Defender® 3000 Indicators Service Manual

i-DT33P

i-DT33XW

TABLE OF CONTENTS

1. INTRODUCTION

This service manual contains the information needed to perform routine maintenance and service on the Defender 3000 Series Scales. There will be two parts for the service manual where first part will describe the service on the Indicator as this manual and second part would describe the service for the bases, please refer to Defender Series Base Service Manual. Please read this manual completely before repair and maintenance.

1.1 Definition of Signal Warning and Symbols

Safety notes are marked with signal words and warning symbols. These show safety issues and warnings. Ignoring the safety notes may lead to personal injury, damage to the instrument, malfunctions and false results.

1.1.1 Safety Precautions

Definition of Signal Warnings and Symbols

Safety notes are marked with signal words and warning symbols. These show safety issues and warnings. Ignoring the safety notes may lead to personal injury, damage to the instrument, malfunctions and false results.

WARNING	For a hazardous situation with medium risk, possibly resulting in severe injuries or death if not avoided.
CAUTION	For a hazardous situation with low risk, resulting in damage to the device or the property or in loss of data, or minor or medium injuries if not avoided.
ATTENTION	For important information about the product. May lead to equipment damage if not avoided.
NOTE	For useful information about the product.

Warning Symbols

 General hazard

 Explosion hazard

 Electrical shock hazard

Safety Precautions

CAUTION: Read all safety warnings before installing, making connections, or servicing this equipment. Failure to comply with these warnings could result in personal injury and/or property damage. Retain all instructions for future reference.

- Before connecting power, verify that the equipment's input voltage range and plug type are compatible with the local AC mains power supply.
- Do not position the equipment such that it is difficult to reach the power connection.
- Only connect the power cord to a compatible grounded electrical outlet.
- Only use a power cord with a rating that exceeds the specifications on the equipment label. (Only for i-DT33P)
- Make sure that the power cord does not pose a potential obstacle or tripping hazard.
- Operate the equipment only under ambient conditions specified in these instructions.
- The equipment is for indoor use only.
- Do not operate the equipment in hazardous or unstable environments.
- Do not allow liquids to enter the equipment.
- Use only approved accessories and peripherals.
- Disconnect the equipment from the power supply when cleaning.
- Service should only be performed by authorized personnel.

WARNING: Never work in an environment subject to explosion hazards! The housing of the instrument is not gas tight. (Explosion hazard due to spark formation, corrosion caused by the ingress of gases).

WARNING: Electrical shock hazards exist within the housing. The housing should only be opened by authorized and qualified personnel. Remove all power connections to the unit before opening.

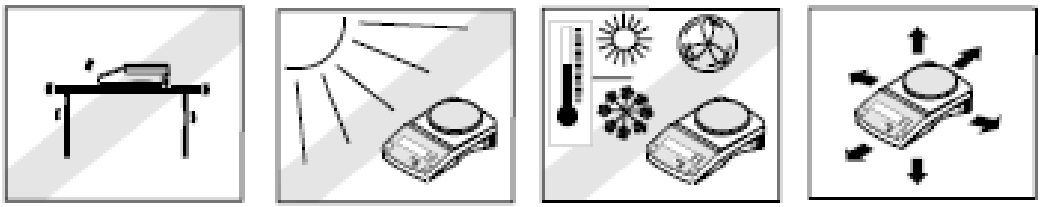
1.1.2 Intended Use

This instrument is intended for use in light industry. It must only be used for measuring the parameters described in these operating instructions. Any other type of use and operation beyond the limits of technical specifications, without written consent from OHAUS, is considered as not intended. This instrument complies with current industry standards and the recognized safety regulations; however, it can constitute a hazard in use. If the instrument is not used according to these operating instructions, the intended protection provided by the instrument may be impaired.

1.2 Service Facilities

To service an indicator, the service area should meet the following requirements:

- Must be protected from electrostatic discharge.
- Should be temperature controlled and meet the indicator specifications for temperature environmental requirements. See specifications for temperature range.
- Must be free of vibrations such as fork lift trucks close by, large motors, etc.
- Must be free of air currents or drafts from air conditioning/heating ducts, open windows, people walking by, fans, etc.
- Area must be clean and air must not contain excessive dust particles.
- Work surface must be stable and level.
- Work surface must not be exposed to direct sunlight or radiating heat sources.



1.3 Tools and Test Equipment Required

In order to properly service the Indicator, certain special tools and test items are required in addition to standard electronic tool kits. These items are listed as follows:

1.3.1 Special Tools and Test Equipment List

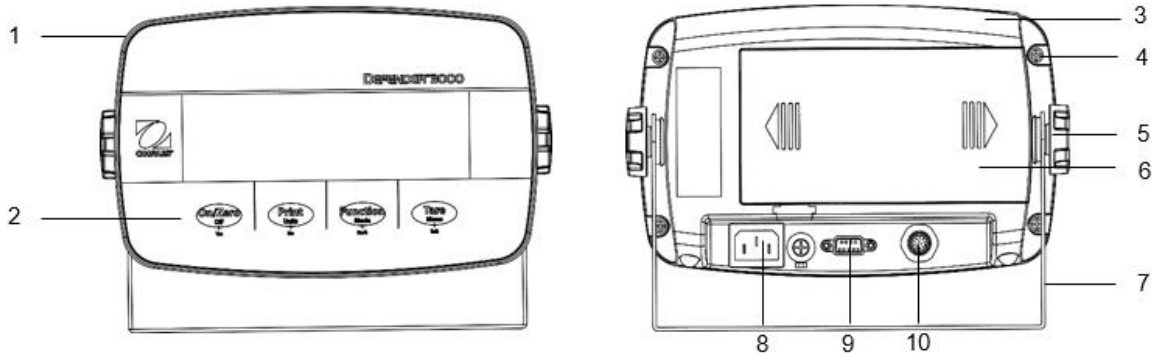
1. Ohaus Scale Base.
2. Load Cell Simulator optional.
3. Computer with RS232/USB Interface for testing the RS232/USB communications.
4. RS232 Interface cable for i-DT33XW
5. Data Printer for use with RS232/USB communications.

1.3.2 Standard Tools and Test Equipment List

1. Standard Electronics Tool Kit
2. Digital Voltmeter (DVM), with clip on probes. Input impedance of at least 10 megohms in the 1 Volt dc position.
3. Soldering Iron, solder and flux remover.
4. ESD work station or mat.

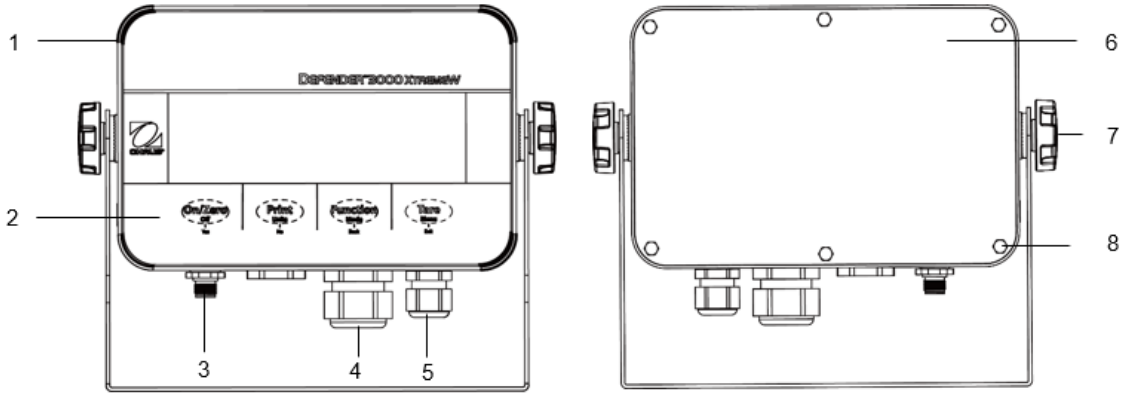
1.4 Overview of Parts

1.4.1 Parts of i-DT33P



Item	Description	Item	Description
1	Front Housing	6	Battery Cover
2	Control Panel	7	Mounting Bracket
3	Rear Housing	8	Power Cord Connector
4	Screws (5)	9	RS232 Connector
5	Adjusting Knobs (2)	10	Load Cell Connector

1.4.2 Parts of i-DT33XW

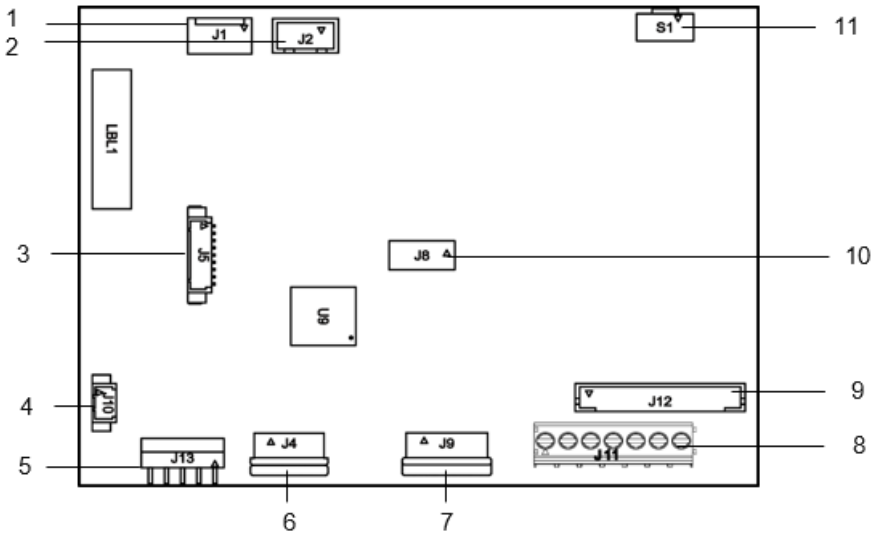


Item	Description
1	Front Housing
2	Control Panel
3	Load Cell Connector
4	Strain Relief for Option
5	Strain Relief for Power Cord
6	Rear Housing
7	Adjusting Knobs (2)
8	Hex Head Bolts (6)

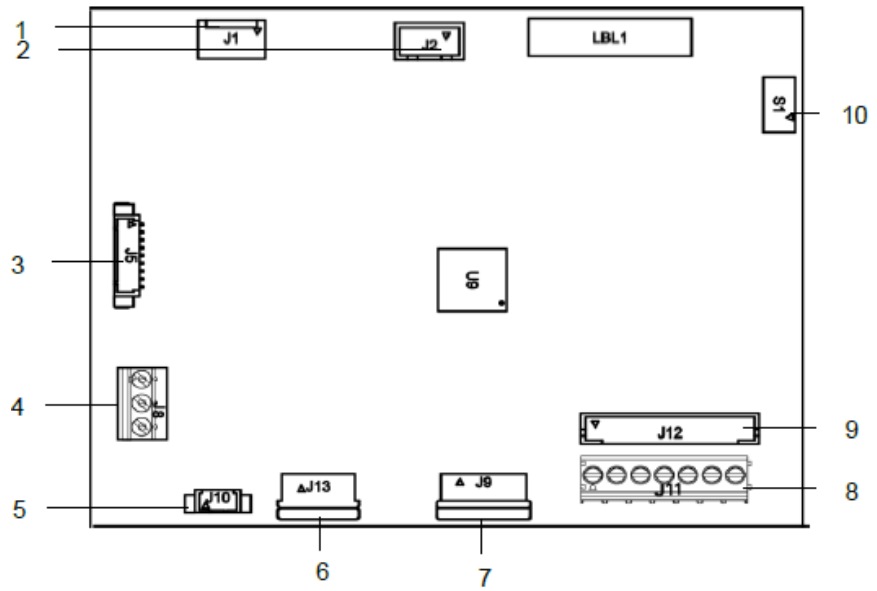
Note:

- There are two types of load cell connector, one supports EasyConnect™ and one does not. Therefore the load cell connector varies for different models.
- For some i-DT33XW models, the position of load cell connector, strain relief for option and power cord may change. Please refer to the actual product.

1.4.3 Main PCB



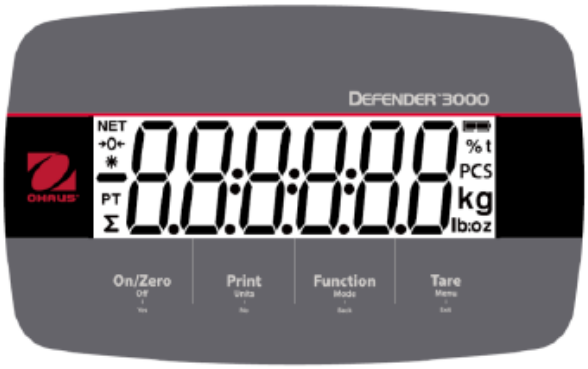
Item	Description	Item	Description
1	DC input (J1)	7	Display board connector (J9)
2	Dry cell input (J2)	8	Load cell terminal block (J11) (for models not supporting EasyConnect™)
3	Ethernet kit / USB device kit connector (J5)	9	Load cell connector (J12) (for models supporting EasyConnect™)
4	Backlight connector (J10)	10	Lead-acid battery charge board kit connector (J8)
5	RS232 connector (J13)	11	Security switch connector (S1)
6	Keyboard connector (J4)		



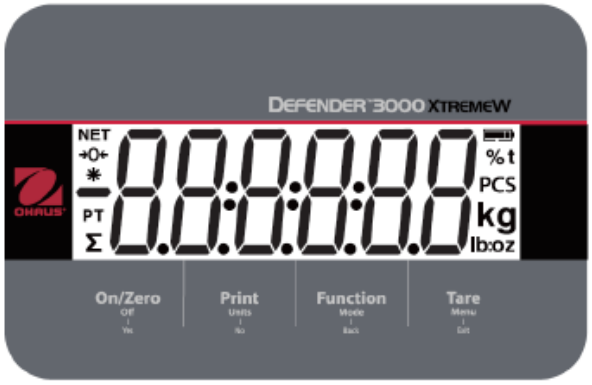
Item	Description	Item	Description
1	DC input (J1)	6	Keyboard connector (J13)
2	Lead-acid battery input (J2)	7	Display board connector (J9)
3	Ethernet kit / USB device kit connector (J5)	8	Load cell terminal block (J11) (for models not supporting EasyConnect™)
4	RS232 connector (J8)	9	Load cell connector (J12) (for models supporting EasyConnect™)
5	Backlight connector(J10)	10	Security switch connector (S1)

Note: Mainboard may vary slightly for different regions.

1.5 Control Functions



i-DT33P Control Panel



i-DT33XW Control Panel

Button	On/Zero (Off / Yes)	Print (Units / No)	Function (Mode / Back)	Tare (Menu / Exit)
Primary Function (Short Press)	**On/Zero** If the terminal is off, press to power on; If the terminal is on, press to set the zero point.	**Print** Sends the current value to the RS232 port if the ***Print Setup → Assignment → Demand*** menu is enabled.	**Function** Initiates an application mode.	**Tare** Performs a tare operation.
Secondary Function (Long Press)	**Off** If the terminal is on, press to power off.	**Units** Changes the weighing unit.	**Mode** Changes the application mode.	**Menu** Enters the user menu. Shows a tare value in application modes.
Menu Function (Short Press)	**Yes** Accepts the current setting on the display or selects a sub-menu or menu item.	**No** Advances to the next menu or menu item. Rejects the current setting on the display and advances to the next available one.	**Back** Moves back to the previous menu item.	**Exit** Exits the user menu. Aborts a calibration in progress. Exits when displaying totalization result or under and over value in check mode.

Notes:

- Short Press: press less than 1 second.
- Long Press: press and hold for more than 3 seconds.

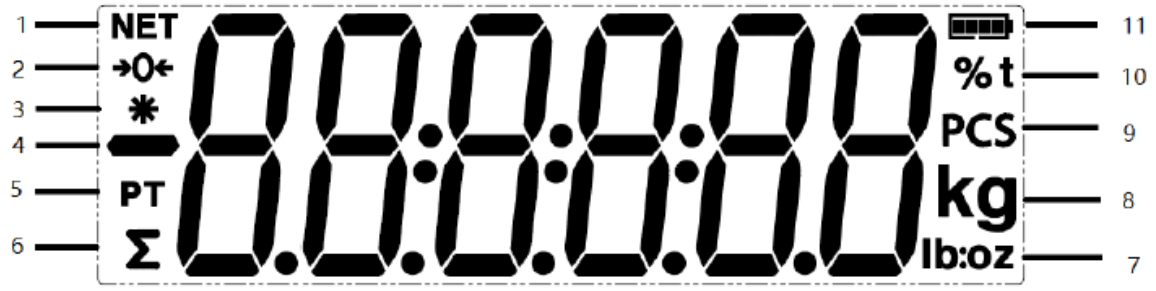


Figure 1-7 Display

Item	Description	Item	Description
1	NET symbol	7	Pound, Ounce, Pound:Ounce symbols
2	Center of Zero symbol	8	Kilogram, Gram symbols
3	Stable weight symbol	9	Pieces symbol
4	Negative symbol	10	Percent symbol, Tonne symbol
5	Preset tare symbol	11	Battery symbol
6	Totalization symbol		

1.6 External Connections

This section of the manual explains the external connection of the product.

1.6.1 Battery Power Supply

i-DT33P

Use 6 C size dry batteries (not included).
In some regions, the i-DT33P model comes with one lead-acid battery installed by factory.
Note: You can contact an authorized OHAUS dealer to buy the lead-acid battery as an option.

i-DT33XW

This model comes with one lead-acid battery installed by factory default.

Note: The lead-acid battery will charge automatically while connecting to the power supply. When charging, the battery level indicator increases or decreases in one grid, two grids, three grids and four grids. The battery level indicator will disappear when the battery is fully charged.

While operating on battery, the battery symbol indicates the battery status:


Battery 5%~25% remaining


Battery 25%~50% remaining


Battery 50%~75% remaining


Battery 75%~100% remaining


Attention: Before using the indicator for the first time, the internal rechargeable battery should be fully charged for up to 12 hours. The indicator can be operated during the charging process. The battery is protected against overcharging and the indicator can remain connected to the AC power line.


CAUTION: BATTERY IS TO BE REPLACED ONLY BY AN AUTHORIZED OHAUS SERVICE DEALER. RISK OF EXPLOSION CAN OCCUR IF THE RECHARGEABLE BATTERY IS REPLACED WITH THE WRONG TYPE OR IF IT IS NOT PROPERLY CONNECTED.


Dispose of the lead acid battery according to local laws and regulations.

1.6.2 AC Power to i-DT61XWE

Connect the AC plug to an electrical outlet to power on the indicator. Connect the other end to the indicator if not connected.

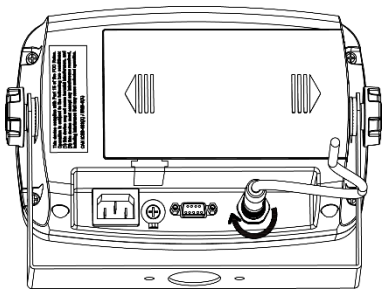
1.7 Internal Connections

Some internal connections require to open the housing first. Therefore, please check the **Open the Housing** section below before making connections.

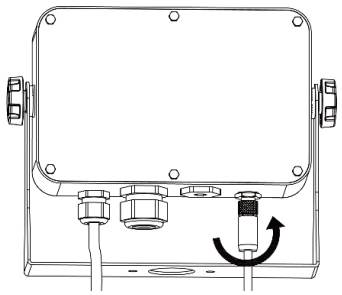
CAUTION: ELECTRICAL SHOCK HAZARD. REMOVE ALL POWER CONNECTIONS TO THE INDICATOR BEFORE SERVICING OR MAKING INTERNAL CONNECTIONS. THE HOUSING SHOULD ONLY BE OPENED BY AUTHORIZED AND QUALIFIED PERSONNEL, SUCH AS AN ELECTRICAL TECHNICIAN.

1.7.1 Load cell connection EasyConnect™ Indicator

To connect an OHAUS EasyConnect™ scale base to an i-DT33P or an i-DT33XW EasyConnect™ indicator, plug the base's connector into the external load cell connector located at the back (i-DT33P) or bottom (i-DT33XW) of the indicator. Then rotate the base connector's locking ring in the direction of the arrows demonstrated below.



i-DT33P



i-DT33XW

Note: For connecting bases which do not support EasyConnect™ to an EasyConnect™ indicator, contact an authorized OHAUS dealer to obtain a load cell cable gland kit (P/N 30379716) as an accessory.

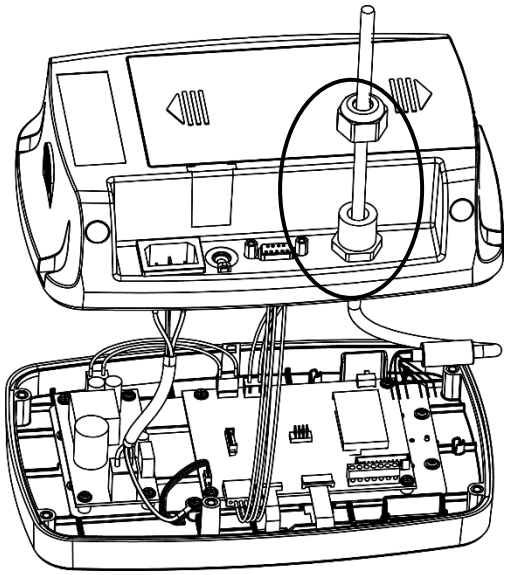
1.7.2 Load cell connection Non-EasyConnect™ Indicator

To connect a non-EasyConnect™ scale base to an i-DT33P or an i-DT33XW non-EasyConnect™ indicator, follow the instruction in **Open the Housing** section to open the housing first before proceeding.

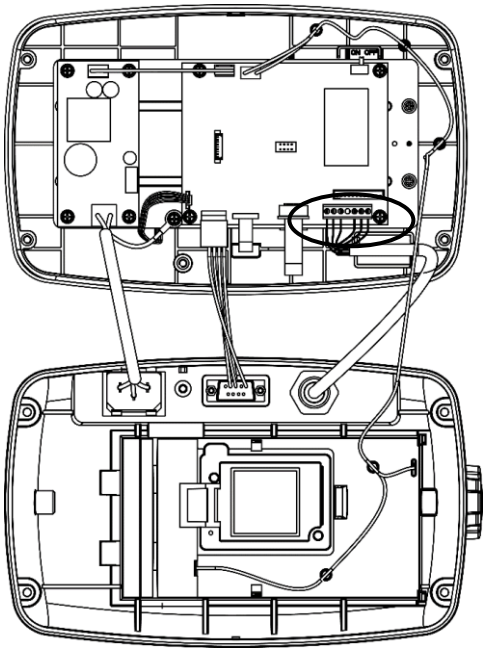
Note: For connecting EasyConnect™ bases to a non-EasyConnect™ indicator, contact an authorized OHAUS dealer to obtain a load cell cable gland kit (P/N 30427858) as an accessory.

i-DT33P

1. After opening the housing, release the load cell connector (circled) on the rear of the indicator and then pass the load cell cable through it.

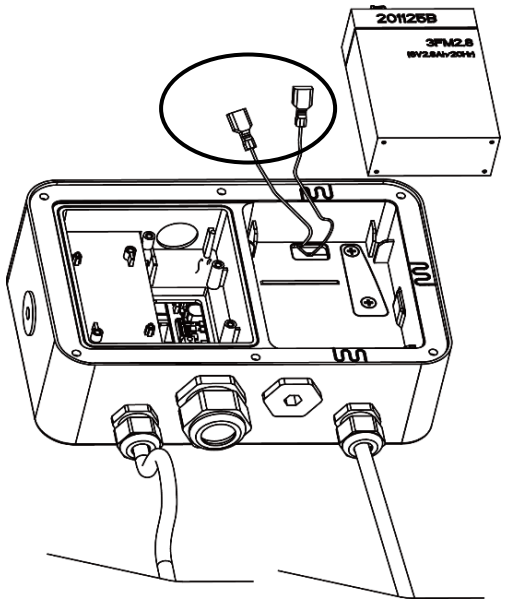


2. Connect all the cables on the load cell cable to the load cell terminal block on the mainboard (circled). Please refer to the Load Cell Terminal Block section.

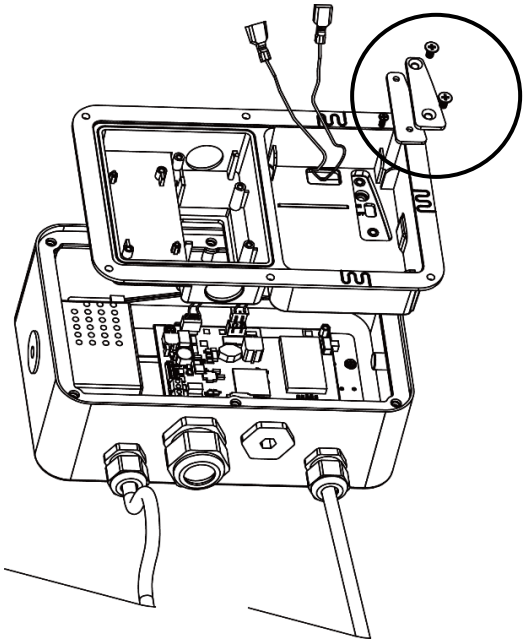


i-DT33XW

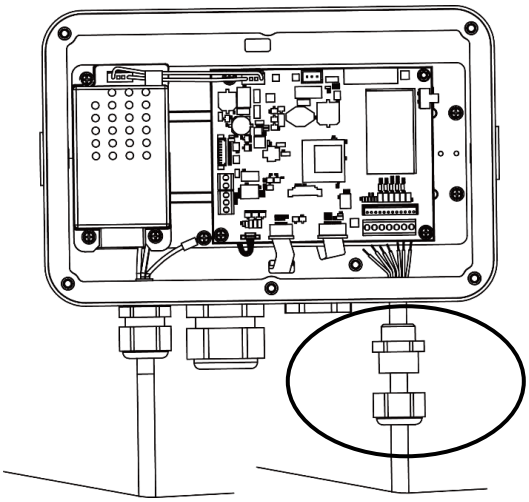
1. After opening the housing, unplug the battery connectors (circled) and take out the battery.



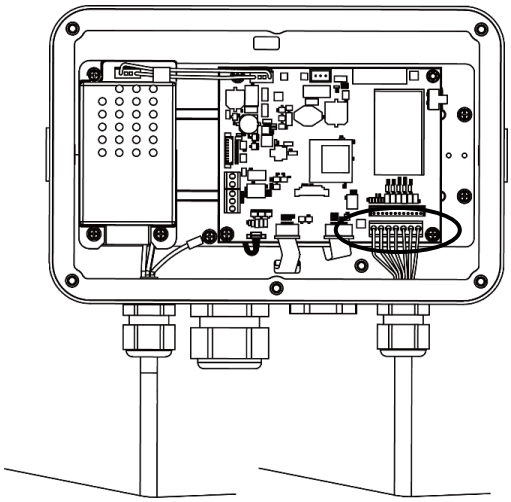
2. Unscrew the two screws on the sealing cover (circled), take out the cover, and then take out the first layer of the built-in housing



3. Release the load cell connector (circled) on the bottom of the indicator and then pass the load cell cable through it.



4. Connect all the cables on the load cell cable to the load cell terminal block on the mainboard (circled). Please refer to the **Load Cell Terminal Block** section for details of the connections.



Load Cell Terminal Block

Proceed with the previous section, to connect the load cell terminal block, first locate it on the mainboard following the instruction in the previous two sections for the two models.

After finding the load cell terminal block, check table 2-1 for the definition of each terminal screw connection and make connections based on it. Please note that when using four-wire load cells, jumpers (the two short wires supplied) must be placed between the +Excitation (+EXE) and +Sense (+SEN) terminals and between the -Excitation (-EXE) and -Sense (-SEN) terminals.

The i-DT33P and i-DT33XW indicators are designed to support both 2mV/V and 3mV/V load cells from the same circuitry. A load cell output rating selection jumper is not required.

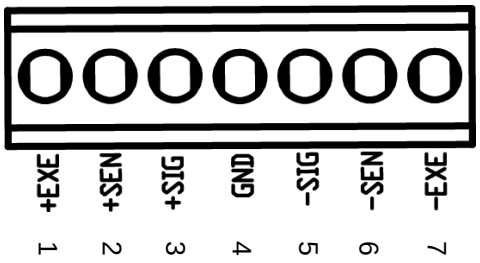


Figure Load Cell Terminal Block

Table Jumper Connections

Number	Connection
1	+EXE
2	+SEN
3	+SIG
4	GND
5	-SIG
6	-SEN
7	-EXE

Installing the Ferrite Core

In order to meet certain electrical noise emission limits and to protect i-DT33P and i-DT33XW from external influences, it is necessary to install a ferrite core on the load cell cable connected to the indicator. The ferrite core is supplied.

To install it, simply route the cable through the center of the core. Either the complete cable or the individual wires can be wrapped through it.

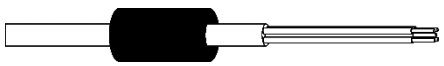


Figure Ferrite Core

1.7.3 RS232 Connection i-DT33P

Connect the optional RS232 cable to the RS232 connector on the rear housing of the i-DT33P indicator. Please refer to table 2-2 for the definition of each pin if needed.

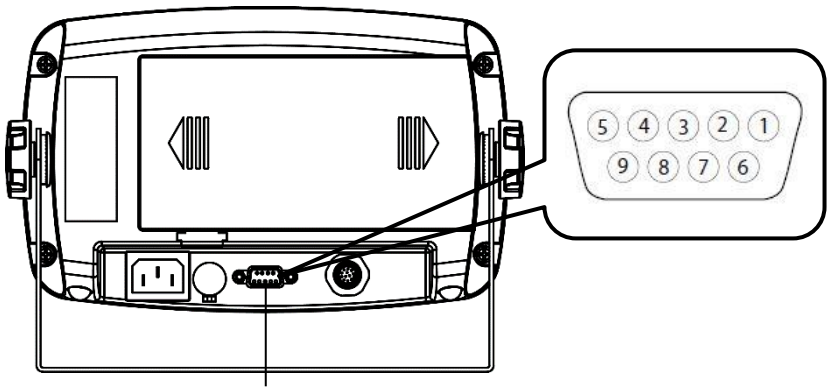


Figure i-DT33P RS232 Connector

Table RS232 Pins

Pin	Connection
1	N/C
2	TXD
3	RXD
4	N/C
5	GND
6	N/C
7	N/C
8	N/C
9	N/C

1.7.4 RS232 Connection i-DT33XW

For i-DT33XW model, to make the RS232 connection:

1. Open the rear housing. Please refer to **Open the Housing** section for how to open the rear housing.
2. Take out the battery. Please refer to the **i-DT33XW** sub-section of **Non-EasyConnect™ Indicator** section for how to take out the battery.
3. Release the strain relief for option connector on the bottom of the indicator and remove the plug on it.
4. Pass the optional RS232 cable 30427860 through the connector and attach it to the RS232 terminal block on the mainboard.

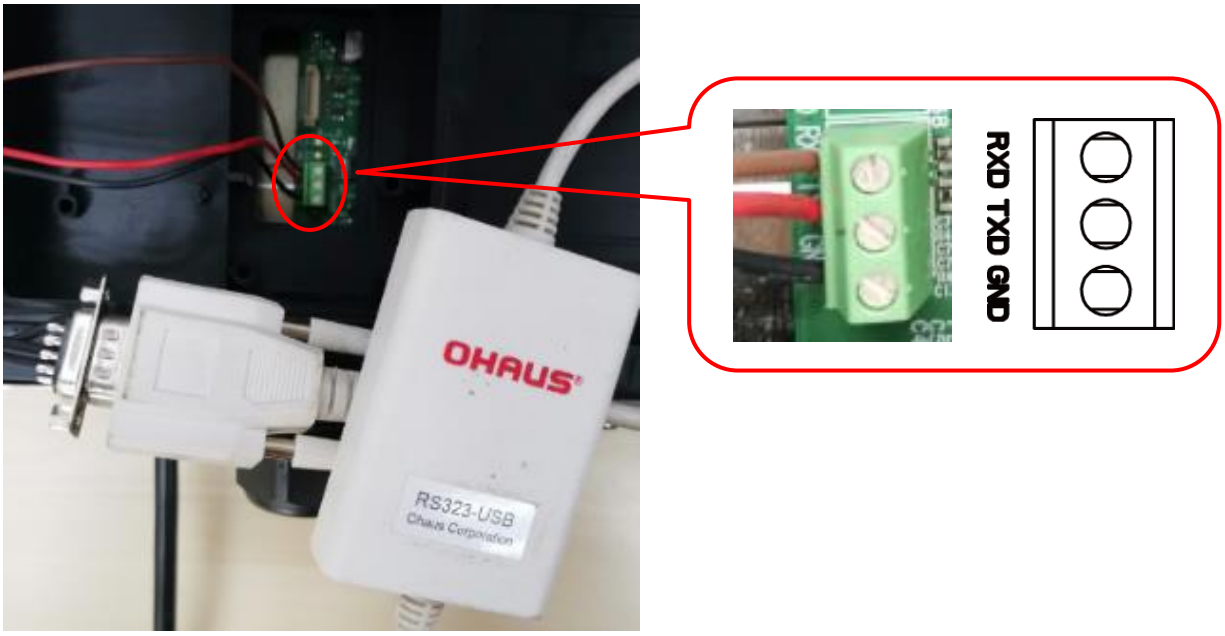


Figure i-DT33XW RS232 Connection

1.8 Mounting Bracket

Attach the bracket to a wall or table using fasteners (not supplied) that are appropriate for the type of mounting surface. The bracket will accommodate up to 6 mm (1/4”) diameter screws. Locate the mounting holes as shown below.

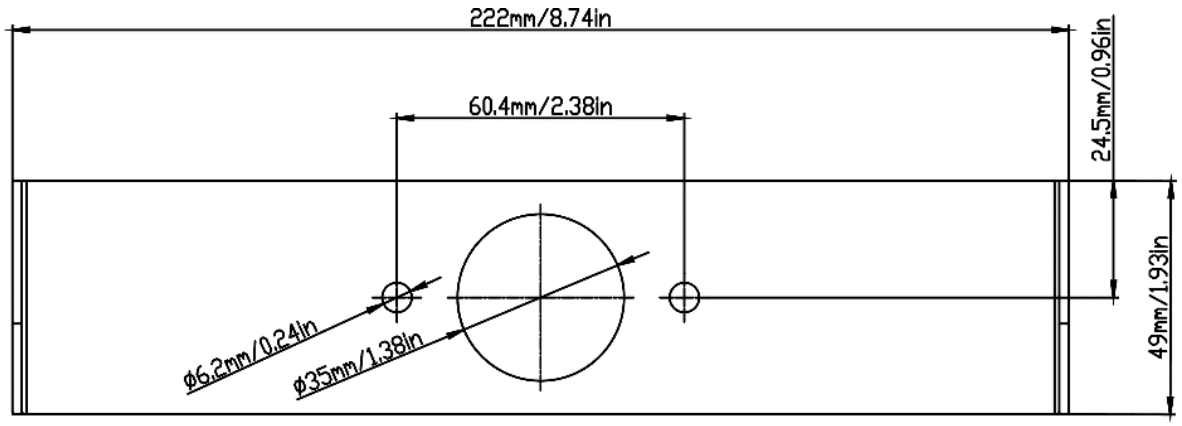


Figure i-DT33P Mounting Bracket Dimensions

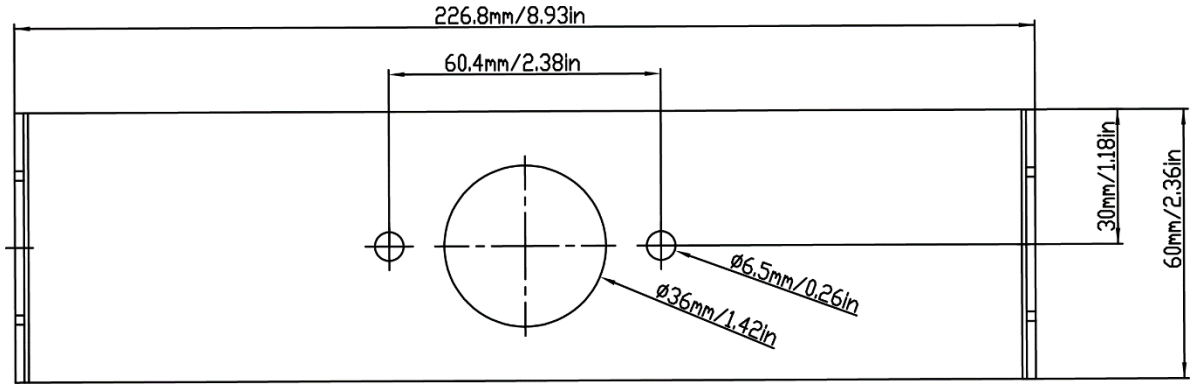


Figure i-DT33XW Mounting Bracket Dimensions

2 MENU SETTINGS

The User Menu allows the customizing of scale settings.

Note: Sub-menu for options (USB, Ethernet and Print2 in the table below) will be active only when the specific board is installed. See their separate option instruction manuals for additional setting information.

2.1 Menu Navigation

CAL	SETUP	READ	MODE	UNIT	ASCII3.2	PRINT	USB	ETHNET	PRINT2	LOCK	End
ZERO SPAN LINE GEO CTEST End	rESEt CUNIt rANGE CAP1 GrAd1 CAP2 GrAd2 P.ZErO P.UNIt R.tArE End	rESEt StAbLE ZErO FILtEr A2t b.LIGHt b.COLOr SCrEEN A.OFF P.SAUEr CEC End	rESEt bUE IGN COUNt CHECK tOtAL tAbLE End	rESEt kg g lb oz lb:oz t End	rESEt bAUd PAr ItY StOP H.SHAKE ALt.P ALt.t ALt.2 End	rESEt ASS IGN StAbLE MODE t IME L INEAr C.SUM tEMP End	rESEt bAUd PAr ItY StOP H.SHAKE ALt.P ALt.t ALt.2 End	rESEt IP.Addr u.E.r. End	rESEt ASS IGN StAbLE MODE t IME L INEAr C.SUM tEMP End	rESEt L.ALL L.OFF L.ZErO L.Pr INt L.UNIt L.MOdE L.MENU L.tArE End	

Notes:

Some modes/units may not be available in all models.

When LEGAL FOR TRADE is turned **ON** (the security switch S1 is in the locked position), the menu settings will be affected as below:

- Calibration function is disabled.
- Zero Range setting is locked at 2%.
- Stable Range setting is locked at 1d.
- Auto-Zero Tracking setting is locked at 0.5d.
- Filter and Units are locked at their current settings.
- Stable Only is locked at On.
- Lb:oz unit is locked at Off.
- Power saving mode is disabled.

Note: Please refer to **Legal for Trade** chapter for the position of the security switch S1.

2.2 Button Navigation

The **Yes** button： allows entry into the displayed menu.

Accepts the displayed setting and advances to the next item.

The **No** button： rejects entry into the displayed menu.

Rejects the displayed menu and move on to the next selection.

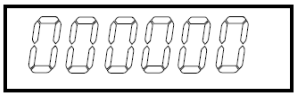
The **Back** button: moves backwards through the upper and middle level menus.

Backs out of a list of selectable items to the previous middle level menu.

The **Exit** button: exits from menu directly to the active weighing mode.

For menu items which need to set numbers such as the scale capacity, the current number is displayed with all digits flashing. To revise:

1. Press the **No** button to begin editing.



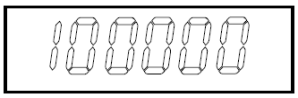
2. The first digit is displayed flashing.

3. Press the **No** button to increase the digit or press the **Yes** button to accept the digit and move to the next one.

4. Repeat this process for all digits.

5. Press the **Yes** button when the last digit has been set.

6. The new setting is displayed with all digits flashing. Press the **Yes** button to accept the setting or press the **No** button to resume editing.



7. To end the current menu selection, press the **Yes** button to advance to the next menu, or press the **No** button to return to the top of the current menu.

2.3 Calibration Menu

Enter the calibration menu **CAL** to perform calibrations.

2.3.1 Initial Calibration

When the scale is operated for the first time, a zero and span calibration are recommended to ensure accurate weighing results.

Before performing the calibration, be sure to have the appropriate calibration weights as listed in table below. Ensure that the LFT switch/calibration lock is set to the unlocked position.

You can also adjust the GEO setting according to your location. For detailed GEO information, please check the **Geo Code Adjustment** section below.

Table Suggested Span Calibration Mass (Sold Separately)

Max Capacity (kg)	Mass* (kg)	Max Capacity (lb)	Mass* (lb)
3 kg	3 kg	6 lb	6 lb
6 kg	6 kg	12 lb	12 lb
15 kg	15 kg	30 lb	30 lb
30 kg	30 kg	60 lb	60 lb
60 kg	60 kg	120 lb	120 lb
150 kg	150 kg	300 lb	300 lb

Note: The calibration unit is consistent with the capacity unit.

2.3.2 Zero Calibration [ZERO]

Zero calibration uses one calibration point. The zero calibration point is established with no weight on the scale. Use this calibration method to adjust for a different static load without affecting the span or linearity calibration.

Calibration procedures:

1. Long press the **Menu** button until you see **MENU**.
2. Release the button and wait for the display to show **CAL**. Press the **Yes** button.
3. The display shows **ZERO**. Press the **Yes** button.
4. **0** kg and the calibration unit are flashing on the display. With no weight on the pan, press the **Yes** button to establish the zero point.
5. The display shows **--C--**, and then **-DONE-** when the Zero calibration is finished.
   Note:

   If zero calibration is failed or if after 40 seconds the calibration is still not successful, **CAL E** is displayed for 3 seconds and the previous calibration data will be restored.

6. Then the display shows **SPAN**. Press the **Exit** button to exit.

2.3.3 Span Calibration [SPAN]

Span calibration uses one point. The span calibration point is established with a calibration mass placed on the scale.

Note: Span calibration should be performed after zero calibration.

Calibration procedures:

1. Long press the **Menu** button until you see MENU.
2. Release the button and wait for the display to show CAL. Press the **Yes** button.
3. Short press the **No** button to navigate until you see SPAN. Press the **Yes** button.
4. The calibration point and the unit are flashing on the display based on the scale capacity and unit set in the menu. (e.g. 030.000 kg) If you do not need to change the calibration point, skip to step 6.
5. To change the calibration point:
   a) Short press the **No** button several times until the desired number appears.
      Note: press the **Back** button can decrease the digit.
   b) Short press the **Yes** button to accept the number and move on to the next digit.
   c) Repeat the process until all the digits are correct.
   d) Press the **Yes** button to accept calibration point. It is flashing on the display.
6. Place a calibration mass of the specified weight on the pan and press the **Yes** button.
7. The display shows --C--, and then -DONE- when the calibration is finished.
8. Then the display shows L in. Press the **Exit** button to exit.

Note:

- If calibration is failed, CAL E is displayed for 3 seconds and the previous calibration data is restored.
- If after waiting for 40 seconds the calibration is still not successful, CAL E is displayed for 3 seconds and the previous calibration data is restored.

2.3.4 Linearity Calibration [L in]

Linearity calibration uses 3 calibration points. The full calibration point is established with a weight on the scale. The mid calibration point is established with a weight equal to half of the full calibration weight on the scale. The zero calibration point is established with no weight on the scale. The full calibration and mid calibration points can be altered by the user during the calibration procedure.

Calibration procedures:

1. Long press the **Menu** button until you see MENU.
2. Release the button and wait for the display to show CAL. Press the **Yes** button.
3. Short press the **No** button several times to navigate until you see L in. Press the **Yes** button.
4. 0 kg and the calibration unit are flashing on the display. With no weight on the pan, press the **Yes** button to establish the zero point. The display shows --C--.
5. Then the first calibration point and the unit are flashing on the display based on the scale capacity and unit you set in the setup menu. (For example, 015.000 kg). If you do not need to change the calibration point, skip to step 7.
6. To change the calibration point:
   a) Short press the **No** button several times until the desired number appears.
      Note: press the **Back** button can decrease the digit.
   b) Short press the **Yes** button to accept the number and move on to the next digit.
   c) Repeat the process until all the digits are correct.
   d) Press the **Yes** button to accept calibration point. It is flashing on the display.
7. Place a calibration mass of the specified weight on the pan and press the **Yes** button. The display shows
   --C--.

8. The second calibration point and the unit are flashing on the display based on the capacity and unit you set in the setup menu. (For example, 030.000 kg)

   Note:

   If after waiting for 40s the calibration is still not successful, CAL E is displayed for 3 seconds and the previous calibration data is restored.
9. Repeat step 6 and 7.
10. The display shows --C--, and then -dONE- when the Linearity calibration is finished.
11. After that the display shows GEO. Press the **Exit** button to exit.

2.3.5 GEO Adjustment [GEO]

Geographical Adjustment Factor (GEO) code is used to adjust the calibration based on the current location. Settings from 0 to 31 are available with 12 being the default.

Please refer to the **Table of Geo Code Values** section in the **Technical Data** chapter to determine the GEO factor that corresponds to the indicator's location.

To set the GEO factor:

1. Long press the **Menu** button until you see MENU.
2. Release the button and wait for the display to show CAL. Press the **Yes** button.
3. Short press the **No** button several times to navigate until you see GEO. Press the **Yes** button.
4. The Geo point is flashing on the display (For example, 12).
5. Short press the **No** button several times until the desired GEO number appears. Press the **Yes** button to accept.
   Note: Press the **Back** button can decrease the digit.
6. Then the display shows C.tEST. Press the **Exit** button to exit.

2.3.6 Calibration Test [C.tEST]

Calibration test procedures:

1. Long press the **Menu** button until you see MENU.
2. Release the button and wait for the display to show CAL. Press the **Yes** button.
3. Short press the **No** button several times to navigate until you see C.tEST. Press the **Yes** button.
4. 0 and the calibration unit are flashing on the display based on the capacity and unit you set in the setup menu. With no weight on the pan, press the **Yes** button to establish the zero point.
5. The display shows --C-- while the zero point is recorded.
6. The calibration weight and the unit of the last time are flashing on the display. (For example, 0 15.000 kg).
6. To change the test calibration weight:
   a) Short press the **No** button several times until the desired number appears.
      Note: press the **Back** button can decrease the digit.

   b) Short press the **Yes** button to accept the number and move on to the next digit.
   c) Repeat the process until all the digits are correct.
   d) Press the **Yes** button to accept the calibration point. It is flashing on the display.
7. Place the specified test weight on the pan and press the **Yes** button.
8. The difference between the calibration data and the test weight is flashing on the display. (For example, 0.0 10 kg). If the indicator is connected to a printer or other devices, the result will be printed.
   Note: the printed result will appear as below:

   Example:

   --------- Cal Test ---------
   New Cal:6.0000kg
   Old Cal:6.0000kg

Diff Cal:0.0000kg
Wt. ID:_____
---------- End ----------

9. After 5 seconds, the test ends and the scale returns to the active weighing mode, displaying the current weight.

2.3.7 End Cal [End]

When **End** is displayed, press the **Yes** button to exit this menu and advance to the next Sub-menu or press the **No** button to advance to the first menu item in the this Sub-menu.

2.4 Service Menu

Enter this menu to check the loadcell, software update and format Alibi Memory etc., by following step:

– Turn the scale off.

– Press and Hold the buttons "On/Zero" and "Tare". As the balance powers up, **Service** appears followed by **Ramp**.

2.4.1 Ramp [rAMP]

The ramp display shows the percentage of use of the A to D circuit, that is, of the temperature-compensated duty cycle. The actual value is not as important as how it changes. It should increase as the weight on the balance is increased. The ramp display should remain constant without fluctuations.

To view the Ramp value. A number will appear and should be constant. Place masses on the scale from minimum to maximum capacity. The reading will increase but should not fluctuate. Fluctuations in the display may indicate a mechanical interference, a cable connection problem, a damaged Main PCB or a damaged load-cell.

2.4.2 Expand [EXPAnd]

Expand reading is the internal calculation result, which should be up and down following with the Ramp changes.

2.4.3 Reset [rESEt]

Reset the indicator the initial setup.

2.4.4 Demo [dEMO]

Show a pseudo weighting value: 30.00KG, which can be adjusted by 1kg. It's for the situation of the indicator without the base connection, the display will show Err 8.x. You may use a pseudo weighing value for the demonstration to customer rather than the Error code.

2.4.5 Auto On [AUtO.On]

The indicator will turn on automatically with the set of Auto On, when power on.

Note: This function is NOT applied to the i-DT33P models, which is with the main PCB 30707556 and without the rechargeable PCB and battery, since this main PCB will be shut off complete, when power off the unit.

3 MAINTENANCE

CAUTION: DISCONNECT THE UNIT FROM THE POWER SUPPLY BEFORE CLEANING.

WARNING: Electric Shock Hazard. Disconnect the equipment from the power supply before cleaning.

Make sure that no liquid enters the interior of the instrument.

Attention: Do not use solvents, harsh chemicals, ammonia or abrasive cleaning agents.

3.1 Preventive Maintenance

Ohaus bases should be carefully handled, stored in a clean, dry area, and cleaned periodically. Follow these precautionary steps:

– When a base has had chemicals or liquids spilled on it, all exterior surfaces should be cleaned as soon as possible with warm water on a damp cloth.

– Do not leave a mass on the base when it is not in use.

– Allow time for the base to stabilize after moving it from an area which is at a different temperature than the area where it is to be operated. Allow one hour for each 5°F (2.7°C) temperature change before using the scale. After temperature stabilization, allow an additional 20 minutes after turning the scale on, for the scale/ indicator electronics to stabilize.

3.2 Preventive Maintenance Checklist

The scale should be inspected and checked regularly, as follows:

1. Clean the outside of the scale/ indicator using a damp cloth with warm water.

   Cleaning for i-DT61PW Model

   - The housing may be cleaned with a cloth dampened with a mild detergent if necessary.

   Cleaning for i-DT61XWE Model

   - Use approved cleaning solutions for the stainless-steel Indicator housing and rinse with water. Dry thoroughly.

CAUTION: DO NOT USE CHEMICAL CLEANERS OR SOLVENTS OF ANY TYPE. SOME CLEANERS ARE ABRASIVE AND MAY AFFECT THE BASE'S FINISH.

2. Check to ensure that the power cord is not broken and has no damaged insulation.
3. If using batteries and the scale malfunctions, first replace the batteries to see if this resolves the problem.
4. Make a visual inspection for faulty connectors, wiring, and loose hardware.

3.3 Troubleshooting

TABLE 3-1 TROUBLESHOOTING

SYMPTOM	PROBABLE CAUSE (s)	REMEDY
EEP Error	EEPROM Checksum Error	Corrupted EEPROM data
Unable to turn on the indicator.	1. Power cord not plugged in or properly connected. 2. Power outlet not supplying electricity. 3. Battery discharged. 4. Other failure.	1. Check power cord connections. Make sure power cord is plugged in properly into the power outlet. 2. Check power source. 3. Recharge battery. 4. Service required.
Cannot zero the scale, or will not zero when turned on the indicator.	1. Weights on the pan exceeds allowable limits. 2. Weight is not stable. 3. Load cell is damaged.	1. Remove weights on the pan. 2. Wait for weight to become stable, check area around the scale and weight on scale for excessive vibration or movement, or increase filtering. 3. Service required.
Unable to calibrate.	1. LFT security switch is turned on. 2. Incorrect value for calibration mass.	1. Turn the LFT security switch off. 2. Use correct calibration mass.
Cannot display weight in desired weighing unit.	Unit is disabled.	Enable unit in the Units Menu. Refer to Unit Menu section for help.
Cannot change menu settings.	The Menu button has been locked.	1. Enable the Menu button in the LOCK Menu. 2. The LFT security switch may need to be switched off.
Error 8.1	Weight reading exceeds Power On Zero limit.	1. Remove weight from the pan. 2. Recalibrate the scale.
Error 8.2	Weight reading below Power On Zero limit.	1. Add weight to the pan. 2. Recalibrate the scale.
Error 8.3	Weight reading exceeds Overload limit.	Reduce weight on the pan.
Error 8.4	Weight reading below Underload limit.	1. Add weight to the pan. 2. Recalibrate the scale.
Error 8.8	Factory calibration data in the EasyConnect™ module on load cell cable is not valid under LFT off status.	Calibrate the scale.
Error 8.9	Fail to read serial number from the EasyConnect™ module or the serial number does not match the LFT ON status.	1. Break the seal or replace the original base/indicator. 2. Service required.
Error 9.5	Calibration data not presented.	Calibrate the scale.
Battery symbol flashing	Low battery	Replace dry batteries for i-DT33P model or recharge battery for i-DT33XW model.
CAL E	Calibration value outside allowable limits	Use correct calibration weight.
REF Err	The average piece of weight (APW) on the pan is too small and less than 0.1d	Replace a heavier batch of samples or change to a scale with readability suitable for your samples.

Note: Please refer to the **LEGAL FOR TRADE** chapter, **Settings** section for the positon of the LFT security switch for each model.

3.4 Verification of the safe state of the equipment after service

After service/ repair, the scale/ indicator should be inspected and checked before connecting the power, as follows:

1. Visual check to ensure that all the parts not broken and installed correctly.
2. For the equipment with electrical supply 100 - 240V ~ , need to check the resistance the conductive part to the pin of power socket/ pins. Grounding pin should be lower than 0.3Ω， Both L and N pin should be higher than 20M Ω or infinity.

Note: The grounding pin of the model i-DT33P to the metal surface of Easyconnector™ should be infinity, since it's mounted on the plastic housing, but it should be lower than 0.3 Ω, when it's connecting with the base.

3.5 Service Information

If the troubleshooting section does not resolve your problem, contact an authorized Ohaus Service Agent. For Service assistance in the United States, call toll-free 1-800-526-0659 between 8:00 AM and 5:00 PM Eastern Standard Time. An Ohaus Product Service Specialist will be available to assist you. Outside the USA, please visit our website www.ohaus.com to locate the Ohaus office nearest you.

4 TECHNICAL DATA

4.1 Specifications

Equipment Ratings:

Indoor use only

Altitude:	2,000m
Operating temperature:	-10°C to 40°C
Humidity:	Maximum relative humidity 80% for temperatures up to 31 °C decreasing linearly to 50% relative humidity at 40°C.
Electrical supply:	100 - 240V～, 0.5A, 50/60Hz
Voltage fluctuations:	Mains supply voltage fluctuations up to ±10% of the nominal voltage.
Overvoltage category (Installation category):	II
Pollution degree:	2

Model	**i-DT33P**
Construction	ABS plastic housing, powder coated carbon steel bracket
Maximum displayed resolution	1:30,000
Maximum approved resolution	1:10,000 or 2 × 3,000e Class III @ 1 μV/e (EC, OIML)； 1:6,000 (NTEP/Measurement Canada) Class III
Weighing units	Kilogram, Gram, Pound, Ounce, Pound: Ounce, Tonne (Metric Tonne)
Modes	Weighing, Counting, Check, Totalization
Display	45 mm / 1.8 in digit height LCD display with 4-color backlight
Check indicator	3 color (red, green, yellow) bar
Keyboard	4 button membrane keyboard
Auto-zero tracking	Off, 0.5 d, 1 d or 3 d
Load cell excitation voltage	5VDC
Load cell drive	Up to 6 X 350 ohm
Load cell input sensitivity	Up to 3 mV/V
Stabilization time	1 second
Power	9 VDC, 6 dry cells, size C; 6 VDC rechargeable battery; 100-240 VAC / 50-60 Hz internal power supply (depending on models)
Battery life	Dry cell battery: up to 200 hours continuous use with backlight off Rechargeable battery: up to 100 hours continuous use with backlight off
Interface	RS232 standard, Optional USB device or Ethernet
Shipping dimensions	300 x 265 x 135 mm

	11.8 x 10.4 x 5.3 in
Product dimensions (with bracket)	252 x 176 x 80 mm / 9.9 x 6.9 x 3.1 in
Approx. net weight	1.3 kg / 2.9 lb
Approx. shipping weight	1.6 kg / 3.5 lb
Operating temperature range	-10°C to 40°C / 14°F to 104°F

Model	**i-DT33XW**
Construction	304 stainless steel housing, 304 stainless steel bracket
Protection	IP66
Maximum displayed resolution	1:30,000
Maximum approved resolution	1:10,000 or 2 × 3,000e Class III @ 1 µV/e (EC, OIML) 1:6,000 (NTEP/Measurement Canada) Class III
Weighing units	Kilogram, Gram, Pound, Ounce, Pound: Ounce, Tonne (Metric Tonne)
Modes	Weighing, Counting, Check, Totalization
Display	45 mm / 1.8 in digit height LCD display with 4-color backlight
Check indicator	3 color (red, green, yellow) bar
Keyboard	4 button membrane keyboard
Auto-zero tracking	Off, 0.5 d, 1 d or 3 d
Load cell excitation voltage	5VDC
Load cell drive	Up to 6 X 350 ohm
Load cell input sensitivity	Up to 3 mV/V
Stabilization time	1 second
Power	6 VDC rechargeable battery; 100-240 VAC / 50-60 Hz internal power supply
Battery life	Up to 100 hours continuous use with backlight off
Interface	RS232 standard, Optional USB device or Ethernet
Shipping dimensions	300 x 265 x 135 mm 11.8 x 10.4 x 5.3 in
Product dimensions (with bracket)	260 x 204 x 74 mm / 10.2 x 8.0 x 2.9 in
Approx. net weight	3.1 kg / 6.8 lb
Approx. shipping weight	3.4 kg / 7.5 lb
Operating temperature range	-10°C to 40°C / 14°F to 104°F

4.2 Table of Geo Values

TABLE 4-1 GEO CODES

		Elevation in meters										
		0	325	650	975	1300	1625	1950	2275	2600	2925	3250
		325	650	975	1300	1625	1950	2275	2600	2925	3250	3575
		Elevation in feet										
		0	1060	2130	3200	4260	5330	6400	7460	8530	9600	10660
		1060	2130	3200	4260	5330	6400	7460	8530	9600	10660	11730
Latitude		GEO value										
0°00'	5°46'	5	4	4	3	3	2	2	1	1	0	0
5°46'	9°52'	5	5	4	4	3	3	2	2	1	1	0
9°52'	12°44'	6	5	5	4	4	3	3	2	2	1	1
12°44'	15°06'	6	6	5	5	4	4	3	3	2	2	1
15°06'	17°10'	7	6	6	5	5	4	4	3	3	2	2
17°10'	19°02'	7	7	6	6	5	5	4	4	3	3	2
19°02'	20°45'	8	7	7	6	6	5	5	4	4	3	3
20°45'	22°22'	8	8	7	7	6	6	5	5	4	4	3
22°22'	23°54'	9	8	8	7	7	6	6	5	5	4	4
23°54'	25°21'	9	9	8	8	7	7	6	6	5	5	4
25°21'	26°45'	10	9	9	8	8	7	7	6	6	5	5
26°45'	28°06'	10	10	9	9	8	8	7	7	6	6	5
28°06'	29°25'	11	10	10	9	9	8	8	7	7	6	6
29°25'	30°41'	11	11	10	10	9	9	8	8	7	7	6
30°41'	31°56'	12	11	11	10	10	9	9	8	8	7	7
31°56'	33°09'	12	12	11	11	10	10	9	9	8	8	7
33°09'	34°21'	13	12	12	11	11	10	10	9	9	8	8
34°21'	35°31'	13	13	12	12	11	11	10	10	9	9	8
35°31'	36°41'	14	13	13	12	12	11	11	10	10	9	9
36°41'	37°50'	14	14	13	13	12	12	11	11	10	10	9
37°50'	38°58'	15	14	14	13	13	12	12	11	11	10	10
38°58'	40°05'	15	15	14	14	13	13	12	12	11	11	10
40°05'	41°12'	16	15	15	14	14	13	13	12	12	11	11
41°12'	42°19'	16	16	15	15	14	14	13	13	12	12	11
42°19'	43°26'	17	16	16	15	15	14	14	13	13	12	12
43°26'	44°32'	17	17	16	16	15	15	14	14	13	13	12
44°32'	45°38'	18	17	17	16	16	15	15	14	14	13	13
45°38'	46°45'	18	18	17	17	16	16	15	15	14	14	13
46°45'	47°51'	19	18	18	17	17	16	16	15	15	14	14
47°51'	48°58'	19	19	18	18	17	17	16	16	15	15	14
48°58'	50°06'	20	19	19	18	18	17	17	16	16	15	15
50°06'	51°13'	20	20	19	19	18	18	17	17	16	16	15
51°13'	52°22'	21	20	20	19	19	18	18	17	17	16	16
52°22'	53°31'	21	21	20	20	19	19	18	18	17	17	16
53°31'	54°41'	22	21	21	20	20	19	19	18	18	17	17
54°41'	55°52'	22	22	21	21	20	20	19	19	18	18	17
55°52'	57°04'	23	22	22	21	21	20	20	19	19	18	18
57°04'	58°17'	23	23	22	22	21	21	20	20	19	19	18
58°17'	59°32'	24	23	23	22	22	21	21	20	20	19	19
59°32'	60°49'	24	24	23	23	22	22	21	21	20	20	19
60°49'	62°90'	25	24	24	23	23	22	22	21	21	20	20
62°90'	63°30'	25	25	24	24	23	23	22	22	21	21	20
63°30'	64°55'	26	25	25	24	24	23	23	22	22	21	21
64°55'	66°24'	26	26	25	25	24	24	23	23	22	22	21
66°24'	67°57'	27	26	26	25	25	24	24	23	23	22	22
67°57'	69°35'	27	27	26	26	25	25	24	24	23	23	22
69°35'	71°21'	28	27	27	26	26	25	25	24	24	23	23
71°21'	73°16'	28	28	27	27	26	26	25	25	24	24	23
73°16'	75°24'	29	28	28	27	27	26	26	25	25	24	24
75°24'	77°52'	29	29	28	28	27	27	26	26	25	25	24
77°52'	80°56'	30	29	29	28	28	27	27	26	26	25	25
80°56'	85°45'	30	30	29	29	28	28	27	27	26	26	25
85°45'	90°00'	31	30	30	29	29	28	28	27	27	26	26

5 REPLACING MAJOR COMPONENTS (INDICATOR)

Ohaus Indicators are precision instruments and should be carefully handled, stored in a clean, dry, dust-free area, and cleaned periodically. Follow these precautionary steps:

- When an Indicator has had chemicals or liquids spilled on it, all exterior surfaces should be cleaned as soon as possible with warm water on a damp cloth.

- Allow at least 10 minutes for the Indicator to stabilize after moving it from an area of a different temperature than the area where it is to be operated.

5.1 Open the Housing

5.1.1 i-DT33P

1. Unplug the Indicator from the AC power source.
2. Remove the 5 screws from the Bottom Housing.

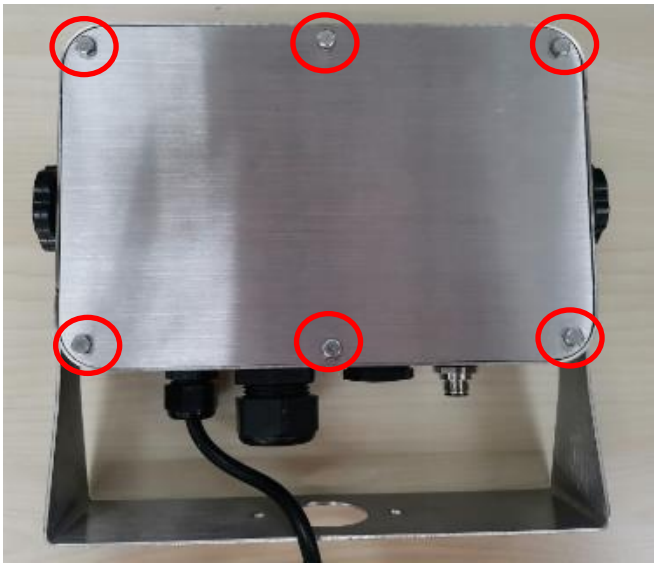
3. Open the housing carefully.

4. Reverse the process for the housing assembly.

Note: The screws should be tightened to 1 N•m (8-9 in-lb) torque for assembly.

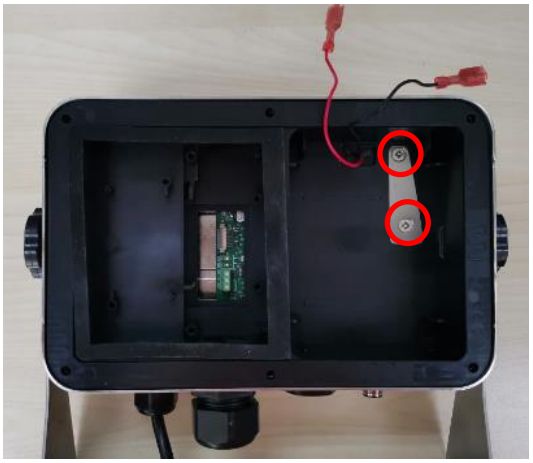
5.1.2 i-DT33XW

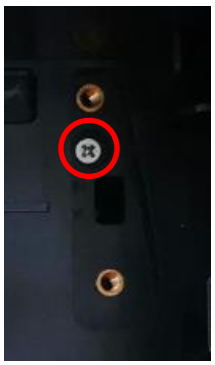
1. Disconnect the Indicator from the AC power source.
2. Remove the 6 bolts from the Bottom Plate.



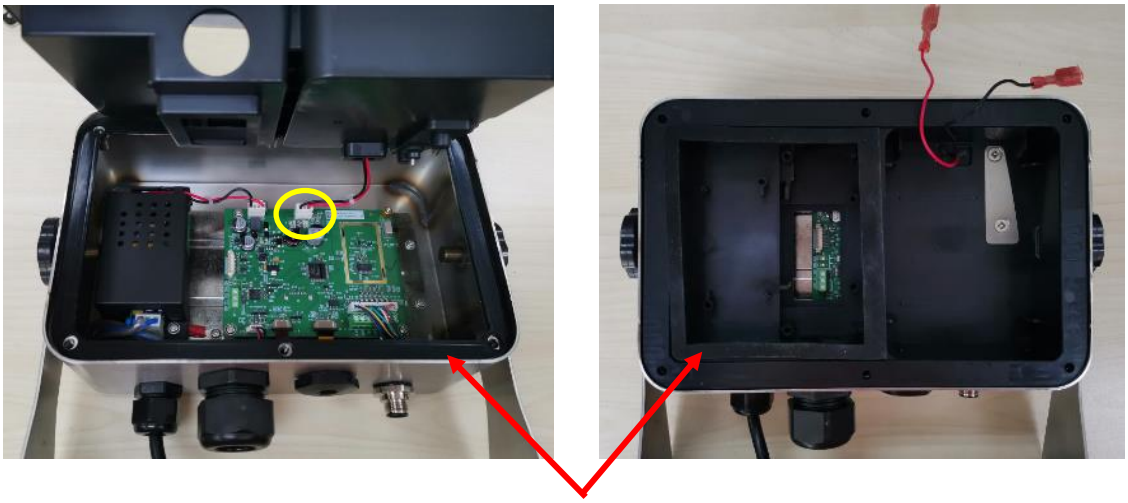
3. Disconnect the cable of battery and take out the battery carefully.

4. Remove the 2 screws from LFT plate and 1 screw under the LFT plate.





5. Disconnect the battery cable and separate the battery housing carefully.



6. Reverse the process for the housing assembly.

Note: The bolts should be tightened to 2.5 N•m (20-25 in-lb) torque and the rubber seal install properly to ensure a watertight seal.

5.2 Printed Circuit Board (PCB) Replacement

WARNING: Electric Shock Hazard. Disconnect the Indicator from power before servicing.

CAUTION: Observe precautions for handling electrostatic sensitive device.

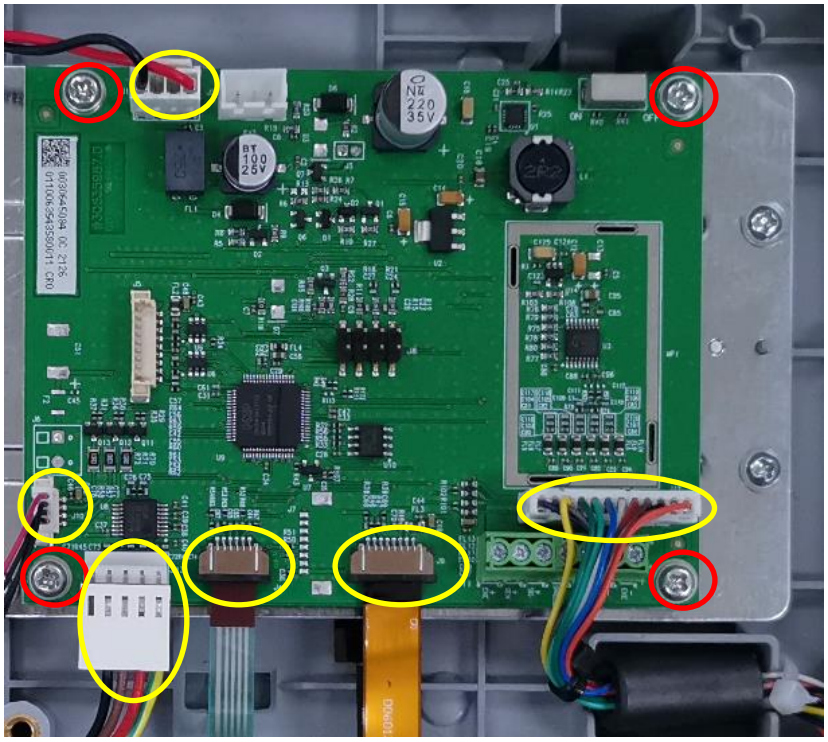
Repairs are not recommended on the PCB. Replacement is recommended rather than repairing.

Replace the PCB for any of the following reasons:

- Display is defective; characters missing or partial display.
- Indicator fails to calibrate properly.
- Display is erratic or unstable.
- Certain functions are not operational.
- Indicator does not operate at all.

5.2.1 i-DT33P

1. To open the housing, please refer to section 5.1.1.
2. Remove the cables of the Power PCB, LCD backlight, RS232, LCD, function label and loadcell from the main PCB.
3. Remove the 4 screws, securely remove the main PCB.



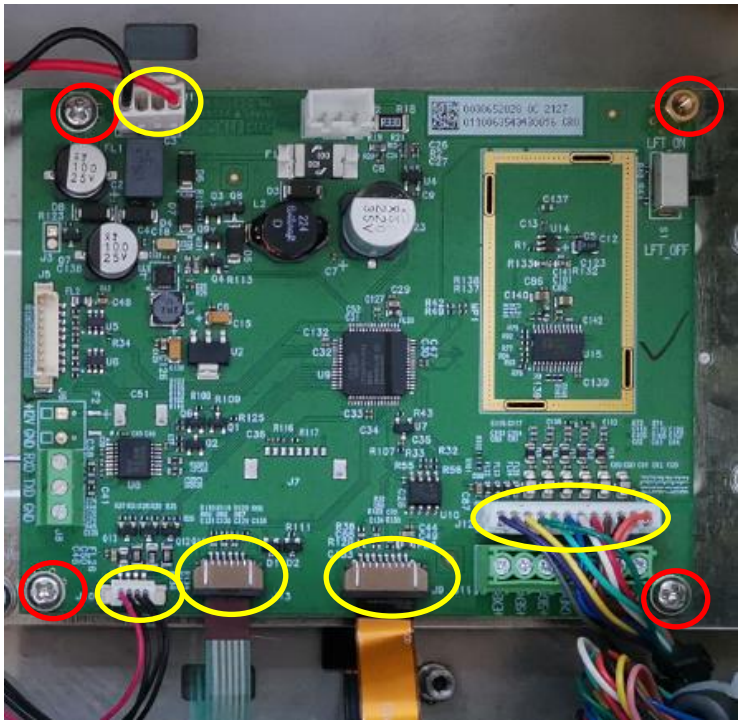
CAUTION: When handling the PCB, grasp it by the edges only!
Do not touch the foil side. Static discharge may damage some components.

4. Reverse the process for the main PCB assembly.

5. After replacing with a new Main PCB, please refer to Appendix A for configuring.

5.2.2 i-DT33XW

1. To open the housing, please refer to section 5.1.2
2. Remove the cables of the Power PCB, LCD backlight, LCD, function label and loadcell from the main PCB.
3. Remove the 3 screws and 1 copper hexagon nut, securely remove the main PCB.



CAUTION: When handling the PCB, grasp it by the edges only!
Do not touch the foil side. Static discharge may damage some components.

4. Reverse the process for the main PCB assembly.
5. After replacing with a new Main PCB, please refer to Appendix A for configuring.

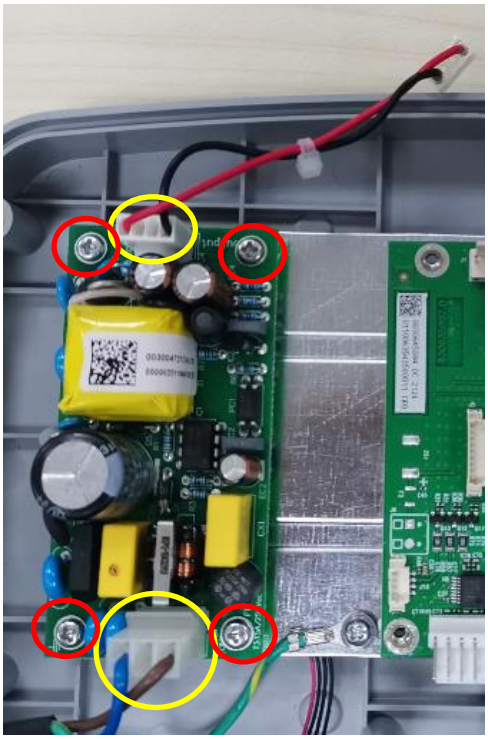
5.3 Power PCB Replacement

WARNING: Electric Shock Hazard. Disconnect the Indicator from power before servicing.

CAUTION: Observe precautions for handling electrostatic sensitive device.

5.3.1 i-DT33P

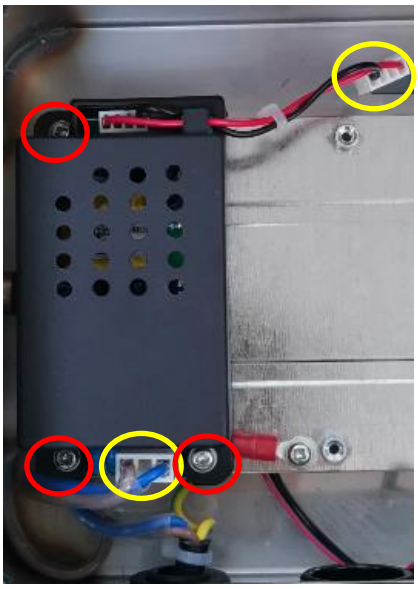
1. To open the housing, please refer to section 5.1.1.
2. Remove the cable connector from the Power PCB to the Main PCBA.
3. Remove the cable connector from the Power PCB to the AC Inlet connector.
4. Remove the 4 screws, and take out the Power PCB carefully.



5. Reverse the process for the Power PCB assembly.

5.3.2 i-DT33XW

1. To open the housing, please refer to section 5.1.2.
2. Remove the cable connector from the Power PCB to the Main PCBA.
3. Remove the cable connector from the Power PCB to the AC Inlet connector.
4. Remove the 3 screws and take out the cover of Power PCB.
5. Remove the last screw and take out the Power PCB carefully.



6. Reverse the process for the Power PCB assembly.

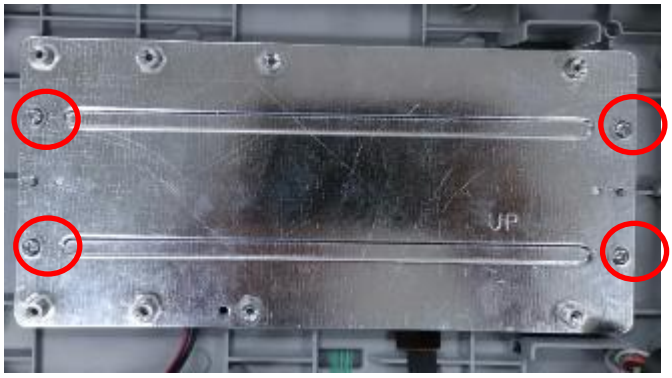
5.4 Display Replacement

WARNING: Electric Shock Hazard. Disconnect the Indicator from power before servicing.

CAUTION: Observe precautions for handling electrostatic sensitive device.

5.4.1 i-DT33P

1. To open the housing, please refer to section 5.1.1.
2. Remove the main PCB (section 5.2.1) and Power PCB (section 5.3.1)
3. Remove the 4 screws and take out the metal PCB Support.



4. Take out the LCD carefully.

5. Reverse the process for the New LCD display installation.

5.4.2 i-DT33XW

1. To open the housing, please refer to section 5.1.2.
2. Remove the main PCB (section 5.2.2) and Power PCB (section 5.3.2)
3. Remove the 5 screws and take out the metal PCB Support.

4. Take out the LCD carefully.

5. Reverse the process for the New LCD display installation.

5.3 Loadcell Cable Replacement

Cables information:

Part Number	Description
30613002	Connector Loadcell i-DT61PW

Part Number	Description
30427858	Loadcell Connector, Short, TD52, i-DT61XWE

1. To open the housing, refer to section 5.1.1.for i-DT33P, section 5.1.2.for i-DT33XW.
2. Disconnect the white cables connector from the main PCB and remove the quick-connect nuts that hold the cables in place.
3. Reverse the process for the new cable install.

5.4 Function Label Replacement

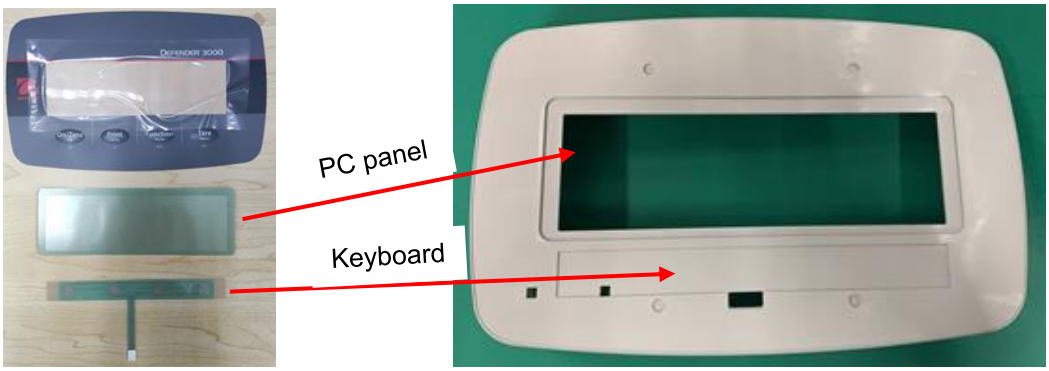
1. Isolate the top housing follow Section 5.1.1 for i-DT33P and section 5.1.2 for i-DT33XW, and disconnect the function label cable from the main PCB.

2. Carefully remove the old function label from the top housing. It is held in place with a strong adhesive.

3. Clean the top cover and remove all traces of adhesive.

4. Remove the protective backing from the back of the new function label. Carefully position it on the top housing, starting at the bottom of the cover. Use a rolling motion to smooth it into position.

Note: For i-D33P, before pasting the function label, place the PC panel and the keyboard in the position as picture shown below.



5. Reconnect the function label cable and reserve step 1 to complete the indicator assembly.

6. Power on for the function test.

6 PARTS IDENTIFICATION

This section of the manual contains exploded views for the Defender 3000 Bases. The exploded view drawings are designed to identify the parts, which can be serviced in the field.

6.1 Defender 3000 Series Indicator: i-DT33P

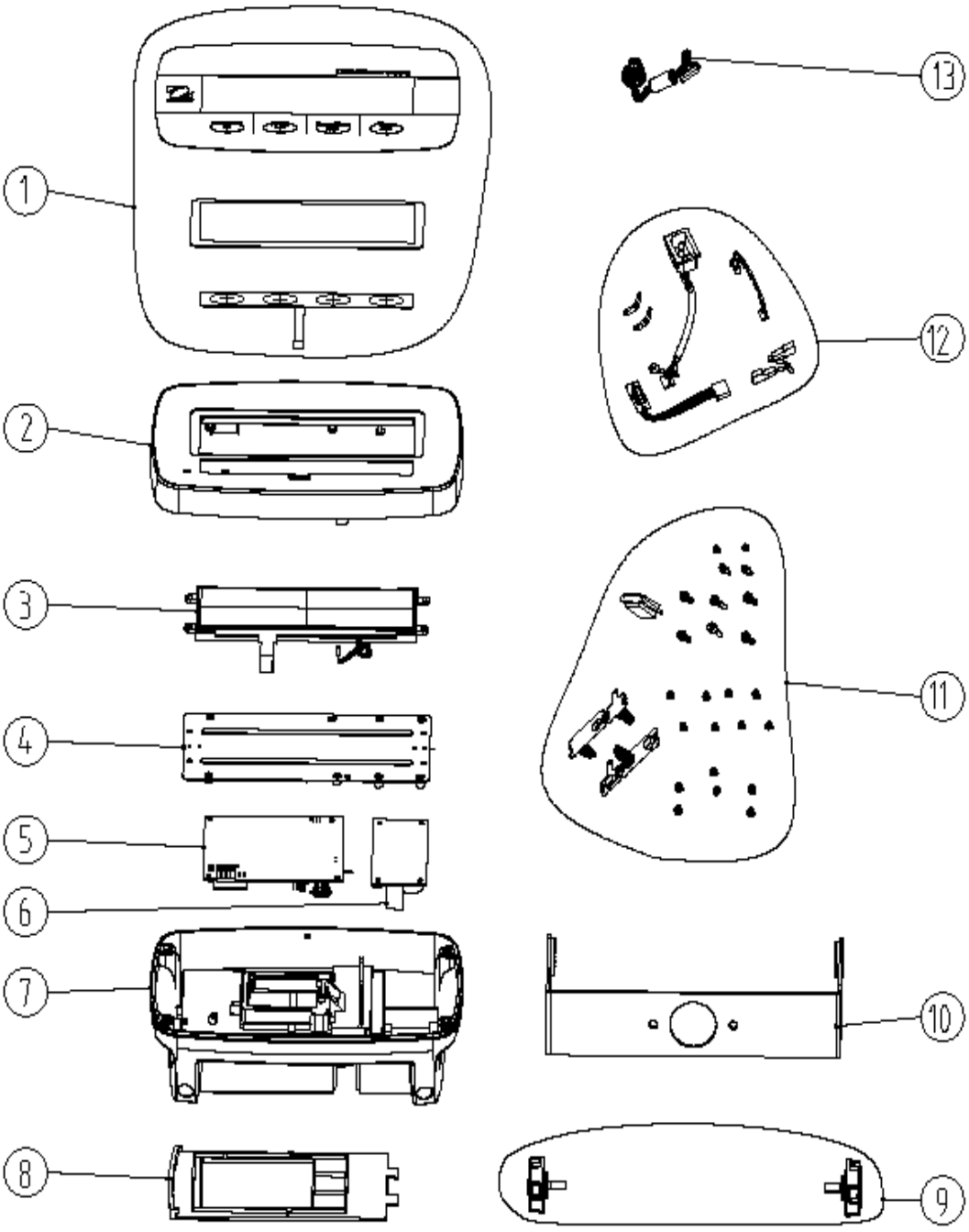


Figure 6-1. Defender 6000 series Indicator: i-DT61PW

Drawing Item	Description
1	Function label Kit EN i-DT33P
	Function label Kit ZH i-DT33P
	Function label Kit JP i-DT33P
	Function label Kit KR i-DT33P
2	Top Housing Kit i-DT33P
3	LCD display Kit i-DT33
4	Support Kit Main PCBA i-DT33
5	PCB Main AD7191 i-DT33P
	PCB Main ADS1230 i-DT33P
6	Switch Power Supply
7	Bottom Housing Kit i-DT33P
8	Battery cover Kit i-DT33P
9	Knob Kit i-DT33
10	Bracket Kit U Bracket Assembly i-DT33P
11	Hardware Kit i-DT33P
12	Hardware kits internal cable i-DT33P
13	Loadcell Connector, Short, TD52
NS	Box Terminal TD52
NS	Box complete Kit i-DT33P
NS	Power Cord CN
NS	Power Cord AU
NS	Power Cord US
NS	Power Cord UK
NS	Power Cord EU
NS	Power Cord JP

6.2 Defender 3000 Series Indicator: i-DT33XW

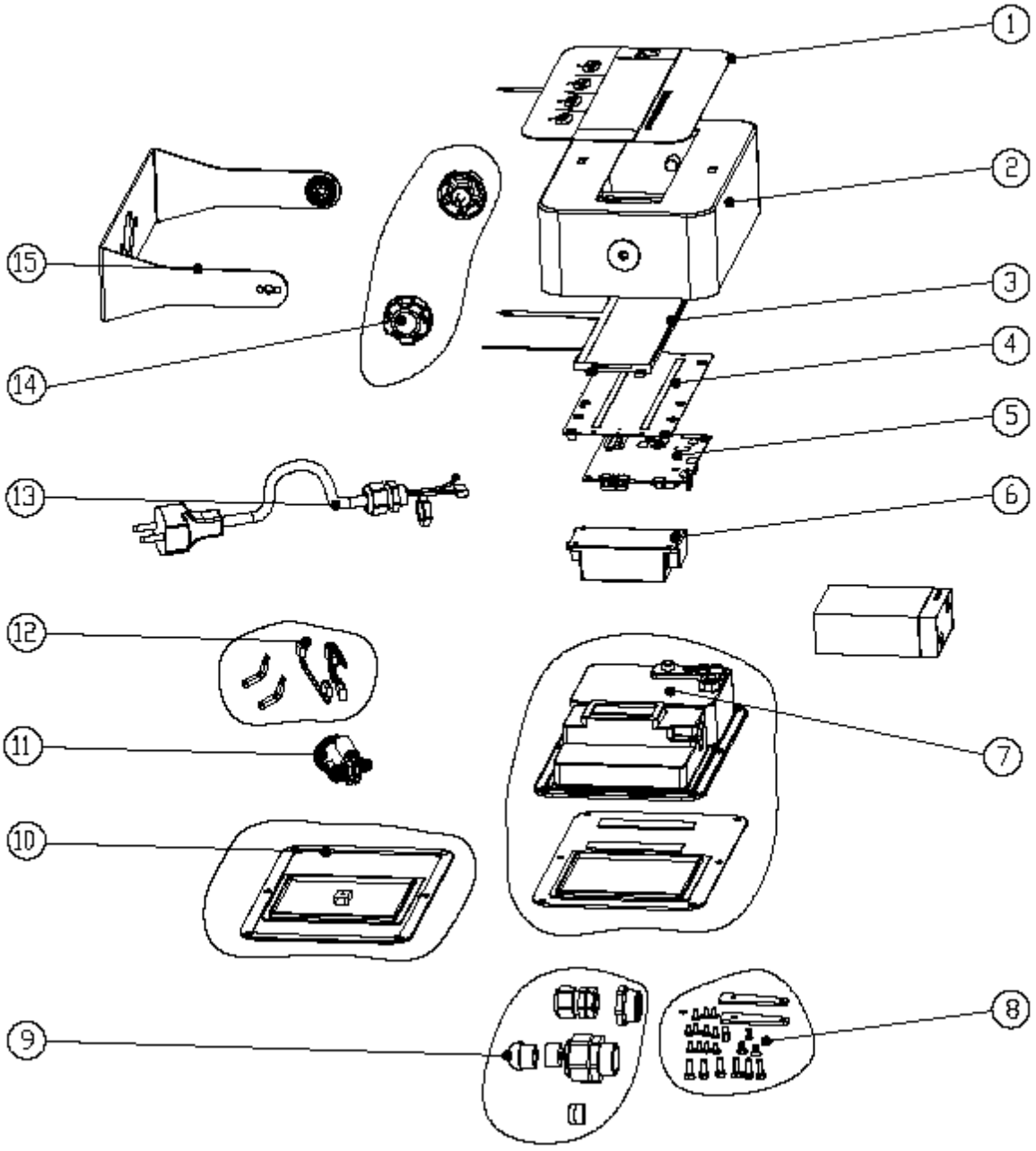


Figure 6-2. Defender 3000 series Indicator: i-DT33XW

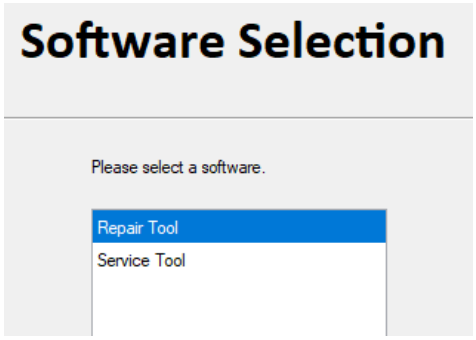
Drawing Item	Description
1	Function label Kit EN i-DT33XW
	Function label Kit ZH i-DT33XW
	Function label Kit JP i-DT33XW
	Function label Kit KR i-DT33XW
2	Top Housing Kit i-DT33XW
3	LCD display Kit i-DT33
4	Support Kit Main PCBA i-DT33
5	PCB Main AD7191 i-DT33XW
	PCB Main ADS1230 i-DT33XW
6	Switch Power Supply
7	Bottom Housing Kit i-DT33XW
8	Hardware kits i-DT33XW
9	Connector Kit i-DT33XW
10	Rubber Kit i-DT33XW
11	Loadcell Connector, Short, TD52
12	Hardware kits internal cable i-DT33XW
13	Power Cord UK TD52XW
	Power Cord JP TD52XW
	Power Cord EU TD52XW
	Power Cord US TD52XW
	Power Cord AU TD52XW
	Power Cord CN TD52XW
14	Knob Kit i-DT33
15	Bracket Kit U bracket Assembly i-DT33XW
NS	Box Terminal TD52
NS	Box complete Kit i-DT33XW

APPENDIX A. CONFIGURING THE MAIN PCBA

Note: To perform the configuration, connect the indicator with computer via RS232. Please refer to section 1.7.3 for i-DT33P, section 1.7.4 for i-DT33XW for the RS232 connection.

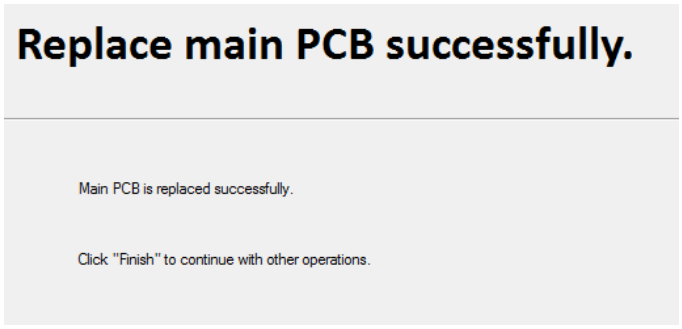
Once a new Main PCBA is installed, you need to perform PCB configure according to their region.

1. Down load and install OHAUS Service and Repair Tools (Version 2.4.3.3 and later).
2. Open the software and select 'Repair Tool' and click 'Next'



3. Select 'DEFENDER i-DT33' under Product Selection and click 'Next'.
4. Select 'Replace Main PCB', click 'Next'
5. Set the same protocol setting between indicator and computer and click 'Next'.
6. Input the 'Serial Number' and 'Model Number' , Select the 'Shipping Country' from the location list and click 'Next'.

7. You will see the below window screen when the configuration is completed successfully.



8. Turn OFF and ON the indicator and check if the configuration is correct.
9. If the process fail kindly check the below.

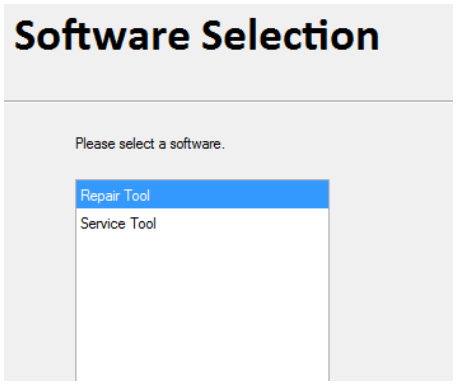
* The communication cable pin configuration.

* The Indicator Protocol setting.

APPENDIX B. SOFTWARE UPGRADE VIA SERVICE TOOL

Note: To perform the software upgrade, connect the indicator with computer via RS232. Please refer to section 1.7.3 for i-DT33P, section 1.7.4 for i-DT33XW for the RS232 connection.

1. Download and install OHAUS Service and Repair Tools (Version 2.4.3.3 and later).
2. Open the software and select 'Repair Tool' and click 'Next'



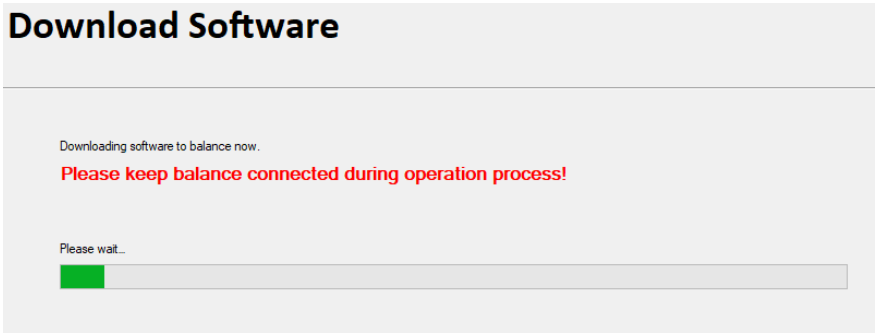
3. Select 'DEFENDER i-DT33' under Product Selection and click 'Next'.
4. Select 'Download Software', click 'Next'
5. Set the same protocol setting between indicator and computer and click 'Next'.
6. Select the Mot file and click 'Next'.

7. Follow by the instruction in the picture below, cycle the power.

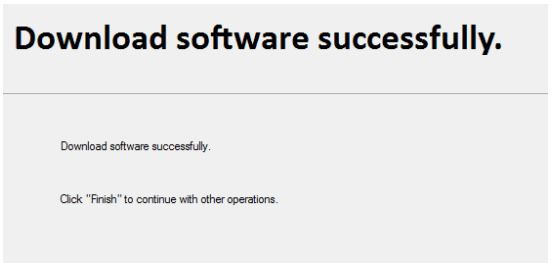
   Note: Process to cycle the power as below:

   1) Unplug the power supply for about 5 second
   2) Press "On/Zero" to switch off the unit completely (this step for the models with battery)
   3) Plug the power supply
   4) Press "On/Zero" to switch on the unit (this step for the models with battery and the models with the main PCB 30707556 and both without the rechargeable PCB and battery)

8. You will see the below window screen, when it's in the process of the software download.



9. You will see the below window screen when the software download is completed successfully.



OHAUS Corporation
7 Campus Drive
Suite 310
Parsippany, NJ 07054 USA
Tel: +1 973 377 9000
Fax: +1 973 944 7177

With offices worldwide

www.ohaus.com

30718420

P/N 30718420A