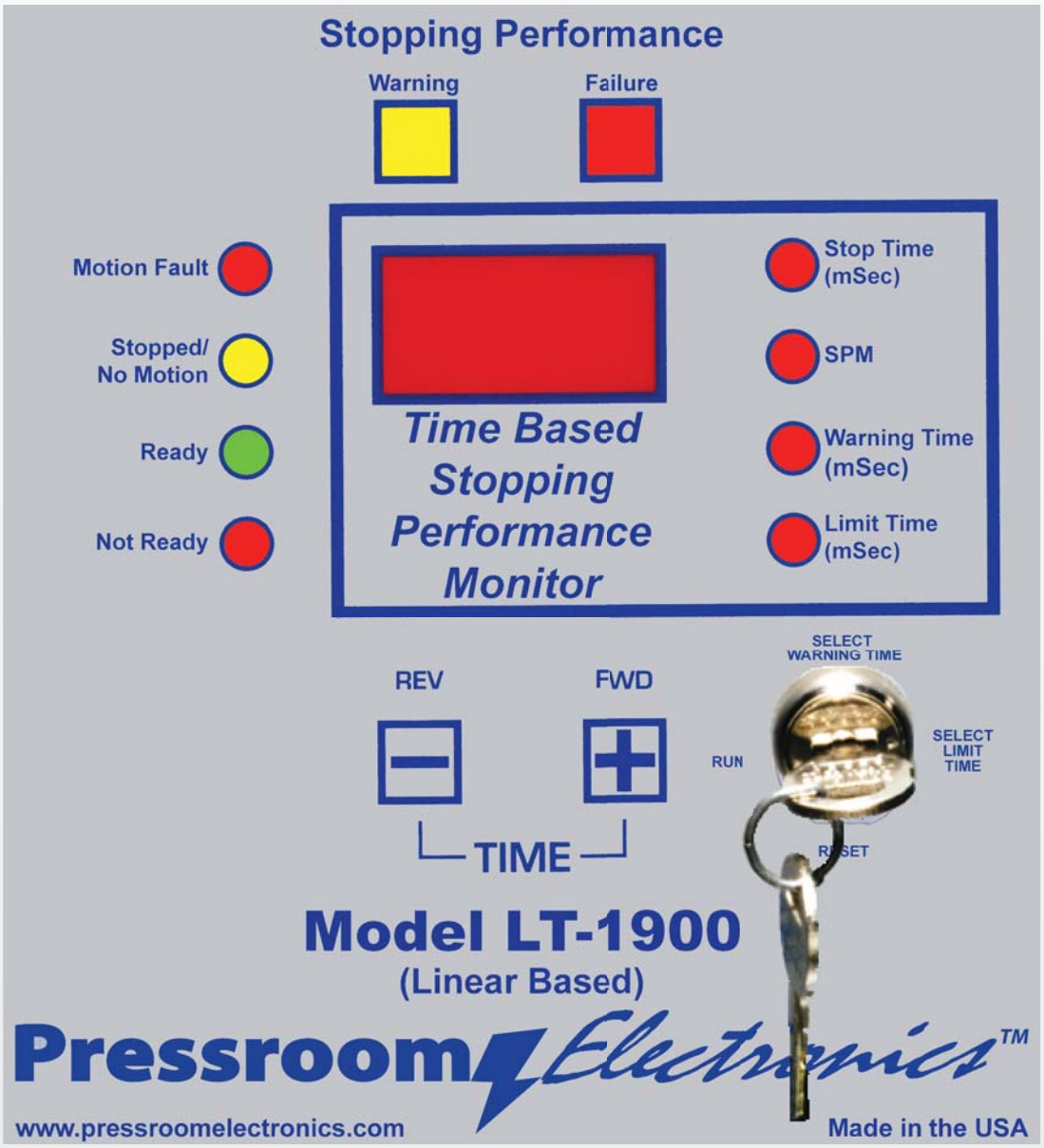
LT-1900

Time Based Stopping Performance Monitor

Installation & Operation Manual



Pressroom Electronics™

LT-1900 Linear Time Based Stopping Performance Monitor

Installation and Operation Manual

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Proper Use and Limitations

The LT-1900 Linear Stopping Performance Monitor is critical for monitoring stopping performance. Repairs should only be made by factory authorized personnel. The manufacturer cannot be held responsible for your repair attempts or the unit's subsequent safe operation.

As the LT-1900 Linear Stopping Performance Monitor is a single function device, that of determining Press stopping times while simultaneously determining that it is capable of just that, any internal malfunction will cause the unit to shut down. We will not supply individual component parts of any circuit board but will supply the individual circuit board complete.

The information disclosed herein includes proprietary rights of the manufacturer. Neither this document nor the information disclosed herein shall be reproduced or transferred to other documents or used or disclosed to others for manufacturing purposes, or for any other purposes, except as specifically authorized in writing by the manufacturer. If this manual is supplied in connection with the sale or delivery of manufacturer's equipment, it is to be used solely for maintenance, repair or installation of such equipment.

Warranty

Manufacturer warrants that this product will be free from defects in material and workmanship for a period of twelve months from the date of shipment thereof. Within the warranty period, manufacturer will repair or replace such products which are returned with shipping charges prepaid and which will be disclosed as defective upon examination by the manufacturer. This warranty will not apply to any product which will have been subject to misuse, negligence, accident, restriction and use not in accordance with manufacturer's instructions or which will have been altered or repaired by person's other than the authorized agent or employees of the manufacturer.

Disclaimer

The provisions of the paragraph "Warranty" are the sole obligations of the manufacturer and exclude all other warranties of merchantability, expressed or implied. Further, there are no warranties which extend beyond the above warranty.

Limitation of Liability

In the event of any claim for breach of any obligations of manufacturer under any order, whether expressed or implied, and particularly in the event of any claim of a breach of the warranty or warranties contained in the paragraph "Warranty" or of any other warranties, expressed or implied, which might despite the paragraph entitled "Disclaimer", be determined to be incorporated in any order, the company shall under no circumstances be liable for any consequential or special damages, either in law or in equity, or for losses or expenses or claims for the same arising from the use of, or inability to use, the products of the manufacturer for any purpose whatsoever.

We have designed our equipment to the very highest performance and safety standards known to the current technological state of the art. However, the installation, usage, suitability, and fitness of our equipment for any purpose, known or unknown, is interdependent upon the performance of other equipment not manufactured, installed, or secured or maintained by manufacturer.

We cannot and do not accept responsibility for any overall system performance when factors, such as these, are beyond our control.

WARNING: The entire machine safety system must be tested at the start of every shift. Machine testing should include: (1) proper machine operation and stopping capability; and (2) verification of proper installation and settings of all point of operation guards and devices before the operation is released for production.

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The LT-1900 Linear based Stop Performance (Time) Monitor is designed to measure speed from 0 to 999 SPM while the Press is commanded to move, and the Stop time from 0 to 999 milliseconds every time the Press is commanded to Stop moving. Set-points for Motion Failure, Stop Failure, Stop Warning, and Stroke Length are all stored along with the last occurring error in nonvolatile memory. A microcontroller, 3 watchdog timers, and 2 Safety Output relays (with Captive contacts) assure control reliability.

All control and timing is done using the microcontroller. The watchdog timers assure that if the microcontroller fails, the relay contacts will always open. Dual captive contact relays assure that if a contact welds or one relay gets stuck closed, the other relay will automatically shut down and open up the remaining relay contact. The press Emergency Stop Circuit should be connected in series with the Stopping Performance Monitor relay contacts to allow the Stopping Performance Monitor to shut down the Press if the machine fails to stop the Press in the required time limit. Nonvolatile memory records any errors that occurred until they are reset using the keyswitch.

The Linear Encoder is used to detect position, speed and motion of the Press by a differential pair Gray code digital signal.

The LT-1900 system complies with OSHA code 29 CFR 1910.217 and ANSI Codes B11.3-2012 and B11.2-2013 for monitoring and control reliability standards.

Care must also be taken that the special magnet rides within .15” on the Linear Encoder rail but not touch and that the magnet be securely mounted so that it will always move in conjunction with the Ram.

Refer to ANSI Standard B11.1-2009 for information on setpoints and safety distances (see *Appendix A: Standards and Requirements, page AA-1*).

Specifications

LT-1900 Linear Stopping Performance Monitor

Controller		
Power:	Standard: Optional: Optional:	120 +/- 10% VAC, 50-60hz, 8 Watts 240 +/- 10% VAC, 50-60hz, 8 Watts 24 +/- 10% VDC, 8 Watts
Relay Configuration:	Dual self-checking force-guided captive contact safety relays	
Relay Contact Rating:	6 amps @ 250VAC resistive for safety relays 4 amps @ 250VAC resistive for alarm relay	
System Accuracy:	+/- 1 millisecond	
Set Points:	Drive failure: Warning: Failure:	1 to 25 tenths of a second 1 to 999 milliseconds 1 to 999 milliseconds
Display:	Speed: Stop time:	0 to 290 +/- 1 SPM 291 to 999 +/- 4 SPM 0 to 999 +/- 1 msecs.
Indicators:	Failure – Red LED Warning – Yellow LED Motion Fault – Red LED Stopped/No Motion – Yellow LED Ready – Green LED Not Ready – Red LED Stop Time – Red LED SPM – Red LED Warning (Setpoint) Time – Red LED Limit Time (Setpoint) – Red LED	
Inputs:	Encoder: UP/Down Valve:	see below 120vac (optional 24vdc)
Output Circuit:	Two captive contact N.O. (held Closed) safety relays in series. Isolated (DRY) Normally open contacts --||--||-- Alarm relay will close when a warning or failure setpoint is exceeded.	
Operating Temperature:	0° to 50° C	
Enclosure:	Lockable NEMA 12 steel	
Enclosure Dimensions:	8” (203mm) Height x 7” (178mm) Width x 4” (127mm) Depth	

Encoder	
Cable:	Cable: 40’ (12m) is supplied standard (30m max). Gauge: 24AWG – 6 conductors plus drain Rating Rating: 300vac @ 60c
Sensor Specs:	Type: RS422 24vdc @.15amps Resolution: Better than .01” (254 parts/inch or 10 parts/mm max) Magnet: PN 40-014, Bracket: PN 40-015 EMC: EN 61326-1:2013
Operating Temp.:	0° to 50° C
Dimensions:	40-009 4” (10.7” 272mm total length, 4.3” 110mm sensor area) linear transducer with 40’ (12m) cable mounting brackets and magnet 40-010 8” (14.7” 372mm total length, 8.3” 210mm sensor area) linear transducer with 40’ (12m) cable mounting brackets and magnet 40-011 16” (22.5” 572mm total length, 16.1” 410mm sensor area) linear transducer with 40’ (12m) cable mounting brackets and magnet 40-012 24” (30.4” 772mm total length, 24.0” 610mm sensor area) linear transducer with 40’ (12m) cable mounting brackets and magnet
Warranty:	1 year

WARNING: The entire machine safety system must be tested at the start of every shift. Machine testing should include: (1) proper machine operation and stopping capability; and (2) verification of proper installation and settings of all point of operation guards and devices before the operation is released for production.

1) The bottom of the Stopping Performance Monitor box has two 1/2" conduit size holes punched in it. The right punch-out will provide for AC power, down valve, and emergency stop circuit lines. The left punch-out is used for the encoder cable only. **Do not run the encoder cable in the same punch-out hole as the high voltage lines.**

2) Mount the Stopping Performance Monitor controller box in a visible location.

3) Mount the Linear Sensor to a fixed part of the Press and out of the way of being struck. Do not allow any other metal or conductive material to come with 0.5" from the Sensor housing. Install both provided brackets within 2.5" from both ends of the Linear Sensor.(see Appendix C for details)

4) Secure the provided magnet to the moving part of the Press (Ram) in such a way that it rides just over the surface of the Linear Sensor (about .1" above). The magnets maximum length of travel should keep it over 3.5" away from both ends of the Linear Sensor. Under No Circumstance should the magnet not be allowed to move with the Ram at all times. (See Appendix C for details)

5) Connect the encoder cable wires to P1 in the LT-1900 box. (See Appendix C for details).

   Supplied standard is 40' of shielded cable, however, the maximum length that can be used is 100' and you may shorten the cable to any length under 100'.

6) Tap off the Up/Down Valve Signal (in parallel), Line side, and run this wire to Terminal 9 of the main enclosure. Next, repeat the tap for the UP Valve signal, but both Line and Neutral to Terminals 13 & 14.

   NOTE: if your Valves are 24vdc, then the LT-1900 must be ordered or modified for 24vdc Valve operation. Terminal 9 is +24v, Terminal 13 is +24vdc, and Terminal 14 is Ground.

7) **Connect the Emergency Stop Circuit to the Output Relay Contact Terminals 7 & 8 so that the Stopping Performance Monitor can control the Stop Circuit. Use Terminals 15 & 16 for a 2nd stop circuit if in a dual stop circuit system.**

8) Connect power to the circuit through Terminals 10 G,11 N, and 12 L.

9) Read ANSI Standard B11.1-2009 for guidelines on how to determine stop limit setpoints and safety distances *(see Appendix A: Standards and Requirements, page AA-1)*.

Drive Failure

Description: When voltage is applied to the Valve (calling for motion) the Stopping Performance Monitor will de-energize its safety relays and issue a C8 error code if it does not see motion of the Press within the Drive Failure Set-Point delay period. This detects faulty wiring, or bad Linear sensor.

At what value should it be set? This set-point should be set as low as possible, but higher than the time it takes for the Press to start moving. Initially the delay is set to 3 which equals .3 seconds. If this value is too high, the Press could completely cycle without ever detecting the Drive Failure.

To change set-point:

a) Turn the keyswitch to "Select Warning Time."

b) Push both the REV and FWD keys until the "Stopped/No Motion" LED indicator turns off.

c) The display now shows drive failure delay time in tenths of seconds (i.e., 10 = 1.0 seconds).

d) Select a new value using the REV and FWD push buttons. When the keyswitch is turned, the new value is stored.

Half Way Down Test

Description. This test provides a Stop time that can be used in determining the Press stop time used in the safety distance formula. The test allows the Press to move half way down and automatically stops by opening up the LT-1900 safety relays. Refer to ANSI Standard B11.1-2009 *(see Appendix A: Standards and Requirements, page AA-1).*

To run test.

a) Place the Press at top stop, turn keyswitch to "Select Limit Time" and Press the REV and FWD keys until the digital display shows C6.

b) Move the keyswitch back into the RUN position and cycle the Press.

c) The Stopping Performance Monitor will open its relay contacts when the Press travels half way down from top stop, then automatically computes the stop time.

Up From Bottom Stop Test

Description. The LT-1900 will allow the Press to move full down and then half way back up before opening up its safety relays. This test provides a Stop time that can be used in determining the Press Stop time used in the safety distance formula.

To Run Test. Simply go into the half way down test and hit the "+" key to change the display from C6 to C11, then follow steps b) and c) of the half way down test.

Stop Time Warning and Failure

Description. When voltage is removed from both the Up and Down Valves, the LT-1900 will determine how long it takes for the Press to come to a complete stop.

a) If the actual stop time exceeds the warning set-point, then the amber warning light will come on to indicate that you are getting close to the failure set-point.

b) If the actual stop time exceeds the failure set-point, then the red failure light will come on and the safety relays will de-energize and shut down the Press from further cycles until you clear the error.

What value should it be set? Read ANSI Standard B11.1-2009 before going any further (see *Appendix A: Standards and Requirements, page AA-1*). The failure set-point is used in the safety distance formula; the larger the value, the further you will have to place your guards from the pinch point, but you won't have to replace the stopping performance monitor as often.

To change set-point:

a) Turn the keyswitch to the "select warning time" position.

b) Select a new warning set-point using the REV and FWD push buttons.

c) Turn the keyswitch to the "select limit time" position.

d) Select a new failure set-point.

e) Turn the keyswitch back to "run."

Stroke Length

Description. The LT-1900 needs to know the length of a full Press stroke. You must enter this value into the LT-1900. This allows the LT-1900 to determine Speed and the halfway points.

To change this set-point:

a) Turn the keyswitch to the “select warning time” position.

b) Push both the REV and FWD keys until the “Warn time” LED turns off.

c) Push both the REV and FWD keys (again) until the “STOP Time” and “SPM” LED’s turn on.

d) Select the new Stroke Length value using the REV and FWD pushbuttons. 4.5” Stroke length = 045

Storing New Set-Point Values

When the keyswitch is moved back into the “run” position, the new settings are permanently stored in nonvolatile memory and does not require a battery.

Reset

Use the “reset” position to clear faults when they occur. Reset will not reset set-points.

Starting the Press

a) The LT-1900 receives a Valve signal (up or down) that there should now be motion.

b) If no motion is detected by the Stopping Performance Monitor within the Drive Failure set-point time the Stopping Performance Monitor shuts down and issues a C8 error code. The error code will be recorded into permanent memory.

c) If motion was detected, the display will show SPM until the stopping performance monitor is reapplied.

Stopping the Press

a) The LT-1900 no longer detects either Valve signal (up or down). This indicates motion should stop or has stopped.

b) The internal Stopping Performance Monitor timer starts to count in 1 millisecond increments.

c) The display shows the accumulating stop time rising.

d) If the current stop time exceeds the warning set-point, then the amber warning light will turn on, but no error will have occurred.

e) If the current stop time exceeds the failure set-point, then the amber warning light will turn off and the red failure light will turn on. The final stop time will be recorded into permanent memory along with the failure code.

f) If the final stop time is less than the failure set-point by more than 80%, then the amber warning light will come on and an error code of C10 will be issued, but not recorded. This indicates that the actual press stopping time is too low compared to the set-point. This may indicate a faulty encoder or that someone has tampered with the set-point by raising it up to prevent shut downs.

g) The final stop time will be displayed until the next cycle starts.

Motion Detection

If the Press moves and the LT-1900 has not received a Valve signal (up or down), the LT-1900 will shut down and turn on both the amber warning and red failure lights. An error code C7 will be issued to permanent memory and may indicate incorrect wiring.

USB Data Port

LT-1900 Linear Stopping Performance Monitor

The LT-1900 USB port can be used to monitor the RAM position along the Linear Sensor, as well as other information like RPM, Valve position, Setpoints, etc.

The USB port requires a Silabs CP210x USB driver installed on your PC computer to setup a virtual serial COM port. After installing the driver and plugging in the USB cable (LED D20 next to the USB port, should now be lit) you can communicate via your own programming or via a terminal emulation program set to 230400 Baud 8N1 XON/XOFF.
At power up the LT-1900 will transmit the following in plain ASCII text:

4LT
1,4
XXXX
E
CODE aaa, WARN bbb, FAIL ccc, TIME ddd, MOTF eee, ST LNG fff, STF ggg
em

The above translates to the following:

XXXX	Current Sensor Position location where 0 is 3.5" from cable end (254 cnts/ inch).
aaa	Any Fault code that was on display at power down last time
bbb	Stop motion warning setpoint (in msec)
ccc	Stop motion failure setpoint (in msec)
ddd	Stop time recorded with last fault (in msec)
eee	Motion Detect timeout setpoint (in 10th of seconds)
fff	Current Stroke Length Value (must be smaller than active sensor area)
ggg	Calculated Stroke Length factor based on fff

To read the status of the LT-1900 unit, you must transmit the ASCII character 'P'.

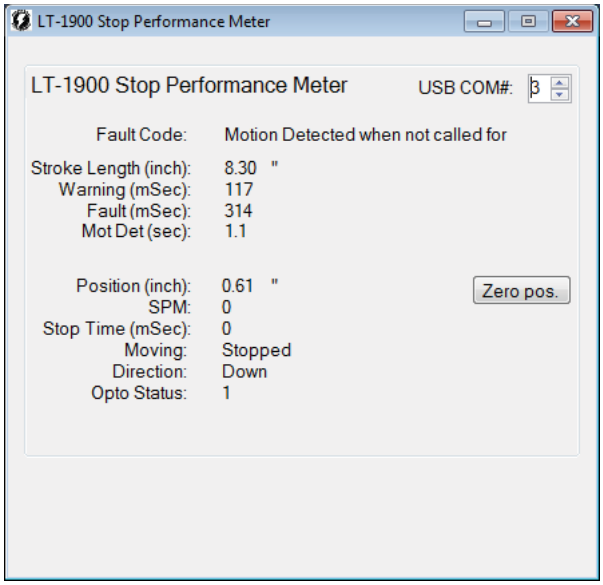
The response from the LT-1900 is as follows:
A,B,C,D,E,F,G,H,I,J,K,L,M,N,O,P@ (all in ASCII text)

Note: There are a total of 18 values transmitted (Tokens). Each Token is ASCII characters that represent a numeric value.

Token	Definition
A	Current Sensor Position (0=3.5" from cable end). To get the position in inches = A/254
B	SPM (Strokes per Minute)
C	Stop Time (mSec)
D	Moving (1=stopping , 0=should be moving)
E	Direction (1=down, 2=up towards cable)
F	Time (mSec) in 1 deg of movement
G	Degrees of travel per every 262mSec
H	Degrees of Travel in Motion Detect Fault
I	Direction Reversal (1=yes, 0=no)
J	Opto Sensor Valve Inputs (1=both OFF, 0= either ON)
K	Keyswitch Position
L	Keyswitch Position
M	Current Fault Code (0=none, 1=Lack of motion, 2=Fail time exceeded, 3=Motion Detect, 4=Sensor failure)
N	Warning Setpoint (mSec)
O	Failure Setpoint (mSec)
P	Fail Time (mSec) if Fault Code = 2
Q	Motion Detect Fault Setpoint (10^{th} of seconds)
R	Stroke Length (in 10^{th} of inches)

You can also download a stand-alone Windows PC program that allows you to view the LT-1900 data in 1 window. The screen shot below is the LT-1900 PC program.

Optional LT1900.exe Windows Program



Safety Distance Calculation

Description: Safety Distance is the separation (in inches) between the hazardous point of operation and the guarding device (i.e., light curtain). Your guarding device manual will contain a formula to calculate this distance. You need to know the total response time of your system (the time from a body part blocking the guard to the total cessation of motion).

The LT-1900 Linear can calculate Safety Distance based on the ANSI Standard B11.1-2009 formula.

IMPORTANT NOTE: This Safety Distance Calculation does not take into account the FAIL set-point. As wear occurs, the stop time will increase until it reaches the FAIL setpoint (limit). This will increase the Safety Distance if the FAIL setpoint is larger then the actual stop time.

ANSI Standard B11.19-2003 Formula for calculating safety distance of light curtains from hazardous point of operation.

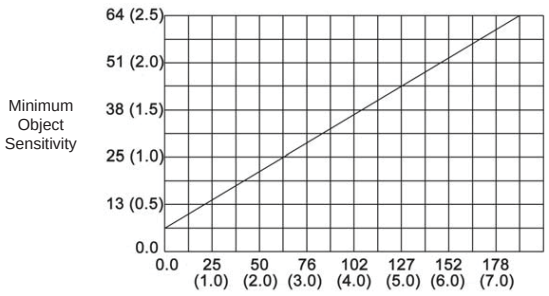
The effective sensing field of the device shall be located at a distance from the nearest recognized hazards such that the operator or others cannot reach the hazard with a hand or other body part before cessation of motion during the hazardous portion of the machine cycle.

The point at which a device responds to an intrusion may vary. The devices should be located or adjusted such that the device always responds to the intrusion at or prior to the safety distance. Care should be exercised when installing the device to ensure that it does not detect false signals from other devices in the area.

Usually the electro-optical presence-sensing device is used in a manner that provides a protected zone in front of the primary work area with auxiliary devices or guards used to protect secondary access areas. In some cases, however, mirrors may be used in conjunction with the device to provide 2-, 3-, or 4-sided protection.

The machine stop time should be measured with the machine running at its fastest speed with its heaviest die or tooling and the stop time being measured at the 90° position in the downstroke.

Minimum Object Sensitivity and D(pf)



Dpf = 3.4 (S-7) mm
(Dpf = 3.4 (S-0.275) in)

The following formula should be used when calculating the safety distance:

Ds = K x (Ts + Tc + Tr + Tbm) + D(pf)

Ds = Minimum safety distance between the device and the nearest point of operation hazard (in inches).

K = Hand speed constant. This value has been determined by various studies and, although these studies indicate speeds of 63 in/sec to over 100 in/sec, they are not conclusive determinations. The employer should determine this value by considering all factors, including physical ability of the operator.

Ts = Stop time of the machine tool measured by a stop time measurement device.

Tc = Response time of the control system (usually is taken care of by the measurement device).

Tr = Response time of the presence-sending device and it's interface, if any, as stated by the manufacturer or measured by the employer.

Tbm = Additional time allowed for the brake monitor to compensate for variations in normal stopping time.

D(pf) = Depth Penetration Factor. Added distance as indicated by Figure 4 on this page. The minimum object sensitivity is stated by the manufacturer. If a Floating Blank is used, use the Dpf numbers found in the Floating Blank section of this manual.

Penetration factor, Dpf, for presence-sensing devices used in a vertical application with object sensitivity less than 64 mm (2.5 inches)

Dpf, the distance added to the safety distance due to the penetration factor compensates for varying object sensitivities of electro-optical presence-sensing devices.

When blanking features are used and when the blanked area is not completely filled by the workpiece or part, or by mechanical guarding, the minimum object sensitivity can be calculated as:

Object sensitivity = size of the blanked area plus minimum object sensitivity without blanking.

Once this value is found, then determine Dpf.

If the entre blanked area is filled with mechanical guarding or other fixed material or guards, use the device's object sensitivity to determine Dpf.

Appendix "A"
Standards and Requirements

ANSI Standard B11.1-2009

The total stopping time of the Press should include the total response time of the control system and the time it takes the Press to cease slide motion. The following formula should be used when calculating the safety distance (D_s):

$D_s = K (T_s + T_c + T_{bm})$

Where:
K = 63 inches/second (hand speed constant).
T_s = the stop time of the Press measured from the final de-energized control element, usually the air valve.
T_c = the response time of the control.
T_{bm} = the additional time allowed by the stopping performance monitor before it detects stop time deterioration.

NOTE - $Ts + Tc$ are usually measured by a stop time measuring device.

When the press stopping-performance monitor timer or STOP position sensor is changed, the safety distance should be recalculated.

American National Standards Institute Standard Requirements

ANSI B11.1-2009 Safety Requirements for Mechanical Power Presses
ANSI B11.2-2013 Safety Requirements for Hydraulic and Pneumatic Power Presses
ANSI B11.3-2012 Safety Requirements for Power Press Brakes
ANSI B11.4-2003 (R2008) Safety Requirements for Shears
ANSI B11.5-1988 (R2008) Iron Workers - Safety requirements for Construction, Care and Use
ANSI B11.6-2001 (R2007) Safety Requirements for Manual Turning Machines
ANSI B11.7-1995 (R2010) Cold Headers and Cold Formers - Safety Requirements for Construction, Care and Use
ANSI B11.8-2001 (R2007) Safety Requirements for Manual Milling, Drilling and Boring Machines
ANSI B11.9-2010 Safety Requirements for Grinding Machines
ANSI B11.10-2003 Safety Requirements for Metal Sawing Machines
ANSI B11.11-2001 (R2007) Safety Requirements for Gear & Spline Cutting Machines
ANSI B11.12-2005 (R2010) Safety Requirements for Roll Forming and Roll Bending Machines
ANSI B11.13-1992 (R2007) Automatic Screw/Bar and Chucking Machines - Safety Requirements for Construction, Care and Use
ANSI B11.15-2001 (R2007) Safety Requirements for Pipe, Tube and Shape Bending Machines
ANSI B11.16 (MPIF #47) - 2003 (R2009) Safety Requirements for Powder/Metal Compacting Presses
ANSI B11.17-2004 (R2009) Safety Requirements for Horizontal Hydraulic Extrusion Presses
ANSI B11.18-2006 Safety Requirements for Machines Processing or Slitting Coiled or Non-coiled Metal
ANSI B11.20-2004 (R2009) Safety Requirements for Integrated Manufacturing Systems
ANSI B11.21-2006 Safety Requirements for Machine Tools Using Lasers for Processing Materials
ANSI B11.22-2002 (R2007) Safety Requirements for Numerically Controlled Turing Machines
ANSI B11.23-2002 (R2007) Safety Requirements for Machining Centers
ANSI B11.24-2002 (R2007) Safety Requirements for Transfer Machines

ANSI B11.TR1-2004 Ergonomic Guidelines for the Design, Installation and Use of Machine Tools

ANSI B11.TR2-1997 Mist Control Considerations for the Design, Installation and Use of Machine Tools Using Metalworking Fluids

ANSI B11.TR3-2000 Risk Assessment and Risk Reduction - A guide to estimate, evaluate and reduce risks associated with machine tools

ANSI B11.TR4-2004 Selection of Programmable Electronic Systems (PES/PLC) for Machine Tools

ANSI B11.TR5-2006 Sound Level Measurement Guidelines

ANSI B11.TR6-2010 Safety Control Systems for Machine Tools

ANSI B11.TR7-2007 Designing and Safety for Lean Manufacturing

ANSI Z535.6-2006 Product Safety Information in Product Manuals, Instructions, and other Collateral Materials

Standards are available at:
ANSI
25 West 43rd Street, 4th floor
New York, NY 10036
W: www.ansi.org
T: 1.212.642.4900
F: 1.212.398.0023

Occupational Safety and Health Administration (OSHA)

29 CFR Part 1910 Subpart O

Machinery and Machine Guarding

1910.211 - Definitions.
1910.212 - General requirements for all machines.
1910.213 - Woodworking machinery requirements.
1910.214 - Cooperage machinery. [Reserved]
1910.215 - Abrasive wheel machinery.
1910.216 - Mills and calenders in the rubber and plastics industries.
1910.217 - Mechanical power presses.
1910.217 - (Appendix A) Mandatory requirements for certification/validation of safety systems for presence sensing device initiation of mechanical power presses
1910.217 - (Appendix B) Nonmandatory guidelines for certification/validation of safety systems for presence sensing device initiation of mechanical power presses
1910.217 - (Appendix C) Mandatory requirements for OSHA recognition of third-party validation organizations for the PSDI standard
1910.217 - (Appendix D) Nonmandatory supplementary information
1910.218 - Forging machines.
1910.219 - Mechanical power-transmission apparatus.

Appendix "B"
Definitions and Display Codes

Indicator Definitions

Stop Warning. Press stopping time exceeded the warning set-point but not the limit set-point. The relay contacts remain closed and the unit does not need to be reset.

Stop Failure. Press stopping time exceeded the limit set-point. The relay contacts open and the unit must be reset.

Drive Failure. No motion was detected within the set-point time (initially .5 sec) by the Stopping Performance Monitor when the machine was released. A C8 error code is also displayed.

Stopped/No Motion. Directly linked to the 120VAC valve Input. This LED is off when the 120VAC signal is present indicating the stopping performance monitor is released.

Ready. Directly linked to the captive contact output relays to indicate that the circuit is closed.

Not Ready. Directly linked to the captive contact output relays to indicate that the circuit is open which indicates that either the keyswitch is in the reset position or a failure occurred.

Stop Time (msec). Indicates that the digital display is showing the Press stopping time in milliseconds.

SPM. Indicates that the digital display is showing the Press speed in strokes per minute.

Warn Time. Indicates that the digital display is showing the select warning time set-point. This means you can change the warning set-point time.

Limit Time. Indicates that the digital display is showing the select limit time set-point. This means you can change the failure set-point time.

Display Codes

C1 Stop Circuit Relay(s) On, Should Be Off

Cause(s): a) Relay contact may be welded.

b) Relay drive circuit may be faulty.

Cure(s): Push nylon tie-wraps out of the way and remove both relays (do not cut the tie-wraps).

a) Check relay contacts for scoring or pitting. If so, check the circuit that the Stopping Performance Monitor is in series with for current draw. Do not exceed half the relay rating. If you see a spark on the relay contact when the relays energize or de-energize, then you are drawing too much current though the relay contacts. Try placing a MOV across the terminals of any relay coils that are energized by this circuit.

b) Also, check for bad solder joints or shorts on the bottom of the board holding the relays.

C2 Stop Circuit Relay(s) Off, Should Be On

Cause(s): a) Relay drive circuit may be faulty.

b) VAC line voltage may be low.

Cure: Check solder joints, relays, and line voltage.

C 3 Failure in EEPROM (nonvolatile memory)

Cause(s): a) VAC line voltage may be low.

b) Bad EEPROM.

Cure: Check line voltage. May require new EEPROM.

C 4 EEPROM Needs to be Initialized

Cause: After a C3 error code, the computer tries to initialize the EEPROM over and over until it takes.

Cure: Computer will automatically try to reprogram chip.

C 5 Internal RAM Fault in Microprocessor

Cause: Ram integrity test failed.

Cure: Shut off power for 1 minute and try again. May require a new microprocessor chip.

C 6 Half Way Down Selected

The Stopping Performance Monitor will allow the Press to travel only half way down from its starting point and compute a stop time.

Cause: The keyswitch was moved into the select limit position and both REV and FWD keys were pushed simultaneously.

Cure: Cycle the Press.

C 7 Motion Detected While Press Stopped

Cause: Stopping Performance Monitor did not get Input signal and Press moved.

Cure(s):
a) Check solenoid connections
b) Check encoder mounting and coupling.
c) Tighten chain or belt.
d) Place MOV devices on power terminals of nearby motors, solenoids, etc.

C 8 Drive Failure (no signal from encoder)

The computer received a 120VAC signal from the Input telling it to expect the Press to start moving; after an initial waiting period (from .1 to 2 seconds) the computer shut downs because it did not receive any signal back from the encoder to indicate that the Press did move.

Cause(s):
a) Encoder cable hooked up wrong.
b) Faulty encoder.
c) Drive Failure set-point too low.

Cure: Check the "Stopped/No Motion" yellow LED on the front panel, it should be off only when you initiate the Press. If it is off at any other time, then the Clutch Input is not hooked up to the valve.

If the Press did not have a chance to move before the error occurred, then you must change the Drive Failure set-point *(see Adjusting the Set-Points, page 4* and 5). Check the encoder cable wiring on both ends.

C 9 Keyswitch in Reset

This will remove any error code(s) from memory and erase the last stop time.

Cause: Keyswitch was moved from the "run" position into the "reset" position.

Cure: Place keyswitch back into "run" position.

C11 Up from Bottom Selected

The LT-1900 will allow the Press to move full down and then half way back up before opening up its safety relays. This is used to check for proper counter balance.

Cause: Hitting the "+" key while in C6 mode.

Cure: Cycle the Press.

C12 Linear Sensor Failure

No data received from Sensor.
Check connector / wiring P1.

Appendix “C”
Dimensions and Diagrams

Cabinet Mounting

Dimensions

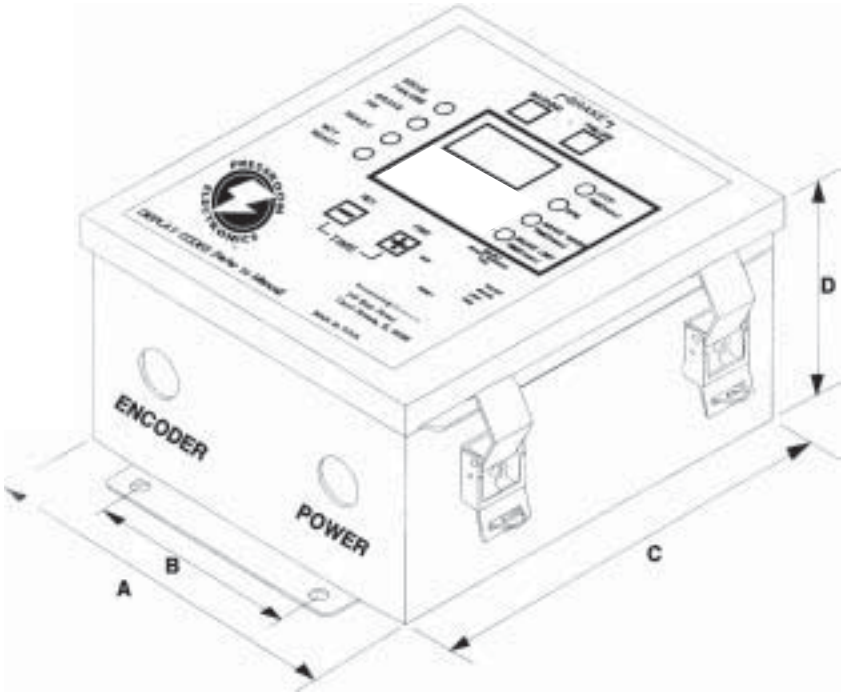
A 7.00” (178mm) Width

B 4.00” (102mm) Distance between holes on each side

C 8.00” (203mm) Height

D 4.00” (102mm) Depth

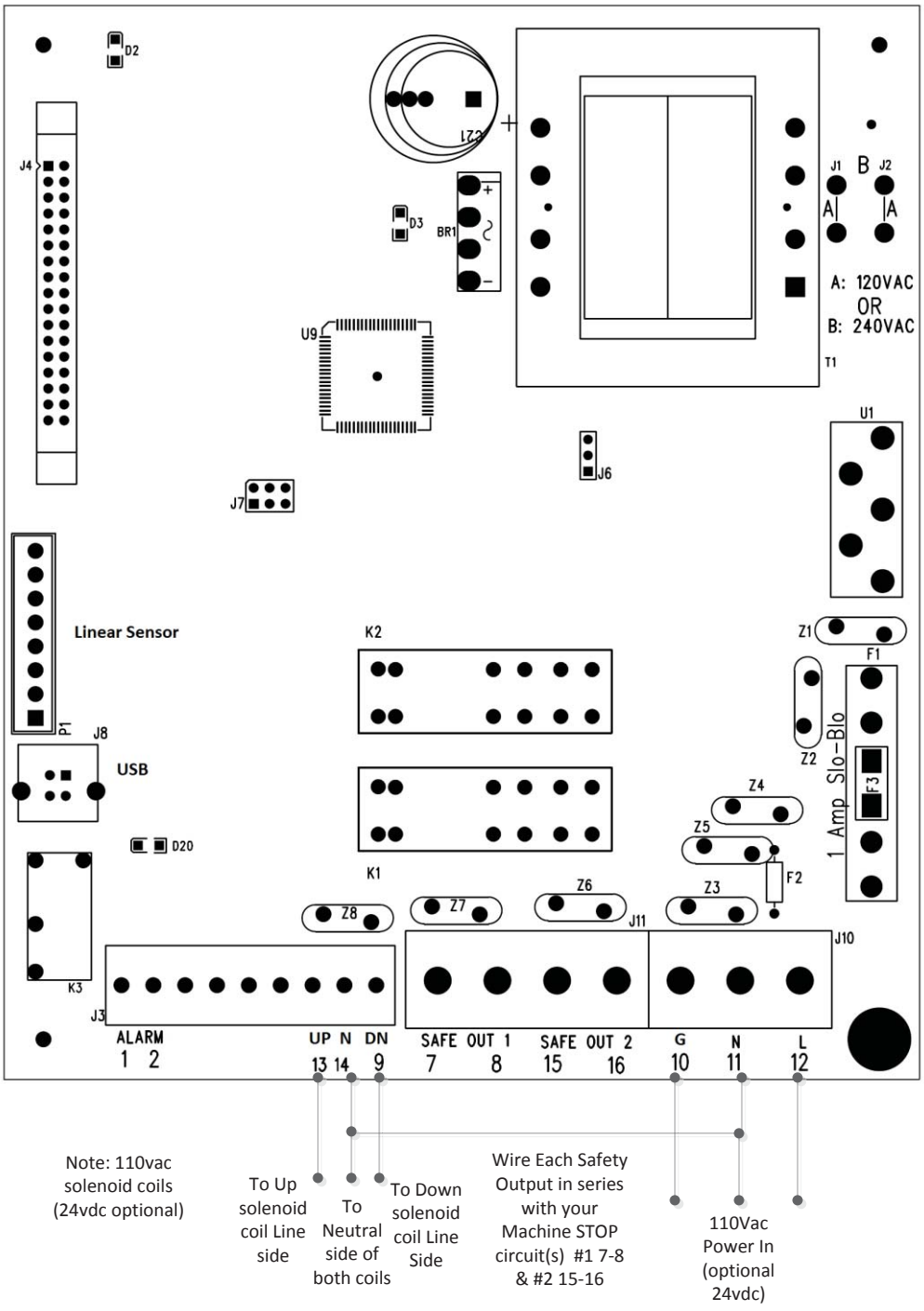
8.65” (220mm) Distance between holes top to bottom



Wiring Terminal Table

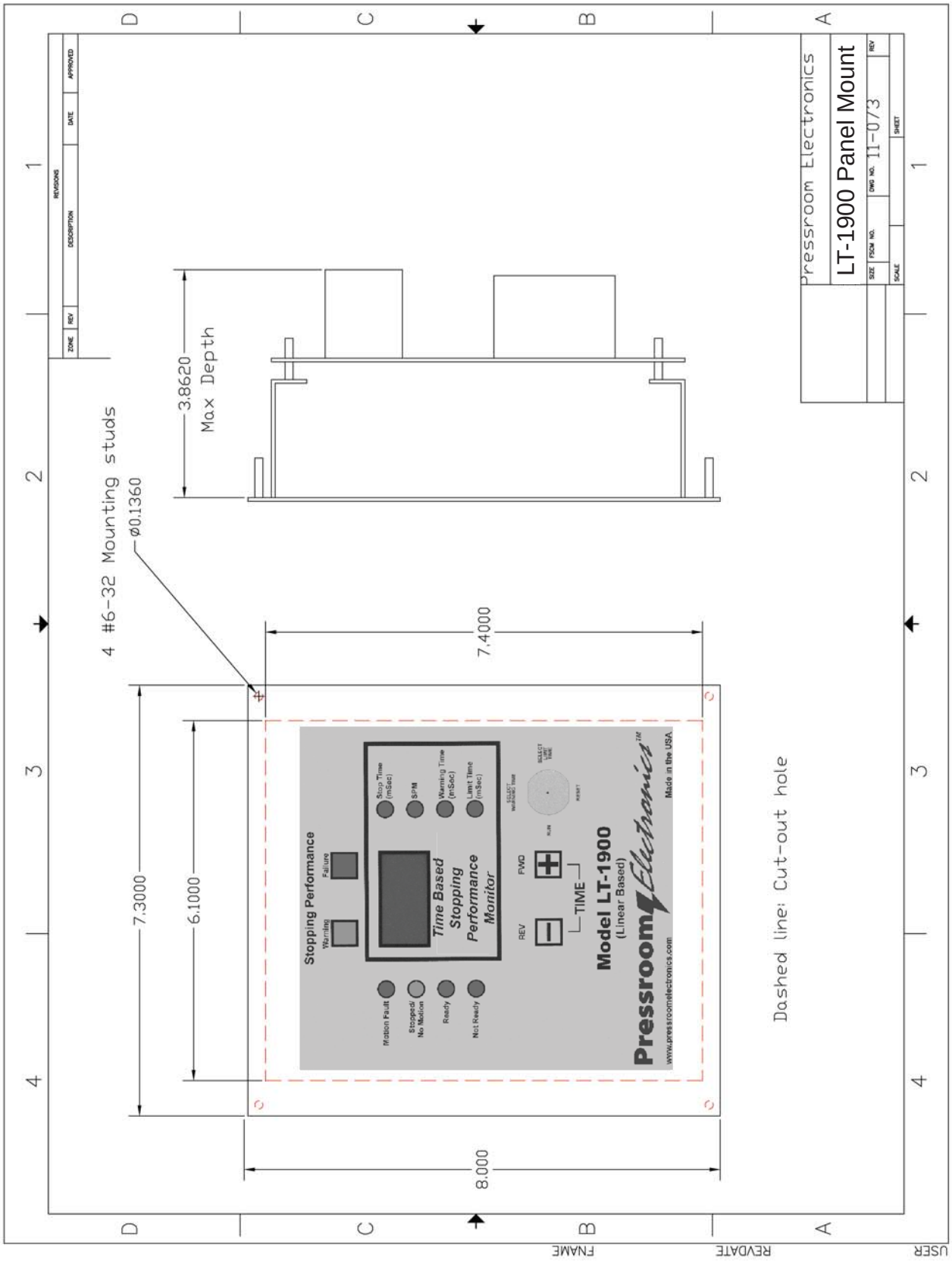
Terminal	Label	Definition
1,2	ALARM	N.O. dry contact closes when error occurs, during a stop time warning, or stop time failure. N.O.
7-8 & 15-16	SAFETY	Two captive contact safety relays in series forming a N.O. dry output contact for use in series with your stop circuit.
9	DOWN CYLINDER	Signal from the coil of the Down cylinder (must order 110vac or 24vdc version)
10	EARTH	Earth ground (to case).
11	N	Neutral side of 120VAC / 240VAC.
12	L	Line side of 120VAC / 240VAC.
		NOTE: If you have the 24VDC option (no transformer), then Terminals 11 and 12 are used as your +/- terminals. These terminals are non-polarized so you can hook up power in either direction (+ - or - +).
13	UP CYLINDER	Signal from the coil of the Up cylinder (must order 110vac or 24vdc version)
14	UP/DWN COMMON	Neutral or Neg common line for both UP and DOWN Cylinders
P1-1	Linear Sensor	Empty
P1-2	Linear Sensor	Green (+CLK)
P1-3	Linear Sensor	Yellow (-CLK
P1-4	Linear Sensor	Gray (+DATA)
P1-5	Linear Sensor	Pink (-DATA)
P1-6	Linear Sensor	White (+24vdc)
P1-7	Linear Sensor	Empty
P1-8	Linear Sensor	Brown (Ground)

PCB Wiring Terminal Layout



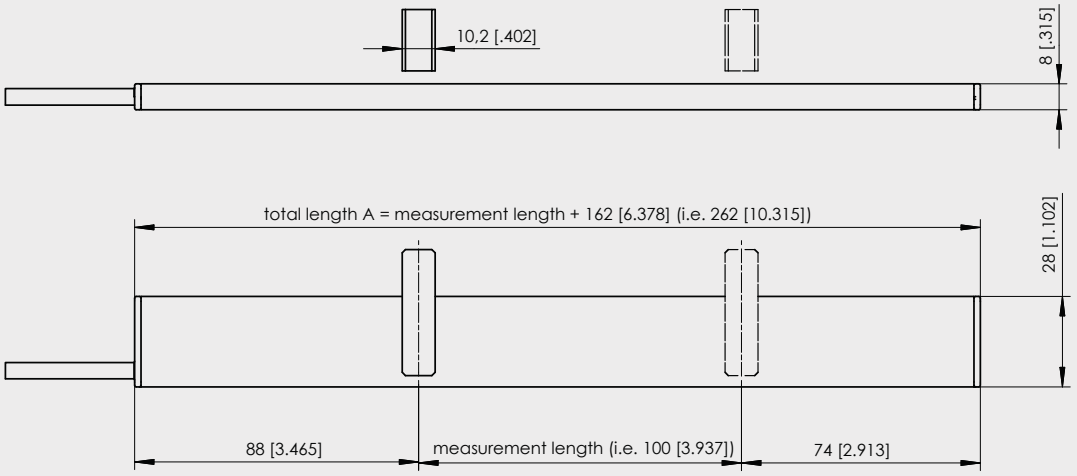
Appendix “C”
Dimensions and Diagrams

Panel Cut-Out Dimensions (#11-073)

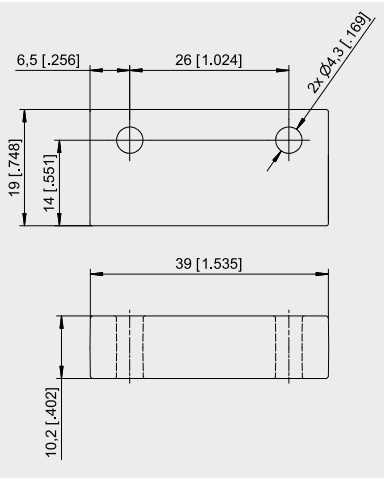


Encoder Mounting

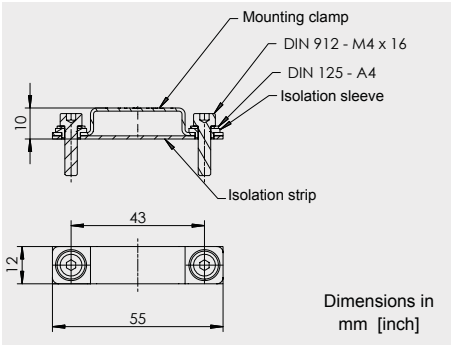
Outline drawing



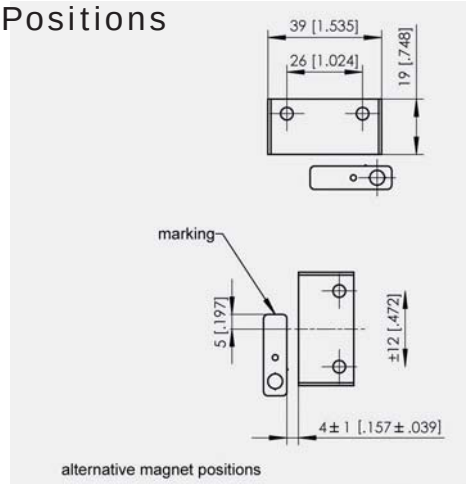
Magnet



Mounting Bracket



Alternate Magnet Positions



REPLACEMENT PARTS LISTING OF MODEL LT-1900

Part Number	Description
11-001	Metal box enclosure (with gasket) (NEMA 12, IP 64)
11-073	Metal panel mount (with gasket) open frame for LT-1900
15-079	8 position mini-Euro plug connector (Linear Sensor)
20-022	1A Slo-Blo nano SMF fuse
26-101	Front panel overlay (LT-1900)
32-101	Kaco Safety relay
42-001	Software microprocessor chip (specify square or rectangular)
52-002	Display board
52-084	Ribbon Cable
52-202	Encoder board
52-319	Computer / Power supply / Relay board (with CPU)
40-009	4” (10.7” 272mm total length, 4.3” 110mm sensor area) linear transducer with 40’ (12m) cable mounting brackets and magnet
40-010	8” (14.7” 372mm total length, 8.3” 210mm sensor area) linear transducer with 40’ (12m) cable mounting brackets and magnet
40-011	16” (22.5” 572mm total length, 16.1” 410mm sensor area) linear transducer with 40’ (12m) cable mounting brackets and magnet
40-012	24” (30.4” 772mm total length, 24.0” 610mm sensor area) linear transducer with 40’ (12m) cable mounting brackets and magnet
40-013	Reserved
40-014	LT-1900 sensor Magnet (requires 1)
40-015	LT-1900 Sensor Mounting Bracket (requires 2)

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Notes

Notes

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Manufacturer warrants that this product will be free from defects in material and workmanship for a period of one year from the date of shipment thereof. Within the warranty period, manufacturer will repair or replace such products which are returned to it with shipping charges prepaid and which will be disclosed as defective upon examination by the manufacturer. This warranty will not apply to any product which will have been subject to misuse, negligence, accident, restriction, and use not in accordance with manufacturer's instructions or which will have been altered or repaired by persons other than the authorized agent or employees of the manufacturer.

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