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REPORT

on

PROCESS CONTROL EQUIPMENT, FOR USE IN HAZARDOUS LOCATIONS

Bristol Babcock Inc.
Watertown, CT

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DESCRIPTION

PRODUCT COVERED:

USL, CNL - Flow Computer Model 3820-EX-10A, followed by -0xx or -1xx for use in Class I, Division 1 Groups C and D; Class I, Division 2, Groups A, B, C and D Hazardous Locations.

GENERAL:

These Flow Computers have been evaluated as complete Explosion-Proof and Nonincendive devices. The unit amplifies its transducer signal and outputs a respective signal to a controlling, recording, or other similar device. The transmitter may also display the relevant readings via an LCD display and a glass viewing window in an alternate cover.

-0xx represents 1/2 - inch NPT Gauge Pressure

-1xx represents 1/4 - inch NPT Differential Pressure

ENGINEERING CONSIDERATIONS (NOT FOR FIELD REPRESENTATIVE'S USE):

* CNL indicates investigation to Canadian National Standard C22.2 No. **61010-1 2nd Edition**, C22.2 No. 30-M1987, and CSA C22.2 No. 213.

USL indicates investigation to U.S. Standard UL **61010-1, Second Edition** and UL 1203, Second Edition, UL 1604, Third Edition.

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RATINGS:

ELECTRICAL

4-20 mA Device

Maximum Input - 30 V dc

PRESSURE

Maximum Rated Pressure - 5000 psi for -0xx model.

Maximum Rated Pressure - 5000 psi for -1xx model.

ENVIRONMENTAL

Operating Ambient - -40°C to 80°C

Temperature Code - T5

MARKINGS:

Each transmitter is provided with a permanently attached metal label containing the following criteria.

1. Manufacturer's name or Trademark.
2. Model number.
3. CNL products require a date code or Serial Number incorporating date of production.
4. Pressure ratings as described under "Ratings".
5. Electrical ratings as described under "Ratings", power may be stated.
6. Operating Temperature as described under "Ratings".
7. Hazardous Locations Class and Groups as described under "Product Covered".
8. Temperature Code, not required for T5 or T6, as described under "Ratings".
9. Explosion-Proof statements:
May be molded in the casting or placed on label, the statements:

"WARNING: To reduce the risk of ignition of Hazardous Atmospheres, conduit runs must have a sealing fitting connected within 18 inches of the enclosure, disconnect the equipment from the supply circuit before opening. Keep assembly tightly closed while in operation".

10. Caution, hot surface,  .

INSTRUCTION MANUAL/DOCUMENTATION:**DOCUMENTATION**

Equipment shall be accompanied by documentation for safety purposes as follows:

- Intended use of the equipment.
- Technical specification.
- Instructions for use.
- Name and address of manufacturer or supplier from whom technical assistance may be obtained.
- Equipment ratings
 - The supply voltage or voltage range, frequency or frequency range, and power or current rating.
 - A description of all input and output connections.
 - A statement of the range of environmental conditions for which the equipment is designed.
- Equipment installation
 - Assembly, location and mounting requirements.
 - Connections to the supply
 - Equipment operation
 - Instructions for interconnection to accessories and other equipment, including indication of suitable accessories, detachable parts and any special materials
 - An explanation of symbols related to safety which are used on the equipment
- There shall be a statement in the instructions that, if the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.
- Equipment maintenance
 - Instructions for the responsible body concerning preventive maintenance and inspection necessary for safety shall be given in sufficient detail.
 - For equipment using replaceable battery, the specific battery type shall be stated.
 - The rating and characteristics of replaceable fuses shall be stated.

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ASSEMBLY AND CONSTRUCTION DETAILS:

Except as noted, all bottomed holes shall have at least 1/8 in. minimum thickness of metal remaining. All bottomed holes with drive pins or screws shall have at least 1/16 in. minimum thickness of metal remaining.

Product may be externally painted or lightly epoxy coated, there must be no contamination of joints.

The construction details of the device are given and described in conjunction with the following figures and illustrations.

<u>Description</u>	<u>Fig.</u>	<u>ILL.</u>
3820-EX Enclosure Body	1	-
3820-EX Internal	2	-
3820-EX Enclosure	-	1,2
3820-EX Covers	-	3,4,5
3820-EX View Window	-	6
3820-EX Separator Plate	-	7
3820-EX Connector Strain Relief	-	8
CPU Block Diagram and Schematics - Rev E		9
CPU BOM Rev L		10
I/O Board Schematics/layout Rev C/A		11
I/O Board BOM Analog Option rev. D		12
I/O Board BOM No Analog Option rev. D		13
I/O Board BOM RTD Rev. C		14
Assembly, gage pressure transducer:721685-00-5,rev.E		15
Fitting, gage pressure:396224-00-8, rev. G		16
Assembly, differential pressure transducer:721684-009, rev. K		17
Assembly with DP and GP		18

MODELS 3820EX ENCLOSURE - FIG. 1

General -All measurements approximate except for Joint measurements that are exact.

Body - Aluminum casting with a minimum internal wall thickness of 0.316 in. An overall diameter of 5.00 in. wide, 3.072 in. tall, and 5.438 in. deep. There is a boss for a two-sided conduit opening at top of the Body. There is approximately a 1.82 in. outer diameter protrusion from the bottom of the body approximately 1.69 in. long with a 1.13 in. inner diameter through-hole and 1.25-20 UN-2B threading. Each Body end is also threaded with 4.5-16 UN-2B threads. Refer to ILL. 1 and 2 for details.

The body contains an internal lip with mounting holes for the Internal Plate, dividing the Body into two portions. The field wiring side is then 1.925 in. deep and the circuit board side is 3.0 in. deep.

Joints in Body - Two 3/4-14 NPT conduit openings providing at least five full threads for engagement, located at top on opposite sides of unit. Entries are well rounded. **Unused conduit openings shall be closed with a (EBNV) Listed Plug suitable for the same Classes and Groups as described under the Product Covered.** Each enclosure side is threaded for mating with the covers. 1.25-20 UN-2 threading, with at least seven full threads of engagement, allows for the pressure transducer connection. A set-screw holds the transducer in place with the body.

Cover - Aluminum casting with a wall minimum thickness of 0.34 in. Internal Cover to Threading cast is concave to provide strength. Cover must have at least 5 engaged threads when screwed onto body. Overall dimensions are 4.95 in. diameter and 1.15 in. wide including threads. A 0.095 in. wide and 0.05 in. deep groove is for the O-ring, before threads begin. Refer to ILLs. 3 and 4 for details.

Alternate Cover - Aluminum casting with a wall minimum thickness of 0.182 in. Cover must have at least seven engaged threads when screwed onto body. Overall dimension are 4.95 in. outer diameter x 2.68 minimum inner diameter x 1.35 in width. Refer to ILL.5 for details.

The 2.67 in. maximum inner diameter view hole widens internally to a maximum 3.504 in. diameter through-hole that is 0.285 in. wide containing a 0.1 in. O-ring groove that is 0.05 in. deep. This is where the view window sits.

This view window area then widens internally to a 3.65 in. inner diameter groove 0.24 in. wide, terminating at a lip with a smaller through-hole diameter of 3.562 in. This is where the wave spring and retaining ring are placed to mechanically secure the view window in place.

Cover to Body Joints - Cover must have at least seven engaged threads when screwed onto body. 4.50-16 UN-2 Threads.

Cover to Glass Joints - Flat Joint no less than 0.385 in. long, with a clearance of .0015 in. Glass is secured by a combination of a wave spring and a retaining ring pressing between the glass surface and a machined groove in the cover. An O'ring between the glass and the cover side-wall is also placed.

Glass - Fully tempered, un-clear, un-coated, glazing quality A, Soda Lime Glass per ASTM C1048 Kind FT, Condition A, Type 1, Class 1, Quality q⁴. Minimum thickness of 0.302 in., Maximum thickness of 3.44 in., with a minimum diameter of 3.497 in. The glass corner is chamfered creating a surface diameter no less than 3.447 in. Refer to ILL. 6.

Internal Plate - Separate Aluminum plate measuring 4.275 in. diameter and 0.187 in. thick, with three parallel recessed through-hole areas grooved 3.061 in. long and 0.25 in wide. Through-holes are 0.125 in. diameter, maximum 20 per area. Refer to ILL. 7.

The wall separates the field wiring and the circuit board portions of the enclosure and is secured by 4 machine screws to a Body lip containing 4 mounting bosses threaded 6-32 UNC-2B.

Intended use is to mount terminal blocks to field wiring side using insulated extender pins that will pass through the through-holes to the circuit board side. Through holes may be filled over with sealant. Not all holes may be placed or utilized.

MODEL 3820EX INTERNAL - FIG. 2

General - Two stacked boards connected via header pins and three standoffs, and then mounted on the Internal Plate that mounts to the Body. The field wiring side of the plate is populated with Terminal blocks and the circuit side is populated with the two boards. The internal most board is the circuit board and the outermost board is the LCD Display board.

Printed Wiring Board - any UL R/C (ZPMV2) printed circuit board, rated 95°C. Overall diameter of 2.85 in. Overall dimensions are approximately of 2.85 in. The following critical components are utilized:

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Terminal Block Headers - R/C (XCFR2) Series MC1.5/X-STF-3.5, rated 300 V, 8 A, 105°C.

Terminal Block Plugs - R/C (XCFR2) Series MCV1.5/X-GF-3.5, rated 300 V, 8 A, 105°C.

Input Fuse (XF1) - R/C (JDYX2) rated no more than 3/8 A.

Switch (SW1) - (Nonincendive) 10 pin dip switch. Protected by RP4.

Resistor Pack (RP4) - Rated 100 ohms, provides 100 ohm resistance to each switch of SW1.

Potentiometer (R43) - (Nonincendive) 0-500K rotary potentiometer.

Jumper (J1) - (Nonincendive) Breaks BT1 circuit directly and discharges C51 rated 1000 pf and C53 rated 10 uF before being protected by R27.

Resistor (R27) - rated 681 ohms.

Battery (BT1) - R/C (BBCV2) Lithium coin cell manufactured by Panasonic, model BR2230, rated 3V. Protected by chip U10 and Resistor R27.

***MODELS 3820EX-0XX and 3820EX-1XX PRESSURE TRANSDUCER**

*General - The following represents **-0xx, -1xx, gage and** differential pressure transducers.

1. Transducer - Type 316 stainless steel or Hasteloy C. Mounted to the diaphragm unit by welding. Transducer contains a sensor made up of a piezo-resistive strain gauge chip embedded inside with only wire leads protruding, and is sealed by epoxy on each connector. Internal diaphragm is filled with either DC200 Silicone Fluid or Fluorolube.

***Transmitters** have external **1.25-20 UN-2A** threads with at least six full threads engaging the enclosure body.

* **-0xx** has 1/2 in. NPT **male** and 1/8 in. NPT **female** for pressure mounting up to 5000 psi.

* **-1xx** has 1/4 in. NPT **female** for pressure mounting up to 5000 psi.

Refer to ILLS 15 and 16 for gage pressure transducer description.

Refer to ILLS 17 for differential pressure transducer description.

ILL. 18 contains drawing of the assembly with the DP and GP transducer options.