Powering Business Worldwide

EDR-3000

Modbus® Register Maps

Version: 3.9

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1 Modbus Parameters

For the Modbus Protocol several parameters have to be set which are relevant for the communication between the control system (SCADA) and the device. The parameters and their setting possibilities or value ranges are shown in the tables below.

NOTICE!

The Parameters are described within the Reference Manual of the device (separate document).

1.1 Notes for the SCADA-System

When using Modbus RTU the following times have to be considered by the control system and are fixed within the device:

The dwell times (t_D) before start of a telegram must be set at least to 3.5 characters.

Examples:

- 3.5 characters 9600 Baud = 4 ms
- 3.5 characters 19200 Baud = 2 ms
- 3.5 characters 38400 Baud = 1 ms

Start of a new telegram is expected when the dwell time (t_D) is > 3.5 characters.

The fact that the probability of disruptions during transmission of a telegram increases with its length has to be taken into duly consideration and thus a query to the Slave should be possibly such that the response telegram is not much longer than 32 Bytes.

2 Specific Modbus Function Codes

For reading out data from the device or to carry out commands, the services listed in the table, also called »Function Codes«, are supported.

Function Code	Designation	Description
3	Read Holding Registers	There are single or several data words read as from a specific data word address. Only status addresses and parameter addresses can be read.
4	Read Input Registers	There are single or several data words read as from a specific data word address. Only measuring values can be read.
5	Write single Output (Bit)	All other values are illegal and will not affect the output. Via this function code acknowledgments can be executed as well as counters reseted or blockings set.
8	Loopback Test	Test function for the communication system.
16	Load Multiple Registers	There are single or several data words written as from a specific data word address.

On the following pages the Modbus functions are described in detail.

2.1 Function Code 3/4

Query

Slave address	3/4	Register address HI	Register address LO	Register number HI	Register number LO	Check-sum HI	Check-sum LO

Response

Slave address	3/4	Byte number	Register 0 HI	Register 0 LO	...	Check-sum HI	Check-sum LO

Register address (HI · 256 + LO) — The data word address from where reading should start.

Register number (HI · 256 + LO) — Number of data words to be read. Valid range: 1…125

Byte number — Number of subsequent Bytes containing data words.

Register — Data words read out of the device (Highbyte and Lowbyte).

2.2 Function Code 5

Query

Slave address	5	Register address HI	Register address LO	Register data HI	Register data LO	Check-sum HI	Check-sum LO

Response

Slave address	5	Register address HI	Register address LO	Register data HI	Register data LO	Check-sum HI	Check-sum LO

Register address (HI · 256 + LO) — Data word address to be written

Register data — Value of the data word to be written (High-byte and Low-byte).

Permitted value range:

- FF00 hex request for a single bit to be on: This often means to reset a counter, execute acknowledgments or set blockings signals.
- 0000 hex request for a single bit to be off: This often means to deactivate blocking signals or to reset single bits.

2.3 Function Code 8

Query

Slave address	8	Data Diag Code HI 0x00	Data Diag Code LO 0x00	Test data	Test data	Check-sum HI	Check-sum LO

Response

Slave address	8	Data Diag Code HI	Data Diag Code LO	Test data	Test data	Check-sum HI	Check-sum LO

Data Diag Code HI (high), Data Diag Code LO (Low) — Diagnostic Code (subfunction code of function code 8) for testing the communication system. The Diagnostic Code “Return Query Data” (0x00, 0x00) is being supported.

Test Data — By using the Diagnostic Code 0x00 0x00, the transmitted data is sent back to the Master unchanged.

2.4 Function Code 16

Query

Slave address	16	Register address HI	Register address LO	Register number HI	Register number LO	Byte number	Register 0 HI	Register 0 LO	…	Check-sum HI	Check-sum LO

Response

Slave address	16	Register address HI	Register address LO	Register number HI	Register number LO	Check-sum HI	Check-sum LO

Register address (HI · 256 + LO) — Data word address as from where writing should start.

Register number (HI · 256 + LO):

- Query: Number of data words to be written. Valid range: 1…123.
- Response: Number of data words written.

Byte number — Number of subsequent Bytes to contain data words.

Register — Data words read out of the device (High-byte and Low-byte).

2.5 Setting Date and Time

Date and time can be set by means of function code 16 and read with function code 3. If the device address 0 (broadcast address) is selected, the times of all devices connected to this bus are simultaneously reset.

NOTICE!

The devices do not respond to a broadcast command.

2.6 Supported MODBUS Error Messages

Exception Response Telegrams are described within the general “Modbus Application Protocol Specification". An exception response table with examples is shown there. The table below contains just the actually used codes. In case the device has recognized an error it will react in the following way:

Exception Code	Designation	Description
1	Illegal Function	The message received includes a function code which is not supported by the Slave.
2	Illegal Data Address	Access was sought on a data word address not included in the data module.
3	Illegal Data Value	The received message contains an invalid data structure (e. g. wrong number of data bytes).
4	Slave Device Failure	An unrecoverable error occurred while the server (or slave) was attempting to perform the requested action.

The response given by the *device* in case of a failure has the following format:

Slave Address	0x80 + Function Code	Exception Code	Check-sum HI	Check-sum LO

In the second Byte of the response the Function Code is sent with the highest Bit set to 1. This is equivalent to an addition by 0x80. The third Byte holds the Exception Code of the error message.

3 Appendix – Register Maps

3.1 Signals

Legend: (*) = These signals have to be acknowledged by the Scada System.

Module (ANSI / IEEE)	Name Function	Start Register Address	No. of Modbus Registers	Function code	Format	Bit Mask (Bit position)	Unit	Description
/SG1		**256**	**1**	**3**	**Struct**			
	CES SG removed	256	1	3	Bit	0x2 (2)	-	Signal: Command Execution Supervision: Switching Command unsuccessful, Switchgear removed.
46[1] – I.Unbalance		**82**	**1**	**3**	**Struct**			
	ExBlo1-I	82	1	3	Bit	0x1 (1)	-	Module Input State: External Blocking1
	ExBlo2-I	82	1	3	Bit	0x2 (2)	-	Module Input State: External Blocking2
	ExBlo TripCmd-I	82	1	3	Bit	0x4 (3)	-	Module Input State: External Blocking of the Trip Command
	Active	82	1	3	Bit	0x8 (4)	-	Signal: Active
	ExBlo	82	1	3	Bit	0x10 (5)	-	Signal: External Blocking
	Blo TripCmd	82	1	3	Bit	0x20 (6)	-	Signal: Trip Command blocked

Module (ANSI / IEEE)	Name Function	Start Register Address	No. of Modbus Registers	Function code	Format	Bit Mask (Bit position)	Unit	Description
	ExBlo TripCmd	82	1	3	Bit	0x40 (7)	-	Signal: External Blocking of the Trip Command
	Pickup	82	1	3	Bit	0x80 (8)	-	Signal: Pickup Negative Sequence
	Trip (*)	82	1	3	Bit	0x100 (9)	-	Signal: Trip
	TripCmd (*)	82	1	3	Bit	0x200 (10)	-	Signal: Trip Command
46[2] – I.Unbalance		**83**	**1**	**3**	**Struct**			
	ExBlo1-I	83	1	3	Bit	0x1 (1)	-	Module Input State: External Blocking1
	ExBlo2-I	83	1	3	Bit	0x2 (2)	-	Module Input State: External Blocking2
	ExBlo TripCmd-I	83	1	3	Bit	0x4 (3)	-	Module Input State: External Blocking of the Trip Command
	Active	83	1	3	Bit	0x8 (4)	-	Signal: Active
	ExBlo	83	1	3	Bit	0x10 (5)	-	Signal: External Blocking
	Blo TripCmd	83	1	3	Bit	0x20 (6)	-	Signal: Trip Command blocked

Module (ANSI / IEEE)	Name Function	Start Register Address	No. of Modbus Registers	Function code	Format	Bit Mask (Bit position)	Unit	Description
	ExBlo TripCmd	83	1	3	Bit	0x40 (7)	-	Signal: External Blocking of the Trip Command
	Pickup	83	1	3	Bit	0x80 (8)	-	Signal: Pickup Negative Sequence
	Trip (*)	83	1	3	Bit	0x100 (9)	-	Signal: Trip
	TripCmd (*)	83	1	3	Bit	0x200 (10)	-	Signal: Trip Command
50P[1] – Phase Inst. OC		**3**	**1**	**3**	**Struct**			
	ExBlo1-I	3	1	3	Bit	0x1 (1)	-	Module Input State: External Blocking1
	ExBlo2-I	3	1	3	Bit	0x2 (2)	-	Module Input State: External Blocking2
	ExBlo TripCmd-I	3	1	3	Bit	0x4 (3)	-	Module Input State: External Blocking of the Trip Command
	Rvs Blo-I	3	1	3	Bit	0x8 (4)	-	Module Input State: Reverse Blocking
	Active	3	1	3	Bit	0x10 (5)	-	Signal: Active
	ExBlo	3	1	3	Bit	0x20 (6)	-	Signal: External Blocking

Module (ANSI / IEEE)	Name Function	Start Register Address	No. of Modbus Registers	Function code	Format	Bit Mask (Bit position)	Unit	Description
	Rvs Blo	3	1	3	Bit	0x40 (7)	-	Signal: Reverse Blocking
	Blo TripCmd	3	1	3	Bit	0x80 (8)	-	Signal: Trip Command blocked
	ExBlo TripCmd	3	1	3	Bit	0x100 (9)	-	Signal: External Blocking of the Trip Command
	IH2 Blo	3	1	3	Bit	0x200 (10)	-	Signal: Blocking the trip command by IH2
50P[1] – Phase Inst. OC		**4**	**1**	**3**	**Struct**			
	Pickup IA	4	1	3	Bit	0x1 (1)	-	Signal: Pickup IA
	Pickup IB	4	1	3	Bit	0x2 (2)	-	Signal: Pickup IB
	Pickup IC	4	1	3	Bit	0x4 (3)	-	Signal: Pickup IC
	Pickup	4	1	3	Bit	0x8 (4)	-	Signal: Pickup
	Trip (*)	4	1	3	Bit	0x80 (8)	-	Signal: Trip
	TripCmd (*)	4	1	3	Bit	0x100 (9)	-	Signal: Trip Command

Module (ANSI / IEEE)	Name Function	Start Register Address	No. of Modbus Registers	Function code	Format	Bit Mask (Bit position)	Unit	Description
50P[2] – Phase Inst. OC		**5**	**1**	**3**	**Struct**			
	ExBlo1-I	5	1	3	Bit	0x1 (1)	-	Module Input State: External Blocking1
	ExBlo2-I	5	1	3	Bit	0x2 (2)	-	Module Input State: External Blocking2
	ExBlo TripCmd-I	5	1	3	Bit	0x4 (3)	-	Module Input State: External Blocking of the Trip Command
	Rvs Blo-I	5	1	3	Bit	0x8 (4)	-	Module Input State: Reverse Blocking
	Active	5	1	3	Bit	0x10 (5)	-	Signal: Active
	ExBlo	5	1	3	Bit	0x20 (6)	-	Signal: External Blocking
	Rvs Blo	5	1	3	Bit	0x40 (7)	-	Signal: Reverse Blocking
	Blo TripCmd	5	1	3	Bit	0x80 (8)	-	Signal: Trip Command blocked
	ExBlo TripCmd	5	1	3	Bit	0x100 (9)	-	Signal: External Blocking of the Trip Command
	IH2 Blo	5	1	3	Bit	0x200 (10)	-	Signal: Blocking the trip command by IH2

Module (ANSI / IEEE)	Name Function	Start Register Address	No. of Modbus Registers	Function code	Format	Bit Mask (Bit position)	Unit	Description
50P[2] – Phase Inst. OC		**6**	**1**	**3**	**Struct**			
	Pickup IA	6	1	3	Bit	0x1 (1)	-	Signal: Pickup IA
	Pickup IB	6	1	3	Bit	0x2 (2)	-	Signal: Pickup IB
	Pickup IC	6	1	3	Bit	0x4 (3)	-	Signal: Pickup IC
	Pickup	6	1	3	Bit	0x8 (4)	-	Signal: Pickup
	Trip (*)	6	1	3	Bit	0x80 (8)	-	Signal: Trip
	TripCmd (*)	6	1	3	Bit	0x100 (9)	-	Signal: Trip Command
50P[3] – Phase Inst. OC		**7**	**1**	**3**	**Struct**			
	ExBlo1-I	7	1	3	Bit	0x1 (1)	-	Module Input State: External Blocking1
	ExBlo2-I	7	1	3	Bit	0x2 (2)	-	Module Input State: External Blocking2
	ExBlo TripCmd-I	7	1	3	Bit	0x4 (3)	-	Module Input State: External Blocking of the Trip Command
	Rvs Blo-I	7	1	3	Bit	0x8	-	Module Input State: Reverse Blocking

Module (ANSI / IEEE)	Name Function	Start Register Address	No. of Modbus Registers	Function code	Format	Bit Mask (Bit position)	Unit	Description
						(4)		
	Active	7	1	3	Bit	0x10 (5)	-	Signal: Active
	ExBlo	7	1	3	Bit	0x20 (6)	-	Signal: External Blocking
	Rvs Blo	7	1	3	Bit	0x40 (7)	-	Signal: Reverse Blocking
	Blo TripCmd	7	1	3	Bit	0x80 (8)	-	Signal: Trip Command blocked
	ExBlo TripCmd	7	1	3	Bit	0x100 (9)	-	Signal: External Blocking of the Trip Command
	IH2 Blo	7	1	3	Bit	0x200 (10)	-	Signal: Blocking the trip command by IH2
50P[3] – Phase Inst. OC		**8**	**1**	**3**	**Struct**			
	Pickup IA	8	1	3	Bit	0x1 (1)	-	Signal: Pickup IA
	Pickup IB	8	1	3	Bit	0x2 (2)	-	Signal: Pickup IB
	Pickup IC	8	1	3	Bit	0x4 (3)	-	Signal: Pickup IC
	Pickup	8	1	3	Bit	0x8	-	Signal: Pickup

Module (ANSI / IEEE)	Name Function	Start Register Address	No. of Modbus Registers	Function code	Format	Bit Mask (Bit position)	Unit	Description
						(4)		
	Trip (*)	8	1	3	Bit	0x80 (8)	-	Signal: Trip
	TripCmd (*)	8	1	3	Bit	0x100 (9)	-	Signal: Trip Command
50R[1] – Residual Inst. OC		**61**	**1**	**3**	**Struct**			
	ExBlo1-I	61	1	3	Bit	0x1 (1)	-	Module Input State: External Blocking1
	ExBlo2-I	61	1	3	Bit	0x2 (2)	-	Module Input State: External Blocking2
	ExBlo TripCmd-I	61	1	3	Bit	0x4 (3)	-	Module Input State: External Blocking of the Trip Command
	Rvs Blo-I	61	1	3	Bit	0x8 (4)	-	Module Input State: Reverse Blocking
	Active	61	1	3	Bit	0x10 (5)	-	Signal: Active
	ExBlo	61	1	3	Bit	0x20 (6)	-	Signal: External Blocking
	Rvs Blo	61	1	3	Bit	0x40 (7)	-	Signal: Reverse Blocking
	Blo TripCmd	61	1	3	Bit	0x80	-	Signal: Trip Command blocked

Module (ANSI / IEEE)	Name Function	Start Register Address	No. of Modbus Registers	Function code	Format	Bit Mask (Bit position)	Unit	Description
						(8)		
	ExBlo TripCmd	61	1	3	Bit	0x100 (9)	-	Signal: External Blocking of the Trip Command
	IGH2 Blo	61	1	3	Bit	0x200 (10)	-	Signal: Blocked by IH2
	Pickup	61	1	3	Bit	0x400 (11)	-	Signal: The pickup value has been exceeded.
	Trip (*)	61	1	3	Bit	0x800 (12)	-	Signal: Trip
	TripCmd (*)	61	1	3	Bit	0x1000 (13)	-	Signal: Trip Command
50R[2] – Residual Inst. OC		**62**	**1**	**3**	**Struct**			
	ExBlo1-I	62	1	3	Bit	0x1 (1)	-	Module Input State: External Blocking1
	ExBlo2-I	62	1	3	Bit	0x2 (2)	-	Module Input State: External Blocking2
	ExBlo TripCmd-I	62	1	3	Bit	0x4 (3)	-	Module Input State: External Blocking of the Trip Command
	Rvs Blo-I	62	1	3	Bit	0x8 (4)	-	Module Input State: Reverse Blocking
	Active	62	1	3	Bit	0x10	-	Signal: Active

Module (ANSI / IEEE)	Name Function	Start Register Address	No. of Modbus Registers	Function code	Format	Bit Mask (Bit position)	Unit	Description
						(5)		
	ExBlo	62	1	3	Bit	0x20 (6)	-	Signal: External Blocking
	Rvs Blo	62	1	3	Bit	0x40 (7)	-	Signal: Reverse Blocking
	Blo TripCmd	62	1	3	Bit	0x80 (8)	-	Signal: Trip Command blocked
	ExBlo TripCmd	62	1	3	Bit	0x100 (9)	-	Signal: External Blocking of the Trip Command
	IGH2 Blo	62	1	3	Bit	0x200 (10)	-	Signal: Blocked by IH2
	Pickup	62	1	3	Bit	0x400 (11)	-	Signal: The pickup value has been exceeded.
	Trip (*)	62	1	3	Bit	0x800 (12)	-	Signal: Trip
	TripCmd (*)	62	1	3	Bit	0x1000 (13)	-	Signal: Trip Command
50X[1] – Meas. Inst. OC		**15**	**1**	**3**	**Struct**			
	ExBlo1-I	15	1	3	Bit	0x1 (1)	-	Module Input State: External Blocking1
	ExBlo2-I	15	1	3	Bit	0x2	-	Module Input State: External Blocking2

Module (ANSI / IEEE)	Name Function	Start Register Address	No. of Modbus Registers	Function code	Format	Bit Mask (Bit position)	Unit	Description
						(2)		
	ExBlo TripCmd-I	15	1	3	Bit	0x4 (3)	-	Module Input State: External Blocking of the Trip Command
	Rvs Blo-I	15	1	3	Bit	0x8 (4)	-	Module Input State: Reverse Blocking
	Active	15	1	3	Bit	0x10 (5)	-	Signal: Active
	ExBlo	15	1	3	Bit	0x20 (6)	-	Signal: External Blocking
	Rvs Blo	15	1	3	Bit	0x40 (7)	-	Signal: Reverse Blocking
	Blo TripCmd	15	1	3	Bit	0x80 (8)	-	Signal: Trip Command blocked
	ExBlo TripCmd	15	1	3	Bit	0x100 (9)	-	Signal: External Blocking of the Trip Command
	IGH2 Blo	15	1	3	Bit	0x200 (10)	-	Signal: Blocked by IH2
	Pickup	15	1	3	Bit	0x400 (11)	-	Signal: The pickup value has been exceeded.
	Trip (*)	15	1	3	Bit	0x800 (12)	-	Signal: Trip
	TripCmd (*)	15	1	3	Bit	0x1000	-	Signal: Trip Command

Module (ANSI / IEEE)	Name Function	Start Register Address	No. of Modbus Registers	Function code	Format	Bit Mask (Bit position)	Unit	Description
						(13)		
50X[2] – Meas. Inst. OC		**16**	**1**	**3**	**Struct**			
	ExBlo1-I	16	1	3	Bit	0x1 (1)	-	Module Input State: External Blocking1
	ExBlo2-I	16	1	3	Bit	0x2 (2)	-	Module Input State: External Blocking2
	ExBlo TripCmd-I	16	1	3	Bit	0x4 (3)	-	Module Input State: External Blocking of the Trip Command
	Rvs Blo-I	16	1	3	Bit	0x8 (4)	-	Module Input State: Reverse Blocking
	Active	16	1	3	Bit	0x10 (5)	-	Signal: Active
	ExBlo	16	1	3	Bit	0x20 (6)	-	Signal: External Blocking
	Rvs Blo	16	1	3	Bit	0x40 (7)	-	Signal: Reverse Blocking
	Blo TripCmd	16	1	3	Bit	0x80 (8)	-	Signal: Trip Command blocked
	ExBlo TripCmd	16	1	3	Bit	0x100 (9)	-	Signal: External Blocking of the Trip Command
	IGH2 Blo	16	1	3	Bit	0x200	-	Signal: Blocked by IH2

Module (ANSI / IEEE)	Name Function	Start Register Address	No. of Modbus Registers	Function code	Format	Bit Mask (Bit position)	Unit	Description
						(10)		
	Pickup	16	1	3	Bit	0x400 (11)	-	Signal: The pickup value has been exceeded.
	Trip (*)	16	1	3	Bit	0x800 (12)	-	Signal: Trip
	TripCmd (*)	16	1	3	Bit	0x1000 (13)	-	Signal: Trip Command
51P[1] – Phase Time OC		**9**	**1**	**3**	**Struct**			
	ExBlo1-I	9	1	3	Bit	0x1 (1)	-	Module Input State: External Blocking1
	ExBlo2-I	9	1	3	Bit	0x2 (2)	-	Module Input State: External Blocking2
	ExBlo TripCmd-I	9	1	3	Bit	0x4 (3)	-	Module Input State: External Blocking of the Trip Command
	Rvs Blo-I	9	1	3	Bit	0x8 (4)	-	Module Input State: Reverse Blocking
	Active	9	1	3	Bit	0x10 (5)	-	Signal: Active
	ExBlo	9	1	3	Bit	0x20 (6)	-	Signal: External Blocking
	Rvs Blo	9	1	3	Bit	0x40	-	Signal: Reverse Blocking

Module (ANSI / IEEE)	Name Function	Start Register Address	No. of Modbus Registers	Function code	Format	Bit Mask (Bit position)	Unit	Description
						(7)		
	Blo TripCmd	9	1	3	Bit	0x80 (8)	-	Signal: Trip Command blocked
	ExBlo TripCmd	9	1	3	Bit	0x100 (9)	-	Signal: External Blocking of the Trip Command
	IH2 Blo	9	1	3	Bit	0x200 (10)	-	Signal: Blocking the trip command by IH2
51P[1] – Phase Time OC		**10**	**1**	**3**	**Struct**			
	Pickup IA	10	1	3	Bit	0x1 (1)	-	Signal: Pickup IA
	Pickup IB	10	1	3	Bit	0x2 (2)	-	Signal: Pickup IB
	Pickup IC	10	1	3	Bit	0x4 (3)	-	Signal: Pickup IC
	Pickup	10	1	3	Bit	0x8 (4)	-	Signal: Pickup
	Trip (*)	10	1	3	Bit	0x80 (8)	-	Signal: Trip
	TripCmd (*)	10	1	3	Bit	0x100 (9)	-	Signal: Trip Command
51P[2] – Phase Time OC		**11**	**1**	**3**	**Struct**			

Module (ANSI / IEEE)	Name Function	Start Register Address	No. of Modbus Registers	Function code	Format	Bit Mask (Bit position)	Unit	Description
	ExBlo1-I	11	1	3	Bit	0x1 (1)	-	Module Input State: External Blocking1
	ExBlo2-I	11	1	3	Bit	0x2 (2)	-	Module Input State: External Blocking2
	ExBlo TripCmd-I	11	1	3	Bit	0x4 (3)	-	Module Input State: External Blocking of the Trip Command
	Rvs Blo-I	11	1	3	Bit	0x8 (4)	-	Module Input State: Reverse Blocking
	Active	11	1	3	Bit	0x10 (5)	-	Signal: Active
	ExBlo	11	1	3	Bit	0x20 (6)	-	Signal: External Blocking
	Rvs Blo	11	1	3	Bit	0x40 (7)	-	Signal: Reverse Blocking
	Blo TripCmd	11	1	3	Bit	0x80 (8)	-	Signal: Trip Command blocked
	ExBlo TripCmd	11	1	3	Bit	0x100 (9)	-	Signal: External Blocking of the Trip Command
	IH2 Blo	11	1	3	Bit	0x200 (10)	-	Signal: Blocking the trip command by IH2
51P[2] – Phase Time OC		**12**	**1**	**3**	**Struct**			

Module (ANSI / IEEE)	Name Function	Start Register Address	No. of Modbus Registers	Function code	Format	Bit Mask (Bit position)	Unit	Description
	Pickup IA	12	1	3	Bit	0x1 (1)	-	Signal: Pickup IA
	Pickup IB	12	1	3	Bit	0x2 (2)	-	Signal: Pickup IB
	Pickup IC	12	1	3	Bit	0x4 (3)	-	Signal: Pickup IC
	Pickup	12	1	3	Bit	0x8 (4)	-	Signal: Pickup
	Trip (*)	12	1	3	Bit	0x80 (8)	-	Signal: Trip
	TripCmd (*)	12	1	3	Bit	0x100 (9)	-	Signal: Trip Command
51P[3] – Phase Time OC		**13**	**1**	**3**	**Struct**			
	ExBlo1-I	13	1	3	Bit	0x1 (1)	-	Module Input State: External Blocking1
	ExBlo2-I	13	1	3	Bit	0x2 (2)	-	Module Input State: External Blocking2
	ExBlo TripCmd-I	13	1	3	Bit	0x4 (3)	-	Module Input State: External Blocking of the Trip Command
	Rvs Blo-I	13	1	3	Bit	0x8 (4)	-	Module Input State: Reverse Blocking

Module (ANSI / IEEE)	Name Function	Start Register Address	No. of Modbus Registers	Function code	Format	Bit Mask (Bit position)	Unit	Description
	Active	13	1	3	Bit	0x10 (5)	-	Signal: Active
	ExBlo	13	1	3	Bit	0x20 (6)	-	Signal: External Blocking
	Rvs Blo	13	1	3	Bit	0x40 (7)	-	Signal: Reverse Blocking
	Blo TripCmd	13	1	3	Bit	0x80 (8)	-	Signal: Trip Command blocked
	ExBlo TripCmd	13	1	3	Bit	0x100 (9)	-	Signal: External Blocking of the Trip Command
	IH2 Blo	13	1	3	Bit	0x200 (10)	-	Signal: Blocking the trip command by IH2
51P[3] – Phase Time OC		**14**	**1**	**3**	**Struct**			
	Pickup IA	14	1	3	Bit	0x1 (1)	-	Signal: Pickup IA
	Pickup IB	14	1	3	Bit	0x2 (2)	-	Signal: Pickup IB
	Pickup IC	14	1	3	Bit	0x4 (3)	-	Signal: Pickup IC
	Pickup	14	1	3	Bit	0x8 (4)	-	Signal: Pickup

Module (ANSI / IEEE)	Name Function	Start Register Address	No. of Modbus Registers	Function code	Format	Bit Mask (Bit position)	Unit	Description
	Trip (*)	14	1	3	Bit	0x80 (8)	-	Signal: Trip
	TripCmd (*)	14	1	3	Bit	0x100 (9)	-	Signal: Trip Command
51R[1] – Residual Time OC		**63**	**1**	**3**	**Struct**			
	ExBlo1-I	63	1	3	Bit	0x1 (1)	-	Module Input State: External Blocking1
	ExBlo2-I	63	1	3	Bit	0x2 (2)	-	Module Input State: External Blocking2
	ExBlo TripCmd-I	63	1	3	Bit	0x4 (3)	-	Module Input State: External Blocking of the Trip Command
	Rvs Blo-I	63	1	3	Bit	0x8 (4)	-	Module Input State: Reverse Blocking
	Active	63	1	3	Bit	0x10 (5)	-	Signal: Active
	ExBlo	63	1	3	Bit	0x20 (6)	-	Signal: External Blocking
	Rvs Blo	63	1	3	Bit	0x40 (7)	-	Signal: Reverse Blocking
	Blo TripCmd	63	1	3	Bit	0x80 (8)	-	Signal: Trip Command blocked

Module (ANSI / IEEE)	Name Function	Start Register Address	No. of Modbus Registers	Function code	Format	Bit Mask (Bit position)	Unit	Description
	ExBlo TripCmd	63	1	3	Bit	0x100 (9)	-	Signal: External Blocking of the Trip Command
	IGH2 Blo	63	1	3	Bit	0x200 (10)	-	Signal: Blocked by IH2
	Pickup	63	1	3	Bit	0x400 (11)	-	Signal: The pickup value has been exceeded.
	Trip (*)	63	1	3	Bit	0x800 (12)	-	Signal: Trip
	TripCmd (*)	63	1	3	Bit	0x1000 (13)	-	Signal: Trip Command
51R[2] – Residual Time OC		**64**	**1**	**3**	**Struct**			
	ExBlo1-I	64	1	3	Bit	0x1 (1)	-	Module Input State: External Blocking1
	ExBlo2-I	64	1	3	Bit	0x2 (2)	-	Module Input State: External Blocking2
	ExBlo TripCmd-I	64	1	3	Bit	0x4 (3)	-	Module Input State: External Blocking of the Trip Command
	Rvs Blo-I	64	1	3	Bit	0x8 (4)	-	Module Input State: Reverse Blocking
	Active	64	1	3	Bit	0x10 (5)	-	Signal: Active

Module (ANSI / IEEE)	Name Function	Start Register Address	No. of Modbus Registers	Function code	Format	Bit Mask (Bit position)	Unit	Description
	ExBlo	64	1	3	Bit	0x20 (6)	-	Signal: External Blocking
	Rvs Blo	64	1	3	Bit	0x40 (7)	-	Signal: Reverse Blocking
	Blo TripCmd	64	1	3	Bit	0x80 (8)	-	Signal: Trip Command blocked
	ExBlo TripCmd	64	1	3	Bit	0x100 (9)	-	Signal: External Blocking of the Trip Command
	IGH2 Blo	64	1	3	Bit	0x200 (10)	-	Signal: Blocked by IH2
	Pickup	64	1	3	Bit	0x400 (11)	-	Signal: The pickup value has been exceeded.
	Trip (*)	64	1	3	Bit	0x800 (12)	-	Signal: Trip
	TripCmd (*)	64	1	3	Bit	0x1000 (13)	-	Signal: Trip Command
51X[1] – Meas. Time OC		**17**	**1**	**3**	**Struct**			
	ExBlo1-I	17	1	3	Bit	0x1 (1)	-	Module Input State: External Blocking1
	ExBlo2-I	17	1	3	Bit	0x2 (2)	-	Module Input State: External Blocking2

Module (ANSI / IEEE)	Name Function	Start Register Address	No. of Modbus Registers	Function code	Format	Bit Mask (Bit position)	Unit	Description
	ExBlo TripCmd-I	17	1	3	Bit	0x4 (3)	-	Module Input State: External Blocking of the Trip Command
	Rvs Blo-I	17	1	3	Bit	0x8 (4)	-	Module Input State: Reverse Blocking
	Active	17	1	3	Bit	0x10 (5)	-	Signal: Active
	ExBlo	17	1	3	Bit	0x20 (6)	-	Signal: External Blocking
	Rvs Blo	17	1	3	Bit	0x40 (7)	-	Signal: Reverse Blocking
	Blo TripCmd	17	1	3	Bit	0x80 (8)	-	Signal: Trip Command blocked
	ExBlo TripCmd	17	1	3	Bit	0x100 (9)	-	Signal: External Blocking of the Trip Command
	IGH2 Blo	17	1	3	Bit	0x200 (10)	-	Signal: Blocked by IH2
	Pickup	17	1	3	Bit	0x400 (11)	-	Signal: The pickup value has been exceeded.
	Trip (*)	17	1	3	Bit	0x800 (12)	-	Signal: Trip
	TripCmd (*)	17	1	3	Bit	0x1000	-	Signal: Trip Command

Module (ANSI / IEEE)	Name Function	Start Register Address	No. of Modbus Registers	Function code	Format	Bit Mask (Bit position)	Unit	Description
						(13)		
51X[2] – Meas. Time OC		**18**	**1**	**3**	**Struct**			
	ExBlo1-I	18	1	3	Bit	0x1 (1)	-	Module Input State: External Blocking1
	ExBlo2-I	18	1	3	Bit	0x2 (2)	-	Module Input State: External Blocking2
	ExBlo TripCmd-I	18	1	3	Bit	0x4 (3)	-	Module Input State: External Blocking of the Trip Command
	Rvs Blo-I	18	1	3	Bit	0x8 (4)	-	Module Input State: Reverse Blocking
	Active	18	1	3	Bit	0x10 (5)	-	Signal: Active
	ExBlo	18	1	3	Bit	0x20 (6)	-	Signal: External Blocking
	Rvs Blo	18	1	3	Bit	0x40 (7)	-	Signal: Reverse Blocking
	Blo TripCmd	18	1	3	Bit	0x80 (8)	-	Signal: Trip Command blocked
	ExBlo TripCmd	18	1	3	Bit	0x100 (9)	-	Signal: External Blocking of the Trip Command
	IGH2 Blo	18	1	3	Bit	0x200	-	Signal: Blocked by IH2

Module (ANSI / IEEE)	Name Function	Start Register Address	No. of Modbus Registers	Function code	Format	Bit Mask (Bit position)	Unit	Description
						(10)		
	Pickup	18	1	3	Bit	0x400 (11)	-	Signal: The pickup value has been exceeded.
	Trip (*)	18	1	3	Bit	0x800 (12)	-	Signal: Trip
	TripCmd (*)	18	1	3	Bit	0x1000 (13)	-	Signal: Trip Command
AR – Auto Relosing		**46**	**1**	**3**	**Struct**			
	Active	46	1	3	Bit	0x1 (1)	-	Signal: Active
	ExBlo	46	1	3	Bit	0x2 (2)	-	Signal: External Blocking
	Running	46	1	3	Bit	0x8 (4)	-	Signal: Auto Reclosing Running
	t-dead	46	1	3	Bit	0x10 (5)	-	Signal: Dead time between trip and reclosure attempt
	successful (*)	46	1	3	Bit	0x100 (9)	-	Signal: Auto Reclosing successful
	failed (*)	46	1	3	Bit	0x200 (10)	-	Signal: Auto Reclosing Failure
	t-AR Supervision	46	1	3	Bit	0x1000	-	Signal: AR Supervision

Module (ANSI / IEEE)	Name Function	Start Register Address	No. of Modbus Registers	Function code	Format	Bit Mask (Bit position)	Unit	Description
						(13)		
AR – Auto Relosing		**47**	**1**	**3**	**Struct**			
	ExBlo1-I	47	1	3	Bit	0x1 (1)	-	Module Input State: External Blocking1
	ExBlo2-I	47	1	3	Bit	0x2 (2)	-	Module Input State: External Blocking2
	Bkr CLOSE Cmd	47	1	3	Bit	0x10 (5)	-	Signal: Bkr. Switch ON (CLOSE) Command
	Pre Shot (*)	47	1	3	Bit	0x20 (6)	-	Pre Shot Control
	Shot 1 (*)	47	1	3	Bit	0x40 (7)	-	Shot Control
	Shot 2 (*)	47	1	3	Bit	0x80 (8)	-	Shot Control
	Shot 3 (*)	47	1	3	Bit	0x100 (9)	-	Shot Control
	Shot 4 (*)	47	1	3	Bit	0x200 (10)	-	Shot Control
	Shot 5 (*)	47	1	3	Bit	0x400 (11)	-	Shot Control
	Shot 6 (*)	47	1	3	Bit	0x800	-	Shot Control

Module (ANSI / IEEE)	Name Function	Start Register Address	No. of Modbus Registers	Function code	Format	Bit Mask (Bit position)	Unit	Description
						(12)		
AR – Auto Relosing		**156**	**1**	**3**	**Struct**			
	Ex Lock-I	156	1	3	Bit	0x1 (1)	-	Module input state: External AR lockout.
	Ex Shot Inc-I	156	1	3	Bit	0x2 (2)	-	Module input state: The AR Shot counter will be incremented by this external Signal. This can be used for Zone Coordination (of upstream Auto Reclosure devices). Note: This parameter enables the functionallity only. The assignment has to be set within the global parameters.
	Blo	156	1	3	Bit	0x4 (3)	-	Signal: Auto Reclosure is blocked
	t-Man Close Blo	156	1	3	Bit	0x8 (4)	-	Signal: AR blocked after breaker was switched on manually. This timer will be started if the breaker was switched on manually. While this timer is running, AR cannot be started.
	Lock	156	1	3	Bit	0x10 (5)	-	Signal: Auto Reclosure is locked out
	t-Reset Lockout	156	1	3	Bit	0x20 (6)	-	Signal: Delay Timer for resetting the AR lockout. The reset of the AR lockout state will be delayed for this time after the reset signal (e.g digital input or Scada) has been detected .
	Ready	156	1	3	Bit	0x40 (7)	-	Signal: Ready to shoot
	t-Run2Ready	156	1	3	Bit	0x80 (8)	-	Signal: Examination Time: If the Breaker remains after a reclosure attempt (shot) for the duration of this timer in the Closed position, the AR has been

Module (ANSI / IEEE)	Name Function	Start Register Address	No. of Modbus Registers	Function code	Format	Bit Mask (Bit position)	Unit	Description
								successful and the AR module returns into the ready state.
	Standby	156	1	3	Bit	0x100 (9)	-	Signal: Standby
	Service Alarm 1	156	1	3	Bit	0x200 (10)	-	Signal: AR - Service Alarm 1, too many switching operations
	Service Alarm 2	156	1	3	Bit	0x400 (11)	-	Signal: AR - Service Alarm 2, too many switching operations
	Max Shots / h exceeded	156	1	3	Bit	0x800 (12)	-	Signal: The maximum allowed number of shots per hour has been exceeded.
BF		**53**	**1**	**3**	**Struct**			
	ExBlo1-I	53	1	3	Bit	0x1 (1)	-	Module Input State: External Blocking1
	ExBlo2-I	53	1	3	Bit	0x2 (2)	-	Module Input State: External Blocking2
	Active	53	1	3	Bit	0x4 (3)	-	Signal: Active
	ExBlo	53	1	3	Bit	0x8 (4)	-	Signal: External Blocking
	Trigger1-I	53	1	3	Bit	0x10 (5)	-	Module Input: Trigger that will start the BF
	Trigger2-I	53	1	3	Bit	0x20	-	Module Input: Trigger that will start the BF

Module (ANSI / IEEE)	Name Function	Start Register Address	No. of Modbus Registers	Function code	Format	Bit Mask (Bit position)	Unit	Description
						(6)		
	Trigger3-I	53	1	3	Bit	0x40 (7)	-	Module Input: Trigger that will start the BF
	Pickup	53	1	3	Bit	0x80 (8)	-	Signal: BF-Module Started (Pickup)
	Trip (*)	53	1	3	Bit	0x100 (9)	-	Signal: Breaker Failure Trip
	Lockout (*)	53	1	3	Bit	0x200 (10)	-	Signal: Lockout
	Waiting for Trigger (*)	53	1	3	Bit	0x400 (11)	-	Waiting for Trigger
Bkr		**123**	**1**	**3**	**Struct**			
	Isum Intr trip	123	1	3	Bit	0x10 (5)	-	Signal: Maximum permissible Summation of the interrupting (tripping) currents exceeded in at least one phase.
	Isum Intr trip: IA	123	1	3	Bit	0x20 (6)	-	Signal: Maximum permissible Summation of the interrupting (tripping) currents exceeded: IA
	Isum Intr trip: IB	123	1	3	Bit	0x40 (7)	-	Signal: Maximum permissible Summation of the interrupting (tripping) currents exceeded: IB
	Isum Intr trip: IC	123	1	3	Bit	0x80 (8)	-	Signal: Maximum permissible Summation of the interrupting (tripping) currents exceeded: IC
	Operations Alarm	123	1	3	Bit	0x100	-	Signal: Too many Operations. (The operations counter »TripCmd Cr« has

Module (ANSI / IEEE)	Name Function	Start Register Address	No. of Modbus Registers	Function code	Format	Bit Mask (Bit position)	Unit	Description
						(9)		exceeded the limit set at »Operations Alarm«.)
	WearLevel Alarm	123	1	3	Bit	0x200 (10)	-	Signal: Breaker Wear curve Alarm
	WearLevel Lockout	123	1	3	Bit	0x400 (11)	-	Signal: Breaker Wear Curve Lockout Level
	Isum Intr ph Alm	123	1	3	Bit	0x800 (12)	-	Signal: Alarm, the per hour Sum (Limit) of interrupting currents has been exceeded.
Bkr		**177**	**1**	**3**	**Struct**			
	CinBkr-52b-I	177	1	3	Bit	0x1 (1)	-	Module Input State: Feed-back signal of the Bkr. (52b)
	CinBkr-52a-I	177	1	3	Bit	0x2 (2)	-	Module Input State: Feed-back signal of the Bkr (52a)
	Ready-I	177	1	3	Bit	0x4 (3)	-	Module Input State: Breaker Ready
	Sys-in-Sync-I	177	1	3	Bit	0x8 (4)	-	State of the module input: This signals has to become true within the synchronization time. If not, switching is unsuccessful.
	Interl OPEN1-I	177	1	3	Bit	0x10 (5)	-	State of the module input: Interlocking of the OPEN command
	Interl OPEN2-I	177	1	3	Bit	0x20 (6)	-	State of the module input: Interlocking of the OPEN command
	Interl OPEN3-I	177	1	3	Bit	0x40	-	State of the module input: Interlocking of the OPEN command

Module (ANSI / IEEE)	Name Function	Start Register Address	No. of Modbus Registers	Function code	Format	Bit Mask (Bit position)	Unit	Description
						(7)		
	Interl CLOSE1-I	177	1	3	Bit	0x80 (8)	-	State of the module input: Interlocking of the CLOSE command
	Interl CLOSE2-I	177	1	3	Bit	0x100 (9)	-	State of the module input: Interlocking of the CLOSE command
	Interl CLOSE3-I	177	1	3	Bit	0x200 (10)	-	State of the module input: Interlocking of the CLOSE command
	SC OPEN-I	177	1	3	Bit	0x800 (12)	-	State of the module input: Switching OPEN Command, e.g. the state of the Logics or the state of the digital input
	SC CLOSE-I	177	1	3	Bit	0x1000 (13)	-	State of the module input: Switching CLOSE Command, e.g. the state of the Logics or the state of the digital input
	TripCmd (*)	177	1	3	Bit	0x2000 (14)	-	Signal: Trip Command
	OPEN Cmd	177	1	3	Bit	0x4000 (15)	-	Signal: OPEN command issued to the switchgear. Depending on the setting the signal may include the OPEN command of the Prot module.
	OPEN Cmd manual	177	1	3	Bit	0x8000 (16)	-	Signal: OPEN Cmd manual
Bkr		**178**	**1**	**3**	**Struct**			
	CLOSE Cmd	178	1	3	Bit	0x1 (1)	-	Signal: CLOSE command issued to the switchgear. Depending on the setting the signal may include the CLOSE command of the Prot module.
	CLOSE Cmd manual	178	1	3	Bit	0x2	-	Signal: CLOSE Cmd manual

Module (ANSI / IEEE)	Name Function	Start Register Address	No. of Modbus Registers	Function code	Format	Bit Mask (Bit position)	Unit	Description
						(2)		
	Sync CLOSE request	178	1	3	Bit	0x4 (3)	-	Signal: Synchronous CLOSE request
	Bwear Slow Breaker	178	1	3	Bit	0x8 (4)	-	Signal: Slow Breaker Alarm
	Res Bwear Sl Breaker	178	1	3	Bit	0x10 (5)	-	Signal: Resetting the slow breaker alarm
	CES Disturbed	178	1	3	Bit	0x40 (7)	-	Signal: Command Execution Supervision: Switching Command unsuccessful. Switchgear in disturbed position.
	CES Field Interl	178	1	3	Bit	0x80 (8)	-	Signal: Command Execution Supervision: Switching Command not executed because of field interlocking.
	CES CLOSE d OPEN	178	1	3	Bit	0x400 (11)	-	Signal: Command Execution Supervision: CLOSE Command during a pending OPEN Command.
	CES SwitchgDir	178	1	3	Bit	0x800 (12)	-	Signal: Command Execution Supervision respectivly Switching Direction Control: This signal becomes true, if a switch command is issued even though the switchgear is already in the requested position. Example: A switchgear that is already OPEN should be switched OPEN again (doubly). The same applies to CLOSE commands.
	CES SG not ready	178	1	3	Bit	0x1000 (13)	-	Signal: Command Execution Supervision: Switchgear not ready
	CES SyncTimeout	178	1	3	Bit	0x2000	-	Signal: Command Execution Supervision: Switching Command not

Module (ANSI / IEEE)	Name Function	Start Register Address	No. of Modbus Registers	Function code	Format	Bit Mask (Bit position)	Unit	Description
						(14)		executed. No Synchronization signal while t-sync was running.
	CES succesf	178	1	3	Bit	0x4000 (15)	-	Signal: Command Execution Supervision: Switching command executed successfully.
	Prot CLOSE	178	1	3	Bit	0x8000 (16)	-	Signal: CLOSE command issued by the Prot module
Bkr		**179**	**1**	**3**	**Struct**			
	Pos Disturb	179	1	3	Bit	0x1 (1)	-	Signal: Breaker Disturbed - Undefined Breaker Position. The feed-back signals (Position Indicators) contradict themselves. After expiring of a supervision timer this signal becomes true.
	Pos Indeterm	179	1	3	Bit	0x4 (3)	-	Signal: Breaker is in Indeterminate Position
	Pos OPEN	179	1	3	Bit	0x8 (4)	-	Signal: Breaker is in OPEN-Position
	Pos CLOSE	179	1	3	Bit	0x10 (5)	-	Signal: Breaker is in CLOSE-Position
	Ready	179	1	3	Bit	0x20 (6)	-	Signal: Breaker is ready for operation.
	Pos not CLOSE	179	1	3	Bit	0x40 (7)	-	Signal: Pos not CLOSE
	SI SingleContactInd	179	1	3	Bit	0x80 (8)	-	Signal: The Position of the Switchgear is detected by one auxiliary contact (pole) only. Thus indeterminate and disturbed Positions cannot be detected.

Module (ANSI / IEEE)	Name Function	Start Register Address	No. of Modbus Registers	Function code	Format	Bit Mask (Bit position)	Unit	Description
	CES Fail TripCmd	179	1	3	Bit	0x800 (12)	-	Signal: Command Execution Supervision: Command execution failed because trip command is pending.
	Interl OPEN	179	1	3	Bit	0x1000 (13)	-	Signal: One or more IL_Open inputs are active.
	Interl CLOSE	179	1	3	Bit	0x2000 (14)	-	Signal: One or more IL_Close inputs are active.
CLPU – Cold Load Pickup		**66**	**1**	**3**	**Struct**			
	ExBlo1-I	66	1	3	Bit	0x1 (1)	-	Module Input State: External Blocking
	ExBlo2-I	66	1	3	Bit	0x2 (2)	-	Module Input State: External Blocking
	Rvs Blo-I	66	1	3	Bit	0x4 (3)	-	Module Input State: Reverse Blocking
	Active	66	1	3	Bit	0x8 (4)	-	Signal: Active
	ExBlo	66	1	3	Bit	0x10 (5)	-	Signal: External Blocking
	Rvs Blo	66	1	3	Bit	0x20 (6)	-	Signal: Reverse Blocking
	enabled	66	1	3	Bit	0x200 (10)	-	Signal: Cold Load enabled

Module (ANSI / IEEE)	Name Function	Start Register Address	No. of Modbus Registers	Function code	Format	Bit Mask (Bit position)	Unit	Description
	detected (*)	66	1	3	Bit	0x400 (11)	-	Signal: Cold Load detected
	I<	66	1	3	Bit	0x800 (12)	-	Signal: No Load Current.
	AR Blo	66	1	3	Bit	0x1000 (13)	-	Signal: Blocked by AR
	Load Inrush	66	1	3	Bit	0x2000 (14)	-	Signal: Load Inrush
	Settle Time	66	1	3	Bit	0x4000 (15)	-	Signal: Settle Time
CTS		**137**	**1**	**3**	**Struct**			
	ExBlo1-I	137	1	3	Bit	0x1 (1)	-	Module Input State: External Blocking1
	ExBlo2-I	137	1	3	Bit	0x2 (2)	-	Module Input State: External Blocking2
	Active	137	1	3	Bit	0x4 (3)	-	Signal: Active
	ExBlo	137	1	3	Bit	0x8 (4)	-	Signal: External Blocking
	Pickup	137	1	3	Bit	0x10 (5)	-	Signal: Pickup Current Transformer Measuring Circuit Supervision
Ctrl		**176**	**1**	**3**	**Struct**			

Module (ANSI / IEEE)	Name Function	Start Register Address	No. of Modbus Registers	Function code	Format	Bit Mask (Bit position)	Unit	Description
	Local	176	1	3	Bit	0x1 (1)	-	Switching Authority: Local
	Remote	176	1	3	Bit	0x2 (2)	-	Switching Authority: Remote
	SG Disturb	176	1	3	Bit	0x8 (4)	-	(At least one) Switch is disturbed.
	SG Indeterm	176	1	3	Bit	0x10 (5)	-	(At least one) Switch is moving (Position cannot be determined).
DI-4P X1		**1000**	**1**	**3**	**Struct**			
	DI 1	1000	1	3	Bit	0x10 (5)	-	Signal: Digital Input
	DI 2	1000	1	3	Bit	0x20 (6)	-	Signal: Digital Input
	DI 3	1000	1	3	Bit	0x40 (7)	-	Signal: Digital Input
	DI 4	1000	1	3	Bit	0x80 (8)	-	Signal: Digital Input
DI-8P X1		**1008**	**1**	**3**	**Struct**			
	DI 1	1008	1	3	Bit	0x1 (1)	-	Signal: Digital Input
	DI 2	1008	1	3	Bit	0x2 (2)	-	Signal: Digital Input

Module (ANSI / IEEE)	Name Function	Start Register Address	No. of Modbus Registers	Function code	Format	Bit Mask (Bit position)	Unit	Description
	DI 3	1008	1	3	Bit	0x4 (3)	-	Signal: Digital Input
	DI 4	1008	1	3	Bit	0x8 (4)	-	Signal: Digital Input
	DI 5	1008	1	3	Bit	0x10 (5)	-	Signal: Digital Input
	DI 6	1008	1	3	Bit	0x20 (6)	-	Signal: Digital Input
	DI 7	1008	1	3	Bit	0x40 (7)	-	Signal: Digital Input
	DI 8	1008	1	3	Bit	0x80 (8)	-	Signal: Digital Input
ExP[1] – Ext Protection		**49**	**1**	**3**	**Struct**			
	ExBlo1-I	49	1	3	Bit	0x1 (1)	-	Module Input State: External Blocking1
	ExBlo2-I	49	1	3	Bit	0x2 (2)	-	Module Input State: External Blocking2
	ExBlo TripCmd-I	49	1	3	Bit	0x4 (3)	-	Module Input State: External Blocking of the Trip Command
	Alarm-I	49	1	3	Bit	0x8 (4)	-	Module Input State: Alarm

Module (ANSI / IEEE)	Name Function	Start Register Address	No. of Modbus Registers	Function code	Format	Bit Mask (Bit position)	Unit	Description
	Trip-I	49	1	3	Bit	0x10 (5)	-	Module Input State: Trip
	Active	49	1	3	Bit	0x20 (6)	-	Signal: Active
	ExBlo	49	1	3	Bit	0x40 (7)	-	Signal: External Blocking
	Blo TripCmd	49	1	3	Bit	0x80 (8)	-	Signal: Trip Command blocked
	ExBlo TripCmd	49	1	3	Bit	0x100 (9)	-	Signal: External Blocking of the Trip Command
	Alarm	49	1	3	Bit	0x200 (10)	-	Signal: Alarm
	Trip (*)	49	1	3	Bit	0x400 (11)	-	Signal: Trip
	TripCmd (*)	49	1	3	Bit	0x800 (12)	-	Signal: Trip Command
ExP[2] – Ext Protection		**50**	**1**	**3**	**Struct**			
	ExBlo1-I	50	1	3	Bit	0x1 (1)	-	Module Input State: External Blocking1
	ExBlo2-I	50	1	3	Bit	0x2 (2)	-	Module Input State: External Blocking2

Module (ANSI / IEEE)	Name Function	Start Register Address	No. of Modbus Registers	Function code	Format	Bit Mask (Bit position)	Unit	Description
	ExBlo TripCmd-I	50	1	3	Bit	0x4 (3)	-	Module Input State: External Blocking of the Trip Command
	Alarm-I	50	1	3	Bit	0x8 (4)	-	Module Input State: Alarm
	Trip-I	50	1	3	Bit	0x10 (5)	-	Module Input State: Trip
	Active	50	1	3	Bit	0x20 (6)	-	Signal: Active
	ExBlo	50	1	3	Bit	0x40 (7)	-	Signal: External Blocking
	Blo TripCmd	50	1	3	Bit	0x80 (8)	-	Signal: Trip Command blocked
	ExBlo TripCmd	50	1	3	Bit	0x100 (9)	-	Signal: External Blocking of the Trip Command
	Alarm	50	1	3	Bit	0x200 (10)	-	Signal: Alarm
	Trip (*)	50	1	3	Bit	0x400 (11)	-	Signal: Trip
	TripCmd (*)	50	1	3	Bit	0x800 (12)	-	Signal: Trip Command
ExP[3] – Ext Protection		**51**	**1**	**3**	**Struct**			

Module (ANSI / IEEE)	Name Function	Start Register Address	No. of Modbus Registers	Function code	Format	Bit Mask (Bit position)	Unit	Description
	ExBlo1-I	51	1	3	Bit	0x1 (1)	-	Module Input State: External Blocking1
	ExBlo2-I	51	1	3	Bit	0x2 (2)	-	Module Input State: External Blocking2
	ExBlo TripCmd-I	51	1	3	Bit	0x4 (3)	-	Module Input State: External Blocking of the Trip Command
	Alarm-I	51	1	3	Bit	0x8 (4)	-	Module Input State: Alarm
	Trip-I	51	1	3	Bit	0x10 (5)	-	Module Input State: Trip
	Active	51	1	3	Bit	0x20 (6)	-	Signal: Active
	ExBlo	51	1	3	Bit	0x40 (7)	-	Signal: External Blocking
	Blo TripCmd	51	1	3	Bit	0x80 (8)	-	Signal: Trip Command blocked
	ExBlo TripCmd	51	1	3	Bit	0x100 (9)	-	Signal: External Blocking of the Trip Command
	Alarm	51	1	3	Bit	0x200 (10)	-	Signal: Alarm
	Trip (*)	51	1	3	Bit	0x400	-	Signal: Trip

Module (ANSI / IEEE)	Name Function	Start Register Address	No. of Modbus Registers	Function code	Format	Bit Mask (Bit position)	Unit	Description
						(11)		
	TripCmd (*)	51	1	3	Bit	0x800 (12)	-	Signal: Trip Command
ExP[4] – Ext Protection		**52**	**1**	**3**	**Struct**			
	ExBlo1-I	52	1	3	Bit	0x1 (1)	-	Module Input State: External Blocking1
	ExBlo2-I	52	1	3	Bit	0x2 (2)	-	Module Input State: External Blocking2
	ExBlo TripCmd-I	52	1	3	Bit	0x4 (3)	-	Module Input State: External Blocking of the Trip Command
	Alarm-I	52	1	3	Bit	0x8 (4)	-	Module Input State: Alarm
	Trip-I	52	1	3	Bit	0x10 (5)	-	Module Input State: Trip
	Active	52	1	3	Bit	0x20 (6)	-	Signal: Active
	ExBlo	52	1	3	Bit	0x40 (7)	-	Signal: External Blocking
	Blo TripCmd	52	1	3	Bit	0x80 (8)	-	Signal: Trip Command blocked
	ExBlo TripCmd	52	1	3	Bit	0x100	-	Signal: External Blocking of the Trip Command

Module (ANSI / IEEE)	Name Function	Start Register Address	No. of Modbus Registers	Function code	Format	Bit Mask (Bit position)	Unit	Description
						(9)		
	Alarm	52	1	3	Bit	0x200 (10)	-	Signal: Alarm
	Trip (*)	52	1	3	Bit	0x400 (11)	-	Signal: Trip
	TripCmd (*)	52	1	3	Bit	0x800 (12)	-	Signal: Trip Command
Fast Status Register		**5000**	**1**	**3**	**Struct**			
	Device Type	5000	1	3	Bit	0xffff (1)	-	Device type code for relationship between device name and its Modbus code. For Eaton E-Series: EDR-3000 - 2 EDR-5000 - 3 EMR-3000 - 4 EMR-3MP0 - 4 EMR-4000 - 5 EMR-5000 - 6 ETR-4000 - 8 ETR-5000 - 9 EGR-5000 - 12 EBR-3000 - 13
Fast Status Register		**5001**	**1**	**3**	**Struct**			

Module (ANSI / IEEE)	Name Function	Start Register Address	No. of Modbus Registers	Function code	Format	Bit Mask (Bit position)	Unit	Description
	Comm Version	5001	1	3	Bit	0xffff (1)	-	Modbus Communication version. This version number changes if something becomes incompatible between different Modbus releases.
Fast Status Register		**5002**	**1**	**3**	**Struct**			
	Config Bin Inp1-I	5002	1	3	Bit	0x1 (1)	-	State of the module input: Config Bin Inp
	Config Bin Inp2-I	5002	1	3	Bit	0x2 (2)	-	State of the module input: Config Bin Inp
	Config Bin Inp3-I	5002	1	3	Bit	0x4 (3)	-	State of the module input: Config Bin Inp
	Config Bin Inp4-I	5002	1	3	Bit	0x8 (4)	-	State of the module input: Config Bin Inp
	Config Bin Inp5-I	5002	1	3	Bit	0x10 (5)	-	State of the module input: Config Bin Inp
	Config Bin Inp6-I	5002	1	3	Bit	0x20 (6)	-	State of the module input: Config Bin Inp
	Config Bin Inp7-I	5002	1	3	Bit	0x40 (7)	-	State of the module input: Config Bin Inp
	Config Bin Inp8-I	5002	1	3	Bit	0x80 (8)	-	State of the module input: Config Bin Inp
	Config Bin Inp9-I	5002	1	3	Bit	0x100 (9)	-	State of the module input: Config Bin Inp

Module (ANSI / IEEE)	Name Function	Start Register Address	No. of Modbus Registers	Function code	Format	Bit Mask (Bit position)	Unit	Description
	Config Bin Inp10-I	5002	1	3	Bit	0x200 (10)	-	State of the module input: Config Bin Inp
	Config Bin Inp11-I	5002	1	3	Bit	0x400 (11)	-	State of the module input: Config Bin Inp
	Config Bin Inp12-I	5002	1	3	Bit	0x800 (12)	-	State of the module input: Config Bin Inp
	Config Bin Inp13-I	5002	1	3	Bit	0x1000 (13)	-	State of the module input: Config Bin Inp
	Config Bin Inp14-I	5002	1	3	Bit	0x2000 (14)	-	State of the module input: Config Bin Inp
	Config Bin Inp15-I	5002	1	3	Bit	0x4000 (15)	-	State of the module input: Config Bin Inp
	Config Bin Inp16-I	5002	1	3	Bit	0x8000 (16)	-	State of the module input: Config Bin Inp
Fast Status Register		**5003**	**1**	**3**	**Struct**			
	Config Bin Inp17-I	5003	1	3	Bit	0x1 (1)	-	State of the module input: Config Bin Inp
	Config Bin Inp18-I	5003	1	3	Bit	0x2 (2)	-	State of the module input: Config Bin Inp
	Config Bin Inp19-I	5003	1	3	Bit	0x4 (3)	-	State of the module input: Config Bin Inp

Module (ANSI / IEEE)	Name Function	Start Register Address	No. of Modbus Registers	Function code	Format	Bit Mask (Bit position)	Unit	Description
	Config Bin Inp20-I	5003	1	3	Bit	0x8 (4)	-	State of the module input: Config Bin Inp
	Config Bin Inp21-I	5003	1	3	Bit	0x10 (5)	-	State of the module input: Config Bin Inp
	Config Bin Inp22-I	5003	1	3	Bit	0x20 (6)	-	State of the module input: Config Bin Inp
	Config Bin Inp23-I	5003	1	3	Bit	0x40 (7)	-	State of the module input: Config Bin Inp
	Config Bin Inp24-I	5003	1	3	Bit	0x80 (8)	-	State of the module input: Config Bin Inp
	Config Bin Inp25-I	5003	1	3	Bit	0x100 (9)	-	State of the module input: Config Bin Inp
	Config Bin Inp26-I	5003	1	3	Bit	0x200 (10)	-	State of the module input: Config Bin Inp
	Config Bin Inp27-I	5003	1	3	Bit	0x400 (11)	-	State of the module input: Config Bin Inp
	Config Bin Inp28-I	5003	1	3	Bit	0x800 (12)	-	State of the module input: Config Bin Inp
	Config Bin Inp29-I	5003	1	3	Bit	0x1000 (13)	-	State of the module input: Config Bin Inp
	Config Bin Inp30-I	5003	1	3	Bit	0x2000	-	State of the module input: Config Bin Inp

Module (ANSI / IEEE)	Name Function	Start Register Address	No. of Modbus Registers	Function code	Format	Bit Mask (Bit position)	Unit	Description
						(14)		
	Config Bin Inp31-I	5003	1	3	Bit	0x4000 (15)	-	State of the module input: Config Bin Inp
	Config Bin Inp32-I	5003	1	3	Bit	0x8000 (16)	-	State of the module input: Config Bin Inp
Fast Status Register		**5004**	**1**	**3**	**Struct**			
	Trip Cause (*)	5004	1	3	Bit	0xffff (1)	-	Initial reason of trip. It is presented as an integer value and corresponds to the “Trip” entry in the fault record, which refers to the name of the protective module that tripped first. Look up the definition of these integer values (i. e. the mapping trip code number-->module name) in the “Cause of Trip” table within the SCADA documentation.
IH2 – Inrush		**22**	**1**	**3**	**Struct**			
	ExBlo1-I	22	1	3	Bit	0x1 (1)	-	Module Input State: External Blocking1
	ExBlo2-I	22	1	3	Bit	0x2 (2)	-	Module Input State: External Blocking2
	Active	22	1	3	Bit	0x4 (3)	-	Signal: Active
	ExBlo	22	1	3	Bit	0x8 (4)	-	Signal: External Blocking
	Blo Phase A	22	1	3	Bit	0x10 (5)	-	Signal: Blocked Phase A

Module (ANSI / IEEE)	Name Function	Start Register Address	No. of Modbus Registers	Function code	Format	Bit Mask (Bit position)	Unit	Description
	Blo Phase B	22	1	3	Bit	0x20 (6)	-	Signal: Blocked Phase B
	Blo Phase C	22	1	3	Bit	0x40 (7)	-	Signal: Blocked Phase C
	Blo IG meas	22	1	3	Bit	0x80 (8)	-	Signal: Blocking of the ground protection module (measured ground current)
	3-ph Blo	22	1	3	Bit	0x100 (9)	-	Signal: Inrush was detected in at least one phase - trip command blocked.
	Blo IG calc	22	1	3	Bit	0x200 (10)	-	Signal: Blocking of the ground protection module (calculated ground current)
IRIG-B		**148**	**1**	**3**	**Struct**			
	IRIG-B active	148	1	3	Bit	0x1 (1)	-	Signal: If there is no valid IRIG-B signal for 60 sec, IRIG-B is regarded as inactive.
	High-Low Invert	148	1	3	Bit	0x2 (2)	-	Signal: The High and Low signals of the IRIG-B are inverted. This does NOT mean that the wiring is faulty. If the wiring is faulty no IRIG-B signal will be detected.
Logic		**1100**	**1**	**3**	**Struct**			
	LE1.Gate Out	1100	1	3	Bit	0x1 (1)	-	Signal: Output of the logic gate
	LE1.Timer Out	1100	1	3	Bit	0x2 (2)	-	Signal: Timer Output
	LE1.Out	1100	1	3	Bit	0x4	-	Signal: Latched Output (Q)

Module (ANSI / IEEE)	Name Function	Start Register Address	No. of Modbus Registers	Function code	Format	Bit Mask (Bit position)	Unit	Description
						(3)		
	LE1.Out inverted	1100	1	3	Bit	0x8 (4)	-	Signal: Negated Latched Output (Q NOT)
	LE1.Gate In1-I	1100	1	3	Bit	0x10 (5)	-	State of the module input: Assignment of the Input Signal
	LE1.Gate In2-I	1100	1	3	Bit	0x20 (6)	-	State of the module input: Assignment of the Input Signal
	LE1.Gate In3-I	1100	1	3	Bit	0x40 (7)	-	State of the module input: Assignment of the Input Signal
	LE1.Gate In4-I	1100	1	3	Bit	0x80 (8)	-	State of the module input: Assignment of the Input Signal
	LE1.Reset Latch-I	1100	1	3	Bit	0x100 (9)	-	State of the module input: Reset Signal for the Latching
Logic		**1101**	**1**	**3**	**Struct**			
	LE2.Gate Out	1101	1	3	Bit	0x1 (1)	-	Signal: Output of the logic gate
	LE2.Timer Out	1101	1	3	Bit	0x2 (2)	-	Signal: Timer Output
	LE2.Out	1101	1	3	Bit	0x4 (3)	-	Signal: Latched Output (Q)
	LE2.Out inverted	1101	1	3	Bit	0x8 (4)	-	Signal: Negated Latched Output (Q NOT)

Module (ANSI / IEEE)	Name Function	Start Register Address	No. of Modbus Registers	Function code	Format	Bit Mask (Bit position)	Unit	Description
	LE2.Gate In1-I	1101	1	3	Bit	0x10 (5)	-	State of the module input: Assignment of the Input Signal
	LE2.Gate In2-I	1101	1	3	Bit	0x20 (6)	-	State of the module input: Assignment of the Input Signal
	LE2.Gate In3-I	1101	1	3	Bit	0x40 (7)	-	State of the module input: Assignment of the Input Signal
	LE2.Gate In4-I	1101	1	3	Bit	0x80 (8)	-	State of the module input: Assignment of the Input Signal
	LE2.Reset Latch-I	1101	1	3	Bit	0x100 (9)	-	State of the module input: Reset Signal for the Latching
Logic		**1102**	**1**	**3**	**Struct**			
	LE3.Gate Out	1102	1	3	Bit	0x1 (1)	-	Signal: Output of the logic gate
	LE3.Timer Out	1102	1	3	Bit	0x2 (2)	-	Signal: Timer Output
	LE3.Out	1102	1	3	Bit	0x4 (3)	-	Signal: Latched Output (Q)
	LE3.Out inverted	1102	1	3	Bit	0x8 (4)	-	Signal: Negated Latched Output (Q NOT)
	LE3.Gate In1-I	1102	1	3	Bit	0x10 (5)	-	State of the module input: Assignment of the Input Signal

Module (ANSI / IEEE)	Name Function	Start Register Address	No. of Modbus Registers	Function code	Format	Bit Mask (Bit position)	Unit	Description
	LE3.Gate In2-I	1102	1	3	Bit	0x20 (6)	-	State of the module input: Assignment of the Input Signal
	LE3.Gate In3-I	1102	1	3	Bit	0x40 (7)	-	State of the module input: Assignment of the Input Signal
	LE3.Gate In4-I	1102	1	3	Bit	0x80 (8)	-	State of the module input: Assignment of the Input Signal
	LE3.Reset Latch-I	1102	1	3	Bit	0x100 (9)	-	State of the module input: Reset Signal for the Latching
Logic		**1103**	**1**	**3**	**Struct**			
	LE4.Gate Out	1103	1	3	Bit	0x1 (1)	-	Signal: Output of the logic gate
	LE4.Timer Out	1103	1	3	Bit	0x2 (2)	-	Signal: Timer Output
	LE4.Out	1103	1	3	Bit	0x4 (3)	-	Signal: Latched Output (Q)
	LE4.Out inverted	1103	1	3	Bit	0x8 (4)	-	Signal: Negated Latched Output (Q NOT)
	LE4.Gate In1-I	1103	1	3	Bit	0x10 (5)	-	State of the module input: Assignment of the Input Signal
	LE4.Gate In2-I	1103	1	3	Bit	0x20 (6)	-	State of the module input: Assignment of the Input Signal

Module (ANSI / IEEE)	Name Function	Start Register Address	No. of Modbus Registers	Function code	Format	Bit Mask (Bit position)	Unit	Description
	LE4.Gate In3-I	1103	1	3	Bit	0x40 (7)	-	State of the module input: Assignment of the Input Signal
	LE4.Gate In4-I	1103	1	3	Bit	0x80 (8)	-	State of the module input: Assignment of the Input Signal
	LE4.Reset Latch-I	1103	1	3	Bit	0x100 (9)	-	State of the module input: Reset Signal for the Latching
Logic		**1104**	**1**	**3**	**Struct**			
	LE5.Gate Out	1104	1	3	Bit	0x1 (1)	-	Signal: Output of the logic gate
	LE5.Timer Out	1104	1	3	Bit	0x2 (2)	-	Signal: Timer Output
	LE5.Out	1104	1	3	Bit	0x4 (3)	-	Signal: Latched Output (Q)
	LE5.Out inverted	1104	1	3	Bit	0x8 (4)	-	Signal: Negated Latched Output (Q NOT)
	LE5.Gate In1-I	1104	1	3	Bit	0x10 (5)	-	State of the module input: Assignment of the Input Signal
	LE5.Gate In2-I	1104	1	3	Bit	0x20 (6)	-	State of the module input: Assignment of the Input Signal
	LE5.Gate In3-I	1104	1	3	Bit	0x40 (7)	-	State of the module input: Assignment of the Input Signal

Module (ANSI / IEEE)	Name Function	Start Register Address	No. of Modbus Registers	Function code	Format	Bit Mask (Bit position)	Unit	Description
	LE5.Gate In4-I	1104	1	3	Bit	0x80 (8)	-	State of the module input: Assignment of the Input Signal
	LE5.Reset Latch-I	1104	1	3	Bit	0x100 (9)	-	State of the module input: Reset Signal for the Latching
Logic		**1105**	**1**	**3**	**Struct**			
	LE6.Gate Out	1105	1	3	Bit	0x1 (1)	-	Signal: Output of the logic gate
	LE6.Timer Out	1105	1	3	Bit	0x2 (2)	-	Signal: Timer Output
	LE6.Out	1105	1	3	Bit	0x4 (3)	-	Signal: Latched Output (Q)
	LE6.Out inverted	1105	1	3	Bit	0x8 (4)	-	Signal: Negated Latched Output (Q NOT)
	LE6.Gate In1-I	1105	1	3	Bit	0x10 (5)	-	State of the module input: Assignment of the Input Signal
	LE6.Gate In2-I	1105	1	3	Bit	0x20 (6)	-	State of the module input: Assignment of the Input Signal
	LE6.Gate In3-I	1105	1	3	Bit	0x40 (7)	-	State of the module input: Assignment of the Input Signal
	LE6.Gate In4-I	1105	1	3	Bit	0x80 (8)	-	State of the module input: Assignment of the Input Signal

Module (ANSI / IEEE)	Name Function	Start Register Address	No. of Modbus Registers	Function code	Format	Bit Mask (Bit position)	Unit	Description
	LE6.Reset Latch-I	1105	1	3	Bit	0x100 (9)	-	State of the module input: Reset Signal for the Latching
Logic		**1106**	**1**	**3**	**Struct**			
	LE7.Gate Out	1106	1	3	Bit	0x1 (1)	-	Signal: Output of the logic gate
	LE7.Timer Out	1106	1	3	Bit	0x2 (2)	-	Signal: Timer Output
	LE7.Out	1106	1	3	Bit	0x4 (3)	-	Signal: Latched Output (Q)
	LE7.Out inverted	1106	1	3	Bit	0x8 (4)	-	Signal: Negated Latched Output (Q NOT)
	LE7.Gate In1-I	1106	1	3	Bit	0x10 (5)	-	State of the module input: Assignment of the Input Signal
	LE7.Gate In2-I	1106	1	3	Bit	0x20 (6)	-	State of the module input: Assignment of the Input Signal
	LE7.Gate In3-I	1106	1	3	Bit	0x40 (7)	-	State of the module input: Assignment of the Input Signal
	LE7.Gate In4-I	1106	1	3	Bit	0x80 (8)	-	State of the module input: Assignment of the Input Signal
	LE7.Reset Latch-I	1106	1	3	Bit	0x100 (9)	-	State of the module input: Reset Signal for the Latching
Logic		**1107**	**1**	**3**	**Struct**			

Module (ANSI / IEEE)	Name Function	Start Register Address	No. of Modbus Registers	Function code	Format	Bit Mask (Bit position)	Unit	Description
	LE8.Gate Out	1107	1	3	Bit	0x1 (1)	-	Signal: Output of the logic gate
	LE8.Timer Out	1107	1	3	Bit	0x2 (2)	-	Signal: Timer Output
	LE8.Out	1107	1	3	Bit	0x4 (3)	-	Signal: Latched Output (Q)
	LE8.Out inverted	1107	1	3	Bit	0x8 (4)	-	Signal: Negated Latched Output (Q NOT)
	LE8.Gate In1-I	1107	1	3	Bit	0x10 (5)	-	State of the module input: Assignment of the Input Signal
	LE8.Gate In2-I	1107	1	3	Bit	0x20 (6)	-	State of the module input: Assignment of the Input Signal
	LE8.Gate In3-I	1107	1	3	Bit	0x40 (7)	-	State of the module input: Assignment of the Input Signal
	LE8.Gate In4-I	1107	1	3	Bit	0x80 (8)	-	State of the module input: Assignment of the Input Signal
	LE8.Reset Latch-I	1107	1	3	Bit	0x100 (9)	-	State of the module input: Reset Signal for the Latching
Logic		**1108**	**1**	**3**	**Struct**			
	LE9.Gate Out	1108	1	3	Bit	0x1 (1)	-	Signal: Output of the logic gate
	LE9.Timer Out	1108	1	3	Bit	0x2	-	Signal: Timer Output

Module (ANSI / IEEE)	Name Function	Start Register Address	No. of Modbus Registers	Function code	Format	Bit Mask (Bit position)	Unit	Description
						(2)		
	LE9.Out	1108	1	3	Bit	0x4 (3)	-	Signal: Latched Output (Q)
	LE9.Out inverted	1108	1	3	Bit	0x8 (4)	-	Signal: Negated Latched Output (Q NOT)
	LE9.Gate In1-I	1108	1	3	Bit	0x10 (5)	-	State of the module input: Assignment of the Input Signal
	LE9.Gate In2-I	1108	1	3	Bit	0x20 (6)	-	State of the module input: Assignment of the Input Signal
	LE9.Gate In3-I	1108	1	3	Bit	0x40 (7)	-	State of the module input: Assignment of the Input Signal
	LE9.Gate In4-I	1108	1	3	Bit	0x80 (8)	-	State of the module input: Assignment of the Input Signal
	LE9.Reset Latch-I	1108	1	3	Bit	0x100 (9)	-	State of the module input: Reset Signal for the Latching
Logic		**1109**	**1**	**3**	**Struct**			
	LE10.Gate Out	1109	1	3	Bit	0x1 (1)	-	Signal: Output of the logic gate
	LE10.Timer Out	1109	1	3	Bit	0x2 (2)	-	Signal: Timer Output
	LE10.Out	1109	1	3	Bit	0x4 (3)	-	Signal: Latched Output (Q)

Module (ANSI / IEEE)	Name Function	Start Register Address	No. of Modbus Registers	Function code	Format	Bit Mask (Bit position)	Unit	Description
	LE10.Out inverted	1109	1	3	Bit	0x8 (4)	-	Signal: Negated Latched Output (Q NOT)
	LE10.Gate In1-I	1109	1	3	Bit	0x10 (5)	-	State of the module input: Assignment of the Input Signal
	LE10.Gate In2-I	1109	1	3	Bit	0x20 (6)	-	State of the module input: Assignment of the Input Signal
	LE10.Gate In3-I	1109	1	3	Bit	0x40 (7)	-	State of the module input: Assignment of the Input Signal
	LE10.Gate In4-I	1109	1	3	Bit	0x80 (8)	-	State of the module input: Assignment of the Input Signal
	LE10.Reset Latch-I	1109	1	3	Bit	0x100 (9)	-	State of the module input: Reset Signal for the Latching
Logic		**1110**	**1**	**3**	**Struct**			
	LE11.Gate Out	1110	1	3	Bit	0x1 (1)	-	Signal: Output of the logic gate
	LE11.Timer Out	1110	1	3	Bit	0x2 (2)	-	Signal: Timer Output
	LE11.Out	1110	1	3	Bit	0x4 (3)	-	Signal: Latched Output (Q)
	LE11.Out inverted	1110	1	3	Bit	0x8 (4)	-	Signal: Negated Latched Output (Q NOT)

Module (ANSI / IEEE)	Name Function	Start Register Address	No. of Modbus Registers	Function code	Format	Bit Mask (Bit position)	Unit	Description
	LE11.Gate In1-I	1110	1	3	Bit	0x10 (5)	-	State of the module input: Assignment of the Input Signal
	LE11.Gate In2-I	1110	1	3	Bit	0x20 (6)	-	State of the module input: Assignment of the Input Signal
	LE11.Gate In3-I	1110	1	3	Bit	0x40 (7)	-	State of the module input: Assignment of the Input Signal
	LE11.Gate In4-I	1110	1	3	Bit	0x80 (8)	-	State of the module input: Assignment of the Input Signal
	LE11.Reset Latch-I	1110	1	3	Bit	0x100 (9)	-	State of the module input: Reset Signal for the Latching
Logic		**1111**	**1**	**3**	**Struct**			
	LE12.Gate Out	1111	1	3	Bit	0x1 (1)	-	Signal: Output of the logic gate
	LE12.Timer Out	1111	1	3	Bit	0x2 (2)	-	Signal: Timer Output
	LE12.Out	1111	1	3	Bit	0x4 (3)	-	Signal: Latched Output (Q)
	LE12.Out inverted	1111	1	3	Bit	0x8 (4)	-	Signal: Negated Latched Output (Q NOT)
	LE12.Gate In1-I	1111	1	3	Bit	0x10 (5)	-	State of the module input: Assignment of the Input Signal

Module (ANSI / IEEE)	Name Function	Start Register Address	No. of Modbus Registers	Function code	Format	Bit Mask (Bit position)	Unit	Description
	LE12.Gate In2-I	1111	1	3	Bit	0x20 (6)	-	State of the module input: Assignment of the Input Signal
	LE12.Gate In3-I	1111	1	3	Bit	0x40 (7)	-	State of the module input: Assignment of the Input Signal
	LE12.Gate In4-I	1111	1	3	Bit	0x80 (8)	-	State of the module input: Assignment of the Input Signal
	LE12.Reset Latch-I	1111	1	3	Bit	0x100 (9)	-	State of the module input: Reset Signal for the Latching
Logic		**1112**	**1**	**3**	**Struct**			
	LE13.Gate Out	1112	1	3	Bit	0x1 (1)	-	Signal: Output of the logic gate
	LE13.Timer Out	1112	1	3	Bit	0x2 (2)	-	Signal: Timer Output
	LE13.Out	1112	1	3	Bit	0x4 (3)	-	Signal: Latched Output (Q)
	LE13.Out inverted	1112	1	3	Bit	0x8 (4)	-	Signal: Negated Latched Output (Q NOT)
	LE13.Gate In1-I	1112	1	3	Bit	0x10 (5)	-	State of the module input: Assignment of the Input Signal
	LE13.Gate In2-I	1112	1	3	Bit	0x20 (6)	-	State of the module input: Assignment of the Input Signal

Module (ANSI / IEEE)	Name Function	Start Register Address	No. of Modbus Registers	Function code	Format	Bit Mask (Bit position)	Unit	Description
	LE13.Gate In3-I	1112	1	3	Bit	0x40 (7)	-	State of the module input: Assignment of the Input Signal
	LE13.Gate In4-I	1112	1	3	Bit	0x80 (8)	-	State of the module input: Assignment of the Input Signal
	LE13.Reset Latch-I	1112	1	3	Bit	0x100 (9)	-	State of the module input: Reset Signal for the Latching
Logic		**1113**	**1**	**3**	**Struct**			
	LE14.Gate Out	1113	1	3	Bit	0x1 (1)	-	Signal: Output of the logic gate
	LE14.Timer Out	1113	1	3	Bit	0x2 (2)	-	Signal: Timer Output
	LE14.Out	1113	1	3	Bit	0x4 (3)	-	Signal: Latched Output (Q)
	LE14.Out inverted	1113	1	3	Bit	0x8 (4)	-	Signal: Negated Latched Output (Q NOT)
	LE14.Gate In1-I	1113	1	3	Bit	0x10 (5)	-	State of the module input: Assignment of the Input Signal
	LE14.Gate In2-I	1113	1	3	Bit	0x20 (6)	-	State of the module input: Assignment of the Input Signal
	LE14.Gate In3-I	1113	1	3	Bit	0x40 (7)	-	State of the module input: Assignment of the Input Signal

Module (ANSI / IEEE)	Name Function	Start Register Address	No. of Modbus Registers	Function code	Format	Bit Mask (Bit position)	Unit	Description
	LE14.Gate In4-I	1113	1	3	Bit	0x80 (8)	-	State of the module input: Assignment of the Input Signal
	LE14.Reset Latch-I	1113	1	3	Bit	0x100 (9)	-	State of the module input: Reset Signal for the Latching
Logic		**1114**	**1**	**3**	**Struct**			
	LE15.Gate Out	1114	1	3	Bit	0x1 (1)	-	Signal: Output of the logic gate
	LE15.Timer Out	1114	1	3	Bit	0x2 (2)	-	Signal: Timer Output
	LE15.Out	1114	1	3	Bit	0x4 (3)	-	Signal: Latched Output (Q)
	LE15.Out inverted	1114	1	3	Bit	0x8 (4)	-	Signal: Negated Latched Output (Q NOT)
	LE15.Gate In1-I	1114	1	3	Bit	0x10 (5)	-	State of the module input: Assignment of the Input Signal
	LE15.Gate In2-I	1114	1	3	Bit	0x20 (6)	-	State of the module input: Assignment of the Input Signal
	LE15.Gate In3-I	1114	1	3	Bit	0x40 (7)	-	State of the module input: Assignment of the Input Signal
	LE15.Gate In4-I	1114	1	3	Bit	0x80 (8)	-	State of the module input: Assignment of the Input Signal

Module (ANSI / IEEE)	Name Function	Start Register Address	No. of Modbus Registers	Function code	Format	Bit Mask (Bit position)	Unit	Description
	LE15.Reset Latch-I	1114	1	3	Bit	0x100 (9)	-	State of the module input: Reset Signal for the Latching
Logic		**1115**	**1**	**3**	**Struct**			
	LE16.Gate Out	1115	1	3	Bit	0x1 (1)	-	Signal: Output of the logic gate
	LE16.Timer Out	1115	1	3	Bit	0x2 (2)	-	Signal: Timer Output
	LE16.Out	1115	1	3	Bit	0x4 (3)	-	Signal: Latched Output (Q)
	LE16.Out inverted	1115	1	3	Bit	0x8 (4)	-	Signal: Negated Latched Output (Q NOT)
	LE16.Gate In1-I	1115	1	3	Bit	0x10 (5)	-	State of the module input: Assignment of the Input Signal
	LE16.Gate In2-I	1115	1	3	Bit	0x20 (6)	-	State of the module input: Assignment of the Input Signal
	LE16.Gate In3-I	1115	1	3	Bit	0x40 (7)	-	State of the module input: Assignment of the Input Signal
	LE16.Gate In4-I	1115	1	3	Bit	0x80 (8)	-	State of the module input: Assignment of the Input Signal
	LE16.Reset Latch-I	1115	1	3	Bit	0x100 (9)	-	State of the module input: Reset Signal for the Latching
Logic		**1116**	**1**	**3**	**Struct**			

Module (ANSI / IEEE)	Name Function	Start Register Address	No. of Modbus Registers	Function code	Format	Bit Mask (Bit position)	Unit	Description
	LE17.Gate Out	1116	1	3	Bit	0x1 (1)	-	Signal: Output of the logic gate
	LE17.Timer Out	1116	1	3	Bit	0x2 (2)	-	Signal: Timer Output
	LE17.Out	1116	1	3	Bit	0x4 (3)	-	Signal: Latched Output (Q)
	LE17.Out inverted	1116	1	3	Bit	0x8 (4)	-	Signal: Negated Latched Output (Q NOT)
	LE17.Gate In1-I	1116	1	3	Bit	0x10 (5)	-	State of the module input: Assignment of the Input Signal
	LE17.Gate In2-I	1116	1	3	Bit	0x20 (6)	-	State of the module input: Assignment of the Input Signal
	LE17.Gate In3-I	1116	1	3	Bit	0x40 (7)	-	State of the module input: Assignment of the Input Signal
	LE17.Gate In4-I	1116	1	3	Bit	0x80 (8)	-	State of the module input: Assignment of the Input Signal
	LE17.Reset Latch-I	1116	1	3	Bit	0x100 (9)	-	State of the module input: Reset Signal for the Latching
Logic		**1117**	**1**	**3**	**Struct**			
	LE18.Gate Out	1117	1	3	Bit	0x1 (1)	-	Signal: Output of the logic gate
	LE18.Timer Out	1117	1	3	Bit	0x2	-	Signal: Timer Output

Module (ANSI / IEEE)	Name Function	Start Register Address	No. of Modbus Registers	Function code	Format	Bit Mask (Bit position)	Unit	Description
						(2)		
	LE18.Out	1117	1	3	Bit	0x4 (3)	-	Signal: Latched Output (Q)
	LE18.Out inverted	1117	1	3	Bit	0x8 (4)	-	Signal: Negated Latched Output (Q NOT)
	LE18.Gate In1-I	1117	1	3	Bit	0x10 (5)	-	State of the module input: Assignment of the Input Signal
	LE18.Gate In2-I	1117	1	3	Bit	0x20 (6)	-	State of the module input: Assignment of the Input Signal
	LE18.Gate In3-I	1117	1	3	Bit	0x40 (7)	-	State of the module input: Assignment of the Input Signal
	LE18.Gate In4-I	1117	1	3	Bit	0x80 (8)	-	State of the module input: Assignment of the Input Signal
	LE18.Reset Latch-I	1117	1	3	Bit	0x100 (9)	-	State of the module input: Reset Signal for the Latching
Logic		**1118**	**1**	**3**	**Struct**			
	LE19.Gate Out	1118	1	3	Bit	0x1 (1)	-	Signal: Output of the logic gate
	LE19.Timer Out	1118	1	3	Bit	0x2 (2)	-	Signal: Timer Output
	LE19.Out	1118	1	3	Bit	0x4 (3)	-	Signal: Latched Output (Q)

Module (ANSI / IEEE)	Name Function	Start Register Address	No. of Modbus Registers	Function code	Format	Bit Mask (Bit position)	Unit	Description
	LE19.Out inverted	1118	1	3	Bit	0x8 (4)	-	Signal: Negated Latched Output (Q NOT)
	LE19.Gate In1-I	1118	1	3	Bit	0x10 (5)	-	State of the module input: Assignment of the Input Signal
	LE19.Gate In2-I	1118	1	3	Bit	0x20 (6)	-	State of the module input: Assignment of the Input Signal
	LE19.Gate In3-I	1118	1	3	Bit	0x40 (7)	-	State of the module input: Assignment of the Input Signal
	LE19.Gate In4-I	1118	1	3	Bit	0x80 (8)	-	State of the module input: Assignment of the Input Signal
	LE19.Reset Latch-I	1118	1	3	Bit	0x100 (9)	-	State of the module input: Reset Signal for the Latching
Logic		**1119**	**1**	**3**	**Struct**			
	LE20.Gate Out	1119	1	3	Bit	0x1 (1)	-	Signal: Output of the logic gate
	LE20.Timer Out	1119	1	3	Bit	0x2 (2)	-	Signal: Timer Output
	LE20.Out	1119	1	3	Bit	0x4 (3)	-	Signal: Latched Output (Q)
	LE20.Out inverted	1119	1	3	Bit	0x8 (4)	-	Signal: Negated Latched Output (Q NOT)

Module (ANSI / IEEE)	Name Function	Start Register Address	No. of Modbus Registers	Function code	Format	Bit Mask (Bit position)	Unit	Description
	LE20.Gate In1-I	1119	1	3	Bit	0x10 (5)	-	State of the module input: Assignment of the Input Signal
	LE20.Gate In2-I	1119	1	3	Bit	0x20 (6)	-	State of the module input: Assignment of the Input Signal
	LE20.Gate In3-I	1119	1	3	Bit	0x40 (7)	-	State of the module input: Assignment of the Input Signal
	LE20.Gate In4-I	1119	1	3	Bit	0x80 (8)	-	State of the module input: Assignment of the Input Signal
	LE20.Reset Latch-I	1119	1	3	Bit	0x100 (9)	-	State of the module input: Reset Signal for the Latching
Modbus		**1005**	**1**	**3**	**Struct**			
	Comm Cmd 1	1005	1	3	Bit	0x1 (1)	-	Communication Command
	Comm Cmd 2	1005	1	3	Bit	0x2 (2)	-	Communication Command
	Comm Cmd 3	1005	1	3	Bit	0x4 (3)	-	Communication Command
	Comm Cmd 4	1005	1	3	Bit	0x8 (4)	-	Communication Command
	Comm Cmd 5	1005	1	3	Bit	0x10 (5)	-	Communication Command
	Comm Cmd 6	1005	1	3	Bit	0x20	-	Communication Command

Module (ANSI / IEEE)	Name Function	Start Register Address	No. of Modbus Registers	Function code	Format	Bit Mask (Bit position)	Unit	Description
						(6)		
	Comm Cmd 7	1005	1	3	Bit	0x40 (7)	-	Communication Command
	Comm Cmd 8	1005	1	3	Bit	0x80 (8)	-	Communication Command
	Comm Cmd 9	1005	1	3	Bit	0x100 (9)	-	Communication Command
	Comm Cmd 10	1005	1	3	Bit	0x200 (10)	-	Communication Command
	Comm Cmd 11	1005	1	3	Bit	0x400 (11)	-	Communication Command
	Comm Cmd 12	1005	1	3	Bit	0x800 (12)	-	Communication Command
	Comm Cmd 13	1005	1	3	Bit	0x1000 (13)	-	Communication Command
	Comm Cmd 14	1005	1	3	Bit	0x2000 (14)	-	Communication Command
	Comm Cmd 15	1005	1	3	Bit	0x4000 (15)	-	Communication Command
	Comm Cmd 16	1005	1	3	Bit	0x8000 (16)	-	Communication Command
PSet-Switch		**59**	**1**	**3**	**Struct**			

Module (ANSI / IEEE)	Name Function	Start Register Address	No. of Modbus Registers	Function code	Format	Bit Mask (Bit position)	Unit	Description
	PS 1	59	1	3	Bit	0x1 (1)	-	Signal: The currently active Parameter Set is PS 1
	PS 2	59	1	3	Bit	0x2 (2)	-	Signal: The currently active Parameter Set is PS 2
	PS 3	59	1	3	Bit	0x4 (3)	-	Signal: The currently active Parameter Set is PS 3
	PS 4	59	1	3	Bit	0x8 (4)	-	Signal: The currently active Parameter Set is PS 4
	PSS manual	59	1	3	Bit	0x10 (5)	-	Signal: Manual switch over of a Parameter Set
	PSS via Comm	59	1	3	Bit	0x20 (6)	-	Signal: Parameter Set Switch via Scada. Write into this output byte the integer of the parameter set that should become active (e.g. 4 => Switch onto parameter set 4).
	PSS via Inp fct	59	1	3	Bit	0x40 (7)	-	Signal: Parameter Set Switch via Input Function
	PS1-I	59	1	3	Bit	0x80 (8)	-	State of the module input, respectively of the signal, that should activate this Parameter Setting Group.
	PS2-I	59	1	3	Bit	0x100 (9)	-	State of the module input, respectively of the signal, that should activate this Parameter Setting Group.
	PS3-I	59	1	3	Bit	0x200 (10)	-	State of the module input, respectively of the signal, that should activate this Parameter Setting Group.

Module (ANSI / IEEE)	Name Function	Start Register Address	No. of Modbus Registers	Function code	Format	Bit Mask (Bit position)	Unit	Description
	PS4-I	59	1	3	Bit	0x400 (11)	-	State of the module input, respectively of the signal, that should activate this Parameter Setting Group.
	Min. 1 param changed (*)	59	1	3	Bit	0x800 (12)	-	Signal: At least one parameter has been changed
Prot		**1**	**1**	**3**	**Struct**			
	ExBlo1-I	1	1	3	Bit	0x1 (1)	-	Module Input State: External Blocking1
	ExBlo2-I	1	1	3	Bit	0x2 (2)	-	Module Input State: External Blocking2
	Active	1	1	3	Bit	0x4 (3)	-	Signal: Active
	ExBlo	1	1	3	Bit	0x8 (4)	-	Signal: External Blocking
	Pickup Phase A	1	1	3	Bit	0x10 (5)	-	Signal: General Pickup Phase A
	Pickup Phase B	1	1	3	Bit	0x20 (6)	-	Signal: General Pickup Phase B
	Pickup Phase C	1	1	3	Bit	0x40 (7)	-	Signal: General Pickup Phase C
	Pickup IX or IR	1	1	3	Bit	0x80 (8)	-	Signal: General Pickup - Ground Fault
	Pickup	1	1	3	Bit	0x100	-	Signal: General Pickup

Module (ANSI / IEEE)	Name Function	Start Register Address	No. of Modbus Registers	Function code	Format	Bit Mask (Bit position)	Unit	Description
						(9)		
	Trip Phase A (*)	1	1	3	Bit	0x200 (10)	-	Signal: General Trip Phase A
	Trip Phase B (*)	1	1	3	Bit	0x400 (11)	-	Signal: General Trip Phase B
	Trip Phase C (*)	1	1	3	Bit	0x800 (12)	-	Signal: General Trip Phase C
	Trip IX or IR (*)	1	1	3	Bit	0x1000 (13)	-	Signal: General Trip Ground Fault
	Trip (*)	1	1	3	Bit	0x2000 (14)	-	Signal: General Trip
Prot		**57**	**1**	**3**	**Struct**			
	Fault No.	57	1	3	Bit	0xffff (1)	-	Waveform number
Prot		**58**	**1**	**3**	**Struct**			
	No of Grid Faults	58	1	3	Bit	0xffff (1)	-	Number of grid faults: This is a counter for all faults (i.e. General Pickups »Prot . Pickup«), but except faults during a running cycle of the Automatic Reclosure module (signal »AR . Running«). (Remark: The »Fault No.« counts every new fault independent of AR cycles. This means that for protective devices without AR module these two counters are equivalent.)

Module (ANSI / IEEE)	Name Function	Start Register Address	No. of Modbus Registers	Function code	Format	Bit Mask (Bit position)	Unit	Description
RO-3 X2 – 3 und Life MK Reduced		**1003**	**1**	**3**	**Struct**			
	RO 1	1003	1	3	Bit	0x4 (3)	-	Signal: Relay Output
	RO 2	1003	1	3	Bit	0x8 (4)	-	Signal: Relay Output
	RO 3	1003	1	3	Bit	0x10 (5)	-	Signal: Relay Output
	DISARMED!	1003	1	3	Bit	0x40 (7)	-	Signal: CAUTION! RELAYS DISARMED in order to safely perform maintenance while eliminating the risk of taking an entire process off-line. (Note: Zone Interlocking and Supervision Contact cannot be disarmed). YOU MUST ENSURE that the relays are ARMED AGAIN after maintenance
	Outs forced	1003	1	3	Bit	0x80 (8)	-	Signal: The State of at least one Relay Output has been set by force. That means that the state of at least one Relay is forced and hence does not show the state of the assigned signals.
RO-3ZI X2		**155**	**1**	**3**	**Struct**			
	DISARMED!	155	1	3	Bit	0x1 (1)	-	Signal: CAUTION! RELAYS DISARMED in order to safely perform maintenance while eliminating the risk of taking an entire process off-line. (Note: Zone Interlocking and Supervision Contact cannot be disarmed). YOU MUST ENSURE that the relays are ARMED AGAIN after maintenance
	Outs forced	155	1	3	Bit	0x2 (2)	-	Signal: The State of at least one Relay Output has been set by force. That means that the state of at least one

Module (ANSI / IEEE)	Name Function	Start Register Address	No. of Modbus Registers	Function code	Format	Bit Mask (Bit position)	Unit	Description
								Relay is forced and hence does not show the state of the assigned signals.
	ZI OUT	155	1	3	Bit	0x4 (3)	-	Signal: Zone Interlocking OUT
	RO 1	155	1	3	Bit	0x8 (4)	-	Signal: Relay Output
	RO 2	155	1	3	Bit	0x10 (5)	-	Signal: Relay Output
	RO 3	155	1	3	Bit	0x20 (6)	-	Signal: Relay Output
RO-5 X2 – MK IRIG (unten)		**1004**	**1**	**3**	**Struct**			
	RO 1	1004	1	3	Bit	0x1 (1)	-	Signal: Relay Output
	RO 2	1004	1	3	Bit	0x2 (2)	-	Signal: Relay Output
	RO 3	1004	1	3	Bit	0x4 (3)	-	Signal: Relay Output
	RO 4	1004	1	3	Bit	0x8 (4)	-	Signal: Relay Output
	RO 5	1004	1	3	Bit	0x10 (5)	-	Signal: Relay Output
	DISARMED!	1004	1	3	Bit	0x40	-	Signal: CAUTION! RELAYS DISARMED in order to safely perform maintenance

Module (ANSI / IEEE)	Name Function	Start Register Address	No. of Modbus Registers	Function code	Format	Bit Mask (Bit position)	Unit	Description
						(7)		while eliminating the risk of taking an entire process off-line. (Note: Zone Interlocking and Supervision Contact cannot be disarmed). YOU MUST ENSURE that the relays are ARMED AGAIN after maintenance
	Outs forced	1004	1	3	Bit	0x80 (8)	-	Signal: The State of at least one Relay Output has been set by force. That means that the state of at least one Relay is forced and hence does not show the state of the assigned signals.
SOTF – Switch Onto Fault		**65**	**1**	**3**	**Struct**			
	ExBlo1-I	65	1	3	Bit	0x1 (1)	-	Module Input State: External Blocking
	ExBlo2-I	65	1	3	Bit	0x2 (2)	-	Module Input State: External Blocking
	Ext SOTF-I	65	1	3	Bit	0x4 (3)	-	Module Input State: External Switch Onto Fault Alarm
	Rvs Blo-I	65	1	3	Bit	0x8 (4)	-	Module Input State: Reverse Blocking
	Active	65	1	3	Bit	0x10 (5)	-	Signal: Active
	ExBlo	65	1	3	Bit	0x20 (6)	-	Signal: External Blocking
	Rvs Blo	65	1	3	Bit	0x40 (7)	-	Signal: Reverse Blocking
	AR Blo	65	1	3	Bit	0x400	-	Signal: Blocked by AR

Module (ANSI / IEEE)	Name Function	Start Register Address	No. of Modbus Registers	Function code	Format	Bit Mask (Bit position)	Unit	Description
						(11)		
	enabled	65	1	3	Bit	0x800 (12)	-	Signal: Switch Onto Fault enabled. This Signal can be used to modify Overcurrent Protection Settings.
	I<	65	1	3	Bit	0x2000 (14)	-	Signal: No Load Current.
SSV		**273**	**1**	**3**	**Struct**			
	System Error	273	1	3	Bit	0x1 (1)	-	Signal: Device Failure
	New error (*)	273	1	3	Bit	0x8 (4)	-	Signal: A new error message has been issued.
	New warning (*)	273	1	3	Bit	0x10 (5)	-	Signal: A new warning message has been issued.
	Active	273	1	3	Bit	0x20 (6)	-	Signal: Active
Sgen		**1012**	**1**	**3**	**Struct**			
	ExBlo1-I	1012	1	3	Bit	0x1 (1)	-	Module Input State: External Blocking1
	Ex ForcePost-I	1012	1	3	Bit	0x2 (2)	-	State of the module input:Force Post state. Abort simulation.
	Running	1012	1	3	Bit	0x10 (5)	-	Signal: Measuring value simulation is running

Module (ANSI / IEEE)	Name Function	Start Register Address	No. of Modbus Registers	Function code	Format	Bit Mask (Bit position)	Unit	Description
	State	1012	1	3	Bit	0xe0 (6)	-	Signal: Wave generation states: 0=Off, 1=PreFault, 2=Fault, 3=PostFault, 4=InitReset
	Ex Start Simulation-I	1012	1	3	Bit	0x100 (9)	-	State of the module input:External Start of Fault Simulation (Using the test parameters)
	ExBlo2-I	1012	1	3	Bit	0x200 (10)	-	Module Input State: External Blocking2
	Manual Start	1012	1	3	Bit	0x400 (11)	-	Fault Simulation has been started manually.
	Manual Stop	1012	1	3	Bit	0x800 (12)	-	Fault Simulation has been stopped manually.
	Started	1012	1	3	Bit	0x1000 (13)	-	Fault Simulation has been started
	Stopped	1012	1	3	Bit	0x2000 (14)	-	Fault Simulation has been stopped
Sys		**154**	**1**	**3**	**Struct**			
	Maint Mode Active	154	1	3	Bit	0x1 (1)	-	Signal: Arc Flash Reduction Maintenance Active
	MaintMode Manually	154	1	3	Bit	0x2 (2)	-	Signal: Arc Flash Reduction Maintenance Manual Mode
	Maint Mode DI	154	1	3	Bit	0x4 (3)	-	Signal: Arc Flash Reduction Maintenance Digital Input Mode

Module (ANSI / IEEE)	Name Function	Start Register Address	No. of Modbus Registers	Function code	Format	Bit Mask (Bit position)	Unit	Description
	Maint Mode Comm	154	1	3	Bit	0x8 (4)	-	Signal: Arc Flash Reduction Maintenance Comm Mode
	Maint Mode Inactive	154	1	3	Bit	0x10 (5)	-	Signal: Arc Flash Reduction Maintenance Inactive
	Maint Mode-I	154	1	3	Bit	0x20 (6)	-	Module Input State: Arc Flash Reduction Maintenance Switch
	SNTP active	154	1	3	Bit	0x80 (8)	-	Signal: If there is no valid SNTP signal for 120 sec, SNTP is regarded as inactive.
	Program Mode Bypass	154	1	3	Bit	0x100 (9)	-	Signal: Short-period bypass of the Program Mode.
SysA		**173**	**1**	**3**	**Struct**			
	ExBlo-I	173	1	3	Bit	0x1 (1)	-	Module Input State: External Blocking
	ExBlo	173	1	3	Bit	0x2 (2)	-	Signal: External Blocking
	Alm Current Demd	173	1	3	Bit	0x4 (3)	-	Signal: Alarm Current demand value
	Active	173	1	3	Bit	0x8 (4)	-	Signal: Active
	Alarm I THD	173	1	3	Bit	0x10 (5)	-	Signal: Alarm Total Harmonic Distortion Current

Module (ANSI / IEEE)	Name Function	Start Register Address	No. of Modbus Registers	Function code	Format	Bit Mask (Bit position)	Unit	Description
	Trip Current Demd (*)	173	1	3	Bit	0x1000 (13)	-	Signal: Trip Current demand value
	Trip I THD (*)	173	1	3	Bit	0x2000 (14)	-	Signal: Trip Total Harmonic Distortion Current
TCM		**150**	**1**	**3**	**Struct**			
	ExBlo1-I	150	1	3	Bit	0x1 (1)	-	Module Input State: External Blocking1
	ExBlo2-I	150	1	3	Bit	0x2 (2)	-	Module Input State: External Blocking2
	Active	150	1	3	Bit	0x4 (3)	-	Signal: Active
	ExBlo	150	1	3	Bit	0x8 (4)	-	Signal: External Blocking
	Pickup	150	1	3	Bit	0x10 (5)	-	Signal: Pickup Trip Circuit Supervision
	Not Possible	150	1	3	Bit	0x20 (6)	-	Not possible because no state indicator assigned to the breaker.
	CinBkr-52a-I	150	1	3	Bit	0x100 (9)	-	Module Input State: Feed-back signal of the Bkr (52a)
	CinBkr-52b-I	150	1	3	Bit	0x200 (10)	-	Module Input State: Feed-back signal of the Bkr. (52b)
TimeSync		**54**	**1**	**3**	**Struct**			

Module (ANSI / IEEE)	Name Function	Start Register Address	No. of Modbus Registers	Function code	Format	Bit Mask (Bit position)	Unit	Description
	synchronized	54	1	3	Bit	0x1 (1)	-	Clock is synchronized.
Wired Inputs		**171**	**1**	**3**	**Struct**			
	TOCa M1-I	171	1	3	Bit	0x1 (1)	-	State of the module input: Main 1 Breaker Connected
	TOCa M2-I	171	1	3	Bit	0x2 (2)	-	State of the module input: Main 2 Breaker Connected
	TOCa T-I	171	1	3	Bit	0x4 (3)	-	State of the module input: Tie Breaker Connected
	43/10 M1-I	171	1	3	Bit	0x8 (4)	-	State of the module input: Main 1 Breaker Selected To Trip
	43/10 M2-I	171	1	3	Bit	0x10 (5)	-	State of the module input: Main 2 Breaker Selected To Trip
	43/10 T-I	171	1	3	Bit	0x20 (6)	-	State of the module input: Tie Breaker Selected To Trip
	43 A-I	171	1	3	Bit	0x40 (7)	-	State of the module input: System in Auto
	43 M-I	171	1	3	Bit	0x80 (8)	-	State of the module input: System In Manual
	43 P1-I	171	1	3	Bit	0x100 (9)	-	State of the module input: Preferred Source 1

Module (ANSI / IEEE)	Name Function	Start Register Address	No. of Modbus Registers	Function code	Format	Bit Mask (Bit position)	Unit	Description
	43 P2-I	171	1	3	Bit	0x200 (10)	-	State of the module input: Preferred Source 2
	52a M1-I	171	1	3	Bit	0x400 (11)	-	State of the module input: Main 1 Breaker Closed
	52a M2-I	171	1	3	Bit	0x800 (12)	-	State of the module input: Main 2 Breaker Closed
	52a T-I	171	1	3	Bit	0x1000 (13)	-	State of the module input: Tie Breaker Closed
	52b M1-I	171	1	3	Bit	0x2000 (14)	-	State of the module input: Main 1 Breaker Open
	52b M2-I	171	1	3	Bit	0x4000 (15)	-	State of the module input: Main 2 Breaker Open
	52b T-I	171	1	3	Bit	0x8000 (16)	-	State of the module input: Tie Breaker Open
Wired Inputs		**172**	**1**	**3**	**Struct**			
	Bkr Trouble-I	172	1	3	Bit	0x1 (1)	-	Breaker Trouble
ZI – Zone Inter.		**139**	**1**	**3**	**Struct**			
	ExBlo1-I	139	1	3	Bit	0x2 (2)	-	Module Input State: External Blocking1
	ExBlo2-I	139	1	3	Bit	0x4 (3)	-	Module Input State: External Blocking2

Module (ANSI / IEEE)	Name Function	Start Register Address	No. of Modbus Registers	Function code	Format	Bit Mask (Bit position)	Unit	Description
	ExBlo TripCmd-I	139	1	3	Bit	0x8 (4)	-	Module Input State: External Blocking of the Trip Command
	Bkr Blo	139	1	3	Bit	0x10 (5)	-	Signal: Blocked by Breaker Failure
	Active	139	1	3	Bit	0x20 (6)	-	Signal: Active
	ExBlo	139	1	3	Bit	0x40 (7)	-	Signal: External Blocking
	Blo TripCmd	139	1	3	Bit	0x80 (8)	-	Signal: Trip Command blocked
	ExBlo TripCmd	139	1	3	Bit	0x100 (9)	-	Signal: External Blocking of the Trip Command
	Ground OUT	139	1	3	Bit	0x200 (10)	-	Signal: Zone Interlocking Ground OUT
	Ground Pickup	139	1	3	Bit	0x400 (11)	-	Signal: Zone Interlocking Ground Pickup
	Ground Trip (*)	139	1	3	Bit	0x800 (12)	-	Signal: Zone Interlocking Ground Trip
	Phase OUT	139	1	3	Bit	0x1000 (13)	-	Signal: Zone Interlocking Phase OUT
	Phase Pickup	139	1	3	Bit	0x2000	-	Signal: Zone Interlocking Phase Pickup

Module (ANSI / IEEE)	Name Function	Start Register Address	No. of Modbus Registers	Function code	Format	Bit Mask (Bit position)	Unit	Description
						(14)		
	Phase Trip (*)	139	1	3	Bit	0x4000 (15)	-	Signal: Zone Interlocking Phase Trip
	IN	139	1	3	Bit	0x8000 (16)	-	Signal: Zone Interlocking IN
ZI – Zone Inter.		**140**	**1**	**3**	**Struct**			
	OUT	140	1	3	Bit	0x1 (1)	-	Signal: Zone Interlocking OUT
	Pickup	140	1	3	Bit	0x2 (2)	-	Signal: Pickup Zone Interlocking
	Trip (*)	140	1	3	Bit	0x4 (3)	-	Signal: Zone Interlocking Trip Logic
	TripCmd (*)	140	1	3	Bit	0x8 (4)	-	Signal: Zone Interlocking Trip Command

3.2 Measuring Values

Module (ANSI / IEEE)	Name Function	Start Register Address	No. of Modbus Registers	Function code	Format	Bit Mask (Bit position)	Unit	Description
AR – Auto Relosing	Total number Cr	20164	2	4	Float IEE754		-	Total number of all executed Automatic Reclosures Attempts
AR – Auto Relosing	Cr failed	20166	2	4	Float IEE754		-	Total number of unsuccessfully executed automatic reclosure attempts
AR – Auto Relosing	Cr successfl	20168	2	4	Float IEE754		-	Total number of successfully executed Automatic Reclosures
AR – Auto Relosing	Cr Service Alarm1	20170	2	4	Float IEE754		-	Remaining numbers of ARs until Service Alarm 1
AR – Auto Relosing	Cr Service Alarm2	20172	2	4	Float IEE754		-	Remaining numbers of ARs until Service Alarm 2
AR – Auto Relosing	AR Shot No.	20188	2	4	Float IEE754		-	Counter - Auto Reclosure Attempts
AR – Auto Relosing	Max Shots / h Cr	20374	2	4	Float IEE754		-	Counter for the maximum allowed shots per hour.
Bkr	TripCmd Cr	20006	2	4	Float IEE754		-	Counter: Total number of trips of the switch.
Bkr	Isum trip IA	20182	2	4	Float IEE754		A	Summation of the tripping currents phase
Bkr	Isum trip IB	20184	2	4	Float IEE754		A	Summation of the tripping currents phase
Bkr	Isum trip IC	20186	2	4	Float IEE754		A	Summation of the tripping currents phase
Bkr	Bkr Wear Level	20516	2	4	Float IEE754		%	Wear level of the breaker. (100% means that the breaker has to be maintained.)
Bkr	Isum Intr per hour	20518	2	4	Float IEE754		kA	Sum per hour of interrupting currents.
CT	IA Fund.	20100	2	4	Float IEE754		A	Measured value: Phase current (Fundamental)
CT	IB Fund.	20102	2	4	Float IEE754		A	Measured value: Phase current (Fundamental)

Module (ANSI / IEEE)	Name Function	Start Register Address	No. of Modbus Registers	Function code	Format	Bit Mask (Bit position)	Unit	Description
CT	IC Fund.	20104	2	4	Float IEE754		A	Measured value: Phase current (Fundamental)
CT	IX meas Fund.	20106	2	4	Float IEE754		A	Measured value (measured): IX (Fundamental)
CT	I0 Fund.	20114	2	4	Float IEE754		A	Measured value (calculated): Zero current (Fundamental)
CT	I1 Fund.	20116	2	4	Float IEE754		A	Measured value (calculated): Positive phase sequence current (Fundamental)
CT	I2 Fund.	20118	2	4	Float IEE754		A	Measured value (calculated): Unbalanced load current (Fundamental)
CT	IA H2	20120	2	4	Float IEE754		%	Measured Value: Ratio of 2nd harmonic over fundamental of IA
CT	IB H2	20122	2	4	Float IEE754		%	Measured Value: Ratio of 2nd harmonic over fundamental of IB
CT	IC H2	20124	2	4	Float IEE754		%	Measured Value: Ratio of 2nd harmonic over fundamental of IC
CT	IG H2 meas	20126	2	4	Float IEE754		%	Measured Value: Ratio of 2nd harmonic over fundamental of IG (measured)
CT	IR calc Fund.	20160	2	4	Float IEE754		A	Measured value (calculated): IR (Fundamental)
CT	Angle IR calc	20200	2	4	Float IEE754		°	Measured Value (Calculated): Angle of Phasor IR calc Reference phasor is required to calculate the angle. This is the first measured voltage (or current) channel with sufficiently high amplitude.
CT	Angle IX meas	20202	2	4	Float IEE754		°	Measured Value (Calculated): Angle of Phasor IX meas Reference phasor is required to calculate the angle. This is the first measured voltage (or current) channel with sufficiently high amplitude.

Module (ANSI / IEEE)	Name Function	Start Register Address	No. of Modbus Registers	Function code	Format	Bit Mask (Bit position)	Unit	Description
CT	Angle IA	20204	2	4	Float IEE754		°	Measured Value (Calculated): Angle of Phasor IA Reference phasor is required to calculate the angle. This is the first measured voltage (or current) channel with sufficiently high amplitude.
CT	Angle IB	20206	2	4	Float IEE754		°	Measured Value (Calculated): Angle of Phasor IB Reference phasor is required to calculate the angle. This is the first measured voltage (or current) channel with sufficiently high amplitude.
CT	Angle IC	20208	2	4	Float IEE754		°	Measured Value (Calculated): Angle of Phasor IC Reference phasor is required to calculate the angle. This is the first measured voltage (or current) channel with sufficiently high amplitude.
CT	IA THD	20210	2	4	Float IEE754		A	Measured Value (Calculated): IA Total Harmonic Current
CT	IB THD	20212	2	4	Float IEE754		A	Measured Value (Calculated): IB Total Harmonic Current
CT	IC THD	20214	2	4	Float IEE754		A	Measured Value (Calculated): IC Total Harmonic Current
CT	%IA THD	20216	2	4	Float IEE754		%	Measured Value (Calculated): IA Total Harmonic Distortion
CT	%IB THD	20218	2	4	Float IEE754		%	Measured Value (Calculated): IB Total Harmonic Distortion
CT	%IC THD	20220	2	4	Float IEE754		%	Measured Value (Calculated): IC Total Harmonic Distortion
CT	IA RMS	20316	2	4	Float IEE754		A	Measured value: Phase current (RMS)

Module (ANSI / IEEE)	Name Function	Start Register Address	No. of Modbus Registers	Function code	Format	Bit Mask (Bit position)	Unit	Description
CT	IB RMS	20318	2	4	Float IEE754		A	Measured value: Phase current (RMS)
CT	IC RMS	20320	2	4	Float IEE754		A	Measured value: Phase current (RMS)
CT	IX meas RMS	20322	2	4	Float IEE754		A	Measured value (measured): IX (RMS)
CT	IR calc RMS	20324	2	4	Float IEE754		A	Measured value (calculated): IR (RMS)
CT	%(I2/I1)	20376	2	4	Float IEE754		%	Measured value (calculated): I2/I1, phase sequence will be taken into account automatically.
CT	Angle I0	20378	2	4	Float IEE754		°	Measured Value (calculated): Angle of Zero Sequence System Reference phasor is required to calculate the angle. This is the first measured voltage (or current) channel with sufficiently high amplitude.
CT	Angle I1	20380	2	4	Float IEE754		°	Measured Value (calculated): Angle of Positive Sequence System Reference phasor is required to calculate the angle. This is the first measured voltage (or current) channel with sufficiently high amplitude.
CT	Angle I2	20382	2	4	Float IEE754		°	Measured value (calculated): Angle of Negative Sequence System Reference phasor is required to calculate the angle. This is the first measured voltage (or current) channel with sufficiently high amplitude.
CT	IG H2 calc	20500	2	4	Float IEE754		%	Measured value (calculated): Ratio of 2nd harmonic over fundamental of IG (calculated)
CT	I1 max Fund.	21074	2	4	Float IEE754		A	Maximum value positive phase sequence current (Fundamental)

Module (ANSI / IEEE)	Name Function	Start Register Address	No. of Modbus Registers	Function code	Format	Bit Mask (Bit position)	Unit	Description
CT	I1 min Fund.	21076	2	4	Float IEE754		A	Minimum value positive phase sequence current (Fundamental)
CT	I2 max Fund.	21080	2	4	Float IEE754		A	Maximum value negative sequence current (Fundamental)
CT	I2 min Fund.	21082	2	4	Float IEE754		A	Minimum value unbalanced load current (Fundamental)
CT	IA avg RMS	21130	2	4	Float IEE754		A	IA average value (RMS)
CT	IB avg RMS	21132	2	4	Float IEE754		A	IB average value (RMS)
CT	IC avg RMS	21134	2	4	Float IEE754		A	IC average value (RMS)
CT	IA max RMS	21136	2	4	Float IEE754		A	IA maximum value (RMS)
CT	IB max RMS	21138	2	4	Float IEE754		A	IB maximum value (RMS)
CT	IC max RMS	21140	2	4	Float IEE754		A	IC maximum value (RMS)
CT	IA min RMS	21142	2	4	Float IEE754		A	IA minimum value (RMS)
CT	IB min RMS	21144	2	4	Float IEE754		A	IB minimum value (RMS)
CT	IC min RMS	21146	2	4	Float IEE754		A	IC minimum value (RMS)
CT	IR calc max RMS	21456	2	4	Float IEE754		A	Measured value (calculated): IR maximum value (RMS)
CT	IR calc min RMS	21458	2	4	Float IEE754		A	Measured value (calculated): IR minimum value (RMS)
CT	IX meas max RMS	21462	2	4	Float IEE754		A	Measured value: IX maximum value (RMS)
CT	IX meas min RMS	21464	2	4	Float IEE754		A	Measured value: IX minimum value (RMS)

Module (ANSI / IEEE)	Name Function	Start Register Address	No. of Modbus Registers	Function code	Format	Bit Mask (Bit position)	Unit	Description
CT	%(I2/I1) max	21468	2	4	Float IEE754		%	Measured value (calculated): I2/I1 maximum value, phase sequence will be taken into account automatically
CT	%(I2/I1) min	21470	2	4	Float IEE754		%	Measured value (calculated): I2/I1 minimum value, phase sequence will be taken into account automatically
CT	IA Peak demand	21784	2	4	Float IEE754		A	IA Peak value, RMS value
CT	IB Peak demand	21786	2	4	Float IEE754		A	IB Peak value, RMS value
CT	IC Peak demand	21788	2	4	Float IEE754		A	IC Peak value, RMS value
Date and Time		**20000**	**6**	**4**	**Struct**			
	y	20000	6	4	Short	Word 0 (1)	-	Year
	m	20000	6	4	Short	Word 1 (17)	-	Month
	d	20000	6	4	Short	Word 2 (33)	-	Days
	h	20000	6	4	Short	Word 3 (49)	-	Hours
	min	20000	6	4	Short	Word 4 (65)	-	Minute
	ms	20000	6	4	Short	Word 5 (81)	-	Milliseconds

Module (ANSI / IEEE)	Name Function	Start Register Address	No. of Modbus Registers	Function code	Format	Bit Mask (Bit position)	Unit	Description
IRIG-B	Edges	20298	2	4	Float IEE754		-	Edges: Total number of rising and falling edges. This signal indicates if a signal is available at the IRIG-B input.
IRIG-B	NoOfFrameErrors	20300	2	4	Float IEE754		-	Total Number of Frame Errors. Physically corrupted Frame.
IRIG-B	NoOfFramesOK	20302	2	4	Float IEE754		-	Total number valid Frames.
Modbus	Mapped Meas 1	23000	2	4	Float IEE754		-	Mapped Measured Values. They can be used to provide measured values to the Modbus Master.
Modbus	Mapped Meas 2	23002	2	4	Float IEE754		-	Mapped Measured Values. They can be used to provide measured values to the Modbus Master.
Modbus	Mapped Meas 3	23004	2	4	Float IEE754		-	Mapped Measured Values. They can be used to provide measured values to the Modbus Master.
Modbus	Mapped Meas 4	23006	2	4	Float IEE754		-	Mapped Measured Values. They can be used to provide measured values to the Modbus Master.
Modbus	Mapped Meas 5	23008	2	4	Float IEE754		-	Mapped Measured Values. They can be used to provide measured values to the Modbus Master.
Modbus	Mapped Meas 6	23010	2	4	Float IEE754		-	Mapped Measured Values. They can be used to provide measured values to the Modbus Master.
Modbus	Mapped Meas 7	23012	2	4	Float IEE754		-	Mapped Measured Values. They can be used to provide measured values to the Modbus Master.
Modbus	Mapped Meas 8	23014	2	4	Float IEE754		-	Mapped Measured Values. They can be used to provide measured values to the Modbus Master.
Modbus	Mapped Meas 9	23016	2	4	Float IEE754		-	Mapped Measured Values. They can be used to provide measured values to the Modbus Master.

Module (ANSI / IEEE)	Name Function	Start Register Address	No. of Modbus Registers	Function code	Format	Bit Mask (Bit position)	Unit	Description
Modbus	Mapped Meas 10	23018	2	4	Float IEE754		-	Mapped Measured Values. They can be used to provide measured values to the Modbus Master.
Modbus	Mapped Meas 11	23020	2	4	Float IEE754		-	Mapped Measured Values. They can be used to provide measured values to the Modbus Master.
Modbus	Mapped Meas 12	23022	2	4	Float IEE754		-	Mapped Measured Values. They can be used to provide measured values to the Modbus Master.
Modbus	Mapped Meas 13	23024	2	4	Float IEE754		-	Mapped Measured Values. They can be used to provide measured values to the Modbus Master.
Modbus	Mapped Meas 14	23026	2	4	Float IEE754		-	Mapped Measured Values. They can be used to provide measured values to the Modbus Master.
Modbus	Mapped Meas 15	23028	2	4	Float IEE754		-	Mapped Measured Values. They can be used to provide measured values to the Modbus Master.
Modbus	Mapped Meas 16	23030	2	4	Float IEE754		-	Mapped Measured Values. They can be used to provide measured values to the Modbus Master.
Values	Build	20008	2	4	Float IEE754		-	Build Number
Values	Operating hours Cr	20010	2	4	Float IEE754		h	Operating hours counter of the protective device

3.3 Commands

Module (ANSI / IEEE)	Name Function	Start Register Address	No. of Modbus Registers	Function code	Format	Bit Mask (Bit position)	Unit	Description
Acknowledge	LEDs	22000	1	5	0xFF00		-	LEDs
Acknowledge	Relay Outputs	22001	1	5	0xFF00		-	Relay Outputs
Acknowledge	SCADA	22002	1	5	0xFF00		-	SCADA Communication
Acknowledge	Device	22003	1	5	0xFF00		-	Device
Acknowledge	Ack TripCmd	22005	1	5	0xFF00		-	Signal: Acknowledge Trip Command
Reset	Modbus diagnosis counter	22006	1	5	0xFF00		-	Modbus diagnosis counter
Reset	Res Isum trip	22012	1	5	0xFF00		-	Reset summation of the tripping currents
Comm Cmd	Assbl Comm Cmd 1	22020	1	5	0xFF00=On, 0x0000=Off		-	Assignable Communication Command
Comm Cmd	Assbl Comm Cmd 2	22021	1	5	0xFF00=On, 0x0000=Off		-	Assignable Communication Command
Comm Cmd	Assbl Comm Cmd 3	22022	1	5	0xFF00=On, 0x0000=Off		-	Assignable Communication Command
Comm Cmd	Assbl Comm Cmd 4	22023	1	5	0xFF00=On, 0x0000=Off		-	Assignable Communication Command
Comm Cmd	Assbl Comm Cmd 5	22024	1	5	0xFF00=On, 0x0000=Off		-	Assignable Communication Command
Comm Cmd	Assbl Comm Cmd 6	22025	1	5	0xFF00=On, 0x0000=Off		-	Assignable Communication Command
Comm Cmd	Assbl Comm Cmd 7	22026	1	5	0xFF00=On, 0x0000=Off		-	Assignable Communication Command
Comm Cmd	Assbl Comm Cmd 8	22027	1	5	0xFF00=On, 0x0000=Off		-	Assignable Communication Command
Comm Cmd	Assbl Comm Cmd 9	22028	1	5	0xFF00=On, 0x0000=Off		-	Assignable Communication Command

Module (ANSI / IEEE)	Name Function	Start Register Address	No. of Modbus Registers	Function code	Format	Bit Mask (Bit position)	Unit	Description
Comm Cmd	Assbl Comm Cmd 10	22029	1	5	0xFF00=On, 0x0000=Off		-	Assignable Communication Command
Comm Cmd	Assbl Comm Cmd 11	22030	1	5	0xFF00=On, 0x0000=Off		-	Assignable Communication Command
Comm Cmd	Assbl Comm Cmd 12	22031	1	5	0xFF00=On, 0x0000=Off		-	Assignable Communication Command
Comm Cmd	Assbl Comm Cmd 13	22032	1	5	0xFF00=On, 0x0000=Off		-	Assignable Communication Command
Comm Cmd	Assbl Comm Cmd 14	22033	1	5	0xFF00=On, 0x0000=Off		-	Assignable Communication Command
Comm Cmd	Assbl Comm Cmd 15	22034	1	5	0xFF00=On, 0x0000=Off		-	Assignable Communication Command
Comm Cmd	Assbl Comm Cmd 16	22035	1	5	0xFF00=On, 0x0000=Off		-	Assignable Communication Command
Fault rec	Res all rec	22040	1	5	0xFF00		-	Reset all records
PSet-Switch	Comm PS1	22050	1	5	0xFF00		-	Communication Setting Group1
PSet-Switch	Comm PS2	22051	1	5	0xFF00		-	Communication Setting Group2
PSet-Switch	Comm PS3	22052	1	5	0xFF00		-	Communication Setting Group3
PSet-Switch	Comm PS4	22053	1	5	0xFF00		-	Communication Setting Group4
Maint Mode	Maint Mode Comm	22054	1	5	0xFF00=On, 0x0000=Off		-	Signal: Arc Flash Reduction Maintenance Comm Mode
Bkr	SG ControlCmd1	22100	1	5	0xFF00=On, 0x0000=Off		-	Control Command Switchgear

3.4 Settings

Module (ANSI / IEEE)	Name Function	Start Register Address	No. of Modbus Registers	Function code	Format	Bit Mask (Bit position)	Unit	Description
Date and Time		**32500**	**6**	**3 16**	**Struct**			
	y	32500	6	3 16	Short	Word 0 (1)	-	Year
	m	32500	6	3 16	Short	Word 1 (17)	-	Month
	d	32500	6	3 16	Short	Word 2 (33)	-	Days
	h	32500	6	3 16	Short	Word 3 (49)	-	Hours
	min	32500	6	3 16	Short	Word 4 (65)	-	Minute
	ms	32500	6	3 16	Short	Word 5 (81)	-	Milliseconds
Fault rec		**50000**	**9**	**3 16**	**Struct**			
	RecordNo	50000	9	3 16	Short	Word 0 (1)	-	Record Number
	Trip Cause	50000	9	3 16	Short	Word 1 (17)	-	Code for the trip cause. In case of several simultaneous trip causes the primary cause is selected. If there is another trip later then the new trip cause overwrites the previous one. The codes for the trip cause are documented in the SCADA documentation.

Module (ANSI / IEEE)	Name Function	Start Register Address	No. of Modbus Registers	Function code	Format	Bit Mask (Bit position)	Unit	Description
	Pickup Cause	50000	9	3 16	Short	Word 2 (33)	-	Code for last PickUp cause corresponds to fault record: See scada doc for correlation between pickup reason and code
	Fault No.	50000	9	3 16	Short	Word 3 (49)	-	Waveform number
	No of Grid Faults	50000	9	3 16	Short	Word 4 (65)	-	Number of grid faults: This is a counter for all faults (i.e. General Pickups »Prot . Pickup«), but except faults during a running cycle of the Automatic Reclosure module (signal »AR . Running«). (Remark: The »Fault No.« counts every new fault independent of AR cycles. This means that for protective devices without AR module these two counters are equivalent.)
	Time stamp:	50000	9	3 16	long long	Word 5-Word 8 (81)	-	Timestamp in milliseconds since 1970

3.5 Cause of Trip

Cause of trip reason is provided on two different Modbus addresses:

- At address 5004 the “last primary trip cause” is available. This means, in case of several simultaneous trip causes the primary cause is selected. If there is another trip later then the new trip cause overwrites the previous one. The trip cause can be read as long as a trip reason is present. In addition, the content of this register can be latched. The trip cause is latched in the same way as other trip signals, that means if the corresponding latching setting in Modbus is active, the content of the register is fixed until it is acknowledged by command.

- At address 50000 and up the last trip and alarm reason is available with related record, fault, net number and time stamp. Any saved record can be requested by sending the record number to the corresponding register. Be aware that the content of these registers can only be read entirely and that the content changes every time a new fault occurs in the fault recorder.

All required fault values must be defined within a SCADApter (ErSMap) mapping file. The default datapoint list cannot be used in this case. All data-points that are needed for communicating with the substation must be defined as a ErSMap mapping file. (See also the separate SCADApter User Manual.)

If not a specific fault is selected, last fault value is presented on these addresses.

The following table is showing the “trip cause code” and its relation to the “trip cause reason”.

Trip Cause	Description	Module
0	**?**	**ZI**
1	**NORM**	
2	**EXTERNAL**	**ExP[1], ExP[2], ExP[3], ExP[4]**
3	**PH IOC**	**50P[1], 50P[2], 50P[3]**
4	**IG IOC**	**50X[1], 50X[2]**
6	**IR IOC**	**50R[1], 50R[2]**
7	**PH TOC**	**51P[1], 51P[2], 51P[3]**
8	**IG TOC**	**51X[1], 51X[2]**
10	**IR TOC**	**51R[1], 51R[2]**

Trip Cause	Description	Module
17	**I UNBAL**	**46[1], 46[2]**

3.6 Fast Status Register

At registers ≥5000 an area is provided where common status indicator bits can be read from one location. See the Register Maps for information that is available in general.

At registers 5002 and 5003 the user has the option to collect arbitrary device status information. The purpose is to get a custom set of device states in a single request. Some of these positions are already pre-configured.

The following table lists the pre-configured states:

General Function	Bit Position	Short Description	Long Description
Relay Health	0	Health status	
General Trips / General Pickups	1	Pickup	General pickup of any type – not element-specific.
	2	Trip	General Trip of any type – not element-specific.
	3		
	4		
	5		
	6		
	7		
Breaker [*]	8	Pos Open	Breaker is in Open position.
	9	Pos Close	Breaker is in Closed position.
	10	Pickup	Breaker failure detected and timer in progress.
	11	Trip	Breaker failure detected and trip initiated.
	12	Lockout	Breaker failure lockout.
	13		
	14		
	15		

General Function	Bit Position	Short Description	Long Description
Sgen status	16	Running	Test simulation signal generation “Running”.
ARMS [**]	17	Maintenance	Maintenance mode active.
Motor [***]	18	Motor Relay Ready – (stopped)	
	19	Motor Relay Start	
	20	Motor Relay Running	

[*] Only available in devices with Breaker Control.

[**] Only available in devices that support Maintenance mode.

[***] Only available in Motor Relays.

Modbus Datapoints IB02602005E

EDR-3000

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