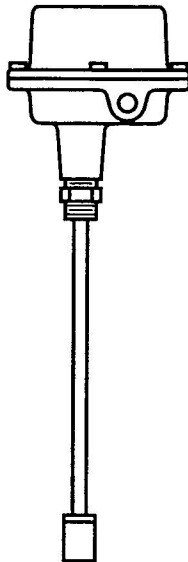


LEVELDATA™

Installation & Operation Manual

Caution: Limit Pressurized Vessel Applications To Media
Which Is Not Harmful To Personnel Or Property



150 Venture Boulevard
Spartanburg, SC 29306
Phone: (864) 574-8060, Fax: (864) 574-8063
Customer Service: (800) 778-9242
Internet: www.bindicator.com
email: sales@bindicator.com

IMPORTANT!

DO NOT DISPOSE OF THE CARTON OR PACKING UNTIL UNIT HAS BEEN INSPECTED FOR DAMAGE. IF THE UNIT IS RECEIVED DAMAGED, NOTIFY CARRIER OR FACTORY FOR INSTRUCTIONS. FAILURE TO DO SO MAY VOID YOUR WARRANTY. THANK YOU!

Leveldata™
Hydrostatic Level Transmitter
Installation and Operation Manual
1/96 Rev. A GAG280001

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Important!

Do not dispose of the carton or packing material until the unit has been inspected for damage.

If the unit is received damaged, notify the carrier or the factory for instructions.

Failure to do so may void your warranty.

Thank you!

1.0 DESCRIPTION

Leveldata™ is a hydrostatic two-wire level transmitter designed for top-of-vessel mounting. It is designed for ease of mounting and calibration. Unlike similar units (conventional DP level transmitters), Leveldata™ does not require tank emptying for mounting. Furthermore, Leveldata™ provides an integral differential pressure compensation port for applications where the tank contents are under pressure. Automatic temperature compensation and nonfouling reservoir design provide reliability. This capability, along with simple non-interacting zero and span calibration make the Leveldata a truly unique level transmitter.

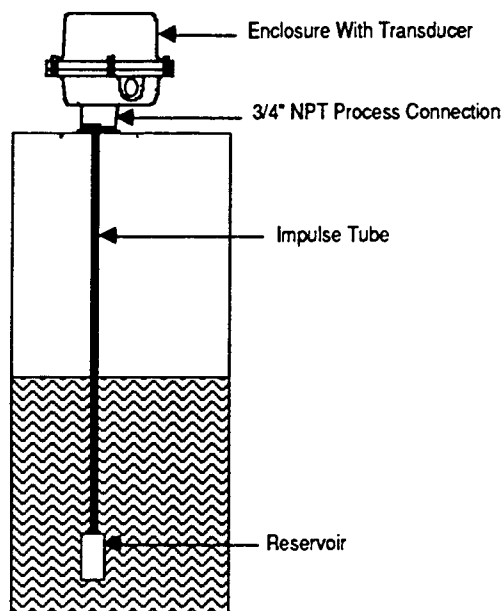
Note: Leveldata™ was designed for liquid level in nonhazardous and noncorrosive applications. Injury could occur if misapplied. Consult factory before using in any questionable processes.

2.0 THEORY OF OPERATION

Leveldata™ measures liquid level by hydrostatic head pressure; converting this pressure to a proportional 4-20mA output signal. Leveldata™ consists of four basic parts to accomplish this measurement, they are; the reservoir, impulse tube, process connection and the pressure transducer circuit board mounted in the enclosure. (Refer to Fig. 1).

These parts form a sealed system where air is not allowed to escape. When the reservoir and impulse tube are lowered vertically into the tank, air (vapor) is trapped inside the impulse tube and this air pressure acts upon the pressure transducer circuit board. This pressure is converted to our output signal. In units designed for atmospheric pressure, the process connection has one port for connection of the impulse tube. Units designed for pressurized vessels contain an extra port in the process connection. This differential port is connected to the pressure transducer circuit board and compensates for vessel pressure by subtracting the vessel pressure from the head pressure reading, resulting in the measurement of liquid level only.

Figure 1



3.0 SPECIFICATIONS

MECHANICAL

Enclosure: NEMA 4 aluminum with corrosion resistant polyester coating

Conduit Connection: 3/4" NPT

Ranges: 0-4", 0-28", 0-32"(drum version), 0-140" or 0-420" H₂O

Process Connection: 3/4" NPT, 316 S.S.

Rigid Impulse Tube: 1/8" Schedule 80, 316 S.S. - Standard on Drum Version (Customer supplied on others as required)

Flexible Impulse Tube Option: 1/8" reinforced PVC tubing with S.S. clamps and (2) 1/8" barb fittings (316 S.S.)

Reservoir: 7/8" 316 S.S. Tube (Field Modified per application)

ELECTRICAL

Input: 24VDC (+/- 15%)

Output: 4-20mA into 600Ω maximum @ 24VDC (impedance increases with voltage)

Accuracy: ±1.0% of calibrated span (combined linearity, hysteresis, stability)

Turndown: 5:1

ENVIRONMENTAL

Temperature: 0° F. to +150° F.

Humidity: 0-95% Non-condensing

Pressure: 2 psi in pressurized vessels; 10 psi absolute maximum

Agency Approval(s): F.M. (Factory Mutual) for General Purpose and Hazardous Areas (Class 1, Div 1, Group C & D intrinsically safe) U.L. (Underwriters Laboratory) for General Purpose Areas Only.

4.0 APPLICATION CONSIDERATIONS

In order to insure successful operation, the following should be noted **before** installing the Leveldata™. Because the silicon transducer could be exposed to the process, only liquids which cannot damage Neoprene or Polyester should be attempted.

- A. Verify that the unit is compatible with the process, including: Pressure, Temperature, Construction, and Area Classification.
- B. Due to the transducer exposure to the vapor in the impulse tube, do not use this device in strong corrosives.
- C. Organic solvents with vapors lighter than air, may damage the transducer.
- D. If strong turbulence is anticipated, use only rigid impulse tube (1/8" pipe) and/or consider mounting the Leveldata in a standpipe.
- E. Changes in Specific Gravity may necessitate recalibration.
- F. A DC supply of 14-32 VDC must be used for powering the Leveldata.
- G. Units designed for pressurized vessels should not be operated with hazardous liquids. Mechanical failure of the transducer could expose personnel to dangerous liquids or vapor.
- H. Do Not use teflon tape for any connections.
- I. When installing in hazardous areas, always use the prescribed intrinsic safety barriers. (see drawing No. GAG2E0001)

5.0 INSTALLATION

5.1 Leveldata Assembly

The most common problem encountered in Leveldata™ installations is air vapor leakage at the impulse tube and reservoir connections. **All pipe and fitting connections must have an air tight seal.** Use a generous amount of Teflon Pipe Sealant or Loctite #567 Sealant when assembling. Proceed to Mounting if a "Barrel Version" was purchased.

- A. Refer to Drawing GAG2E0000 in the back of this manual to determine the following:
 1. **Insertion Length** ("A" Dimension): This is the distance from process connection to the desired zero or empty point in the vessel.
 2. **Reservoir Length** ("B" Dimension): Leveldata reservoirs are shipped in lengths to operate at the maximum range specified. Example: (GAG 200000, Range 0-140" H2O operating with a 140" insertion length). If this unit is to operate at the maximum do not cut reservoir. If it will be at less than maximum, cut the reservoir to the length calculated. The required distance is measured from the top of the hex **downward**.
 3. **Impulse Tube** ("C" Dimension): If you will use your own 1/8" pipe as the impulse tube, determine the length by following Step B on the drawing. We recommend using 1/8" SCH 80, 316 S.S. pipe. Cut and thread each end as specified. If using the purchase flexible tube, cut to length calculated in Step C.

- B. Assemble Leveldata™ impulse tube and reservoir to process connection of transmitter assembly as shown on drawing GAG2E0000. Use Teflon Pipe Sealant or Loctite #567 on all threaded connections. Allow Loctite to dry for one hour before submerging. Tubing clamps supplied with flexible impulse tube must securely crimp tubing to barb fittings to form an air-tight seal.

5.2 Mounting

Locate a suitable location for mounting and install a 3/4" NPT female connection. If the vessel cannot be emptied for zero calibration, refer to the calibration section and check the zero setting before lowering unit into vessel. If vessel will be emptied for zero calibration, lower unit into tank vertically and tighten process connection using only the wrench flats on the stainless process connection. Rotating the process connection in the housing may cause damage or failure and will void the warranty.

Note: Air/Vapor must not escape from impulse tube. If bubbles are evident at any fitting during installation, remove unit and reseal-connections.

5.3 Electrical Hook-up

Using a shielded, twisted pair of 22 AWG minimum; run the wire through the 3/4" conduit connection and terminate at the terminal labeled (+) and (-) observing wire polarity. At this time, the ground shield should be connected to the green ground screw located in the enclosure bottom.

To eliminate the possibility of water incursion, use a drip leg or seal fitting in the conduit prior to connection. Units damaged by water are not covered under the warranty.

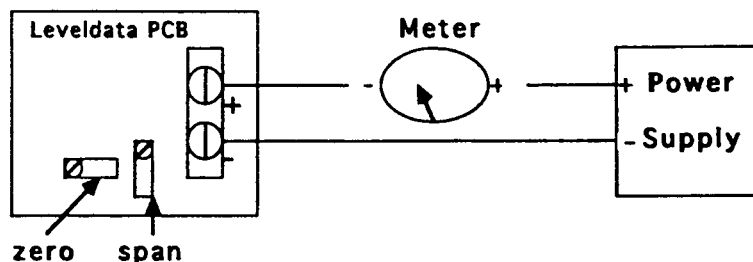
Leveldata™ requires a transmitter excitation voltage of 15-40 VDC. This can be supplied through the loop wiring from an external supply or will be supplied if Leveldata™ is being used in conjunction with a Genelco Tank-Vu 100 or other meter providing an Excitation Supply. For typical wiring schemes, see Drawings GTV2E0001 and GAG2E0001 in the back of the manual.

5.4 Supply Voltage /Output Impedance (Max.)

Supply Voltage	Output Impedance (Max.)
40 Volts DC	1400 Ohms
35 Volts DC	1150 Ohms
30 Volts DC	900 Ohms
24 Volts DC	600 Ohms
20 Volts DC	400 Ohms
15 Volts DC	150 Ohms

6.0 CALIBRATION

The Leveldata™ will be calibrated to your liquid level using the "Zero" and "Span" potentiometers located on the PCB (circuit board). A meter capable of reading a 4-20 mA output will be, required and must be connected in series with the Leveldata™ output.



Calibration Hook-Up

6.1 Zero Calibration

Zero calibration was performed at the factory prior to shipment. To verify calibration, hook-up unit as shown on page (3) three of this manual and check for 4mA output. If required, adjust "Zero" for 4mA at meter. Zero must be set with reservoir assembly in open air (not submerged). Zero calibration is an offset adjustment only and will not calibrate out liquid which may be covering the sensor. The length of the impulse tube and reservoir assembly determines the zero calibration point.

6.2 Span Calibration

- A. **Full Vessel-** If vessel can be filled to desired 100% point, adjust the "Span" potentiometer for an output of 20mA.
- B. **Partially Filled Vessel-** If vessel can only be partially filled for calibration, the span will be set as a percent of the liquid height. For example: if the vessel is 50% full, the output is set at 50% of full scale or 12 mA. To calculate the span current for any liquid level, use the following formula:

$$\frac{\text{Actual Level (inches)}}{\text{Desired Full-Scale Span (inches)}} \times 16\text{mA} (+ 4\text{mA}) = \text{Span}$$

Example:

A 100" vessel is 50% full (50") and Desired Full-Scale Span is 100". The Span calculation and output at 50% would be:

$$\frac{50"}{100"} \times 16 \text{ mA} (+4 \text{ mA}) = 12 \text{ mA}$$

The span for this example would be set for at 12 mA output by adjusting the "Span" potentiometer to the 50% level. The unit would now be spanned for 100 inches as desired.

The best calibration results will be obtained when the level approaches 100%. We do not recommend spanning the unit below 50%.

7.0 OPERATION

Verify that all proceeding steps have been followed and that the system is operational before powering or wiring to any control device. It is strongly recommended that the unit be operated with a static vessel condition (no movement of level) for 12 hours after installation and calibration to check for leakage at the various fittings. If the output drops more than 2% (or 1mA) over 12 hours with no level change, reseal all connections and reinstall. Recalibration should not be required.

Note: *Limit pressurized vessel applications to media which is not harmful to personnel or property.*

8.0 TROUBLESHOOTING

Symptom

The output is 0 mA

The output is always 4 mA

The output is always 20 mA or more

Output is sluggish or doesn't change

Output doesn't agree with contents

Specific Gravity has changed

Possible Cause

Incorrect wiring; Bad power supply

Leak in reservoir/impulse tube/process connection; Leak in enclosure at Neoprene hose or transducer.

Vessel is pressurized and unit does not have compensation port. Consult representative.

Material is plugging reservoir

Unit not calibrated on liquid in vessel;

Leak at fittings

9.0 DRAWINGS

Drawing Number

GAG2E0004

GTV2E0001

GAG2E0001

Description

Outline & Mechanical Hook-up Drawing

Tank-VU 100 Hookup Drawing

I.S. Loop Diagram

10.0 ORDERING INFORMATION

Leveldata™ - Vessels At Atmosphere

Part Number	Description
GAG200010	0 - 4" H ₂ O Range
GAG200006*	0 - 28" H ₂ O Range
GAG200000*	0 -140" H ₂ O Range
GAG200001*	0 -420" H ₂ O Range
GAG200004	0 - 32" H ₂ O 55 Gallon Drum

Leveldata™ - Pressurized Vessels

Part Number	Description
GAG200007*	0- 28" H ₂ O DP Range
GAG200002*	0-140" H ₂ O DP Range
GAG200003*	0-420" H ₂ O DP Range
GAG200005	0- 32" H ₂ O DP, 55 Gallon Drum

***Includes Transmitter And Reservoir Only**

All units except the drum version require the purchase of the flexible impulse tube or rigid 1/8" schedule 80 pipe as a separate item. Alternately, a 1/8" Schedule 80 pipe (threaded at each end) may be purchased at your local pipe supply (316 S.S. recommended).

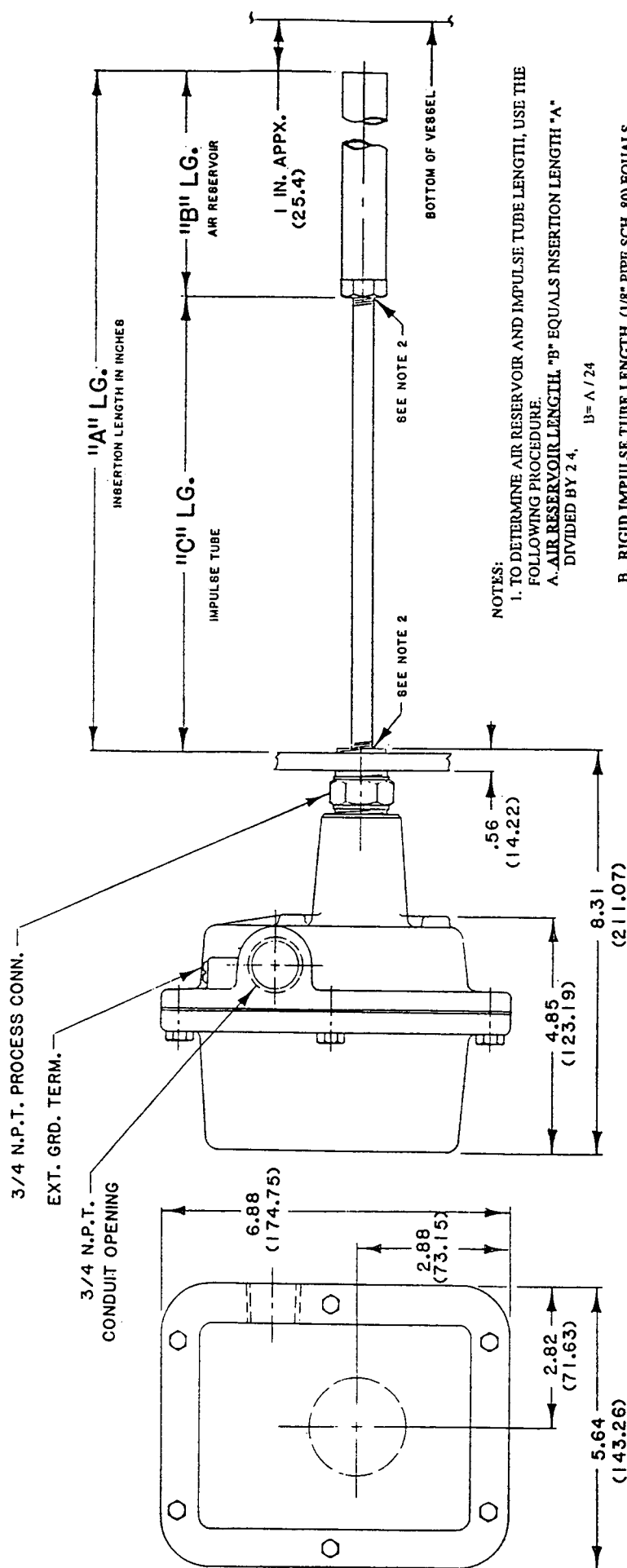
Rigid Pipe (Recommended)

Part Number	Description
GAG220012	1/8" Schedule 80, 316 SS cut & threaded to length (8 feet lengths maximum due to shipping limitations)
GAG230003	1/8" couplings for attaching multiple sections

Application/Usage Notes:

- Assembled units must be lowered vertically into liquid.
- Ranges specified are based upon water (SG = 1.0). Fluids with a higher or lower specific gravity (SG) will decrease/increase range, respectively (in proportion to the SG change.)
- To add a display and alarm capabilities, see the Tank-Vu 100.
- All fittings must be sealed with Teflon Pipe Sealant or Loctite #567. **(Do Not Use Teflon Tape)**
- Leveldata will operate properly with all process displays having a transmitter excitation supply and PLC/PC's accepting 4-20mA inputs.

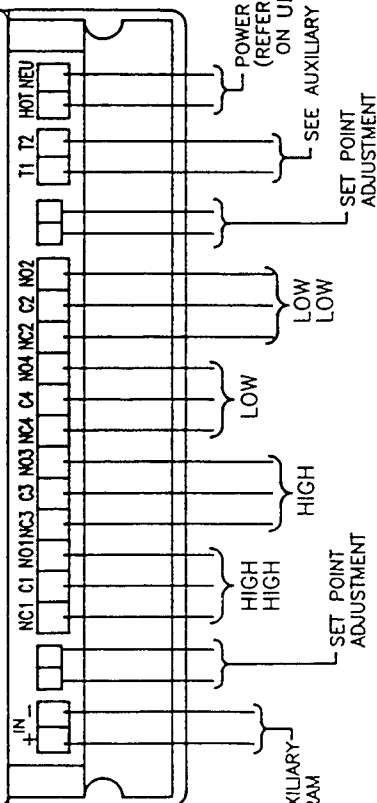
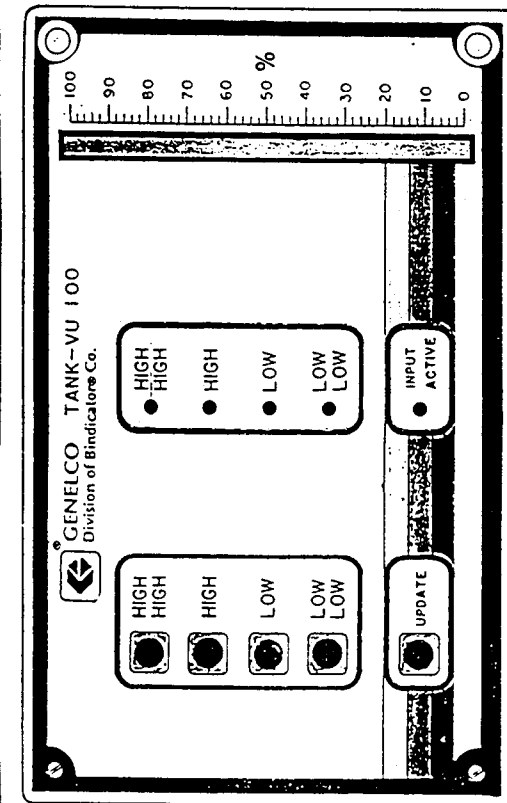
REVISIONS	DATE	CHECK'D	APPRO'D
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NOTES:

- TO DETERMINE AIR RESERVOIR AND IMPULSE TUBE LENGTH, USE THE FOLLOWING PROCEDURE:
 A. AIR RESERVOIR LENGTH "B" EQUALS INSERTION LENGTH "A" DIVIDED BY 2.4,
 $B = A / 2.4$
- RECOMMENDED THREAD SEALANT IS:
 LOCITE BRAND PST PIPE SEALANT #567
 (DO NOT USE TEFELON TAPE)

DO NOT SCALE DIMENSIONS ARE IN INCHES		MATERIAL		FINISH		TITLE		SCALE		SIZE		PART OR DRAWING		MAT. OR PART	
~		~		~		OUTLINE & MECHANICAL HOOKUP LEVELDATA-RIGID TUBE		NONE		B		GA62EDD04		PREVIOUS	
UNSPECIFIED TOL. DECIMALS: ± .005		DRAWN BOB		CHECKED EP		APPROVED		DATE 9-24-93		DATE 9-24-93		DATE 7/27/93		PROD.	
ANGLES: ± 1/2°		NEXT ASSY.		DEBURR & BREAK EDGES .005		SCALE		NONE		SIZE		PART OR DRAWING		REF.	



NOTES:

1. ALL RELAYS OPERATE FAILSAFE. (DENERGIZE ON ALARM.)
2. FOR CONTACT CLOSURE ON ALARM, WIRE TO COMMON (C) & NORMALLY CLOSED (NC) CONTACT.
3. OPEN LOOP (INPUT) CREATES SAME CONDITION AS POWER LOSS EXCEPT ALARM LIGHTS ALL ON.

ALARM CONDITION	CONTACTS	RELAY STATE	ALARM LIGHT
ABOVE HIGH-HIGH	C - NC	OFF	ON
ABOVE HIGH	C - NC	OFF	ON
BELOW LOW	C - NC	OFF	ON
BELOW LOW-LOW	C - NC	OFF	ON
POWER LOSS	C - NC	OFF	N/A

DO NOT SCALE
DIMENSIONS ARE IN INCHES

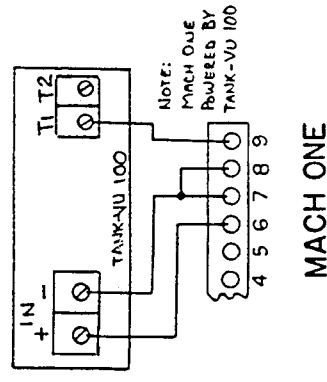
MATERIAL

FINISH

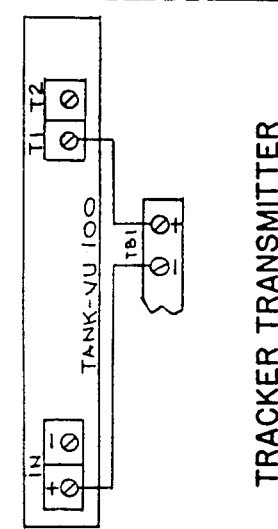
GENELCO
Division of Bindicator Co.
PORT HURON, MICHIGAN 48060

REVISIONS	DATE	CK'D	APP'D
RE DRAWN			
REVISED PER EGO 892-119	3/4		
ADDED CHART & NOTES	808		
RELAY COILS RELABELED	2/81		

AUXILIARY DIAGRAM



LEVEL TRACER
LEVEL DATA
TRANSMITTER



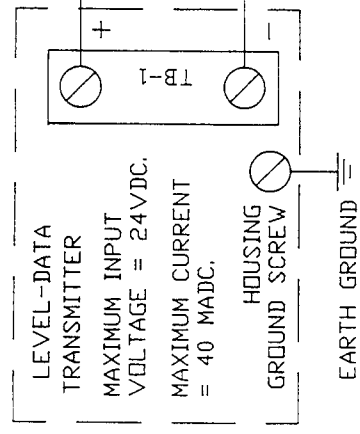
LEVEL TRACER

DET.	REQ'D. SHT.	DESCRIPTION	MAT. OR PART
UNSPECIFIED TOL. DECIMALS: X.X X.X X.X <td></td> <td>DRAWN: RESEUTUO <td>CHECKED: A E </td></td>		DRAWN: RESEUTUO <td>CHECKED: A E </td>	CHECKED: A E
ANGLES: 5 1/2° <td></td> <td>DATE: APRIL 27-72 <td>APPROVED: [Signature] </td></td>		DATE: APRIL 27-72 <td>APPROVED: [Signature] </td>	APPROVED: [Signature]
DEBURR & BREAK EDGES, LOS <td></td> <td>DATE: 27 APR 11 1972 <td>DATE: MAY 1972 </td></td>		DATE: 27 APR 11 1972 <td>DATE: MAY 1972 </td>	DATE: MAY 1972
		SCALE: NONE <td>PART OR DRAWING: 6TVZE0001 </td>	PART OR DRAWING: 6TVZE0001
		TITLE: TANK-VU 100 HOOKUP DRAWING <td>PREVIOUS: [Signature] </td>	PREVIOUS: [Signature]

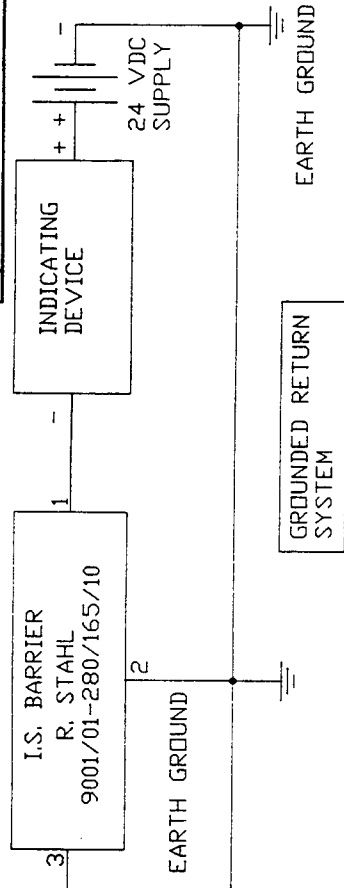
REF.

HAZARDOUS AREA

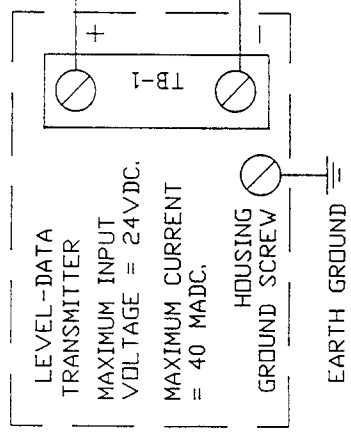
CLASS I, DIV. 1, GROUPS C & D



NON-HAZARDOUS AREA



ALTERNATIVE FLOATING RETURN SYSTEM



FACTORY MUTUAL
Certified Product
No Modifications Permitted
Without Reference to
FACTORY MUTUAL

REVISIONS		DATE	CHK'D	APPT'D
A	RELOCATE IND. DEVICE PER ECO # 92-029	09/03/92	JS	RB
B	STAHL BARRIER N'D'S. OBSOLETE REVISED PER ECO #92-139	10/98	BOB	RB
C	CHANGED TERMINALS ON STAHL BARRIERS, PER ECO #94-053	5/12/94	JJ	RE

- NOTES:
- MAXIMUM CABLE CAPACITANCE AND INDUCTANCE TO BE AS FOLLOWS:
GROUP C 0.3 MICROFARADS
4.6 MILLIHENRYS
GROUP D 0.86 MICROFARADS
8.7 MILLIHENRYS
 - RECOMMENDED MAXIMUM LOOP RESISTANCE IS 450 OHMS INCLUDING BARRIERS AND INDICATING DEVICE.
MAXIMUM SAFE AREA VOLTAGE TO BE 250 V.

DET.	REQD'SHT	DESCRIPTION	MAT. OR PART
UNSPECIFIED TOL. DECIMALS: XXX ±	DRAWN W.C.	CHECKED JS	PROD. RB
ANGLES: + 1/2°	DATE 5/14/90	DATE 6/1/92	DATE 1/13/94
DEBURR & BREAK EDGES: 200	SCALE NONE	SIZE B	PART OR DRAWING GAG2E0001

GENELCO
Division of Blindicator Co.
PORT HURON, MICHIGAN 48060

TITLE I.S. LOOP DIAGRAM
LEVEL-DATA

PENDING FM APPROVAL

GENERAL TERMS AND CONDITIONS OF SALE

1. PAYMENT Terms of payment are Net 30 days and are effective from the actual date of invoice. If, in the Seller's opinion, the financial condition of the Buyer at any time-or any other circumstances do not justify the incurrence of production costs or shipment on the terms of payment specified, the Seller may require partial or full payment in advance.

2. F.O.B. All shipments are F.O.B. Seller's factory in Port Huron, Michigan, unless otherwise stated in the quotation.

3. QUOTATION AND PRICES Quoted prices are firm for thirty days and are subject to change without notice after expiration of this period. Orders calling for future deliveries will be invoiced according to prices in effect at the time of shipment.

4. TAXES Any applicable sales, use, revenue, excise or other taxes not specifically stated in the quotation are to be remitted by the Buyer directly to the appropriate regulatory agency.

5. EQUIPMENT WARRANTY/LIMITATION The following BINDICATOR products are warranted for a period of two years from date of shipment against defective materials and workmanship: RF Series, Mark III Yo-Yo, General Purpose Yo-Yo, Micro-Sonic Series, Eagle, Mach One, Leveldata, Tracker, and Levelite Series. All CELTEK and other Bindicator products are warranted for a period of one year from date of shipment against defective materials and workmanship. WE MAKE NO OTHER WARRANTY, EXPRESS OR IMPLIED, AND ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE WHICH EXCEEDS THE FOREGOING IS HEREBY DISCLAIMED AND EXCLUDED FROM THIS CONTRACT. If the products are being acquired for resale, Buyer will make, in connection with any such resale, only those warranties contained herein and will indemnify us against any claims, causes of actions and judgements which arise from any representations, warranties or agreements made by or entered into by Buyer, other than those contained herein.

6. BUYER'S EXCLUSIVE REMEDY In the event of any breach of warranty, the sole and exclusive remedy of Buyer (or any person claiming through Buyer) shall be limited to the repair or replacement of defective products or parts, at our plant or at Seller's option, to the refund of the purchase price, provided that notice of such defects is given within six months after shipment. In no event will our liability include any incidental or consequential damages.

7. DELIVERY The Seller shall not be liable for loss or damage of any kind resulting from delay or inability to deliver or account of flood, fire, strike, labor troubles, riot, civil disturbances, accidents, acts or orders or regulations of civil or military authorities, shortages of materials, or any other cause or causes (whether or not similar in nature to any of these enumerated) beyond Seller's control.

8. PRODUCT CHANGES In keeping with our continuing policy of product improvement, we reserve the right to make changes in our products at any time, without incurring an obligation to change equipment previously shipped.

9. RETURN OF GOODS In no case may products or parts be returned without Seller's prior written permission. Products or parts returned under the aforementioned Equipment Guarantee must be shipped with transportation charges prepaid. All other returns must be shipped with transportation charges prepaid and will be subject to a restocking charge. Only products of standard Bindicator manufacture will be accepted for return. Products which are specially modified or produced to the Buyer's specifications will not be accepted for return.

10. CONTRACT FORMATION A binding contract shall not be effective until a written purchase order is received at Seller's office in Port Huron, Michigan and accepted in writing by an authorized employee of the Seller at its Port Huron office. The terms and conditions in our quotation or acknowledgment shall govern the contract and any different or additional terms in Buyer's purchase order, unless approved by Seller in writing, are hereby objected to.

11. CONSTRUCTION Any agreement arrived at shall be considered to be a Michigan contract and shall be construed under the laws of the State of Michigan.

12. CANCELLATION Request for cancellation must be in writing and referred to Bindicator. No orders will be accepted with the understanding that they may later be cancelled. If and when cancellation is approved by Bindicator, it is with the understanding that Bindicator will be fully reimbursed by payment of cancellation charge: which are to be determined by Bindicator.

13. CERTIFICATION OF NONSEGREGATED FACILITIES Our firm does not maintain facilities of a segregated nature contrary to the provision of 41 CFR 60-1.8, and further that if we have 50 or more employees and our contractual arrangements of \$50,000 or more we have complied with 41 CFR 60-1.7 concerning the annual filing of a report on Standard Form 100 (EEO-1) and with 41 CFR 60-1.40 by developing a written Affirmative Action Compliance Program.



150 Venture Boulevard
Spartanburg, SC 29306
Phone: (864) 574-8060, Fax: (864) 574-8063
Customer Service: (800) 778-9242
Internet: www.bindicator.com
Email: sales@bindicator.com