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User guide – Doosan Robot Arm



I. The robot set up

Wire	Plugging place	Wire using
Tablet's wire	Inside the computer box, under the electronics circuit, in the middle	Sends the data from the tablet to the robot
Robot's power data / wire	Outside : on the robot's side // Inside : next to the tablet's wire	Powers the robot and send him the data from the tablet or the computer
Ethernet yellow wire	Outside : on the field computer // Inside : on any position for the ethernet wires on the top right corner in the computer box	Send the data from the field's computer to the robot
Computer box's power wire	Inside the computer box, under the electronics circuits on the right extremity of the surface	Powers the computer box

Once all the plugging part is done, you need to turn off the on / off switch into the computer box next to its powering wire, and then the robot will start. Next there is also the tablet button to press to start up the tablet.

II. Measurement starting

To start a measurement, you must launch the .exe file named “Robot_app”. This file will automatically open the GUI code created using Python. Once this file is open on the field computer, to establish the link between this program and the robot, you must run the file “Control_python” that you will find on the Device Manager of the Doosan software on the robot’s tablet. This 5 steps program can make the link between the Python file to control the robot with the field computer.

After that, comes the measurement settings part. In the GUI you can find three different windows : “Data saving” ; “Technical settings” ; “Field position”

The screenshot displays a software interface with two main panels. The left panel, titled 'Data saving', contains a text input field with the path 'c:\Users\mobil\Desktop\robot\python\data_2025_06_26_0953.csv' and a 'Choose a saving place' button. Below this are controls for 'Amount of fields' (set to 1), 'Measured variables' (checkboxes for Temperature, Wind, CO2, Pressure, H2O, and P and T (CO2)), 'Measurement time (min):' (set to 30), 'Measuring mode:' (set to Continuous), and 'Frequency (Hz) (< 20):' (set to 1). A 'Find Ground' button is at the bottom. The right panel, titled 'Technical settings', shows 'Robot IP adress:' (192.168.137.100) and 'Robot communication port:' (20002), with a 'Connect' button and a 'Not connected' status indicator. Below this is a 'Field(s) position' section with 'Position field 1:' (700 mm, 90) and a 'Go to' button.

- Data saving :

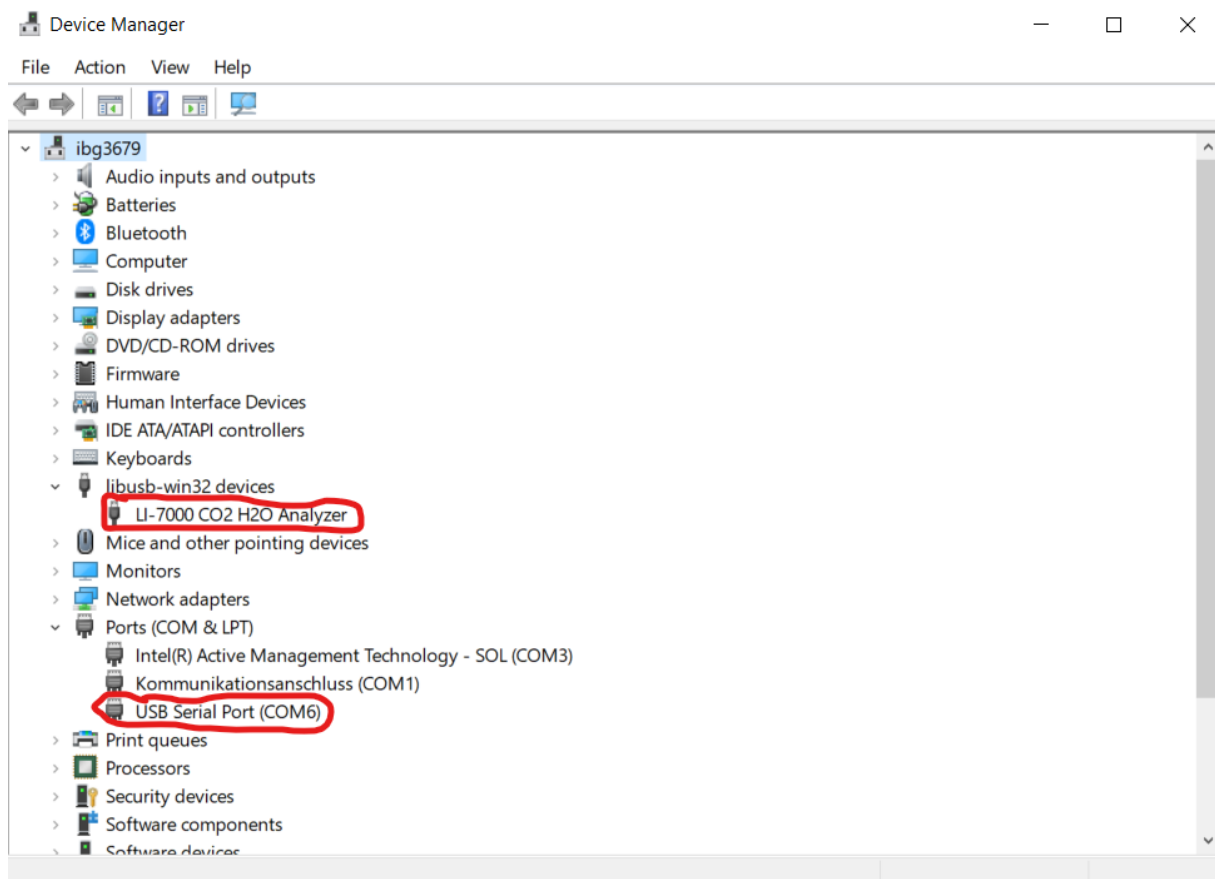
This window is used choose the settings for the measurement ; the first one is the path and the name for the .csv file where all the data are saved. Then, you can choose different physical quantities that you want to measure depending on each sensor. Temperature, pressure and wind are measured by the wind sensor. Humidity, CO2 and "P and T (CO2)" (Pressure and Temperature inside the CO2 sensor) are measured with the LI-7000. After that, then comes the choosing place for the time of the measurement. You can enter any time duration (in minutes), and then when you'll launch a measurement, the robot will keep on moving and making the measurement until the time runs out.

If the time happen to run out between two different up & down, the robot will finish its series of up & down and after it will stop. Same thing if you use the "Stop Button".

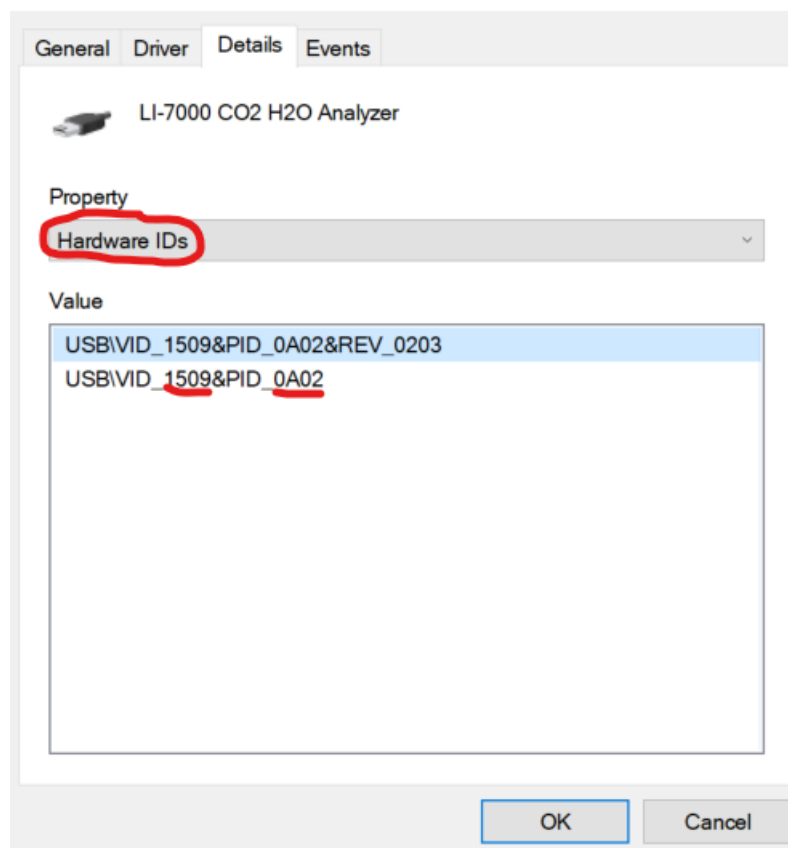
Then, there is two last settings to manage, one to choose if the robot will execute continuous (with a frequency) or discontinuous (stop X times for each up & down) up & down movements, and one setting to set up the acquisition frequency (max 20 Hz) or number of point (depend on the mode selected).

- Technical settings :

This display is used to get all the information for the identification of the robot and the sensors. The main important thing is to remember to check (and to change if different features) the ID for the devices. You can find the COM port for the wind sensor very easily. For the LI-7000 it is more difficult, you have to find the idVendor (VID) and idProduct (PID).



LI-7000 CO2 H2O Analyzer Properties



Once all the ID places are fulfilled, you can click on the “connect” button, then wait and if the robot is connected, it will give a green dot and a short message to confirm it. In case of bad connecting of the robot, then a popup window will warn the user to tell that there was a problem during the link with the GUI and the sensors / the robot.

- **Field position :**



The screenshot shows a dark-themed GUI window titled "Field(s) position" with a pencil icon. It contains three sections for field positions:

- Position field 1 :** Distance input is 700 mm, angle input is 90°. A blue "Go to" button is to the right.
- Position field 2 :** Distance input is 1000 mm, angle input is 0°. A blue "Go to" button is to the right.
- Position field 3 :** Distance input is 1600 mm, angle input is -90°. A blue "Go to" button is to the right.

This window can adapt itself its size depending on the amount of field chosen in the “Data saving” window (from 1 to 3 fields).

Then, for each field you can choose the distance of the field from the support of the robot to the measurement point (between 700 to 1600 mm). To orientate the robot to the right angle, you can also change the angle (-90 to 90°).

To see if this is right for you, you can click "Go to". So the robot will move to this position.

III. Find ground sequence

Then, there is still one step to execute to calibrate the ground level for the acquisition. This “find ground sequence” comes right after the setting’s saving for the measurement, you can activate this step using the yellow button on the bottom of the “Data saving” window of the GUI. Once the robot has returned to its base position (if you moved it previously with the "Go to" buttons), in the "Field position" section the field positions disappear to make way for this interface :

Field(s) position

Ground Distance field 1 : mm

The robot will then move above the first field. You can therefore enter the distance between the base of the arm and the ground of your field. We advise you to leave 0 mm to start and then measure to know the distance with the ground. Little by little you can get closer to the ground by decreasing this value and using the "Go to" to test. The values go from 0 mm (fields at the same height as the base of the robot arm) to -500 mm (50 cm below the base of the arm). Be careful when it is indicated 0 mm it will be the end of the arm which will go to this position and not the sensors !! So be careful with the length of your tubes ! Once the height suits you, you can click on "Save", and the robot will continue with the second and then the third field (if there are more than 1 field).

Once all positions are saved, this interface appears :

Data saving

Amount of fields :

Measured variables :

<input type="checkbox"/> Temperature	<input checked="" type="checkbox"/> Pressure
<input type="checkbox"/> Wind	<input checked="" type="checkbox"/> H2O
<input checked="" type="checkbox"/> CO2	<input type="checkbox"/> P and T (CO2)

Measurement time (min):

Measuring mode :

Frequency (Hz) (< 20) :

Technical settings

Robot IP adress :

Robot communication port :

Serial port wind sensor :

CO2 idVendor :

CO2 idProduct :

● Connected

Field(s) position

Ground Distance field 3 : mm

So you can still change your frequency (or your number of points) and measurement mode if you wish. When you are happy with it, you can click start. And now the interface looks like this :

The screenshot displays a software interface with two main panels. The left panel, titled 'Data saving', contains a file path input field showing 'c:\Users\mobil\Desktop\robot\python\data_2025_06_26_1129.csv' and a 'Choose a saving place' button. Below this are settings for 'Amount of fields' (set to 1), 'Measured variables' (with checkboxes for Temperature, Wind, CO2, Pressure, H2O, and P and T (CO2)), 'Measurement time (min):' (set to 30), 'Measuring mode:' (set to Continuous), and 'Frequency (Hz) (< 20):' (set to 1). A red dot indicates 'Recording in progress', and a progress bar shows 44% completion. At the bottom are 'Stop' and 'Update Value' buttons. The right panel, titled 'Technical settings', includes fields for 'Robot IP adress' (192.168.137.100), 'Robot communication port' (20002), 'Serial port wind sensor' (COM6), 'CO2 idVendor' (1509), and 'CO2 idProduct' (0A02). A 'Connect' button is next to a green 'Connected' indicator. Below this is a 'Field(s) position' section with 'Ground Distance field 3' (0 mm) and 'Go to' and 'Save' buttons.

You now have a small progress bar that allows you to estimate approximately how much measurement time remains. However, if you want to change the measurement duration, you can still do so ! In fact, this is the only parameter you can still modify once the acquisition has started. To do this, simply enter the desired value in the field, then click "Update Value." If you want to stop the measurement early, you have a stop button. The robot will finish its up and down if it has already started one, then it will reset itself.

Be careful, the only thing to do is not to disconnect the robot while the "Connected" indicator is visible ! This causes the program to crash, so the only solution is to close and reopen the window.

Have fun with our little robot !