[1] Introduction

The Energy Meter and Electrical Greatnesses Digital Transducer **Mult-K 120** is a digital micro-processed instrument, to be installed on a panel's background, allowing the measurement of up to 44 electrical parameters at an alternate current system (AC).

With this meter, it is possible to execute direct measurements (without the use of CTs – current transformers) on circuits with currents of up to 120Aac.

It has the *data concentrator* function, collecting information from water and gas meters, which have pulses output. This information is made available either via serial RS-485 or via the MMI.

Illustrative photo

[2] Operation principle

By means of the voltage and current signals from the system to be measured (mono-phase, two-phase or three-phase), the **Mult-K 120** calculates the electrical parameters, using a high resolution internal A/D converter, with 64 samples per cycle.

This equipment is dedicated to low voltage systems.

[3] Applications

- Substation automation;
- Industrial and premise automation;
- Circuits and electrical equipment analysis;
- Costs allotment;
- Analogical instruments replacement;
- Any application involving electrical parameter measurements.

[4] Measured greatnesses

Measurement of up to 44 electrical parameters, as follows:

- Voltage (phase-phase, phase-neutral and three-phase)
- Frequency
- Current (per phase and three-phase)
- Active power (per phase and three-phase)
- Reactive power (per phase and three-phase)
- Apparent power (per phase and three-phase)
- Power Factor (per phase and three-phase)
- THD (per voltage and current phase, until the 31st order)
- Active demand (average and maximum)
- Apparent demand (average and maximum)
- Active power (positive and negative)
- Reactive power (positive and negative)
- Maximum (Voltage and Current)

[5] Accuracy

- Voltage, current, power: 0,2%*
- Frequency: 0.1 Hz
- Power factor: 0,5%*
- Energy: 0,5%
- THD: <3%

(at 25°C, observing the recommended voltage and current ranges)

* Accuracy refers to the full scale

[6] Electrical Characteristics

AUXILIARY SUPPLY

- Nominal: 12*, 24 or 48Vdc / 120-220Vac
  - Utilization range: 80 to 120% of nominal value
- TOP Source: 85-265Vac and 100-375Vdc
- Internal consumption: < 10 VA

* Utilization range of 90 to 120% of nominal value.

VOLTAGE INPUT (MEASUREMENT)

- Operation range: 20 to 500Vac (F-F)
- Overcharge: 1.5 x Vmax (1s)
- Operation frequency: 44 to 72Hz
- Internal consumption: < 0.5 VA

CURRENT INPUT (MEASUREMENT)

Nominal	Effective measurement range	
	Minimum	Maximum
5Aac (*E-01*)	50mAac	30Aac
15Aac	750mAac	100Aac
30Aac	1.5Aac	120Aac

KRON Instrumentos Elétricos Ltda.
Phone: (11) 5525-2000
Website: http://www.kron.com.br - Email: energia@kron.com.br

[7] Mechanical Characteristics

DISPLAY

- Type: LCD – 8 columns x 2 rows
- With illumination (backlight)
- Color: green

ENCLOSURE

- Material: thermoplastic (ABS V0)
- Protection grade: IP-40 (for enclosure)

ASSEMBLY

- Type: panel background
- Assembling position: any
- Fastening: side screws

ELECTRICAL CONNECTIONS

- Type: quick connection terminal
- Protection grade: IP-00
- Maximum cable to be used:
  - Auxiliary supply and measurement voltage: 2.5mm²
- Pulse output, digital input and digital output: 1.5mm²
- Current measurement: passing cable with maximum diameter of 13mm (35mm²)

[8] Relevant environmental conditions

- Operation temperature: 0 to 60ºC
- Storage and transport temperature: -25 to 60 ºC
- Relative air humidity: 90% maximum (without condensation)
- Temperature coefficient: 50ppm / ºC

[9] Serial Interface

- Type: RS-485 (2 wires)
- Speed: 9600, 19200, 38400 or 57600bps (configurable)
- Data format: 8N1, 8N2, 8E1, 8O1 (configurable)
- Address: 1 to 247 (configurable)
- Protocol: MODBUS-RTU (standard) or METASYS-N2 (Johnson Controls)
- Information encoding:

METASYS N2 and MODBUS-RTU up to version 1.6:

Floating point, IEEE-754 standard

MODBUS-RTU beginning with version 2.0:

FlexData mapping with configurable floating point IEEE 754 (32 bits), also counting with reading formats at 16 bits (signed and unsigned integer)

- Cable: For RS-485, a shielded cable must always be used, with at least two ways (2x24 AWG), minimum section of 0.25mm² and characteristic impedance of 120ohms.

METASYS-N2 VERSION

On the version that uses protocol METASYS-N2, the communication speed and data format are fixed, as follows:

- Speed: 9600 bps
- Data format: 8N1

BACNET VERSION

On the version that uses protocol BACNET, the communication speed must be defined in the ordering process.

- Speed: 9600 bps or 19200 bps
- Data format: 8N1
- Address: 1 to 254 (configurable)

NOTE: On using Mult-K's 120 BACNET protocol models it's indispensable that the addresses chosen for the meters be between the aforementioned range. If not, it will be necessary to send the equipment for an analysis in Kron's technical support department.

[10] Pulses Output (optional)

- Type: open collector
- Parameters: positive active power (output 1) and positive reactive power (output 2)
- Pulse width: 200ms
- Maximum current: 1mA
- Maximum frequency: 1Hz

[11] Digital Input (optional)

Application: integration of water and gas meters equipped with pulses output. The collected data can be visualized both at the display and via RS-485.

- Quantity: Two inputs
- Type: optical coupler
- Voltage level: 12-24Vdc
- Drained current: < 50 mA
- Minimum pulse width: 200ms
- Detection: Rising edge
- Maximum frequency: 2Hz

[12] Digital Output (optional)

Application: allows commanding loads remotely. The output driving is made through a command sent via RS-485.

- Quantity: two outputs
- Type: relay with Normally-Open contact
- Voltage level: up to 250Vac / 250Vdc
- Maximum current: 2Aac / 2Adc

[13] Applicable software programs

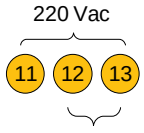
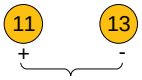
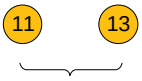
- Software for reading and parameterization: Network MB5 5.19 or higher (freely supplied by KRON)
- Compatible with supervisory applications, CLPs and concentrators that support MODBUS-RTU protocol

[14] Connection Diagrams

Terminal description:

Terminal	Description	Terminal	Description
1	Voltage Vc	14	Serial: DATA-
2	Voltage Vb	15	Serial DATA+
3	Voltage Va	16	Serial: Ground
4	Neutral	17	Active Pulse (C)
6	Passage cable current Phase C	18	Active Pulse (E)
		19	Reactive Pulse (C)
8	Passage cable current Phase B	20	Reactive Pulse (E)
		21	Digital Input 1 (C)
10	Passage cable current Phase A	22	Digital Input 1 (E)
		23	Digital Input 2 (C)
11	Auxiliary supply	24	Digital Input 2 (E)
12		25	Digital Output 1 (Common)
13		26	Digital Output 1 (NO)
		27	Digital Output 2 (Common)
		28	Digital Output 2 (NO)

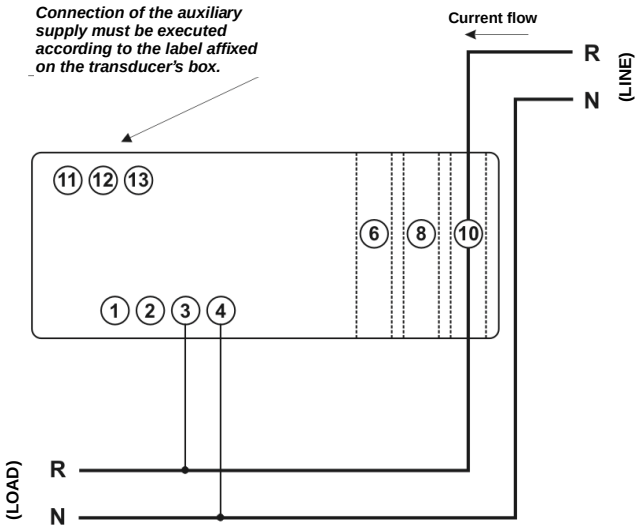
Description of terminals related to the auxiliary supply:

Power source (120 or 220 Vac)	Power source DC (12/24/48Vdc)	Power source TOP (85 to 265Vac or 100 to 375Vdc)
	 12 / 24 / 48 Vdc. Respect polarities	 85 to 265Vac 100 to 375Vdc There is no polarity for direct current signal.

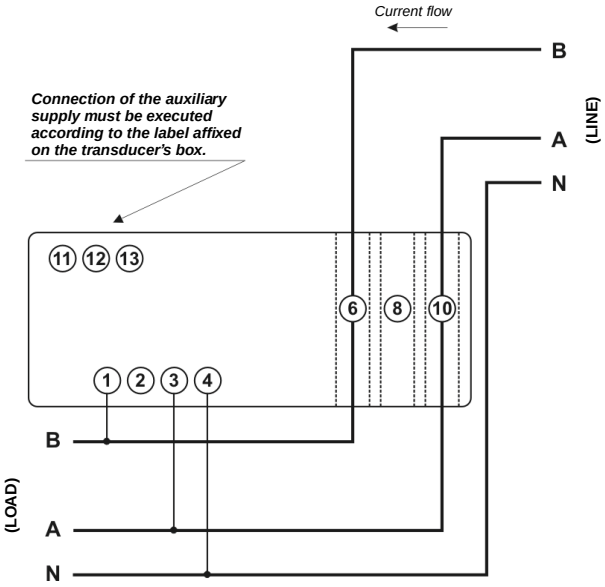
- Recommended cable for auxiliary supply and measurement voltage: minimum section of 1.5mm².
- Recommended cable for pulses output, digital inputs and digital outputs: minimum section of 0.5mm².
- For RS-485, a shielded cable must always be used, with at least two ways, minimum section of 0.25mm² and characteristic impedance of 120ohms.
- The cables that feed the circuit to be measured must pass inside the meter, through three circular openings with a diameter of 13mm (identifications 6, 8 and 10).
- The auxiliary supply (terminals 11, 12 and 13) must always be made according to the label affixed on the instrument.
- In the case of utilization of the TOP SOURCE, the supply must be connected to terminals 11 and 13 respecting the characteristic limits, without the need of observing the polarization if the input signal is either continuous or alternate.
- The standard direction of the current flow is from top to bottom, as indicated in the following diagrams. However, to facilitate the connection in certain installations, this direction may be altered by means of software RedeMB5.

[14] Connection Diagrams (continued)

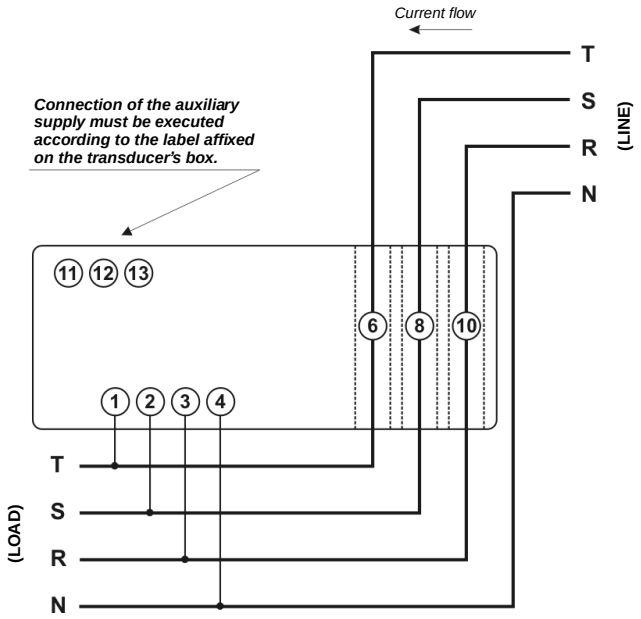
TL-02: Mono-phase (1F + N)



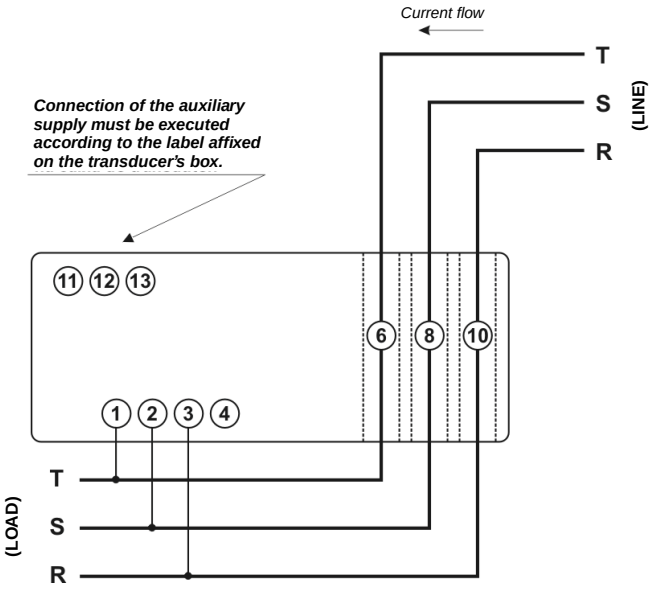
TL-01: Two-phase (2F + N)



TL-00: Three-phase Star (3F + N)

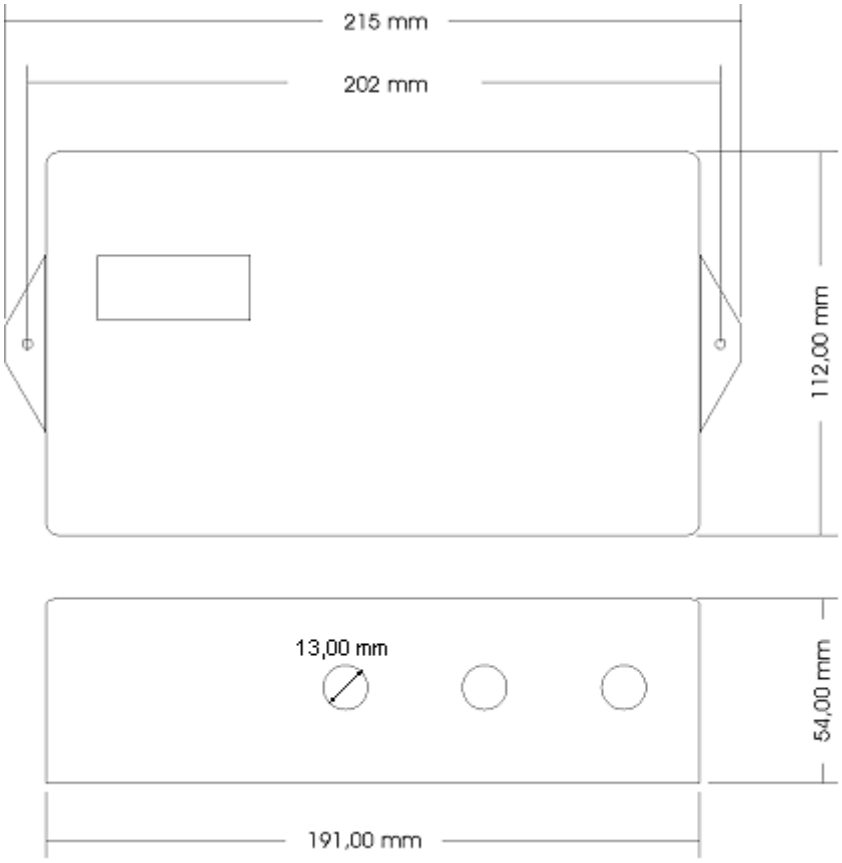


TL-48: Three-phase Delta (3F)



[15] Dimensions

Dimensions in millimeters.
Tolerance: ± 1mm



[16] Specification by code

The product codification allows the correct project specification, ensuring that the purchased material is exactly the necessary for the application.

The identification is made by an alphanumeric sequence of 13 characters:

Z	Fixed
0	Fixed
3	Fixed
2	Fixed
8	Fixed
1	Protection grade: 1: Standard
5	Voltage input: 5: 20 to 500Vac (F-F)
___	Current input: Protocolos Modbus-RTU ou Metasys N2 1: In = 15Aac (Imáx = 100Aac) **2: In = 30Aac (Imáx = 120Aac)** 3: In = 5Aac (Imáx = 30Aac) – *E-01* *Protocolo Bacnet MS/TP* 4: In = 30Aac (Imáx = 120Aac) – *E03* 5: In = 5Aac (Imáx = 30Aac) – *E06*
___	Frequency: **1: 60Hz** 2: 50Hz
___	Output: **1: RS-485** 2: RS-485 + Pulses output 3: RS-485 + Pulses output + Digital input + Digital output 0: No output
___	Auxiliary supply: 1: **120/220Vac *** 2: TOP Source: 85-265Vac / 100-375Vdc 4: 48Vdc * 5: 24Vdc * 6: 12Vdc *
___	MMI: 0: **LCD Display + navigation key** 1: DIP-Switch for address selection + Display LCD + navigation key 8: Special version (upon consultation) 9: No MMI
___	Protocol / special version: 0: **MODBUS-RTU** 1: METASYS-N2 (Johnson Controls) 2: BACNET – 9600 bps ** 3: BACNET – 19200 bps **

Notes on encoding:

1) The bold signaled items indicate the standard option having higher stock availability;
2) For 125Vdc auxiliary supply, consider item 2 (TOP source).
3) **In the cases where there already exist the definitions of connection type to be made and the utilization of PTs and/or CTs in the application, inform with an order the transformers relation and the chosen diagram.**

* Not available for Bacnet protocol models.
*** * Only for E-03 and E-06 versions (BACNET protocol).**

[17] Special versions

The **Mult-K 120** standard version presents all greatnesses measured in the LCD display. Optionally, versions may be developed to present just a few of the measured greatnesses.

For that, consult our technical department.

- **E-01**

  Version with nominal current of 5Aac, for utilization with CT or direct measurement on low consumption systems, that is, up to 30Aac.

  Specify with the code "3" at the "current input" item.

- **E-03 (Bacnet MS/TP)**

  Version with the same measurement characteristics of the standard model (In = 30Aac, Imax = 120Aac), but using Bacnet MS/TP communication protocol.

  Specify with the code "4" at the "current input" item.

- **E-06 (Bacnet MS/TP)**

  Similar to E-01 version (In = 5Aac, Imax = 30Aac), using Bacnet MS/TP communication protocol.

  Specify with the code "5" at the "current input" item.

[18] Normalizations

The products of the **Mult-K** line meet the following standards:

- IEC 61000-4-2
- IEC 61000-4-3
- IEC 61000-4-4
- IEC 61000-4-5
- IEC 61000-4-6
- IEC 61000-4-8
- IEC 61000-4-11
- CISPR 11

The information contained in this technical sheet is subject to changes without previous notice.

For correct utilization of the product, the User Manual must be consulted before its installation or operation.

Some items presented herein may be optional, being necessary the correct product specification by their code.

Device disposal

Products showing this symbol must be disposed of separately from regular domestic residues, according to the local environmental legislation.

In case you do not obtain safe information, contact our technical assistance on the phone (11) 5525-2027 or through the www.kron.com.br website.

KRON Instrumentos Elétricos Ltda.
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