

# ***SANITARY SERIES***

## ***Turbine Flowmeters***

### **USER'S MANUAL**



**HP-257**  
**February 2022**

***HOFFER***  
***Flow Controls***

**Perfecting Measurement™**

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# NOTICE

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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 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.

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## Limited Warranty Policy for Hoffer Flow Controls

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HOFFER FLOW CONTROLS, INC. ("HFC") warrants HFC's Precision Series, API Series and CT Series of turbine flowmeters to be free from defects in material and workmanship under normal use and service, only if such goods have been properly selected for the service intended, properly installed and properly operated and maintained as described in the turbine flowmeter manual. Reference "turbine flowmeter manual" for specific details. This warranty shall extend for a period of five (5) years from the date of shipment to the original purchaser and covers the Precision Series and API Series of flowmeters supplied with their standard hybrid ceramic ball bearings only. All other HFC products carry a one (1) year warranty. 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 Hoffer product is defective, the product must be returned to HFC, transportation prepaid by Purchaser, within the appropriate warranty period relative to the product. If HFC's inspection determines that the workmanship or materials are defective and the required maintenance has been performed and, has been properly installed and operated, the product 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 a transportation method selected by HFC.

Prior to returning the product 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 not 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 Hoffer product to be 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 receipt of Purchaser's written instructions and agreement to pay 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 the product 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 product 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.

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**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.
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**Appendix A:   Drawing**  
                  Typical Assembly Sanitary Flowmeter  
                  With Installation Kit

**Appendix B:   Installation Instructions for IS Pickup Coils**



## **1. INTRODUCTION**

We are proud that you have selected a Hoffer Turbine Flowmeter, the finest precision turbine flow transducer on the market.

The information in this manual is provided to assist in the proper installation, use, and maintenance of your instrument.

Please take a few minutes to read through this manual before installing and operating your meter. If you have any problems with the meter, refer to the maintenance and troubleshooting sections of this manual.

If you need further assistance, contact your local Hoffer Representative or contact the Hoffer Flow Controls customer service department by telephone, fax, or email for advice.

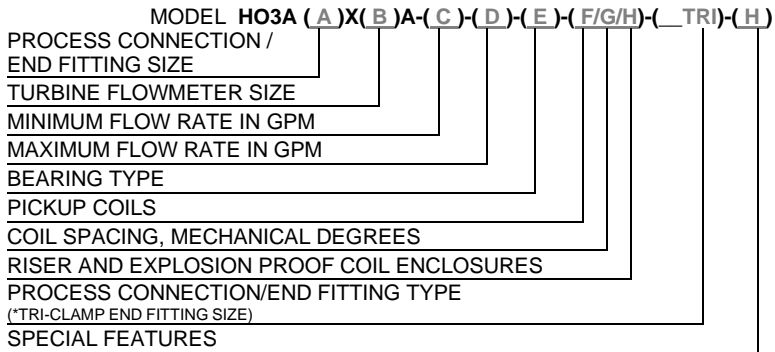
We welcome you to our growing family of satisfied customers. If you are not completely satisfied with either our product or service, we encourage you to let us know. We want to improve!

## Introduction 2

### 1.1 Model Number Designation

The Model number of the meter describes various fittings and options.

#### HO SANITARY LIQUID TURBINE SERIES



#### PROCESS CONNECTION/END FITTING & TURBINE FLOWMETER SIZE

MODEL HO3A(A)X(B)A-( )-( )-( )-( // )-( )-( )

	( A )		( B )
HO3A	1 1/2	X	1/4A
HO3A	3/4	X	1/4A
HO3A	1 1/2	X	3/8A
HO3A	3/4	X	3/8A
HO3A	1 1/2	X	1/2A
HO3A	3/4	X	1/2A
HO3A	1 1/2	X	5/8A
HO3A	3/4	X	5/8A
HO3A	1 1/2	X	3/4A
HO3A	1 1/2	X	1A
HO3A	1 1/2	X	1 1/4A
HO3A	1 1/2	X	1 1/2A
HO3A	2	X	2A
HO3A	3	X	2 1/2A
HO3A	4	X	3B

#### MINIMUM FLOW AND MAXIMUM FLOW RATE IN GPM

MODEL HO3A( )X( )-(C)-(D)-( )-( // )-( )-( )

NOTE: FOR EXTENDED RANGES REFER TO ENGINEERING GUIDE HO-EG-106

	( C )		( D )
TURBINE SIZE	MINIMUM FLOW	TO	MAXIMUM FLOW
1/4	.35 GPM		3.5 GPM
3/8	.75 GPM		7.5 GPM
1/2	1.25 GPM		9.5 GPM
5/8	1.75 GPM		16 GPM
3/4	2.5 GPM		29 GPM
1	4 GPM		60 GPM
1 1/4	6 GPM		93 GPM
1 1/2	8 GPM		130 GPM
2	15 GPM		225 GPM
2 1/2	25 GPM		400 GPM
3	40 GPM		650 GPM



**BEARING TYPE**

MODEL HO3A( )X( )-( )-( )-(E)-( // )-( )-( )

TURBINE SIZESOPTION ( E )

1/4" THRU 11/2"	(C9)	HARD CARBON COMPOSITE SLEEVE BEARING. M-199 GRADE; <u>NOT ACCEPTABLE</u> FOR USE IN FOOD WITH pH BELOW 6.
	(C1)	HARD CARBON COMPOSITE SLEEVE BEARING. M-100 GRADE; ACCEPTABLE FOR USE IN FOOD WITH pH BELOW 6.
2"	(C9)	HARD CARBON COMPOSITE SLEEVE BEARING. M-199 GRADE; <u>NOT ACCEPTABLE</u> FOR USE IN FOOD WITH pH BELOW 6.
	(C1)	HARD CARBON COMPOSITE SLEEVE BEARING. M-100 GRADE; ACCEPTABLE FOR USE IN FOOD WITH pH BELOW 6.
21/2"	(C9)	HARD CARBON COMPOSITE SLEEVE BEARING. M-199 GRADE; <u>NOT ACCEPTABLE</u> FOR USE IN FOOD WITH pH BELOW 6.
	(C1)	HARD CARBON COMPOSITE SLEEVE BEARING. M-100 GRADE; ACCEPTABLE FOR USE IN FOOD WITH pH BELOW 6.
3"	(C9)	HARD CARBON COMPOSITE SLEEVE BEARING. M-199 GRADE; <u>NOT ACCEPTABLE</u> FOR USE IN FOOD WITH pH BELOW 6.
	(C1)	HARD CARBON COMPOSITE SLEEVE BEARING. M-100 GRADE; ACCEPTABLE FOR USE IN FOOD WITH pH BELOW 6.

NOTE: BOTH BEARINGS ARE APPROVED BY THE FOOD AND DRUG ADMINISTRATION.

**PICKUP COILS**

MODEL HO3A( )X( )-( )-( )-( )-(F//)-( )-( )

OPTION ( F )

(1M)	ONE MAG COIL
(2M)	TWO MAG COILS
(1MC3PA)	ONE RF COIL
(1MC2PAHT)	ONE HIGH TEMP 6" PIGTAIL RF COIL
(2MC2PAHT)	TWO HIGH TEMP 6" PIGTAIL RF COILS
(2MC3PA)	TWO RF COILS
(1HTM)	HIGH TEMP MAG COIL
(2HTM)	TWO HIGH TEMP MAG COILS
(1ISM)	ONE INTRINSICALLY SAFE MAG COIL, NORTH AMERICA
(1ISM-ATEX)	ONE ISM ATEX COIL
(2ISM)	TWO INTRINSICALLY SAFE MAG COILS, NORTH AMERICA
(2ISM-ATEX)	TWO ISM ATEX COILS
(1RPMXXX)	ONE REDI-PULSE MAG COIL
(2RPMXXX)	TWO REDI-PULSE MAG COILS
(1RPRXXX)	ONE REDI-PULSE RF COIL
(2RPRXXX)	TWO REDI-PULSE RF COILS
(1DMXXX)	ONE REDI-PULSE INTRINSICALLY SAFE MAG COIL
(2DMXXX)	TWO REDI-PULSE INTRINSICALLY SAFE MAG COILS
(1DRXXX)	ONE REDI-PULSE INTRINSICALLY SAFE RF COIL
(2DRXXX)	TWO REDI-PULSE INTRINSICALLY SAFE RF COILS

## Introduction 4

- (-ATEX)\* WHEN ANY COIL IS GOING TO HAVE AN ATEX ENCLOSURE MOUNTED ON THE FLOWMETER ADD -ATEX AFTER THE COIL PART NUMBER.  
(THE COIL NEEDS TO BE MODIFIED TO FIT INTO A 3/4" RISER WELDED TO THE BODY REQUIRED BY ATEX.)
- (-P\*) PIGTAIL OR FLYING LEADS, ADD -P AND THE \*LENGTH OF LEADS AFTER ANY COIL EXCEPT THE HIGH TEMPERATURE COILS.

### COIL SPACING, MECHANICAL DEGREES

MODEL HO3A( )X( )-( )-( )-( )-( /G / )-( )-( )

NOTE ( G ): 90 DEG. ELECTRICAL COIL SPACING FOR TWO COILS REQUIRE THE FOLLOWING MECHANICAL SPACING. IF A SECOND COIL IS NOT REQUIRED, SKIP OPTION (G) AND MOVE ON TO OPTION (H).

TURBINE SIZE	FORWARD MECH. DEGREES	REVERSE MECH. DEGREES	COIL SPARE DEGREES
1/4	ZERO	135	250
3/8	ZERO	135	250
1/2	ZERO	135	250
5/8	ZERO	135	180
3/4	ZERO	135	250
1	ZERO	135	250
1 1/4	ZERO	135	250
1 1/2	ZERO	135	250
2	ZERO	101.25	250
2 1/2	ZERO	97.50	180
3	ZERO	97.50	180
4	ZERO	97.50	180

### RISER AND EXPLOSION PROOF COIL ENCLOSURES

MODEL HO3A( )X( )-( )-( )-( )-( / H )-( )-( )

(CONTACT FACTORY FOR EXPLOSION-PROOF APPLICATION)

#### OPTION ( H )

##### RISER FOR STANDARD MODELS AND Ex d CERTIFIED SYSTEMS

- (X) 1" MNPT RISER, WELDED TO BODY  
(X-ATEX) 3/4" MNPT RISER, WELDED TO BODY  
(X-ATEX)E2\* 3/4" MNPT RISER WITH E2 ENCLOSURE\*\*

##### RISER FOR STANDARD MODELS AND Ex d CERTIFIED SYSTEMS

- (XE2)\* 1" MNPT RISER WITH E2 ENCLOSURE\*\*  
INCLUDES STOCK #300-8375 1"X3/4" ADAPTER
- (X8S) 8" LONG S/S 1" MNPT RISER  
FOR FLUID TEMPERATURES BELOW -40°F (-40°C) OR ABOVE +158°F (+70°C)
- (X8S-ATEX) 8" LONG S/S 3/4" MNPT RISER  
FOR FLUID TEMPERATURES BELOW -40°F (-40°C) OR ABOVE +158°F (+70°C)

##### \*OPTIONS FOR ENCLOSURE STYLE E2

- (\_S) STAINLESS STEEL ENCLOSURE (ONLY RATED FOR ATEX/IECEx)

\*\*NOTES: EXPLOSION-PROOF/FLAME-PROOF ENCLOSURE WITH 3/4" FNPT MOUNT AND 3/4" CABLE ENTRY

FM: CLASS I, DIV. 1, GR. ABCD, CLASS II/III, DIV. 1, GR. EFG, TYPE 4X

CSA: CLASS I, DIV. 1, GR. ABCD, CLASS II, DIV 1, GR. EFG, CLASS III,  
TYPE 4X EX D IIC, CLASS I, ZONE 1, IP 66

ATEX: EX II 2GD Ex d tD IIC, IP66/68

IEC: EX D IIC IP68

**FOR UL LISTED ENCLOSURE CONTACT FACTORY**

**END FITTING TYPES**

MODEL HO3A( )X( )-( )-( )-( )-( // )-( TRI)-( )  
 ( TRI) TRI-CLOVER SANITARY END FITTING

**SPECIAL FEATURES**

MODEL HO3A( )X( )-( )-( )-( )-( // )-( )-( )

**OPTION ( I )**

- (CE) CE MARK REQUIRED FOR EUROPE.
- (PED-CE) PED REQUIRES THAT BOTH THE OPERATING PRESSURE AND TEMPERATURE MUST BE KNOWN AND ENTERED ON THE ORDER. THIS INFORMATION WILL BE MARKED ON THE HOUSING TO MEET PED REQUIREMENTS.
- (SEP-CE) SOUND ENGINEERING PRACTICE.
- (EX) FOR CAT, HRT1 AND HIT4 Ex d CERTIFIED SYSTEMS (LIQUID DYE PENETRANT TEST REQUIRED ON RISER WELD).  
 NOTE: ...SANITARY METER CANNOT BE INSTALLED IN CANADA FOR HAZARDOUS INSTALLATION.**
- (C-EX) FOR USE WITH CERTIFIED REMOTE MOUNTED CAT WITH (C) OPTION. REQUIRES FLOWMETER (X) RISER OPTION. INCLUDES 1" CERTIFIED UNION, 1" X 3/4" SS RISER , E2 ENCLOSURE AND LIQUID DYE PENETRANT TEST.
- (SP) ANY SPECIAL FEATURES THAT ARE NOT COVERED IN THE MODEL NUMBER, USE A WRITTEN DESCRIPTION OF THE -SP.
- (X) NO SPECIAL FEATURES.

**1.2 Specifications**

Linearity:	± 0.5% of reading over linear flow range
Repeatability:	± 0.1% of reading
Flow Range:	0.35 to 650 gpm
Temperature Range:	-450°F to +450°F, process fluid Std. Magnetic pickup coil -40°F to +185°F, process fluid Std. Redi-Pulse pickup coil
Output:	10 mVrms or greater into 10K ohm load at minimum flow rate.

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## 2. OPERATION

### 2.1 Principle

The flowing media engages the vaned rotor causing it to rotate at an angular velocity proportional to the flow rate. The pickup coil senses the spinning motion of the rotor through the housing and converts it into a pulsing electrical signal. Summation of the pulsing electrical signal relates directly to the total flow, while the frequency is linearly related to the flow rate.

### 2.2 Precautions

- ◆ Do not drop the meter. Dropping the meter may result in damage to the meter housing and/or internals.
- ◆ Do not operate the meter at flowrates greater than the maximum flowrate marked on the meter. Operating at flowrates greater than the maximum flowrate may over-spin the meter. Over-spinning may result in damage to the meter.

**CAUTION:** *Avoid over-spinning the meter. Over-spinning the meter may result in damage to the meter internals and lead to meter failure.*

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## 3. INSTALLATION

**CAUTION:** *Turbine meter has to be installed in the vertical direction with flow direction up (see Appendix A) to ensure proper drainability.*

Upon receipt of the turbine flowmeter carefully inspect it, checking for any indications of damage which may have occurred during shipment. Inspect all packing material carefully for parts or auxiliary components which may have been packed with the shipment. Refer to the packing list/invoice for a detailed list of items included in the shipment.

### 3.1 General Piping

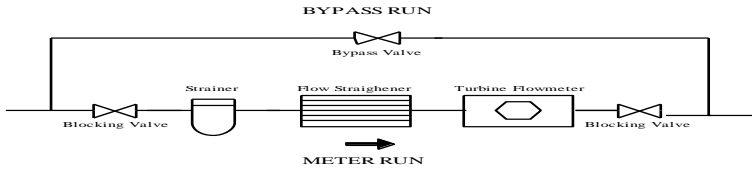
The meter housing is marked by a flow direction arrow to indicate the calibrated direction of flow through the meter. The meter must be installed in the piping in the correct orientation to ensure the most accurate and reliable operation. Care should be taken in the proper selection of the mating fittings. Size, type of material, and pressure rating should be the same as the flowmeter supplied. The correct gaskets and clamps should be utilized.

When it is expected that flow will be intermittent, the meter should not be mounted at a low point in the piping system. Solids which settle or congeal in the meter may affect meter performance.

In order to achieve optimum electrical signal output from the flowmeter, due consideration must be given to its isolation from ambient electrical interference such as nearby motors, transformers, and solenoids.

The fluid moving through the flowmeter engages the vaned rotor and swirl present in the fluid ahead of the meter can change the effective angle of engagement and, therefore, cause a deviation from the supplied calibration (performed under controlled flow conditions). Turbine meters are constructed with flow straighteners to minimize the affects of fluid swirl and non-uniform velocity profiles and are adequate for most installations. However, it is good practice to maintain a minimum straight run of approximately 10 pipe diameters ahead of the inlet and 5 pipe diameters following the outlet. Proper installation of the flowmeter minimizes the negative effects of fluid swirl.

A typical flowmeter installation is shown below:



**Typical Flowmeter Installation**

Blocking and Bypass valves should be installed if it is necessary to do preventive maintenance on the flowmeter without shutting down the flow system. The Bypass valve can be opened before the Blocking valves are closed allowing the flow to continue while removing the turbine flowmeter for service.

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**IMPORTANT:** *All flow lines should be purged prior to installing the meter. To prevent possible damage to the meter, install the meter **ONLY** in flow lines that are clean and free of debris.*

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Upon initial start-up of the system a spool piece should be installed in place of the flowmeter so that purging of the system can be performed to remove all particle debris which could cause damage to the meter internals. In applications where meter flushing is required after meter service, care should be taken as to not over-spin the meter, as severe meter damage may occur.

**CAUTION:** *Avoid over-spinning the meter. Over-spinning the meter may result in damage to the meter internals and lead to meter failure.*

To maintain an accurate flow measurement it is necessary to maintain a downstream pressure sufficient to prevent flashing/cavitation.

Flashing of the liquid will result in an indication of flow significantly higher than the actual flow. In order to eliminate this condition adequate downstream pressure must be maintained. The minimum



required downstream pressure may be calculated using the following equation:

$$\text{Minimum Pressure} = (2 \times \text{Pressure Drop}) + (1.25 \times \text{Vapor Pressure})$$

Downstream pressure may be maintained by a downstream valve that provides the necessary downstream pressure to prevent flashing/cavitation in the metering run.

### 3.2 Strainers/Filters

Turbine flowmeters are designed for use in a clean fluid service. However, the service fluid may carry some particulate material which would need to be removed before reaching the flowmeter. Under these conditions a strainer/filter may be required to reduce the potential hazard of fouling or damage that may be caused by foreign matter.

METER SIZE	MESH SIZE	PARTICLE SIZE (Maximum)
¼" to ½"	100	.0055
⅝" to 1¼"	70	.008
1½" to 3"	40	.015

If a strainer/filter is required in the system, it should be located upstream of the flowmeter taking care that the proper minimum distance is kept between the strainer and flowmeter.

### 3.3 Flow Straighteners and Installation Kits

Proper application of the Hoffer Sanitary Series Flowmeter requires a minimum inlet straight pipe run of 10 pipe diameters and a minimum outlet straight pipe run of 5 pipe diameters.

Installation kits for the Hoffer Sanitary Series Flowmeter consist of two lengths of appropriate tubing cut to a length appropriate for the upstream and downstream straight pipe run with appropriate end fittings. Flow straightening sections may be provided within the installation kit.

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## 4. MAINTENANCE

### 4.1 General

With the early design, field repairs are not recommended. Should any of these meters require repairs, it is recommended that the meter be returned to the factory. The later design allows for field repairs. When making field repairs carefully follow the disassembly and assembly instructions in the following sections. Consult the Factory to determine the meter design.

### 4.2 Cleaning Procedures

The Hoffer Sanitary Series flowmeters have been designed to allow for cleaning by commercially accepted practices. These include removing the flowmeter from the line for cleaning in an approved fluid, flushing the line with an approved cleaning solution, and steam cleaning. With all cleaning methods, care must be taken to not over-spin the meter, as severe meter damage may occur.

**CAUTION:** *Avoid over-spinning the meter. Over-spinning the meter may result in damage to the meter internals and lead to meter failure.*

#### 4.2.1 Chemical Cleaning

The flowmeters may be chemically cleaned using an approved cleaning solution by either removing the meter from the service line and using a bath or by flushing the meter in place.

The hard carbon composite bearing designs used have been tested and found to be compatible with the following CPI fluids manufactured by Klenszade; Mandate, AC-300, AC-101, Principle, and XY-12.

Following the cleaning operation, the cleaning solution should be flushed from the meter and/or service line with potable water to remove the chemically active cleaning solution.

Care should be taken to ensure that flowrates occurring during chemical cleaning do not exceed the flow capacity of the flowmeter.

### 4.2.2 Steam Cleaning

Steam cleaning is only recommended for meters with hard carbon composite bearings.

The steam flow velocity during the cleaning should not exceed 1/3 of the maximum liquid flow capacity of the flowmeter.

#### Steam Cleaning Rates at Various Steam Pressures

Meter Size	50 psig PPH <sup>1</sup>	75 psig PPH <sup>1</sup>	100 psig PPH <sup>1</sup>	125 psig PPH <sup>1</sup>	Velocity FPS <sup>2</sup>	Rate GPM <sup>3</sup>
¼	1.25	1.70	2.25	2.50	1.72	1.05
3/8	2.70	3.67	4.75	5.39	3.68	2.25
½	3.50	4.73	6.14	7.00	4.74	2.90
5/8	5.78	7.82	10.20	11.50	5.02	4.80
¾	10.50	14.20	18.40	20.90	6.32	8.70
1	21.70	29.40	38.10	43.10	7.35	18.00
1 ¼	33.70	45.70	59.30	67.10	7.32	28.00
1 ½	47.00	63.60	82.50	93.50	7.08	39.00
2	81.30	110.10	142.80	162.00	6.89	67.50
2 ½	144.60	196.00	254.00	288.00	7.84	120.00
3	235.00	318.00	412.60	467.00	8.85	195.00

#### NOTES

1. PPH = Pounds Per Hour
2. The velocity is expressed for a line size equal to the inlet bore of the flowmeter.
3. The apparent GPM is provided since many applications have a flow rate indicator which can be used to set a safe flow rate during the steam cleaning cycle.

### 4.3 Pickup Coil Testing

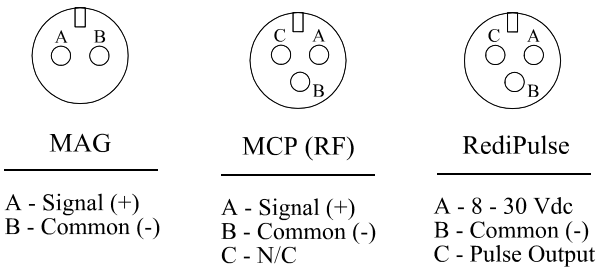
Testing the MAG and MCP (RF) coils consists of measuring the resistance with an ohmmeter. Resistance measurements are to be made only when there is no flow through the meter.

1. Measure the resistance between pin A and pin B. The resistance should be approximately as listed in the following table of some common coils.
2. The resistance from any pin to the case should be greater than 1 Mohm.

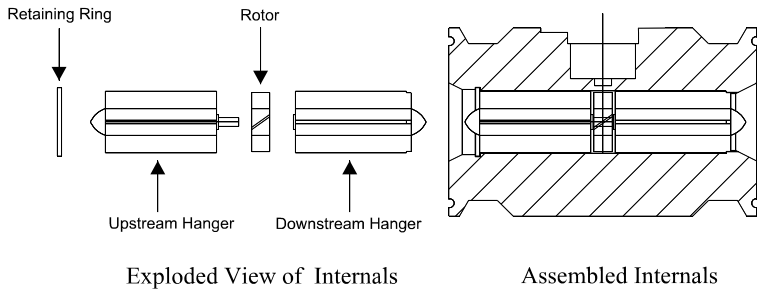
COIL*	DC RESISTANCE
	(Ohms)
MC2PAHT	15.0 ±10%
MCP3A	11.5 ±10%
PC13-74G	1800 ±10%
PC13-74S	1850 ±15%
PC24-45G	1350 ±10%
PC24-45S	1850 ±15%
PC28-13G	120 ±20%
PC28-14G	180 ±20%

If either resistance measurement fails, replace the pickup coil. Firmly seat the new coil in the flowmeter and tighten the locking nut.

### Pickup Connections



\* For specific coils not listed contact the HFC Customer Service Department for the approximate resistance readings.



#### 4.4 Disassembly

1. Remove the retaining ring from the inlet end of the meter.
2. Using a blunt tool, carefully push the internals out of the meter through the inlet end.
3. Remove the coil **ONLY** if it must be replaced.

#### 4.5 Assembly

1. The down stream hanger is placed into the housing with the bearing end toward the inlet end. Ensure that the hanger is firmly against the shoulder at the outlet end. Use a blunt tool so as not to damage the hanger.
2. Place the rotor on the upstream hanger. Ensure that the rotor "IN" faces the upstream hanger.
3. Place the upstream hanger in the housing. Align the hanger with the downstream hanger.
4. Replace the retainer ring using an appropriate tool.
5. Check for rotor endplay. The rotor should have free lateral movement and should make a rattling noise when gently shaken from end-to-end.

## 4.6 Trouble Shooting

Refer to the following troubleshooting guide for assistance with possible meter malfunctions:

TROUBLE	CAUSE	REMEDY
Fluid will not flow through the meter	<ul style="list-style-type: none"> <li>▪ Meter clogged.</li> <li>▪ Line to meter blocked.</li> </ul>	Clean meter. Clean line to meter.
Reduced flow through the meter	<ul style="list-style-type: none"> <li>▪ Meter partially clogged.</li> <li>▪ Line to meter partially blocked.</li> </ul>	Clean meter. Clean line to meter.
Meter readings inaccurate	<ul style="list-style-type: none"> <li>▪ Fluid flowrate is not within meter flow range.</li> <li>▪ Meter drag due to improper installation</li> </ul>	See “Specifications” for min and max flowrates. Replace internals.
Meter not giving pulse Signal	<ul style="list-style-type: none"> <li>▪ Faulty pickup coil.</li> <li>▪ Meter internals not turning due to improper installation.</li> </ul>	Replace pickup coil. Replace internals.

## 4.7 Spare Parts

Spare parts for the Hoffer Sanitary Series flowmeters are as follows:

### Pickup Coils

Specific pick-up coil is application dependent. Consult with the factory for the correct part number. Have complete meter model number or pick-up coil model number available.

### Complete Set of Calibrated Internals

Meter internals are ordered by the size of the meter. Consult with the factory for the correct part number. Have complete meter model number available.

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**NOTE:** *For our sanitary flow meters we supply complete sets of calibrated flow meter internals only. Spare parts at the component level are not available for our sanitary flow meters.*

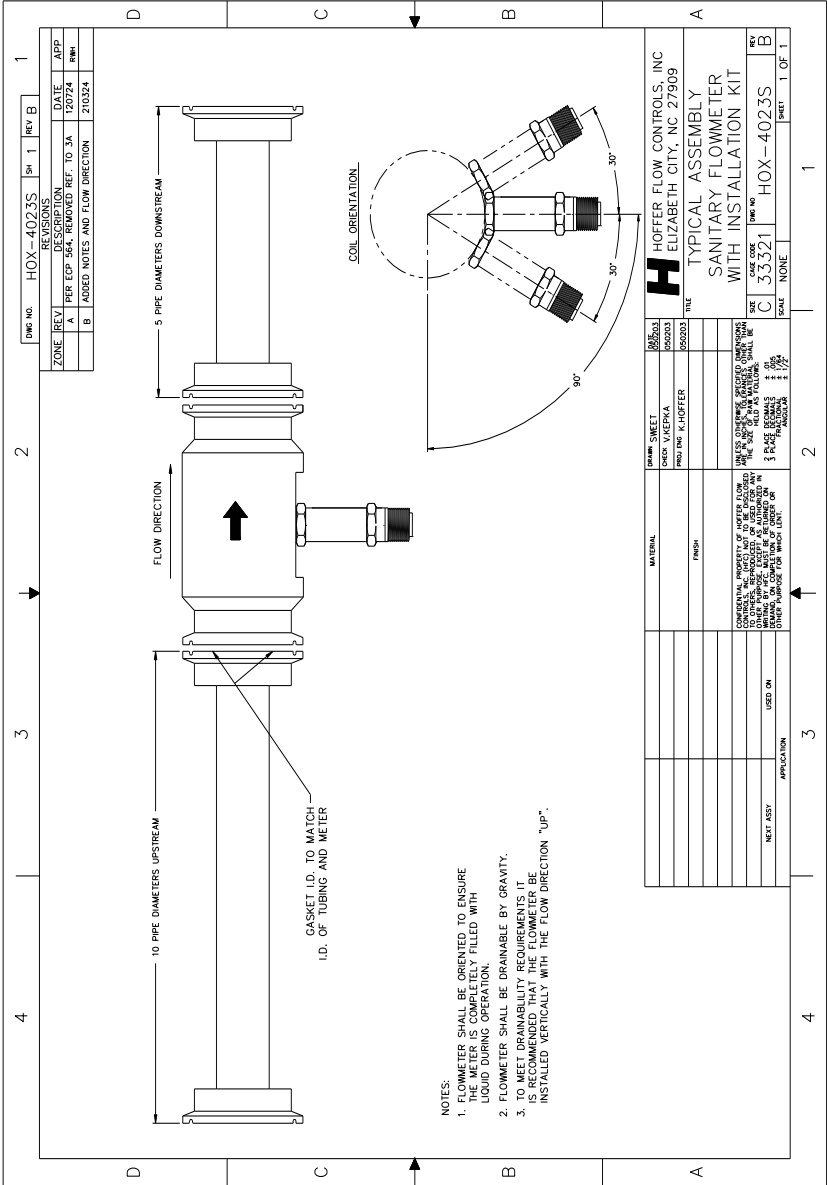
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**APPENDIX A**

**DRAWING**

**Typical Assembly  
Sanitary Flowmeter with Installation Kit**



ZONE		REV		DATE		APP	
A		PEP ECP S&A REMOVED REF. TO 3A		120724		RWB	
B		ADDED NOTES AND FLOW DIRECTION		210324		RWB	

DWG NO.		REV		SHEET		REV	
HOX-4023S		SH 1		1		B	

REVISIONS	
DESCRIPTION	
DATE	
APP	

SCALE		NONE		SHEET		1 OF 1	
CASE NO.		33321		REV		B	
KIT		HOX-4023S		REV		B	

10 PIPE DIAMETERS UPSTREAM

FLOW DIRECTION

5 PIPE DIAMETERS DOWNSTREAM

GASKET I.D. TO MATCH I.D. OF TUBING AND METER

COIL ORIENTATION

- NOTES:
1. FLOWMETER SHALL BE ORIENTED TO ENSURE THE METER IS COMPLETELY FILLED WITH LIQUID DURING OPERATION.
  2. FLOWMETER SHALL BE DRAINABLE BY GRAVITY.
  3. TO MEET DRAINABILITY REQUIREMENTS IT IS RECOMMENDED THAT THE FLOWMETER BE INSTALLED VERTICALLY WITH THE FLOWMETER "UP".

DRAWN SHEET		DATE		TITLE	
GREG V. KEFKA		050203		HOFFER FLOW CONTROLS, INC ELIZABETH CITY, NC 27909	
PRO ENG K. HOFFER		050203		TYPICAL ASSEMBLY SANITARY FLOWMETER WITH INSTALLATION KIT	
MATERIAL		FINISH		SCALE	
				NONE	
SHEET NO.		REV		SHEET	
1		B		1 OF 1	

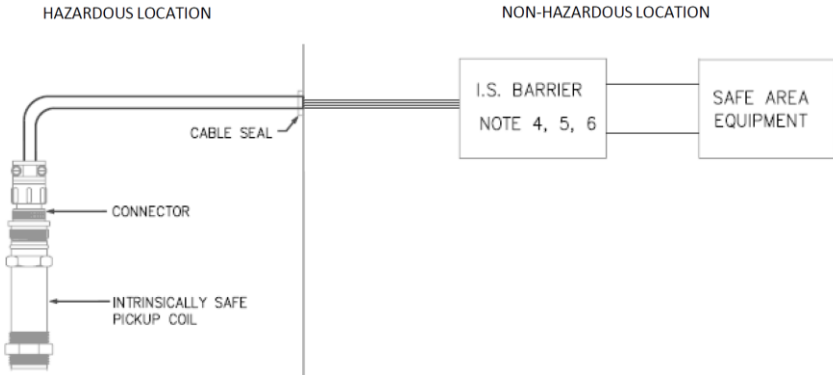
CONTROL NO. SHOULD BE KEPT IN RECORDS FOR THIS PROJECT. THE USER SHALL BE RESPONSIBLE FOR THE PROPER INSTALLATION OF THE FLOWMETER. THE USER SHALL BE RESPONSIBLE FOR THE PROPER MAINTENANCE OF THE FLOWMETER.

REVISIONS

NO.	DESCRIPTION
1	ISSUED FOR CONSTRUCTION
2	REVISED TO REFLECT CHANGES TO THE FLOWMETER
3	REVISED TO REFLECT CHANGES TO THE FLOWMETER

## **APPENDIX B**

### **Installation Instructions For Intrinsically Safe Pickup Coils ISM and ISMC Series**



Notes:

1. For CSA-NRTL Installations: Installation should be in accordance with ANSI/ISA RP12.6 “Installation of Intrinsically Safe Systems for Hazardous Locations” and the National Electric Code (ANSI/NFPA 70). For ATEX Installations: Installation should be in accordance with ATEX Directive for Installation of Intrinsically Safe systems in hazardous locations and in accordance with the relevant local Electric Codes.
2. For CSA Installations: Install in accordance with Canadian Electric Code Part 1. For ATEX Installations: Install in accordance with the relevant local Electric Code.
3. Pickup coils equipped with the “MS” type connector are only suitable for hazardous locations Class 1, Division 1, Groups A, B, C, D; Class II, Division 1 Group G, Class III, and Coal Dust. Pickup coils with an “NPT” connector or “pigtail” leads can be used in hazardous locations Class 1, Division 1, Groups A,B,C,D; Class II, Division 1, Groups E, F, G, and Class III. For ATEX installations, pickup coils are suitable for use in Ex ia IIC or IIB hazardous locations, where Exia is defined as Intrinsically Safe/Securite Intrinseque.
4. For entity installations, select a CSA or ATEX certified barrier that satisfies the following:

$$V_{max} \geq V_{oc}; \quad C_i + C_{cable} \leq C_a;$$

$$I_{max} \geq I_{sc}; \quad L_i + L_{cable} \leq L_a$$

5. For system installations, select a CSA or ATEX certified single channel barrier having the parameters of 28 Vdc (Max) and 300 ohms (Min).
6. Barriers must be installed in accordance with manufacturer'S instructions.
7. Exia is defined as intrinsically safe/secureite intrinseque.

The PC45 series pickups are intrinsically safe electrical equipment and can be used in potentially explosive atmospheres. The apparatus must be installed with certified intrinsically safe equipment and the combination must be compatible with intrinsically safe rules and the electrical parameters in the below table.

### CSA Entity Parameters

NOTE: Electrical specification V, and I, of the barriers installed with the pickup cannot exceed any of the following values.

Class/Group (CSA)	Vmax	I <sub>max</sub>	Ci(F)	Li(mH)
Class I, Gr A, B, C, D; Class II Group E,F,G; Class III	30	300	0	0
Class I Group C,D; Class II Group E,F,G; Class III	30	300	0	0

### ATEX Entity Parameters:

NOTE: Electrical specification U, I, and P of the barriers installed with the pickup cannot exceed any of the following values.

Gas Group (ATEX)	U <sub>i</sub> (V) V <sub>max</sub>	I <sub>i</sub> (mA) I <sub>max</sub>	P <sub>i</sub> (W)	Ci(F)	Li(mH)
IIC	30	300	.75	0	0

**Maximum Ambient Temperature:**

The maximum ambient temperature of the PC45 series is in accordance with the following temperature classes:

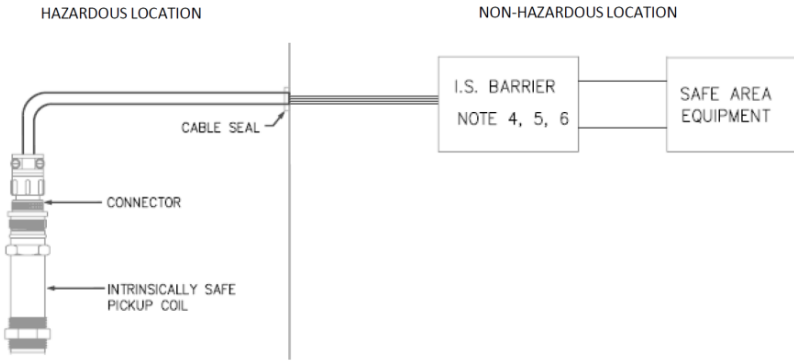
T6	T5	T4	T3
-50°C to +80°C Max	-50°C to +95°C Max	-50°C to +130°C Max	-50°C to +175°C Max

**Marking:**

The PC45 series shall be marked with either CSA or ATEX identification, or a combination label, as applicable and shall be identified by the part number, date code (AA BB), and Lot Identification number (YYYYYY).

**WARNING: Do not separate when energized.**

**Installation Instructions  
For  
Intrinsically Safe Pickup Coils  
DMX and DRX Series**



Notes:

1. For CSA-NRTL Installations: Installation should be in accordance with ANSI/ISA RP12.6 “Installation of Intrinsically Safe Systems for Hazardous Locations” and the National Electric Code (ANSI/NFPA 70). For ATEX Installations: Installation should be in accordance with ATEX Directive for Installation of Intrinsically Safe systems in hazardous locations and in accordance with the relevant local Electric Codes.
2. For CSA Installations: Install in accordance with Canadian Electric Code Part 1. For ATEX Installations: Install in accordance with the relevant local Electric Code.
3. Pickup coils (with or without integral pre-amp) are suitable for hazardous locations Class I, Zone 0 and Class I, Division 1 (Groups as noted depend on the model). Pickup coils equipped with the "MS" type connector are only suitable for hazardous locations Class I, Division 1, Groups A, B, C, D; Class II, Division 1, Groups G, Class III and Coal Dust. Pickup coils with an "NPT" connector or "pigtail" leads can be used in hazardous locations Class I, Division 1, Groups A, B, C, D; Class II, Division 1, Groups E, F, G, and Class III. For ATEX installations, pickup coils are suitable for use in Ex ia IIC or IIB hazardous locations, where Exia is defined as Intrinsically Safe/Securite Intrinseque.
4. For entity installations, select a CSA or ATEX certified barrier that satisfies the following:

$$\begin{array}{ll}
 U_i/V_{max} \geq U_o/V_{oc}; & C_i + C_{cable} \leq C_a/C_o \\
 L_i/I_{max} \geq I_o/I_{sc}; & L_i + L_{cable} \leq L_a/L_o
 \end{array}$$



5. For system installations, select a CSA or ATEX certified single channel barriers or one dual channel barrier where each channel has parameters of 28 Vdc (Max) and 600 ohms (Min), such as MTL-778 or Stahl 9002/77-280-094-00.
6. Barriers must be installed in accordance with manufacturer'S instructions.
6. Exia is defined as intrinsically safe/securite intrinseque.
7. For system installations, select a CSA or ATEX certified single channel barriers or one dual channel barrier where each channel has parameters of 28 Vdc (Max) and 600 ohms (Min), such as MTL-778 or Stahl 9002/77-280-094-00.
6. Barriers must be installed in accordance with manufacturer'S instructions.
8. Exia is defined as intrinsically safe/securite intrinseque.

The amplified series of pickups are intrinsically safe electrical equipment and can be used in potentially explosive atmospheres. The apparatus must be installed with certified intrinsically safe the equipment and combination must be compatible with intrinsically safe rules and the electrical parameters in the below table.

### CSA Entity Parameters

Class/Group (CSA)	Part Numbers	Ui/Vmax	li/lmax	Ci/Ci	Li/Li
Class 1, Zone 0 Group IIC/Class 1, DIV 1, Group A,B,C,D	DMX-XXX-1 DMX-XXX-2 DRX-XXX-1 DRX-XXX-2	30 VDC	200 mA	0 uF	0.5 mH
Class 1, Zone 0 Group IIA/Class 1, DIV 1, Group D	DMX-XXX-3 DMX-XXX-4 DMX-XXX-5 DRX-XXX-4 DRX-XXX-5 DRX-XXX-3	30 VDC	190 mA	0 uF	0.5 mH

Part Numbers	Group	Electrical Parameters
DMX-XXX-1 DMX-XXX-2 DRX-XXX-1 DRX-XXX-2	IIC	Ui = 30V; li = 200mA; Pi = 0.75W; Ci = 0; Li = 0.5mH
DMX-XXX-3 DMX-XXX-4 DMX-XXX-5 DRX-XXX-3 DRX-XXX-4 DRX-XXX-5	IIA	Ui = 30V; li = 190mA; Pi = 2.55W; Ci = 0; Li = 0.5mH

**Maximum Ambient Temperature:**

The maximum ambient temperature of the Amplified series is in accordance with the following temperature classes. Note: Refer to individual product specification sheet for temperature capabilities of specific model being used.

**ATEX Certified Group IIC and IIA:**

T2	T4
-40°C to +125°C	-40°C to +51°C

**CSA Certified Group IIC:**

T2	T4
-40°C to +125°C	-40°C to +51°C

**CSA Certified Group IIA:**

T2	T4
-40°C to +100°C	-40°C to +51°C

**Marking:**

The amplified series of pickups and preamplifiers shall be marked with either CSA or ATEX identification, or a combination label, as applicable and shall be identified by the part number, date code (AA BB), and Lot Identification number (YYYYYY).

**WARNING: Do not separate when energized.**