transcell®

TI-1500B
Force Gauge Digital Indicator

Setup / Operation Manual

V. A2

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Chapter 1: Introduction To The TI-1500B Digital Indicator

TI-1500B indicator is always used in many industrial fields, such as measuring martial performance, measuring peak value, checking resistance strain gauge load cell and so on. It is industrial class digital indicator. This mode operates identically, can readout up to 100,000 display divisions. It has 10/80Hz (Option) A/D converting frequent, four absolute channels. All setup parameters may be entered via the front panel keys, including calibration.

If your Model TI-1500B digital indicator is part of a complete force gauge or has been installed for you, you may skip to Chapter 7 for operating instructions. Prior to using the indicator, please read this chapter carefully and completely. Store the manual in a safe and convenient place so it will be available if you have questions concerning the operation of the scale.

If you are an installer, the indicator's installation and wiring instructions are found in Chapter 2. The indicator contains two main setup menus: The Setup ("F") menu, which configures the indicator to your force gauge's platform and the User ("A") menu, which configures the serial communication port and enables some user options. Chapter 3 gives an overview and explains how to use the five front panel keys to maneuver and save settings in both menus. Chapters 4 and 5 explain the Setup and User Menu options, respectively. Chapter 6 covers system calibration. Prior to installing the indicator, please read this manual carefully and completely. Store the manual in a safe and convenient place so it will be available if you have questions concerning the setup and operation of the force gauge.
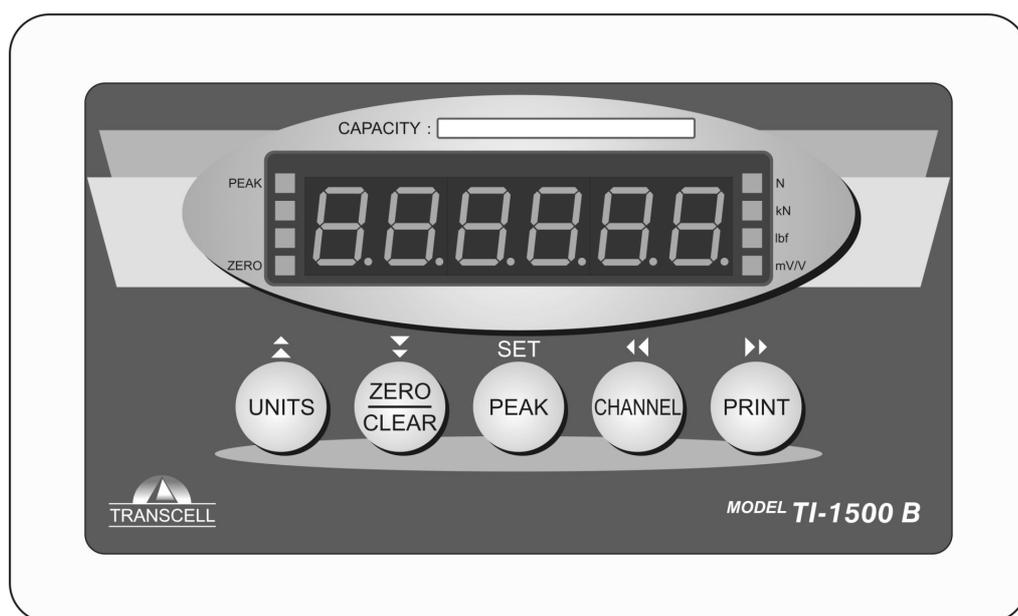

Figure 1-1: TI-1500B Front Panel

Chapter 2: Installation

2.1 Indicator Connect

The rear panel contains all connectors necessary to make the appropriate connections to the force gauge's platform, printer, remote display and batch equipment.

2.1.1 Connecting the force gauge platform

1. Plug the load cell's cable into LOADCELL Port on the rear panel of the indicator. Show in figure 2-2.
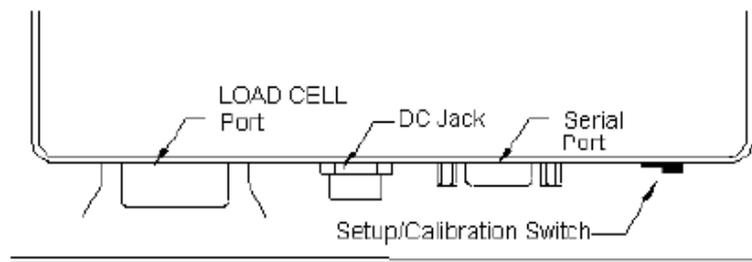
TI-1500B Rear Panel

Pin No.	Pin Name
1/8	+ Excitation
3/10	-Excitation
5/12	+ Signal
7/14	-Signal

Figure 2-2: Pin assignments for the Load Cell Port

2.1.2 Connecting the serial printer, remote display or computer

The TI-1500B indicator comes standard with one full duplex RS-232 serial port, designed for connection to either a PC, a serial printer or a remote display. Figure 2-4 shows the serial port pinout.

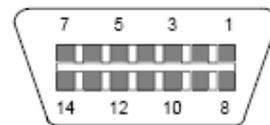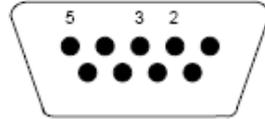| Pin No.	Pin Name	Signal Lever	
2	Receive Data	RS-232	
3	Transmit Data	RS-232	
5	Signal Ground	RS-232	

Figure 2-3: Pin assignments for the RS-232 serial port connector

Chapter 3: Configuration

3.1 Configuration Overview

The TI-1500B indicator includes four absolute data channels. Before using the channel, please set the parameters for the channel which has been used. Finished parameter setting and system calibrating, in general force gauge mode, the system will be work convenience by changing the data channel. Not need calibrate again. In every channel the system has two menus. The Setup Menu ("F" Menu) which configures the indicator to your force gauge's platform and the User Menu ("A" Menu) which configures the serial communication port and enables some user options. The Setup and User menus consist of several menu selections, each with its own sub-menu of choices.

3.2 Choosing Channel

1. Power off the indicator.
2. Move the cover in the under of the indicator. Finding a DIP two-position switch.
3. Move the switch to the right.
4. Power on the indicator. The indicator shows "CH 0" (default).
5. Use the **CHANNEL** (◁◁) key or the **PRINT** (◁◁) key to choose the data channel.

3.3 Setup ("F") Menu

3.3.1 Entering the Setup Menu

1. After choosing the data channel, the indicator shows "CH X", use the **SET(PEAK)** key entering the Setup ("F") Menu.

   X --- Channel No.

3.3.2 Navigating in the Setup Menu

Use the directional keys shown in Figure 3-1 to move around in the Setup Menu.
1. To move to a new "F" heading, use the **CHANNEL** ($\triangleleft\kern-0.5em\triangleleft$) or **PRINT** ($\triangleleft\kern-0.5em\triangleleft$) key to move right or left in the Setup Menu Chart.
2. To move to the selection level, press the **ZERO** ($\triangledown$) key once. The current saved selection is shown.
3. To view the available selections for the current "F" heading, use the **CHANNEL** ($\triangleleft\kern-0.5em\triangleleft$) key or **PRINT** ($\triangleleft\kern-0.5em\triangleleft$) key to move through the selection field.
4. To save a new selection, press the **PEAK (SET)** key. To exit without saving, press the **UNITS** ($\triangle$) key to return to the current "F" heading.
5. Repeat steps 1 through 4 until the Setup Menu is programmed.
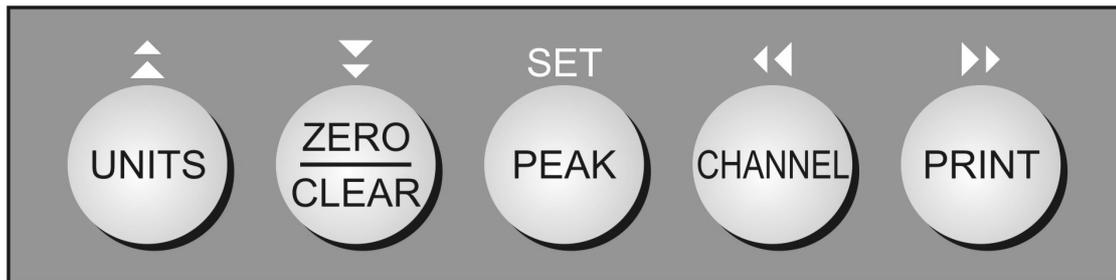
Figure 3-1 Setup Menu Key Assignments

3.3.3 Notes on the Setup Menu

1. There is an **F21** sub-menu present that is for **FACTORY USE ONLY!**
2. Detailed description of the setup menu parameters can be found in Chapter 4 of this manual.

3.3.4 Exiting the Setup Menu

1. On the rear panel. Move the DIP switch back to its original position.
2. The display will go through a digit check, then settle into Normal Operation mode. All front panel keys will now return to their normal mode of operation.

3.4 User ("A") Menu
3.4.1 Entering the User Menu

1. Power off the indicator.
2. Move the cover in the under of the indicator. Finding a DIP two-position switch.

3. Move the switch to the right.
4. Power on the indicator. The indicator shows "CH X", use PESK (SET) key entering the User ("A") Menu, use the **CHANNEL** (◁◁) key or the **PRINT** (◁◁) key to move right or left in the Setup ("F") menu until the indicator shows "A1".

3.4.2 Navigating in the User Menu

Use the directional keys shown in Figure 3-2 to move around in the User Menu.
1. To move to a new "A" heading, use the **CHANNEL** (◁◁) or **PRINT** (◁◁) key to move right or left in the User Menu Chart.
2. To move to the selection level, press the **ZERO** (▽) key once. The current saved selection is shown.
3. To view the available selections for the current "A" heading, use the **CHANNEL** (◁◁) key or **PRINT** (◁◁) key to move through the selection field.
4. To save a new selection, press the **PEAK (SET)** key. To exit without saving, press the **UNITS** (△) key to return to the current "A" heading.
5. Repeat steps 1 through 4 until the User Menu is programmed.

Figure 3-2 User Menu Key Assignments

3.4.3 Notes on the User Menu

1. Detailed descriptions of the user menu parameters can be found in Chapter 5 of this manual.

3.4.4 Exiting the User Menu

1. On the rear panel. Move the DIP switch back to its original position.
2. The display will go through a digit check, then settle into Normal Operation mode. All front panel keys will now return to their normal mode of operation.

Note: From F3.3 ("F" Menu) to F3.4 ("A" Menu) have the same entering terminal, you can finish all the parameters setting, then exit the menu.

Chapter 4: Setup Menu

Setup Menu Descriptions

This section provides more detailed descriptions of the selections found in the Setup Menu Chart.

Factory-set defaults are shown in bold with a checkmark (√).

Table 4-1 shows the selections that are <u>not</u> allowed for "Legal-for-Trade" applications.

Name / Code	Description	Code / Value
F1 Graduations	Specifies number of full-scale graduations. Value should be consistent with legal requirements and environmental limits on the useful system resolution.	1-100000
F2 AD Frequent		10Hz, 80Hz
F3 Zero Track Band	Selects the range within which the scale will automatically zero. Note that the scale must be in standstill to automatically zero. Selections are in Display Divisions.	0d, 0.5d√, 1d, 3d, 5d
F5 Motion Band	Sets the level at which motion is detected by comparing the present display update with the previous one. Maximum value varies depending on local regulations.	1d√, 3d, 5d,10d
F6 Digital Filter	Averages weight readings to produce higher stability. The higher the filter setting, the greater the stability but the slower the indicator's response time.	FAST--fast NNEd--middle SLO—slow
F8 Calib. Unit	Selects the primary base unit to be used in the calibration process. "1"= primary unit is kN "2"= primary unit is mV/V	1√, 2
F9 Display Divisions	Determines the desired weight increments. Value should be consistent with legal requirements.	1√, 2, 5, 10, 20, 50
F10 Decimal Pt.	Determines location of the decimal point.	0√, 0.0, 0.00, 0.000, 0.0000, 0.00000
F16 Zero Calibration	Places indicator in the zero calibration routine. The default unit is kN.	
F17 Span Calibration	Places indicator in the span calibration routine. The default unit is kN.	
F18	Actuates the function that allows you to view both the	

Name / Code	Description	Code / Value
View Calibration	zero and span calibration value. The values displayed in this function are valid only after Calibration (F16 & F17) has been successfully completed.	
F19 Key-in Zero	Allows you to key-in zero calibration value in case of memory loss in the field.	
F20 Key-in Span	Allows you to key-in a known span calibration value in case of memory loss in the field.	
F21 Factory Reset	This sub-menu will reset all parameters in the "F" and "A" menu to the default settings. **USE WITH CAUTION!**	

Chapter 5: User Menu

5.1 User Menu Descriptions

This section provides more detailed descriptions of the selections of the selections found in the User Menu Chart.

Factory-set defaults are shown in bold with a checkmark (√).

Name / Code	Description	Code / Value
A1 Baud Rate	Selects the baud rate for data transmission through the serial port.	300,600,1200, 2400,4800,9600
A2 Data Bits and Parity	Selects the number of data bits and parity of serial transmission. "8n"=8 data bits with no parity bit and one stop bit. "7O"=7 data bits with odd parity bit and one stop bit. "7E"=7 data bits with even parity bit and one stop bit.	8n√ 7O 7E

Chapter 6: Calibration

6.1 Calibration Overview

The indicator is calibrated by following the procedures embedded in F16 (Zero) and F17 (Span) of the Setup Menu. Each procedure enters a value into the indicator's non-volatile memory – F16 the zero value (deadweight) and F17 the span value (test weight). The minimum test weight that can be used is 1% of full-scale capacity. After the two calibration procedures are executed successfully, you should record both calibration values in Table 6-1 using the F18 View procedure.

In the unlikely event that either value is lost while in the field, the setup menu makes provisions for re-entering these values via F19 and F20, thus eliminating the need for re-calibration with test weights.

Note: This chapter assumes that the indicator is in Setup ("F") Menu mode. If the indicator is not in Setup Menu mode, refer to Chapter 3 for instructions.

6.2 Zero Calibration (F16)

1. While in the Setup mode, scroll to "F16", then scroll down once using the **ZERO** (▽) key to enter zero calibration menu. The display will momentarily show "**C 0**" followed by a value. This value is the internal A/D count and can prove useful when trying to troubleshoot setup problems.

2. After making sure that there are no test weights on the platform, press the **ZERO** key again to zero out the displayed value.

3. Press the **PEAK (SET)** key to save the zero point value. The display will show "**EndC0**" momentarily, then revert back up to F16. At this time, proceed to the F17 span calibration to complete indicator calibration.

6.3 Span Calibration (F17)

1. While in the Setup mode, scroll to "F17", then scroll down once using the **ZERO** (▽) key to enter span calibration menu.

2. The display will momentarily show "C 1" for the span calibration, followed by a value with one flashing digit. This value will be zero with the Decimal Point parameter selected in F10. Place the test weight on the force gauge platform.

3. Use the four directional keys to adjust the displayed value to the actual test weight value. Increase the flashing digit by pressing the **UNITS** (△) key. Decrease the flashing digit by pressing the **ZERO** (▽) key. Pressing the **CHANNEL** (◁◁) key or the **PRINT** (◁◁) key will change the position of the flashing digit.

4. After setting the exact value, press the **PEAK (SET)** key to save the value.

5. If the calibration was successful, the display will show "**SET**" momentarily, then show "**C2**", begin to calibrate cal point 2.

6. Repeat step 2—5, finish calibrating the three cal point, then the display revert back up to F17.

Note: If you want to set one cal point, please press PEAK (SET) key twice, when the display shows "C 2".

7. If the calibration was not successful, one of the error messages below will appear. Take the indicated action to correct the problem, then perform a new calibration.

"ERR0" – The calibration test weight or the adjusted keyed-in weight is large than the full capacity of the system. Change the calibration test weight or check the input data.

"ERR1" – The calibration test weight or the adjusted keyed-in weight is smaller than 1% of the full capacity of the system. Change the calibration test weight or check the input data.

"ERR2" – The internal resolution of the system is not high enough to accept the calibration value. Select a large parameter for the Span Gain (F2). SEE APPENDIX C FOR MORE INFORMATION.

6.4 View Calibration Values (F18)

Note: The values displayed in this procedure are valid only after a successful calibration has been performed using F16 and F17.

1. While in the Setup mode, scroll to "F18", then scroll down once using the ZERO (▽) key to enter View calibration menu.

2. The display will show the information list in Table 6-1. The code will display briefly follow by the value. It is recommended that you record all the value in the table below. Press any key to continue down the list. At he completion the list, the indicator reverts back up to F18.

Code	Name	Value
C 0	Zero calibration value	
T 1	First test weight value	
C 1	First span calibration value	
T 2	Second test weight value	
C 2	Second span calibration value	
T 3	Third test weight value	
C 3	Third span calibration value	

Table 6-1: Calibration Value Table

6.5 Key-in Zero Calibration Value (F19)

Note: This procedure is intended for emergency use only in the case of non-volatile memory loss. A valid zero calibration value, obtained from a successful F16 calibration procedure, must be used.

1. While in the Setup mode, scroll to "F19", then scroll down once using the ZERO (▽) key.

2. The display will momentarily show "ET C0", followed by a flashing zero. Use the four directional keys to adjust the displayed value to the zero calibration value.

3. After setting the exact value, press the PEAK (SET) key to save the value. The display will show "SET" momentarily, then revert back up to F19.

6.6 Key-in Zero Calibration Value (F19)

Note: This procedure is intended for emergency use only in the case of non-volatile memory loss. A valid span calibration value, obtained from a successful F17 calibration procedure, must be used.

1. While in the Setup mode, scroll to "F20", then scroll down once using the ZERO (▽) key. The indicator will prompt you to enter the information in the follow table.

2. If the value shown is correct, press **PEAK (SET)** key to save the value, then move to the next value. Otherwise, use the four directional keys to adjust the actual calibration value.

3. After setting the exact value, press the **PEAK (SET)** key to save the value.

4. If the entered values are entered successful, the display will show "SET" momentarily before continuing to the next parameter. At the completion of the sequence, the indicator will then revert back up to F20.

Code	Name	Value
C 0	Zero calibration value	
T 1	First test weight value	
C 1	First span calibration value	
T 2	Second test weight value	
C 2	Second span calibration value	
T 3	Third test weight value	
C 3	Third span calibration value	

Recommend: Please record 6.4,6.5,6.6 value into the table immediately and print the table. In the case of non-volatile memory loss, you will key-in the value.

Chapter 7: Operation

7.1 Display

TI-1500B utilize a 6 digit 7-segment LED display to show the weight and system information. Table 7-1 summarizes both types of display annunciators.

Figure 7-1: TI-1500B LED Display

7.1.1 LED Display

Figure 7-1 shows the display detail of the LED.

LED Annunciator	Meaning
ZERO	This light is active when ever the displayed weight is within zero range.
PEAK	Keeping the peak value. When the weight is less than 2% of full capacity, this function is unable.
N, kN, LBF, MV/V	Indicates the unit of the displayed weight.

7.2 Keyboard

TI-1500B is composed of five function keys. Refer to Figures 7-2 for the overall layout and key locations.

Figure 7-2: TI-1500B Function Keys Layout

7.3 General Scale Operation

7.3.1 Force gauge

1. Select the desired weighing unit by pressing the **UNITS** key.
2. If necessary, press the **ZERO** key to obtain a weight reading of zero.
3. Place the object to be weighed on the platter and allow the indicator to stabilize. When the weighing unit default kN, if the item weight exceeds 9d over the system's weight capacity, it displays "□□□□□". When the weight unit is N/lbf, if the item weight doesn't exceed 9d over the system's weight capacity, but the display value exceed LED's maximum digital, it display "□□□□□".
4. Read the weight shown on the display.

7.3.2 Zero & Clear

1. In general force gauge mode, the key is **ZERO** function key: Press the **ZERO** key to obtain a weight reading of zero.
2. In keeping peak value mode, the key is **CLEAR** function key: Press the **CLEAR** key to clear the peak value which is shown in the display, prepare to the next peak value keeping operation.

7.3.3 Keeping Peak Value

1. Press the **PEAK** key to enter keeping peak value mode. The item's weight is from 2% to 100% of full capacity, the indicator can record the maximum value in real time. When the weight is less 2% of full capacity, the function is unable.
2. If necessary, press **CLEAR** key to clear the present peak value shown in the display.
3. Press **PEAK** key again, exit the keeping peak value mode.
4. In calibration mode, press **PEAK** key to enter the present channel to set the parameters.

7.3.4 Channel Change

1. Press **CHANNEL** (◁◁) key to change the present channel circulating. The default channel is channel 0. When pressing the CHANNEL (◁◁) key, the system will automatic delay 2—5 seconds, then enter the next channel. TI-1500B has four absolute channels for custom using in the different load cell standard sources.

Note: In general operate mode, just using CHANNEL key to change the channels. It's different from using in calibration mode.

7.3.5 Print

1. This key is used to print weight information by serial printer and send weight information out to the PC by serial port.

Chapter 8: Legal for Trade Sealing

8.1 Lead Sealing

Indicators in the ABS enclosure can be sealed for commercial (Legal for Trade) application as follows:

1. Power off the indicator.
2. On the back of the indicator, locate the DIP switch cover.
3. Thread a wire security seal through both drilled head screws securing the calibration switch cover as well as the single drilled head screw holding on the rear panel.

Appendix A: Specifications

Analog Specifications:

Full Scale input Signal	30mV, including dead load
Minimum Sensitivity–Non H-44	0.4μV/ grad
Minimum Sensitivity–H-44	1.0μV/ grad
Input Impedance	30MΩ, typical
Calibration Method	Software Calibration, with long term storage in EEPROM
Excitation Voltage	+5VDC
Power	AC110V – AC230V
Operation Temperature	10℃ -- + 40℃
Storage Temperature	- 25℃ -- + 70℃

Digital Specifications:

Microcontrollers	W78E58B
Digital Filtering	Software Selectable

Serial Communications:

Serial Port	Full Duplex, 300, 600, 1200, 2400, 4800, 9600 Baud
	8 data bits, no parity, 1 stop bit
	7 data bits, odd parity, 1 stop bit
	7 data bits, even parity, 1 stop bit

Operator Interface:

Display – LED	1" (25mm), 6 Digit, 7-Segment, LED

Additional Symbols	Peak, Zero, N, kN, lbf, mV/V
Keyboard	5 – key flat membrane panel

Mechanical:

Overall Dimensions (Standard)	310mm x 100mm x 205mm

Appendix B: Serial Port Information

B.1 Demand Mode

The Demand mode allows control from a host device, usually a PC, and can be activated by pressing the PRINT key on the indicator's front panel. Figure B-1 shows a suggested cable diagram for interface to a PC. Figure B-2 shows the serial data format for the Demand Mode.
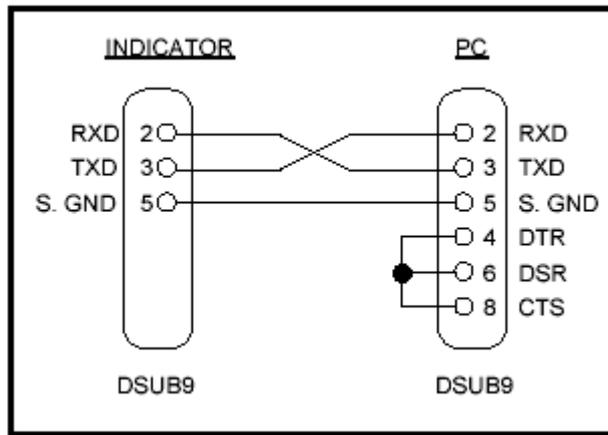

Figure B-1: Cable Diagram for Indicator to PC

Figure B-2: Consolidated Controls Demand Mode

B.2 Recognized Host Commands

"P" - This command is sent to the indicator to print the indicator display. The indicator will not respond if the system is in motion, positive overload or negative overload.

"Z" – This command is sent to the indicator to zero the system. The indicator will not respond if the system is in motion, positive overload or negative overload.

Appendix C: Displayed Error Codes

Code	Mode	Meaning / Possible Solution
☐☐☐☐☐	Normal Operating Mode	Gross Overload. A weight greater than the rated capacity has been applied to the system. Remove the weight from the platter or try recalibrating the system. Otherwise, check for a bad load cell connection or possible load cell damage due to overloading.
ERR0	Span Calibration Mode (F17)	Keyed-in weight value is larger than full-scale capacity. Use a smaller test weight or check keyed-in value.
ERR1	Span Calibration Mode (F17)	Keyed-in weight value is less than 1% of full-scale capacity. Use a larger test weight or check keyed-in value.
ERR2	Span Calibration Mode (F17)	There is not enough load cell signal to produce the internal counts necessary to properly calibrate the system. First check all load connections. Use F16 mode to view internal counts.
ERR3	All Modes	Non-volatile memory read error. One or more setup parameters have been lost.

Warranty:

1. Warranty Period: Twelve (12) months for data of shipment from manufacturer.
2. Over the warranty period, the maintenance must be charged. According the product's fault, charge for parts, maintenance and calibration.
3. Non-warranty:
   a. Not correct installing, using and storing.
   b. Not connecting the power correctly.
   c. Natural disasters and animal damage.
Immersing the indicator into water, it belongs to non-warranty.

Global headquarters
Sales: +1-800-503-9180
Office: +1-847-419-9180
Fax: +1-847-419-1515
E-mail: sales@transcell.com
Add: 975 Deerfield Parkway Buffalo Grove, IL,
60089 U.S.A
www.transcell.com

Asia Pacific headquarters
Tel:+886-2-8919-1012
Fax:+886-2-8919-1011
E-mail : info.apac@transcell.com
Add: 7F, No. 129, Ln, 235, Baoqiao Rd.,
Xindian Dist., New Taipei, 231, Taiwan

China headquarters
电话：+86-4008-803-808
传真：+86-25-5276-0038
邮箱：info.cn@transcell.com
地址：中国南京市江宁区科学园兴苑路
8 号 211100