

IONX Technical Data



WSN-4 Series Sensor Installation Manual

Document Number: 303506

Revision: C




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These instructions are not designed to imply or replace any operating or safety rules.
It is the responsibility of the installer to understand and follow all company safety practices.


1. Precautions and Preparation


 **WARNING** In order to comply with hazardous classification, only those items specifically listed can be used and must be used only as shown. Substitution of components may affect intrinsic safety.

 **WARNING** Installation shall be carried out in accordance with the applicable code of practice by suitably-trained personnel.


 **WARNING** Repair of this equipment shall be carried out in accordance with the applicable code of practice.

 **WARNING** Any machining, drilling, grinding, sanding and/or welding related to the installation of this system should be pre-approved by the authorized department before work is started.


 **WARNING** If the equipment is likely to come into contact with aggressive substances, then it is the responsibility of the user to take suitable precautions that prevent it from being adversely affected, thus ensuring that the type of protection is not compromised.

 **WARNING** RF Device: Unit cannot be painted or coated with any material. Coating can adversely affect the performance of the device. Unit shall be masked appropriately if post installation coating is required.

 **WARNING EXPLOSION HAZARD:** The equipment temperature Class is T4 and only certified for use in ambient temperatures in the range Product is rated from -40°C to +55°C and should not be used outside this range in an explosive environment.

 **WARNING POTENTIAL ELECTROSTATIC CHARGING HAZARD:** Under certain extreme circumstances, the non-metallic parts incorporated in the enclosure of this equipment may generate an ignition-capable level of electrostatic charge. Therefore the equipment shall not be installed in a location where the external conditions are conducive to the build-up of electrostatic charge on such surfaces. This is particularly important if the equipment is installed in a zone 0 location.

 **WARNING POTENTIAL ELECTROSTATIC CHARGING HAZARD:** Suitable for hose down cleaning only. Do not clean unit with a dry cloth. Static can be generated when two dry parts are rubbed together.

 **WARNING** Products contain Primary Lithium batteries. Proper disposal procedures are required at end of life conditions. Use local regulatory disposal method for lithium Thionyl chloride batteries. For example, disposal procedure 49 CFR 173.185 or Battery Directive 2006/66/EC.

1. Avertissements

Ces instructions ne sont pas conçues pour impliquer ou remplacer des règles d'utilisation ou de sécurité. Il est de la responsabilité de l'installateur de comprendre et de suivre toutes les pratiques de sécurité de l'entreprise. Instructions complètes pour utiliser CMU en français en attente.



AVERTISSEMENT Afin de se conformer à la classification des matières dangereuses, seuls les éléments spécifiquement énumérés peuvent être utilisés et doivent être utilisés uniquement comme indiqué. La substitution de composants peut affecter la sécurité intrinsèque.



AVERTISSEMENT L'installation doit être effectuée conformément au code de pratique applicable par du personnel dûment formé.



AVERTISSEMENT La réparation de cet équipement doit être effectuée conformément au code de pratique applicable.



AVERTISSEMENT Tout usinage, perçage et / ou ponçage lié à l'installation de ce système doit être préalablement approuvé par le service autorisé avant le début des travaux.



AVERTISSEMENT Si l'équipement est susceptible d'entrer en contact avec des substances agressives, il est de la responsabilité de l'utilisateur de prendre les précautions appropriées qui empêchent qu'il soit affecté de manière négative, garantissant ainsi que le type de protection n'est pas compromis.



ATTENTION Dispositif RF: L'unité ne peut être peinte ou revêtue d'aucun matériau. Le revêtement peut nuire aux performances de l'appareil. L'unité doit être masquée de manière appropriée si un revêtement post-installation est requis.



ATTENTION DANGER D'EXPLOSION: La classe de température de l'équipement est T4 et seulement certifiée pour une utilisation à des températures ambiantes. Le produit est évalué de -40°C à +55°C et ne doit pas être utilisé en dehors de cette plage dans un environnement explosif.



ATTENTION DANGER D'EXPLOSION: L'installation doit être effectuée conformément au code de pratique en vigueur par du personnel qualifié.



ATTENTION DANGER DE CHARGE ÉLECTROSTATIQUE POTENTIEL: Dans certaines circonstances extrêmes, les pièces non métalliques incorporées dans l'enveloppe de cet équipement peuvent générer un niveau de charge électrostatique capable d'amorçage. Par conséquent, l'équipement ne doit pas être installé dans un endroit où les conditions externes favorisent l'accumulation de charges électrostatiques sur ces surfaces. Ceci est particulièrement important si l'équipement est installé dans un emplacement de la zone 0.

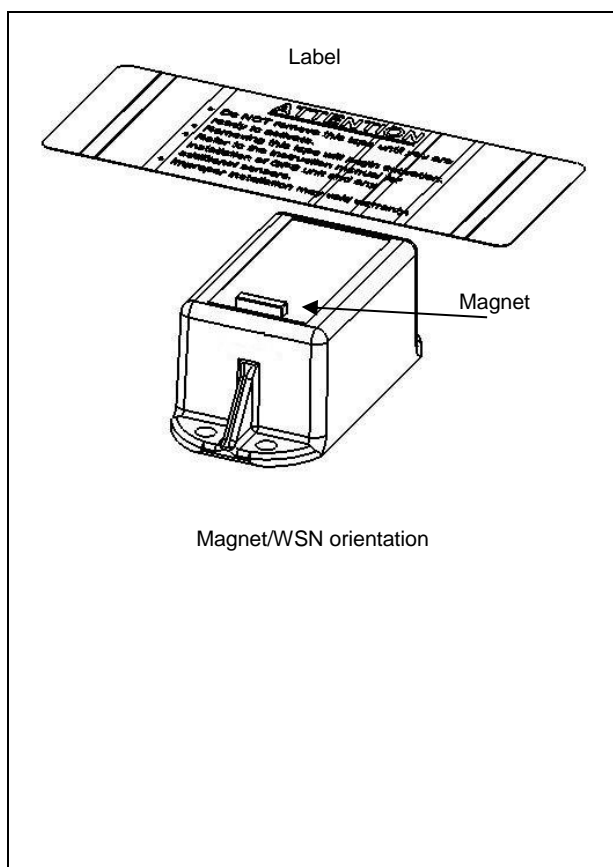


ATTENTION DANGER DE CHARGE ÉLECTROSTATIQUE POTENTIEL: Convient uniquement au nettoyage par tuyau. Ne nettoyez pas l'appareil avec un chiffon sec. Statique peut être généré lorsque deux parties sèches sont frottées ensemble.



ATTENTION Les produits contiennent des batteries au lithium primaire. Des procédures d'élimination appropriées sont requises en fin de vie. Utiliser une méthode d'élimination réglementaire locale pour les piles au lithium-chlorure de thionyle. Par exemple, procédure d'élimination 49 CFR 173.185 ou Directive 2006/66/CE.

2. Initiating the WSN-4 Series Sensor



Note: Before beginning, make sure to complete the instructions for activating the CMU and initiating the Wireless Sensor Monitor.

Section 1:

1. For WSN-4 Series Sensors not supplied with a magnet taped to the chassis proceed to Section 2.
2. Remove the tape/magnet when instructed by the CMU installation instructions and a red internal LED will flash briefly on the WSN-4 Series Sensor indicating the unit is awake and attempting to connect to an IONX CMU-EX.
3. Refer to the CMU-EX instructions to complete installation.

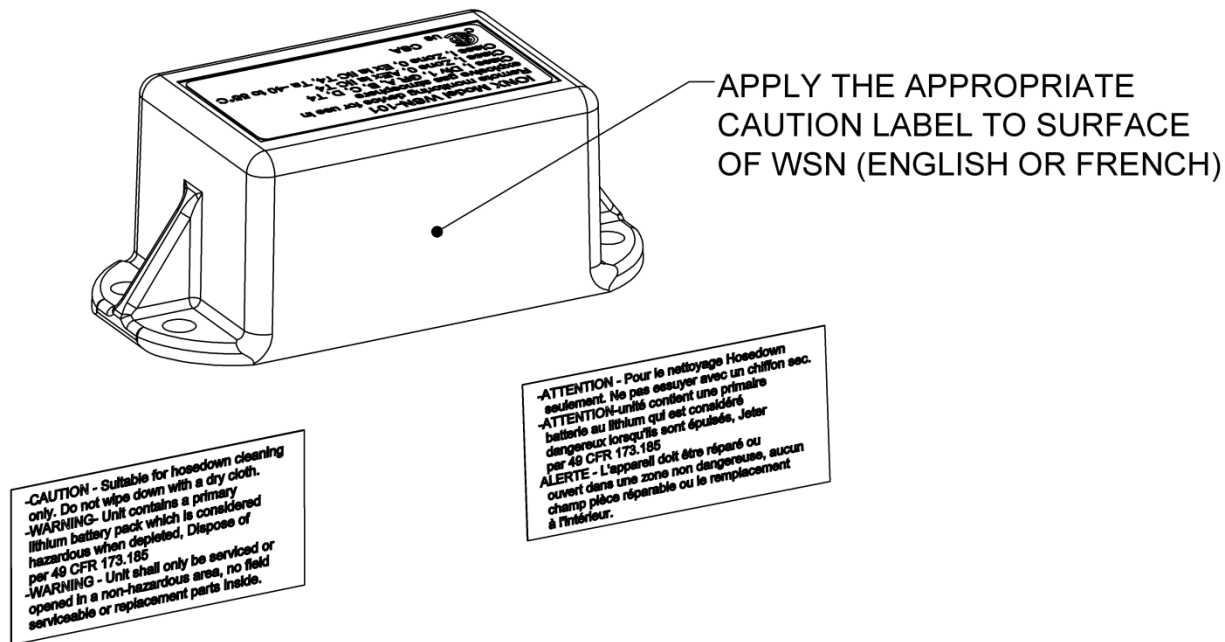
Section 2:

1. Place the WSN on the Near Field Communication (NFC) reader (supplied by IONX) and follow instructions in the NFC Field Tool User Manual to complete installation.

For more information, contact IONX Support Center at 1-800-621-8442, supportcenter@ionxlive.com

3. Testing the WSN-4 Series Sensor

1. Reference Manual CMU Installation Manual 303550.






4. Miscellaneous

Translations available upon request.





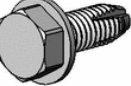



Traductions disponibles sur demande.


Appendix 1 WSN-401 Installation

Required Tools/Materials

Tool Name (Part No)	Description
3/8" Magnetic Drive Socket	 Securing self-drilling screws
#16 (.177") or 4.5mm Drill Bit	 Drilling pilot holes for self-tapping screws(Optional) (should use a stop collar set to no more than 3/8" or 10mm)
13/64 Drill Bit	 Drilling clearance holes for #10 Screws

Supplied Materials

QTY	Part No:	Description
1	W401A0XX	 WSN-401, Magnetic detector.
1	302211	 Magnet
1	301730	 Spacer, Magnet
1	258464	 AAR Compliance Label
4	215215	 Screw, 10-32x.5, Self Tapping
2	301731	 Screw, 10-32x2.25, Button Head
2	215217	 #10 Washer with gasket
2	211694	 #10 Locknut

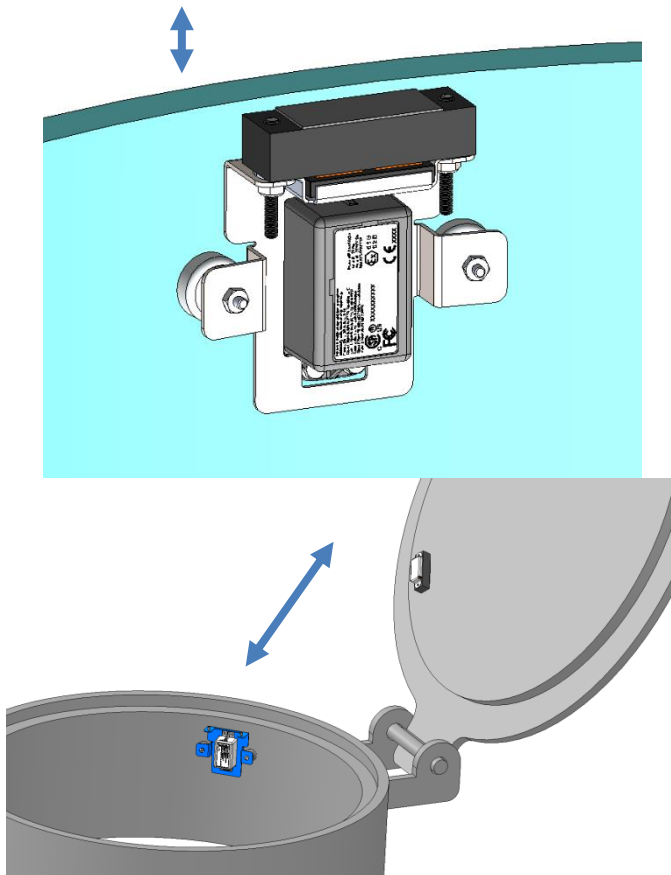
1	301735		WSN-101 Installation Jig
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Installing the WSN-401 inside hatch

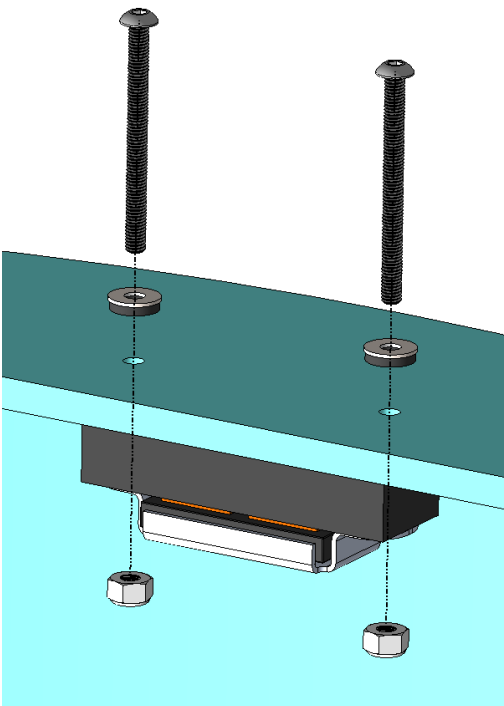
NOTE:

- Prior to installation, activate and test the WSN.
- Choose a mounting location that will not be prone to damage from tools used to access valves and valve plugs, or other routine maintenance.

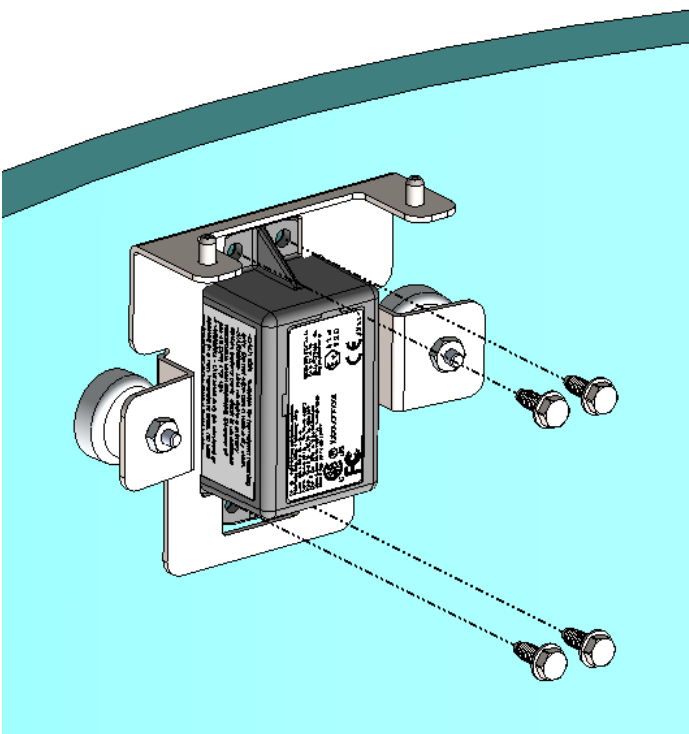




1. Assemble jig with WSN, magnet and magnet spacer as shown on the left.
2. Position jig into hatch ring so magnet spacer is about 1" (25mm) above the top of the ring.
3. Remove adhesive backing on magnet spacer.
4. Fully close hatch lid onto jig. The jig will be slid down to the correct height.
5. Open the hatch lid and the magnet with magnet spacer will be stuck to the lid.
6. Mark and drill holes for the spacer and magnet using the 13/64" Drill Bit.



7. Mount spacer and magnet using the 10-32x2.25 button head screws, sealing washers, and locknuts as shown.



8. Mark and drill holes for the Self-Tapping screw using the #16 (.177") or 4.5mm Drill Bit to a depth of 0.5" (12.5mm)
9. Attach WSN using the 10-32x.5 Self-Tapping screws.



10. Apply the yellow AAR Compliance label on the tank car jacket within 2-5" (50-125mm) of the WSN where it is clearly visible. **Note: Each WSN installed requires the application of one AAR Compliance label.**






Appendix 2 WSN-407 Installation



Required Tools/Materials






Tool Name (Part No)	Description
5/16" Magnetic Drive Socket	 Securing self-drilling screws
.177" (#16) or 4.5mm Drill Bit	 Drilling pilot holes (should use a stop collar set to no more than 1/2" or 12mm)

Supplied Materials

QTY	Part No:	Description
1	W407A0XX	 WSN-407, Magnetic Field and Tilt sensor
1	258464	 AAR Compliance Label
4	215215	 Screw, 10-32x.5, Self Tapping

Appendix 3 WSN-413 Installation

Required Tools/Materials

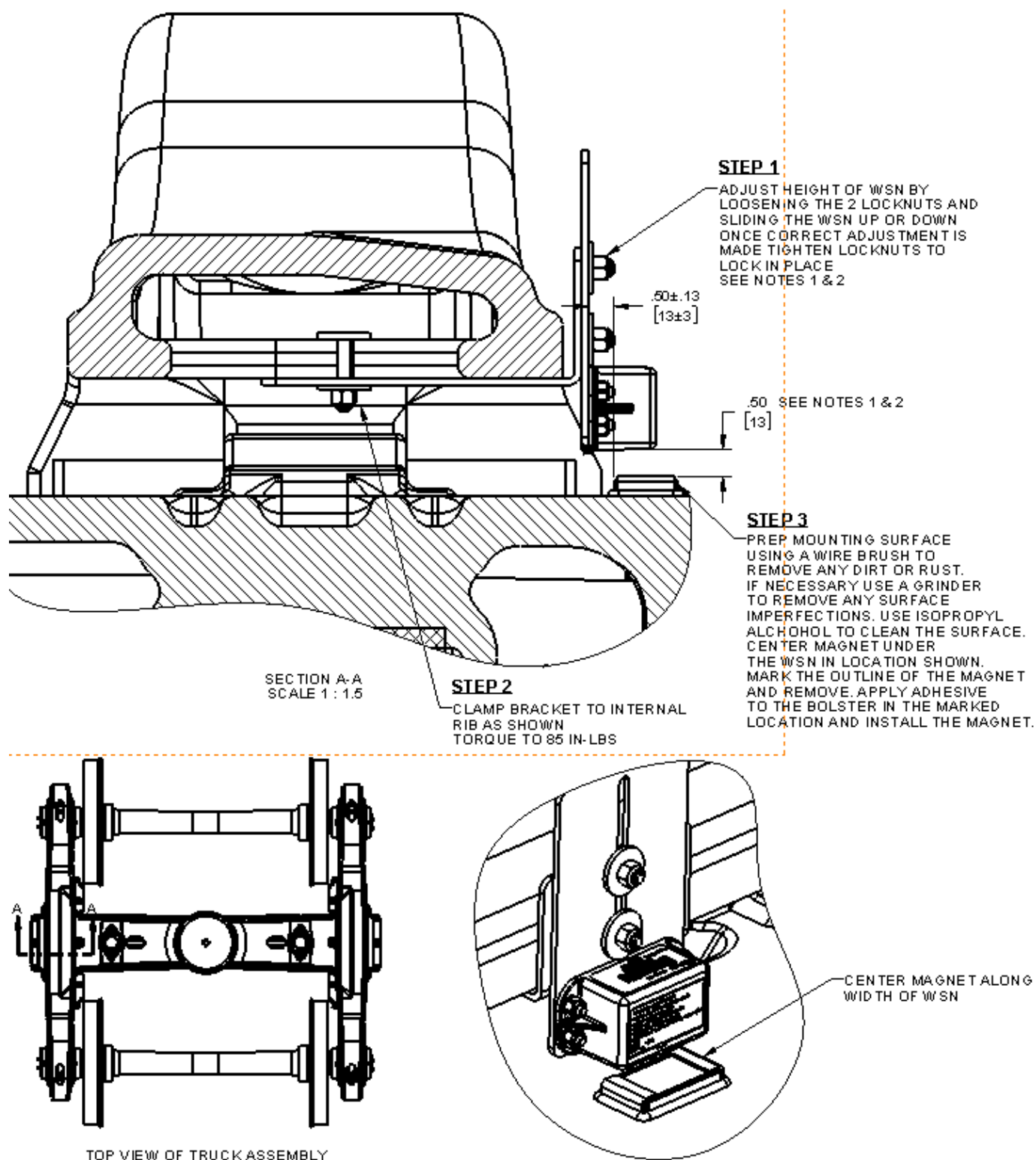
Tool Name (Part No)	Description
3/8" Socket wrench	 Attaching WSN to bracket
7/16" Socket wrench	 Attaching Bracket Assembly to Railcar
Wire Brush/Grinder	 Prep Surface to epoxy magnet
Epoxy applicator gun (McMaster: 74695A71)	 Epoxy applicator gun for applying epoxy. Requires mixing tips below.
Applicator tips (McMaster: 74695A25)	 Applicator tips for mixing and dispensing epoxy

Supplied Materials

QTY	Part No:	Description
1	W413A0XX	 WSN-413, Magnetic detector.
1	301820	 Bracket Kit, Empty/Full Sensor
1	258464	 AAR Compliance Label
1	301799	 Magnet with holder

1	211632		Epoxy Adhesive, Methacrylate
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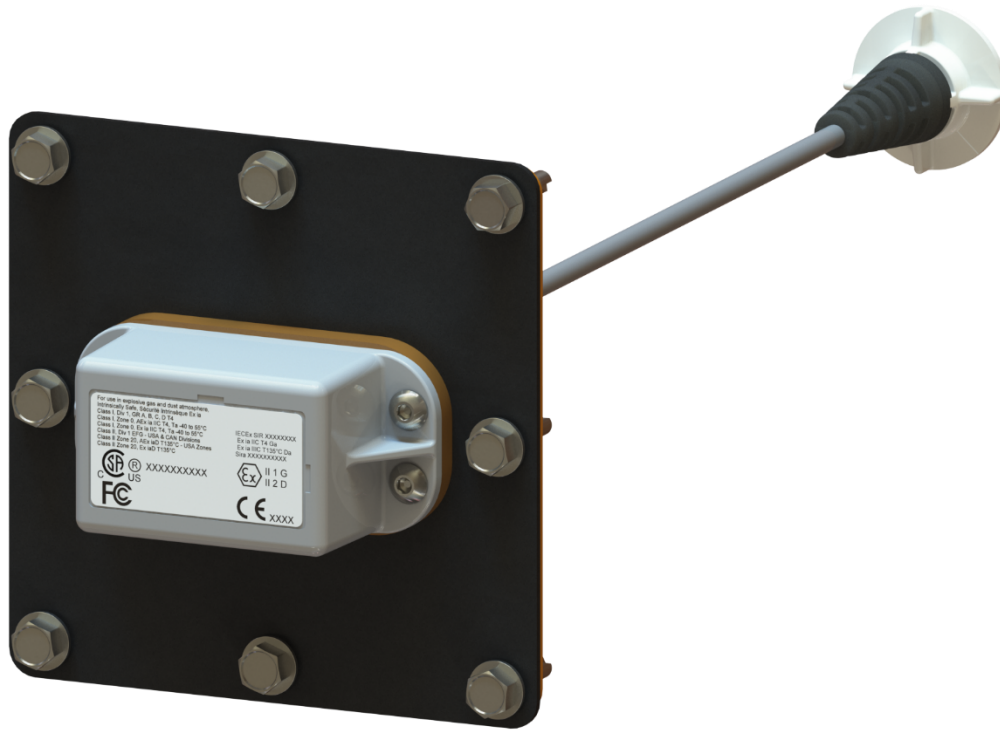
Installing the WSN-413





1. **NOTE: INSTALLATION MUST BE PERFORMED ON AN EMPTY CAR.**
2. **CORRECT SPACING CAN BE DETERMINED BY SETTING UP THE UNIT ON THE OUTSIDE FACE OF THE SIDE FRAME. THE DEFAULT DISTANCE BETWEEN THE TOP OF THE MAGNET AND THE BOTTOM OF THE WSN HOUSING SHOULD BE 0.5" (13MM) HOWEVER SLIGHT ADJUSTMENTS MAY BE NECESSARY ON CERTAIN APPLICATIONS.**
3. Apply the yellow AAR Compliance label on the tank car jacket within 2-5" (50-125mm) of the WSN where it is clearly visible. **Note: Each WSN installed requires the application of one AAR Compliance label.**






Appendix 4 WSN-414 Installation

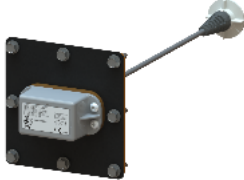



Required Tools/Materials

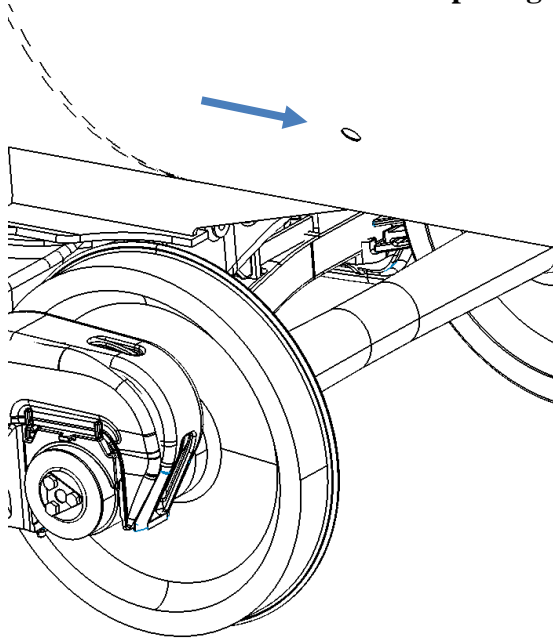
Tool Name (Part No)	Description	
Isopropyl Alcohol	Preparing tank car surface	
120-Grit Wire Brush Attachment (McMaster: 4914A41)		Preparing inner tank car surface
3/8" Magnetic Drive Socket		Securing self-drilling screws

3/16" Metal Drill Bit		Drilling pilot holes (Optional)
2" Diameter Bi-metal Hole Saw (McMaster: 4066A35)		Drilling hole in tank car jacket
Drill Extension		Adding length for wire brush cleaning

Supplied Materials

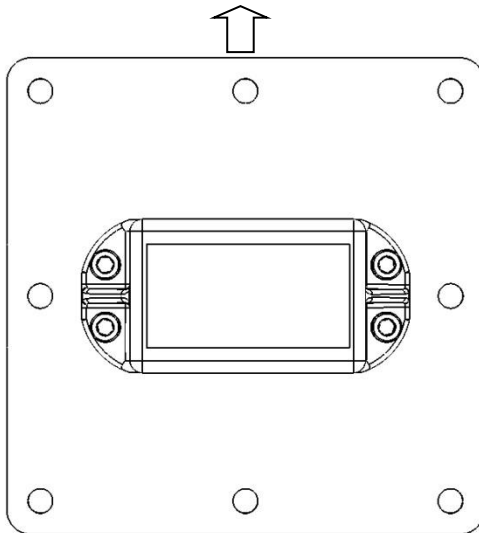
QTY	Part No:	Description
1	W414A0XX	 WSN-414, Ext. Temperature Sensor
1	258464	 AAR Compliance Label

Preparing the Tank Car Jacket



1. Mark the mounting location on the outer tank car jacket, ensuring the area is free of damage or any weld seams and has a suitable curvature to fit the jacket plate assembly. **Note: It may be easiest to dry-fit the plate to find the optimal location.**
2. Using a suitable 2" diameter hole-saw, drill through the outer jacket. **Note: A drill extension may be needed in applications where the insulation is >4" (100mm) thick.**
3. Remove any insulation so that a clear path is made from the hole in the outer jacket to the inner jacket surface.
4. Using a suitable wire brush attachment, clean a 2-4" (50-100mm) diameter area on the inner jacket, ensuring rust, grease, and other contaminants are removed.
5. Degrease the abraded inner jacket surface with Isopropyl Alcohol. **Note: Solvents other than those listed here may adversely affect the durability and strength of the adhesive bond.**
6. On the outer jacket, clean the area surrounding the hole with isopropyl alcohol or suitable solvent. Be sure to remove grease, oil, and any other contaminants.

Top of tank car



Attaching the Temperature Sensor & Jacket Plate

1. Peel the adhesive backing from the magnetic sensor. **Note: Adhere with ambient and surface temperatures ideally between 70-100°F (21-32°C). Do not apply below 50°F (10°C)**
2. Holding the WSN-414 in one hand and the sensor in the other, feed the magnetic sensor through the hole in the outer jacket and press onto the cleaned inner jacket surface. **Note: It may be easiest to test this step before removing the adhesive backing from the magnetic sensor (dry-fit).**
3. Pack insulation around the sensor wire, ensuring all voids are filled in. **Note: It may be necessary to pack additional insulation in some applications or use expanding foam insulation to replace solid type insulation.** Once the magnetic sensor is secured, peel the adhesive backing from the gasket on the underside of the jacket plate.

Note: The jacket plate may be square or round depending on the application, both of which follow this instruction set.

4. Carefully press the adhesive plate onto the tank car, centering over the drilled hole. Be sure to orient the assembly as shown to the left in Figure 1.
5. Insert the supplied self-drilling screws in the through-holes on the jacket plate. Be sure to use the tightening sequence shown in the figure to the left in Figure 1. Tighten **40-50 in-lbs (4.5-5.6Nm)**.
6. Apply the AAR Compliance label on the tank car jacket above the jacket plate (within 2-5 inches or 50-125mm). **Note: Each WSN installed requires the application of one AAR Compliance label.**

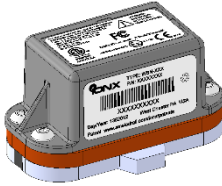



Appendix 5 WSN-415 Installation

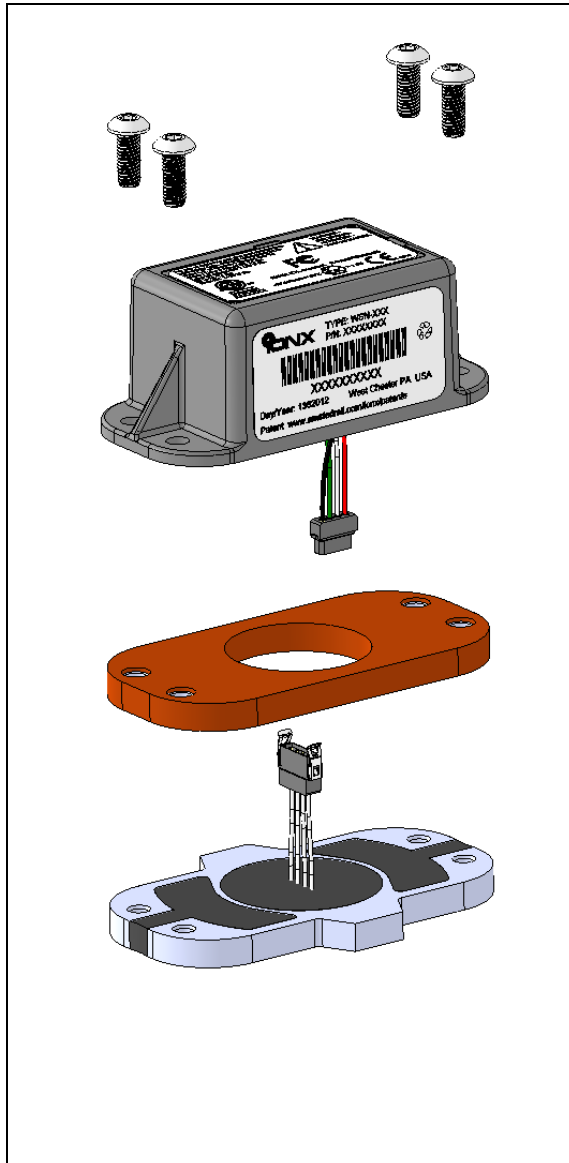
Required Tools/Materials

Tool Name (Part No)	Description
Screw Driver	 1/8 hex screw driver

Supplied Materials

QTY	Part No:	Description
1	W415A0XX	 WSN-415 Weld-on Load Cell Assembly
1	258464	 AAR Compliance Label

Installing the WSN-415



1. Refer to the welding instructions and install the load cell device. Align the WSN at a 90 degree position next to the installed load cell device.
2. Connect the 4 pin connector from the WSN to the Load Cell Sensor. This is a small polarized connector so it should connect in only one direction.
3. Rotate the WSN so it is sitting on top of the load cell sensor. Make sure the slack cable is neatly wrapped around the connector internally.
4. Insert and hand tighten the four screws. Inspect the gasket to assure it is sitting flush and there is nothing between the gasket and two mating surfaces.
5. Use the 1/8 hex screwdriver to secure the WSN to the sensor.
6. Apply the AAR Compliance label on the tank car jacket above the jacket plate (within 2-5 inches or 50-125mm). **Note: Each WSN installed requires the application of one AAR Compliance label.**



THIS IS A REMOTE MONITORING DEVICE
For questions please contact
+1 484-653-2600

Appendix 6: Compliance Requirements

Intrinsic Safety Compliance

Conforms To

UL STDS 913, 60079-0, & 60079-11

Certified To

CSA STD C22.2 # 157, 60079-0, 60079-11, & 25

Electromagnetic Compliance

FCC ID 2ADEPWSN4-A applies to WSN devices marked WSN-401, WSN-407, WSN-408, WSN-413, WSN-414, and WSN-415.

FCC WARNING

Statement 15.19(a)(3): This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation. Changes or modifications not expressly approved by Amsted Digital Solutions, Inc. could void the user's authority to operate the equipment.

Numéro de certification d'Industrie Canada IC: 12436A-WSN4A s'applique aux appareils WSN marqués WSN-401, WSN-407, WSN-408, WSN-413, WSN-414, and WSN-415.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes:

- (1) l'appareil ne doit pas produire de brouillage, et*
- (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.*

Industry Canada Certification Number IC: 12436A-WSN4A applies to WSN devices marked WSN-401, WSN-407, WSN-408, WSN-413, WSN-414, and WSN-415.

This device complies with Industry Canada's license-exempt RSSs. Operation is subject to the following two conditions:

- (1) This device may not cause interference, and*
- (2) This device must accept any interference, including interference that may cause undesired operation of the device.*

FVIN: WSN_4_A-1.0

Appendix 7: Declaration of Conformity



Declaration of Conformity



We, IONX LLC, 300 Willowbrook Lane, West Chester, PA 19382 USA declare under the sole responsibility that our Wireless Sensor Nodes WSN-401, WSN-407, WSN-414, and WSN-415, to which this declaration relates, are in conformity with the following standards when installed per the device installation requirements.

1. ATEX Directive 2014/34/EU

- Equip. Gr. II Cat. 1G, Ex ia IIC T4 Ga, $-40^{\circ}\text{C} \leq \text{Ta} \leq 55^{\circ}\text{C}$
- Equip. Gr. II Cat. 1D, Ex ia IIC T135°C Da

Intertek Cortland NY

EC Type Examination, Certificate Number: ITS19ATEX44860X

IECEx Certificate Number: IECEx ETL 19.0026X

The design was assessed to the below standards:



- II 1 GD
- $-40^{\circ}\text{C} \leq \text{Tamb} \leq 55^{\circ}\text{C}$



0518

IECEx	ATEX
IEC 60079-0:2011 Ed 6+CORR1+CORR2	EN 60079-0:2012+A11:2013
IEC 60079-11:2011 Ed 6+CORR1	EN 60079-11:2012

2. North America

Intertek Cortland NY



5011609

- Class I Division 1 Group A,B,C,D T4
- Class II, III Division 1 Group E,F,G T135°C
- Class I Zone 0, AEx ia IIC T4 Ga
- Class II Zone 20, AEx ia IIC T135°C Da
- $-40^{\circ}\text{C} \leq \text{Tamb} \leq 55^{\circ}\text{C}$

Canada Requirements	USA Requirements
CSA-C22.2 No 157-92+G1,U2-16	UL 913:2013 Ed 8+R:10Dec2018
CSA-C22.2 No 60079-0:15	UL 60079-0: ED6,13, R20OCT2017
CSA-C22.2 No 60079-11:14	UL 60079-11:ED6,13+R:28Mar2014
CSA C22.2 No. 25-1966 +G1	

3. EMC Directive 2004/108/EC

EN 55016-2-3 (EN 55022)	Radiated Emissions, 30 MHz to 6 GHz	Part 2-3
EN 61000-4-2	Electrostatic Discharge	Part 4-2
EN 61000-4-3	Radiated Immunity, 27 MHz to 1 GHz, 1.4 to 2.5 MHz	Part 4-3
EN 61000-4-6	Electromagnetic compatibility testing and measurement techniques	Part 4-6
EN 50121-3-2:2006	Railway applications – Electromagnetic compatibility – Part 3-2: Rolling Stock – Apparatus	Part 3-2, 2006

4. Other Standards

ETSI EN 301 489-1 V 1.8.1 (2008-04)	Electromagnetic compatibility and Radio spectrum Matters (ERM); ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 1: Common technical requirements	Part 1, 2008
ETSI EN 301 489-3 V1.4.1 (2002-08)	Electromagnetic compatibility and Radio spectrum Matters (ERM); ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 3: Specific conditions for Short-Range Devices (SRD) operating on frequencies between 9 kHz and 40 GHz	Part 3, 2002
CFR, Title 47	Code of Federal Regulations, Telecommunications Radio Frequency Devices	Part 15
CFR, Title 47	Code of Federal Regulations, Telecommunications, Part 2, Frequency Allocations and Radio Treaty Matters; General Rules and Regulations	Part 2
ANSI C63.4:2003	American National Standard, Methods of Measurement of Radio - Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz	2003
ICES-003	Industry Canada, Interference - Causing Equipment Standard	Issue 4
ISO 7637-2: 2004	Road vehicles - Electrical disturbances from conduction and coupling -Part 2: Electrical transient conduction along supply lines only	Part 2, 2004
CISPR 16	Specification for Radio Disturbance and Immunity Measuring Apparatus and Methods	
MIL-PRF-15733	Filters and Capacitors, Radio Frequency Interference, General Specifications for	H
AAR 5-9401	AAR, Manual of Standards and Recommended Practices, Section K –Part I, Railway Electronics	Section K, Part 1, 2005
Directive 2011/65/EU	ROHS Directive on the restriction of the use of certain hazardous substances in electrical and electronic equipment. First year of CE marking 2018.	

The manufacturer bears full responsibility for the production conformity to the requirements stated in the declaration.

Signature: 
Edward J. Mansfield, Senior Director-Operations

Date: 29 May 2019

720-00014 Declaration of Conformity, WSN-40X
Revision date: 29-May-19

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