

High-Speed Counting Using the Q4X, TL70, and DXM100



This document provides step by step instructions on how to use the Q4X Laser Sensor, EZ-LIGHT TL70 Wireless Tower Light, and the DXM100 Wireless Controller to create a high-speed counting device with wireless reporting. This solution is capable of counting up to 660 parts per second (pps).

Equipment

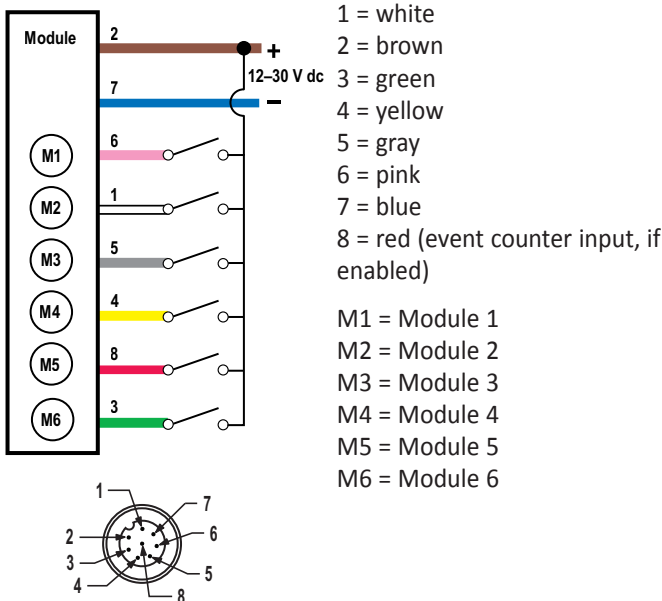
DXM100-B1R1	DXM100 Wireless Controller with a DX80 900 MHz Gateway
Q4XTKLAF300-Q8	Q4X Laser Adjustable Field Sensor with IO-Link
TL70DXN9GYRQ	TL70 Wireless Tower Light, 900 MHz with 8-pin base bound as Node 1

Step 1: Wire the Q4X to the TL70 Tower Light

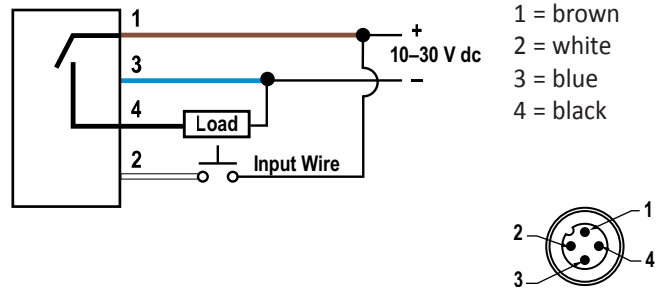
To use the Q4X with the TL70 Wireless Tower Light, wire the Q4X to the TL70's counter input and set up the TL70 for part counting.

1. On the TL70, set DIP switch 3 in the base switched into the ON position.
2. Wire power to pins 1 and 3 on the Q4X and pins 2 and 7 on the TL70.
3. Connect pin 4 on the Q4X to pin 8 on the TL70.

Wiring for the TL70



Wiring for the Q4X



Step 2: Configure the Q4X for Counting

Follow these steps to configure the Q4X for counting.

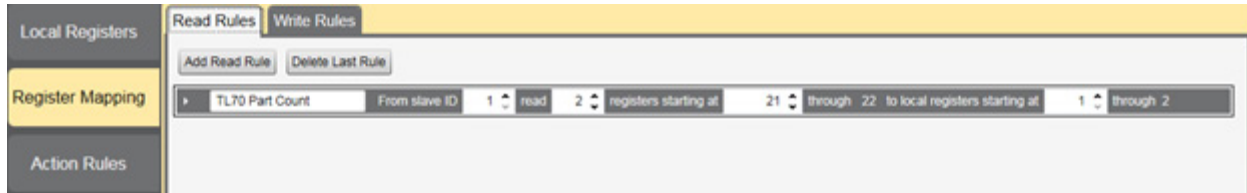
1. On the Q4X: Apply power.
2. Click and hold Mode until out1 displays on the LCD.
3. Tap + until SPd is displayed. Click TEACH.
4. Select the response speed using + / – and click TEACH when the desired speed displays on the LCD.
Options include 1.5 ms (667 pps), 3 ms (333 pps), 10 ms (100 pps), 25 ms (40 pps), or 50 ms (20 pps).
NOTE – The 50 ms speed is slower than the standard TL70 counting; the totalizing function of the Q4X isn't needed if you are counting this slowly.
5. Tap + until dLy1 is displayed. Click TEACH.
6. Tap + until totL is displayed. Click TEACH.
7. Tap + one time to display totL again. Click TEACH.
8. Set the totalizer number (1–99) using + / – for the number of parts the Q4X will count before sending an output to the TL70. Click TEACH.
9. Because the TL70 requires a 25ms ON and 25ms OFF time between inputs, the following examples show the minimum number of items that need to be totalized:
 - 660 pps = 33
 - 400 pps = 20
 - 250 pps = 13
 - 100 pps = 5
10. Tap + one time to display dt1. Click TEACH.
11. Set the delay time using + / – to 25. Click TEACH.
This provides the 25ms ON time for the output signal required by the TL70.
12. Tap + until End is displayed. Click TEACH to exit the menu.
13. Tap TEACH once and the Q4X displays the current count up to the defined total value.
When the total value is reached, the output light flashes to indicate an output was sent to the TL70. The count resets to zero. The TL70 and DXM keep the total count.

Step 3: Define the Local Registers on the DXM

Use the DXM Configuration Tool to configure the DXM Wireless Controller.

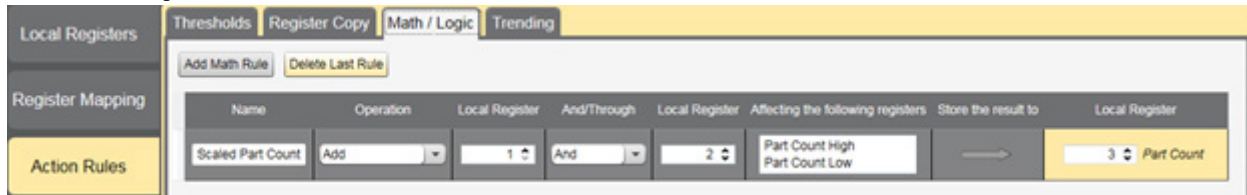
1. Connect the DXM, via the USB cable supplied with the DXM, to a computer containing the DXM Configuration Tool software or download the software and install it on a computer.
2. Launch the software.
3. Go to the **Local Registers** screen.
4. Click the arrow next to the register you want to configure. Any local register can be selected. For this example, select register 1. This tech note requires 2 registers in a row.
5. Type a descriptive name into the box that says “None” (for example, Part Count High Word). This register will be used for the Part Count High Word from the TL70.
6. Change the **Scaling** to multiply and set the **Scale** value to 65535.
7. Select the next register to be used for the Part Count Low Word, in this example register 2. Enter a descriptive name (Part Count Low Word). Do not change the scaling.
8. Select the next register to be used for the **Scaled Part Count**, in this example register 3. Enter a descriptive name (Part Count).
9. Change the **Scaling** to multiply and set the **Scale** value to the totalizer number used on the Q4X (for example, 20 for 400 pps).

Step 4: Set up the Read Rule



1. On the DXM Configuration Tool: Go to the **Register Mapping > Read Rules** screen.
2. Click **Add Read Rule**.
3. Enter a name in field that says **New Read Rule** (for example, TL70 Part Count).
The data will be read **From slave ID 1**. Slave ID 1 is the ISM radio (the Gateway) in the DXM. The TL70 Node sends the part count data to the Gateway in the DXM.
4. Set to **Read 2 registers**, as we need both the high and low part count registers from the TL70.
5. Set **Starting at 21 through 22**. Refer to the TL70 datasheet to see that the part counts are held in registers 5 and 6 of the Node. The Modbus holding register for part counts in Node 1, I/O 1 is $5 + (\text{Node\#} \times 16) = 5 + (1 \times 16) = 21$ and 22.
6. **To local registers starting at 1 through 2**. We defined local registers 1 and 2 as Part Count High Word and Part Count Low Word.

Step 5: Set up the Action Rule



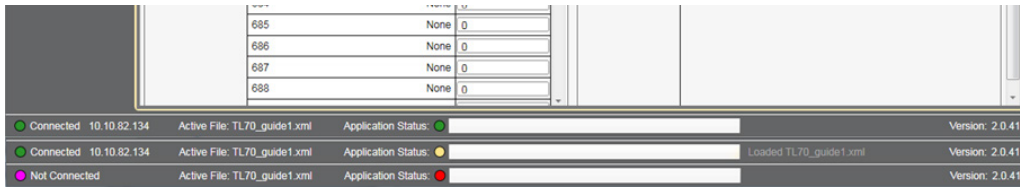
1. Go to the **Action Rules > Math/Logic** screen.
2. Click **Add Math Rule**.
3. In the **Name** field, enter a descriptive name (for example, Scaled Part Count).
4. In the **Operation** drop-down list, select **Add**.
5. Set up the next three fields to be **Local Register 1 And Local Register 2**.
6. In the **Store the Results to** field, select **Local Register 3**.

Step 6: Save and Load the XML File

When changes are made to the XML file, save the changes. To apply the changes, load the XML file to the DXM.

1. **Save** the file by going to the **File > Save** menu.
2. **Load** the file onto the DXM by going to the **Device > Send Configuration to Device** menu. The DXM configuration program reboots the controller after the program finishes uploading the configuration file.

Verify the file is loading by looking at the Application Status indicator in the status bar. If the Application Status indicator is red, close and restart the DXM Configuration Tool, unplug and re-plug in the USB cable and reconnect the DXM to the software. If the Application Status indicator is green, the file upload is complete. If the Application Status indicator is yellow, the file transfer is in progress.



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