Model ACC-52

DC Powered Version

Mag Coil Flow Rate Conditioner Frequency to Flow Alarm

USER'S MANUAL

HP-252
September 2004

HOFFER
Flow Controls
Perfecting Measurement™

107 Kitty Hawk Lane • P.O. Box 2145 • Elizabeth City, NC 27909
1-800-628-4584 • (252) 331-1997 • Fax (252) 331-2886
www.hofferflow.com email: info@hofferflow.com

Notice

HOFFER FLOW CONTROLS, INC. MAKES NO WARRANTY OF ANY KIND WITH REGARD TO THIS MATERIAL, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

This manual has been provided as an aid in installing, connecting, calibrating, operating, and servicing this unit. Every precaution for accuracy has been taken in the preparation of this manual; however, HOFFER FLOW CONTROLS, INC. neither assumes responsibility for any omissions or errors that may appear nor assumes liability for any damages that may result from the use of the products in accordance with information contained in the manual.

HOFFER FLOW CONTROLS' policy is to provide a user manual for each item supplied. Therefore, all applicable user manuals should be examined before attempting to install or otherwise connect a number of related subsystems.

During installation, care must be taken to select the correct interconnecting wiring drawing. The choice of an incorrect connection drawing may result in damage to the system and/or one of the components.

Please review the complete model number of each item to be connected and locate the appropriate manual(s) and/or drawing(s). Identify all model numbers exactly before making any connections. A number of options and accessories may be added to the main instrument, which are not shown on the basic user wiring. Consult the appropriate option or accessory user manual before connecting it to the system. In many cases, a system wiring drawing is available and may be requested from HOFFER FLOW CONTROLS.

HOFFER FLOW CONTROLS' policy is to make running changes, not model changes, whenever an improvement is possible. This affords our customers the latest in technology and engineering. The information contained in this document is subject to change without notice.

RETURN REQUESTS / INQUIRIES

Direct all warranty and repair requests/inquiries to the Hoffer Flow Controls Customer Service Department, telephone number (252) 331-1997 or 1-800-628-4584. BEFORE RETURNING ANY PRODUCT(S) TO HOFFER FLOW CONTROLS, PURCHASER MUST OBTAIN A RETURNED MATERIAL AUTHORIZATION (RMA) NUMBER FROM HOFFER FLOW CONTROLS' CUSTOMER SERVICE DEPARTMENT (IN ORDER TO AVOID PROCESSING DELAYS). The assigned RMA number should then be marked on the outside of the return package and on any correspondence.

FOR **WARRANTY** RETURNS, please have the following information available BEFORE contacting HOFFER FLOW CONTROLS:

1. P.O. number under which the product was PURCHASED,
2. Model and serial number of the product under warranty, and
3. Repair instructions and/or specific problems relative to the product.

FOR **NON-WARRANTY** REPAIRS OR **CALIBRATIONS**, consult HOFFER FLOW CONTROLS for current repair/calibration charges. Have the following information available BEFORE contacting HOFFER FLOW CONTROLS:

1. P.O. number to cover the COST of the repair/calibration,
2. Model and serial number of the product, and
3. Repair instructions and/or specific problems relative to the product.

LIMITED WARRANTY

HOFFER FLOW CONTROLS, INC. ("HFC") warrants HFC's products ("goods") described in the specifications incorporated in this manual to be free from defects in material and workmanship under normal use and service, but only if such goods have been properly selected for the service intended, properly installed and properly operated and maintained. This warranty shall extend for a period of one (1) year from the date of delivery to the original purchaser (or eighteen (18) months if the delivery to the original purchaser occurred outside the continental United States). This warranty is extended only to the original purchaser ("Purchaser"). *Purchaser's sole and exclusive remedy is the repair and/or replacement of nonconforming goods as provided in the following paragraphs.*

In the event Purchaser believes the goods are defective, the goods must be returned to HFC, transportation prepaid by Purchaser, within twelve (12) months after delivery of goods (or eighteen (18) months for goods delivered outside he continental United States) for inspection by HFC. If HFC's inspection determines that the workmanship or materials are defective, the goods will be either repaired or replaced, at HFC's sole determination, free of additional charge, and the goods will be returned, transportation paid by HFC, using he lowest cost transportation available.

Prior to returning the goods to HFC, Purchaser must obtain a Returned Material Authorization (RMA) Number from HFC's Customer Service Department within 30 days after discovery of a purported breach of warranty, but no later than the warranty period; otherwise, such claims shall be deemed waived. See the Return Requests/Inquiries Section of this manual.

If HFC's inspection reveals the goods are free of defects in material and workmanship or such inspection reveals the goods were improperly used, improperly installed, and/or improperly selected for service intended, HFC will notify the purchaser in writing and will deliver the goods back to Purchaser upon (i) receipt of Purchaser's written instructions and (ii) the cost of transportation. If Purchaser does not respond within thirty (30) days after notice from HFC, the goods will be disposed of in HFC's discretion.

HFC does not warrant these goods to meet the requirements of any safety code of any state, municipality, or other jurisdiction, and Purchaser assumes all risk and liability whatsoever resulting from the use thereof, whether used singly or in combination with other machines or apparatus.

This warranty shall not apply to any HFC goods or parts thereof, which have been repaired outside HFC's factory or altered in any way, or have been subject to misuse, negligence, or accident, or have not been operated in accordance with HFC's printed instructions or have been operated under conditions more severe than, or otherwise exceeding, those set forth in the specifications for such goods.

THIS WARRANTY IS EXPRESSLY IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. HFC SHALL NOT BE LIABLE FOR ANY LOSS OR DAMAGE RESULTING, DIRECTLY OR INDIRECTLY, FROM THE USE OR LOSS OF USE OF THE GOODS. WITHOUT LIMITING THE GENERALITY OF THE FOREGOING, THIS EXCLUSION FROM LIABILITY EMBRACES THE PURCHASER'S EXPENSES FOR DOWNTIME OR FOR MAKING UP DOWNTIME, DAMAGES FOR WHICH THE PURCHASER MAY BE LIABLE TO OTHER PERSONS, DAMAGES TO PROPERTY, AND INJURY TO OR DEATH OF ANY PERSONS. HFC NEITHER ASSUMES NOR AUTHORIZES ANY PERSON TO ASSUME FOR IT ANY OTHER LIABILITY IN CONNECTION WITH THE SALE OR USE OF HFC'S GOODS, AND THERE ARE NO ORAL AGREEMENTS OR WARRANTIES COLLATERAL TO OR AFFECTING THE AGREEMENT. *PURCHASER'S SOLE AND EXCLUSIVE REMEDY IS THE REPAIR AND/OR REPLACEMENT OF NONCONFORMING GOODS AS PROVIDED IN THE PRECEDING PARAGRAPHS. HFC SHALL NOT BE LIABLE FOR ANY OTHER DAMAGES WHATSOEVER INCLUDING INDIRECT, INCIDENTAL, OR CONSEQUENTIAL DAMAGES.*

TABLE OF CONTENTS

SECTION I

GENERAL

The Model ACC-52 is a flowrate converter which provides a flowrate alarm output with a user programmable alarm trip point and also provides a voltage output proportional to flowrate. A conditioned pulse output with limited pulse scaling is also provided for applications involving remote transmission of a frequency or pulse output.

Two basic versions of the ACC-52 are available depending on the number of alarm trip points required. The standard version offers a single trip point with a ten turn alarm trip point dial. The second version has two alarm trip points with a 270° scale and with a more limited selection of alarm output types.

Alarm Outputs are available in the forms of Open Collector, TTL/CMOS, and Low Power Relay types.

The analog output voltage signal is directly proportional to input frequency generated by the flowmeter as a linear function of flowrate. Several Ranges are available. Span and Zero Controls are provided.

Several Output Pulse configurations are available which offer flexibility in choosing the interface required by the host system. The output is available in TTL/CMOS and Open Collector configurations. Switch selectable binary pulse scaling of divide by 1, 2, 4, 8, 16 and 32 are standard with divide by 64 and 128 optionally available on special order. The pulse scaling is intended to reduce the output pulse frequency where required.

The input signal conditioning circuitry is designed for use with flowmeters equipped with magnetic pickups. The input circuitry accepts the low level turbine flowmeter signal while providing rejection of unwanted noise and spurious signals. A signal threshold control allows the user to set the input sensitivity above the background noise level, thereby eliminating any false signal from being accepted.

As a member of the Hoffer ACC Series of Turbine Flowmeter Interface Accessories, the ACC-52 is enclosed in the standard Style 2 enclosure thereby providing a compact assembly suitable for mounting indoors. Optional enclosures provide for Nema-4 and Explosion Proof service ratings.

The ACC-52 is available with power options of 15-35 VDC and 115 VAC 50/60 Hz.

SPECIFICATIONS

SIGNAL INPUT

General	Magnetic Pickup Compatible. Input Protected, RF and Bandpass Filtered. Adjustable Trigger Level.
Input Impedance	40 K-Ohm (Nominal).
Trigger Sensitivity	10 mVrms.
Input Frequency Range	10 to 2500 Hz
Over-voltage Protection Limit	130 Vrms

ALARM TRIP POINTS

Single Alarm	10 turn dial calibrated 0 - 100% of span.
Dual Alarm	Two 0 to 270° rotation calibrated 0 - 100% of span.
Deadband	2% of span.
Setpoint Accuracy	1% span.

ALARM OUTPUTS

Table A - Alarm Output Matrix

Output Type	Above Alarm	Below Alarm	Power Fail
TTL/CMOS	Logic 1	Logic 0	5.6 Kohms
Open Collector	OFF	ON	OFF
Relay	OFF	Energized	OFF

Response Time	Two second delay on alarm for 0 to 110% of trip point input excitation.
TTL/CMOS	Logic 1 (TTL) 2.4 VDC at -0.5 mA Logic 1 (CMOS) 4.5 VDC at -0.1 mA Logic 0 -- 0.4 VDC at 100 mA
Open Collector	Maximum OFF State Voltage -- 60 VDC. Saturation Voltage -- 0.4 VDC (100 mA).
Relay Output	Form C.
Contact Rating	0.6 @ 125 VAC, 0.6 @ 110 VDC and 2 @ 30 VDC

SPECIFICATIONS (CONTINUED)

ANALOG OUTPUT

Available Range Options	0 to 5 VDC and 0 to 10 VDC
Output Impedance	5 ohms
Minimum Load Resistance	1000 ohms
Linearity	0.1% FS (0.05% FS Typical)
Temperature Effects	250 PPM/degree C
Response Time (10 - 90%)	0.5 seconds
Short Circuit Protection	Current limited for shorts to common at about 15 mA.
Effect of Line Power Variations	0.0025% Span/% Line Variation

PULSE OUTPUT

Available Forms	TTL/CMOS, Open Collector, HTL
Pulse Scaling	Divide by 1, 2, 4, 8, 16, 32 standard. Divide by 64, 128 special order.
Open Collector	Maximum Collector OFF Voltage = 60 V. Maximum ON Current 1 amp.
TTL/CMOS	4.5 VDC at 1.2 mA. 0.4 VDC at 100 mA.

POWER

AC Option	115 ±10%
DC Option	15 to 35 VDC.

ENVIRONMENTAL

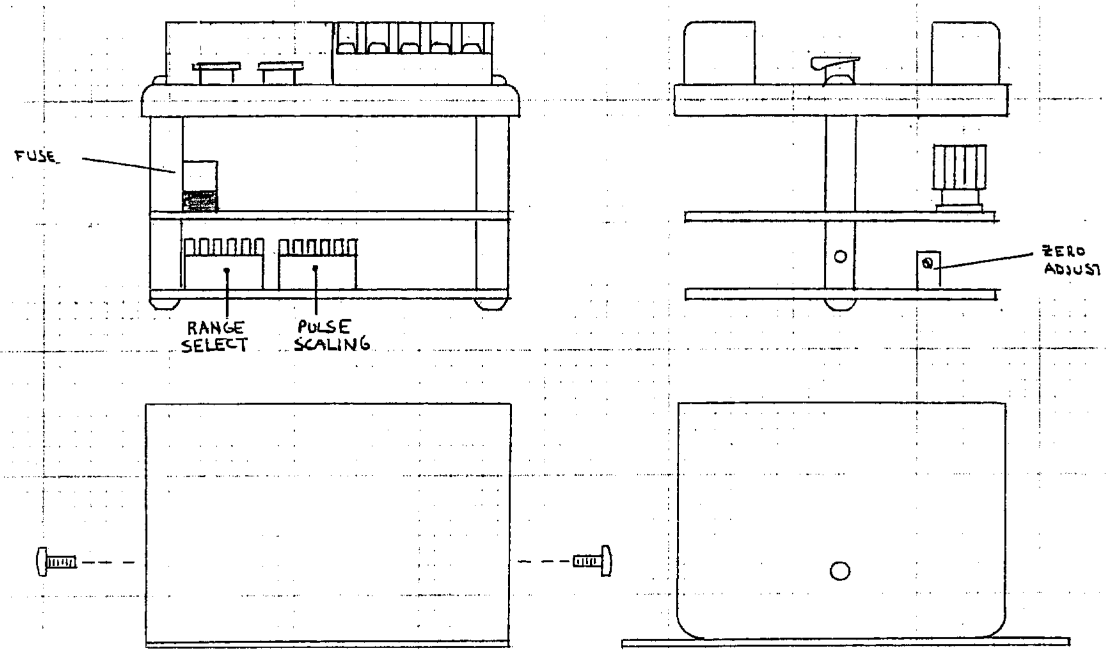
Enclosure	ACC Series Style-2 Standard. Explosion Proof and NEMA-4 Optional
Operating Temperature	-40 to 85 degrees Centigrade.
Warm-up Time	10 minutes

CONTROLS AND ADJUSTMENTS

ALARM TRIP SETPOINT

Single Alarm Option	A ten turn control with a dial calibrated 0 to 100% of span.
Dual Alarm Option	270 degree rotation over scale with 25 graduations from 0 to 100%.
Course Range	Six position DIP switch located on the PCA-95. Used to select the range of the input frequency.
Fuse	A circuit protection device on the PCA-94 for AC power option.
Scaling Factor	A six position DIP Switch located on the PCA-95. Used to select pulse output scaling factor.
Sensitivity	A 20 turn, external adjustment used to set the input trigger threshold above the background noise pickup.
Span	A 20 turn, external adjustment to set the span of the analog output.
Zero	A 20 turn, internal adjustment to set the zero of the analog output.

SUB ASSEMBLY DETAIL



SERVICING PROCEDURE

TO REMOVE COVER/PRINTED CIRCUIT SUBASSEMBLY

1. TURN POWER TO ACC-52 OFF
2. REMOVE TWO MACHINE SCREWS FROM SIDE OF CASE.
3. LIFT COVER/PRINTED CARD ASSEMBLY OUT.

REPLACING FUSE

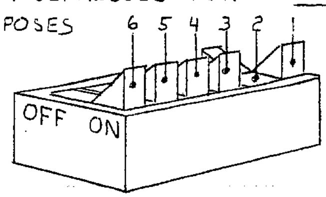
1. REMOVE COVER/PRINTED CIRCUIT SUB ASSEMBLY.
2. LOCATE FUSE ON SUB ASSEMBLY
3. PULL FUSE FROM SOCKET USING FINGERS. (PLIERS NOT RECOMMENDED)
4. INSTALL NEW FUSE (.50mA FUSE)
5. REASSEMBLE

RANGE SELECT/PULSE SCALING PROGRAM

1. REMOVE COVER/PRINTED CIRCUIT ASSEMBLY.
2. TURN 'ON' DESIRED RANGE AND PULSE SCALING POSITION USING A BALL POINT PEN OR SIMULIAR OBJECT, SEE RANGE SELECT/PULSE SCALING DETAIL
3. REASSEMBLE

RANGE SELECT/PULSE SCALING DETAIL

SWITCH 2 IS SHOWN DEPRESSED FOR ILLUSTRATIVE PURPOSES ONLY.



NOTE: SELECT ONE SWITCH ONLY ALL OTHER SWITCHES MUST BE OFF.

RANGE SELECT

SWITCH POSITION	F MAX
1	75-150
2	150-300
3	300-600
4	600-1200
5	1200-2400
6	2400-4800

PULSE SCALING

SWITCH POSITION	DIVIDE BY
1	1
2	2
3	4
4	8
5	16
6*	32,64,128 *

* DIVIDE BY 32, 64, OR 128 IS FACTORY WIRED CONSULT FACTORY IF CHANGE IS DESIRED

LET.	DATE	CHANGE	BY	APP.

REVISIONS

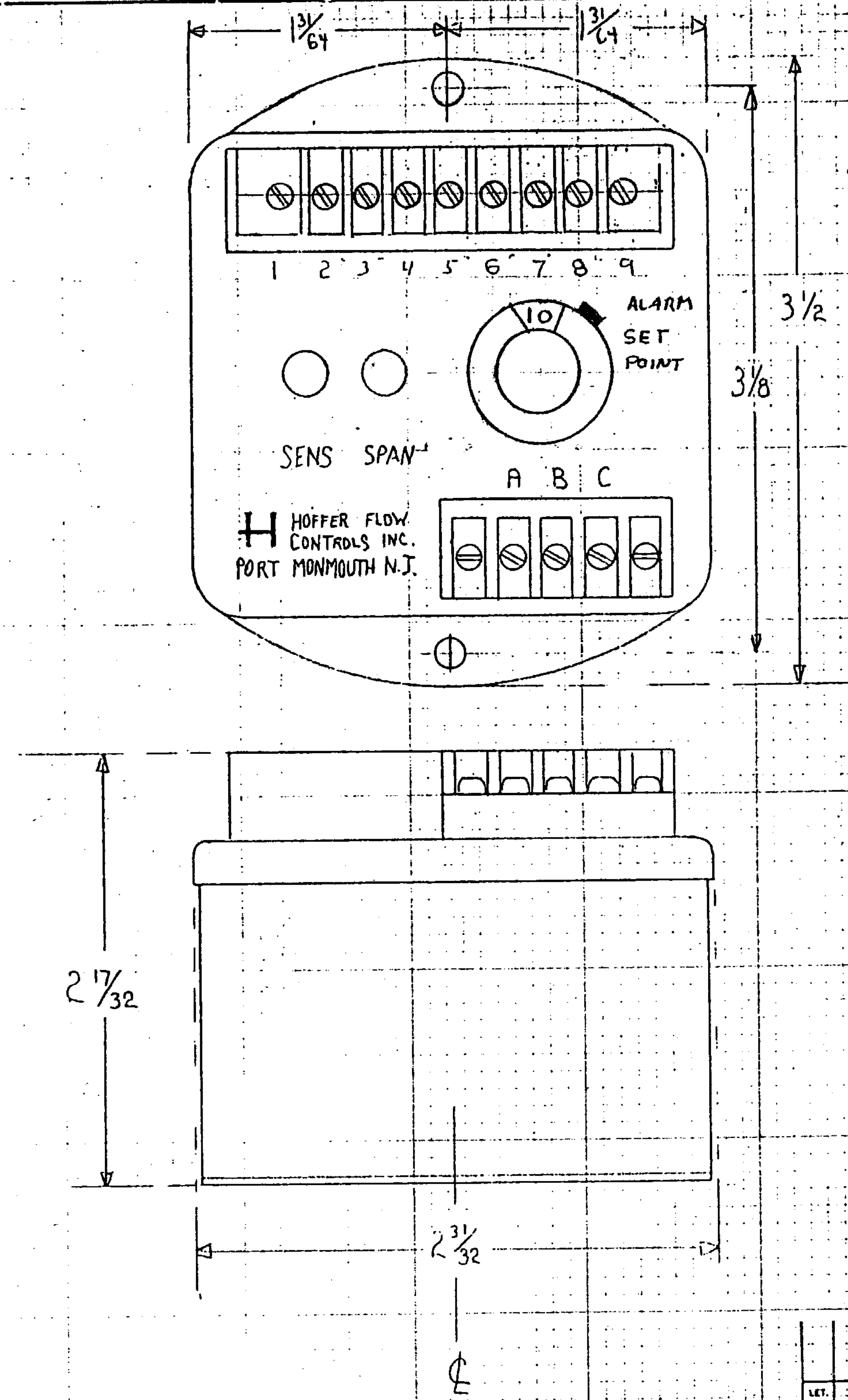
TITLE CONTROLS AND ADJUSTMENTS DETAIL

HOFFER FLOW CONTROLS, INC. CODE 33321

CONFIDENTIAL PROPERTY OF HOFFER FLOW CONTROLS INC. (HFC) NOT TO BE DISCLOSED TO OTHERS, REPRODUCED, OR USED FOR ANY PURPOSE, EXCEPT AS AUTHORIZED IN WRITING BY HFC. MUST BE RETURNED TO HFC ON DEMAND, ON COMPLETION OF ORDER, OR OTHER PURPOSES FOR WHICH LENT.

DWG. SIZE B ACC-52 -401 REV.

SCALE N/A SHEET 1 OF 1



NOTES-

1. SPAN AND ZERO ARE ONLY EQUIPPED FOR ANALOG OUTPUT OPTION

LET.	DATE	CHANGE	BY	APP.

REVISIONS

DWN. JT	DATE 4/82	CK.
ENGR. RS.	MFG. ENGR.	DATE 11/82

TITLE OUTLINE DRAWING ACC 52 IN STYLE-2 CASE

HOFFER FLOW CONTROLS, INC. CODE 33321

DWG. SIZE A | ACC-52-403 | REV.

SCALE N/A | SHEET 1 OF 1

SECTION II

FLOWMETER INSTALLATION

GENERAL

Proper application of the turbine flowmeter requires a suitable piping installation in order to achieve accurate and reliable operation.

The piping configuration immediately preceding and following the flowmeter is termed the meter run. Refer to the manufacturer's outline and installation instructions when installing the flowmeter and meter run.

RELATIVE - The performance of the turbine flowmeter is affected by the fluid swirl and non-uniform velocity profiles. The following recommendation will reduce such flow irregularities.

It is advisable not to locate the meter run immediately downstream of pumps, partially opened valves, bends or other similar piping configurations. In addition, the area surrounding the flowmeter should be free of sources of electrical noise such as motors, solenoids, transformers and power lines which may be coupled to the pickoff device.

The metering section should not be subjected to excessive vibration or shock. Such a condition may result in an mechanically induced output signal from the pickoff device.

METER RUN - In general, the meter run should be chosen to have the same inner diameter as the meter bore. A minimum of 10 pipe diameters of straight pipe upstream and 5 pipe diameters downstream are required. Where this optimum line configuration can not be implemented, it is advisable to install a flow straightener properly positioned upstream of the flowmeter. Orientation is not a critical factor, however, horizontal is a preferred orientation.

BYPASS - A properly sized bypass run with suitable blocking valves may be equipped where an interruption in fluid flow for turbine meters servicing can not be tolerated.

STRAINER - A strainer, filter and/or air eliminator is recommended to reduce the potential of fouling or damage. See table for recommended mesh size.

On initial startup of a line, it is advisable to install a spool piece purging the line to eliminate damaging the flowmeter, due to flux, tape, solder, welds or other contaminates carried along by the fluid stream.

CAVITATION - Cavitation causes measurement inaccuracies in turbine flowmeter and should be avoided by suitable line and operating configurations.

Whenever the pressure within a pipeline instantaneously falls below the equilibrium vapor pressure of the fluid, a portion of the fluid vaporizes and forms bubbles in the pipeline. This is termed cavitation. Cavitation is eliminated by maintaining adequate back pressure on the flowmeter. A downstream valve that provides the necessary back pressure is one means for preventing cavitation in the metering run. Control valves should be located downstream, if possible. Some installations may also make use of a vapor eliminator upstream of the flowmeter.

The minimum required back pressure may be estimated using Equation A:

Equation A - Back Pressure Equation

Min: Back Pressure = 1.25 X Vapor Pressure + 2 X Pressure Drop

INSTALLATION WIRING LAYOUT FOR INTERCONNECTIONS

In considering the interconnection between the flowmeter and the flow measurement system some attention must be given to anticipated noise sources and to the coupling of these noise sources to the interconnecting wiring.

Noise signals may be coupled inductively or capacitvely into the wiring between the flowmeter and the electronic measuring systems. In general, utilizing a shielded, twisted pair for the interconnection greatly reduces this coupling. The shield should be grounded on one end of the cable only. In general, grounding only on the electronic measuring system is best.

However, even with proper interconnecting cabling crosstalk with other signal lines or power lines may still occur and should be avoided. Physical isolation in the manner in which the wiring is run reduces the chances of potential problems.

It is common to transmit the low level output signal from the flowmeter several hundred feet through a shielded, twisted pair instrument cable. Where a noise environment is suspect, it is recommended that a preamplifier be installed on or near the flowmeter to assure the preservation of flow information from the flowmeter to the electronic measuring system. Suitable accessory models are available from manufacturer.

PLANNING THE INSTALLATION OF THE ACC-52 (DC VERSION)

The ACC-52 should be placed in a convenient location which maintains access to the unit should repairs or readjustment be required.

Refer to the case outline and installation drawing for the appropriate case type to be installed. Drill appropriate mounting holes as required.

Refer to the wiring installation drawing for appropriate terminals for the interconnections. Connections to the terminal block should be carefully dressed to avoid having bare wires extending pass the screw clamp on the terminal block. This is particularly important for units mounted in an explosion proof enclosure. Wiring should be neatly dressed near the bottom of the enclosure to assure the wiring will not become fouled when the cover is installed.

Connect the two conductor shielded cable from the flowmeter. Connect the shield to the ACC-52 only.

Connect the analog voltage output to the desired, compatible receiving instrument if used. Be sure to observe polarity at the receiving end. Shielded wiring is recommended.

Connect the pulse output to the desired, compatible receiving instrument. Be sure to observe polarity. Shielded wiring is recommended.

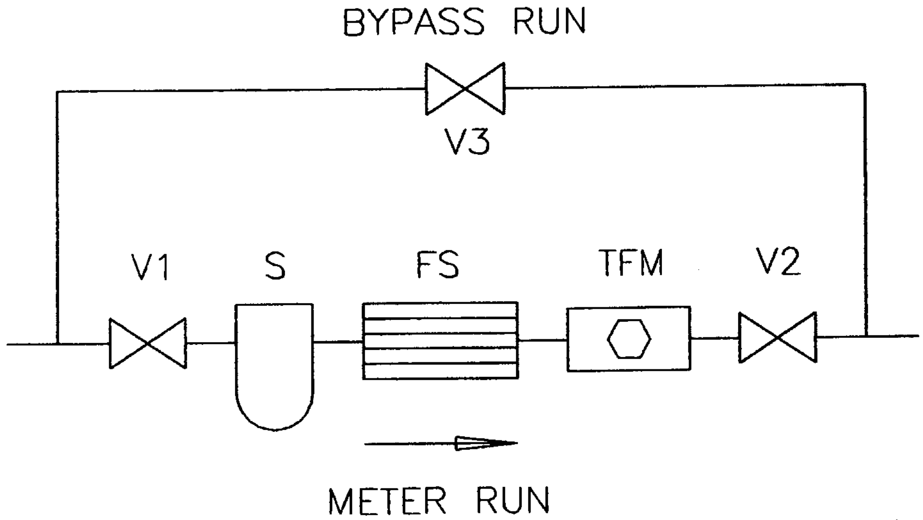
Connect the alarm output to the desired alarm receiving device, be certain that the alarm output type desired is the same as that supplied.

The power source voltage should be the same as that specified in the model number and of the correct type AC/DC. Connection to the power should be made through a circuit breaker so that power can be turned off while servicing the unit. An earth ground is required in most instances to properly terminate shields.

NOTES:
1. FACTORY RECOMMENDS 10" PIPE DIA. UPSTREAM AND 5 PIPE DIA. DOWNSTREAM OF SAME SIZE PIPE AS FLOWMETER. A FLOW STRAIGHTENER IS RECOMMENDED IF THIS IS NOT POSSIBLE OR FOR CUSTODY TRANSFER APPLICATIONS.

REVISIONS

REV	DESCRIPTION	DATE	APP
A	REDRAWN	1-31-92	
B	ADDED NOTE 2, CHG'D MESH SIZE	3-17-92	
C	DRAWING NO. WAS INSTL-104.	950907	



METER SIZE	MESH SIZE
MF SERIES	100
1/4" - 1/2"	100
5/8" - 1 1/4"	70
1 1/2" - 3"	40
4" - 12"	24

V1, V2	BLOCKING VALVE
S	STRAINER
FS	FLOW STRAIGHTENER
TFM	TURBINE FLOWMETER
V3	BYPASS VALVE

REPLACES INSTL-104

NEXT ASSY	USED ON
APPLICATION	

MATERIAL

FINISH

		DATE
DRAWN	DW	1-31-92
CHECK	JD	1-31-92
QA	H.COVELL	1-31-92
PROJ ENG	KRH	1-31-92

HOFFER FLOW CONTROLS, INC.
ELIZABETH CITY, NC 27909

TITLE
TYPICAL TURBINE INSTALLATION

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES OTHER THAN RAW MATERIAL SHALL BE HELD AS FOLLOWS:

2 PLACE DECIMAL	±.01
3 PLACE DECIMAL	±.005
FRACTIONAL	±1/64
ANGULAR	±1/2°

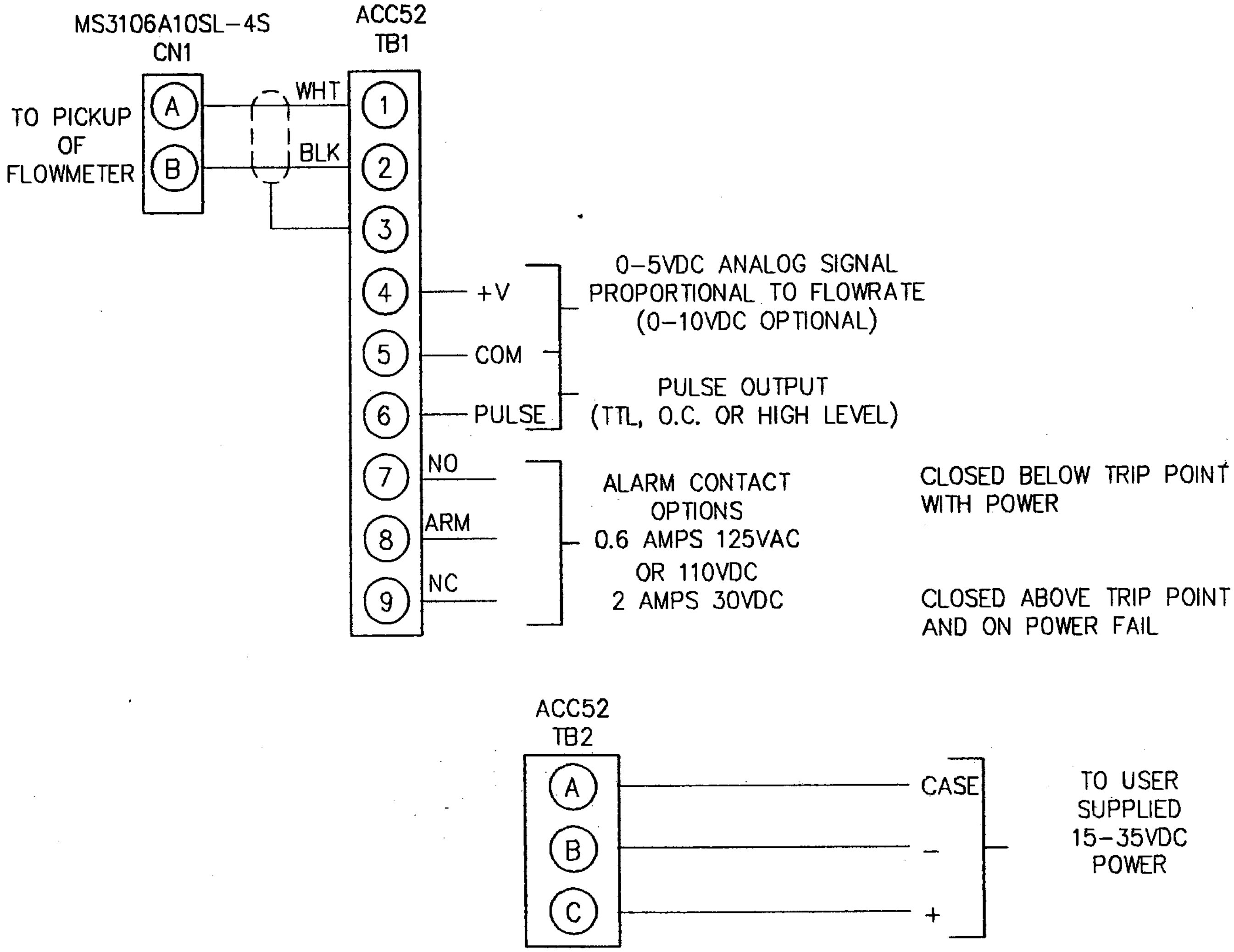
SIZE	CAGE CODE	DWG NO	REV
A	33321	500-0194	C

SCALE NONE   SHEET 1 OF 1

H:\dRAWINGS\500\50001941.DWG

REVISIONS

REV	DESCRIPTION	DATE	APP
A	CHANGED WIRING TO TB2 (RG)	12/86	
B	REDRAWN ON CAD. (CS)	930820	



NEXT ASSY	USED ON	
APPLICATION		
MATERIAL		
FINISH		

CONFIDENTIAL PROPERTY OF HOFFER FLOW CONTROLS, INC. (HFC) NOT TO BE DISCLOSED TO OTHERS, REPRODUCED, OR USED FOR ANY OTHER PURPOSE, EXCEPT AS AUTHORIZED IN WRITING BY HFC. MUST BE RETURNED ON DEMAND, ON COMPLETION OF ORDER OR OTHER PURPOSE FOR WHICH LENT.

CONTRACT/JN		DATE
DRAWN	R.G.	12/85
CHECK	J.D.	12/85
QA		
PROJ ENG	R.G.	12/85

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES OTHER THAN RAW MATERIAL SHALL BE HELD AS FOLLOWS:

2 PLACE DECIMAL	±.01
3 PLACE DECIMAL	±.005
FRACTIONAL	±1/64
ANGULAR	±1/2?

HOFFER FLOW CONTROLS, INC.
ELIZABETH CITY, NC 27909

TITLE

USER WIRING
ACC52-3-3-1-X-D-2

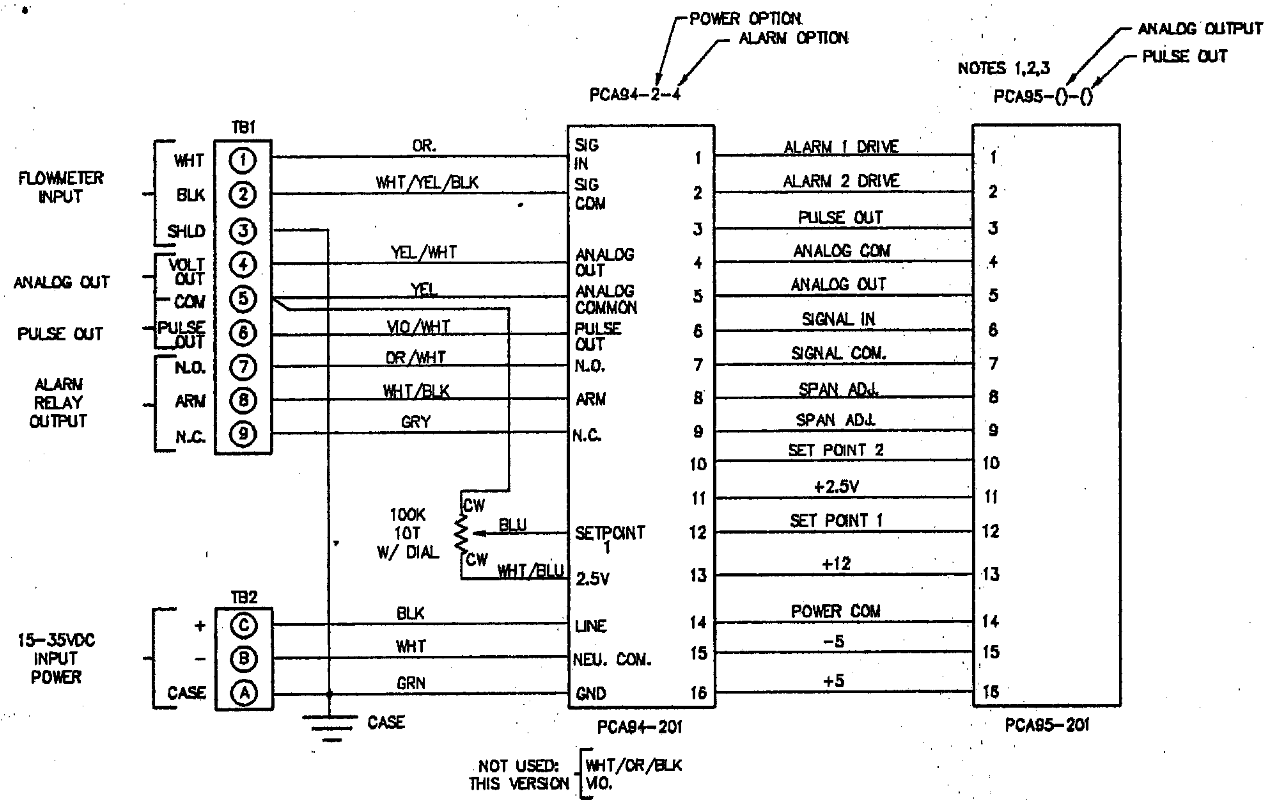
SIZE	FSCM NO	DWG NO	REV
A	33321	ACC52-701	B
SCALE NONE		SHEET 1 OF 1	

DWG NO. ACC52-302 | SH 1 | REV B

NOTES:
1. SEE NOTES FOR PCA-94, PCA-95 AND ORDERING INFORMATION FOR ACC52 FOR OPTION SELECTIONS.
2. PULSE OUTPUT CONFIGURED AT FINAL TESTING.
3. ANALOG OUTPUT SPAN CONFIGURED AT FINAL TESTING.

REVISIONS

ZONE	REV	DESCRIPTION	DATE	APP
	A	CASE WIRING TB-2	12/86	
	B	REDRAWN ON CAD. (CS)	930514	



		MATERIAL	CONTRACT/JN	
			DRAWN R.G.	DATE 12/85
			CHECK	
		FINISH	QA	
			PROJ ENG R.G.	12/85
NEXT ASSY	USED ON	CONFIDENTIAL PROPERTY OF HOFFER FLOW CONTROLS, INC. (HFC) NOT TO BE DISCLOSED TO OTHERS, REPRODUCED, OR USED FOR ANY OTHER PURPOSE, EXCEPT AS AUTHORIZED IN WRITING BY HFC. MUST BE RETURNED ON DEMAND, ON COMPLETION OF ORDER OR OTHER PURPOSE FOR WHICH LENT.	UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES. TOLERANCES OTHER THAN THE SIZE OF RAW MATERIAL SHALL BE HELD AS FOLLOWS: 2 PLACE DECIMALS ± .01; 3 PLACE DECIMALS ± .005; FRACTIONAL ± 1/64; ANGULAR ± 1/2°	
APPLICATION				

HOFFER FLOW CONTROLS, INC
ELIZABETH CITY, NC 27909

TITLE: INTERNAL WIRING, ACC52 – RELAY OUTPUT/DC POWER

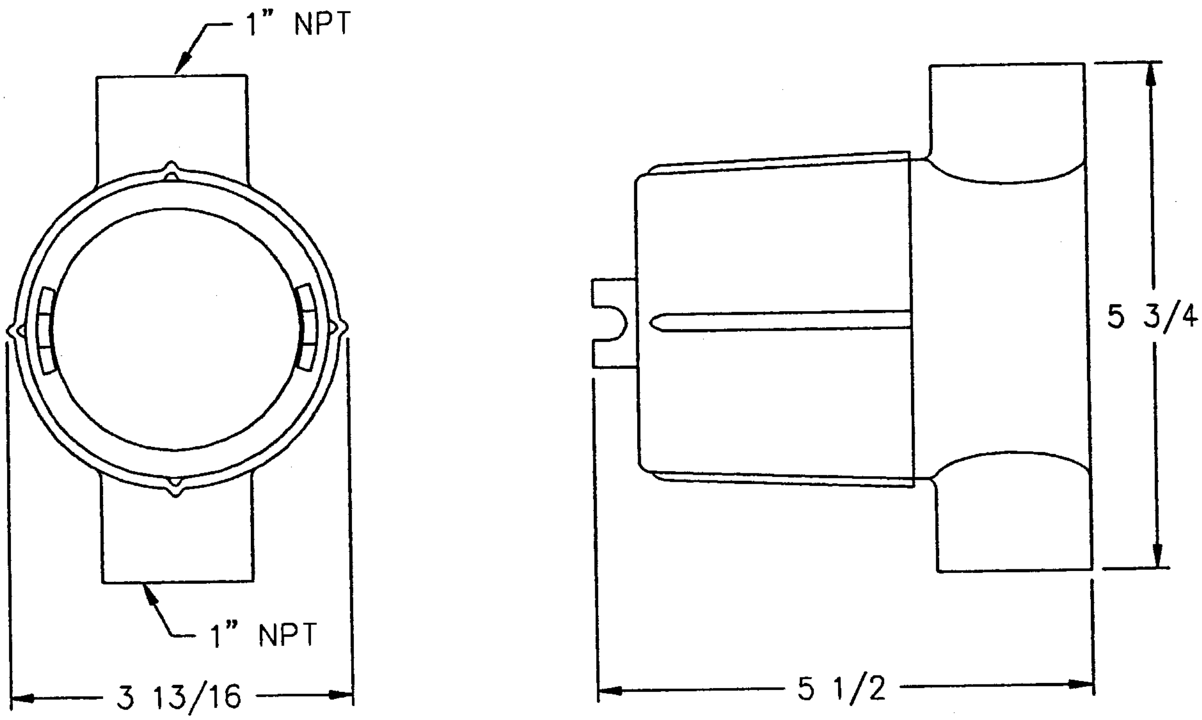
SIZE C | CAGE CODE 33321 | DWG NO ACC52-302 | REV B

SCALE NONE | SHEET 1 OF 1

REVISIONS			
REV	DESCRIPTION	DATE	APP

NOTES:

1. ENCLOSURE MEETS:
   CLASS I, GROUP C & D
   CLASS II, GROUP E, F & G
   NEMA 7 & 9
2. USED WHEN SIGNAL CONDITIONER IS ENCLOSED, MOUNTED OR REMOTE.



		MATERIAL	DRAWN	DATE 940831
			CHECK	
			PROJ ENG	940831
		FINISH		
NEXT ASSY	USED ON	CONFIDENTIAL PROPERTY OF HOFFER FLOW CONTROLS, INC. (HFC) NOT TO BE DISCLOSED TO OTHERS, REPRODUCED, OR USED FOR ANY OTHER PURPOSE, EXCEPT AS AUTHORIZED IN WRITING BY HFC. MUST BE RETURNED ON DEMAND, ON COMPLETION OF ORDER OR OTHER PURPOSE FOR WHICH LENT.	UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES OTHER THAN RAW MATERIAL SHALL BE HELD AS FOLLOWS: 2 PLACE DECIMAL ±.01; 3 PLACE DECIMAL ±.005; FRACTIONAL ±1/64; ANGULAR ±1/2°	
APPLICATION				

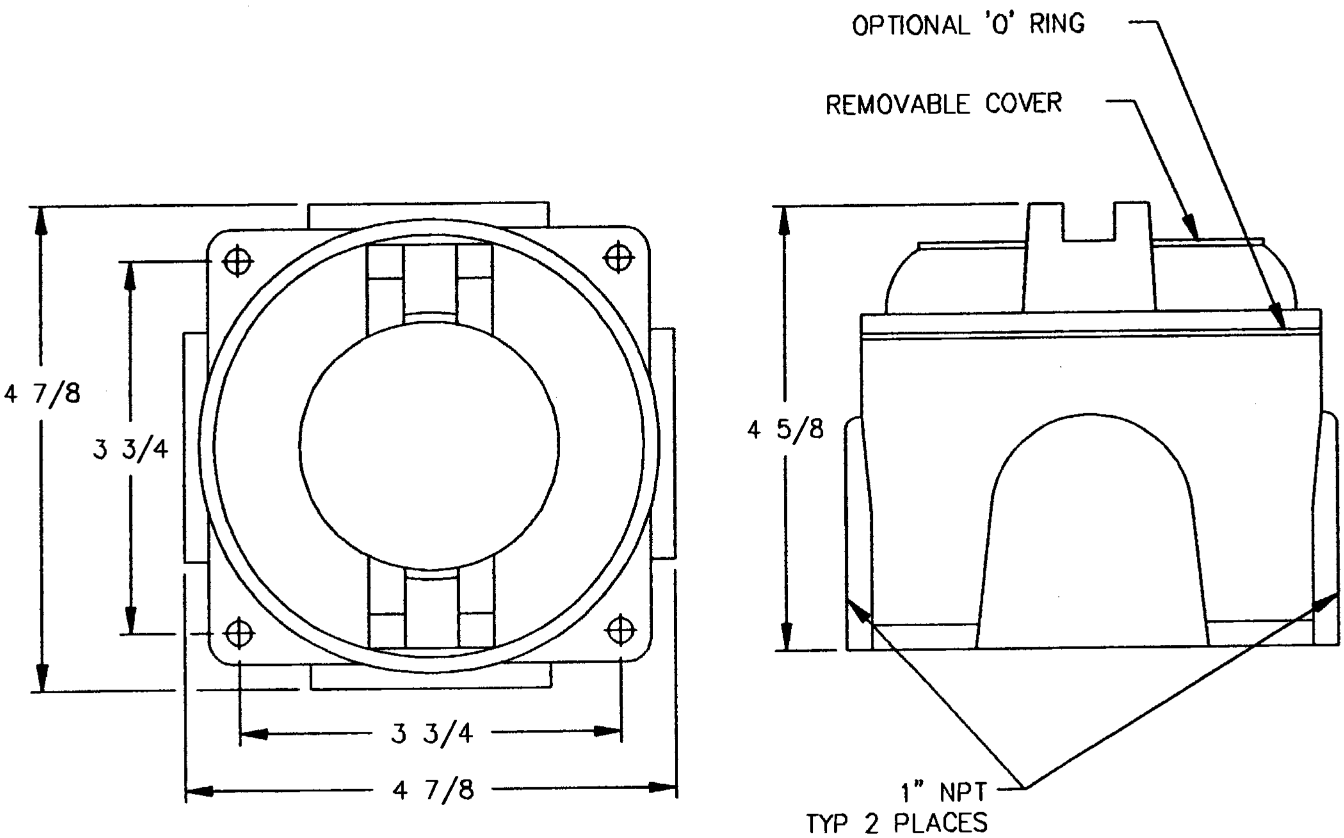
HOFFER FLOW CONTROLS, INC.
ELIZABETH CITY, NC 27909

TITLE ENCLOSURE, EXPLOSION PROOF-STYLE 3

SIZE	CAGE CODE	DWG NO	REV
A	33321	500-0018	–
SCALE NONE		SHEET 1 OF 1	

REVISIONS			
REV	DESCRIPTION	DATE	APP

NOTES:
ENCLOSURE MEETS:
CLASS I, GROUPS C & D
CLASS II, GROUPS E, F & G
NEMA 7 & 9



		MATERIAL	DRAWN Sweet	DATE 940831
			CHECK	
			PROJ ENG	941031
		FINISH		
NEXT ASSY	USED ON			
APPLICATION				

HOFFER FLOW CONTROLS, INC.
ELIZABETH CITY, NC 27909

TITLE
ENCLOSURE, EXPLOSION PROOF- STYLE 4

CONFIDENTIAL PROPERTY OF HOFFER FLOW CONTROLS, INC. (HFC) NOT TO BE DISCLOSED TO OTHERS, REPRODUCED, OR USED FOR ANY OTHER PURPOSE, EXCEPT AS AUTHORIZED IN WRITING BY HFC. MUST BE RETURNED ON DEMAND, ON COMPLETION OF ORDER OR OTHER PURPOSE FOR WHICH LENT.

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES OTHER THAN RAW MATERIAL SHALL BE HELD AS FOLLOWS:

2 PLACE DECIMAL	±.01
3 PLACE DECIMAL	±.005
FRACTIONAL	±1/64
ANGULAR	±1/2?

SIZE	FSCM NO	DWG NO	REV
A	33321	500-0021	—
SCALE NONE		SHEET 1 OF 1	

THIS PAGE LEFT INTENTIONALLY BLANK.

SECTION III

CALIBRATION OF ANALOG OUTPUT - GENERAL CONSIDERATIONS

INTRODUCTION

In general, all flow measurement systems supplied by Hoffer Flow Controls have been factory calibrated as specified by the user, at the time of purchase, free of charge.

All systems which underwent such a factory calibration have a calibration card attached prior to shipment. This card contains the details of analog outputs, as well as other useful calibration data.

Field calibration is only required when a change has occurred or is sought to the measuring system. Such a change may be due to repair, replacement or recalibration of the flowmeter, or perhaps a change in the analog output span.

PROCEDURE

Begin by determining the equivalent maximum volumetric flowrate in GPM, expected by the application, term this GPM (MAX). GPM (MAX) may be calculated based on the analog output scale requirements or may be the maximum flowrate listed on the flowmeter's calibration sheet.

From the calibration constant (or K Factor) listed on the data sheet for the flowmeter, obtain the frequency corresponding to GPM (MAX) using Equation B and designate this frequency F (MAX).

Equation B - Frequency Equation

$$F_{MAX} = \frac{K_{AVG} \ X \ GPM_{MAX}}{60}$$

FOR ANALOG OPTION

The analog output of the ACC-52 may be calibrated with the aid of an external oscillator used in conjunction with a frequency counter.

The external oscillator is used to supply a test frequency. In this method, the external oscillator is connected to the signal input terminals as shown in Figure 1. The oscillator's output frequency is set to equal F (MAX) as indicated on the frequency counter.

1. The course range adjustment is accomplished by selecting a switch position on a DIP switch located on the PCA-57 printed circuit card. See Table A to determine required switch position and set into switch as shown on drawing ACC-52-403 for anticipated F Max.

2. Connect a digital voltmeter or equivalent, across the voltage output terminals.

3. Adjust ZERO control for desired zero voltage (i.e., .001 VDC, .000 VDC).

4. Turn SPAN POT fully CCW until detent is felt or 25 turns.

5. Inject the Test Frequency equal to F (MAX) while adjusting SPAN for voltage equal to +5.000 V ±1 mV. See test setup shown in Figure 1.

NOTE: *Iterate steps 3 and 4 until no change is observed.*

<u>FOR PULSE SCALING OPTION</u>

1. An optional DIP switch is located on the PCA-95 printed circuit card. See Table C to determine required switch position and set into switch, as shown in the *Controls and Adjustments drawing*, for required divide by N.

2. For a required divide by 64 or 128 switch position 6 must be jumpered as shown in the *Controls and Adjustments drawing (ACC-52-401)*.

Table B - Analog Switch Position

F (MAX)	RANGE SELECT SWITCH POSITION
75 TO 150	1
150 TO 300	2
300 TO 600	3
600 TO 1200	4
1200 TO 2400	5
2400 TO 4300	6

Table C - Pulse Scaling Switch Position

) N	SWITCH POSITION
1	1
2	2
4	3
8	4
16	5
32	
64*	6
128*	

**NOTE:* *For divide by 32, 64, or 128, switch position 6 is jumpered to appropriate location on PCA-52 printed circuit board.*

<u>CALIBRATION AND SETUP OF THE ACC-52 ALARMS</u>

The alarm trip points are selected by an adjustment which has a calibrated scale of 0-100% of the span of the analog output.

In the ACC-52, the span of the analog output is established during the preceding calibration procedure.

To calculate the alarm trip point setting in percent of the full scale span, perform the following calculation:

Equation C - Determining Alarm Trip Point Setting

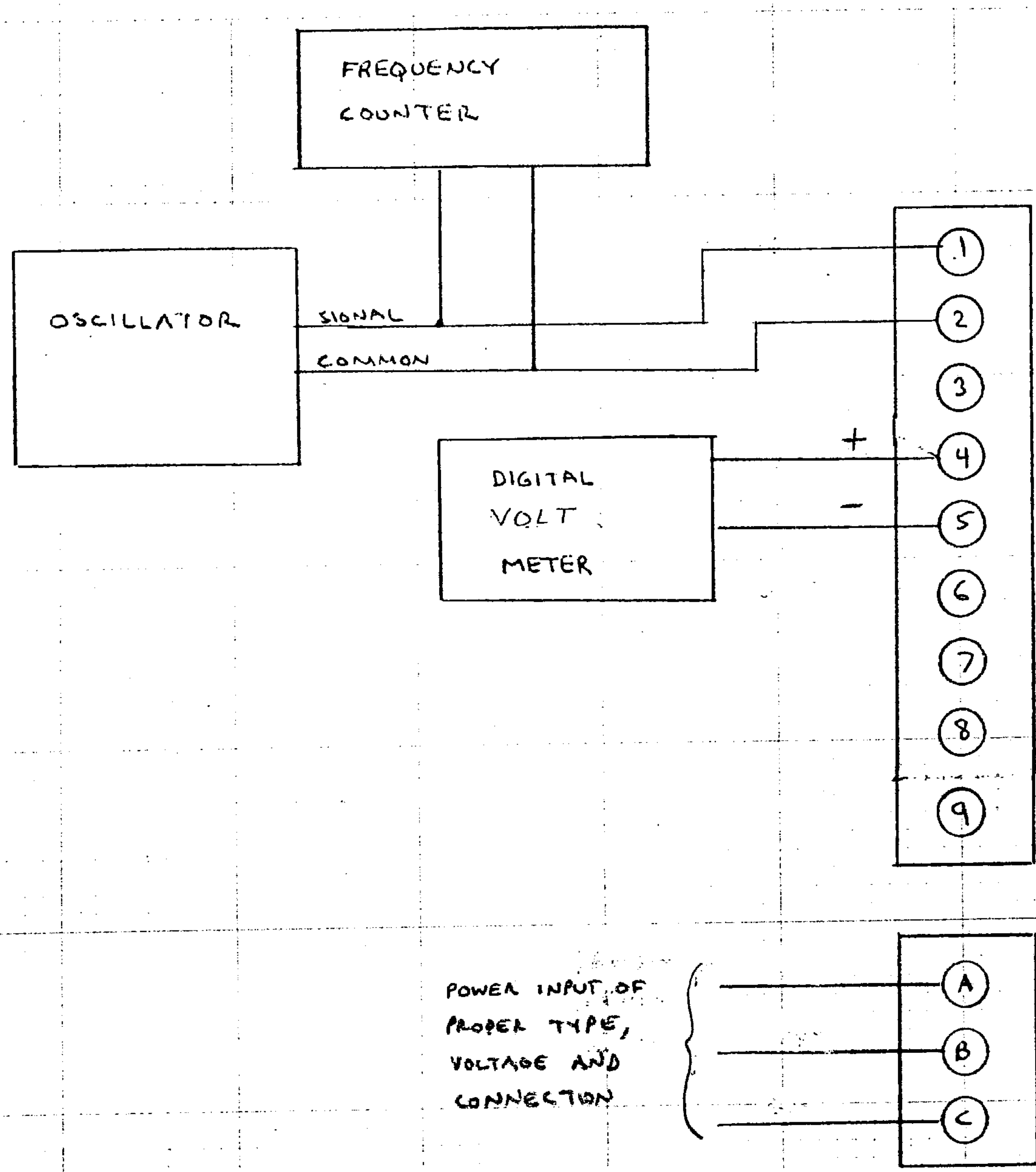
Given: Full Scale Flowrate of analog output in GPM
Desired Flowrate Trip Point in GPM

$$\text{Alarm Setting in Percent} = \frac{\text{Trip Point GPM}}{\text{Full Scale GPM}} \text{ X } 100\%$$

In some configuration of the ACC-52, more than one alarm trip point is supplied. In this case the above equation is recalculated for the second alarm trip point.

The calibration dials for the alarm trip point make selecting the trip point easy.

There are several forms of the alarm outputs available. Single alarms are available in Form C relay output, TTL/CMOS logic level and finally in the form of a "NPN" type open collector transistor. Dual alarm types only offer TTL/CMOS and open collector configurations. The alarm output form is a factory equipped option.



NOTE -

1. USE TEST AMPLITUDE OF 100 mV RMS OR LESS, SINUSOIDAL WAVE FORM,
2. REMOVE ALL OTHER INTERCONNECTIONS OTHER THAN THOSE SHOWN.
3. OBSERVE CAUTION WHEN PERFORMING CALIBRATION.

LET.	DATE	CHANGE	BY	APP.

REVISIONS

DWN. | DATE | CK.
ENGR. | MFG. ENGR. | DATE

TITLE CALIBRATION SETUP FIGURE - 1

HOFFER FLOW CONTROLS, INC. CODE 33321

DWG. SIZE A ACC-52-602 REV.

SCALE N/A SHEET 1 OF 1

SECTION IV

INITIAL STARTUP OF THE ACC-52

PURGING OF DEBREE FROM THE LINE

Perform any purging of the piping with a spool piece installed in place of the flowmeter. Once completed, install the flowmeter and connect the cabling to the flowmeter pickup coil.

SENSITIVITY ADJUSTMENT PROCEDURE

Noise pickup may cause undesirable outputs from the ACC-52 during periods of little or no flow. If false outputs occur turn the sensitivity control counterclockwise till false output stops.

INITIAL OPERATIONAL CHECKOUT

Verify that the alarms, analog output and pulse outputs are functioning properly.

GENERAL OPERATION OF THE ACC-52

The pulse output, analog output, and alarm(s) function automatically when flow commences.

The ACC-52 will generate the desired voltage output proportional to flowrate as specified in the model numbering system. That is either 0-5 VDC or 0-10 VDC. The span will correspond to that established during the calibration section. The load resistance should be greater than the minimum specified.

The pulse output will be of the form specified in the model numbering system and will be a square wave whose frequency is equal to the input frequency divided by the scaling factor selected during the setup of the instrument.

The alarm outputs will be the type specified in the model numbering system and will activate at the flowrate for which they are set.

Any questions which arise regarding incompatibility with receiving instruments may be addressed to the engineering group at Hoffer Flow Controls, Inc.

THEORY OF OPERATION

The *Block Diagram of the ACC-52 drawing* has key features, as well as, information flow designated. Refer to this drawing for the following discussion.

The frequency signal proportional to flowrate enters the ACC-52 from the flowmeter through the "SENS" control which is used to attenuate unwanted noise. The amplifier and comparitor from a signal conditioning section. The input signal conditioning circuitry is designed for use with magnetic pickups which generate a compatible signal over the frequency range usually generated by turbine flowmeters.

The signal is then passed to a pulse scaling network to an output transistor buffer. The pulse scaling network is used to reduce the frequency from the flowmeter to slow enough rate to be compatible with the receiving data acquisition system. The pulse output buffer transistor allows a convenient means of offering a number of different pulse output configurations and drive levels.

The frequency signal from the flowmeter is also passed to a precision frequency to voltage converter. This circuit has zero and span adjustments. The output from the F/V Converter is sent to the analog output amplifier and to the alarm comparitors.

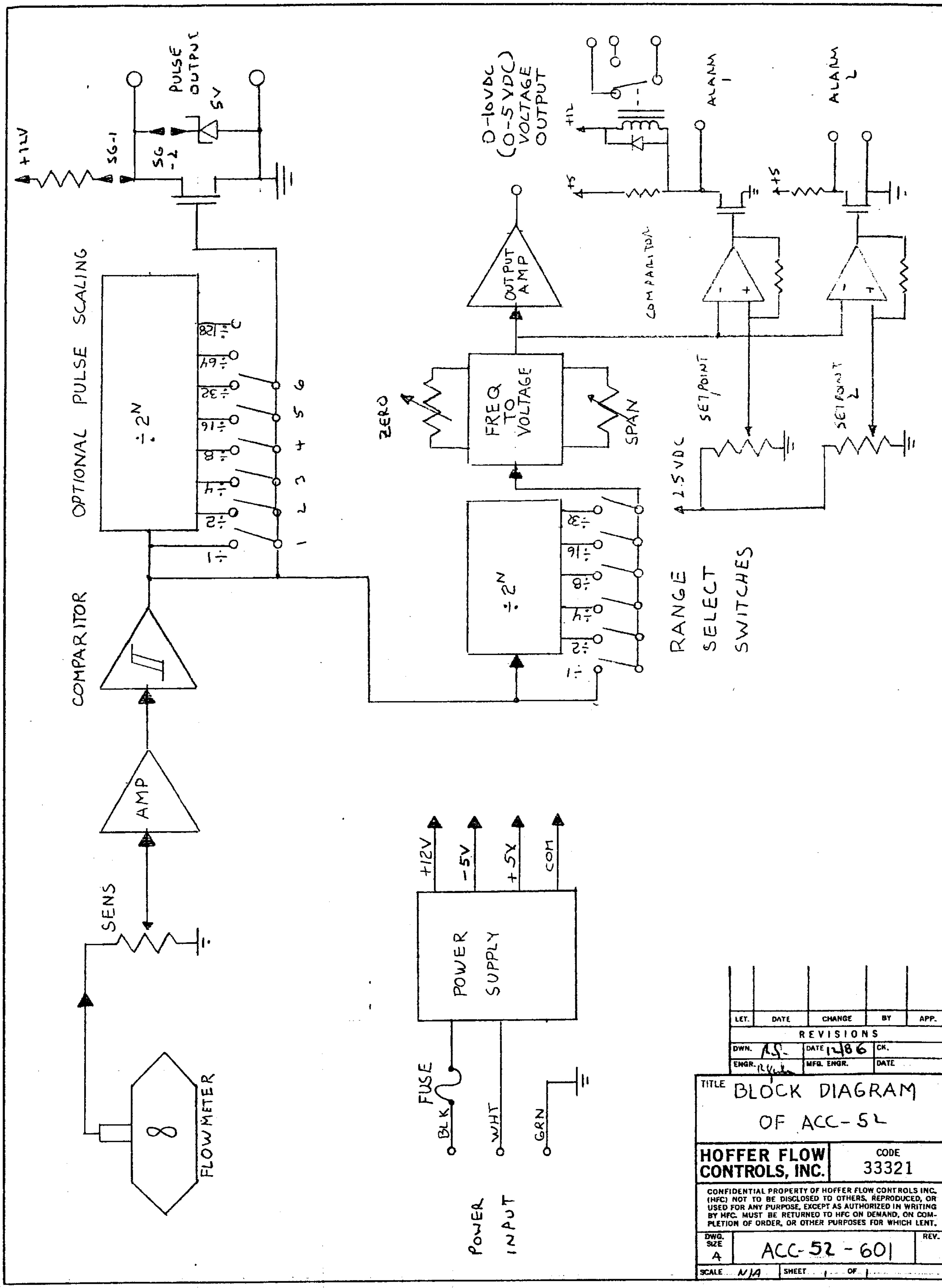
The analog output amplifier functions as a buffer amplifier providing the required drive current for the output and isolating the output from the alarm function. A short on the analog output does not effect the alarm.

The alarm comparitors compare the voltage proportional to the current flowrate to the setpoint voltage proportional to the alarm trip point. The state of the alarms is set or cleared appropriately.

Several forms of the alarm output may be provided based on the components supplied on the alarm comparitor output. These are factory wired options. There are limitations on the form of the output alarms when more than one alarm trip point is supplied.

The power supply circuitry for the AC power option consists of a fuse, a transformer, power rectifiers, power input filter, and regulators which provide the required internal bias voltages of +5 and +12 VDC. A DC/DC converter is used to generate a -5 VDC supply which allows for true zero in the analog output. A precision +2.5 volt reference is also generated for use by the alarm setpoints. The shield ground is terminated to the earth ground of the line power input.

The power supply circuitry for the DC power option has no fuse or transformer. The rectifiers are used to provide reverse polarity protection. The shield ground is terminated by the third power wire labeled chassis ground.



LET.	DATE	CHANGE	BY	APP.

REVISIONS

DWN. AS. DATE 12/86 CK.
ENGR. MFG. ENGR. DATE

TITLE BLOCK DIAGRAM OF ACC-52

HOFFER FLOW CONTROLS, INC. CODE 33321

DWG. SIZE A ACC-52-601 REV.

SCALE N/A SHEET 1 OF 1

THIS PAGE LEFT INTENTIONALLY BLANK.

SECTION V

MAINTENANCE, GENERAL

Hoffer Flow Controls Flow Measurement Systems are constructed to give a long service life in the targeted measuring field and service environment. However, problems do occur from time to time and the following points should be considered for preventative maintainence and repairs.

The bearing type used in the flowmeter was chosen to give compromise between long life, chemical resistance, ease of maintenance and performance. A preventative maintenance schedule should established to determine the amount of wear which has occurred since last overhaul. See user's manual for flowmeter for further instructions.

A spare parts list has been provided which, at the discretion of the user, may be user stocked. Consult with the manufacturer is an abridged spare parts list is sought. The recommended spare parts list may be found following this section and in the user's manual for the flowmeter.

In case the flow measurement system malfunctions or becomes inoperative, a troubleshooting procedure is enclosed.

Factory consultation is available to assist in diagnosing problems. In addition, factory repair parts and service are available for individuals who wish to utilize this service.

A complete set of schematic diagrams for all printed cards is available from Hoffer Flow Controls, Inc. for users who wish their own personnel to service the measuring system.

NOTE: *All printed circuit cards are warranteed for one year after date of sale.*

All printed circuit cards may be factory repaired at a nominal fee for parts and labor after warrantee period.

Table B - Recommended Spare Parts List

Model ACC-52 Frequency/Voltage Flow Alarm Subsystem		
Part Number	**Description**	**Quantity**
1/20 Amp	Fuse, Power Supply	1 Box
ACC52-XX	Conditioner/Converter	1
PC-XX-XX	Coil	1

NOTE: *Additional spare parts may be recommended for the turbine flowmeter. See user's manual for turbine flowmeter for details.*