
HDI 2200 Position Indicator Gauge

User's Manual Rev3



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SECTION 1 Systems General Information:

1.1 General Information:

This manual describes the installation operation and maintenance of the HDI #2200 Position Indicating System. This manual shall provide the user with information necessary to properly utilize the Position Indicating System. Included in this manual are all the necessary procedures to install and maintain this Position Indicating System Instrumentation properly.

1.2 Unpacking and Inspection:

Upon receipt of the equipment, assure all items are accounted for 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, Inc.

1.3 Precautionary Information:

Assure all directions on the packages are followed during unpacking and handling. Please note: if the return spring is preinstalled on the linear shaft, **Do Not** compress the spring and let the spring to freely extend. There is enough force when compressed that the linear shaft can be pulled from the internal body. If damaged, the linear potentiometer must be replaced. The unit is an oil-filled sealed unit.

1.4 Personnel Qualifications:

This equipment requires experienced personnel to handle, install and maintain. HDI offers a technical training school on their premises if the Customer desires.

SECTION 2 Systems Description:

2.1 Systems Description:

The HDI 2200 System is an Electronic Position Indicating System. The system consists of three (3) primary components as detailed in Section 2.2. An electronic potentiometer is housed in a stainless steel housing based on your specific choke body. The assembly is adjustable inside the housing to assure the sensor is located properly. The housing(s) are constructed to adapt to a variety of choke(s): Shaffer/NOV, Cameron, Swaco, Control Flow, Cortec and others as required. The display is a liquid crystal display (LCD), which includes both a three digit numerical display (for accuracy) and a bar-graph (101 segments) representation (for trend). The electronic bar graph display indicates choke position from closed to open, 0 - 100 percent and in 1/8 graduations. Dependent on choke body, your LCD may be configured to be shown as percent (%) Closed versus the traditional percent (%) Open.

2.2 System Components:

2.2.1 Position Indicators:

Two (2) Position Indicators with numeric and Bar Graph displays are used for dual applications for respective Left / Right Choke or Choke / Kill identification; otherwise, a single display system is used for Single Choke applications.

2.2.2 Position Sensors:

As noted above, HDI has designed several different sensor housings to be compatible to various choke styles to reduce onsite customization and to simplify installation after removing the existing pneumatic sensors. General dimensional drawings or photos are available upon request.

2.2.3 Cables:

All interconnecting cables supplied by HDI or can be adapted to use junction box for open termination.

2.3 System Capacities:

2.3.1 Position Indicators:

Choke Position Indicators are rated for 0 to 100 percent or in one-eighth graduations and will be respective of your choke body orientation for Open or Close .

2.4 System Options:

Custom designed systems will include, per the customers' request or customers' specifications, certain options required to meet offshore area classifications or specific customer requirements. Each system of this type will be designed to meet specific requirements or classifications and is therefore unique and as such goes beyond the scope of this publication. Barriers or explosion proof junction boxes are not required as the system has been certified intrinsically safe by the Canadian Standards Association (CSA). The following are common examples that may be encountered or requested by customers. HDI offers the following options at additional cost.

2.4.1. Remote Display:

Remote displays may be provided to allow secondary indicators at an alternate location at the customer's request.

2.4.2 4/20 mA Output:

HDI offers as an option, a signal current loop providing a 4/20 mA remote output that may be used for chart recorder inputs and/or datalogging.

2.4.3 0-1VDC Output:

HDI offers as an option, a signal providing a 0-1Vdc remote output that may be used by the customer for chart recorder inputs and/or datalogging. This is a factory installed option and does not require calibration.

2.4.4 ATEX Compliance

HDI offers as an option, to have units third party inspection by DNV for ATEX Compliance. This is done on special requests and lead times may vary dependent on DNV availability and HDI's current delivery schedule. Copy of the ATEX Certificate showing the approved classification and marking is available upon request.

SECTION 3 Installation:

3.1 Components Location:

3.1.1 Control Head and Sensors:

The Control Head and Sensors are to be mounted by the Customer at the locations deemed most suitable for such equipment. The system transducer (POTENTIOMETER) comes from the factory as a complete assembly and only requires mounting of the transducer housing using standard practices for such installations.

3.1.2 Cables:

All wire lengths from the Panel to the sensors shall be supplied by the customer. Prefabricated cables from HDI typically have the 3 Pin Male / 3 Socket Female connectors for quick installation.

3.2 Mounting Hardware:

Sensor integration to the choke bodies will generally use the existing bolts from the pneumatic sensors once removed, while the HDI sensors will be complete with all necessary hardware or adaptive stems as required for Swaco Rotary Sensors. Custom fit ups are available as option by HDI.

3.3 Position Sensor Assembly and Standard Installation:

3.3.1 Assembly General:

The Position Potentiometer and mounting brackets are provided to replace an existing pneumatic regulator choke position system presently in use.

This assembly is designed to mount in the original choke position enclosure utilizing the existing hole patterns and mounting hardware. Remove the existing choke position assembly. Install the new stainless steel housing and potentiometer assembly with mounting brackets with the existing mounting hardware.

Standard Linear Potentiometer,

Loosen the potentiometer brass mounting brackets to allow for adjustment. With the choke body in the fully closed position, adjust the cylinder potentiometer assembly to allow 1/8" to 1/4" compression of the shaft into the potentiometer housing and tighten the bolts on the brass mounting brackets. Observe the choke bodies and sensor while you Open the Chokes to assure the potentiometer does not bottom out inside the cylinder housing. Once you confirmed there is no issues, you may proceed to Calibration, see Section 5.

Rotary potentiometer:

HDI provides an adaptive shaft (for Swaco) that must be threaded into the existing choke shaft via the adjustment stud. As part of the initial set up for a rotary sensor, the potentiometer is marked with the active span for proper installation and orientation. Orientation to Clockwise and counterclock-wise operation is critical to avoid crossing into the dead span of the potentiometer, which will cause a spike or erratic reading on your LCD. Once you believe you have orientated the Rotary potentiometer to match Clockwise and Counterclock-wise orientation, gently tighten the set screw on the brass mounting block to secure the potentiometer assembly from rotating during operation.

3.3.2. Position Display:

The system gauge is designed to be installed in a 7.25" x 4.25" cut-out hole in the panel. Mounting dimensional drawing is located in the rear of this manual under Appendix. Remove the ¼" elastic stopnuts from the ¼-20 screws, drop the gauge in the appropriate hole and replace the stopnuts. As part of our deliverables, HDI provides a rubber gasket that allows the LCD display to be dropped in from the front of the panel face or can be inserted from the back side based on your preference and serviceability.

3.3.3. Cables

The system comes complete with wire and connectors made to the customer's specifications. Simply route the wire from the transducer to the gauge using standard practices, connect the cables to the transducer and gauge, and tighten the collars.

3.4 Non Certified 4-20 mA Position Sensor Assembly Installation:

HDI offers our sensor configurations with a Slidewire Potentiometer 4-20mA converter allowing our clients to directly interface with a Data Acquisition or PLC system. This configuration is installed in the same manner as previously addressed in this manual. The sensor housing will have a small junction box mounted to the housing or may be mounted near by per a client's request. Depending on your request, the jbox may have open ended cables for direct termination or interface connectors may be configured for plug and play approach.

The converter is a SEM210X, an ATEX certified component that requires an external resistor across terminals 3 & 5 (484.5 ohm) which has already been preinstalled and a spare is included with your shipment so when servicing the unit, you have a spare. As with a 4-20mA signal, the unit requires 24vdc to complete the current loop. Please note, the SEM210 is calibrated via full 2k resistance travel and is not adjustable. Your PLC system should allow you to set the respective high side of the SEM210 output to your high side reference and complete the display span of 0-100%.

Wiring layout is included in the Appendix of this manual. You may skip Section 4 and 5 and reviewing System Maintenance. *Although SEM210X is a certified ATEX component, the overall Assembly of the 4-20 mA is not certified.






SECTION 4 Theory of Operation:

4.1 Positioning Systems:

The major components of this system consist of the Control Head, Sensor, and interconnect Cable. The LCD (Control head) has an internal Power Source, a 3.6 potted (replaceable) Battery Pack that supplies power to the LCD via the power cable. The Control Head then supplies the excitation to the Sensor. The Sensor is typically a 2 or 5K potentiometer that measures its own extension and compression. This information is returned to the Control Head in which it then converts the voltage to digital information which is used to drive the 101 segment Bar Graph display with one-eighth division Bar Graph. The Position Indicator does not require any warm up period. Turning the system off when not in use will greatly extend battery life

(Power OFF by pressing the Mode Select Button and then pressing the Power Button.)

The Position Indicator contains these operator initiated functions:

	Mode Select Button	Selects calibration and power on/off Modes.
	UP ARROW 100% Calibration Select Button	Allows for calibration at open position.
	DOWN ARROW 0% Calibration Select Button	Allows for calibration at closed position.
	Enter Select Button	Enters Mode and Calibration Selections
	Power ON/OFF	Power on/off switch.

Power ON: Press Power button once (Unit performs self-test, all display segments turn on)

Power OFF: Press MODE button once (the RUN indicator should TURN OFF) then press the POWER button with-in .5 sec. NOTE: (if the RUN indicator does not TURN OFF, press the MODE button again)

SECTION 5 CALIBRATION:

5.1 Position System:

THIS DEVICE IS CALIBRATED FROM THE POSITION INDICATOR (Display Panel)
(SEE Section 4)

5.1.1 Setting Closed Position Level

1. Once the installation is complete the choke should be closed completely.
2. Apply power to device by pressing the POWER button.
3. Position Indicator will perform self test for approximately 5 seconds during which time all LCD displays will be active.
4. After self test, the display will be in the run/active mode. (RUN indicator will appear at the lower left side of the LCD display)
5. With Choke completely CLOSED, press the MODE button. (RUN indicator will turn OFF)
6. Press Down button within 2 secs. (Now in calibration mode)
7. The down arrow and a four digit number will appear at the top of the LCD display.
8. Press the Enter button. (Accepts the low / closed set point position, unit returns to RUN mode)
9. The closed position level is now set, and the three digit display should read 000.0

5.1.2 Setting Open Position Level

1. Open the Choke completely.
2. With Choke completely open press MODE button. (RUN indicator will turn OFF)
3. Press UP button within 2 secs. (Now in calibration mode)
4. the up arrow and a four digit number will appear at the top of the LCD display.
5. Press the Enter button. (Accepts the low / closed set point position, unit returns to RUN mode)
6. The closed position level is now set, and the three digit display should read 100.0
7. Unit is now fully calibrated.

SECTION 6 MAINTENANCE:

6.1 Position System

The HDI 2200 is a digital electronic gauge designed specifically for Oilfield applications. The system is easily calibrated while at Open and Close respective position and can be completed within minutes if Minor Adjustments are required. Generally, this system should only require calibration every 2 years when the power pack is replaced or if there are any change in system wiring or if a repair is completed. One (1) to two (2) hours per gauge should be allocated if a potentiometer needs to be replaced allowing the unit to be removed from the choke body, repaired and then calibrated to the LCD.

6.2 Position Systems Battery Replacement:

Remove the Canon Connector from the back side of the case. Remove the four (4) 1/4"-20 hex screws, nuts and washers and remove the unit from the panel. Remove the 10 8x32 flat head phillips screws from the front of the unit. Remove the front plate, trim ring plexiglass and gasket. Be careful not to damage the gasket. Lay the gauge to the side and assure it does not get damaged. The battery is secured by velcro to the case. Pull apart the connector that connects the battery to the display. A large screwdriver may be used by carefully placing it under the battery to pry it out of the case. Insert the new battery in the case to the velcro. Reconnect the connectors. It is suggested that you replace the desiccant pack, corrosion inhibitor and humidity indicator at this time. Reassemble the display which has the HDI 013 processor board assembly as one piece. If possible, it is suggested that you Test the System to ensure everything is working before closing up the gauge. You may connect the connector to the case and have the choke bodies functioned to calibrate the unit per Section V. If the system operates properly, reassemble and remount in the reverse order. Connect the canon connector to the rear of the case prior to securing the LCD to your panel. Check Calibration as a precaution. Note: the Power pack is covered under a 1 year warranty from date of shipment and will generally last you 18-24 months. When not in use, it is suggested to power off the unit to extend battery life.

6.3 Tools Required for Calibration and Service:

THIS STEP IS NOT NECESSARY WHEN MAKING MINOR ADJUSTMENTS TO A PREVIOUSLY CALIBRATED SYSTEM

1. Screwdriver, Phillips.
2. Screwdriver, Flat Blade
3. Nutdriver, 3/8".
4. Nutdriver, 7/16".

Note: All required tools may be purchased from HDI or your local tools shop.

SECTION 7 Preventative Maintenance:

7.1 Position Systems:

This system does not require any user maintenance for day to day operation. The battery pack will need to be replaced on average every two (2) years.

It is suggested for our linear potentiometer systems that you perform a visual inspection from time to time, perhaps every 6 months to ensure the stem has not been bent. The sensor box when mounted has some play in the mounting pattern allowing you to align the unit to avoid putting any bind on the stem while in operation.

You should also periodically check the cables for any visual damage or cuts that will allow water or moisture into the cable causing interference and erroneous results.

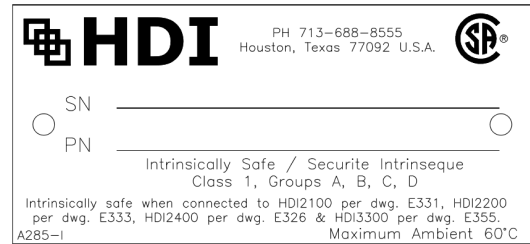
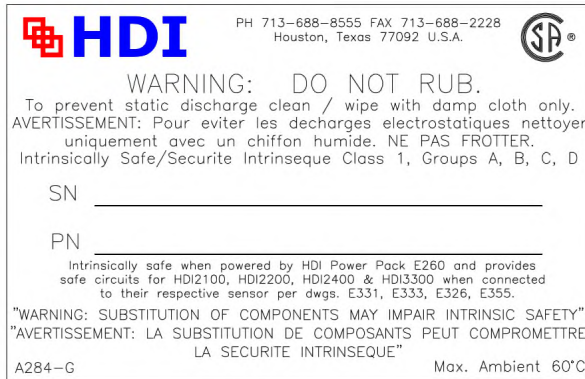
Note: The system calibration should be checked after battery replacement.

SECTION 8 Certification:

8.1 Certification Markings:

Gauge Head

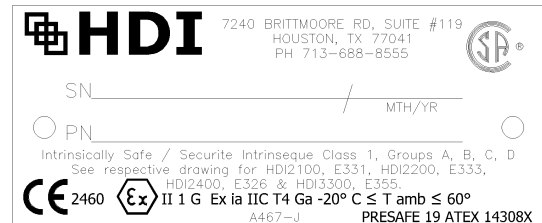
Sensor



ATEX Certification Markings:

Gauge Head

Sensor




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.

8.2 Certification Reports:

CSA Report

HDI 2100 & 2200 SERIES



CSA INTERNATIONAL


Certificate of Compliance

Certificate Number: LR 97791-2


Revision: LR 97791-4 **Date Issued:** March 14, 2000

Issued To: **HOUSTON DIGITAL INSTRUMENTS**
 4130 Directors Row
 Houston, TX 77092
 USA
 Attention: Mr. David Goodin

The products listed below are eligible to bear the CSA Mark shown



Issued by: D. Lippert

Signature: 

PRODUCTS

CLASS 2258 03 - PROCESS CONTROL EQUIPMENT - Intrinsicly Safe and Non-Incendive Systems - For Hazardous Locations

Class I, Groups A, B, C and D:

HDI 2100 Pump Strokes Counter system, consisting of Model 211ab00 Pump Strokes Counter Head where a is 2 or 4, b is 1, 2, 3 or 4 and one Model SAS2101, SAS2102, SAS2103, SAS2104, SAS2111, SAS2112, SAS2113 or SAS2114 sensor assembly; battery operated; intrinsically safe when powered by HDI battery pack, P/N HDIBATT-E260-DOT-AA and connected per control drawing ELTSCH E-331-PGO-AA. Max ambient 60C.

HDI 2200 Choke Position Indicator system, consisting of Model 2204021ab1 Choke Position Indicator Gauge Master/Slave Control Head where a is 0 to 9, b is 1, 2 or 3 and one Model SAS2200 Sensor; battery operated; intrinsically safe when powered by HDI battery pack P/N HDIBATT-E260-DOT-AA and connected per control drawing ELTSCH E-333-PGO-AA. Max ambient 60C.

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ATEX Report:

SECTION 9 – Warranty

HDI Instruments, LLC. (HDI) warrants this product 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 for Normal Oilfield Usage. For the purpose of this Warranty, Normal Oilfield Usage shall be defined as normal, oilfield monitoring applications.

HDI shall not honor the Warranty if any evidence of tampering, misuse or intrusion is indicated except by an HDI authorized technician or agent.

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. This is to include all applicable custom clearance fees, etc. for inbound international shipments. 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 that 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 non transferable 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.

APPENDIX A

WIRING INFORMATION:

Input from Sensor:

See listing under HDI 013 PCB in the table below:

Sensor Wiring:

Linear Potentiometer

Device Markings	Connector	HDI 013 PCB	Color Code
1	A	P	BLACK
2	B	S	WHITE
3	C	G	GREEN

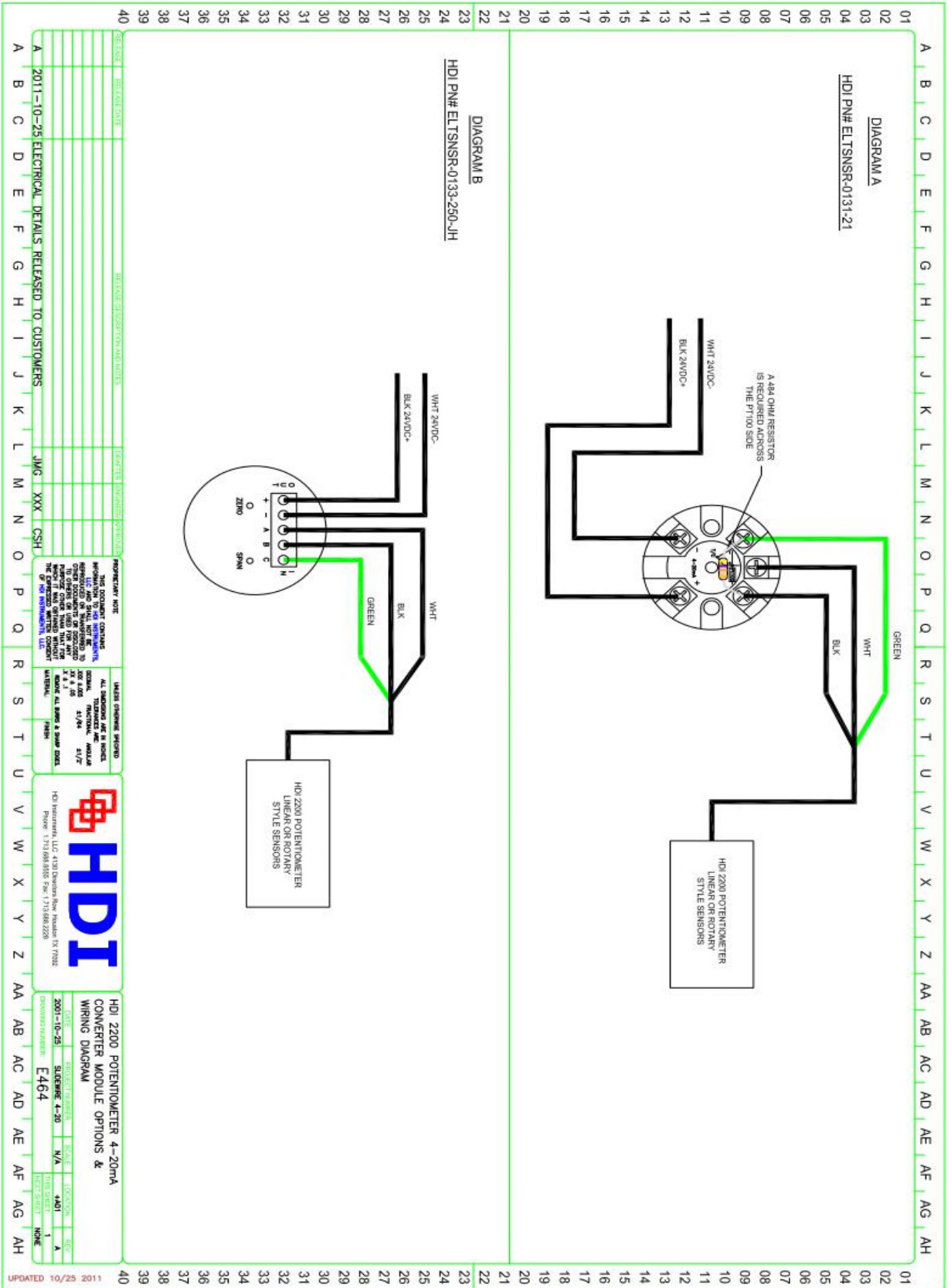
Rotary Potentiometer

w/ stem face you	Connector	HDI 013 PCB	Color Code
Left	A	P	BLACK
Middle	B	S	WHITE
Right	C	G	GREEN

4-20mA Output (from LCD):

Connector	A	B	C	D	E
Function Code	4-20 +	4-20 -	Not Used	Not Used	GRND
Color	Black	White	Red	Green	Shield

For custom specific 4-20mA Transmitter applications, see below drawing for (2) possible options:



Client Maintenance Notes



ISO 9001:2008

Office Phone - 713.688.8555
After Hours Support - 713.819.6103

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