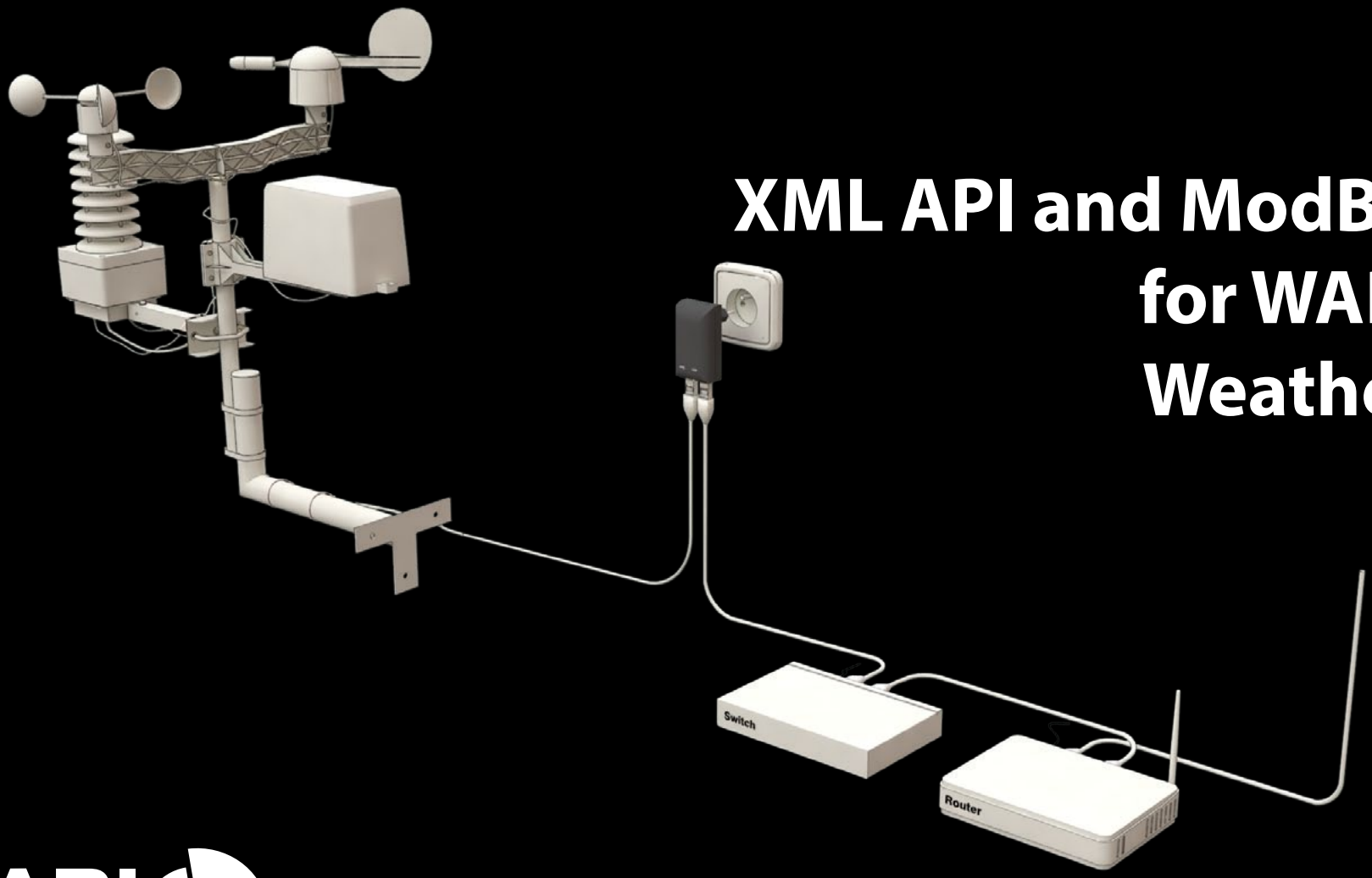

XML API and ModBus TCP/IP for WARIO ME13 Weather Station

WARIO inside

(for firmware ME220005)

Content

1 ModBus

ModBus TCP/IP receives signal from the 502 port. To enable ModBus communication go to the "Network" section and on the "ModBus" tab enable the "ModBus" option and you can also change the "ModBus address" (default value is 1000).

In the "Sensors" section you can click the "ModBus table" button to view a complete table of values that can be read, or use the URL **http://[WEATHERSTATION_IP]/xml.xml**, where each "ID" corresponds to the particular ModBus register.

Values are retrieved as 16bit signed short and are multiplied by a coefficient, which is given in the table "Sensor Types" as "ModBus coefficient" – this means that the retrieved values must be divided by this coefficient to get the actual measured values. ModBus can also control two independent relay outputs.

ModBus can use two types of addressing, therefore check your system configuration. In some higher-level systems it is necessary to for example subtract -1 from the sensor address from the weather station if the weather station address is set to 1002, the address necessary for communication is 1001.

Security

ModBus communication can be secured by setting one specific IP address, which will be the only one accepted for communication with the weather station. This can be enabled in the "Security" section by enabling the "ModBus Secured access" option and filling in the particular address in the "IP address" field.

Example of reading values using the MODPOLL software

Temperature .... id 1006

Modbus port: 502

Input type: input register integer

address: 192.168.55.56 (default weather station address)

modpoll.exe -m tcp -r 1006 -t 3:int -p 502 192.168.55.56

Modpoll software and a user guide for it can be downloaded at **http://www.modbusdriver.com/modpoll.html**

2 XML

XML data can be retrieved from several addresses, where each address has its own function. Parameters are passed via the HTTP GET method. XML can also be used to control two independent relay outputs. The weather station can send the xml files to the user specified address (server). More information can be found in the "Sending data automatically to the server" section.

Security

XML communication can be secured by a key, which then must be included in order to retrieve the desired data. This can be enabled in the "Security" section by activating the "Require login after startup" option. The specific key should be specified in the "shared key" field and is then used to retrieve data from XML. If the "Require login after startup" option is enabled, it is then necessary to include the USID parameter, which corresponds to the shared key value, in each XML query. Aktuální data meteostanice

Address: **http://[ADRESA_METEOSTANICE]/xml.xml**

Parameters

- **USID –** only if authorization is enabled, must correspond to the shared key value

xml example:

```
<?xml version="1.0" encoding="UTF-8"?>
<wario  date="2013-11-11" time="12:00:00" pressure_type="1">
  <input>
    <sensor>
      <type>wind_direction</type>
      <id>1002</id>
      <name>Wind direction</name>
      <value>315.0</value>
    </sensor>
    <sensor>
      <type>temperature</type>
      <id>1006</id>
```

```
      <name>Temperature</name>
      <value>5.3</value>
    </sensor>
  </input>
  <output>
    <sensor>
      <type>io</type>
      <id>1000</id>
      <name>OUT1</name>
      <value>0</value>
    </sensor>
  </output>
  <variable>
    <sunrise>7:30</sunrise>
    <sunset>15:49</sunset>
  </variable>
  <minmax>
    <s id="1006" min="15.4" max="21.8"/>
    <s id="1007" min="33.3" max="77.7"/>
  </minmax>
</wario>
```

The individual weather station sensors are divided into the nodes "input" (these can only be read) and "output" (these can also be controlled).

Each "sensor" node includes the following elements:

Type: sensor type, see section „Sensor types" for more information

ID: unique sensor ID

Name: system sensor name

Value: sensor value, units depend on the particular sensor type

The "variable" node provides two calculated values, which are described in the "Sensor Types" section in the "Other values" table.

The "minmax" node gives the maximum ("max") and minimum ("min") measured value for that particular day for the particular sensor (specified by its unique ID).

Weather station history data

Address: http://[ADRESA_METEOSTANICE]/data.xml

Parameters:

- USID – only if authorization is enabled, must correspond to the shared key value
- time – desired time, value given as GMT timestamp, default value if no time is specified is the current date and time
- avg – average of n items in the database, the response is a number between 1 and 1440, if the parameter is not specified the default value is 1. The individual elements are averaged, unless specified otherwise in the "Sensor Types" table. The method used for averaging the sensor values is specified in the table under the "data.xml" (see section Sensor types).
- count – number of values read from the database from the specified time parameter in descending order. The reported value is an integer between 1 and 9999, if the parameter is not specified, the default value is 60

Depending on the required time span and averaging type, the query can take longer to process. In order to achieve reasonable response times and optimization, the following values are recommended:

- avg: 2 – for days
- avg: 15 – for week
- avg: 60 – for month
- avg: 1440 – for year

xml example:

```
<?xml version="1.0" encoding="UTF-8"?>
<wario date="2013-11-11" time="12:00:00" pressure_type="1">
  <variable>
```

```
    <sunrise>5:4</sunrise>
    <sunset>20:10</sunset>
  </variable>
  <types_sensors>
    <s id="1006" type="temperature" name="Temperature"/>
    <s id="1007" type="humidity" name="Humidity"/>
  </types_sensors>
  <ts value="1399894505">
    <s id="1006">10.9</s>
    <s id="1007">22.5</s>
  </ts>
  <ts value="1399894444">
    <s id="1006">10.9</s>
    <s id="1007">22.5</s>
  </ts>
</wario>
```

The "sensor types" node gives an overview of the weather station sensors, where the "type" attribute corresponds to the sensor type and the "name" attribute shows its system name.

The individual measured values are divided into nodes "ts", where the value is specified as the "value" attribute – time as timestamp.

Each "s" note has an attribute "id" (sensor id – sensor typ can be determined from the "types_sensors" node) and sensor value, in the units corresponding to the particular sensor type.

The response also includes the node "variable", which can be used to determine "sunrise" and "sunset" for the specified day (based on the "time" parameter in the query).

Controlling the relay outputs

Address: http://[ADRESA_METEOSTANICE]/xml.cgi

Parameters:

- USID – authorization id- required, corresponds to the shared key
- MID – sensor id, value given as the sensor id parameter in the "ouput" node – type "io"
- value – sensor configuration, values: 0 – OFF, 1 – ON, 2 – change of current state

Example:

The following address would turn the output 1 ON

http://[ADRESA_METEOSTANICE]/xml.cgi?USID=x&MID=1002&value=1

Weather station configuration

Address: http://[ADRESA_METEOSTANICE]/variable.xml

Parameters:

- USID – only if authorization is enabled, corresponds to the shared key

XML example:

```
<?xml version="1.0" encoding="UTF-8"?>
<wario date="2013-11-11" time="12:00:00" pressure_type="1">
<configuration>
  <elevation value="350" />
  <latitude value="0" />
  <location value="" />
  <longitude value="0" />
</configuration>
</wario>
```

Individual elements

elevation: elevation above sea level in meters

latitude: latitude (N)

location: station location (URL encoded - % and two hexadecimal numbers)

longitude: longitude (E)

3 Sensor types

Sensor type	Description	ModBus coefficient	Data.xml
humidity	humidity in %	10	
pressure	atmospheric pressure in hPa	10	
exposure	solar radiation in W/m2	10	
temperature	temperature in °C	10	
wind_speed	wind speed in m/s	10	
wind_direction	wind direction in degrees. See Wind directions table	10	prevailing wind direction
dew_point	dew point in °C	10	
precipitation	precipitation in mm	10	cumulated precipitation
ping	network ping. If the value is greater than or equal to "0", the network element is active and the actual value is the response time in ms. If the value is -1, the network element is not available. If the value is „INACTIVE" or „-32000", sensor PING is not configured.	1	-
temperature_apparent	apparent temperature in °C	10	
wind_gust	wind gust in m/s	10	highest measured value
exposure_ideal	ideal solar radiation W/m2	10	

Other values

Value type	Description	ModBus coefficient
sunrise	sun rise	1, in minutes
sunset	sun set	1, in minutes
civstart	beginning of civil twilight	1, in minutes
civend	end of civil twilight	1, in minutes
nautstart	beginning of nautical twilight	1, in minutes
nautend	end of nautical twilight	1, in minutes
astrostart	beginning of astronomical twilight	1, in minutes
astroend	end of astronomical twilight	1, in minutes
daylen	day length	1, in minutes
civlen	civil twilight length	1, in minutes
nautlen	nautical twilight length	1, in minutes
astrolen	astronomical twilight	1, in minutes
moonphase	moon phase: 1: New Moon 2: Waxing crescent 3: First quarter 4: Waxing gibbous 5: Full Moon 6: Waning gibbous 7: Third quarter 8: Waning crescent	1
isday	day time (1) or night time (0)	1
bio	biometeorological forecast	1
agl	expected cloud base height	1
fog	possibility of fog: 0: no fog 1: fog possible 2: high probability of fog 3: possibility of freezing fog 4: high probability of freezing fog	

Wind directions

Degrees	Wind direction
0	*North*
45	*Northeast*
90	*East*
135	*Southeast*
180	*South*
225	*Southwest*
270	*West*
315	*Northwest*

4 Sending data to server automatically

The weather station allows automatic sending of data to a specified server in XML format. An XML file "xml.xml" is sent approximately once every minute and approximately once every 30 minutes, the file "variable.xml" is sent.

To enable automatic sending of XML files to custom server go to the weather station settings, section "Synchronization" and enable "Enable synchronization" and disable "Synchronize with www.meteo-pocasi.cz". In the "server" field enter the address of the server where you want to send the files (for example www.meteo-pocasi.cz). Then enter the port number of the server in the "port" field (for example 80). In the "address" field fill in the address of the script on the server, which will process the data (for example "process.php").

Data can be passed to the script in RAW format from the request, here is an example for PHP:

```
<?php
$data_xml = trim( file_get_contents(‚php://input‘) );
$xml = simplexml_load_string($data_xml);
if($xml){
  if($xml->configuration){
    // meteo.xml
  }elseif($xml->input){
    // xml.xml
  }
}
…..
?>
```

Note: by parsing the XML data for example for the $xml->configuration node, it is possible to determine whether the file is the "xml.xml" or "meteo.xml".