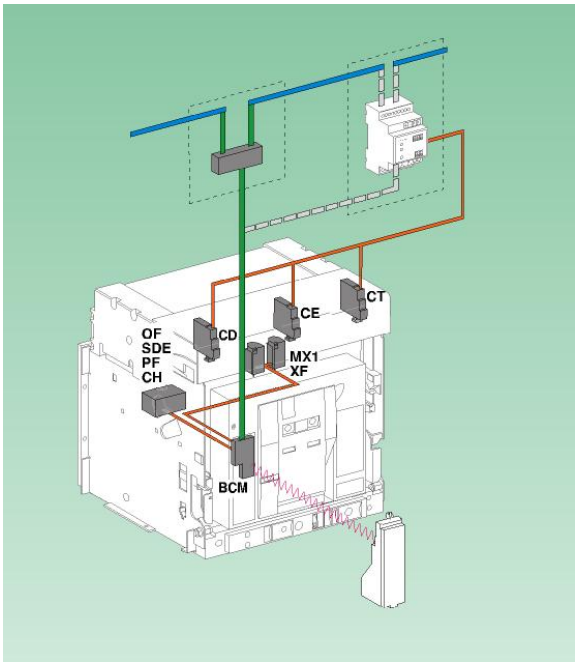
Low voltage electrical distribution

Masterpact Modbus

Modbus communication option

User manual

04/2012



Schneider Electric

This document presents the architecture and the functions of the Modbus communication option.

The Modbus communication option makes it possible to remotely use all the functions of your Masterpact or Compact circuit breaker, its Micrologic control unit and all the pertaining options.
Remote operations are based on secure communication architecture.
The Modbus communication option may be used to interconnect the Micrologic control units (A, E, P or H) and a supervisor, a PLC or Modbus master equipment.
The connection implements an RS485 physical link and the Modbus -RTU protocol.
The relevant Micrologic control units are:

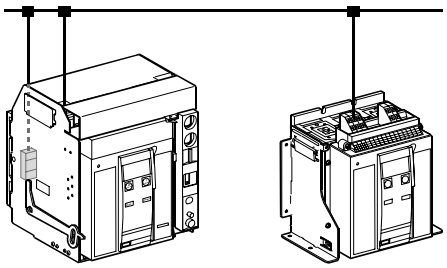
- **Micrologic 2.0 A, 3.0 A, 5.0 A, 6.0 A, 7.0 A**
- **Micrologic 2.0 E, 3.0 E, 5.0 E, 6.0 E,**
- **Micrologic 5.0 P, 6.0 P, 7.0 P**
- **Micrologic 5.0 H, 6.0 H, 7.0 H**

To install and connect the system, see the corresponding installation manual: 5100512864AA.pdf

Contents

Introduction

E71901A



Withdrawable Fixed

Connection of a fixed circuit breaker requires one connection point on the RS485 bus for the "device" communication module which is installed behind the Micrologic control unit.

Connection of a withdrawable circuit breaker requires two connection points on the RS485 bus, one for the "device" communication module and the second for the "chassis" communication module.

The RS485 standard limits the number of physical connections per segment to 32

Maximum number of circuit breakers per RS485 segment	
Fixed	31
Withdrawable	15

The "device" communication module contains three managers:
- **the circuit-breaker manager**
- **the metering manager**
- **the protection manager.**

The "chassis" communication module contains the chassis manager.

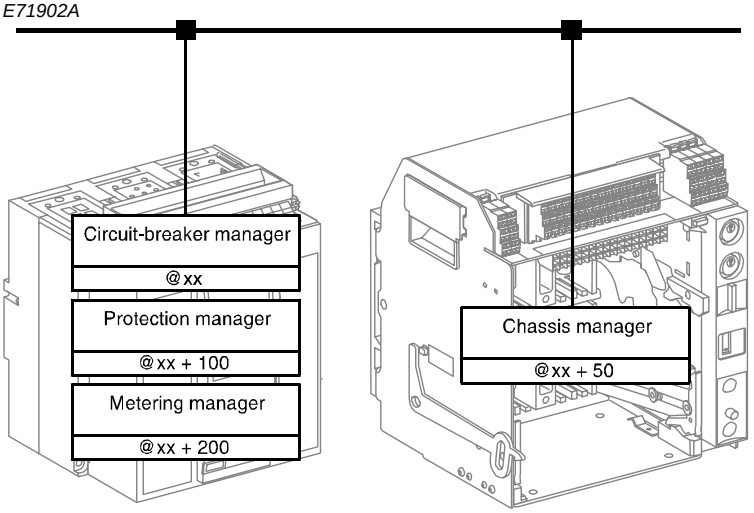
The division into four separate managers enhances the security of data exchange between the supervision system and the circuit-breaker actuators.

The manager addresses are automatically inferred from the @xx address entered on the Micrologic control unit. By default, the circuit-breaker manager address is **47**.

Addresses	
@ xx	Circuit-breaker manager
@ xx + 50	Chassis manager
@ xx + 200	Metering manager
@ xx + 100	Protection manager

Note: *For information on setting the control-unit address, see the installation manual for the equipment.*

E71902A



Device Chassis

Introduction

Manager architecture

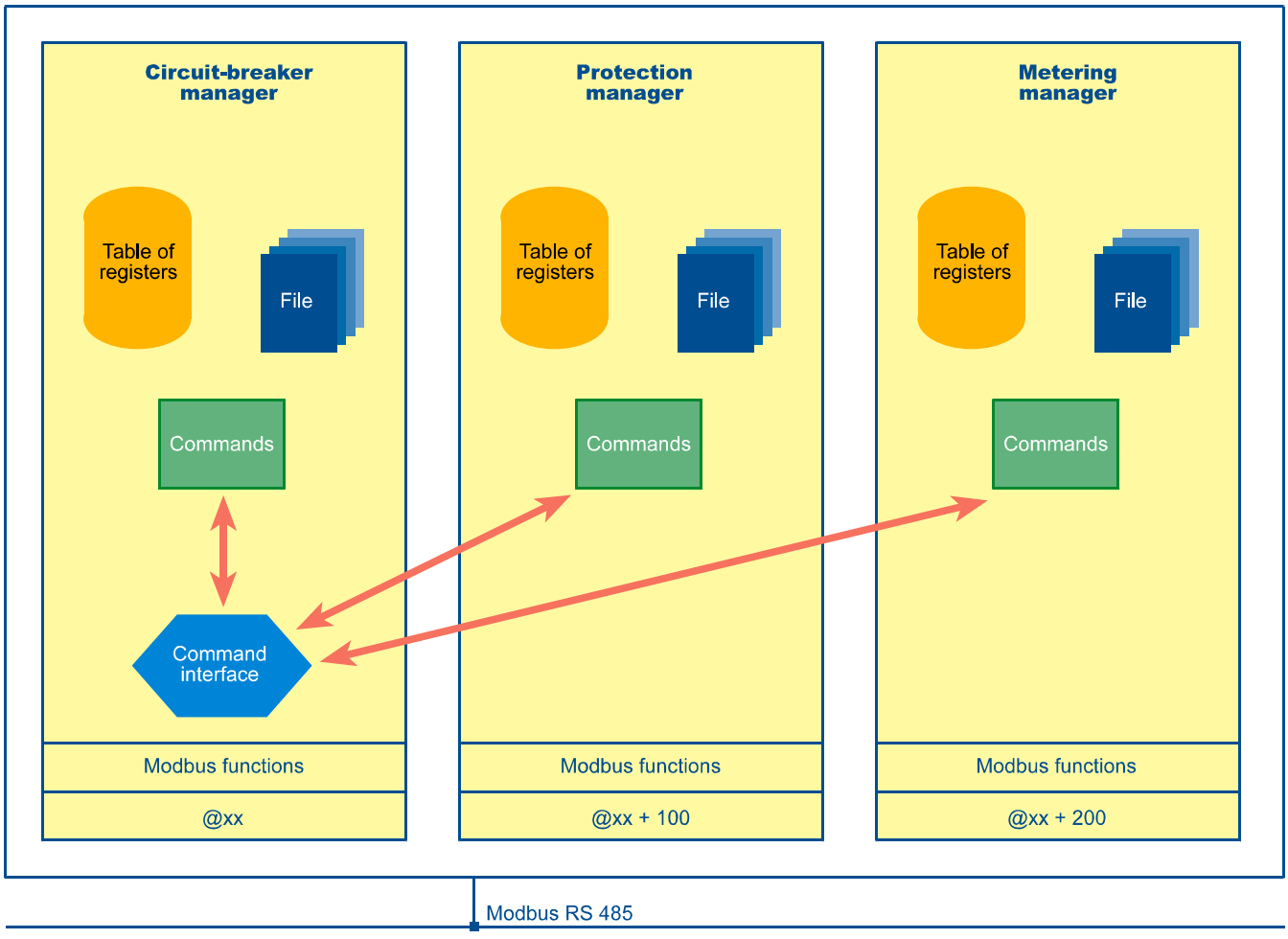
- **A manager contains:**
  - **a table of registers that may be read-accessed only**
  - **files such as the event log**
  - **commands for functions such as write in the registers, turn the circuit breaker ON or OFF, reset counters, etc**
  - **Modbus functions used to remotely access the registers and the manger files.**

Note: *The commands for the metering and protection managers are controlled by the circuit-breaker manager.*

- **A command interface in the circuit-breaker and chassis managers is used to control the applications.**

This interface monitors execution of the command and issues a report.

E71900A



Modbus functions

The device and chassis Modbus options operate in slave mode and enable a Modbus master to access all the registers, files and applications contained in the managers.

Circuit-breaker manager: @ xx

The circuit-breaker manager may be used to remotely monitor circuit-breaker status:
- **open (OFF)**
- **closed (ON)**
- **tripped (SDE)**
- **ready to close (PF), etc.**

It is also possible to remotely open or close the circuit breaker if the MX and/or XF communicating coils are installed.

Remote control (“Auto” mode) may be disabled by locally setting the Micrologic control unit to Local control ("Manu" mode). See register 670

The circuit-breaker manager contains the registers listed below.

Register range	Description
515-543	Modbus configuration and identification
544-577	Diagnostics counters and Modbus password
603-624	Metering/protection manager event notification
650-670	Tripping cause and circuit-breaker status
671-715	Time-stamping of last status changes
718-740	Event log in the circuit-breaker manager (see the section : Access to the files)
800	Communication profile activation
12000-12215	Communication profile

Note: *More detailed information on these registers is presented in the section Appendix: Table of registers: circuit-breaker -manager.*

Communication profile

In order to optimize the number of Modbus request, a communication profile has been implemented. The communication profile is located in the circuit-breaker manager **@xx**. This communication profile contains information’s coming from the circuit-breaker manager, the metering manager and the Protection manager. The communication profile is defined in the register range: 12000-12215.

Simplified OPEN/CLOSE command

In order to simplify the application software to remotely open or close the circuit-breaker, a simplified OPEN/CLOSE command has been implemented. The simplified OPEN/CLOSE command is located in the circuit-breaker manager **@xx**. With the simplified OPEN/CLOSE command, it is not necessary to request the flag, neither to enter in configuration mode, neither to read the control word. It is still necessary to be in AUTO mode (see register 670). Furthermore, this simplified OPEN/CLOSE command is password protected (default value=0000). In order to change the password, it is mandatory to use the « magic box » and the associated Micrologic utility RSU.(please consult us).
The simplified OPEN/CLOSE command is a share command (command code = 57400).
Note: *More detailed information on this command is presented in the section Appendix: List of command: circuit-breaker -manager.*
.
WARNING:
Communication profile and simplified OPEN/CLOSE command are available only with a Breaker Communication Module firmware version greater or equal to V2.0 (register 577 must be greater or equal to 02000)

Chassis manager: @ xx + 50

The chassis manager indicates the position of the device on the chassis:
- **"connected" position**
- **"test" position**
- **"disconnected" position.**

The chassis manager contains the registers listed below.

Register range	Description
515-543	Modbus configuration and identification
544-577	Diagnostics counters and Modbus password
661-664	Chassis status
679-715	Time-stamping of last status changes

Note: *More detailed information on these registers is presented in the section Appendix: Table of registers: chassis-manager.*
.

Metering manager: @ xx + 200

The metering manager prepares the electrical values used to manage the low-voltage distribution system.

Every second, the metering manager refreshes the "real-time" RMS measurements. Using this data, it then calculates the demand and energy values, and stores the minimum / maximum values recorded since the last reset.

Metering-manager operation depends on the Micrologic settings:
- **type of neutral (internal, external, none)**
- **the normal direction for the flow of active power (this setting determines the sign of the measured power).**
- **voltage-transformation ratio**
- **rated frequency.**

The metering manager must be set independently of the protection manager to determine:
- **the calculation mode for the power (type of distribution system)**
- **the calculation mode for the power factor (IEEE, IEEE alt., IEC)**

The metering manager contains the registers listed below.

Register range	Description
1000-1299	Real-time measurements
1300-1599	Minimum values for the real-time measurements from 1000 to 1299
1600-1899	Maximum values for the real-time measurements from 1000 to 1299
2000-2199	Energy
2200-2299	Demand values
3000-3299	Time stamping
3300-3999	Configuration of the metering manager
4000-4099	Reserved
4100-5699	Spectral components
5700-6899	Analog pre-defined alarm (1 to 53)
7100-7499	File Header/ status (see the section : Access to the files)

Note: *More detailed information on these registers is presented in the section Appendix: Table of registers: metering-manager.*

Registers 1000 to 1299: real-time measurements

The metering manager refreshes the real-time measurements every second.

Registers 1300 to 1599: minimum values of the real-time measurements from 1000 to 1299

The minimum values for the real-time measurements may be accessed at the registers of the real-time values + 300.

All the minimum values are stored in non volatile memory and may be reset to zero, group by group according to the list below, by the command interface:
- **RMS current**
- **current unbalance**
- **RMS voltage**
- **voltage unbalance**
- **frequency**
- **power**
- **power factor**
- **fundamental**
- **total harmonic distortion**
- **voltage crest factor**
- **current crest factor.**

Note:
- *The minimum and maximum values of the real-time measurements are stored in the memory. They may be reset to zero.*
- *The maximum values of the demand measurements are time stamped and stored in memory. They may be reset to zero.*

Registers 1600 to 1899: maximum values of the real-time measurements from 1000 to 1299

The maximum values for the real-time measurements may be accessed at the registers of the real-time values + 600.

All the maximum values are stored in non volatile memory and may be reset to zero, group by group according to the list below, by the command interface:
- **RMS current**
- **current unbalance**
- **RMS voltage**
- **voltage unbalance**
- **frequency**
- **power**
- **power factor**
- **fundamental**
- **total harmonic distortion**
- **voltage crest factor**
- **current crest factor.**

Registers 2000 to 2199: energy measurements

The energy counters may be:
- **reset to zero**
- **preloaded with an initial value**

using the reset applications via the command interface.

Registers 2200 to 2299: demand values

The demand values are refreshed every 15 seconds for sliding windows or at the end of the time interval for block windows. When block windows are used, an estimation of the value at the end of the time interval is calculated every 15 seconds.

Metering manager: @ xx + 200

Registers 3000 to 3299: time stamping

The time-stamping function becomes useful once the time and date have been set on the Micrologic control unit, either locally or via the communication network.
If power to the Micrologic control unit is cut, the time and date must be set again.
With firmware release “logic 2002 AA” and above, the clock is powered by the battery. So, it is no more necessary to set time and date after power comes off on the Micrologic control unit.
If power to the communication option is cut, the time and date must be set again
The maximum drift of the Micrologic clock is approximately 0.36 seconds per day. To avoid any significant drift, the clocks must be periodically synchronised via the communication network.

Registers 3300 to 3999: configuration of the metering manager

The configuration registers may be read at all times. The registers may be modified via the command interface in configuration mode.

Registers 4100 to 5699: spectral components

- **RMS/phase of voltage harmonic**
- **RMS/phase of current harmonic.**

Registers 6000 to 6899: Analog pre-defined Alarms (1 to 53)

The alarms registers may be read at all times. The registers may be modified via the command interface in configuration mode. These alarms (available with Micrologic H only) can be used to trigger Wave form Capture.

Registers 7100 to 7499: File header/Status

Event log configuration/characteristics and format of records for:

Wave Form Capture	(file n° 5)
Event log of the metering manager	(file n° 10)
Min-Max event log	(file n° 11)
Maintenance event log of the metering manager	(file n° 12)

Protection manager: @ xx + 100

The protection manager ensures the critical circuit-breaker functions. The Micrologic control unit was designed to make this manager completely independent and thus guarantee secure operation.

It does not use the measurements generated by the metering manager, but rather calculates the protection-function inputs and outputs itself. This ensures extremely fast reaction times.

The protection manager manages:
- **The basic protection: the long-time (LT), short-time (ST), instantaneous and ground-fault current protection functions**
- **The advanced protection: currents I max, I unbal, voltages U max, U min and U unbal, frequency F max and F min, maximum reverse power Rp max, phase rotation ΔΦ.**

The protection manager controls:
- **the automatic load shedding and reconnection functions, depending on current and power**
- **the optional M2C and M6C contacts.**

It is also possible to remotely access the protection manager. Remote access to the protection manager may be enabled by locally setting the Micrologic control unit to YES (remote access unlocked). See register 9800.

A local operator may disable all remote access to the protection manager by opening the Micrologic plastic cover. It is also possible to limit access to certain users by setting up a password on the Micrologic control unit.

A protection function intended to trip the circuit breaker cannot be modified if the protective cover is closed, with or without the password.

The protection manager contains the registers listed below.

Register range	Description
8750-8753	Characteristics of the protection manager
8754-8803	Fine settings for the long-time, short-time, instantaneous, ground-fault and earth-leakage protection functions
8833-8842	Measurements carried out by the protection manager
8843-8865	Status of the protection manager
9000-9599	Time stamping and trip/alarm history
9600-9628	Micrologic configuration
9629-9799	Advanced protection settings
9800-9899	Relay configuration (M2C/M6C)
9900-9924	Event log (see the section : Access to the files) File N° 20
9932-9956	Maintenance event log (see the section : Access to the files) File N° 12
9964-9989	Fault Wave form Capture (see the section : Access to the files) File N° 22

Note: *More detailed information on these registers is presented in the section Appendix: Table of registers: protection manager.*

.

Operating principle

Write access to Micrologic data and control-unit options is monitored to inhibit accidental operation and operation by unauthorised persons.

Commands sent to Micrologic control units are carried out via a command interface.

The command interface manages transmission and execution of the various commands using the registers numbered from 7700 to 7729 that may be accessed by the Modbus read and write functions.

The circuit-breaker manager supports the command interface for the commands intended for the circuit-breaker, measurement and protection managers.

The chassis manager supports its own command interface.

Slave @ xx [circuit-breaker manager]	**Slave @ xx+50 [chassis manager]**
Command interface 7700 to 7729	**Command interface 7700 to 7729**
Commands intended for the circuit-breaker manager	Commands intended for the chassis manager only
Commands intended for the protection manager	
Commands intended for the metering manager	

The command interface offers two command-management modes:

■ **Shared mode**

This mode may be used to send up to 20 commands in series. It returns exclusively the indications on command transmission via the Modbus protocol. This mode does not return the result of command execution. Therefore, it is not recommended to use the I/O scanning mode with Modbus TCP/IP protocol.

■ **Protected mode**

This mode may be used to monitor execution of a command and to manage access by a number of supervisors to a single circuit breaker. This is the case for the Modbus multi-master architectures on Ethernet TCP/IP).

When a command is written, the command interface updates its registers with information on command execution. **It is necessary to wait until the command is terminated before sending the next command**. (Recommended time-out is 500 ms)

Furthermore, when the command is terminated, it is necessary to respect a delay before sending the next command. (Recommended delay is 20 ms).

Access control is achieved by a flag reservation and freeing mechanism. In protected mode, a command may be issued only after receiving a flag (and not after releasing the flag).

Note: *Certain commands may be accessed only in protected mode. See the section with the list of commands to determine the possible command-management modes.*

Command interface registers

register	address	nb of reg.	read/ write	scale	unit	format	interval	A/E	P/H	description
7700	7699	10	R/W	-	-	INT	0.. 65535	A/E	P/H	command interface in shared mode – commands (1),
7715	7714	5	R	-	-	INT	0.. 65535	A/E	P/H	command interface in protected mode – status (1)
7720	7719	10	R/W	-	-	INT	0.. 65535	A/E	P/H	command interface in protected mode – commands (1),
7730	7729	100	R	-	-	INT	0.. 65535	A/E	P/H	command interface in protected mode – return data(1),

(1) *See the section "List of commands".*

Send commands in shared mode

The shared mode uses the registers numbered 7700 to 7709 in the command interface:
Command interface registers 7700 to 7709 may be read accessed. They are used to send parameters and run execution of commands in shared mode.

Registers	Description
7700	Command number
7701	Parameter P1
7702	Parameter P2
7703	Parameter P3
7704	Parameter P4
7705	Parameter P5
7706	Parameter P6
7707	Parameter P7
7708	Parameter P8
7709	Parameter P9

See the list of commands that may be accessed in shared mode and the corresponding parameters in the section with the list of commands for Micrologic control units.

Proceed in the following manner to send a command in shared mode.
■ **Step 1. Parameters**
Fill in the command parameters in registers 7701 to 7709
■ **Step 2. Write command**
Write the command number to register 7700 to initiate execution.

It is possible to optimise data flow on the communication system by using function 16 in the Modbus protocol. In this case, the data may be written to registers 7700 to 7709 in a single step. The circuit-breaker communication option will automatically put steps 1 and 2 in the correct order.

Send commands in protected mode

The protected mode uses the registers numbered 7715 to 7829 in the command interface.

Command interface registers 7715 to 7719 may be read accessed only and provide the indications required to use the protected mode (status).

Registers	Description
7715	Flag query (1)
7716	Active Flag (2)
7717	Number of the command being executed (3)
7718	Number of the last command executed (4)
7719	Result code of the last command executed (4)

Note:
(1) Register 7715 must be read-accessed to request an access flag to the command interface in protected mode. The communication option returns 0 if the flag was already attributed during a previous query and not returned (see the command table for information on return). Otherwise, a random number is read, corresponding to the flag attributed. This number becomes the active flag.

(2) The active flag indicates to a supervisor the number of the flag with current access rights to the command interface in protected mode. Only the supervisor that was attributed the given number during a flag query has the right to use the command interface in protected mode. The active flag returns to 0 if no command is sent for two minutes or if the user returns the flag (see the command table for information on return).

(3) The number of the command currently being executed remains set to 0 as long as no command is sent to 7720. As soon as a command is sent, register 7717 indicates the number of the command. It returns to 0 when command execution is terminated.

(4) When command execution is terminated, register 7718 receives the number of the command and register 7719 indicates the result code. The contents of registers 7718 and 7719 are not modified until the next command has been completely executed.)

Register 7719: Command result codes table

Result codes	Description of register 7719
0	Command successfully executed.
10	Command not executed, the necessary resources are not available or the option is not installed. or remote access = NO
11	Command not executed, a local user is using the resources.
12	Command not executed, the portable test kit is using the local resources.
14	Command not executed, the resources are being used by a remote user.
15	Invalid record size.
16	Illegal file command.
17	Insufficient memory.
42	Invalid file number.
81	Command not defined.
82	Command parameters not set or invalid.
107	Invalid record number.
125	Invalid number of records.
200	Protected mode not active.
201	End of time delay. Command not executed.
202	Invalid password. Command not executed.
204	Invalid Command ; enter configuration mode while already in configuration mode; exit configuration mode while not in configuration mode

Send commands in protected mode

Command interface registers 7720 to 7729 may be read accessed. They are used to send parameters and run execution of commands in protected mode.

Registers	Description
7720	Command number
7721	Parameter P1
7722	Parameter P2
7723	Parameter P3
7724	Parameter P4
7725	Parameter P5
7726	Parameter P6
7727	Parameter P7
7728	Parameter P8
7729	Parameter P9

See the list of commands that may be accessed in protected mode and the corresponding parameters in the section with the list of commands for Micrologic control units.

Command interface registers 7730 to 7829 may be read accessed. They are used as a buffer for the returned data.

.

Send commands in protected mode

Proceed as follows to send a command in protected mode.

■ **Step 1: Request the flag**
Read register 7715 to request the flag required to access the protected mode.
If the register returns 0, another user currently has the access rights and it is necessary to wait until that user returns the flag. It is possible, however, that you already took the flag for another command and did not return it.
E.g. if you wished to sequence sending of a series of commands.
It is possible to check if you have the rights by reading the active flag at register 7716. In this case, even if you read 0 at 7715 when you made the request, it is possible to send the commands.

■ **Step 2: Fill in parameters**
Fill in the command parameters (P1 to P9) in registers 7721 to 7729.

■ **Step 3: Write command**
Write the command number to register 7720 to initiate execution.

■ **Step 4: Wait for command being executed**
Wait until the command is fully terminated, by reading registers 7717 and 7718.
(Recommended time-out = 500 ms)

■ **Step 5: Check Result code**
Check the result code for the command by reading register 7719.

■ **Step 6: Send New command**
Send new commands in protected mode by starting with step 2 or go on to step 7.
(Recommended delay between command fully terminated and new command = 20 ms)

■ **Step 7: Release the flag**
Return the flag to free the protected mode. See the command table for information on returning the flag.

Send commands in protected mode

Optimise sending of commands

It is possible to optimise data flow on the communication system by using function 16 in the Modbus protocol. In this case, the data may be written to registers 7720 to 7729 in a single step. The command interface will automatically put steps 2 and 3 in the correct order.

Caution:
It is advised not to use function 23 to optimise steps 1, 2 and 3, because this function does not check access rights to protected mode before sending the command. This may cause problems for another supervisor who current has the access rights.

Most of the commands that may be used to remotely control the circuit breaker implement two steps, namely the request for the flag (step 1) and return of the flag (step 7).

This mechanism makes it possible for a number of supervisors to issue commands, on the condition that the two steps are implemented.

Using this procedure, you take and return the flag for each of the commands to be issued. In this case, the possible degree of parallelism between the various supervisors is increased, but at the cost of more traffic on the communication system.

If you have a number of commands to send, optimise the mechanism by sending all the commands between the two steps, i.e. request the flag, send all the commands in one shot and then return the flag. In this case, you occupy the command interface for a longer time, but traffic on the communication system is optimised.

Remote configuration

Detailed information on the registers is presented in the Appendix containing the tables of registers.

A number of simple concepts must be clear in order to remotely configure the circuit breaker successfully.

■ **Configuration is carried out via the configuration registers (R/W).**
The configuration registers for all the managers (circuit breaker, chassis, metering and protection) may be read accessed in the table of registers.

The only way to remotely modify a configuration is to modify the contents of the configuration registers.

■ **The configuration registers (R/W) may be write accessed in configuration mode only.**
To modify the configuration registers, it is necessary to remove the register write-protect function by running the command required to enter in configuration mode, via the command interface. Once in configuration mode, it is possible to write access the configuration registers and you may modify one or more configuration registers using the standard Modbus write functions.

Circuit-breaker manager @ xx

Register range	Configuration registers
534-543	Identification of the Breaker Communication Module

Chassis manager @ xx + 50

Register range	Configuration registers
534-543	Identification of the Chassis Communication Module

Metering manager @ xx + 200

Register range	Configuration registers
3303-3355	Configuration of the metering manager
6000-6011	Configuration of Analog pre-defined Alarm 1
6012 to 6635	Configuration of Analog pre-defined Alarm 2 to 53

Protection manager @ xx + 100

Register range	Configuration registers
8753-8803	Fine adjustments for the basic protection
9604-9618	Configuration of the protection manager
9629-9798	Settings for the advanced protections
9800-9846	Configuration of the output relays (M2C/M6C)

Specific conditions must be met to enter the configuration mode.

Remote configuration

Consult the list of commands for details on the check words.

Remote access is not possible if local configuration is underway and vice-versa

When a local user is in the process of locally modifying the configuration of Micrologic or of its options, it is not possible to start a remote-configuration sequence.

Micrologic considers that a local user is in the process of modifying the configuration when a parameter field is displayed in reverse video or as soon as the Micrologic plastic cover is opened.

Access to configuration mode is subject to different restrictions depending on the manager

Access to configuration mode for the protection manager requires the remote-access code that was programmed on the front panel of the Micrologic control unit. This code (default value = 0000) may be obtained only via the setting screen on the Micrologic control unit itself. What is more, it is possible to access the configuration mode for the protection manager only if the Micrologic control unit has been set to authorise remote access. This setting must be made manually via the front panel of the Micrologic control unit. It is possible to consult the protection-manager register 9800 to check the status of this parameter. Then you can access to the configuration mode for the protection manager by using the command In_pCfg.

Access to configuration mode for the circuit-breaker and metering managers requires a control word that must first be read in the table of registers. Register 553 is the control word for the circuit-breaker, register 3300 is the control word for the metering manager. Then you can access to the configuration mode by using the command In_mCfg for the metering manager or by using the command In_CommCfg for the circuit-breaker manager.

This two-step operation is intended to avoid inadvertent access to the configuration mode.
The access commands for configuration mode implement the protected mode and systematically inform on the command result.

New configurations are always checked before being accepted

When writing in the configuration registers, the Modbus write functions are accepted, even if the written value exceeds the limits presented in the tables of registers that should be consulted first.

To assist in configuring the protection functions, Micrologic provides access to a set of registers that list the minimum and maximum permissible values for the various protection settings
All the configuration data entered are checked before they enter into effect. This check is run when you exit configuration mode, using the commands Out_pCfg for the protection manager, Out_mCfg for the metering manager or Out_CommCfg for the circuit-breaker manager.
If one of the configuration settings is incorrect, all the new configuration data are rejected. The system indicates why the data are rejected via the result returned for the command used to exit the configuration mode. The protection manager indicates the first ten faulty configuration registers. See the information on command Out_pCfg for further details.

The new configuration data take effect only on exiting configuration mode

The new configuration data take effect only on exiting configuration mode so that the data can be checked. I.e., it is when the Out_pCfg, Out_mCfg or Out_CommCfg command has been successfully run that the new configuration settings become active.

Remote configuration

Example of a remote parameter-setting sequence

Below are the steps that must be followed to modify the long-time (LT) current setting.

■ **Step 1**
Check that remote access is authorised by reading register 9800 at address @+100 [protection manager].

■ **Step 2**
Make sure you have the remote-access code, noted on the "Local / Remote" screen in the "COM setup" menu of Micrologic (default value = 0000).

■ **Step 3**
Enter configuration mode for the protection manager, using the In_pCfg command. See the "Examples of commands" appendix.

■ **Step 4**
Enter the new setting in registers 8753 to 8803, at the address @+100 [protection manager].
Make sure these new settings are below the value set by the rotary switch.

■ **Step 5**
Exit configuration mode for the protection manager, using the Out_pCfg command, and check first for an error code returned by the command interface, then the parameters returned by Out_pCfg in registers 7730 to 7739 of the circuit-breaker command interface.

■ **Step 6**
Read the contents of the registers 8756 and 8757. The settings should be those entered, if step 5 did not return an error.

Introduction

Micrologic stores events and wave form in different files. These files may be read with the command interface: ReadFileX_RecY. The requested recording may be read starting in registers 7730. See the section Appendix: Examples of commands.

A file is made up of records. All records in a file have the same structure and size. Each record, with a maximum of 100 is made up of a number of registers.
Each file is linked to a descriptor. The descriptor is made up of a read zone for file configuration (Header) and for file characteristics (Status). Descriptors are updated each time new data is added to the file.
The file configuration (Header) gives information about size of file and records.
The file Characteristic (Status) gives information about record numbers. The file characteristics (Status) makes available to the supervisor two sequence registers that indicate the first and last events recorded in the file. They enable the supervisor to determine whether certain events were deleted before they could be read. The sequence number for the last event increments from 1 to 8000 each time a new event is recorded. When the file is full (maximum of 100), the new events overwrite the oldest events. The sequence number for the last event continues to increment normally. When the oldest event is overwritten, the sequence number for the first event also increments.
When the sequence number reaches 8000, the next sequence number will be one.

Event log

■ The event log of the circuit-breaker manager Micrologic A/E/P/H
The system stores the events that concern circuit-breaker control (e.g. opening or closing of the contacts) in the file N° 30. This file is made up of 100 records; each record is made up of 5 registers. This file is reset in case of 24 VDC power loss on the Breaker Communication Module or change of the communication parameter 4W/2W +ULP.

■ The event log of the protection manager Micrologic P/H
The system stores the events that concern the protection manager (trips, alarms) in the file N° 20. .This file is made up of 100 records; each record is made up of 9 registers.

■ The event log of the metering manager Micrologic H
The system stores the events that concern the metering manager (Analog Pre-defined alarms 1 to 53) in the file N° 10. This file is made up of 100 records; each record is made up of 9 registers.

■ The Maintenance event log of the protection manager Micrologic H
The system stores the events that concern the maintenance protection manager (power-up, M6C relays, Max peak fault current, …) in the file N° 21. .This file is made up of 20 records; each record is made up of 6 registers.
This maintenance event log has been implemented as well on Micrologic P with firmware Plogic2002AA and above.

■ The Maintenance event log of the metering manager Micrologic H
The system stores the events that concern the maintenance metering manager (counter reset …) in the file N° 12. .This file is made up of 20 records; each record is made up of 6 registers.

■ The min-MAX event log of the metering manager Micrologic H
The system stores the events that concern the metering manager (minimum and Max values for the Real Time measurements 1000 to 1136) in the file N° 11. .This file is made up of 136 records; each record is made up of 8 registers.

Wave Form Capture

■ The WFC in the metering manager Micrologic H
The system stores the variables Va, Vb, Vc, Ia, Ib, Ic, Ineutral during 4 cycles (64 points per cycles) in the file N° 5.
The capture is triggered:
- manually (user request) by using the command " Forcelog "
  (See the section Appendix : List of commands in the metering manager)
- automatically attached to Pre-defined analog alarms (1 to 53) by setting to 1 the log action.
  (See register 6010 for alarm N° 1, register 6634 for alarm N° 53)

■ The Fault WFC in the protection manager Micrologic H
The system stores the variables Va, Vb, Vc, Ia, Ib, Ic, Ineutral during 12 cycles (16 points per cycles) in the file N° 22.
The capture is triggered:
automatically attached to alarms (1000 to 1030) .by setting to 1 the log action
(See register 8762 for alarm N° 1000, register 9797 for alarm N° 1030)

Event log of the circuit-breaker manager

Descriptor of the event log in the circuit-breaker manager

■ **Event log configuration (Header)**

register	address	nb of reg.	read/ write	scale	unit	format	interval	A/E	P/H	description
718	717	1	R	-	-	INT	0xFFFF	A/E	P/H	File status :0xFFFF= file enabled always equal to : 0xFFFF
719	718	1	R	-	-	INT	30	A/E	P/H	type of file: event log of the circuit-breaker manager always equal to : 30
720	719	1	R	-	-	INT	0xFFFF	A/E	P/H	File allocation : 0xFFFF= file allocated always equal to : 0xFFFF
721	720	1	R	x1	register	INT	5	A/E	P/H	Size of records in register always equal to : 5
722	721	1	R	-	-	INT	0	A/E	P/H	File filling mode : 0 = circular always equal to : 0

■ **Event log characteristics (status)**

register	address	nb of reg.	read/ write	scale	unit	format	interval	A/E	P/H	description
734	733	1	R	x1	rec.	INT	100	A/E	P/H	Size of file in records always equal to 100
735	734	1	R	x1	register	INT	5	A/E	P/H	size of a record in registers always equal to 5
737	736	1	R	x1	rec.	INT	0..100	A/E	P/H	number of records in the file 0 = no record in the file
738	737	1	R	x1	rec.	INT	0..8000	A/E	P/H	sequence number of first record in the file (the oldest) 0 = no record in the file
739	738	1	R	x1	rec.	INT	0..8000	A/E	P/H	sequence number of last record in the file (the most recent) 0: no record in the file
740	739	3	R	-	-	DATE	-		P/H	date the last file was reset

Event log of the circuit-breaker manager

Format of records in the event log of the circuit-breaker manager

Registers	Description
1-4	Event date, in the XDATE format (see the section Appendix: Formats)
5	Event number (See below)

Events in the event log of the circuit-breaker manager

Event number	Description
1	RESET or system energized
2	Configuration data stored in the chassis manager
3	Spring charged
4	Circuit breaker opened (O)
5	Circuit breaker closed (F)
6	Circuit breaker tripped (SD)
7	Circuit breaker fault tripped (SDE)
8	Reserved
9	Reserved
10	Closing command input remotely (AUTO) (XF)
11	Opening command input remotely (AUTO) (MX)
12	Modification of Modbus configuration (address, baud rate, parity)
13	Event log reset
14	Clock update input locally accepted
15	Clock update input locally rejected (synchronization by the supervisor)

Event log of the protection manager

Descriptor of the event log in the protection manager

■ **Event log configuration (Header)**

register	address	nb of reg.	read/ write	scale	unit	format	interval	A/E	P/H	description
9900	9899	1	R/W	-	-	INT	{0x0000, 0xFFFF}		P/H	file status 0xFFFF: file enabled 0: file disabled Default value: 0xFFFF
9901	9900	1	R	-	-	INT	20		P/H	type of file: protection-manager event log always equal to : 20
9902	9901	1	R	x1	rec.	INT	100		P/H	size of file in records always equal to : 100
9903	9902	1	R	x1	register	INT	9		P/H	size of a record in registers always equal to : 9 registers per record
9904	9903	1	R	-	-	INT	0		P/H	file filling mode 0: circular always equal to 0

■ **Event-log characteristics (Status)**

register	address	nb of reg.	read/ write	scale	unit	format	interval	A/E	P/H	description
9916	9915	1	R	x1	rec.	INT	100		P/H	size of file in records always equal to 100
9917	9916	1	R	x1	Register	INT	9		P/H	size of a record in registers: always equal to 9
9918	9917	1	R	x1	-	INT	0,10,20,30, 250,253, 254,255, 0xFF00, 0xFE00, OxFD00, OxFC00		P/H	0: file OK 10: record size smaller than expected 20: record size larger than expected 30: insufficient memory 250: internal error 253: corrupted allocation table 254: configuration zero 255: invalid configuration 0xFF00: cannot allocate file 0xFE00: file not supported 0xFD00: invalid record number 0xFC00: invalid file number
9919	9918	1	R	x1	rec.	INT	0..100		P/H	number of records in the file 0: no record in the file
9920	9919	1	R	x1	rec.	INT	0..8000		P/H	sequence number of first record in the file (the oldest) 0: no record in the file
9921	9920	1	R	x1	rec.	INT	0..8000		P/H	sequence number of last record in the file (the most recent). 0: no record in the file
9922	9921	3	R	-	-	DATE	cfformat		P/H	date the last file was reset Default value: 0x8000 0x8000 0x8000

Event log of the protection manager

Format of records in the event log of the protection manager

Registers	Description
1-4	Event date, in the XDATE format (see the section Appendix: Formats)
5	Event number (see below)
6	Event characteristics (1)
7	Type of event (2)
8	Logging bitmap associated to the Alarm (3)
9	Action bitmap associated to the Alarm (3)

Note.
(1) For alarms 1000 to 1004, the data is the value of the fault current interrupted by the circuit breaker. For all other events, this value is forced to 32768.

(2) Bits 0 to 7
The value 1 indicates an alarm of the "Over" type.
The value 2 indicates an alarm of the "Under" type.
The value 3 indicates an alarm of the "Minimum" type.
The value 4 indicates an alarm of the "Maximum" type.
The value 5 indicates an alarm of the "Assorted" type.
(2) Bits 8 to 11
The value 1 indicates the start of an alarm.
The value 2 indicates the end of an alarm
(2) Bits 12 to 15
Alarms 1100 to 1106 are priority 3. For the other alarms, the value contained in these four bits represents the priority linked to the event (if applicable and depending on the alarm configuration.

(3) Registers 8 and 9 are a copy of the alarm-configuration registers at the moment the event occurred. They depend entirely on the user configurations. For the events 1100 to 1106, these registers are forced to 32768.

Events in the event log of the protection manager

Event number	Description
1000 to 1015	Basic protection (1)
1016 to 1031	Advanced protection (1)
1100 to 1115	Digital alarms (1)

(1) See description of the "Alarm numbers" in the section Appendix: Trip/Alarm History

Event log of the metering manager

Descriptor of the event log in the metering manager

■ **Event log configuration (Header)**

register	address	nb of reg.	read/ write	scale	unit	format	interval	A/E	P/H	description
7164	7163	1	R/W	-	-	INT	{0x0000, 0xFFFF}		H	log status 0xFFFF: file enabled 0: file disabled Default value: 0xFFFF
7165	7164	1	R	-	-	INT	10		H	type of file: metering-manager event log Default value: 10
7166	7165	1	R	x1	rec.	INT	100		H	size of file in records Default value: 100 records per file
7167	7166	1	R	x1	register	INT	9		H	size of a record in registers Default value: 9 registers per record
7168	7167	1	R	-	-	INT	0		H	file filling mode : 0 = circular always equal to 0

■ **Event-log characteristics (Status)**

register	address	nb of reg.	read/ write	scale	unit	format	interval	A/E	P/H	description
7180	7179	1	R	x1	rec.	INT	100		H	size of file in records :100 always equal to 100
7181	7180	1	R	x1	register	INT	9		H	size of a record in registers: always equal to 9
7182	7181	1	R	x1	-	INT	0,10,20,30, 250,253, 254,255, 0xFF00, 0xFE00, OxFD00, OxFC00		H	0: file OK 10: record size smaller than expected 20: record size larger than expected 30: insufficient memory 250: internal error 253: corrupted allocation table 254: configuration zero 255: invalid configuration 0xFF00: cannot allocate file 0xFE00: file not supported 0xFD00: invalid record number 0xFC00: invalid file number
7183	7182	1	R	x1	rec.	INT	0..100		H	number of records in the file 0: no record in the file
7184	7183	1	R	x1	rec.	INT	0..8000		H	sequence number of first record in the file (the oldest) 0: no record in the file
7185	7184	1	R	x1	rec.	INT	0..8000		H	sequence number of last record in the file (the most recent) 0: no record in the file
7186	7185	3	R	-	-	DATE	cfformat		H	date the last file was reset Default value: 0x8000 0x8000 0x8000

Event log of the metering manager

Format of records in the event log of the metering manager

Registers	Description
1-3	Event date, in the XDATE format (see the section Appendix: Formats)
4	Reserved
5	Event number (see below)
6	Extreme value
7	Type of event [2]
8	Logging bitmap associated to the Alarm [3]
9	Action bitmap associated to the Alarm [3]

Note.
[2] Bits 0 to 7
The value 0 indicates an alarm of the "Over" type.
The value 1 indicates an alarm of the "Under" type.
The value 2 indicates an alarm of the "Equal to" type.
The value 3 indicates an alarm of the "Different from" type.
The value 5 is used for all other alarms
[2] Bits 8 to 11
The value 1 indicates the start of an alarm.
The value 2 indicates the end of an alarm.
[2] Bits 12 to 15
The value contained in these four bits represents the priority linked to the event (if applicable and depending on the alarm configuration.

[3] Registers 8 and 9 are a copy of the alarm-configuration registers at the moment the event occurred. They depend entirely on the user configurations.

Events in the event log of the metering manager

Event number	Description
1 to 53	Analog Pre-defined alarms

[1] See the "Analog pre-defined alarms"1 to 53 in the section: Appendix Table of registers 6000 to 6624

Maintenance event log of the protection manager

Descriptor of the Maintenance event log in the protection manager

■ **Event log configuration (Header)**

register	address	nb of reg.	read/ write	scale	unit	format	interval	A/E	P/H	description
9932	9931	1	R/W	-	-	INT	0xFFFF		H	File status 0xFFFF: file enabled always equal to: 0xFFFF
9933	9932	1	R	-	-	INT	21		H	type of file: Maintenance protection-manager event log always equal to: 21
9934	9933	1	R	x1	rec.	INT	20		H	size of file in records always equal to 20 records per file
9935	9934	1	R	x1	register	INT	6		H	size of a record in registers always equal to 6 registers per record
9936	9935	1	R	-	-	INT	1		H	log filling mode :1 = inhibition is full always equal to 1

■ **Event-log characteristics (Status)**

register	address	nb of reg.	read/ write	scale	unit	format	interval	A/E	P/H	description
9948	9947	1	R	x1	rec.	INT	20		H	size of file in records : 20 size always equal to 20
9949	9948	1	R	x1	register	INT	6		H	size of a record in registers: always equal to 6
9950	9949	1	R	x1	-	INT	0,10,20,30, 250,253, 254,255, 0xFF00, 0xFE00, OxFD00, OxFC00		H	0: file OK 10: record size smaller than expected 20: record size larger than expected 30: insufficient memory 250: internal error 253: corrupted allocation table 254: configuration zero 255: invalid configuration 0xFF00: cannot allocate file 0xFE00: file not supported 0xFD00: invalid record number 0xFC00: invalid file number
9951	9950	1	R	x1	rec.	INT	20		H	number of records in the file Always Equal to 20
9952	9951	1	R	x1	rec.	INT	1		H	sequence number of first record in the file Always Equal to 1
9953	9952	1	R	x1	rec.	INT	20		H	sequence number of last record in the file Always Equal to 20
9954	9953	3	R	-	-	DATE	cfformat		H	date the last file was reset Default value: 0x8000 0x8000 0x8000

Maintenance event log of the protection manager

Formats of records in the maintenance event log of the protection manager

This file consists of a fixed number of records (20). All records are of similar size, i.e 6 registers wide.

Record number	Registers	Description
1	1-3	Last Power Loss (XDATE Format)
	4-6	Reserved
2	1-3	Date/time of last counter reset (DATE Format)
	4	Number of output operations for relay 1
	5-6	Reserved
3 to 6	1-3	Date/time of last counter reset (DATE Format)
	4	Number of output operations for relay 3 to 6
	5-6	Reserved
7	1-3	Date/time of last counter reset (DATE Format)
	4	Number of output operations for relay 6
	5-6	Reserved
8	1-3	Date/time of last record updated (DATE Format)
	4	Worst contact wear
	5-6	Reserved
9	1-3	Date/time of last record updated (DATE Format)
	4	Max reverse power
	5-6	Reserved
10	1-3	Date/time of last record updated (DATE Format)
	4	Battery indicator (see register 8843)
	5-6	Reserved
11	1-3	Date/time of last record updated (DATE Format)
	1	Number of power losses
	5-6	Reserved
12	1-6	Reserved
13	1-6	Reserved
14	1-6	Reserved
15	1-6	Reserved
16	1-3	Date/time of last record updated (DATE Format)
	4	Number of Max resets
	5-6	Reserved
17	1-6	Reserved
18	1-3	Date/time of last record updated (DATE Format)
	4	Max peak fault current breaker ever opened
	5-6	Reserved
19	1-6	Reserved
20	1-6	Reserved

Maintenance event log of the metering manager

Descriptor of the Maintenance event log in the metering manager

■ **Event log configuration (Header)**

register	address	nb of reg.	read/ write	scale	unit	format	interval	A/E	P/H	description
7228	7227	1	R/W	-	-	INT	0xFFFF		H	File status 0xFFFF: file enabled always equal to 0xFFFF
7229	7228	1	R	-	-	INT	12		H	type of file: Maintenance metering-manager event log always equal to: 12
7230	7229	1	R	x1	rec.	INT	20		H	size of file in number of records always equal to 20 records per file
7231	7230	1	R	x1	register	INT	6		H	size of a record in number of registers always equal to 6 registers per record
7232	7231	1	R	-	-	INT	1		H	log filling mode :1= disabled if log is full always equal to 1

■ **Event-log characteristics (Status)**

register	address	nb of reg.	read/ write	scale	unit	format	interval	A/E	P/H	description
7244	7243	1	R	x1	rec.	INT	20		H	size of file in records:20 always equal to 20
7245	7244	1	R	x1	register	INT	6		H	size of a record in registers: always equal to 6
7246	7245	1	R	x1	-	INT	0,10,20,30, 250,253, 254,255, 0xFF00, 0xFE00, OxFD00, OxFC00		H	0: file OK 10: record size smaller than expected 20: record size larger than expected 30: insufficient memory 250: internal error 253: corrupted allocation table 254: configuration zero 255: invalid configuration 0xFF00: cannot allocate file 0xFE00: file not supported 0xFD00: invalid record number 0xFC00: invalid file number
7247	7246	1	R	x1	rec.	INT	20		H	number of records in the file Always Equal to 20
7248	7247	1	R	x1	rec.	INT	1		H	sequence number of first record in the file Always Equal to 1
7249	7248	1	R	x1	rec.	INT	20		H	sequence number of last record in the file Always Equal to 20
7250	7249	3	R	-	-	DATE	cfformat		H	date the last file was reset Default value: 0x8000 0x8000 0x8000

Maintenance event log of the metering manager

Formats of records in the maintenance event log of the metering manager

This file consists of a fixed number of records (20). All records are of similar size, i.e 6 registers wide.

Record number	Registers	Description
1	1-3	Date/time of last counter reset (DATE Format)
	4	Number of min resets
	5-6	Reserved
2	1-3	Date/time of last counter reset (DATE Format)
	4	Number of Max resets
	5-6	Reserved
3	1-3	Date/time of last counter reset (DATE Format)
	4	Number of Peak current Demand resets
	5-6	Reserved
4	1-3	Date/time of last counter reset (DATE Format)
	4	Number of Peak power demand resets
	5-6	Reserved
5	1-3	Date/time of last counter reset (DATE Format)
	4	Number of Energy resets
	5-6	Reserved
6 to 20	1-6	Reserved

Min-Max event log of the metering manager

Descriptor of the min-Max event log in the metering manager

■ **Event log configuration (Header)**

register	address	nb of reg.	read/ write	scale	unit	format	interval	A/E	P/H	description
7196	7195	1	R/W	-	-	INT	0xFFFF		H	File status 0xFFFF: file enabled always equal to 0xFFFF
7197	7196	1	R	-	-	INT	11		H	type of file: Min/Max event log = 11 always equal to: 11
7198	7197	1	R	x1	rec.	INT	Real Time zone size		H	size of file in number of records. identical to the size of the MM Real Time zone. always equal to 136
7199	7198	1	R	x1	register	INT	8		H	size of records in number of registers always equal to 8 registers per record
7200	7199	1	R	-	-	INT	1		H	log filling mode 1: disabled if log is full always equal to 1

■ **Event-log characteristics (Status)**

register	address	nb of reg.	read/ write	scale	unit	format	interval	A/E	P/H	description
7212	7211	1	R	x1	rec.	INT	Real Time zone size		H	size of file in records: size always equal to Real Time zone size Value equal to 136
7213	7212	1	R	x1	register	INT	8		H	size of a record in registers: always equal to 8
7214	7213	1	R	x1	-	INT	0,10,20,30, 250,253, 254,255, 0xFF00, 0xFE00, OxFD00, OxFC00		H	0: file OK 10: record size smaller than expected 20: record size larger than expected 30: insufficient memory 250: internal error 253: corrupted allocation table 254: configuration zero 255: invalid configuration 0xFF00: cannot allocate file 0xFE00: file not supported 0xFD00: invalid record number 0xFC00: invalid file number
7215	7214	1	R	x1	rec.	INT	Real Time zone size		H	Actual number of records in the file. Always Equal to Real Time zone size. Value equal to 136
7216	7215	1	R	x1	rec.	INT	1		H	number of first record present Always Equal to 1
7217	7216	1	R	x1	rec.	INT	Real Time zone size		H	number of last record present Always Equal to 20
7218	7217	3	R	-	-	DATE	cfformat		H	date the last file was reset Default value: 0x8000 0x8000 0x8000

Min-Max event log of the metering manager

Format of Records in the min-Max event log of the metering manager

This file contains the minimum and Maximum values reached by the Real Time measurements.
Real Time value: See registers 1000 to 1135
Min of Real Time value: See registers 1300 to 1435
Max of Real Time value: See registers 1600 to 1735
All records are of similar size, i.e. 8 registers wide.

Record number	Registers	Description
1	1	Last Min Value (register 1300)
	2-4	Date/time of last Min Value (DATE Format)
	5	Last Max Value (register 1600)
	6-8	Date/time of last Max Value (DATE Format)
2	1	Last Min Value (register 1301)
	2-4	Date/time of last Min Value (DATE Format)
	5	Last Max Value (register 1601)
	6-8	Date/time of last Max Value (DATE Format)
x (3 to 135)	1	Last Min Value (register 130**x**)
	2-4	Date/time of last Min Value (DATE Format)
	5	Last Max Value (register 160**x**)
	6-8	Date/time of last Max Value (DATE Format)
136	1	Last Min Value (register 1435)
	2-4	Date/time of last Min Value (DATE Format)
	5	Last Max Value (register 1735)
	6-8	Date/time of last Max Value (DATE Format)

Wave Form Capture

Descriptor of the Wave Form Capture in the metering manager

■ **Wave Form Capture configuration (Header)**

register	address	nb of reg.	read/ write	scale	unit	format	interval	A/E	P/H	description
7132	7131	1	R/W	-	-	INT	{0x0000, 0xFFFF}		H	File status :0xFFFF = file enabled 0x0000 = file disabled Default value: 0xFFFF
7133	7132	1	R	-	-	INT	5		H	type of file: Wave Form Capture always equal to: 5 (WFC)
7134	7133	1	R	x1	rec.	INT	29		H	size of file in number records = 29 always equal to 29 records/file
7135	7134	1	R	x1	register	INT	64		H	size of records in number of registers always equal to: 64 registers per record
7136	7135	1	R	-	-	INT	{0,1}		H	File filling mode : 1: disabled if log is full. 0: circular. Default value: 0
7137	7136		R	1	segment	INT	1		H	Number of 4 cycle segments Always equal to 1
7138	7137		R	1	Cycle	INT	2		H	Number of cycle before capture always equal to 2
7139	7138		R	1	points	INT	64		H	Number of points per cycle always equal to 64

■ **Wave Form Capture characteristics (Status)**

register	address	nb of reg.	read/ write	scale	unit	format	interval	A/E	P/H	description
7148	7147	1	R	x1	rec.	INT	{0,29}		H	size of file in records either equal to 0 or 29
7149	7148	1	R	x1	register	INT	64		H	size of a record in registers: always equal to 64
7150	7149	1	R	x1	-	INT	0,10,20,30, 250,253, 254,255, 0xFF00, 0xFE00, OxFD00, OxFC00		H	0: file OK. 10: record size smaller than expected. 20: record size larger than expected. 30: insufficient memory. 250: internal error. 253: corrupted allocation table. 254: configuration zero 255: invalid configuration 0xFF00: cannot allocate file 0xFE00: file not supported 0xFD00: invalid record number 0xFC00: invalid file number
7151	7150	1	R	x1	rec.	INT	{0,29}		H	Actual number of records in the file. either equal to 0 or 29
7152	7151	1	R	x1	rec.	INT	{0,1}		H	number of first record present either equal to 0 or 1
7153	7152	1	R	x1	rec.	INT	{0,29}		H	number of last record present either equal to 0 or 29
7154	7153	3	R	-	-	DATE	cfformat		H	date the last file was reset Default value: 0x8000 0x8000 0x8000

Wave Form Capture

Format of records in the Wave Form Capture of the metering manager

This file consists of a fixed number of records (29). All records are of similar size, i.e 64 registers wide.

Record number	Registers	Description
1	1-4	Extended Date/time
	5-11	Reserved
	12	Id of WFC trigger (analog pre-defined alarm 1 to 53) Available with firmware HLogic2005AF
	13	System type :31, 40 or 41 (See register 3314)
	14	Breaker nominal current in Amps
	15	Voltage multiplier for phase A (format is SFIXPT)
	16	Voltage Offset for phase A (format is INT)
	17	Same as 15, for phase B
	18	Same as 16, for phase B
	19	Same as 15, for phase C
	20	Same as 16, for phase C
	21	Current multiplier for phase A (format is SFIXPT)
	22	Current Offset for phase A (format is INT)
	23	Same as 21, for phase B
	24	Same as 22, for phase B
	25	Same as 21, for phase C
	26	Same as 22, for phase C
	27	Current multiplier for Neutral (format is SFIXPT)
	28	Same as 22, for Neutral
	29	Scaling factor used for SFIXPT math on voltage samples
	30	Scaling factor used for SFIXPT math on phase current samples
	31	Scaling factor used for SFIXPT math on neutral current samples
	32 to 64	Not used
2 to 5	1-64	Voltage A Sample points (64 points – 4 cycles)
6 to 9	1-64	Voltage B Sample points (64 points – 4 cycles)
10 to 13	1-64	Voltage C Sample points (64 points – 4 cycles)
14 to 17	1-64	Current A Sample points (64 points – 4 cycles)
18 to 21	1-64	Current B Sample points (64 points – 4 cycles)
22 to 25	1-64	Current C Sample points (64 points – 4 cycles)
26 to 29	1-64	Current N Sample points (64 points – 4 cycles) Only valid in 41 system

■ **In order to derive phase A Voltage, apply this rule:**
Sample (Volt) = [(sample – reg.16 of 1st rec.) x reg 15 of 1st rec.] / reg.29 of 1st rec.

Register 18, 17 for phase B voltage; Register 20, 19 for phase C Voltage

■ **In order to derive phase A Current, apply this rule:**
Sample (Amp) = [(sample – reg.22 of 1st rec.) x reg 21 of 1st rec.] / reg.30 of 1st rec.

Register 24, 23 for phase B Amp; Register 26, 25 for phase C Amp

■ **In order to derive Neutral Amp Current, apply this rule:**
Sample (Amp) = [(sample – reg.28 of 1st rec.) x reg 27 of 1st rec.] / reg.31 of 1st rec.

Fault Wave Form Capture

Descriptor of the Fault Wave Form Capture in the protection manager

■ **Fault Wave Form capture configuration (Header)**

register	address	nb of reg.	read/ write	scale	unit	format	interval	A/E	P/H	description
9964	9963	1	R/W	-	-	INT	{0x0000, 0xFFFF}		H	file status :0xFFFF: file enabled 0: file disabled default value: 0xFFFF
9965	9964	1	R	-	-	INT	22		H	type of file: Fault Wave Form Capture default value: 22 (FWFC)
9966	9965	1	R	x1	rec.	INT	22		H	size of file in number records always equal to 22 records/file
9967	9966	1	R	x1	register	INT	64		H	size of records in number of registers always equal to: 64 registers per record
9968	9967	1	R	-	-	INT	0		H	file filling mode : 1: disabled if log is full. 0: circular. default value: 0
9969	9968		R	1	segment	INT	1		H	number of 12 cycle segments always equal to 1
9970	9969		R	1	cycle	INT	2		H	number of cycle before capture always equal to 2
9971	9970		R	1	points	INT	16		H	number of points per cycle always equal to 16

■ **Fault Wave Form capture characteristics (Status)**

register	address	nb of reg.	read/ write	scale	unit	format	interval	A/E	P/H	description
9980	9979	1	R	x1	rec.	INT	{0,22}		H	size of file in records either equal to 0 or 22
9981	9980	1	R	x1	register	INT	64		H	size of a record in registers always equal to 64
9982	9981	1	R	x1	-	INT	0,10,20,30,250,253, 254,255, 0Xff00, 0xFE00, OxFD00, OxFC00		H	0: file OK. 10: record size smaller than expected. 20: record size larger than expected. 30: insufficient memory. 250: internal error. 253: corrupted allocation table. 254: configuration zero 255: invalid configuration 0xFF00: cannot allocate file 0xFE00: file not supported 0xFD00: invalid record number 0xFC00: invalid file number
9983	9982	1	R	x1	rec.	INT	{0,22}		H	Actual number of records in the file. Either equal to 0 or 22
9984	9983	1	R	x1	rec.	INT	{0,1}		H	number of first record present either equal to 0 or 1
9985	9984	1	R	x1	rec.	INT	{0,22}		H	number of last record present either equal to 0 or 22
9986	9985	3	R	-	-	DATE	cfformat		H	date the last file was reset Default value: 0x8000 0x8000 0x8000

Fault Wave Form Capture

Format of records in the Fault Wave Form Capture of the protection manager

This file consists of a fixed number of records (22). All records are of similar size, i.e 64 registers wide.

Record number	Registers	Description
1	1-4	Extended Date/time
	5-11	Reserved
	12	Id of fault WFC Trigger : Alarm number : 1000 to 1031 (See the section appendix : Trip/Alarm history)
	13	System type :31, 40 or 41 (See register 3314)
	14	Breaker nominal current in Amps
	15	Voltage multiplier for phase A (format is SFIXPT)
	16	Voltage Offset for phase A (format is INT)
	17	Same as 15, for phase B
	18	Same as 16, for phase B
	19	Same as 15, for phase C
	20	Same as 16, for phase C
	21	Current multiplier for phase A (format is SFIXPT)
	22	Current Offset for phase A (format is INT)
	23	Same as 21, for phase B
	24	Same as 22, for phase B
	25	Same as 21, for phase C
	26	Same as 22, for phase C
	27	Current multiplier for Neutral (format is SFIXPT)
	28	Same as 22, for Neutral
	29	Scaling factor used for SFIXPT math on voltage samples
	30	Scaling factor used for SFIXPT math on phase current samples
	31	Scaling factor used for SFIXPT math on neutral current samples
	32 to 64	Not used
2 to 4	1-64	Voltage A Sample points (16 points – 12 cycles)
5 to 7	1-64	Voltage B Sample points (16 points – 12 cycles)
8 to 10	1-64	Voltage C Sample points (16 points – 12 cycles)
11 to 13	1-64	Current A Sample points (16 points – 12 cycles)
14 to 16	1-64	Current B Sample points (16 points – 12 cycles)
17 to 19	1-64	Current C Sample points (16 points – 12 cycles)
20 to 22	1-64	Current N Sample points (16 points – 12 cycles) Only valid in 41 system

■ **In order to derive phase A Voltage, apply this rule:**
Sample (Volt) = [(sample – reg.16 of 1st rec.) x reg 15 of 1st rec.] / reg.29 of 1st rec.

Register 18, 17 for phase B voltage; Register 20, 19 for phase C Voltage

■ **In order to derive phase A Current, apply this rule:**
Sample (Amp) = [(sample – reg.22 of 1st rec.) x reg 21 of 1st rec.] / reg.30 of 1st rec.

Register 24, 23 for phase B Amp ; Register 26, 25 for phase C Amp

■ **In order to derive Neutral Amp Current, apply this rule:**
Sample (Amp) = [(sample – reg.28 of 1st rec.) x reg 27 of 1st rec.] / reg.31 of 1st rec.

Generality

Introduction

Modbus is an application layer messaging protocol, positioned at level 7 of the OSI model that provides client/server communication between devices connected on different types of buses or networks.
The Internet community can access Modbus at a reserved system port 502 on the TCP/IP stack.
Modbus is a request/reply protocol and offers services specified by function codes.

Modbus / Jbus protocol

In the Modbus protocol, register numbering begins with 1, whereas in the JBus protocol, numbering of the equivalent registers begins with 0. However, a JBus master can dialogue with a Modbus slave by addressing a **register number - 1** to access the correct register on the Modbus slave.

Example of a read request

In order to read the RMS current on phase 1 (contents of register 1016), you will have to access the address number 1016 – 1 = 1015
1015 (decimal) = 0x03F7 (hexa)

Request			**Response**		
Function		03	Function		03
Starting Address	Hi	03	Byte count		02
Starting Address	Lo	F7	Register value	Hi	02
N° of registers	Hi	00	Register value	Lo	2B
N° of registers	Lo	01			

The contents of register 1016 (RMS current on phase 1) are shown as the two byte values of 02 2B (hexa), or 555 decimal.
Therefore, RMS current on phase 1 is 555 Amps.

Modbus exception responses

When a client device (master) sends a request to a server device (slave) it expects a normal response. One of four possible events can occur from the master's query:
■ **If the server device receives the request without a communication error, and can handle the query normally, it returns a normal response.**
■ **If the server device does not receive the request due to a communication error, no response is returned. The client program will eventually process a timeout condition for the request.**
■ **If the server device receives the request, but detects a communication error (parity, LRC, CRC…), no response is returned. The client program will eventually process a timeout condition for the request.**
■ **If the server device receives the request without a communication error, but cannot handle it (for example, if the request is to read a non existing register), the server will return an exception response informing the client of the nature of the error.**
The exception response message has two fields that differentiate it from a normal response:
Function code: Function code of the original request + 0x80 (hexa)
Exception code: See list below
ILLEGAL FUNCTION
ILLEGAL DATA ADDRESS
ILLEGAL DATA VALUE
SLAVE DEVICE FAILURE
ACKNOWLEDGE (in conjunction with programming commands)
SLAVE DEVICE BUSY (in conjunction with programming commands)
MEMORY PARITY ERROR (with function code 0x14)

Modbus functions

Read functions

Function code	Sub-function	Description
3		Read n output or internal registers (1) (2)
4		Read n input registers (1) (2)
23		Simultaneously read/write n and p registers (1) (2)
43		Read Device Identification (3)

Read device identification example

The Read Device Identification function is used to access in a standardized manner the information required to clearly identify a device. The description is made up of a set of objects (ASCII character strings)
A complete description of the Read Device Identification function is available at www.modbus.org.
The coding for the identification of the Breaker Communication Module is the following:

Name	Type	Description
Vendor name	String	'Schneider Electric' (18 characters)
Product code	String	'33106'
Firmware version	String	'VX.Y.Z'
Vendor URL	String	'www.schneider-electric.com'
Product name	String	'BCM ULP'
Protection type	String	'XY'
Metering type	String	'z'

Write functions

Function code	Sub-function	Description
6		Write one register
16		Write n registers (1) (2)
22		Write one register with mask
23		Simultaneously read/write n and p registers (1) (2)

(1) Registers 4XXXX and 3XXXX are linked to the same data in registers XXXX in the data tables
(2) The n (or p) words constitute a block specified by the basic block address and the size of the block. Number of registers n is limited to 52 with Micrologic E.
(3) Read Device Identification is available only with a Breaker Communication Module firmware version greater or equal to V3.0 (register 577 must be greater or equal to 03000).

Diagnosis functions

These functions act exclusively on the circuit-breaker manager (@ xx) and the chassis manager (@ xx +50).

Function code	Sub-function	Description
8		Management of the diagnostics counters
8	10	Clear the diagnostics counters
8	11	Read the bus-messages counter managed by the slave
8	12	Read the bus-errors counter managed by the slave
8	13	Read the bus exception answer counter managed by the slave
8	14	Read the counter for messages sent to the slave
8	15	Read the counter for messages sent to the slave and to which the slave did not answer
8	16	Read the counter for messages sent to the slave and to which the slave replied with an exception code 07 "Negative Acknowledge"
8	17	Read the counter for messages sent to the slave and to which the slave replied with an exception code 06 "Slave Device Busy"
8	18	Read the counter for messages sent to the slave that it could not process due to a transmission error
11		Read the Modbus event counter
17		Read the identifier of the Modbus slave

Modbus functions

Read File Record: function 20 (0x14)

This function acts exclusively on the protection manager (@ xx +100) and the metering manager (@ xx +200).
This function code is used to perform a file record read. All Request Data Lengths are provided in terms of number of bytes and all Record Lengths are provided in terms of registers.
The quantity of registers to be read combined with all other fields in the expected response must not exceed the allowable length of Modbus messages: 256 bytes.

Request			**Response**		
Function code	1 Byte	**0x14**	Function	1 Byte	**0x14**
Byte count	1 Byte	0x07	Data Length	1 Byte	2 + **N**x2
Reference Type	1 Byte	0x06	File Resp.Length	1 Byte	1 + **N**x2
File number	2 Bytes	0x0000 to 0xFFFF	Reference type	1 Byte	0x06
Record number	2 Bytes	0x0000 to 0x270F	Record Data	**N**x2 Bytes	Data
Record length	2 Bytes	**N**			

Example of a request to read the most recent record in the event log of the protection manager

The event log of the protection manager is the file N° 20 (0x0014). This file is made up of 100 records; each record is made up of 9 registers. So, the record length is 9 (0x0009). The sequence number of last record in the file (the most recent) is the content of register 9921.
Let's take 0x1234 for the content of register 9921.

Request			**Response**		
Function code	1 Byte	0x14	Function	1 Byte	0x14
Byte count	1 Byte	0x07	Data Length	1 Byte	0x14
Reference Type	1 Byte	0x06	File Resp.Length	1 Byte	0x13
File number	2 Bytes	0x0014	Reference type	1 Byte	0x06
Record number	2 Bytes	0x1234	Record Data	**9**x2 Bytes	Data
Record length	2 Bytes	**0x0009**			

Read n non-contiguous words (function 100, sub-function 4)

The n non-contiguous registers must be specified one after the other by their register in the data table. The Maximum for n is 100 (When using Micrologic A or E, it is recommended to have n lower or equal to 21).

To optimise access to Micrologic and its COM options, it may be very useful to read n non-contiguous registers in a data table.

Use of function 100, sub-function 4 avoids:

- **reading a large block of contiguous data when only a few elements of data are required**
- **multiplying read functions for n registers (functions 3 and 4) or for one register (function 1) simply to read a few elements of non-contiguous data.**

The table below provides an example of reading the data in registers 101 and 103 of the slave with the Modbus address 47.

Request		**Answer**	
Name of field	**Example**	**Name of field**	**Example**
Slave address	47	Slave address (identical)	47
Function (1)	100	Function (1)	100
Number of registers read +2	6	Number of bytes requested and returned + 2	6
Sub-function code (1)	4	Sub-function code (1)	4
Transmission number (2)	0xXX	Transmission number (2)	0xXX
Address of first register to read (most significant byte)	0	First register read (most significant byte)	0x12
Address of first register to read (least significant byte)	101	First word register (least significant byte)	0x0A
Address of second register to read (most significant byte)	0	Second register read (most significant byte)	0xFA
Address of second register to read (least significant byte)	103	Second register read (least significant byte)	0x0C
CRC high	XX	CRC high	XX
CRC low	XX	CRC low	XX

(1) These values are constant.
(2) The transmission number is provided by the master prior to each request for a non-contiguous read. The slave device must return the same number.

Format

UINT
UINT corresponds to a 16-bit unsigned integer with an interval of values from 0x0000…0xFFFF (0…65535).

INT
INT corresponds to a 16-bit signed integer with an interval of values from 0x8000…0x7FFF (-32768…+32767).

UDINT
UDINT corresponds to a 32-bit unsigned integer with an interval of values from 0x00000000…0xFFFFFFFF (0…4 294 967 295).

DINT
DINT corresponds to a 32-bit signed integer with an interval of values from 0x00000000…0xFFFFFFFF (-2 147 483 648…+2 147 483 647).

Mod10000
Mod10000 corresponds to n registers in the INT format.
Each register contains an integer from 0 to 9999. A value V representing n registers is calculated as indicated below.
$V = sum(R[n] + R[n+ 1] \times 10000 + ..+ R[n+m] \times 10000^{(m-1)})$,
where Rn is the number of register n.
Example: Register 2000 = 123 ; Register 2001 = 4567; Register 2002 = 89 ; Register 2003=0
Energy = 123 + 4567x10 000 + 89x $(10\ 000)^2$ + 0 = 89 4567 0123 kWh

SFIXPT
SFIXPT corresponds to a signed INT integer with a fixed point. The position of the point is indicated by the scale factor. The interval of values is:
-32767…+32767 with a scale factor "x1".
Other example:
-32.767…+32.767 with a scale factor "x1000".

DATE
Date corresponds to a normal date made up of three UINT, as follows:
■ **first UINT:**
month expressed using the eight most-significant bits (January = 0x41)
day expressed using the eight least-significant bits [(1)]
Example: 0x0519 = May 25
■ **second UINT:**
year expressed using the eight most-significant bits (modulo 100)
(00 to 49 → years 2000 to 2049, from 50 to 99 → years 1950 to 1999)
hours expressed using the eight least-significant bits
Example: 0x6e12 = 2010 18h
■ **third UINT:**
minutes expressed using the eight most-significant bits
seconds expressed using the eight least-significant bits.
Example: 0x1a39 = 26mn 57s

(1) If the most-significant bit is set, the date and time may be incorrect. There are two possibilities:
- no synchronisation with the supervisor
- loss of power.
If power has been lost, the self-test bitmap "D/T loss" is enabled until the date and time are enabled (via the control unit or the communication manager).

Trip/Alarm history

XDATE

XDATE corresponds to an extended date made up of four UINT, as follows:

■ **first UINT:**
month expressed using the eight most-significant bits(1) (January = 0x41)
day expressed using the eight least-significant bits
■ **second UINT:**
year expressed using the eight most-significant bits (modulo 100)
(00 to 49 → years 2000 to 2049, from 50 to 99 → years 1950 to 1999)
hours expressed using the eight least-significant bits
■ **third UINT:**
minutes expressed using the eight most-significant bits
seconds expressed using the eight least-significant bits.
■ **fourth UINT: milliseconds.**

ASCII

ASCII corresponds to a series of n UINT registers forming a sting of ASCII characters. The first character is contained in the eight most-significant bits of the register. The start of the string is in the first register.

Note.
(1) If the most-significant bit is set, the date and time may be incorrect. There are two possibilities:
- no synchronisation with the supervisor
- loss of power.
If power has been lost, the self-test bitmap "D/T loss" is enabled until the date and time are enabled (via the control unit or the communication manager).

TRIP RECORD

TRIP RECORD format matches the trip history displayed on the graphic screen of the Micrologic (E, P, and H only).
TRIP RECORD format presents the characteristics of a fault trip. It corresponds to a series of ten fields (9100, 9120, 9140… 9280) with a total of 20 registers.
Register 9098 returns the number of faults recorded in the trip history (FIFO)
Register 9099 return the value of the pointer for the last fault recorded in the trip history.
Each field (containing 20 registers) is presented below:

Field	Nb of reg.	Format	Interval	N/A	Description
___.XtedDT	4	XDATE	Cfformat	0x8000	Trip date
___.ActCause AlarmNum	1	INT	0..1031	0x8000	Number of alarm causing activation
___.PuValue	2	MOD 10000	See text	0x8000	Value of protection setting that caused trip(2)
___.PuDelay	1	INT	See text	0x8000	Value of time delay that caused trip(2)
___.FaultI[0]	1	INT	0..16000	0x8000	Trip current phase 1, expressed with respect to the rated current (1) (2)
___.FaultI[1]	1	INT	0..16000	0x8000	Trip current phase 2, expressed with respect to the rated current (1) (2)
___.FaultI[2]	1	INT	0..16000	0x8000	Trip current phase 3, expressed with respect to the rated current (1) (2)
___.FaultI[3]	1	INT	0..16000	0x8000	Trip current on neutral, expressed with respect to the rated current (1) (2)
___.WorstContactWear	1	INT	0..32767	0x8000	New value of contact-wear indicator following a trip. The control unit (2) records one indicator per contact. Here, only the value for the most worn contact is given. (See registers 9094 to 9097)
___.AddInfo	2	See text	See text	0x8000	Reserved
___.Reserved	5	-	-	0x8000	Reserved

(1) Expressed as x 0.1 of In (rated current).
(2) Not available with Micrologic E.

Trip/Alarm history

ALARM RECORD

ALARM RECORD format matches the alarm history displayed on the graphic screen of the Micrologic (P, H only).
ALARM RECORD format presents the characteristics of a fault alarm. It corresponds to a series of ten fields (9302, 9317, 9332… 9437) with a total of 15 registers.
Register 9300 returns the number of alarms recorded in the alarm history (FIFO)
Register 9301 return the value of the pointer for the last alarm recorded in the alarm history.
Each field (containing 15 registers) is presented below:

Field	Nb of reg.	Format	Interval	N/A	Description
___.XtedDT	4	XDATE	cfformat	0x8000	Alarm date
___.ActCause AlarmNum	1	INT	0..1031	0x8000	Number of alarm causing activation
___.PuValue	2	MOD 10000	See text	0x8000	Value of protection setting that caused alarm activation
___.PuDelay	1	INT	See text	0x8000	Value of time delay that caused alarm activation
___.FaultI[0]	1	INT	0..16000	0x8000	Alarm current phase 1, expressed with respect to the rated current (1)
___.FaultI[1]	1	INT	0..16000	0x8000	Alarm current phase 2, expressed with respect to the rated current (1)
___.FaultI[2]	1	INT	0..16000	0x8000	Alarm current phase 3, expressed with respect to the rated current (1)
___.FaultI[3]	1	INT	0..16000	0x8000	Alarm current on neutral, expressed with respect to the rated current (1)
___.AddInfo	2	See text	See text	0x8000	Additional information, depending on type of alarm
___.Reserved	1	-	-	0x8000	Reserved

(1) *Expressed as x 0.1 of In (rated current)*

Trip/Alarm history

Alarm numbers

■ **Basic protections**

Description		Number
Trip due to Long-time protection	Ir	1000
Trip due to Short-time protection	Isd	1001
Trip due to Instantaneous protection	Ii	1002
Trip due to Ground-fault protection	Ig	1003
Trip due to Earth-leakage protection	IDelta n	1004
Trip due to Integrated instantaneous protection	I >>	1005
Reserved		1006 to 1007
Trip due to advanced protection		1008
Trip due to extended advanced protection		1009
Reserved		1010
Reserved		1011 to 1012
Long time protection alarm		1013
Ground-fault protection alarm		1014
Earth-leakage protection alarm		1015

■ **Advanced protections**

Description	Number
Current unbalance	1016
Ia Max demand	1017
Ib Max demand	1018
Ic Max demand	1019
IN Max demand	1020
Under voltage	1021
Over voltage	1022
Voltage unbalance	1023
Reverse power	1025
Under frequency	1026
Over frequency	1027
Phase rotation	1028
Current load shedding	1029
Power load shedding	1030
Reserved	1031

■ **Digital alarms**

Description	Number
System energised / reset	1100
Reserved	1101 to 1105
Loss of date and time	1106
Reserved	1107 to 1114
Battery low	1115

Table of registers
Structure of the table

Each Modbus logical table is made up of the fields listed below.

■ **register: number of the Modbus register.**

■ **nbr of registers: number of registers that must be read or written for a given complete piece of information. This datum indicates the type of register (8-bit, 16-bit or 32-bit word).**

■ **read/write:**
"R": register that may be accessed by the Modbus read functions 3, 4, 23, 20, 100 (see page 40).
Modbus function 20 is supported by the Metering and Protection managers only.
"W": register that may be accessed by the Modbus write functions 6, 16, 22, 23 (see page 40)
"R/W": register that may be read and write accessed.

■ **scale (x n): value contained in the register multiplied by n. The requested information is obtained by dividing the register contents by n. The result in expressed in the indicated unit.**
Example:
Register 1054 contains the frequency. The unit is Hz and the scale factor is 10.
If the register returns 504, this means that the frequency is 504/10 = 50.4 Hz.

■ **unit: unit of measurement for the value contained in the register.**

■ **format: format in which the information is coded.**

■ **interval: interval of the possible values that each register in the group {Register, Register +1,..., Register + Nb} can have.**

■ **A, E, P, H: type of control unit using the register:**
"A": Micrologic A control unit
"E": Micrologic E control unit
"P": Micrologic P control unit
“H”: Micrologic H control unit

■ **description: additional information describing the register, providing coding data and any necessary information on how to modify the register, particularly when the command interface is required to carry out the modification.**

Table of registers
Circuit-breaker manager @ xx

Configuration of the circuit-breaker manager

register	address	nb of reg.	read/ write	scale	unit	format	interval	A/E	P/H	description
515	514	1	R	-	-	INT	15139	A/E	P/H	Square D Product Identification 15139 = Breaker Communication Module
531	530	1	R/W	-	-	INT	1..47	A/E	P/H	MODBUS address of the COM option (@XX) Default value: 47
532	531	1	R/W	-	-	INT	0..1	A/E	P/H	Parity: 0: no parity 1: even parity Default value: 1
533	532	1	R/W	-	-	INT	1200.. 38400	A/E	P/H	Baud rate: 1200: 1200 baud 2400: 2400 baud 4800: 4800 baud 9600: 9600 baud 19200: 19200 baud 38400: 38400 baud Default value: 19200

Identification of the circuit-breaker manager

register	address	nb of reg.	read/ write	scale	unit	format	interval	A/E	P/H	description
534	533	2	R/W	-	-	ASCII	0x00.. 0x7F7F	A/E	P/H	short identifier of circuit-breaker COM option, coded over 4 ASCII characters Default value: 0x00
536	535	8	R/W	-	-	ASCII	0x00.. 0x7F7F	A/E	P/H	long identifier of circuit-breaker COM option, coded over 16 ASCII characters Default value: 0x00

Table of registers
Circuit-breaker manager @ xx

Diagnostics counters and Control word

register	address	nb of reg.	read/ write	scale	unit	format	interval	A/E	P/H	description
544	543	1	R	-	-	INT	0..32767	A/E	P/H	Modbus diagnostics counter – messages sent to the slave (identical to function 8-14) (2)
545	544	1	R	-	-	INT	0..32767	A/E	P/H	Modbus diagnostics counter – messages sent to other slaves (2)
546	545	1	R	-	-	INT	0..32767	A/E	P/H	Modbus diagnostics counter – bus messages managed by the slave (identical to function 8-11) (2)
547	546	1	R	-	-	INT	0..32767	A/E	P/H	Modbus diagnostics counter –bus errors managed by the slave (identical to function 8-12) (2)
548	547	1	R	-	-	INT	0..32767	A/E	P/H	Modbus diagnostics counter – messages sent to the slave comprising a non-supported Modbus function (2)
549	548	1	R	-	-	INT	0..32767	A/E	P/H	Modbus event counter (identical to function 11) (2)
550	549	1	R	-	-	INT	0..32767	A/E	P/H	Modbus diagnostics counter –bus exception replies managed by the slave (identical to function 8-13) (2)
551	550	1	R	-	-	INT	0..32767	A/E	P/H	Modbus diagnostics counter – broadcast messages received by the slave (identical to function 8-15) (2)
553	552	1	R	-	-	INT	0..65535	A/E	P/H	Control word of the circuit-breaker COM option. This Control word cannot be set by the user. It is randomly changed each time the system is energised. It is necessary to read the Control word before sending certain commands to the circuit-breaker COM option.
554	553	1	R	-	-	INT	0..65535	A/E	P/H	Counter for number of times the circuit-breaker COM option is energised (1)
555	554	1	R	-	-	INT	0..65535	A/E	P/H	Counter for the number of circuit-breaker COM option resets, whether following power loss or not.(1)
577	576	1	R	1	-	INT	-	A/E	P/H	Breaker Communication Module firmware version
580	579	1	R/W	1	-	INT	0..65535	A/E	P/H	OF counter threshold (default value = 5000)
581	580	1	R/W	1	-	INT	0..65535	A/E	P/H	Close command counter threshold (default value = 5000)

(1) The counter automatically cycles from 65535 to 0.
(2) The counter automatically cycles from 32767 to 0.

Metering/protection-manager event notification

register	address	nb of reg.	read/ write	scale	unit	format	interval	A/E	P/H	description
603	602	1	R	-	-	INT	1..8000	-	H	number of first (oldest) record in the metering-manager event log (file N° 10)
604	603	1	R	-	-	INT	1..8000	-	H	number of last (most recent) record in the metering-manager event log (file N° 10)
623	622	1	R	-	-	INT	1..8000	-	P/H	number of first (oldest) record in the protection-manager event log (file N° 20)
624	623	1	R	-	-	INT	1..8000	-	P/H	number of last (most recent) record in the protection-manager event log (file N° 20)

Table of registers
Circuit-breaker manager @ xx

Cause of tripping

register	address	nb of reg.	read/ write	scale	unit	format	interval	A/E	P/H	description
650	649	1	R	-	-	INT	0..65535			Bitmap indicating cause of tripping for basic protection functions:
								A/E	P/H	0x01: long-time protection. Ir
								A/E	P/H	0x02: short-time protection Isd
								A/E	P/H	0x04: instantaneous protection Ii
								A/E	P/H	0x08: ground-fault protection Ig
								A	P/H	0x10: earth-leakage protection (vigi)
									P/H	0x20: Integrated Instantaneous protection
								A/E		0x40: Integrated Instantaneous protection
									P/H	0x40: Internal failure (temperature
								A/E	P/H	0x80: Internal failure (overvoltage)
									P/H	0x0100: Other protection (see register 651)
651	650	1	R	-	-	INT	0..65535			Bitmap indicating cause of tripping for advanced protection functions:
									P/H	0x01: current unbalance
									P/H	0x02: Over current phase 1
									P/H	0x04 Over current phase 2
									P/H	0x08: Over current phase 3
									P/H	0x10: Over current on Neutral
									P/H	0x20: Under voltage
									P/H	0x40: Over voltage
									P/H	0x80: voltage unbalance
									P/H	0x0100: Over power
									P/H	0x0200: reverse power
									P/H	0x0400: Under frequency
									P/H	0x0800: Over frequency
									P/H	0x1000: phase rotation
									P/H	0x2000: load shedding based on current
									P/H	0x4000: load shedding based on power

Note: *The bit indicating the cause of tripping is set as soon as a trip occurs. The bit is reset as soon as the circuit-breaker is closed again.*

Table of registers
Circuit-breaker manager @ xx

Circuit-breaker status, Auto/Manu

register	address	nb of reg.	read/ write	scale	unit	format	interval	A/E	P/H	description
661	660	1	R	-	-	Bitmap16	-	A/E	P/H	Circuit-breaker status: See next page
662	661	1	R	-	-	INT	0..65535	A/E	P/H	counter for total number of operations (OF): the counter increments when bit 0 in register 661 switches from 0 to 1.(1)
663	662	1	R	-	-	INT	0..65535	A/E	P/H	counter for operations (OF) since last reset: the counter increments when bit 0 in register 661 switches from 0 to 1.(1)
664	663	1	R	-	-	INT	0..65535	A/E	P/H	counter for operations (SD): the counter increments when bit 1 in register 661 switches from 0 to 1.(1)
665	664	1	R	-	-	INT	0..65535	A/E	P/H	counter for operations (SDE): the counter increments when bit 2 in register 661 switches from 0 to 1.(1)
669	668	1	R	-	-	Bitmap16	0..65535	A/E	P/H	authorisation word for actuation by MX and XF auxiliaries: when bit 1 and 3 are set, MX is authorised to actuate the circuit breaker when bit 2 and 3 are set, XF is authorised to actuate the circuit breaker
670	669	1	R	-	-	INT	0..1	A/E	P/H	Auto/Manu (Remote/Local mode) : 0, "Manu" (Local mode) : remote opening and closing of the circuit breaker are disabled 1, "Auto" (Remote mode) : remote opening and closing of the circuit breaker are enabled Auto/Manu mode can be modified via the HMI of Micrologic P/H (only locally). Default value = 1

(1) The counter automatically cycles from 65535 to 0.

OF ON / OFF.
SD Trip indication.
SDE Fault-trip indication.

Table of registers
Circuit-breaker manager @ xx

List of possible values for register 661 (circuit-breaker status) in the circuit-breaker manager

BrStatus bitmap detail :

Bit 0 (0x01) : OF ; Indication contacts
For Compact and Masterpact :
0= Breaker is opened , 1 = Breaker is closed

Bit 1 (0x02) : SD ; Trip indication contact
For Compact :
0 = no trip
1 = Breaker has tripped due to electrical fault
or Shunt trip or Push to trip
For Masterpact : always 0

Bit 2 (0x04) : SDE ; Fault trip indication contact
For Compact and Masterpact :
0 = no trip
1 = Breaker has tripped due to electrical fault
(including Ground Fault test and Earth leakage test).

Bit 3 (0x08) : CH ; Charged (used only with motor mechanism)
For Compact : always 0
For Masterpact :
0 = Spring discharged, 1 = Spring loaded

Bit 4 (0x10) : Reserved (internal use only)

Bit 5 (0x20) : Reserved (internal use only)

Bit 6 (0x40) : Compact / Masterpact differenciation
0 = Compact NS , 1 = Masterpact

Bit 7-15 : Reserved

Note:
A bitmap mask should be used to test the Breaker status.
If a value test is used, the following values should be used for Mastepact :
0x44 Tripped discharged not RTC
0x4C Tripped charged not RTC
0x50 OFF discharged not RTC
0x51 ON discharged not RTC
0x59 ON charged not RTC
0x78 OFF charged RTC

Table of registers
Circuit-breaker manager @ xx

Time stamping

register	address	nb of reg.	read/ write	scale	unit	format	interval	A/E	P/H	description
671	670	3	R	-	-	DATE	-	A/E	P/H	date of last actuation of MX auxiliary
674	673	1	R	-	-	INT	0..65535	A/E	P/H	MX actuation counter (1)
675	674	3	R	-	-	DATE	-	A/E	P/H	date of last actuation of XF auxiliary
678	677	1	R	-	-	INT	0..65535	A/E	P/H	XF actuation counter (1)
679	678	4	R	-	-	XDATE	-	A/E	P/H	current date of circuit-breaker COM option
684	683	3	R	-	-	DATE	-	A/E	P/H	date of last circuit-breaker opening
687	686	3	R	-	-	DATE	-	A/E	P/H	date of last circuit-breaker closing
690	689	3	R	-	-	DATE	-	A/E	P/H	date of last trip without an electrical fault
693	692	3	R	-	-	DATE	-	A/E	P/H	date of last trip with an electrical fault
696	695	3	R	-	-	DATE	-	A/E	P/H	date of last PAF (Ready To Close) closing
699	698	3	R	-	-	DATE	-	A/E	P/H	date of last DLO (half moon) closing
702	701	3	R	-	-	DATE	-	A/E	P/H	date of last AD (charged) closing
705	704	3	R	-	-	DATE	-	A/E	P/H	date of last address change (register 531)
708	707	3	R	-	-	DATE	-	A/E	P/H	date of last reset of circuit-breaker COM option event log
711	710	4	R	-	-	XDATE	-	A/E	P/H	date when time for circuit-breaker COM option was last set
715	714	1	R	-	-	INT	0..65535	A/E	P/H	counter for time setting for circuit-breaker COM option (1)
800	799	1	R/W				0…1	A/E	P/H	Communication profile activation 0 = Not activated 1 = activated Default value = 0 (firmware version smaller to V3.0) (2) Default value = 1 (firmware version greater or equal to V3.0
802	801	1	R					A/E	P/H	Open command status
803	802	1	R					A/E	P/H	Close command status
806	805	1	R/W					A/E	P/H	4 Wire / 2 Wire+ULP communication parameter 0 = 4 wire 1 = 2 Wire+ULP Default value = 0

Event log of the circuit-breaker manager

Registers 718 → 740 file N° 30 (see the section: Access to the files)

The counter automatically cycles from 65535 to 0.
Communication profile is available only with a Breaker Communication Module firmware version greater or equal to V2.0 (register 577 must be greater or equal to 02000)

Table of registers
Chassis manager @ xx + 50

Configuration of the chassis manager

register	address	nb of reg.	read/ write	scale	unit	format	interval	A/E	P/H	description
515	514	1	R	-	-	INT	15140	A/E	P/H	Square D Product Identification 15140 = Chassis Communication Module
531	530	1	R/W	-	-	INT	51..97	A/E	P/H	MODBUS address of the COM option (@ xx + 50) Default value: 50+47=97
532	531	1	R/W	-	-	INT	0..1	A/E	P/H	Parity: 0: no parity 1: even parity Default value: 1
533	532	1	R/W	-	-	INT	1200.. 38400	A/E	P/H	Baud rate: 1200: 1200 baud 2400: 2400 baud 4800: 4800 baud 9600: 9600 baud 19200: 19200 baud 38400: 38400 baud Default value: 19200

Identification of the chassis manager

register	address	nb of reg.	read/ write	scale	unit	format	interval	A/E	P/H	description
534	533	2	R/W	-	-	ASCII	0x00.. 0x7F	A/E	P/H	short identifier of the chassis COM option coded over 4 ASCII characters Default value: 0x00
536	535	8	R/W	-	-	ASCII	0x00.. 0x7F	A/E	P/H	long identifier of the chassis COM option coded over 16 ASCII characters Default value: 0x00

Table of registers
Chassis manager @ xx + 50

Diagnostics counters and Control word

register	address	nb of reg.	read/ write	scale	unit	format	interval	A/E	P/H	description
544	543	1	R		-	INT	0..32767	A/E	P/H	Modbus diagnostics counter – messages sent to the slave (identical to function 8-14) (2)
545	544	1	R	-	-	INT	0..32767	A/E	P/H	Modbus diagnostics counter – messages sent to other slaves (2)
546	545	1	R	-	-	INT	0..32767	A/E	P/H	Modbus diagnostics counter – bus messages managed by the slave (identical to function 8-11) (2)
547	546	1	R	-	-	INT	0..32767	A/E	P/H	Modbus diagnostics counter –bus errors managed by the slave (identical to function 8-12) (2)
548	547	1	R	-	-	INT	0..32767	A/E	P/H	Modbus diagnostics counter – messages sent to the slave comprising a non-supported Modbus function (2)
549	548	1	R	-	-	INT	0..32767	A/E	P/H	Modbus event counter (identical to function 11) (2)
550	549	1	R	-	-	INT	0..32767	A/E	P/H	Modbus diagnostics counter –bus exception replies managed by the slave (identical to function 8-13) (2)
551	550	1	R	-	-	INT	0..32767	A/E	P/H	Modbus diagnostics counter – broadcast messages received by the slave (identical to function 8-17) (2)
553	552	1	R	-	-	INT	0..65535	A/E	P/H	Control word of the chassis manager. This Control word cannot be set by the user. It is randomly changed each time the system is energised. It is necessary to read the Control word before sending certain commands to the chassis manager.
554	553	1	R	-	-	INT	0..65535	A/E	P/H	Counter for number of times the circuit-breaker COM option is energised (1)
555	554	1	R	-	-	INT	0..65535	A/E	P/H	Counter for the number of circuit-breaker COM option resets, whether following power loss or not. (1)
577	576	1	R	1	-	INT	-	A/E	P/H	Chassis Communication firmware version

(1) The counter automatically cycles from 65535 to 0.
(2) The counter automatically cycles from 32767 to 0.

Table of registers
Chassis manager @ xx + 50

Chassis status

register	address	nb of reg.	read/ write	scale	unit	format	interval	A/E	P/H	description
661	660	1	R	-	-	Bitmap 16	-	A/E	P/H	device status: If bit 9 (0x0200) is set to 1, the device is connected. CE If bit 8 (0x0100) is set to 1, the device is disconnected. CD If bit 10 (0x400) is set to 1, the device is in the test position. CT
662	661	1	R	-	-	INT	0..65535	A/E	P/H	counter for change to the "connected" position: the counter increments when bit 8 in register 661 switches from 0 to 1.(1)
663	662	1	R	-	-	INT	0..65535	A/E	P/H	counter for change to the "disconnected" position: the counter increments when bit 9 in register 661 switches from 0 to 1.(1)
664	663	1	R	-	-	INT	0..65535	A/E	P/H	counter for change to the "test" position: the counter increments when bit 10 in register 661 switches from 0 to 1.(1)

(1) The counter automatically cycles from 65535 to 0.

Time-stamping

register	address	nb of reg.	read/ write	scale	unit	format	interval	A/E	P/H	description
679	678	4	R	-	-	XDATE	-	A/E	P/H	current date of chassis COM option
684	683	3	R	-	-	DATE	-	A/E	P/H	date of the last change to the "connected" position
687	686	3	R	-	-	DATE	-	A/E	P/H	date of the last change to the "disconnected" position
690	989	3	R	-	-	DATE	-	A/E	P/H	date of the last change to the "test" position
705	704	3	R	-	-	DATE	-	A/E	P/H	date of the last change in address (register 531)
711	710	4	R	-	-	XDATE	-	A/E	P/H	date when time for chassis COM option was last set
715	714	1	R	-	-	INT	0..65535	A/E	P/H	counter for time setting for chassis COM option

Table of registers
Metering manager @ xx + 200

Voltages

register	address	nb of reg.	read/ write	scale	unit	format	interval	A/E	P/H	description
1000	999	1	R	x 1	V	INT	0..1200	E	P/H	RMS phase-to-phase voltage V12
1001	1000	1	R	x 1	V	INT	0..1200	E	P/H	RMS phase-to-phase voltage V23
1002	1001	1	R	x 1	V	INT	0..1200	E	P/H	RMS phase-to-phase voltage V31
1003	1002	1	R	x 1	V	INT	0..1200	E(1)	P/H(1)	RMS phase-to-neutral voltage V1N.
1004	1003	1	R	x 1	V	INT	0..1200	E(1)	P/H(1)	RMS phase-to-neutral voltage V2N.
1005	1004	1	R	x 1	V	INT	0..1200	E(1)	P/H(1)	RMS phase-to-neutral voltage V3N.
1006	1005	1	R	x 1	V	INT	0..1200	E	P/H	arithmetic mean of the phase-to-phase voltages 1/3 x (V12+V23+V31).
1007	1006	1	R	x 1	V	INT	0..1200	E	P/H	arithmetic mean of the phase-to-neutral voltages 1/3 x (V1N+V2N+V3N). (1)
1008	1007	1	R	x10	%	INT	-1000.. +1000	E	P/H	V12 phase-to-phase voltage unbalance with respect to the arithmetic mean of the phase-to-phase voltages
1009	1008	1	R	x10	%	INT	-1000.. +1000	E	P/H	V23 phase-to-phase voltage unbalance with respect to the arithmetic mean of the phase-to-phase voltages
1010	1009	1	R	x10	%	INT	-1000.. +1000	E	P/H	V31 phase-to-phase voltage unbalance with respect to the arithmetic mean of the phase-to-phase voltages
1011	1010	1	R	x10	%	INT	-1000.. +1000	E	P/H	V1N phase-to-neutral voltage unbalance with respect to the arithmetic mean of the phase-to-neutral voltages (1)
1012	1011	1	R	x10	%	INT	-1000.. +1000	E	P/H	V2N phase-to-neutral voltage unbalance with respect to the arithmetic mean of the phase-to-neutral voltages (1)
1013	1012	1	R	x10	%	INT	-1000.. +1000	E	P/H	V3N phase-to-neutral voltage unbalance with respect to the arithmetic mean of the phase-to-neutral voltages (1)
1014	1013	1	R	x10	%	INT	-1000.. +1000	E	P/H	maximum phase-to-phase voltage unbalance value in registers 1008, 1009 and 1010
1015	1014	1	R	x10	%	INT	-1000.. +1000	E(1)	P/H	maximum phase-to-neutral voltage unbalance value in registers 1011, 1012 and 1013 (1)

(1) Value not accessible when the configuration register 3314 selects type 31..

Table of registers
Metering manager @ xx + 200

Currents

register	address	nb of reg.	read/ write	scale	unit	format	interval	A/E	P/H	description
1016	1015	1	R	x1	A	INT	0..32767	A/E	P/H	RMS current on phase 1.
1017	1016	1	R	x1	A	INT	0..32767	A/E	P/H	RMS current on phase 2
1018	1017	1	R	x1	A	INT	0..32767	A/E	P/H	RMS current on phase 3
1019	1018	1	R	x1	A	INT	0..32767	A/E	P/H	RMS current on the neutral (2)
1020	1019	1	R	x1	A	INT	0..32767	A/E	P/H	maximum RMS current in registers 1016, 1017, 1018 and 1019
1021	1020	1	R	x1	A	INT	0..32767	A/E	P/H	ground-fault current If this current exceeds 32767 A, the register blocks at 32767 (3)
1022	1021	1	R	x1	mA	INT	0..32767	A/E	P/H	earth-leakage current If this current exceeds 32767 A, the register blocks at 32767 (4)
1023	1022	1	R	X1	A	INT	0..32767		H	Apparent current phase 1 (peak/ √2
1024	1023	1	R	X1	A	INT	0..32767		H	Apparent current phase 2 (peak/ √2
1025	1024	1	R	X1	A	INT	0..32767		H	Apparent current phase 3 (peak/ √2
1026	1025	1	R	X1	A	INT	0..32767		H	Apparent current Neutral (peak/ √2
1027	1026	1	R	x1	A	INT	0..32767	E	P/H	arithmetic mean of phase currents 1, 2 and 3: 1/3 x (I1+I2+I3)
1028	1027	1	R	x10	%	INT	-1000.. +1000	E	P/H	I1 current unbalance with respect to the arithmetic mean of the phase currents
1029	1028	1	R	x10	%	INT	-1000.. +1000	E	P/H	I2 current unbalance with respect to the arithmetic mean of the phase currents
1030	1029	1	R	x10	%	INT	-1000.. +1000	E	P/H	I3 current unbalance with respect to the arithmetic mean of the phase currents
1031	1030	1	R	x10	%	INT	-1000.. +1000	E	P/H	IN current unbalance with respect to the arithmetic mean of the phase currents (2)
1032	1031	1	R	x10	%	INT	-1000.. +1000	E	P/H	Maximum current unbalance in registers 1028, 1029 and 1030.
1033	1032	1	R	-	-	-	-		P/H	Reserved

(2) Value not accessible when the configuration register 3314 selects type 31 or 40.
(3) Accessible only with Micrologic 5.0 P/H and 6.0 A/P/H
(4) Accessible only with Micrologic 7.0 A/P/H

Table of registers
Metering manager @ xx + 200

Power

register	address	nb of reg.	read/ write	scale	unit	format	interval	A/E	P/H	description
1034	1033	1	R	x1	kW	INT	+/-0..32767	E	P/H	active power on phase 1 (1), (5)
1035	1034	1	R	x1	kW	INT	+/-0..32767	E	P/H	active power on phase 2 (1), (5)
1036	1035	1	R	x1	kW	INT	+/-0..32767	E	P/H	active power on phase 3 (1), (5)
1037	1036	1	R	x1	kW	INT	+/-0..32767	E	P/H	total active power (5)
1038	1037	1	R	x1	kVAR	INT	+/-0..32767	E	P/H	reactive power on phase 1 (1), (5)
1039	1038	1	R	x1	kVAR	INT	+/-0..32767	E	P/H	reactive power on phase 2 (1), (5)
1040	1039	1	R	x1	kVAR	INT	+/-0..32767	E	P/H	reactive power on phase 3 (1), (5)
1041	1040	1	R	x1	kVAR	INT	+/-0..32767	E	P/H	total reactive power (5)
1042	1041	1	R	x1	kVA	INT	0..32767	E	P/H	apparent power on phase 1 with 3 wattmeters (1)
1043	1042	1	R	x1	kVA	INT	0..32767	E	P/H	apparent power on phase 2 with 3 wattmeters (1)
1044	1043	1	R	x1	kVA	INT	0..32767	E	P/H	apparent power on phase 3 with 3 wattmeters (1)
1045	1044	1	R	x1	kVA	INT	0..32767	E	P/H	total apparent power

(1) Value not accessible when the configuration register 3314 selects type 31.
(5) The sign of the active and reactive power depends on configuration register 3316.

Power factor

register	address	nb of reg.	read/ write	scale	unit	format	interval	A/E	P/H	description
1046	1045	1	R	x1000	none	INT	-1000.. +1000	E	P/H	power factor on phase 1 (absolute value equal to |P|/S) (1), (6)
1047	1046	1	R	x1000	none	INT	-1000.. +1000	E	P/H	power factor on phase 2 (absolute value equal to |P|/S) (1), (6)
1048	1047	1	R	x1000	none	INT	-1000.. +1000	E	P/H	power factor on phase 3 (absolute value equal to |P|/S) (1), (6)
1049	1048	1	R	x1000	none	INT	-1000.. +1000	E	P/H	total power factor (absolute value equal to |Ptotal|/Stotal) (6)
1050	1049	1	R	x1000	none	INT	-1000.. +1000		H	Fundamental power factor on phase 1 (its absolute value is equal to |FundP|/FundS). Sign convention the same as the one for the real power factor. N/A if type 31 network.
1051	1050	1	R	x1000	none	INT	-1000.. +1000		H	same as above phase 2.
1052	1051	1	R	x1000	none	INT	-1000.. +1000		H	same as above phase 3.
1053	1052	1	R	x1000	none	INT	-1000.. +1000		H	Total fundamental power factor (its absolute value is equal to |FundPtot|/FundStot). Sign convention the same as the one for the real power factor.

(1) Value not accessible when the configuration register 3314 selects type 31.
(6) The sign of the power factor depends on configuration register 3318.

Table of registers
Metering manager @ xx + 200

Frequency

register	address	nb of reg.	read/ write	scale	unit	format	interval	A/E	P/H	description
1054	1053	1	R	x10	Hz	INT	400…600		P/H	system frequency
1055	1054	1	R	X .001	s	INT	0..32767		P/H	Duration of the interval between the last update of real time values and the current table (about 1s)

Fundamental

register	address	nb of reg.	read/ write	scale	unit	format	interval	A/E	P/H	description
1056	1055	1	R	x1	V	INT	0..1200		H	Fundamental (RMS) of phase-to-phase voltage V12.
1057	1056	1	R	x1	V	INT	0..1200		H	same as above V23.
1058	1057	1	R	x1	V	INT	0..1200		H	same as above V21.
1059	1058	1	R	x1	V	INT	0..1200		H	Fundamental (RMS) of phase-to-neutral voltage V1N. – N/A if type 31 network
1060	1059	1	R	x1	V	INT	0..1200		H	same as above V2N
1061	1060	1	R	x1	V	INT	0..1200		H	same as above V3N
1062	1061	6	R	x1	-	-	-		H	Reserved.
1068	1067	1	R	x1	A	INT	0..32767		H	Fundamental (RMS) of Phase A current.
1069	1068	1	R	x1	A	INT	0..32767		H	same as above phase 2. Measured with type 31.
1070	1069	1	R	x1	A	INT	0..32767		H	same as above phase 3
1071	1070	1	R	x1	A	INT	0..32767		H	same as above Neutral. – N/A with type 31, 40 networks. Measured with type 41.
1072	1071	4	R	x1	-	-	-		H	Reserved
1076	1075	1	R	x1	kW	INT	0..32767		H	Phase 1 fundamental active power with 3 wattmeters (type 40 & 41) N/A for type 31. Same sign convention as with active power.
1077	1076	1	R	x1	KW	INT	0..32767		H	Phase 2 fundamental active power with 3 wattmeters (type 40 & 41) N/A for type 31. Same sign convention as with active power.
1078	1077	1	R	x1	KW	INT	0..32767		H	Phase 3 fundamental active power with 3 wattmeters (type 40 & 41) N/A for type 31.Same sign convention as with active power.
1079	1078	1	R	x1	kW	INT	0..32767		H	Total fundamental active power. Same sign convention as with active power.
1080	1079	1	R	x1	kVAR	INT	0..32767		H	Phase 1 fundamental reactive power with 3 wattmeters (type 40 & 41) N/A for type 31.
1081	1080	1	R	x1	kVAR	INT	0..32767		H	Phase 2 fundamental reactive power with 3 wattmeters (type 40 & 41) N/A for type 31.

Table of registers
Metering manager @ xx + 200

Fundamental

register	address	nb of reg.	read/ write	scale	unit	format	interval	A/E	P/H	description
1082	1081	1	R	x1	kVAR	INT	0..32767		H	Phase 3 fundamental reactive power with 3 wattmeters (type 40 & 41) N/A for type 31.
1083	1082	1	R	x1	kVAR	INT	0..32767		H	Total fundamental reactive power.
1084	1083	1	R	x1	kVA	INT	0..32767		H	Phase 1 fundamental apparent power. N/A for type 31
1085	1084	1	R	x1	KVA	INT	0..32767		H	Phase 2 fundamental apparent power. N/A for type 31.
1086	1085	1	R	x1	KVA	INT	0..32767		H	Phase 3 fundamental apparent power. N/A for type 31.
1087	1086	1	R	x1	kVA	INT	0..32767		H	Total fundamental apparent power.
1088	1087	1	R	x1	kVAR	INT	0..32767		H	Phase 1 distortion power. N/A for type 31.
1089	1088	1	R	x1	kVAR	INT	0..32767		H	Phase 2 distortion power. N/A for type 31.
1090	1089	1	R	x1	kVAR	INT	0..32767		H	Phase 3 distortion power. N/A for type 31.
1091	1090	1	R	x1	kVAR	INT	0..32767		H	Total distortion power.

Table of registers
Metering manager @ xx + 200

Total Harmonic Distortion

register	address	nb of reg.	read/ write	scale	unit	format	interval	A/E	P/H	description
1092	1091	1	R	x10	%	INT	0..5000		H	Total harmonic distortion of V12 voltage compared to the fundamental.
1093	1092	1	R	x10	%	INT	0..5000		H	same as above V23
1094	1093	1	R	x10	%	INT	0..5000		H	same as above V21
1095	1094	1	R	x10	%	INT	0..5000		H	Total harmonic distortion of Van voltage compared to the fundamental. – N/A with type 31 network.
1096	1095	1	R	x10	%	INT	0..5000		H	same as above V2N
1097	1096	1	R	x10	%	INT	0..5000		H	same as above V3N
1098	1097	1	R	x10	%	INT	0..5000		H	Total harmonic distortion of phase 1 current compared to the fundamental.
1099	1098	1	R	x10	%	INT	0..5000		H	same as above phase 2. Measured with type 31.
1100	1099	1	R	x10	%	INT	0..5000		H	same as above phase 3
1101	1100	1	R	x10	%	INT	0..5000		H	same as above Neutral – N/A with type 31 networks. Measured with type 41, calculated with type 40.
1102	1101	1	R	x10	%	INT	0..1000		H	Total harmonic distortion of V12 voltage compared to the RMS value.
1103	1102	1	R	x10	%	INT	0..1000		H	same as above V23
1104	1103	1	R	x10	%	INT	0..1000		H	same as above V21
1105	1104	1	R	x10	%	INT	0..1000		H	Total harmonic distortion of Van voltage compared to the RMS value. – N/A with type 31 network.
1106	1105	1	R	x10	%	INT	0..1000		H	same as above V2N
1107	1106	1	R	x10	%	INT	0..1000		H	same as above V3N
1108	1107	1	R	x10	%	INT	0..1000		H	Total hamronic distortion of phase 1 current compared to the RMS value.
1109	1108	1	R	x10	%	INT	0..1000		H	same as above phase 2. Measured with type 31.
1110	1109	1	R	x10	%	INT	0..1000		H	same as above phase 3
1111	1110	1	R	x10	%	INT	0..1000		H	same as above Neutral – N/A with type 31 networks. Measured with type 41, calculated with type 40.
1112	1111	1	R	x10	Deg	INT	0..3600		H	Phase shift V12 / I1 with type 31 ; V1N / I1 with type 40 & 41.
1113	1112	1	R	x10	Deg	INT	0..3600		H	Phase shift V23 / I2 with type 31 ; V2N / I2 with type 40 & 41.
1114	1113	1	R	x10	Deg	INT	0..3600		H	Phase shift V31 / I3 with type 31 ; V3N / I3 with type 40 & 41.
1115	1114	1	R	x10	None	INT	0..1000		H	Phase 1 K-factor. N/A in 400Hz nominal freq. networks.
1116	1115	1	R	x10	None	INT	0..1000		H	Phase 2 K-factor. N/A in 400Hz nominal freq. networks.
1117	1116	1	R	x10	None	INT	0..1000		H	Phase 3 K-factor. N/A in 400Hz nominal freq. networks.
1118	1117	1	R	x10	None	INT	0..1000		H	Neutral K-factor. – N/A with type 30 and 31 networks. N/A in 400Hz nominal freq. Networks.
1119	1118	1	R	x100	None	INT	0..10000		H	V12 voltage peak factor. – N/A with type 40 and 41 networks. – N/A in 400Hz config

Table of registers
Metering manager @ xx + 200

Total Harmonic Distortion

register	address	nb of reg.	read/ write	scale	unit	format	interval	A/E	P/H	description
1120	1119	1	R	x100	None	INT	0..10000		H	V23 voltage peak factor. – N/A with type 40 and 41 networks. – N/A in 400Hz config
1121	1120	1	R	x100	None	INT	0..10000		H	V31 voltage peak factor. – N/A with type 40 and 41 networks. – N/A in 400Hz config
1122	1121	1	R	x100	None	INT	0..10000		H	V1N voltage peak factor. – N/A with type 31 networks. – N/A in 400Hz config
1123	1122	1	R	x100	None	INT	0..10000		H	V2N voltage peak factor. – N/A with type 31 networks. – N/A in 400Hz config
1124	1123	1	R	x100	None	INT	0..10000		H	V3N voltage peak factor. – N/A with type 31 networks. – N/A in 400Hz config
1125	1124	1	R	x100	None	INT	0..10000		H	Phase 1 current peak factor. – N/A in 400Hz config
1126	1125	1	R	x100	None	INT	0..10000		H	Phase 2 current peak factor. – N/A in 400Hz config
1127	1126	1	R	x100	None	INT	0..10000		H	Phase 3 current peak factor. – N/A in 400Hz config
1128	1127	1	R	x100	None	INT	0..10000		H	Neutral current peak factor. – N/A with type 31, 40 networks. Measured with type 41. – N/A in 400Hz config
1129	1128	4	R	-	-	-	-		H	Reserved
1133	1132	1	R	x10	Deg	INT	0..3600		H	Phase shift V12 / V12 with type 31; V1N / V1N with type 40 & 41. Definition leads to content being always 0.
1134	1133	1	R	x10	Deg	INT	0..3600		H	Phase shift V23 / V12 with type 31; V2N / V1N with type 40 & 41. Under phase balanced conditions, equals 240 degrees
1135	1134	1	R	x10	Deg	INT	0..3600		H	Phase shift V31 / V12 with type 31; V3N / V1N with type 40 & 41. Under phase balanced conditions, equals 120 degrees.

Registers 1300 to 1599: minimum values of the real-time measurements from 1000 to 1299

The minimum values for the real-time measurements may be accessed at the registers of the real-time values + 300.
Available with Micrologic E, P and H
Not available with Micrologic A
The minimum values for arithmetic means and unbalance voltage (registers 1306…1315) and for unbalance current (registers 1327…1332) are not available with Micrologic E.

Registers 1600 to 1899: maximum values of the real-time measurements from 1000 to 1299

The maximum values for the real-time measurements may be accessed at the registers of the real-time values + 600.
Available with Micrologic E, P and H
Not available with Micrologic A
The Maximum values for arithmetic means and unbalance voltage (registers 1606…1615) and for unbalance current (registers 1627…1632) are not available with Micrologic E

Minimum/Maximum Measurements rule

Minimum and Maximum measurements takes into account the relative value of real time measurements. Therefore the following rule applies :
-3800<-400<0<10<200<600
In this case, the minimeter = -3800, the maximeter = 600

Table of registers
Metering manager @ xx + 200

Energy

register	address	nb of reg.	read/ write	scale	unit	format	interval	A/E	P/H	description
2000	1999	4	R	x1	kWh	MOD 10000	+- 0.. 9999	E(3)	P/H	total active energy Ep (2)
2004	2003	4	R	x1	kVARh	MOD 10000	+- 0.. 9999	E(3)	P/H	total reactive energy Eq(2)
2008	2007	4	R	x1	kWh	MOD 10000	0..9999		P/H	active energy positively incremented: EpIn(1)
2012	2011	4	R	x1	kWh	MOD 10000	0..9999		P/H	active energy negatively incremented: EpOut(1)
2016	2015	4	R	x1	kVARh	MOD 10000	0..9999		P/H	reactive energy positively incremented EqIn (1)
2020	2019	4	R	x1	kVARh	MOD 10000	0..9999		P/H	reactive energy negatively incremented: EqOut(1)
2024	2023	4	R	x1	kVAh	MOD 10000	0..9999	E	P/H	total apparent energy Es

(1) The Energy In and Energy Out values are incremented according to the power sign set in the Micrologic menu « Micrologic set-up » (See register 3316)
(2) As standard, the total calculated energy values are absolute total values. They represent the sum of the energy in and out values. (See register 3324)
Ep = EpIn + EpOut
EQ = Eqn + EqOut
(3) Total active energy and total reactive energy are always positively incremented with Micrologic E
***Note 1**: How to convert MOD 10000 format*
For example, if the total active energy is 987654321 kWh, then
Register 2000 returns 4321
Register 2001 returns 8765
Register 2002 returns 9
Register 2003 returns 0
$987654321 = 4321 \times (10000)^{0} + 8765 \times (10000) + 9 \times (10000)^{2}$
***Note 2**: Energy display on Micrologic E screen*
The Micrologic E screen displays positive values (only) up to 999 999 999 kWh. Over this value, Micrologic E screen displays 999 999 999 kWh.
***Note 3**: Energy display on Micrologic P or H screen*
The Micrologic P or H screen displays positive values up to 99 999 999 kWh. Over this value, Micrologic P or H screen displays 0 and then 1 kWh…
The Micrologic P or H screen displays negative values up to -99 999 999 kWh. Over this value, Micrologic P or H screen displays 0 and then -1 kWh…
It is the same behaviour for reactive energy and apparent energy.

Table of registers
Metering manager @ xx + 200

Demand current

register	address	nb of reg.	read/ write	scale	unit	format	interval	A/E	P/H	description
2200	2199	1	R	x1	A	INT	0..32767	E [3]	P/H	current demand on phase 1
2201	2200	1	R	x1	A	INT	0..32767	E [3]	P/H	current demand on phase 2
2202	2201	1	R	x1	A	INT	0..32767	E [3]	P/H	current demand on phase 3
2203	2202	1	R	x1	A	INT	0..32767	E [3]	P/H	current demand on the neutral [2]
2204	2203	1	R	x1	A	INT	0..32767	E	P/H	current demand maximum on phase 1 since the last reset
2205	2204	1	R	x1	A	INT	0..32767	E	P/H	current demand maximum on phase 2 since the last reset
2206	2205	1	R	x1	A	INT	0..32767	E	P/H	current demand maximum on phase 3 since the last reset
2207	2206	1	R	x1	A	INT	0..32767	E	P/H	current demand maximum on the neutral since the last reset [2]

[2] Value not accessible when the configuration register 3314 selects type 31 or 40.
[3] Only the thermal algorithm is available with Micrologic E, while Micrologic P/H have both the thermal and arithmetical mean algorithms

K-factor demand

register	address	nb of reg.	read/ write	scale	unit	format	interval	A/E	P/H	description
2212	2211	1	R	x10	None	INT	0..1000		H	K-factor demand, phase A.
2213	2212	1	R	x10	None	INT	0..1000		H	same as above Phase B.
2214	2213	1	R	x10	None	INT	0..1000		H	same as above Phase C.
2215	2214	1	R	x10	None	INT	0..1000		H	same as above Neutral. N/A with type 31 or 40 network.
2216	2215	1	R	x10	None	INT	0..1000		H	K-factor demand peak, phase A, since last reset.
2217	2216	1	R	x10	None	INT	0..1000		H	same as above Phase B.
2218	2217	1	R	x10	None	INT	0..1000		H	same as above Phase C.
2219	2218	1	R	x10	None	INT	0..1000		H	same as above Neutral. N/A with type 31 or 40 network.

Table of registers
Metering manager @ xx + 200

Demand power

register	address	nb of reg.	read/ write	scale	unit	format	interval	A/E	P/H	description
2224	2223	1	R	x1	kW	INT	0..32767	E[9]	P/H	total active-power demand [7]
2225	2224	1	R	x1	kW	INT	0..32767	E	P/H	active-power demand maximum since the last reset
2226	2225	1	R	x1	kW	INT	0..32767		P/H	predicted active-power demand at the end of the window [8]
2227	2226	1	R	x1000	sans	INT	-1000.. +1000		P/H	total power factor at last active-power demand maximum
2228	2227	1	R	x1	kVAR	INT	0..32767		P/H	value of reactive-power demand at last active-power demand maximum
2229	2228	1	R	x1	kVA	INT	0..32767		P/H	value of apparent-power demand at last active-power demand maximum
2230	2229	1	R	x1	kVAR	INT	0..32767		P/H	total reactive-power demand [7]
2231	2230	1	R	x1	kVAR	INT	0..32767		P/H	reactive-power demand maximum since the last reset
2232	2231	1	R	x1	kVAR	INT	0..32767		P/H	predicted reactive-power demand at the end of the window [8]
2233	2232	1	R	x1000	sans	INT	-1000.. +1000		P/H	total power factor at last reactive-power demand maximum
2234	2233	1	R	x1	kW	INT	0..32767		P/H	value of active-power demand at last reactive-power demand maximum
2235	2234	1	R	x1	kVA	INT	0..32767		P/H	value of apparent-power demand at last reactive-power demand maximum
2236	2235	1	R	x1	kVA	INT	0..32767	E	P/H	total apparent power demand [7]
2237	2236	1	R	x1	kVA	INT	0..32767	E	P/H	apparent-power demand maximum since the last reset
2238	2237	1	R	x1	kVA	INT	0..32767		P/H	predicted apparent-power demand at the end of the window [8]
2239	2238	1	R	x1000	sans	INT	-1000.. +1000		P/H	total power factor at last apparent-power demand maximum
2240	2239	1	R	x1	kW	INT	0..32767		P/H	value of active-power demand at last apparent-power demand maximum
2241	2240	1	R	x1	kVAR	INT	0..32767		P/H	value of reactive-power demand at last apparent-power demand maximum

[7] Value updated at end of window for the "block" mode. For the "sliding" mode, the value is updated every 15 seconds.
[8] Value updated every 15 seconds for both "block" and "sliding" modes.
[9] Only the thermal algorithm is available with Micrologic E, while Micrologic P/H have both the thermal and arithmetical mean algorithms.

Table of registers
Metering manager @ xx + 200

Time stamping

register	address	nb of reg.	read/ write	scale	unit	format	interval	A/E	P/H	description
3000	2999	4	R	-	-	DATE	-		P/H	current date of the metering manager
3005	3004	3	R	-	-	DATE	-	E	P/H	date of last current demand maximum I1 (register 2204)
3008	3007	3	R	-	-	DATE	-	E	P/H	date of last current demand maximum I2 (register 2205)
3011	3010	3	R	-	-	DATE	-	E	P/H	date of last current demand maximum I3 (register 2206)
3014	3013	3	R	-	-	DATE	-	E	P/H	date of last current demand maximum on the neutral (register 2207) (2)
3017	3016	3	R	-	-	DATE	-	E	P/H	date of last active-power demand maximum (register 2224)
3020	3019	3	R	-	-	DATE	-		P/H	date of last reactive-power demand maximum (register 2230)
3023	3022	3	R	-	-	DATE	-	E	P/H	date of last apparent-power demand maximum (register 2236)
3026	3025	3	R	-	-	DATE	-		P/H	date of last reset of current demand maximum values
3029	3028	3	R	-	-	DATE	-		P/H	date of last reset of power demand maximum values
3032	3031	3	R	-	-	DATE	-		P/H	Date-Time of last min registers reset (1300-1599)(*)
3035	3034	3	R	-	-	DATE	-		P/H	Date-Time of last max registers reset (1600-1899)(*)
3038	3037	3	R	-	-	DATE	-		P/H	date of last reset of energy meters
3041	3040	3	R	-	-	DATE	-		P/H	Date of appearance of last K-factor demand peak (phase A)
3044	3043	3	R	-	-	DATE	-		P/H	Date of appearance of last K-factor demand peak (phase B)
3047	3046	3	R	-	-	DATE	-		P/H	Date of appearance of last K-factor demand peak (phase C)
3050	3049	3	R	-	-	DATE	-		P/H	Date of appearance of last K-factor demand peak (Neutral) N/A for type 31 & 40 networks
3053	3052	3	R	-	-	DATE	-		P/H	Date of appearance of last I2 demand peak (phase A)
3056	3055	3	R	-	-	DATE	-		P/H	Date of appearance of last I2 demand peak (phase B)
3059	3058	3	R	-	-	DATE	-		P/H	Date of appearance of last I2 demand peak (phase C)
3062	3061	3	R	-	-	DATE	-		P/H	Date of appearance of last I2 demand peak (Neutral) N/A for type 31 & 40 networks

(2) N/A for type 31 or 40 networks.

(*) Caution: this register is updated whenever any of the min register is reset. Command interface authorizes user to clear min of Current RMS & Unbal values, Voltage RMS & Unbal values, frequency, P/Q/S/PF, Fundamental quantities & THD, Voltage Crest & Current crest independently. However, since only one date/time of last reset is maintained, it is recommended to always set all bits in the command that resets min values.

Table of registers
Metering manager @ xx + 200

Configuration of the metering manager

register	address	nb of reg.	read/ write	scale	unit	format	interval	A/E	P/H	description
3300	3299	1	R	-	-	INT	0..65535	E(1)	P/H	Control word for the metering manager. This Control word may not be user set. It is randomly modified and must be read before sending certain commands to the metering manager.
3303	3302	2	R/W	-	-	ASCII	0x00..0x7F		P/H	short identifier of the metering manager, coded over four ASCII characters. Default value: "set!"
3305	3304	8	R/W	-	-	ASCII	0x00..0x7F		P/H	long identifier of the metering manager, coded over 16 ASCII characters. Default value: "please set me up"
3314	3313	1	R/W	-	-	INT	{30, 31, 40, 41}	E(2)	P/H	If you have a system type: 3 Phase, 4 Wire, 4 Current Transformer (3P breaker with External Neutral CT connected + External Neutral Voltage Tap not connected to VN), select system type **30**: measurement of the phase-to-neutral voltage is not available measurement of the neutral current is available. Power is calculated with 2 Wattmeter s method If you have a system type: 3 Phase, 3 Wire, 3 Current Transformer (3P breaker without External Neutral CT connected + External Neutral Voltage Tap not connected to VN), select system type **31**: measurement of the phase-to-neutral voltage is not available measurement of the neutral current is not available. Power is calculated with 2 Wattmeter s method If you have a system type: 3 Phase, 4 Wire, 3 Current Transformer (3P breaker without External Neutral CT connected + External Neutral voltage Tap connected to VN), select system type **40**: measurement of the phase-to-neutral voltages is available measurement of the neutral current is not available. Power is calculated with 3 Wattmeter s method If you have a system type : 3 Phase, 4 Wire, 4 Current Transformer (3P breaker with External Neutral CT connected + External Neutral voltage Tap connected to VN or 4P breaker), select system type **41**: measurement of the phase-to-neutral voltages is available measurement of the neutral current is available. Power is calculated with 3 Wattmeter s method Default value: 40 with Micrologic E, 41 with Micrologic P/H
3316	3315	1	R/W	-	-	INT	{0,1}	E	P/H	sign convention for the power sign 0: " + " if the active power flows from upstream (top) to downstream (bottom) (⇩) Topfed 1: "+" if the active power flows from downstream (bottom) to upstream (top) (⇧). Bottomfed Default value: 0

(1) Always equals to 0 for Micrologic E

(2) If 4W3ct selected on Micrologic E display, register 3314 returns 40
If 4W4ct selected on Micrologic E display register 3314 returns 41
If 3W3ct selected on Micrologic E display, register 3314 returns 31

Table of registers
Metering manager @ xx + 200

Configuration

register	address	nb of reg.	read/ write	scale	unit	format	interval	A/E	P/H	Description
3317	3316	1	R/W	-	-	INT	{0,1}		P/H	sign convention for the reactive power : 0: alternate IEEE convention 1: IEEE & IEC convention Default value: 1 (1)
3318	3317	1	R/W	-	-	INT	{0,1,2}	E	P/H	sign convention for the power factor: 0: IEC convention (2) 1: alternate IEEE convention 2: IEEE convention Default value: 2 (3)
3319	3318	1	R/W	-	-	INT	{0,1}		H	ELU: N/A Reactive power calculation convention: 0: fundamental alone. 1: harmonics included [DEFAULT].
3324	3323	1	R/W	-	-	INT	{0,1}	E(5)	P/H P/H	Total energy metering convention: 0: absolute accumulation (Ep=EpIn + EpOut) 1: signed accumulation (Ep=EpIn - EpOut-) Default = 0 : Absolute
3351	3350	1	R/W	-	-	INT	{0,1}	E(6)	P/H P/H	Current-demand calculation method ; window type 0: Block interval ; sliding 1: Thermal ; sliding Default value: 1
3352	3351	1	R/W	x1	min	INT	5..60	E	P/H	duration in minutes of the current-demand calculation window : Default value: 15 minutes (4)
3354	3353	1	R/W	-	-	INT	{0,1, 2, 5}	E(6)	P/H P/H P/H P/H	Power-demand calculation method ; window type : 0: Block interval ; sliding 1: Thermal ; sliding 2: block interval ; block 5: Synchronised to communication Default value: 0
3355	3354	1	R/W	x1	min	INT	5..60	E	P/H	duration in minutes of the power-demand calculation window : Default value: 15 minutes
3816	3815	1	R	-	-	INT	0..32767	A/E	P/H	Square D Identification number : Micrologic A : PM = 15131 E : PM = 15137, MM = 15138 P : PM = 15133, MM = 15134 H : PM = 15135, MM = 15136

(1) With Micrologic E, only IEC convention

(2) To have IEE alt., set 3317 to 0 and 3318 to 1
To have IEC, set 3317 to 1 and 3318 to 0
To have IEEE, set 3317 to 1 and 3318 to 2

(3) With Micrologic E, only IEEE convention

(4) The duration in minutes of the current-demand calculation window set in this register is used for the maximum current I1, I2, and I3 and IN protection functions.
When these protection functions are active, it is possible to modify the duration of the calculation window whether the protective cover for the dial settings is closed or not, whether remote access is authorised (Micrologic) or not, and whether the supervisor knows the remote-access control word or not.

(5) With Micrologic E, only absolute computation is available.

(6) With Micrologic E, only Thermal sliding option is available.

Table of registers
Metering manager @ xx + 200

Spectral Components (odd rank)

register	address	nb of reg.	read/ write	scale	unit	format	interval	A/E	P/H	description
4100	4099	1	R	x10	%	INT	0..1200		H	% value (in respect with the fundamental) of the amplitude of harmonic 3 of V12. – N/A in 400Hz systems
4101	4100	1	R	x10	%	INT	0..1200		H	% value (in respect with the fundamental) of the amplitude of harmonic 3 of V23. – N/A in 400Hz systems
4102	4101	1	R	x10	%	INT	0..1200		H	% value (in respect with the fundamental) of the amplitude of harmonic 3 of V31. – N/A in 400Hz systems
4103	4102	1	R	x10	%	INT	0..1200		H	% value (in respect with the fundamental) of the amplitude of harmonic 3 of V1N. – N/A in 400Hz systems – N/A with type 31
4104	4103	1	R	x10	%	INT	0..1200		H	% value (in respect with the fundamental) of the amplitude of harmonic 3 of V2N. – N/A in 400Hz systems – N/A with type 31
4105	4104	1	R	x10	%	INT	0..1200		H	% value (in respect with the fundamental) of the amplitude of harmonic 3 of V3N. – N/A in 400Hz systems – N/A with type 31
4106	4105	6	R	x10	%	INT	0..1200		H	same as above harmonic 5
4112	4111	6	R	x10	%	INT	0..1200		H	same as above harmonic 7
4118	4117	6	R	x10	%	INT	0..1200		H	same as above harmonic 9
4124	4123	6	R	x10	%	INT	0..1200		H	same as above harmonic 11
4130	4129	6	R	x10	%	INT	0..1200		H	same as above harmonic 13
4136	4135	6	R	x10	%	INT	0..1200		H	same as above harmonic 15
4142	4141	6	R	x10	%	INT	0..1200		H	same as above harmonic 17
4148	4147	6	R	x10	%	INT	0..1200		H	same as above harmonic 19
4154	4153	6	R	x10	%	INT	0..1200		H	same as above harmonic 21
4160	4159	6	R	x10	%	INT	0..1200		H	same as above harmonic 23
4166	4165	6	R	x10	%	INT	0..1200		H	same as above harmonic 25
4172	4171	6	R	x10	%	INT	0..1200		H	same as above harmonic 27
4178	4177	6	R	x10	%	INT	0..1200		H	same as above harmonic 29
4184	4183	6	R	x10	%	INT	0..1200		H	same as above harmonic 31
4190	4189	1	R	x10	%	INT	0..32767		H	% value (in respect with the fundamental) of the amplitude of harmonic 3 of I1. – N/A in 400Hz systems
4191	4190	1	R	x10	%	INT	0..32767		H	% value (in respect with the fundamental) of the amplitude of harmonic 3 of I2. – N/A in 400Hz systems
4192	4191	1	R	x10	%	INT	0..32767		H	% value (in respect with the fundamental) of the amplitude of harmonic 3 of I3. – N/A in 400Hz systems
4193	4192	1	R	x10	%	INT	0..32767		H	% value (in respect with the fundamental) of the amplitude of harmonic 3 of IN. – N/A in 400Hz systems – N/A with type 31
4194	4193	4	R	x10	%	INT	0..32767		H	same as above harmonic 5
4198	4197	4	R	x10	%	INT	0..32767		H	same as above harmonic 7
4202	4201	4	R	x10	%	INT	0..32767		H	same as above harmonic 9
4206	4205	4	R	x10	%	INT	0..32767		H	same as above harmonic 11

Table of registers
Metering manager @ xx + 200

Spectral Components (odd rank)

register	address	nb of reg.	read/ write	scale	unit	format	interval	A/E	P/H	description
4210	4209	4	R	x10	%	INT	0..32767		H	same as above harmonic 13
4214	4213	4	R	x10	%	INT	0..32767		H	same as above harmonic 15
4218	4217	4	R	x10	%	INT	0..32767		H	same as above harmonic 17
4222	4221	4	R	x10	%	INT	0..32767		H	same as above harmonic 19
4226	4225	4	R	x10	%	INT	0..32767		H	same as above harmonic 21
4230	4229	4	R	x10	%	INT	0..32767		H	same as above harmonic 23
4234	4233	4	R	x10	%	INT	0..32767		H	same as above harmonic 25
4238	4237	4	R	x10	%	INT	0..32767		H	same as above harmonic 27
4242	4241	4	R	x10	%	INT	0..32767		H	same as above harmonic 29
4246	4245	4	R	x10	%	INT	0..32767		H	same as above harmonic 31
4250	4249	1	R	x10	Deg	INT	0..3600		H	Phase of harmonic 3 of V12. – N/A in 400Hz systems
4251	4250	1	R	x10	Deg	INT	0..3600		H	Phase of harmonic 3 of V23. – N/A in 400Hz systems
4252	4251	1	R	x10	Deg	INT	0..3600		H	Phase of harmonic 3 of V31. – N/A in 400Hz systems
4253	4252	1	R	x10	Deg	INT	0..3600		H	Phase of harmonic 3 of V1N. – N/A in 400Hz systems – N/A with type 31
4254	4253	1	R	x10	Deg	INT	0..3600		H	Phase of harmonic 3 of V2N. – N/A in 400Hz systems – N/A with type 31
4255	4254	1	R	x10	Deg	INT	0..3600		H	Phase of harmonic 3 of V3N. – N/A in 400Hz systems – N/A with type 31
4256	4255	6	R	x10	Deg	INT	0..3600		H	same as above harmonic 5
4262	4261	6	R	x10	Deg	INT	0..3600		H	same as above harmonic 7
4340	4339	1	R	x10	Deg	INT	0..3600		H	Phase of harmonic 3 of I1. – N/A in 400Hz systems
4341	4340	1	R	x10	Deg	INT	0..3600		H	Phase of harmonic 3 of I2. – N/A in 400Hz systems
4342	4341	1	R	x10	Deg	INT	0..3600		H	Phase of harmonic 3 of I3. – N/A in 400Hz systems
4343	4342	1	R	x10	Deg	INT	0..3600		H	Phase of harmonic 3 of IN. – N/A in 400Hz systems – N/A with type 31
4344	4343	4	R	x10	Deg	INT	0..3600		H	same as above harmonic 5
4348	4347	4	R	x10	Deg	INT	0..3600		H	same as above harmonic 7
4352	4351	4	R	x10	Deg	INT	0..3600		H	same as above harmonic 9

Table of registers
Metering manager @ xx + 200

Spectral Components (even rank)

register	address	nb of reg.	read/ write	scale	unit	format	interval	A/E	P/H	description
4400	4399	1	R	x10	%	INT	0..1200		H	% value (in respect with the fundamental) of the amplitude of harmonic 2 of V12. – N/A in 400Hz systems
4401	4400	1	R	x10	%	INT	0..1200		H	% value (in respect with the fundamental) of the amplitude of harmonic 2 of V23. – N/A in 400Hz systems
4402	4401	1	R	x10	%	INT	0..1200		H	% value (in respect with the fundamental) of the amplitude of harmonic 2 of V31. – N/A in 400Hz systems
4403	4402	1	R	x10	%	INT	0..1200		H	% value (in respect with the fundamental) of the amplitude of harmonic 2 of V1N. – N/A in 400Hz systems – N/A with type 31
4404	4403	1	R	x10	%	INT	0..1200		H	% value (in respect with the fundamental) of the amplitude of harmonic 2 of V2N. – N/A in 400Hz systems – N/A with type 31
4405	4404	1	R	x10	%	INT	0..1200		H	% value (in respect with the fundamental) of the amplitude of harmonic 2 of V3N. – N/A in 400Hz systems – N/A with type 31
4406	4405	6	R	x10	%	INT	0..1200		H	same as above harmonic 4
4412	4411	6	R	x10	%	INT	0..1200		H	same as above harmonic 6
4418	4417	6	R	x10	%	INT	0..1200		H	same as above harmonic 8
4424	4423	6	R	x10	%	INT	0..1200		H	same as above harmonic 10
4430	4429	6	R	x10	%	INT	0..1200		H	same as above harmonic 12
4436	4435	6	R	x10	%	INT	0..1200		H	same as above harmonic 14
4442	4441	6	R	x10	%	INT	0..1200		H	same as above harmonic 16
4448	4447	6	R	x10	%	INT	0..1200		H	same as above harmonic 18
4454	4453	6	R	x10	%	INT	0..1200		H	same as above harmonic 20
4460	4459	6	R	x10	%	INT	0..1200		H	same as above harmonic 22
4466	4465	6	R	x10	%	INT	0..1200		H	same as above harmonic 24
4472	4471	6	R	x10	%	INT	0..1200		H	same as above harmonic 26
4478	4477	6	R	x10	%	INT	0..1200		H	same as above harmonic 28
4484	4483	6	R	x10	%	INT	0..1200		H	same as above harmonic 30
4490	4489	1	R	x10	%	INT	0..32767		H	% value (in respect with the fundamental) of the amplitude of harmonic 2 of I1. – N/A in 400Hz systems
4491	4490	1	R	x10	%	INT	0..32767		H	% value (in respect with the fundamental) of the amplitude of harmonic 2 of I2. – N/A in 400Hz systems
4492	4491	1	R	x10	%	INT	0..32767		H	% value (in respect with the fundamental) of the amplitude of harmonic 2 of I3. – N/A in 400Hz systems
4493	4492	1	R	x10	%	INT	0..32767		H	% value (in respect with the fundamental) of the amplitude of harmonic 2 of IN. – N/A in 400Hz systems – N/A with type 31
4494	4493	4	R	x10	%	INT	0..32767		H	same as above harmonic 4
4498	4497	4	R	x10	%	INT	0..32767		H	same as above harmonic 6
4502	4501	4	R	x10	%	INT	0..32767		H	same as above harmonic 8
4506	4505	4	R	x10	%	INT	0..32767		H	same as above harmonic 10

Table of registers
Metering manager @ xx + 200

Spectral Components (even rank)

register	address	nb of reg.	read/ write	scale	unit	format	interval	A/E	P/H	description
4510	4509	4	R	x10	%	INT	0..32767		H	same as above harmonic 12
4514	4513	4	R	x10	%	INT	0..32767		H	same as above harmonic 14
4518	4517	4	R	x10	%	INT	0..32767		H	same as above harmonic 16
4522	4521	4	R	x10	A	INT	0..32767		H	same as above harmonic 18
4526	4525	4	R	x10	A	INT	0..32767		H	same as above harmonic 20
4530	4529	4	R	x10	A	INT	0..32767		H	same as above harmonic 22
4534	4533	4	R	x10	A	INT	0..32767		H	same as above harmonic 24
4538	4537	4	R	x10	A	INT	0..32767		H	same as above harmonic 26
4542	4541	4	R	x10	A	INT	0..32767		H	same as above harmonic 28
4546	4545	4	R	x10	A	INT	0..32767		H	same as above harmonic 30
4550	4549	1	R	x10	Deg	INT	0..3600		H	Phase of harmonic 2 of V12. – N/A in 400Hz systems
4551	4550	1	R	x10	Deg	INT	0..3600		H	Phase of harmonic 2 of V23. – N/A in 400Hz systems
4552	4551	1	R	x10	Deg	INT	0..3600		H	Phase of harmonic 2 of V31. – N/A in 400Hz systems
4553	4552	1	R	x10	Deg	INT	0..3600		H	Phase of harmonic 2 of V1N. – N/A in 400Hz systems – N/A with type 31
4554	4553	1	R	x10	Deg	INT	0..3600		H	Phase of harmonic 2 of V2N. – N/A in 400Hz systems – N/A with type 31
4555	4554	1	R	x10	Deg	INT	0..3600		H	Phase of harmonic 2 of VN. – N/A in 400Hz systems – N/A with type 31
4556	4555	6	R	x10	Deg	INT	0..3600		H	same as above harmonic 4
4562	4531	6	R	x10	Deg	INT	0..3600		H	same as above harmonic 6
4568	4567	6	R	x10	Deg	INT	0..3600		H	same as above harmonic 8
4640	4639	1	R	x10	Deg	INT	0..3600		H	Phase of harmonic 2 of I1. – N/A in 400Hz systems
4641	4640	1	R	x10	Deg	INT	0..3600		H	Phase of harmonic 2 of I2. – N/A in 400Hz systems
4642	4641	1	R	x10	Deg	INT	0..3600		H	Phase of harmonic 2 of I3. – N/A in 400Hz systems
4643	4642	1	R	x10	Deg	INT	0..3600		H	Phase of harmonic 2 of IN. – N/A in 400Hz systems – N/A with type 31
4644	4643	4	R	x10	Deg	INT	0..3600		H	same as above harmonic 4
4648	4647	4	R	x10	Deg	INT	0..3600		H	same as above harmonic 6
4652	4651	4	R	x10	Deg	INT	0..3600		H	same as above harmonic 8

Table of registers
Metering manager @ xx + 200

Analog Pre-defined Alarms

register	address	nb of reg.	read/ write	scale	unit	format	interval	A/E	P/H	description
5700	5699	1	R	-	-	Bitmap	0.0xFFFF		H	Pre-Defined Alarms Status Bitmap. Alarms 48 through 63. Bit 0 represents status of Pre-Defined. Alarm N°48. If set, Alarm is active. Status tracks the actual alarm status.
5701	5700	1	R	-	-	Bitmap	0.0xFFFF		H	Pre-Defined Alarms Status Bitmap. Alarms 32 through 47. Bit 0 represents status of Pre-Defined Alarm N°32. If set, Alarm is active. Status tracks the actual alarm status.
5702	5701	1	R	-	-	Bitmap	0.0xFFFF		H	Pre-Defined Alarms Status Bitmap. Alarms 16 through 31. Bit 0 represents status of Pre-Defined Alarm N°16. If set, Alarm is active. Status tracks the actual alarm status.
5703	5702	1	R	-	-	Bitmap	0.0xFFFF		H	Pre-Defined Alarms Status Bitmap. Alarms 0 through 15. Bit 0 represents status of Pre-Defined Alarm N°1. If set, Alarm is active. Status tracks the actual alarm status.
6000	5999	12					Template			Pre-Defined Alarm N° 1 Setting. Over Current Phase 1
6000	5999	1	R/W*	-	-	INT	see text		H	MSB: 0=ON, 1=OFF, LSB: Priority set to 0, 1, 2 or 3. When set to 0, MM will not log event into MM event log (file N°10) and MM will not log event into MM Wave Form capture (file N°5). Default value: 0x0101
6001	6000	1	Read only	-	-	INT	1016		H	Register number which content gets compared to the pickup setpoint and to the dropout setpoint. Default value: 1016
6002	6001	1	Read only	-	-	INT	1		H	Comparison mode. MSB indicates Pickup mode. LSB indicates Dropout mode. MSB can be set to 1, 2 or 4. LSB can be set to 1, 2 or 4. - 1 selects Immediate mode: register PuValue contains the numerical value to which the monitored register is compared. No percentage is applied. .Default value is 0x0101
6003	6002	1	R/W*	see text	see text	INT			H	Alarm Actuation set point. When Immediate mode is selected, care must be taken to set this register with the same units and scale factors then the Compare Register CompReg. Default value: 0x8000.

Table of registers
Metering manager @ xx + 200

Analog Pre-defined Alarms

register	address	nb of reg.	read/ write	scale	unit	format	interval	A/E	P/H	description
6004	6003	1	Read only	100	%	INT			H	This register contains a numerical value that is multiplied to the content of the pickup register, when Direct Mode is selected. Otherwise, register is not used. Default value: 0x8000.
6005	6004	1	R/W*	x1	s	INT			H	Actuation time delay Time delay must be set in seconds. Default value: 0x8000.
6006	6005	1	R/W*	see text	see text	INT			H	Release set point When Immediate mode is selected, care must be taken to set this register with the same units and scale factors then the Compare Register CompReg. Default value: 0x8000.
6007	6006	1	Read only	100	%	INT			H	This register contains a numerical value that is multiplied to the content of the dropout register, when Direct Mode is selected. Otherwise, register is not used. Default value: 0x8000.
6008	6007	1	R/W*	x1	s	INT			H	Release time delay. Time delay must be set in seconds. Default value: 0x8000.
6009	6008	1	Read only	-	-	INT	{0, 1, 2, 3}		H	Alarm Type. 0 indicates “Over”, 1 indicates “Under”, 2 indicates “Equal to”, 3 indicates “Different from”, 5 is used for all other alarms. Default is: 1.
6010	6009	1	R/W*	-	-	INT	Bitmap		H	Action associated with overrunning of the set point after the time delay has run out. Log into the Wave Form Capture file (file N° 5). 0x0200➔action activated. Default value is 0x0000.
6011	6010	1	R/W*	-	-	-			H	Reserved.
6012	6011	12					Template		H	Pre-Defined Alarm N° 2 Setting. Over Current Phase 2
6024	6023	12					Template		H	Pre-Defined Alarm N° 3 Setting. Over Current Phase 3
6036	6035	12					Template		H	Pre-Defined Alarm N° 4 Setting. Over Neutral Current
6048	6047	12					Template		H	Pre-Defined Alarm N° 5 Setting. Over Ground Current
6060	6059	12					Template		H	Pre-Defined Alarm N° 6 Setting. Under Current Phase 1
6072	6071	12					Template		H	Pre-Defined Alarm N° 7 Setting. Under Current Phase 2
6084	6083	12					Template		H	Pre-Defined Alarm N° 8 Setting. Under Current Phase 3

Table of registers
Metering manager @ xx + 200

Analog Pre-defined Alarms

register	address	nb of reg.	read/ write	scale	unit	format	interval	A/E	P/H	description
6096	6095	12					Template		H	Pre-Defined Alarm N° 9 Setting. Over Current Unbalance Phase 1
6108	6107	12					Template		H	Pre-Defined Alarm N° 10 Setting. Over Current Unbalance Phase 2
6120	6119	12					Template		H	Pre-Defined Alarm N° 11 Setting. Over Current Unbalance Phase 3
6132	6131	12					Template		H	Pre-Defined Alarm N° 12 Setting. Over Voltage Phase 1
6144	6143	12					Template		H	Pre-Defined Alarm N° 13 Setting. Over Voltage Phase 2
6156	6155	12					Template		H	Pre-Defined Alarm N° 14 Setting. Over Voltage Phase 3
6168	6167	12					Template		H	Pre-Defined Alarm N° 15 Setting. Under Voltage Phase 1
6180	6179	12					Template		H	Pre-Defined Alarm N° 16 Setting. Under Voltage Phase 2
6192	6191	12					Template		H	Pre-Defined Alarm N° 17 Setting. Under Voltage Phase 3
6204	6203	12					Template		H	Pre-Defined Alarm N° 18 Setting. Over Voltage Unbalance Phase 1
6216	6215	12					Template		H	Pre-Defined Alarm N° 19 Setting. Over Voltage Unbalance Phase 2
6228	6227	12					Template		H	Pre-Defined Alarm N° 20 Setting. Over Voltage Unbalance Phase 3
6240	6239	12					Template		H	Pre-Defined Alarm N° 21 Setting. Over kVA 3-ph Total
6252	6251	12					Template		H	Pre-Defined Alarm N° 22 Setting. Over kW Into The Load 3-ph Total
6264	6263	12					Template		H	Pre-Defined Alarm N° 23 Setting. Over kW Out Of The Load 3-ph Total
6276	6275	12					Template		H	Pre-Defined Alarm N° 24 Setting. Over kVAR Into The Load 3-ph Total
6288	6287	12					Template		H	Pre-Defined Alarm N° 25 Setting. Over kVAR Out of The Load 3-ph Total
6300	6299	12					Template		H	Pre-Defined Alarm N° 26 Setting. Under kVA 3-ph Total
6312	6311	12					Template		H	Pre-Defined Alarm N° 27 Setting. Under kW Into The Load 3-ph Total
6324	6323	12					Template		H	Pre-Defined Alarm N° 28 Setting. Under kW Out Of The Load 3-ph Total
6336	6335	12					Template		H	Pre-Defined Alarm N° 29 Setting. Under kVAR Into The Load 3-ph Total
6348	6347	12					Template		H	Pre-Defined Alarm N° 30 Setting. Under kVAR Into The Load 3-ph Total
6360	6359	12					Template		H	Pre-Defined Alarm N° 31 Setting. Lagging True Power Factor 3-ph Total

Table of registers
Metering manager @ xx + 200

Analog Pre-defined Alarms

register	address	nb of reg.	read/ write	scale	unit	format	interval	A/E	P/H	description
6372	6371	12					Template		H	Pre-Defined Alarm N° 32 Setting. Leading True Power Factor 3-ph Total
6384	6383	12					Template		H	Pre-Defined Alarm N° 33 Setting. Lagging Displacement Power Factor 3-ph Total
6396	6395	12					Template		H	Pre-Defined Alarm N° 34 Setting. Leading Displacement Power Factor 3-ph Total
6408	6407	12					Template		H	Pre-Defined Alarm N° 35 Setting. Over Value THD Current Phase 1
6420	6420	12					Template		H	Pre-Defined Alarm N° 36 Setting. Over Value THD Current Phase 2
6432	6432	12					Template		H	Pre-Defined Alarm N° 37 Setting. Over Value THD Current Phase 3
6444	6443	12					Template		H	Pre-Defined Alarm N° 38 Setting. Over Value THD Voltage V12
6456	6455	12					Template		H	Pre-Defined Alarm N° 39 Setting. Over Value THD Voltage V23
6468	6467	12					Template		H	Pre-Defined Alarm N° 40 Setting. Over Value THD Voltage V21
6480	6479	12					Template		H	Pre-Defined Alarm N° 41 Setting. Over Value THD Voltage V1N
6492	6491	12					Template		H	Pre-Defined Alarm N° 42 Setting. Over Value THD Voltage V2N
6504	6503	12					Template		H	Pre-Defined Alarm N° 43 Setting. Over Value THD Voltage V3N
6516	3515	12					Template		H	Pre-Defined Alarm N° 44 Setting. Over Predicted kVA Demand
6528	3527	12					Template		H	Pre-Defined Alarm N° 45 Setting. Over Predicted kW Demand Into The Load 3-ph Total
6540	6539	12					Template		H	Pre-Defined Alarm N° 46 Setting. Over Predicted kW Demand Out Of The Load 3-ph Total
6552	6551	12					Template		H	Pre-Defined Alarm N° 47 Setting. Over Predicted kVAR Demand Into The Load 3-ph Total
6564	6563	12					Template		H	Pre-Defined Alarm N° 48 Setting. Over Predicted kVAR Demand Out Of The Load 3-ph Total
6576	6575	12					Template		H	Pre-Defined Alarm N° 49 Setting. Under Predicted kVA Demand
6588	6587	12					Template		H	Pre-Defined Alarm N° 50 Setting. Under Predicted kW Demand Into The Load 3-ph Total
6600	6599	12					Template		H	Pre-Defined Alarm N° 51 Setting. Under Predicted kW Demand Out Of The Load 3-ph Total
6612	6611	12					Template		H	Pre-Defined Alarm N° 52 Setting. Under Predicted kVAR Demand Into The Load 3-ph Total
6624	6623	12					Template		H	Pre-Defined Alarm N° 53 Setting. Under Predicted kVAR Demand Out Of The Load 3-ph Total

Table of registers
Metering manager @ xx + 200

Wave Form Capture
Registers 7132 to 7157 file N° 5 (see the section: Access to the files)

Event log
Registers 7164 to 7188 file N° 10 (see the section: Access to the files)

Min-Max Event log
Registers 7196 to 7220 file N° 11 (see the section: Access to the files)

Maintenance Event log
Registers 7228 to 7252 file N° 12 (see the section: Access to the files)

Table of registers
Protection manager @ xx + 100

Characteristics of the protection manager

register	address	nb of reg.	read/ write	scale	unit	format	interval	A/E	P/H	description
8700	8699	4	R	1	-	Ascii	-	A/E	P/H	Serial number encoded in Ascii
8710	8709	1	R	1	-	INT	-	A/E	P/H	Protection module firmware version
8716	8715	1	R	1	-	INT		A/E	P/H	Square D Identification number 15131 = Micrologic A (PM) 15137 = Micrologic E (PM) 15133 = Micrologic P (PM) 15135 = Micrologic H (PM) Default value = 0x8000
8740	8739	1	R	1	-	Ascii	20,30,40 50,60,70	A/E	P/H	Type of protection 20 = Micrologic 2.0, … 70 = Micrologic 7.0
8741	8740	1	R	1	-	Ascii	A,E,P,H	A/E	P/H	Type of measurement : A, E, P or H Or Type of application : M
8742	8741	1	R	1	-	INT	0..15	A/E	P/H	Type of long time rating plug 0 = missing, 1= IEC standard; 2 = IEC low ; 3 = IEC High ; 10 = OFF ; 7 = UL-A ; 8 = UL-B ; 9 = UL-C ; 11= UL-D ; 12 = UL-E ; 13 = UL-F ; 14 = UL- G ; 15 = UL-H
8750	8749	1	R	x1	A	INT	0..8000	A/E	P/H	rated circuit-breaker current Default value: 100 A (circuit-breaker sensor plug not present)
8753	8752	1	R/W*	x1	notch	INT	0..3	A/E A/E A/E	P/H P/H P/H P/H	type of neutral protection 0: OFF 1: N/2 (Ir/2) 2: N (Ir) 3: Nx1.6 (1.6 Ir)

(*) Write Access only with Micrologic P, H

Table of registers
Protection manager @ xx + 100

Basic protections settings
■ **Long-time protection** **Alarm N° 1000** **Ir**

register	address	nb of reg.	read/ write	scale	unit	format	interval	A/E	P/H	description
8754	8753	1	R	-	-	INT	0x0001	A/E	P/H	0x0001 (protection active)
8755	8754	1	R/W*	-	-	INT	Bitmap 16	A/E		type of Idmtl curve
									P/H	bit 0: standard long-time curve I²t (default value)
									P/H	bit 1: SIT curve
									P/H	bit 2: VIT curve
									P/H	bit 3: EIT (#I²t on) curve
									P/H	bit 4: HVF curve
									P/H	bit 5: constant time (#I²t off)
8756	8755	2	R/W*	x1	A	MOD 10000	40..8000	A/E	P/H	Ir pickup for the long-time protection
8758	8757	1	R/W*	x1	ms	INT	500. 24000	A/E	P/H	tr tripping delay for the long-time protection
8762	8761	1	R/W*	-	-	INT	Bitmap 16		H	actions linked to overrun of set point at the end of the delay Register set to 0x0100 will Log the Wave Form into the Fault Wave Form Capture file (file N°22)
8763	8762	1	R/W	-	-	INT	Bitmap 16			list of "pickup" actions linked to overrun of set point at the end of the delay Bit set to 1: action activated
										bit 0: always set to 1 (trip action)
								E(1)	P/H	If bit 8 is set to 1, contact No. 1 on an M2C or M6C module is closed
								E(1)	P/H	If bit 9 is set to 1, contact No. 2 on an M2C or M6C module is closed
									P/H	If bit 10 is set to 1, contact No. 3 on an M6C module is closed
									P/H	If bit 11 is set to 1, contact No. 4 on an M6C module is closed
									P/H	If bit 12 is set to 1, contact No. 5 on an M6C module is closed
									P/H	If bit 13 is set to 1, contact No. 6 on an M6C module is closed Default value: 0x0001 – (trip action)

(*) Write Access only with Micrologic P, H
(1) Micrologic E does only support M2C. M6C is not supported. Hence, only bit 8 and bit 9 can be set with Micrologic E. .

Table of registers
Protection manager @ xx + 100

■ **Short-time protection** **Alarm N° 1001** **Isd**

register	address	nb of reg.	read/ write	scale	unit	format	interval	A/E	P/H	description
8764	8763	1	R	-	-	INT	0x0001	A/E	P/H	0x0001 (protection active)
8765	8764	1	R/W*	-	-	INT	0, 1	A/E	P/H	type de protection 0: type i²ton 1: type i²toff
8766	8765	2	R/W*	x1	A	MOD 10000	60.. 80 000	A/E	P/H	Isd pickup for the short-time protection
8768	8767	1	R/W*	x1	ms	INT	0..400	A/E	P/H	tsd tripping delay for the short-time protection 0 s valid only for the I²t off position 100 to 400 ms: valid for the I²t on and I²t off positions
8772	8771	1	R/W*	-	-	INT	Bitmap 16		H	actions linked to overrun of set point at the end of the delay Register set to 0x0100 will Log the Wave Form into the Fault Wave Form Capture file (file N°22)
8773	8772	1	R/W	-	-	INT	Bitmap 16			list of "pickup" actions linked to overrun of set point at the end of the delay Bit set to 1: action activated
										bit 0: always set to 1 (trip action)
								E(1)	P/H	If bit 8 is set to 1, contact No. 1 on an M2C or M6C module is closed
								E(1)	P/H	If bit 9 is set to 1, contact No. 2 on an M2C or M6C module is closed
									P/H	If bit 10 is set to 1, contact No. 3 on an M6C module is closed
									P/H	If bit 11 is set to 1, contact No. 4 on an M6C module is closed
									P/H	If bit 12 is set to 1, contact No. 5 on an M6C module is closed
									P/H	If bit 13 is set to 1, contact No. 6 on an M6C module is closed Default value: 0x0001 – (trip action)

(*) Write Access only with Micrologic P, H
(1) Micrologic E does only support M2C. M6C is not supported. Hence, only bit 8 and bit 9 can be set with Micrologic E.

Table of registers
Protection manager @ xx + 100

■ **Instantaneous protection** **Alarm N°1002** **Ii**

register	address	nb of reg.	read/ write	scale	unit	format	interval	A/E	P/H	description
8774	8773	1	R	-	-	INT	0x0001 0x0101	A/E	P/H	0x0001 (protection active) 0x0101 (protection OFF) Default value = 0x0001
8775	8774	1	R/W*	-	-	INT	-	A/E	P/H	reserved
8776	8875	2	R/W*	x1	A	MOD 10000	200.. 120 000	A/E	P/H	I pickup for the instantaneous protection
8778	8777	1	R/W*	-	-	-	-			reserved
8782	8781	1	R/W*	-	-	INT	Bitmap 16		H	actions linked to overrun of set point at the end of the delay Register set to 0x0100 will Log the Wave Form into the Fault Wave Form Capture file (file N°22)
8783	8782	1	R/W	-	-	INT	Bitmap 16			list of "pickup" actions linked to overrun of set point at the end of the delay Bit set to 1: action activated
										bit 0: always set to 1 (trip action)
								E(1)	P/H	If bit 8 is set to 1, contact No. 1 on an M2C or M6C module is closed
								E(1)	P/H	If bit 9 is set to 1, contact No. 2 on an M2C or M6C module is closed
									P/H	If bit 10 is set to 1, contact No. 3 on an M6C module is closed
									P/H	If bit 11 is set to 1, contact No. 4 on an M6C module is closed
									P/H	If bit 12 is set to 1, contact No. 5 on an M6C module is closed
									P/H	If bit 13 is set to 1, contact No. 6 on an M6C module is closed Default value: 0x0001 – (trip action)

(*) Write Access only with Micrologic P, H
(1) Micrologic E does only support M2C. M6C is not supported. Hence, only bit 8 and bit 9 can be set with Micrologic E.

Table of registers
Protection manager @ xx + 100

■ **Ground-fault protection** **Alarm N°1003** **Ig**

register	address	nb of reg.	read/ write	scale	unit	format	interval	A/E	P/H	description
8784	8783	1	R/W* (1)	-	-	INT	0x0001 0x0101	A/E	P/H	0x0001 (protection active) 0x0101 (protection OFF) Default value = 0x0001
8785	8784	1	R/W*	-	-	INT	0, 1	A/E	P/H	type de protection 0: I²t on 1: I²t off
8786	8785	2	R/W*	x1	A	MOD 10000	30..1200	A/E	P/H	Ig pickup for the ground-fault protection
8788	8787	1	R/W*	x1	ms	INT	0..400	A/E	P/H	tg tripping delay for the ground-fault protection 0 s valid only for the I²t off position 100 to 400 ms: valid for the I²t on and I²t off positions
8792	8791	1	R/W*	-	-	INT	Bitmap 16		H	actions linked to overrun of set point at the end of the delay Register set to 0x0100 will Log the Wave Form into the Fault Wave Form Capture file (file N°22)
8793	9792	1	R/W	-	-	INT	Bitmap 16			list of "pickup" actions linked to overrun of set point at the end of the delay Bit set to 1: action activated
										bit 0: always set to 1 (trip action)
								E(1)	P/H	If bit 8 is set to 1, contact No. 1 on an M2C or M6C module is closed
								E(1)	P/H	If bit 9 is set to 1, contact No. 2 on an M2C or M6C module is closed
									P/H	If bit 10 is set to 1, contact No. 3 on an M6C module is closed
									P/H	If bit 11 is set to 1, contact No. 4 on an M6C module is closed
									P/H	If bit 12 is set to 1, contact No. 5 on an M6C module is closed
									P/H	If bit 13 is set to 1, contact No. 6 on an M6C module is closed Default value: 0x0001 – (trip action)

(*) Write Access only with Micrologic P, H

(1) In order to be able to write this register, the following conditions must be met : Micrologic 6 P or 6 H
Firmware revision 8.243 or above (see register 8710)
Activation of the option Ground Faulit Inhibit through the utility enable_GFI (available on request)

(2) Micrologic E does only support M2C. M6C is not supported. Hence, only bit 8 and bit 9 can be set with Micrologic E.

Table of registers
Protection manager @ xx + 100

■ **Earth-leakage protection**[1] **Alarm N°1004 Idelta n**

register	address	nb of reg.	read/ write	scale	unit	format	interval	A/E	P/H	description
8794	8793	1	R	-	-	INT	0x0001	A	P/H	0x0001 (protection active)
8795	8794	1	R/W*	-	-	INT	-	A	P/H	reserved
8796	8795	2	R/W*	x1	mA	MOD 10000	5..300	A	P/H	IΔN pickup for the earth-leakage protection
8798	8797	1	R/W*	x1	ms	INT	0..1000	A	P/H	Δt tripping delay for the earth-leakage protection
8802	8801	1	R/W*	-	-	INT	Bitmap 16		H	actions linked to overrun of set point at the end of the delay Register set to 0x0100 will Log the Wave Form into the Fault Wave Form Capture file (file N°22)
8803	8802	1	R/W*	-	-	INT	Bitmap 16		P/H	list of "pickup" actions linked to overrun of set point at the end of the delay Bit set to 1: action activated bit 0: always set to 1 (trip action) If bit 8 is set to 1, contact No. 1 on an M2C or M6C module is closed If bit 9 is set to 1, contact No. 2 on an M2C or M6C module is closed If bit 10 is set to 1, contact No. 3 on an M6C module is closed If bit 11 is set to 1, contact No. 4 on an M6C module is closed If bit 12 is set to 1, contact No. 5 on an M6C module is closed If bit 13 is set to 1, contact No. 6 on an M6C module is closed Default value: 0x0001 – (trip action)

(*) Write Access only with Micrologic P, H

Table of registers
Protection manager @ xx + 100

Protection manager measurements

register	address	nb of reg.	read/ write	scale	unit	format	interval	A/E	P/H	description
8804	8803	1	R	-	-	UINT	0.0xFFFF		P/H	PM configuration change counter. This counter is incremented each time a PM setting change is applied through HMI (keyboard or switches) or COM. If switches were change during power off, this counter is incremented at power up
8833	8832	1	R	x10	% In	INT	0..16000		P/H	maximum fault current (trip) recorded on pole 1 since last reset (10) Default value: 0x8000 (no fault recorded or circuit-breaker type not entered)
8834	8833	1	R	x10	% In	INT	0..16000		P/H	maximum fault current (trip) recorded on pole 2 since last reset (10) Default value: 0x8000 (no fault recorded or circuit-breaker type not entered)
8835	8834	1	R	x10	% In	INT	0..16000		P/H	maximum fault current (trip) recorded on pole 3 since last reset (10) Default value: 0x8000 (no fault recorded or circuit-breaker type not entered)
8836	8835	1	R	x10	% In	INT	0..16000		P/H	maximum fault current (trip) recorded on the neutral pole since last reset (10) Default value: 0x8000 (no fault recorded or circuit-breaker code not supplied)
8837	8836	1	R	x1	% Ir	INT	0..32767	A	P/H	RMS current on phase 1 expressed as a % of the Ir long-time set point
8838	8837	1	R	x1	% Ir	INT	0..32767	A	P/H	RMS current on phase 2 expressed as a % of the Ir long-time set point
8839	8838	1	R	x1	% Ir	INT	0..32767	A	P/H	RMS current on phase 3 expressed as a % of the Ir long-time set point
8840	8839	1	R	x1	% Ir	INT	0..32767	A	P/H	RMS current on the neutral expressed as a % of the rated current In x the selected neutral setting (x 1, x 2 or x 0.5). (2)
8841	8840	1	R	x1	% Ig	INT	0..32767	A	P/H	"Residual" ground-fault current expressed as a % of the Ig ground-fault protection set point (3)
8842	8841	1	R	X100	% Idn	INT	0..32767	A	P/H	Earth-leakage current expressed as a % of the I N earth-leakage protection set point (4)

(2) Value not accessible when configuration register 9618 selects "no external CT".
(3) Accessible only with Micrologic 6.0.
(4) Accessible only with Micrologic 7.0.
(10) Auxiliary power is required to calculate the fault currents. Calculation is effective only when the circuit-breaker selection code has been supplied (see the Micrologic user manual).

Table of registers
Protection manager @ xx + 100

Status of the protection manager

register	address	nb of reg.	read/ write	scale	unit	format	interval	A/E	P/H	description
8843		1	R	x1	%	INT	0..100	A/E	P/H	battery-charge indicator U>2800mV : 100% 2200<U<2800mV : 50% U<2200mV : 0%
8857		1	R	-	-	INT	Bitmap 16			status word for the contacts on the M2C or M6C module bit set to 1: contact close bit set to 0: contact open Reset not possible. Automatic update.
								E	P/H	bit 0: contact 1 on an M2C or M6C module
								E	P/H	bit 1: contact 2 on an M2C or M6C module
									P/H	bit 2: contact 3 on an M6C module
									P/H	bit 3: contact 4 on an M6C module
									P/H	bit 4: contact 5 on an M6C module
									P/H	bit 5: contact 6 on an M6C module
8862	8861	1	R	-	-	INT	Bitmap 16	E	P/H	status word for overrun of current-protection set points. This condition is reached as soon as the protection set point is overrun, even if the time delay has not expired. bit 0: long-time and LT IDMTL protection If the bit is set to: 0: set-point overrun = False 1: set-point overrun = True
8863	8862	1	R	-	-	INT	Bitmap 16		P/H	status word for overrun of protection set points bit 0: current unbalance bit 1: maximum current on phase 1 bit 2: maximum current on phase 2 bit 3: maximum current on phase 3 bit 4: maximum current on the neutral bit 5: minimum voltage bit 6: maximum voltage bit 7: voltage unbalance bit 8: maximum power bit 9: reverse power bit 10: minimum frequency bit 11: maximum frequency bit 12: phase rotation bit 13: load shedding based on current bit 14: load shedding based on power
8864	8863					INT	Bitmap 16			continuation of status word for overrun of advanced protection set points
								E	P/H	bit 0: ground-fault alarm
									P/H	bit 1: earth-leakage alarm
8865	8864	2	R	x10	s	MOD 10000	-		P/H	time remaining before long-time tripping
8872	8871	1	R				0…1		P/H	Phase rotation 0 = abc (123) ; 1 = acb (132)

Table of registers
Protection manager @ xx + 100

Time stamping and trip/alarm history

register	address	nb of reg.	read/ write	scale	unit	format	interval	A/E	P/H	Description
9000	8999	4	R	-	-	XDATE	-	E	P/H	current date of the protection manager
9010	9009	3	R	-	-	DATE	-		P/H	date of last reset of the maximum phase, ground-fault and earth-leakage currents
9070	9069	3	R	-	-	DATE	-		P/H	date of last reset of the trip history (last ten faults)
9073	9072	3	R	-	-	DATE	-		P/H	date of last reset of the alarm history (last ten alarms)

■ **Trip history**

register	address	nb of reg.	read/ write	scale	unit	format	interval	A/E	P/H	Description
9094	9093	4	R	1	%	INT	0..32767		P/H	Contact wear indicator per phase Default value = 0x8000 The contacts must be inspected each time the counter reaches a hundred mark. The message “Not available or circuit-breaker type not defined” is displayed if the type of the circuit-breaker has not been defined. In this case, see “Breaker selection” in the Micrologic set-up menu. See register 9846
9098	9097	1	R	-	-	INT	0..10	E	P/H	number of faults recorded in the trip history (FIFO)
9099	9098	1	R	-	-	INT	0..9	E	P/H	value of the pointer for the last fault recorded in the trip history. The last fault recorded is in nvLastTripQ_Entry. The next to last fault is in nvLastTripQ_Entry-1 modulo 10.
9100	9099	20	R	-	-	TRIP RECORD	-	E	P/H	record 0 in the FIFO
9120	9119	20	R	-	-	TRIP RECORD	-	E	P/H	record 1 in the FIFO
9140	9139	20	R	-	-	TRIP RECORD	-	E	P/H	record 2 in the FIFO
9160	9159	20	R	-	-	TRIP RECORD	-	E	P/H	record 3 in the FIFO
9180	9179	20	R	-	-	TRIP RECORD	-	E	P/H	record 4 in the FIFO
9200	9199	20	R	-	-	TRIP RECORD	-	E	P/H	record 5 in the FIFO
9220	9219	20	R	-	-	TRIP RECORD	-	E	P/H	record 6 in the FIFO
9240	9239	20	R	-	-	TRIP RECORD	-	E	P/H	record 7 in the FIFO
9260	9259	20	R	-	-	TRIP RECORD	-	E	P/H	record 8 in the FIFO
9280	9279	20	R	-	-	TRIP RECORD	-	E	P/H	record 9 in the FIFO

For further details see section Appendix: Trip/alarm history

Table of registers
Protection manager @ xx + 100

■ **Alarm history**

register	address	nb of reg.	read/ write	scale	unit	format	interval	A/E	P/H	Description
9300	9299	1	R	-	-	INT	0..10		P/H	number of alarms recorded in the alarm history (FIFO)
9301	9300	1	R	-	-	INT	0..9		P/H	value of the pointer for the last alarm recorded in the alarm history. The last alarm recorded is in nvLastAlarmQ_Entry. The next to last alarm is in nvLastAlarmQ_Entry-1 modulo 10.
9302	9301	15	R	-	-	ALARM RECORD	-		P/H	record 0 in the FIFO
9317	9316	15	R	-	-	ALARM RECORD	-		P/H	record 1 in the FIFO
9332	9331	15	R	-	-	ALARM RECORD	-		P/H	record 2 in the FIFO
9347	9346	15	R	-	-	ALARM RECORD	-		P/H	record 3 in the FIFO
9362	9361	15	R	-	-	ALARM RECORD	-		P/H	record 4 in the FIFO
9377	9376	15	R	-	-	ALARM RECORD	-		P/H	record 5 in the FIFO
9392	9391	15	R	-	-	ALARM RECORD	-		P/H	record 6 in the FIFO
9407	9406	15	R	-	-	ALARM RECORD	-		P/H	record 7 in the FIFO
9422	9421	15	R	-	-	ALARM RECORD	-		P/H	record 8 in the FIFO
9437	9436	15	R	-	-	ALARM RECORD	-		P/H	record 9 in the FIFO

For further details see section Appendix: Trip/alarm history

Table of registers
Protection manager @ xx + 100

Configuration of the protection manager

register	address	nb of reg.	read/ write	scale	unit	format	interval	A/E	P/H	Description
9600	9599	1	R	-	-	INT	0..32767	E[1]	P/H	Control word for the protection manager. This control word may not be user set. It is randomly modified and must be read before sending certain commands to the protection manager.
9604	9603	2	R/W	-	-	ASCII	0x00.. 0x7F		P/H	short identifier of the protection manager, coded over four ASCII characters. Default value: "set!"
9606	9605	8	R/W	-	-	ASCII	0x00.. 0x7F		P/H	long identifier of the protection manager, coded over 16 ASCII characters. Default value: "please set me up"
9614	9613	1	R/W	-	-	INT	Bitmap 16		P/H	language used by the control unit May be modified via the control-unit keypad. Default value: "english" (but may be factory set if necessary). bit 0: French bit 1: US English bit 2: UK English bit 3: German bit 4: Spanish bit 5: Italian bit 7: Chinese bit 8 : Russian bit 9: optional language available on order from Schneider Electric
9615	9614	1	R/W	-	-	INT	Bitmap 16		P/H	rated circuit-breaker operating frequency required by the protection manager to disable phase-rotation protection for 400 Hz distribution system. Default value: 50 / 60 Hz, other possible value: 400 Hz. bit 0: 50 / 60 Hz bit 3: 400 Hz
9616	9615	1	R/W	x1	V	INT	100..1150	E	P/H	rated primary voltage on the voltage transformer Default value: 690 V
9617	9616	1	R/W	x1	V	INT	100..690		P/H	rated secondary voltage on the voltage transformer Default value: 690 V
9618	9617	1	R/W	-	-	INT	{0,1, 2}		P/H P/H P/H	0: 3-Pole circuit breaker without External Neutral Current Transformer ° 1: 4-Pole circuit breaker ° 2: 3-Pole circuit breaker with External Neutral Current Transformer° Default value: 0

[1] Always 0 for Micrologic E

Table of registers
Protection manager @ xx + 100

Advanced protection settings

The concerned protection functions are the listed below.
ground-fault or earth-leakage alarm
current unbalance I unbal
maximum current I1 max, I2 max, I3 max and IN max
minimum and maximum voltage U min and U max
voltage unbalance U unbal
reverse power rP max
minimum and maximum frequency F min and F max
phase rotation
load shedding and reconnection based on current and power.

■ **Ground-fault alarm** **Alarm N°1014**

register	address	nb of reg.	read/ write	scale	unit	format	interval	A/E	P/H	description
9629	9628	1	R/W	-	-	INT	0x0001 0x0101		P/H	0x0001 (alarm active) 0x0101 (OFF) Default value: 0x0101
9631	9630	2	R/W*	x1	A	MOD 10000	20..1200		P/H	pickup for the ground-fault protection alarm minimum limited to 5% of In Default value: 1200 A
9633	9632	1	R/W*	x10	Sec	INT	10..100		P/H	pickup delay for the ground-fault protection alarm Default value: 100 (10 s)
9634	9633	2	R/W*	x1	A	MOD 10000	20..1200		P/H	dropout for the ground-fault protection alarm maximum limited to AlarmTerreRes_PuValue minimum limited to 5% of In, default value: 1200 A
9636	9635	1	R/W*	x10	Sec	INT	10..100		P/H	dropout delay for the ground-fault protection alarm Default value: 10 (1s)
9637	9636	1	R/W	-	-	INT	Bitmap 16		H	actions linked to overrun of set point at the end of the delay Register set to 0x0100 will Log the Wave Form into the Fault Wave Form Capture file (file N°22)
9638	9637	1	R/W*	-	-	INT	Bitmap 16			List of pick-up actions linked to overrun of set point at the end of the delay
										bit 0: always set to 0 (trip disabled for this type of alarm)
									P/H	If bit 8 is set to 1, contact No. 1 on an M2C or M6C module is closed
									P/H	If bit 9 is set to 1, contact No. 2 on an M2C or M6C module is closed
									P/H	If bit 10 is set to 1, contact No. 3 on an M6C module is closed
									P/H	If bit 11 is set to 1, contact No. 4 on an M6C module is closed
									P/H	If bit 12 is set to 1, contact No. 5 on an M6C module is closed
									P/H	If bit 13 is set to 1, contact No. 6 on an M6C module is closed
										Default value: 0x0000 – no action

Accessible only with Micrologic,5.0 P, 6.0 P, 5.0 H, 6.0 H

Table of registers
Protection manager @ xx + 100

■ **Earth-leakage alarm** (*) **Alarm N°1015**

register	address	nb of reg.	read/ write	scale	unit	format	interval	A/E	P/H	description
9639	9638	1	R/W*	-	-	INT	0x0001 0x0101		P/H	0x0001 (alarm active) 0x0101 (OFF) Default value: 0x0101
9641	9640	2	R/W*	x10	A	MOD 10000	5..300		P/H	pickup for the earth-leakage protection alarm Default value: 300 (30 A)
9643	9642	1	R/W*	x10	Sec	INT	10..100		P/H	pickup delay for the earth-leakage protection alarm Default value: 100 (10 s)
9644	9643	2	R/W*	x10	A	MOD 10000	5..300		P/H	dropout for the earth-leakage protection alarm maximum limited to AlarmTerreVigi_PuValue Default value: 300 (30 A)
9646	9645	1	R/W*	x10	Sec	INT	10..100		P/H	dropout delay for the earth-leakage protection alarm Default value: 10 (1 s)
9647	9546	1	R/W	-	-	INT	Bitmap 16		H	actions linked to overrun of set point at the end of the delay Register set to 0x0100 will Log the Wave Form into the Fault Wave Form Capture file (file N°22)
9648	9647	1	R/W*	-	-	INT	Bitmap 16		P/H	List of pick-up actions linked to overrun of set point at the end of the delay bit 0: always set to 0 (trip disabled for this type of alarm) If bit 8 is set to 1, contact No. 1 on an M2C or M6C module is closed If bit 9 is set to 1, contact No. 2 on an M2C or M6C module is closed If bit 10 is set to 1, contact No. 3 on an M6C module is closed If bit 11 is set to 1, contact No. 4 on an M6C module is closed If bit 12 is set to 1, contact No. 5 on an M6C module is closed If bit 13 is set to 1, contact No. 6 on an M6C module is closed Default value: 0x0000 – no action

(1) Accessible only with Micrologic 7.0P, 7.0 H

Table of registers
Protection manager @ xx + 100

■ **Current unbalance** **Alarm N°1016** **I unbal protection**

register	address	nb of reg.	read/ write	scale	unit	format	interval	A/E	P/H	description
9649	9648	1	R/W	-	-	INT	0x0001 & 0x0101		P/H	0x0001 (Alarm or protection active) 0x0101 (OFF) Default value: 0x0101
9651	9650	2	R/W	x1	%	MOD 10000	5..60		P/H	pickup for the current unbalance on phase 1 Default value: 60%
9653	9652	1	R/W	x10	s	INT	10..400		P/H	pickup delay for the current unbalance on phase1 Default value: 400 (40 s)
9654	9653	2	R/W	x1	%	MOD 10000	5..60		P/H	dropout for the current unbalance on phase 1 Default value: 60%
9656	9655	1	R/W	x10	s	INT	100..3600		P/H	dropout delay for the current unbalance on phase1 Default value: 10 (1 s)
9657	9656	1	R/W	-	-	INT	Bitmap 16		H	actions linked to overrun of set point at the end of the delay Register set to 0x0100 will Log the Wave Form into the Fault Wave Form Capture file (file N°22)
9658	9657	1	R/W	-	-	INT	Bitmap 16		P/H	List of pick-up actions linked to overrun of set point at the end of the delay If bit 0 is set to1, the circuit-breaker trips If bit 8 is set to 1, contact No. 1 on an M2C or M6C module is closed If bit 9 is set to 1, contact No. 2 on an M2C or M6C module is closed If bit 10 is set to 1, contact No. 3 on an M6C module is closed If bit 11 is set to 1, contact No. 4 on an M6C module is closed If bit 12 is set to 1, contact No. 5 on an M6C module is closed If bit 13 is set to 1, contact No. 6 on an M6C module is closed Default value: 0x0000 – no action

Table of registers
Protection manager @ xx + 100

■ **Maximum current** **Alarm N°1017** **I1 max protection**

register	address	nb of reg.	read/ write	scale	unit	format	interval	A/E	P/H	description
9659	9658	1	R/W	-	-	INT	0x0001 & 0x0101		P/H	0x0001 (Alarm or protection active) 0x0101 (OFF) Default value: 0x0101
9661	9660	2	R/W	x1	A	MOD 10000	20.. 80000		P/H	pickup for the maximum current I1 max maximum limited to 1 x hwNominalCurrent minimum limited to 0.2 x hwNominalCurrent default value: 1 x hwNominalCurrent
9663	9662	1	R/W	x1	s	INT	15.. 1500		P/H	pickup delay for the maximum current I1 max Default value: 1500 s
9664	9663	2	R/W	x1	A	MOD 10000	20.. 80000		P/H	dropout for the maximum current I1 max maximum limited to OverIa_PuValue minimum limited to 0.2 x hwNominalCurrent default value: 1 x hwNominalCurrent
9666	9665	1	R/W	x1	s	INT	15.. 3000		P/H	dropout delay for the maximum current I1 max Default value: 15 s
9667	9666	1	R/W	-	-	INT	Bitmap 16		H	actions linked to overrun of set point at the end of the delay Register set to 0x0100 will Log the Wave Form into the Fault Wave Form Capture file (file N°22)
9668	9667	1	R/W	-	-	INT	Bitmap 16		P/H	List of pick-up actions linked to overrun of set point at the end of the delay If bit 0 is set to1, the circuit-breaker trips If bit 8 is set to 1, contact No. 1 on an M2C or M6C module is closed If bit 9 is set to 1, contact No. 2 on an M2C or M6C module is closed If bit 10 is set to 1, contact No. 3 on an M6C module is closed If bit 11 is set to 1, contact No. 4 on an M6C module is closed If bit 12 is set to 1, contact No. 5 on an M6C module is closed If bit 13 is set to 1, contact No. 6 on an M6C module is closed Default value: 0x0000 – no action

Table of registers
Protection manager @ xx + 100

■ **Maximum current** **Alarm N°1018** **I2 max protection**

register	address	nb of reg.	read/ write	scale	unit	format	interval	A/E	P/H	description
9669	9668	1	R/W	-	-	INT	0x0001 & 0x0101		P/H	0x0001 (Alarm or protection active) 0x0101 (OFF) Default value: 0x0101
9671	9670	2	R/W	x1	A	MOD 10000	20.. 80000		P/H	pickup for the maximum current I2 max maximum limited to 1 x hwNominalCurrent minimum limited to 0.2 x hwNominalCurrent default value: 1 x hwNominalCurrent
9673	9672	1	R/W	x1	s	INT	15.. 1500		P/H	pickup delay for the maximum current I2 max Default value: 1500 s
9674	9673	2	R/W	x1	A	MOD 10000	20.. 80000		P/H	dropout for the maximum current I2 max maximum limited to OverIb_PuValue minimum limited to 0.2 x hwNominalCurrent default value: 1 x hwNominalCurrent
9676	9675	1	R/W	x1	s	INT	15.. 3000		P/H	dropout delay for the maximum current I2 max Default value: 15 s
9677	9676	1	R/W	-	-	INT	Bitmap 16		H	actions linked to overrun of set point at the end of the delay Register set to 0x0100 will Log the Wave Form into the Fault Wave Form Capture file (file N°22)
9678	9677	1	R/W	-	-	INT	Bitmap 16		P/H	List of pick-up actions linked to overrun of set point at the end of the delay If bit 0 is set to1, the circuit-breaker trips If bit 8 is set to 1, contact No. 1 on an M2C or M6C module is closed If bit 9 is set to 1, contact No. 2 on an M2C or M6C module is closed If bit 10 is set to 1, contact No. 3 on an M6C module is closed If bit 11 is set to 1, contact No. 4 on an M6C module is closed If bit 12 is set to 1, contact No. 5 on an M6C module is closed If bit 13 is set to 1, contact No. 6 on an M6C module is closed Default value: 0x0000 – no action

Table of registers
Protection manager @ xx + 100

■ **Maximum current** **Alarm N°1019** **I3 max protection**

register	address	nb of reg.	read/ write	scale	unit	format	interval	A/E	P/H	description
9679	9678	1	R/W	-	-	INT	0x0001 & 0x0101		P/H	0x0001 (Alarm or protection active) 0x0101 (OFF) Default value: 0x0101
9682	9681	2	R/W	x1	A	MOD 10000	20.. 80000		P/H	pickup for the maximum current I3 max maximum limited to 1 x hwNominalCurrent minimum limited to 0.2 x hwNominalCurrent default value: 1 x hwNominalCurrent.
9683	9682	1	R/W	x1	s	INT	15.. 1500		P/H	pickup delay for the maximum current I3 max Default value: 1500 s
9685	9684	2	R/W	x1	A	MOD 10000	20.. 80000		P/H	dropout for the maximum current I3 max maximum limited to OverIc_PuValue minimum limited to 0.2 x hwNominalCurrent default value: 1 x hwNominalCurrent
9686	9685	1	R/W	x1	s	INT	15.. 3000		P/H	dropout delay for the maximum current I3 max Default value: 15 s
9687	9686	1	R/W	-	-	INT	Bitmap 16		H	actions linked to overrun of set point at the end of the delay Register set to 0x0100 will Log the Wave Form into the Fault Wave Form Capture file (file N°22)
9688	9687	1	R/W	-	-	INT	Bitmap 16		P/H	List of pick-up actions linked to overrun of set point at the end of the delay If bit 0 is set to1, the circuit-breaker trips If bit 8 is set to 1, contact No. 1 on an M2C or M6C module is closed If bit 9 is set to 1, contact No. 2 on an M2C or M6C module is closed If bit 10 is set to 1, contact No. 3 on an M6C module is closed If bit 11 is set to 1, contact No. 4 on an M6C module is closed If bit 12 is set to 1, contact No. 5 on an M6C module is closed If bit 13 is set to 1, contact No. 6 on an M6C module is closed Default value: 0x0000 – no action

Table of registers
Protection manager @ xx + 100

■ **Maximum current** **Alarm N°1020** **IN max protection**

register	address	nb of reg.	read/ write	scale	unit	format	interval	A/E	P/H	description
9689	9688	1	R/W	-	-	INT	0x0001 & 0x0101		P/H	0x0001 (Alarm or protection active) 0x0101 (OFF) Default value: 0x0101
9692	9691	2	R/W	x1	A	MOD 10000	20.. 80000		P/H	pickup for the maximum current IN max maximum limited to 1 x hwNominalCurrent minimum limited to 0.2 x hwNominalCurrent default value: 1 x hwNominalCurrent.
9693	9692	1	R/W	x1	s	INT	15.. 1500		P/H	pickup delay for the maximum current IN max Default value: 1500 s
9695	9694	2	R/W	x1	A	MOD 10000	20.. 80000		P/H	dropout for the maximum current IN max maximum limited to OverIn_PuValue minimum limited to 0.2 x hwNominalCurrent Default value: 1 x hwNominalCurrent
9696	9695	1	R/W	x1	s	INT	15.. 3000		P/H	dropout delay for the maximum current IN max Default value: 15 s
9697	9696	1	R/W	-	-	INT	Bitmap 16		H	actions linked to overrun of set point at the end of the delay Register set to 0x0100 will Log the Wave Form into the Fault Wave Form Capture file (file N°22)
9698	9697	1	R/W	-	-	INT	Bitmap 16		P/H	actions linked to overrun of set point at the end of the delay If bit 0 is set to 1, the circuit breaker trips If bit 8 is set to 1, contact No. 1 on an M2C or M6C module is closed If bit 9 is set to 1, contact No. 2 on an M2C or M6C module is closed If bit 10 is set to 1, contact No. 3 on an M6C module is closed If bit 11 is set to 1, contact No. 4 on an M6C module is closed If bit 12 is set to 1, contact No. 5 on an M6C module is closed If bit 13 is set to 1, contact No. 6 on an M6C module is closed Default value: 0x0000 – no action

Table of registers
Protection manager @ xx + 100

■ **Minimum voltage** **Alarm N°1021** **U min protection**

register	address	nb of reg.	read/ write	scale	unit	format	interval	A/E	P/H	description
9699	9698	1	R/W	-	-	INT	0x0001 & 0x0101		P/H	0x0001 (Alarm or protection active) 0x0101 (OFF) Default value: 0x0101
9701	9700	2	R/W	x1	V	MOD 10000	100.. 1200		P/H	pickup for the minimum voltage U min maximum limited to OverV.PuValue default value: 100 V
9703	9702	1	R/W	x100	s	INT	20..500		P/H	pickup delay for the minimum voltage U min Default value: 500 (5 s)
9704	9703	2	R/W	x1	V	MOD 10000	100.. 1200		P/H	dropout for the minimum voltage U min minimum limited to UnderV_PuValue default value: 100 V
9706	9705	1	R/W	x100	s	INT	20.. 3600		P/H	dropout delay for the minimum voltage U min Default value: 20 (0.02 s)
9707	9706	1	R/W	-	-	INT	Bitmap 16		H	actions linked to overrun of set point at the end of the delay Register set to 0x0100 will Log the Wave Form into the Fault Wave Form Capture file (file N°22)
9708	9707	1	R/W	-	-	INT	Bitmap 16		P/H	actions linked to overrun of set point at the end of the delay If bit 0 is set to 1, the circuit breaker trips If bit 8 is set to 1, contact No. 1 on an M2C or M6C module is closed If bit 9 is set to 1, contact No. 2 on an M2C or M6C module is closed If bit 10 is set to 1, contact No. 3 on an M6C module is closed If bit 11 is set to 1, contact No. 4 on an M6C module is closed If bit 12 is set to 1, contact No. 5 on an M6C module is closed If bit 13 is set to 1, contact No. 6 on an M6C module is closed Default value: 0x0000 – no action

Table of registers
Protection manager @ xx + 100

■ **Maximum voltage** **Alarm N°1022** **U max protection**

register	address	nb of reg.	read/ write	Scale	unit	format	interval	A/E	P/H	description
9709	9708	1	R/W	-	-	INT	0x0001 & 0x0101		P/H	0x0001 (Alarm or protection active) 0x0101 (OFF) Default value: 0x0101
9711	9710	2	R/W	x1	V	MOD 10000	100.. 1200		P/H	pickup for the maximum voltage U max minimum limited to the pickup value default value: +5% above eePT_RatioPri (primary voltage on the voltage transformer)
9713	9712	1	R/W	x100	s	INT	20..500		P/H	pickup delay for the maximum voltage U max Default value: 500 (5 s)
9714	9713	2	R/W	x1	V	MOD 10000	100.. 1200		P/H	dropout for the maximum voltage U max maximum limited to OverV_PuValue default value: +5 % above de eePT_RatioPri (primary voltage on the voltage transformer).
9716	9715	1	R/W	x100	s	INT	20.. 3600		P/H	dropout delay for the maximum voltage U max Default value: 20 (0.02 s)
9717	9716	1	R/W	-	-	INT	Bitmap 16		H	actions linked to overrun of set point at the end of the delay Register set to 0x0100 will Log the Wave Form into the Fault Wave Form Capture file (file N°22)
9718	9717	1	R/W	-	-	INT	Bitmap 16		P/H	actions linked to overrun of set point at the end of the delay If bit 0 is set to 1, the circuit breaker trips If bit 8 is set to 1, contact No. 1 on an M2C or M6C module is closed If bit 9 is set to 1, contact No. 2 on an M2C or M6C module is closed If bit 10 is set to 1, contact No. 3 on an M6C module is closed If bit 11 is set to 1, contact No. 4 on an M6C module is closed If bit 12 is set to 1, contact No. 5 on an M6C module is closed If bit 13 is set to 1, contact No. 6 on an M6C module is closed Default value: 0x0000 – no action

Table of registers
Protection manager @ xx + 100

■ **Voltage unbalance Alarm N°1023** **U unbal protection**

register	address	nb of reg.	read/ write	Scale	unit	format	interval	A/E	P/H	description
9719	9718	1	R/W	-	-	INT	0x0001 & 0x0101		P/H	0x0001 (Alarm or protection active) 0x0101 (OFF) Default value: 0x0101
9721	9720	2	R/W	x1	%	MOD 10000	2..30		P/H	pickup for the voltage unbalance U unbal Default value: 30%
9723	9722	1	R/W	x10	s	INT	10..400		P/H	pickup delay for the voltage unbalance U unbal Default value: 400 (40 s)
9724	9723	2	R/W	x1	%	MOD 10000	2..30		P/H	dropout for the voltage unbalance U unbal maximum limited to UnbalV_PuValue default value: 30%
9726	9725	1	R/W	x10	s	INT	100.. 3600		P/H	dropout delay for the voltage unbalance U unbal Default value: 100 (10 s)
9727	9726	1	R/W	-	-	INT	Bitmap 16		H	actions linked to overrun of set point at the end of the delay Register set to 0x0100 will Log the Wave Form into the Fault Wave Form Capture file (file N°22)
9728	9727	1	R/W	-	-	INT	Bitmap 16			actions linked to overrun of set point at the end of the delay If bit 0 is set to 1, the circuit breaker trips If bit 8 is set to 1, contact No. 1 on an M2C or M6C module is closed If bit 9 is set to 1, contact No. 2 on an M2C or M6C module is closed If bit 10 is set to 1, contact No. 3 on an M6C module is closed If bit 11 is set to 1, contact No. 4 on an M6C module is closed If bit 12 is set to 1, contact No. 5 on an M6C module is closed If bit 13 is set to 1, contact No. 6 on an M6C module is closed Default value: 0x0000 – no action

Table of registers
Protection manager @ xx + 100

■ **Reverse power** **Alarm N°1025** **rP max protection**

register	address	nb of reg.	read/ write	scale	unit	format	interval	A/E	P/H	description
9739	9738	1	R/W	-	-	INT	0x0001 & 0x0101		P/H	0x0001 (Alarm or protection active) 0x0101 (OFF) Default value: 0x0101
9740	9739	1	R/W*	-	-	INT	-		P/H	direction of active-power flow bit 0 set to 0: "standard" - power connections made to the lower terminals of the circuit breaker bit set to 1: "reverse" - power connections made to the upper terminals of the circuit breaker The direction may be modified by the control unit or by directly writing to the register after obtaining the right (using a command). Default value: 0 x 0000
9741	9740	2	R/W	x1	kW	MOD 10000	5..500		P/H	pickup for the maximum reverse power rP max Default value: 500 kW
9743	9742	1	R/W	x10	s	INT	2..200		P/H	pickup delay for the maximum reverse power rP max Default value: 200 (20 s)
9744	9743	2	R/W	x1	kW	MOD 10000	5..500		P/H	dropout for the maximum reverse power rP max maximum limited to RevPwr_PuValue default value: 500 kW
9746	9745	1	R/W	x10	s	INT	10..3600		P/H	dropout delay for the maximum reverse power rP max Default value: 10 (1 s)
9747	9746	1	R/W	-	-	INT	Bitmap 16		H	actions linked to overrun of set point at the end of the delay Register set to 0x0100 will Log the Wave Form into the Fault Wave Form Capture file (file N°22)
9748	9747	1	R/W	-	-	INT	Bitmap 16		P/H	actions linked to overrun of set point at the end of the delay If bit 0 is set to 1, the circuit breaker trips If bit 8 is set to 1, contact No. 1 on an M2C or M6C module is closed If bit 9 is set to 1, contact No. 2 on an M2C or M6C module is closed If bit 10 is set to 1, contact No. 3 on an M6C module is closed If bit 11 is set to 1, contact No. 4 on an M6C module is closed If bit 12 is set to 1, contact No. 5 on an M6C module is closed If bit 13 is set to 1, contact No. 6 on an M6C module is closed Default value: 0x0000 – no action

Table of registers
Protection manager @ xx + 100

■ **Minimum frequency Alarm N°1026** **F min protection**

register	address	nb of reg.	read/ write	scale	unit	format	interval	A/E	P/H	description
9749	9748	1	R/W	-	-	INT	0x0001 & 0x0101		P/H	0x0001 (Alarm or protection active) 0x0101 (OFF) Default value: 0x0101
9751	9750	2	R/W	x10	Hz	MOD 10000	450.. 5400		P/H	pickup for the minimum frequency F min maximum limited to OverFreq.PuValue default value: 450 (45 Hz)
9753	9752	1	R/W	x100	s	INT	20..500		P/H	pickup delay for the minimum frequency F min Default value: 500 (5 s)
9754	9753	2	R/W	x10	Hz	MOD 10000	450.. 4400		P/H	dropout for the minimum frequency F min minimum limited to UnderFreq_PuValue default value: 450 (45 Hz)
9756	9755	1	R/W	x100	s	INT	100.. 3600		P/H	dropout delay for the minimum frequency F min Default value: 100 (1 s)
9757	9756	1	R/W	-	-	INT	Bitmap 16		H	actions linked to overrun of set point at the end of the delay Register set to 0x0100 will Log the Wave Form into the Fault Wave Form Capture file (file N°22)
9758	9757	1	R/W	-	-	INT	Bitmap 16		P/H	actions linked to overrun of set point at the end of the delay If bit 0 is set to 1, the circuit breaker trips If bit 8 is set to 1, contact No. 1 on an M2C or M6C module is closed If bit 9 is set to 1, contact No. 2 on an M2C or M6C module is closed If bit 10 is set to 1, contact No. 3 on an M6C module is closed If bit 11 is set to 1, contact No. 4 on an M6C module is closed If bit 12 is set to 1, contact No. 5 on an M6C module is closed If bit 13 is set to 1, contact No. 6 on an M6C module is closed Default value: 0x0000 – no action

Table of registers
Protection manager @ xx + 100

■ **Maximum frequency Alarm N°1027** **F max protection**

register	address	nb of reg.	read/ write	Scale	unit	format	interval	A/E	P/H	description
9759	9758	1	R/W	-	-	INT	0x0001 & 0x0101		P/H	0x0001 (Alarm or protection active) 0x0101 (OFF) Default value: 0x0101
9761	9760	2	R/W	x10	Hz	MOD 10000	450.. 5400		P/H	pickup for the maximum frequency F max minimum limited to UnderFreq.PuValue default value: 650 (65 Hz)
9763	9762	1	R/W	x100	s	INT	20..500		P/H	pickup delay for the maximum frequency F max Default value: 500 (5 s)
9764	9763	2	R/W	x10	Hz	MOD 10000	450.. 4400		P/H	dropout for the maximum frequency F max maximum limited to OverFreq_PuValue default value: 650 (65 Hz)
9766	9765	1	R/W	x100	s	INT	100.. 3600		P/H	dropout delay for the maximum frequency F max Default value: 100 (1 s)
9767	9766	1	R/W	-	-	INT	Bitmap 16		H	actions linked to overrun of set point at the end of the delay Register set to 0x0100 will Log the Wave Form into the Fault Wave Form Capture file (file N°22)
9768	9767	1	R/W	-	-	INT	Bitmap 16		P/H	actions linked to overrun of set point at the end of the delay If bit 0 is set to 1, the circuit breaker trips If bit 8 is set to 1, contact No. 1 on an M2C or M6C module is closed If bit 9 is set to 1, contact No. 2 on an M2C or M6C module is closed If bit 10 is set to 1, contact No. 3 on an M6C module is closed If bit 11 is set to 1, contact No. 4 on an M6C module is closed If bit 12 is set to 1, contact No. 5 on an M6C module is closed If bit 13 is set to 1, contact No. 6 on an M6C module is closed Default value: 0x0000 – no action

Table of registers
Protection manager @ xx + 100

■ **Phase rotation alarm** **Alarm N° 1028**

register	address	nb of reg.	read/ write	scale	unit	format	interval	A/E	P/H	description
9769	9768	1	R/W	-	-	INT	0x0001 & 0x0101		P/H	0x0001 (Alarm active) 0x0101 (OFF) Default value: 0x0101
9771	9770	2	R/W	-	-	MOD 10000	{0, 1}		P/H	0: actuation if the detected rotation is Ph1, Ph2, Ph3 1: actuation if the detected rotation is Ph1, Ph3, Ph2 Default value: 0
9777	9776	1	R/W	-	-	INT	Bitmap 16		H	actions linked to overrun of set point at the end of the delay Register set to 0x0100 will Log the Wave Form into the Fault Wave Form Capture file (file N°22)
9778	9777	1	R/W	-	-	INT	Bitmap 16		P/H	List of pick-up actions linked to overrun of set point at the end of the delay bit 0: always set to 0 (trip disabled for this type of alarm) If bit 8 is set to 1, contact No. 1 on an M2C or M6C module is closed If bit 9 is set to 1, contact No. 2 on an M2C or M6C module is closed If bit 10 is set to 1, contact No. 3 on an M6C module is closed If bit 11 is set to 1, contact No. 4 on an M6C module is closed If bit 12 is set to 1, contact No. 5 on an M6C module is closed If bit 13 is set to 1, contact No. 6 on an M6C module is closed Default value: 0x0000 – no action

Table of registers
Protection manager @ xx + 100

■ **Load shedding and reconnection based on current Alarm N°1029**

register	address	nb of reg.	read/ write	scale	unit	format	interval	A/E	P/H	description
9779	9778	1	R/W	-	-	INT	0x0001 & 0x0101		P/H	0x0001 (Alarm active) 0x0101 (OFF) Default value: 0x0101
9781	9780	2	R/W	x1	%	MOD 10000	50..100		P/H	pickup for load shedding and reconnection based on current, expressed as a % of the long-time Ir set point Default value: 100%
9783	9782	1	R/W	x1	%Tr	INT	20..80		P/H	pickup delay for load shedding and reconnection based on current, expressed as a % of the long-time delay tr set point (20 to 80%) Default value: 80%
9784	9783	2	R/W	x1	%	MOD 10000	30..100		P/H	dropout for load shedding and reconnection based on current, expressed as a % of the long-time Ir set point Default value: 100%
9786	9785	1	R/W	x1	S	INT	10.. 600		P/H	dropout delay for load shedding and reconnection based on current Default value: 10 s
9787	9786	1	R/W	-	-	INT	Bitmap 16		H	actions linked to overrun of set point at the end of the delay Register set to 0x0100 will Log the Wave Form into the Fault Wave Form Capture file (file N°22)
9788	9787	1	R/W	-	-	INT	Bitmap 16			List of pick-up actions linked to overrun of set point at the end of the delay bit 0: always set to 0 (trip disabled for this type of alarm) P/H If bit 8 is set to 1, contact No. 1 on an M2C or M6C module is closed P/H If bit 9 is set to 1, contact No. 2 on an M2C or M6C module is closed P/H If bit 10 is set to 1, contact No. 3 on an M6C module is closed P/H If bit 11 is set to 1, contact No. 4 on an M6C module is closed P/H If bit 12 is set to 1, contact No. 5 on an M6C module is closed P/H If bit 13 is set to 1, contact No. 6 on an M6C module is closed Default value: 0x0000 – no action

Table of registers
Protection manager @ xx + 100

■ **Load shedding and reconnection based on power** **Alarm N°1030**

register	address	nb of reg.	read/ write	scale	unit	format	interval	A/E	P/H	description
9789	9788	1	R/W	-	-	INT	0x0001 & 0x0101		P/H	0x0001 (Alarm active) 0x0101 (OFF) Default value: 0x0101
9790	9789	1	R/W*	-	-	INT	-			direction of active-power flow bit set to 0: "standard" - power connections made to the lower terminals of the circuit breaker bit set to 1: "reverse" - power connections made to the upper terminals of the circuit breaker The direction may be modified by the command interface or by directly writing to the register after obtaining the right (using a command). Default value: 0 x 0000
9791	9790	2	R/W	x1	kW	MOD 10000	200.. 10000		P/H	pickup for load shedding and reconnection based on power Default value: 10 MW
9793	9792	1	R/W	x1	s	INT	10..3600		P/H	pickup delay for load shedding and reconnection based on power Default value: 3600 s
9794	9793	2	R/W	x1	kW	MOD 10000	100.. 10000		P/H	dropout for load shedding and reconnection based on power Default value: 10 MW
9796	9795	1	R/W	x1	s	INT	10..3600		P/H	dropout delay for load shedding and reconnection based on power Default value: 10 s
9797	9796	1	R/W	-	-	INT	Bitmap 16		H	actions linked to overrun of set point at the end of the delay Register set to 0x0100 will Log the Wave Form into the Fault Wave Form Capture file (file N°22)
9798	9797	1	R/W	-	-	INT	Bitmap 16		P/H	List of pick-up actions linked to overrun of set point at the end of the delay bit 0: always set to 0 (trip disabled for this type of alarm) If bit 8 is set to 1, contact No. 1 on an M2C or M6C module is closed If bit 9 is set to 1, contact No. 2 on an M2C or M6C module is closed If bit 10 is set to 1, contact No. 3 on an M6C module is closed If bit 11 is set to 1, contact No. 4 on an M6C module is closed If bit 12 is set to 1, contact No. 5 on an M6C module is closed If bit 13 is set to 1, contact No. 6 on an M6C module is closed Default value: 0x0000 – no action

Table of registers
Protection manager @ xx + 100

Relay configuration M2C/M6C

register	address	nb of reg.	read/ write	scale	unit	format	interval	A/E	P/H	description
9800	9799	1	R	-	-	INT	{0, 1}		P/H (1)	bit set to 1: YES (Unlocked) indicates that remote access for configuration is authorised.. bit set to 0: NO (Locked) indicates that remote access for configuration is not authorised Remote access mode can be modified via the HMI of Micrologic P/H (only locally). Default value: 0
9801	9800	1	R/W	-	-	INT	{0,1,2,3,4}	E	P/H	0: normal (non-latching) mode, contact activated each time for as long as the alarm remains active.
									P/H	1: latching mode, contact activated for each alarm and remains activated until the alarm is rest by the user (via the command interface or by a reset on the control unit).
									P/H	2: time-delay mode, contact activated for a set time for each alarm. It is deactivated at the end of the time delay, whether the alarm is still active or not. The alarm must change status at least once to activate the contact again.
								E	P/H	3: forced to 1, the contact remains closed and is not controlled by the alarm status.
								E	P/H	4: forced to 0, the contact remains open and is not controlled by the alarm status. Default value: 0x0001 (latching mode)
9802	9801	1	R/W	x10	s	INT	10..3600		P/H	contact activation delay for time-delay mode Default value: 3600 (360 s)
9803	9802	4	R/W	-	-	ASCII	0x00.. 0x7F		P/H	contact name in ASCII (A..Z and 0..9) using four characters. Update via the control unit not possible. Default value: "set up !".
9807	9806	1	R/W	-	-	INT	1000, ..1031	E	P/H	owner alarm number for the contact of the first relay. See alarm number in the section appendix: trip/alarm history. Default value: 0x8000 (no owner)
9808	9807	7	:	:	:	:	:	E	P/H	register configuration identical to registers 9801 to 9807 for contact N° 2
9815	9814	7	:	:	:	:	:		P/H	register configuration identical to registers 9801 to 9807 for contact N° 3
9822	9821	7	:	:	:	:	:		P/H	register configuration identical to registers 9801 to 9807 for contact N° 4
9829	9828	7	:	:	:	:	:		P/H	register configuration identical to registers 9801 to 9807 for contact N° 5
9836	9835	7	:	:	:	:	:		P/H	register configuration identical to registers 9801 to 9807 for contact N° 6

(1) When an old version of Micrologic P/H (firmware version must be >2009 AJ) is connected to a Modbus communication interface (IFM), remote access mode should be set to 1 YES (unlocked). If not, the Modbus locking pad on the front panel of the Modbus communication interface is disabled.

Table of registers
Protection manager @ xx + 100

Relay configuration M2C/M6C

register	address	nb of reg.	read/ write	scale	unit	format	interval	A/E	P/H	description
9843	9842	1	R	-	-	INT	{0,2,6}	E	P/H	type of output module
									P/H	0: none 2: M2C 6: M6C Selection is automatic, depending on the type of module installed. Data always supplied.
9846	9845	8	R	-	-	-	-		P/H	circuit-breaker characteristics The data may be supplied: by the user via the circuit-breaker selection menu using the keypad on the Micrologic P control unit; by downloading the characteristics using the test kit. The following registers then contain the circuit-breaker description in a comprehensible format: BrCharacteristic[0]= standard: 0 = UL 1 = IEC 2 = ANSI 3 = IEC/GB BrCharacteristic[1]= type: 0 = Masterpact 1 = Compact NS 2 = Powerpact BrCharacteristic[2..7]= ASCII character strings (e.g. “NT08N”). Default value: 0X8000 = not defined

Event log
Registers 9900 to 9924 file N° 20 (see the section: Access to the files)

Maintenance event log
Registers 9932 to 9956 file N° 12 (see the section: Access to the files)

Fault Wave form Capture
Registers 9964 to 9989 file N° 22 (see the section: Access to the files)

Table of registers
Protection manager @ xx + 100

Rate of wear counter

register	address	nb of reg.	read/ write	scale	unit	format	interval	A/E	P/H	description
29853	29852	1	R	1	%	UINT	0...32 766		P/H	Maximum (among each phase) of the contact wear indicator Default value = 0x8000 The contacts must be inspected each time the counter reaches a hundred mark. The message “Not available or circuit-breaker type not defined” is displayed if the type of the circuit-breaker has not been defined. In this case, see “Breaker selection” in the Micrologic set-up menu. See register 9846 0% = The circuit breaker contact is new

.

Load profile counters

register	address	nb of reg.	read/ write	scale	unit	format	interval	A/E	P/H	description
29880 29881	29879 29880	2	R	1	Hour-	UDINT	0... 4 294 967 295	A/E	P/H	Number of hours for the 0…49% of the nominal current range
29882 29883	29881 29882	2	R	1	Hour-	UDINT	0... 4 294 967 295	A/E	P/H	Number of hours for the 50…79% of the nominal current range
29884 29885	29883 29884	2	R	1	Hour-	UDINT	0... 4 294 967 295	A/E	P/H	Number of hours for the 80…89% of the nominal current range
29886 29887	29885 29886	2	R	1	Hour-	UDINT	0... 4 294 967 295	A/E	P/H	Number of hours for the 90…100% of the nominal current range

The load profile counters report the number of hours for each range of current in the Micrologic control unit. If the load profile counters reach the Maximum value 4 294 967 295 and a new load profile event occurs, then the load profile counters are reset to 0.

Table of registers
Communication profile @ xx

Activation of the communication profile

Following registers (12000…12215) are available only with a Breaker Communication Module firmware version greater or equal to V2.0 (register 577 must be greater or equal to 02000) and only if the communication profile is activated. In order to activate the communication profile, it is necessary to set the register 800 to 1. Per default, the communication profile is not activated (register 800=0) with firmware version smaller to V3.0. Per default, the communication profile is activated (register 800=1) with firmware version greater or equal to V3.0.
When the communication profile is not activated, the content of the registers are not refreshed and therefore equal to 0x8000.
Registers written in **bold** shall be refreshed every 50 ms
Registers written in **bold** shall be refreshed every 1.2 s
Registers written in *italic* shall be refreshed every 5 s

I/O status

■ **Breaker**

register	address	nb of reg.	read/ write	scale	unit	Format	interval	A/E	P/H	description	
12000	11999	1	R	-	-	Bitmap16	-	A/E	P/H	Bitmap that indicates the validity of each bit in the Breaker Status register Default value = 0x7F	new
12001	12000	1	R	-	-	Bitmap16	-	A/E	P/H	Circuit-breaker status: See details below	661

BrStatus bitmap detail :
Bit 0 (0x01) : OF ; Indication contacts
For Compact and Masterpact : 0= Breaker is opened, 1 = Breaker is closed

Bit 1 (0x02) : SD ; Trip indication contact
For Compact : 0 = no trip, 1 = Breaker has tripped due to electrical fault , Shunt trip or push to trip
For Masterpact : always 0

Bit 2 (0x04) : SDE ; Fault trip indication contact
For Compact and Masterpact :
0 = no trip, 1 = Breaker has tripped due to electrical fault (including Ground fault test and Earth leakage test)

Bit 3 (0x08) : CH ; Charged (used only with motor mechanism)
For Compact : always 0
For Masterpact : 0 = Spring discharged, 1 = Spring loaded

Bit 4 (0x10) : Reserved (internal use only)

Bit 5 (0x20) : PF ; Ready To Close
For Compact : always 0
For Masterpact : 0 = Not Ready To Close, 1 = Ready To Close (RTC)

Bit 6 (0x40) : Compact / Masterpact differenciation
0 = Compact , 1 = Masterpact

Bit 7-15 : Reserved

Note:
A bitmap mask should be used to test the Breaker status.
If a value test is used, the following values should be used for Mastepact :
0x44 Tripped discharged not RTC
0x4C Tripped charged not RTC
0x50 OFF discharged not RTC
0x51 ON discharged not RTC
0x59 ON charged not RTC
0x78 OFF charged RTC

■ **Input I/O**

register	address	nb of reg.	read/ write	scale	unit	format	interval	A/E	P/H	description
12002	12001	1	R	-	-	Bitmap 16	-	A/E	P/H	Reserved for I/O
12003	12002	1	R	-	-	Bitmap 16	-	A/E	P/H	Reserved for I/O

Table of registers
Communication profile @ xx

■ **Tripping cause**

register	address	nb of reg.	read/ write	scale	unit	format	interval	A/E	P/H	description	
12004	12003	1	R	-	-	INT	0.. 65535			Bitmap indicating cause of tripping for basic protection functions	650
								A/E	P/H	0x01: long-time protection Ir	
								A/E	P/H	0x02: short-time protection Isd	
								A/E	P/H	0x04: instantaneous protection Ii	
								A/E	P/H	0x08: ground-fault protection Ig	
								A	P/H	0x10: earth-leakage protection (vigi)	
								A/E	P/H	0x20: Integrated Instantaneous protection)	
								A/E	P/H	0x40: Other protection 0x40: Internal failure (temperature)	
								A/E	P/H	0x80: Internal failure (overvoltage)	
									P/H	0x0100: Other protection (see register 12004) Bit 15: If this bit is set to 1 then bit 0…14 are not valid.	
12005	12004	1	R	-	-	INT	0.. 65535			Bitmap indicating cause of tripping for advanced protection functions	651
									P/H	0x01: current unbalance	
									P/H	0x02: Over current phase 1	
									P/H	0x04 Over current phase 2	
									P/H	0x08: Over current phase 3	
									P/H	0x10: Over current on Neutral	
									P/H	0x20: Under voltage	
									P/H	0x40: Over voltage	
									P/H	0x80: voltage unbalance	
									P/H	0x0100: Over power	
									P/H	0x0200: reverse power	
									P/H	0x0400: Under frequency	
									P/H	0x0800: Over frequency	
									P/H	0x1000: phase rotation	
									P/H	0x2000: load shedding based on current	
									P/H	0x4000: load shedding based on power	
12006	12006	1	R	-	-	Bitmap 16	-	A/E	P/H	reserved for tripping cause	651
12007	12007	1	R	-	-	Bitmap 16	-	A/E	P/H	reserved for tripping cause	

*(1) This value is only available for Micrologic trip units x.**2** x and x.3 x for which register 8740 returns 52, 62, 72 and 53, 63, 73 respectively (Compact NSX only).*
*(2) This value is only available for Micrologic trip units x.**0** x for which register 8740 returns 20, 30, 50, 60 or 70.*
(3) This value is only available for Micrologic trip units P/H for which register 8741 returns P or H

***Note:** The bit indicating the cause of tripping is set as soon as a trip occurs. The bit is reset as soon as the circuit-breaker is closed again.*

Table of registers
Communication profile @ xx

■ **Alarming Setpoint**

Register	address	nb of reg.	read/ write	scale	unit	format	interval	A/E	P/H	description	
12008	12007	1	R	-	-	INT	Bitmap 16		P/H	Basic protection set point overrun Bit 0: long-time pick-up Bit 1…14 reserved Bit 15: If this bit is set to 1 then bit 0…14 are not valid.	8862
12009	12008	1	R	-	-	INT	Bitmap 16		P/H	Advanced protection set point overrun with Micrologic P/H (3) (2). bit 0: current unbalance bit 1: maximum current on phase 1 bit 2: maximum current on phase 2 bit 3: maximum current on phase 3 bit 4: maximum current on the neutral bit 5: minimum voltage bit 6: maximum voltage bit 7: voltage unbalance bit 8: maximum power bit 9: reverse power bit 10: minimum frequency bit 11: maximum frequency bit 12: phase rotation bit 13: load shedding based on current bit 14: load shedding based on power bit 15: If this bit is set to 1 then bit 0…14 are not valid	8863
12010	12009	1	R	-	-	INT	Bitmap 16	E	P/H	Continuation of the previous register Bit 0: ground-fault alarm Bit 1: earth-leakage alarm Bit 2…14 reserved Bit 15: If this bit is set to 1 then bit 0…14 are not valid	8864
12011	12010	1	R	-	-	-	-			Pre-alarms registers (1)	
12012	12011	1	R	-	-	-	-			User-defined-alarms registers (1)	
12013	12012	1	R	-	-	-	-			Reserved	
12015	12014	1	R	-	-	-	-			Reserved	

*(1) This value is only available for Micrologic trip units x.**2** x and x.3 x for which register 8740 returns 52, 62, 72 and 53, 63, 73 respectively (Compact NSX only).*
*(2) This value is only available for Micrologic trip units x.**0** x for which register 8740 returns 20, 30, 50, 60 or 70.*
(3) This value is only available for Micrologic trip units P/H for which register 8741 returns P or H

Table of registers
Communication profile @ xx

METERING

■ Currents

register	address	nb of reg.	read/ write	scale	unit	format	interval	A/E	P/H	description	
12016	12015	1	R	x1	A	INT	0..32767	A/E	P/H	RMS current on phase 1: I1	1016
12017	12016	1	R	x1	A	INT	0..32767	A/E	P/H	RMS current on phase 2: I2	1017
12018	12017	1	R	x1	A	INT	0..32767	A/E	P/H	RMS current on phase 3: I3	1018
12019	12018	1	R	x1	A	INT	0..32767	A/E	P/H	RMS current on the neutral: IN(1)	1019
12020	12019	1	R	x1	A	INT	0..32767	A/E	P/H	maximum of I1, I2, I3 and IN	1020
12021	12020	1	R	(2)	A	INT	0..32767	A/E	P/H	ground-fault current Ig	1021
12022	12021	1	R	(3)	mA	INT	0..32767	A	P/H	Earth-leakage current	1022

(1) Value not accessible for motor application and not accessible when the system type in register 3314 returns 31 or 40
(2) This value is only available for Micrologic trip units 6.0, 6.2 and 6.3 for which register 8740 returns 60,62 or 63 respectively. Unit is A when register 8740 returns 60. Unit is %Ig when register 8740 returns 62 or 63.
(3) This value is only available for Micrologic trip units 7.0, 7.2 and 7.3 for which register 8740 returns 70,72 or 73 respectively. Unit is mA when register 8740 returns 70. Unit is %IDn when register 8740 returns 72 or 73.

■ Maximum Values of Currents

register	address	nb of reg.	read/ write	scale	unit	format	interval	A/E	P/H	description	
12023	12022	1	R	x1	A	INT	0..32767	A/E	P/H	Maximum RMS current on phase 1: I1	1616
12024	12023	1	R	x1	A	INT	0..32767	A/E	P/H	Maximum RMS current on phase 2: I2	1617
12025	12024	1	R	x1	A	INT	0..32767	A/E	P/H	Maximum RMS current on phase 3: I3	1618
12026	12025	1	R	x1	A	INT	0..32767	A/E	P/H	Maximum RMS current on the neutral: IN(1)	1619
12027	12026	1	R	x1	A	INT	0..32767	A/E	P/H	Maximum in previous 4 registers	1620
12028	12027	1	R	x1	(2)	INT	0..32767	A/E	P/H	Maximum Ground-fault current Ig	1621
12029	12028	1	R	x1	(3)	INT	0..32767	A	P/H	Maximum Earth-leakage current	1622

(1) Value not accessible for motor application and not accessible when the system type in register 3314 returns 31 or 40
(2) This value is only available for Micrologic trip units 6.0, 6.2 and 6.3 for which register 8740 returns 60,62 or 63 respectively. Unit is A when register 8740 returns 60. Unit is %Ig when register 8740 returns 62 or 63.
(3) This value is only available for Micrologic trip units 7.0, 7.2 and 7.3 for which register 8740 returns 70,72 or 73 respectively. Unit is mA when register 8740 returns 70. Unit is %IDn when register 8740 returns 72 or 73.

■ Voltages

register	address	nb of reg.	read/ write	scale	unit	format	interval	A/E	P/H	description	
12030	12029	1	R	x 1	V	INT	0..1200	E	P/H	RMS phase-to-phase voltage V12	1000
12031	12030	1	R	x 1	V	INT	0..1200	E	P/H	RMS phase-to-phase voltage V23	1001
12032	12031	1	R	x 1	V	INT	0..1200	E	P/H	RMS phase-to-phase voltage V31	1002
12033	12032	1	R	x 1	V	INT	0..1200	E	P/H	RMS phase-to-neutral voltage V1N. (1)	1003
12034	12033	1	R	x 1	V	INT	0..1200	E	P/H	RMS phase-to-neutral voltage V2N. (1)	1004
12035	12034	1	R	x 1	V	INT	0..1200	E	P/H	RMS phase-to-neutral voltage V3N. (1)	1005

(1) Value not accessible for motor application and not accessible when the system type in register 3314 returns 31 or 40.

■ Frequency

register	address	nb of reg.	read/ write	scale	unit	format	interval	A/E	P/H	description	
12036	12035	1	R	x10	Hz	INT	400…600		P/H	Network frequency : F	1054
12037	12036	1	R	x10	Hz	INT	400…600		P/H	Maximum of network frequency	1654

Table of registers
Communication profile @ xx

■ **Power**

register	address	nb of reg.	read/ write	scale	unit	format	interval	A/E	P/H	description	
12038	12037	1	R	(3)	kW	INT	+/- 0..32767	E	P/H	Active power on phase 1 : P1 (1), (5)	1034
12039	12038	1	R	(3)	kW	INT	+/- 0..32767	E	P/H	Active power on phase 2 : P2(1), (5)	1035
12040	12039	1	R	(3)	kW	INT	+/- 0..32767	E	P/H	Active power on phase 3 : P3(1), (5)	1036
12041	12040	1	R	(3)	kW	INT	+/- 0..32767	E	P/H	Total active power : Ptot(5)	1037
12042	12041	1	R	(3)	kVAR	INT	+/- 0..32767	E	P/H	Reactive power on phase 1 : Q1(1), (5)	1038
12043	12042	1	R	(3)	kVAR	INT	+/- 0..32767	E	P/H	Reactive power on phase 2 : Q2(1), (5)	1039
12044	12043	1	R	(3)	kVAR	INT	+/- 0..32767	E	P/H	Reactive power on phase 3 : Q3(1), (5)	1040
12045	12044	1	R	(3)	kVAR	INT	+/- 0..32767	E	P/H	Total reactive power : Qtot(5)	1041
12046	12045	1	R	(3)	kVA	INT	0..32767	E	P/H	Apparent power on phase 1 : S1 (1)	1042
12047	12046	1	R	(3)	kVA	INT	0..32767	E	P/H	Apparent power on phase 2 : S2 (1)	1043
12048	12047	1	R	(3)	kVA	INT	0..32767	E	P/H	Apparent power on phase 3 : S3 (1)	1044
12049	12048	1	R	(3)	kVA	INT	0..32767	E	P/H	Total apparent power : Stot	1045

(1) Value not accessible for motor application and not accessible when the system type in register 3314 returns 31 or 40
(3 The scale factor depends on the Micrologic trip unit type:
If register 8740 returns 52, 53, 62, 63, 72 or 73, the scale factor is 10.
If register 8740 returns 50 or 60, the scale factor is 1.
(5) The sign of the active and reactive power depends on configuration register 3316

■ **Energy**

register	address	nb of reg.	read/ write	scale	unit	form at	interval	A/E	P/H	description	
12050	12049	2	R	x1	kWh	INT	+- 0..1 999 999 999	E (1)	P/H	Total Active energy Ep	2000
12052	12051	2	R	x1	kvarh	INT	+- 0..1 999 999 999	E (1)	P/H	Total Reactive energy Eq	2004
12054	12053	2	R	x1	kWh	INT	0..1 999 999 999		P/H	Active energy counted positively EpIn	2008
12056	12055	2	R	x1	kWh	INT	0..1 999 999 999		P/H	Active energy counted negatively EpOut	2012
12058	12057	2	R	x1	kvarh	INT	0..1 999 999 999		P/H	Reactive energy counted positively EqIn	2016
12060	12059	2	R	x1	kvarh	INT	0..1 999 999 999		P/H	Reactive energy counted negatively EqOut	2020
12062	12061	2	R	x1	kVAh	INT	0..1 999 999 999	E	P/H	Total apparent energy Es	2024
12064	12063	2	R	x1	kWh	INT	0..1 999 999 999		-	Active energy counted positively (not resetable) EpIn (2)	
12066	12065	2	R	x1	kWh	INT	0..1 999 999 999		-	Active energy counted negatively (not resetable) EpOut (2)	
12068 to 12079	12067 to 12078	1	R			INT	0..32767		-	Reserved	

(1) This value is always positive with Micrologic E
(2) This value is only available for Micrologic trip units x.2 x and x.3 x for which register 8740 returns 52, 62, 72 and 53, 63, 73 respectively (Compact NSX only).

***Note 1:** Energy display on FDM121 screen*
The FDM121 screen displays positive values up to 1 999 999 999 kwh. Over this value, FDM121 screen displays 1 999 999 999 kwh.
The FDM121 screen displays negative values up to -1 999 999 999 kwh. Over this value, FDM121 screen displays -1 999 999 999 kwh.
It is the same behaviour for reactive energy and apparent energy
***Note 2**: Energies are stored in big endian format: the most significant word is transmitted first, the least significant second.*

Table of registers
Communication profile @ xx

■ **Current demand**

register	address	nb of reg.	read/ write	scale	unit	format	interval	A/E	P/H	description	
12080	12079	1	R	x1	A	INT	0..32767	E	P/H	Current demand on phase 1 : I1 Dmd	2200
12081	12080	1	R	x1	A	INT	0..32767	E	P/H	Current demand on phase 2 : I2 Dmd	2201
12082	12081	1	R	x1	A	INT	0..32767	E	P/H	Current demand on phase 3 : I3 Dmd	2202
12083	12082	1	R	x1	A	INT	0..32767	E	P/H	Current demand on the neutral : IN Dmd(1)	2203

(1) Value not accessible for motor application and not accessible when the system type in register 3314 returns 31 or 40

■ **Power demand**

register	address	nb of reg.	read/ write	scale	unit	format	interval	A/E	P/H	description	
12084	12083	1	R	(3)	kW	INT	0..32767	E	P/H	Total active-power demand : Ptot Dmd(7)	2224
12085	12084	1	R	(3)	kVAR	INT	0..32767		P/H	Total reactive-power demand : Qtot Dmd(7)	2230
12086	12085	1	R	(3)	kVA	INT	0..32767		P/H	total apparent power demand Stot Dmd(7)	2236
12087	12086	-	-	-	-	-	-		-	available	-
12088	12087	-	-		-	-	-		-	available	-
12089	12088	-	-	-	-	-	-		-	available	-

(7) Value updated at end of window for the "block" mode. For the "sliding" mode, the value is updated every 15 seconds.
(3 The scale factor depends on the Micrologic trip unit type:
If register 8740 returns 52, 53, 62, 63, 72 or 73, the scale factor is 10.
If register 8740 returns 50 or 60, the scale factor is 1.

■ **Maximum values of voltages**

register	address	nb of reg.	read/ write	scale	unit	format	interval	A/E	P/H	description	
12090	12089	1	R	x 1	V	INT	0..1200	E	P/H	RMS phase-to-phase voltage V12	1600
12091	12090	1	R	x 1	V	INT	0..1200	E	P/H	RMS phase-to-phase voltage V23	1601
12092	12091	1	R	x 1	V	INT	0..1200	E	P/H	RMS phase-to-phase voltage V31	1602
12093	12092	1	R	x 1	V	INT	0..1200	E	P/H	Maximum RMS phase-to-neutral voltage V1N. (1)	1603
12094	12093	1	R	x 1	V	INT	0..1200	E	P/H	Maximum RMS phase-to-neutral voltage V2N. (1)	1604
12095	12094	1	R	x 1	V	INT	0..1200	E	P/H	Maximum RMS phase-to-neutral voltage V3N. (1)	1605

(1) Value not accessible for motor application and not accessible when the system type in register 3314 returns 31 or 40.

■ **Power factor**

register	address	nb of reg.	read/ write	scale	unit	format	interval	A/E	P/H	description	
12096	12095	1	R	(3)	none	INT	-1000… +1000	E	P/H	Power factor on phase 1 : PF1 (1), (6)	1046
12097	12096	1	R	(3)	none	INT	ditto	E	P/H	Power factor on phase 2 : PF2 (1), (6)	1047
12098	12097	1	R	(3)	none	INT	ditto	E	P/H	Power factor on phase 3 : PF3 (1), (6)	1048
12099	12098	1	R	(3)	none	INT	ditto	E	P/H	Total power factor : PF (6)	1049
12100	12099	1	R	(3)	none	INT	ditto		H	Fundamental power factor on phase 1 : cosphi1 (1)	1050
12101	12100	1	R	(3)	none	INT	ditto		H	Fundamental power factor on phase 2 : cosphi2 (1)	1051
12102	12101	1	R	(3)	none	INT	ditto		H	Fundamental power factor on phase 3 : cosphi3 (1)	1052
12103	12102	1	R	(3)	none	INT	ditto		H	Total fundamental power factor : cosphi	1053

(1) Value not accessible for motor application and not accessible when the system type in register 3314 returns 31 or 40
(6) The sign of the power factor depends on configuration register 3318
(3 The scale factor depends on the Micrologic trip unit type:
If register 8740 returns 52, 53, 62, 63, 72 or 73, the scale factor is 100.
If register 8740 returns 50 or 60, the scale factor is 1000.

Table of registers
Communication profile @ xx

■ **Total Harmonic Distortion**

register	address	nb of reg.	read/ write	scale	unit	format	interval	A/E	P/H	description	
12104	12103	1	R	x10	%	INT	0..5000		H	Total Harmonic Distortion of V12 voltage compared to the fundamental.	1092
12105	12104	1	R	x10	%	INT	0..5000		H	same as above V23	1093
12106	12105	1	R	x10	%	INT	0..5000		H	same as above V21	1094
12107	12106	1	R	x10	%	INT	0..5000		H	Total Harmonic Distortion of V1N voltage compared to the fundamental. (1)	1095
12108	12107	1	R	x10	%	INT	0..5000		H	same as above V2N (1)	1096
12109	12108	1	R	x10	%	INT	0..5000		H	same as above V3N (1)	1097
12110	12109	1	R	x10	%	INT	0..5000		H	Total Harmonic Distortion of phase 1 current compared to the fundamental.	1098
12111	12110	1	R	x10	%	INT	0..5000		H	same as above phase 2.	1099
12112	12111	1	R	x10	%	INT	0..5000		H	same as above phase 3	1100

(1) Value not accessible for motor application and not accessible when the system type in register 3314 returns 31 or 40

■ **12114 to 12145 are available**
■ **12146 to 12160 are reserved**
■ **12170 to 12179 are available**

■ **Basic protection settings (1)**

register	address	nb of reg.	read/ write	scale	unit	format	interval	A/E	P/H	description	
12180	12179	2	R	x1	A	MOD 10000	40..8000	A/E	P/H	Ir pickup for the long-time protection	8756
12182	12181	1	R	x1	ms	INT	500. 24000	A/E	P/H	tr tripping delay for the long-time protection	8758
12183	12182	2	R	x1	A	MOD 10000	60.. 80 000	A/E	P/H	Isd pickup for the short-time protection	8766
12185	12184	1	R	x1	ms	INT	0..400	A/E	P/H	tsd tripping delay for the short-time protection 0 s valid only for the I²t off position 100 to 400 ms: valid for the I²t on and I²t off positions	8768
12186	12185	1	R	x1	-	INT	0x0001 0x0101	A/E	P/H	0x0001 (protection active) 0x0101 (protection OFF) Default value = 0x0001	8774
12187	12186	2	R	x1	A	MOD 10000	200.. 120 000	A/E	P/H	I pickup for the instantaneous protection	8776
12189	12188	2	R	x1	A	MOD 10000	30..1200	A/E	P/H	Ig pickup for the ground-fault protection	8786
12191	12190	1	R	x1	ms	INT	0..400	A/E	P/H	tg tripping delay for the ground-fault protection 0 s valid only for the I²t off position 100 to 400 ms: valid for the I²t on and I²t off positions	8788
12192	12191	2	R	x1	mA	MOD 10000	5..300	A	P/H	I N pickup for the earth-leakage protection	8796
12194	12193	1	R	x1	ms	INT	0..1000	A	P/H	t tripping delay for the earth-leakage protection	8798
12195	12194	-	-	-	-	-	-		-	Available	-

*(1) This value is only available for Micrologic trip units x.**0** x for which register 8740 returns 20, 30, 50, 60 or 70.*

.

Table of registers
Communication profile @ xx

■ **Circuit-Breaker ID (1)**

register	address	nb of reg.	read/ write	scale	unit	Format	interval	A/E	P/H	description	
12196	12195	4	R	1	-	Ascii	-	A/E	P/H	Serial number encoded in Adcii	8700
12200	12199	1	R	1	-	INT	-	A/E	P/H	Protection module firmware version	8710
12201	12200	1	R	1	-	INT		A/E	P/H	Square D Identification number 15131 = Micrologic A (PM) 15137 ? = Micrologic E (PM) 15133 = Micrologic P (PM) 15135 = Micrologic H (PM) Default value = 0x8000	8716
12202	12201	1	R	1	-	Ascii	20,30,40 50,60,70	A/E	P/H	Type of protection 20 = Micrologic 2.0,…70 = Micrologic 7.0	8740
12203	12202	1	R	1	-	Ascii	A,E,P,H	A/E	P/H	Type of control unit :A , P or H	8741
12204	12203	1	R	1	-	INT	0..15	A/E	P/H	Type of long time rating plug 0 = missing, 1= IEC standard; 2 = IEC low ; 3 = IEC High ; 10 = OFF ; 7 = UL-A ; 8 = UL-B ; 9 = UL-C ; 11= UL-D ; 12 = UL-E ; 13 = UL-F ; 14 = UL- G ; 15 = UL-H	8742
12205	12204	1	R	x1	A	INT	0..8000	A/E	P/H	rated circuit-breaker current Default value: 100 A (circuit-breaker sensor plug not present)	8750
12206	12205	1	R	x1	notch	INT	0..3	A/E	P/H	type of neutral protection 0: OFF 1: N/2 (Ir/2) 2: N (Ir) 3: Nx1.6 (1.6xIr)	8753
12207	12206	1	R	-	-	INT	0..65535	A/E	P/H	counter for total number of operations (OF): the counter increments when bit 0 in register 661 switches from 0 to 1.(1)	662
12208	12207	1	R	-	-	INT	0..65535	A/E	P/H	counter for operations (OF) since last reset: the counter increments when bit 0 in register 661 switches from 0 to 1.(1)	663
12209	12208	1	R	-	-	INT	0..65535	A/E	P/H	counter for operations (SD): the counter increments when bit 1 in register 661 switches from 0 to 1.(1)	664
12210	12209	1	R	-	-	INT	0..65535	A/E	P/H	counter for operations (SDE): the counter increments when bit 2 in register 661 switches from 0 to 1.(1)	665

(*) Write Access only with Micrologic P, H
*(1)This value is only available for Micrologic trip units x.**0** x for which register 8740 returns 20, 30, 50, 60 or 70.*

■ **Miscellaneous (1)**

register	address	nb of reg.	read/ write	scale	unit	Format	interval	A/E	P/H	description	
12211	12210	1	R	-	-	INT	1..8000	-	P/H	Number of first (oldest) record in the protection-manager event log (file N°20)	623
12212	12211	1	R	-	-	INT	1..8000	-	P/H	Number of last (most recent) record in the protection-manager event log (file N°20)	624
12213	12212	2	R	x0.1	s	MOD 10000	-		P/H	time remaining before long-time tripping	8865
12215	12214	4	R	1	%	INT	0..32767		P/H	Contact wear indicator per phase (Default value = 0x8000) The contacts must be inspected each time the counter reaches a hundred mark. The message “Not available or circuit-breaker type not defined” is displayed if the type of the circuit-breaker has not been defined. In this case, see “Breaker selection” in the Micrologic set-up menu. See register 9846	9094

*(1)This value is only available for Micrologic trip units x.**0** x for which register 8740 returns 20, 30, 50, 60 or 70.*

Appendix

List of commands
Circuit-breaker manager commands

Cmd #	Description	Parameter(s)	Mode	Label
57394	Enter configuration mode	P1 = 3 (1) P2 = 4 (2) P3 = control word read in register 533 of the circuit-breaker manager	Protected	In_CommCfg
57395	Exit configuration mode and activate the new parameters.	P1 = 3 (1) P2 = 4 (2) P3 = control word read in register 533 of the circuit-breaker manager	Protected	Out_CommCfg
57400	Simplified Open/Close	P1 = 4 (1) P2 = 4 (2) P3 = 0 or 1 (0 for Open ; 1 for Close) P4 = password (default value= 0000)	Shared	Open/Close
57447	Modify 4W / 2W + ULP	P1 = 3 (1) P2 = 4 (2) P3 = 0 or 1 (0 for 4W ; 1 for 2W+ULP)	Shared	4W/2W+ULP
57856	Preset Breaker Status Counters	P1 = 5 to 10 (1) P2 = 4 (2) P3 = control word read in register 553 P4 = bitmap of counter to Preset (3) P5 = Counter value 1 (4) P6 = Counter value 2 (4) P7 = Counter value 3 (4) P10 = Counter value 6 (4)	Protected	PresetBrStatCtr
57857	Preset Coils Operation Counters	P1 = 6 (1) P2 = 4 (2) P3 = control word read in register 553 P4 = bitmap for coil control (5) P5 = MX Counter value (0000 to reset) P6 = XF Counter value (0000 to reset)	Protected	PresetCoilCtr

(1) Parameter P1 for the circuit-breaker manager command interface contains the total number of command parameters, including P1

(2) The value "4" for parameter P2 informs the circuit-breaker manager command interface that it must run the command itself.

(3) Bitmap of counter to Preset

Bit	Breaker counter status	Affected counter registers
0 (0x0001)	OF : ON/OFF	663
1 (0x0002)	SD : Trip indication	664
2 (0x0004)	SDE : Fault-trip indication	665
6 (0x0040)	OF threshold	581
7 (0x0080)	Close command threshold	582

(4) Control Value 1 = Value of counter corresponding to 1st bit set when bitmap is read from LSB to MSB (0000 to reset counter)
Control Value 2 = Value of counter corresponding to next bit set when bitmap is read from LSB to MSB (0000 to reset counter)

(5) Bitmap for coil control

Bit	Coil control status	Affected counter registers
1 (0x0002)	MX coil-control bit	674
2 (0x0004)	XF coil-control bit	678
3 (0x0008)	To be set to 1 in order to activate MX or XF	

List of commands
Circuit-breaker manager commands

Cmd #	Description	Parameter(s)	Mode	Label
58769	Open circuit breaker using MX coil	P1 = 4 (1) P2 = 4 (2) P3 = control word read in register 553 P4 = 1	Shared Protected	OpenBr
58770	Close circuit breaker using XF coil	P1 = 4 (1) P2 = 4 (2) P3 = control word read in register 553 P4 = 1	Shared Protected	CloseBr
58771	Authorise activation of MX or XF coils, or both	P1 = 4 (1) P2 = 4 (2) P3 = control word read in register 553 P4 = bitmap for coil-control (5)	Protected	EnCoilsactivation
58772	Disable activation of MX or XF coils, or both	P1 = 4 (1) P2 = 4 (2) P3 = control word read in register 553 P4 = bitmap for coil- control (5)	Protected	EnCoilsdesactivation
59492	Release flag for access to protected mode	P1 = 3 (1) P2 = 4 (2) P3 = flag active	Protected	ReleaseProt Flag
61541	Set time and date for circuit-breaker manager and the protection and measurement managers Year YY is 0 for 1900, 100 for 2000, 101 for 2001, etc.	P1 = 5 (1) P2 = 4 (2) P3 = MM:DD P4 = YY:HH P5 = MIN:SEC	Shared Protected	SetD_T

(1) Parameter P1 for the circuit-breaker manager command interface contains the total number of command parameters, including P1

(2) The value "4" for parameter P2 informs the circuit-breaker manager command interface that it must run the command itself.

(3) Bitmap of counter to Preset

Bit	Breaker counter status	Affected counter registers
0 (0x0001)	OF : ON/OFF	663
1 (0x0002)	SD : Trip indication	664
2 (0x0004)	SDE : Fault-trip indication	665
6 (0x0040)	OF threshold	581
7 (0x0080)	Close command threshold	582

(4) Control Value 1 = Value of counter corresponding to 1st bit set when bitmap is read from LSB to MSB (0000 to reset counter)
Control Value 2 = Value of counter corresponding to next bit set when bitmap is read from LSB to MSB (0000 to reset counter)

(5) Bitmap for coil control

Bit	Coil control status	Affected counter registers
1 (0x0002)	MX coil-control bit	674
2 (0x0004)	XF coil-control bit	678
3 (0x0008)	To be set to 1 in order to activate MX or XF	

List of commands
Metering-manager commands

Cmd #	Description	Parameter(s)	Mode	Label	A/E	P/H
53298	Enter configuration mode	P1 = 3 (1) P2 = 8 (2) P3 = control word read in register 3300 of the metering manager(7)	Protected	In_mCfg	E	P/H
53299	Exit configuration mode and activate the new parameters.	P1 = 3 (1) P2 = 8 (2) P3 = control word read in register 3300 of the metering manager(7)	Protected	Out_mCfg	E	P/H
61952	Reset minimeters / maximeters in the metering manager	P1 = 4 (1) P2 = 8 (2) P3 = bitmap of minimeters to reset (3) P4 = bitmap of maximeters to reset (3)	Protected	Reset_m_M	A/E	P/H
53762	Reset of current demand maximums	P1 = 3 (1) P2 = 8 (2) P3 = bitmap of maximum values to reset (4)	Protected	ResetI_PeakDmd	E	P/H
53763	Reset of power demand maximums	P1 = 3 (1) P2 = 8 (2) P3 = bitmap of maximum values to reset (5)	Protected	ResetP_PeakDmd	E	P/H
53760	Preset or reset the energy counters	P1 = 3 to 32 (1) P2 = 8 (2) P3 = bitmap of counters to preset or reset (6) P4 to P7 = first counter to preset according to P3 P8 to P11 = second counter to preset according to P3 P28 to P32 = seventh counter to preset according P3.	Protected	PresetAccEnCtr	E	P/H
55234	Forcelog into WFC (file N° 5)	P1 = 4 (1) P2 = 8 (2) P3 = bitmap of file N° 5 = 0x0000 P4 = bitmap of file N° 5 = 0x0010	Shared Protected	Forcelog		H

(1) Parameter P1 for the circuit-breaker manager command interface contains the total number of command parameters, including P1.

(2) The value "8" for parameter P2 informs the circuit-breaker manager command interface that the metering manager must run the command.

(3) Bitmap for reset of minimeters / Maximeters

Bit	minimeters / Maximeters	Affected real-time measurement registers
0 (0x0001)	Currents	1016 to 1027
1 (0x0002)	Current unbalance	1028 to 1032
3 (0x0008)	Voltages	1000 to 1007
4 (0x0010)	Voltage unbalance	1008 to 1015
6 (0x0040)	Frequency	1054
7 (0x0080)	Power, PF	1034 to 1049
11 (0x800)	Fundamental, THD	1050 to 1118
13 (0x2000)	V_Crest	1119 to 1124
14 (0x4000)	I_Crest	1125 to 1128

(4) Bitmap for reset of current demand maximums

Bit	Maximum of current demand	Affected data registers
1 (0x0002)	Phase 1	2204 + 3005 to 3007 + 3026 to 3028
2 (0x0004)	Phase 2	2205 + 3008 to 3010 + 3026 to 3028
3 (0x0008)	Phase 3	2206 + 3011 to 3013 + 3026 to 3028
4 (0x0010)	Neutral	2207 + 3014 to 3016 + 3026 to 3028

(5) Bitmap for reset of power demand maximums

Bit	Maximums of Power demand	Affected data registers
4 (0x0010)	Active power	2225 to 2229 + 3017 to 3019 + 3029 to 3031
8 (0x0100)	Reactive power	2230 to 2235 + 3020 to 3022 + 3029 to 3031
12 (0x1000)	Apparent power	2236 to 2241 + 3023 to 3025 + 3029 to 3031

(6) A number of counters may be preset or reset at the same time. Each counter is coded over four 16-bit registers. The counters to be preset are indicated in the bitmap. The values to be preset are transmitted as parameters, in the same order as the bits set to one, starting with the least significant. The number of counters to be transmitted is equal to the number of bits set to one in the bitmap.
For E, only Bit1&7can be set

Bit	Energy counter	Affected data reg.
0 (0X0001)	All the counters are simply reset	
1 (0X0002)	Total Active-Energy	2000 to 2003
2 (0X0004)	Total Reactive-Energy	2004 to 2007
3 (0X0008)	Total Active-Energy IN (positively incremented)	2008 to 2011
4 (0X0010)	Total Active-Energy OUT(negatively incremented)	2012 to 2015
5 (0X0020)	Total Reactive-Energy IN (positively incremented)	2016 to 2019
6 (0X0040)	Total Reactive-Energy OUT(negatively incremented)	2020 to 2023
7 (0X0080)	Total Apparent-Energy	2024 to 2027

(7) Always 0 for Micrologic A and E

List of commands
Protection-manager commands

Cmd #	Description	Parameter(s)	Mode	Label	A/E	P/H
49202	Enter configuration mode	P1 = 3 (1) P2 = 2 (2) P3 = Access code to be consulted in the menu of the control unit :Com set-up / Remote access (default value is 0000) (5)	Protected	In_pCfg	E	P/H
49203	Exit configuration mode and activate the new parameters.	P1 = 3 (1) P2 = 2 (2) P3 = Access code to be consulted in the menu of the control unit :Com set-up / Remote access (default value is 0000) (5)	Protected	Out_pCfg	E	P/H
50579	"Release" of a relay on optional M2C or M6C module, set to latching mode. Release is effective if the alarm that tripped contact closing is no longer active.	P1 = 4 (1) P2 = 2 (2) P3 = Access code to be consulted in the menu of the control unit :Com set-up / Remote access (default value is 0000) (5) P4 = bitmap of the relay to release (4)	Protected	ReleaseRly	E	P/H
50580	"Energize" a relay of an optional M2C or M6C module.	P1 = 5 (1) P2 = 2 (2) P3 = control word read from register 9600 P4 = Time duration in hundred of milliseconds P5 = bitmap of the relay to energize (4)	Protected	EnergizeBr	E	P/H
63176	Clear the files ***Note**: In order to clear a file, it is mandatory to disable the file before.*	P1 = 4 (1) P2 = 2 (2) P3 = bitmap of file reference (5) P4 = bitmap of file reference (5)	Shared Protected	ClearFiles		P/H
63377	Disable access to files	P1 = 4 (1) P2 = 2 (2) P3 = bitmap of file reference (5) P4 = bitmap of file reference (5)	Shared Protected	DisFiles		P/H
63178	Read a record in the event log of the protection manager (file No. 20). The content of the record is available starting in register 7730.	P1 = 4 (1) P2 = 2 (2) P3 = 20 (Number of the file to be read) P4 = number of event to be read	Protected	ReadFileX_ RecY		P/H
63376	Enable access to files	P1 = 4 (1) P2 = 2 (2) P3 = bitmap of file reference (5) P4 = bitmap of file reference (5)	Shared Protected	EnFiles		P/H

(1) Parameter P1 for the circuit-breaker manager command interface contains the total number of command parameters, including P1.
(2) The value "2" for parameter P2 informs the circuit-breaker manager command interface that the protection manager must run the command.
(4) Bit 0 corresponds to relay S1 (M2C or M6C option), bit 1 corresponds to relay S2 (M2C or M6C option), bits 2 to 5 correspond respectively to relay S3 to S6 on the M6C module.

(5) Event log of the protection manager (File N°20)		*P3=0x0008*	*P4=0x0000*
Event log of the metering manager (File N°10)		*P3=0x0000*	*P4=0x0200*
Maintenance event log of the protection manager (File N°21)		*P3=0x0010*	*P4=0x0000*
Maintenance event log of the metering manager (File N°12)		*P3=0x0000*	*P4=0x0800*
Min-Max event log of the metering manager (File N°11)		*P3=0x0000*	*P4=0x0400*
Event log of the circuit-breaker manager (File N°30)		*P3=0x2000*	*P4=0x0000*
Wave form Capture	*(File N°5)*	*P3=0x0000*	*P4=0x0010*
Fault .Wave form Capture	*(File N°22)*	*P3=0x0020*	*P4=0x0000*

(6) For Micrologic A and E, this value is always 0000.

Examples of commands
Send commands in shared mode
Simplified Open/Close

Command number: 57400
Simplified Open/close

■ **Step 1: Fill in Parameters**

MODBUS slave Register	Address @ [circuit-breaker manager] Datum to be written
7700	57400 (command number)
7701	P1 = 4 (total number of parameters including P1)
7702	P2 = 4 (circuit-breaker manager)
7703	P3 = 0 for Open or P3 = 1 for Close
7704	P4 = 0000 (Password default value)

■ **Step 2: Write command**
WRITE the previous registers by using function 16 of Modbus protocol

After receiving the command, the status command register (802 for Open ; 803 for close) is set to 1 if the simplified Open/Close command has been accepted by the Circuit-Breaker manager.

Following table gives the values set in the Status command register.

Value	Label	Use case
1	RES_OK	Command accepted
2	ERR_NBR_PARAM	Incorrect number of parameters
3	ERR_COIL_ID_VALUE	Incorrect coilValue (must be 0 or 1)
4	ERR_COIL_PASSWORD_VALUE	Incorrect password value
5	ERR_MANU	Register 670 in MANU mode

WARNING:
Simplified OPEN/CLOSE commands are available only with a Breaker Communication Module firmware version greater or equal to V2.0 (register 577 must be greater or equal to 02000).
It is necessary to be in AUTO mode (see register 670).

Examples of commands
Send commands in protected mode

■ **Step 1: Request the flag**
READ the following registers by using function 3 of Modbus protocol

MODBUS slave Register	Address @ [circuit-breaker manager] Datum to be read
7715 (1)	flag. The value read must be different than 0 to go on to the next step.

(1) The value read in register 7715 is called a "flag". If it is zero, another supervisor on a multi-supervisor system is already in configuration mode. You must wait for the flag to be different than zero before starting to configure.

■ **Step 2: Fill in Parameters**

MODBUS slave Register	Address @ [circuit-breaker manager] Datum to be written
7720	Command number to be written (see the section : List of commands)
7721	P1 = total number of parameters to be send (including P1)
7722	P2 = identification of the micrologic manager. Protection mgr=2, circuit-breaker mgr=4, metering mgr=8
7723 to 7729	P3 to P9 = parameters specific to the command

■ **Step 3: Write command**
WRITE the previous registers by using function 16 of Modbus protocol

■ **Step 4: Wait for the command being executed**
READ the following registers by using function 3 of Modbus protocol

MODBUS slave Register	Address @ [circuit-breaker manager] Datum to be read
7717	command is active: as long as the command is being executed, the datum is **the command number**. When command execution is finished, the datum is 0.
7718	command executed: as long as the command is being executed, the datum is 0. When command execution is finished, the datum is **the command number**.

■ **Repeat readings until command execution is finished.**

■ **Step 5: Check Result code**
READ the following registers by using function 3 of Modbus protocol

MODBUS slave Register	Address @ [circuit-breaker manager] Datum to be read
7719	result codes for the executed command, descripted in register 7719. Refer to the command result-code table for information on the meaning of the result codes. (See the section : Send command in protected mode)

Command number: 59492
ReleaseProtFlag

■ **Step 6: Release the flag**
WRITE the following registers by using function 16 of Modbus protocol

MODBUS slave Register	Address @ [circuit-breaker manager] Datum to be written
7720	**59492** (command number)
7721	P1 = 3 (total number of parameters including P1)
7722	P2 = 4 (circuit-breaker manager)
7723	P3 = flag (value read in register 7715 at step 1)

Examples of commands
Remotely open the circuit breaker

Open the circuit breaker

Some preliminary operations are required to send the command.
On the menu of Micrologic P or H control unit, within « Com set up » menu, Remote control must be set to Auto (Register 670 must be equal to 1).
Then circuit breaker may be remotely controlled.
Caution, to open the circuit breaker using the COM option, the device must be equipped with an MX « communicating » voltage release.
Note: *For the standard steps such as Request the flag, Wait for command being executed, Check result code and Return the flag, please refer to the first example of command (Send commands in protected mode) described in page 119.*

■ **Step 1: Request the flag**

Command number: 58771
EnCoilactivation

■ **Step 2: Get Control word**
Read the control word in register 553 of the circuit-breaker manager

■ **Step 3: Enable activation of the MX coil**
WRITE the following registers by using function 16 of Modbus protocol

MODBUS slave	Address @ [circuit-breaker manager]
Register	**Datum to be write**
7720	**58771** (command number)
7721	P1 = 4 (total number of parameters including P1)
7722	P2 = 4 (circuit-breaker manager)
7723	P3 = Content of Control word read in step2 (register 553)
7724	P4 = 10 (0x000A) See bitmap for MX coil control

■ **Step 4: Wait for the command being executed**

Command number: 58769
OpenBr

■ **Step 5: Check Result code**

■ **Step 6: Open the circuit-breaker**
WRITE the following registers by using function 16 of Modbus protocol

MODBUS slave	Address @ [circuit-breaker manager]
Register	**Datum to be write**
7720	**58769** (command number)
7721	P1 = 4 (total number of parameters including P1)
7722	P2 = 4 (circuit-breaker manager)
7723	P3 = Content of Control word read in step2 (register 553)
7724	P4 = 1

■ **Step 7: Wait for the command being executed**

Command number: 58772
DisCoilactivation

■ **Step 8: Check Result code**

■ **Step 9: Disable activation of the MX coil**
WRITE the following registers by using function 16 of Modbus protocol

MODBUS slave	Address @ [circuit-breaker manager]
Register	**Datum to be write**
7720	**58772** (command number)
7721	P1 = 4 (total number of parameters including P1)
7722	P2 = 4 (circuit-breaker manager)
7723	P3 = Content of Control word read in step2 (register 553)
7724	P4 = 10 (0x000A) See bitmap for MX coil control

■ **Step 10: Wait for the command being executed**

■ **Step 11: Check Result code**

■ **Step 12: Return the flag**

Examples of commands
Remotely close the circuit breaker

Close the circuit breaker

Some preliminary operations are required to send the command.
On the menu of Micrologic P or H control unit, within « Com set up » menu, Remote control must be set to Auto (Register 670 must be equal to 1)
Then circuit breaker may be remotely controlled.
Caution, to close the circuit breaker using the COM option, the device must be equipped with an XF « communicating » voltage release.
Note: *For the standard steps such as Request the flag, Wait for command being executed, Check result code and Return the flag, please refer to the first example of command (Send commands in protected mode) described in page 119.*

■ **Step 1: Request the flag**

Command number: 58771
EnCoilactivation

■ **Step 2: Get Control word**
Read the control word in register 553 of the circuit-breaker manager

■ **Step 3: Enable activation of the XF coil**
WRITE the following registers by using function 16 of Modbus protocol

MODBUS slave Register	Address @ [circuit-breaker manager] Datum to be write
7720	**58771** (command number)
7721	P1 = 4 (total number of parameters including P1)
7722	P2 = 4 (circuit-breaker manager)
7723	P3 = Content of Control word read in step2 (register 553)
7724	P4 = 12 (0x000C) See bitmap for XF coil control

Command number: 58770
CloseBr

■ **Step 4: Wait for the command being executed**

■ **Step 5: Check Result code**

■ **Step 6: Close the circuit-breaker**
WRITE the following registers by using function 16 of Modbus protocol

MODBUS slave Register	Address @ [circuit-breaker manager] Datum to be write
7720	**58770** (command number)
7721	P1 = 4 (total number of parameters including P1)
7722	P2 = 4 (circuit-breaker manager)
7723	P3 = Content of Control word read in step2 (register 553)
7724	P4 = 1

■ **Step 7: Wait for the command being executed**

Command number: 58772
DisCoilactivation

■ **Step 8: Check Result code**

■ **Step 9: Disable activation of the XF coil**
WRITE the following registers by using function 16 of Modbus protocol

MODBUS slave Register	Address @ [circuit-breaker manager] Datum to be write
7720	**58772** (command number)
7721	P1 = 4 (total number of parameters including P1)
7722	P2 = 4 (circuit-breaker manager)
7723	P3 = Content of Control word read in step2 (register 553)
7724	P4 = 12 (0x000C) See bitmap for XF coil control

■ **Step 10: Wait for the command being executed**

■ **Step 11: Check Result code**

■ **Step 12: Return the flag**

Examples of commands
Synchronise the clocks

Set the time and synchronise the protection and metering managers

When the time is set for the COM option, it in turn automatically sets the time for the protection and metering managers.
Each time the supervision-system and COM-option clocks are synchronised, the COM option automatically synchronises with the protection and metering managers.
Note: *For the standard steps such as Request the flag, Wait for command being executed, Check result code and Return the flag, please refer to the first example of command (Send commands in protected mode) described in page 119.*

Set the time and synchronise the circuit-breaker manager

The time set for the circuit-breaker manager is automatically used for the protection and metering managers.
To set the time, proceed as follows.

■ **Step 1: Request the flag**

■ **Step 2: Set Date Time of the Breaker Communication Module**
WRITE the following registers by using function 16 of Modbus protocol

Command number : 61541
SetD_T

MODBUS slave	**Address @ [circuit-breaker manager]**
Register	**Datum to be write**
7720	**61541** (command number)
7721	P1 = 5 (total number of parameters including P1)
7722	P2 = 4 (circuit-breaker manager)
7723	P3 : bits 15 to 8 = month (1 to 12) P3 : bits 7 to 0 = day (1 to 31)
7724	P4 : bits 15 to 8 = year (0 to 199, 0 represents 1900, 102 represents 2002) P4 : bits 7 to 0 hours (0 to 23)
7725	P5 : bits 15 to 8 = minutes (0 to 59) P5 : bits 7 to 0 = seconds (0 to 59)

■ **Step 3: Wait for the command being executed**

■ **Step 4: Check Result code**

■ **Step 5: Return the flag**
Depending on the procedure used to synchronise the system clocks, it is advised to:
broadcast the time-setting command

Set the time and synchronise the chassis manager

The time must be set for the chassis manager even if the circuit-breaker manager is already set.
Follow the same procedure described for the circuit-breaker manager
Warning:
when sending a command to the CCM (Chassis Communication Module), you do not have to fill the two first parameter (P1 = Number of parameter and P2 = ID of the manager)

WRITE the following registers by using function 16 of Modbus protocol

Command number: 61541
SetD_T

MODBUS slave	**Address @ [circuit-breaker manager] + 50**
Register	**Datum to be write**
7720	**61541** (command number)
7721	P1 : bits 15 to 8 = month (1 to 12) P1 : bits 7 to 0 = day (1 to 31)
7722	P2 : bits 15 to 8 = year (0 to 199, 0 represents 1900, 102 represents 2002) P2 : bits 7 to 0 hours (0 to 23)
7723	P3 : bits 15 to 8 = minutes (0 to 59) P3 : bits 7 to 0 = seconds (0 to 59)

Examples of commands
Remotely configure and set

Write settings of the long time protection

By setting the protection manager to configuration mode, it is possible to write the setup registers (8754 to 8803 and 9604 to 9798). The new configuration is not taken into account until after exiting configuration mode.
Some preliminary operations are required to send the command.
On the Micrologic P or H front panel, within « Com set up » menu, Remote access must be set to Yes (Register 9800 must be equal to 1).
Then enter the access code. The protection-manager configuration is protected by this access code that may be programmed and viewed exclusively on the Micrologic front panel. This password must be noted before starting. Default access code is 0000. Then you can access the configuration mode.
Note: *For the standard steps such as Request the flag, Wait for command being executed, Check result code and Return the flag, please refer to the first example of command (Send commands in protected mode) described in page 119.*

Command number: 49202
In_pCfg

■ **Step 1: Request the flag**

■ **Step 2: Access the configuration mode**
WRITE the following registers by using function 16 of Modbus protocol

MODBUS slave Register	Address @ [circuit-breaker manager] Datum to be write
7720	**49202** (command number)
7721	P1 = 3 (total number of parameters including P1)
7722	P2 = 2 (protection manager)
7723	P3 = Access code to be consulted in the menu of the control unit :Com set-up / Remote access (default value is 0000)

■ **Step 3: Wait for the command being executed**
■ **Step 4: Check Result code**

■ **Step 5: Enter new settings**
For the fine adjustments of the long time, short time, instantaneous, ground fault, and earth leakage protection functions, you have to WRITE the following registers (8754 to 8803) at the address @+100[Protection Manager] by using function 6 or 16 of Modbus protocol. If you change the Ir setting, you have to change accordingly the Isd setting since Isd expressed in Amps = (Isd rotary switch position) x Ir

For example with the long time Protection settings (assuming a 1000 Amps breaker)
- □ **Write 850 into register 8756 and 0 into register 8757 will set 850 Amps as fine adjustment for Ir setting (assuming Ir rotary switch set at position .9 or higher)**
- □ **Write 1500 into register 8758 will set 1.5 s as fine adjustment for tr setting (assuming tr rotary switch set at position 2 or higher).**
- □ **Write 3400 into register 8766 and 0 into register 8767 will set 3400 Amps (3400 = 850x4) as fine adjustment for Isd setting (assuming Isd rotary switch set at position 4 or higher).**
- □ **Write 0x0100 into register 8762 will actuate the log of the long time protection into the Fault Wave Form capture (File N°22).**

Command number: 49203
Out_pCfg

■ **Step 6: Exit the configuration mode**
WRITE the following registers by using function 16 of Modbus protocol

MODBUS slave Register	Address @ [circuit-breaker manager] Datum to be write
7720	**49203** (command number)
7721	P1 = 3 (total number of parameters including P1)
7722	P2 = 2 (protection manager)
7723	P3 = Access code to be consulted in the menu of the control unit :Com set-up / Remote access (default value is 0000)

■ **Step 7: Wait for the command being executed**
■ **Step 8: Check Result code**
■ **Step 9: Return the flag**
■ **Step 10: Check new settings**
READ the contents of the registers (8754 to 8803) by using function 3 of Modbus protocol. The settings should be those entered in step 5.

Examples of commands
Run remote Resets / Preset

Reset the current and Voltage maximeters in the metering manager

The minimeters / Maximeters of the real-time measurements are reset using the Reset_m_M command. This operation may be carried out at the same time as the reset for other maximeters. Precise operation depends on the parameters sent with the command. . (see the section Appendix List of commands in the metering manager).

Note: *For the standard steps such as Request the flag, Wait for command being executed, Check result code and Return the flag, please refer to the first example of command (Send commands in protected mode) described in page 119.*

■ **Step 1: Request the flag**

■ **Step 2: Do not Reset minimeters / Reset Maximeters for current and Voltage WRITE the following registers by using function 16 of Modbus protocol**

Command number: 61952
Reset_m_M

MODBUS slave Register	Address @ [circuit-breaker manager] Datum to be read
7720	**61952** (command number)
7721	P1 = 4 (total number of parameters including P1)
7722	P2 = 8 (Metering Manager)
7723	P3 = 0 (bitmap of minimeters to reset)
7724	P4 = 9 (bitmap of Maximeters to reset)

■ **Step 3: Wait for the command being executed**

■ **Step 4: Check Result code**

■ **Step 5: Return the flag**

Preset the total active-energy and the total apparent energy

The Energy counter values are preset using the PresetAccEnCtr command. This operation may be carried out at the same time as the preset for active, reactive or apparent-Energy counter values. Precise operation depends on the parameters sent with the command. (See the section Appendix: List of commands in the metering manager).

Follow the same procedure described for the circuit-breaker manager

■ **Step 2: Preset of total Active energy counter to 8,0364,0905,0372 kWh and preset of total Apparent energy counter to 373,0904,0365,0009 kVAh WRITE the following registers by using function 16 of Modbus protocol .**

Command number: 53760
PresetAccEnCtr

MODBUS slave Register	Address @ [circuit-breaker manager] Datum to be read	
7720	**53760** (command number)	
7721	P1 = 11 (total number of parameters including P1)	
7722	P2 = 8 (Metering Manager)	
7723	P3 = 130 (0x0082) preset active and apparent energy counter	
7724	P4 = 372 (0x174)	Register 2000
7725	P5 = 905 (0x0389)	Register 2001
7726	P6 = 364 (0x016c)	Register 2002
7727	P7 = 8 (0x0008)	Register 2003
7728	P8 = 9 (0x0009)	Register 2024
7729	P9 = 365 (0x016d)	Register 2025
7730	P10 = 904 (0x0388)	Register 2026
7731	P11 = 373 (0x175)	Register 2027

Examples of commands
Manage the event logs

Read a recording in event log of the Circuit-Breaker Manager

The event log of the Circuit-Breaker Manager is file No. 30.
This file is always enabled.
This file will record the events associated to the alarms (1000 to 1106)
The size of each recording and the valid recording numbers may be read in registers 718 to 743.
The event log of the circuit-breaker manager may be read using the standard read/write functions (3, 4, 6, 16, and 23).
Simply follow steps. When the command is finished, the contents of the requested recording may be read starting in register 7730 (see format of the events in the event log of the circuit-breaker manager in the section: Access to the files.)
Note: *For the standard steps such as Request the flag, Wait for command being executed, Check result code and Return the flag, please refer to the first example of command (Send commands in protected mode) described in page 119.*

■ **Step 1: Request the flag**

■ **Step 2: Read event log characteristics (status)**
Read the following registers by using function 3 of Modbus protocol
737 = Number of records in the file (0 = no record)
738 = Sequence number of first record (the oldest) in the file
739 = Sequence number of last record (the most recent)in the file

■ **Step 3: Read event log recording**
Write the following registers by using function 16 of Modbus protocol.

Command number: 63178
ReadFileX_RecY

MODBUS slave Register	Address @ [circuit-breaker manager] Datum to be read
7720	**63178** (command number)
7721	P1 = 4 (total number of parameters including P1)
7722	P2 = 4 (circuit-breaker manager)
7723	P3 = 30 (number of the file to be read)
7724	P4 = number of the recording to be read, between the numbers of the oldest (738) and most recent (739) recordings, as per results in step2

■ **Step 4: Wait for the command being executed**

■ **Step 5: Check Result code**
The requested recording may be read starting in registers **7730** (see format of the events in the event log of the circuit-breaker manager in the section: Access to the files) by using function 3 of Modbus protocol.

Repeat step 3 until all the records (737) have been read.

■ **Step 6: Return the flag**

Examples of commands
Manage the event logs

Read a recording in event log of the Metering Manager

The event log of the Metering Manager is file No. 10.
This file is normally enabled (register 7164 = 0xFFFF). If not, you have to enable it by using the Command 63376: EnFiles.
This file will record the events associated to the Analog pre-defined alarms (1 to 53). It is therefore mandatory to configure these alarms (See the example: Configure Analog pre-defined alarm n°1)
The size of each recording and the valid recording numbers may be read in registers 7164 to 7189.
The event log of the Metering Manager may be read using the standard read/write functions (3, 4, 6, 16, and 23).
Simply follow steps. When the command is finished, the contents of the requested recording may be read starting in register 7730 (see format of the events in the event log of the circuit-breaker manager in the section: Access to the files.)
Note: *For the standard steps such as Request the flag, Wait for command being executed, Check result code and Return the flag, please refer to the first example of command (Send commands in protected mode) described in page 119.*

■ **Step 1: Request the flag**

■ **Step 2: Read event log characteristics (status)**
Read the following registers by using function 3 of Modbus protocol
7183 = Number of records in the file (0 = no record)
7184= Sequence number of first record (the oldest) in the file
7185 = Sequence number of last record (the most recent) in the file

■ **Step 3: Read event log recording**
Write the following registers by using function 16 of Modbus protocol.

Command number: 63178
ReadFileX_RecY

MODBUS slave Register	Address @ [circuit-breaker manager] Datum to be read
7720	**63178** (command number)
7721	P1 = 4 (total number of parameters including P1)
7722	P2 = 8 (Metering Manager)
7723	P3 = 10 (number of the file to be read)
7724	P4 = number of the recording to be read, between the numbers of the oldest (7184) and most recent (7185) recordings, as per results in step2

■ **Step 4: Wait for the command being executed**

■ **Step 5: Check Result code**
The requested recording may be read starting in registers **7730** (see format of the events in the event log of the circuit-breaker manager in the section: Access to the files) by using function 3 of Modbus protocol.

Repeat step 3 until all the records (register 7183) have been read.

■ **Step 6: Return the flag**

Examples of commands
Configure Analog pre-defined Alarm n°1: Over Current Phase A

Write settings of the Alarm n°1

By setting the metering manager to configuration mode, it is possible to write access the setup registers (6000 to 6624). The new configuration is not taken into account until after exiting configuration mode.
Some preliminary operations are required to send the command.
On the front panel of Micrologic P or H, within « Com set up » menu, Remote access must be set to Yes (register 9800 must be equal to 1).
Then read the control word. The metering-manager configuration is protected by a control word that may be read in register 3300.
Then you can access the configuration mode.
Note: *For the standard steps such as Request the flag, Wait for command being executed, Check result code and Return the flag, please refer to the first example of command (Send commands in protected mode) described in page 119.*

■ **Step 1: Request the flag**

■ **Step 2: Get Control word**
Read the control word in register 3300 of the metering manager

■ **Step 3: Acces the configuration mode**
WRITE the following registers by using function 16 of Modbus protocol

Command number: 53298
In_mCfg

MODBUS slave Register	Address @ [circuit-breaker manager] Datum to be write
7720	**53298** (command number)
7721	P1 = 3 (total number of parameters including P1)
7722	P2 = 8 (metering manager)
7723	P3 = content of register 3300 read in step 2

■ **Step 4: Wait for the command being executed**

■ **Step 5: Check Result code**

■ **Step 6: Enter new settings**
For the adjustments of the analog pre-defined Alarm n°1, you have to WRITE the following registers (6000 to 6010) at the address @+200[Metering Manager] by using function 6 or 16 of Modbus protocol.
Write 0x0001 into register 6000 will activate the alarm n°1 (Over Current Phase A)
Write 900 into register 6003 will set the Pick-up value to 900 Amps
Write 7 into register 6005 will set the Pick-up time delay to 7 s
Write 650 into register 6006 will set the Drop-out value to 650 Amps
Write 11 into register 6008 will set the Drop-out time delay to 11 s
Write 0x0200 into register 6010 will actuate the log of Alarm n°1 into the Wave Form capture (file N° 5)

■ **Step 7: Get Control word**
Read the control word in register 3300 of the metering manager

■ **Step 8: Exit the configuration mode**
WRITE the following registers by using function 16 of Modbus protocol

Command number: 53299
Out_mCfg

MODBUS slave Register	Address @ [circuit-breaker manager] Datum to be write
7720	**53299** (command number)
7721	P1 = 3 (total number of parameters including P1)
7722	P2 = 8 (metering manager)
7723	P3 = content of register 3300 read in step 7

■ **Step 9: Wait for the command being executed**

■ **Step 10: Check Result code**

■ **Step 11: Return the flag**

■ **Step 12: Check new settings**
READ the contents of the registers (6000 to 6624) by using function 3 of Modbus protocol. The settings should be those entered in step 6.

Examples of commands
Manage the Wave Form Capture

Read a record in Wave Form Capture of the Metering Manager after a user request

The Wave Form Capture of the Metering Manager is file No. 5.
This file is normally enabled (register 7132 = 0xFFFF). If not, you have to enable it by using the Command 63376: EnFiles.

■ **This file will record the Wave Form capture triggered either by the Analog pre-defined alarms (1 to 53). It is therefore mandatory to configure these alarm (See the example: Configure Analog pre-defined alarm n°1) either on user request by using the command Forcelog**

This file consists of a fixed number of records (29). All records are of similar size, i.e 64 registers wide
The record of Wave Form Capture may be read using the standard read/write functions (3, 4, 6, 16, and 23).
Simply follow steps. When the command is finished, the contents of the requested recording may be read starting in register 7730.
Note: *For the standard steps such as Request the flag, Wait for command being executed, Check result code and Return the flag, please refer to the first example of command (Send commands in protected mode) described in page 119.*

■ **Step 1: Request the flag**

■ **Step 2: Forcelog**
Write the following registers by using function 16 of Modbus protocol.

Command number: 55234
Forcelog

MODBUS slave Register	Address @ [circuit-breaker manager] Datum to be read
7720	**55234** (command number)
7721	P1 = 4 (total number of parameters including P1)
7722	P2 = 8 (metering manager)
7723	P3 = 0 (0x0000) bitmap of file N° 5
7724	P4 = 16 (0x0010) bitmap of file N° 5

■ **Step 3: Read Wave Form Capture characteristics (Status)**
Read the following registers by using function 3 of Modbus protocol
7151 = Actual Number of records in the log (0 or 29)
If 0, there is no record
If 29, you can read the records

■ **Step 4: Read Wave Form Capture recording**
Write the following registers by using function 16 of Modbus protocol.

Command number: 63178
ReadFileX_RecY

MODBUS slave Register	Address @ [circuit-breaker manager] Datum to be read
7720	**63178** (command number)
7721	P1 = 4 (total number of parameters including P1)
7722	P2 = 8 (metering manager)
7723	P3 = 5 (number of the file to be read)
7724	P4 = number of the recording to be read, between 1 and 29

■ **Step 5: Wait for the command being executed**

■ **Step 6: Check Result code**
The requested recording may be read starting in registers **7730** (see the section *Access to the files* format of the records in the Wave Form Capture) by using function 3 of Modbus protocol.

Repeat step 4 until all the records (29) have been read.

■ **Step 7: Return the flag**

Examples of commands
Manage the Fault Wave Form Capture

Read a record in the Fault Wave Form Capture of the Protection Manager after a trip condition

The Fault Wave Form Capture of the Protection Manager is file No. 22.
This file is normally enabled (register 9964 = 0xFFFF). If not, you have to enable it by using the Command 63376: EnFiles.

■ **This file will record the Fault Wave Form capture triggered by the alarms (1000 to 1038). It is therefore mandatory to actuate the log of these alarms into the FWFC (file N°22). See the example: Remotely configure and set.**

This file consists of a fixed number of records (29). All records are of similar size, i.e 64 registers wide
The record of Fault Wave Form Capture may be read using the standard read/write functions (3, 4, 6, 16, and 23).
Simply follow steps. When the command is finished, the contents of the requested recording may be read starting in register 7730.
***Note**: For the standard steps such as Request the flag, Wait for command being executed, Check result code and Return the flag, please refer to the first example of command (Send commands in protected mode) described in page 119.*

■ **Step 1: Request the flag**

■ **Step 2: Read Wave Form Capture characteristics (Status)**
Read the following registers by using function 3 of Modbus protocol
9983 = Actual Number of records in the log (0 or 29)
If 0, there is no record
If 29, you can read the records

■ **Step 3: Read Wave Form Capture recording**
Write the following registers by using function 16 of Modbus protocol.

MODBUS slave	Address @ [circuit-breaker manager]
Register	**Datum to be read**
7720	**63178** (command number)
7721	P1 = 4 (total number of parameters including P1)
7722	P2 = 2 (Protection Manager)
7723	P3 = 22 (number of the file to be read)
7724	P4 = number of the recording to be read, between 1 and 29

Command number: 63178
ReadFileX_RecY

■ **Step 4: Wait for the command being executed**

■ **Step 5: Check Result code**
The requested recording may be read starting in registers **7730** (see the section Access to the files: format of the records in the Wave Form Capture) by using function 3 of Modbus protocol.

Repeat step 3 until all the records (29) have been read.

■ **Step 6: Return the flag**

Modbus protocol

For more information on the **Modbus protocol**,
see the Modbus-implementation guide: DBTP542en.pdf.
Additional information available at: http://www.modbus.org

Schneider Electric Industries SAS
35, rue Joseph Monier
CS30323
F-92506 Rueil-Malmaison Cedex

http://www.schneider-electric.com

Publication: Schneider Electric

COMBT32EN_AP

04/2012