



KÖHLER

ELEKTRİK SAYAÇLARI SAN.ve TİC. A.Ş.

AEL.SM.400

**SINGLE-PHASE MODULAR
ACTIVE REACTIVE
ELECTRONIC ELECTRICITY METER**

INTRODUCTION AND USER MANUAL

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0. INTRODUCTION

This user manual describes the technical information of the electronic electricity meters that are manufactured with advanced technology and comply with the Measuring Instruments Directive 2014/32/EU (MID) published by the EU within the scope of the new approach legislation; these meters measure active/reactive electrical energy and the maximum power drawn, display this data on the LCD display, hold the required information and programs in memory, and allow this information to be accessed whenever required.

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CAUTION!

READ THIS USER MANUAL CAREFULLY BEFORE INSTALLING THE METER.

- ✓ The meter must be installed only by **qualified expert personnel**.
- ✓ During installation, **live parts must never be touched**.
- ✓ During installation and removal of the meter, **the power must always be switched off**.
- ✓ KÖHLER Electronic Meters are a high-technology product. All technical data and documents are company property and may not be copied or used by third parties.
- ✓ This booklet provides summary information about the meter.
- ✓ Expert personnel must check that the meter type to be used suits the network and the installation. Otherwise the wrong meter selection or connection will damage your meter. **Meters in this condition are not covered by the warranty.**
- ✓ The information shown on the meter display is determined by TEDAŞ.
- ✓ Meter parameter settings and maintenance cannot be carried out by the user. Meter parameter settings and maintenance are performed only by authorised TEDAŞ personnel.

1. METER TECHNICAL SPECIFICATIONS

Meter Description	Single-Phase, Two-Wire, Four-Tariff, Demand-Metering, Outdoor, Active – Reactive Modular Electronic Electricity Meter
Connection Type	Directly Connected
Reference Voltage (Un)	230 V – 240 V
Operating Voltage Range	50 V (Minimum) – 330V (Maximum)
Reference Frequency (Fn)	50 Hz ±5%
Accuracy Class	Active: C , Reactive: 1
Starting Current (Ist)	0.02A (0.04.Itr)
Minimum Current (Imin)	0.15A
Transitional Current (Itr)	0.5A
Reference Current (In)	5A
Maximum Current (Imax)	100A
IP Class	IP54 (Outdoor)
Protection Class	Two (2)
Relative Humidity	95%
Operating Temperature	-40 °C, +70 °C (3K7)
Mechanical Environment Class	M1 (according to Directive 2014/32/EU)
Electromagnetic Environment Class	E2 (according to Directive 2014/32/EU)
Operating Environment	In non-condensing humidity
Voltage Circuit Power Consumption	≤ 1W
Current Circuit Power Consumption	≤ 1VA
ESD Voltage Withstand	Contact: 8 kV ; Air: 15 kV
Impulse Voltage	6 kV
Meter Constant	1,600 imp/kWh and 1,600 imp/kVArh
LCD Display	6+3 Digits
Optical Port	Yes (IEC 62056-21 or DLMS)
RS485	Yes (IEC 62056-21 or DLMS)
Communication Speed	300 – 19,200 Baud
System Battery Life	≥ 10 years
Real-Time Clock Battery Life	≥ 10 years
Meter Shelf Life	≥ 4 years
Clock Accuracy	0.5 s/day (at room temperature) (IEC-EN 61038)
Data Storage Capacity	4 Years
Relevant Standards	TS EN 50470-1, TS EN 50470-3, TS EN 62053-23

2. MAIN FUNCTIONS

2.1. Measurement: The meter measures total active and reactive energy and demand across 8 tariffs.

2.2. Programming the Meter: Time zones and tariffs can be programmed. Eight separate time zones can be defined within a day and each time zone can be mapped to one of the 8 tariffs. It also allows separate tariff settings for weekdays, Saturdays and Sundays. Once the terminal cover has been opened, the date and time and the tariff information in the meter can be changed only by authorised TEDAŞ personnel.

2.3. Reading the Meter: 48 months of billing information, total consumed energy amounts, terminal cover opening information, 48 months of demand information and the first opening date of the main cover can be read from the meter via the optical port or the RS485 output.

2.4. Self-Diagnostics Feature: The meter constantly checks its internal circuits and shows fault types on the display. Fault indications are explained under “LCD DISPLAY INFORMATION”.

2.5. Terminal Cover and Main Cover Open/Close Recording Feature: If the main cover is opened, the first opening date is recorded. If the terminal cover is opened, the first opening date of each month and the total number of openings within that month are recorded. Cover opening dates and counts are kept in memory for the last 48 months.

2.6. Signal Output: There are LEDs on the meter that indicate the active and reactive energy consumed. The number of flashes of these LEDs indicates the Imp/kWh and Imp/kVarh values of the meter.

1,600 imp/kWh or imp/kVarh : 1,600 flashes = 1kWh or 1kVarh

2.7. Operating the Display During a Power Cut: When the power is cut, the required data can be called up on the LCD with the meter call button and read from the optical port.

2.8. Communication: Data read through the optical port on the meter with an optical reader is transferred to a portable computer (handheld unit). In addition, thanks to the RS485 communication output supplied as standard on all combi meters, remote access to the meter data is also possible. The meter can communicate over the optical port and the RS485 output at the same time. No reading is possible from the RS485 output while there is no power.

2.9. Communication Module: The meter has a slot into which a module can be fitted for remote communication. The modules are designed as plug-and-play units. The communication module can be fitted by opening the module slot cover, without breaking the calibration seals of the meter. It draws the power and communication signals it needs through the module connector. No additional connection is required for the module. The module must be fitted only by **expert personnel**.

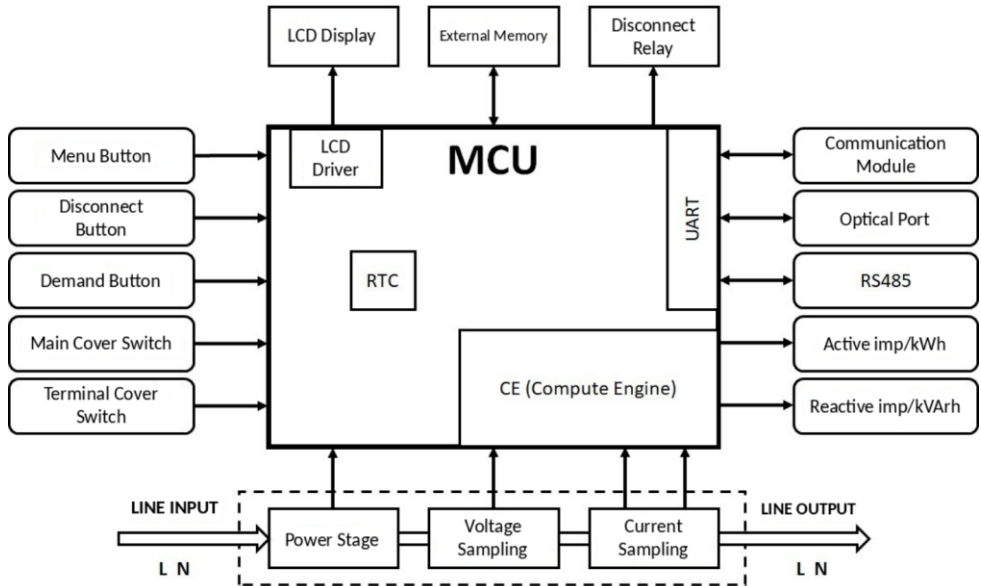
2.10. Disconnect Relay: The meter optionally contains a disconnect relay. In normal operation the disconnect relay is closed and allows energy to pass. If a predefined condition occurs (load limit exceeded, overvoltage or overcurrent, credit exhausted) the disconnect relay opens and the power is cut. To close the relay again and restore power, these conditions must be cleared or a relay-close command must be sent over the communication channels. Where permitted, this can also be done with the disconnect button on the meter.

3. METER STRUCTURE AND OPERATING PRINCIPLE

3.1. Meter Structure

The body and covers of the meter are fully sealed in accordance with the IP54 Outdoor standard. They are made of high-grade flame-retardant plastic. All electronic components are mounted on a PCB, and this PCB is fitted into the meter body. After the meter is calibrated at the factory, the main cover is screwed down and secured with the main cover seal. The terminal cover is sealed by authorised personnel after the meter has been installed.

3.2. Meter Block Diagram



4. OPERATING THE METER

Once the meter is installed and energised, it operates normally and the LCD display is activated.

4.1. Checking the Functions

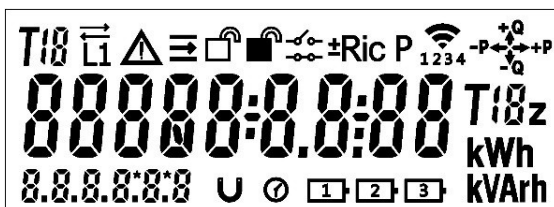
When the meter is installed the electrical connections must be checked for correctness. Once the meter is correctly mounted in place, the terminal cover screw is tightened. The flashing 2nd lock symbol on the LCD display will disappear after the first reading. If it does not, the terminal cover is not fitted correctly or its screw is not fully tightened.

4.2. Operation of the LCD Display

When the meter starts up, the automatic menu mode is activated. Each menu of the relevant mode stays on the display for 5 seconds and then moves automatically to the next information menu. When the button on the meter is pressed, the button menu mode is activated. If no key is pressed for 30 seconds, the meter returns to the automatic menu mode.

Holding the meter call button pressed for 5 seconds activates the sub-menus. This menu generally contains the information of previous months. You can return to the button menu by pressing the call button for 5 seconds again.

5. LCD DISPLAY INFORMATION



The symbols and information on the LCD display are defined as follows:

	This icon indicates the main cover opening status. If the icon is flashing while the cover is closed, it means that the cover has been opened previously. If it is shown steadily on the display, the main cover is in the open position.
	This icon indicates the terminal cover opening status. If the icon is flashing while the cover is closed, it means that the cover has been opened previously. If it is shown steadily on the display, the cover is in the open position. The icon disappears once the meter has been read via the optical port or RS485.
	The Clock Error icon appears if the clock is not working normally.
	This icon appears if the system battery voltage is low.
	This icon appears if the clock battery voltage is low.
	This icon appears if the replaceable battery voltage is low.
	Indicates whether the phase is present. The arrows above the phase icon show the direction of energy flow.
	Lights up when the meter is magnetically tampered with. It stays lit even after the tampering ends. The icon clears once the meter is read via the optical port or RS485.
	Indicates the current tariff. For example, if the current date/time falls within tariff T1, T1 is shown on the display. In the event of any fault in the meter clock, T1 is always active.
	The Error icon lights up if the difference between the phase and neutral currents is more than 10%.
	Lights up while data is being read from the meter, to indicate data transfer. When the reading ends the indicator disappears from the display. 1: Optical, 2: RS485, 3: shows that communication is via the module.
	Indicates the characteristic of the energy flowing through the system.
	Indicates the status of the internal disconnect relay. In normal operation the relay is closed. If the defined load limits are exceeded or the loaded credit runs out, the disconnect relay opens and the power is cut.



In normal operation the Energy Flow icon is lit continuously. If the disconnect relay cuts the power because the defined load limits have been exceeded or the loaded credit has run out, the Energy Flow icon goes out.

5.1 Display List Example

Meter Date (YYYY-MM-DD)	T 1 2021-07-08 0.9.2
Meter Time (HH:MM:ss)	T 1 17:52:34 0.9.1
Imported Active Energy, Total (+T)	T 1 000265.289T kWh 1.8.0
Imported Active Energy, Tariff 1 (+T1)	T 1 000071.423T kWh 1.8.1
Imported Active Energy, Tariff 2 (+T2)	T 1 000046.286T kWh 1.8.2
Imported Active Energy, Tariff 3 (+T3)	T 1 000051.367T kWh 1.8.3
Imported Active Energy, Tariff 4 (+T4)	T 1 000029.604T kWh 1.8.4
Imported Active Energy, Tariff 5 (+T5)	T 1 000019.482T kWh 1.8.5
Imported Active Energy, Tariff 6 (+T6)	T 1 000037.967T kWh 1.8.6
Imported Active Energy, Tariff 7 (+T7)	T 1 000002.074T kWh 1.8.7
Imported Active Energy, Tariff 8 (+T8)	T 1 000007.086T kWh 1.8.8

Exported Active Energy, Total (-T)	T 1 000132.939T 2.8.0 kWh
Exported Active Energy, Tariff 1 (-T1)	T 1 000045.086T 2.8.1 kWh
Exported Active Energy, Tariff 2 (-T2)	T 1 000023.751T 2.8.2 kWh
Exported Active Energy, Tariff 3 (-T3)	T 1 000037.684T 2.8.3 kWh
Exported Active Energy, Tariff 4 (-T4)	T 1 000003.504T 2.8.4 kWh
Exported Active Energy, Tariff 5 (-T5)	T 1 000017.289T 2.8.5 kWh
Exported Active Energy, Tariff 6 (-T6)	T 1 000000.872T 2.8.6 kWh
Exported Active Energy, Tariff 7 (-T7)	T 1 000003.278T 2.8.7 kWh
Exported Active Energy, Tariff 8 (-T8)	T 1 000001.475T 2.8.8 kWh
Imported Total Reactive Energy (+R)	T 1 000050.783T 3.8.0 kVArh
Exported Total Reactive Energy (-R)	T 1 000044.136T 4.8.0 kVArh
Imported Inductive Reactive Energy (+Ri)	T 1 000036.273T 5.8.0 kVArh

Meter Serial Number	T1 123456789 0.0.0
Main Cover Opening Date	T1 2021-03-24 96.70
Main Cover Opening Time	T1 10:45 96.70
Terminal Cover Opening Date	T1 2021-02-17 96.71
Terminal Cover Opening Time	T1 19:32 96.71
Software Version Number	T1 nr 00.01 0.2.0
Measurement Software Version Number	T1 r 00.01 0.2.1
Instantaneous Voltage	T1 223.781 32.70 V
Instantaneous Current	T1 037.409 31.70 A
Instantaneous Power	T1 008.196 21.70 kW
Grid Frequency	T1 50.01 14.70 Hz
Cosφ	T1 PF 0.974 33.70

Neutral Current	T1 037.603 9 1.7.8 A
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6. LOAD PROFILE

The meter has 3 independent load profiles. Each load profile can be set independently to a 15, 30 or 60 minute period. The load profile capacity is 180 days for a 15-minute period. The load profile is recorded so that it coincides with the top of the hour. A load profile record is also taken during power failures. Records between two times, or all records, can be read.

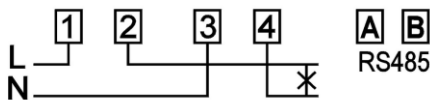
Load Profile 1 (P.01) : 1.8.0, 2.8.0, 5.8.0, 6.8.0, 7.8.0, 8.8.0, 1.6.0, 2.6.0

Load Profile 2 (P.02) : 1.8.0, 1.8.1, 1.8.2, 1.8.3, 1.8.4, 1.8.5, 1.8.6, 1.8.7, 1.8.8, 2.8.1, 2.8.2, 2.8.3, 2.8.4, 2.8.5, 2.8.6, 2.8.7, 2.8.8

Load Profile 3 (P.03) : Vrms(max), Vrms(min), Irms, Frequency, Cosα

Energy Registers of the Meter	Unidirectional	Bidirectional
Imported Active Energy (+T)	1.8.0	1.8.0
Exported Active Energy (-T)	1.8.0	2.8.0
Quadrant I + II Imported Reactive Energy (+R)	3.8.0	3.8.0
Quadrant III + IV Exported Reactive Energy (-R)	4.8.0	4.8.0
Quadrant I Imported Inductive Energy (+Ri)	5.8.0	5.8.0
Quadrant II Imported Capacitive Energy (+Rc)	8.8.0	6.8.0
Quadrant III Exported Inductive Energy (-Ri)	5.8.0	7.8.0
Quadrant IV Exported Capacitive Energy (-Rc)	8.8.0	8.8.0

7. CONNECTION DIAGRAM



CAUTION: The inner diameter of the current terminals of the meters is 6.3 mm. These meters must be connected to a 100A line with a cable of at least 25 mm².

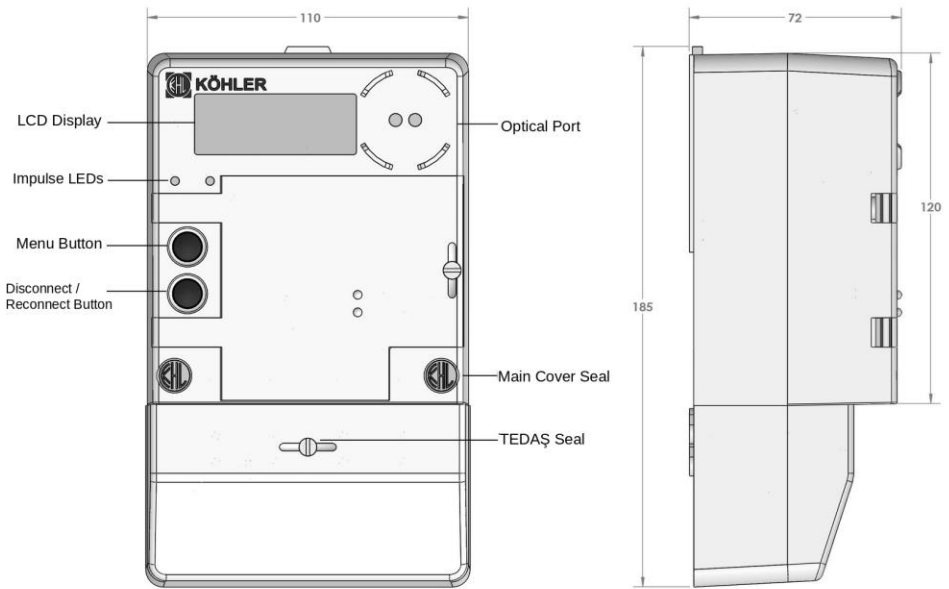
CAUTION: (A) and (B) to the right of the terminal block are the RS485 outputs. Never apply power to them! The RS485 outputs of the meter are arranged so that the meter can be read in parallel. In this way 32 meters can be connected in parallel to an RS485 converter attached to a computer and read. The parallel connection is made by connecting the A terminals to each other and the B terminals to each other.

The serial numbers of the meters are used to reach more than one meter on the RS485 output. The query uses the structure /?XXXXXXXXX! (CR) (LF). XXXXXXXXXX is the nine-digit meter serial number.

8. TYPE CODE TABLE

Type Code:		AEL	.	SM400	.	1	1	3	4	1	4	.	P	1	2	0	.
Brand																	
Köhler		AEL															
Model																	
Monophase				SM400													
Connection																	
1 phase 2 wire DIN Terminal						1											
Voltage																	
230V							1										
240V							5										
Current																	
5(60)A								1									
5(80)A								2									
5(100)A								3									
Energy Measurement																	
Active+								1									
Active+ Active-								2									
Active+ Reactive+								3									
Active+ Active- Reactive+ Reactive-								4									
Neutral Measurement																	
No								0									
Yes								1									
Active & Reactive Accuracy																	
Class B									1								
Class C									2								
Class B & Class 1									3								
Class C & Class 1									4								
Module																	
None													N				
Integrated PLC Module													P				
Integrated RF Module													F				
Integrated RFID Module													R				
Integrated Keypad													K				
Latch Relay																	
None														0			
Integrated														1			
Communication																	
None															0		
Optic															1		
Optic & RS485															2		
Input / Output																	
None																0	
1 Generator Input																2	
Configuration																	
Basic																	
Backlight & Magnetic Sensor																	

9. DIMENSIONS



10. EU DECLARATION OF CONFORMITY



EU DECLARATION OF CONFORMITY (AB UYGUNLUK BEYANI)

Manufacturer (Üretici)	: KÖHLER ELEKTRİK SAYAÇLARI SAN. VE TİC. A.Ş. Akçaburgaz Mahallesi 3055.Sokak No:3 Esenyurt - İstanbul / TÜRKİYE
Product Description (Ürün Tanımı)	: Single-Phase, Two-Wire, Four-Tariff, Demand-Measuring, Outdoor, Active Electronic Energy Meter Bir Fazlı, İki Tellî, 4 Tarifeli, Demantmetreli, Bina Dışı, Aktif Elektronik Elektrik Sayacı
Model Name (Model Adı)	: AEL.SM.400
Applicable Directives (Uygulanan Yönetmelikler)	: Measuring Instruments Directive (2014/32/EU) Ölçü Aletleri Yönetmeliği (2014/32/AB) Electromagnetic Compatibility Directive (2014/30/EU) Elektromanyetik Uyumluluk Yönetmeliği (2014/30/AB)
Applicable Standards (Uygulanan Standartlar)	: EN 50470-1 (TS EN 50470-1) EN 50470-3 (TS EN 50470-3) EN 62052-11 (TS EN 62052-11) EN 62053-21 (TS EN 62053-21) EN 62053-23 (TS EN 62053-23)
EU Approval Number (AB Onay No)	: MID-3040-3014
Conformity Assessment Body For Module D (Modül D uygunluk değerlendirme kuruluşu)	: : Türk Standartları Enstitüsü (NoBo ID No: 1783)

We declare that the product stated above complies with the requirements of the standards and directives stated above.

(Yukarıda adı geçen ürünün yukarıda belirtilen yönetmelik ve standart hükümlerinin gereksinimlerini karşıladığını beyan ederiz).

CE 1783



İstanbul/TÜRKİYE
August 10, 2026
(10 Ağustos 2026)

Declaration No: KHL/2026-08

**KÖHLER ELEKTRİK SAYAÇLARI
SAN. VE TİC. A.Ş. ADDRESSES AND
TELEPHONE NUMBERS**

FACTORY / HEAD OFFICE:

Akçaburgaz Mah.3055. Sok. No:3
Esenyurt – İSTANBUL / TÜRKİYE
Tel: +90 212 886 26 39 (Pbx)
Fax: +90 212 886 86 94
www.kohlersayac.com.tr
e-mail: kohler@kohlersayac.com.tr

KARAKÖY BRANCH:

Bereketzade Mah. Şair Ziya Paşa Cad.
Küçük Yeni Han No:21A
Beyoğlu – İSTANBUL / TÜRKİYE
Tel: +90 212 243 05 40

**Toll-Free Helpline
+90 800 211 00 64**



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ELEKTRİK SAYAÇLARI SAN.ve TİC. A.Ş.