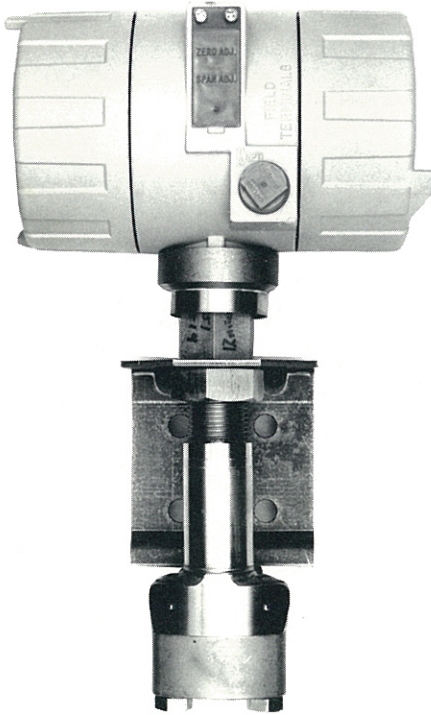
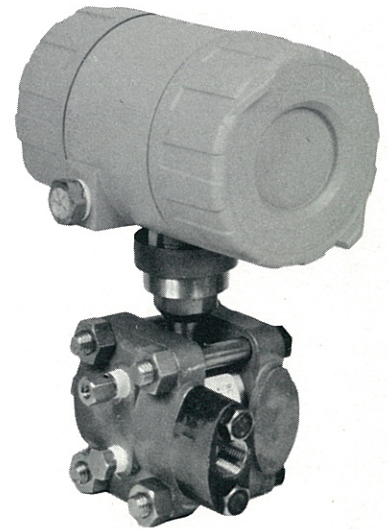


## Smart Electronic Pressure Transmitter TYPE BCN2/3/4/5/6



High Range  
Gage Pressure  
BCN 58/59

A0241



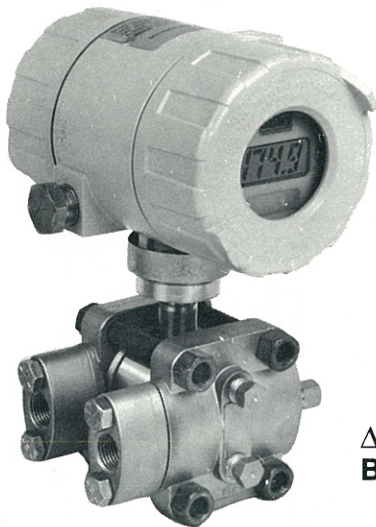
A9244

Gage/Absolute  
Pressure  
BCN 5/6



STT02  
Communication  
Terminal

A0580



$\Delta$  Pressure/Flow  
BCN 2/3/4

A9003



A0212

High Range  
Gage/Absolute  
Pressure  
BCN 5/6

**WARNING** notices as used in this manual apply to hazards or unsafe practices which could result in personal injury or death.

**CAUTION** notices apply to hazards or unsafe practices which could result in property damage.

**NOTES** highlight procedures and contain information which assist the operator in understanding the information contained in this manual.

## WARNING

### INSTRUCTION MANUALS

DO NOT INSTALL, MAINTAIN OR OPERATE THIS EQUIPMENT WITHOUT READING, UNDERSTANDING AND FOLLOWING THE PROPER **Bailey Controls** INSTRUCTIONS AND MANUALS, OTHERWISE INJURY OR DAMAGE MAY RESULT.

### RADIO FREQUENCY INTERFERENCE

MOST ELECTRONIC EQUIPMENT IS INFLUENCED BY RADIO FREQUENCY INTERFERENCE (RFI). CAUTION SHOULD BE EXERCISED WITH REGARD TO THE USE OF PORTABLE COMMUNICATIONS EQUIPMENT IN THE AREA AROUND SUCH EQUIPMENT. PRUDENT PRACTICE DICTATES THAT SIGNS SHOULD BE POSTED IN THE VICINITY OF THE EQUIPMENT CAUTIONING AGAINST THE USE OF PORTABLE COMMUNICATIONS EQUIPMENT.

### POSSIBLE PROCESS UPSETS

MAINTENANCE MUST BE PERFORMED ONLY BY QUALIFIED PERSONNEL AND ONLY AFTER SECURING EQUIPMENT CONTROLLED BY THIS PRODUCT. ADJUSTING OR REMOVING THIS PRODUCT WHILE IT IS IN THE SYSTEM MAY UPSET THE PROCESS BEING CONTROLLED. SOME PROCESS UPSETS MAY CAUSE INJURY OR DAMAGE.

## AVERTISSEMENT

### MANUELS D'OPERATION

NE PAS METTRE EN PLACE, REPARER OU FAIRE FONCTIONNER CE MATERIEL SANS AVIORS LU, COMPRIS ET SUIVI LES INSTRUCTIONS REGLIMENTAIRES DE **Bailey Controls** TOUTE NEGLIGENCE A CET EGARD POURRAIT ETRE UNE CAUSE D'ACCIDENT OU DE DEFAILLANCE DU MATERIEL.

### PERTURBATIONS DE LA FREQUENCE RADIOPHONIQUE

LA PLUPART DES EQUIPEMENTS ELECTRONIQUES SONT SENSIBLES AUX PERTURBATIONS DE LA FREQUENCE RADIO. DES PRECAUTIONS DEVRONT ETRE PRISES LORS DE L'UTILISATION DE MATERIEL DE COMMUNICATION PORTATIF. LA PRUDENCE EXIGE QUE LES PRECAUTIONS A PRENDRE DANS CE CAS SOIENT SIGNALÉES AUX ENDROITS VOULUS DANS VOTRE USINE.

### PERTES PROCEDE RENVERSEMENTS

L'ENTRETIEN DOIT ETRE ASSURE PAR UN PERSONNEL QUALIFIE ET EN CONSIDERATION DE L'ASPECT SECURITAIRE DES EQUIPEMENTS CONTROLÉS PAR CE PRODUIT. L'ADJUSTEMENT ET/OU L'EXTRACTION DE CE PRODUIT LORSQU'IL EST INSERE A UN SYSTEME ACTIF PEUT OCCASIONNER DES A-COUPS AU PROCEDE CONTROLÉ. SUR CERTAINS PROCEDES, CES A-COUPS PEUVENT EGALEMENT OCCASIONNER DES DOMMAGES OU BLESSURES.

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# Preface

## PURPOSE

This Publication is for the use of technical personnel responsible for installation, operation, and maintenance of the Bailey Type BCN2/3/4, BCN53/54/55/56/57/58/59, and BCN6 Smart Electronic Pressure Transmitters.

## ASSOCIATED DOCUMENTS

Type STT02 Smart Transmitter Terminal, Product Instruction I-E21-28

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## Safety Summary

### GENERAL WARNINGS

#### HAZARDOUS LOCATIONS

The equipment used herein may be used only in those classes of hazardous locations identified on the nameplate.

L'équipement décrit par cette notice ne peut être installé que dans les emplacements spécifiés sur la plaque signalétique de l'appareil.

#### NAMEPLATE RATINGS

Do not at any time exceed the ratings listed on the nameplate. (Page 3-1)

On ne doit en aucune circonstance dépasser les valeurs nominales figurant sur la plaque d'identification. (Page 3-1)

#### SYSTEM MAINTENANCE

System maintenance must be performed by qualified personnel and only after securing equipment controlled by the circuit. Altering or removing components from an active circuit may upset the process being controlled. (Page 7-1)

L'entretien du système doit être effectué par des personnes compétentes et uniquement à partir du moment où les éléments contrôlés par le circuit ont été isolés. Le fait d'enlever ou d'ajouter des composants d'un circuit sous tension peut perturber le processus contrôlé. (Page 7-1)

#### SUBSTITUTION OF COMPONENTS

Substitution of components may impair suitability for use in hazardous locations. (Page A-1)

La substitution de composants peut rendre l'émetteur inadéquat à l'utilisation dans un environnement dangereux. (Page A-1)

### SPECIFIC WARNINGS and CAUTIONS

#### WARNING

Any recognized corrosive properties of the fluid to be measured must be considered when selecting piping materials. (Page 3-5)

The output of this equipment changes to a fixed value during start-up and transmitter detected failure conditions. These values must be selected by the user to ensure safe operation. (Page 5-2)

Disconnecting/reconnecting wiring or repairing the transmitter is not considered normal operation. These operations should only be done if power has been removed from all wiring or if the flammable atmosphere is known not to be present. (Page A-1)

Intrinsic safety is dependent upon the components used in the transmitter. Any substitution of components may impair the intrinsic safety. (Page A-4)

Explosion proof/dust-ignition proof installation and intrinsically safe installations in Class II or III hazardous locations require that the assembly be kept tight while circuits are live unless the location is known to be non-hazardous at the time. (Page A-4)



## CAUTION

Do not remove or force amplifier assembly completely out of housing. This will cause damage to pin connectors at P1, P2 and the sensor lead connector. (Page 8-2)

Extreme care should be used when unscrewing the transducer assembly from the amplifier housing to avoid damaging the sensor leads. (Page 8-4)

## AVERTISSEMENT

la sortie de cet appareil adopte une valeurs fixes doivent etre selectionnees par l'utilisateur pour assurer une securite d'operation lorsquelles surviennent. (Page 3-5)

Les proprietees corrosives des fluides doivent etre considerees au moment de la selection de la tuyauterie. (Page 5-2)

Le debranchement ou le rebranchement des fils ainsi que la reparation du transmetteur n'entrent pas dans les procedures normales. Si l'atmosphere est inflammable, on ne doit effectuer les etapes ci-dessus que si l'alimentation a ete interrompue. (Page A-1)

La securite intrinseque depend des composantes utilisees dans l'emetteur. Toute substitution de composante pourrait nuire a cette securite intrinseque. (Page A-4)

En ce qui concerne les installations de securite intrinseque dans des endroite se Classe II ou III et l'installation anti-explosion et anti-ignition provoquee par la poussiere, il est indispensable que l'assemblage soit tenu etanche pendant que les circuits sont electises, a moins que cet endroit ne presente aucun danger a ce moment-la. (Page A-4)

## ATTENTION

Prendre les precautions qui s'imposent au moment de devisser le transmetteur du boitier de l'amplificateur afin d'eviter d'endommager les fils de la sonde. (Page 8-2)

Nes pas retirer completement l'assemblage des composants de son boitier. Ceci endommagerait les broches et les connexion P1 et P2 ainsi que le connecteur des fils de la sonde. (Page 8-4)



## Introduction

### INTRODUCTION

This Product Instruction is intended to assist personnel with operation, calibration, troubleshooting and maintenance procedures for the Bailey Type BCN2/3/4, BCN53/54/55/56/57/58/59, and BCN6 Smart Electronic Transmitter.

### EQUIPMENT DESCRIPTION

The Bailey Type BCN Smart Electronic Transmitter measures pressure and may be user-configured to provide a poled digital process variable signal (Field Bus Mode) or a 4 to 20 mA process variable signal (Point-to-Point Mode). The electronics package uses the latest microcomputer technology, allowing the user to calibrate and troubleshoot the transmitter from either a local or remote location.

The Bailey Type STT02 Smart Transmitter Terminal can communicate with the Smart Transmitter. Configuration, readout, and other interactions with the transmitter operate by this communication method. An optional Liquid Crystal Display is also available when local transmitter output indication is necessary.

### EQUIPMENT APPLICATION

The BCN Electronic Pressure Transmitter is designed to measure liquid, gas or vapor pressures.

### INSTRUCTION CONTENT

This document includes the following sections.

**Introduction** – This section provides a description of this Instruction Manual; its sections and their uses, along with a brief description of the BCN Transmitter. Also included in this section are instructions on how to use this document, Glossary of Terms and Abbreviations, Product Nomenclature and Specifications.

**Description and Operation** – Describes the operation of principle components of the BCN Transmitter. Also

covered in this section are communication techniques and the diagnostic capabilities afforded to the user.

**Installation** – This section gives information on the various tasks associated with the installation of the transmitter. Procedures detailed here are: unpacking, location considerations, physical installation, piping suggestions and wiring diagrams.

**Calibration** – Identifies the calibration status of the unit and provides calibration check procedures. This section also explains temperature compensation of the BCN, including a temperature compensation example.

**Operating Procedures** – This section addresses start-up procedures, configuration of the BCN (using STT02), and the procedures that make the unit operational.

**Troubleshooting** – This area of instruction gives the user steps that aid in solving operating difficulties that can occur. Tables are provided that list corrective actions as they relate to error messages. Also included is a troubleshooting flow chart.

**Maintenance** – Includes maintenance information as it pertains to the BCN Pressure Transmitters.

**Repair/Replacement** – This section covers procedures involved in replacing components of the Type BCN Transmitter and steps used to check component status.

### HOW TO USE THIS MANUAL

It is important for safety and operating reasons, that this product instruction be read and understood completely before installing or completing any task associated with operation.

The sections of this instruction book are sequentially arranged as they relate to initial startup; from **Unpacking** to **Repair/Replacement** procedures. After initial startup is complete and successful, the instruction may then be referred to as needed by section.

# Introduction

---

## GLOSSARY OF TERMS AND ABBREVIATIONS

|                            |  |
|----------------------------|--|
| <b>ANSI</b>                | American National Standards Institute.   |
| <b>EEPROM</b>              | Electrically Erasable Programmable Read Only Memory. A type of non-volatile memory that is programmed and erased electrically. |
| <b>EPROM</b>               | Erasable Programmable Read Only Memory. This memory holds the microcomputers operating program.                                |
| <b>Final Installation</b>  | The final position or plane in which the transmitter will be in during operation.  |
| <b>Non-volatile Memory</b> | Memory that retains programmed information; such as configuration and calibration parameters, even when power is removed.      |
| <b>Sediment</b>            | A solid material deposit that settles in a liquid or gas. Such deposits can cause blockage.                                    |
| <b>Transducer</b>          | A device that takes an input, such as pressure, and converts the output into some other form, such as voltage.                 |

## Nomenclature

### TYPE BCN2/3/4/5/6 SMART ELECTRONIC PRESSURE TRANSMITTER

| Pos.   | 4  | 5                        | 6                        | 7                        | 8                        | 9                               | 10                       | 11                       |                          |                        |      |                                 |         |                                   |                        |                                   |                        |               |                      |               |                   |                    |              |                 |              |                 |              |                      |  |  |  |         |         |  |        |      |             |            |                         |                         |               |   |     |     |      |      |      |                              |   |     |      |      |      |      |                          |  |     |      |     |      |      |                       |   |       |       |       |      |      |                            |  |       |      |      |      |      |                          |   |     |     |     |      |      |                            |  |     |      |      |      |      |                          |   |     |     |     |     |      |                              |   |     |     |     |     |           |                                 |   |       |       |       |       |           |                      |   |     |     |     |     |           |                      |   |      |      |      |      |           |                           |
|--|--|--------------------------|--------------------------|--------------------------|--------------------------|---------------------------------|--------------------------|--------------------------|--------------------------|------------------------|------|---------------------------------|---------|-----------------------------------|------------------------|-----------------------------------|------------------------|---------------|----------------------|---------------|-------------------|--------------------|--------------|-----------------|--------------|-----------------|--------------|----------------------|--|--|--|---------|---------|--|--------|------|-------------|------------|-------------------------|-------------------------|---------------|---|-----|-----|------|------|------|------------------------------|---|-----|------|------|------|------|--------------------------|--|-----|------|-----|------|------|-----------------------|---|-------|-------|-------|------|------|----------------------------|--|-------|------|------|------|------|--------------------------|---|-----|-----|-----|------|------|----------------------------|--|-----|------|------|------|------|--------------------------|---|-----|-----|-----|-----|------|------------------------------|---|-----|-----|-----|-----|-----------|---------------------------------|---|-------|-------|-------|-------|-----------|----------------------|---|-----|-----|-----|-----|-----------|----------------------|---|------|------|------|------|-----------|---------------------------|
| BCN  | <input type="checkbox"/>   | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>        | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |                        |      |                                 |         |                                   |                        |                                   |                        |               |                      |               |                   |                    |              |                 |              |                 |              |                      |  |  |  |         |         |  |        |      |             |            |                         |                         |               |   |     |     |      |      |      |                              |   |     |      |      |      |      |                          |  |     |      |     |      |      |                       |   |       |       |       |      |      |                            |  |       |      |      |      |      |                          |   |     |     |     |      |      |                            |  |     |      |      |      |      |                          |   |     |     |     |     |      |                              |   |     |     |     |     |           |                                 |   |       |       |       |       |           |                      |   |     |     |     |     |           |                      |   |      |      |      |      |           |                           |
| <b>SMART ELECTRONIC PRESSURE TRANSMITTER BCN2 through BCN6</b> |  |                          |                          |                          |                          |                                 |                          |                          |                          |                        |      |                                 |         |                                   |                        |                                   |                        |               |                      |               |                   |                    |              |                 |              |                 |              |                      |  |  |  |         |         |  |        |      |             |            |                         |                         |               |   |     |     |      |      |      |                              |   |     |      |      |      |      |                          |  |     |      |     |      |      |                       |   |       |       |       |      |      |                            |  |       |      |      |      |      |                          |   |     |     |     |      |      |                            |  |     |      |      |      |      |                          |   |     |     |     |     |      |                              |   |     |     |     |     |           |                                 |   |       |       |       |       |           |                      |   |     |     |     |     |           |                      |   |      |      |      |      |           |                           |
| 2  | <div style="display: flex; justify-content: space-between;"> <span>Pg. 1-4</span> <span>TYPE</span> </div> <p>Medium Range (3600 psi maximum static pressure)<br/>                     High Range (2000 psi maximum static pressure) BCN38 or<br/>                     (3600 psi maximum static pressure) BCN36, 37</p> <p><b>High Static Pressure (6000 psi maximum static pressure)</b><br/>                     Gage Pressure<br/>                     Absolute Pressure</p> <table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">SPAN (min to max span)</th> <th style="text-align: left;">TYPE</th> </tr> </thead> <tbody> <tr> <td>3 to 30 inches H<sub>2</sub>O</td> <td>BCN2, 5</td> </tr> <tr> <td>20 to 200 inches H<sub>2</sub>O</td> <td>BCN2, 4, 5, 6 (Medium)</td> </tr> <tr> <td>75 to 750 inches H<sub>2</sub>O</td> <td>BCN2, 4, 5, 6 (Medium)</td> </tr> <tr> <td>10 to 100 psi</td> <td>BCN3, 4, 5, 6 (High)</td> </tr> <tr> <td>30 to 300 psi</td> <td>BCN3, 5, 6 (High)</td> </tr> <tr> <td>150 to 1500 psi or</td> <td>BCN38 (High)</td> </tr> <tr> <td>250 to 2500 psi</td> <td>BCN58 (High)</td> </tr> <tr> <td>600 to 6000 psi</td> <td>BCN59 (High)</td> </tr> </tbody> </table> <p><b>DIAPHRAGM/TRIM MATERIAL (NOTE 1)</b><br/>                     316L Stainless Steel (BCN2, 3, 4, 53-57, BCN6)<br/>                     Hastelloy C-276 (BCN2, 3, 4, 53-57, BCN6)<br/>                     Monel 400 (BCN2, 53-57, BCN6)<br/>                     17-4PH Stainless Steel (Required for BCN58 or 59 only)</p> <p><b>FILL FLUID</b><br/>                     None (BCN58/59 only)<br/>                     Silicone Fluid<br/>                     Fluorinated Oil</p> <p><b>MATERIAL</b></p> <table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr> <th colspan="4">HI-SIDE &amp;/OR LO-SIDE</th> <th>HI-SIDE</th> <th>LO-SIDE</th> <th></th> </tr> <tr> <th>FLANGE</th> <th>VENT</th> <th>ADAPTER KIT</th> <th>DRAIN PLUG</th> <th>REMOTE SEAL CAP/ FLANGE</th> <th>REMOTE SEAL CAP/ FLANGE</th> <th>(Notes 1 &amp; 2)</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>316</td> <td>316</td> <td>None</td> <td>None</td> <td>None</td> <td>(for BCN2-4, 53-55, 64 &amp; 65)</td> </tr> <tr> <td>1</td> <td>316</td> <td>None</td> <td>None</td> <td>None</td> <td>None</td> <td>(for BCN56, 57, 66 &amp; 67)</td> </tr> <tr> <td></td> <td>316</td> <td>None</td> <td>316</td> <td>None</td> <td>None</td> <td>(for BCN58 and BCN59)</td> </tr> <tr> <td>3</td> <td>C-276</td> <td>C-276</td> <td>C-276</td> <td>None</td> <td>None</td> <td>(for BCN2, 53-55, 64 &amp; 65)</td> </tr> <tr> <td></td> <td>C-276</td> <td>None</td> <td>None</td> <td>None</td> <td>None</td> <td>(for BCN56, 57, 66 &amp; 67)</td> </tr> <tr> <td>4</td> <td>400</td> <td>400</td> <td>400</td> <td>None</td> <td>None</td> <td>(for BCN2, 53-55, 64 &amp; 65)</td> </tr> <tr> <td></td> <td>400</td> <td>None</td> <td>None</td> <td>None</td> <td>None</td> <td>(for BCN56, 57, 66 &amp; 67)</td> </tr> <tr> <td>5</td> <td>316</td> <td>316</td> <td>316</td> <td>316</td> <td>None</td> <td>(for BCN2-4, 53-55, 64 &amp; 65)</td> </tr> <tr> <td>6</td> <td>316</td> <td>316</td> <td>316</td> <td>316</td> <td>Stainless</td> <td>None (for BCN2, 53-55, 64 &amp; 65)</td> </tr> <tr> <td>7</td> <td>C-276</td> <td>C-276</td> <td>C-276</td> <td>C-276</td> <td>Stainless</td> <td>None (for BCN2 only)</td> </tr> <tr> <td>8</td> <td>400</td> <td>400</td> <td>400</td> <td>400</td> <td>Stainless</td> <td>None (for BCN2 only)</td> </tr> <tr> <td>9</td> <td>None</td> <td>None</td> <td>None</td> <td>None</td> <td>Stainless</td> <td>Stainless (for BCN2 only)</td> </tr> </tbody> </table> <p>316 = 316 Stainless, C-276 = C-276 Hastelloy, 400 = 400 Monel</p> |                          |                          |                          |                          |                                 |                          |                          |                          | SPAN (min to max span) | TYPE | 3 to 30 inches H <sub>2</sub> O | BCN2, 5 | 20 to 200 inches H <sub>2</sub> O | BCN2, 4, 5, 6 (Medium) | 75 to 750 inches H <sub>2</sub> O | BCN2, 4, 5, 6 (Medium) | 10 to 100 psi | BCN3, 4, 5, 6 (High) | 30 to 300 psi | BCN3, 5, 6 (High) | 150 to 1500 psi or | BCN38 (High) | 250 to 2500 psi | BCN58 (High) | 600 to 6000 psi | BCN59 (High) | HI-SIDE &/OR LO-SIDE |  |  |  | HI-SIDE | LO-SIDE |  | FLANGE | VENT | ADAPTER KIT | DRAIN PLUG | REMOTE SEAL CAP/ FLANGE | REMOTE SEAL CAP/ FLANGE | (Notes 1 & 2) | 0 | 316 | 316 | None | None | None | (for BCN2-4, 53-55, 64 & 65) | 1 | 316 | None | None | None | None | (for BCN56, 57, 66 & 67) |  | 316 | None | 316 | None | None | (for BCN58 and BCN59) | 3 | C-276 | C-276 | C-276 | None | None | (for BCN2, 53-55, 64 & 65) |  | C-276 | None | None | None | None | (for BCN56, 57, 66 & 67) | 4 | 400 | 400 | 400 | None | None | (for BCN2, 53-55, 64 & 65) |  | 400 | None | None | None | None | (for BCN56, 57, 66 & 67) | 5 | 316 | 316 | 316 | 316 | None | (for BCN2-4, 53-55, 64 & 65) | 6 | 316 | 316 | 316 | 316 | Stainless | None (for BCN2, 53-55, 64 & 65) | 7 | C-276 | C-276 | C-276 | C-276 | Stainless | None (for BCN2 only) | 8 | 400 | 400 | 400 | 400 | Stainless | None (for BCN2 only) | 9 | None | None | None | None | Stainless | Stainless (for BCN2 only) |
| SPAN (min to max span)   |  |                          |                          |                          |                          |                                 |                          |                          |                          | TYPE                   |      |                                 |         |                                   |                        |                                   |                        |               |                      |               |                   |                    |              |                 |              |                 |              |                      |  |  |  |         |         |  |        |      |             |            |                         |                         |               |   |     |     |      |      |      |                              |   |     |      |      |      |      |                          |  |     |      |     |      |      |                       |   |       |       |       |      |      |                            |  |       |      |      |      |      |                          |   |     |     |     |      |      |                            |  |     |      |      |      |      |                          |   |     |     |     |     |      |                              |   |     |     |     |     |           |                                 |   |       |       |       |       |           |                      |   |     |     |     |     |           |                      |   |      |      |      |      |           |                           |
| 3 to 30 inches H <sub>2</sub> O                                |  |                          |                          |                          |                          |                                 |                          |                          |                          | BCN2, 5                |      |                                 |         |                                   |                        |                                   |                        |               |                      |               |                   |                    |              |                 |              |                 |              |                      |  |  |  |         |         |  |        |      |             |            |                         |                         |               |   |     |     |      |      |      |                              |   |     |      |      |      |      |                          |  |     |      |     |      |      |                       |   |       |       |       |      |      |                            |  |       |      |      |      |      |                          |   |     |     |     |      |      |                            |  |     |      |      |      |      |                          |   |     |     |     |     |      |                              |   |     |     |     |     |           |                                 |   |       |       |       |       |           |                      |   |     |     |     |     |           |                      |   |      |      |      |      |           |                           |
| 20 to 200 inches H <sub>2</sub> O                              |  |                          |                          |                          |                          |                                 |                          |                          |                          | BCN2, 4, 5, 6 (Medium) |      |                                 |         |                                   |                        |                                   |                        |               |                      |               |                   |                    |              |                 |              |                 |              |                      |  |  |  |         |         |  |        |      |             |            |                         |                         |               |   |     |     |      |      |      |                              |   |     |      |      |      |      |                          |  |     |      |     |      |      |                       |   |       |       |       |      |      |                            |  |       |      |      |      |      |                          |   |     |     |     |      |      |                            |  |     |      |      |      |      |                          |   |     |     |     |     |      |                              |   |     |     |     |     |           |                                 |   |       |       |       |       |           |                      |   |     |     |     |     |           |                      |   |      |      |      |      |           |                           |
| 75 to 750 inches H <sub>2</sub> O                              |  |                          |                          |                          |                          |                                 |                          |                          |                          | BCN2, 4, 5, 6 (Medium) |      |                                 |         |                                   |                        |                                   |                        |               |                      |               |                   |                    |              |                 |              |                 |              |                      |  |  |  |         |         |  |        |      |             |            |                         |                         |               |   |     |     |      |      |      |                              |   |     |      |      |      |      |                          |  |     |      |     |      |      |                       |   |       |       |       |      |      |                            |  |       |      |      |      |      |                          |   |     |     |     |      |      |                            |  |     |      |      |      |      |                          |   |     |     |     |     |      |                              |   |     |     |     |     |           |                                 |   |       |       |       |       |           |                      |   |     |     |     |     |           |                      |   |      |      |      |      |           |                           |
| 10 to 100 psi  |  |                          |                          |                          |                          |                                 |                          |                          |                          | BCN3, 4, 5, 6 (High)   |      |                                 |         |                                   |                        |                                   |                        |               |                      |               |                   |                    |              |                 |              |                 |              |                      |  |  |  |         |         |  |        |      |             |            |                         |                         |               |   |     |     |      |      |      |                              |   |     |      |      |      |      |                          |  |     |      |     |      |      |                       |   |       |       |       |      |      |                            |  |       |      |      |      |      |                          |   |     |     |     |      |      |                            |  |     |      |      |      |      |                          |   |     |     |     |     |      |                              |   |     |     |     |     |           |                                 |   |       |       |       |       |           |                      |   |     |     |     |     |           |                      |   |      |      |      |      |           |                           |
| 30 to 300 psi  |  |                          |                          |                          |                          |                                 |                          |                          |                          | BCN3, 5, 6 (High)      |      |                                 |         |                                   |                        |                                   |                        |               |                      |               |                   |                    |              |                 |              |                 |              |                      |  |  |  |         |         |  |        |      |             |            |                         |                         |               |   |     |     |      |      |      |                              |   |     |      |      |      |      |                          |  |     |      |     |      |      |                       |   |       |       |       |      |      |                            |  |       |      |      |      |      |                          |   |     |     |     |      |      |                            |  |     |      |      |      |      |                          |   |     |     |     |     |      |                              |   |     |     |     |     |           |                                 |   |       |       |       |       |           |                      |   |     |     |     |     |           |                      |   |      |      |      |      |           |                           |
| 150 to 1500 psi or   |  |                          |                          |                          |                          |                                 |                          |                          |                          | BCN38 (High)           |      |                                 |         |                                   |                        |                                   |                        |               |                      |               |                   |                    |              |                 |              |                 |              |                      |  |  |  |         |         |  |        |      |             |            |                         |                         |               |   |     |     |      |      |      |                              |   |     |      |      |      |      |                          |  |     |      |     |      |      |                       |   |       |       |       |      |      |                            |  |       |      |      |      |      |                          |   |     |     |     |      |      |                            |  |     |      |      |      |      |                          |   |     |     |     |     |      |                              |   |     |     |     |     |           |                                 |   |       |       |       |       |           |                      |   |     |     |     |     |           |                      |   |      |      |      |      |           |                           |
| 250 to 2500 psi  |  |                          |                          |                          |                          |                                 |                          |                          |                          | BCN58 (High)           |      |                                 |         |                                   |                        |                                   |                        |               |                      |               |                   |                    |              |                 |              |                 |              |                      |  |  |  |         |         |  |        |      |             |            |                         |                         |               |   |     |     |      |      |      |                              |   |     |      |      |      |      |                          |  |     |      |     |      |      |                       |   |       |       |       |      |      |                            |  |       |      |      |      |      |                          |   |     |     |     |      |      |                            |  |     |      |      |      |      |                          |   |     |     |     |     |      |                              |   |     |     |     |     |           |                                 |   |       |       |       |       |           |                      |   |     |     |     |     |           |                      |   |      |      |      |      |           |                           |
| 600 to 6000 psi  |  |                          |                          |                          |                          |                                 |                          |                          |                          | BCN59 (High)           |      |                                 |         |                                   |                        |                                   |                        |               |                      |               |                   |                    |              |                 |              |                 |              |                      |  |  |  |         |         |  |        |      |             |            |                         |                         |               |   |     |     |      |      |      |                              |   |     |      |      |      |      |                          |  |     |      |     |      |      |                       |   |       |       |       |      |      |                            |  |       |      |      |      |      |                          |   |     |     |     |      |      |                            |  |     |      |      |      |      |                          |   |     |     |     |     |      |                              |   |     |     |     |     |           |                                 |   |       |       |       |       |           |                      |   |     |     |     |     |           |                      |   |      |      |      |      |           |                           |
| HI-SIDE &/OR LO-SIDE   |  |                          |                          | HI-SIDE                  | LO-SIDE                  |                                 |                          |                          |                          |                        |      |                                 |         |                                   |                        |                                   |                        |               |                      |               |                   |                    |              |                 |              |                 |              |                      |  |  |  |         |         |  |        |      |             |            |                         |                         |               |   |     |     |      |      |      |                              |   |     |      |      |      |      |                          |  |     |      |     |      |      |                       |   |       |       |       |      |      |                            |  |       |      |      |      |      |                          |   |     |     |     |      |      |                            |  |     |      |      |      |      |                          |   |     |     |     |     |      |                              |   |     |     |     |     |           |                                 |   |       |       |       |       |           |                      |   |     |     |     |     |           |                      |   |      |      |      |      |           |                           |
| FLANGE   | VENT   | ADAPTER KIT              | DRAIN PLUG               | REMOTE SEAL CAP/ FLANGE  | REMOTE SEAL CAP/ FLANGE  | (Notes 1 & 2)                   |                          |                          |                          |                        |      |                                 |         |                                   |                        |                                   |                        |               |                      |               |                   |                    |              |                 |              |                 |              |                      |  |  |  |         |         |  |        |      |             |            |                         |                         |               |   |     |     |      |      |      |                              |   |     |      |      |      |      |                          |  |     |      |     |      |      |                       |   |       |       |       |      |      |                            |  |       |      |      |      |      |                          |   |     |     |     |      |      |                            |  |     |      |      |      |      |                          |   |     |     |     |     |      |                              |   |     |     |     |     |           |                                 |   |       |       |       |       |           |                      |   |     |     |     |     |           |                      |   |      |      |      |      |           |                           |
| 0  | 316  | 316                      | None                     | None                     | None                     | (for BCN2-4, 53-55, 64 & 65)    |                          |                          |                          |                        |      |                                 |         |                                   |                        |                                   |                        |               |                      |               |                   |                    |              |                 |              |                 |              |                      |  |  |  |         |         |  |        |      |             |            |                         |                         |               |   |     |     |      |      |      |                              |   |     |      |      |      |      |                          |  |     |      |     |      |      |                       |   |       |       |       |      |      |                            |  |       |      |      |      |      |                          |   |     |     |     |      |      |                            |  |     |      |      |      |      |                          |   |     |     |     |     |      |                              |   |     |     |     |     |           |                                 |   |       |       |       |       |           |                      |   |     |     |     |     |           |                      |   |      |      |      |      |           |                           |
| 1  | 316  | None                     | None                     | None                     | None                     | (for BCN56, 57, 66 & 67)        |                          |                          |                          |                        |      |                                 |         |                                   |                        |                                   |                        |               |                      |               |                   |                    |              |                 |              |                 |              |                      |  |  |  |         |         |  |        |      |             |            |                         |                         |               |   |     |     |      |      |      |                              |   |     |      |      |      |      |                          |  |     |      |     |      |      |                       |   |       |       |       |      |      |                            |  |       |      |      |      |      |                          |   |     |     |     |      |      |                            |  |     |      |      |      |      |                          |   |     |     |     |     |      |                              |   |     |     |     |     |           |                                 |   |       |       |       |       |           |                      |   |     |     |     |     |           |                      |   |      |      |      |      |           |                           |
|  | 316  | None                     | 316                      | None                     | None                     | (for BCN58 and BCN59)           |                          |                          |                          |                        |      |                                 |         |                                   |                        |                                   |                        |               |                      |               |                   |                    |              |                 |              |                 |              |                      |  |  |  |         |         |  |        |      |             |            |                         |                         |               |   |     |     |      |      |      |                              |   |     |      |      |      |      |                          |  |     |      |     |      |      |                       |   |       |       |       |      |      |                            |  |       |      |      |      |      |                          |   |     |     |     |      |      |                            |  |     |      |      |      |      |                          |   |     |     |     |     |      |                              |   |     |     |     |     |           |                                 |   |       |       |       |       |           |                      |   |     |     |     |     |           |                      |   |      |      |      |      |           |                           |
| 3  | C-276  | C-276                    | C-276                    | None                     | None                     | (for BCN2, 53-55, 64 & 65)      |                          |                          |                          |                        |      |                                 |         |                                   |                        |                                   |                        |               |                      |               |                   |                    |              |                 |              |                 |              |                      |  |  |  |         |         |  |        |      |             |            |                         |                         |               |   |     |     |      |      |      |                              |   |     |      |      |      |      |                          |  |     |      |     |      |      |                       |   |       |       |       |      |      |                            |  |       |      |      |      |      |                          |   |     |     |     |      |      |                            |  |     |      |      |      |      |                          |   |     |     |     |     |      |                              |   |     |     |     |     |           |                                 |   |       |       |       |       |           |                      |   |     |     |     |     |           |                      |   |      |      |      |      |           |                           |
|  | C-276  | None                     | None                     | None                     | None                     | (for BCN56, 57, 66 & 67)        |                          |                          |                          |                        |      |                                 |         |                                   |                        |                                   |                        |               |                      |               |                   |                    |              |                 |              |                 |              |                      |  |  |  |         |         |  |        |      |             |            |                         |                         |               |   |     |     |      |      |      |                              |   |     |      |      |      |      |                          |  |     |      |     |      |      |                       |   |       |       |       |      |      |                            |  |       |      |      |      |      |                          |   |     |     |     |      |      |                            |  |     |      |      |      |      |                          |   |     |     |     |     |      |                              |   |     |     |     |     |           |                                 |   |       |       |       |       |           |                      |   |     |     |     |     |           |                      |   |      |      |      |      |           |                           |
| 4  | 400  | 400                      | 400                      | None                     | None                     | (for BCN2, 53-55, 64 & 65)      |                          |                          |                          |                        |      |                                 |         |                                   |                        |                                   |                        |               |                      |               |                   |                    |              |                 |              |                 |              |                      |  |  |  |         |         |  |        |      |             |            |                         |                         |               |   |     |     |      |      |      |                              |   |     |      |      |      |      |                          |  |     |      |     |      |      |                       |   |       |       |       |      |      |                            |  |       |      |      |      |      |                          |   |     |     |     |      |      |                            |  |     |      |      |      |      |                          |   |     |     |     |     |      |                              |   |     |     |     |     |           |                                 |   |       |       |       |       |           |                      |   |     |     |     |     |           |                      |   |      |      |      |      |           |                           |
|  | 400  | None                     | None                     | None                     | None                     | (for BCN56, 57, 66 & 67)        |                          |                          |                          |                        |      |                                 |         |                                   |                        |                                   |                        |               |                      |               |                   |                    |              |                 |              |                 |              |                      |  |  |  |         |         |  |        |      |             |            |                         |                         |               |   |     |     |      |      |      |                              |   |     |      |      |      |      |                          |  |     |      |     |      |      |                       |   |       |       |       |      |      |                            |  |       |      |      |      |      |                          |   |     |     |     |      |      |                            |  |     |      |      |      |      |                          |   |     |     |     |     |      |                              |   |     |     |     |     |           |                                 |   |       |       |       |       |           |                      |   |     |     |     |     |           |                      |   |      |      |      |      |           |                           |
| 5  | 316  | 316                      | 316                      | 316                      | None                     | (for BCN2-4, 53-55, 64 & 65)    |                          |                          |                          |                        |      |                                 |         |                                   |                        |                                   |                        |               |                      |               |                   |                    |              |                 |              |                 |              |                      |  |  |  |         |         |  |        |      |             |            |                         |                         |               |   |     |     |      |      |      |                              |   |     |      |      |      |      |                          |  |     |      |     |      |      |                       |   |       |       |       |      |      |                            |  |       |      |      |      |      |                          |   |     |     |     |      |      |                            |  |     |      |      |      |      |                          |   |     |     |     |     |      |                              |   |     |     |     |     |           |                                 |   |       |       |       |       |           |                      |   |     |     |     |     |           |                      |   |      |      |      |      |           |                           |
| 6  | 316  | 316                      | 316                      | 316                      | Stainless                | None (for BCN2, 53-55, 64 & 65) |                          |                          |                          |                        |      |                                 |         |                                   |                        |                                   |                        |               |                      |               |                   |                    |              |                 |              |                 |              |                      |  |  |  |         |         |  |        |      |             |            |                         |                         |               |   |     |     |      |      |      |                              |   |     |      |      |      |      |                          |  |     |      |     |      |      |                       |   |       |       |       |      |      |                            |  |       |      |      |      |      |                          |   |     |     |     |      |      |                            |  |     |      |      |      |      |                          |   |     |     |     |     |      |                              |   |     |     |     |     |           |                                 |   |       |       |       |       |           |                      |   |     |     |     |     |           |                      |   |      |      |      |      |           |                           |
| 7  | C-276  | C-276                    | C-276                    | C-276                    | Stainless                | None (for BCN2 only)            |                          |                          |                          |                        |      |                                 |         |                                   |                        |                                   |                        |               |                      |               |                   |                    |              |                 |              |                 |              |                      |  |  |  |         |         |  |        |      |             |            |                         |                         |               |   |     |     |      |      |      |                              |   |     |      |      |      |      |                          |  |     |      |     |      |      |                       |   |       |       |       |      |      |                            |  |       |      |      |      |      |                          |   |     |     |     |      |      |                            |  |     |      |      |      |      |                          |   |     |     |     |     |      |                              |   |     |     |     |     |           |                                 |   |       |       |       |       |           |                      |   |     |     |     |     |           |                      |   |      |      |      |      |           |                           |
| 8  | 400  | 400                      | 400                      | 400                      | Stainless                | None (for BCN2 only)            |                          |                          |                          |                        |      |                                 |         |                                   |                        |                                   |                        |               |                      |               |                   |                    |              |                 |              |                 |              |                      |  |  |  |         |         |  |        |      |             |            |                         |                         |               |   |     |     |      |      |      |                              |   |     |      |      |      |      |                          |  |     |      |     |      |      |                       |   |       |       |       |      |      |                            |  |       |      |      |      |      |                          |   |     |     |     |      |      |                            |  |     |      |      |      |      |                          |   |     |     |     |     |      |                              |   |     |     |     |     |           |                                 |   |       |       |       |       |           |                      |   |     |     |     |     |           |                      |   |      |      |      |      |           |                           |
| 9  | None   | None                     | None                     | None                     | Stainless                | Stainless (for BCN2 only)       |                          |                          |                          |                        |      |                                 |         |                                   |                        |                                   |                        |               |                      |               |                   |                    |              |                 |              |                 |              |                      |  |  |  |         |         |  |        |      |             |            |                         |                         |               |   |     |     |      |      |      |                              |   |     |      |      |      |      |                          |  |     |      |     |      |      |                       |   |       |       |       |      |      |                            |  |       |      |      |      |      |                          |   |     |     |     |      |      |                            |  |     |      |      |      |      |                          |   |     |     |     |     |      |                              |   |     |     |     |     |           |                                 |   |       |       |       |       |           |                      |   |     |     |     |     |           |                      |   |      |      |      |      |           |                           |
| 3  |  |                          |                          |                          |                          |                                 |                          |                          |                          |                        |      |                                 |         |                                   |                        |                                   |                        |               |                      |               |                   |                    |              |                 |              |                 |              |                      |  |  |  |         |         |  |        |      |             |            |                         |                         |               |   |     |     |      |      |      |                              |   |     |      |      |      |      |                          |  |     |      |     |      |      |                       |   |       |       |       |      |      |                            |  |       |      |      |      |      |                          |   |     |     |     |      |      |                            |  |     |      |      |      |      |                          |   |     |     |     |     |      |                              |   |     |     |     |     |           |                                 |   |       |       |       |       |           |                      |   |     |     |     |     |           |                      |   |      |      |      |      |           |                           |
| 4  |  |                          |                          |                          |                          |                                 |                          |                          |                          |                        |      |                                 |         |                                   |                        |                                   |                        |               |                      |               |                   |                    |              |                 |              |                 |              |                      |  |  |  |         |         |  |        |      |             |            |                         |                         |               |   |     |     |      |      |      |                              |   |     |      |      |      |      |                          |  |     |      |     |      |      |                       |   |       |       |       |      |      |                            |  |       |      |      |      |      |                          |   |     |     |     |      |      |                            |  |     |      |      |      |      |                          |   |     |     |     |     |      |                              |   |     |     |     |     |           |                                 |   |       |       |       |       |           |                      |   |     |     |     |     |           |                      |   |      |      |      |      |           |                           |
| 5  |  |                          |                          |                          |                          |                                 |                          |                          |                          |                        |      |                                 |         |                                   |                        |                                   |                        |               |                      |               |                   |                    |              |                 |              |                 |              |                      |  |  |  |         |         |  |        |      |             |            |                         |                         |               |   |     |     |      |      |      |                              |   |     |      |      |      |      |                          |  |     |      |     |      |      |                       |   |       |       |       |      |      |                            |  |       |      |      |      |      |                          |   |     |     |     |      |      |                            |  |     |      |      |      |      |                          |   |     |     |     |     |      |                              |   |     |     |     |     |           |                                 |   |       |       |       |       |           |                      |   |     |     |     |     |           |                      |   |      |      |      |      |           |                           |
| 6  |  |                          |                          |                          |                          |                                 |                          |                          |                          |                        |      |                                 |         |                                   |                        |                                   |                        |               |                      |               |                   |                    |              |                 |              |                 |              |                      |  |  |  |         |         |  |        |      |             |            |                         |                         |               |   |     |     |      |      |      |                              |   |     |      |      |      |      |                          |  |     |      |     |      |      |                       |   |       |       |       |      |      |                            |  |       |      |      |      |      |                          |   |     |     |     |      |      |                            |  |     |      |      |      |      |                          |   |     |     |     |     |      |                              |   |     |     |     |     |           |                                 |   |       |       |       |       |           |                      |   |     |     |     |     |           |                      |   |      |      |      |      |           |                           |
| 7  |  |                          |                          |                          |                          |                                 |                          |                          |                          |                        |      |                                 |         |                                   |                        |                                   |                        |               |                      |               |                   |                    |              |                 |              |                 |              |                      |  |  |  |         |         |  |        |      |             |            |                         |                         |               |   |     |     |      |      |      |                              |   |     |      |      |      |      |                          |  |     |      |     |      |      |                       |   |       |       |       |      |      |                            |  |       |      |      |      |      |                          |   |     |     |     |      |      |                            |  |     |      |      |      |      |                          |   |     |     |     |     |      |                              |   |     |     |     |     |           |                                 |   |       |       |       |       |           |                      |   |     |     |     |     |           |                      |   |      |      |      |      |           |                           |
| 8  |  |                          |                          |                          |                          |                                 |                          |                          |                          |                        |      |                                 |         |                                   |                        |                                   |                        |               |                      |               |                   |                    |              |                 |              |                 |              |                      |  |  |  |         |         |  |        |      |             |            |                         |                         |               |   |     |     |      |      |      |                              |   |     |      |      |      |      |                          |  |     |      |     |      |      |                       |   |       |       |       |      |      |                            |  |       |      |      |      |      |                          |   |     |     |     |      |      |                            |  |     |      |      |      |      |                          |   |     |     |     |     |      |                              |   |     |     |     |     |           |                                 |   |       |       |       |       |           |                      |   |     |     |     |     |           |                      |   |      |      |      |      |           |                           |
| 9  |  |                          |                          |                          |                          |                                 |                          |                          |                          |                        |      |                                 |         |                                   |                        |                                   |                        |               |                      |               |                   |                    |              |                 |              |                 |              |                      |  |  |  |         |         |  |        |      |             |            |                         |                         |               |   |     |     |      |      |      |                              |   |     |      |      |      |      |                          |  |     |      |     |      |      |                       |   |       |       |       |      |      |                            |  |       |      |      |      |      |                          |   |     |     |     |      |      |                            |  |     |      |      |      |      |                          |   |     |     |     |     |      |                              |   |     |     |     |     |           |                                 |   |       |       |       |       |           |                      |   |     |     |     |     |           |                      |   |      |      |      |      |           |                           |
| 0  |  |                          |                          |                          |                          |                                 |                          |                          |                          |                        |      |                                 |         |                                   |                        |                                   |                        |               |                      |               |                   |                    |              |                 |              |                 |              |                      |  |  |  |         |         |  |        |      |             |            |                         |                         |               |   |     |     |      |      |      |                              |   |     |      |      |      |      |                          |  |     |      |     |      |      |                       |   |       |       |       |      |      |                            |  |       |      |      |      |      |                          |   |     |     |     |      |      |                            |  |     |      |      |      |      |                          |   |     |     |     |     |      |                              |   |     |     |     |     |           |                                 |   |       |       |       |       |           |                      |   |     |     |     |     |           |                      |   |      |      |      |      |           |                           |
| 1  |  |                          |                          |                          |                          |                                 |                          |                          |                          |                        |      |                                 |         |                                   |                        |                                   |                        |               |                      |               |                   |                    |              |                 |              |                 |              |                      |  |  |  |         |         |  |        |      |             |            |                         |                         |               |   |     |     |      |      |      |                              |   |     |      |      |      |      |                          |  |     |      |     |      |      |                       |   |       |       |       |      |      |                            |  |       |      |      |      |      |                          |   |     |     |     |      |      |                            |  |     |      |      |      |      |                          |   |     |     |     |     |      |                              |   |     |     |     |     |           |                                 |   |       |       |       |       |           |                      |   |     |     |     |     |           |                      |   |      |      |      |      |           |                           |
| 2  |  |                          |                          |                          |                          |                                 |                          |                          |                          |                        |      |                                 |         |                                   |                        |                                   |                        |               |                      |               |                   |                    |              |                 |              |                 |              |                      |  |  |  |         |         |  |        |      |             |            |                         |                         |               |   |     |     |      |      |      |                              |   |     |      |      |      |      |                          |  |     |      |     |      |      |                       |   |       |       |       |      |      |                            |  |       |      |      |      |      |                          |   |     |     |     |      |      |                            |  |     |      |      |      |      |                          |   |     |     |     |     |      |                              |   |     |     |     |     |           |                                 |   |       |       |       |       |           |                      |   |     |     |     |     |           |                      |   |      |      |      |      |           |                           |

# Introduction

## TYPE BCN2/3/4/5/6 SMART ELECTRONIC PRESSURE TRANSMITTER

| Pos. | 4                        | 5                        | 6                        | 7                        | 8                        | 9                        | 10                       | 11                       |  |
|------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--|
| BCN  | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | SMART ELECTRONIC PRESSURE TRANSMITTER  |
|      | Pg. 1-3                  |                          |                          |                          |                          |                          |                          |                          |  |
|      |                          |                          |                          |                          |                          |                          |                          |                          | <b>O-RING/BOLTING MATERIAL (NOTE 1)</b>  |
|      |                          |                          |                          |                          |                          | 1                        |                          |                          | Viton/Carbon Steel (for BCN2 – 6)  |
|      |                          |                          |                          |                          |                          | 2                        |                          |                          | Teflon/Carbon Steel (for BCN2 – 6)   |
|      |                          |                          |                          |                          |                          | 3                        |                          |                          | Viton/300 Series Stainless Steel (for all except BCN4)                               |
|      |                          |                          |                          |                          |                          | 4                        |                          |                          | Teflon/300 Series Stainless Steel (for all except BCN4)                              |
|      |                          |                          |                          |                          |                          | 7                        |                          |                          | Viton/4140 Carbon Steel, ASTM A193, GR. B7 (NACE CL. 3) (for all except BCN4)        |
|      |                          |                          |                          |                          |                          | 8                        |                          |                          | Teflon/4140 Carbon Steel, ASTM A193, GR. B7 (NACE CL. 3) (for all except BCN4,58/59) |
|      |                          |                          |                          |                          |                          |                          |                          |                          | <b>INTEGRAL METER</b>  |
|      |                          |                          |                          |                          |                          |                          | 5                        |                          | None   |
|      |                          |                          |                          |                          |                          |                          | 6                        |                          | Digital Meter  |
|      |                          |                          |                          |                          |                          |                          |                          |                          | <b>FLANGE ADAPTER KIT &amp;/OR MOUNTING BRACKET</b>                                  |
|      |                          |                          |                          |                          |                          |                          | 0                        |                          | Both Kits, if applicable, provided with basic transmitter                            |
|      |                          |                          |                          |                          |                          |                          | 1                        |                          | Delete Mounting Bracket Kit (for BCN2 – 6)   |
|      |                          |                          |                          |                          |                          |                          | 2                        |                          | Delete 316 Stainless Flange Adapter Kit (for all except BCN56,57,66 & 67)            |
|      |                          |                          |                          |                          |                          |                          | 3                        |                          | Delete 316 Stless Flg. Adptr. & Mtg. Brkt. Kits (for all except BCN56,57,66 & 67)    |
|      |                          |                          |                          |                          |                          |                          | 4                        |                          | Delete C-276 Hastelloy Flange Adapter Kit (for BCN2,53,54,55,64 & 65)                |
|      |                          |                          |                          |                          |                          |                          | 5                        |                          | Delete C-276 Hastelloy Flg. Adptr. & Mtg. Brkt. Kits (for BCN2,53,54,55,64 & 65)     |
|      |                          |                          |                          |                          |                          |                          | 6                        |                          | Delete 400 Monel Flange Adapter Kit (for BCN2,53,54,55,64 & 65)                      |
|      |                          |                          |                          |                          |                          |                          | 7                        |                          | Delete 400 Monel Flg. Adapter Kit & Mtg. Brkt. Kit (for BCN2,53,54,55,64 & 65)       |

- NOTES:**
- The following material combinations are required to comply with the National Association of Corrosion Engineers (NACE) Std. MR-01-75 :  
 Diaphragm/Trim \_\_\_\_\_ Hastelloy C-276.  
 Flange/Vent/Adapter/Drain Plug \_\_\_\_\_ 316 Stainless Steel.  
 Bolting \_\_\_\_\_ 4140 Carbon Steel, per ASTM A193, Grade B7.
  - The Remote Seal Cap is No.304 Stainless Steel and the Remote Seal Flange is No.316 Stainless Steel.

MONEL<sup>®</sup> is a registered trademark International Nickel Co.  
 HASTELLOY C<sup>®</sup> is a registered trademark of Cabot Corp., Stellite Div.  
 VITON<sup>®</sup> and TEFLON<sup>®</sup> are registered trademarks of E.I. DuPont de Nemours & Co.

## PERFORMANCE/FUNCTIONAL SPECIFICATIONS (Zero-Based Spans)

|                               |  |
|-------------------------------|--|
| <b>Service</b>                | Liquid, gas or vapor.  |
| <b>Accuracy</b>               | <b>BCN2, BCN44/45, BCN53/54/55, and BCN64/65:</b> $\pm 0.10\%$ of calibrated span;<br><b>BCN3, BCN46, BCN56/57/58/59 and BCN66/67:</b> $\pm 0.25\%$ of calibrated span. (All percentages include effects of linearity, hysteresis, repeatability, and dead band).  |
| <b>Stability</b>              | $\pm 0.10\%$ of upper range limit for six months.  |
| <b>Long Term Stability</b>    | Drift less than $\pm 0.20\%$ of upper range limit for 12 months.   |
| <b>Output Signal</b>          | <b>Analog Output:</b> 4 to 20 mA; user-selectable for linear, square root, 3/2 power, 5/2 power, volume or function generator output. (See Figure 1 for square root output.)<br><b>Digital Output:</b> Digital process variable reports up to ten times per second for control purposes.   |
| <b>Output Current</b>         | 25 mA maximum.   |
| <b>Supply Voltage</b>         | 13 to 42 V dc.   |
| <b>Power Supply Effect</b>    | <b>Point-to-Point Mode:</b> 0.005% of span per volt.<br><b>Field Bus Mode:</b> No effect.  |
| <b>Loop Load Limits</b>       | See Figure 2.  |
| <b>Static Pressure Limit</b>  | <b>BCN2 and BCN36/37:</b> 3600 psig (24822 kPa).<br><b>BCN38:</b> 2000 psig (13790 kPa).<br><b>BCN4:</b> 6000 psig (41370 kPa).<br>(Not applicable to <b>BCN5/6</b> ).   |
| <b>Static Pressure Effect</b> | <b>Zero error:</b><br><b>BCN23/24:</b> $\pm 0.25\%$ of upper range limit/2000 psig (13790 kPa);<br><b>BCN25:</b> 1.00% of upper range limit/2000 psig (13790 kPa);<br><b>BCN3:</b> $\pm 0.75\%$ of upper range limit/2000 psig (13790 kPa);<br><b>BCN4:</b> $\pm 0.3\%$ of upper range limit/6000 psig (41370 kPa).<br><b>Span error:</b><br><b>BCN2 and BCN3:</b> $\pm 0.25\%$ of upper range limit/2000 psig (13790 kPa);<br><b>BCN4:</b> 0.3% of upper range limit/6000 psig (41370 kPa). |
| <b>Overpressure Limit</b>     | <b>BCN2 and BCN36/37:</b> 3600 psig (24822 kPa);<br><b>BCN38, BCN53/54/55 and BCN64/65:</b> 2000 psig (13790 kPa);<br><b>BCN4:</b> 6000 psig (41370 kPa);<br><b>BCN56/57, and BCN66/67:</b> 300% of upper range.<br><b>BCN58:</b> 200% of upper range limit.<br><b>BCN59:</b> 165% of upper range limit.   |

|   |   |
|---|---|
| <b>Overpressure Limit (Cont)</b>        | Full vacuum to overpressure limit on either or both sides will not damage the transmitter. Any zero shift due to overpressure condition should be calibrated out.   |
| <b>Mounting Position Effect</b>         | No span effect.<br>No zero effect in plane of diaphragm. Maximum of 2 in. H <sub>2</sub> O (0.49 kPa) zero shift in any other plane; can be calibrated out.   |
| <b>Damping</b>                          | Continuously adjustable from 0.00 to 32.00 seconds.   |
| <b>Temperature Limits</b>               | <b>Operating:</b> From $-13^{\circ}$ to $+185^{\circ}\text{F}$ ( $-25^{\circ}$ to $+85^{\circ}\text{C}$ ) transmitter will operate within specifications; From $-40^{\circ}$ to $+212^{\circ}\text{F}$ ( $-40^{\circ}$ to $+100^{\circ}\text{C}$ ) transmitter will operate without damage to the unit.<br><b>Storage:</b> $-58^{\circ}$ to $212^{\circ}\text{F}$ ( $-50^{\circ}$ to $100^{\circ}\text{C}$ ). |
| <b>Units with Optional LCD Meter</b>    | <b>Operating and Visibility Range:</b> $+32^{\circ}$ to $+122^{\circ}\text{F}$ ( $0^{\circ}$ to $+50^{\circ}\text{C}$ ). Temperatures outside of this range will cause the display to go blank until temperatures return to operating range.<br><b>Storage:</b> $-5^{\circ}$ to $+158^{\circ}\text{F}$ ( $-20^{\circ}$ to $+70^{\circ}\text{C}$ )   |
| <b>Temperature Effects</b>              | <b>Operating:</b> From $-13^{\circ}$ to $+185^{\circ}\text{F}$ ( $-25^{\circ}$ to $+85^{\circ}\text{C}$ )<br><b>Total error:</b> $\pm 0.25\%$ of upper range limit for any temperature changes of not more than $\pm 50^{\circ}\text{F}$ ( $\pm 28^{\circ}\text{C}$ ). (Reference conditions of $80^{\circ}\text{F}$ [ $27^{\circ}\text{C}$ ]).   |
| <b>Elevation/Suppression</b>            | Maximum zero elevation is 1000% of calibrated span.*<br>Maximum zero suppression is 900% of calibrated span. Neither span nor upper or lower range value may exceed 100% of upper range limit.  |
| <b>RFI Effect</b>                       | $\pm 1.0\%$ of calibrated span for 20–1000 MHz @ 30 V/m field strength.   |
| <b>Turn Down</b>                        | 10:1  |
| <b>Turn on Time</b>                     | 4 seconds at minimum dampening.   |
| <b>Humidity Limits</b>                  | 0–100% continuous when covers on correctly and conduit is sealed.   |
| <b>Response Time (electronics only)</b> | <b>Point-to-Point Mode:</b> 250 milliseconds.<br><b>Field Bus Mode:</b> Process variable reported up to ten times a second.   |

\* Use of the BCN56/57 products are not recommended for measurements below 14 psig (96.8 kPa). Consult your Bailey Sales Representative for details.

# Introduction

## PHYSICAL CHARACTERISTICS

|                               |  |
|-------------------------------|--|
| <b>Amplifier Housing</b>      | Housing is a die cast aluminum alloy with less than 1% copper, protected with a chemical resistant polyurethane coating; rated NEMA 4X.  |
| <b>Process Connections</b>    | Refer to Figures 9, 10 and 11 in <b>INSTALLATION</b> .   |
| <b>Electrical Connections</b> | Test, signal, and grounding terminals are accessible through one of the two 1/2" NPT conduit holes provided on opposite sides of the transmitter; unused opening is plugged with a 1/2" stainless steel NPT pipe plug. |
| <b>Materials Selection</b>    | Fill Fluid: Silicone or fluorinated oil for all except: <b>BCN58/59</b> .<br>Process-wetted parts: Refer to <b>NOMENCLATURE</b>  |

## OPTIONS AND ACCESSORIES

|                            |   |
|----------------------------|---|
| <b>Material Variations</b> | Refer to <b>NOMENCLATURE</b> .  |
| <b>LCD Meter</b>           | (Refer to <b>NOMENCLATURE</b> for selection). Integral circuit board provides 12-digit alphanumeric liquid crystal display of transmitter output signal as percent of span or in engineering units (display accurate to 0.1% of span and suitable for calibration of device.) Rotatable in 90 degree increments to yield best viewing orientation. LCD Meter is also available as an add-on option. Kit No. 258453A1.                                   |
| <b>Flange Adapter</b>      | A 1/4-18 NPT or welded socket process piping connection can be used instead of the standard 1/2-14 NPT connection; Part No. 6634268 (1/4-18 NPT), Part No.683421-T (welded socket), Part No. 6633852-1 (Aminco stainless steel). (Not applicable to BCN56/57/58/59, and BCN66/67).  |
| <b>3-Valve Manifold</b>    | Provides the required valving for flow measurement using differential pressure-producing primary elements; Attaches directly to the transmitter in place of the flange adapters. Part No. 6626715-1, 316SS (Anderson, Greenwood and Co. M4AVS);<br><br>Part No. 6626715-2, carbon steel (Anderson, Greenwood and Co. M4AVS); Part No. 6626715-3, 316SS, special cleaned; Part No. 6626715-4, carbon steel, special cleaned. (Not applicable to BCN5/6.) |

|                                   |  |
|-----------------------------------|--|
| <b>Mounting Brackets</b>          | Flat bracket for wall or pipe mounting can be supplied with transmitter, Part No. 682603-1; L-shaped bracket for horizontal pipe mounting also available, Part No. 6627204-1.                              |
| <b>Conversion Kit (BC to BCN)</b> | Kit No.: 258456-2. This converts any BC Transmitter to the BCN Transmitter.  |
| <b>Smart Transmitter Terminal</b> | Battery-powered portable communications device; allows the user to remotely configure, calibrate, troubleshoot, or verify the operation of a BCN transmitter. Order by <b>NOMENCLATURE</b> : STT02.        |
| <b>Transient Suppressor</b>       | Suppresses switching and lightning induced transients; mounts internally or externally; Part No.1947359-1.   |
| <b>**Special Cleaning</b>         | Transmitter wetted parts are cleaned to remove any trace contaminants including grease and oil.  |
| <b>Tag Option</b>                 | Part No. 1993318A1: Mylar <sup>®</sup> , adhesive backed aluminum finish. Part No. 487436A2: Stainless steel, specify wire attached or permanently affixed. Customer may specify 4 lines of 12 characters. |

\*\* For Oxygen Service Preparation: Normal practice is to specify fluorinated oil sensor fill fluid (refer to **NOMENCLATURE**) and Special Cleaning.

SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE

## CERTIFICATION

|  |   |
|--|---|
| Certifications by Canadian Standards Association (CSA), Factory Mutual Research (FM), and Standards Association of Australia (SAA) are pending as follows: |   |
| <b>Nonincendive (Nonsparking)</b>  |   |
| CSA  | Class I; Div 2; Groups B-D                |
| FM   | Class I; Div 2; Groups C,D                |
| SAA  | Zone 2, Ex n, Group IIC                   |
| Intrinsically Safe when used with appropriate barriers per Bailey Controls Co. Drawing B222611.  |   |
| CSA  | Classes I, II, III; Div 1; Groups A-G, T4 |
| FM   | Classes I, II, III; Div 1; Groups A-G, T6 |
| SAA  | Zone 0; Ex ia, Group IIC, T6              |

MYLAR<sup>®</sup> is a registered trademark of E.I. Dupont de Nemours & Co.



**CERTIFICATION (Cont)**

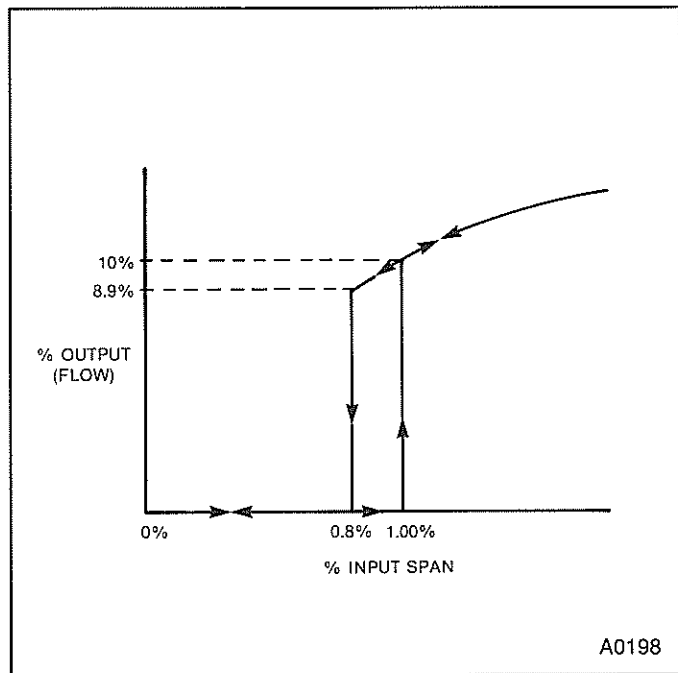
**Explosionproof (flameproof)**

CSA Class I; Div 1; Groups B-D  
 \*FM Class I; Div 1; Groups B-D  
 SAA Zone 1; Ex d; Group IIB

**Dust-ignitionproof**

CSA Classes II, III; Div 1; Groups E-G  
 \*FM Classes II, III; Div 1; Groups E-G  
 SAA Zone 1; Ex DIP 13 Enclosures IP65

\* Approval received.



A0198

**Note:** Accuracy of square root mode: Below 0.8% of input., the output is forced to 0%. Above 1% of output, the accuracy equals the square root of the accuracy stated in the specifications. Example: BCN2 accuracy equals  $\pm 0.1\%$ , in the square root mode accuracy equals the square root of 0.1.

FIGURE 1 – Square Root Output

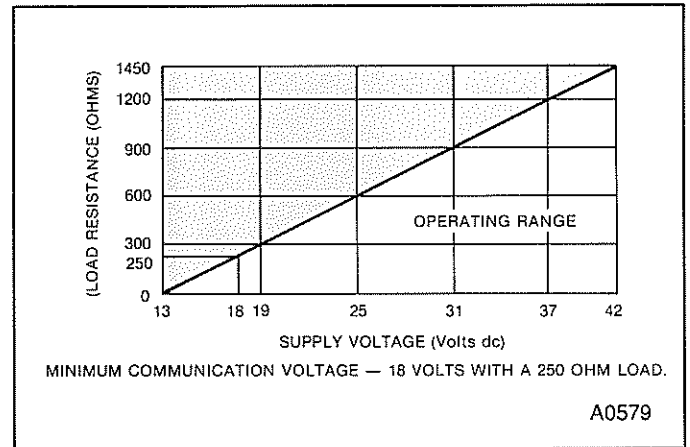


FIGURE 2 – Load Range



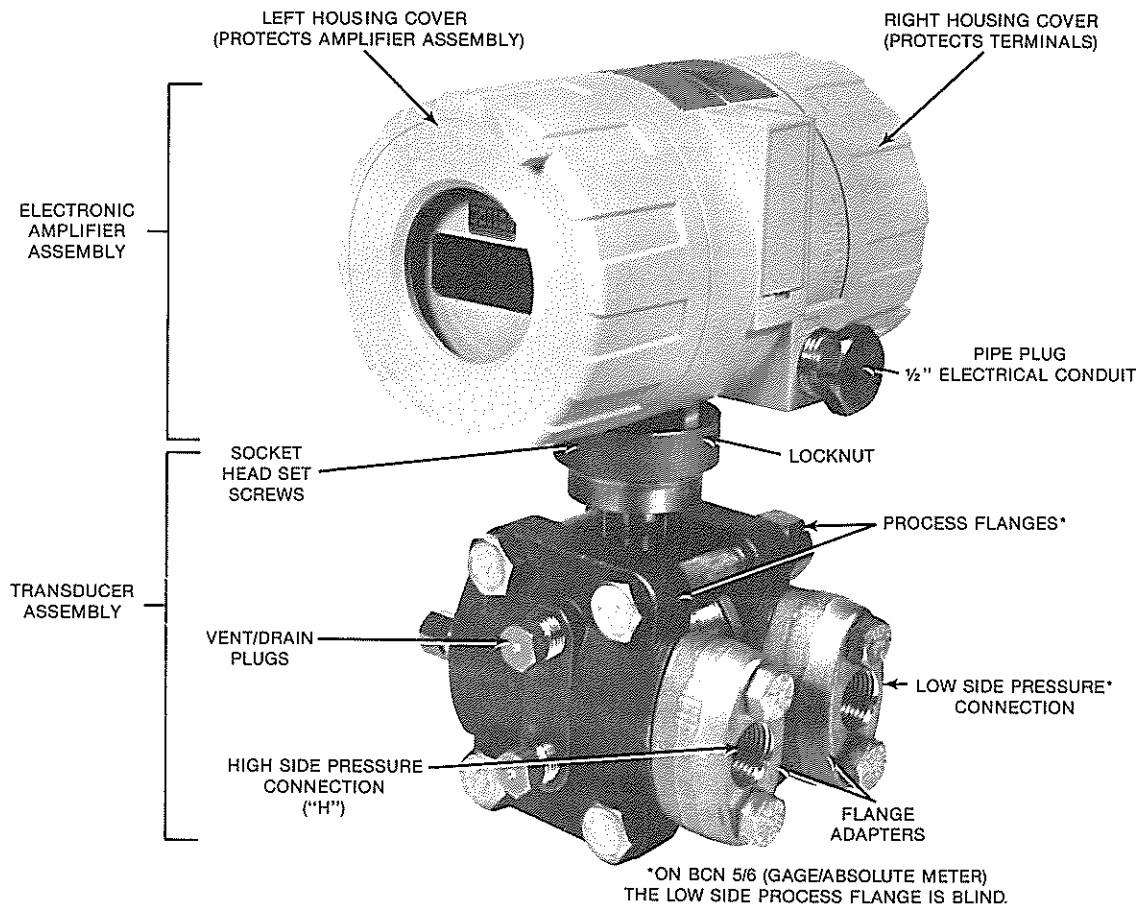
## Description And Operation

### INTRODUCTION

This section of the instruction book describes and explains the BCN Transmitter; operation of its principle components and the manner in which the user accesses the information the transmitter provides.

### FUNCTIONAL OPERATION

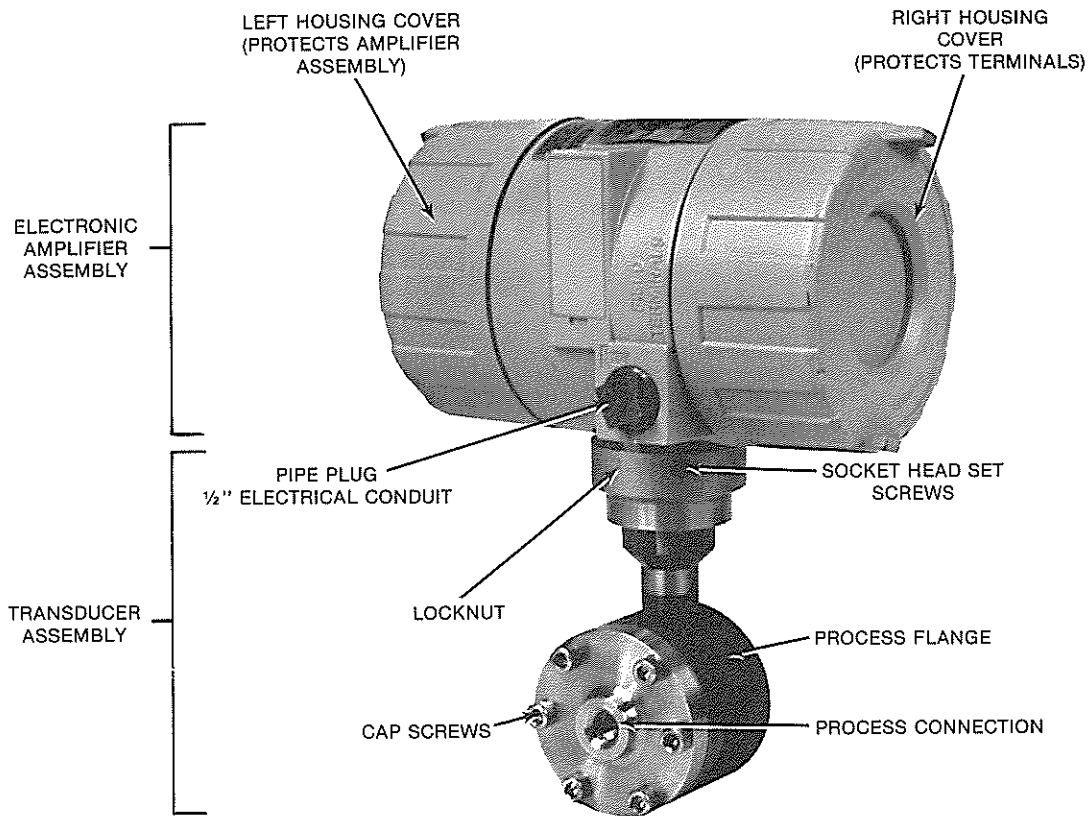
The BCN Smart Transmitter consists of two major sections: a transducer assembly and an electronics assembly (see Figures 3, 4 and 5). The STT02 Smart Transmitter Terminal is available to communicate with the Smart Transmitter.



A0211

FIGURE 3 – Smart BCN Pressure Transmitter (BCN2/3/4, BCN53/54/55 and BCN64/65)

# Description and Operation



A0212

FIGURE 4 – Smart BCN High Range Pressure Transmitter (BCN56/57 and BCN66/67)

## PHYSICAL OPERATION

### Transducer Assembly

The transducer contains two outer isolating diaphragms and one internal sensing diaphragm.

In the differential pressure units (BCN2/3/4), process pressures are applied to the high (“H” stamped on the transducer body next to the high side process flange) and low (unmarked) sides of the transducer by direct connection to the transducer flanges or through flange adapters. The low pressure side is open to atmosphere on the gage pressure unit (BCN5) or pre-evacuated and sealed on the absolute pressure unit (BCN6).

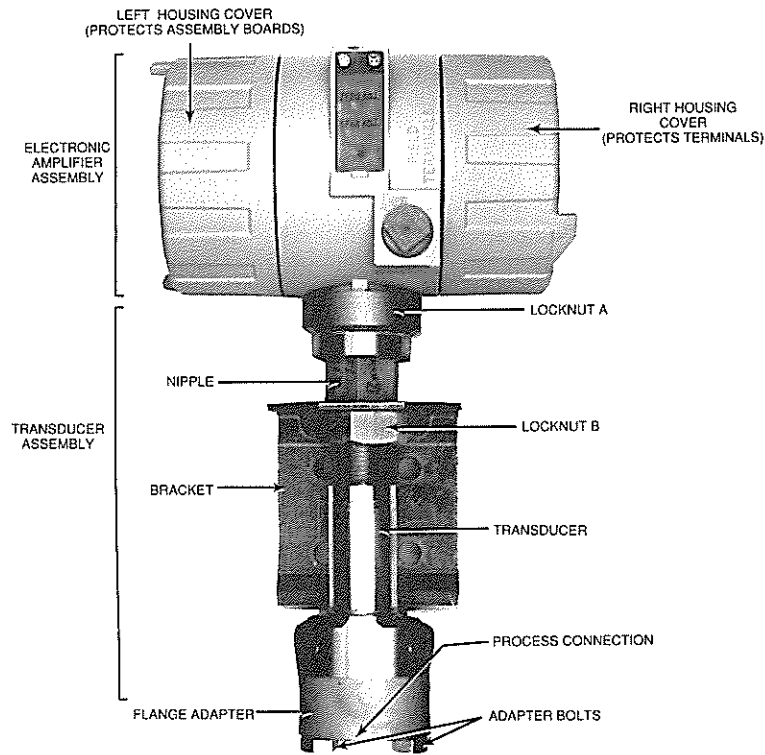
Process pressures act upon pressure receiving diaphragms which generate a force applied to a cantilever beam. A closed bridge strain gage is affixed to the cantilever beam. Deflection of the beam by pressure

variations produces an output voltage from the bridge which is directly proportional to the process pressure.

### Transmitter Electronics Assembly

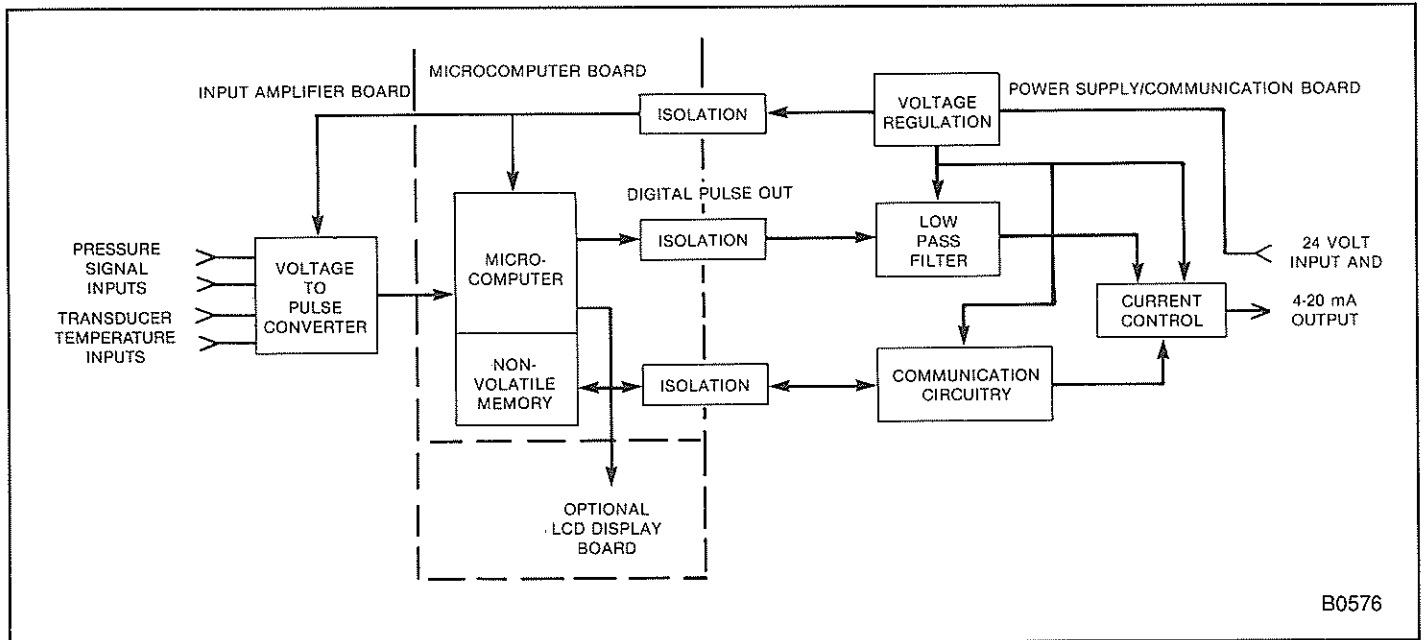
The electronics assembly is shown in Figure 6 in block form. The output of the strain gage (not shown) is fed into a voltage-to-pulse converter. The voltage-to-pulse converter outputs a variable duty cycle pulse which the microcomputer can understand. The microcomputer uses all inputs from the voltage-to-pulse converter and calculates an output based on the variable duty cycle pulse inputs. The transmitter’s configured memory is stored in an EEPROM.

The output of the microcomputer is fed into an active multiple pole low pass filter. The filter outputs a dc voltage level proportional to the output duty cycle of the pulse input. This dc level feeds the output transistor which controls the 4 to 20 mA signal.



A0241

FIGURE 5 – Type BCN Gage Pressure Transmitter (BCN58/59)



B0576

FIGURE 6– Type BCN Smart Transmitter Electronics Block Diagram

## Description and Operation

**COMMUNICATION.** Communication between the BCN Transmitter and the remote terminal is accomplished by attaching the STT02 anywhere along the signal wires. No adapters, jacks or plugs are necessary. An ac voltage imposed on the signal wires allows communication between the BCN Transmitter and the STT02 Terminal. Since the communication signal is high frequency ac, its dc average is zero and has no effect on the output of the transmitter. Two different frequency levels are used to transmitter, a logic 0 or logic 1. This enables the location of the BCN Transmitter to be as far as one mile (1.6 Km) from the STT02 Terminal, while still providing excellent noise immunity for remote communications (Figure 7). A minimum of 250 ohms loop resistance is necessary to support communication capabilities (Figure 2).

The user programs the transmitter, via the STT02, to be in the digital field bus mode by selecting a node address for the transmitter (Figure 8). When the transmitter is requested to be in the digital mode, the microcomputer sets the output of the transmitter to less than 4 mA for low power consumption. When polled the transmitter will then provide a digital process variable signal. The Smart Transmitter Terminal includes an internal converter which accepts the transmitter's communication data, and alternately converts the Smart Transmitter Terminal commands to signals compatible with the transmitter.

**TEMPERATURE COMPENSATION.** A temperature sensor is located within the transducer assembly. The

output of the temperature sensor is monitored and used to calculate a correction for the transducer output based on programmed transducer temperature characteristics. This transmitter temperature can be monitored using the STT02 Terminal.

**DIAGNOSTICS.** Continuous self-diagnostics are available through the STT02 Terminal. Areas monitored are transducer, the transducer's temperature, input circuits, non-volatile memory, processor ROM, and reference voltages. The modular amplifier design allows the diagnostics to identify the malfunctioning electronic section. The diagnostics also indicate if the user is making a calibration error.

### Transmitter Software Functions

Configuration and operational commands allow the user to input an ID Tag for the transmitter configuration, select engineering units, and define the output. The output can be defined as a square root (Figure 1), 3/2 or 5/2 power of the input. Other user definable outputs include volume of a spherical or flat end tank, or a function generator that follows a six segment curve. The output can be set to normal or reverse acting and fixed to a specific value for troubleshooting purposes. Other commands allow the output to be set to default values upon transmitter failure and powerup. Other commands allow the user to monitor the configuration, input, output, and status of the transmitter. A damping adjustment command is also available.

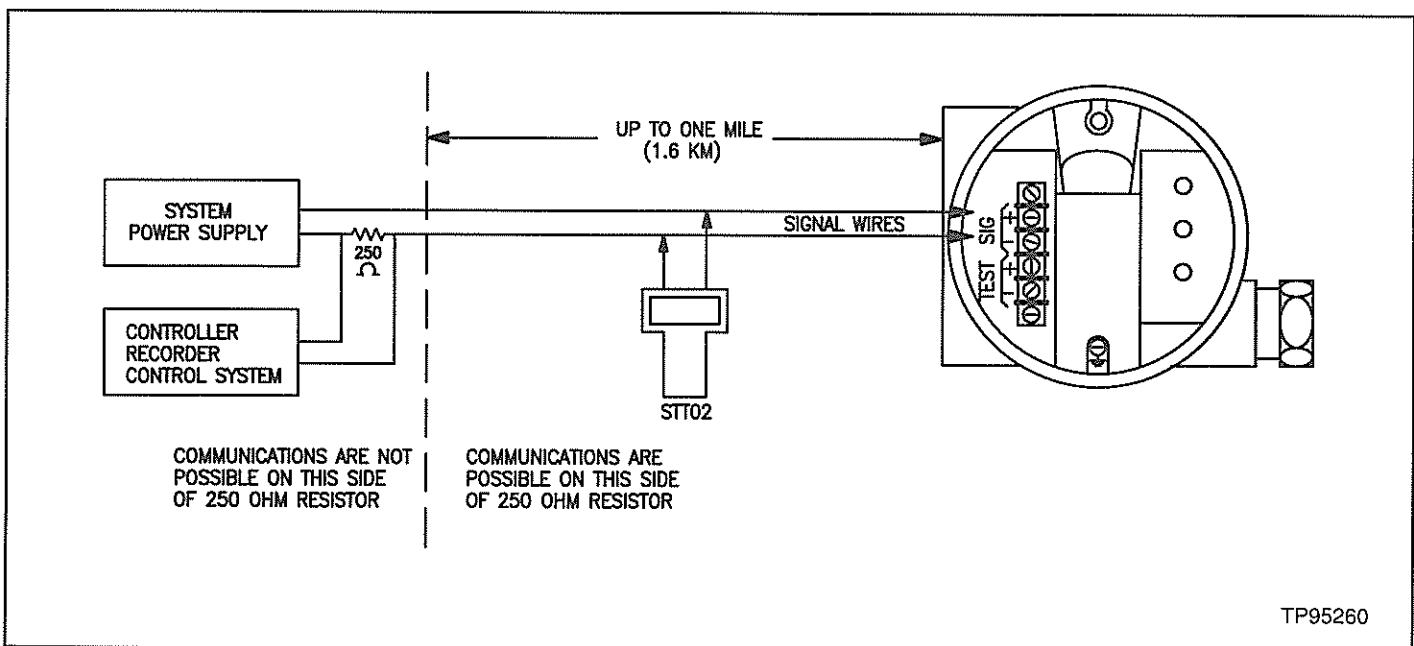


FIGURE 7 – Point-to-Point Wiring

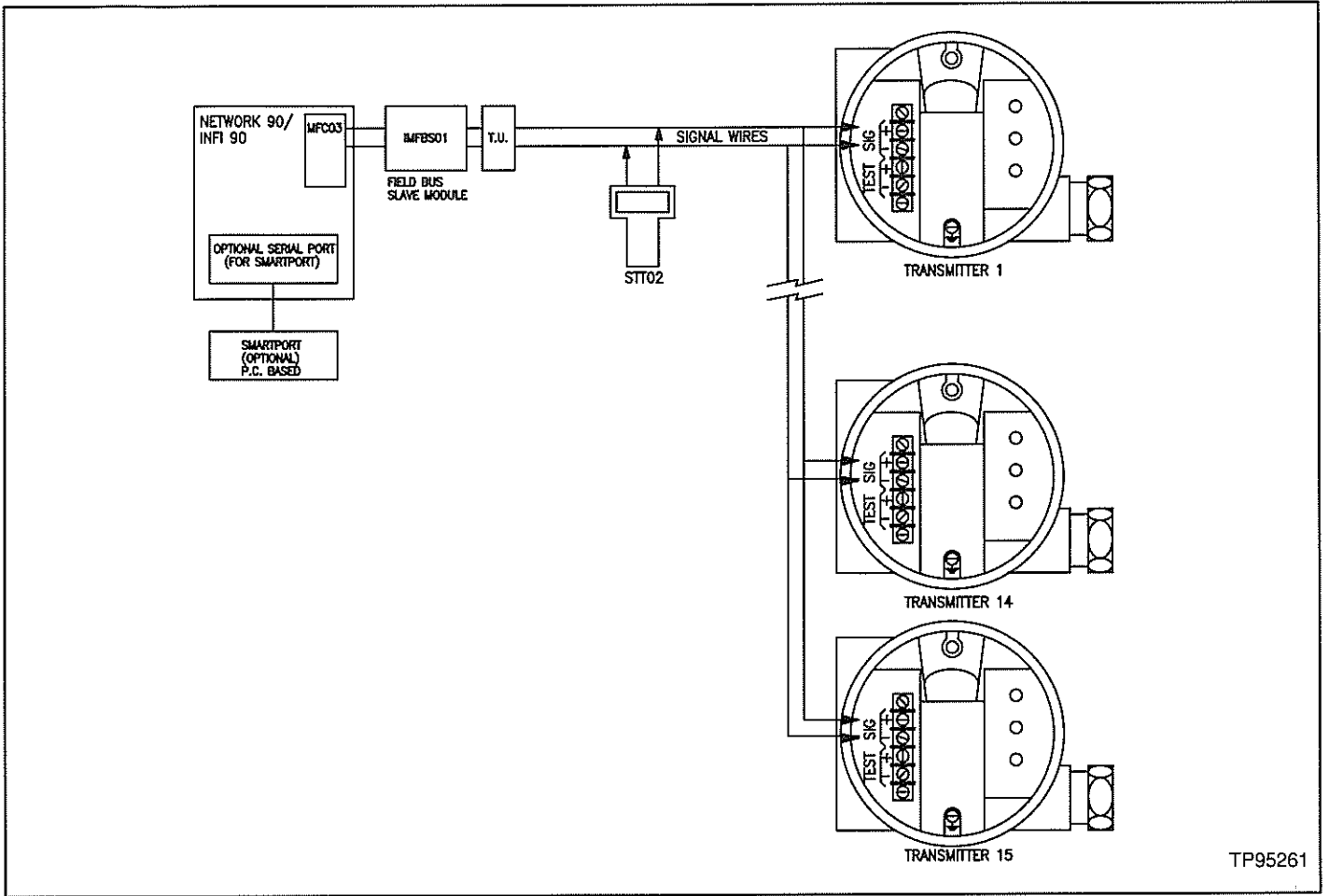


FIGURE 8 – Field Bus Arrangement





## Installation

### INTRODUCTION

This section provides the user with information necessary for correct installation, which is vital for safe and reliable operation of the Type BCN Pressure Transmitter. This information includes unpacking procedures, transmitter location considerations, and installation suggestions from piping requirements to wiring instructions.

**NOTE:** Refer to **APPENDIX A – APPLICATIONS IN FLAMMABLE ATMOSPHERES** when applicable.

### UNPACKING AND INSPECTION

Before unpacking, carefully examine exterior of shipping containers for evidence of in-transit damage. Inspect for punctures, tears or other damage which penetrates the outer containers, and for any evidence of water damage. If transmitter is damaged, contact the carrier.

1. Examine the exterior of the transmitter for nicks, dents and scratches.
2. Before mounting or installing check the nameplate (located on the amplifier housing) to make certain that you have received the equipment that was ordered.

#### WARNING

Do not, at any time, exceed the ratings listed on the nameplate.

#### AVERTISSEMENT

On ne doit en aucune circonstance dépasser les valeurs nominales figurant sur la plaque d'identification.

If the transmitter is to be stored prior to installation, pack in the original container, if possible. Store in an area free of corrosive vapors and extremes in temperature and humidity. Install covers and seal all conductive wiring inlets.

**NOTE:** Storage temperatures must not exceed the following limits:  $-60^{\circ}$  to  $+212^{\circ}\text{F}$  ( $-58^{\circ}$  to  $+100^{\circ}\text{C}$ ); Units with optional LCD Meter:  $-5^{\circ}$  to  $+158^{\circ}\text{F}$  ( $-20^{\circ}$  to  $+70^{\circ}\text{C}$ ).

### LOCATION CONSIDERATIONS

Because of process and economic considerations, flow and level transmitters must often be installed in harsh environmental locations. The transmitter should, however, be located as to minimize the effects of temperature gradients and fluctuations, and to avoid vibration and shock.

### SETUP AND PHYSICAL INSTALLATION

The quality of a flow or level measurement depends to a great extent on proper installation of the transmitter and the pressure piping. For flow measurement, proper installation of the primary measuring element is also critical to the accuracy of the measurement. (Refer to Product Instruction G23-1 **Installation of Orifices and Flow Nozzles.**)

**NOTE:** If installation of the transmitter requires that the housing be rotated, be sure to loosen set screws (Item 56, Figure 34) and slide locknut (Item 55, Figure 34) off of the housing. This allows the housing to rotate without causing damage to the transmitter.

The Type BCN Transmitter may be supported by the piping connections if mounted directly at the point of measurement. It may also be surface-mounted or mounted to 2-inch piping using Bailey Mounting Kit Part No. 682603-1. Refer to Figures 9, 10 and 11 for external and mounting dimensions.

**NOTE:** Flange adapters are not available for the BCN56/57 or BCN66/67.

The Type BCN flange adapter process connections are on 2.12-inch (54 mm) centers to allow direct mounting to orifice flanges and permit the use of commercially available manifolds. Refer to **Options and Accessories** for information on flange adapters and manifolds available from Bailey.

Process connections on the transmitter flanges are 1/4-18 NPT. Flange adapters may be supplied with 1/2-14 NPT connections. The flange adapters allow the transmitter to be easily disconnected from the process by removing the flange adapter bolts.

Refer to Figure 3 for identification of the optional vent/drain plugs. The primary purpose of the vent/drain

# Installation

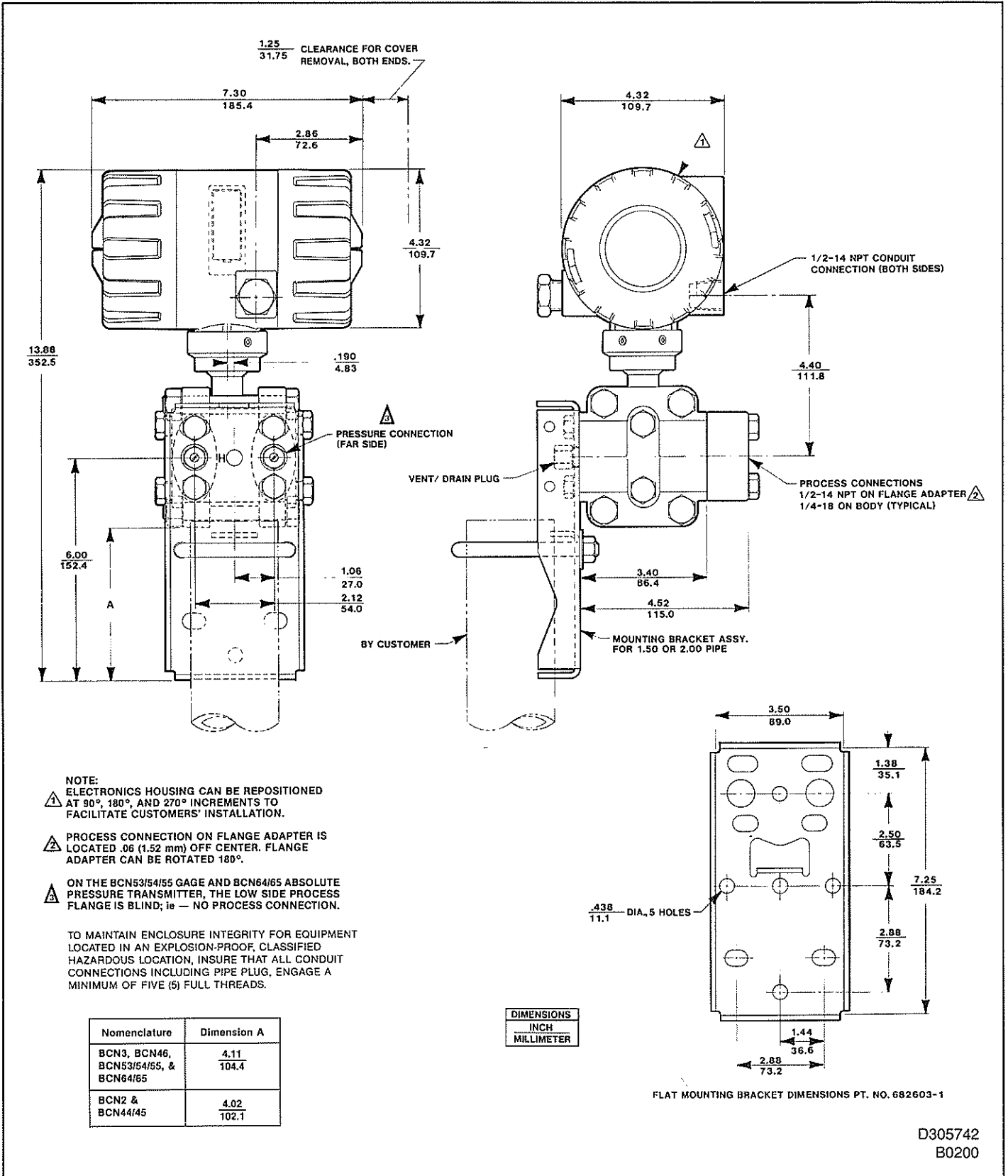


FIGURE 9 – External and Mounting Dimensions (Smart BCN21314, BCN53154155, and BCN64165)

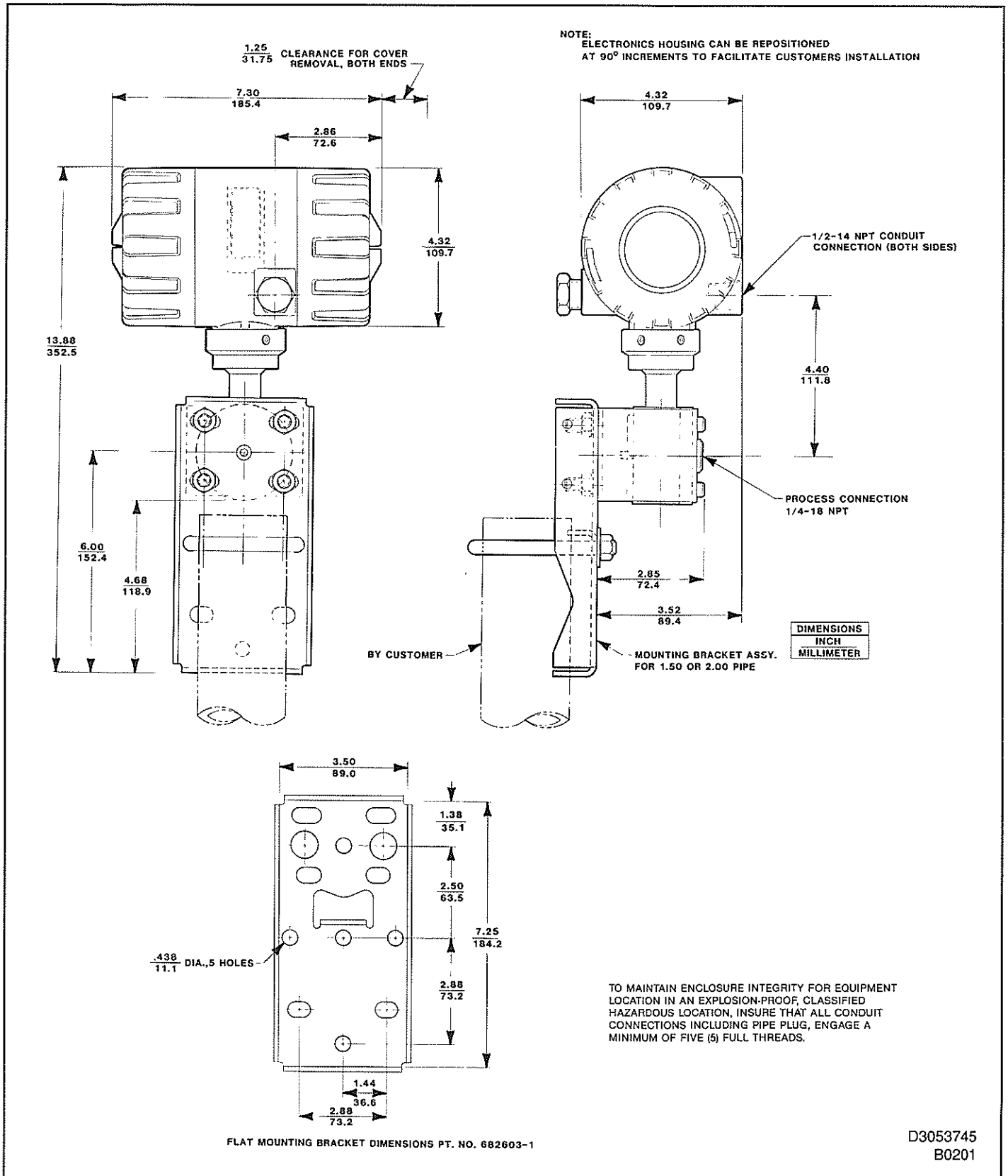
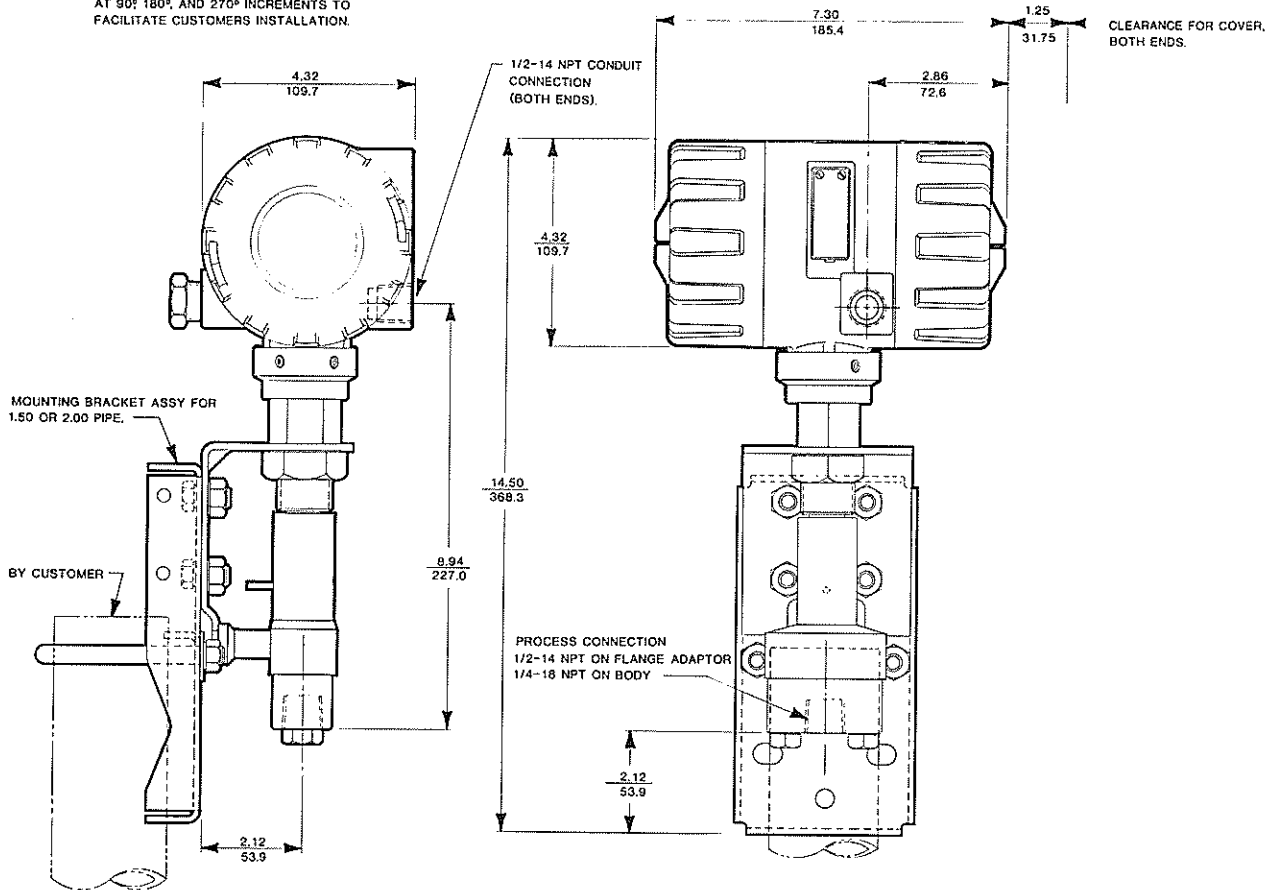


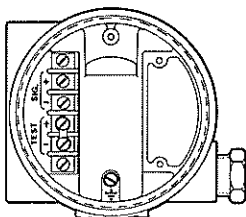
FIGURE 10 – External and Mounting Dimensions (Smart BCN56/57 and BCN66/67)

# Installation

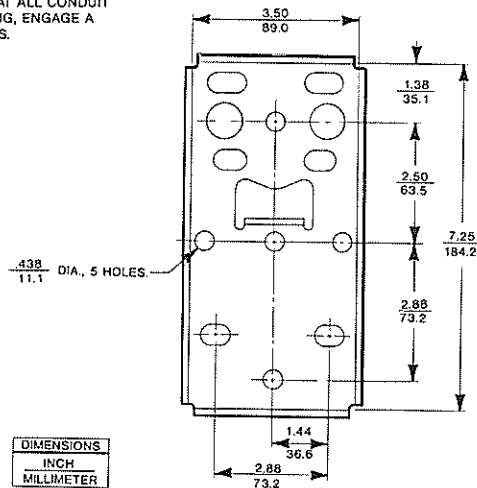
NOTE: ELECTRONICS HOUSING CAN BE REPOSITIONED AT 90°, 180°, AND 270° INCREMENTS TO FACILITATE CUSTOMERS INSTALLATION.



TO MAINTAIN ENCLOSURE INTEGRITY FOR EQUIPMENT LOCATED IN AN EXPLOSION-PROOF, CLASSIFIED HAZARDOUS LOCATION, INSURE THAT ALL CONDUIT CONNECTIONS INCLUDING PIPE PLUG, ENGAGE A MINIMUM OF FIVE (5) FULL THREADS.



AMPLIFIER CONNECTIONS (EXTERNAL COVER REMOVED) SECTION A-A



DIMENSIONS  
INCH  
MILLIMETER

FLAT MOUNTING BRACKET DIMENSIONS  
PT. NO. 682603-1

D3053746  
B9807

FIGURE 11 – External and Mounting dimensions (Smart BCN58/59)

feature is to release residual pressure during start-up and servicing (as a bleeder valve). This applies to discharging (in gas applications) and venting (in liquid/vapor applications). During installation, check that vent/drain plugs, if provided, are tight before proceeding with piping installation and calibration.

After mounting, calibration should be verified to ensure that there has not been a zero shift due to mounting the unit (refer to **CALIBRATION**).

## Connecting Piping

Connecting piping should be in accordance with ANSI Code (B31.1.0) for Pressure Piping.

The connecting piping shown in Figures 12, 13, 14, 16, 18, and 20 are typical piping arrangements only. They are intended as generalized guides, and may not necessarily reflect the exact configuration required for the particular service.

## WARNING

Any recognized corrosive properties of the fluid to be measured must be considered when selecting piping materials.

## AVERTISSEMENT

Les proprietees corrosives des fluides doivent etre considerees au la selection de la tuyauterie.

**FLOW MEASUREMENT.** Proper location of the transmitter with respect to the process pipe depends on the process material. The following should be considered in determining the best location:

1. Hot process material [above 220°F (104°C)] must be kept out of contact with the transmitter.

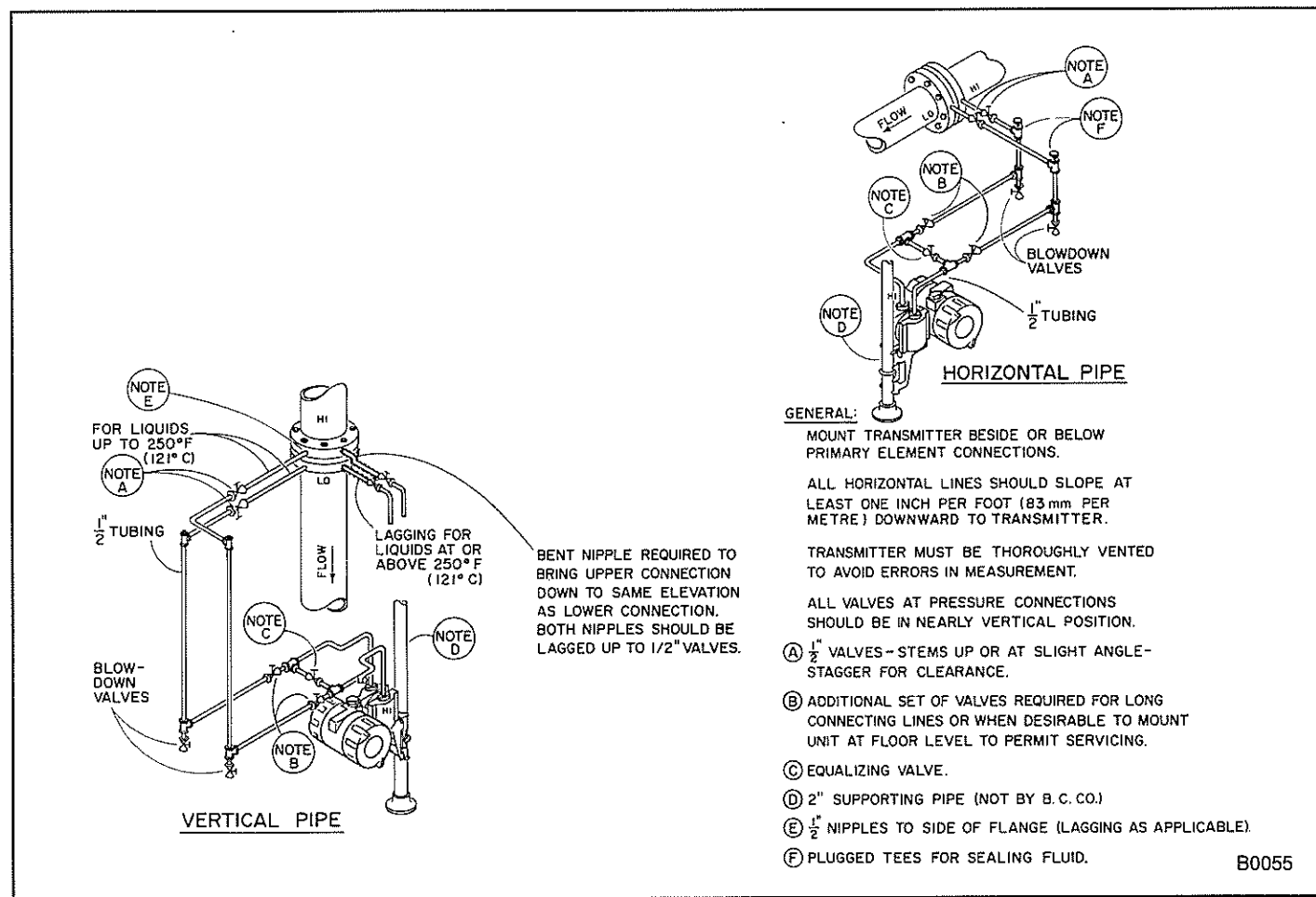


FIGURE 12 – Connecting Piping for Liquid Measurement

# Installation

2. Sediment should be kept from depositing in the pressure piping.
3. Liquid head must be kept balanced on both legs of pressure piping.
4. Pressure piping should be as short as possible.
5. Ambient temperature gradients and fluctuations should be minimized.

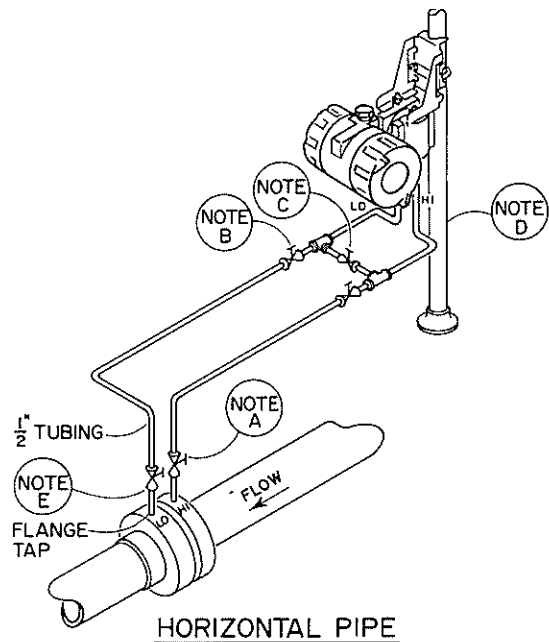
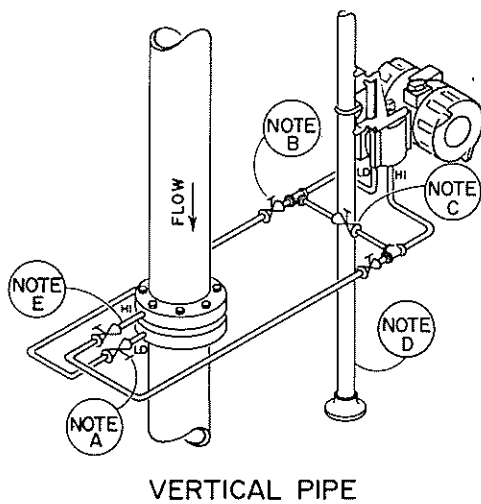
## LIQUID FLOW.

1. Primary element taps should be made to side of flange to avoid sediment deposits (Figure 12).

2. Transmitter should be mounted beside or below primary element taps to allow gases to vent into process line.

## GAS FLOW.

1. Primary element taps should be made to top or side of flange (Figure 13).
2. Transmitter should be mounted beside or above primary element taps to allow liquid to drain into process line.



### GENERAL:

MOUNT TRANSMITTER BESIDE OR ABOVE PRIMARY ELEMENT CONNECTIONS.

MAKE PRIMARY ELEMENT CONNECTIONS ON TOP OF FLANGE IN HORIZONTAL FLOW.

ALL HORIZONTAL LINES SHOULD SLOPE AT LEAST ONE INCH PER FOOT (83mm PER METRE) DOWNWARD TO PRIMARY ELEMENT.

- (A)  $\frac{1}{2}$ " VALVES - STEMS UP OR AT SLIGHT ANGLE - STAGGER FOR CLEARANCE.

- (B) ADDITIONAL SET OF VALVES REQUIRED FOR LONG CONNECTING LINES OR WHEN DESIRABLE TO MOUNT UNIT AT FLOOR LEVEL TO PERMIT SERVICING.

- (C) EQUALIZING VALVE.

- (D) 2" SUPPORTING PIPE (NOT BY B. C. CO.)

- (E)  $\frac{1}{2}$ " NIPPLES TO FLANGE.

B0056

FIGURE 13 - Connecting Piping for Gas Measurement

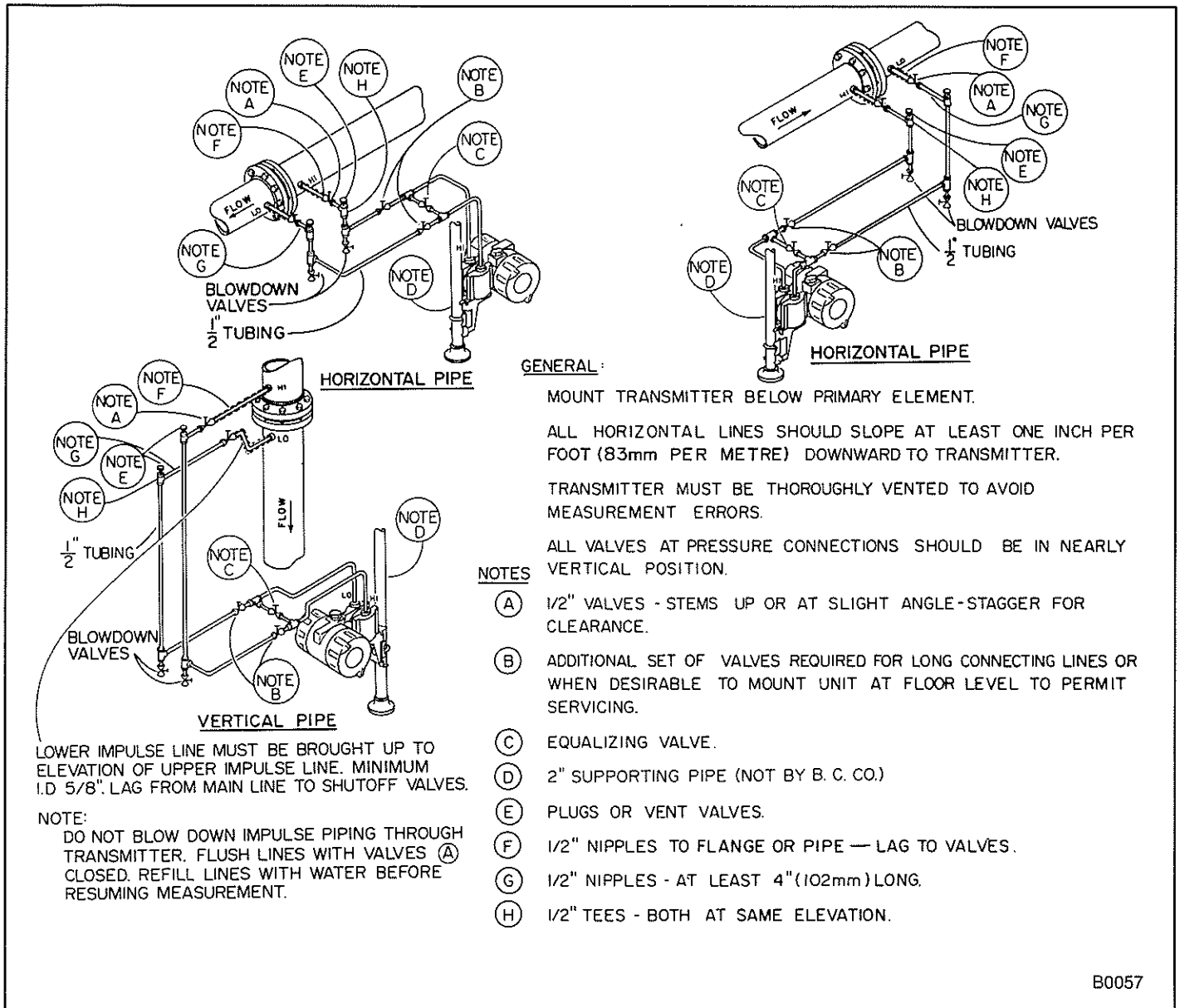


FIGURE 14 – Connecting Piping for Steam Measurement

**STEAM FLOW.**

1. Primary element taps should be made to side of pipe line (Figure 14).
2. Transmitter should be mounted below primary element taps to allow condensate to fill pressure piping, preventing contact of live steam with the transmitter.

**NOTE:** Condensate chambers are not necessary since volumetric displacement of the transmitter is negligible.

**LEVEL MEASUREMENT – OPEN TANK.** In an open vessel, level can be measured by making a pressure measurement at the bottom of the vessel (Figure 15). The pressure at the transmitter “H” connection will be equal to the height of the liquid ( $h_2 \times SG_{liq}$ ). The connection is made to the high (H) side of the transmitter; the low side of the transmitter is open to atmosphere (refer to Figure 16 for typical connecting piping arrangements). The output of the transmitter will be proportional to the level of the liquid above the transmitter. If the zero point of the desired level range is above the transmitter, the transmitter zero must be suppressed to elevate the range.

# Installation

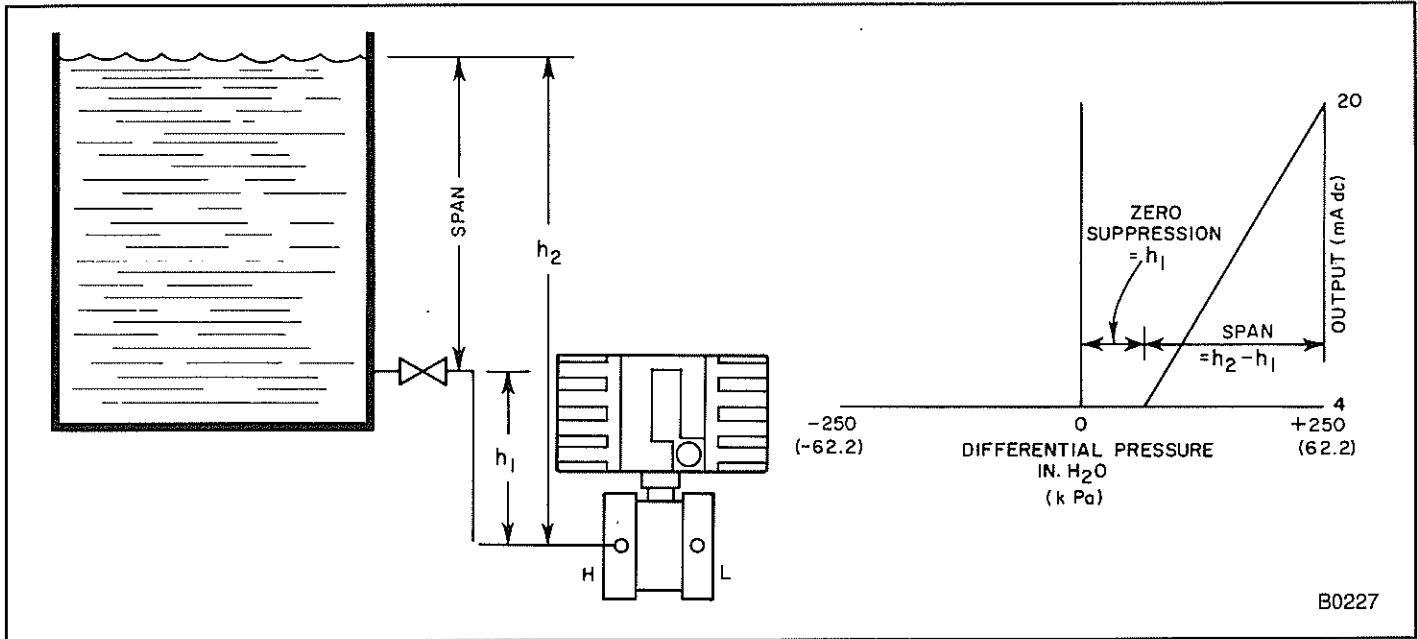


FIGURE 15 – Example of Open Tank Level Measurement

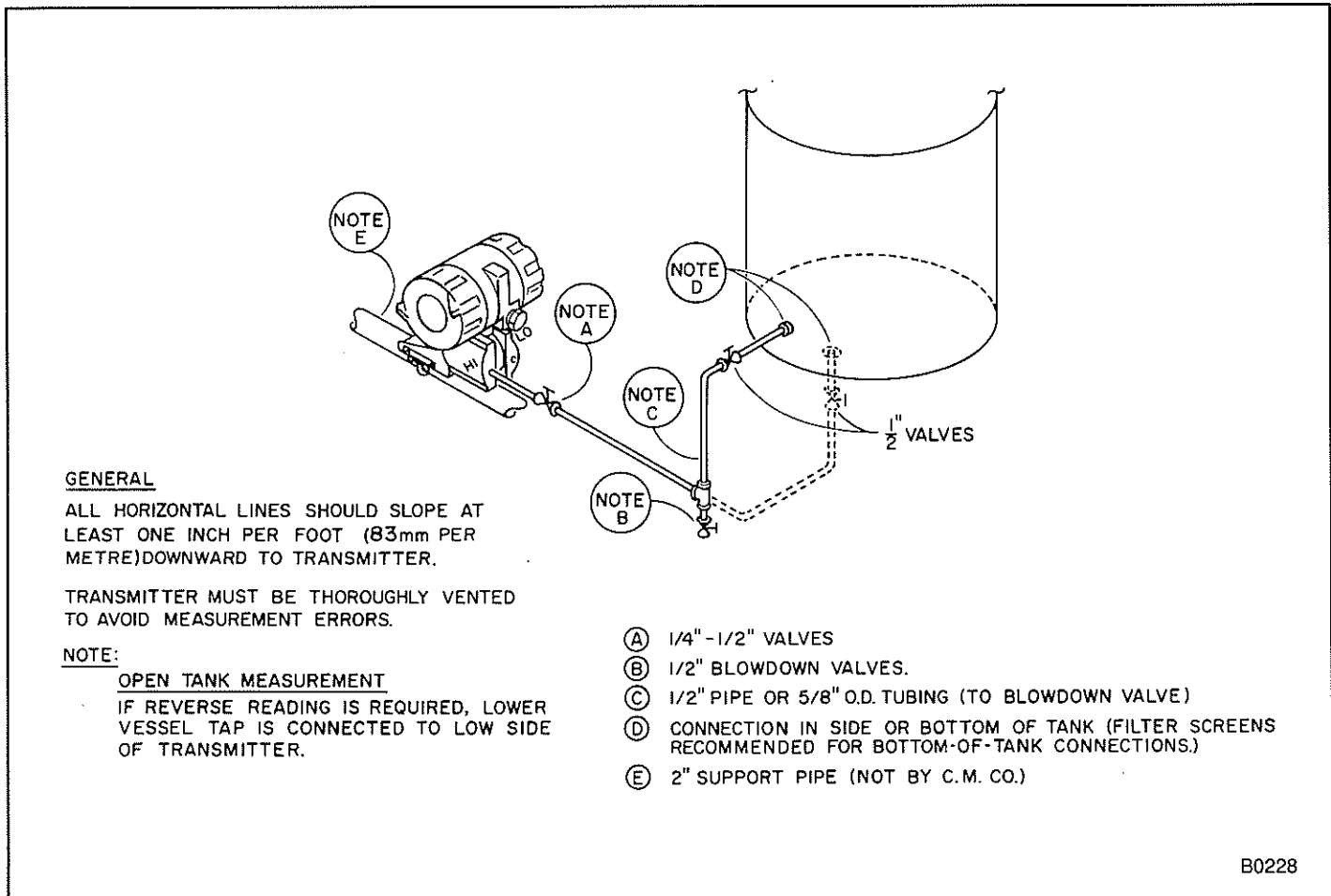


FIGURE 16 – Connecting Piping for Open Tank Level Measurement



**LEVEL MEASUREMENT – CLOSED TANK.** In a closed vessel, pressure above the liquid will affect pressure measured at the bottom of the vessel, and must be subtracted from the measurement. This is accomplished by making a pressure tap above maximum range level and connecting pressure piping to the low side of the transmitter.

If the atmosphere above the liquid is non-condensable (Figure 17), the pressure line from the top connection will be dry. The transmitter responds only to the pressure of the fluid measured at a lower tap, and calculations are the same as for open tank level measurements. The transmitter flange is the high (H) side of the transmitter, and the pressure line from the top connection is connected to the low side of the transmitter (refer to Figure 18 for connecting piping arrangements). If the zero point of the desired level is above the transmitter, the transmitter zero must be suppressed to elevate the range.

If the atmosphere (vapor state of the liquid) above the liquid is condensable (i.e., steam above boiler water if water level is being measured), the upper pressure line will fill with condensate creating a wet leg or reference leg which exerts a pressure at the transmitter low side connection greater than that exerted by the variable level

at the high (H) side connection. If  $h_3$  is the level of the water at any point between minimum and maximum level range values, the transmitter senses the difference in pressure between the fixed head at  $h_2$  and the variable head at  $h_3$  (Figure 19). As the level of  $h_3$  increases, the difference between  $h_2$  and  $h_3$  decreases. Transmitter output decreases with increasing level and decreasing differential pressure. The effect is that of a negative differential pressure which decreases in numerical value as the level rises. This negative differential is simulated for calibration purposes by a positive pressure, increasing in value, imposed on the transmitter low side pressure connection. Therefore, the transmitter may be considered reverse acting, but only with respect to the positive pressure used in calibration. Refer to Figure 20 for typical piping arrangements.

**Pressure Piping**

The piping between the primary element and the transmitter must transfer the pressure seen at the pipe or flange taps to the transmitter. Possible sources of error in this pressure transfer are:

1. Leaks.
2. Friction loss, if purging is used.

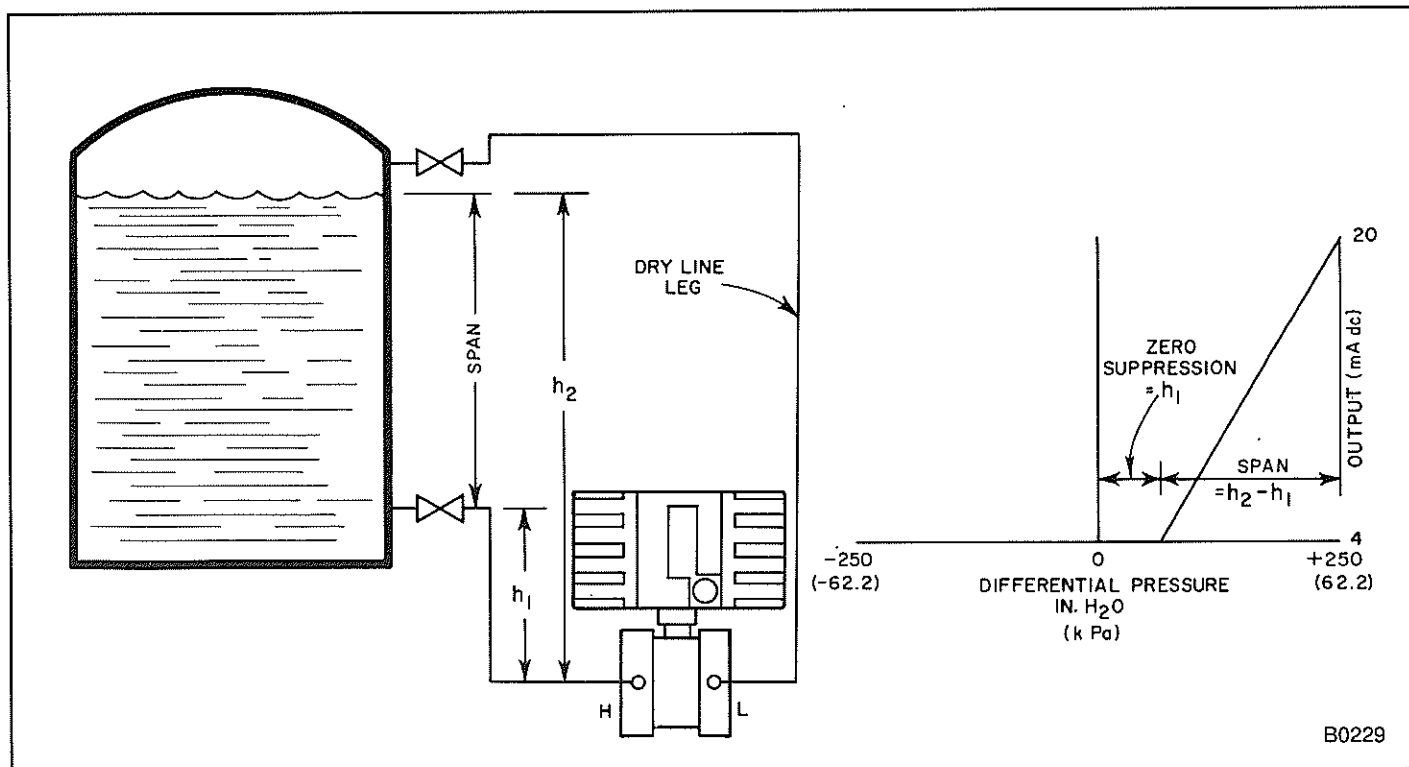


FIGURE 17 – Example of Closed Tank, Noncondensing Atmosphere, Level Measurement

# Installation

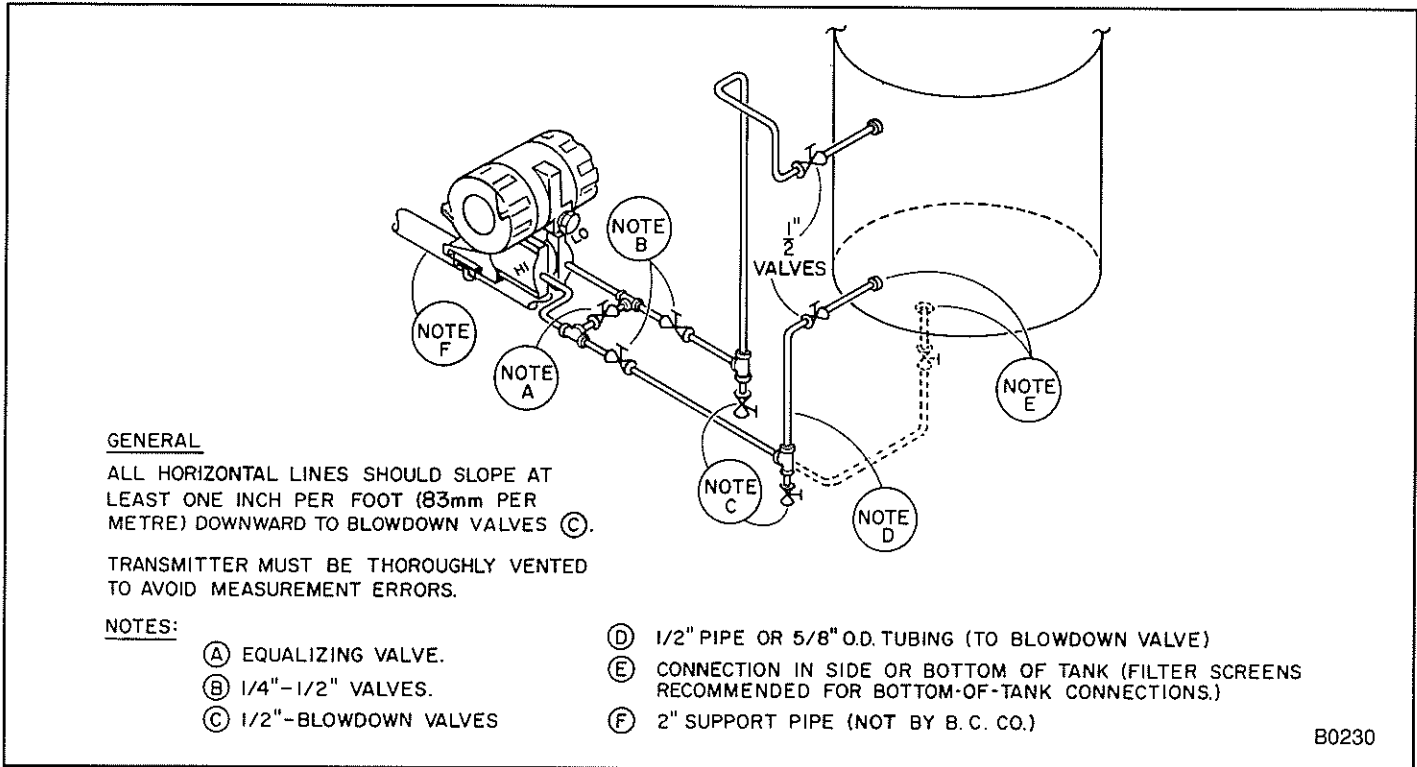


FIGURE 18 – Connecting Piping for Closed Tank, Noncondensing Atmosphere, Level Measurement

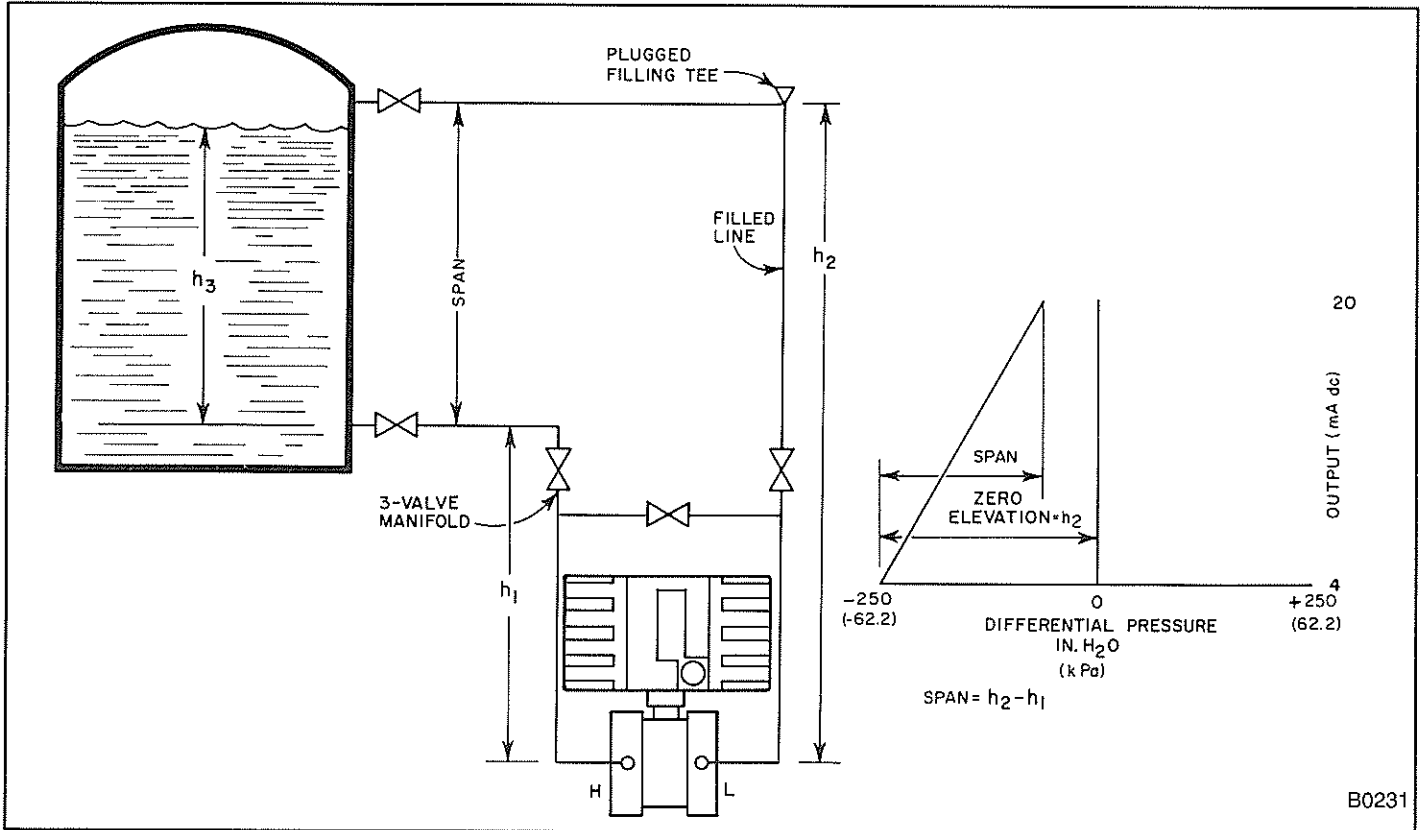


FIGURE 19 – Example of Closed Tank, Condensing Atmosphere, Level Measurement

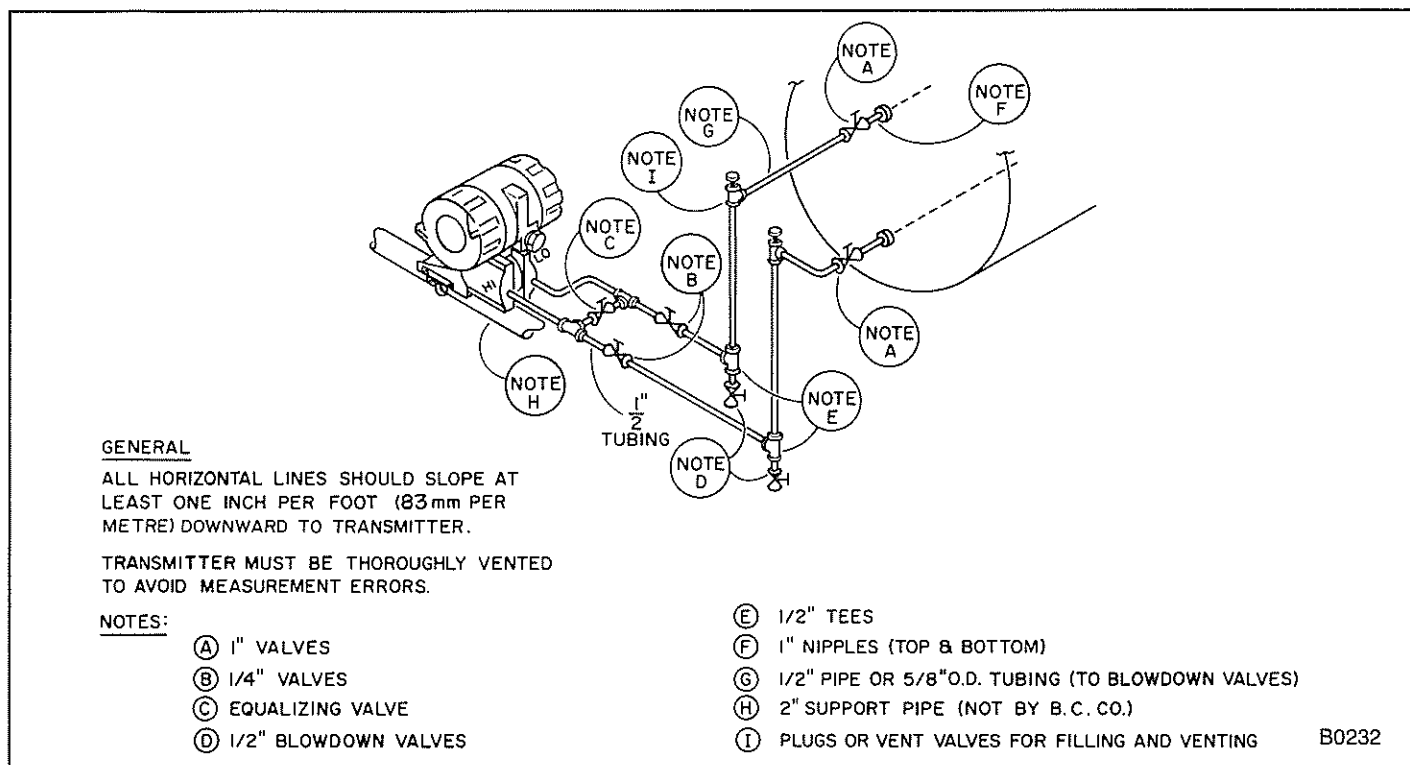


FIGURE 20 – Connecting Piping for Closed Tank, Condensing Atmosphere, Level Measurement

3. Trapped gas in a liquid line (head error).
4. Liquid in a gas line (head error).
5. Temperature-induced density variations between pressure lines (head error).

The following precautions are suggested to minimize the possibility of errors:

1. Make pressure piping as short as possible.
2. Slope piping from primary element at least 1 inch per foot (83 mm per meter) down toward the transmitter for liquid and steam.
3. Slope piping from the transmitter at least 1 inch per foot (83 mm per meter) down toward primary element for gas.
4. Avoid high points in liquid lines and low points in gas lines.
5. Keep both pressure lines at the same temperature.

6. Use pressure piping of sufficient diameter to avoid friction effects.

7. Be sure all gas is vented from liquid pressure lines.

8. When sealing fluid is used, fill both pressure lines to same level.

9. When purging is used, make purge connection close to primary element taps and purge through equal lengths of same size pipe. Avoid purging through the transmitter.

### Wiring

**POINT-TO-POINT MODE (ANALOG MODE).** In the point-to-point mode of operation, the electrical connections are made in the typical two-wire, 4 to 20 mA configuration shown in Figure 7. A positive (+) and a negative (-) terminal is provided at the transmitter to identify the signal leads.

**NOTE:** Ensure that the temperature rating of the wire is sufficient for the operating temperature.

# Installation

The signal terminals located in the electronics housing will accept wire sizes up to 14 AWG. All power is supplied over the signal leads by a standard 24 V dc system power supply. Maximum supply is 42 V dc. Minimum power supply voltage is determined by the loop resistance as follows:

Minimum Supply Voltage = 13 Volts + (0.02 x Load Resistance [in ohms])

Load resistance must include the resistance of any meters external to the transmitter, the wiring, and the system input. Power supply regulation is not critical as long as supply voltage remains above the minimum value required to drive the external load resistance (see Figure 2).

Two “TEST” terminals located next to the signal terminals allow connection of a milliammeter so loop current can be monitored without disturbing the existing wiring.

**NOTE:** When jumper 31 (Figure 34) is removed from the terminal block the minimum supply voltage for the transmitter increases to 13.7 V dc.

**FIELD BUS MODE (DIGITAL MODE).** In the field bus mode of operation there is no 4 to 20 mA output signal as in the point-to-point mode. The transmitter draws less than 4 mA to maintain operation. In this mode, up to 15 transmitters can share a common set of wires (Figure 8).

In the field bus mode the process variable signal of each transmitter is a digitally polled variable. The IMFBS01 Module sequentially poles each transmitter output on the bus. Each transmitter on the bus has its own unique address which is assigned during calibration (see **CALIBRATION**). Using these addresses the FBS knows which module it is communicating with.

Each transmitter present on the bus is wired to the control system by connecting the signal leads from the control system to the positive (+) and negative (-) terminals of the transmitter. Transmitters on the bus are to be connected in parallel.

Minimum power supply voltage is determined by the loop resistance as follows:

Minimum Supply Voltage = 13 volts + [(0.004 x no. of transmitters on bus) x (load resistance)]

Load resistance must include the system input resistance and the resistance of the wire. No meters or measuring devices are to be included in the field bus loop since the transmitters are not delivering an analog process variable. Power supply regulation is not critical assuming the supply voltage to the transmitter remains above 13 volts. This is the minimum voltage required to properly drive the transmitter.

The STT02 can be connected anywhere there is access to the signal leads. Since the STT02 also has its own bus address, it can be connected to the bus while the control system is on line. Only one STT02 can be connected to the bus at any one time. While the field bus is on-line, the STT02 can monitor any transmitter on the bus.

In order to change any calibration or configuration parameters of transmitters using the STT02, the IMFBS01 Module must be taken off-line, or the IMFBS01 Module must be instructed to bring the desired transmitter off line.

Signal wiring should not be run in conduit or open trays with power wiring and should not be run near heavy electrical equipment. Twisted shielded pairs are recommended for best results. Reverse polarity protection is built into the transmitter to protect it against accidental reversal of the field wiring connections.

**NOTE:** Refer to the IMFBS01 Product Instruction, I-E96-302 for wire length and wiring practices in the field bus mode.

## Grounding

Signal wiring may be either ungrounded (floating) or grounded at any one point in the signal loop. If more than one transmitter is connected to a single power supply, grounding should be at the supply. The transmitter case must also be grounded. A ground terminal is provided inside the electronics housing near the signal wiring terminals.

## Hazardous Locations (Flammable Atmospheres)

The BCN Smart Transmitter must not be located in a hazardous (classified) location unless factory marked as suitable for that location. This equipment must be installed and operated per **APPENDIX A, Applications in Flammable Atmospheres**.

## Calibration

### INITIAL CALIBRATION

The transmitter is shipped completely calibrated from the factory. If a calibration check is desired before placing the transmitter in service or if calibration is required due to repair, an overpressure condition, or replacement of parts, use the following procedures in **Checkout** as a guide.

### CHECKOUT

If using the point-to-point mode of operation:

1. Connect the transmitter in a calibration setup (see Figure 21). Position the transmitter in the same position as final installation.

2. Apply the low range pressure; check the output. It should be:

- 4.000  $\pm$ 0.016 mA on the BCN2, BCN44/45, BCN53/54/55, BCN58/59 and BCN64/65;
- 4.000  $\pm$ 0.04 mA on the BCN3, BCN46, BCN56/57, and BCN66/67.

3. If the output is not within the limits stated in Step 2, then recalibrate the unit. Press the CALIBRATE key on the STT02 and follow the step-by-step procedures (refer to STT02 Product Instruction).

4. Apply the full range pressure to the transmitter and check the output. It should be:

- 20.000  $\pm$ 0.016 mA on the BCN2, BCN44/45, BCN53/54/55, BCN58/59, and BCN66/67;
- 20.000  $\pm$ 0.04 mA on the BCN3, BCN46, BCN56/57, and BCN66/67.

5. If the output is not within the limits stated in Step 4, then recalibrate the unit by pressing the CALIBRATE key on the STT02 and follow the step-by-step procedures (refer to STT02 Product Instruction).

If using the field bus mode of operation:

1. Connect the transmitter in a calibration setup (see Figure 21). Place the transmitter in the same position as the final installation.

2. Apply the low range pressure, check the 4 to 20 mA output. It should be below 4 mA. Press the OUTPUT key on the STT02, then select *REPORT OUTPUT*. The STT02 should be displaying 0%:

- $\pm$ 0.1 % for BCN2, BCN44/45, BCN53/54/55, BCN58/59, BCN64/65 and
- $\pm$ 0.25% for BCN3, BCN46, BCN56/57 and BCN66/67.

3. If the digital output is not within the limits stated in Step 2, recalibrate the unit. Press the CALIBRATE key on the STT02 and follow the step-by-step procedures.

4. Apply the full range pressure to the Transmitter and check the 4 to 20 mA output. It should be below 4 mA. Press the OUTPUT key on the STT02 then select *REPORT OUTPUT*. The STT02 should be displaying 100.0%:  $\pm$  0.15%.

5. If the digital output is not within the limits stated in Step 4, recalibrate the unit by pressing the CALIBRATE key on the STT02 and follow the step-by-step procedures.

**NOTE:** If the 4 to 20 mA output does change with respect to pressure, then the unit is not in the digital mode. To enter the digital mode, press the CONFIGURE key on the STT02 and follow the step-by-step procedures to configure the transmitter for digital operation. Use the SEND CONF key to send new configuration to the transmitter.

# Calibration

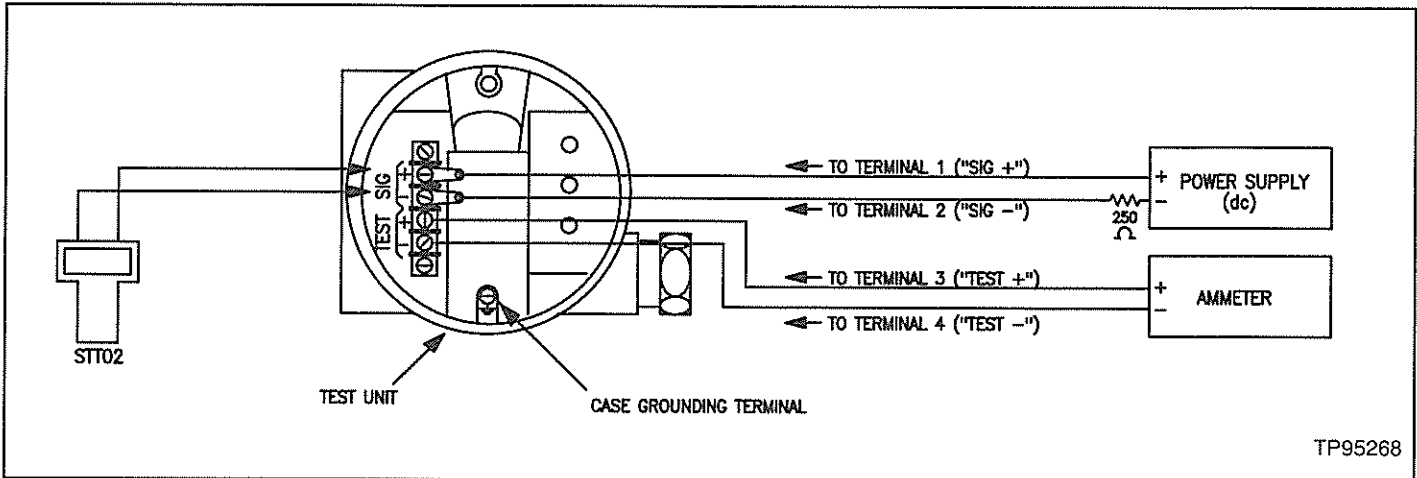


FIGURE 21 – Typical Calibration Setup

## Temperature Compensation

A temperature sensor located within the transducer assembly reads and reports the transducer's temperature to the microcomputer. Using this temperature along with user-entered temperature coefficient data (Figure 22), temperature compensation is performed.

Temperature coefficient data should be checked prior to bench calibration, since the temperature coefficient can affect the output. This temperature coefficient data is found on a label mounted in the electronics side of the amplifier housing. Temperature compensation of the Smart BCN Transmitter is accomplished as follows:

1. Using the STT02, press the CALIBRATE key, select *BENCH CALIB.* and follow the step-by-step instructions. The STT02 will ask for the ambient temperature of the transducer in degrees Celcius. It is important for operation that this temperature be within  $\pm 1$ oC to the actual temperature. This information is used to calibrate the temperature sensor. By performing this calibration, the transmitter knows which sensor type it is addressing. (Conventional BC, Smart BC or BCN).

2. When the sensor type is established, the STT02 will ask if temperature coefficients will be viewed. Select *YES*, then press ENTER. The STT02 will now display the appropriate screen for entering temperature compensation data. If the value is correct, press ENTER; if not correct, enter the correct data.

3. The checksum number that appears with the other temperature coefficient data is provided for error detection to ensure that the coefficient data is input correctly. If any of the data is incorrectly entered, the STT02 will ask that the numbers be re-entered.

Smart BCN sensor: the STT02 asks for temperature coefficient data (zero and span shift, A thur E). Enter the data found on the label inside the housing as prompted by the STT02. (See Figure 22.)

Smart BC sensor: the STT02 will ask for coefficient data (zero and span shift) in percentage form; enter appropriate data from the label located inside the amplifier housing.

Conventional BC sensor: the STT02 will display the screen for the BCN sensor. The user should enter zeros for all values, including the checksum number. The conventional BC sensor provides its own temperature compensation.

**NOTE:** For temperature compensation of the BCN58/59; when the STT02 asks for coefficient data, enter zeros for zero shift, span shift and checksum values. The BCN58/59 is temperature compensated by hardware located in the neck of the transducer assembly.

**NOTE:** The data appearing in Figure 22 is sample data, used for illustrative purposes. The data for actual use is located inside the amplifier housing.

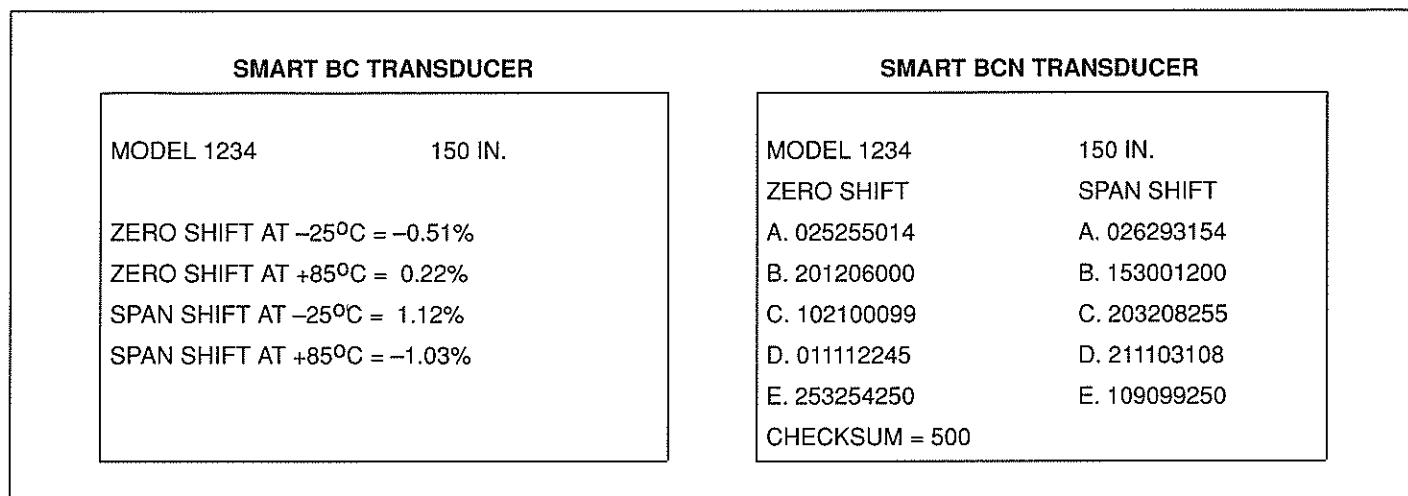


FIGURE 22 – Sample Temperature Coefficient Data Labels

**Changing Calibration (Linear 4 to 20 mA Output)**

1. All calibration is done electronically by the STT02 Smart Transmitter Terminal. Connect transmitter in a calibration setup (see Figure 21). Position the transmitter in the same position as the final installation.

2. Readjust the transmitter by pressing the CALIBRATE key and selecting *BENCH CALIB.* and follow the directions given by the STT02.



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## Operating Procedures

### INTRODUCTION

This section provides the user with the configuration parameters necessary to set the transmitter for your application. Also discussed are start-up and failure conditions for the BCN Pressure Transmitter.

Transmitter configuration requires the STT02. Refer to Product Instruction I-E21-28 for detailed information and data entry procedures.

### OPERATOR INTERFACE

The Bailey Type BCN Smart Transmitter can be monitored and controlled using the Bailey Type STT02 Smart Transmitter Terminal. It can be connected anywhere there is access to the signal wires. Connect the STT02 across the signal wires in a parallel connection.

#### Configuration Procedure

The Bailey Smart Transmitter can be configured using the STT02 Smart Transmitter Terminal. Configuration of the transmitter includes defining an identification tag, primary lower and upper range values, digital or analog mode of operation, primary engineering units, secondary engineering units and secondary lower and upper range values, output parameters, and a damping constant. Use the CONFIGURE key and follow the step-by-step procedure. Once a configuration has been saved in the terminal's memory, it can be sent to a connected transmitter using the SEND CONFIG key. (Refer to STT02 Product Instruction.) The following paragraphs explain the configuration parameters.

**TRANSMITTER ADDRESS.** The transmitter address is used for field bus transmitters. Each transmitter on the field bus must have a separate address. The address range is 1 through 15. If the transmitter address is programmed to be between 1 and 15 the transmitter will put itself into the field bus mode (digital mode) and will not output a 4 to 20 mA signal in proportion to the input. The output will be "locked" below 4 mA. If the user specifies point-to-point mode (analog) instead of selecting a particular address, the transmitter will then be in the analog mode thus providing a 4 to 20 mA output signal.

Under no circumstance should a transmitter configured for point-to-point mode be connected to a field bus. The field bus will not support analog output devices.

**ID TAG.** The Smart Transmitter ID tag is a 12-character alphanumeric tag which can be programmed into the transmitter. It is different than the previously discussed Transmitter Address. The ID tag is inputted by the user during configuration for the users own identification needs. To display the ID tag on the screen, press the STATUS key on the STT02; the user specified ID tag will appear.

**OUTPUT TYPE.** The output of the transmitter must be specified as linear with respect to the input, as the square root of the input, as 3/2 power output, as 5/2 power output. Also the output can be specified as the volume of a spherical tank, as the volume of a flat ended horizontal tank, or as a function generator that follows a six segment linear function programmed by the user. If a function generator is chosen, five input and output points must also be specified as a percent of input. Note that the first and last point on the curve are assumed to be 0.00 and 100.0%. The user should program five points between these two values.

**OUTPUT ACTION.** A transmitter in the normal acting mode has an output that increases with increasing input. The output of a transmitter in the reverse acting mode decreases with increasing input.

**DAMPING ADJUSTMENT.** Damping is adjustable and provides time constant values from 0.00 to 32.00 seconds. Damping adjustments have no effect on the calibration or accuracy of the transmitter, however it can be used to "smooth out" a fluctuating input signal.

**PRIMARY ENGINEERING UNITS.** Smart transmitter primary engineering pressure units can be defined. Note that when the engineering pressure units are changed, the upper and lower range values will automatically be changed to match the new units. The limits are  $\pm 9999$ . (See example.)

Example: primary engineering units changed from psi to H<sub>2</sub>O.

Engineering units are psi.

Lower range value: 0 psi

Upper range value: 1 psi

# Operating Procedures

Engineering units changed to inches H<sub>2</sub>O.

Lower range value automatically becomes: 0 inches H<sub>2</sub>O.

Upper range value automatically becomes: 27.7 inches H<sub>2</sub>O.

## PRIMARY LOWER & UPPER RANGE VALUES.

The transmitter's range may be set electronically to any value within  $\pm 100\%$  of the upper range limit to suit a specific application need.

## SECONDARY (FLOW) ENGINEERING UNITS.

Secondary (flow) engineering units can be programmed. These units are in a free form format of six characters. Any six characters can be programmed into the transmitter, such as MA or GAL/HR. These units are used in conjunction with the secondary lower and upper range values.

Use the up and down arrow keys or the decimal number keys to select the secondary units.

## SECONDARY (FLOW) LOWER AND UPPER RANGE VALUES.

The transmitters secondary lower and upper range value can be set to any range within  $\pm 9999$ . These ranges can be monitored by the STT02 or displayed on the optional LCD display. These ranges are a function of the output of the device, hence if a non-linear output is selected such as square root, the output to the STT02 will be in units representing the non-linear square root function. The flow output can be poled from the device or displayed on the LCD screen. These ranges have no effect on the calibration of the transmitter and are used so that the user can report the output of the transmitter in familiar units.

**LOCAL LCD SET UP.** The local LCD can be programmed to display output in percent, input in pressure engineering units or output in secondary engineering units. This feature can be programmed using the SPECIAL FEATURE key on the STT02.

## Start-up and Failure Conditions

### WARNING

The output of this equipment changes to a fixed value during start-up and transmitter detected failure conditions. These values must be selected by the user to ensure safe operation.

### AVERTISSEMENT

La sortie de cet appareil adopte une valeur fixe lors de la mise sous tension et de certaines conditions de pannes. Ces valeurs fixes doivent être sélectionnées par l'utilisateur pour assurer une sécurité d'opération lorsqu'elles surviennent.

On power-up, there is a two second initialization period during which the output of the transmitter is either above 100% or below 0% as defined by the user during configuration. *INITIALIZE LOW* sets the output to below 0% (approx. 3.8 mA) while *INITIALIZE HIGH* sets the output to above 100% (approx. 21 mA). The default initialization value is low (below 0%). After initialization, the output ramps up or down to the correct value.

If during its continual diagnostics, the microcomputer detects a problem that is fatal to the transmitter or system, the transmitter output will be set to a predetermined level. This level must be selected by the user during configuration. The default value is set low (below 0%). Troubleshooting Table 1 shows what types of errors will cause the transmitter to enter into the fail mode.

**NOTE:** For a transmitter in the normal acting mode, 0% output would be 4 mA and 100% output would be 20 mA; for a transmitter in the reverse acting mode, 0% output would be 20 mA and 100% output would be 4 mA.

## Spherical and Flat end Tank Outputs

**SPHERICAL TANK CALCULATION PROCEDURE.** The user must calibrate the BCN using the "empty" tank pressure as the primary lower range value (i.e. 0.00 inches H<sub>2</sub>O [0.00 kPa]) and the "full" tank pressure as the primary upper range value (i.e. 500 inches H<sub>2</sub>O [124.5 kPa]).

The pressure sensor must be located at the bottom of the sphere, or below the sphere (see Figure 23). If the sensor is located below the sphere, use the following procedures to calibrate out the zero offset:

If 50 inches H<sub>2</sub>O (12.5 kPa) is the pressure at A (Figure 23), then the primary lower range value of the transmitter should be set at 50 inches H<sub>2</sub>O and the primary upper range value will be set at 550 inches H<sub>2</sub>O (137 kPa), ("full" pressure plus pressure from the fluid in the base of the tank).

It is necessary to know the “empty” volume of the spherical tank (always zero), and the “full” volume of the tank. Enter the “empty” volume as the secondary lower range value, and the “full” volume as the secondary upper range value. Enter the desired engineering units for the secondary range values (i.e. GALS.).

**NOTE:** The “empty” and “full” volume do not include the tank base, the volume includes only the spherical portion of the tank.

Configure the BCN for spherical volume by pressing the **CALIBRATE** key on the STT02 and selecting *SPHERICAL VOLUME*. Send the configuration to the transmitter by pressing the **SEND CONFIG** key on the STT02.

**FLAT END TANK CALCULATION PROCEDURE.** The user must calibrate the BCN using the “empty” tank pressure as the primary lower range value (i.e. 0.00 inches H<sub>2</sub>O [0.00 kPa]) and the “full” tank pressure as the primary upper range value (i.e. 500 inches

H<sub>2</sub>O [124.5 kPa]). The tank must be level and the sensor must be at the bottom of the tank (see Figure 24).

If 50 inches H<sub>2</sub>O (12.5 kPa) is the pressure at A (Figure 24), then the primary lower range value of the transmitter should be set at 50 inches H<sub>2</sub>O and the primary upper range value will be set at 550 inches H<sub>2</sub>O (137 kPa), (“full” pressure plus pressure from the fluid in the base of the tank).

The “empty” volume (always zero), and the “full” volume of the tank must be known. Enter the “empty” volume of the tank as the secondary lower range value. Enter the “full” volume as the secondary upper range value. Also enter the desired engineering units for the secondary ranges (i.e. GALS.).

Configure the BCN for spherical volume by pressing the **CALIBRATE** key on the STT02 and selecting *FLAT END TANK*. Send the configuration to the transmitter by using the **SEND CONFIG** key on the STT02.

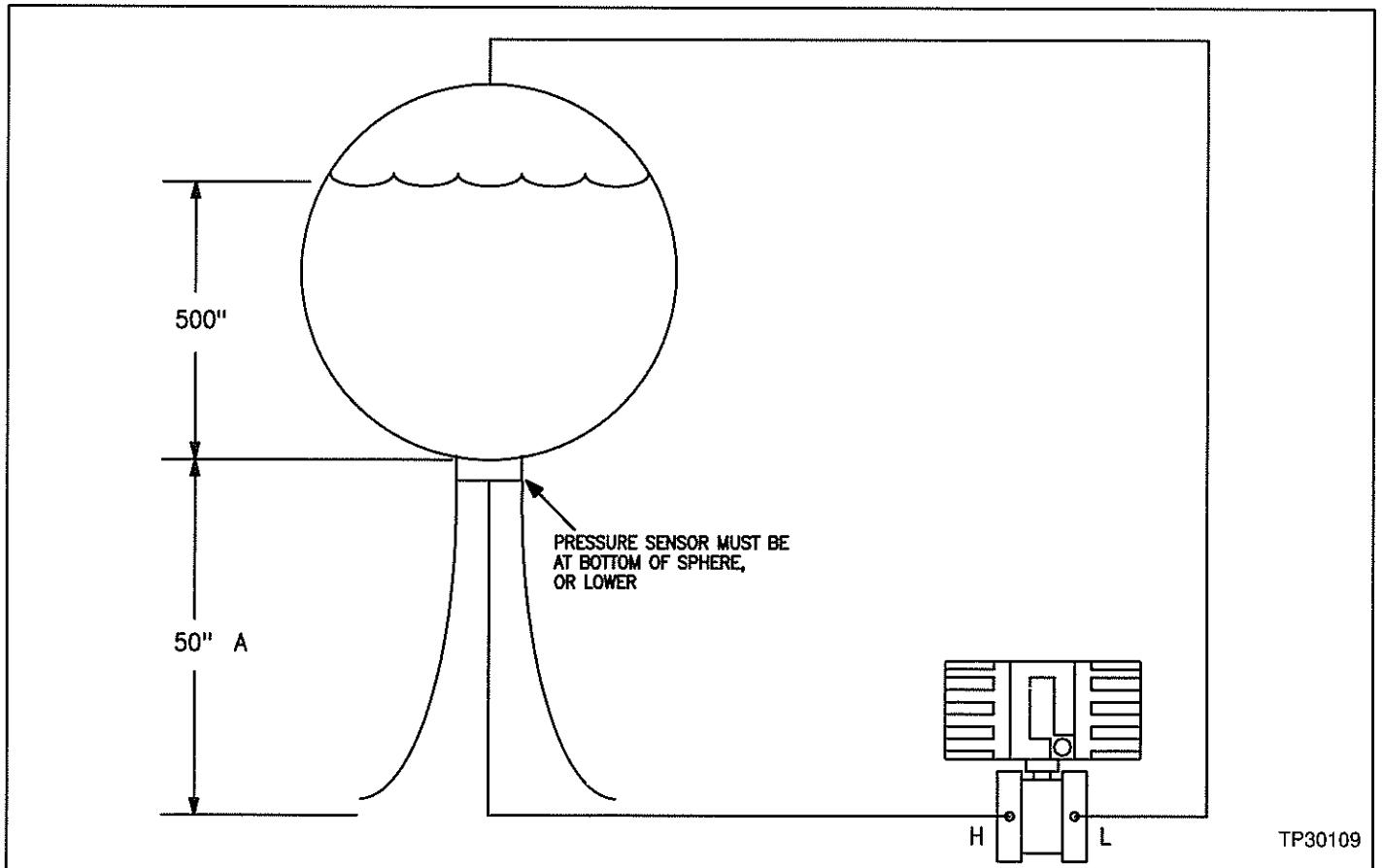


FIGURE 23 – Spherical Tank Measurement

# Operating Procedures

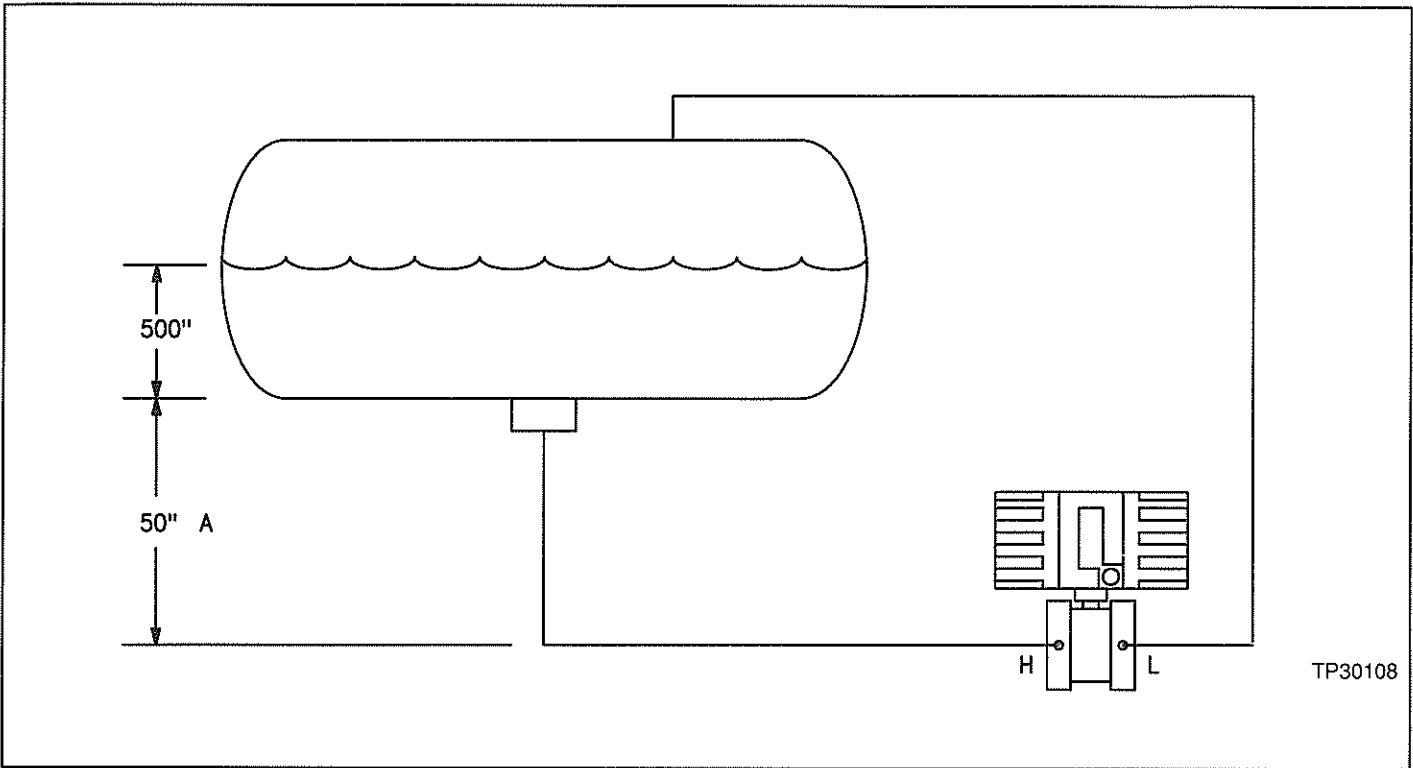


FIGURE 24 – Flat End Tank Measurement

## Get Configuration Procedure

Once a Smart Transmitter has been configured, the configuration may be viewed by pressing the GET CONFIG Key on the STT02 (refer to STT02 Product Instruction).

## Configuration Lockout Procedure

The Smart Transmitter has a “lockout” feature that, once engaged, allows all transmitter functions to be monitored but prevents the transmitter configuration from being altered.

To utilize the “lockout” feature, change the Jumper J1 on the microcomputer board of the transmitter from pins 2 and 3 to pins 1 and 2. Refer to Figure 25 for Jumper J1 location and positions. To gain access to the upper amplifier board, refer to **Replacing the Amplifier Housing Components** in the **REPAIR/REPLACEMENT** section of this Product Instruction.

## Monitor Input Procedure

The input to the Smart Transmitter can be monitored by utilizing the OUTPUT key on the STT02 and selecting *REPORT INPUT* from the displayed menu (refer to STT02 Product Instruction). The input is displayed in engineering units and the display is updated every second.

## Monitor Output Procedure

The Smart Transmitter output can be monitored by selecting the OUTPUT key on the STT02, and choosing REPORT OUTPUT from the display menu (refer to STT02 Product Instruction). The output will be displayed as a percent, rather than in mA, and the display will be updated every second.

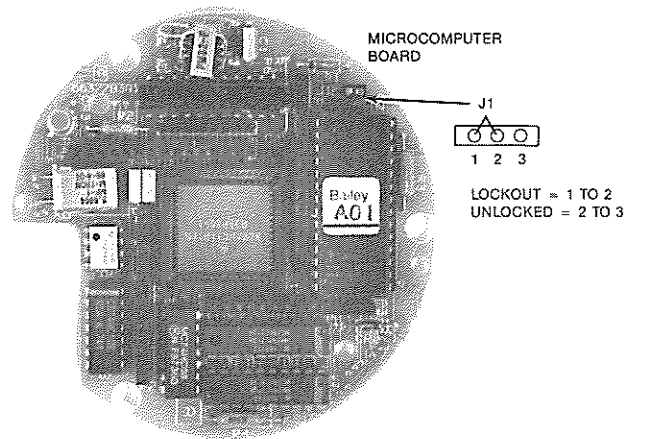


FIGURE 25 – Lockout Jumper J1 Location and Position on the Microcomputer Board.

### Monitor Secondary Engineering Units Procedure

The Secondary Engineering Units variable can be monitored by the STT02 by pressing the OUTPUT key and selecting *SECONDARY UNITS*. The output will reflect the output of the transmitter but it will be a percentage of the secondary lower and upper range value and will be displayed in secondary engineering units.

**Example:** If secondary lower range value is 0.0 GAL/HR and the secondary upper range value is 100 GAL/HR and the output of the transmitter is at 50%, the display will read 50% range or 50 GAL/HR.

### Monitor Transducer Temperature Procedure

By pressing the OUTPUT key and selecting *MONITOR TEMPERATURE*, the STT02 can display the ambient temperature of the transducer. The temperature is displayed in degrees Celcius.

**NOTE:** If using a BCN58/59, or when a conventional transducer has been upgraded to Smart BCN electronics, the transmitter will always output 25°C (77°F). These transducers do not have a temperature sensor that the BCN electronics can access.

### Fix Output Procedure

For system troubleshooting purposes, the Smart Transmitter output can be set to a constant, specified as a percent of the 4 to 20 mA signal. Press the SPECIAL FEATURE key, select *FIX OUTPUT* from the menu of the STT02 to set the constant (refer to STT02 Product Instruction). To cancel *FIX OUTPUT*, press the SPECIAL FEATURE key, then select *CANCEL FIX OUTPUT*.

### Transmitter Status Check Procedure

The status of the transmitter, determined from results of the continuous self-diagnostics, can be checked using the STATUS key on the STT02. Refer to the MAINTENANCE section for corrective action as needed.



## Troubleshooting

### INTRODUCTION

If the Type BCN Transmitter is unable to implement any command, the STT02 Terminal will be prompted. Pressing the STATUS key on the STT02 will enable the user to see what problem exists. Table 1 shows the corrective action to take when the transmitter diagnostics detects a problem and an error message is displayed on the STT02. Figure 26 is a troubleshooting flow chart for the amplifier assembly. Table 2 lists possible output problems, and corrective action to be taken.

**NOTE:** More than one error can be present on one transmitter, however, only one error at a time can be displayed on the STT02. As such, error messages on the STT02 are based on a priority structure. The error holding the most significance to the system will be displayed first and any others that follow will appear according to their rank on the priority structure.

### ERROR MESSAGES AND CORRECTIVE ACTION

TABLE 1 – Error Messages

| ERROR   | PROBABLE CAUSE  | CORRECTIVE ACTION  |
|---|---|--|
| TRANSMITTER CHECKSUM ERROR                          | The data the transmitter received did not pass a checksum test (data corrupted).  | Extreme line noise could cause this message to randomly appear. Since transmitter and STT02 do check data for integrity, this is not a problem. If error message appears frequently, replace communication board. Refer to <b>Replacing Amplifier Housing Components</b> for board replacement |
| TRANSMITTER CAN'T EXECUTE COMMAND: HARDWARE PROBLEM | Detect error in hardware.   | Press STATUS key to determine error and use this table for the appropriate corrective action.  |
| TRANSMITTER CAN'T EXECUTE COMMAND: LOCKOUT ENGAGED  | The hardware lockout jumper on the microcomputer board is set in the lockout mode. (The user cannot change any parameters when this jumper is set in the lockout mode.) | Refer to <b>Configuration Lockout Procedure</b> to change jumper position on the microcomputer board (see Figure 25).  |
| TRANSMITTER CAN'T EXECUTE COMMAND: FBS ON LINE      | The STT02 cannot change any transmitter parameters while the field bus is active.   | Transmitter must be brought off-line. Slave can bring transmitter off-line, or the slave can be unplugged from the rack. There is two-minute time out period until the STT02 will be allowed to change parameters. After the two-minute period, the transmitter will allow the STT02 access.   |
| *TRANSMITTER EPROM CHECKSUM ERROR                   | Program chip on microcomputer board is bad.   | Replace microcomputer board. Refer to <b>Replacing Amplifier Housing Components</b> for replacement procedures.  |
| *TRANSMITTER FAILED RAM CHECK                       | RAM is inoperable because microcomputer chip is defective   | Replace microcomputer board. Refer to <b>Replacing Amplifier Housing Components</b> for replacement procedures.  |
| *TRANSMITTER EEPROM FAILURE                         | Microcomputer has detected a memory problem.  | Reconfigure the transmitter and recalibrate it. The microcomputer will attempt to correct the problem. If it cannot (after three calibration attempts), it will send out a MICROCOMPUTER BAD error message. Refer to that message in this table.   |
| *TRANSMITTER uP HAS BAD EEPROM                      | The microcomputer cannot retain configuration and calibration data. Microcomputer board is defective.   | Replace microcomputer board. Refer to <b>Replacing Amplifier Housing Components</b> for replacement procedures.  |
| *TRANSMITTER INTERNAL REFERENCE FAILURE             | Input board defective. Most probable cause.<br>Microcomputer board defective. Least probable cause.   | Replace input board. Refer to <b>Replacing Amplifier Housing Components</b> for replacement procedures.<br>Replace microcomputer board. Refer to <b>Replacing the Amplifier Components</b> for replacement procedures.   |

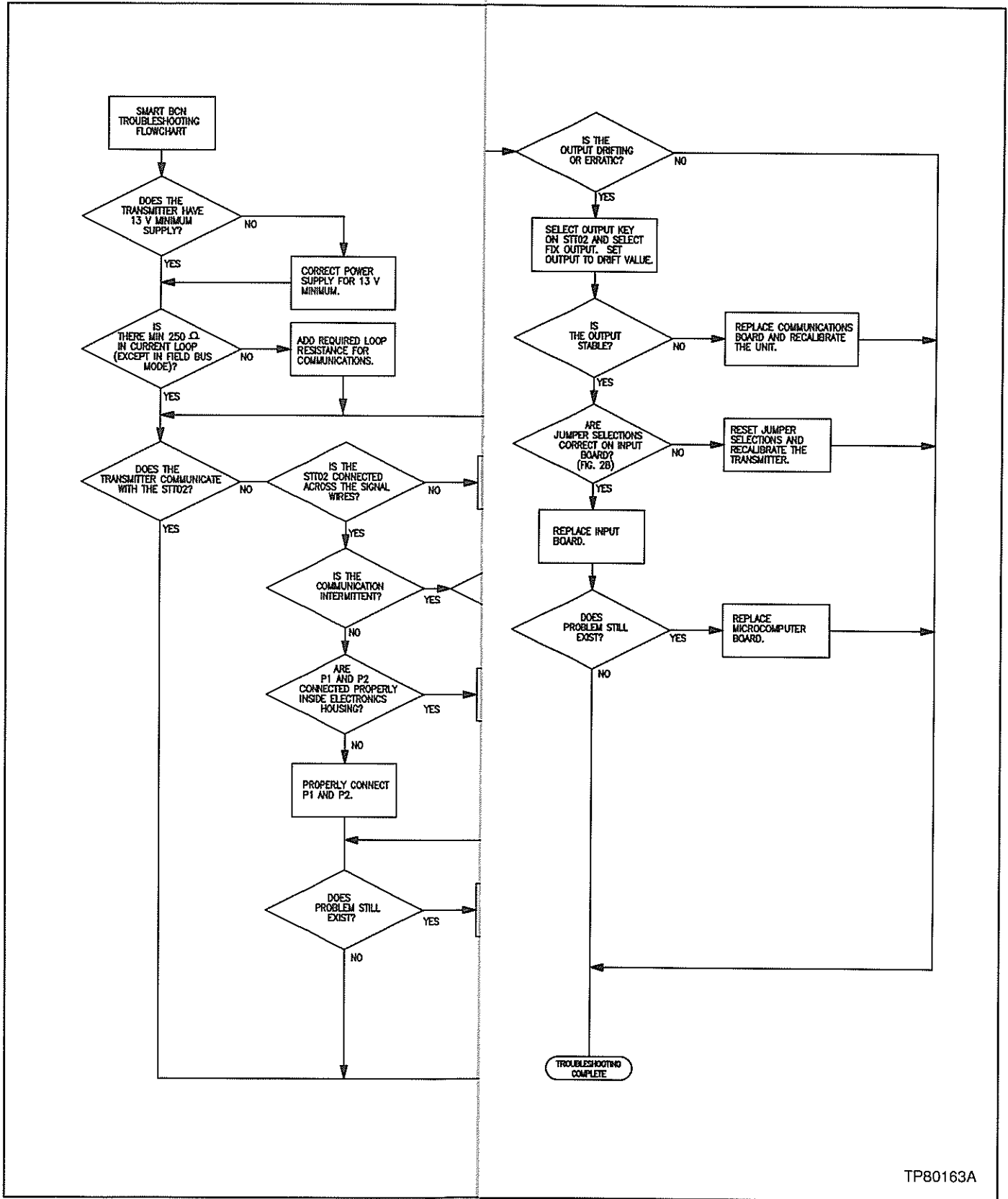
# Troubleshooting

TABLE 1 – Error Messages (Cont)

| ERROR  | PROBABLE CAUSE   | CORRECTIVE ACTION   |
|--|--|---|
| *TRANSMITTER MAIN INPUT FAILURE  | Sensor failure. Most probable cause.   | Check input board connections. Refer to <b>Replacing Amplifier Housing Components</b> for replacement procedures to allow a check of connections. Check jumper selections on the input board.   |
|  | Input board failure. Least probable cause.   | Replace input board. Refer to <b>Replacing Amplifier Housing Components</b> for replacement procedures.   |
| *TRANSMITTER INPUT OVER RANGE<br><br>OR<br><br>*TRANSMITTER INPUT UNDER RANGE          | Pressure out of range.   | a. Make certain proper input is applied to transmitter. Recalibrate. If error still present, input board defective. (Refer to b).   |
|  | Jumper connections not correct.  | b. Check transducer connection.   |
|  | Input board not connected properly   | c. Check jumper connections. Remove the amplifier assembly. Refer to <b>Replacing Amplifier Housing Components</b> for removal procedures.  |
|  |  | d. Replace input board. Refer to <b>Replacing Amplifier Housing Components</b> for replacement procedures.  |
| TRANSMITTER INPUT APPLIED INCORRECTLY  | Input signal is not at specified level.  | Correct signal and recalibrate. Refer to <b>CALIBRATION</b> section.  |
| TRANSMITTER OUTPUT IS FIX OUTPUT OR IN ADJ. MODE                                       | STT02 turned off when output was fixed to a value or while the 4 to 20 mA output was being adjusted.   | Power down the transmitter then power up the transmitter.   |
| TRANSMITTER TEMPERATURE OVER 85°C<br><br>OR<br><br>TRANSMITTER TEMPERATURE UNDER -25°C | Transmitter not calibrated properly, or transmitter is at a temperature limit at which the temperature performance is not specified. Error message will not affect operation but could mean that temperature performance is out of spec. | Recalibrate the transmitter. Refer to the <b>CALIBRATION</b> section.<br><br><b>NOTE:</b> Uncalibrated transmitters may have this error message until they are calibrated.  |
| TRANSMITTER NOT RESPONDING   | a. STT02 is not connected to transmitter.  | a. Connect STT02 across transmitter terminals. Use cord with clip connectors.   |
|  | b. Transmitter does not have a minimum of 13 V dc across inputs.   | b. Correct power problem.   |
|  | c. Not using correct communication method.   | c. Turn off STT02, turn on and select FSK/BUS and press ENTER again. ID Tags will appear on screen. Select the ID Tag of the transmitter or, select the one appearing within brackets if unsure of ID Tag. Press ENTER. Press STATUS key. If this error message still present, refer to step d.   |
|  | d. Transmitter or STT02 is defective.  | d. If available, verify that the STT02 is functional by connecting it to another transmitter. If STT02 is not functional, replace.<br><br>If STT02 is functional; replace communication board on transmitter (refer to <b>Replacing Amplifier Housing Components</b> .)<br><br>If problem still is present; replace microcomputer board in transmitter (refer to <b>Replacing Amplifier Housing Components</b> .) |

\* Transmitters with this error will enter into the Fail Mode that was specified in transmitter configuration.





TP80163A

FIGURE 26 – Troubleshooting Flow Chart

# Troubleshooting

TABLE 2 – Troubleshooting Chart

| SYMPTOM                   | PROBABLE CAUSE                      | CORRECTIVE ACTION   |
|---------------------------|-------------------------------------|---|
| HIGH OUTPUT               | Primary element                     | Check for restriction at the primary element.   |
|                           | Pressure piping                     | Check for leaks or blockage.<br>Check that blocking valves are fully open.<br>Check for entrapped gas in liquid lines and for liquid in dry lines.<br>Check that density of fluid in pressure lines is unchanged.<br>Check for sediment in transmitter process flanges.   |
|                           | Transmitter electronics connections | Make sure pins and receptacles are clean and check sensor connections.  |
|                           | Transmitter electronics failure     | Refer to Figure 26 – Troubleshooting Flow Chart.  |
|                           | Transducer                          | Refer to <b>Transducer Check</b> .  |
| ERRATIC OUTPUT            | Loop wiring                         | Check for intermittent shorts, open circuits, and multiple grounds.   |
|                           | Process fluid pulsation             | Install dampers in pressure piping.   |
|                           | Pressure piping                     | Check for entrapped gas in liquid lines and for liquid in dry lines.  |
|                           | Transmitter electronics connections | Check for intermittent shorts and open circuits.<br>Make sure pins and receptacles are clean and check sensor connections.  |
|                           | Transmitter electronics failure     | Refer to Figure 26 – Troubleshooting Flow Chart.  |
| LOW OUTPUT OR ZERO OUTPUT | Power supply                        | Check output of power supply.   |
|                           | Loop wiring                         | Check for shorts and multiple grounds.<br>Check polarity of connections.<br>Check loop impedance.   |
|                           | Primary element                     | Check installation and condition of element. Note any changes in process properties which may affect output.  |
|                           | Pressure piping                     | Check that high and low pressure connections are correct.<br>Check for leaks or blockage.<br>Check that blocking valves are fully open and that bypass valves are tightly closed.<br>Check for entrapped gas in liquid lines and for liquid in dry lines.<br>Check that density of fluid in pressure piping is unchanged.<br>Check for sediment in transmitter process flanges. |
|                           | Device in digital mode              | If analog output is desired reconfigure using the CONFIGURE key. Then press SEND CONFIG.  |
|                           | Transmitter electronics connections | Check for shorts in sensor leads. Make sure pins and receptacles are clean and check sensor connections.  |
|                           | Test diode failure                  | Replace test diode or jumper test terminals.  |
|                           | Transmitter electronics failure     | Refer to Figure 26 – Troubleshooting Flow Chart.  |
|                           | Transducer                          | Refer to <b>Transducer Check</b> .  |

## Maintenance

### INTRODUCTION

This section provides the user with maintenance procedures that are necessary in order to ensure reliable service from the BCN Transmitter.

#### WARNING

System maintenance must be performed only by qualified personnel and only after securing equipment controlled by the circuit. Altering or removing components from an active circuit may upset the process being controlled.

#### AVERTISSEMENT

L'entretien du système doit être effectué par des personnes compétentes et uniquement à partir du moment où les éléments contrôlés par le circuit ont été isolés. Le fait d'enlever ou d'altérer les composants d'un circuit sous tension peut perturber le processus contrôlé.

**NOTE:** Refer to **APPENDIX A – APPLICATIONS IN FLAMMABLE ATMOSPHERES** when applicable.

If the transmitter is inoperative, or if operation is faulty, refer to **TROUBLESHOOTING** section.

### MAINTENANCE SCHEDULE

#### Amplifier Housing

Maintenance as it pertains to the BCN Transmitter, is limited by the nature of its function. It has no moving parts that need tending, rather it contains solid state electronic components, which when operated within specifications need no maintenance. The amplifier housing is rated

NEMA 4X, which provides excellent isolation of electronics from harmful atmospheric conditions.

**NOTE:** In the event of malfunction, troubleshooting procedures may involve the electronics portion of the transmitter (see **TROUBLESHOOTING**).

#### Transducer Assembly

The transducer portion of the BCN Transmitter does require maintenance. These depend mainly on specific applications.

**FLANGE.** It is important to keep the flange free of deposits. This normally is not a problem; however, when the transmitter is used in a area where dust and process overspray is heavy, it is necessary to keep flange free of excessive accumulation of process residue.

**NOTE:** When cleaning the exterior of the transmitter it is common to hose the unit down to free it of dust and process deposits. When this is done, the temperature of the medium (water, steam, or air) should not exceed specifications of the transmitter (see **Performance/Functional Specifications**).

**TRANSMITTER REZERO.** This maintenance procedure is necessary only when the highest degree of accuracy is needed. In most applications rezeroing the transmitter is not necessary unless some change has been made (such as replacing transducer or components of amplifier assembly). However, if no change has been made and rezeroing is desired, press the **CALIBRATE** key and select **REZERO** and follow the procedure displayed on the **STT02**.



## Repair/Replacement

### INTRODUCTION

Repair/Replacement section gives the user methods for checking the status of BCN components; including transducer and the amplifier assembly. This section also outlines procedures for replacing components.

### PROCEDURES

Bailey does not recommend the repair of printed circuit boards in the field. Equipment requiring repair should be returned to the factory or your nearest Bailey Service Center.

**NOTE:** Before disconnecting the pressure lines, open the appropriate vent/drain plugs to release residual pressure. When not releasing residual pressure, check that the vent/drain plugs are securely tightened.

#### Transducer Check

Items Required: digital voltmeter, dc power supply.

**SMART BCN TRANSMITTER.** The transducer is not field repairable and must be replaced if defective. If there is no obvious defect, the transducer may be checked as follows:

1. Disconnect sensor leads from amplifier board.
2. Connect a 6.2 V dc power supply to the yellow (–) and the orange (+) BCN sensor leads.
3. Connect a voltmeter to the green (+) and black (–) sensor leads.
4. Apply appropriate pressure to the input and verify that the output changes with changing input pressure. The output should be between +20 mV and –20 mV and should change with changing input pressure.
5. Connect the voltmeter to the blue (+) and brown (–) leads. The voltmeter connected to the Smart BCN sensor should read about 22 mV  $\pm$ 3 mV at room temperature (80°F [26.6°C]).
6. If output does not change with pressure, or the temperature sensor output is incorrect, replace transducer assembly. After installation of the new transducer assembly, the temperature coefficients supplied with the

replacement transducer must be programmed into the mating electronics to assure proper temperature compensation. The transmitter must then be calibrated. (Refer to the **CALIBRATION** section of this Product Instruction.)

**SMART BCN58/59 TRANSMITTER.** The transducer is not field repairable and must be replaced if defective. If there is no obvious defects, the transducer may be checked as follows:

1. Disconnect the extension lead from the amplifier board.
2. Connect a 6.2 V dc power supply to the orange (–) and green (+) wires in the sensor lead extension.
3. connect a voltmeter to the blue (+) and yellow (–) wires in the sensor lead extension.
4. Apply appropriate pressure to the input and verify that the output changes with changing input pressure. The output will be in millivolts.
5. If the output does not change with pressure, replace the transducer assembly. The transmitter must be calibrated (see **Calibration**).

**CONVENTIONAL AND SMART BC UPGRADED TRANSMITTER.** For those transmitters that have been upgraded using the Bailey Conversion Kit (Kit No.258456–2), use the following procedure to check the transducer assembly.

The transducer is not field repairable and must be replaced if defective. If there is no obvious defect, the transducer may be checked as follows:

1. Disconnect sensor leads from amplifier board.
2. Conventional BC Sensor: connect 6.2 V dc power supply to the yellow (–) and the orange (+) to the sensor leads.
3. Smart BC Sensor: connect a 6.2 V dc power supply to the blue (–) and the orange (+) sensor leads.

## Repair/Replacement.

4. Connect a voltmeter to the green (+) and black (-) sensor leads.

5. Apply appropriate pressure to input and verify that the output changes with changing input pressure. The output should be between +20 mV and -20 mV and should change with changing input pressure.

**NOTE:** If checking Conventional BC sensor, proceed to Step 7.

6. For a Smart BC sensor, connect the voltmeter to the yellow (+) and brown (-) leads. The voltmeter should read about 15 mV  $\pm$ 2 mV at 80°F (27°C).

7. If output does not change with pressure, or the temperature sensor output is incorrect, replace transducer assembly. After installation of the new transducer assembly, the temperature coefficients supplied with the replacement transducer must be programmed into the mating electronics to assure proper temperature compensation. The transmitter must then be calibrated. (Refer to the **CALIBRATION** section of this Product Instruction.)

### Amplifier Assembly Boards

The amplifier assembly can easily be checked for a malfunction by substituting spare circuit boards in the circuit. Refer to **Replacing the Amplifier Housing Components** for removal procedures.

#### AMPLIFIER BOARDS CHECK.

1. Remove LCD board, if used.

2. Apply appropriate pressure to the input and verify that the output changes with changing input pressure. If correct operation cannot be obtained, replace with spare amplifier boards, recalibrate and repeat check. If operation still cannot be obtained, replace the transducer.

**NOTE:** If the amplifier boards are replaced, the temperature coefficients supplied with the transducer must be programmed into the mating electronics to assure proper temperature compensation (refer to **CALIBRATION**).

**LCD BOARD CHECK.** The optional LCD board should be checked (if used) only after the amplifier boards have been verified operational.

1. Attach the LCD board to the amplifier assembly (see **Replacing the Amplifier Housing Components**).

2. Check for correct operation in this mode. If correct operation cannot be obtained, replace with spare LCD board and repeat check. If correct operation still cannot be obtained, replace the microcomputer board.

### Replacing the Amplifier Housing Components (LCD Board and Amplifier Boards Assembly)

**NOTE:** See Figure 27 for an exploded view of the amplifier housing assembly.

Items Required: phillips screw driver.

1. Turn off power to the transmitter.

2. Unscrew and remove the amplifier housing cover.

3. Remove the three screws that secure the amplifier assembly to the housing. Partially remove the assembly from the housing.

#### CAUTION

Do not remove or force amplifier assembly completely out of housing. This will cause damage to pin connectors at P1, P2 and the sensor lead connector.

#### ATTENTION

Nes pas retirer complètement l'assemblage des composants de son boîtier. Ceci endommagerait les broches et les connexion P1 et P2 ainsi que le connecteur des fils de la sonde.

**NOTE:** Do not try to completely remove the amplifier assembly from the housing before the sensor lead connector and pin connectors P1 and P2 have been disconnected; otherwise the pins and connectors may be damaged.

4. Disconnect the sensor lead pin connector and pin connectors P1 and P2.

5. Remove the amplifier assembly from the housing.

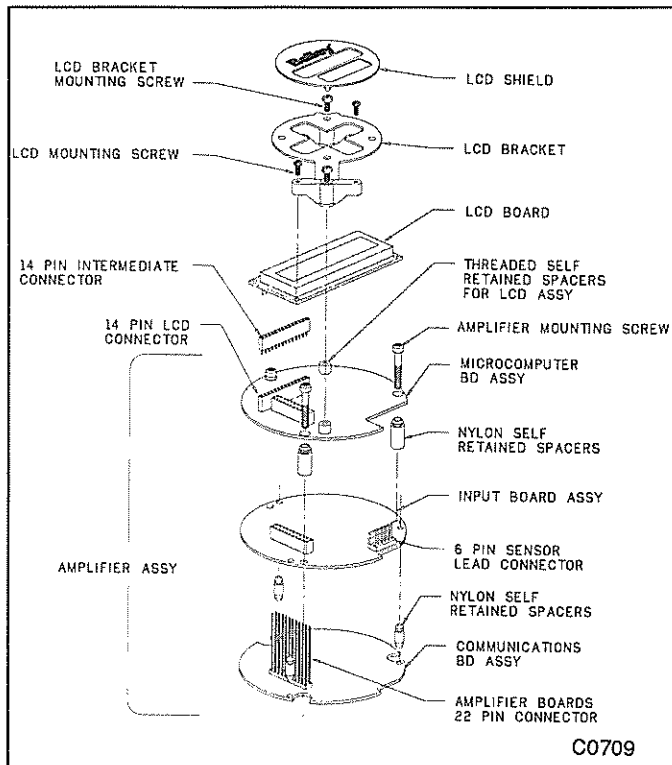


FIGURE 27 – Amplifier Assembly (Exploded View)

6. If the LCD meter is provided, remove the two screws holding the LCD shield to the amplifier assembly.

7. Disconnect the LCD connector from the microcomputer board.

**NOTE:** If disassembly of the transducer assembly is required, refer to **Replacing the Transducer Assembly**. If not, continue with the reassembly procedure.

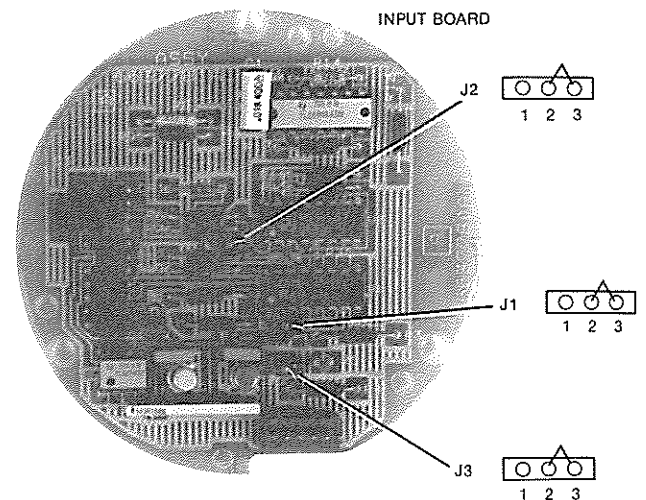
8. If the amplifier boards assembly is replaced, be sure that Jumpers J1, J2, and J3 on input board assembly, Bailey Part No. 6637778-1, are positioned as shown in Figure 28.

9. Plug LCD into amplifier assembly.

10. Using the two screws and lockwashers provided, attach the LCD bracket to the amplifier assembly.

**NOTE:** At this point in the assembly, make sure that all of the screws are tightened securely.

11. Partially slide the amplifier assembly into the housing. Attach the sensor lead connector and the red (P1) and black (P2) filter leads.



A0755

FIGURE 28 – Jumper Wire Locations and Positions on input board.

12. Slide the assembly completely into the housing; secure the assembly to the housing with the three screws provided.

13. Replace the left cover on the electronics housing. Fully engage.

## Replacing the Transducer Assembly

### REPLACING THE TRANSDUCER ASSEMBLY (BCN2/3/4, BCN53/54/55, and BCN64/65).

**NOTE:** Do not attempt to remove the transducer assembly from the amplifier housing while the transmitter is connected to the process. This procedure should be performed in the calibration shop.

1. Remove the amplifier assembly boards from the housing as described in **Replacing the Amplifier Housing Components**.

2. Loosen the socket head set screws on the locknut located between the electronic amplifier assembly and the transducer assembly (Figure 3).

3. Slide the locknut down to allow the amplifier housing to rotate.

## Repair/Replacement

### CAUTION

Extreme care should be used when unscrewing the transducer assembly from the amplifier housing to avoid damaging the sensor leads.

### ATTENTION

Prendre les précautions qui s'imposent au moment de dévisser le transmetteur du boîtier de l'amplificateur afin d'éviter d'endommager les fils de la sonde.

4. Unscrew the amplifier housing from the transducer assembly by turning transducer assembly in a counter-clockwise direction while rotating the sensor leads as necessary to prevent twisting.

5. Remove the locknut and set it aside.

6. Position the transducer assembly in vise (with soft jaws) so that the transducer is in a horizontal plane and flange bolt heads are up, as in Figure 29. Vise jaws should clamp on the rough-casted (non-machined) surface of the bottom process flange. Secure in vise.

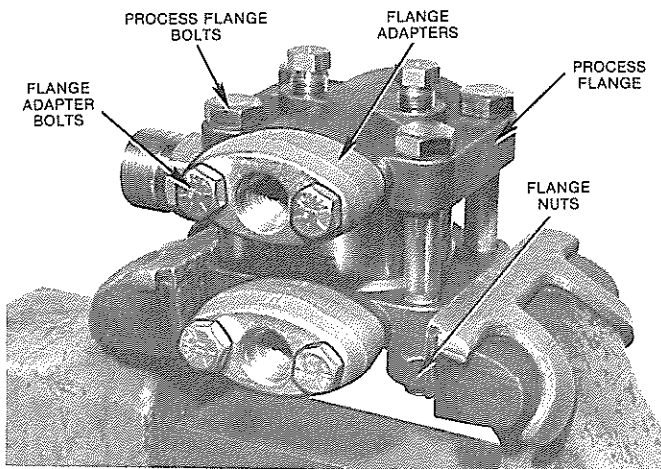


FIGURE 29 – Transducer Assembly Positioned in Vise A8463

7. Remove the two bolts from each process flange adapter. Lift off the process flange adapter(s) and O-ring.

8. Loosen the process flange bolts.

9. While holding the corresponding bolt, unthread each process flange nut. Set nuts aside.

10. Lift process flange bolts from process flanges and set aside.

11. Carefully, lifting straight up, remove the top flange from the transducer. **MAKE CERTAIN THAT NOTHING TOUCHES THE DIAPHRAGM SURFACE OR DIAPHRAGM STUD.**

12. Observe and note the location of the “H” marking on the transducer (see Figure 30). During reassembly, the “H” marking must be on the same side of the neck of the transducer.

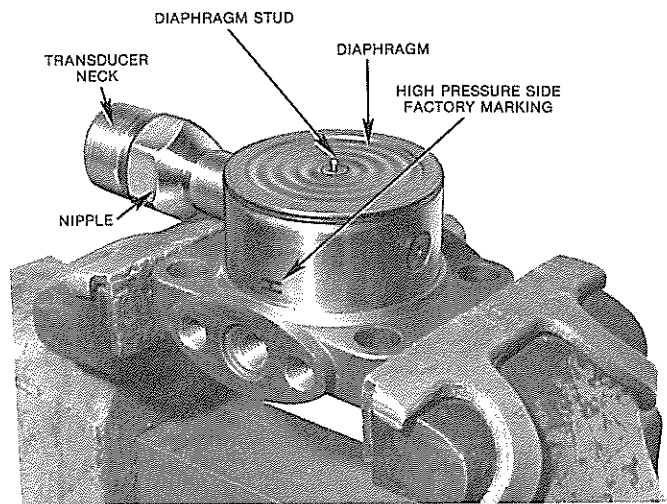


FIGURE 30 – Transducer Resting on Flange (with Top Flange Removed) A8467

13. Holding the transducer by its neck, lift the transducer straight up and away from the bottom process flange. **MAKE CERTAIN THAT NOTHING TOUCHES THE TRANSDUCER DIAPHRAGM SURFACES OR DIAPHRAGM STUDS.**

14. Carefully, rest the transducer on the bench. When not in the process flanges, the transducer must not be dropped or set down resting on the diaphragms or diaphragm studs.

15. Locate the O-rings in the grooves on the process flanges (Figure 31) or on the transducer. Carefully remove the O-rings and set them aside.



Note the position of the vent plug in the remaining process flange (Figure 31). If removed from the vise for replacement, the replacement flange must be placed in the vise in the same position. Vise jaws should clamp on the rough-casted (non-machined) surface of the process flange; The machined surface (with the O-ring groove) should face up.

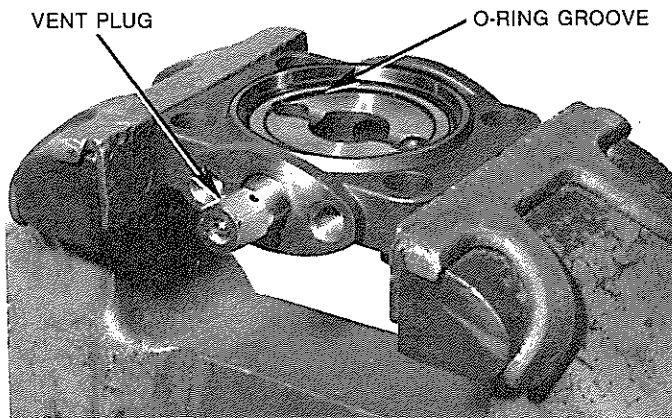


FIGURE 31 – Flange Positioned in Vise A8470

16. Clean the O-ring and O-ring groove in the process flange.

17. Lubricate the O-ring with Dow Corning<sup>®</sup> No. 4 Compound and place it in the groove in the process flange.

18. Carefully, grasping the transducer neck, place the transducer on the process flange so that the “H” marking is on the same side of the transducer neck as previously observed (Step 12). Process flanges are not identical on all units and must be in the same orientation as when disassembled. **MAKE CERTAIN THAT NOTHING TOUCHES THE TRANSDUCER DIAPHRAGM SURFACES OR DIAPHRAGM STUDS.** Make sure clearance exists between the transducer neck and the vise. When fully assembled and the transmitter faces front, the “H” side diaphragm and process connection must be on the transmitter’s left side.

19. Align the transducer neck between the two flange bolt holes as shown in Figure 30.

20. Clean the O-ring and O-ring groove on the process flange.

21. Lubricate the O-ring with Dow Corning No. 4 Compound and place in the groove in the process flange.

22. Position the flange on the transducer.

23. Insert the process flange bolts through the process flanges as shown in Figure 29. Flange bolt heads should be on top. (Be sure that the flange bolts are grade 8 carbon steel for 3600 psi applications.)

24. Thread the nuts onto the process flange bolts (finger tight only).

25. Check the transducer neck alignment.

26. Evenly torque the process flange bolts to 48 to 52 ft.-lbs. (65 to 70 Nm).

27. Clean the threads on the process flange adapters to remove any sealant.

28. Clean the O-ring grooves and O-rings.

29. Lubricate the O-rings with Dow Corning No. 4 compound and place them in the grooves on the process flange adapters.

**NOTE:** Ensure that the O-rings are completely seated in the groove to avoid pinching.

30. Bolt the process flange adapters to the flanges. Torque the process flange adapter bolts to 20 to 25 ft.-lbs. (27 to 34 Nm).

31. Remove the transducer assembly from the vise.

32. Set the transducer assembly in an upright position on the bench.

33. Slide the locknut over the transducer neck.

34. Clean the threads on the transducer neck and mating connection on the amplifier housing.

<sup>®</sup> DOW CORNING is a registered trademark of Dow Corning Corp.

## Repair/Replacement

35. Apply LOCTITE<sup>®</sup> Primer NF and LOCTITE Pipe Sealant with TEFLON 592 to the threads on the transducer neck according to LOCTITE directions.

36. Carefully insert the sensor lead wires with connector through the mating hole in the amplifier housing.

37. Thread the amplifier housing onto the neck of the transducer. Engage a minimum of seven full threads. While rotating the housing, turn the sensor leads as necessary to prevent twisting. Make sure that, in the fully engaged position, the Bailey name tag is centered vertically between the process flange adapters with the "H" connection on the left and the low side connection on the right.

38. Slide the locknut into position over the neck of the transducer and base of the amplifier housing.

39. Tighten the socket head set screws in the locknut.

40. Program the temperature coefficients supplied with the replacement transducer into the mating electronics (refer to **CALIBRATION** for details).

### REPLACING THE TRANSDUCER ASSEMBLY (BCN56/57 and BCN66/67).

1. Remove the amplifier housing from the transducer assembly as outlined in Steps 1–4 in **Replacing the Transducer (BCN2/3/4, BCN53/54/55, and BCN64/65)**.

2. Remove the six cap screws (Figure 32) from the process flange.

3. Carefully remove the process flange from the transducer. **ENSURE THAT NOTHING TOUCHES THE DIAPHRAGM SURFACE OR DIAPHRAGM STUD.**

4. Locate the O-ring in the groove in the process flange or on the transducer (Figure 32). Carefully remove the O-ring and set it aside.

5. Clean the O-ring and O-ring groove in the process flange.

6. Lubricate the O-ring with DOW CORNING No. 4 compound and place it in the groove in the process flange.

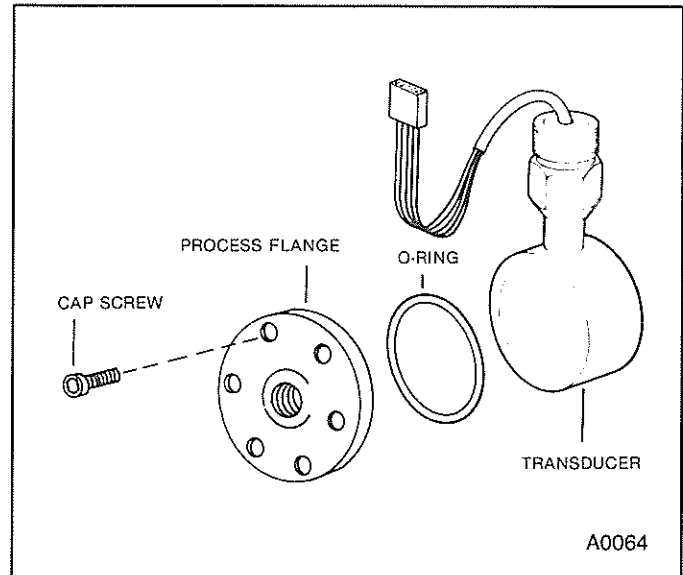


FIGURE 32 – Transducer Assembly (BCN56/57 and BCN66/67)

7. Position the flange on the transducer.

8. Replace the six cap screws on the process flange. Torque the screws to 15 ft.-lbs. (20.34 Nm.) for carbon steel screws and  $5 \pm 1$  ft.-lbs. ( $6.78 \pm 1.36$  Nm.) for stainless steel screws.

9. Assemble the transducer assembly to the amplifier housing assembly [see Steps 33–39 in **Replacing the Transducer (BCN2/3/4, BCN54/55/56, and BCN64/65)**].

10. Program the temperature coefficients supplied with the replacement transducer into the mating electronics (refer to **CALIBRATION** for details).

### REPLACING THE TRANSDUCER ASSEMBLY (BCN58 and BCN59).

**NOTE:** Do not attempt to remove the transducer assembly from the amplifier housing while the transmitter is connected to the process. This procedure should be performed in the calibration shop.

1. Remove the amplifier assembly boards as described in **Replacing Amplifier Housing Components**.

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2. Remove pipe plugs and conduit connection from the amplifier housing.
3. Remove the bolt and lockwasher (Figure 33) from the bracket.
4. Remove the sensor lead extension from the transducer sensor leadwires.
5. Slide the transducer straight down out of the nipple while being careful not to damage the leadwires.

**NOTE:** If transducer assembly will not slide out, turn the transducer assembly clockwise a 1/4 turn and pull down. Transducer should be free to separate from the nipple.

6. Loosen the bolts holding the flange adapter to transducer.
7. Remove the bolts and flange adapter.
8. Locate and remove the O-ring from the groove in the transducer assembly.

9. Clean the O-ring and O-ring groove in the transducer assembly.

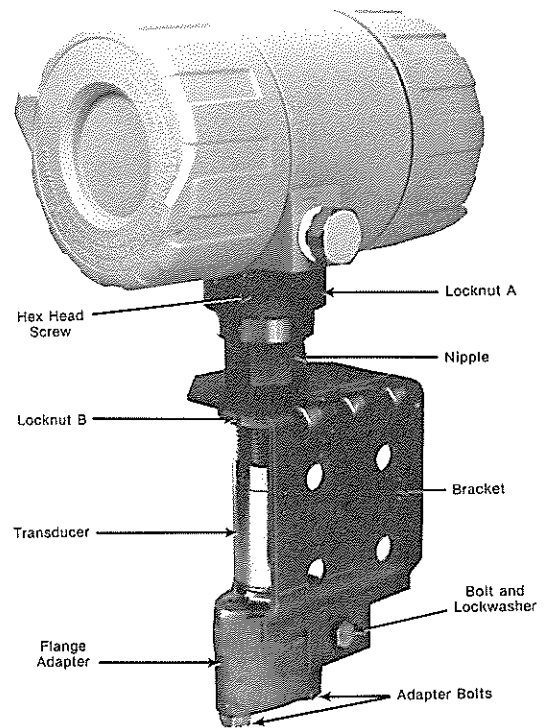
10. Lubricate the O-ring with DOW CORNING NO.4 compound and place it in the groove in the transducer assembly.

11. Attach the flange adapter to the replacement transducer assembly with bolts.

12. Slip transducer into the bracket/nipple assembly.

13. Torque the bolt and lockwasher to the bracket and transducer to 50 in.-lbs. (5.65 Nm).

**NOTE:** To align the bolt, transducer threads and bracket, it may be necessary to loosen locknut B, this will allow enough clearance for the bolt to be attached.



A9926

FIGURE 33 – Type BCN58159 Smart Terminal Transmitter (Side View)



## Support Services

### INTRODUCTION

This section provides an illustration of the transmitter, its housing and amplifier assembly, along with transducer assemblies.

A parts list for the transmitter and associated spare parts kits are also provided.

### REPLACEMENT PARTS

Mechanical hardware, base housings, covers, and mounting brackets are interchangeable among units without regard to range or calibration. Refer to Figure 34 for a Replacement Parts Drawing. Interchange of electronics and transducers is subject to the following conditions:

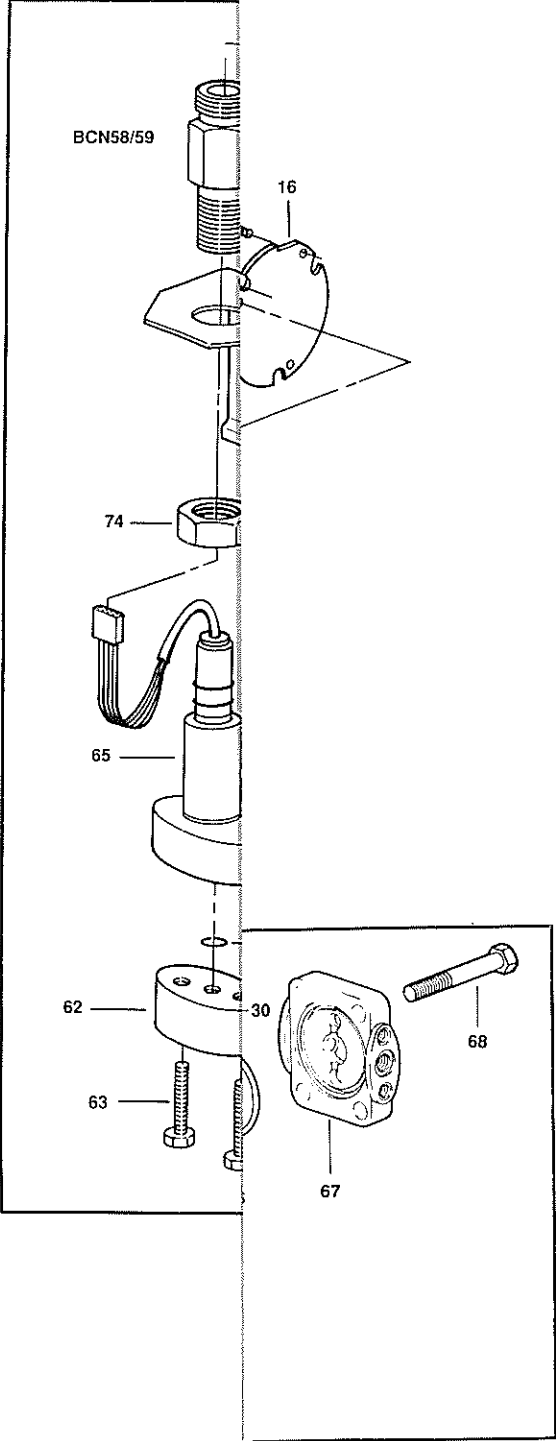
1. Amplifier circuit board assembly is interchangeable among units without regard to range. Any interchange of amplifier assemblies will require calibration of the new electronics.
2. Transducers are interchangeable, but calibration is required for both zero and span.
3. When either the amplifier assembly or the transducer is replaced, the temperature coefficients supplied with the transducer must be programmed into the electronics.

# Support Services

| ITEM | PART   | NAME   |
|------|--|--|
| 1    | SEE TABLE 1                                  | COVER  |
| 2    | 1948528-114                                  | CONNECTOR <sup>1</sup>                                       |
| 3    | 6636084-1                                    | LCD ASSY <sup>1</sup>  |
| 6    | 6634628-2                                    | HOUSING, BASE  |
| 7    | 1951420-154                                  | O-RING, SEAL, 2 REQD   |
| 8    | 6634668-1                                    | FILTER ASSY (BLK)  |
| 9    | 6634668-2                                    | FILTER ASSY (RED)  |
| 10   | 6634627-1                                    | COVER <sup>1</sup>   |
| 11   | 1964021-1                                    | LABEL  |
| 12   | 1946447-1                                    | DIODE, SIG, SI, IN914B                                       |
| —    | 6638009-1                                    | AMPLIFIER ASSY (INCLUDES ITEMS 14-18)                        |
| 14   | 6637783-1                                    | MICROCOMPUTER BD ASSY  |
| 15   | 6637781-1                                    | INPUT BD ASSY  |
| 16   | 6637779-1                                    | COMMUNICATIONS BD ASSY                                       |
| 17   | 197729-4                                     | STANDOFF, 3 REQD   |
| 18   | 197833-1                                     | STANDOFF, 3 REQD   |
| 19   | 6633667-1                                    | LOCKNUT <sup>1</sup>   |
| 20   | 6638057-1                                    | LCD SUPPORT <sup>1</sup>                                     |
| 21   | 1948533-1                                    | LUG, 2 REQD  |
| 23   | 6638062-1                                    | SHIELD, LCD <sup>1</sup>                                     |
| 24   | 1951420-036                                  | O-RING, SEAL <sup>1</sup>                                    |
| 25   | 199927-1                                     | WINDOW <sup>1</sup>  |
| 26   | 197675-2                                     | WASHER   |
| 27   | 1947784-4                                    | TERMINAL BLOCK   |
| 28   | 6634662-1                                    | SHIELD, TERM. BLOCK  |
| 29   | 195148-3                                     | PLUG, PIPE   |
| 30   | 487436-2                                     | TAG, STN. STL.   |
| 31   | 1944495-2                                    | JUMPER   |
| 33   | SEE TABLE 4                                  | CSA, FM LABEL  |
| 34   | 1963318- <input checked="" type="checkbox"/> | NAMEPLATE  |
| 35   | 1963508-1                                    | LABLE <sup>1</sup>   |
| 36   | 1963327-1                                    | CALIBRATION LABEL  |
| 41   | 16349  | 1/2 IN. PULL PLUG  |
| 42   | R2041-1650                                   | 22 AWG BLK LDWIRE (1.5 IN.)                                  |
| 43   | R2041-1652                                   | 22 AWG RED LDWIRE (6.00 IN.)                                 |
| 45   | NDNAC12006                                   | .138-32X .375 FIL HD SCREW (ROLOK)                           |
| 46   | NDOAC13012                                   | .138-32X .750 FIL HD SCREW (ROLOK), 2 REQD                   |
| 47   | NDOAC13014                                   | .138-32X .875 FIL HD SCREW, (ROLOK), 3 REQD                  |
| 48   | NHSHAO5004                                   | .086-56X .250 STN STL SLTD PAN HD SCREW, 2 REQD <sup>1</sup> |
| 49   | NHSHAO9004                                   | .112-40X .250 STN STL SLTD PAN HD SCREW, <sup>1</sup>        |

| ITEM | PART        | NAME  |
|------|-------------|---|
| 51   | R6440-0005  | .031 DIA. 347 STN STL WIRE (6.00 IN.)                   |
| 52   | NKJHA13004  | .138-32x .250 STN STL SET SCREW, 2 REQD <sup>1</sup>    |
| 53   | 6637013-1   | BRACKET (NOT SHOWN)                                     |
| 54   | 6634409-1   | KIT, MOUNTING (NOT SHOWN)                               |
| 55   | 6634690-1   | LOCKNUT   |
| 56   | NKJHA21005  | .250-20x .312L HEX HDLS SCKT SET CP PNT SET SCR, 2 REQD |
| 57   | SEE TABLE 2 | VENT VALVE  |
| 58   | SEE TABLE 3 | NUT, 4 REQD   |
| 59   | SEE TABLE 2 | DRAIN PLUG  |
| 60   | SEE TABLE 2 | FLANGE  |
| 61   | SEE TABLE 3 | O-RING  |
| 62   | SEE TABLE 2 | ADAPTER   |
| 63   | SEE TABLE 3 | BOLT  |
| 64   | SEE TABLE 3 | O-RING  |
| 65   | SEE TABLE 4 | TRANSDUSER ASSEMBLY                                     |
| 66   | SEE TABLE 3 | O-RING  |
| 67   | SEE TABLE 2 | FLANGE  |
| 68   | SEE TABLE 3 | FLANGE BOLTS, 4 REQD                                    |
| 69   | SEE TABLE 7 | O-RING  |
| 70   | SEE TABLE 8 | FLANGE  |
| 71   | SEE TABLE 6 | CAP SCREWS  |
| 72   | A16349      | 1/4 PULL PLUG   |
| 73   | 6636943-1   | NIPPLE  |
| 74   | 6636945-1   | LOCKNUT   |
| 75   | 6636944-    | BRACKET   |
| 76   | NTJHA11030  | SPRG LKWASHER .250 REG. SPLIT (HELICAL)                 |
| 77   | NAUHA20008  | CAP SCR, HEX HD .250-28x.500                            |
| 78   | 6636977-1   | LEADWIRE EXT.   |

<sup>1</sup>BCN  6



C0756

FIGURE 34 – Type BCN Transmitter Replacement Parts

# Support Services

TABLE 1- Left Housing Cover Part No.

| NOMENCLATURE | METER | ITEM 1    |
|--------------|-------|-----------|
| BCN □□□□□ 5  | NONE  | 6634627A1 |
| BCN □□□□□ 6  | LCD   | 6634627C2 |

TABLE 2 - Flange and Adapter Part Nos.

| NOMENCLATURE  | MATERIALS | VENT VALVE<br>ASSY ITEM 57 | DRAIN PLUG<br>ITEM 59 | FLANGE<br>ITEM 60                                     | FLANGE ADAPTER<br>ITEM 62 |                                      | FLANGE<br>ITEM 67                                   |
|---|-----------|----------------------------|-----------------------|---|---------------------------|--------------------------------------|---|
|   |           |                            |                       |   | PART NO.                  | REQD                                 |   |
| BCN23□□□ 0 □ □<br>BCN24<br>BCN25<br>BCN3                                      | 316 SST   | 6628319A1                  | OMIT                  | 6634673A9   | OMIT                      | 0                                    | 6634673A9<br>A9<br>D11<br>D11                       |
| BCN44□□□ 0 □ □<br>BCN45<br>BCN46  | 316 SST   | 6628319A1                  | OMIT                  | 6635836A1<br>A3<br>A3                                 | OMIT                      | 0                                    | 6635836A1<br>A4<br>A4                               |
| BCN53□□□ 0 □ □<br>BCN54<br>BCN55<br>BCN64<br>BCN65                            | 316       | 6628319A1                  | OMIT                  | 6634673A9<br>A9<br>A9<br>A13<br>A13                   | OMIT                      | 0                                    | 6634673A9<br>A9<br>D11<br>A9<br>A9                  |
| BCN24□□□ 3 □ □<br>BCN24<br>BCN25<br>BCN53<br>BCN54<br>BCN55<br>BCN64<br>BCN65 | HASTELLOY | 6628319A2                  | 6633661A1             | 6634673A2<br>A2<br>A2<br>A9<br>A9<br>A9<br>A13<br>A13 | 6634268A2                 | 2<br>2<br>2<br>1<br>1<br>1<br>1<br>1 | 6634673A2<br>A2<br>D6<br>A2<br>A2<br>D6<br>A2<br>A2 |
| BCN23□□□ 4 □ □<br>BCN24<br>BCN25<br>BCN53<br>BCN54<br>BCN55<br>BCN64<br>BCN65 | MONEL     | 6628319A3                  | 6633366A2             | 6634673A3<br>A3<br>A3<br>A9<br>A9<br>A9<br>A13<br>A13 | 6634268A2                 | 2<br>2<br>2<br>1<br>1<br>1<br>1<br>1 | 6634673A3<br>A3<br>D7<br>A3<br>A3<br>D7<br>A3<br>A3 |
| BCN23□□□ 5 □ □<br>BCN24<br>BCN25<br>BCN3                                      | 316 SST   | 6628319A1                  | 6633661A3             | 6634673A1   | 6634268A1                 | 2                                    | 6634673A1<br>A1<br>D5<br>D5                         |
| BCN44□□□ 5 □ □<br>BCN45<br>BCN46  | 316 SST   | 6628319A1                  | 6633661A3             | 6635836A1   | 6634268A1                 | 2                                    | 6635836A1<br>A2<br>A2                               |
| BCN53□□□ 5 □ □<br>BCN54<br>BCN55<br>BCN64<br>BCN65                            | 316 SST   | 6628319A1                  | 6633661A3             | 6634673A9<br>A9<br>A9<br>A13<br>A13                   | 6634268A1                 | 1                                    | 6634673A1<br>A1<br>D5<br>A1<br>A1                   |
| BCN58□□□□□ 0<br>BCN59□□□□□ 0<br>BCN58□□□□□ 1<br>BCN59□□□□□ 1                  | OMIT      | OMIT                       | OMIT                  | OMIT  | 6636959A1                 | 1                                    | OMIT  |



TABLE 3 – O-Ring And Bolting Part Nos.

| NOMENCLATURE  | O-RING MAT'L | BOLTING MATERIAL | NUT ITEM 58 | O-RING ITEM 61 |         | BOLT ITEM 63 |         | O-RING ITEM 66  | O-RING ITEM 64  | FLANGE BOLT ITEM 68 |
|---|--------------|------------------|-------------|----------------|---------|--------------|---------|---|---|---------------------|
|   |              |                  |             | PART NO.       | QTY REQ | PART NO.     | QTY REQ |   |   |                     |
| BCN23□□□1□<br>BCN24<br>BCN25<br>BCN3<br>BCN44<br>BCN45<br>BCN46 | VITON        | CARBON STL       | 197771A1    | 1951414A210    | 2       | 683303E1     | 4       | 1951414A036<br>A036<br>A032<br>A032<br>A036<br>A036<br>A032 | 1951414A036<br>A036<br>A036<br>A036<br>A036<br>A032<br>A032 | 197767A1            |
| BCN53□□□1□<br>BCN54<br>BCN55<br>BCN64<br>BCN65                  | VITON        | CARBON STL       | 197771A1    | 1951414A210    | 1       | 683303E1     | 2       | 1951414A036<br>A036<br>A032<br>A036<br>A036                 | OMIT  | 197767A1            |
| BCN23□□□2□<br>BCN24<br>BCN25<br>BCN3<br>BCN44<br>BCN45<br>BCN46 | TEFLON       | CARBON STL       | 197771A1    | 1951201A210    | 2       | 683303E1     | 4       | 1951201A036<br>A036<br>A036<br>A032<br>A036<br>A036<br>A032 | 1951201A036<br>A036<br>A036<br>A036<br>A036<br>A032<br>A032 | 197767A1            |
| BCN53□□□2□<br>BCN54<br>BCN55<br>BCN64<br>BCN65                  | TEFLON       | CARBON STL       | 197771A1    | 1951201A210    | 1       | 683303E1     | 2       | 1951201A036<br>A036<br>A032<br>A036<br>A036                 | OMIT  | 197767A1            |
| BCN23□□□3□<br>BCN24<br>BCN25<br>BCN3                            | VITON        | 316 SST          | 197769A1    | 1951414A210    | 2       | 197740A1     | 4       | 1951414A036<br>A036<br>A032<br>A032                         | 1951414A036   | 197738A2            |
| BCN53□□□3□<br>BCN54<br>BCN55<br>BCN64<br>BCN65                  | VITON        | 316 SST          | 197769A1    | 1951414A210    | 1       | 197740A1     | 2       | 1951414A036<br>A036<br>A036<br>A036<br>A036                 | OMIT  | 1978738A2           |
| BCN23□□□4□<br>BCN24<br>BCN25<br>BCN3                            | TEFLON       | 316 SST          | 197769A1    | 1951201A210    | 2       | 197740A1     | 4       | 1951201A036<br>A036<br>A032<br>A032                         | 1951201A036   | 197738A2            |
| BCN53□□□4□<br>BCN54<br>BCN55<br>BCN64<br>BCN65                  | TEFLON       | 316 SST          | 197769A1    | 1951201A210    | 1       | 197740A1     | 2       | 1951201A036<br>A036<br>A032<br>A036<br>A036                 | OMIT  | 197738A2            |
| BCN58□□□1□<br>BCN59   | VITON        | CARBON STL       | OMIT        | 1951414A210    | 1       | 683303E1     | 2       | OMIT  | OMIT  | OMIT                |
| BCN58□□□2□<br>BCN59   | TEFLON       | CARBON STL       | OMIT        | 1951201A210    | 1       | 683303E1     | 2       | OMIT  | OMIT  | OMIT                |
| BCN58□□□3□<br>BCN59   | VITON        | 316 SST          | OMIT        | 1951414A210    | 1       | 197740A1     | 2       | OMIT  | OMIT  | OMIT                |
| BCN58□□□4□<br>BCN59   | TEFLON       | 316 SST          | OMIT        | 1951201A210    | 1       | 197740A1     | 2       | OMIT  | OMIT  | OMIT                |

NOTE: Item 61, 62, 63 (O-ring, adapter and bolt) are omitted if there is a 0 in the 8th digit of the Nomenclature per Table 2.

# Support Services

TABLE 4 – Transmitter/Transducer/Kit Cross Reference

| NOMENCLATURE                            | TRANSDUCER KIT NO.   | TRANSDUCER ITEM 65                                      | SPAN  | DIAPHRAGM MATERIAL |
|---|--|---|---|--------------------|
| BCN232*<br>242*<br>252*                 | 258299A232*B-N<br>A242*B-N<br>A252*B-N                         | 6636246A232*B<br>A242*B<br>A252*B                       | 3 – 30 IN. H <sub>2</sub> O<br>20 – 200<br>75 – 750   | 316L SST           |
| BCN362*<br>372*<br>382*                 | 258299A362*D-N<br>A372*D-N<br>A382*D-N                         | 6636252D362*<br>D372*B<br>D382*                         | 10 – 100 PSI<br>30 – 300 PSI<br>150 – 1500 PSI  |                    |
| BCN442*<br>452*<br>462*                 | 258299A242*A-N<br>A252*A-N<br>A362*B-N                         | 6636246A242*A<br>A252*A<br>6636252D362*B                | 20 – 200 IN. H <sub>2</sub> O<br>75 – 750 IN. H <sub>2</sub> O<br>10 – 100 PSI  |                    |
| BCN532*<br>542*<br>552*<br>562*<br>572* | 258299A232*C-N<br>A242*C-N<br>A252*C-N<br>A562* -N<br>A572* -N | 6636246A232*C<br>A242*C<br>A252*C<br>A562*<br>A572*     | 3 – 30 IN. H <sub>2</sub> O<br>20 – 200 IN. H <sub>2</sub> O<br>75 – 750 IN. H <sub>2</sub> O<br>10 – 100 PSI<br>30 – 300 PSI |                    |
| BCN642*<br>652*<br>662*<br>672*         | 258299A642* -N<br>A652* -N<br>A662* -N<br>A672* -N             | 6636266A642*<br>A652*<br>A662*<br>A672*                 | 20 – 200 IN. H <sub>2</sub> O<br>75 – 750 IN. H <sub>2</sub> O<br>10 – 100 PSI<br>30 – 300 PSI                                |                    |
| BCN233*<br>243*<br>253*                 | 258299A233* -N<br>A243* -N<br>A253* -N                         | 6636246A233*<br>A243*<br>A253*                          | 3 – 30 IN. H <sub>2</sub> O<br>20 – 200<br>75 – 750   |                    |
| BCN363*<br>373*<br>383*                 | 258299A363*B-N<br>A373*B-N<br>A383*B-N                         | 6636252D363*B<br>D373*B<br>A383*                        | 10 – 100 PSI<br>10 – 300<br>150 – 1500  |                    |
| BCN443*<br>453*<br>463*                 | 258299A243*A-N<br>A253*A-N<br>A363*A-N                         | 6636246A243*A<br>A253*A<br>6636252A363*A                | 20 – 200 IN. H <sub>2</sub> O<br>75 – 750 IN. H <sub>2</sub> O<br>10 – 100 PSI  |                    |
| BCN533*<br>543*<br>553*<br>563*<br>573* | 258299A233* -N<br>A243* -N<br>A253* -N<br>A663* -N<br>A573* -N | 6636246A233*<br>A243*<br>A253*<br>6635441A663*<br>A673* | 3 – 30 H <sub>2</sub> O<br>20 – 200 IN. H <sub>2</sub> O<br>75 – 750 IN. H <sub>2</sub> O<br>10 – 100 PSI<br>30 – 300 PSI     |                    |
| BCN643*<br>653*<br>663*<br>673*         | 258299A643* -N<br>A653* -N<br>A663* -N<br>A673* -N             | 6636266A643*<br>A653*<br>6635441A663*<br>A673*          | 20 – 200 IN. H <sub>2</sub> O<br>75 – 750 IN. H <sub>2</sub> O<br>10 – 100 PSI<br>30 – 300 PSI                                |                    |
| BCN234*<br>244*<br>254*                 | 258299A234* -N<br>A244* -N<br>A254* -N                         | 6636246A234*<br>A244*<br>A254*                          | 3 – 30 IN. H <sub>2</sub> O<br>20 – 200<br>75 – 750   | MONEL 400          |
| BCN534*<br>544*<br>554*<br>564*<br>574* | 258299A234* -N<br>A244* -N<br>A254* -N<br>A564* -N<br>A574* -N | 6636246A234*<br>A244*<br>A254*<br>6635441A564*<br>A674* | 3 – 30 IN. H <sub>2</sub> O<br>20 – 200 IN. H <sub>2</sub> O<br>75 – 750 IN. H <sub>2</sub> O<br>10 – 100 PSI<br>30 – 300 PSI |                    |
| BCN58701<br>BCN59701                    | 258394A1<br>258394A2   | 6636906A2500<br>6636906A6000                            | 175 – 2500 PSI<br>400 – 6000 PSI  | 17-4 PH SST        |
| BCN644*<br>654*<br>664*<br>674*         | 258299A644* -N<br>A654* -N<br>A564* -N<br>A574* -N             | 6636266A664*<br>A564*<br>6635441A564*<br>A574*          | 20 – 200 IN. H <sub>2</sub> O<br>75 – 750 IN. H <sub>2</sub> O<br>10 – 100 PSI<br>30 – 300 PSI                                | MONEL 400          |

\* This digit signifies the transducer fill fluid; 0 = none, 1 = silicone fluid, 2 = fluorinated oil

TABLE 5 – Items Included in Transducer Kits

KIT 258299A–□□□□ 1  
**TRANSDUCER FOR BCN** □□□□□□□□  
 (See Table 4 for Transmitter/Transducer Kit Cross Reference)

| PART NO.    | QUANTITY  | NAME                |
|-------------|---|---------------------|
| SEE TABLE 4 | 1   | TRANSDUCER ASSEMBLY |
| 6634690A1   | 1   | LOCKNUT             |
| NKJHA21005  | 2   | SCREW               |
| 1951201A036 | 2 (BCN23/24, BCN3, BCN44/46, BCN53/54)<br>1 (BCN25, BCN45, BCN55, BCN6) | O-RING (TEFLON)     |
| 1951414A036 | 2 (BCN23/24, BCN3, BCN44/46, BCN53/54)<br>1 (BCN25, BCN45, BCN55, BCN6) | O-RING (VITON)      |
| 1951201A032 | 1 (BCN25, BCN45, BCN55)   | O-RING (TEFLON)     |
| 1951414A032 | 1 (BCN25, BCN45, BCN55)   | O-RING (VITON)      |
| 1951201A031 | 1 (BCN56/57, BCN66/67)  | O-RING (TEFLON)     |
| 1951414A031 | 1 (BCN56/57, BCN66/67)  | O-RING (VITON)      |

TABLE 6 – Items Included in Transducer Kits

KIT 258394A–  
**TRANSDUCER FOR BCN58/59**  
 (See Table 4 for Transmitter/Transducer Kit Cross Reference)

| PART NO.    | QUANTITY | NAME  |
|-------------|----------|---|
| SEE TABLE 4 | 1        | TRANSDUCER ASSEMBLY                         |
| NTJHA11030  | 1        | WASHER                                      |
| NAUHA21008  | 1        | SCREW                                       |
| 1951201A210 | 1        | O-RING (TEFLON)                             |
| 1951414A210 | 1        | O-RING (VITON)                              |
| 6636952A1   | 1        | LEADWIRE, EXT.<br>(BCN58/59 □□□□ 5/6 only.) |
| 6636977A1   | 1        | LEADWIRE, EXT.                              |

TABLE 7 – O-Rings and Cap Screws (BCN56/57/66/67)

| NOMENCLATURE   | SCREW MATERIAL | O-RING MATERIAL | O-RING ITEM 69 | CAP SCREW ITEM 71 |
|----------------|----------------|-----------------|----------------|-------------------|
| BCN5/6 □□□ 1 □ | CARBON         | VITON           | 1951414A031    | NBABC21012        |
| BCN5/6 □□□ 2 □ | STEEL          | TEFLON          | 1951201A031    |                   |
| BCN5/6 □□□ 3 □ | STAINLESS      | VITON           | 1951414A031    | NBAHA21012        |
| BCN5/6 □□□ 4 □ | STEEL          | TEFLON          | 1951201A031    |                   |

TABLE 8 – Flange (BCN56/57/66/67)

| NOMENCLATURE    | MATERIAL  | FLANGE ITEM 70 |
|-----------------|-----------|----------------|
| BCN5/6 □□□ 1 □□ | 316L SST  | 6635440A1      |
| BCN5/6 □□□ 3 □□ | HASTELLOY | 6635440A2      |
| BCN5/6 □□□ 4 □□ | MONEL     | 6635440A3      |

# Support Services

## RECOMMENDED SPARE PARTS KITS

### KIT NO. 258456-1 AMPLIFIER ASSEMBLY

| ITEM NO. | PART NO.   | NAME           |
|----------|------------|----------------|
| 14-18    | 6638009-1  | AMPLIFIER ASSY |
| 47       | NDOAC13014 | SCREW, 3 REQD  |
| 21       | 1948533-1  | LUG, 2 REQD    |

### KIT NO. 258453-1 LCD REPLACEMENT ASSEMBLY (FOR BCN 6)

| ITEM NO. | PART NO.    | NAME          |
|----------|-------------|---------------|
| 3        | 6636084-1   | LCD           |
| 2        | 1948528-114 | CONNECTOR     |
| 20       | 6638057-1   | LCD SUPPORT   |
| 23       | 6638062-1   | LCD SHIELD    |
| 35       | 1963508-1   | LABEL         |
| 48       | NHSHAO5004  | SCREW, 2 REQD |
| 49       | NHSHAO9004  | SCREW, 2 REQD |

### KIT NO. 258453-1 LCD ADD-ON KIT ASSEMBLY (FOR BCN 6)

| ITEM NO. | PART NO.    | NAME          |
|----------|-------------|---------------|
| 1        | 6634627-2   | COVER         |
| 2        | 1948528-114 | CONNECTOR     |
| 3        | 6636084-1   | LCD ASSEMBLY  |
| 19       | 6633667-1   | LOCKNUT       |
| 20       | 6638057-1   | LCD SUPPORT   |
| 23       | 6638062-1   | LCD SHIELD    |
| 24       | 1951420-036 | O-RING        |
| 25       | 199927-1    | WINDOW        |
| 35       | 1963508-1   | LABEL         |
| 48       | NHSHA05004  | SCREW, 2 REQD |
| 49       | NHSHA09004  | SCREW, 2 REQD |
| 52       | NKJHA13004  | SET SCREW     |

### KIT NO. 258461- AMPLIFIER PC BOARDS

| KIT PART NO. | MICRO-COMPUTER PC BD (ITEM NO. 14) | INPUT PC BD (ITEM NO. 15) | COMMUNICATIONS PC BD (ITEM NO. 16) |
|--------------|------------------------------------|---------------------------|------------------------------------|
| 258461-1     | 1 REQD                             | OMIT                      | OMIT                               |
| 258461-2     | OMIT                               | 1 REQD                    | OMIT                               |
| 258461-3     | OMIT                               | OMIT                      | 1 REQD                             |

### KIT NO. 258283A1 COVER O-RING

| PART NO.    | QTY. | NAME   |
|-------------|------|--------|
| 1951420A154 | 10   | O-RING |

### KIT NO. 258300A3 PROCESS FLANGE O-RING (TEFLON) (FOR BCN25 1/3 )

| ITEM | PART NO.    | QTY. | NAME        |
|------|-------------|------|-------------|
| 66   | 1951201A032 | 10   | O-RING SEAL |

### KIT NO. 258300A4 PROCESS FLANGE O-RING (VITON) (FOR BCN25 2/4 )

| ITEM | PART NO.    | QTY. | NAME        |
|------|-------------|------|-------------|
| 66   | 1951414A032 | 10   | O-RING SEAL |

### KIT NO. 258300A7 PROCESS FLANGE O-RING (TEFLON) (FOR BCN5/6 2/4 )

| PART NO.    | QTY. | NAME        |
|-------------|------|-------------|
| 1951201A031 | 10   | O-RING SEAL |

**KIT NO. 258300A8 – PROCESS FLANGE O-RING**  
 (FOR BCN5/6  1/3  )

| PART NO.    | QTY. | NAME        |
|-------------|------|-------------|
| 1951414A031 | 10   | O-RING SEAL |

**KIT NO. 258276A1 – VENT VALVE (ITEM NO 57)\***  
 (FOR BCN  0  ,  
 BCN  1  &  
 BCN  5  ,

| PART NO.  | QTY. | NAME            |
|-----------|------|-----------------|
| 682388A1  | 1    | VALVE STEM      |
| 6628318A1 | 1    | VENT VALVE BODY |

**KIT NO. 258276A2 – VENT VALVE (ITEM NO 57) \***  
 (FOR BCN2  3  ,  
 BCN5  3  , &  
 BCN6  3  ,

| PART NO.  | QTY. | NAME            |
|-----------|------|-----------------|
| 682388A2  | 1    | VALVE STEM      |
| 6628318A2 | 1    | VENT VALVE BODY |

**KIT NO. 258276A3 – VENT VALVE (ITEM NO 57) \***  
 (FOR BCN2  4  ,  
 BCN5  4  , &  
 BCN6  4  ,

| PART NO.  | QTY. | NAME            |
|-----------|------|-----------------|
| 682388A3  | 1    | VALVE STEM      |
| 6628318A3 | 1    | VENT VALVE BODY |

\* Items listed are components of Vent Valve Assembly Part No. 6628319-.

**KIT NO. 258300A1 – PROCESS FLANGE O-RING**  
 (FOR BCN2  2/4  ,  
 BCN3  2/4  , &  
 BCN4  2/4  ,

| PART NO.    | QTY. | NAME        |
|-------------|------|-------------|
| 1951414A036 | 10   | O-RING SEAL |

**KIT NO. 258300A2 – PROCESS FLANGE O-RING**  
 (FOR BCN2  1/3  ,  
 BCN3  1/3  , &  
 BCN4  1/3  ,

| PART NO.    | QTY. | NAME        |
|-------------|------|-------------|
| 1951201A036 | 10   | O-RING SEAL |



## Appendix A

### APPLICATIONS IN FLAMMABLE ATMOSPHERES

#### Hazardous Locations

The BCN Smart Transmitter is being evaluated for Factory Mutual Research (FM) approval and Canadian Standards Association (CSA) certification for use in flammable atmospheres as follows:

Nonincendive for: Class I; Division 2; Groups B,C,D

**NOTE:** "Nonincendive" implies the equipment will not ignite a specific hazardous atmosphere mixture under normal operating conditions.

Explosionproof for: Class I; Division 1;  
Groups B,C,D

Dust-ignitionproof for: Class II; Division 1; Groups E-G  
Class III; Division 1

Intrinsically-safe for: Class I,II,III; Division 1;  
Groups A-G

#### Division 2 Applications Utilizing Nonincendive Rating

A Division 2 hazardous location is a location where a flammable substance is normally adequately contained or is normally adequately diluted by ventilation. A flammable or explosive concentration might occur due to a failure of containment or ventilation, however, such an occurrence would happen infrequently and for a short period of time. Containment failures could be due to leaking fittings, connectors, or seals. Guidelines for area classification are found in standards such as ANSI/NFPA 497A **Classification of Class I Hazardous (Classified) Locations for Electrical Installations in Chemical Process Areas.**

#### Nonincendive Equipment Rating

The incendive rating for the transmitter means that the unit has been evaluated to FM Class Number 3611 and CSA C22.2 No. 213 and has been found that under normal operation will not create a spark capable of igniting a specified test gas.

The T5 temperature message means that the BCN cannot be used with gases that have an autoignition temperature (AIT) less than 212°F (100°C). Auto ignition temperatures for many common gases and vapors can be found in ANSI/NFPA 497M "Classification of Gases, Vapors and Dusts for Electrical Equipment in Hazardous (classified) Locations."

#### WARNING

Disconnecting/reconnecting wiring or repairing the transmitter is not considered normal operation. These operations should only be done if power has been removed from all wiring or if the flammable atmosphere is known not to be present.

#### ATTENTION

Le débranchement ou le rebranchement des fils ainsi que la réparation du transmetteur n'entrent pas dans les procédures normales. Si l'atmosphère est inflammable, on ne doit effectuer les étapes ci-dessus que si l'alimentation a été interrompue.

Disconnecting the signal wiring connected to the transmitter would be permitted if the circuit is a Nonincendive Field Circuit. The National Electrical Code (NEC) refers to such a circuit as simply a Nonincendive circuit (since the NEC is an installation document, all references are to external circuits, e.g. field circuits) installed and tested while powered. Care must be taken to ensure that only one circuit is worked on at a time and that separate circuits are not shorted. Shorting of separate circuits is not part of the evaluation and could result in ignition capable arcs.

#### WARNING

Substitution of components may impair suitability for use in a hazardous location.

#### AVERTISSEMENT

La substitution de composants peut rendre ce matériel inacceptable pour les emplacements dangereux.

#### Wiring Requirements

Unless the current from the power supply is limited by series resistance, then the wiring must be suitable for a Division 2 hazardous location. The National Electrical Code requires the use of rigid metal conduit or non-metallic cable certified as "HL".

PLTC cable is rated 300 V and can be obtained in wire sizes 22 AWG to 16 AWG at various temperature ratings.

## Appendix A

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This would be the recommended wiring for transmitters installed in the United States.

### Nonincendive Field Circuits

If it is desired to use ordinary location wiring for the circuit or if it is desired to service individual transmitters while they are powered, then the power source must be voltage and current limited such that opening, shorting, or grounding of the circuit will not cause an ignition capable arc. In addition, operating on live circuits should only be done if there is not a shock hazard. For dry locations, the voltage should be less than 42 V dc or 30 V ac.

The documents listed at the end of this Appendix provide ignition curves to provide guidelines for limiting voltage and current. In general, there are three criteria:

1. For a given open circuit voltage, adequate series resistance must be provided at the power source to limit the short circuit current.
2. For given open circuit voltage, the capacitance of the transmitter plus cable must not exceed a specific value.
3. For a given short circuit current, the inductance of the transmitter plus cable must not exceed a specific value.

Any wiring type may be used for nonincendive field circuits per the exception in the NEC article 501-4 (b) and CEC article 18-066 (2).

### Applicable Standards

The following standards are available for designing and installing nonincendive circuits and equipment:

ANSI/ISA RP12.6-1988 "Installation of Intrinsically Safe Systems for Hazardous (Classified) Locations".

Instrument Society of America  
67 Alexander Drive  
P.O. Box 12277  
Research Triangle Park, NC 27709

ANSI/ISA S12.12-1984 "Electrical Equipment for use in Class I, Division 2 Hazardous (Classified) Locations".

Instrument Society of America  
67 Alexander Drive  
P.O. Box 12277  
Research Triangle Park, NC 27709

CSA C22.2 No. 213-M1987 "Non-Incendive Electrical Equipment for use in Class I, Division 2 Hazardous Locations".

Canadian Standards Association  
178 Rexdale Boulevard  
Rexdale (Toronto), Ontario Canada M9W 1R3

UL 1604 (1982) "Electrical Equipment for use in Hazardous Locations".

Underwriters Laboratories  
333 Pfingsten Road  
Northbrook, ILL. 60062

Fm Class Number 3611 (1986) "Electrical Equipment for use in Class I, II Division 2; Class III, Division 1 and 2 Hazardous Locations".

Factory Mutual Research  
1151 Boston-Providence Turnpike  
Norwood, Mass 02062

### INTRINSIC SAFETY APPLICATIONS

Bailey Controls Technical Guide TG999-13 contains information for determining minimum power supply voltage for performance of a 4 to 20 mA loop when various intrinsic barriers are used.

### FACTORY MUTUAL (FM)

Factory Mutual (FM) approved with entity rated barriers that do not exceed 40 volts (Voc) and 332 mA (Isc) (See Figure A1).



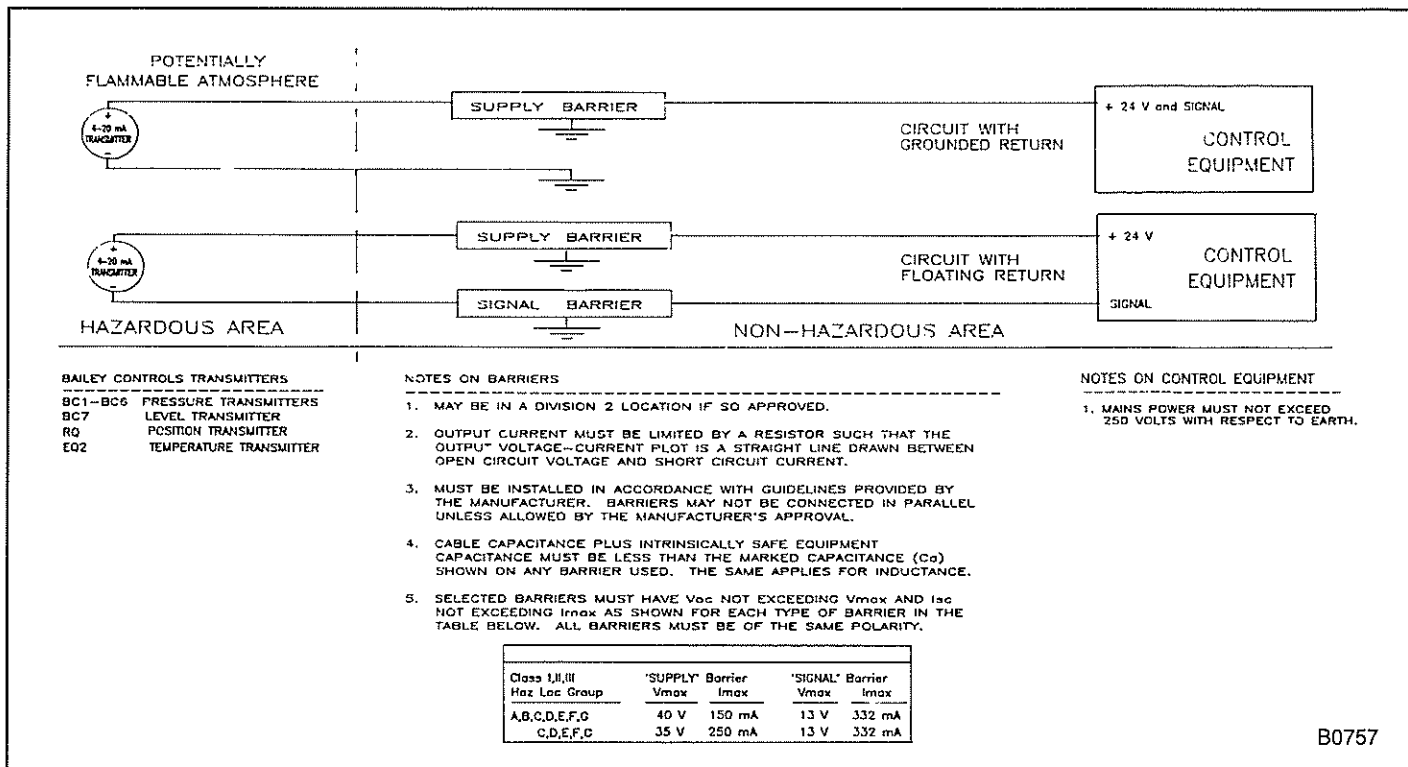


FIGURE A1 – Factory Mutual Approved Entity Parameters

**Canadian Standards Association (CSA)**

CSA certification pending with any certified barrier which does not exceed the following parameters:

| VOLTAGE (MAXIMUM) | GROUPS A-G RESISTANCE (MINIMUM) | GROUPS C-G RESISTANCE (MINIMUM) |
|-------------------|---------------------------------|---------------------------------|
| 32 volts          | 400 ohms                        | _____                           |
| 30 volts          | _____                           | 150 ohms                        |
| 28 volts          | 270 ohms                        | _____                           |
| 27 volts          | _____                           | 120 ohms                        |
| 22 volts          | 150 ohms                        | _____                           |
| 12 volts          | 40 ohms                         | 40 ohms                         |

Manufacturers with CSA certified barriers include Bailey Controls, Beckman, MTL, Stahl, and Taylor.

**Generals Requirements**

Any intrinsically safe installation must be done in accordance with barrier manufacture's instructions. ISA RP12.6 "Installation of Intrinsically Safe Systems in Hazardous (Classified) Locations" also provides detailed recommendations for installing equipment and wiring in

intrinsically safe loops. The essential parts of a proper installation are:

- Mounting barriers and field equipment only in flammable atmosphere for which they are specified.
- Segregation of intrinsically safe wiring to prevent contact with other circuits.
- Grounding of non-isolating intrinsic safety barriers.
- Verifying that Control Room equipment does not contain voltages above 250 V ac unless suitably certified to limit the voltage to barriers.
- Verifying that enclosures are properly sealed when used in Class II and Class III hazardous locations (see **WARNING** under "Explosionproof/Dust-ignition proof").

### WARNING

Intrinsic safety is dependent upon the components used in the transmitter. Any substitution of components may impair the intrinsic safety.

### AVERTISSEMENT

La sécurité intrinsèque dépend des composantes utilisées dans l'émetteur. Toute substitution de composante pourrait nuire à cette sécurité intrinsèque.

### Explosionproof/Dust-Ignitionproof

A proper explosion proof installation must comply with national codes such as NFPA 70 (ANSI C1) and local regulations for electrical installations in hazardous locations. The essential parts of such an installation are:

1. All tapered conduit connections must be made with at least five fully engaged threads.
2. All unused conduit openings must be closed by a 1/2-inch NPT pipe plug with at least five fully engaged threads.

3. The enclosure covers must be fully threaded on the enclosure with at least seven fully engaged threads.

4. All conduit connections must be properly sealed no farther than 18 inches (45 cm) from the enclosure.

5. Tapered threaded connections (such as pipe plugs and thermowells) must engage at least five full threads.

### WARNING

Explosion proof/dust-ignition proof installation and intrinsically safe installations in Class II or III hazardous locations require that the assembly be kept tight while circuits are live unless the location is known to be non-hazardous at the time.

### AVERTISSEMENT

En ce qui concerne l'installation anti-explosion et anti-ignition provoquée par la poussière dans des endroits de Classe II ou III, il est indispensable que l'assemblage soit tenu étanche pendant que les circuits sont électrifiés, à moins que cet endroit ne présente aucun danger à ce moment-là.