Vaisala WXT510 Weather transmitter – SDI-12

Introduction
The Vaisala WXT510 is a weather transmitter for general purpose applications and is easily read by the DT80 range of loggers.

The DT80 range loggers are designed to intelligently talk to the SDI-12 devices connected. This allows the user to simply select which measurement they want and the DT80 will perform the measurement, wait and read data request transparently and present the requested data. The DT80 range of loggers also enquire of the device as to what version of the SDI-12 standard the device has and configures itself to communicate in the best possible manner.

This makes the reading of SDI-12 devices simpler for the user who only needs to select the data item they require.

Requirements

WXT510 Configuration:
Connect service cable to WXT510 and connect to an RS232 port on your computer. Run WXT510 configuration software. Configure com port. File > connection set up and select com port. Settings > device > Check SDI-12
User port settings. Select SDI-12 click OK

Close software.
Disconnect Service cable.

SDI-12

The DT80 and DT85 can communicate with four separate SDI-12 networks each connected to digital inputs 5, 6, 7 and 8. The DT81 has one SDI-12 Network on digital input 4. Each SDI-12 network can have up to 10 SDI-12 devices each with a unique address in the range 0 to 9.

Wiring Configurations:

The wiring configuration to the DT80 Series SDI-12 channels is as per table 1.

<table>
<thead>
<tr>
<th>Wire Color</th>
<th>M12 Pin#</th>
<th>SDI-12</th>
<th>DT80 Series</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blue</td>
<td>7</td>
<td>Data in/out (Tx)</td>
<td>Digital 5, 6, 7 or 8 (1)</td>
</tr>
<tr>
<td>White</td>
<td>1</td>
<td>Data in/out (Rx)</td>
<td>Digital 5, 6, 7 or 8 (1)</td>
</tr>
<tr>
<td>Green</td>
<td>3</td>
<td>GND for data</td>
<td>D GND</td>
</tr>
<tr>
<td>Pink</td>
<td>6</td>
<td>GND for Vh+</td>
<td>External Power + (2)</td>
</tr>
<tr>
<td>Yellow</td>
<td>4</td>
<td>Vh+ (heating)</td>
<td>External Power – (2)</td>
</tr>
<tr>
<td>Red/Clear</td>
<td>8</td>
<td>GND for Vin+</td>
<td>D GND (3)</td>
</tr>
<tr>
<td>Brown</td>
<td>2</td>
<td>Vin+ (operating)</td>
<td>PWR OUT (3)</td>
</tr>
</tbody>
</table>

Table 1. Wiring configuration.
Notes:
1. Tx and Rx lines must be connected to the same digital input.
2. Must have a separate power supply if heating function is used.
3. There are three separate power options
   - External power to Brown to Power +, Red/Clear to Power -.
   - DT80 and DT85, 12V to Brown, D GND to Red/Clear.
   - DT85, PWR OUT to Brown, D GND to Red/Clear.

SDI-12 WXT510 Data

With SDI-12 each message, or register set, can have a number of items of data. For example
the WXT510 message 2 (Register set 2) has three items of data Air Temperature, Relative
Humidity and Air Pressure.

A summary of the WXT510 messages and data item is shown in table 2

<table>
<thead>
<tr>
<th>Register</th>
<th>Item 1</th>
<th>Item 2</th>
<th>Item 3</th>
<th>Item 4</th>
<th>Item 5</th>
<th>Item 6</th>
<th>Item 7</th>
<th>Item 8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Set 0</td>
<td>Composite message</td>
<td>Wind Direction Ave</td>
<td>Wind Direction Max</td>
<td>Wind Speed Min</td>
<td>Wind Speed Ave</td>
<td>Wind Speed Max</td>
<td>Wind Speed Max</td>
<td>Wind Speed Max</td>
</tr>
<tr>
<td>Set 1</td>
<td>Wind direction Min</td>
<td>Relative Humidity</td>
<td>Air Pressure</td>
<td>Wind Direction Ave</td>
<td>Wind Direction Max</td>
<td>Wind Speed Min</td>
<td>Wind Speed Ave</td>
<td>Wind Speed Max</td>
</tr>
<tr>
<td>Set 2</td>
<td>Air Temperature</td>
<td>Rain Accumulation</td>
<td>Rain Duration</td>
<td>Rain Intensity</td>
<td>Hail Accumulation</td>
<td>Hail Duration</td>
<td>Hail Intensity</td>
<td>Rain Peak Intensity</td>
</tr>
<tr>
<td>Set 3</td>
<td>Rain Accumulation</td>
<td>Rain Duration</td>
<td>Rain Intensity</td>
<td>Hail Accumulation</td>
<td>Hail Duration</td>
<td>Hail Intensity</td>
<td>Rain Peak Intensity</td>
<td>Hail Peak Intensity</td>
</tr>
<tr>
<td>Set 4</td>
<td>Not Used</td>
<td>Heating Temperature</td>
<td>Heating Voltage</td>
<td>Supply Voltage</td>
<td>Refereme Voltage</td>
<td>Refereme Voltage</td>
<td>Refereme Voltage</td>
<td>Refereme Voltage</td>
</tr>
<tr>
<td>Set 5</td>
<td>Not Used</td>
<td>Heating Temperature</td>
<td>Heating Voltage</td>
<td>Supply Voltage</td>
<td>Reference Voltage</td>
<td>Reference Voltage</td>
<td>Reference Voltage</td>
<td>Reference Voltage</td>
</tr>
</tbody>
</table>

Table 2. Summary of messages and data items.

Notes:
1. Register Set 0 - Composite message items will change depending on which items
   are selected. Refer to WXT510 manual for further details.
2. Register Set 4 is not used.

Resetting Counters

The WXT510 requires special commands to reset the rain accumulation and rain intensity
counters.
1. nXZRU! Resets the rain accumulation counter.
2. nXZRI! Reset rain intensity counter.

Notes:
1. Resets both rain and hail counters.
2. n is the SDI-12 device number.

These commands can be sent using the dataTaker command SDI12SEND m “Command”
Where m is the digital channel of the SDI-12 network and Command is any valid SDI-12
command. The SDI-12 command must be enclosed in the double quotes. Refer to program below for example of usage.

Example Program:

This sample program

• Read all the standard messages from the WXT510 every one minute.
• Clear the counters every hour.
• Powers weather transmitter from the 12 VDC supply of the dataTaker data logger.

BEGIN"WXT510"
1SSPWR=1 'Turn on power to WXT510
RAIL LOGONA GA 'Poll WXT510 every one minute
 'Read all items from message 1
5SDI12(AD0,R101,"WindDirMin-Deg") 'Read Wind direction minimum
5SDI12(AD0,R102,"WindDirAve-Deg") 'Read Wind direction Average
5SDI12(AD0,R103,"WindDirMax-Deg") 'Read Wind direction Maximum
5SDI12(AD0,R104,"WindSpeedMin-m/s") 'Read Wind speed minimum
5SDI12(AD0,R105,"WindSpeedMid-m/s") 'Read Wind speed minimum
5SDI12(AD0,R106,"WindSpeedMax-m/s") 'Read Wind speed minimum

 'Read all items from message 2
5SDI12(AD0,R201,"Air Temp-DegC") 'Read Air temperature
5SDI12(AD0,R202,"Humidity-%RH") 'Read Humidity
5SDI12(AD0,R203,"AirPressure-kPa") 'Read Air pressure

 'Read all items from message 3
5SDI12(AD0,R301,"RainAcc-mm") 'Read Rain accumulation
5SDI12(AD0,R302,"RainDuration-sec") 'Read Rain duration
5SDI12(AD0,R303,"RainIntensity-mm/hr") 'Read rain intensity
5SDI12(AD0,R304,"HailAcc-Hits/cm^2") 'Read Hail accumulation
5SDI12(AD0,R305,"HailDuration-sec") 'Read Hail duration
5SDI12(AD0,R306,"HailIntensity-Hits/cm^2/hr") 'Read Hail intensity

RBLH LOGOFFB GB 'Reset rain and rain intensity counters every 1 Hour
DO{SDI12SEND 5 "0XZRU!"} 'Reset Rain counter
DO{SDI12SEND 5 "0XZRPI!"} 'Reset Rain Intensity counter

END

Note: When a register set is first read the message is loaded into a buffer and then each item of data can be read as required. As the WXT510 takes 15 seconds to read and return the data for each time a new register set is requested, it is best practice to read all the required data from each register set before requesting the next data set. Randomly accessing data from multiple register sets will greatly increase the sample time.