

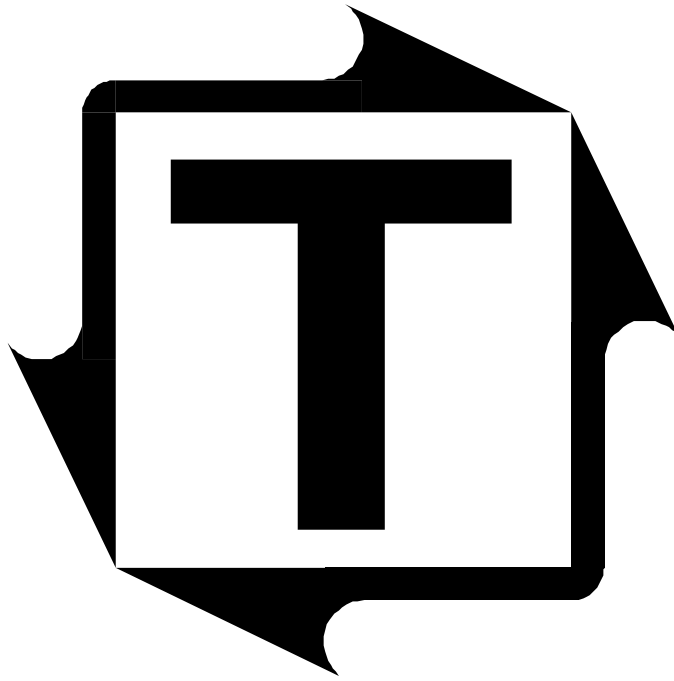
ZT-SLIM



Tonnage Load Monitor

By Toledo Integrated Systems

User's Manual



ZT-SLIM User's Manual

Rev C 1-20-2025



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Limited Warranty

This unit is warranted by the manufacturer, Toledo Integrated Systems, to be free of defects in workmanship and materials for one year from date of manufacturer's shipment. This warranty is limited to repairing or replacing products which manufacturer's investigation shows were defective at the time of shipment by the manufacturer.

All products subject to this warranty must be returned for examination, repair, or replacement

F.O.B. to: Toledo Integrated Systems
1345 Ford St.
Maumee, Ohio 43537

The express warranty set forth herein is in lieu of all other warranties, expressed or implied, including without limitation any warranties of merchantability or fitness for a particular purpose. All such warranties are hereby disclaimed and excluded by the manufacturer.

Repair or replacement of defective products as provided above is the sole and exclusive remedy provided thereunder. The manufacturer shall not be liable for any further loss, damages, or expenses, including incidental or consequential damages, directly or indirectly arising from the sale or use of this product.

Any unauthorized repair voids this warranty.

There are no warranties that extend beyond those expressly set forth herein.

1) System Overview

The ZT-SLIM is made up of separate modules: the ZTSLM, which is the tonnage control module, and the ZT-4T, which is a 4-input signal conditioner. 8-Channel units add an additional ZT-4T module for a total of eight tonnage inputs.

4-CHANNEL UNIT



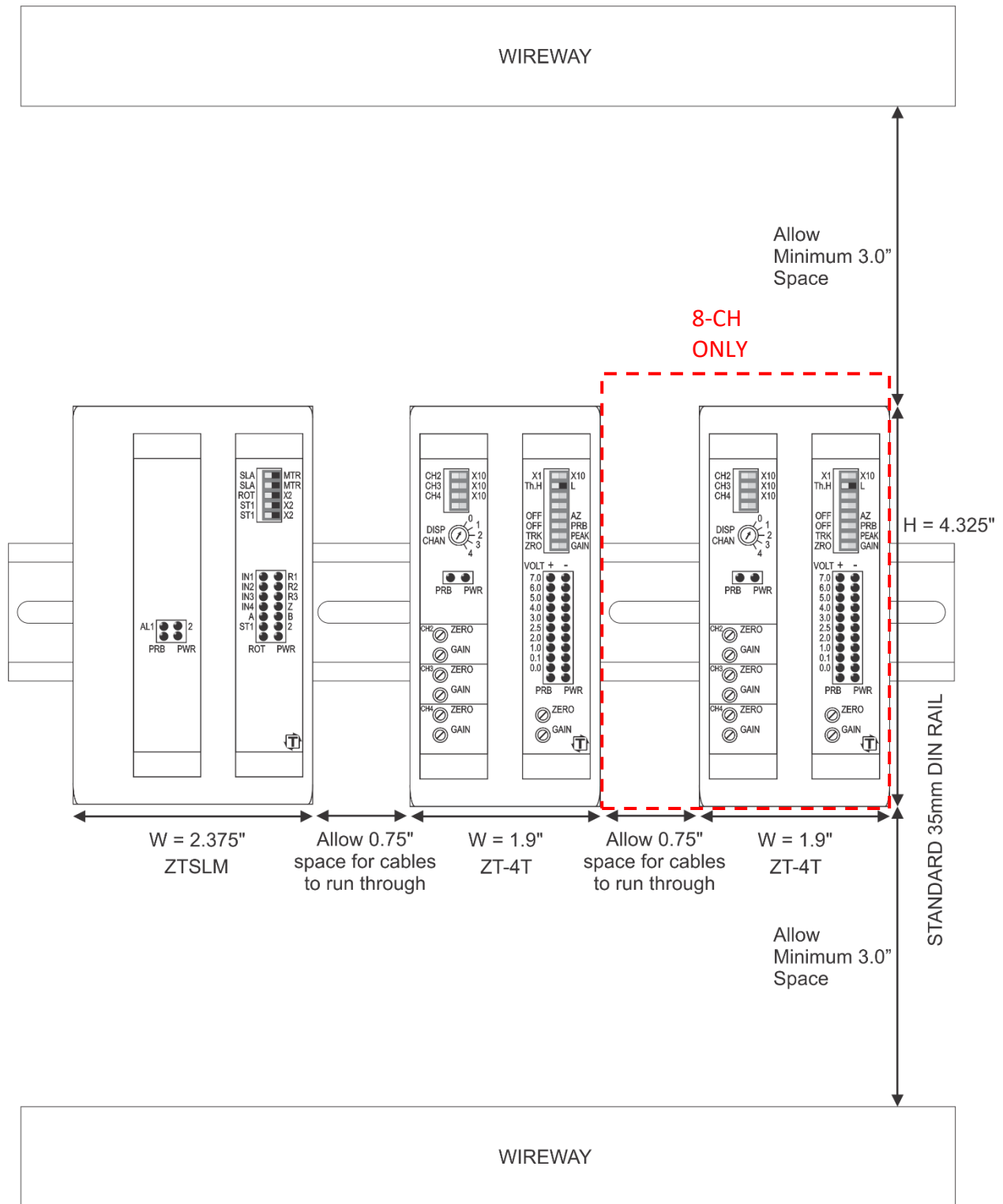
8-CHANNEL UNIT



2) ZT-SLIM Specifications

Tonnage	No. of Channels Sensor Inputs Sensor Excitation Sensor Input Connections Balance Range Gain Ranges Inaccuracy Non-linearity Frequency Response Resolution Calibration Shunt Analog Output	Two or Four (Six or Eight optional) Full bridge strain gage sensors 120 to 1,000 ohms Up to (8) 350 ohm sensors Built-in 10VDC @ 250mA max Terminal blocks +/- 1mV/V of sensor imbalance Low range = x50 to x550 adjustable High range = x500 to x5,500 adjustable +/- 1% of full scale max +/- .02% of full scale max DC to 5 KHz Each channel provides a 5-digit load value in 1024 count resolution Built-in 1 mega ohm (.1%) Track output = -10 to +10VDC
Speed Limit	1200 SPM Max. 2000 SPM Max. 500 SPM Max.	Resolver trigger Probe trigger Threshold trigger
Shutdown Relays		(2) solid state relays (N.O.) – Top and Immediate Stop 0.5 AMP @ 250V AC/DC
Communication	Ethernet TCP/IP Bluetooth RS232/422 Serial	SlimWare HMI and/or Allen Bradley PLC tags support TT ForceView Android app Optional with USB-to-Serial adapter
General	Resolver Encoder Power requirements Operating temperature Enclosure Dimensions 4-Channel Unit Mounting	Built-in excitation supports standard 5000Hz rotor excited positional resolver Incremental (A, B, Z Inputs) 24VDC at 2.2A (4-Channel Unit). 2.9A (8-Channel Unit). 0-50 degrees Celsius 4.525" W x 4.325" H x 4.7" D, or 115mm W x 110mm H x 119mm D +2.15" (55 mm) W for 8-Channel Unit Standard DIN Rail mount

3) Mounting the ZT-SLIM Units



Install the modules on the enclosure's DIN rail by resting the top rail guide on the back of the module on the top of the DIN rail. Pivot the bottom of the module downward until it locks in place. Use a small flat-blade screwdriver to pull down on the red tab if needed.





4) Wire Termination

The ZT-SLIM package comes with wire ferrules of different sizes. Use them to terminate all wires. They provide strain relief which make the wires connect better.

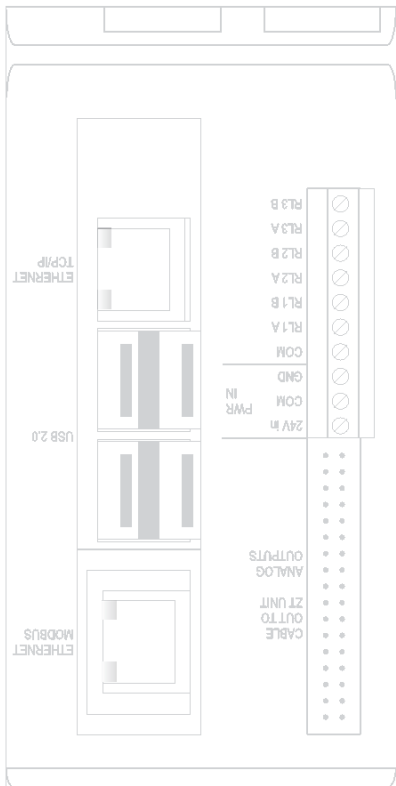
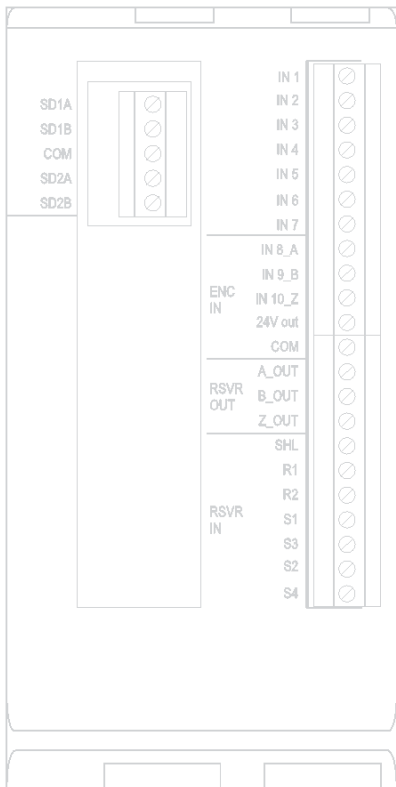


 14AWG Yellow

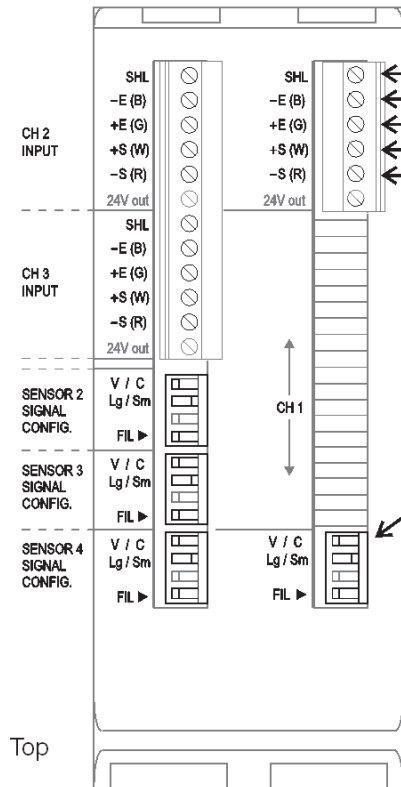
 18AWG Red

 26AWG Grey

5) T400 Sensor Connections/Configurations

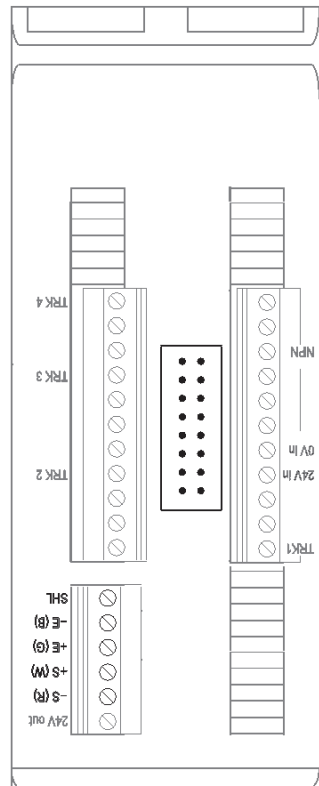


ZTSLM



Top

Bottom



ZT-4T (Group 1)

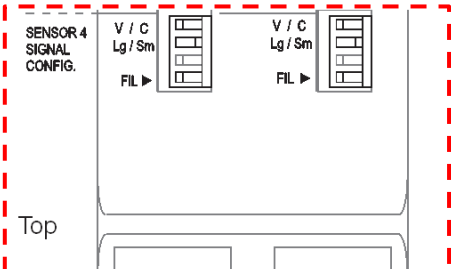
For Outer Slide sensors
Typically 4 sensors

Typical wiring for each channel.

- Shield
- Excitation (Black)
- + Excitation (Green)
- + Signal (White)
- Signal (Red)

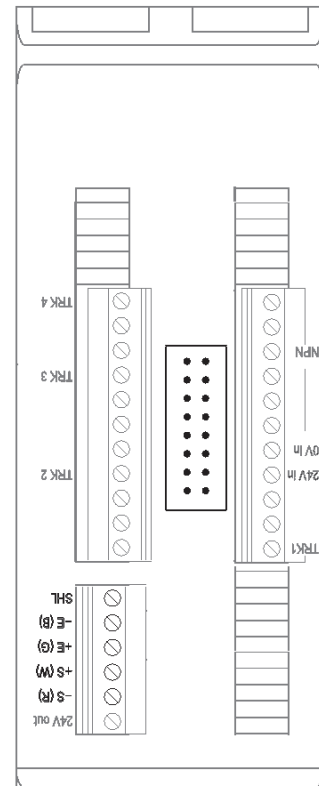
Typical settings for each channel.

- V / C: V = Voltage for Tonnage Sensors
- Lg / Sm: Sm = Small Signal (Un-amplified)
- FIL: No Filter



Top

Bottom



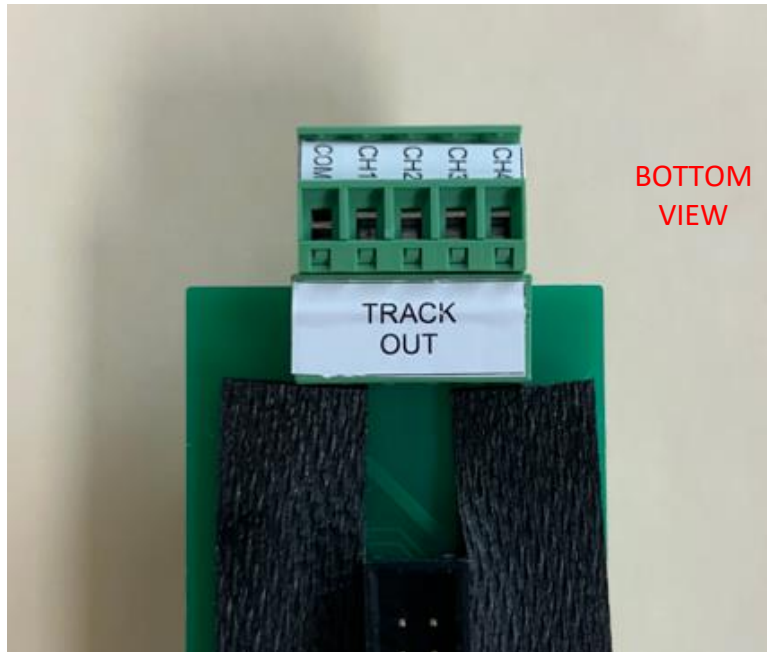
ZT-4T (Group 2)

For Inner Slide sensors
Typically 4 sensors

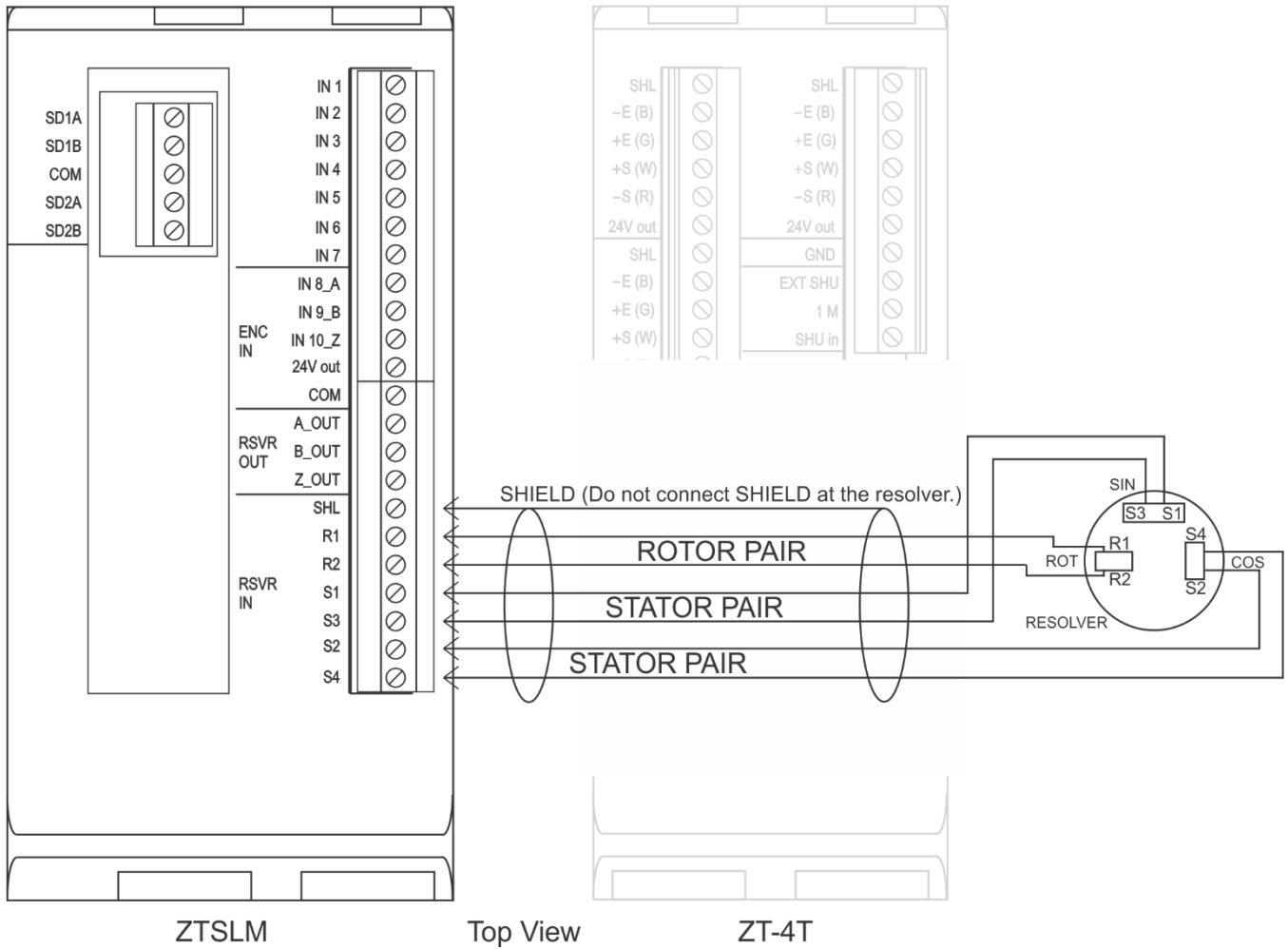
8-CH ONLY

6) Analog Output

Each ZT-4T module provides a user-accessible terminal block on the bottom of the unit. It provides a track tonnage signal for each of the four channels with a range of -10VDC to +10VDC. This signal can be read for real-time live tonnage data.

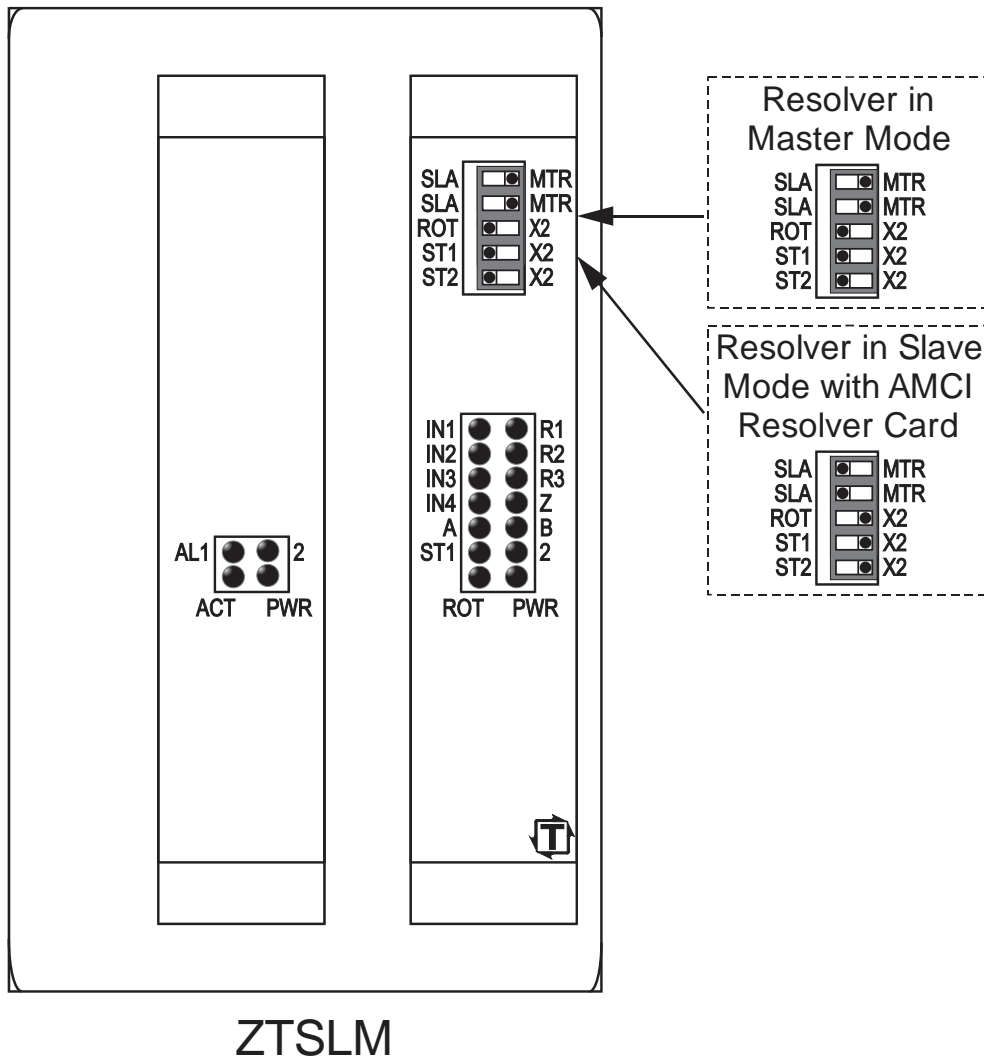


7) Resolver Connection

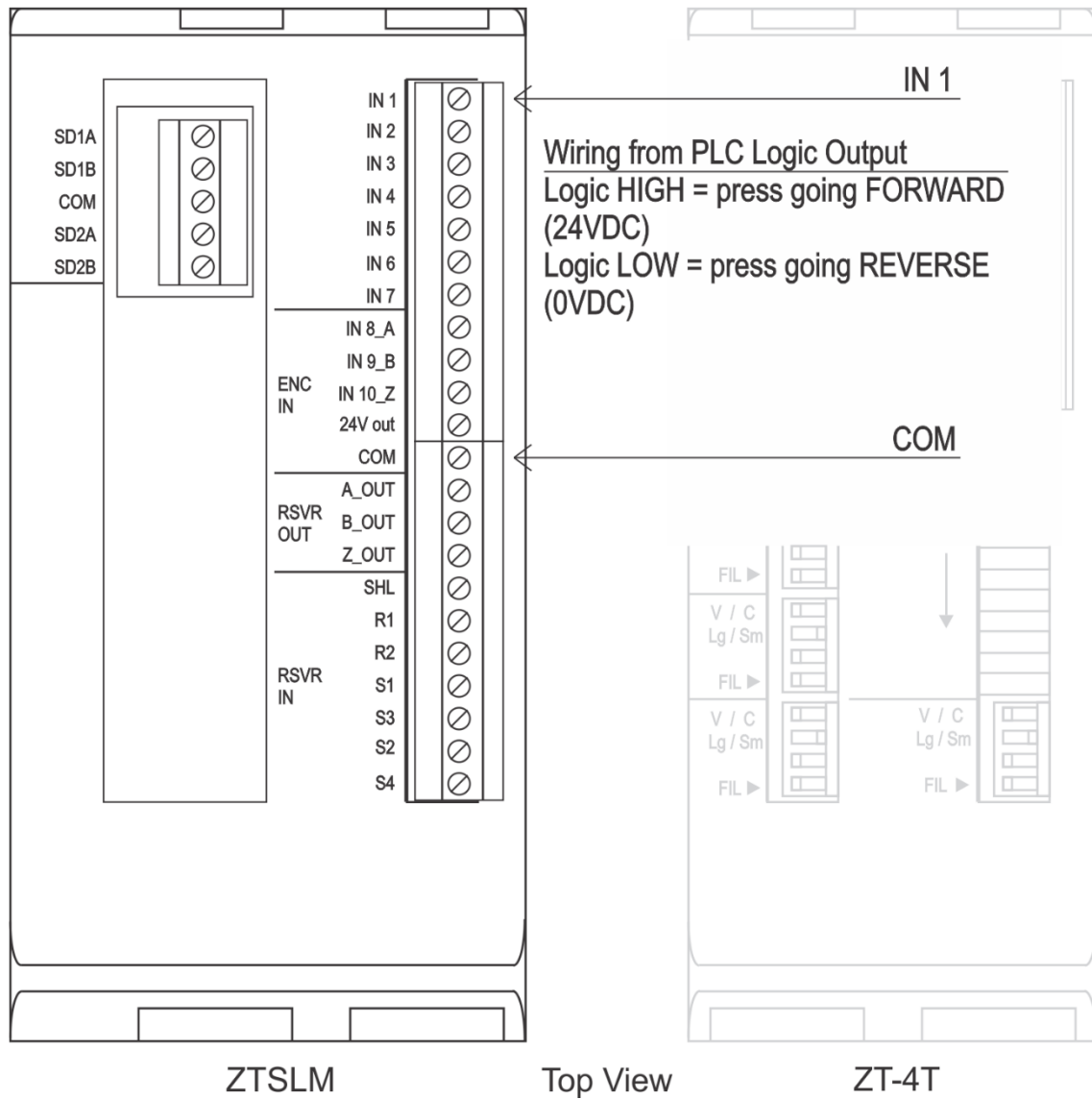


8) Resolver Dip Switch Settings

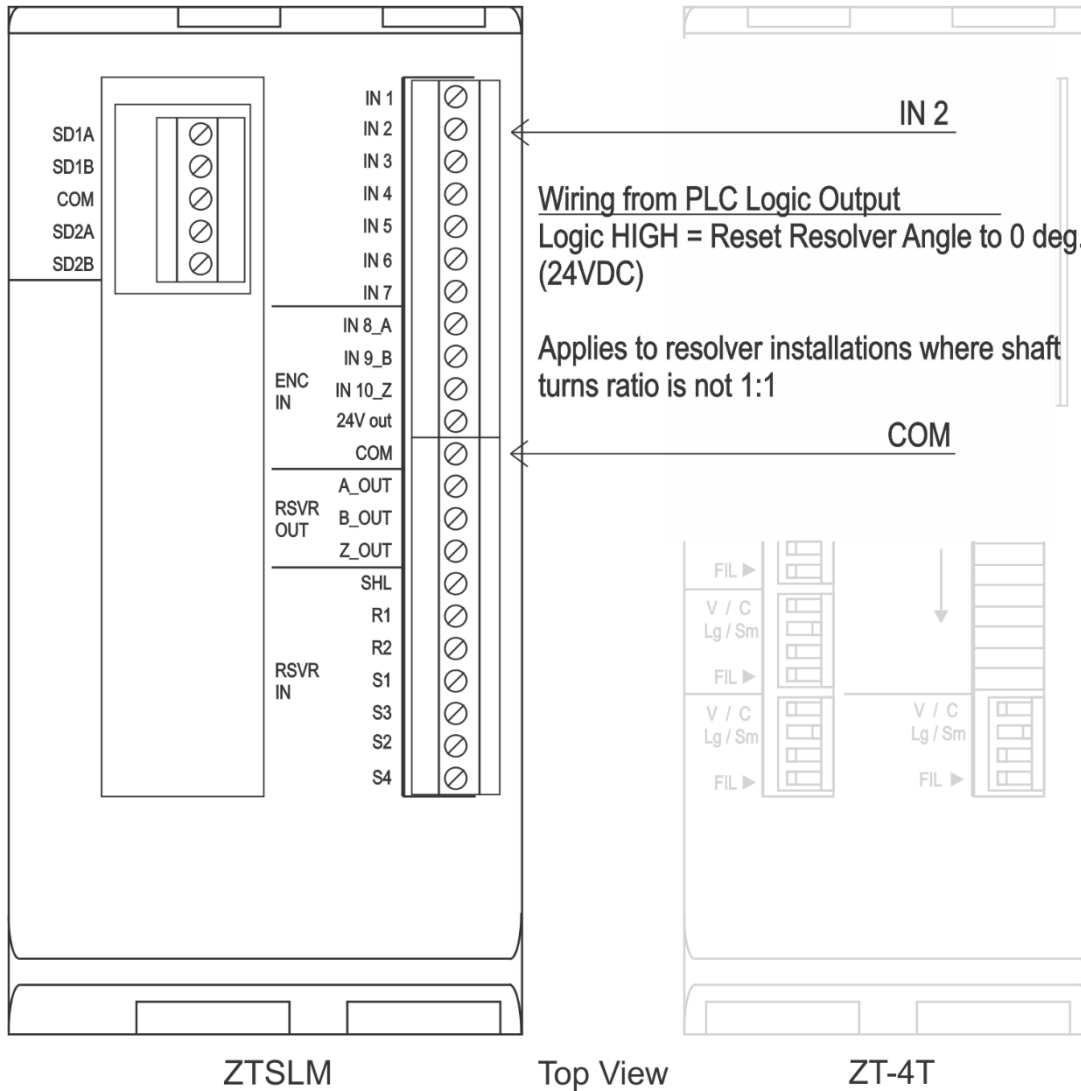
Set Dip-Switches
as shown.



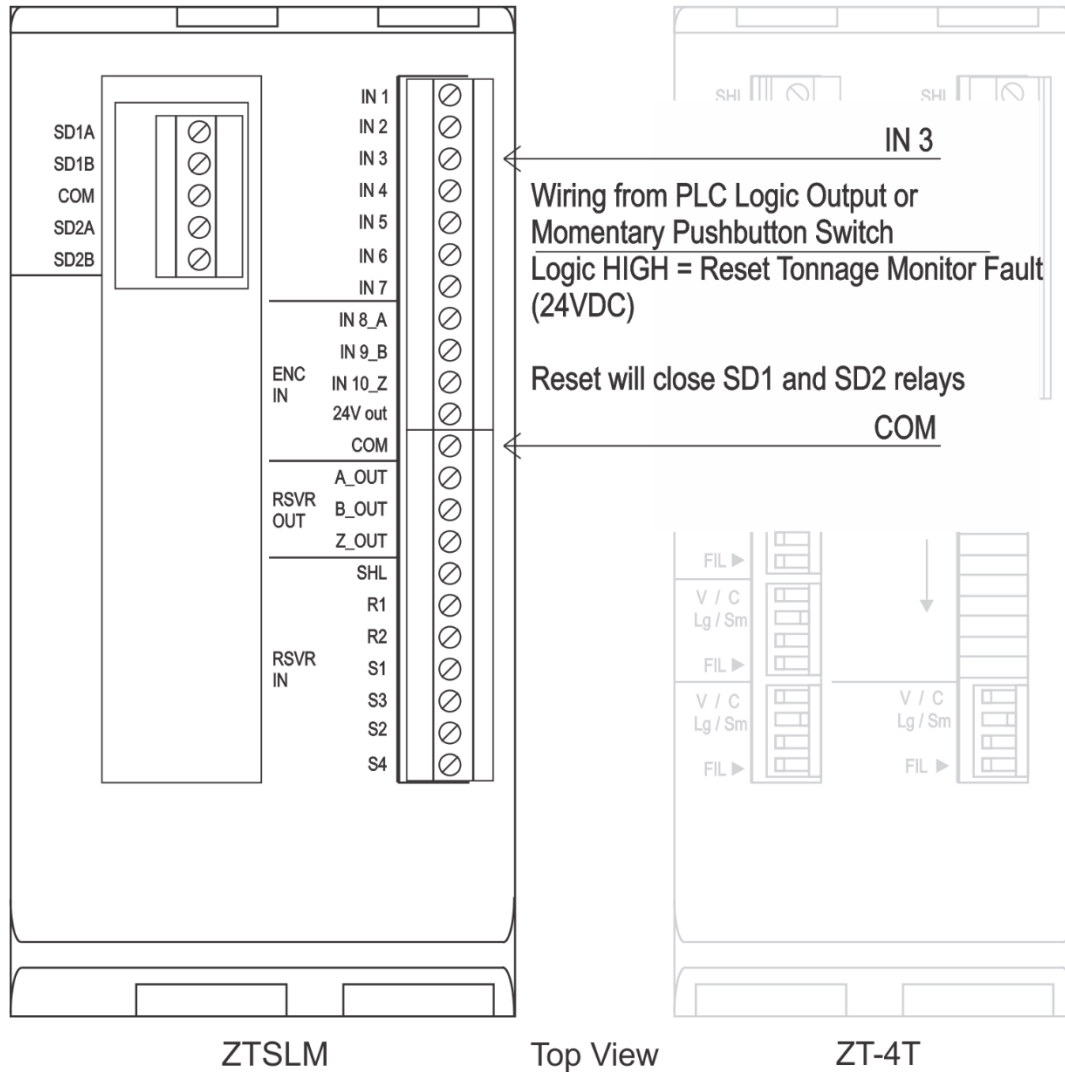
9) Servo Press Direction Signal



10) Resolver Angle Reset Signal

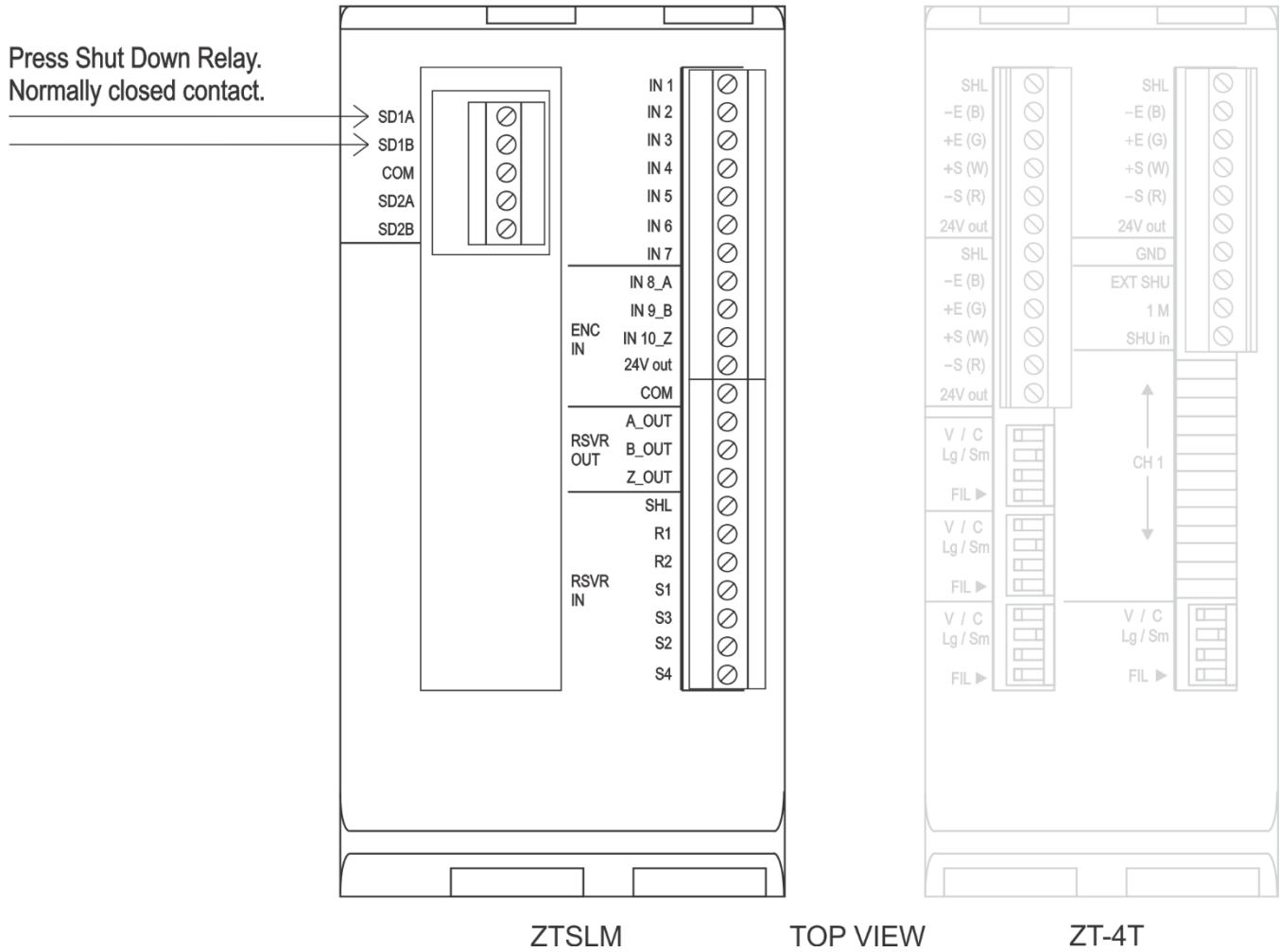


11) Fault Reset Signal

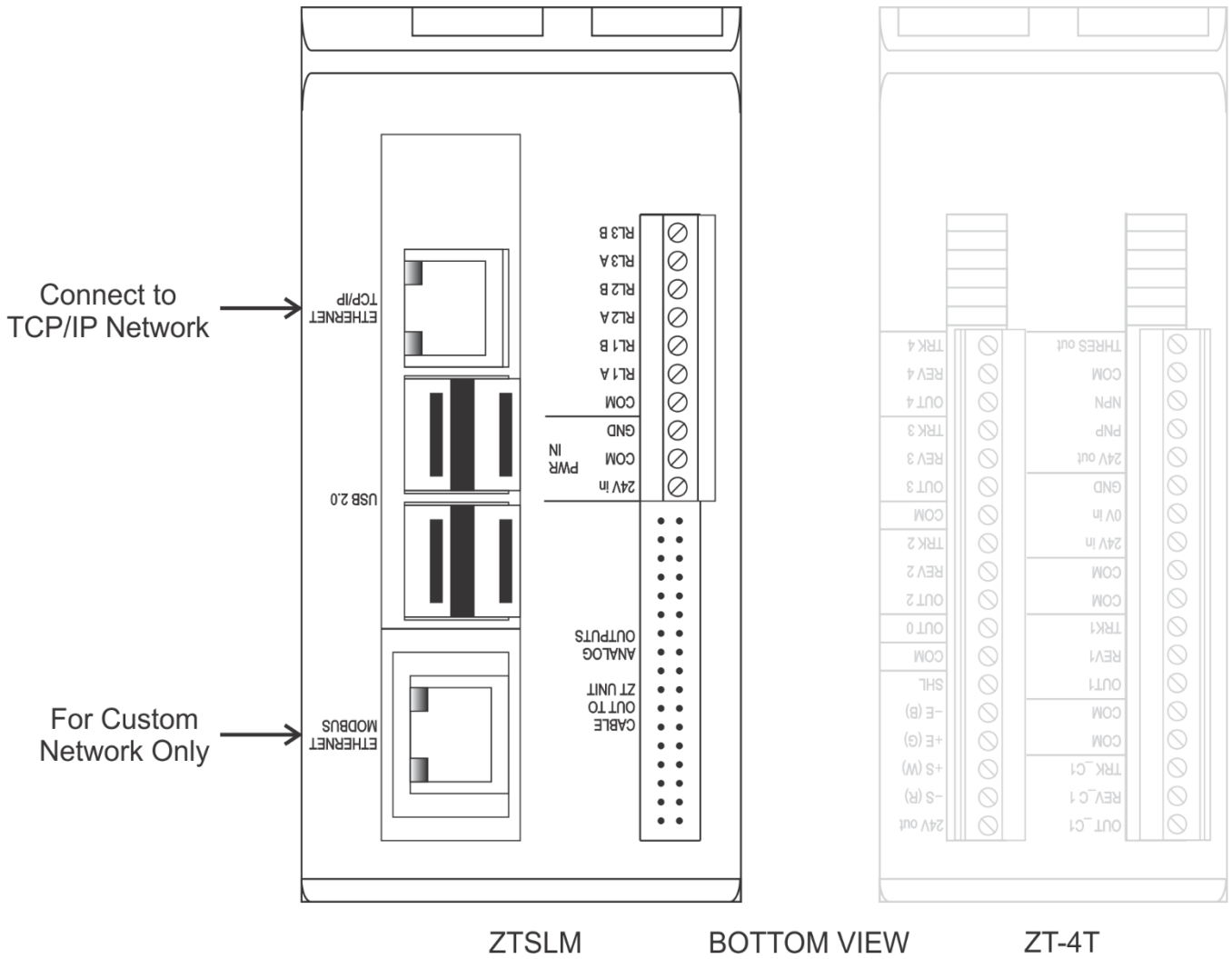


Note: Feature requires ZT-SLIM firmware 1151 or later.

12) Shutdown Relay Connection



13) Network Connection

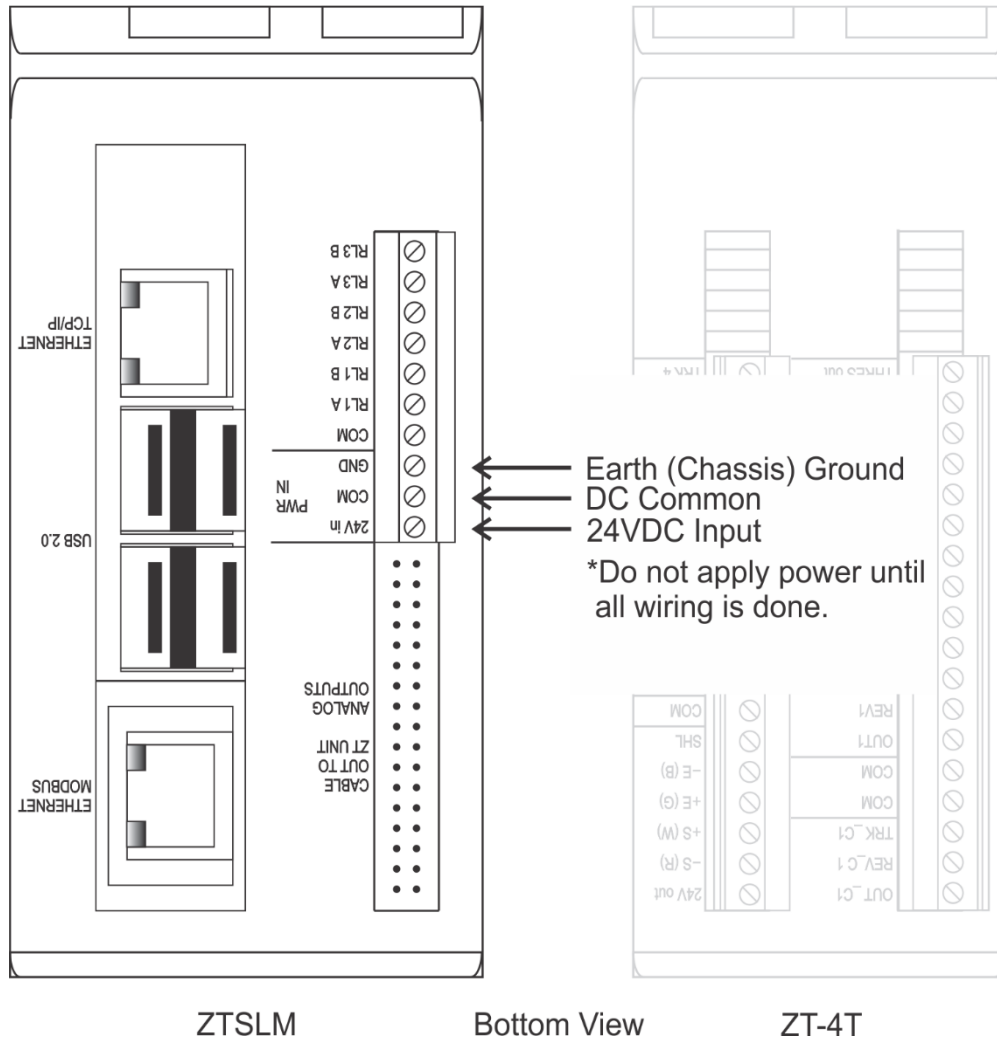


ZTSLM

BOTTOM VIEW

ZT-4T

14) DC Power Connection

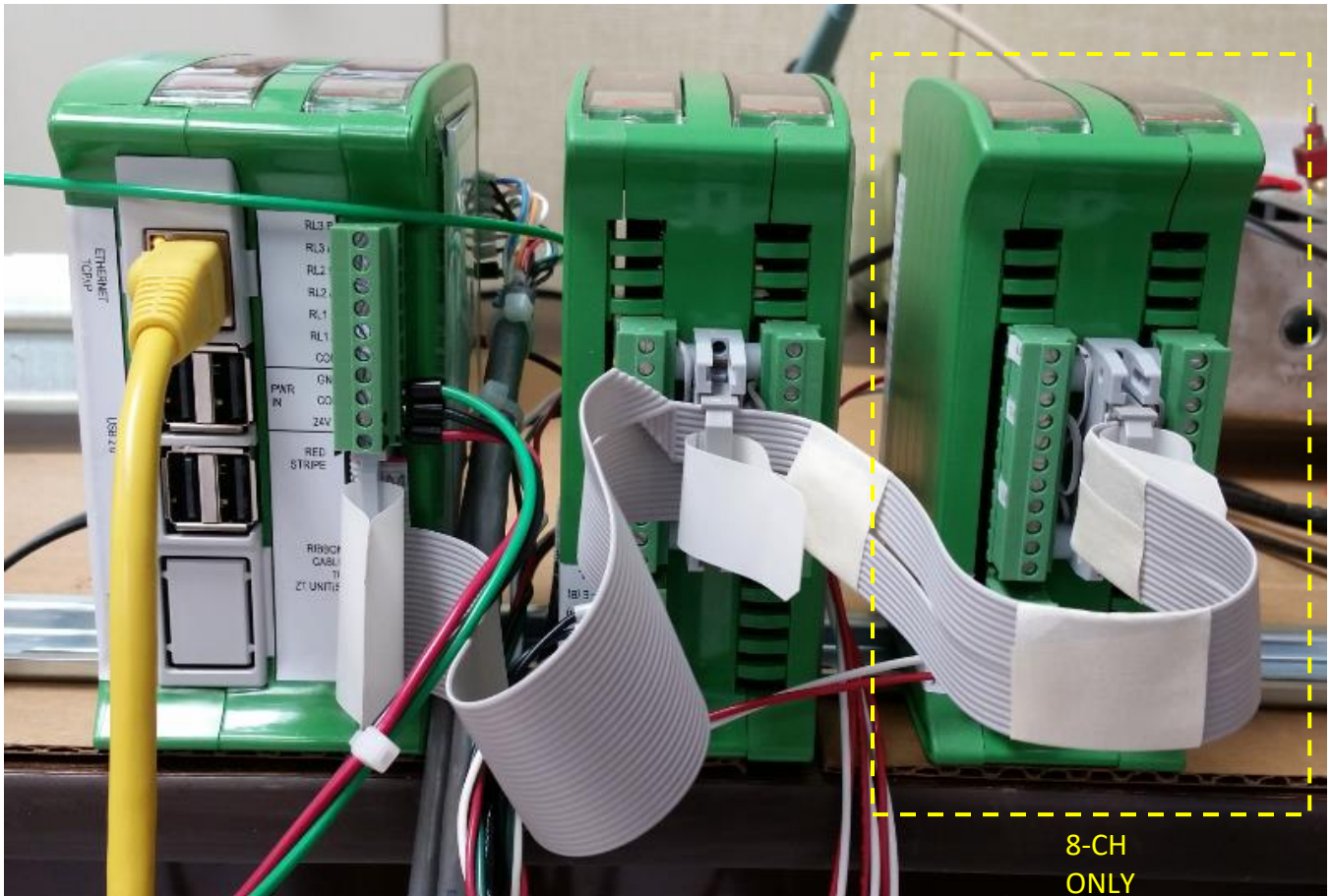


15) ZTSLM to ZT-4T Connection

Connect the ribbon cable from the ZTSLM to the ZT-4T module(s) as illustrated below.

Note: The ribbon cable shown is for 8-Channel systems. It has three connectors, one for each module. 4-Channel systems have only two connectors.

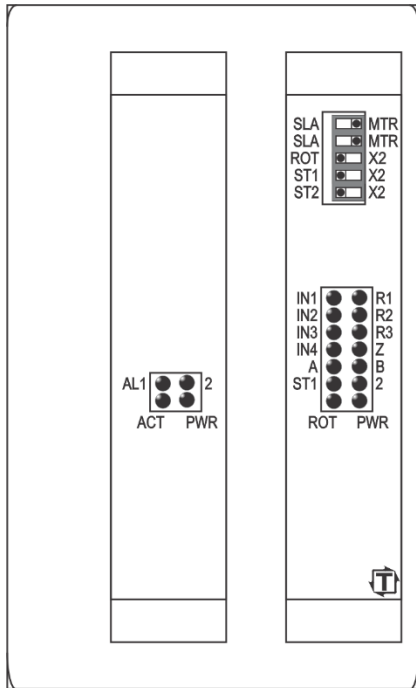
Note: The appearance of the ZT-4T ribbon cable connection might differ from the picture below, depending on the age of your ZT-SLIM. The connection method is the same.



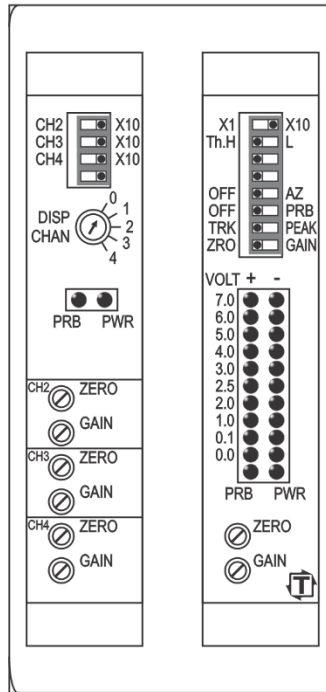
16) Typical Switch Settings

Set Dip-Switches as shown.

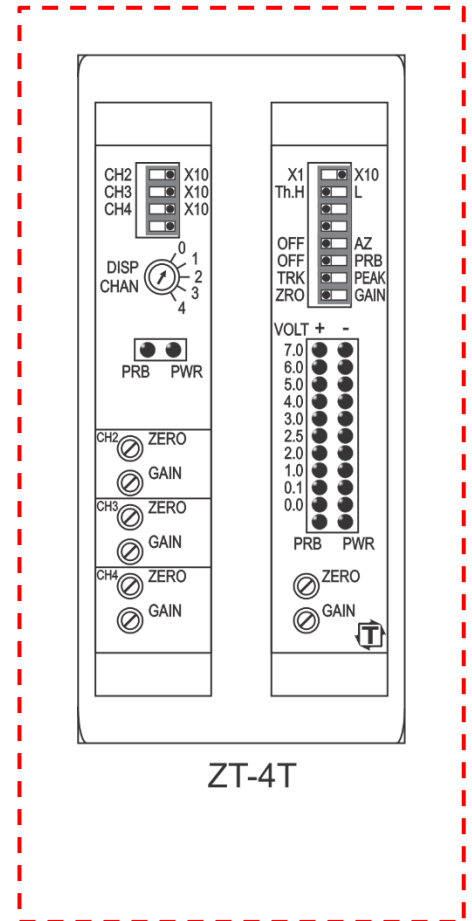
8-CH ONLY



ZTSLM



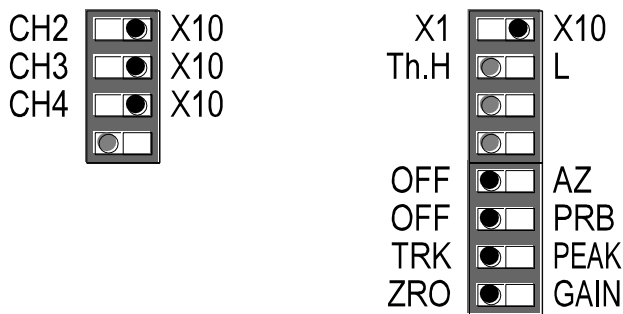
ZT-4T



ZT-4T

17) Calibration Procedures

- 1) Before calibrating the unit, verify each piece of hardware is connected and set up properly.
- 2) With the sensors placed in the best possible location, (see appendix), torque the sensors down to 150 in-lbs on the sensor bolts. Do not put the sensor enclosure covers on yet. You will need to test each sensor location.
- 3) If you have a double action press, you will need to do the following steps for the Outer Slide, and then repeat the same steps for the Inner Slide.
- 4) Find the shut height of the press.
 - Jog the press until the ram is at bottom dead center (BDC) or 180° without the load cells or die in the press.
 - Determine the amount of spacers needed with your load cell. Cycle the press without load cells to insure correct height.
- 5) Place the load cells in the correct position in the press.
 - All load cells should be equal distance from the sides and front and rear. For example, 12" from the sides, 10" from front and rear. Load cells are typically placed at each corner of the press's bed.
 - Cycle the press without hitting the load cells first.
 - Place cardboard on the top and bottom of the load cells.
- 6) Set ZT-4T dip-switches as shown. Set all gain pots to fully clockwise, then dial each gain pot about 12 turns counter-clockwise. This will put the ZT-4T in medium gain range.



- 7) Balance the tonnage sensors.
 - Go to the Calibration page in SlimWare and select "Display Balance".
 - Adjust the ZERO pots until the Balance reads zero in each channel.

8) Cycle the press.

- Select "Capture Tonnage" in SlimWare.
- Further adjust the shut height so that the press impacts the load cells and generates a load at 100% of press capacity. See warning below.

WARNING

Depending on the press capacity and the size of the load cells being used, loading the press at capacity with load cells could indent the ram or bolster. If this is a concern, you may choose to calibrate the press only up to 80% of capacity.

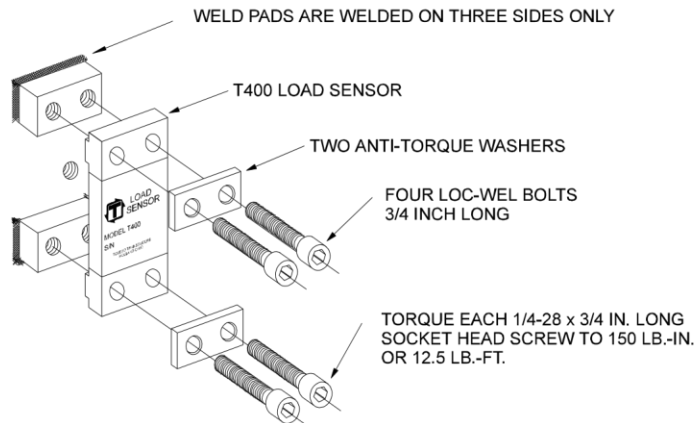
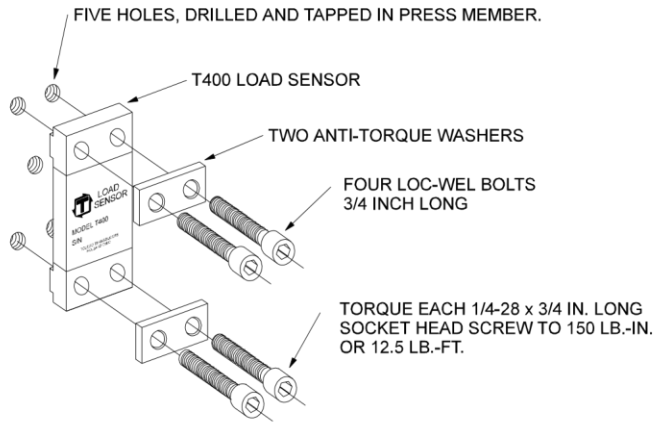
9) Adjust the gain.

- Run the press for 2 cycles at capacity.
- Compare the tonnage readings in SlimWare with the load cell readings.
- Adjust the GAIN pots.
- Repeat until the SlimWare readings match the load cell readings.
- If less gain is needed, change the Gain switch to X1.

10) If you have a double action press, go back to Step 4 to calibrate the Inner Slide.

Appendix

INSTALLING T400 LOAD SENSORS



The above illustrations represent the proper arrangement of Model T400 Load Sensor kit parts using either the Drill and Tap method or the Weld method.

A proper installation is necessary to produce good results.

Before installing the sensors, please read the appropriate instructions listed below.

Sensor Placement	Page 2
Press Frame	Page 3
Pitman Mount	Page 4
Drill and Tap Method of Installing Sensors	Page 5
Weld Method of Installing Sensors	Page 6
T400 Enclosure Mounting Details	Page 7

NOTES:

- 1) (2) SENSORS REQUIRED
- 2) (2) SENSOR ENCLOSURES ARE INCLUDED. THESE HELP PROTECT THE T400 SENSOR GAUGES. THESE ENCLOSURES INCLUDE 1/2" KNOCK-OUT HOLES. IF CONDUIT IS USED, WE SUGGEST USING 1/2" STRAIN RELIEFS IN THE KNOCK-OUT HOLES.

SENSOR PLACEMENT

Sensor location must be determined. You have two locations. The front or the rear of the press. (Shown in the shaded area.)

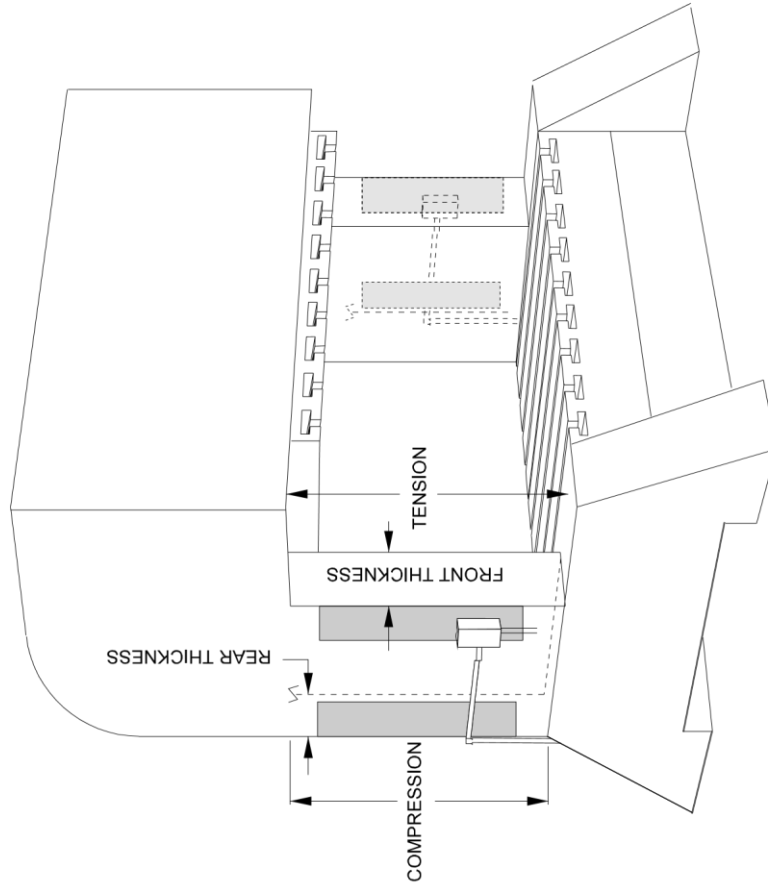
HOW TO DETERMINE THE BEST LOCATION

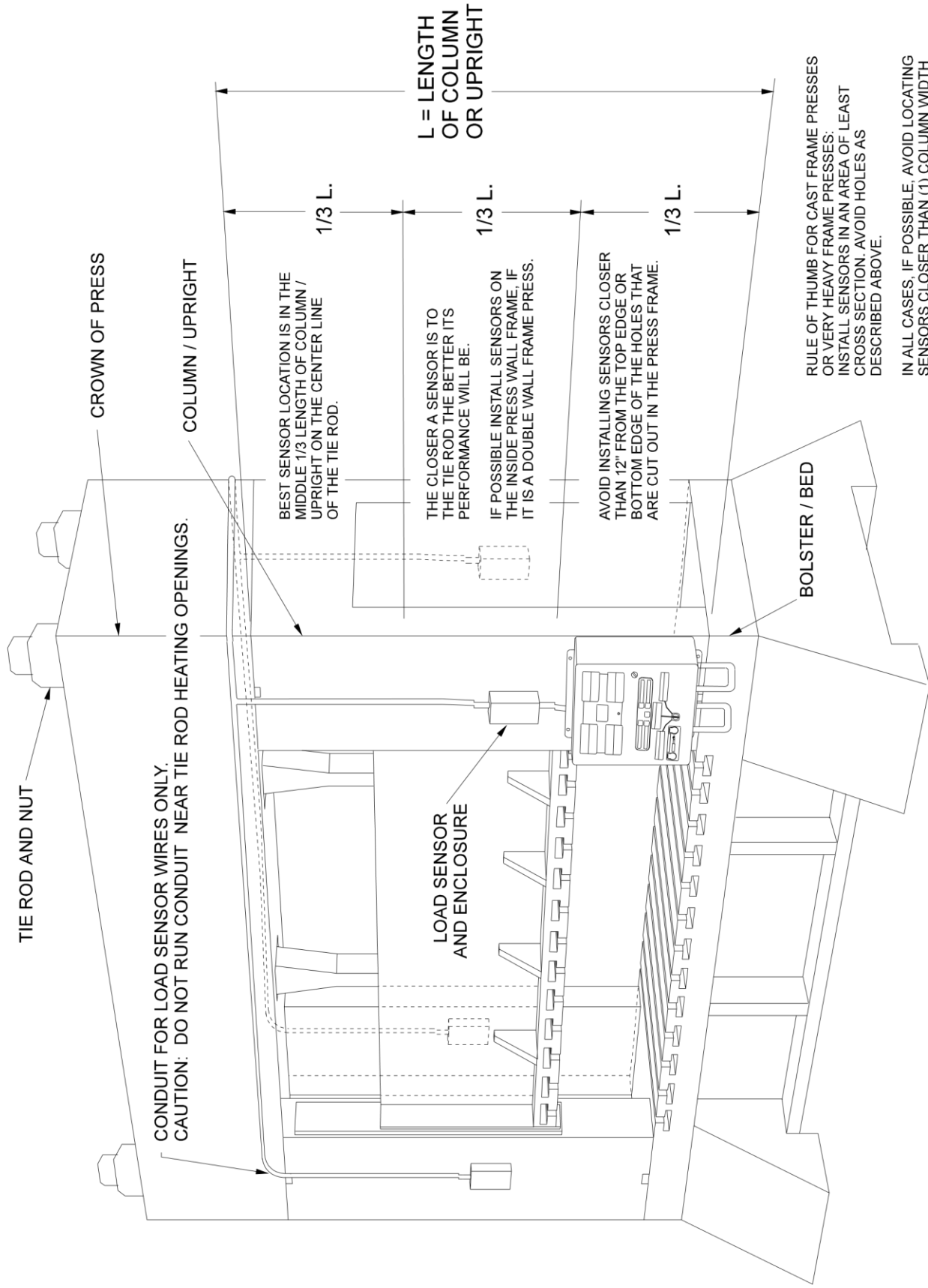
* MEASURE THE REAR THICKNESS

* MULTIPLY BY THREE X 3 =

* MEASURE THE FRONT THICKNESS FRONT

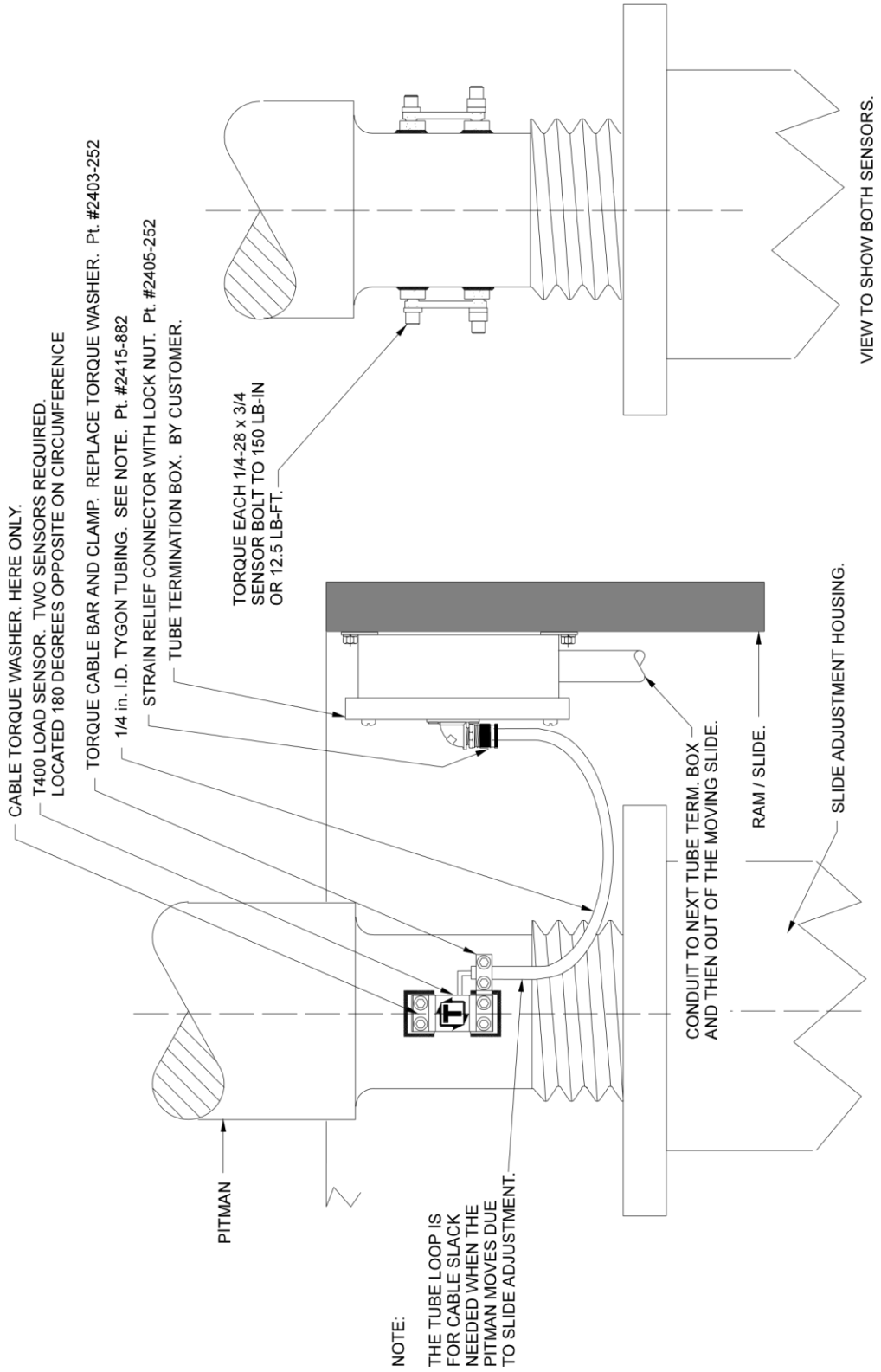
If the front thickness is smaller than value in , then mount sensors in the front. (This is the most common.) If the front thickness is larger, then place the sensor in the rear. Adjust the input connection for compression readings instead of tension.





RULE OF THUMB FOR CAST FRAME PRESSES OR VERY HEAVY FRAME PRESSES:
 INSTALL SENSORS IN AN AREA OF LEAST CROSS SECTION. AVOID HOLES AS DESCRIBED ABOVE.

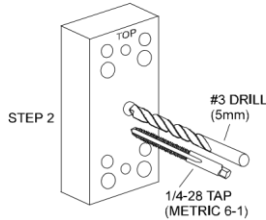
IN ALL CASES, IF POSSIBLE, AVOID LOCATING SENSORS CLOSER THAN (1) COLUMN WIDTH FROM THE CROWN OR BOLSTER.



USING THE T400 SENSOR INSTALLATION FIXTURE KIT No. 1977-749 (METRIC INSTALLATION FIXTURE KIT No. 1974-749)

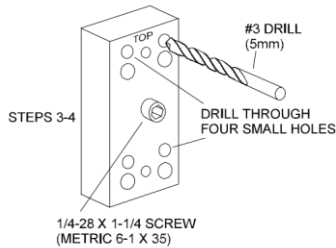
DRILL AND TAP METHOD FOR MOUNTING SENSORS

BE SURE THE SENSOR LOCATION FOLLOWS THE BEST LOCATION DESCRIBED ON THE PREVIOUS PAGES.



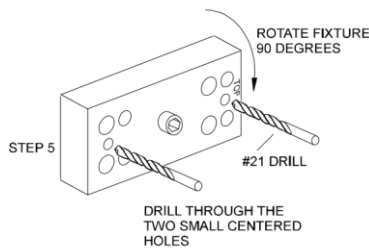
STEP 1 Remove all paint and grease from sensor mount area. If the machine surface is flat (total indicated reading of .002”) and smooth (125 μ in.) the load sensor can be bolted directly to the surface.

STEP 2 Drill and tap the center hole for mounting the fixture to the press member. This hole should be ½ inch (13mm) deep.



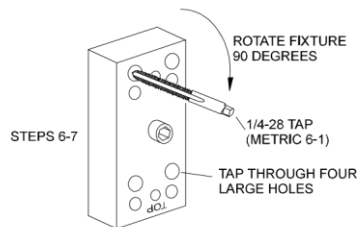
STEP 3 Bolt the fixture to the press member using the ¼-28 by 1-¼ inch (M6-1 x 35) long socket head cap screw in the center of the fixture.

STEP 4 Insert the number 3 drill (5mm) into the smaller corner hole and drill out all four holes to a depth of ¾ of an inch (19mm.)



STEP 5 Loosen the fixture. Rotate the fixture 90 degrees clockwise. Tighten the center screw of the fixture. Insert the number 21 drill into the small centered hole and drill out both holes to a depth of 3/8 of an inch. These holes are for mounting the sensor enclosure. The fixture does not allow for tapping these holes. They are tapped without the fixture. Enclosure mounting is not done in metric.

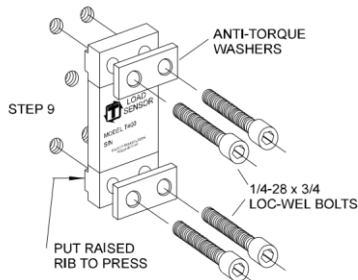
STEP 6 Loosen the fixture. Rotate the fixture another 90 degrees clockwise such that the larger corner holes line up with the holes drilled in Step 4. Insert a tap to be sure the holes line up. Lock the fixture in place by tightening the center screw.



STEP 7 Insert the tap into the larger tap guide holes and tap each hole.

BE SURE TO USE PLENTY OF TAPPING FLUID.

STEP 8 Remove the fixture and repeat Steps 1-7 for each additional sensor mounting position.

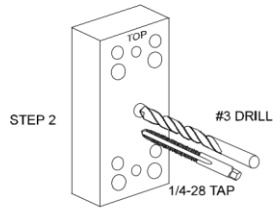


STEP 9 Mount the sensor with the raised rib to the press. The anti-torque washers should go between the screw and the sensor body. Torque each ¼-28 x ¾ in. long socket head cap screw to 150 LB.-IN or 12.5 LB.-FT.

USING THE T400 SENSOR INSTALLATION FIXTURE KIT No. 1977-749

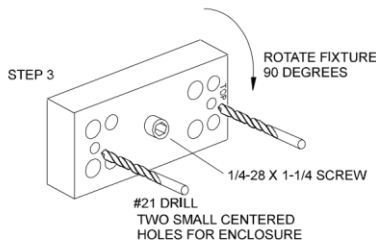
WELD PAD METHOD FOR MOUNTING SENSORS

BE SURE THE SENSOR LOCATION FOLLOWS THE BEST LOCATION DESCRIBED ON THE PREVIOUS PAGES.

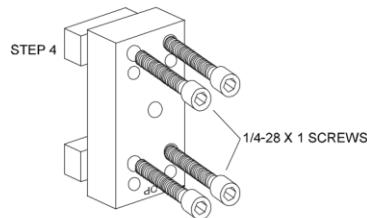


STEP 1 Remove all paint, grease, and or rust from surface to be welded. (Surface should be flat T.I.R. 1/32 of an inch.)

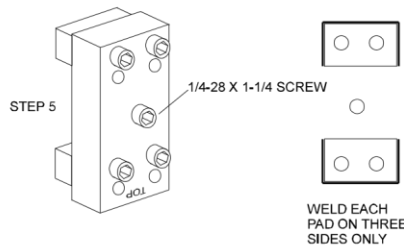
STEP 2 Drill and tap the center hole for mounting the fixture to the press member. This hole should be 1/2 inch deep. (Optional)



STEP 3 Bolt the fixture to the press member using the 1/4-28 by 1-1/4 inch long socket head cap screw in the center of the fixture. Orient the fixture as shown and drill out the #21 holes to a depth of 3/8 of an inch for the enclosure mounting. The fixture is not used for tapping these holes. (Optional)



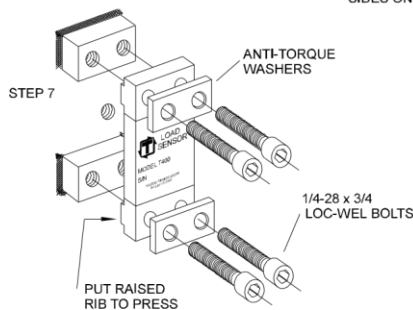
STEP 4 Remove the fixture from the press member. Bolt the weld pads to the fixture with 1/4-28 by 1 inch long socket head cap screws provided. Reattach the fixture with the weld pads bolted on using the center hole as in Step 3. Orient the fixture as shown.



STEP 5 Weld the weld pads to the press member. (BE SURE TO ONLY WELD THE WELD PADS ON THREE SIDES AS SHOWN.) A single pass is sufficient. Do not remove the fixture until slag is removed and or assembly has cooled. When welding cast iron, use a dry nickel rod such as: Lincoln Electric "Soft Weld", Hobart "NI Cast 99", or MB Weld Prod. "MG 210. Strike arc on steel then puddle into the cast iron.

STEP 6 Remove the weld fixture. DO NOT WELD AFTER FIXTURE IS REMOVED. The 4 screws holding the pads to the fixture and the 1 center screw may be discarded. DO NOT USE THE FOUR 1 INCH LONG SCREWS TO ASSEMBLE SENSOR.

The sensor kit contains four 3/4 inch long screws for assembling the sensor to the press member. Weld pad surface must be clean – no weld bumps, scratches, etc. Be sure the weld pad tapped holes are clean and bottom of holes are free of weld flash.

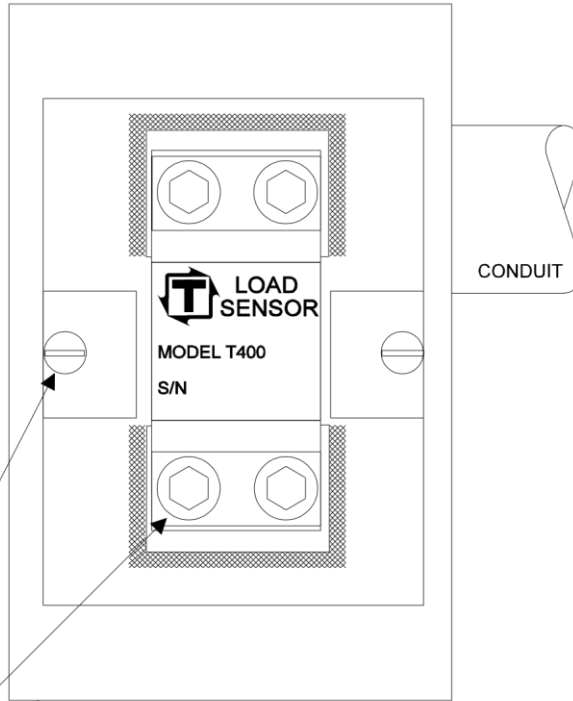
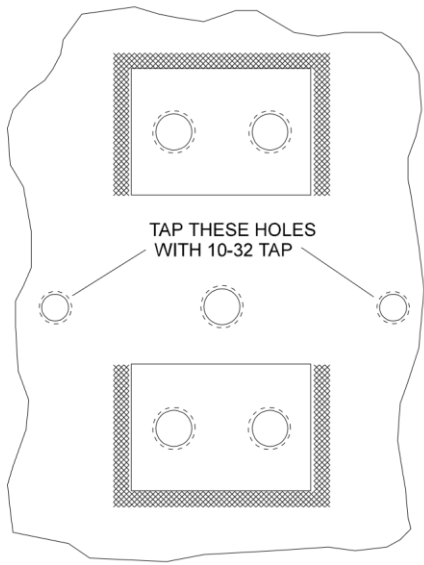


STEP 7 Mount the sensor with the raised rib to the press. The anti-torque washers should go between the screw and the sensor body. Torque each 1/4-28 x 3/4 in. long socket head screw to 150 LB.-IN or 12.5 LB.-FT.

SENSOR ENCLOSURE MOUNTING

USE 10-32 TAP IN THE TWO 3/8" DEEP HOLES THAT WERE DRILLED WITH THE FIXTURE IN THE PREVIOUS INSTRUCTIONS. MOUNT THE ENCLOSURE TO THE PRESS MEMBER AND RUN 1/2" INCH CONDUIT TO THE LOAD MONITOR ENCLOSURE.

RUN SENSOR CABLE THROUGH CONDUIT. PLACE SENSOR ON MOUNTING HOLES. PLACE ANTI-TORQUE WASHERS OVER SENSOR HOLES. SCREW IN SENSORS BOLTS, (4) EACH, FINGER TIGHT. USE ONLY THE 1/4-28 x 3/4" "LOC-WEL" BOLTS THAT ARE IN THE SENSOR PACKAGE. TORQUE EACH 1/4-28 x 3/4" SCREW TO 150 LB.-IN. OR 12.5LB.-FT. ASSEMBLE BOX COVER.



10-32 x 3/8 PAN HEAD MACHINE SCREW.

1/4-28 x 3/4 SOC. HD. SCREW

SENSOR ENCLOSURE

COMPANY: _____

 CONTACT: _____
 PHONE: (____) _____
 SERVICE ORDER #: _____

DATE: _____
 PRESS SERIAL No: _____
 PRESS (Type and & No.): _____
 PRESS CAPACITY: _____
 LOAD MONITOR MODEL: _____
 MONITOR SERIAL No. _____

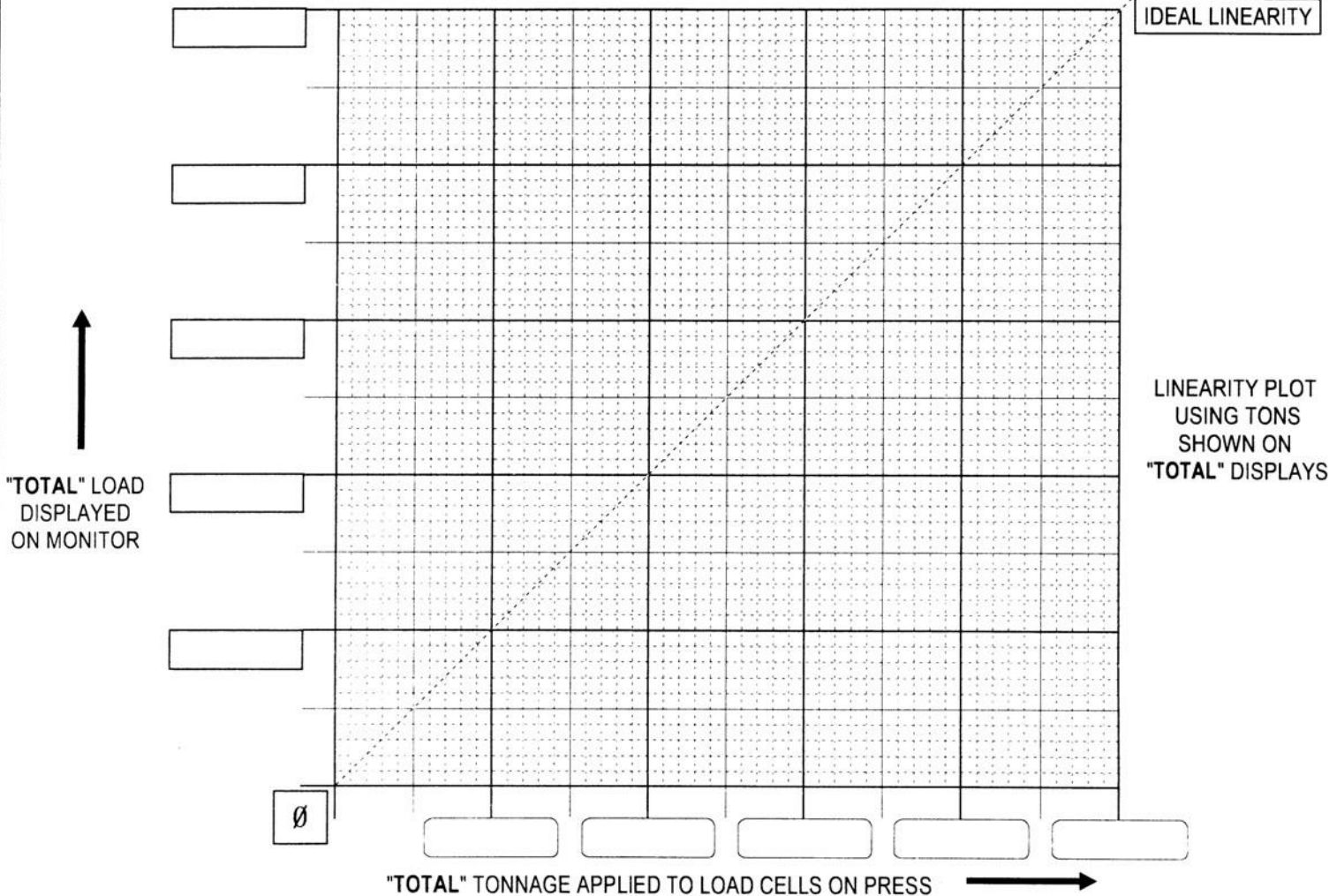
SLIDE-ADJUST INDICATOR

TONNAGE APPLIED TO **LOAD CELLS** ON PRESS

LR	<input type="text"/>	TOTAL	<input type="text"/>	RR
LF	<input type="text"/>	<input type="text"/>	<input type="text"/>	RF
LR	<input type="text"/>	TOTAL	<input type="text"/>	RR
LF	<input type="text"/>	<input type="text"/>	<input type="text"/>	RF
LR	<input type="text"/>	TOTAL	<input type="text"/>	RR
LF	<input type="text"/>	<input type="text"/>	<input type="text"/>	RF
LR	<input type="text"/>	TOTAL	<input type="text"/>	RR
LF	<input type="text"/>	<input type="text"/>	<input type="text"/>	RF

TONNAGE DISPLAYED ON **LOAD MONITOR**

LR	<input type="text"/>	TOTAL	<input type="text"/>	RR
LF	<input type="text"/>	<input type="text"/>	<input type="text"/>	RF
LR	<input type="text"/>	TOTAL	<input type="text"/>	RR
LF	<input type="text"/>	<input type="text"/>	<input type="text"/>	RF
LR	<input type="text"/>	TOTAL	<input type="text"/>	RR
LF	<input type="text"/>	<input type="text"/>	<input type="text"/>	RF
LR	<input type="text"/>	TOTAL	<input type="text"/>	RR
LF	<input type="text"/>	<input type="text"/>	<input type="text"/>	RF



DRAW IN : _____

- CHANNEL NUMBER
- SENSOR LOCATION
- MONITOR LOCATION
- LOAD CELL LOCATION
- DIRECTION OF MATL. FLOW

SHUNT RESISTORS:
ONE MEG ? YES ___ NO ___

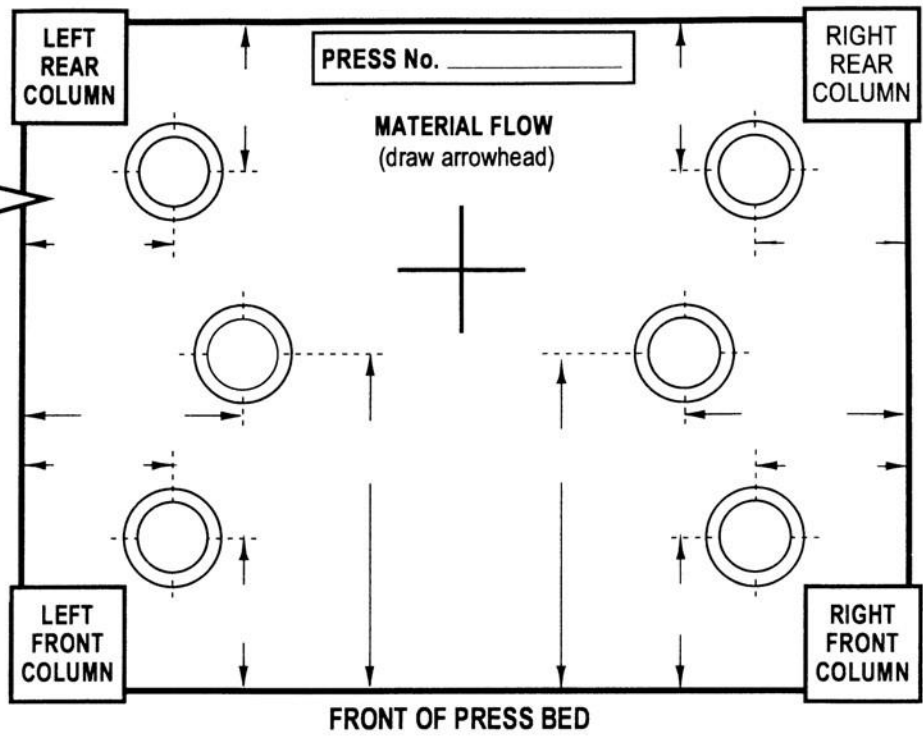
OTHER RESISTORS:

CHAN. 1 _____

CHAN. 2 _____

CHAN. 3 _____

CHAN. 4 _____



TYPE OF LOAD CELLS: _____

TYPE OF LOAD CELL READOUT: _____

TONNAGE SENSORS

CALIBRATION LOAD CELLS

SENSOR NUMBER	SERIAL NO.	CAL. NO.	X 10	LOCATION (LF, RF, LR, RR)
1				
2				
3				
4				

CELL NUMBER	CAPACITY TONS	SERIAL NO.	CAL. NO.
1			
2			
3			
4			

CCM TYPE: _____ CCM OFFSET: _____ STI REFERENCE NUMBER: LOW: _____ HIGH: _____

STI DEGREES IN CHANNEL No. 1: _____

TRIGGERED FROM PROBE ? YES ___ NO ___ (Show threshold value if not triggered from probe): _____

TRIPPED ALARM RELAY STOPS PRESS ? YES ___ NO ___ EXPLAIN: _____

ALL STICKERS AND DOCUMENTS FILLED OUT ? YES ___ NO ___ IF NOT, EXPLAIN WHY: _____

TFP No.: HIGH 2 ___ LOW 2 ___ HIGH 4 ___ LOW 4 ___ HIGH 6 ___ LOW 6 ___ HIGH 8 ___ LOW 8 ___

COMMENTS: _____

TESTS MADE BY: _____ TESTS ACCEPTED BY: _____ DATE: _____

MAIL ADDRESS:
TOLEDO TRANSDUCERS, INC.
P.O. BOX 10
HOLLAND, OHIO 43528

SHIPPING ADDRESS:
TOLEDO TRANSDUCERS, INC.
6834 SPRING VALLEY DR.
HOLLAND, OHIO 43528

PHONE: 1 (419) 867-4170
FAX: 1 (419) 867-4180

COMPANY: _____

DATE: _____

PRESS SERIAL No: _____

PRESS (Type and & No.): _____

CONTACT: _____

PRESS CAPACITY: _____

PHONE: (____) _____

LOAD MONITOR MODEL: _____

SERVICE ORDER #: _____

MONITOR SERIAL No. _____

SLIDE-ADJUST INDICATOR

TONNAGE APPLIED TO **LOAD CELLS** ON PRESS

TONNAGE DISPLAYED ON **LOAD MONITOR**

LR	<input type="text"/>	TOTAL	<input type="text"/>	RR
LF	<input type="text"/>	<input type="text"/>	<input type="text"/>	RF

LR	<input type="text"/>	TOTAL	<input type="text"/>	RR
LF	<input type="text"/>	<input type="text"/>	<input type="text"/>	RF

LR	<input type="text"/>	TOTAL	<input type="text"/>	RR
LF	<input type="text"/>	<input type="text"/>	<input type="text"/>	RF

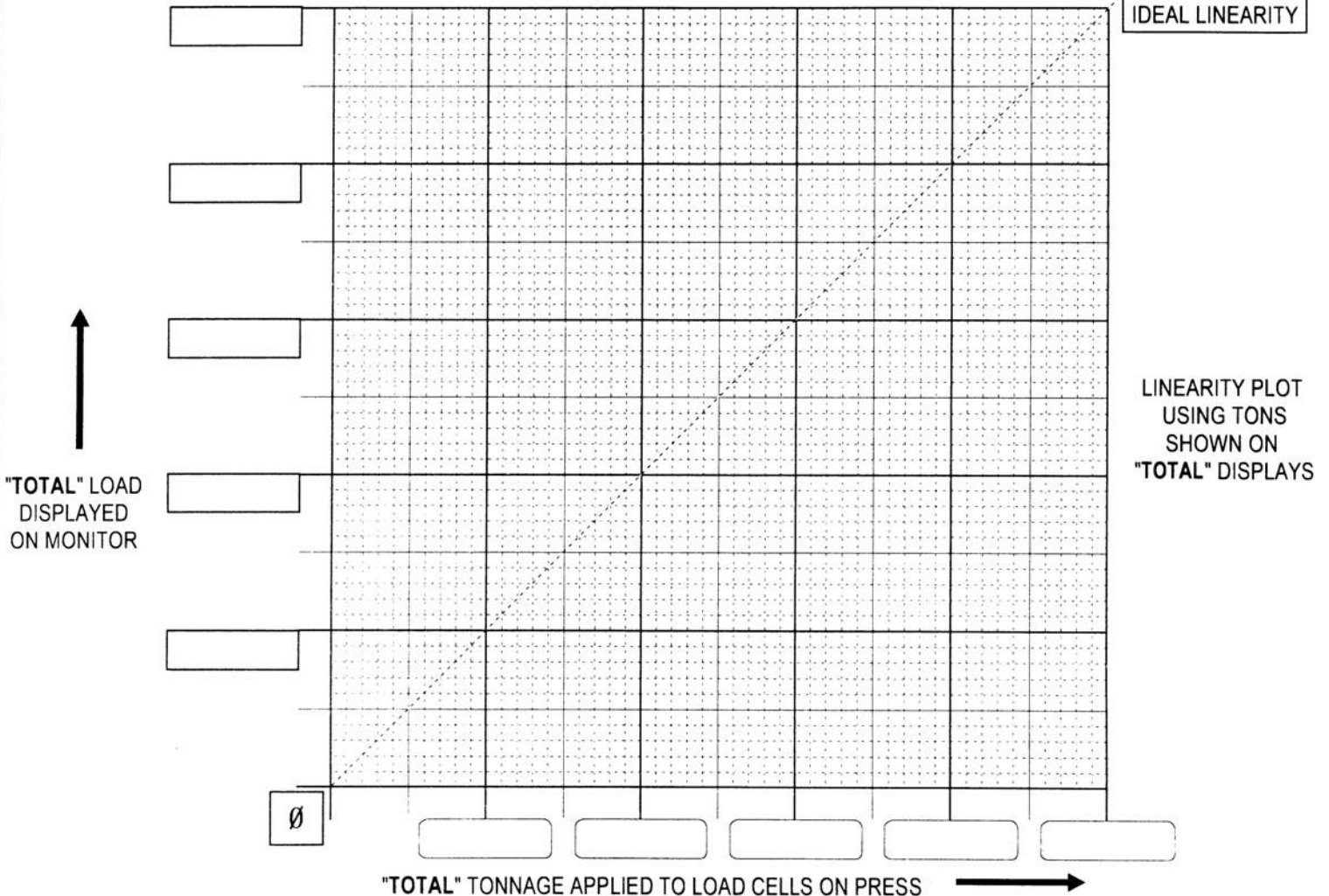
LR	<input type="text"/>	TOTAL	<input type="text"/>	RR
LF	<input type="text"/>	<input type="text"/>	<input type="text"/>	RF

LR	<input type="text"/>	TOTAL	<input type="text"/>	RR
LF	<input type="text"/>	<input type="text"/>	<input type="text"/>	RF

LR	<input type="text"/>	TOTAL	<input type="text"/>	RR
LF	<input type="text"/>	<input type="text"/>	<input type="text"/>	RF

LR	<input type="text"/>	TOTAL	<input type="text"/>	RR
LF	<input type="text"/>	<input type="text"/>	<input type="text"/>	RF

LR	<input type="text"/>	TOTAL	<input type="text"/>	RR
LF	<input type="text"/>	<input type="text"/>	<input type="text"/>	RF

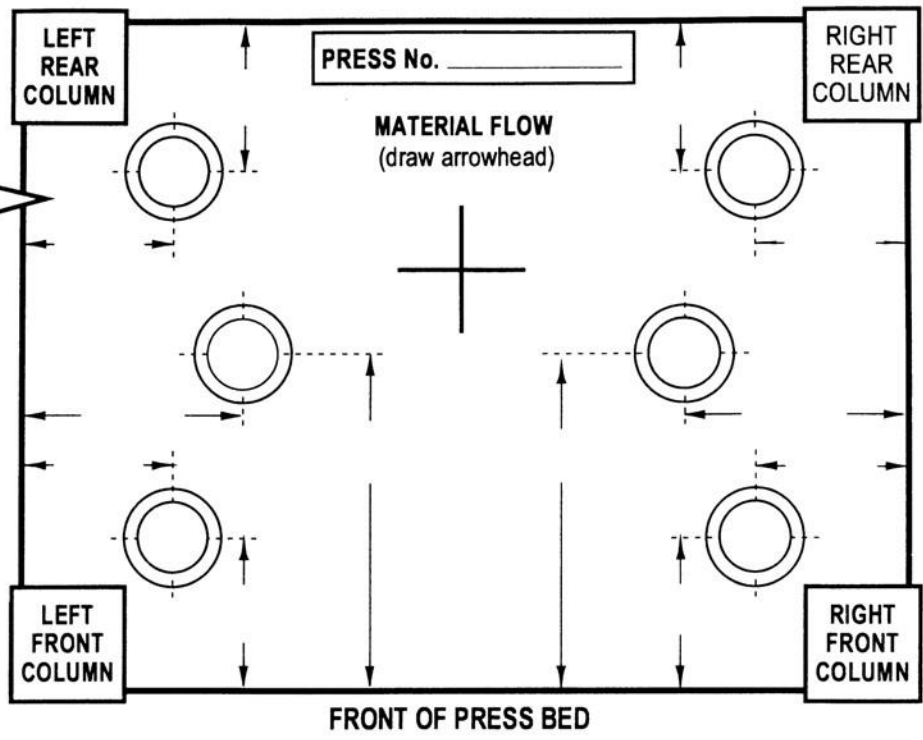


DRAW IN : _____

- CHANNEL NUMBER
- SENSOR LOCATION
- MONITOR LOCATION
- LOAD CELL LOCATION
- DIRECTION OF MATL. FLOW

SHUNT RESISTORS:
ONE MEG ? YES ___ NO ___

OTHER RESISTORS:
CHAN. 1 _____
CHAN. 2 _____
CHAN. 3 _____
CHAN. 4 _____



TYPE OF LOAD CELLS: _____

TYPE OF LOAD CELL READOUT: _____

TONNAGE SENSORS

CALIBRATION LOAD CELLS

SENSOR NUMBER	SERIAL NO.	CAL. NO.	X 10	LOCATION (LF, RF, LR, RR)
1				
2				
3				
4				

CELL NUMBER	CAPACITY TONS	SERIAL NO.	CAL. NO.
1			
2			
3			
4			

CCM TYPE: _____ CCM OFFSET: _____ STI REFERENCE NUMBER: LOW: _____ HIGH: _____

STI DEGREES IN CHANNEL No. 1: _____

TRIGGERED FROM PROBE ? YES ___ NO ___ (Show threshold value if not triggered from probe): _____

TRIPPED ALARM RELAY STOPS PRESS ? YES ___ NO ___ EXPLAIN: _____

ALL STICKERS AND DOCUMENTS FILLED OUT ? YES ___ NO ___ IF NOT, EXPLAIN WHY: _____

TFP No.: HIGH 2 ___ LOW 2 ___ HIGH 4 ___ LOW 4 ___ HIGH 6 ___ LOW 6 ___ HIGH 8 ___ LOW 8 ___

COMMENTS: _____

TESTS MADE BY: _____ TESTS ACCEPTED BY: _____ DATE: _____

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