

**USER INSTRUCTION MANUAL FOR LOADCELL
TRANSMITTER MODEL TDC/I/0550 (SOFTWARE: VER2A)**

DOCUMENT NO: TDC 0550 MANUAL - 2

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1.0. INTRODUCTION:

1.1. ABOUT THIS MANUAL:

This document covers the information needed to connect and calibrate your instrument. Abbreviations and short form descriptions are explained in section 1.2. Special attention should be given to WARNINGS and PRACTICES. The FUNCTIONS used for CALIBRATION and OPERATING the instrument are indicated on the lefthand side of the DISPLAY board by means of LED and are numbered 1 – 20.

1.2. INTRODUCTION:

The TDC/I/0550 is a general purpose PROCESSOR based Loadcell transmitter with 4 ALARM SETPOINTS, PRINT, ZERO, TARE and HOLD function. Power to the unit can be from AC (110 or 220V) or DC (12-27V). No gain adjustment is required, as provision is made for a signal input range from 0-3.2mV/V. DATA displayed can be recorded by connecting a printer with serial port to the unit. Relay setpoints can be altered by simple selecting the RELAY number. (An external setpoint controller, (option 001) is available for applications where altering the setpoints during operation is needed.) This new value will be stored when the enter switch is pressed. Housed in a IP67 polycarbonate enclosure with removable LID, cage clamp wire connectors and simple calibration procedure makes for a quick installation and commissioning.

1.3. CONVENTIONS USED IN THIS MANUAL:

- NUMERIC INCREMENT SWITCHES refers to 5 push button switches mounted under the LED DISPLAY. This is used to select numeric data and store in permanent memory. (S5, S6, S7, S8, S9)
- LED DISPLAY refers to the 5 display units that indicate numeric values, decimal point and the function that was selected.
Note that the most significant digit can only be 0 or 1.
- NO LOAD SIGNAL refers to the MILLI-VOLT output from the loadcell(s) to the instrument, when the weigh bridge is empty.
- SLOPE refers to the relation between the MILLI-VOLT output of the loadcells and the DISPLAY value.
- DISPLAY INCREMENTS will be calculated by the processor according to the DATA value set for display increments (DISP - position 1). The following table shows the increments for different display values.

DISPLAY VALUE	INCREMENTS(steps)	RESOLUTION(%)
0 to 3000	1	.03
0 to 6000	2	.03
0 to 10000	5	.05
0 to 19999	10	.05

2.0 SETUP INFORMATION:

2.1 **CALIBRATION ACCURACY:** Best accuracy will be achieved when the known mass that is used for calibrating the

system, is as CLOSE as possible to the maximum system capacity. (Full load on the loadcells)

2.2 **WARM-UP TIME:** The instrument should be allowed to stabilise for approximately 20 minutes.

2.3 **ANALOG OUTPUTS:** Both process outputs (0-10Volt, 4-20mA) can be used simultaneously.

2.4 **The VOLTAGE OUTPUT:** (0-10Volt) should not be loaded with an impedance less than 5Kohm. If needed, fine adjustment of the ZERO and SPAN settings can be done by adjusting VR2 for ZERO and VR3 for 10 Volt.(maximum voltage output can not exceed 10.2Volts).

2.5 **The CURRENT OUTPUT:** (4-20mA) is capable of driving 20mA into a load of 500ohm. See calibration procedure.

NOTE: IF ANY ADJUSTMENT NEEDS TO BE DONE, THE VOLTAGE OUTPUT MUST BE ADJUSTED BEFORE THE CURRENT OUTPUT.

The current output can be changed to 0-20mA, by removing jumper J3.

VR5 can be used to fine trim the 4mA setting and VR4 for adjusting the 20mA, if required.

3. SPECIFICATIONS:

3.1 TRANSMITTER INDICATOR:

Power supply	AC	:	110 or 220V (Jumper selectable)
	DC	:	12 to 27V
Power consumption		:	12VA max. (4 relays energized)
Excitation voltage		:	10Volt (+5/-5Volt) Sense included.
Excitation current		:	Up to 6 Loadcells (350 ohm min.)
Tare offset		:	100% of Display value.
Analog outputs	: V	:	0-10Volt into 5K Ohm min.
	: A	:	0/4 -20mA into 500 Ohm max.
Accuracy		:	0.02%
Operating temp.		:	0 to 60 degrees C
Enclosure		:	175 x 175 x 78mm Polycarbonate
Weight		:	1.5 kg

3.2 INPUT SIGNAL and CONVERTER:

Millivolt input range	:	0-3,1 mV/V
Input impedance	:	1 x 10 ⁶ ohm.
A to D converter	:	24 conversions per sec.
A to D resolution	:	16 bit
Linearity	:	0.013% (up to 3.2mV/V)

3.3. ANALOG OUTPUT CHARACTERISTICS:

D to A resolution	:	14 bit (6000 increment for Pos. and 6000 for Neg.)
Voltage output	:	0-10V (Pos & Neg) into 5k Ohm (min).
Current output	:	0/4-20mA into 500 Ohm maximum.
Resolution	:	1 in 3000 divisions.
Linearity	:	0,03%
ISOLATION	:	None (referenced to 0 volt)

3.4. DISPLAY:

Type	:	LED 4,5 Digit (with dec. point & polarity)
Display height	:	20mm

3.5. CALIBRATION INTERFACE:

Data input	:	5 Push button switches
Menu selection	:	1 Function select switch with 1 sec message prompt on LED display
Protection	:	Dual press to capture calibration values.

3.6. OPERATOR INTERFACE:

Function keys	:	4 Mounted on faceplate. Polycab. overlay
Type	:	Snap type 4 leg domes
Setpoint indicators	:	4 relay status LED's.

3.7. PROCESSORS and ARCHITECTURE:

<u>Master CPU</u>	:	Dallas 80C320 at 22mHZ
Programme memory	:	Eprom 64kbytesx8
RTC & Static memory	:	I ² C / 32bytesx8
Serial ports	1) OUT	: RS485 (Output data continuous)
	2) OUT	: RS232 (Printer)

4. **CALIBRATION PROCEDURE:**

To select the calibration function required, press the “FUNC” button. An LED will eliminate to verify selection.

Definitions for function select:

	<u>FUNCTION</u>	<u>DISPLAY INDICATION</u>
1.	Display maximum	S – 01
2.	Zero (no – load)	S – 02
3.	Slope / calibration mass	S – 03
4.	No function	-No-
5.	No function	-No-
6.	No function	-No-
7.	4mA setting	S – 07
8.	20mA setting	S – 08
9.	Limit 1 On Value	S – 09
10.	Limit 1 Off Value	S – 10
11.	Limit 2 On Value	S – 11
12.	Limit 2 Off Value	S – 12
13.	Limit 3 On Value	S – 13
14.	Limit 3 Off Value	S – 14
15.	Limit 4 On Value	S – 15
16.	Limit 4 Off Value	S – 16
17.	Time/date setting	Date
18.	Unit ID	S – 18
19.	Print all settings	S – 19 / print
20.	No function	Print

NOTE: Display will time-out in 30 seconds and revert to operation mode if no buttons are pressed. Only steps not completed will need to be resumed. Already saved steps will not be lost.

4.1 **SETTING MAXIMUM DISPLAY VALUE:**

- Step 1: Press “FUNC” select, S – 01 is displayed.
- Step 2: Press S5 – S9 to display the maximum display value on the LED display.
- Step 3: Press the “DEC PNT” repeatedly to place the decimal point.
- Step 4: Press “ENTER” to store value.

4.2 **CAPTURING THE NO-LOAD SIGNAL:**

- Step 5: Press “FUNC” select, S – 02 is displayed.
- Step 6: Press S5 – S9, with zero load or no-load signal applied to display the zero setting on the LED display.
- Step 7: Press “ENTER” to store value.

4.3. **SETTING THE SLOPE:**

- Step 8: Press “FUNC” select, S – 03 is displayed.
- Step 9: Press S5 – S9 to display the value of the applied calibration mass/signal on the LED display.
- Step 10: Apply calibration mass/signal.
- Step 11: Press “ENTER” to store value.

4.7 **ANALOG OUTPUT CALIBRATION (CURRENT/VOLTAGE):**

For (4-20mA/0-10V) Jumper “J3” installed
(0-20mA/0-10V) Jumper “J3” removed

- Step 1: Press “FUNC” select, S – 07 is displayed.
- Step 2: Press S5 – S9 to display the 4mA value on the LED display.
- Step 3: Press “ENTER” to store value.
- Step 4: Press “FUNC” select, S – 08 is displayed.
- Step 5: Press S5 – S9 to display the 20mA value on the LED display.
- Step 6: Press “ENTER” to store value.

4.9 SETPOINT CALIBRATION:

Limits can be used with positive or negative values.

- Step 1: Press “FUNC” select, S – 09 is displayed. (setpoint 1)
- Step 2: Press S5 – S9 to display ON value on LED display.
- Step 3: Press “ENTER” to store value.
- Step 4: Press “FUNC” select, S – 10 is displayed (setpoint 1)
- Step 5: Press S5 – S9 to display OFF value on LED display.
- Step 6: Press “ENTER” to store value.
- Step 7: Setpoints (2, 3, 4) are entered and stored in the same way as setpoint 1. (steps 1-6)

4.17 REAL TIME CLOCK ADJUST:

- Step 1: Press “FUNC” select, date is displayed.
- Step 2: Press S6 – S9 to display hours/minutes on LED display.
- Step 3: Press “ENTER” to store value.
- Step 4: Press S6 – S9 to display year (eg 1999) on LED display.
- Step 5: Press “ENTER” to store value.
- Step 6: Press S6 – S9 to display month/days on LED display.
- Step 7: Press “ENTER” to store value.

4.18 UNIT ID SETTINGS:

- Step 1: Press “FUNC” select, S – 18 is displayed.
- Step 2: Press S5 – S9 to display ID number on LED display.
- Step 3: Press “ENTER” to store value.

4.19 PRINTING ALL SETTINGS:

- Step 1: Press “FUNC” select, S – 19/print is displayed.
- Step 2: Press “ENTER”.
- Step 3: Your printer will now print the full 550 setup.

5. EXTENDED USER SETTINGS:

Definitions for function select:

<u>FUNCTION:</u>	<u>DISPLAY INDICATION:</u>
1. Hold Function	E – 01
2. Limit Reference	E – 02
3. Display Update Delay	E – 03
4. Serial Port Update Delay	E – 04
5. Filter Level	E – 05
6. Print Button	E – 06
7. Shift Start Time	E – 07
8. Shift Cycle Time	E – 08

Function E – 09 to E – 20 are not being used.

To enter the extended user settings press and hold first the “enter and Dec Pnt” and then press the zero button. Release simultaneously. –E- will be displayed to indicate you are in the extended menu.

6. HOLD FUNCTION SETTINGS:

- Step 1: Enter the extended user settings. E – 01 is displayed.
- Step 2: Select between 0 (normal hold) or 1 (peak hold) by pressing S9.
- Step 3: Press “ENTER” to store value.

6.1 **LIMIT REFERENCE SETTINGS:**

- Step 1: Enter the extended user settings. E – 01 is displayed.
- Step 2: Press “FUNC” select, E – 02 is displayed.
- Step 3: Select between 0 (limits will work from display 0) or 1 (limits will work from system zero reference) by pressing S9.
- Step 4: Press “ENTER” to store value.

6.2 **DISPLAY UPDATE (IN STEPS OF 40ms):**

- Step 1: Enter the extended user settings. E – 01 is displayed.
- Step 2: Press “FUNC” select until E – 03 is displayed.
- Step 3: Select the display delay time by pressing S6 – S9 (eg. 10 on display is 10 x 40ms = ms)
- Step 4: Press “ENTER” to store value.

6.3 **SERIAL PORT UPDATE DELAY (IN STEPS OF 40ms):**

- Step 1: Enter the extended user settings. E – 01 is displayed.
- Step 2: Press “FUNC” select until E – 04 is displayed.
- Step 3: Select the serial port delay time by pressing S6 – S9 (eg. 10 on display is 10 x 40ms = 400ms)
- Step 4: Press “ENTER” to store value.

6.4 **FILTER LEVEL SETTINGS:**

- Step 1: Enter the extended user settings. E – 01 is displayed.
- Step 2: Press “FUNC” select until E – 05 is displayed.
- Step 3: Select from 0 (no filter), 1 (high frequency), 2 (intermediate frequency) and 3 (low frequency) filter by pressing S9.
- Step 4: Press “ENTER” to store value.

6.5 **PRINT BUTTON FUNCTION:**

- Step 1: Enter the extended user setting. E – 01 is displayed.
- Step 2: Press “FUNC” select until E – 06 is displayed.
- Step 3: Press “ENTER”.
- Step 4: Your printer will now print the full 550 setup.

6.6 **SHIFT START TIME:**

- Step 1: Enter the extended user setting. E – 01 is displayed.
- Step 2: Press “FUNC” select until E – 07 is displayed.
- Step 3: Enter in the hours/minutes you would like the shift to start by using S6 – S9.
- Step 4: Press “ENTER” to store value.

6.7 **SHIFT CYCLE TIME:**

- Step 1: Enter the extended user settings. E – 01 is displayed.
- Step 2: Press “FUNC” select until E – 08 is displayed.
- Step 3: Enter in the hours/minutes of the duration of the shift cycle using S6 – S9.
- Step 4: Press “ENTER” to store value.

7. **APPLICATION INFORMATION:**

7.1 **PRINTER:**

After power up, the heading is printed. Every time PRINT is selected, the TIME, DATE, BATCH NUMBER and DISPLAY VALUE is recorded.

7.2 ELECTRICAL CONNECTIONS ON PRINTER PLUG (EPSON LX300):

PIN NUMBER (Enclosure plug)	FUNCTION	PRINTER PLUG (25pin, D-type, male)
1	TX (red)	PIN 3
7 OR 8	GND (yellow)	PIN 7
2	RX (green)	PIN 2
		(INTERCONNECT PINS 6,8 and 20)

DATA FORMAT:

DATA LENGTH: 8
 BAUDRATE : 9600
 STARTBIT : 1
 STOPBIT : 1
 PARITY : NONE
 ASINCRONE

AC supply can be selected between 110V and 220V, by removing the 2 jumpers provided, and plugging it next to the inscription on the PCB.

7.3 WIRE SIZES AND TERMINALS:

Use a flat screwdriver to open the springloaded cage clamp. Insert the wire inside the round hole and release. The wire size should not exceed 0.5mm square. The screwdriver to be 3mm flat.

7.4 REMOTE ZERO AND TARE:

ZERO and TARE functions can be used by simply connecting a normal open (potential free) switch to the indicated terminals on the bottom PCB.

7.5 FOLDBACK PROTECTION:

Provision is made for protecting the instrument against overload conditions. If overloaded or installed in a environment with temperature higher than $\pm 60^{\circ}\text{C}$, foldback overload condition might occur. The red LED indicated as “overloaded” will light up. The instrument can be reset by switching off the power for ± 5 min.

8. SERIAL INTER-FACE DATA:

8.1 RS485 PIN CONNECTIONS:

PIN NUMBER	FUNCTION
5	RS485 A
6	RS485 B
8	GROUND

--- BAUD RATE: 9600
 --- WORD LENGTH: 8 DATA BITS
 --- STOP BITS : 1
 --- PARITY : NONE

MESSAGE STRUCTURE.

MESSAGE CONSISTS OF 7 BYTES AS FOLLOWS:

BYTE 1: AAhex (START OF MESSAGE)
 BYTE 2: 55hex (START OF MESSAGE)
 BYTE 3: SYSTEM ID
 BYTE 4: DISPLAY INFO (WEIGHT)
 BYTE 5: DISPLAY INFO (WEIGHT)
 BYTE 6: BIT 0, 1, 2 - DECIMAL POINT
 BIT 3 TO 6 - NOT USED
 BIT 7 - TO INDICATE POLARITY OF DISPLAY
 BYTE 7: CHECK SUM.

TRANSMISSION RATE: 2 CONVERSIONS PER SECOND.

SPECIAL SOFTWARE.

485 PORT IS BI-DIRECTIONAL, SOFTWARE CAN BE ALTERED TO ACCOMMODATE SPECIAL APPLICATIONS.

9. **WARNINGS AND PRACTICES:**

- POWER MUST ALWAYS BE DISCONNECTED BEFORE CONNECTIONS ARE DONE ON INSTRUMENT.
 - BEFORE POWER IS CONNECTED TO THE INSTRUMENT, TEST ALL OUTGOING LINES FOR SHORT CIRCUITS.
 - ENSURE THE INSTRUMENT IS FREE OF LOOSE METALLIC OBJECTS.
 - IF A DC SUPPLY IS USED, MAKE SURE THE POLARITY IS CORRECT.
 - NEVER REMOVE THE DISPLAY BOARD WHILE POWER IS STILL CONNECTED TO THE UNIT.
 - IF FOR ANY UNFORSEEN REASON, IT HAPPENS THAT THE FUSE BLOWS, NEVER REPLACE IT WITH A HIGHER RATING. CONTACT THE SUPPLIER FOR ADVICE.
 - IT IS ADVISED TO USE THE EXCITATION VOLTAGE SENSE FUNCTION, IF THE DISTANCE BETWEEN THE INSTRUMENT AND THE LOADCELLS EXCEEDS THE STANDARD LENGTH OF THE LOADCELL, OR IF A JUNCTION BOX IS USED, 6 CORE SCREENED CABLE SHOULD BE USED TO CONNECT BETWEEN THE INSTRUMENT AND THE JUNCTION BOX.
- WHEN LOADCELLS MANUFACTURED BY TRANSDUCER DEVELOPMENTS Co. (Pty) Ltd. ARE USED IN THE APPLICATION, THE FOLLOWING COLOUR CODE IS APPLICABLE. CONFIRM DURING COMMISSIONING THAT THE EXCITATION VOLTAGE IS STABLE, AND WITHIN THE LIMITS 10 VOLT (+/-80mV). USE COLOUR CODING AS FOLLOWS:

<u>ALLOCATION</u>	<u>4 CORE CABLE</u>	<u>6 CORE CABLE</u>
SENSE +	*****	WHITE
EXCITATION +	BLUE	BLUE
SIGNAL +	RED	RED
SIGNAL -	GREEN	GREEN
EXCITATION -	YELLOW	YELLOW
SENSE -	*****	BLACK
SCREEN	GREY	GREY

10. OPERATING INSTRUCTIONS:

10.1 Using the ZERO function:

Pressing on this function will clear the display to 0000. This is a very useful function when you need to load a specific mass on a scale, or when some residue was left over from a previous batch.

10.2 TARE function:

This function is used for clearing the display, not loosing previous data.

If the value 88 units is displayed, and the TARE function is selected, the display will clear to 0000. The polarity sign will flash to indicate "TARE" mode. If TARE is selected again, the value 88 will appear on the display. (Provided that the load was kept the same).

If the value 88 is displayed and TARE is selected, the display will go to 0000. If the load is now increased with 22 units, and TARE is selected again, the display will indicate the result 100. Pressing the display again, will repeat the sequence.

10.3 HOLD function:

Selecting this function will instruct the processor to hold the display value or the highest value. This value will be indicated in flashing mode. Pressing the HOLD key again, will reset the instrument to normal operating mode.

10.4 PRINT function:

Pressing this key will print one single line on a serial printer with the correct setup.

Every time the power to the unit is removed and reconnected, the heading will be printed. If the print button is selected, the value on the display, the date, time and batch number will be printed. Rotating the FUNCTION SELECT switch to any other function and back to OPER (refer operate), will also print the heading and reset the batch counter.

10.5 Time delay on pressing the keys:

After a key was pressed, a 1 second time count will be initialised. During that time all keys will be disabled.

10.6 SETPOINT indicators:

The status of the 4 relays is indicated on the left of the display. When a relay has changed from the normal to the energised state, the corresponding LED will light up. Note that it will only fall out again when the load drop to 1% lower than the presetted value. (as described in 4.5).

APPENDIX A

TDC 550 TOTALISER FUNCTION

IO – PORT CONFIGURATION

1 –	11 –
2 –	12 –
3 –	13 – ENTER
4 –	14 – DECIMAL POINT
5 –	15 –
6 –	16 –
7 –	17 –
8 – FUNCTION BUTTON	18 –
9 –	19 – GROUND
10 –	20 – GROUND

TOTALISER OPERATION

THE TOTALISING FUNCTION IS ENABLED/DISABLED IN THE FACTORY SETTINGS, POSITION 10. IF THE VALUE IS 1, THE FUNCTION IS ENABLED.

IN NORMAL OPERATION, IF 'ENTER' BUTTON IS PRESSED, THE TOTALISING FUNCTION WILL START. THE VALUE ON THE SCALE AT THAT STAGE WILL BE ADDED TO THE TOTAL.. EACH TIME 'ENTER' IS PRESSED THE VALUE WILL BE ADDED TO THE TOTAL. ONLY THE CURRENT VALUE WILL BE DISPLAYED. IF 'PRINT' IS PRESSED, EVERY BATCH AS WELL AS THE TOTAL WILL BE PRINTED ON THE PRINTER. IF THE TOTALISING FUNCTION IS IN PROGRESS, THE SIGN ON THE DISPLAY WILL FLASH.

IF 'DEC PNT' IS PRESSED, THE AVERAGE FOR THE BATCHES WILL BE CALCULATED AND DISPLAYED. THE DISPLAY WILL FLASH. IF 'PRINT' IS PRESSED, THE NUMBER OF BATCHES, THE TOTAL FOR THE BATCHES AS WELL AS THE AVERAGE WILL BE PRINTED. IF 'DEC PNT' IS PRESSED AGAIN, EVERYTHING WILL BE CLEARED AND THE SYSTEM WILL GO BACK TO NORMAL OPERATION.

IF 'ENTER' IS PRESSED WHILE THE AVERAGE VALUE IS DISPLAYED, THE WEIGHT ON THE SCALE WILL BE ADDED TO THE TOTAL AND THE SYSTEM WILL CONTINUE WITH TOTALISING FUNCTION UNTIL 'DEC PNT' IS PRESSED AGAIN.

APPENDIX B
EXTERNAL LIMIT ADJUSTER TDC/I/0550

- : TO CHANGE DIGIT VALUES.
- ↑ : TO MOVE BETWEEN DIGITS.
- NEXT : TO SELECT NEXT LIMIT.
- SELECT : TO ENTER THE LIMIT SETTING AS WELL AS TO EXIT.

OPERATING:

1. PRESS THE SELECT BUTTON, - L - SHOWS ON DISPLAY AND THEN MOVE TO S – 09.
2. SELECT THE VALUE YOU WANT BY USING THE UP AND SIDE ARROW, IF YOU HAVE THE VALUE YOU WANT, PRESS THE NEXT BUTTON TO MOVE ON TO THE NEXT LIMIT OR PRESS SELECT TO EXIT THE PROGRAM.