



STATE OF MAINE
DEPARTMENT OF TRANSPORTATION
16 STATE HOUSE STATION
AUGUSTA, MAINE 04333-0016

Janet T. Mills
GOVERNOR

Bruce A. Van Note
COMMISSIONER

July 7, 2025
Subject: Continuous Counting
Stations
WIN: 027680.25
Location: Wilton, New Portland &
Mattawamkeag
Amendment No. 2

Dear Sir/Ms.:

The following questions have been received:

Question: Is there any items/equipment that will be provided by Maine DOT? If so, please specify

Response: All Cabinet Equipment is already present on site. Solar, Solar Controller, EMU3 Classifier with surge suppression, GX450 modem and batteries are already installed within the cabinets.

Question: Does the SOW include the installation of road sensors? If so, please provide required sensor specifications

Response: See Attachments. BL Sensors and Grout, IMSA 51-7 Loop Wire.

Question: Is there a preferred brand/model for the Continuous Traffic Monitoring Unit?

Response: Q-Free EMU3 Classifier (Already Installed)

Question: Could you please provide more information regarding the existing cabinets? Is power available? Are these cabinets dedicated for the monitoring station or are they shared with other departments (additional equipment)? Could you please provide cabinet drawings and/or dimensions?

Response: Power is available through solar. These cabinets are dedicated for traffic monitoring only. Equipment is already installed, it will just need the loop and piezo sensor leads brought into the cabinet. Dimensions are 15 inches in Depth, 24 inches wide, 38 inches in height.

Question: What type of communication means are available at the location (eg. fiber, cellular?)

Response: Cellular, via GX450 modems

Consider these changes and information prior to submitting your bid on July 16, 2025.

Sincerely,



George M. A. Macdougall P.E.
Contracts & Specifications Engineer



ROADTRAX BL TRAFFIC SENSOR

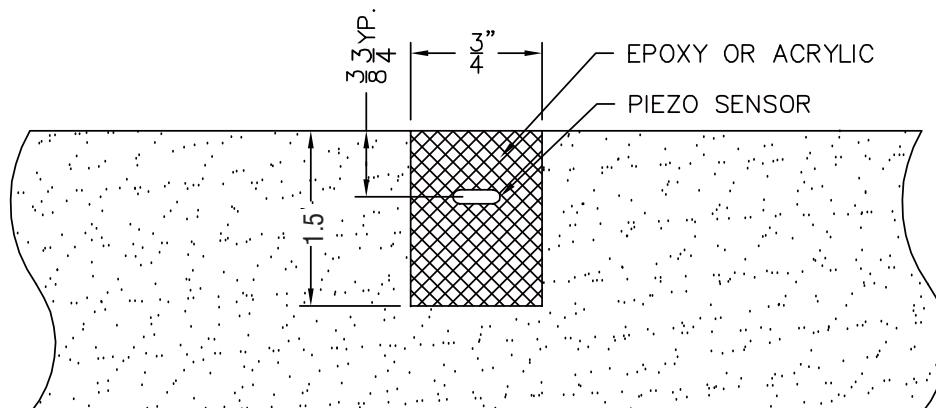
PIEZOELECTRIC AXLE SENSOR
PRODUCT GUIDE

Product Description

The Roadtrax BL Traffic Sensor is designed for permanent or temporary installation into or onto the road surface for the collection of traffic data. The unique construction of the sensor allows direct installation into the road in a flexible format so that it can conform to the profile of the road. The flat construction of the sensor gives an inherent rejection of road noise due to road bending, adjacent lanes, and bow waves of approaching vehicles. The small cut in the road minimizes the damage done to the road, speeds up the installation and reduces the amount of grout used for the installation. The Roadtrax BL sensor is available both as a Class I sensor for the highest level of uniformity needed for Weigh in Motion applications and as a Class II sensor which is more cost effective for Counting, Classifying, Open Road tolling, Speed Detection, and Red Light Cameras.

- Uniform, high amplitude piezoelectric output compatible with existing counters and classifiers on the market.
- Excellent Signal to Noise Ratio which has an inherent 10:1 rejection of road noise caused by road bending, adjacent lanes and bow waves of approaching vehicles.
- Flexible sensor - conforms to road profiles while maintaining a uniform distance to the road surface.
- The final installation is flush with the road surface - snowplows will not damage the sensor.
- Durable enough to withstand normal installation handling and millions of ESALs.
- Sensors are tested and certified for performance as a complete sensor prior to shipment.
- Custom Passive Signal Cable with High Density Poly Ethylene Jacket which is rated for direct burial and resists nicks and cuts.

1. Easy installation in a 3/4" wide by 1.5" deep (19 x 38 mm) slot. The sensor to be installed 3/4" (19mm) below the surface. This balances the disturbance of the road and the depth of the cut while maintaining the integrity of the pavement over time. A shallow installation is fill an option, depending on local conditions



2. This figure illustrates the new deeper installation. A shallower installation is still an option depending on local conditions and roads.

Permanent in the Road Installation

Performance Characteristics

Output Uniformity	$\pm 20\%$ for Class II (Classification) $\pm 7\%$ for Class I (Weigh in Motion)
Operating Temperature Range	- 40 to 160°F (-40 to 70°C)
Temperature Sensitivity	0.2%/°F typ, dependent on the grout used
Typical Output Level proper installation	A wheel load of 400 pounds will produce a minimum output signal of 250 mV, at 70°F and 55 mph for a
Passive Signal Cable	RG 58C/U with a High Density Polyethylene Outer jacket that is rated for direct burial; 3/16" (4.75mm) OD
Product Life	40 Million ESAL's; dependent on the installation
Capacitance	See Chart
Weight	See Chart
Insulation Resistance	>500 M OHM
Packaging	All sensors are packaged two per each 24"x20"x3" (600x550x75mm) corrugated cardboard box, but are sold as single sensors.
Installation Brackets	Included. One bracket is used every 6" (150mm)

Specifications¹

The Measurement Specialties BL Traffic sensor has the following specifications:

1. Center Core: 16 gauge, flat, braided, silver plated copper wire.
2. Piezoelectric Material: Spiral-wrapped PVDF Piezoelectric film
3. Outer Sheath: 0.016" thick brass, CDA-260, ASTM B587-88
4. Final Dimensions: 0.260" wide x 0.063" (6.6*1.6mm)thick; $\pm 0.005"$ ($\pm 0.127\text{mm}$)
5. Insulation resistance between core and shield: > 500 MS.
6. Piezoelectric Coefficient: 34 pC/N - nominal.
7. Passive Signal Cable: RG 58 type with a underground/direct burial rated outer jacket. The OD of the cable is 0.187" (4.75mm). The nominal capacitance of the cable is 27 pF/ft (89pF/m).
8. Sensors are packaged 2 per box. The box size is 24"x20"x3" (600x550x75mm).
For cables over 200ft in length, there is only 1 per box.
9. Two sizes of installation brackets are included with the sensors, 3/4" (small) brackets and 1" (large) brackets.
There is one small and one large bracket per 6" (150mm)of sensor length.

Notes:

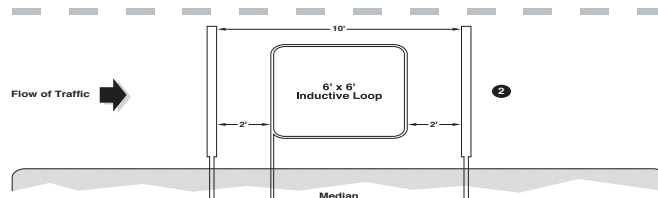
Although TE makes every effort to ensure the accuracy of the specifications at the time of publication, specifications for this product are subject to change without notice. Contact TE for the most current information at +1 800-522-6752 or customercare.hmpt@te.com

Sensor Length	Sensor Classification ¹	Capacitance with 100' cable ²	Weight ³ pounds (kg)	Visible Brass Length	Installed Length ⁴	Part Number ⁵
6' (1.82m)	Class II	4.00 nF ≤ C ≤ 10.00 nF	2.75 (1.25)	70" (1.78m)	76" (1.93m)	0-1005333-Y
8' (2.42m)	Class II	5.50 nF ≤ C ≤ 11.50 nF	2.80 (1.27)	94" (2.38m)	100" (2.54m)	1-1005333-Y
9' (2.73m)	Class II	6.25 nF ≤ C ≤ 12.25 nF	2.85 (1.30)	106" (2.69m)	112" (2.85m)	2-1005333-Y
10' (3.03m)	Class II	7.00 nF ≤ C ≤ 13.00 nF	2.90 (1.32)	118" (3.00m)	124" (3.15m)	3-1005333-Y
11' (3.33m)	Class II	7.75 nF ≤ C ≤ 13.75 nF	2.95 (1.34)	130" (3.30m)	136" (3.45m)	4-1005333-Y
12' (3.64m)	Class II	8.50 nF ≤ C ≤ 14.50 nF	3.00 (1.36)	139" (3.53m)	145" (3.68m)	5-1005333-Y
13' (3.94m)	Class II	9.25 nF ≤ C ≤ 15.25 nF	3.05 (1.39)	154" (3.91m)	160" (4.06m)	6-1005333-Y
6' (1.82m)	Class I (WIM)	4.00 nF ≤ C ≤ 10.00 nF	2.75 (1.25)	70" (1.78m)	76" (1.93m)	1-1005438-Y
8' (2.42m)	Class I (WIM)	5.50 nF ≤ C ≤ 11.50 nF	2.80 (1.27)	94" (2.38m)	100" (2.54m)	2-1005438-Y
9' (2.73m)	Class I (WIM)	6.25 nF ≤ C ≤ 12.25 nF	2.85 (1.30)	106" (2.69m)	112" (2.85m)	3-1005438-Y
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11' (3.33m)	Class I (WIM)	7.75 nF ≤ C ≤ 13.75 nF	2.95 (1.34)	130" (3.30m)	136" (3.45m)	5-1005438-Y
12' (3.64m)	Class I (WIM)	8.50 nF ≤ C ≤ 14.50 nF	3.00 (1.36)	139" (3.53m)	145" (3.68m)	6-1005438-Y
13' (3.94m)	Class I (WIM)	9.25 nF ≤ C ≤ 15.25 nF	3.05 (1.39)	154" (3.91m)	160" (4.06m)	7-1005438-Y
2.0m (6'7")	Class II	4.94 nF ≤ C ≤ 10.94 nF	2.75 (1.25)	1.98 m (78")	2.14 m (84")	1-1005528-Z
2.5m (8'3")	Class II	6.17 nF ≤ C ≤ 12.17 nF	2.85 (1.30)	2.48 m (98")	2.64 m (104")	2-1005528-Z
3.0m (9'11")	Class II	7.40 nF ≤ C ≤ 13.40 nF	2.95 (1.35)	2.98 m (117")	3.14 m (123")	3-1005528-Z
3.5m (11'6")	Class II	8.63 nF ≤ C ≤ 14.63 nF	3.05 (1.40)	3.48 m (137")	3.64 m (143")	4-1005528-Z
4.0m (13'2")	Class II	9.87 nF ≤ C ≤ 15.87 nF	3.15 (1.45)	3.98 m (157")	4.14 m (163")	5-1005528-Z
4.5m (14'10")	Class II	11.09 nF ≤ C ≤ 17.09 nF	3.25 (1.50)	4.48 m (177")	4.64 m (183")	6-1005528-Z
5.0m (16'6")	Class II	12.32 nF ≤ C ≤ 18.32 nF	3.35 (1.55)	4.98 m (196")	5.14 m (202")	7-1005528-Z
5.5m (18'2")	Class II	13.55 nF ≤ C ≤ 19.55 nF	3.45 (1.60)	5.48 m (216")	5.64 m (222")	8-1005528-Z
2.0m (6'7")	Class I (WIM)	4.94 nF ≤ C ≤ 10.94 nF	2.75 (1.25)	1.98 m (78")	2.14 m (84")	1-1005527-Z
2.5m (8'3")	Class I (WIM)	6.17 nF ≤ C ≤ 12.17 nF	2.85 (1.30)	2.48 m (98")	2.64 m (104")	2-1005527-Z
3.0m (9'11")	Class I (WIM)	7.40 nF ≤ C ≤ 13.40 nF	2.95 (1.35)	2.98 m (117")	3.14 m (123")	3-1005527-Z
3.5m (11'6")	Class I (WIM)	8.63 nF ≤ C ≤ 14.63 nF	3.05 (1.40)	3.48 m (137")	3.64 m (143")	4-1005527-Z
4.0m (13'2")	Class I (WIM)	9.87 nF ≤ C ≤ 15.87 nF	3.15 (1.45)	3.98 m (157")	4.14 m (163")	5-1005527-Z
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5.0m (16'6")	Class I (WIM)	12.32 nF ≤ C ≤ 18.32 nF	3.35 (1.55)	4.98 m (196")	5.14 m (202")	7-1005527-Z

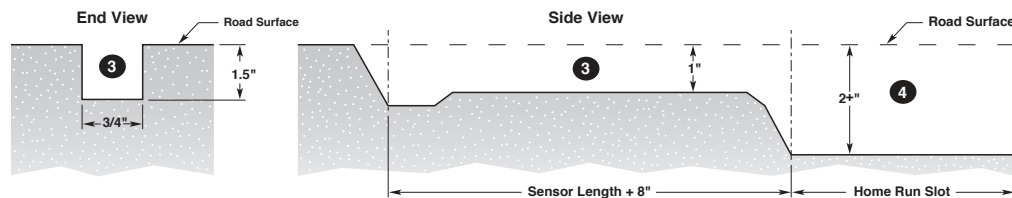
- Class II sensors have a uniformity of $\pm 20\%$ and are typically used for Classification purposes. Class I sensors have a uniformity of $\pm 7\%$ and are typically used for Weigh in Motion applications.
- Additional cable has a capacitance of 27 pF/ft (89 pF/m) or 2.7 nF/100' (2.2 nF/25m). Provided with each sensor is a test certificate with the actual tested value for the sensor. Field tests should be within $\pm 20\%$ of these values, at room temperature (70F or 23C).
- Most sensors are packaged 2 per box. The box weighs 1.5 lbs (0.7 kg). Sensors with cable longer than 200 ft. are packaged 1 per box.
- This length refers to the installed length of the sensor. This is the minimum lane width for the installed sensor.
- The suffix refers to the cable length. Cable lengths for -Y are as follows: -1 @ 100', -2 @ 150', -3 @ 200', -4 @ 250', -5 @ 300'. Cable lengths for the -Z are as follows: -1 @ 35m, -2 @ 50m, -3 @ 75M, and -4 @ 100m.

BL Piezoelectric Traffic Sensor Installation Instructions

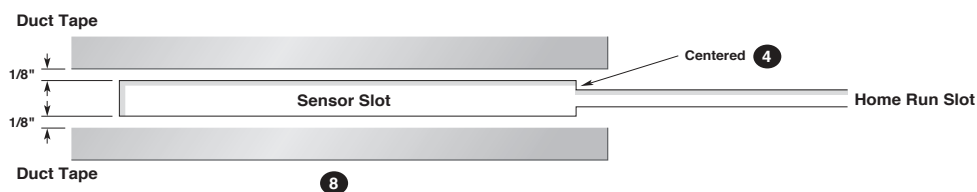
- (1) Ensure that the road is safely closed, as per local regulations.
- (2) Using pavement crayons, paint, tape measure and cord, carefully mark the layout of the sensor installation. Ensure sensors are emplaced exactly perpendicular to the flow of traffic and that all lines are straight. Verify that the passive cable length is enough to reach the cabinet. DO NOT SPLICE CABLE IF IT IS TOO SHORT. Typical WIM/Classification site layout with 11' (3.5 m) sensors is shown below.



- (3) Using a 3/4" (20 mm) Diamond Blade, wet cut slot for sensor. Slot must be 3/4" (20 mm) wide ($\pm 1/16"$ or ± 2 mm) by 1.5" (38 mm) minimum deep. Cut slot 8" (200 mm) longer than sensor length (including lead attachment). Drop blade an extra 1/2" (12 mm) down on both ends. Repeat for all sensors.

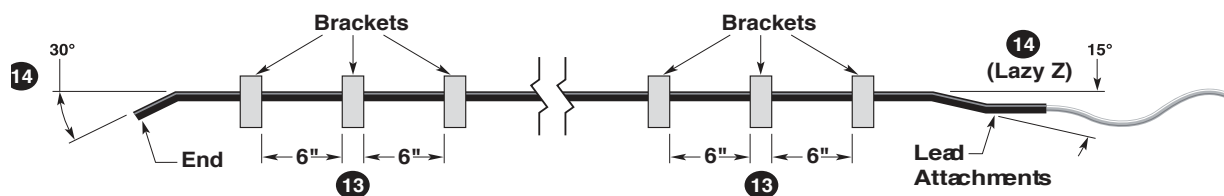


- (4) Cut home run slots for BL sensors. Center the home run slot on the sensor slot. Home run slots are typically cut the depth of the loop home run slots. The minimum width of the slot needs to be 1/4" (6 mm). Cut it wider if you are using conduit or tubing.
- (5) Cut all inductive loops sets (if applicable).
- (6) Power wash and sweep all slots. All slots must be very clean.
- (7) Dry all slots with compressed air. All slots and the pavement 1' (300 mm) on either side must be completely dry.
- (8) Place duct tape along length of both sides of the sensor slot. Tape must be 1/8" (3 mm) away from the slot. Repeat for all sensors.

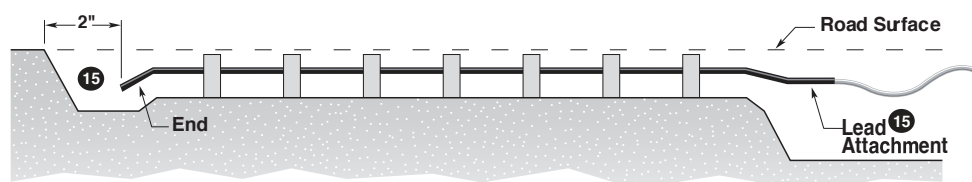


- (9) Remove BL sensor from box. Visually inspect sensor to ensure it is straight without any twists or curls. Check the passive cable for any nicks or gouges or bare wires. Check lead attachment for cracks or gaps. Again, verify that there is sufficient passive cable to reach the cabinet.
- (10) Connect sensor up to LCR Meter. Test capacitance and dissipation factor. Test the resistance on the 20M setting. Capacitance and dissipation should be within $\pm 20\%$ of the enclosed data sheet. Resistance should be infinite. Record all results on the data sheet.
- (11) Place sensor on tape next to the slot. From this point forward, handle the sensor with latex (or equivalent) gloves.

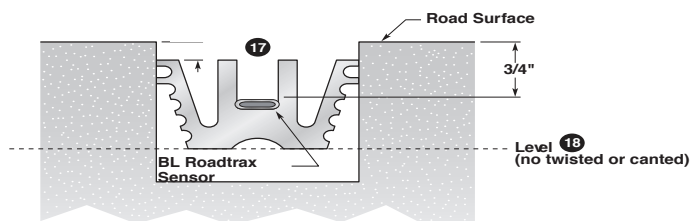
- (12) Clean sensor with steel wool or emery pad. Wipe down with alcohol and clean lint-free cloth.
- (13) Place installation brackets on sensor every 6" (150 mm) for the length of the sensor, use the 3/4" (20 mm) (small) brackets
- (14) Bend the end of the sensor downward at a 30° angle. Bend the lead attachment end down at a 15° angle and then 15° back up until level (forming a lazy Z).



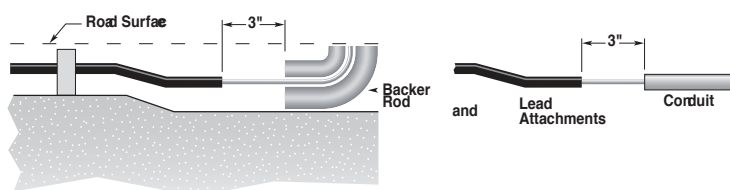
- (15) Emplace sensor in the slot in the road. The end of the sensor should be at least 2" (50 mm) from the end of the slot, and the tip should not touch the bottom of the slot. The lead attachment should also not touch the bottom or the sides of the slot.



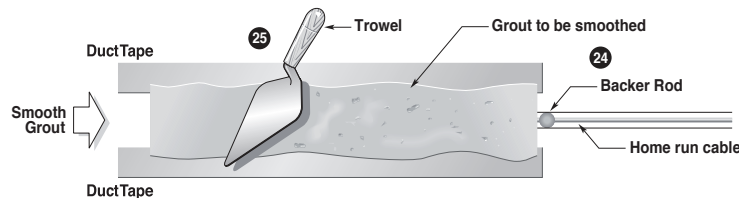
- (16) If any of the 3/4" (20 mm) (small) brackets do not fit snugly against the sides of the slot or are loose, replace with a 1" (25 mm) (large) bracket and repeat step 15.



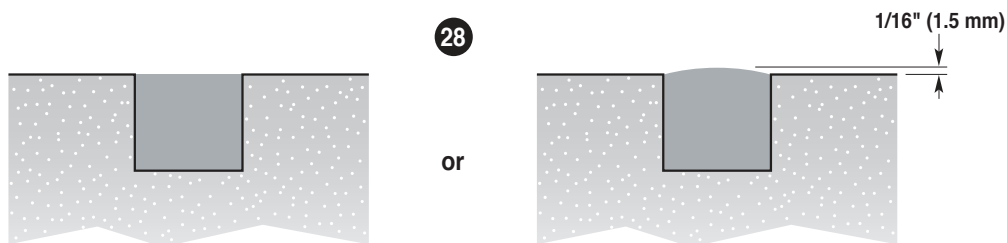
- (17) Starting at the lead attachment end, use the installation depth gauge to position the sensor so that it is 3/4" (19mm) below the surface of the road by pressing the depth gauge against the top of the sensor.
- (18) Visually inspect the length of the sensor to ensure it is at uniform depth along its length and it is level (not twisted, canted or bent).
- (19) Run the passive wire the length of the home run slot. 3" (75 mm) from the lead attachment, place backer rod under and over passive cable (inside the slot). This will keep the grout from running out into the deeper home run slot. If the passive cable is put in a conduit, also allow 3" (75 mm) between the lead attachment and the beginning of the conduit.
- (20) Repeat steps 9 to 19 for all BL sensors to be installed.



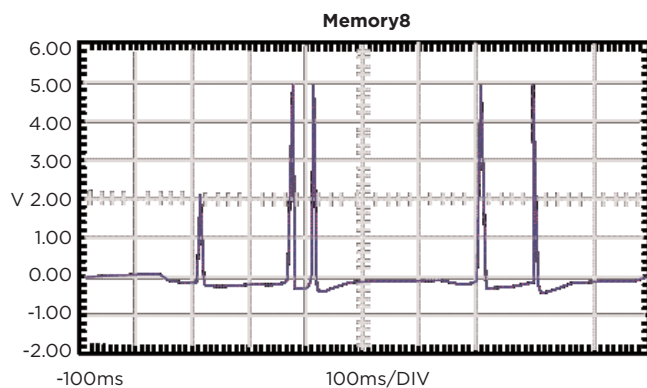
- (21) Emplace all inductive loops to site specifications (if applicable).
- (22) Using low speed mixing drill (450 rpm) and a mixing paddle, premix the grout for 2 min or until smooth.
- (23) Add hardener to grout and mix according to manufacturer's instructions.



- (24) Immediately pour grout into slot using a small bead. Using a small bead allows the installer to watch the grout flow under the sensor, eliminating air pockets. Start at the end and pour towards the lead attachment. Repeat until slot is completely full of grout. **DO NOT FILL SLOT IN ONE PASS.**
- (25) Using putty knife or trowel, lightly spread (feather) the grout smooth along the length of the slot. Resin should be slightly higher than tape as it will shrink while curing.
- (26) Remove tape as soon as grout begins to set (2-5 min, depending on grout type and ambient temperature)

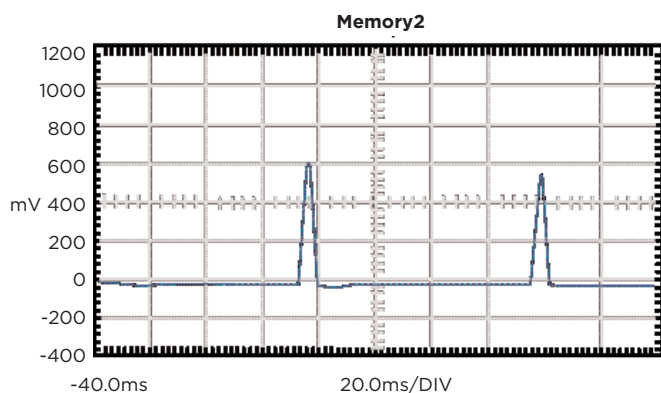


- (27) Remove backer rod from the slot. Fill in home run cable and inductive loops with loop sealant.
- (28) Once grout is cured, use an angle grinder or a belt sander to grind/sand the top of the grout flush with the surface.
- (29) Wait allotted period to allow loop sealant and grout to fully cure (45 - 60 min) and then open the lane to traffic.
- (30) Hook up oscilloscope to sensors and view wave forms as vehicles pass. Ensure signal is clear without noise.



Datablock

Name =Memory8
 Date =5/20/97
 Time =8:55:43 PM
 Y Scale =1.00V/Dlv
 Y A50%=1.00V
 X Scale =100 ms/Dlv
 X, 0% =-100 ms
 X Size =250 (256)
 Maximum=5.60V
 Minimum=-0.44V



Datablock

Name =Memory2
 Date =6/14/97
 Time =9:19:37 AM
 Y Scale =200 mV/Dlv
 Y A50%=400V
 X Scale =20.0 ms/Dlv
 X, 0% =-40 ms
 X Size =250 (25%)
 Maximum=608 mV
 Minimum=-40 mV

Required/recommended tools and materials

- TE BL Sensors with installation brackets. Sensors should be ordered with sufficient passive cable to reach the control cabinet.
- Installation instruction. Read these instructions prior to the installation. There may need to be some adaptation of these instructions based on local conditions.
- Sensor support brackets. These are shipped in the box with the sensors.
- Installation Depth Gauge. These are shipped in the box with each sensor.
- Installation encapsulation. See Recommended materials under frequently asked questions. Approximately 1/2 to 1 gallon (1.5 to 3 liters) of material is needed per sensor. The slot must be carefully cut in order to ensure that it is not too deep; otherwise excessive material is used. Read, understand and follow the directions supplied by the manufacturer of the installation encapsulation. Adhere to the temperature limits imposed on the material to ensure adequate drying time is available. Follow all recommended safety precautions.
- Loop sealant material, to cover the home run cables. Amount used will depend on the length and width of the homerun cuts. DO NOT USE HOT TAR.
- Thin wall tubing for homerun cables. Minimum 3/8" (9mm) ID, flexible tubing. Materials for this tubing are typically flexible PVC or polyethylene. Sufficient quantity for all homeruns from the end of the sensors to the cabinet as needed.
- PVC pipe, 2-3" (50-75mm) dia. For use as conduit for any underground runs from junction boxes to cabinets as needed.
- PVC solvent and joints - as needed for any splices in the pipes.
- Wet cutting pavement saw. A self-propelled saw of at least 35 hp, fitted with a 14" (350mm) or larger blade. This saw must be capable of cutting a 3/4" wide x 1.5" deep (19mm wide x 38mm deep) cut in a single pass.
- Diamond Blades for the saw. Appropriate type for the pavement being cut. The Piezo sensor needs a cut 11/16" to 13/16" (19mm ± 1mm) wide, 1.5" (25mm) deep slot cut in the road in a single pass. If a single blade is not available, multiple blades can be put together to form a dado blade. A 3/8" (9mm) and a 1/4" (6mm) blade, with a 1/16" (2mm) spacer between them performs very well. Additional blade widths are necessary for cutting the slots for the tubing for the home run cables.
- Large capacity air compressor (at least 150 CFM) with hose and nozzle - for blowing out the slot and drying the area after the cut.
- Trenching equipment as required for burying the conduit to the control cabinet.
- Power washer or high pressure water hose - for washing out the slot.
- Water - for saw and for washing out the slot
- Broom - Street broom type with stiff bristles for general cleanup.
- Slow speed electric drill with mixing paddle. Typically battery operated drills do not have sufficient torque and battery life to mix all materials.
- Additional mixing paddle if a two part loop sealant is used. There should not be cross contamination of the grout used for the piezo and the loop sealant material.
- Wire Brush and/or bristle brush - for cleaning out the slot after cutting and during washing.
- 3" or 4" (75-100mm) putty knife for use with the grout
- Small pointed trowel for putting the grout into the slot.
- Wire Strippers. Knife type blade strippers, such as Ideal Tools Stripmasters should be used due to the toughness of the HDPE jacket on the sensor homerun cable.
- Cleaning Materials for hands and equipment. The citrus hand cleaner works well. Include lots of paper towels.
- Angle Grinder with appropriate grinding wheel or belt sander for smoothing out the grout after the installation.
- Hammer and masonry chisels. May be required for chipping corners, etc.
- Disposable gloves (rubber dishwashing gloves work much better than the latex or plastic gloves)
- 2" (50mm) duct tape. Enough for twice the length of all the sensors. Used to keep excessive grout off the road next to the slot during the installation.
- Plumbers putty or duct seal to form dams at the end of the grout
- Straight edge
- Tape measure - at least 20' (6m) long
- Pavement crayons
- Chalk line
- Pavement paint
- 1/8" (3mm) diameter cord or rope for use in laying out the lines
- LCR Meter, such as a BK 875A, to check and measure Capacitance and Resistance of the sensors before and after installation.
- Oscilloscope. Although not essential, it is the only instrument that will give a complete verification that the sensors are fully functioning when the installation is complete. The picoscope 2000 series USB oscilloscopes work well and are relatively inexpensive.
- Generator if electrical power is not available on site. Verify the electrical load of the tools being used compared to the capacity of the generator.
- Appropriate traffic control, as required by local regulations and appropriate safety guidelines
- Safety equipment required for workers. Safety helmets, safety glasses, reflective vests, etc, as required.
- Not included in this list are materials required for inductive loops (if used), control cabinets, junction boxes, and other off the road work.

Important Notes and Hints:

- The quality of the road will affect the quality of the data. The roads should conform to ASTM COST323 specifications for Weigh in Motion applications.
- Diamond blades should be used on the road saw. The tolerance for the cut is 11/16" to 13/16". A 3/4" diamond blade is recommended for cutting the slot. Do not try to do two independent cuts as it is very difficult to achieve this level of accuracy.
- Wet cutting is preferred to dry cutting. The dry cutting forces particles into the sidewalls of the slot which are very difficult to thoroughly clean. This residue will diminish the adhesion of the adhesive to the road, potentially causing the premature failure of the sensor.
- The passive cable length should not exceed 300' without consulting the manufacture. It is **STRONGLY** recommended that the sensors be ordered with sufficient cable to avoid splices. If splices are needed, only similar grade of RG-58 cable should be used, the splices must be soldered, and an approved splice kit used to waterproof the splice. TE is not responsible for any problems arising from splicing the cable.
- Disposable gloves must be worn when working with the clean sensor and encapsulation material. Appropriate precautions should be taken, according to the encapsulation material manufacturer's instructions. Ensure you read and follow all safety instructions.
- Adequate traffic control is essential. Do not put any of your workers at risk.
- Ensure that the sensor is placed in the correct location on the road. Six foot sensors should be positioned in a wheel path, NOT in the center of the lane.
- Care should be taken when mixing the encapsulation material to minimize the amount of trapped air in the material. Do not lift the mixing paddle out of the encapsulation material while the mixing head is spinning. Stop the blade and then use a stirring paddle to scrape the edges of the can. Make sure that all of the silica filler material is fully mixed and incorporated into the grout before adding the hardener.
- If heaters are needed to speed the curing process for the grout, extreme care should be taken to ensure that the sensors are not destroyed. The maximum temperature that the sensors can withstand is 170°F! An A-Frame should be constructed out of metal or plywood, and placed over the sensor. Warm air from a torpedo heater should be blown in horizontally into the A-Frame, but NEVER aimed directly at the sensor. The air temperature at the sensor location should not be higher than what can be tolerated by your hand for 20-30 seconds. If it is hotter than this, the sensor will lose its piezo activity and will not function.
- Once the sensor is installed and the grout is cured, it is recommended that any excessive grout be ground off, using an angle grinder or belt sander. The best installation has the grout flush with the road surface to minimize any chance of the tires bridging over the sensor.
- Thin walled plastic tubing may be used to contain the home run cable. In the unlikely event that the sensor needs to be replaced, the passive cable can then be pulled through the tubing, thereby eliminating the need for recutting the home run slot.
- Read all of the directions carefully and completely prior to the installation. Ensure that you have all of the required equipment available. If there are any questions on the installation, call Measurement Specialties and we will be happy to 'walk' you through the procedures.

Sensor Testing:

The piezoelectric sensors should be tested prior to and after installation. Because of the high costs of installation compared to the cost of the sensor, it is imperative that the sensors be checked out prior to putting them into the road to determine if any damage has been done to the sensor during shipping and handling. The following tests should be done prior to installation:

Equipment needed: LCR meter.

1. Capacitance: Measure the capacitance of the sensor with the attached lead in cable. This should be within 20% of the sensor's data sheet included in the box. The meter should typically be set on a 20nF range. The red probe should be connected to the center electrode of the cable and the Black probe to the outer braid. Make sure that your hands are not holding across the two connections.
2. Resistance: Measure the resistance across the sensor. The meter should be set on the 20M Ω setting. The meter should read in excess of 20M Ω , which is typically displayed with a '1'. This will vary from meter to meter. There are also some meters that have difficulties in reading the full value. Please make sure that you know your meter. Test your meter on a known good sensor so that you are not surprised out in the field.

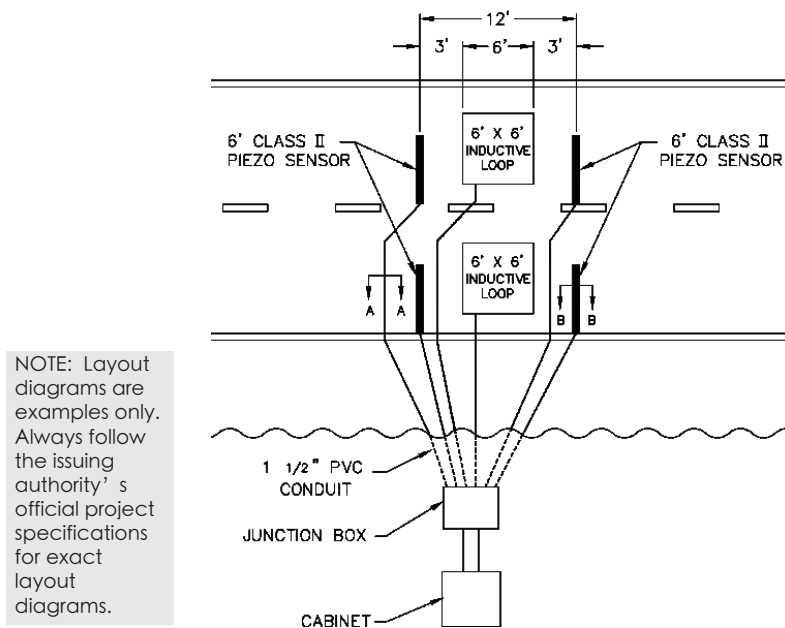
Testing after installation:

Once the sensor is installed and the grout has cured, retest the sensor according to the instructions above. In addition, it is recommended that an oscilloscope be connected to the sensor and typical waveforms be collected for a truck and a car. These should then be printed out and saved for permanent records. The output of the sensor will depend on the type of the installation, sensor length, cable length and epoxies used for the installation. Typical settings for the scope would be 200 mV/div for a voltage setting and 50 msec/div for a time setting. The trigger should be set at about 50 mV for a positive going signal.

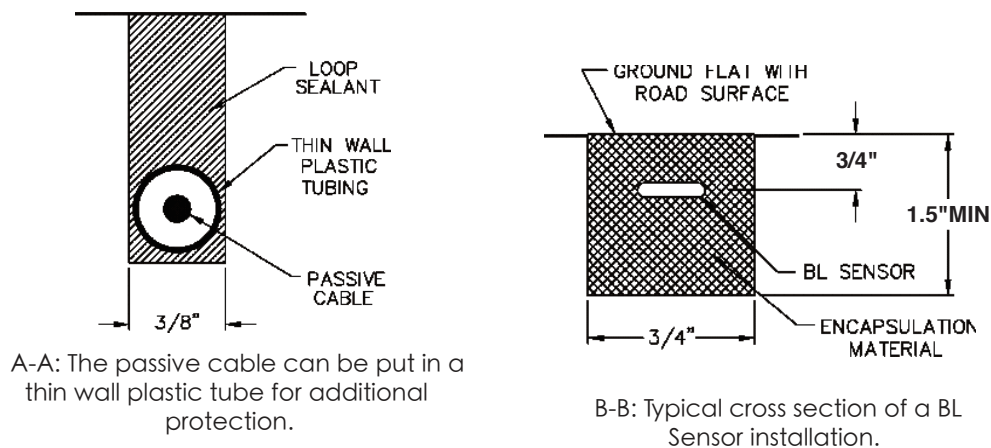
Sensor Maintenance:

Like any piece of equipment, regular maintenance should be done to the piezoelectric sensors in order to maintain them for a long service life. The sensors should be inspected on a semi-annual basis, and any cracks in the road or in the sensor encapsulation should be filled. A low viscosity loop sealant such as Bondo 606 or a low viscosity epoxy such as Global PX768 should be poured into any cracks, and then squeegeed smooth. Any loose asphaltic material should be wire brushed away prior to pouring the sealant material in the cracks. Be careful not to raise the profile of the sensor. The sensor should be tested for capacitance and resistance, and the results logged in on the data sheet for the sensors.

Additional Roadtrax Installation Diagrams



Typical installation layout for a Piezo-Loop-Piezo installation for 6' Class II sensors



Frequently Asked Questions:

Approved Grout for installation:

Polyurethane
PU 200

Global Resins Limited Unit 7
Park Lane Industrial Estate Corsham,
Wilts SN13 9LG England
Tel: +44 1249 715566
Fax: +44 1249 715533
Available through TE.

Acrylic AS475

International Road Dynamics 702 43rd
Street East Saskatoon, Saskatchewan
Canada S7K 3T9
Tel: 306 653 6600
Fax: 306 242 5599
Available through TE.

Order Information

TCPN	Part Number	Part Description
11028376-00	1005333-1	BL CLS 2, 6'SENSOR/100'
11031999-00	1005333-2	BL CLS 2, 6'SENSOR/150'
11029062-00	1005333-3	BL CLS 2, 6'SENSOR/200'
11028377-00	1005333-4	BL CLS 2, 6'SENSOR/250'
11032000-00	1005333-5	BL CLS 2, 6'SENSOR/300'
1005333-6	1005333-6	BL CLS 2, 6'SENSOR/350'
1005333-7	1005333-7	BL CLS 2, 6'SENSOR/400'
1005333-8	1005333-8	BL CLS 2, 6'SENSOR/450'
1005333-9	1005333-9	BL CLS 2, 6'SENSOR/500'
11026278-00	1-1005333-1	BL CLS 2, 8'SENSOR/100'
11029079-00	1-1005333-2	BL CLS 2, 8'SENSOR/150'
11026954-00	1-1005333-3	BL CLS 2, 8'SENSOR/200'
11029810-00	1-1005333-4	BL CLS 2, 8'SENSOR/250'
11030572-00	1-1005333-5	BL CLS 2, 8'SENSOR/300'
1-1005333-6	1-1005333-6	BL CLS 2, 8'SENSOR/350'
1-1005333-7	1-1005333-7	BL CLS 2, 8'SENSOR/400'
1-1005333-8	1-1005333-8	BL CLS 2, 8'SENSOR/450'
1-1005333-9	1-1005333-9	BL CLS 2, 8'SENSOR/500'
11027165-00	2-1005333-1	BL CLS 2, 9'SENSOR/100'
11031452-00	2-1005333-2	BL CLS 2, 9'SENSOR/150'
11026309-00	2-1005333-3	BL CLS 2, 9'SENSOR/200'
11032270-00	2-1005333-4	BL CLS 2, 9'SENSOR/250'
11030004-00	2-1005333-5	BL CLS 2, 9'SENSOR/300'

TCPN	Part Number	Part Description
2-1005333-6	2-1005333-6	BL CLS 2, 9'SENSOR/350'
2-1005333-7	2-1005333-7	BL CLS 2, 9'SENSOR/400'
2-1005333-8	2-1005333-8	BL CLS 2, 9'SENSOR/450'
2-1005333-9	2-1005333-9	BL CLS 2, 9'SENSOR/500'
11030041-00	3-1005333-1	BL CLS 2, 10'SENSOR/100'
11032302-00	3-1005333-2	BL CLS 2, 10'SENSOR/150'
11027197-00	3-1005333-3	BL CLS 2, 10'SENSOR/200'
11028643-00	3-1005333-4	BL CLS 2, 10'SENSOR/250'
11026541-00	3-1005333-5	BL CLS 2, 10'SENSOR/300'
3-1005333-6	3-1005333-6	BL CLS 2, 10'SENSOR/350'
3-1005333-7	3-1005333-7	BL CLS 2, 10'SENSOR/400'
3-1005333-8	3-1005333-8	BL CLS 2, 10'SENSOR/450'
3-1005333-9	3-1005333-9	BL CLS 2, 10'SENSOR/500'
11032346-00	4-1005333-1	BL CLS 2, 11'SENSOR/100'
11027221-00	4-1005333-2	BL CLS 2, 11'SENSOR/150'
11028665-00	4-1005333-3	BL CLS 2, 11'SENSOR/200'
11029247-00	4-1005333-4	BL CLS 2, 11'SENSOR/250'
11030076-00	4-1005333-5	BL CLS 2, 11'SENSOR/300'
4-1005333-6	4-1005333-6	BL CLS 2, 11'SENSOR/350'
4-1005333-7	4-1005333-7	BL CLS 2, 11'SENSOR/400'
4-1005333-8	4-1005333-8	BL CLS 2, 11'SENSOR/450'
4-1005333-9	4-1005333-9	BL CLS 2, 11'SENSOR/500'
11032406-00	5-1005333-1	BL CLS 2, 12'SENSOR/100'

TCPN	Part Number	Part Description
11032407-00	5-1005333-2	BL CLS 2, 12'SENSOR/150'
11029274-00	5-1005333-3	BL CLS 2, 12'SENSOR/200'
11031510-00	5-1005333-4	BL CLS 2, 12'SENSOR/250'
11027877-00	5-1005333-5	BL CLS 2, 12'SENSOR/300'
5-1005333-6	5-1005333-6	BL CLS 2, 12'SENSOR/350'
5-1005333-7	5-1005333-7	BL CLS 2, 12'SENSOR/400'
5-1005333-8	5-1005333-8	BL CLS 2, 12'SENSOR/450'
5-1005333-9	5-1005333-9	BL CLS 2, 12'SENSOR/500'
11030810-00	6-1005333-1	BL CLS 2, 13'SENSOR/100'
11029285-00	6-1005333-2	BL CLS 2, 13'SENSOR/150'
11032442-00	6-1005333-3	BL CLS 2, 13'SENSOR/200'
11026571-00	6-1005333-4	BL CLS 2, 13'SENSOR/250'
11028704-00	6-1005333-5	BL CLS 2, 13'SENSOR/300'
6-1005333-6	6-1005333-6	BL CLS 2, 13'SENSOR/350'
6-1005333-7	6-1005333-7	BL CLS 2, 13'SENSOR/400'
6-1005333-8	6-1005333-8	BL CLS 2, 13'SENSOR/450'
6-1005333-9	6-1005333-9	BL CLS 2, 13'SENSOR/500'
11032047-00	1-1005438-1	BL CLS 1, 6'SENSOR/100'
11026955-00	1-1005438-2	BL CLS 1, 6'SENSOR/150'
11028423-00	1-1005438-3	BL CLS 1, 6'SENSOR/200'
11027670-00	1-1005438-4	BL CLS 1, 6'SENSOR/250'
11029080-00	1-1005438-5	BL CLS 1, 6'SENSOR/300'
1-1005438-6	1-1005438-6	BL CLS 1, 6'SENSOR/350'
1-1005438-7	1-1005438-7	BL CLS 1, 6'SENSOR/400'
1-1005438-8	1-1005438-8	BL CLS 1, 6'SENSOR/450'
1-1005438-9	1-1005438-9	BL CLS 1, 6'SENSOR/500'
11027805-00	2-1005438-1	BL CLS 1, 8'SENSOR/100'
11028605-00	2-1005438-2	BL CLS 1, 8'SENSOR/150'
11026536-00	2-1005438-3	BL CLS 1, 8'SENSOR/200'
11026537-00	2-1005438-4	BL CLS 1, 8'SENSOR/250'
11030005-00	2-1005438-5	BL CLS 1, 8'SENSOR/300'
2-1005438-6	2-1005438-6	BL CLS 1, 8'SENSOR/350'
2-1005438-7	2-1005438-7	BL CLS 1, 8'SENSOR/400'
2-1005438-8	2-1005438-8	BL CLS 1, 8'SENSOR/450'
2-1005438-9	2-1005438-9	BL CLS 1, 8'SENSOR/500'
11030042-00	3-1005438-1	BL CLS 1, 9'SENSOR/100'
11027198-00	3-1005438-2	BL CLS 1, 9'SENSOR/150'
11027199-00	3-1005438-3	BL CLS 1, 9'SENSOR/200'
11032303-00	3-1005438-4	BL CLS 1, 9'SENSOR/250'

TCPN	Part Number	Part Description
11026314-00	3-1005438-5	BL CLS 1, 9'SENSOR/300'
3-1005438-6	3-1005438-6	BL CLS 1, 9'SENSOR/350'
3-1005438-7	3-1005438-7	BL CLS 1, 9'SENSOR/400'
3-1005438-8	3-1005438-8	BL CLS 1, 9'SENSOR/450'
3-1005438-9	3-1005438-9	BL CLS 1, 9'SENSOR/500'
11030780-00	4-1005438-1	BL CLS 1, 10'SENSOR/100'
11027847-00	4-1005438-2	BL CLS 1, 10'SENSOR/150'
11028666-00	4-1005438-3	BL CLS 1, 10'SENSOR/200'
11031490-00	4-1005438-4	BL CLS 1, 10'SENSOR/250'
11030077-00	4-1005438-5	BL CLS 1, 10'SENSOR/300'
4-1005438-6	4-1005438-6	BL CLS 1, 10'SENSOR/350'
4-1005438-7	4-1005438-7	BL CLS 1, 10'SENSOR/400'
4-1005438-8	4-1005438-8	BL CLS 1, 10'SENSOR/450'
4-1005438-9	4-1005438-9	BL CLS 1, 10'SENSOR/500'
11031511-00	5-1005438-1	BL CLS 1, 11'SENSOR/100'
11030796-00	5-1005438-2	BL CLS 1, 11'SENSOR/150'
11030105-00	5-1005438-3	BL CLS 1, 11'SENSOR/200'
11028695-00	5-1005438-4	BL CLS 1, 11'SENSOR/250'
11032408-00	5-1005438-5	BL CLS 1, 11'SENSOR/300'
5-1005438-6	5-1005438-6	BL CLS 1, 11'SENSOR/350'
5-1005438-7	5-1005438-7	BL CLS 1, 11'SENSOR/400'
5-1005438-8	5-1005438-8	BL CLS 1, 11'SENSOR/450'
5-1005438-9	5-1005438-9	BL CLS 1, 11'SENSOR/500'
11027887-00	6-1005438-1	BL CLS 1, 12'SENSOR/100'
11029286-00	6-1005438-2	BL CLS 1, 12'SENSOR/150'
11030811-00	6-1005438-3	BL CLS 1, 12'SENSOR/200'
11032443-00	6-1005438-4	BL CLS 1, 12'SENSOR/250'
11029287-00	6-1005438-5	BL CLS 1, 12'SENSOR/300'
6-1005438-6	6-1005438-6	BL CLS 1, 12'SENSOR/350'
6-1005438-7	6-1005438-7	BL CLS 1, 12'SENSOR/400'
6-1005438-8	6-1005438-8	BL CLS 1, 12'SENSOR/450'
6-1005438-9	6-1005438-9	BL CLS 1, 12'SENSOR/500'
11032591-00	7-1005438-1	BL CLS 1, 13'SENSOR/100'
11029329-00	7-1005438-2	BL CLS 1, 13'SENSOR/150'
11030170-00	7-1005438-3	BL CLS 1, 13'SENSOR/200'
11027940-00	7-1005438-4	BL CLS 1, 13'SENSOR/250'
11028735-00	7-1005438-5	BL CLS 1, 13'SENSOR/300'
7-1005438-6	7-1005438-6	BL CLS 1, 13'SENSOR/350'
7-1005438-7	7-1005438-7	BL CLS 1, 13'SENSOR/400'

TCPN	Part Number	Part Description
7-1005438-8	7-1005438-8	BL CLS 1, 13'SENSOR/450'
7-1005438-9	7-1005438-9	BL CLS 1, 13'SENSOR/500'
11026957-00	1-1005528-1	BL CLS 2, 2.0M SENSOR W/35M
11030573-00	1-1005528-2	BL CLS 2, 2.0M SENSOR W/50M
11032050-00	1-1005528-3	BL CLS 2, 2.0M SENSOR W/75M
11032051-00	1-1005528-4	BL CLS 2, 2.0M SENSOR W/100M
11027168-00	2-1005528-1	BL CLS 2, 2.5M SENSOR W/35M
11028609-00	2-1005528-2	BL CLS 2, 2.5M SENSOR W/50M
11032271-00	2-1005528-3	BL CLS 2, 2.5M SENSOR W/75M
11028610-00	2-1005528-4	BL CLS 2, 2.5M SENSOR W/100M
9-1005528-1	9-1005528-1	BL CLS 2, 2.75M SENSOR W/35M
9-1005528-2	9-1005528-2	BL CLS 2, 2.75M SENSOR W/50M
9-1005528-3	9-1005528-3	BL CLS 2, 2.75M SENSOR W/75M
9-1005528-4	9-1005528-4	BL CLS 2, 2.75M SENSOR W/100M
11027828-00	3-1005528-1	BL CLS 2, 3.0M SENSOR W/35M
11028646-00	3-1005528-2	BL CLS 2, 3.0M SENSOR W/50M
11030753-00	3-1005528-3	BL CLS 2, 3.0M SENSOR W/75M
11030043-00	3-1005528-4	BL CLS 2, 3.0M SENSOR W/100M
11030079-00	4-1005528-1	BL CLS 2, 3.5M SENSOR W/35M
11031493-00	4-1005528-2	BL CLS 2, 3.5M SENSOR W/50M
11028669-00	4-1005528-3	BL CLS 2, 3.5M SENSOR W/75M
11029249-00	4-1005528-4	BL CLS 2, 3.5M SENSOR W/100M
11030798-00	5-1005528-1	BL CLS 2, 4.0M SENSOR W/35M
11027244-00	5-1005528-2	BL CLS 2, 4.0M SENSOR W/50M
11026561-00	5-1005528-3	BL CLS 2, 4.0M SENSOR W/75M
11030107-00	5-1005528-4	BL CLS 2, 4.0M SENSOR W/100M
11030118-00	6-1005528-1	BL CLS 2, 4.5M SENSOR W/35M
11030119-00	6-1005528-2	BL CLS 2, 4.5M SENSOR W/50M
11030813-00	6-1005528-3	BL CLS 2, 4.5M SENSOR W/75M
11027250-00	6-1005528-4	BL CLS 2, 4.5M SENSOR W/100M
11027942-00	7-1005528-1	BL CLS 2, 5.0M SENSOR W/35M
11032592-00	7-1005528-2	BL CLS 2, 5.0M SENSOR W/50M
11027294-00	7-1005528-3	BL CLS 2, 5.0M SENSOR W/75M
11027295-00	7-1005528-4	BL CLS 2, 5.0M SENSOR W/100M
11032761-00	8-1005528-1	BL CLS 2, 5.5M SENSOR W/35M
11032762-00	8-1005528-2	BL CLS 2, 5.5M SENSOR W/50M
11029388-00	8-1005528-3	BL CLS 2, 5.5M SENSOR W/75M
11028776-00	8-1005528-4	BL CLS 2, 5.5M SENSOR W/100M
11029813-00	1-1005527-1	BL CLS 1, 2.0M SENSOR W/35M

TCPN	Part Number	Part Description
11031281-00	1-1005527-2	BL CLS 1, 2.0M SENSOR W/50M
11026956-00	1-1005527-3	BL CLS 1, 2.0M SENSOR W/75M
11029814-00	1-1005527-4	BL CLS 1, 2.0M SENSOR W/100M
11030006-00	2-1005527-1	BL CLS 1, 2.5M SENSOR W/35M
11030731-00	2-1005527-2	BL CLS 1, 2.5M SENSOR W/50M
11030007-00	2-1005527-3	BL CLS 1, 2.5M SENSOR W/75M
11028608-00	2-1005527-4	BL CLS 1, 2.5M SENSOR W/100M
9-1005527-1	9-1005527-1	BL CLS 1, 2.75M SENSOR W/35M
9-1005527-2	9-1005527-2	BL CLS 1, 2.75M SENSOR W/50M
9-1005527-3	9-1005527-3	BL CLS 1, 2.75M SENSOR W/75M
9-1005527-4	9-1005527-4	BL CLS 1, 2.75M SENSOR W/100M
11028644-00	3-1005527-1	BL CLS 1, 3.0M SENSOR W/35M
11031471-00	3-1005527-2	BL CLS 1, 3.0M SENSOR W/50M
11032304-00	3-1005527-3	BL CLS 1, 3.0M SENSOR W/75M
11028645-00	3-1005527-4	BL CLS 1, 3.0M SENSOR W/100M
11029248-00	4-1005527-1	BL CLS 1, 3.5M SENSOR W/35M
11031492-00	4-1005527-2	BL CLS 1, 3.5M SENSOR W/50M
11030078-00	4-1005527-3	BL CLS 1, 3.5M SENSOR W/75M
11028668-00	4-1005527-4	BL CLS 1, 3.5M SENSOR W/100M
11030106-00	5-1005527-1	BL CLS 1, 4.0M SENSOR W/35M
11032410-00	5-1005527-2	BL CLS 1, 4.0M SENSOR W/50M
11030797-00	5-1005527-3	BL CLS 1, 4.0M SENSOR W/75M
11027879-00	5-1005527-4	BL CLS 1, 4.0M SENSOR W/100M
11032446-00	6-1005527-1	BL CLS 1, 4.5M SENSOR W/35M
11030117-00	6-1005527-2	BL CLS 1, 4.5M SENSOR W/50M
11029290-00	6-1005527-3	BL CLS 1, 4.5M SENSOR W/75M
11030812-00	6-1005527-4	BL CLS 1, 4.5M SENSOR W/100M
11026117-00	7-1005527-1	BL CLS 1, 5.0M SENSOR W/35M
11027293-00	7-1005527-2	BL CLS 1, 5.0M SENSOR W/50M
11031543-00	7-1005527-3	BL CLS 1, 5.0M SENSOR W/75M
11027941-00	7-1005527-4	BL CLS 1, 5.0M SENSOR W/100M
11026348-00	8-1005527-1	BL CLS 1, 5.5M SENSOR W/35M
11027343-00	8-1005527-2	BL CLS 1, 5.5M SENSOR W/50M
11032760-00	8-1005527-3	BL CLS 1, 5.5M SENSOR W/75M
11027344-00	8-1005527-4	BL CLS 1, 5.5M SENSOR W/100M

The TE Roadtrax Brass Linguini axle sensor ... and why it's the sensor for you!!

■ Great Signal

- ★ Positive signal as tires pass over the sensor
- ★ Good dynamic range - works with large to small vehicles
- ★ Reduced Road Flexing noise
- ★ High Signal to Noise Ratio for ease of signal processing
- ★ High capacitance - can drive long cables
- ★ Works even for slow speeds

■ Easy to Handle

- ★ Conforms to many road profiles
- ★ Coils in a 2'x2' (600x600mm) box
- ★ Rugged

■ Easy Installation

- ★ Installs in a 3/4" x 1.5" (19 x 38mm) cut in the road to minimize damage to the road
- ★ Shallower installation possible, please contact us.
- ★ Installs with fast curing acrylic, or appropriate polyurethane
- ★ Smaller cut means less encapsulation material

■ Quality

- ★ Sensors are tested for capacitance, insulation resistance, piezo activity and uniformity
- ★ Computerized process controls on the manufacturing process for the piezoelectric material.
- ★ All sensors Serial Numbered for traceability

■ Durability

- ★ sensor and the passive cable
- ★ The sensor will not be damaged by bending to a radius of > 3" (75mm)
- ★ Will withstand normal handling
- ★ Tested to 40 Million Equivalent Single Axle Loadings

■ Versatility

- ★ Same sensor for over and in the road applications
- ★ Can be used in Portland Cement or Asphalt
- ★ Available in many lengths - both English and Metric - with cable lengths from 100' to 300' (35m to 100m). Longer lengths available on custom basis

■ Great Passive Cable

- ★ Super tough High Density Poly Ethylene (HDPE)
- ★ Rated as Waterproof for direct burial

■ Customer Support

- ★ Installation clips included with all sensors
- ★ Installation instructions included with all sensors
- ★ Available Internationally
- ★ On site installation training available

NORTH AMERICA

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a TE Connectivity Company
Phone: +1 800-522-6752
Email: customer care.hmpt@te.com

EUROPE

Measurement Specialties(Europe)Ltd,
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Phone: +49 231-9740-0
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ASIA

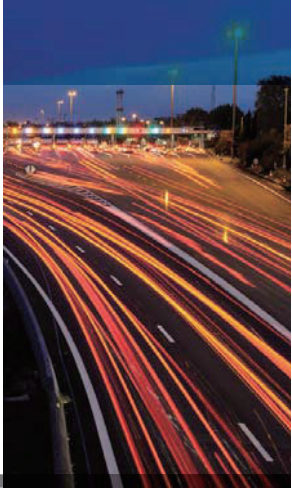
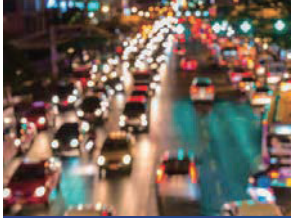
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Roadtrax Booklet EN 09/2019



ROADTRAX BL TRAFFIC SENSOR

PIEZOELECTRIC AXLE SENSOR
PRODUCT GUIDE

RoadTrax BL TRAFFIC SENSOR

PIEZOELECTRIC AXLE SENSOR PRODUCT GUIDE

TE Connectivity's (TE) RoadTrax Brass Linguini (BL) traffic sensor is designed for permanent or temporary installation into or onto the road surface for the collection of traffic data. The unique construction of the sensor allows direct installation into the road in a flexible format so that it can conform to the profile of the road. The flat construction of the sensor gives an inherent rejection of road noise due to road bending, adjacent lanes, and bow waves of approaching vehicles. The small cut in the road minimizes the damage done to the road, speeds up the installation and reduces the amount of grout used for the installation. The RoadTrax BL sensor is available both as a class I sensor for the highest level of uniformity needed for weigh in motion applications and as a class II sensor which is more cost effective for counting, classifying, Open Road tolling, speed detection, and red light cameras.

Great Signal

- Positive signal as tires pass over the sensor
- Good dynamic range - works with large to small vehicles
- Reduced road flexing noise
- High signal to noise ratio for ease of signal processing
- High capacitance - can drive long cables
- Works even for slow speeds

Easy to Handle

- Conforms to many road profiles
- Coils in a 2'x2' (600x600mm) box
- Rugged so that it does not break with handling

Easy Installation

- Installs in a 3/4" x 1.5" (19 x 38mm) cut in the road to minimize damage to the road
- Shallow installation possible, please contact us
- Installs with fast curing, acrylic, or appropriate polyurethane
- Smaller cut means less encapsulation material

Quality

- Sensors are tested for capacitance, insulation resistance, piezo activity any uniformity
- Computerized process controls all in house piezoelectric materials used
- All sensors are serial numbered for traceability

Durability

- Triple sealed coax splice between the sensor and the passive cable
- The sensor will not be damaged by bending to a radius of > 3" (75mm)
- Will withstand normal handling
- Tested to 40 million equivalent single axle loadings

Great Passive Cable

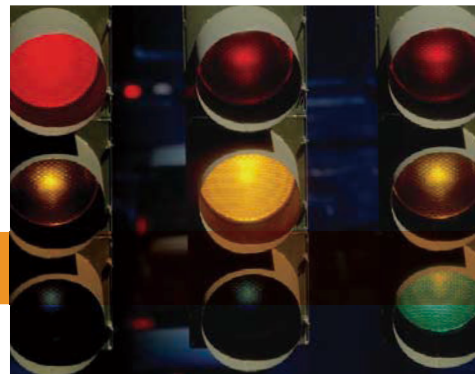
- Super tough High Density Poly Ethylene (HDPE)
- Rated as waterproof for direct burial

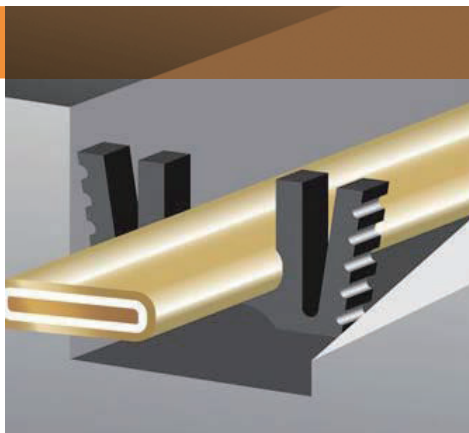
Versatility

- Same sensor for over and in the road applications
- Can be used in portland cement or asphalt
- Available in many lengths - both english and metric - with cable lengths from 100' to 300' (35m to 100m). Longer lengths available on custom basis

Customer Support

- Fast delivery - units in stock
- Installation clips included with all sensors
- Installation instructions included with all sensors
- Available internationally
- Onsite installation training available





Characteristics for Permanent Road Installation

Output Uniformity	±20% for Class II (Classification), ±7% for Class I (Weigh in Motion)
Operating Temperature Range	- 40 to 160°F (-40 to 70°C)
Typical Output Level	A wheel load of 400 pounds will produce a minimum output signal of 250 mV, at 70°F and 55 mph for a proper installation
Passive Signal Cable	RG 58C/U with a High Density Polyethylene Outer jacket that is rated for direct burial; 3/16" (4.75mm) OD.
Product Life	40 Million ESALs; dependent on the installation
Capacitance (12' class II with 100' cable) ¹	8.50 nF ≤ C ≤ 14.50 nF
Weight (12' class II with 100' cable) ²	3.00 lbs (1.36 kg)
Insulation Resistance	> 500 M OHM
Packaging	All sensors are packaged two per each 24"x20"x3" (600x550x75mm) cardboard box, but are sold as single sensors
Installation Brackets	Included. One bracket is used every 6" (150mm)

Specifications³

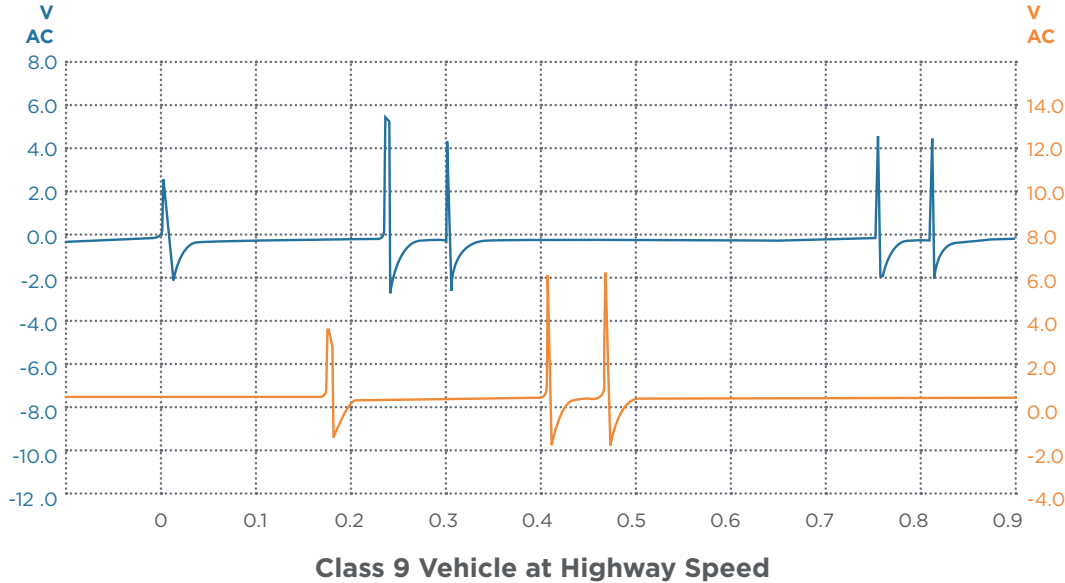
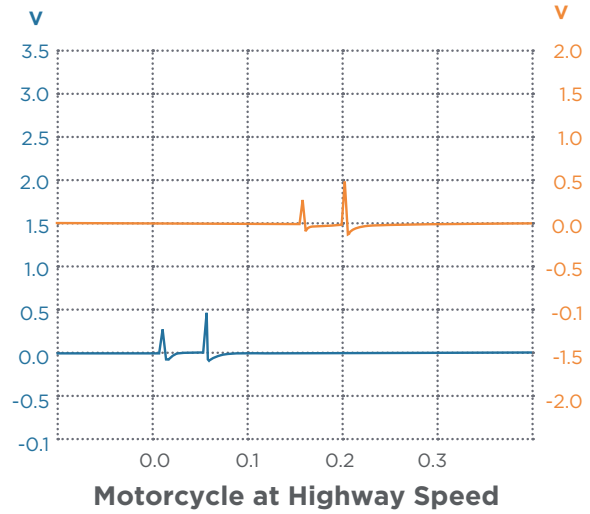
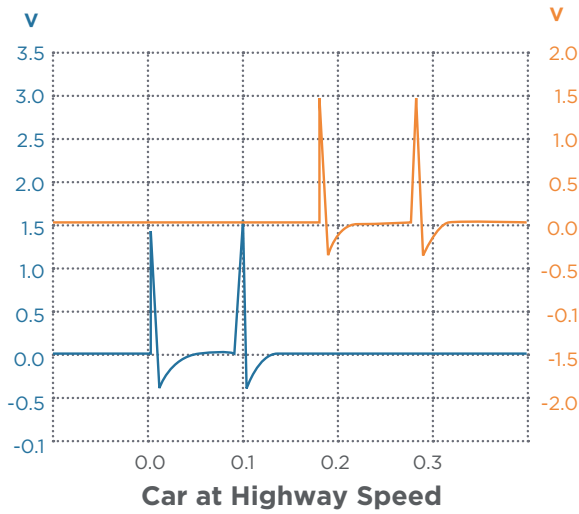
The TE BL Traffic sensor has the following specifications:

- Center Core: 16 gage, flat, braided, silver plated copper wire.
- Piezoelectric Material: Spiral-wrapped PVDF Piezoelectric film with a nominal Piezoelectric Coefficient of 34 pC/N.
- Outer Sheath: 0.016" thick brass, CDA-260, ASTM B587-88
- Final Dimensions: 0.260" wide x 0.063" thick;
- Passive Signal Cable: RG 58 type with an underground/direct burial rated outer jacket. The OD of the cable is 0.187" (4.75mm). The nominal capacitance of the cable is 27 pF/ft (89pF/m).
- Two sizes of installation brackets are included with the sensors, 3/4" (small) brackets and 1" (large) brackets. There is one small and one large bracket per 6" (150mm) of sensor length.

Notes:

1. Capacitance value will change with the length of the sensor and the length of the passive cable. Provided with each sensor is a test certificate with the actual tested value for the sensor.
2. All sensors are packaged 2 per box. The box weighs 1.5 lbs (0.7 kg). Sensors with cable longer than 200 ft. are packaged 1 per box
3. Although TE makes every effort to ensure the accuracy of the specifications at the time of publication, specifications for this product are subject to change without notice.

Output Waveforms



te.com/sensorsolutions

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SS-TS-TE600 07/2018

TE SENSOR SOLUTIONS

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www.te.com

PIEZOELECTRIC TRAFFIC SENSOR



MEAS | MEAS ROADTRAX

TE Model # ROADTRAX BL PIEZO SENSORS

TE Internal #: CAT-TRA0001

[View on TE.com >](#)

The RoadTrax BL Piezo Traffic Sensor is available both as a Class I (weigh in motion) and Class II sensor (counting, classifying, toll booths, red lights, etc.).



Sensors > Traffic Sensors

The RoadTrax BL Brass Linguini (BL) Piezoelectric traffic sensor is designed for permanent or temporary installation into or onto the road surface for the collection of traffic data.



Sensor Type: Piezoelectric Traffic Sensors

The unique construction of the sensor allows direct installation into the road in a flexible format so that it can conform to the profile of the road.

The flat construction of the sensor gives an inherent rejection of road noise due to road bending, adjacent lanes, and bow waves of approaching vehicles. The small cut in the road minimizes the damage done to the road, speeds up the installation and reduces the amount of grout used for the installation. The RoadTrax BL sensor is available both as a class I sensor for the highest level of uniformity needed for weigh in motion applications and as a class II sensor which is more cost effective for counting, classifying, high speed toll booths, speed detection, and red light cameras.

ROADTRAX BL TRAFFIC SENSOR (English)

TE's RoadTrax BL axle sensors are made with our unique PVDF (piezoelectric) cable for dynamic road traffic monitoring. Highly accurate for speed and classification, robust, low cost, easy to install, and offering a great signal-to-noise ratio, these sensors offer tremendous value.

Benefits

- Great signal
- Easy to handle
- Easy Installation

PIEZOELECTRIC TRAFFIC SENSOR

TE Model # ROADTRAX BL PIEZO SENSORS
TE Internal #: CAT-TRA0001



- Quality
- Durability
- Great passive cable
- Versatility
- Customer support

Product Guide

[Download Now](#)

PIEZOELECTRIC AXLE SENSOR PRODUCT GUIDE

TE CONNECTIVITY'S (TE) RoadTrax Brass Linguini (BL) traffic sensor and benefits

TE's Roadtrax BL axle sensor are made with our unique Piezoelectric PVDF cable for Dynamic road traffic monitoring. Highly accurate for speed and classification, they are robust, low cost, easy to install and offer a high signal to noise ratio. These sensors offer tremendous value.



STRONG SIGNAL PRECISION

Great signal, minimizing interference from adjacent lanes



SUITABLE FOR MANY ROAD SURFACES

Conforms to road, working equally well in concrete and asphalt



EASE OF INSTALLATION

The small cut (20x50mm) in the road minimizes the damage done to the road



DURABLE TRAFFIC SENSOR

Withstands >40 million ESAL (Equivalent Single Axel Loads) with correct installation



VERSATILITY

Detects axels ranging from bicycles to the heaviest trucks

APPLICATIONS



Vehicle (axle) counts



Vehicle classification:
class system based on
size of vehicle and
number of axles



Weigh in Motion
(WIM); pre-selection



Speed studies and
speed cameras



Red light cameras



Bicycle counting



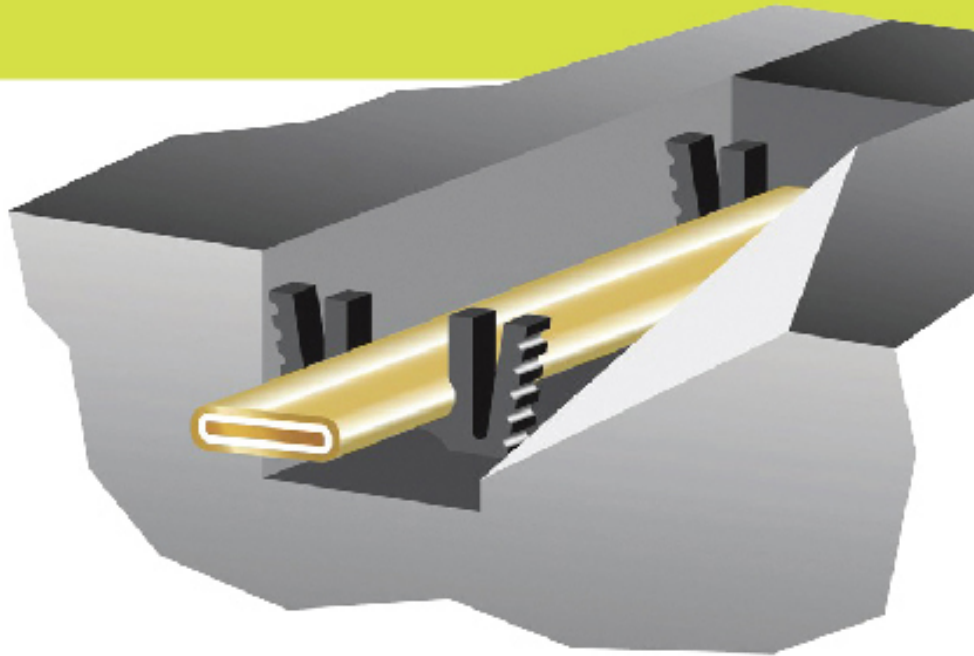
Dual Tire Detection



Position in Lane

INSTALLATION

- A slot 20 mm wide and 50 mm deep is cut in the road, perpendicular to the flow of traffic.
- The RoadTrax sensor is placed in the slot using supplied clips to hold in place.
- A specialized installation grout is poured into the slot, fully encapsulating the sensor.
- Once cured, the sensor is connected to commercially available interface systems.



PIEZOELECTRIC TRAFFIC SENSOR

TE Model # ROADTRAX BL PIEZO SENSORS
TE Internal #: CAT-TRA0001



Key Specifications

- **Center Core:** 16 gage, flat, braided, silver plated copper wire
- **Piezoelectric Material:** Spiral-wrapped PVDF Piezoelectric film with a nominal Piezoelectric Coefficient of 34 pC/N
- **Outer Sheath:** 0.016" thick brass, CDA-260, ASTM B587-88
- **Final Dimensions:** 0.260" wide x 0.063" thick; 0.005"
- **Passive Signal Cable:** RG 58 type with an underground/direct burial rated outer jacket. The OD of the cable is 0.187" (4.75mm). The nominal capacitance of the cable is 27 pF/ft (89pF/m).
- **Brackets:** Two sizes of installation brackets are included with the sensors, 3/4" (small) brackets and 1" (large) brackets. There is one small and one large bracket per 6" (150mm) of sensor length.

Features

Product Type Features

Traffic Sensor Class	Class I, Class II
Sensor Type	Piezoelectric Traffic Sensors

Dimensions

Sensor Length (m)	3.5
Sensor Length (ft)	10, 11, 12, 6, 8
Cable Length (m)	50
Cable Length (ft)	100, 150, 200, 250, 300

SEE PRODUCTS ON NEXT PAGE

PIEZOELECTRIC TRAFFIC SENSOR

TE Model # ROADTRAX BL PIEZO SENSORS
TE Internal #: CAT-TRA0001



Products (1 of 5)



BL CLS 2, 8'SENSOR/100'



BL CLS 2, 8'SENSOR/250'



BL CLS 1, 6'SENSOR/100'
CABLE



BL CLS 2, 6'SENSOR/100'

TE Model / Part #	11026278-00	11029810-00	11032047-00	11028376-00
EU RoHS Directive 2011/65 /EU	EU RoHS Compliant	EU RoHS Compliant	EU RoHS Compliant	EU RoHS Compliant
EU ELV Directive 2000/53/EC	Not Yet Reviewed for EU ELV	Not Yet Reviewed for EU ELV	Not Yet Reviewed for EU ELV	Not Yet Reviewed for EU ELV
Product Families	MEAS	MEAS	MEAS	MEAS
Series	MEAS ROADTRAX	MEAS ROADTRAX	MEAS ROADTRAX	MEAS ROADTRAX

*EU RoHS Directive 2011/65/EU

These products comply with the substance restrictions of the Restriction on Hazardous Substances Directive 2011/65/EU (RoHS2). The RoHS2 Directive requires that certain electrical and electronic equipment products do not contain mercury, cadmium, hexavalent chromium, PBB, PBDE, lead, DEHP, BBP, DBP and DIBP above defined thresholds. Products indicated as 'Compliant' do not contain any of these substances above the prohibition thresholds. Finished electrical and electronic equipment products will be CE marked as required by the Directive. Components may not be CE marked.

**EU ELV Directive 2000/53/EC

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PIEZOELECTRIC TRAFFIC SENSOR

TE Model # ROADTRAX BL PIEZO SENSORS
TE Internal #: CAT-TRA0001



Products (2 of 5)



	BL CLS 2, 6'SENSOR/150'	BL CLS 2, 6'SENSOR/200'	BL CLS 2, 6'SENSOR/250'	BL CLS 2, 6'SENSOR/300'
TE Model / Part #	11031999-00	11029062-00	11028377-00	11032000-00
EU RoHS Directive 2011/65 /EU	EU RoHS Compliant	EU RoHS Compliant	EU RoHS Compliant	EU RoHS Compliant
EU ELV Directive 2000/53/EC	Not Yet Reviewed for EU ELV	Not Yet Reviewed for EU ELV	Not Yet Reviewed for EU ELV	Not Yet Reviewed for EU ELV
Product Families	MEAS	MEAS	MEAS	MEAS
Series	MEAS ROADTRAX	MEAS ROADTRAX	MEAS ROADTRAX	MEAS ROADTRAX

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PIEZOELECTRIC TRAFFIC SENSOR

TE Model # ROADTRAX BL PIEZO SENSORS
TE Internal #: CAT-TRA0001



Products (3 of 5)



BL CLS 2, 10'SENSOR/100'BL CLS 2, 10'SENSOR/200'BL CLS 2, 10'SENSOR/300'BL CLS 2, 11'SENSOR/100'

TE Model / Part #	11030041-00	11027197-00	11026541-00	11032346-00
EU RoHS Directive 2011/65 /EU	EU RoHS Compliant	EU RoHS Compliant	EU RoHS Compliant	EU RoHS Compliant
EU ELV Directive 2000/53/EC	Not Yet Reviewed for EU ELV	Not Yet Reviewed for EU ELV	Not Yet Reviewed for EU ELV	Not Yet Reviewed for EU ELV
Product Families	MEAS	MEAS	MEAS	MEAS
Series	MEAS ROADTRAX	MEAS ROADTRAX	MEAS ROADTRAX	MEAS ROADTRAX

*EU RoHS Directive 2011/65/EU

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PIEZOELECTRIC TRAFFIC SENSOR

TE Model # ROADTRAX BL PIEZO SENSORS
TE Internal #: CAT-TRA0001



Products (4 of 5)



BL CLS 2, 11'SENSOR/300'



BL CLS 1, 10'SENSOR/100'
CABLE



BL CLS 1, 3.5MSENSOR W
/50M



BL CLS 1, 11'SENSOR/100'
CABLE

TE Model / Part #	11030076-00	11030780-00	11031492-00	11031511-00
EU RoHS Directive 2011/65 /EU	EU RoHS Compliant	EU RoHS Compliant	EU RoHS Compliant	EU RoHS Compliant
EU ELV Directive 2000/53/EC	Not Yet Reviewed for EU ELV	Not Yet Reviewed for EU ELV	Not Yet Reviewed for EU ELV	Not Yet Reviewed for EU ELV
Product Families	MEAS	MEAS	MEAS	MEAS
Series	MEAS ROADTRAX	MEAS ROADTRAX	MEAS ROADTRAX	MEAS ROADTRAX

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PIEZOELECTRIC TRAFFIC SENSOR

TE Model # ROADTRAX BL PIEZO SENSORS
TE Internal #: CAT-TRA0001



Products (5 of 5)



BL CLS 1, 11'SENSOR/150'
CABLE



BL CLS 1, 11'SENSOR/300'
CABLE



BL CLS 1, 12'SENSOR/100'
CABLE



BL CLS 1, 12'SENSOR/300'
CABLE

TE Model / Part #	11030796-00	11032408-00	11027887-00	11029287-00
EU RoHS Directive 2011/65 /EU	EU RoHS Compliant	EU RoHS Compliant	EU RoHS Compliant	EU RoHS Compliant
EU ELV Directive 2000/53/EC	Not Yet Reviewed for EU ELV	Not Yet Reviewed for EU ELV	Not Yet Reviewed for EU ELV	Not Yet Reviewed for EU ELV
Product Families	MEAS	MEAS	MEAS	MEAS
Series	MEAS ROADTRAX	MEAS ROADTRAX	MEAS ROADTRAX	MEAS ROADTRAX

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PIEZOELECTRIC TRAFFIC SENSOR

TE Model # ROADTRAX BL PIEZO SENSORS
TE Internal #: CAT-TRA0001



Related Materials

[Data Sheet](#)

[RoadTrax BL TRAFFIC SENSOR](#)

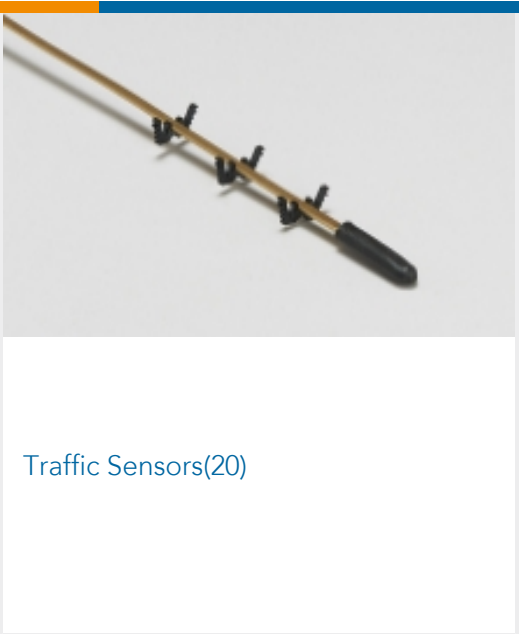
English

[Specification Or Standard](#)

[Roadtrax_BL_Piezoelectric_Axle_Sensor](#)

English

Also in the Series | [MEAS ROADTRAX](#)



Piezoelectric Axle Sensor

Class I & Class II Piezo Axle Sensor

The **RoadTrax Brass Linguini BL Piezo Traffic Sensor** is designed by TE Connectivity for permanent or temporary installation into or onto the road surface for the collection of traffic data. **The unique construction of the sensor allows direct installation into the road in a flexible format so that it can conform to the profile of the road.** The flat construction of the sensor gives an inherent rejection of road noise due to road bending, adjacent lanes, and bow waves of approaching vehicles. The small cut in the road minimizes the damage done to the road, speeds up the installation and reduces the amount of grout used for the installation.

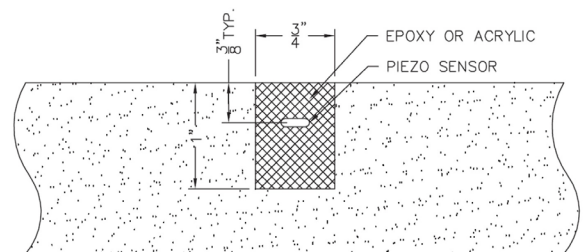
The RoadTrax BL sensor is available both as a class I sensor for the highest level of uniformity needed for weigh in motion applications and as a class II sensor which is more cost effective for counting, classifying, high speed toll booths, speed detection, and red light cameras.

Features

- High Output Signal for Cars, Trucks, Motorcycles & Bikes
- Conforms to Any Road Profile and Coils to 2' x 2' (600mm x 600mm)
- Sensors Can Be Mounted Permanently or Temporarily
- Tested to 40 Million Equivalent Single Axle Loadings
- Cable Lengths to 500' (150m) are Waterproof for Direct Burial
- Piezo Sensors Lengths 6', 8', 9', 10', 11' & 12'
- Metric Sensor Lengths 2.0, 2.5, 2.75, 3.0, 3.5, 4.0, 4.5, 5.0 and 5.5 meters



RoadTrax BL Piezo Axle Sensor



Installs in a 3/4" x 1" (19 x 25mm) Saw Cut in the Road Surface

Class I & Class II Piezo Axle Sensor

Technical Specifications

Characteristics for Permanent Road Installation

Output Uniformity	±20% for Class II (Classification), ±7% for Class I (Weigh in Motion)
Operating Temperature Range	- 40 to 160°F (-40 to 70°C)
Typical Output Level	A wheel load of 400 pounds will produce a minimum output signal of 250 mV, at 70°F and 55 mph (89 kph) for a proper installation
Passive Signal Cable	RG 58C/U with a High Density Polyethylene Outer jacket that is rated for direct burial; 3/16" (4.75mm) OD.
Product Life	40 Million ESAL's; dependent on the installation
Capacitance (12' class II with 100' cable)	8.50 nF ≤ C ≤ 14.50 nF
Weight (12' class II with 100' cable)	3.00 lbs (1.36 kg)
Insulation Resistance	>500 MΩ
Packaging	All sensors are packaged two per each 24"x20"x3" (600x550x75mm) cardboard box
Installation Brackets	Included. One bracket is used every 6" (150mm)



Flexible and easily transported, the sensor may be rolled for shipping



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Experience the Connection:
Safer. Greener. Trusted.



AS475 Axle Sensor Grout

A high-quality and durable resin-based grout for embedding axle sensors in asphalt or concrete pavements.

GROUT FOR PIEZOELECTRIC AXLE SENSORS

AS475 Grout has been used for over 20 years for axle sensor installations and is recognized as one of the best grouts available. AS475 Grout is recommended for use by Thermocoax, Inc. and Measurement Specialties, Inc. (MSI), suppliers of Piezoelectric Sensors, and has been used by Departments of Transportation throughout North America.

IRD's AS475 Axle Sensor Grout is a high-quality and durable resin-based grout. It is specifically designed to embed permanent axle sensors and their cables into asphalt or concrete pavements.

The AS475 grout serves two purposes:

- Adhesive bond between the sensor and the road pavement material
- Isolation medium between the sensor and the road pavement



Flowable Mortar for Asphalt or Concrete Roads

FEATURES

- Withstands the pressure and impact of thousands of vehicles a day
- Endures all types of weather conditions including rain, snow, sleet, extreme heat and cold, and freeze/thaw
- Rapid curing axle sensor grout, allowing for shorter road closures
- Cures at low temperatures (to 14°F/-10°C), allowing the AS475 Grout to be used in colder climates
- AS475 Grout has been used to install thousands of axle sensors since the 1980's



Pouring Grout into Slot



Grout Application

Technical Specifications

IRD's AS475 Grout is a flowable mortar based on methyl methacrylate resin. This two-part, plastic compound is for application on either asphalt or concrete roads. AS475 Grout is an epoxy resin that complies with ASTM C881/C881M, Type IV, Grade 1 and has a minimum bond strength of 3,000 psi at 14 days.

The grouting mixture consists of a resin material that has been mixed with a fine mineral aggregate, providing strength and consistency to the grout mixture. The aggregate also prevents the resin from cracking, by serving as a heat sink for the significant heat created during the curing process.

Curing of the grout begins once the catalyst (the white BPO-Benzoyl Peroxide Organic) powder has been added. The reaction time for curing is dependent on external temperature conditions. However, the curing time can be controlled by adjusting the amount of BPO catalyst added to the grout.

Packaging

- Available in 7.5 kg, 10 kg, and 18 kg units
- 7.5 kg package*: Sufficient for one 6 ft (1.83 m) unencapsulated Piezo Sensor
- 10 kg package*: Sufficient for one 6 ft (1.83 m) encapsulated or one 12 ft (3.5 m) unencapsulated Piezo Sensor
- 18 kg package*: Sufficient for two 6 ft (1.8 m) unencapsulated Piezo Sensors or one 12 ft (3.5 m) encapsulated Piezo Sensor
- * The foregoing assumes that IRD installation instructions and road saw cut dimensions are followed. Above sensor dimensions are approximations.

Application

- Suitable for application on concrete and asphalt

Coverage

- May be applied onto the pavement in liquid form and is suitable for application in varying film thickness

Cure Time

- Controllable by the workers. Under normal conditions, once the BPO powder is added to the mixture:
 - AS475 Grout partially cures in 5-10 minutes
 - AS475 Grout fully cures in 30-40 minutes
- Complete curing occurs in less than one hour at all times

For Best Possible Adhesion

- Install AS475 Grout in a liquid state in a temperature range of 14°F to 95°F (-10°C to +35°C)

Chemical Resistance

- Resistant to sodium chloride, calcium chloride, and other chemicals used against the formation of ice on roadways and streets, oil content of pavement materials, as well as fuel and oil residue from traffic
- Ultra Violet rays from the sun will not cause discoloration or bond failure of the material

Compressive Strength

- ASTM D638 5000 psi (min.)

Water Absorption

- ASTM D570 0.3% (max.)

Wear Resistance

- ASTM D4060, CS10 wheel, 1000 gm load, 1000 cycles 186 mg loss

Shelf Life

- 18 months

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Mixing Instructions For: International Road Dynamics Inc.

“AS475 Grout”

Step 1: Make sure that you have all of the required tools to mix the formula. A corded or cordless drill and a mortar mixer.
(Available at most hardware stores)



Step 2: Open pail and ready drill for use.

Step 3: Mix grout with drill and bit in a circular and up and down motion for not less than 1.5 minute until contents are of consistent nature without lumps.



Step 4: Add BPO (catalyst in small vials) while mixing in accordance to Table 1 below depending on ambient temperature.

Step 5: Mix thoroughly in same circular and up and down motion for another 45 seconds – 1 minutes.



Step 6: Use product! (Cure time 30 – 40 minutes)

Table 1: Based on 30 minute cure time

TEMPERATURE		AMOUNT OF BENZOL PEROXIDE POWDER (BPO)	
°C	°F	to mix with 18Kg (18US qt) of grout	to mix with 10 Kg (10 US qt) of grout
<13	<55	6 x 33g Vials	3 x 33g Vials
13-24	55-75	4 x 33g Vials	2 x 33g Vials
>24	>75	2 x 33g Vials	1 x 33g Vials
		to mix with 7.5Kg (7.5US qt) of grout	to mix with 5 Kg (5 US qt) of grout
<13	<55	3 x 33g Vials	2 x 33g Vials
13-24	55-75	2 x 33g Vials	1.5 x 33g Vials
>24	>75	1 x 33g Vials	0.75 x 33g Vials

* Due to nature of grouting material please read MSDS and take precautions while using to ensure safety of the user

** For more detailed instructions please see detailed AS475 general reference installation guide.

AS475 SYSTEM 400 GROUT

1.0 INTRODUCTION

IRD's AS475 Sensor Grout (System 400) is a resin based grout. It is specifically designed to embed permanent axle sensors and their cables into asphalt or concrete pavements.

The AS475 grout serves two purposes:

- Acts as an adhesive bond between the sensor and the road pavement material
- Act as isolation medium between the sensor and the road pavement

The AS475 grout is used when installing a piezoelectric sensor as well as when installing a Temperature sensor.

This grouting mixture consists of a resin material that has been mixed with a fine mineral aggregate. The aggregate provides strength and consistency to the grout mixture. The aggregate also prevents the resin from cracking, by serving as a heat sink for the significant heat created during the curing of the resin.

The grout mixture will cure (harden) once a catalyst powder is added. The catalyst used with the AS475 grout is a Benzyl Peroxide Organic (BPO) powder.

1.1 SHELF LIFE

AS475 System 400 Grout has a shelf life of 18 months from the date of manufacturing.

1.2 STORAGE AND HANDLING

AS475 System 400 Grout should be stored out of direct sunlight in a cool ventilated area. As well the material should be stored upright in their respective pails.

1.3 SAFETY PRECAUTIONS

<p>NOTE: <i>Due to the nature of the grouting material being used precautions should be taken to ensure the safety of the user.</i></p>

The following should be noted:

- Read and be familiar with the Material Safety Data Sheet for AS475 Grout and for Benzyl Peroxide Organic (BPO) powder.
- Avoid contact to skin and eyes. Wear appropriate protective clothing such as boots, overalls, gloves and safety glasses.
- Do not use these products in an enclosed area. Ensure there is good ventilation when using these materials. Avoid inhalation of vapors produced.
- Do not use the BPO powder near heat, sparks or open flame. BPO is a very powerful oxidizer that supplies its own oxygen when burning.

1.4 HOW MUCH GROUT

The amount of AS475 grout to be used is dependent upon the type of sensor being installed. For details regarding the amount of grout to use, refer to the appropriate installation manual for the sensor being installed.

1.5 HOW MUCH CATALYST

The table below gives the amount of catalyst to add to the grouting mixture in order to produce a total curing time of 30 – 40 minutes. That is, if the amounts below are used, the grout mixture will be totally cured in 30-40 minutes.

Table 1: Based on 30 minute cure time

TEMPERATURE		AMOUNT OF BENZOL PEROXIDE POWDER (BPO)	
°C	°F	to mix with 18Kg (18US qt) of grout	to mix with 10 Kg (10 US qt) of grout
<13	<55	6 x 33g Vials	3 x 33g Vials
13-24	55-75	4 x 33g Vials	2 x 33g Vials
>24	>75	2 x 33g Vials	1 x 33g Vials
		to mix with 7.5Kg (7.5US qt) of grout	to mix with 5 Kg (5 US qt) of grout
<13	<55	3 x 33g Vials	2 x 33g Vials
13-24	55-75	2 x 33g Vials	1.5 x 33g Vials
>24	>75	1 x 33g Vials	0.75 x 33g Vials

1.6 RECOMMENDED TOOLS AND MATERIALS

The following is the list of tools that should be required to complete the installation:

- AS475 Grout
- BPO Powder
- Electric drill with mortar mixer attachment
- Protective clothing such as boots, overalls, gloves, safety glasses and possibly a dust mask
- Paint thinner

1.7 MIXING DIRECTIONS

1. Ensure the roadway and the sensor is ready for installation. All preliminary work to ready the road should be complete prior to the grout being prepared.
2. Ensure that all safety precautions, as outlined at the start of this section, have been observed.
3. Ensure that you have all of the required tools to mix the AS475 Grout (corded or cordless drill and mortar mixing bit). Open pail and ready drill for use.
4. Mix the grout with the drill and bit attached in a circular and up and down motion for not less than 1.5 minutes in the pail. All of the fine aggregate at the bottom of the pail must be thoroughly mixed. Mix until the grout contents are of a consistent nature without lumps.
5. Add BPO (catalyst in small vials) while mixing in accordance to Table 1 above depending on ambient temperature.

6. Mix the grout and BPO powder thoroughly in same circular and up and down motion for another 45 seconds to 1 minute. There is now 5-10 minutes of working time where the grout mixture can be used before it partially cures depending on ambient temperature.
7. Use the grout mixture to install a sensor as indicated in the appropriate installation manual. Ensure there are no voids or air bubbles when applying the grout mixture. There is now 30-40 minutes before the grout mixture is completely cured.
8. Clean any uncured grout mixture from tools and equipment with paint thinner. It should be noted that once the grout mixture has cured, it can only be removed by mechanical means.

1.8 CURE TIME

Once the BPO powder is added to the mixture, there is 5-10 minutes (ambient temperature depending) before the mixture partially cures. AS475 cures fully in 30-40 minutes (again temperature depending).

1.9 DISPOSAL OF EXCESS

To dispose of the excess BPO and AS475, mix the left over BPO powder with the leftover AS475 and let it set.

Once set it becomes inert (solid plastic) and can be disposed of regularly in a waste facility.

TUBE LOOP DETECTOR WIRE IMSA 51-7

600 Volt Single Conductor Copper, Cross Linked Polyethylene Insulation, Polyvinyl Chloride PVC or High Molecular Weight HMW Tube



Image not to scale.
See Table 1 for Dimensions

CONSTRUCTION:

1. **Conductors:** 19 stranded annealed bare copper per ASTM B3 and B8
2. **Insulation:** Cross Linked Polyethylene
3. **Rip Chord:** High strength rip chord for ease of tube removal
4. **Tube:** Loose Polyvinyl Chloride or High Molecular Weight Polyethylene HMW Tube

APPLICATIONS AND FEATURES:

Southwire's IMSA 51-7 cable meets the requirements of International Municipal Signal Association IMSA 51-7 specification. Rated for use in traffic signal, traffic control systems, underground conduit and loop detector wire. iMSA 51-7 600 Volt series cables run from the switch buried in asphalt to the junction box. The conductors are bare annealed copper 19 strand and covered with an abrasion, sunlight and moisture resistant cross linked polyethylene. The conductor is housed in a polyvinyl chloride or high molecular weight polyethylene tube. These cables are capable of operating continuously at a conductor temperature between -20°C and 75°C.

- Cable is manufactured by Southwire Company in their Waukegan, IL plant USA.

SPECIFICATIONS:

- ASTM B3- Soft or annealed copper
- ASTM B8 - Concentric-lay-standard copper
- IMSA 51-7
- Insulation Color: Black
- EPA 40 CFR, Part 26, Subpart C, Heavy metals per Table 1, TCLP method

SAMPLE PRINT LEGEND:

SOUTHWIRE® YEAR SIZE 600V IMSA 51-7 CABLE SEQUENTIAL FOOT MARK.



Southwire Company, LLC | One Southwire Drive, Carrollton, GA 30119 | www.southwire.com

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Southwire®

SPEC 45655_PSS DIVISION DATE: 02/20/2018 Rev:1.0.00M

Table 1 – Weights & Measurements

Stock Number	Conductor		Insulation Thickness	Nominal OD (2)	Tube Type	Tube Thickness	Tube OD	Nominal Weight	DC Resistance @ 25°C	Min Bend Radius
	Size (19 Strands)	Diam (1)								
	AWG	inches	mils	inches		mils	inches	lbs./MFT	Ω/MFT	inches
595987	14	0.0735	30	0.133	PVC	30	0.250	30	2.73	0.55
TBA	12	0.0925	30	0.153	PVC	30	0.250	38	1,72	0.61
TBA	14	0.0735	30	0.133	PE	30	0.250	30	2.73	0.55
TBA	12	0.0925	30	0.153	PE	30	0.250	38	1,72	0.61

All dimensions are nominal and subject to normal manufacturing tolerances


Southwire®