CARLO GAVAZZI
Automation Components

CARLO GAVAZZI

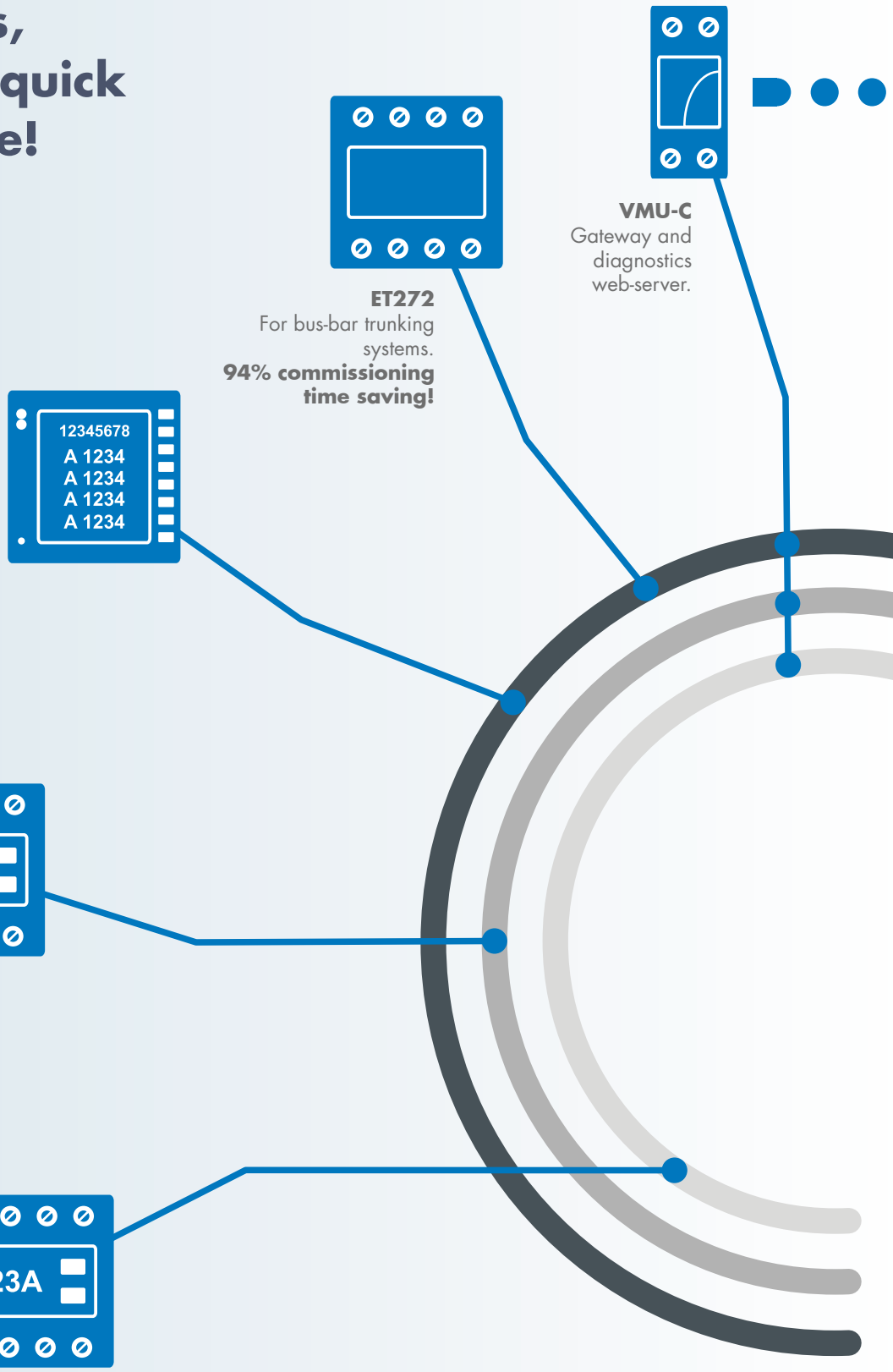
Energy monitoring solutions for server and data centre

Controls

Energy monitoring

Solutions for servers and data centres

From servers to data centres, the best fit, quick and effective!



VMU-C
Gateway and diagnostics web-server.

ET272
For bus-bar trunking systems.
94% commissioning time saving!

WM50
For PDUs.
75% installation time saving!

EM270 and EM280
Quick-fit solution and fast configuration.

EM210 and EM271 Retrofitting hybrid solution.

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 an 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 center efficiency;
5. because you can't effectively manage what 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.

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 the costs and the maximizing of savings. The following list shows you the different individual or combined approaches:

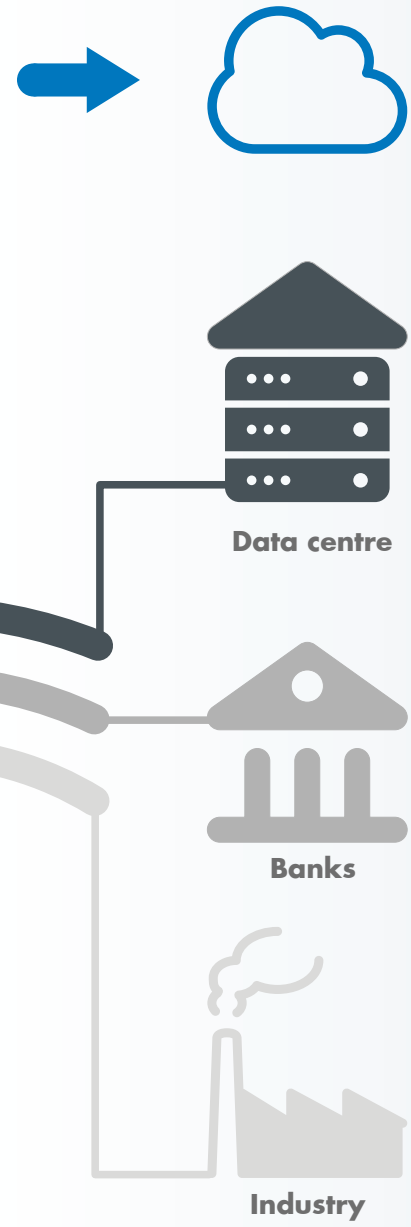
- the "prefabricated modular data centre" where the aim is the short deployment timeframe and improved predictability of performance;
- the DCIM "Data Centre Infrastructure Management" where the set of tools that help to organise and manage the infrastructure and the PUE (Power Usage Effectiveness) is 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.

If savings along the working life of the data centre can be achieved by using a proper monitoring solution, there is also a one-time cost which is the combination of different elements like: the monitoring solution itself, the relevant installation and commissioning costs.

As many suppliers are still supplying ordinary monitoring devices, Carlo Gavazzi has improved the pure metering part supplying specific "new installation" and "retrofit" monitoring solutions. Moreover, just by using the ET272 meter combined to the VMU-C Gateway/Web-Server which becomes also a deployment tool, the following goals can be achieved:

- no meter configuration;
- automatic meter detection in the network;
- no commissioning errors;
- ease of layout checking;
- reduced commissioning time.

This means a 94% (32 working hours) commissioning time saving (16 bus-bar trunking, 32 meters/each) in an ordinary data centre hall based on "bus-bar trunking systems" (see the case C in the inner pages).
If the electrical system is more based on regular PDUs (Power Distribution Systems), the estimation installation time saving with 48 measuring channels is 75% using a WM50 BCM which requests only 4 hours vs. 16 hours of a standard solution (see the case D in the inner pages).



Case A: critical power

Case B: servers

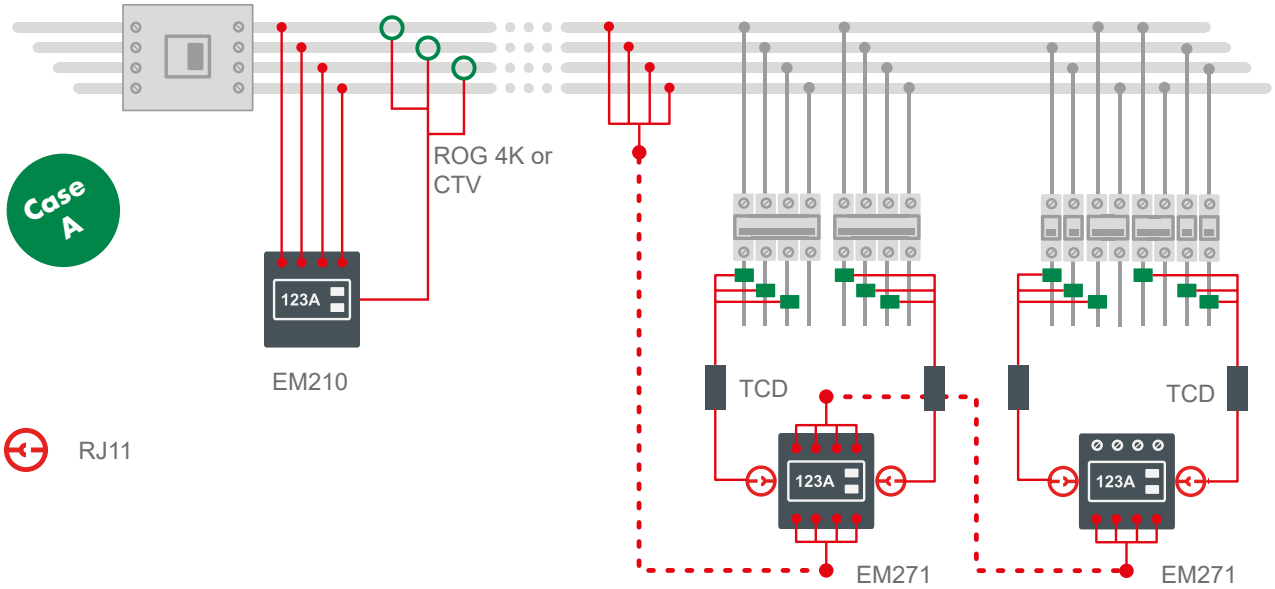
Case C and D: data centre

Solutions

The main focuses

Servers monitoring in production facilities

In most of cases these are installations to be retrofit adding a proper monitoring system which have to manage combinations of regular loads and servers.



EM210, main metering solution

- Patented meter, 4-DIN modules and 72x72mm solution in the same housing for DIN-rail or panel mounting
- Up to 456 VLL ac and CT/CTV/ROG-based current measuring inputs
- 5A CT (AV version), 333mV from CTV xX 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
- Basic accuracy ±0.5%RDG (V/A), bi-directional energy metering kWh class 1 (IEC62053-21), class B (EN50470-3), MID approved
- Detachable 3*3-DGT/7-DGT display
- Pulse output and RS485 Modbus RTU (up to 115 kbps) port
- Sealable terminal covers
- CE, cULus approved

EM271, sub metering solution

- Patented meter, 4-DIN modules and 72x72mm solution in the same housing for DIN-rail or panel mounting
- Up to 456 VLL ac and TCD-based current measuring inputs
- Current measurement by two basic TCD units with quick RJ11 plugs (see TCD M 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: 2.0% RDG (meter + TCD M unit). kWh: class 1 (IEC62053-21)
- Detachable 3*3-DGT/7-DGT display
- 2 pulse outputs (loads 1 and 2)
- RS485 Modbus RTU
- CE, cULus approved (EM271 + TCD-M)

CTV/ROG 4K series, sensing solutions

- **CTV 1X/2X/3X/4X.** Split-core current sensing unit, 333mV signal output. CE, cURus approved

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

- **ROG 4K.** Rogowski coil current sensors. CE, cURus approved. Primary: 20 to 4000A, diameters (mm): 115, 179, 275

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

- Single split-core current sensing unit

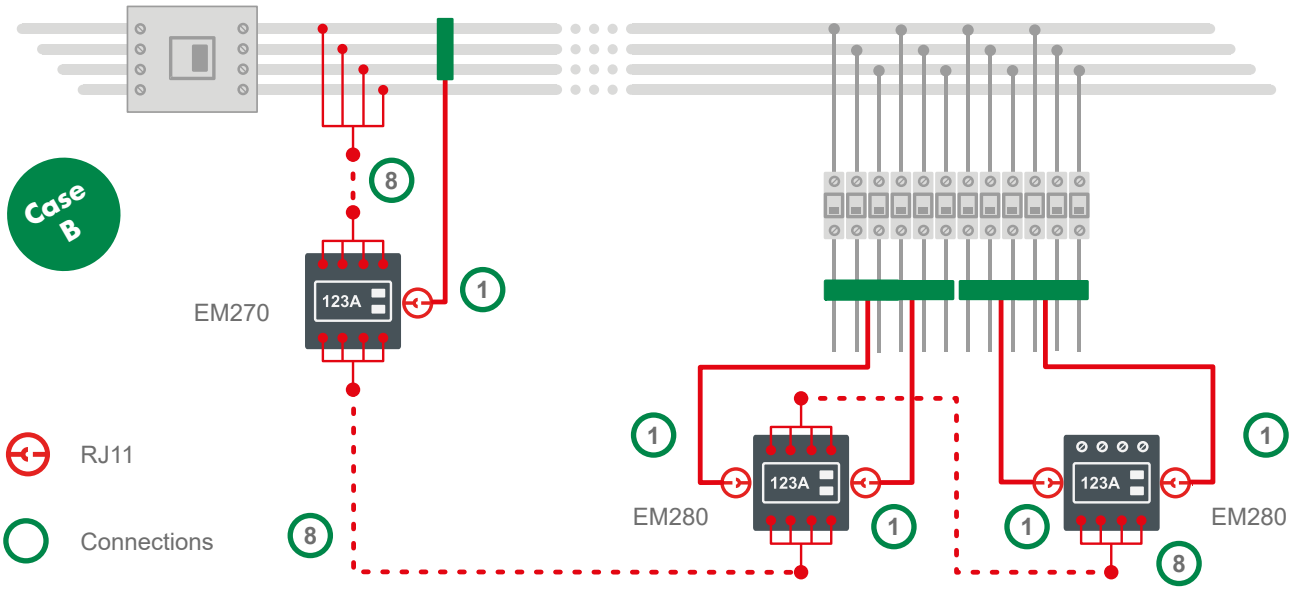
Model	Primary (A)	Hole size (mm)
TCD 0M	60	9.6
TCD 1M	100	15.5
TCD 2M	200	15.5
TCD 3M	400	20.5

- Basic TCD M unit (connected to three current sensors) for panel and DIN-rail mounting




Servers monitoring in banks

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



EM270, main metering solution

- Patented meter, 4-DIN modules and 72x72mm solution in the same housing for DIN-rail or panel mounting
- Up to 456 VLL 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 (IEC62053-21)
- Detachable 3*3-DGT/7-DGT display
- 2 pulse outputs (loads 1 and 2)
- RS485 Modbus RTU
- CE, cULus approved (EM270 + TCD-X)

EM280, sub metering solution

- Patented meter, 4-DIN modules and 72x72mm solution in the same housing for DIN-rail or panel mounting
- Up to 456 VLL ac and TCD-based current measuring inputs
- Current measurement by one 6-channel solid-core sensing unit with quick RJ11 plugs (see TCD X 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-06 unit). kWh: class 1 (IEC62053-21)
- Detachable 3*3-DGT/7-DGT display
- 2 pulse outputs (loads 1 and 2)
- RS485 Modbus RTU
- CE, cULus approved (EM280 + TCD-06)

TCD 1/2/3-X, sensing solutions

- Triple solid-core current sensing unit

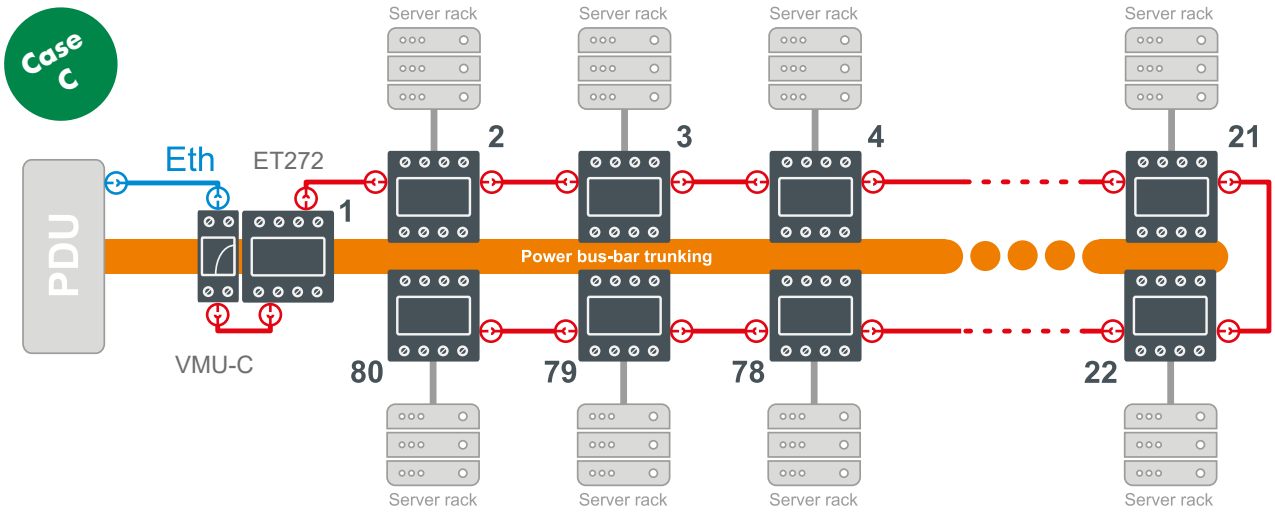
Model	Primary (A)	Bus-bar sizes (mm)	Centre-to-centre distance (mm)
TCD 1X	3*160	15.5 x 25	25
TCD 2X	3*250	21 x 25	35
TCD 3X	3*630	31 x 31	45

TCD 06BX/06BS, sensing solutions

New installation, TCD06BX	Retrofitting, TCD 06BS
6-channel solid-core current sensing unit	6-channel split-core current sensing unit
• Primary: 6*32A • Hole size (mm): 7 • Centre-to-centre distance (mm): 17.5mm • RJ11 cable length (cm): 80, 150 or 200	

Data centre monitoring

For both existing and new installations based on power bus-bar trunking systems (bus-duct).
A 94% commissioning time saving can be achieved when ET272 is combined with a VMU-C EM.



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

- Patented meter, 4-DIN modules for DIN-rail mounting
- Up to 456 VLL ac and TCD-based current measuring inputs
- Current measurement by two basic TCD units with quick RJ11 plugs (see TCD M 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: 2.0% RDG (meter + TCD M unit). kWh: class 1 (IEC62053-21)
- Data format: 3-DGT (inst. variables)/7-DGT (totalizers)
- 2 pulse outputs (loads 1 and 2)
- RS485 Modbus RTU
- CE, cULus approved (ET272 + TCD-M)

VMU-C gateway and web-server solution

- VMU-C and VMU-D (if needed) are part of the ET272 solution
- 2-DIN module housing
- 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 up to 32 3-phase meters.
- One RS485-Modbus port for the management up to 10 VMU-M EM master units (digital inputs, temperature and pulse signals)
- 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 individual load. Costs analysis
- Virtual meter with sum function
- Alarm management (e-mail or SMS by means of VMU-D)
- 12 to 28 V dc power supply, CE, cULus approved

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.

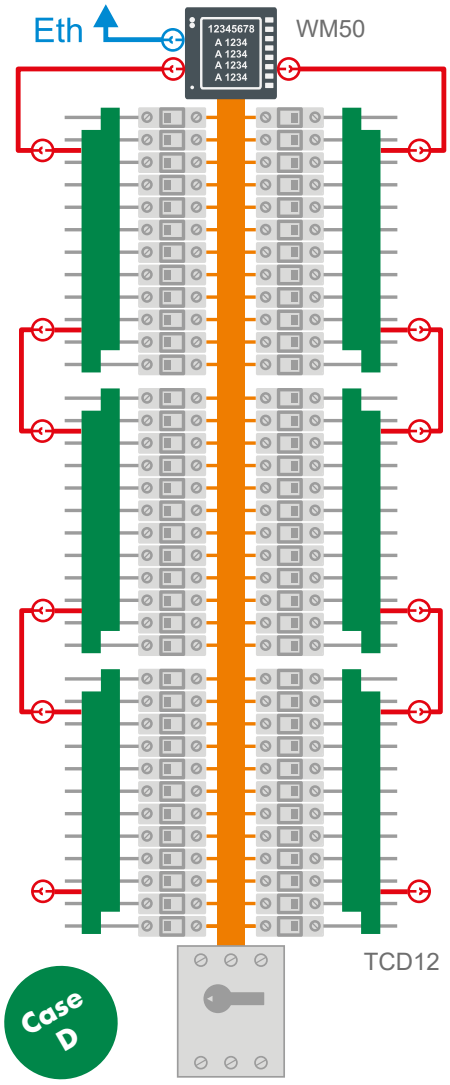
VMU-D modem

- 2-DIN module housing
- Modem extension unit for VMU-C EM
- 3G or 4G Mobile Internet connectivity with SMS alerting and SMS commands management
- 20 to 28 V dc power supply
- CE, cULus approved

VMU-C + VMU-D, if needed,
are suitable also for use cases A, B and D

Data centre monitoring

For existing installations and new installations based on PDUs (Power Distribution Units).
A 75% installation time saving can be achieved by using WM50 BCM.



WM50, main metering solution for PDUs

- 96x96mm panel mounting meter with IP65, NEMA4X/12 front protection degree and modular housing
- Up to 480 VLL ac and 5A 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 EN62053-22), THD analysis up to 31st harmonics, single harmonics via Modbus
- Basic accuracy 0.2% RDG (V/A)
- 9+1-DGT totalized variables LCD display
- Optical port for fast data reading and configuration
- Universal power supply (90 to 260Vac/dc)
- 4-tariff management
- 16-alarm PLC logic and digital inputs for utility metering, built-in event and data stamping for instantaneous variables
- cULus approved

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

UCS and UCS Mobile + OptoProg

- UCS configuration and diagnostics Software
- UCS Mobile configuration and diagnostics app for Android mobile phones
- Optoprog optical port coupling unit with rechargeable battery for WM50, provided with both USB and Bluetooth communication capabilities to be used in combination with UCS solutions.

TCD12, sub metering

- Primary: 12*32A
- Hole size (mm): 8.5
- Centre-to-centre 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

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