

Setup Instructions - Volvo Group 2: Smart IIoT Enabled Logistics Rack

Steps to follow to ensure the proper setup for a bin-ramp system with relevant circuit systems being enabled are as follows. Disclaimer: These steps can be repeated due to the scalable modularity of each system.

These steps can be followed in a series of groups that ensure each aspect being operational before the runtime of the devices begins.

Group A: Ensuring Ramp Setup

1. To ensure the ramp is set up correctly, first inspect the ramp, and check that it indeed has an angle of 10 degrees (or 9 degrees. 8,746 degrees to be exact) as specified. This can be done with a protractor measure.
2. Place the provided bin in one of the ramp slides. The ramp slides are demarcated through small rises in the ramp slide.
3. Add any of the items as needed into the bins, by items more specifically, tools or such objects are ideal. Make sure the objects are within 5kg of weight as a whole (that is the bin limit for measurement). Hold the bin at the top of the ramp during this time.
4. Fasten the given enclosed unit of monitoring onto the lip of the ramp by using 2 M4 screws in the demarcated lip holes through the holes on the enclosed unit. Make sure that the plate of the load cell is on the side facing the ramp.

Group B: Powering up

1. Plug in the USB - B cable to the ESP 32 in the enclosed monitoring unit, and the USB - C to the Magtag Display in the enclosed monitoring unit. The other USB serial plugs can either enter a wall plug via a USB to plug adapter, or to a power bank that is charged with USB serial ports.
2. Turn on the utilized power supply. Ensure that the supply is standard 220V-230V commercial, that the power bank or adapter will convert to the required 5V range.

3. Wait for about 30 to 60 seconds till the LED indicator for power turns on from low (power supplied) to bright (functioning code level). The magtag will boot up to display its first image as well.
4. An alternative method employs that of a common wire that is already plugged into the ESP32 and magtag power inputs, and has only one port to apply to a central power unit (wall plug or wireless battery pack). Follow steps 2 and 3 for Group B in this event, and only plug the USB output into a wall plug via a USB to plug adapter, or to a power bank that is charged with USB serial ports.

Group C: Device Connections

1. The button D4 on the magtag can be used to cycle through the images of different barcodes as per the objects in the bin (corresponding item markets).
2. Plug in the Load cell wires (color coded) to the protruding pins from the enclosure, as specified in the datasheet. Additional codes/indicators and other notes to follow related to this are in the datasheet as well.
3. Wait 30 more seconds till the first reading is actually recorded by the system, and the pins/connections are initialized within the code. Ensure the correct placement of the bin with the ramp slide alignment, and drop the bin in the direction of the load cell plate. You may wait another minute, additionally, if necessary.
4. Login to the cloud server at this website, using user credentials:
<https://thingspeak.com/login?skipSSOCheck=true> and then visit Channels. In the channels tab, select my channels and enter the channel titled “Volvo IIoT”. This will have device fields corresponding to the internal device number of the ESP32 (labeled on the top of the enclosure walls that was fastened on the lip, from 1 onwards, as titles in the plots of the cloud service).
5. The data is recorded once every 10 seconds in real time, hence per field, the values on the line graph on the left will update with the timestamps, and the graph on the right will update to show the range of change of the value. The fields 1 and 2 correspond to the weight and the percentage data of 1 of the Bins with an internal device number, in correspondence.

Group D: Final Checks

1. Once it is ensured that the Magtag and the ESP32 are powered up through the LEDs, and that the relevant data is being received in real time on the cloud service you can ensure that the load cell is not unders train by examining the bin position and seeing if the load cell unit is being bent at an unnatural angle. If that is the case, replace the load cell unit and rewire as per the listed procedure in *Group C, steps 2 and 3*.
2. The full system is now functional and operational. Repeat all steps to add another bin.