

605 series / Relion® Protection and Control

# Feeder Protection and Control / Feeder Protection REF601/REJ601 MODBUS Communication Protocol Manual





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This product complies with the directive of the Council of the European Communities on the approximation of the laws of the Member States relating to electromagnetic compatibility (EMC Directive 2004/108/EC) and concerning electrical equipment for use within specified voltage limits (Low-voltage directive 2006/95/EC). This conformity is the result of tests conducted by ABB in accordance with the product standards EN 50263 and EN 60255-26 for the EMC directive, and with the product standards EN 60255-1 and EN 60255-27 for the low voltage directive. The IED is designed in accordance with the international standards of the IEC 60255 series.

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## Section 1

# Modbus Overview

### 1.1

## Protocol Overview

The Modbus protocol was first introduced by Modicon Inc. and is widely accepted as a communication standard for industrial device controllers and programmable logic controllers (PLCs). The protocol determines how each controller connected to a Modbus network will recognize a message addressed to it. It also determines the task to be performed and extracts any data or other information contained in the message. If a reply is required, the controller will construct a reply message and send it using the Modbus protocol.

A master device can be connected to slave devices either directly, or via modems using a compatible serial interface. The interface defines the connector pinouts, cabling, signal levels, transmission baud rates, and parity checking.

The communication technique used in the Modbus protocol is a master-slave technique. This means that only one device can be the master and initiate transactions while other devices connected to the network are slaves and can therefore not initiate any transactions.

A message sent by the master to the slave is called a query.

The master can address a query to an individual slave or to all slaves, that is, to broadcast the query. After the slave has received a query, it attempts to perform the requested task. If a query has been sent to an individual slave, the slave will send a message, that is, a response to the master. However, if it has been broadcast, no response will be sent. The response can be either a normal response (in case of performing the requested task) or an exception response (other cases).

## Modbus Overview

### 1.2

### RTU transmission frame format

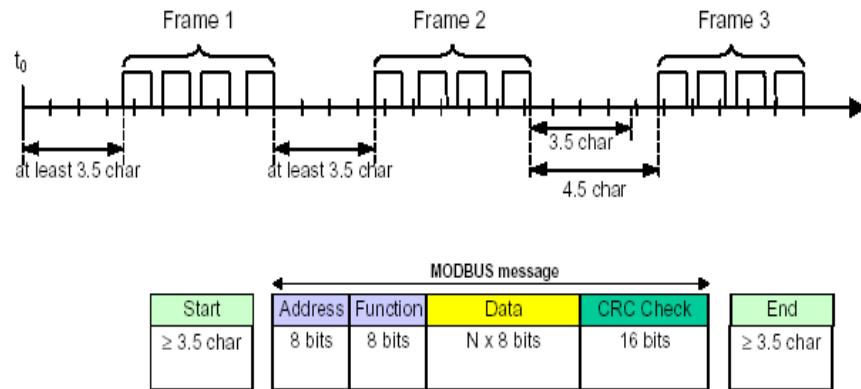
For Modbus serial line using the RTU (Remote Terminal Unit) mode, each byte (8 bits) in a message contains two hexadecimal (4 bits) characters. The main advantage of this mode is that its greater character density allows better data throughput than ASCII mode for the same baud rate. In the RTU mode each message telegram is sent in binary format. Each telegram has:

- One start bit,
- Eight data bits,
- One even, odd or no parity bit, and
- One or two stop bits

The number of stop bits depends on whether a parity bit is used. If odd or even parity is used, the character will have one stop bit. If parity is not used, however, there will be two stop bits. In total there are eleven bits in one character.

A Modbus message is placed by the transmitting device into a frame that has a known beginning and ending point. This allows devices that receive a new frame to begin at the start of the message, and to know when the message is completed. Partial messages must be detected and errors for the same must be set as a result.

In RTU mode, message frames are separated by a silent interval of at least 3.5 characters (3.5 bytes time) times and this time interval is called t3, 5.



*Figure 1 RTU Message Frame*

The entire message frame must be transmitted as a continuous stream of characters. If a silent interval of more than 3.5 character times occurs between two characters, the message frame is declared incomplete and should be discarded by the receiver.

The RTU mode includes an error–checking field that is based on a Cyclic Redundancy Check (CRC) method performed on the message contents. The CRC field checks the contents of the entire message. It is applied regardless of any parity checking method used for the individual characters of the message. The CRC field contains a 16-bit value implemented as two 8-bit bytes. The CRC field is appended to the message as the last field in the message.

## Section 2

## IED specific implementation

### 2.1

### Modbus Interface details

REF601/REJ601 is a dedicated feeder and motor protection relay, intended for the protection of utility substations and industrial power systems, in primary and secondary distribution networks. REF601/REJ601 is a member of ABB's Relion ® product family and part of its 605 series.

The Relay equipped with the optional communication board provides RS485 communication port with Modbus RTU protocol support.

*Table 1: Supported Modbus Interface Type*

Description	Value
Protocol	Modbus, RTU
Communication port	RS485 , 2 wire

### 2.2

### Protocol parameters

The protocol and link parameters of the Modbus interface can be programmed by means of a local HMI by selecting :

Main Menu → Settings → COM Parameters

The following parameters are available:

*Table 2: Modbus Settings*

Sr. No.	Name	Default Value	Range
1	Baud Rate	19200	Baud rates: 2400/4800/9600/19200/38400 bps
2	Relay address	001	The Modbus unit address 1...247
3	Parity	Even	None parity Odd parity Even parity

### 2.3

### Connectivity diagram

The below diagram (Figure 2) shows the connection details for a standard USB-RS485 converter and REJ601/REF601 variant relay.

## IED specific implementation

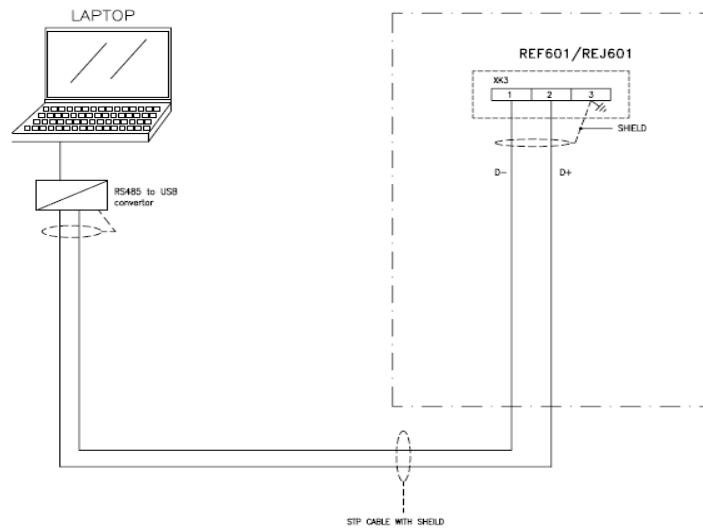


Figure: 2 Peer-to-peer Connection diagram

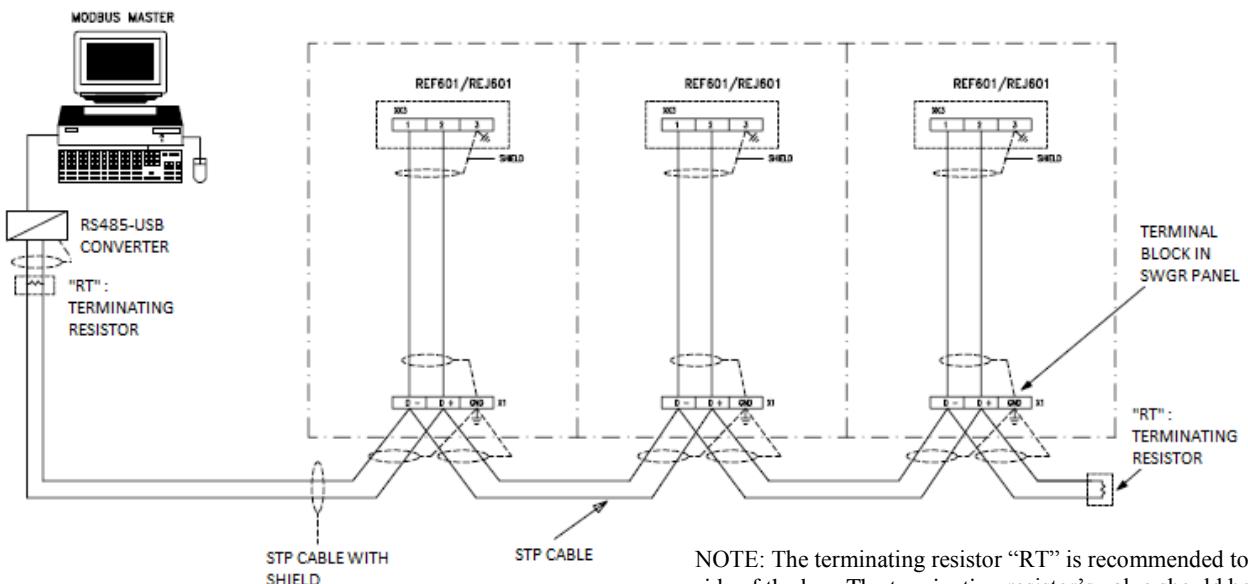


Figure: 3 Multiple IED connection diagram



The following RS485 STP cables with the listed resistor values can be used for connecting the controller.

Belden #9271 (or equivalent with 120 ohm termination resistors (2,000 ft. /610 meters maximum)

Belden #9182 (or equivalent with 150 ohm termination resistors (4,000 ft./1220 meters maximum). Example used converter for USB-RS485 is MOXA /UPORT-1150.

## 2.4 Supported Functions

The implementation of the Modbus protocol in the REF601 / REJ601 supports the following functions:

### 2.4.1 Application Functions

*Table 3: Modbus RTU function codes and definitions*

Function Code	Name	Usage
1	Read Coils	Read the status of Coils (Discrete Outputs).
2	Read Discrete Inputs	Read the status of discrete inputs.
3	Read Holding Registers	Read data in 16-bit Register Format (High/Low).Used to read process data. Registers are consecutive and are imaged from the instrument to the host. These are used to read settings/configuration from the relay.
4	Read Input Registers	These are used to read event log/data log from the relay.
5	Change Digital Output	Change the state of the digital output. In case of REF601/REJ601 this is used to set/clear binary outputs like Breaker open/Breaker close/Reset of Protection Trip/Remote Trip.
6	Pre-set Single Register	Write data in 16-bit Integer format (High/Low) only. These are used to write settings/configuration to the relay.
8	Loop Back Test	Used for diagnostic testing of the communications port.
16	Write Multiple registers	Only write to single register is supported.

#### 2.4.1.1 Function Code: 01 (Read Relay Coils)

This function code is used to read the status of coils (discrete outputs) of the relay unit. The Request Packet specifies the starting address, i.e. the address of the first output specified, and the number of outputs. In the Packet, Coils are addressed starting at zero. Therefore, coils numbered 1-6 are addressed as 0-5.

The coils (discrete outputs) in the response message are packed as one output per bit of the data field. Status is indicated as 1 = ON; 0 = OFF. The LSB of the first data byte contains the output addressed in query. The other coils follow towards the higher order end of this byte, and from low order to high order in subsequent bytes.

If the returned output quantity is not a multiple of eight, the remaining bits in the final data byte will be padded with zeros (toward the higher order end of byte). Byte count field specifies the quantity of complete bytes of data.

Example: Read relay output 1 to 3, from slave at output address 01.

## IED specific implementation

**Table 4:** Request

Slave Address	Function Code	Starting Address high	Starting Address low	Quantity of outputs high	Quantity of outputs low	CRC	CRC
0x01	0x 01	0x 00	0x 01	0x 00	0x 03	CRC	CRC

**Table 5:** Response message format for function code 01

Slave Address	Function Code	Byte count	Output status	CRC	CRC
0x 01	0x 01	0x 01*	0x 07	CRC	CRC

\* Byte count (N) = no. of outputs / 8; If the remainder is equal to 0; N = N. If the remainder is different of 0; N = N+1. The status of the discrete outputs 01 – 03 is shown as byte value 07 hex, or binary 0000 0111. Status of output 1 is shown as LSB, status of output 2 as 2nd bit from LSB and so on...

## 2.4.1.2

**Function Code: 02 (Read Relay Discrete Inputs)**

This function code is used to read the status of discrete inputs of the relay unit. The Request Packet specifies the starting address, i.e. the address of the first input specified, and the number of inputs. In the Packet, Discrete Inputs are addressed starting at zero. Therefore, inputs numbered 1-7 are addressed as 0-6.

The discrete inputs in the response message are packed as one input per bit of the data field. Status is indicated as 1 = ON; 0 = OFF. The LSB of the first data byte contains the input addressed in query. The other inputs follow towards the higher order end of this byte, and from low order to high order in subsequent bytes.

If the returned input quantity is not a multiple of eight, the remaining bits in the final data byte will be padded with zeros (toward the higher order end of byte). Byte count field specifies the quantity of complete bytes of data.

Example: Read relay input 1 to 3, from slave at input address 01.

**Table 6:** Request

Slave Address	Function Code	Starting Address high	Starting Address low	Quantity of outputs high	Quantity of outputs low	CRC	CRC
0x 01	0x 01	0x 00	0x 01	0x 00	0x 03	CRC	CRC

**Table 7:** Response message format for function code 02

Slave Address	Function Code	Byte count	Output status	CRC	CRC
0x 01	0x 01	0x 01*	0x 07	CRC	CRC

\* Byte count (N) = no. of inputs / 8;

If the remainder is equal to 0; N = N

If the remainder is different of 0; N = N+1

The status of the discrete inputs 01 – 03 is shown as byte value 07 hex, or binary 0000 0111. Status of input1 is shown as LSB, status of input 2 as 2nd bit from LSB and so on.

## 2.4.1.3

**Function Code: 03 (Read Relay Settings and Configurations)**

This function code is used to read the parameter settings of the relay unit. The Request Packet specifies the starting register address and the number of registers. In the packet, registers are addressed starting at zero. Therefore, registers numbered 1-18 are addressed as 0-17.

The register data in the response message are packed as two bytes per register, with the binary contents right justified within each byte. For each register, the first byte contains the high order bits and the second contains the low order bits.

Example: Read relay settings 1 to 5, from slave at address 01.

*Table 8: Request*

Slave Address	Function Code	Starting Address high	Starting Address low	Quantity of outputs high	Quantity of outputs low	CRC	CRC	
0x 01	0x 03	0x 00	0x 01	0x 00	0x 05	CRC	CRC	

*Table 9: Response message format for function code 03*

Slave Address	Function Code	Byte count	Data1 Hi	Data1 Lo	.....	Data5 Hi	Data5 Lo	CRC	CRC
0x 01	0x 03	0x 0A	0x 00	0x 05	...	0x 00	0x38	CRC	CRC

In the response the relay settings is shown as data bytes. The byte count provides the number of bytes that will follow. The same function code is also used to read the relay configuration parameters.

## 2.4.1.4

**Function Code: 04 (Read Fault Record, Event log, Measurements)**

This function code is used to read fault record of last five faults and event log of last hundred events occurred in the relay. The same function code is also used to read the phase and earth current (i.e. I1-I2-I3-I0). The mapping of current measurement is  $1In = 1000$ . For example, a current value of  $2In$  will be displayed in Hex format as 0x07D0 (2000 in decimal). The measurement will not be a real time measurement but it will be a query based communication between the base relay and the communication board and subsequently for the Modbus.

The Request Packet specifies the starting register address and the number of registers. The register data in the response message are packed as two bytes per register, with the binary contents right justified within each byte. For each register, the first byte contains the high order bits and the second contains the low order bits.

## IED specific implementation

Example: Read Fault Record\_1 log from slave at address 01.

*Table 10: Request*

Slave Address	Function Code	Starting Address high	Starting Address low	Quantity of outputs high	Quantity of outputs low	CRC	CRC
0x 01	0x 04	0x 00	0x 00	0x 00	0x1C	CRC	CRC

*Table 11: Response message format for function code 04*

Slave Address	Function Code	Byte count	Data1 Hi	Data1 Lo	.....	Data5 Hi	Data5 Lo	CRC	CRC
0x 01	0x 04	0x26	0x 05	0x 01	...	C0	0xF6	CRC	CRC

In the response the Fault Record of the last event is shown as data bytes. The byte count provides the number of bytes that will follow.

## 2.4.1.5

**Function Code: 05 (Change Digital output)**

This function code is used to enable digital output/s of the relay. A value of 0xFF00 or 0x0000 requests the output to be enabled or disabled. However, in the commands implemented for Relay, writing a value 0xFF00 will enable the output as per Binary Output configured and 0x0000 will have no effect also generate exception of illegal data value, since there are no such operations that need to be disabled. The normal response is an echo of the request, returned after the coil state has been written. A value other than 0xFF00 will generate an exception for illegal data value and any address other than those mentioned will generate an exception of illegal data address.

Example: Change the Breaker Close output.

*Table 12: Request*

Slave Address	Function Code	Starting Address high	Starting Address low	Quantity of outputs high	Quantity of outputs low	CRC	CRC
0x 01	0x 05	0x 00	0x 01	0x FF	0x 00	CRC	CRC

*Table 13: Response message format for function code 0x05*

Slave Address	Function Code	Output Address high	Output Address low	Output value high	Output value low	CRC	CRC
0x 01	0x 05	0x 00	0x 01	0x FF	0x 00	CRC	CRC

## 2.4.1.6

**Function Code: 06 (Write single register-Change relay setting and configuration)**

This function code is used to change single setting of relay device. The Request Packet specifies the address of the register to be written. The normal response is an echo of the request, returned after the register contents have been written. The same function code is also used for editing the configuration of the relay. The configuration parameters that can be edited through the Modbus include Phase/Earth Secondary CT Type selection (1A - 5A), Frequency Selection (50Hz - 60 Hz) and Earth Type Selection (Internal-External) of relay. Also Binary Inputs and Outputs Configuration supported by this function.

Example: Write 0Ah value to register value with address 0x0005 on slave at address 01.

**Table 14: Request**

Slave Address	Function Code	Starting Address high	Starting Address low	Quantity of outputs high	Quantity of outputs low	CRC	CRC
0x 01	0x 06	0x 00	0x 05	0x 00	0x 0A	CRC	CRC

**Table 15: Response message format for function code 06**

Slave Address	Function Code	Starting Address high	Starting Address low	Setting value High	Setting value Low	CRC	CRC
0x 01	0x 06	0x 00	0x 05	0x 00	0x 0A	CRC	CRC

## 2.4.1.7

**Function Code: 08 (Diagnostics- Loop back message)**

This function code is to check the health of the RS485 link, where the query sent is received back by the master. The message can be of any length from 4 to 16 bytes. The normal Response is an echo of the query.

**Table 16: Request**

Slave Address	Function Code	Any data, length limited from 4 to 16 bytes				CRC	CRC
0x 01	0x 08	0x 01	0x 02	0x 03	0x 04	CRC	CRC

**Table 17: Response:**

Slave Address	Function Code	Any data, length limited from 4 to 16 bytes				CRC	CRC
0x 01	0x 08	0x 01	0x 02	0x 03	0x 04	CRC	CRC

## IED specific implementation

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### 2.4.2

### Exception Response

When a client device sends a request to a slave device it expects a normal response. But, if the slave device cannot handle the request (for example, if the request is to read a non-existent output or register), it will return an exception response informing the master of the nature of the error.

The exception response message has two fields that differentiate it from a normal response:

**Function Code Field:**

In a normal response, the server echoes the function code of the original request in the function code field of the response. All function codes have a most significant bit (MSB) of 0 (their values are all below 80 hexadecimal). In an exception response, the server sets the MSB of the function code to 1. This makes the function code value in an exception response exactly 80 hexadecimal, higher than the value for a normal response. With the function code's MSB set, the client's application program can recognize the exception response and can examine the data field for the exception code.

**Data Field:**

In a normal response, the server may return data or statistics in the data field (any information that was requested in the request). In an exception response, the server returns an exception code in the data field. This defines the server condition that caused the exception.

An example for the same is as below:

*Table 18: Request frame*

Slave Address	Function Code	Starting Address High	Starting Address Low	Quantity of registers High	Quantity of registers Low	CRC	CRC
0x 01	0x 01	0x 00	0x 01	0x 00	0x 05	CRC	CRC

This creates an exception and the response format is as below:

*Table 19: Response message format*

Slave Address	Function Code	Exception Code	CRC	CRC
0x 01	0x 81	0x 01	CRC	CRC

81h in the starting field indicates that the frame is for exception frame and exception code 0x01 indicates that the requested function code is not implemented in the slave device.

*Table 20: Modbus Exception codes*

Exception Code	Exception Code	Description
0x01	Illegal Function	The function code received in the query is not an allowable action for the slave. This may be because the function code is only applicable to newer devices, and was not implemented in the unit selected. It could also indicate that the slave is in the wrong state to process a request of this type, for example because it is un-configured and is being asked to return register values.
0x02	Illegal Data Address	The data address received in the query is not an allowable address for the slave. More specifically, the combination of reference number and transfer length is invalid. For a controller with 100 registers, a request with offset 96 and length 4 would succeed a request with offset 96 and length 5 will generate exception 02.
0x03	Illegal Data Value	A value contained in the query data field is not an allowable value for slave. This also indicates a fault in the structure of the remainder of a complex request, such as that the implied length is incorrect.
0x06	Slave Device Busy	Specialized use in conjunction with programming commands. The server (or slave) is engaged in processing a long-duration program command. The client (or master) should retransmit the message later when the server (or slave) is free.
0x08	Memory Parity Error	The slave attempted to read record file but detected a parity error in the memory.

## 2.5

### Modbus address mapping details

Measurands and other 16-bit values can be read from the Input register (IR) and are marked as Read-only (R).However, there are also write-only coils in the Modbus data mapping of REF601 / REJ601.Those coils are marked as writable (W) in the point lists. Parameter that can be possible to read and write both, are Marked as (R/W).

#### 2.5.1

#### Current measurement

*Table 21: Current measurement*

Sr. No.	Parameter description	Modbus Address	Function code	Read / Write	Range HEX (decimal)	Scale	Comments
1	Data for current measurement on I1	512	0x04	( R )	0000-FFFF (0 – 65535)	*Refer below formula	Nominal Current
2	Data for current measurement on I2	513	0x04	( R )	0000-FFFF (0 – 65535)	*Refer below formula	Nominal Current
3	Data for current measurement on I3	514	0x04	( R )	0000-FFFF (0 – 65535)	*Refer below formula	Nominal Current
4	Data for current measurement on I0	515	0x04	( R )	0000-FFFF (0 – 65535)	*Refer below formula	Nominal Current
5	Operation counter	516	0x04	( R )	0000-FFFF (0 – 65535)	1	-

## IED specific implementation

**Table 22:** Current measurement, continue

Sr. No.	Parameter description	Modbus Address	Function code	Read / Write	Range HEX (decimal)	Scale	Comments
6	Negative phase sequence current measurement	517	0x04	( R )	0000-FFFF (0 – 65535)	0.1	%
7	Thermal level	518	0x04	( R )	0000-03E8 (0 – 1000)	1	%
8	Run Time Counter	519	0x04	( R )	0000-FFFF (0 – 65535)	1	Hours
9	t motor start	520	0x04	( R )	0000-270F (0 – 9999)	0.1	secs
10	Istr max	521	0x04	( R )	0000-FFFF (0 – 65535)	*Refer below formula	Amp
11	Rstr Enable t	522	0x04	( R )	0000-2A30 (0 – 10800)	0.0167	mins

Scaling formula for measuring primary current

CT variant

$$\text{Actual Current} = (\text{Value in Modbus Register} * \text{Ipn}) / 1000$$

Sensor variant

$$\text{Actual Current} = (\text{Value in Modbus Register} * \text{Ir}) / 1000$$

Istr max:

$$\text{Actual Current} = (\text{Value in Modbus Register} * \text{Ib}) / 1000$$

Where:

Ipn: 20..9999 (Primary current of phase CT),

Ir: Relay reference current (only for sensor variant)

Ib: Base current

**2.5.2****Binary Input / Output status****Table 23:** Binary Input / Output status

Sr. No.	Parameter description	Modbus Address	Function code	Read / Write	Range HEX
1	Binary Input 1 Status	3	0x02	( R )	0=OFF, 1=ON
2	Binary Input 2 Status	4	0x02	( R )	0=OFF, 1=ON
3	Binary Input 3 Status	5	0x02	( R )	0=OFF, 1=ON
4	Binary Input 4 Status	6	0x02	( R )	0=OFF, 1=ON
5	Binary Output 1 Status	0	0x01	( R )	0=OFF, 1=ON
6	Binary Output 2 Status	1	0x01	( R )	0=OFF, 1=ON
7	Binary Output 3 Status	2	0x01	( R )	0=OFF, 1=ON
8	Binary Output 4 Status	3	0x01	( R )	0=OFF, 1=ON
9	Binary Output 5 Status	4	0x01	( R )	0=OFF, 1=ON
10	Binary Output 6 Status	5	0x01	( R )	0=OFF, 1=ON
11	Programmable LED 1 Status	6	0x01	( R )	0=OFF, 1=ON

*Table 24: Binary Input / Output status, continue*

Sr. No.	Parameter description	Modbus Address	Function code	Read / Write	Range HEX
12	Programmable LED 2 Status	7	0x01	( R )	0=OFF, 1=ON
13	Programmable LED 3 Status	8	0x01	( R )	0=OFF, 1=ON
14	Programmable LED 4 Status	9	0x01	( R )	0=OFF, 1=ON
15	Programmable LED 5 Status	10	0x01	( R )	0=OFF, 1=ON

## 2.5.3

### Breaker status / control parameters

*Table 25: Breaker status / control parameters*

Sr. No.	Parameter description	Modbus Address	Function code	Read / Write	Range HEX
1	Breaker Open Status	0	0x02	( R )	0000=Not Open, 0001=Open
2	Breaker Close Status	1	0x02	( R )	0000=Not Closed, 0001=Closed
3	Breaker in Service Status	2	0x02	( R )	0000=Not in Service, 0001=In Service
4	Breaker Open command	0	0x05	( W )	0x00FF
5	Breaker Close command	1	0x05	( W )	0x00FF
6	Reset of protection command	2	0x05	( W )	0x00FF
7	Remote trip command	3	0x05	( W )	0x00FF
8	IED Status	288	0x04	( R )	0000=Internal Relay Fault, 0004=Unit Ready with no trip 0005=Unit Ready with Phase Trip 0006=Unit Ready with Earth Trip
9	L/R Status	289	0x04	( R )	0000=Local, 0001=Remote



Binary inputs BI2 to BI4 can be configured to indicate the status of circuit breaker i.e. breaker open or breaker close or breaker in maintenance (service).

## 2.5.4

### Protection status Signals (Momentary and Change Detection)

*Table 26: Status signals for Protection Functions*

Sr. No.	Parameter description	Modbus Address	Function code	Read / Write	Range HEX
1	I> Start Status	7	0x02	( R )	0000 – Signal not active, 0001 – Signal Active
2	I> Start Status CD*	8	0x02	( R )	0000 – Signal not active, 0001 – Signal Active
3	I> trip Status	9	0x02	( R )	0000 – Signal not active, 0001 – Signal Active

## IED specific implementation

**Table 27: Status signals for Protection Functions, continue**

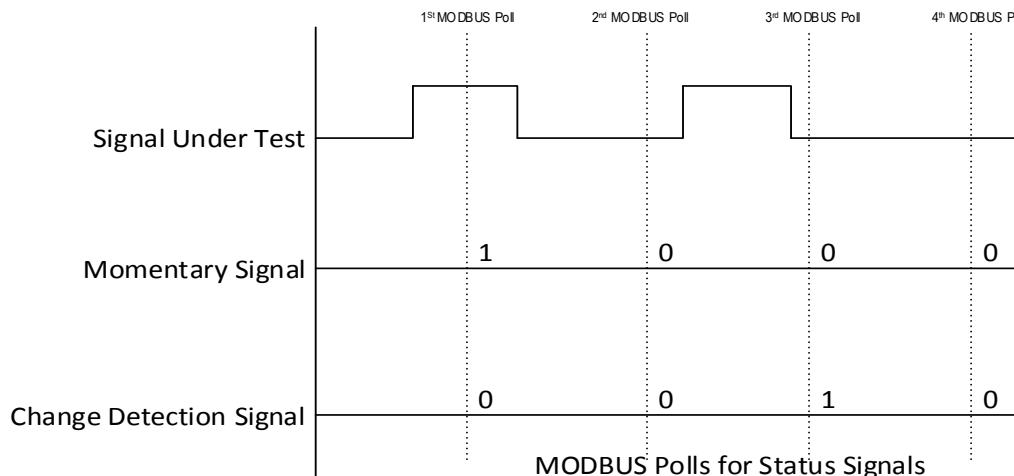
Sr. No.	Parameter description	Modbus Address	Function code	Read / Write	Range HEX
4	I> trip Status CD*	10	0x02	( R )	0000 – Signal not active, 0001 – Signal Active
5	I>> Start Status	11	0x02	( R )	0000 – Signal not active, 0001 – Signal Active
6	I>> Start Status CD*	12	0x02	( R )	0000 – Signal not active, 0001 – Signal Active
7	I>> trip Status	13	0x02	( R )	0000 – Signal not active, 0001 – Signal Active
8	I>> trip Status CD*	14	0x02	( R )	0000 – Signal not active, 0001 – Signal Active
9	I>>> Start Status	15	0x02	( R )	0000 – Signal not active, 0001 – Signal Active
10	I>>> Start Status CD*	16	0x02	( R )	0000 – Signal not active, 0001 – Signal Active
11	I>>> trip Status	17	0x02	( R )	0000 – Signal not active, 0001 – Signal Active
12	I>>> trip Status CD*	18	0x02	( R )	0000 – Signal not active, 0001 – Signal Active
13	I0> Start Status	19	0x02	( R )	0000 – Signal not active, 0001 – Signal Active
14	I0> Start Status CD*	20	0x02	( R )	0000 – Signal not active, 0001 – Signal Active
15	I0> trip Status	21	0x02	( R )	0000 – Signal not active, 0001 – Signal Active
16	I0> trip Status CD*	22	0x02	( R )	0000 – Signal not active, 0001 – Signal Active
17	I0>> Start Status	23	0x02	( R )	0000 – Signal not active, 0001 – Signal Active
18	I0>> Start Status CD*	24	0x02	( R )	0000 – Signal not active, 0001 – Signal Active
19	I0>> trip Status	25	0x02	( R )	0000 – Signal not active, 0001 – Signal Active
20	I0>> trip Status CD*	26	0x02	( R )	0000 – Signal not active, 0001 – Signal Active
21	3lth>Alm Status	27	0x02	( R )	0000 – Signal not active, 0001 – Signal Active
22	3lth>Alm Status CD*	28	0x02	( R )	0000 – Signal not active, 0001 – Signal Active
23	3lth>trip Status	29	0x02	( R )	0000 – Signal not active, 0001 – Signal Active
24	3lth>trip Status CD*	30	0x02	( R )	0000 – Signal not active, 0001 – Signal Active
25	I2/I1> Start Status	31	0x02	( R )	0000 – Signal not active, 0001 – Signal Active
26	I2/I1> Start Status CD*	32	0x02	( R )	0000 – Signal not active, 0001 – Signal Active
27	I2/I1> trip Status	33	0x02	( R )	0000 – Signal not active, 0001 – Signal Active
28	I2/I1> trip Status CD*	34	0x02	( R )	0000 – Signal not active, 0001 – Signal Active
29	I2> Start Status	35	0x02	( R )	0000 – Signal not active, 0001 – Signal Active

**Table 28:** Status signals for Protection Functions, continue

Sr. No.	Parameter description	Modbus Address	Function code	Read / Write	Range HEX
30	I2> Start Status CD*	36	0x02	( R )	0000 – Signal not active, 0001 – Signal Active
31	I2> trip Status	37	0x02	( R )	0000 – Signal not active, 0001 – Signal Active
32	I2> trip Status CD*	38	0x02	( R )	0000 – Signal not active, 0001 – Signal Active

\*As the master may not detect the changes of states of all protection status signals when scanning, an additional change detect (CD) indication bit is created for every momentary indication point.

If the momentary value of an indication bit has changed two or more times since the master last read it, the CD bit will be set to 1. Once the CD bit has been read, it will be set to 0.



## 2.5.5 RTC / Date and time

**Table 29:** RTC / Date and time

Sr. No.	Parameter description	Modbus Address	Modbus new Address	Function code	Read / Write	Range HEX (decimal)
1	RTC – DD – Date	45	4877	0x03	( R )	0001-001F (1 – 31)
				0x06 or 0x10	( W )	
2	RTC – MM – Month	46	4878	0x03	( R )	0001-000C (1 – 12)
				0x06 or 0x10	( W )	
3	RTC – YY – Year	47	4879	0x03	( R )	000B-0063 (11 – 99)
				0x06 or 0x10	( W )	

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**Table 30:** *RTC / Date and time , continue*

Sr. No.	Parameter description	Modbus Address	Modbus new Address	Function code	Read / Write	Range HEX (decimal)
4	RTC – HH – Hour	48	4880	0x03	( R )	0000-0017 (0 – 23)
				0x06 or 0x10	( W )	
5	RTC – MM – Minute	49	4881	0x03	( R )	0000-003B (0 – 59)
				0x06 or 0x10	( W )	
6	RTC – SS – Second	50	4882	0x03	( R )	0000-003B (0 – 59)
				0x06 or 0x10	( W )	
7	RTC – MILLI – Second	51	4883	0x03	( R )	0000-03E7 (0 – 999)

## 2.5.6

## Protection settings

*Table 31: Protection settings*

Sr No	Parameter description	Modbus Old Address	SG1/ SG2 Address	Function code	Read / Write	Range	Default value	Step Size	Scale
1	I> Curve	0	4096/ 7936	0x03	( R )	1- DT 2- IEC NI 3- IEC VI 4- IEC LI 5- IEC EI 6- IEC RI 7-ANSI NI 8- ANSI VI 9- ANSI MI 10-ANSI EI	DT	1(1)	1
				0x06 or 0x10	( W )				
2	I> k (Time multiplier)	1	4097/ 7937	0x03	( R )	20 – 1600 (0.02 – 1.6)	-	10 (0.01)	0.001
				0x06 or 0x10	( W )				
3	I>	2	4098/ 7938	0x03	( R )	500 – 2500 (0.5 In – 2.5 In)	01.500 In	1 (0.001 )	0.001
				0x06 or 0x10	( W )				
4	t>	3	4099/ 7939	0x03	( R )	40 – 64000 (0.04s – 64s)	01.00 s	10 (0.01)	0.001
				0x06 or 0x10	( W )				
5	I>>	4	4100/ 7940	0x03	( R )	500 – 25000* (0.5 In – 25 In)	04.000 In	1 (0.001 )	0.001
				0x06 or 0x10	( W )				
6	t>>	5	4101/ 7941	0x03	( R )	40 – 64000 (0.04s – 64s)	00.30 s	10 (0.01)	0.001
				0x06 or 0x10	( W )				
7	I>>>	6	4102/ 7942	0x03	( R )	500 – 25000* (0.5 In – 25 In)	10.000 In	1 (0.001 )	0.001
				0x06 or 0x10	( W )				
8	t>>>	7	4103/ 7943	0x03	( R )	30 – 64000 (0.03s – 64s)	00.03 s	10 (0.01)	0.001
				0x06 or 0x10	( W )				
9	I0> Curve	8	4104/ 7944	0x03	( R )	1- DT 2- IEC NI 3- IEC VI 4- IEC LI 5- IEC EI 6- IEC RI 7-ANSI NI 8- ANSI VI 9- ANSI MI 10-ANSI EI	DT	1(1)	1
				0x06 or 0x10	( W )				
10	I0> k0 (Time multiplier)	9	4105/ 7945	0x03	( R )	20 – 1600 (0.02 – 1.6)	-	10 (0.01)	0.001
				0x06 or 0x10	( W )				

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*Table 32: Protection settings, continue*

Sr No	Parameter description	Modbus Old Address	SG1/ SG2 Address	Function code	Read / Write	Range	Default value	Step Size	Scale
11	I0>	10	4106/ 7946	0x03 0x06 or 0x10	( R ) ( W )	For External Earth type : 50 – 2000 (0.05 In – 2.0 In) For Internal Earth type: 500 – 2000 (0.5 In – 2.0 In)	00.500 In	1 (0.001 )	0.001
12	t0>	11	4107/ 7947	0x03 0x06 or 0x10	( R ) ( W )	40 – 64000 (0.04s – 64s)	01.50 s	10 (0.01)	0.001
13	I0>>	12	4108/ 7948	0x03 0x06 or 0x10	( R ) ( W )	For External Earth type: 50 – 12500 (0.05 In – 12.5 In) For Internal Earth type: 500 – 12500 (0.5 In – 12.5 In)	02.500 In	1 (0.001 )	0.001
14	t0>>	13	4109/ 7949	0x03 0x06 or 0x10	( R ) ( W )	40–64000 (0.04s – 64s)	00.50 s	10 (0.01)	0.001
15	I inr (Inrush Current Threshold)	14	4110/ 7950	0x03 0x06 or 0x10	( R ) ( W )	200–25000* (0.2 In – 25 In)	00.50 In	10 (0.01)	0.001
16	Inrush Ratio	15	4111/ 7951	0x03 0x06 or 0x10	( R ) ( W )	30 - 50 (30% - 50%)	30%	1 (1)	1
17	st_I2>.Isat	-	4112/ 7952	0x03 0x06 or 0x10	( R ) ( W )	0.1 - 1.50 (100-1500)	0.30	10 (0.01)	0.001
18	st_I2>.Time	-	4113/ 7953	0x03 0x06 or 0x10	( R ) ( W )	4-30000 (0.04s – 300s)	1.0	10 (0.1)	0.01
19	st_I2/I1>.Isat	-	4114/ 7954	0x03 0x06 or 0x10	( R ) ( W )	10 - 100	15	1	1
20	st_I2/I1>.Time	-	4115/ 7955	0x03 0x06 or 0x10	( R ) ( W )	40- 64000 (0.4s – 64s)	0.1	10 (0.01)	0.001

Table 33: Protection settings, continue

Sr. No .	Parameter description	Modbus Old Address	SG1/ SG2 Address	Function code	Read / Write	Range	Default value	Step Size	Scale
21	Counter. BI Map	-	4116/ 7956	0x03	( R )	0 - 4	-	1	1
				0x06 or 0x10	( W )				
22	Counter. BIValue Set	-	4117/ 7957	0x03	( R )	0 -65535	-	1	1
				0x06 or 0x10	( W )				
23	Setting Group Selection	-	4118/ 7958	0x03	( R )	1 = Setting Group 1 2 = Setting Group 2	1	1 (1)	1
				0x06 or 0x10	( W )				
24	Setting Group Activation	-	4119/ 7959	0x03	( R )	1 = Setting Group 1 2 = Setting Group 2	1	1 (1)	1
				0x06 or 0x10	( W )				
25	Setting Group Edit	-	4120/ 7960	0x03	( R )	1 = Setting Group 1 2 = Setting Group 2	1	1 (1)	1
				0x06 or 0x10	( W )				
26	Reserved	-	4121/ 7961	0x03	( R )	-	-	-	-
				0x06 or 0x10	( W )				
27	Reserved	-	4122/ 7962	0x03	( R )	-	-	-	-
				0x06 or 0x10	( W )				
28	Mode $\phi$	-	4123/ 7963	0x03	( R )	0 = Static 1 = Rotating	0	1	1
				0x06 or 0x10	( W )				
29	$\varphi_0$	-	4124/ 7964	0x03	( R )	0 - 100	80	1	1
				0x06 or 0x10	( W )				
30	lb	-	4125/ 7965	0x03	( R )	100-1500 (0.1 - 1.5)	1	100 (0.1)	0.001
				0x06 or 0x10	( W )				
31	t <sup>^</sup>	-	4126/ 7966	0x03	( R )	1 - 300	45	1	1
				0x06 or 0x10	( W )				
32	t <sub>↓</sub> s	-	4127/ 7967	0x03	( R )	1 - 300	45	1	1
				0x06 or 0x10	( W )				
33	t <sub>Ú</sub> r	-	4128/ 7968	0x03	( R )	1 - 1000	180	1	1
				0x06 or 0x10	( W )				
34	$\varphi$ alm	-	4129/ 7969	0x03	( R )	50 - 200	121	1	1
				0x06 or 0x10	( W )				

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*Table 34: Protection settings, continue*

Sr. No	Parameter description	Modbus Old Address	SG1/ SG2 Address	Function code	Read / Write	Range	Default value	Step Size	Scale
35	$\varphi$ trip	-	4130/ 7970	0x03	(R)	50 - 200	144	1	1
				0x06 or 0x10	(W)				
36	$\varphi$ strinhibit	-	4131/ 7971	0x03	(R)	50 - 200	105	1	1
				0x06 or 0x10	(W)				
37	$\varphi$ EM	-	4132/ 7972	0x03	(R)	10 - 100	50	1	1
				0x06 or 0x10	(W)				
38	Mode $\varphi$ powerOFF	-	4133/ 7973	0x03	(R)	1 – 4	4	1	1
				0x06 or 0x10	(W)				
39	Reserved	-	4134/ 7974	0x03	(R)	-	-	-	-
				0x06 or 0x10	(W)				
40	AR start mode	-	4135/ 7975	0x03	(R)	1=Select trip 2=General Start and Trip	1	1	1
				0x06 or 0x10	(W)				
41	CB ready	-	4136/ 7976	0x03	(R)	1 = OCO 2 = CO	1	1	1
				0x06 or 0x10	(W)				
42	shot	-	4137/ 7977	0x03	(R)	0 – 4	1	1	1
				0x06 or 0x10	(W)				
43	Reserved	-	4138/ 7978	0x03	(R)	-	-	-	-
				0x06 or 0x10	(W)				
44	Cycle t1	-	4139/ 7979	0x03	(R)	20-30000 (0.2 – 300)	50 (0.5)	1 (0.01)	0.01
				0x06 or 0x10	(W)				
45	Cycle t2	-	4140/ 7980	0x03	(R)	20-30000 (0.2 – 300)	50 (0.5)	1 (0.01)	0.01
				0x06 or 0x10	(W)				
46	Cycle t3	-	4141/ 7981	0x03	(R)	20-30000 (0.2 – 300)	50 (0.5)	1 (0.01)	0.01
				0x06 or 0x10	(W)				

Table 35: Protection settings, continue

Sr. No .	Parameter description	Modbus Old Address	SG1/ SG2 Address	Function code	Read / Write	Range	Default value	Step Size	Scale
47	Cycle t4	-	4142/ 7982	0x03	(R)	20-30000 (0.2 – 300)	50 (0.5)	1 (0.01)	0.01
				0x06 or 0x10	(W)				
48	Reclaim tr	-	4143/ 7983	0x03	(R)	1-300	1	1	1
				0x06 or 0x10	(W)				
49	Block tb	-	4144/ 7984	0x03	(R)	1-300	5	1	1
				0x06 or 0x10	(W)				
50	Pulse tp	-	4145/ 7985	0x03	(R)	200-20000 (0.2 – 20)	200 (0.2)	100 (0.1)	0.001
				0x06 or 0x10	(W)				
51	Activation t	-	4146/ 7986	0x03	(R)	100-5000 (0.1 – 5)	800 (0.8)	100 (0.1)	0.001
				0x06 or 0x10	(W)				
52	I CBFP	-	4147/ 7987	0x03	(R)	200-2000 (0.2 – 2)	1100 (1.1)	100 (0.1)	0.001
				0x06 or 0x10	(W)				
53	Io CBFP	-	4148/ 7988	0x03	(R)	100-2000 (0.1 – 2)	1100 (1.1)	100 (0.1)	0.001
				0x06 or 0x10	(W)				
54	t retrip	-	4149/ 7989	0x03	(R)	60-500 (0.06 – 0.5)	100 (0.1)	10 (0.01)	0.001
				0x06 or 0x10	(W)				
55	t backup	-	4150/ 7990	0x03	(R)	60-500 (0.06 – 0.5)	120 (0.12)	10 (0.01)	0.001
				0x06 or 0x10	(W)				
56	I2tn< I start>	-	4151/ 7991	0x03	(R)	1000-10000 (1 – 10)	1300 (1.3)	100 (0.1)	0.001
				0x06 or 0x10	(W)				
57	I2tn<I startup	-	4152/ 7992	0x03	(R)	1000-10000 (1 – 10)	6000 (6)	100 (0.1)	0.001
				0x06 or 0x10	(W)				
58	I2tn<t startup	-	4153/ 7993	0x03	(R)	5 - 120	12	1	1
				0x06 or 0x10	(W)				
59	I2tn< t lockrotor	-	4154/ 7994	0x03	(R)	2- 200	10	1	1
				0x06 or 0x10	(W)				

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**Table 36:** Protection settings, continue

Sr. No .	Parameter description	Modbus Old Address	SG1/ SG2 Address	Function code	Read / Write	Range	Default value	Step Size	Scale
60	I2tn< max str	-	4155/ 7995	0x03	(R)	1 - 10	3	1	1
				0x06 or 0x10	(W)				
61	I2tn<tn	-	4156/ 7996	0x03	(R)	1 - 180	60	1	1
				0x06 or 0x10	(W)				
62	I2tn< Restraine 68M	-	4157/ 7997	0x03	(R)	0 = No 1 = Yes	0	-	1
				0x06 or 0x10	(W)				
63	I2R>	-	4158/ 7998	0x03	(R)	100 – 1500 (0.1 – 1.5)	300 (0.3)	10 (0.01)	0.001
				0x06 or 0x10	(W)				
64	tI2R>	-	4159/ 7999	0x03	(R)	10-30000 (0.1 – 300)	100 (1)	10 (0.1)	0.01
				0x06 or 0x10	(W)				
65	3I<	-	4160/ 8000	0x03	(R)	120-800 (0.12 – 0.8)	400 (0.4)	10 (0.01)	0.001
				0x06 or 0x10	(W)				
66	t3I<	-	4161/ 8001	0x03	(R)	400-30000 (0.4 – 30)	10000 (10)	100 (0.1)	0.001
				0x06 or 0x10	(W)				



\* Upper Current Limit for Sensor Variant - 20000 and for CT Variant- 25000.

**2.5.7****Binary Input / Output configuration****Table 37:** Binary Input / Output Configuration parameters

Sr. No.	Parameter description	Modbus old Address	Modbus New Address	Function code	Read / Write	Range Values in [HEX]	Default value
1	Binary Input1 configuration status	60	5632	0x03	( R )	0000 = Non-Inverted, 0001 = Inverted	0
				0x06 or 0x10	( W )		
2	Binary Input2 configuration status	61	5633	0x03	( R )	0000 = Non-Inverted 0001 = Inverted	0
				0x06 or 0x10	( W )		
3	Binary Input3 configuration status	62	5634	0x03	( R )	0000 = Non-Inverted, 0001 = Inverted	0
				0x06 or 0x10	( W )		

## IED specific implementation

*Table 38: Binary Input / Output Configuration parameters*

Sr. No.	Parameter description	Modbus old Address	Modbus New Address	Function code	Read / Write	Range Values in [HEX]	Default value
4	Binary Input4 configuration status	63	5635	0x03	( R )	0000 = Non-Inverted, 0001 = Inverted	0
				0x06 or 0x10	( W )		
5	Binary Output 1 configuration status	90	6400	0x03	( R )	0000 = Non-Inverted Hold 0001 = Non-Inverted Latch 0002 = Non-Inverted Self Reset 0003 = Non-Inverted Pulse 0100 = Inverted Hold 0101 = Inverted Latch 0102 = Inverted Self Reset 0103 = Inverted Pulse	3
				0x06 or 0x10	( W )		
6	Binary Output 2 configuration status	91	6401	0x03	( R )	0000 = Non-Inverted Hold 0001 = Non-Inverted Latch 0002 = Non-Inverted Self Reset 0003 = Non-Inverted Pulse 0100 = Inverted Hold 0101 = Inverted Latch 0102 = Inverted Self Reset 0103 = Inverted Pulse	3
				0x06 or 0x10	( W )		
7	Binary Output 3 configuration status	92	6402	0x03	( R )	0000 = Non-Inverted Hold 0001 = Non-Inverted Latch 0002 = Non-Inverted Self Reset 0003 = Non-Inverted Pulse 0100 = Inverted Hold 0101 = Inverted Latch 0102 = Inverted Self Reset 0103 = Inverted Pulse	3
				0x06 or 0x10	( W )		
8	Binary Output 4 configuration status	93	6403	0x03	( R )	0000 = Non-Inverted Hold 0001 = Non-Inverted Latch 0002 = Non-Inverted Self Reset 0003 = Non-Inverted Pulse 0100 = Inverted Hold 0101 = Inverted Latch 0102 = Inverted Self Reset 0103 = Inverted Pulse	2
				0x06 or 0x10	( W )		
9	Binary Output 5 configuration status	94	6404	0x03	( R )	0000 = Non-Inverted Hold 0001 = Non-Inverted Latch 0002 = Non-Inverted Self Reset 0003 = Non-Inverted Pulse 0100 = Inverted Hold 0101 = Inverted Latch 0102 = Inverted Self Reset 0103 = Inverted Pulse	3
				0x06 or 0x10	( W )		

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*Table 39: Binary Input / Output Configuration parameters*

Sr. No.	Parameter description	Modbus old Address	Modbus New Address	Function code	Read / Write	Range Values in [HEX]	Default value
10	Binary Output 6 configuration status	95	6405	0x03	( R )	0000 = Non-Inverted Hold 0001 = Non-Inverted Latch 0002 = Non-Inverted Self Reset 0003 = Non-Inverted Pulse 0100 = Inverted Hold 0101 = Inverted Latch 0102 = Inverted Self Reset 0103 = Inverted Pulse	3
				0x06 or 0x10	( W )		
11	I> Block	70*	5652	0x03	( R )	0000=Not mapped and 0001=Mapped with BI1	0
				0x06 or 0x10	( W )		
12	I>> Block	71*	5653	0x03	( R )	0000=Not mapped and 0001=Mapped with BI1	0
				0x06 or 0x10	( W )		
13	I>>> Block	72*	5654	0x03	( R )	0000=Not mapped and 0001=Mapped with BI1	0
				0x06 or 0x10	( W )		
14	I0> Block	73*	5655	0x03	( R )	0000=Not mapped and 0001=Mapped with BI1	0
				0x06 or 0x10	( W )		
15	I0>> Block	74*	5656	0x03	( R )	0000=Not mapped and 0001=Mapped with BI1	0
				0x06 or 0x10	( W )		
16	CB Ctl Blk	75*	5657	0x03	( R )	0000=Not mapped and 0001=Mapped with BI1	0
				0x06 or 0x10	( W )		
17	Lockout Rs (Reset)	76*	5658	0x03	( R )	0000=Not mapped, 0002=Mapped with BI2, 0004=Mapped with BI3, 0008=Mapped with BI4	8
				0x06 or 0x10	( W )		
18	CB Cls Pos	77*	5659	0x03	( R )	0000=Not mapped, 0002=Mapped with BI2, 0004=Mapped with BI3, 0008=Mapped with BI4	0
				0x06 or 0x10	( W )		
19	CB Opn Pos	78*	5660	0x03	( R )	0000=Not mapped, 0002=Mapped with BI2, 0004=Mapped with BI3, 0008=Mapped with BI4	0
				0x06 or 0x10	( W )		
20	CB Maint	79*	5661	0x03	( R )	0000=Not mapped, 0002=Mapped with BI2, 0004=Mapped with BI3, 0008=Mapped with BI4	0
				0x06 or 0x10	( W )		
21	TCS	80*	5662	0x03	( R )	0000=Not mapped and 0001=Mapped with BI2	1
				0x06 or 0x10	( W )		
22	Ext Trip	81*	5663	0x03	( R )	0000=Not mapped, 0002=Mapped with BI2, 0004=Mapped with BI3, 0008=Mapped with BI4	4
				0x06 or 0x10	( W )		

Table 40: Binary Input / Output Configuration parameters

Sr. No.	Parameter description	Modbus old Address	Modbus New Address	Function code	Read / Write	Range Values in [HEX]	Default value
23	Ext Close	82*	5664	0x03	( R )	0000=Not mapped, 0002=Mapped with BI2, 0004=Mapped with BI3, 0008=Mapped with BI4	0
				0x06 or 0x10	(W)		
24	Power Off	83*	5665	0x03	( R )	0000=Not mapped, 0002=Mapped with BI2, 0004=Mapped with BI3, 0008=Mapped with BI4	0
				0x06 or 0x10	(W)		
25	SIGNAL 1	84*	5666	0x03	( R )	0000=Not mapped, 0002=Mapped with BI2, 0004=Mapped with BI3, 0008=Mapped with BI4	0
				0x06 or 0x10	(W)		
26	SIGNAL 2	85*	5667	0x03	( R )	0000=Not mapped, 0002=Mapped with BI2, 0004=Mapped with BI3, 0008=Mapped with BI4	0
				0x06 or 0x10	(W)		
27	SIGNAL 3	86*	5668	0x03	( R )	0000=Not mapped, 0002=Mapped with BI2, 0004=Mapped with BI3, 0008=Mapped with BI4	0
				0x06 or 0x10	(W)		
28	TCS Block	87*	5669	0x03	( R )	0000=Not mapped and 0001=Mapped with BI1	0
				0x06 or 0x10	(W)		
29	I2> Block	-	5670	0x03	( R )	0000=Not mapped and 0001=Mapped with BI1	0
				0x06 or 0x10	(W)		
30	I2/I1> Block	-	5671	0x03	( R )	0000=Not mapped 0001=Mapped with BI1	0
				0x06 or 0x10	(W)		
31	3lth Block	-	5672	0x03	( R )	0000=Not mapped 0001=Mapped with BI1	0
				0x06 or 0x10	(W)		
32	SG Select	-	5673	0x03	( R )	0000=Not mapped, 0002=Mapped with BI2, 0004=Mapped with BI3, 0008=Mapped with BI4	0
				0x06 or 0x10	(W)		
33	Reserved	-	5674	0x03	( R )	-	0
				0x06 or 0x10	(W)		
34	I2tn< Block	-	5675	0x03	( R )	0000=Not mapped 0001=Mapped with BI1	0
				0x06 or 0x10	(W)		
35	CB Ready	-	5676	0x03	( R )	0000=Not mapped, 0002=Mapped with BI2, 0004=Mapped with BI3, 0008=Mapped with BI4	0
				0x06 or 0x10	(W)		
36	BF Block	-	5677	0x03	( R )	0000=Not mapped 0001=Mapped with BI1	8
				0x06 or 0x10	(W)		

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*Table 41: Binary Input / Output Configuration parameters*

Sr. No.	Parameter description	Modbus old Address	Modbus New Address	Function code	Read / Write	Range Values in [HEX]	Default value
37	BF ProtExt	-	5678	0x03	( R )	0000=Not mapped, 0002=Mapped with BI2, 0004=Mapped with BI3, 0008=Mapped with BI4	0
				0x06 or 0x10	( W )		
38	BF RecTrip	-	5679	0x03	( R )	0000=Not mapped, 0002=Mapped with BI2, 0004=Mapped with BI3, 0008=Mapped with BI4	0
				0x06 or 0x10	( W )		
39	ESTART RQ	-	5680	0x03	( R )	0000=Not mapped, 0002=Mapped with BI2, 0004=Mapped with BI3, 0008=Mapped with BI4	0
				0x06 or 0x10	( W )		
40	I2tn< SpdSw	-	5681	0x03	( R )	0000=Not mapped, 0002=Mapped with BI2, 0004=Mapped with BI3, 0008=Mapped with BI4	0
				0x06 or 0x10	( W )		
41	I2R> Block	-	5682	0x03	( R )	0000=Not mapped 0001=Mapped with BI1	0
				0x06 or 0x10	( W )		
42	3I< Block	-	5683	0x03	( R )	0000=Not mapped 0001=Mapped with BI1	0
				0x06 or 0x10	( W )		
43	I>Start mapped with Binary Output _Data value	100*	6420	0x03	( R )	0000-003F	0
				0x06 or 0x10	( W )		
44	I>>Start Mapped with Binary Output _Data Value	101*	6421	0x03	( R )	0000-003F	0
				0x06 or 0x10	( W )		
45	I>>>Start Mapped with Binary Output _Data Value	102*	6422	0x03	( R )	0000-003F	0
				0x06 or 0x10	( W )		
46	Unit Rdy Mapped with Binary Output _Data Value	103*	6423	0x03	( R )	0000-003F	8
				0x06 or 0x10	( W )		
47	I0>Start Mapped with Binary Output _Data Value	104*	6424	0x03	( R )	0000-003F	0
				0x06 or 0x10	( W )		
48	I0>>Start Mapped with Binary Output _Data Value	105*	6425	0x03	( R )	0000-003F	0
				0x06 or 0x10	( W )		
49	I>Trip Mapped with Binary Output _Data Value	106*	6426	0x03	( R )	0000-003F	19
				0x06 or 0x10	( W )		
50	I>>Trip Mapped with Binary Output _Data Value	107*	6427	0x03	( R )	0000-003F	19
				0x06 or 0x10	( W )		

Table 42: Binary Input / Output Configuration parameters

Sr. No.	Parameter description	Modbus old Address	Modbus New Address	Function code	Read / Write	Range Values in [HEX]	Default value
51	I>>Trip Mapped with Binary Output _Data Value	108*	6428	0x03	( R )	0000-003F	19
				0x06 or 0x10	(W)		
52	TCS Fault Mapped with Binary Output _Data Value	109*	6429	0x03	( R )	0000-003F	0
				0x06 or 0x10	(W)		
53	I0>Trip Mapped with Binary Output _Data Value	110*	6430	0x03	( R )	0000-003F	35
				0x06 or 0x10	(W)		
54	I0>>Trip mapped with Binary Output _Data Value	111*	6431	0x03	( R )	0000-003F	35
				0x06 or 0x10	(W)		
55	CB Cls Cmd Mapped with Binary Output _Data Value	112*	6432	0x03	( R )	0000-003F	4
				0x06 or 0x10	(W)		
56	CB Opn Cmd Mapped with Binary Output _Data Value	113*	6433	0x03	( R )	0000-003F	3
				0x06 or 0x10	(W)		
57	SIGNAL 1 mapped with Binary Output _Data value	114*	6434	0x03	( R )	0000-003F	0
				0x06 or 0x10	(W)		
58	SIGNAL 2 mapped with Binary Output _Data value	115*	6435	0x03	( R )	0000-003F	0
				0x06 or 0x10	(W)		
59	SIGNAL 3 mapped with Binary Output _Data value	116*	6436	0x03	( R )	0000-003F	0
				0x06 or 0x10	(W)		
60	I2> START	-	6437	0x03	( R )	0000-003F	0
				0x06 or 0x10	(W)		
61	I2> Trip mapped with Binary Output _Data value	-	6438	0x03	( R )	0000-003F	0
				0x06 or 0x10	(W)		
62	I2/I1> START	-	6439	0x03	( R )	0000-003F	0
				0x06 or 0x10	(W)		
63	I2/I1> TRIP	-	6440	0x03	( R )	0000-003F	0
				0x06 or 0x10	(W)		
64	3lth tr	-	6441	0x03	( R )	0000-003F	0
				0x06 or 0x10	(W)		

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*Table 43: Binary Input / Output Configuration parameters*

Sr. No.	Parameter description	Modbus old Address	Modbus New Address	Function code	Read / Write	Range Values in [HEX]	Default value
65	3lth Alarm	-	6442	0x03	( R )	0000-003F	0
				0x06 or 0x10	( W )		
66	3lth BLK CL	-	6443	0x03	( R )	0000-003F	0
				0x06 or 0x10	( W )		
67	0->I Close	-	6444	0x03	( R )	0000-003F	0
				0x06 or 0x10	( W )		
68	0->I InPro	-	6445	0x03	( R )	0000-003F	0
				0x06 or 0x10	( W )		
69	0->I Final Tr	-	6446	0x03	( R )	0000-003F	0
				0x06 or 0x10	( W )		
70	0->I Blocked	-	6447	0x03	( R )	0000-003F	0
				0x06 or 0x10	( W )		
71	BF Stage 1	-	6448	0x03	( R )	0000-003F	0
				0x06 or 0x10	( W )		
72	BF Stage 2	-	6449	0x03	( R )	0000-003F	0
				0x06 or 0x10	( W )		
73	BF Rec Trip mapped with Binary Output _Data value	-	6450	0x03	( R )	0000-003F	0
				0x06 or 0x10	( W )		
74	L1 Fault	-	6458	0x03	( R )	0000-003F	0
				0x06 or 0x10	( W )		
75	L2 Fault	-	6459	0x03	( R )	0000-003F	0
				0x06 or 0x10	( W )		
76	L3 Fault	-	6460	0x03	( R )	0000-003F	0
				0x06 or 0x10	( W )		

**Table 44: Binary Input / Output Configuration parameters**

Sr. No.	Parameter description	Modbus old Address	Modbus New Address	Function code	Read / Write	Range Values in [HEX]	Default value
77	AND 1_Out	-	6461	0x03 0x06 or 0x10	( R ) ( W )	0000-003F	0
78	AND 2_Out	-	6462	0x03 0x06 or 0x10	( R ) ( W )	0000-003F	0
79	AND 3_Out	-	6463	0x03 0x06 or 0x10	( R ) ( W )	0000-003F	0
80	OR 1_Out	-	6464	0x03 0x06 or 0x10	( R ) ( W )	0000-003F	0
81	OR 2_Out	-	6465	0x03 0x06 or 0x10	( R ) ( W )	0000-003F	0
82	NOT 1_Out	-	6466	0x03 0x06 or 0x10	( R ) ( W )	0000-003F	0
83	NOT 2_Out	-	6467	0x03 0x06 or 0x10	( R ) ( W )	0000-003F	0
84	NOT 3_Out	-	6468	0x03 0x06 or 0x10	( R ) ( W )	0000-003F	0
85	NOT 4_Out	-	6469	0x03 0x06 or 0x10	( R ) ( W )	0000-003F	0
86	TONDelay1	-	6470	0x03 0x06 or 0x10	( R ) ( W )	0000-003F	0
87	TONDelay2	-	6471	0x03 0x06 or 0x10	( R ) ( W )	0000-003F	0
88	TONDelay3	-	6472	0x03 0x06 or 0x10	( R ) ( W )	0000-003F	0
89	TONDelay4	-	6473	0x03 0x06 or 0x10	( R ) ( W )	0000-003F	0
90	TOFFDelay1	-	6474	0x03 0x06 or 0x10	( R ) ( W )	0000-003F	0
91	TOFFDelay2	-	6475	0x03 0x06 or 0x10	( R ) ( W )	0000-003F	0

## IED specific implementation

Refer below table for Data Value Description

Data Value	BO6	BO5	BO4	BO3	BO2	BO1	Description
0x0000	0	0	0	0	0	0	No Channel Selected
0x0001	0	0	0	0	0	1	Binary Output Channel 1 Selected
0x0003	0	0	0	0	1	1	Binary Output Channel 1 and 2 Selected
0x003F	1	1	1	1	1	1	All Channel Selected



UNIT READY status is permanent configured at BO4 and cannot be changed. No other signals can be configured at BO4.

Binary Inputs and Binary Outputs configuration parameters can be read and write with data length one.

## 2.5.8

## LED Configuration parameters

*Table 45: LED Configuration parameters*

Sr. No.	Parameter description	Modbus old Address	Modbus New Address	Function code	Read / Write	Range Values in [HEX]	Default value
1	LED 1 Config	-	7168	0x03	R/W	0000 = Non-Inverted Hold 0002 = Non-Inverted Self Reset	0000
2	LED 2 Config	-	7169	0x03	R/W	0000 = Non-Inverted Hold 0002 = Non-Inverted Self Reset	0000
3	LED 3 Config	-	7170	0x03	R/W	0000 = Non-Inverted Hold 0002 = Non-Inverted Self Reset	0002
4	LED 4 Config	-	7171	0x03	R/W	0000 = Non-Inverted Hold 0002 = Non-Inverted Self Reset	0000
5	LED 5 Config	-	7172	0x03	R/W	0000 = Non-Inverted Hold 0002 = Non-Inverted Self Reset	0000
6	I> Start	-	7188	0x03	R/W	0000 – 001F	0000
7	I>> Start	-	7189	0x03	R/W	0000 – 001F	0000
8	I>>> Start	-	7190	0x03	R/W	0000 – 001F	0000
9	I0> Start	-	7191	0x03	R/W	0000 – 001F	0000
10	I0>> Start	-	7192	0x03	R/W	0000 – 001F	0000
11	I> Trip	-	7193	0x03	R/W	0000 – 001F	0001
12	I>> Trip	-	7194	0x03	R/W	0000 – 001F	0001
13	I>>> Trip	-	7195	0x03	R/W	0000 – 001F	0001
14	I0> Trip	-	7196	0x03	R/W	0000 – 001F	0002

**Table 46:** LED Configuration parameters , continue

Sr. No.	Parameter description	Modbus old Address	Modbus New Address	Function code	Read / Write	Range Values in [HEX]	Default value
15	I0>> Trip	-	7197	0x03	R/W	0000 – 001F	0002
16	TCS	-	7198	0x03	R/W	0000 – 001F	0004
17	SIGNAL 1	-	7199	0x03	R/W	0000 – 001F	0000
18	SIGNAL 2	-	7200	0x03	R/W	0000 – 001F	0000
19	SIGNAL 3	-	7201	0x03	R/W	0000 – 001F	0000
20	I2>Start	-	7202	0x03	R/W	0000 – 001F	0000
21	I2>Trip	-	7203	0x03	R/W	0000 – 001F	0000
22	I2/I1>Start	-	7204	0x03	R/W	0000 – 001F	0000
23	I2/I1>Trip	-	7205	0x03	R/W	0000 – 001F	0000
24	3 Ith > Trip	-	7206	0x03	R/W	0000 – 001F	0000
25	3 Ith > Alarm	-	7207	0x03	R/W	0000 – 001F	0000
26	3 Ith > BlkCl	-	7208	0x03	R/W	0000 – 001F	0000
27	0->I Close	-	7209	0x03	R/W	0000 – 001F	0000
28	0->I InPro	-	7210	0x03	R/W	0000 – 001F	0000
29	0->I Final Tr	-	7211	0x03	R/W	0000 – 001F	0000
30	0->I Blocked	-	7212	0x03	R/W	0000 – 001F	0000
31	BF Stage 1	-	7213	0x03	R/W	0000 – 001F	0000
32	BF Stage 2	-	7214	0x03	R/W	0000 – 001F	0000
33	BF RecTrip	-	7215	0x03	R/W	0000 – 001F	0000
34	ESTART	-	7216	0x03	R/W	0000 – 001F	0000
35	I2tn<Mstr	-	7217	0x03	R/W	0000 – 001F	0000
36	I2tn<Trip	-	7218	0x03	R/W	0000 – 001F	0000
37	I2tn<BlkCl	-	7219	0x03	R/W	0000 – 001F	0000
38	I2R>Start	-	7220	0x03	R/W	0000 – 001F	0000
39	I2R>Trip	-	7221	0x03	R/W	0000 – 001F	0000
40	3I<Start	-	7222	0x03	R/W	0000 – 001F	0000
41	3I<Trip	-	7223	0x03	R/W	0000 – 001F	0000

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*Table 47: LED Configuration parameters, continue*

Sr. No.	Parameter description	Modbus old Address	Modbus New Address	Function code	Read / Write	Range Values in [HEX]	Default value
42	L1 Fault	-	7224	0x03 0x06 or 0x10	R/W	0000 – 001F	0000
43	L2 Fault	-	7225	0x03 0x06 or 0x10	R/W	0000 – 001F	0000
44	L3 Fault	-	7226	0x03 0x06 or 0x10	R/W	0000 – 001F	0000
45	AND 1_Out	-	7227	0x03 0x06 or 0x10	R/W	0000 – 001F	0000
46	AND 2_Out	-	7228	0x03 0x06 or 0x10	R/W	0000 – 001F	0000
47	AND 3_Out	-	7229	0x03 0x06 or 0x10	R/W	0000 – 001F	0000
48	OR 1_Out	-	7230	0x03 0x06 or 0x10	R/W	0000 – 001F	0000
49	OR 2_Out	-	7231	0x03 0x06 or 0x10	R/W	0000 – 001F	0000
50	NOT 1_Out	-	7232	0x03 0x06 or 0x10	R/W	0000 – 001F	0000
51	NOT 2_Out	-	7233	0x03 0x06 or 0x10	R/W	0000 – 001F	0000
52	NOT 3_Out	-	7234	0x03 0x06 or 0x10	R/W	0000 – 001F	0000

## IED specific implementation

Table 48: LED Configuration parameters , continue

Sr. No.	Parameter description	Modbus old Address	Modbus New Address	Function code	Read / Write	Range Values in [HEX]	Default value
53	NOT 4_Out	-	7235	0x03 0x06 or 0x10	R/W	0000 – 001F	0000
54	TONDelay1	-	7236	0x03 0x06 or 0x10	R/W	0000 – 001F	0000
55	TONDelay2	-	7237	0x03 0x06 or 0x10	R/W	0000 – 001F	0000
56	TONDelay3	-	7238	0x03 0x06 or 0x10	R/W	0000 – 001F	0000
57	TONDelay4	-	7239	0x03 0x06 or 0x10	R/W	0000 – 001F	0000
58	TOFFDelay1	-	7240	0x03 0x06 or 0x10	R/W	0000 – 001F	0000
59	TOFFDelay2	-	7241	0x03 0x06 or 0x10	R/W	0000 – 001F	0000

Refer below table for Data Value Description

Data Value	LED 5	LED 4	LED 3	LED 2	LED1	Description
0x0000	0	0	0	0	0	No LED Selected
0x0001	0	0	0	0	1	LED 1 Selected
0x0003	0	0	0	1	1	LED's 1 and 2 Selected
0x001F	1	1	1	1	1	All LED's Selected



LED configuration parameters can be read and write with data length one.

## 2.5.9 OR Logic Configuration parameters

### 2.5.9.1 OR1 Logic Configuration parameters

*Table 49: OR1 Configuration parameters*

Sr. No.	Parameter description	Modbus Address	Function code	Read / Write	Range Values in [HEX]	Default value
1	OR1 Event Disable / Enable	8368	0x03 0x06 or 0x10	( R ) (W)	0000 – 0001	0000
2	I> Start	8369	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
3	I>Trip	8370	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
4	I>> Start	8371	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
5	I>> Trip	8372	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
6	I>>> Start	8373	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
7	I>>> Trip	8374	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
8	I0> Start	8375	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
9	I0> Trip	8376	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
10	I0>> Start	8377	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
11	I0>> Trip	8378	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
12	3Ith> Alarm	8379	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
13	3Ith> Trip	8380	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
14	3Ith>BlkCl	8381	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000

Table 50: OR1 Configuration parameters, continue

Sr. No.	Parameter description	Modbus Address	Function code	Read / Write	Range Values in [HEX]	Default value
15	RESERVED	8382	--	--	--	0000
16	RESERVED	8383	--	--	--	0000
17	RESERVED	8384	--	--	--	0000
18	I2/I1> Start	8385	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
19	I2/I1> Trip	8386	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
20	I2> Start	8387	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
21	I2> Trip	8388	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
22	RESERVED	8389	--	--	--	0000
23	RESERVED	8390	--	--	--	0000
24	RESERVED	8391	--	--	--	0000
25	RESERVED	8392	--	--	--	0000
26	BF Stage1	8393	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
27	BF Stage2	8394	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
28	BF RecTrip	8395	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
29	O-> I Close	8396	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
30	O-> I In Progress	8397	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
31	O-> I Final Trip	8398	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
32	O-> I Blocked	8399	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
33	BinInput_1	8400	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
34	BinInput_2	8401	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000

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*Table 51: OR1 Configuration parameters, continue*

Sr. No.	Parameter description	Modbus Address	Function code	Read / Write	Range Values in [HEX]	Default value
35	BinInput_3	8402	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
36	BinInput_4	8403	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
37	CB Open Cmd	8404	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
38	CB Cls Cmd	8405	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
39	TCS Fault	8406	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
40	Unit Ready	8407	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
41	L1 Fualt	8408	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
42	L2 Fault	8409	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
43	L3 Fault	8410	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
44	AND1_Out	8411	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
45	AND2_Out	8412	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
46	AND 3_Out	8413	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
47	RESERVED	8414	--	--	--	0000
48	OR 2_Out	8415	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
49	NOT 1_Out	8416	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
50	NOT 2_Out	8417	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
51	NOT 3_Out	8418	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000

Table 52: OR1 Configuration parameters, continue

Sr. No.	Parameter description	Modbus Address	Function code	Read / Write	Range Values in [HEX]	Default value
52	NOT 4_Out	8419	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
53	TONDelay1	8420	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
54	TONDelay2	8421	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
55	TONDelay3	8422	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
56	TONDelay4	8423	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
57	TOFFDelay1	8424	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
58	TOFFDelay2	8425	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000

Refer below table for Data Value Description

Data Value	OR1 Input3	OR1 Input2	OR1 Input1	Description
0x0000	0	0	0	Signal not mapped on OR1 gate inputs
0x0001	0	0	1	Signal mapped on input 1 of OR1 Gate
0x0002	0	1	0	Signal mapped on input 2 of OR1 Gate
0x0004	1	0	0	Signal mapped on input 3 of OR1 Gate
0x0007	1	1	1	Signal mapped on all 3 inputs of OR1 Gate



OR1 configuration parameters can be read with variable data length and starting address, within the range of OR1 addresses. OR1 configuration parameters can be written with data length one.

## 2.5.9.2 OR2 Logic Configuration parameters

Table 53: OR2 Configuration parameters

Sr. No.	Parameter description	Modbus Address	Function code	Read / Write	Range Values in [HEX]	Default value
1	OR2 Event Disable / Enable	8448	0x03 0x06 or 0x10	( R ) (W)	0000 – 0001	0000
2	I> Start	8449	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000

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**Table 54:** OR2 Configuration parameters , continue

Sr. No.	Parameter description	Modbus Address	Function code	Read / Write	Range Values in [HEX]	Default value
3	I>Trip	8450	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
4	I>> Start	8451	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
5	I>> Trip	8452	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
6	I>>> Start	8453	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
7	I>>> Trip	8454	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
8	I0> Start	8455	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
9	I0> Trip	8456	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
10	I0>> Start	8457	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
11	I0>> Trip	8458	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
12	3lth> Alarm	8459	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
13	3lth> Trip	8460	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
14	3lth>BlkCl	8461	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
15	RESERVED	8462	--	--	--	0000
16	RESERVED	8463	--	--	--	0000
17	RESERVED	8464	--	--	--	0000
18	I2/I1> Start	8465	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
19	I2/I1> Trip	8466	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000

Table 55: OR2 Configuration parameters, continue

Sr. No.	Parameter description	Modbus Address	Function code	Read / Write	Range Values in [HEX]	Default value
20	I2> Start	8467	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
21	I2> Trip	8468	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
22	RESERVED	8469	--	--	--	0000
23	RESERVED	8470	--	--	--	0000
24	RESERVED	8471	--	--	--	0000
25	RESERVED	8472	--	--	--	0000
26	BF Stage1	8473	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
27	BF Stage2	8474	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
28	BF RecTrip	8475	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
29	O-> I Close	8476	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
30	O-> I In Progress	8477	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
31	O-> I Final Trip	8478	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
32	O-> I Blocked	8479	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
33	BinInput_1	8480	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
34	BinInput_2	8481	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
35	BinInput_3	8482	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
36	BinInput_4	8483	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
37	CB Open Cmd	8484	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000

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*Table 56: OR2 Configuration parameters , continue*

Sr. No.	Parameter description	Modbus Address	Function code	Read / Write	Range Values in [HEX]	Default value
38	CB Cls Cmd	8485	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
39	TCS Fault	8486	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
40	Unit Ready	8487	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
41	L1 Fuault	8488	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
42	L2 Fault	8489	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
43	L3 Fault	8490	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
44	AND1_Out	8491	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
45	AND2_Out	8492	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
46	AND 3_Out	8493	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
47	OR 1_Out	8494	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
48	RESERVED	8495	--	--	--	0000
49	NOT 1_Out	8496	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
50	NOT 2_Out	8497	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
51	NOT 3_Out	8498	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
52	NOT 4_Out	8499	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
53	TONDelay1	8500	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
54	TONDelay2	8501	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000

*Table 57: OR2 Configuration parameters , continue*

Sr. No.	Parameter description	Modbus Address	Function code	Read / Write	Range Values in [HEX]	Default value
55	TONDelay3	8502	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
56	TONDelay4	8503	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
57	TOFFDelay1	8504	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
58	TOFFDelay2	8505	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000

Refer below table for Data Value Description

Data Value	OR2 Input3	OR2 Input2	OR2 Input1	Description
0x0000	0	0	0	Signal not mapped on OR2 gate inputs
0x0001	0	0	1	Signal mapped on input 1 of OR2 Gate
0x0002	0	1	0	Signal mapped on input 2 of OR2 Gate
0x0004	1	0	0	Signal mapped on input 3 of OR2 Gate
0x0007	1	1	1	Signal mapped on all 3 inputs of OR2 Gate



OR2 configuration parameters can be read with variable data length and starting address, within the range of OR2 addresses. OR2 configuration parameters can be written with data length one.

## 2.5.10

## AND Logic Configuration parameters

### 2.5.10.1

### AND1 Logic Configuration parameters

*Table 58: AND1 Configuration parameters*

Sr. No.	Parameter description	Modbus Address	Function code	Read / Write	Range Values in [HEX]	Default value
1	AND1 Event Disable / Enable	8608	0x03 0x06 or 0x10	( R ) (W)	0000 – 0001	0000
2	I> Start	8609	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
3	I>Trip	8610	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000

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*Table 59: AND1 Configuration parameters, continue*

Sr. No.	Parameter description	Modbus Address	Function code	Read / Write	Range Values in [HEX]	Default value
4	I>> Start	8611	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
5	I>> Trip	8612	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
6	I>>> Start	8613	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
7	I>>> Trip	8614	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
8	I0> Start	8615	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
9	I0> Trip	8616	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
10	I0>> Start	8617	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
11	I0>> Trip	8618	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
12	3Ith> Alarm	8619	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
13	3Ith> Trip	8620	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
14	3Ith>BlkCl	8621	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
15	RESERVED	8622	--	--	--	0000
16	RESERVED	8623	--	--	--	0000
17	RESERVED	8624	--	--	--	0000
18	I2/I1> Start	8625	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
19	I2/I1> Trip	8626	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
20	I2> Start	8627	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000

*Table 60: AND1 Configuration parameters, continue*

Sr. No.	Parameter description	Modbus Address	Function code	Read / Write	Range Values in [HEX]	Default value
21	I2> Trip	8628	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
22	RESERVED	8629	--	--	--	0000
23	RESERVED	8630	--	--	--	0000
24	RESERVED	8631	--	--	--	0000
25	RESERVED	8632	--	--	--	0000
26	BF Stage1	8633	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
27	BF Stage2	8634	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
28	BF RecTrip	8635	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
29	O-> I Close	8636	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
30	O-> I In Progress	8637	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
31	O-> I Final Trip	8638	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
32	O-> I Blocked	8639	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
33	BinInput_1	8640	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
34	BinInput_2	8641	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
35	BinInput_3	8642	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
36	BinInput_4	8643	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
37	CB Open Cmd	8644	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
38	CB Cls Cmd	8645	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
39	TCS Fault	8646	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000

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*Table 61: AND1 Configuration parameters, continue*

Sr. No.	Parameter description	Modbus Address	Function code	Read / Write	Range Values in [HEX]	Default value
40	Unit Ready	8647	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
41	L1 Fualt	8648	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
42	L2 Fault	8649	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
43	L3 Fault	8650	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
44	RESERVED	8651	--	--	--	0000
45	AND2_Out	8652	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
46	AND 3_Out	8653	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
47	OR 1_Out	8654	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
48	OR 2_Out	8655	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
49	NOT 1_Out	8656	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
50	NOT 2_Out	8657	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
51	NOT 3_Out	8658	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
52	NOT 4_Out	8659	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
53	TONDelay1	8660	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
54	TONDelay2	8661	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
55	TONDelay3	8662	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
56	TONDelay4	8663	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000

*Table 62: AND1 Configuration parameters, continue*

Sr. No.	Parameter description	Modbus Address	Function code	Read / Write	Range Values in [HEX]	Default value
57	TOFFDelay1	8664	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
58	TOFFDelay2	8665	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000

Refer below table for Data Value Description

Data Value	AND1 Input3	AND1 Input2	AND1 Input1	Description
0x0000	0	0	0	Signal not mapped on AND1 gate inputs
0x0001	0	0	1	Signal mapped on input 1 of AND1 Gate
0x0002	0	1	0	Signal mapped on input 2 of AND1 Gate
0x0004	1	0	0	Signal mapped on input 3 of AND1 Gate
0x0007	1	1	1	Signal mapped on all 3 inputs of AND1 Gate



AND1 configuration parameters can be read with variable data length and starting address, within the range of AND1 addresses. AND1 configuration parameters can be written with data length one.

### 2.5.10.2 AND2 Logic Configuration parameters

*Table 63: AND2 Configuration parameters*

Sr. No.	Parameter description	Modbus Address	Function code	Read / Write	Range Values in [HEX]	Default value
1	AND2 Event Disable / Enable	8688	0x03 0x06 or 0x10	( R ) (W)	0000 – 0001	0000
2	I> Start	8689	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
3	I>Trip	8690	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
4	I>> Start	8691	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
5	I>> Trip	8692	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
6	I>>> Start	8693	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000

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*Table 64: AND2 Configuration parameters, continue*

Sr. No.	Parameter description	Modbus Address	Function code	Read / Write	Range Values in [HEX]	Default value
7	I>> Trip	8694	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
8	I0> Start	8695	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
9	I0> Trip	8696	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
10	I0>> Start	8697	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
11	I0>> Trip	8698	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
12	3Ith> Alarm	8699	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
13	3Ith> Trip	8700	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
14	3Ith>BlkCl	8701	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
15	RESERVED	8702	--	--	--	0000
16	RESERVED	8703	--	--	--	0000
17	RESERVED	8704	--	--	--	0000
18	I2/I1> Start	8705	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
19	I2/I1> Trip	8706	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
20	I2> Start	8707	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
21	I2> Trip	8708	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
22	RESERVED	8709	--	--	--	0000
23	RESERVED	8710	--	--	--	0000
24	RESERVED	8711	--	--	--	0000
25	RESERVED	8712	--	--	--	0000
26	BF Stage1	8713	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000

*Table 65: AND2 Configuration parameters, continue*

Sr. No.	Parameter description	Modbus Address	Function code	Read / Write	Range Values in [HEX]	Default value
27	BF Stage2	8714	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
28	BF RecTrip	8715	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
29	O-> I Close	8716	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
30	O-> I In Progress	8717	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
31	O-> I Final Trip	8718	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
32	O-> I Blocked	8719	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
33	BinInput_1	8720	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
34	BinInput_2	8721	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
35	BinInput_3	8722	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
36	BinInput_4	8723	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
37	CB Open Cmd	8724	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
38	CB Cls Cmd	8725	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
39	TCS Fault	8726	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
40	Unit Ready	8727	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
41	L1 Fualt	8728	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
42	L2 Fault	8729	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
43	L3 Fault	8730	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000

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**Table 66:** AND2 Configuration parameters, continue

Sr. No.	Parameter description	Modbus Address	Function code	Read / Write	Range Values in [HEX]	Default value
44	AND1_Out	8731	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
45	RESERVED	8732	--	--	--	0000
46	AND 3_Out	8733	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
47	OR 1_Out	8734	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
48	OR 2_Out	8735	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
49	NOT 1_Out	8736	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
50	NOT 2_Out	8737	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
51	NOT 3_Out	8738	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
52	NOT 4_Out	8739	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
53	TONDelay1	8740	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
54	TONDelay2	8741	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
55	TONDelay3	8742	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
56	TONDelay4	8743	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
57	TOFFDelay1	8744	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
58	TOFFDelay2	8745	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000

Refer below table for Data Value Description

Data Value	AND2 Input3	AND2 Input2	AND2 Input1	Description
0x0000	0	0	0	Signal not mapped on AND2 gate inputs
0x0001	0	0	1	Signal mapped on input 1 of AND2 Gate
0x0002	0	1	0	Signal mapped on input 2 of AND2 Gate
0x0004	1	0	0	Signal mapped on input 3 of AND2 Gate
0x0007	1	1	1	Signal mapped on all 3 inputs of AND2 Gate



AND2 configuration parameters can be read with variable data length and starting address, within the range of AND2 addresses. AND2 configuration parameters can be written with data length one.

### 2.5.10.3 AND3 Logic Configuration parameters

*Table 67: AND3 Configuration parameters*

Sr. No.	Parameter description	Modbus Address	Function code	Read / Write	Range Values in [HEX]	Default value
1	AND3 Event Disable / Enable	8768	0x03 0x06 or 0x10	( R ) ( W )	0000 – 0001	0000
2	I> Start	8769	0x03 0x06 or 0x10	( R ) ( W )	0000 – 0007	0000
3	I>Trip	8770	0x03 0x06 or 0x10	( R ) ( W )	0000 – 0007	0000
4	I>> Start	8771	0x03 0x06 or 0x10	( R ) ( W )	0000 – 0007	0000
5	I>> Trip	8772	0x03 0x06 or 0x10	( R ) ( W )	0000 – 0007	0000
6	I>>> Start	8773	0x03 0x06 or 0x10	( R ) ( W )	0000 – 0007	0000
7	I>>> Trip	8774	0x03 0x06 or 0x10	( R ) ( W )	0000 – 0007	0000
8	I0> Start	8775	0x03 0x06 or 0x10	( R ) ( W )	0000 – 0007	0000
9	I0> Trip	8776	0x03 0x06 or 0x10	( R ) ( W )	0000 – 0007	0000

## IED specific implementation

*Table 68: AND3 Configuration parameters, continue*

Sr. No.	Parameter description	Modbus Address	Function code	Read / Write	Range Values in [HEX]	Default value
10	I0>> Start	8777	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
11	I0>> Trip	8778	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
12	3Ith> Alarm	8779	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
13	3Ith> Trip	8780	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
14	3Ith>BlkCl	8781	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
15	RESERVED	8782	--	--	--	0000
16	RESERVED	8783	--	--	--	0000
17	RESERVED	8784	--	--	--	0000
18	I2/I1> Start	8785	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
19	I2/I1> Trip	8786	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
20	I2> Start	8787	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
21	I2> Trip	8788	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
22	RESERVED	8789	--	--	--	0000
23	RESERVED	8790	--	--	--	0000
24	RESERVED	8791	--	--	--	0000
25	RESERVED	8792	--	--	--	0000
26	BF Stage1	8793	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
27	BF Stage2	8794	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
28	BF RecTrip	8795	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
29	O-> I Close	8796	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000

*Table 69: AND3 Configuration parameters, continue*

Sr. No.	Parameter description	Modbus Address	Function code	Read / Write	Range Values in [HEX]	Default value
30	O-> I In Progress	8797	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
31	O-> I Final Trip	8798	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
32	O-> I Blocked	8799	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
33	BinInput_1	8800	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
34	BinInput_2	8801	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
35	BinInput_3	8802	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
36	BinInput_4	8803	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
37	CB Open Cmd	8804	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
38	CB Cls Cmd	8805	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
39	TCS Fault	8806	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
40	Unit Ready	8807	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
41	L1 Fualt	8808	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
42	L2 Fault	8809	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
43	L3 Fault	8810	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
44	AND1_Out	8811	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
45	AND2_Out	8812	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
46	RESERVED	8813	--	--	--	0000

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*Table 70: AND3 Configuration parameters, continue*

Sr. No.	Parameter description	Modbus Address	Function code	Read / Write	Range Values in [HEX]	Default value
47	OR 1_Out	8814	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
48	OR 2_Out	8815	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
49	NOT 1_Out	8816	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
50	NOT 2_Out	8817	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
51	NOT 3_Out	8818	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
52	NOT 4_Out	8819	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
53	TONDelay1	8820	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
54	TONDelay2	8821	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
55	TONDelay3	8822	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
56	TONDelay4	8823	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
57	TOFFDelay1	8824	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000
58	TOFFDelay2	8825	0x03 0x06 or 0x10	( R ) (W)	0000 – 0007	0000

Refer below table for Data Value Description

Data Value	AND3 Input3	AND3 Input2	AND3 Input1	Description
0x0000	0	0	0	Signal not mapped on AND3 gate inputs
0x0001	0	0	1	Signal mapped on input 1 of AND3 Gate
0x0002	0	1	0	Signal mapped on input 2 of AND3 Gate
0x0004	1	0	0	Signal mapped on input 3 of AND3 Gate
0x0007	1	1	1	Signal mapped on all 3 inputs of AND3 Gate



AND3 configuration parameters can be read with variable data length and starting address, within the range of AND3 addresses. AND3 configuration parameters can be written with data length one.

## 2.5.11

## NOT Logic Configuration parameters

*Table 71: NOT Configuration parameters*

Sr. No.	Parameter description	Modbus Address	Function code	Read / Write	Range Values in [HEX]	Default value
1	NOT1 Event Enable	8960	0x03 0x06 or 0x10	( R ) ( W )	0000 – 0001	0000
2	NOT2 Event Enable	8961	0x03 0x06 or 0x10	( R ) ( W )	0000 – 0001	0000
3	NOT3 Event Enable	8962	0x03 0x06 or 0x10	( R ) ( W )	0000 – 0001	0000
4	NOT4 Event Enable	8963	0x03 0x06 or 0x10	( R ) ( W )	0000 – 0001	0000
5	RESERVED	8964	--	--	--	0000
6	RESERVED	8965	--	--	--	0000
7	I> Start	8966	0x03 0x06 or 0x10	( R ) ( W )	0000 – 000F	0000
8	I>Trip	8967	0x03 0x06 or 0x10	( R ) ( W )	0000 – 000F	0000
9	I>> Start	8968	0x03 0x06 or 0x10	( R ) ( W )	0000 – 000F	0000
10	I>> Trip	8969	0x03 0x06 or 0x10	( R ) ( W )	0000 – 000F	0000
11	I>>> Start	8970	0x03 0x06 or 0x10	( R ) ( W )	0000 – 000F	0000
12	I>>> Trip	8971	0x03 0x06 or 0x10	( R ) ( W )	0000 – 000F	0000
13	I0> Start	8972	0x03 0x06 or 0x10	( R ) ( W )	0000 – 000F	0000
14	I0> Trip	8973	0x03 0x06 or 0x10	( R ) ( W )	0000 – 000F	0000

## IED specific implementation

*Table 72: NOT Configuration parameters , continue*

Sr. No.	Parameter description	Modbus Address	Function code	Read / Write	Range Values in [HEX]	Default value
15	I0>> Start	8974	0x03 0x06 or 0x10	( R ) ( W )	0000 – 000F	0000
16	I0>> Trip	8975	0x03 0x06 or 0x10	( R ) ( W )	0000 – 000F	0000
17	3Ith> Alm	8976	0x03 0x06 or 0x10	( R ) ( W )	0000 – 000F	0000
18	3Ith> Tr	8977	0x03 0x06 or 0x10	( R ) ( W )	0000 – 000F	0000
19	3Ith>BlkCl	8978	0x03 0x06 or 0x10	( R ) ( W )	0000 – 000F	0000
20	RESERVED	8979	--	--	--	0000
21	RESERVED	8980	--	--	--	0000
22	RESERVED	8981	--	--	--	0000
23	I2/I1> Start	8982	0x03 0x06 or 0x10	( R ) ( W )	0000 – 000F	0000
24	I2/I1> Trip	8983	0x03 0x06 or 0x10	( R ) ( W )	0000 – 000F	0000
25	I2> Start	8984	0x03 0x06 or 0x10	( R ) ( W )	0000 – 000F	0000
26	I2> Trip	8985	0x03 0x06 or 0x10	( R ) ( W )	0000 – 000F	0000
27	RESERVED	8986	--	--	--	0000
28	RESERVED	8987	--	--	--	0000
29	RESERVED	8988	--	--	--	0000
30	RESERVED	8989	--	--	--	0000
31	BF Stage1	8990	0x03 0x06 or 0x10	( R ) ( W )	0000 – 000F	0000
32	BF Stage2	8991	0x03 0x06 or 0x10	( R ) ( W )	0000 – 000F	0000
33	BF RecTrip	8992	0x03 0x06 or 0x10	( R ) ( W )	0000 – 000F	0000
34	O-> I Close	8993	0x03 0x06 or 0x10	( R ) ( W )	0000 – 000F	0000

Table 73: NOT Configuration parameters, continue

Sr. No.	Parameter description	Modbus Address	Function code	Read / Write	Range Values in [HEX]	Default value
35	O-> I In Progress	8994	0x03 0x06 or 0x10	( R ) ( W )	0000 – 000F	0000
36	O-> I Final Trip	8995	0x03 0x06 or 0x10	( R ) ( W )	0000 – 000F	0000
37	O-> I Blocked	8996	0x03 0x06 or 0x10	( R ) ( W )	0000 – 000F	0000
38	BinInput_1	8997	0x03 0x06 or 0x10	( R ) ( W )	0000 – 000F	0000
39	BinInput_2	8998	0x03 0x06 or 0x10	( R ) ( W )	0000 – 000F	0000
40	BinInput_3	8999	0x03 0x06 or 0x10	( R ) ( W )	0000 – 000F	0000
41	BinInput_4	9000	0x03 0x06 or 0x10	( R ) ( W )	0000 – 000F	0000
42	CB Open Cmd	9001	0x03 0x06 or 0x10	( R ) ( W )	0000 – 000F	0000
43	CB Cls Cmd	9002	0x03 0x06 or 0x10	( R ) ( W )	0000 – 000F	0000
44	TCS Fault	9003	0x03 0x06 or 0x10	( R ) ( W )	0000 – 000F	0000
45	Unit Rdy	9004	0x03 0x06 or 0x10	( R ) ( W )	0000 – 000F	0000
46	L1 Fualt	9005	0x03 0x06 or 0x10	( R ) ( W )	0000 – 000F	0000
47	L2 Fault	9006	0x03 0x06 or 0x10	( R ) ( W )	0000 – 000F	0000
48	L3 Fault	9007	0x03 0x06 or 0x10	( R ) ( W )	0000 – 000F	0000
49	AND 1_Out	9008	0x03 0x06 or 0x10	( R ) ( W )	0000 – 000F	0000
50	AND 2_Out	9009	0x03 0x06 or 0x10	( R ) ( W )	0000 – 000F	0000
51	AND 3_Out	9010	0x03 0x06 or 0x10	( R ) ( W )	0000 – 000F	0000

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*Table 74: NOT Configuration parameters , continue*

Sr. No.	Parameter description	Modbus Address	Function code	Read / Write	Range Values in [HEX]	Default value
52	OR 1_Out	9011	0x03 0x06 or 0x10	( R ) ( W )	0000 – 000F	0000
53	OR 2_Out	9012	0x03 0x06 or 0x10	( R ) ( W )	0000 – 000F	0000
54	NOT 1_Out	9013	0x03 0x06 or 0x10	( R ) ( W )	0000 – 000F	0000
55	NOT 2_Out	9014	0x03 0x06 or 0x10	( R ) ( W )	0000 – 000F	0000
56	NOT 3_Out	9015	0x03 0x06 or 0x10	( R ) ( W )	0000 – 000F	0000
57	NOT 4_Out	9016	0x03 0x06 or 0x10	( R ) ( W )	0000 – 000F	0000
58	TONDelay1	9017	0x03 0x06 or 0x10	( R ) ( W )	0000 – 000F	0000
59	TONDelay2	9018	0x03 0x06 or 0x10	( R ) ( W )	0000 – 000F	0000
60	TONDelay3	9019	0x03 0x06 or 0x10	( R ) ( W )	0000 – 000F	0000
61	TONDelay4	9020	0x03 0x06 or 0x10	( R ) ( W )	0000 – 000F	0000
62	TOFFDelay1	9021	0x03 0x06 or 0x10	( R ) ( W )	0000 – 000F	0000
63	TOFFDelay2	9022	0x03 0x06 or 0x10	( R ) ( W )	0000 – 000F	0000

Refer below table for Data Value Description

Data Value	NOT Gate-4	NOT Gate-3	NOT Gate-2	NOT Gate-1	Description
0x0000	0	0	0	0	Signal not mapped on any of the NOT gate
0x0001	0	0	0	1	Signal mapped on NOT Gate -1
0x0002	0	0	1	0	Signal mapped on NOT Gate -2
0x0008	1	0	0	0	Signal mapped on NOT Gate -4
0x000F	1	1	1	1	Signal mapped on all 4 NOT Gates



NOT configuration parameters can be read with variable data length and starting address, within the range of NOT addresses.  
 NOT configuration parameters can be written with data length one.



Only one signal can be connected to the input of a particular NOT gate.



The output of the same Boolean gates cannot be connected to its own input

## 2.5.12

## ON Time Delay Timer Configuration parameters

*Table 75: ON Time Delay Timer Configuration parameters*

Sr. No.	Parameter description	Modbus Address	Function code	Read / Write	Range Values in [HEX]	Default value
1	TON1 Event Enable	9472	0x03 0x06 or 0x10	( R ) ( W )	0000 – 0001	0000
2	TON2 Event Enable	9473	0x03 0x06 or 0x10	( R ) ( W )	0000 – 0001	0000
3	TON3 Event Enable	9474	0x03 0x06 or 0x10	( R ) ( W )	0000 – 0001	0000
4	TON4 Event Enable	9475	0x03 0x06 or 0x10	( R ) ( W )	0000 – 0001	0000
5	RESERVED	9476	--	--	--	0000
6	RESERVED	9477	--	--	--	0000
7	I> Start	9478	0x03 0x06 or 0x10	( R ) ( W )	0000 – 000F	0000
8	I>Trip	9479	0x03 0x06 or 0x10	( R ) ( W )	0000 – 000F	0000
9	I>> Start	9480	0x03 0x06 or 0x10	( R ) ( W )	0000 – 000F	0000
10	I>> Trip	9481	0x03 0x06 or 0x10	( R ) ( W )	0000 – 000F	0000
11	I>>> Start	9482	0x03 0x06 or 0x10	( R ) ( W )	0000 – 000F	0000

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### IED specific implementation

*Table 76: ON Time Delay Timer Configuration parameters , continue*

Sr. No.	Parameter description	Modbus Address	Function code	Read / Write	Range Values in [HEX]	Default value
12	I>> Trip	9483	0x03 0x06 or 0x10	( R ) ( W )	0000 – 000F	0000
13	I0> Start	9484	0x03 0x06 or 0x10	( R ) ( W )	0000 – 000F	0000
14	I0> Trip	9485	0x03 0x06 or 0x10	( R ) ( W )	0000 – 000F	0000
15	I0>> Start	9486	0x03 0x06 or 0x10	( R ) ( W )	0000 – 000F	0000
16	I0>> Trip	9487	0x03 0x06 or 0x10	( R ) ( W )	0000 – 000F	0000
17	3Ith> Alm	9488	0x03 0x06 or 0x10	( R ) ( W )	0000 – 000F	0000
18	3Ith> Tr	9489	0x03 0x06 or 0x10	( R ) ( W )	0000 – 000F	0000
19	3Ith>BlkCl	9490	0x03 0x06 or 0x10	( R ) ( W )	0000 – 000F	0000
20	RESERVED	9491	--	--	--	0000
21	RESERVED	9492	--	--	--	0000
22	RESERVED	9493	--	--	--	0000
23	I2/I1> Start	9494	0x03 0x06 or 0x10	( R ) ( W )	0000 – 000F	0000
24	I2/I1> Trip	9495	0x03 0x06 or 0x10	( R ) ( W )	0000 – 000F	0000
25	I2> Start	9496	0x03 0x06 or 0x10	( R ) ( W )	0000 – 000F	0000
26	I2> Trip	9497	0x03 0x06 or 0x10	( R ) ( W )	0000 – 000F	0000
27	RESERVED	9498	--	--	--	0000
28	RESERVED	9499	--	--	--	0000
29	RESERVED	9500	--	--	--	0000
30	RESERVED	9501	--	--	--	0000
31	BF Stage1	9502	0x03 0x06 or 0x10	( R ) ( W )	0000 – 000F	0000

Table 77: ON Time Delay Timer Configuration parameters , continue

Sr. No.	Parameter description	Modbus Address	Function code	Read / Write	Range Values in [HEX]	Default value
32	BF Stage2	9503	0x03 0x06 or 0x10	( R ) ( W )	0000 – 000F	0000
33	BF RecTrip	9504	0x03 0x06 or 0x10	( R ) ( W )	0000 – 000F	0000
34	O-> I Close	9505	0x03 0x06 or 0x10	( R ) ( W )	0000 – 000F	0000
35	O-> I In Progress	9506	0x03 0x06 or 0x10	( R ) ( W )	0000 – 000F	0000
36	O-> I Final Trip	9507	0x03 0x06 or 0x10	( R ) ( W )	0000 – 000F	0000
37	O-> I Blocked	9508	0x03 0x06 or 0x10	( R ) ( W )	0000 – 000F	0000
38	BinInput_1	9509	0x03 0x06 or 0x10	( R ) ( W )	0000 – 000F	0000
39	BinInput_2	9510	0x03 0x06 or 0x10	( R ) ( W )	0000 – 000F	0000
40	BinInput_3	9511	0x03 0x06 or 0x10	( R ) ( W )	0000 – 000F	0000
41	BinInput_4	9512	0x03 0x06 or 0x10	( R ) ( W )	0000 – 000F	0000
42	CB Open Cmd	9513	0x03 0x06 or 0x10	( R ) ( W )	0000 – 000F	0000
43	CB Cls Cmd	9514	0x03 0x06 or 0x10	( R ) ( W )	0000 – 000F	0000
44	TCS Fault	9515	0x03 0x06 or 0x10	( R ) ( W )	0000 – 000F	0000
45	Unit Rdy	9516	0x03 0x06 or 0x10	( R ) ( W )	0000 – 000F	0000
46	L1 Fualt	9517	0x03 0x06 or 0x10	( R ) ( W )	0000 – 000F	0000
47	L2 Fault	9518	0x03 0x06 or 0x10	( R ) ( W )	0000 – 000F	0000
48	L3 Fault	9519	0x03 0x06 or 0x10	( R ) ( W )	0000 – 000F	0000

## IED specific implementation

*Table 78: ON Time Delay Timer Configuration parameters , continue*

Sr. No.	Parameter description	Modbus Address	Function code	Read / Write	Range Values in [HEX]	Default value
49	AND 1_Out	9520	0x03 0x06 or 0x10	( R ) ( W )	0000 – 000F	0000
50	AND 2_Out	9521	0x03 0x06 or 0x10	( R ) ( W )	0000 – 000F	0000
51	AND 3_Out	9522	0x03 0x06 or 0x10	( R ) ( W )	0000 – 000F	0000
52	OR 1_Out	9523	0x03 0x06 or 0x10	( R ) ( W )	0000 – 000F	0000
53	OR 2_Out	9524	0x03 0x06 or 0x10	( R ) ( W )	0000 – 000F	0000
54	NOT 1_Out	9525	0x03 0x06 or 0x10	( R ) ( W )	0000 – 000F	0000
55	NOT 2_Out	9526	0x03 0x06 or 0x10	( R ) ( W )	0000 – 000F	0000
56	NOT 3_Out	9527	0x03 0x06 or 0x10	( R ) ( W )	0000 – 000F	0000
57	NOT 4_Out	9528	0x03 0x06 or 0x10	( R ) ( W )	0000 – 000F	0000
58	TONDelay1	9529	0x03 0x06 or 0x10	( R ) ( W )	0000 – 000F	0000
59	TONDelay2	9530	0x03 0x06 or 0x10	( R ) ( W )	0000 – 000F	0000
60	TONDelay3	9531	0x03 0x06 or 0x10	( R ) ( W )	0000 – 000F	0000
61	TONDelay4	9532	0x03 0x06 or 0x10	( R ) ( W )	0000 – 000F	0000
62	TOFFDelay1	9533	0x03 0x06 or 0x10	( R ) ( W )	0000 – 000F	0000
63	TOFFDelay2	9534	0x03 0x06 or 0x10	( R ) ( W )	0000 – 000F	0000

Refer below table for Data Value Description

Data Value	TON - 4	TON - 3	TON - 2	TON - 1	Description
0x0000	0	0	0	0	Signal not mapped on any of the ON Delay Timer
0x0001	0	0	0	1	Signal mapped on 'ON Delay Timer -1'
0x0002	0	0	1	0	Signal mapped on 'ON Delay Timer - 2'
0x0008	1	0	0	0	Signal mapped on 'ON Delay Timer - 4'
0x000F	1	1	1	1	Signal mapped on all 4 ON Delay Timers



TON configuration parameters can be read with variable data length and starting address, within the range of TON addresses. TON configuration parameters can be written with data length one.



Only one signal can be connected to the input of a particular ON Delay Timer.



The output of the same ON Delay Timer can not be connected to its own input.

## 2.5.13 OFF Time Delay Timer Configuration parameters

*Table 79: OFF Time Delay Timer Configuration parameters*

Sr. No.	Parameter description	Modbus Address	Function code	Read / Write	Range Values in [HEX]	Default value
1	TOFF1 Event Enable	9552	0x03 0x06 or 0x10	( R ) ( W )	0000 – 0001	0000
2	TOFF2 Event Enable	9553	0x03 0x06 or 0x10	( R ) ( W )	0000 – 0001	0000
3	RESERVED	9554	--	--	--	0000
4	RESERVED	9555	--	--	--	0000
5	RESERVED	9556	--	--	--	0000
6	RESERVED	9557	--	--	--	0000
7	I> Start	9558	0x03 0x06 or 0x10	( R ) ( W )	0000 – 0003	0000
8	I>Trip	9559	0x03 0x06 or 0x10	( R ) ( W )	0000 – 0003	0000
9	I>> Start	9560	0x03 0x06 or 0x10	( R ) ( W )	0000 – 0003	0000
10	I>> Trip	9561	0x03 0x06 or 0x10	( R ) ( W )	0000 – 0003	0000

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*Table 80: OFF Time Delay Timer Configuration parameters, continue*

Sr. No.	Parameter description	Modbus Address	Function code	Read / Write	Range Values in [HEX]	Default value
11	I>> Start	9562	0x03 0x06 or 0x10	( R ) ( W )	0000 – 0003	0000
12	I>> Trip	9563	0x03 0x06 or 0x10	( R ) ( W )	0000 – 0003	0000
13	I0> Start	9564	0x03 0x06 or 0x10	( R ) ( W )	0000 – 0003	0000
14	I0> Trip	9565	0x03 0x06 or 0x10	( R ) ( W )	0000 – 0003	0000
15	I0>> Start	9566	0x03 0x06 or 0x10	( R ) ( W )	0000 – 0003	0000
16	I0>> Trip	9567	0x03 0x06 or 0x10	( R ) ( W )	0000 – 0003	0000
17	3Ith> Alm	9568	0x03 0x06 or 0x10	( R ) ( W )	0000 – 0003	0000
18	3Ith> Tr	9569	0x03 0x06 or 0x10	( R ) ( W )	0000 – 0003	0000
19	3Ith>BlkCl	9570	0x03 0x06 or 0x10	( R ) ( W )	0000 – 0003	0000
20	RESERVED	9571	--	--	--	0000
21	RESERVED	9572	--	--	--	0000
22	RESERVED	9573	--	--	--	0000
23	I2/I1> Start	9574	0x03 0x06 or 0x10	( R ) ( W )	0000 – 0003	0000
24	I2/I1> Trip	9575	0x03 0x06 or 0x10	( R ) ( W )	0000 – 0003	0000
25	I2> Start	9576	0x03 0x06 or 0x10	( R ) ( W )	0000 – 0003	0000
26	I2> Trip	9577	0x03 0x06 or 0x10	( R ) ( W )	0000 – 0003	0000
27	RESERVED	9578	--	--	--	0000
28	RESERVED	9579	--	--	--	0000
29	RESERVED	9580	--	--	--	0000
30	RESERVED	9581	--	--	--	0000

*Table 81: OFF Time Delay Timer Configuration parameters, continue*

Sr. No.	Parameter description	Modbus Address	Function code	Read / Write	Range Values in [HEX]	Default value
31	BF Stage1	9582	0x03 0x06 or 0x10	( R ) ( W )	0000 – 0003	0000
32	BF Stage2	9583	0x03 0x06 or 0x10	( R ) ( W )	0000 – 0003	0000
33	BF RecTrip	9584	0x03 0x06 or 0x10	( R ) ( W )	0000 – 0003	0000
34	O-> I Close	9585	0x03 0x06 or 0x10	( R ) ( W )	0000 – 0003	0000
35	O-> I In Progress	9586	0x03 0x06 or 0x10	( R ) ( W )	0000 – 0003	0000
36	O-> I Final Trip	9587	0x03 0x06 or 0x10	( R ) ( W )	0000 – 0003	0000
37	O-> I Blocked	9588	0x03 0x06 or 0x10	( R ) ( W )	0000 – 0003	0000
38	BinInput_1	9589	0x03 0x06 or 0x10	( R ) ( W )	0000 – 0003	0000
39	BinInput_2	9590	0x03 0x06 or 0x10	( R ) ( W )	0000 – 0003	0000
40	BinInput_3	9591	0x03 0x06 or 0x10	( R ) ( W )	0000 – 0003	0000
41	BinInput_4	9592	0x03 0x06 or 0x10	( R ) ( W )	0000 – 0003	0000
42	CB Open Cmd	9593	0x03 0x06 or 0x10	( R ) ( W )	0000 – 0003	0000
43	CB Cls Cmd	9594	0x03 0x06 or 0x10	( R ) ( W )	0000 – 0003	0000
44	TCS Fault	9595	0x03 0x06 or 0x10	( R ) ( W )	0000 – 0003	0000
45	Unit Rdty	9596	0x03 0x06 or 0x10	( R ) ( W )	0000 – 0003	0000
46	L1 Fault	9597	0x03 0x06 or 0x10	( R ) ( W )	0000 – 0003	0000
47	L2 Fault	9598	0x03 0x06 or 0x10	( R ) ( W )	0000 – 0003	0000

## IED specific implementation

*Table 82: OFF Time Delay Timer Configuration parameters, continue*

Sr. No.	Parameter description	Modbus Address	Function code	Read / Write	Range Values in [HEX]	Default value
48	L3 Fault	9599	0x03 0x06 or 0x10	( R ) ( W )	0000 – 0003	0000
49	AND 1_Out	9600	0x03 0x06 or 0x10	( R ) ( W )	0000 – 0003	0000
50	AND 2_Out	9601	0x03 0x06 or 0x10	( R ) ( W )	0000 – 0003	0000
51	AND 3_Out	9602	0x03 0x06 or 0x10	( R ) ( W )	0000 – 0003	0000
52	OR 1_Out	9603	0x03 0x06 or 0x10	( R ) ( W )	0000 – 0003	0000
53	OR 2_Out	9604	0x03 0x06 or 0x10	( R ) ( W )	0000 – 0003	0000
54	NOT 1_Out	9605	0x03 0x06 or 0x10	( R ) ( W )	0000 – 0003	0000
55	NOT 2_Out	9606	0x03 0x06 or 0x10	( R ) ( W )	0000 – 0003	0000
56	NOT 3_Out	9607	0x03 0x06 or 0x10	( R ) ( W )	0000 – 0003	0000
57	NOT 4_Out	9608	0x03 0x06 or 0x10	( R ) ( W )	0000 – 0003	0000
58	TONDelay1	9609	0x03 0x06 or 0x10	( R ) ( W )	0000 – 0003	0000
59	TONDelay2	9610	0x03 0x06 or 0x10	( R ) ( W )	0000 – 0003	0000
60	TONDelay3	9611	0x03 0x06 or 0x10	( R ) ( W )	0000 – 0003	0000
61	TONDelay4	9612	0x03 0x06 or 0x10	( R ) ( W )	0000 – 0003	0000
62	TOFFDelay1	9613	0x03 0x06 or 0x10	( R ) ( W )	0000 – 0003	0000
63	TOFFDelay2	9614	0x03 0x06 or 0x10	( R ) ( W )	0000 – 0003	0000

Refer below table for Data Value Description

Data Value	TOFF - 2	TOFF - 1	Description
0x0000	0	0	Signal not mapped on any of the OFF delay Timer
0x0001	0	1	Signal mapped on 'OFF Delay Timer -1'
0x0002	1	0	Signal mapped on 'OFF Delay Timer - 2'
0x0003	1	1	Signal mapped on both OFF Delay Timers



TOFF configuration parameters can be read with variable data length and starting address, within the range of TOFF addresses. TOFF configuration parameters can be written with data length one.



Only one signal can be connected to the input of a particular OFF Delay Timer.



The output of the same OFF Delay Timer can not be connected to its own input.

## 2.5.14 Relay Configuration parameters

*Table 83: Relay Configuration parameters*

Sr. No.	Parameter description	Modbus old Address	Modbus New Address	Function code	Read / Write ***	Range Value in [HEX] (value in decimal for reference)	Default value
1	Application configuration	-	4861	0x03	( R )	0001 = "A" 0002 = "B" 0003 = "C" 0004 = "D" 0005 = "E"	-
2	Base Board Software Version	-	4862	0x03	( R )	0000-270F (0 – 9999)	02.20
3	Base Board Software Sub Version	-	4863	0x03	( R )	0000-0063 (0-99)	00
4	Model Type	32	4864	0x03	( R )	0=CEI 0-16 1= IEC	1
5	Nominal Current	33*	4865	0x03	( R )	For 250 A Sensor Type: 0000=40A 0001=80A 0002=250A 0003=1250A For 80 A Sensor Type: 0000=12.8A 0001=25.6A 0002=80A 0003=400A	-
				0x06 or 0x10	( W )		
6	Product Name	34	4866	0x03	( R )	0000= REF 0001= REJ	-

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*Table 84: Relay Configuration parameters, continue*

Sr. No.	Parameter description	Modbus old Address	Modbus New Address	Function code	Read / Write ***	Range Value in [HEX] (value in decimal for reference)	Default value
7	Earth Type(I0 Measurement)	35	4867	0x03	( R )	0000 = Internal Calculation 0001= External Measurement	-
				0x06 or 0x10	( W )		
8	Base Board Software Version	36	4868	0x03	( R )	0000-270F (0 – 9999)	-
9	Phase Trip counter	37	4869	0x03	( R )	0000-270F (0 – 9999)	-
10	Earth Trip counter	38	4870	0x03	( R )	0000-270F (0 – 9999)	-
11	Frequency	39	4871	0x03	( R )	0000= 50 Hz 0001 = 60 Hz	-
				0x06 or 0x10	( W )		
12	Comm. Board Software Version	40	4872	0x03	( R )	0000-270F (0 – 9999)	-
13	Comm. Board Software Sub Version	41	4873	0x03	( R )	0000-0063 (0-99)	-
14	TCS Operating Time (in Second)	42	4874	0x03	( R )	0001 – 012C (1-300)	-
				0x06 or 0x10	( W )		
15	Reserved	43	4875	-	-	-	-
16	TCS Block/Unblock	44	4876	0x03	( R )	0000=TCS Unblock 0001=TCS Block	-
				0x06 or 0x10	( W )		
17	Analogue Input type****	52	4884	0x03	( R )	0001=1A CT 0005=5A CT	0005
				0x06 or 0x10	( W )		
18	Phase CT primary	53**	4885	0x03	( R )	0014 – 270F (20-9999)	-
				0x06 or 0x10	( W )		
19	Earth CT secondary****	54	4886	0x03	( R )	0001=1A 0005=5A	0005
				0x06 or 0x10	( W )		
20	Earth CT primary	55	4887	0x03	( R )	0014 – 270F (20-9999)	-
				0x06 or 0x10	( W )		

Table 85: Relay Configuration parameters, continue

Sr. No.	Parameter description	Modbus old Address	Modbus New Address	Function code	Read / Write ***	Range Value in [HEX] (value in decimal for reference)	Default value
21	I>Block	-	4888	0x03 0x06 or 0x10	( R ) ( W )	0000 – 0010 ( 0 – 16 ) 0000 =No 0001=Yes 0002= OR1 Out 0003= OR2 Out 0004= AND1 Out 0005= AND2 Out 0006= AND3 Out 0007= NOT1 Out 0008= NOT2 Out 0009= NOT3 Out 000A= NOT4 Out 000B= TON Delay1 000C= TON Delay2 000D= TON Delay3 000E= TON Delay4 000F= TOFF Delay1 0010= TOFF Delay	0000
22	I>>Block	-	4889	0x03 0x06 or 0x10	( R ) ( W )	0000 – 0010 ( 0 – 16 ) 0000=No 0001=Yes 0002= OR1 Out 0003= OR2 Out 0004= AND1 Out 0005= AND2 Out 0006= AND3 Out 0007= NOT1 Out 0008= NOT2 Out 0009= NOT3 Out 000A= NOT4 Out 000B= TON Delay1 000C= TON Delay2 000D= TON Delay3 000E= TON Delay4 000F= TOFF Delay1 0010= TOFF Delay	0000
23	I>>>Block	-	4890	0x03 0x06 or 0x10	( R ) ( W )	0000 – 0010 ( 0 – 16 ) 0000=No 0001=Yes 0002= OR1 Out 0003= OR2 Out 0004= AND1 Out 0005= AND2 Out 0006= AND3 Out 0007= NOT1 Out 0008= NOT2 Out 0009= NOT3 Out 000A= NOT4 Out	0000

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*Table 86: Relay Configuration parameters, continue*

Sr. No.	Parameter description	Modbus old Address	Modbus New Address	Function code	Read / Write ***	Range Value in [HEX] (value in decimal for reference)	Default value
23	I>>Block	-	4890	0x03	( R )	000B= TON Delay1 000C= TON Delay2 000D= TON Delay3 000E= TON Delay4 000F= TOFF Delay1 0010= TOFF Delay2	0000
24	I0>Block	-	4891	0x03 0x06 or 0x10	( R ) ( W )	0000 – 0010 ( 0 – 16 ) 0000=No 0001=Yes 0002= OR1 Out 0003= OR2 Out 0004= AND1 Out 0005= AND2 Out 0006= AND3 Out 0007= NOT1 Out 0008= NOT2 Out 0009= NOT3 Out 000A= NOT4 Out 000B= TON Delay1 000C= TON Delay2 000D= TON Delay3 000E= TON Delay4 000F= TOFF Delay1 0010= TOFF Delay	0000
25	I0>>Block	-	4892	0x03 0x06 or 0x10	( R ) ( W )	0000 – 0010 ( 0 – 16 ) 0000=No 0001=Yes 0002= OR1 Out 0003= OR2 Out 0004= AND1 Out 0005= AND2 Out 0006= AND3 Out 0007= NOT1 Out 0008= NOT2 Out 0009= NOT3 Out 000A= NOT4 Out 000B= TON Delay1 000C= TON Delay2 000D= TON Delay3 000E= TON Delay4 000F= TOFF Delay1 0010= TOFF Delay	0000

Table 87: Relay Configuration parameters, continue

Sr. No.	Parameter description	Modbus old Address	Modbus New Address	Function code	Read / Write ***	Range Value in [HEX] (value in decimal for reference)	Default value
26	I2>Block	-	4893	0x03 0x06 or 0x10	( R ) ( W )	0000 – 0010 ( 0 – 16 ) 0000=No 0001=Yes 0002= OR1 Out 0003= OR2 Out 0004= AND1 Out 0005= AND2 Out 0006= AND3 Out 0007= NOT1 Out 0008= NOT2 Out 0009= NOT3 Out 000A= NOT4 Out 000B= TON Delay1 000C= TON Delay2 000D= TON Delay3 000E= TON Delay4 000F= TOFF Delay1 0010= TOFF Delay	0000
27	I2/I1>Block	-	4894	0x03 0x06 or 0x10	( R ) ( W )	0000 – 0010 ( 0 – 16 ) 0000=No 0001=Yes 0002= OR1 Out 0003= OR2 Out 0004= AND1 Out 0005= AND2 Out 0006= AND3 Out 0007= NOT1 Out 0008= NOT2 Out 0009= NOT3 Out 000A= NOT4 Out 000B= TON Delay1 000C= TON Delay2 000D= TON Delay3 000E= TON Delay4 000F= TOFF Delay1 0010= TOFF Delay	0000
28	BF Blocking	-	4895	0x03 0x06 or 0x10	( R ) ( W )	0000 – 0010 ( 0 – 16 ) 0000=No 0001=Yes 0002= OR1 Out 0003= OR2 Out 0004= AND1 Out 0005= AND2 Out 0006= AND3 Out 0007= NOT1 Out 0008= NOT2 Out 0009= NOT3 Out 000A= NOT4 Out	0000

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*Table 88: Relay Configuration parameters, continue*

Sr. No.	Parameter description	Modbus old Address	Modbus New Address	Function code	Read / Write ***	Range Value in [HEX] (value in decimal for reference)	Default value
28	BF Blocking	-	4895	0x03	( R )	000B= TON Delay1 000C= TON Delay2 000D= TON Delay3 000E= TON Delay4 000F= TOFF Delay1 0010= TOFF Delay	0000
				0x06 or 0x10	( W )		
29	3I>/I0 – I>Trigger	-	4896	0x03	( R )	0000>No 0001=Yes	0000
				0x06 or 0x10	( W )		
30	3I>/I0 – I>> Trigger	-	4897	0x03	( R )	0000>No 0001=Yes	0000
				0x06 or 0x10	( W )		
31	3I>/I0 – I>>> Trigger	-	4898	0x03	( R )	0000>No 0001=Yes	0000
				0x06 or 0x10	( W )		
32	3I>/I0 – I0> Trigger	-	4899	0x03	( R )	0000>No 0001=Yes	0000
				0x06 or 0x10	( W )		
33	3I>/I0 – I0>> Trigger	-	4900	0x03	( R )	0000>No 0001=Yes	0000
				0x06 or 0x10	( W )		
34	Thermal Protection Block	-	4901	0x03	( R )	0000 – 0010 ( 0 – 16 ) 0000>No 0001=Yes 0002= OR1 Out 0003= OR2 Out 0004= AND1 Out 0005= AND2 Out 0006= AND3 Out 0007= NOT1 Out 0008= NOT2 Out 0009= NOT3 Out 000A= NOT4 Out 000B= TON Delay1 000C= TON Delay2 000D= TON Delay3 000E= TON Delay4 000F= TOFF Delay1 0010= TOFF Delay	0000
				0x06 or 0x10	( W )		
				0x06 or 0x10	( W )		
39	RT Count Value	-	4906	0x03	( R )	0000-FFFF (0 – 65535)	0000
				0x06 or 0x10	( W )		
40	Base Ib	-	4907	0x03	( R )	0014-270F (20 – 9999)	1000
				0x06 or 0x10	( W )		
41	TON Delay1 configuration	-	4908	0x03 0x06 or 0x10	( R ) _____ ( W )	( 0 – EA60) 0 – 60000 ms	0
42	TON Delay2 configuration	-	4909	0x03 0x06 or 0x10	( R ) _____ ( W )	( 0 – EA60) 0 – 60000 ms	0

Table 89: Relay Configuration parameters, continue

Sr. No.	Parameter description	Modbus old Address	Modbus New Address	Function code	Read / Write ***	Range Value in [HEX] (value in decimal for reference)	Default value
43	TON Delay3 configuration	-	4910	0x03 0x06 or 0x10	( R ) _____ ( W )	( 0 – EA60) 0 – 60000 ms	0
44	TON Delay4 configuration	-	4911	0x03 0x06 or 0x10	( R ) _____ ( W )	( 0 – EA60) 0 – 60000 ms	0
45	TOFF Delay1 configuration	-	4912	0x03 0x06 or 0x10	( R ) _____ ( W )	( 0 – EA60) 0 – 60000 ms	0
46	TOFF Delay2 configuration	-	4913	0x03 0x06 or 0x10	( R ) _____ ( W )	( 0 – EA60) 0 – 60000 ms	0

\* address 33 (0x0021) is applicable to SENSOR variant only. In case of CT variant Illegal Data Address Exception Code (0x02) will be generated.

\*\* Data value range of address 53 is applicable to CT variant only. In case of SENSOR variant 80 and 250 only will be Data Value



.\*\*\* “COM Admin Level” in IED must be “YES” for Relay Configuration Write.

\*\*\*\* Analog input type as well as Earth secondary can be written only in case of Analog inputs and outputs selection – F4 (1A/5A).

## 2.5.15

### Event log to address mapping

Table 90: Event log to address mapping

Sr. No.	Parameter	Parameter description	Modbus Address	Function code	Read / Write	Comments
1	Event1	Event type and sub-type*	768	0x04	( R )	Latest Event
2		DD/MM/	769	0x04	( R )	
3		YY:HH/	770	0x04	( R )	
4		MM/SS:	771	0x04	( R )	
5		mSec	772	0x04	( R )	
6		Reserved	773	0x04	( R )	
7		Reserved	774	0x04	( R )	
8		Reserved	775	0x04	( R )	

## IED specific implementation

**Table 91:** Event log to address mapping, continue

Sr. No.	Parameter	Parameter description	Modbus Address	Function code	Read / Write	Comments
9	Event 2 to 99	Event type and sub-type*	776 to 1552	0x04	( R )	
10		DD/MM/	777 to 1553	0x04	( R )	
11		YY:HH/	778 to 1554	0x04	( R )	
12		MM/SS:	779 to 1555	0x04	( R )	
13		mSec	780 to 1556	0x04	( R )	
14		Reserved	781 to 1557	0x04	( R )	
15		Reserved	782 to 1558	0x04	( R )	
16		Reserved	783 to 1559	0x04	( R )	
17	Event 100	Event type and sub-type*	1560	0x04	( R )	
18		DD/MM/	1561	0x04	( R )	
19		YY:HH/	1562	0x04	( R )	
20		MM/SS:	1563	0x04	( R )	
21		mSec	1564	0x04	( R )	
22		Reserved	1565	0x04	( R )	
23		Reserved	1566	0x04	( R )	
24		Reserved	1567	0x04	( R )	



Each Event Log from Event 1 to Event 100 contains the Event type and Sub-Type with Time stamp (DD/MM/YY and HH/MM/SS/mSec) at the time of event, as shown in the following table. \*For Event type and sub type see below table.

**Table 92:** Event log data – Event Type and Sub-Type description

Event Type	Event – Event Sub Type
EMPTY	00 – 00
Breaker Open	01 – 00 to 01 - 01
Breaker Close	02 – 00 to 02 – 01
Reset	03 – 00
Remote Trip	04 – 00
IRF	05 – 01 to 05-128*
Unit Ready	06 – 00
Setting I>	08 – 01
Setting t>	08 – 02
Event Type	Event – Event Sub Type
Setting I>>	08 – 03
Setting t>>	08 – 04
Setting I>>>	08 – 05
Setting t>>>	08 – 06
Setting I0>	08 – 07
Setting t0>	08 – 08
Setting I0>>	08 – 09
Setting t0>>	08 – 10
Setting I2>	08 – 11
Setting tI2>	08 – 12
Setting I2/I1>	08 – 13
Setting tI2/I1>	08 – 14

**Table 93: Event log data – Event Type and Sub-Type description, continue**

Event Type	Event – Event Sub Type
Setting 3Ith>F0	08 – 15
Setting 3Ith>lb	08 – 16
Setting 3Ith>t^	08 – 17
Setting 3Ith>tds	08 – 18
Setting 3Ith>tdr	08 – 19
Setting 3Ith>Falm	08 – 20
Setting 3Ith>Ftrp	08 – 21
Setting 3Ith>Fstrinhibit	08 – 22
Setting 3Ith>FEM	08 – 23
Setting 3Ith>Mode	08 – 24
Setting 3Ith>Mode FpowerOFF	08 – 25
Setting 3I>/I0>BF lcbfp	08 – 26
Setting 3I>/I0>BF I0cbfp	08 – 27
Setting 3I>/I0>BF t Retrip	08 – 28
Setting 3I>/I0>BF t Backup	08 – 29
Setting O→I Str Mode	08 – 30
Setting O→I CB Ready	08 – 31
Setting O→I # of Cycle	08 – 32
Setting O→I Pulse tp	08 – 33
Setting O→I Cyclt1	08 – 34
Setting O→I Cyclt2	08 – 35
Setting O→I Cyclt3	08 – 36
Setting O→I Cyclt4	08 – 37
Setting O→I Reclaim tr	08 – 38
Setting O→I Block tb	08 – 39
Setting O→I Activate t	08 – 40
Setting SG No.	08 – 41
Setting SG Act.	08 – 42
Setting SG Edt.	08 – 43
Setting SG Act.	08 – 44
Setting I start>	08 – 45
Setting Istartup	08 – 46
Setting tstartup	08 – 47
Setting t LokRot	08 – 48
Setting Max Strt	08 – 49
Setting tn	08 – 50
Setting Rst 68M	08 – 51
Setting 3I<	08 – 52
Setting t3I<	08 – 53
Setting I2R>	08 – 54
Setting tI2R>	08 – 55
TCS fault↑	10 – 00
Memory Read Fail	11 – 00
External Block Activation	16 – 00
CB Open Position	17 – 00
CB Close Position	18 – 00
CB Maintenance↑	19 – 00

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**Table 94:** Event log data – Event Type and Sub-Type description, continue

Event Type	Event – Event Sub Type
Hardware Test	20 – 00
BO Test	21 – 00
Functional Test	22 – 00
Power Off	23 – 00
BI1 Activation	24 – 00
BI1 Deactivation	25 – 00
BI2 Activation	26 – 00
BI2 Deactivation	27 – 00
BI3 Activation	28 – 00
BI3 Deactivation	29 – 00
BI4 Activation	30 – 00
BI4 Deactivation	31 – 00
Count value	32 – 00
Start I2>↑	33 – 00
Start I2>↓	34 – 00
Trip I2>↑	35 – 00
Trip I2>↓	36 – 00
Start I2/I1>↑	37 – 00
Start I2/I1>↓	38 – 00
Trip I2/I1>↑	39 – 00
Trip I2/I1>↓	40 – 00
3Ith>Alarm ↑	41 – 00
3Ith>Alarm ↓	42 – 00
3Ith>Trip ↑	43 – 00
3Ith>Trip ↓	44 – 00
3Ith>Blk Cls ↑	45 – 00
3Ith>Blk Cls ↓	46 – 00
BF Stage1 ↑	47 – 00
BF Stage1 ↓	48 – 00
BF Stage2 ↑	49 – 00
BF Stage2 ↓	50 – 00
BF RecTrip BO ↑	51 – 00
BF RecTrip BO ↓	52 – 00
BF RecTrip BI ↑	53 – 00
O→I Started ↑	54 – 00
O→I Stopped ↑	55 – 00
O→I FinalTrt	56 – 00
O→I close1 ↑	57 – 00
O→I close2 ↑	58 – 00
O→I close3 ↑	59 – 00
O→I close4 ↑	60 – 00
O→I Blocked ↑	61 – 00
O→I Blocked ↓	62 – 00
TCS fault ↓	63 – 00
Start I>>>↑	64 – 01
Start I>>↑	64 – 02
Start I>↑	64 – 03
Start I0>>↑	64 – 04
Start I0>↑	64 – 05

**Table 95: Event log data – Event Type and Sub-Type description, continue**

Event Type	Event – Event Sub Type
Start I>>>↓	65 – 01
Start I>>↓	65 – 02
Start I>↓	65 – 03
Start IO>>↓	65 – 04
Start IO>↓	65 – 05
Trip I>>>↑	66 – 01
Trip I>>↑	66 – 02
Trip I>↑	66 – 03
Trip IO>>↑	66 – 04
Trip IO>↑	66 – 05
Trip I>>>↓	67 – 01
Trip I>>↓	67 – 02
Trip I>↓	67 – 03
Trip IO>>↓	67 – 04
Trip IO>↓	67 – 05
External Block Deactivation	68 – 00
CB POS OPN↓	69 – 00
CB POS CLS↓	70 – 00
CB Maintenance↓	71 – 00
Start↑	72 – 00
Start↓	73 – 00
Trip↑	74 – 00
Trip↓	75 – 00
Factory Default	76 – 00
Emergency Start	77 – 00
Motor Start ↑	78 – 00
Motor Start ↓	79 – 00
Stall Trip ↑	80 – 00
Stall Trip ↓	81 – 00
Trip I2t ↑	82 – 00
Trip I2t ↓	83 – 00
Blk Cls I2tn< ↑	84 – 00
Blk Cls I2tn< ↓	85 – 00
OPTS Value	86 – 00
Trip 3I< ↑	87 – 00
Trip 3I< ↓	88 – 00
Start I2R>↑	89 – 00
Start I2R>↓	90 – 00
Trip I2R>↑	91 – 00
Trip I2R>↓	92 – 00
Phase L1 fault	93 -- 01
Phase L2 fault	93 -- 02
Phase L12 fault	93 -- 03
Phase L3 fault	93 -- 04
Phase L13 fault	93 -- 05
Phase L23 fault	93 -- 06
Phase L123 fault	93 -- 07
TONDelay1 Out ↑	94 - 00
TONDelay1 Out ↓	95 - 00

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**Table 96:** Event log data – Event Type and Sub-Type description, continue

Event Type	Event – Event Sub Type
TONDelay2 Out ↑	96 – 00
TONDelay2 Out ↓	97 – 00
TONDelay3 Out ↑	98 – 00
TONDelay3 Out ↓	99 – 00
TONDelay4 Out ↑	100 – 00
TONDelay4 Out ↓	101 – 00
TOFFDelay1 Out ↑	102 – 00
TOFFDelay1 Out ↓	103 – 00
TOFFDelay2 Out ↑	104 – 00
TOFFDelay2 Out ↓	105 – 00
AND1 Out ↑	106 – 00
AND1 Out ↓	107 – 00
AND2 Out ↑	108 – 00
AND2 Out ↓	109 – 00
AND3 Out ↑	110 – 00
AND3 Out ↓	111 – 00
OR1 Out ↑	112 – 00
OR1 Out ↓	113 – 00
OR2 Out ↑	114 – 00
OR2 Out ↓	115 – 00
NOT1 Out ↑	116 – 00
NOT1 Out ↓	117 – 00
NOT2 Out ↑	118 – 00
NOT2 Out ↓	119 – 00
NOT3 Out ↑	120 – 00
NOT3 Out ↓	121 – 00
NOT4 Out ↑	122 – 00
NOT4 Out ↓	123 – 00
I> Block ↑	124 – 01
I>> Block ↑	124 – 02
I>> Block ↑	124 – 03
I0> Block ↑	124 – 04
I0>> Block ↑	124 – 05
3Ith> Block ↑	124 – 06
I2/I1> Block ↑	124 – 09
I2> Block ↑	124 – 10
BF Block ↑	124 – 13
Remote Ctrl Block ↑	124 – 14
I> Block ↓	125 – 01
I>> Block ↓	125 – 02
I>> Block ↓	125 – 03
I0> Block ↓	125 – 04
I0>> Block ↓	125 – 05
3Ith> Block ↓	125 – 06
I2/I1> Block ↓	125 – 09
I2> Block ↓	125 – 10
BF Block ↓	125 – 13
Remote Ctrl Block ↓	125 – 14

\* Sub-Type of Event IRF is briefly explained in below table.

The Event Type and Sub-Type is a 2 byte field. Bit positions 0 - 7 form the byte 1 for Event Type and bit position 8 - 15 forms byte 2 for Event Sub-Type. For e.g. in case of IRF, the event type and sub type shall follow as explained below:

**Table 97: Byte 1: Event Type**

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	0	0	0	0	1	0	1

**Table 98: Byte 2: Event Sub-Type**

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	0	0	0	0	0	0	0

The description of each bit of Byte 2 is explained in the below table.

**Table 99: Event log – Sub-Type mapping for IRF**

Bit position	Value (1 = SET, 0 = CLEAR)	Description
0	0-1	Flash Faulty
1	0-1	Power On Ram Faulty
2	0-1	Run Time Ram Faulty
3	0-1	VC Check Fault
4	0-1	Power On EEPROM Faulty
5	0-1	Run Time EEPROM Faulty
6	0-1	Gain Check Fault
7	0-1	TRIP Fault

IRF 001: Flash Faulty.

IRF 064: Gain Check Fault.

IRF 005: Run Time Ram Faulty and Flash Faulty.

## 2.5.16 Fault Record log to address mapping

**Table 100: Fault Record log to address mapping**

Sr. No.	Parameter description	Modbus Address	Function code	Read / Write	Range	Default value
1	Fault Record 1	0000 - 0027	0x04	( R )	-	-
2	Fault Record 2	0028 - 0055	0x04	( R )	-	-
3	Fault Record 3	0056 - 0083	0x04	( R )	-	-
4	Fault Record 4	0084 - 0111	0x04	( R )	-	-
5	Fault Record 5	0112 - 0139	0x04	( R )	-	-



Each Fault Record contains 5 instances current values with 1 Pre-Start, Start along with Time Stamp, Trip along with Time Stamp and 2 Post-Trip values.



Fault Record can be read with variable data length and starting address, within the range of individual Fault Record addresses.

## IED specific implementation

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An example to read the above Record is as follows:

Example: Read Fault Record 1 (Address 0000 – 0027)

Address Range	Data Log Mapping	Description
0	Current I1 of 1st Value	Value at tstart – 100mSec
1	Current I2 of 1st Value	
2	Current I3 of 1st Value	
3	Current I0 of 1st Value	
4	Current I1 of 2nd Value	Value at tstart with Time Stamp
5	Current I2 of 2nd Value	
6	Current I3 of 2nd Value	
7	Current I0 of 2nd Value	
8	DD/MM/	
9	YY:HH/	
10	MM/SS:	
11	mSec	
12	Current I1 of 3rd Value	Value at ttrip withTime Stamp
13	Current I2 of 3rd Value	
14	Current I3 of 3rd Value	
15	Current I0 of 3rd Value	
16	DD/MM/	
17	YY:HH/	
18	MM/SS:	
19	mSec	
20	Current I1 of 4th Value	Value at ttrip + 80mSec
21	Current I2 of 4th Value	
22	Current I3 of 4th Value	
23	Current I0 of 4th Value	
24	Current I1 of 5th Value	Value at ttrip + 200mSec
25	Current I2 of 5th Value	
26	Current I3 of 5th Value	
27	Current I0 of 5th Value	

## Section 3

# Modbus diagnostics and Profile

### 3.1

## Modbus Diagnostics

Possible faults in:

### RS485

Are the termination resistors placed at the end of the line?

Is the line polarity correct? Are the lines swapped accidentally?

Is the maximum line length exceeded?

### Modbus Communication parameters

Is baud rate correctly set?

Are the parity and the stop bits correctly set?

Is the slave address correct?

Are there two devices with the same address in the system? If yes, fix it!

### Modbus master

Is the request to response timeout correct?

Is the Modbus silent interval between two telegrams > 3.5 character times?

Notice that the slave device will not give any response when it is addressed with a broadcast (slave address = 0).

### Modbus slave

- Does the device have a unique Modbus address (recommendation: shall be different than the factory default address (001))?
- Is the function code supported by the device?
- Does the request have a valid address?
- Does the request have a valid quantity of coils, inputs, and registers?
- Is the power supply turned on for the Relay unit?

## 3.2

**Appendix-A Modbus Profile Checklist***Table 101: Supported function codes*

Function Code Name	Function Code (HEX)	Supported
Read coil Status	01	Yes
Read Input Status	02	Yes
Read Holding Register	03	Yes
Read Input Registers	04	Yes
Force Single Coil	05	Yes
Preset Single Register	06	Yes
Read Exception Status	07	No
Diagnostics	08	Yes
Fetch Comm. Event Counter	0B	No
Fetch Comm. Event Log	0C	No
Force Multiple Coils	0F	No
Preset Multiple Registers	10	No
Report Slave ID	11	No
Read General Reference	14	No
Write General Reference	15	No
Mask Write 4x Register	16	No
Read/Write 4x Registers	17	No

*Table 102: Supported exception responses*

Exception Response	Function Code (HEX)	Supported
Illegal Function	01	Yes
Illegal Data address	02	Yes
Illegal Data Value	03	Yes
Slave Device Failure	04	No
Acknowledge	05	No
Slave Device Busy	06	Yes
Negative Acknowledge	07	No
Memory Parity Error	08	Yes

*Table 103: Supported data types*

Data Type	Supported
Digital input	Yes
Coil	Yes
Input register	Yes
Holding register	Yes
General reference	No
Name Supported	No

### 3.3

### Abbreviations

ASCII	American Standard Code for Information Interchange
CRC	Cyclic Redundancy Check
BI	Binary Input
BO	Binary Output
HMI	Human-machine interface
RTU	Remote Terminal Unit
TCS	Trip Circuit Supervision

### 3.4

### Appendix-B Reference Documents

REF601/REJ601 Application Manual

1MDU07230-YN A

REF601/REJ601 Product Guide

1MDB07221-YN A





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