



KÖHLER

ELEKTRİK SAYAÇLARI SAN.ve TİC. A.Ş.

AEL.KT.020

AEL.KT.021

**THREE-PHASE ACTIVE ELECTRONIC
ELECTRICITY METER INTRODUCTION AND
USER MANUAL**

**CE 1783
ISO9001**

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0. INTRODUCTION

The meter is designed in accordance with the Technical Specifications for Electronic Electricity Meters (TEDAŞ-MLZ/2017-062.B), prepared by the Strategy Development Department of Turkey Electricity Distribution Inc. (TEDAŞ), and complies with the 2014/32/EU Measuring Instruments Directive (MID) published by the European Union under the New Approach legislation. It measures active electrical energy as well as maximum power demand, displays this data on an LCD screen, stores the required information and programs in memory, allows authorized access to this data when needed, and is manufactured using advanced technology.

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WARNING!

READ THIS USER MANUAL CAREFULLY BEFORE INSTALLING THE METER.

- ✓ The meter should only be installed by **qualified personnel**.
- ✓ Do not touch any **parts under voltage** during installation.
- ✓ **Power must be disconnected** during both the installation and removal of the meter.
- ✓ KÖHLER Electronic Meters are high-tech products. All technical information and documents are the intellectual property of the company. They may not be reproduced or used by third parties.
- ✓ This manual provides summary information about the meter.
- ✓ The suitability of the meter type to be used for the network and facility must be checked by qualified personnel. Otherwise, your meter may be damaged due to incorrect meter selection and connection. **Meters in this situation are not covered by the warranty.**
- ✓ The information displayed on the meter screen is determined by TEDAŞ.
- ✓ Meter parameter settings and maintenance cannot be performed by the user. Meter parameter setting procedures and maintenance are performed only by authorized TEDAŞ personnel.

1. TECHNICAL SPECIFICATIONS OF THE METER

Meter Description	3-Phase, 4-Wire, 4-Tariff, Demantmeter, Outdoor,	
Model Name	AEL.KT.020	AEL.KT.021
One-Way / Two-Way	Import Only	Optionally Export
Accuracy Class	Active: B or C (1% or 0.5%)	
Connection Method	Current and Voltage: Direct	
Reference Voltage (Un)	3x230/400 V	
Operating Voltage Range	3x35V / 60V (Minimum) - 3x270V/468V(Maximum)	
Reference Frequency (Fn)	50 Hz $\pm$ 5%	
Starting Current (Ist)	0.02A (0.04.Itr)	
Minimum Current (Imin)	0.25A or 0.15A	0.25A or 0.15A
Transition Current (Itr)	0.5A	
Reference Current (In/Ib)	5A	
Maximum Current (Imax)	100A	
IP Rating	IP54 (Outdoor)	
Protection Class	II	
Relative Humidity	95%	
Operating Temperature	-40 °C, +70 °C (3K7)	
Mechanical Environment	M1 (according to Regulation 2014/32/EU)	
Electromagnetic Environment	E2 (according to Regulation 2014/32/EU)	
Operating Environment	Non-Condensing Humidity Environment	
Voltage Circuit Power Consumption	$\leq$ 1W	
Current Circuit Power Consumption	$\leq$ 1VA	
ESD Voltage Resistance	Contact: 8 kV; Air: 15 kV	
Surge Voltage	6 kV	
LED Pulse Output	1 LED (Active)	
Meter Constant (imp/kWh)	1,000 imp.	
LCD Display	6+3 Digits	
Optical Port	Available (IEC 62056-21)	
RS485	Optional	
Communication Speed	300 - 19,200 baud	
System Battery Life	$\geq$ 10 years	
Real-Time Clock Battery Life	$\geq$ 10 years	
Meter Shelf Life	$\geq$ 4 years	
Time Accuracy	0.5 sec/day (at room temperature) (IEC-EN 61038)	
Data Storage Capacity	2 years	
Relevant Standards	TS EN 50470-1, TS EN 50470-3, TS EN 62053-23	

Reference Conditions Meter Measurement Error Limit (Active)

Current Range	Power Factor	Error Limit Value (%)	
		Class B	Class C
$I_{min} \leq I < I_{tr}$	1	± 1.5	± 1.0
$I_{tr} \leq I \leq I_{max}$	0.5 ind....1.....cap 0.8	± 1	± 0.5

2. MAIN FUNCTIONS

2.1. Measurement: The meter measures total active energy and demand in 4 tariffs.

2.2. Meter Programming: Time intervals and tariffs can be programmed. Eight separate time periods can be defined during the day, and each time period can be assigned to and selected from one of four tariffs. It also has the ability to set separate tariffs for weekdays, Saturdays, and Sundays. The date and time, tariff information, and tariff details on the meter can only be changed by authorized TEDAŞ personnel after opening the terminal cover.

2.3. Meter Reading: Billing information for 24 months, total energy consumption amounts, terminal cover opening information, demand information for 24 months, and the date of the first opening of the top cover can be read from the meter via the optical port or RS485 output.

2.4. Self-Diagnostic Feature: The meter continuously monitors its internal circuits and displays fault types on the screen. Fault displays are explained under the heading "LCD SCREEN INFORMATION".

2.5. Terminal Cover and Upper Cover Opening/Closing Recording Feature: The device records the date each time the main or terminal cover is opened. It stores the last 10 opening records for the main cover and the last 24 records for the terminal cover, including both the opening date and the number of times each cover has been opened.

2.6. Signal Output: LEDs are available on the meter to indicate the active energy consumed. The number of flashes of these LEDs indicates the meter's Imp/kWh values.

1,000 Imp/kWh or Imp/kVarh: 1,000 flashes = 1kWh or 1kVarh

2.7. Display Operation During Power Outage: When the power is out, the desired information can be called up on the LCD screen using the call button on the meter, and readings can be taken via the optical port.

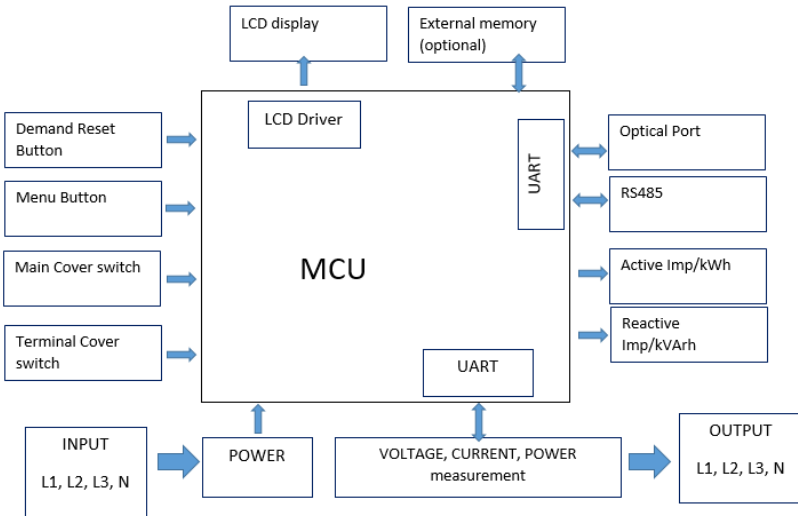
2.8. Communication: Information obtained from the optical reader via the meter's optical port is transferred to a portable computer (indexer) for data collection. Additionally, remote access to meter data is possible through the RS485 communication interface, which is provided as a standard feature on all combination meters. The meter supports simultaneous communication via both the optical port and the RS485 output. However, data reading over RS485 is not possible when the RS485 output is unpowered.

3. METER STRUCTURE AND OPERATING PRINCIPLE

3.1. Structure of the Meter

The meter body and covers are fully sealed, compliant with the IP54 Outdoor Building standard. They are made of high-quality flame-retardant plastic. All electronic components are mounted on a PCB, which is then mounted on the meter body. After the meter is calibrated at the factory, the top cover is screwed on and sealed with a top cover seal. The terminal cover is sealed by authorized TEDAŞ personnel after the meter is installed.

3.2. Meter Block Diagram



4. OPERATING THE METER

The meter operates normally and displays information on the LCD screen when it is installed and powered.

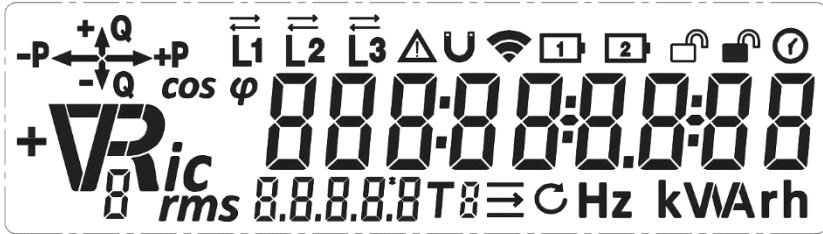
4.1. Function Check

When the meter is installed, the electrical connections must be checked to ensure they are correct. Once the meter is securely mounted in its position, the terminal (clamp) cover should be properly closed and its screw fully tightened. A blinking second lock symbol on the LCD screen indicates that the terminal cover is either not properly closed or the screw is not fully tightened. This symbol will disappear after the first successful reading, confirming that the cover is correctly secured. Whenever the terminal cover is opened, the terminal cover indicator on the LCD begins to blink, signaling that the cover has been accessed. After the terminal cover is closed, if the indicator remains active, the associated event records should be read via Optical port or RS485 in order to clear the indicator.

4.2. LCD Screen Operation

When the meter begins operating, it automatically enters **automatic menu mode**. In this mode, each screen is displayed for 5 seconds before automatically switching to the next item in the sequence. Pressing the button on the meter activates **button menu mode**, allowing manual navigation through the display screens. If no button is pressed for 30 seconds, the meter will automatically return to automatic menu mode. To access additional information, such as historical data from previous months, press and hold the button for 5 seconds to enter the **submenu mode**. To return to the main button menu, press and hold the button again for 5 seconds.

5. LCD SCREEN INFORMATION



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



Upper Cover Open (Lock 1)

This symbol indicates that the top cover is open. If the symbol flashes it indicates that the cover has been opened previously.



Terminal Cover Open (Lock 2)

When blinking, this symbol indicates that the terminal cover is currently open. If the symbol remains steadily on while the cover is closed, it means the cover was opened previously. The symbol is cleared after the meter is read via the optical port or RS485 interface.



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



Indicates whether the L1 R phase, L2 S phase, and L3 T phase are present. For example, if there is no R phase voltage, only **L2 L3** will appear on the screen. If the **L1 L2 L3** symbols are all flashing together, it means there is a phase error. The arrow signs above the phase icons indicate the direction of energy flow.



Magnetic field warning icon.



It shows the current tariff. For example, if the current date/time corresponds to the T2 tariff, **T2** will be displayed on the screen. In case of any malfunction in the meter clock, **T1** is always active.

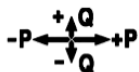


Reverse current warning icon for single-phase meters.



Lights up to indicate data transfer while reading data from the meter via optical or RS485. The indicator disappears from the screen when the reading is complete.

The meter displays the characteristics of the energy flow in the system using arrow indicators. For example, if energy is flowing:



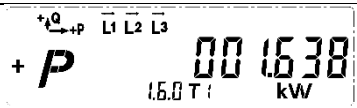
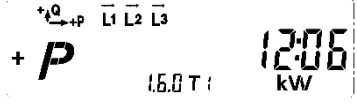
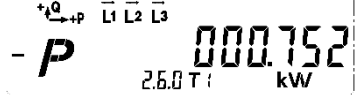
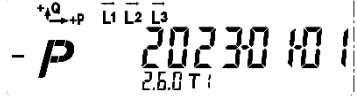
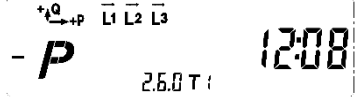
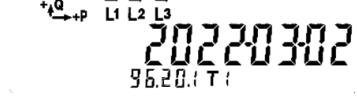
- From the R phase in the +P and +Q directions,
- From the S phase in the +P direction, and
- From the T phase in the +P and -Q directions,



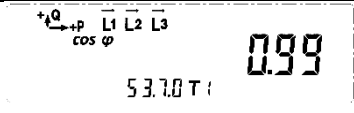
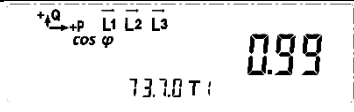
the arrow indicators on the screen will appear accordingly - showing +P, +Q, -Q - to represent the combined flow directions across all phases.

5.1 Display Example

Meter Date (YYYY-MM-DD)	
Meter Time (HH:MM:ss)	
Active Energy Consumed, Total (+T)	
Active Energy Consumed, Tariff1 (+T1)	
Active Energy Consumed, Tariff 2 (+T2)	
Active Energy Consumed, Tariff 3 (+T3)	
Active Energy Consumed, Tariff 4 (+T4)	
Active Energy Supplied, Total (-T)	
Active Energy Supplied, Tariff 1 (-T1)	

Active Energy Supplied, Tariff 2 (-T2)	$\begin{matrix} +\text{L1}^0 +\text{L2}^0 +\text{L3}^0 \\ -T_2 \end{matrix}$ 
Active Energy Supplied, Tariff 3 (-T3)	$\begin{matrix} +\text{L1}^0 +\text{L2}^0 +\text{L3}^0 \\ -T_3 \end{matrix}$ 
Active Energy Supplied, Tariff 4 (-T4)	$\begin{matrix} +\text{L1}^0 +\text{L2}^0 +\text{L3}^0 \\ -T_4 \end{matrix}$ 
Consumed Active Maximum Demand (+P)	$\begin{matrix} +\text{L1}^0 +\text{L2}^0 +\text{L3}^0 \\ +P \end{matrix}$ 
Consumed Active Maximum Demand (+P) Date (YYYY-MM-DD)	$\begin{matrix} +\text{L1}^0 +\text{L2}^0 +\text{L3}^0 \\ +P \end{matrix}$ 
Consumed Active Maximum Demand (+P) Time (HH:MM)	$\begin{matrix} +\text{L1}^0 +\text{L2}^0 +\text{L3}^0 \\ +P \end{matrix}$ 
Supplied Active Maximum Demand (-P)	$\begin{matrix} +\text{L1}^0 +\text{L2}^0 +\text{L3}^0 \\ -P \end{matrix}$ 
Supplied Active Maximum Demand (-P) Date (YYYY-MM-DD)	$\begin{matrix} +\text{L1}^0 +\text{L2}^0 +\text{L3}^0 \\ -P \end{matrix}$ 
Active Maximum Demand (-P) Time (HH:MM)	$\begin{matrix} +\text{L1}^0 +\text{L2}^0 +\text{L3}^0 \\ -P \end{matrix}$ 
Meter Serial Number	$\begin{matrix} +\text{L1}^0 +\text{L2}^0 +\text{L3}^0 \\ 020043210 \end{matrix}$ 
Main Cover Opening Date	$\begin{matrix} +\text{L1}^0 +\text{L2}^0 +\text{L3}^0 \\ 20220302 \end{matrix}$ 

Main Cover Opening Time	$\vec{I}_{Q \rightarrow P}$ $\bar{L}_1 \bar{L}_2 \bar{L}_3$ 12:08 96.20.1 T1
Terminal Cover Opening Date	$\vec{I}_{Q \rightarrow P}$ $\bar{L}_1 \bar{L}_2 \bar{L}_3$ 20220302 96.20.6 T1
Terminal Cover Opening Time	$\vec{I}_{Q \rightarrow P}$ $\bar{L}_1 \bar{L}_2 \bar{L}_3$ 12:08 96.20.6 T1
Software Version Number	$\vec{I}_{Q \rightarrow P}$ $\bar{L}_1 \bar{L}_2 \bar{L}_3$ 00 100 0.2.0 T1
Instantaneous Voltage in Phase L1	$\vec{I}_{Q \rightarrow P}$ $\bar{L}_1 \bar{L}_2 \bar{L}_3$ V I_{rms} 230.4 V 32.7.0 T1
Instantaneous Voltage in Phase L2	$\vec{I}_{Q \rightarrow P}$ $\bar{L}_1 \bar{L}_2 \bar{L}_3$ V I_{rms} 230.4 V 52.7.0 T1
Instantaneous Voltage in Phase L3	$\vec{I}_{Q \rightarrow P}$ $\bar{L}_1 \bar{L}_2 \bar{L}_3$ $\cos \varphi$ V I_{rms} 230.4 V 72.7.0 T1
Instantaneous Current in Phase L1	$\vec{I}_{Q \rightarrow P}$ $\bar{L}_1 \bar{L}_2 \bar{L}_3$ I I_{rms} 0036 A 31.7.0 T1
Instantaneous Current in Phase L2	$\vec{I}_{Q \rightarrow P}$ $\bar{L}_1 \bar{L}_2 \bar{L}_3$ I I_{rms} 0036 A 51.7.0 T1
Instantaneous Current in Phase L3	$\vec{I}_{Q \rightarrow P}$ $\bar{L}_1 \bar{L}_2 \bar{L}_3$ I I_{rms} 0036 A 71.7.0 T1
Network Frequency	$\vec{I}_{Q \rightarrow P}$ $\bar{L}_1 \bar{L}_2 \bar{L}_3$ F 50.0 Hz 14.7.0 T1
L1 Phase Cosp	$\vec{I}_{Q \rightarrow P}$ $\bar{L}_1 \bar{L}_2 \bar{L}_3$ $\cos \varphi$ 0.99 33.7.0 T1

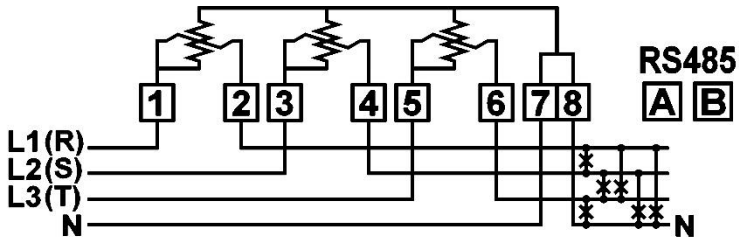
L2 Phase Cosφ	
L3 Phase Cosφ	

6. LOAD PROFILE

The meter has the capability to record load profiles in 15-minute intervals over a 180-day period. The recorded information includes the following.

- Year-month-day-hour-minute
- Event logs
- Active Energy Consumed, Active Energy Supplied (For each tariff)
- RMS Voltage (For each phase)
- RMS Current (For each phase)
- Cosφ
- Frequency

7. CONNECTION DIAGRAM



CAUTION: The (A) and (B) terminals on the right side of the terminal block are RS485 outputs. Do not apply power under any circumstances!

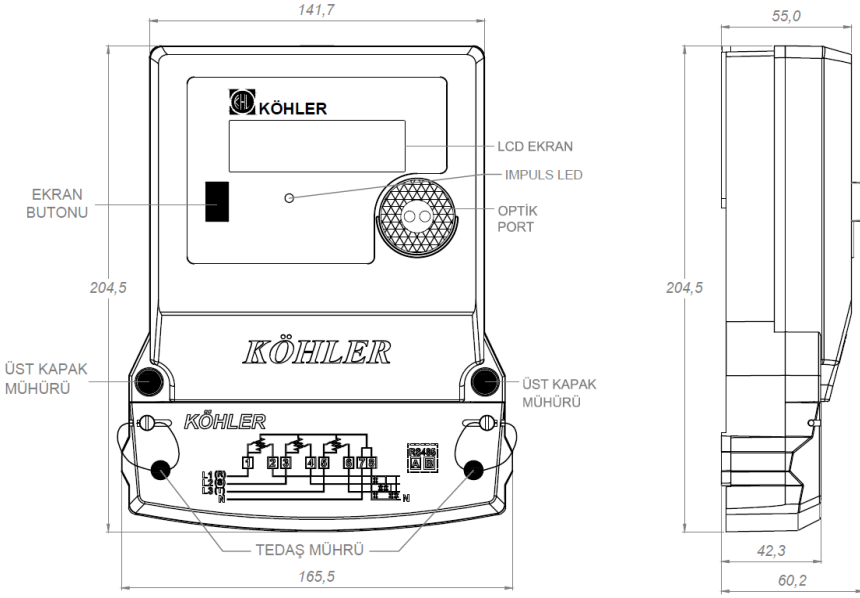
CAUTION: The inner diameter of the current sleeves for 3x5(100)A combination meters is 7mm. These meters must be connected to a 100A line with at least 25mm² cable.

The meter's RS485 outputs are arranged so that the meter can be read in parallel. This allows 32 meters to be connected in parallel to an RS485 converter connected to a computer for reading. Parallel connection is made by connecting the A terminals to each other and the B terminals to each other.

Multiple meters on the RS485 output are accessed using the meters' serial numbers. The structure /?XXXXXXXXX! (CR) (LF) is used during the query. XXXXXXXXXX: nine-digit meter serial number.

8. MEASUREMENTS

AEL.KT.020 / AEL.KT.021



9. AT CONFORMITY DECLARATION



EC 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)	: 3 Phase 4 Wire, 4 Tariff, Demand Measuring, Outdoor, Active-Reactive-Capacitive Electronic Electric Meter 3 Fazlı, 4 Telli, 4 Tarifeli, Demantmetreli, Bina Dışı, Aktif-Reaktif-Kapasitif Elektronik Elektrik Sayacı
Model Name (Model Adı)	: AEL.KT.020 / AEL.KT.021 AEL.KT.020-1 / AEL.KT.021-1 AEL.KT.025 / AEL.KT.026 AEL.KT.025-1 / AEL.KT.026-1
Applicable Directives (Uygulanan Yönetmelikler)	: Measuring Instruments Directive (2014/32/EC) Ölçü Aletleri Yönetmeliği (2014/32/AB) Electromagnetic Compatibility Directive (2014/30/EC) Elektromanyetik Uyumluluk Yönetmeliği(2014/30/AB)
Applicable Standards (Uygulanan Standartlar)	: EN 50470-1:2006 (TS EN 50470-1:2007) EN 50470-3:2006 (TS EN 50470-3:2007) EN 62052-11:2003 (TS EN 62052-11:2005) EN 62053-21:2003 (TS EN 62053-21:2005) EN 62053-23:2003 (TS EN 62053-23:2005)
EC Approval Number (AT Onay No)	:
Conformity Assessment Body For Module D (Modül D uygunluk değerlendirme kuruluşu)	: Türk Standartları Enstitüsü (NoBo ID No: 1783)

Bu uygunluk beyanı imalatçının sorumluluğu altında düzenlenmiştir.

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

Mehmet UÇAR
Chairman
(Yönetim Kurulu Başkanı)

İstanbul/TÜRKİYE
February 02, 2023
(02 Şubat 2023)

Declaration No: KHL/2023-01

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