

Using **Action** Rules to Control External Sensors

The DXM Controller can control external sensors using the timer/counter feature and Action Rules. In this example, the DXM controls a sensor using a cyclical loop with a timer. To configure this application, you must

1. Define the Local Registers
2. Define the Read/Write Rules
3. Define the Action Rules

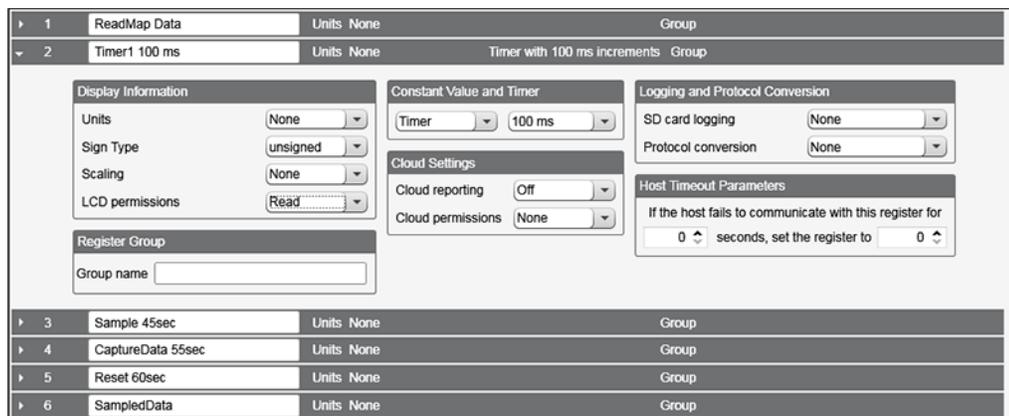
One of the local registers is defined as a timer, which starts counting at zero. When 45 seconds has passed, the output is turned on to supply power to the sensor. At 55 seconds, the data is captured from the I/O board and saved. At 65 seconds, the output is turned off and the counter reset.

Define the Local Registers

Use the DXM Configuration Tool to define the local registers needed to control the external sensor.

This task assumes you have downloaded and installed the latest version of the DXM Configuration Tool onto a Windows-based PC.

1. Go to the Local Registers > Local Register **Configuration** screen.
2. Name local register 1 to contain the read data from the DXM I/O board.
3. Define local register 2 to be a 100 ms timer/counter.



4. Name local register 3 to hold the result of Action Rule 1 (when the timer/counter reaches 45 seconds, this register value is 1).
5. Name local registers 4 and 5 to hold the results of Action Rules 2 and 3.
6. Name local register 6 as the saved sensor data.
7. Set the LCD permission to Read on all registers so that the register values display on the LCD.

After this configuration file is saved and uploaded to the DXM Controller, the register values display on the LCD under the Register menu.

Create the Read and Write Rules

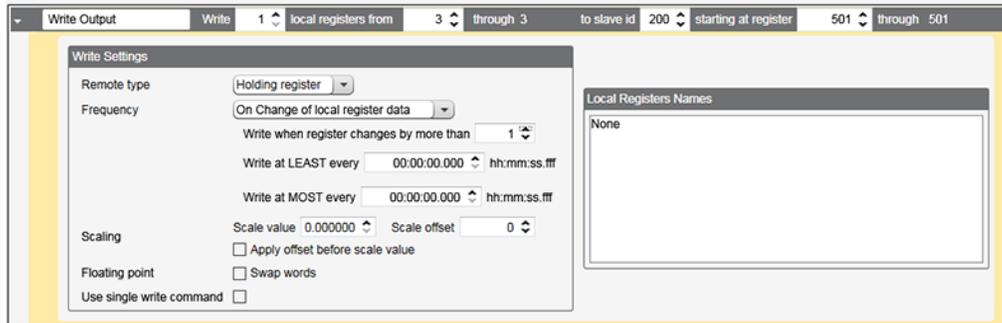
Use Read/Write maps to write local register values to other Modbus devices or read Modbus registers from other Modbus devices.

For our example, the DXM I/O board is another Modbus device (slave ID 200) to read to or write from.

1. Go to the Register Mapping > Read Rules screen. Click Add Read Rule. A new read rule is created.
2. Click the arrow next to the new read rule to display the parameters.
3. Name your read rule.
4. Enter the From slave ID and the number of registers to read from. For this example, we want to read from slave ID 200, the DXM I/O board.
5. Enter the frequency you'd like to read from this register. For our example, we'd like to read the selected register every 1 second.

6. Go to the Write Rules screen and click Add Write Rule.
A new write rule is created.
7. Click the arrow next to the new write rule to display the parameters.
8. Name your write rule.
9. Enter the parameters to write from the local register to the target register.

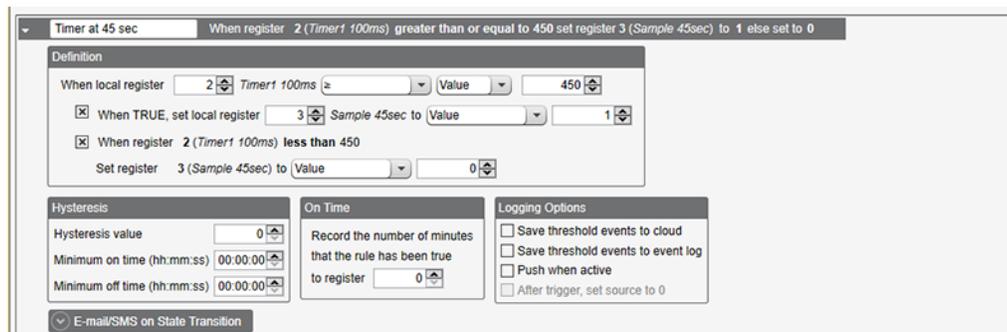
For our example, we have to write from local register 3 to a holding register on slave ID 200, register 501. This writes a local register to an output on the DXM I/O board (slave ID 200) to control the power to the external sensor. We want to write at a Frequency of On Change of local register data so that the output register 501 only changes when the local register value changes from 0 to 1.



Create the **Action Rules**

Five Action Rules define the logic statements required to complete the application. The first three action rules define when the timer is greater than 45 seconds, greater than 55 seconds, and greater than 60 seconds. The final two rules capture the read data and reset the timer back to zero to restart the process.

1. Go to the **Action Rules** > Thresholds screen and click Add Threshold Rule.
2. Name the first action rule (checks the timer to see if it has reached 45 seconds or greater) and enter the necessary parameters.



For this example, we want to check when local register 2 (the timer/counter) is greater than or equal to 45 seconds. When it does, set local register 3 to 1, otherwise, set local register 3 to zero.

3. Create the second and third action rules, which also check the timer count (local register 2) and change the values of local register 4 (CaptureData 55sec) and local register 5 (Read 60sec), respectively.

4. Create the fourth action rule to sample the sensor data.

Timer at 45 sec	When register 2 (Timer1 100ms) equals 450 set register 3 (Sample 45sec) to 1 else set to 0
Timer at 55 sec	When register 2 (Timer1 100ms) equals 550 set register 4 (CaptureData 55sec) to 1 else set to 0
Timer at 60 sec	When register 2 (Timer1 100ms) equals 600 set register 5 (Read 60sec) to 1 else set to 0
SaveReadData	When register 4 (CaptureData 55sec) equals 1 set register 6 (Sampled Data) to register 1 (ReadMap Data) else set to register 6 (Sampled Data)

Definition

When local register 4 CaptureData 55sec = Value 1

When TRUE, set local register 6 Sampled Data to Register ReadMap Data

When register 4 (CaptureData 55sec) not equal to 1

Set register 6 (Sampled Data) to Register Sampled Data

Hysteresis

Hysteresis value 0

Minimum on time (hh:mm:ss) 00:00:00

Minimum off time (hh:mm:ss) 00:00:00

On Time

Record the number of minutes that the rule has been true to register 0

Logging Options

Save threshold events to cloud

Save threshold events to event log

Push when active

After trigger, set source to 0

E-mail/SMS on State Transition

This action rule detects when local register 4 (timer at 55 seconds) is 1. The value of local register 6 is set to the value of local register 1 (ReadMap Data). When the value of local register 4 is not 1, local register 6 remains unchanged.

5. Create action rule 5 to reset the counter value and begin the count again.

Timer at 45 sec	When register 2 (Timer1 100ms) equals 450 set register 3 (Sample 45sec) to 1 else set to 0
Timer at 55 sec	When register 2 (Timer1 100ms) equals 550 set register 4 (CaptureData 55sec) to 1 else set to 0
Timer at 60 sec	When register 2 (Timer1 100ms) equals 600 set register 5 (Read 60sec) to 1 else set to 0
SaveReadData	When register 4 (CaptureData 55sec) equals 1 set register 6 (Sampled Data) to register 1 (ReadMap Data) else set to register 6 (Sampled Data)
ResetCounter	When register 5 (Read 60sec) equals 1 set register 2 (Timer1 100ms) to 0 else set to register 2 (Timer1 100ms)

Definition

When local register 5 Read 60sec = Value 1

When TRUE, set local register 2 Timer1 100ms to Value 0

When register 5 (Read 60sec) not equal to 1

Set register 2 (Timer1 100ms) to Register Timer1 100ms

Hysteresis

Hysteresis value 0

Minimum on time (hh:mm:ss) 00:00:00

Minimum off time (hh:mm:ss) 00:00:00

On Time

Record the number of minutes that the rule has been true to register 0

Logging Options

Save threshold events to cloud

Save threshold events to event log

Push when active

After trigger, set source to 0

E-mail/SMS on State Transition

When the timer/counter register has reached 60 seconds (local register 5 is 1), set the value of the timer register back to 0. Otherwise, do not change the value.

Save and Upload the **Configuration File**

After making any changes to the DXM Controller configuration, you must save the configuration files to your computer, then upload it to the DXM Controller.

1. Save the XML configuration file to your hard drive by going to the File > Save As menu.
2. Upload the configuration file to your DXM Controller.
 - a) Verify your DXM Controller is connected to the Windows-based PC running the DXM Configuration Tool.
 - b) Go to the Device > Send XML **Configuration** to DXM menu.

The DXM Controller reboots and begins running the new configuration.