

U ***SER MANUAL***

A-Series

Sensor Forks and Camera Forks

Manual Number 6912503-R3

**cascade[®]
corporation**

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INTRODUCTION

This user manual is for Cascade A-Series Sensor Forks and Camera Forks. It contains Installation Instructions, Using the Indicator, Using the System, Battery, User Settings and Periodic Maintenance.

NOTE: "Sensor Forks" throughout this manual also refers to Camera Forks unless otherwise noted.

Special Definitions

The statements shown, appear throughout this manual where special emphasis is required. Read all **WARNINGS** and **CAUTIONS** before proceeding with any work. Statements labeled **IMPORTANT** and **NOTE** are provided as additional information of special significance or to make the job easier.

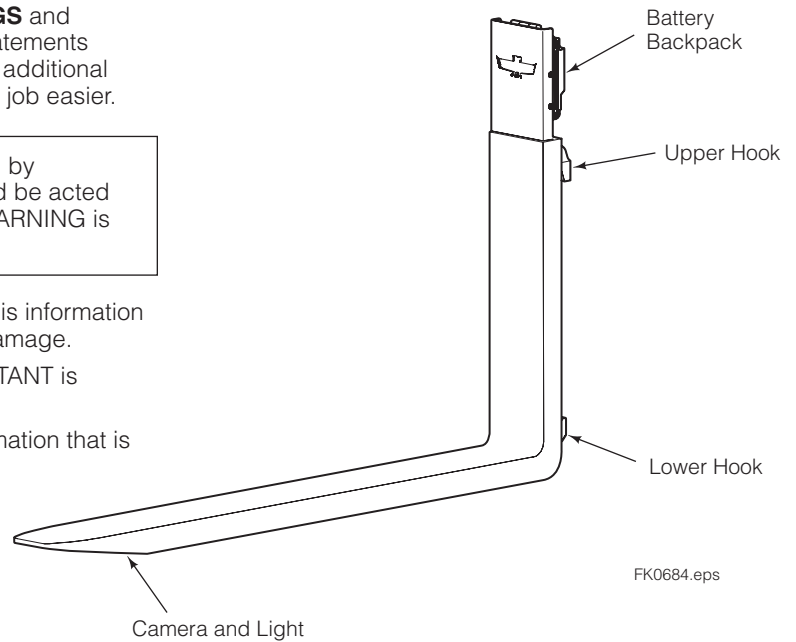


WARNING – A statement preceded by WARNING is information that should be acted upon to prevent **bodily injury**. A WARNING is always inside a ruled box.

CAUTION – A statement preceded by CAUTION is information that should be acted upon to prevent machine damage.

IMPORTANT – A statement preceded by IMPORTANT is information that possesses special significance.

NOTE – A statement preceded by NOTE is information that is handy to know and may make the job easier.



WARNINGS & SAFETY MEASURES



WARNING: Cascade is not responsible for any physical harm done to the operator due to the presence of the indicator in the truck cabin.



WARNING: The Sensor Forks System is not a safety device. It is intended to reduce pallet/bin damage and aid operators.



WARNING: Residual risk exists to pedestrians and to bystanders in the work area. Operate lift truck and Sensor Forks System in a safe work area and in compliance with facility, local and national standards and rules.



WARNING: Do not operate the system unless trained and a authorized lift truck driver.



WARNING: Wear appropriate protective gear, goggles, steel toe boots and gloves during installation and periodic maintenance procedures.



WARNING: On both of the sensor forks is a designation stamping or nameplate for capacity. The maximum capacity is for the **fork pair** and load center is stamped.



WARNING: This product contains a Class 1 laser. Do not look into the sensor's laser beam. Looking directly into the beam may result in eye injury. EN/IEC 60825-1:2014 Complies with 21 CFR 1040.10 and 1040.11 except for deviations pursuant to laser notice No. 50, dated June 24, 2017.

IMPORTANT: Field alterations may impair performance or capability and could result in loss of warranty. Consult Cascade for any required modifications.

Battery

Operating Temperature Range:

-4°F to 140°F (-20°C to 60°C)

Charging Temperature Range:

32°F to 113°F (0°C to 45°C)

IMPORTANT: Keep battery clean and dry. Store battery with a charged state between 40-60% and in an environment below 68°F (20°C), low humidity, without dust and corrosive gas.

NOTE: Refer to Appendix for complete battery data.

Sensor Forks

Storage Temperature Range:

-4°F to 140°F (-20°C to 60°C)

Operating Temperature Range:

32°F to 104°F (0°C to 40°C)

NOTE: For every 1,000 ft (304.8 m) of elevation, the operating temperature is derated 33°F (0.5°C).

Maximum Operating Temperature Rate of Change:

50°F (10°C) per hour

IMPORTANT: Keep sensor forks clean and dry. Store battery with a charged state between 40-60% and in an environment below 120°F (50°C), low humidity, without dust and corrosive gas.

INSTALLATION

NOTE: For Low Profile Forks Installation, refer to page 6.

Standard Sensor Forks

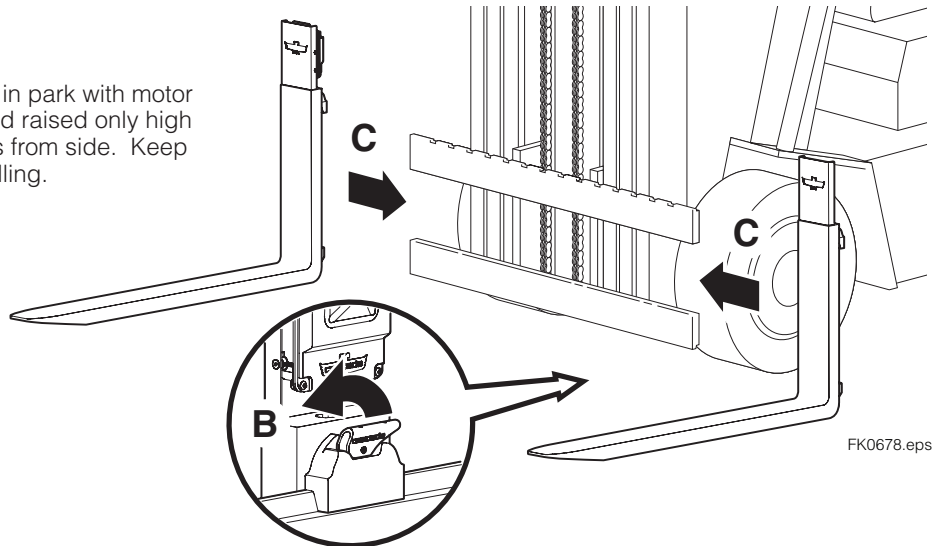
1 Install forks

IMPORTANT: Truck must be in park with motor off. Mast must be vertical and raised only high enough to install sensor forks from side. Keep feet clear of forks when installing.

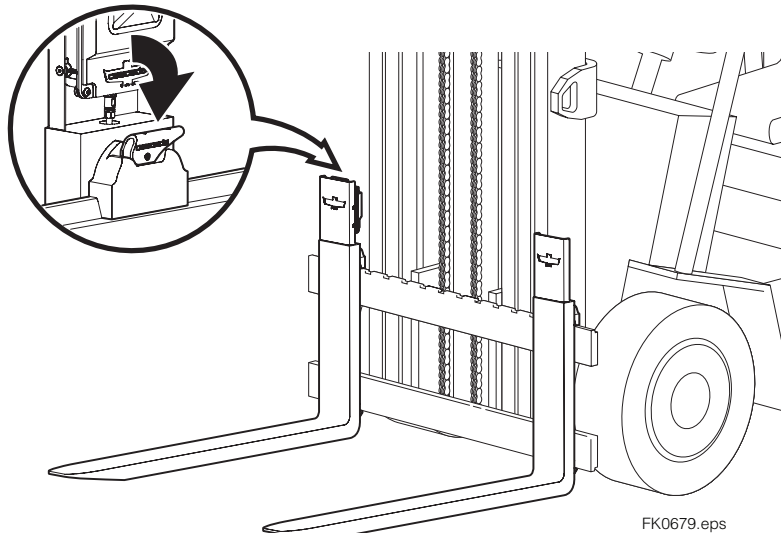
A Remove standard forks.

B Unlock forks.

C Install forks.



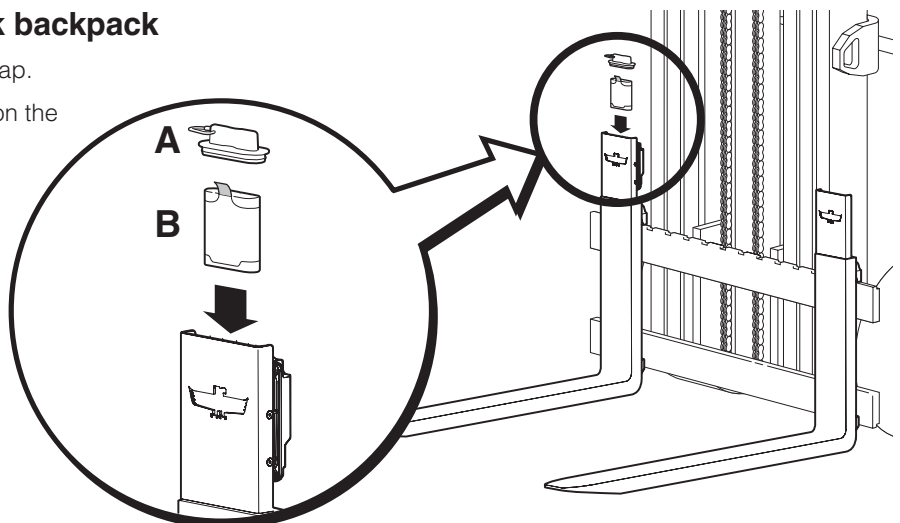
2 Lock Forks



3 Install battery into fork backpack

A Remove Battery Backpack cap.

B Use the battery tab to position the battery in the Backpack.



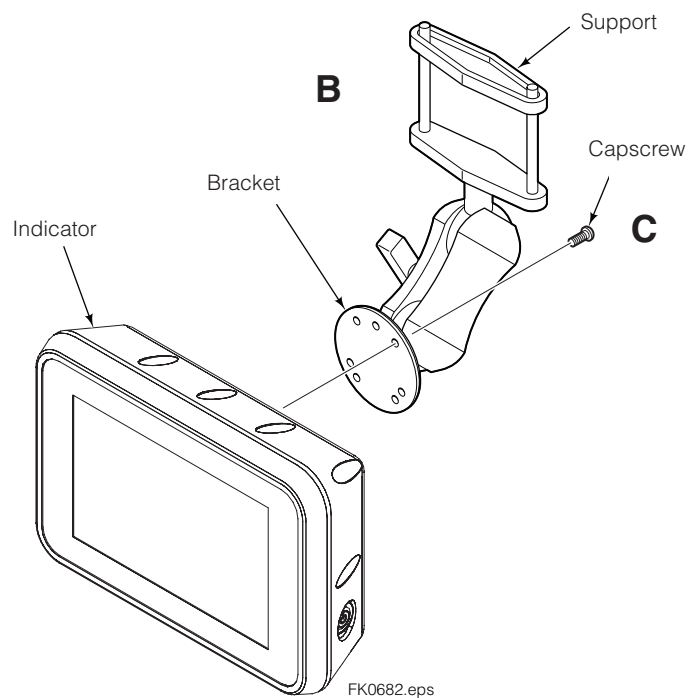
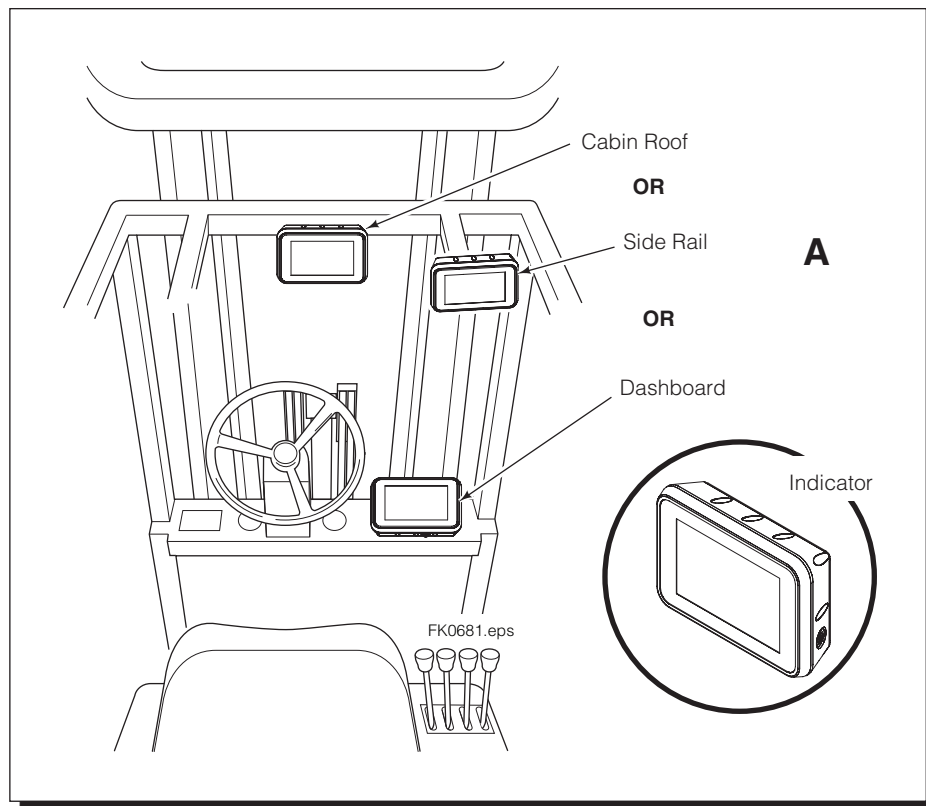
Standard Sensor Forks (continued)

4 Locate and mount the indicator

A Find a suitable location for readout and easy access to indicator.

B Install bracket to the support.

C Install the indicator to the bracket/support assembly.



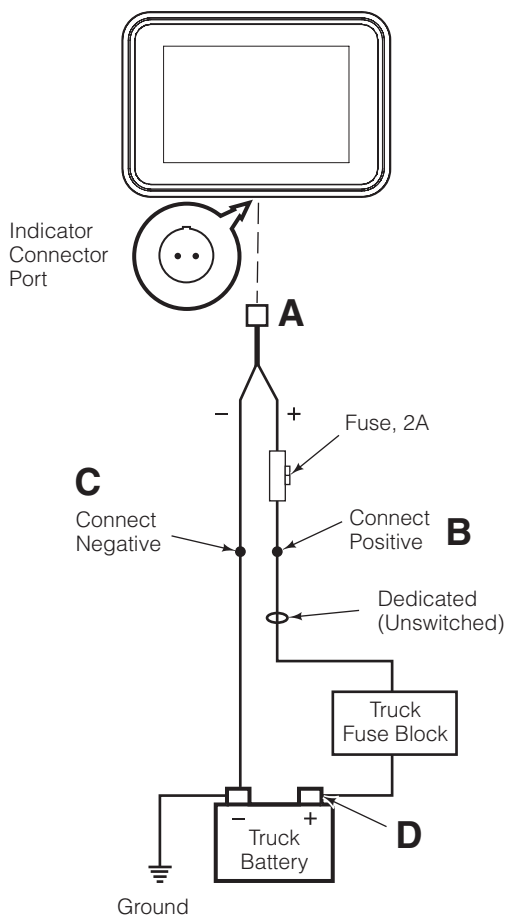
Standard Sensor Forks (continued)

5 Connect indicator to truck power

Disconnect the cable from the negative battery terminal or as directed by OEM truck manual.

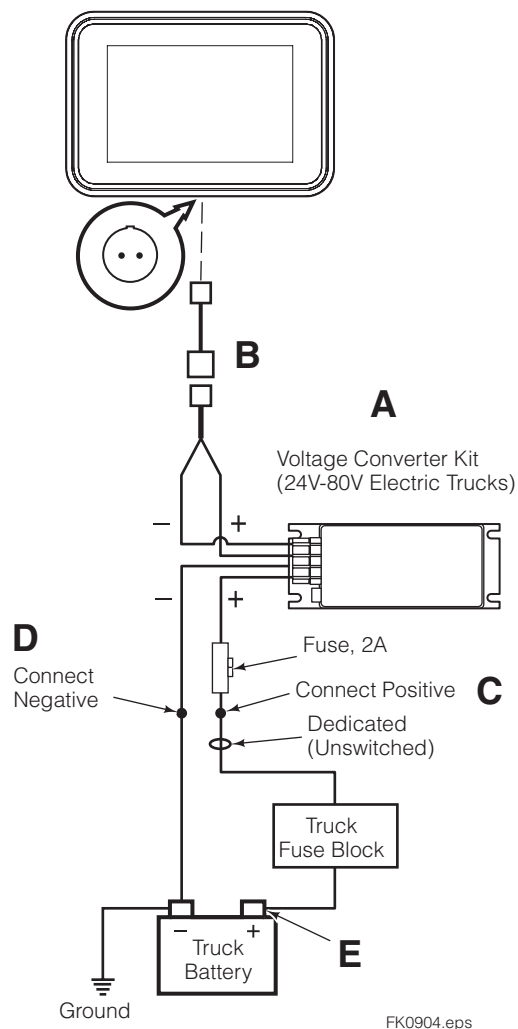
9V-48V Trucks

- A** Connect the power cable to the indicator.
- B** Connect the power cable terminal, labeled "Key (+)", to a 9V-48V power source.
- C** Connect the power cable terminal, labeled "Truck Gnd", to ground.
- D** Connect battery cable(s) to their proper terminal(s).



60V-80V Trucks

- A** Mount the converter kit to the truck.
- B** Connect the indicator cable, labeled "6936303 9-24VDC", to the indicator. Connect the converter kit's power cable to the indicator cable.
- C** Connect the converter kit's fused positive terminal, labeled "Source (+)", to a 24V-80V power source.
- D** Connect the converter terminal, labeled "Source(-)", to ground.
- E** Connect battery cable(s) to their proper terminal(s).



Low Profile Forks and Backpack Installation

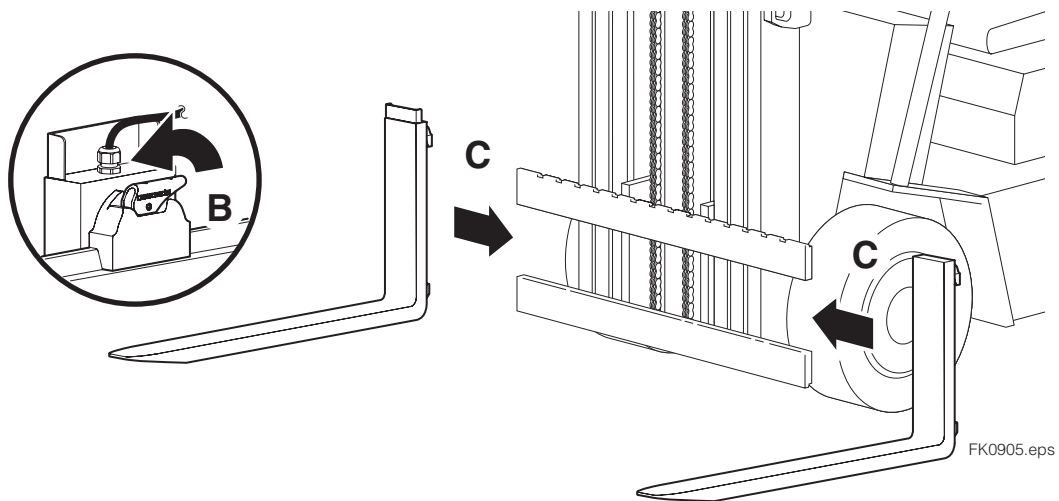
1 Remove backrest, if required

2 Install forks

A Remove standard forks.

B Unlock forks.

C Install forks.



3 Install Backrest

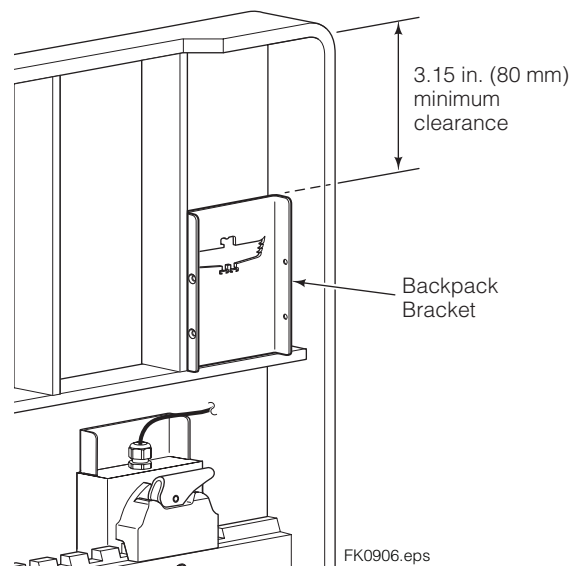
For reassembly, tighten Cascade backrests to 145 ft.-lbs. (195 Nm). For other backrests, refer to OEM recommendations.

4 Install Backpack Bracket

Find a suitable location on the attachment's backrest to install the backpack bracket with the following guidelines:

- The bracket should be clear of load and mast interference.
- Allow for easy access to install the backpack mounting screws, battery and cable connections.
- Allow 3.15 inches (80 mm) minimum clearance above the bracket.

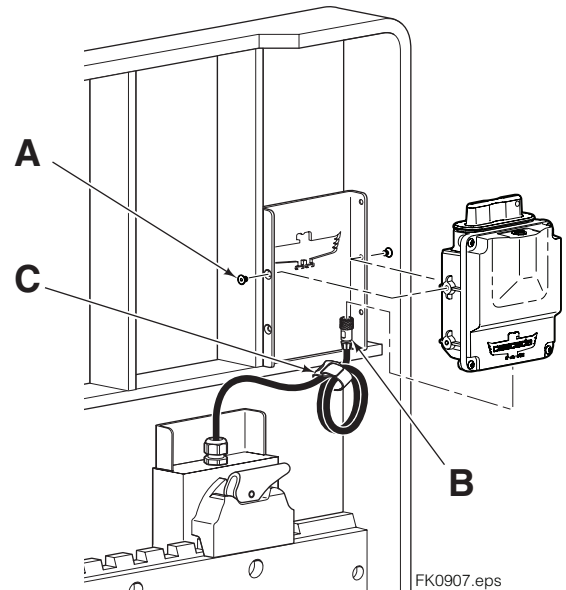
Tack weld the bracket as necessary.



Low Profile Forks and Backpack Installation (continued)

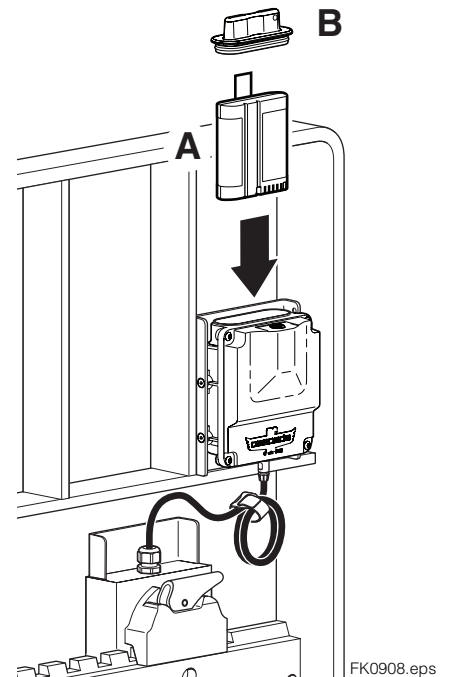
5 Install backpack

- A** Install backpack and tighten capscrew to 30 in.-lbs. (3 Nm).
- B** Connect cable to backpack.
- C** Coil cable and wrap in reusable Velcro tie. Verify the cable is clear of moving parts.



6 Install battery into backpack

- A** Use the battery tab to position the battery in the Backpack.
- B** Secure Battery Backpack cap with wire provided and install into backpack.



7 Indicator Installation

For mounting and connecting the indicator, refer to Standard Sensor Fork Installation section, Step 4 and 5.

Indicator Buttons



Return – Returns to Previous Screen.



Home – Returns to the Home Screen.



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Check – Accept the changes and save.

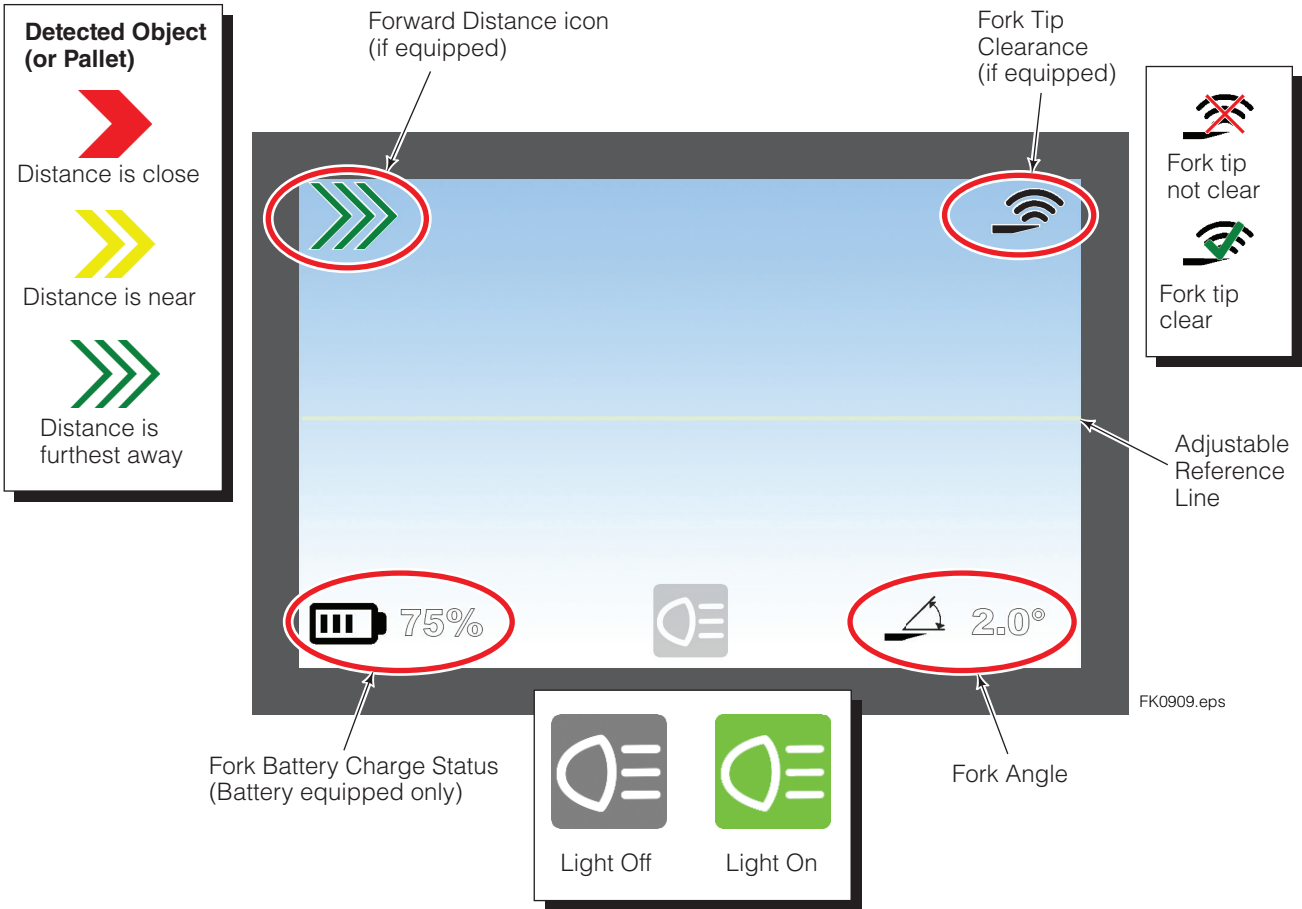


Settings – Go to Settings Menu



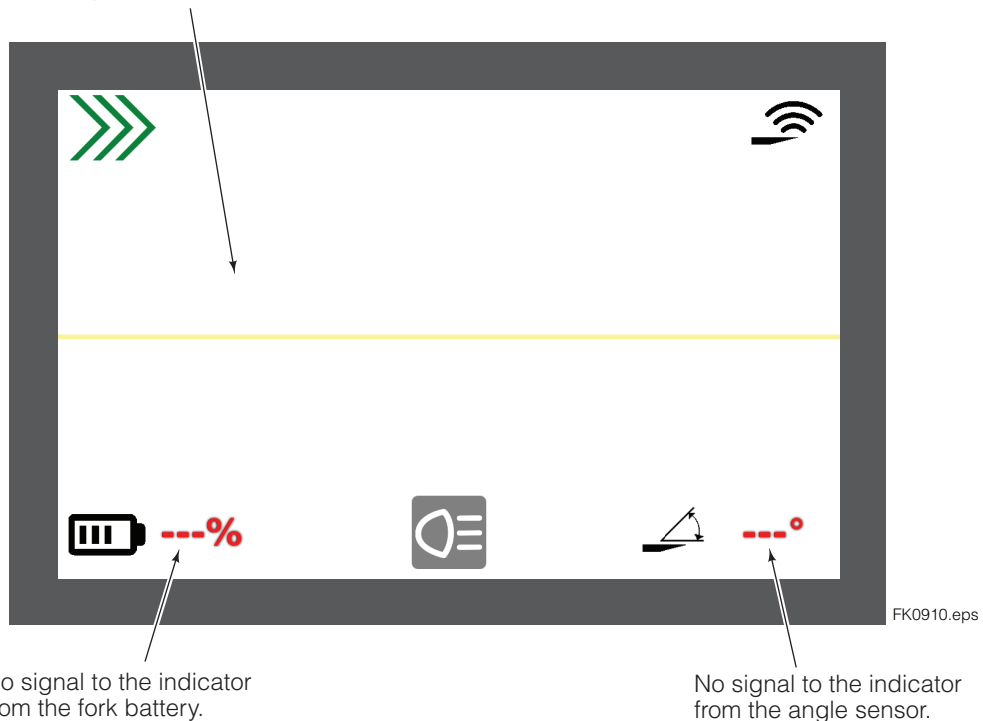
Light – Toggle light On/Off

Indicator Home Screen



Indicator Errors

Blank Indicator or Frozen Image –
No signal to the indicator from the camera.



To correct these errors:

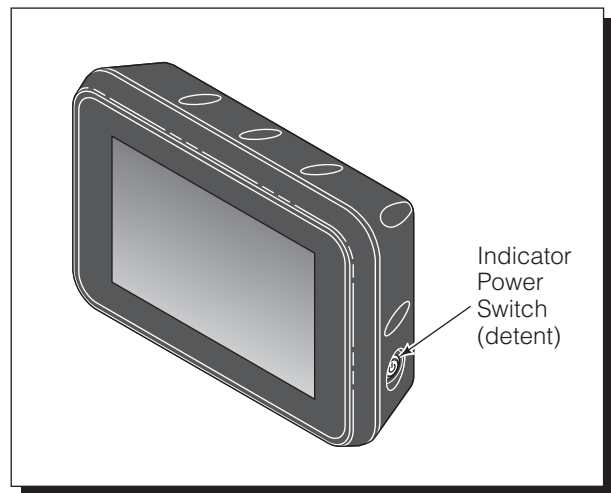
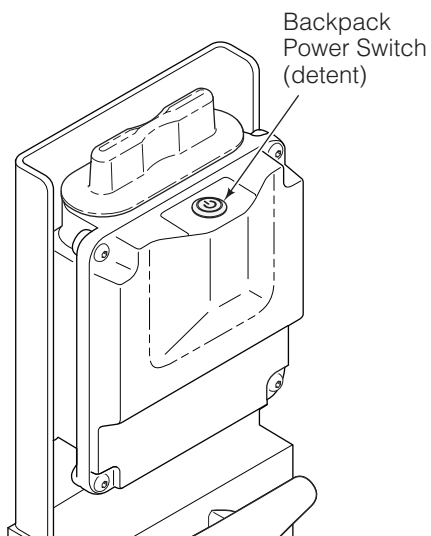
- Verify fork battery is charged and seated properly.
- Power cycle the battery backpack and indicator.
- Verify connection between the backpack and camera module.
- Verify WiFi connection. If repairing is required, refer to Appendix Section, "Pairing The Indicator with Sensor Fork", page 23. **NOTE:** After pairing, wait at least two minutes for the battery backpack to reboot.

If the problem does not resolve, contact Cascade.

USING THE SYSTEM

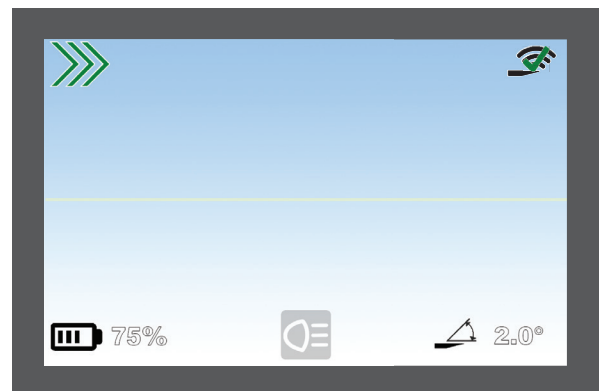
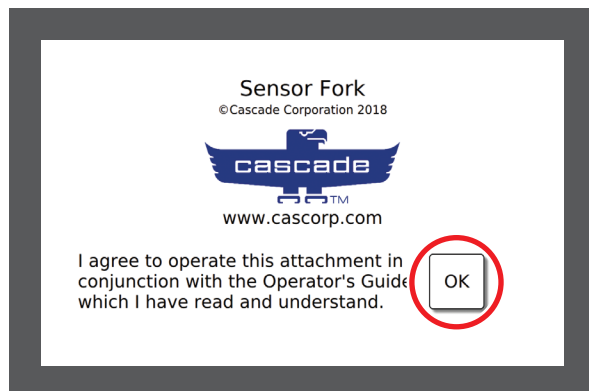
Basic Operation

- 1** If required, power "On" the indicator and backpack.



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- 2** Read Acknowledgement statement and press the "OK?" button to continue.

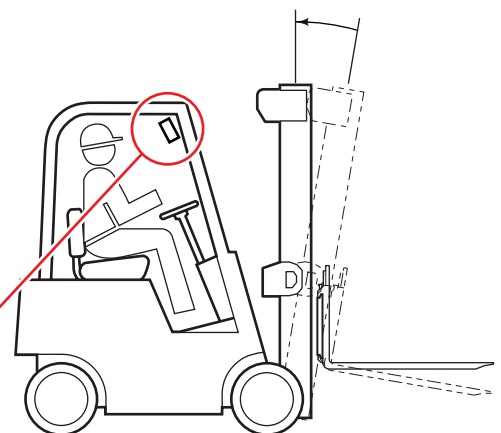


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- 3** Tilt mast to position forks parallel to floor. The screen will show the angle.



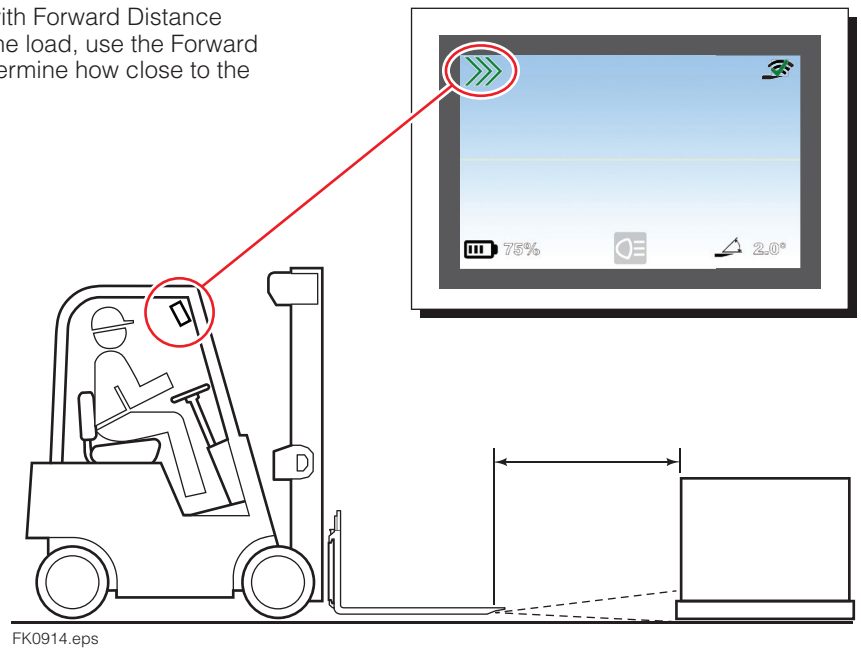
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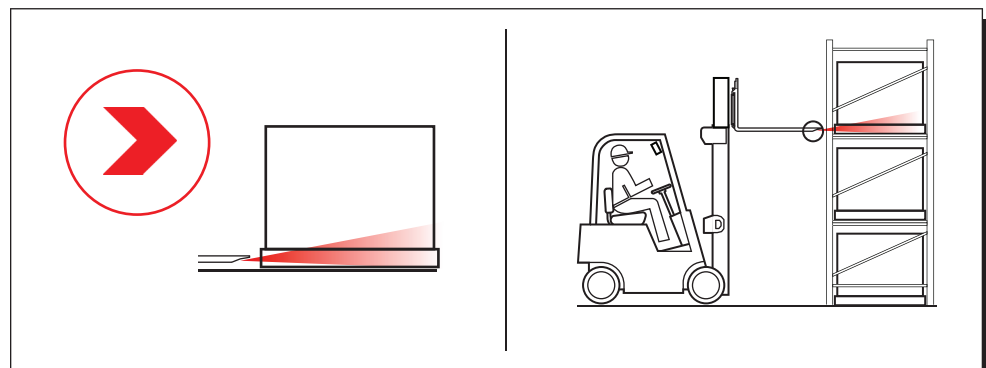
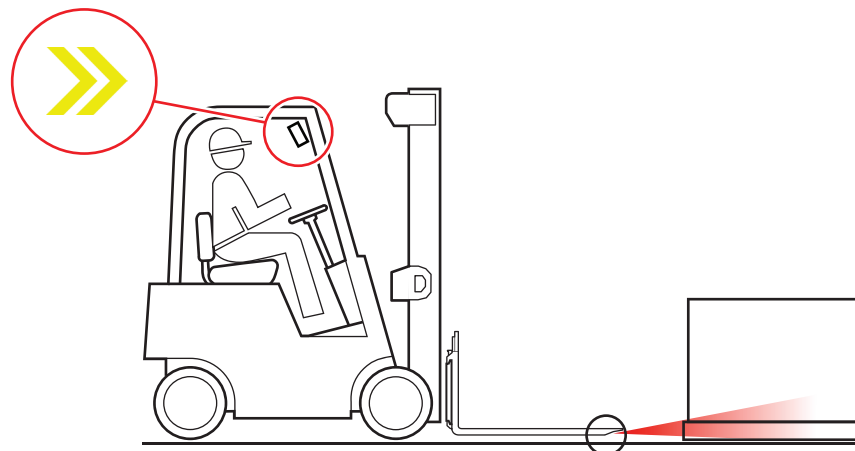
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Basic Operation (continued)

- 4** Approach a load. If equipped with Forward Distance sensor, when two meters from the load, use the Forward Distance icon as a guide to determine how close to the load the forks are.



- 5** Use the light and camera to aid with positioning the forks with the load. If equipped with Forward Distance sensor, note that the Forward Distance icon changes as the forks progress closer to the load.



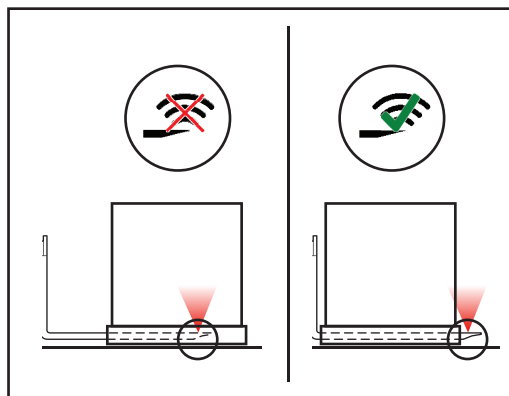
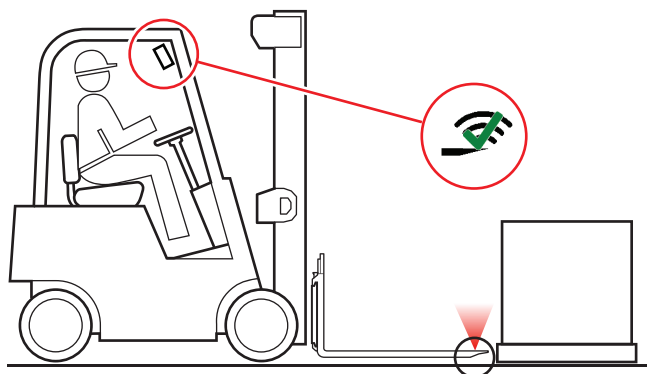
Basic Operation (continued)

6

As the forks pass through the pallet (or under load), continue to use the camera and light.

If equipped with Fork Tip Clearance sensor, the sensor's icon will show an "X" on the arcs. Once the fork tips are beyond the pallet (or load), the screen will show a check mark on the Fork Tip Clearance icon.

NOTE: If equipped with Forward Distance sensor, while forks move through the pallet (or under the load), the Forward Distance sensor will be unreliable. Once the fork tips are beyond the pallet (or load), the sensor will detect the object (wall, pallet, etc.).

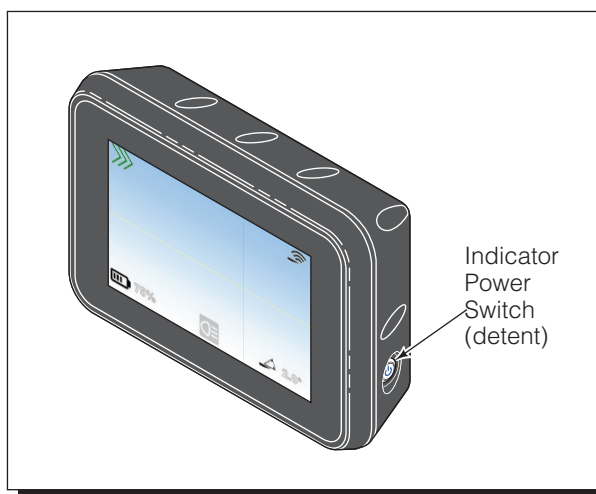
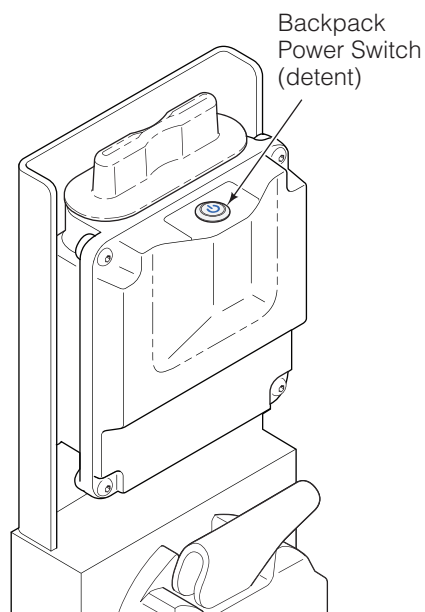


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7

Once the load is on the forks, operate the truck and attachment per operator guides.

Turn Power 'Off'



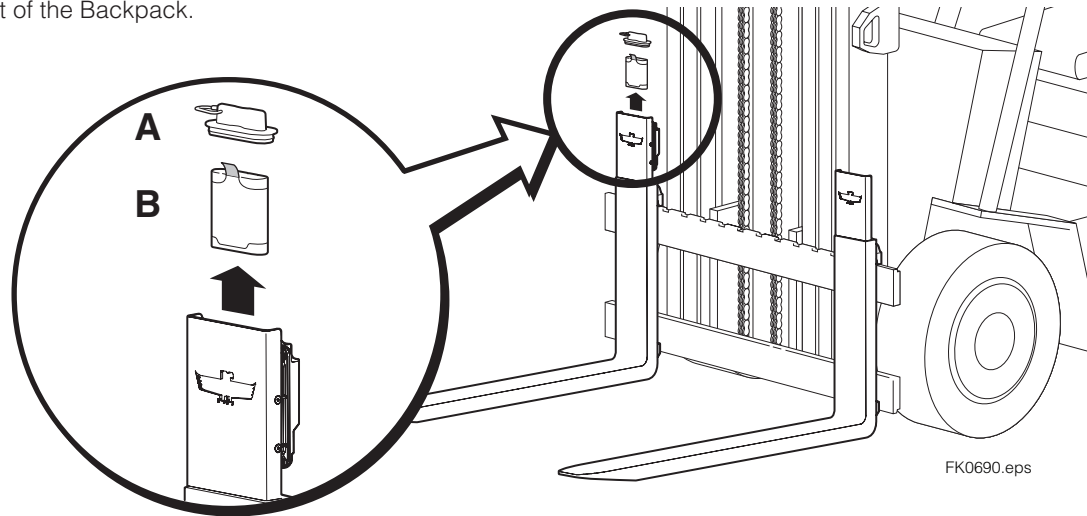
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Charging Fork Battery

1

Remove battery

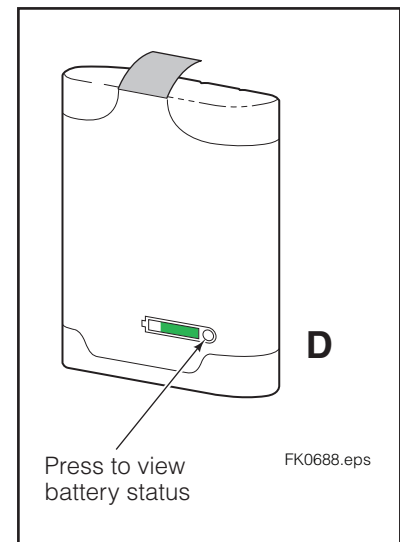
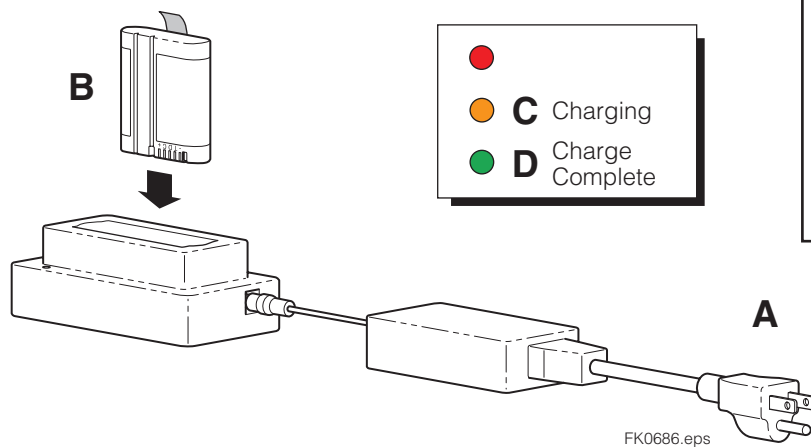
- A** Remove Battery Backpack cap.
- B** Use the battery tab to lift the battery out of the Backpack.



2

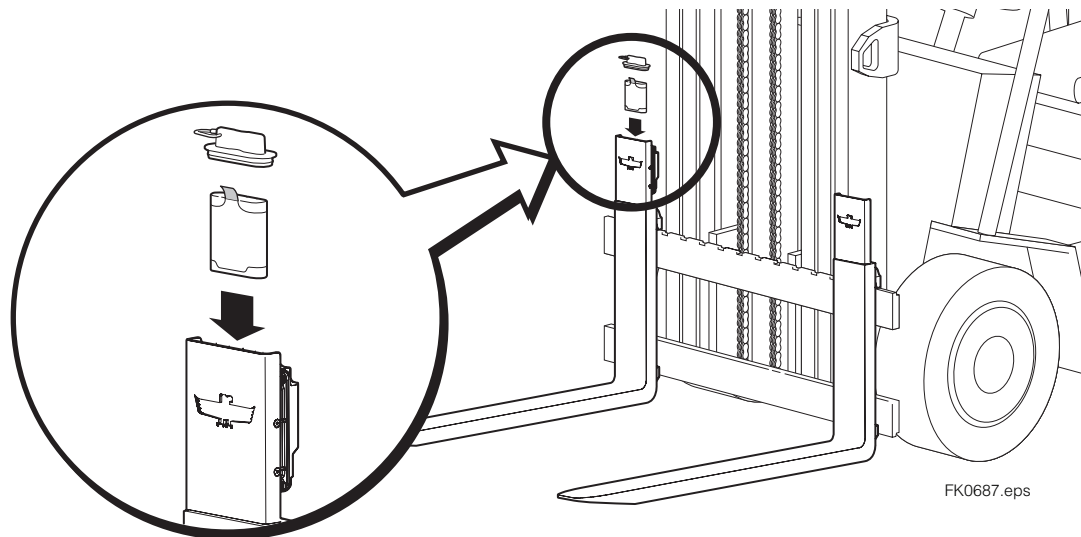
Charge Battery

- A** Plug the power adapter into 110V source.
- B** Seat the battery into the charger. The green and red LEDs will blink.
- C** The power adapter LED will show amber and is charging.
- D** Once the battery is completely charged, the power adapter LED will show green and is no longer charging. The battery will also show a full status on battery status (press button).

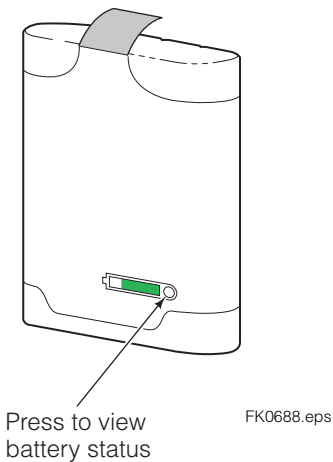


Charging Fork Battery (continued)

3 Re-Install battery in fork backpack



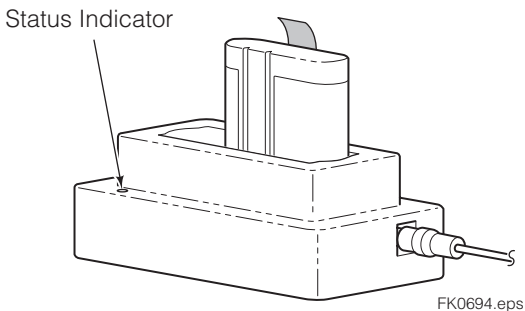
Battery LED Status Indication



LED	Battery Percentage
	Less than 10%
	10 to 25%
	26 to 50%
	51 to 75%
	76 to 100%

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Charger LED Status Indication

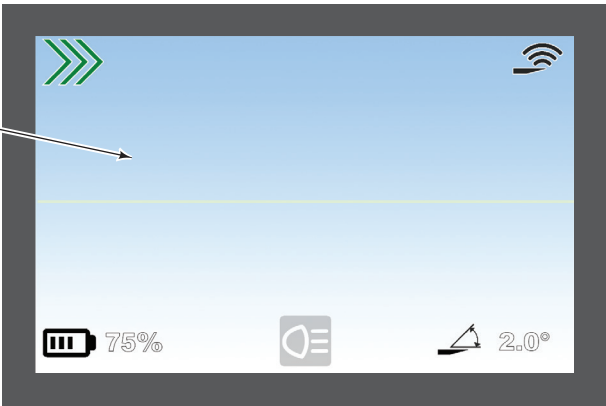


LED	LED Behavior	Meaning
	One time blink	Charger is ready to use
	Blinks for a period of time	Initializing
	Solid	Battery is charging
	Solid	Battery is charged and ready to use
	Continuous Blinking	Battery is too hot or cold. Cold Battery – Battery will charge once sufficiently warm. Hot Battery – Remove battery and cool down.
	Solid	Battery is damaged or is not the correct battery.

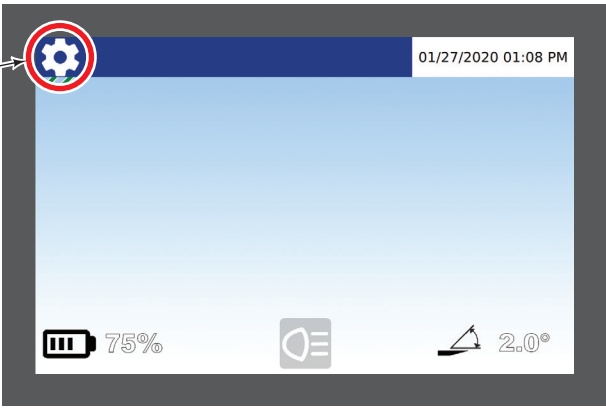
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Access User Settings

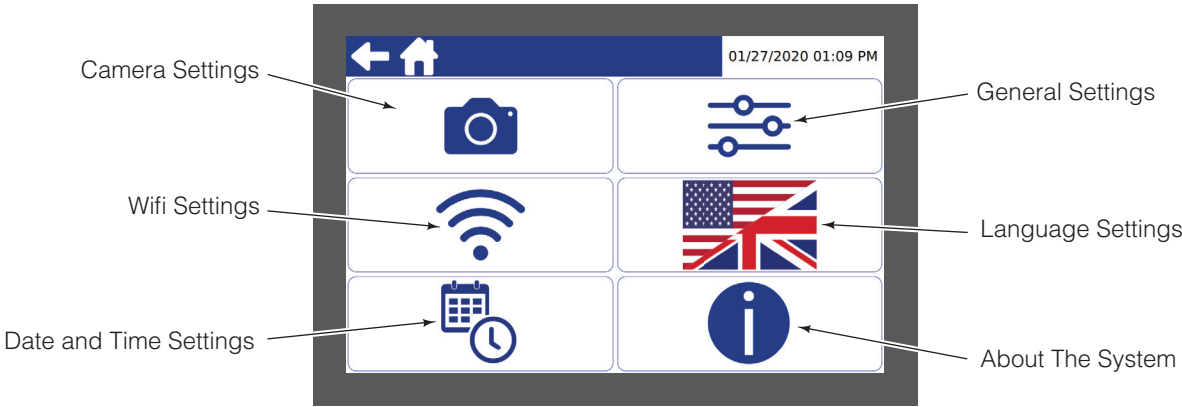
Tap anywhere on the screen to access the drop-down Settings Bar



Access User Settings



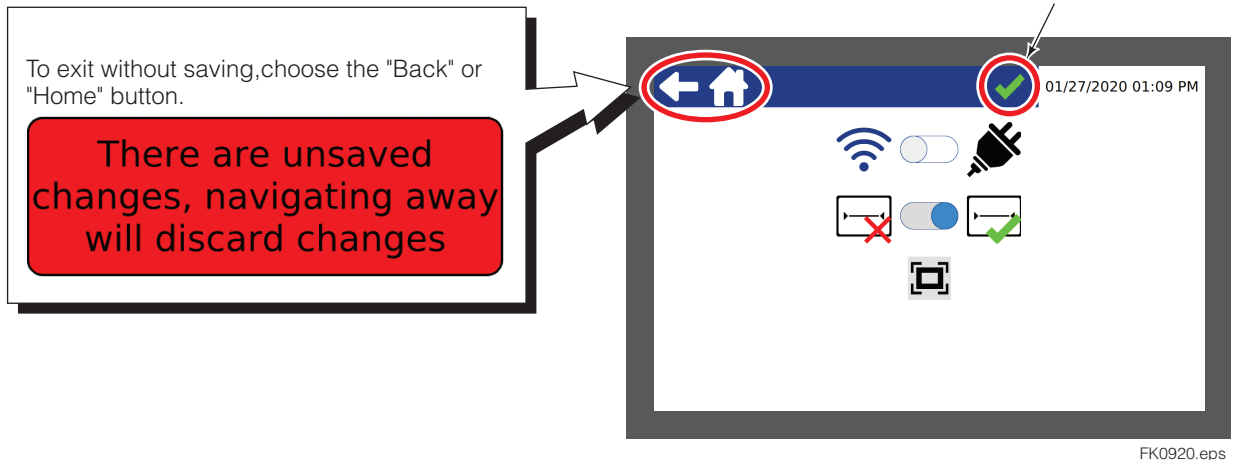
Choose a setting:



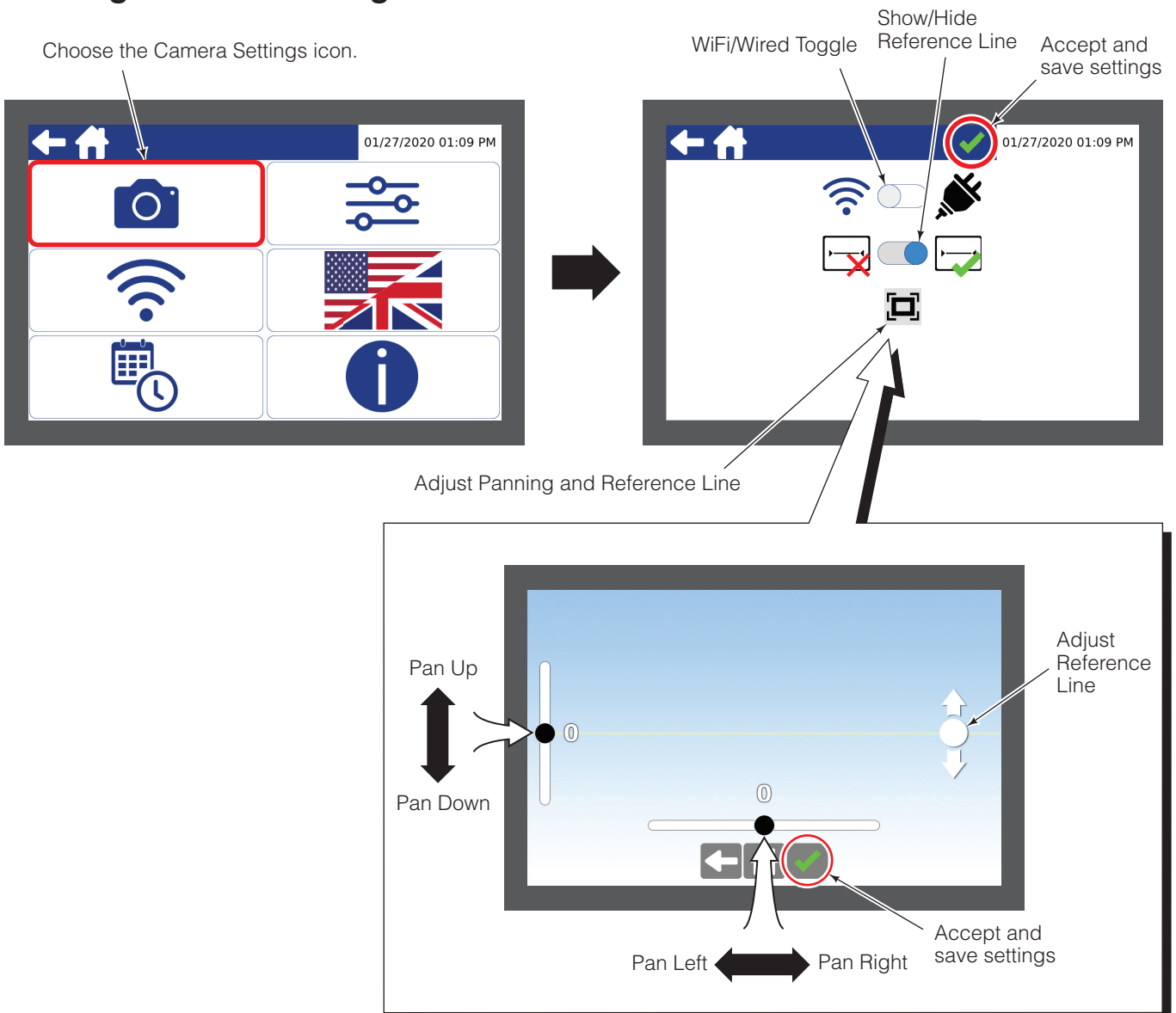
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USER SETTINGS

Exit User Settings

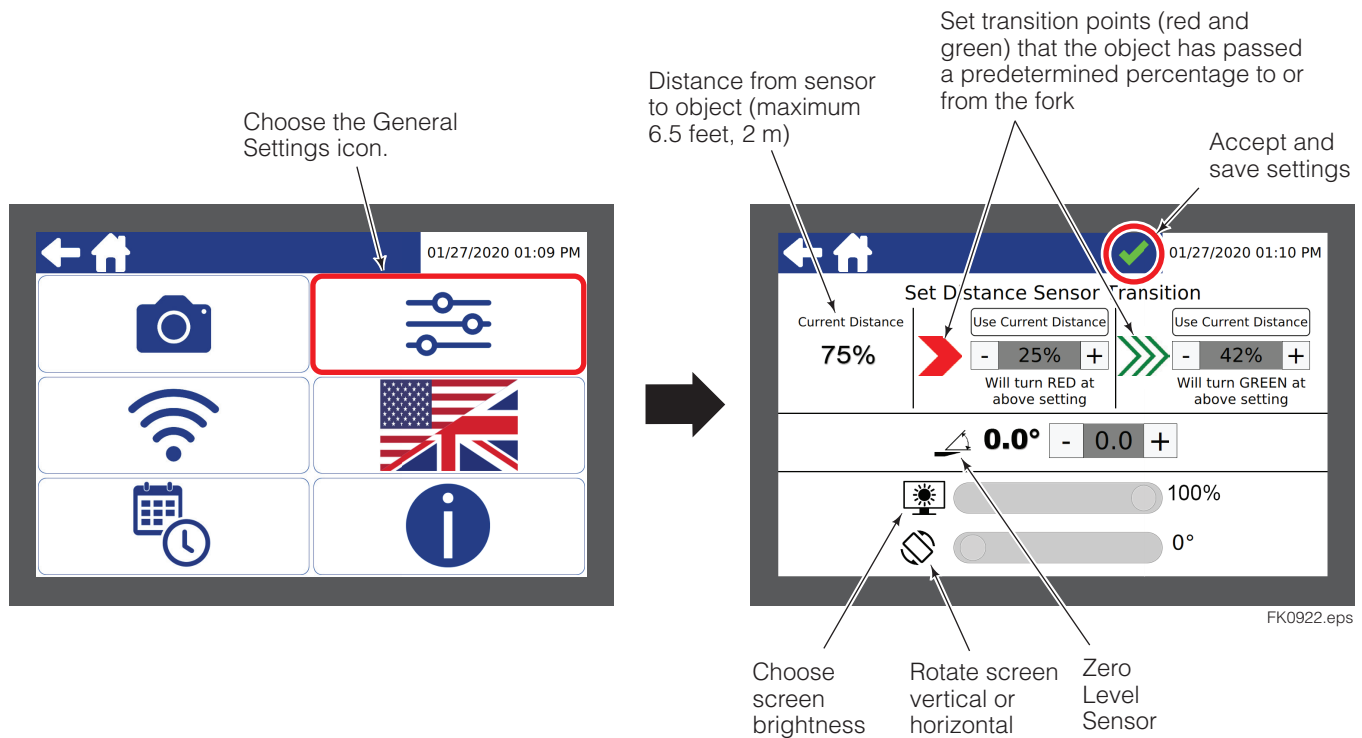


Change Camera Settings

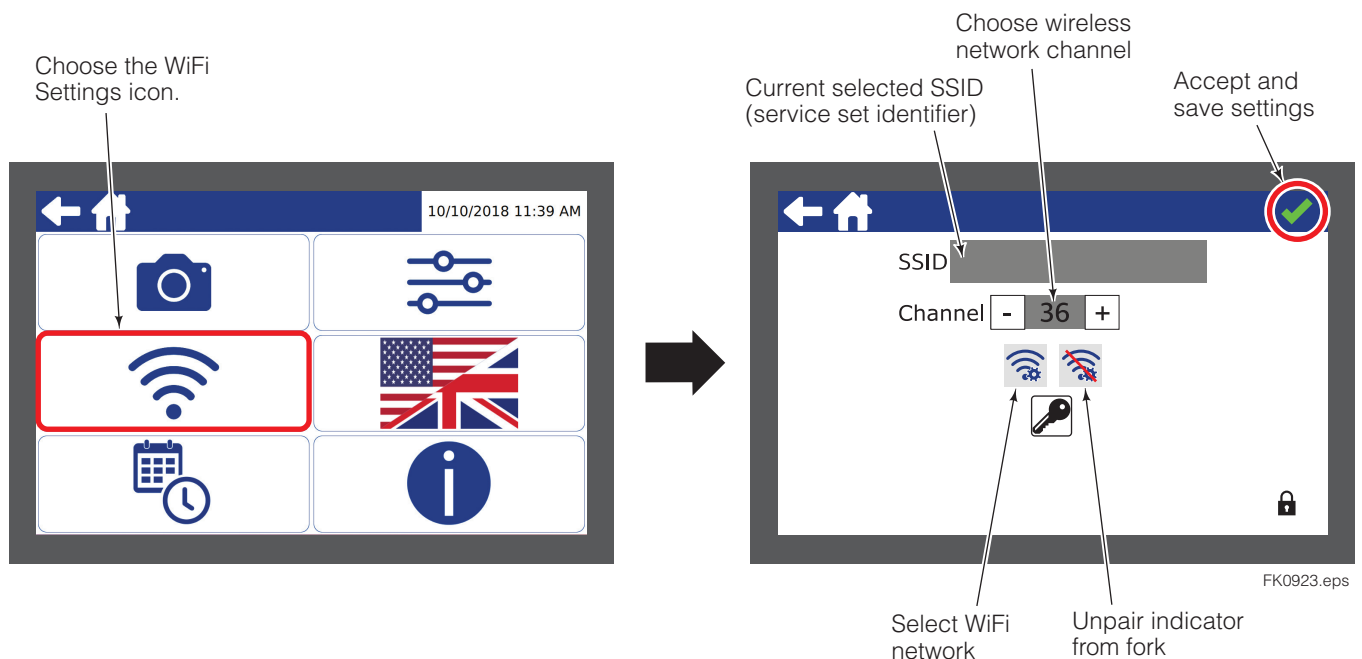


USER SETTINGS

Change General Settings



Change WiFi Settings

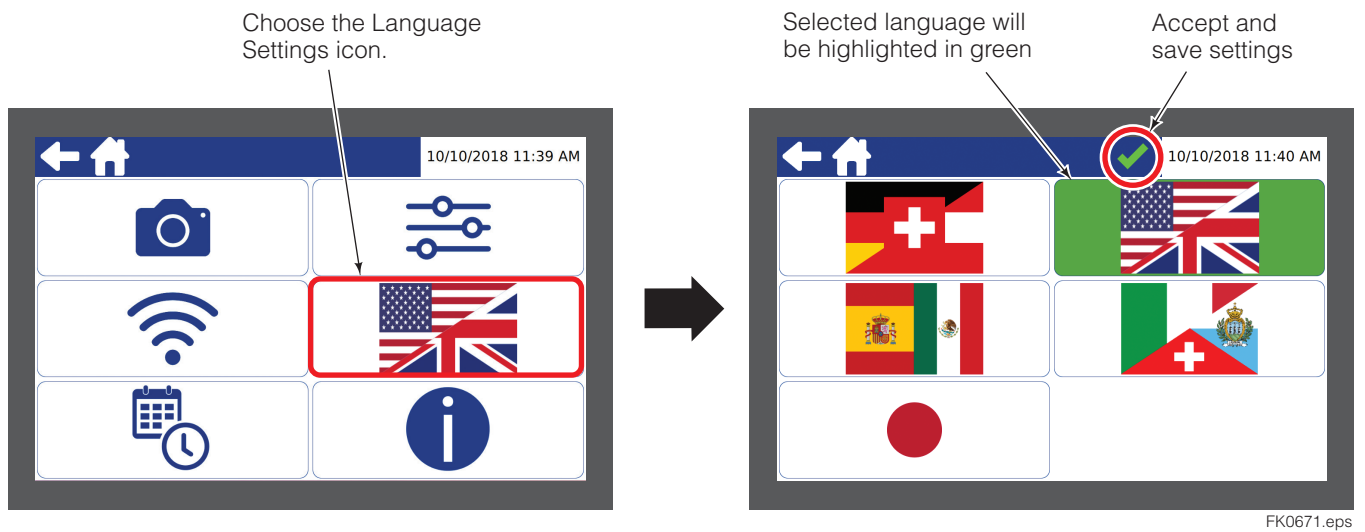


NOTE: After pairing, wait at least two minutes for the battery backpack to reboot.

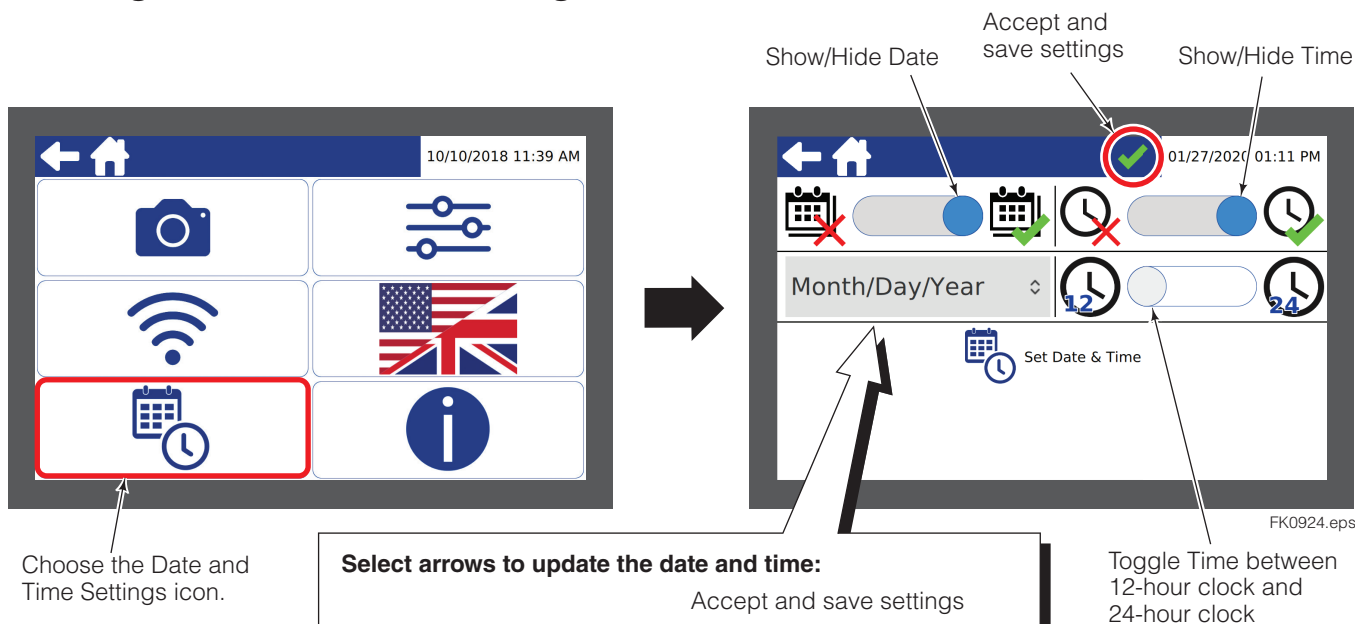
IMPORTANT: Before unpairing the indicator, the fork must be powered on.

USER SETTINGS

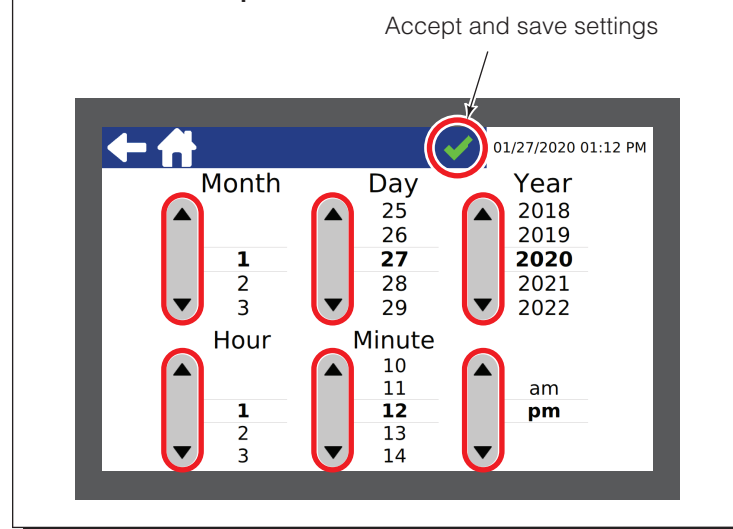
Change Language Settings



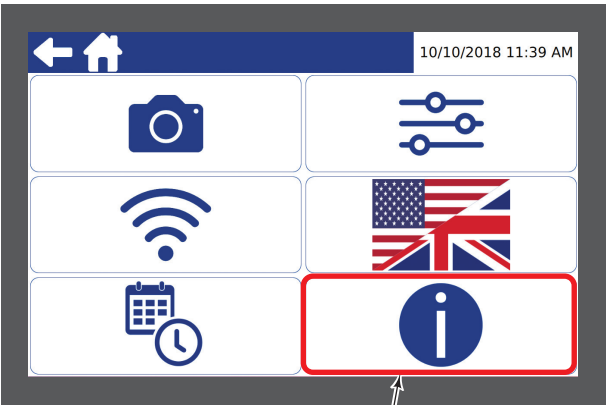
Change Date And Time Settings



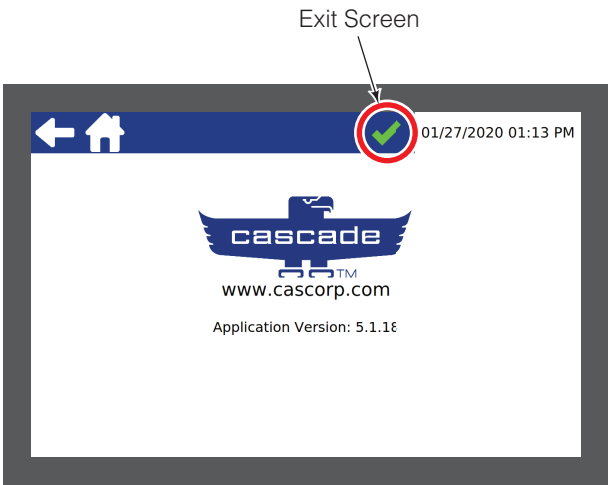
Select arrows to update the date and time:



View System Information



Choose the System Information icon.



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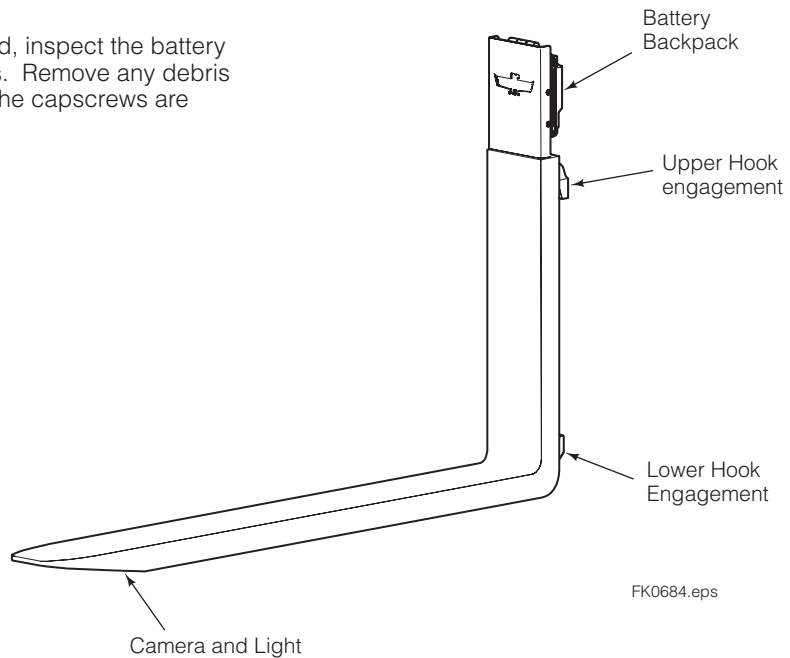
PERIODIC MAINTENANCE

IMPORTANT: Truck must be in park with motor off. Keep feet clear of forks when inspecting.

Daily Inspection

Prior to each shift of truck operation, complete the following procedures:

- Check the lens covering the camera and light. As necessary, clean the lens with an isopropyl alcohol based lens wipe.
- When the battery pack is changed, inspect the battery backpack for damage and debris. Remove any debris found. Check to make sure that the capscrews are tight.



PERIODIC MAINTENANCE

2000-Hour Maintenance

After 2000 hours of truck operation, forks in use shall be inspected at intervals of not more than 12 months (for single shift operations) or whenever any defect or permanent deformation is detected. Severe applications will require more frequent inspection.

Inspect fork hooks and carriage bar clearance

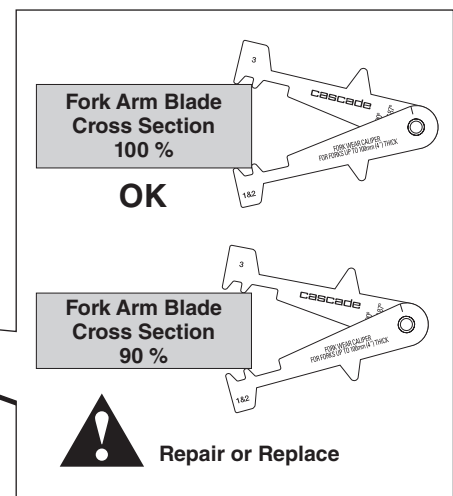
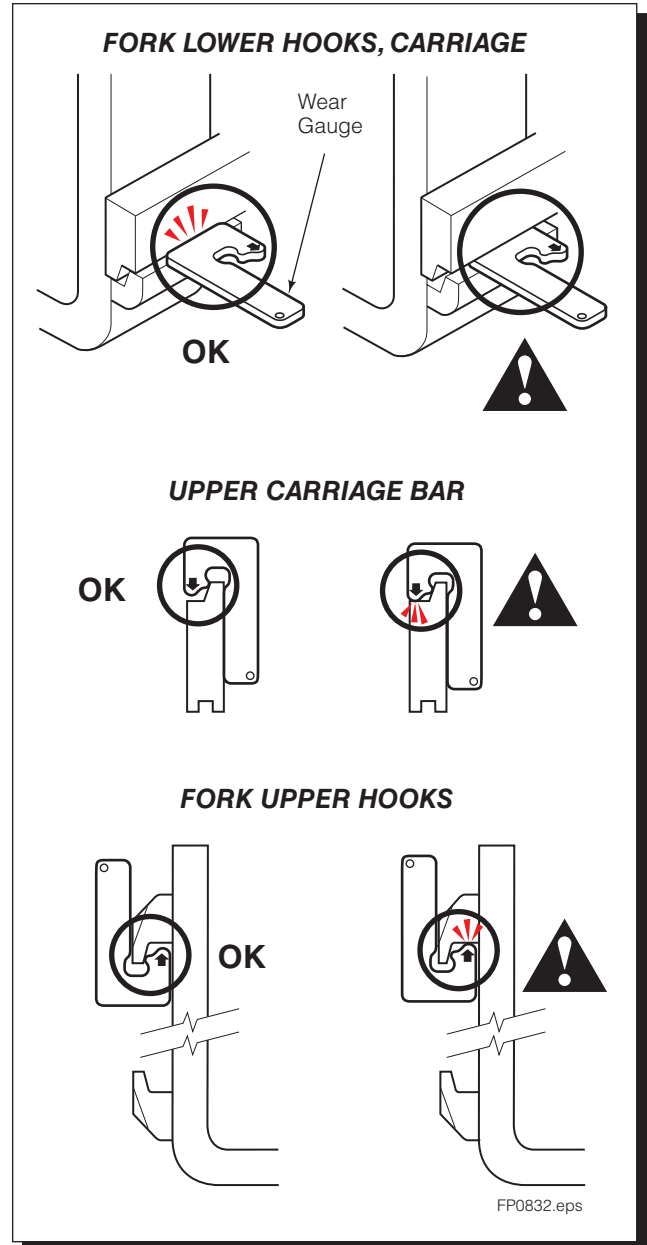
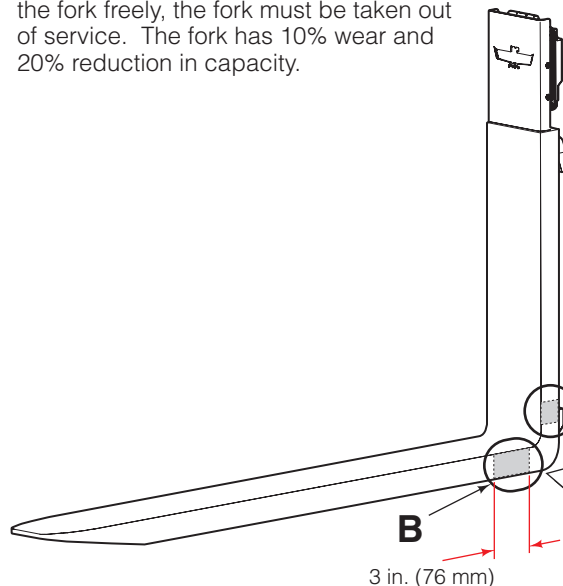
NOTE: Use Go/No-Go Wear Gauge Part No. 209560 (Class II) or 209561 (Class III).

- A** Inspect the fork lower hooks and carriage bar. If the gauge fits between the carriage bar and lower hook, repair or replacement is needed.
- B** Inspect the upper carriage bar. If the gauge arrow touches the carriage bar, repair or replacement is needed.
- C** Inspect the fork upper hooks. If the gauge arrow touches the hook, repair or replacement is needed.

Inspect forks

NOTE: Use fork calipers on forks up to and including 4 in. (100 mm) thick. Fork calipers indicate a 10% wear factor if the calipers can pass over the blade cross-section.

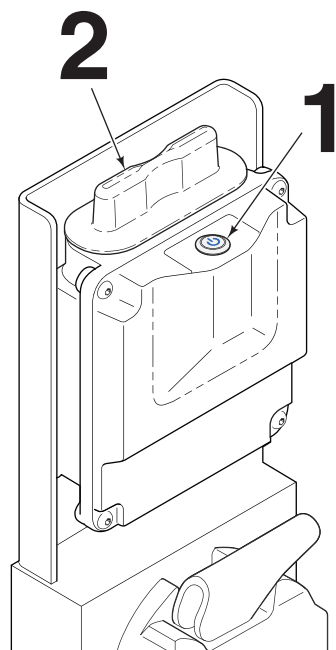
- A** Measure the fork shank thickness with the caliper outer teeth approximately 2 in. (50 mm) above top of blade.
- B** Position the caliper inner teeth on the fork arm blade approximately 3 in. (76 mm) out from the face of the shank.
 - If the inside teeth of the caliper hit the fork, it has less than 10% wear and requires no replacement.
 - If the inside teeth of the caliper pass over the fork freely, the fork must be taken out of service. The fork has 10% wear and 20% reduction in capacity.



Pairing the Indicator with the Sensor Fork

In situations where the indicator and sensor fork are not communicating, perform the following procedure:

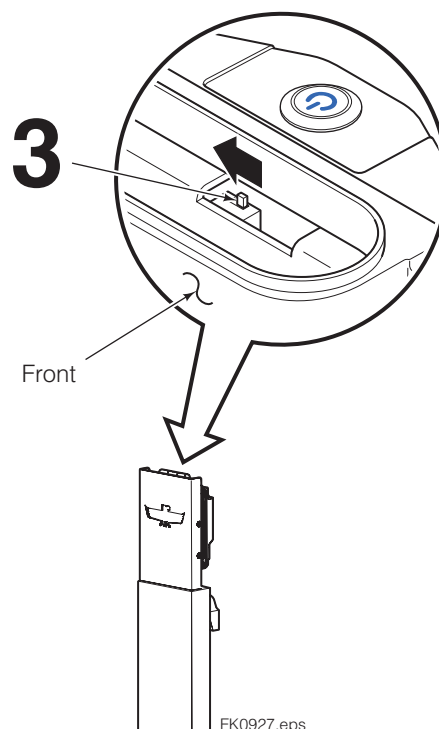
- 1 Verify that the indicator and sensor fork are both powered "On". The detent switches will show blue.
- 2 On the Sensor Fork, remove Battery Backpack cap from the backpack.



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- 3 Locate the tan switch in the backpack. Move the switch to the right position (from drivers view). Wait 10 seconds and then move the switch back to left position. Note that the backpack power light will flash momentarily.

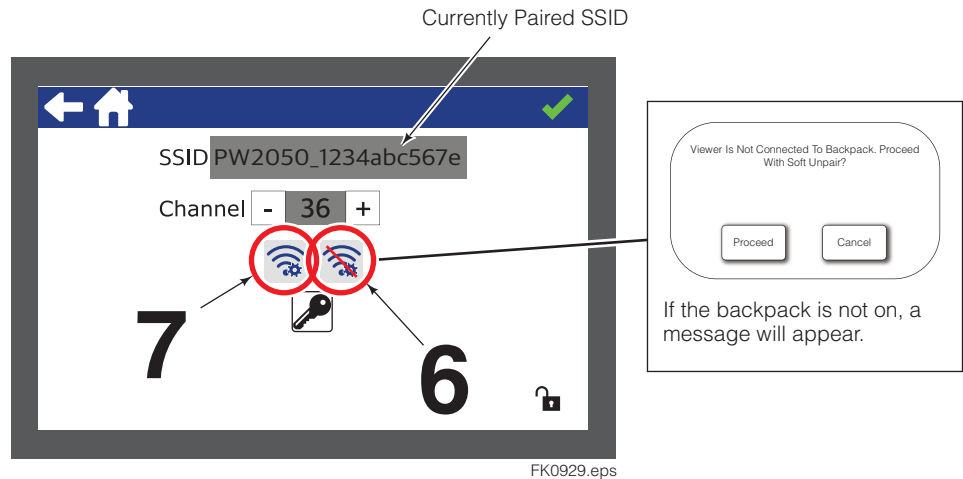
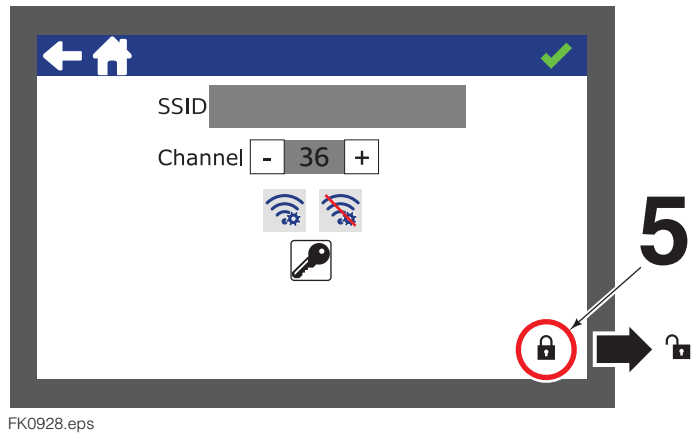
- 4 The system will reboot. Wait approximately 2 minutes.



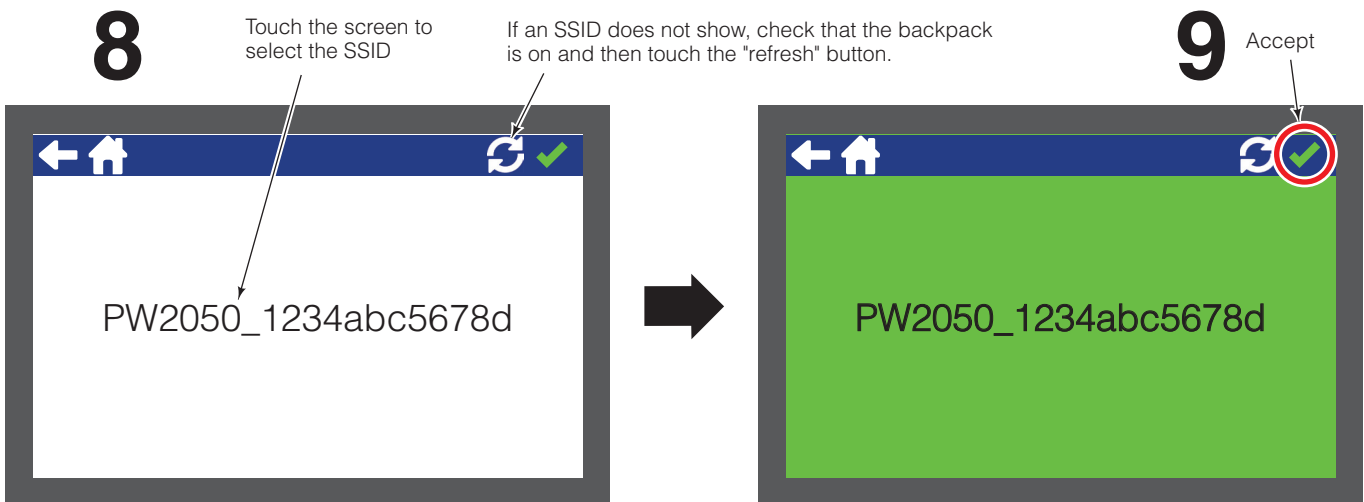
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Pairing the Indicator with the Sensor Fork (continued)

- 5 On the indicator, touch and hold the "Locked Lock" icon for 10 seconds. The icon will change to an "Unlock Lock" icon.
- 6 If indicator is paired to a sensor fork, touch "Unpair Indicator" icon. To verify if a pairing is present, the screen will show an SSID beginning with "PW2050".
The SSID box will be blank after the indicator and fork are unpaired.
- 7 Touch "Select WiFi Network" icon.

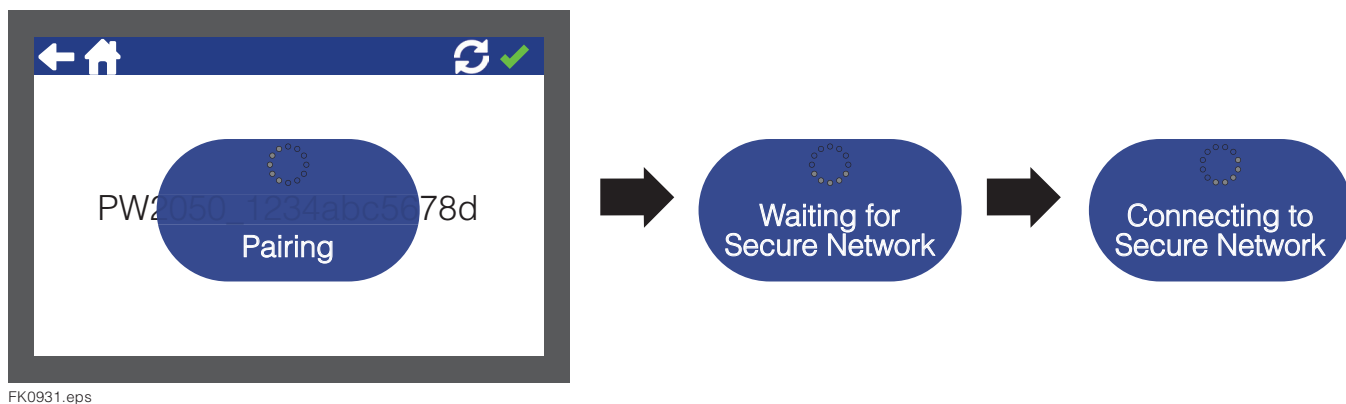


- 8 A wheel of dots will appear and spin. This may take up to a minute to discover the backpack address (SSID). After the address appears, touch the screen to select. The background will turn green.
- 9 To accept the selection, touch the green check mark.



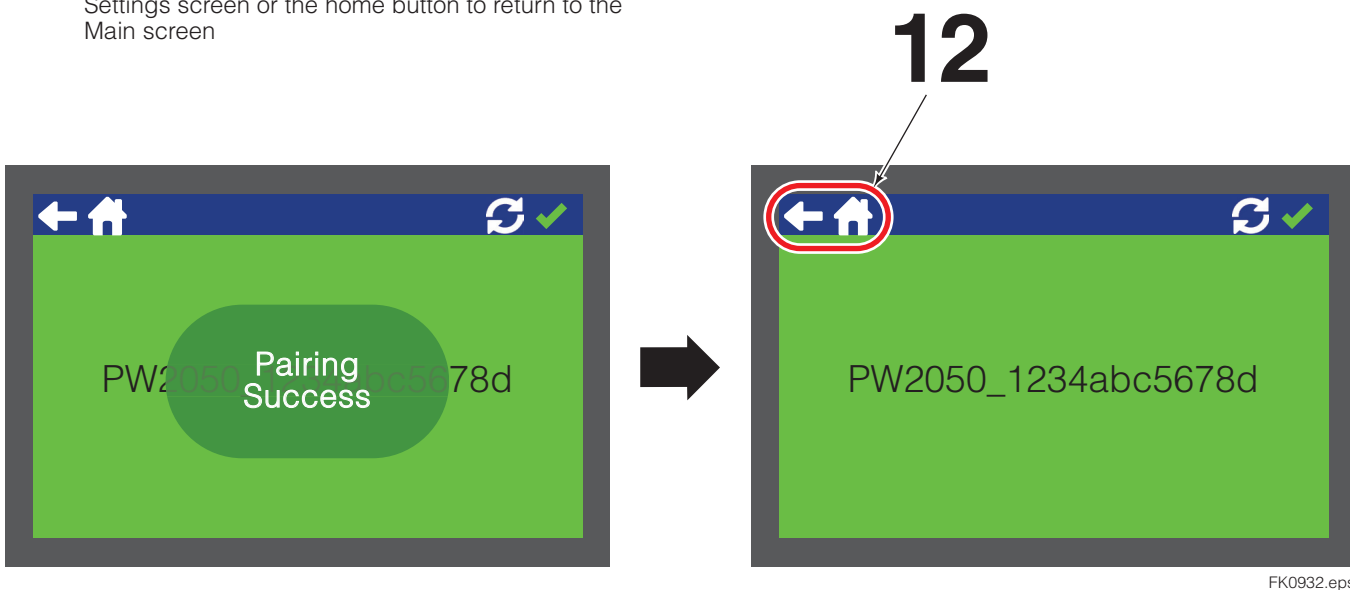
Pairing the Indicator with the Sensor Fork (continued)

- 10** A blue oval will appear with "Pairing", then "Waiting To Secure Network" and lastly, "Connecting to Secure Network". This will take approximately 2 minutes.



- 11** After "Pairing Success" appears, the screen will fade to a green screen and address beginning with "PW2050".

- 12** Touch the upper left return arrow to return to the WiFi Settings screen or the home button to return to the Main screen



Battery Data

Safety:

- Do not open or dismantle batteries.
- Do not expose batteries to heat or fire. Avoid storage in direct sunlight.
- Do not short-circuit a battery.
- Do not store batteries haphazardly in a box or drawer where they may short-circuit each other or be short-circuited by other metal objects.
- Do not remove a battery from its original packaging until required for use.
- Do not subject batteries to mechanical shock.
- In the event of a battery leaking, do not allow the liquid to come in contact with the skin or eyes. If contact has been made, wash the affected area with copious amounts of water and seek medical advice.
- Do not use any charger other than that specifically provided for use with the equipment. See also chapter "Charging".
- Observe the plus (+) and minus (-) marks on battery and equipment and ensure correct use.
- Do not mix batteries of different manufacture, capacity, size or type within a device.
- Keep batteries out of the reach of children.
- Keep batteries clean and dry.
- Secondary batteries need to be charged before use.
- Use only the battery in the application for which it was intended.
- When possible, remove the battery from the equipment when not in use.
- Do not store batteries longer than 1 month in discharged state.
- Do not store batteries longer than 1 year without recharge.
- The battery must be recycled or disposed of properly.

Operating Temperature:

For charge: 0°C to +45°C
For discharge: -20°C to +60°C

Storage Temperature:

< 1 year: -20°C to +20°C
< 3 month: -20°C to +45°C
< 1 month: -20°C to +60°C

Recommendation: Store the battery at below 20°C, low humidity, no dust and no corrosive gas atmosphere. Store the battery with a state of charge between 40-60%.

Charging: Charge only with a SMBUS compliant charger, e.g. RRC-SMB-MBC. Refer also to the manufacturer's instructions or equipment manual for proper charging instructions.

Specifications:

Type	RRC2054
Voltage	15.00V
Capacity	3.20Ah
Max. charge current	2.17A
Max. charge voltage	17.40V
Max. discharge current	4.25A
Dimensions (L x W x H)	85.35mm x 77.65mm x 23.0mm (max.)
Weight	240g

Recycling: Recycle batteries according to national and local regulations. Contact your local representative for assistance. The batteries must be disposed only in a discharged state at the collection center. In case of not fully discharged batteries, provide for a risk against short circuits. Short circuits can be prevented by isolating the terminals with tape.

Declaration of conformity:

CE: The battery complies with the current regulations of the EU guidelines.

FCC: This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Symbols: Explanation of symbols which are on the battery and/or in this manual.

	Caution, consult accompanying documents		UN Transportation Test
	Operator's manual; operating instructions		Recycling Symbol
	Mark of conformity to applicable European Directives		Dispose of this product according to local regulations.
	Regulatory Compliance Mark of Australia and New Zealand.		For Canada & USA: Please call 1-800-822-8837 for information on how to recycle this battery
	UL Recognized for Canadian and US market		China RoHS
	Recycling Symbol Taiwan		Regulatory Compliance Mark of Japan
	KC		EAC/Gost
	China CQC		India BIS

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Do you have questions you need answered right now?

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