



AEL.KM.400-1

AEL.KM.401-1

**SINGLE-PHASE ELECTRONIC ENERGY
METER**

INTRODUCTION AND USER MANUAL

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0. INTRODUCTION

This manual describes the technical data of the electronic electricity meters produced with advanced technology in compliance with the Technical Specification for Electronic Electricity Meters (TEDAŞ-MLZ/2017-062.A) issued by the Strategy Development Department of Türkiye Elektrik Dağıtım A.Ş. (TEDAŞ) and with Measuring Instruments Directive 2014/32/EU (MID) published by the EU under the new approach legislation. These meters measure active electrical energy and maximum demand, show these data on the LCD display, store the required data and programs in memory and allow them to be accessed on request.

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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, used or shared 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 may 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

Model name	AEL.KM.400-1	AEL.KM.401-1
Uni- / Bi-directional	Uni-directional	Bi-directional
Meter description	Single-phase, 2-wire, 4-tariff, demand-metering, outdoor, active electronic electricity meter	
Accuracy class (TS EN 50470-3)	Class C (Optional B)	
Reference voltage (U_n)	230 V	
Operating voltage range	50 V (Minimum) – 330V (Maximum)	
Reference frequency (F_n)	50 Hz $\pm 5\%$	
Starting current (I_{st})	0.02 A (0.04.I _{tr})	
Minimum current (I_{min})	0.15 A	
Transitional current (I_{tr})	0.5 A	
Reference current (I_n)	5 A	
Maximum current (I_{max})	100 A	
IP class	IP54 (Outdoor)	
Relative humidity	95%	
Operating temperature	-40 °C, +70 °C (3K7)	
Connection type	Directly connected	
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	≤ 1 W	
Current circuit power consumption	4 VA	
Power Factor	0 $\sim \pm 1$	
Impulse voltage withstand	6 kV	
ESD voltage withstand	Contact: 8 kV Air: 15 kV	
Meter constant	1600 imp/kWh	
LCD display	6+3 Digits	
Communication speed (Optical Port)	300-19200 (IEC 62056 – 21) AMR (OSOS) Compatible or Non-Compatible Meters	
Interface unit	Optical Port	
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) (TS EN 62054-21)	
Data storage capacity	1 Year	
Relevant standards	TS EN 50470-1, TS EN 50470-3	

Error Limit under Reference Conditions

Current Range	Power Factor	Error Limit (%)
$I_{min} \leq I < I_{tr}$	1	± 1
$I_{tr} \leq I \leq I_{max}$	0.5 ind....1.....cap 0.8	± 0.5

2. MAIN FUNCTIONS

- **Measurement:** The meter measures total active energy across 4 tariffs.
- **Programming the Meter:** Time zones and tariffs can be programmed. Eight time zones can be defined per day and each can be mapped to one of the 4 tariffs. Separate tariffs can also be set for weekdays, Saturdays and Sundays. Once the terminal cover has been opened, the date, time and tariff data can be changed only by authorised TEDAŞ personnel.
- **Reading the Meter:** 12 months of billing data, total energy consumed, terminal cover opening data, 6 months of demand data and the main cover first opening date can be read from the meter via the optical port.
- **Self-Diagnostics Feature:** The meter continuously checks its internal circuits and shows the following fault types in the display menu.



Main Cover
Open Warning



Terminal Cover
Open Warning



System Battery
Low Warning



Clock Battery
Low Warning



Clock Error



Reverse Current Direction
Warning Icon

- **Terminal Cover and Main Cover Opening/Closing Recording Feature:**

If the main cover is opened, it records the first opening date.

If the terminal cover is opened, it records the first opening date for each month and the total number of openings within that month.

The cover opening date and count information is stored in memory for the last 12 months.

- **Communication:** Data read through the optical port with an optical reader is transferred to a portable computer (handheld unit).
- **Signal Output:** One LED on the meter indicates the active energy consumed. The number of flashes gives the meter's Imp/kWh value.
1600 Imp/kWh: 1600 flashes = 1kWh
- **Operating the Display During a Power Cut:** When the power is cut, the required data can be shown on the LCD with the meter button and read from the optical port.

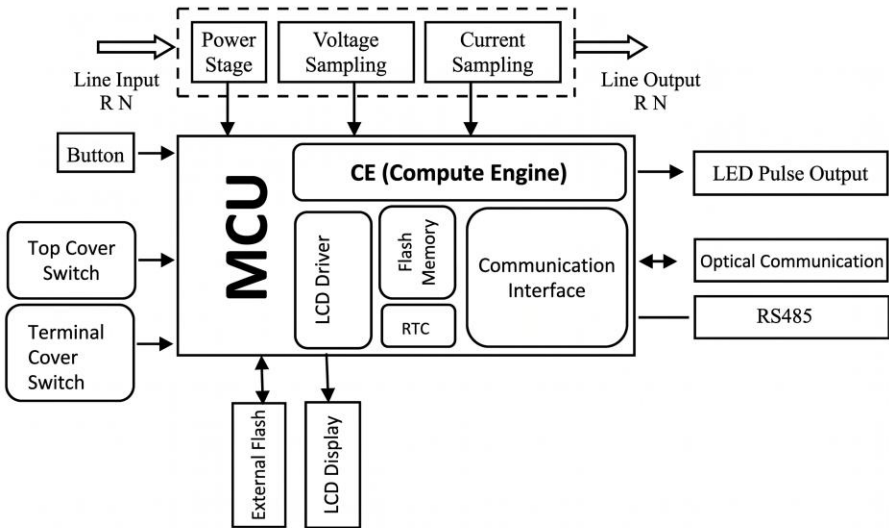
3. METER STRUCTURE AND OPERATING PRINCIPLE

3.1. Meter Structure

The meter body and covers are fully sealed to the IP54 Outdoor standard and made of high-grade flame-retardant plastic.

All electronic components are mounted on a dedicated PCB fitted into the meter body. The terminal cover is sealed by authorised TEDAŞ personnel after the meter is installed.

3.2. Operating 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, the terminal cover screw is tightened. The flashing 2nd lock symbol on the LCD will disappear after the first reading.

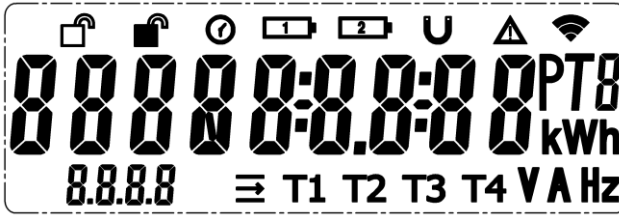
If not, the terminal cover is not fitted properly or its screw is not tight.

4.2. Operation of the LCD Display

When the meter starts up, auto-display mode is activated. Each menu stays on the screen for 5 seconds and then moves automatically to the next information menu.

When the button on the meter is pressed, display call mode is activated and the information stays on the screen for 30 seconds. It then returns to auto-display mode.

5.LCD DISPLAY INFORMATION



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

Main Cover Open



This symbol shows the main cover opening status. If it flashes while the cover is closed, the cover has been opened before. If it is shown steadily, the main cover is open.

Terminal Cover Open



This symbol shows the terminal cover opening status. If it flashes while the cover is closed, the cover has been opened before. If it is shown steadily, the cover is open. The symbol disappears once the meter has been read.



Clock Error: This symbol appears if the clock is not working normally.



System Battery: This symbol appears if the system battery voltage is low.



Clock Battery: This symbol appears if the clock battery voltage is low.

T1 T2 T3 T4

Tariff Indicator: Shows the tariff period applicable at the time the meter is in use.

PT8
kWh

Shows the tariff information currently being read on the display.

Indicates the unit of active energy.



Magnetic Warning Icon

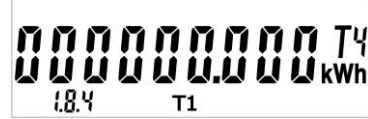
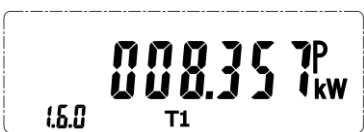
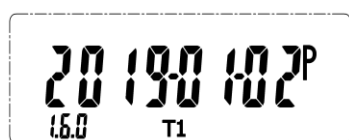
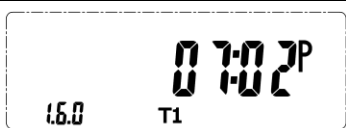


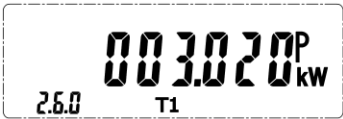
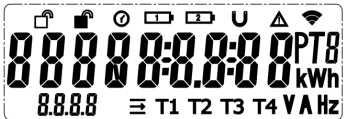
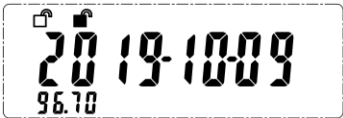
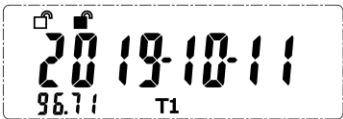
Reverse Current Direction Warning Icon



Meter Reading Icon

5.1 Display List Example

Date Menu	
Time Menu	
Total Active Energy	
Active Energy in Tariff T1	
Active Energy in Tariff T2	
Active Energy in Tariff T3	
Active Energy in Tariff T4	
Maximum Demand within the Month	
Demand Date	
Demand Time	

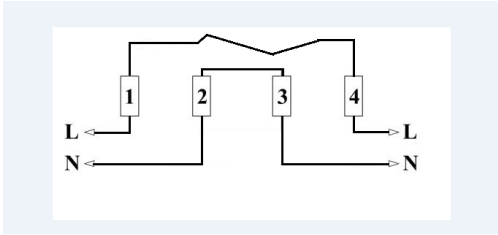
Maximum Demand within the Month (Export)	
Demand Date	
Demand Time	
Test Display	
Meter Serial Number (Sub-Menu)	
Main Cover Opening Date (Sub-Menu)	
Main Cover Opening Time (Sub-Menu)	
Terminal Cover Opening Date (Sub-Menu)	
Terminal Cover Opening Time (Sub-Menu)	

Program Version (Sub-Menu)	
Grid Voltage RMS Value (Sub-Menu)	
Current flowing through the line (Sub-Menu)	
Grid Frequency (Sub-Menu)	
Phase Angle (Sub-Menu)	

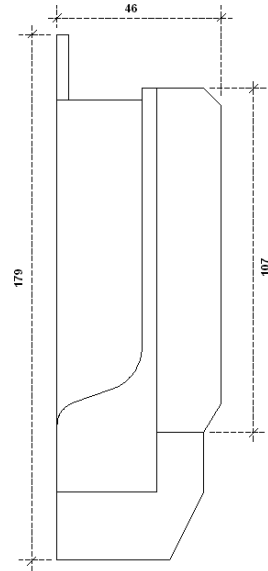
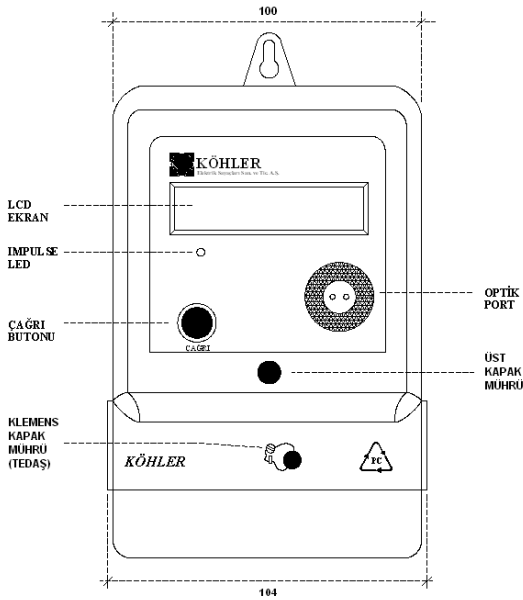
Energy Records of the Meter	AEL.KM.400-1	AEL.KM.401-1
Imported Active Energy (+T)	1.8.0	1.8.0
Exported Active Energy (-T)	1.8.0	2.8.0

6. CONNECTION DIAGRAM

The phase and neutral terminals of AEL.KM.400-1 – AEL.KM.401-1 single-phase meters are 6.3 mm in diameter. If this meter is connected to a 100 Ampere line, the copper conductor cross-section of the cable must be at least 25 mm².



7. INSTALLATION DIMENSIONS AND SEALING PLAN



8. EU Declaration of Conformity

DECLARATION OF CONFORMITY



KÖHLER
ELEKTRİK SAYAÇLARI SAN.VE TİC. A.Ş.

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)	: 1 Phase 2 Wire, 4 Tarıff, Demand Measuring, Outdoor, Active Electronic Electric Meter 1 Fazlı, 2 Telli, 4 Tarifeli, Demantmetreli, Bina Dışı, Aktif Elektrik Sayacı
Model Name (Model Adı)	: AEL.KM.400 / AEL.KM.401 / AEL.KM.480 AEL.KM.400-1 / AEL.KM.401-1
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)	: 1783-MID-0160 TSE
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

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

Declaration No: KHL/2026-08

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