

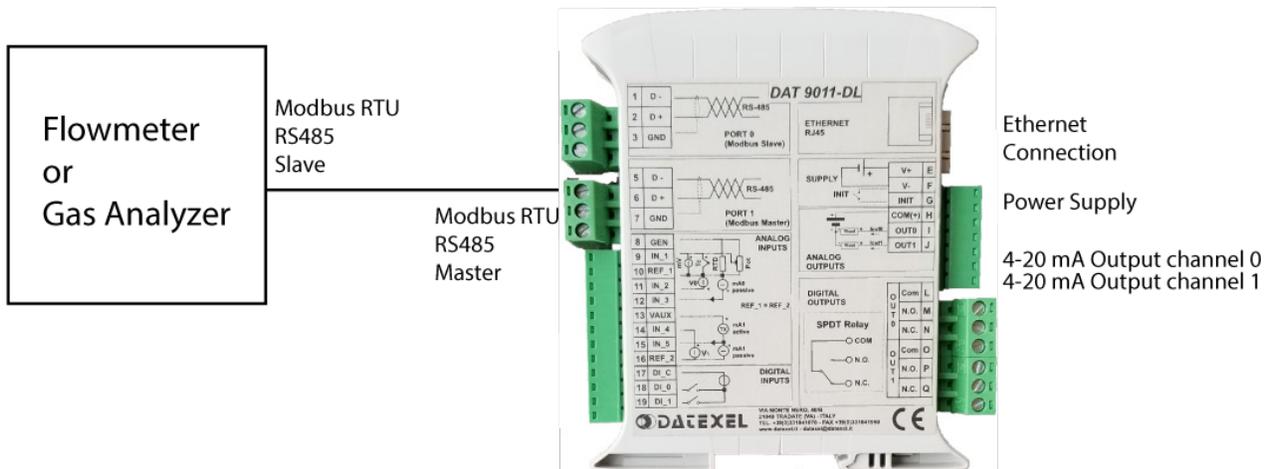
DATATEXEL LLC

Converting Modbus RTU to 4-20mA with a DAT9011.

This application is converting an output from a Flow meter or Gas Analyzer with a Modbus RTU RS485 output into a 4-20mA using a Modbus RTU Master Controller DAT9011.

Start-up.

1. It is important that you identify the Address, Baud rate, Parity, and Stop bit of the device which you are receiving the Modbus RTU (Flow-Meter or Gas Analyzer) signal from and identify the actual register which you want to read.
2. There are two methods to communicate with the DAT9011. It is recommended you use the Ethernet method. Both the Ethernet and RS485 communication method have application notes on our download page.
3. This application note starts where you have set the DAT9011 as the controller as per the Application Note “configure a Modbus Master RTU”.



Wiring connections for Modbus Flow Meter and Modbus Master Controller.

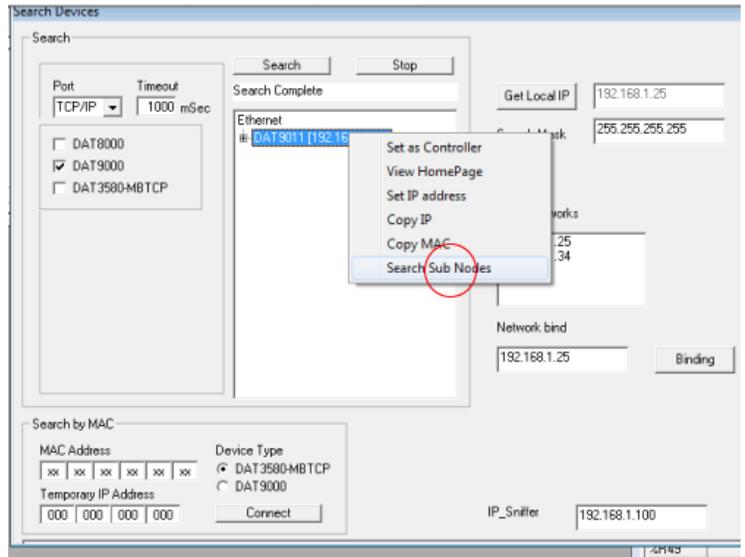
1. Connect power to Flow meter and the Modbus RTU Master Controller.
2. Connect the Flow meter Modbus Slave port to the DAT9011 Modbus Master Port.
3. Connect CAT 5 crossover cable to the Ethernet port and PC.
4. Connect 24 Vdc power supply and a multimeter to 4-20 mA output channel 0.
5. Download Dev9K software from Datexel download page and run software.

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Call 561 779 5660 for technical support.

Setting up Modbus Master

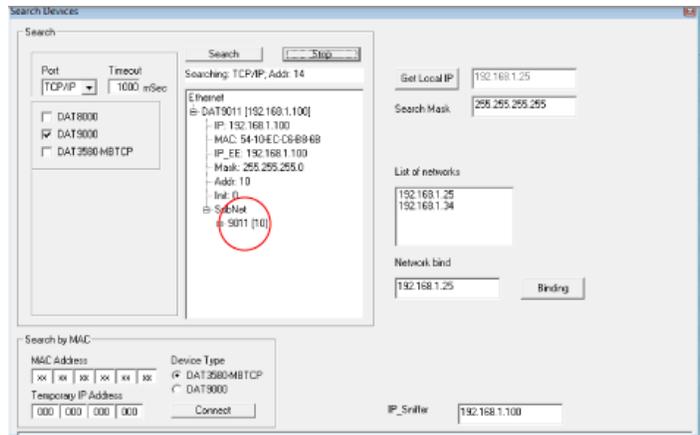
1. Starting from the prior application note, right click the IP address and select “set as Controller”.
2. On the drop down menu, right click “Search Sub Nodes”.
3. The software will now search the addresses until it finds a Datexel product.



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Reading the Modbus Address

1. The default Address for a DAT9011 or any other DAT9(XXX) is 10.
2. The Dev9K will now search from Address 1 up to Address 254. It can only see Datexel devices. The Datexel device must also be on the same Communication parameters.
3. The Modbus software should now see 9011 (10).
4. The search can be stopped at anytime by clicking the stop label.



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Modbus Master Register Table.

1. Now Click the R button in the yellow box to read the registers in the register table.
2. Each time you click the yellow register table box the register table updates.
3. If the register changes it is in red.

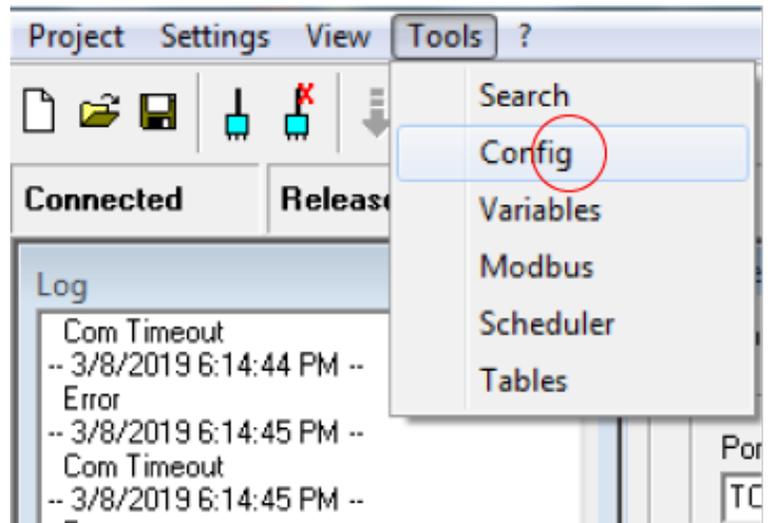


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Setting up Modbus Master Communication port to the same as the flow-meter.

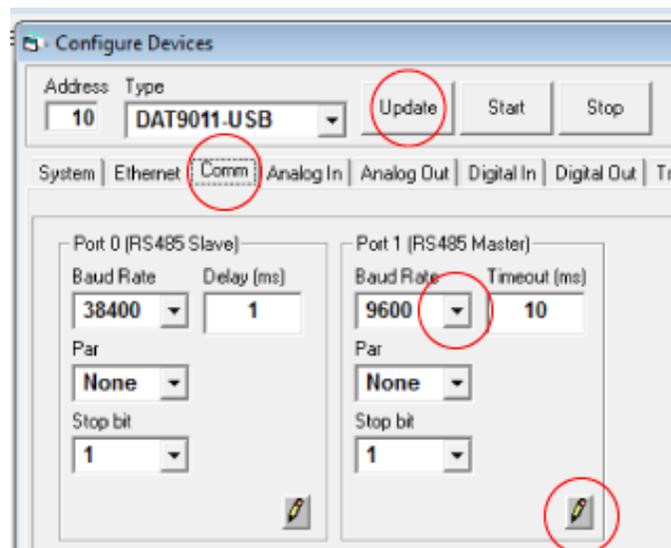
The devices will not communicate to each other unless they have the same Baud rate, Parity, and Stop bit.

1. Click on Tools.
2. From the drop down menu click Config.



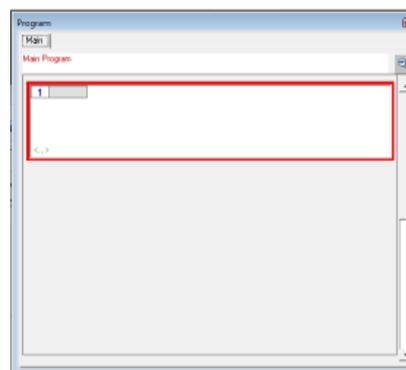
Setting up Modbus Master Baud Rate.

1. Click on Comm.
2. Select the Baud rate and other settings of the field instrument.
3. Click the pencil in the bottom right to upload the changes to the Modbus Master Port 1.
4. Finally click update.
5. It is a good idea to close the box and open again to check that the comm port changes have been uploaded to the DAT9011. From the drop down menu click Config.



Now you are ready to write a Program to the DAT9011.

1. Click the Project label at the top.
2. Click New in the Drop down menu.
3. The Program outline should open.

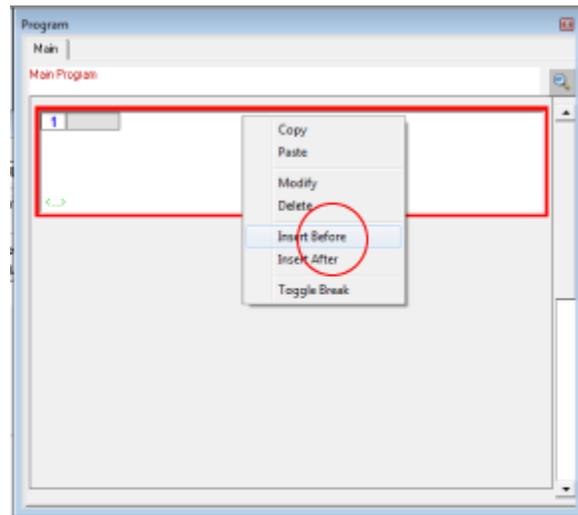


Insert Function Blocks.

The program is made up with a group of function blocks. More information on these function blocks are available in the DAT9xxx user guide.

Importantly the first function block must be labeled start and the last function block must be a goto function block with the command return to start.

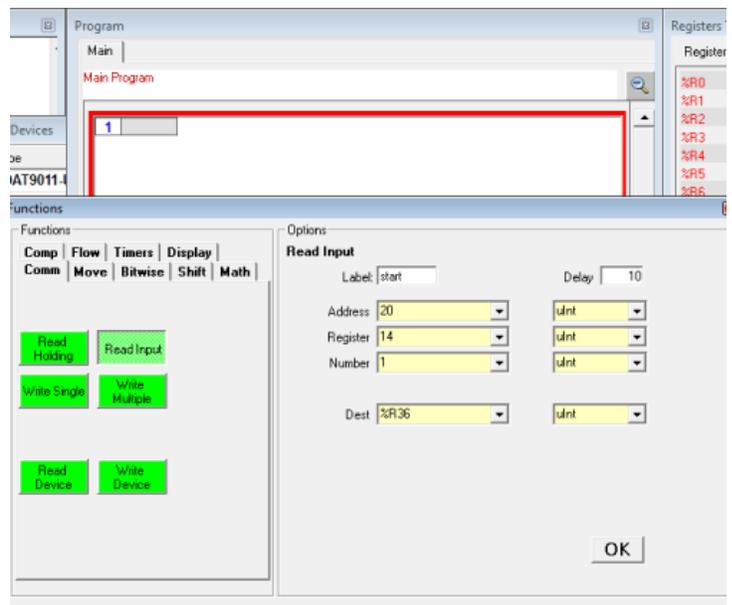
You can insert a function block anywhere in the program with the Insert before or after label.



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Read input Function Block from flow meter.

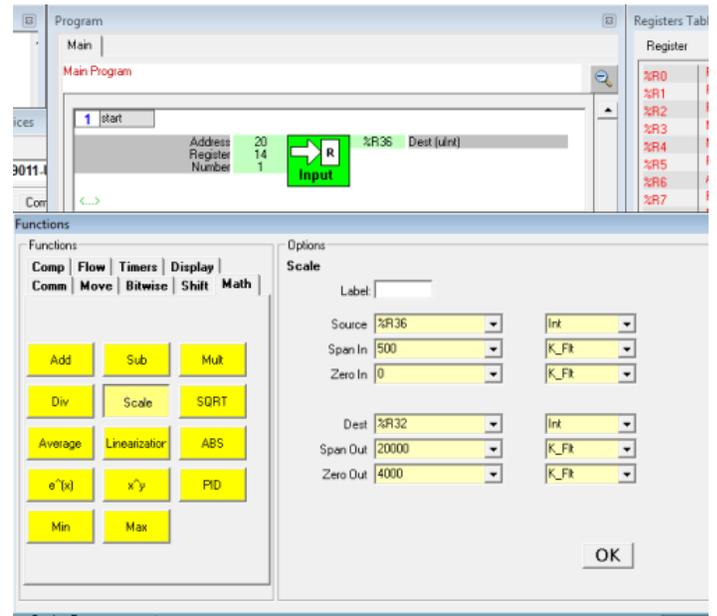
1. Right click on Function Block 1.
2. On the drop down menu click Modify.
3. Click Comm and select Read Input.
4. Write start in the Label. (Important).
5. We are now setting up the parameters of the flow-meter, so the DAT9011 can access them.
6. Write the address of the flow-meter in the address box. Our example is 20.
7. Write in the Register box the register where the flow rate is stored in the flow-meter. Our example is 14.
8. Write how many registers you need to obtain.
9. Write 36 in Dest. This is where the flow reading is transferred and stored on the DAT9011. You can only read this value after the program is run.



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Set up the 4-20mA output.

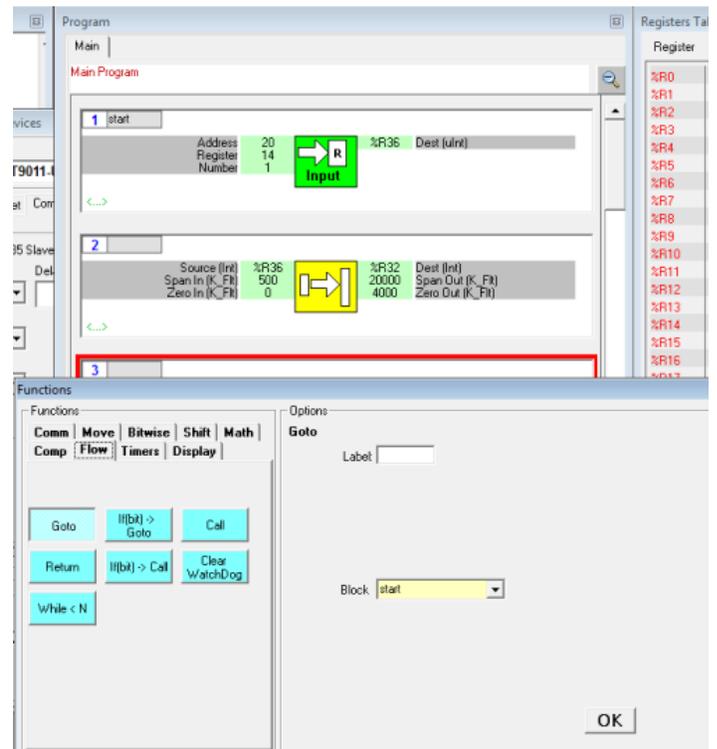
1. Right click on function block 2.
2. On the drop down menu click Modify.
3. Click Math and select Scale.
4. There is no need to write anything in the Label.
5. The source is where the flow meter reading is stored in the DAT9011. We have chosen register 36.
6. Write in span and zero box the span and zero of the flow range.
7. Write into Dest 32 which is the register for the 4-20mA output on the DAT9011.
8. Span Out, and Zero Out is the 4-20mA range. 4000 equals 4 mA and 20000 equals 20 mA.
9. Leave the Registers as Int and the numbers as K_Flt.
10. Click OK.



Modbus Master Goto Function block.

To make the program continuously run we have to insert a Goto function block.

1. Click the Flow label and Click the Goto function block.
2. Type start in the Block. It is important that it is in the same case as the label in the first function block.
3. Click OK.

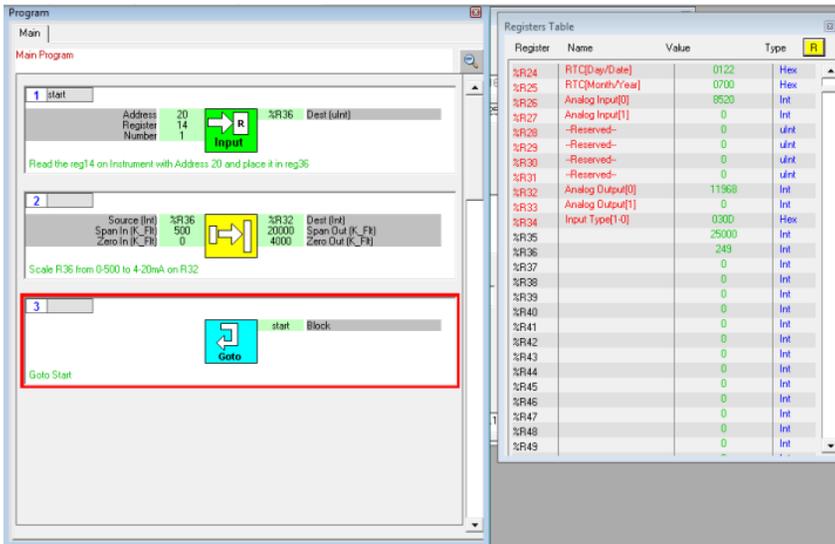


Saving the Project.

1. Save the project.

Running the Project.

1. Reconnect to the DAT9011 and make the DAT9011 the controller.
2. Click the Debug button.
3. Click the Download button, in the download drop down menu click OK.
4. The software will now download from the PC to the DAT9011. The yellow led will flash slowly.
5. It is very important now to click the Release mode and both the TX2 and RX2 LED's will flash quickly.
6. Now the program is stored in the DAT9011.



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Explanation of the Project.

- Function block 1 is labeled start to make sure when the project is in the loop, the last function block returns to the function block 1.
- Function block 1 reads register 14 in the Flow-meter. The address of the flow-meter is 20.
- Function block 1 then moves this reading to register 36 inside the DAT9011 Modbus Master.
- Function block 2 reads register 36 inside the DAT9011 Modbus Master and scales the output.
- If register 36 reads 0 then 4000 is sent to register 32. If register 36 reads 500 then 20000 is sent to register 32. Register 32 drives the channel 0 output of 4-20mA.
- Function block 3 is a simple Goto start (function block 1).