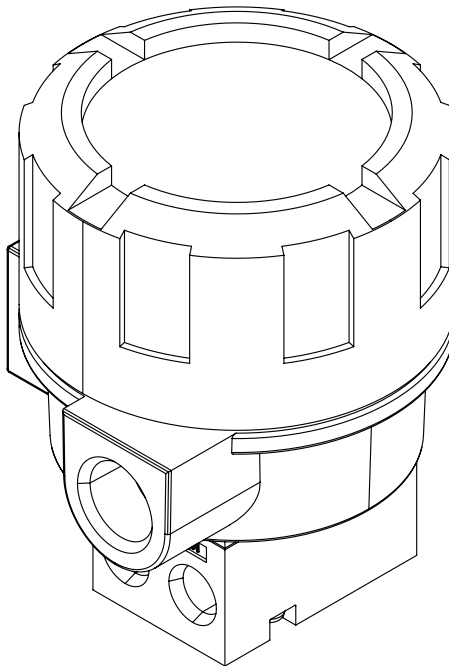


NITRA NCP3 SERIES EXPLOSION PROOF I/P TRANSDUCER USER MANUAL

INSTALLATION, OPERATION AND MAINTENANCE INSTRUCTIONS

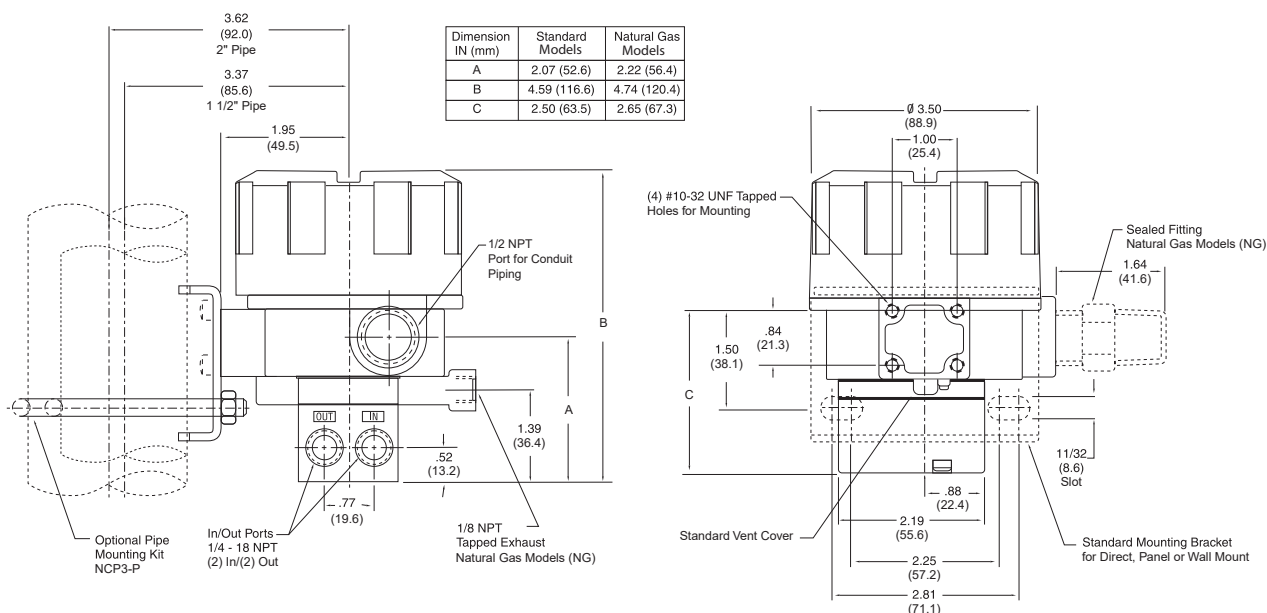


NITRA EXPLOSION PROOF I/P TRANSDUCER

USER MANUAL

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1 INSTALLATION & APPROVALS



Notes

1. (North America) Control equipment connected to the Associated Apparatus must not use or generate more than 250 Vrms or Vdc.

2. (North America) The IS Barriers or Equipment (Associated Apparatus) must be FM Approved and CSA certified and the configuration of associated Apparatus must be installed within the Hazardous (Classified) location for which it is certified. The Associated Apparatus and hazardous location loop apparatus manufacturer's control drawings must be followed when installing this equipment. An AEx [b] Associated Apparatus is suitable only for connection to Class I, Zone 1, Hazardous (Classified) Locations and is not suitable for Class I, Zone 0, or Class I, Division 1 Hazardous (Classified) Locations.

3. (US) Installation should be in accordance with ANSI/ISA RP12.06.01 "Installation of Intrinsically Safe Systems for Hazardous (Classified) Locations" and Article 500 of the National Electrical Code (ANSI/NFPA 70) (Canada) Installation should be in accordance with Section 18 of the Canadian Electrical Code.

4. (North America) All units suitable for Type 4X installations.

5. (North America) Units are suitable for Class I, Division 2, Groups A, B, C, and D hazardous (classified) locations. Transducers to be installed in accordance with the (US) National Electrical Code (ANSI/NFPA 70) (Division 2 hazardous (classified) location wiring techniques (Canada) Canadian Electrical Code.

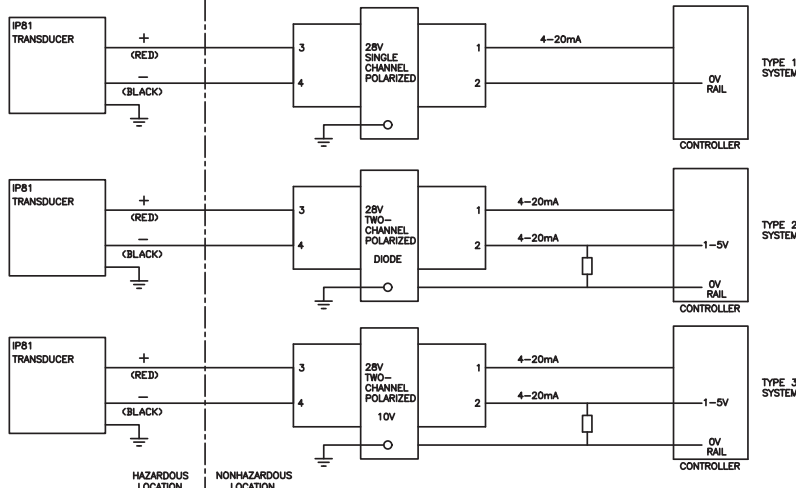
6. The Intrinsic Safety Entity concept allows the interconnection of two intrinsically safe devices with entity parameters not specifically examined in combination as a system when:

U_i or V_{max} > U_o or V_o or V_i > 7.2 volts
 I_i or I_{max} > I_o or I_e or I_e
 C_a or C_o > C_i + C_{leak}
 L_a or L_o > L_i + L_{leak}
 P_s > P_e
 Entity Parameters
 U_i (V_{max}) = 30 V
 I_i (I_{max}) = 125 mA
 P_i = 0.70 watts
 C_i = 0 uF
 L_i = 0 mH

7. No revision to this drawing is permitted without prior FM Approval and CSA Certification.

8. Specific Conditions of Use:

- The IP converter was found to be suitable for use with methane as the process medium.
- The enclosure contains aluminum and is considered to constitute a potential risk of ignition by impact or friction and must be taken into account during installation and use.



MODEL	INPUT	OUTPUT
NCP3-20-315XA	4-20mA	3-15 PSI
NCP3-20-315XANG	4-20mA	3-15 PSI
NCP3-20-033X	4-20mA	0-33 PSI
NCP3-20-033XNG	4-20mA	0-33 PSI

HAZARDOUS LOCATION UNITS:

FM & CSA
 EXPLOSION PROOF:
 CLASS I, DIV. I, GROUPS B, C & D
 DUST IGNITION PROOF:
 CLASS II & III, DIV. I, GROUPS E, F & G
 INTRINSICALLY SAFE:
 CLASS I, II & III, DIV. I, GROUPS C, D, E, F & G
 SUITABLE FOR:
 CLASS I, II, III, DIV. 2, GROUPS A, B, C, D, F, & G

REVISION HISTORY				NITRA BY AUTOMATION DIRECT			
NO.	ECN	DATE	BY	DESCRIPTION	PRODUCT	DATE	SCALE
1					INTERCONNECTION DIAGRAM		
2					AUTO DIRECT NC3P-20-* TRANSDUCER		
3					ORIGINAL	DCW	1-14-26
4					REDRAWN BY	DATE	DRAWING NO.
5					APPROVED BY	DATE	531-990-113

DANGER, WARNING, CAUTION and NOTE statements

DANGER	Refers to conditions or hazards which could result in serious personal injury or death.
WARNING	Refers to conditions or hazards which could result in personal injury.
CAUTION	Refers to conditions or hazards which could result in equipment or property damage.
NOTE	Alerts you to facts or special instructions.

ALL DANGER, WARNING, AND CAUTION NOTICES MUST BE COMPLIED WITH IN FULL

SPECIFICATIONS

Functional Specifications

Inputs	4-20 mA	
Note: Extended periods of electrical input without supply air pressure may damage unit.		
Outputs	3-15 psig	0.20-1.00 bar
	3-27 psig *	0.20-1.80 bar
	6-30 psig *	0.40-2.00 bar
	0-33 psig	0.0-2.2 bar
Air Consumption	3.0 scfh (1.5 NI/min) at mid range	
Note: Multiply by 1.29 for Natural Gas		
Supply Pressure	100 psig (7.0 bar) max. [0-33 psig unit: 45-70 psig (3.0-5.0 bar)]	
Note: Supply pressure must be a minimum of 5 psig above maximum output		
Flow Capacity	4.5 scfm (127.35 NI/min) at 25 psig (1.7 bar) supply	
	12.0 scfm (339.60 NI/min) at 100 psig (7.0 bar) supply	
Note: Multiply flow value by 1.29 for Natural Gas		
Temperature Limits	Operation (Standard FM/CSA)	-40° F to +158° F (-40° C to +70° C)
	Storage	-40° F to +200° F (-40° C to +93° C)
Loop Load, I/P Transducer	9.5 VDC @ 20 mA (500 Ohms resistance)	

Performance Specifications

Accuracy, Hysteresis, and Repeatability	±0.10% of span
Deadband	0.02% of span
Position Effect	No measurable effect
Vibration Effect	Less than ±1.0% of span under the following conditions: 5-15Hz @ 0.8 inches constant displacement; 15-500Hz @ 10g's
Supply Pressure Effect	No measurable effect
Temperature Effect	±0.045%/°F (0.07%/°C) of span
Reverse Polarity Effect	No damage from reversal of normal supply current (4-20 mA) or from misapplication of up to 60 mA
RFI/EMI Effect	Less than 0.5% of span change in output pressure per En 61000-4-3:1998, Amendment 1, Performance Criteria A

Physical Specifications

Port Sizes	Pneumatic	1/4" NPT
	Exhaust (Natural Gas model)	1/8" NPT
	Electric	1/2" NPT
Media	Clean, dry, oil-free, air-filtered to 40 micron Natural gas when NG model (NG) is ordered (FM/CSA)	
Mounting	Direct wall, panel, or 2" pipe (optional)	
Materials	Housing	Chromate-treated aluminum with epoxy paint. NEMA 4X (IP65)
	Elastomers	Buna-N
	Trim	Stainless steel; brass; zinc-plated steel

* 3-27 psig and 6-30 psig is achieved with field selectable units.

1. INSTALLATION AND APPROVALS

1.1 Pre-installation Requirements

1.1.1 Environment: Suitable for installation in the following locations:

- Intrinsically safe operation in hazardous locations outdoors (NEMA 4X, CSA.ENC.4 & IP65)
- Explosion Proof Installation in hazardous locations outdoors (NEMA 4X, CSA.ENC.4 & IP65)
- See section 1.5, 1.6 and 1.7 for Factory Mutual, Canadian Standards.

WARNING The I/P transducer enclosure contains aluminum and is considered to constitute a potential risk of ignition by impact or friction. Care must be taken into account during installation to prevent impact or friction.

DANGER All wiring must be made to all local and national codes appropriate to the area of installation.

1.1.2 Electrical Input: 4-20 mAdc current source. It is recommended that shielded cable be used and that the shield be grounded to unit and earth ground. See Figure 1 on page 4 for location of ground screw.

1.1.3 Air supply: Clean, dry, oil free instrument air filtered to 40 micron

1.1.4 If the Natural gas option (NG) is selected, the unit is suitable for use with natural gas media as approved by Factory Mutual (FM) and Canadian Standards Association (CSA). Natural gas model (NG) includes tapped/captured exhaust and installed sealed conduit fitting. Removal of conduit fitting will void approvals (FM/CSA) for use with natural gas media.

CAUTION Use caution not to scar threads of fitting during installation as this can void integrity of the seal.

CAUTION Exhaust gas must be vented to a safe area.

1.2 Mounting

1.2.1 The Type NCP3 series has been designed to mount inline, to a standard valve yoke (bracket included with unit), or to a 1.5" (3.8 cm) or 2" (5.1 cm) pipe (optional mounting kit NCP3-P required).

1.3 Pneumatic Connections

1.3.1 Clean all pipe lines to remove dirt and scale prior to installation.

1.3.2 Supply air must be filtered to 40 microns and free of moisture and lubricants.

1.3.3 Two (2) 1/4" NPT ports are provided for supply air connections. Either port may be used. The unused port must be plugged with the pipe plug included with the unit.

1.3.4 Two (2) 1/4" NPT ports are provided for pneumatic output connections. Either port may be used and one may be used for the mounting of an output gauge. If no gauge is installed, the unused port must be plugged with the pipe plug included with the unit.

1.4 Electrical Connections

1.4.1 The Type NCP3 series is supplied with a 1/2" NPT electrical conduit connection as standard.

1.4.2 A two (2) position terminal block that is wire ready is supplied for 22-12 AWG wire. Wire should be stripped approximately 1/4" before insertion. The terminals are labeled "+" and "-" on the terminal board (see figure 1).

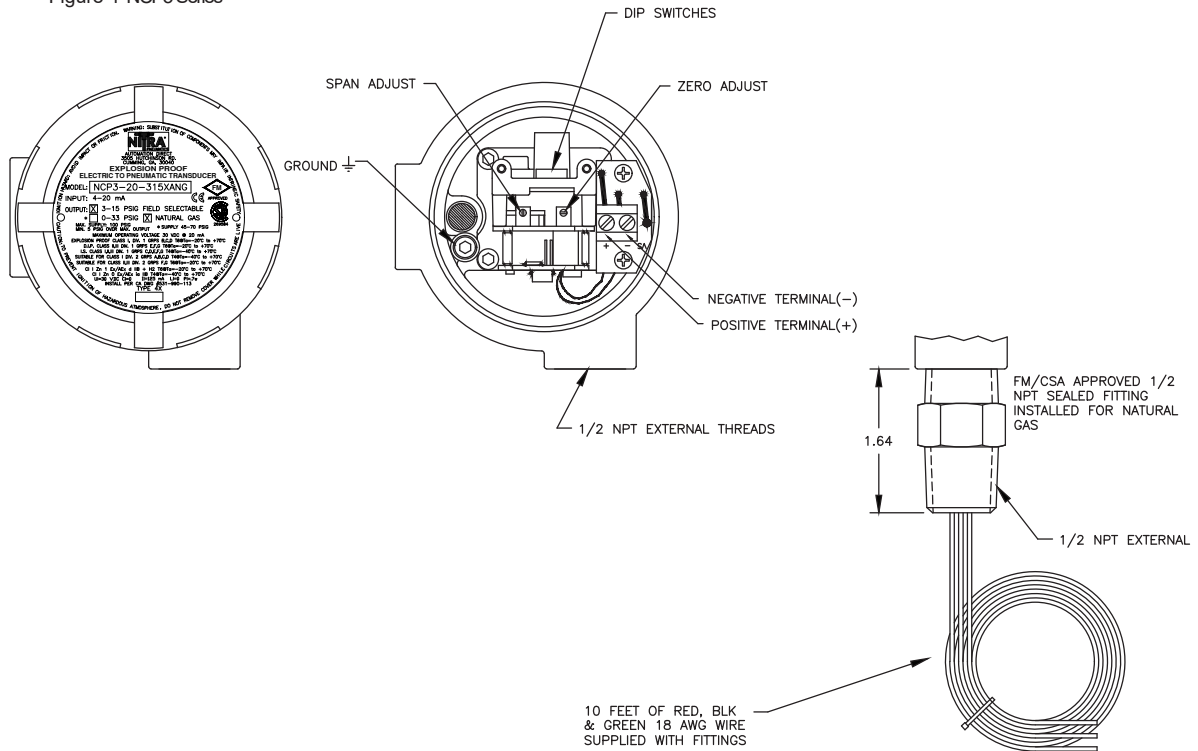
1.4.3 It is recommended that shielded cable be used and that the shield be grounded at the unit (ground screw provided) and to earth ground.

CAUTION Do not apply electrical input for extended periods without supply air pressure being present.

NOTE Observe polarity. Reverse polarity will not damage the unit, but unit will not operate.

CAUTION Conduit should be connected to prevent condensation from collecting in the unit.

Figure 1 NCP3 Series



1.5 Factory Mutual Research Corporation (FM) and Canadian Standards Association (CSA)



Intrinsically Safe

Class I, Division 1, Groups C & D
Class II, Division 1, Groups E, F, & G
Class III, Division 1, Fibers
Enclosure Nema 4X(IP65)
Rated 4-20 mA, 30 VDC Max.
Temp. Code T4

Explosion Proof

Class I, Division 1 & 2, Groups B, C & D
Enclosure Nema 4X (IP65)
Temp. Code T6

Dust Ignition Proof

Class II & III, Division 1, Groups E, F & G
Enclosure Nema 4X(IP65)
Temp. Code T6

Non-Incendive

Class I, Division 2, Groups A, B, C & D Temp. Code T4
Class II, Division 2, Groups F & G
Class III, Division 2, Fibers
Enclosure Nema 4X(IP65)
Temp. Code T6

Entity Parameters

$V_{max} = 30 \text{ VDC}$ $C_i = 0 \text{ uF}$
 $I_{max} = 125 \text{ mA}$ $L_i = 0 \text{ mH}$

Entity Installation Requirements

$V_{max} \geq V_t \text{ OR } V_{oc}$
 $I_{max} \geq I_t \text{ OR } I_{sc}$
 $C_a \geq C_i + C_{cable}$
 $L_a \geq L_i + L_{cable}$

Note: Cable capacitance and inductance must be considered when connecting to pressure transducer.

2. OPERATION

2.1 Calibration

- 2.1.1 All units are shipped from the factory calibrated, direct acting. If the user requires a different mode of operation (i.e. reverse acting, split range) it is necessary to reposition internal electrical dip switches located on the circuit board (see figure 1) as indicated below in Figure 3.
- 2.1.2 Though the units are factory calibrated for direct acting operation it is suggested that the user check the calibration to ensure that settings and operation match the application requirements.

NOTE It is not necessary to remove the plastic cover of the unit for calibration if the Direct Acting mode is desired.

NOTE Repeated cycling of supply pressure may cause increased leakage and premature product failure.

2.2 Direct Acting Calibration

- 2.2.1 In direct acting operation the unit is calibrated so that minimum input signal corresponds to minimum output pressure and increasing input signal results in increasing output pressure.
- 2.2.2 Connect the electrical input and set the input signal to 4mA.
- 2.2.3 Observe the output pressure. If necessary, adjust the zero screw until reaching minimum output pressure setting. Turn zero screw clockwise to decrease and counter clockwise to increase.
- 2.2.4 Increase electrical input signal to 20mA.
- 2.2.5 Observe the output pressure. If necessary, adjust the span screw until reaching maximum output pressure setting.
- 2.2.6 After setting the span it will be necessary to recheck the zero. Repeat steps 2-5 until both end points are at required values.

Figure 3 Direct Acting Switch Settings

SWITCH	1	2	3	4	5	6	7	8	9	10	11	12
ON												
OFF												

2.3 Reverse Acting Calibration

- 2.3.1 When calibrating to operate in the reverse acting mode the minimum input signal produces the maximum output pressure and increasing the input signal results in decreasing the output pressure. Setting the unit to operate in the reverse acting mode is accomplished by positioning internal electrical dip switches located on the circuit board (see figure 1).

CAUTION Do not touch any components on circuit board except dip switches.

CAUTION Do not reverse the input leads. Damage may occur.

CAUTION Transducer fails in direct mode regardless of operating mode selected.

- 2.3.2 Access circuit board by first removing the die cast cover of the unit. Then remove plastic cover by taking out two screws.
- 2.3.3 Position the dip switches as illustrated in Figure 4. Replace both covers.
- 2.3.4 Set the input signal to the minimum value being used. Turn the zero screw to set the maximum output pressure. Turn screw clockwise to decrease and counter clockwise to increase.

NOTE In reverse acting mode, the effect of turning the span screw is the opposite of direct acting mode.

- 2.3.5 Set the span by applying the maximum input signal. Turn the span screw to set the minimum output pressure. Turn screw counter clockwise to decrease and clockwise to increase.
- 2.3.6 It may be necessary to repeat steps 4-5 until both end points are at desired values.
- 2.3.7 Replace both covers by reversing procedure of step 2.3.2.

NOTE Switches not shown match Direct Acting Settings (see figure 3).

Figure 4 Reverse Acting Switch Settings

SWITCH	3	4	5	6	7	10
ON						
OFF						

2.4 Split Range Calibration

NOTE Units with field selectable option can not be split ranged.

CAUTION Do not touch any components on circuit board except dip switches.

- 2.4.1 When calibrated to operate in the split range mode a full input signal (i.e. 4-20mA) will operate the unit at one half the normal output span (i.e. 3-9 psig, 9-15 psig). Setting the unit to operate in the split range mode is accomplished by positioning internal electrical dip switches.
- 2.4.2 Access circuit board by first removing the die cast cover of the unit. Then remove plastic cover by taking out two screws.
- 2.4.3 Position switches as illustrated in Figure 5.
- 2.4.4 Replace both covers by reversing procedure of step 2.4.2.
- 2.4.5 After replacing covers, refer to the appropriate calibration procedure (Direct Acting or Reverse Acting) to get to desired output range (i.e. 3-9 psig, 9-15 psig).

NOTE Switches not shown match Direct Acting Settings (see figure 3).

Figure 5 Split Range Switch Settings

SWITCH	1	2
ON	☒	☒
OFF	☐	☐

2.5 Field Selectable Calibration (Optional)

NOTE Units with field selectable option can not be split ranged.

CAUTION Do not touch any components on circuit board except dip switches.

- 2.5.1 Unit is shipped calibrated and labeled as ordered. Changing the unit to operate in a different range is accomplished by positioning internal dip switches.
- 2.5.2 Access circuit board by first removing the die cast cover of the unit. Then remove plastic cover by taking out two screws.
- 2.5.3 Position switches as illustrated in Figure 6 to reach desired output range.
- 2.5.4 Replace both covers by reversing procedure of step 2.5.2.
- 2.5.5 After replacing covers, refer to the appropriate calibration procedure (Direct Acting or Reverse Acting) to get to desired output range (i.e. 3-15 psig, 3-27 psig or 6-30 psig).

NOTE Switches not shown match Direct Acting Settings (see figure 3).

Figure 6 Field Select Switch Settings

Field Select - High (3-27 psig and 6-30 psig)		
SWITCH	1	2
ON	☐	☐
OFF	☒	☒
Field Select - Low (3-15 psig)		
SWITCH	1	2
ON	☒	☒
OFF	☐	☐

3. MAINTENANCE

NOTE Under normal circumstances, no maintenance should be required.

3.1 Instrument Air Filtration

- 3.1.1 Failures due to instrument supply air contamination are not covered by warranty.
- 3.1.2 Use of oil and/or water saturated instrument air can cause erratic operation.
- 3.1.3 Poor quality instrument air can result in unit failure. It is recommended that a filter regulator be placed upstream of each unit where oil and/or water laden instrument air is suspected.
- 3.1.4 If clean, dry air is not used the orifice can become blocked. To clean, first turn off supply air, then remove the screw located on the side of the unit above the "out" port. Unplug the orifice using a wire that has a smaller diameter than 0.012" (0.30mm). Replace screw tightly into unit.

4. TROUBLESHOOTING

PROBLEM	LOOK FOR	SOLUTION
Sluggish performance	Blocked orifice	Clean external orifice (3.1.4)
Output won't go above 0	No air input	Check Instrument air supply (1.1.3)
Output stays below 3 psi with increase of input	Input leads reversed Bad electrical connection	Reverse input leads (1.4.2) Check input wiring (1.4.2)
Unit will not go full scale with full-scale input	Insufficient supply pressure Leak in connections	Increase supply pressure (1.1.3) Check connections (1.3.1)

NOTE If problems are not solved by troubleshooting procedures, please contact AutomationDirect Technical Support for further assistance.

5. WARRANTY & DISCLAIMER

WARNING These products are intended for use in industrial compressed-air systems only. Do not use these products where pressures and temperatures can exceed those listed under Specifications. Not for oxygen service.