



## 3-PHASE KWH-METER

EMU ALLROUNDER

EMU PROFESSIONAL

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MID B + D approved

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ISO 50001

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M-Bus

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Modbus RTU + Modbus TCP

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KNX

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TCP/IP

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EMU - energy meters, data loggers and energy management software straight from the manufacturer - everything from one source.

## DEVELOPMENT AND PRODUCTION

Since we manufacture our energy meters in-house ourselves in Switzerland, we know all the ins-and-outs and are able to cater to our client's specific requirements. Tell us what you have in mind and we will develop a practical solution, for you.

## TRAINING

On a training day we provide you with our specialist knowledge of measuring techniques and evaluation systems. You get comprehensive background knowledge about the construction and the functionalities of energy meters. Together we talk over examples of usage in practice.

## QUALITY QUARANTEE

With EMU energy- and power meters you are choosing the highest quality. In production we emphasise state-of-the-art manufacturing technology and competent suppliers. All energy meters are subject to stringent test procedures and accuracy measurements.

## EMU PROFESSIONAL AND ALLROUNDER QUALITY, THAT COUNTS - MADE IN SWITZERLAND

With the EMU Professional and the EMU Allrounder we are setting new benchmarks in the DIN-rail energy meter sector. Via a wide variety of read-out interfaces different measurement readings can be communicated. The EMU Professional and the EMU Allrounder are excellently suited for use in industrial facilities, for cost centre billing and sub-measurements, as well as performance monitoring and energy management according to ISO 50001.

As with all EMU products this latest generation of energy meters has been designed for maximum performance, longevity, functionality and sophisticated measurement tasks.



### EXAMPLES OF USE

- Cost centre billing
- Load optimisation
- Power monitoring with alerting
- Ventilation and heating facilities
- Central building control system
- Energy management according to ISO 50001

### TRANSPARENCY WITHIN THE COMPANY

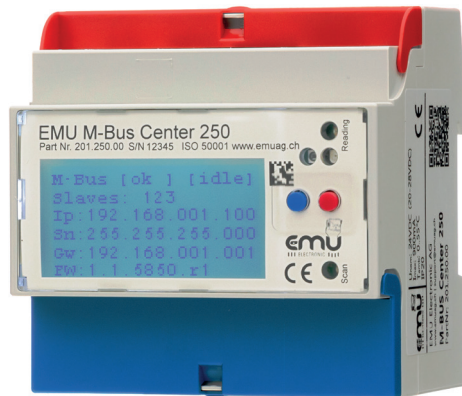
Transparency is the basis for any improvement in efficiency. The better you're able to keep an eye on energy fluxes, the more savings potentials you're able to tap. Large companies own several locations, use a variety of energy carriers and have a very diverse infrastructure of meters, networks and data sources. Centralising and processing all of this energy data requires an extremely flexible, effective platform and a specialist such as EMU.

# RECOMMENDED PRODUCTS COMPLETE SOLUTIONS

From energy meters, data loggers all the way to energy management software - we're your one stop for all your needs. Plug & Play energy monitoring optimised for manufacturing companies.

## M-Bus data logger

Automated meter readout guarantees error-free and continuous data collection for later analysis and billing as per ISO 50001. All energy meter (e.g. electricity, water, heat, gas) with M-Bus interface per EN 13757-2, -3 are read out via 2-wire line.



- Compatible with existing M-Bus energy meters / infrastructure
- Use-friendly, quick configuration
- Easy measuring concept upgrade
- IoT & Industry 4.0 ready
- M-Bus to BACnet IP gateway
- M-Bus to UPC UA gateway

	Article number	Designation
<b>M-Bus data logger</b>	201.250.00	M-Bus Center for 250 M-Bus meters
	201.120.00	M-Bus Center for 120 M-Bus meters
	201.060.00	M-Bus Center for 60 M-Bus meters
	201.020.00	M-Bus Center for 20 M-Bus meters

## Local service

- Record actual state, targets and proposed solutions
- Measuring concept proposal
- Set-up and configuration
- Training & online support



# COMPREHENSIVE SOLUTION FOR ISO 50001

From energy meters, data loggers all the way to energy management software - we're your one stop source for all your needs. Plug & Play energy monitoring optimised for manufacturing companies.

## Web-based energy management as per ISO 50001

Use our ISO 50001 Energy Management System software to monitor all usage data and bill utilities at the push of a button. The EMS software is quickly be integrated in an existing IT landscape and scaled to an unlimited number of meters regardless of the location.

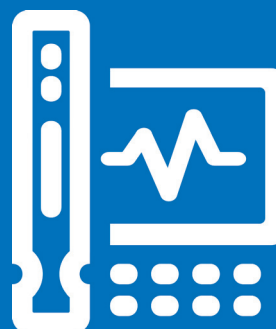


- Visualisation incl. graphs and key figures
- Automatic analysis & reports via e-mail
- Monitoring and alerting, threshold values
- Multi-user capability, multilingual
- Suitable for electric, water, heat and gas

	Article number	Designation
<b>Energy Management ISO 50001</b>	EMS0EL000	Energy Management ISO 50001   Joulio-Web Basic
	LIC0EL010	Licence for 10 devices
	LIC0EL050	Licence for 50 devices

## Protection of investment

The open communication and Gateway functions allow our energy meters and data loggers to communicate with systems of different manufacturers. This protects your hardware and installation investments.



## 3-PHASE KWH-METER EMU PROFESSIONAL

EMU Professional is a multifunctional energy and power meter, just 90 mm (5TE) width, with outstanding flexibility and accuracy.

Via direct or current transformer connection /5 and /1A it helps to analyse and monitor a variety of parameters in the most exacting applications in the residential, business and industrial sectors. It combines the functions of a multi-meter, a power and energy meter and a data logger.

With the TCP/IP interface you can see all the parameters via a password-protected website.

EMU Professional is manufactured in accuracy class B (+/-1%) according to MID standard, with class C (+/-0.5%) available upon request by the client.

«Quality that counts – Made in Switzerland».



## FEATURES

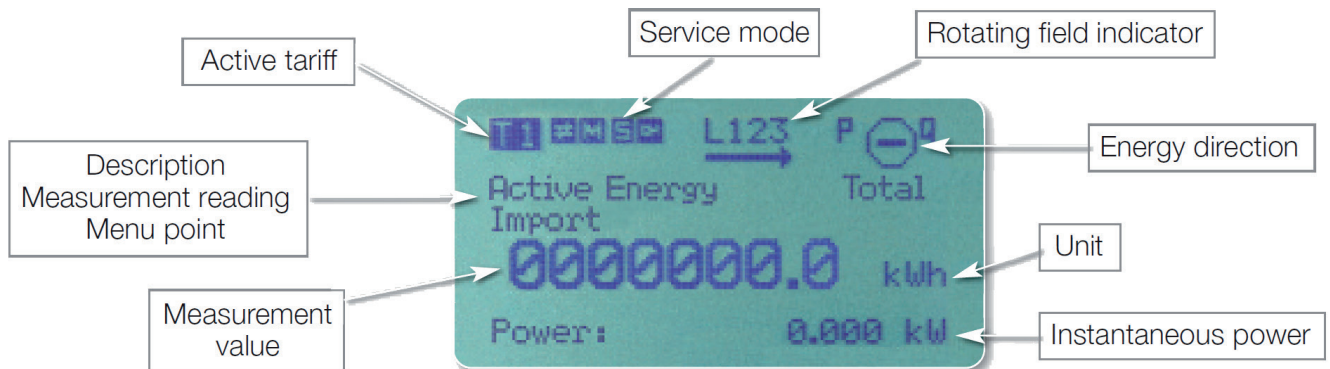
- Peak demand optimisation
- Maximum-Alert
- MiD B + D approval for billing purposes ex-factory
- 1 or 5 A current transformer connection for up to 20'000/5 or 4'000/1 A
- Direct connection up to 80A (MID 75A)
- Control input for high and low tariff, double tariff
- Optional up to 4 tariffs
- High-performance Opto Power MOSFET S0 Impulse output, 5–400V AC or V DC, max. 90 mA
- Graphic LC display (60x30 mm) with background lighting
- 8-digit display with one decimal place 1234567.8 kWh
- Mounting on 35 mm DIN rails
- Accuracy class B (+/-1%) for active energy EN50470-1, -3
- Can be read remotely via different interfaces

## EXAMPLES OF USE

- Cost centre billing
- Load optimisation
- Power monitoring with alerting
- Ventilation and heating facilities
- Central building control system
- Energy management ISO 50001

## OPERATION AND DISPLAY

A 60x30 mm graphic LC-display with LED background lighting makes it possible for parameters and settings to be read, and the figures are very visible. The desired menu language can be selected via the keys. The clear and intuitive operation makes start-up and daily use of the energy meters easier.



## DISPLAY DATA

	Total / sum 3 phases	Per phase	Per tariff
Active energy import (kWh)	•	-	•
Active energy export (kWh)	•	-	•
Reactive energy inductive (kvarh)	•	•	•
Reactive energy capacitive (kvarh)	-	•	•
Active power (kW)	•	•	-
Reactive power (kvar)	•	•	-
Apparent power (kVA)	•	•	-
Current (A)	•	•	-
Voltage (V) L-N	-	•	-
Voltage (V) L-L	-	•	-
Performance factor (Cos Phi)	-	•	-
Power frequency (Hz)	•	-	-
Number of power outages	•	-	-
Instantaneous x Min. Maximum *	-	-	•
x Min. effective power maximum	-	-	•
Date/Time	•	-	-

\*Measurement period 1, 5, 15, 30 or 60 minutes.

## READ-OUT INTERFACES

The EMU Professional can be equipped with a variety of read-out modules. All read-out modules are integrated in the EMU Professional where they are protected from contamination and manipulation.

A variety of measurement readings are transferred via the Bus system, for instance active and reactive power, current, voltage, active, reactive and apparent power, power factor, frequency, minimum and maximum values.

- M-Bus
- Modbus RTU + ASCII
- TCP/IP: Web-Server and Modbus TCP
- KNX
- LON

## EMU MB-CONNECT SOFTWARE

To configure the EMU energy and power meter with M-Bus interface, our free EMU MB- Connect software is available on our website.

All energy meters with an M-Bus interface according EN13757 can be configured and read by our MB-Connect. Read-out occurs manually or periodically in an adjustable interval.

The selected readings can be exported to a CSV file (Comma Separated Values) and processed in Excel for instance.

### Functions:

- Checking the M-Bus installation
- Addressing of meters
- Setting individual read-out data
- Changing the baud rate
- Automatic meter read-out
- Export of read-out data to a CSV file

## ADJUSTABLE CURRENT TRANSFORMER FACTOR

The current transformer ratio can be set on the EMU Professional and the EMU Allrounder with MiD-approval via buttons, from 5/5 to 20'000/5 A or 1/1 to 4'000/1 A. The set-up button is sealed, preventing manipulation.



## ACCURACY IN PHOTOVOLTAIC INSTALLATIONS

EMU Professional and EMU Allrounder have been specifically tested for use with inverters in photovoltaic installations. An additional inspection ensures that EMU energy meters in the not officially regulated frequency range between 2 kHz and 150 kHz provide a precise measurement. With regard to this problem, renowned specialist journals have reported that measurement errors of up to 18% may occur.

## STARTING CURRENT AND MEASUREMENT SYSTEM

Two currents are listed on the dial of every electricity meter. Nominal current  $I_N$  and limit current. 5(80)A, 5 = Nominal current, 80 = limit current.

According to EN50470-3 the maximum starting current for accuracy class B is 0.4 % of  $I_N$ .

One crucial detail: The starting current provides information regarding how much power can be consumed without the energy meter starting a measurement.

An example for accuracy class B with a nominal current of 5 and 10 amperes:

5(80) A	10(80)A
$I_N = 5 \text{ A}$	$I_N = 10 \text{ A}$
$I_{tr} = 5/10 = 0.5 \text{ A}$	$I_{tr} = 10/10 = 1 \text{ A}$
$I_{\text{Initial current}} = 0.04 * I_{tr}$	$I_{\text{Initial current}} = 0.04 * I_{tr}$
$I_{\text{Initial current}} = 0.04 * 0.5 \text{ A}$	$I_{\text{Initial current}} = 0.04 * 1 \text{ A}$
$I_{\text{Initial current}} = 20 \text{ mA/Phase}$	$I_{\text{Initial current}} = 40 \text{ mA/Phase}$

Starting current EMU direct connection energy meter: 9 mA/Phase

Starting current EMU transformer connection energy meter: 1 mA/Phase

### Nominal current $I_N$

The nominal current provides information about the internal measurement system and has an impact on the approval on the starting current of the electricity meter.

### Limit current $I_{\text{max}}$

The limit current is the highest current with which the electricity meter fulfils the precision requirements as per the European EN50470-1 standard. Exceeding of the limit current increases errors in measurement. Our electricity meters are designed for steady load with limit current.

## So IMPULSE OUTPUT

On the EMU Professional there are 4 S0 Impulse outputs (Opto Power MOSFET, 5–400V AC or V DC, 90 mA) available. Pulse length and rate can be configured via buttons for optimum solution.

- Active energy import
- Active energy export
- Reactive energy inductive
- Reactive energy capacitive

Adjustable pulse rate and length

Pulse rate per kWh/kvarh: 0.001, 0.01, 0.1, 1, 10, 100, 1'000 or 10'000

Pulse length in milliseconds: 4 to 250 ms, adjustable in 2 ms-stages

Factory set configuration in energy meters for:

Direct connection: 1'000 Impulse/40 ms

Current transformer connection: 10 Impulse/120 ms

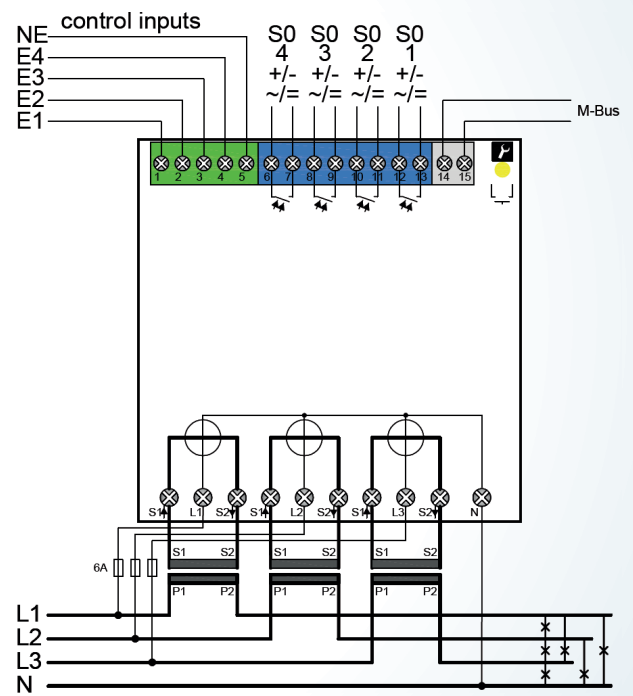
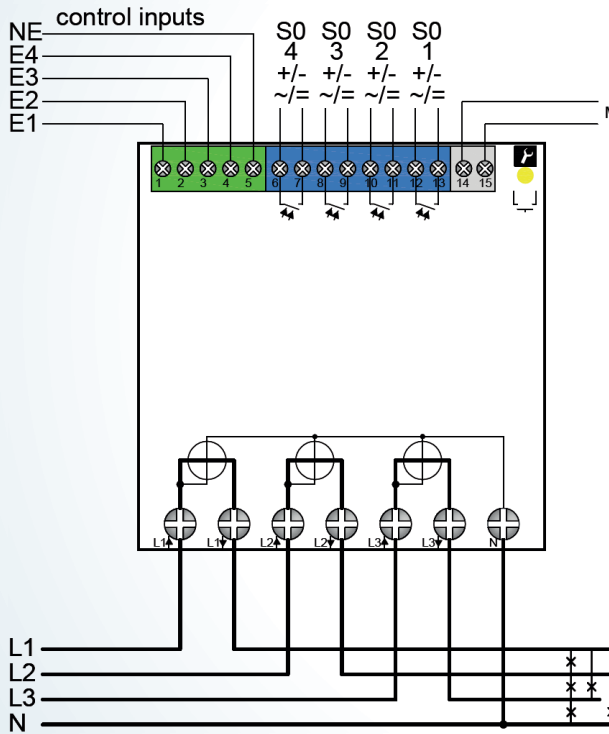
## MID APPROVAL

EMU Professional and EMU Allrounder have been tested and approved in accordance with MiD modules B + D (Measurement Instrument Directive).

With additional certification according to module D, QM system for manufacture and final inspection, all EMU Professional and EMU Allrounder can be utilised ex factory for billing purposes within the European Union.

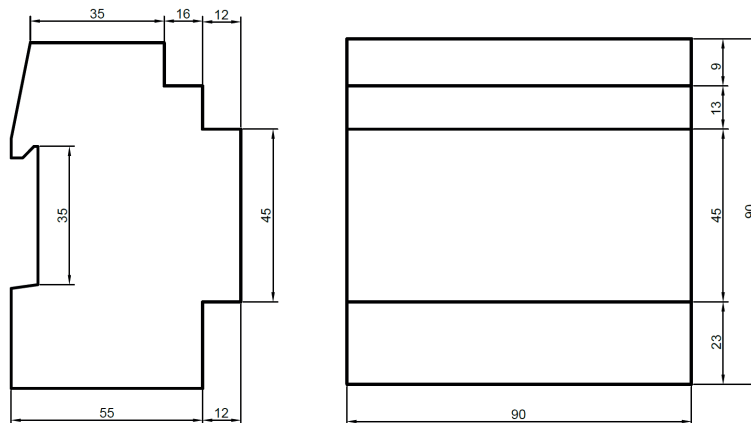
Part No.	Type	Current	Voltage	
P0200000	EMU Professional 3/75	75A	3x230 / 400V AC	MID B+D
P020000M	EMU Professional 3/75 M-Bus	75A	3x230 / 400V AC	MID B+D
P020000T	EMU Professional 3/75 TCP/IP	75A	3x230 / 400V AC	MID B+D
P020000K	EMU Professional 3/75 KNX	75A	3x230 / 400V AC	MID B+D
P020000L	EMU Professional 3/75 LON	75A	3x230 / 400V AC	MID B+D
P020000MO	EMU Professional 3/75 Modbus	75A	3x230 / 400V AC	MID B+D
P1200000	EMU Professional 3/5	CT /5, /1A	3x230 / 400V AC	MID B+D
P120000M	EMU Professional 3/5 M-Bus	CT /5, /1A	3x230 / 400V AC	MID B+D
P120000T	EMU Professional 3/5 TCP/IP	CT /5, /1A	3x230 / 400V AC	MID B+D
P120000K	EMU Professional 3/5 KNX	CT /5, /1A	3x230 / 400V AC	MID B+D
P120000L	EMU Professional 3/5 LON	CT /5, /1A	3x230 / 400V AC	MID B+D
P120000MO	EMU Professional 3/5 Modbus	CT /5, /1A	3x230 / 400V AC	MID B+D

## WIRING DIAGRAM



## DIMENSION DIAGRAM

EMU Allrounder and EMU Professional



## 3-PHASE KWH-METER EMU ALLROUNDER

The multifunctional 5 module (90 mm) width, 3-phase energy and power meter, EMU Allrounder for direct connection up to 75 A, or current transformer /1 or /5 A with S0 Impulse output for active energy.

The key measurement values can be read on the display. The Allrounder collects active energy (kWh), with an accuracy of 1%. This conforms to accuracy class B, as per MiD.

«Quality that counts – Made in Switzerland».



### EXAMPLES OF USE

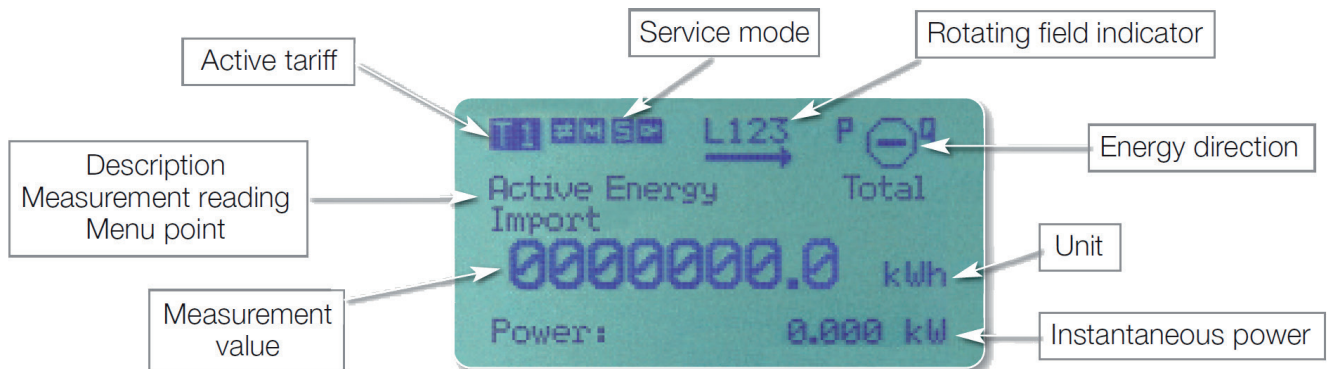
- Cost centre billing
- Load optimisation
- Ventilation and heating facilities
- Central building control system
- Energy management ISO 50001

### FEATURES

- MiD B + D approval for billing purposes ex-factory
- 1 or 5 A current transformer connection for up to 20'000/5 or 4'000/1 A
- Direct connection up to 75 A
- Control input for high and low tariff, double tariff
- Optional up to 4 tariffs
- High performance Opto Power MOSFET S0 Impulse output,
- 5–400V AC or V DC, max. 90 mA
- Graphic LC-display (60x30 mm) with background lighting
- 8-digit display with one decimal place 0000000.0 kWh
- Mounting on 35 mm DIN rails
- Own consumption just 0.8W/phase
- Accuracy class B (+/-1 %) for active energy EN50470-1, -3
- Can be read remotely via different interfaces

## OPERATION AND DISPLAY

A 60x30 mm graphic LC-display with LED background lighting makes it possible for parameters and settings to be read, and the figures are very visible. The desired menu language can be selected via the keys. The clear and intuitive operation makes start-up and daily use of the energy meters easier.



## DISPLAY DATA

	Total 3 phases	Per phase	Per tariff
Active energy import (kWh)	•	-	•
Active energy import (kWh) (resettable)	•	-	•
Active power (kW)	•	•	-
Voltage (V) L-N	-	•	-
Number of power failures	•		-

## ADJUSTABLE CURRENT TRANSFORMER FACTOR

The current transformer ratio can be set on the EMU Allrounder with MiD-approval via buttons, from 5/5 to 20'000/5 A or 1/1 to 4'000/1 A. The set-up button is sealed, preventing manipulation.

## READ-OUT INTERFACES

The EMU Professional can be equipped with a variety of read-out modules. All read-out modules are integrated in the EMU Professional where they are protected from contamination and manipulation.

A variety of measurement readings are transferred via the Bus system, for instance active and reactive power, current, voltage, active, reactive and apparent power, power factor, frequency, minimum and maximum values.

- M-Bus

## So IMPULSE OUTPUT

On the EMU Allrounder there is one S0 Impulse output (Opto Power MOSFET, 5–400V AC or V DC, 90 mA) for active energy. Pulse length and rate can be configured via buttons.

Adjustable pulse rate and length

Pulse rate per kWh: 0.001, 0.01, 0.1, 1, 10, 100, 1'000 or 10'000

Pulse length in milliseconds: 4 to 250 ms, adjustable in 2 ms-stages

Factory set configuration in energy meters for:

Direct connection: 1'000 Impulse/40 ms

Current transformer connection: 10 Impulse/120 ms

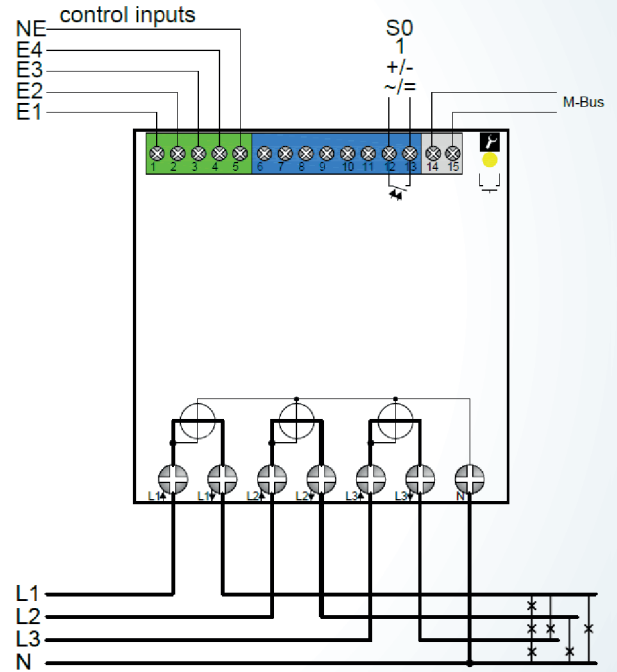
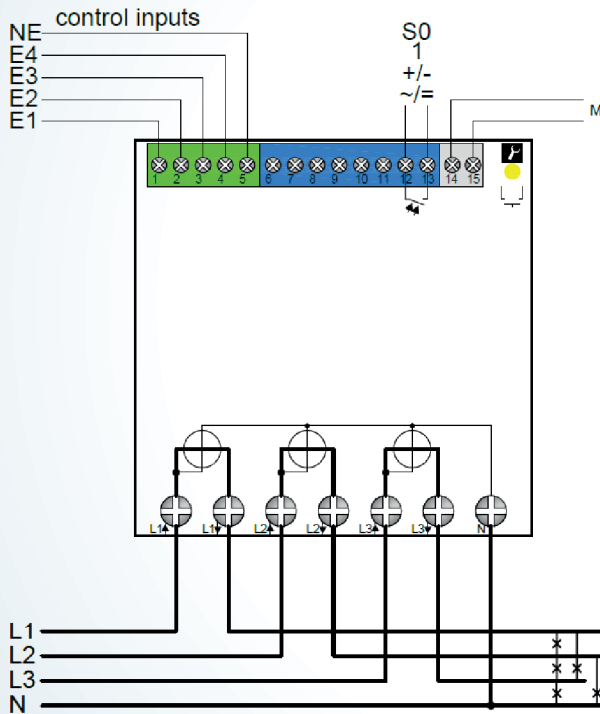
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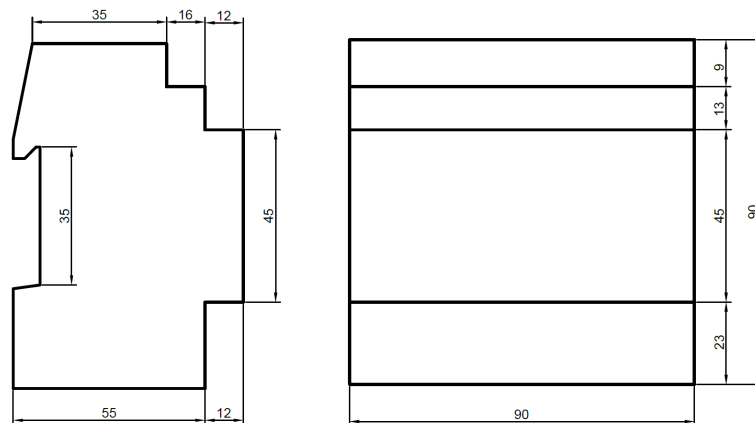
Part No.	Type	Current	Voltage	
A0200000	EMU Allrounder 3/75	75A	3x230 / 400V AC	MID B+D
A020000M	EMU Allrounder 3/75 M-Bus	75A	3x230 / 400V AC	MID B+D
A1200000	EMU Allrounder 3/5	CT /5, /1A	3x230 / 400V AC	MID B+D
A120000M	EMU Allrounder 3/5 M-Bus	CT /5, /1A	3x230 / 400V AC	MID B+D

## WIRING DIAGRAM



## DIMENSION DIAGRAM

EMU Allrounder



# M-BUS INTERFACE

## READ-OUT DATA AND CONFIGURATION

There is a variety of read-out data available on the M-Bus such as active power and reactive power, current, voltage, form factor and net frequency. The control keys on the energy meter allow primary and secondary addresses and baud rate to be set.

The read-out data can be parametrised with our free EMU MB-Connect software. This means you can put together your own individual M-Bus protocol. The M-Bus load of the EMU Allrounder and EMU Professional is 1.5 mA or a standard load.

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## BUS CONNECTION AND CABLE TYPE

The M-Bus cable is connected to a 2-pole terminal for flexible and rigid cables. The best cable available must be selected for each unit.

M-Bus cabling should be as short as possible and be located a few centimetres away from the power supply system.

Recommended cable type: telephone cable, twisted pair, shrouded,  
Type: JY(St)Y 2x0.5 to 1.5 mm<sup>2</sup>

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## DATA TRANSMISSION RATE

Via M-Bus the EMU Professional and EMU Allrounder communicate on 300, 600, 1'200, 2'400, 4'800 and 9'600 Baud.

Default ex-factory: 2400 Baud

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# TCP/IP INTERFACE

## WEB-SERVER + MODBUS TCP

### READ-OUT DATA AND CONFIGURATION

With the TCP/IP module you can analyse different measurement readings and load profile can be analysed via your web browser and IP address in a LAN or WAN. The module logs measurement values in a configurable interval and exports it to a CSV file (Comma-Separated Values).

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### FEATURES

- Display of instantaneous measurement reading
- Graphical load profile
- Logging of different measurement values
- Display of minimum and maximum values
- Access protection with password
- Remote reading via Modbus TCP

### MODBUS TCP

Modbus TCP is very similar to Modbus RTU, but TCP/IP packages are used to transfer data. TCP-Port 502 is reserved for Modbus TCP.

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## PRODUCT INFORMATION

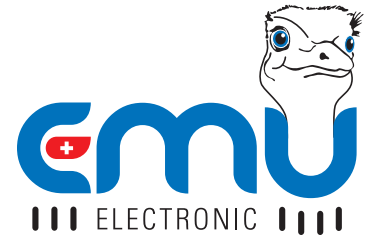
Accuracy active energy	Class B (1%) as per EN50470-3 Class C (0.5%) as per EN50470-3 optional
Accuracy reactive energy	Class 2 (2%) as per EN62053
Operating voltage	L-L: 400VAC +/- 30% L-N: 230VAC +/- 30% Additional voltage ranges available on request.
Maximum current / Fuse	Direct-meter: 75A (80A fuse) Indirect-meter / current transformer: 10 A
Starting current	Direct-meter: <9 mA at cos phi 1 Indirect-meter / current transformer: <1 mA at cos phi 1
Network frequency	Nominal frequency: 50 / 60Hz Limiting frequency: 40 - 65 Hz
Own consumption	Voltage circuit: 0.8 VA / 0.8W per phase Current path transformer-connected meter: 0.03 VA per phase
Current and voltage connector	Direct-meter: 1-25 mm <sup>2</sup> , recommended torque: 2 Nm, max. 3 Nm Current transformer: 1-16 mm <sup>2</sup> , recommended torque: 1 Nm, max. 3 Nm
Tariff control	230VAC
Adjustable current transformer ratios	Current transformer /5 A 5/5 A to 20'000/5 A in 5 A-stages Current transformer /1 A 1/1 A to 4'000/1 A in 1 A-stages
Display	LCD display 8-digit with one decimal place 1234567.8 kWh White backlight, LCD graphics Dimension (WxH): 60x30 mm
S0 Impulse output	Standard specifications EN62053-31 Switching voltage/current 5 to 400 V DC and V DC, max. 90 mA Potential-free Pulse rate per kWh/kvarh 0.001, 0.1, 1, 10, 100, 1'000, 10'000 pulses Pulse length 4 to 250 ms, adjustable in 2 ms-stages Impulse rate and length can be adjusted on the meter Connection cross-section 0.5–2.5 mm <sup>2</sup> , Torque 0.5 Nm, max. 1 Nm
M-Bus	Standard specifications EN13757-2, -3 M-Bus consumption: 1.5 mA, one standard load Cable cross-section 0.5–2.5 mm <sup>2</sup> Secondary address 8-digit 00000000–99999999 Primary address 0 to 250 Baud rate 300, 600, 1'200, 2'400, 4'800 and 9'600 Baud Configuration: Via buttons or EMU MB-Connect Software Read-out data: Configurable via EMU MB-Connect Software

## TECHNICAL DATA

Optional data interfaces	M-Bus EN13757-2, -3 TCP/IP: Web-server and Modbus TCP Modbus RTU and ASCII KNX LON
Optical D0 (IR) interface	EN 62056-21
Data retention	In Up Flash or Eeprom, Minimum 10 years
Assembly / Mounting	Location: Irrespective On 35 mm DIN-rails or with front installation structure Weigh Approx. 400 g
Casing	Casing material Polycarbonate, halogen-free, recyclable Case protection type IP20 Protection class II
Approvals	CE and MID B + D Suitable for energy management according to ISO 50001
Environmental conditions	Operating temperature: -25 °C ... + 60 °C Limiting temperature: -40 °C ... + 70 °C Relative humidity: ≤80 % at 40 °C, non-condensing
Safety information	Current transformers should not be operated open, since high voltages may occur. This may cause damage to people and materials.

### Disclaimer

This brochure may contain forward-looking statements based on current assumptions and estimates of the management of EMU Electronic AG. By using appropriate formulations, forward-looking statements are identified. These statements are not to be understood as guarantees that these expectations will prove to be correct. The future development and results actually achieved by EMU Electronic AG and its affiliates are subject to a number of risks and uncertainties and may therefore differ materially from the forward-looking statements. Several of these factors are beyond the control of the Company and can not be accurately estimated in advance, such as the future economic environment and the behavior of competitors, other market participants and legislators. An update of the forward-looking statements is neither planned nor the company assumes a separate obligation.



EMU Electronic AG  
Jöchlerweg 2  
6340 Baar  
Switzerland

Phone: +41 (0)41 545 03 00  
Mail: [info@emuag.ch](mailto:info@emuag.ch)  
Web: [www.emuag.ch](http://www.emuag.ch)

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Technical changes reserved.