# HUR Series Modbus TCP Remote I/O Devices User Manual

1. About HUR Series Modbus TCP Remote I/O Devices



HUR Series Modbus TCP Remote Input/Output (I/O) Devices are designed for facilities of rugged industry and infrastructure. HUR Series Modbus TCP Remote I/O Devices are tailored to perform various features such as wide temperature, wide range power input range... etc. HUR Series Modbus TCP Remote I/O Devices offers different I/O combinations, which provide greater flexibility and are compatible with many different applications that makes them the perfect choice for establishing a cost-effective remote I/O system.

## 2. Hardware Features

HUR Series Modbus TCP Remote I/O Devices has several versions with different I/O options such as:

- 8 Channel 5-275V AC-DC, 100mA Digital Optocoupler Output
- <u>8 Channel Digital 5Amps 250VAC/30VDC Relay Output</u>

• <u>8 Channel 12-275V AC-DC, 60mA Digital Optocoupler Input</u>

#### • <u>8 Channel 0-10V and 0-20mA Selectable Analog Input</u>

• <u>5 Channel 4-20mA Analog Output</u>

All versions can be selected with 100 - 240V AC (120 – 370V DC), 50Hz to 60Hz AC input or 5-48V (max. 60V) DC wide range power input. HUR Series Modbus TCP Remote I/O Devices communicate over TCP/IP connection.

HUR Multi Slot Version contains 4 of the above I/O options such as

#### • <u>4 x 8 Channel Digital 5Amps 250VAC/30VDC Relay Output</u>

There are several alternatives and project based application is also available.

#### 2.1 Features

- Supports 2 x 10/100Base-T(X) ports
- Supports Full/Half-Duplex, auto MDI/MDI-X on each port
- Supports 1 x RS232 and 1 x RS485 Serial Connection up to 921600 Baud

Modbus TCP to RTU Gateway functionality for Modbus packages with different addresses

on serial line (Different than device own address)

- Embedded web interface for ease of use
- 2 different Operating Modes:

Modbus TCP Remote I/O Device with MQTT Publisher in Server Mode

Modbus TCP Remote I/O Device as a slave Device in Client Mode and Supports I/O Mirror

for Output Devices

• MQTT Publisher with different data transfer options

**OBIS Values as Data Objects** 

OBIS Values as Modbus Frame

- HUR can send Data to Server and MQTT Server can remotely control Output Versions of HUR Devices in the same time
- Up to 10 client connection in Server Mode
- DHCP Server Capability
- Easy to follow Device Status on web interface
- Device Address changeable via web interface
- Easy to follow Device Parameters such as Device Up Time, Modbus read counter etc. on web interface

- Easy to follow Serial and Ethernet data packages on web interface
- Black List and White List based IP Filter in TCP Server Mode
- Firmware Upgrade over Web
- 2 firmware storage capability on same device (1 active only)
- AC or DC wide range power options
- Wide operating temperature range from -25 to 70 °C AC and -40 to 85 °C DC power input versions
- Rugged Metal IP-40 housing design
- DIN-Rail mounting

#### 2.2 Extra Features for Output Models

- Output configuration can be defined by user for restart
- Output values can be saved and applied during auto restart
- I/O Mirror functionality: Device can duplicate output from a Modbus input device

### 3. Installation

Each device has a Din-Rail kit on rear panel. The Din-Rail kit helps device to fix on the Din-Rail. Slant the switch and mount the metal spring to Din-Rail.

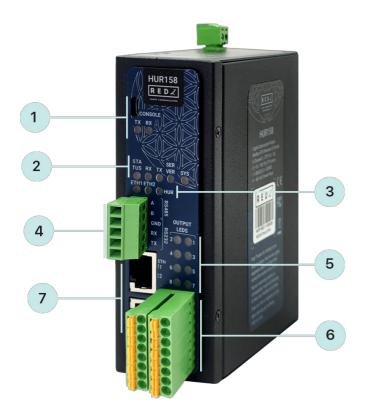


Then Push the switch toward the Din-Rail until you heard a "click" sound.



## 4. Front Panel Description

#### 4.1 HUR158 & HUR258



- 1. Micro USB or USB Type-C Console port for LOG in 115200 baud Console Tx and Rx Blinks when data transmission occurs
- 2. Device Status LEDs

STATUS: Blinks based on device operation

- When TCP line used blinks during no connection and keeps ON after TCP connection
- When Serial line used keeps ON

Device Tx and Rx Blinks when data transmission occurs

SERVER: Keeps ON after selecting Server from Server-Client Operating Modes. Keeps

OFF if Client operating Mode selected

SYS: Turns On for 1 second and Turns OFF for 1 second under normal operation of I/O Interface

3. ETHERNET Activity LEDs for port 1, 2 and HUR device itself. Blinks during ethernet activity

#### 4. 5 pin Terminal Block

RS232: Tx, Rx and GND pins

RS485: A, B and GND pins

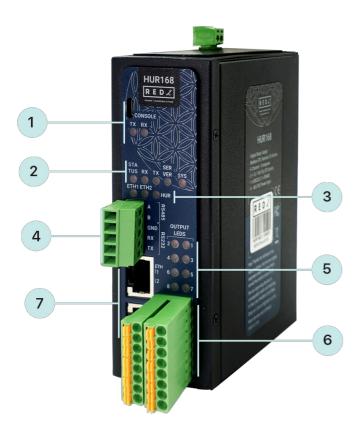
Can be activated over web interface and baud rate/data type configurable

5. Output Status LEDs: Shows which pin is ON (conducting) and OFF (cut off) for Digital Outputs

LED Number	LED Status and Description
1	
2	
3	ON: Output ON, circuit is
4	closed and running
5	OFF: Output is OFF,
6	circuit is open and cut off
7	
8	

- Output Channels: 8 Channel Output terminals and polarity is not important. 2 pins for each connection and total 16 connection pins. 5-275V AC-DC, 100mA Digital Optocoupler Outputs.
- 7. 10/100Base-T(X) Ethernet ports

#### 4.2 HUR168 & HUR268



1. Micro USB or USB Type-C Console port for LOG in 115200 baud

Console Tx and Rx Blinks when data transmission occurs

2. Device Status LEDs

STATUS: Blinks based on device operation

- When TCP line used blinks during no connection and keeps ON after TCP connection
- When Serial line used keeps ON

Device Tx and Rx Blinks when data transmission occurs

SERVER: Keeps ON after selecting Server from Server-Client Operating Modes. Keeps

OFF if Client operating Mode selected

SYS: Turns On for 1 second and Turns OFF for 1 second under normal operation of I/O Interface

- 3. ETHERNET Activity LEDs for port 1, 2 and HUR device itself. Blinks during ethernet activity
- 4. 5 pin Terminal Block

RS232: Tx, Rx and GND pins

RS485: A, B and GND pins

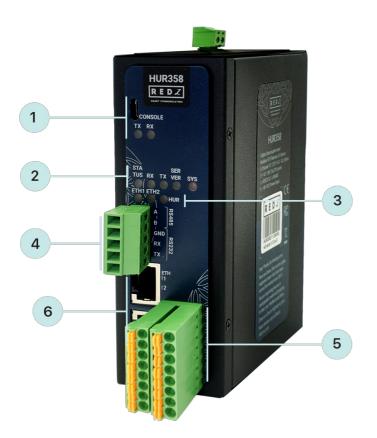
Can be activated over web interface and baud rate/data type configurable

5. Output Status LEDs: Shows which pin is ON (conducting) and OFF (cut off) for Digital Outputs.

LED Number	LED Status and Description
1	
2	
3	ON: Output ON, circuit is closed
4	and running
5	OFF: Output is OFF, circuit is open
6	and cut off
7	
8	

- Output Channels: 8 Channel Output terminals and polarity is not important. 2 pins for each connection and total 16 connection pins. Maximum 5 Amperes 250VAC/30VDC for each channel.
- 7. 10/100Base-T(X) Ethernet ports

#### 4.3 HUR358 & HUR458



1. Micro USB or USB Type-C Console port for LOG in 115200 baud

Console Tx and Rx Blinks when data transmission occurs

2. Device Status LEDs

STATUS: Blinks based on device operation

- When TCP line used blinks during no connection and keeps ON after TCP connection
- When Serial line used keeps ON

Device Tx and Rx Blinks when data transmission occurs

SERVER: Keeps ON after selecting Server from Server-Client Operating Modes. Keeps

OFF if Client operating Mode selected

SYS: Turns On for 1 second and Turns OFF for 1 second under normal operation of I/O Interface

- 3. ETHERNET Activity LEDs for port 1, 2 and HUR device itself. Blinks during ethernet activity
- 4. 5 pin Terminal Block

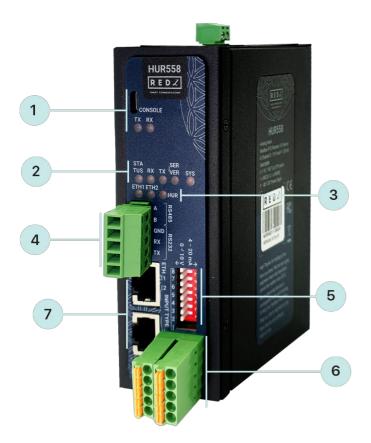
RS232: Tx, Rx and GND pins

RS485: A, B and GND pins

Can be activated over web interface and baud rate/data type configurable

- Input Channels: 8 Channel Input terminals and polarity is not important. 2 pins for each connection and total 16 connection pins. 12–275 AC-DC, 60mA Digital Optocoupler Inputs.
- 6. 10/100Base-T(X) Ethernet ports

#### 4.4 HUR558 & HUR658



1. Micro USB or USB Type-C Console port for LOG in 115200 baud

Console Tx and Rx Blinks when data transmission occurs

2. Device Status LEDs

STATUS: Blinks based on device operation

- When TCP line used blinks during no connection and keeps ON after TCP connection
- When Serial line used keeps ON

Device Tx and Rx Blinks when data transmission occurs

SERVER: Keeps ON after selecting Server from Server-Client Operating Modes. Keeps

OFF if Client operating Mode selected

SYS: Turns On for 1 second and Turns OFF for 1 second under normal operation of  $\rm I/O$ 

Interface

- 3. ETHERNET Activity LEDs for port 1, 2 and HUR device itself. Blinks during ethernet activity
- 4. 5 pin Terminal Block

RS232: Tx, Rx and GND pins

RS485: A, B and GND pins

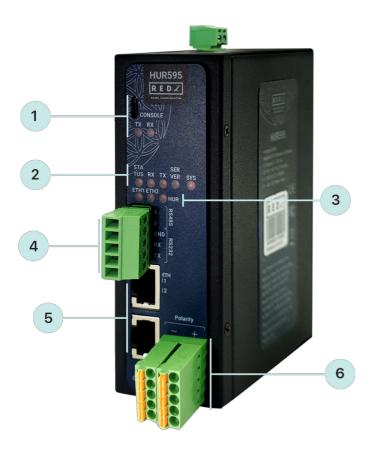
Can be activated over web interface and baud rate/data type configurable

5. Operation Mode Selection Switches for Analog Inputs: 8 pin Switch to select operation mode of each Analog Input either 0-10V or 0-20mA.

Switch Number	Switch Status and Description
1	
2	Switch Position ON: 4-20mA analog input expected
3	
4	
5	Switch Position OFF: 0-10V
6	analog input expected
7	
8	

- Input Channels: 8 Channel Input terminals and polarity is important. All inputs references to Common point. 2 Common points and 8 Analog Inputs total 10 connection pins. 0–10V and 0–20mA Individually Selectable Analog Inputs.
- 7. 10/100Base-T(X) Ethernet ports

#### 4.5 HUR595 & HUR695



1. Micro USB or USB Type-C Console port for LOG in 115200 baud

Console Tx and Rx Blinks when data transmission occurs

2. Device Status LEDs

STATUS: Blinks based on device operation

- When TCP line used blinks during no connection and keeps ON after TCP connection
- When Serial line used keeps ON

Device Tx and Rx Blinks when data transmission occurs

SERVER: Keeps ON after selecting Server from Server-Client Operating Modes. Keeps

OFF if Client operating Mode selected

SYS: Turns On for 1 second and Turns OFF for 1 second under normal operation of I/O Interface

- 3. ETHERNET Activity LEDs for port 1, 2 and HUR device itself. Blinks during ethernet activity
- 4. 5 pin Terminal Block

RS232: Tx, Rx and GND pins

RS485: A, B and GND pins

Can be activated over web interface and baud rate/data type configurable

- Output Channels: 5 Channel Output terminals and polarity is important. 2 pins for each connection and total 10 connection pins. 4–20mA Analog Outputs designed for 24V 250ohm load or 12V 125ohm load.
- 6. 10/100Base-T(X) Ethernet ports

#### 4.6 HUR711 & HUR811



- 1. Micro USB or USB Type-C Console port for LOG in 115200 baud Console Tx and Rx Blinks when data transmission occurs
- 2. Device Status LEDs

STATUS: Blinks based on device operation

- When TCP line used blinks during no connection and keeps ON after TCP connection
- When Serial line used keeps ON

Device Tx and Rx Blinks when data transmission occurs

SERVER: Keeps ON after selecting Server from Server-Client Operating Modes. Keeps OFF if Client operating Mode selected

S-1, S-2, S-3 and S-4: Turns On for 1 second and Turns OFF for 1 second under normal operation of I/O Interface. Each LED corresponds to related I/O Slot.

- 3. ETHERNET Activity LEDs for port 1, 2 and HUR device itself. Blinks during ethernet activity
- 4. Output Status LEDs: Shows which pin is ON (conducting) and OFF (cut off) for Digital Outputs for relevant Slot

LED Number	LED Status and Description
1	
2	
3	ON: Output ON, circuit is
4	closed and running
5	OFF: Output is OFF,
6	circuit is open and cut off
7	
8	

- 5. Output Channels for All Slots: 8 Channel Output terminals and polarity is not important.
  2 pins for each connection and total 16 connection pins. 5-275V AC-DC, 100mA Digital Optocoupler Outputs.
- 6. 10/100Base-T(X) Ethernet ports

#### 4.7 HUR712 & HUR812



- 1. Micro USB or USB Type-C Console port for LOG in 115200 baud Console Tx and Rx Blinks when data transmission occurs
- 2. Device Status LEDs

STATUS: Blinks based on device operation

- When TCP line used blinks during no connection and keeps ON after TCP connection
- When Serial line used keeps ON

Device Tx and Rx Blinks when data transmission occurs

SERVER: Keeps ON after selecting Server from Server-Client Operating Modes. Keeps

OFF if Client operating Mode selected

- 3. S-1, S-2, S-3 and S-4: Turns On for 1 second and Turns OFF for 1 second under normal operation of I/O Interface. Each LED corresponds to related I/O Slot.
- 4. ETHERNET Activity LEDs for port 1, 2 and HUR device itself. Blinks during ethernet activity
- 5. Output Status LEDs: Shows which pin is ON (conducting) and OFF (cut off) for Digital

LED Number	LED Status and Description
1	
2	
3	ON: Output ON, circuit is closed
4	and running
5	OFF: Output is OFF, circuit is open
6	and cut off
7	
8	

- 6. Output Channels for All Slots: 8 Channel Output terminals and polarity is not important.
  2 pins for each connection and total 16 connection pins. Maximum 5 Amperes
  250VAC/30VDC for each channel.
- 7. 10/100Base-T(X) Ethernet ports

#### 4.8 HUR713 & HUR813



- 1. Micro USB or USB Type-C Console port for LOG in 115200 baud Console Tx and Rx Blinks when data transmission occurs
- 2. Device Status LEDs

STATUS: Blinks based on device operation

- When TCP line used blinks during no connection and keeps ON after TCP connection
- When Serial line used keeps ON

Device Tx and Rx Blinks when data transmission occurs

SERVER: Keeps ON after selecting Server from Server-Client Operating Modes. Keeps

OFF if Client operating Mode selected

S-1, S-2, S-3 and S-4: Turns On for 1 second and Turns OFF for 1 second under normal operation of I/O Interface. Each LED corresponds to related I/O Slot.

- 3. ETHERNET Activity LEDs for port 1, 2 and HUR device itself. Blinks during ethernet activity
- 4. Input Channels for All Slots: 8 Channel Input terminals and polarity is not important. 2 pins for each connection and total 16 connection pins. 12–275 AC-DC, 60mA Digital

Optocoupler Inputs.

5. 10/100Base-T(X) Ethernet ports

#### 4.9 HUR714 & HUR814



1. Micro USB or USB Type-C Console port for LOG in 115200 baud

Console Tx and Rx Blinks when data transmission occurs

2. Device Status LEDs

STATUS: Blinks based on device operation

- When TCP line used blinks during no connection and keeps ON after TCP connection
- When Serial line used keeps ON

Device Tx and Rx Blinks when data transmission occurs

SERVER: Keeps ON after selecting Server from Server-Client Operating Modes. Keeps

OFF if Client operating Mode selected

S-1, S-2, S-3 and S-4: Turns On for 1 second and Turns OFF for 1 second under normal operation of I/O Interface. Each LED corresponds to related I/O Slot.

- 3. ETHERNET Activity LEDs for port 1, 2 and HUR device itself. Blinks during ethernet activity
- Input Channels for All Slots: 8 Channel Input terminals and polarity is important. All inputs references to Common point. 2 Common points and 8 Analog Inputs total 10 connection pins. 0–10V and 0–20mA Individually Configurable during order (default is 0–20mA version) Analog Inputs.
- 5. 10/100Base-T(X) Ethernet ports

#### 4.10 HUR715 & HUR815



- 1. Micro USB or USB Type-C Console port for LOG in 115200 baud Console Tx and Rx Blinks when data transmission occurs
- 2. Device Status LEDs

STATUS: Blinks based on device operation

- When TCP line used blinks during no connection and keeps ON after TCP connection
- When Serial line used keeps ON

Device Tx and Rx Blinks when data transmission occurs

SERVER: Keeps ON after selecting Server from Server-Client Operating Modes. Keeps

OFF if Client operating Mode selected

S-1, S-2, S-3 and S-4: Turns On for 1 second and Turns OFF for 1 second under normal operation of I/O Interface. Each LED corresponds to related I/O Slot.

- 3. ETHERNET Activity LEDs for port 1, 2 and HUR device itself. Blinks during ethernet activity
- 4. Output Channels for All Slots: 5 Channel Output terminals and polarity is important. 2 pins for each connection and total 10 connection pins. 4–20mA Analog Outputs designed for 24V 250ohm load or 12V 125ohm load.
- 5. 10/100Base-T(X) Ethernet ports

#### 4.11 HUR721 & HUR821



- 1. Micro USB or USB Type-C Console port for LOG in 115200 baud Console Tx and Rx Blinks when data transmission occurs
- 2. Device Status LEDs

STATUS: Blinks based on device operation

- When TCP line used blinks during no connection and keeps ON after TCP connection
- When Serial line used keeps ON

Device Tx and Rx Blinks when data transmission occurs

SERVER: Keeps ON after selecting Server from Server-Client Operating Modes. Keeps

OFF if Client operating Mode selected

S-1, S-2, S-3 and S-4: Turns On for 1 second and Turns OFF for 1 second under normal operation of I/O Interface. Each LED corresponds to related I/O Slot.

- 3. ETHERNET Activity LEDs for port 1, 2 and HUR device itself. Blinks during ethernet activity
- 4. Output Status LEDs for Slot 1 and 2: Shows which pin is ON (conducting) and OFF (cut

off) for Digital Outputs for relevant Slot

LED Number	LED Status and Description
1	
2	
3	ON: Output ON, circuit is
4	closed and running
5	OFF: Output is OFF,
6	circuit is open and cut off
7	
8	

- Output Channels for Slot 1 and 2: 8 Channel Output terminals and polarity is not important. 2 pins for each connection and total 16 connection pins. 5-275V AC-DC, 100mA Digital Optocoupler Outputs.
- 6. Input Channels for Slot 3 and 4: 8 Channel Input terminals and polarity is not important.
  2 pins for each connection and total 16 connection pins. 12–275 AC-DC, 60mA Digital Optocoupler Inputs.
- 7. 10/100Base-T(X) Ethernet ports

#### 4.12 HUR722 & HUR822



- 1. Micro USB or USB Type-C Console port for LOG in 115200 baud Console Tx and Rx Blinks when data transmission occurs
- 2. Device Status LEDs

STATUS: Blinks based on device operation

- When TCP line used blinks during no connection and keeps ON after TCP connection
- When Serial line used keeps ON

Device Tx and Rx Blinks when data transmission occurs

SERVER: Keeps ON after selecting Server from Server-Client Operating Modes. Keeps

OFF if Client operating Mode selected

S-1, S-2, S-3 and S-4: Turns On for 1 second and Turns OFF for 1 second under normal operation of I/O Interface. Each LED corresponds to related I/O Slot.

- 3. ETHERNET Activity LEDs for port 1, 2 and HUR device itself. Blinks during ethernet activity
- 4. Output Status LEDs for Slot 1 and 2: Shows which pin is ON (conducting) and OFF (cut

off) for Digital Outputs for relevant Slot

LED Number	LED Status and Description
1	
2	
3	ON: Output ON, circuit is
4	closed and running
5	OFF: Output is OFF,
6	circuit is open and cut off
7	
8	

- Output Channels for Slot 1 and 2: 8 Channel Output terminals and polarity is not important. 2 pins for each connection and total 16 connection pins. Maximum 5 Amperes 250VAC/30VDC for each channel.
- 6. Input Channels for Slot 3 and 4: 8 Channel Input terminals and polarity is not important.
  2 pins for each connection and total 16 connection pins. 12–275 AC-DC, 60mA Digital Optocoupler Inputs.
- 7. 10/100Base-T(X) Ethernet ports

#### 4.13 HUR725 & HUR825



- 1. Micro USB or USB Type-C Console port for LOG in 115200 baud Console Tx and Rx Blinks when data transmission occurs
- 2. Device Status LEDs

STATUS: Blinks based on device operation

- When TCP line used blinks during no connection and keeps ON after TCP connection
- When Serial line used keeps ON

Device Tx and Rx Blinks when data transmission occurs

SERVER: Keeps ON after selecting Server from Server-Client Operating Modes. Keeps

OFF if Client operating Mode selected

S-1, S-2, S-3 and S-4: Turns On for 1 second and Turns OFF for 1 second under normal operation of I/O Interface. Each LED corresponds to related I/O Slot.

- 3. ETHERNET Activity LEDs for port 1, 2 and HUR device itself. Blinks during ethernet activity
- 4. Output Channels for Slot 1 and 2: 5 Channel Output terminals and polarity is important.2 pins for each connection and total 10 connection pins. 4–20mA Analog Outputs

designed for 24V 250ohm load or 12V 125ohm load.

- Input Channels for Slot 3 and 4: 8 Channel Input terminals and polarity is important. All inputs references to Common point. 2 Common points and 8 Analog Inputs total 10 connection pins. 0-10V and 0-20mA Individually Configurable during order (default is 0-20mA version) Analog Inputs.
- 6. 10/100Base-T(X) Ethernet ports

#### 4.14 HUR741 & HUR841



- Micro USB or USB Type-C Console port for LOG in 115200 baud Console Tx and Rx Blinks when data transmission occurs
- 2. Device Status LEDs

STATUS: Blinks based on device operation

- When TCP line used blinks during no connection and keeps ON after TCP connection

- When Serial line used keeps ON

Device Tx and Rx Blinks when data transmission occurs

SERVER: Keeps ON after selecting Server from Server-Client Operating Modes. Keeps

OFF if Client operating Mode selected

S-1, S-2, S-3 and S-4: Turns On for 1 second and Turns OFF for 1 second under normal operation of I/O Interface. Each LED corresponds to related I/O Slot.

- 3. ETHERNET Activity LEDs for port 1, 2 and HUR device itself. Blinks during ethernet activity
- 4. Output Status LEDs for Slot 2: Shows which pin is ON (conducting) and OFF (cut off) for Digital Outputs for relevant Slot

LED Number	LED Status and Description
1	
2	
3	ON: Output ON, circuit is
4	closed and running
5	OFF: Output is OFF,
6	circuit is open and cut off
7	
8	

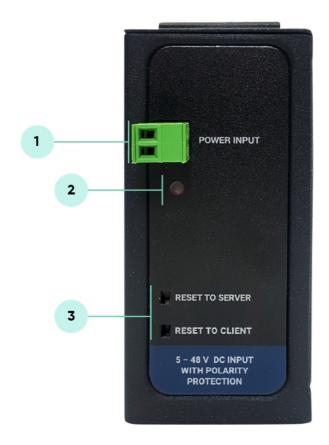
- Output Channels for Slot 1: 5 Channel Output terminals and polarity is important. 2 pins for each connection and total 10 connection pins. 4–20mA Analog Outputs designed for 24V 250ohm load or 12V 125ohm load.
- Output Channels for Slot 2: 8 Channel Output terminals and polarity is not important. 2 pins for each connection and total 16 connection pins. Maximum 5 Amperes 250VAC/30VDC for each channel.
- Input Channels for Slot 3: 8 Channel Input terminals and polarity is important. All inputs references to Common point. 2 Common points and 8 Analog Inputs total 10 connection pins. 0–10V and 0–20mA Individually Configurable during order (default is

0-20mA version) Analog Inputs.

- Input Channels for Slot 4: 8 Channel Input terminals and polarity is not important. 2 pins for each connection and total 16 connection pins. 12–275 AC-DC, 60mA Digital Optocoupler Inputs.
- 9. 10/100Base-T(X) Ethernet ports

## 5. Top Panel Description

#### 5.1 HUR158 & HUR168 & HUR358 & HUR558 & HUR595



- 1. Power Input DC: 5-48V (allows up to 60V) DC. Polarity protected so that the power input can be connected in any direction
- 2. Power LED: Turns ON when there is power in device
- 3. Reset Buttons

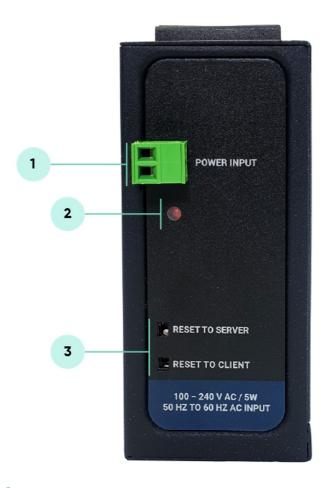
RESET TO SERVER: Resets the device to factory setting as Server from Server-Client

Operating Modes

RESET TO CLIENT: Resets the device to factory setting as Client from Server-Client

Operating Modes

#### 5.2 HUR258 & HUR268 & HUR458 & HUR658 & HUR695



- 1. Power Input AC: 100 240V AC (120 370V DC), 50Hz to 60Hz AC Input
- 2. Power LED: Turns ON when there is power in device
- 3. Reset Buttons

RESET TO SERVER: Resets the device to factory setting as Server from Server-Client

**Operating Modes** 

RESET TO CLIENT: Resets the device to factory setting as Client from Server-Client

**Operating Modes** 

Reset can be done at any time by pushing any of the button for 5 seconds.

# 5.3 HUR711 & HUR712 & HUR713 & HUR714 & HUR715 & HUR721 & HUR722 & HUR725 & HUR741



- 1. Power Input DC: 5-48V (allows up to 60V) DC. Polarity protected so that the power input can be connected in any direction
- 2. Power LED: Turns ON when there is power in device
- 3. Reset Buttons

RESET TO SERVER: Resets the device to factory setting as Server from Server-Client

**Operating Modes** 

RESET TO CLIENT: Resets the device to factory setting as Client from Server-Client

**Operating Modes** 

Reset can be done at any time by pushing any of the button for 5 seconds.

# 5.4 HUR811 & HUR812 & HUR813 & HUR814 & HUR815 & HUR821 & HUR822 & HUR825 & HUR841



- 1. Power Input AC: 100 240V AC (120 370V DC), 50Hz to 60Hz AC Input
- 2. Power LED: Turns ON when there is power in device
- 3. Reset Buttons

RESET TO SERVER: Resets the device to factory setting as Server from Server-Client

**Operating Modes** 

RESET TO CLIENT: Resets the device to factory setting as Client from Server-Client

Operating Modes

Reset can be done at any time by pushing any of the button for 5 seconds.

## 6. Ethernet Cables

HUR Series Modbus TCP Remote Input/Output (I/O) Deviceshave standard Ethernet ports. According to the link type, the switches use CAT 3, 4, 5, 5e UTP cables to connect to any other network device (PCs, servers, switches, routers, or hubs).

#### 6.1 Cable Type and Specifications

Cable	Туре	Max. Length	Connector
10BASE-T	Cat. 3, 4, 5 100- ohm	UTP 100 m (328 ft)	RJ-45
100BASE-TX	Cat. 5 100-ohm UTP	UTP 100 m (328 ft)	RJ-45

#### 6.2 ETH Cable Pin Assignments

With 100BASE-TX/10BASE-T cable, pins 1 - 2 are used for transmitting data and pins 3 - 6 are used for receiving data.

Pin Number	Description
1	TD+
2	TD-
3	RD+
4	Not Used
5	Not Used
6	RD-
7	Not Used
8	Not Used

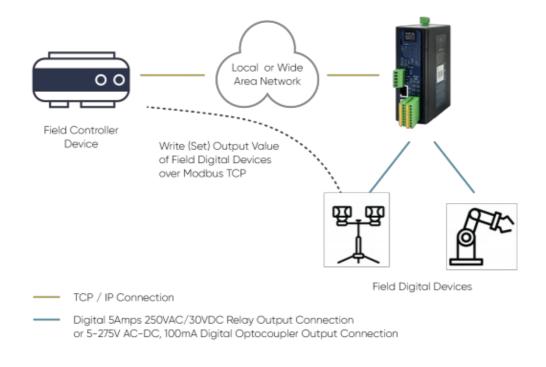
## 7. Usage Scenarios and Connection Diagrams

HUR Series Modbus TCP Remote I/O Devices can be used in different scenarios. Usages are not limited to that examples and user may create their own usage scenario.

#### 6.1 Scenario 1: Write/Set Status of Digital Field Devices

HUR Series Modbus TCP Remote I/O Devices can be connected to Digital field devices and Field Control or Central Software Control System can write parameters such as Turn ON a light or Turn on a valve. Communication protocol will be Modbus TCP. Outputs will be 5-275V AC-DC, 100mA Digital Optocoupler Output or 5Amperes 250VAC/30VDC Relay Output. Following devices can be used for this application:

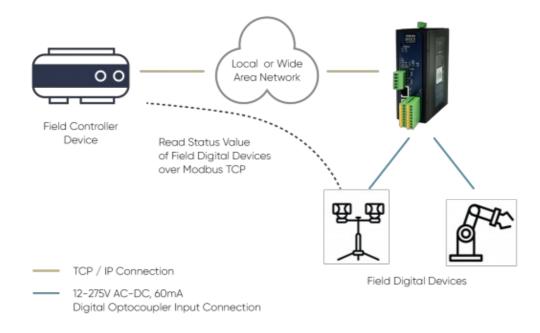
- HUR158 and HUR258 with 8 Channel 5-275V AC-DC, 100mA Digital Optocoupler Output
- HUR168 and HUR268 with 8 Channel Digital 5Amps 250VAC/30VDC Relay Output



#### 6.2 Scenario 2: Read Status of Digital Field Devices

HUR Series Modbus TCP Remote I/O Devices can be connected to Digital field devices and Field Control or Central Software Control System can read status of the field devices such as status of light or status of a circuit breaker. Communication protocol will be Modbus TCP. Inputs will be 12-275V AC-DC, 60mA Digital Optocoupler Input. Following devices can be used for this application:

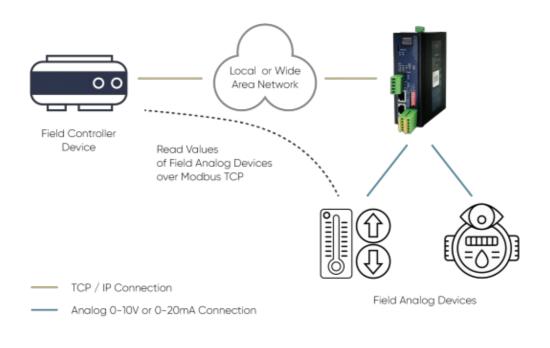
• HUR358 and HUR458 with 8 Channel 12-275V AC-DC, 60mA Digital Optocoupler Input



#### 6.3 Scenario 3: Read Analog Field Devices

HUR Series Modbus TCP Remote I/O Devices can be connected to Analog field devices and Field Control or Central Software Control System can read status of the field devices such as status temperature sensors or pressure sensors. Communication protocol will be Modbus TCP. Inputs will be 0-10V and 0-20mA Selectable Analog Input. Following devices can be used for this application:

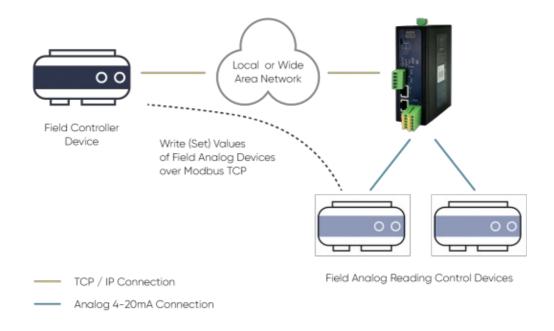
• HUR558 and HUR658 with 8 Channel 0-10V and 0-20mA Selectable Analog Input



#### 6.4 Scenario 4: Write Analog Values for Field Control Devices

HUR Series Modbus TCP Remote I/O Devices can be connected to field control devices and Field Main Control or Central Software Control System can write Analog Values for that secondary field control devices such as duplicating or generating an analog value like flow of a fluid value for a field control device. Communication protocol will be Modbus TCP. Outputs will be 4-20mA Analog Output. Following devices can be used for this application:

• HUR595 and HUR695 with 5 Channel 4-20mA Analog Output



#### 6.5 Scenario 5: Read Status of Digital Field Devices Over LoRa RF Wireless Network

REDZ TLM Series LoRa Based RF Gateways can link TCP/IP based devices and create a network over RF. For example, with TLM Series LoRa Based RF Gateways users can connect HUR Series Modbus TCP Remote I/O Devices with Field Control Devices over RF network and create wireless automation.

TLM act as TCP/IP to LoRa RF Gateway configured as Client Mode on HUR Series Modbus TCP Remote I/O Devices side to connect them actively and configured as Server Mode on Field Controller Device side to wait connection.

HUR Series Modbus TCP Remote I/O Devices can be connected to Digital field devices and Field Control or Central Software Control System can read status of the field devices such as status of light or status of a circuit breaker.

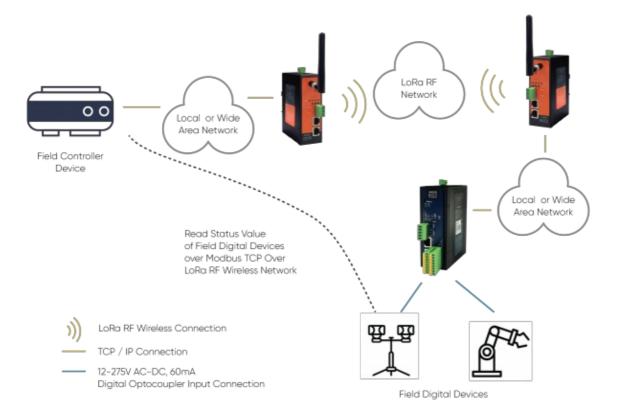
Communication protocol will be Modbus TCP over Lora RF Network thanks to TLM connection.

Inputs will be 12-275V AC-DC, 60mA Digital Optocoupler Input. Following devices can be used for this application:

- TLM154: 868MHz LoRa based gateway, 2x 10/100 T(x) ETH ports, 1 x RS232 & 1 x RS485, 5-60V DC Power Input
- TLM254: 868MHz LoRa based gateway, 2x 10/100 T(x) ETH ports, 1 x RS232 & 1 x RS485, 90 265V AC (100 370V DC), 47Hz to 63Hz AC Power Input
- TLM655: 868MHz LoRa based gateway, 2x 10/100 T(x) ETH ports + 1 x BPL (Broadband Power Line) Link, 1 x RS232 & 1 x RS485, 3 Phase AC Power Input, 110V-240V/50-60Hz

(User needs to create a Broadband Powerline Network with REDZ devices by using TLM or BSB series in order to use that model)

• HUR358 and HUR458 with 8 Channel 12-275V AC-DC, 60mA Digital Optocoupler Input



# 6.6 Scenario 6: Read/Write Field I/O Devices with Modbus TCP Protocol Over TCP/IP Network and Send Read Data to MQTT Server and Control Remote Output From MQTT Server

HUR Series Modbus TCP Remote I/O Devices can be connected to Analog field devices and Field Control or Central Software Control System can read status of the field devices such as status temperature sensors or pressure sensors.

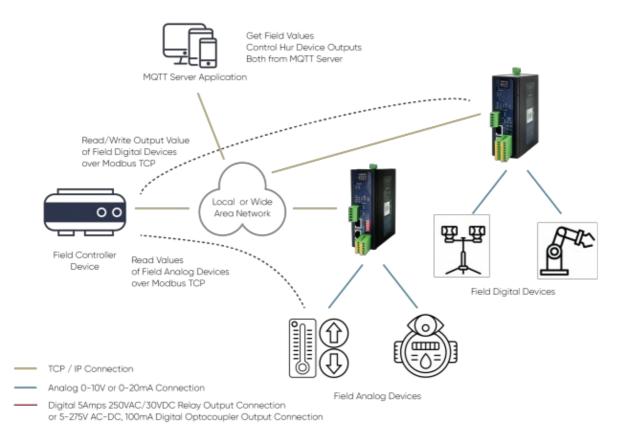
Inputs will be 0-10V and 0-20mA Selectable Analog Input. Following devices can be used for this application:

• HUR518 and HUR618 with 8 Channel 0-10V and 0-20mA Selectable Analog Input

HUR Series Modbus TCP Remote I/O Devices can be connected to Digital field devices and Field Control or Central Software Control System can write parameters such as Turn ON a light or Turn on a valve. Communication protocol will be Modbus TCP. Outputs will be 5-275V AC-DC, 100mA Digital Optocoupler Output or 5Amperes 250VAC/30VDC Relay Output. Following devices can be used for this application:

- HUR158 and HUR258 with 8 Channel 5-275V AC-DC, 100mA Digital Optocoupler Output
- HUR168 and HUR268 with 8 Channel Digital 5Amps 250VAC/30VDC Relay Output

All read data can be sent to MQTT server for web based applications. Also MQTT Server can control field device remotely via commands. Field device can read/write HUR Series Modbus TCP Remote I/O Devices, all can take palce in simultaneously.



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**NOTE:** HUR Series Modbus TCP Remote I/O Devices can be queried via Modbus TCP and send their data to MQTT Server simultaneously.

Thus, same HUR device can be used for field I/O device over Modbus TCP and getting I/O data from MQTT Server and even control output of HUR via MQTT Server.

### 6.7 Scenario 7: I/O Mirror Application Between 2 HUR Series Modbus TCP Remote I/O Devices

HUR Series Modbus TCP Remote I/O Devices Output versions can duplicate input value of Input versions. Outputs can be 5-275V AC-DC, 100mA Digital Optocoupler Output or 5Amperes 250VAC/30VDC Relay Output or 4-20mA Analog Output. Following devices can be used as output device for this application:

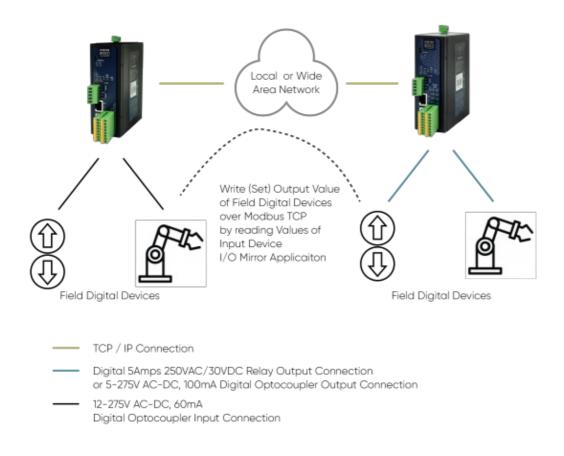
- HUR158 and HUR258 with 8 Channel 5-275V AC-DC, 100mA Digital Optocoupler Output
- HUR168 and HUR268 with 8 Channel Digital 5Amps 250VAC/30VDC Relay Output

• HUR595 and HUR695 with 5 Channel 4-20mA Analog Output

Inputs can be 12-275V AC-DC, 60mA Digital Optocoupler Input or 4-20mA Analog Input. Following devices can be used for this application:

- HUR358 and HUR458 with 8 Channel 12-275V AC-DC, 60mA Digital Optocoupler Input
- HUR558 and HUR658 with 8 Channel 0-10V and 0-20mA Selectable Analog Input

As expected, Analog devices can pair with each other and Digital devices can pair with each other.



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**NOTE:** I/O Mirror Application can be done between same I/O devices which means Analog devices can pair with each other and Digital devices can pair with each other.

# 8. Configuration via WEB Interface

HUR Series Modbus TCP Remote I/O Devices can be configured over web interface.

Device will get IP from DHCP client when connected to a network. User can use discovery tool to see IP of the device.



Once the IP of the device is set, user may login the device by simply typing the Ip address of device.

Microchip TCPIP Discoverer				-		×
	Discover Devices	Network Direct Broadcas		Exit		
	ip Devices					
Har	mony MAC-Address - 60:8a:10:a3:5e:05					
_	MAC-Address - 60:8a:10:a3:5e:05 MAC-Address - 60:8a:10:a3:81:00					
	MAC-Address - 60:8a:10:a3:63:5d					
	MAC-Address - 60:8a:10:a3:6b:62					
-	MAC-Address - 60:8a:10:a3:81:8b					
	MAC-Type					
	PIC32INT					
11	HUR_SERVER     IP Addresses					
	Addresses     192.168.0.106					
	MAC-Address - e8:eb:1b:f3:a9:72					
	MAC-Address - 60:8a:10:a3:6b:5e					
			Date - Oct,31 2017 Version - TCPIP Disc	overer 2.0	6	

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**NOTE 1:** HUR default firmware runs with DHCP off and expects an IP lease. If user need static IP or prefers DHCP on during start up, additional firmware is available.

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**NOTE 2**: If there is no DHCP server in LAN, REDZ device will get default 192.168.1.1 IP if it is set as Server Mode. It will get default 192.168.1.100 IP if it is set as Client mode.

# 10.1 Connecting Web Interface

Simply write IP of the device to the http client. Google Chrome is suggested to use. Login screen will pop up.

#### Default user name: admin Default password: admin

Oturum açı	n			
http://192.168.0.143 Bu siteye bağlantınız gizli değil				
Kullanıcı adı	admin			
Şifre	•••••			
	Oturum açın	İptal		

Main screen of device will appear with following information:

		REDZ HUR Series Multi Slot I/O Device Version: 2.01.00, -built Nov 30.2023.21.14.16 MAC: 60.8a.10.a3.81.8b
×	Operating Mode	Operating Mode
		Server Configuration
		Client Configuration
		Device Name HUR_SERVER
f.		

Firmware Info, MAC details and Device Name on top

Menu Items on left

Menu Item details in center

# 10.2 MENU: Operating Mode

From this menu user may select the operating mode of the device.

There are 2 different Operating Modes:

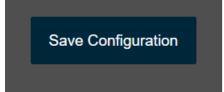
Server Configuration act as TCP Server Device with MQTT Publisher

Client Configuration act as TCP Client Device

- Set <u>"Server Configuration</u>" to read or control Input/Output (I/O) values of device over Modbus TCP and/or send meter data to MQTT Server.
- Set <u>"Client Configuration</u>" to read or control Input/Output values of device over Modbus TCP but this time client will connect to remote IP by itself. This is also used in I/O Mirror applciation to connect remote I/O device.

"Device Name" field is used to identify device.

When all settings done, click "Save Configuration" to save settings.



After clicking button system will tell if the settings applied successfully or not.

Operating Mode Changed.	
ОК	

**NOTE 1:** HUR Series Modbus TCP Remote I/O Devices can keep configuration of 2 different modes in its memory and once the configuration enabled, its already saved settings will be applied. Device can act as Server or Client at a time.

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NOTE 2: Settings will be applied once the device is rebooted from web interface or repowered manually.

### 10.3 MENU: Network Settings - Server

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From this menu user may change the network settings of the device.

- User can change NTP Server address that used in MQTT data transmission.
- User can activate MQTT Publisher mode and change settings for MQTT data tranmission.
- User can change TCP Listening port for field devices.
- User can select maximum number of clients allowed to connect device.
- User can activate DHCP server.
- User can force device to a static IP.

NTP Settings	
NTP Server	
pool.ntp.org	
MQTT Settings	
Enable MQTT Publisher for Enabled Obis Codes	
Server Network Settings	
Server Listening Port	Maximum Number of Clients
502	
DHCP Server Enabled	Use Static Address for Device

<u>"NTP Server"</u>: NTP Server address that used in MQTT data transmission.

<u>"Enable MQTT Publisher for Enabled Obis Codes"</u>: Click to enable MQTT Publisher. HUR will send data read from meters for enabled OBIS codes ( there are up to 48 available) to MQTT Server

If "Enable MQTT Publisher for Enabled Obis Codes" is checked, following settings will be shown.

Enable MQTT Publisher	
MQTT Broker IP	MQTT Broker Port
75.2.83.130	1883
Client ID MQTT_HUR_Client	
User Name	Password
MQTT_HUR_User	c57cc77a-168f-4033-9bec-2e4f25d0e269
Publish Topic	Subscribe Topic
MQTT_HUR_Publish_topic	MQTT_HUR_Subscribe_topic
Minimum Send Interval for a Parsed Data (in seconds) 60	Data Format PARSED DATA AS OBJECTS ~

<u>"MQTT Broker IP"</u>: TCP IP of the MQTT Server. User must enter IP value Ex: 75.2.83.130 is for "https://tago.io/" web address

<u>"MQTT Broker Port"</u>: TCP Port of the MQTT Server. Ex: 1883 is for "https://tago.io/" web address

<u>"Client ID"</u>: MQTT Publisher client ID. Default is "MQTT\_HUR\_Client". Maximum length for this field is 32.

<u>"User Name</u>": MQTT Publisher user name. This must be entered based on MQTT server settings. Maximum length for this field is 64.

<u>"Password</u>": MQTT Publisher password. This must be entered based on MQTT server settings. Maximum length for this field is 48.

<u>"Publish Topic"</u>: MQTT Publisher topic value. Default is "MQTT\_HUR\_Publish\_topic". Maximum length for this field is 32.

<u>"Subscribe Topic"</u>: MQTT Publisher subscribe topic value. Default is "MQTT\_HUR\_Subscribe\_topic". Maximum length for this field is 32.

<u>"Minimum Send Interval for a Parsed Data (in seconds)"</u>: Minimum value to send meter data to MQTT Server. This time may be longer due to meter quantity in reading queue.

"Data Format": Options for how data is shared by HUR with MQTT server. There are 2 options:

Parsed Data as Objects

Parsed Data as Modbus Frame

When selected as "Parsed Data as Objects", HUR will share data as follows

Device Name, Device Model, NTP Time and Data itself in pairs as IO number and its value.

Device Model Can be:

"Analog Out" "Digital Out" "Analog In" "Digital In"

Here is an example for "Digital Out"

#### 11:04:49: [MQTT] Device publish

{ "topic": "MQTT\_HUR\_Publish\_topic", "payload": "{\"HURNme\":\"HUR\_SERVER1\",\"HURMdl\":\"Digital Out\","Time\":\"1701417889\","Data\": {\"I01\":\"1\",\"I02\":\"1\",\"I03\":\"0\",\"I04\":\"0\",\"I05\":\"0\",\"I06\":\"0\",\"I07\":\"1\",\"I08\":\"1\"}}", "qos": 0, "isHex": false, "bucket": "65326fbe7dc2cd00092f998f", "messageId": 0 } { "topic": "MOTT\_HUB\_Publish\_topic", "payload": "{\"HURNme\":\"HUB\_SERVER1\",\"HUBMdl\":\"Digital\_Out\",\"Time\":\"1701417889\",\"Data\":

{ "topic": "MQTT\_HUR\_Publish\_topic", "payload": "{"HURNme!":\"HUR\_SERVER1\",\"HURMdl\":\"Digital Out\",\"Time\":\"1701417889\",\"Data\": {\"IO1\":\"1\",\"IO2\":\"1\",\"IO3\":'"0\",\"IO4\":\"0\",\"IO5\":\"0\",\"IO6\":\"0\",\"IO7\":\"1\",\"IO8\":\"1\"}}", "qos": 0, "isHex": false, "bucket": "65326fbe7dc2cd00092f998f", "messageld": 0 }

"IO1" is the first one and its value is shown as "1" Which means digital out value for 1st port is "1" or "ON". Next values can be seen in same manner.

Here is an example for "Digital In"

#### 12:13:54: [MQTT] Device publish

{ "topic": "MQTT\_HUR\_Publish\_topic", "payload": "{\"HURNme\":\"HUR\_SERVER\",\"HURMdl\":\"Digital In\",\"Time\":\"1701422033\",\"Data\":

{\"IO1\":\"1\",\"IO2\":\"0\",\"IO3\":\"0\",\"IO3\":\"0\",\"IO3\":\"0\",\"IO5\":\"0\",\"IO6\":\"0\",\"IO7\":\"0\",\"IO8\":\"0\"}}", "qos": 0, "isHex": false, "bucket": "65699f72cc7006000fd24c88", "messageId": 0 }

{ "topic": "MQTT\_HUR\_Publish\_topic", "payload": "{\"HURNme\":\"HUR\_SERVER\",\"HURMdl\":\"Digital In\",\"Time\":\"1701422033\",\"Data\": {\"IO1\":\"1\",\"IO2\":\"0\",\"IO3\":\"0\",\"IO4\":\"0\",\"IO5\":\"0\",\"IO6\":\"0\",\"IO7\":\"0\",\"IO8\":\"0\",\"IO8\":\"0\"}}", "qos": 0, "isHex": false, "bucket": "65699f72cc7006000fd24c88", "messageld": 0 }

"IO1" is the first one and its value is shown as "1" Which means diaital out value for 1st port is "1" or "ON". Next values can be seen in same manner.

Here is an example for "Analog Out"

12:03:13:

[MQTT] Device publish

{ "topic": "MQTT HUR Publish topic", "payload": "{\"HURNme\":\"HUR SERVER1\",\"HURMd\\":\"Analog Out/",/"Time/":/"1701421393/",/"Data/":{\"IO1/":/"1F4\",/"IO2/":/"64\",/"IO3/":/"3E8\",/"IO4/":/"64\",/"IO5/":/"32\"}}", "gos": 0, "isHex": false, "bucket": "65326fbe7dc2cd00092f998f", "messageId": 0 }

{ "topic": "MQTT\_HUR\_Publish\_topic", "payload": "{\"HURNme\":\"HUR\_SERVER1\",\"HURMd\":\"Analog Out\",\"Time\":\"1701421393\",\"Data\": {\"IO1\":\"1F4\",\"IO2\":\"64\",\"IO3\":\"3E8\",\"IO4\":\"64\",\"IO5\":\"32\"}}", "qos": 0, "isHex": false, "bucket": "65326fbe7dc2cd00092f998f", "messageld": 0 }

"IO1" is the first one and its value is shown as "IF4"

Which means analog out value for 1st port is "500" in decimal within a range of 0-1000. Which means port 1 value is "12.0mA".

Next values can be seen in same manner.

Here is an example for "Analog In"

12:09:07:

#### [MQTT] Device publish

{ "topic": "MQTT HUR Publish topic", "payload": "{\"HURNme\":\"HUR AI 8100\",\"HURMdl\":\"Analog In\",\"Data\": {\"IO1\":\"7F3B\",\"IO2\":\"0\",\"IO3\":\"0\",\"IO4\":\"0\",\"IO5\":\"0\",\"IO6\":\"0\",\"IO7\":\"0\",\"IO8\"\"IO8\":\"0\",\"IO8\":\"0\",\"IO8\":\"0\",\"IO8\":\"0\",\"IO8\" false, "bucket": "65699c4040e648000925f01e", "messageId": 0 }

{ "topic": "MQTT HUR Publish topic", "payload": "{\"HURNme\":\"HUR AI 8100\",\"HURMdl\":\"Analog In\",\"Data\":

{\"IO1\":\"7F3C\",\"IO2\":\"0\",\"IO3\":\"0\",\"IO4\":\"0\",\"IO5\":\"0\",\"IO6\":\"0\",\"IO7\":\"0\",\"IO8\":\"0\"}}," qos": 0, "isHex": false, "bucket": "65699c4040e648000925f01e", "messageld": 0 }

"IO1" is the first one and its value is shown as "F3C"

Which means analog out value for 1st port is "32572" in decimal within a range of 0-65535. Which means port 1 value is "10.0mA".

Next values can be seen in same manner.

When selected as "Parsed Data as Modbus Frame", HUR will share data as follows

Device Name, Device Model, NTP Time and Data itself in hexadecimal format just like a Modbus query response. First byte will show data bytes count and rest is the data itself. Data will be in similar formta with how the device responds when read via Modbus commands.

Here is an example for "Digital Out"

11:11:47: [MQTT] Device publish { "topic": "MQTT\_HUR\_Publish\_topic", "payload": "{\"HURNme\":\"HUR\_SERVER1\",\"HURMdl\\":\"Digital Out/",/"Time/":/"1701418305/",/"Data/":{\"ModFr/":/"01C3/"}}", "qos": 0, "isHex": false, "bucket": "65326fbe7dc2cd00092f998f", "messageId": 0 } { "topic": "MQTT\_HUR\_Publish\_topic", "payload": "{\"HURNme\":\"HUR\_SERVER1\",\"HURMdl\":\"Digital Out\",\"Time\":\"1701418305\",\"Data\": {\"ModFr\":\"01C3\"}}", "qos": 0, "isHex": false, "bucket": "65326fbe7dc2cd00092f998f", "messageId": 0 }

Next is the value of 8 ports which is 'C3" Binary equivalent of hec C3 is "11000011"

This means

Port 1 value is "1" Port 2 value is "0" Port 3 value is "0" Port 4 value is "0" Port 5 value is "0" Port 6 value is "0" Port 7 value is "1"

The 1st bit is port 1 value and 8th bit is port 8 value.

Here is an example for "Digital In"

11:58:33: **[MQTT] Device publish** { "topic": "MQTT\_HUR\_Publish\_topic", "payload": "{\"HURNme\":\"HUR\_SERVER\",\"HURMdl\":\"Digital In\",\"Time\":\"1701421113\",\"Data\":{\"ModFr\":\"0101\"}}", "qos": 0, "isHex": false, "bucket": "65699f72cc7006000fd24c88", "messageld": 0 } { "topic": "MQTT\_HUR\_Publish\_topic", "payload": "{\"HURNme\":\"HUR\_SERVER\",\"HURMdl\":\"Digital In\",\"Time\":\"1701421113\",\"Data\": { "ModFr\":\"0101\"}}", "qos": 0, "isHex": false, "bucket": "65699f72cc7006000fd24c88", "messageld": 0 }

01 in beginning is hexadecimal equivalent for 1 byte data count Next is the value of 8 ports which is 'b1" Binary equivalent of hec C3 is "00000001"

This means

Port 1 value is "1" Port 2 value is "0" Port 3 value is "0" Port 4 value is "0" Port 5 value is "0" Port 6 value is "0" Port 7 value is "0" Port 8 value is "0"

The 1st bit is port 1 value and 8th bit is port 8 value.

Here is an example for "Analog Out"

```
11:16:48:
```

```
[MQTT] Device publish
```

{ "topic": "MQTT\_HUR\_Publish\_topic", "payload": "{\"HURNme\":\"HUR\_SERVER1\",\"HURMdl\":\"Analog Out\",\"Time\":\"1701418608\",\"Data\":{\"ModFr\":\"0A01F4006403E800640032\"}}", "qos": 0, "isHex": false, "bucket": "65326fbe7dc2cd00092f998f", "messageId": 0 }

{ "topic": "MQTT\_HUR\_Publish\_topic", "payload": "{\"HURNme\":\"HUR\_SERVER1\",\"HURMdl\":\"Analog Out\",\"Time\":\"1701418608\",\"Data\": {\"ModFr\":\"0A01F4006403E800640032\"}}", "qos": 0, "isHex": false, "bucket": "65326fbe7dc2cd00092f998f", "messageId": 0 }

OA in beginning is hexadecimal equivalent for 10 bytes data count. Each value is 2 bytes, for 5 ports Analog out device, there are 10 bytes.

Next 2 bytes are the value of port 1 which is "01F4"

That means "500" in decimal and that is equal to "12.0mA" in a range of 0-1000.

Next values can be seen in same manner.

#### 11:46:22:

#### [MQTT] Device publish

{ "topic": "MQTT\_HUR\_Publish\_topic", "payload": "{\"HURNme\":\"HUR\_AI\_8100\",\"HURMdl\":\"Analog In\",\"Data\":

{\"ModFr\":\"107FBE0000000000000000000000000000\\"}}", "qos": 0, "isHex": false, "bucket": "65699c4040e648000925f01e", "messageId": 0 }

10 in beginning is hexadecimal equivalent for 10 bytes data count. Each value is 2 bytes, for 8 ports Analog in device, there are 16 bytes.

Next 2 bytes are the value of port 1 which is "FBE"

That means "32702" in decimal and that is equal to "9.98mA" in range 0-65535.

Next values can be seen in same manner.

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**NOTE:** Analog Out and Digital Out models can also be controlled via MQTT server.

Format will be as follows:

#### IO11:500

Letters 'I' and 'O', then Slot number 'I' (always 1 for single Slot devices and can be 1-2-3-4 for multi slot device), then ':' and then the value which is a value between range 0-1000 for Analog output version and 0 or 1 for Digital out version. User can write multiple commands and those must be seperated with new line '\n' or 0x0D in hexadecimal format.

Here is screenshot for an example:

n Tags More		
т	igger	Action
By interval Every 10 minutes, every 2 days	⑦ Run Action every	/ Name
By date	1 Minute ~	HUR multi
On the first day of each month	Note: The action can take up to 1 minute to be executed.	7 Type of action - Learn more about this Action type
Learn more abou	it Trigger by Schedule	QoS 0       QoS 1       QoS 2       Retain         QoS 0       QoS 1       QoS 2       Retain         Image: Publish to the devices linked to         Image: Publish to to
		IO15:50

Following parameters and static IP settings available for "Server Network Settings" part.

Server Network Settings	
Server Listening Port	Maximum Number of Clients
502	5 ~
DHCP Server Enabled	Use Static Address for Device
	<ul><li>✓</li></ul>
Server IP Address	Server Net Mask
192 168 0 143	255 255 255 0
Server Gateway Address	
192 168 0 1	

"Listening Port": TCP Port that HUR uses for incoming connections. Remote devices can use HUR IP and this port to connect to HUR for Modbus TCP query.

<u>"Maximum Number of Clients"</u>: Maximum numbers of incoming connections accepted. HUR can accept up to 10 simultaneous connection and all devices can query Modbus TCP.

<u>"Use Static Address for Device"</u>: Set a static TCP IP for HUR from this part. Enable and enter network settings and HUR will be available to connect from this static IP locally or remotely (gateway must be set properly for remote WAN connection).

Following parameters available if "DHCP Server" setting is enabled. This is used if DHCP server is needed in network. HUR can distribute IP to field devices connected to it in this way.

DHCP Server Enabled	Use Static Address for Device
Server IP Address	Server Net Mask
192 168 1 1	255 255 255 0
Server Gateway Address	
192 168 1 1	
DHCP Server Primary DNS Address	DHCP Server Range Start Address
192 168 1 1	192 168 1 100
DHCP Server Secondary DNS Address	
192 168 1 1	

Once the setting has been changed, "Save Configuration" button will be enabled.



After clicking button system will tell if the settings applied successfully or not.

Network Settings Cl	nanged.	
ОК		

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**NOTE 1:** HUR Series Modbus TCP Remote I/O Devices can keep configuration of 2 different modes in its memory and once the configuration enabled, its already saved settings will be applied. Device can act as Server or Client at

NOTE 2: Settings will be applied once the device is rebooted from web interface or repowered manually.

# 10.4 MENU: Network Settings - Client

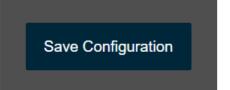
From this menu user may change the network settings of the device.

- User can change NTP Server address that used in MQTT data transmission.
- User can force device to a static IP.

	NTP Settings
I	NTP Server
	pool.ntp.org
(	Client Network Settings
(	Jse Static Address

"NTP settings" and "Client Network Settings" are done in same way like in "Network Settings" for "Server Configuration" explained in item 10.3.

Once the setting has been changed, "Save Configuration" button will be enabled.



After clicking button system will tell if the settings applied successfully or not.

Network Settings Changed.	
ОК	

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**NOTE 1:** HUR Series Modbus TCP Remote I/O Devices can keep configuration of 2 different modes in its memory and once the configuration enabled, its already saved settings will be applied. Device can act as Server or Client at a time.

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NOTE 2: Settings will be applied once the device is rebooted from web interface or repowered manually.

### 10.5 MENU: Serial Settings - Single Slot Devices Only

HUR Series Modbus TCP Remote I/O Devices can be single slot device or multi slot devices.

This menu is shown only if HUR is set <u>"Client Configuration"</u> and the device has single slot.

HUR Series Modbus TCP Remote I/O Devices can direct the Modbus TCP message to serial line if the Modbus Id of received package do not match with HUR own Modbs uld thus it can be used as Modbus TCP to Modbsu RTU gateway.

From this menu user may select RS232 or RS485 connection for Modbus RTU communication with another device in field.

- User can select RS232 line and can set baud rate and data type for serial line.
- User can select RS485 line and can set baud rate and data type for serial line.

×	Operating Mode		
	Network Settings	Server Serial Settings	
ئې	Serial Settings	Enable RS232	Enable RS485
	Device Status		<b>~</b>
×	VO Settings	Baud rate	Line Control 8_NONE_1 ~
	VO Status		
$\odot$		Save Configuration	
£.	Management		

"Baud rate": Serial communication baud rate selection.

"Line Control": Serial communication data type selection in form of Data bits-Parity-Stop bits. Available options are:

8\_NONE\_1 9\_NONE\_1 8\_EVEN\_1 8\_EVEN\_2 8\_ODD\_1 8\_ODD\_2 8\_NONE\_2 9\_NONE\_2

Once the setting has been changed, "Save Configuration" button will be enabled.



After clicking button system will tell if the settings applied successfully or not.

Serial Settings Changed.	
ОК	

NOTE 1: Settings will be applied once the device is rebooted from web interface or repowered manually.

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NOTE 2: This page is only available for Single Slot HUR Devices.

### 10.6 MENU: Device Status

From this menu user may monitor device status and statistics based on operating mode of device. The page also helps users to check connections and modbus communication status.

REDZ	REDZ HUR Series Analog Input Remote I/O Device Verses 20100, -but Nor 32 20221+604 - UAC: 68:tkr312:18:00
	Server Status
	IP Address App Status 192.168.0.165 SERVING_CONNECTIONS
ț Device Status	
	N. of Module UART Errors N. of Simul UART Errors 0 0
	N. of Module Timeout Emors N. of Serial Timeout Emors
	N of TCP Output Full Errors N of TCP Disconnections
	N. of Incorrect TCP Characters Received N. of Incorrect Sental Characters Received
	N of Incorrect Module Characters Received 42
	N. of TCP Messages Received Correctly  A543  4543  4543
	N of Serial Messages Received Correctly N: of Serial Messages Sent Correctly
	N of Module Messages Received Correctly N of Module Messages Sent Correctly 32504 32504
	MOTT Sent Messages MOTT Status APP_MOTT_STATE_SUBSCRIBED Connections
	Client Ip Address         Client TCP Port           01.         192.168.0.111         39607           02.         0         0           03.         0         0           04.         0         0           05.         0         0           06.         0         0           07.         0         0           08.         0         0           09.         0         0           09.         0         0           09.         0         0           09.         0         0           09.         0         0           09.         0         0           09.         0         0           09.         0         0           09.         0         0           09.         0         0           00.         0         0           01.         0         0
	ResetLogs Retresh Status

#### In "Device Status" part:

"IP Address": TCP/IP address of HUR itself.

<u>"App Status"</u>: It shows current status of HUR application. "SERVING CONNECTIONS" means device is ready for normal operation.

"Log Status": It is only available when "Log" is enabled from "Management" menu and shows current status of HUR logging. "LOG\_STATE\_TRYWRITELOG" means normal operation.

"Log Counter": It is only available when "Log" is enabled from "Management" menu and shows how many log lines has been transfered till now.

<u>"N. of Module UART Errors"</u>: Number of Module (I/O) side uart errors. Device will enter "Reboot State" if this number is above 20.

"N. of Serial UART Errors": Number of Serial side uart errors both on RS232 and RS485. Device will enter "Reboot State" if this number is above 20.

<u>"N. of Module Timeout Errors"</u>: Number of Module (I/O) side time out errors during waiting respond for Modbus command.

<u>"N. of Serial Timeout Errors"</u>: Number of Serial side time out errors during waiting respond for Modbus command both on RS232 and RS485.

<u>"N. of TCP Output Full Errors"</u>: Number of TCP output full errors during trying to send data to TCP client. Device will enter "Reboot State" if this number is above 5.

"N. of TCP Disconnections": Number of TCP disconnections from HUR.

<u>"N. of Incorrect Module Characters Received"</u>: Number of Module (I/O) side incorrect chars received as Modbus response frame which cannot be recognized by HUR device. Device will enter "Reboot State" if this number is higher than maximum allowed incorrect chars.

<u>"N. of TCP Messages Received Correctly"</u>: Number of Modbus TCP messages received by HUR over TCP/IP.

<u>"N. of TCP Messages Sent Correctly</u>": Number of Modbus TCP messages sent by HUR over TCP/IP.

"N. of Serial Messages Received Correctly": Number of Modbus RTU messages received by HUR over RS232 or RS485 Serial lines.

<u>"N. of Serial Messages Sent Correctly"</u>: Number of Modbus RTU messages received by HUR over RS232 or RS485 Serial lines.

<u>"N. of Module Messages Received Correctly"</u>: Number of Modbus RTU messages received by HUR from Module (I/O) side.

<u>"N. of Module Messages Sent Correctly</u>": Number of Modbus RTU messages sent by HUR to Module (I/O) side.

<u>"MQTT Sent Messages"</u>: It is only available when "MQTT" is enabled from "Network Settings" menu and shows how many MQTT messages has been transfered till now.

<u>"MQTT Status"</u>: It is only available when "MQTT" is enabled from "Network Settings" menu and shows current status of HUR MQTT Publisher. "APP\_MQTT\_STATE\_SUBSCRIBED" means MQTT publisher is ready for normal operation.

#### In "Connections" part:

"Client Ip Address": Is the TCP IP address of client connected to HUR.

"Client TCP Port": Is the TCP Port number of client connected to HUR.

After clicking "Refresh Status" button, system will reload data only and will not reload page. Button will be disabled during reload for an instance. If timeout occurs during the reload, the button will be enabled again with warning of timeout. In normal operation reload of status data will be done immediately. "Reset Logs" button will reset device status parameres. NOTE 1: "Modbus Communication Status" will list based on "Maximum Number of Clients" set in "Network Settings" menu.

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**NOTE 2:** "Client Operation Mode" has similar status menu. In client configuration HUR will connect remote TCP IP Modbus device.

Thus in "Connections" part, HUR will show target ip and port in "Target IP and Port" part and will show connection status in "Connection Status" part.

Connection	ns	
01.	Target IP and Port 192.168.1.101:502	Connection Status WAIT FOR CONNECTION
Reset Logs	Refresh Status	

# 10.7 MENU: I/O Settings

From this menu user may change Input/Output (I/O) parameters.

- Modbus Address of HUR I/O Slot can be changed
- For output devices "Default Output Status When Powered Up" can be changed
- Only in "Client" Operating Mode, "Remote Device IP Address" and "Remote Device TCP Port" that the device will connect be changed
- Only in "Client" Operating Mode and only for output devices, user can enable "I/O Mirror" functionality and can change "Remote Input Device Modbus Address" that the ports will be mirrored.

	Vers	REDZ HUR Series Multi Slot I/O Device inn: 2.01.00, -bult: Nov 30 2023 21:14:16 MAC: 60.88:10:a3.81:86
Coperating Mode	Server I/O Device Settings	
Network Settings		
۰۰۰ Device Status	Slot 1: Analog Output Settings	Slot 2: Digital Output Settings
్లి VO Settings	Modbus Address	Modbus Address
⊜ <sup>_3</sup> UO Status		
Management	Default Output Status When Powered Up	Default Output Status When Powered Up
	ALL SET TO LEAST VALUE	
	Slot 3: Analog Input Settings	Slot 4: Digital Input Settings
	Modbus Address	Modbus Address

<u>"Modbus Adress"</u>: Is the Modbus address of relevant I/O Slot of HUR.

<u>"Default Output Status When Powered Up"</u>: Only shown for output devices. User can define initial state of output values when the device is powered up.

For Analog output modules, user can set and number within range 0-1000 for 4-20mA output.

Default Output Sta	atus When Powered	l Up		
USER DEFINED ~				
Output Defa	ult Settings	Value		
Output 1	0	Raw: 0 4-20mA: 4.00		
Output 2		Raw: 0 4-20mA: 4.00		
Output 3		Raw: 0 4-20mA: 4.00		
Output 4		Raw: 0 4-20mA: 4.00		
Output 5		Raw: 0 4-20mA: 4.00		

For Digital output modules, user can simply set intiial value of output as "0"-"OFF" or "1"-"ON".

Default Output Status When Powered Up	
USER DEFINED ~	
Output Default Settings	
Output Number Default State Value	
Output 1 0 / OFF	
Output 2 0 / OFF	
Output 3 0 / OFF	
Output 4 0 / OFF	
Output 5 0 / OFF	
Output 6 0 / OFF	
Output 7 0 / OFF	
Output 8 0 / OFF	

**NOTE:** This menu will change based on module used in HUR Series Modbus TCP Remote I/O Devices. Muti slot version will show several option in same screen, single slot versions will show only 1.

When device set to "Client" operating mode, following options will be shown.

			REDZ HUR Series Multi Slot I/O Device Version: 2.01.00, -built Nov 30 2023 21.14.16 MAC: 50.8a 10.a3.81.8b
		Client I/O Device Settings	
		Slot 1: Analog Output Settings	Siot 2: Digital Output Settings
×	I/O Settings	Modbus Address	Modbus Address
		Remote Device IP Address 192.168.1.101	Remote Device IP Address 192.168 1.102
		Remote Device TCP Part	Remote Device TCP Part
		Enable VO Mirror	Enable I/O Mirror
		Default Output Status When Powered Up ALL SET TO LEAST VALUE	Default Output Status When Powared Up
		Slot 3: Analog Input Settings	Slot 4: Digital Input Settings
		Modbus Address 3	Modbus Address
		Remote Device IP Address 192-168 1-103	Remote Device IP Address 192.168.1.104
		Ramote Device TCP Port	Remote Device TCP Part

Only in "Client" Operating Mode, "Remote Device IP Address" and "Remote Device TCP Port" that the device will connect be shown. User can enter remote device Ip and Port from that options.

Only in "Client" Operating Mode and only for output devices, user can enable "I/O Mirror" functionality and can change "Remote Input Device Modbus Address" that the ports will be mirrored.

In short, user will enter remote device IP, port and Modbus Id from this options.

Enable I/O Mirror	
Demote Input Device Medhue Address	
Remote Input Device Modbus Address	
1	

Once the setting has been changed, "Save Configuration" button will be enabled.



After clicking button system will tell if the settings applied successfully or not.

Gateway S	Settings Chang	jed.	
	ок		

# 10.8 MENU: I/O Status

From this menu user may monitor I/O status and statistics. The page also helps users to change output values for output devices.

REDZ	N Versier 12	REDZ HUR Series Multi Slot VO Device 21.00 due Nov 20.2023 21:14:18 - MAC-9858-1828/0105
52 Operating Mode		
Activity Settings	VO Status	
	Latert Message Received - Modeus Package	
Device Status	Message Time	Lange
°⊊C so Settings	0010.57	2
⊕ <sup>3</sup> 205kaka	Payload in Her . ETH	
🕤 Security Settings		
FT Management	Payload in Her - SCRIAL	
		Stot 2: Digital Output Status
		Module Lip Time
	Slot 1: Analog Output Status	0e/87/55
	Noble Up Time	Module Read Counter
	04 37 54	
	Noble Read Counter	Molule Farmure
		25.00.3021 yeld 03
	Nocluie Fernivan	Digital Output Status Set Output Clear Output Namber
	21-63-3003 906-65	Digital Output 1 1/ Dil Putric Count: 1 Salt Out 1 Clear Out 1
	Analog Codput Set Weiver Slaten Set Colput Number Analog Colput 1 500 Alars 500 4-20m/s 12.00 Set Colput 1	Digital Output 2 81 OFF Poline Doarit: 1 Set Out 2 Clear Out 2
		Digital Output 3 BJ CKFF Pulme Downt 1 Sait Out 3 Clear Out 3
	Analog Culput 2 108 Fine: 100 4-20mik : 5:08 Set Dut 2	Digite/Deput # From Count 1 Set Dat 4 Char Dat 4
	Analog Culput 3 1000 Rone 1000 4.20%4.25.90 Set Dat 3	Didat Cultura 5 8/017
	Analog Calguel 4 Rose Rane: 100 4-20ml; 5:00 Sell Out 4	
	Analog Cutput 5 90 4-20col: 4-80 Set Dat 5	
		Digital Oxford 7 Plater Coart 1 Sel Oxf 7 Clear Oxf 7
		Digital Output 8 8/00P Pulse Count 1 Set Out 8 Clear Out 8
	Slot 2: Analog Input Status	
	Mudule Up True	Slot 4. Digital Input Status
		Motule Up Time
	Module Read Counter	06.87.58
	Notale Firmane	Motule Read Counter
	7143.3021 vel 83	
	Analog Input Number Status	Mulde Panwat 21-02-201
	Rav E Analog Input 1 4.750A 6.80 6.107 6.80	Datial Isaad Namber Sidon
	Rance 8 Analog Input 2: 4-20% 6-80 0-16% 6-80	Digital Input 1 0 / OFF Palse Count: 0
	Hane G Avadag Input 3 4 - Stirak 6 80 6 - FFF C 80	Digital Imput 2 97.000 Palain Gasat: 0 Digital Imput 3 97.000 Digital Imput 3 99.000
	Rave D Analog Input 4 G20val: 6.20 G-102/ 0.00	Digital Input 3 07/OPF Pride Cloadt 0 Digital Input 4 07/OPF Public Cloadt 0
		Digital Input 5 Palas Count: 0
	University Card Have & Analog Ingul & 4:200A.C 800 0-10*C 800	Digital Inputs 0 / 0 / 0 / 0 / 0 / 0 / 0 / 0 / 0 / 0
	Ranc 6 Analog lapul 7 4-26mA, 6 80 6.51V 6 80	Palai Cault 0 Digital legal 3 Palai Cisatt 0
	Analog Input E 4700A 0 800 Analog Input E 4700A 0 80 6.1107 C 807	
	Referant I/O Status	
	Research Control of Co	

#### In "Latest Message Received - Modbus Package" part:

<u>"Message Time"</u>: Time when Modbus message received. The device shows time as hours and minutes since it is powered up.

"Length": Time message length of Modbus message received.

<u>"Payload in Hex - ETH"</u>: Latest Modbus TCP message received shown as hexadecimal array.

<u>"Payload in Hex - SERIAL"</u>: Latest Modbus RTU message received shown as hexadecimal array. This is valid for single slot devices only.

**NOTE:** The following options are available for anly slot and single slot devices only shows Slot 1 and multi slot devices shows Slot 1-2-3-4.

Analog Output

Digital Output

Analog Input

Digital Input

In "Slot 1" part:

In this example "Analog Output" is used in Slot 1

#### Slot 1: Analog Output Status

Module Up Time

00:09:39

Module Read Counter

521

Module Firmware

23-02-2023 v00.03

Analog Output Set Value Number

Analog	500	Raw:	
Output 1	500	4- 20mA: 12.00	Set Out 1
		Raw:	
Analog Output 2	100	4- 20mA: 5.60	Set Out 2
Analog	1000	Raw: 1000 4-	
Output 3	1000	20mA: 20.00	Set Out 3
		Raw:	
Analog Output 4	100	4- 20mA: 5.60	Set Out 4
		Raw:	
Analog Output 5	50	4- 20mA:	Set Out 5

Status Set Output

<u>"Module Up Time"</u>: Time as hours and minutes since the I/O module is powered up.

<u>"Module Read Counter"</u>: Shows how many times the I/O module is queried with Modbus commands since it is powered up.

<u>"Module Firmware</u>": The firmware version and build date of I/O module used in this slot.

<u>"Analog Output Number"</u>: The port number of I/O module.

<u>"Set Value"</u>: User can set output value of output versions of I/O modules. User can enter a value in range 0-1000 to set Analog Output Value and from <u>"Status"</u> part user can also see the Analog value to be set based on entered raw value.

<u>"Set Output"</u>: User can set output value of output versions of I/O modules. Every output has its own button for sending command. Once the button clicked the command will sent to HUR and the command will be realized immediately. Meanwhile the value will be updated automatically on screen within 1 second.

#### In "Slot 2" part:

In this example "Digital Output" is used in Slot 2

#### Slot 2: Digital Output Status

Module Up Time

00:09:39

Module Read Counter

528

Module Firmware

23-02-2023 v00.03

#### Digital

Output Number	Status	Set Output	Clear Output
D:-:4-1	1/ON		
Digital Output 1	Pulse Count: 1	Set Out 1	Clear Out 1
<b>D:</b> 11 1	0/OFF		
Digital Output 2	Pulse Count: 1	Set Out 2	Clear Out 2
Digital	0 / OFF Pulse		
Output 3		Set Out 3	Clear Out 3
Disital	0 / OFF		
Digital Output 4	Pulse Count: 1	Set Out 4	Clear Out 4
Digital	0 / OFF Pulse		
Output 5		Set Out 5	Clear Out 5
D:-:4-1	0/OFF		
Digital Output 6	Pulse Count: 1	Set Out 6	Clear Out 6
Digital	0 / OFF Pulse		
Output 7		Set Out 7	Clear Out 7
Digital	0 / OFF Pulse		
Output 8		Set Out 8	Clear Out 8

<u>"Module Up Time"</u>: Time as hours and minutes since the I/O module is powered up.

<u>"Module Read Counter"</u>: Shows how many times the I/O module is queried with Modbus commands since it is powered up.

<u>"Module Firmware"</u>: The firmware version and build date of I/O module used in this slot.

<u>"Digital Output Number"</u>: The port number of I/O module.

<u>"Set Output"</u>: User can set output value of output versions of I/O modules. Every output has its own button for sending command. This option is used to set Digital Output "1" or "ON". Once the button clicked the command will sent to HUR and the command will be realized immediately. Meanwhile the value will be updated automatically on screen within 1 second.

<u>"Clear Output"</u>: User can set output value of output versions of I/O modules. Every output has its own button for sending command. This option is used to set Digital Output "0" or "OFF". Once the button clicked the command will sent to HUR and the command will be realized immediately. Meanwhile the value will be updated automatically on screen within 1 second.

#### In "Slot 3" part:

In this example "Analog Input" is used in Slot 3

# Slot 3: Analog Input Status

Module Up Time	
00:09:39	
Module Read Counter	
518	
Module Firmware	
21-02-2023	
v00.03	
Analog Input Number	Status
	Raw: 0
Analog Input 1	4-20mA: 0.00
	0-10V: 0.00
	Raw: 0
Analog Input 2	4-20mA: 0.00
	0-10V: 0.00
A	Raw: 0
Analog Input 3	4-20mA: 0.00
	0-10V: 0.00
A I	Raw: 0
Analog Input 4	4-20mA: 0.00
	0-10V: 0.00
Apolog Input 5	Raw: 0 4-20mA: 0.00
Analog Input 5	4-20ma. 0.00 0-10V: 0.00
Analog Input 6	Raw: 0 4-20mA: 0.00
Analog Input o	0-10V: 0.00
	Raw: 0
Analog Input 7	4-20mA: 0.00
	0-10V: 0.00
	Raw: 0
Analog Input 8	4-20mA: 0.00
r indiog input o	0-10V: 0.00
	0.00

<u>"Module Up Time"</u>: Time as hours and minutes since the I/O module is powered up.

<u>"Module Read Counter"</u>: Shows how many times the I/O module is queried with Modbus commands since it is powered up.

<u>"Module Firmware"</u>: The firmware version and build date of I/O module used in this slot.

<u>"Analog Input Number"</u>: The port number of I/O module.

<u>"Status"</u>: Actual port values of Analog Input I/O module. User can see the raw value within a range 0-65535, the current value 0-20mA or voltage value 0-10V.

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**NOTE:** For Analog Input models, input value can be configured via switches for 0-10V or 0-20mA. This is available in single slot versions

Multi slot versions comes in 0-20mA setting as standard. If needed 0-10V version can also be ordered.

In "Slot 4" part:

In this example "Digital Output" is used in Slot 4

Slot 4: Digital	Input Status
-----------------	--------------

Module Up Time	
00:09:40	
Module Read Counter	
516	
Module Firmware	
21-02-2023	
v00.03	
Digital Input Number	Status
Digital Input 1	0 / OFF Pulse Count: 0
Digital Input 1 Digital Input 2	0 / OFF Pulse Count: 0 0 / OFF
	0 / OFF Pulse Count: 0 0 / OFF Pulse Count: 0 0 / OFF
Digital Input 2	0 / OFF Pulse Count: 0 0 / OFF Pulse Count: 0 0 / OFF Pulse Count: 0
Digital Input 2	0 / OFF Pulse Count: 0 0 / OFF Pulse Count: 0 0 / OFF
Digital Input 2 Digital Input 3	0 / OFF Pulse Count: 0 0 / OFF Pulse Count: 0 0 / OFF Pulse Count: 0 0 / OFF
Digital Input 2 Digital Input 3 Digital Input 4 Digital Input 5	0 / OFF Pulse Count: 0 0 / OFF Pulse Count: 0 0 / OFF Pulse Count: 0 0 / OFF Pulse Count: 0 0 / OFF
Digital Input 2 Digital Input 3 Digital Input 4	0 / OFF Pulse Count: 0 0 / OFF Pulse Count: 0
Digital Input 2 Digital Input 3 Digital Input 4 Digital Input 5 Digital Input 6	0 / OFF Pulse Count: 0 0 / OFF
Digital Input 2 Digital Input 3 Digital Input 4 Digital Input 5	0 / OFF Pulse Count: 0 0 / OFF Pulse Count: 0
Digital Input 2 Digital Input 3 Digital Input 4 Digital Input 5 Digital Input 6	0 / OFF Pulse Count: 0 0 / OFF

<u>"Module Up Time"</u>: Time as hours and minutes since the I/O module is powered up.

<u>"Module Read Counter"</u>: Shows how many times the I/O module is queried with Modbus commands since it is powered up.

<u>"Module Firmware"</u>: The firmware version and build date of I/O module used in this slot.

"Digital Input Number": The port number of I/O module.

<u>"Status"</u>: Actual port values of Digital Input I/O module. User can see the raw value as "1"-"ON" or "0"-"OFF". Webside also shows the pulse count, which menas how many times the output value changed from "0" to "1".

After clicking "Refresh Status" button, system will reload data only and will not reload page.

Button will be disabled during reload for an instance. If timeout occurs during the reload, the button will be enabled again with warning of timeout. In normal operation reload of status data will be done immediately.

# 10.9 MENU: Security Settings - Server Only

This menu is available only in Server Operating mode since it filters TCP/IP connections based on IP of the devices.

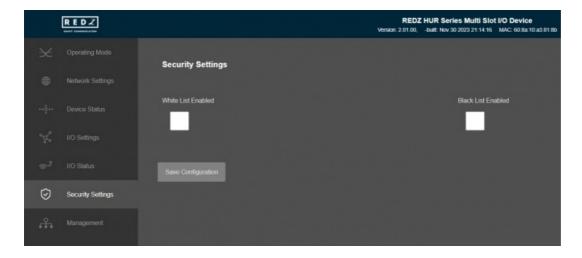
From this menu user may activate TCP IP filter based on White list (accepted packages from IP Address) or Black list (rejected packages from IP Address).

• User can select to activate White List and HUR device will accept data packages only

from the devices with addresses stated in the list.

• User can select to activate Black List and HUR device will accept all data packages

except from the devices with addresses stated in the list.



Up to 20 IPs to be filtered are available for any of the list.

Once the setting has been changed, "Save Configuration" button will be enabled.



After clicking button system will tell if the settings applied successfully or not.

Security Settings Changed.	
OK	

NOTE 1: Settings will be applied once the device is rebooted from web interface or repowered manually.

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NOTE 2: This page is only available for Server Operating mode.

#### 10.11 MENU: Management

From this menu user may change parameters or send command to device

The device restarts itself every 86400 seconds (which means every 24 hours). There are also timeout restart routines in Server mode during listening clients and in Client Mode trying to connect to the server. ( both preset to 10 minutes which means device will restart system if fails to connect a server in Client mode or a client do not connect in preset time in Server mode)

• User can change firmware of device. HUR Series Modbus TCP Remote I/O Devices has easy to use firmware capability and system can store 2 firmware at memory. After a firmware change, user can restore back old firmware anytime needed.

After a firmware change old configuration will be used for minor changes. If a major change occurs system will restore to factory default configuration.

- User can backup configuration of device and restore it back.
- User can change the login information.

- User can change the debug level of the device. HUR Series Modbus TCP Remote I/O Devices has micro USB or USB Type-C and gives log in 115200 - 8N1 format.
  Any terminal program can be used to listen the LOG over USB type-C or micro USB port of the device which is recognized as Virtual COM port in PC.
  LOG to remote UDP server is also available. If set to UDP server, then HUR will send LOG data to remote UDP server device.
- User can restore to factory settings and force device to reboot. Factory settings restored for Client if the device in Client mode and factory settings are restored for Server if the device in Server mode.

REDZ		REDZ HUR Series Multi Slot I/O Device Version: 2.61.00, duit Nov 30.2923 21:14:19 MAC: 68 86:107.a3.51:89
Operating Mode     Network Settings	Management	
	Live Firmware Update	
్లో VO Settings	Select Firmware File	Firmware Ne to upload
문 <sup>3</sup> UD Status ⓒ Security Settings		
Anagement	Alternative Firmware Date Nov 30 2023 21:14:16	Alternative Firmware Version 2:01.00
	Reboot Alternative Firmware	
	Download / Upload Configuration	
	Download Current Configuration	Upload Configuration File
	Change Password	
	Current Password	
	New Password	
	Contirm New Password	
김 태제도 동문에	LOG	
	Log Level DEBUG 🐱	
	Lag Output CONSOLE V	
	Restore / Reboot	
	Restore Factory Configuration Reboot Device	

In "Live Firmware Update" part:

Firmware upgrade is possible only with files that REDZ supplied. Once the file selected, TLM shows selected file:

Then "Upload Firmware" button must be clicked. HUR will start to upload file and show status on pop up screen.

	Upload firmware file
	Uploading
%33	

Click "Close" when finished. If somehow HUR fails to upload, refresh webpage and try again please.

After successful upload, HUR will show "Alternative Firmware Date" and "Alternative Firmware Version" data.

Alternative Firmware Date	Alternative Firmware Version	
Nov 30 2023 21:14:16	2.01.00	
Reboot Alternative Firmware		
	이 사람이 많이 많이 많은 것이 많이	

Click "Reboot Alternative Firmware" and HUR will reboot with new firmware and show status on screen.

Reboot Alternative Firmware Comm sent.	nand has been	
Sciit.		
Rebooting		
%70		

This will take 5 seconds only. Please wait .

Check firmware details from upper part of main screen please if the update firmware procedure finalized properly.

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**NOTE 1:** User must refresh cache of their browser by clicking CTRL+F5 after a succesfull firmware change so that it will force browser to reload web interface (with latest updates/changes).

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NOTE 2: In major updates user must also reset device to factory settings.

#### In "Download / Upload Configuration" part:

User can download current configuration of the device to a file or restore a previously defined configuration to device from file.

<u>"Download Current Configuration"</u>: Downloads the configuration to a file. It uses "Device Name" for file name and the extensions will be "\*.zcfg". <u>"Download Configuration File"</u>: Uploads the configuration from "\*.zcfg" file.

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**NOTE:** Modbus Id configurations will not work if they are different from uploaded device. User must set those values manually.

#### In "Log" part:

User may activate Logging and see details of operation. There are different levels of Log with different amount of data.

<u>"None"</u>: Logging is closed <u>"Error"</u>: Only errors in systems will be logged <u>"Info"</u>: General info and errors will be logged <u>"Debug"</u>: All details regarding device operation will be logged

If "Console" is selected as output of Log, then micro USB or USB Type-C port of device will be used for logging. Proper cable must be connected and a teminal should be used to receive Log data. As an example "RealTerm" tool can be used.

Simply select COM port and set baud rate 115200 and data type 8N1 and then click open. Device will send log data.

00:00:02][INF]Serv 00:00:02][INF]192. 00:00:02][INF]192. 00:00:02][INF]serv 00:00:02][INF]serv 00:00:02][INF]Soch 00:00:02][INF]Clic 00:00:02][INF]Mess 00:00:03][INF]Mess 00:00:03][INF]Mess 00:00:03][INF]Mess 00:00:03][INF]Mess 00:00:03][INF]Mess 00:00:03][INF]Mess	ka:10:a3:6b:5eGMF Procedure started (Procedure started (et Connected.Index) age from Client In (age from Client In	255.0-192.168.0.1 (944 		
Baud 115200 - Port 9	Stop Bits	2C   I2C-2   I2CMisc   Misc   Even	ns   <u>Ju</u> ] <u>Clean</u>	Status Connected RXD (2) TXD (3)
None     8 bits     Odd     7 bits     Even     Mark     6 bits	1 bit C 2 bits Hardware Flow Control None C RTS/CTS C DTR/DSR C RS485-rts	Transmit Xoff Char: 19		CTS (8) DCD (1) DSR (6) Ring (9) BREAK Error

If "UDP Server" is selected as output of Log, then proper tool must be used to get log data. User must set "UDP Server IP" and "UDP Server Port". Device will send Log to that address. As an example "Package Sender" tool can be used.

Click "File" and then "Settings". Enable "UDP Server" and set the port. Device will send Log data to UDP server.

Name											
											Load File
Address			c Port		Reser	nd Delay		off	тср	▼ Send	Save
										Delete Saved Packet	Persistent T
-		-									
Clear Log (1	1)						C	Log Traffi	c Save Log	Save Traffic Packet	Copy to Clipboar
		From IP	From Port	To Address	To Port	Viethoc					
15:55	16.677	192.168.0.143	59742	You	7001	UDP		[00:00:03][	DBG]Mess->:0-	\r\n	
15:55	:16.618	192.168.0.143	59742	You	7001	UDP		[00:00:03][	INF)Message fr	om Client Index: 0\r\n	
15:55	16.178	192.168.0.143	59742	You	7001	UDP		[00:00:02][	DBG]Mess->:0-	\r\n	
15:55	16.109	192.168.0.143	59742	You	7001	UDP		[00:00:02][	INF]Message fr	om Client Index: 0\r\n	
15:55	:15.916	192.168.0.143	59742	Yau	7001	UDP		[00:00:02][	INF)Client Conr	ected.Serving connection	ns.\r\n
15:55	15.856	192.168.0.143	59742	You	7001	UDP		[00:00:02][	INF]Socket Con	nected.Index: 0\r\n	
15:55	15.656	192.168.0.143	59742	You	7001	UDP		[00:00:02][	DBGJMQTT Pro	cedure started\r\n	
15:55	15.596	192.168.0.143	59742	You	7001	UDP		[00:00:02][	INF]serving con	nections\r\n	
15:55	15.526	192.168.0.143	59742	You	7001	UDP		[00:00:02][	INF)60:8a:10:a3	:6b:5e\r\n	
iii 15:55	15.475	192.168.0.143	59742	You	7001	UDP		[00:00:02][	INF]192.168.0.1	43-255.255.255.0-192.16	8.0.1\r\n
<b>i</b> 15:55	15,417	192.168.0.143	59742	You	7001	UDP		[00:00:00][	DBGJSYS_FS_M	ount Failed: \r\n[00:00:00]	[[DBG]SYS_FS_Mou

Here is a video example to enable UDP log and receive data via UDP Server software. Video is created with CKL series but applies to all series.

# ځ

NOTE: This page has same settings both for Server and Client operating modes.

# 9. Modbus Communication Example

HUR Series Modbus TCP Remote I/O Devices communicate in Modbus TCP protocol over TCP/IP. HUR Series Modbus TCP Remote I/O Devices has several versions with different I/O options and different version uses different Modbus Function codes:

#### • HUR Devices with 8 Channel 5-275V AC-DC, 100mA Digital Optocoupler Output

Uses Function Code 0x01: Read Coil Status to read status of output values

Uses Function Code 0x03: Read Holding Registers to read device status of monitoring values

Uses Function Code 0x05: Force Single Coil to set value of individual output values

Uses Function Code 0x0F: Force Multiple Coils to set value of all output values at once

#### • HUR Devices with 8 Channel Digital 5Amps 250VAC/30VDC Relay Output

Uses Function Code 0x01: Read Coil Status to read status of output values

Uses Function Code 0x03: Read Holding Registers to read device status of monitoring values

Uses Function Code 0x05: Force Single Coil to set value of individual output values

Uses Function Code 0x0F: Force Multiple Coils to set value of all output values at once

#### • HUR Devices with 8 Channel 12-275V AC-DC, 60mA Digital Optocoupler Input

Uses Function Code 0x02: Read Input Status to read status of input values

Uses Function Code 0x03: Read Holding Registers to read device status of monitoring values

• HUR Devices with 8 Channel 0-10V and 0-20mA Selectable Analog Input

Uses Function Code 0x03: Read Holding Registers to read device status of monitoring values

Uses Function Code 0x04: Read Input Registers to read input values

#### • HUR Devices with 5 Channel 4-20mA Analog Output

Uses Function Code 0x03: Read Holding Registers to read device status of monitoring values

Uses Function Code 0x04: Read Input Registers to read output values

Uses Function Code 0x06: Preset Single Register to set value of individual device output values

#### 9.1 Reading I/O Module Status Values: For all I/O Models

HUR Series Modbus TCP Remote I/O Devices shares module status values with Modbus Function Code 3:

Modbus Read Counter: Shows how many times this module is queried via Modbus

<u>Device Up Time in Seconds:</u> Shows seconds passed since the module is powered up.

<u>Firmware Version Original:</u> The firmware downloaded in this module during manufacturing process.

Firmware Version Upgraded: Actual firmware running in this module right now.

Register Number	Definition	Explanation	Modbus Address (Decimal)	Modbus Address (Hexadecimal)	Data Type
1	Modbus Read Counter	This value increments 1 after successful sending a Modbus Response Package from HUR device side.	160	OxAO	Unsigned Long (Ulnt32)
2	Second Counter	Increments 1 every second since the device is powered up. Module restarts after 24 hours (86400 seconds)	162	OxA2	Unsigned Long (UInt32)

3	FW Version Original	Gives device firmware info when the device is sold from stock. Includes version and build date 4 byte data example: 0x1A37E401: 0x1A: DAY = 26 0x3: MONTH = 3 0x7E4: YEAR = 2020 0x01: VERSION = 1	164	OxA4	Unsigned Long (Ulnt32)
4	FW Version Upgraded	Gives device firmware info and it differs from FW Original version if the device firmware changed in the field. Includes version and build date 4 byte data example: 0x1B37E401: 0x1B37E401: 0x1B: DAY = 27 0x3: MONTH = 3 0x7E4: YEAR = 2020 0x01: VERSION = 1	166	OxA6	Unsigned Long (UInt32)

# Read Holding Registers (Function Code=3)

<u>Request</u>

This command is requesting the content of module status holding registers from the HUR Series Modbus TCP Remote I/O Devices with address 1.

#### 0001 0000 0006 01 03 0005 0008

0001: Modbus TCP - Transaction Identifier

0000: Modbus TCP - Protocol Identifier

0006: Modbus TCP - Message Length (6 bytes to follow)

01: The Slave Address (01 hex = address 1)

03: The Function Code 3 (read module status)

00A0: The Data Address of the first register requested.

(00A0 hex = 160 decimal)

0008: The total number of registers requested. (read 8 registers for 4 values since each value is 4byte)

#### <u>Response</u>

#### 0001 0000 0013 01 03 10 0000 053D 0000 05BD 1B37 E401 1727 E703

0001: Modbus TCP - Transaction Identifier

0000: Modbus TCP - Protocol Identifier

- 0013: Modbus TCP Message Length (19 bytes to follow)
- 01: The Slave Address (01 hex = address 1)
- 03: The Function Code 3 (read module status)
- 10: The number of data bytes to follow (4 registers x 4 bytes each = 16 bytes)
- 0000 053D: The contents of register "Modbus Read Counter"
- 0000 05BD: The contents of register "Second Counter"
- 1B37 E401: The contents of register "FW Version Original"

1727 E703: The contents of register "FW Version Upgraded"

# Read Holding Registers (Function Code=3): Read via ZTerminal Software Example

ZTerminal software can be used to read values of HUR Series Modbus TCP Remote I/O Devices.

Enter "IP" and "port" value of HUR device, select "Modbus TCP" and click connect.

Z Terminal v3.9					- 0	×
onnection Data HUR Modbus	LKM Modbus					
Mode	TCP/IP	Device				
O Serial O TCP/IP	IP 192.168.0.106	<ul> <li>Transparent</li> </ul>				
	Port 502	O HCI WMBus	○ WMBus			
Setal	Force Reconnect	O Modbus RTU	O Modbus TCP			
COM10 ~ 115200 ~	Multi Socket Settings Number of Sockets	Connection				
8N1 ~	1 Data Send delay (ms)					
See COM Ports	200	CONNECT	DISCONNECT			
	Data Differantiate					
nt Date and Time: 12/4/2023 2:10- meeting DNNECTED DOCKET: 1]	4 PM)					

Then go to "HUR Modbus" page, enter module Modbus Adress Value"" and click "Read Monitoring Values". ZTerminal will show monitoring values.

		Digital Inputs		Digital Outputs			Analog Inputs				
Adress Value 1		Digital Input 1:	~	Digital Output 1:	~	Set OLIT 1	Analog Input 1:		Analog Outputs Analog Output 1	0	Set OUT 1
LKM Configuration		Digital input 2:	~	Digital Output 2:	~	Set OLIT 2	Analog Input 2		Analog Output 2:	-	SHOLT 2
Modbus Address	Set Modbus Address	Digital Input 3:	~	Digital Output 3:	÷	SHOUTS	Analog Input 3:		Analog Output 3:	-	SH OLIT 3
Save Data On S		Digital Input 4:	· · ·	Digital Output 4:	÷	SH DI IT &	Analog Input 4:		Analog Output 4:	0	Genina
Save Lake Un S	Set Data Save Option	Digital Input 5:	· · · ·	Digital Output 5:	~	Secure.	Analog Input 5:		Analog Output 5:	0	SHOLTS
		Digital Input 6:	¥	Digital Output 6:	÷	Secure	Analog Input 6:		-		
Use Custon Dat	a On Device Power Up	Digital Input 7:	~	Digital Output 7:	Ŷ	Sel OLIT 7	Analog Input 7:			Read Analog	
L	Set Custom Start	Digital Input 8:	×	Digital Output 8:	Ŷ	See CILIT 8	Analog Input 8:			Outputs	
Read Co	onfigured Values		Read Digital Inputs	Write Digital Outputs		lead Digital Outputs	0 0-20 mA	Read			
							O 0-10V	Inputs			
Monitoring		Register Va	slues								
Modbus Read C	ounter 2121	Register 1:		Set RRG 1							
Device Uptime in	Seconds 2294	Register 2		Get BEG 2							
	00:38:14	Register 3.		Set REG 1							
Firmware Version	Original 456647681	Register 4:		Set REG 4							
	27-03-2020			See REG 5							
Firmware Version	Upgraded 388491011 23-02-2023	Register 6. v0.3 Register 7:		Set REG &							
	23-02-2023	Register 8:		Sue REG 7							
		regime o.		Set REG 8							
Read	Monitoring Values		Read Register Values								

Modbus Poll Software can also be used to read those values. After successfull connection to HUR device, following settings can be used to read status values.

Edit Connectio			·							
🖻 🖬 🎒 🗙		. 05 06	15 16 22 2	23   101   💡	N?					
Mbpoll1			83							
= 1257: Err = 0	: ID = 1: F = 03	: SR = 100	Oms			Read/Wri	te Definition			
			_			Slave ID	1			OK
Alias	00160					Function	03 Read	Holding Register:	(4x) ~	Cancel
	2471					Address:	160			And
	2667					Quantity.	8			Apply
	2007					Scan Ra	te: 1000	ms		
	456647681					Read	/Write Enable	d		Read/Write Onc
						View				
	388491011					Row 0 10		50 () 100	Hide A	lias Columns
									Addres	is in Cell
						Display	Long Inver	ie v	U PLC A	ddresses (Base 1)
						Display	Long Inver	ie ~	U PLC A	ddresses (Base 1)
						Display	Cong Inver	ie ~	U PLC A	ddresses (Base 1)
						Display	Long Inver	ie V	U PLC A	ddresses (Base 1)
elp, press F1.			192.10	58.0.10 <del>6</del> : 502		Display	: Long Inver	18 ~	U PLC A	ddresses (Base 1)
6	ication Traffic	_	192.10	58.0.106: 502		Display	E Long Inver	18 ~	U PLC A	
Communi	ication Traffic	_	192.10			Display	C Long Inver	18 V	U PLC A	ddresses (Base 1)
6	ication Traffic	Save	192.10 Copy	58.0.106: 502	on Error	Display	c Long Inver	ie V	U PLC Ar	
Exit 000512-Tx:	Stop	88 86 8	Copy 03 00 A	Stop						
Communi Exit	Stop :05 30 00 00 :05 30 00 00	00 06 0 00 13 0	Copy 83 88 A 83 10 8	Stop				01 17 27 E		
Exit 000512-Tx: 000513-Rx: 000513-Rx: 000515-Rx:	Stop :05 30 00 00 :05 30 00 00 :05 31 00 00 :05 31 00 00	00 06 0 00 13 0 00 06 0 00 13 0	Copy 63 00 A1 03 10 01 63 00 A1 10 3 10 01	Stop 66 68 00 09 A7 00 68 00 09 A7 00 09 A7	00 00	0A 6B 1	B 37 E4		7 83	
Exit 000512-Tx: 000513-Rx: 000513-Rx: 000514-Tx: 000516-Tx: 000516-Tx: 000517-Rx:	Stop 30 00 00 30 30 00 00 35 31 00 00 35 31 00 00 35 31 00 00 35 31 00 00 35 30 00 36 30 00 37 40 00 38 40 00 39 5 32 00 00 30 5 30 00 00 30 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	00 06 0 00 13 0 00 06 0 00 13 0 00 13 0 00 06 0 00 13 0	Copy 63 00 A1 03 10 01 63 00 A1 03 10 01 03 00 A1 03 10 01 10 01 01	Stop	00 00 00 00	0A 6B 1 0A 6B 1	B 37 E4 B 37 E4	01 17 27 E	7 03 7 03	
Exit 000512-Tx: 000513-Rx: 000513-Rx: 000515-Rx: 000516-Tx: 000517-Rx: 000518-Tx:	Stop : 05 30 00 00 : 05 30 00 00 : 05 31 00 00 : 05 31 00 00 : 05 32 00 00 : 05 32 00 00 : 05 33 00 00	00 06 0 00 13 0 00 13 0 00 13 0 00 13 0 00 13 0 00 06 0	Copy 03 08 A1 03 10 0 03 10 0 03 08 A1 03 08 A1 03 08 A1 03 08 A1 03 08 A1 03 08 A1	Stop 0 00 09 A7 0 00 09 A7	00 00 00 00 00 00	0A 6B 1 0A 6B 1 0A 6B 1	B 37 E4 B 37 E4 B 37 E4	01 17 27 E 01 17 27 E 01 17 27 E	7 03 7 03 7 03 7 03	
Exit 000513-Rx: 000513-Rx: 000513-Rx: 000515-Rx: 000516-Tx: 000516-Tx: 000516-Tx: 000519-Rx: 000519-Rx: 000519-Rx: 000520-Tx:	Stop 30 30 00 00 30 31 00 00 31 00 00 35 31 00 00 35 31 00 00 35 32 00 00 35 32 00 00 33 00 00 35 33 00 00 35 34 00 00	80         86         87           80         13         87           80         86         87           80         86         87           80         86         87           80         86         87           80         86         87           80         86         87           80         86         87           80         86         87           80         86         87           80         86         87           80         86         87           80         86         87           80         86         87           80         86         87           80         86         87	Copy 63 88 Ai 63 10 61 63 88 Ai 63 88 Ai 63 18 61 63 18 61 63 18 61 63 18 61 63 18 61 63 88 Ai	5 Stop 0 00 08 0 00 09 A7 0 00 09 A7	00 00 00 00 00 00 00 00	0A 6B 1 0A 6B 1 0A 6B 1 0A 6B 1	B 37 E4 B 37 E4 B 37 E4 B 37 E4 B 37 E4	01 17 27 E 01 17 27 E 01 17 27 E 01 17 27 E 01 17 27 E	7 03 7 03 7 03 7 03 7 03	
Exit 800512-Tx: 800513-Rx: 800515-Rx: 800515-Rx: 800515-Rx: 800516-Tx: 800518-Tx: 800519-Rx: 800519-Rx:	Stop 05 30 00 00 05 31 00 00 05 31 00 00 05 32 00 00 05 32 00 00 05 33 00 00 05 33 00 00 05 34 00 00	80         86         87           80         86         86         87           80         86         86         87           80         86         86         87           80         86         86         87           80         86         86         87           80         86         86         87           80         86         87         88           80         13         87           80         13         87           80         13         87           80         86         87           80         13         87	Copy 03 00 A 03 10 01 03 00 A 03 10 01	Stop 0 00 08 0 00 09 A7 0 00 09 A7 0 00 08 0 00 09 A7 0 00 08 0 00 09 A7 0 00 08 0 00 99 A7 0 00 08 0 09 A7 0 00 08 0 09 A7 0 00 08	00 00 00 00 00 00 00 00	0A 6B 1 0A 6B 1 0A 6B 1 0A 6B 1	B 37 E4 B 37 E4 B 37 E4 B 37 E4 B 37 E4	01 17 27 E 01 17 27 E 01 17 27 E	7 03 7 03 7 03 7 03 7 03	

## 9.2 Reading and Writing I/O Values: Digital Output Models

Following commands available to read and write output values of HUR Series Modbus TCP Remote I/O Devices.

• HUR Devices with 8 Channel 5-275V AC-DC, 100mA Digital Optocoupler Output

and/or with 8 Channel Digital 5Amps 250VAC/30VDC Relay Output

Uses Function Code 0x01: Read Coil Status to read status of output values

Uses Function Code 0x05: Force Single Coil to set value of individual output values

Uses Function Code 0x0F: Force Multiple Coils to set value of all output values at once

# Read Output Values with Read Coil Status (Function Code=1)

#### <u>Request</u>

This command is requesting the ON/OFF status of discrete outputs # 01 to 08

from the slave device with address 1.

#### 0001 0000 0006 02 01 0001 0008

0001: Modbus TCP - Transaction Identifier

0000: Modbus TCP - Protocol Identifier

0006: Modbus TCP - Message Length (6 bytes to follow)

02: The Slave Address (02 hex = address 2)

01: The Function Code 1 (read coil status)

0001: The Data Address of the first output to read.

(0001 hex = 01)

0008: The total number of outputs requested. (08hex = 8)

<u>Response</u>

#### 0001 0000 0004 02 01 01 C3

0001: Modbus TCP - Transaction Identifier

0000: Modbus TCP - Protocol Identifier

0004: Modbus TCP - Message Length (4 bytes to follow)

02: The Slave Address (02 hex = address 2)

01: The Function Code 1 (read coil status)

01: The number of data bytes to follow (8 Outputs / 8 bits per byte = 1 byte)

C3: Outputs 1 - 8 (1100 0011)

The more significant bits contain the higher output variables.

This shows that outputs 8-7 and 1-2 are ON - 1, rest of the outputs are OFF - 0.

#### Write Individual Output Value with Force Single Coil (Function Code=5)

#### <u>Request</u>

This command is writing the contents of discrete output # 7 to OFF - 0 in the slave device with address 2.

#### 0001 0000 0006 02 05 0007 0000

0001: Modbus TCP - Transaction Identifier

0000: Modbus TCP - Protocol Identifier

0006: Modbus TCP - Message Length (6 bytes to follow)

02: The Slave Address (02 hex = address 2)

05: The Function Code 5 (Force Single Coil)

0007: The Data Address of the coil. (output# 7 = 7 hex)

(0007 hex = 7 = output # 7)

0000: The value to write ( FF00 = ON, 0000 = OFF )

#### <u>Response</u>

#### 0001 0000 0006 02 05 0007 0000

0001: Modbus TCP - Transaction Identifier

0000: Modbus TCP - Protocol Identifier

0006: Modbus TCP - Message Length (6 bytes to follow)

02: The Slave Address (02 hex = address 2)

05: The Function Code 5 (Force Single Coil)

0007: The Data Address of the coil which is written

0000: The written value ( FF00 = ON, 0000 = OFF )

#### Write Output Values at Once with Force Multiple Coils (Function Code=15)

#### <u>Request</u>

This command is writing the contents of a series of 8 discrete outputs from #1 to #8

to the slave device with address 2.

#### 0001 0000 0008 02 0F 0007 0001 0100

0001: Modbus TCP - Transaction Identifier

0000: Modbus TCP - Protocol Identifier

0008: Modbus TCP - Message Length (8 bytes to follow)

02: The Slave Address (02 hex = address 2)

OF: The Function Code 15 (Force Multiple Coils)

0007: The Data Address of the coil. (output# 7 = 7 hex)

(0007 hex = 7 = output # 7)

0001: The number of outputs to write (01 hex = 1)

01: The number of data bytes to follow (8 outputs / 8 bits per byte = 1 byte)

00: The value to write

#### <u>Response</u>

0001 0000 0006 OF 05 0007 0001

0001: Modbus TCP - Transaction Identifier

0000: Modbus TCP - Protocol Identifier

0008: Modbus TCP - Message Length (8 bytes to follow)

02: The Slave Address (02 hex = address 2)

OF: The Function Code 15 (Force Multiple Coils)

0007: The Data Address of the written coil. (output# 7 = 7 hex)

(0007 hex = 7 = output # 7)

**0001**: The number of outputs written (01 hex = 1)

#### Read via ZTerminal Software Example

ZTerminal software can be used to read values of HUR Series Modbus TCP Remote I/O Devices.

Enter "IP" and "port" value of HUR device, select "Modbus TCP" and click connect.

Then go to "HUR Modbus" page, enter module Modbus Adress Value"" and click "Read Digital Outputs". ZTerminal will show output values.

Connection Data	HUR Modbus LKM M											
Adress Value ;	2	Digital Inputs		Digital Outputs				Analog Inputs		Analog Outputs		
LKM Configure	ston	Digital Input 1:	~	Digital Output 1:		~	See OLIT 1	Analog Input 1:		Analog Output 1:	-	SHOUT1
Modbus Addres		Digital Input 2	~	Digital Output 2:	1	. Y	SHOIT 2	Analog input 2:		Analog Output 2:	0	SHOLT 2
	Set Modbus Address	Digital Input 3:	~	Digital Output 3:	0	Y	SHOUTI	Analog Input 3:		Analog Output 3:	0	SHOUT1
Save Data On	Self Restart	Digital Input 4:	~	Digital Output 4:	0	~	Senit 4	Analog Input 4:		Analog Output 4:	0	Sel OLIT 4
	Set Data Save Option	Digital Input 5:	~	Digital Output 5:	0	~	SHOUTS	Analog Input 5:		Analog Output 5:	0	SHOUTS
Une Custom D	ata On Device Power Up	Digital Input 6:	~	Digital Output 6:	0	~	SHOUTE	Analog Input 6:			Read	
CHE CERCITE	Set Custon Start	Digital Input 7:	~	Digital Output 7:	0	~	Set OLIT 7	Analog Input 7:			Analog Outputs	
-		Digital Input 8:	~	Digital Output 8:	1	~	SHOUTS	Analog Input 8:			ouputs	
Read	Configured Values		Read Digital Inputs	Wite Digital Outputs			ead Digital Outputs	hput Type 0 0-20 mA	Read			
Fernivare Versi	e in Seconda 2294 00.38:14 100 Otganal 456647581 27-03-2020 on Upgraded 368491011 23-02-2023 ad Monitoring Values	Register 6:	Read Register Values	Cur BERS 2 Cur BERS 3 Cur BERS 4 Cur BERS 6 Cur BERS 6 Cur BERS 7 Cur BERS 8								
UR Diatal Outputs	dbus TCP Package END- s - Read has been sent 10-01-00-00-00-04-02-01-01- dbus TCP Package END s - Read has been sent 10-01-00-00-04-02-01-01-											

In the same way click "Set Out 4" button to set output value of port 4 after changing its value

OFF - 0 or ON - 1. User may change output values and click "Write Digital Outputs" to set all values at once.

		Digital Inputs		Digital Outputs				Analog Inputs				
Adress Value 2		Digital Input 1:	~	Digital Output 1:	1	~	Set OLIT 1	Analog input 1:		Analog Outputs Analog Output 1:	0	Set OLIT 1
LKM Configuration		Digital Input 2	~ ~	Digital Output 2:	1	~	SH OLIT 2	Analog Input 2:		Analog Output 2:	-	SHOLT 2
Modbus Address	Set Modbus Address	Digital Input 3:	~	Digital Output 3:	0	~	SHOUT 1	Analog input 3:		Analog Output 3:		SHOUT1
		Digital Input 4:	~	Digital Output 4:	0	~	Set OUT 4	Analog Input 4:		Analog Output 4		Set OLIT 4
Save Data On S		Digital Input 5:	~	Digital Output 5: Digital Output 6:	0	~	SH OLIT 5	Analog Input 5:		Analog Output 5:	-	SHOUTS
	Set Data Save Option	Digital Input 6:	~		0	~	SHOUTE	Analog Input 6:			-	
Use Custom Dat	a On Device Power Up	Digital Input 7:	~	Digital Output 7:	0	v	Set OLIT 7	Analog Input 7:			Read Analog	
	Set Custom Start	Digital Input 8:	~	Digital Output 8:	1	v	SHOUTS	Analog Input 8:			Outputs	
						-		Input Type				
Read Co	onfigured Values		Read Digital Inputs	Write Digital Outputs			ead Digital Outputs	0 0-20mA	Read Analog Inputs			
Monitoring Modbus Read C		Register V Register 1: Register 2:	i.es	See REG 1								
Device Uptime in	Seconds 2294	Register 3:		Set REG 3								
	00:38:14	Register 4:		See BEG &								
Firmware Version		Register 5:	-	Set REG 5								
Firmware Version	27-03-2020 Upgraded 388491011	Register 6:		Set REG 6								
	23-02-2023	v0.3 Register 7:		Set REG 7								
		Register 8:		See REG R								
Read	Monitoring Values		Read Register Values									
IR Digital Outputs - ceived HEX <: 00	us TCP Package END- Read has been sent 01-00-00-00-04-02-01-01											
IR Digital Outputs - ceived HEX << 00 Mode IR Digital Outputs - ceived HEX << 00	us TCP Package END- Read has been sent 01-00-00-00-04-02-01-01 us TCP Package END- Read has been sent 01-00-00-00-04-02-01-01 us TCP Package END-											

Modbus Poll Software can also be used to read and write those values. After successfull connection to HUR device, following settings can be used to read output values.

🎽 🖬 🎒 🗙 🛅 🗒 🗒 🛄 🕮 🗍 05 06 15 16 22 23   101	leip <b>१ №?</b>
Alias 00000 1 1 1 1 1 1 1 1 1 1 1 1 1	Read/Write Definition       >         Slave ID:       Image: Collis (0x)       OK         Function:       01 Read Collis (0x)       Cancel         Address:       1       Apply         Quantity:       8       Apply         Scan Rate:       1000       ms         Image: Read/Write Enabled       Read/Write Once         View       View
	Bows     Hide Alias Columns       10     20     50     100       Address in Cell     Addresses (Base 1)
Ip, press F1. 192.168.0.106: 50	N2 X

Also user can double click any of the port to open dialog for value write and select the value and write it to device. This dialog also lets user to select writing with Function code 5 or 15.

Connection Setup Functions Display View Window Help         Image: Setup Functions Display View Help         Image: Setup Functions Display View Help         Image: Setup Functions Display View Help	
Alias     00000     Write Single Coil     X       Slave ID:     2     Send       1     Address:     1     Cancel	
Alias         00000         Write Single Coil         X           Image: Color of the state of the	
Alias 00000 Write Single Coil X Slave ID: 2 Send Address: 1 Cancel	
Alias 00000 Slave ID: 2 Send Address: 1 Cancel	
Alias 00000 Slave ID: 2 Send Address: 1 Cancel	
0     Slave ID:     2     Send       1     Address:     1     Cancel	
1 Address: 1 Cancel	
1 Address: Concern	
Value	
1 Result	
0 Response ok	
0 Close dialog on "Response ok"	
Use Function	
O 05: Write single coil	
15: Write multiple coils	
vress F1. 192.168.0.106: 502	
Communication Traffic	×
Exit Stop Save Copy Stop on Error	
02926-Tx:0D 29 00 00 00 06 02 01 00 01 00 08	
102927-Rx:0D 29 00 00 00 04 02 01 01 8B	
102928-Tx:0D 2A 00 00 06 02 01 00 01 00 08 102929-Rx:0D 2A 00 00 08 04 02 01 01 8B	
182929-Rx:8D 2A 88 88 88 82 81 81 88 182938-Tx:8D 2B 88 88 88 86 82 81 88 81 88	
02931-Rx:0D 2B 00 00 00 04 02 01 01 8B	
102932-Tx:0D 2C 00 00 00 06 02 05 00 01 00 00	
102933-Rx:0D 2C 00 00 00 06 02 05 00 01 00 00 102934-Tx:0D 2D 00 00 06 06 02 01 00 01 00 08	
102935-Rx:0D 2D 00 00 00 04 02 01 01 8B	
102936-Tx:00 2E 00 00 00 06 02 01 00 01 00 08 102937-Rx:00 2E 00 00 00 04 02 01 01 8A	1

# 9.3 Reading I/O Values: Digital Input Models

Following commands available to read input values of HUR Series Modbus TCP Remote I/O Devices.

• HUR Devices with 8 Channel 12-275V AC-DC, 60mA Digital Optocoupler Input

Uses Function Code 0x02: Read Input Status to read status of input values

#### Read Input Values with Read Input Status (Function Code=2)

#### <u>Request</u>

This command is requesting the ON/OFF status of discrete inputs # 01 to 08

from the slave device with address 1.

#### 0001 0000 0006 01 02 0001 0008

0001: Modbus TCP - Transaction Identifier

0000: Modbus TCP - Protocol Identifier

0006: Modbus TCP - Message Length (6 bytes to follow)

01: The Slave Address (01 hex = address 1)

02: The Function Code 2 (read input status)

0001: The Data Address of the first output to read.

(0001 hex = 01)

0008: The total number of outputs requested. (08hex = 8)

#### <u>Response</u>

#### 0001 0000 0004 02 01 01 C3

0001: Modbus TCP - Transaction Identifier

0000: Modbus TCP - Protocol Identifier

0004: Modbus TCP - Message Length (4 bytes to follow)

01: The Slave Address (01 hex = address 1)

02: The Function Code 2 (read input status)

01: The number of data bytes to follow (8 Outputs / 8 bits per byte = 1 byte)

01: Outputs 1 - 8 (0000 0001)

The more significant bits contain the higher output variables.

This shows that output 1 is ON - 1, rest of the outputs are OFF - 0.

## Read via ZTerminal Software Example

ZTerminal software can be used to read values of HUR Series Modbus TCP Remote I/O Devices.

Enter "IP" and "port" value of HUR device, select "Modbus TCP" and click connect.

Then go to "HUR Modbus" page, enter module Modbus Address Value"" and click "Read Digital Outputs". Zterminal will show input values.

nnection Data	HUR Modbus LKM N												
Adress Value 1		Digital Inputs			Digital Outputs				Analog Inputs		Analog Outputs		
LKM Configura		Digital Input 1:	1	~	Digital Output 1:	1	~ ~	Set OI IT 1	Analog Input 1:		Analog Output 1:	0	Sel OIIT 1
Modbus Addres		Digital Input 2:	0	~	Digital Output 2:	1	~	Sal OLIT 2	Analog Input 2:		Analog Output 2:	0	See OIIT 2
	Set Modbus Address	Digital Input 3:	0	4	Digital Output 3:	0	~	SHOUTS	Analog Input 3:		Analog Output 3:	0	Set OILT 3
Save Data On	Self Restart	Digital Input 4:	0	~	Digital Output 4	1	v	SH DI IT A	Analog Input 4:		Analog Output 4:	0	SHOUT &
	Set Data Save Option	Digital Input 5:		~	Digital Output 5:	0	Y	SHOUTS	Analog Input 5:		Analog Output 5:	0	Set OUT 5
Use Castron D	ata On Device Power Up	Digital Input 6:	0	v	Digital Output 6:	0	v	SHOUTE	Analog Input 6:			Read	
Use Custon D	Set Custon Start	Digital Input 7:	0	~	Digital Output 7:	0	v	Se OLIT 7	Analog Input 7:			Analog	
	Secondaria Stat	Digital Input 8:	0	~	Digital Output 8:	1	~	Ser CHITE	Analog Input 8:			Outputs	
Read	Configured Values		Rea	d Digital Inputs	Witte Digital Outputs		R	ead Digital Outputs	0 - 20 mA	Read			
			_						O 0-10 V	Inputs			
Monitoring		Register											
Modbus Read	Counter 2121	Register 1	_		See REG 1								
Device Uptime	in Seconds 2294	Register 2			Get REG 2								
	00.38.14	- Register 3	_		See REG 3								
Firmware Versi	n Original 456647681	Register 4	_		See REG &								
	27-03-2020				Get REG 5								
Firmware Versio	n Upgraded 388491011	Register 6	_	_	Sar RIFG R								
	23-02-2023	v0.3 Register 7 Register 8	-		See REG 7								
		riegater a	K		Sat REG 8								
Rea	d Monitoring Values		Read	Register Value	•								
Mor	bus TCP Package END-												
eived HEX << 0	Read has been sent 1-01-00-00-00-04-01-02-01- bus TCP Package END	-01											
R Digital Inputs - served HEX << 0	Read has been sent 0-01-00-00-00-04-01-02-01- bus TCP Package END	-01											
R Digital Inputs -	Read has been sent 1-01-00-00-00-04-01-02-01	-01											

Modbus Poll Software can also be used to read and write those values. After successfull connection to HUR device, following settings can be used to read input values.

		Read/Write Definition	
Alias	00000	- Slave ID:	OK
	00000	Function: 02 Read Discrete Inputs (1	x) 🗠 Cancel
	1	Address: 1	Apply
	0	Quantity: 8	
	0	Scan Rate: 1000 ms	Read/Write Onc
	0	View	
	0	Rows	Hide Alias Columns
	0	• 10 ○ 20 ○ 50 ○ 100	Address in Cell
			C Marcos In Cell
	0	Display: Long Inverse V	PLC Addresses (Base 1)
	0	Display: Long Inverse ~	
elp, press F1.	0	Display: Long Inverse ~	
elp, press F1.	0 ation Traffic		
	0 cation Traffic Stop Save		PLC Addresses (Base 1)
Communic Exit 894369-Tx :	Stop Save	192.168.0.166: 502 Сору Stop on Елгог 2 80 01 90 08	PLC Addresses (Base 1)
Exit 004360-Tx: 004361-Rx: 004362-Tx:	Stop         Save           ØF         F7         00         00         00         04         01           ØF         F7         00         00         00         04         01           ØF         F7         00         00         00         04         01           ØF         F8         00         00         00         06         01	192.168.0.166: 502 Ссеу Stop on Елег 2 00 01 00 08 2 01 01 2 00 01 00 08	PLC Addresses (Base 1)
© Communic Exit 084360-Tx: 084361-Rx: 084362-Tx: 084362-Tx:	Stop         Save           0F         F7         00         00         08         06         01         0           0F         F7         00         00         00         04         01         0           0F         F8         00         00         08         06         01         0           0F         F8         00         00         08         06         01         0           0F         F8         00         00         08         04         01         0	192.168.0.166: 502 Сору Stop on Елог 2 00 01 00 08 2 01 01	PLC Addresses (Base 1)
Exit 004360-Tx: 004361-Tx: 004362-Tx: 004363-Rx: 004363-Rx: 004365-Rx:	Stop         Save           0F         F7         00         00         00         06         01           0F         F7         00         00         08         04         01           0F         F8         00         00         08         04         01           0F         F8         00         00         08         04         01           0F         F9         08         08         06         01         0           0F         F9         08         00         08         04         01	192.168.0.166: 502 192.168.0.166: 502 Ссеру Stop on Елег 2 00 01 00 08 2 01 01 2 00 01 00 08 2 01 01	PLC Addresses (Base 1)

# 9.4 Reading and Writing I/O Values: Analog Output Models

Following commands available to read and write output values of HUR Series Modbus TCP Remote I/O Devices.

• HUR Devices with 5 Channel 4-20mA Analog Output

Uses Function Code 0x04: Read Input Registers to read output values

Uses Function Code 0x06: Preset Single Register to set value of individual device output values

## Read Output Values with Read Input Registers (Function Code=4)

#### <u>Request</u>

This command is requesting the values for analog outputs # 01 to 05

from the slave device with address 1.

0001 0000 0006 01 04 0001 0005

0001: Modbus TCP - Transaction Identifier

0000: Modbus TCP - Protocol Identifier

0006: Modbus TCP - Message Length (6 bytes to follow)

01: The Slave Address (01 hex = address 1)

04: The Function Code 4 (read input registers)

0001: The Data Address of the first output to read.

(0001 hex = 01)

0005: The total number of outputs requested. (05hex = 5)

#### Response

#### 0001 0000 000D 01 04 0A 01F4 0064 03E8 0064 0032

0001: Modbus TCP - Transaction Identifier

0000: Modbus TCP - Protocol Identifier

000D: Modbus TCP - Message Length (13 bytes to follow)

01: The Slave Address (01 hex = address 1)

04: The Function Code 4 (read input registers)

OA: The number of data bytes to follow (5 Outputs / 2 bytes per output)

01F4: Value Output 1 in a range of 0-1000

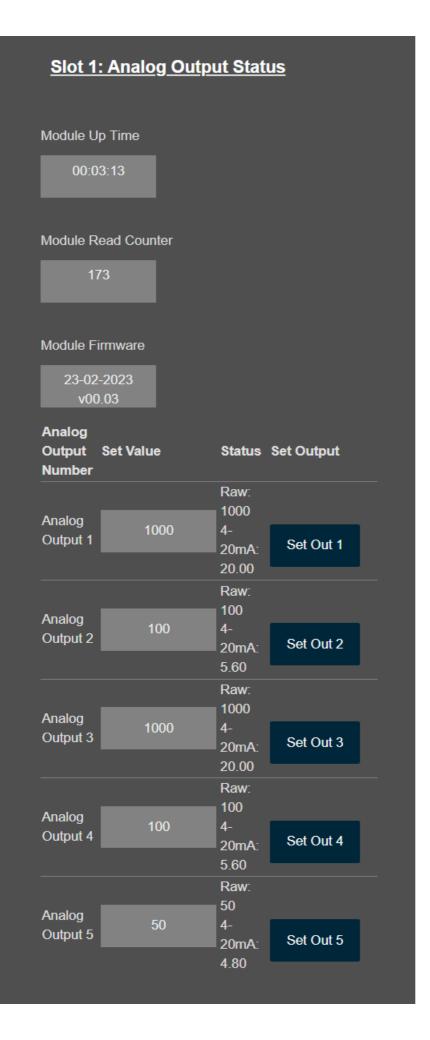
0064: Value Output 2 in a range of 0-1000

03E8: Value Output 3 in a range of 0-1000

0064: Value Output 4 in a range of 0-1000

0032: Value Output 5 in a range of 0-1000

For output 5, Hexadecimal 0x0032 is 50 in decimal. Which is 4.80mA. "I/O Status" menu also shows the value in decimal and in 4-20mA range.



#### <u>Request</u>

This command is writing the value for analog outputs # 01

from the slave device with address 1.

#### 0001 0000 0006 01 06 0001 0005

0001: Modbus TCP - Transaction Identifier

0000: Modbus TCP - Protocol Identifier

0006: Modbus TCP - Message Length (6 bytes to follow)

01: The Slave Address (01 hex = address 1)

06: The Function Code 6 (preset single register)

0001: The Data Address of the output to write.

(0001 hex = 01)

0032: The value to write. (Set output port 1 to 0x32 = 50 in decimal and which is 4.80mA)

#### <u>Response</u>

#### 0001 0000 0006 01 06 0001 0005

0001: Modbus TCP - Transaction Identifier

0000: Modbus TCP - Protocol Identifier

- 0006: Modbus TCP Message Length (6 bytes to follow)
- 01: The Slave Address (01 hex = address 1)
- 06: The Function Code 6 (preset single register)

#### 0001: The Data Address of the output written.

0032: The value written. (Output port 1 is now 0x32 = 50 in decimal and which is 4.80mA)

"I/O Status" menu also shows the value in decimal and in 4-20mA range.

# Slot 1: Analog Output Status

Module Up Time

01:51:49

#### Module Read Counter

6291

#### Module Firmware

23-02-2023 v00.03

#### Analog

Output Number	Set Value	Status	Set Output
Analog Output 1	50	Raw: 50 4- 20mA: 4.80	Set Out 1
Analog Output 2	100	Raw: 100 4- 20mA: 5.60	Set Out 2
Analog Output 3	1000	Raw: 1000 4- 20mA: 20.00	Set Out 3
Analog Output 4	100	Raw: 100 4- 20mA: 5.60	Set Out 4
Analog Output 5	50	Raw: 50 4- 20mA: 4.80	Set Out 5

Read via ZTerminal Software Example

ZTerminal software can be used to read and write values of HUR Series Modbus TCP Remote I/O Devices.

Enter "IP" and "port" value of HUR device, select "Modbus TCP" and click connect.

Then go to "HUR Modbus" page, enter module Modbus Address Value"" and click "Read Analog Outputs". ZTerminal will show output values.

		Digital Inputs		Digital Outputs				Analog Inputs				
Adress Value 1		Digital Input 1:	1.	Digital Output 1		~	Set OUT 1	Analog Input 1:		Analog Outputs Analog Output 1	13.000	Ser OUT 1
LKM Configuratio	n	Digital Input 2	0 ~	Digital Output 2		~	Set OUT 2	Analog Input 2:		Analog Output 2		Ser OIIT 2
Modbus Address		Digital Input 3:	0 ~	Digital Output 3		~	SHOUT 3	Analog Input 3:		Analog Output 3:		Ser OUT 3
	Set Modbus Address	Digital Input 4:	0 ~	Digital Output 4	1	~	SHOIT 4	Analog Input 4:		Analog Output 4		Set OUT 4
Save Data On S		Digital Input 5:	0 ~	Digital Output 5	0	~	SHOUTS	Analog Input 5:		Analog Output 5:		Secours
	Set Data Save Option	Digital Input 6:	0 ~	Digital Output 6	0	~	SHOUTE	Analog Input 6:		ready costor of	4.000	Contract of
Use Custom Data	a On Device Power Up	Digital Input 7:	0 ~	Digital Output 7	0	~	SHOUT 7	Analog Input 7:			Read Analog	
	Set Custom Start	Digital Input 8:	0 ~	Digital Output 8	1	~	SHOUTS	Analog Input 8:			Outputs	
								Input Type				
Read Co	nfigured Values		Read Digital Input	Write Digit Outputs			ead Digital Outputs	0 0 - 20 mA	Read Analog Inputs			
Monitoring		Register V	alues					O 0 - 10 V	e poce			
		Register 1:		Set REG 1								
Modbus Read Co		Register 2		Set REG 2								
Device Uptime in	Seconds 2254	Register 3		Set BEG 1								
	00:38:14	Register 4:		See BEG 4								
Firmware Version		Register 5		Set REG 5								
Firmware Version	27-03-2020 Upgraded 388491011	V0.1 Register 6:	_	Set REG 6								
	23-02-2023	v0.3 Register 7:		Set BEG 7								
		Register 8:		Set REG 8								
			-									
Read	Monitoring Values		Read Register Valu	es								
necting NNECTED CKET: 1 R Analog Outputs - xeived HEX <<: 004	2/4/2023 3 28:00 PM) Read has been sent 01-00-00-00-01-04-07 us TCP Package END	-01.F4-00-64-03-E8	00-64-00-32									

In the same way click "Set Out 4" button to set output value of port 4 after changing its value in range 4 - 20mA.

dress Value 1		Digital inputs	1.0		Digital Outputs	1.			Analog Inputs		Analog Outputs			
LKM Configurati	an .	Digital Input 1	1	~	Digital Output 1:	1	~	Set OUT 1	Analog Input 1:		Analog Output 1:		SHOUT	1
Modbus Address		Digital Input 2 Digital Input 3	0	~	Digital Output 2: Digital Output 3:	1	v	Set OUT 3	Analog Input 2:		Analog Output 2		SHOUT	
	Set Modbus Address	Digital Input 4	0	~	Digital Output 4:	1	~	Set OUT 4	Analog Input 3:		Analog Output 3:		Set OUT	
Save Data On S	lef Restart	Digital input 5:	0	-	Digital Output 5	0		Set OUT 5	Analog Input 4:		Analog Output 4:		Sernin	_
	Set Data Save Option	Digital input 6	0	~	Digital Output 6:	0	~	SHOUTE	Analog Input 5: Analog Input 6:	2	Analog Output 5	4.800	SerOUT	5
Use Custom Da	a On Device Power Up	Digital input 7:	0		Digital Output 7:	0	~	Set OUT 7	Analog input s: Analog input 7:			Read		
	Set Custom Start	Digital input 8:	0	~	Digital Output 8:	1	-	SHOUTS	Analog Input 7: Analog Input 8:			Analog Outputs		
			-			-			input Type					
Read C	onfigured Values		Rea	d Digital Inputs	Write Digital Outputs			ead Digital Outputs	0 0-20mA	Read Analog				
Monitoring		Register	alues						O 0-10V	Inputs				
		Register 1			Set BEG 1									
Modbus Read C		Register 2	-		Set BES 2									
Device Uptime i	Seconds 2294	Register 3	-		Set REG 3									
-	00:38:14	Register 4			See BEG 4									
Firmware Version	Original 456647581	Register 5	-		Set REG 5									
Firmware Version	Upgraded 388491011	Register 6			Set REG 6									
	23-02-2023	v0.3 Register 7			Set REG 7									
		Register 8			Set REG R									
Read	Monitoring Values		Read	Register Value										
	12/4/2023 3:20:00 PM)													
ecting NECTED KET: 1	Production													
ived HEX <: 00	- Read has been sent 01-00-00-00-00-01-04-0 us TCP Package END	4-01-F4-00-64-03-E	-00-64	00-32										

Modbus Poll Software can also be used to read and write those values. After successfull connection to HUR device, following settings can be used to read output values.

Mbpoll1			
= 1371: Err = 0: Alias	ID = 1: F = 04: SR = 1000 00000 500 100 1000 50	Slave ID: Function: 04 Read Input Registers (3x) Address: 1 Quankity: 5 Scan Rate: 1000 ms Read/Write Enabled View Rows 0 10 0 20 0 50 0 100 Hidd Add	OK Cancel Apply Read/Write Onc e Alias Columns ress in Cell Addresses (Base 1)
elp, press F1.	ation Traffic	192.168.0.106: 502	×

Also user can double click any of the port to open dialog for value write and select the value and write it to device within range 0-1000.

	n Setup Function	ns Display View Win	dow Help		
🖻 🖬 🎒 🗙	П. 🚊 🖾 л.	05 06 15 16 22 23	101 😵 🎀		
Mbpoll1					
	ID = 1: F = 04: S				
Alias	00000	Write Single Registe	r X		
		Slave ID: 1	Send		
	500	Address: 3	Cancel		
	500				
	100	Value: 500			
	50	Result Response ok			
		Close dialog on	"Response ok"		
		Use Function			
		<ul> <li>0 06: Write single</li> </ul>	register		
		0 16: Write multipl	e registers		
_	_				
elp, press F1.		192.168	.0.106: 502		
( The second	cation framic				×
Communi					
Communi Exit	Stop	Save Copy	Stop on Error		
Exit 005253-Tx:	16 96 88 88 8	8 86 81 84 88 81	00 05	64 00 32	
Exit 005253-Tx: 005254-Rx: 005255-Tx:	16 96 88 88 8 16 96 88 88 8 16 97 88 88 8	10 06 01 04 00 01 10 0D 01 04 0A 01 10 06 01 04 00 01	00 05 F4 00 64 03 E8 00 00 05		
Exit 005253-Tx: 005254-Rx: 005255-Tx: 005256-Rx: 005257-Tx:	16 96 88 88 8 16 96 80 80 8 16 97 88 88 8 16 97 88 88 8 16 98 88 88 8	10         06         01         04         00         01           10         00         01         04         0A         01           10         06         01         04         0A         01	00 05 F4 00 64 03 E8 00 00 05 F4 00 64 03 E8 00 00 05	64 00 32	
Exit 005253-Tx: 005254-Rx: 005255-Tx: 005256-Rx: 005257-Tx: 005258-Rx:	16 96 00 00 0 16 96 00 00 0 16 97 00 00 0 16 97 00 00 0 16 98 00 00 0 16 98 00 00 0	10         06         01         04         00         01           10         00         01         04         0A         01           10         06         01         04         0A         01	00 05 F4 00 64 03 E8 00 00 05 F4 00 64 03 E8 00	64 00 32	
Exit 005253-Tx: 005254-Rx: 005255-Tx: 005256-Rx: 005258-Rx: 005258-Rx: 005259-Tx: 005260-Rx:	16         96         88         88         8           16         96         00         00         0           16         97         88         88         8           16         97         88         88         8           16         97         88         88         8           16         97         88         88         8           16         98         88         88         8           16         98         88         88         8           16         98         88         88         8           16         98         88         88         8           16         98         88         88         8           16         99         88         88         8	0         06         01         04         08         01           00         0D         01         04         0A         01           00         06         01         06         08         03           00         06         01         06         00         03	00 05 F4 00 64 03 E8 00 00 05 F4 00 64 03 E8 00 00 05 F4 00 64 03 E8 00	64 00 32	
Exit 005253-Tx: 005254-Rx: 005255-Tx: 005256-Rx: 005258-Rx: 005258-Rx: 005259-Tx: 005260-Rx: 005261-Tx: 005261-Tx:	16         96         88         88         8           16         97         80         80         8           16         97         88         88         8           16         97         88         88         8           16         98         88         88         8           16         98         80         88         8           16         98         80         88         8           16         99         88         88         8           16         99         88         88         8           16         99         88         88         8           16         99         88         88         8           16         94         88         88         8           16         94         88         88         8           16         94         88         88         8           16         94         88         88         8           16         94         88         88         8           16         94         88         88         8           16         <	0         06         01         04         00         01           0         0D         01         04         0A         01           00         06         01         04         08         03           00         06         01         04         0A         01           00         06         01         04         0A         01	00 05 F4 00 64 03 E8 00 00 05 F4 00 64 03 E8 00 00 05 F4 00 64 03 E8 00 01 F4 01 F4	9 64 88 32 9 64 88 32	

# 9.5 Reading I/O Values: Analog Input Models

Following commands available to read input values of HUR Series Modbus TCP Remote I/O Devices.

• HUR Devices with 8 Channel 0-10V and 0-20mA Selectable Analog Input

Uses Function Code 0x04: Read Input Registers to read input values

Read Input Values with Read Input Registers (Function Code=4)

#### <u>Request</u>

This command is requesting the values for analog outputs # 01 to 08

from the slave device with address 1.

#### 0001 0000 0006 01 04 0001 0008

0001: Modbus TCP - Transaction Identifier

0000: Modbus TCP - Protocol Identifier

0006: Modbus TCP - Message Length (6 bytes to follow)

01: The Slave Address (01 hex = address 1)

04: The Function Code 4 (read input registers)

0001: The Data Address of the first output to read.

(0001 hex = 01)

0008: The total number of outputs requested. (08hex = 8)

#### <u>Response</u>

0001: Modbus TCP - Transaction Identifier

0000: Modbus TCP - Protocol Identifier

0013: Modbus TCP - Message Length (19 bytes to follow)

01: The Slave Address (01 hex = address 1)

04: The Function Code 4 (read input registers)

10: The number of data bytes to follow (8 Outputs / 2 bytes per output)

7FFC: Value Output 1 in a range of 0-65535

0000: Value Output 2 in a range of 0-65535

0000: Value Output 3 in a range of 0-65535

0000: Value Output 4 in a range of 0-65535

0000: Value Output 5 in a range of 0-65535

0000: Value Output 6 in a range of 0-65535

0000: Value Output 7 in a range of 0-65535

0000: Value Output 8 in a range of 0-65535

For output 1, Hexadecimal 0x7FFC is 32764 in decimal. Which is 10.0mA. "I/O Status" menu also shows the value in decimal and in 4-20mA range.

#### Slot 1: Analog Input Status

Module Up Time	
01:02:04	
Module Read Counter	
13977	
Module Firmware	
21-02-2023	
v00.03	
Analog Input Number	Status
	Raw: 32764
Analog Input 1	4-20mA: 10.00 0-10V: 5.00
	Raw: 0
Analog Input 2	4-20mA: 0.00
	0-10V: 0.00
Analog Input 3	Raw: 0 4-20mA: 0.00
	0-10V: 0.00
	Raw: 0
Analog Input 4	4-20mA: 0.00 0-10V: 0.00
	Raw: 0
Analog Input 5	4-20mA: 0.00
	0-10V: 0.00
Analog Input 6	Raw: 0 4-20mA: 0.00
Analog input o	0-10V: 0.00
	Raw: 0
Analog Input 7	4-20mA: 0.00 0-10V: 0.00
	Raw: 0
Analog Input 8	4-20mA: 0.00
	0-10V: 0.00

#### Read via ZTerminal Software Example

ZTerminal software can be used to read values of HUR Series Modbus TCP Remote I/O Devices.

Enter "IP" and "port" value of HUR device, select "Modbus TCP" and click connect.

Then go to "HUR Modbus" page, enter module Modbus Address Value"" and click "Read Analog Inputs". ZTerminal will show input values.

onnection Data	HUR Modbus LIGH N												
Adress Value 1		Digital Ing			Digital Outputs			-	Analog Inputs		Analog Outputs		
LKM Configuratio	n	Digital Input		1 v	Digital Output 1:		v	Sel OLIT 1	Analog Input 1:	9.999	Analog Output 1:		SHOUT1
Modbus Address		Digital Input		0 ~	Digital Output 2		~	Senit 2	Analog Input 2	0.000	Analog Output 2:		Set OLIT 2
	Set Modbus Address	Digital Input		0 ~	Digital Output 3	-	~	Ser OILT 3	Analog Input 3:	0.000	Analog Output 3:		See OUT 3
Save Data On S	elf Restart	Digital Input		0 ~	Digital Output 4		~	Se OIIT 4	Analog Input 4:	0.000	Analog Output 4:		SH DIT 4
	Set Data Save Option	Digital Input		0 ~	Digital Output 5		~	Ser DI IT S	Analog Input 5:	0.000	Analog Output 5:	4.800	Ser OUT 5
Use Custom Dat	On Device Power Up	Digital Input		0 ~	Digital Output 6:		~		Analog Input 6:	0.000		Read	
	Set Custon Stat	Digital Input		0 ~	Digtal Output 7		v	Ser OUT 7	Analog Input 7:	0.000		Analog Outputs	
		Digital Input	4 0:	0 ~	Digital Output 8	1	v	Senine	Analog Input 8:	0.000		outputs	
Read Co	rfigured Values			Read Digital Input	Write Digit Outputs	4		ead Digital Outputs	0 0-20mA	Read Analog Inputs			
Monitoring		Reg	gister Va	Aues					O 0 - 10 V	riputa			
			ister 1:		See 865 1								
Modbus Read Cr	ounter 2121		ister 2		Set BEG 2								
Device Uptime in			inter 3		Set REG 1								
	00:38:14		Register 4:		Set BEG 4								
Firmware Version		Beel	inter 5:		Set REG 5								
Ermann Venion	27-03-2020 Upgraded 388491011	V0.1	Register 6: Register 7:		Set BES 4								
rannare version	23-02-2023			_	Set BEG 7								
			inter S:		See BEG 8								
					- se mitta								
Read	Monitoring Values			Read Register Valu	es								
JR Analog Inputs - F cerived HEX << 00- Modb JR Analog Inputs - F cerived HEX << 00- Modb JR Analog Inputs - F cerived HEX << 00-	01-00-00-00-13-01-04-10 us TCP Package END Read has been sent 01-00-00-00-13-01-04-10 us TCP Package END	7F-3F-00-00	00000	0.00-00-00-00-00-00	-00-00-00								

Modbus Poll Software can also be used to read those values. After successfull connection to HUR device, following settings can be used to read input values.

C Addiss in Cer		t 0 5 0 View	Alias         00000         Function:         04 Read Input Registers (3x)         Cance           32704         Address:         1	5	0 0 0 0	View Rows 10 20 50 100 Hide Alias Columns Address in Cel
Help, press F1. 192.168.0.165: 502	Display: Signed V DLC Addresses (Base 1)	0         0	Alias       00000         Image: Signed       Image: Signed         Image: Alias       00000         Image: Alias       Image: Alias         Image: Al	1		
0     View       0     Rows       0     Hide Alias Columns			Alias         00000         Function:         04 Read Input Registers (3x)         Cancel           32704         Address:         1         Apple		0	
0     Scan Rate: 1000     ms       0     Image: Comparison of the state of the sta	Scan Rate: 1000 ms Read/Write Enabled Read/Write Once	0 Scan Rate: 1000 ms	Alias 00000		32704	Address: 1 Apply
32704     Address:     1     La       0     0     Quantity:     8       0     0     Scan Rate:     1000       0     0     Image: Comparison of the compari	Address: 1 Apply Quantity: 8 Scan Rate: 1000 ms Read/Write Enabled Read/Write Once	32704         Address:         1         Cancel           0         Quantity:         8         Apply           0         Scan Rate:         1000         ms			00000	Stave ID: 04 Bead Insut Registers (3v) V

# 10. MQTT Communication Example

HUR Series Modbus TCP Remote I/O Devices lets user to read input values or write output values over Modbus TCP. Simultaneously all meter data can be sent to MQTT Server.

## 12.1 MQTT Data Transmission: Example

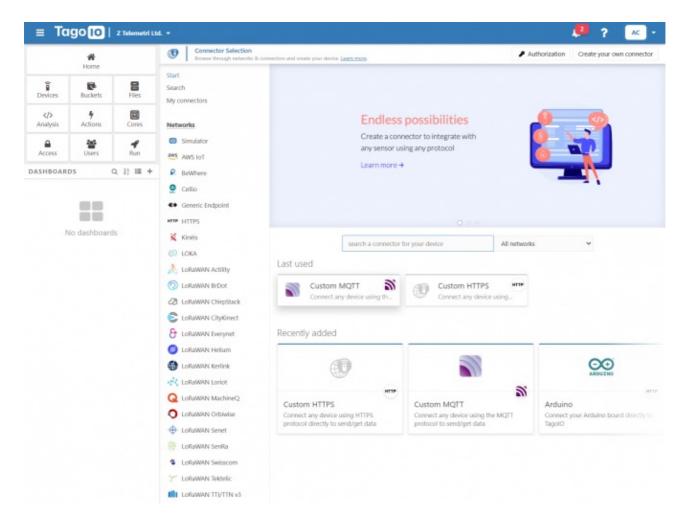
Please follow details regarding reading or writing Modbus registers of HUR which is explained in chapter "9. Modbus Communication" and make sure all readings are ok.

Then go to "Network Settings" menu and "Enable MQTT Publisher for Enabled Obis Codes" part.

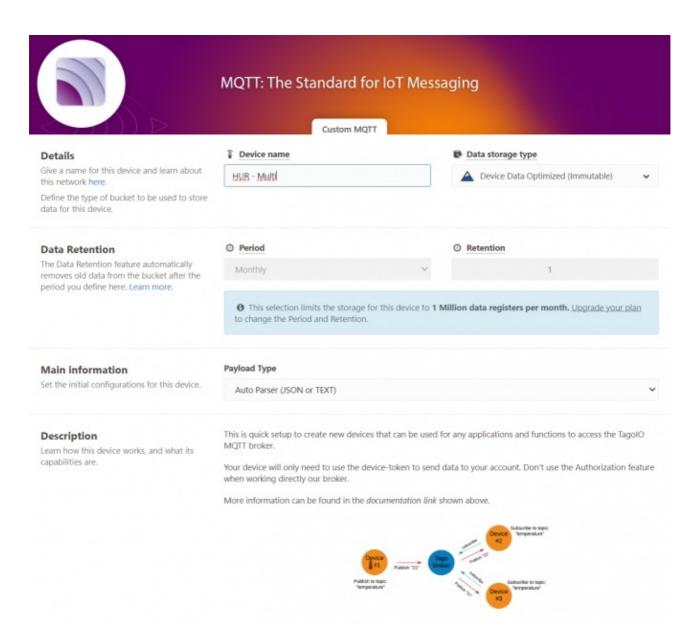
			HUR Series Multi Slot VO Device Juil: Nov 30 2023 21:14:16 MAC: 60 8a:10 a3:81 8b
×			
۲	Network Settings	NTP Settings	
••• <sup>‡</sup> ••		NTP Server	
×			
ę.ª		MQTT Settings	
Ø		Enable MQTT Publisher	
.A.		✓	
		MQTT Broker IP	MQTT Broker Port
		Client ID	
		User Name	Password
			0d05344d-4783-45be-e113-336221d0684f
		Publish Topia	Subscribe Tapic
		MQTT_HUR_Publish_topic	MQTT_HUR_Subscribe_topic
		Minimum Send Interval for a Parsed Data (in seconds)	Data Format
			PARSED DATA AS OBJECTS -

In our example we will use "https://tago.io/" as MQTT Server.

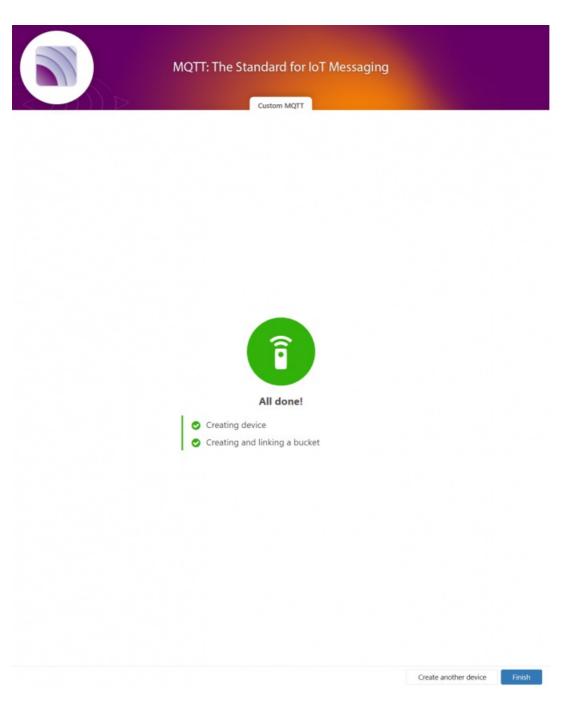
Go to MQTT server panel and click "Add Device" to add HUR to MQTT Server. We will also get password after adding device.



Select "Custom MQTT".



Then enter "Device name" in pop up screen and click "Create My Device".



Click "Finish" when all done.

	A Home		HUR - Multi     Last Input Never   1	ype Device Data O	ptimized (Immuta	ble)		
-		_	General Information	Emulator	Payload P	arser	Live Inspect	tor
Devices	Buckets	Files	្ធិ Name					Stat
	4		HUR - Multi				Ð	View
Analysis	Actions	Cores	Network		③ Connector	Dr		D
Access	Users	🖋 Run	MQTT	Custom MQTT				
DASHBOARDS Q. ↓2 III +			📰 Token & Serial Number					
			Token Name					
			Token #2			Ge 😡	Copy token	
			Default		-	•	2	
1	lo dashboard	s						

Once the device is created, click "Copy Token" button. This will copy password value.

Then go back to HUR and enter that value as password and click "Save Configuration" button.

			REDZ HUR Series Multi Slot I/O Device Version: 2.01.00, -built: Nov 30 2023 21:14:16 MAC: 60.84:10.43.81.8b
۲	Network Settings	NTP Settings	
		NTP Server	
		MQTT Settings	
		Enable MQTT Publisher	
÷.			
		MQTT Broker IP	MQTT Broker Port
		Client ID	
		User Name	Password
		MQTT_HUR_User	468280ce-15/7-4322-8/69-569/0650416
		Publish Topic MQTT_HUR_Publish_topic	Subscribe Topic
		Minimum Send Interval for a Parsed Data (in seconds)	
			PARSED DATA AS OBJECTS ~
		Server Network Settings	
		Server Listening Port	Maximum Number of Clients
		DHCP Server Enabled	Use Static Address for Device
		Save Configuration	

<u>"MQTT Broker IP"</u>: TCP IP of the MQTT Server. User must enter IP value 75.2.83.130 is IP of "https://tago.io/" web address.

<u>"MQTT Broker Port"</u>: TCP Port of the MQTT Server. 1883 is TCP Port of "https://tago.io/" web address.

<u>"Client ID"</u>: MQTT Publisher client id. Default is MQTT\_HUR\_Client. Maximum length for this field is 32.

<u>"User Name"</u>: MQTT Publisher user name. This must be entered based on MQTT server settings. Maximum length for this field is 64.

<u>"Password</u>": MQTT Publisher password. This must be entered based on MQTT server settings. Maximum length for this field is 48.

<u>"Publish Topic"</u>: MQTT Publisher topic value. Default is MQTT\_HUR\_Publish\_topic. Maximum length for this field is 32. <u>"Subscribe Topic"</u>: MQTT Publisher subscribe topic value. Default is MQTT\_HUR\_Subscribe\_topic. Maximum length for this field is 32.

<u>"Minimum Send Interval for a Parsed Data (in seconds)"</u>: Minimum value to send meter data to MQTT Server. This time may be longer due to meter quantity in reading queue.

"Data Format": Options for how data is shared by HUR with MQTT server. There are 2 options:

Parsed Data as Objects

Parsed Data as Modbus Frame

When selected as "Parsed Data as Objects", HUR will share data as follows

Device Name, Device Model, NTP Time and Data itself in pairs as IO number and its value.

Device Model Can be:

"Analog Out" "Digital Out" "Analog In" "Digital In"

Here is an example for "Digital Out"

11:04:49:

[MQTT] Device publish

{ "topic": "MQTT\_HUR\_Publish\_topic", "payload": "{\"HURNme\":\"HUR\_SERVER1\",\"HURMdl\":\"Digital Out\",\"Time\":\"1701417889\",\"Data\": {\"I01\":\"1\",\"I02\":\"1\",\"I03\":\"0\",\"I04\":\"0\",\"I05\":\"0\",\"I06\":\"0\",\"I07\":\"1\",\"I08\":\"1\"}}", "qos": 0, "isHex": false, "bucket": "65326fbe7dc2cd00092f998f", "messageId": 0 } { "topic": "MQTT\_HUB\_Publish\_topic" "payload": "\"HUBNme\":\"HUB\_SERVER1\","HUBMd\\":\"Digital\_Out\",\"Time\":\"1701417889\",\"Data\":

{ "topic": "MQTT\_HUR\_Publish\_topic", "payload": "{\"HURNme\":\"HUR\_SERVER1\",\"HURMdl\":\"Digital Out\",\"Time\":\"1701417889\",\"Data\": {\"IO1\":\"1\",\"IO2\":\"1\",\"IO3\":\"0\",\"IO4\":\"0\",\"IO5\":\"0\",\"IO6\":\"0\",\"IO7\":\"1\",\"IO8\":\"1\"}}", "qos": 0, "isHex": false, "bucket": "65326fbe7dc2cd00092f998f", "messageId": 0 }

"IO1" is the first one and its value is shown as "1" Which means digital out value for 1st port is "1" or "ON". Next values can be seen in same manner.

Here is an example for "Digital In"

12:13:54: **[MQTT] Device publish** { "topic": "MQTT\_HUR\_Publish\_topic", "payload": "{\"HURNme\":\"HUR\_SERVER\",\"HURMdl\":\"Digital In\",\"Time\":\"1701422033\",\"Data\": {\"IO1\":\"1\",\"IO2\":\"0\",\"IO3\":\"0\",\"IO4\":\"0\",\"IO5\":\"0\",\"IO6\":\"0\",\"IO7\":\"0\",\"IO8\":\"0\"}}, "qos": 0, "isHex": false, "bucket": "65699f72cc7006000fd24c88", "messageId": 0 } { "topic": "MQTT\_HUR\_Publish\_topic", "payload": "{\"HURNme\":\"HUR\_SERVER\",\"HURMdl\":\"Digital In\",\"Time\":\"1701422033\",\"Data\": {\"IO1\":\"1\",\"IO2\":\"0\",\"IO3\":\"0\",\"IO5\":\"0\",\"IO6\":\"0\",\"IO7\":\"0\",\"IO8\":\"0\"}}", "qos": 0, "isHex": false, "bucket": "65699f72cc7006000fd24c88", "messageId": 0 }

"IO1" is the first one and its value is shown as "1" Which means digital out value for 1st port is "1" or "ON". Next values can be seen in same manner.

Here is an example for "Analog Out"

#### "isHex": false, "bucket": "65326fbe7dc2cd00092f998f", "messageId": 0 }

{ "topic": "MQTT\_HUR\_Publish\_topic", "payload": "{\"HURNme\":\"HUR\_SERVER1\",\"HURMdl\":\"Analog Out\",\"Time\":\"1701421393\",\"Data\": {\"IO1\":\"1F4\",\"IO2\":\"64\",\"IO3\":\"3E8\",\"IO4\":\"64\",\"IO5\":\"32\"}}", "qos": 0, "isHex": false, "bucket": "65326fbe7dc2cd00092f998f", "messageId": 0 }

"IO1" is the first one and its value is shown as "IF4"

Which means analog out value for 1st port is "500" in decimal within a range of 0-1000. Which means port 1 value is "12.0mA".

Next values can be seen in same manner.

Here is an example for "Analog In"

#### 12:09:07:

#### [MQTT] Device publish

{ "topic": "MQTT\_HUR\_Publish\_topic", "payload": "{\"HURNme\":\"HUR\_AI\_8100\",\"HURMdl\":\"Analog In\",\"Data\": {\"IO1\":\"7F3B\",\"IO2\":\"0\",\"IO3\":\"0\",\"IO4\":\"0\",\"IO5\":\"0\",\"IO6\":\"0\",\"IO7\":\"0\",\"IO8\":\"0\"}}", "qos": 0, "isHex": false, "bucket": "65699c4040e648000925f01e", "messageId": 0 }

{ "topic": "MQTT\_HUR\_Publish\_topic", "payload": "{\"HURNme\":\"HUR\_AI\_8100\",\"HURMdl\":\"Analog In\",\"Data\":

{\"IO1\":\"7F3C\",\"IO2\":\"0\",\"IO3\":\"0\",\"IO4\":\"0\",\"IO5\":\"0\",\"IO6\":\"0\",\"IO7\":\"0\",\"IO8\":\"0\",\"IO8\":\"0\"}}", "qos": 0, "isHex": false, "bucket": "65699c4040e648000925f01e", "messageId": 0 }

"IO1" is the first one and its value is shown as "7F3C"

Which means analog out value for 1st port is "32572" in decimal within a range of 0-65535. Which means port 1 value is "10.0mA".

which means port i value is 10.0mA.

Next values can be seen in same manner.

When selected as "Parsed Data as Modbus Frame", HUR will share data as follows

Device Name, Device Model, NTP Time and Data itself in hexadecimal format just like a Modbus query response. First byte will show data bytes count and rest is the data itself. Data will be in similar format with how the device responds when read via Modbus commands.

Here is an example for "Digital Out"

11:11:47: **[MQTT] Device publish** { "topic": "MQTT\_HUR\_Publish\_topic", "payload": "{\"HURNme\":\"HUR\_SERVER1\",\"HURMdl\":\"Digital Out\",\"Time\":\"1701418305\",\"Data\":{\"ModFr\":\"01C3\"}}", "qos": 0, "isHex": false, "bucket": "65326fbe7dc2cd00092f998f", "messageId": 0 } { "topic": "MQTT\_HUR\_Publish\_topic", "payload": "{\"HURNme\":\"HUR\_SERVER1\",\"HURMdl\":\"Digital Out\",\"Time\":\"1701418305\",\"Data\": { "topic": "MQTT\_HUR\_Publish\_topic", "payload": "{\"HURNme\":\"HUR\_SERVER1\",\"HURMdl\":\"Digital Out\",\"Time\":\"1701418305\",\"Data\": { "ModFr\":\"01C3\"}}", "qos": 0, "isHex": false, "bucket": "65326fbe7dc2cd00092f998f", "messageId": 0 }

01 in beginning is hexadecimal equivalent for 1 byte data count Next is the value of 8 ports which is "C3" Binary equivalent of hec C3 is "11000011"

This means

Port 1 value is "1" Port 2 value is "1" Port 3 value is "0" Port 4 value is "0" Port 5 value is "0" Port 6 value is "0" Port 7 value is "1" Port 8 value is "1"

The 1st bit is port 1 value and 8th bit is port 8 value.

Here is an example for "Digital In"

#### 11:58:33: [MQTT] Device publish

{ "topic": "MQTT\_HUR\_Publish\_topic", "payload": "{\"HURNme\":\"HUR\_SERVER\",\"HURMdl\":\"Digital In\",\"Time\":\"1701421113\",\"Data\":{\"ModFr\":\"0101\"}}", "qos": 0, "isHex": false, "bucket": "65699f72cc7006000fd24c88", "messageld": 0 }

{ "topic": "MQTT\_HUR\_Publish\_topic", "payload": "{\"HURNme\":\"HUR\_SERVER\",\"HURMdl\":\"Digital In\",\"Time\":\"1701421113\",\"Data\": {\"ModFr\":\"0101\"}}", "qos": 0, "isHex": false, "bucket": "65699f72cc7006000fd24c88", "messageId": 0 }

01 in beginning is hexadecimal equivalent for 1 byte data count Next is the value of 8 ports which is "b1" Binary equivalent of hec C3 is "00000001"

This means

Port 1 value is "1" Port 2 value is "0" Port 3 value is "0" Port 4 value is "0" Port 5 value is "0" Port 6 value is "0" Port 7 value is "0"

The 1st bit is port 1 value and 8th bit is port 8 value.

Here is an example for "Analog Out"

11:16:48: **[MQTT] Device publish** { "topic": "MQTT\_HUR\_Publish\_topic", "payload": "{\"HURNme\":\"HUR\_SERVER1\",\"HURMdl\":\"Analog Out\",\"Time\":\"1701418608\",\"Data\":{\"ModFr\":\"0A01F4006403E800640032\"}}", "qos": 0, "isHex": false, "bucket": "65326fbe7dc2cd00092f998f", "messageId": 0 }

{ "topic": "MQTT\_HUR\_Publish\_topic", "payload": "{\"HURNme\":\"HUR\_SERVER1\",\"HURMdl\":\"Analog Out\",\"Time\":\"1701418608\",\"Data\": {\"ModFr\":\"0A01F4006403E800640032\"}}", "qos": 0, "isHex": false, "bucket": "65326fbe7dc2cd00092f998f", "messageId": 0 }

OA in beginning is hexadecimal equivalent for 10 bytes data count. Each value is 2 bytes, for 5 ports Analog out device, there are 10 bytes.

Next 2 bytes are the value of port 1 which is "b1F4"

That means "500" in decimal and that is equal to "12.0mA" in a range of 0-1000.

Next values can be seen in same manner.

Here is an example for "Analog In"

11:46:22:

#### [MQTT] Device publish

{ "topic": "MQTT\_HUR\_Publish\_topic", "payload": "{\"HURNme\":\"HUR\_AI\_8100\",\"HURMdl\":\"Analog In\",\"Data\": {\"ModFr\":\"107FBE0000000000000000000000000000000\"}}", "qos": 0, "isHex": false, "bucket": "65699c4040e648000925f01e", "messageId": 0 }

{ "topic": "MQTT\_HUR\_Publish\_topic", "payload": "{\"HURNme\":\"HUR\_AI\_8100\",\"HURMdl\":\"Analog In\",\"Data\":

{\"ModFr\":\"107FBE000000000000000000000000\"}}", "qos": 0, "isHex": false, "bucket": "65699c4040e648000925f01e", "messageId": 0 }

10 in beginning is hexadecimal equivalent for 10 bytes data count. Each value is 2 bytes, for 8 ports Analog in device, there are 16 bytes.

Next 2 bytes are the value of port 1 which is "7FBE"

That means "32702" in decimal and that is equal to "9.98mA" in range 0-65535.

Next values can be seen in same manner.

**NOTE:** Analog Out and Digital Out models can also be controlled via MQTT server.

Format will be as follows:

1011:500

Letters 'I' and 'O', then Slot number '1' (always 1 for single Slot devices and can be 1-2-3-4 for multi slot device), then ':' and then the value which is a value between range 0-1000 for Analog output version and 0 or 1 for Digital out version. User can write multiple commands and those must be seperated with new line '\n' or 0x0D in hexadecimal format.

Here is screenshot for an example:

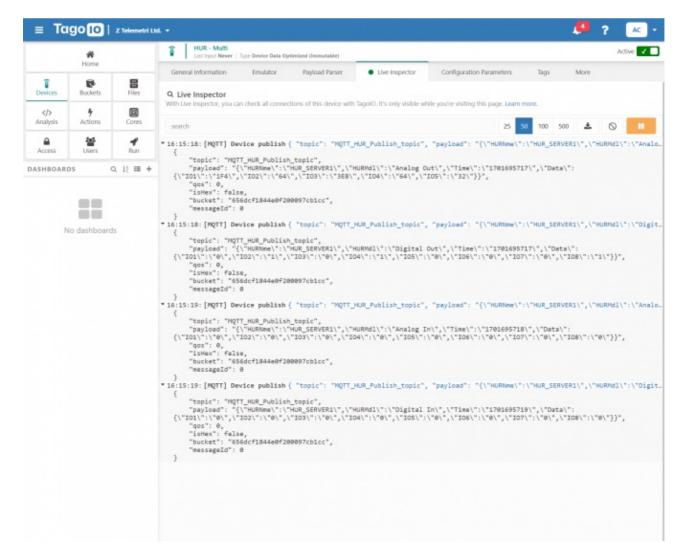
Tags More				
Tr	igger		Action	
By interval very 10 minutes, every 2 days	O Run Action	every	/ Name	
By date	1	Minute ~	HUR multi	
 On the first day of each month	Note: The actio	n can take up to 1 minute to be	7 Type of action - Learn more about this Action	type
		executed.	Publish to MQTT	
Learn more abou	It Trigger by Schedule		Quality of Service	
			QoS 0 QoS 1 QoS 2 R	etain
			Publish to the devices linked to	
			HUR Multi	×
			i≣ Topic	
			MQTT_HUR_Subscribe_topic	
			Payload	
			IO11:500 IO12:100 IO13:1000 IO14:100 IO15:50	

When all settings are done click "Save Configuration".

Go back to "https://tago.io/" panel and click "Live Inspector" for the HUR and click "Play button".

Data will be shown in real time.

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User has to parse and use that parsed data for visualization (for graphs for example) for their application. That is beyond scope of HUR usage.

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**NOTE:** HUR Multi models send values to MQTT server for all slots. HUR single slot versions can also send values for 1 slot.

HUR single slot or multi slot Output slots can be managed from MQTT server in same manner.

# 11. I/O Mirror Application Example with TLM LoRa RF Modems

11.1 I/O Mirror Application Between 2 HUR Series Modbus TCP Remote I/O Devices

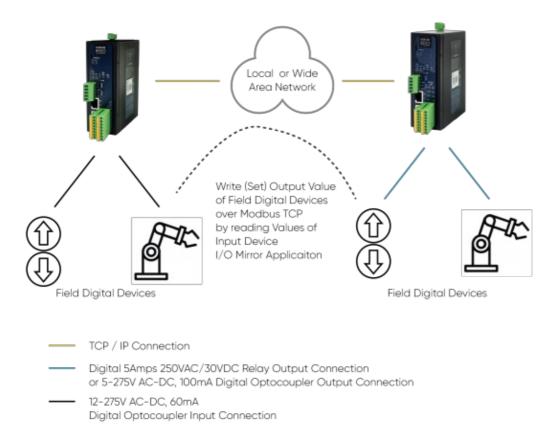
HUR Series Modbus TCP Remote I/O Devices Output versions can duplicate input value of Input versions. Outputs can be 5-275V AC-DC, 100mA Digital Optocoupler Output or 5Amperes 250VAC/30VDC Relay Output or 4-20mA Analog Output. Following devices can be used as output device for this application:

- HUR158 and HUR258 with 8 Channel 5-275V AC-DC, 100mA Digital Optocoupler Output
- HUR168 and HUR268 with 8 Channel Digital 5Amps 250VAC/30VDC Relay Output
- HUR595 and HUR695 with 5 Channel 4-20mA Analog Output

Inputs can be 12-275V AC-DC, 60mA Digital Optocoupler Input or 4-20mA Analog Input. Following devices can be used for this application:

- HUR358 and HUR458 with 8 Channel 12-275V AC-DC, 60mA Digital Optocoupler Input
- HUR558 and HUR658 with 8 Channel 0-10V and 0-20mA Selectable Analog Input

As expected, Analog devices can pair with each other and Digital devices can pair with each other.



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**NOTE:** I/O Mirror Application can be done between same I/O devices which means Analog devices can pair with each other and Digital devices can pair with each other.

# 11.2 I/O Mirror Application Example Between 2 HUR Series Analog Input and Analog Output Devices

Here is an example video for I/O Mirror application between

• HUR558 and HUR658 with 8 Channel 0-10V and 0-20mA Selectable Analog Input

The Analog Current value we input from Analog In HUR is set to Analog Out HUR via TLM Series LoRa RF Modems.

Here is the video for configurations:

# 12. Ordering Information

<u>HUR158:</u> 8 Channels 5-275V AC-DC, 100mA Digital Optocoupler Output Modbus TCP Remote IO Device, 1 x RS485, 5-48V (max. 60V) DC Power Input

<u>HUR168:</u> 8 Channels Digital 5Amps 250VAC/30VDC Relay Output Modbus TCP Remote IO Device, 1 x RS485, 5-48V (max. 60V) DC Power Input

<u>HUR258:</u> 8 Channels 5-275V AC-DC, 100mA Digital Optocoupler Output Modbus TCP Remote IO Device, 1 x RS485, 100 - 240V AC (120 - 370V DC), 50Hz to 60Hz AC Power Input

<u>HUR268:</u> 8 Channels Digital 5Amps 250VAC/30VDC Relay Output Modbus TCP Remote IO Device, 1 x RS485, 100 - 240V AC (120 - 370V DC), 50Hz to 60Hz AC Power Input

<u>HUR358:</u> 8 Channels 12-275 AC-DC, 60mA Digital Optocoupler Input Modbus TCP Remote IO Device, 1 x RS485, 5-48V (max. 60V) DC Power Input

<u>HUR458:</u> 8 Channels 12–275 AC–DC, 60mA Digital Optocoupler Input Modbus TCP Remote IO Device, 1 x RS485, 100 – 240V AC (120 – 370V DC), 50Hz to 60Hz AC Power Input

<u>HUR558:</u> 8 Channels 0-10V and 0-20mA Selectable Analog Input Modbus TCP Remote IO Device, 1 x RS485, 5-48V (max. 60V) DC Power Input

<u>HUR595:</u> 5 Channels 4-20mA Analog Output Modbus TCP Remote IO Device, 1 x RS485, 5-48V (max. 60V) DC Power Input

<u>HUR658:</u> 8 Channels 0-10V and 0-20mA Selectable Analog Input Modbus TCP Remote IO Device, 1 x RS485, 100 - 240V AC (120 - 370V DC), 50Hz to 60Hz AC Power Input

<u>HUR695:</u> 5 Channels 4-20mA Analog Output Modbus TCP Remote IO Device, 1 x RS485, 100 - 240V AC (120 - 370V DC), 50Hz to 60Hz AC Power Input

<u>HUR711:</u> Multi Slot, 4 x 8 Channels 5-275V AC-DC, 100mA Digital Optocoupler Output Modbus TCP Remote IO Device, 5-48V (max. 60V) DC Power Input

<u>HUR811:</u> Multi Slot, 4 x 8 Channels 5-275V AC-DC, 100mA Digital Optocoupler Output Modbus TCP Remote IO Device, 100 - 240V AC (120 - 370V DC), 50Hz to 60Hz AC Power Input

<u>HUR712:</u> Multi Slot, 4 x 8 Channels Digital 5Amps 250VAC/30VDC Relay Output Modbus TCP Remote IO Device, 5-48V (max. 60V) DC Power Input

<u>HUR812:</u> Multi Slot, 4 x 8 Channels Digital 5Amps 250VAC/30VDC Relay Output Modbus TCP Remote IO Device, 100 - 240V AC (120 - 370V DC), 50Hz to 60Hz AC Power Input

<u>HUR713:</u> Multi Slot, 4 x 8 Channels 12-275 AC-DC, 60mA Digital Optocoupler Input Modbus TCP Remote IO Device, 5-48V (max. 60V) DC Power Input

<u>HUR813:</u> Multi Slot, 4 x 8 Channels 12-275 AC-DC, 60mA Digital Optocoupler Input Modbus TCP Remote IO Device, 100 - 240V AC (120 - 370V DC), 50Hz to 60Hz AC Power Input

<u>HUR714:</u> Multi Slot, 4 x 8 Channels 0-20mA Analog Input Modbus TCP Remote IO Device, 5-48V (max. 60V) DC Power Input

<u>HUR814:</u> Multi Slot, 4 x 8 Channels 0-20mA Analog Input Modbus TCP Remote IO Device, 100 - 240V AC (120 – 370V DC), 50Hz to 60Hz AC Power Input

<u>HUR715:</u> Multi Slot, 4 x 5 Channels 4-20mA Analog Output Modbus TCP Remote IO Device, 5-48V (max. 60V) DC Power Input

<u>HUR815:</u> Multi Slot, 4 x 5 Channels 4-20mA Analog Output Modbus TCP Remote IO Device, 100 - 240V AC (120 - 370V DC), 50Hz to 60Hz AC Power Input

<u>HUR721:</u> Multi Slot, 2 x 8 Channels 5-275V AC-DC, 100mA Digital Optocoupler Output, 2 x 8 Channels 12-275 AC-DC, 60mA Digital Optocoupler Input Modbus TCP Remote IO Device, 5-48V (max. 60V) DC Power Input

<u>HUR821:</u> Multi Slot, 2 x 8 Channels 5-275V AC-DC, 100mA Digital Optocoupler Output, 2 x 8 Channels 12-275 AC-DC, 60mA Digital Optocoupler Input Modbus TCP Remote IO Device, 100 - 240V AC (120 – 370V DC), 50Hz to 60Hz AC Power Input

<u>HUR722:</u> Multi Slot, 2 x 8 Channels Digital 5Amps 250VAC/30VDC Relay Output, 2 x 8 Channels 12-275 AC-DC, 60mA Digital Optocoupler Input Modbus TCP Remote IO Device, 5-48V (max. 60V) DC Power Input

<u>HUR822:</u> Multi Slot, 2 x 8 Channels Digital 5Amps 250VAC/30VDC Relay Output, 2 x 8 Channels 12-275 AC-DC, 60mA Digital Optocoupler Input Modbus TCP Remote IO Device, 100 - 240V AC (120 - 370V DC), 50Hz to 60Hz AC Power Input

<u>HUR725:</u> Multi Slot, 2 x 5 Channels 4-20mA Analog Output, 2 x 8 Channels 0-20mA Analog Input Modbus TCP Remote IO Device, 5-48V (max. 60V) DC Power Input

<u>HUR825:</u> Multi Slot, 2 x 5 Channels 4-20mA Analog Output, 2 x 8 Channels 0-20mA Analog Input Modbus TCP Remote IO Device, 100 - 240V AC (120 - 370V DC), 50Hz to 60Hz AC Power Input

<u>HUR741:</u> Multi Slot, 1 x 5 Channels 4-20mA Analog Output, 1 x 8 Channels Digital 5Amps 250VAC/30VDC Relay Output, 1 x 8 Channels 0-20mA Analog Input, 1 x 8 Channels 12-275 AC-DC, 60mA Digital Optocoupler Input Modbus TCP Remote IO Device, 5-48V (max. 60V) DC Power Input

<u>HUR841:</u> Multi Slot, 1 x 5 Channels 4-20mA Analog Output, 1 x 8 Channels Digital 5Amps 250VAC/30VDC Relay Output, 1 x 8 Channels 0-20mA Analog Input, 1 x 8 Channels 12-275 AC-

DC, 60mA Digital Optocoupler Input Modbus TCP Remote IO Device, 100 - 240V AC (120 - 370V DC), 50Hz to 60Hz AC Power Input

# 13. Product Selection

Model	5-48V (max. 60V) DC Power input	100- 240V AC (120 - 370V DC), 50Hz to 60Hz AC Power Input	1 x RS485 port	8 Channel 5-275V AC- DC, 100mA Digital Optocoupler Output	8 Channel Digital 5Amp. Relay Output	8 Channel 12-275 AC- DC, 60mA Digital Optocoupler Input	8 Channel 0-10V and 0-20mA Selectable Analog Input	4-20mA	Multi Slot
<u>HUR158</u>	Х		Х	Х					
<u>HUR168</u>	Х		Х		Х				
<u>HUR258</u>		Х	Х	Х					
<u>HUR268</u>		Х	Х		Х				
<u>HUR358</u>	Х		Х			Х			
<u>HUR458</u>		Х	Х			Х			
<u>HUR558</u>	Х		Х				Х		
<u>HUR595</u>	Х		Х					Х	
<u>HUR658</u>		Х	Х				Х		
<u>HUR695</u>		Х	Х					Х	
<u>HUR711</u>	Х			X (4)					Х
<u>HUR811</u>		Х		X (4)					Х
<u>HUR712</u>	Х				X (4)				Х
HUR812		Х			X (4)				Х
<u>HUR713</u>	Х					X (4)			Х
<u>HUR813</u>		Х				X (4)			Х
<u>HUR714</u>	Х						X (4)		Х
<u>HUR814</u>		Х					X (4)		Х
<u>HUR715</u>	Х							X (4)	Х
<u>HUR815</u>		Х						X (4)	Х
<u>HUR721</u>	Х			X (2)		X (2)			Х
<u>HUR821</u>		Х		X (2)		X (2)			Х
<u>HUR722</u>	Х				X (2)	X (2)			Х
HUR822		Х			X (2)	X (2)			Х
HUR725	Х						X (2)	X (2)	Х
HUR825		Х					X (2)	X (2)	Х
<u>HUR741</u>	Х				Х	Х	Х	Х	Х
<u>HUR841</u>		Х			Х	Х	Х	Х	Х