EM50

Energy analyzer for single, two and three-phase systems

INSTRUCTION MANUAL

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Information property

CARLO GAVAZZI Controls SpA reserves the right to apply modifications or make improvements to the relative documentation without the obligation of advance notice.

Safety messages

The following section describes the warnings related to user and device safety included in this document:

***NOTICE**: indicates obligations that if not observed may lead to damage to the device.*

CAUTION! Indicates a risky situation which, if not avoided, may cause data loss.

IMPORTANT: provides essential information on completing the task that should not be neglected.

General warnings

This manual is an integral part of the product and accompanies it for its entire working life. It should be consulted for all situations tied to configuration, use and maintenance. For this reason, it should always be accessible to operators.

***NOTICE:** no one is authorized to open the analyzer. This operation is reserved exclusively for CARLO GAVAZZI technical service personnel. Protection may be impaired if the instrument is used in a manner not specified by the manufacturer.*

Service and warranty

In the event of malfunction, fault, requests for information or to purchase accessory modules, contact the CARLO GAVAZZI branch or distributor in your country.

Installation and use of analyzers other than those indicated in the provided instructions void the warranty.

Download

This manual	www.productselection.net/MANUALS/UK/EM50_im_use.pdf
Installation instruction	www.productselection.net/MANUALS/UK/EM50_im_inst.pdf
UCS desktop	www.productselection.net/Download/UK/ucs.zip

EM50

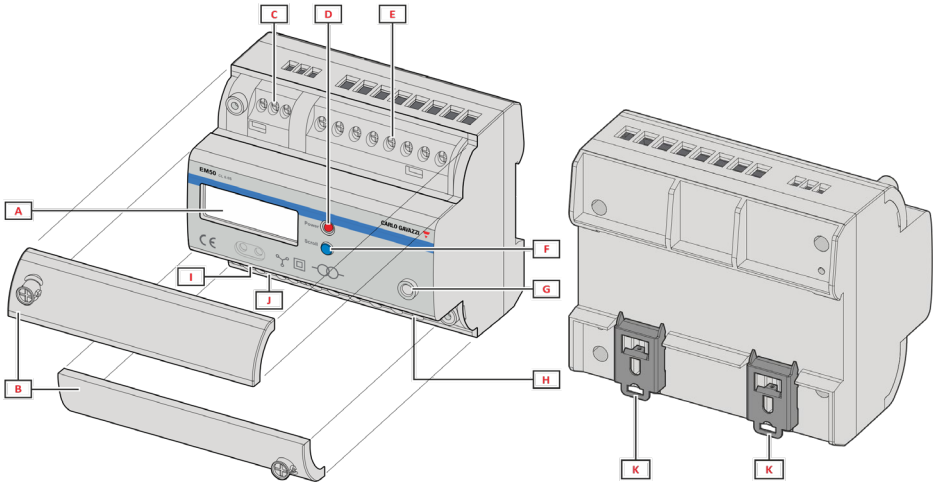
Introduction

EM50 is an energy analyzer for single, two and three-phase systems. Depending on the model, using 5A current transformers, 333mV or 80 mA current sensors or Rogowski coil, it can be installed in systems with rated voltage up to 600 V L-L.

Equipped with a static output (for pulse transmission) and a relay output (for alarm status or remote control), It can be easily configured by means of UCS software via RS485 and offers Modbus RTU communication for data retrieving by any Modbus master (e.g. PLC or SCADA) or by UWP3.0 by Carlo Gavazzi.

The Measurement Canada version (80 mA or 5 A current inputs) can be used for fiscal purposes in Canada.

Components description



Part	Description
A	LCD display
B	Terminal protection covers
C	RS485 connections
D	Power supply LED
E	Current connections
F	Push button for page scrolling
G	Sealable locking cap
H	Power supply and voltage connections
I	Static output and relay connections
J	Push button for programming
K	DIN rail mounting springs

UCS (Universal Configuration Software)

It can connect to EM50 via RS485. The following is possible with UCS:

- configure EM50
- view system status for diagnostics and configuration checks
- download data log and event log (xls format)

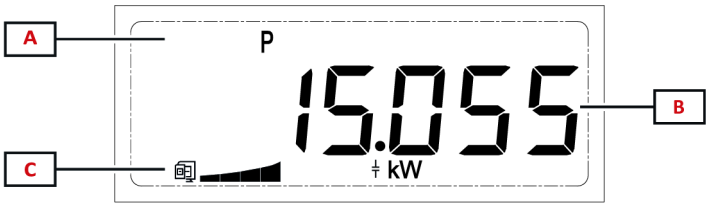
EM50 USE

Interface

EM50 is organized in three menus:

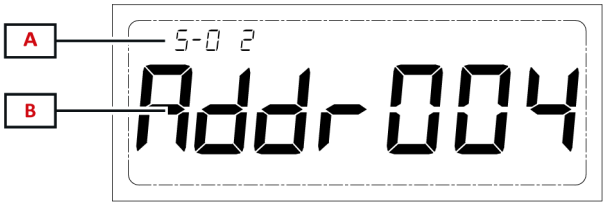
- **basic menu:** pages used to display energy meters and other electrical variables; the available pages can be changed setting the page filter (via UCS software or settings menu)
- **settings menu:** pages used to change settings (password required)
- **full menu:** pages that display device info and current settings (password not required) and all measurement pages without considering the page filter

Measurement pages



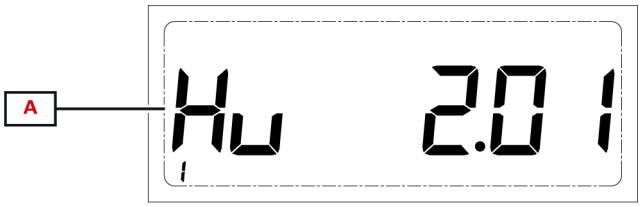
Area	Description
A	Phase or variable reference.
B	Variable or energy meter value
C	Warnings, information and units of measure

Setting pages



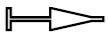
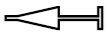
Area	Description
A	Page number
B	Page title and current value/option

Information pages



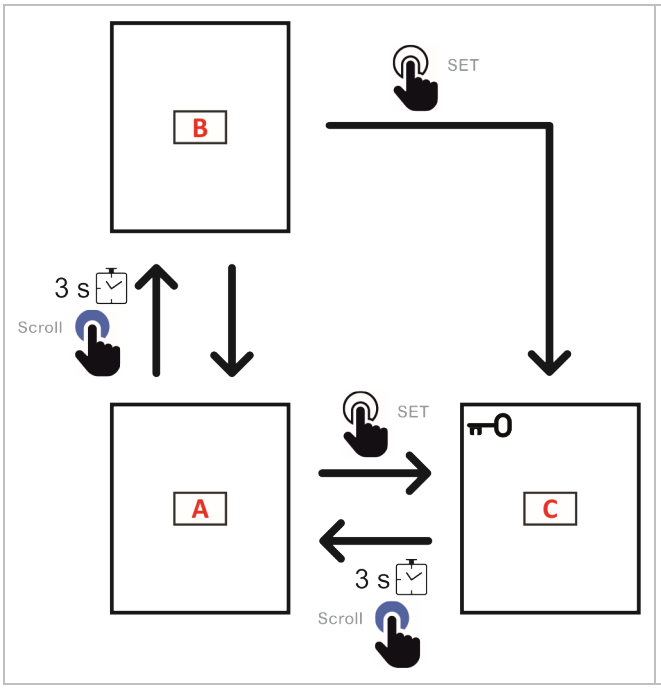
Area	Description
A	Page title and current value/option

Information and warnings

Symbol	Description
	RS485 communication
	Energy value shown is imported
	Energy value shown is exported
	Inductive load
	Capacitive load
	Load Size (percentage of the load based on the rated current)

Working with EM50

Navigating the menus



Section	Function
A	Basic menu
B	Full menu
C	Settings menu (password required)

Basic menu navigation

Button	Function
Scroll	Go to next page
Scroll 3 s	Go to **Full menu**
SET	Go to **Setting menu**

Full menu navigation

Button	Function
Scroll	Go to next page

Button	Function
	Go to **Basic menu**
	Go to **Setting menu**

Settings menu navigation

Button	Function
	• View mode-> next page • Editing mode (blinking)->increase value
	• View mode -> enter editing mode • Editing mode (blinking)->->confirm value
	• **Exit** and go to **Basic menu**

Menu description

Basic menu – measurement pages

***Note*:** the available measurements depend on the type of system set and on the settings of the page filter.

Displayed measurements	Descrizione
P (-> kWh)	Imported active energy
L1 P (-> kWh)	Imported active energy phase 1
L2 P (-> kWh)	Imported active energy phase 2
L3 P (-> kWh)	Imported active energy phase 3
L1 U (V)	Voltage L1-N
L2 U (V)	Voltage L2-N
L3 U (V)	Voltage L3-N
L1 I (A)	Current L1

Displayed measurements	Descrizione
L2 I (A)	Current L2
L3 I (A)	Current L3
L I (A)	Neutral current
P (kW)	System active power
L1 P (kW)	Active power phase 1
L2 P (kW)	Active power phase 2
L3 P (kW)	Active power phase 3
F (Hz)	Frequency
t	Temperature
T1	Device operating time
T2	Load operating time

Full menu – information and measurement pages

Page title	Information displayed	Type
Uxxxxxx	Voltage check wiring Note: see *Wiring check* for further information	Info
Ixxxxxx	Current check wiring Note: see *Wiring check* for further information	Info
Addr (*)	Modbus address	Info
Bd (*)	Baud rate	Info
Pr (*)	Parity	Info
Addr (**)	MAC Address	Info
bd (**)	Baudrate	Info
InF (**)	Maximum information frame number	Info

Page title	Information displayed	Type
Hu	Hardware version	Info
Su	Firmware version	Info
EM50	Model	Info
P (-> kWh)	Imported active energy	Measurement
L1 P (-> kWh)	Imported active energy phase 1	Measurement
L2 P (-> kWh)	Imported active energy phase 2	Measurement
L3 P (-> kWh)	Imported active energy phase 3	Measurement
L1 U (V)	Voltage L1-N	Measurement
L2 U (V)	Voltage L2-N	Measurement
L3 U (V)	Voltage L3-N	Measurement
L1 I (A)	Current L1	Measurement
L2 I (A)	Current L2	Measurement
L3 I (A)	Current L3	Measurement
L I (A)	Neutral current	Measurement
P (kW)	System active power	Measurement
L1 P (kW)	Active power phase 1	Measurement
L2 P (kW)	Active power phase 2	Measurement
L3 P (kW)	Active power phase 3	Measurement
F (Hz)	Frequency	Measurement
t	Temperature (internal)	Measurement
T1	Device operating time	Measurement
T2	Load operating time	Measurement
L T1 P (-> kWh)***	Imported active energy, tariff 1 Previous month	Measurement
L T2 P (-> kWh)***	Imported active energy, tariff 2 Previous month	Measurement

Page title	Information displayed	Type
L T3 P (-> kWh)***	Imported active energy, tariff 3 Previous month	Measurement
L T4 P (-> kWh)***	Imported active energy, tariff 4 Previous month	Measurement
L T1 P (<- kWh)***	Exported active energy, tariff 1 Previous month	Measurement
L T2 P (<- kWh)***	Exported active energy, tariff 2 Previous month	Measurement
L T3 P (<- kWh)***	Exported active energy, tariff 3 Previous month	Measurement
L T4 P (<- kWh)***	Exported active energy, tariff 4 Previous month	Measurement
M T1 P (-> kWh)***	Imported active energy, tariff 1 Current month	Measurement
M T2 P (-> kWh) ***	Imported active energy, tariff 2 Current month	Measurement
M T3 P (-> kWh) ***	Imported active energy, tariff 3 Current month	Measurement
M T4 P (-> kWh) ***	Imported active energy, tariff 4 Current month	Measurement
M T1 P (<- kWh) ***	Exported active energy, tariff 1 Current month	Measurement
M T2 P (<- kWh) ***	Exported active energy, tariff 2 Current month	Measurement
M T3 P (<- kWh) ***	Exported active energy, tariff 3 Current month	Measurement
M T4 P (<- kWh) ***	Exported active energy, tariff 4 Current month	Measurement
---	Exit	

*** not available in Measurement Canada models.

Settings menu

Page title	Description	Values	Default
Pd	Enter current password	Current password	0000
PrOtC	Protocol	**0**: Modbus RTU **1**: BacNET MS/TP	0
Addr (*)	Modbus address	From 1 to 247	1
bd (*)	Baud rate	**1200**= 1.2 kbps **2400**= 2.4 kbps **4600**= 4.6 kbps **9600**= 9.6 kbps **19200**= 19.2 kbps **38400**= 38.4 kbps **11520**= 115.2 kbps	9600
Pr(*)	Parity	**EvEn:** even **odd:** odd **non1:** no parity, 1 stop bit **non2**: no parity, 2 stop bit	non1
Addr (**)	MAC Address	From 0 to 127	1
bd (**)	Baudrate	9600/19200/38400/76800 bps	9600 bps
InF (**)	Maximum information frame number	From 10 to 255	10
[no title](**)	Device instance number	From 1 to 4194302	9999
rst(**)	Reset device and apply BacNET settings	**0:** no action **1:** reset command	0
Pulse	Pulse output energy	**P:** active energy **Q:** reactive energy	P

Page title	Description	Values	Default
qCal	Reactive power calculation	**0:** True **1:** Generalized	0
Pd	Password setting	From 0000 to 9999	0000
CAL	Measurement side	**1:** Primary **2:** Secondary	1
Lt	System	**3Ln:** 3-phase with neutral **2LL:** 3-phase without neutral **1LL:** 2-phase **1Ln:** 1-phase	3Ln
CT	Current transformer secondary	AV5 version: **5**: 5 A **1**: 1 A MA5 version: **200**: 200 mA **100**: 100 mA **80**: 80 mA RG5 version: **100**: 100 mV @50 Hz MV5 version: **333**: 333 mV	**AV5:** 5 **MA5:** 100 **RG5:** 100 **MV5:** 60
-	Current transformer primary	From 1 to 50000 A	**AV5:** 5 **MA5:** 10 **RG5:** 1000 **MV5:** 10
PT	Voltage transformer secondary	From 50 to 400 V	400 V
-	Voltage transformer primary	From 50 to 1000000 V	400 V
Pn	Pulse weight (pulses/kWh or pulses/kvarh, referred to secondary output)	From 1 to 60000	1000
PH	Pulse width	From 20 to 100 ms	30 ms

Page title	Description	Values	Default
Fn	Energy resolution	**0**: 1 kWh/kvarh/kVAh **1**: 0.1 kWh/kvarh/kVAh **2**: 0.01 kWh/kvarh/kVAh **3**: 0.001 kWh/kvarh/kVAh	1
uAdd	Page filter (add page)	From 1 to 25	-
Udel	Page filter (remove page)	From 1 to 25	-
Ch	Wiring check enabling	On/off	On
dirA	Phase 1 current direction	**0:** Positive **1:** Negative	0
dirB	Phase 1 current direction	**0:** Positive **1:** Negative	0
dirC	Phase 1 current direction	**0:** Positive **1:** Negative	0

(*) Setting available if PrOtC=0 (Modbus RTU)

(**) Setting available if PrOtC=1 (BacNET MS/TP)

CONFIGURE EM50

Configuration mode

You can configure EM50

- via UCS desktop (PC connected to EM50 via RS485)
- using the keypad

Configuration via UCS

To configure EM50 with UCS:

1. install UCS on your PC:

Application	Compatibility	Where to find it
UCS desktop	PC Windows 7 or later	www.productselection.net/Download/UK/ucs.zip

2. Connect the PC to EM50 via RS485 (using a USB to RS485 converter if needed)
3. Power on EM50
4. Start UCS and connect to EM50 via automatic scan or by manually setting correct communication parameters (default: address 1, baudrate 9600 bps, parity none).
5. Open the settings section, set parameters and save changes.
6. Check correct system operations using the data display and reading tools included in UCS.

Configuration via keypad

To configure EM50 by keypad:

1. Remove terminal protection covers
2. Power on EM50
3. Enter Settings menu pressing **SET**
4. Enter correct password (change digit value with **SCROLL** and confirm with **SET)**
5. Press **SCROLL** until you reach the parameter you want to change
6. Enter edit mode with **SET**
7. Change value with **SCROLL**
8. Confirm with **SET**
9. Exit setting menu (long press **SCROLL**)

Frequently used procedures

Set electrical system, CT ratio and VT ratio

1. Power on EM50
2. Press **SET** to enter SETTINGS menu
3. Enter the correct password (press **SET** to confirm a digit, press **SCROLL** to change the value)
4. Press SCROLL until you reach “Lt”
5. Press SET to enter editing mode and **SCROLL** to select the system (see *Settings menu*), **SET** to confirm.
6. Press **SCROLL**, set primary current and confirm.
7. Press **SCROLL**, set secondary current and confirm.
8. Press **SCROLL**, set primary voltage and confirm.
9. Press **SCROLL**, set secondary voltage and confirm.
10. Exit menu pressing **SCROLL** for more than 2 seconds (long press)

Note: *As alternative, connect to EM50 via UCS software and change the parameters from the Settings.*

Set the Modbus parameters

11. Power on EM50
12. Press **SET** to enter SETTINGS menu
13. Enter the correct password (press **SET** to confirm a digit, press **SCROLL** to change the value)
14. If the parameter PrOtC=0, press SCROLL to go to next page, otherwise press SET to enter editin mode, change it to 0 (**SCROLL**) and confirm (**SET**)
15. Press **SCROLL** to go the next parameter, the Modbus address. If needed, change it (**SET** to enter editing mode, **SCROLL** to change value and **SET** again to confirm)
16. Repeat the previous step for the following parameters (baudrate and parity)
17. Exit menu pressing **SCROLL** for more than 2 seconds (long press)

Note: *As alternative, connect to EM50 via UCS software and change the parameters from the Settings.*

Set the BacNET parameters

1. Power on EM50
2. Press **SET** to enter SETTINGS menu
3. Enter the correct password (press **SET** to confirm a digit, press **SCROLL** to change the value)
4. If the parameter PrOtC=1, press SCROLL to go to next page, otherwise press SET to enter editin mode, change it to 1 (**SCROLL**) and confirm (**SET**)
5. Press **SCROLL** to go the next parameter, the MAC address. If needed, change it (**SET** to enter editing mode, **SCROLL** to change value and **SET** again to confirm)
6. Repeat the previous step for the following parameters (baudrate, max information frame number and Device instance number)
7. Press **SCROLL** to go the page **RST.** Press **SET, SCROLL,** and **SET** again to confirm 1 (apply reset)
8. Exit menu pressing **SCROLL** for more than 2 seconds (long press)

ESSENTIAL INFORMATION

Alarm settings

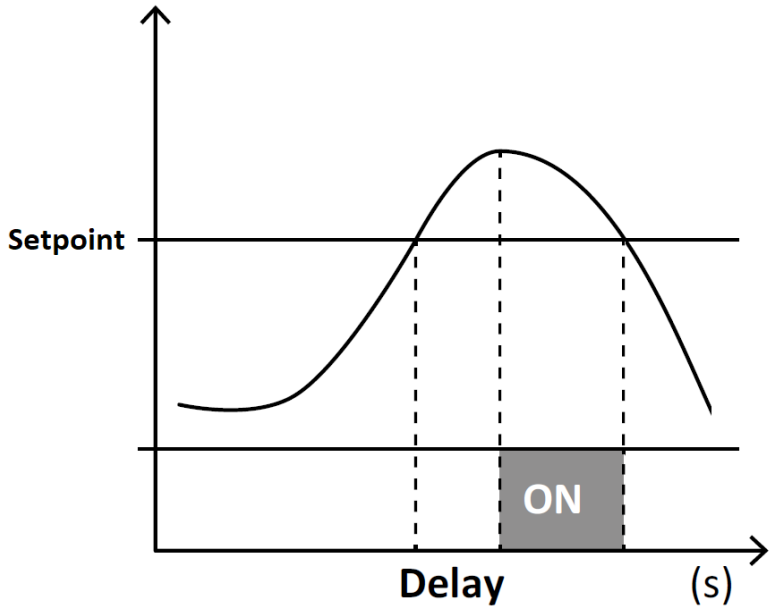
EM50 is able to manage 12 alarms linked to the measured variables.

For each variable you have to define

- Controlled variable (**Variable to be linked**), selectable among the measured variables
- Alarm type (**Comparing method**)
- Activation threshold (**Setpoint**)
- Activation delay (**On delay**)

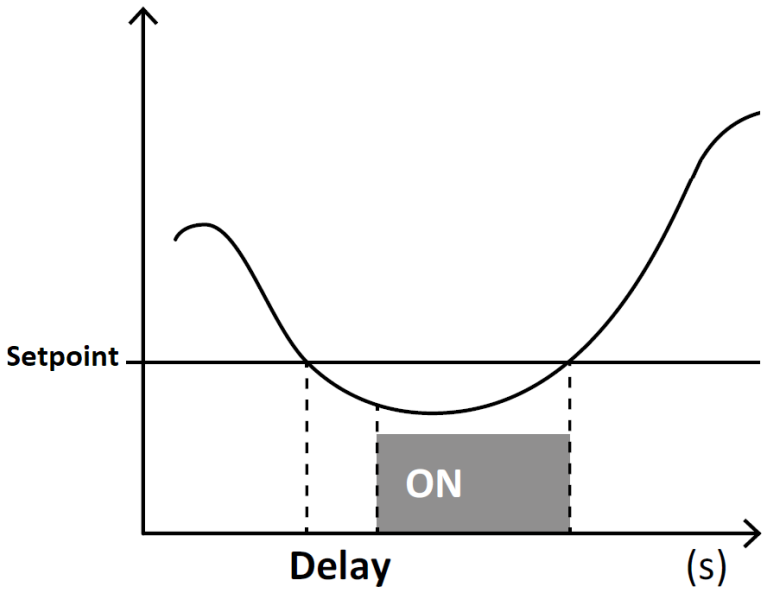
Up alarm (higher than)

The alarm is activated when the monitored variable exceeds the Setpoint value for a time equal to the activation delay (Delay) and is deactivated when it drops below.



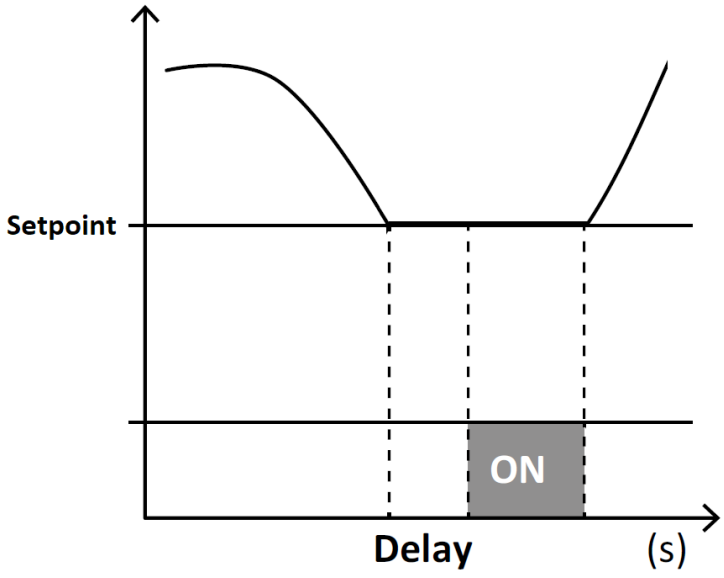
Down alarm (less than)

The alarm is activated when the monitored variable drops below the Setpoint value for a time equal to the activation delay (Delay) and is deactivated when it exceeds the Setpoint.



Equal-to-a-value alarm

The alarm is activated when the monitored variable is equal to the Setpoint value for a time equal to the activation delay (Delay) and is deactivated when it is different from the Setpoint.



Alarm setpoint

The alarm setpoint that you have to set depends on the monitored variable.

Current

The set point is Is referred to the secondary output of the current transformer or current sensor.

$$SETPOINT = SETPOINT_{prim} \cdot \frac{CT_{sec}}{CT_{prim}}$$

- $SETPOINT_{prim}$ is the desired setpoint referred to the primary

- CT_{sec} is:
  - 5 or 1 depending on the secondary of the current transformer (AV5 version)
  - 0.08 (MA5 version)
  - 1 (MV5, RG5 versions)
- CT_{prim} is:
  - The primary current (**AV5 version**)
  - The primary current corresponding to 333 mV (**MV5 version**)
  - The primary current corresponding to 80 mA (**MA5 version**)
  - 1000 using a 100mV/kA @ 50Hz Rogowski coil, being the primary current corresponding to 100 mV (**RG5 version**)

Voltage

In case of direct connection the setpoint is directly the desired setpoint (e.g 240 V)

In case of voltage connection via voltage transformer the setpoint is referred to the secondary.

$$SETPOINT = SETPOINT_{prim} \cdot \frac{VT_{sec}}{VT_{prim}}$$

- $SETPOINT_{prim}$ is the desired setpoint referred to the primary

- VT_{sec} is the secondary voltage
- VT_{prim} is the primary voltage

Active power, reactive power and apparent power

The set point (given in kW, kvar or kVA) Is referred to the secondary output of the current transformer or current sensor and the secondary of the voltage transformer.

$$SETPOINT = SETPOINT_{prim} \cdot \frac{VT_{sec}}{VT_{prim}} \cdot \frac{CT_{sec}}{CT_{prim}}$$

Power factor

The setpoint is a value from -1 to 1, without any further calculation needed

Frequency

The setpoint is directly expressed is Hz.

Alarm setpoint resolution and hysteresis

The hysteresis depends on the variable selected, being related to the resolution on the secondary side.

Variable	Resolution	Hysteresis
Voltage	0.1 V	0.05 V
Current	0.001 A	0.0005 A
Frequency	0.01 Hz	0.005 Hz
Power factor	0.001	0.0005
Active power	0.001 kW	0.0005 kW
Reactive power	0.001 kvar	0.0005 kvar
Apparent power	0.001 kVA	0.0005 kVA

Given that the setpoint is referred to the secondary, to get the resolution and hysteresis referred to the primary side, you have take into account CT and VT settings.

Example 1

- Model: EM50 AV5
- CT Primary=100 A, CT secondary=5 A
- VT Primary=500 V, VT secondary=100 V
- Alarm setpoint 5.063 kW, up alarm

The hysteresys is 0.0005 so the alarm will activate when the active power is greater than 5.0635 kW on the secondary that is equivalent to 5.0635*100/5*500/100=506.35 kW on the primary and disactivate when the power is below 5.063*20*5=506.3 kW.

Example 2

- Model: EM50 MA5
- CT Primary=100 A, CT secondary=80 mA
- VT Primary=500 V, VT secondary=100 V
- Alarm setpoint 0.053 kW, up alarm

The hysteresys is 0.0005 so the alarm will activate when the active power is less than 0.0525 kW on the secondary that is equivalent to 0.0525 *100/0.08*500/100=328.125 kW on the primary and disactivate when the power is above 0.053*100/0.08*500/100 =331.25 kW.

Outputs configuration

Static output

The static output is a pulse output that can be linked to

- active energy consumption or
- reactive energy consumption (not available in Measurement Canada version).

Note: *the pulse weight, that can be set via UCS software, is referred to the secondary side of current and voltage transformers. The parameter shall be therefore set in pulses/kWh_secondary or pulses/kWh_secondary.*

If you want to refer to the primary (pulses/kWh_primary) the value to be set is the following:

$$pulses/kWh\_secondary = \frac{pulses/kWh\_primary}{CT_{ratio} * VT_{ratio}}$$

For example if you want to set a pulse weight equal to 0.001 kWh/pulse (1000 pulses/kWh) and VT ratio is 1 while CT ratio is 200 (1000/5 A) the value you have to set is 5 (that is 1000/200).

Relay output

The relay output can can run one of the following functions:

If you set the relay function as…	then the output status…
Alarm	depends on the alarm settings and is • **OPEN** when all the alarms linked to the output are OFF • **CLOSED** when at least one of the alarms linked to the output is ON (OR condition) and the setting is **level** • **CLOSED for a few milliseconds** when one of the alarms trips and the setting is **pulse**
Remote control	is managed by a Modbus command

Demand variables (DMD)

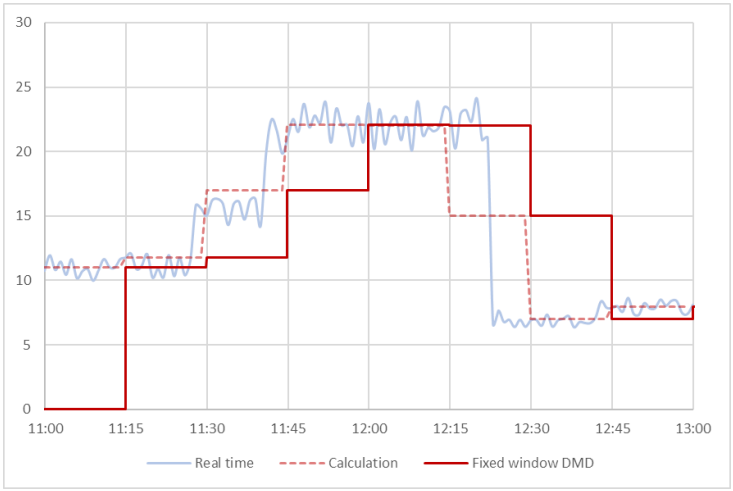
Calculation

The system calculates the average value of electrical variables in a set integration interval (15 min by default).

Calculation methods

The DMD calculation method can be set via UCS software.

Fixed window



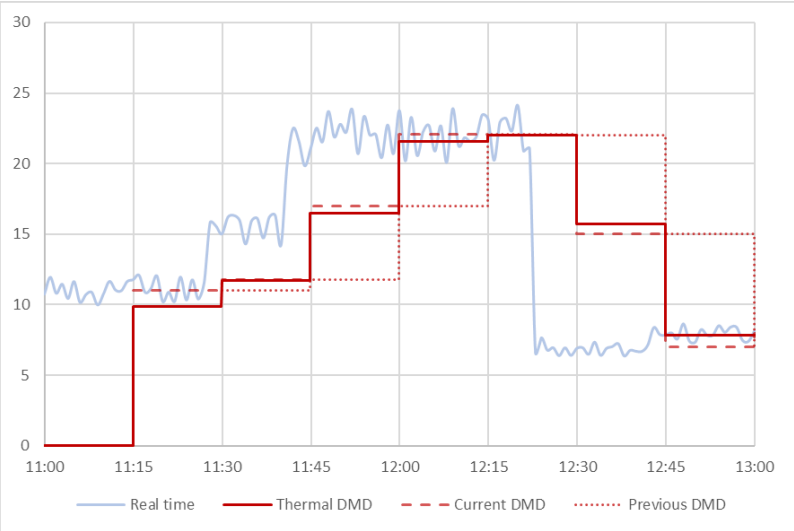
The value is updated every integration interval

Example (integration time 15 minutes):

- the value shown at 11:45 is referred to the interval 11:30-11:45,
- the value at 12:00 is referred to the interval 11:45-12:00
- the value at 12:15 is referred to the interval 12:00-12:15
- …

Note: during the first integration interval after power on the value is 0.

Thermal



The thermal calculation method is based on the fixed window calculation but includes a contribution of the previous interval.

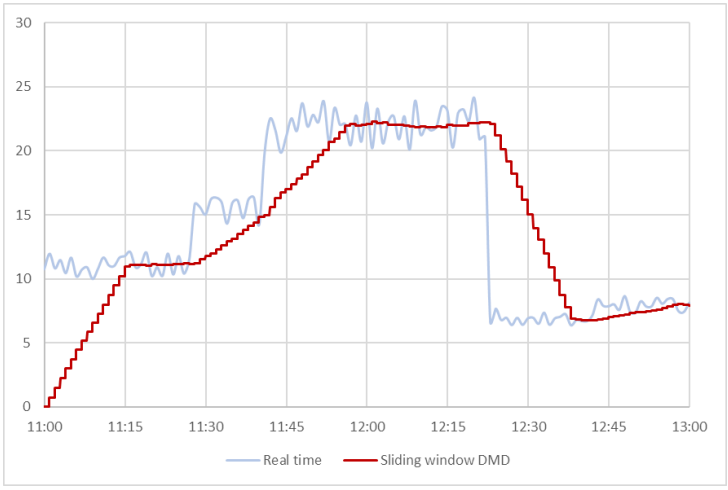
The value is calculated considering the last demand value and the current demand value:

(0.9* current DMD value)+ (0.1* previous interval DMD value).

Example (integration time 15 minutes):

- the value shown at 11:45 is the sum of
  - the average in the interval 11:15-11:30 multiplied by 0.1
  - the average in the interval 11:30-11:45 multiplied by 0.9
- the value shown at 11:46 is the sum of
  - the average in the interval 11:30-11:45 multiplied by 0.1
  - the average in the interval 11:45-11:46 multiplied by 0.9
- the value shown at 11:47 is the sum of
  - the average in the interval 11:30-11:45 multiplied by 0.1
  - the average in the interval 11:45-11:47 multiplied by 0.9
- …

Sliding window



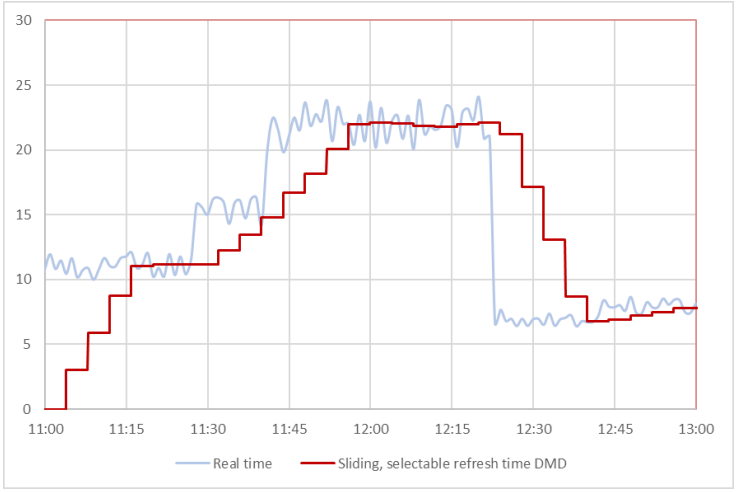
The value is updated every minute.

Example (integration time 15 minutes):

- the value shown at 11:45 is referred to the interval 11:30-11:45,
- the value at 11:46 is referred to the interval 11:31-11:46
- the value at 11:47 is referred to the interval 11:32-11:47
- …

Note: during the first minute after power on the value is 0.

Sliding window with selectable refresh time



The behaviour is the same of the calculation “Sliding window”, but the subinterval can be set to a value different from 1.

Example (integration time 15 minutes, sub-interval 4 minutes):

- the value shown at 11:45 is referred to the interval 11:30-11:45,
- the value is then updated at 11:49, referred to the interval 11:34-11:49
- the value is then updated at 11:53, referred to the interval 11:38-11:53

- …

Note: during the first minute after power on the value is 0.

Synchronization

The integration interval is synchronized with the power on or the setting programming.

- Integration interval start: at power on, or when you set DMD parameters
- First displayed value:
  - at the end of the first integration interval (fixed window or thermal)
  - at the end of the first sub-interval (sliding window or sliding window with selectable refresh time)
- Example 1:
  - On: at 11:28
  - Set integration time: 15 min
  - Calculation method: fixed window
  - First value displayed: at 11:43 for the interval from 11:28 to 11:43
- Example 2:
  - On: at 11:28
  - Set integration time: 15 min
  - Calculation method: sliding window
  - First value displayed: at 11:29 for the interval from 11:28 to 11:29

Metering

Measurement side

All the measurements shown on the display and transmitted via serial communication can be referred to the primary side or the secondary side of the current transformers and voltage transformers. You can set the measurement side via UCS software.

If measurement side is set to…	then measurements…	and CT ratio and VT ratio…
Primary	are referred to the real load on the primary	are considered to calculate currents, voltages, powers and energies
Secondary	are referred to the current and voltage inputs (secondary side of current and voltage transformers	are not considered

In the following table an example is shown:

Settings	Primary side	Secondary side
• 3-phase system • VT=10000/100 • CT=250/5	• V L1-N =9980 V • V L2-N =9950 V • V L3-N =9900 V • Current L1 =120 A • Current L2 =125 A • Current L3 =122 A • PF=0.98 • Active power=3576 kW	• V L1-N =99.8 V • V L2-N =99.5 V • V L3-N =99 V • Current L1 =2.4 A • Current L2 =2.5 A • Current L3 =2.44 A • PF=0.98 Active power=0.71 kW

Power factor convention

The sign of the power factor follows the IEC convention.

IEC convention

The sign the depends on the sign of the active power.

Quadrant	Active power	Reactive power	Power factor sign
1	Positive (kW>0)	Positive (kvar>0)	+

2	Negative (kW<0)	Positive (kvar>0)	-
3	Negative (kW<0)	Negative (kvar<0)	-
4	Positive (kW>0)	Negative (kvar<0)	+

Reactive power calculation

From UCS you can select the reactive power calculation method.

If you select…	then the calculation…
True	is based on the Budeanu's formula that considers the reactive power of each harmonic and introduces the concept of the distortion power. In this context the reactive power is $$Q = \sqrt{S^2 - P^2 - D^2}$$ where • Q=reactive power • P=active power • S=apparent power • D= distortion power
Generalized	neglects the harmonic content. In this case: $$Q = \sqrt{S^2 - P^2}$$

Energy resolution

The energy resolution is 0.001 (kWh, kvarh, kVAh) referred to the secondary side.

Absolute and net energy

The absolute energy is calculated as

$$|Positive\ energy| + |Negative\ energy|$$

The net energy is calculated as

$$|Positive\ energy| - |Negative\ energy|$$

Database

Introduction

EM50 is able to save automatically events and energy data.

The following databases are available:

- Events
- Max demand
- Monthly energy

Databases can be exported to .xls files from UCS software.

Event Database

The database includes the following tables:

Table	Description	Data recorded for each record	Number of records
Reset events	A new record is saved when one of the tables is reset	• Date • Time • Reset table (Setting changes events, DMD reset events, Cover opening events)	3
Setting change	A new record is saved when a setting is changed	• Date • Time • Setting	3
DMD reset	A new record is saved in case of DMD reset command	• Date • Time	3
Cover opening	A new record is saved when the terminal protection cover is open	• Date opening • Time opening • Date closing • Time closing	3

Alarms	A new record is saved in case of alarm status change (alarm on or alarm off)	• Date • Time • Monitored variable • Value • Status (alarm/no alarm)	20

Max DMD database

The database of maximum DMD includes time, date and the max value of the following variables:

Imported active power DMD

- kW+ DMD
- kW+ DMD tariff 1
- kW+ DMD tariff 2
- kW+ DMD tariff 3
- kW+ DMD tariff 4

Exported active power DMD

- kW- DMD
- kW- DMD tariff 1
- kW- DMD tariff 2
- kW- DMD tariff 3
- kW- DMD tariff 4

Imported active power DMD

- kvar+ DMD
- kvar+ DMD tariff 1
- kvar+ DMD tariff 2
- kvar+ DMD tariff 3
- kvar+ DMD tariff 4

Exported active power DMD

- kvar- DMD
- kvar- DMD tariff 1
- kvar- DMD tariff 2
- kvar- DMD tariff 3

- kvar- DMD tariff 4

Total apparent power DMD

- kVA DMD

Current DMD

- L1 current DMD
- L2 current DMD
- L3 current DMD

Monthly energy database

The monthly energy database includes the values of energies of

- the current month,
- the previous month and
- the month before (2 months ago).

The database can be downloaded using UCS software.

Note: Where not available, the energy value is still included in the file, but is fixed to 0.

Depending on the model the following meters are available

- Active energy

Energy	Standard (suffix X)	Measurement Canada (suffix MC)
kWh+	•	•
kWh-	•	•
kWh+ L1	•	•
kWh+ L2	•	•
kWh+ L3	•	•
kWh absolute	•	
kWh net	•	

- Active energy by tariff

Energy	Standard (suffix X)	Measurement Canada (suffix MC)
kWh+ tariff 1, 2, 3, 4	•	•
kWh- tariff 1, 2, 3, 4	•	•
kWh absolute tariff 1, 2, 3, 4	•	
kWh net tariff 1, 2, 3, 4	•	

- Apparent energy

Energy	Standard (suffix X)	Measurement Canada (suffix MC)
kVAh+	•	•
kVAh-	•	
kVAh+ L1	•	•
kVAh+ L2	•	•
kVAh+ L3	•	•
kVAh- L1	•	
kVAh- L2	•	
kVAh- L3	•	

- Reactive energy

Energy	Standard (suffix X)	Measurement Canada (suffix MC)
kvarh+	•	•
kvarh-	•	•
kvarh Q1	•	•
kvarh Q2	•	•
kvarh Q3	•	•
kvarh Q4	•	•
kvarh Q1 L1	•	•

kvarh Q1 L2	•	•
kvarh Q1 L3	•	•
kvarh Q2 L1	•	•
kvarh Q2 L2	•	•
kvarh Q2 L3	•	•
kvarh Q3 L1	•	•
kvarh Q3 L2	•	•
kvarh Q3 L3	•	•
kvarh Q4 L1	•	•
kvarh Q4 L2	•	•
kvarh Q4 L3	•	•
kvarh absolute	•	•
kvarh net	•	•

- Reactive energy by tariff

Energy	Standard (suffix X)	Measurement Canada (suffix MC)
kvarh absolute tariff 1, 2, 3, 4	•	•
kvarh net tariff 1, 2, 3, 4	•	•
kvarh+ tariff 1, 2, 3, 4	•	•
kvarh- tariff 1, 2, 3, 4	•	•
kvarh- tariff 2	•	•

Date and time

Date and time settings

The date and time can be set via UCS software

- manually
- via PC synchronization

Daylight savings time

The following is possible with UCS:

- disable daylight savings time management.
- set automatic time change

Tariff management

Tariff management mode

Tariffs can be managed by means of

- communication (Modbus commands)
- Calendar and internal clock

<table>
<tr><th>To manage tariffs via…</th><th>you have to…</th></tr>
<tr><td>communication</td><td>• Set tariff management via communication.
• Change the tariff by entering the value corresponding to the current tariff according to the following table in the 040Dh registry:
<table>
<tr><th>Value</th><th>Tariff</th></tr>
<tr><td>1</td><td>Tariff 1</td></tr>
<tr><td>2</td><td>Tariff 2</td></tr>
<tr><td>3</td><td>Tariff 3</td></tr>
<tr><td>4</td><td>Tariff 4</td></tr>
</table></td></tr>
<tr><td>Internal clock and calendar</td><td>• Connect to EM50 via UCS software
• Set time and date
• Set tariff management via clock/calendar.
• Set the tariff calendar and confirm</td></tr>
</table>

Display and keypad

Page filter

By using UCS software it is possible to select the measurement pages that are available in the basic menu of EM50, in addition to the total imported active energy.

Screensaver

After 120 s of inactivity, all the pages included in the page filter are shown in sequence (slide-show mode).

Programming lock cap

Applying the programming lock cap you can lock:

- Clock settings
- Setting change via RS485
- Run hour meter and meter operating time resets

To lock the functions described above:

1. Remove the programming lock cap
2. Connect to EM50 via UCS software
3. Enable the locking as desired and save
4. Mount the lock cap and fix it with a seal

Wiring check

The first and the second pages of the Full menu (can be accessed from the basic menu with a long press of **SCROLL**) helps detecting wiring errors.

Voltage connection check

In the first page of the Full menu you can check the **voltage connection**. The meaning of the six bits is the following:

Bit	**1**	**2**	**3**	**4**	**5**	**6**
Meaning	**V L1-N presence**	**V L2-N presence**	**V L3-N presence**	**V L1-N connection**	**V L2-N connection**	**V L3-N connection**
Value=0	OK	OK	OK	OK	OK	OK
Value=1	Missing	Missing	Missing	Wrong position	Wrong position	Wrong position

For example U010000 means VL2-N missing.

Current connection check

In the second page of the Full menu you can check the **current connection**. The meaning of the six bits is the following:

Bit	**1**	**2**	**3**	**4**	**5**	**6**
Meaning	**Current L1 direction**	**Current L2 direction**	**Current L3 direction**	**Current L1 connection**	**Current L2 connection**	**Current L3 connection**
Value=0	OK	OK	OK	OK	OK	OK
Value=1	Reverse	Reverse	Reverse	Wrong position	Wrong position	Wrong position

For example I000011 means that currents 2 and 3 are in the wrong position.

MAINTENANCE AND DISPOSAL

Cleaning

Use a slightly dampened cloth to clean the display. Do not use abrasives or solvents.

Responsibility for disposal

The product must be disposed of at the relative recycling centers specified by the government or local public authorities. Correct disposal and recycling will contribute to the prevention of potentially harmful consequences to the environment and persons.

DOWNLOAD

www.productselection.net

- software UCS
- datasheet
- instruction manuals