Verifying the **Connection** Between a Modbus Sensor and **MultiHop** Radio or DXM

Technical Note

Initial Steps and Equipment Needed

Follow these steps to monitor a Modbus Banner Engineering sensor connection and/or operation status when the sensor is connected to a MultiHop radio or a DXM Controller with an embedded MultiHop module.

Required equipment includes:

- Wireless DXM Controller master with a MultiHop radio module
- Wireless DXM Controller slaves and/or MultiHop slave radios
- Modbus sensor such as the Temperature/Humidity Modbus Sensor model M12FTH3Q, or an SDI-12 sensor
- Windows-based PC running the DXM Configuration Tool v3 (downloaded from the Banner website)

To confirm the connection between the sensor and radio, define Read Rules and Action Rules. Use two local registers to monitor each Modbus RTU sensor. Use an optional third register to monitor how long the sensor was not connected to the radio.

Note: This procedure works with the current firmware and DXM Configuration Tool as well as with version 1.0 firmware and the DXM Configuration Tool V2.

1. Connect to the DXM Controller master radio using serial or TCP/IP.
2. Define the Local Registers.
3. Define the Read Rule.
4. Define the Threshold/Action Rule.
5. Repeat these steps for each Modbus sensor and MultiHop slave radio you'd like to track.

Define the Local Registers

Define the local registers used to verify the connection between a Modbus sensor and a MultiHop radio.

Before beginning, you should have downloaded the DXM Configuration Tool to your computer and have launched it.

1. Go to the Local Registers > Local Register **Configuration** screen.
2. Define a register to hold a data point.

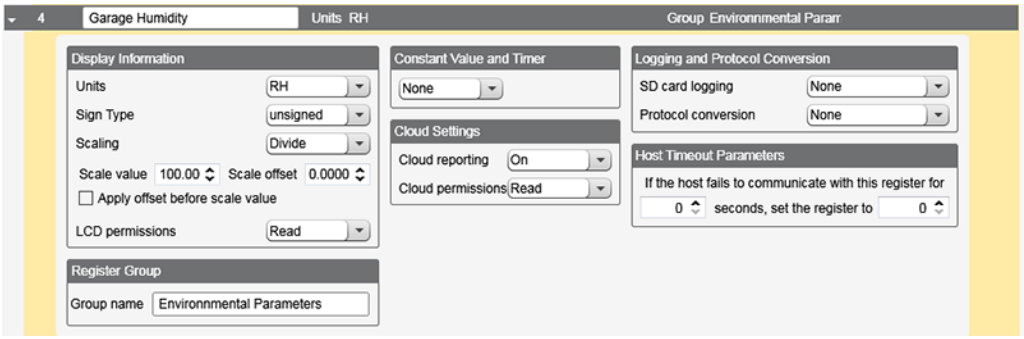

Figure 1. Example data point for a relative humidity (RH) Modbus sensor.

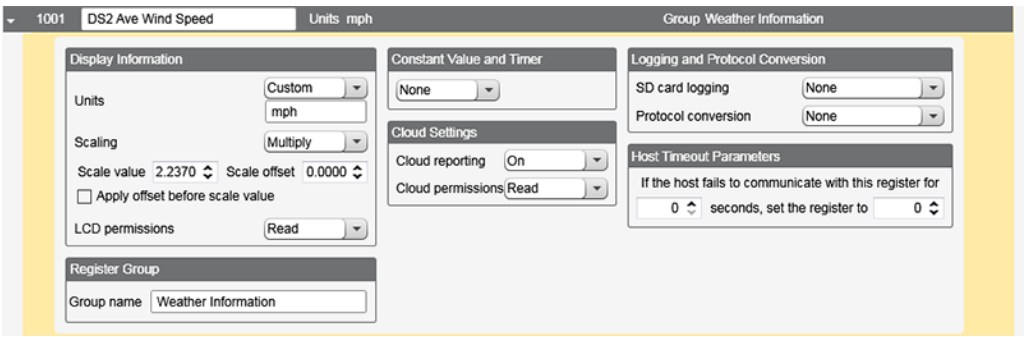

Figure 2. Example data point for a wind speed SDI-12 sensor.

3. Define a register to be used as an alarm notification register when the MultiHop radio cannot communicate with the sensor.

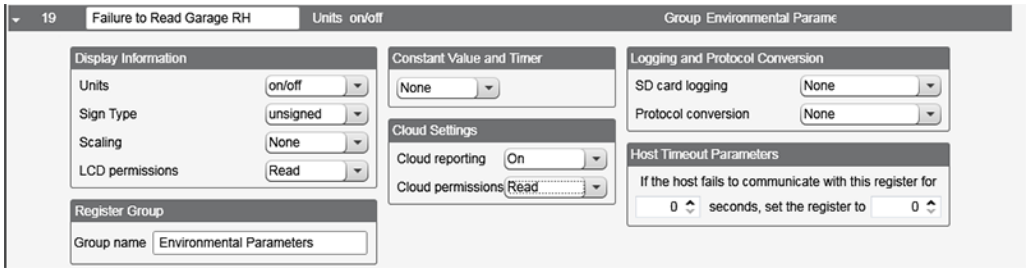

Figure 3. Example alarm notification register for a relative humidity sensor.

Figure 4. Example alarm notification register for a wind speed sensor.

4. Define a register to be used to track how long the Modbus sensor was not communicating with the master radio.

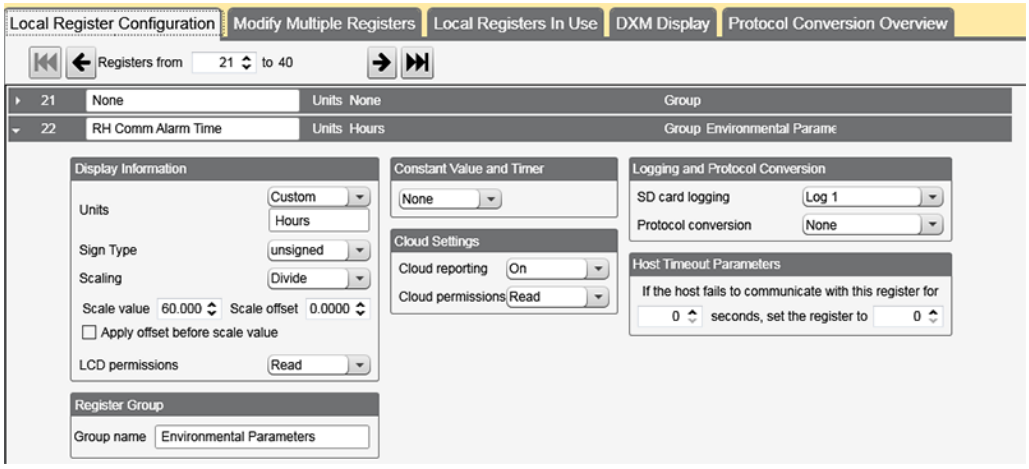

Figure 5. Example communication register for a temperature/relative humidity sensor.

Create a Read Rule

Create a Read Rule to define how often to read the sensor register and what to do if the communication attempt fails.

1. Go to the Register Mapping > Read Rules screen.
2. Click Add New Rule to create a Read Rule.
3. Name the Read Rule and define from which slave ID this register is being read, how many registers are being read, and the starting register.
4. Define how often to read this register (Frequency).

5. Define what value should be written to the register (Apply value) after the number of failed read attempts (read failures).

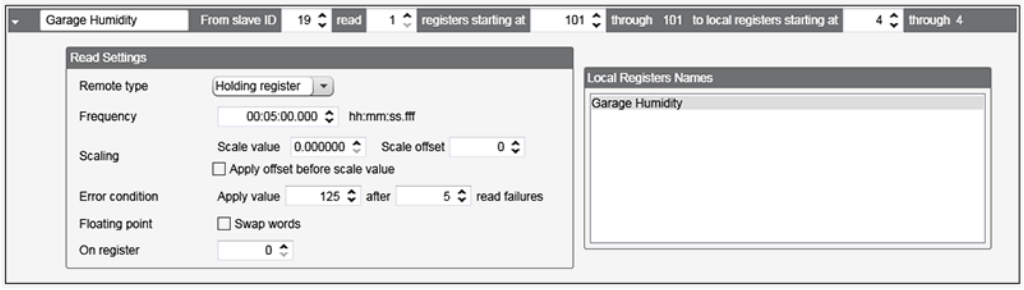

Figure 6. Example read rule for monitoring the relative humidity sensor connection..

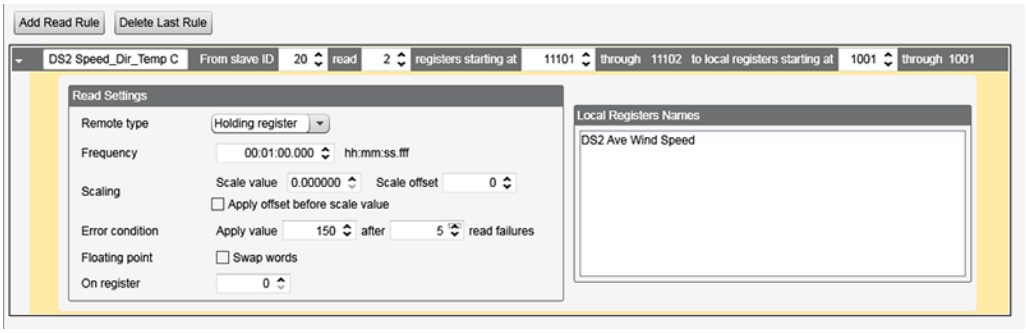

Figure 7. Example read rule for monitoring the wind speed sensor connection.

For the **relative** humidity example, local register 4 (Garage Humidity) will be populated with the value from Modbus ID 19, register 101. The DXM master radio attempts to communicate with the Modbus sensor (Slave ID 19) every 5 minutes. After five consecutive unsuccessful attempts, the value of 125 is placed in the local register 19 (Failure to Read Garage RH).

For the wind speed example, local register 1001 (DS2 Wind Speed) will be populated with the value from Modbus ID 20, register 11101 and 11102. The DXM master radio attempts to communicate with the Modbus sensor (Slave ID 20) every 1 minute. After five consecutive unsuccessful attempts, the value ot 150 is placed in the local register 19 (Failure to Read DS2 Wind Sensor).

Note: You must place the SDI-12 sensor results in the 32-Bit Floating Point Register set in the DXM Controller. When using an SDI-12 sensor and an SDI-12 enabled MultiHop radio, when the DXM master or remote radios cannot communicate with the sensor, a value of 65535 is entered into the Results Register for that sensor in the Local Registers.

Select am alarm value that makes sense for the potential values of the application, but won't adversely affect graphing or charting the data point for analysis. For the RH example, the normal value for this local register is between 0 and 100. Therefore, 125 is not too excessive but is different enough to be a trigger value. For the wind speed example, 150 is a good choice.

Create a Threshold Rule

Create an action rule to define the behavior of the system when the communication fails.

1. Go to the **Action** Rules > Thresholds screen.
2. Click Add Threshold Rule.

3. Define a Threshold Rule so that when the local register Failure to Read value equals the error value (125 for relative humidity, 150 for wind speed), a value of 1 is entered into the Communication Alarm register.

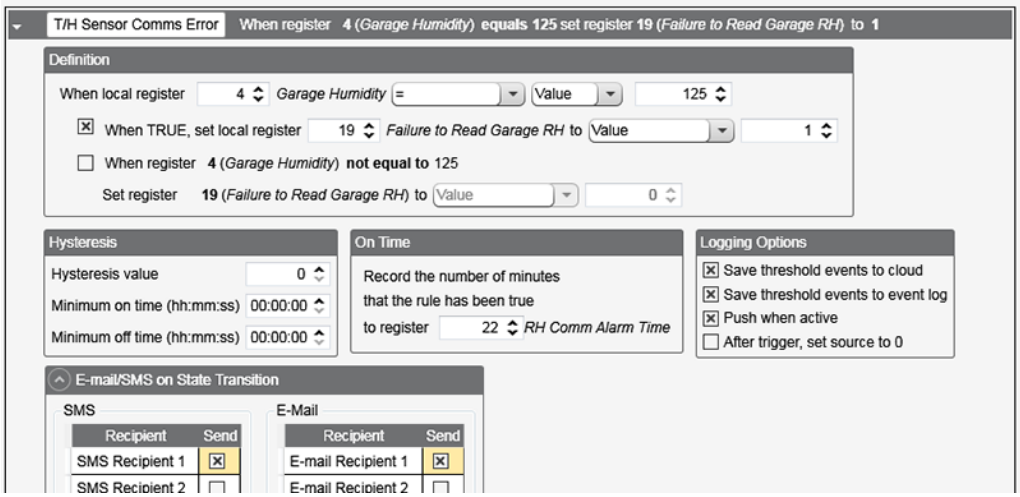

Figure 8. Example threshold/action rule for a humidity sensor communication failure.

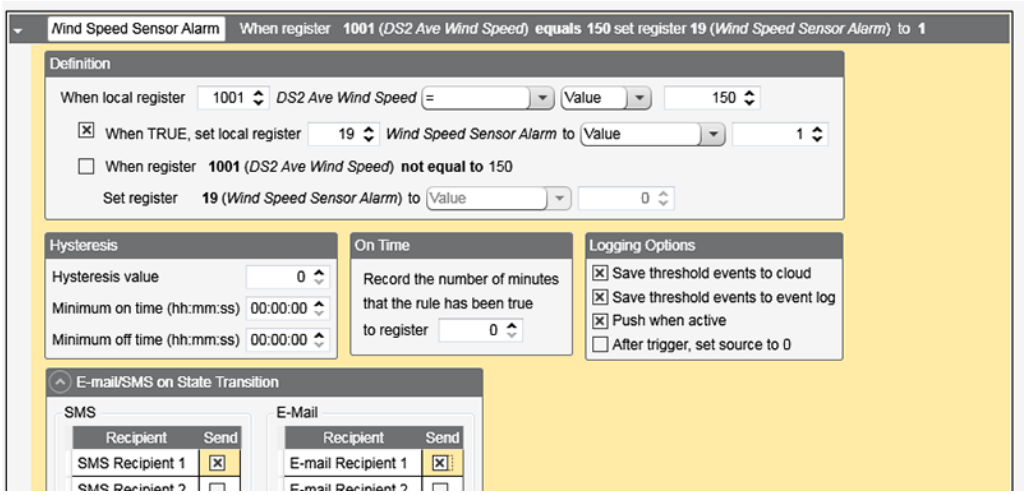

Figure 9. Example threshold/action rule for a wind speed sensor communication failure.

For the relative humidity example, when this register's value equals 1, local register 22 tracks how long this Modbus sensor was not able to be reached. The alarm is sent to the web server service, and the event is logged in the Events Log on the DXM. A message is sent to one SMS recipient and one email recipient, although you can configure it to send more messages if necessary.