

## OCS Series

### Electronic Crane Scale

- OCSA3 & OCSA4 General Purpose Crane Scales
- OCSB3 & OCSB4 Compact Crane Scales
- OCSC3 & OCSC4 Enhanced Crane Scales
- OCSG1 & OCSG2 Heat Resistant Crane Scales
- OCSM1 & OCSM2 Light Duty Crane Scales
- OCSZ Heavy Duty Crane Scale





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## 1. User Input

*In this section, the operator will learn how to operate the scale properly either on scale or by its 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 Operations

*Operations section features the versatile and powerful functions for crane scale measurement. Most of the operations are accessible via dedicated remote controller. Some of the settings in the scale are protected by password to prevent unwanted settings modification. If you are not sure to do it, contact your local representative or dealership for technical support.*

### Action

- To enter **SCALE CONFIGURATION MODE**, press 2ND key on scale or  on remote controller twice. The password message will display.
- To input **SCALE CONFIGURATION** password, use ZERO and TARE keys on scale or  and  on remote controller.
- To confirm the password or inputted value, press HOLD keys on scale or  on remote controller.
- To save and exit **SCALE CONFIGURATION MODE**, press 2ND key on scale or  on remote controller.
- To exit **SCALE CONFIGURATION MODE** without saving, press ON/OFF key on scale or  on remote controller.

*To learn more how to input values or change the option, refer to 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 will display the welcome message:



**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 or dealership with the correct password.*

**Condition**


- The scale must not in **HOLD** mode otherwise an error message  will display.

**AUTO-ZERO RANGE**

- During the power-on procedure, the initial load on the scale will be automatically zeroed if the load is within the **AUTO-ZERO RANGE**.
- There are 6 options of **AUTO-ZERO RANGE**: “0%”, “2%”, “4%”, “10%”, “20%”, and “100%” of Max. Cap.. When **AUTO-ZERO RANGE** is set to “0%” Max. Cap., the **AUTO-ZERO** function is disabled.
- The default **AUTO-ZERO RANGE** is set to “20%” Max. Cap..



**MANUAL-ZERO RANGE**

- After powering on, the scale can be zeroed manually by pressing ZERO key on scale or  on remote controller if the load's weight is in **MANUAL-ZERO RANGE**. *Some models do not have zero key on scale, use the remote controller instead.*
- There are 6 options of **MANUAL -ZERO RANGE**: “0%”, “2%”, “4%”, “10%”, “20%”, and “100%” Max. Cap.. When **MANUAL -ZERO RANGE** is set to “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 will zero the scale when weight reading is within the **ZERO-TRACKING RANGE**.
- There are 6 options of **ZERO-TRACKING RANGE**: 0.0 division, 0.5 division, 1.0 division, 1.5 division, 2.0 division, and 2.5 division equivalent to “0E”, “0.5E”, “1.0E”, “1.5E”, “2.0E”, and “2.5E”, respectively. When **ZERO-TRACKING RANGE** is “0.0E”, the **ZERO-TRACKING** function is disabled.
- The default **ZERO-TRACKING RANGE** is set to 0.5 division, “0.5E”



**NOTE:**

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

## ACCELERATION DUE TO GRAVITY

- 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 was 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”.



**NOTE:**

*A **USER-DEFINED UNIT** is an additional unit represents the unit defined by the user, aside from kg or lb. The conversion value is equivalent to the ratio against to its **SYSTEM UNIT**.*


*For example, assuming the scale's system unit is kg. If the **USER-DEFINED UNIT** is equivalent to 1.234 unit per 1kg then after switching to **USER-DEFINED UNIT**, the scale should display the 1000kg weight to 1234 user-defined unit.*

- After pressing 2ND key on scale or  on remote controller, the scale will save current settings and will exit from **SCALE CONFIGURATION MODE** then automatically returns to **WEIGHING MODE**.








## CALIBRATION

### Action

- To enter **CALIBRATION MODE**, press 2ND key on scale or  on remote controller twice. *Some models do not have 2ND key on scale, use the remote controller instead.* Enter the password for calibration. (Note, this procedure should be done by qualified or authorized person to change the calibration settings. Ask the password from your local dealership or from technical support).

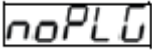


- To input **CALIBRATION** password, press ZERO and TARE keys on scale or  and  on remote controller.
- To confirm the password, press HOLD key on scale or  on remote controller.
- To save and exit **CALIBRATION MODE**, press 2ND key on scale or  on remote controller.
- To exit **CALIBRATION MODE** without saving, press ON/OFF key on scale or  on remote controller.

*To learn more on how to input values or change the option, refer to User Input section in User's Guide.*

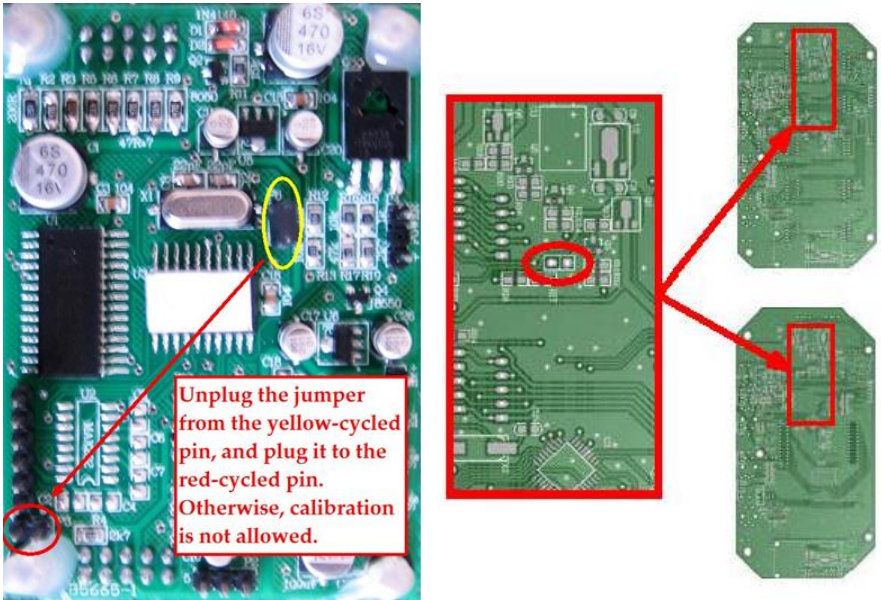
#### NOTE:

To meet some countries' metrology requirements, a Calibration plug is equipped which will be used to switch the scale from weighing mode to calibration mode.

Upon entering the Calibration mode, a message  may display in the screen. This means that you need to switch the jumper of the calibration plug. Refer to the sample images for the mainboard of some of OCS models and locate the calibration jumper pin and the instructions to switch the jumper. In this model, the user must take off the front panel to access the plug.

After the calibration, put the jumper back to its original pin.

If your model does not have calibration plug, just enter the calibration password and proceed with the calibration process.



**Function**

- When the scale needs to be recalibrated, user can recalibrate the scale in **CALIBRATION MODE**.
- The screen displays the welcome message:



**NOTE:**  
*It is NOT recommended to do the CALIBRATION unless you are authorized from your local representative.*

**Condition**



- The scale must not in **HOLD** mode otherwise, error message hold will display.

## SYSTEM UNIT

- In contrast to the **DISPLAY UNIT**, the **SYSTEM UNIT** was set before it leaves the factory. It was set when the scale was calibrated at factory.
- Some models were set to metric scale's **SYSTEM UNIT** (kg by default) while some were set to imperial scale's **SYSTEM UNIT** (lb by default).

*To switch between metric and imperial system, refer to the Display Unit Switch section.*



- The lb indicator  lb will light on after **SYSTEM UNIT** switches to lb.
- The kg indicator  kg will light on after **SYSTEM UNIT** switches to kg.

**Note:** Some models may not have both lb and kg indicator. Some may have lb indicator or kg indicator only. For models with only one indicator, the light will turn off when the scale is switch to its alternate measurement unit (either in kg or lb).

**NOTE:**

*SYSTEM UNIT shall be changed only if the alternate unit will be made as the new system unit. Most of these scales are calibrated from factory with imperial unit (lb unit) as the system unit. If you want to use the metric as the system unit, change the system unit to Un PG then recalibrate the scale. Recalibration is required for changing SYSTEM UNIT.*

*The same process if your scale was set with metric system unit, switch the system unit to Un Lb then recalibrate.*

## MAXIMUM CAPACITY

### Action

- To set the scale's **MAXIMUM CAPACITY**, select the capacity options. The parameter value will be multiplied by 1000 to get the maximum capacity value. For example, if it is set to FS 2 ( see image below) then the scale will be set to have 2000 lb or 2000kg max capacity (it will not matter what unit you set at system unit).




**WARNING:**

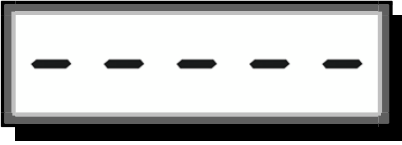
*Do NOT try to set maximum capacity bigger than the scale's actual capacity. Overloading may damage and break the scale. It is also dangerous and it may cause injury or fatality.*

## ZERO WEIGHT CALIBRATION



### Action

- When the screen displays **LoAd0**, this means that we have to start the zero calibration. Remove the load from scale except for hooks or chains that will be used to hold the test weight. Keep the scale unloaded, stabled and relatively at zero weight.
- After pressing HOLD key on scale or  on remote controller, the scale will detect current weight, displaying the below detection message.




- **ZERO WEIGHT CALIBRATION** is finished when message **LoAd 1** is displaying.


**ONE LOAD CALIBRATION**





**Action**

- Put on the test weight, when the screen displays **LoAd 1**.
- After pressing HOLD key on scale or  on remote controller, the scale displays the below message, waiting for user's input of the load's weight value.

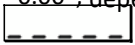
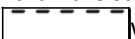


- After pressing HOLD key on scale or  on remotecontroller, the scale will detect the load's weight and will display the below detection message.



- **ONE LOAD CALIBRATION** is finished when message  is displaying. To finish the calibration, press 2ND key 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 an error message  will display.
- The load must not be heavier than the scale’s maximum capacity otherwise an error message  will display.

#### NOTE:

*It is recommended to use test weight or span calibration weight that is equal to scale’s maximum capacity in calibrating the scale.*



#### NOTE:

*In most cases, one load calibration is enough but if high linearity performance of the scale is required then calibrate the scale using the multi load calibration like Two Loads Calibration or Three Loads Calibration.*


## TWO LOADS CALIBRATION





### Action

- Put on the second weight, when the screen displays 
- After pressing HOLD key on scale or  on remote controller, the scale displays the first load’s weight value, waiting for user’s input of the second load’s weight value.





- After pressing HOLD key on scale or  on remote controller, the scale will detect the second weight and will display the below detection message.



- **TWO LOADS CALIBRATION** is finished when message  is displaying. To finish the calibration, press 2ND key on scale or  on remote controller.

### Condition

- The second load must be heavier than the first load otherwise an error message  will display.
- The second load must not be heavier than the scale's maximum capacity otherwise an error message  will display.



### NOTE:

*If the scale will be calibrated with two loads, it is recommended to use a first test weight of 50% of scale's maximum capacity and then 100% of scale's maximum capacity for the second test weight.*


## THREE LOADS CALIBRATION



### Action

- Put on the third weight, when the screen displays 
- After pressing the HOLD key scale or  on remote controller, the scale displays the second load's weight value, waiting for user's input of the third load's weight value.





- After pressing HOLD key on scale or  on remote controller, the scale will detect the third weight and will display the below detection message.



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



**Condition**

- The third load must be heavier than the second load otherwise an error message  will display.
- The third load must not be heavier than the scale's maximum capacity otherwise an error message  will display.







**NOTE:**

*If the scale will be calibrated with three loads, it is recommended to use a first test weight of 33% of scale's maximum capacity, 66% of scale's maximum capacity for the second and then 100% of scale's maximum capacity for the third.*



## POWER ADJUSTMENT MODE

### Action


- To enter **POWER ADJUSTMENT MODE**, press 2ND key on scale or  on remote controller twice.
- To input **POWER ADJUSTMENT** password, press ZERO and TARE keys on scale or  and  on remote controller.
- To confirm the password, press HOLD key on scale or  on remote controller.
- To save and exit **POWER ADJUSTMENT MODE**, press 2ND key on scale or  on remote controller.
- To exit **POWER ADJUSTMENT MODE** without saving, press ON/OFF key on scale or  on remote controller.

*To learn more on how to input values or change the option, refer to 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:



- After pressing HOLD key 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 key on scale or  on remote controller, the scale will save the new voltage and will return 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, computer, etc.*

#### COMMUNICATION WAYS

- There are two options for communicating the scales and digital peripherals. Either in cabled or wireless way. For cabled way, the peripherals can be connected to the scale's full duplex communication port (optional) while for via wireless, the peripherals can communicate to the 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 at the rear of scale. Plug another end of the connector to your peripherals that support RS-232 communication.
- For wireless, the scale can work with peripherals over 500 meters on a condition that there is no obstruction between them.

#### RS-232 PROTOCOL

- The scale sends out data in the format of string. A string is consisting of 10 bytes, 1 byte for start flag, 1 byte for scale address, 5 bytes for LED data, 1 byte for indicator data and 1 byte for check sum, shown 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 for start is always fixed at 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 for Scale Address, 5 bytes for LED data and 1 byte for indicator data.

When **OUTPUT MODE** in **COMMUNICATION SETUP** is set to “2”, the scale will be able to answer request with specified data.

Request shall consist 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 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



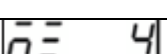
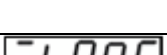
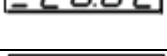
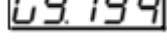
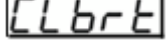
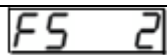
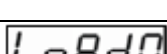



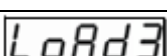
Flag of start are always fixed to be 0x1B. Scale address is defined at **SCALE ADDRESS** in **COMMUNICATION SETUP**. Default address is set to 00 (0x00 in hexadecimal).

Request command is fixed to be 0xAB.

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

**4. Messages Illustration**

*Possible messages the scale displays are listed here*

	scale configuration	<b>SCALE CONFIGURATION</b> welcome message
	auto-zero range	<b>AUTO-ZERO RANGE</b>
	manual-zero range	<b>MANUAL-ZERO RANGE</b>
	zero-tracking range	<b>ZERO-TRACKING RANGE</b>
	gravity acceleration	<b>GRAVITY ACCELERATION</b> welcome message
	calibration	<b>CALIBRATION</b>
	full scale	<b>MAXIMUM CAPACITY</b>
	load 0	<b>ZERO WEIGHT CALIBRATION</b>
	load 1	<b>ONE LOAD CALIBRATION</b>
	load 2	<b>TWO LOADS CALIBRATION</b>
	load 3	<b>THREE LOADS CALIBRATION</b>
	end	Save and exit
	power <b>adj</b> ustment	<b>POWER ADJUSTMENT</b> welcome message

## 5. Appendix

### OCS Series Crane Scale Passwords

*Below is a list of modes that require password to access the scale functions.*

<b>Mode</b>	<b>Password</b>
Scale Configuration	0258
Calibration	8416
System Info	1860
Power Adjustment	1123
Clear Overload Records	4321

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