

OCS Technical Manual

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1. User Input

In this section, you will learn how to operate this scale in a convenient way either on scale or by remote controller.

KEYS ON SCALE

| | ON/OFF | ZERO | TARE | HOLD | 2ND |
|---------------------|--------|------|------|---------|------|
| Scale Configuration | Exit | ↑ | → | Confirm | Save |
| Calibration | Exit | ↑ | → | Confirm | Save |
| Power Adjustment | Exit | ↑ | → | Confirm | |
| System Info | Exit | | | Confirm | |

KEYS ON REMOTE CONTROLLER


| | Scale Configuration | Calibration | Power Adjustment | System Info |
|---|---------------------|-------------|------------------|-------------|
|  | ↑ | ↑ | ↑ | |
|  | → | → | → | |
|  | Confirm | Confirm | Confirm | Confirm |
|  | ↓ | ↓ | ↓ | |
|  | ← | ← | ← | |
|  | | | | |
|  | | | | |
|  | Exit | Exit | Exit | Exit |
|  | Save | Save | | |



2. Advanced Operation


Operations in this section feature versatile and powerful functions for crane scale measurement. Most of the operations are accessible via dedicated remote controller. Some of the settings to the scale require password. Please contact your local representatives for password information.


SCALE CONFIGURATION

Action

Before entering SCALE CONFIGURATION MODE, press 2ND button on scale or  on remote controller twice to enter the password interface first.

To input SCALE CONFIGURATION password or digits, press ZERO and TARE button on scale or  and  on remote controller.

To confirm the password or input value, press HOLD button on scale or  on remote controller.

To save and exit SCALE CONFIGURATION MODE, press 2ND button on scale or  on remote controller.

To exit SCALE CONFIGURATION MODE without saving, press ON/OFF button on scale or  on remote controller.

To learn how to input digits or change the option, please refer to 1 User Input section in User's Guide.

Function

In SCALE CONFIGURATION MODE, user can change the scale's metrology performance, like system measurement unit, auto and manual zero, automatic zero-tracking, anti-motion algorithm, and gravity acceleration, etc.

The screen displays the welcome message as below.



WARNING:

Parameters in SCALE CONFIGURATION are closely related to scale's metrology performance. It is NOT recommended to change anything in SCALE CONFIGURATION unless you are authorized from your local representative with the correct password.

Condition

- The scale must not be in **HOLD** mode. Otherwise, error message hold will keep flashing.

AUTO-ZERO RANGE


During the power-on procedure, load on scale will be automatically zeroed if the load's weight is in **AUTO-ZERO RANGE**.

There are optional 6 **AUTO-ZERO RANGE**, "0%", "2%", "4%", "10%", "20%", and "100%" Max. Cap.. When **AUTO-ZERO RANGE** is "0%" Max. Cap., the **AUTO-ZERO** function is disabled.

The default **AUTO-ZERO RANGE** is set to "20%" Max. Cap..



MANUAL-ZERO RANGE

After powered on, the scale can be zeroed manually (by pressing **ZERO** button on scale or  on remote controller), if the load's weight is in **MANUAL-ZERO RANGE**.

There are optional 6 **MANUAL-ZERO RANGE**, "0%", "2%", "4%", "10%", "20%", and "100%" Max. Cap.. When **MANUAL-ZERO RANGE** is "0%" Max. Cap., the **MANUAL-ZERO** function is disabled.

The default **MANUAL-ZERO RANGE** is set to "4%" Max. Cap..



ZERO-TRACKING RANGE

ZERO-TRACKING function zeros the scale when weight reading is in **ZERO-TRACKING RANGE**.

There are optional 6 **ZERO-TRACKING RANGE**, 0.0 division, 0.5 division, 1.0 division, 1.5 division, 2.0 division, and 2.5 division, respectively "0E", "0.5E", "1.0E", "1.5E", "2.0E", and "2.5E". When **ZERO-TRACKING RANGE** is "0.0E", the **ZERO-TRACKING** function is disabled.

The default **ZERO-TRACKING RANGE** is set to 0.5 division, namely, "0.5E".

**NOTICE:**

Enabling Zero-Tracking will enhance temperature and drift performance of the scale

GRAVITY ACCELERATION

Adjust the **GRAVITY ACCELERATION**, only when you use the scale in a place where acceleration of gravity is greatly different from the place where the scale is calibrated.

GRAVITY ACCELERATION can be set from "9.700" to "9.899".

The default **GRAVITY ACCELERATION** is set to "9.794".

**USER-DEFINED UNIT**

The scale allows user to define a special unit as **USER-DEFINED UNIT**.


USER-DEFINED UNIT can be set from "0.000" to "9.999".

The default **USER-DEFINED UNIT** is set to "1.000".

**NOTICE:**

*A **USER-DEFINED UNIT** is a named unit which is usually used in user's region, but not included in the scale by default, like kg, lb, etc. It is a ratio to the **SYSTEM UNIT**.*

*For example, if **USER-DEFINED UNIT** is set to 1.234 when **SYSTEM UNIT** is kg, then after switching to **USER-DEFINED UNIT**, scale calculates the weight (1000 kg), and displays the calculated value (1234 user-defined unit).*


After pressing 2ND button on scale or  on remote controller, scale will save current settings, exit the **SCALE**

CONFIGURATION MODE automatically and returns to WEIGHING MODE.




CALIBRATION


Action

Before entering CALIBRATION MODE, press 2ND button on scale or  on remote controller twice to enter the password interface first.

To input CALIBRATION password or digits, press ZERO and TARE button on scale or  and  on remote controller.

To confirm the password or input value, press HOLD button on scale or  on remote controller.

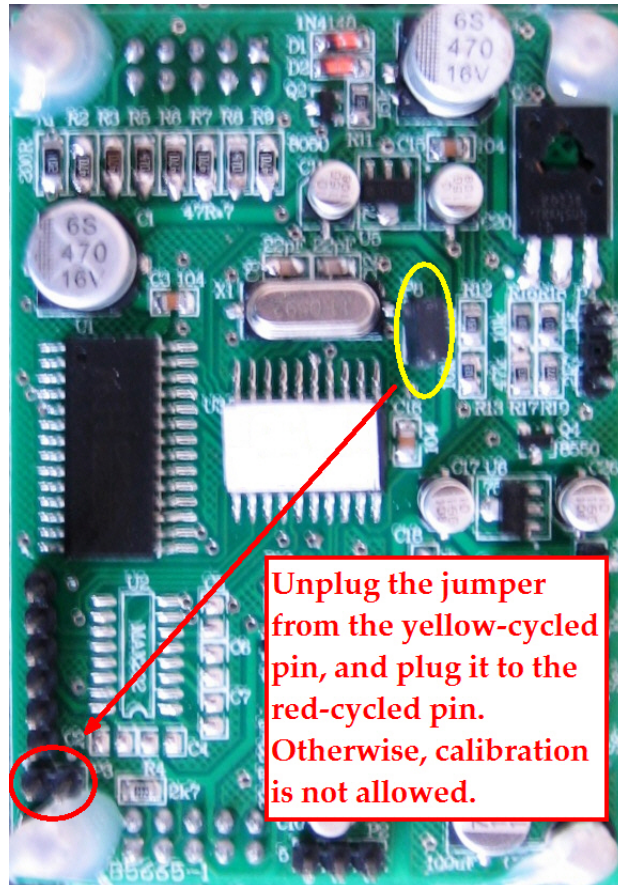
To save and exit CALIBRATION MODE, press 2ND button on scale for  on remote controller.

To exit CALIBRATION MODE without saving, press ON/OFF button on scale or  on remote controller.

To learn how to input digits or change the option, please refer to 1 User Input section in User's Guide.

NOTICE:

To meet metrology government's requirement in some of the European countries, the scale is protected against user calibration with calibration plug. In this version's scale, user must take off the front panel and change the position of the calibration plug. See below picture.



Error message `noPLU` will fresh, indicating that there is no plug on required position.

After calibration, put the plug back onto its original pin.

Function

When the scale needs to be re-calibrated, user can recalibrate the scale in **CALIBRATION MODE**.

The screen displays the welcome message as below.



WARNING:

It is **NOT** recommended to do the **CALIBRATION** unless you are authorized from your local representative with the correct password.

Condition

- The scale must not be in HOLD mode. Otherwise, error message `hold` will keep flashing.


SYSTEM UNIT


In contrast to the **DISPLAY UNIT**, the **SYSTEM UNIT** is set before it leaves factory. To be more exact, it is set when the scale is calibrated at factory.

A metric scale's **SYSTEM UNIT** is kg by default, while an imperial scale's **SYSTEM UNIT** is lb by default.

To switch between metric and imperial system, please flip to the Display Unit Switch part.



The lb indicator  **lb** lights on, after **SYSTEM UNIT** switches to lb.

The kg indicator  **kg** lights on, after **SYSTEM UNIT** switches to kg.

WARNING:

SYSTEM UNIT needs to be changed only before an imperial scale needs to be recalibrated to a metric scale, or a metric scale to an imperial one. It is absolutely wrong to switch the SYSTEM UNIT here without re-calibrating the scale.

MAXIMUM CAPACITY

Action

To set the scale's **MAXIMUM CAPACITY**, input the capacity in unit "ton". For example, "1" means 1,000 kg or lb, "5" means 5,000 kg or lb.




WARNING:

Do NOT attempt to set maximum capacity bigger than the scale's actual capacity. Overloading causes severe harm to the scale, and is very dangerous.

ZERO WEIGHT CALIBRATION**Action**

When the screen displays **LoAd0**, keep the scale unloaded or with relatively zero weight.


After pressing HOLD button on scale or  on remote controller, the scale will detect current weight, displaying the below detection message.




ZERO WEIGHT CALIBRATION is finished when message **LoAd1** is displayed.

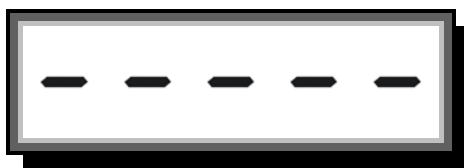
ONE LOAD CALIBRATION**Action**

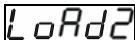

Put on the weight, when the screen displays **LoAd1**.

After pressing HOLD button on scale or  on remote controller, the scale displays the below message, waiting for user's input of the load's weight.





After pressing HOLD button on scale or  on remote controller, the scale will detect the load's weight, displaying the below detection message.



ONE LOAD CALIBRATION is finished when message  is displayed. To finish the calibration, press 2ND button on scale or  on remote controller.

Condition

- The load must be heavier than “0”, (or “0.0” or “0.00”, depending on the resolution). Otherwise, error message  will flash.
- The load must not be heavier than the scale's maximum capacity. Otherwise, error message  will flash.

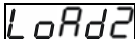
NOTICE:
It is recommended to use the weight that is equal to scale's maximum capacity to calibrate the scale.


NOTICE:
In most cases, one load calibration is enough.
Calibrating the scale with more than one weight is usually required only when the scale's linearity performance is not desired.

TWO LOADS CALIBRATION




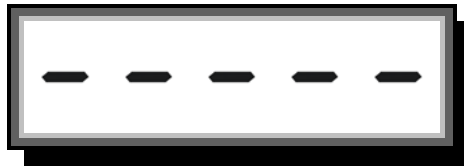
Action


Put on the second weight, when the screen displays  .

After pressing HOLD button on scale or  on remote controller , the scale displays the first load's weight, waiting for user's input of the second load's weight.





After pressing HOLD button on scale or  on remote controller, the scale will detect the second weight, displaying the below detection message.



TWO LOADS CALIBRATION is finished when message **LoAd3** is displayed. To finish the calibration, press 2ND button on scale or  on remote controller.

Condition

- The second load must be heavier than the first load. Otherwise, error message  will flash.
- The second load must not be heavier than the scale's maximum capacity. Otherwise, error message  will flash.


NOTICE:
If the scale is calibrated with two loads, it is recommended to use the second weight that is equal to scale's maximum capacity to calibrate.

THREE LOADS CALIBRATION




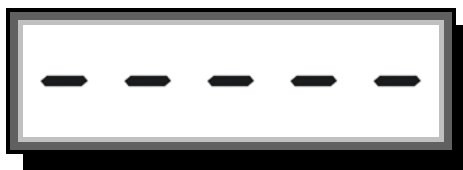
Action

Put on the third weight, when the screen displays **LoAd3**.

After pressing HOLD button on scale or  on remote controller, the scale displays the second load's weight, waiting for user's input of the third load's weight.



After pressing HOLD button on scale or  on remote controller, the scale will detect the third weight, displaying the below detection message.



THREE LOADS CALIBRATION is finished when the below message is displayed. The scale will exit **CALIBRATION MODE** automatically and returns to **WEIGHING MODE**.



Condition

- The third load must be heavier than the second load. Otherwise, error message ---- will flash.
- The third load must not be heavier than the scale’s maximum capacity. Otherwise, error message ---- will flash.

NOTICE:
 If the scale is calibrated with three loads, it is recommended to use the third weight that is equal to scale’s maximum capacity to calibrate.

POWER ADJUSTMENT

Action

Before entering **POWER ADJUSTMENT MODE**, press 2ND button on scale or on remote controller twice to enter the password interface first.

To input **POWER ADJUSTMENT** password or digits, press ZERO and TARE button on scale or and on remote controller.

To confirm the password or input value, press HOLD button on scale or on remote controller.

To save and exit **POWER ADJUSTMENT MODE**, press 2ND button on scale for on remote controller.

To exit **POWER ADJUSTMENT MODE** without saving, press ON/OFF button on scale or on remote controller.


To learn how to input digits or change the option, please refer to 1 User Input section in User’s Guide.

Function


System power needs to be adjusted, when the scale is reset manually. User can adjust the system voltage in **POWER ADJUSTMENT MODE**.

The screen displays the welcome message as below.



After pressing HOLD button on scale or  on remote controller, the scale displays current system voltage (or 6.50V if the scale has been reset), waiting for user's input of new voltage.



After pressing HOLD button on scale or  on remote controller, the scale saves the new voltage, and returns to **WEIGHING MODE**.



3. RS-232 Communication

The scale is equipped with a RS-232 serial input/output port, which is intended for interfacing scoreboards, desktop indicator, hand-held data collector, and computer, etc.

COMMUNICATION WAYS

There are optionally two ways of communication in between scales and peripherals, cabled way and wireless way. Through cable, peripherals can be connected to the scale's full duplex communication port (optional), while via wireless, peripherals can communicate with scale through its half-duplex wireless port (optional).

Cable connection distance is up to 15 meters. Plug one end of the 9-pin D-type connector into the RS-232 socket in the rear of scale. Plug another end of the connector to your peripherals that support RS-232 communication.

Wirelessly, scale works with peripherals over 500 meters, on condition that there is no block between them.

RS-232 PROTOCOL

The scale sends out data in the format of string. A string is consisted of 10 bytes, 1 byte of start flag, 1 byte of scale address, 5 bytes of LED data, 1 byte of indicator data, and 1 byte of check sum, showed as below:

| Byte | ASCII | Default Value |
|-------------------|-----------------------|-----------------------|
| flag of start | 0x7F | 0x7F |
| address of scale | user defined | 0x00 |
| data of LED1 | according to display | according to display |
| data of LED2 | according to display | according to display |
| data of LED3 | according to display | according to display |
| data of LED4 | according to display | according to display |
| data of LED5 | according to display | according to display |
| data of indicator | according to display | according to display |
| check sum | according to all data | according to all data |

Flag of start are always fixed to be 0x7F.

Scale address is defined at **SCALE ADDRESS** in **COMMUNICATION SETUP**, default address is set to 00 (0x00 in hexadecimal).

LED data is defined as below.

| ASCII | Dec | Hex | Display | ASCII | Dec | Hex | Display |
|-------|-----|------|---------|-------|-----|------|---------|
| '0' | 48 | 0x30 | 0 | 'a' | 97 | 0x61 | A |
| '1' | 49 | 0x31 | 1 | 'b' | 98 | 0x62 | B |
| '2' | 50 | 0x32 | 2 | 'c' | 99 | 0x63 | C |
| '3' | 51 | 0x33 | 3 | 'd' | 100 | 0x64 | D |
| '4' | 52 | 0x34 | 4 | 'e' | 101 | 0x65 | E |
| '5' | 53 | 0x35 | 5 | 'f' | 102 | 0x66 | F |
| '6' | 54 | 0x36 | 6 | 'g' | 103 | 0x67 | G |
| '7' | 55 | 0x37 | 7 | 'h' | 104 | 0x68 | H |
| '8' | 56 | 0x38 | 8 | 'i' | 105 | 0x69 | I |
| '9' | 57 | 0x39 | 9 | 'j' | 106 | 0x6A | J |
| '.' | 41 | 0x29 | . | 'k' | 107 | 0x6B | K |
| ',' | 33 | 0x27 | , | 'l' | 108 | 0x6C | L |
| '@' | 64 | 0x40 | @ | 'm' | 109 | 0x6D | M |
| '#' | 35 | 0x23 | # | 'n' | 110 | 0x6E | N |
| '\$' | 36 | 0x24 | \$ | 'o' | 111 | 0x6F | O |
| '%' | 37 | 0x25 | % | 'p' | 112 | 0x70 | P |
| '^' | 94 | 0x5E | ^ | 'q' | 113 | 0x71 | Q |
| '&' | 38 | 0x26 | & | 'r' | 114 | 0x72 | R |
| '*' | 42 | 0x2A | * | 's' | 115 | 0x73 | S |
| '(' | 40 | 0x28 | (| 't' | 116 | 0x74 | T |
| ' ' | 32 | 0x20 | | 'u' | 117 | 0x75 | U |
| '*' | 42 | 0x2A | * | 'v' | 118 | 0x76 | V |
| '~' | 126 | 0x7E | ~ | 'w' | 119 | 0x77 | W |
| '-' | 45 | 0x2D | - | 'x' | 120 | 0x78 | X |
| '_' | 95 | 0x5F | _ | 'y' | 121 | 0x79 | Y |
| | | | | 'z' | 122 | 0x7A | Z |

Data of indicator has two formats, depending on the PCB version.

| version 1 | | version 2 | |
|-----------|----------------|-----------|----------------|
| bit | indicator | bit | indicator |
| bit 0 | kg indicator | bit 0 | not defined |
| bit 1 | b indicator | bit 1 | STB indicator |
| bit 2 | ZERO indicator | bit 2 | TARE indicator |
| bit 3 | not defined | bit 3 | ZERO indicator |
| bit 4 | TARE indicator | bit 4 | lb indicator |
| bit 5 | HOLD indicator | bit 5 | kg indicator |
| bit 6 | STB indicator | bit 6 | HOLD indicator |
| bit 7 | not defined | bit 7 | not defined |

Check sum is the XOR sum of 7 bytes, 1 byte of Scale Address, 5 bytes of LED data and 1 byte of indicator data.

When **OUTPUT MODE** in **COMMUNICATION SETUP** is set to be "2", the scale is able to answer request with specified data. Request consists of 4 bytes, 1 byte of flag of start, 1 byte of address of scale, 1 byte of request command, and 1 byte of check sum, showed as below:

| Byte | Hex |
|------------------|---|
| flag of start | 0x1B |
| address of scale | user defined |
| request command | 0xAB |
| check sum | according to address of scale and request command |

Flag of start are always fixed to be 0x1B.


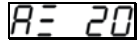
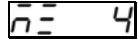


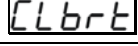
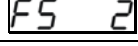




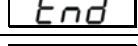
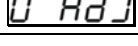
Scale address is defined at **SCALE ADDRESS** in **COMMUNICATION SETUP**, default address is set to 00 (0x00 in hexadecimal).

Request command is currently fixed to be 0xAB.

Check sum is the XOR sum of 2 bytes, 1 byte of Scale Address, 1 byte of request command.

4. Message Illustration

Possible messages the scale displays are listed here.

| | | |
|---|--------------------------------------|--------------------------------------|
|  | s cale configuration | SCALE CONFIGURATION welcome message |
|  | a uto- z ero range | AUTO-ZERO RANGE |
|  | m anual- z ero range | MANUAL-ZERO RANGE |
|  | z ero- t racking range | ZERO-TRACKING RANGE |
|  | g ravty acceleration | GRAVITY ACCELERATION welcome message |
|  | c alibration | CALIBRATION |
|  | f ull s cale | MAXIMUM CAPACITY |
|  | l oad 0 | ZERO WEIGHT CALIBRATION |
|  | l oad 1 | ONE LOAD CALIBRATION |
|  | l oad 2 | TWO LOADS CALIBRATION |
|  | l oad 3 | THREE LOADS CALIBRATION |
|  | e nd | Save and exit |
|  | power a djustment | POWER ADJUSTMENT welcome message |

5. NOTES