



**VOLTAGE and
& CURRENT ANALYZER**

CAVA- 250

(Code 7 71 090)

INSTRUCTION MANUAL

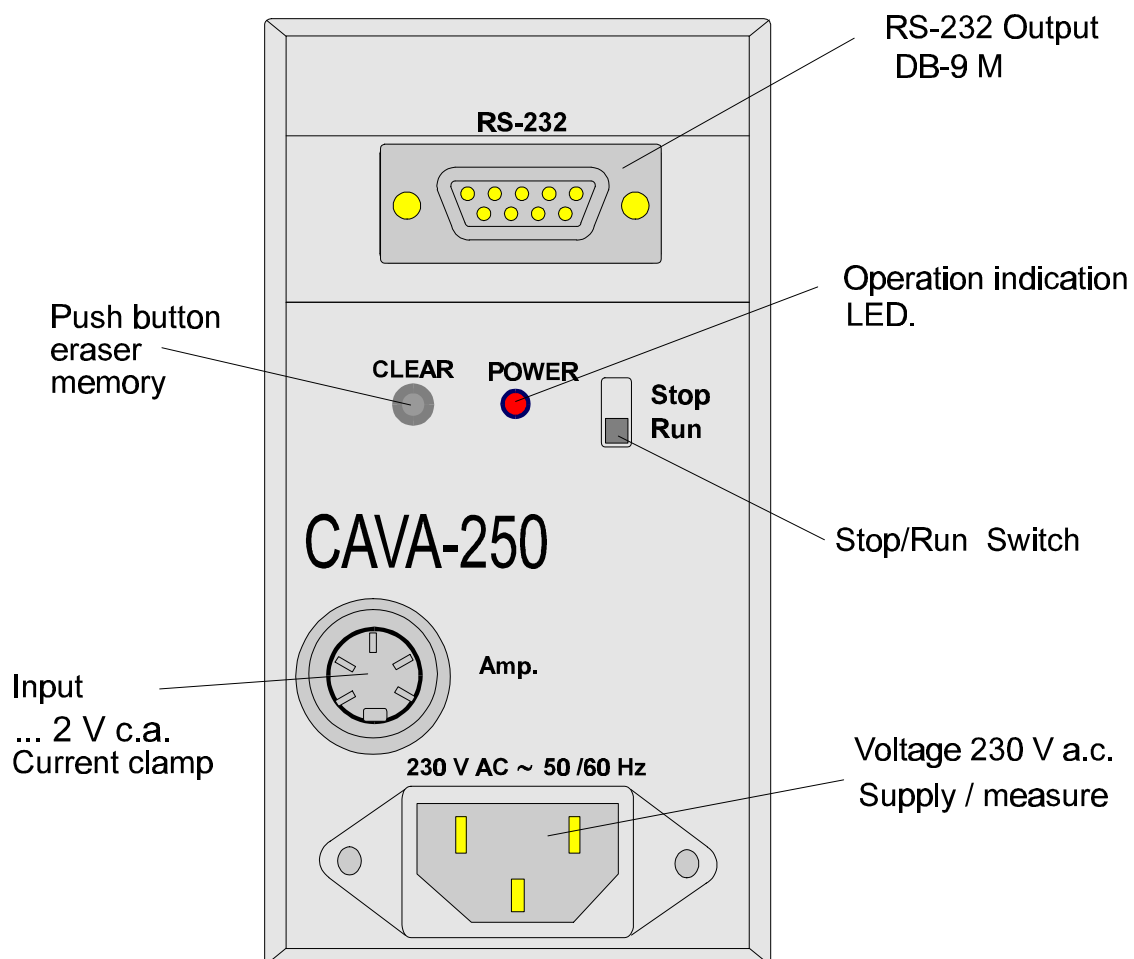
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CAVA-250 SINGLEPHASE ANALYSER TECHNICAL DESCRIPTION (CODE 771090)

THIS INSTRUMENT IS DESIGNED TO MEASURE CERTAIN PARAMETERS WHICH CAN HELP DETERMINE THE ELECTRIC SERVICE QUALITY.

THE FOLLOWING PARAMETERS CAN BE MEASURED :

- **VOLTAGE a.c.**
- IT CAN ALSO BE USED AS A CURRENT METER IF A 2 V c.a. OUTPUT AMMETER CLAMP IS CONNECTED.
- THE VOLTAGE MEASUREMENT IS DONE THROUGH THE SUPPLY INPUT.
- THE CURRENT INPUT IS A CONNECTOR SIMILAR TO THE ONE USED BY CIRCUTOR WITH (.../2 V c.a) AMMETER CLAMPS.



- THE FOLLOWING ELEMENTS ARE INCLUDED IN **CAVA-250** BOX (ENCLOSURE)

- **CLEAR PUSH BUTTON** : ERASES DATA IN RAM MEMORY IN ORDER TO OPEN A NEW FILE (REGISTER)

- **RUN/STOP SWITCH** : ON RUN POSITION CAVA-250 REGISTERS AS IT PROGRAMMS ITSELF ON STOP POSITION THE SYSTEM IS ON, BUT NO READINGS ARE BEING DONE. THIS POSITION IS ADVISABLE WHEN PARAMETERS ARE READ AND NO NEW READING HAVE TO BE MADE.

CAUTION: IF CAVA-250 IS DISCONNECTED FROM THE MAIN TO TAKE IT TO THE OFFICE AND READ THE MEASURED PARAMETERS.

THE INSTRUMENT MUST BE ON “ STOP POSITION” WHEN RECONNECTING THE INSTRUMENT. IF NOT THE PARAMETERS WILL SHOW ZEROS FROM THE TIME THE CAVA 250 WAS DISCONNECTED TO THE TIME IT IS CONNECTED AGAIN.

- **RS-232 CONNECTION** :

A 9 PIN CONNECTOR TYPE SUB D IS USED TO CONNECT TO THE COMPUTER, TO PROGRAM CAVA-250 OR TO READ THE INTERNAL MEASURED PARAMETERS.

THIS RS-232 IS OPTO COMPLED (OPTO ISOLATED) FROM THE MEASURING CIRCUIT.

- **INTERNAL SELECTION SWITCH** : PROGRAMS VOLTAGE OR CURRENT INPUT. THE PROGRAMMING MUST BE CHANGED IN ORDER TO SELECT THE PARAMETER TO BE MEASURED OR THE CURRENT CLAMP FULL SCALE IF CURRENT IS BEING MEASURED. KEEP IN MIND THAT EACH PARAMETER (VOLTAGE OR CURRENT) HAS A DIFFERENT CALIBRATION.

PROGRAMMING

PROGRAMMING IS CARRIED OUT THROUGH THE RS-232 CONNECTION.

THE FOLLOWING PARAMETERS CAN BE PROGRAMMED:

- FRECUENCY
- READING CADENCE OR PERIOD (DELAY) IN SECONDS
- LINEAL OR CIRCULAR MEMORY
 - CIRCULAR : READINGS REGISTER ON TOP OR PREVIOUS ONES.
 - LINEAL : ALL READING STOP ONCE THE MEMORY IS FULL.

IF A PROBLEM OCCUR PARAMETER READINGS STOP. IT AUTOMATICALLY GOES TO LINEAL MEMORY.

WORKING PARAMETERS : VOLTAGE OR CURRENT

FULL SCALE : 5 POSSIBLE SCALES

0.000 TO 1.000
00.0 TO 10.00
000.0 TO 100.0
0000 TO 1000
00000 TO 10000

- CLOCK SET UP.

-RS-232 SERIAL COMMUNICATION PORT PROGRAMMING.

GENERAL CHARACTERISTICS:

SUPPLY VOLTAGE : 220V c.a
TOLERANCE : -30% + 20%
FRECUENCY : 45 TO 65 Hz
CURRENT INPUT : 2 V c.a.

INSOLUTION BETWEEN VOLTAGE AND COMMUNICATION CIRCUIT: 1500 V. c.a.

DATA CAPACITY

CAVA-250 KEEPS DATA UP TO 120 KBYTES (122 880 BYTES).

A REGISTER CONSISTS OF:

A HEADING THAT SHOWS:

- DATE, TIME AND CHECK SUM.
- DATA REGISTERS (10 BYTES EACH)
- VOLTAGE OR CURRENT AVERAGE
- VOLTAGE OR CURRENT MAXIMUM VALUE
- VOLTAGE OR CURRENT MINIMUM VALUE TOTAL HARMONIC DISTORTION RATE VALUE IN % (%X10)
- HARMONIC FLICKER VALUE IN UNITS PSTX10.

CAVA-250 CAN REGISTER UP TO **12.287** READINGS , THEREFORE A 10 MINUTES REGISTERING PERIOD HAS A REGISTERING CAPACITY OF 85 DAYS AND A 15 MINUTE HAS A REGISTERING CAPACITY OF 127 DAYS.

VOLTAGE OR CURRENT ANALIZER

CAVA-250 MEASURES THE VOLTAGE OR CURRENT REAL TRUE VALUE (TRMS) OF EACH CYCLE.

THE INSTANT VALUE IS THE AVERAGE OF ALL CYCLES DURING ONE SECOND. WITH THE READINGS OF EACH SECOND AN AVERAGE READING IS PERFORMED EVERY 30 SECONDS. EACH SECOND, AN AVERAGE VALUE OF THE 30 PREVIOUS SECONDS IS AVAILABLE.

(AS PER CIRCULAR MEASURING, SYSTEM MEMORY HAS BEEN PROVIDED WITH A TABLE COMPOSED BY 30 REGISTERS WITH THE LAST 30 SECOND READINGS. EACH SECOND A NEW REGISTER IS ADDED AND THE OLDEST IS AUTOMATICALLY ERASED)

ONCE EVERY AVERAGE VALUE IS CALCULATED IT IS TRANSFERRED TO ANOTHER TABLE. WITH DATA FROM THIS TABLE A FURTHER STATISTICAL ANALYSIS (FROM 5 TO 15 MINUTE PERIOD) WILL ALLOW DRAWING VOLTAGE PERFORMANCE DURING PROGRAMMED PERIOD OF TIME.

VOLTAGE AVERAGE VALUE OF THE PROGRAMMED PERIOD ACCORDING TO THE VOLTAGE VALUES THAT HAVE BEEN REACHED ON 95% OF THE READINGS THE MINIMUM VOLTAGE VALUE IS OBTAINED.

ACCORDING TO THE VOLTAGE VALUES THAT HAVE NOT BEEN REACHED ON 95% OF THE READINGS THE MAXIMUM VOLTAGE VALUE IS OBTAINED. SAME PROCEDURE WHEN IT COMES TO CURRENT.

HARMONIC ANALIZER

FROM THE SAMPLES TAKEN FOR THE VOLTAGE CALCULATION THE FAST FOURIER TRANSFORM ANALYSIS CAN BE EXECUTED.

FROM EACH HARMONIC VALUE (FROM 2nd TO 15th) THE TAD IS CALCULATED. FOR THE HARMONIC TOTAL DISTORTION CALCULATION THE FOLLOWING FORMULA IS APPLIED.

$$TDT = \sqrt{\sum (V_n / V_1)^2}$$

THE READING IS DONE WITH THE THD OBTAINED VALUE * 1000 WHICH GIVES US A 0.1% READING.

THE CHARACTERISTICS AS AN HARMONIC METER ARE AS FOLLOWS.

MEASURED HARMONICS FROM 2 TO 15 THD REPRESENTATION

RESOLUTION : 0.1 %

ACCURACY : + 0.5 %

FLICKER MEASUREMENT

ALL FREQUENCIES COMPONENTS BETWEEN 0.5 Hz AND 25Hz ARE CALCULATED ACCORDING TO THE FAST FOURIER TRANSFORM (FFT).

ONCE THE AMPLITUDE VALUES OF EACH FREQUENCY ARE OBTAINED, THE EQUIVALENT BALANCED VALUE IN 8.8 Hz FREQUENCY IS CALCULATED.

$$W = \sqrt{\sum (F_n * C_{fo} / C_n)^2}$$

W : REFERRED FLICKER VALUE TO 8.8 HZ
FN : FLICKER SENOIDAL COMPONENT VALUE
CFO : BALANCED COEFFICIENT OF THE 8.8 HZ FREQUENCY.
Cn : ANALIZED FREQUENCY BALANCED COEFFICIENT OF THE ANALIZED FREQUENCY.

FROM THE W VALUES THE STATISTIC ANALYSIS IS DONE CLASSIFYING EACH VALUE IN DETECTABLE.

UNITS FROM 1 TO 100. THE TIME REMAINED AT EACH LEVEL IS COUNTED.

STARTING THEN, THE P_{ST} VALUE OF THE INTERVAL CHOSEN FROM 5 TO 15 MINUTES IS CALCULATED.

PST IS CALCULATED ACCORDING TO THE STANDARDS CEI 868 (ANNEX A)

$$P_{st} = \sqrt{\sum (0.0314P_{0.1} + 0.0525P_1 + 0.0657P_3 + 0.28P_{10} + 0.08P_{50})}$$

P_{0.1}, P₁, P₁₀ and P₅₀ ARE THE EXCEEDING FLICKER LEVELS DURING 0.1, 1, 3, 10 AND 50% OF THE PROGRAMMED PERIOD TOTAL TIME.

THE CHARACTERISTICS OF THE FLICKER MEASURING FUNCTION ARE AS FOLLOWS:

- FLICKER FREQUENCY FROM 0.5 TO 25 HZ
- dU/ V ACCURACY: 0.4%
- dU/ V RESOLUTION : 0.1 %
- FULL SCALE HIGHER THAN d U/V : 10%
- ANALYSIS SHORT PERIOD FROM 5 TO 15 MINUTES