Energy Meter Selection Guide

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Victron VM-3P75CT

ET112

ET340

EM540

ABB B21

ABB B23/B24

Venus OS supports several types of energy meters, some of which are manufactured and/or stocked by Victron and others that need to be purchased from the manufacturers directly, such as Carlo Gavazzi or ABB.

The Energy Meters are used in systems with a GX device to measure the output of a PV Inverter, a AC Genset or as a Grid Meter in an ESS installation. It also can be used to measure AC loads.

The VM-3P75CT energy meter connects to the GX device via VE.Can or Ethernet and is ready to use out of the box with no configuration required. Alternatively, the EM24 Ethernet meter can be used, provided the meter connects to a local network in such a way that the GX device can reach it. All other Energy Meters listed here connect to a GX device via RS485 either through a wired connection via a RS485 to USB interface or wirelessly via a Zigbee to USB and Zigbee to RS485 converters. Its data is then displayed on a GX device and the VRM portal.

To make a selection, first decide if you need a single-, split- or three-phase meter:

Which Energy Meter should be selected depends on the installation, the number of phases you want to measure and the maximum current per phase.

Examples: For a three-phase utility connection, use a three-phase meter. For a three-phase PV Inverter, use a three-phase meter as well. For a single-phase utility connection, use a single-phase meter or alternatively a three-phase meter; most of them have a single-phase mode. And in an installation with a single-phase utility connection, that also has a PV Inverter that needs measuring with an energy meter, then you can use two pieces of ET112 or use the ET340. If the application exceeds the max. current rating, use an Energy Meter with current transformers. Note that most PV Inverters feature "direct-readout" by the Victron system and thus don't need their output to be measured by an energy meter.

Now, based on current, select the model:

Requirement	Measurement type	Solution
Single-phase up to 100A	Direct/Shunt	ET1XX / EM1XX / ABB B21
Three-phase up to 65A/phase	Direct/Shunt	ET340 / EM24 / EM340 / EM540 / ABB B23
Single-phase more than 100A/phase	Current Transformers	Not available, use a 3-phase CT solution
Split-phase more than 65A/phase	Current Transformers	VM-3P75CT
Three-phase more than 65A/phase	Current Transformers	VM-3P75CT / EM24* / EM330 / EM530 / ABB B24

* EM24DINAV53DISX only, not stocked by Victron

Choose between RS485, VE.Can and/or Ethernet connection:

The Ethernet mode of the VM-3P75CT and the EM24 Ethernet will have an advantage in installations where an Ethernet network is available. Rather than having to pull an RS485 wire between the main AC distribution board and the storage system, the existing Ethernet can be used. The disadvantage is that this relies on that network functioning properly – in case of issues the storage system will switch to idle mode: passthrough.
It's even easier via the VE.Can connection, a direct connection between the VM-3P75CT and the GX device that works completely independently of a network connection.

The VM-3P75CT offers a configurable energy registration method, allowing selection between vector, arithmetic, or absolute registration. This flexibility makes it suitable for various regional requirements. Vector registration is the preferred method for countries, such as Germany and Austria and most other countries. In contrast, the EM24, EM5XX, and ABB meters use only vector registration. All other energy meters use arithmetic registration. See FAQ Q8 in the Victron Energy Meter manuals for further details regarding energy counting differences.

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Energy Meter	VM-3P75CT	ET112	ET340	EM540	EM24 Ethernet [5]
Manual	VM-3P75CT	ET112	ET340	EM540	EM24 Ethernet
Part number	REL200300100	REL300100000	REL300300000	REL200100100	REL200200100
Display	No			LCD	
Phases	3	1	3		
Max Current Rating	80 A	100 A	65 A per phase		65 A per phase 5 A per phase
Measurement type	CTs	Direct/Shunt			Direct/Shunt CTs
Comms	VE.Can / Ethernet	RS485			Ethernet
Refresh rate	100 ms	750 ms	2000 ms	100 ms	600 ms
Power Factor reporting	Yes	No		Yes	No
Phase sequence reporting	Yes	No	Yes	Yes	
Remarks	Also for split-phase	ET112DINAV01XS1X	ET340DINAV23XS1X	EM540DINAV23XS1X	EM24DINAV23XE1X EM24DINAV53XE1X [3]

Other Energy Meters with GX firmware support									
Energy Meter	EM111	EM112	EM330 [1]	EM340 [1]	EM530 [1]	EM24 RS485 [1]	ABB B21 [1,2]	ABB B23 [1,2]	ABB B24 [1,2]
Manual	EM111	EM112	EM330	EM340	EM530	EM24 RS485	B21	B23	B24
Part number	Not stocked								
Display	LCD								
Phases	1		3				1	3	
Max Current Rating	45 A	100 A	5 A per phase	65 A per phase	5 A per phase	65 A per phase	65 A	65 A per phase	
Measurement type	Direct/Shunt		CTs	Direct/Shunt	CTs	Direct/Shunt			CTs
Comms	RS485								
Refresh rate	750 ms		1200 ms	-	100 ms	600 ms	480 ms		
Power Factor reporting	No						Yes		
Phase sequence reporting	No		Yes				No		
Remarks			EM330DINAV53HS1X27 EM330DINAV53HS1PFB27	EM340DINAV23XS1X27 EM340DINAV23XS1PFB27	EM530DINAV53XS1X	EM24DINAV93XISX	2CMA100155R1000 Silver	2CMA100169R1000 Silver	2CMA100183R1000 Silver

[1] Selected models are supported
[2] Zigbee connection is not supported
[3] Not stocked by Victron
[4] Refresh rate = how often the energy meter provides a new value in its registers. Note that the GX device's latency (the time it takes to read at 9600 baud) is between 180 and 250ms.