



Servers and data centres protection and monitoring solutions

Controls

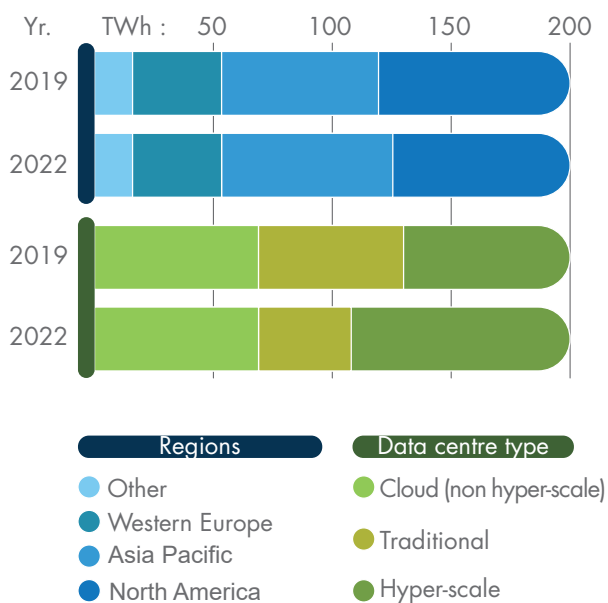
Solutions

From servers to Data Centres

■ Data Centres, a battle between growth and efficiency

As the world becomes increasingly digitized, information and communications, technology is emerging as an important source of electricity demand. Billions of devices and machines are already connected, and more will be connected over the coming years, using electricity directly and fuelling growth in demand for data centre and transmission network services.

Electricity demand in the world's data centres in 2019 amounted to 200 TWh, about 1% of the global electricity demand. While IP traffic and workloads are projected to triple in near terms, global data centre electricity demand is expected to remain flat up to 2022 based on efficiency trends, see the graph below.



Font: IEA, World Energy Outlook 2020

The strong growth in demand for data centre services is offset by continued improvements to servers, storage devices, network switches and data centre infrastructure as well as a shift to much larger shares of highly efficient cloud and hyper-scale data centres supported by the use of artificial intelligence and machine learning that will reduce the energy intensity of data centre services even more.



■ 5 good reasons to have a critical power & data centre monitoring solution:

1. because it is an energy-intensive user (usually more than 20MW for large data centres);
2. because it has to provide a 99.9% up-time (equivalent to 364.3 uptime days);
3. because the most overlooked elements are power utilization, consumption and monitoring;
4. because making the right decisions can improve server health and data centre efficiency;
5. because you can't effectively manage something you can't monitor. The only way to run a properly optimized data centre is to have a solid monitoring platform designed for your environment.

■ Avoid unplanned downtime costs

According to a survey made in the USA (the largest data centre market) by the Ponemon Institute, the average cost per minute of unplanned data centre downtime is 5,900 USD. A significant cost which can be avoided using a proper monitoring solution.

The data centre industry is using different technical solutions and installation technologies, depending on the number of servers, where the most important goal is always, directly or indirectly, the streamlining of costs and the maximizing of savings. The following list shows you the different individual or combined approaches:

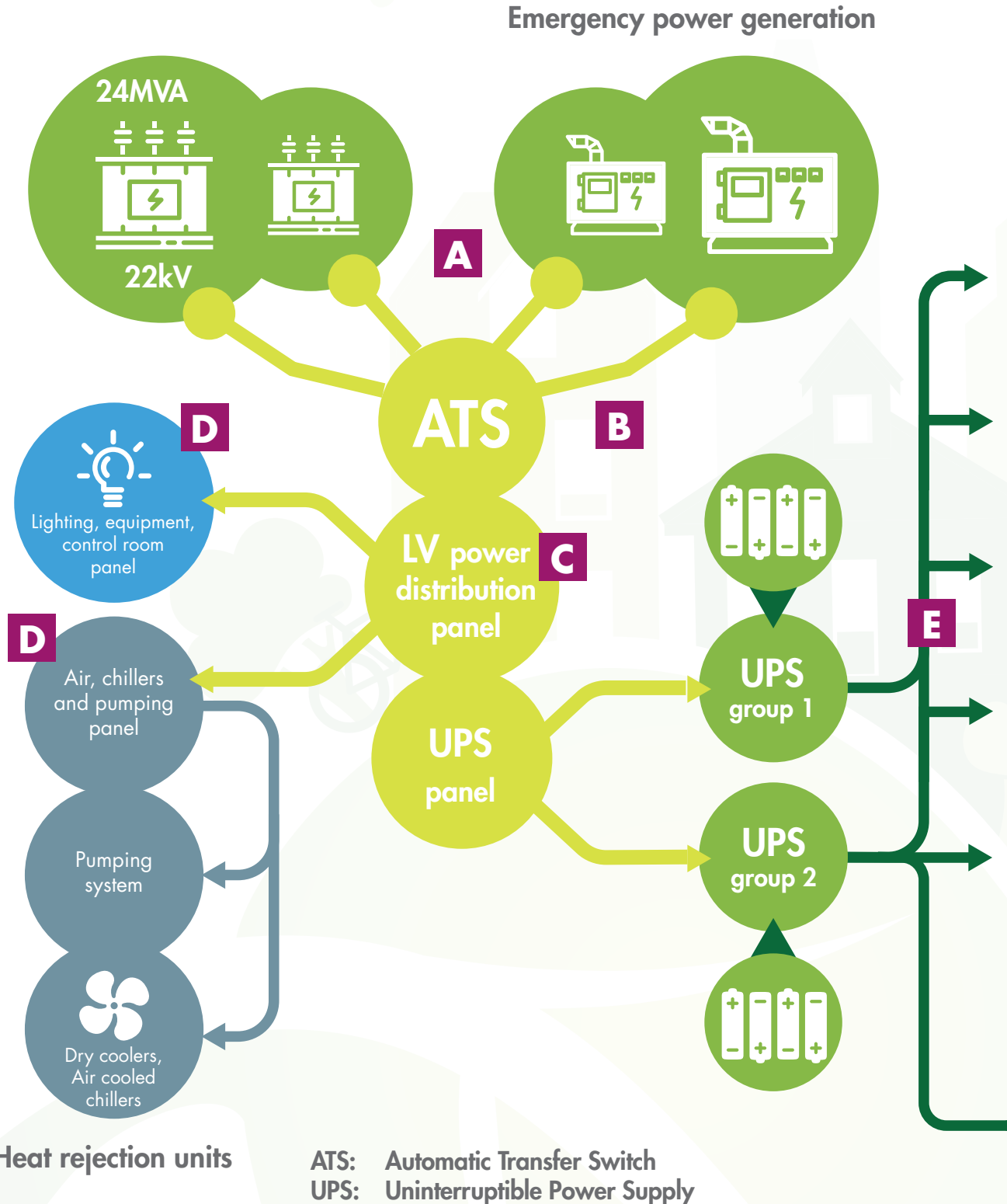
- the **"prefabricated modular data centre"** where the aim is the short deployment timeframe and improved predictability of performance;
- the **DCIM "Data Centre Infrastructure Management"** where the set of tools that help to organise and manage the infrastructure and the PUE (Power Usage Effectiveness) is a measure of how efficiently a data centre uses energy;
- the **"green data centre"** where the maximum energy efficiency and minimum environmental impact is the goal.

Monitoring

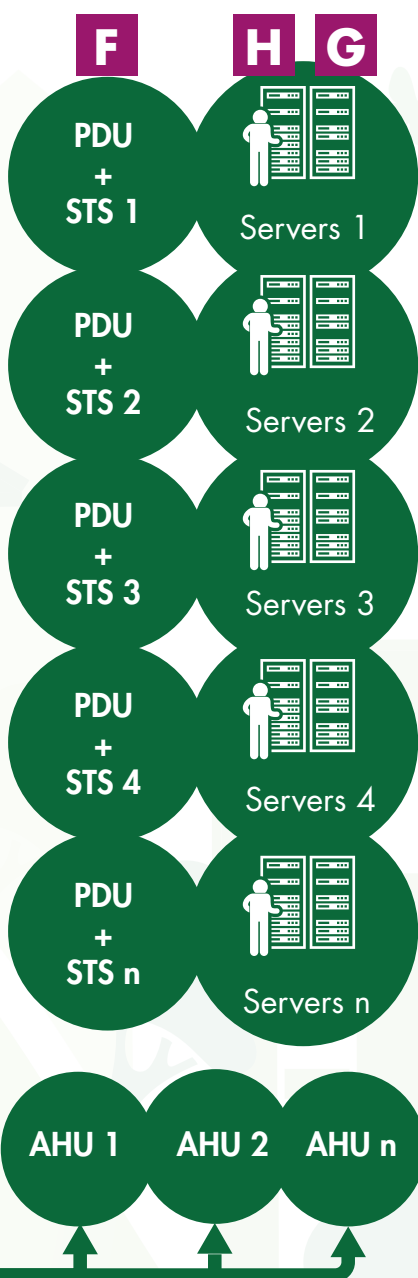
The map

■ The Carlo Gavazzi protection and monitoring map

This map guides you, in this example, through the Carlo Gavazzi competences and product solutions. A journey through protections, core units, utility meters data acquisition and integration solutions. But also integration of main, sub-metering and high density metering systems in existing and new installations!



Servers room



PDU: Power Distribution Unit
STS: Static Transfer Switch
AHU: Air Handling Unit

The topics

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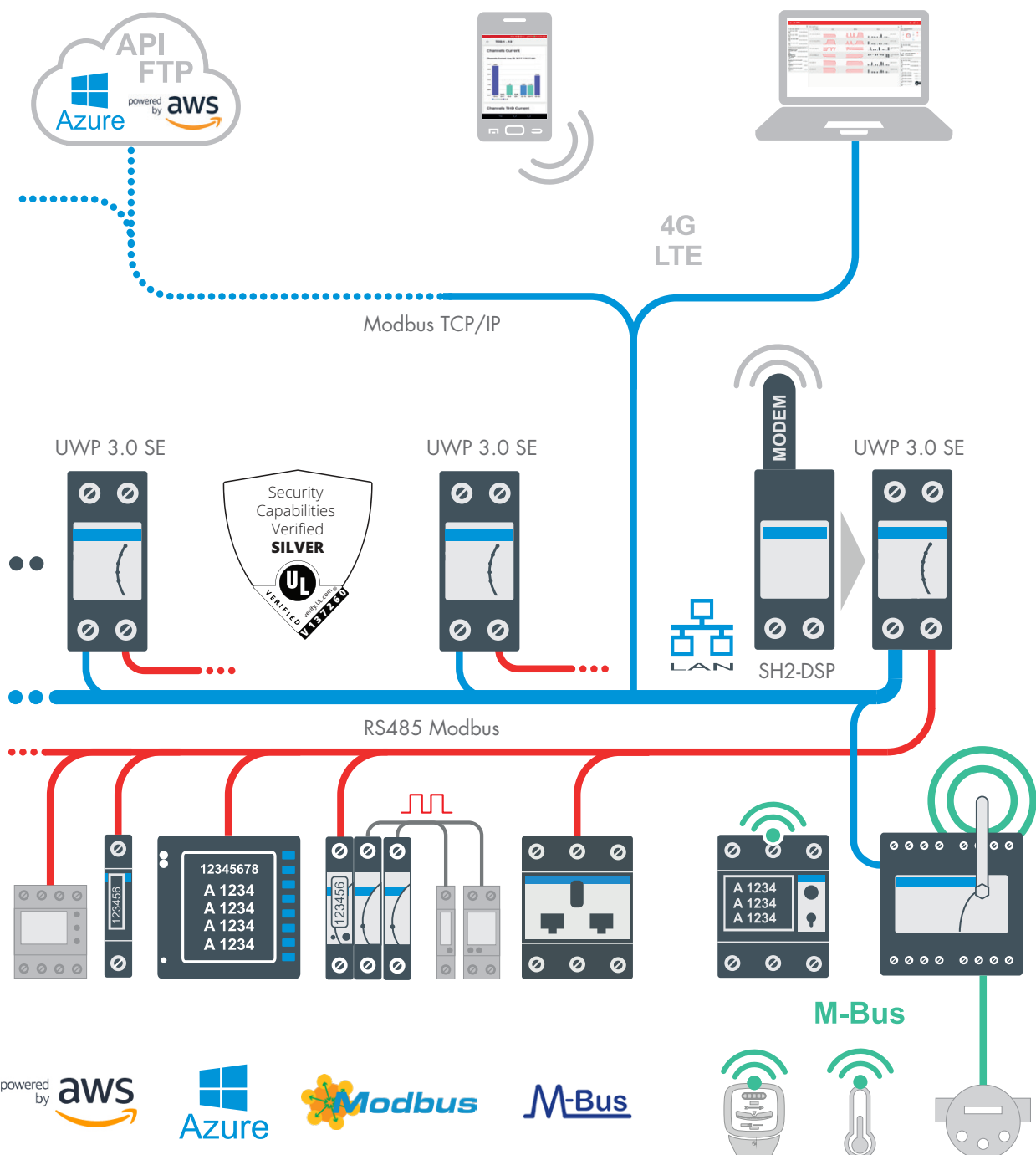
Platform

One platform, many integration solutions

Communication, analysis and reporting in one unit

UWP 3.0 SE is a core unit capable to collect data from meters and other sensing devices suitable to be used to monitor critical loads.

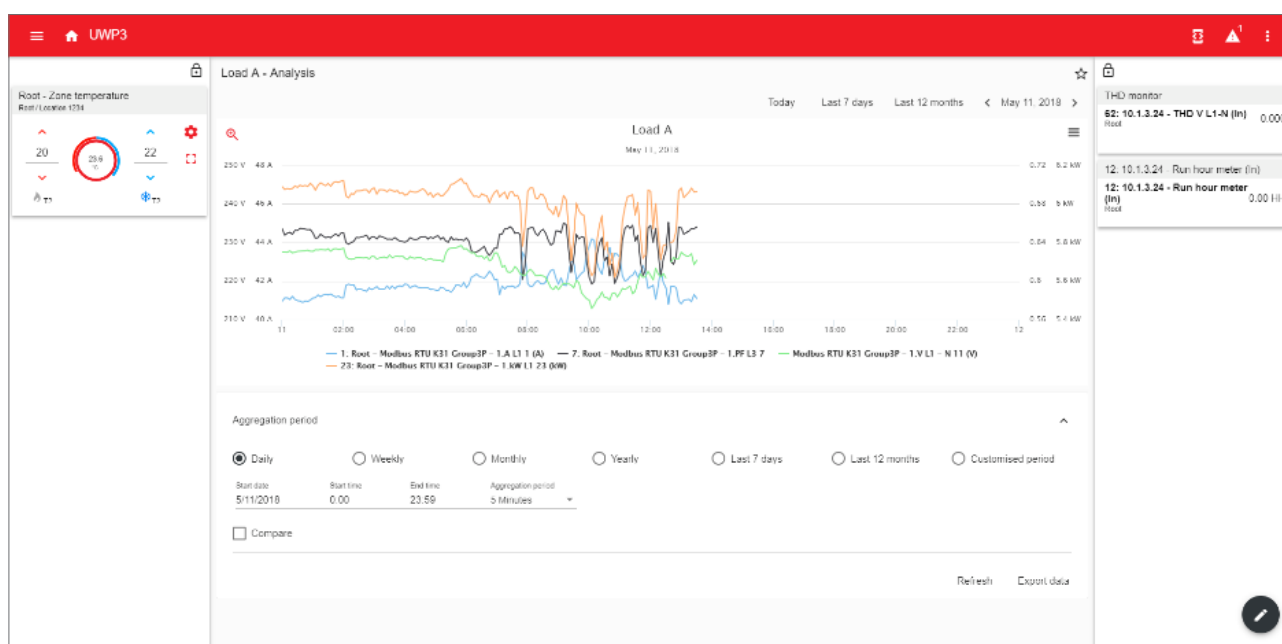
UWP 3.0 SE is key to meet today's Energy Managers and Energy Service Companies requirements to achieve energy efficiency goals, but also to monitor the behaviour of critical loads such as dry coolers, air cooled chillers and servers in data Centres. It can provide, as a first step, all the remote, on-premise, or cloud functionalities. Simple architecture, short commissioning time, cost reductions, error proof configuration, expandability and scalability are the distinctive characteristics of this unit. UWP 3.0 SE is a Web-Server but also a gateway. UWP 3.0 SE is Microsoft® certified for IoT. One or many UWP 3.0 SE pushing their data to the Microsoft® Azure IoT Hub will allow System Integrators to extend the level of integration to other systems. Data can be shared locally via Modbus/TCP or BACnet, while M2M makes integration with other systems possible via Rest-API or standard FTP, SFTP, FTPS communication. Excel® reports can be generated online or via the embedded scheduler.



Tools to properly display the key variables

The UWP 3.0 SE unit allows you to automate the process of collecting data points from multiple meters and other sensing units.

The embedded Web-Server allows both system integrators and Energy Managers, by means of Dashboards, to mix both history and real time data. This means, to display the key plant variables using analysis tools such as tables, trends, histograms, pies, comparison functions, which can be used also to perform diagnostics on both communication and data during plant commissioning, particularly when UWP 3.0 SE is part of a complex management architecture.



UWP 3.0 SE

- Micro PC with embedded Web Server, WEB services and data logger functions
- Ethernet Modbus TCP master/slave function
- 2 x RS485 ports, both of which support up to 64 Modbus devices
- Data display (charts and tables)
- Real time or scheduled data export to Excel, CSV and HTML formats
- 4GB internal memory, Back-up memory on micro SDHC and USB
- Energy analysis of each load
- Configurable dashboards with data analytics and real time display functions
- Embedded Modbus editor for compatibility with any Modbus meter
- Alarm management (e-mail or SMS by means of SH2-DSP)
- 2-DIN module housing
- 12 – 28 V dc power supply



SH2-DSP

- Modem extension unit for UWP 3.0 SE
- 3G or 4G Mobile Internet connectivity with SMS alerts and SMS commands management
- 2-DIN module housing
- 20 – 28 V dc power supply



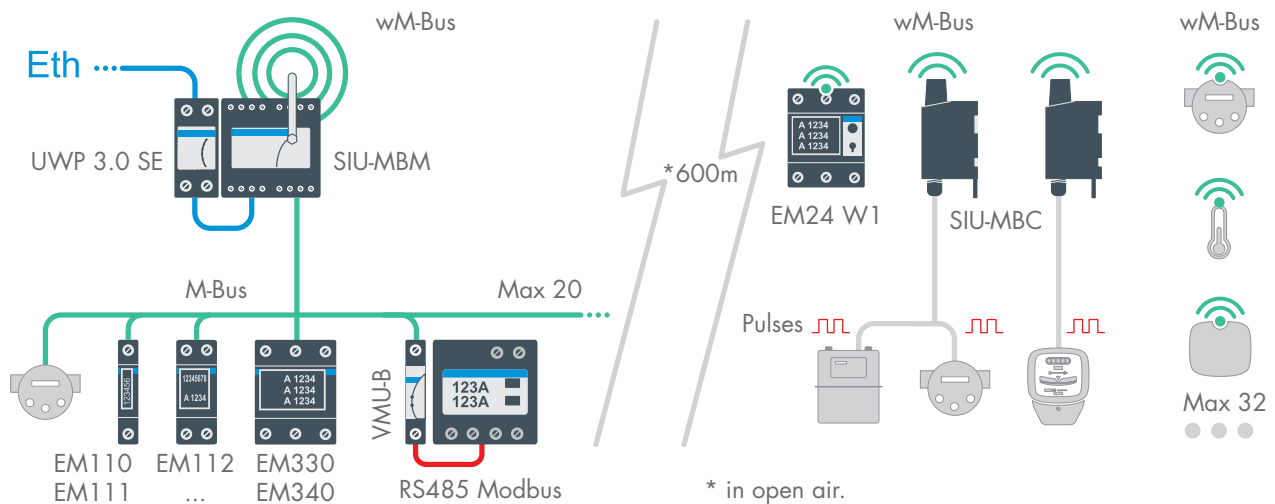
Monitoring

Utility, main and sub meter integration

Existing utility metering

The utility meters are sources of valuable, unexplored, frequently unavailable information.

If the utility meters are M-Bus (EN13757) wired or wireless based, then SIU-MBC can be used as a dual pulse counter or directly via SIU-MBM which acts as a gateway. These add-on solutions make this valuable information available for your Automatic Energy Monitoring System. More specifically: if the utility meter has only a pulse output, no available auxiliary power supply, and the meter itself is far from your nearest distribution board, the solution is the wireless SIU-MBC. It is self-powered by an internal battery lasting up to 12 years, and is perfectly suited to outdoor applications; if the utility meter is wired or wireless M-Bus-based, the solution is SIU-MBM. All devices with the exception of SIU-MBC can be configured using UCS, the Universal Configuration Software for Carlo Gavazzi meters and accessories.



SIU-MBM 01, SIU-MBM 02

SIU-MBM 01 and 02

- Collects data from multiple M-Bus and wireless M-Bus devices
- Converts data from M-Bus and wireless M-Bus into Modbus TCP/IP
- Up to 20 connected M-Bus devices (300 to 38,400 bps), daisy chain or star connection
- Ethernet Modbus TCP/IP output
- 15 – 21 V ac, 18 – 35 V dc power supply
- On DIN rail or wall-mounted, IP20.

SIU-MBM 02

- Up to 32 wireless M-Bus devices
- Wireless communication antenna
- Frequency 868 MHz

VMU-B

- RS485 Modbus-based meter to M-Bus adapter
- One to one communication
- Meter self recognition: EM210, EM270, EM271, EM280 and WM15
- Universal power supply (18 – 260 V ac/dc)

SIU-MBC

- 2 pulse inputs, selectable scale and engineering unit, like: 1/10/100/1000 (Wh, dm³ or L)
- Wireless M-Bus, 868 MHz
- Data transmission interval: 10 s, 10 min, 12 h
- Operating range up to 600 m in open air
- Battery: lithium, Li-SOCI2 (≥12 years lifetime)
- Mechanical lock with safety seal to ensure protection degree and prevent accidental opening
- Assembly with zip ties on tube/mast or wall-mounted with screws or on DIN rails
- Anti-fraud system, IP67

EM24 W1

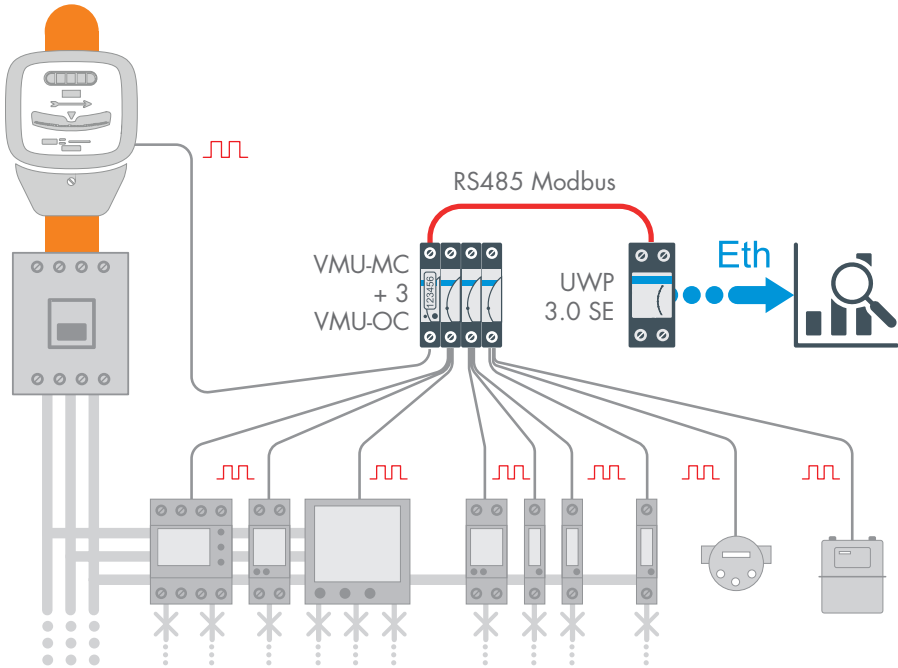
- CT 5 A, 230 – 400 V L-L ac measuring inputs, 115 – 230 V ac power supply
- 65 A, 230 – 400 V L-L ac measuring inputs, self-power supply
- 4-DIN modules housing
- 3 counter digital inputs
- 2*8-digit LCD
- Single and three-phase measurements: V, A, Hz, PF, W, VA, var, run-hour, kvarh, 4-tariff, 3*1-phase kWh
- Basic accuracy (V/A): ±0.5% RDG
- Bi-directional kWh (cl. B EN50470-3 MID approved)
- wM-Bus wireless communication
- Two antenna options: external or built-in



Existing main and sub metering

Already installed pulse output-based meters can still be part of a data collection system!

In many installations, old fashioned meters are still working properly but energy information is still collected manually with both high data collection costs and potential transcription errors. Now, concentrating on multiple meters' pulse outputs and making them available as RS485 Modbus counters is possible, thanks to the modular VMU-MC + VMU-OC solution ranging from 2 to 11 pulse inputs (counters). Pulse to Modbus conversion is the key to automatic data collection, which ensures quality, granularity, and full management of data.

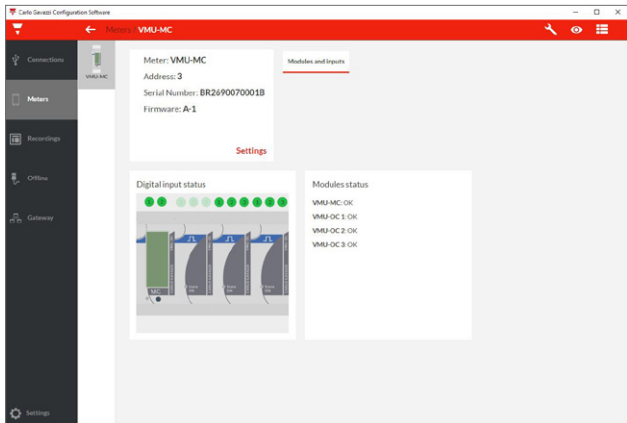


VMU-MC, VMU-OC

- 1-DIN module housing
 - Modular
 - RS485 communication port
 - 11 total inputs available
 - Unit of measure: kWh, kvarh, kVAh, kJ, kcal, m³, Nm³, h, pcs, kg
- VMU-MC:
- LCD display for: status, counter, any active tariff
 - 2 inputs available (for pulses counting or for up to 4 tariffs selection)
 - 15 – 24 V dc power supply
- VMU-OC:
- 3 inputs available (for pulses counting only)

The UCS software configuration advantages extended also to VMU-MC and VMU-OC!

UCS features for configuring devices, storing configurations into a database, sharing configurations and logs among users, and checking the device status are available also for VMU-MC/OC. Therefore the two VMU-MC inputs can be set as counters, or one as a counter and one to sense tariff change as a digital input, managing automatically the energy increase for both tariff 1 and tariff 2. Every counter input and function has an independently configurable pulse weight.



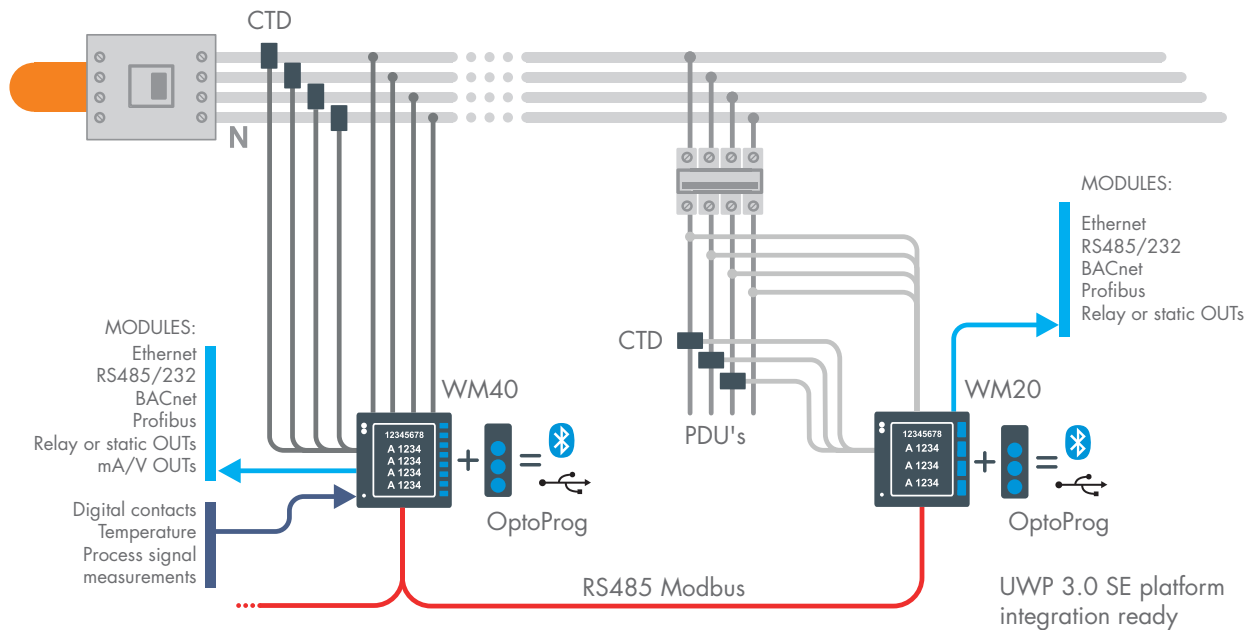
Monitoring

Harmonics and other analysis

Main metering with module-based expandable functions

A high-spec meter is often time demanding due to its installation and commissioning complexity: how can you make it time and cost effective?

Yes, by selecting the most appropriate device to meet the different installation and application needs among the three available power analyser models. Metering capabilities, and control functions, as well as a common modular system are the key features. Panel Builders, System Integrators and Installers enhance and speed up their activities of initial meter configuration, communication diagnostics and commissioning with the help of the combination of new and innovative tools like OptoProg, UCS desktop, and UCS mobile.



WM20

- 96*96 mm panel mounting housing with front protection degree IP65
- Single and three-phase measurements: V, A, An, Hz, PF, W, VA, var, run-hour, kvarh, bi-directional kWh (cl. 0.5s IEC/EN62053-22)
- 3*4 DGT instantaneous variables, LCD display
- Max values of all power variables
- Automatic scrolling pages
- 2 freely configurable virtual alarms
- 9+1-DGT counter variables, backlit LCD display
- Modular housing (see the modules list besides)
- Optical port for fast data reading and configuration
- Universal power supply (90 - 264 V ac/dc, 21 - 55 V ac/dc)
- THD analysis up to 31st harmonics with source detection, single harmonics via Modbus

WM30

- 5 A current inputs for current transformers
 - Up to 793 V L-L measuring inputs
 - Basic accuracy (V/A): $\pm 0.2\%$ RDG
- 4*4 DGT instantaneous variables, LCD display
- Avg and max values of all system and single phase variables
- 4 freely configurable virtual alarms
- Real time clock
- Other features, same as WM20

WM40

- 4-tariff management
- Factor K and TDD metering
- 16-alarm PLC logic and digital inputs for utility metering, built-in event and data stamping for instantaneous variables and load profiling
- Other features, same as WM30

Modules

WM20/WM30/WM40

- RS485/RS232 Modbus RTU
- BACnet IP
- BACnet MS/TP
- Ethernet (Modbus TCP)
- EtherNet/IP (WM20 excluded)
- Profibus DP-VO
- 2-static and relay outputs

WM30

- 2*20 mA dc or 2*10 V dc outputs

WM40

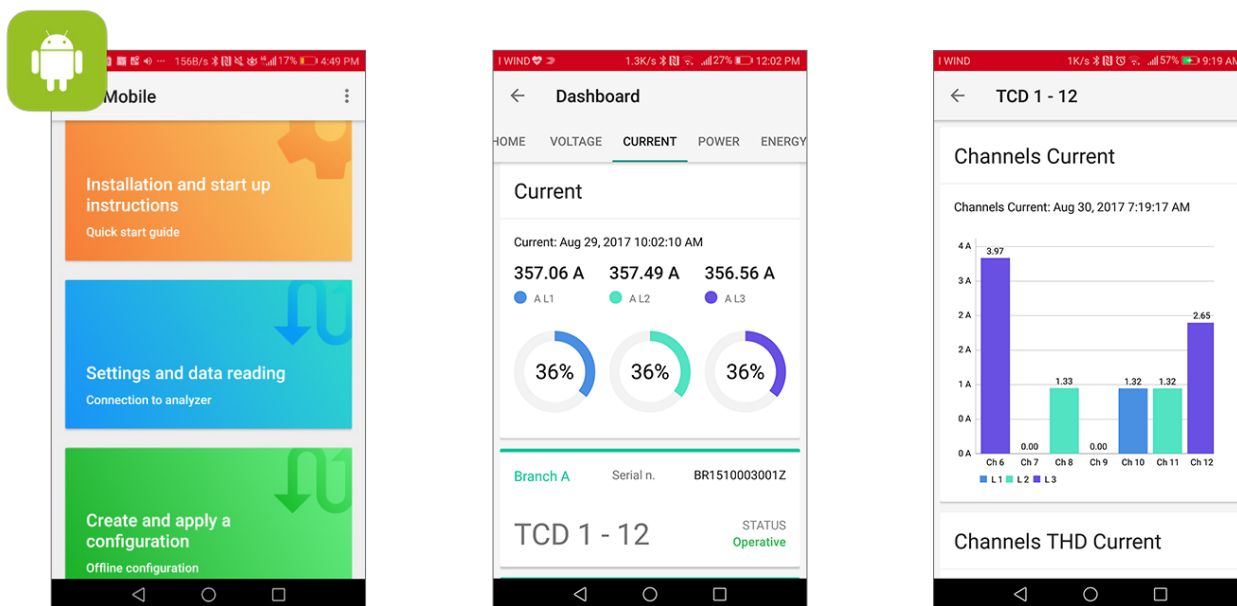
- Up to 4*20 mA dc or 10 V dc outputs
- 6-channel digital inputs, up to 6 relay/8 static outputs + OR/AND alarm logic management
- Direct An + Temperature + Process signal measurements



Advanced configuration and commissioning tools

An innovative solution to drastically reduce both configuration and commissioning time!

The installation, the configuration, and the commissioning of a power analyser has an intrinsic complexity which is due not only to the product itself, but also to the sequence of events which usually starts in the workshop of a Panel Builder and moves to the plant for the final installation. Hence, one product, which for different reasons and in different contexts moves through different professionals. To be able to be effective, there is the need to be able to supply a tool matching the skills and needs of different people. OptoProg, with its App, or simply as desktop software, is the best answer to simplify the whole process.



How do you do it? OptoProg + UCS is the solution!

OptoProg, the optical port-based coupling unit with built-in rechargeable battery, provided with both USB and Bluetooth communication capabilities to be used in combination with either UCS desktop or UCS Mobile (Android), with its excellent usability, allows the Panel Builder to set all initial metering parameters without physically using the meter front keypad.

If the panel is produced in series with the same overall characteristics and meter settings, by using the configuration upload and download function, the process is further shortened and error free. Once the distribution board with the power analyser is on site, the System Integrator using its OptoProg unit and UCS software can download the meter configuration parameters, change them, add alarms and upload the new configuration to the power analyser again to complete the process. With the same UCS it is possible to test the communication to other devices in the same Modbus network. The whole OptoProg process can be performed without opening the distribution board door, making this process more efficient, effective and safe. Once everything is done, just remove OptoProg from the power analyser and install it on another meter.

OptoProg

- Bridge mode use with embedded optical port
- Built-in lithium battery for one month operations
- Sleep mode for energy savings
- Configuration and communication status LED
- Bluetooth 2.0, 2.1, 3.0 and 4.0 connectivity
- Micro-USB B port
- RED 2014/53/EU, FCC and IC approvals



OptoProg is compatible with: WM15, WM20, WM30, WM40, WM50, ET340.

Monitoring

Current adapters and protections

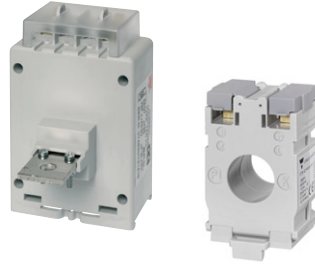
Solid-core and split-core current adapters

From compact sizes to high currents and from solid-core to split-core, these are the current adapters for Carlo Gavazzi meters and the appropriate solution for any kind of installation.

TAD K/K2

TAD	from (A)	to (A)
K	1	40
K2	1	250

- Wound primary/fixed bar
- Secondary: 5 A (standard), 1 A (available upon request)
- Sealable terminal covers
- IEC/EN61869-2 compliant



CTD 1Z

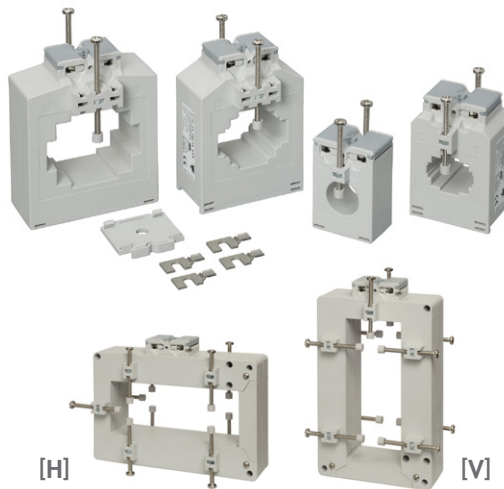
CTD	from (A)	to (A)
1z	50	200

- Solid core for cable or bus-bar
- Cable diameter: 22 mm
- Secondary: 5 A
- IEC/EN 61869-2 compliant

CTD 1/2/3/4-X

CTD	from (A)	to (A)
1x	50	300
2x	40	600
3x	50	800
4x	150	1600

- Solid core for cable or bus-bar
- Cable diameter: 23 mm to 51 mm
- Bus-Bar: 20*5mm to 64*20 mm or 51*43 mm
- Secondary: 5 A (standard), 1 A (available upon request)
- Sealable terminal covers
- IEC/EN61869-2 compliant



CTD 8/9/10/11/12-V-H

CTD	from (A)	to (A)
8 V/H	150	1600
9 V/H	400	2500
10 V/H		2000
11 V/H	1000	4000
12 V/H	1000	4000

- Solid core for cable or bus-bar
- Bus-Bar: 37*125 mm to 53*125 mm
- Secondary: 5 A (standard), 1 A (available upon request)
- Sealable terminal covers
- IEC/EN61869-2 compliant

CTD 5/6-S

CTD	from (A)	to (A)
5 S	100	400
6 S	150	1000

- Split-core for cable or bus-bar
- Bus-Bar: 26*32 mm, 50*52 mm
- Secondary: 5 A (standard), 1 A (available upon request)
- Sealable terminal covers
- IEC/EN61869-2 compliant



CTD 8/9/10-S

CTD	from (A)	to (A)
8 S	150	1600
9 S	400	2500
10 S		2000
		3200

- Split-core for cable or bus-bar
- Bus-Bar: 31*81 mm to 50*125 mm
- Secondary: 5 A (standard), 1 A (available upon request)
- Sealable terminal covers
- IEC/EN61869-2 compliant

CTA 5/6

CTA	from (A)	to (A)
5 X	100	300
6 X	200	600

- Split-core for cable
- Secondary: 5 A
- Cable diameter: 24 mm (5x), 36 mm (6X)
- IEC/EN61869-2 compliant



MRCD type Installation Protection Devices

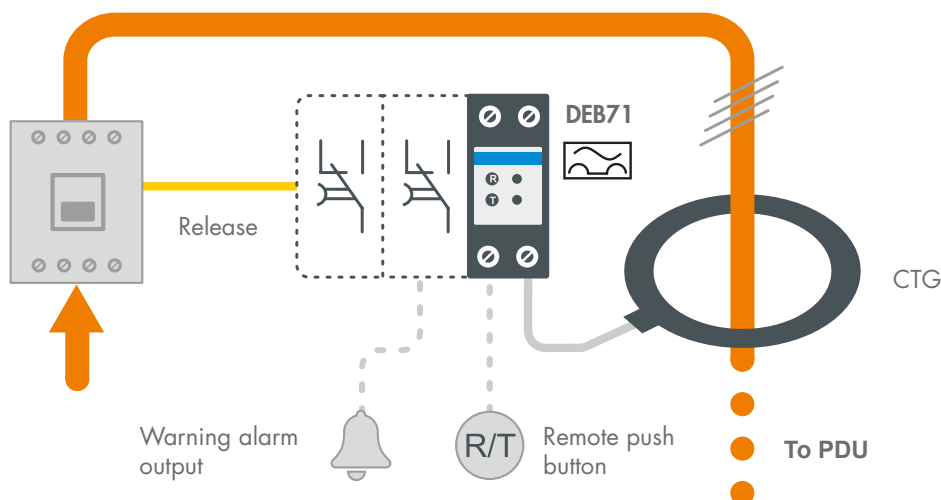
Avoid a nuisance trip of protection and maintain the availability of power supply.

How to prevent injury? In the wide range of protection devices, there is a family of units called RCD Residual Current Device. The purpose of an RCD is to prevent threats to life by protecting against the risks of electrocution and fire caused by earth faults.

How to detect dangerous earth leakage currents? In industrial, commercial and data centre applications, due to their specific requirements, the device used is called an MRCD Modular Residual Current Device. More specifically, it is an earth leakage current relay which can detect by means of an external core balance transformer the earth leakage current.

How to avoid power supply interruption? Both RCDs and MRCDs are prone to nuisance trips from normal harmless earth leakage. Those are due to external factors, such as a high current discharge due to lightning or to an earth rod placed close to a neighbouring earth rod on a building. A nuisance trip would affect the availability of power supply, which for example in a production facility, or in a data centre because of its nature, is not allowed.

The Carlo Gavazzi solution is made of two models: DEA71 and DEB71, combined with CTG, our core balance transformer family. Our MRCDs comply with IEC/EN 60947-2, so to avoid nuisance trips and fulfil the "A" type operating characteristic so to work in case either of presence or absence of dc component of residual currents.



DEA71

- Fixed current setting: 30 mA or 300 mA
- 2 relay outputs for warning and alarm
- Input for remote Reset / Test
- 24 – 240 V ac power supply



DEB71

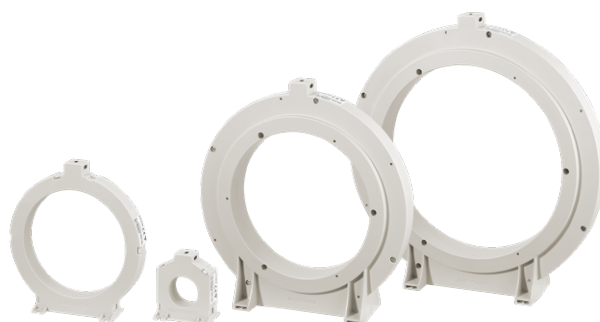
- Adjustable setting from 30 mA to 5 A
- Adjustable delay up to 5 s
- Leakage level LED bar
- 2 relay outputs for warning and alarm
- Input for remote Reset / Test
- 24 – 240 V ac power supply



CTG, core balance transformer

- Easy installation
- High accuracy and sensitivity

Model	Hole size (mm)
CTG35	35
CTG50	50
CTG70	70
CTG120	120
CTG160	160
CTG210	210



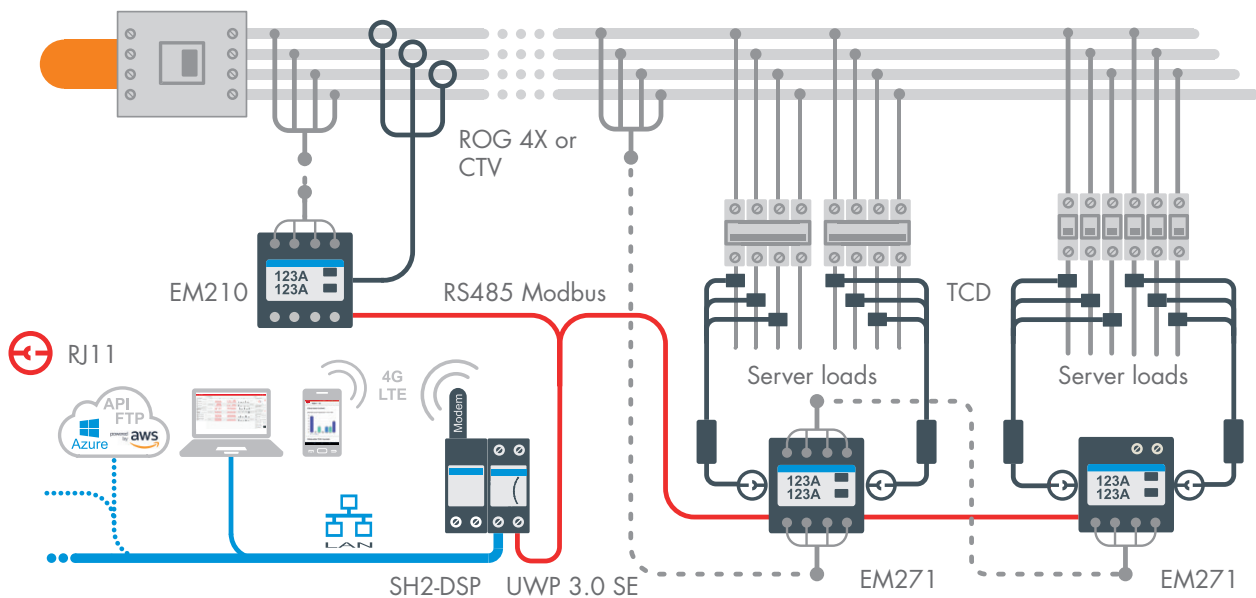
Monitoring

Server and regular loads monitoring

How to cut costs with the quick-fit solution in production facilities

In most cases these are retrofit installations. The use of a proper monitoring system will manage a combination of regular loads and servers.

“Quick-fit” means: installation flexibility and TCO reduction, performed using a detachable display which allows the unit to be mounted on either a DIN-rail or on a panel; quick connections of the current sensors and the replacement of two regular 3-phase meters or six single-phase meters with one compact unit only EM271.



EM210, main metering solution

- Patented meter, 4-DIN and 72x72 mm solution in the same housing for DIN-rail or panel mounting. Detachable 3*3-DGT/7-DGT display
- Up to 415 V L-L ac and CT/CTV/ROG-based current measuring inputs
- 5 A CT (AV version), 333 mV from CTV 1X-2X-3X-4X-6X-8X sensors (MV version), Rogowski current sensors (MV version)
- Measurements: V, A, Hz, PF, W, VA, var, bi-directional kWh
- An (calculated), THD up to 15th harmonics
- Pulse output and RS485 Modbus RTU (up to 115 kbps) port
- Self powered (230 V ac)
- Basic accuracy (V/A): $\pm 0.5\%$ RDG, kWh class 1 (IEC/EN 62053-21)
- Class B (EN50470-3), MID approved (AV version only)

CTV and ROG 4X series, sensing solutions

- CTV 1X-2X-3X-4X-6X-8X.** Split-core current sensing unit, 333 mV output.

Model	Primary (A)	Hole size (mm)
CTV 1X and CTV 2X	60 and 100	9.6 and 15.5
CTV 3X, CTV 4X and CTV 6X	200 and 400	15.5, 20.5 and 36
CTV 8X	800	50*89.8

- ROG 4X.** Rogowski coil current sensors. Primary: 20 to 4000 A, diameters: 90, 120, 200, 290 mm



Up to 800A

EM271, sub metering solution

- Patented meter, 4-DIN and 72x72 mm solution in the same housing for DIN-rail or panel mounting. Detachable 3*3-DGT/7-DGT display
- Up to 415 V L-L ac and TCD-based current measuring inputs
- Current measurement by two basic TCD units with quick RJ11 plugs (see TCD xM series)
- Quick configuration by automatic recognition of TCD units
- 2*3-phase energy analysers with sum function in the same unit
- Measurements: V, A, Hz, PF, W, VA, var, bi-directional kWh
- RS485 Modbus RTU. 2 pulse outputs (loads 1 and 2)
- Self powered (230 V ac)
- Basic accuracy (kW): $\pm 2.0\%$ RDG (meter + TCD xM unit), kWh: class 1 (IEC/EN 62053-21)

TCD 0M-1M-2M-3M, MM sensing solutions

- Combination of three single split-core current sensing units

Model	Primary (A)	Hole size (mm)
TCD 0M and TCD 1M	60 and 100	9.6 and 15.5
TCD 2M and TCD 3M	200 and 400	15.5 and 20.5
TCD MM	Up to 10000(*)	See CTV series

- Basic TCD xM unit (connected to three current sensors) for panel and DIN-rail mounting
(*) Compatible with current sensors with 333mV output

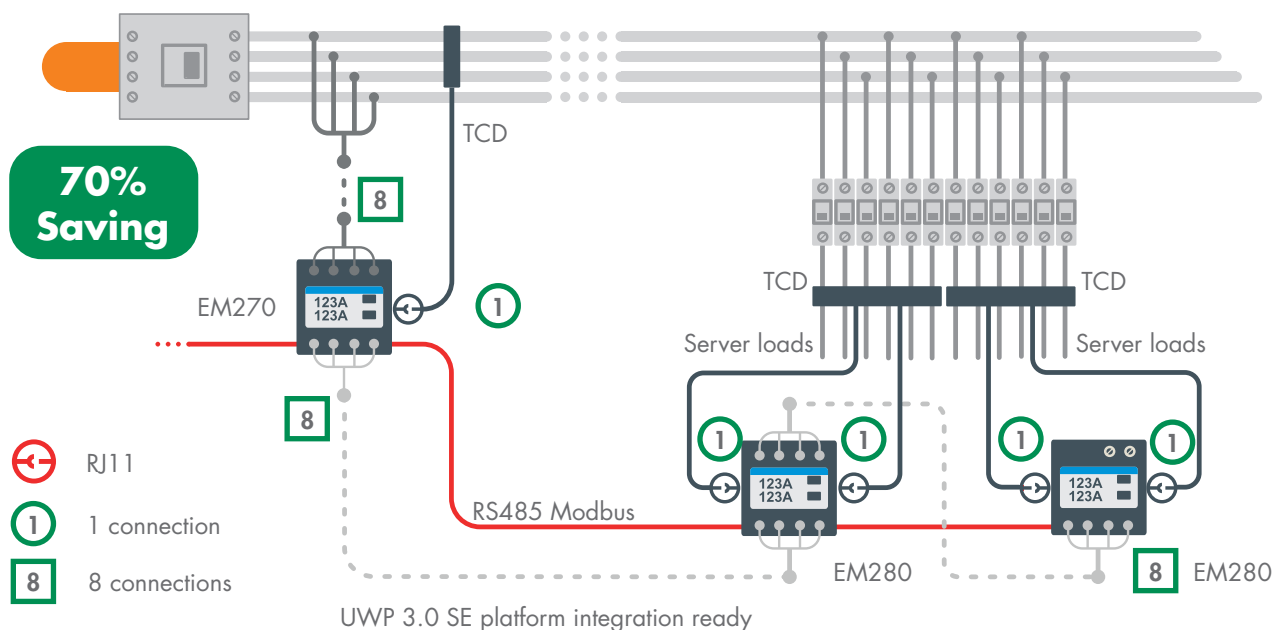


Up to 10kA

How to cut costs with the quick-fit solution in banks

In most cases these are installations with limited space to fit a proper monitoring system.

Here again, we have all the benefits provided by the Carlo Gavazzi "Quick-fit" solution, but using in this case either 3-channel or 6-channel compact sensing units, in three-phase or one-phase circuits. This means, referring to the drawing below, also a reduction of 65% of all connections vs a regular solution but also using, in comparison, less devices.



EM270, main metering solution

- Patented meter, 4-DIN and 72*72 mm solution in the same housing for DIN-rail or panel mounting. Detachable 3*3-DGT/7-DGT display
- Up to 456 V L-L ac and TCD-based current measuring inputs
- Current measurement by two triple solid-core sensing units with quick RJ11 plugs (see TCD X series)
- Quick configuration by automatic recognition of TCD units
- 2*3-phase energy analysers with sum function in the same unit
- Measurements: V, A, Hz, PF, W, VA, var, bi-directional kWh
- Basic accuracy (kW): ±1.25% RDG (meter + TCD x unit). kWh: class 1 (IEC/EN 62053-21)
- RS485 Modbus RTU. 2 pulse outputs (loads 1 and 2)
- Self powered (230 V ac)

TCD 1X-2X-3X, sensing solutions

- Triple solid-core current sensing unit

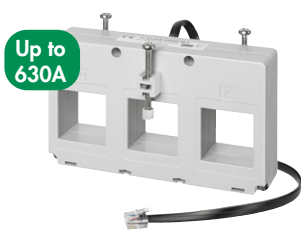
Model	Primary (A)	Bus-bar sizes (mm)	Centre-to-centre distance (mm)
TCD 1X	3*160	15.5*25	25
TCD 2X	3*250	21*25	35
TCD 3X	3*630	31*31	45

EM280, sub metering solution

- Patented meter, 4-DIN and 72*72 mm solution in the same housing for DIN-rail or panel mounting. Detachable 3*3-DGT/7-DGT display
- Up to 456 V L-L ac and TCD-based current measuring inputs
- Current measurement by one 6-channel solid-core sensing unit with quick RJ11 plugs (see TCD O6 series)
- Quick configuration by automatic recognition of TCD units
- 2*3-phase/6*1-phase energy analysers with sum function in the same unit
- Measurements: V, A, Hz, PF, W, VA, var, kWh
- Basic accuracy (kW): ±1.25% RDG (meter + TCD-O6 unit). kWh: class 1 (IEC/EN 62053-21)
- RS485 Modbus RTU. 2 pulse outputs (loads 1 and 2)
- Self powered (230 V ac)

TCD 06BX-06BS, sensing solutions

New installation, TCD 06BX	Retrofitting, TCD 06BS
6-channel solid-core current sensing unit	6-channel split-core current sensing unit
• Primary: 6*32 A, hole size: 7 mm. Centre-to-centre distance: 17.5 mm. RJ11 cable length: 80, 150 or 200 cm	

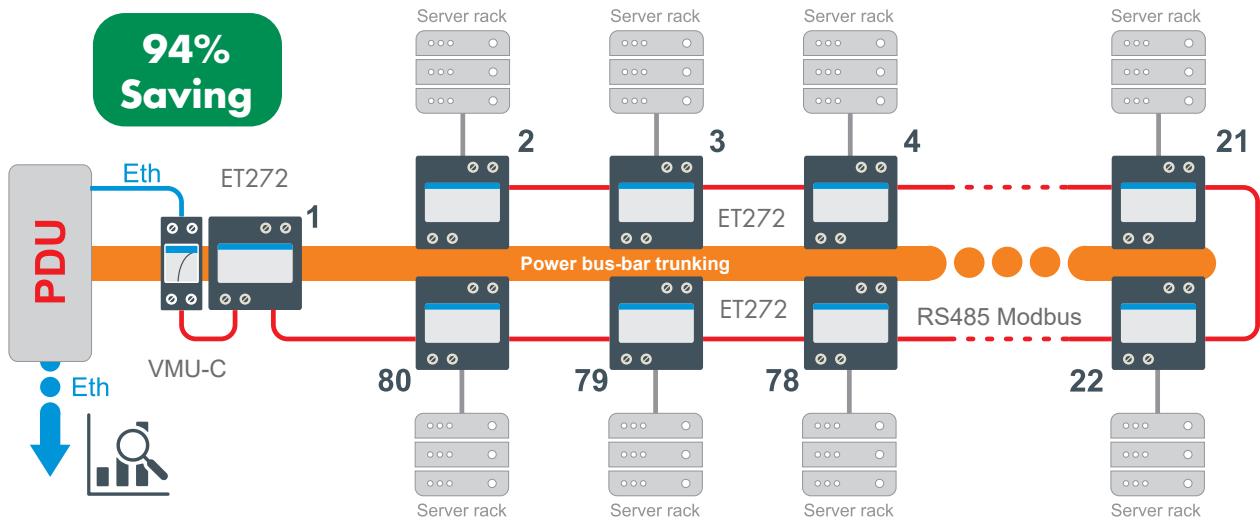


Monitoring

Power busbar-based monitoring in Data Centres

A 94% commissioning time saving

For both existing and new installations based on power bus-bar trunking systems (bus-duct).



ET272, main and sub metering solution for tap-off boxes

- Patented meter, 4-DIN modules for DIN-rail mounting
- Up to 415 V L-L ac and TCD-based current measuring inputs
- Current measurement by two basic TCD units with quick RJ11 plugs (see TCD xM series)
- Quick configuration by automatic recognition of TCD units
- Self addressing in a Modbus system (in combination with VMU-C)
- 2*3-phase energy analysers with sum function in the same unit
- Measurements: V, A, Hz, PF, W, VA, var, bi-directional kWh
- Basic accuracy (kW): $\pm 2.0\%$ RDG (meter + TCD xM unit). kWh: class 1 (IEC/EN 62053-21)
- Data format: 3-DGT (instantaneous variables)/7-DGT (totalizers)
- RS485 Modbus RTU. 2 pulse outputs (loads 1 and 2)
- Universal power supply (230 V ac)

TCD 0M-1M-2M-3M-MM, sensing solutions

- Triple split-core sensing unit for panel and DIN-rail mounting

Model	Primary (A)	Hole size (mm)
TCD 0M	60	9.6
TCD 1M	100	15.5
TCD 2M	200	15.5
TCD 3M	400	20.5
TCD MM	Up to 10000(*)	-

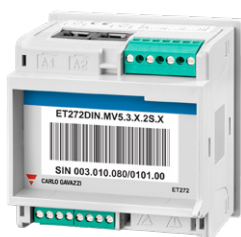
(*) using CTV sensing units.

VMU-C gateway and web-server solution

- VMU-C EM and ET272 are mandatory parts of the bus-duct solution
- 2-DIN module housing. 12 – 28 V dc power supply
- Micro PC with embedded Web Server, WEB services and data logger functions
- Ethernet Modbus TCP master/slave function
- One RS485-Modbus port for the management of up to 80 ET272
- Data display (charts and tables). Real time or scheduled data export to Excel, CSV and HTML formats
- 4GB internal memory, Back-up memory on micro SDHC and USB
- Energy analysis of each load. Costs analysis
- Virtual meter with sum function
- Alarm management (e-mail or SMS by means of SH2-DSP)

SH2-DSP

- Modem extension unit for VMU-C
- 3G or 4G Mobile Internet connectivity with SMS alerts and SMS commands management
- 2-DIN module housing
- 20 - 28 Vdc power supply



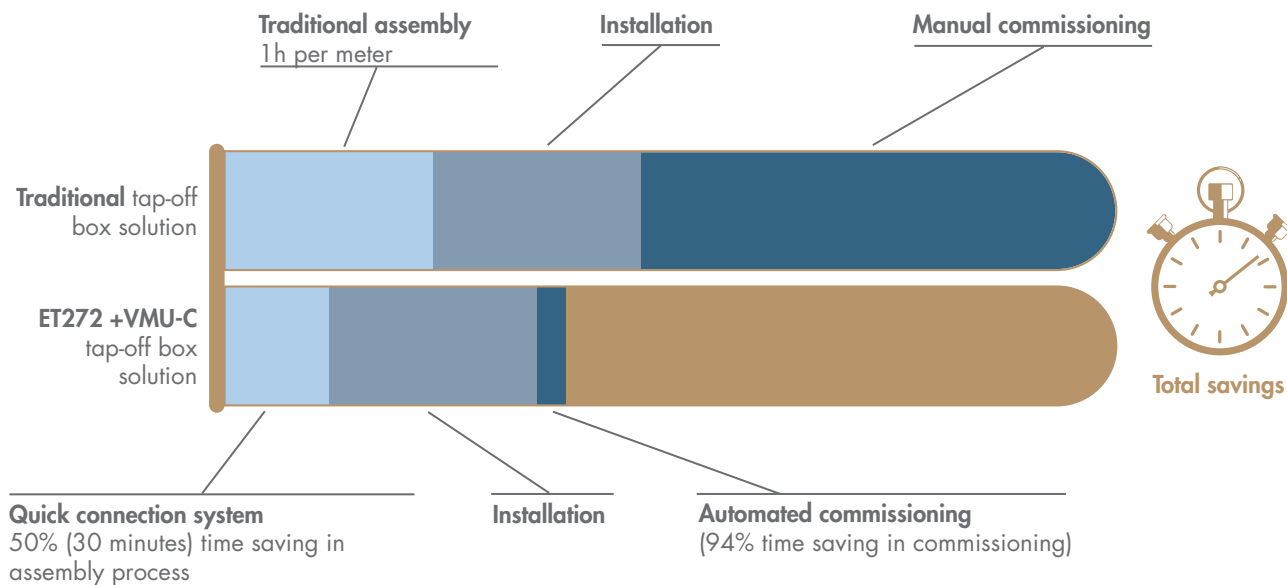
Up to 10kA



The saving details

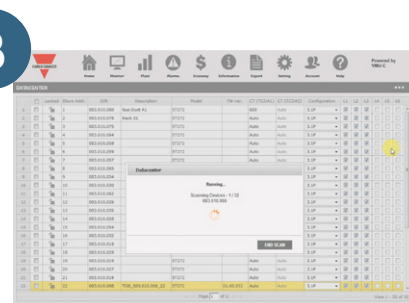
How ET272 + VMU-C achieve the commissioning time saving goal.

Traditional tap-off box solution: the first configuration, the following addressing and the final commissioning in case of 16 bus-bar trunking systems of 32 tap-off boxes each (total more than 2 hours) require a total of about 34 hours of Professionals work.



ET272 + VMU-C tap-off box solution: no manual configuration, no ID addressing, a general process improvement. Leading to a total configuration and commissioning time reduction from 34 hours of Professionals work to only 2 hours!

Step	Actor	Site	Action	Benefit
1	Panel builder	Production	Quick tap-off box assembly and ID label sticking on the tap-off box.	Quick connections and the split-core current sensors of ET272 (see next page).
2	Installer	Data centre	Affixing the ID labels to the installation document, and tap-off box installation on the bus-bar.	Easy identification of the tap-off box in order to minimize positioning errors.
3	System integrator	Data centre	ID labels installation document barcode reading.	Full automated commissioning thanks to the Embedded VMU-C tools.



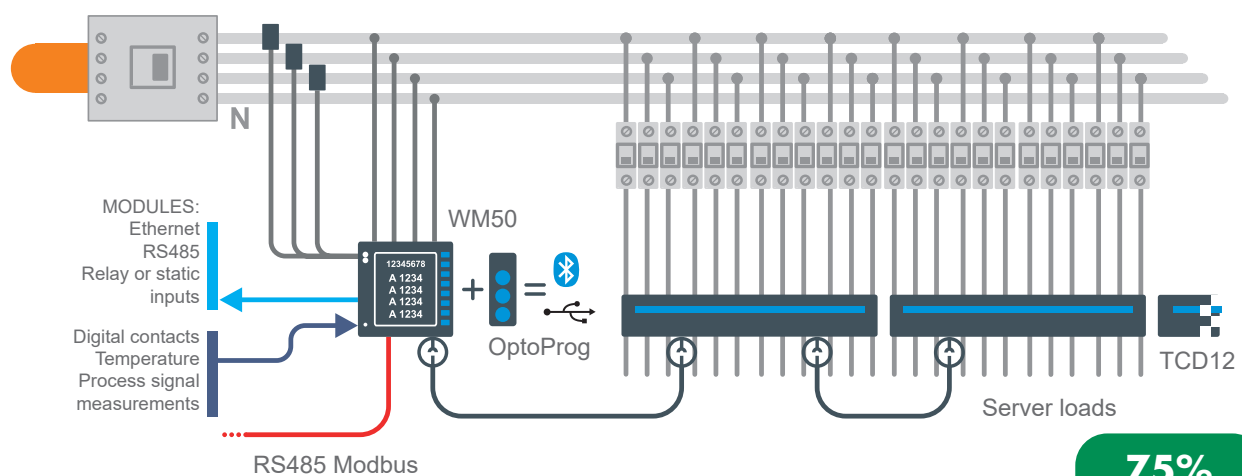
Monitoring

PDU-based monitoring in Data Centres

A 75% installation time saving

In a single solution the combination of a three-phase main meter with CT inputs and 65A integrated TCD sub-meter units with up to 96 single-phase channels or 32 three-phase channels.

When the electrical system is different from a bus-bar trunking or bus-duct system, and numerous loads are fed from a common distribution board, than WM50-96 is the ideal solution for branch circuit monitoring. The solution is based on one core unit WM50, which is usually installed and connected on the mains, and some TCD12 units as combined meters installed downstream the MCBs for single phase or three-phase loads. As the whole installation cost derives not only from the cost of the components, but even more by installation and commissioning costs, this innovative solution allows you to achieve more than 75% installation and commissioning savings vs. standard solutions.



**75%
Saving**

WM50, main metering solution for distribution boards

- 96*96 mm panel mounting meter with IP65 front protection degree and modular housing
- Up to 480 V L-L ac and 5 A CT measuring inputs
- Single and three-phase measurements: V, A, An, Hz, PF, W, VA, var, run-hour, kvarh, bi-directional kWh (cl. 0.5S IEC/EN62053-22), THD analysis up to 31st harmonics, single harmonics via Modbus
- Basic accuracy (V/A): $\pm 0.2\%$ RDG
- 9+1-DGT totalized and 4-DGT instantaneous variables LCD display
- Optical port for fast data reading and configuration
- Universal power supply (90 – 260 V ac/dc)
- 4-tariff management
- 16-alarm PLC logic and digital inputs for utility metering, built-in event and data stamping for instantaneous variables

WM50, I/O optional modules

- RS232/RS485
- Ethernet (Modbus TCP)
- 6-channel digital inputs, up to 4-relay/6-static outputs + OR/AND alarm logic management
- Direct An + Temperature + Process signal measurements



From main metering to submetering

WM50 is the combination in a single solution of a three-phase main meter with CT inputs and 65A integrated TCD submeter units up to 96 channels.



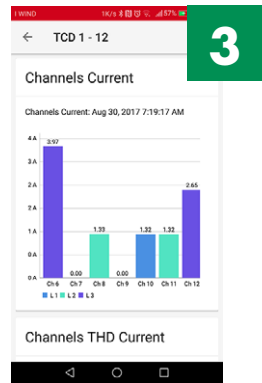
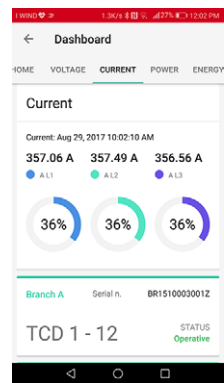
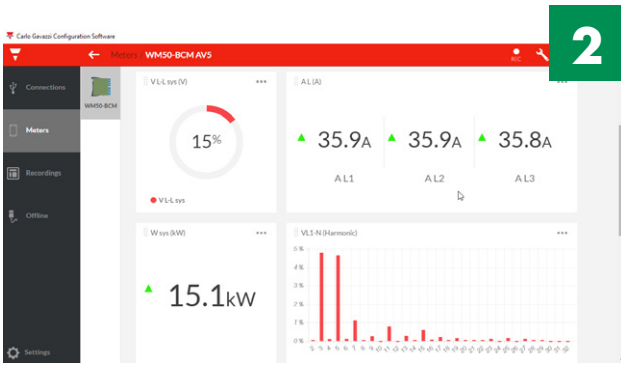
TCD12, sub metering

- Primary: 12*65A
- Hole size (mm): 8.5
- Center-to-center distance (mm): 17.5mm
- RJ cable length (cm): 30 to 500
- 12-channel split-core current sensing unit
- Accuracy Class 2 (kWh) according to EN62053-21 (meter + TCD unit)
- Up to 96 channels: kWh, W, var, VA, PF, A, THD A
- Data available via communication module on board of WM50

The tools to speed up the configuration and commissioning time

From laptop to smartphone!

- OptoProg (1): the optical port coupling unit with rechargeable battery, provided with both USB and Bluetooth communication capabilities to be used in combination with UCS.
- UCS desktop: the laptop configuration and diagnostics platform (2) compatible with all Carlo Gavazzi meters.
- UCS Mobile: the configuration and diagnostics App (3) for Android smart phones.



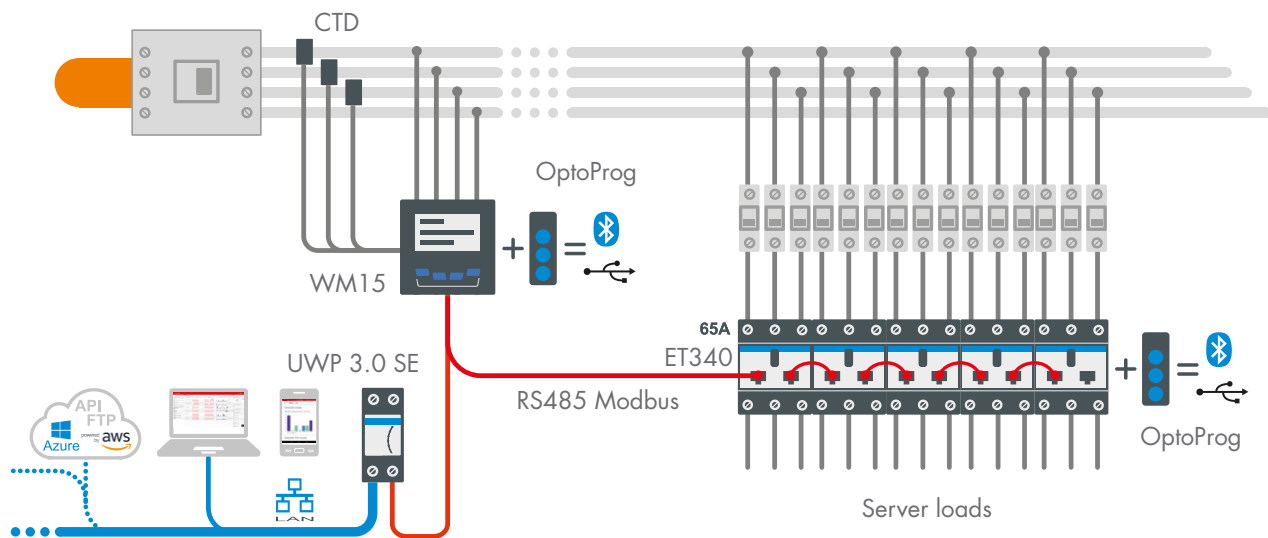
Monitoring

Server monitoring in Data Centres

Ultra flexible solution for regular PDU-based server systems

WM15, displaying measured variables in both analogue and digital formats and ET340, a metering unit without display are the ideal metering solution for server rooms in Banks, production facilities and Data Centres.

This solution provides the following benefits: configuration and commissioning with the same advanced OptoProg and UCS tools saving time and being more effective; all ET340 units can be daisy chained using an RJ45 cable being more reliable in connections and cutting connection costs; a single ET340 has the same footprint of three single-phase MCBs or a three-phase MCB, this means a modularity of three and therefore the capability to be mounted wherever there is a limited space or there is the need to put them in an array of many MCBs; UWP 3.0 SE being key part of the whole metering system can manage, using a proper RJ45 cable, up to 100 ET340 units equivalent to 300 server or server racks, a massive number of information.



WM15

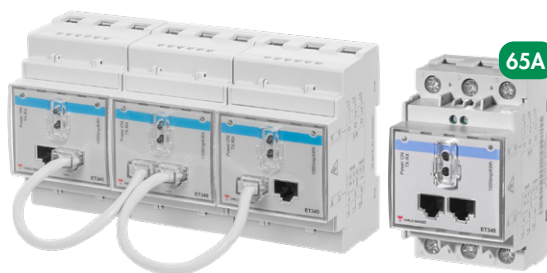
- 5 A current inputs for current transformers
- Up to 477 V L-L measuring inputs (self-power supply)
- Up to 690 V L-L measuring inputs (auxiliary power supply 120 - 240 V ac/dc)
- 96*96 panel mounting, 59 mm depth
- 4*4-DGT + 3-bargraph backlit matrix display
- Optical port for fast data reading and configuration
- Bidirectional kWh and kvarh, run hour meter
- System and phase measurements: V L-L/ L-N, A, W, var, VA, PF, Hz, THD (V-A)
- Current and power demand calculation
- Static output for pulse transmission or alarm
- RS485 Modbus RTU port (100 ms data refresh)
- Basic accuracy (V/A): $\pm 0.5\%$ RDG, kWh class 1 (IEC/EN 62053-21)
- MID approved (on request)

ET340

- 65 A direct current inputs
- 230 – 400 V L-L ac measuring inputs
- 3-DIN modules housing
- Single and three-phase measurements: V, A, Hz, PF, W, VA, var, run-hour, kvarh, dual tariff, 3*1-phase kWh, An
- Bi-directional kWh, class 1 (IEC/EN 62053-21)
- Metering setting for three-phase systems or for three time single-phase systems
- Basic accuracy (V/A): $\pm 0.5\%$ RDG
- Optical port for fast data reading and configuration
- Self powered (230 V ac)
- RS485 Modbus RTU port (RJ45 daisy chain and screw terminal block connections)

OptoProg

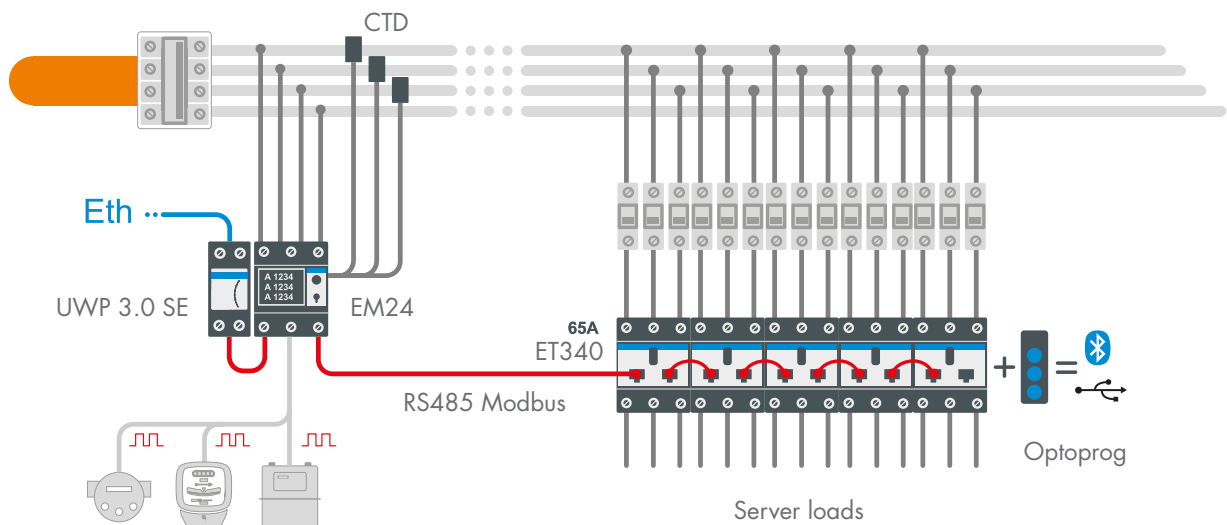
- Bridge mode use with embedded optical port
- Built-in lithium battery for one month operations
- Sleep mode for energy savings
- Configuration and communication status LED
- Bluetooth 2.0, 2.1, 3.0 and 4.0 connectivity
- Micro-USB B port
- RED 2014/53/EU, FCC and IC approvals



Ultra flexible solution for full DIN-rail based PDUs

If the target is to provide a streamlined solution for server rooms in banks and production facilities, than the solution is EM24 + ET340.

Streamlining a monitoring solution for banks and facilities means, to be more cost effective in providing solutions capable to perform not only main and submetering but also being able to gather data from utility meters. For EM24, it doesn't matter if the pulse signals are coming from watt-hour meters, gas meters, water meters or from all of them, because it has all the necessary hardware resources to manage all those signals. So, if EM24 has the task to perform, in the installation, the integration of the utility meters into the UWP 3.0 SE monitoring platform, it has in addition, also the task to perform the main metering in the distribution board where it is installed. While the ET340 units have the task to measure a full set of electrical variables being needed to complete the analysis of all loads connected downstream the main MCB or MCCB.



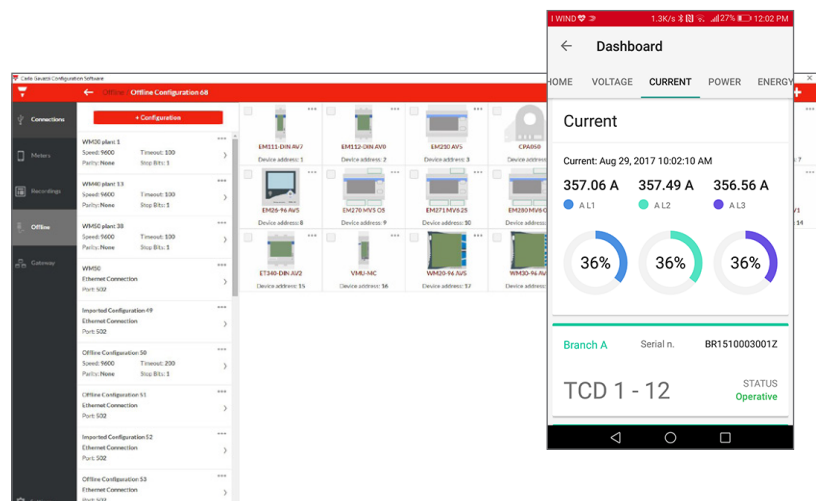
EM24

- CT 5 A, 230 – 400 V L-L ac measuring inputs, 115 – 230 V ac power supply
- 65 A, 230 – 400 V L-L ac measuring inputs, self-power supply
- 4-DIN modules housing
- 3 counter digital inputs
- 2*8-digit LCD
- Single and three-phase measurements: V, A, Hz, PF, W, VA, var, run-hour, kvarh, 4-tariff, 3*1-phase kWh
- Bi-directional kWh, class 1 (IEC/EN 62053-21)
- Basic accuracy (V/A): $\pm 0.5\%$ RDG
- Bi-directional kWh, class 1 (IEC/EN 62053-21), (cl. B EN50470-3 MID approved)
- Pulse output or RS485 Modbus RTU, M-Bus port or Ethernet



An effective tool to cut the TCO (Total Cost of Ownership)

In addition to the standard display of variables, functionality and configuration parameters, it is common the need to be more effective and efficient during first meter configuration (by the Panel Builder) and site commissioning (by the System Integrator). UCS, the Universal Configuration Software, is the answer, providing a full set of effective tools for meter configuration, variable displaying and communication diagnostics. These tools are aimed to be quick and to help the different professionals, such as Panel Builder, Installer, System Integrator, and End-user, to limit and fix any installation, configuration, and commissioning error.



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