SPRAGUE
INSTRUMENTS

User Manual
Wireless Cable Tension Meter
Model: Gripper CTR-GAWL-150

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Introduction

This document describes about the SPRAGUE Instrument's Wireless Cable Tensiometer (Gripper CTR-GAWL-150) specifications and user instructions.

Overview

Tensiometer is a wireless strain-measuring instrument. It uses Bluetooth technology for communication between the sensor and the display unit. The sensor unit measures tension in the cable which gets displayed on the display unit.

It consists of 2 Parts

- Display unit
- Sensor unit

Contents in the Box

- Display Unit
- Sensor unit
- Batteries for Display and Sensor unit
- 5V Adapter
- User Manual

Display Unit

1. Temperature indication
2. Tension Reading
3. Power ON/OFF Button
4. Cable Size/Up Navigation Button
5. Tension Unit Selection/ Left Navigation Button
6. Settings/Down Navigation Button
7. Charging Port
8. Charge Indication
9. Zero Set/Right Navigation Button
10. OK Button
11. Display Backlight ON/OFF Button
12. Tension Unit
13. Sensor Signal Strength
14. Cable Size Selected
15. Temperature unit

Sensor Unit

Sensor Top View

1. Power Button
2. Connectivity Indication
3. Charge Indication

Sensor Bottom View

4

Specifications

Property	Details
Scale Range	10 to 150 Pounds
Scale Resolution	1 Pound
Scale Tolerance	+/- 2% of Full scale
Unit of Measurement	Metric – Kg, ^{0}C lbs – lb , ^{0}F
Number of Calibrations	5
Supported Cables Sizes	1/16, 3/32, 1/8, 5/32, 3/16 inches
Ambient Temperature	Selectable ^{0}C and ^{0}F
Operating Temp Range	14 to 100 F (-10 to 40 C)
Storage Temperature	-4 to 122 F (-20 to 50 C)
Operating Modes	Measurement / Calibration / Firmware Update
Humidity	5 to 95 %
Communication	BLE 4.2 (Between Display Unit & Sensor Unit)
Wireless Range	10 meters

Display Unit	
• Display	160 x 128 Dot Matrix LCD
	Back light ON/OFF option
• Charging	5V DC / Charge status Indicator
	1900mAH – Li Po Rechargeable Battery
	~10000 Reading in single charge with back light OFF
	~3000 Reading in single charge with back light ON
• Sleep mode	Activated of 5 Mins of inactivity
• Dimension	164x80x29mm
• Weight	160gm(approx.)
• Housing	ABS Plastic

Sensor Unit	
• Charging Voltage	5VDC / Charge Status Indicator
• Power	500mAH – Li Po Rechargeable Battery
	~4000 Reading in Single Charge
	Sleep mode after 5 mins idle time
• Dimension	105x40x27mm
• Weight	240gm(approx.)
• Housing	6061 Aluminum.

Display units Buttons

Buttons	Naming	Functions
	Power ON/OFF Switch	• Press to ON • Hold 3 Secs to OFF
Kg / lb	Tension Unit Selection/Left Navigation Switch	• Toggle lbs/Metric units for Tension and Temperature • Back Button / Navigate Left direction
	Display Backlight ON/OFF Switch	• Turn display backlight ON/OFF
ZERO	Zero/Right Navigation Switch	• Set Zero load offset • Navigate Right direction
Cable Size	Cable Size/Up Navigation Switch	• Select Cable Size (supported sizes 1/16, 3/32, 1/8, 5/32, 3/16 inches) • Navigate Upward direction
SETTINGS	Settings/Down Navigation Switch	• Go to Settings • Navigate downward direction
OK	OK Switch	• Confirmation for user action/settings

Battery Charging (Display & Sensor Units)

Both Meter and Sensor unit use rechargeable battery which can be charged through 5V@1A adapter.

Charge Status Led Indications (Display & Sensor Units)

Charge Status are indicated using dual color Led indications. For this Green and Blue colored led are used. Status of charge can be described using the following table.
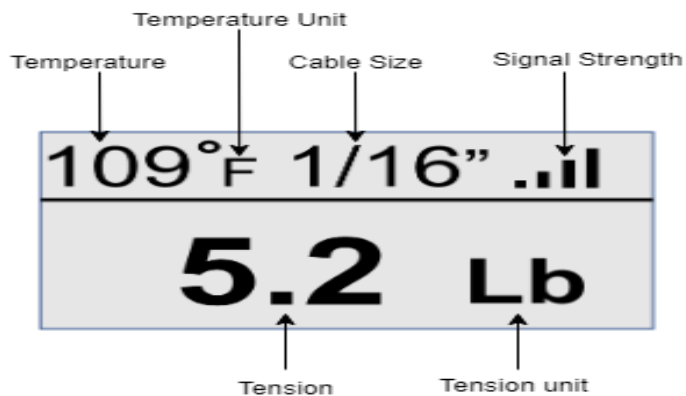
State	LED
Charge in Progress	Blue LED
Charge Complete	Green LED

Meter Reading

For start system operation, Power ON/OFF button need to be single pressed. On the meter unit, a display will pop up with a welcome screen for few seconds. LCD backlight will be ON by default. If required, it can be turned OFF by pressing Backlight ON/OFF button
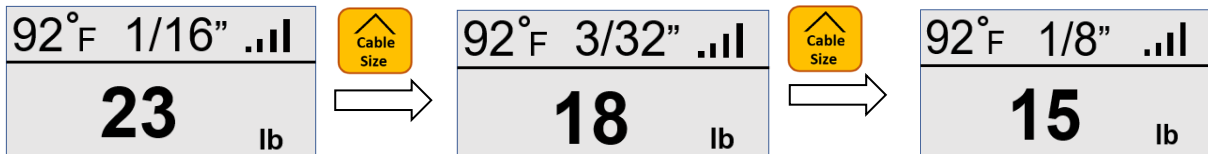

After that it displays following if Sensor is switched ON, it displays temperature, cable size, Sensor Signal Strength and tension based on data received from sensor
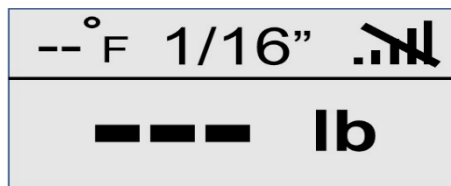
Sensor Unit Power ON

- For start system operation, the Power ON/OFF button needs to be single pressed
- Green led will turn on and it will start transmitting tension data
- It will remain ON until not turned off.

- Desired cable size can be selected by a single press on the Cable Size Selection button.
- It will change from one cable size to the other on subsequent Cable size key press as shown.
- Supported cable diameter sizes are 1/16, 3/32, 1/8, 5/32, 3/16 inches.
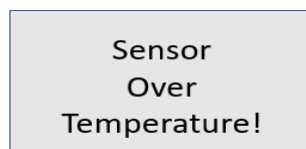- Each cable size calibration needs to be done independently.

$92°F$ 1/16" ..ıl		$92°F$ 3/32" ..ıl		$92°F$ 1/8" ..ıl
23 lb	Cable Size ⟹	**18** lb	Cable Size ⟹	**15** lb

Sensor Out of Range

- In case sensor is placed out of range or if it is turned OFF, it will display following

$$\text{--}°F \quad 1/16" \quad \text{.ıll}\!\!\!/$$
$$\text{---} \quad lb$$

Over Temperature Shutdown

- In case sensor unit temperature reaches 53° Celsius/ 127° Fahrenheit, Display/Meter board displays over temperature message with warning buzzer. Any button pressed in Display/Meter board can stop buzzer sound only.

Sensor
Over
Temperature!

- When it reaches beyond 55°C/ 131° F then the sensor unit will go into shutdown.
- Once sensor board is removed from over temperature area or turn off the sensor board only makes Display/meter board to work normally otherwise it displays above message.

- In case the Display/Meter unit temperature reaches 63º Celsius/ 145º Fahrenheit, the Display/Meter board displays over temperature message with a warning buzzer. Any button pressed in the Display/Meter board can stop the buzzer sound only.

```
Meter
Over
Temperature!
```

- When it reaches beyond 65ºC/ 149º F then the Display/meter unit will go into shutdown.
- Once the Display/meter board is removed from over temperature area or turn off the meter board.
- Both the Display/meter board and Sensor board attain over temperature or the Display/meter board gets over temperature and the sensor board gets disconnected then the below message is displayed on the screen.

```
Meter Battery Low
Recharge Battery!
Sensor Battery Low
Recharge Battery!
```
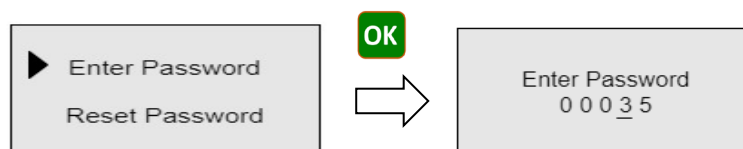
Tension/Temperature Unit selection

- Meter supports both lbs units (lb. for tension and degree Fahrenheit for temperature) and metric units (kg for tension and degree Celsius for temperature measurement).
- Pressing it will change from lbs to metric or metric to lbs when pressed.
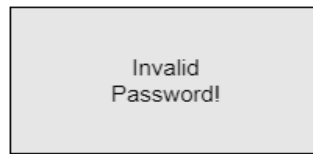
Zero load Setting

- Zero load can be set using Zero button. Once set to zero, tension value read will get set to 0lb.
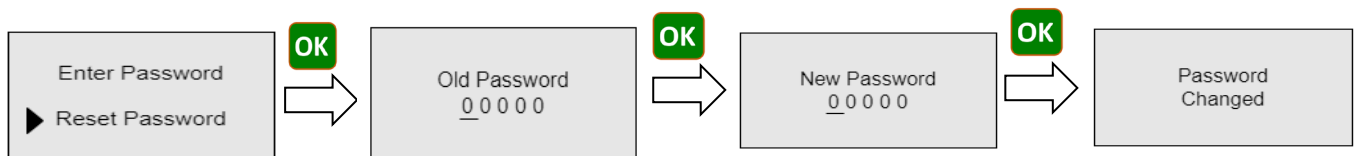
Password Protection

- Sensor Id and Calibration settings are protected by a password; Once the user enters a valid password then only the user can be allowed to change the Sensor Id and Calibration.
- Selected digit will be underlined(cursor symbol).

```
▶ Enter Password              Enter Password
  Reset Password                0 0 0 3 5
```
OK

- Use the Zero key for navigation: Use the cable size key and setting key to change numbers and then press the OK button to enter.
- For every wrong password, an invalid password message pops up and back to Enter password screen.

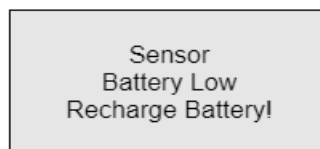```
   Invalid
   Password!
```

- If a user needs to change password, then use Reset password option to set a new password.
- If User forgot' s password, then he can use Master key (77724) in the place of old password to set new password.

```
Enter Password   Old Password   New Password   Password
▶ Reset Password   0 0 0 0 0   0 0 0 0 0   Changed
```
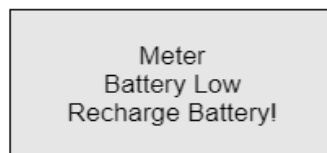**OK** → **OK** → **OK** →

## Low Battery Indication

- Low battery indication messages are displayed on the Display/Meter board.
- When battery percentage reaches 20% from onwards low battery indication message came in Display/Meter board for every 5% battery power decreases.
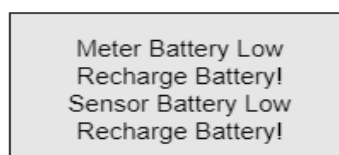  Sensor board low battery indication:

```
        Sensor
     Battery Low
   Recharge Battery!
```

Display/Meter board low battery indication:

```
        Meter
     Battery Low
   Recharge Battery!
```

Both board battery became low at same time:

```
   Meter Battery Low
   Recharge Battery!
   Sensor Battery Low
   Recharge Battery!
```
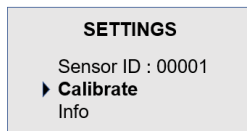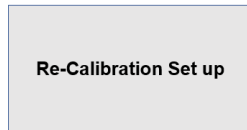
Calibration Procedure

Meter needs to be calibrated for each cable size and different weights before they can be used. The following procedures describe the process of calibration
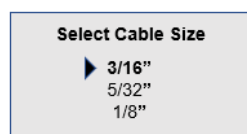
- Going to Settings menu- Press Settings buttons
- Display shows settings options as below. Use Up/Down button to select 'Calibrate'. It will get highlighted in Bold with an arrow pointing to it.

> **SETTINGS**
>
> Sensor ID : 00001
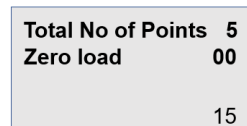> ▶ **Calibrate**
> Info

- Press the OK(Confirmation) button to enter the Calibration process. It will ask for the password to enter calibration.
- Password is a 5-digit numerical number, whenever the user provides the correct password it allows to re-calibrate.
- User can use up and down navigation buttons to enter a password. Password value for each digit will increment on the up button press and decrement on the down button press.
- To select the next digit, press the right navigation button. The user needs to enter 5 digits password in total one by one.
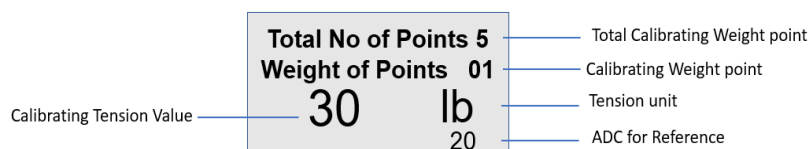- Once the password is entered correctly, it displays the following for 2sec

> **Re-Calibration Set up**

- Select desired rope size. Use Up/Down buttons to navigate to desired cable size

> **Select Cable Size**
>
> ▶ **3/16"**
> 5/32"
> 1/8"

- Then it displays the following. Connect the Sensor unit to the cable and press the OK button for Zero load.

> **Total No of Points   5**
> **Zero load   00**
>
> 15

- Press the OK button to start the calibration process for weight 30lb. It shows below (naming conventions marked for clarification)

> **Total No of Points 5** — Total Calibrating Weight point
> **Weight of Points   01** — Calibrating Weight point
> Calibrating Tension Value — **30   lb** — Tension unit
>   20 — ADC for Reference

- Add 30lb load. When ADC reference value is stable, press OK. This will confirm 30lb load is calibrated. The weight point will change to 2 which corresponds 60lb.
  Add a Weight of 60lb for calibration

Total No of Points 5
Weight of Points 02
60 lb
27

- When ADC value gets stable, press OK button. This will complete calibration for weight 60lb. Weight point will change to 3. Add weight for 90 lb and press Ok button.
- Continue procedures i.e. add weight of 30lb each and press OK button till the weight of point 5 (for 150lb)

Total No of Points 5
Weight of Points 05
150 lb
240

- When calibration is done for 150lb, Press OK to check the measurement or left navigation button for going back to setting menu.

Calibration finished
Press <- to Settings
Press OK to Meter
Reading

- When the Ok button is pressed, calibration procedure is completed.
- For calibrating other cable sizes, the above procedures need to be followed i.e. starting calibration from 0 lb and ending at 150lb.

Device Info

For getting device info, press Settings button->Navigate downward to select 'Info' and press OK. It displays Cable Tension meter (CT) model number, meter, and Sensor Board Firmware version as well as Battery Voltage.
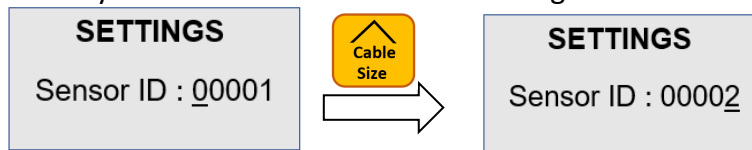
INFO
Sensor Batt : 98%
Meter Batt : 75%
Sensor FW : v1.0
Meter FW : v1.0

Setting Sensor ID

- Sensor ID can be set by pressing Setting button. Use Up/Down navigation key to select the Sensor ID option (it will get highlighted and the arrow will point to it). Now Press OK to enter Sensor ID settings

SETTINGS
▶ Sensor ID : 00001
Calibrate
Info

- Use the Left/Right Navigation key to point to the digit to be set. The selected digit will be underlined.
- Use Up/Down key to set the desired value for the digit selected.

SETTINGS		SETTINGS
Sensor ID : 00001	Cable Size ⟹	Sensor ID : 00002

- Finally Press OK and the respective Id will be set with the below acknowledgment pop-up message.

Sensor Id Settings
Done

- Set id will be displayed as shown (sensor ID set to 00002)

SETTINGS
▶ Sensor ID : 00002
Calibrate
Info