

NEO-DYN<sup>®</sup>

MODELS 100P, 101P, 110P, 142P, 180P, 200P, 201P  
ADJUSTABLE PRESSURE SWITCHES;

MODELS 152P AND 160P  
ADJUSTABLE DIFFERENTIAL PRESSURE SWITCHES,  
ENCLOSURE 3X FOR WEATHERPROOF APPLICATIONS

INSTALLATION AND  
OPERATION MANUAL

PN 610-0008 Rev C



**ITT**

ENGINEERED FOR LIFE

Manual No. 610-0008 Rev C  
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## Important Information

The product warranty applicable to this ITT Neo-Dyn® instrument is as stated on page 19 of this manual.

Should any after-delivery problems arise, please contact ITT Neo-Dyn's Customer Service using the information above. Our normal business hours are weekdays, 7:00 am to 3:30 PM, Pacific Time.

Before installing this pressure switch, become familiar with the installation and adjustment instructions in Chapters 2 and 3.

***WARNING*** **Indicates a hazard which can cause severe personal injury, death, or substantial property damage if the warning is ignored.**

***CAUTION*** Indicates a hazard which will or can cause minor personal injury or property damage if the caution is ignored.

***NOTE*** Indicates additional information about a particular item necessary to the operation of the unit.

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# CHAPTER

# 1

## INTRODUCTION

The Neo-Dyn® Enclosure 3X Switches described in this manual are weather-proof, electromechanical sensing devices designed for a wide range of applications in pneumatic and hydraulic systems up to 10,000 psig. Models 100P, 101P, 110P, 200P, and 201P are gauge pressure switches, Models 142P and 180P are vacuum switches, and Models 152P and 160P are differential pressure switches.

The most common wetted materials of these pressure and vacuum switches include a polyimide (Kapton) sensing diaphragm, nitrile O-ring, and aluminum alloy or corrosion resistant steel (CRES) pressure port. CRES diaphragms and all-welded constructions are also available in some models for corrosive pressure media and are standard on the temperature switches.

Setpoint adjustments are easily made through the adjustable range by turning an adjustment nut located inside the housing. On Models 101P and 201P this adjustment is external.

The standard configuration of these switches will switch up to 15 amp at up to 250 VAC in a single-pole configuration, and up to 11 amp at up to 250 VAC in a double-pole configuration. When ordered with M Option, the switch is rated for currents to one amp, but its bifurcated gold contacts will reliably switch currents in the milliamper and microampere ranges.

These switches have CE Mark, and they all have weatherproof enclosures with IP66 ingress protection and that meet the requirements of NEMA 3, 3R, 3S, 4, 4X and 13. The internal switch elements are UL and CSA recognized components.

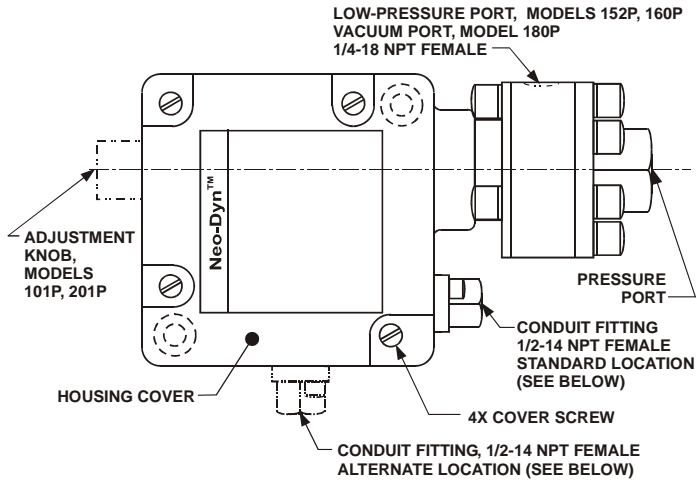


Figure 1: Models 100P, 101P, 110P, 142P, 152P, 160P, 180P, 200P, 201P: Enclosure 3X Adjustable Pressure Switches (Pressure Port Configurations Vary with Model and Range)

Hidden lines indicate mounting holes under the cover (see page 4).

The following models use the Alternate Conduit Fitting Location: 100P and 101P, Range 1; 110P; 142P, 152P, 160P, 180P

Chapter 5 on page 12 contains complete specifications for these Adjustable Pressure Switches.

## **CUSTOMER SERVICE**

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If you have any questions about these Pressure Switches that are not covered in this manual, you can contact Neo-Dyn or our representatives in several ways.

The Neo-Dyn customer service phone number is (661) 295-4000. Our customer service department is open from 7:00 am to 3:30 p.m. Pacific Time.

Our Internet site is [www.neodyn.com](http://www.neodyn.com); it includes lists of sales representatives and distributors.

## **OTHER CONFIGURATIONS**

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*WARNING* The models described in this manual are also available in special and factory-set configurations. For these units, follow the installation and operating instructions herein, except **adhere to the pressure and electrical limits marked on the units.**

# CHAPTER

# 2

## INSTALLATION

Installation of these Neo-Dyn® Enclosure 3X pressure switches is straightforward. However, they must be installed by a qualified electrician, in compliance with all local and national electrical codes.

**WARNING Electrical Hazard**

**WARNING Do not make electrical connections while power is on.**

**WARNING Always check for multiple circuits.**

**WARNING Always make sure grounding is adequate.**

### **MOUNTING**

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The Pressure Switch can be mounted directly to the process connection if there is no significant vibration and the fluid lines are capable of supporting the weight. It can also be attached to a flat surface, such as a wall or panel, using .250 in. diameter or M6 socket-head cap screws through the mounting holes that are accessed by removing the housing cover; allow .5 in. (12.7 mm) screw length above the mounting surface. These holes are located on two corners of a 2.72 inch (6.91 cm) square, or 3.85 inches (9.77 cm) apart on a 45° diagonal.

Note that on certain models and ranges the housing of the pressure fitting has a large outside diameter that extends below the mounting surface, requiring either a cutout in that surface, or having the pressure fitting overhang an edge. These models are 100P and 101P, Range 1; 110P; 142P; 152P; 160P; and 180P.



## PROCESS CONNECTIONS

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The process connections are:

Model 142P: ½” - 14 NPT female standard

Models 160P and 180P, both ports: ¼” - 18 NPT female standard. On Model 180P, the vacuum port is on the side of the round housing, and the normal pressure port must be left open to the atmosphere, which serves as the reference pressure.

Model 152P: ½” - 14 NPT female high, ¼” - 18 NPT female low

All other pressure switches:

Wetted Material 1: ¼” - 18 NPT female standard

Wetted Materials 4-9: ½” - 14 NPT female standard

In addition, some pressure switches can be ordered with Option E (7/16”-20 SAE port); refer to part numbering in Chapter 5

When installing the Pressure Switch, always:

- Make sure that the unit and your system have matching threads.
- Use the wrench flats provided.
- Seal all joints with pipe joint sealing compound.

*CAUTION* Avoid excessive torque on all threaded connections.

*WARNING* **Do not exceed the marked Maximum Operating Pressure in normal operation.**

The marked Proof Pressure is provided to give the maximum allowable pressure without causing permanent damage to the pressure switch in the event of an over-pressure condition. Set pressure relief/safety valves below this setting.

## PROCESS MEDIA

Process media must be compatible with the wetted materials listed in Chapter 5 starting on page 13. Compatibility is defined by an “A” rating in the Chemical Resistance Guide for Metals and Alloys, the Chemical Resistance Guide for Plastics, and the Chemical Resistance Guide for Elastomers, all published by Compass Publications, and available from the National Association of Corrosion Engineers (NACE), Houston, Texas; telephone 281 228-6200.

## ELECTRICAL CONNECTIONS

An internal terminal block is standard, with a green screw for attaching the ground wire. See Figure 2 and Figure 3.

**WARNING** All field wiring must comply with requirements of the NEC or applicable local or national electrical codes, including wire gauges and insulation temperature ratings. Conduit seals may be required.

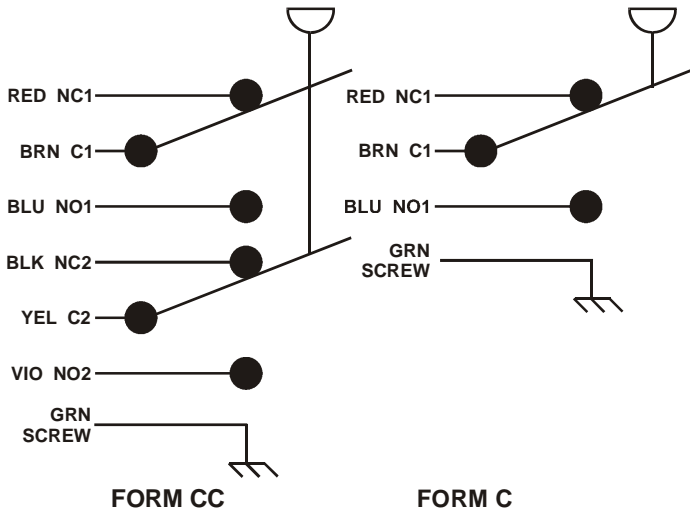


Figure 2. Form C and CC Schematics Shown Below the Decreasing Setpoint

**NOTE** The direction of increasing pressure shown above represents the direction of increasing vacuum on Model 180P.

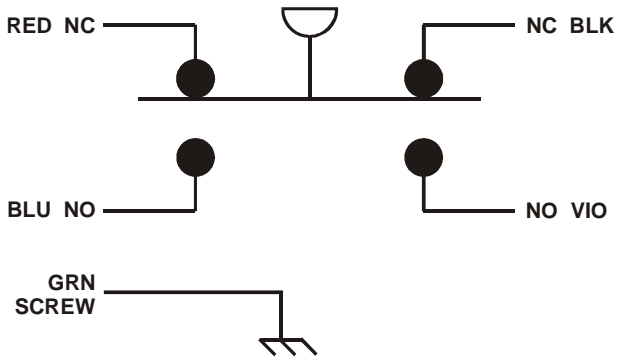


Figure 3. Form Z Schematic Shown  
Below the Decreasing Setpoint

*NOTE* The direction of increasing pressure shown above represents the direction of increasing vacuum on Model 180P.

# CHAPTER

# 3

## ADJUSTMENTS AFTER INSTALLATION

The factory-set setpoint or adjustable setpoint range is marked on the nameplate of the switch. This section describes the adjustments needed after an Adjustable Pressure Switch has been properly installed.

### **SETPOINT ADJUSTMENT**

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Disconnect the electrical power. Check for multiple circuits.

1. On all models except 101P and 201P, loosen the screws on the housing cover, and move it aside.
2. Check the setpoints per paragraphs 4 and 5 below for precise adjustments.
3. The adjustment nut can be rotated by hand or with an open-end wrench or similar tool (use a screwdriver on Models 101P and 201P, or turn the knob by hand if a knob is included). The range scale is intended to be used only as an approximate guide; it indicates the increasing setpoint.
4. To check the increasing setpoint, connect a pressure source and a calibrated pressure gauge or transducer to the pressure port and slowly apply increasing pressure (or vacuum on Model 180P) until the switch actuates. Actuation can be noted by listening to the audible snap of the Belleville spring, or with an ohmmeter across the appropriate terminals in the terminal block.

5. If you want to check the decreasing setpoint, slowly decrease the pressure or vacuum after the switch has actuated and note the value at which the audible snap or an ohmmeter indicates deactuation. Deadband may be calculated if desired by subtracting the decreasing setpoint reading from the increasing setpoint reading.

*CAUTION* 6. On all models except 101P and 201P, replace the cover by moving it back into position over the top of the housing and tightening the screws until the cover is snug against its gasket. Do not over tighten, as this could damage the gasket.

# CHAPTER

# 4

## TROUBLESHOOTING

In-service problems are unlikely, but the following paragraphs suggest ways to verify any problems that might arise:

### 1. Pressure Switch Leaks

If a leak is suspected, isolate the pressure switch from the rest of the system. Connect the switch and a calibrated pressure gauge downstream from a pressure source and shutoff valve. Apply normal system pressure, isolate the gauge and Pressure Switch from the pressure source with the shutoff valve for at least one minute, and check for leaks as evidenced by a drop in the gauge reading.

If a leak is verified, return the unit for repair. Contact ITT directly, or your local sales representative or distributor (see [www.neodyn.com](http://www.neodyn.com) for a contact list).

### 2. Failure to Switch

If application of pressure or vacuum 10% greater than the adjusted setpoint fails to produce actuation, first check for contamination in the process connection, and verify that the expected pressure is reaching the sensing diaphragm or piston, or temperature is reaching the temperature probe.

If the Belleville spring can be heard to audibly snap, but an ohmmeter indicates no electrical switching, the cause is probably stuck or burned switch contacts, or the switch element has moved away from the position where it was synchronized with the snap action. Return the unit for repair.

If application of pressure or vacuum 10% greater than the adjusted setpoint fails to produce an audible snap of the Belleville spring, there is probably a mechanical failure or binding due to contamination. Return the unit for repair.

### 3. Calibration Shifts

If it is suspected that the setpoints have shifted, recheck them per paragraphs 4 and 5 of Chapter 3. If you verify unstable or drifting setpoints, return the unit for repair.

# CHAPTER

# 5

## SPECIFICATIONS

This section shows standard specifications and available options.

### STANDARD

#### Interfaces

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Weight: approximately 3 pounds (1.4 kg) each

Conduit Connection: ½" - 14 NPT female

Standard Pressure Port:

Model 142P: ½" - 14 NPT female

Models 160P (both ports) and 180P: ¼" - 18 NPT female

Model 152P: ½" - 14 NPT female high, ¼" - 18 NPT female low

All other pressure switches:

Wetted Material 1: ¼" - 18 NPT female

Wetted Materials 4-9: ½" - 14 NPT female

#### Listing Agency Approvals

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Switch Elements            UL and CSA recognized components

CE Mark                      All models

Internal switching elements are recognized components by both UL and CSA.



## Part Number

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The part number contains information about which configurations and options are included in your Adjustable Pressure Switch. To determine the pressure range, electrical rating, and options, compare the part number of your unit with the information in Figure 4 below and the following tables.

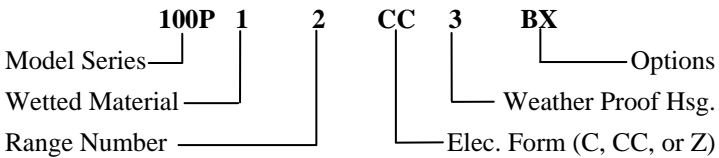


Figure 4. Part Number Breakdown

*NOTE* Part number format varies for specials.

### Wetted Materials (Except Models 142P and 152P)

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Table 1	
No	Description
1	Aluminum alloy port, teflon-coated polyimide (Kapton) diaphragm and nitrile O-ring
1	Aluminum alloy port and piston, Teflon seal, Nitrile O-ring (only wetted materials available on Models 200P and 201P)
4	UNS S31600 CRES port, teflon coated polyimide diaphragm and nitrile O-ring
5	UNS S31600 CRES port and diaphragm, heliarc welded*
6	Hastelloy C port, Tantalum diaphragm, electron-beam welded*
7	Hastelloy C port and diaphragm*
9	Monel port and Inconel diaphragm, heliarc welded*

\* Models 100P and 101P only

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## Wetted Material 8 for Models 142P and 152P

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“Wetted Material 8” allows various material combinations. The part number of these Models contains a series of 3 numbers following the miscellaneous options; these numbers define the individual wetted materials:

Example: 142P81C3MX443

1<sup>st</sup> Number (4) is Pressure Port Material:

4 UNS 31600 CRES      7 Hastelloy C

2<sup>nd</sup> Number (4) is Diaphragm Material:

1 Polyimide (Kapton)      6 Tantalum  
4 UNS 31600 CRES      7 Hastelloy C

3<sup>rd</sup> Number (3) is O-ring Material:

2 Kalrez      5 EPR  
3 Viton      8 Nitrile

## Pressure Ratings - Models 100P and 101P

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\* See Figure 4 on page 13 for the part number breakdown

Table 2			
Part No**	Range No	Max Operating Pressure, psig (bar)	Proof Pressure PSIG (bar)
100P*1*3X	1	600 (41.37)	1000 (68.95)
100P*2*3X	2	3000 (206.9)	5000 (344.8)
100P*4*3X	4	3000 (206.9)	5000 (344.8)
100P*5*3X	5	3000 (206.9)	5000 (344.8)
100P*7*3X	7	3000 (206.9)	5000 (344.8)
100P*8*3X	8	3000 (206.9)	5000 (344.8)

\*\* Same part number format for Model 101P

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### Pressure Ratings - Model 110P

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Table 3			
Part No	Range No	Max Operating Pressure, psig (bar)	Proof Pressure PSIG (bar)
110P*2*3X	2	300 (20.69)	500 (34.48)
110P*4*3X	4	300 (20.69)	500 (34.48)

### Pressure Ratings - Model 142P

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Table 4			
Part No	Range No	Max Operating Pressure	Proof Pressure
142P80*3X	0	30 in H <sub>2</sub> O (0.0747 bar) vacuum to +30 in H <sub>2</sub> O pressure	30 in H <sub>2</sub> O (0.0747 bar) vacuum to +5 psig (0.34 bar) pressure
142P81*3X	1	30 in H <sub>2</sub> O (0.0747 bar) vacuum to +5 psig (0.34 bar) pressure	30 in H <sub>2</sub> O (0.0747 bar) vacuum to +15 psig (1.03 bar) pressure
142P82*3X	2	Full vacuum to +15 psig (1.03 bar) pressure	Full vacuum to +100 psig (6.90 bar) pressure

### Pressure Ratings - Model 180P

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Table 5			
Part No	Range No	Max Operating Pressure, psig (bar)	Proof Pressure psig (bar)
180P*4*3X	4	225 (15.51)	350 (24.13)

## Pressure Ratings - Models 200P and 201P

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Table 6			
Part No**	Range No	Max Operating Pressure, psig (bar)	Proof Pressure psig (bar)
200P12*3X	2	3000 (207)	4500 (310)
200P13*3X	3	7500 (517)	11250 (776)
200P16*3X	6	7500 (517)	11250 (776)
200P18*3X	8	10000 (690)	15000 (1034)
200P18*3EX	8	9500 (655)	15000 (1034)

\*\* Same part number format for Model 201P

## Pressure Ratings - Model 152P

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Table 7			
Part No	Range No	Max Operating Pressure	Proof Pressure
152P82*3X	2	15 psig (1.03 bar) simul. or high / low; 100 in H <sub>2</sub> O (0.25 bar) low / high	100 psig (6.90 bar) simul. or high / low; 15 psig (1.03 bar) low / high

## Pressure Ratings - Model 160P

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Table 8			
Part No	Range No	Max Operating Pressure, psig (bar)	Proof Pressure psig (bar)
160P*2*3X	2	300 (20.69)	500 (34.48) high / low; 200 (13.79) low / high
160P*4*3X	4	500 (34.48)	1000 (68.95) high / low; 400 (27.58) low / high
160P*6*3X	6	500 (34.48)	1000 (68.95) high / low; 400 (27.58) low / high
160P*7*3X	7	500 (34.48)	1000 (68.95) high / low; 400 (27.58) low / high

## **Weather Proof Ratings:**

Ingress protection IP66

Enclosure type 3, 3R, 3S, 4, 4X, 13 (NEMA)

## **Temperature Ratings for Pressure Media**

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Standard (Nitrile O-rings, -40°C (-40°F) to +121°C (+250°F) and Wetted Matl. 5-7, 9);

C Option (EPR O-rings):

B Option (Viton O-rings): -26°C (-15°F) to +121°C (+250°F) and Kalrez O-rings

Wetted Material 8: Follows limits defined by O-rings above; Kalrez is same as Viton

## **Electrical and Ambient Temperature Ratings**

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Minimum ambient temperature is -40 °C (-40 °F), except with B Option and Kalrez O-rings it is -26°C (-15°F)

Form C3X (SPDT):

15 amp @ 125 or 250 VAC , 1/8 HP @ 125 VAC,

¼ HP @ 250 VAC, to +70 °C (+158 °F) max;

5 amp resistive , 3 amp inductive @ 28 VDC; .5 amp resistive , .04 amp inductive @ 125 VDC to +85 °C (+186 °F) max.

Form CC3X (DPDT):

11 amp\* and ¼ hp @ 125 or 250 VAC to +65 °C (+149 °F) max;

5 amp resistive , 3 amp inductive @ 28 VDC; .5 amp resistive @ 125 VDC to +85 °C (+186 °F) max.

Form C3MX or CC3MX (SPDT or DPDT with M Option):

1 amp @ 125 VAC to +85 °C (+186 °F) max.

Form Z3X (SPDT):

15 amp @ 125 or 250 VAC , 1/4 HP @ 125 VAC,

1/2 HP @ 250 VAC, to +80 °C (+176 °F) max;

5 amp resistive , 3 amp inductive @ 28 VDC; 1 amp resistive , .5 amp inductive @ 125 VDC to +85 °C (+186 °F) max.

## OPTIONS

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The available options for standard switches are listed below. These options can be combined; every included option will be indicated in the part number of the unit.

Table 9		
Option	Description	Available on Model
A	Epoxy-painted exterior	All
B	Viton O-Ring - Refer to Wetted Materials	100P, 101P, 110P, 160P, 180P, 200P, 201P
C	EPR O-Ring - Refer to Wetted Materials	100P, 101P, 110P, 160P, 180P, 200P, 201P
E	7/16 - 20 SAE Port (Wetted Material 1 Only)	100P, 101P, 200P, 201P
G	½-14 NPT Male Port	110P (Wetted Matl 4 only)
K	Knob for external adjustment	101P, 201P
M	Gold Electrical Contacts For Extremely Low Current Applications	All
S	Corrosion-Resistant Steel Diaphragm	100P; 101P; 110P; 160P Ranges 2, 4; 180P Range 2; Wetted Material 4 Only
W	CRES exterior screws	100P, 101P, 110P, 200P, 201P Wetted Material 1 Only (Std on other wetted materials)
X	CE mark	All

# WARRANTY INFORMATION

## **A. Warranty:**

ITT Industries (ITT) warrants that at the time of shipment, the products manufactured by ITT Neo-Dyn and sold hereunder, will be free from defects in material and workmanship and will conform to the specifications furnished or approved by ITT.

## **B. Warranty Adjustment:**

If any defect within this warranty appears, the Buyer shall notify ITT immediately.

ITT agrees to repair or furnish a replacement for, but not install, any product which, within one (1) year from the date of shipment by ITT shall, upon test and examination by ITT, prove defective within the above warranty.

No product will be accepted for return or replacement without the written authorization of ITT. Upon such authorization, and in accordance with instructions by ITT, the product will be returned with shipping charges prepaid by the Buyer. Replacements made under this warranty will be shipped prepaid.

## **C. Exclusion from Warranty:**

THE FOREGOING WARRANTY IS IN LIEU OF AND EXCLUDES ALL OTHER EXPRESSED OR IMPLIED WARRANTIES OF MERCHANTABILITY, OR FITNESS, OR OTHERWISE.

Components manufactured by any supplier other than ITT shall bear only the warranty made by the manufacturer of that product, and ITT assumes no responsibility for the performance or reliability of the unit as a whole.

In no event shall ITT be liable for indirect, incidental or consequential damages nor shall the liability of ITT arising in connection with any products sold hereunder (whether such liability arises from a claim based on contract, warranty, tort or otherwise) exceed the actual amount paid by Buyer to ITT for the products delivered hereunder.

The warranty does not extend to any product manufactured by ITT, which has been subject to misuse, neglect, accident, improper installation, or to use in violation of instructions furnished by ITT.

The warranty does not extend to or apply to any unit, which has been repaired or altered at any place other than at ITT's factory or service locations, by persons not expressly approved by ITT.

