

THREE-PHASE ELECTRONIC ELECTRICITY METER

CST 0410E meters belong to the category of the work measuring means and are meant for active and reactive electric energy metering for residential consumers and commercial and industrial agents that use multi-tariff systems for electric energy billing.



CST 0410E

Meters of the latest generation, multi-tariff, multifunctional active energy metering in 4 dials, class A, B or C (EN 50470 - 1, 3) active energy metering in 4 dials, class 0,2 (NML 005-05) active energy metering in dials, class 1, 2 (NML 005-05) record of the maximum power communication protocol SR EN 62056-21 or DLMS / COSEM protocol.

TECHNICAL CHARACTERISTICS

Rated values

- Rated voltage U_n (V): 3x230 / 400 V (for the meter with direct connection)
- Rated voltage U_n (V): 3x57.7 / 100 V (for the meter with transformer connection);
- I_{ref} base current (A) 5 A (direct connection)
- Rated current I_n (A): 1 A, 5 A (connection via transformers for measuring)
- Maximum current I_{max} (A): 6 A (for the meter with connection via transformers of voltage); 20 A (for the meter with direct connection to voltage circuits); 100 A (for the meter with direct connection);
- Rated frequency f_n (Hz): 50 Hz
- Frequency range (Hz): 45 ... 65
- Meter constant imp / kWh (kvarh): 10000 for $I_{max} = 6$ A; 5000 for $I_{max} = 20$ A; 1000 for $I_{max} = 100$ A; 40000 for $I_n = 1$ A;
- $I_{max} = 6$ A and $U_n = 3 \times 57.7 / 100$ V

Accuracy characteristics:

- Class A, B, C for active energy according to EN 50470-1,3;
- Class 0.2 for active energy according to NML 005-05;
- Class 1, 2 for reactive energy, according to NML 027-05;
- Time base accuracy: max. $\pm 0.5s / 24h$ according to SR EN 62053-21

Climatic characteristics:

- Operating temperature range: $-40 \dots + 70$ °C
- Transport and storage temperature: $-40 \dots + 70$ °C
- Mechanical environmental class: M1
- Electromagnetic environment class: E2

Mechanical and constructive characteristics

- Overall dimensions: 241.5x179x78.5 mm, as shown in Figure 2;
- Dimensions for the 3 points mounting: 154x171 mm, as shown in Figure 2;
- Display: LCD custom design 80x30 mm as shown in Figure 1;
- Wiring diagram: L1L1L2L2L3L3NN;
- Optical port: according to IEC 62056-21
- Protection degree: according to IEC 62056-21
- Protection degree: IP 51
- Testing device: LED for imp / kWh + LED for imp / kvarh
- Equipment options:
 - x - 0 (glued case);
 - 1 (normal case);
 - 2 (glued case by mechanical deformation);
 - y - 0 (non-transparent cover);
 - 1 (transparent cover);
 - z - 0 (with optical port seal);
 - 1 (no optical port seal);
 - t - 0 (with upper case opening signaling button);
 - 1 (without upper case opening signaling button);
 - u - 0 (equipped with magnetic sensor);
 - 1 (not equipped with magnetic sensor);
 - v - 0 (with back protection plate);
 - 1 (without back protection plate);
 - w - 0 (with signaling button for the terminal-block cover opening);
 - 1 (without signaling button for the terminal-block cover opening)

- Variants M and N can be attached to GSM EXT modems 232 and GSM EXT 485 produced by the AEM.

All versions are optional.



Electrical characteristics of the auxiliary outputs:

- max. 40 V;
- maximum current 100 mA;
- Impulse duration for the pulse generator: min. 30 ms

Equipment options

A - Auxiliary supply voltage;
 C - Load profile memory;
 DS - Sealable Reset button for blocking the parameters changing;
 G ** - Pulse generators;
 M * - RS232 port with DB9 connector for remote reading;
 R ** - Signalling relay;
 N * - RS485 port with DB9 connector for remote reading;
 RJ ** - RS485 port with RJ45 connector for remote reading;
 * Excluded mutually
 ** For class A, B or C meter variants for active energy , the meter is equipped with 4 pulse generators (import active energy, export active energy, import reactive energy, export reactive energy) and a signaling relay for the end-of-life calculation interval of the maximum power and with a serial port, M or N. On RJ equipment, the meter is equipped with 2 pulse generators (active and reactive energy) and two serial ports: M or N and RJ45.

Equipment options

x-0 (glued case);
 1 (normal case);
 2 (glued case by mechanical deformation);
 y-0 (non-transparent cover);
 1 (transparent cover);
 z-0 (with optical port seal);
 1 (no optical port seal);
 t- 0 (with upper case opening signaling button);
 1 (without upper case opening signaling button);
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Tariff programs

The meter enables tariffing the energy in up to 4 time zones, for import and export active energy and for reactive energy in four dials. There can be defined two tariffing sequences in the tariffing program for time zones; one is currently active, the other is resident.

The time zones metering program is annual. There can be defined up to 12 seasons in a year. Within each season, the weekly program will be defined, it being made up of 7 types of days chosen from the 24 types of days which can be defined. Every day there can be defined up to 12 switchings for each of the two sequences of the daily program. The programming resolution is of 30 minutes.

There can also be defined 64 more holidays groups within the tariffing program. The time length of a holidays group can be programmed for an interval of 1 to 4 days. Each holidays group of days can be defined with or without annual repetition.

Meter self-reading (for billing purposes)

- energy indexes memorizing (20 registers);
 - registered demands memorizing;
 - demands summing up in cumulative registers;
 - the demand registers are reset to "0" (demand register reset);
 - the time when the self-reading occurred is memorized.
- The meter memorizes the self-read values of the last 12 self-readings.

Load profile (option)

In the load profile, the energies measured in the acquisition period in the curve are stored in six channels. The types of energies are: active energy import and export and reactive energies in the four dials. For a acquisition period duration of 15 minutes, the information is stored for 64 days (6144 registrations).

Operational characteristics

- Total energy metering as presented below:
 - a) 3 registers of active energy imported, exported and active unidirectional ($|W +|$, $|W -|$, $|W +| + |W -|$);
 - b) 9 registers of reactive energy in quadrants I, II, III, IV), imported (I+II), exported (III+IV), inductive (I+III), capacitive (II+IV), total reactive (I+II+III+IV);
 - c) 2 registers of apparent imported and exported energy.
- Also, active energy import and export, as well as reactive energies in the four dials can be metered in 4 time zones.

• Maximum demand registering

The meter has:

- 8 registers for 8 demands
- 8 cumulative registers corresponding to the 8 demands.

The programmable time interval with 5, 10, 15, 20, 30, 60 min. using block or sliding window method.

The demand registering functions can be suspended for some time after the supply breakdown and its resuming. The time interval will be programmable from 0 to 60 minutes with one minute resolution.



SYMBOLS

- CST 0410E - A, C, DS, G, M, N, R, RJ (options) - 0(1)(2), 0(1), 0(1), 0(1), 0(1), 0(1), 0(1), 3x230/400 V, 5(20) A, 50 Hz, Active: cl. C, Reactive: cl.

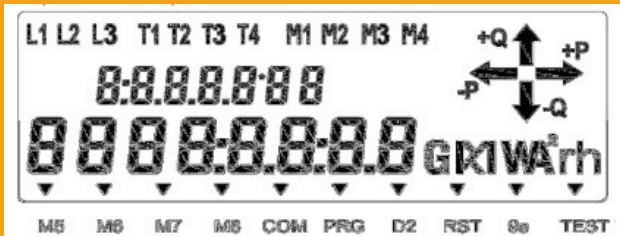


Fig.1

In the case of detection of an external and continuous magnetic field, the meter display will show a warning, inserted after each size of the display sequence for one second: "OnnFIELD" (abbreviation from over magnetic field). Also, if the battery voltage drops below the acceptable limit, the "LoBat" message may be display at the end of the display sequence.

• Display

According to figure 1, the LCD displays the following:

- voltage on each phase L1, L2, L3;
- active tariff (T1, T2, T3, T4);
- the programmed demand which is calculated as per programming (M1, M2, M3, M4, M5, M6, M7, M8, according to figure 1);
- code of displayed quantity according to IEC 62056-61 Electricity metering - Data exchange for meter reading, tariff and load control
- Part 61 - OBIS Object Identification System;
- the measured value;
- measuring units for active, reactive, apparent energies and powers, voltages, currents, with k, M, G multiples;
- quantities measured by the meter (active power in one or two directions +P și -P and/or reactive power in one or two directions +Q and -Q);
- momentary directions of active and reactive measured energy:: imported active energy →, exported active energy ←, reactive positive energy ↑; reactive negative energy ↓;

NOTE: The dial sign is as follows:

- quadrant I: ↑ →, active energy imported, reactive positive inductive;
- quadrant II: ← ↑, active energy exported, reactive positive capacitive;
- quadrant III: ← ↓, exported active energy, reactive negative inductive;
- quadrant IV: ↓ →, active energy imported, reactive negative, capacitive;

- annunciators which indicate the following:

- meter operation with the second display sequence, "D2 annunciator";
- demands reset and the meter self-reading, "RST annunciator";
- the last 9 seconds for the demand calculation time interval, "9S annunciator";
- test mode meter operation, "TEST annunciator".

Meter display modes: two programmable sequences, that can be scrolled manually or automatically.

• Clock - Calendar

The meter is provided with the clock-calendar function and the observance of leap years. The meter clock-calendar function enables the automatic change of the summer time /winter time according to "last Sunday in March/October" rule, with programmable changing hour and direction, and with the possibility of disabling this function.

• Events

The event list contains 500 events.

Types of Events:

- 1). Supply voltage drop
- 2). Restored supply voltage
- 3). Voltage drop on phase R
- 4). Restored voltage on phase R
- 5). Voltage drop on phase S
- 6). Restored voltage on phase S
- 7). Voltage drop on phase T
- 8). Restored voltage on phase T
- 9). Frequency exceeds -6%...+4% fn range, limits according to SR EN 50160
- 10). Energy direction reversing
- 11). Positive energy direction
- 12). RTS phases succession
- 13). RST phases succession
- 14). Meter programming (without clock)
- 15). Meter clock programming
- 16). Low battery
- 17). Measuring circuit error
- 18). Polarity different phases
- 19). Polarities phase of the same sign
- 20). BCC memory code error
- 21). Cover opening
- 22). Magnetic field sensing
- 23). Magnetic field disappearance
- 24). Terminal block cover opening
- 25). Error of the control number of the energy registers



- Errors and warnings diagnosis

The meter is provided with self-diagnosis facilities. If an error is detected, on the screen appears and remain the message: Err: x
x x x x x

- x can be 1 for measuring circuit error
- 2 for energy registers error
- 3 for firmware memory error
- 4 for calibration zone error
- 5 for tariffing programm error

Communication

- an optical port
 - Optical port according to IEC 62056-21: Direct local data exchange (3d edition of IEC 61107):
 - serial client port, RS485 type, RJ45 connector;
RS232 or RS485 serial port connector, DB9 connector.
- The communication protocols in all cases are in accordance with IEC 62056-21 or DLMS.

Additional features:

- energy quality facilities according to SR EN 50160:
- time metering with f_n out of the range $\pm 1\%$;
- time metering with U_n out of the range $U_n \pm 10\%$;
- event generation to f_n out of the range $6\% \dots + 4\%$.

OVERALL AND MOUNTING DIMENSIONS

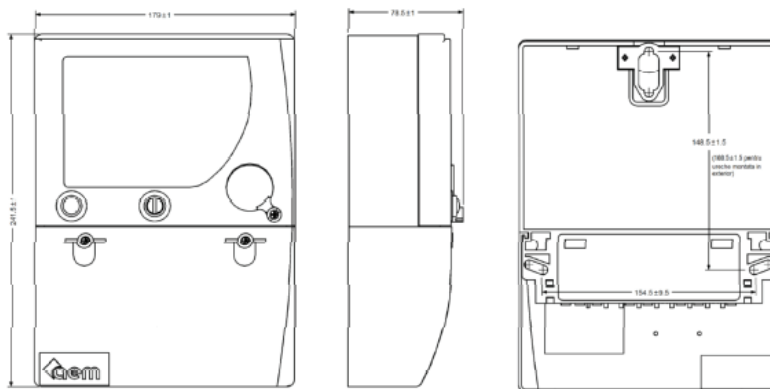


Fig.2

WIRING DIAGRAM

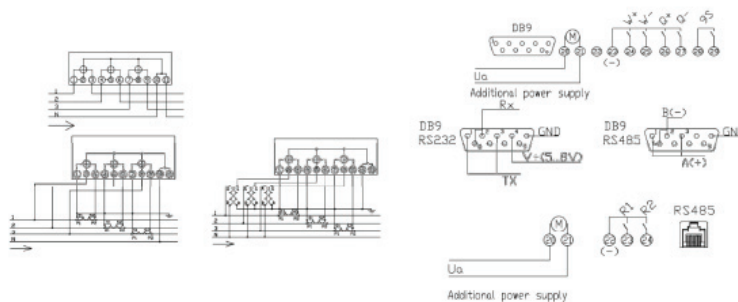


Fig.3

