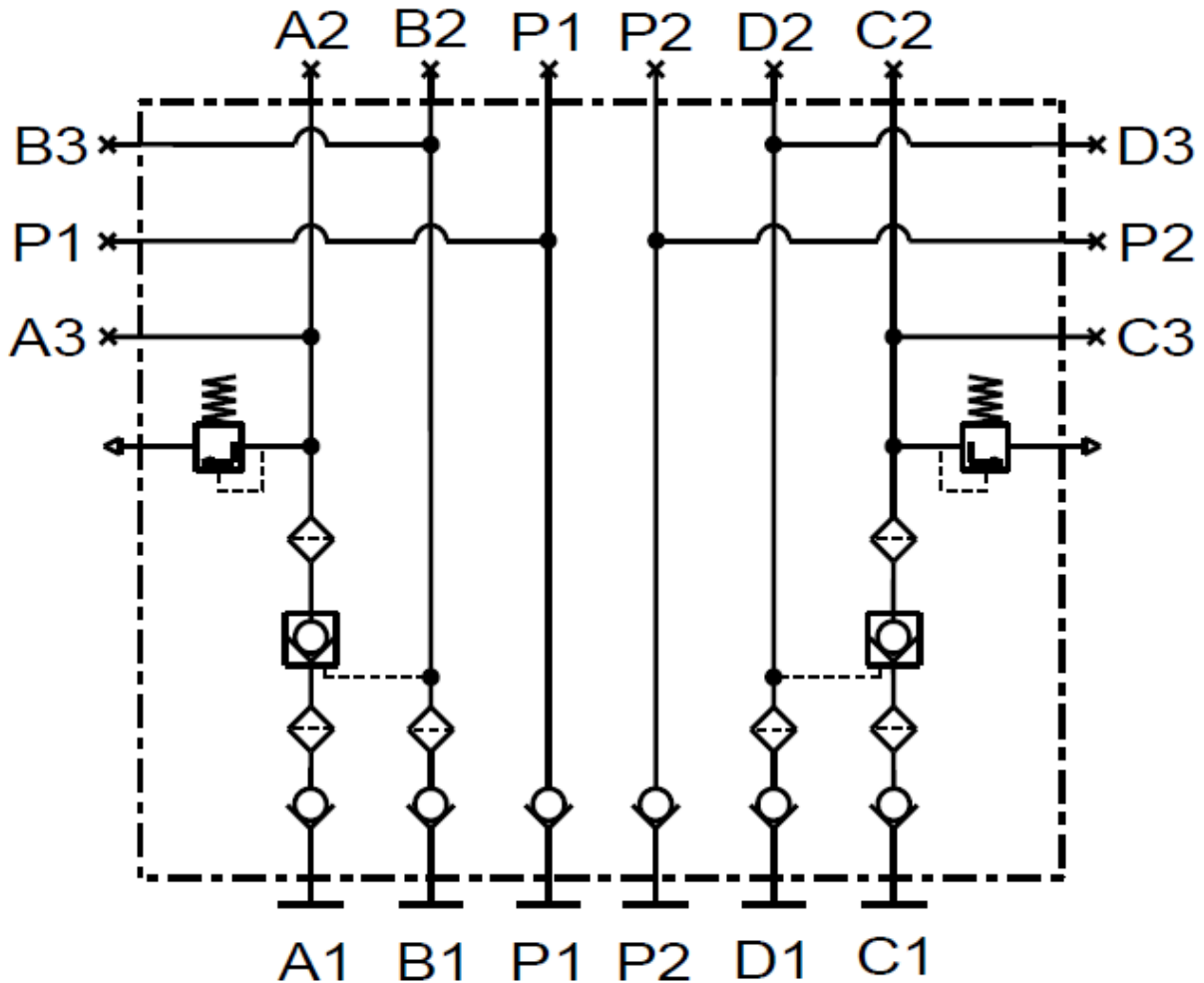


Figure 4: Receiver Hydraulic Schematic

Note on check valves:

The Receiver incorporates a crucial design feature using two pilot-operated check valves for each clamp circuit (A and C). These valves maintain clamping pressure even after the pump is disconnected, ensuring a secure and reliable clamping operation. To release pressure in clamp circuit A, it is necessary to pressurize unclamp circuit B. Circuits C and D operate in the same manner.

Installing the Auto-Coupler

Mounting Considerations

The Auto-Coupler should typically be mounted outside the machining enclosure. If it is installed inside, it is best practice to keep the Auto-Coupler protected from chips and high-pressure coolant spray. For the best performance, the Auto-Coupler should be mounted or stored out of the machining environment and slid into place with an air slide or put into place with a robot.

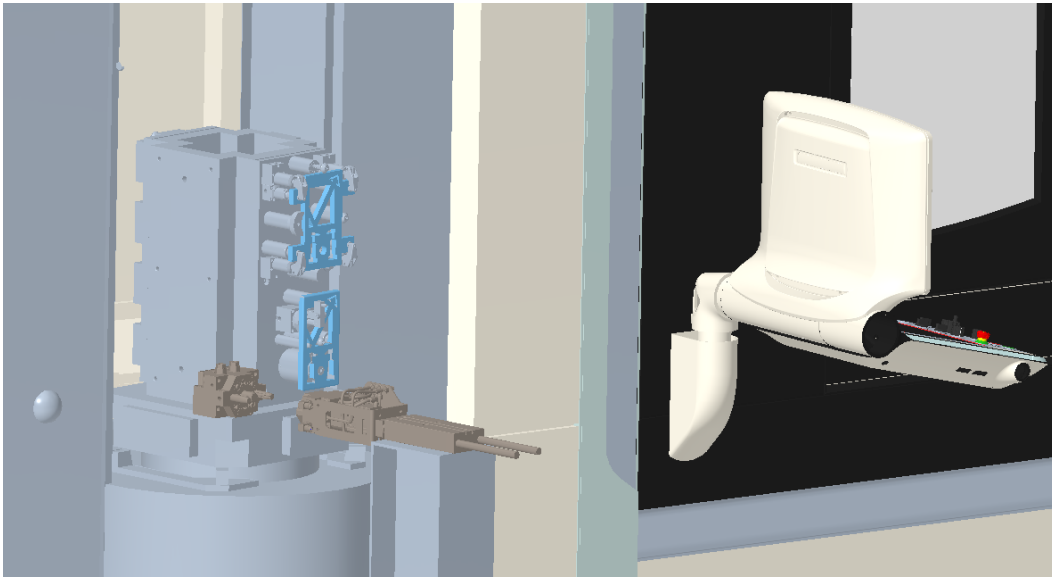


Figure 5: Auto-Coupler with slide

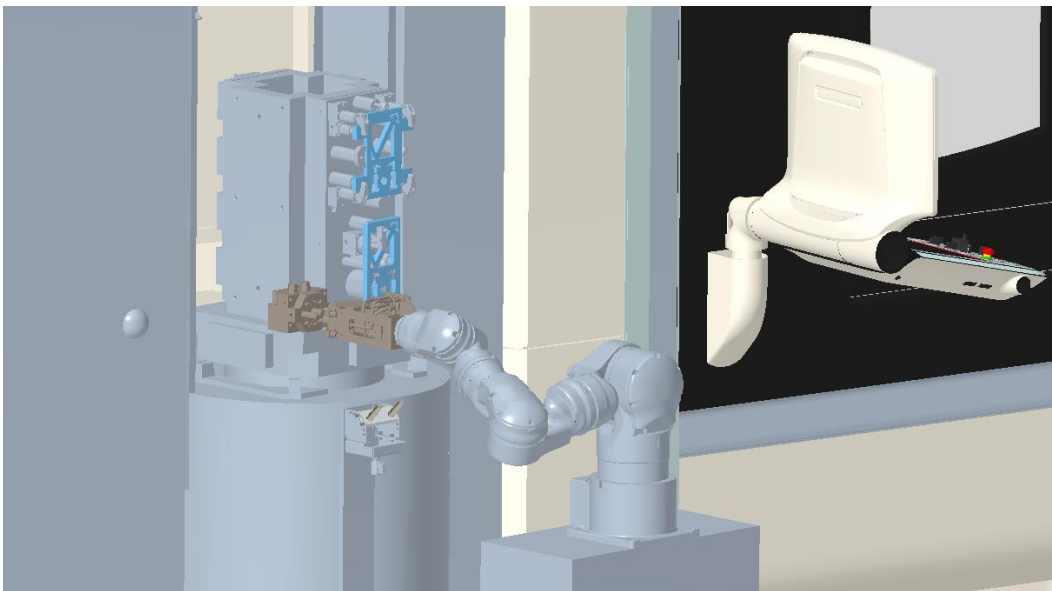


Figure 6: Auto-Coupler with robot

Mounting Pattern: Mount the Auto-Coupler using 4x 1/4 " or 4x 5mm bolts. The inner bolt pattern will fit Vektek supplied air slides, the outer bolt pattern is included for increased mounting options and versatility.

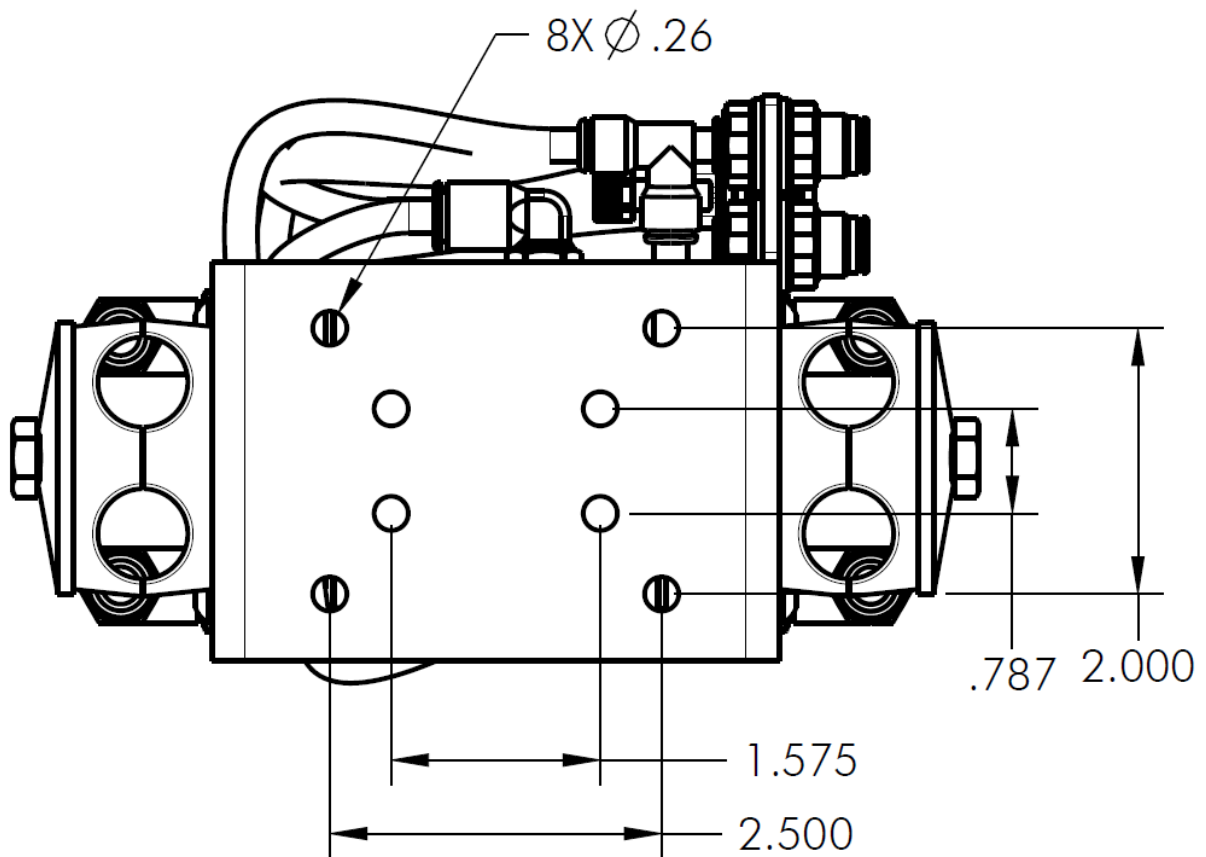


Figure 7: Auto-Coupler mounting options.

Pneumatic and sensing connections: There are 5 pneumatic ports on the Auto-Coupler. The front two ports will be used to couple and uncouple the Auto-Coupler once it is in position. The next two ports can optionally be used as air pass throughs for air sensing capable clamps. The final rearmost port is used for the air blow off of the Receiver before coupling to clear the hydraulic elements of debris.

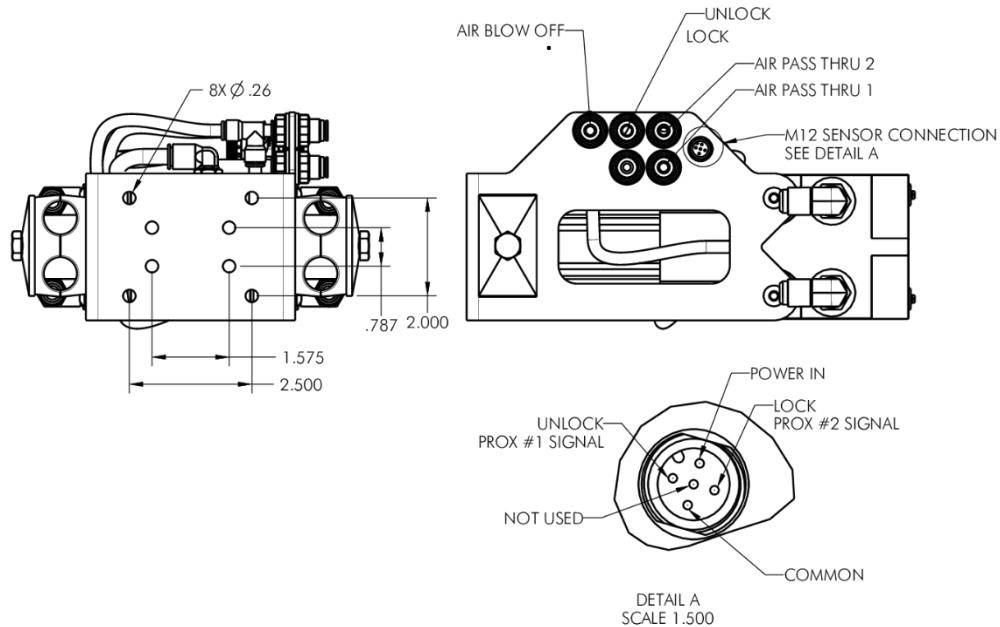


Figure 8: Pneumatic and sensing connections

Auto-Coupler States and Signal Logic (with slide)

General Overview:

State 1: Auto-Coupler Home

- Slide retracted.
 - Slide Pneumatic Valve Deactivated.
 - Prox sensor #3 active.
- Pneumatic coupler unlocked.
 - Coupler Pneumatic Valve Deactivated.
 - Prox sensor #1 active.

State 2: Auto-Coupler Extended – Ready to Couple

- Slide extended. (Slide actuation to be 1-3s, adjust with flow controls)
 - Slide Pneumatic Valve activated.
 - Prox sensor #4 active.
- Pneumatic coupler unlocked.
 - Coupler Pneumatic Valve Deactivated.
 - Prox sensor #1 active.

State 3: Auto-Coupler Extended – Coupled

- Slide extended.
 - Slide Pneumatic Valve activated.
 - Prox sensor #5 active. (not provided, optional)
 - When coupled the slide will move forward .21"
 - Prox sensor #5 confirms successful coupling.
- Pneumatic coupler locked.
 - Coupler Pneumatic Valve activated.
 - Prox sensor #2 active.

State 4: Unclamp & Clamp Cycle

- Unclamp – Pressurize B and D circuits.
 - Unload finished part.
 - Load new part.
- Clamp – Pressurize A and C circuits.

State 5: Auto-Coupler uncoupled - Ready to be retracted (Same sensor state as State 2)

- Slide extended.
 - Slide Pneumatic Valve activated.
 - Prox sensor #4 active.
- Pneumatic coupler unlocked.
 - Coupler Pneumatic Valve Deactivated.
 - Prox sensor #1 active

State 6: Auto-Coupler Home

- Slide retracted.
 - Slide Pneumatic Valve Deactivated.
 - Prox sensor #3 active
- Pneumatic coupler unlocked.
 - Slide Pneumatic Valve Deactivated.
 - Prox sensor #1 active

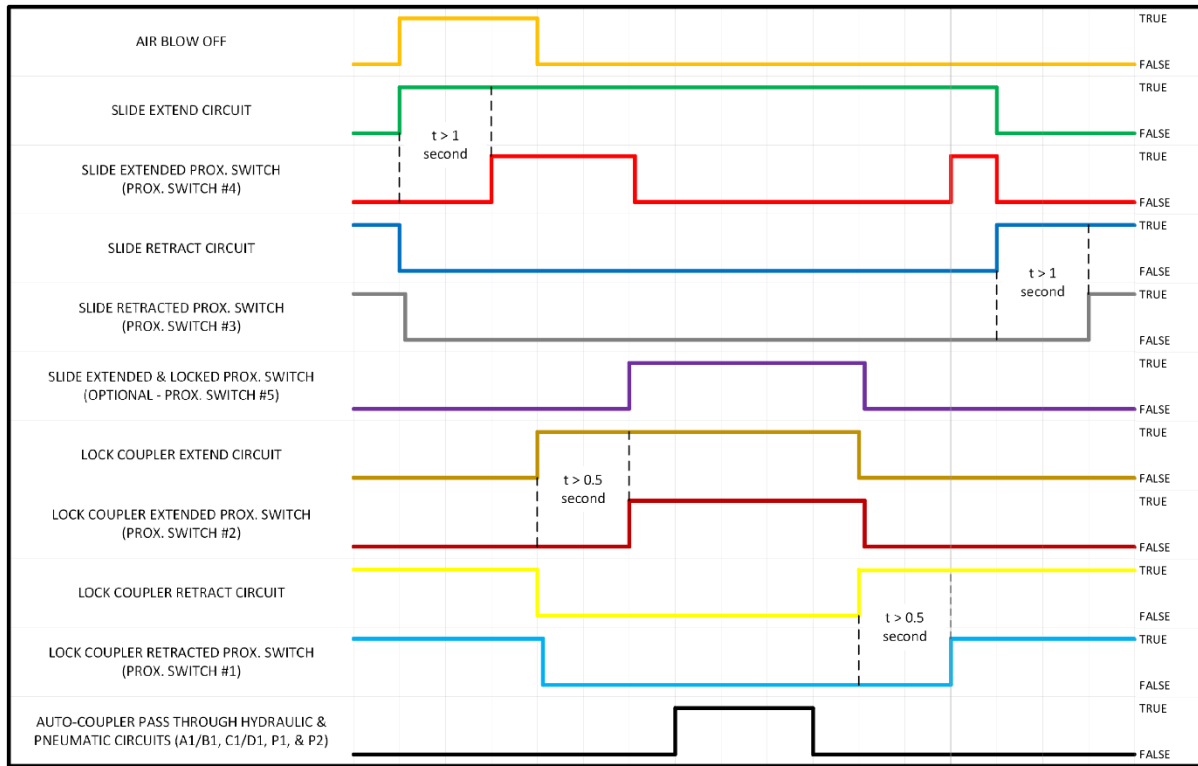


Figure 9: State Diagram

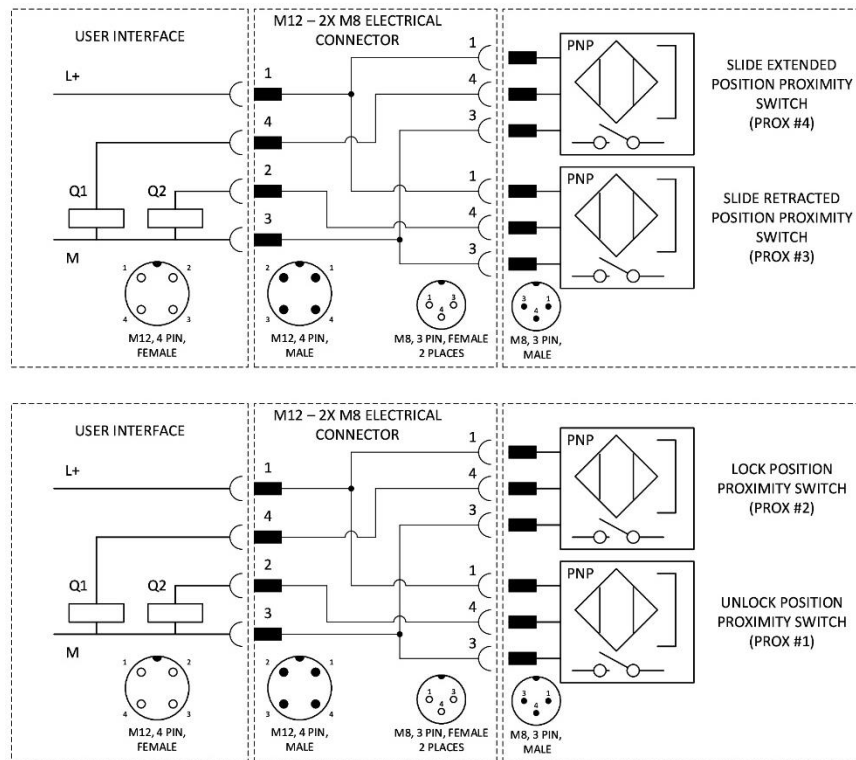


Figure 10: PNP Electrical Schematic

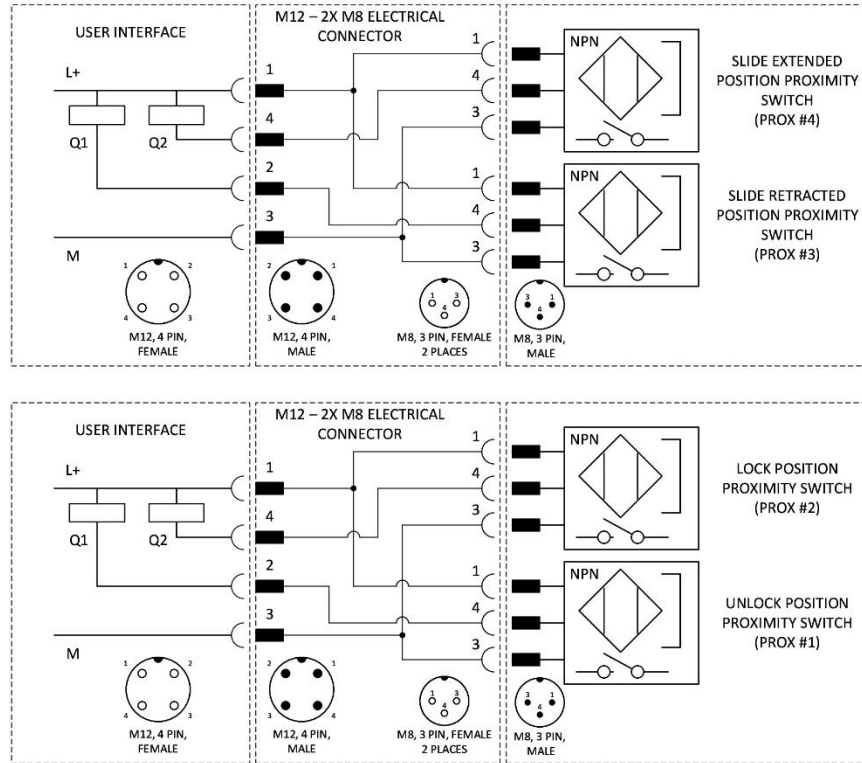


Figure 11: NPN Electrical Schematic

Auto-Coupler – Robot Integration FAQ

How much does the Auto-Coupler weigh?

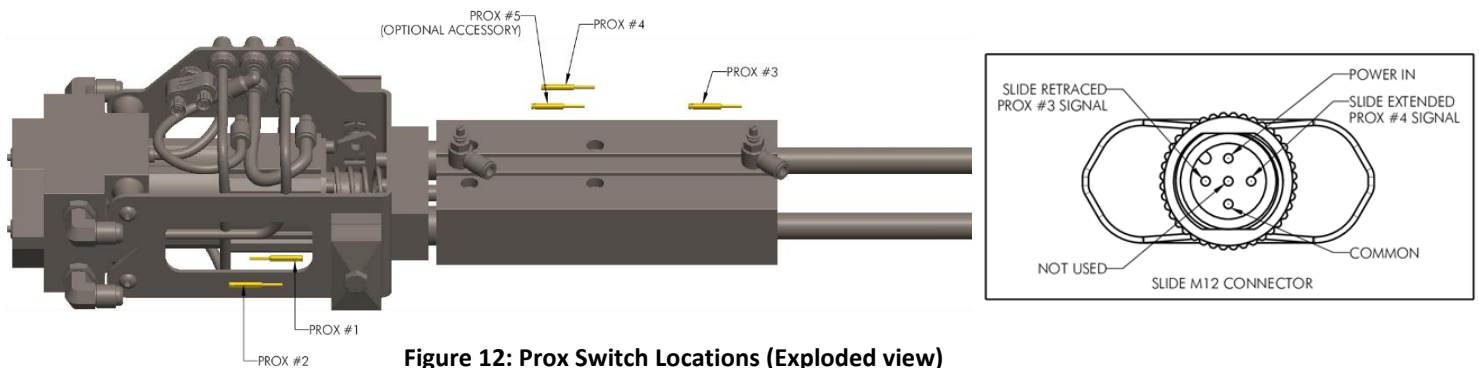
The Auto-Coupler weighs 9.6lbs, but it is also important to consider the weight of the hoses that are connected to the Auto-Coupler when specifying a robot with enough capacity to use the Auto-Coupler.

How much force does it take to push the Auto-Coupler in position to be ready to lock?

The force to push the Auto-Coupler in place depends on the amount of misalignment there is with the Receiver. At maximum misalignment 70lbf will be needed to push the Auto-Coupler onto the Receiver alignment pins.

What is the Locking Stroke of the Auto-Coupler?

The Auto-Coupler will need to move forward .21” to lock. This will be powered by the Auto-Coupler’s locking mechanism and not forced by the robot, but the robot will need to move forward as it locks.



Sensor Adjustments:

Upon setting up the Auto-Coupler the prox switches may have to be adjusted for proper functionality. Prox switch #3 can be properly adjusted by retracting the slide all the way to its home state. However, prox switch #4 can only be properly adjusted when the receiver is installed, and the Auto-Coupler is fully pushed into place and ready to lock. Prox switch #5 can be adjusted once the Auto-Coupler is fully locked to the receiver in the application. Prox Switches #1 and #2 will be pre-set from the factory and should not need adjustment. But to correctly set these simply unlock and adjust prox switch #1 and lock and adjust prox switch #2.

Specifications

Air Pressure:

- Max air pressure: 150 PSI
- Min air pressure: 90 PSI

Hydraulic Pressure:

- Max hydraulic pressure: 5,000 PSI
- Min hydraulic pressure: 500 PSI

Prox Switch Electrical Specifications:

- 2 or 5 PNP Position Sensors
 - 10-30 VDC
 - 100 mA max
 - SWITCH BURDEN: ≤ 8 mA

Maintenance

Receiver

TORQUE: 11 FT-LB

TORQUE: 11 FT-LB

TORQUE: 11 FT-LB

TORQUE: 30 FT-LB

TORQUE: 30 FT-LB

SPANNER TOOL: AT-5613-00
SEAL TOOL: AT-5603-00

NOTED	N/A	N/A	60561000	REPAIR KIT, PALLET RECIEVER
X	18	1	90199995	PIN, DOWEL 5/16 X 1-1/4 LG
	17	1	90199994	PIN, DOWEL 3/16 X 1/4 LG
	16	2	90199959	ASSY,BALLSEAT,SC,7500
X	15	2	85600108	PIN,TAPER 5/8 NOM. AUTO-COUPLER
	14	2	85600106	AUTO CPLR, AIR CHECK
	13	2	70333771	ASSY, VLV, PO CHECK, CM
X	12	4	56111300	COUPLING ELEMENT, SCREW, NIPPLE, PRESS, ND3
X	11	12	39054010	BU RING, (-012)
X	10	2	39050008	O-RING, (-014)
X	9	4	39000056	O-RING, (-116)
X	8	12	31050013	DIFFUSER, DISK, SAE 6
X	7	6	31050011	FILTER,DISC,SAE 6,25 MICRON
	6	4	30603322	PLUG, PIPE, HEX, HOL, 1/8 NPT, STEEL
	5	8	30601166	PLUG, SOCH, SAE 6
X	4	2	23600013	BALL STEEL, ALLOY, 312
	3	2	23350091	SPRING, COMPRESSION
	2	3	21440054	SHSS, CUP POINT, 5/16-18 X 1/4
	1	1	21410135	SHCS, 1/2-13 X 2-1/2 IN LG BO
INCLUDED IN KIT	No.	QTY	PART No.	DESCRIPTION

PL5650-7

REV A

Auto-Coupler

NOT FIELD REPAIRABLE
CONTACT CUSTOMER SUPPORT

TORQUE: 11 FT-LB
SPANNER TOOL: AT-5613-00
SEAL TOOL: AT-5603-00

MAX TORQUE 14FT-LB

NOTED	N/A	N/A	60561010	REPAIR KIT, AUTOCOUPLER
	15	5	P3022700	BULKHEAD, PUSH-TO-CONNECT, PANEL MOUNT, NUT
	14	1	P3022202	Plug-In Run Tee: Push-to-Connect x Tube Stem
	13	1	P3022101	Elbow: Push-to-Connect x Tube Stem, 1/4" x 1/4"
	12	2	P3012100	MALE ELBOW, 1/4" TUBE x 1/8" NPTF
	11	1	85600114	MOUNT, HANDLE, MANIFOLD
X	10	4	85600113	ISOLATER, AC, HANDLE
	9	2	62297002	PNP, M8, POSITION SENSOR
X	8	4	56101300	COUPLING ELEMENT, SCREW, MECH, PRESS, ND3
X	7	2	39053025	WIPER, SNAP-IN, (5/16)
	6	2	35200602	CLAMP, HOSE, TWIN, .68 ID
	5	4	30161566	ELBOW, 90, 3/8 FLRD TB - SAE 6
	4	1	27842203	M12 X 2x M8, ELECTRICAL CONNECTOR
	3	1	23350078	SPRING, COMPRESSION
	2	4	21411056	BHCS, 1/4-20 X 1/4, ALY
	1	4	21410131	SCREW, CAP, SOCH, 10-24 X 4 1/2, ALY
INCLUDED IN KIT	No.	QTY	PART No.	DESCRIPTION

PL5650-8

REV B

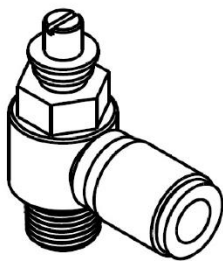
Accessory Items

The diagram illustrates the assembly of the Vektek Auto-Coupler with various accessory items. Item 1 is a T-coupler, item 2 is an electrical connector, item 3 is a docking station, item 4 is a PNP position sensor, item 5 is an NPN position sensor, item 6 is an air slide, and item 7 is a flow control elbow. The main assembly is shown with these items being installed or nearby.

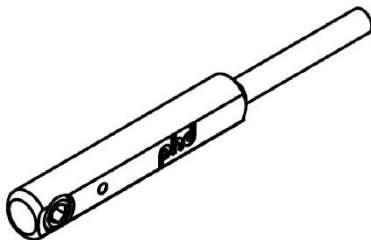
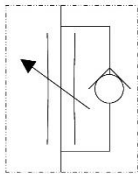
7	1	P3012101	FLOW CONTROL, ELBOW, 1/4" PUSH-TO-CONNECT FEMALE x 1/8 NPT
6	1	85600120	AIR SLIDE, 1 IN BORE, 6 IN STROKE
5	1	62297003	NPN, M8, POSITION SENSOR
4	1	62297002	PNP, M8, POSITION SENSOR
3	1	56000820	ASSY, DOCKING STATION, PR
2	1	27842203	M12 X 2x M8, ELECTRICAL CONNECTOR
1	1	27842202	T-COUPLER, M12 MALE-M12 FEMALE
No.	QTY	PART No.	DESCRIPTION

PL5650-11

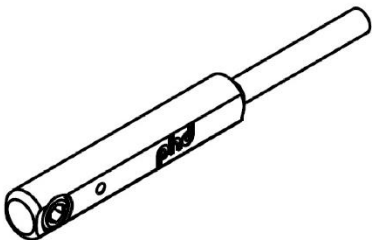
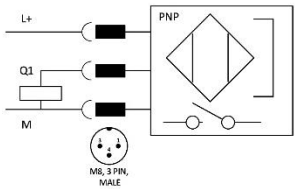
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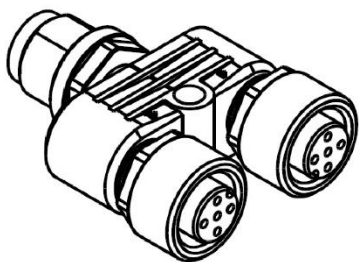
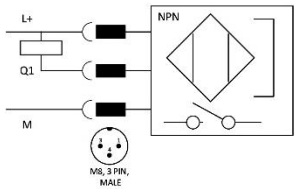
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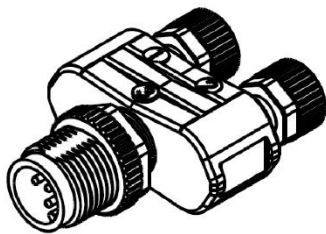
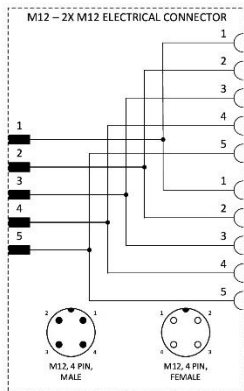
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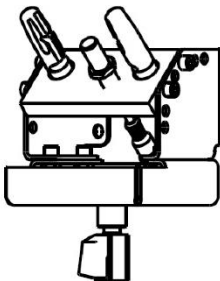
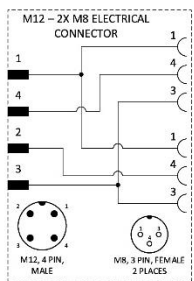
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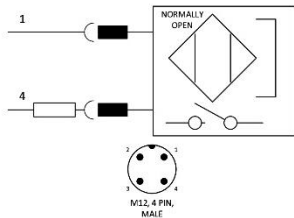
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56-0008-20



PL5650-12

Troubleshooting

Symptom	Cause	Solution
Auto-Coupler will not couple	<ol style="list-style-type: none"> 1. Hydraulic elements are worn out. 2. Rubber isolators worn out. 	<ol style="list-style-type: none"> 1. Replace worn out hydraulic elements. 2. Replace rubber isolators.
Receiver not holding pressure	<ol style="list-style-type: none"> 1. Check valves need to be serviced 	<ol style="list-style-type: none"> 1. Replace cartridge PO Check valves.

Figure 8: Auto-Coupler Troubleshooting

If the preceding chart does not correct the problem, please contact Vektek Customer Support Engineers at 1-800-992-0236 for additional assistance. Please have AUTO-COUPLER revision available for technical support.