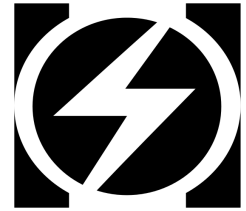


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**OSHMI**



# **Open Substation HMI**

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Modbus TCP Driver

Configuration Manual

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Version 1.01

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## Introduction

This driver is based on **libmodbus** protocol stack from:

<http://libmodbus.org/>

Using this driver it is possible to connect OSHMI to "n" PLC's, meters, RTU's or other generic IED's that can support Modbus/ TCP protocol.

This driver is not a gateway, it only directs data to OSHMI.

## Configuration

OSHMI must be configured to use the I104M adapter protocol. So, it must be configured the BDTR section of the *hmi.ini* file to disable the BDTR protocol, like this:

```
[BDTR]
IP_BDTR1=""
IP_BDTR2=""
```

Other entries in this section can be commented out.

The driver modbus.exe file is installed in c:\oshmi\bin\. This executable must be configured to run in mon\_proc.ini or be executed manually.

The driver config file is c:\oshmi\conf\modbus\_queue.ini. This file has the following format:

---

```

; Define a Modbus slave IED
[RTU_1]
IP=127.0.0.1
PORT=502
; delay after each interrogation (in milliseconds)
DELAY=1000
; read holding registers (FC=0x03) 1 = mb_address, number of registers, OSHMI_address of 1st
; Analog 16bit values are converted to float and divided by 32767.0 (1FFFh -> 1.0),
; so use kconv1=32767.0 in point_list.txt to restore the value as decimal from modbus
; or scale the values as needed using kconv1(multiplier) and kconv2(offset).
READHR_1=40001 5 1000
READHR_2=40010 10 2000
; read each pair of consecutive holding registers (FC=0x03) as floats 1 = mb_address, number of
floats, OSHMI_address of 1st
READHR_FLOAT_1=60001 5 11000
READHR_FLOAT_2=60010 10 12000
; read input registers (FC=0x04) 1 = mb_address, number of registers, OSHMI_address of 1st
; Analog 16bit values are converted to float and divided by 32767.0 (1FFFh -> 1.0),
; so use kconv1=32767.0 in point_list.txt to restore the value as decimal from modbus
; or scale the values as needed using kconv1(multiplier) and kconv2(offset).
READIR_1=30001 5 3000
READIR_2=30006 1 3006
; read input status (FC=0x02) 1 = mb_address, number of bits, OSHMI_address of 1st
READIS_1=10001 32 5000
; read coils status (FC=0x01) 1 = mb_address, number of bits, OSHMI_address of 1st
READCS_1=1 32 8000

; Define a second Modbus slave IED
[RTU_2]
IP=127.0.0.1
PORT=503
; delay after each interrogation (in milliseconds)
DELAY=100
; read holding registers (FC=0x03) 1 = mb_address, number of registers, OSHMI_address of 1st
READHR_1=40001 5 11000
READHR_2=40010 10 12000
; read input registers (FC=0x04) 1 = mb_address, number of registers, OSHMI_address of 1st
READIR_1=30001 5 13000
READIR_2=30006 1 13006
; read input status (FC=0x02) 1 = mb_address, number of input bits, OSHMI_address of 1st
READIS_1=10001 32 15000
; read coils status (FC=0x01) 1 = mb_address, number of input bits, OSHMI_address of 1st
READCS_1=1 32 18000
...
; when there are just 2 parameters per line, OSHMI address will be the same as mb_address

```

**Warning:** do not let empty lines, this can cause problems.

In the *point\_list.txt* file must be configured point numbers, addresses as OSHMI\_address (or mb\_address when OSHMI\_address omitted), RTU column as the RTU number from modbus\_queue and conversion factors (*kconv's*) as needed.

Analog values from Modbus are sent to OSHMI emulating an IEC104 type 9 format (normalized value). Integer 16 bit values are divided by 32767 and converted to float (the value 32767=7FFFh represents the float value 1.0). So to restore the value as Modbus 16 bit integer you must use *kconv1=32767* and *kconv2=0* in *point\_list.txt*. Use *kconv1*(multiplier) and *kconv2*(offset) to adjust the scale to your measurement as needed.

---

Commands are only programmed in the *c:\oshmil\conf\point\_list.txt* as follows:

**ADDR** column = Modbus object address.

**RTU** column = sequential number of RTU from *modbus\_queue.ini*.

**ASDU** column must be configured according to the command type:

Command type	Modbus	ASDU
Binary command	Single Coil, FC=0x05	45
Binary double command	Multiple Coils, FC=0x0F	46
Analog output, normalized 16 bits	Preset Single Register, FC=0x06	48
Analog output, scaled 16 bits	Preset Single Register, FC=0x06	49

Sample *point\_list.txt* file configuration:

```

VERSION 3
POINT_NUMB ADDR ID TYP MESSAGE ALM EQ INF OR UN RTU ASDU KCONV1 KCONV2 SUPCMD DC PR INIVAL "SUBST~BAY~DESCRIPTION"
1000 0 MODBUS_RTU1_HR40001 A Unit 0 0 0 0 E 1 0 1.000000 0.000000 0 1 1 1.00 "Modbus~RTU_1~Holding Register 40001"
1001 0 MODBUS_RTU1_HR40002 A Unit 0 0 0 0 E 1 0 1.000000 0.000000 0 1 1 1.00 "Modbus~RTU_1~Holding Register 40002"
1002 0 MODBUS_RTU1_HR40003 A Unit 0 0 0 0 E 1 0 1.000000 0.000000 0 1 1 1.00 "Modbus~RTU_1~Holding Register 40003"
1003 0 MODBUS_RTU1_HR40004 A Unit 0 0 0 0 E 1 0 1.000000 0.000000 0 1 1 1.00 "Modbus~RTU_1~Holding Register 40004"
1004 0 MODBUS_RTU1_HR40005 A Unit 0 0 0 0 E 1 0 1.000000 0.000000 0 1 1 1.00 "Modbus~RTU_1~Holding Register 40005"
2000 0 MODBUS_RTU1_HR40010 A Unit 0 0 0 0 E 1 0 1.000000 0.000000 0 1 1 1.00 "Modbus~RTU_1~Holding Register 40010"
2001 0 MODBUS_RTU1_HR40011 A Unit 0 0 0 0 E 1 0 1.000000 0.000000 0 1 1 1.00 "Modbus~RTU_1~Holding Register 40011"
2002 0 MODBUS_RTU1_HR40012 A Unit 0 0 0 0 E 1 0 1.000000 0.000000 0 1 1 1.00 "Modbus~RTU_1~Holding Register 40012"
2003 0 MODBUS_RTU1_HR40013 A Unit 0 0 0 0 E 1 0 1.000000 0.000000 0 1 1 1.00 "Modbus~RTU_1~Holding Register 40013"
2004 0 MODBUS_RTU1_HR40014 A Unit 0 0 0 0 E 1 0 1.000000 0.000000 0 1 1 1.00 "Modbus~RTU_1~Holding Register 40014"
2005 0 MODBUS_RTU1_HR40015 A Unit 0 0 0 0 E 1 0 1.000000 0.000000 0 1 1 1.00 "Modbus~RTU_1~Holding Register 40015"
2006 0 MODBUS_RTU1_HR40016 A Unit 0 0 0 0 E 1 0 1.000000 0.000000 0 1 1 1.00 "Modbus~RTU_1~Holding Register 40016"
2007 0 MODBUS_RTU1_HR40017 A Unit 0 0 0 0 E 1 0 1.000000 0.000000 0 1 1 1.00 "Modbus~RTU_1~Holding Register 40017"
2008 0 MODBUS_RTU1_HR40018 A Unit 0 0 0 0 E 1 0 1.000000 0.000000 0 1 1 1.00 "Modbus~RTU_1~Holding Register 40018"
2009 0 MODBUS_RTU1_HR40019 A Unit 0 0 0 0 E 1 0 1.000000 0.000000 0 1 1 1.00 "Modbus~RTU_1~Holding Register 40019"
3000 0 MODBUS_RTU1_IR30001 A Unit 0 0 0 0 E 1 0 1.000000 0.000000 0 1 1 1.00 "Modbus~RTU_1~Holding Register 30001"
3001 0 MODBUS_RTU1_IR30002 A Unit 0 0 0 0 E 1 0 1.000000 0.000000 0 1 1 1.00 "Modbus~RTU_1~Holding Register 30002"
3002 0 MODBUS_RTU1_IR30003 A Unit 0 0 0 0 E 1 0 1.000000 0.000000 0 1 1 1.00 "Modbus~RTU_1~Holding Register 30003"
3003 0 MODBUS_RTU1_IR30004 A Unit 0 0 0 0 E 1 0 1.000000 0.000000 0 1 1 1.00 "Modbus~RTU_1~Holding Register 30004"
3004 0 MODBUS_RTU1_IR30005 A Unit 0 0 0 0 E 1 0 1.000000 0.000000 0 1 1 1.00 "Modbus~RTU_1~Holding Register 30005"
3006 0 MODBUS_RTU1_IR30006 A Unit 0 0 0 0 E 1 0 1.000000 0.000000 0 1 1 1.00 "Modbus~RTU_1~Holding Register 30006"
5000 0 MODBUS_RTU1_IS10001 D OFF/ON 0 0 0 0 E 1 0 1.000000 0.000000 0 1 0 1.00 "Modbus~RTU_1~Input Status 10001"
5001 0 MODBUS_RTU1_IS10002 D OFF/ON 0 0 0 0 E 1 0 1.000000 0.000000 0 1 0 1.00 "Modbus~RTU_1~Input Status 10002"
5002 0 MODBUS_RTU1_IS10003 D OFF/ON 0 0 0 0 E 1 0 1.000000 0.000000 0 1 0 1.00 "Modbus~RTU_1~Input Status 10003"
5003 0 MODBUS_RTU1_IS10004 D OFF/ON 0 0 0 0 E 1 0 1.000000 0.000000 0 1 0 1.00 "Modbus~RTU_1~Input Status 10004"
5004 0 MODBUS_RTU1_IS10005 D OFF/ON 0 0 0 0 E 1 0 1.000000 0.000000 0 1 0 1.00 "Modbus~RTU_1~Input Status 10005"
5005 0 MODBUS_RTU1_IS10006 D OFF/ON 0 0 0 0 E 1 0 1.000000 0.000000 0 1 0 1.00 "Modbus~RTU_1~Input Status 10006"
5006 0 MODBUS_RTU1_IS10007 D OFF/ON 0 0 0 0 E 1 0 1.000000 0.000000 0 1 0 1.00 "Modbus~RTU_1~Input Status 10007"
5007 0 MODBUS_RTU1_IS10008 D OFF/ON 0 0 0 0 E 1 0 1.000000 0.000000 0 1 0 1.00 "Modbus~RTU_1~Input Status 10008"
5008 0 MODBUS_RTU1_IS10009 D OFF/ON 0 0 0 0 E 1 0 1.000000 0.000000 0 1 0 1.00 "Modbus~RTU_1~Input Status 10009"
5009 0 MODBUS_RTU1_IS10010 D OFF/ON 0 0 0 0 E 1 0 1.000000 0.000000 0 1 0 1.00 "Modbus~RTU_1~Input Status 10010"
5010 0 MODBUS_RTU1_IS10011 D OFF/ON 0 0 0 0 E 1 0 1.000000 0.000000 0 1 0 1.00 "Modbus~RTU_1~Input Status 10011"
5011 0 MODBUS_RTU1_IS10012 D OFF/ON 0 0 0 0 E 1 0 1.000000 0.000000 0 1 0 1.00 "Modbus~RTU_1~Input Status 10012"
5012 0 MODBUS_RTU1_IS10013 D OFF/ON 0 0 0 0 E 1 0 1.000000 0.000000 0 1 0 1.00 "Modbus~RTU_1~Input Status 10013"
5013 0 MODBUS_RTU1_IS10014 D OFF/ON 0 0 0 0 E 1 0 1.000000 0.000000 0 1 0 1.00 "Modbus~RTU_1~Input Status 10014"
5014 0 MODBUS_RTU1_IS10015 D OFF/ON 0 0 0 0 E 1 0 1.000000 0.000000 0 1 0 1.00 "Modbus~RTU_1~Input Status 10015"
5015 0 MODBUS_RTU1_IS10016 D OFF/ON 0 0 0 0 E 1 0 1.000000 0.000000 0 1 0 1.00 "Modbus~RTU_1~Input Status 10016"
5016 0 MODBUS_RTU1_IS10017 D OFF/ON 0 0 0 0 E 1 0 1.000000 0.000000 0 1 0 1.00 "Modbus~RTU_1~Input Status 10017"
5017 0 MODBUS_RTU1_IS10018 D OFF/ON 0 0 0 0 E 1 0 1.000000 0.000000 0 1 0 1.00 "Modbus~RTU_1~Input Status 10018"
5018 0 MODBUS_RTU1_IS10019 D OFF/ON 0 0 0 0 E 1 0 1.000000 0.000000 0 1 0 1.00 "Modbus~RTU_1~Input Status 10019"
5019 0 MODBUS_RTU1_IS10020 D OFF/ON 0 0 0 0 E 1 0 1.000000 0.000000 0 1 0 1.00 "Modbus~RTU_1~Input Status 10020"
5020 0 MODBUS_RTU1_IS10021 D OFF/ON 0 0 0 0 E 1 0 1.000000 0.000000 0 1 0 1.00 "Modbus~RTU_1~Input Status 10021"
5021 0 MODBUS_RTU1_IS10022 D OFF/ON 0 0 0 0 E 1 0 1.000000 0.000000 0 1 0 1.00 "Modbus~RTU_1~Input Status 10022"
5022 0 MODBUS_RTU1_IS10023 D OFF/ON 0 0 0 0 E 1 0 1.000000 0.000000 0 1 0 1.00 "Modbus~RTU_1~Input Status 10023"
5023 0 MODBUS_RTU1_IS10024 D OFF/ON 0 0 0 0 E 1 0 1.000000 0.000000 0 1 0 1.00 "Modbus~RTU_1~Input Status 10024"
5024 0 MODBUS_RTU1_IS10025 D OFF/ON 0 0 0 0 E 1 0 1.000000 0.000000 0 1 0 1.00 "Modbus~RTU_1~Input Status 10025"
5025 0 MODBUS_RTU1_IS10026 D OFF/ON 0 0 0 0 E 1 0 1.000000 0.000000 0 1 0 1.00 "Modbus~RTU_1~Input Status 10026"
5026 0 MODBUS_RTU1_IS10027 D OFF/ON 0 0 0 0 E 1 0 1.000000 0.000000 0 1 0 1.00 "Modbus~RTU_1~Input Status 10027"
5027 0 MODBUS_RTU1_IS10028 D OFF/ON 0 0 0 0 E 1 0 1.000000 0.000000 0 1 0 1.00 "Modbus~RTU_1~Input Status 10028"
5028 0 MODBUS_RTU1_IS10029 D OFF/ON 0 0 0 0 E 1 0 1.000000 0.000000 0 1 0 1.00 "Modbus~RTU_1~Input Status 10029"
5029 0 MODBUS_RTU1_IS10030 D OFF/ON 0 0 0 0 E 1 0 1.000000 0.000000 0 1 0 1.00 "Modbus~RTU_1~Input Status 10030"
5030 0 MODBUS_RTU1_IS10031 D OFF/ON 0 0 0 0 E 1 0 1.000000 0.000000 0 1 0 1.00 "Modbus~RTU_1~Input Status 10031"
5031 0 MODBUS_RTU1_IS10032 D OFF/ON 0 0 0 0 E 1 0 1.000000 0.000000 0 1 0 1.00 "Modbus~RTU_1~Input Status 10032"
8000 0 MODBUS_RTU1_CS01 D OFF/ON 0 0 0 0 E 1 0 1.000000 0.000000 0 1 0 1.00 "Modbus~RTU_1~Coil Status 01"
8001 0 MODBUS_RTU1_CS02 D OFF/ON 0 0 0 0 E 1 0 1.000000 0.000000 0 1 0 1.00 "Modbus~RTU_1~Coil Status 02"
8002 0 MODBUS_RTU1_CS03 D OFF/ON 0 0 0 0 E 1 0 1.000000 0.000000 0 1 0 1.00 "Modbus~RTU_1~Coil Status 03"
8003 0 MODBUS_RTU1_CS04 D OFF/ON 0 0 0 0 E 1 0 1.000000 0.000000 0 1 0 1.00 "Modbus~RTU_1~Coil Status 04"
8004 0 MODBUS_RTU1_CS05 D OFF/ON 0 0 0 0 E 1 0 1.000000 0.000000 0 1 0 1.00 "Modbus~RTU_1~Coil Status 05"
8005 0 MODBUS_RTU1_CS06 D OFF/ON 0 0 0 0 E 1 0 1.000000 0.000000 0 1 0 1.00 "Modbus~RTU_1~Coil Status 06"
8006 0 MODBUS_RTU1_CS07 D OFF/ON 0 0 0 0 E 1 0 1.000000 0.000000 0 1 0 1.00 "Modbus~RTU_1~Coil Status 07"
8007 0 MODBUS_RTU1_CS08 D OFF/ON 0 0 0 0 E 1 0 1.000000 0.000000 0 1 0 1.00 "Modbus~RTU_1~Coil Status 08"
8008 0 MODBUS_RTU1_CS09 D OFF/ON 0 0 0 0 E 1 0 1.000000 0.000000 0 1 0 1.00 "Modbus~RTU_1~Coil Status 09"
8009 0 MODBUS_RTU1_CS10 D OFF/ON 0 0 0 0 E 1 0 1.000000 0.000000 0 1 0 1.00 "Modbus~RTU_1~Coil Status 10"
8010 0 MODBUS_RTU1_CS11 D OFF/ON 0 0 0 0 E 1 0 1.000000 0.000000 0 1 0 1.00 "Modbus~RTU_1~Coil Status 11"
8011 0 MODBUS_RTU1_CS12 D OFF/ON 0 0 0 0 E 1 0 1.000000 0.000000 0 1 0 1.00 "Modbus~RTU_1~Coil Status 12"
8012 0 MODBUS_RTU1_CS13 D OFF/ON 0 0 0 0 E 1 0 1.000000 0.000000 0 1 0 1.00 "Modbus~RTU_1~Coil Status 13"
8013 0 MODBUS_RTU1_CS14 D OFF/ON 0 0 0 0 E 1 0 1.000000 0.000000 0 1 0 1.00 "Modbus~RTU_1~Coil Status 14"
8014 0 MODBUS_RTU1_CS15 D OFF/ON 0 0 0 0 E 1 0 1.000000 0.000000 0 1 0 1.00 "Modbus~RTU_1~Coil Status 15"

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8015 0 MODBUS_RTU1_CS16 D OFF/ON 0 0 0 0 E 1 0 1.000000 0.000000 0 1 0 1.00 "Modbus-RTU_1~Coil Status 16"
8016 0 MODBUS_RTU1_CS17 D OFF/ON 0 0 0 0 E 1 0 1.000000 0.000000 0 1 0 1.00 "Modbus-RTU_1~Coil Status 17"
8017 0 MODBUS_RTU1_CS18 D OFF/ON 0 0 0 0 E 1 0 1.000000 0.000000 0 1 0 1.00 "Modbus-RTU_1~Coil Status 18"
8018 0 MODBUS_RTU1_CS19 D OFF/ON 0 0 0 0 E 1 0 1.000000 0.000000 0 1 0 1.00 "Modbus-RTU_1~Coil Status 19"
8019 0 MODBUS_RTU1_CS20 D OFF/ON 0 0 0 0 E 1 0 1.000000 0.000000 0 1 0 1.00 "Modbus-RTU_1~Coil Status 20"
8020 0 MODBUS_RTU1_CS21 D OFF/ON 0 0 0 0 E 1 0 1.000000 0.000000 0 1 0 1.00 "Modbus-RTU_1~Coil Status 21"
8021 0 MODBUS_RTU1_CS22 D OFF/ON 0 0 0 0 E 1 0 1.000000 0.000000 0 1 0 1.00 "Modbus-RTU_1~Coil Status 22"
8022 0 MODBUS_RTU1_CS23 D OFF/ON 0 0 0 0 E 1 0 1.000000 0.000000 0 1 0 1.00 "Modbus-RTU_1~Coil Status 23"
8023 0 MODBUS_RTU1_CS24 D OFF/ON 0 0 0 0 E 1 0 1.000000 0.000000 0 1 0 1.00 "Modbus-RTU_1~Coil Status 24"
8024 0 MODBUS_RTU1_CS25 D OFF/ON 0 0 0 0 E 1 0 1.000000 0.000000 0 1 0 1.00 "Modbus-RTU_1~Coil Status 25"
8025 0 MODBUS_RTU1_CS26 D OFF/ON 0 0 0 0 E 1 0 1.000000 0.000000 0 1 0 1.00 "Modbus-RTU_1~Coil Status 26"
8026 0 MODBUS_RTU1_CS27 D OFF/ON 0 0 0 0 E 1 0 1.000000 0.000000 0 1 0 1.00 "Modbus-RTU_1~Coil Status 27"
8027 0 MODBUS_RTU1_CS28 D OFF/ON 0 0 0 0 E 1 0 1.000000 0.000000 0 1 0 1.00 "Modbus-RTU_1~Coil Status 28"
8028 0 MODBUS_RTU1_CS29 D OFF/ON 0 0 0 0 E 1 0 1.000000 0.000000 0 1 0 1.00 "Modbus-RTU_1~Coil Status 29"
8029 0 MODBUS_RTU1_CS30 D OFF/ON 0 0 0 0 E 1 0 1.000000 0.000000 0 1 0 1.00 "Modbus-RTU_1~Coil Status 30"
8030 0 MODBUS_RTU1_CS31 D OFF/ON 0 0 0 0 E 1 0 1.000000 0.000000 0 1 0 1.00 "Modbus-RTU_1~Coil Status 31"
8031 0 MODBUS_RTU1_CS32 D OFF/ON 0 0 0 0 E 1 0 1.000000 0.000000 0 1 0 1.00 "Modbus-RTU_1~Coil Status 32"
11000 0 MODBUS_RTU2_HR40001 A Unit 0 0 0 0 E 1 0 1.000000 0.000000 0 1 1 1.00 "Modbus-RTU_1~Coil Status 32"
... other entries from RTU2 ... (this is not a valid line, just a comment)
:::Commands::: (this is not a valid line, just a comment)
90000 7000 MODBUS_RTU1_FSC_7000 D Open/Close 0 0 0 7 E 1 45 1.000000 0.000000 5000 2 1 0.00 "Modbus-RTU_1~Output Single Coil 7000"
90001 7005 MODBUS_RTU1_PSR_7005 D Unit 0 0 0 7 E 1 48 1.000000 0.000000 40000 2 1 0.00 "Modbus-RTU_1~Output Single Reg 7000"
90002 7000 MODBUS_RTU2_FSC_7000 D Open/Close 0 0 0 7 E 2 45 1.000000 0.000000 5000 2 1 0.00 "Modbus-RTU_2~Output Single Coil 7000"
90003 7005 MODBUS_RTU2_PSR_7005 D Unit 0 0 0 7 E 2 48 1.000000 0.000000 40000 2 1 0.00 "Modbus-RTU_2~Output Single Reg 7000"

```