CD52-Bandit

Non-Intrusive Pig Passage Signaler

(CSA-UL Certification)

USER GUIDE

Apache PIPELINE PRODUCTS

C US

PIGGING PRODUCTS & SERVICES ASSOCIATION member

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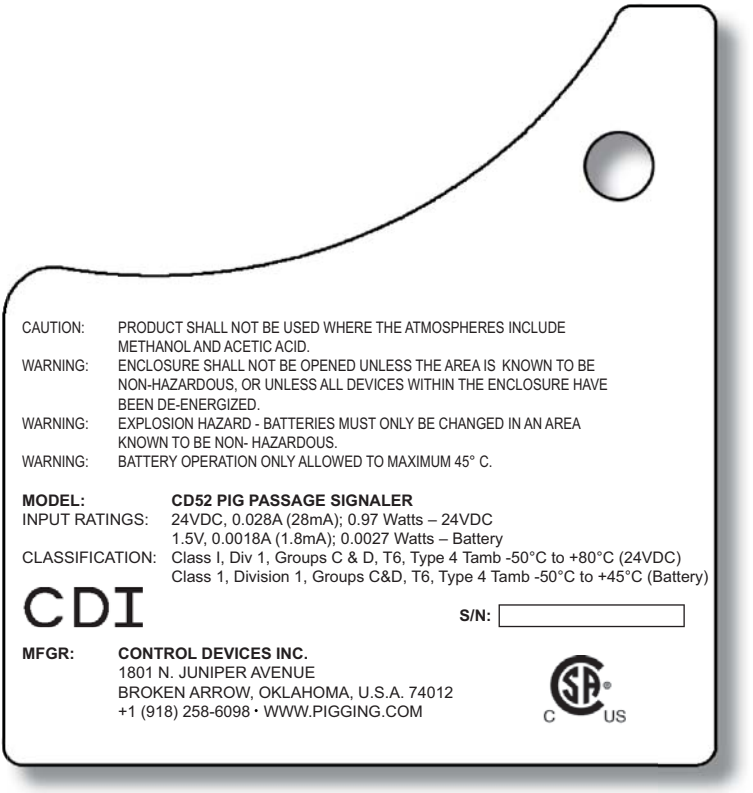
The CD52 product is covered under United States Patent No. 6,489,771 B1



NOTICE

Any operation involving work on pipelines containing gases or liquids under pressure is potentially hazardous. It is necessary, therefore, to follow correct procedures in the use of this equipment to maintain a safe working environment.

No person should use this equipment unless fully aware of potential hazards of working with pressurized pipelines and trained in the procedures stated in this manual.

The purchaser of this equipment is responsible for the training and competence of operators and the manner in which it is used.

Contact CDI immediately should any difficulty arise in the use of this equipment.

CONTENTS

INTRODUCTION

The CD52 Bandit is a computerized electronic device for non-intrusive detection of pipeline pigs equipped with either a permanent magnet or 22Hz electromagnetic transmitter.

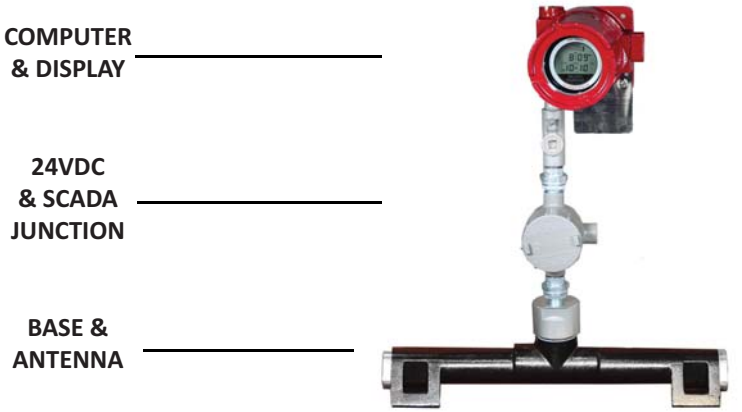
The Bandit accomplishes this by a proprietary and patented magnetic field antenna array located in its base and attached to (or near) the pipeline. This antenna array signals an on-board computer if and when a pig passage has occurred.

Once passage has been detected, the time and date of passage are recorded into the on-board memory of the Bandit and displayed on an LCD screen.

In addition to the most recent pig passage time and date, the Bandit will remember the dates and times of the previous nine pig passages as well. Therefore, an operator may quickly and easily retrieve the dates and times of the 10 most recent pig passages via the Bandit's user interface.

The CD52 Bandit is available in several configurations:

- Rigid stalk extension-mounted ("standard")
- Extended flex-cable*
- Extended pipe*
- Portable



STANDARD

* contact CDI

FLEX CABLE

PORTABLE

EXTENDED PIPE

SETUP & OPERATION

Power Options

The Bandit in its standard configuration can be powered for one year on two new D-Cell alkaline batteries (see note). However, many customers choose to power the Bandit by supplying 24VDC power.

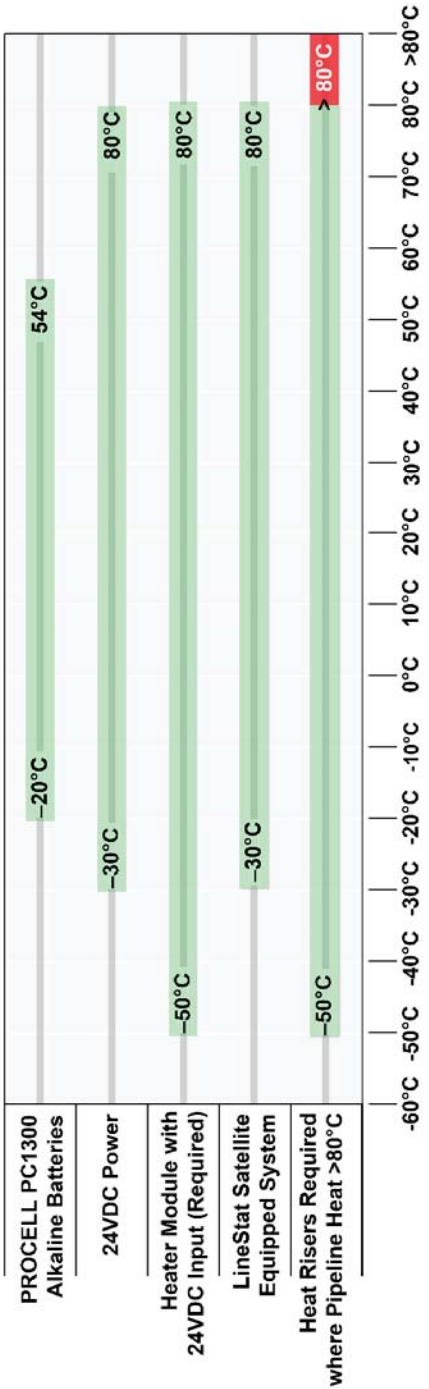
In extreme cold temperatures, 24VDC will be necessary to power the Bandit as a small heating element option (see pg. 32) is required. Also, CSA-UL guidelines require use of external 24VDC power where temperatures exceed +45°C.

See the Power Configuration chart on the following page to determine which power option is required for your conditions.

NOTE: If using batteries as a power source, DURACELL® PROCELL (PC1300) D-Cell alkaline batteries are required by CSA-UL standards to maintain system certification.

Power Configuration

Green indicates CSA-UL certified temperature range



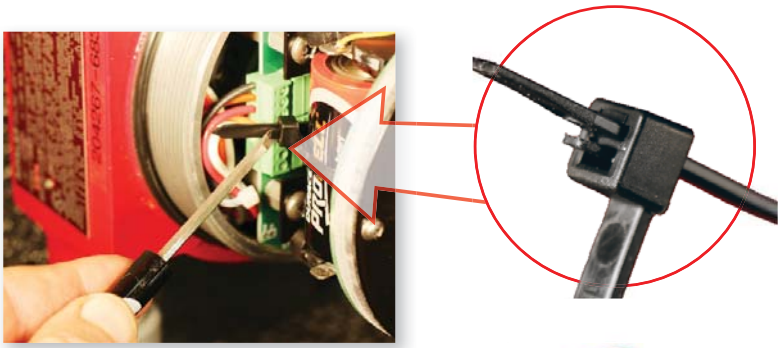
Battery Installation

NOTE: The battery cable ties are releasable and do not need to be cut.

To install D-cell batteries:

1. Unscrew and carefully remove front cover

2. If old batteries are in place, pull cable-tie release tab (use small screwdriver or fingernail) to disengage cable-tie.



3. Insert new alkaline batteries, both with positive (+) side up.

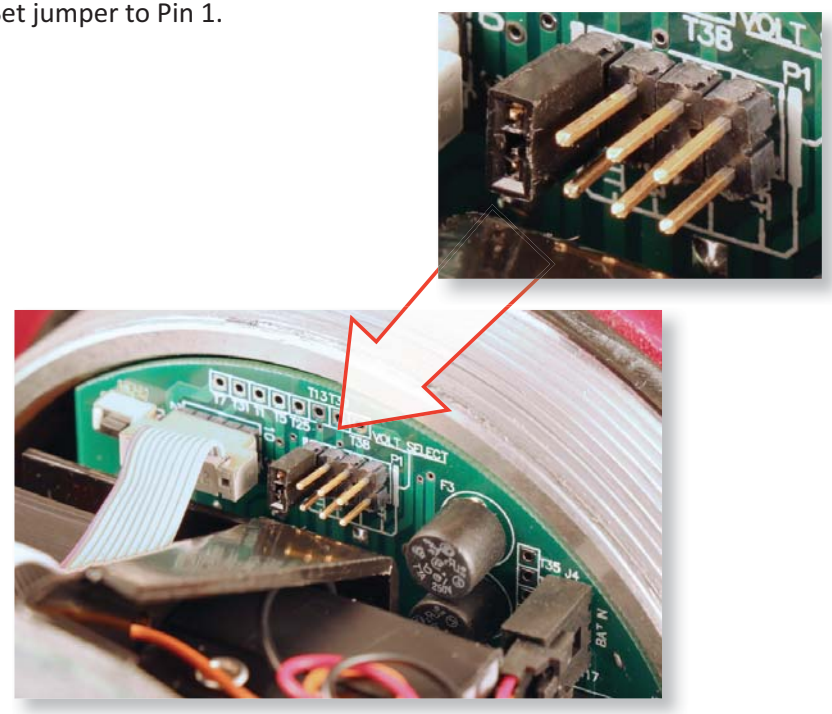
User Board Jumper Settings

The CD52 Bandit user board contains a jumper block which has been factory set for battery or 24VDC power source, depending on specification at time of order. If power source is to be changed (for example, if your CD52 was ordered and shipped as a 24VDC-powered unit and you desire instead to operate it with batteries), you must re-set the jumper as shown:

Board Settings for Battery Power

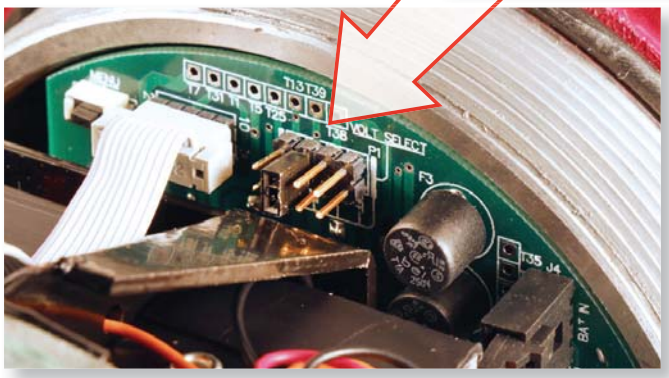
NOTE: Set jumper before installing batteries.

Set jumper to Pin 1.



Board Settings for 24VDC Power

Set jumper to Pin 2.



CSA-UL WARNINGS

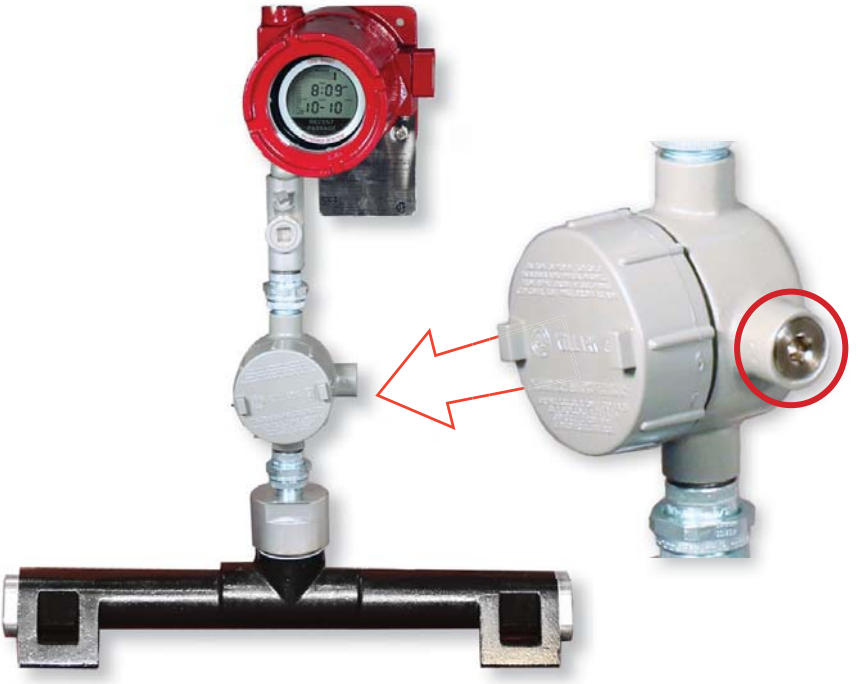
Tamb = -30°C ~ +80°C (24VDC OPERATION)
Tamb = -20°C ~ +54°C (BATTERY OPERATION)

WARNING:	**USE ONLY DURACELL PC1300 BATTERIES**
WARNING:	**DO NOT MIX OLD WITH NEW BATTERIES**
WARNING:	**DO NOT OPEN WHEN ENERGIZED**
WARNING:	**EXPLOSION HAZARD – BATTERIES MUST ONLY BE CHANGED IN AN AREA KNOWN TO BE NON-HAZARDOUS**
WARNING:	**BATTERY OPERATION ONLY ALLOWED TO MAXIMUM 45°C**
WARNING:	**DO NOT OPEN WHEN AN EXPLOSIVE GAS ATMOSPHERE IS PRESENT**

24VDC & SCADA Connections

It is the customer's responsibility to provide their own wiring and conduit for 24VDC power and SCADA. CDI recommends routing 24VDC and SCADA wiring through separate conduits. To route 24VDC and SCADA into the Bandit unit:

1. Remove the Killark junction box side plug.



* SCADA (Supervisory Control and Data Acquisition) compatible relay contacts can be used for passage annunciation (lights, horns, etc.) where an unmanned passage must be monitored.

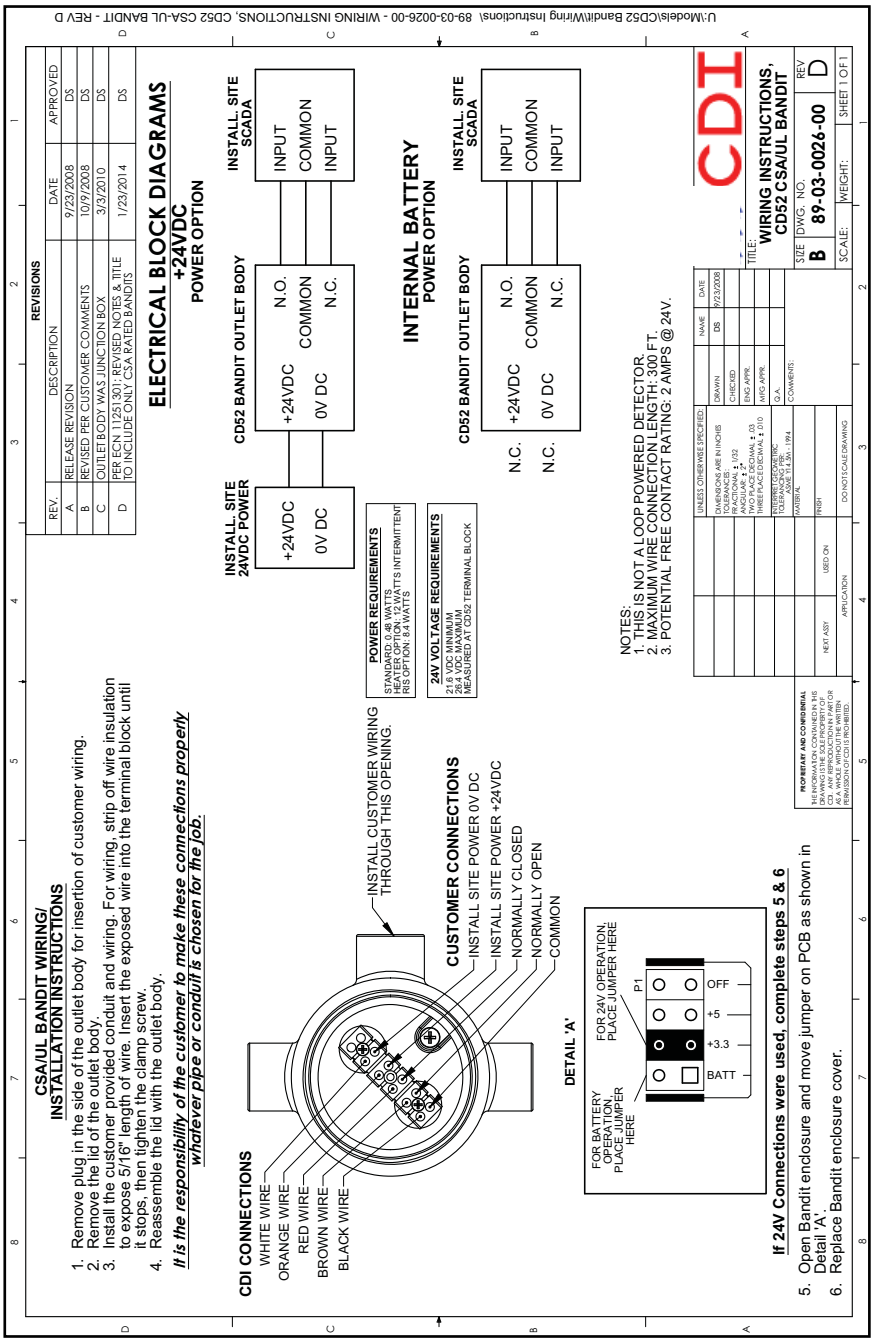
NOTE: Once plug is removed–and wiring installed–it is critical that the hole be resealed properly for the Bandit to remain watertight. This can be done with pipe dope or pipe sealant and a proper conduit pipe.

It is the customer's responsibility to ensure that all conduit connections are made and sealed according to CSA-UL standards to maintain system certification.

2. Remove the junction box faceplate, feed the wiring through the conduit and using the wiring diagram (following page), secure the wires to the proper terminals.

3. Replace the junction box cover and secure by hand-tightening.

At this point, with correct electrical connections, you should have an assembled and fully-functional CD52 Bandit system. A system wired in this manner is capable of running on 24VDC (allowable range: 21.6 to 26.4VDC) and indicating a passage to the SCADA system via relay closure.

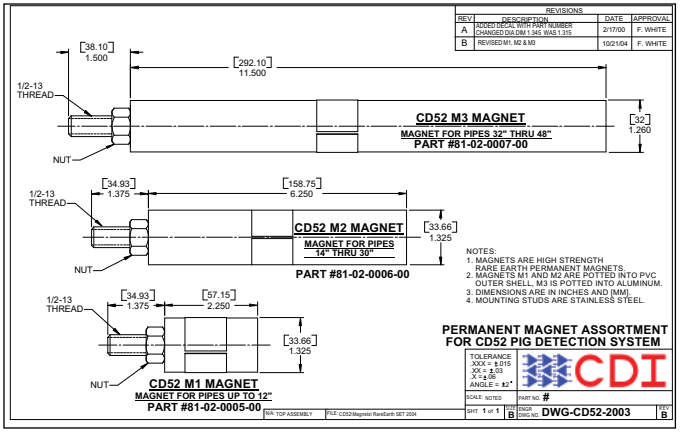

U:\Models\CD52 Bandit\Wiring Instructions\ 89-03-0026-00 - WIRING INSTRUCTIONS, CD52 CSA-UL BANDIT - REV D
REVISIONS
REV. DESCRIPTION DATE APPROVED
A RELEASE REVISION 9/23/2008 DS
B REVISED PER CUSTOMER COMMENTS 10/9/2008 DS
C OUTLET BODY WAS JUNCTION BOX 3/3/2010 DS
D PER ECN 112513O1; REVISED NOTES & TITLE TO INCLUDE ONLY CSA RATED BANDITS 1/23/2014 DS
ELECTRICAL BLOCK DIAGRAMS
+24VDC
POWER OPTION
INSTALL. SITE 24VDC POWER
+24VDC
0V DC
CD52 BANDIT OUTLET BODY
+24VDC
0V DC
N.O.
COMMON
N.C.
INSTALL. SITE SCADA
INPUT
COMMON
INPUT
POWER REQUIREMENTS
STANDARD: 0.48 WATTS
HEATER OPTION: 12 WATTS INTERMITTENT
RIS OPTION: 8.4 WATTS
24V VOLTAGE REQUIREMENTS
21.6 VDC MINIMUM
28.8 VDC MAXIMUM
MEASURED AT CD52 TERMINAL BLOCK
INTERNAL BATTERY
POWER OPTION
N.C.
N.C.
NOTES:
1. THIS IS NOT A LOOP POWERED DETECTOR.
2. MAXIMUM WIRE CONNECTION LENGTH: 300 FT.
3. POTENTIAL FREE CONTACT RATING: 2 AMPS @ 24V.
CSA/UL BANDIT WIRING/
INSTALLATION INSTRUCTIONS
1. Remove plug in the side of the outlet body for insertion of customer wiring.
2. Remove the lid of the outlet body.
3. Install the customer provided conduit and wiring. For wiring, strip off wire insulation to expose 5/16" length of wire. Insert the exposed wire into the terminal block until it stops, then tighten the clamp screw.
4. Reassemble the lid with the outlet body.
It is the responsibility of the customer to make these connections properly whatever pipe or conduit is chosen for the job.
CDI CONNECTIONS
WHITE WIRE
ORANGE WIRE
RED WIRE
BROWN WIRE
BLACK WIRE
INSTALL CUSTOMER WIRING THROUGH THIS OPENING.
CUSTOMER CONNECTIONS
INSTALL SITE POWER 0V DC
INSTALL SITE POWER +24VDC
NORMALLY CLOSED
NORMALLY OPEN
COMMON
DETAIL 'A'
FOR BATTERY OPERATION, PLACE JUMPER HERE
FOR 24V OPERATION, PLACE JUMPER HERE
P1
OFF
+5
+3.3
BATT
If 24V Connections were used, complete steps 5 & 6
5. Open Bandit enclosure and move jumper on PCB as shown in Detail 'A'.
6. Replace Bandit enclosure cover.
PROPRIETARY AND CONFIDENTIAL
THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF CDI. ANY REPRODUCTION IN PART OR AS A WHOLE WITHOUT THE WRITTEN PERMISSION OF CDI IS PROHIBITED.
UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN INCHES
TOLERANCES:
FRACTIONAL ± 1/32
ANGULAR: ± 2°
TWO PLACE DECIMAL ± .03
THREE PLACE DECIMAL ± .010
INTERPRET GEOMETRIC TOLERANCING PER: ASME Y14.5M - 1994
MATERIAL
NEXT ASSY
USED ON
APPLICATION
DRAWN DS 9/23/2008
CHECKED
ENG APPR.
MFG APPR.
Q.A.
COMMENTS:
FINISH
DO NOT SCALE DRAWING
CDI
TITLE:
WIRING INSTRUCTIONS, CD52 CSA/UL BANDIT
SIZE B
DWG. NO. 89-03-0026-00
REV D
SCALE:
WEIGHT:
SHEET 1 OF 1

Detection Methods

The CD52 Bandit is able to detect pig passages via two very distinct methods: permanent magnets and 22Hz electromagnetic transmitters. The advantages to each method are discussed below.

Permanent Magnets

The Bandit can detect rare earth permanent magnets attached to a pipeline pig. Magnets for this purpose are available from CDI for pipeline diameters from 2 in. to 60 in. (50.8 mm to 1524 mm).



NOTE: Where pipe wall thickness exceeds 25.4 mm (1 in.), a custom magnet design may be required. Please consult CDI for an evaluation of deployment options.

Advantages of Permanent Magnets

- Small
- Inexpensive
- Low maintenance
- Batteries are not required

Despite these benefits, because of the permanent magnet's static magnetic field, it may be difficult to locate a pig that is stalled, obstructed, or otherwise immobilized in a pipeline. In these situations, an active (electromagnetic) transmitter is a recommended option.

Electromagnetic Transmitters

The CD52 Bandit readily detects active electromagnetic transmitters. CDI offers the largest family of pipeline pig location and tracking transmitters in the industry.

Our Transmitters operate by emitting electromagnetic fields at a very low frequency (between 15 and 30Hz). This makes CDI's pig tracking transmitters safe and reliable for use in any onshore or offshore environment and any pipeline product (water, oil, gas, ammonia, carbon dioxide, etc.).

Many models even have the ability to remain dormant until activated by preconfigured pipeline pressure.

Another advantage of CDI's active transmitters is the ease of locating an immobilized pig. A stuck pig can easily be detected by walking the pipeline from the last known location using a handheld active locater system.

With that in mind, CDI is proud to offer our customers the *TRAXALL Multi-source Pig Location and Tracking System.*

(See pg. 34 for details for more information about the TRAXALL.)

It is possible to use both a permanent magnet and a transmitter in the same pig. This will not prevent the Bandit, TRAXALL, or CD42 Receiver systems from successfully tracking and locating pigs.

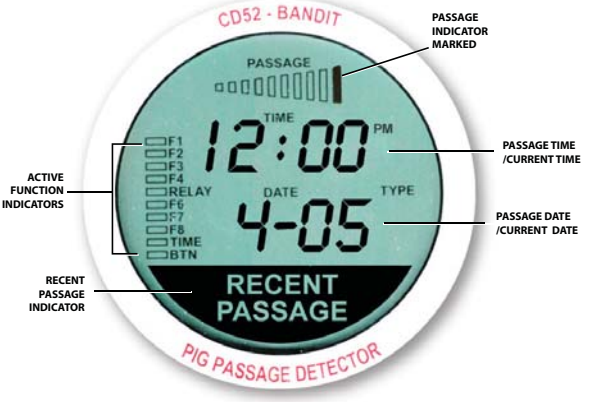
Regardless of which type of transmission source you use, the Bandit will detect it.

Advantages of Electromagnetic Transmitters

- Easily located with a handheld device
- Quicker to locate

The User Interface

The Bandit's user interface display contains much information for an operator, yet is quite simple and easy to read.



This display automatically cycles between showing the most recent pig passage time, date and the actual real-time every seven (7) seconds. This allows the operator to simply approach the Bandit on the pipeline and see the most recent pig passage time, as well as verify the internal clock is set correctly – all without having to touch the unit.

Passage Time / Current Time

These display segments normally alternate between showing the most recent pig passage and the actual real-time as known by the unit. When the real-time is displayed, the colon will blink (momentarily appear) and the "TIME" Active Function Indicator segment will display.

When the most recent pig passage time is displayed, the colon display will be constant (non-blinking) and the "TIME" Active Function Indicator segment will not display.

Passage Date / Current Date

These segments normally alternate between displaying the real-time date and the date of the most recent pig passage. This date is in American format (MONTH–DATE; the year is not displayed). Therefore, 4-05 would be April 5th, with the year assumed to be current year.

Recent Passage Indicator

The Recent Pig Passage Indicator Segment is a large segment that consumes most of the lower half of the Bandit's display area. This segment indicates that a pig passage has been detected recently. The behavior of this segment conveys information about how recent the pig passage was.

When a pig passage occurs, the segment will blink once per second. The segment will continue to blink for one full hour after the pig passage. After one hour, the display will switch to a constant-on mode. This feature allows an operator to approach the unit and quickly determine how recent a pig passage has been.

Therefore, a constant-on segment indicates a pig passage has occurred within the last 12 hours but more than one hour ago.

RECENT PASSAGE SEGMENT STATUS

	**MEANING**
SEGMENT NOT LIT	**No passage detected within the last 12 hours**
SEGMENT BLINKING	**Passage was detected within the last one hour**
SEGMENT LIT, NOT BLINKING	**Passage was detected more than one hour ago, but less than 12 hours ago**

Displayed Passage Indicator

The Displayed Passage Indicator is a cone-shaped array of 10 segments. Each one of these individual segments represents one of the 10 pig passage times that are recorded in the Bandit's memory. The larger the segment, the more recent the pig passage represented.

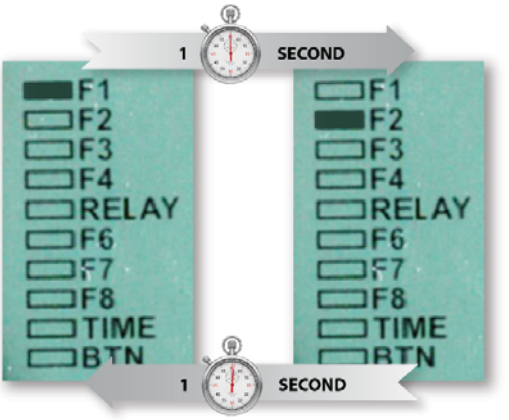
Active Function Indicators

The Active Function Indicators are an array of 10 rectangular LCD segments aligned vertically along the left-hand side of the display.

Note: some of the segments are reserved for future functions and/or customer-requested applications.

F1	**Unit is in Suspend Mode***
F2	**Unit is in Suspend Mode***
F3	**Reserved**
F4	**Reserved**
RELAY	**Internal contact relay engaged**
F6	**Reserved**
F7	**Reserved**
F8	**Reserved**
TIME	**Real-time currently displayed**
BTN	**User Interface Lever currently engaged**

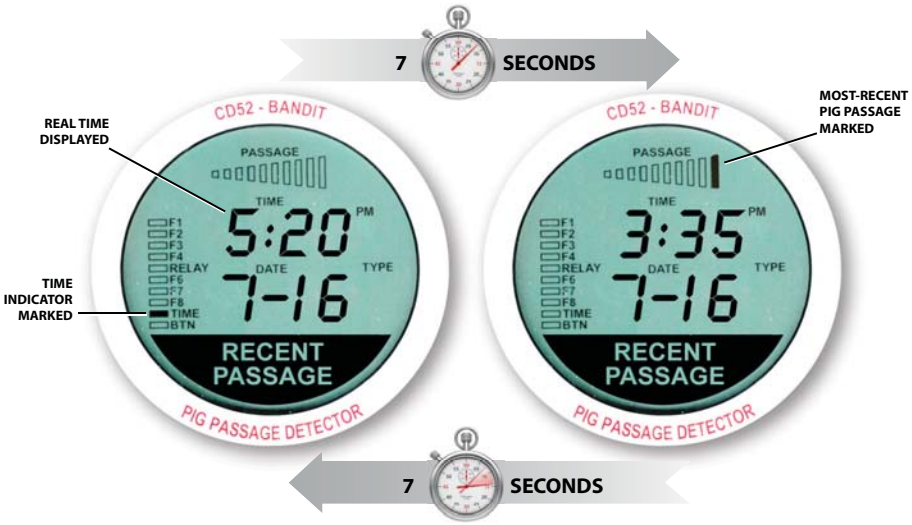
* Suspend Mode feature is available only on the portable Bandit (see pg. 26). When in Suspend Mode the Active Function Indicator LCD will cycle between F1 and F2 every second.



Display Rotation

During the Bandit's normal operation it automatically cycles between two display screens. The first screen shows time and date of the most recent pig passage. The second screen is the current (real) time.

For example: If a Bandit unit records its most recent pig passage at 3:35 PM on July 16, and the real time is 5:20 PM, the operator will see two displays alternating every seven seconds as shown here:



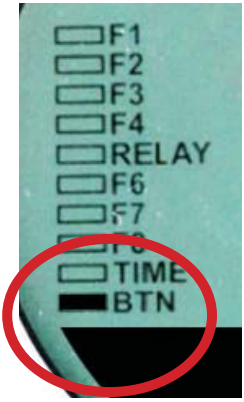
Interface Lever

The pivoting lever on the side of the unit has several functions:

- Retrieving dates/times of the last ten passages
- Clearing the recent passage indicator
- Set the real-time clock

The lever contains a small magnet that actuates a reed switch through sealed housing. Rotating this lever controls all aspects of the Bandit's user interface. In its neutral (disengaged) position, the red lever hangs down. To activate, rotate the bottom of the lever away from you.

Any time the Bandit's lever is activated, the "BTN" display segment will confirm contact.

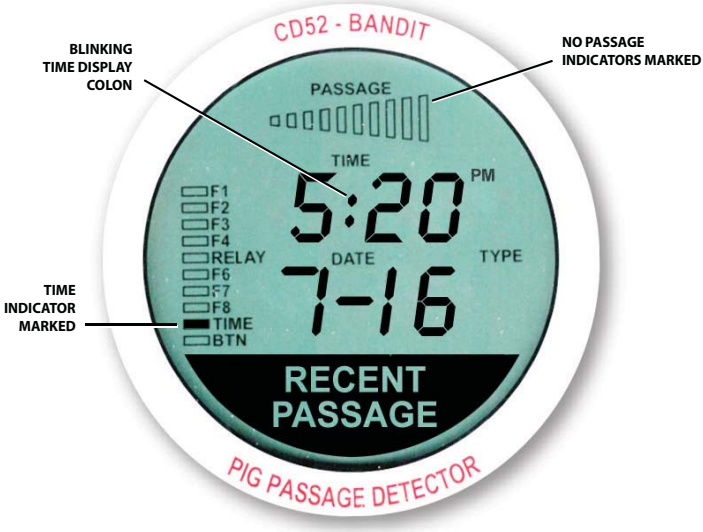


To ensure Bandit's availability under adverse conditions (wind, icing, vandalism, etc.) that could move the lever into the engaged position while unattended, the unit will automatically override the lever setting after one minute and 45 seconds, and automatically return to normal operation.

Real-time Display

The primary purpose of the real-time display is to allow an operator to quickly and easily confirm the clock is set to the correct time. (See page 24 for instructions on setting the clock.)

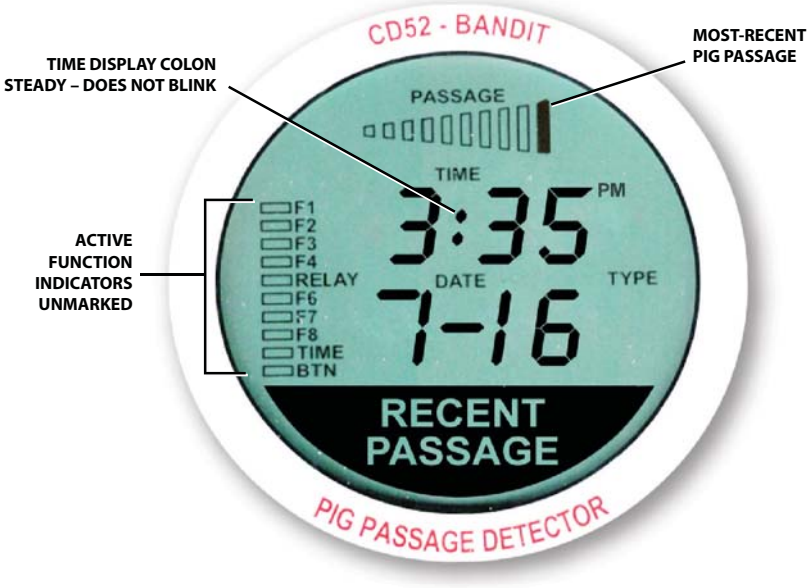
The real-time display has the following characteristics:



Most Recent Pig Passage Display

Pig passages are captured and indicated on the display of the Bandit. Typically, the operator is interested in the time and date of the most recent passage. By default the Bandit displays this information. Anyone can approach a unit and see the most recent passage data without interaction.

When displaying the time of the most recent passage, the display will appear as shown:

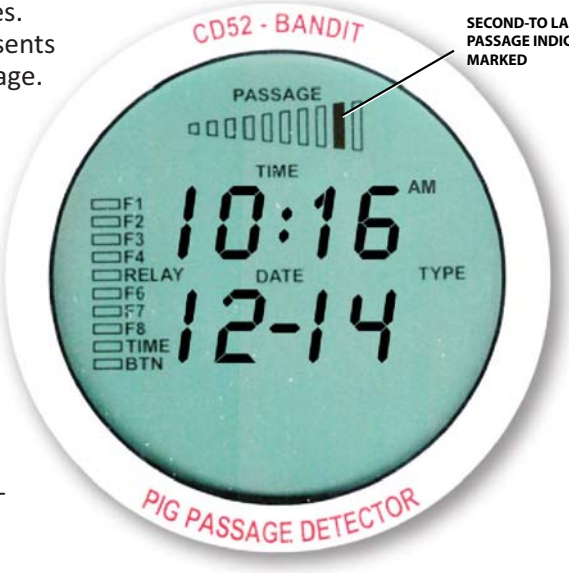


Previous Pig Passages

Use the Interface lever to review pig passage dates and times other than the most recent. Simply rotate the bottom of the lever away from you and toward the rear of the unit.

Hold the handle in this position until you notice the BTN LCD segment marked as shown.

The display will change showing the second most recent pig passage with the date and time. The 10 bars represent pig passages. The largest bar represents the most recent passage. The smallest bar represents the oldest pig passage stored in memory.



After one lever press, the screen should appear as shown here.

This display indicates that the second most-recent pig passage occurred at 10:16 AM on December 14th.

Repeatedly pressing and releasing the lever will toggle through the recorded pig passages and change the Displayed Passage Indicator segment to the corresponding indicator. Moving to the oldest passage in memory requires a total of nine (9) lever activations, after which the Displayed Passage Indicator segments loop back to the first passage.

To exit this mode and return to the normal operating mode of cycling between the most recent passage time and the real (current) time, simply allow the lever to hang in its disengaged position for a period of twenty-five (25) seconds. Normal display cycling will resume.

Clearing the "Recent Passage" Flag

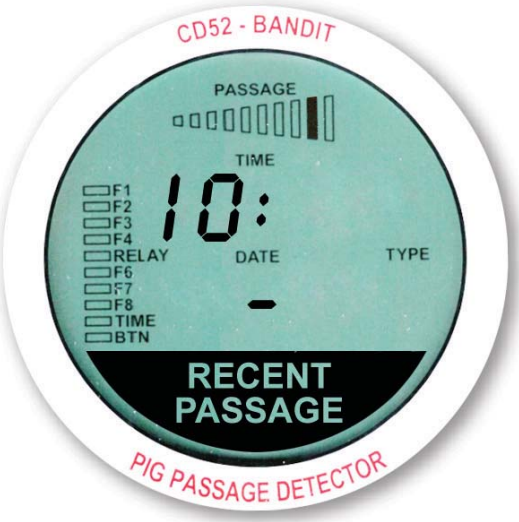
The Recent Passage LCD segment will blink for one hour after a pig passage then remain on for an additional 11 hours. However, you may wish to manually terminate the blinking cycle (for example, when the Bandit is used in a portable application or on a launcher or receiver). To clear the recent passage display, rotate the Interface Lever into the "activated" position (see pg. 21) and hold it there for a period of four (4) seconds. Once cleared, release the lever to return the unit to normal operation.

Removing the "Recent Passage" message from the screen will not affect anything in memory. The most recent pig passage time and date will cycle every few seconds.

Setting the Clock

Occasionally it will be necessary to set the unit's real-time clock.* To do so, hold the lever in the activate position for a period of eight (8) seconds. After eight seconds you will see the majority of the Bandit's display go blank. Release the lever, and then briefly press and release it one time. You should then see a display similar to this:

***NOTE: the unit calendar does not automatically compensate for a leap year, so it will be necessary to re-set the unit every February 29 to ensure accuracy.**



The Bandit is now prepared to set the hour portion of the clock. To change the hour, simply rotate the lever to the activate position and hold it there. You should notice the BTN segment lights and the hour digits begins to increase at a rate of one hour per second.

Continuing to hold the lever in the activated position will cause the hours to increase until they reach “12”, and then wrap to “1” (The Bandit uses 12-hour, not 24-hour time).

Hold the lever in the activated position until the digit reaches the desired hour and then release. The display will jump to the minute portion of the time to set. The same method is used to set the minutes. Simply press and hold the lever to increment the digits, and release to move to the date.

Repeatedly pressing and releasing the lever while in clock set mode causes the unit to cycle through the following clock set options:

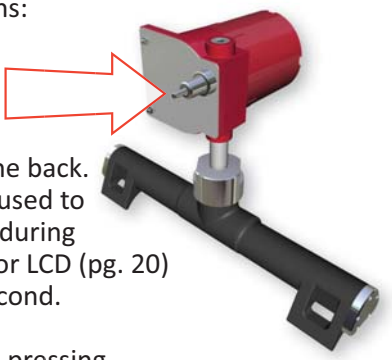
1. HOURS
2. MINUTES
3. AM/PM
4. DAY
5. MONTH

To end the clock set mode, simply release the lever. Normal Bandit operation will return in twenty-five (25) seconds and the clock will be set to the time indicated.

Portable Models

The portable Bandit is designed for temporary location/relocation from one tracking site to the next. It is identical to standard units in function and operation, with two notable exceptions:

- Battery power only
- Suspend Mode push button



The Suspend Mode button is located on the back. When pressed, all Bandit functions are paused to prevent inadvertent triggering of the unit during repositioning. The Active Function Indicator LCD (pg. 20) will alternate between F1 and F2 every second.

When the portable Bandit is repositioned, pressing the Suspend button a second time readies the portable Bandit to resume passage detection. The Active Function Indicator F1-F2 cycle will cease.

INSTALLATION

Standard Units

The Bandit can be installed on pig launchers, receivers, and all pipelines from 50.8 mm to 1524 mm (2 in. to 60 in.). The Bandit's base is 508 mm (20 in.) long.

Make sure there is enough room on the pipe for installation. To ensure unimpeded movement of the interface lever, it is recommended the Bandit be mounted on a horizontal pipe.

1: Prep Banding

Prepare the band and buckle. Slide the buckle over the band and crimp in place.

NOTE: The banding material and band tension tool* are stocked by CDI.

2: Attach Base

Set the base on the pipeline. Loop the free end of the band through the slots at one end of the base. Continue looping the free end around the pipe until it meets the buckle at the other end of the band.

NOTE: The standard CD52 antenna base (shown here) is of cast aluminum and must be handled with care. Do not over-torque bands.

If needed, use electrical insulators to prevent interference with cathodic rectifiers.

Continue looping the free end around the pipe through the buckle at the other end of the band.

*CDI Part # 81-04-0008-00

3: Tension Tool

Thread free end through both jaws of tension tool as shown here.

Tighten the tension on the band using the tension tool.

NOTE: **Do not over-torque bands on cast aluminum antenna base.**

4: Cut Excess

Raise the tension tool to bend the band back over the buckle. Pull the cutoff lever and cut off the excess banding material.

5: Secure Buckle

Secure the buckle. Bend the end of the band down by lightly tapping with a hammer. Using a hammer, bend the two locking tabs over the end of the band.

Once installation is complete, the face of the Bandit can be rotated as much as 180° in either direction to obtain the desired orientation for optimum viewing.

To do this, loosen the union joint and adjust the Bandit face to the desired position. Re-tighten union joint.

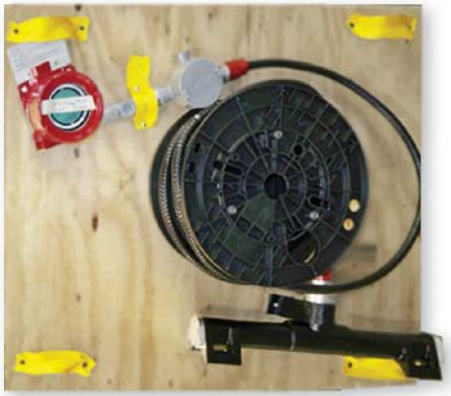
If you have any difficulties or questions assembling and installing your Bandit system, please feel free to contact CDI:

Telephone (worldwide): +1 (918) 258-6068

Email: *support@pigging.com*

Armored Flex Cable Units

Bandit units configured with armored flex cable are shipped mounted on a plywood sheet with webbing straps. Special unpacking procedures should be followed:



NOTE: Prepare an unobstructed 6 m x 6 m (20 ft x 20 ft) area before unpacking.

Required tools/materials:

- Screw gun or Phillips screwdriver
- Banding kit (supplied)
- Batteries (supplied)

1. **Lift mounted assembly** with webbing handles only.

2. **Remove antenna base unit strap** using Phillips screw driver.

3. **Uncoil cable.** This requires two (2) personnel. Person #1 will hold antenna base (while supporting cable) and walk in an ever-widening circle. While walking, Person #1 will continually untwist the antenna base to prevent cable from kinking.

NOTE: Maintain a 152 mm (6 in.) minimum bend radius to avoid kinking or breaking the aluminum cable armor.

Person #2 will be responsible for uncoiling cable at the plastic spool.

4. **Startup procedure** is identical to that of standard units.

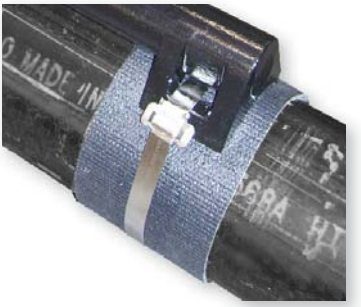
OPTIONAL EQUIPMENT

Remote Indicator System (RIS)

The Remote Indicator System (RIS) consists of four high-luminosity LEDs that, when pig passage occurs, can be seen over distances as great as 100 meters (328 feet).

The RIS may be added to any Bandit System.

Cathodic Protection Base Mounting



Cathodic protection insulation matting is available to protect pipeline coating.

Heater

A 24VDC internal heater is available and recommended for operation in temperatures below –30°C (–22°F).

Heat Risers

Heat riser insulators for the CD52 Bandit allow the system to be used on geothermal pipeline, or other environments where pipeline surface temperatures exceed of 80°C (176°F).

NOTE: Heat risers enable the CD52 Bandit to operate with product temperatures greater than 80°C (176°F). However, if the *ambient air environment* of the system is *greater* than 80°C (176°F), it will be operating outside of CSA-UL Certification.

LineStat

TRAXALL LineStat is a global, value-added satellite-based event notification service provided by CDI and targeted primarily to the oil and gas pipeline industry. LineStat provides notification to email addresses and SMS text messaging telephone numbers of remote events from both fixed position and portable equipment.

Some of the details included in event notification messages are date, time, GPS position, battery status, and vibration.

This information is transmitted via satellite without use of cellular networks and without need of a wired infrastructure.

Sunshade

The stainless steel sunshade can help protect the Bandit from intense sunlight by reducing overall temperature inside, thus prolonging the life of the electronic components. The sunshade's 316 stainless steel construction guarantees long life in a harsh pipeline environment and is available for all Bandit variants.

TRAXALL 720/770 Multi-source Pig Location and Tracking System

The TRAXALL 720 and 770 track CDI X-Series electromagnetic transmitters, pigging industry-standard 22-Hz “Legacy” transmitters, and magnetic-flux leakage (MFL) pigs.

This advanced tracking and locating tool also includes built-in GPS and Bluetooth communication.

The TRAXALL is ideal for passage detection, pinpointing, and launch/ receive verification.

Warranty

All equipment sold by Control Devices, Incorporated (CDI) is warranted for a period of one (1) year from the date of shipment to Purchaser, providing the instrument or equipment has not been modified, abused or used for purposes other than that for which it was designed.

Batteries, probes, leads, magnets and other consumables subject to wear are not covered by this warranty. CDI will repair or replace faulty equipment during the warranty period when the cause is a defect arising from faulty design, materials or workmanship.

Making a Warranty Claim

Equipment being considered for warranty repair, or a representative sample thereof, must be returned to CDI at the Purchaser's expense. The equipment must be accompanied by the Purchaser's written order* describing the defect(s) and authorizing CDI to invoice the Purchaser for any charges not covered by the warranty.

Upon receipt of the equipment and Purchase Order, CDI will examine the equipment and make a determination of the nature and cause of the defect. If the defect is not covered by the warranty, CDI will quote to Purchaser the cost for replacement or repair equipment, and will not proceed until Purchaser delivers a written acceptance of the quotation.

During the one year warranty, CDI will bear the cost to return units repaired under the warranty back to the Purchaser's domestic premises. CDI will return units to foreign countries at Purchaser's expense.

* Contact CDI at 1-800-580-4234, ext 143 for *CDI RMA Form FM-03-0089*

Care and Maintenance

Equipment designed by CDI is protected against the environment in which it is intended to operate. Much of the equipment is designed for prolonged use in the field without any special maintenance other than routine battery replacements. It is the Purchaser's responsibility to insure that proper precautions are taken during installation and operation so that weather seals are in place, routine maintenance occurs, etc. Failure to perform these operations nullifies this warranty.

CDI equipment should only be operated by qualified personnel who are familiar with any and all manuals and procedures for said equipment's operation.

Operating equipment while in a damaged condition nullifies this warranty.

Service and Repairs

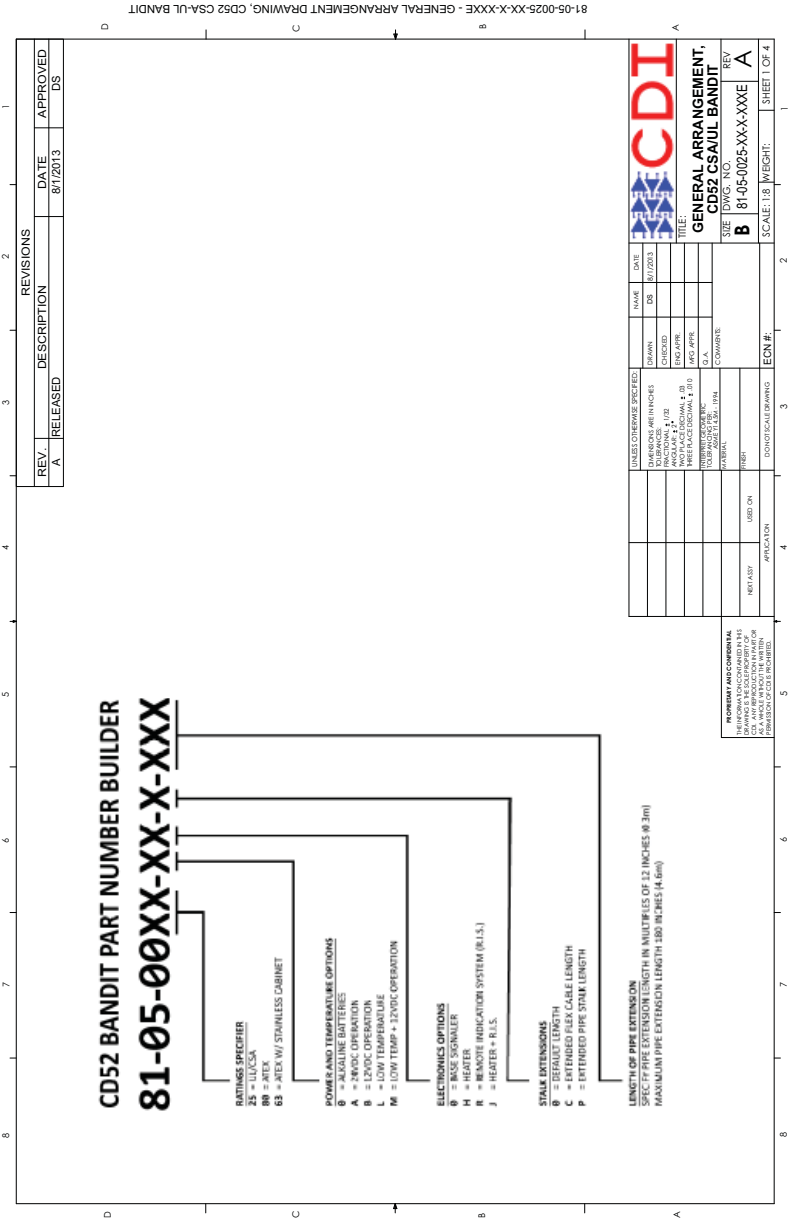
Cost for repairs not covered by the warranty or carried out after the warranty period has expired will be charged at the current hourly or set service rate, plus the cost of materials, upon approval by Purchaser.

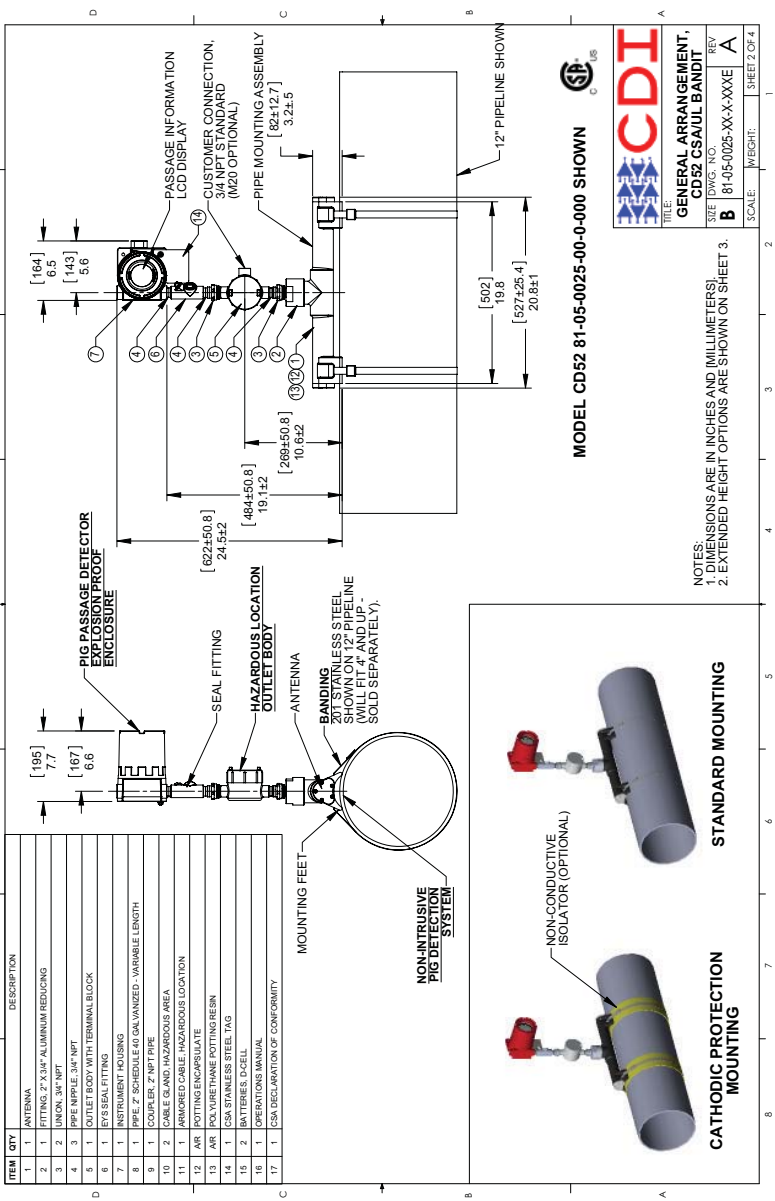
Equipment for repair must be sent at the Purchaser's expense and be accompanied by the Purchaser's written order describing the defect and authorizing CDI to invoice the Purchaser for labor, materials and return delivery cost.

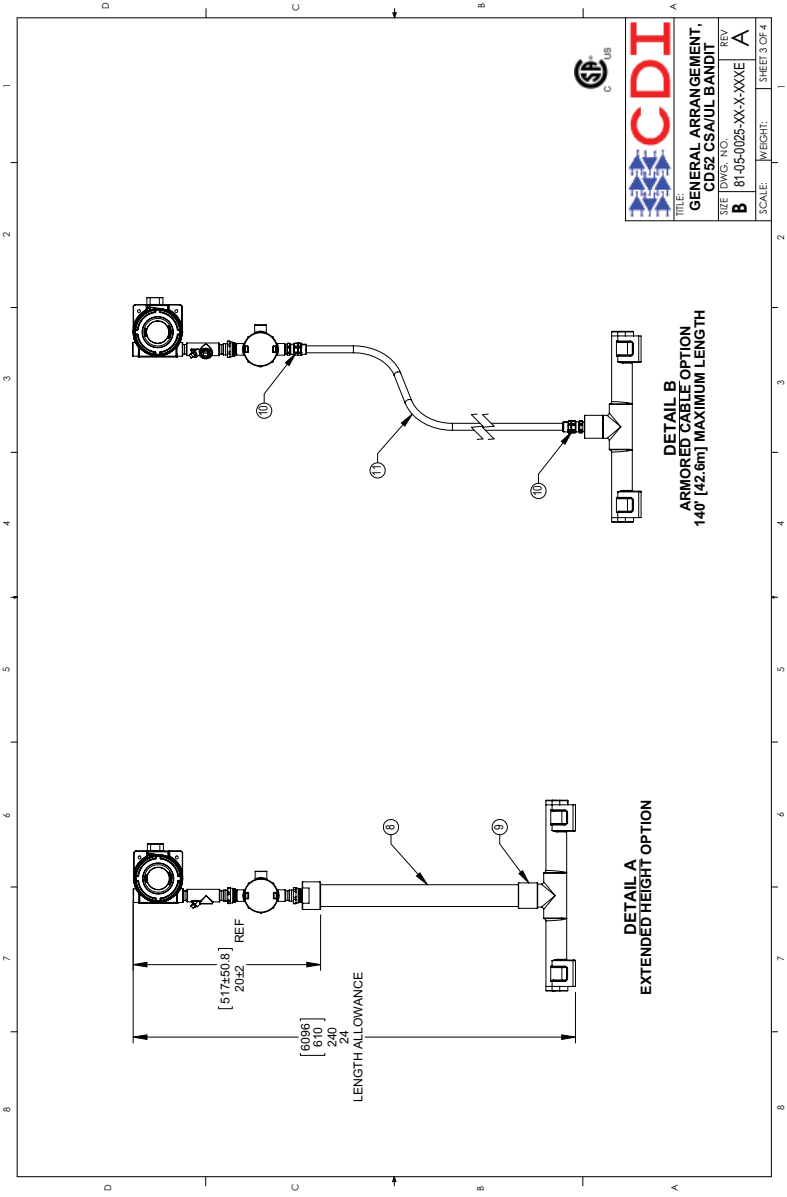
No service or repair will be undertaken until an approved written order is received from the Purchaser.

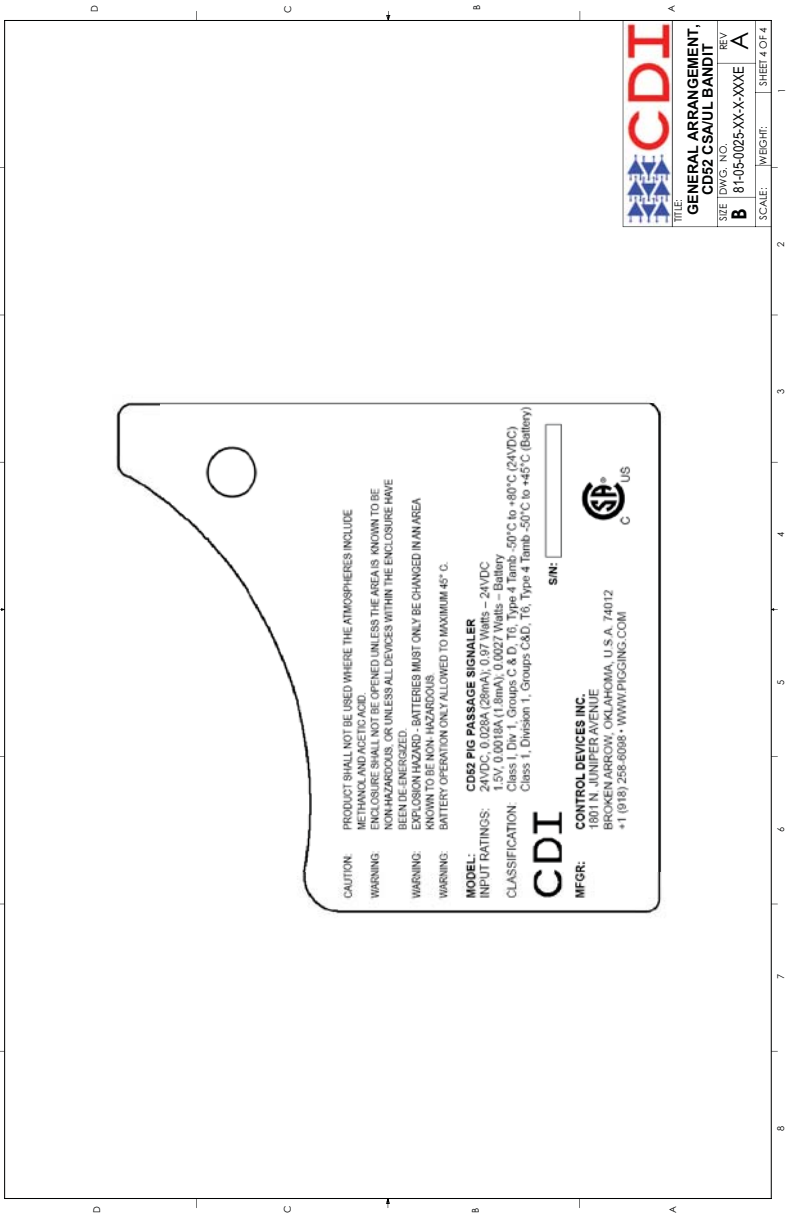
Operating equipment while in a damaged condition nullifies this warranty.

GENERAL ARRANGEMENT DRAWINGS




ITEM QTY DESCRIPTION
1 1 ANTENNA
2 1 FITTING, 2" X 3/4" ALUMINUM REDUCING
3 2 UNION, 3/4" NPT
4 3 PIPE NIPPLE, 3/4" NPT
5 1 OUTLET BODY WITH TERMINAL BLOCK
6 1 EYS SEAL FITTING
7 1 INSTRUMENT HOUSING
8 1 PIPE, 2" SCHEDULE 40 GALVANIZED - VARIABLE LENGTH
9 1 COUPLER, 2" NPT PIPE
10 2 CABLE GLAND, HAZARDOUS AREA
11 1 ARMORED CABLE, HAZARDOUS LOCATION
12 AR POTTING ENCAPSULATE
13 AR POLYURETHANE POTTING RESIN
14 1 CSA STAINLESS STEEL TAG
15 2 BATTERIES, D-CELL
16 1 OPERATIONS MANUAL
17 1 CSA DECLARATION OF CONFORMITY
PIG PASSAGE DETECTOR EXPLOSION PROOF ENCLOSURE
SEAL FITTING
HAZARDOUS LOCATION OUTLET BODY
ANTENNA
BANDING 201 STAINLESS STEEL SHOWN ON 12" PIPELINE (WILL FIT 4" AND UP - SOLD SEPARATELY).
MOUNTING FEET
NON-INTRUSIVE PIG DETECTION SYSTEM
PASSAGE INFORMATION LCD DISPLAY
CUSTOMER CONNECTION, 3/4 NPT STANDARD (M20 OPTIONAL)
PIPE MOUNTING ASSEMBLY [82±12.7] 3.2±.5
[164] 6.5
[143] 5.6
[195] 7.7
[167] 6.6
[622±50.8] 24.5±2
[484±50.8] 19.1±2
[269±50.8] 10.6±2
[502] 19.8
[527±25.4] 20.8±1
12" PIPELINE SHOWN
MODEL CD52 81-05-0025-00-0-000 SHOWN
NOTES:
1. DIMENSIONS ARE IN INCHES AND [MILLIMETERS].
2. EXTENDED HEIGHT OPTIONS ARE SHOWN ON SHEET 3.
CDI
TITLE: GENERAL ARRANGEMENT, CD52 CSA/UL BANDIT
SIZE B DWG. NO. 81-05-0025-XX-X-XXXE REV A
SCALE: WEIGHT: SHEET 2 OF 4
NON-CONDUCTIVE ISOLATOR (OPTIONAL)
CATHODIC PROTECTION MOUNTING
STANDARD MOUNTING


CDI
TITLE:
GENERAL ARRANGEMENT,
CD52 CSA/UL BANDIT
SIZE
B
DWG. NO.
81-05-0025-XX-X-XXXE
REV
A
SCALE:
WEIGHT:
SHEET 3 OF 4
DETAIL B
ARMORED CABLE OPTION
140' [42.6m] MAXIMUM LENGTH
10
11
10
DETAIL A
EXTENDED HEIGHT OPTION
8
9
[517±50.8]
20±2
REF
[6096]
610
240
24
LENGTH ALLOWANCE


CAUTION: PRODUCT SHALL NOT BE USED WHERE THE ATMOSPHERE IS INCLUDE METHANOL AND ACETIC ACID.
WARNING: ENCLOSURE SHALL NOT BE OPENED UNLESS THE AREA IS KNOWN TO BE NON-HAZARDOUS, OR UNLESS ALL DEVICES WITHIN THE ENCLOSURE HAVE BEEN DE-ENERGIZED.
WARNING: EXPLOSION HAZARD - BATTERIES MUST ONLY BE CHANGED IN AN AREA KNOWN TO BE NON -HAZARDOUS
WARNING: BATTERY OPERATION ONLY ALLOWED TO MAXIMUM 45° C.
MODEL: CD52 PIG PASSAGE SIGNALER
INPUT RATINGS: 24 VDC, 0.028A (.28mA), 0.97 Watts – 24VDC
1.5V, 0.0018A (1.8mA), 0.0027 Watts – Battery
CLASSIFICATION: Class 1, Div 1, Groups C & D, T6, Type 4 Tamb -50°C to +80°C (24VDC)
Class 1, Division 1, Groups C&D, T6, Type 4 Tamb -50°C to +45°C (Battery)
CDI
S/N:
MFGR: CONTROL DEVICES INC.
1601 N. JUNIPER AVENUE
BROKEN ARROW, OKLAHOMA, U.S.A. 74012
+1 (918) 258-6098 • WWW.PIGGING.COM
C US
CDI
TITLE: GENERAL ARRANGEMENT, CD52 CSA/UL BANDIT
SIZE B
DWG. NO. 81-05-0025-XX-X-XXXE
REV A
SCALE:
WEIGHT:
SHEET 4 OF 4

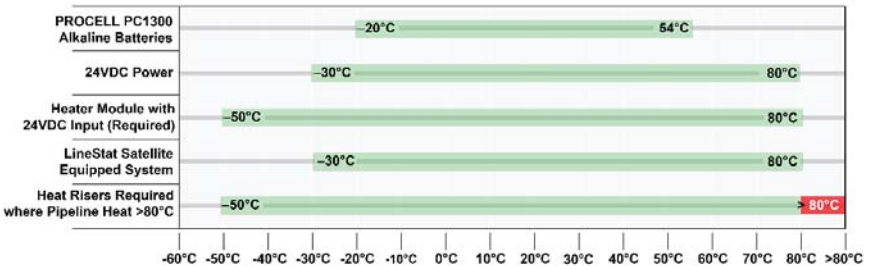
SYSTEM SPECIFICATIONS

Detection Type:	Non-Intrusive, Magnetic
Devices Detected:	CD42 Transmitters or CD52 Permanent Magnets
Detection Direction:	Bi-Directional
Passage Visual Indicator:	LCD blinks one hour after passage LCD holds steady for next 11 hours Auto-Resets at 12 hours
Passage Electrical Indicator:	Isolated Dry Contact Closure
Detection Speed:	0.01 meter/sec to 20 meter/sec
Battery Life:	One full year minimum on two standard 1.5VDC D-Cell alkaline batteries
External Power:	24VDC (21.6 to 26.4VDC Allowable Range)
Enclosure:	Aluminum
Window:	Tempered Glass
System Certification:	CSA-UL Standard C22.2 No.30 rated for Class 1 Division 1 explosion-proof environments groups C and D Tamb -50°C to +80°C (24VDC Power) Tamb -50°C to +45°C (Battery)
Line Sizes:	152 mm to 1524 mm (6 in. to 60 in.)
Pipe Wall Thickness:	Up to 38.1 mm (1.5 in.) **Where pipe wall thickness exceeds 25.4 mm (1 in.), a custom magnet design may be required. Please consult CDI for an evaluation of deployment options.**
Pipe Mounting Assembly:	Aluminum (316 Stainless Steel optional)
Banding and Buckles:	201 Stainless Steel (316 Stainless Steel optional)

Contact Closure: Electrically Isolated
Double Pole - Double Throw
Available in normally-open or normally closed configurations w/customer-specified relay dwell time

Contact Closure Current Capacity: 2 Amps at 30 Volts DC

Operational Temperature Ranges:



LineStat Satellite Equipped System: -30°C to 80°C (-22°F to 176°F)

Heat Risers Required with Product Heat: > 80°C (176°F)

Total Passage Count: 10 (First In, First Out)

Stored Passage Information: Time and Date of passages. Information is stored through loss of power.

System Design Life: 20 years
Storage Life: 20 years

PIG MAGNET MOUNTING

CD42-Tx and TRAXALL X-series electromagnetic transmitters and CD52-MX series magnets and can be mounted onto foam, uni-cast, or metal pigs.

Virtually any pig may be equipped to be detected by the CD52 Bandit system.