(6

(M145H01-03-18A)

CONFIGURATION GUIDE



CVM-A1500







SAFETY PRECAUTIONS

Follow the warnings described in this manual with the symbols shown below.



DANGER

Warns of a risk, which could result in personal injury or material damage.



ATTENTION

Indicates that special attention should be paid to a specific point.

If you must handle the unit for its installation, start-up or maintenance, the following should be taken into consideration:



In this manual, if the instructions marked with this symbol are not respected or carried out correctly, it can result in injury or damage to the unit and /or installations.

CIRCUTOR, SA reserves the right to modify features or the product manual without prior notification.

DISCLAIMER

CIRCUTOR, SA reserves the right to make modifications to the device or the unit specifications set out in this instruction manual without prior notice.

CIRCUTOR, SA on its web site, supplies its customers with the latest versions of the device specifications and the most updated manuals.

www.circutor.com





CIRCUTOR, recommends using the original cables and accessories that are supplied with the device.



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REVISION LOG

	Table 1: Revision log.					
Date	Revision	Description				
09/18	M145H01-03-18A	Versión Inicial				

Note: Device images are for illustrative purposes only and may differ from the actual device.



1.- CVM-A1500 INITIAL CONFIGURATION

1.1.- DATE AND TIME

From the main menu, go to the setup menu of and select the **Date and Time** menu

Set the date and time using the screen of Figure 1



1.2.- TIME ZONE

Select options +1, + 2, etc. to adjust the time in accordance with geographical location, **Figure 2**. Check the daylight saving time option if applicable.



Figure 2: Date and time configuration screen.



1.3.- MEASUREMENT CONNECTION MODE

From the main menu, go to the setup menu **O** and select the **Measurement connection mode** menu **O**.



Figure 3: Measurement connection mode configuration screen.

•The configuration values are:



Refer to the **CVM-A1500** (**M136B01-03-xxx**) manual access schemes of different modes of connection to the mains.

1.4.- INSTALLATION DATA

From the main menu, go to the setup menu 🖸 and select the Installation data menu 🕺



Figure 4: Installation features configuration screen.

Configure the 50 or 60 Hz mains frequency to adapt the device's sampling to the waveform frequency.

This screen is also used to configure the option of 2 or 4 quadrants, calculating and displaying Consumption or Consumption and Generation data.

1.5.- RATIO OF VOLTAGE TRANSFORMERS

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From the main menu, go to the setup menu \bigcirc and select the **Ratio of voltage transformers** menu \checkmark .



Figure 5: Voltage transformer ratio configuration screen.

Full-scale voltage must be configured for the voltage transformers in the voltage **Primary**. The primary and secondary voltage ratio will be from 1 to 1.0 when measuring directly up to 1000 V phase-phase or 600 V phase-neutral.

It is important to correctly configure the **Rated Ph-N Voltage**, as it is the reference used by the analyser to detect quality events (overvoltages, gaps or interruptions).

Example 1: 25000V / 110V ratio transformers are available, the device configuration should be:

✓ Primary: 25000
 ✓ Secondary: 110
 ✓ Rated Ph-N Voltage: 25000 / √3 ≈ 14434

According to Standard IEC 41000-4-30, the voltage values the events would be detected at are therefore as follows:

✓ **Overvoltage** \rightarrow 110% on Phase-Neutral rated voltage \approx 15877 VPh-N

✓ Voltage gap \rightarrow 90% on Phase-Neutral rated voltage ≈ 12990 VPh-N

✓ Voltage interruption \rightarrow 10% on Phase-Neutral rated voltage ≈ 1443 VPh-N

Example 2: In low voltage with direct measurement , no ratio transformers, the device would be configured as follows:

✓ Primary: 1
 ✓ Secondary: 1.0
 ✓ Rated Ph-N Voltage: 127 or 230 depending on the installation.



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1.6.- RATIO OF CURRENT TRANSFORMERS

From the main menu, go to the setup menu 0 and select the **Ratio of current transformers** menu \swarrow .



Figure 6: Current transformer ratio configuration screen.

Select the **primary** and **secondary** current according to the connected transformers. The **CVM-A1500** accepts.../5 ../1 A and MC efficient transformers.

The neutral current ratios are not shown when a connection to the mains is configured for measurement without neutral.

The secondary ratio can be configured as ".../A" whenever there is no transformer for neutral current measurement. In this case, the device will obtain the neutral current using mathematical calculations based on the other configuration parameters.

```
1.7.- DEFINING QUALITY EVENT DETECTION LIMITS
```

From the main menu, go to the setup menu 2 and select the Quality menu

Select **Quality Events** from the two options shown in the menu.



Figure 7: Quality events setup screen.

The CVM-A1500 shows the default values configured for event detection according to standard



IEC41000-4-30.

The **CVM-A1500** can be configured to be more sensitive if the installation requires lower % supply voltage quality events to be detected. For example, the overvoltage value could be configured to 105% and the gap value to 95%, as well as increasing the % interruption value.

The hysteresis value can also be increased to avoid detection of several consecutive interrelated quality events.

1.8.- CONFIGURATION OF THE ALARM FOR THE DETECTION OF QUALITY EVENTS

From the main menu, go to the setup menu 🖸 and select the **Relay digital outputs** menu

Note : It is necessary that the device has the expansion module of Digital Inputs / Outputs installed



Figure 8: Configuration screen of relay digital outputs.

From this screen the transistor or relay digital outputs are configured, being able to relate them to any instantaneous parameter that the device measures or calculates. This relationship is made using the **variable code** parameter indicated in the equipment manual tables (**M136B01-03-xxx**).

Exemple: Set the code of variable **112** (Detect quality event in any phase). This variable is temporarily activated from **0** to **1** in quality event detection in any phase.

Table 2:	Code of the quality	variables	usea	tor p	programming	the digital	and trans	istor outp	outs.

Quality variables								
Variable	Phase	Code	Phase	Code	Phase	Code	Phase	Code
Instantaneous Flicker (Pinst)	L1	94	L2	95	L3	96	-	-
PST Flicker (Pst)	L1	97	L2	98	L3	99	-	-
K Factor	L1	100	L2	101	L3	102	-	-
Voltage peak factor	L1	103	L2	104	L3	105	-	-
Current peak factor	L1	106	L2	107	L3	108	-	-
Quality event	L1	109	L2	110	L2	111		112



Table 2 (Continuation) :Code of the quality variables used for programming the digital and transistor outputs.

Variable	Phase	Code	Phase	Code	Phase	Code	Phase	Code
Transient	L1	113	L2	114	L3	115		116

Configure the alarm trigger values as follows:

✓ Minimum : 0
✓ Maximum : 1
✓ Pre-alarm : 0
✓ Delay ON : 0
✓ Delay OFF : 0
✓ Output status : N/A
✓ Latch : Disable

With this configuration, the configured relay contact will close temporarily for two seconds when detecting any type of quality event (overvoltage, gap or interruption) in any of the three phases.

2.- DATA DISPLAY - WEB SERVER

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2.1.- CONFIGURATION OF THE IP ADDRESS IN THE CVM-A1500

From the main menu, go to the setup menu **O** and select the **Expansion modules** menu . In this menu select the **Datalogger module**

Access the **Configuration of DHCP activation/deactivation** screen, and disable the automatic IP assignment.



Figure 9: Datalogger module setup screen (TCP Auto).

Access the Manual Configuration of the TCP parameters screen, and configure a known IP address (*Exemple*: 10.0.107.112).



Figure 10: Manual TCP Parameter setup screen.

Connect the device to the PC using an Ethernet cable, no crossover cable required.



2.2.- CONFIGURATION OF A STATIC IP ADDRESS ON THE PC

Access the **Properties of the Local Area Connection of the PC** and select **Internet Protocol Properties version 4 (TCP / IPv4), Figure 11.**

Organizar	 Deshabilitar este dispositivo de red 	Diagnosticar esta conexión »
	Conexión de área local Cable de red desconectado Intel(R) Ethernet Connection 1219-V Conexión de red Bluetooth 2 No conectado Dispositivo Bluetooth (Red de áre	Conexión de área local 2 Cable de red desconectado TAP-Windows Adapter V9 Conexión de red inalámbrica Circunet.com Intel(R) Dual Band Wireless-AC 82
	Wicrosoft Virtual WiFi Miniport A	Propiedades de Conexión de área local unciones de red Uso compartido Conectar usando:

Figure 11: Local area connection properties.

Select "Use the following IP address" and configure, for example (10.0.107.1/255.255.255.0), Figure 12.

General						
Puede hacer que la configuración IP se asigne automáticamente si la red es compatible con esta funcionalidad. De lo contrario, deberá consultar con el administrador de red cuál es la configuración IP apropiada.						
Obtener una dirección IP automát	icamente					
Osar la siguiente dirección IP: —						
Dirección IP:	10 . 0 . 107 . 1					
Máscara de subred:	255.255.255.0					
Puerta de enlace predeterminada:						
Obtener la dirección del servidor (DNS automáticamente					
Osar las siguientes direcciones de	servidor DNS:					
Servidor DNS preferido:						
Servidor DNS alternativo:						

Figure 12: Properties: Internet protocol version 4 (TCP/IPv4).

Run the web browser on the PC (preferably Google Chrome).

Enter the address configured in the **CVM-A1500** in the browser bar. The **CVM-A1500** web server will appear, **Figure 13**.



PowerStudio Client - Das X				
← → C ③ 10.0.107.112/html5/i	index.html			☆ 💻 🖬 🗄
🛄 Aplicacions 📙 CIRCUTOR 🄤 Trad	luctor de Google			
	0			j 🔶 🗄
Devices status			Events	
	Туре Ре	ercentage		
	Communicate	100%		
	Error	0%	0%	0%
	Not initialized	0%		
	Download file	0%		
			Active	Unrecognized
Devices			Shortcu	its
2	Total: 1			
1				

Figure 13: CVM-A1500 Web server.

2.3.- GENERATING A QUALITY EVENT IN THE CVM-A1500 DEMO KIT

The kit has three red push-buttons to cause a voltage gap/interruption in each of the three phases separately.

Check that all three buttons are not pressed. Enter the measurement menu and show Phase-Neutral voltage; this should be 230 or 127 V, as appropriate.

Press one of the buttons to trigger a Quality event.

A **Blue** indicator will appear in the top right of the device. A Power Quality event in the last 24 hours is indicated. The **Blue** indicator will disappear if 24 hours pass without event detection.

2.4.- DISPLAY AND DOWNLOAD DATA

Expand the main menu and select the **Table** or **Graph** menu.

Select the **CVM-A1500** device folder in the next window and select the **CVM-A1500** device, **Figure 14**.

Device selection	X
- CVM-A1500	
CVM-A1500	
System's event	
	Accept Cancel

Figure 14:Select the CVM-A1500 device.



Select the standard option in the displayed window, Figure 15.

Dis	scriminator and type selection	×
Тур	es	
S	Standard	•
	Accept Cance	:

Figure 15:Select the Standard option.

2.4.1.- STANDARD VARIABLES LOGS

Select in the **General** and **Power** tabs the variables to be displayed in a graph or in a table, **Figure 16**.

Variables selection						
General Power Energy Varia	bles Harmonics					
Active power						
✓ Active power III	Active power L1	Active power L2				
Active power L3	Minimum active power III	Minimum active power L1				
Minimum active power L2	Minimum active power L3	Maximum active power III				
Maximum active power L1	Maximum active power L2	Maximum active power L3				
Max. active P. demand L1 T1	Max. active P. demand L1 T2	Max. active P. demand L1 T3				

Figure 16:Variables selection.

Collapse all the variables menus by clicking on each title bar of the variables group until the **Accept** button is shown, and then click on it.

Variables	selection				×
General	Power	Energy	Variables	Harmonics	
1 Active	power				
II Capac	tive powe	ſ			
II Induct	ive power				
II React	ive power				
II Appar	ent power				
					Accept Cancel

Figure 17:Variables selection.



The **CVM-A1500** Web Server will display the data in the form of a Table or Graph after a few seconds, as previously selected, **Figure 18** and **Figure 19**.



Figure 18: Visualization of the data in the form of a graphic.

• These data can be downloaded to a JPG image by clicking on the

Ŧ	icon.
	icon

					: 🔶 🗒
		09/07/201	18 - 15/07/2018		
		Grouped by	Period		
		Manual • A	utomatic 🔹 🖬 🛃 י	→	
					Search
Date/time	CVM-A1500.Voltage L3 (V) 🗍	CVM-A1500.Voltage L2 (V)	CVM-A1500.Voltage L1 (V)	CVM-A1500.Current L1 (A)	CVM-A1500.Current L2 (A)
• 09/07/2018 00:00:00	230.803	230.64	230.497	31.771	26.078
09/07/2018 00:30:00	231.733	231.613	231.453	31.898	25.92
09/07/2018 01:00:00	231.04	231.003	230.81	34.992	26.283
• 09/07/2018 01:30:00	231.047	230.873	230.837	32.19	26.544
• 09/07/2018 02:00:00	231.32	231.26	231.173	32.239	26.383
• 09/07/2018 02:30:00	231.417	231.337	231.333	31.688	26.324
• 09/07/2018 03:00:00	231.697	231.627	231.613	31.881	26.148
09/07/2018 03:30:00	232.093	231.957	231.903	30.955	25.266
09/07/2018 04:00:00	231.193	231.13	231.027	33.013	28.277
09/07/2018 04:30:00	230.873	230.783	230.757	32.691	32.011

Figure 19: Visualization of the data in the form of a table.

These data can be downloaded to an Excel spreadsheet in CSV format by clicking on
 icon.



2.4.2.- ENERGY PERIODS LOGS

The **CVM-A1500** power analyser can measure total energy, by phase and by three tariffs, both in consumption and in generation.

To have the energy data in a given period, select **Energy type III** variables to display total energy, or **L1**, **L2** and **L3** for energies by phase.

√ariables	selection					×
General	Power	Energy	Variables	Harmonics		
It Activ	e energy					
•	Acti	ive energy III		Active energy L1	Active energy L1 Begin	
	Active	energy L1 End		Active energy L1 T1	Active energy L1 T1 Begin	
	A . 41		Figur	e 20:Variables selectio	on.	

• The "**Begin**" and "**End**" variables take the meter reading back to the beginning (**Begin**) and end (**End**) of the selected period.

Collapse all the variables menus by clicking on each title bar of the variables group until the **Accept** button is shown, and then click on it.

		0		:
	16/07/2018 - 22/07/2018			
	Grouped by Period			
+	Manual 🔹 Automatic 💌 🏢 📩 🕈	Search		
Date/time 11	CVM-A1500.Active energy III (kWh)			ţţ.
16/07/2018 00:00:00	9778.542			
16/07/2018 00:30:00	9660.319			
16/07/2018 01:00:00	10119.577			
16/07/2018 01:30:00	10105.915			
16/07/2018 02:00:00	9564.187			
16/07/2018 02:30:00	9593.943			
16/07/2018 03:00:00	9648.494			
16/07/2018 03:30:00	9593.777			
16/07/2018 04:00:00	9400.154			
16/07/2018 04:30:00	9874.778			
16/07/2018 05:00:00	10226.977			
Showing 1 to 11 of 28 entries		Previous	1 2	3 Next

Figure 21:Visualization of the data in the form of a table.

These data can be downloaded to an Excel spreadsheet in CSV format by clicking on icon.

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These data can be converted to graphic format using the **Graph** icon in the Web server menu.



Figure 22: Web server menu.

The information in the above table, Figure 21, is displayed in Graph format after a few seconds.



Figure 23:Visualization of the data in the form of a graphic.

• These data can be downloaded to a JPG image by clicking on the

L icon.

The closing period can be changed by selecting different resolutions for the data displayed, using the start and end of period control or calendar control



Figure 24: Changing the display period.



Select interval			×
From date		From time	
07/09/2018	=	00:00	G
To date		To time	
07/16/2018		00:00	G
		4	Cancel

Figure 25: Changing the display period.

2.4.3.- QUALITY EVENTS LOGS

Select the **Harmonics** tab (this will be changed to a tab called **Quality** in future versions), and select the variables shown in the image. Click on the header of the group of variables to minimize them.

Variables selection
General Power Energy Harmonics
II General
I Voltage harmonics
I Current harmonics
It Variables
II #MONETARY
IL EURO
alt % Vn
Events - History L1 Events - History L2 Events - History L3

Figure 26:Variables selection.

The Web server will display the table in Figure 27.

Powerstudio Client - Tab X			
C (10.0.107.112/html5/m	ndex.html		
🗄 Aplicacions 📋 CIRCUTOR 🏹 Tradi	actor de Google		
= Powerstudie	0		
1 C A B		20/04/2040 20/04/2040	
		22/01/2018 - 28/01/2018	
		Grouped by	
		← Week → 🖬 🕹 →	
			Search
Date/time	L CVM-A1500.Events - History L1	CVM-A1500.Events - History L2	CVM-A1500.Events - History L3
23/01/2018 10:35:44.970		% j 39.81 (230 ms - Vm 41.36 - Va 98.76)	
23/01/2018 10:35:45:200		1 0 (2000 ms - Vm 0 - Va 39.86)	
24/01/2018 10:34:03.220			% ↓ 40.2 (200 ms - Vm 40.22 - Va 0)
24/01/2018 10:34:03.430			⊥ 0 (1473600 ms - Vm 0 - Va 40.24)
24/01/2018 10:52:42.020	% j 25.37 (110 ms - Vm 32.89 - Va 96.66)		
24/01/2018 10:58:37:210		% j 25.24 (310 ms - Vm 27.78 - Va 101.01)	
24/01/2018 10:58:37.220	% j 25.3 (300 ms - Vm 26.67 - Va 95.5)		
24/01/2018 10:58:37.510	↓ 0 (400 ms - Vm 0 - Va 25.33)	↓ 0 (400 ms - Vm 0 - Va 25.26)	
24/01/2018 10:58:38	% j 25.28 (200 ms - Vm 25.32 - Va 0)	% į 25.22 (200 ms - Vm 25.25 - Va 0)	
24/01/2018 10:58:38.120	1 0 (1400 ms - Vm 0 - Va 25.32)	1 0 (1200 ms - Vm 0 - Va 25.25)	
24/01/2018 10:58:39.510	% ↓ 40.45 (200 ms - Vm 40.48 - Va 0)		
24/01/2018 10:58:39.710	↓ 0 (17800 ms - Vm 0 - Va 40.46)		
24/01/2018 10:58:57.900		% j 23.74 (210 ms - Vm 28.93 - Va 100.98)	
24/01/2018 10:58:58			% 1 23.68 (200 ms - Vm 27.37 - Va 97.91)
24/01/2018 10:58:58:130		1.0 (1800 ms - Vm 0 - Va 26.54)	0 (2000 ms - Vm 0 - Va 26.49)

Figure 27:Table of quality events.



• The first column shows the event detection date and time. In the hour they are indicated until the milliseconds.

• The events detected by each phase are shown in each column.

• A different icon is displayed to identify each event type (Overvoltage, Gap or Interruption).

Note : According to standard, when detecting a interrupt event, the Gap event and the interrupt event must first be recorded separately.

- The % of phase-neutraL voltage which triggered the detection is shown.
- In parentheses, it is shown:
 - \checkmark The length of the event in ms (milliseconds).
 - \checkmark The % of phase-neutral voltage measured, **Vm**, over the duration of the event.
 - \checkmark The % of phase-neutral voltage prior, **Va**, prior to the detected event is shown.

These data can be downloaded to an Excel spreadsheet in CSV format by clicking on

In the graph of **Figure 28**, all detected events are displayed according to their Phase-Neutral voltage% and duration.

Pou	ver _{studio}										
						CVN	/I-A1500				
					+	Grouped	by	l. →			
					W Events - His	tory L1 K Eve	nts - History L2	H Events -	History L3		
.64											
43											
13	24/0 Even	1/2018 11:06 Is - History L1: 40.5	8 % Vn								
13											
12										 	
2											
41											
21											
00											
50											
60					-					 	

Figure 28: Graphic of quality events.

These data can be downloaded to an Excel spreadsheet in CSV format by clicking on
 icon.



2.4.3.1.- Display of an extended waveform

Expand the main menu and select the **Graph** menu.

Select the CVM-A1500 device folder in the next window and select the CVM-A1500 device. On the screen in Figure 29 select "Waves form (extended)"

Discriminator and type selection	×
Types	
Standard	*
Standard Harmonics	
Waves form (extended) Event duration	

Figure 29:Select Waves form extended.

Select the variables to be displayed in the graph, Figure 30.

∨ariables se	election		\$
General			
II Voltage			
✓	Voltage wave form L1	Voltage wave form L2	Voltage wave form L3
L Current			
✓	Current wave form L1	Current wave form L2	Current wave form L3
			Accept Cancel

Figure 30: Variables selection.

After clicking on Accept, the CVM-A1500 web server will display the last waveform recorded, Figure 31.







• These data can be downloaded to a JPG image by clicking on the icon.

Note: In section **5.2** of the manual of the **CVM-A1500** (**M136B01-03-xxx**), it explains how to view, through the device screen, the registered quality events and their associated information.



3.- CVM-A1500 ADVANCED CONFIGURATION - PowerStudio EMBEDDED

3.1.- INSTALLATION OF PowerStudio SCADA (Editor)

Download the PowerStudio SCADA version from CIRCUTOR's website.

Run the installation on a 64-bit operating system. User, company, and serial number are information fields.

Choose the customised setup option during installation, and select the Client and Editor option. Follow the steps in the wizard to finish installing.



Figure 32: PowerStudio SCADA installation.

3.2.- IMPORTATION AND EXPORT OF THE **PowerStudio EMBEDDED** APPLICATION IN **CVM-A1500**

Once the editing and monitoring software is installed, run the **PowerStudio SCADA** editor by clicking on the **PowerStudio Scada Editor** icon in the start menu.

If a window is displayed to include new devices, choose no.

Click on the IMPORT button

after running the **PowerStudio SCADA** editor.





Figure 33: PowerStudio editor.

On the screen that appears, Figure 34, enter the IP address assigned to the CVM-A1500. The port is always 80.

M Import application
Engine address IP
Port
80 The communication engine requires authentication
User name
Password
Accept 🥻 Cancel

Figure 34: Import data.

After clicking on Accept, the system will import the **CVM-A1500** embedded system settings into the editing environment.

Events		
	36 %	
Importing		
	0 %	
	0 %	
	💢 Cancel	

Figure 35: Import data.

All the advanced settings options offered by **CIRCUTOR**'s **PowerStudio** embedded system are available once the import process is finished, **Figure 36**.





Figure 36:PowerStudio embedded.

Once made the changes in the advanced configuration of **PowerStudio** embedded of the **CVM-A1500**, it is necessary to send the application with the new configurations so that the Web

server implements them in the system. To do this, click on the Export button.

3.3.- CONFIGURATION OF ADDITIONAL VARIABLES WITH MATHEMATICAL CALCULATIONS

The **CVM-A1500**'s **PowerStudio** embedded system allows new variables to be generated using data from the analyser itself. These variables may contain relatively complex calculations.

For it, import the **CVM-A1500 PowerStudio** embedded system application into the **PowerStudio** Editor, and go to the **Setup** tab.



Figure 37: PowerStudio.



Go to **Calculated variables** module, **Figure 38**, click **Add** and enter a name for the group of variables.

If you want to record the variables the group will contain, check the **save** option and define the recording period.

Registering groups of variables with a recording period of less than 10 minutes is not recommended. If less time is configured, the system may not have enough memory to record the variables for the entire analyser for the remainder of the current month.

At the start of a new month, the embedded system provides the space necessary for the following month, deleting all the records for the oldest month if there is not enough memory.

₩ Calculated variables		
Blocks of calculated variables (Limited to 5)	(Limited to 5)	
Name Description	Identifier Name	Description
	👗 Add - Numeric	🚵 Add - Text
👫 Add 🛛 🖓 Modify 🖉 Delete	派 Modify	Delete
Accept	8	Cancel

Figure 38: Calculated variables screen.

Then generate as many variables as required in the group of variables created, and configure the available options. See the complete **PowerStudio** manual for more information about the functions of these settings.

General	Advanced
Identifier	Discriminator
VARIABLE1	<none></none>
Name	Forcible variable
VARIABLE1	Remember last forced value
Description	Incremental
VARIABLE1	Meter
Accuracy	Maximum value
3 decimals	▼ 32 bits ▼
Units	Agrupation criteria
< Without units >	Average value
	When you save if no value to evaluate expression Formula
Formula (Empty cell)	
	Graph
Events	Table

Click on the **Wizard** button to generate the formula of the variable that is being configured.

The screen in Figure 40 appears, where they are displayed the options to access different items





Figure 40: Formula creation assistance.

• The first option will help you to choose a variable integrated in the device, or a variable integrated in another group of previously created variables.

Y Select driver		x
Groups Groups CVM-A1500 CVM-A1500		
Accept	样 Cancel	

Figure 41:First option.

• The second option gives access to the special mathematical calculation functions available in the embedded system. See the **PowerStudio** manual for more information on each of these functions.

Function	to add in the ex	xpression		
- Functions -				
sqit log exp sin cos tan asin acos				
		sqrt(
• (🖌 Accept		💢 Cancel	0.0

Figure 42:Second option.

•The third option shows the logical operations and symbols to complete the formula.

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Figure 43:Third option.

As an example, configure a group of variables containing three variables set up as follows, **Figure 44**.

The maximum is 5 groups of variables with 5 variables.

Y Calculated variables			
Blocks of calculated variables (Limited to 5)	Variables for the group 'Quality' (Lin	ited to 5)	
Name Description	Identifier	Name E	escription
& Quality	12 OVER_TOTAL	OVER_TOTAL C	VER_TOTAL
	12 SAG_TOTAL	SAG_TOTAL S	AG_TOTAL
	♥ UNDER_TOTAL	UNDER_TOTAL L	INDEH_TUTAL
	🐍 Add - Numeric	👗 Adı	d · Text
Add 🦓 Modify 👫 Delete	🐉 Modify	C	velete
Accept		💢 Cancel	

Figure 44:Calculated variables, example.

Define each variable as indicated in Figure 45.

Modify calculated variable	X
General Identifier VER_TOTAL Name OVER_TOTAL Description OVER_TOTAL Accuracy Without decimals Units < Without units >	Advanced Discriminator <none> Forcible variable Remember last forced value Incremental Meter Maximum value 32 bits Agrupation criteria Last value When you save if no value to evaluate expression Formula 0</none>
Formula 0 Events	Graph Table
Accept	🕌 Cancel

Figure 45:Calculated variables, modify calculated variable.



All three variables must have the **Forcible variable** option enabled, as a **Agrupation criteria** *Last value*. The formula must contain a zero.

3.4.- CONFIGURATION OF ALARMS FOR SENDING EMAILS

The **CVM-A1500**'s **PowerStudio** embedded system is capable of sending e-mails according to a condition programmed in the **events** module. It can also be used to set up mailing lists to send mail to different users at the same time.

To configure this feature, it is necessary to pre-program the account and the outgoing mail server from which the embedded **PowerStudio** system will send the mail. To do this, access the **Preferences** module,**Figure 46**.

Modem Port Server URL PIN Baude Rate Database Default capture period 15 minutes	General Language English Save system events Updates Mail Gonfigure mail server Distribution lists	Client application Client application Enable toolbar Enable statusbar Start visualization C Device status Device	Authentication Activate user authentication Characterization Active events RSS
Database Default capture period	Modem Port PIN Baude Rate		Server URL
	Database Default capture period		Number of RSS items

Click on the **Configure mail server** button

🍠 Configure mail server



🔪 Configure mail server 🛛 🔀	J						
Mail address							
medidacircutor@gmail.com							
Mail server address (SMTP)							
<user defined=""> smtp.gmail.com</user>							
Port							
587							
The mail server (SMTP) requires identification							
Password							

Repeat password							

Protocol SSL							
😿 Testing configuration							
Accept 🎽 Cancel							

Figure 47: Configure mail server.

👩 Testing configuration...

Click on the test button to ensure that the account settings are correct and the embedded system has connectivity to the configured mail server.

If the outgoing server does not work properly, check the account settings and ensure the **CVM-A1500** has Ethernet connectivity and the mail server is accessible.

If you are sure the settings and connectivity are correct, click on **Accept** and carry out the steps detailed below to automatically send a test email using the event settings.

Once the mail server and outgoing account are configured, go to the main **Setup** panel and select **Events** to generate a new event.



Figure 48:Main Panel: Setup tab.

On the screen of Figure 49 add a new event. The **PowerStudio** embedded system in the **CVM-A1500** supports up to 10 events.



🐚 Eve	nts set up		-			x
Even	nts (Limited to 10)		Disable according to	even Notify	Register	
	😯 Add		Modify		麗 Delete	
	~	Accept		💢 Canc	el	

Figure 49:Add a new event.

As an example, configure an event to send an email in the case of detecting an overvoltage in any of the three phases.

Name		
Alarm OVER VOLTAGE		
General Advanced Motor's actions Client's action	8	
Condition (Empty coll)		
		**
r Use condition for deactivation		
Deactivation condition (Empty cell)		
		ja.
Notify through emerging window	🔲 Register in file	
- Groups		

Click on the

2

Wizard button to generate the activation condition.

Select the Quality tab and check the Overvoltage counter Phase 1 variable, Figure 51.





Select variables - CVM-A1500				-	-	-					-		20		
General Power Maximum demand Energy / Cost Voltage H	narmonics	Current ha	armonics Qua	ality Other	variables BAS	E Module	e 1 Module	e 2 Module :	3 Module 4						
	Instant	aneous				Maximu	ums				Minimu	ns			
			A	1				/	All				,	All	
		L1	L2	L3			L1	L2	L3			L1	L2	L3	
Ponderated flicker		_	F	F			F	F							
Pot		_	-	_		-	-	_				_		_	
Freet factor - Voltage		_	-			-		_				_		_	
					_					_			1		_
Asumetru - Voltage															
Direct imbalance - Voltage										1					
Indirect imbalance - Voltage															
Homonolar imbalance - Voltage															
Eactor K		Г	Г	Г			Г	Г				Г	Г	Г	
Crest factor - Current						-							Г		
Imbalance - Current		~	-	-	Г		-	-	~	Г		-		-	Г
Asymmetry - Current					Γ					Г					
Direct imbalance - Current					Г										
Indirect imbalance - Current					Г										
Homopolar imbalance - Current															
Overvoltage counter	•	~													
Sag counter															
Interrupt counter	•														
Transient counter	•														
	\$	Accept							ä	Cancel					

Figure 51:Select variables.

After clicking **Accept**, the following expression is displayed in the formula field. After clicking OK, the following expression is displayed in the formula field. This expresses the overvoltage counter of Phase 1 of the**CVM-A1500**:

[CVM-A1500.OCEVQ1]

Complete the formula with the following expression. The number of overvoltage events of the three phases are therefore added up.

[CVM-A1500.OCEVQ1] + [CVM-A1500.OCEVQ2] + [CVM-A1500.OCEVQ3]

The activation condition of the event needs a comparison in order to be carried out. It will be compared with the variable calculated in previous steps.

[CVM-A1500.OCEVQ1] + [CVM-A1500.OCEVQ2] + [CVM-A1500.OCEVQ3] > [R\$CAL_Quality.OVER_TOTAL]

To include the variable **[R\$CAL_Quality.OVER_TOTAL]** in the formula, select the **Wizard** button followed by the group of calculated variables.

Magnetic Select driver
Groups □ □ Devices □ □ CVM-A1500 □ □ CVM-A1500

Figure 52:Selection of the calculated variables (Step 1).



On the screen of **Figure 53**, choose the variable that will contain the value of the number of total overvoltage events of the three phases.

Mage Select variables - Calculated variables	×
Quality	
Description	
Name	
OVER_TOTAL	v
SAG_TOTAL	
UNDER_TOTAL	
Accept	Zancel

Figure 53:Selection of the calculated variables (Step 2).

The **action** the **CVM-A1500 PowerStudio** embedded system is to run must be configured once the event activation condition is defined. This is done by selecting **Motor's actions** and the **On activating** tab, **Figure 54**.

🐚 Modify event	Suchashas Country	
Name		
Alarm OVER VOLTAGE		
General Advanced Motor's action	S Client's actions	
On activating While is active O	n deactivating	
Туре	Description	

Figure 54:Selection of the calculated variables (Step 3).

Click on the Add button and select the Send mail option, Figure 55.



Figure 55:Selection of the calculated variables (Step 4).

Then include a text message and indicate email address of its recipient, Figure 56.



Modify action send mail	4 1	-	x
Message			
OVER VOLTAGE AT CIRCUTO	R FLOOR 2		*
			~
	🌮 Assistant		
Mail address			
circutor@circutor.com			
🔊 Add	∭⊛ Modify	∑a Delete	
	Mail		_
		1	
💁 Add	👌 Modify	Delete	
Mailing lists			
	1	Link	
Add		[편] Delete	
🖌 Accept		💥 Cancel	
			1

Figure 56:Selection of the calculated variables (Step 5).

Finally, the new total value from adding together the overvoltage meters of the three phases is passed to the associated variable, which it is compared with to activate the event.

Select Add new event, and choose the Force one variable option,

Help to create an action	×			
What action do you want to add?-				
Force one variable	Execute an external programme			
Send mail	Send SMS			
Cancel				

Figure 57:Selection of the calculated variables (Step 6).

Click on the **Wizard** for the overvoltage event.

button to search for the previously calculated variable



Using the same button, then select the **CVM-A1500** overvoltage meter for line 1 and finish configuring the sum with the other two overvoltage events meters of the other two phases.

Yerce variable modify action	x	
Variable		
[R\$CAL_Quality.OVER_TOTAL]		
Value (3)*		
[CVM-A1500.0CEVQ1] + [CVM-A1500.0CEVQ2] + [CVM-A1500.0CEVQ3]		
🖌 Accept 🛛 🎉 Cancel		

Figure 58:Selection of the calculated variables (Step 7).

Click on **Accept** in all windows.

Finally, **Export** the application as explained above, in order to apply the changes to the **CVM-A1500 PowerStudio** embedded system.

From now on, the **CVM-A1500** embedded system will send an email every time it detects overvoltage in any of the three phases.

The same settings can be used for the other two types of events, Gaps and Interruptions, following the same steps as above. Remember to **Export** the application to the **CVM-A1500** power analyser to apply the changes.

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