

# Model: CAT3

*DC or AC Powered Microprocessor  
Controlled Transmitter*

## **USER'S MANUAL**



**HP-312  
June 2018**

**HOFFER**  
**Flow Controls**

**Perfecting Measurement™**

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## NOTICE

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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.

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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
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## 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 the 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 the 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.

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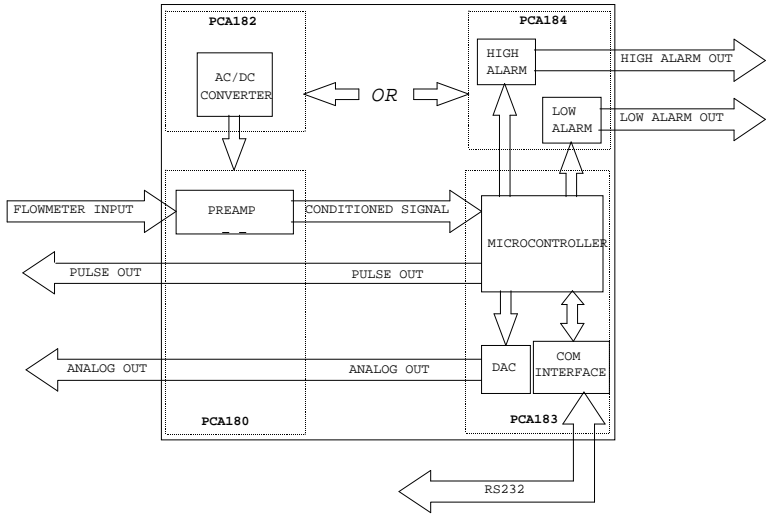


# 1. Introduction

The CAT3 is a versatile DC or AC powered microprocessor-based transmitter, which provides pulse output, analog output and High/Low flow alarm options. Up to 3 circuit boards may be installed to provide a variety of input/output options.

The flowmeter input circuitry will accept a variety of signal types including, low level sinusoidal, MCP/RF, pulse and contact closure. Optional 20-point linearization is available to correct for flowmeter non-linearities, improving overall system accuracy. The CAT3 is compatible with all Hoffer turbine flowmeters as well as the H.O.G. series positive displacement flowmeters.

## CAT3 Block Diagram



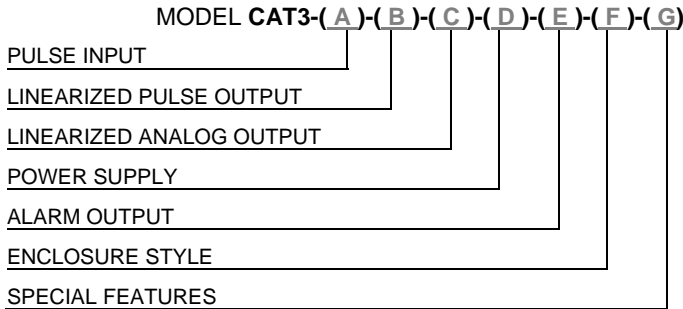
An RS232 communications port located under the top plate allows CAT3 to be remotely configured using DevConfig 3.0, a PC application program that is included with all units.

## **2 Introduction**

The standard unit is packaged in an extruded aluminum enclosure for wall mounting or may be mounted directly on a flowmeter using an optional NEMA 4X or EX enclosure. An optional bracket is also available for mounting on standard DIN rail.



## 1.1 Model Number Designation



### PULSE INPUT

MODEL CAT3-(A)-( )-( )-( )-( )-( )-( )

OPTION ( A )

- (1) MAG COIL, PULSE, DRY CONTACT
- (2) MC3P
- (3) ISOLATED PULSE, RPM, RPR AND HALL EFFECT COILS

### LINEARIZED PULSE OUTPUT

MODEL CAT3-( )-(B)-( )-( )-( )-( )-( )

OPTION ( B )

- (1) 0-5 TTL / CMOS
- (2) OPEN COLLECTOR
- (3) OPEN COLLECTOR WITH PULL UP TO V+
- (4) AC SQUARE WAVE
- (5) 0-10V SQUARE WAVE

**NOTE:** NOT RECOMMENDED FOR USE AS A FLOW RATE SIGNAL.  
MAXIMUM INPUT SENSOR FREQUENCY ALLOWED IS 100HZ.

### LINEARIZED ANALOG OUTPUT

MODEL CAT3-( )-( )-(C)-( )-( )-( )-( )

OPTION ( C )

- (1) 4-20 MA
- (5) 1-5 VDC

### POWER SUPPLY

MODEL CAT3-( )-( )-( )-(D)-( )-( )-( )

OPTION ( D )

- (DC) 13-30 VDC
- (AC) 100-240 VAC

**NOTE:** WHEN (AC) IS SELECTED, THE ALARM OPTION IS NOT AVAILABLE.  
USE REMOTE ACC39B POWER SUPPLY IF REQUIRED.

## 4 Introduction

### ALARM OUTPUT

MODEL CAT3-( )-( )-( )-( )-(E)-( )-( )

OPTION ( E )

- (4) HIGH OPEN COLLECTOR
- (5) HIGH TTL / CMOS
- (6) HIGH RELAY ONE SPDT, CONTACT RATED @ 2A 30V
- (7) LOW OPEN COLLECTOR
- (8) LOW TTL / CMOS
- (9) LOW RELAY ONE SPDT, CONTACT RATED @ 2A 30V

**NOTE: WHEN ALARM OPTION IS SELECTED, (AC) POWER IS NOT AVAILABLE. USE REMOTE ACC39B POWER SUPPLY.**

### ENCLOSURE STYLE

MODEL CAT3-( )-( )-( )-( )-( )-(E)-( )

OPTIONS ( F )

- (1) GENERAL PURPOSE.  
2.6" L X 2.6" H X 2.6" W MINIMUM MOUNTING SPACE.
- (D) 2" LONG DIN RAIL MOUNT SINGLE UNIT.  
UP TO 20 CAT3 UNITS CAN BE MOUNTED ON A SINGLE RAIL. ADD 2" PER UNIT.
- (E3) EXPLOSION-PROOF (ALL CONDUIT PORTS ARE ¾" FNPT)
- (E3M) EXPLOSION-PROOF (CONDUIT PORTS D2 & D3 = M20 THR'D;
- (E4)\* EXPLOSION-PROOF - FOR USE WITH AC POWERED CAT ONLY  
(NOT Ex d SYSTEM CERTIFIED)  
**\*FOR Ex d CERTIFIED SYSTEM USE E6 OR E6M ENCLOSURE**
- (E6) EXPLOSION-PROOF STAINLESS STEEL  
(ALL CONDUIT PORTS ARE ¾"FNPT)
- (E6M) EXPLOSION-PROOF STAINLESS STEEL (M20 NOT AVAILABLE FOR CANADA)

**NOTE: FOR UL LISTED EXPLOSION-PROOF APPLICATIONS CONTACT FACTORY.**



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## 2. Specifications

### General Specifications

Input Signal Type:	Magnetic pick up, MCP pick up, Contact Closure, Pulse
Input Frequency Range:	0.2 Hz to 4 KHz
Signal Level:	10 mV rms to 30 Vdc
Power Supply:	13-30 Vdc (Reverse polarity protected) 100-240 Vac (Fuse rating 0.5A, 250 Vac)
Analog Output:	4-20mA, 1-5V
Analog Output Response Time:	1/8 sec.*
Load Resistance:	Max 650 Ohms at 24 Vdc
Accuracy:	+/- 0.02% of full scale @ 20° C
Temperature Drift:	40ppm/deg C
Pulse Output:	0-5, 0-10V, Open Collector, AC square Internal pull-up resistor 2.7k Ohms Recommended load min. 50k Ohms
Maximum Pulse Frequency:	1, 2, 4, 8, 100, 50% Duty Cycle
Pulse Scaling:	Per flow unit of measure, divide by 1, 10, 100
Hi/Lo Alarm:	Relay (2A, 30 Vdc), 0-5V, Open Collector (0.5A, 30 Vdc)
Communications:	RS232 port for Configuration and diagnostics
Operating Temperature:	T5 and STD: $-40^{\circ} \leq T_a \leq 85^{\circ} \text{ C}$ T6: $-40^{\circ} \leq T_a \leq 79^{\circ} \text{ C}$
Humidity:	0-90% Non-condensing
Enclosure:	Extruded aluminum DIN rail mount Explosion Proof
Regulatory:	CE compliant

\*Limited by signal frequency and MST settings. Refer to Section 3.4.

### Options

20 Point Linearization

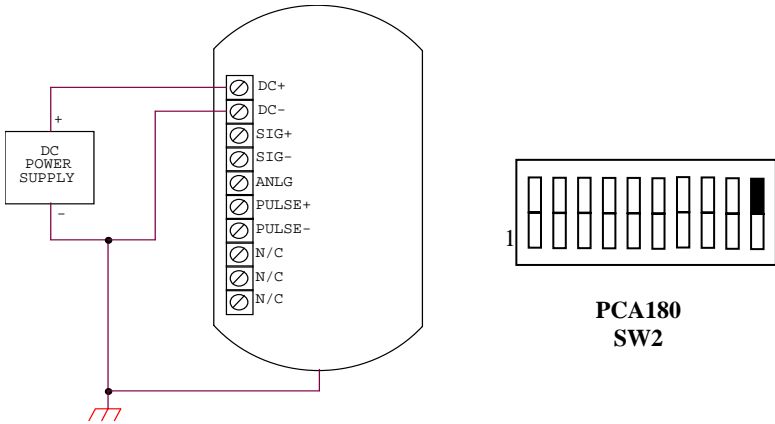
## 8 Specifications

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### 3. Installation and Operation

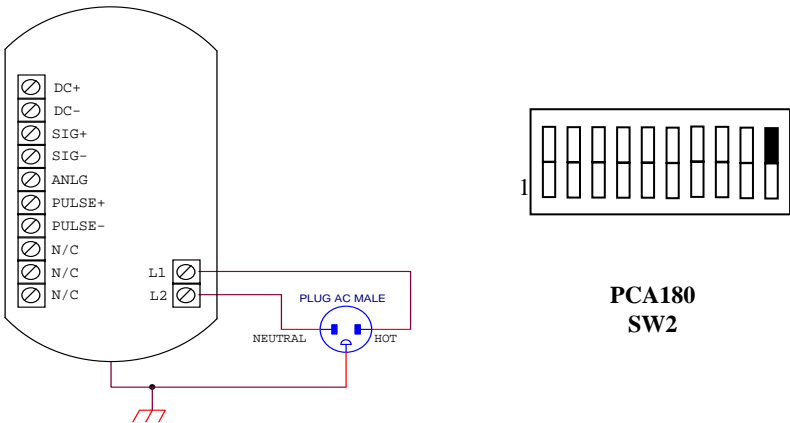
#### 3.1 Power Supply

##### DC Power (13-30 VDC)



##### AC Power (100-240 VAC)

AC power for CAT3 requires an optional circuit board, PCA182. The Alarm option (PCA184) is not available when the AC Power option is equipped.

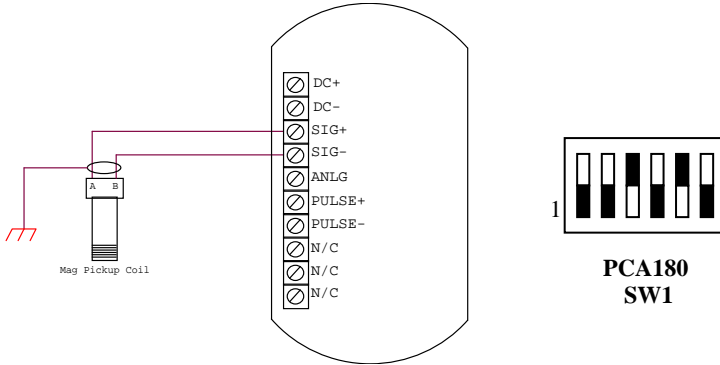


## 10 Installation and Operation

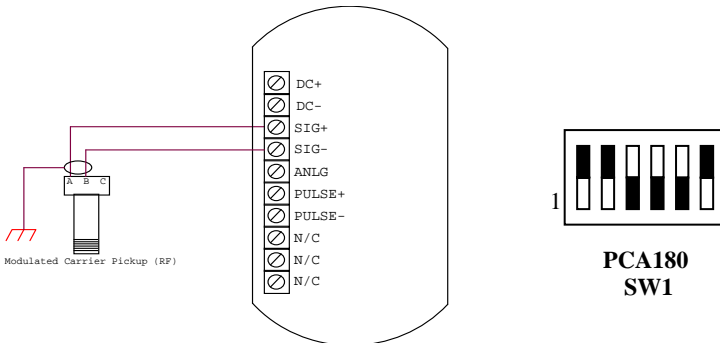
### 3.2 Flowmeter Input

The Preamp circuitry for conditioning the flow signal is located on PCA180. The following drawings illustrate typical connections and switch settings on PCA180 for various input signals.

#### Magnetic Pickup Coil

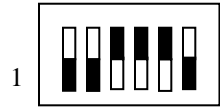
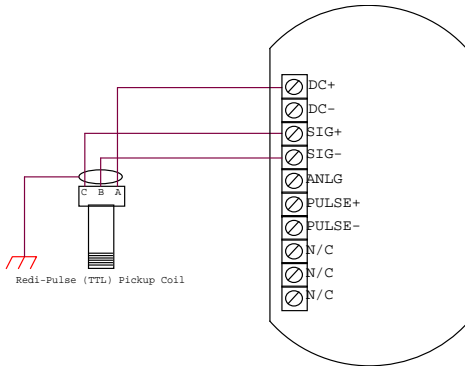


#### MCP/RF Coil



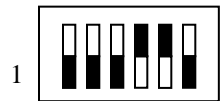
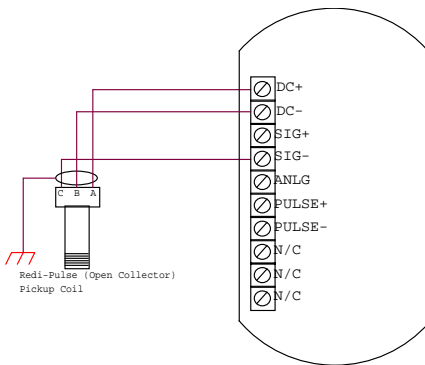


Redi-Pulse (TTL Pulse)



**PCA180  
SW1**

Redi-Pulse (Open Collector)



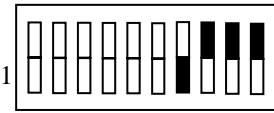
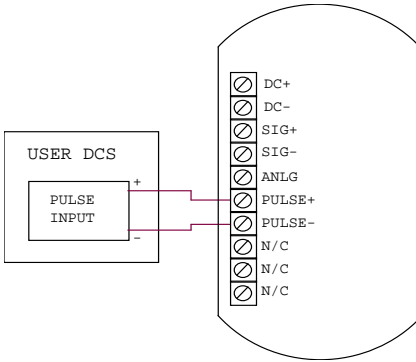
**PCA180  
SW1**

## 12 Installation and Operation

### 3.3 Pulse Output

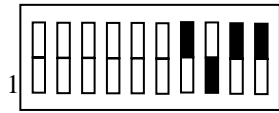
CAT3 provides a Pulse Output option that is scaled per flow unit of measure by a factor of 1, 10 or 100. Pulse output frequency varies with flow rate. The maximum frequency can be set at 1, 2, 4, 8, 100 Hz. The following drawings illustrate typical connections and switch settings for various pulse output options.

#### TTL(0-5V), 0-10V, High Level (DC In), AC Square



**PCA180  
SW2**

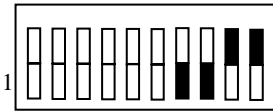
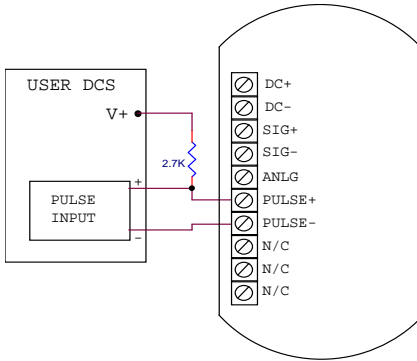
TTL(0-5V), 0-10V, AC Square



**PCA180  
SW2**

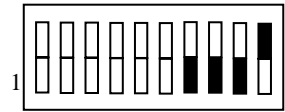
High Level Pulse, AC Square

Open Collector, Isolated Pulse



**PCA180  
SW2**

Open Collector



**PCA180  
SW2**

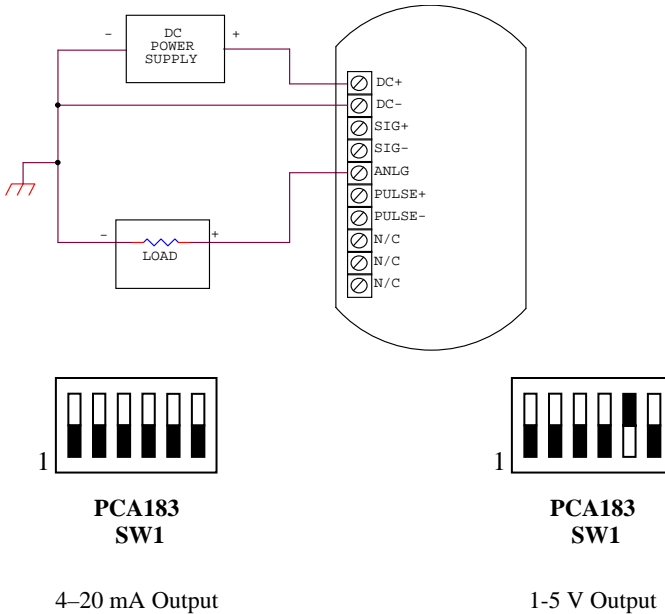
Isolated Pulse

## 14 Installation and Operation

### 3.4 Analog Output

CAT3 provides an Analog Output option that will output an analog current or voltage that is proportional to the flow rate.

#### Analog Output



The Microcontroller, located on PCA183, accepts the square-wave output of the preamplifier and performs all of the calculations that are required to control the Loop Driver. After measuring the frequency of the square-wave, the Microcontroller uses the following equations to compute the flow rate and current.

$$flowrate = \frac{frequency}{Kfactor} \times 60^{FM} \times CF$$

Where:

- Kfactor = Is dependent on the Flow Calculation Method setting and is either the Average K-Factor or the Linearized K-Factor from the Frequency / K-Factor table.
- FM = Is the Flow rate Units setting of 0, 1, or 2. Where “0” is for Seconds, “1” is for Minutes, and “2” is for Hours.
- CF = Is the Correction Factor setting.

$$current = 4mA + \left( 16mA \times \frac{flowrate}{AF} \right)$$

Where:

- AF = Is the 20 mA maximum Flow rate value.

If the calculated flowrate is greater than the AF setting, the current will be set to 24mA to indicate an “Over-range” condition. After calculating the current, the Microcontroller digitally sends the current information to the Loop Driver. The loop driver, located on PCA183, uses the digital information sent to it by the Microcontroller to set the current of the loop. The Loop Driver also supplies power to the Microcontroller.

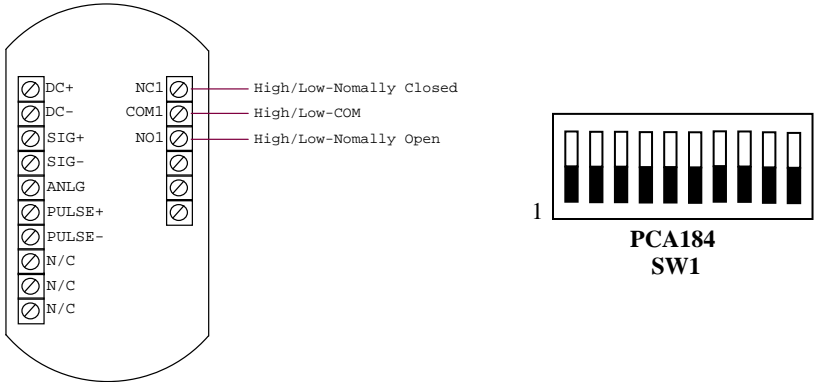
The analog output response time to reach steady state due to a change in the flow rate is approximately 1/8 of a second. When flow stops, the time for the analog output to return to 4 mA will be between .25 and 8 seconds, depending on the Maximum Sample Time (MST) setting. MST is adjusted using the NB=(DATA) command, where NB is a value between 1 and 80. The default MST setting is NB= 1. Adjusting the MST is only recommended for low flow applications where the minimum input frequency is below 1 Hz.

## 16 Installation and Operation

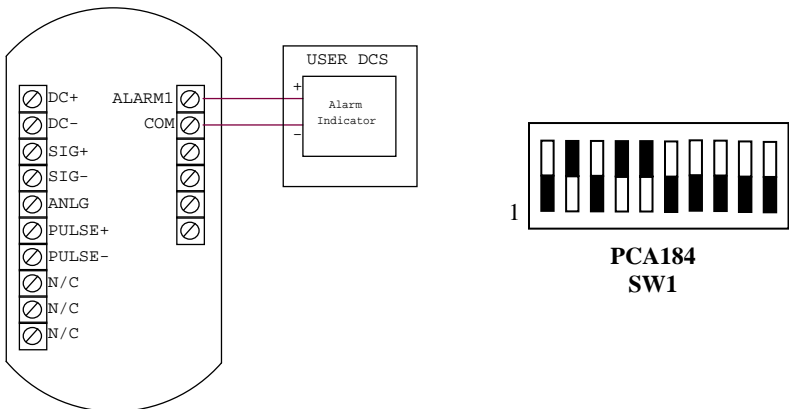
### 3.5 Alarm Outputs

CAT3 provides an optional High/Low Flow Alarm feature. Alarms require an optional circuit board, PCA184. The Alarm option is not available when the AC Power option is equipped. The drawings below illustrate the typical connections and switch settings for various alarm options.

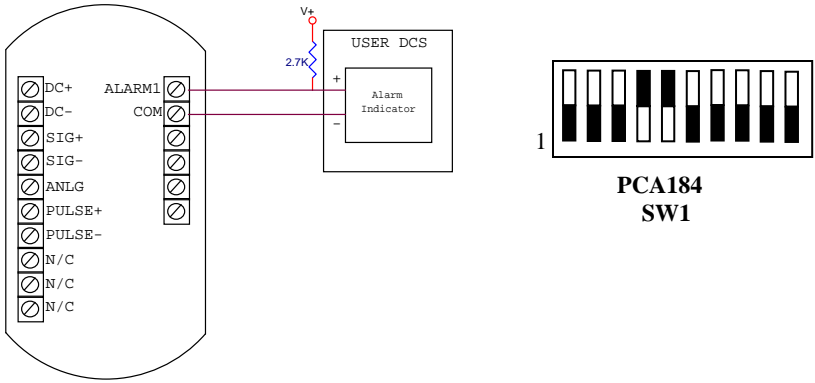
#### Hi/Lo Alarm Relay



#### Hi/Lo Alarm TTL(0-5V)



Hi/Lo Alarm Open Collector



## 18 Installation and Operation

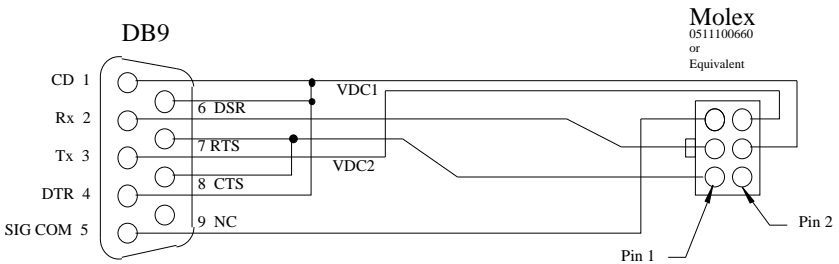
### 3.6 Communications Port

CAT3 is equipped with RS232 serial communication port for changing CAT3 configuration, diagnostics functions, and flow monitoring. Hoffer communication program DevConfig 3.0 must be used to communicate with CAT3.

The RS232 serial port connector is located under the top plate of CAT3 and may be accessed by removing the two screws from the top plate. A matching connector is provided with HOFFER HIT2A-301 Communications Cable. CAT3 unit has to be powered from external supply in order to be able to communicate. Additional power for CAT3 communication circuitry is supplied by the RS232 serial port of the computer/terminal. COM port settings must be set as follows:

Baud Rate: 2400  
Data Bits: 8  
Parity: None  
Stop bits: 1  
Handshaking: None

#### HOFFER HIT2A-301 Communications Cable





### 3.7 Wiring

When installing CAT3, it is a good practice to use shielded cables for all input and output signals. The shield should be connected to the earth ground lug on the CAT3. The shield on the opposite end of the cable should be left open. Connections are made to the CAT3 terminal blocks using wire gauges 16 to 28 AWG and 12 to 26 AWG (AC Power), tightening Torque 0.22 to 0.25Nm.

This wiring practice is mandatory in order to comply with the requirements for Electromagnetic Compatibility, as per EMC-Directive 2014/30/EU of the Council of European Community.

# **APPENDIX A - Default Configuration**

<i>FIELD</i>	<i>Value</i>
FLOW CALC. METHOD	0 (Average)
K-FACTOR DECIMAL	3
AVERGAE K-FACTOR	1.00
NUMBER OF POINTS IN K-TABLE	10
FREQUENCY 01	4999.981
FREQUENCY 02	4999.982
FREQUENCY 03	4999.983
FREQUENCY 04	4999.984
FREQUENCY 05	4999.985
FREQUENCY 06	4999.986
FREQUENCY 07	4999.987
FREQUENCY 08	4999.988
FREQUENCY 09	4999.989
FREQUENCY 10	4999.990
FREQUENCY 11	4999.991
FREQUENCY 12	4999.992
FREQUENCY 13	4999.993
FREQUENCY 14	4999.994
FREQUENCY 15	4999.995
FREQUENCY 16	4999.996
FREQUENCY 17	4999.997
FREQUENCY 18	4999.998
FREQUENCY 19	4999.999
FREQUENCY 20	5000.000
K-FACTOR 01	1.00
K-FACTOR 02	1.00
K-FACTOR 03	1.00
K-FACTOR 04	1.00
K-FACTOR 05	1.00
K-FACTOR 06	1.00
K-FACTOR 07	1.00
K-FACTOR 08	1.00
K-FACTOR 09	1.00
K-FACTOR 10	1.00
K-FACTOR 11	1.00
K-FACTOR 12	1.00
K-FACTOR 13	1.00
K-FACTOR 14	1.00
K-FACTOR 15	1.00
K-FACTOR 16	1.00
K-FACTOR 17	1.00
K-FACTOR 18	1.00
K-FACTOR 19	1.00
K-FACTOR 20	1.00
MEASURING UNITS	GAL
FLOW RATE TIME UNITS	MIN
MAX SAMPLE TIME	01
ANALOG OUTPUT LOW	0.000
ANALOG OUTPUT HIGH	100.000
PULSE SCALE	OFF
PULSE FREQUENCY	100
ALARM FUNCTION	Off
ALARM LEVEL	100.000

## APPENDIX B - Declaration of Conformity



### EU Declaration of Conformity – CAT Series Transmitters

Manufacturer: Hoffer Flow Controls Inc, 107 Kitty Hawk Ln, Elizabeth City, NC 27909

Equipment: Flame Proof Transmitters

Designation/Model: CAT1-X-X-X-X, CAT2-X-X-X-X-X-X and CAT3-X-X-X-X-X-X-X

NOTE: "X" in Model number may be any combination of numbers and characters representing specific options.

Marking: With Aluminum Explosion Proof Enclosure

Class I, Division 1, Groups BCD; Class II, Division 1, Groups E,F,G; Class III; Type 4X;

Ex d IIB+H<sub>2</sub> T6/T5; Gb; Ex tb T80°C/T86°C IIIC Db; IP66;

Class I, Zone 1, AEx db IIB+H<sub>2</sub> T6/T5; Gb; Class I, Zone 21, AEx tb T80°C/T86°C IIIC Db; IP66:

II 2 G Ex db IIB+H<sub>2</sub> T6/T5 Gb

II 2 D Ex tb IIIC T80°C/T86°C Db IP66

T6 = -40°C to +79°C; T5 = -40°C to +85°C

Seal within 50mm of enclosure.

Marking: With Stainless Steel Enclosure

Class I, Division 1, Groups BCD; Class II, Division 1, Groups E,F,G; Class III; Type 4X;

Ex d IIB+H<sub>2</sub> T6/T5; Gb; Ex tb T80°C/T86°C IIIC Db; IP66;

Class I, Zone 1, AEx db IIB+H<sub>2</sub> T6/T5; Gb; Class I, Zone 21, AEx tb T80°C/T86°C IIIC Db; IP66:

II 2 G Ex db IIB+H<sub>2</sub> T5/T6 Gb

II 2 D Ex tb IIIC T86°C Db IP66

T6 = -40°C to +79°C; T5 = -40°C to +85°C

Seal within 18" of enclosure.



We hereby declare that the product, which is subject of this declaration, is in conformity with the following standards:

ATEX	ATEX Directive 2014/34/EU: Equipment and protective systems intended for use in potentially explosive atmospheres. Applicable Standards - EN 60079-0:2012/A11:2013; EN 60079-1:2014 and EN 60079-31:2014	EC-Type Examination Certificate: Sira 16 ATEX 1086 X
CSA	Applicable CSA Requirements: CSA C22.2 No. 0-10, CSA C22.2 no. 142-M1987, CSA C22.2 No. 25-1966 (R2014), CSA C22.2 No. 30-M1986 (R2012), UL 508, CAN-CSA 60079-0:11, 60079-1:11 60079-39:12, FM 3600, FM 3615, FM 3616, UL 60079-0:2013, 60079-1: 2015 and 60079-31:2015	CSA-Type Examination Certificate:
IECEx	IEC Certification for Explosive Atmospheres. Applicable Standards IEC 60079-0:2011 IEC 60079-1:2014 and IEC 60079-31:2013	IECEx CSA 16.0016X

EC-Type Examination Certificate and IECEx Certificate issued by:

TÜV Rheinland Industrie Service GmbH  
Am Grauen Stein  
D-51105 Köln  
Country : Germany

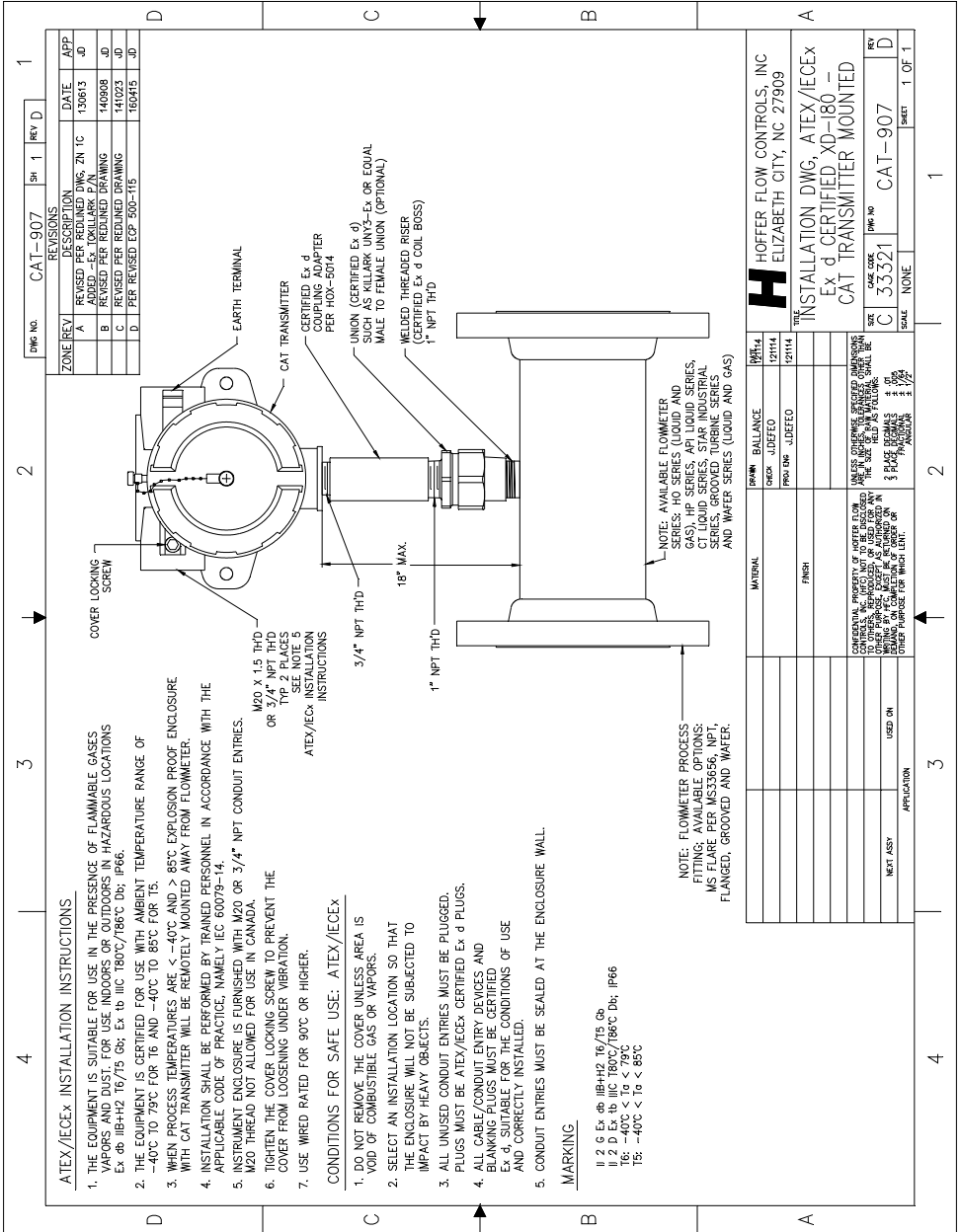
Notified Body Number: 0035

CSA-Type Examination Certification issued by:

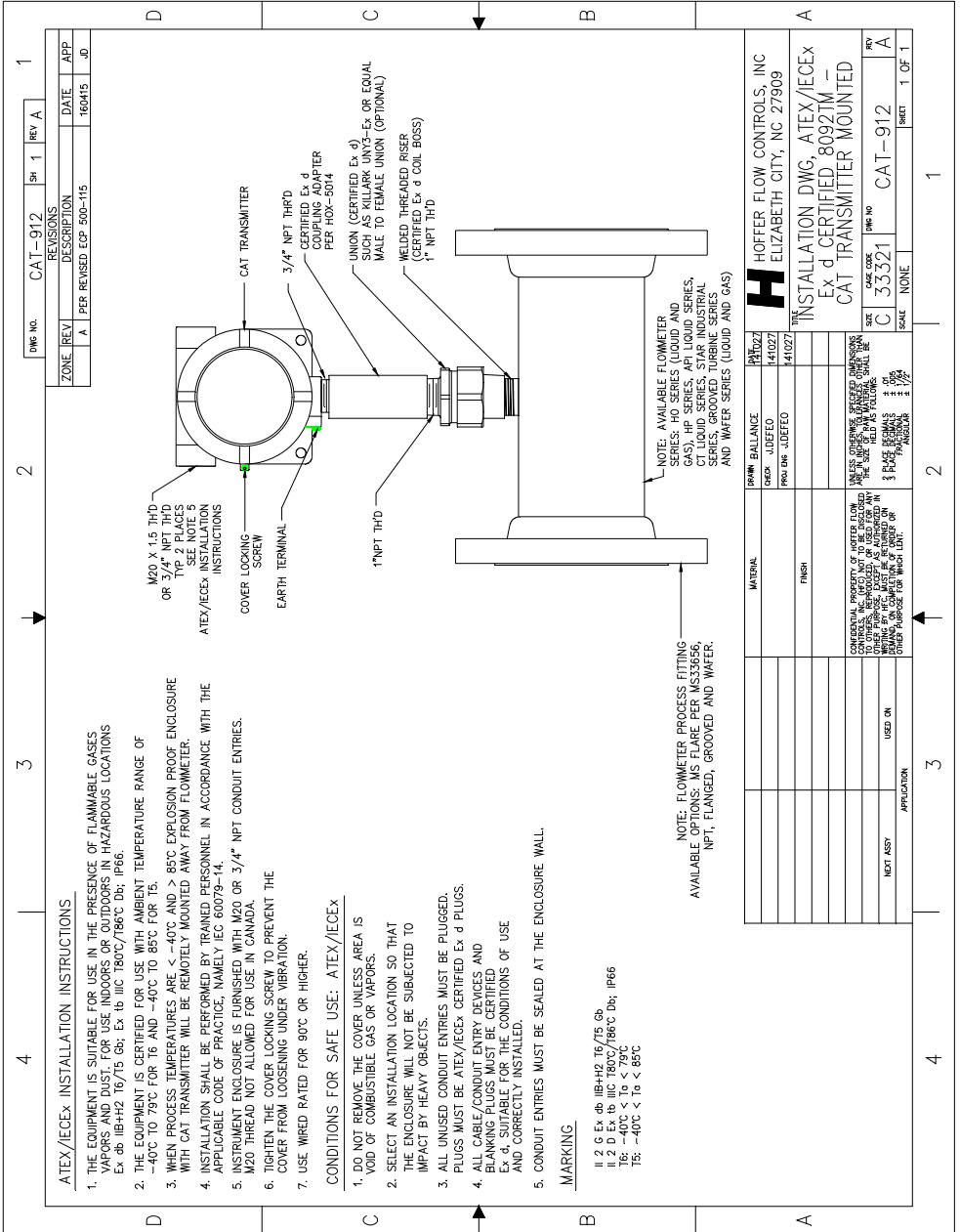
CSA Group Testing & Certification Inc.  
Edmonton, AB, Canada T6N 1E6

## **APPENDIX C - Installation and Conditions for Safe Use Drawings for Certified Systems**









**ATEX/IECEx INSTALLATION INSTRUCTIONS**

1. THE EQUIPMENT IS SUITABLE FOR USE IN THE PRESENCE OF FLAMMABLE GASES, VAPORS AND DUST FOR USE INDOORS OR OUTDOORS IN HAZARDOUS LOCATIONS  
Ex db IIB+H2 I6/75 Db; Ex tb IIC 180C/186C Db; IP66.
2. THE EQUIPMENT IS CERTIFIED FOR USE WITH AMBIENT TEMPERATURE RANGE OF -40°C TO 70°C FOR T6 AND -40°C TO 85°C FOR T4.
3. WHEN PROCESS TEMPERATURES ARE 175°C AND > 85°C EXPLOSION PROOF ENCLOSURE WITH CAT TRANSMITTER WILL BE REMOTELY MOUNTED AWAY FROM FLOWMETER.
4. INSTALLATION SHALL BE PERFORMED BY TRAINED PERSONNEL IN ACCORDANCE WITH THE APPLICABLE CODE OF PRACTICE, NAMELY IEC 60079-14.
5. INSTRUMENT ENCLOSURE IS FINISHED WITH M20 OR 3/4" NPT CONDUIT ENTRIES.
6. M20 THREAD NOT ALLOWED FOR USE IN CANADA.
7. TIGHTEN THE COVER LOCKING SCREW TO PREVENT THE COVER FROM LOOSENING UNDER VIBRATION.
7. USE WIRE RATED FOR 90°C OR HIGHER.

**CONDITIONS FOR SAFE USE: ATEX/IECEx**

1. DO NOT REMOVE THE COVER UNLESS AREA IS VOID OF COMBUSTIBLE GAS OR VAPORS.
2. SELECT AN INSTALLATION LOCATION SO THAT THE ENCLOSURE WILL NOT BE SUBJECTED TO IMPACT BY HEAVY OBJECTS.
3. ALL UNUSED CONDUIT ENTRIES MUST BE PLUGGED. PLUGS MUST BE ATEX/IECEx CERTIFIED Ex d PLUGS.
4. ALL CABLE/CONDUIT ENTRY DEVICES AND BLANKING PLUGS MUST BE CERTIFIED Ex d, SUITABLE FOR THE CONDITIONS OF USE AND CORRECTLY INSTALLED.
5. CONDUIT ENTRIES MUST BE SEALED AT THE ENCLOSURE WALL.

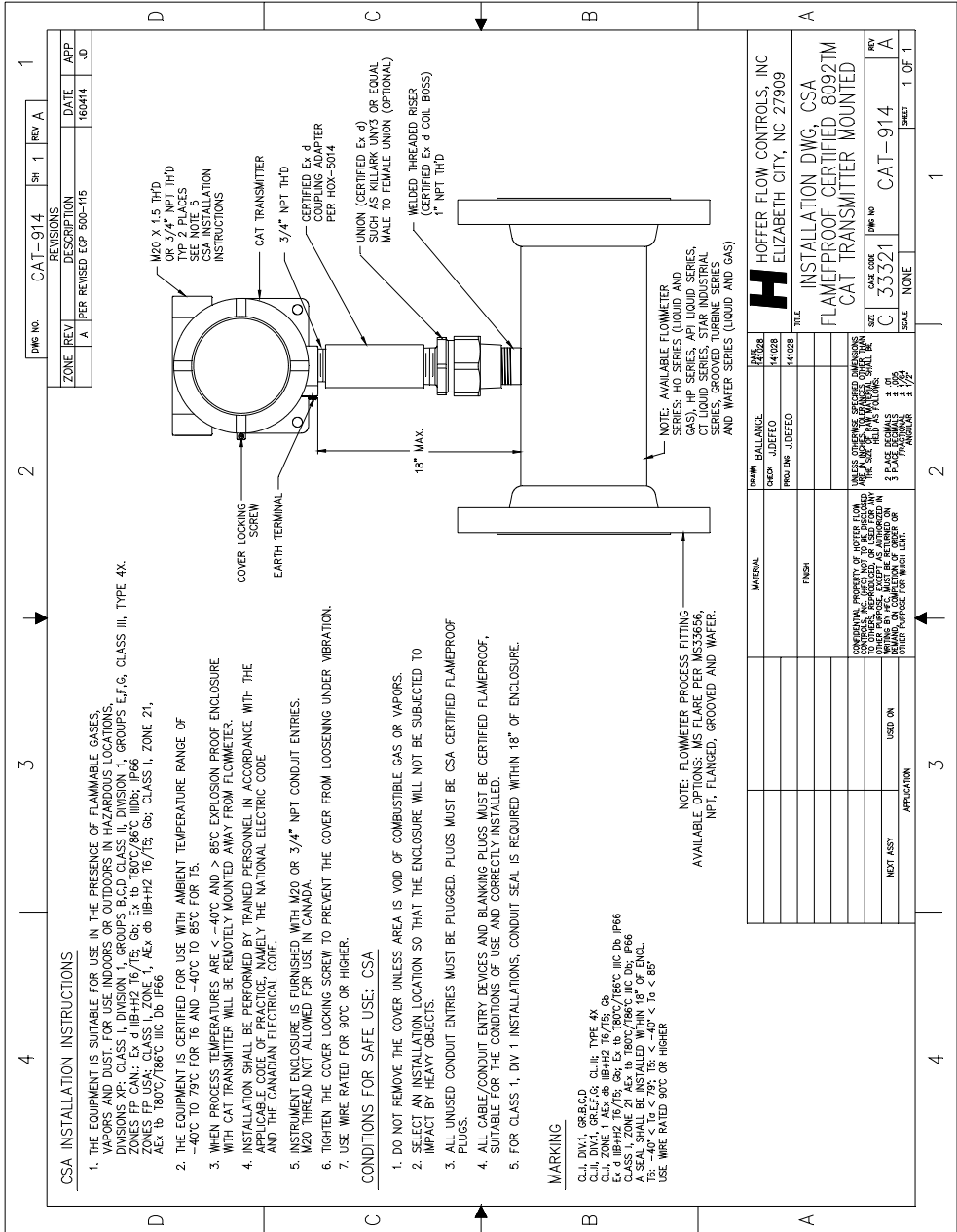
**MARKING**

- II 2 G Ex db IIB+H2 I6/75 Db
- II 2 D Ex tb IIC 180C/186C Db; IP66
- T6; -40°C ≤ T5 ≤ 85°C
- T4; -40°C ≤ T5 ≤ 85°C

NOTE: FLOWMETER PROCESS FITTING AVAILABLE OPTIONS: MS FLARE PER M333656, NPT, FLANGED, GROOVED AND WAFER.

NOTE: AVAILABLE FLOWMETER SERIES: HO SERIES (LIQUID AND GAS), HP SERIES (LIQUID SERIES), HT SERIES (LIQUID AND GAS), HTS SERIES (LIQUID AND GAS), TUBULAR SERIES, GROOVED TURBINE SERIES AND WAFER SERIES (LIQUID AND GAS)

MATERIAL	DRWN	141027	H OFFER FLOW CONTROLS, INC ELIZABETH CITY, NC 27909
	CHECK	141027	
	PROJ	41027	INSTALLATION DWG. ATEX/IECEx Ex d CERTIFIED 80921M CAT TRANSMITTER MOUNTED
	PROJ	41027	
			CAC CODE C 33321
			DWG NO CAT-912
			SCALE NONE
			SHEET 1 OF 1
			REV
			A



ZONE	REV	DESCRIPTION	DATE	APP
A	PER REVISED ECP 500-115		160414	JD

DWG NO.	CAT-914	SH	1	REV	A
REVISIONS					

ZONE	REV	DESCRIPTION	DATE	APP
A	PER REVISED ECP 500-115		160414	JD

DWG NO.	CAT-914	SH	1	REV	A
REVISIONS					

ZONE	REV	DESCRIPTION	DATE	APP
A	PER REVISED ECP 500-115		160414	JD

CSA INSTALLATION INSTRUCTIONS

- THE EQUIPMENT IS SUITABLE FOR USE IN THE PRESENCE OF FLAMMABLE GASES, VAPORS AND DUST FOR USE INDOORS OR OUTDOORS IN HAZARDOUS LOCATIONS. DIVISIONS XP, CLASS I, DIVISION 1, GROUPS B,C,D CLASS II, DIVISION 1, GROUPS E,F,G, CLASS III, TYPE 4X. ZONES FF CAN: Ex d IIB-H2 16/15; Gb; Ex tb 180C/186C IIBb; IP66 ZONES FF USA: CLASS I, ZONE 1, AEx db IIB-H2 16/15; Gb; CLASS I, ZONE 21, AEx tb 180C/186C IIBc Db IP66
- THE EQUIPMENT IS CERTIFIED FOR USE WITH AMBIENT TEMPERATURE RANGE OF -40C TO 78C FOR 16 AND -40C TO 85C FOR 15.
- WHEN PROCESS TEMPERATURES ARE < -40C AND > 85C EXPLOSION PROOF ENCLOSURE WITH CAT TRANSMITTER WILL BE REMOTELY MOUNTED AWAY FROM FLOWMETER.
- INSTALLATION SHALL BE PERFORMED BY TRAINED PERSONNEL IN ACCORDANCE WITH THE APPLICABLE CODE OF PRACTICE, NAMELY THE NATIONAL ELECTRIC CODE AND THE CANADIAN ELECTRICAL CODE.
- INSTRUMENT ENCLOSURE IS FINISHED WITH M20 OR 3/4" NPT CONDUIT ENTRIES.
- TIGHTEN THE COVER LOCKING SCREW TO PREVENT THE COVER FROM LOOSENING UNDER VIBRATION.
- USE WIRE RATED FOR 90C OR HIGHER.

CONDITIONS FOR SAFE USE: CSA

- DO NOT REMOVE THE COVER UNLESS AREA IS VOID OF COMBUSTIBLE GAS OR VAPORS.
- SELECT AN INSTALLATION LOCATION SO THAT THE ENCLOSURE WILL NOT BE SUBJECTED TO IMPACT BY HEAVY OBJECTS.
- ALL UNUSED CONDUIT ENTRIES MUST BE PLUGGED. PLUGS MUST BE CSA CERTIFIED FLAMEPROOF PLUGS.
- ALL CABLE/CONDUIT ENTRY DEVICES AND BLANKING PLUGS MUST BE CERTIFIED FLAMEPROOF, SUITABLE FOR THE CONDITIONS OF USE AND CORRECTLY INSTALLED.
- FOR CLASS 1, DIV 1 INSTALLATIONS, CONDUIT SEAL IS REQUIRED WITHIN 18" OF ENCLOSURE.

MARKING

CLASS 1, DIV 1, GROUP C, DIVISION 1, TYPE 4X  
 CLASS 1, ZONE 21, AEx tb 180C/186C IIBc Db IP66  
 CLASS 1, ZONE 1, AEx db IIB-H2 16/15; Gb; Ex tb 180C/186C IIBb; IP66  
 CLASS 1, ZONE 21, AEx tb 180C/186C IIBc Db IP66  
 CLASS 1, ZONE 1, AEx db IIB-H2 16/15; Gb; Ex tb 180C/186C IIBb; IP66  
 USE WIRE RATED 90C OR HIGHER

NOTE: FLOWMETER PROCESS FITTING  
 AVAILABLE OPTIONS: MS FLARE PER MS33636, NPT, FLANGED, GROOVED AND WAFER.

NOTE: AVAILABLE FLOWMETER SERIES: HO SERIES (LIQUID AND GAS), HP SERIES, API LIQUID SERIES, SPECTROPHOTOMETRIC SERIES, GROOVED TURBINE SERIES, AND WATER SERIES (LIQUID AND GAS)

ITEM	QUANTITY	DESCRIPTION	UNIT	REMARKS
1	1	FLOWMETER		
2	1	CAT TRANSMITTER		
3	1	ENCLOSURE		
4	1	CONDUIT		
5	1	PLUG		
6	1	SCREW		
7	1	TERMINAL		

DRWG NO.	CAT-914	SH	1	REV	A
REVISIONS					
ZONE	REV	DESCRIPTION	DATE	APP	
A	PER REVISED ECP 500-115		160414	JD	

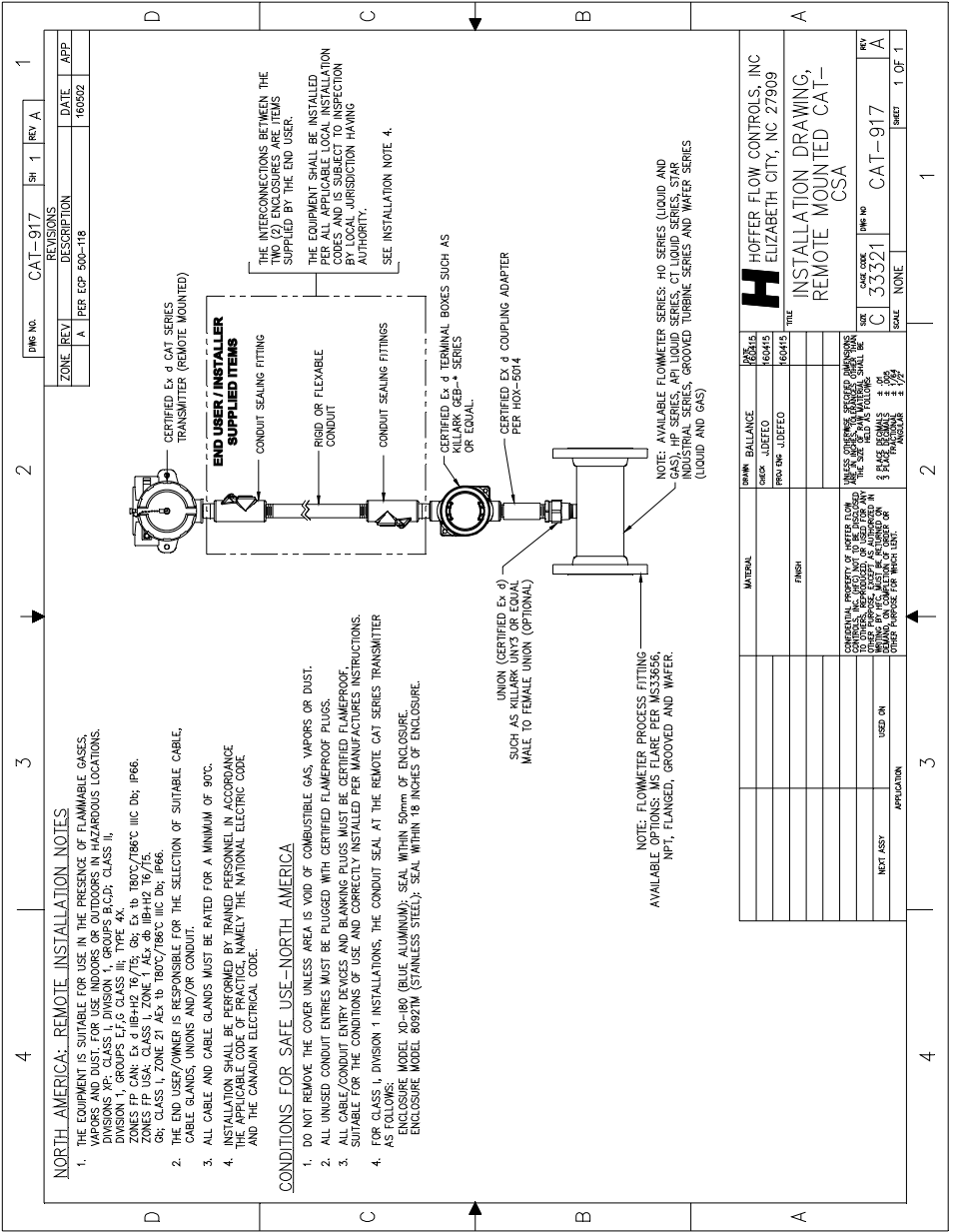
  

DRAWN	BALANCE	PROJ. ENGR.	JDFEFO	PROJ. MGR.	JDFEFO
CHECKED	JDFEFO	DATE	14/02/89	REVISED	14/02/89

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN MILLIMETERS (INCHES)	UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES (MILLIMETERS)
FRONT VIEW IS UNLESS OTHERWISE SPECIFIED	FRONT VIEW IS UNLESS OTHERWISE SPECIFIED
FRONT VIEW IS UNLESS OTHERWISE SPECIFIED	FRONT VIEW IS UNLESS OTHERWISE SPECIFIED

OFFER FLOW CONTROLS, INC  
 ELIZABETH CITY, NC 27909  
 INSTALLATION DWG. CSA  
 FLAMEPROOF CERTIFIED 80921M  
 CAT TRANSMITTER MOUNTED  
 CAT NO. 33321  
 CAT-914  
 SHEET 1 OF 1



**NORTH AMERICA: REMOTE INSTALLATION NOTES**

1. THE EQUIPMENT IS SUITABLE FOR USE IN THE PRESENCE OF FLAMMABLE GASES, VAPORS AND DUST, FOR USE INDOORS OR OUTDOORS IN HAZARDOUS LOCATIONS. DIVISIONS XP, CLASS I, DIVISION 1, GROUPS B,C,D, CLASS II, DIVISION 1, GROUPS E,F,G CLASS III, THE 4X, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 118, 119, 120, 121, 122, 123, 124, 125, 126, 127, 128, 129, 130, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156, 157, 158, 159, 160, 161, 162, 163, 164, 165, 166, 167, 168, 169, 170, 171, 172, 173, 174, 175, 176, 177, 178, 179, 180, 181, 182, 183, 184, 185, 186, 187, 188, 189, 190, 191, 192, 193, 194, 195, 196, 197, 198, 199, 200, 201, 202, 203, 204, 205, 206, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 219, 220, 221, 222, 223, 224, 225, 226, 227, 228, 229, 230, 231, 232, 233, 234, 235, 236, 237, 238, 239, 240, 241, 242, 243, 244, 245, 246, 247, 248, 249, 250, 251, 252, 253, 254, 255, 256, 257, 258, 259, 260, 261, 262, 263, 264, 265, 266, 267, 268, 269, 270, 271, 272, 273, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 285, 286, 287, 288, 289, 290, 291, 292, 293, 294, 295, 296, 297, 298, 299, 300, 301, 302, 303, 304, 305, 306, 307, 308, 309, 310, 311, 312, 313, 314, 315, 316, 317, 318, 319, 320, 321, 322, 323, 324, 325, 326, 327, 328, 329, 330, 331, 332, 333, 334, 335, 336, 337, 338, 339, 340, 341, 342, 343, 344, 345, 346, 347, 348, 349, 350, 351, 352, 353, 354, 355, 356, 357, 358, 359, 360, 361, 362, 363, 364, 365, 366, 367, 368, 369, 370, 371, 372, 373, 374, 375, 376, 377, 378, 379, 380, 381, 382, 383, 384, 385, 386, 387, 388, 389, 390, 391, 392, 393, 394, 395, 396, 397, 398, 399, 400, 401, 402, 403, 404, 405, 406, 407, 408, 409, 410, 411, 412, 413, 414, 415, 416, 417, 418, 419, 420, 421, 422, 423, 424, 425, 426, 427, 428, 429, 430, 431, 432, 433, 434, 435, 436, 437, 438, 439, 440, 441, 442, 443, 444, 445, 446, 447, 448, 449, 450, 451, 452, 453, 454, 455, 456, 457, 458, 459, 460, 461, 462, 463, 464, 465, 466, 467, 468, 469, 470, 471, 472, 473, 474, 475, 476, 477, 478, 479, 480, 481, 482, 483, 484, 485, 486, 487, 488, 489, 490, 491, 492, 493, 494, 495, 496, 497, 498, 499, 500, 501, 502, 503, 504, 505, 506, 507, 508, 509, 510, 511, 512, 513, 514, 515, 516, 517, 518, 519, 520, 521, 522, 523, 524, 525, 526, 527, 528, 529, 530, 531, 532, 533, 534, 535, 536, 537, 538, 539, 540, 541, 542, 543, 544, 545, 546, 547, 548, 549, 550, 551, 552, 553, 554, 555, 556, 557, 558, 559, 560, 561, 562, 563, 564, 565, 566, 567, 568, 569, 570, 571, 572, 573, 574, 575, 576, 577, 578, 579, 580, 581, 582, 583, 584, 585, 586, 587, 588, 589, 590, 591, 592, 593, 594, 595, 596, 597, 598, 599, 600, 601, 602, 603, 604, 605, 606, 607, 608, 609, 610, 611, 612, 613, 614, 615, 616, 617, 618, 619, 620, 621, 622, 623, 624, 625, 626, 627, 628, 629, 630, 631, 632, 633, 634, 635, 636, 637, 638, 639, 640, 641, 642, 643, 644, 645, 646, 647, 648, 649, 650, 651, 652, 653, 654, 655, 656, 657, 658, 659, 660, 661, 662, 663, 664, 665, 666, 667, 668, 669, 670, 671, 672, 673, 674, 675, 676, 677, 678, 679, 680, 681, 682, 683, 684, 685, 686, 687, 688, 689, 690, 691, 692, 693, 694, 695, 696, 697, 698, 699, 700, 701, 702, 703, 704, 705, 706, 707, 708, 709, 710, 711, 712, 713, 714, 715, 716, 717, 718, 719, 720, 721, 722, 723, 724, 725, 726, 727, 728, 729, 730, 731, 732, 733, 734, 735, 736, 737, 738, 739, 740, 741, 742, 743, 744, 745, 746, 747, 748, 749, 750, 751, 752, 753, 754, 755, 756, 757, 758, 759, 760, 761, 762, 763, 764, 765, 766, 767, 768, 769, 770, 771, 772, 773, 774, 775, 776, 777, 778, 779, 780, 781, 782, 783, 784, 785, 786, 787, 788, 789, 790, 791, 792, 793, 794, 795, 796, 797, 798, 799, 800, 801, 802, 803, 804, 805, 806, 807, 808, 809, 810, 811, 812, 813, 814, 815, 816, 817, 818, 819, 820, 821, 822, 823, 824, 825, 826, 827, 828, 829, 830, 831, 832, 833, 834, 835, 836, 837, 838, 839, 840, 841, 842, 843, 844, 845, 846, 847, 848, 849, 850, 851, 852, 853, 854, 855, 856, 857, 858, 859, 860, 861, 862, 863, 864, 865, 866, 867, 868, 869, 870, 871, 872, 873, 874, 875, 876, 877, 878, 879, 880, 881, 882, 883, 884, 885, 886, 887, 888, 889, 890, 891, 892, 893, 894, 895, 896, 897, 898, 899, 900, 901, 902, 903, 904, 905, 906, 907, 908, 909, 910, 911, 912, 913, 914, 915, 916, 917, 918, 919, 920, 921, 922, 923, 924, 925, 926, 927, 928, 929, 930, 931, 932, 933, 934, 935, 936, 937, 938, 939, 940, 941, 942, 943, 944, 945, 946, 947, 948, 949, 950, 951, 952, 953, 954, 955, 956, 957, 958, 959, 960, 961, 962, 963, 964, 965, 966, 967, 968, 969, 970, 971, 972, 973, 974, 975, 976, 977, 978, 979, 980, 981, 982, 983, 984, 985, 986, 987, 988, 989, 990, 991, 992, 993, 994, 995, 996, 997, 998, 999, 1000.
2. THE END USER/OWNER IS RESPONSIBLE FOR THE SELECTION OF SUITABLE CABLE, CABLE GLANDS, UNIONS AND/OR CONDUIT.
3. ALL CABLE AND CABLE GLANDS MUST BE RATED FOR A MINIMUM OF 90°C.
4. INSTALLATION SHALL BE PERFORMED BY TRAINED PERSONNEL IN ACCORDANCE WITH THE APPLICABLE CODE OF PRACTICE, NAMELY THE NATIONAL ELECTRIC CODE AND THE CANADIAN ELECTRICAL CODE.

**CONDITIONS FOR SAFE USE-NORTH AMERICA**

1. DO NOT REMOVE THE COVER UNLESS AREA IS VOID OF COMBUSTIBLE GAS, VAPORS OR DUST.
2. ALL UNUSED CONDUIT ENTRIES MUST BE PLUGGED WITH CERTIFIED FLAMEPROOF PLUGS.
3. ALL WIRING MUST BE PERFORMED IN ACCORDANCE WITH THE APPLICABLE CODE OF PRACTICE AND CORRECTLY INSTALLED PER MANUFACTURER'S INSTRUCTIONS.
4. FOR CLASS I, DIVISION 1 INSTALLATIONS, THE CONDUIT SEAL AT THE REMOTE CAT SERIES TRANSMITTER ENCLOSURE MODEL 80921M (BLUE ALUMINUM), SEAL WITHIN 50mm OF ENCLOSURE. ENCLOSURE MODEL 80921M (STAINLESS STEEL): SEAL WITHIN 18 INCHES OF ENCLOSURE.

NOTE: FLOWMETER PROCESS FITTING AVAILABLE OPTIONS: MS FLARE PER M53856, NPT, FLANGED, GROOVED AND WAFER.

ZONE	REV	DESCRIPTION	DATE	APP
A		PER ECP 500-118	160802	

DWG NO.	CAT-917	SH 1	REV A
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DATE	REV	DESCRIPTION
160802		

DRWN	BALANCE	DATE	BY
		160415	
CHKD	JDFEEO	160415	
PRV	JDFEEO	160415	

TITLE	SCALE	DWG NO	REV
INSTALLATION DRAWING, REMOTE MOUNTED CAT-917	NONE	33321	A

COMPANY	OFFICE
HOFFER FLOW CONTROLS, INC	ELIZABETH CITY, NC 27909

CONTRACT NO.	PROJECT NO.

DATE	REV	DESCRIPTION
160802		

DATE	REV	DESCRIPTION
160802		

DATE	REV	DESCRIPTION
160802		

4	3	2	1																																																																				
<p><b>AT/Ex/IECex REMOTE INSTALLATION NOTES</b></p> <ol style="list-style-type: none"> <li>THE EQUIPMENT IS SUITABLE FOR USE IN THE PRESENCE OF FLAMMABLE GASES, VAPORS AND DUST. FOR USE INDOORS OR OUTDOORS IN HAZARDOUS LOCATIONS: Ex db IIB+H2 T6/T5; db; Ex to IIC 80%/786°C Db; IP66.</li> <li>THE END USER/OWNER IS RESPONSIBLE FOR THE SELECTION OF SUITABLE ARMORED CABLE, CABLE GLANDS AND/OR UNIONS.</li> <li>ALL CABLE AND CABLE GLANDS MUST BE RATED FOR A MINIMUM OF 90°C.</li> <li>INSTALLATION SHALL BE PERFORMED BY TRAINED PERSONNEL IN ACCORDANCE WITH THE APPLICABLE CODE OF PRACTICE, NAMELY IEC 60079-14.</li> </ol> <p><b>CONDITIONS FOR SAFE USE—AT/Ex/IECEx</b></p> <ol style="list-style-type: none"> <li>DO NOT REMOVE THE COVER UNLESS AREA IS VOID OF COMBUSTIBLE GAS, VAPORS OR DUST.</li> <li>ALL UNUSED CONDUIT ENTRIES MUST BE PLUGGED WITH CERTIFIED FLAMEPROOF PLUGS.</li> <li>ALL CABLE/CONDUIT ENTRY DEVICES AND BLANKING PLUGS MUST BE CERTIFIED FLAMEPROOF SUITABLE FOR THE CONDITION OF USE AND CORRECTLY INSTALLED PER MANUFACTURES INSTRUCTION.</li> <li>CONDUIT ENTRIES MUST BE SEALED AT THE ENCLOSURE WALL.</li> </ol>																																																																							
<p><b>END USER / INSTALLER SUPPLIED ITEMS</b></p> <p>CERTIFIED Ex d CAT SERIES TRANSMITTER (REMOTE MOUNTED)</p> <p>CABLE GLANDS</p> <p>ARMORED CABLE</p> <p>CABLE GLANDS</p> <p>CERTIFIED Ex d TERMINAL BOXES SUCH AS KILLARK GEB-3 SERIES OR EQUAL</p> <p>CERTIFIED Ex d COUPLING ADAPTER PER HOX-5014</p> <p>UNION (CERTIFIED Ex d) SUCH AS KILLARK UNY3 OR EQUAL MALE TO FEMALE UNION (OPTIONAL)</p>																																																																							
<p>NOTE: FLOWMETER PROCESS FITTING AVAILABLE OPTIONS: MS FLARE PER MS32656, NPT, FLANGED, GROOVED AND WAFER.</p> <p>NOTE: AVAILABLE FLOWMETER SERIES: HQ SERIES (LIQUID AND GAS), HP SERIES, AP LIQUID SERIES, CT LIQUID SERIES, STAR INDUSTRIAL SERIES, GROOVED TURBINE SERIES AND WAFER SERIES (LIQUID AND GAS)</p>																																																																							
<p>THE INTERCONNECTIONS BETWEEN THE TWO (2) ENCLOSURES ARE ITEMS SUPPLIED BY THE END USER.</p> <p>THE EQUIPMENT SHALL BE INSTALLED PER ALL APPLICABLE LOCAL INSTALLATION CODES AND IS SUBJECT TO INSPECTION BY LOCAL JURISDICTION HAVING AUTHORITY.</p> <p>SEE INSTALLATION NOTE 4.</p>																																																																							
<p><b>H</b> HOFFER FLOW CONTROLS, INC ELIZABETH CITY, NC 27809</p> <p>INSTALLATION DRAWING, REMOTE MOUNTED CAT – AT/Ex/IECEx</p>																																																																							
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td>FILE NO.</td> <td>CAT-918</td> <td>Sr 1</td> <td>REV A</td> </tr> <tr> <td colspan="4" style="text-align: center;">REVISIONS</td> </tr> <tr> <td>ZONE REV</td> <td>A</td> <td>PER EOP 500-118</td> <td>DATE</td> </tr> <tr> <td></td> <td></td> <td></td> <td>10/2002</td> </tr> <tr> <td></td> <td></td> <td></td> <td>APP</td> </tr> </table>		FILE NO.	CAT-918	Sr 1	REV A	REVISIONS				ZONE REV	A	PER EOP 500-118	DATE				10/2002				APP	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td>DRINK</td> <td>BALANCE</td> <td>RESERVE</td> <td></td> </tr> <tr> <td>CHECK</td> <td>LIBREFO</td> <td>RESERVE</td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td colspan="4" style="text-align: center;">MATERIAL</td> </tr> <tr> <td colspan="4" style="text-align: center;">EMPTY</td> </tr> <tr> <td colspan="4" style="text-align: center;">UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN MILLIMETERS (INCHES). ALL DIMENSIONS ARE TO BE DIMENSIONED TO THE CENTERLINE UNLESS OTHERWISE SPECIFIED. DIMENSIONS ARE APPROXIMATE IN DRAWING. IN CONSTRUCTION, REFER TO THE PARTS LIST FOR EXACT DIMENSIONS AND TOLERANCES.</td> </tr> <tr> <td>NOT ASSY</td> <td>USED ON</td> <td>CASE CODE</td> <td>REV</td> </tr> <tr> <td></td> <td></td> <td>C 33321</td> <td>A</td> </tr> <tr> <td>APPLICATION</td> <td></td> <td>FILE NO</td> <td></td> </tr> <tr> <td></td> <td></td> <td>CAT-918</td> <td></td> </tr> <tr> <td></td> <td></td> <td>SCALE</td> <td>SHEET 1 OF 1</td> </tr> </table>		DRINK	BALANCE	RESERVE		CHECK	LIBREFO	RESERVE										MATERIAL				EMPTY				UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN MILLIMETERS (INCHES). ALL DIMENSIONS ARE TO BE DIMENSIONED TO THE CENTERLINE UNLESS OTHERWISE SPECIFIED. DIMENSIONS ARE APPROXIMATE IN DRAWING. IN CONSTRUCTION, REFER TO THE PARTS LIST FOR EXACT DIMENSIONS AND TOLERANCES.				NOT ASSY	USED ON	CASE CODE	REV			C 33321	A	APPLICATION		FILE NO				CAT-918				SCALE	SHEET 1 OF 1
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UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN MILLIMETERS (INCHES). ALL DIMENSIONS ARE TO BE DIMENSIONED TO THE CENTERLINE UNLESS OTHERWISE SPECIFIED. DIMENSIONS ARE APPROXIMATE IN DRAWING. IN CONSTRUCTION, REFER TO THE PARTS LIST FOR EXACT DIMENSIONS AND TOLERANCES.																																																																							
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