OPERATOR'S MANUAL

INCLUDING: OPERATION, INSTALLATION AND MAINTENANCE

PE03X-XXX-XXX-XXXX
PE05X-XXX-XXX-XXXX
PE07X-XXX-XXX-XXXX

ELECTRONIC INTERFACE

for Diaphragm Pumps

RELEASED: 3-26-13
REVISED: 12-6-19
(REV: G)

READ THIS MANUAL CAREFULLY BEFORE INSTALLING, OPERATING OR SERVICING THIS EQUIPMENT.

It is the responsibility of the employer to place this information in the hands of the operator. Keep for future reference.

PUMP DATA

PE03X-XXX-XXX-XXXX is PE series 3/8" Compact Diaphragm Pumps with electronic interface
PE05X-XXX-XXX-XXXX is PE series 1/2" Compact Diaphragm Pumps with electronic interface
PE07X-XXX-XXX-XXXX is PE series 3/4" Compact Diaphragm Pumps with electronic interface.

GENERAL DESCRIPTION

This manual is supplemental information for the electronic interface options on the PE series of pumps. For complete pump installation, disassembly and reassembly, safety information, and other general pump information, please refer to the PD pump manual that was also included with the pump.
This electronic interface includes options for solenoid control, end of stroke feedback, leak detection (diaphragm failure), cycle counting on the major valve, and a ported motor with no major valve for user-supplied control directly to the two diaphragm air chambers.
Solenoid control allows the cycle rate of the pump to be controlled electronically.
With Solenoid control, when the solenoid is energized, the pump strokes and dispenses the fluid in one chamber. When the solenoid is de-energized, the pump strokes in the opposite direction, dispensing the fluid in the other chamber.
By providing continuous ON - OFF signals to the solenoid, the fluid transfer rate may be increased or decreased remotely.
End of stroke feedback can be used in conjunction with the solenoid valve to cycle the pump based upon completion of each stroke.
The leak detection option incorporates an optical fluid sensor in each air chamber to provide a signal when a diaphragm has failed and fluid is leaking through the pump.
The ported motor with no major valve is provided as an option for users who want to supply compressed air directly to each diaphragm and control the operation of the pump with their own external air controls.

MODEL DESCRIPTION CHART

PE0XX-XXX-XXX-X X X X

Pump Size
03 - 3/8" Compact Diaphragm Pumps
05 - 1/2" Compact Diaphragm Pumps(★)
07 - 3/4" Compact Diaphragm Pumps

Fluid Caps & Manifod Material
A - Aluminum (★)
D - Gorundable Acetal (single port)
E - Gorundable Acetal (multiple port)
K - PVDF (Kynar) (single port)
L - PVDF (Kynar) (multiple port)
P - Polypropylene (single port)
R - Polypropylene (multiple port)
S - Stainless Steel (★)

Revision Level

Specialty Code 1 (Blank if no Specialty Code)
A - Solenoid 120 VAC, 110 VAC and 60 VDC
B - Solenoid 12 VDC, 24 VAC and 22 VAC
C - Solenoid 240 VAC, 220 VAC and 120 VDC
D - Solenoid 24 VDC, 48 VAC and 44VAC
E - Solenoid 12 VDC NEC/CEC (★)
F - Solenoid 24 VDC NEC/CEC (★)
G - Solenoid 12 VDC ATEX/IECEx (★)
H - Solenoid 24 VDC ATEX/IECEx (★)
J - Solenoid 120 VAC NEC/CEC (★)
K - Solenoid 220 VAC ATEX/IECEx (★)
N - Solenoid with no coil
P - Ported Motor (No major valve provided)
0 - Standard Valve Block (No Solenoid)
S - Cycle Sensing on Major Valve

Specialty Code 2 (Blank if no Specialty Code)
E - End of Stroke feedback + Leak Detection
F - End of Stroke feedback
G - End of Stroke ATEX/IECEx (★)
H - End of Stroke + Leak Detection ATEX/IECEx (★)
L - Leak Detection
M - Leak Detection ATEX/IECEx/NEC/CEC (★)
R - End of Stroke Feedback NEC/CEC (★)
T - End of Stroke Feedback + Leak Detection NEC/CEC (★)
0 - No Option

Special Testing
Testing for special testing options, please contact your nearest **ARO** Customer Service Representative or Distributor.

(★) Only options indicated with an asterisk (★) are acceptable for use in hazardous locations, however, certain combinations are not possible.

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arozone.com

CCN 46750808

ARO Ingersoll Rand

SOLENOID VALVE BLOCK SERVICE KIT OPTIONS

Solenoid Valve Block Service Kit 637540 - X - X

Valve Block Materials

1 - Aluminum
2 - Stainless Steel
3 - Black Non-Metallic

For Solenoid Option, choose letter in Specialty Code 1 from "MODEL DESCRIPTION CHART"

Includes items: 107, 111, 132, 135, 136, 137, 138, 139, 140, 141, 166, 200, 232, 403, 413, 414, 415, 416, 417, 418, 419, 420, 421 and 429

PARTS LIST / PE0XX-XXX-XXX-XXXX

Item	Description	Part no	Qty
1	**Connecting Rod** (PE03)	97122	(1)
	(PE05 & PE07)	97132	(1)
101	**Center Body** (PE03)	97008	(1)
	(PE05 & PE07)	97006	(1)
	(PE05A)	95978	(1)
107	**Plug, Small**	96353	(1)
111	**Major Valve Spool** (PE0XX-XXX-XXX-X0XX)	95919	(1)
	(PE0XX-XXX-XXX-XAXX, PE0XX-XXX-XXX-XBXX, PE0XX-XXX-XXX-XCXX, PE0XX-XXX-XXX-XDXX, PE0XX-XXX-XXX-XEXX, PE0XX-XXX-XXX-XFXX PE0XX-XXX-XXX-XGXX, PE0XX-XXX-XXX-XHXX, PE0XX-XXX-XXX-XJXX, PE0XX-XXX-XXX-XKXX, PE0XX-XXX-XXX-XNXX)	96955	(1)
126	**Pipe Plug** (1/4 - 18 NPT x 7/16") (PE0XX-XXX-XXX-XXFX, PE0XX-XXX-XXX-XX0X, PE0X-XXX-XXX-XXGX)	93832-3	(2)
128	**Plug** (#10 - 32 x 5/32") (PE0XX-XXX-XXX-XPXX)	59632-1	(1)
129	**Muffler Sensor Assembly** (PE03X-XXX-XXX-XXEX,PE03X-XXX-XXX-XXFX, PE03X-XXX-XXX-XXRX, PE03X-XXX-XXX-XXTX)	97048	(1)
	Cover Sensor Assembly (PE05X-XXX-XXX-XXEX, PE05X-XXX-XXX-XXFX) (PE07X-XXX-XXX-XXEX, PE07X-XXX-XXX-XXFX)	97053	(1)
	Cover Sensor Assembly (PE05X-XXX-XXX-XXGX, PE05X-XXX-XXX-XXHX, PE05X-XXX-XXX-XXRX, PE05X-XXX-XXX-XXTX) (PE07X-XXX-XXX-XXGX, PE07X-XXX-XXX-XXHX, PE07X-XXX-XXX-XXRX, PE07X-XXX-XXX-XXTX)	97406	(1)
132	**Air Manifold Gasket**	96214-1	(1)
135	**Valve Block**	96204	(1)
	(for PE0XA-XXX-XXX-XXXX)	95980	(1)
	Porting Plate (ported motor only) (for PE0XX-XXX-XXX-XPXX)	96382	(1)
	(for PE0XA-XXX-XXX-XPXX)	96382-4	(1)
136	**Plug, Large** (PE0XX-XXX-XXX-X0XX, PE0XX-XXX-XXX-XSXX)	96352	(1)
	(PE0XX-XXX-XXX-XAXX, PE0XX-XXX-XXX-XBXX, PE0XX-XXX-XXX-XCXX, PE0XX-XXX-XXX-XDXX, PE0XX-XXX-XXX-XEXX, PE0XX-XXX-XXX-XFXX, PE0XX-XXX-XXX-XGXX, PE0XX-XXX-XXX-XHXX, PE0XX-XXX-XXX-XJXX, PE0XX-XXX-XXX-XKXX, PE0XX-XXX-XXX-XNXX	96971	(1)
137	**"O" Ring** (1/16" x 1-5/8" o.d.)	Y325-29	(3)
138	**"U" Cup Packing** (1/8" x 1" o.d.)	94395	(1)
139	**"U" Cup Packing** (1/8" x 1-7/16" o.d.)	96383	(1)
140	**Valve Insert**	93276	(1)
141	**Valve Plate**	96173	(1)

Item	Description	Part no	Qty
166	**"O" Ring** (1/16" x 1-1/4" o.d.)	Y325-24	(1)
197	**Leak Detector Sensor Adapter** (PE0XX-XXX-XXX-XXEX, PE0XX-XXX-XXX-XXLX)	95088	(1)
198	**Leak Detector Sensor Cable** (PE0XX-XXX-XXX-XXEX, PE0XX-XXX-XXX-XXLX)	95087	(1)
200	**Porting Gasket**	96364	(1)
201	**Muffler** (PE05/PE07 Metallic)	93110	(1)
	(PE05/PE07 PP)	93110-1	(1)
283	**Leak Detector Sensor** (PE0XX-XXX-XXX-XXEX, PE0XX-XXX-XXX-XXLX)	96270-1	(2)
	Leak Detector Sensor ATEX/IECEx (PE05X-XXX-XXX-XXHX, PE05X-XXX-XXX-XXMX)	96270-2	(2)
	Leak Detector Sensor NEC/CEC (PE05X-XXX-XXX-XXMX, PE05X-XXX-XXX-XXTX)	96270-2	(2)
	Barrier Amplifier, End of Stroke ATEX/IECEx (PE05X-XXX-XXX-XXGX), (PE05X-XXX-XXX-XXHX)	97491	(1)
	Barrier Amplifier, End of Stroke NEC/CEC (PE05X-XXX-XXX-XXRX, PE05X-XXX-XXX-XXTX)	97412	(1)
	ZENER Barrier Leak Detection ATEX (PE05X-XXX-XXX-XXHX), (PE05X-XXX-XXX-XXMX) (PE05X-XXX-XXX-XXTX)	97414	(1)
403	**Valve** (All PE0XX with Solenoid)	114102	(1)
413	**Coil Nut** (All PE0XXX with Solenoid)	119380	(1)
414	**Coil ,120VAC** (PE0XX-XXX-XXX-XAXX)	116218-33	(1)
	Coil ,240VAC (PE0XX-XXX-XXX-XCXX)	116218-35	(1)
	Coil, 12VDC (PE0XX-XXX-XXX-XBXX)	116218-38	(1)
	Coil, 24VDC ATEX/IECEx (PE05X-XXX-XXX-XHXX)	117345-39	(1)
	Coil, 24VDC (PE0XX-XXX-XXX-XDXX)	116218-39	(1)
	Coil, 220VAC ATEX/IECEx (PE05X-XXX-XXX-XKXX)	117345-35	(1)
	Coil, 12VDC ATEX/IECEx (PE05X-XXX-XXX-XGXX)	117345-38	(1)
	Coil, 12VDC NEC/CEC (PE05X-XXX-XXX-XEXX)	114772-38	(1)
	Coil, 24 VDC NEC/CEC (PE05X-XXX-XXX-XFXX)	114772-39	(1)
	Coil, 120 VDC NEC/CEC (PE05X-XXX-XXX-XJXX)	114772-33	(1)

PARTS LIST / PE0XX-XXX-XXX-XXXX

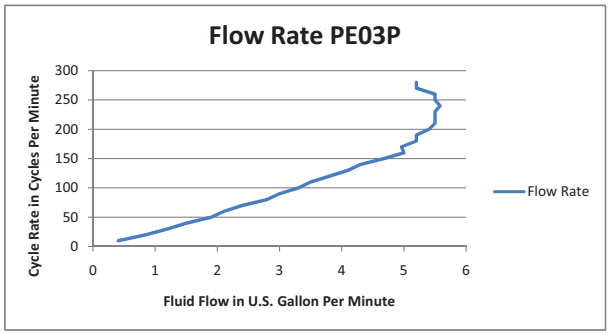
Item	Description	Part no	Qty
415	**O-Ring** (All PE0XX with Solenoid)	114103	(1)
416	**O-Ring** (All PE0XX with Solenoid)	114104	(1)
417	**Screw** (All PE0XX with Solenoid)	96728647	(2)
418	**Tube** (All PE0XX with Solenoid)	15309974	(1)
419	**Seal** (All PE0XX with Solenoid)	96957	(1)

Item	Description	Part no	Qty
420	**Snap Ring** (All PE0XX with Solenoid)	Y147-43	(1)
421	**Retainer** (All PE0XX with Solenoid)	15309990	(1)
429	**Solenoid Muffler** (All PE0XX with Solenoid)	116464	(1)

SOL ENOID

GENERAL DESCRIPTION

Without End of Stroke Feedback, solenoid control can only be used to cycle the pump based on timing. The following curves represent the flow rates of a pump based on timed operation of the solenoid at a common operating point of 70 psig air pressure and 30 psig of back pressure.



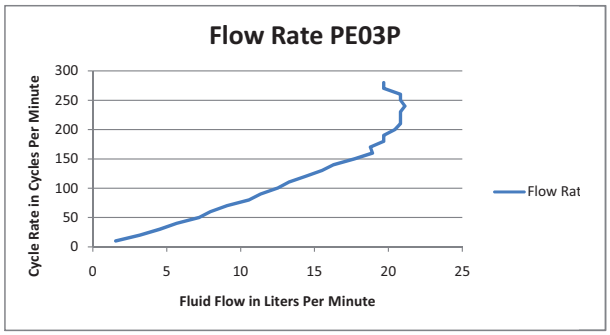
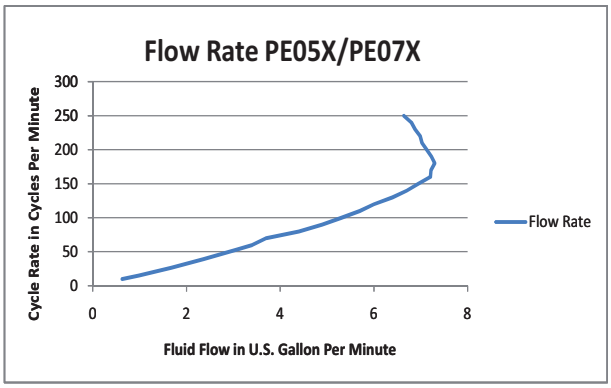


Figure1



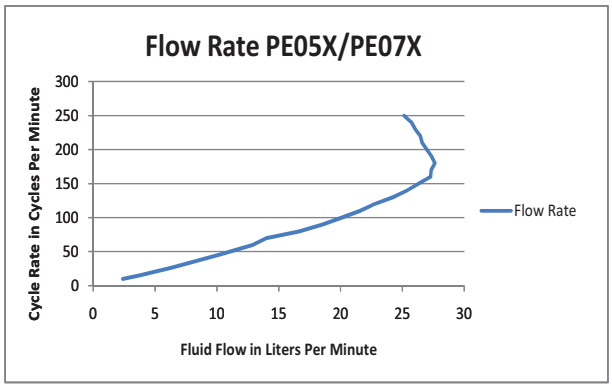
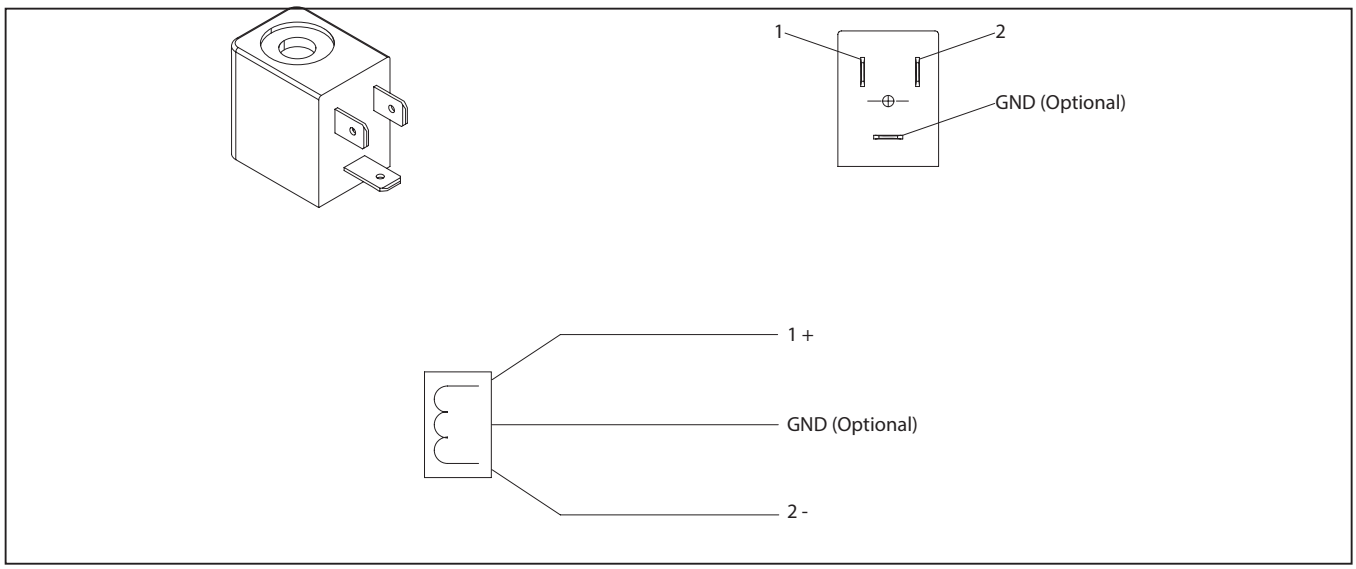


Figure 2

NON - HAZARDOUS DUTY SOLENOID WIRING DIAGRAM



Caution: When running pump while using Electronic Interface / Solenoid Control, it is possible for air inlet pressure to exceed fluid discharge pressure. This pressure differential could cause shortened diaphragm life. Assure that appropriate inlet air pressure is being applied based on application parameters and that the supplied air is shut off and vented when the pump is not in use.

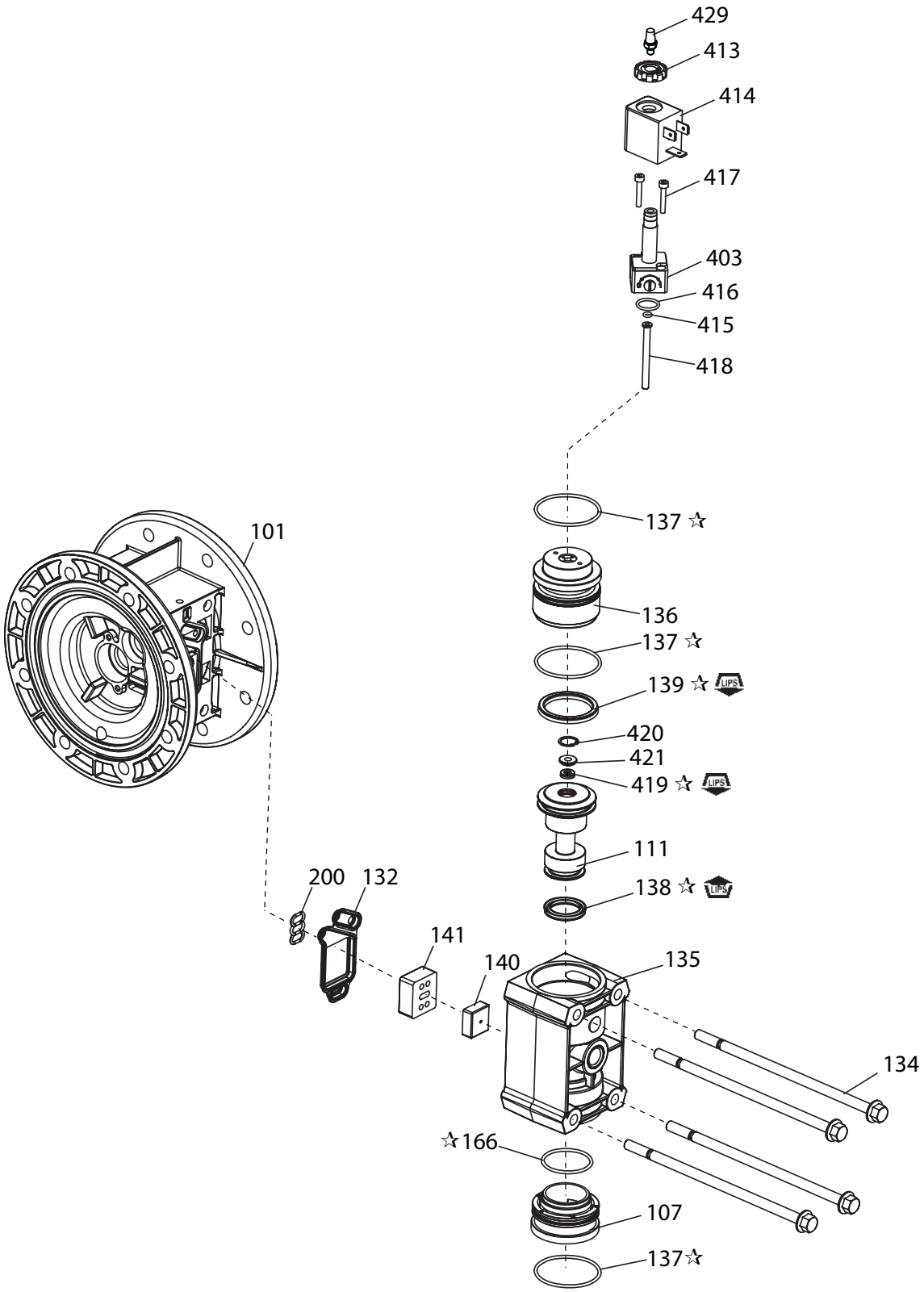


Figure 3

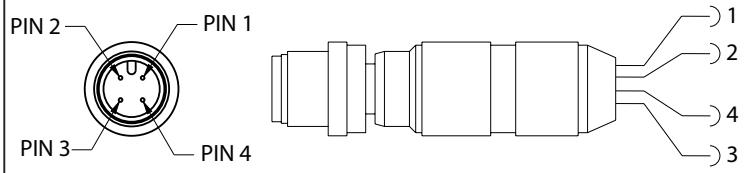
☞LUBRICATION / SEALANTS ☜

☆ Apply Lubriplate FML-2 grease (94276) to all "O" rings, "U" cups and mating parts.

NON - HAZARDOUS DUTY END OF STROKE

With End of Stroke feedback, The End of stroke sensor detects when the diaphragm rod has reached the end of each stroke. This allows closed loop control of the diaphragm pump, verifying each stroke is complete.

End of Stroke / Cycle Sensor Pinout, M12 Connector

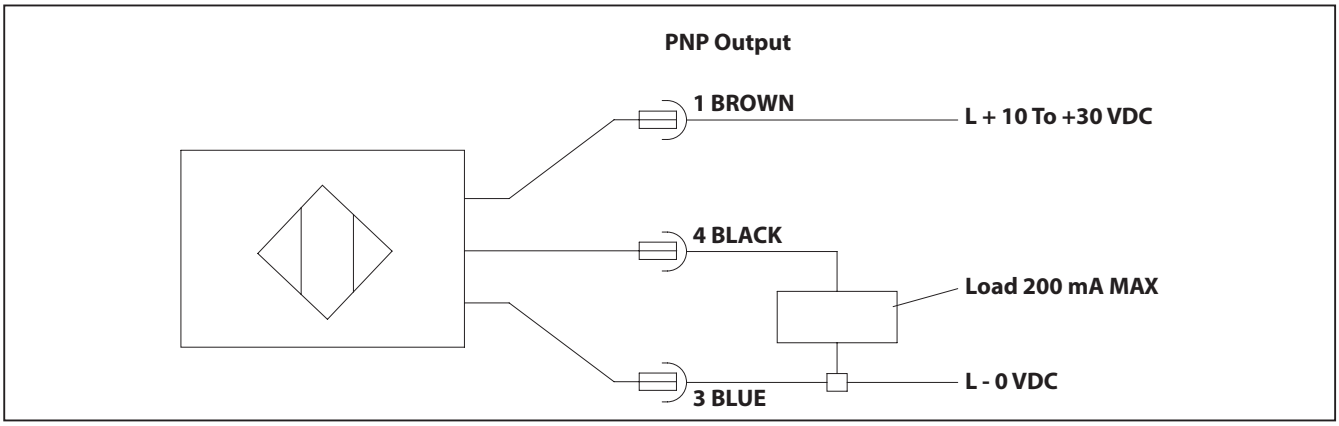


CABLE ASSEMBLY WIRING COLORS:

PIN 1 - BROWN, POSITIVE VOLTAGE (+10 TO +30 VDC)
PIN 2 - WHITE, NOT USED
PIN 3 - BLUE, ZERO VOLTS
PIN 4 - BLACK, SIGNAL

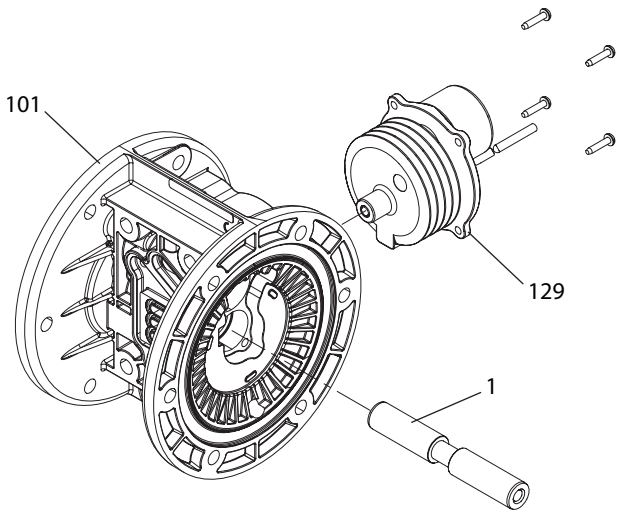
NOTE: WIRING COLORS ARE BASED ON AUTOMATION DIRECT CD12L AND CD12M 4-POLE CABLE ASSEMBLIES.

End of Stroke / Cycle Sensor Pinout, Wiring Diagram (No Connector)



PART LIST

PE03X-XXX-XXX-XXXX



PE05X-XXX-XXX-XXXX / PE07X-XXX-XXX-XXXX

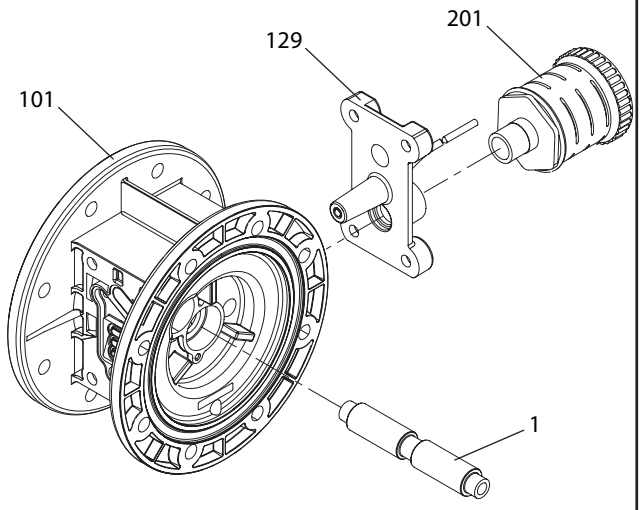


Figure 4

GENERAL DESCRIPTION

An ARO® diaphragm pump equipped with the ARO Leak Detection Sensor warns of a diaphragm failure by sensing the presence of liquid in the air chamber of the pump. This system uses a liquid sensor in each of the two air chambers which will send an output signal when fluid is detected.

INSTALLATION AND WARNINGS

NOTE: ALL WIRING MUST COMPLY WITH ALL LOCAL AND / OR NATIONAL ELECTRICAL CODES.

- Electrical codes that apply must be strictly adhered to; failure to do so may lead to shock hazard or serious injury.
- Some local electrical codes may require the installation of rigid conduit.
- The diaphragm failure detector components must be installed by a qualified electrician in compliance with all national, state and local codes and regulations to reduce the risk of electrical shock or other serious injury during installation and operation.
- ARO is not responsible for accidents resulting from improper installation of components or hardware.
- HAZARDOUS VOLTAGE. Do not attempt any service without disconnecting all electrical supply sources.

PART LIST / PE0XX-XXX-XXX-XXEX, PE0XX-XXX-XXX-XXLX

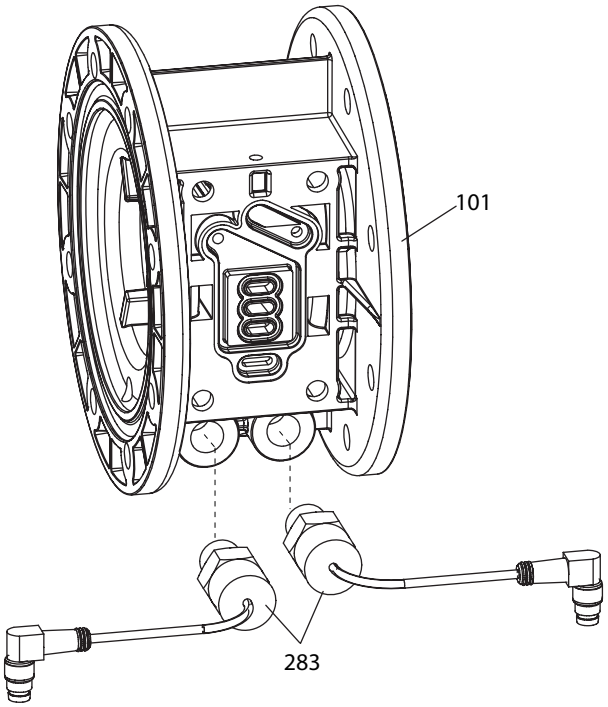
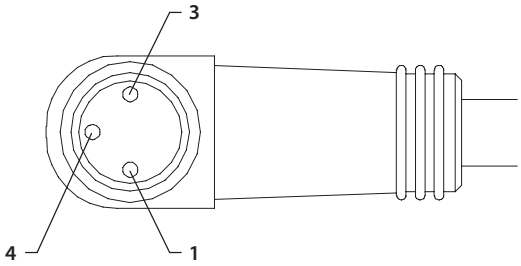


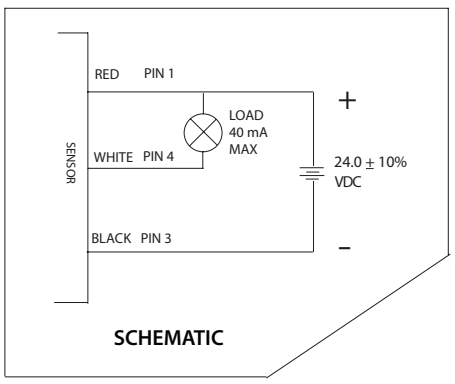
Figure 5

LEAK DETECTION (DIAPHRAGM FAILURE DETECTOR) - PINOUT DESCRIPTIONS

96270-1 SENSOR PINOUTS



Pin	Function	Color
1	+24 VDC	Red
3	Ground	Black
4	Signal	White



SCHEMATIC

TURCK (PICOFAST) Connector PSW 3M -2/90

Figure 6

INSTALLATION OF ELECTRONIC INTERFACE COMPONENTS FOR HAZARDOUS DUTY APPLICATIONS

Pumps that will operate in environments defined as "hazardous locations" must only be installed, connected and set-up by qualified personnel with knowledge and understanding of protection classes, regulations and provisions for apparatus in hazardous areas, for the region where the pump will operate, because these regulations and provisions, along with the definition of what constitutes hazardous areas vary by location.

Solenoid Coils PN	Voltage	Device Rating (mA)	Temperature Rating
114772-33	120 VAC	57	-4° F - 140° F (-20° C - 60° C)
114772-38	12 VDC	375	-4° F - 140° F (-20° C - 60° C)
114772-39	24 VDC	191	-4° F - 140° F (-20° C - 60° C)
117345-35 (ATEX)	220 VAC	22	-4° F - 140° F (-20° C - 60° C)
117345-38 (ATEX)	12 VDC	392	-4° F - 140° F (-20° C - 60° C)
117345-39 (ATEX)	24 VDC	192	-4° F - 140° F (-20° C - 60° C)

End of Stroke Proximity Sensor PN	Voltage	Device Rating (mA)	Temperature Rating
97398 (ATEX/IECEx/NEC/CEC)	7.5-30 VDC	50	-4° F - 158° F (-20° C - 70° C)
97399 (ATEX/IECEx/NEC/CEC)	7.5-30 VDC	50	-4° F - 158° F (-20° C - 70° C)

Barrier Amplifier, End of Stroke PN	Voltage	Device Rating (mA)	Temperature Rating
97491 (ATEX/IECEx)	19.2 - 31.2 VDC	12	-4° F - 140° F (-20°C - 60° C)
97412 (NEC/CEC)	24 VDC	100	-4° F - 140° F (-20°C - 60° C)

Zener Barrier, Leak Detection PN	Voltage	Device Rating (mA)	Temperature Rating
97414 (ATEX/IECEx/NEC/CEC)	24 VDC	100	-4° F - 140° F (-20° C - 60° C)

Leak Detector Sensor PN	Voltage	Device Rating (mA)	Temperature Rating
96270-1	24 VDC	40	-0° F - 176° F (-18° C - 80° C)
96270-2 (ATEX/IECEx)	24 VDC	40	-0° F - 176° F (-18° C - 80° C)

Maximum process fluid and ambient temperatures should not exceed 50° C.

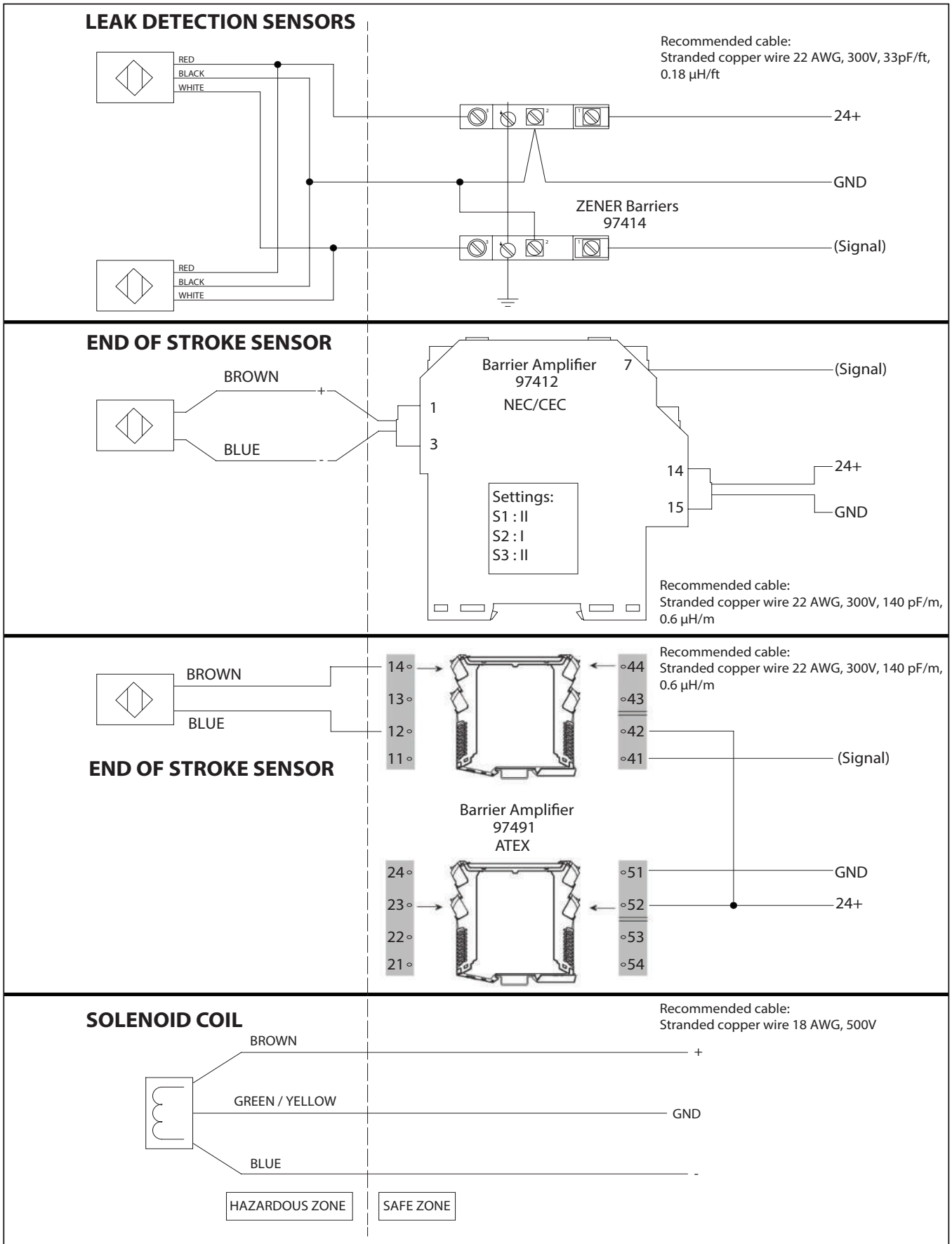


Figure 7

NOTE: Installer is responsible for extending cables and bringing them outside hazardous area using approved methods and components.