



DEWETRON

---

# OXYGEN Modbus TCP Plugin

TECHNICAL REFERENCE MANUAL

---

## WELCOME TO THE WORLD OF DEWETRON!

Congratulations on your new device! It will supply you with accurate, complete and reproducible measurement results for your decision making.

Look forward to the easy handling and the flexible and modular use of your DEWETRON product and draw upon more than 30 years of DEWETRON expertise in measurement engineering.

---

ISO9001



**THE MEASURABLE DIFFERENCE.**

© 2020 DEWETRON GmbH

The information contained in this document is subject to change without notice.

DEWETRON GmbH (DEWETRON) shall not be liable for any errors contained in this document. DEWETRON MAKES NO WARRANTIES OF ANY KIND ABOUT THIS DOCUMENT, WHETHER EXPRESS OR IMPLIED. DEWETRON SPECIFICALLY DISCLAIMS THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

DEWETRON shall not be liable for any direct, indirect, special, incidental, or consequential damages, whether based on contract, tort, or any other legal theory, in connection with the furnishing of this document or the use of the information in this document.

## Technical Support

Please contact your local authorized DEWETRON representative first for any support and service questions.

For Asia and Europe, please contact:

### **DEWETRON GmbH**

Parkring 4  
8074 Grambach  
AUSTRIA

Tel.: +43 316 3070  
Fax: +43 316 307090  
Email: [support@dewetron.com](mailto:support@dewetron.com)  
Web: <http://www.dewetron.com>

The telephone hotline is available Monday to Friday between 08:00 and 17:00 CET (GMT +1:00)

For America, please contact:

### **DEWETRON, Inc.**

2850 South County Trail, Unit 1  
East Greenwich, RI 02818  
U.S.A.

Tel.: +1 401 284 3750  
Toll-free: +1 877 431 5166  
Fax: +1 401 284 3755  
Email: [us.support@dewetron.com](mailto:us.support@dewetron.com)  
Web: <http://www.dewetron.com>

The telephone hotline is available Monday to Friday between 08:00 and 17:00 GST (GMT -5:00)

## Restricted Rights Legend:

Use Austrian law for duplication or disclosure.

### **DEWETRON GmbH**

Parkring 4  
8074 Grambach  
AUSTRIA

## Printing History:

Please refer to the page bottom for printing version. Copyright © DEWETRON GmbH

This document contains information which is protected by copyright. All rights are reserved. Reproduction, adaptation, or translation without prior written permission is prohibited, except as allowed under the copyright laws.

All trademarks and registered trademarks are acknowledged to be the property of their owners.

Before updating your software please contact DEWETRON. Use only original software from DEWETRON.

Please find further information at [www.dewetron.com](http://www.dewetron.com).

# Table of Content

1	PREFACE .....	4
2	FUNCTIONAL OVERVIEW .....	5
2.1	CONCEPT .....	5
2.2	DATATYPES AND SCALING .....	5
2.3	CONSTANT LINEAR SCALING .....	5
2.4	SUNSPEC SCALING .....	6
3	GETTING STARTED.....	7
4	XML CONFIG FILE .....	8
4.1	MINIMUM WORKING EXAMPLE .....	8
4.2	PROPERTIES .....	8
4.2.1	TCPENDPOINT .....	8
4.2.2	DEVICE .....	9
4.2.3	MODBUSDEVICE .....	9
4.2.4	REGISTER .....	9
4.2.5	DATATYPES .....	10
4.2.6	BYTE ORDER.....	10

# 1 PREFACE

This documentation describes, how to use the MODBUS Plugin in OXYGEN.

From Wikipedia [<https://en.wikipedia.org/wiki/Modbus>]

Modbus is a data communications protocol for use with its programmable logic controllers (PLCs). Modbus has become a de facto standard communication protocol and is now a commonly available means of connecting industrial electronic devices. Modbus is popular in industrial environments because it is openly published and royalty-free. It was developed for industrial applications, is relatively easy to deploy and maintain compared to other standards, and places few restrictions - other than the datagram (packet) size - on the format of the data to be transmitted. Modbus uses the RS485 or Ethernet as its wiring type. Modbus supports communication to and from multiple devices connected to the same cable or Ethernet network. For example, a device that measures temperature and a different device to measure humidity, both of which communicates the measurements to a computer.

## 2 FUNCTIONAL OVERVIEW

The MODBUS Plugin for OXYGEN is an extension for the popular OXYGEN measurement software to read data from Modbus devices. This allows the user, to use Modbus devices as data sources.

Features:

- Reading Data from Modbus TCP Devices
- Support of various data types (int, float, ...)
- Support of different scaling modes (linear and sunspec)
- Independent definition of register and endpoints for simple reuse
- Per endpoint definable refresh rate

Known Limitation:

- No support of RTU

### 2.1 CONCEPT

- TCP Endpoint: An Endpoint is a Node with a unique IP address and port an can hold one to many devices.
- Device: Is the representation of a physical modbus device. It is described by its UNIT\_ID.

### 2.2 DATATYPES AND SCALING

The Plugin supports two different types of data scaling:

- const\_linear: Linear scaling with factor and offset
- sunssf: Variable scaling with another register value, compatible with the sunspec scaling (INT+SF)

### 2.3 CONSTANT LINEAR SCALING

Typically, the linear scaling is used for converting the binary data to physical values.

Output Value = read\_value \* scale + offset

**Example:**

```
read_value = 2314
scale = 0.1
offset = 0
output_value = 2314 * 0.1 + 0.0 = 231.4
```

## 2.4 SUNSPEC SCALING

Within Solar inverters, the sunssf scaling is often used. It is defined by Sunspec. In this case, a separate register is read, which holds the actual scaling value. This specific value is an exponent of 10.

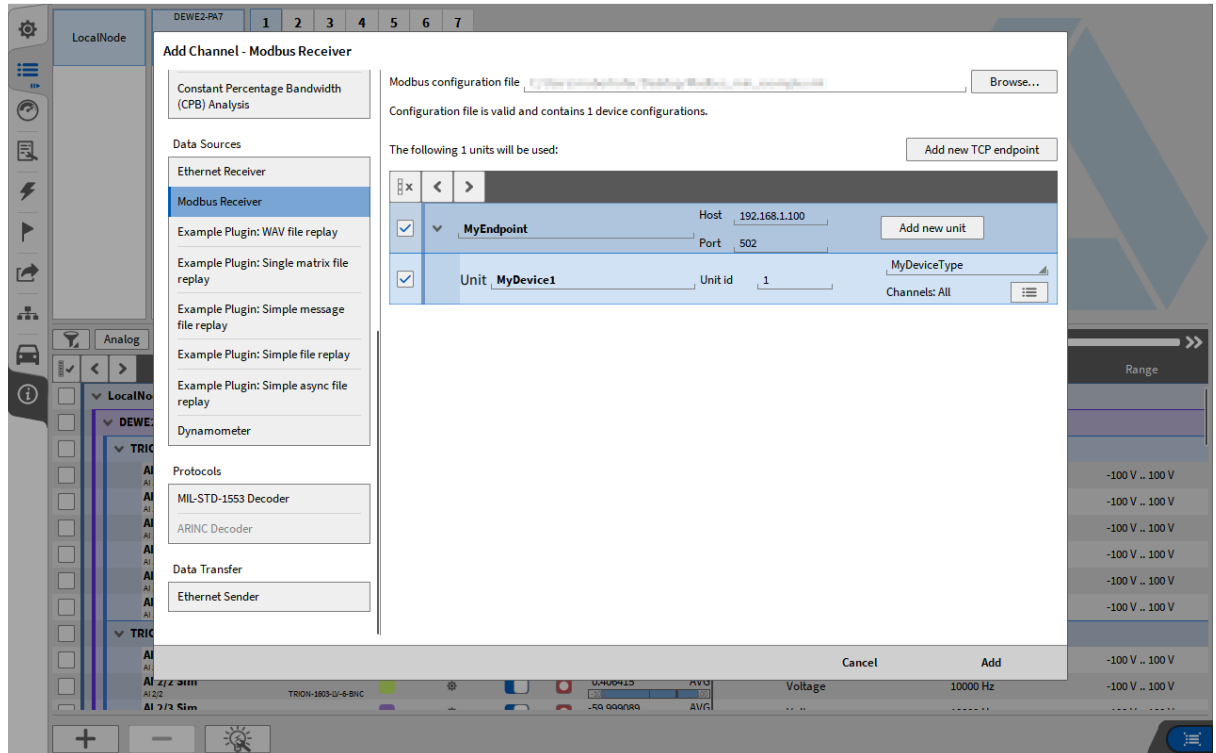
Output Value = read\_value \* 10<sup>scale\_reg\_val</sup>

### Example:

```
read_value = 2314  
scale_reg_val = -1  
output_value = 2314 * 10-1 = 231.4
```

## 3 GETTING STARTED

1. Start OXYGEN (if not already started)
2. Open the channel list
3. Press "+" add channel
4. Select "MODBUS" in the Receiver section



5. Load a XML Document with the Device and Network description
6. Adapt settings if necessary (e.g. load only selected channels, change IP-address)
7. Click "Add"

## 4 XML CONFIG FILE

Most of the configuration is provided via a XML document. It is designed, to be very flexible in usage as well as easy to create.

### 4.1 MINIMUM WORKING EXAMPLE

This example consists of one TCP endpoint, one Modbus device with one register.

```
<Modbus version="1.0">
  <TCPEndpoint name = "MyEndpoint" host = "192.168.1.100" port = "502" polling_rate = "1Hz">
    <Device name = "MyDevice1" device_type = "MyDeviceType" unit_id = "1"/>
  </TCPEndpoint>
  <ModbusDevice name="MyDeviceType">
    <HoldingRegister address="40000" description="This is a Test Value" name="Value 1"
type="float"/>
  </ModbusDevice>
</Modbus>
```

The first part in this Example is the TCPEndpoint.

```
<TCPEndpoint name = "MyEndpoint" host = "192.168.1.100" port = "502" polling_rate = "1Hz"
  <Device name = "MyDevice1" device_type = "MyDeviceType" unit_id = "1"/>
</TCPEndpoint>
```

The TCPEndpoint Node in the XML describes an endpoint with the name "MyEndpoint". The host can be an ip-address or a hostname, the ip-port is 502 by default. In this case, the polling rate is set to 1Hz, which means, that the register values are read once per second. An Endpoint consists of one or more devices, which are separated by their UNIT\_ID. The Endpoint is the dedicated device itself, which is holding the Modbus registers. Typically, the Endpoint is equal to the device. But in some cases, an Endpoint consists of 2 or more devices (e.g. a gateway). The important value here is the `device_type`. It holds the name of the device, which is defined in the bottom part of the XML (ModbusDevice). This allows the user, to re-use the description of one device in multiple Endpoints.

```
<ModbusDevice name="MyDeviceType">
  <HoldingRegister address="40000" description="This is a Test Value" name="Value 1"
type="float"/>
</ModbusDevice>
```

### 4.2 PROPERTIES

#### 4.2.1 TCPENDPOINT

Property	Value Options	Mandatory	Example	Description
name	string	yes	"My Endpoint"	Friendly name of the Endpoint
host	string	yes	"192.168.1.100"	Hostname of the Endpoint, IP address or hostname allowed
port	number	yes	"502"	IP-Port of the Endpoint, default is 502
polling_rate	rate [0.1Hz - 10Hz]	no	"1Hz"	Polling / reading rate of the endpoint
response_timeout	time	no	"0.25s"	Timeout for waiting on response of the endpoint



#### 4.2.2 DEVICE

Property	Value Options	Mandatory	Example	Description
name	string	yes	"My Device"	Friendly name of the Device
device_type	string	yes	"MyDevice- Type"	Name of the used device, must be available as ModbusDevice
unit_id	number [0-255]	yes	"1"	Unit_Id of the device, typically "1"

#### 4.2.3 MODBUSDEVICE

Property	Value Options	Mandatory	Example	Description
name	string	yes	"MyDeviceType"	Friendly name of the Modbus Device
byte_order	see <a href="#">byte order</a>	no	"big_endian"	Byte / Word Order

#### 4.2.4 REGISTER

- Coil use function code 0x01 for reading.
- DiscreteInput use function code 0x02 for reading.
- HoldingRegister use function code 0x03 for reading.
- InputRegister use function code 0x04 for reading.

Property	Value Options	Mandatory	Example	Description
address	number [0-65535]	yes	"40000"	Register Start address, starting with 0
name	string	yes	"Value 1"	Channel name of the Modbus Register in OXYGEN
type	data_type	yes	"int16"	Data type of the register value
scale_mode	"const_linear" or "sunssf"	no	"const_linear"	Scaling Mode
scale	number	no	"0.1"	Scaling factor, only valid if scale_mode == "const_linear"
offset	number	no	"100"	Scaling offset, only valid if scale_mode == "const_linear"
scale_reg	register	no	"1234"	Scaling register, only valid if scale_mode == "sunssf"
min	number	no	"-100"	Minimum display value range [RESERVED]
max	number	no	"100"	Maximum display value range [RESERVED]
unit	string	no	"V"	Value Unit
nan	value	no	"0xffff"	Value to be treated as NaN
byte_order	see <a href="#">byte order</a>	no	"big_endian"	Byte / Word Order
description	string	no	"Description"	Channel description of the Modbus Register in OXYGEN

#### 4.2.5 DATATYPES

Name	Word Count	Description	Value Range
"uint16"	1	Unsigned Integer 16 Bit	0 to 32767
"int16"	1	Signed Integer 16 Bit	-16384 to 16383
"uint32"	2	Unsigned Integer 32 Bit	0 to $2^{32}-1$
"int32"	2	Signed Integer 32 Bit	$-2^{31}$ to $2^{31}-1$
"float"	2	IEE 754 Floating Point Single	$+3.402823e+38$
"double"	4	IEE 754 Floating Point Double	$+1e+308$

#### 4.2.6 BYTE ORDER

Name	Synonym	Description
"abcd"	"big_endian"	Decode Data in Big Endian matter (High-Byte before Low-Byte)
"dcba"	"little_endian"	Decode Data in Little Endian matter (Low-Byte before High-Byte)
"cdab"	-	Decode Data in Mixed-Byte Order
"badc"	-	Decode Data in Mixed-Byte Order