

TM SERIES

Tension Meter



www.globalcas.com

OWNER'S MANUAL

CAS

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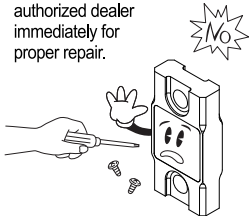
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Warning

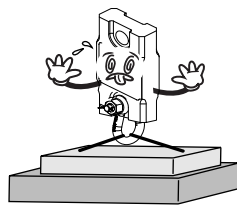
Precautions when installing the scale. To ensure that you get the most from your scale, please follow these instruction.

Do not disassemble the scale.

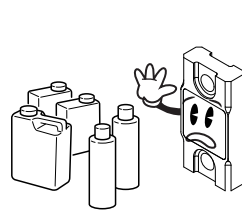
When any damage or defect occurs, contact your CAS authorized dealer immediately for proper repair.



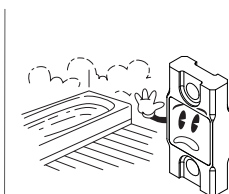
Do not overload beyond the maximum weight limit.



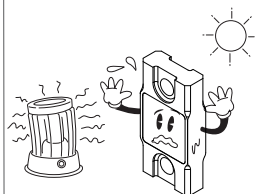
To prevent from fire occurring, Do not place or use the scale near flammable or corrosive gas.



To reduce electric shock or incorrect reading, Do not spill water on the scale or place it in humid condition.



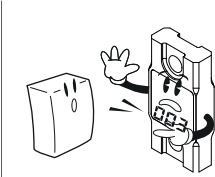
Avoid placing the scale near heater or in direct sunlight.



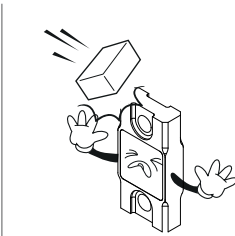
Attention

Make sure to plug your scale into the proper power outlet. For maximum performance, plug into a power outlet 30 minutes before the usage for warm up.

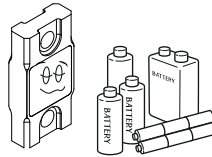
For consistent and accurate reading, maintain periodical check by your CAS authorized dealer.



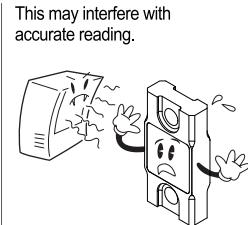
Avoid sudden shock to the scale.



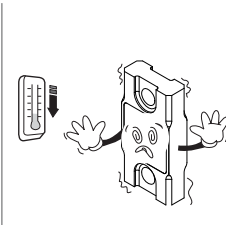
Take the battery out when scale is not in use for long time. Leakage from the batteries is hazardous.



Keep the scale away from other electromagnetic generating devices.



Place the scale on firm and temperature consistent environment.



During weighing, do not stand below the product and be careful about any safety accident.

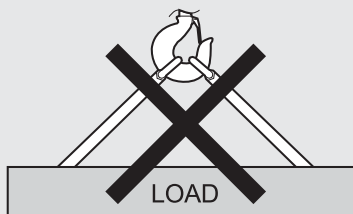
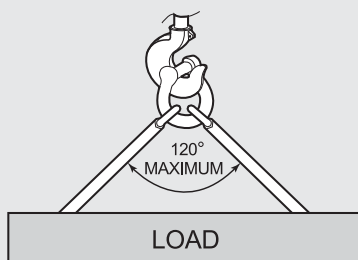
Install a safety pin and be careful so that the shackle may not fall off.

1. PRECAUTIONS

When the product is not used for a long time, please separate the battery from the battery case in the rear face of the balance and store it.

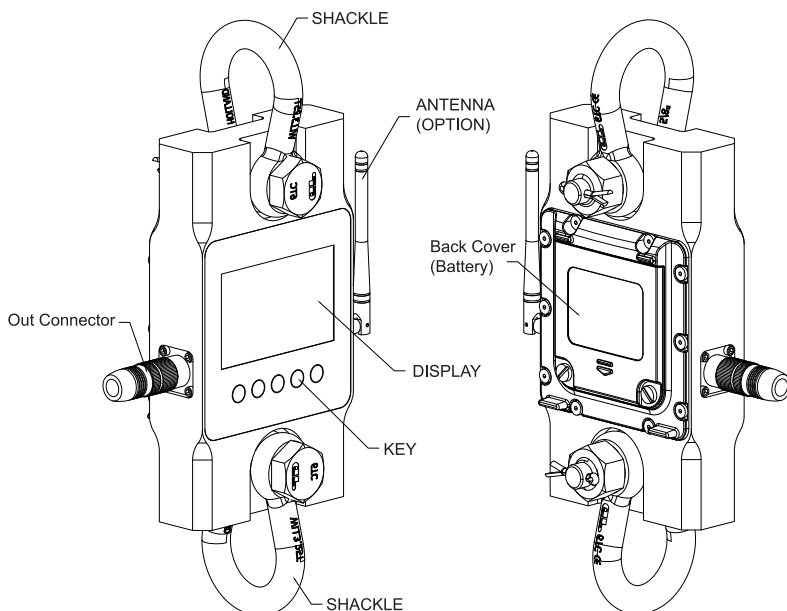


WARNING: The load which hang on the hook should be a vertical load. (Refer to the next features.)



- The load which hang on the hook should be a vertical load.

2. OVERALL VIEW (TM-Series)



SPECIFICATIONS

MAX. TARE WEIGHT	FULL TARE	
DISPLAY	LCD (5 digit + Sign)	
OPERATION TEMPERATURE	- 20℃ ~ +60℃	
POWER SOURCE	DC 6 V (AA Size Battery 4EA)	
POWER CONSUMPTION	STANDARD	0.03 W
	WIRELESS (Option)	0.36 W
CONTINUOUS USING TIME	STANDARD	400 HOURS (About) (2850mA)
	WIRELESS (Option)	44 HOURS (About) (2850mA)
Communication Distance (Wireless Option)	Bluetooth	Max 50~100 (M)
	X-Bee	Max 200M (OVER) (2.1dB ANTENNA))

3. DISPLAY & KEY FUNCTIONS



■ DISPLAY

DISPLAY	Weight Display or Message. (5 Digit).
ZERO	The current weight is '0'.
NET	The current display of weight is a net weight.
HOLD	The current status is under hold.
S1	The weight is heavier than the lower limit.
S2	The weight is heavier than the upper limit.
↑↓	-
	Displayed when the battery should be changed.
X1000 T lb daN kg	The current weight unit.

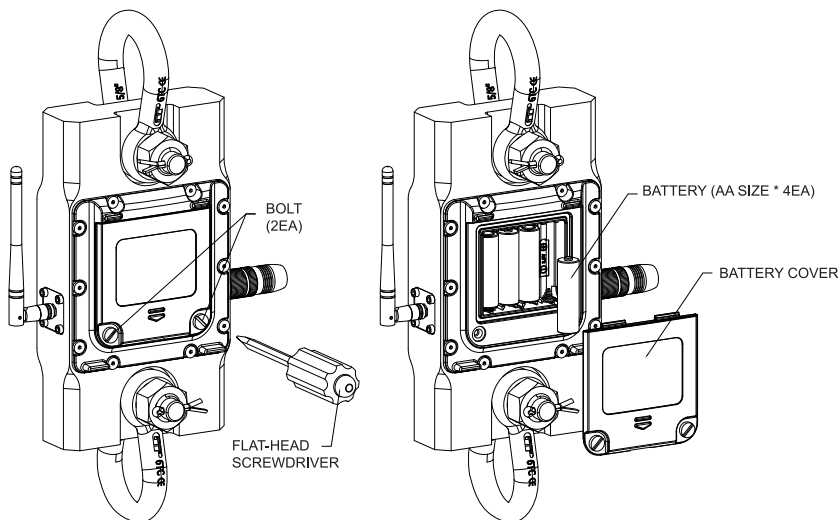
■ KEY FUNCTIONS

KEY	DESCRIPTION
	Used to turn the scale ON / OFF.
	Used to change the weight unit. Used to increase the input value (Set Mode)
	Used to reset the scale zero. Used to enter the Set Mode & Increase the (set mode)value.
	Used to activate tare function and to clear tare entry.
	Used to weigh unstable things (livestock, liquid, etc.) Used to store the set value in 'AP/HL' mode



WARNING: Do not press the keys with excessive force,
the keys are to be pressed with a soft touch.

4. BATTERY USAGE



* Shut off the power supply using the power supply ON/OFF switch.

* Open the battery cover in the rear face and separate the dry-cell battery(AA SIZE*4EA).

* Put in the new batteries and use it after assembling the battery cover.
(Make sure to put in the battery in the correct polarity)

5. FUNCTION & DESCRIPTIONS

(1) POWER ON / POWER OFF

- Press **ON / OFF** key.
- LCD display will be on and then, it will show from 00000 to 99999 continuously
- Press **ON/OFF** key
- LED display will show off and then power turns off

(2) ZERO FUNCTION

- Used to correct drifted zero value when the scale is unloaded motion is not detected.
- You can adjust the zero up to $\pm 2\%$ of the maximum capacity
- The function does not work when weight is fluctuated or unstable.

(3) TARE FUNCTION

- Use tare function after removing the weighing material from container being used.
- The function does not work when weight is fluctuated or unstable.
- The weight including TARE weight can't exceed the maximum capacity.

(4) HOLD FUNCTION

<Caution> Weighing may not be accurate when the HOLD function is used.

There are four HOLD functions : Manual / Auto , Peak , Average
To use this function , must be check Hold-type of 'HL' mode.

DISPLAY	FUNCTION
HL - 00	Manual HOLD
	Auto HOLD
HL - 01	Peak HOLD
HL - 02	Average HOLD

■ **Manual HOLD (HL - 0) :** Calculates the wavering weight at the moment that the HOLD key is pushed.

- Used in the case of weighing a unstable weight.
- Place the article to be weighed and push the HOLD key.
- After "MHOLD" message is displayed, the HOLD weight is indicated.
(HOLD lamp is turned ON)
- HOLD function is cancelled when the zero point condition is obtained by removing
the article being weighed or when the HOLD key is pushed again.

■ **Auto HOLD (HL -> 0) :** Automatically calculates an average value for the wavering weights.

- Used when the automatic HOLD function is employed.
- When the HOLD key is pushed in the zero point condition, the automatic HOLD function begins after "AHOLD" message is displayed. (HOLD lamp is turned ON)
- When the weighing article is placed, an average value over about 2 seconds is automatically calculated and displayed.
- When the weight is changed by more than 20 graduations from the displayed HOLD value,
the average weight over 2 seconds is calculated and displayed again.
- When the HOLD key is pushed again, the automatic HOLD is cancelled.

■ **Peak HOLD (HL -> 1) : Calculates the maximum value for the wavering weights.**

- Used when a maximum value of the wavering weights is calculated.
- When the HOLD key is pushed in the zero point condition, the automatic HOLD function begins after "PHOLD" message is displayed. (HOLD lamp is turned ON)
- When a weight larger than the displayed HOLD weight is imposed, a maximum value is displayed again.
- When the weighed article is removed and the zero point condition is recovered, the displayed value is deleted, (The HOLD condition is maintained)
- When the HOLD key is pushed again, the HOLD function is cancelled.

■ **Average HOLD (HL ->2) : Calculates an average value for the wavering weights.**

- Used when a unstable weight is weighed.
- Place the weighing article and push the HOLD key.
- After "HOLD" message is displayed, the HOLD weight after about 2 seconds is displayed. (HOLD lamp is turned ON)
- When the HOLD key is pushed again or the zero-point condition is recovered by removal of the weighing article, the HOLD function is cancelled.
- Setting is possible only when OP function is set at tU or zb.
(It will not be displayed without the OP setting.)

6. SET Mode Description

(1) AP MODE

Press ON key while ZERO key is pressed, then you can enter into 'AP' mode.
(‘AP’ means ‘Auto Power off’)

■ Key Usage

	Used to increase the input value
	Used to save the input value and Return to Normal Mode.
	Go to Next Mode.

■ Setting Menu

DISPLAY	FUNCTION
AP-00	Not use
AP-10	Power off after keeping '0'kg 10 minute
AP-20	Power off after keeping '0'kg 20 minute
AP-30	Power off after keeping '0'kg 30 minute

(2) SLEEP MODE

Press ON key while ZERO key is pressed and Press ZERO Again, then you can enter into 'SLEEP' mode.
(‘Sb’ means ‘SLEEP’.)

■ Key Usage

	Used to increase the input value.
	Used to save the input value and Return to Normal Mode.
	Go to Next Mode.

■ Setting Menu.

DISPLAY	FUNCTION
Sb-00	Sleep mode is deactivated.
Sb-20	Sleep mode is activated after 20 seconds.
Sb-40	Sleep mode is activated after 40 seconds.
Sb-60	Sleep mode is activated after 1 minute.

(3) Key Lock MODE.

Press ON key while ZERO key is pressed and Press ZERO Twice, then you can enter into 'Key lock' mode.

■ Key Usage

	Used to increase the input value
	Used to save the input value and Return to Normal Mode.
	Go to Next Mode.

■ Setting Menu

DISPLAY	FUNCTION
LoCk	Use Key Lock.
ULoCk	Do not use Key Lock.

(4) C1 MODE

Press ON key while ZERO key is pressed and Press ZERO Three times, then you can enter into 'C1' mode.

('C1' means 'Communication Port 1': RS-232 PORT)

■ Key Usage

	Used to increase the input value
	Used to save the input value and Return to Normal Mode.
	Go to Next Mode.

■ Setting Menu

DISPLAY	FUNCTION
C1-no	Do not use RS-232 Communication.
C1-Co	Use RS-232 Command Communication.
C1-St	Use RS-232 stream.

(5) C2 MODE

Press ON key while ZERO key is pressed and Press ZERO Four times, then you can enter into 'C2' mode.

('C2' means 'Communication Port 2' : RS-485 & Wireless Option)

■ Key Usage

	Used to increase the input value
	Used to save the input value and Return to Normal Mode.
	Go to Next Mode.

■ Setting Menu

DISPLAY	FUNCTION
C2-no	Do not use RS-485 Communication.
C2-Co	Use RS-485 Command Communication.
C2-St	Use RS-485 stream.

(6) OP MODE

-Setting is possible only when C2 function is set at "C2-Co".

Press ON key while ZERO key is pressed and Press ZERO Five times, then you can enter into 'OP' mode.

('OP' means 'Option' : Bluetooth or X-bee wireless module)

■ Key Usage

	Used to increase the input value
	Used to save the input value and Return to Normal Mode.
	Go to Next Mode.

■ Setting Menu

DISPLAY	FUNCTION
OP-no	Do not use wireless option.
OP-tU	Use Bluetooth Module.
OP-Zb	Use X-Bee Module.

(7) Module(option) MODE

-Setting is possible only when OP function is set at tU or zb.

Press ON key while ZERO key is pressed and Press ZERO Six times,
then you can enter into 'Module' mode.

(It will not be displayed without the OP setting.)

■ btSet / CH-00

When the Option function is set at tU or ZB, the following setting window appears according to the Option setting upon pushing  key.

OPTION	DISPLAY	FUNCTION
tU	rESET	1. Bluetooth Module is initialized. 2. Bluetooth Module is initialized when  key is pushed. (When the initialization failed, 'rEtry' message is displayed for 2 seconds. Try again after affirming the Bluetooth Module condition.) 3. In the case that Bluetooth Module is not to be initialized, it will shift to the next mode upon pushing  key.
Zb	CH 00	1. Channel for X-bee Module is set. 2. The set value is increased upon pushing  key, and when setting is completed, 3. Push  key to store the setting. About 3 seconds later, channel change is completed and it shifts to the next mode. Setting is possible for the channels 0~11. 4. When a channel is not set with X-bee Module, it will shift to the next mode upon pushing  key.

(8) ID MODE

Press ON key while ZERO key is pressed and Press ZERO Seven times, then you can enter into 'ID' mode.

('ID' means 'Identification' : Device identification from 0 to 9 can be set.)

■ Key Usage

	Used to increase the input value
	Used to save the input value and Return to Normal Mode.
	Go to Next Mode.

■ Setting Menu

DISPLAY	FUNCTION
id-0	Device ID is set to 0.
id-9	Device ID is set to 9.

(9) HI MODE

Press ON key while ZERO key is pressed and Press ZERO Eight times, then you can enter into 'HI' mode.

('HI' means 'High' : High limit)

You can set the high limit value, up to a maximum capacity.

■ Key Usage

	Input values are initialized..
	Used to increase the input value
	Used to move the digits of 'input value'.
	Saving the input values, and entry to the 'LO' mode.

■ Setting Menu

DISPLAY	FUNCTION
HI-00000	The high limit value is set to 0. (Do not use high relay)
HI-01000	The high limit value is set to 1000. (The upper limit relay operates when the displayed weight is above 1000)

(10) LO MODE

After you enter the 'HI' value, press the HOLD key and then you can enter the 'LO' value.

('LO' means 'LOW' : Low limit)

■ Key Usage

	Input values are initialized..
	Used to increase the input value
	Used to move the digits of 'input value'.
	Saving the input values, and entry to the weighing mode.

■ Setting Menu

DISPLAY	FUNCTION
LO-00000	The low limit value is set to 0. (Do not use Low relay)
LO-00500	The high limit value is set to 500. (The lower limit relay operates when the displayed weight is above 500)

(11) HL MODE

Press ON key while HOLD key is pressed, then you can enter into 'HL' mode.

('HL' means 'Hold type'.)

■ Key Usage

	Used to increase the input value
	Used to save the input value

■ Setting Menu

DISPLAY	FUNCTION
HL-00	Auto Hold / Manual Hold
HL-01	Peak Hold use
HL-02	Average Hold use

Notice :

While using the HOLD function, the weight displayed may be not exact..

(12) Set Use Unit MODE

When the power supply is turned ON with the UNIT key being pushed, the unit to be used may be set.

■ Key Usage

	Used to increase the input value
	Used to save the input value and Return to Normal Mode.
	Go to Next Mode.

■ Unit Table (kg & lb is default)

UNIT	Unit (LCD)	Display	SET
Metric Ton	X1000 kg	mt -	0 : Not Use 1 : Use
Short Ton	T	St -	0 : Not Use 1 : Use
Long Ton	T	Lt -	0 : Not Use 1 : Use
Newton	N	n -	0 : Not Use 1 : Use
Kilo Newton	X1000 N	kn -	0 : Not Use 1 : Use
Deca Newton	daN	dA -	0 : Not Use 1 : Use

Note :

- The weight is changed by the set unit whenever the unit conversion key is pushed in the weighing mode.
- Short Ton and Long Ton may not be used simultaneously.
 - If the Short Ton is set at 1, it will not be displayed in the Long Ton setting menu.
 - If the Long Ton is set at 1, it will not be displayed in the Short Ton setting menu.
- Relationships among Short Ton, Long Ton, Metric Ton
 - Short Ton(US Ton) : 1 (Short Ton) = 907 kg
 - Long Ton(British Ton) : 1 (Long Ton) = 1016 kg
 - Metric Ton(used in Korea and general countries) : 1(Metric Ton) = 1000 kg
- In the case of using the relay, the relay setting values must be re-set if the unit conversion is used.

1. Setting method for connection between TWN and TM (Bluetooth)

- (1) Turn on the power supply () with the ZERO () key pushed. (AP - 00 is displayed.)
- (2) Shift to the 'C2-' mode by pushing the ZERO () key for 4 times in a row.
- (3) Select the 'C2-CO' mode by pushing the UNIT () key.
- (4) Shift to the 'OP-' mode by pushing the ZERO () key once.
- (5) Select the 'OP-tU' mode by pushing the UNIT () key. (Bluetooth module is used)
- (6) Affirm the 'rESET' display by pushing the ZERO () key once.
- (7) Bluetooth module initialization is started when the HOLD () key is pushed.
- (8) When initialization of the Bluetooth module is failed, 'rEtry' is displayed, followed by display of 'rESET'.
- (9) When initialization of the Bluetooth module is completed, it will shift to the 'id' setting after 'Ok' is displayed.
- (10) Set at 'id-0' and push the  key. (for communication with TWN)

2. Setting method for connection between TWN and TM (X-Bee).

- (1) Turn ON the power supply() with the ZERO () key being pushed. (AP - 00 is displayed.)
- (2) Shift to the 'C2-' mode by pushing the ZERO () key for 4 times in a row.
- (3) Select the 'C2-CO' mode by pushing the UNIT () key.
- (4) Shift to the 'OP-' mode by pushing the ZERO () key once.
- (5) Select the 'OP- Zb' mode by pushing the UNIT () key. (Bluetooth module is used)
- (6) Shift to the channel setting mode of 'CH-' by pushing the ZERO () key once.
- (6) Set the desired channel by pushing the UNIT () key.
(While setting is possible for channels 0~11, initial value upon shipment from the factory is '0').
- (7) When the HOLD () key is pushed, channel setting is started.
- (8) When initialization of the X-Bee module is failed, 'CH-' is displayed after 'Err' is displayed.
- (9) When initialization of the X-Bee module is completed, it shifts to the 'id' setting.
- (10) Set at 'id-0', and push the  key. (for communication with TWN)

7. Communication PROTOCOL & Command

(1) Data Bit : 8, Stop Bit : 1, Parity Bit : None

(2) Communication Baud rate : 9600bps

Ⓐ	Ⓑ	,	Ⓒ	Ⓓ	,	Ⓔ	Ⓕ	Weight Data (8byte)	Ⓖ	Ⓗ	Ⓘ	⓫
---	---	---	---	---	---	---	---	------------------------	---	---	---	---

Ⓐ Ⓑ	ST (Stable), US (Unstable), OL (Over Load)				
Ⓒ Ⓓ	GS (Gross), NT (Net)			Ⓔ	Device ID
Ⓕ	STATE Byte	Ⓖ	Blank	Ⓗ, Ⓘ	단위
⓫	CR	⓫	LF		

■ Device ID : Device ID is the successive value of ASCII code.

Ex) Device No. 01 : 0x31, Device No. 09 : 0x39, Device No. 13 : 0x3d

(Device ID set in the 'ID MODE')

■ Data(8 byte) :

Weight data containing a decimal point, i.e., ASCII code 8 bytes corresponding to each of '0', '0', '0', '0', '1', '3', '.', '5' are transmitted in the case of 13.5 kg

■ State Byte.

Bt7 1	Bt6 Stable	Bt5 0	Bt4 HOLD	Bt3 PRINT	Bt2 GROSS	Bt1 TARE	Bt0 ZERO
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Command Mode Protocol

Command (ASCII code)	Description	State
KT	Key Tare Value	Read / Write
WT	Current Weight	Read
ZE	Operating like the ZERO key	Read
TR	Operating like the TARE key	Read
HD	Operating like the HOLD key	Read
UC	Operating like the UNIT key	Read

Read

1	2	3	4	5
Device ID	Command		CR	LF

Note. 1 Device ID is hex and Command is ASCII

[Ex] Device ID is 3 when user want to know the current weight.

→write 03 57 54 0d 0a

Write

1	2	3	4	5	6	7	8	9	10
Device ID	Command	KEY TARE			CR			LF	

Note. 1 Device ID is hex and DATA is ASCII

[Ex] When user want to input Key Tare Value (to 200).

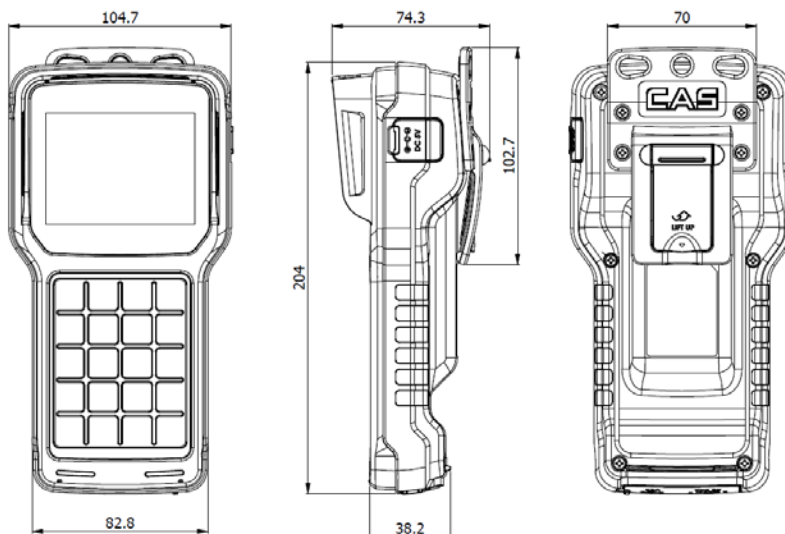
→write 03 4B 54 30 30 32 30 30 0D 0A

[Ex] When user want to read Key Tare Value.

→write 03 4B 54 0D 0A

8. TWN (OPTION)

Details, please refer to the Product Manual

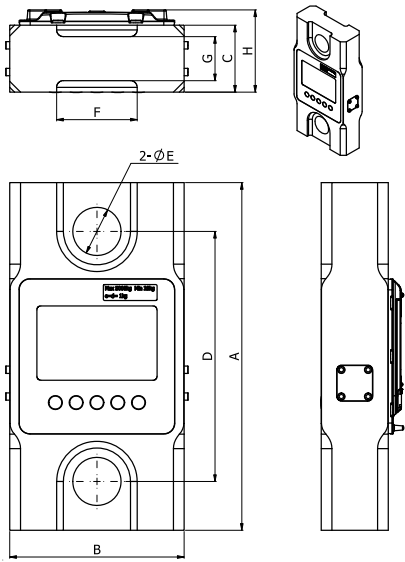


TWN Specification

Frequency	2.4GHz(433.175MHz~434.775MHz)
Communication methods	ZIGBEE (BLUETOOTH)
Baud Rate	9600
Effective distance for communications	Maximum about 50 ~ 100M
Display	320*240 TFT LCD
Display below zero	"-" minus signal
Battery life time	Approx 24hours
Battery changing time	Approx 5 ~ 6 hours
Power	TWN : Rechargeable DC Battery 3.6V 4400mA Charger : adapter
Temperature range	-10 ℃ ~ +40 ℃
Function	Printer interface, zero, tare, hold, print ID setting, weight sum.

9. PRODUCT SIZE

TM-0.5ton ~ 5ton



TM Series Specification

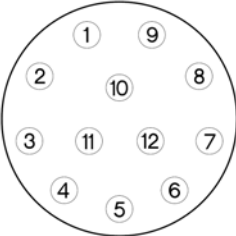
Part	TM-0.5	TM-1	TM-3	TM-5
Capacity	0.5ton	1ton	3ton	5ton
Max (kg)	500	1,000	3,000	5,000
Min (kg)	10	20	40	100
e (=d) (kg)	0.5	1	2	5
Resolution	1/1000	1/1000	1/1500	1/1000
Safety Factor	3:1	3:1	3:1	3:1
Weight	2.3 kg	2.3 kg	2.5 kg	3.3 kg
Operation Temp.	-20℃ ~ +60℃			
Protection	IP 65, NEMA4			
Material	Aluminum			
Dimension A	220	220	220	260
Dimension B	120	120	128	130
Dimension C	42	42	42	50
Dimension D	165	165	165	187
Dimension E	21	21	21	28
Dimension F	44	44	44	60
Dimension G	24	24	24	33
Dimension H	53	53	53	61
CROSBY SHACKLE	G-2130 5/8"	G-2130 5/8"	G-2130 5/8"	G-2130 7/8"
SHACKLE WEIGHT(PAIR)	1.24kg	1.24kg	1.24kg	3.58kg

* Shape and dimensions can be changed for the purpose of product enhancements.

10. ERROR MESSAGE

Error Message	Description	Solution
"Err 0"	The "Err 0" occurs when scale is not stable.	Remove unstable facts.
"Err 1"	The "Err 1" occurs when a current zero point has shifted from the last span calibration.	Please call your CAS dealer.
"Err 3"	The "Err 3" is an overload error.	Please remove the weight.

► Notice : Specifications are subject to change for improvement without notice.

PIN Description	Type	Pin Num	Wire color	Function
	RS485	1	Pink	GND
		2	Sky Blue	Rx-
		3	Gray	Rx+
		4	White	Tx-
		5	Purple	Tx+
	RELAY OUT	6	Blue	RY_COM
		7	Green	RY_OUT 3
		8	Yellow	RY_OUT 2
		9	Orange	RY_OUT 1
	RS 232	10	Black	GND
		11	Brown	Tx
		12	Red	Rx

< 1.1> Unit change Factor Table

	kg	lb	N	KN	daN	Short ton	Long ton	Metric ton
kg	1	2.204622	9.80665	0.0098665	0.980665	0.001102311	0.000984207	0.001
lb	0.45359237	1	4.448221615	0.004448222	0.444822162	0.0005	0.000446429	0.000453592
N	0.101971621	0.224808943	1	0.001	0.1	0.000112404	0.000100361	0.000101972
KN	101.9716213	224.8089431	1000	1	100	0.112404472	0.100361135	0.101971621
daN	1.019716213	2.248089431	10	0.01	1	0.001124045	0.001003611	0.001019716
Short ton	907.18474	2000	8896.44321	8.896443231	889.6443231	1	0.892857143	0.90718474
Long ton	1016.046909	2240	9964.016418	9.964016418	996.4016418	1.12	1	1.016046909
Metric ton	1000	2204.622622	9806.65	9.80665	980.665	1.102311311	0.984206528	1

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