## **HDI 1021/2021 4-20mA Transmitter**

USER'S MANUAL Rev5



(Custom designed top pictured above. Unit may vary.)





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# SECTION I Systems General Information

#### A. General Information:

This manual describes the installation, operation, maintenance and calibration of the HDI 1021/2021 Transducer Assembly. This manual will provide the user with information necessary to properly utilize the instrument. Included in this manual are all the necessary procedures to install and maintain this instrument properly. The 1021 product includes HDI's Calibration Certificate and Certificate of Compliance. The 2021 Series product include the third-party approval (ATEX/IECEx/CSA) along with HDI's Calibration Certificate and Certificate of Compliance.

For brevity, we will use the name "2021" to refer to both the 1021 and 2021 products. The 1021 and 2021 Series units are identical for purposes of this user's manual, unless noted otherwise (E.G., third-party approvals).

## **B. Unpacking and Inspection:**

Upon receipt account for all pieces on the packing list. If any items are missing, immediately inform the freight forwarder. Inspect all items for damage. If any items are damaged, immediately inform the freight forwarder and Houston Digital Instruments, LLC.

### **C. Precautionary Information:**

Assure all directions on the packages are followed during unpacking and handling. Extra care should be taken to assure that the pressure sensor, which is mounted in the transducer housing supplied with the system, is protected from contact with any hard or sharp objects, i.e., screwdriver, fingernail, etc., during the installation of the sensor. Any evidence of mishandling or abuse shall VOID the warranty (see Section VIII Warranty for detailed coverage). Also avoid any extreme tightening efforts, with a hammer, at installation.

## **D. Personnel Qualifications:**

This equipment requires experienced personnel to handle, install and maintain. HDI can provide technical schooling if required at their Houston facility or on-site.

# SECTION II Systems Description

## A. Systems Description:

The transducer (sensor) is an embedded strain gauge housed in a stainless-steel case. The strain gauge is commonly housed in either a hammer union or a flange. Any style housing may be specified by the customer.

## **B. Systems Description:**

- a. Pressure Transducer: 2" 1502, 2" 2002, 2" 2202, and 1" NPT possible flanged housings
- b. Cables:

A high-grade shipboard approved instrument cable with woven shield is recommended to reduce noise interference. Other types of cable are available at additional cost.

## C. System Capacities:

a. Transducer:

Transducers are rated at full range. Units 10K and under are capable of withstanding a 30% over pressurization without damage to the system. 16K units are capable of withstanding a 10 percent over pressurization without damage to the system. System capacities are from 5K PSI to 30K PSI.

## SECTION III Installation

## A. Components:

#### a. Transducer:

The transducer is to be mounted by the customer at the locations deemed most suitable for such equipment.

### b. Cables:

Maximum recommended cable length is 200'. Cable lengths, other than standard, shall have been specified by the customer to the factory in advance. Other cable types are available upon request. Cabling will be installed using acceptable industry standards for such installations.

## **B. Mounting Components:**

### a. Pressure Transducer:

The pressure system transducer comes from the factory as a complete assembly and only requires mounting of the transducer housing using standard practices for such installations. Note: Special care should be taken to ensure that the transducer pill mounted in the center of the transducer housing, is not allowed to make contact with any hard and/or sharp object as the accuracy and the sensitivity could be affected. The transducer pill is vulnerable to this type of contact. Any evidence of mishandling or abuse shall void the warranty. We have installed an "orifice plate" to help minimize direct contact; in doing so, regular cleaning should be performed to increase longevity with the above precautions.

# SECTION IV Theory of Operation

## A. Pressure System:

The major components of this system are the transducer and the communications link (cable). The transducer utilizes a four active arm Wheatstone Bridge Strain Gauge which, when excited by the current source, will produce an electrical signal that is proportional to pressure applied to it. The cabling serves as an interconnect for the transducer, taking the excitation power in and carrying away the signal.

## **B. Factory Preset Calibration:**

The HDI 2021 is a digital electronic pressure measurement device designed specifically for Oilfield applications. This system has been factory preset and will not require periodic calibration as with the previous version of the HDI 2021 or to our similar product line, HDI 2400 Pressure Gauge Systems.

The HDI 2021 is based on a "Strain Gage" design concept. The calibration of the strain gauge is similar to tuning a stringed instrument. It is necessary to understand the system is based on small resonant electronic signals.

The baseline for calibration is the current excitation across the bridge. This is preset at the factory and cannot be changed.

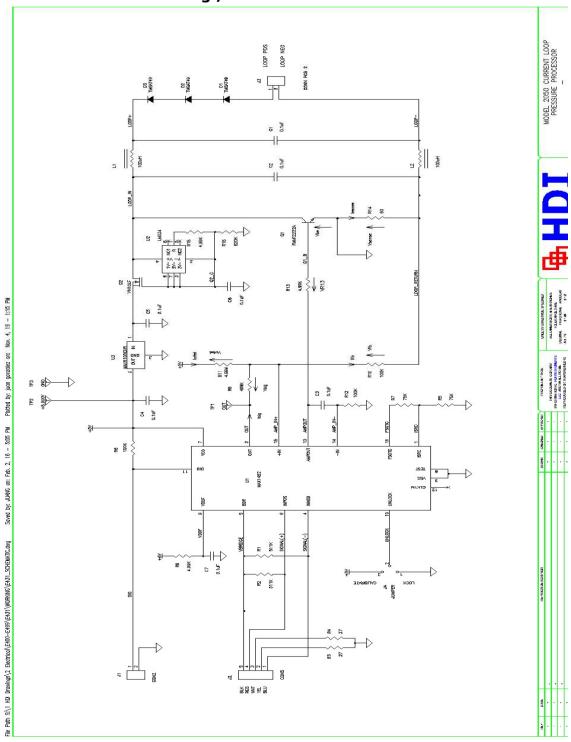
## SECTION V Maintenance

#### A. Guidelines:

First, maintain the integrity of the cable and visually check for abuse. Second, assure the system is cleaned and checked periodically for damage following our listed precautions. Last of all, set a schedule for periodic calibrations by Houston Digital Instruments, if required.

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## **B. Schematic Drawing / Parts List:**



## **SECTION VI** Certification

### A. CSA Certificate



## **Certificate of Compliance**

Certificate:

1829270 (LR 97791)

Master Contract: 159619

Project:

1829270

Date Issued:

2007/03/28

Issued to:

Houston Digital Instruments Inc.

4130 Directors Row Houston, TX 77092

USA

Attention: David Colotta

The products listed below are eligible to bear the CSA Mark shown with adjacent indicators 'C' and 'US'



Issued by:

E. Foo, C.E.T.

Authorized by: Patricia Pasemko, Operations

thing pagent

PRODUCTS

CLASS 2258 83

- PROCESS CONTROL EQUIPMENT-Intrinsically Safe and

Non-Incendive - Systems-For Hazardous Locations-Certified to U.S.

Standards

CLASS 2258 03

- PROCESS CONTROL EQUIPMENT - Intrinsically Safe and Non -

Incendive Systems - For Hazardous Locations

 HDI 202X\*\*\* 4-20mA Pressure Transducer. Intrinsically Safe when installed with Certified safety barriers per Installation Dwg. E431. Temperature Code T6 at Tamb.= 60°C.

Note: Model suffixes "\*\*\*" denote alpha-numeric characters representing mechanical and pressure variations.

The 'C' and 'US' indicators adjacent to the CSA Mark signify that the product has been evaluated to the applicable CSA and ANSI/UL Standards, for use in Canada and the U.S., respectively. This 'US' indicator includes products eligible to bear the 'NRTL' indicator, NRTL, i.e. National Recognized Testing Laboratory, is a designation granted by the U.S. Occupational Safety and Health Administration (USHA) to laboratories which have been recognized to perform certification to U.S. Standards.

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### **B. DNV Certificate**



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DNV 22 ATEX 31844X, Issue 0

[13] Schedule

[14] Certificate of Conformity No: DNV 22 ATEX 31844X Issue 0

#### [15] Description of Product

There are two intrinsically safe products covered by this unit certification: the HDI 2021 Pressure Transmitter and the HDI 2100 Pump Stroke Counter.

The HDI 2021 is powered from either a 15.8V or 28V barrier and is provided with an integral connector for user connections.

The HDI 2100 is powered from an encapsulated battery pack that contains a 3.6 V Lithium Thionyl Chloride cell and a protection diode, along with current limitation formed by two  $50 \Omega$  resistors connected in parallel. Connection to the electronics is made from a cable that emerges from the encapsulated battery assembly. The HDI 2100 is a standalone unit and contains no connections to external circuits.

The sensors connected to these units can be considered as simple apparatus, and none of the units are a spark ignition or a thermal ignition risk with two faults applied anywhere.

#### **Type Designation**

HDI 2021 Pressure Transmitter HDI 2100 Pump Stroke Counter

#### **Electrical Data**

HDI 2021 Units: -	Ui = 15.8V, Ii = 150mA, Pi = 593mW Ci = 15.2nF, Li =296µH
	Ui = 28V, Ii = 110mA, Pi = 770mW Ci = 15.2nF, Li = 296μΗ
HDI 2100 Units:	HDIBATT-E260-DOT-AA, providing 3.6V, 165mA

#### Serial Numbers Covered by this Certificate of Conformity

HDI 2021:	2021-1484 to 2021-1533	(50 units)
HDI 2100:	2100-1817 to 2100-1866	(50 units)

[16] Report No.: 2022-3068, Issue 00

Project No.: PRJC-546402-2016-PRC-USA

This certificate may only be reproduced in its entirety and without any change, schedule included.

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DNV 22 ATEX 31844X, Issue 0

#### [17] Specific Conditions of Use

1. Installation shall be in accordance with the applicable HDI installation drawing, as follows:

Model	HDI Installation Drawing
HDI 2021	E430, Rev B
HDI 2100	ELTSCHE-E331-PGO-AA, Rev A

- 2. Where barriers are used, they shall be ATEX certified.
- 3. The battery pack shall only be replaced in an area known to be non-hazardous.
- 4. <u>HDI 2100 Only</u>: The external non-metallic materials of the enclosure have a surface resistance >10GΩ. Care shall be taken to avoid the generation of a potentially dangerous electrostatic charge. Clean only with a water damp cloth. See manual for details.
- 5. HDI 2021 Only: The integral cable provided shall not exceed 76 meters in length.

#### [18] Essential Health and Safety Requirements

Essential Health and Safety Requirements (EHSRs) are covered by the standards listed at item 9

#### [19] Drawings and documents

Number	Title	Rev.	Date
121	HDI 2021 Drawings and Documents		
CSA Report 1829270	CSA Report Covering the 2021 Pressure Transmitter	1	2007-03-28
- 15/	HDI 2021 Pressure Transmitter CSA Documents	y/	-
A447	2000B Sensor and 2021 Serial Number Tag	K	2020-01-16
E430	2021 Installation Drawing	В	2006-09-21
1/	HDI 2100 Drawings and Documents		
CSA Report LR 97791-2	CSA Report Covering the 2100 Pump Stroke Counter	2	2000-03-14
-	HDI 2100 Pump Stroke Counter CSA Documents	=1	-
A466	2100 and 2200 Serial Number Tag	I	2020-01-16
A467	2100 and 2200 Sensor Serial Number Tag	K	2020-01-16
ELTSCHE-E331-PGO-AA	2100 Installation Drawing	Α	1999-04-08

#### [20] Certificate History

Issue	Description	Issue date	Report no.
0	Original issue	2022-04-22	2022-3068, Issue 00

#### END OF CERTIFICATE

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## C. CSA Certification Markings and Tag:



## D. ATEX Certificate and Tag:



Note: In the event one of the components (gauge or sensor) fails, you can order the replacement for a quick drop-in replacement. When ordering, be sure to provide the applicable serial # or certification requirements to ensure the replacement is acceptable.

## **SECTION VII** 1021 / 2021 DATA AND PRODUCT CONFIGURATION SHEET



## 1021 and 2021 LOOP POWERED PRESSURE TRANSMITTER

## Data and Configuration Sheets



#### **Specifications:**

- Pressure Range: Up to 30K

## • Rig Powered Instrumentation 1. PRESSURE RANGE (SELECT ONE) ○ 5KPSI ○ 6KPSI ○ 10KPSI ○ 15KPSI ○ 16KPSI ○ 20KPSI ○ 30KPSI 2. SENSOR CONNECTION (SELECT ONE) O 2" 1502 Hammer Union 9/16" Autoclave Sensor (Standard) Note: Only Compatible with O 2" 1502 H2S Hammer Union O 2" 2002 H2S Hammer Union 2" 2202 H2S Hammer Union

### 3. AUTOCLAVE FLANGES (MUST SELECT 9/16" AUTOCLAVE SENSOR)

Specify Pressure Rating and Size Pressure Rating: O 5M. O 10M O 15M O 20M Size: 0 1 13/16" 0 2 1/16" 0 3 1/16"



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Data and Configuration Sheets

## CROSSOVER FLANGES / WYE ADAPTERS (MUST SELECT 1502, 2002, OR 2202 HAMMER UNION SENSOR)

For Wye Adapter: 1502 Connection Only

For Cross Over Flange: Specify Pressure Rating, Size, and

Connection Type below:

Pressure Rating: 0 5M 0 10M 0 15M 0 20M

Size: 0 11/16" 0 21/16" 0 31/16"

Connection Type: ○ 1502 ○ 2002 ○ 2202



#### 5. CABLE

The 2021 Pressure Transmitter System does not include any cable. 4-20mA Output Cable is required for new orders; clients with existing 4-20mA Output Cable may use the existing cable with a new 2021 Pressure Transmitter System. Cable is purchased in 5' increments.

4-20mA Output Cable: Distance from 2021 Pressure Transmitter to Local J-Box Termination

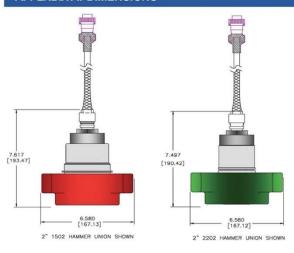
#### 6. CERTIFICATION

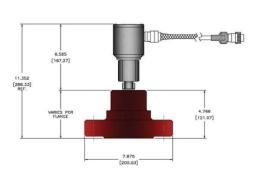
- O CSA: Intrinsically Safe Class 1, Division 1, Groups A, B, C, and D (Standard)
- ATEX: optional, II 1 G, Ex ia IIC T4
- IECEx (in process)





#### APPENDIX A: DIMENSIONS





\*2-1/16" 10M API FLANGE H2S PSL LEVEL 3 WITH BX152 RING GROOVE

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Data and Configuratio n Sheets

### APPENDIX B: REPLACEMENT PARTS

Part Number	Description
HDI20000600STDAA	600 Bar Pill And Temp Comp Board Assy For 6K or 10K PSI Pressure Gauge Sensors
HDI20001000STDAA	1000 Bar Pill And Temp Comp Board Assy For 10K or 16K PSI Pressure Sensors
CONTACT HDI FOR PRODUCT CONFIGURATION	Pill Replacement Kit: Includes Pill Rubber Diaphragm, Snap Ring, Rubber Grommet for Kellum's Grip Design (Wire Mesh, Post 2009), Rubber Grommet for M983 Design (No Wire Mesh, Pre 2009), and Pill Insertion Tool

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## SECTION VIII Warranty

Houston Digital Instruments, Inc. (HDI) warrants for a period of one year from the date of shipment, HDI's manufactured products to the extent that HDI will replace those parts having defects in material or workmanship when used for the purpose or specification HDI recommends.

HDI will replace

or repair, as it deems necessary, any products covered by this warranty, after HDI's examination discloses to its satisfaction, that in fact the products are defective, and an adjustment is required. If an adjustment is required, the amount of the adjustment is the net sales price of the defective product. No allowances shall be made for labor or expenses of repairing defective products or damage resulting from same. All products accepted under the provisions of this warranty shall be shipped prepaid to HDI and returned to the customer prepaid by HDI. All products not accepted under the provisions of this warranty shall be shipped prepaid to HDI and returned freight collect.

HDI shall not be responsible for repair or replacement of products, resulting from improper handling, storage, installation, misuse, negligence, or use in a manner contrary to the recommendations of HDI.

HDI warrants only the products which it sells of Other Manufacturers to the extent of their warranties. All warranty claims shall be made in writing to the nearest HDI office or authorized factory representative. HDI makes no other warranty of any kind, expressed or implied, and all implied warranties of merchantability or fitness for a particular purpose which exceed HDI's afore-stated obligation are hereby disclaimed by HDI and excluded from this warranty.

This warranty is nontransferable and HDI shall not be liable for any damage, injury, loss to property or persons resulting from the use of any HDI's products or equipment whether such damage, injury or loss results from, or is caused by: manner of use, defects in materials or workmanship or otherwise.