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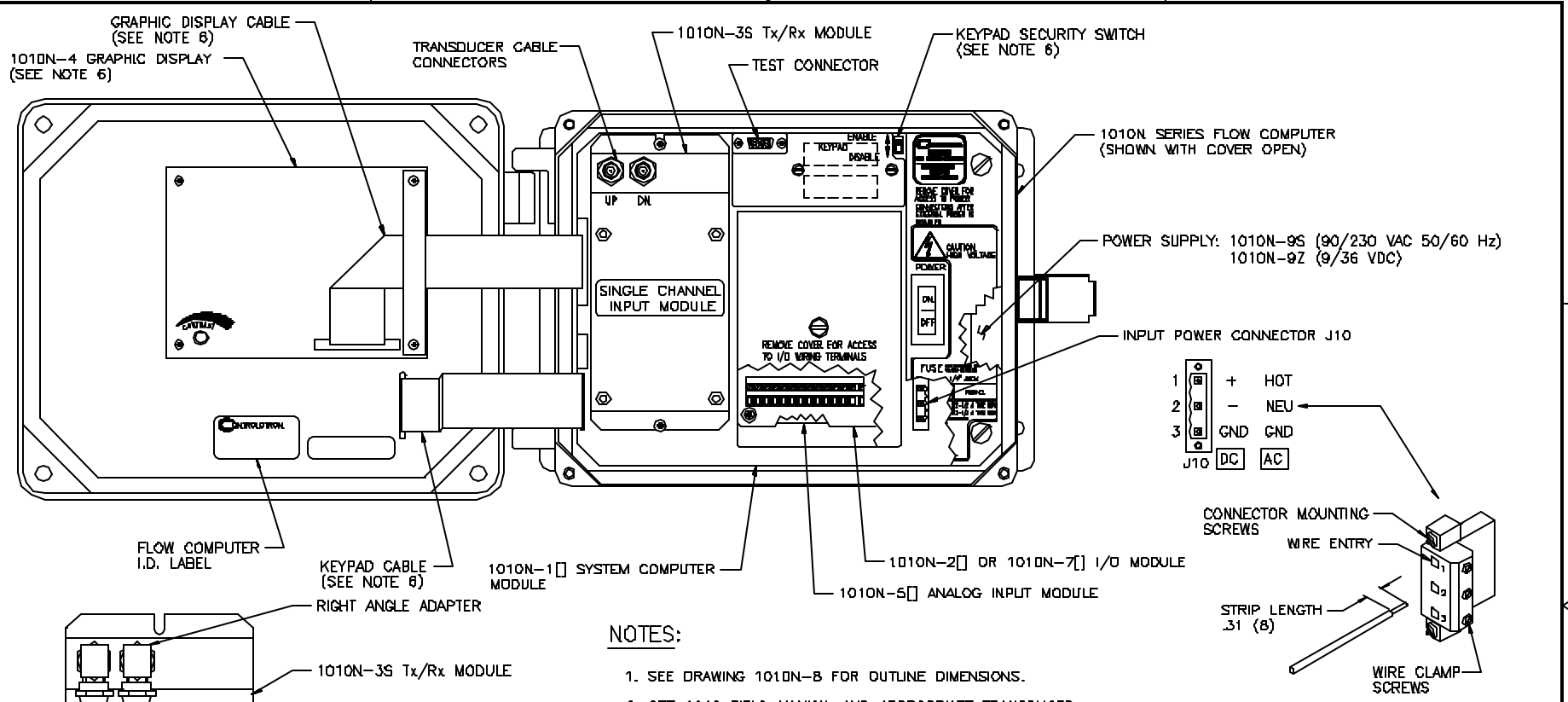
# APPENDIX C
# ENGINEERING DRAWINGS

**Flow Computer Drawings**

| | |
|---|---|
| 1010N-7 | Installation Drawing, 1010 Series Single Channel Flow Computer |
| 1010N-8 | Outline Dimensions, 1010 Series Single Channel Flow Computer |
| 1010DN-7 | Installation Drawing, 1010 Series Dual Channel Flow Computer |
| 1010DN-8 | Outline Dimensions, 1010 Series Dual Channel Flow Computer |
| 1010NS2-7 | Installation Drawing, 1010 Series Flow Computer, FM Approved |
| 1010NS2-8 | Outline Dimensions, 1010 Series Flow Computer, FM Approved |
| 1010N-7-7 | Installation Drawing, Expanded I/O Module |
| 1010N-5-7 | Installation Drawing, Analog Input Module |
| 1010N-2-7 | Installation Drawing, I/O Module |

**Transducer and Accessory Drawings**

| | |
|---|---|
| 1011HNFS-7 | Installation, 1011HNFS Series Dedicated Plastic Body Transducer |
| 1011HNFS-8 | Outline Dimension, 1011HNFS Series Dedicated Plastic Body Transducer |
| 1011NFPS-7 | Installation 1011NFPS Series Dedicated Plastic Body Transducer |
| 1011NFPS-8 | Outline Dimensions, 1011NFPS Series Dedicated Plastic Body Transducer |
| 1012BN-8 | Outline Dimensions, 1010 Series Spacer Bar |
| 1012FN-8 | Outline Dimensions, 1011 Series Dedicated Transducer Mounting Frames |
| 1012FNH-8 | Outline Dimensions, 1011HN Series Dedicated Transducer Mounting Frames |
| 1012MS-8 | Installation/Outline, Adjustable Mounting Strap |
| 1012TB-8 | Installation/Outline, 1011 Series Test Block |
| 1012TN-7 | Installation Drawing, 1010 Series Transducer & Mounting Tracks |
| 1012TN-8 | Outline Dimensions, 1012 Series Mounting Tracks |
| 1012TNH-7 | Installation Drawing, 1010 Series Transducer & Mounting Tracks |
| 1012TNH-8 | Outline Dimensions, 1012 Series Mounting Tracks |
| 1012F-DB-7 | Installation Drawing, Dual Path Transducer Set w/Mounting Frames |
| 990TDMVH-7A | Installation Drawing, 990 Series Transducer & Tracks, Very High Temp., Direct Mode |
| 990TDMVH-7B | Installation Drawing, 990 Series Transducer & Tracks, Very High Temp., Direct Mode |
| 990TRMVH-7A | Installation Drawing, 990 Series Transducers & Tracks, Very High Temp., Reflect Mode |
| 990TRMVH-7B | Installation Drawing, 990 Series Transducers & Tracks, Very High Temp., Reflect Mode |
| 191N1S-7 | Installation Drawing, 191N1S Transducer, NEMA 4 |
| 191N1S-8 | Outline Dimensions, 191N1S Transducer, NEMA 4 |
| 191N1H-7 | Installation Drawing, 191N1H Transducer, Hi Temp., NEMA-4 |
| 191N1H-8 | Outline Dimensions, 191N1H Transducer, Hi Temp., NEMA-4 |
| 991TN-7 | Installation Drawing, Temperature Sensor, NEMA-4 |
| 991TN-8 | Outline Dimensions, Temperature Sensor, NEMA-4 |
| 991TN-7A | Installation Drawing, 990 Series, Temperature Sensor, NEMA-4 |
| 991TN-8A | Outline Dimensions, 990 Series, Temperature Sensor, NEMA-4 |
| 991TW-8 | Installation/Outline Dimensions, Insert Temperature Sensor, 990E System |
| 1012WS-1-7 | Weld Seal Installation Instructions, Single Enclosure |
| 1012WS-2-7 | Weld Seal Installation Instructions, Dual Enclosure |




## NOTES:

1. SEE DRAWING 1010N-8 FOR OUTLINE DIMENSIONS.
2. SEE 1010 FIELD MANUAL AND APPROPRIATE TRANSDUCER INSTALLATION DRAWINGS FOR MOUNTING PROCEDURE.
3. DISABLE INSTRUMENT POWER BEFORE SERVICING POWER SUPPLY POWER SWITCH / CIRCUIT BREAKER OR INPUT POWER CONNECTION.
4. ALL TRANSDUCER CABLES ORIGINATING AT THE SAME FLOW COMPUTER MAY SHARE THE SAME CONDUIT. NO OTHER CABLES SHOULD BE HOUSED IN THE TRANSDUCER CABLE CONDUITS. CONNECT METALLIC CONDUITS TO EARTH GROUND.
5. OBSERVE FOLLOWING LIMITS WHEN INSTALLING TRANSDUCER CABLES IN CONDUIT:
   MAX. PULL TENSION: 80 lbs.
   MIN. BEND RADIUS: 2-1/2 INCHES
6. OPTIONAL DISPLAY AND KEYPAD APPEAR ON MODELS WITH GRAPHIC DISPLAY ONLY.

THE INPUT POWER CONNECTOR IS A PLUGGABLE, LUG-LESS WIRE CLAMP TYPE, PROVIDING RELIABLE TERMINATION OF STRIPPED STRANDED OR SOLID CONDUCTORS AWG.12-18 SECURE WITH SCREWS AFTER MATING CONNECTOR.

DO NOT SCALE THIS DRAWING

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES (MM) TOLERANCES ON-
INCHES ± .1 (MM) ± 2

CONTRACT NO.

DR HJ DATE 11/21/97
CHK DATE
ENG DATE
PROD DATE
APPD DATE

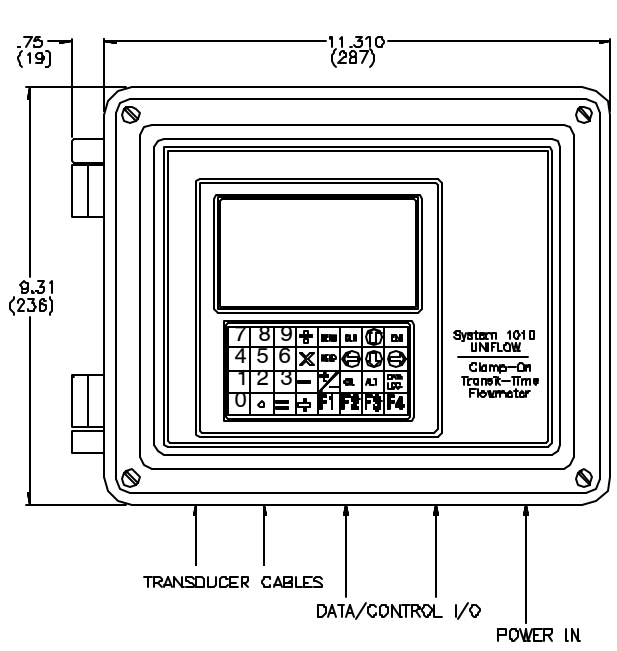
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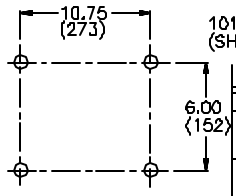
CONTROLOTRON
HAUPPAUGE, NY 11788

# INSTALLATION DRAWING
# 1010 SERIES SINGLE CHANNEL FLOW COMPUTER

| SIZE | CODE IDENT NO. | | REV. |
|---|---|---|---|
| C | 21614 | 1010N - 7 | B |
| SCALE: NONE | WT. | SHEET 1 OF 1 | |

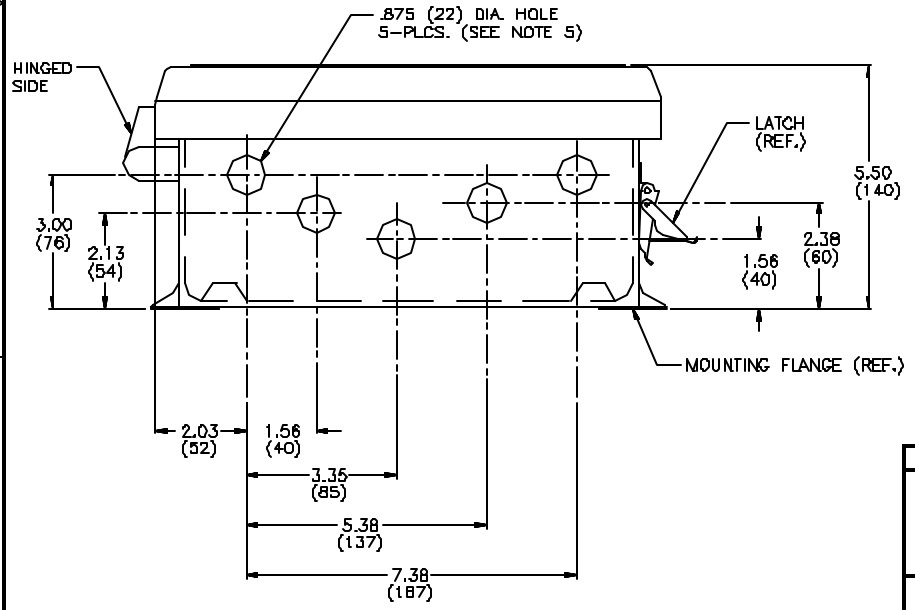
R14: 1010N-7 rev.B
CN#4246







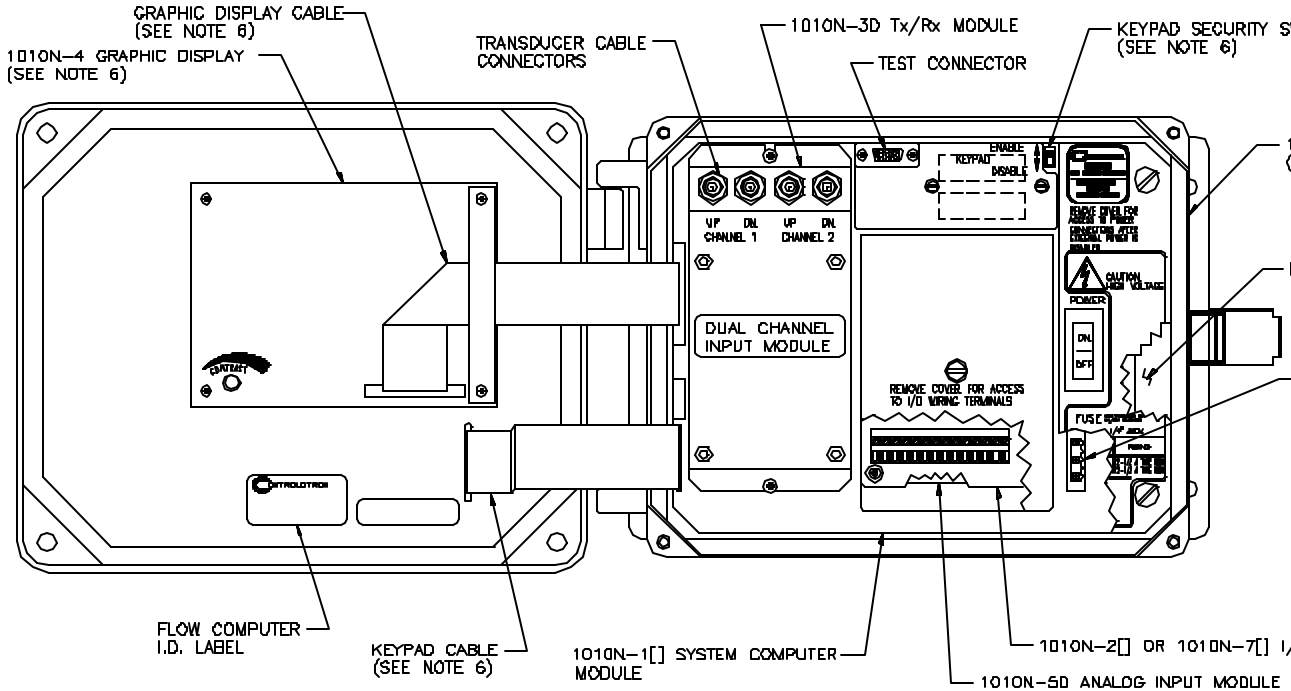


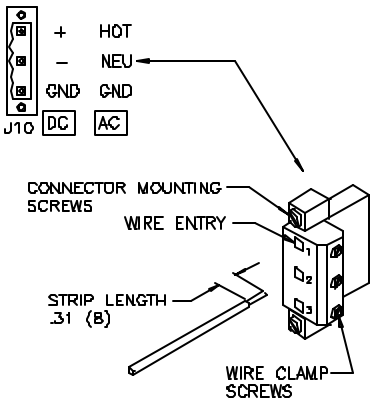

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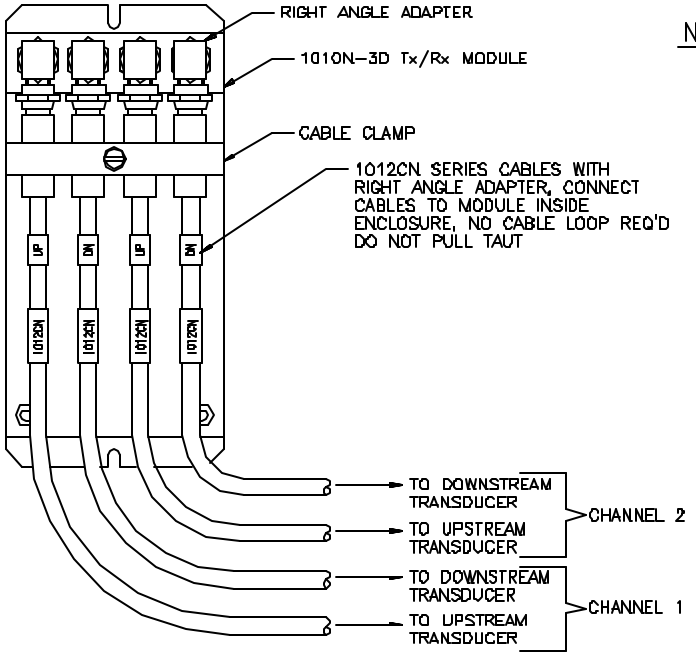
1. NET WEIGHT: 9.0 lbs. MAX.
2. SEE DRAWING 1010N-7 AND THE 1010 INSTALLATION MANUAL FOR INSTALLATION WIRING.
3. SEE DRAWING 1010N-2-7 OR 1010N-7-7 FOR I/O SPECIFICATIONS.
4. SEE DRAWING 1010N-5-7 FOR INPUT SPECIFICATIONS.
5. USE CONDUIT FITTINGS OR CABLE GLANDS AT ALL CABLE ENTRIES. INSTALL WEATHER TIGHT SEALS AT ALL UNUSED HOLES.

| | | | |
|---|---|---|---|
| DO NOT SCALE THIS DRAWING | CONTRACT NO. | CONTROLOTRON HAUPPAUGE, NY 11788 | |
| UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES TOLERANCES ON- INCHES ± .1 (MM) ± 2 | DR H.J DATE 11/21/97; CHK DATE; ENG DATE; PROD DATE; APPD DATE; CERTIFIED DATE | OUTLINE DIMENSIONS 1010 SERIES SINGLE CHANNEL FLOW COMPUTER | |
| | | SIZE C; CODE IDENT NO. 21614; 1010N - 8; REV. C | |
| | | SCALE: NONE; WT.; SHEET 1 OF 1 | |

R14: 1010N-8 rev.C
CN#4248




## NOTES:

1. SEE DRAWING 1010DN-8 FOR OUTLINE DIMENSIONS.
2. SEE 1010 FIELD MANUAL AND APPROPRIATE TRANSDUCER INSTALLATION DRAWINGS FOR MOUNTING PROCEDURE.
3. DISABLE INSTRUMENT POWER BEFORE SERVICING POWER SUPPLY, POWER SWITCH / CIRCUIT BREAKER OR INPUT POWER CONNECTOR.
4. ALL TRANSDUCER CABLES ORIGINATING AT THE SAME FLOW COMPUTER MAY SHARE THE SAME CONDUIT. NO OTHER CABLES SHOULD BE HOUSED IN THE TRANSDUCER CABLE CONDUITS. CONNECT METALLIC CONDUITS TO EARTH GROUND.
5. OBSERVE FOLLOWING LIMITS WHEN INSTALLING TRANSDUCER CABLES IN CONDUIT:
   MAX. PULL TENSION: 80 lbs.
   MIN. BEND RADIUS: 2-1/2 INCHES
6. OPTIONAL DISPLAY AND KEYPAD APPEAR ON MODELS WITH GRAPHIC DISPLAY ONLY.

THE INPUT POWER CONNECTOR IS A PLUGGABLE, LUG-LESS WIRE CLAMP TYPE, PROVIDING RELIABLE TERMINATION OF STRIPPED STRANDED OR SOLID CONDUCTORS AWG 12-18. SECURE WITH SCREWS AFTER MATING CONNECTOR.

DO NOT SCALE THIS DRAWING

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES (MM) TOLERANCES ON-
INCHES (MM)
± .1 ± 2

CONTRACT NO.

DR H.J DATE 11/21/97
CHK DATE
ENG DATE
PROD DATE
APP'D DATE

CERTIFIED
DATE

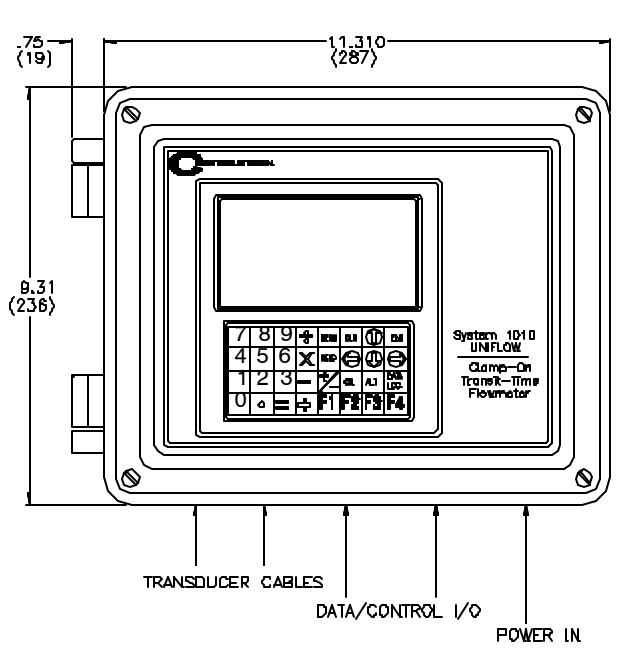
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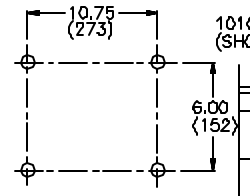
# INSTALLATION DRAWING 1010 SERIES DUAL CHANNEL FLOW COMPUTER

| SIZE | CODE IDENT NO. | | REV. |
|---|---|---|---|
| C | 21614 | 1010DN - 7 | B |

SCALE: NONE | WT. | SHEET 1 OF 1

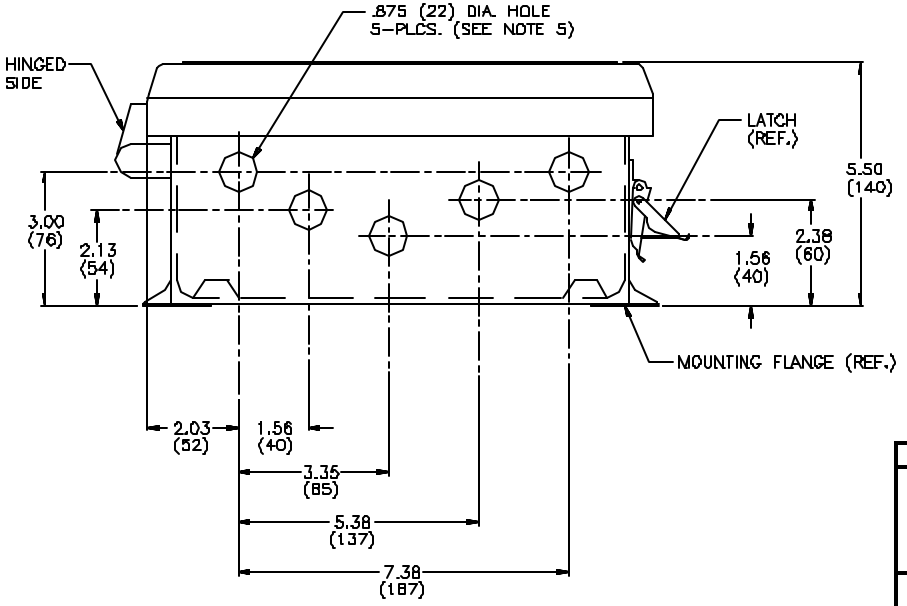
R14: 1010DN-7 rev.B
CN#4246










## NOTES:

1. NET WEIGHT: 9.0 lbs. MAX.
2. SEE DRAWING 1010DN-7 AND THE 1010 INSTALLATION MANUAL FOR INSTALLATION WIRING.
3. SEE DRAWING 1010N-2-7 OR 1010N-7-7 FOR I/O SPECIFICATIONS.
4. SEE DRAWING 1010N-5D-7 FOR INPUT SPECIFICATIONS.
5. USE CONDUIT FITTINGS OR CABLE GLANDS AT ALL CABLE ENTRIES. INSTALL WEATHER TIGHT SEALS AT ALL UNUSED HOLES.

DO NOT SCALE THIS DRAWING

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES (MM) TOLERANCES ON-

| INCHES | (MM) |
|---|---|
| ± .1 | ± 2 |

CONTRACT NO.

| | | |
|---|---|---|
| DR | H.J | DATE 11/21/97 |
| CHK | | DATE |
| ENG | | DATE |
| PROD | | DATE |
| APPD | | DATE |

CERTIFIED

DATE

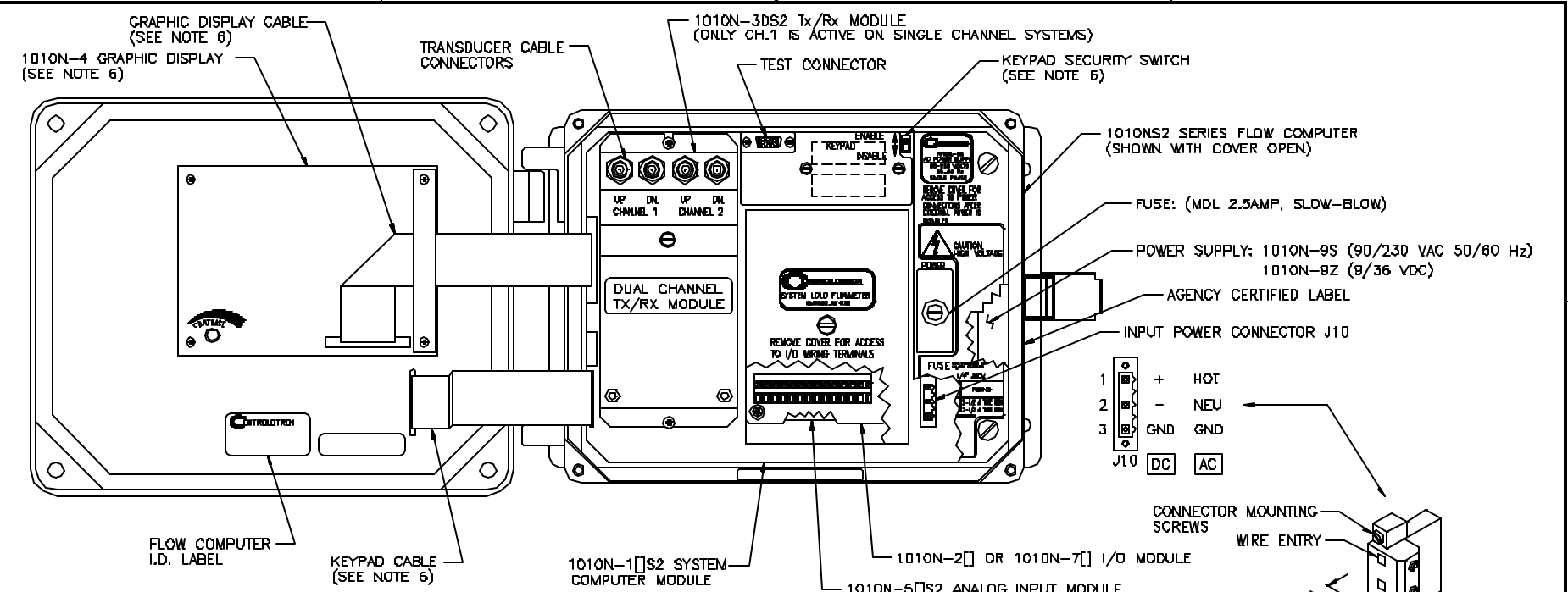
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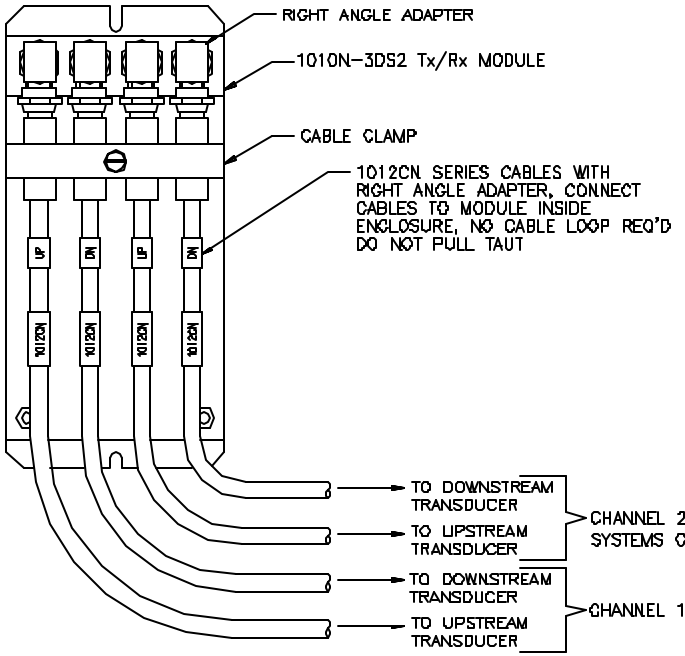
# OUTLINE DIMENSIONS
# 1010 SERIES DUAL CHANNEL FLOW COMPUTER

| SIZE | CODE IDENT NO. | | REV. |
|---|---|---|---|
| C | 21614 | 1010DN - 8 | C |

SCALE: NONE | WT. | SHEET 1 OF 1

R14: 1010DN-8 rev.C
CN#4246




## NOTES:

1. SEE DRAWING 1010NS2-8 FOR OUTLINE DIMENSIONS.
2. SEE 1010 FIELD MANUAL AND APPROPRIATE TRANSDUCER INSTALLATION DRAWINGS FOR MOUNTING PROCEDURE.
3. DISABLE INSTRUMENT POWER BEFORE SERVICING POWER SUPPLY, POWER SWITCH / CIRCUIT BREAKER OR INPUT POWER CONNECTOR.
4. ALL TRANSDUCER CABLES ORIGINATING AT THE SAME FLOW COMPUTER MAY SHARE THE SAME CONDUIT. NO OTHER CABLES SHOULD BE HOUSED IN THE TRANSDUCER CABLE CONDUITS. CONNECT METALLIC CONDUITS TO EARTH GROUND.
5. OBSERVE FOLLOWING LIMITS WHEN INSTALLING TRANSDUCER CABLES IN CONDUIT:
   MAX. PULL TENSION: 80 lbs.
   MIN. BEND RADIUS: 2-1/2 INCHES
6. OPTIONAL DISPLAY AND KEYPAD APPEAR ON MODELS WITH GRAPHIC DISPLAY ONLY.

THE INPUT POWER CONNECTOR IS A PLUGGABLE, LUG-LESS WIRE CLAMP TYPE, PROVIDING RELIABLE TERMINATION OF STRIPPED STRANDED OR SOLID CONDUCTORS AWG.12-18 SECURE WITH SCREWS AFTER MATING CONNECTOR.

CHANGES TO THIS DOCUMENT REQUIRE SAFETY AGENCY APPROVAL

DO NOT SCALE THIS DRAWING
UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES (MM) TOLERANCES ON-
INCHES (M.M)
± .1 ± 2

CONTRACT NO.

DR H.J DATE 4/22/98
CHK DATE
ENG DATE
PROD DATE
APPD DATE

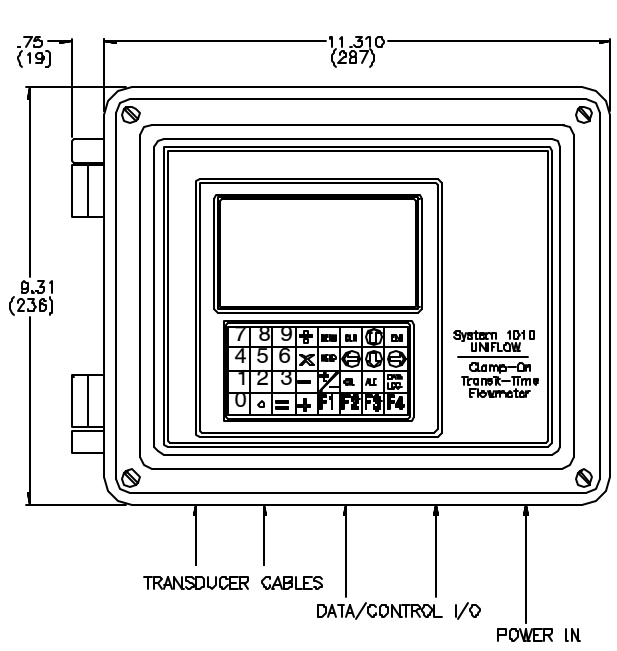
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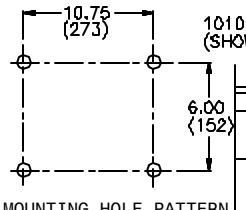
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# INSTALLATION DRAWING 1010 SERIES FLOW COMPUTER FM APPROVED

| SIZE | CODE IDENT NO. | | REV. |
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| SCALE: NONE | WT. | SHEET 1 OF 1 | |

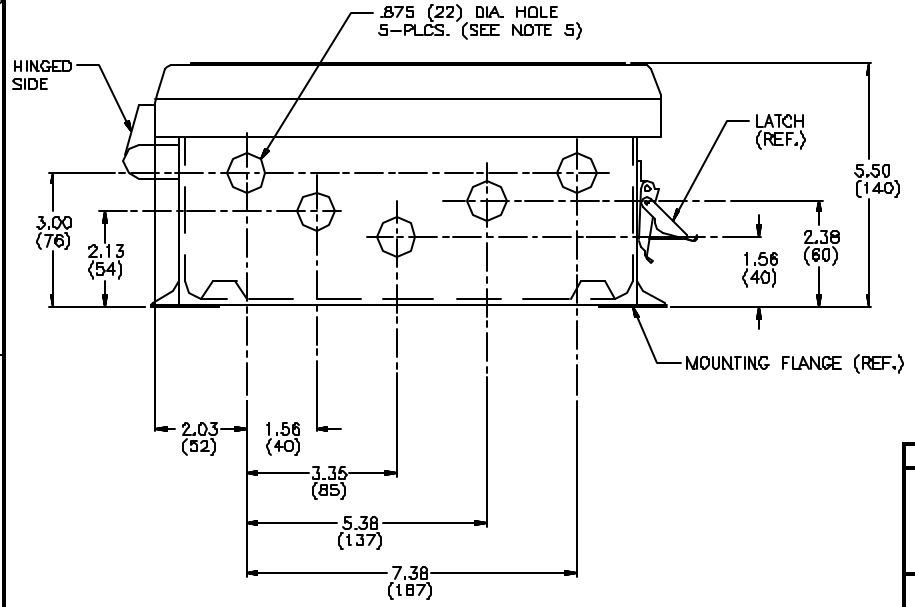
R14: 1010NS2-7 sht.1 rev.B
CN#4250










NOTES:

1. NET WEIGHT: 9.0 lbs. MAX.
2. SEE DRAWING 1010NS2-7 AND THE 1010 INSTALLATION MANUAL FOR INSTALLATION WIRING.
3. SEE DRAWING 1010N-2-7 OR 1010N-7-7 FOR I/O SPECIFICATIONS.
4. SEE DRAWING 1010N-5[]S2 OR 1010N-5DS2-7 FOR INPUT SPECIFICATIONS.
5. USE CONDUIT FITTINGS OR CABLE GLANDS AT ALL CABLE ENTRIES. INSTALL WEATHER TIGHT SEALS AT ALL UNUSED HOLES.

CHANGES TO THIS DOCUMENT REQUIRE SAFETY AGENCY APPROVAL

DO NOT SCALE THIS DRAWING

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON-

| INCHES | (MM) |
|---|---|
| ± .1 | ± 2 |

CONTRACT NO.

| | | |
|---|---|---|
| DR | H.J | DATE 4/22/98 |
| CHK | | DATE |
| ENG | | DATE |
| PROD | | DATE |
| APPD | | DATE |

CERTIFIED

DATE

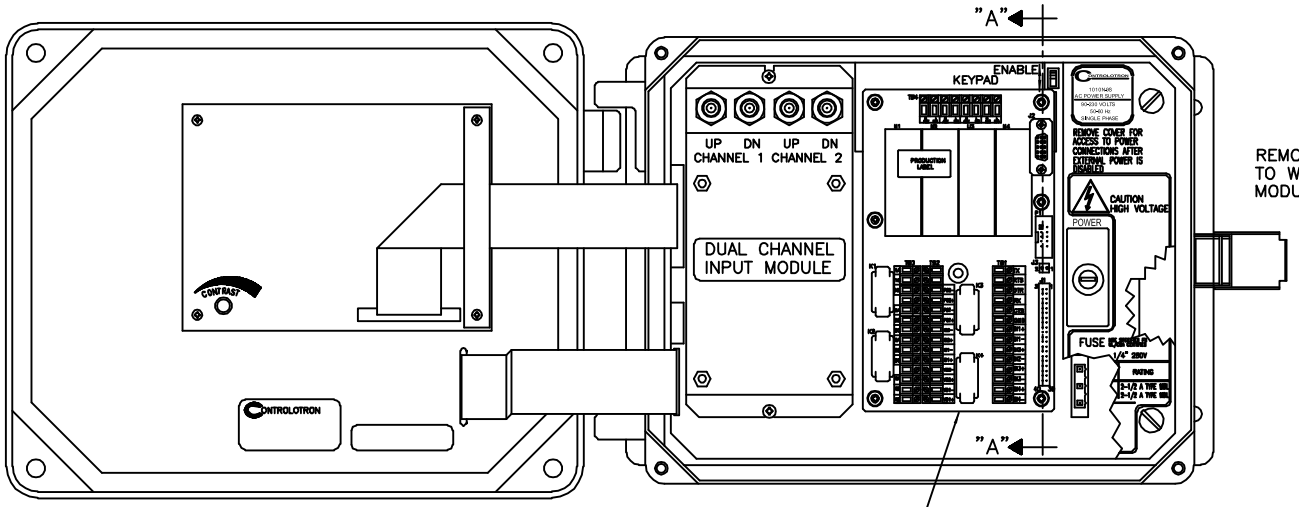
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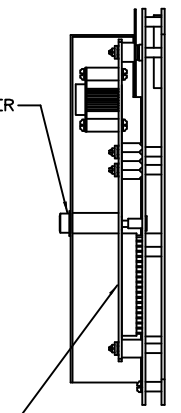
# OUTLINE DIMENSIONS
# 1010 SERIES FLOW COMPUTER
# FM APPROVED

| SIZE | CODE IDENT NO. | | REV. |
|---|---|---|---|
| C | 21614 | 1010NS2 - 8 | B |

SCALE: NONE | WT. | SHEET 1 OF 1

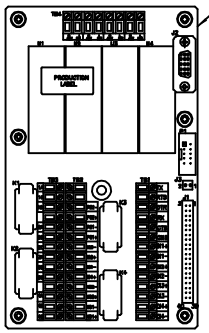
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CN#4250



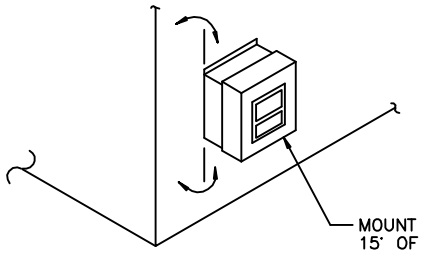




VIEW "A-A"

1010N–7[] I/O MODULE
INSTALLED IN 1010DN SERIES FLOWMETER
(SHOWN WITH COVER REMOVED)
SEE APPROPRIATE FLOWMETER OUTLINE DRAWING
FOR OTHER CONFIGURATIONS



| MODULE PART No. | RELAY TYPE |
|---|---|
| 1010N–7 | NONE |
| 1010N–7K2 | MERCURY WETTED, FORM 1A |
| 1010N–7K3 | DRY REED, FORM 1C |




SEE SHT.2 FOR WIRING CONNECTIONS WHEN USED IN STANDARD, HIGH PERFORMANCE OR ENHANCED PERFORMANCE FLOWMETERS
SEE SHT.3 FOR WIRING CONNECTIONS WHEN USED IN ULTRA PERFORMANCE FLOWMEWTERS

## NOTES: (CONT'D ON SHT. 2)

1. TERMINAL BLOCKS TB1, TB2, TB3 AND TB4 ARE LUG–LESS WIRE CLAMP TYPE, PROVIDING RELIABLE CONNECTION TO STRIPPED STRANDED WIRE, AWG. #14–24.
2. RELAY TYPE VARIES WITH MODULE PART NUMBER. SEE TABLE, ZONE B4.
3. RELAY CLOSURES ARE USER PROGRAMMABLE THROUGH THE 1010 INSTALLATION MENU. SEE THE 1010 FIELD MANUAL AND SHTS. 2 AND 3 FOR LIST OF ASSIGNABLE FUNCTIONS.
4. SET METER AND INSTRUMENTATION POWER TO OFF WHEN INSERTING OR REMOVING THE MODULE OR WHEN MAKING CONNECTIONS TO TB1, TB2, TB3 AND TB4.
5. REFER TO THE 1010 FIELD MANUAL FOR ADDITIONAL INSTALLATION INFORMATION.
6. WHEN SUPPLIED WITH MERCURY WETTED RELAYS (MODULE PART No. 1010N–7K2) MOUNT FLOW COMPUTER WITHIN 15° OF VERTICAL, BOTH PLANES, FOR PROPER RELAY OPERATION. (SEE ZONE B2).

DO NOT SCALE THIS DRAWING

UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN INCHES (MM)
TOLERANCES ON–
INCHES (MM)
± .1 ± 2

DR H.J DATE 8/30/00
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# INSTALLATION WIRING EXPANDED I/O MODULE

| SIZE | CODE IDENT NO. | | REV. |
|---|---|---|---|
| C | 21614 | 1010N-7-7 | D |
| SCALE: NONE | WT. | SHEET 1 OF 3 | |

R14: 1010N–7–7 rev.D
CN#4695

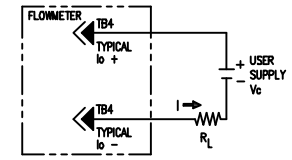
## TERMINAL BLOCK WIRING CONNECTIONS WHEN USED IN STANDARD, HIGH PERFORMANCE AND ENHANCED PERFORMANCE FLOWMETERS

| TB1 | PIN # | SIGNAL | FUNCTION | DESCRIPTION | USE | LOAD | WIRING | CABLE LENGTH | NOTES |
|---|---|---|---|---|---|---|---|---|---|
| RS232 PORT | 1 | Tx | TRANSMIT | STANDARD RS232 SIGNALS | STANDARD RS232 COMMUNICATION PORT | | SHIELDED DATA CABLE 24 GA. MINIMUM | 50 FT. MAX. AS PER EIA RS232 FOR GREATER RANGE, CONSULT FACTORY, SEE NOTE 7 | |
| | 2 | RTS | REQUEST TO SEND | | | | | | |
| | 3 | DTR | DATA TERMINAL READY | | | | | | |
| | 4 | Rx | RECEIVE | | | | | | |
| | 5 | CTS | CLEAR TO SEND | | | | | | |
| | 6 | GND | GROUND | COMMON RETURN | RS232 REFERENCE | | | | |
| | 7 | D1+ | DIGITAL INPUT 1 | CH1 NOTOT | FREEZES CH1 TOTALIZER | | SHIELDED 24 GA. INSTRUMENT CABLE | 1000 FT. MAX. WITHOUT FACTORY APPROVAL | CH1 NOTOT AND CLRTOT LINES ALSO CONTROL DUAL BEAM SYSTEM (PATH 3) TOTALIZER FUNCTIONS |
| | 8 | D1− | DIGITAL RETURN | COMMON | COMMON | | | | |
| | 9 | D2+ | DIGITAL INPUT 2 | CH2 NOTOT | FREEZES CH2 TOTALIZER | | | | |
| | 10 | D2− | DIGITAL RETURN | COMMON | COMMON | | | | |
| | 11 | D3+ | DIGITAL INPUT 3 | CH1 CLRTOT | CLEARS CH1 TOTALIZER | | | | |
| | 12 | D3− | DIGITAL RETURN | COMMON | | | | | |
| | 13 | D4+ | DIGITAL INPUT 4 | CH2 CLRTOT | CLEARS CH2 TOTALIZER | | | | |
| | 14 | D4− | DIGITAL RETURN | COMMON | COMMON | | | | |

| TB2 | PIN # | SIGNAL | FUNCTION | DESCRIPTION | USE | LOAD | WIRING | CABLE LENGTH | NOTES |
|---|---|---|---|---|---|---|---|---|---|
| | 1 | Vo1+ | 0−10 VOLT ANALOG OUTPUT | ALL ANALOG OUTPUTS ASSIGNABLE TO Vo, Vfo, Vs, Valc & OTHER SYSTEM VARIABLES UNDER MENU CONTROL | SYSTEM ANALOG OUTPUTS | 10KΩ MIN. | 24 GA. MIN. | | |
| | 2 | Vo1− | REF. GROUND | | | | | | |
| | 3 | Vo2+ | 0−10 VOLT ANALOG OUTPUT | | | 10KΩ MIN. | | | |
| | 4 | Vo2− | REF. GROUND | | | | | | |
| | 5 | Io1+ | 4−20mA OUTPUT 1 | | | 1000Ω MAX. | | | |
| | 6 | Io1− | ISOLATED RETURN | | | | | | 4−20mA OUTPUTS ARE SELF POWERED. DO NOT CONNECT TO "LOOP POWERED" CIRCUITS. |
| | 7 | Io2+ | 4−20mA OUTPUT 2 | | | 1000Ω MAX. | | | |
| | 8 | Io2− | ISOLATED RETURN | | | | | | |
| | 9 | PG1 | FREQUENCY OUTPUT 1 | 0−5000 Hz 5 VOLT LOGIC SQUARE WAVEFORM | | 2 TTL LOADS | | | |
| | 10 | PG2 | REF. GROUND | | | | | | |
| | 11 | PG3 | FREQUENCY OUTPUT 2 | | | | | | |
| | 12 | PG4 | REF. GROUND | | | | | | |
| | 13 | | NO CONNECTION | | | | | | |
| | 14 | | NO CONNECTION | | | | | | |

| TB3 | PIN # | SIGNAL | FUNCTION | DESCRIPTION | USE | LOAD NON−INDUCTIVE | WIRING | CABLE LENGTH | NOTES |
|---|---|---|---|---|---|---|---|---|---|
| | 1 | K1 A | RELAY 1 NORMALLY OPEN | ASSIGNMENT OF RELAY FUNCTIONS IS UNDER 1010 MENU CONTROL | ALARM OR CONTROL | MODULE 1010N−2K3: 3VA 30VDC .25A MAX. | AS REQ'D | AS REQ'D | ALL RELAYS ASSIGNED AS ALARMS ARE ENERGIZED WHILE NON−ALARMED STATUS EXISTS. |
| | 2 | K1 B | RELAY 1 NORMALLY CLOSED | | | | | | |
| | 3 | K1 C | RELAY 1 COMMON | | | | | | COUNT RELAYS ARE ENERGIZED FOR 200MS FOR EACH TOTALIZER INCREMENT. SEE NOTE 8 |
| | 4 | | NO CONNECTION | | | | | | |
| | 5 | K2 A | RELAY 2 NORMALLY OPEN | | | | | | |
| | 6 | K2 B | RELAY 2 NORMALLY CLOSED | | | | | | |
| | 7 | K2 C | RELAY 2 COMMON | | | | | | |
| | 8 | K3 A | RELAY 3 NORMALLY OPEN | | | | | | |
| | 9 | K3 B | RELAY 3 NORMALLY CLOSED | | | | | | NORMALLY CLOSED RELAY FUNCTION IS NOT AVAILABLE ON MODULE 1010N−2K2 |
| | 10 | K3 C | RELAY 3 COMMON | | | | | | |
| | 11 | | NO CONNECTION | | | | | | |
| | 12 | K4 A | RELAY 4 NORMALLY OPEN | | | MODULE 1010N−2K2: 50VA 350VDC (PEAK AC) 0.5A MAX. | | | |
| | 13 | K4 B | RELAY 4 NORMALLY CLOSED | | | | | | |
| | 14 | K4 C | RELAY 4 COMMON | | | | | | SEE NOTE 5 (SHT. 1) |

| TB4 | PIN # | SIGNAL | FUNCTION | DESCRIPTION | USE | LOAD NON−INDUCTIVE | WIRING | CABLE LENGTH | NOTES |
|---|---|---|---|---|---|---|---|---|---|
| | 1 | AUX IO1+ | ISOLATED LOOP SUPPLY | CONNECT +30V MAX. LOOP SUPPLY HERE | AUXILLIARY 4−20mA LOOPS ASSIGNED AND SPANNED UNDER MENU CONTROL OF Vo AND PGEN OUTPUTS | 1000Ω MAX. WHEN USING 24 VOLT LOOP SUPPLY | SHIELDED 24 GA. INSTRUMENT CABLE | 1000 FT. MAX. WITHOUT FACTORY APPROVAL | REF. SCHEMATIC "A" ZONE D1. CONNECT USER LOOP SUPPLY +30 VOLTS DC MAX. |
| | 2 | AUX IO1− | LOOP−POWERED 4−20mA | PGEN 1 DATA PRESENTED AS 4−20mA | | | | | |
| | 3 | AUX IO2+ | ISOLATED LOOP SUPPLY | CONNECT +30V MAX. LOOP SUPPLY HERE | | | | | |
| | 4 | AUX IO2− | LOOP−POWERED 4−20mA | PGEN 2 DATA PRESENTED AS 4−20mA | | | | | |
| | 5 | AUX IO3+ | ISOLATED LOOP SUPPLY | CONNECT +30V MAX. LOOP SUPPLY HERE | | | | | |
| | 6 | AUX IO3− | LOOP−POWERED 4−20mA | Vo1 DATA PRESENTED AS 4−20mA | | | | | |
| | 7 | AUX IO4+ | ISOLATED LOOP SUPPLY | CONNECT +30V MAX. LOOP SUPPLY HERE | | | | | |
| | 8 | AUX IO4− | LOOP−POWERED 4−20mA | Vo2 DATA PRESENTED AS 4−20mA | | | | | |




Vc: 24VDC TYPICAL
$R_L$: 1000Ω TYPICAL
I = 4−20mA
$R_L$ = LOOP WIRE RESISTANCE PLUS USER'S INPUT LOAD RESISTANCE

SCHEMATIC "A"
AUX. ISOLATED 4−20mA OUTPUT

(CONT'D FROM SHT. 1)

7. RS−232 RANGE CAN BE INCREASED BY:
   a) USE OF SHORT HAUL MODEMS.
   b) USE OF SPECIAL DATA CABLES AND/OR SLOWER DATA RATES.
   c) USE OF TELEPHONE LINE MODEM.
   CONSULT FACTORY FOR DETAILS.
8. IT IS RECOMMENDED THAT MODULE 1010N−7K2 (MERCURY WETTED RELAYS) BE EMPLOYED IF TOTALIZER RELAY PULSES ARE TO BE SELECTED.
9. LOAD CAPABLITY VARIES WITH SUPPLIED VOLTAGE. MAXIMUM LOAD FIGURES INCLUDE WIRING.

DO NOT SCALE THIS DRAWING

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES (MM) TOLERANCES ON−
INCHES ± .1 (MM) ± 2

CONTRACT NO.

DR H.J DATE 8/30/00
CHK ____ DATE ____
ENG ____ DATE ____
PROD ____ DATE ____
APPD ____ DATE ____

CERTIFIED ____
DATE ____

CONTROLOTRON
HAUPPAUGE, NY 11788

# INSTALLATION DRAWING EXPANDED I/O MODULE

| SIZE | CODE IDENT NO. | | REV. |
|---|---|---|---|
| C | 21614 | 1010N-7-7 | D |
| SCALE: NONE | WT. | SHEET 2 OF 3 | |

R14: 1010N−7−7 rev.D
CN#4695

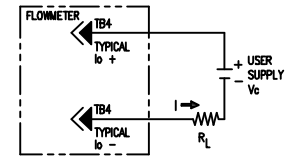
## TERMINAL BLOCK WIRING CONNECTIONS WHEN USED IN ULTRA PERFORMANCE FLOWMETERS

| TB1 | PIN # | SIGNAL | FUNCTION | DESCRIPTION | USE | LOAD | WIRING | CABLE LENGTH | NOTES |
|---|---|---|---|---|---|---|---|---|---|
| RS232 PORT | 1 | Tx | TRANSMIT | STANDARD RS232 SIGNALS | STANDARD RS232 COMMUNICATION PORT | | SHIELDED DATA CABLE 24 GA. MINIMUM | 50 FT. MAX. AS PER EIA RS232 FOR GREATER RANGE, CONSULT FACTORY, SEE NOTE 7 | |
| | 2 | RTS | REQUEST TO SEND | | | | | | |
| | 3 | DTR | DATA TERMINAL READY | | | | | | |
| | 4 | Rx | RECEIVE | | | | | | |
| | 5 | CTS | CLEAR TO SEND | | | | | | |
| | 6 | GND | GROUND | COMMON RETURN | RS232 REFERENCE | | | | |
| | 7 | D1+ | DIGITAL INPUT 1 | SYSTEM TOTALIZER GATE | FREEZES TOTALIZER | SHORT D1+ TO D1- TO FREEZE TOTALIZER | SHIELDED 24 GA. INSTRUMENT CABLE | 1000 FT. MAX. WITHOUT FACTORY APPROVAL | |
| | 8 | D1- | DIGITAL RETURN | COMMON | COMMON | | | | |
| | 9 | | NO CONNECTION | | | | | | |
| | 10 | | NO CONNECTION | | | | | | |
| | 11 | | NO CONNECTION | | | | | | |
| | 12 | | NO CONNECTION | | | | | | |
| | 13 | | NO CONNECTION | | | | | | |
| | 14 | | NO CONNECTION | | | | | | |

| TB2 | PIN # | SIGNAL | FUNCTION | DESCRIPTION | USE | LOAD | WIRING | CABLE LENGTH | NOTES |
|---|---|---|---|---|---|---|---|---|---|
| | 1 | Vo1+ | 0-10 VOLT ANALOG OUTPUT | ALL ANALOG OUTPUTS ASSIGNABLE TO Vo, Vfo, Vs, Valc & OTHER SYSTEM VARIABLES UNDER MENU CONTROL | SYSTEM ANALOG OUTPUTS | 10KΩ MIN. | 24 GA. MIN. | | |
| | 2 | Vo1- | REF. GROUND | | | | | | |
| | 3 | Vo2+ | 0-10 VOLT ANALOG OUTPUT | | | 10KΩ MIN. | | | |
| | 4 | Vo2- | REF. GROUND | | | | | | |
| | 5 | Io1+ | 4-20mA OUTPUT 1 | | | 1000Ω MAX. | | | 4-20mA OUTPUTS ARE SELF POWERED. DO NOT CONNECT TO "LOOP POWERED" CIRCUITS AUX. Io's (SHOWN BELOW) ARE LOOP POWERED |
| | 6 | Io1- | ISOLATED RETURN | | | | | | |
| | 7 | Io2+ | 4-20mA OUTPUT 2 | | | 1000Ω MAX. | | | |
| | 8 | Io2- | ISOLATED RETURN | | | | | | |
| | 9 | PG1 | PRIMARY FREQUENCY OUTPUT/OPEN COLLECTOR | DIGITALLY SYNTHESIZED PULSE WAVEFORM | ASSIGNED TO FLOWRATE ONLY, USER-DEFINED NUMBER OF PULSES PER UNIT VOLUME | SEE NOTE 10 | | | FLOW DIRECTION CONDITIONS QUADRATURE RELATIONSHIP (+90° TO -90°) USE TB2 PINS 2 & 4 AS COMMON REF. |
| | 10 | PG2 | PRIMARY FREQUENCY OUTPUT/TTL | | | 2 TTL LOADS | | | |
| | 11 | PG3 | QUADRATURE FREQUENCY OUTPUT/OPEN COLLECTOR | | | SEE NOTE 10 | | | |
| | 12 | PG4 | QUADRATURE FREQUENCY OUTPUT/TTL | | | 2 TTL LOADS | | | |
| | 13 | | NO CONNECTION | | | | | | |
| | 14 | | NO CONNECTION | | | | | | |

| TB3 | PIN # | SIGNAL | FUNCTION | DESCRIPTION | USE | LOAD NON-INDUCTIVE | WIRING | CABLE LENGTH | NOTES |
|---|---|---|---|---|---|---|---|---|---|
| | 1 | K1 A | RELAY 1 NORMALLY OPEN | ASSIGNMENT OF RELAY FUNCTIONS IS UNDER 1010 MENU CONTROL | ALARM OR CONTROL | MODULE 1010N-2K3: 3VA 30VDC .25A MAX. | AS REQ'D | AS REQ'D | ALL RELAYS ASSIGNED AS ALARMS ARE ENERGIZED WHILE NON-ALARMED STATUS EXISTS. COUNT RELAYS ARE ENERGIZED FOR 200MS FOR EACH TOTALIZER INCREMENT. SEE NOTE 8 NORMALLY CLOSED RELAY FUNCTION IS NOT AVAILABLE ON MODULE 1010N-2K2 SEE NOTE 5 (SHT. 1) |
| | 2 | K1 B | RELAY 1 NORMALLY CLOSED | | | | | | |
| | 3 | K1 C | RELAY 1 COMMON | | | | | | |
| | 4 | | NO CONNECTION | | | | | | |
| | 5 | K2 A | RELAY 2 NORMALLY OPEN | | | | | | |
| | 6 | K2 B | RELAY 2 NORMALLY CLOSED | | | | | | |
| | 7 | K2 C | RELAY 2 COMMON | | | | | | |
| | 8 | K3 A | RELAY 3 NORMALLY OPEN | | | | | | |
| | 9 | K3 B | RELAY 3 NORMALLY CLOSED | | | | | | |
| | 10 | K3 C | RELAY 3 COMMON | | | | | | |
| | 11 | | NO CONNECTION | | | | | | |
| | 12 | K4 A | RELAY 4 NORMALLY OPEN | | | | | | |
| | 13 | K4 B | RELAY 4 NORMALLY CLOSED | | | | | | |
| | 14 | K4 C | RELAY 4 COMMON | | | MODULE 1010N-2K2: 50VA 350VDC (PEAK AC) 0.5A MAX. | | | |

| TB4 | PIN # | SIGNAL | FUNCTION | DESCRIPTION | USE | LOAD NON-INDUCTIVE | WIRING | CABLE LENGTH | NOTES |
|---|---|---|---|---|---|---|---|---|---|
| | 1 | | NO CONNECTION | | | | | | |
| | 2 | | NO CONNECTION | | | | | | |
| | 3 | | NO CONNECTION | | | | | | |
| | 4 | | NO CONNECTION | | | | | | |
| | 5 | AUX IO3+ | ISOLATED LOOP SUPPLY | CONNECT +30V MAX. LOOP SUPPLY HERE | AUXILLIARY 4-20mA LOOPS ASSIGNED AND SPANNED UNDER MENU CONTROL OF Vo AND PGEN OUTPUTS | 1000Ω MAX. WHEN USING 24 VOLT LOOP SUPPLY | SHIELDED 24 GA. INSTRUMENT CABLE | 1000 FT. MAX. WITHOUT FACTORY APPROVAL | REF. SCHEMATIC "A" ZONE D1. CONNECT USER LOOP SUPPLY +30 VOLTS DC MAX. |
| | 6 | AUX IO3- | LOOP-POWERED 4-20mA | Vo1 DATA PRESENTED AS 4-20mA | | | | | |
| | 7 | AUX IO4+ | ISOLATED LOOP SUPPLY | CONNECT +30V MAX. LOOP SUPPLY HERE | | | | | |
| | 8 | AUX IO4- | LOOP-POWERED 4-20mA | Vo2 DATA PRESENTED AS 4-20mA | | | | | |




Vc: 24VDC TYPICAL
$R_L$: 100DΩ TYPICAL
I = 4-20mA
$R_L$ = LOOP WIRE RESISTANCE PLUS USER'S INPUT LOAD RESISTANCE

SCHEMATIC "A"
AUX. ISOLATED 4-20mA OUTPUT

(CONT'D FROM SHT. 1)

7. RS-232 RANGE CAN BE INCREASED BY:
   a) USE OF SHORT HAUL MODEMS.
   b) USE OF SPECIAL DATA CABLES AND/OR SLOWER DATA RATES.
   c) USE OF TELEPHONE LINE MODEM.
   CONSULT FACTORY FOR DETAILS.
8. IT IS RECOMMENDED THAT MODULE 1010N-7K2 (MERCURY WETTED RELAYS) BE EMPLOYED IF TOTALIZER RELAY PULSES ARE TO BE SELECTED.
9. LOAD CAPABLITY VARIES WITH SUPPLIED VOLTAGE. MAXIMUM LOAD FIGURES INCLUDE WIRING.
10. LOAD FOR PG1 AND PG3: 28 VOLT MAX. OPEN COLLECTOR RESISTIVE LOAD.

DO NOT SCALE THIS DRAWING

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES (MM) TOLERANCES ON-
INCHES (MM)
± .1 ± 2

CONTRACT NO.

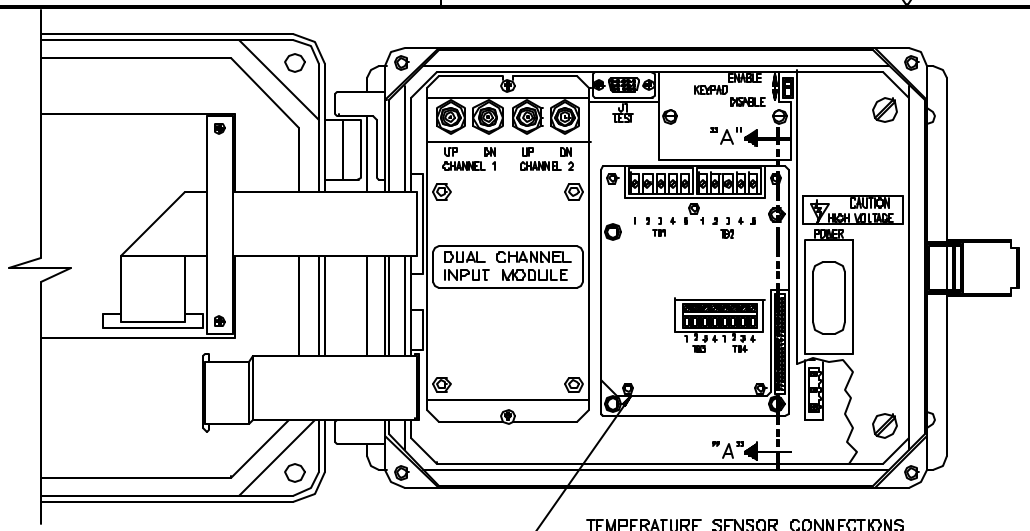
DR H.J DATE 8/30/00
CHK DATE
ENG DATE
PROD DATE
APPD DATE
CERTIFIED
DATE

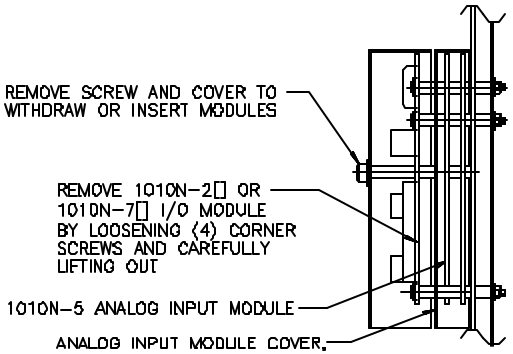
CONTROLOTRON
HAUPPAUGE, NY 11788

# INSTALLATION DRAWING EXPANDED I/O MODULE

| SIZE | CODE IDENT NO. | | REV. |
|---|---|---|---|
| C | 21614 | 1010N-7-7 | D |
| SCALE: NONE | WT. | SHEET 3 OF 3 | |

R14: 1010N-7-7 rev.D
CN#4695



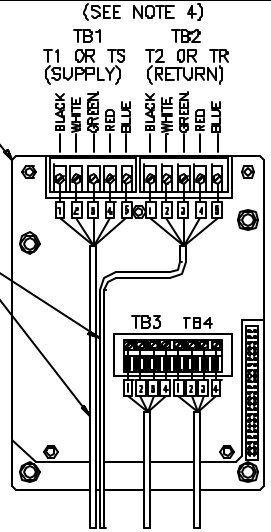




SECTION "A-A"

1010N-5 ANALOG INPUT MODULE (SHOWN WITH SCREW, COVER AND I/O MODULE 1010N-2[] OR 1010N-7[] REMOVED IN TYPICAL 1010DN FLOW COMPUTER SEE APPROPRIATE FLOW COMPUTER OUTLINE DRAWING FOR OTHER CONFIGURATIONS

1012EC SERIES CABLES

TEMPERATURE SENSOR CONNECTIONS (SEE NOTE 4)




## TB1 WIRING

| PIN | COLOR | FUNCTION SEE NOTE 4 | DESCRIPTION | WIRING | CABLE LENGTH | NOTES |
|---|---|---|---|---|---|---|
| 1 | BLACK | RTD CURRENT HIGH | RTD TEMPERATURE MEASUREMENT T1 OR TS (SUPPLY TEMPERATURE) (SEE NOTE 5) | AWG.14-24 | 1000 FT. MAX. WITHOUT FACTORY APPROVAL | SEE NOTE 3 |
| 2 | WHITE | RTD VOLTAGE HIGH | | | | |
| 3 | GREEN | RTD VOLTAGE LOW | | | | |
| 4 | RED | RTD CURRENT LOW | | | | |
| 5 | BLUE | GROUND | | | | |

## TB2 WIRING

| PIN | COLOR | FUNCTION SEE NOTE 4 | DESCRIPTION | WIRING | CABLE LENGTH | NOTES |
|---|---|---|---|---|---|---|
| 1 | BLACK | RTD CURRENT HIGH | RTD TEMPERATURE MEASUREMENT T2 OR TR (RETURN TEMPERATURE) (SEE NOTE 5) | AWG.14-24 | 1000 FT. MAX. WITHOUT FACTORY APPROVAL | SEE NOTE 3 |
| 2 | WHITE | RTD VOLTAGE HIGH | | | | |
| 3 | GREEN | RTD VOLTAGE LOW | | | | |
| 4 | RED | RTD CURRENT LOW | | | | |
| 5 | BLUE | GROUND | | | | |

## TB3 WIRING

| PIN | FUNCTION SEE NOTE 4 | USE | DESCRIPTION | BEHAVIOR | LOAD | WIRING | CABLE LENGTH | NOTES |
|---|---|---|---|---|---|---|---|---|
| 1 | AUX.1 IN | Iin1 INPUT | ANALOG CURRENT INPUT REFERENCED TO METER GROUND | 4 TO 20 mA | 200Ω | AWG.14-24 | 1000 FT. MAX. WITHOUT FACTORY APPROVAL | SEE NOTE 3 |
| 2 | AUX.1 COM | Iin1 COMMON | | | | | | |
| 3 | AUX.2 IN | Iin2 INPUT | | | | | | |
| 4 | AUX.2 COM | Iin2 COMMON | | | | | | |

## TB4 WIRING

| PIN | FUNCTION SEE NOTE 4 | USE | DESCRIPTION | BEHAVIOR | LOAD | WIRING | CABLE LENGTH | NOTES |
|---|---|---|---|---|---|---|---|---|
| 1 | AUX.3 IN | Iin1 INPUT | ANALOG CURRENT INPUT REFERENCED TO METER GROUND | 4 TO 20 mA | 200Ω | AWG.14-24 | 1000 FT. MAX. WITHOUT FACTORY APPROVAL | SEE NOTE 3 |
| 2 | AUX.3 COM | Iin1 COMMON | | | | | | |
| 3 | AUX.4 IN | Iin2 INPUT | | | | | | |
| 4 | AUX.4 COM | Iin2 COMMON | | | | | | |

## NOTES:

1. TERMINAL BLOCKS TB1, TB2, TB3 AND TB4 ARE LUG-LESS WIRE CLAMP TYPE, PROVIDING RELIABLE CONNECTION TO STRIPPED STRANDED WIRE, AWG. #14-24.
2. SET METER AND INSTRUMENTATION POWER TO OFF WHEN INSERTING OR REMOVING THE MODULE OR WHEN MAKING CONNECTIONS TO TB1, TB2, TB3 AND TB4.
3. REFER TO THE 1010 FIELD MANUAL FOR ADDITIONAL INSTALLATION INFORMATION.
4. USE 1012ECN SERIES CABLES TO CONNECT BETWEEN TEMPERATURE SENSOR INPUT WIRING TERMINALS TB1, TB2 AND 991T OR 1011T SERIES TEMPERATURE SENSORS. NOTE SUPPLY AND RETURN TEMPERATURE SENSOR DESIGNATIONS WHEN USED WITH A 1010E SERIES ENERGY FLOW COMPUTER.
5. WHEN A SINGLE TEMPERATURE INPUT IS USED COMPLETE THE TEMPERATURE SENSOR CURRENT LOOP BY SHORTING TOGETHER TERMINALS 1 AND 4 OF THE UNUSED TEMPERATURE SENSOR TERMINAL BLOCK. GROUND THE VOLTAGE SENSING LEADS (TERMINALS 2 AND 3) BY CONNECTING THEM BOTH TO TERMINAL 5.

DO NOT SCALE THIS DRAWING

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES (MM) TOLERANCES ON- INCHES ± .1 (MM) ± 2

CONTRACT NO.

| | | |
|---|---|---|
| DR | H.J | DATE 11/21/97 |
| CHK | | DATE |
| ENG | | DATE |
| PROD | | DATE |
| APPD | | DATE |

CERTIFIED

DATE

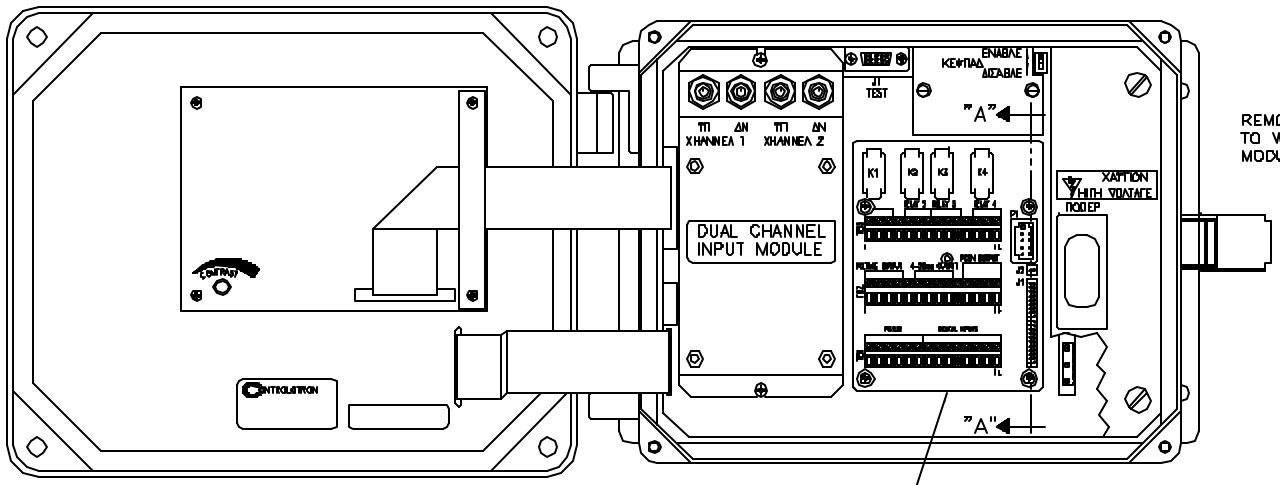
CONTROLOTRON HAUPPAUGE, NY 11788

# INSTALLATION DRAWING A ANALOG INPUT MODULE

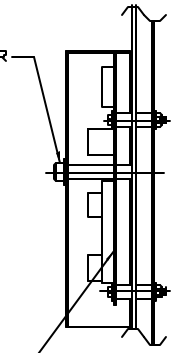
| SIZE | CODE IDENT NO. | | REV. |
|---|---|---|---|
| C | 21614 | 1010N - 5 - 7 | D |
| SCALE: NONE | WT. | SHEET 1 OF 1 | |

R14: 1010N-5-7 rev.D

CN#4349



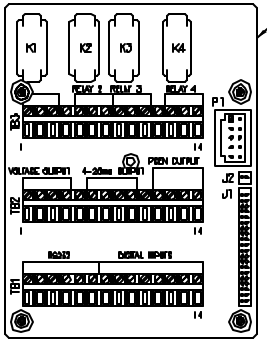

REMOVE SCREW AND COVER TO WITHDRAW OR INSERT MODULES



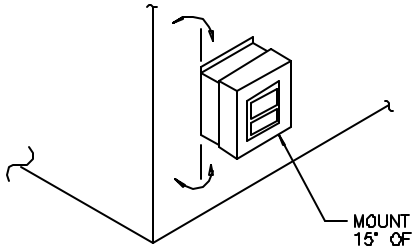
1010N-2[] I/O MODULE

SECTION "A-A"

1010N-2[] I/O MODULE
(SHOWN WITH COVER REMOVED)
(SEE NOTE 3)




| MODULE PART No. | RELAY TYPE |
|---|---|
| 1010N-2 | NONE |
| 1010N-2K2 | MERCURY WETTED, FORM 1A |
| 1010N-2K3 | DRY REED, FORM 1C |



MOUNT FLOW COMPUTER WITHIN 15° OF VERTICAL (SEE NOTE 6)

## NOTES: (CONT'D ON SHT. 2)

1. TERMINAL BLOCK TB1, TB2 AND TB3 ARE LUG-LESS WIRE CLAMP TYPE, PROVIDING RELIABLE CONNECTION TO STRIPPED STRANDED WIRE, AWG. #14-24.
2. RELAY TYPE VARIES WITH MODULE PART NUMBER. SEE TABLE, ZONE B4.
3. RELAY CLOSURES ARE USER PROGRAMMABLE THROUGH THE 1010 INSTALLATION MENU. SEE THE 1010 FIELD MANUAL AND SHT.2 FOR LIST OF ASSIGNABLE FUNCTIONS.
4. SET METER AND INSTRUMENTATION POWER TO OFF WHEN INSERTING OR REMOVING THE MODULE OR WHEN MAKING CONNECTIONS TO TB1, TB2 AND TB3.
5. REFER TO THE 1010 FIELD MANUAL FOR ADDITIONAL INSTALLATION INFORMATION.
6. WHEN SUPPLIED WITH MERCURY WETTED RELAYS (MODULE PART No. 1010N-2K2-1945) MOUNT FLOW COMPUTER WITHIN 15° OF VERTICAL, BOTH PLANES, FOR PROPER RELAY OPERATION. (SEE ZONE B2).

DO NOT SCALE THIS DRAWING

UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN INCHES (MM)
TOLERANCES ON-
INCHES (MM)
± .1 ± 2

DR H.J DATE 2/20/98
CHK DATE
ENG DATE
APPD DATE
CERTIFIED
DATE

CONTROLOTRON
HAUPPAUGE, NY 11788

# INSTALLATION WIRING I/O MODULE

| SIZE | CODE IDENT NO. | | REV. |
|---|---|---|---|
| C | 21614 | 1010N-2-7 | B |
| SCALE: NONE | WT. | SHEET 1 OF 2 | |

R14: 1010N-2-7 rev.B
CN#4406

## TERMINAL BLOCK WIRING CONNECTIONS

| TB1 | PIN # | SIGNAL | FUNCTION | DESCRIPTION | USE | LOAD | WIRING | CABLE LENGTH | NOTES |
|---|---|---|---|---|---|---|---|---|---|
| RS232 PORT | 1 | Tx | TRANSMIT | STANDARD RS232 SIGNALS | STANDARD RS232 COMMUNICATION PORT | | SHIELDED DATA CABLE 24 GA. MINIMUM | 50 FT. MAX. AS PER EIA RS232 FOR GREATER RANGE, CONSULT FACTORY, SEE NOTE 1 | |
| | 2 | RTS | REQUEST TO SEND | | | | | | |
| | 3 | DTR | DATA TERMINAL READY | | | | | | |
| | 4 | Rx | RECEIVE | | | | | | |
| | 5 | CTS | CLEAR TO SEND | | | | | | |
| | 6 | GND | GROUND | COMMON RETURN | RS232 REFERENCE | | | | |
| | 7 | DI1+ | DIGITAL INPUT 1 | CH1 NOTOT | FREEZES CH1 TOTALIZER | | SHIELDED 24 GA. INSTRUMENT CABLE | 1000 FT. MAX. WITHOUT FACTORY APPROVAL | CH1 NOTOT AND CLRTOT LINES ALSO CONTROL DUAL BEAM SYSTEM (PATH 3) TOTALIZER FUNCTIONS |
| | 8 | DI1− | DIGITAL RETURN | COMMON | COMMON | | | | |
| | 9 | DI2+ | DIGITAL INPUT 2 | CH2 NOTOT | FREEZES CH2 TOTALIZER | | | | |
| | 10 | DI2− | DIGITAL RETURN | COMMON | COMMON | | | | |
| | 11 | DI3+ | DIGITAL INPUT 3 | CH1 CLRTOT | CLEARS CH1 TOTALIZER | | | | |
| | 12 | DI3− | DIGITAL RETURN | COMMON | | | | | |
| | 13 | DI4+ | DIGITAL INPUT 4 | CH2 CLRTOT | CLEARS CH2 TOTALIZER | | | | |
| | 14 | DI4− | DIGITAL RETURN | COMMON | COMMON | | | | |

| TB2 | PIN # | SIGNAL | FUNCTION | DESCRIPTION | USE | LOAD | WIRING | CABLE LENGTH | NOTES |
|---|---|---|---|---|---|---|---|---|---|
| | 1 | Va1+ | 0-10 VOLT ANALOG OUTPUT | ALL ANALOG OUTPUTS ASSIGNABLE TO Va, Vaf, Vsl, Valc & OTHER SYSTEM VARIABLES UNDER MENU CONTROL | SYSTEM ANALOG OUTPUTS | 10KΩ MIN. | 24 GA. MIN. | 1000 FT. MAX. WITHOUT FACTORY APPROVAL | |
| | 2 | Va1− | REF. GROUND | | | | | | |
| | 3 | Va2+ | 0-10 VOLT ANALOG OUTPUT | | | 10KΩ MIN. | | | |
| | 4 | Va2− | REF. GROUND | | | | | | |
| | 5 | | NO CONNECTION | | | | | | |
| | 6 | Io1+ | 4-20mA OUTPUT 1 | | | 1000Ω MAX. SEE NOTE 10 | | | 4-20mA OUTPUTS ARE SELF POWERED, DO NOT CONNECT TO "LOOP POWERED" CIRCUITS. |
| | 7 | Io1− | ISOLATED RETURN | | | | | | |
| | 8 | Io2+ | 4-20mA OUTPUT 2 | | | 1000Ω MAX. SEE NOTE 10 | | | |
| | 9 | Io2− | ISOLATED RETURN | | | | | | |
| | 10 | | NO CONNECTION | | | | | | |
| | 11 | PGEN 1+ | FREQUENCY OUTPUT 1 | 0-5000 Hz 5 VOLT LOGIC SQUARE WAVEFORM | | 2 TTL LOADS | | | |
| | 12 | PGEN 1− | REF. GROUND | | | | | | |
| | 13 | PGEN 2+ | FREQUENCY OUTPUT 2 | | | | | | |
| | 14 | PGEN 2− | REF. GROUND | | | | | | |

| TB3 | PIN # | SIGNAL | FUNCTION | DESCRIPTION | USE | LOAD NON-INDUCTIVE | WIRING | CABLE LENGTH | NOTES |
|---|---|---|---|---|---|---|---|---|---|
| | 1 | K1 A | RELAY 1 NORMALLY OPEN | ASSIGNMENT OF RELAY FUNCTIONS IS UNDER 1010 MENU CONTROL | ALARM OR CONTROL | MODULE 1010N-2K3: 3VA 30VDC .25A MAX. | AS REQ'D | AS REQ'D | ALL RELAYS ASSIGNED AS ALARMS ARE ENERGIZED WHILE NON-ALARMED STATUS EXISTS. |
| | 2 | K1 B | RELAY 1 NORMALLY CLOSED | | | | | | |
| | 3 | K1 C | RELAY 1 COMMON | | | | | | COUNT RELAYS ARE ENERGIZED FOR 200MS FOR EACH TOTALIZER INCREMENT. SEE NOTE 8 |
| | 4 | | NO CONNECTION | | | | | | |
| | 5 | K2 A | RELAY 2 NORMALLY OPEN | | | | | | |
| | 6 | K2 B | RELAY 2 NORMALLY CLOSED | | | | | | NORMALLY CLOSED RELAY FUNCTION IS NOT AVAILABLE ON MODULE 1010N-2K2 |
| | 7 | K2 C | RELAY 2 COMMON | | | | | | |
| | 8 | K3 A | RELAY 3 NORMALLY OPEN | | | | | | |
| | 9 | K3 B | RELAY 3 NORMALLY CLOSED | | | | | | |
| | 10 | K3 C | RELAY 3 COMMON | | | | | | |
| | 11 | | NO CONNECTION | | | | | | |
| | 12 | K4 A | RELAY 4 NORMALLY OPEN | | | MODULE 1010N-2K2: 50VA 350VDC (PEAK AC) 0.5A MAX. | | | SEE NOTES 5 & 11 |
| | 13 | K4 B | RELAY 4 NORMALLY CLOSED | | | | | | |
| | 14 | K4 C | RELAY 4 COMMON | | | | | | |

## NOTES: (CONT'D FROM SHT. 1)

7. RS-232 RANGE CAN BE INCREASED BY:
   a) USE OF SHORT HAUL MODEMS.
   b) USE OF SPECIAL DATA CABLES AND/OR SLOWER DATA RATES.
   c) USE OF TELEPHONE LINE MODEM.
   CONSULT FACTORY FOR DETAILS.
8. IT IS RECOMMENDED THAT MODULE 1010N-2K2 (MERCURY WETTED RELAYS) BE EMPLOYED IF TOTALIZER RELAY PULSES ARE TO BE SELECTED.
9. LOAD CAPABILITY VARIES WITH SUPPLIED VOLTAGE. MAXIMUM LOAD FIGURES INCLUDE WIRING.
10. LOAD REDUCES TO 575 ohms WHEN SAFETY BARRIERS ARE USED PER 1010-304.
11. VOLTAGE AND CURRENT LIMITED TO SAFETY BARRIER SPECIFICATIONS WHEN USED. SEE 1010-304.

DO NOT SCALE THIS DRAWING
UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES (MM) TOLERANCES ON—
INCHES ± .1 (MM) ± 2

CONTRACT NO.

DR H.J DATE 11/21/97
CHK DATE
ENG DATE
PROD DATE
APPD DATE

CERTIFIED
DATE

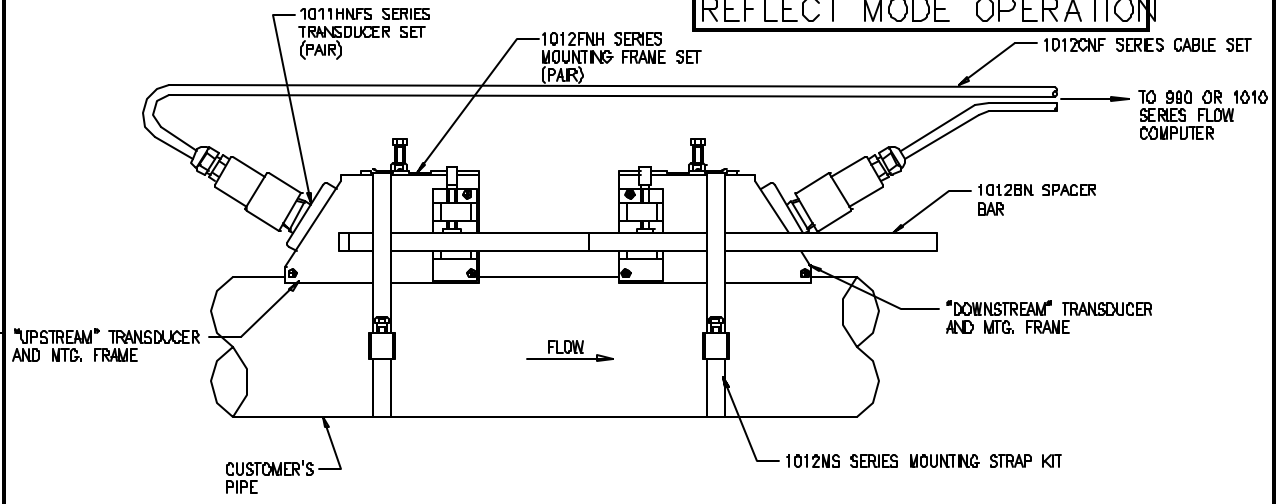
CONTROLOTRON
HAUPPAUGE, NY 11788

# INSTALLATION DRAWING
# I/O MODULE

| SIZE | CODE IDENT NO. | | REV. |
|---|---|---|---|
| C | 21614 | 1010N - 2 - 7 | B |
| SCALE: NONE | WT. | SHEET 2 OF 2 | |

R14: 1010N-2-7 rev.B
CN#4406

## REFLECT MODE OPERATION




## INSTALLATION NOTES – SEE DRAWING REFERENCE 1

1. USING THE INSTALLATION MENU AND THE PROCEDURE OUTLINED IN THE FLOW COMPUTER FIELD MANUAL, CONFIRM THAT YOU HAVE THE APPROPRIATE TRANSDUCERS AND SPACER BAR (IF USED) FOR REFLECT MODE OPERATION ON THE CHOSEN PIPE.

2. SELECT MOUNTING LOCATION:
2.1 CHOOSE LOCATION WHICH REMAINS FULL AT ZERO FLOW.
2.2 WHERE POSSIBLE LOCATE TRACK ASS'Y 10 PIPE DIAMETERS OR MORE FROM BEND TO ENSURE FULLY DEVELOPED AND STABLE FLOW PROFILE.
2.3 ON HORIZONTAL PIPE, SELECT HORIZONTAL PLANE, IF POSSIBLE TO AVOID SEDIMENT BLOCKAGE OF ULTRASONIC BEAM.

3. PREPARE PIPE FOR TRACK MOUNT:
3.1 REMOVE GRIT, CORROSION, COATING OR HEAVY PAINT
3.2 CLEAN AND DEGREASE SURFACE
3.3 DO NOT MOUNT OVER FROST.
3.4 CONDITION PIPE SURFACE:
LOCALLY SMOOTH THE PIPE SURFACE TO ACCEPT THE TRANSDUCERS. USE THE ABRASIVE PAD PROVIDED.

4. LOCATE MOUNTING FRAMES:
4.1 CONSULT THE 1010 FIELD MANUAL AND USE THE INSTALLATION MENU TO SELECT THE APPROPRIATE INDEX HOLE OR SPACING (LTN) FOR YOUR APPLICATION.

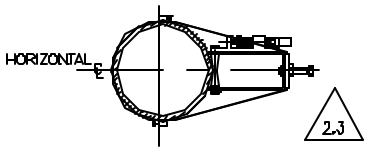
4.2 IF SPACER BAR IS USED:
4.2.1 CLAMP ONE MOUNTING FRAME AT THE UN-NUMBERED REFERENCE POSITION OF THE SPACER BAR. BE SURE THE INDEX PIN AND SPACER BAR INDEX SCREW ENGAGE THE HOLE IN THE SPACER BAR.
4.2.2 CLAMP THE SECOND MOUNTING FRAME TO THE SPACER BAR IN THE SAME MANNER AT THE INDEX HOLE INDICATED DURING STEP 4.1.
4.2.3 HOLD THE MOUNTING FRAME/SPACER BAR ASSEMBLY ON THE PIPE AT THE SELECTED LOCATION AND TEMPORARILY SECURE IT TO THE PIPE USING STRAPS FROM THE 1012MS STRAP MOUNTING KIT. GO TO 4.4.

4.3 IF MOUNTING FRAMES ARE SPACED BY MEASURING "LTN":
4.3.1 TEMPORARILY SECURE ONE OF THE MOUNTING FRAMES TO THE PIPE USING STRAPS FROM THE 1012MS STRAP MOUNTING KIT.
4.3.2 MEASURE ALONG THE PIPE AND TEMPORARILY SECURE THE SECOND MOUNTING FRAME TO THE PIPE SO THAT SPACING "LTN" DETERMINED IN STEP 4.1 IS MEASURED BETWEEN THE SPACING MARKS ON THE MOUNTING FRAMES.

4.4 IF THE PIPE SURFACE IS CLEAN AND SMOOTH, PROCEED TO TRANSDUCER INSTALLATION ON SHT.3. IF PIPE SURFACE NEEDS CONDITIONING, MARK THE MOUNTING FRAME POSITION CAREFULLY, LOOSEN STRAPS AND MOVE THE MOUNTING FRAMES ASIDE. LOCALLY SMOOTH THE PIPE SURFACE IN THE MARKED AREAS USING THE ABRASIVE PAD SUPPLIED. SHIFT THE MOUNTING FRAMES BACK INTO THEIR APPROPRIATE LOCATIONS AND TIGHTEN THE THE MOUNTING STRAPS SECURELY.

** SEE SHEET 3 FOR INSTRUCTIONS TO COMPLETE TRANSDUCER INSTALLATION.

## PREFERRED MOUNTING PLANE

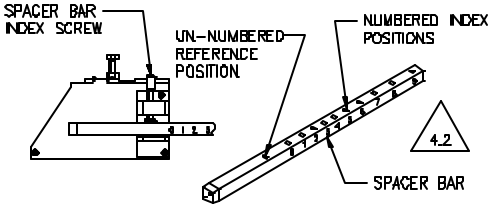



MOUNT TRANSDUCERS/MOUNTING FRAMES IN HORIZONTAL PLANE TO PREVENT BLOCKING OF ULTRASONIC BEAM BY AIR OR SEDIMENT.

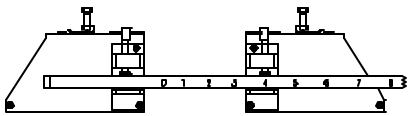
## USING THE SPACER BAR TO SET TRANSDUCER MOUNTING FRAME SPACING

USING THE INSTALLATION MENU, AS OUTLINED IN THE FLOW COMPUTER FIELD MANUAL, DETERMINE THE SPACING INDEX NUMBER FOR THE SELECTED APPLICATION.

USE THE SPACER BAR INDEX SCREW TO SECURE THE SPACER BAR TO ONE OF THE MOUNTING FRAMES AT THE UN-NUMBERED REFERENCE POSITION.

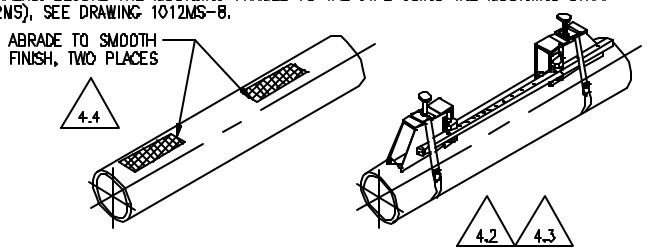



SECURE THE SECOND MOUNTING FRAME TO THE SPACER BAR AT THE NUMBERED INDEX POSITION DETERMINED FROM THE INSTALLATION MENU.



## SECURING MOUNTING FRAMES TO THE PIPE SURFACE

HOLD THE MOUNTING FRAME/SPACER BAR ASSEMBLY AGAINST THE PIPE AT THE SELECTED MOUNTING LOCATION. MARK THE APPROXIMATE OUTLINE OF THE MOUNTING FRAMES ON THE PIPE SURFACE. USING THE ABRASIVE PAD SUPPLIED, SMOOTH THE PIPE SURFACE IN THE MARKED AREAS. SECURE THE MOUNTING FRAMES TO THE PIPE USING THE MOUNTING STRAP KIT (1012MS), SEE DRAWING 1012MS-8.




DO NOT SCALE THIS DRAWING

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES (MM) TOLERANCES ON–

| INCHES | (MM) |
|---|---|
| ± .1 | ± 2 |

CONTRACT NO.

| | | |
|---|---|---|
| DR | H.J | DATE 7/6/99 |
| CHK | | DATE |
| ENG | | DATE |
| PROD | | DATE |
| APPD | | DATE |

CERTIFIED

DATE

CONTROLOTRON
HAUPPAUGE, NY 11788

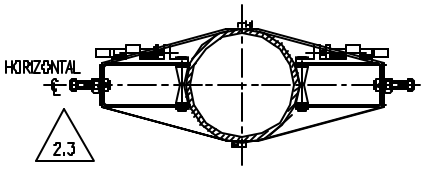
# INSTALLATION, 1011HNFS SERIES DEDICATED PLASTIC BODY TRANSDUCER

| SIZE | CODE IDENT NO. | | REV. |
|---|---|---|---|
| C | 21614 | 1011HNFS - 7 | A |

SCALE: NONE | WT. | SHEET 1 OF 3

R14: 1011HNFS-7 sht.1 rev.A
ER#1447

## PREFERRED MOUNTING PLANE

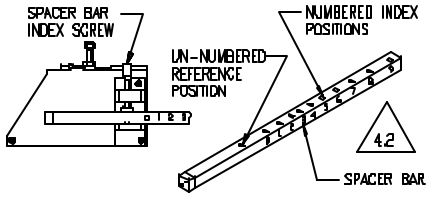



MOUNT TRANSDUCERS/MOUNTING FRAMES IN HORIZONTAL PLANE TO PREVENT BLOCKING OF ULTRASONIC BEAM BY AIR OR SEDIMENT.

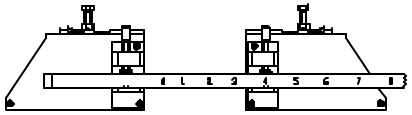
## USING THE SPACER BAR TO SET TRANSDUCER MOUNTING FRAME SPACING

USING THE INSTALLATION MENU, AS OUTLINED IN THE FLOW COMPUTER FIELD MANUAL, DETERMINE THE SPACING INDEX NUMBER FOR THE SELECTED APPLICATION.

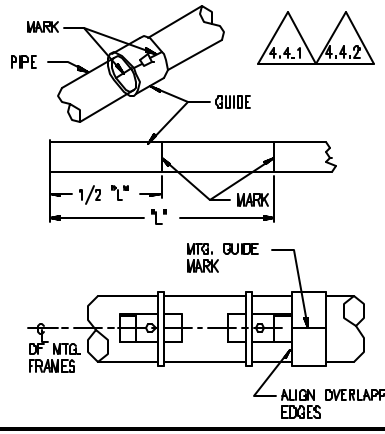
USE THE SPACER BAR INDEX SCREW TO SECURE THE SPACER BAR TO ONE OF THE MOUNTING FRAMES AT THE UN-NUMBERED REFERENCE POSITION.



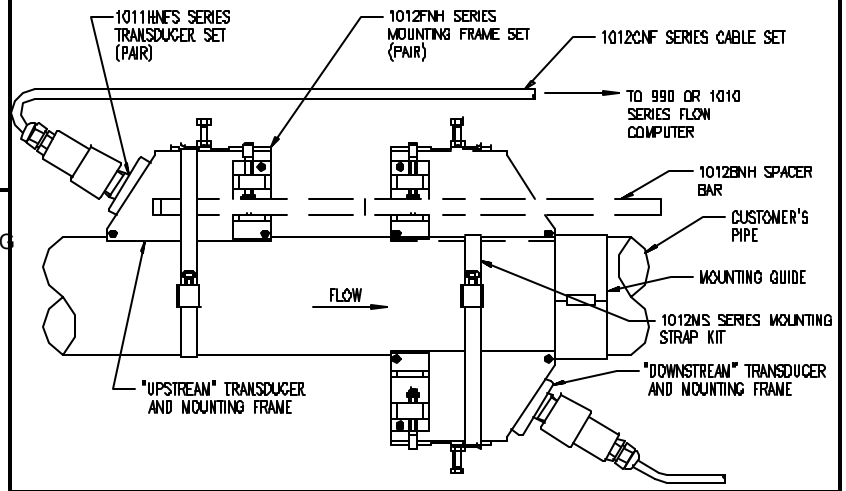

SECURE THE SECOND MOUNTING FRAME TO THE SPACER BAR AT THE NUMBERED INDEX POSITION DETERMINED FROM THE INSTALLATION MENU.



WRAP MOUNTING GUIDE AROUND PIPE AND MARK AT OVERLAPPING EDGE, UNWRAP GUIDE, MEASURE DISTANCE "L" FROM EDGE TO MARK, MARK AGAIN AT 1/2 "L". RE-INSTALL THE MOUNTING GUIDE, TAPE IN PLACE WITH BOTH MARKS VISIBLE, ALIGN ONE MARK WITH THE CENTER LINE OF THE MOUNTING FRAMES.

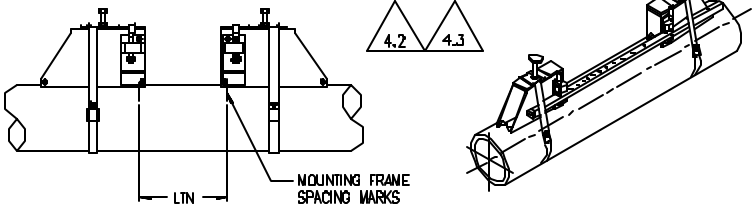



# DIRECT MODE OPERATION

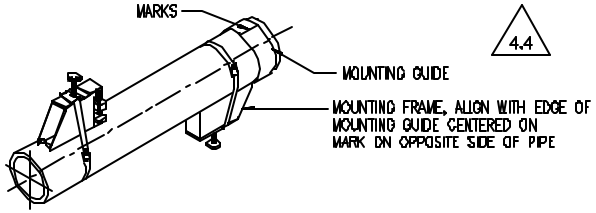



## SECURING MOUNTING FRAMES TO THE PIPE SURFACE

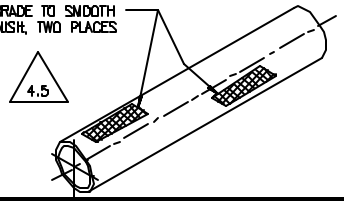
HOLD THE MOUNTING FRAME/SPACER BAR ASSEMBLY AGAINST THE PIPE AT THE SELECTED MOUNTING LOCATION OR POSITION USING LTN, TEMPORARILY STRAP IN PLACE.




USE THE MOUNTING GUIDE TO TRANSFER ONE OF THE MOUNTING FRAMES TO THE OPPOSITE SIDE OF THE PIPE.




IF NECESSARY, USE THE ABRASIVE PAD SUPPLIED TO PRODUCE A SMOOTH FINISH ON THE PIPE AT THE TRANSDUCER MOUNTING POSITIONS.




## INSTALLATION NOTES – SEE DRAWING REFERENCE #

1. USING THE INSTALLATION MENU AND THE PROCEDURE OUTLINED IN THE FLOW COMPUTER FIELD MANUAL, CONFIRM THAT YOU HAVE THE APPROPRIATE TRANSDUCERS AND SPACER BAR (IF USED) FOR DIRECT MODE OPERATION ON THE CHOSEN PIPE.
2. SELECT MOUNTING LOCATION:
   2.1 CHOOSE LOCATION WHICH REMAINS FULL AT ZERO FLOW.
   2.2 WHERE POSSIBLE LOCATE TRACK ASS'Y 10 PIPE DIAMETERS OR MORE FROM BEND TO ENSURE FULLY DEVELOPED AND STABLE FLOW PROFILE.
   2.3 ON HORIZONTAL PIPE, SELECT HORIZONTAL PLANE, IF POSSIBLE TO AVOID SEDIMENT BLOCKAGE OF ULTRASONIC BEAM.
3. PREPARE PIPE FOR TRACK MOUNT:
   3.1 REMOVE GRIT, CORROSION, COATING OR HEAVY PAINT
   3.2 CLEAN AND DEGREASE SURFACE
   3.3 DO NOT MOUNT OVER FROST.
   3.4 CONDITION PIPE SURFACE:
   LOCALLY SMOOTH THE PIPE SURFACE TO ACCEPT THE TRANSDUCERS. USE THE ABRASIVE PAD PROVIDED.
4. LOCATE MOUNTING FRAMES:
   4.1 CONSULT THE 1010 FIELD MANUAL AND USE THE INSTALLATION MENU TO SELECT THE APPROPRIATE INDEX HOLE OR SPACING (LTN) FOR YOUR APPLICATION.
   4.2 IF SPACER BAR IS USED:
   4.2.1 CLAMP ONE MOUNTING FRAME AT THE UN-NUMBERED REFERENCE POSITION OF THE SPACER BAR. BE SURE THE INDEX PIN AND SPACER BAR INDEX SCREW ENGAGE THE HOLE IN THE SPACER BAR.
   4.2.2 CLAMP THE SECOND MOUNTING FRAME TO THE SPACER BAR IN THE SAME MANNER AT THE INDEX HOLE INDICATED DURING STEP 4.1.
   4.2.3 HOLD THE MOUNTING FRAME/SPACER BAR ASSEMBLY ON THE PIPE AT THE SELECTED LOCATION AND TEMPORARILY SECURE IT TO THE PIPE USING STRAPS FROM THE 1012MS STRAP MOUNTING KIT. GO TO 4.4.
   4.3 IF MOUNTING FRAMES ARE SPACED BY MEASURING "LTN":
   4.3.1 TEMPORARILY SECURE ONE OF THE MOUNTING FRAMES TO THE PIPE USING STRAPS FROM THE 1012MS STRAP MOUNTING KIT.
   4.3.2 MEASURE ALONG THE PIPE AND TEMPORARILY SECURE THE SECOND MOUNTING FRAME TO THE PIPE SO THAT SPACING "LTN" DETERMINED IN STEP 4.1 IS MEASURED BETWEEN THE SPACING MARKS ON THE MOUNTING FRAMES. USE STRAIGHT EDGE OR OTHER MEANS TO ALIGN BOTH MOUNTING FRAMES WITH PIPE AXIS:
   4.4 USE THE MOUNTING GUIDE INCLUDED WITH THE 1012MS STRAP MOUNTING KIT TO TRANSFER ONE OF THE MOUNTING FRAMES TO THE OPPOSITE SIDE OF THE PIPE.
   4.4.1 WRAP THE MOUNTING GUIDE AROUND THE PIPE. POSITION IT SO THAT THE OVERLAPPING LENGTHS ARE EDGE-ALIGNED, MARK THE OVERLAPPED PORTION OF THE GUIDE AT THE EDGE OF THE OVERLAPPING PORTION. REMOVE THE GUIDE, MEASURE THE DISTANCE FROM THE END TO THE MARK AND MARK AGAIN HALFWAY BETWEEN.
   4.4.2 RE-POSITION THE GUIDE ON THE PIPE AND TAPE IN PLACE SO THAT ONE OF THE MARKS INDICATES THE CENTERLINE OF THE INSTALLED MOUNTING FRAMES AND THE MOUNTING GUIDE EDGE IS AGAINST THE END OF ONE OF THE MOUNTING FRAMES. MAKE SURE THE OVERLAPPING LENGTHS OF THE MOUNTING GUIDE ARE EDGE-ALIGNED. THIS ASSURES A DIAMETRICAL TRANSFER OF THE MOUNTING FRAME POSITION.
   4.4.3 LOOSEN THE MOUNTING STRAP ON THE MOUNTING FRAME WITH WHICH THE MOUNTING GUIDE HAS BEEN ALIGNED. ROTATE IT AROUND THE PIPE SURFACE UNTIL IT IS CENTERED ON THE OPPOSITE SIDE MOUNTING GUIDE MARK MADE IN STEP 4.4.1. TIGHTEN THE STRAP, REMOVE THE MOUNTING GUIDE.
   4.5 IF THE PIPE SURFACE IS CLEAN AND SMOOTH, PROCEED TO TRANSDUCER INSTALLATION ON SHT.3, IF PIPE SURFACE NEEDS CONDITIONING; MARK THE MOUNTING FRAME POSITION CAREFULLY, LOOSEN STRAPS AND MOVE THE MOUNTING FRAMES ASIDE. LOCALLY SMOOTH THE PIPE SURFACE IN THE MARKED AREAS USING THE ABRASIVE PAD SUPPLIED. SHIFT THE MOUNTING FRAMES BACK INTO THEIR APPROPRIATE LOCATIONS AND TIGHTEN THE MOUNTING STRAPS SECURELY.

** SEE SHEET 3 FOR INSTRUCTIONS TO COMPLETE TRANSDUCER INSTALLATION.

DO NOT SCALE THIS DRAWING

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES (MM) TOLERANCES ON-

| INCHES | (MM) |
|---|---|
| ± .1 | ± 2 |

CONTRACT NO.

| | | |
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| DR | H.J | DATE 7/6/99 |
| CHK | | DATE |
| ENG | | DATE |
| PROD | | DATE |
| APP'D | | DATE |

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DATE

CONTROLOTRON
HAUPPAUGE, NY 11788

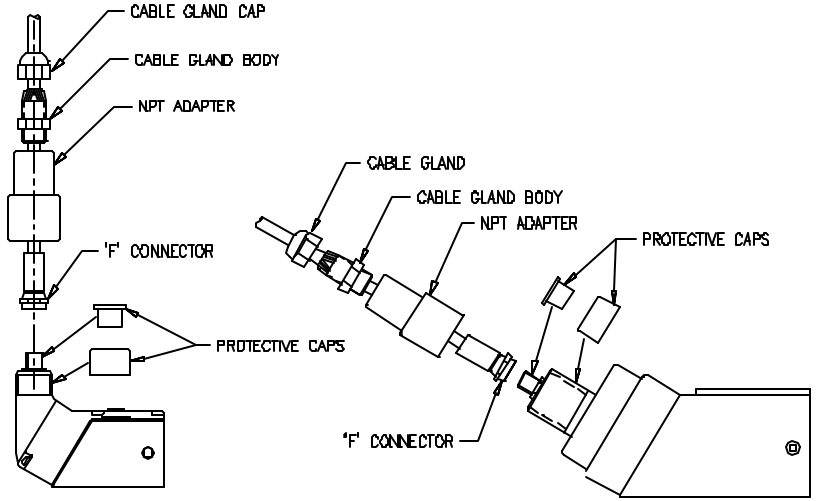
# INSTALLATION, 1011HNFS SERIES DEDICATED PLASTIC BODY TRANSDUCER

| SIZE | CODE IDENT NO. | | REV. |
|---|---|---|---|
| C | 21614 | 1011HNFS - 7 | A |
| SCALE: NONE | WT. | SHEET 2 OF 3 | |

R14: 1011HNFS-7 sht.2 rev.A
ER#1447

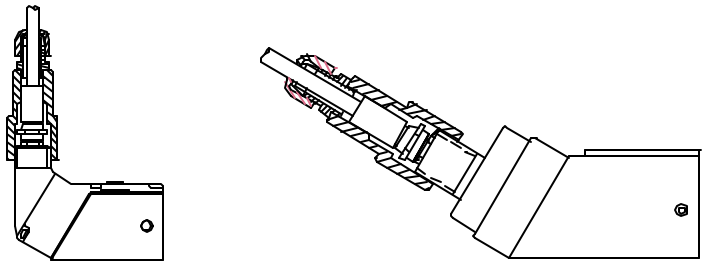
## MATING 1012CNF SERIES TRANSDUCER CABLES WITH 1011HNF SERIES TRANSDUCERS

a) REMOVE PROTECTIVE CAPS.
b) SEE APPROPRIATE CABLE ASSEMBLY DRAWING FOR 'F' CONNECTOR, NPT ADAPTER AND GLAND ASSEMBLY DETAIL.
c) MATE 'F' CONNECTORS, CABLES TO TRANSDUCER.
d) FOR BEST WEATHER SEAL, WRAP TEFLON PIPE TAPE (NOT SUPPLIED) AROUND MALE NPT THREADS ON TRANSDUCER HOUSING.
e) SCREW NPT ADAPTER TO TRANSDUCER HOUSING (HAND TIGHT IS SUFFICIENT).
f) TIGHTEN GLAND BODY WITH NPT ADAPTER AND SECURE CABLE BY TIGHTENING GLAND TOP NUT. (HAND TIGHT IS SUFFICIENT).




TRANSDUCER SIZE A & B

TRANSDUCER SIZE C & D



TRANSDUCER SIZE A & B

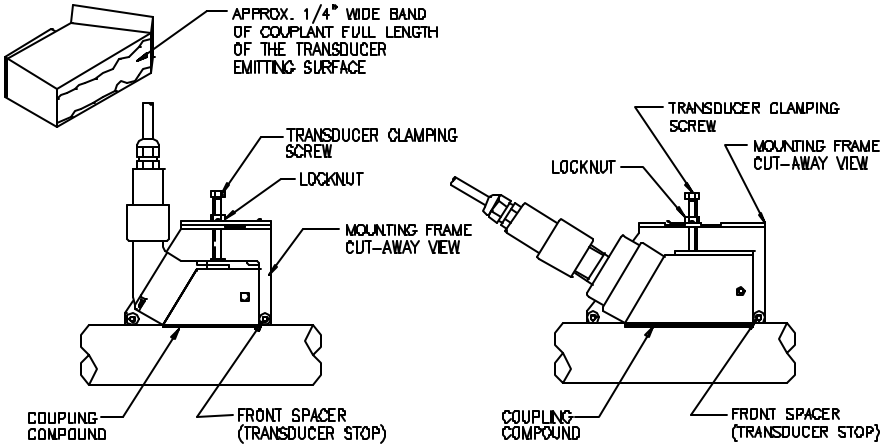
TRANSDUCER SIZE C & D

## INSTALLATION NOTES – CONT'D FROM SHT. 1 OR SHT. 2

5. MAKE CABLE CONNECTIONS AT FLOW COMPUTER IN ACCORDANCE WITH APPROPRIATE FLOW COMPUTER INSTALLATION DRAWING AND 1010 FIELD MANUAL.
6. SEE DRAWINGS 1012FHN-8 AND 1011HNFS-8 FOR MOUNTING FRAME AND TRANSDUCER OUTLINE DIMENSIONS.

## INSTALLING TRANSDUCERS IN MOUNTING FRAMES

APPLY A THIN BAND OF COUPLANT TO THE EMITTING SURFACE OF THE TRANSDUCERS. SLIP THE TRANSDUCERS INTO THE MOUNTING FRAMES, SEATING THEM SQUARELY ON THE PIPE SURFACE, PUSH FORWARD INTO THE FRAMES AGAINST THE FRONT SPACER. TIGHTEN THE TRANSDUCER CLAMPING SCREW, FIRMLY SEATING THE TRANSDUCERS ON THE PIPE SURFACE. SECURE THE CLAMPING SCREW WITH THE LOCKNUT.



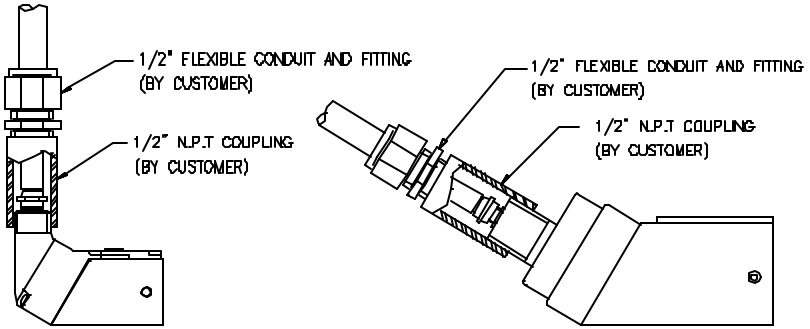

TRANSDUCER SIZE A & B

TRANSDUCER SIZE C & D

**SEE DRAWING 1012THP-7 FOR INSTALLATION USING 1012THP SERIES MOUNTING TRACKS.

## USE OF FLEXIBLE CONDUIT WITH TRANSDUCERS

THE TRANSDUCER WIRING HOUSING HAS INTEGRAL 1/2" N.P.T THREADS TO ACCEPT A CONDUIT COUPLING. IF FLEXIBLE CONDUIT IS USED, MAKE CONNECTION AS SHOWN, THEN PASS COUPLING AND CONDUIT OVER THE CABLE, SECURE TO THE TRANSDUCER WIRING HOUSING.




DO NOT SCALE THIS DRAWING

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES (MM) TOLERANCES ON-
INCHES ± .1 (MM) ± 2

CONTRACT NO.

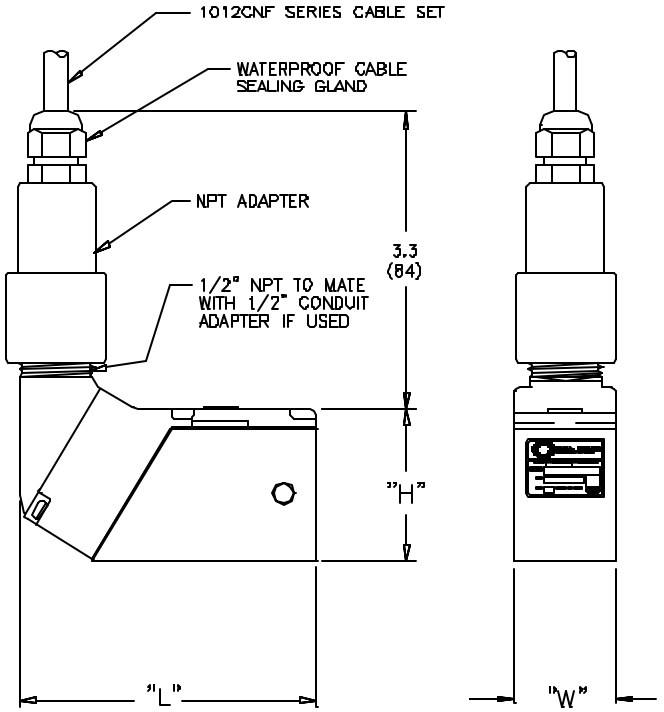
DR HJ DATE 7/6/99
CHK DATE
ENG DATE
PROD DATE
APP'D DATE
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DATE

CONTROLOTRON
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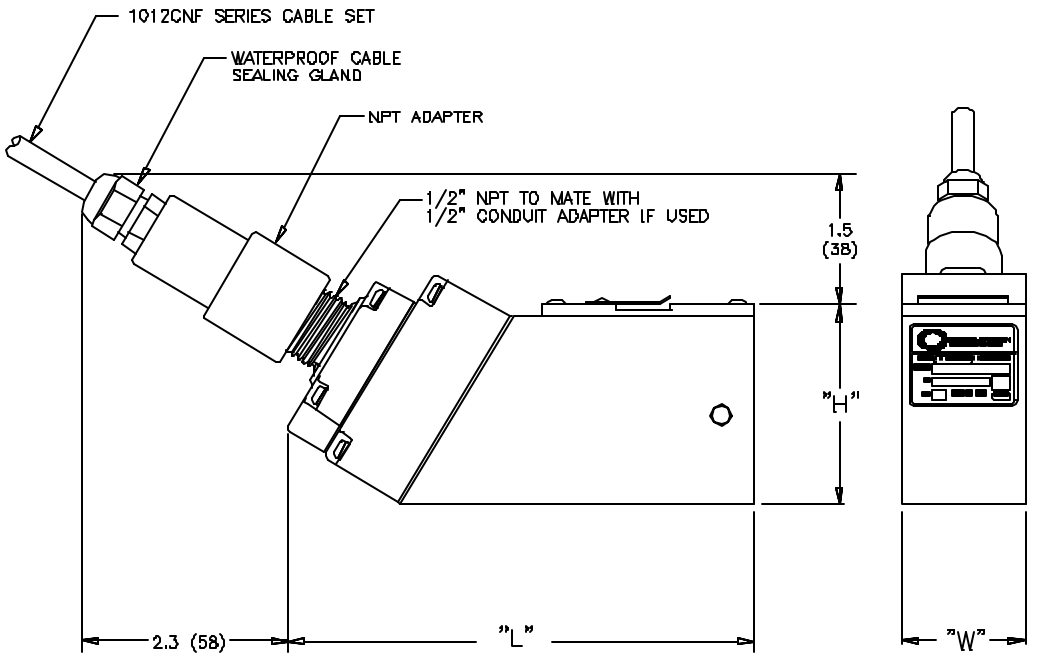
# INSTALLATION, 1011HNFS SERIES DEDICATED PLASTIC BODY TRANSDUCER

| SIZE | CODE IDENT NO. | | REV. |
|---|---|---|---|
| C | 21614 | 1011HNFS - 7 | A |
| SCALE: NONE | WT. | SHEET 3 OF 3 | |

R14: 1011HNFS-7 sht.3 rev.A
ER#1447




SIZE "A" & "B"




SIZE "C" & "D"

| TRANSDUCER PART NUMBER | L | W | H |
|---|---|---|---|
| 1011HNFS-A* | 2.2 (56) | 1.1 (28) | 1.7 (43) |
| 1011HNFS-B* | 3.3 (84) | 1.1 (28) | 1.7 (43) |
| 1011HNFS-C* | 5.0 (127) | 1.3 (33) | 2.2 (56) |
| 1011HNFS-D* | 7.5 (191) | 2.0 (51) | 3.3 (84) |

* SEE NOTE 3

NOTES :

1. TRANSDUCERS ARE SUPPLIED IN MATCHED PAIRS, BOTH TRANSDUCERS OF A PAIR HAVE THE SAME SERIAL NUMBER.
2. SEE THE APPROPRIATE TRANSDUCER INSTALLATION DRAWING FOR COMPLETE INSTALLED DIMENSIONS.
3. TRANSDUCER PART NUMBER VARIES WITH OPERATING FREQUENCY AND APPLICATION TEMPERATURE.

DO NOT SCALE THIS DRAWING
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON-
INCHES ± .1 (MM) ± 2

CONTRACT NO.

| | | |
|---|---|---|
| DR | HJ | DATE 7/6/99 |
| CHK | | DATE |
| ENG | | DATE |
| PROD | | DATE |
| APPD | | DATE |

CERTIFIED
DATE

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HAUPPAUGE , NY 11788

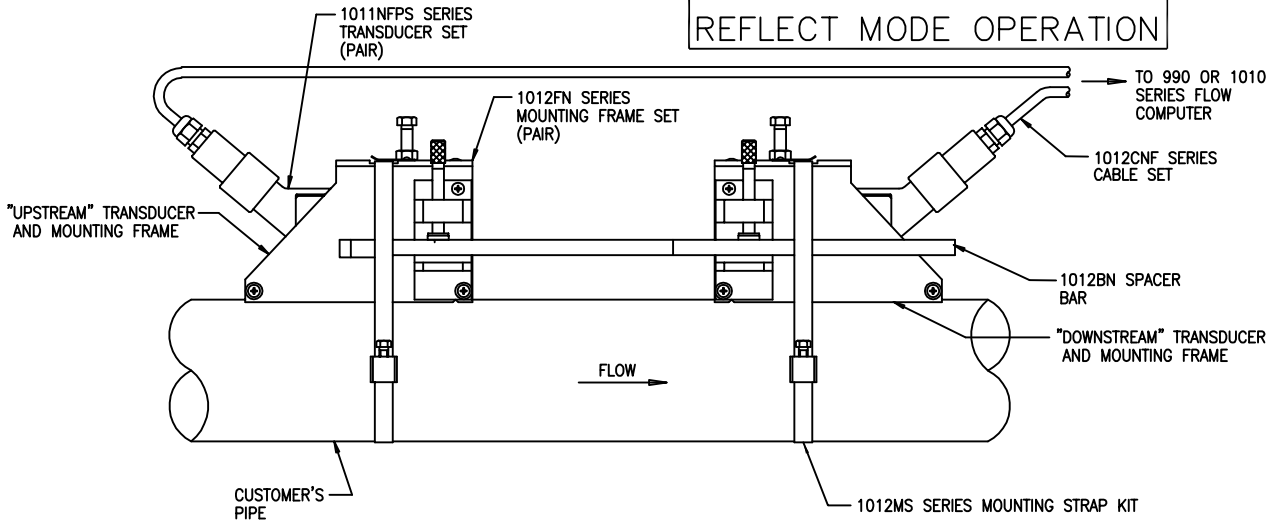
# OUTLINE DIMENSIONS 1011HNFS SERIES DEDICATED PLASTIC BODY TRANSDUCERS

| SIZE | CODE IDENT NO. | | REV. |
|---|---|---|---|
| C | 21614 | 1011HNFS - 8 | A |

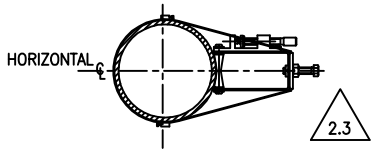
SCALE: NONE | WT. | SHEET 1 OF 1

R14: 1011HNFS-8 sht.1 rev.A
ER#1447

## REFLECT MODE OPERATION




### PREFERRED MOUNTING PLANE

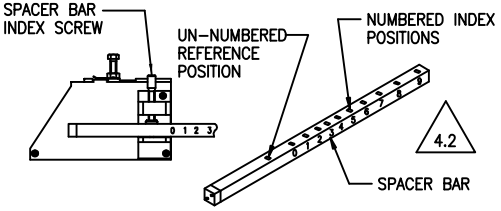



MOUNT TRANSDUCERS/MOUNTING FRAMES IN HORIZONTAL PLANE TO PREVENT BLOCKING OF ULTRASONIC BEAM BY AIR OR SEDIMENT.

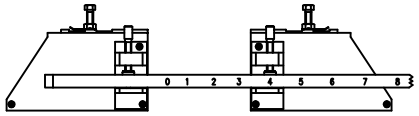
### USING THE SPACER BAR TO SET TRANSDUCER MOUNTING FRAME SPACING

USING THE INSTALLATION MENU, AS OUTLINED IN THE FLOW COMPUTER FIELD MANUAL, DETERMINE THE SPACING INDEX NUMBER FOR THE SELECTED APPLICATION.

USE THE SPACER BAR INDEX SCREW TO SECURE THE SPACER BAR TO ONE OF THE MOUNTING FRAMES AT THE UN-NUMBERED REFERENCE POSITION.

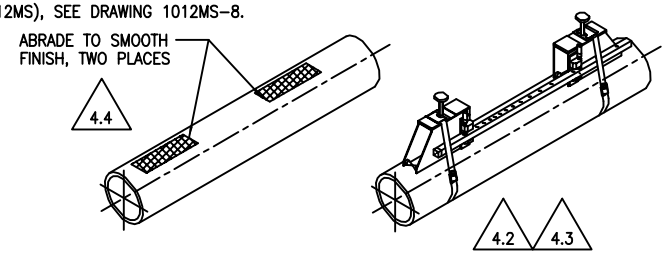



SECURE THE SECOND MOUNTING FRAME TO THE SPACER BAR AT THE NUMBERED INDEX POSITION DETERMINED FROM THE INSTALLATION MENU.




### SECURING MOUNTING FRAMES TO THE PIPE SURFACE

HOLD THE MOUNTING FRAME/SPACER BAR ASSEMBLY AGAINST THE PIPE AT THE SELECTED MOUNTING LOCATION. MARK THE APPROXIMATE OUTLINE OF THE MOUNTING FRAMES ON THE PIPE SURFACE. USING THE ABRASIVE PAD SUPPLIED, SMOOTH THE PIPE SURFACE IN THE MARKED AREAS. SECURE THE MOUNTING FRAMES TO THE PIPE USING THE MOUNTING STRAP KIT (1012MS), SEE DRAWING 1012MS-8.




### INSTALLATION NOTES – SEE DRAWING REFERENCE ⚠

1. USING THE INSTALLATION MENU AND THE PROCEDURE OUTLINED IN THE FLOW COMPUTER FIELD MANUAL, CONFIRM THAT YOU HAVE THE APPROPRIATE TRANSDUCERS AND SPACER BAR (IF USED) FOR REFLECT MODE OPERATION ON THE CHOSEN PIPE.

2. SELECT MOUNTING LOCATION;
2.1 CHOOSE LOCATION WHICH REMAINS FULL AT ZERO FLOW.
2.2 WHERE POSSIBLE LOCATE TRANSDUCERS 10 PIPE DIAMETERS OR MORE FROM BEND TO ENSURE FULLY DEVELOPED AND STABLE FLOW PROFILE.
2.3 ON HORIZONTAL PIPE, SELECT HORIZONTAL PLANE, IF POSSIBLE TO AVOID SEDIMENT BLOCKAGE OF ULTRASONIC BEAM.

3. PREPARE PIPE FOR TRANSDUCER MOUNTING:
3.1 REMOVE GRIT, CORROSION, COATING OR HEAVY PAINT
3.2 CLEAN AND DEGREASE SURFACE
3.3 DO NOT MOUNT OVER FROST.
3.4 CONDITION PIPE SURFACE;
LOCALLY SMOOTH THE PIPE SURFACE TO ACCEPT THE TRANSDUCERS. USE THE ABRASIVE PAD PROVIDED.

4. INSTALLATION WITH MOUNTING FRAMES
4.1 CONSULT THE 1010 FIELD MANUAL AND USE THE INSTALLATION MENU TO SELECT THE APPROPRIATE INDEX HOLE OR SPACING (LTN) FOR YOUR APPLICATION.

4.2 IF SPACER BAR IS USED:
4.2.1 CLAMP ONE MOUNTING FRAME AT THE UN-NUMBERED REFERENCE POSITION OF THE SPACER BAR. BE SURE THE INDEX PIN AND SPACER BAR INDEX SCREW ENGAGE THE HOLE IN THE SPACER BAR.
4.2.2 CLAMP THE SECOND MOUNTING FRAME TO THE SPACER BAR IN THE SAME MANNER AT THE INDEX HOLE INDICATED DURING STEP 4.1.
4.2.3 HOLD THE MOUNTING FRAME/SPACER BAR ASSEMBLY ON THE PIPE AT THE SELECTED LOCATION AND TEMPORARILY SECURE IT TO THE PIPE USING STRAPS FROM THE 1012MS STRAP MOUNTING KIT. GO TO 4.4.

4.3 IF MOUNTING FRAMES ARE SPACED BY MEASURING "LTN":
4.3.1 TEMPORARILY SECURE ONE OF THE MOUNTING FRAMES TO THE PIPE USING STRAPS FROM THE 1012MS STRAP MOUNTING KIT.
4.3.2 MEASURE ALONG THE PIPE AND TEMPORARILY SECURE THE SECOND MOUNTING FRAME TO THE PIPE SO THAT SPACING "LTN" DETERMINED IN STEP 4.1 IS MEASURED BETWEEN THE SPACING MARKS ON THE MOUNTING FRAMES.

4.4 IF THE PIPE SURFACE IS CLEAN AND SMOOTH, PROCEED TO TRANSDUCER INSTALLATION ON SHT.3. IF PIPE SURFACE NEEDS CONDITIONING; MARK THE MOUNTING FRAME POSITION CAREFULLY, LOOSEN STRAPS AND MOVE THE MOUNTING FRAMES ASIDE. LOCALLY SMOOTH THE PIPE SURFACE IN THE MARKED AREAS USING THE ABRASIVE PAD SUPPLIED. SHIFT THE MOUNTING FRAMES BACK INTO THEIR APPROPRIATE LOCATIONS AND TIGHTEN THE THE MOUNTING STRAPS SECURELY.

** SEE SHEET 3 FOR INSTRUCTIONS TO COMPLETE TRANSDUCER INSTALLATION.

SEE SHEET 4 FOR TRANSDUCER INSTALLATION WITHOUT MOUNTING FRAMES

DO NOT SCALE THIS DRAWING

UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN INCHES (MM)
TOLERANCES ON-

| INCHES | (MM) |
|---|---|
| ± .1 | ± 2 |

CONTRACT NO.

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| DR | H.J | DATE 7/7/99 |
| CHK | | DATE |
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CONTROLOTRON
HAUPPAUGE , NY 11788

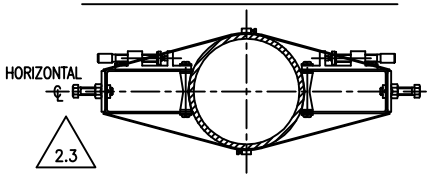
# INSTALLATION, 1011NPFS SERIES DEDICATED PLASTIC BODY TRANSDUCER

| SIZE | CODE IDENT NO. | | REV. |
|---|---|---|---|
| C | 21614 | 1011NFPS - 7 | B |

SCALE: NONE | WT. | SHEET 1 OF 4

R14: 1011NFPS-7 rev.B
CN4333

## PREFERRED MOUNTING PLANE

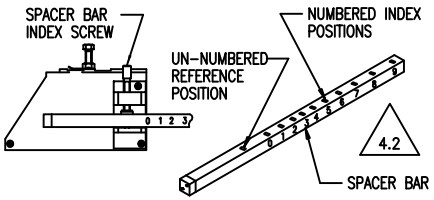



MOUNT TRANSDUCERS/MOUNTING FRAMES IN HORIZONTAL PLANE TO PREVENT BLOCKING OF ULTRASONIC BEAM BY AIR OR SEDIMENT.

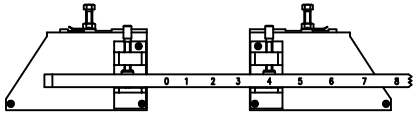
## USING THE SPACER BAR TO SET TRANSDUCER MOUNTING FRAME SPACING

USING THE INSTALLATION MENU, AS OUTLINED IN THE FLOW COMPUTER FIELD MANUAL, DETERMINE THE SPACING INDEX NUMBER FOR THE SELECTED APPLICATION.

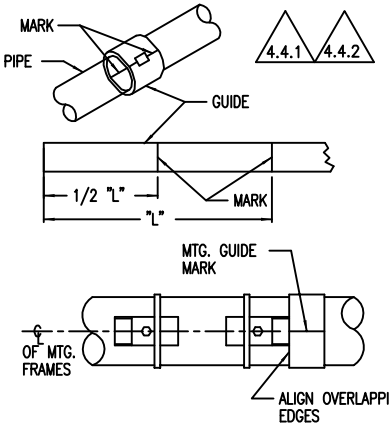
USE THE SPACER BAR INDEX SCREW TO SECURE THE SPACER BAR TO ONE OF THE MOUNTING FRAMES AT THE UN-NUMBERED REFERENCE POSITION.



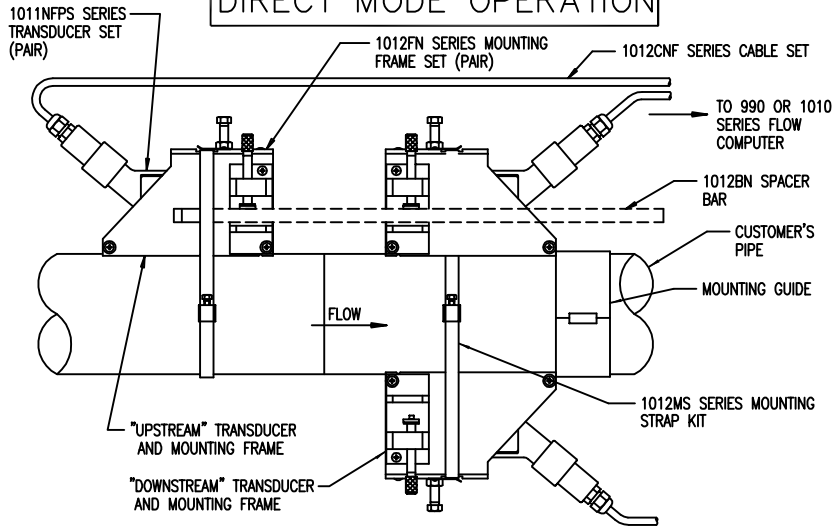

SECURE THE SECOND MOUNTING FRAME TO THE SPACER BAR AT THE NUMBERED INDEX POSITION DETERMINED FROM THE INSTALLATION MENU.




WRAP MOUNTING GUIDE AROUND PIPE AND MARK AT OVERLAPPING EDGE, UNWRAP GUIDE, MEASURE DISTANCE "L" FROM EDGE TO MARK, MARK AGAIN AT 1/2 "L". RE-INSTALL THE MOUNTING GUIDE, TAPE IN PLACE WITH BOTH MARKS VISIBLE, ALIGN ONE MARK WITH THE CENTER LINE OF THE MOUNTING FRAMES.

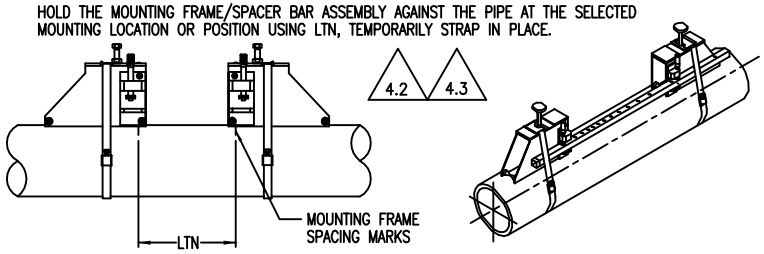



# DIRECT MODE OPERATION

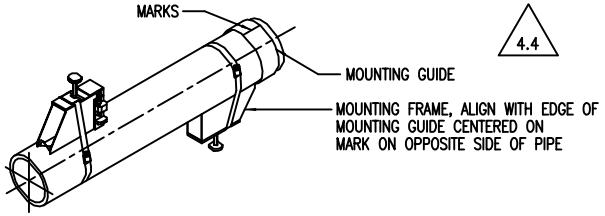



## SECURING MOUNTING FRAMES TO THE PIPE SURFACE

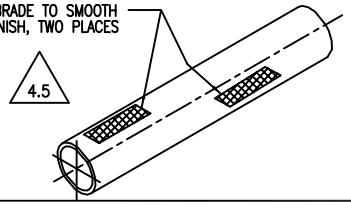
HOLD THE MOUNTING FRAME/SPACER BAR ASSEMBLY AGAINST THE PIPE AT THE SELECTED MOUNTING LOCATION OR POSITION USING LTN, TEMPORARILY STRAP IN PLACE.




USE THE MOUNTING GUIDE TO TRANSFER ONE OF THE MOUNTING FRAMES TO THE OPPOSITE SIDE OF THE PIPE.




IF NECESSARY, USE THE ABRASIVE PAD SUPPLIED TO PRODUCE A SMOOTH FINISH ON THE PIPE AT THE TRANSDUCER MOUNTING POSITIONS.




## INSTALLATION NOTES – SEE DRAWING REFERENCE ⚠

1. USING THE INSTALLATION MENU AND THE PROCEDURE OUTLINED IN THE FLOW COMPUTER FIELD MANUAL, CONFIRM THAT YOU HAVE THE APPROPRIATE TRANSDUCERS AND SPACER BAR (IF USED) FOR DIRECT MODE OPERATION ON THE CHOSEN PIPE.
2. SELECT MOUNTING LOCATION;
2.1 CHOOSE LOCATION WHICH REMAINS FULL AT ZERO FLOW.
2.2 WHERE POSSIBLE LOCATE TRANSDUCERS 10 PIPE DIAMETERS OR MORE FROM BEND TO ENSURE FULLY DEVELOPED AND STABLE FLOW PROFILE.
2.3 ON HORIZONTAL PIPE, SELECT HORIZONTAL PLANE, IF POSSIBLE TO AVOID SEDIMENT BLOCKAGE OF ULTRASONIC BEAM.
3. PREPARE PIPE FOR TRANSDUCER MOUNTING
3.1 REMOVE GRIT, CORROSION, COATING OR HEAVY PAINT
3.2 CLEAN AND DEGREASE SURFACE
3.3 DO NOT MOUNT OVER FROST.
3.4 CONDITION PIPE SURFACE;
LOCALLY SMOOTH THE PIPE SURFACE TO ACCEPT THE TRANSDUCERS. USE THE ABRASIVE PAD PROVIDED.
4. INSTALLATION WITH MOUNTING FRAMES
4.1 CONSULT THE 1010 FIELD MANUAL AND USE THE INSTALLATION MENU TO SELECT THE APPROPRIATE INDEX HOLE OR SPACING (LTN) FOR YOUR APPLICATION.
4.2 IF SPACER BAR IS USED:
4.2.1 CLAMP ONE MOUNTING FRAME AT THE UN-NUMBERED REFERENCE POSITION OF THE SPACER BAR. BE SURE THE INDEX PIN AND SPACER BAR INDEX SCREW ENGAGE THE HOLE IN THE SPACER BAR.
4.2.2 CLAMP THE SECOND MOUNTING FRAME TO THE SPACER BAR IN THE SAME MANNER AT THE INDEX HOLE INDICATED DURING STEP 4.1.
4.2.3 HOLD THE MOUNTING FRAME/SPACER BAR ASSEMBLY ON THE PIPE AT THE SELECTED LOCATION AND TEMPORARILY SECURE IT TO THE PIPE USING STRAPS FROM THE 1012MS STRAP MOUNTING KIT. GO TO 4.4.
4.3 IF MOUNTING FRAMES ARE SPACED BY MEASURING "LTN":
4.3.1 TEMPORARILY SECURE ONE OF THE MOUNTING FRAMES TO THE PIPE USING STRAPS FROM THE 1012MS STRAP MOUNTING KIT.
4.3.2 MEASURE ALONG THE PIPE AND TEMPORARILY SECURE THE SECOND MOUNTING FRAME TO THE PIPE SO THAT SPACING "LTN" DETERMINED IN STEP 4.1 IS MEASURED BETWEEN THE SPACING MARKS ON THE MOUNTING FRAMES. USE STRAIGHT EDGE OR OTHER MEANS TO ALIGN BOTH MOUNTING FRAMES WITH PIPE AXIS:
4.4 USE THE MOUNTING GUIDE INCLUDED WITH THE 1012MS STRAP MOUNTING KIT TO TRANSFER ONE OF THE MOUNTING FRAMES TO THE OPPOSITE SIDE OF THE PIPE.
4.4.1 WRAP THE MOUNTING GUIDE AROUND THE PIPE. POSITION IT SO THAT THE OVERLAPPING LENGTHS ARE EDGE-ALIGNED, MARK THE OVERLAPPED PORTION OF THE GUIDE AT THE EDGE OF THE OVERLAPPING PORTION. REMOVE THE GUIDE, MEASURE THE DISTANCE FROM THE END TO THE MARK AND MARK AGAIN HALFWAY BETWEEN.
4.4.2 RE-POSITION THE GUIDE ON THE PIPE AND TAPE IN PLACE SO THAT ONE OF THE MARKS INDICATES THE CENTERLINE OF THE INSTALLED MOUNTING FRAMES AND THE MOUNTING GUIDE EDGE IS AGAINST THE END OF ONE OF THE MOUNTING FRAMES. MAKE SURE THE OVERLAPPING LENGTHS OF THE MOUNTING GUIDE ARE EDGE-ALIGNED. THIS ASSURES A DIAMETRICAL TRANSFER OF THE MOUNTING FRAME POSITION.
4.4.3 LOOSEN THE MOUNTING STRAP ON THE MOUNTING FRAME WITH WHICH THE MOUNTING GUIDE HAS BEEN ALIGNED. ROTATE IT AROUND THE PIPE SURFACE UNTIL IT IS CENTERED ON THE OPPOSITE SIDE MOUNTING GUIDE MARK MADE IN STEP 4.4.1. TIGHTEN THE STRAP, REMOVE THE MOUNTING GUIDE.
4.5 IF THE PIPE SURFACE IS CLEAN AND SMOOTH, PROCEED TO TRANSDUCER INSTALLATION ON SHT.3, IF PIPE SURFACE NEEDS CONDITIONING; MARK THE MOUNTING FRAME POSITION CAREFULLY, LOOSEN STRAPS AND MOVE THE MOUNTING FRAMES ASIDE. LOCALLY SMOOTH THE PIPE SURFACE IN THE MARKED AREAS USING THE ABRASIVE PAD SUPPLIED. SHIFT THE MOUNTING FRAMES BACK INTO THEIR APPROPRIATE LOCATIONS AND TIGHTEN THE MOUNTING STRAPS SECURELY.

** SEE SHEET 3 FOR INSTRUCTIONS TO COMPLETE TRANSDUCER INSTALLATION.

DO NOT SCALE THIS DRAWING

UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN INCHES (MM)
TOLERANCES ON-

| INCHES | (MM) |
|---|---|
| ± .1 | ± 2 |

CONTRACT NO.

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| PROD | | DATE | |
| APPD | | DATE | |

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HAUPPAUGE , NY 11788

# INSTALLATION, 1011NPFS SERIES DEDICATED PLASTIC BODY TRANSDUCER

| SIZE | CODE IDENT NO. | | REV. |
|---|---|---|---|
| C | 21614 | 1011NFPS - 7 | B |

SCALE: NONE | WT. | SHEET 2 OF 4

R14: 1011NFPS-7 rev.B
CN4333

## MATING 1012CNF SERIES TRANSDUCER CABLES WITH 1011NFPS SERIES TRANSDUCERS

a) REMOVE PROTECTIVE CAPS.

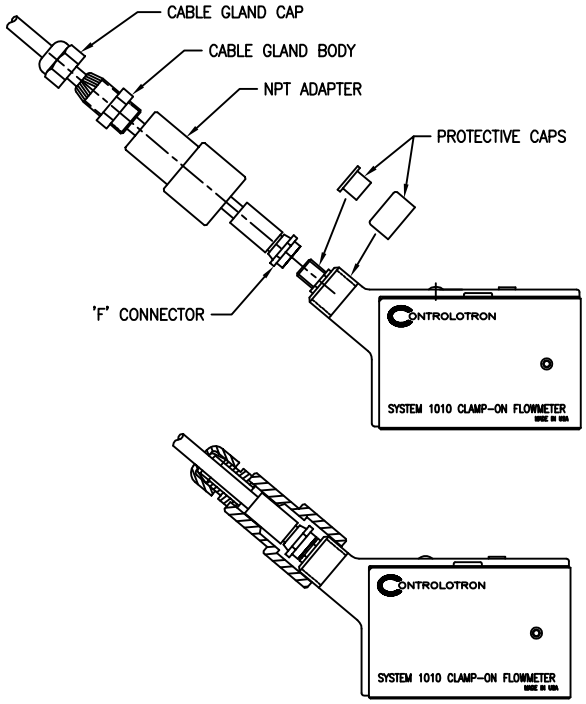
b) SEE APPROPRIATE CABLE ASSEBMLY DRAWING FOR 'F' CONNECTOR, NPT ADAPTER AND GLAND ASSEMBLY DETAIL.

c) MATE 'F' CONNECTORS, CABLES TO TRANSDUCER.

d) FOR BEST WEATHER SEAL, WRAP TEFLON PIPE TAPE (NOT SUPPLIED) AROUND MALE NPT THREADS ON TRANSDUCER HOUSING.

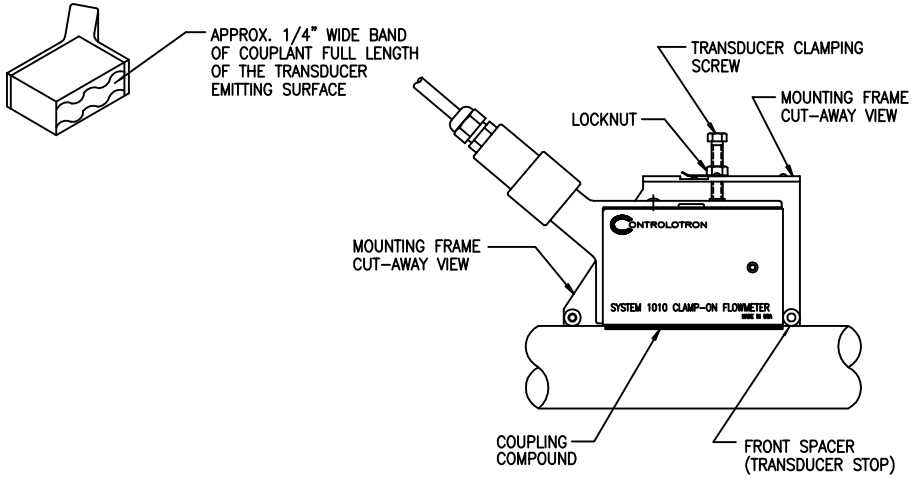
e) SCREW NPT ADAPTER TO TRANSDUCER HOUSING (HAND TIGHT IS SUFFICIENT).

f) TIGHTEN GLAND BODY WITH NPT ADAPTER AND SECURE CABLE BY TIGHTENING GLAND TOP NUT. (HAND TIGHT IS SUFFICIENT).




## INSTALLING TRANSDUCERS IN MOUNTING FRAMES

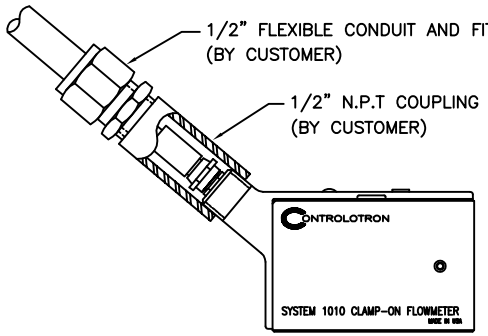
APPLY A THIN BAND OF COUPLANT TO THE EMITTING SURFACE OF THE TRANSDUCERS. SLIP THE TRANSDUCERS INTO THE MOUNTING FRAMES, SEATING THEM SQUARELY ON THE PIPE SURFACE, PUSH FORWARD INTO THE FRAMES AGAINST THE FRONT SPACER. TIGHTEN THE TRANSDUCER CLAMPING SCREW, FIRMLY SEATING THE TRANSDUCERS ON THE PIPE SURFACE. SECURE THE CLAMPING SCREW WITH THE LOCKNUT.




**SEE DRAWING 1012TP-7 FOR INSTALLATION USING 1012TP SERIES MOUNTING TRACKS.

## USE OF FLEXIBLE CONDUIT WITH TRANSDUCERS

THE TRANSDUCER WIRING HOUSING HAS INTEGRAL 1/2" N.P.T THREADS TO ACCEPT A CONDUIT COUPLING IF FLEXIBLE CONDUIT IS USED. MAKE CONNECTION AS SHOWN, THEN PASS COUPLING AND CONDUIT OVER THE CABLE, SECURE TO THE TRANSDUCER WIRING HOUSING.




## INSTALLATION NOTES – CONT'D FROM SHT. 1 OR SHT. 2

5. MAKE CABLE CONNECTIONS AT FLOW COMPUTER IN ACCORDANCE WITH APPROPRIATE FLOW COMPUTER INSTALLATION DRAWING AND 1010 FIELD MANUAL.
6. SEE DRAWINGS 1012FN-8 AND 1011NFPS-8 FOR MOUNTING FRAME AND TRANSDUCER OUTLINE DIMENSIONS.

DO NOT SCALE THIS DRAWING

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES (MM) TOLERANCES ON-

| INCHES | (MM) |
|---|---|
| ± .1 | ± 2 |

CONTRACT NO.

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| DR | H.J | DATE | 7/7/99 |
| CHK | | DATE | |
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| PROD | | DATE | |
| APPD | | DATE | |

CERTIFIED

DATE

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HAUPPAUGE , NY 11788

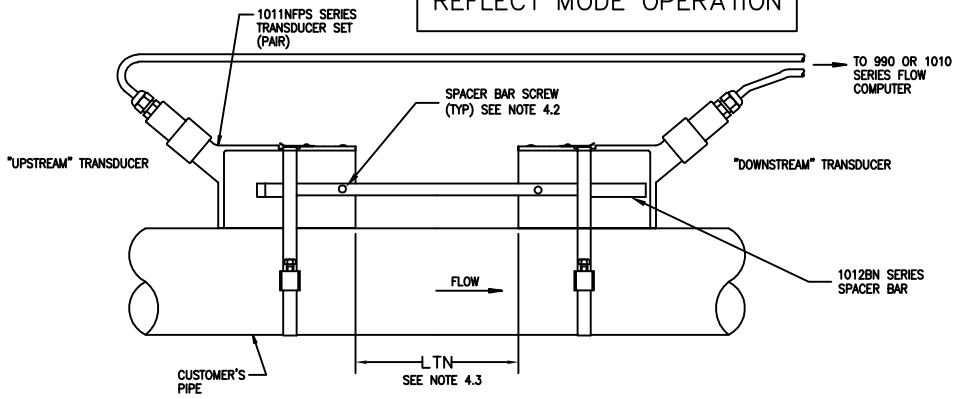
# INSTALLATION, 1011NPFS SERIES DEDICATED PLASTIC BODY TRANSDUCER

| SIZE | CODE IDENT NO. | | REV. |
|---|---|---|---|
| C | 21614 | 1011NFPS - 7 | B |

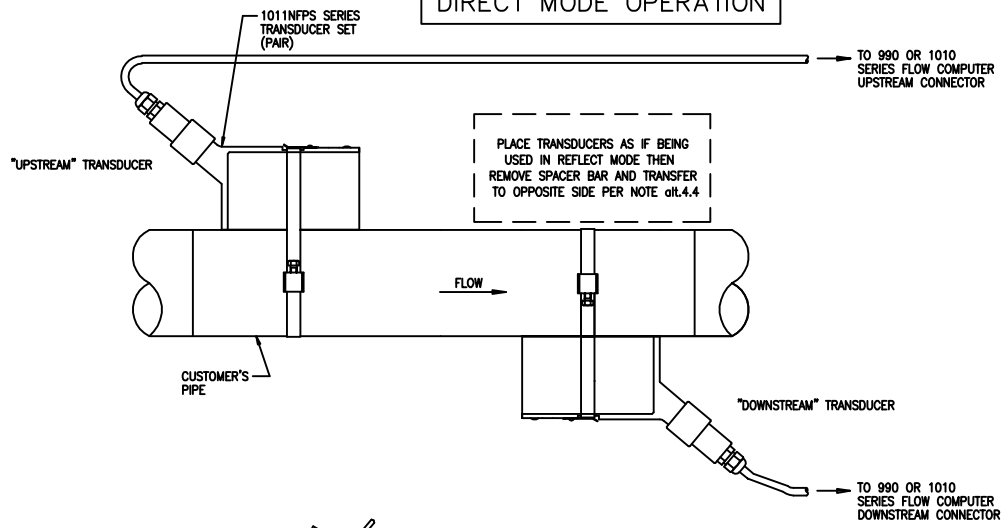
SCALE: NONE | WT. | SHEET 3 OF 4

R14: 1011NFPS-7 rev.B
CN4333

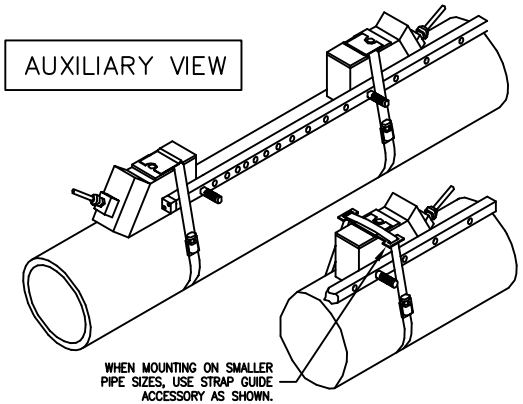
## REFLECT MODE OPERATION




## DIRECT MODE OPERATION




## AUXILIARY VIEW




## INSTALLATION OF TRANSDUCERS WITHOUT MOUNTING FRAMES

THE SAME GENERAL NOTES AND PROCEDURES APPLY WHEN INSTALLING TRANSDUCERS WITHOUT THE BENEFIT OF MOUNTING FRAMES. APPLY THE FOLLOWING ALTERNATES TO THE INSTALLATION NOTES ON SHEETS 1 & 2.

4.2 IF SPACER BAR IS USED:

alt.4.2.1 SECURE ONE TRANSDUCER AT THE UN-NUMBERED REFERENCE POSITION OF THE SPACER BAR BY ENGAGING ONE OF THE SCREWS STOWED IN THE SPACER BAR CAP WITH THE THREADED INSERT IN THE SIDE OF THE TRANSDUCER BLOCK.

alt4.2.2 SECURE THE SECOND TRANSDUCER TO THE SPACER BAR IN THE SAME MANNER AT THE INDEX HOLE INDICATED DURING STEP 4.1.

alt.4.2.3 HOLD TRANSDUCER/SPACER BAR ASSEMBLY ON THE PIPE AT THE SELECTED LOCATION AND TEMPORARILY SECURE IT TO THE PIPE USING STRAPS FROM THE 1012MS STRAP MOUNTING KIT.

4.3 IF TRANSDUCERS ARE SPACED BY MEASURING "LTN":

alt.4.3.1 TEMPORARILY SECURE ONE OF THE TRANSDUCERS TO THE PIPE USING STRAPS FROM THE 1012MS STRAP MOUNTING KIT.

alt.4.3.2 MEASURE ALONG THE PIPE AND TEMPORARILY SECURE THE SECOND TRANSDUCER TO THE PIPE SO THAT SPACING "LTN" DETERMINED IN STEP 4.1 IS MEASURED BETWEEN THE SPACING MARKS ON THE FRONT FACES OF THE TRANSDUCERS. USE A STRAIGHT EDGE OR OTHER MEANS TO ALIGN BOTH TRANSDUCERS WITH THE PIPE AXIS.

FOR REFLECT MODE INSTALLATION GO TO STEP alt.4.5
FOR DIRECT MODE INSTALLATION CONTINUE WITH alt.4.4

alt.4.4 USE THE MOUNTING GUIDE INCLUDED WITH THE 1012MS STRAP MOUNTING KIT TO TRANSFER ONE OF THE TRANSDUCERS TO THE OPPOSITE SIDE OF THE PIPE. (SEE SHEET 2, ZONE A4)

alt.4.4.1 WRAP THE MOUNTING GUIDE AROUND THE PIPE. POSITION IT SO THAT THE OVERLAPPING LENGTHS ARE EDGE-ALIGNED, MARK THE OVERLAPPED PORTION OF THE GUIDE AT THE EDGE OF THE OVERLAPPING PORTION. REMOVE THE GUIDE, MEASURE THE DISTANCE FROM THE END TO THE MARK AND MARK AGAIN HALFWAY BETWEEN.

alt.4.4.2 RE-POSITION THE GUIDE ON THE PIPE AND TAPE IN PLACE SO THAT ONE OF THE MARKS INDICATES THE CENTERLINE OF THE INSTALLED TRANSDUCER AND THE MOUNTING GUIDE EDGE IS AGAINST THE END OF ONE OF THE TRANSDUCERS. MAKE SURE THE OVERLAPPING LENGTHS OF THE MOUNTING GUIDE ARE EDGE-ALIGNED. THIS ASSURES A DIAMETRICAL TRANSFER OF THE TRANSDUCER POSITION.

alt.4.4.3 LOOSEN THE MOUNTING STRAP ON THE TRANSDUCER WITH WHICH THE MOUNTING GUIDE HAS BEEN ALIGNED. ROTATE IT AROUND THE PIPE SURFACE UNTIL IT IS CENTERED ON THE OPPOSITE SIDE MOUNTING GUIDE MARK MADE IN STEP alt.4.4.1. TIGHTEN THE STRAP, REMOVE THE MOUNTING GUIDE.

alt.4.5 WITH THE TRANSDUCERS TEMPORARILY STRAPPED IN PLACE, MARK THE PIPE SURFACE AT THE TRANSDUCER PERIMETER. REMOVE THE TRANSDUCERS FROM THE PIPE. IF THE PIPE SURFACE IS CLEAN AND SMOOTH, PROCEED TO STEP alt.4.6. IF THE PIPE SURFACE NEEDS CONDITIONING, LOCALLY SMOOTH THE SURFACE IN THE MARKED AREAS USING THE ABRASIVE PAD SUPPLIED. DO NOT OBSCURE THE MARKED TRANSDUCER LOCATIONS.

alt.4.6 APPLY A THIN BAND OF COUPLANT TO THE EMITTING SURFACE OF BOTH TRANSDUCERS. CAREFULLY REPLACE THE TRANSDUCERS ON THE PIPE, REPEATING THE PROCEDURE ABOVE, IF REQUIRED, TO ASSURE ACCURATE POSITIONING.

CONTINUE WITH INSTALLATION NOTE 5 AND CABLE CONNECTING INSTRUCTIONS ON SHEET 3.

DO NOT SCALE THIS DRAWING

UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN INCHES (MM)
TOLERANCES ON-
INCHES ± .1 (MM) ± 2

CONTRACT NO.

DR H.J DATE 7/7/99
CHK DATE
ENG DATE
PROD DATE
APPD DATE

CERTIFIED
DATE

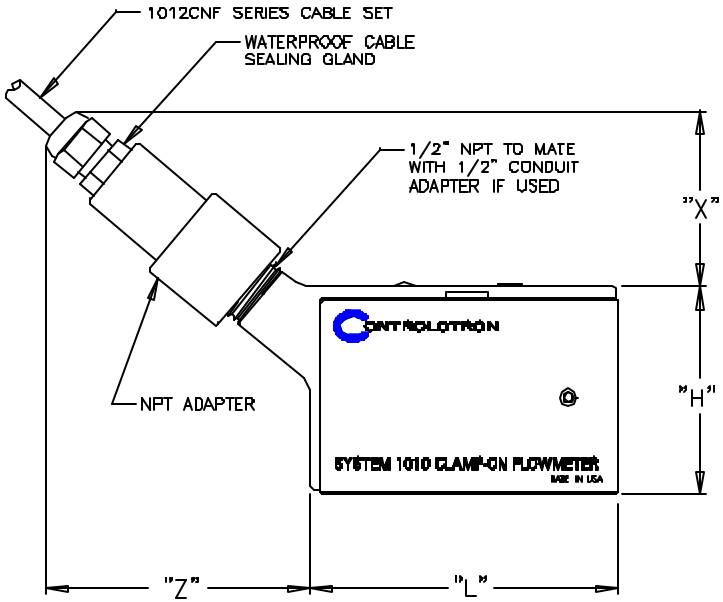
CONTROLOTRON
HAUPPAUGE , NY 11788

# INSTALLATION, 1011NPFS SERIES DEDICATED PLASTIC BODY TRANSDUCER

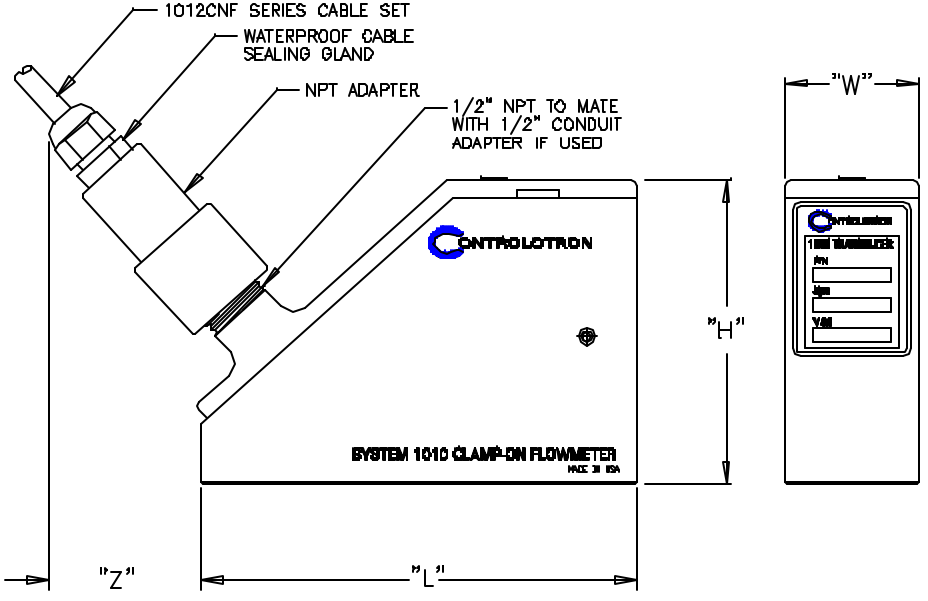
| SIZE | CODE IDENT NO. | | REV. |
|---|---|---|---|
| C | 21614 | 1011NFPS - 7 | B |

SCALE: NONE | WT. | SHEET 4 OF 4

R14: 1011NFPS-7 rev.B
CN4333




SIZES "B", "C" & "D"




SIZE "E"

TRANSDUCER IDENTIFICATION LABEL

| TRANSDUCER PART NUMBER | L | H | W | X | Z | NET WT. (PAIR) |
|---|---|---|---|---|---|---|
| 1011NFPS-A1<br>1011NFPS-A2 | 1.9(47) | 1.4(36) | 1.0 (25) | 1.9 (48) | 2.1 (53) | 0.4 #<br>(0.2kg) |
| 1011NFPS-B1<br>1011NFPS-B2<br>1011NFPS-B3 | 1.9(47) | 1.4(36) | 1.0 (25) | 1.9 (48) | 2.1 (53) | 0.4 #<br>(0.2kg) |
| 1011NFPS-C1<br>1011NFPS-C2<br>1011NFPS-C3 | 3.1(79) | 2.2(55) | 1.4 (35) | 1.9 (48) | 2.1 (53) | 1.0 #<br>(0.5kg) |
| 1011NFPS-D1<br>1011NFPS-D2<br>1011NFPS-D3 | 4.6(117) | 3.0 (77) | 1.4 (35) | 1.9 (48) | 2.1 (53) | 2.1 #<br>(1.0kg) |
| 1011NFPS-E1<br>1011NFPS-E2<br>1011NFPS-E3 | 6.5 (165) | 4.5 (114) | 2.0 (51) | ——— | 1.4 (40) | 2.5 #<br>(1.1kg) |

NOTES:

1. TRANSDUCERS ARE SUPPLIED IN MATCHED PAIRS,BOTH TRANSDUCERS OF A PAIR HAVE THE SAME SERIAL NUMBER.
2. SEE THE APPROPRIATE TRANSDUCER INSTALLATION DRAWING FOR COMPLETE INSTALLED DIMENSIONS.

DO NOT SCALE THIS DRAWING

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES (MM) TOLERANCES ON- INCHES- +/- 0.1 (MM)- +/- 2

CONTRACT NO.

| | | |
|---|---|---|
| DR | H.J. | DATE 7/7/99 |
| CHK | | DATE |
| ENG | | DATE |
| PROD | | DATE |
| APPD | | DATE |

CERTIFIED

DATE

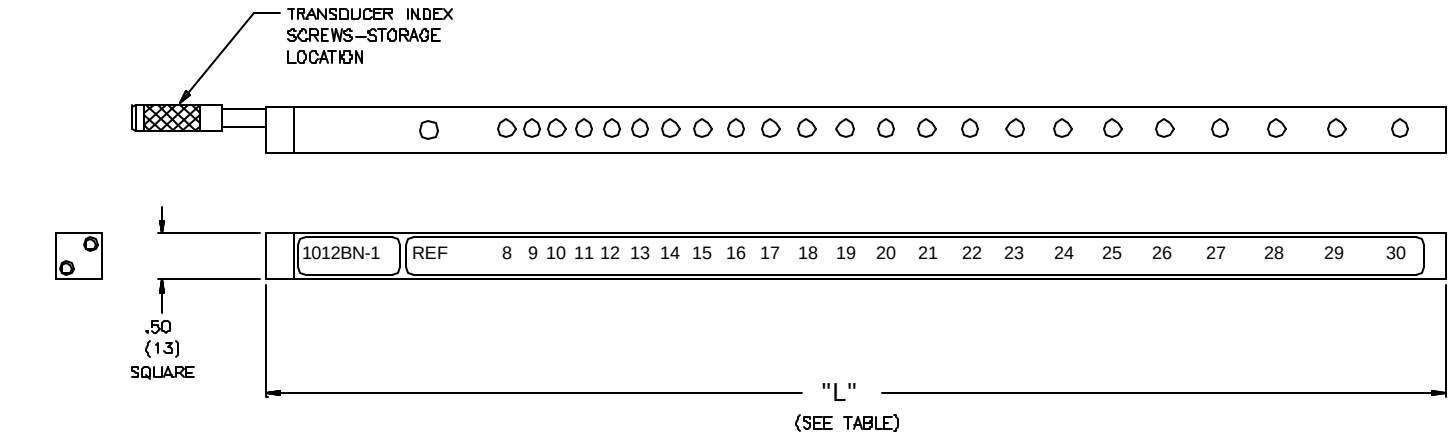
CONTROLOTRON
HAUPPAUGE , NY 11788

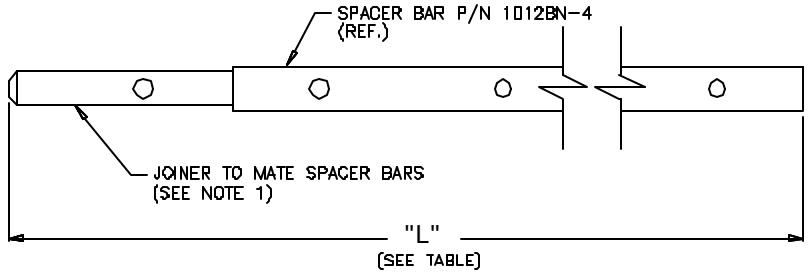
# OUTLINE DIMENSIONS 1011NPFS SERIES DEDICATED PLASTIC BODY TRANSDUCERS

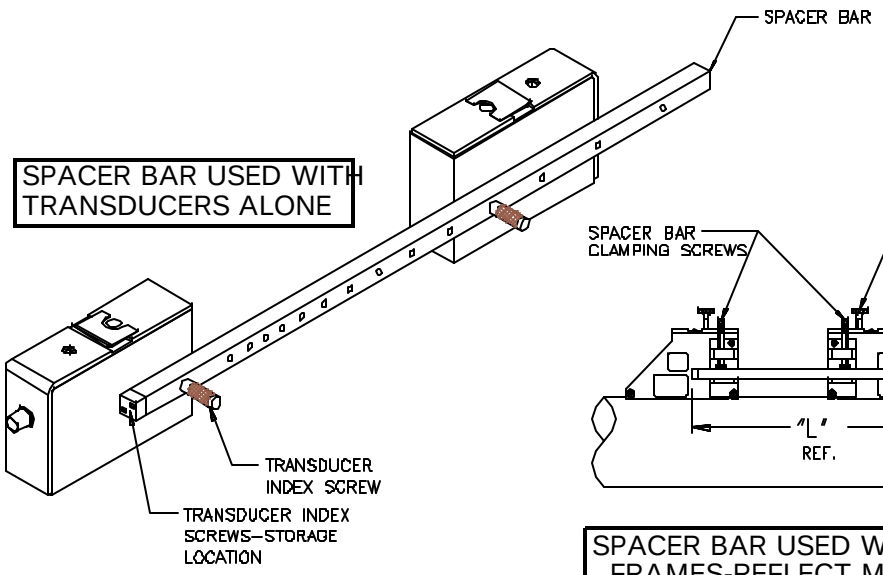
| SIZE | CODE IDENT NO. | | REV. |
|---|---|---|---|
| C | 21614 | 1011NFPS-8 | B |

SCALE: NONE | WT. | SHEET 1 of 1

R14: 1011NFPS-8 sht.1 revA
ER#1447/CN4132




SPACER BAR USED WITH TRANSDUCERS ALONE




SPACER BAR USED WITH MOUNTING FRAMES-REFLECT MODE SHOWN

| | SPACER BAR PART NUMBER | "L" | PIPE O.D.RANGE (SEE NOTE 2) |
|---|---|---|---|
| (SHOWN) | 1012BN–1 | 13.16 (334) | UP TO 8" (203) |
| | 1012BN–2 | 25.87 (657) | UP TO 18" (457) |
| | 1012BN–3 | 40.47 (1028) | UP TO 30" (762) |
| | 1012BN–4 | 27.05 (687) | UP TO 48" (1219) |

## NOTES:

1. SPACER BAR PART NUMBER 1012BN–4 MUST BE USED IN CONJUNCTION WITH SPACER BAR PART NUMBER 1012BN–3.
2. PIPE O.D. RANGES ARE NOMINAL VALUES. ACTUAL DIAMETER LIMITS ARE DEPENDENT ON TRANSDUCER USED, APPLICATION PIPE AND LIQUID.

DO NOT SCALE THIS DRAWING

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES (MM) TOLERANCES ON- INCHES- +/- .1 (MM)- +/- 2

CONTRACT NO.

DR HJ DATE 8/11/98
CHK DATE
ENG DATE
PROD DATE
APPD DATE

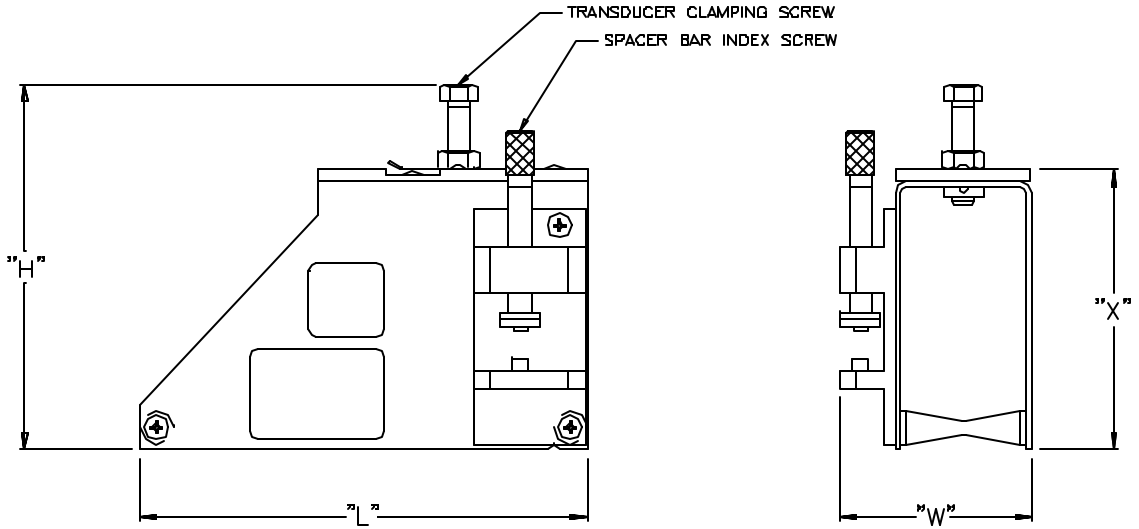
CERTIFIED
DATE

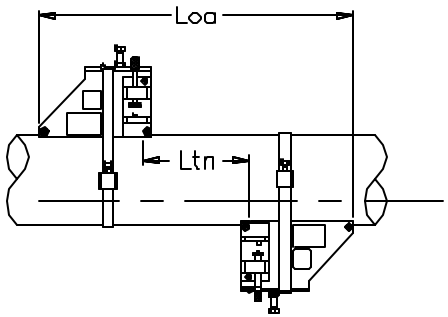
CONTROLOTRON HAUPPAUGE, NY 11788

# OUTLINE DIMENSIONS 1010 SERIES SPACER BAR

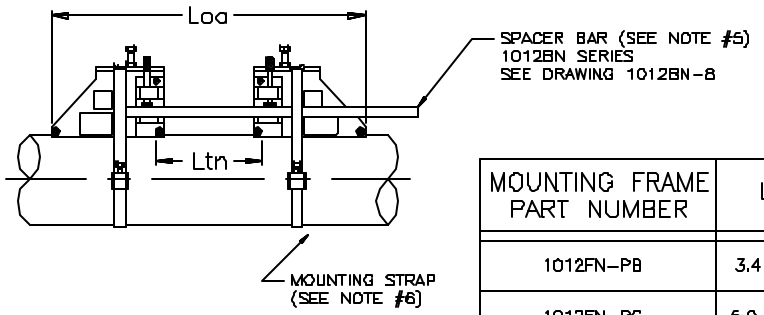
| SIZE | CODE IDENT NO. | | REV. |
|---|---|---|---|
| C | 21614 | 1012BN-8 | B |
| SCALE: NONE | VT. | SHEET 1 OF 1 | |

R14: 1012BN–8
ECN#3980




DIRECT MODE




REFLECT MODE

INSTALLED ON PIPE

| MOUNTING FRAME PART NUMBER | L | W | H | X | Loa |
|---|---|---|---|---|---|
| 1012FN-PB | 3.4 (86) | 1.8 (46) | 3.4 (86) | 2.4 (61) | Ltn +6.0 (153) |
| 1012FN-PC | 5.0 (127) | 2.2 (56) | 4.1 (104) | 3.1 (79) | Ltn +9.3 (236) |
| 1012FN-PD | 6.3 (160) | 2.2 (56) | 4.9 (124) | 3.9 (100) | Ltn +11.8 (300) |
| 1012FN-PE | 8.0 (203) | 2.8 (71) | 6.3 (160) | 5.3 (135) | Ltn +15.3 (389) |

NOTES :

1. TRANSDUCER MOUNTING FRAMES ARE SUPPLIED IN SETS OF TWO.
2. MOUNTING CHAINS OR STRAPS ARE SUPPLIED SEPARATELY.
3. Ltn IS SPACING BETWEEN TRANSDUCERS. Ltn VARIES WITH APPLICATION.
4. Loa IS OVERALL INSTALLED LENGTH ON PIPE.
5. TRANSDUCERS MAY BE SPACED BY Ltn OR BY SPACER BAR INDEX NUMBER.
6. MOUNTING STRAP KIT SHOWN, SEE APPROPRIATE INSTALLATION DRAWING FOR OTHER MOUNTING KIT OPTIONS.

DO NOT SCALE THIS DRAWING

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES TOLERANCES ON- INCHES +/- .1 (MM) +/- 2

CONTRACT NO.

DR H.J DATE 9/16/97
CHK DATE
ENG DATE
PROJ DATE
APPD DATE

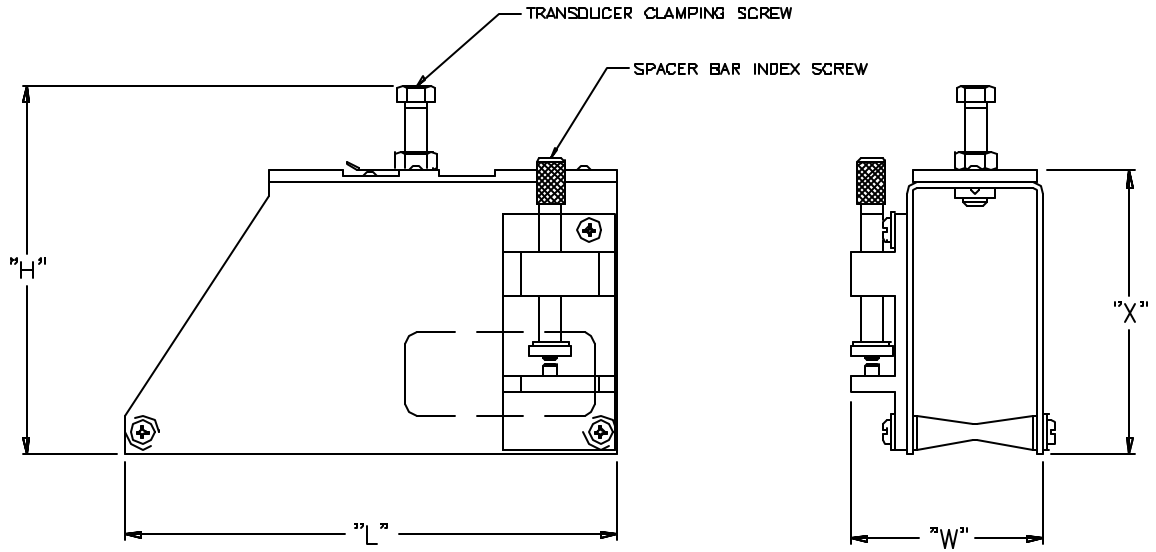
CERTIFIED
DATE

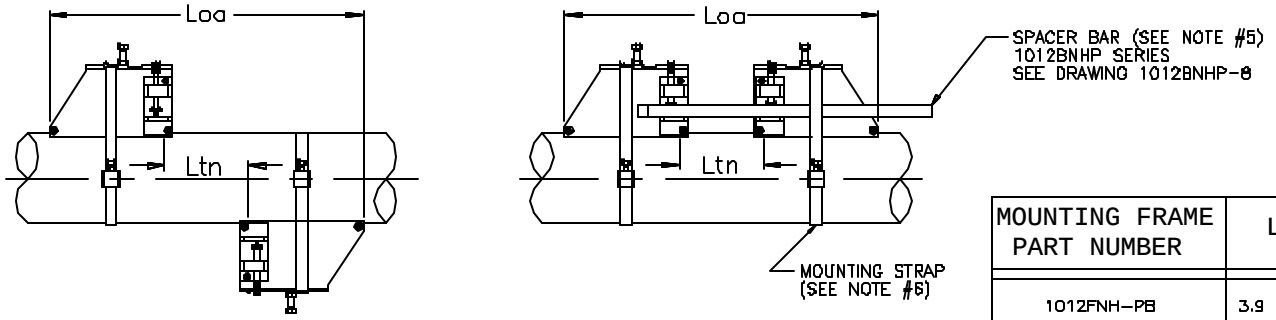
CONTROLOTRON
HAUPPAUGE, NY 11788

# OUTLINE DIMENSIONS 1011 SERIES DEDICATED TRANSDUCER MTG. FRAMES

| SIZE | CODE IDENT NO. | | REV. |
|---|---|---|---|
| C | 21614 | 1012FN-8 | B |
| SCALE: NONE | WT. | SHEET 1 of 1 | |

R14: 1012FN-8
ER#1315 ECN#3849




DIRECT MODE

REFLECT MODE

INSTALLED ON PIPE

| MOUNTING FRAME PART NUMBER | L | W | H | X | Loa |
|---|---|---|---|---|---|
| 1012FNH-PB | 3.9 (100) | 1.8 (46) | 3.4 (86) | 2.5 (63) | Ltn + 6.3 (162) |
| 1012FNH-PC | 5.5 (140) | 2.0 (51) | 4.1 (104) | 3.2 (81) | Ltn + 10.2 (260) |
| 1012FNH-PD | 8.8 (224) | 2.7 (69) | 5.7 (145) | 4.8 (122) | Ltn + 16.6 (420) |

NOTES :

1. TRANSDUCER MOUNTING FRAMES ARE SUPPLIED IN SETS OF TWO.
2. MOUNTING STRAPS OR CHAINS ARE SUPPLIED SEPARATELY.
3. Ltn IS SPACING BETWEEN TRANSDUCERS. Ltn VARIES WITH APPLICATION.
4. Loa IS OVERALL INSTALLED LENGTH ON PIPE.
5. TRANSDUCERS MAY BE SPACED BY Ltn OR BY SPACER BAR INDEX NUMBER.
6. MOUNTING STRAP KIT SHOWN.SEE APPROPRIATE INSTALLATION DRAWING FOR OTHER MOUNTING KIT OPTIONS.

DO NOT SCALE THIS DRAWING

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES TOLERANCES ON-

| INCHES | (MM) |
|---|---|
| +/- .1 | +/- 2 |

CONTRACT NO.

DR HJ DATE 3/6/97
CHK DATE
ENG DATE
PROD DATE
APP'D DATE

CERTIFIED

DATE

CONTROLOTRON
HAUPPAUGE , NY 11788

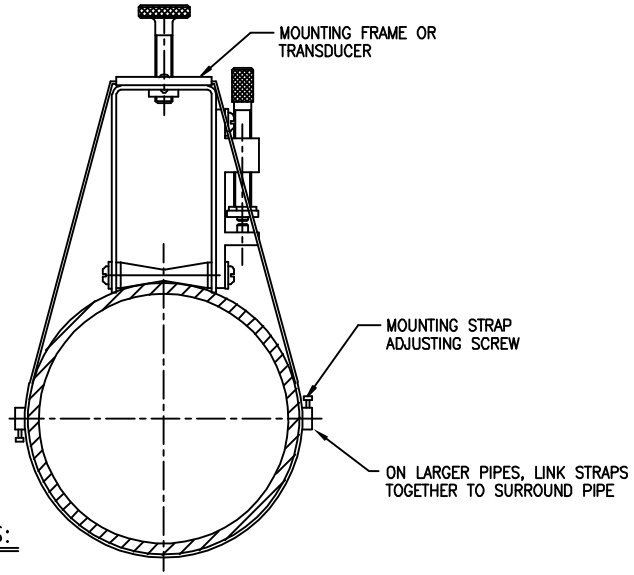
# OUTLINE DIMENSIONS 1011HN SERIES DEDICATED TRANSDUCER MTG. FRAMES

| SIZE | CODE IDENT NO. | | REV. |
|---|---|---|---|
| C | 21614 | 1012FNH-8 | A |
| SCALE: NONE | VT. | SHEET 1 OF 1 | |

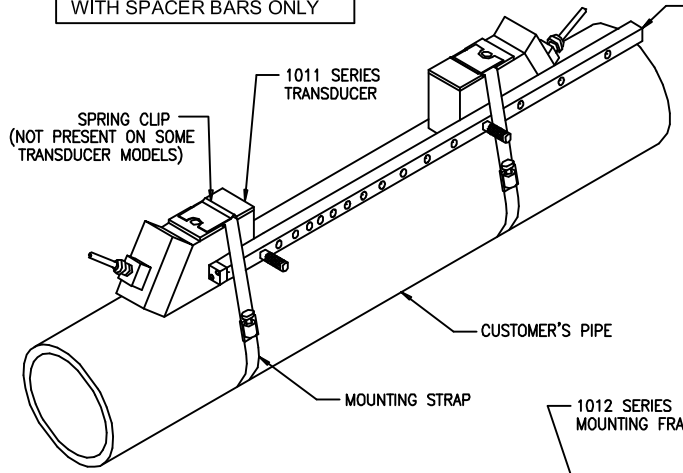
R14: 1012FNH-8
ER#1268

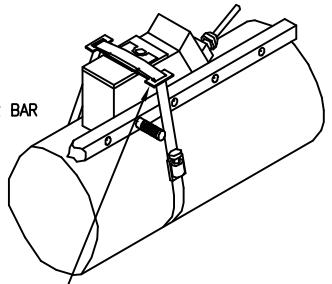
## INSTALLATION PROCEDURE

MOUNTING STRAP KITS ARE TO FASTEN TRANSDUCERS OR MOUNTING FRAMES TO THE PIPE.

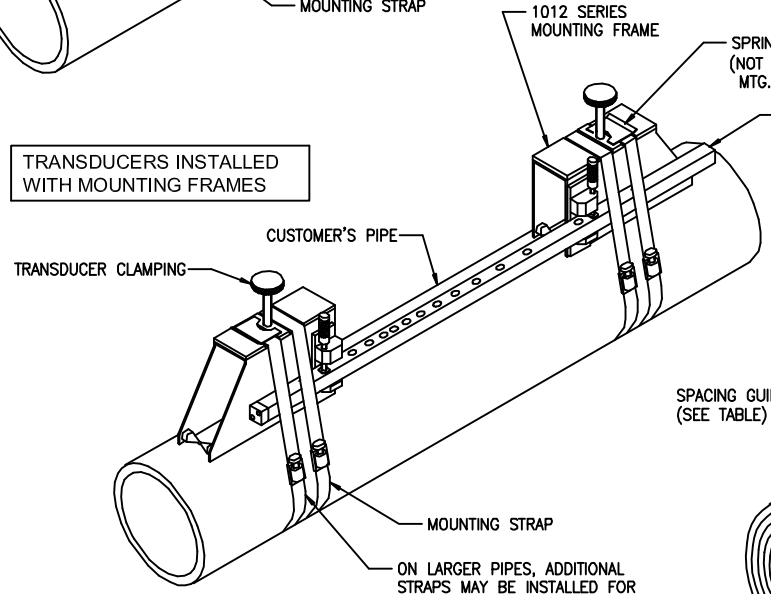


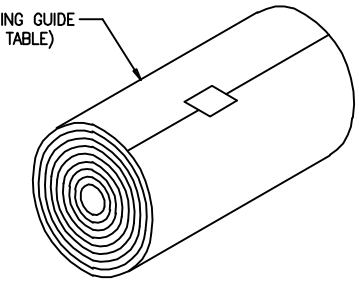

TRANSDUCERS INSTALLED WITH SPACER BARS ONLY




TRANSDUCERS INSTALLED WITH MOUNTING FRAMES




## NOTES:

1. WRAP THE MOUNTING STRAP AROUND THE PIPE, PULL TAUT AND ENGAGE THE END OF MOUNTING STRAP WITH THE MOUNTING STRAP ADJUSTING SCREW.
2. TIGHTEN THE ADJUSTING SCREW TO SECURE THE ASSEMBLY TO THE PIPE.
3. TO SURROUND LARGER PIPES, LINK MOUNTING STRAP SECTIONS TOGETHER AS SHOWN.

| STRAP MTG. KIT PART No. | PIPE DIA. | BAND SIZE (QTY) | SPACING GUIDE P/N (DESCRIPTION) | KIT NET WT. |
|---|---|---|---|---|
| 1012MS-1A | 2"-7" | #88 (2)<br>#128 (2) | 1012-145-1A (2" x 26") | |
| 1012MS-1 | 2"-13" | #88 (2)<br>#152 (2) | 1012-145-1 (2" x 45") | |
| 1012MS-2 | 13"-24" | #188 (2)<br>#280 (2) | 1012-145-2 (4" x 81") | |
| 1012MS-3 | 24"-48" | #152 (4)<br>#312 (4) | 1012-145-3 (4" x 155") | |
| 1012MS-4 | 48"-60" | 36' OF 1/2" BAND AND FASTENER | 1012-145-4 (6" x 196") | |
| 1012MS-5 | 60"-84' | 46' OF 1/2" BAND AND FASTENER | NOT SUPPLIED | |
| 1012MS-6 | 84"-120" | 65' OF 1/2" BAND AND FASTENER | NOT SUPPLIED | |
| 1012MS-7 | 120"-216" | 116' OF 1/2" BAND AND FASTENER | NOT SUPPLIED | |
| 1012MS-8 | 216"-360" | 190' OF 1/2" BAND AND FASTENER | NOT SUPPLIED | |

DO NOT SCALE THIS DRAWING

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES (MM) TOLERANCES ON-

| INCHES | (MM) |
|---|---|
| ± .1 | ± 2 |

CONTRACT NO.

| | | |
|---|---|---|
| DR | H.J | DATE 2/14/97 |
| CHK | | DATE |
| ENG | | DATE |
| PROD | | DATE |
| APP'D | | DATE |

CERTIFIED

DATE

CONTROLOTRON
HAUPPAUGE , NY 11788

# INSTALLATION / OUTLINE ADJUSTABLE MOUNTING STRAP

| SIZE | CODE IDENT NO. | | REV. |
|---|---|---|---|
| C | 21614 | 1012MS - 8 | F |

SCALE: NONE | WT. | SHEET 1 OF 2

R14: 1012MS-8 sht.1 rev.F
ECN#3974, ECN#4022

## STEP - 1

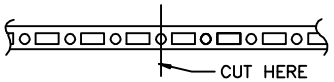
DETERMINE PROPER BAND LENGTH ONE OF TWO WAYS:

A) IF DIAMETER IS KNOWN, REFER TO BAND LENGTH TABLE OR CALCULATE MAXIMUM BAND LENGTH 3.14 x DIA. + 18", TRIM TO FIT WHEN INSTALLING.

B) IF DIAMETER IS NOT KNOWN, MEASURE CIRCUMFERENCE WITH STRING, TWINE, etc., AND ADD 18" (TO ENCIRCLE FRAMES). THIS DIMENSION IS APPROXIMATE, TRIM BAND TO FIT WHEN INSTALLING.

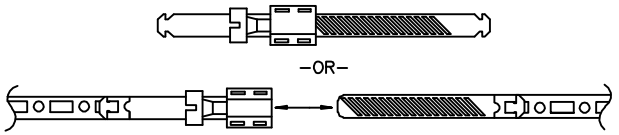
## STEP - 2

MEASURE BAND TO PROPER LENGTH AND CUT THROUGH CENTER OF NEAREST ROUND HOLE WITH SHEARS, SNIPS, HACKSAW etc.

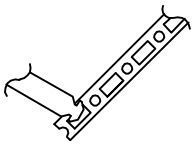



## STEP - 3

EITHER MATE FASTENER HALVES AND THEN LINK TO STRAP ALREADY IN PLACE AROUND PIPE, OR LINK FASTENER HALVES INDEPENDENTLY TO STRAP ENDS (HOLD IN PLACE WITH TAPE IF NECESSARY) AND ENGAGE FASTENER AFTER WRAPPING STRAP AROUND PIPE.

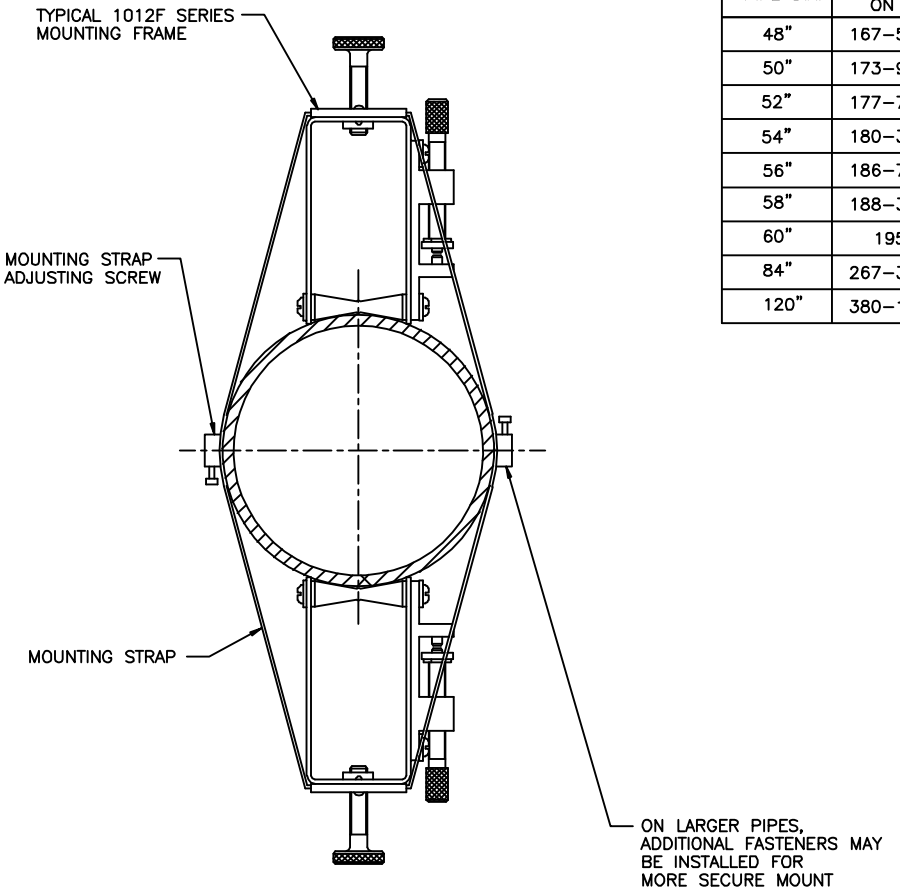



DIAGONALLY INSERT FASTENER END INTO RECTANGULAR SLOTS TO LINK WITH STRAP (INSERT AT LOCATION BEST SUITED FOR TIGHT FIT).



## STEP - 4

USING STRAPS MADE TO SIZE REQUIRED, INSTALL MOUNTING TRACKS AND TRANSDUCERS IN ACCORDANCE WITH APPROPRIATE INSTALLATION DRAWING FOR SPECIFIC TRACK ASSEMBLIES.




| BAND LENGTH TABLE | |
|---|---|
| PIPE DIA. | LENGTH TO CUT ON MARK |
| 48" | 167–5/16" |
| 50" | 173–9/16" |
| 52" | 177–7/8" |
| 54" | 180–3/16" |
| 56" | 186–7/16" |
| 58" | 188–3/4" |
| 60" | 195" |
| 84" | 267–3/8" |
| 120" | 380–1/2" |

NOTES:

1. BAND LENGHTS ARE APPROXIMATE AND CALCULATED FOR USE OF SIZE "D" OR "E" 1011 TRANSDUCERS.

DO NOT SCALE THIS DRAWING

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES (MM) TOLERANCES ON–

| INCHES | (MM) |
|---|---|
| ± .1 | ± 2 |

CONTRACT NO.

| | | |
|---|---|---|
| DR | H.J | DATE 2/14/97 |
| CHK | | DATE |
| ENG | | DATE |
| PROD | | DATE |
| APP'D | | DATE |

CERTIFIED

DATE

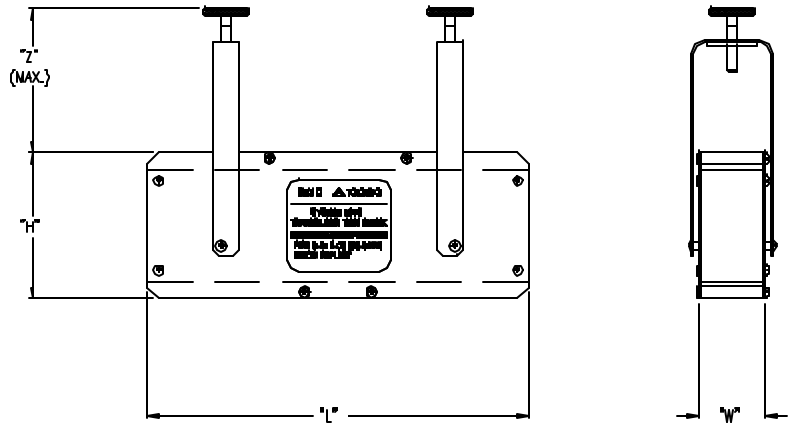
CONTROLOTRON
HAUPPAUGE , NY 11788

# INSTALLATION / OUTLINE ADJUSTABLE MOUNTING STRAP

| SIZE | CODE IDENT NO. | | REV. |
|---|---|---|---|
| C | 21614 | 1012MS - 8 | F |

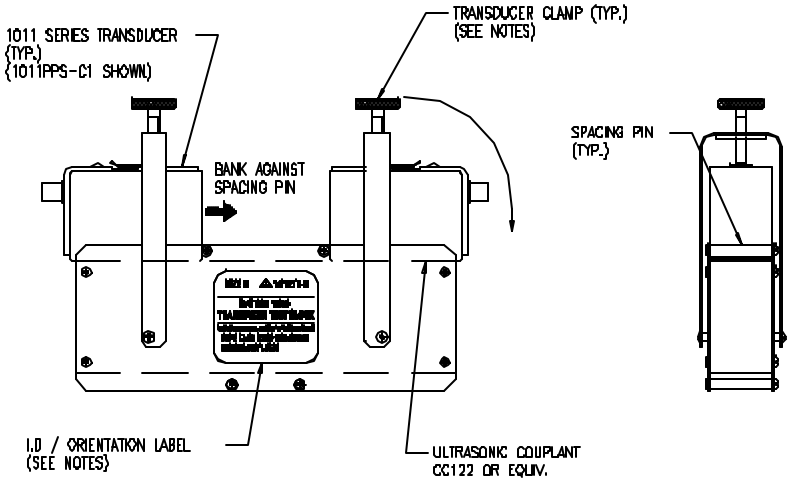
SCALE: NONE | WT. | SHEET 2 OF 2

R14: 1012MS–8 sht.2 rev.F
ECN#3974, ECN#4022




| TEST BLOCK PART No. | "L" | "H" | "W" | "Z" | USED ON 1011N, 1011P TRANSDUCER SIZE |
|---|---|---|---|---|---|
| 1012TB-1 | 4.41 (112.0) | 1.52 (38.6) | 1.06 (26.9) | 2.62 (66.5) | A , B |
| 1012TB-2 | 8.51 (216.1) | 3.26 (82.8) | 1.48 (37.6) | 4.38 (111.2) | C , D |

(SHOWN)




NOTES:

1. SEE FIELD MANUAL FOR FLOW COMPUTER SET-UP FOR TRANSDUCER TEST.
2. ROTATE TRANSDUCER CLAMP 180° FOR INSTALLATION OF LARGER TRANSDUCERS FOR TEST.
3. NOTE ORIENTATION OF LABEL BEFORE INSTALLING TRANSDUCERS FOR TEST.

DO NOT SCALE THIS DRAWING

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES (MM) TOLERANCES ON-

| INCHES | (MM) |
|---|---|
| ± .1 | ± 2 |

CONTRACT NO.

DR HJ DATE 1/4/17
CHK DATE
ENG DATE
PROD DATE
APPD DATE

CERTIFIED

DATE

CONTROLOTRON
HAUPPAUGE , NY 11788

# INSTALLATION/OUTLINE 1011 SERIES TEST BLOCK

| SIZE | CODE IDENT NO. | | REV. |
|---|---|---|---|
| C | 21614 | 1012TB - 8 | B |

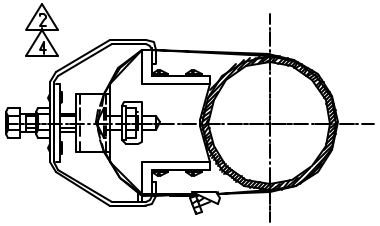
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R14: 1012TB-8 sht.1 rev.B
ER#1311

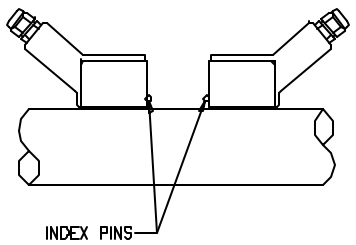
# REFLECT MODE INSTALLATION

1011N UNIVERSAL TRANSDUCER AND TRACK

SELECT AND PREPARE THE TRANSDUCER MOUNTING LOCATION, SECURE TRACKS TO PIPE WITH STRAP



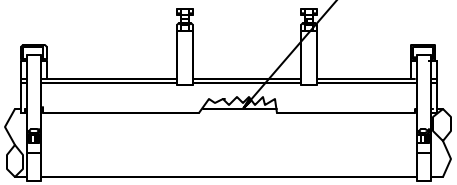

TRANSDUCER INDEX PIN ORIENTATION

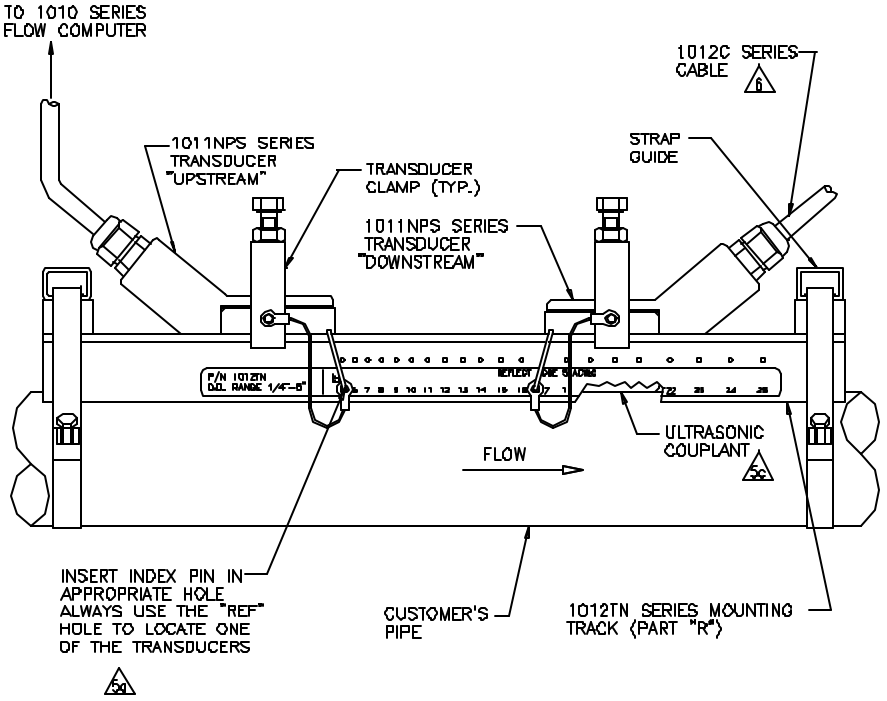



ORIENTATION OF PROPERLY INSTALLED TRANSDUCERS IN REFLECT MODE OPERATION

CONDITION PIPE SURFACE AT THE TRANSDUCER MOUNTING LOCATION USING THE ABRASIVE PAD SUPPLIED.

3






INSTALLATION PROCEDURE – SEE DRAWING REFERENCES 4

1. USING THE INSTALLATION MENU PROCEDURES PRESENTED IN THE 1010 FIELD MANUAL, CONFIRM THAT YOU HAVE THE APPROPRIATE TRANSDUCERS AND TRACK FOR REFLECT MODE OPERATION ON THE CHOSEN PIPE.

2. SELECT MOUNTING LOCATION;
   a) CHOOSE LOCATION WHICH REMAINS FULL AT ZERO FLOW.
   b) WHERE POSSIBLE LOCATE TRACK ASS'Y TEN (10) PIPE DIAMETERS OR MORE FROM BEND TO ENSURE FULLY DEVELOPED AND STABLE FLOW PROFILE.
   c) ON HORIZONTAL PIPE, SELECT HORIZONTAL PLANE, IF POSSIBLE, TO AVOID SEDIMENT BLOCKAGE OF TRANSDUCER SIGNAL.

3. PREPARE PIPE FOR TRACK MOUNT;
   a) REMOVE GRIT, CORROSION, COATING OR HEAVY PAINT
   b) CLEAN AND DEGREASE SURFACE
   c) DO NOT MOUNT OVER FROST.
   d) CONDITION PIPE SURFACE; LOCALLY SMOOTH THE PIPE SURFACE TO ACCEPT THE TRANSDUCERS. USE THE ABRASIVE PAD PROVIDED.

4. MOUNT TRACK ON PIPE;
   a) PLACE TRACK RAIL ASS'Y (ASS'Y WITH STRAP) AGAINST PIPE. WHILE HOLDING TRACK, WRAP STRAP AROUND PIPE AND TIGHTEN.
   b) ROTATE ASS'Y AROUND THE PIPE FOR PROPER POSITIONING. ONCE THAT HAS BEEN ACHIEVED, SECURE THE TRACK RAIL ASS'Y TO THE PIPE WITH THE STRAP.

5. LOCATE TRANSDUCERS;
   a) CONSULTING THE 1010 FIELD MANUAL, USE THE INSTALLATION MENU TO DETERMINE THE APPROPRIATE INDEX HOLES FOR YOUR APPLICATION AND INSERT PINS.
   b) APPLY A THIN BAND OF THE ULTRASONIC COUPLANT PROVIDED TO THE BASE OF EACH TRANSDUCER.
   c) INSERT TRANSDUCERS INTO TRACK AS SHOWN, BANKING AGAINST INDEX PINS. SECURE TRANSDUCERS WITH CLAMPS.

6. MAKE TRANSDUCER CABLE CONNECTIONS IN ACCORDANCE WITH THE APPROPRIATE FLOW COMPUTER INSTALLATION DRAWING AND 1010 FIELD MANUAL.

7. SEE DRAWING 1012TN-8 AND 1011NPS-8 FOR TRACK AND TRANSDUCER OUTLINE DIMENSIONS.

DO NOT SCALE THIS DRAWING

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES (MM) TOLERANCES ON-

| INCHES | (MM) |
|---|---|
| +/- .1 | +/- 1 |

CONTRACT NO.

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| DR | H.J | DATE 8/10/98 |
| CHK | | DATE |
| ENG | | DATE |
| PROD | | DATE |
| APPD | | DATE |

CERTIFIED

DATE

CONTROLOTRON
HAUPPAUGE, NY 11788

# INSTALLATION DRAWING 1010 SERIES TRANSDUCERS AND MOUNTING TRACKS

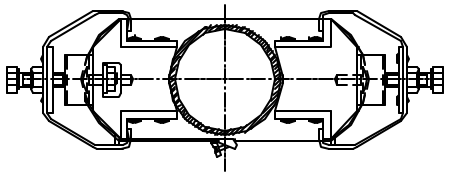
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R14: 1012TN-7A rev.A

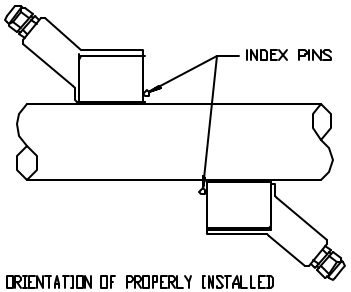
# DIRECT MODE INSTALLATION

1011N UNIVERSAL TRANSDUCER AND TRACK

SELECT AND PREPARE THE TRANSDUCER MOUNTING LOCATION, SECURE TRACKS TO PIPE WITH STRAP

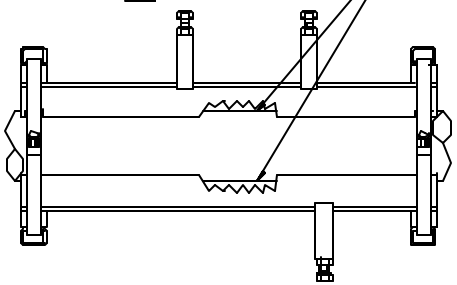


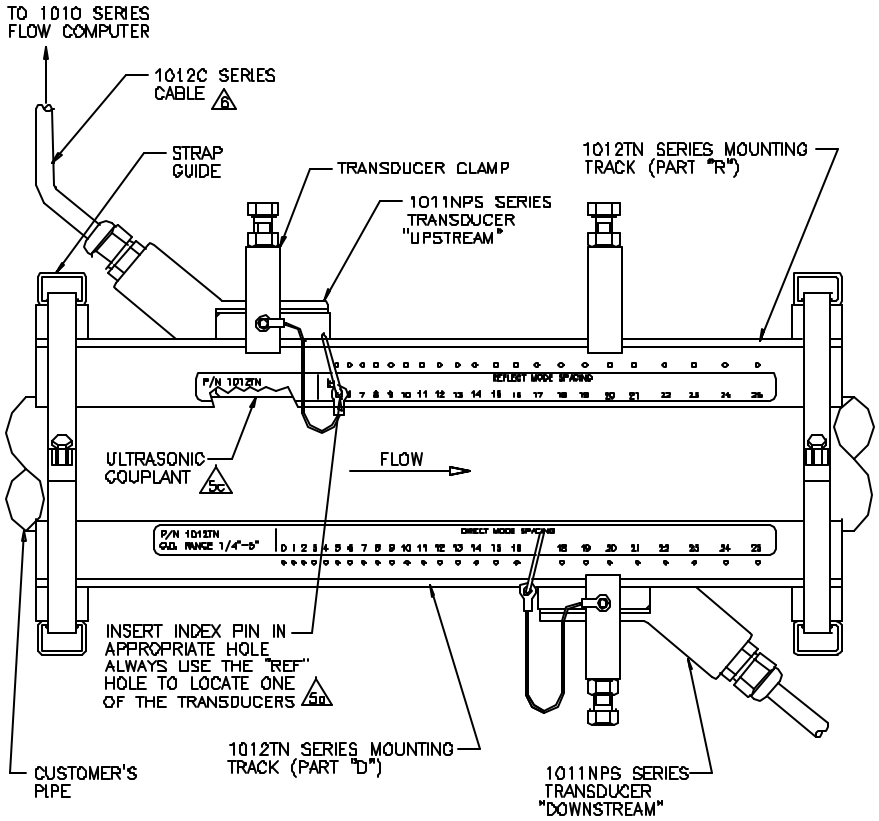
TRANSDUCER INDEX PIN ORIENTATION




ORIENTATION OF PROPERLY INSTALLED TRANSDUCERS IN DIRECT MODE OPERATION

CONDITION PIPE SURFACE AT THE TRANSDUCER MOUNTING LOCATION USING THE ABRASIVE PAD SUPPLIED.






## INSTALLATION PROCEDURE – SEE DRAWING REFERENCES

1. USING THE INSTALLATION MENU, PROCEDURES PRESENTED IN THE 1010 FIELD MANUAL, CONFIRM THAT YOU HAVE THE APPROPRIATE TRANSDUCERS AND TRACK FOR DIRECT MODE OPERATION ON THE CHOSEN PIPE.

2. SELECT MOUNTING LOCATION;
   a) CHOOSE LOCATION WHICH REMAINS FULL AT ZERO FLOW.
   b) WHERE POSSIBLE LOCATE TRACK ASS'Y TEN( 10) PIPE DIAMETERS OR MORE FROM BEND TO ENSURE FULLY DEVELOPED AND STABLE FLOW PROFILE.
   c) ON HORIZONTAL PIPE, SELECT HORIZONTAL PLANE, IF POSSIBLE, TO AVOID SEDIMENT BLOCKAGE OF TRANSDUCER SIGNAL.

3. PREPARE PIPE FOR TRACK MOUNT;
   a) REMOVE GRIT, CORROSION, COATING OR HEAVY PAINT
   b) CLEAN AND DEGREASE SURFACE
   c) DO NOT MOUNT OVER FROST.
   d) CONDITION PIPE SURFACE;
   LOCALLY SMOOTH THE PIPE SURFACE TO ACCEPT THE TRANSDUCERS. USE THE ABRASIVE PAD PROVIDED.

4. MOUNT TRACK ON PIPE;
   a) PLACE TRACK RAIL ASS'Y (ASS'Y WITH STRAP) AGAINST PIPE. WHILE HOLDING TRACK, PLACE THE SECOND TRACK ONTO THE PIPE AND HOLD TOGETHER IN PLACE.
   b) ROTATE ASS'Y AROUND THE PIPE FOR PROPER POSITIONING. ONCE THAT HAS BEEN ACHIEVED, SECURE THE TRACK RAIL ASS'Y TO THE PIPE WITH THE STRAP.

5. LOCATE TRANSDUCERS;
   a) CONSULTING THE 1010 FIELD MANUAL, USE THE INSTALLATION MENU TO DETERMINE THE APPROPRIATE INDEX HOLES FOR YOUR APPLICATION AND INSERT PINS.
   b) APPLY A THIN BAND OF THE ULTRASONIC COUPLANT PROVIDED TO THE BASE OF EACH TRANSDUCER.
   c) INSERT TRANSDUCERS INTO TRACK AS SHOWN, BANKING AGAINST INDEX PINS. SECURE TRANSDUCERS WITH CLAMPS.

6. MAKE TRANSDUCER CABLE CONNECTIONS IN ACCORDANCE WITH THE APPROPRIATE FLOW COMPUTER INSTALLATION DRAWING AND 1010 FIELD MANUAL.

7. SEE DRAWING 1012TN-8 AND 1011NPS-8 FOR TRACK AND TRANSDUCER OUTLINE DIMENSIONS.

DO NOT SCALE THIS DRAWING

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES (MM) TOLERANCES ON-

| INCHES | (MM) |
|---|---|
| +/- .1 | +/- 2 |

CONTRACT NO.

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| DR | H.J | DATE 6/10/98 |
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| PROD | | DATE |
| APPD | | DATE |

CERTIFIED

DATE

CONTROLOTRON
HAUPPAUGE , NY 11788

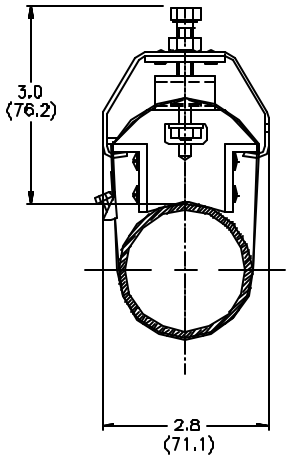
# INSTALLATION DRAWING 1010 SERIES TRANSDUCERS AND MOUNTING TRACKS

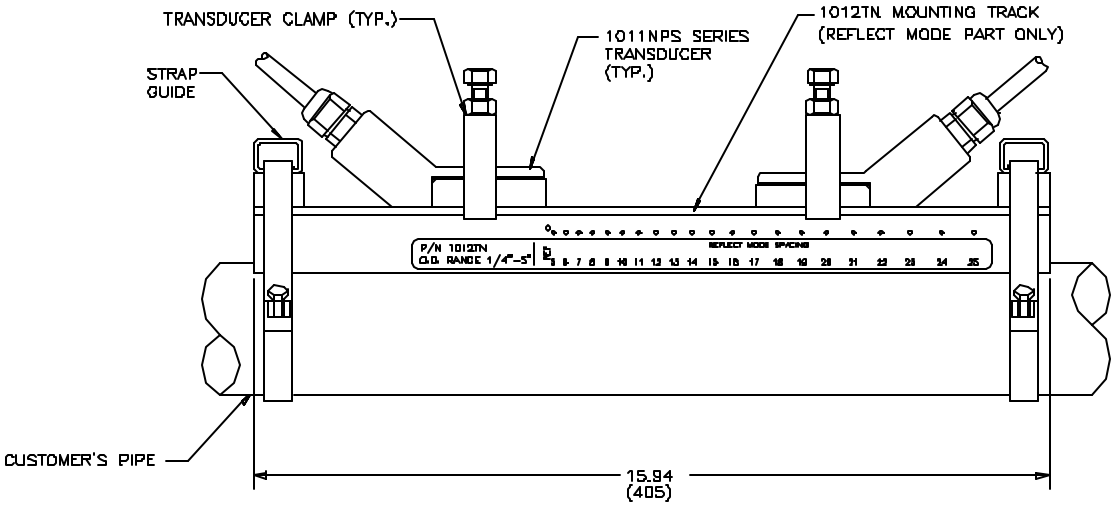
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| C | 21614 | 1012TN-7 | A |

SCALE: NONE | VT. | SHEET 2 OF 2

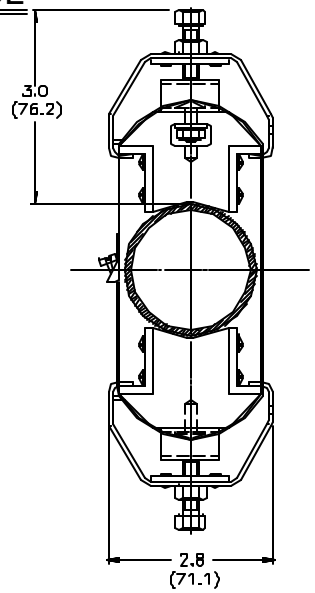
R14: 1012TN-7B rev.A

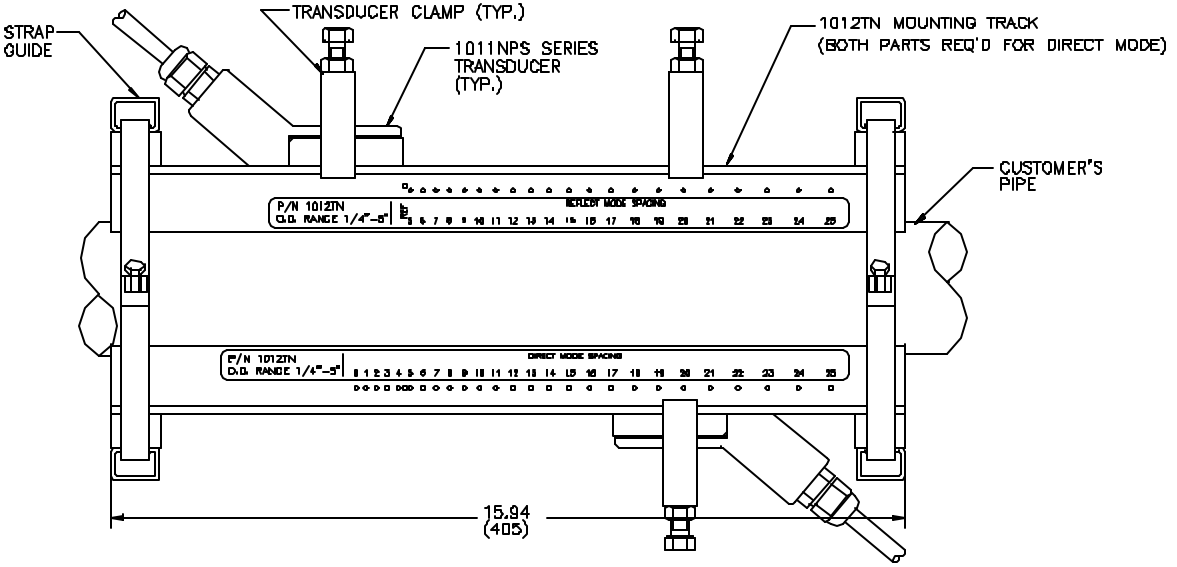
## REFLECT MODE




## DIRECT MODE




NOTE:

1. SEE DRAWING 1012TN-7 FOR TRANSDUCER AND MOUNTING TRACK INSTALLATION INSTRUCTIONS.
2. SEE DRAWING 1011NPS-8 FOR TRANSDUCER OUTLINE DIMENSIONS.

DO NOT SCALE THIS DRAWING

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES (MM) TOLERANCES ON-

| INCHES | (MM) |
|---|---|
| ± .1 | ± 2 |

CONTRACT NO.

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|---|---|---|
| DR | HJ | DATE 6/10/98 |
| CHK | | DATE |
| ENG | | DATE |
| PROD | | DATE |
| APPD | | DATE |

CERTIFIED

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CONTROLOTRON
HAUPPAUGE, NY 11788

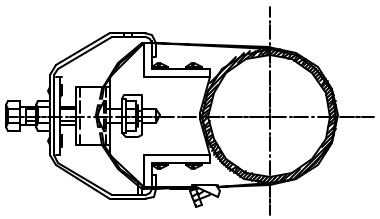
# OUTLINE DIMENSIONS
# 1012TN SERIES
# MOUNTING TRACK

| SIZE | CODE IDENT NO. | | REV. |
|---|---|---|---|
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| SCALE: NONE | WT. | SHEET 1 OF 1 | |

R14: 1012TN-8 rev.A

# REFLECT MODE INSTALLATION

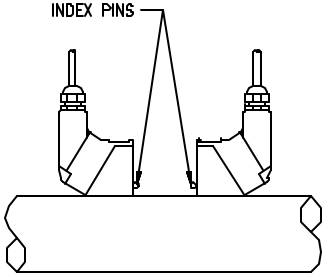
1011HN HIGH PRECISION TRANSDUCER AND TRACK



2
4

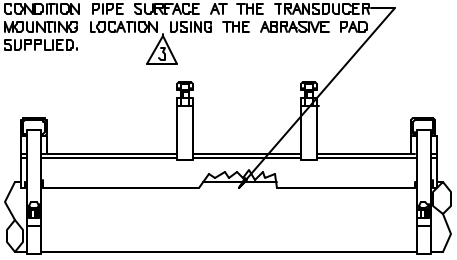
SELECT AND PREPARE THE TRANSDUCER MOUNTING LOCATION, SECURE TRACKS TO PIPE WITH STRAP

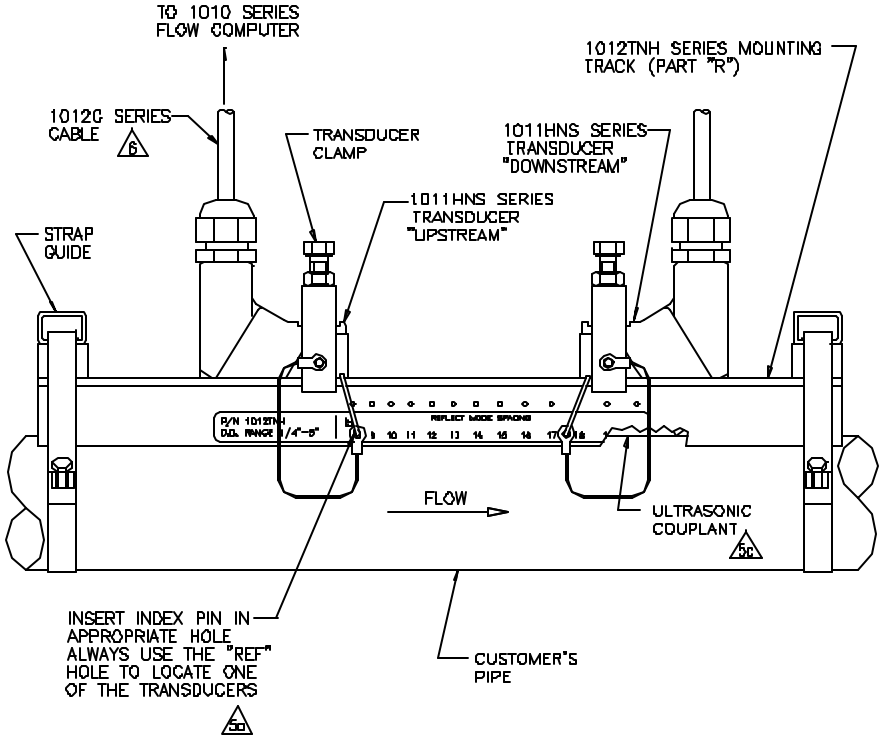
TRANSDUCER INDEX PIN ORIENTATION




ORIENTATION OF PROPERLY INSTALLED TRANSDUCERS IN REFLECT MODE OPERATION

CONDITION PIPE SURFACE AT THE TRANSDUCER MOUNTING LOCATION USING THE ABRASIVE PAD SUPPLIED. 3






INSTALLATION PROCEDURE – SEE DRAWING REFERENCES 4

1. USING THE INSTALLATION MENU PROCEDURES PRESENTED IN THE 1010 FIELD MANUAL, CONFIRM THAT YOU HAVE THE APPROPRIATE TRANSDUCERS AND TRACK FOR REFLECT MODE OPERATION ON THE CHOSEN PIPE.

2. SELECT MOUNTING LOCATION;
   a) CHOOSE LOCATION WHICH REMAINS FULL AT ZERO FLOW.
   b) WHERE POSSIBLE LOCATE TRACK ASS'Y TEN (10) PIPE DIAMETERS OR MORE FROM BEND TO ENSURE FULLY DEVELOPED AND STABLE FLOW PROFILE.
   c) ON HORIZONTAL PIPE, SELECT HORIZONTAL PLANE, IF POSSIBLE, TO AVOID SEDIMENT BLOCKAGE OF TRANSDUCER SIGNAL.

3. PREPARE PIPE FOR TRACK MOUNT;
   a) REMOVE GRIT, CORROSION, COATING OR HEAVY PAINT
   b) CLEAN AND DEGREASE SURFACE
   c) DO NOT MOUNT OVER FROST.
   d) CONDITION PIPE SURFACE; LOCALLY SMOOTH THE PIPE SURFACE TO ACCEPT THE TRANSDUCERS. USE THE ABRASIVE PAD PROVIDED.

4. MOUNT TRACK ON PIPE;
   a) PLACE TRACK RAIL ASS'Y (ASS'Y WITH STRAP) AGAINST PIPE. WHILE HOLDING TRACK, WRAP STRAP AROUND PIPE AND TIGHTEN.
   b) ROTATE ASS'Y AROUND THE PIPE FOR PROPER POSITIONING. ONCE THAT HAS BEEN ACHIEVED, SECURE THE TRACK RAIL ASS'Y TO THE PIPE WITH THE STRAP.

5. LOCATE TRANSDUCERS;
   a) CONSULTING THE 1010 FIELD MANUAL, USE THE INSTALLATION MENU TO DETERMINE THE APPROPRIATE INDEX HOLES FOR YOUR APPLICATION AND INSERT PINS.
   b) APPLY A THIN BAND OF THE ULTRASONIC COUPLANT PROVIDED TO THE BASE OF EACH TRANSDUCER.
   c) INSERT TRANSDUCERS INTO TRACK AS SHOWN, BANKING AGAINST INDEX PINS. SECURE TRANSDUCERS WITH CLAMPS.

6. MAKE TRANSDUCER CABLE CONNECTIONS IN ACCORDANCE WITH THE APPROPRIATE FLOW COMPUTER INSTALLATION DRAWING AND 1010 FIELD MANUAL.

7. SEE DRAWING 1012TNH-8 AND 1011HNS-8 FOR TRACK AND TRANSDUCER OUTLINE DIMENSIONS.

DO NOT SCALE THIS DRAWING

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES (MM) TOLERANCES ON-

| INCHES | (MM) |
|---|---|
| +/- .1 | +/- 2 |

CONTRACT NO.

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| DR | H.J | DATE 8/10/98 |
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| PROD | | DATE |
| APPD | | DATE |

CERTIFIED

DATE

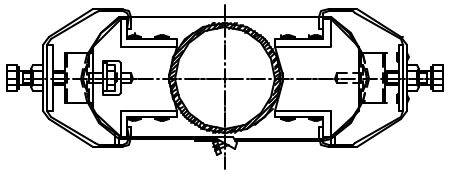
CONTROLOTRON
HAUPPAUGE, NY 11788

# INSTALLATION DRAWING 1010 SERIES TRANSDUCERS AND MOUNTING TRACKS

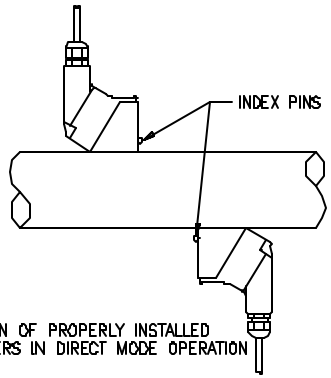
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|---|---|---|---|
| C | 21614 | 1012TNH-7 | A |
| SCALE: NONE | VT. | SHEET 1 OF 2 | |

R14: 1012TNH-7A rev.A

SELECT AND PREPARE THE TRANSDUCER MOUNTING LOCATION, SECURE TRACKS TO PIPE WITH STRAP

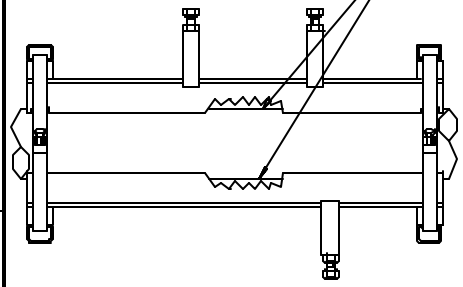


TRANSDUCER INDEX PIN ORIENTATION



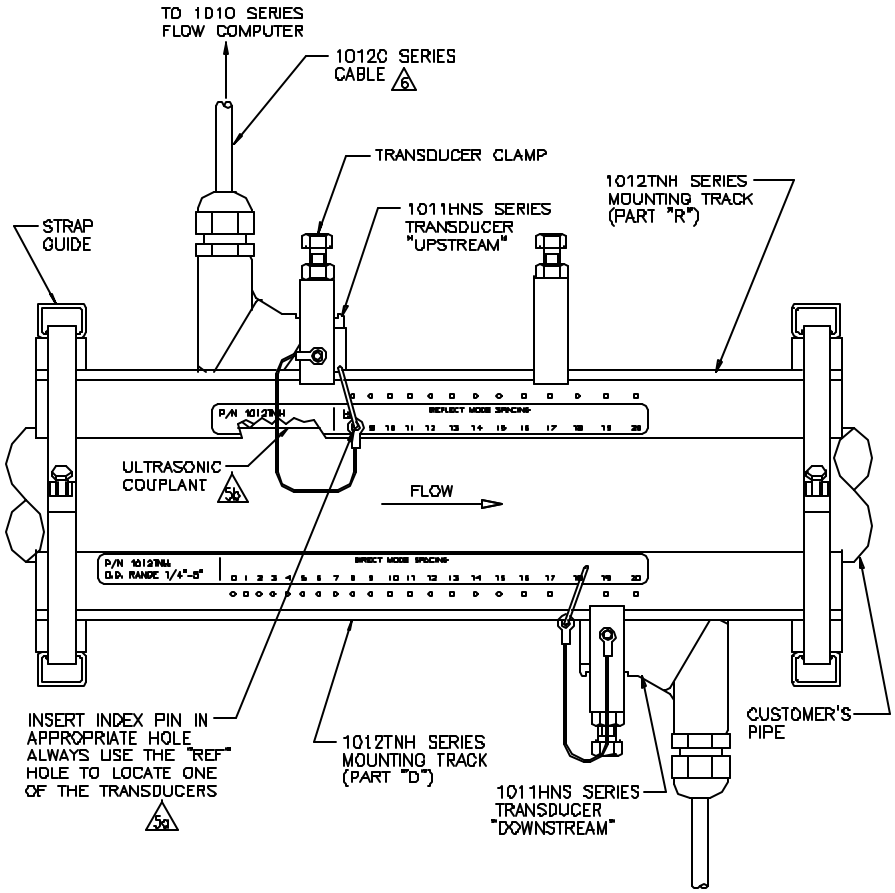

ORIENTATION OF PROPERLY INSTALLED TRANSDUCERS IN DIRECT MODE OPERATION

CONDITION PIPE SURFACE AT THE TRANSDUCER MOUNTING LOCATION USING THE ABRASIVE PAD SUPPLIED.



# DIRECT MODE INSTALLATION

## 1011HN HIGH PRECISION TRANSDUCER AND TRACK




INSTALLATION PROCEDURE – SEE DRAWING REFERENCES 4

1. USING THE INSTALLATION MENU, PROCEDURES PRESENTED IN THE 1010 FIELD MANUAL, CONFIRM THAT YOU HAVE THE APPROPRIATE TRANSDUCERS AND TRACK FOR DIRECT MODE OPERATION ON THE CHOSEN PIPE.

2. SELECT MOUNTING LOCATION;
   a) CHOOSE LOCATION WHICH REMAINS FULL AT ZERO FLOW.
   b) WHERE POSSIBLE LOCATE TRACK ASS'Y TEN( 10) PIPE DIAMETERS OR MORE FROM BEND TO ENSURE FULLY DEVELOPED AND STABLE FLOW PROFILE.
   c) ON HORIZONTAL PIPE, SELECT HORIZONTAL PLANE, IF POSSIBLE, TO AVOID SEDIMENT BLOCKAGE OF TRANSDUCER SIGNAL.

3. PREPARE PIPE FOR TRACK MOUNT;
   a) REMOVE GRIT, CORROSION, COATING OR HEAVY PAINT
   b) CLEAN AND DEGREASE SURFACE
   c) DO NOT MOUNT OVER FROST.
   d) CONDITION PIPE SURFACE;
   LOCALLY SMOOTH THE PIPE SURFACE TO ACCEPT THE TRANSDUCERS. USE THE ABRASIVE PAD PROVIDED.

4. MOUNT TRACK ON PIPE;
   a) PLACE TRACK RAIL ASS'Y (ASS'Y WITH STRAP) AGAINST PIPE. WHILE HOLDING TRACK, PLACE THE SECOND TRACK ONTO THE PIPE AND HOLD TOGETHER IN PLACE.
   b) ROTATE ASS'Y AROUND THE PIPE FOR PROPER POSITIONING. ONCE THAT HAS BEEN ACHIEVED, SECURE THE TRACK RAIL ASS'Y TO THE PIPE WITH THE STRAP.

5. LOCATE TRANSDUCERS;
   a) CONSULTING THE 1010 FIELD MANUAL, USE THE INSTALLATION MENU TO DETERMINE THE APPROPRIATE INDEX HOLES FOR YOUR APPLICATION AND INSERT PINS.
   b) APPLY A THIN BAND OF THE ULTRASONIC COUPLANT PROVIDED TO THE BASE OF EACH TRANSDUCER.
   c) INSERT TRANSDUCERS INTO TRACK AS SHOWN, BANKING AGAINST INDEX PINS. SECURE TRANSDUCERS WITH CLAMPS.

6. MAKE TRANSDUCER CABLE CONNECTIONS IN ACCORDANCE WITH THE APPROPRIATE FLOW COMPUTER INSTALLATION DRAWING AND 1010 FIELD MANUAL.

7. SEE DRAWING 1012TNH-8 AND 1011HNS-8 FOR TRACK AND TRANSDUCER OUTLINE DIMENSIONS.

DO NOT SCALE THIS DRAWING

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES (MM) TOLERANCES ON-

| INCHES | (MM) |
|---|---|
| +/- .1 | +/- 2 |

CONTRACT NO.

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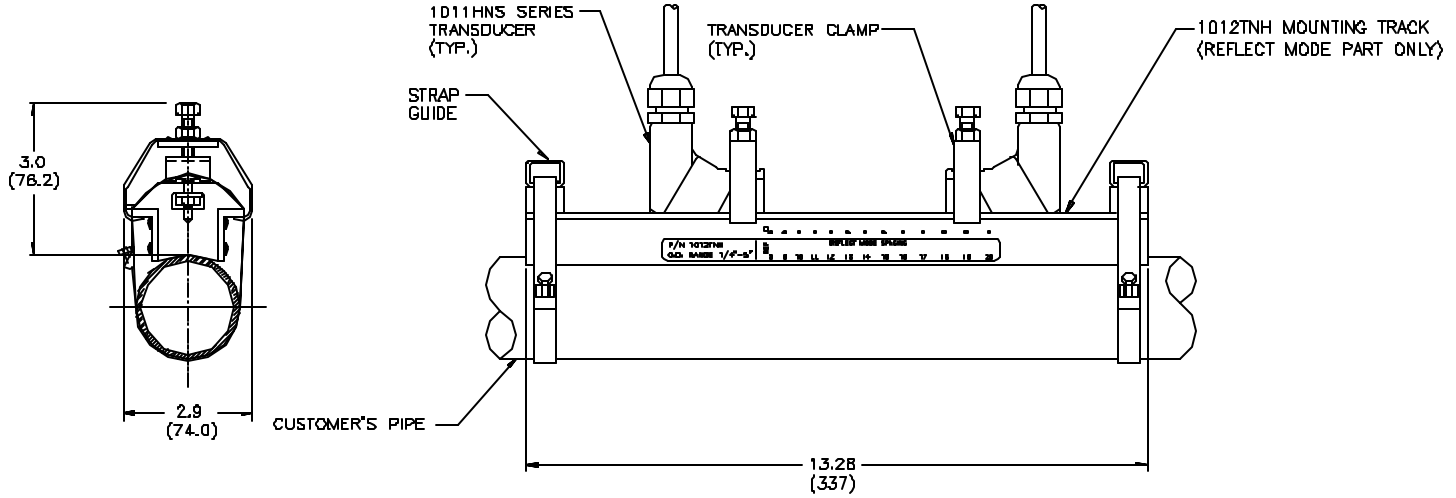
CONTROLOTRON
HAUPPAUGE , NY 11788

# INSTALLATION DRAWING 1010 SERIES TRANSDUCERS AND MOUNTING TRACKS

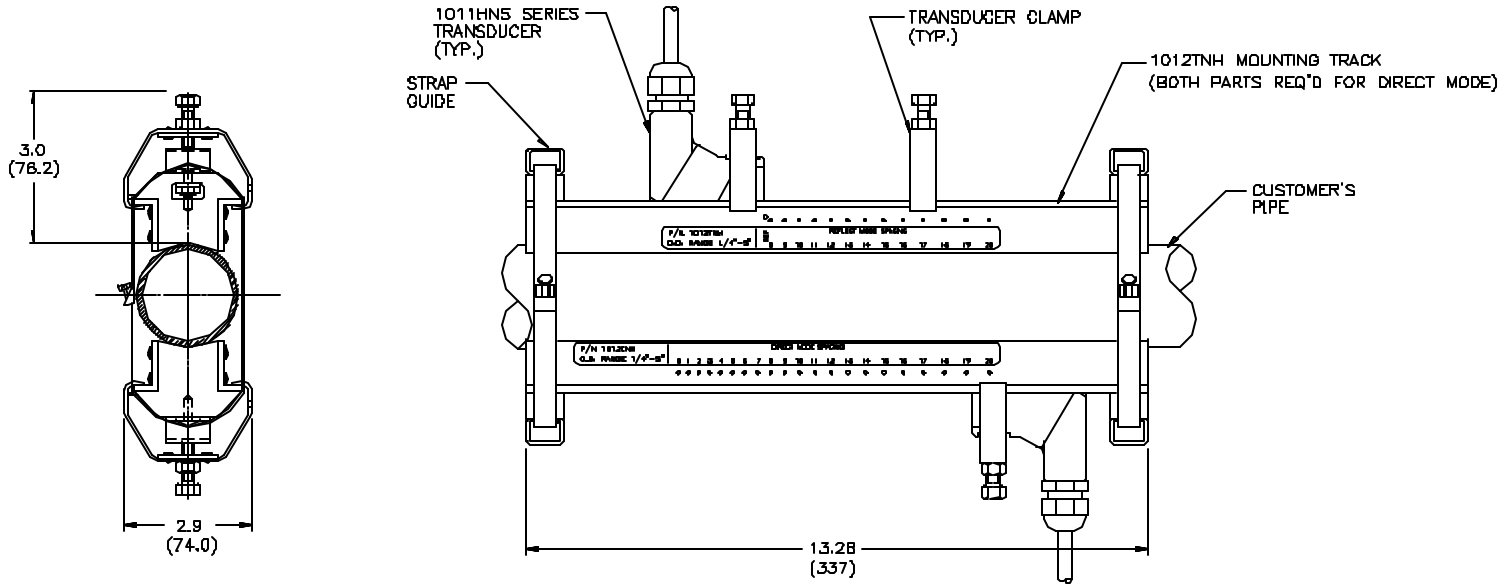
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|---|---|---|---|
| C | 21614 | 1012TNH-7 | A |
| SCALE: NONE | VT. | SHEET 2 OF 2 | |

R14: 1012TNH-7B rev.A

## REFLECT MODE




## DIRECT MODE




NOTE:

1. SEE DRAWING 1012TNH-7 FOR TRANSDUCER AND MOUNTING TRACK INSTALLATION INSTRUCTIONS.
2. SEE DRAWING 1011HNS-8 FOR TRANSDUCER OUTLINE DIMENSIONS.

DO NOT SCALE THIS DRAWING

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES (MM) TOLERANCES ON-

| INCHES | (MM) |
|---|---|
| ± .1 | ± 2 |

CONTRACT NO.

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|---|---|---|
| DR | HJ | DATE 6/10/98 |
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| PROD | | DATE |
| APP'D | | DATE |

CERTIFIED

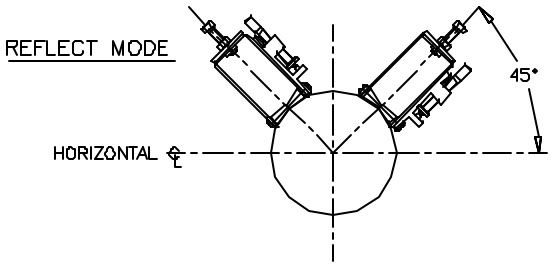
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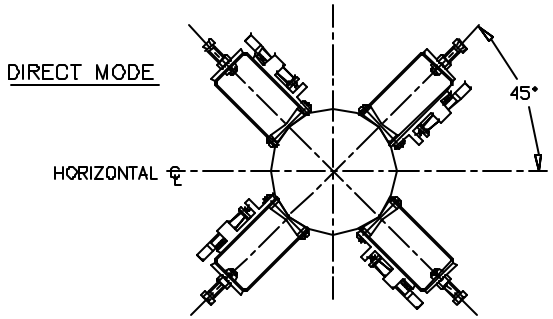
CONTROLOTRON
HAUPPAUGE, NY 11788

# OUTLINE DIMENSIONS 1012TNH SERIES MOUNTING TRACK

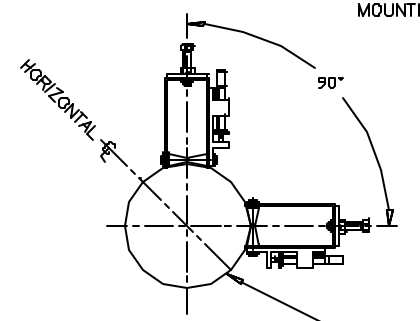
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| C | 21614 | 1012TNH - 8 | A |
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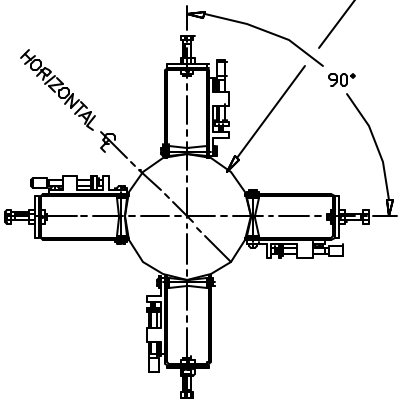
R14: 1012TNH-8 rev.A

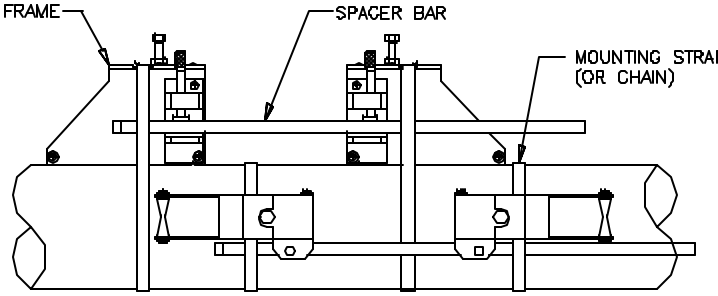


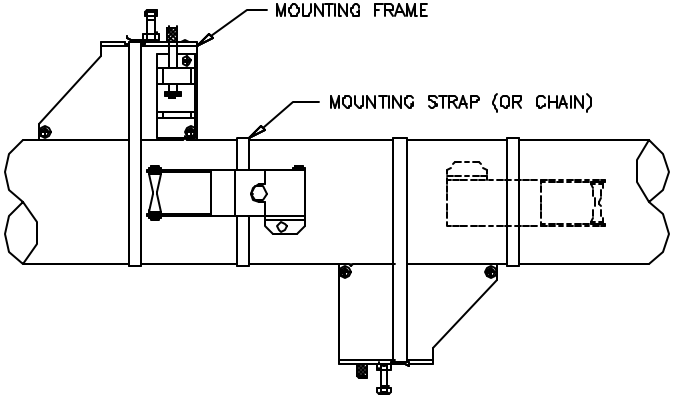

RECOMMENDED INSTALLATION
ON HORIZONTAL PIPES




POSITION FRAME ASSEMBLIES 90° APART (1/4 CIRCUMFERENCE)
BEFORE TIGHTENING ADJUSTING SCREW




## NOTES:

1. USING THE INSTALLATION MENU AND THE PROCEDURE OUTLINED IN THE FIELD MANUAL, SELECT THE APPROPRIATE TRANSDUCERS AND MOUNTING FRAMES FOR THE MODE OF OPERATION CHOSEN FOR YOUR APPLICATION. REFLECT MODE IS PREFERRED.
2. SELECT MOUNTING LOCATION:
   a) TRANSDUCER SETS SHOULD BE MOUNTED SO THAT THE PLANES OF OPERATION OF THE TWO SETS INTERSECT ORTHOGONALLY; THAT IS, 90° OR 1/4 THE CIRCUMFERENCE OF THE PIPE APART.
   b) CHOOSE A LOCATION WHICH REMAINS FULL AT ZERO FLOW. ON HORIZONTAL PIPES, MOUNT AWAY AWAY FROM THE UNDERSIDE TO AVOID SEDIMENT BLOCKAGE OF ULTRASONIC BEAM. MOUNT AWAY FROM TOPSIDE TO AVOID BLOCKAGE DUE TO ENTRAPPED AIR.
   c) WHERE POSSIBLE, LOCATE MOUNTING FRAME ASSEMBLIES AS FAR AS POSSIBLE DOWNSTREAM FROM ANY FLOW DISTURBANCE TO ASSURE FULLY DEVELOPED AND STABLE FLOW PROFILE.
3. MOUNT FRAMES ON PIPE:
   a) REFER TO THE APPROPRIATE INSTALLATION DRAWING FOR THE PORTABLE OR DEDICATED TRANSDUCERS AND FRAMES SELECTED FOR USE. NOTE THESE DRAWINGS PROVIDE INSTRUCTIONS FOR SINGLE PATH INSTALLATIONS. DUAL PATH SYSTEMS ARE INSTALLED IN THE SAME FASHION BY OFFSETTING A SECOND SET OF MOUNTING FRAMES IN AN ORTHOGONAL PLANE AS SHOWN ABOVE.
4. CONDITION PIPE SURFACE:
   LOCALLY SMOOTH THE PIPE SURFACE AT EACH TRANSDUCER LOCATION AND INSTALL TRANSDUCERS IN ACCORDANCE WITH THE PROCEDURE DESCRIBED ON THE APPROPRIATE TRANSDUCER AND FRAME INSTALLATION DRAWING. MAKE SURE THAT TRANSDUCER PAIRS ARE INSTALLED AND CONNECTED TO THE FLOW COMPUTER CORRECTLY.
5. REFER TO THE APPROPRIATE OUTLINE DRAWINGS FOR TRANSDUCER AND MOUNTING FRAME OUTLINE DIMENSIONS.

DO NOT SCALE THIS DRAWING

UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN INCHES (MM)
TOLERANCES ON-

CONTRACT NO.

| | | |
|---|---|---|
| DR | H.J | DATE 9/10/96 |
| CHK | | DATE |
| ENG | | DATE |
| PROD | | DATE |
| APPD | | DATE |

CERTIFIED

DATE

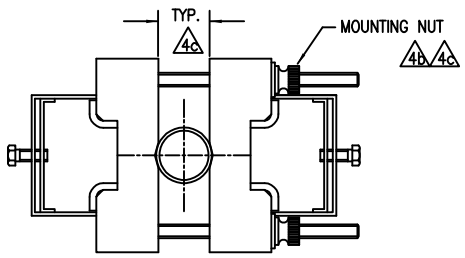
CONTROLOTRON
HAUPPAUGE . NY 11788

# INSTALLATION DRAWING
# DUAL PATH TRANSDUCER SET
# WITH MOUNTING FRAMES

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|---|---|---|---|
| C | 21614 | 1012F-DB-7 | B |

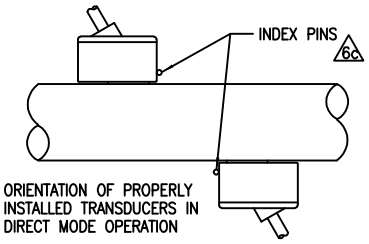
SCALE NONE | WT. | SHEET 1 OF 1

R14: 1012F-DB-7 sht.1 rev.B



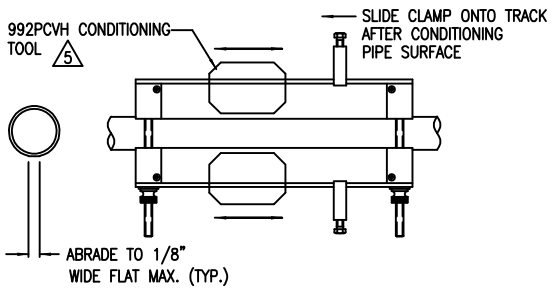

SELECT AND PREPARE THE TRANSDUCER MOUNTING LOCATION, SECURE TRACKS TO PIPE WITH MOUNTING NUTS.
HORIZONTAL ℄ SHOWN

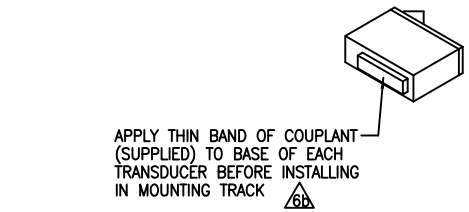
TRANSDUCER INDEX PIN ORIENTATION

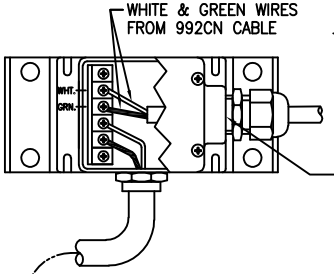



ORIENTATION OF PROPERLY INSTALLED TRANSDUCERS IN DIRECT MODE OPERATION

PIPE CONDITIONING: WITH TRACKS IN PLACE, CONDITION PIPE SURFACE USING 992PCVH PIPE CONDITIONING TOOL AND ABRASIVE PAPER STRIPS SUPPLIED. IN ELEVATED TEMP. ENVIRONMENT, PERIODICALLY DIP THE CONDITIONING TOOL IN WATER BATH TO COOL. THIS WILL ASSURE BEST GRIP OF WATERPROOF ADHESIVE ON THE ABRASIVE STRIPS.



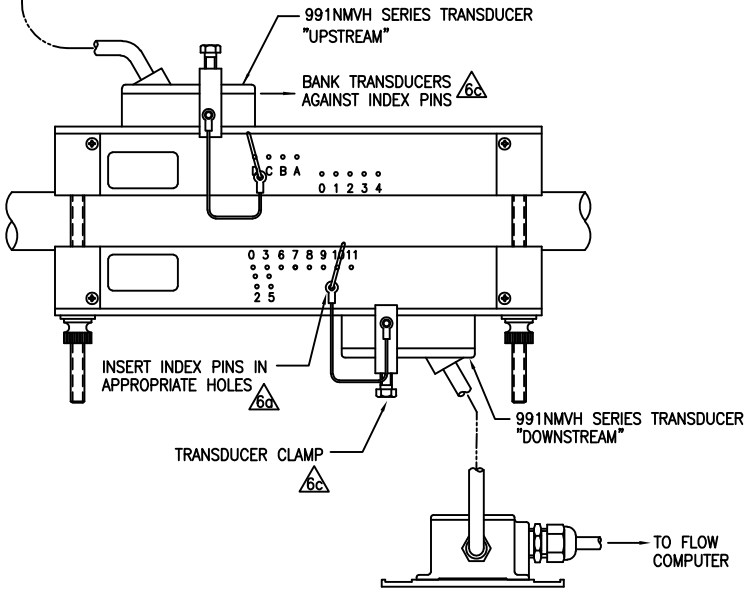

991NMVH TRANSDUCERS WITH 992CN CABLE:
- –ATTACH WHITE WIRE TO TERMINAL "1"
- –ATTACH GREEN WIRE TO TERMINAL "2"

AFTER WIRING, REPLACE COVER & GASKET

991PMVH TRANSDUCERS HAVE BNC CONNECTORS FOR USE WITH 992CP CABLES. 7 8

991NMVH WIRING HOUSING: 1/2" N.P.T THREAD ACCEPTS CUSTOMER'S FITTING FOR CONDUIT OR CABLE ENTRY GLAND (1/4" CABLE O.D.). AVOID USE OF RIGID CONDUIT TO PREVENT TRANSDUCER MOVEMENT AS A RESULT OF CONDUIT STRESS OR VIBRATION.

FLEXIBLE UMBILICAL CABLE TO WIRING HOUSING (PART OF TRANSDUCER ASS'Y)




## INSTALLATION PROCEDURE – SEE DRAWING REFERENCES #

1. USING THE INSTALLATION MENU PROCEDURES PRESENTED IN THE FIELD MANUAL, CONFIRM THAT YOU HAVE THE APPROPRIATE TRANSDUCERS AND TRACK FOR REFLECT MODE OPERATION ON THE CHOSEN PIPE.
2. SELECT MOUNTING LOCATION;
   a) CHOOSE LOCATION WHICH REMAINS FULL AT ZERO FLOW.
   b) WHERE POSSIBLE LOCATE TRACK ASS'Y TEN (10) PIPE DIAMETERS OR MORE FROM BEND TO ENSURE FULLY DEVELOPED AND STABLE FLOW PROFILE.
   c) ON HORIZONTAL PIPE, SELECT HORIZONTAL PLANE, IF POSSIBLE, TO AVOID SEDIMENT BLOCKAGE OF TRANSDUCER SIGNAL.
3. PREPARE PIPE FOR TRACK MOUNT;
   a) REMOVE GRIT, CORROSION, COATING OR HEAVY PAINT
   b) CLEAN AND DEGREASE SURFACE
   c) DO NOT MOUNT OVER FROST.
4. MOUNT TRACK ON PIPE;
   a) PLACE TRACK RAIL ASS'Y (ASS'Y WITH 1/4–20 STUDS) AGAINST PIPE. WHILE HOLDING TRACK, SLIDE THE SECOND TRACK ONTO THE STUDS AND HOLD TOGETHER IN PLACE (MAKE SURE "V"s COME TOGETHER A SHOWN).
   b) INSTALL MOUNTING NUTS, SNUG BUT NOT OVERLY TIGHT. ROTATE ASS'Y AROUND THE PIPE FOR PROPER POSITIONING, ONCE THAT HAS BEEN ACHIEVED, SECURE THE TRACK RAIL ASS'Y TO THE PIPE WITH THE MOUNTING NUTS.
   c) IMPORTANT: KEEP EQUAL SPACING BETWEEN THE TWO TRACK RAIL ASSEMBLIES WHILE TIGHTENING THE MOUNTING NUTS. (ZONE D4)
5. CONDITION PIPE SURFACE; LOCALLY SMOOTH THE PIPE SURFACE TO ACCEPT THE TRANSDUCERS. USE THE 992PCVH CONDITIONING TOOL AND ABRASIVE PAPER (ADHESIVE BACKED) PROVIDED. FINISHED SURFACE SHOULD BE APPROXIMATELY 1/8" WIDE FLAT AT CENTER OF MOUNTING TRACK.
6. LOCATE TRANSDUCERS;
   a) CONSULTING THE FIELD MANUAL, USE THE INSTALLATION MENU TO DETERMINE THE APPROPRIATE INDEX HOLES FOR YOUR APPLICATION AND INSERT PINS.
   b) APPLY A THIN BAND OF THE ULTRASONIC COUPLANT PROVIDED TO THE BASE OF EACH TRANSDUCER.
   c) INSERT TRANSDUCERS INTO TRACK AS SHOWN, BANKING AGAINST INDEX PINS. SECURE TRANSDUCERS WITH CLAMPS.
7. MAKE TRANSDUCER CABLE CONNECTIONS IN ACCORDANCE WITH THE APPROPRIATE FLOW COMPUTER INSTALLATION DRAWING AND 990 FIELD MANUAL.
8. SEE DRAWING 990TDMVH–8A AND 990THMVH–8A FOR TRACK AND TRANSDUCER OUTLINE DIMENSIONS.

DO NOT SCALE THIS DRAWING

UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN INCHES (MM)
TOLERANCES ON–

CONTRACT NO.

DR H.J DATE 11/03/04
CHK DATE
ENG DATE
PROD DATE
APPD DATE

CERTIFIED
DATE

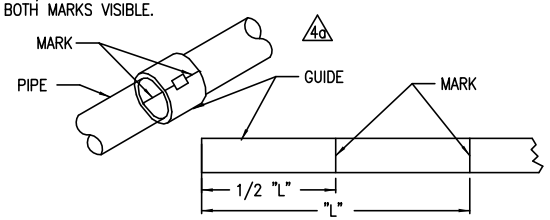
CONTROLOTRON
HAUPPAUGE , NY 11788

# INSTALLATION DRAWING 990 SERIES TRANSDUCER DIRECT MODE, VERY HIGH TEMP.

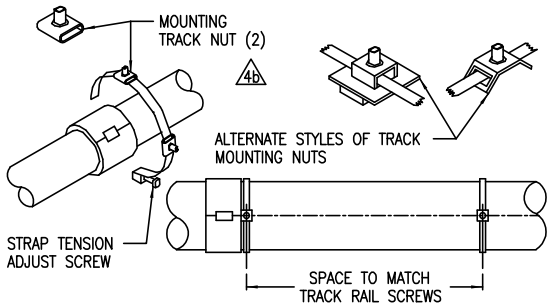
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| C | 21614 | 990TDMVH-7A | A |

SCALE: NONE | WT. | SHEET 1 OF 1

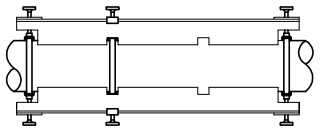
WRAP MOUNTING GUIDE AROUND PIPE AND MARK AT OVERLAPPING EDGE. UNWRAP GUIDE, MEASURE DISTANCE "L" FROM EDGE TO MARK, MARK AGAIN AT 1/2 "L". RE-INSTALL THE MOUNTING GUIDE, TAPE IN PLACE WITH BOTH MARKS VISIBLE.



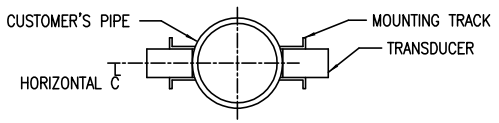

WRAP STRAP WITH MOUNTING NUT AROUND THE PIPE, ALIGN WITH MOUNTING GUIDE, SECURE WITH STRAP TENSION ADJUST SCREWS AFTER POSITIONING MOUNTING NUTS AT MOUNTING GUIDE MARKS. MOUNT SECOND STRAP ON THE PIPE ALIGNING THE MOUNTING NUTS AND SPACED TO MATCH THE TRACK RAIL MOUNTING SCREWS.



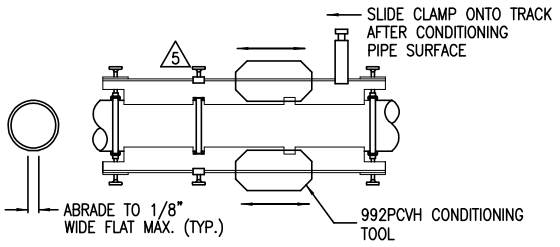

LONGER MOUNTING TRACKS ASSEMBLIES INCLUDE A THIRD STRAP AND MOVEABLE MOUNTING SCREW. POSITION MOVEABLE SCREW FOR BEST ADVANTAGE AFTER TRANSDUCER INDEX HOLES HAVE BEEN SELECTED.

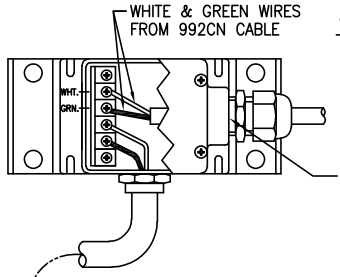


PREFERRED MOUNTING PLANE OF TRANSDUCERS 2c




PIPE CONDITIONING: WITH TRACKS IN PLACE, CONDITION PIPE SURFACE USING 992PCVH PIPE CONDITIONING TOOL AND ABRASIVE PAPER STRIPS SUPPLIED. IN ELEVATED TEMP. ENVIRONMENT, PERIODICALLY DIP THE CONDITIONING TOOL IN WATER BATH TO COOL. THIS WILL ASSURE BEST GRIP OF WATERPROOF ADHESIVE ON THE ABRASIVE STRIPS.



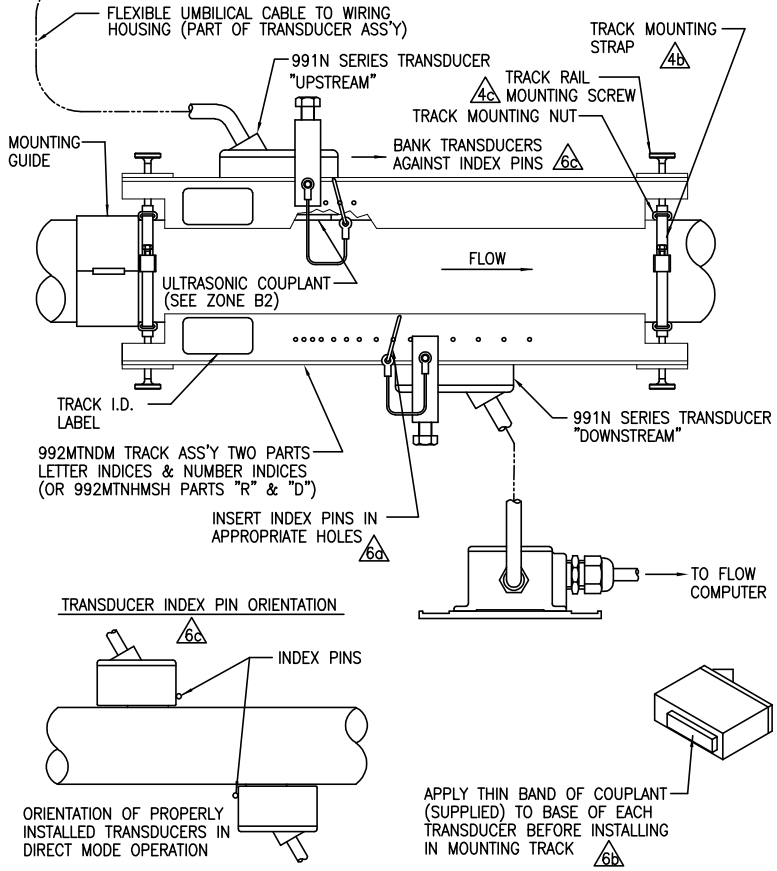




991NMVH TRANSDUCERS WITH 992CN CABLE:

-ATTACH WHITE WIRE TO TERMINAL "1"
-ATTACH GREEN WIRE TO TERMINAL "2"
AFTER WIRING, REPLACE COVER & GASKET

991PMVH TRANSDUCERS HAVE BNC CONNECTORS FOR USE WITH 992CP CABLES. 7

991NMVH WIRING HOUSING: 1/2" N.P.T THREAD ACCEPTS CUSTOMER'S FITTING FOR CONDUIT OR CABLE ENTRY GLAND (1/4" CABLE O.D.). AVOID USE OF RIGID CONDUIT TO PREVENT TRANSDUCER MOVEMENT AS A RESULT OF CONDUIT STRESS OR VIBRATION.




TRANSDUCER INDEX PIN ORIENTATION 6c




ORIENTATION OF PROPERLY INSTALLED TRANSDUCERS IN DIRECT MODE OPERATION



APPLY THIN BAND OF COUPLANT (SUPPLIED) TO BASE OF EACH TRANSDUCER BEFORE INSTALLING IN MOUNTING TRACK 6b

INSTALLATION PROCEDURE – SEE DRAWING REFERENCES #

1. USING THE INSTALLATION MENU PROCEDURES PRESENTED IN THE FIELD MANUAL, CONFIRM THAT YOU HAVE THE APPROPRIATE TRANSDUCERS AND TRACK FOR REFLECT MODE OPERATION ON THE CHOSEN PIPE.
2. SELECT MOUNTING LOCATION;
   a) CHOOSE LOCATION WHICH REMAINS FULL AT ZERO FLOW.
   b) WHERE POSSIBLE LOCATE TRACK ASS'Y TEN (10) PIPE DIAMETERS OR MORE FROM BEND TO ENSURE FULLY DEVELOPED AND STABLE FLOW PROFILE.
   c) ON HORIZONTAL PIPE, SELECT HORIZONTAL PLANE, IF POSSIBLE, TO AVOID SEDIMENT BLOCKAGE OF TRANSDUCER SIGNAL.
3. PREPARE PIPE FOR TRACK MOUNT;
   a) REMOVE GRIT, CORROSION, COATING OR HEAVY PAINT
   b) CLEAN AND DEGREASE SURFACE
   c) DO NOT MOUNT OVER FROST.
4. MOUNT TRACK ON PIPE;
   a) WRAP THE MOUNTING GUIDE AROUND THE PIPE. POSITION SO THAT THE OVERLAPPING LENGTHS ARE EDGE-ALIGNED. MARK THE OVERLAPPING PORTION OF THE GUIDE AT THE END OF THE OVERLAPPING PORTION. REMOVE THE GUIDE. MEASURE THE DISTANCE FROM THE END TO THE MARK AND MARK AGAIN HALFWAY BETWEEN. RE-POSITION THE GUIDE ON THE PIPE AND TAPE IN PLACE SO THAT THE MARKS ON THE MOUNTING GUIDE APPEAR AT THE SELECTED TRACK MOUNTING LOCATIONS.
   b) SLIP TWO OF THE TRACK MOUNTING NUTS PROVIDED ONTO EACH OF THE MOUNTING STRAPS. WRAP ONE OF THE STRAPS AROUND PIPE, USING THE MOUNTING GUIDE TO ALIGN THE STRAP PERPENDICULAR TO THE FLOW AXIS. ENGAGE THE STRAP TENSION ADJUST SCREWS AND TIGHTEN SECURELY AFTER POSITIONING THE MOUNTING NUTS SO THAT THEY ARE CENTERED ON THE MOUNTING GUIDE MARKS MADE EARLIER, 180° OPPOSED. WRAP THE SECOND MOUNTING STRAP AROUND THE PIPE, POSITIONING THE MOUNTING NUTS SO THAT THEY ARE ALIGNED ALONG THE FLOW AXIS WITH THE NUTS ON THE FIRST STRAP AND SPACED TO MATE WITH THE SCREWS AT EITHER END OF THE TRACK RAIL ASSEMBLIES TIGHTEN THE STRAP TENSION ADJUST SCREWS.
   c) SECURE THE TRACK RAIL ASSEMBLIES TO THE PIPE USING THE TRACK RAIL MOUNTING SCREWS.
5. CONDITION PIPE SURFACE;
   LOCALLY SMOOTH THE PIPE SURFACE TO ACCEPT THE TRANSDUCERS. USE THE 992PCVH CONDITIONING TOOL AND ABRASIVE PAPER (ADHESIVE BACKED) PROVIDED. FINISHED SURFACE SHOULD BE APPROXIMATELY 1/8" WIDE FLAT AT CENTER OF MOUNTING TRACK.
6. LOCATE TRANSDUCERS;
   a) CONSULTING THE FIELD MANUAL, USE THE INSTALLATION MENU TO DETERMINE THE APPROPRIATE INDEX HOLES FOR YOUR APPLICATION AND INSERT PINS.
   b) APPLY A THIN BAND OF THE ULTRASONIC COUPLANT PROVIDED TO THE BASE OF EACH TRANSDUCER.
   c) INSERT TRANSDUCERS INTO TRACK AS SHOWN, BANKING AGAINST INDEX PINS. SECURE TRANSDUCERS WITH CLAMPS.
7. MAKE TRANSDUCER CABLE CONNECTIONS IN ACCORDANCE WITH THE APPROPRIATE FLOW COMPUTER INSTALLATION DRAWING AND 990 FIELD MANUAL.
8. SEE DRAWING 990TDMVH-8 AND 990THMVH-8 FOR TRACK AND TRANSDUCER OUTLINE DIMENSIONS.
9. SEE DRAWING 992-60-7 FOR ASSEMBLY OF CUT-TO-FIT ADJUSTABLE MOUNTING STRAPS.

DO NOT SCALE THIS DRAWING

UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN INCHES (MM)
TOLERANCES ON-

CONTRACT NO.

DR H.J DATE 11/03/04
CHK DATE
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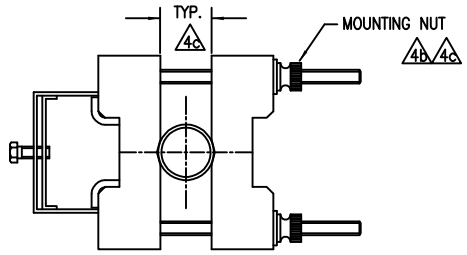
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CONTROLOTRON
HAUPPAUGE , NY 11788

# INSTALLATION DRAWING
# 990 SERIES TRANSDUCER
# DIRECT MODE, VERY HIGH TEMP.

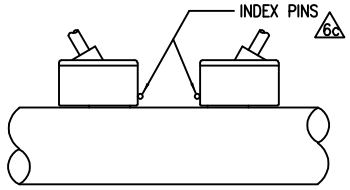
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| C | 21614 | 990TDMVH-7B | E |

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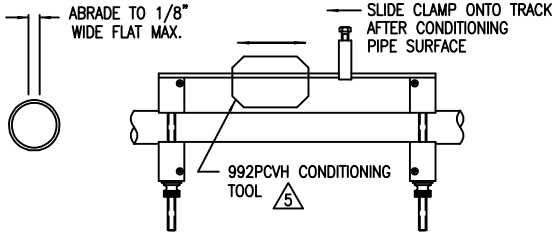

SELECT AND PREPARE THE TRANSDUCER MOUNTING LOCATION, SECURE TRACK TO PIPE WITH MOUNTING NUTS.
HORIZONTAL ℄ SHOWN

TRANSDUCER INDEX PIN ORIENTATION



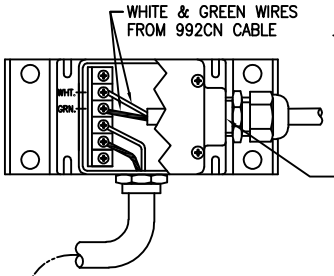

ORIENTATION OF PROPERLY INSTALLED TRANSDUCERS IN REFLECT MODE OPERATION

PIPE CONDITIONING: WITH TRACKS IN PLACE, CONDITION PIPE SURFACE USING 992PCVH PIPE CONDITIONING TOOL AND ABRASIVE PAPER STRIPS SUPPLIED. IN ELEVATED TEMP. ENVIRONMENT, PERIODICALLY DIP THE CONDITIONING TOOL IN WATER BATH TO COOL. THIS WILL ASSURE BEST GRIP OF WATERPROOF ADHESIVE ON THE ABRASIVE STRIPS.






APPLY THIN BAND OF COUPLANT (SUPPLIED) TO BASE OF EACH TRANSDUCER BEFORE INSTALLING IN MOUNTING TRACK
6b

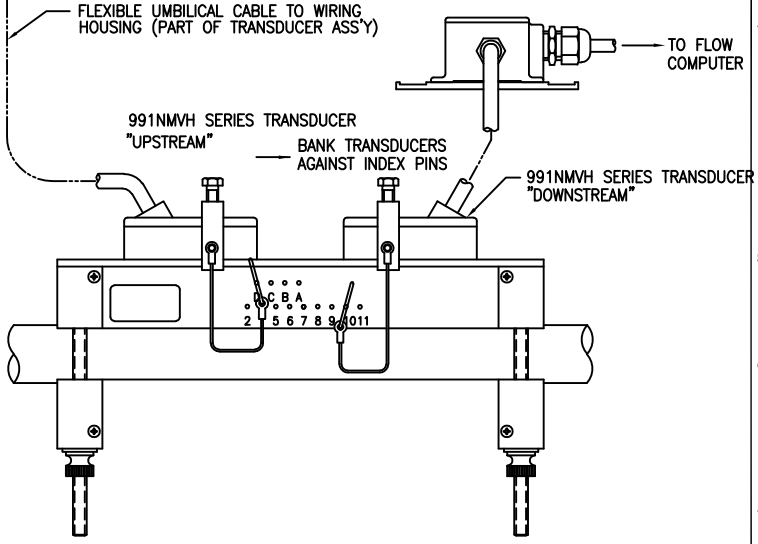



991NMVH TRANSDUCERS WITH 992CN CABLE:
- –ATTACH WHITE WIRE TO TERMINAL "1"
- –ATTACH GREEN WIRE TO TERMINAL "2"

AFTER WIRING, REPLACE COVER & GASKET

991PMVH TRANSDUCERS HAVE BNC CONNECTORS FOR USE WITH 992CP CABLES. 7

991NMVH WIRING HOUSING: 1/2" N.P.T THREAD ACCEPTS CUSTOMER'S FITTING FOR CONDUIT OR CABLE ENTRY GLAND (1/4" CABLE O.D.). AVOID USE OF RIGID CONDUIT TO PREVENT TRANSDUCER MOVEMENT AS A RESULT OF CONDUIT STRESS OR VIBRATION.




## INSTALLATION PROCEDURE – SEE DRAWING REFERENCES #

1. USING THE INSTALLATION MENU PROCEDURES PRESENTED IN THE FIELD MANUAL, CONFIRM THAT YOU HAVE THE APPROPRIATE TRANSDUCERS AND TRACK FOR REFLECT MODE OPERATION ON THE CHOSEN PIPE.
2. SELECT MOUNTING LOCATION;
   a) CHOOSE LOCATION WHICH REMAINS FULL AT ZERO FLOW.
   b) WHERE POSSIBLE LOCATE TRACK ASS'Y TEN (10) PIPE DIAMETERS OR MORE FROM BEND TO ENSURE FULLY DEVELOPED AND STABLE FLOW PROFILE.
   c) ON HORIZONTAL PIPE, SELECT HORIZONTAL PLANE, IF POSSIBLE, TO AVOID SEDIMENT BLOCKAGE OF TRANSDUCER SIGNAL.
3. PREPARE PIPE FOR TRACK MOUNT;
   a) REMOVE GRIT, CORROSION, COATING OR HEAVY PAINT
   b) CLEAN AND DEGREASE SURFACE
   c) DO NOT MOUNT OVER FROST.
4. MOUNT TRACK ON PIPE;
   a) PLACE TRACK RAIL ASS'Y (ASS'Y WITH 1/4–20 STUDS) AGAINST PIPE. WHILE HOLDING TRACK, SLIDE THE POSITIONING BLOCK ONTO THE STUDS AND HOLD TOGETHER IN PLACE (MAKE SURE "V"s COME TOGETHER A SHOWN).
   b) INSTALL MOUNTING NUTS, SNUG BUT NOT OVERLY TIGHT. ROTATE ASS'Y AROUND THE PIPE FOR PROPER POSITIONING, ONCE THAT HAS BEEN ACHIEVED, SECURE THE TRACK RAIL ASS'Y TO THE PIPE WITH THE MOUNTING NUTS.
   c) IMPORTANT: KEEP EQUAL SPACING BETWEEN THE TWO TRACK RAIL ASSEMBLIES WHILE TIGHTENING THE MOUNTING NUTS. (ZONE D4)
5. CONDITION PIPE SURFACE;
   LOCALLY SMOOTH THE PIPE SURFACE TO ACCEPT THE TRANSDUCERS. USE THE 992PCVH CONDITIONING TOOL AND ABRASIVE PAPER (ADHESIVE BACKED) PROVIDED. FINISHED SURFACE SHOULD BE APPROXIMATELY 1/8" WIDE FLAT AT CENTER OF MOUNTING TRACK.
6. LOCATE TRANSDUCERS;
   a) CONSULTING THE FIELD MANUAL, USE THE INSTALLATION MENU TO DETERMINE THE APPROPRIATE INDEX HOLES FOR YOUR APPLICATION AND INSERT PINS.
   b) APPLY A THIN BAND OF THE ULTRASONIC COUPLANT PROVIDED TO THE BASE OF EACH TRANSDUCER.
   c) INSERT TRANSDUCERS INTO TRACK AS SHOWN, BANKING AGAINST INDEX PINS. SECURE TRANSDUCERS WITH CLAMPS.
7. MAKE TRANSDUCER CABLE CONNECTIONS IN ACCORDANCE WITH THE APPROPRIATE FLOW COMPUTER INSTALLATION DRAWING AND 990 FIELD MANUAL.
8. SEE DRAWING 990TRMVH–8A AND 990THMVH–8A FOR TRACK AND TRANSDUCER OUTLINE DIMENSIONS.

DO NOT SCALE THIS DRAWING

UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN INCHES (MM)
TOLERANCES ON–

CONTRACT NO.

DR H.J DATE 11/03/04
CHK DATE
ENG DATE
PROD DATE
APPD DATE

CERTIFIED

DATE

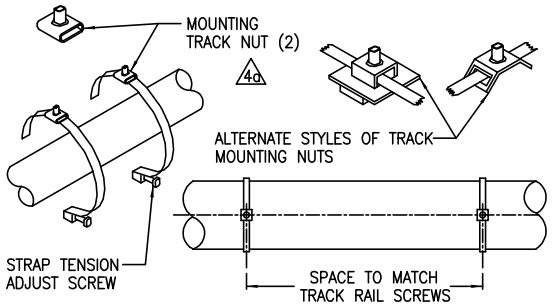
CONTROLOTRON
HAUPPAUGE , NY 11788

# INSTALLATION DRAWING
# 990 SERIES TRANSDUCER
# DIRECT MODE, VERY HIGH TEMP.

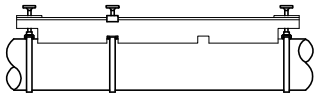
| SIZE | CODE IDENT NO. | | REV. |
|---|---|---|---|
| C | 21614 | 990TRMVH-7A | A |

SCALE: NONE | WT. | SHEET 1 OF 1

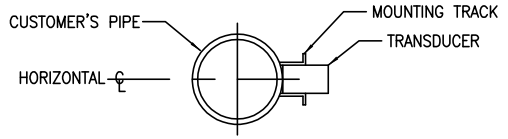
WRAP STRAP WITH MOUNTING NUT AROUND THE PIPE, ALIGN WITH MOUNTING GUIDE, SECURE WITH STRAP TENSION ADJUST SCREWS AFTER POSITIONING MOUNTING NUTS AT MOUNTING GUIDE MARKS. MOUNT SECOND STRAP ON THE PIPE ALIGNING THE MOUNTING NUTS AND SPACED TO MATCH THE TRACK RAIL MOUNTING SCREWS.



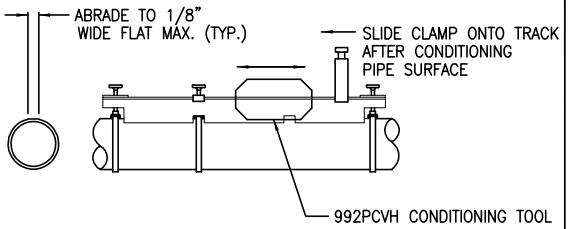

LONGER MOUNTING TRACKS ASSEMBLIES INCLUDE A THIRD STRAP AND MOVEABLE MOUNTING SCREW. POSITION MOVEABLE SCREW FOR BEST ADVANTAGE AFTER TRANSDUCER INDEX HOLES HAVE BEEN SELECTED.



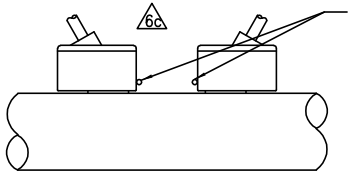
PREFERRED MOUNTING PLANE OF TRANSDUCERS 2c



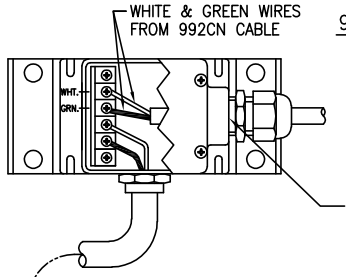

PIPE CONDITIONING: WITH TRACKS IN PLACE, CONDITION PIPE SURFACE USING 992PCVH PIPE CONDITIONING TOOL AND ABRASIVE PAPER STRIPS SUPPLIED. IN ELEVATED TEMP. ENVIRONMENT, PERIODICALLY DIP THE CONDITIONING TOOL IN WATER BATH TO COOL. THIS WILL ASSURE BEST GRIP OF WATERPROOF ADHESIVE ON THE ABRASIVE STRIPS. 5




TRANSDUCER INDEX PIN ORIENTATION




ORIENTATION OF PROPERLY INSTALLED TRANSDUCERS IN REFLECT MODE OPERATION




991NMVH TRANSDUCERS WITH 992CN CABLE:

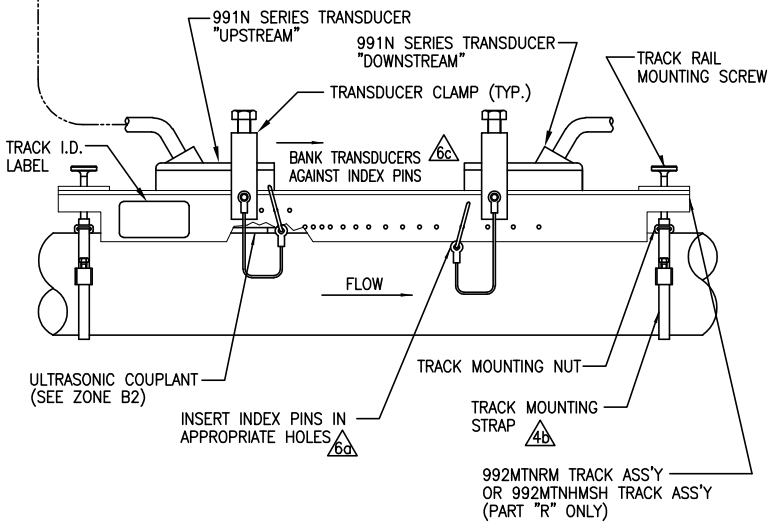
–ATTACH WHITE WIRE TO TERMINAL "1"
–ATTACH GREEN WIRE TO TERMINAL "2"
AFTER WIRING, REPLACE COVER & GASKET

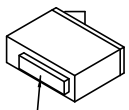
991PMVH TRANSDUCERS HAVE BNC CONNECTORS FOR USE WITH 992CP CABLES.

7

991NMVH WIRING HOUSING: 1/2" N.P.T THREAD ACCEPTS CUSTOMER'S FITTING FOR CONDUIT OR CABLE ENTRY GLAND (1/4" CABLE O.D.). AVOID USE OF RIGID CONDUIT TO PREVENT TRANSDUCER MOVEMENT AS A RESULT OF CONDUIT STRESS OR VIBRATION.

FLEXIBLE UMBILICAL CABLE TO WIRING HOUSING (PART OF TRANSDUCER ASS'Y)



APPLY THIN BAND OF COUPLANT (SUPPLIED) TO BASE OF EACH TRANSDUCER BEFORE INSTALLING IN MOUNTING TRACK 6b

INSTALLATION PROCEDURE – SEE DRAWING REFERENCES #

1. USING THE INSTALLATION MENU PROCEDURES PRESENTED IN THE FIELD MANUAL, CONFIRM THAT YOU HAVE THE APPROPRIATE TRANSDUCERS AND TRACK FOR REFLECT MODE OPERATION ON THE CHOSEN PIPE.
2. SELECT MOUNTING LOCATION;
   a) CHOOSE LOCATION WHICH REMAINS FULL AT ZERO FLOW.
   b) WHERE POSSIBLE LOCATE TRACK ASS'Y TEN (10) PIPE DIAMETERS OR MORE FROM BEND TO ENSURE FULLY DEVELOPED AND STABLE FLOW PROFILE.
   c) ON HORIZONTAL PIPE, SELECT HORIZONTAL PLANE, IF POSSIBLE, TO AVOID SEDIMENT BLOCKAGE OF TRANSDUCER SIGNAL.
3. PREPARE PIPE FOR TRACK MOUNT;
   a) REMOVE GRIT, CORROSION, COATING OR HEAVY PAINT
   b) CLEAN AND DEGREASE SURFACE
   c) DO NOT MOUNT OVER FROST.
4. MOUNT TRACK ON PIPE:
   a) SLIP ONE OF THE MOUNTING NUTS PROVIDED ONTO EACH OF THE MOUNTING STRAPS. WRAP THE STRAPS AROUND THE PIPE AT THE SELECTED LOCATION AND ENGAGE THE ADJUSTING SCREWS. POSITION THE MOUNTING NUTS IN LINE WITH THE FLOW AXIS AND SPACED TO MATE WITH THE SCREWS AT EITHER END OF THE TRACK ASSEMBLY. SECURE THE STRAPS (AND NUTS) BY TIGHTENING THE MOUNTING STRAP ADJUSTING SCREWS.
   b) SECURE THE TRACK RAIL ASSEMBLIES TO THE PIPE USING THE TRACK RAIL MOUNTING SCREWS.
5. CONDITION PIPE SURFACE;
   LOCALLY SMOOTH THE PIPE SURFACE TO ACCEPT THE TRANSDUCERS. USE THE 992PCVH CONDITIONING TOOL AND ABRASIVE PAPER (ADHESIVE BACKED) PROVIDED. FINISHED SURFACE SHOULD BE APPROXIMATELY 1/8" WIDE FLAT AT CENTER OF MOUNTING TRACK.
6. LOCATE TRANSDUCERS;
   a) CONSULTING THE FIELD MANUAL, USE THE INSTALLATION MENU TO DETERMINE THE APPROPRIATE INDEX HOLES FOR YOUR APPLICATION AND INSERT PINS.
   b) APPLY A THIN BAND OF THE ULTRASONIC COUPLANT PROVIDED TO THE BASE OF EACH TRANSDUCER.
   c) INSERT TRANSDUCERS INTO TRACK AS SHOWN, BANKING AGAINST INDEX PINS. SECURE TRANSDUCERS WITH CLAMPS.
7. MAKE TRANSDUCER CABLE CONNECTIONS IN ACCORDANCE WITH THE APPROPRIATE FLOW COMPUTER INSTALLATION DRAWING AND 990 FIELD MANUAL.
8. SEE DRAWING 99TRMVH–8 AND 990THMVH–8 FOR TRACK AND TRANSDUCER OUTLINE DIMENSIONS.
9. SEE DRAWING 992–60–7 FOR ASSEMBLY OF CUT–TO–FIT ADJUSTABLE MOUNTING STRAPS.

DO NOT SCALE THIS DRAWING

UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN INCHES (MM)
TOLERANCES ON–

CONTRACT NO.

DR H.J DATE 11/03/04
CHK DATE
ENG DATE
PROD DATE
APPD DATE

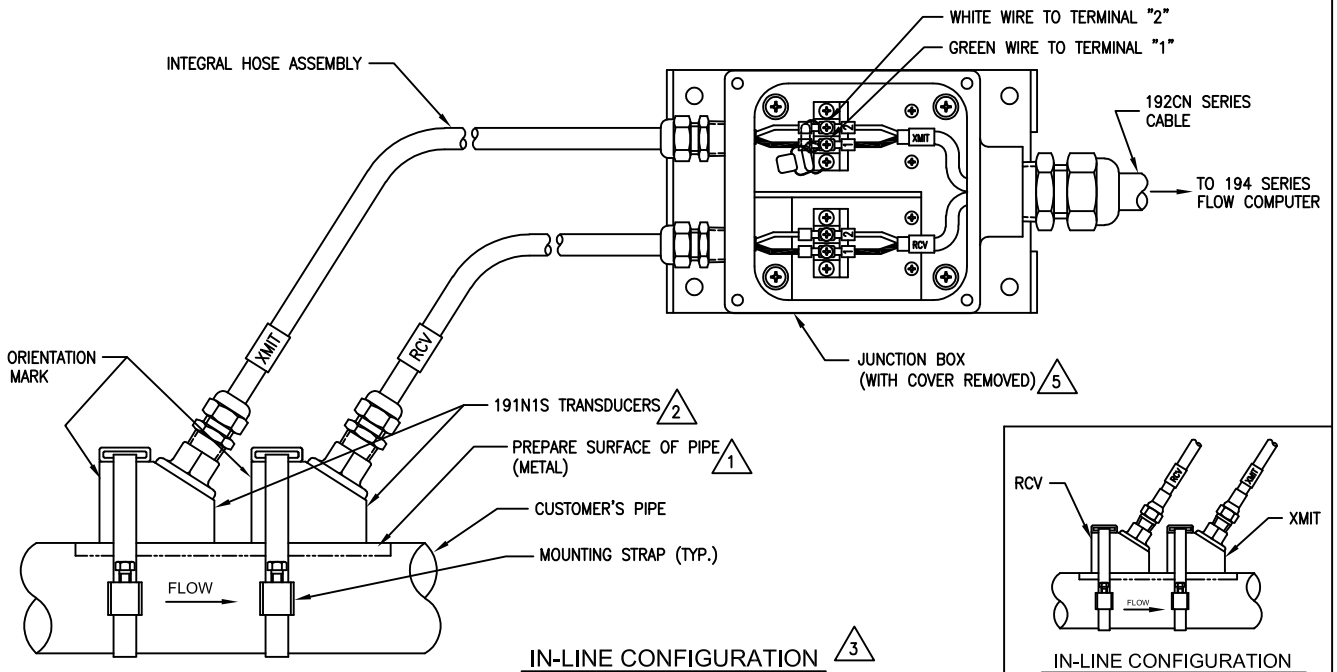
CERTIFIED

DATE

CONTROLOTRON
HAUPPAUGE , NY 11788

# INSTALLATION DRAWING
# 990 SERIES TRANSDUCER
# REFLECT MODE, VERY HIGH TEMP.

| SIZE | CODE IDENT NO. | | REV. |
|---|---|---|---|
| C | 21614 | 990TRMVH-7B | E |
| SCALE: NONE | WT. | | SHEET 1 OF 1 |




IN-LINE CONFIGURATION 3

(SHOWN IN TYPICAL INSTALLATION ON METAL PIPE)




IN-LINE CONFIGURATION

(ON PLASTIC PIPE)

## INSTALLATION PROCEDURE – SEE DRAWING REFERENCES 4

1. SELECT MOUNTING LOCATION / PREPARE PIPE:
   SELECT A SECTION OF PIPE THAT REMAINS FULL AT ALL FLOW RATES. REMOVE ANY EXTERNAL CORROSION OR LOOSE PAINT AND PREPARE A CLEAN, SMOOTH MOUNTING SPACE ON THE PIPE, OF APPROXIMATELY THE SIZE SHOWN.

2. CHOOSE THE APPROPRIATE TRANSDUCER MOUNTING ARRANGEMENT:
   IF THE LIQUID TO BE MEASURED CONTAINS A REASONABLE AMOUNT OF PARTICULATE MATTER (FOR EXAMPLE A "SLURRY") THEN THE "IN-LINE" TRANSDUCER CONFIGURATION IS RECOMMENDED. IF THE LIQUID TO BE MEASURED CONTAINS A SMALL AMOUNT OF PARTICULATE MATTER, OR IF ENHANCED FLOW PROFILE AVERAGING IS REQUIRED, THEN THE "DUAL-HEAD" CONFIGURATION IS RECOMMENDED BECAUSE OF ITS ABILITY TO INCREASE TRANSDUCER SENSITIVITY.

3. CONFIGURATION OF THE TRANSDUCERS FOR "IN-LINE" MODE:
   MOUNT TRANSDUCERS INDIVIDUALLY, EACH WITH ITS OWN METAL STRAP. POSITION IN LINE, AS CLOSE AS PRACTICAL. BOTH ORIENTATION MARKS MUST FACE THE SAME DIRECTION. RELATIVE POSITION OF THE "XMIT" AND "RCV" TRANSDUCERS IS DETERMINED BY PIPE MATERIAL, NOTE THE DIFFERENCE IN MOUNTING FOR METAL AND PLASTIC PIPES.

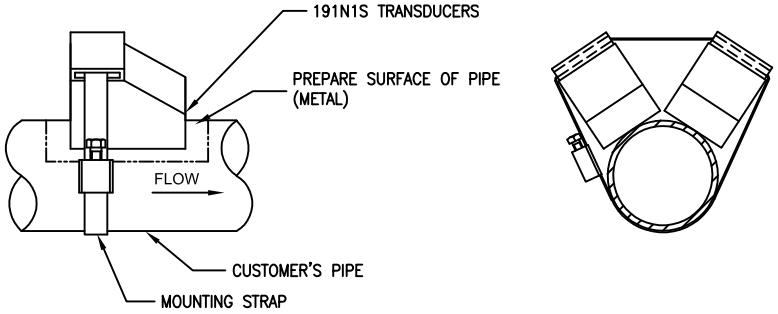
4. CONFIGURATION OF THE TRANSDUCERS FOR "DUAL-HEAD" MODE:
   USING A SINGLE METAL STRAP TO MOUNT BOTH TRANSDUCERS ON THE PIPE. BOTH ORIENTATION MARKS MUST FACE THE SAME DIRECTION. THR RELATIVE POSITION OF "XMIT" AND "RCV" TRANSDUCERS DOES NOT MATTER WHEN USED IN THE "DUAL-HEAD" MODE.

5. TEMPORARILY MOUNT THE TRANSDUCERS IN THE SELECTED CONFIGURATION AT CHOSEN LOCATION. CONNECT THE CABLES AS SHOWN AT THE JUNCTION BOX AND THE FLOW COMPUTER. ONCE SATISFACTORY OPERATION HAS BEEN ESTABLISHED, CHOOSE ONE OF THE MOUNTING OPTIONS DESCRIBED ON DRAWING 191N1S-8 AND PERMANENTLY INSTALL THE JUNCTION BOX. INSTALL CABLES (CONDUITS) IN ACCORDANCE WITH LOCAL REQUIREMENTS.

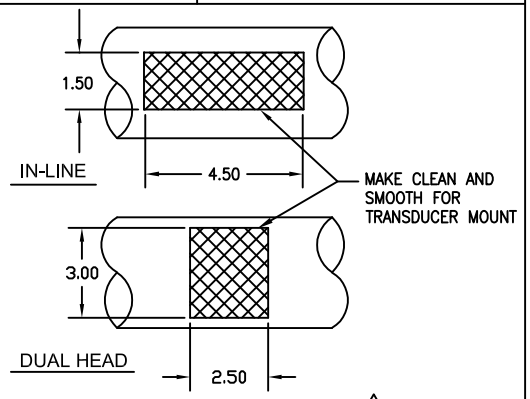
6. REMOVE AND CLEAN THE TRANSDUCERS THEN RE-INSTALL AT THE SAME LOCATIONS WITH THE PERMANENT ULTRASONIC COUPLANT SUPPLIED.

7. SEE DRAWING 191N1S-8 FOR OUTLINE DIMENSIONS.

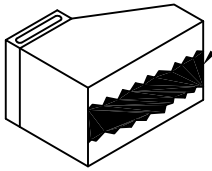
8. SEE DRAWING 194N-7 FOR FLOW COMPUTER INSTALLATION INFORMATION AND 194N-8 FOR FLOW COMPUTER OUTLINE DIMENSIONS.




DUAL HEAD CONFIGURATION 4




PIPE PREPARATION 1




USE OF COUPLANT COMPOUND 6

DO NOT SCALE THIS DRAWING

UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN INCHES (MM)
TOLERANCES ON-

| INCHES | (MM) |
|---|---|
| ± .1 | ± 2 |

CONTRACT NO.

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|---|---|---|---|
| DR | H.J | DATE | 1/12/00 |
| CHK | | DATE | |
| ENG | | DATE | |
| PROD | | DATE | |
| APPD | | DATE | |

CERTIFIED

DATE

CONTROLOTRON
HAUPPAUGE , NY 11788

# INSTALLATION DRAWING
# 191N1S TRANSDUCER
# NEMA 4

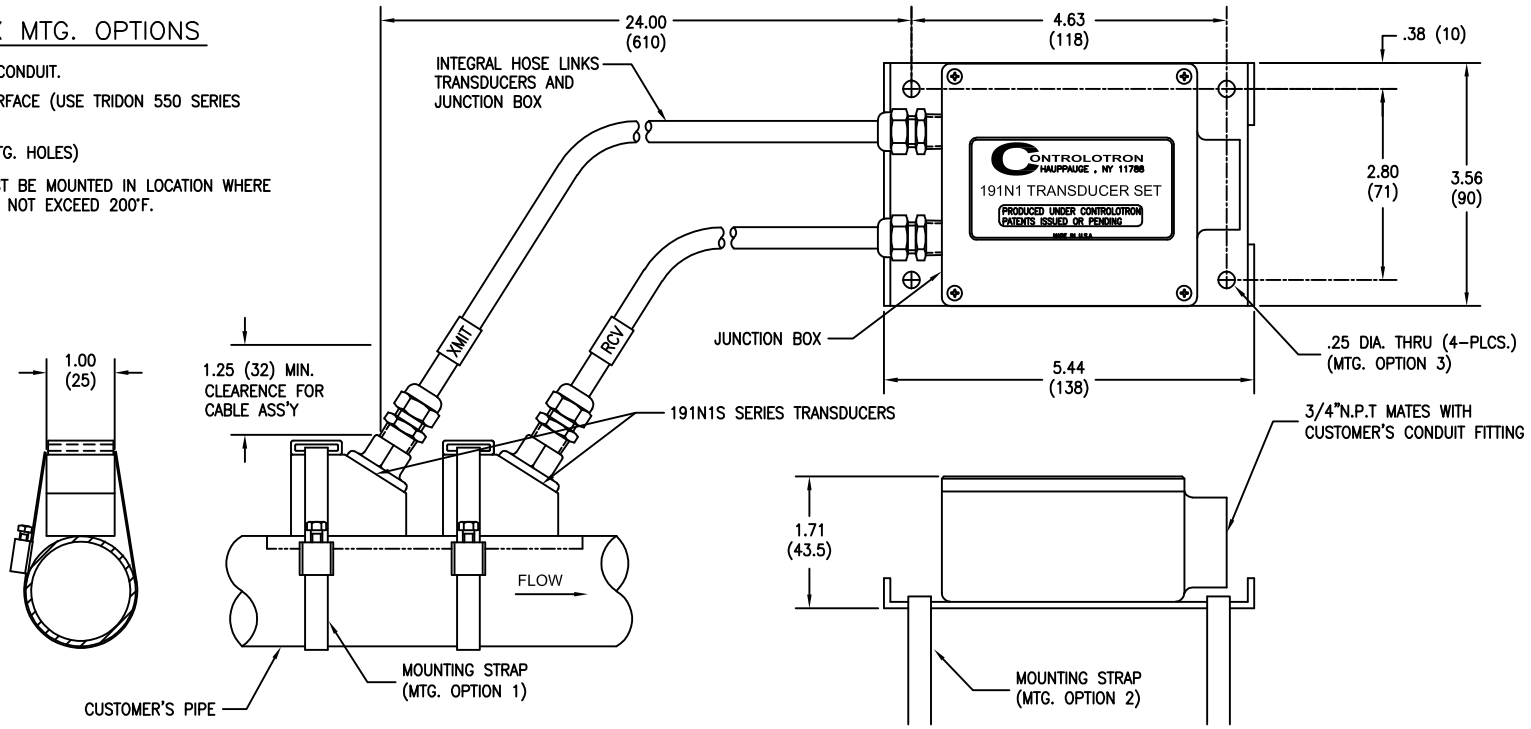
| SIZE | CODE IDENT NO. | | REV. |
|---|---|---|---|
| C | 21614 | 191N1S - 7 | B |

SCALE: NONE | WT. | SHEET 1 OF 1

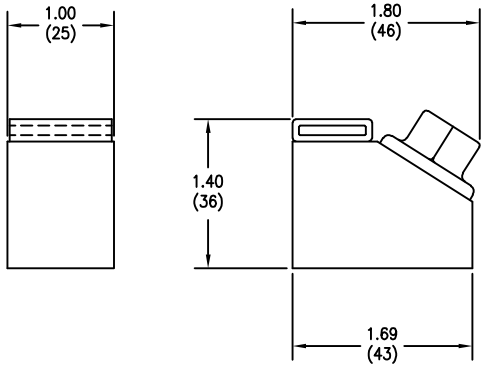
R14: 191N1S – 7 sht.1 rev.B

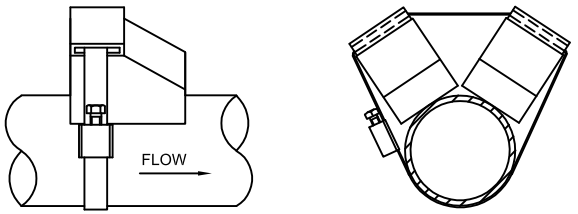
## JUNCTION BOX MTG. OPTIONS

1. ANCHOR TO RIGID CONDUIT.
2. STRAP TO PIPE SURFACE (USE TRIDON 550 SERIES OR EQUIVALENT).
3. WALL MOUNT (4–MTG. HOLES)
4. JUNCTION BOX MUST BE MOUNTED IN LOCATION WHERE TEMPERATURE DOES NOT EXCEED 200°F.



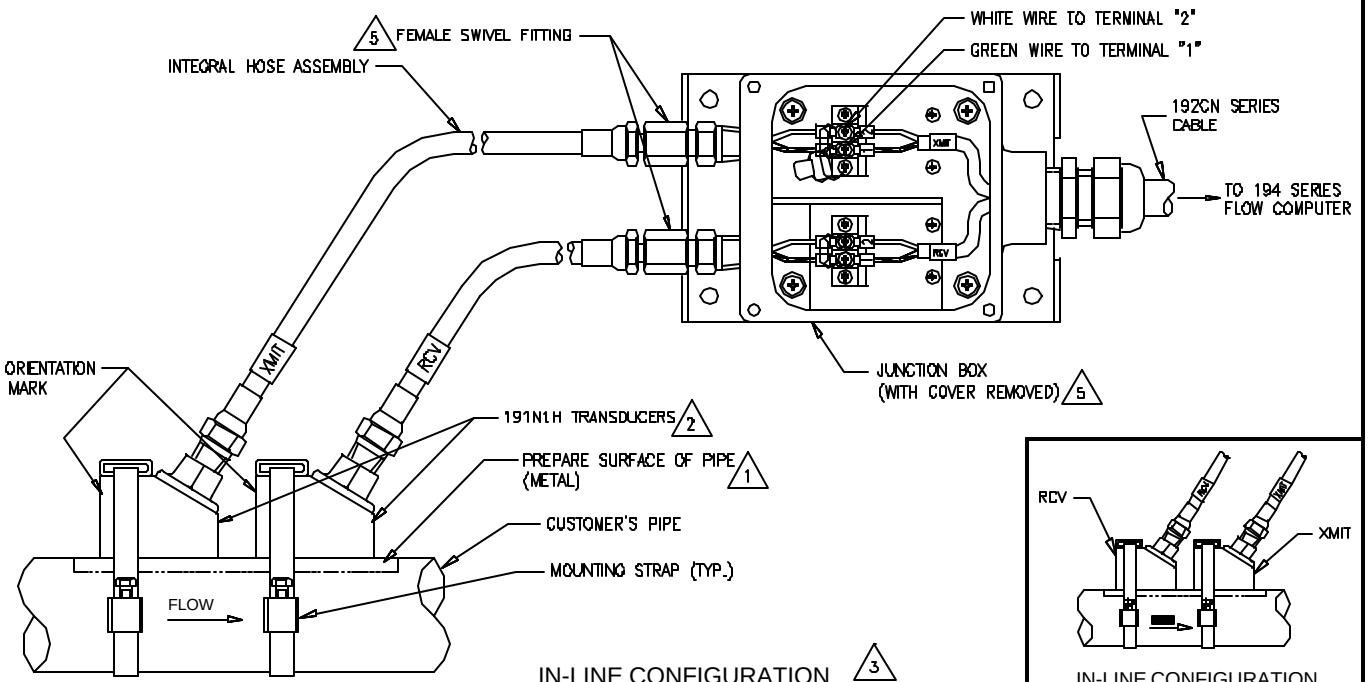

## IN-LINE CONFIGURATION




## DUAL HEAD CONFIGURATION

| | | | |
|---|---|---|---|
| DO NOT SCALE THIS DRAWING<br>UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES (MM) TOLERANCES ON–<br>INCHES ± .1 (MM) ± 2 | CONTRACT NO. | CONTROLOTRON HAUPPAUGE , NY 11788 | |
| | DR H.J DATE 1/11/00<br>CHK DATE<br>ENG DATE<br>PROD DATE<br>APPD DATE | OUTLINE DIMENSIONS<br>191N1S TRANSDUCER<br>NEMA 4 | |
| | CERTIFIED<br>DATE | SIZE C / CODE IDENT NO. 21614 / 191N1S - 8 / REV. B<br>SCALE: NONE / WT. / SHEET 1 OF 1 | |



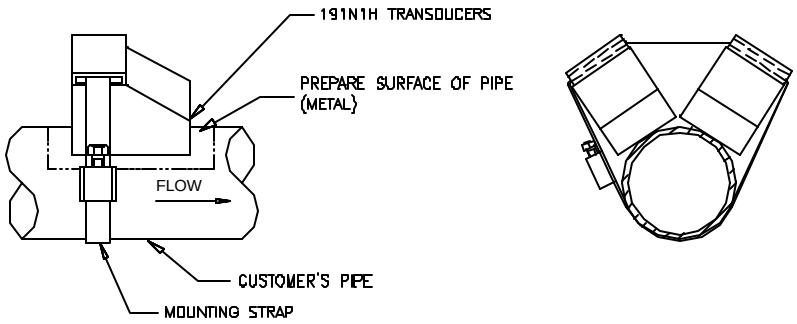

IN-LINE CONFIGURATION 3

(SHOWN IN TYPICAL INSTALLATION ON METAL PIPE)

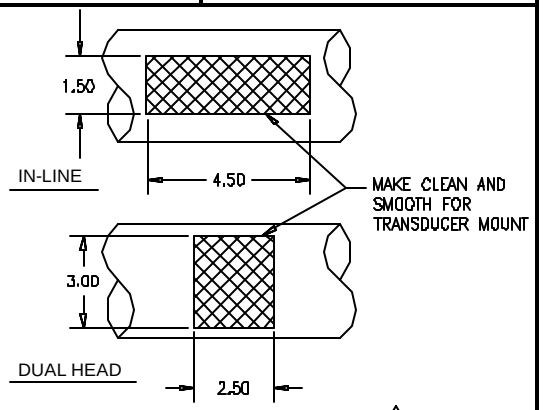



IN-LINE CONFIGURATION

(ON PLASTIC PIPE)




DUAL HEAD CONFIGURATION 4




PIPE PREPARATION 1

## INSTALLATION PROCEDURE – SEE DRAWING REFERENCES 4

1. SELECT MOUNTING LOCATION / PREPARE PIPE:
   SELECT A SECTION OF PIPE THAT REMAINS FULL AT ALL FLOW RATES. REMOVE ANY EXTERNAL CORROSION OR LOOSE PAINT AND PREPARE A CLEAN, SMOOTH MOUNTING SPACE ON THE PIPE, OF APPROXIMATELY THE SIZE SHOWN.

2. CHOOSE THE APPROPRIATE TRANSDUCER MOUNTING ARRANGEMENT:
   IF THE LIQUID TO BE MEASURED CONTAINS A REASONABLE AMOUNT OF PARTICULATE MATTER (FOR EXAMPLE A "SLURRY") THEN THE "IN-LINE" TRANSDUCER CONFIGURATION IS RECOMMENDED. IF THE LIQUID TO BE MEASURED CONTAINS A SMALL AMOUNT OF PARTICULATE MATTER, OR IF ENHANCED FLOW PROFILE AVERAGING IS REQUIRED, THEN THE "DUAL-HEAD" CONFIGURATION IS RECOMMENDED BECAUSE OF ITS ABILITY TO INCREASE TRANSDUCER SENSITIVITY.

3. CONFIGURATION OF THE TRANSDUCERS FOR "IN-LINE" MODE:
   MOUNT TRANSDUCERS INDIVIDUALLY, EACH WITH ITS OWN METAL STRAP. POSITION IN LINE, AS CLOSE AS PRACTICAL. BOTH ORIENTATION MARKS MUST FACE THE SAME DIRECTION. RELATIVE POSITION OF THE "XMIT" AND "RCV" TRANSDUCERS IS DETERMINED BY PIPE MATERIAL, NOTE THE DIFFERENCE IN MOUNTING FOR METAL AND PLASTIC PIPES.

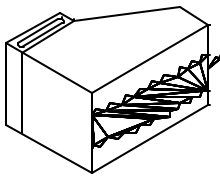
4. CONFIGURATION OF THE TRANSDUCERS FOR "DUAL-HEAD" MODE:
   USING A SINGLE METAL STRAP TO MOUNT BOTH TRANSDUCERS ON THE PIPE. BOTH ORIENTATION MARKS MUST FACE THE SAME DIRECTION. THR RELATIVE POSITION OF "XMIT" AND "RCV" TRANSDUCERS DOES NOT MATTER WHEN USED IN THE "DUAL-HEAD" MODE.

5. LOOSEN FEMALE SWIVEL FITTING (2-PLCS.) AND TEMPORARILY MOUNT THE TRANSDUCERS IN THE SELECTED CONFIGURATION AT CHOSEN LOCATION. CONNECT THE CABLES AS SHOWN AT THE JUNCTION BOX AND THE FLOW COMPUTER. ONCE SATISFACTORY OPERATION HAS BEEN ESTABLISHED, CHOOSE ONE OF THE MOUNTING OPTIONS DESCRIBED ON DRAWING 191N1H-8 AND PERMANENTLY INSTALL THE JUNCTION BOX. INSTALL CABLES (CONDUITS) IN ACCORDANCE WITH LOCAL REQUIREMENTS. TIGHTEN FEMALE SWIVEL FITTING (2-PLCS.).

6. REMOVE AND CLEAN THE TRANSDUCERS THEN RE-INSTALL AT THE SAME LOCATIONS WITH THE PERMANENT ULTRASONIC COUPLANT SUPPLIED.

7. SEE DRAWING 191N1H-8 FOR OUTLINE DIMENSIONS.

8. SEE DRAWING 194N-7 FOR FLOW COMPUTER INSTALLATION INFORMATION AND 194N-8 FOR FLOW COMPUTER OUTLINE DIMENSIONS.



APPLY A THIN BAND OF COUPLANT TO BASE OF EACH TRANSDUCER BEFORE INSTALLING ON PIPE

USE OF COUPLANT COMPOUND 6

DO NOT SCALE THIS DRAWING

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES (MM) TOLERANCES ON–

| INCHES | (MM) |
|---|---|
| ± .1 | ± 2 |

CONTRACT NO.

| | | |
|---|---|---|
| DR | H.J | DATE 1/12/00 |
| CHK | | DATE |
| ENG | | DATE |
| PROD | | DATE |
| APPD | | DATE |

CERTIFIED

DATE

CONTROLOTRON
HAUPPAUGE, NY 11788

# INSTALLATION DRAWING 191N1H TRANSDUCER HIGH TEMP., NEMA 4

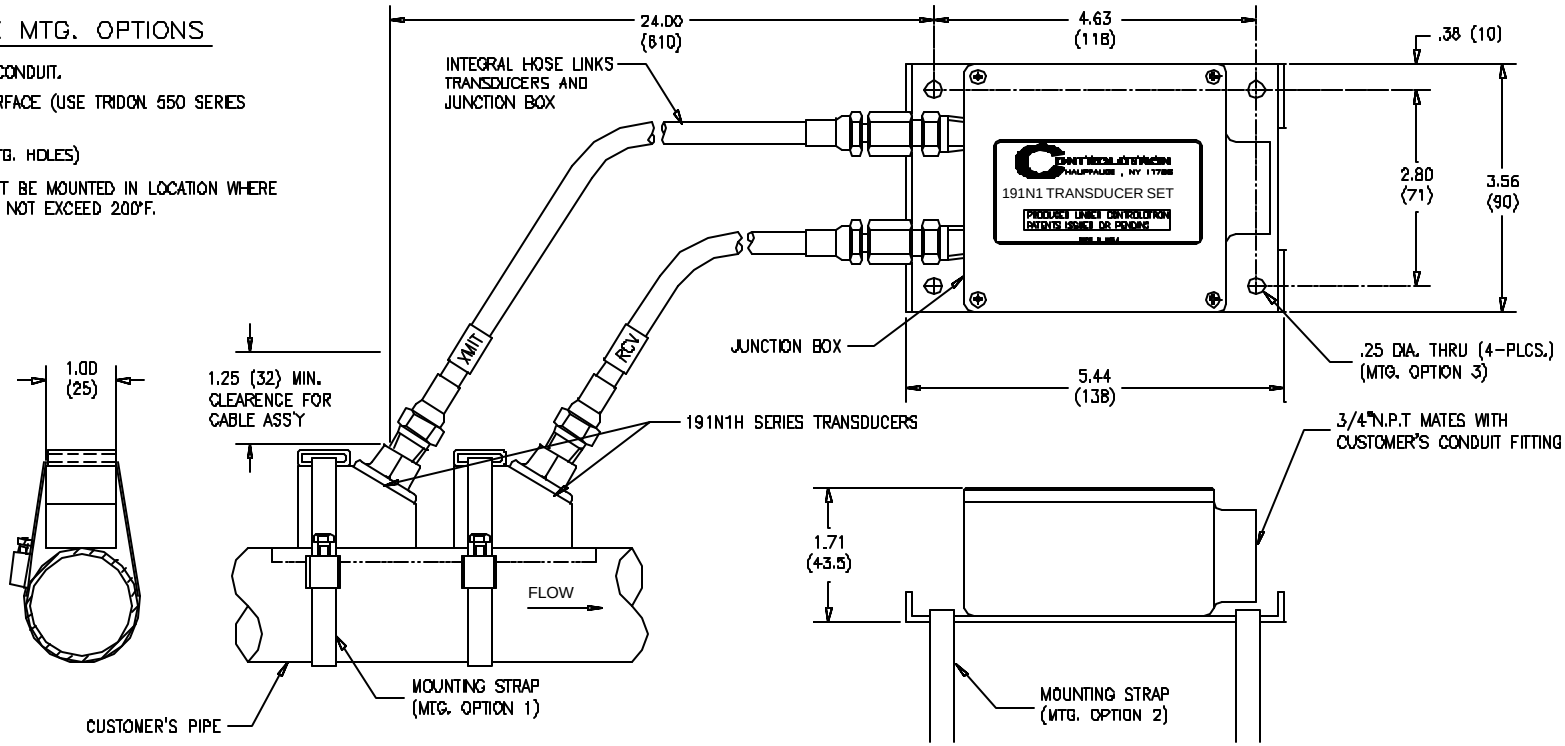
| SIZE | CODE IDENT NO. | | REV. |
|---|---|---|---|
| C | 21614 | 191N1H - 7 | B |

SCALE: NONE | WT. | SHEET 1 OF 1

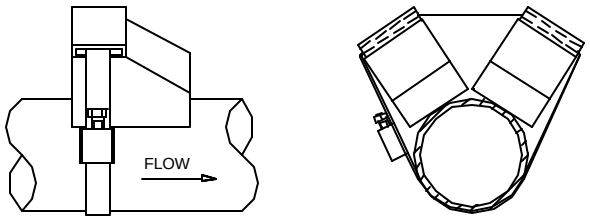
R14: 191N1H – 7 sht.1 rev.B

## JUNCTION BOX MTG. OPTIONS

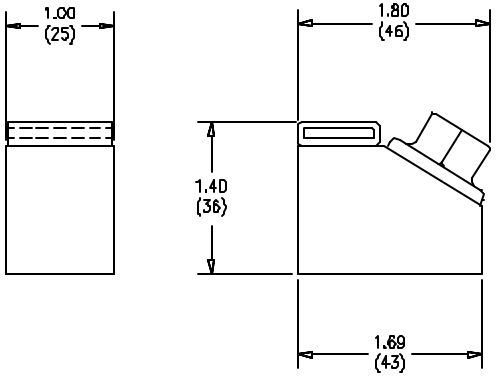
1. ANCHOR TO RIGID CONDUIT.
2. STRAP TO PIPE SURFACE (USE TRIDON 550 SERIES OR EQUIVALENT).
3. WALL MOUNT (4–MTG. HOLES)
4. JUNCTION BOX MUST BE MOUNTED IN LOCATION WHERE TEMPERATURE DOES NOT EXCEED 200°F.




## IN-LINE CONFIGURATION




## DUAL HEAD CONFIGURATION




DO NOT SCALE THIS DRAWING

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES (MM) TOLERANCES ON–

| INCHES | (MM) |
|---|---|
| ± .1 | ± 2 |

CONTRACT NO.

| | | |
|---|---|---|
| DR | H.J | DATE 1/11/00 |
| CHK | | DATE |
| ENG | | DATE |
| PROD | | DATE |
| APPD | | DATE |

CERTIFIED

DATE

CONTROLOTRON
HAUPPAUGE , NY 11788

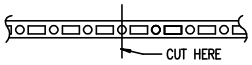
# OUTLINE DIMENSIONS 191N1H TRANSDUCER HIGH TEMP., NEMA 4

| SIZE | CODE IDENT NO. | | REV. |
|---|---|---|---|
| C | 21614 | 191N1H - 8 | B |
| SCALE: NONE | WT. | SHEET 1 OF 1 | |

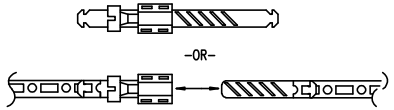
R14: 191N1H – 8 sht1 rev.B

**STEP - 1** DETERMINE PROPER BAND LENGTH ONE OF TWO WAYS:
A) IF DIAMETER IS KNOWN, REFER TO BAND LENGTH TABLE OR CALCULATE BAND LENGTH = 3.14 x DIA.– 3.5".
B) IF DIAMETER IS NOT KNOWN, MEASURE CIRCUMFERENCE WITH STRING, TWINE, etc., AND SUBTRACT 3.5" (TO ALLOW LENGTH OF FASTENER) TO DETERMINE PROPER BAND LENGTH.

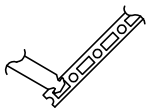
**STEP - 2** MEASURE BAND TO PROPER LENGTH AND CUT THROUGH CENTER OF NEAREST ROUND HOLE WITH SHEARS, SNIPS, HACKSAW etc.



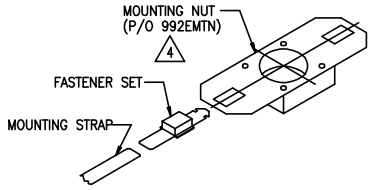

**STEP - 3** EITHER MATE FASTENER HALVES AND THEN LINK TO STRAP ALREADY IN PLACE AROUND PIPE, OR LINK FASTENER HALVES INDEPENDENTLY TO STRAP ENDS (HOLD IN PLACE WITH TAPE IF (IF NECESSARY) AND ENGAGE FASTENER AFTER WRAPPING STRAP AROUND PIPE.

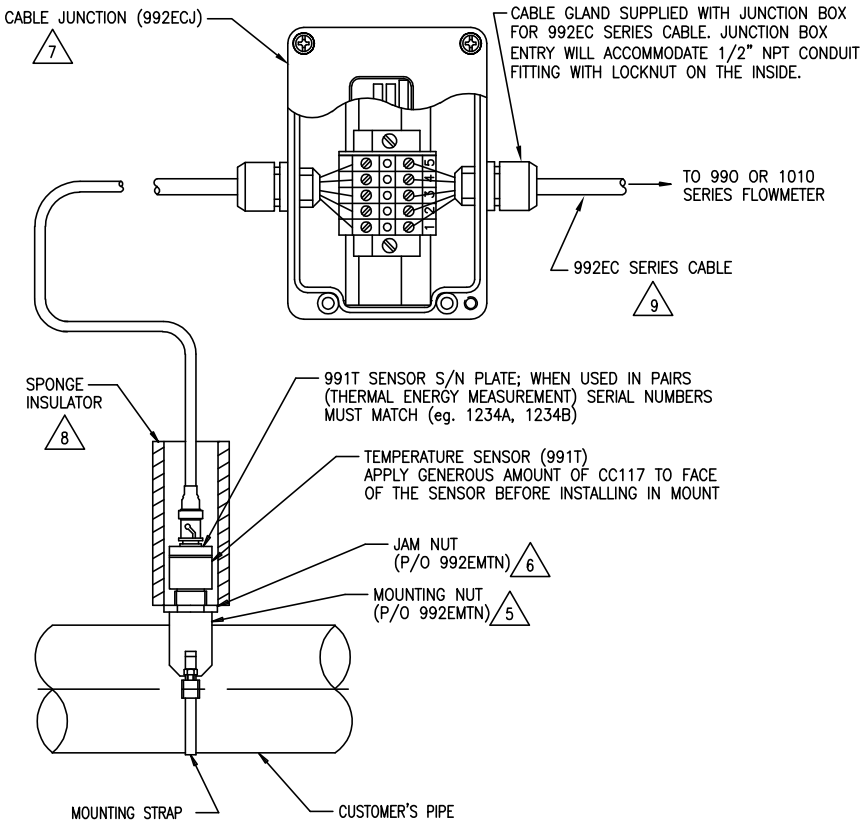



DIAGONALLY INSERT FASTENER END INTO RECTANGULAR SLOTS TO LINK WITH STRAP (INSERT AT LOCATION BEST SUITED FOR TIGHT FIT).

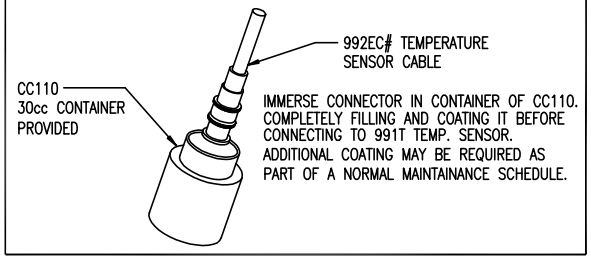


**STEP - 4** MATE "T" ON FASTENERS WITH RECTANGULAR CUT–OUT ON MOUNTING NUT ASSEMBLY.
SIZE 2 MOUNTING ASSY'S INCLUDE FIXED LENGTH STRAPS TO MATE WITH FASTENERS ATTACHED TO MOUNTING NUT.
SIZES 3 & 4 MOUNTING ASSY'S INCLUDE A CUT–TO–FIT MOUNTING STRAP. (SEE STEP 3).




FOR HARSH OR HEAVY CONDENSATE ENVIRONMENTS:
SERVICE TEMPERATURE RANGE: -40°F TO +150°F




## INSTALLATION PROCEDURE – SEE DRAWING REFERENCE 4

1. INSTALLATION OF THE DEDICATED NEMA 4 TEMPERATURE SENSOR FOR PIPES 1 1/4" – 48" DIAMETER REQUIRES THE FOLLOWING: THE SENSOR 991T(S), A MOUNTING ASS'Y 992EMTN(–2,–3,–4), AND A CABLE 992ECN–(LENGTH) IN TWO PARTS, JUNCTION 992ECJ AND CABLE 992ECC–(LENGTH).
2. TEMPERATURE SENSORS ARE SUPPLIED IN PAIRS (P/N 991T) FOR THERMAL ENERGY FLOWMETER APPLICATIONS OR SINGLY (P/N 991TS) FOR TEMPERATURE COMPENSATED MASS FLOWMETER APPLICATIONS AND INTERFACE DETECTION.
3. SELECT THE PIPE LOCATION WHERE TEMPERATURE IS TO BE MONITORED IN ACCORDANCE WITH RECOMMENDATIONS IN THE FIELD MANUAL.
4. CLEAN A SMALL AREA OF PIPE SURFACE (APPROXIMATELY 1" DIAMETER); REMOVE PAINT, SCALE, FOREIGN MATTER THAT CAN AFFECT GOOD THERMAL CONTACT.
5. CENTER THE MOUNTING NUT (PART OF 992EMTN) OVER THE CLEAN SPOT AND STRAP IN PLACE. ALLOW THE STRAP TO REACH APPROXIMATELY THE TEMPERATURE OF THE PIPE AND TIGHTEN SECURELY.
6. SPIN THE JAM NUT (PART OF 992EMTN) ONTO THE 991T SENSOR BODY. APPLY A GENEROUS AMOUNT OF THERMAL COUPLANT (SUPPLIED WITH 992EMTN) TO THE FACE OF THE SENSOR AND SCREW IT INTO THE MOUNTING NUT, HAND TIGHT ENGAGEMENT IS SUFFICIENT. SECURE THE SENSOR BY TIGHTENING THE JAM NUT AGAINST THE MOUNTING NUT.
7. SELECT A MOUNTING LOCATION FOR THE 992ECJ JUNCTION BOX. USE INTEGRAL MOUNTING FLANGES OR SECURE AT THE END OF RIGID CONDUIT. IF CONDUIT IS USED, REMOVE THE WATERTIGHT GLAND SUPPLIED WITH THE 992ECC CABLE. INSTALL THE 992ECC CABLE, MAKING WIRING CONNECTIONS 1–5 AS SHOWN.
8. SLIP THE SPONGE INSULATOR (SUPPLIED WITH 991T) OVER THE CONNECTOR AND CABLE PART OF JUNCTION 994ECJ. MATE THE JUNCTION CONNECTOR TO THE 991T. PUSH THE INSULATOR ONTO THE SENSOR BODY.
9. MAKE CABLE CONNECTIONS TO THE 994 OR 1010 SERIES METER IN ACCORDANCE WITH THE APPROPRIATE INSTALLATION. DRAWING.
10. SEE DRAWING 991TN–8 FOR OUTLINE DIMENSIONS.

## PERMANENT INSTALLATION / SERVICE NOTE

INSULATION IN THE IMMEDIATE VICINITY OF THE 991T SENSOR SHOULD BE REMOVABLE TO ALLOW FOR TOOL ACCESS REQUIRED FOR PERIODIC REFRESHMENT OF CC117 THERMAL COMPOUND.

## BAND LENGTH TABLE

| PIPE DIA. | LENGTH TO CUT ON MARK | PIPE DIA. | LENGTH TO CUT ON MARK | PIPE DIA. | LENGTH TO CUT ON MARK |
|---|---|---|---|---|---|
| 6" | 14–3/16" | 16" | 45–7/8" | 32" | 95–3/8" |
| 7" | 16–3/4" | 17" | 48–7/16" | 34" | 101–5/8" |
| 8" | 20–1/2" | 18" | 52–1/8" | 36" | 107–7/8" |
| 9" | 23–1/8" | 19" | 54–3/4" | 38" | 114–1/4" |
| 10" | 26–7/8" | 20" | 58–1/2" | 40" | 120–9/16" |
| 11" | 29–3/8" | 22" | 64–7/8" | 42" | 127" |
| 12" | 33–5/16" | 24" | 71–1/8" | 44" | 133–5/16" |
| 13" | 33–3/4" | 26" | 76–1/4" | 46" | 139–5/8" |
| 14" | 39–1/2" | 28" | 85–5/8" | 48" | 145–15/16" |
| 15" | 42–1/16" | 30" | 88–7/8" | | |

DO NOT SCALE THIS DRAWING
UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES (MM) TOLERANCES ON–
INCHES ± .1 (MM) ± 2

CONTRACT NO.

DR H.J DATE 10/28/96
CHK DATE
ENG DATE
PROD DATE
APPD DATE

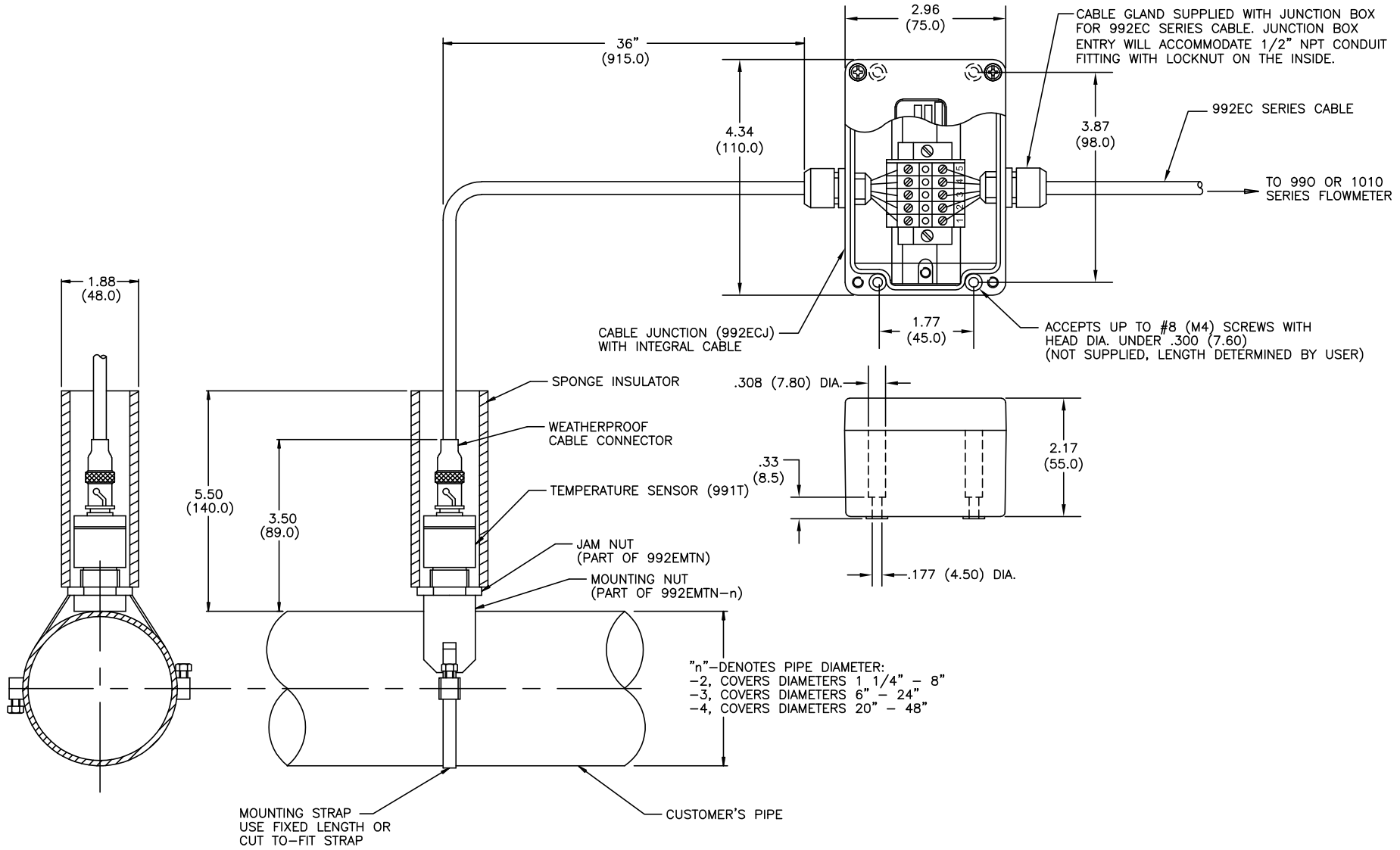
CERTIFIED
DATE

CONTROLOTRON
HAUPPAUGE , NY 11788

# INSTALLATION DRAWING TEMPERATURE SENSOR DEDICATED, NEMA 4

| SIZE | CODE IDENT NO. | | REV. |
|---|---|---|---|
| C | 21614 | 991TN - 7 | G |
| SCALE: NONE | WT. | SHEET 1 OF 1 | |

CN#4860

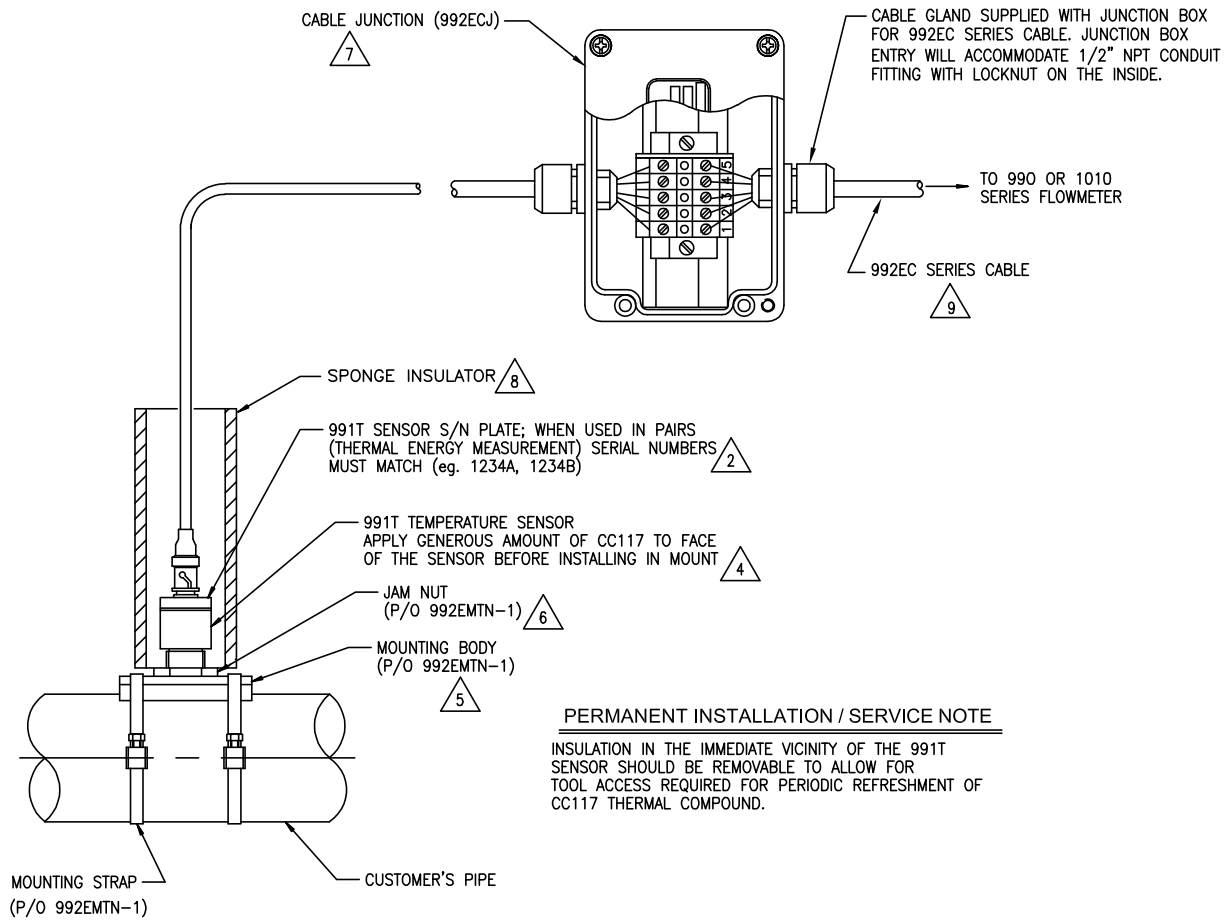



NOTES:

1. THE DEDICATED NEMA 4 TEMPERATURE SENSOR FOR PIPES 1 1/4" – 48" DIAMETER CONSISTS OF THE FOLLOWING: THE SENSOR 991T(S), A MOUNTING ASS'Y 992EMTN(-2,-3,-4), AND A CABLE 992ECN-(LENGTH) IN TWO PARTS, JUNCTION 992ECJ AND CABLE 992ECC-(LENGTH).
2. TEMPERATURE SENSORS ARE SUPPLIED IN PAIRS (P/N 991T) FOR THERMAL ENERGY METER APPLICATIONS OR SINGLY (P/N 991TS) FOR TEMPERATURE COMPENSATED MASS METER APPLICATIONS AND INTERFACE DETECTION.

| | | |
|---|---|---|
| DO NOT SCALE THIS DRAWING<br>UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES (MM) TOLERANCES ON-<br>INCHES ± .1 (MM) ± 2 | CONTRACT NO.<br>DR H.J DATE 10/28/96<br>CHK DATE<br>ENG DATE<br>PROD DATE<br>APPD DATE<br>CERTIFIED<br>DATE | CONTROLOTRON<br>HAUPPAUGE , NY 11788<br>OUTLINE DIMENSIONS<br>TEMPERATURE SENSOR<br>DEDICATED, NEMA 4<br>SIZE C · CODE IDENT NO. 21614 · 991TN - 8 · REV. F<br>SCALE: NONE · WT. · SHEET 1 OF 1 |

CN#4860



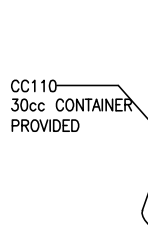

## PERMANENT INSTALLATION / SERVICE NOTE

INSULATION IN THE IMMEDIATE VICINITY OF THE 991T SENSOR SHOULD BE REMOVABLE TO ALLOW FOR TOOL ACCESS REQUIRED FOR PERIODIC REFRESHMENT OF CC117 THERMAL COMPOUND.

## INSTALLATION PROCEDURE – SEE DRAWING REFERENCE 4

1. INSTALLATION OF THE DEDICATED NEMA 4 TEMPERATURE SENSOR FOR PIPES 1/2" – 2" DIAMETER REQUIRES THE FOLLOWING: THE SENSOR 991T (OR 991TS), A MOUNTING ASS'Y 992EMTN-1, AND A CABLE 992ECN-(LENGTH) IN TWO PARTS, JUNCTION 992ECJ AND CABLE 992ECC-(LENGTH).SEE NOTE 11.
2. TEMPERATURE SENSORS ARE SUPPLIED IN PAIRS (P/N 991T) FOR THERMAL ENERGY FLOWMETER APPLICATIONS OR SINGLY (P/N 991TS) FOR TEMPERATURE COMPENSATED MASS FLOWMETER APPLICATIONS.
3. SELECT THE PIPE LOCATION WHERE TEMPERATURE IS TO BE MONITORED IN ACCORDANCE WITH RECOMMENDATIONS IN THE FIELD MANUAL.
4. CLEAN A SMALL AREA OF PIPE SURFACE (APPROXIMATELY 1" DIAMETER); REMOVE PAINT, SCALE, FOREIGN MATTER THAT CAN AFFECT GOOD THERMAL CONTACT.
5. CENTER THE MOUNTING NUT (PART OF 992EMTN) OVER THE CLEAN SPOT AND STRAP IN PLACE. ALLOW THE STRAP TO REACH APPROXIMATELY THE TEMPERATURE OF THE PIPE AND TIGHTEN SECURELY.
6. SPIN THE JAM NUT (PART OF 992EMTN-1) ONTO THE SENSOR BODY (991T OR 991TS). APPLY A GENEROUS AMOUNT OF THERMAL COUPLANT (SUPPLIED WITH 992EMTN-1) TO THE FACE OF THE SENSOR AND SCREW IT INTO THE MOUNTING BODY, HAND TIGHT ENGAGEMENT IS SUFFICIENT. SECURE THE SENSOR BY TIGHTENING THE JAM NUT AGAINST THE MOUNTING BODY.
7. SELECT A MOUNTING LOCATION FOR THE 992ECJ JUNCTION BOX. USE INTEGRAL MOUNTING FLANGES OR SECURE AT THE END OF RIGID CONDUIT. IF CONDUIT IS USED, REMOVE THE WATERTIGHT GLAND SUPPLIED WITH THE 992ECC CABLE. INSTALL THE 992ECC CABLE, MAKING WIRING CONNECTIONS 1–5 AS SHOWN.
8. SLIP SPONGE INSULATOR (SUPPLIED WITH 991T) OVER THE CONNECTOR AND CABLE PART OF JUNCTION BOX 992ECJ. MATE THE JUNCTION BOX CONNECTOR TO THE 991T. PUSH THE SPONGE INSULATOR ONTO THE TEMP. SENSOR BODY.
9. MAKE CABLE CONNECTIONS TO THE 994 OR 1010 SERIES FLOWMETER IN ACCORDANCE WITH THE APPROPRIATE FLOWMETER INSTALLATION DRAWING.
10. SEE DRAWING 991TN-8A FOR OUTLINE DIMENSIONS.

FOR HARSH OR HEAVY CONDENSATE ENVIRONMENTS:
SERVICE TEMPERATURE RANGE: -40°F TO +150°F




IMMERSE CONNECTOR IN CONTAINER OF CC110. COMPLETELY FILLING AND COATING IT BEFORE CONNECTING TO 991T TEMP. SENSOR. ADDITIONAL COATING MAY BE REQUIRED AS PART OF A NORMAL MAINTAINANCE SCHEDULE.

DETAIL 'A'

DO NOT SCALE THIS DRAWING

UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN INCHES (MM)
TOLERANCES ON–

| INCHES | (MM) |
|---|---|
| ± .1 | ± 2 |

MATERIAL:

FINISH:

CONTRACT NO.

| | | |
|---|---|---|
| DR | H.J | DATE 11/14/96 |
| CHK | | DATE |
| ENG | | DATE |
| PROD | | DATE |
| APPD | | DATE |

CERTIFIED

DATE

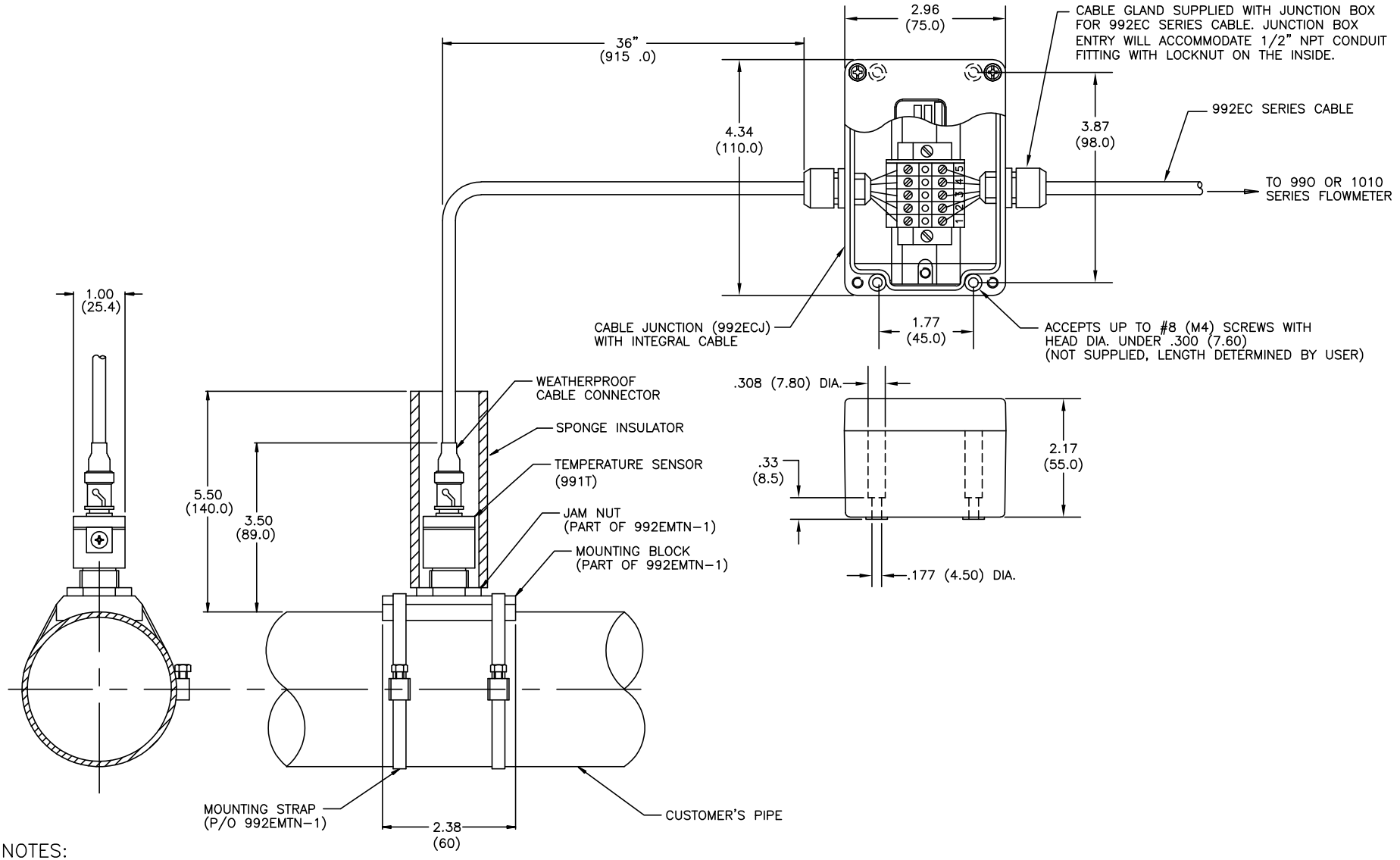
CONTROLOTRON
HAUPPAUGE , NY 11788

# INSTALLATION DRAWING, TEMP. SENSOR, DEDICATED, NEMA 4 PIPE O.D. 1/2"- 2" (13-51MM)

| SIZE | CODE IDENT NO. | | REV. |
|---|---|---|---|
| C | 21614 | 991TN - 7A | D |

SCALE: NONE | WT. | SHEET 1 OF 1

CN#4860



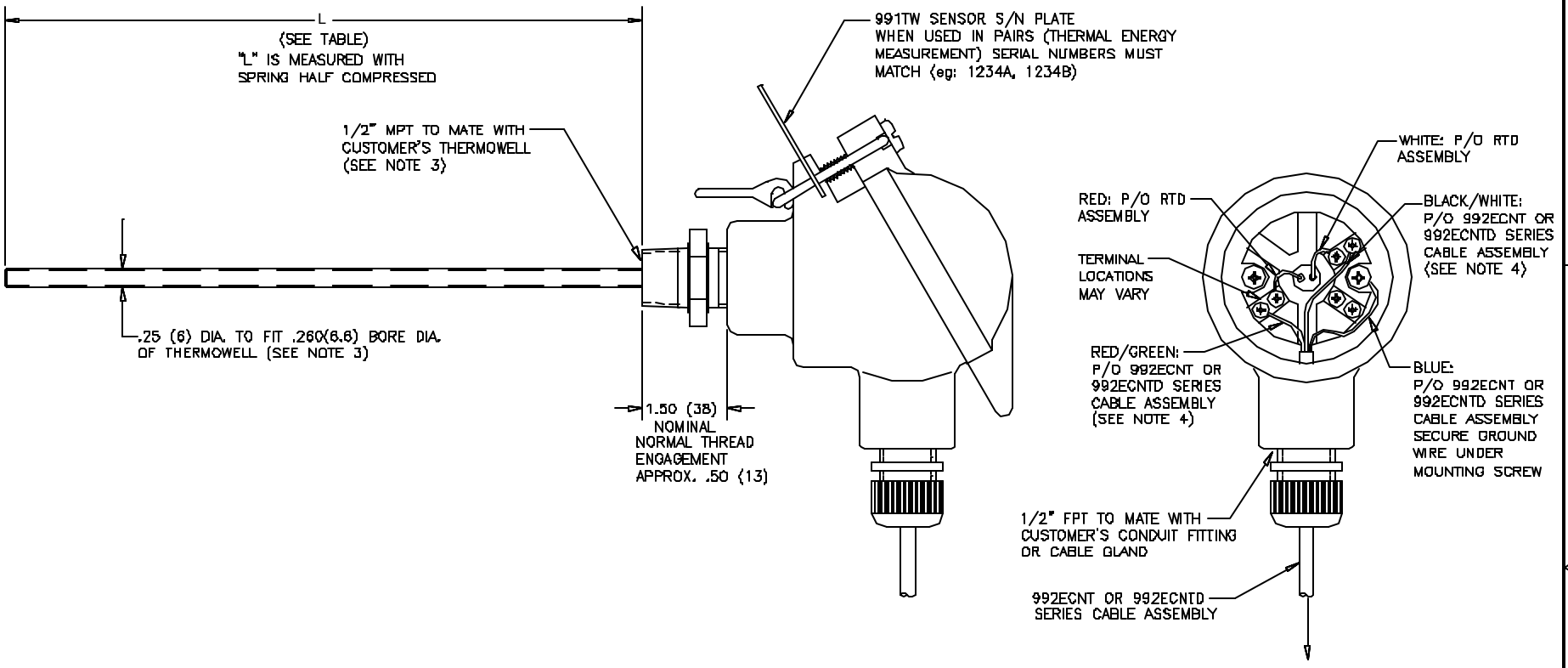

NOTES:

1. THE DEDICATED NEMA 4 TEMPERATURE SENSOR FOR PIPES 1/2"- 2" (13-51MM) DIAMETER CONSISTS OF THE FOLLOWING; THE SENSOR 991T (OR 991TS), A MOUNTING ASS'Y 992EMTN-1, AND A CABLE 992ECN-(LENGTH) IN TWO PARTS; JUNCTION 992ECJ AND CABLE 992ECC-(LENGTH). LENGTH IN FEET.

2. TEMPERATURE SENSORS ARE SUPPLIED IN PAIRS (991T) FOR THERMAL FLOWMETER APPLICATIONS OR SINGLY (991TS) FOR TEMPERATURE COMPENSATED MASS FLOWMETER APPLICATIONS.

| | | |
|---|---|---|
| DO NOT SCALE THIS DRAWING | CONTRACT NO. | CONTROLOTRON HAUPPAUGE , NY 11788 |
| UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES (MM) TOLERANCES ON- INCHES ± .1 (MM) ± 2 | DR H.J DATE 11/14/96<br>CHK DATE<br>ENG DATE<br>PROD DATE<br>APPD DATE | OUTLINE DIMENSIONS, TEMP. SENSOR, DEDICATED, NEMA 4 PIPE O.D. 1/2"- 2" (13-51MM) |
| MATERIAL: | CERTIFIED | SIZE C · CODE IDENT NO. 21614 · 991TN - 8A · REV. D |
| FINISH: | DATE | SCALE: NONE · WT. · SHEET 1 OF 1 |

CN#4860




| PART No. | L (PROBE LENGTH) |
|---|---|
| 991TW-1 | 5.50 (140) |
| 991TW-2 | 8.50 (216) |
| 991TW-3 | 11.50 (292) |
| 991TW-4 | 14.50 (368) |
| 991TW-5 | 17.50 (444) |
| 991TW-6 | 23.50 (597) |

*SPECIAL ORDER ONLY

GLAND SUPPLIED WITH CABLE IS SUITABLE FOR AMBIENT TEMPERATURE TEMPERATURE BELOW 225°F ONLY

NOTES:

1. TEMPERATURE SENSORS ARE SUPPLIED IN PAIRS (P/N 991TW) FOR THERMAL ENERGY FLOWMETER APPLICATIONS OR SINGLY (P/N 991TWS) FOR TEMPERATURE COMPENSATED MASS FLOWMETER APPLICATIONS.
2. MAKE RING CONNECTIONS USING 992ECNT OR 992ECNTD CABLE AS SHOWN. FOR WIRING CONNECTION TO THERMAL ENERGY OR MASS FLOWMETER COMPUTER SEE APPROPRIATE COMPUTER INSTALLATION DRAWINGS.
3. IF CUSTOMER REQUIRES THERMALWELLS IN PIPE, CUSTOMER MAY PURCHASE FROM: ALLOY ENGINEERING COMPANY BRIDGEPORT CONN., 06607 AS: 260L TYPE OR EQUIVALENT.
4. FOR WIRE CLAMP STYLE TERMINALS, REMOVE CRIMP LUGS FROM CABLE ASSEMBLY STRIP 1/4" AND MAKE WIRE CONNECTIONS INDICATED.

DO NOT SCALE THIS DRAWING
UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES (MM) TOLERANCES ON—
INCHES ± .1 (MM) ± 2

CONTRACT NO.

DR HJ DATE 5/8/91
CHK DATE
ENG DATE
PROD DATE
APPD DATE

CERTIFIED
DATE

CONTROLOTRON
HAUPPAUGE, NY 11788

# INSTALLATION/OUTLINE
# INSERT TEMPERATURE SENSOR

| SIZE | CODE IDENT NO. | | REV. |
|---|---|---|---|
| C | 21614 | 991TW - 8 | D |
| SCALE: NONE | WT. | SHEET 1 OF 1 | |

R14; 991TW-8 sht.1 rev.D

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