



OPERATING INSTRUCTIONS

SPY® IN-PLANT PULSE HOLIDAY DETECTOR

MODEL 125/135

SPU®

PIPELINE INSPECTION COMPANY
www.spyinspect.com

WELCOME

Thank you for purchasing the SPY® Model 125/135 In-Plant Pulse Holiday Detector.

Pipeline Inspection Company and our SPY® brand of Coating Inspection, JeepMeter and Pig Tracking equipment has been serving companies all over the world since 1953. With the purchase of this high precision instrument you can now enjoy access to worldwide service and support only SPY® and our vast Distributor network can offer.

For more information about SPY® brand equipment please visit our website at www.spyinspect.com.



The SPY® Model 125/135 In-Plant Pulse Holiday Detector meets the Electromagnetic Compatibility Directive and the Low Voltage Directive. This product is a Class A, Group 1 ISM equipment according to CISPR 11. Group 1 ISM product: A product in which there is intentionally generated and/or used conductively coupled radio-frequency energy which is necessary for the internal functioning of the equipment itself. Class A products are suitable for use in all establishments other than domestic and those directly connected to a low voltage power supply network which supplies buildings used for domestic purpose.

SPY is a registered trademark of Pipeline Inspection Company, Houston, Texas 77055, United States.

A copy of this Operating Instructions Manual can be downloaded on our website at www.spyinspect.com.

TABLE OF CONTENTS

Operator Safety	4
Unit Calibration	6
Principles of Operation	7
Included with Kit	8
125/135 Overview	9
Installation Instructions	12
Testing & Operating	13
Field Calibration Instructions	14
Manual Inspection	15
Manual Inspection Overhead Trolley Wire	16
Automatic Inspection	17
Technical Specifications	18
Maintenance & Repair	19
Troubleshooting Guide	20
Warranty	23
Accessories	24
Electrode Types	26
Related Equipment	27
Test Voltage Guide	28

OPERATOR SAFETY

PLEASE READ THESE INSTRUCTIONS CAREFULLY PRIOR TO USING THE EQUIPMENT!



WARNING! This is a HIGH VOLTAGE device capable of producing an electrical shock if not properly grounded and/or operated in accordance with the instructions and procedures prescribed in this manual! If you have a pacemaker or other life critical electronic medical device DO NOT use this device.

Only trained and responsible personnel should operate high voltage equipment. Display warning labels prominently prior to and during testing. In-Plant Holiday Detectors are designed to operate and maintain an electric current output well below levels which could cause injury. However, you may experience a mild shock if the test electrode or ground is touched while the equipment is activated. Wear rubber or plastic gloves and non-conductive footwear to minimize potential shock. Keep in mind that the shock prevention effectiveness of the rubber or plastic gloves and footwear is limited to the condition of their protective surface. Make sure your gloves and footwear are void of tears and holes and are in good condition.

Use of In-Plant Holiday Detectors is limited to finding defects in insulating materials. Testing should be conducted clear of personnel not involved in the testing procedure. Personnel operating In-Plant Holiday Detectors should be aware of the safety limitations imposed by their environment at all times. Operator should have an assistant to ensure that unauthorized personnel are kept clear of the testing area.



DANGER! In-Plant Holiday Detectors create an arc or spark. Use of an In-Plant Holiday Detector in or around combustible or flammable environments can result in an explosion. When operating in any potentially hazardous area, consult with the plant or site safety officer before proceeding with a holiday detection test in any potentially hazardous or suspect area.



DANGER! IF YOU HAVE A PACEMAKER DO NOT USE THIS DEVICE.



CAUTION! DO NOT TOUCH THE BARE GROUND WIRE WHEN THE DETECTOR IS TURNED ON.



WARNING! IF USED INDOORS DO NOT USE THIS DEVICE WHEN IT IS RAINING. If it is raining then there is a safety concern

for the operator. Pure water is non-conductive, but almost any contaminant will cause water to become conductive (dust in the air, salt from an operator's hands). If this conductive water covers the wand (black plastic part of the detector where the electrode is attached) and the orange case then the operator will become the return path for the high voltage. While this is NOT LETHAL, it does hurt. Also the unit may become damaged.



If it is not raining, but the coating surface is wet, the problem becomes one of accurately locating the coating defect (holiday). Again, the water will conduct the electricity and you may get false holiday indications many feet from the actual holiday(s). In this case it is recommended that you dry the testing area prior to inspection.



CAUTION! DO NOT USE THIS DEVICE AROUND SENSITIVE ELECTRONICS OR RADIO EQUIPMENT. When in standby the

SPY® Model 125/135 In-Plant Pulse Holiday Detector will generate radio frequency emissions which are within the limit defined by the Electromagnetic Compatibility Directive. Due to its method of operation however, the SPY® Model 125/135 In-Plant Pulse Holiday Detector will generate broadband RF emissions when the unit is generating high voltage or when a spark is produced at the electrode. It is therefore recommended that the user does not activate the high voltage within the vicinity of sensitive electronics or radio equipment.

ELECTRODES/ACCESSORIES: It is imperative for the accurate operation of the unit that electrodes (Spring & Brush) and accessory attachments (Spring & Brush Wands & Ground Cable) be kept clean and free of dirt and debris. Please clean with a damp cloth before storing them for future use.

UNIT CALIBRATION

As the operator of this unit you require accurate, safe, and reliable equipment to perform coating inspections at the proper output voltage.

Prior to leaving our manufacturing facility Pipeline Inspection Co. certifies that the SPY® Model 125/135 In-Plant Pulse Holiday Detector has been calibrated and demonstrates the output voltage, which appears on the display of the detector within +/- 5% of the indicated setting over the range of 5-25 kV Pulse for the Model 125 and 10-35 kV Pulse for the Model 135. Since output voltage is regulated, this tolerance is maintained regardless of load.

Your unit comes with a **Factory Calibration Certificate** and a **Factory Authorized Calibration Decal** applied to the side of the unit both with the date your unit was calibrated.

Our units do not tend to drift but it is recommended that this unit be calibrated at least once per year or more frequently based on heavy usage. **Recalibration of our equipment should be performed ONLY at a SPY® Authorized Service Center due to the unique calibration process; test equipment utilized and properly trained SPY® technicians.**

We DO NOT recommend using any other calibration service other than a SPY® Authorized Service Center; using an outside service with technicians not trained to work on SPY® brand equipment could damage the unit and if the enclosure is opened will void the warranty.

When calibration is needed please return your unit to a SPY® Authorized Service Center or SPY® manufacturing facility located at:

Pipeline Inspection Company
Attention: Calibration
1919 Antoine Drive
Houston, Texas 77055

Please include: Company Name and Contact info. For a complete list of Authorized Service Centers please visit our website at www.spyinspect.com. If a copy of the Calibration Certificate on file is needed it may be obtained by emailing a request to sales@spyinspect.com.

PRINCIPLES OF OPERATION

Metal objects such as pipelines, reinforcing bar (rebar), storage tanks or structural steel are normally covered with a protective coating to prevent corrosion. Holiday detectors are used to inspect these coatings for pin holes, scratches or other coating faults. They work by generating a voltage high enough to jump a gap that is longer than the thickness of the coating.

The laws of physics determine the required voltage level to jump a given distance, or gap. Coating type also affects voltage level requirements. Environmental Conditions such as humidity will affect voltage required to jump a given distance.

A holiday detector simply applies a voltage to the outside of the coating. With the pipe connected to ground and with the holiday detector connected to ground, a hole in the coating will allow a spark to jump or "arc" from the electrode to the pipe to complete the circuit. When a complete circuit is formed, a signal is activated on the Holiday Detector.

A brief description of the steps necessary to operate a SPY®, Model 125/135 holiday detector is presented here with detailed steps following later in the manual.

INCLUDED WITH KIT



- | | | | |
|---|--------------------------------|---|-----------------------------|
| 1 | 125/135 Pulse Holiday Detector | 4 | 25 ft Spring Electrode Wand |
| 2 | Klaxon Horn | 5 | Brush Electrode Adapter Kit |
| 3 | Operating Instructions | | |

SPY® MODEL 125/135 IN-PLANT PULSE HOLIDAY DETECTOR OVERVIEW

The Model 125/135 In-Plant Pulse Holiday Detector is designed for high voltage inspection of discontinuities (holidays) in protective coatings in-plant or yard coating operations. Typical applications include: inline coating plants; pipe racks or arrays; storage tanks; polyethylene or pvc film plants; or others.

MODEL 125 FOR TAPE, EXTRUDED AND COAL TAR TYPE COATINGS

5-25 kV Pulse • 16-400 mils

For thicker coatings the Model 125 has fully adjustable output voltage from 5-25 kilovolts. For very demanding conditions, a sensitivity switch offers additional control.

MODEL 135 FOR SOME TAPE, EXTRUDED AND COAL TAR AND EVEN THICKER SOMASTIC TYPE COATINGS

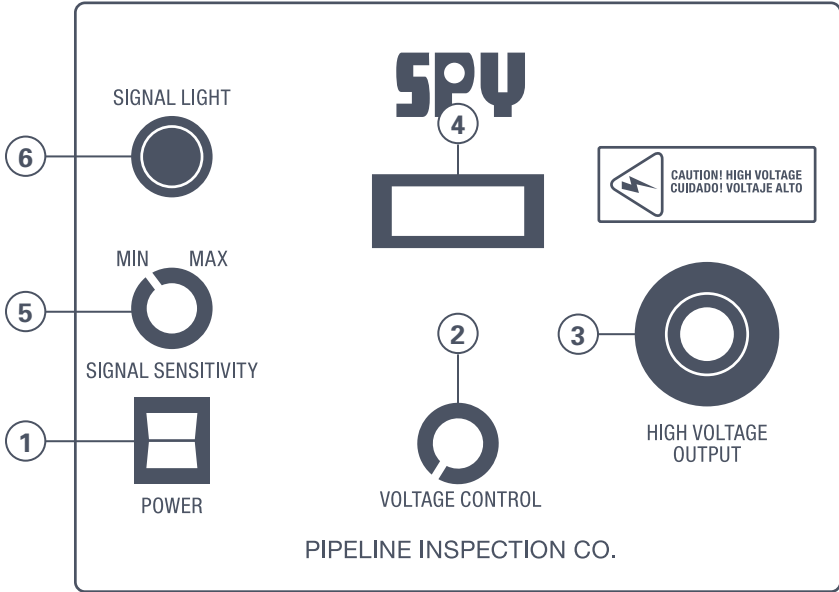
10-35 kV Pulse • 64-750 mils

For a wider Kilovolt Pulse range with a maximum output voltage to handle even thicker coatings the Model 135 has fully adjustable output voltage from 10 to 35 KV.

The configuration and installation of the model 125/135 In-Plant Pulse Holiday Detector systems are determined by individual requirements and are normally engineered and assembled by plant or on-sight personnel, i.e., custom designed. The Model 125/135 requires a 120-volt 50/60 Hz power source.

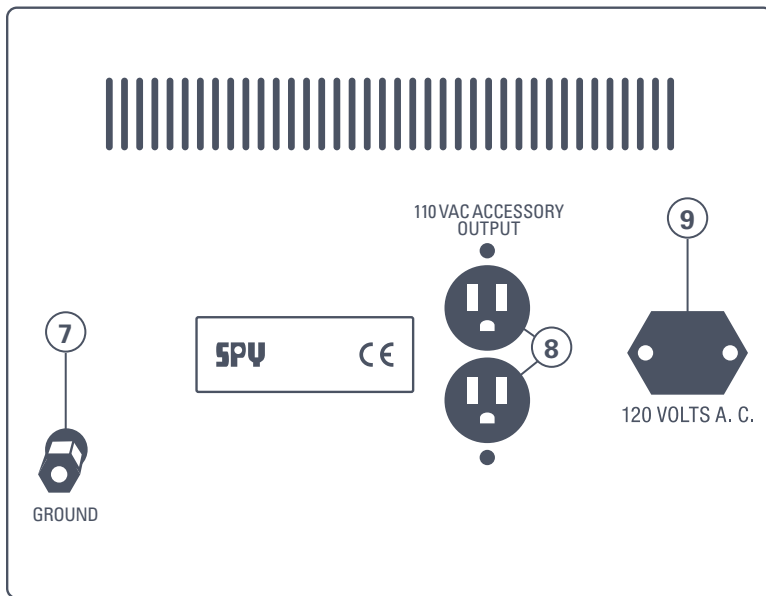
It uses the ground (neutral) line of the 120 volt power source; therefore, it is vitally important that the 3 prong power cord plug be properly connected to a properly wired 3-wire grounding receptacle. When wired properly, there is no voltage potential between the ground and the detector case.

FRONT OF UNIT



- 1 On/Off Control Switch
- 2 Voltage Control
- 3 Spring or Brush Electrode Connector
- 4 Built-In Digital LCD JM (Voltage Meter) to Verify Output Voltage Setting
- 5 Signal Light for Holiday Detection
- 6 Signal Sensitivity Control Knob

BACK OF UNIT



- 7 Ground Cable Connection Point
- 8 2-110 VAC Accessory Output Connections to plug in Klaxon Horn & Ink Auto Marker
- 9 120-Volt AC Power Plug with Fuse

INSTALLATION INSTRUCTIONS

Although installation of the Model 125/135 depends highly upon the intended use and operational or physical layout of plant, all units require the same basic components and procedures.

If using a Trolley or Automatic inspection system then make sure the Metal substrate of the test object is grounded.

STEP 1 Plug the unit into a 3-pronged grounded 120-volt AC plug. If you are using 240-volt power source, a step down isolation transformer will be required (optional accessory from SPY®, see page 26).

The secondary 120 VAC winding of the step down transformer should be connected to hot and neutral of the receptacle on the back of the unit.

The neutral has to be bonded to plant or earth ground.

STEP 2 Connect the high voltage cable by inserting its fitting into the high voltage output. When it has gone in as far as it will go, maintain the forward pressure and twist the cable clockwise to lock it in place.

STEP 3 Connect the electrode to the wand or high voltage wire.

STEP 4 The Unit comes with two 110 VAC Accessory Output connections, "Plug the Klaxon Horn into either the top or bottom Output connection. The other Output connection can be used for an Ink Auto Marker System (optional accessory from SPY®, see page 26).

STEP 5 Connect the ground wire to the black ground connection terminal marked "Ground" on the back of the detector and then connect the other end of the ground wire to a plant ground.

STEP 6 Set the sensitivity switch to minimum position.

TESTING AND OPERATING

After verifying the unit is properly installed with the electrode, grounds and all other connections properly connected:

STEP 1 Turn on the detector.

STEP 2 Using the voltage control knob, set the high voltage output to the desired inspection voltage shown on the digital LCD display.

STEP 3 The detector system is now ready for operation. Roll the spring electrode (or other electrode) toward the bare metal end of the pipe. When the electrode is sufficiently close, a spark will jump from the electrode to the pipe, the signal light will light up and the signal horn will sound to designate a holiday. Of course it is not a real holiday but it demonstrates what happens when the electrode encounters a holiday and verifies correct detector operation.



CAUTION! The Model 125/135 In-Plant Pulse Holiday Detector system operates on high voltage and extreme precautions should be made for handling, proper connecting of electrical equipment and adequate grounding in all cases.



CAUTION! If using a Trolley or Automatic inspection system then make sure the metal substrate of the test object is grounded to plant or earth ground.

FIELD CALIBRATION INSTRUCTIONS

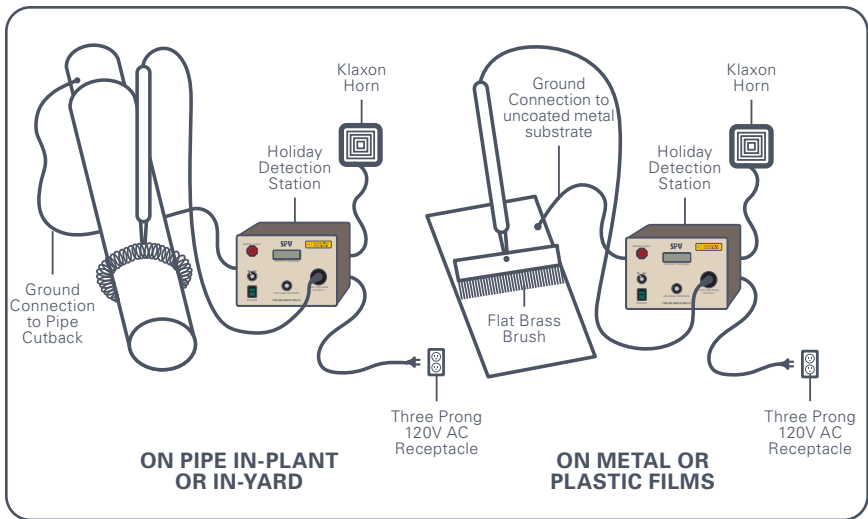
Prior to each use of the Model 125/135 In-Plant Pulse Holiday Detector it is important to perform a Field Calibration to verify that the required voltage setting for the coating thickness will accurately detect defects (holidays) in the coating.

ADDING TEST DEFECTS TO THE COATING.

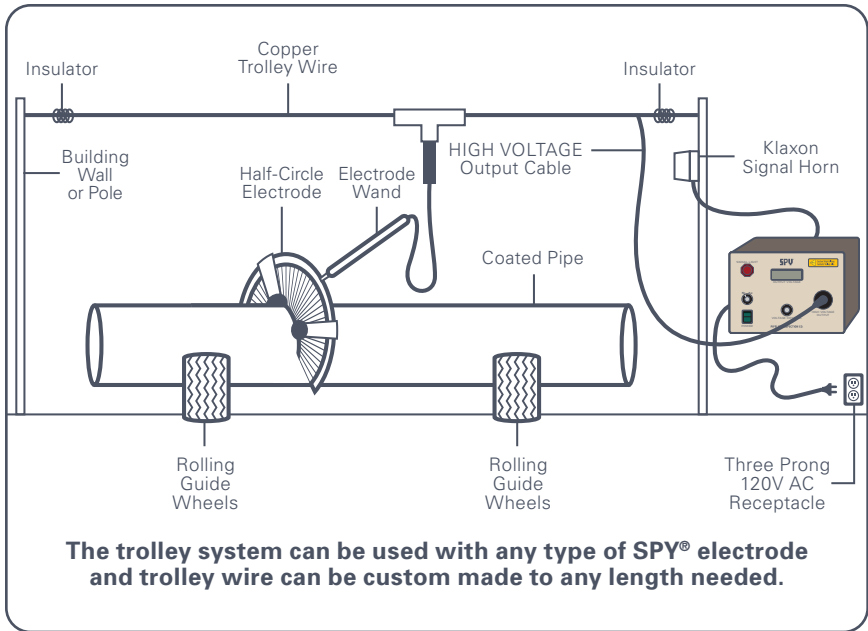
1. Prior to turning on and setting the voltage on the detector manually, add one pinhole size defect on the coating surface. Make sure the defect goes down to the substrate (bare metal).
2. Set the voltage on the detector to the minimum voltage based on the coating thickness $1250 \times \text{sqrt}(\text{mils})$ and using the spring or brush electrode travel over the test defects (see voltage guide on page 29).
3. When a defect (holiday) is present in the coating a spark will jump the gap from the electrode to the substrate, that holiday will activate the horn with a loud tone and the light on the front of the detector will illuminate. this will signal that you have successfully detected defects (holidays) in the coating and verified the detector is operating properly.
4. If your test does not successfully detect the test defect then increase the voltage by 10% and test again. If the test fails again continue increasing by 10% until the test is successful.

MANUAL INSPECTION

CAN BE DONE USING ANY TYPE OF SPY® ELECTRODE

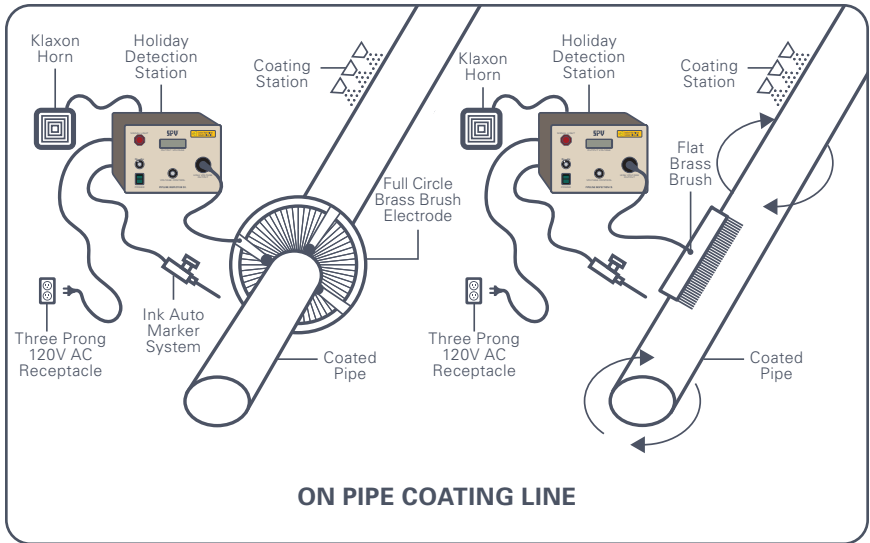


MANUAL INSPECTION OVERHEAD TROLLEY WIRE



CAUTION! If using a Trolley or Automatic inspection system then make sure the metal substrate of the test object is grounded to plant or earth ground.

AUTOMATIC INSPECTION



CAUTION! If using a Trolley or Automatic inspection system then make sure the metal substrate of the test object is grounded to plant or earth ground.

TECHNICAL SPECIFICATIONS

MODEL	125	135
Voltage Type	Pulse	Pulse
Voltage Range (kV)	5-25 kV	10-35 kV
Voltage Output Accuracy	±5%	±5%
Coating Range (Min-Max)	16-400 mils	64-750 mils
Pulse Repetition Rate	28 Hz	28 Hz
Operating Temperature	-20°F to 148°F	-20°F to 148°F
Internal Volt Meter	YES	YES
Display Type	LCD	LCD
Holiday Indicator Type	Audible/Visual	Audible/Visual
Power Requirement	120V AC (optional 220V to 120V isolation transformer)	120V AC (optional 220V to 120V isolation transformer)
Unit Weight (w/ battery only)	9.6 lb	9.7 lb
Unit Dimensions (LxWxH)	12" x 13" x 8.5"	12" x 13" x 8.5"
Domestic/International Standards Unit Complies With	ANSI/AWWA C203, ANSI/AWWA C214, ASTM D4787, ASTM D5162, NACE RP0274, NACE SP0188, NACE SP0490, NACE TM0186, NACE TM0384	ANSI/AWWA C203, ANSI/AWWA C214, ASTM D4787, ASTM D5162, NACE RP0274, NACE SP0188, NACE SP0490, NACE TM0186, NACE TM0384
Factory Warranty	12 Month	12 Month

MAINTENANCE AND REPAIR

If maintained the Model 125/135 In-Plant Pulse Holiday Detector will offer you a lifetime of dependable operation. Regular care and maintenance of the unit is a requirement of good quality management practices.



WARNING! This detector does not contain any user-serviceable parts; your warranty will be voided if the SPY® unit is opened by anyone other than a SPY® Authorized Service Center or SPY® manufacturing facility.

In the event the unit fails to operate properly please return your unit to a SPY® Authorized Service Center or SPY® manufacturing facility located at:

Pipeline Inspection Company
Attention: Repair
1919 Antoine Drive
Houston, Texas 77055

Please include: Company name, contact information and a short description of the problem with the unit. For a complete list of Authorized Service Centers please visit our website at spyinspect.com.

ELECTRODES AND ACCESSORIES

Springs and Brush electrodes and all attached accessories are prone to wear and tear and will eventually need to be replaced, timing of replacement will depend on how they are maintained and the coatings that they are used on.

TROUBLESHOOTING GUIDE

PROBLEM	POSSIBLE SOLUTION	CORRECTION METHOD
HOLIDAY DETECTOR WILL NOT DETECT HOLIDAYS	Field Calibration	Perform a field calibration to compensate for environmental factors (see page 14). Use NACE equation to set min voltage. Travel over known holiday. Turn up voltage and repeat until holiday is detected. (Note: Max voltage is determined by the coating manufacture, typical values for new coating range from 400 to 1000 Volts/mil)
	Detection Testing	Touch electrode directly to bare end of a metal substrate or plant ground to test that the unit is functioning properly. A spark will appear and the horn will sound. If unit still fails to detect a direct short repair may be needed, Call Pipeline Inspection Company for support.
	MINIMUM Voltage Setting	Follow NACE standard SP0274-2011: Section 3

TROUBLESHOOTING GUIDE

PROBLEM	POSSIBLE SOLUTION	CORRECTION METHOD
HOLIDAY DETECTOR WILL NOT DETECT HOLIDAYS	Check Detector Ground Connection	With the detector OFF ensure ground post on the back of a holiday detector is connected to a plant earth ground. If ground cable from the holiday detector is directly connected to the pipe cutback (substrate) make sure all connections are clean (free of debris) and secure.
	Check Electrode Connection	With the detector OFF remove the high voltage connector and fully reinsert until it locks into place. Ensure that electrode connection point is clean.
	Adjust Travel Speed	Travel speed is important on Pulse units and must not be too fast or holidays could be missed. Follow NACE standard SP0274-2011 section 6.3: Make or find a holiday and attempt to detect at various speeds until reliable detection is obtained.
DETECTOR VOLTAGE NEEDS TO BE VERIFIED	Use SPY JM or PJM	Do not use a regular multimeter as they will get damaged and are not rated for over 1,000 Volts. The SPY JM is rated for 7,000 Volts DC and 40,000 Volts Peak (crescent) on pulse. The SPY PJM can measure up to 20,000 Volts Pulse.

TROUBLESHOOTING GUIDE CONTINUED ON THE NEXT PAGE...

TROUBLESHOOTING GUIDE

PROBLEM	POSSIBLE SOLUTION	CORRECTION METHOD
<p>PIPELINE ENGINEERS, INSPECTOR OR OWNER REQUIRE A SPECIFIC VOLTAGE FOR TESTING BUT HOLIDAYS ARE NOT BEING DETECTED</p>	Sensitivity Adjustment	Set sensitivity switch to maximum and while connected to material under test see if unit indicates false holiday signal. Adjust sensitivity switch down until false detection stops.
	Field Calibration	If the testing documentation on the pipeline requires a specific Voltage then that setting must be used. However environmental conditions such as humidity and temperature will affect the required voltage to spark across a specific gap size (holiday). For the holiday detector to create a spark or Jeep the voltage must be high enough to overcome the gap. If the voltage is set too low for the thickness, humidity and temperature then a spark will not occur. It is recommended to perform a field calibration every day or periodically as conditions change. See Field Calibration above.

WARRANTY

Pipeline Inspection Co., hereafter referred to as (SPY®) warrants that SPY® Model 125/135 In-Plant Pulse Holiday Detector shall, under normal use and service, be free from defects in material and workmanship. SPY®'s entire warranty obligation shall be limited to, at SPY®'s option, the repair or replacement free of charge to the buyer of any defective equipment or parts thereof which prove to be defective in material and workmanship under normal use and service.

Claims for defective parts must be made in writing within twelve (12) months after shipment of the equipment from the works of SPY®. Fast wearing and consumable parts including, but not limited to, electrodes and ground cables, are expressly excluded from the warranty. SPY® shall have the option to require return of a claimed defective part to SPY®'s plant in the U.S.A., freight prepaid by buyer for examination to establish buyer's claim.

Except with SPY®'s prior written approval, SPY® shall not be liable (a) for the cost of repairs, alterations or replacements or any expense connected therewith made or incurred by the buyer or its designers, or (b) for defects resulting from alterations or repairs made by others than SPY, or its approved representatives.

SPY® shall not be liable for damages, including but not limited to direct, special, indirect or consequential, resulting from the handling, or use, whether alone or in combination with other products, or any SPY® equipment or third party designed or manufactured equipment, including without limitation, any loss or damage sustained or caused by the operation and use of the equipment which is improperly operated or its successful operation is impaired by natural elements after its delivery to the buyer.

The foregoing warranty is exclusive and in lieu of all other warranties whether written, oral or implied (including without limitation, any warranty of merchantability or fitness for purpose).

ACCESSORIES

The Model 125/135 has a wide variety of accessories to assist you with your coating inspection project.



**INK AUTO
MARKER
SYSTEM**
ITEM #14202



KLAXON HORN
ITEM #12513



**STEP-DOWN
TRANSFORMER**
ITEM #14213



**WIRE TROLLEY
SYSTEM**
ITEM #11936



**SPRING BRUSH
WAND W/ 25-100
FT VOLT CABLE**
ITEMS #12769 (25'),
#13574 (50'), #13460
(85'), #13090 (100')



**HIGH VOLT CABLE
(25-100 FT)**
ITEMS #13813 (25'),
#12659 (50'), #13504
(100'), #13719 (150')

Please call our office at (713) 681-5837 or email us at sales@spyinspect.com for more product details or to place an order.

ACCESSORIES

The Model 125/135 has a wide variety of accessories to assist you with your coating inspection project.



SPRING
ADAPTER FOR
ELCOMETER
SPRINGS
ITEM #13996



ELECTRODE FLEX
WAND
(36" – 72")



SPRING
ADAPTER FOR
TINKER & RASOR
SPRINGS
ITEM #13995



GROUND CABLE
(50 FT – 600 FT)



ELECTRODE
WANDS
(36" – 72")



SPRING SUPPORT
PUSHER WAND
(FOR SPRINGS
OVER 60")

Please call our office at (713) 681-5837 or email us at sales@spyinspect.com for more product details or to place an order.

ELECTRODE TYPES

The Model 125/135 can be fitted with a wide variety of electrodes that vary in form, size and material to fit a wide range of coating inspection projects. If we don't carry it we can custom build an electrode to fit your project needs.



FLAT BRUSH
(BRASS, STEEL
OR NEOPRENE)
1" - 72" (25-1829MM)



**FULL-CIRCLE
STEEL SPRING**
2" - 80" (50-2032MM)



**HALF-CIRCLE
BRUSH (BRASS,
STEEL OR
NEOPRENE)**
1" - 60" (25-1524MM)



**INTERNAL
NEOPRENE
OR SPONGE**
1" - 64" (25-1625MM)
2" - 28" (50-711MM)



**FULL-CIRCLE
BRUSH (BRASS,
STEEL OR
NEOPRENE)**
8" - 60" (203-1524MM)



**30'-100' INTERNAL
PULL CABLE**

Please call our office at (713) 681-5837 or email us at sales@spyinspect.com for more product details or to place an order.

RELATED EQUIPMENT



SPY® MODEL 115 IN-PLANT
DC HOLIDAY DETECTOR



SPY® MODEL JM JEEPMETER
(VOLTAGE METER)



SPY® MODEL PJM POCKET
JEEPMETER (VOLTAGE METER)

TEST VOLTAGE GUIDE FOR 125/135 IN-PLANT HOLIDAY DETECTORS

1250* SQRT (MILS)

MINIMUM TEST VOLTAGE FOR THICK FILM COATINGS

COATING THICKNESS		MINIMUM TESTING VOLTAGE
mm	mil	KiloVolts
0.51	20	5.6
0.76	30	6.9
1.5	60	9.7
2.3	90	11.9
3.0	120	13.7
3.8	150	15.4
4.6	180	16.8
12.7	500	28.0
15.9	625	31.3
19.1	750	34.3

PIPELINE INSPECTION CO.

SHIPPING ADDRESS

1919 Antoine Dr.
Houston, Texas 77055

WEBSITE

www.spyinspect.com

TELEPHONE

713-681-5837

FAX

713-681-4838

E-MAIL

sales@spyinspect.com



The logo for SPV Pipeline Inspection Company features the letters 'SPV' in a bold, orange, sans-serif font. The 'S' and 'P' are connected at the top, and the 'V' is positioned to the right. The background is dark gray with a faint, repeating pattern of a grid and stylized pipe lines.

SPV

PIPELINE INSPECTION COMPANY