SONAR
PROCESS MONITORING SYSTEM

SUPPLEMENT FOR
ATEX ZONE 2 SAFETY

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1 SCOPE

This Zone 2 explosive gas location safety supplement includes the information mandated by EN60079-0:2012, EN60079-15:2010 and EN60079-11:2012 for the ATEX Zone 2 certification of either of the following sets of equipment:

1) System comprised of Transmitter TB8-xx-xx-xx-03 with Sensor Head SH-xxx-xx-xA-xxx-03, or,
2) Transmitter TB8-xx-xx-xx-04 with separately certified sensor head (see appropriate separate manual for the separately certified Sensor Head).

   (where “x” in the above markings can be any character).

This supplementary manual is to be read first, but used in conjunction with the main Process Monitoring System Installation and Startup Manual that contains more specific instructions for installation and operation. In the event of a conflict between the safety instructions of this manual and those of the main manual, the instructions of this manual take precedence.

Note: This is a UL/DEMKO controlled document.

2 MARKINGS

The following explains the hazardous area markings that can be found on the equipment.

2.1 Transmitter [TB8-xx-xx-xx-03] for use with Sensor Head [SH-xxx-xx-xA-xxx-03]:

 II 3 G Ex ic nA [ic] IIB T4 Gc -20C<=T_{amb}<=+57C IP55
DEMKO 07 ATEX 0608105X

This particular model of transmitter can be installed in a safe area or an area that is classified as an Equipment Group II (not in mines), explosive gas (not explosive dusts or fibers), ATEX Zone 2 location with explosive gas group IIA or IIB. Its enclosure has been tested to IP55 (the second-to-highest dust rating and the rating for low-pressure water jets). It is intended for an operating ambient air temperature range of -20 ºC to +57 ºC. If installed properly, it will not produce a hot-spot temperature in excess of 135 ºC during normal operation.

The transmitter includes certain energy-limited interfaces (see list to determine which interfaces are energy-limited) that allow wires from these interfaces to be routed in Zone 2 areas with a reduced possibility of explosion. This, for example, permits the convenience of being able to disconnect the sensor head cable connector from the sensor head cover with the power ON with a reduced risk of generating a spark with sufficient energy to trigger an explosion if an explosive atmosphere happens to be present.

Note: In Zone 2, explosive atmospheres are not expected to be present except under fault conditions. If the operator is aware that a fault condition exists at the facility that makes it likely that an explosive atmosphere is present, then extra caution is indicated.

2.2 Sensor Head [SH-xxx-xx-xA-xxx-03]:

-40C<=T_{amb}<=+100C IP55
ONLY TO BE USED WITH TRANSMITTER TB8-xx-xx-xx-03
FOR ATEX MARKING SEE LABEL ON TB8 TRANSMITTER

This particular model of sensor head can be installed in a safe area or an area that is classified as an Equipment Group II (not in mines), explosive gas (not explosive dusts or fibers), ATEX Zone 2 location with explosive gas group IIA or IIB. Its enclosure has been tested to IP55 (the second-to-highest dust rating and the rating for low-pressure water jets). It is marked for an operating ambient air temperature range of –40 ºC to +100 ºC.

The +100 ºC rating relates to the safety aspect only and is intended to include the effects of heating from the pipe on which it is mounted. To

achieve good operating performance in addition to safety, the pipe can be at temperatures up to 100 ºC, but the air temperature in the vicinity of the pipe should be no greater than 60 ºC. If the pipe temperature is greater than 60 ºC, it is recommended that there be no coverings or obstructions that would prevent free air movement around the outside surface of the sensor head enclosure. If installed properly, it will not produce a hot-spot temperature in excess of 135 ºC during normal operation.

This sensor head is only to be used with Transmitter TB8-xx-xx-xx-03 (not TB8-xx-xx-xx-04), which provides an energy-limited interface to it. This permits the convenience of being able to disconnect the sensor head cable connector from the sensor head cover with the power on with a reduced risk of generating a spark with sufficient energy to trigger an explosion if an explosive atmosphere happens to be present.

Note: In Zone 2, explosive atmospheres are not expected to be present except under fault conditions. If the operator is aware that a fault condition exists at the facility that makes it likely that an explosive atmosphere is present, then extra caution is indicated.

2.3 Transmitter [TB8-xx-xx-xx-04]:

⟨Ex⟩ II 3 G Ex ic nA IIB T4 Gc -20C<=T_{amb}<=+57C IP55
DEMKO 07 ATEX 0608105X

This particular model of transmitter can be installed in a safe area or an area that is classified as an Equipment Group II (not in mines), explosive gas (not explosive dusts or fibers), ATEX Zone 2 location with explosive gas group IIA or IIB. Its enclosure has been tested to IP55 (the second-to-highest dust rating and the rating for low-pressure water jets). It is intended for an operating ambient air temperature range of -20 ºC to +57 ºC. If installed properly, it will not produce a hot-spot temperature in excess of 135 ºC during normal operation.

The transmitter includes no energy-limited interfaces. It cannot be used in conjunction with the SH-xxx-xx-xA-xxx-03 Sensor Head. It can only be used with a separately certified sensor head and the wiring to that sensor head must be selected and installed in accordance with rules for incendive wires in hazardous areas.

Note: In Zone 2, explosive atmospheres are not expected to be present except under fault conditions. If the operator is aware that a fault condition exists at the facility that makes it likely that an explosive atmosphere is present, then extra caution is indicated.

3 ATEX ZONE 2 SPECIAL CONDITIONS OF USE RELATED TO THE SYMBOL “X”

These Conditions of Use are those specifically identified by certain clauses in standards EN60079-0:2012, EN 60079-15:2010 and EN60079-11:2012 and are linked to the DEMKO certificate via the suffix “X” in the certificate number (DEMKO 07 ATEX 0608105X).

3.1 Transient Protection

Provision shall be made external to the apparatus to prevent the rated voltage being exceeded by transient disturbance of more than 40%.

3.2 Electrostatic Charging

The non-metallic materials the transmitter and the sensor head enclosures are constructed from have a high enough surface resistivity that there is a risk of the generation of electrostatic sparks from rubbing those enclosures during operations such as cleaning. Such sparks could potentially ignite explosive gas atmospheres if they were present.

To mitigate this risk, the transmitter and sensor head enclosures should not be rubbed except with a clean rag dampened with water or a water-based cleanser (non-flammable solvent). The dampened rag will reduce the generation of charges from rubbing and facilitate the discharging of surface charges that may be generated.

3.3 Cable Glands

Cable glands to be ATEX approved for gas groups IIB or IIC or marked for group II, have at least IP55 rating, be sized for the cable and mounting hole where installed, and have temperature rating of at least -20ºC to +60ºC.

3.4 Control Drawings

Installation shall be per Control Drawing 20907-01C for complete system (TB8-xx-xx-xx-03 Transmitter used with SH-xxx-xx-xA-xxx-03 Sensor Head) or per Control Drawing 20908-01C for the TB8-xx-xx-xx-04 Transmitter.

3.5 Environment

This equipment will be used in an area not more than Pollution Degree 2 as defined by IEC 60664-1.

4 STANDARDS

See the CE Declaration of Conformity shipped with the sonar process monitoring system for the complete and up-to-date set of directives and standards to which this equipment complies.

Specific to ATEX Zone 2, this equipment is in conformity with Directive 94/9/EC “Equipment Intended for Use in Potentially Explosive Atmospheres (ATEX)” per the application of standards:

EN60079-0:2012 “Electrical Apparatus for Explosive Gas Atmospheres – Part 0: General Requirements”

and

EN 60079-15:2010 “Electrical Apparatus for Explosive Gas Atmospheres – Part 15: Construction, Test and Marking of Type of Protection “n” Electrical Apparatus“.

and

EN 60079-11:2012 “Explosive atmospheres - Part 11: Equipment protection by intrinsic safety "i"”

5 CONTROL DRAWINGS

The control drawings define how the Zone 2 hardware can be installed into hazardous areas. Refer to the following drawings:

Control Drawing	System	Reference Annex
20907-01C	System including TB8-xx-xx-xx-03 Transmitter and SH-xxx-xx-xA-xxx-03 Sensor Head	Annex B
20908-01C	Transmitter TB8-xx-xx-xx-04 Transmitter and separately certified Sensor Head (with separate Control Drawing)	Annex C

Table 1 Control Drawings

6 SPECIFICATIONS

6.1 Electrical Parameters

The mains power connections are made to the transmitter only. There is a DC-powered transmitter (TB8-xx-06-xx-xx) that requires 18-36VDC at 25W max. There is an AC-powered transmitter (TB8-xx-05-xx-xx) that requires 100-240VAC, 50-60Hz at 25W max.

These signals can also be found in Table 2, below. Electrical parameters of other signals can be found in tables 3, 4, and 5.

6.2 Maximum Surface Temperatures

All three components of the sonar process monitoring system covered by this manual have temperature classification “T4”. This means that when properly installed and operating normally they will not produce hot spot temperatures in excess of 135 ºC.

The following signals are not energy-limited for any of the transmitter models. Some models may have one-piece screw terminal blocks and others may have two-piece pluggable terminal blocks with either screw or spring clip terminals. These terminals will accept 0.20 to 3.31 mm^2 (24-12 AWG) conductor size. Conductor size 0.82 mm^2 (18 AWG) or larger cross section is recommended.

POWER ENTRY BOARD	**DC TRANSMITTER (TB8-xx-06-xx-xx) LIMITATION**	**AC TRANSMITTER (TB8-xx-05-xx-xx) LIMITATION**
L (+)	+18 to +36 VDC	100 to 240 VAC, 50-60Hz
N (-)	RTN	Neutral
GND (⏚)	Connect to protective earth	Connect to protective earth

Table 2 Mains Power Connections

The following signals are not energy-limited for any of the transmitter models.

***Note**: These signals are not present on every model. Some models may have one-piece screw terminal blocks and others may have two-piece pluggable terminal blocks with either screw or spring clip terminals. These terminals will accept 0.325 to 1.31 mm^2 (22-16 AWG) conductor sizes.*

CUSTOMER I/O	OUTPUT IS LIMITED TO	LIMIT INPUT TO
COMM – COM+	RS-232 or RS-485 signal levels	RS-232 or RS-485 signal levels
COMM – COM-	RS-232 or RS-485 signal levels	RS-232 or RS-485 signal levels
COMM – SHD	Ground	Ground shields at one end only
PULSE – P+	Isolated solid state relay closure	-10V to +30V, 100mA
PULSE - P-	Isolated solid state relay closure	-10V to +30V, 100mA
PULSE – SHD	Ground	Ground shields at one end only
ALARM – AL+	Isolated solid state relay closure	-10V to +30V, 100mA
ALARM – AL-	Isolated solid state relay closure	-10V to +30V, 100mA
ALARM – SHD	Ground	Ground shields at one end only
CUR 1 – VEXT	Not an output	+15V to +30V, 100mA
CUR 1 – IOUT	21mA	500 ohm (max) to GND or VINT-
CUR 1 – VINT-	-10V	Not an input
SHD	Ground	Ground shields at one end only
SHD	Ground	Ground shields at one end only
SHD	Ground	Ground shields at one end only
CUR 2 – VEXT	Not an output	+15V to +30V, 100mA
CUR 2 – IOUT	21mA	500 ohm (max) to GND or VINT-
CUR 2 –VINT-	-10V	Not an input

Table 3 Customer I/O Connections

The following signals are not energy-limited for any of the transmitter models. ***Note**: These signals are not present on every model. Also, some models may have one-piece screw terminal blocks and others may have two-piece pluggable terminal blocks with either screw or spring clip terminals. These terminals will accept 0.325 to 1.31 mm^2 (22-16 AWG) conductor sizes.*		
FIELDBUS CONNECTOR	**OUTPUT IS LIMITED TO**	**LIMIT INPUT TO**
A (Polarity is self-correcting)	Isolated and bus powered	+30VDC, 100mA from bus
B (Polarity is self-correcting)	Isolated and bus powered	+30VDC, 100mA from bus

Table 4 Fieldbus Connections

All of the following signals are energy-limited for the TB8-xx-xx-xx-03 transmitter only. For the TB8-xx-xx-xx-04 Transmitter they are not energy-limited.

***Note**: These signals are not present on every model. Some models may have one-piece screw terminal blocks and others may have two-piece pluggable terminal blocks with either screw or spring clip terminals. These terminals will accept 0.325 to 1.31 mm^2 (22-16 AWG) conductor sizes. Conductor size 0.52 mm^2 (20AWG) or larger cross section is recommended.*

I/O NAME	OUTPUT IS LIMITED TO	LIMIT INPUT TO
Sensor 1 - HI	+12V, 48mA	Passive 4-20mA transducer
Sensor 1 - LO	-12V, 48mA	Passive 4-20mA transducer
Sensor 1 - SHD	Ground	Ground shields at one end only
Sensor 2 - HI	+12V, 48mA	Passive 4-20mA transducer
Sensor 2 - LO	-12V, 48mA	Passive 4-20mA transducer
Sensor 2 - SHD	Ground	Ground shields at one end only
1 – WHT	+/-8.5V, 43mA from Sensor Head	Connect only to sensor head cable
1 – BLK	+/-8.5V, 22mA from Sensor Head	Connect only to sensor head cable
2 – WHT	+/-8.5V, 43mA from Sensor Head	Connect only to sensor head cable
2 – BLK	+/-8.5V, 22mA from Sensor Head	Connect only to sensor head cable
3 – WHT	+/-8.5V, 43mA from Sensor Head	Connect only to sensor head cable
3 – BLK	+/-8.5V, 22mA from Sensor Head	Connect only to sensor head cable
4 – WHT	+/-8.5V, 43mA from Sensor Head	Connect only to sensor head cable
4 – BLK	+/-8.5V, 22mA from Sensor Head	Connect only to sensor head cable
5 – WHT	+/-8.5V, 43mA from Sensor Head	Connect only to sensor head cable
5 – BLK	+/-8.5V, 22mA from Sensor Head	Connect only to sensor head cable
6 – WHT	+/-8.5V, 43mA from Sensor Head	Connect only to sensor head cable
6 – BLK	+/-8.5V, 22mA from Sensor Head	Connect only to sensor head cable
7 – WHT	+/-8.5V, 43mA from Sensor Head	Connect only to sensor head cable
7 – BLK	+/-8.5V, 22mA from Sensor Head	Connect only to sensor head cable
8 – WHT	+/-8.5V, 43mA from Sensor Head	Connect only to sensor head cable
8 – BLK	+/-8.5V, 22mA from Sensor Head	Connect only to sensor head cable
9 – WHT	Ground	Connect only to sensor head cable
9 – BLK	Ground	Connect only to sensor head cable
10 – WHT	RS-485 bus levels	Connect only to sensor head cable
10 – BLK	RS-485 bus levels	Connect only to sensor head cable
11 – WHT	-12V nom (-14.25V max), 180mA	Connect only to sensor head cable
11 – BLK	Ground	Connect only to sensor head cable
12 – WHT	+12V nom (+14.25V max), 180mA	Connect only to sensor head cable
12 – BLK	Ground	Connect only to sensor head cable
SHD	Ground	Use for drain wire of sensor head cable
SHD	Ground	Use for orange communication wire, if present.
SHD	Ground	Provisional
SHD	Ground	Provisional

Table 5 Sensor Connections

7 OPERATING CONDITIONS UNDER WHICH THIS PRODUCT MAY BE SAFELY USED

7.1 Scope

These are the criteria under which it is safe to install the ATEX Zone 2 rated products:

The system comprised of: Transmitter TB8-xx-xx-xx-03 with Sensor Head SH-xxx-xx-xA-xxx-03, or

The system comprised of: Standalone Transmitter TB8-xx-xx-xx-04 with separately certified sensor head

7.2 Hazardous Rating Location of Facility Where It Is To Be Installed

7.2.1 System including TB8-xx-xx-xx-03 Transmitter

The TB8-xx-xx-xx-03 Transmitter must be installed in an area that is rated as Non-Hazardous or ATEX Zone 2. The SH-xxx-xx-xA-xxx-03 Sensor Head must be installed in an area that is rated as Non-Hazardous or ATEX Zone 2. The cable connecting the TB8-xx-xx-xx-03 Transmitter and the SH-xxx-xx-xA-xxx-03 Sensor must be routed through areas that are rated Non-Hazardous or ATEX Zone 2 and must not exceed 114 meters (375 feet) in length.

The cable between the Transmitter and Sensor Head should be installed per the applicable electric codes of that jurisdiction and/or per the guidance of EN 60079-14 for this Zone 2 intrinsically safe [ic] (energy limited) associated apparatus field wiring. The Sensor 1 and Sensor 2 inputs are also intrinsically safe [ic] (energy limited) associated apparatus field wiring.

None of the other wiring is intrinsically safe field wiring. This wiring must be wired per the applicable electric codes of that jurisdiction and/or per the guidance of EN 60079-14 wiring techniques for Zone 2 incendive wiring if any part of that wiring is in a Zone 2 area. Cable glands used should preserve the IP 55 and ATEX rating of the enclosure. Refer to paragraph 8.3.1 for information on the selection of cable glands.

7.2.2 System including TB8-xx-xx-xx-04 Transmitter

The TB8-xx-xx-xx-04 Transmitter must be installed in an area that is rated as Non-Hazardous, or ATEX Zone 2. All of its interfaces must be treated as incendive and wired per the applicable electric codes of that jurisdiction and/or per the guidance of EN 60079-14 wiring techniques for Zone 2 incendive wiring if any part of the wiring is in a

Zone 2 area. Cable glands used should preserve the IP 55 and ATEX rating of the enclosure. Refer to paragraph 8.3.1 for information on the selection of cable glands.

7.3 Installation Site Ambient Temperature, Pressure, Humidity

7.3.1 Temperature

The transmitter (TB8-xx-xx-xx-03 or TB8-xx-xx-xx-04) must be installed in a location where the ambient temperature during operation will be within -20 ºC to +57 ºC.

The sensor head (SH-xxx-xx-xA-xxx-03) must be installed in a location where the ambient temperature during operation will be within -40 ºC to +60 ºC.

The process temperature of the fluid in the pipe on which the sensor head is mounted must stay within -40 ºC to +100 ºC during operation.

The cable used to connect the transmitter to the sensor head must have a temperature rating consistent with the ambient temperatures along the path over which it is routed. Cable installers should observe the cable's minimum installation temperature rating.

7.3.2 Barometric Pressure

The range of ambient air pressure over which validity of the Zone 2 certification of equipment so marked applies is 80 to 110 kPa (0.8 to 1.1 bar) (11.76 to 16.17 PSIA). This ambient air pressure range translates into an altitude range of approximately +1950 meters to -700 meters (+6400 feet to -2300 feet).

The safety standards assume the air in the vicinity of this equipment has normal oxygen content, typically 21% by volume. If nearby sources of excess oxygen are present, please consult with CiDRA Customer Support prior to installation.

7.3.3 Humidity

The sonar process monitoring system certification is based on Pollution Degree 2. This means the electrical circuitry inside the enclosures is expected to be exposed to only dry non-conductive pollution that will only temporarily become conductive due to condensation.

The IP55 enclosures are suitable for installation outdoors where there can be wide fluctuations in temperature and moisture levels in the environment.

Condensation on circuit boards should be avoided. In the continuous-operating mode of operation for which this equipment was designed,

the heat generated on those circuit boards will help keep them free of condensation. Care should be taken during commissioning to verify that the electronics do not have accumulated condensed water or frost on them prior to powering them.

7.4 Water Spray and Dust

Both transmitters (TB8-xx-xx-xx-03 or TB8-xx-xx-xx-04) and the sensor head (SH-xxx-xx-xA-xxx-03) are rated IP55. This means that they offer the next-to-highest degree of protection against dust and protection against low-pressure water jets (but not against high pressure jets or immersion).

The installation location must be consistent with the IP ratings of these enclosures. Installation and operating procedures must be designed to ensure that the electronics inside the enclosures stay clean and dry. Installers must take care to assure that the seals mate properly, the latches are latched tightly, and that appropriate accessories (for example, cable glands with the appropriate ratings – see paragraph 8.3.1) are properly selected and installed.

These flow meters are for permanent installations. Cables must be routed and installed by means that protect them from damage. They should be secured near their terminations to prevent pulling and twisting at the cable glands.

Note: The explosion protection certification is for explosive gasses but not for explosive dusts or flyings.

7.5 Explosive Gasses

If so marked, the sonar process monitoring system is rated for Zone 2 use in explosive gas group IIA or IIB.

The T4 rating of the sonar process monitoring system means that if it is operated within the allowed range of ambient temperatures, the hot spot temperatures should not exceed 135 ºC under normal operating conditions.

7.6 Condition of piping

The Zone 2 safety of the sensor head is dependent, in part, on keeping the electronics underneath the clamp-on sensor head cover clean and dry. This means that leaks in the piping under the sensor head cover are not anticipated.

Inspect the pipe prior to installation and periodically thereafter for evidence of impending pipe leaks and take appropriate preemptive action. The specifics of the pipe inspections and the frequency of the periodic monitoring depend on the customer's knowledge of their facility and the history of pipe leaks.

7.7 Chemical Environment

The materials used to construct the sonar process monitoring system are resistant to damage from chemicals expected in target applications.

If there are any known chemical agents in the intended installation location that the installer believes may pose a special threat of chemical attack on metallic or non-metallic materials, please consult with Customer Support personnel prior to installation.

Notify Customer Support and, if necessary, take the affected equipment out of service if routine inspections reveal the enclosures, gaskets, or other system components are being chemically degraded in their installed environment.

7.8 Mains Power

Mains power must be available at the transmitter location. Mains power is not required at the sensor head location because it is powered by low voltages created by the transmitter.

The mains power must be within the range of voltages and currents required by the particular transmitter. The DC powered transmitter (TB8–xx-06-xx-xx) requires voltage within the range of 18 to 36 VDC. The AC powered transmitter (TB8-xx-05-xx-xx) requires voltage in the range of 100 to 240VAC, 50 to 60Hz. Both types have a 25W maximum input power rating and both have a requirement for power quality with limited amplitude voltage spikes (see paragraph 3.1).

The mains power should wired per the applicable electric codes of the facility in which it is installed and/or per the guidance of EN 60079-14. Cable glands used should preserve the IP 55 and ATEX rating of the enclosure. See paragraph 8.3.1 for information on the selection of cable glands.

8 SUPPLEMENTARY INSTRUCTIONS FOR SAFE ASSEMBLY AND INSTALLATION

8.1 Use Control Drawing, Install Per Code

Ensure installation is consistent with the requirements of the Control Drawing (see Annex B or C, depending on transmitter model number) and that the markings on the equipment are consistent with the classifications of the installation locations.

Use cables and cable installation techniques consistent with applicable electric codes of the facility in which it is installed and/or per the guidance of EN 60079-14.

8.2 Make Correct Terminal Block Connections

Transmitter terminal block connections are as shown in Tables 2, 3, 4, and 5.

8.3 Use Cable Glands and/or Conduit Entries

Cable entering the transmitter enclosure shall utilize cable glands or shall enter using conduit with appropriate conduit fittings to maintain the Zone 2 and IP55 ratings of the transmitter enclosure.

8.3.1 Selection of Cable Glands

Cable glands shall be ATEX-approved for Group II or Group IIB or IIC gasses, have at least an IP55 rating, be appropriately constructed and sized for the cable and mounting hole where they are to be installed, and used in a manner consistent with the gland manufacturer's instructions. See drawing 20885-01C (Annex A) for a list of recommended glands and corresponding cable size limitations.

8.3.2 Selection of Conduit Fittings

Conduit entries shall be constructed and mounted such that they do not alter the type of protection and the specific characteristics of the electrical apparatus. They shall be locked into the unthreaded holes at the bottom of the transmitter or into an adaptor plate designed to be fitted in or on the bottom of the transmitter enclosure.

8.4 Wire With Power OFF

All wiring operations should be performed with dead circuits.

8.5 Wire Securely to Terminals and Route Neatly

Refer to the Process Monitoring System Installation and Startup Manual for the proper wire insulation strip length for each terminal block. The proper strip length will be long enough to guarantee that the terminal grips the bare wire and not the insulation, yet short enough to minimize the risk of shorting exposed bare wires projecting from adjacent terminals.

After stripping the insulation, twist strands of stranded wire together prior to inserting into terminal so that all strands are gripped by the terminal.

Securely tighten the terminal.

Tug gently on wire after installation to ensure the wire is being well gripped by the terminal.

Route the wire neatly in the lower portion of the transmitter and secure with wire ties to keep the wires from getting pinched when the cover closes, to keep the wires away from the circuit boards, and to keep the three groupings of wire separated from each other (mains power, incendive customer I/O, and sensor signals). Do not store excessive amounts of excess wire inside the transmitter.

8.6 No Foreign Objects

Do not store tools or extraneous loose items inside the transmitter or sensor head enclosures.

8.7 Avoid Leaky Pipes

Do not install the sensor band on pipes that are likely to leak. If there is doubt, perform the appropriate pipe inspections to look for evidence of an impending leak prior to installation of the sensor band. (See also paragraph 7.6.)

8.8 Seal Sensor Head Cover

Ensure sensor head cover gaskets are in good condition and mate properly to each other and to the pipe. Connect all latches and properly install the clamps on the boot gaskets.

8.9 Secure The Access Panel.

Use the access panel opening to access the sensor band cable connector and connect it to the preamplifier. This operation is performed after the sensor head cover is secured onto the pipe. Afterwards, securely re-install the access panel to seal that opening.

9 SUPPLEMENTARY INSTRUCTIONS FOR SAFELY PUTTING INTO SERVICE

9.1 Prior to Applying Power

Perform a final inspection of the installation. Use the installation instructions and the Control Drawing to aid in the inspection.

Verify the absence of condensation or frost inside the enclosures.

Verify the customer input / output connections are made properly and are connected to remote circuits operating within the allowed ranges of voltage and current (refer to Table 3).

Verify that Sensor #1 and #2 inputs (if used) are connected to passive (not active) 4-20mA transducers (reference Table 4).

9.2 Apply Power

Apply power and verify a normal startup sequence as defined in the main Installation and Startup manual. If the startup sequence is abnormal, then remove power until ready to perform troubleshooting.

9.3 Perform Setup

Perform the system setup procedures as defined in the main manual.

9.4 Verify Proper Operation

Verify proper operation of the sonar process monitoring system and its configuration prior to using the system as a feedback element in a process control loop.

10 SUPPLEMENTARY INSTRUCTIONS FOR SAFE USE (NORMAL OPERATION WITH NO OPERATOR INTERVENTION)

10.1 Keep Enclosures Closed During Use

10.1.1 Transmitter

Verify the following:

- The transmitter cover should be tightly closed and all 4 screws installed to secure the cover.
- Cable glands should be properly installed and snug in their mounting holes in the enclosure and snug around their cables.
- Cables shall be prevented from applying pulling or twisting forces on the cable glands.

10.1.2 Sensor Head

Verify the following:

- All sensor head latches should be snugly mated.
- Clamps should be snugly installed on the boot seals.
- The cable connector shall be snugly latched onto the mating connector.
- The cable shall be installed with a drip loop (if necessary) such that water will not run along the cable toward the connector
- The cable shall be installed such that the connector will not be subjected to twisting or pulling forces.

10.2 Periodic Inspections

Include the sonar process monitoring system in periodic inspections of the facility.

10.2.1 Transmitter Inspections

Verify the absence of the following:

- Loose hardware or fittings
- Damage to enclosure
- Damage to seals
- Dirt or moisture inside enclosure

10.2.2 Sensor Head Inspections

Verify the absence of the following:

- Loose or damaged latch hardware
- Loose or damaged boot seal clamps
- Damage to enclosure
- Damage to seals
- Loose or damaged access cover (including screws and seals)
- Loose handles
- Loose or damaged electrical connector or seals at the connector
- Evidence from the condition of the pipe that a pipe leak under the Sensor Head might occur before the next inspection (reference paragraph 7.6).

10.2.3 Cables Inspections

Verify the absence of the following:

- Damaged cables
- Improperly installed cables (for example, cable is under tension or too tight bend radius)
- Loose cable management elements (strain reliefs, clamps, etc.)

10.3 Problems Found During Inspection

If inspections turn up serious problems, remove the sonar process monitoring system from service until repairs can be made.

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11 SUPPLEMENTARY INSTRUCTIONS FOR SAFE ADJUSTMENT

11.1 General

Note: Making adjustments to the meter usually interrupts normal function of the meter and its outputs. If the meter is being used in a control loop, this can cause the loop to “open”.

Inform Control Room Personnel that adjustments to the meter are going to be made to allow them to put the control loop into a manual mode of operation until adjustments are complete and the meter is ready to be brought back “on line” in the control loop.

11.2 Transmitter Adjustments

11.2.1 Use of Keypad and RESET Switch

The Zone 2 certification permits the transmitter cover to be opened for short periods of time while the power is ON for the purpose of making software configuration adjustments using the keypad or the RESET button.

This is permitted without the necessity of testing first to be certain that no hazardous gasses are present. However, it is essential that when using the keypad or the RESET switch the wiring within the transmitter not be intentionally or unintentionally disturbed and that the circuitry inside the transmitter be kept clean and dry.

11.2.2 Use of USB Memory Stick Interface

The USB connector is for use of a USB memory stick and is intended only for short-term infrequent use. The USB connector may only be used if the area is known to be free of explosive gas mixtures during the time immediately prior to, during, and after use of the memory stick.

The USB connector is behind a tool-enabled cover. Close and secure this cover over the USB connector after use of the USB interface.

11.2.3 Use of RJ45 Ethernet Connector Interface

This is a diagnostic interface and intended only for short-term infrequent use. The RJ45 Ethernet connector may only be used if the area is known to be free of explosive gas mixtures during the time immediately prior to, during, and after use of the Ethernet interface to connect to a laptop computer for diagnostic purposes.

11.2.4 Use of DB9 RS232 Connector Interface

This is a diagnostic interface and intended only for short-term infrequent use. The DB9 RS232 connector may only be used if the area is known to be free of explosive gas mixtures during the time immediately prior to, during, and after use of the RS232 interface to connect to a laptop computer for diagnostic purposes.

11.3 Sensor Head Adjustments

In normal operation there are no adjustments that need to be made at the sensor head.

12 SUPPLEMENTARY INSTRUCTIONS FOR SAFE MAINTENANCE, SERVICING AND EMERGENCY REPAIR

12.1 General

12.1.1 UOS, OFF And No Explosive Gasses Present

All maintenance, service, and repair should be performed with dead circuits and after testing to make sure that no explosive gas mixtures are present, unless otherwise stated (UOS).

12.1.2 Notify Control Room

Note: In most cases, servicing will interrupt normal functioning of the meter and its outputs. If the meter is being used in a control loop, this can cause the loop to “open”. Inform Control Room Personnel that the meter will be “off-line” so the control loop can be placed into a manual mode of operation until adjustments are complete and the meter is ready to be brought back “on line” in the control loop.

12.2 Transmitter

12.2.1 General

12.2.1.1 Ensure There Are No Explosive Gases Present

No connection or disconnection of wiring at any of the terminal blocks in the transmitter shall be performed in the hazardous area without first testing to make sure that no explosive gas mixtures are present.

12.2.1.2 Keep Clean and Dry

Keep the inside of the transmitter enclosure clean and dry.

12.2.2 Mains Power OFF

Wiring of the mains power terminal blocks shall only be performed with the mains power wiring in a de-powered and locked-out safe state.

12.2.3 Fuse Replacement

The two fuses on the power entry board are the only user serviceable fuses. They may only be replaced with the mains power wiring in a de-powered and locked-out safe state. Use only the replacement fuses indicated on the fuse warning label.

12.2.4 Sensor Terminal Blocks

The Sensor Terminal blocks should be wired with the mains power OFF. This ensures that these signals are all de-powered.

12.2.5 Customer Input / Output and Fieldbus Terminal Blocks

To the extent possible, ensure that the equipment on the far end of these lines is de-powered before servicing the associated terminal block connections. If unsure about whether the remote equipment is de-powered, ensure that no explosive gas mixtures are present before servicing.

12.2.6 Electrical Circuitry and Electro-Static Discharge (ESD)

Take simple ESD precautions to protect the electronics such as touching a grounded metal object prior to reaching into the transmitter or sensor head enclosures and avoiding touching the circuit boards with hands, gloves, or sleeves when servicing the system.

12.3 Sensor Head

12.3.1 General

Ensure the inside of the sensor head cover remains clean and dry during installation and inspection.

12.3.2 Sensor Head Electrical Connector

Properly re-install the sensor head connector if it is removed for inspection or troubleshooting.

Note: This cable connector can be removed with the power ON and without the necessity of testing first to be certain that no hazardous gasses are present. Close and latch the dust cover over the connector half that remains on the sensor head cover whenever the sensor head electrical connector on the cable is removed from the sensor head cover. Prevent contamination of the de-mated cable connector. Prior to mating the cable to the cover connector, inspect both halves to ensure they are clean and dry.

12.3.3 Access Panel

Properly re-install the access panel after every time it is opened.

12.3.4 Sensor Band

12.3.4.1 Use of Access Panel

The access panel must be used to gain access to and disconnect the sensor band cable connector from the preamplifier before the sensor

head cover can be removed from the pipe. Failure to do this will damage the sensor band.

12.3.4.2 Safety Procedure for Damaged Sensor Bands

The sensor band should be removed from service and taken out of the hazardous area if it has mechanical damage. The damaged sensor band must be treated as a potentially incendive device – even when it is disconnected from a power source. The damaged sensor band should not be handled in or transported through any areas where explosive gas mixtures may be present.

13 SUPPLEMENTARY INSTRUCTIONS FOR SAFE DISASSEMBLY OR DISPOSAL

13.1 Most Warnings Same As For Maintenance

Most warnings are the same as those in Supplementary Instructions for Safe Maintenance, Servicing, and Emergency Repair, in paragraph 12, above. Additions and modifications are described below.

13.2 General

13.2.1 Dead Circuits

Power must be disconnected and testing performed to ensure that no explosive gas mixtures are present during disassembly and/or disposal

13.2.2 Disposal Issues

Refer to Process Monitoring System Installation and Startup Manual for disposal instructions (WEEE considerations).

13.3 Sensor Band

13.3.1 Damaged Sensor Bands

The sensor band should be removed from service and taken out of the hazardous area if it has mechanical damage. The damaged sensor band must be handled as a potentially incendive device even when it is disconnected from a power source. The damaged sensor band should not be handled in or transported through any areas where explosive gas mixtures may be present.

13.3.2 Undamaged Sensor Bands

Handle the band carefully to avoid damaging it (no sharp bend radii and avoid actively flexing it or allowing it to be bumped during transport). If there is any doubt about whether the sensor band might be damaged, follow the handling and transport procedures for damaged sensor bands, above. The original packing foam mandrel packing material should be used for storage. Do not store the sensor band in a hazardous area.

14 TRAINING

Contact CiDRA Customer Support for availability and scheduling of training courses.

15 CONTACT INFORMATION

CiDRA Corporate Services
50 Barnes Park North
Wallingford, Connecticut USA 06492

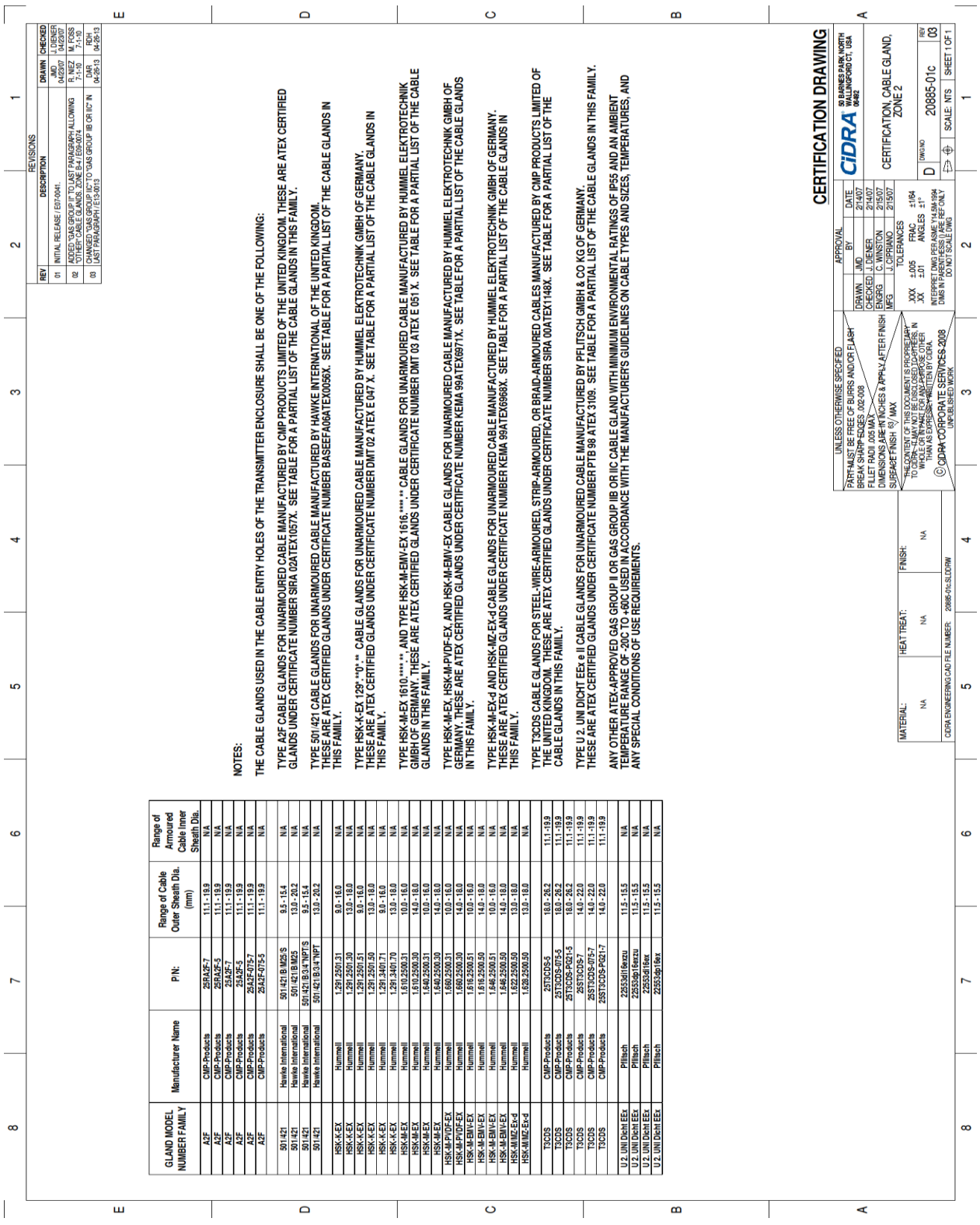
Telephone numbers

1-877-243-7277	Toll-free in US and Canada
203-265-0035	Elsewhere
203-265-7861	Fax

Email:

customersupport@cidra.com

Annex A 20885-01C, CERTIFICATION, CABLE GLAND, ZONE 2



GLAND MODEL NUMBER FAMILY	Manufacturer Name	P/N:	Range of Cable Outer Sheath Dia. (mm)	Range of Armoured Cable Inner Sheath Dia.
A2F	CMP-Products	25RA2F-7	11.1 - 19.9	N/A
A2F	CMP-Products	25RA2F-3	11.1 - 19.9	N/A
A2F	CMP-Products	25A2F-7	11.1 - 19.9	N/A
A2F	CMP-Products	25A2F-3	11.1 - 19.9	N/A
A2F	CMP-Products	25A2F-075-7	11.1 - 19.9	N/A
A2F	CMP-Products	25A2F-075-3	11.1 - 19.9	N/A
501/421	Hawke International	501/421/B/M25/S	9.5 - 15.4	N/A
501/421	Hawke International	501/421/B/M25	13.0 - 20.2	N/A
501/421	Hawke International	501/421/B/3/4"NPT/S	9.5 - 15.4	N/A
501/421	Hawke International	501/421/B/3/4"NPT	13.0 - 20.2	N/A
HSK-K-EX	Hummel	1.291.2501.31	9.0 - 16.0	N/A
HSK-K-EX	Hummel	1.291.2501.30	13.0 - 18.0	N/A
HSK-K-EX	Hummel	1.291.2501.51	9.0 - 16.0	N/A
HSK-K-EX	Hummel	1.291.2501.50	13.0 - 18.0	N/A
HSK-K-EX	Hummel	1.291.3401.71	9.0 - 16.0	N/A
HSK-K-EX	Hummel	1.291.3401.70	13.0 - 18.0	N/A
HSK-M-EX	Hummel	1.610.2500.31	10.0 - 16.0	N/A
HSK-M-EX	Hummel	1.610.2500.30	14.0 - 18.0	N/A
HSK-M-EX	Hummel	1.640.2500.31	10.0 - 16.0	N/A
HSK-M-EX	Hummel	1.640.2500.30	14.0 - 18.0	N/A
HSK-M-PVDF-EX	Hummel	1.660.2500.31	10.0 - 16.0	N/A
HSK-M-PVDF-EX	Hummel	1.660.2500.30	14.0 - 18.0	N/A
HSK-M-EMV-EX	Hummel	1.616.2500.51	10.0 - 16.0	N/A
HSK-M-EMV-EX	Hummel	1.616.2500.50	14.0 - 18.0	N/A
HSK-M-EMV-EX	Hummel	1.646.2500.51	10.0 - 16.0	N/A
HSK-M-EMV-EX	Hummel	1.646.2500.50	14.0 - 18.0	N/A
HSK-M-MZ-Ex-d	Hummel	1.622.2500.50	13.0 - 18.0	N/A
HSK-M-MZ-Ex-d	Hummel	1.628.2500.50	13.0 - 18.0	N/A
T3CDS	CMP-Products	25T3CDS-5	18.0 - 26.2	11.1 -19.9
T3CDS	CMP-Products	25T3CDS-075-5	18.0 - 26.2	11.1 -19.9
T3CDS	CMP-Products	25T3CDS-PG21-5	18.0 - 26.2	11.1 -19.9
T3CDS	CMP-Products	25T3CDS-7	14.0 - 22.0	11.1 -19.9
T3CDS	CMP-Products	25T3CDS-075-7	14.0 - 22.0	11.1 -19.9
T3CDS	CMP-Products	25T3CDS-PG21-7	14.0 - 22.0	11.1 -19.9
U 2. UNI Dicht EEx	Pflitsch	22553dl18exzu	11.5 - 15.5	N/A
U 2. UNI Dicht EEx	Pflitsch	22553dp18exzu	11.5 - 15.5	N/A
U 2. UNI Dicht EEx	Pflitsch	22553dl18ex	11.5 - 15.5	N/A
U 2. UNI Dicht EEx	Pflitsch	22553dp18ex	11.5 - 15.5	N/A

NOTES:

THE CABLE GLANDS USED IN THE CABLE ENTRY HOLES OF THE TRANSMITTER ENCLOSURE SHALL BE ONE OF THE FOLLOWING:

TYPE A2F CABLE GLANDS FOR UNARMOURED CABLE MANUFACTURED BY CMP PRODUCTS LIMITED OF THE UNITED KINGDOM. THESE ARE ATEX CERTIFIED GLANDS UNDER CERTIFICATE NUMBER SIRA 02ATEX1057X. SEE TABLE FOR A PARTIAL LIST OF THE CABLE GLANDS IN THIS FAMILY.

TYPE 501/421 CABLE GLANDS FOR UNARMOURED CABLE MANUFACTURED BY HAWKE INTERNATIONAL OF THE UNITED KINGDOM. THESE ARE ATEX CERTIFIED GLANDS UNDER CERTIFICATE NUMBER BASEEFA06ATEX0056X. SEE TABLE FOR A PARTIAL LIST OF THE CABLE GLANDS IN THIS FAMILY.

TYPE HSK-K-EX 129*.**0*.** CABLE GLANDS FOR UNARMOURED CABLE MANUFACTURED BY HUMMEL ELEKTROTECHNIK GMBH OF GERMANY. THESE ARE ATEX CERTIFIED GLANDS UNDER CERTIFICATE NUMBER DMT 02 ATEX E 047 X. SEE TABLE FOR A PARTIAL LIST OF THE CABLE GLANDS IN THIS FAMILY.

TYPE HSK-M-EX 1610.****.** AND TYPE HSK-M-EMV-EX 1616.****.** CABLE GLANDS FOR UNARMOURED CABLE MANUFACTURED BY HUMMEL ELEKTROTECHNIK GMBH OF GERMANY. THESE ARE ATEX CERTIFIED GLANDS UNDER CERTIFICATE NUMBER DMT 03 ATEX E 051 X. SEE TABLE FOR A PARTIAL LIST OF THE CABLE GLANDS IN THIS FAMILY.

TYPE HSK-M-EX, HSK-M-PVDF-EX, AND HSK-M-EMV-EX CABLE GLANDS FOR UNARMOURED CABLE MANUFACTURED BY HUMMEL ELEKTROTECHNIK GMBH OF GERMANY. THESE ARE ATEX CERTIFIED GLANDS UNDER CERTIFICATE NUMBER KEMA 99ATEX6971X. SEE TABLE FOR A PARTIAL LIST OF THE CABLE GLANDS IN THIS FAMILY.

TYPE HSK-M-EX-d AND HSK-MZ-EX-d CABLE GLANDS FOR UNARMOURED CABLE MANUFACTURED BY HUMMEL ELEKTROTECHNIK GMBH OF GERMANY. THESE ARE ATEX CERTIFIED GLANDS UNDER CERTIFICATE NUMBER KEMA 99ATEX6966X. SEE TABLE FOR A PARTIAL LIST OF THE CABLE GLANDS IN THIS FAMILY.

TYPE T3CDS CABLE GLANDS FOR STEEL-WIRE-ARMOURED, STRIP-ARMOURED, OR BRAID-ARMOURED CABLES MANUFACTURED BY CMP PRODUCTS LIMITED OF THE UNITED KINGDOM. THESE ARE ATEX CERTIFIED GLANDS UNDER CERTIFICATE NUMBER SIRA 00ATEX1148X. SEE TABLE FOR A PARTIAL LIST OF THE CABLE GLANDS IN THIS FAMILY.

TYPE U 2. UNI DICHT EEx e II CABLE GLANDS FOR UNARMOURED CABLE MANUFACTURED BY PFLITSCH GMBH & CO KG OF GERMANY. THESE ARE ATEX CERTIFIED GLANDS UNDER CERTIFICATE NUMBER PTB 98 ATEX 3109. SEE TABLE FOR A PARTIAL LIST OF THE CABLE GLANDS IN THIS FAMILY.

ANY OTHER ATEX-APPROVED GAS GROUP II OR GAS GROUP IIB OR IIC CABLE GLAND WITH MINIMUM ENVIRONMENTAL RATINGS OF IP55 AND AN AMBIENT TEMPERATURE RANGE OF -20C TO +80C USED IN ACCORDANCE WITH THE MANUFACTURER'S GUIDELINES ON CABLE TYPES AND SIZES, TEMPERATURES, AND ANY SPECIAL CONDITIONS OF USE REQUIREMENTS.

REVISIONS

REV	DESCRIPTION	DRAWN	CHECKED
01	INITIAL RELEASE / E07-0041.	JMD 04/07/07	J. DIENER 04/14/07
02	ADDED "GAS GROUP IIC" TO "LAST PARAGRAPH, ALLOWING OTHER" CABLE GLANDS. ZONE B-4 / E09-0074	R. NEFZ 7-1-10	M. FOSS 7-1-10
03	CHANGED "GAS GROUP IIC" TO "GAS GROUP IIB OR IIC" IN LAST PARAGRAPH / E13-0013	DAR 04-26-13	RDH 04-26-13

CERTIFICATION DRAWING

UNLESS OTHERWISE SPECIFIED
PART MUST BE FREE OF BURRS AND/OR FLASH
BREAK SHARP EDGES .002-.008
FILLET RADII .005 MAX
DIMENSIONS ARE IN INCHES & APPLY AFTER FINISH
SURFACE FINISH 63 MAX

APPROVAL	BY	DATE
DRAWN	JMD	2/14/07
CHECKED	J. DIENER	2/14/07
ENGR'G	C. WINSTON	2/15/07
MFG	J. CIPRIANO	2/15/07

TOLERANCES
.XXX ±.005 FRAC ±1/64
.XX ±.01 ANGLES ±1°
INTERPRET DWG PER ASME Y14.5M-1994
DIMS IN ( ) ARE REFERENCE ONLY
DO NOT SCALE DWG

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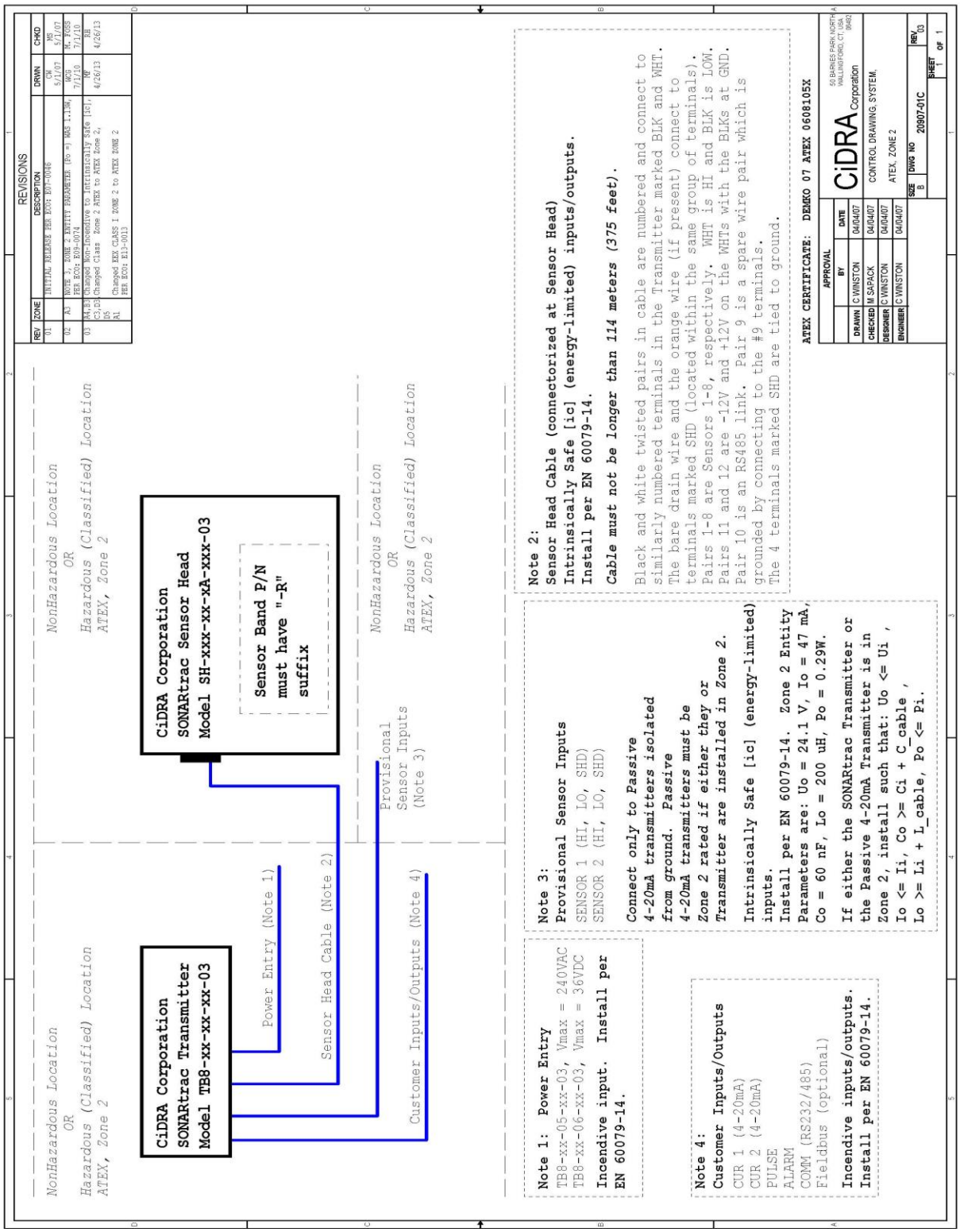
CERTIFICATION, CABLE GLAND, ZONE 2

MATERIAL:	HEAT TREAT:	FINISH:
NA	NA	NA

CIDRA ENGINEERING CAD FILE NUMBER: 20885-01c-SLDDRW

SIZE	DWG.NO	REV
D	20885-01c	03
SCALE: NTS		SHEET 1 OF 1

Annex B 20907-01C, CONTROL DRAWING, SYSTEM, ATEX ZONE 2



Annex C 20908-01C, CONTROL DRAWING, TRANSMITTER, ATEX ZONE 2