User manual

Wireless sensors

WLC
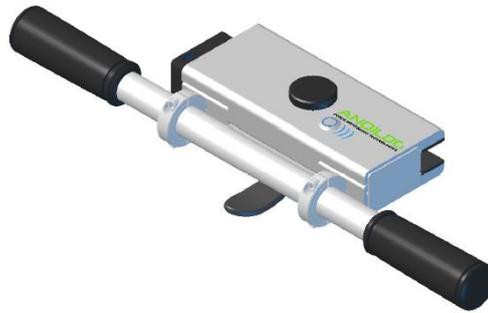
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Executive Summary

Rev	Date	Description
1.0	Juillet 2018	Création
	May 2019	English translation

1. Introduction

1.1. Presentation

Thank you for choosing a WLC wireless force or torque sensor manufactured by Andilog to perform your measurements.

This instrument is the result of more than 30 years of experience in force and torque measurement. It integrates the latest technologies available to offer you unparalleled performance and measurement quality.

The WLC sensors are equipped with Bluetooth technology which allows them to be connected wirelessly to different displays to take your measurements: our Centor Touch displays, a computer coupled to Caligraph software or by developing your specific solution.

1.2. Definition

To facilitate the proper understanding of this user manual, some definitions of terms frequently used throughout this manual.

1.2.1. Calibration

The WLC sensors are delivered calibrated by Andilog with a calibration certificate attached COFRAC with measurement reading. The calibration data is stored in the electronics integrated in the sensor. It is generally recommended to calibrate force or torque measuring instruments once a year unless there is a different internal procedure. Andilog guarantees each calibration a complete verification of the instrument as well as an adjustment of the calibration to ensure perfect accuracy.

1.2.2. Bluetooth

WLC sensors are equipped with Bluetooth technology, which makes them compatible with most devices with this technology. The module used in our sensors is Bluetooth 5 Class 2 certified. It allows data transfers with our Caligraph software up to 1,000 measurements per second and 500 per second with our Centor Touch display. The range is about 20 meters in open fields.

2. Getting Started

CAUTION: Opening of the product. Check that the WLC sensor was supplied in the original case and that it was not damaged during transport. In case of doubt, contact Andilog for further information to check the proper functioning of your gauge.

2.1. Opening the product

WLC sensors are available in different versions: force, torque and different sensor shapes (S, miniature, key, chuck...). They are delivered at least with:

- A briefcase
- A micro USB charger
- A calibration certificate (dematerialized, usually sent by email before delivery)
- Caligraph software or Centor Touch display (Option)Recommandations avant utilisation

2.1.1. Battery

The WLC sensors are equipped with single cell 3.7 V Lithium Polymer (Lipo) batteries. Depending on the sensor format, the battery capacity may vary. Most of our sensors are nevertheless equipped with a 1,000 mAh battery that provides them with an autonomy of approximately 20 hours in measurement.

Sensors are not shipped with a 100% recharged battery. We recommend charging the sensor before the first use until the charging led is switched off in order to guarantee maximum autonomy from the first use.

We recommend using the charger with a micro USB connector for charging the sensor. This charger delivers a voltage of 5V and must be able to supply at least a current of 500mA.

Rechargeable batteries have a limited number of charging cycles and may require replacement. Battery life and number of charging cycles vary depending on use and settings.

2.1.2. Sensor

Despite the overload protection provided by this instrument, the application of a force or torque greater than the capacity of the sensor can damage the sensor.

It is important that the measured values are generally less than 90% of the sensor capacity. Constant use of the sensor beyond 90% of its capacity can cause premature wear of the sensor. When the sensor is used on a motorized frame, it is necessary to program a frame stop when the force approaches the maximum capacity of the sensor. This limit must take into account the fact that at high speed a frame does not stop immediately and the risk of damaging the sensor is high due to the inertia of the motor.
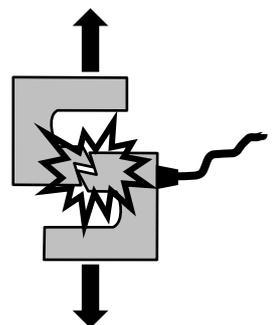
2.1.3. Precaution during testing

Most of the tests performed with the Andilog range of instruments are destructive tests. The hazards associated with this type of test require the use of our instruments by experienced and trained operators. By the nature and use of the equipment sold by Andilog, the buyer's acceptance of Andilog's products constitutes an acceptance of the risks and damages that may result from the use of Andilog's equipment.

2.1.4. Environmental conditions

- Operating temperature: 0 to 35° C (32 to 95 F)
- Storage temperature: -20 to 45° C (-4 to 113 F)
- Relative humidity: 5% to 95%, non-condensing
- Maximum operating altitude: 3,000 m (9850 feet)

2.1.5. Warranty

Subject to the conditions below, Andilog warrants to the buyer that it will repair or replace without charge the new instruments sold subject to normal use and maintenance. This warranty applies if the buyer detects a manufacturing defect or defect in the material for a period of two (2) years following the date of shipment.

The conditions of application are:

- ANDILOG was notified in writing of the defect before the end of the warranty period
- The products are shipped to Andilog with the prior agreement of Andilog Technologies
- Transport costs are paid by the buyer to return the equipment to Andilog
- The products have been used and maintained under normal conditions of use

Any repair or replacement carried out by the seller outside the Andilog agreement voids the warranty.

In no event shall Andilog be liable for any damage, loss of business, production stoppages due to the purchase, use or non-functioning of our products. This is even if Andilog has been informed of the possibility of such damage.

The accuracy of our devices is guaranteed at the time of shipment at the value indicated in our documentation or offers.

If the products are damaged during shipment, notify the carrier and Andilog immediately.

The warranty is void in the event of accident, misuse or abuse of use.

Calibrations, overloaded sensors, consumable parts, such as batteries, are not covered by the warranty, unless the damage is due to a defect in material or workmanship.
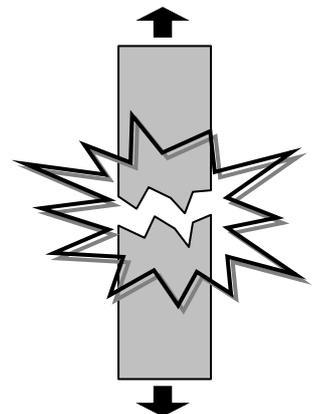
2.2.   Turn on your sensor

To turn on your sensor, press the sensor button. The activity LED will light up and remain fixed until the sensor is connected to a display. The sensor is equipped with an automatic standby system. If the sensor is not connected to a display after 2 minutes, it will automatically go into standby mode.

2.3.   First connection of the sensor

2.3.1. With a computer

When using the sensor for the first time, it is necessary to couple the sensor to your computer. To do this, your PC must have Bluetooth connectivity. Some PCs, such as laptops and tablets, have built-in Bluetooth connectivity. If this is not the case with your PC, you can connect a Bluetooth adapter to your PC's USB port to get it. To start using Bluetooth, you must first pair your Bluetooth device with your PC.

Then follow the following procedure:

1. Switch on the sensor
2. On the computer, in Windows, select the Start button, then select Settings > Devices > Bluetooth and other devices .
3. Enable Bluetooth, then select Add Bluetooth device or other device > Bluetooth. Choose the device (WLC XXX) and follow the additional instructions, if any, then select OK.

You can then use our Caligraph software to make your measurements. This operation is only necessary once. For later use, you can start your sensor and use Caligraph directly.

2.3.1. With a Centor Touch

Make sure that the Bluetooth module for Centor Touch is connected to the display.

1. Switch on the sensor
2. Start-up the Centor Touch
3. After the start page, a window appears to scan the available devices.
4. Choose the WLC XXX sensor from the list and you will arrive on the measurement page with the sensor ready to measure.

Once the sensor is connected, the Centor Touch will automatically propose it to you in the list of sensors at each start without having to scan all Bluetooth devices.

2.3.2. With a phone or an Android tablet

First of all you must activate Bluetooth on your system:

1. Open the Settings application ⚙ on your device.
2. Select **Connected devices**.
3. Enable or disable **Bluetooth**.

When Bluetooth is enabled, the ⚹ icon appears at the top of the screen.

<u>Associate and connect the WLC sensor:</u>

To connect your phone or tablet to the WLC sensor, you must first associate them. Be aware that the devices remain associated until you dissociate them. When the Bluetooth settings are open, nearby devices can detect your device.

1. To select a new device, press **Add a new device**.
   Note: If the "Add new device" option is not displayed, it means that you are using another version of Android. Check the section "Available devices". If necessary, press More ⋮ ＞ **Refresh**.
2. Select the name of the WLC XXX sensor you want to associate with the phone or tablet.
3. Follow the instructions on the screen.

3. Simple operation of the WLC sensor

The WLC sensors have been designed for easy use with software or displays designed by Andilog. If you want to use the sensor for your own software or connect it to another system, refer to the **advanced use** section.

3.1.   LED and button of the WLC sensor

The WLC sensor has a button, a load led and an activity led. It works as follows:

Charging LED:

- On: charging
- Charger off when connected: charging completed

Status LED:

- On steady: sensor on, ready to connect, automatic standby after 2 minutes if no device connects
- Flashing light: sensor connected, sending measurements
- Fast flashing light: low battery
- Off: sensor in standby or battery completely discharged

Button:

- If the status LED is off, turns on the sensor
- If the status LED flashes, makes the sensor tare
- A long press on the button resets the sensor and closes the Bluetooth connection.

3.2.   Use with a Centor Touch

The sensor behaves in exactly the same way as wired sensors. Once connected, the Centor Touch will display the values in real time, plot the curve or perform calculations as if it had a wired sensor. It is possible to use all the functions of the Centor Touch such as transfer to USB Datastick, connection to a computer...

The data transfer speed between the sensor and the Centor Touch is 500Hz maximum.

3.3.   Use with Caligraph

Once your WLC sensor has been paired with your computer, you can use the Caligraph software. Refer to the Software Help for more details on configurations.

The button on the sensor in use with Caligraph can be used to Tare, start or stop the curve plot. For the rest, the sensor behaves like other Andilog instruments connected in RS232 or USB to a computer. Data transfer can be done up to 1000Hz.

3.4. Use with a phone or Android tablet

Once connected to the device, the WLC sensor can be used with specific Andilog applications. Refer directly to the application for more details.

4. Advanced use of the WLC sensor

You can also use WLC sensors to develop your own applications. The WLC sensor uses Bluetooth Classic mode and the SPP protocol. In this case, it sends the measured values in text to the virtual serial link created. Due to the amount of important data to be transmitted, the communication speed in this mode can become saturated beyond 250Hz.

4.1. Data format

The measurement sent in text is signed, followed by a space, the unit and the end of line character (0Dh).

4.2. Available commands

The WLC sensors have different controls to communicate with the display. These commands must be sent in binary.

All exchanges follow the following format:

- 1st byte: 0x02
- 2nd byte: length of the frame
- 3rd byte and following: frame
- Last byte: 0x03

When ordering, the frame consists of a function code on 1 or 2 bytes, then any parameters.

The response frame consists of:

- 1 byte which includes the function code, or the 2nd byte of the function code when it contains 2 bytes
- 1 optional byte describing the result, 0x05 for a positive acknowledgement
- Optional parameters, whose high byte is always issued first

4.2.1. Reading the sensor capacity

Command : 02 01 D4 03
Response: 02 03 D4 `capacity` 03

The sensor capacity is sent on two unsigned bytes.

4.2.2. Reading the sensor unit

Command : 02 01 D5 03
Response: 02 02 D5 `unit` 03

The sensor unit is sent on one byte. The units are:

- 01h : Nm
- 02h : Kg.cm
- 03h : Lb.in
- 04h : mN.m
- 08h : N
- 09h : KN
- 0Ah : Kg
- 0Bh : Lb
- 0Ch : oz
- 0Dh : daN
- 0Eh : g

4.2.3. Changing the frequency of sending measurements

Command : 02 03 F0 `frequency` 03
Response : 02 02 F0 05 03

`frequency` is encoded on 2 bytes and must be between 1 and 1000. The sensor uses the millisecond period resulting from the entire division of 1000 by frequency.

Example for 250Hz : 02 03 F0 00 FA 03.

4.2.4. Start of measurement transmission

Command : 02 01 FD 03
Response : 02 02 FD 05 03

Continuous sending of measurements is disabled when the power is turned on and each time you disconnect Bluetooth. This reduces battery consumption.

4.2.5. Interruption of measurement transmission

Command : 02 01 F7 03
Response : 02 02 F7 05 03

4.2.6. Pressing the sensor button

Each time the sensor button is pressed, it emits the frame "02 01 F2 03'. No answer is expected. A tare is performed, unless this function has been disabled (see § Tare).

4.2.7. Reading the Bluetooth name

Command : 02 02 FB 98 03
Response : 02 `length` 98 05 `nameOfTheModule` 03

Example: the module :'SBT_DEV' answers : '02 09 98 05 53 42 54 5F 44 45 56 03'.

4.2.8. Tare

Command : 02 02 F5 `mode` 03
Response : 02 02 F5 05 03

The mode byte contains:

Byte 7	Byte 6	Byte 5	Byte 4	Byte 3	Byte 2	Byte 1	Byte 0
0	0	0	BTN	0	0	TARE	

- BTN :
  - o 0: disables the tare by pressing the button (until the sensor is reset or wakes up)
  - o 1: allows tare by button (default behavior)
- TARE :
  - o 00 : nothing
  - o 01, 10, 11 : tare

This command also starts the transmission of measurements.

4.3.   Usage

In order for the sensor to perform a tare, it must have some measurements "in stock", so it needs the transmission of measurements to be activated beforehand. In our software, we use the following sequence:

1. Start of measurement transmission
2. Changing the frequency of sending measurements
3. Reading the sensor capacity
4. Reading the sensor unit
5. Tare

Note: Between a command and its response, several measurements can be inserted.

5. Appendices

5.1. Connection problems

5.1.1. Impossible to couple the sensor

Check that your system is equipped with Bluetooth in version 2.0 or higher.

If during scanning the sensor does not appear in the list of available devices, check that the sensor LED is on. If so, press and hold the button to reset the sensor. Then restart a scan on your device.

5.1.2. Measurements are abrupt or loss of connections

The quality of the Bluetooth connection varies the maximum data rate that the sensor can send. If the distance between the sensor and the display is too long or if there are metal walls or walls, the quality of the connection may decrease, and the sensor may not be able to transmit enough data or may disconnect. In this case:

- Bring the display and sensor closer together as much as possible.
- Avoid enclosing the sensor in metal boxes separate from the display.
- Decrease the frequency with which data is sent.