CALMET TB30

Data Sheet

Three Position Meter Test Bench

The Calmet TB30 Three Position Desktop Meter Test Bench is used for calibration and simultaneously testing up to three units of single and three phase electromechanical and electronic active and reactive electricity meters and portable test equipment with accuracy referenced to an internal reference meter.

Calmet TB30
• New generation of the fully automated Smart Meter Test Bench
• Accuracy class 0.02% or 0.05% with internal reference meter
• Extremely high accuracy class with external reference meter
• Automatic Test Procedures
• Simultaneously testing up to 3 units of electricity meters
• Programmed form and special shapes of currents and voltages
• Three-phase current and voltage source in range 0.001A…120A and 0.5…560V
• Signal generation without auxiliary amplifiers
• Compact design size and light weight
• AC single phase power supply operation only
• Calibration Certificate

The Calmet TB30 Test Bench employs modern precision power source with the internal reference (without need to use an additional external reference energy meter with additional cables). By this conception may be achieved simultaneously flexible customer orientated solution characterised by extremely compact size, light weight, high metrological properties at reasonable price.
In case the high-accuracy application requirement, it is possible to upgrade the existing Calmet TB30 Test Bench by adding an external reference meter.

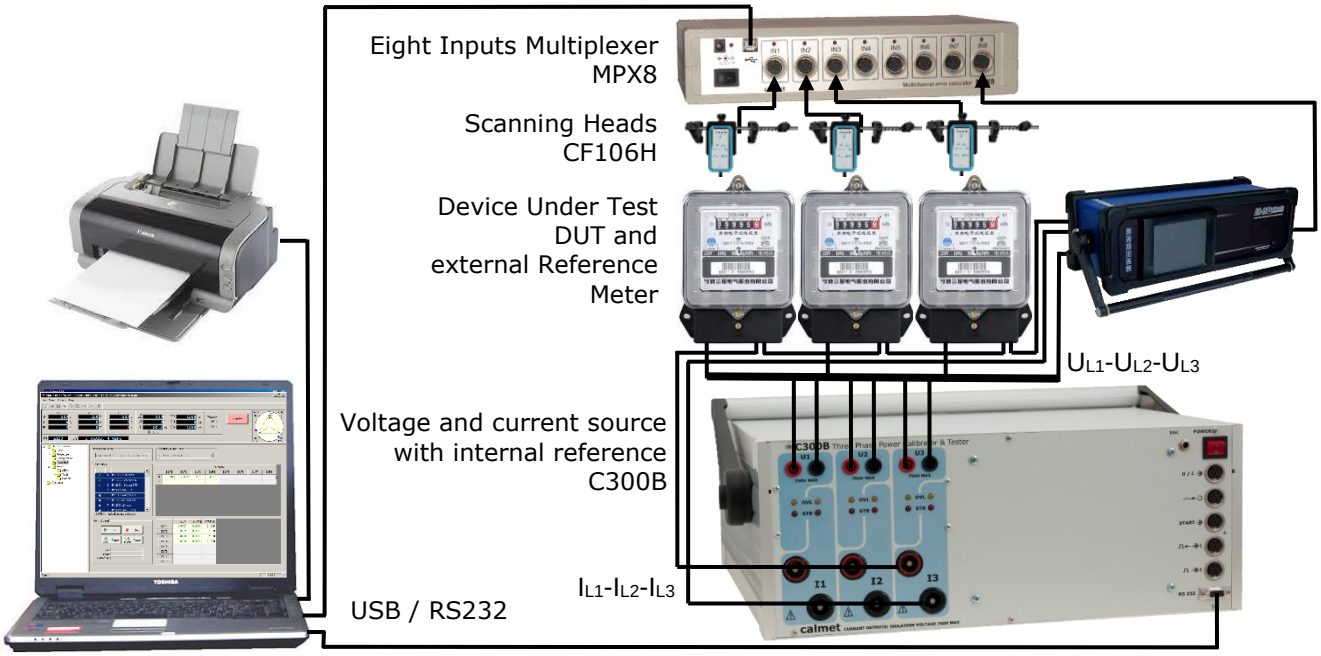
The Calmet TB30 Test Bench comprises:

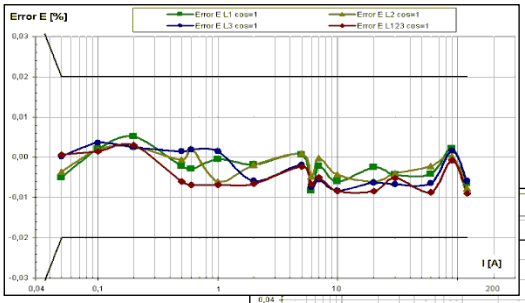
- three phase power source with accuracy class of internal reference 0.02 or 0.05. Three phase power source generates voltage up to 560V and current up to 120A with programmable shapes, frequency in 40…500Hz range and phase shifts in 0…±360° range,
- three position testing stand with photo scanning heads and cables,
- MPX8 Eight Inputs Meter Error Calculator with MPX8 PC Soft.

The Calmet TB30 Test Bench performs the following automatic tests of electricity meters:

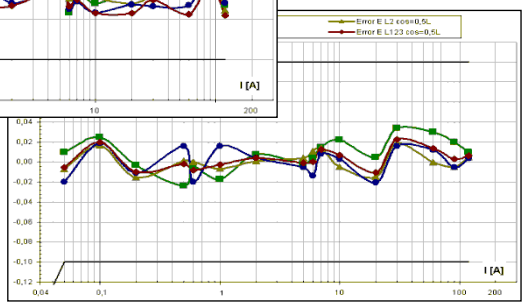
- measure the basic error characteristics and repeatability,
- checking the starting current,
- checking the no-load run,
- measure the influence of frequency, voltage, self-heating, reversed phase sequence, distortion and special shapes of currents and voltages,
- checking the impulse output and energy meter counter,
- checking the maximum power indicator.

Configuration of the Calmet TB30 with using external Reference meter





The accuracy of the basic parameters of the Calmet TB30 - voltage, current, power and energy in a wide voltage 21...560V and current 0.05...120A ranges, is expressed as a percentage of the setting value, without the component as a percentage of the range value. This form of errors specification is very useful when checking instruments, such as electricity meters.



Energy errors diagrams of the Calmet TB30 class 0.02 as a function of current settings for balanced and unbalanced loads at 230V/50Hz and power factor cosφ=1 and 0.5L, achieved in automatic test procedure using Calpro300 TS software and reference meter Radian RD33.

Power source with internal reference						
Parameter	**Range**	**Settings span**	**Resolution**	**Uncertainty 1)**		**Maximum load**
				class 0.02	**class 0.05**	
Voltage U	70V	0.5000...70.0000V	0.0001V	±0.02% 2)4)	±0.05% 2)4)	560mA@70V
	140V	1.000...140.000V	0.001V			280mA@140V
	280V	2.000...280.000V	0.001V			140mA@280V
	560V	5.000...560.000V	0.001V			70mA@560V
Voltage short term [1h] stability				±0.005% 2)	±0.010% 2)	
Voltage long term [1year] stability				±0.01% 2)	±0.02% 2)	
Voltage temperature drift per 1°C				±0.0005% 2)	±0.0010% 2)	
Current I	0.5A	0.001000...0.500000A	0.000001A	±0.02% 2)5)	±0.05% 2)5)	17V@0.5A
	6A	0.05000...6.00000A	0.00001A			8.5V@6A
	20A	0.2000...20.0000A	0.0001A			3.3V@20A
	120A	1.000...120.000A	0.001A			0.95V@60A 7) 0.70V@120A 7)
Current short term [1h] stability				±0.005% 2)	±0.010% 2)	
Current long term [1year] stability				±0.01% 2)	±0.02% 2)	
Current temperature drift per 1°C				±0.0005% 2)	±0.0010% 2)	
Frequency f		40.000...500.000Hz	0.001Hz	±0.005%		
Phase shift φ		0.00...±360.00°	0.01°	±0.05° 2)	±0.10° 2)	
Active power P		0...3x67200.0W	0.00001-0.1W	±0.02% 2)3)	±0.05% 2)3)	
Reactive power Q		0...3x67200.0var	0.00001-0.1var	±0.02% 2)3)	±0.05% 2)3)	
Apparent power S		0...3x67200.0VA	0.00001-0.1VA	±0.02% 2)	±0.05% 2)	
Power short term [1h] stability				±0.005% 2)8)	±0.010% 2)8)	
Power long term [1year] stability				±0.01% 2)8)	±0.02% 2)8)	
Power temperature drift per 1°C				±0.0005% 2)	±0.0010% 2)	
Harmonics magnitude	up to 64th or 3200Hz	0...100% output value	0.01%	±0.02% 9)		
Harmonics phase		0...360°	0.01°	±0.5° 9)		
Time 6)		1...36000s	1s	±0.01% ±0.001s		
Energy	calculated from settings of power and time			±0.02% 2)3)	±0.05% 2)3)	
Impulse input	two impulse inputs: IN_L 0...2V, IN_H 4...27V up to 200kHz (150kHz with external reference meter)					
Impulse output	programmable impulse output: open collector 28V/100mA up to 210kHz					
Special shapes	Phase Fired and Burst acc. To EN50470					
Power supply	Single phase 90V...264V / 47...63Hz / 900VA acc. to IEC 60359 for group I					
Dimensions and weight	(width 480 x height 200 x depth 560)mm and 28kg					
Testing stand						
Test rack	Three position test rack is made of light aluminium profiles Dimensions (width 760 x height 340 x depth 820)mm and weight 12kg					
Set of cables	Set of safety voltage cables (18 units), set of safety current cables up to 20A (12 units) and up to 120A (12 units) with set of accessories for safety cables					
Photo scanning head						
Photo scanning head type CF106H (3units) which detect the disc movement or the LED flash of the meter						

1) absolute extended uncertainty under confidence level of 95% covers reference uncertainty of standards, stability in 12 months, influence quantities (ambient temperature in range +20...+26°C, humidity and power supply voltage according to the table 2.3, load acc. to table 2.1, frequency in range 45...65Hz) and nonlinearity. For frequency band below 45Hz and above 65Hz – linear rise up typically to double value for frequency 40Hz and 500Hz
2) of setting value, for settings from 10% of current range and 30% of voltage range
3) uncertainty of power P(Q) under cosφ(sinφ)=1, for cosφ(sinφ)≠1 linear rise up to 0.15% (class 0.02) or 0.30% (class 0.05) for cosφ(sinφ)=0.5
4) for voltage below 30% of range uncertainty 0.006% of range (class 0.02) or 0.015% of range (class 0.05)
5) for current below 10% of range uncertainty 0.002% of range (class 0.02) or 0.005% of range (class 0.05)
6) for energy dosage
7) 0.85V@60A and 0.50V@120A using the AKD300 current cables length 1m
8) stability of power S and P(Q) under cosφ(sinφ)=1, for cosφ(sinφ)≠1 linear rise up to 0.04% for cosφ(sinφ)=0.5
9) 0,02% of output value and 0,5° for frequency range of harmonics 80-120Hz with linear rise up to 0.2% of output value and 4° for 3200Hz

Mpx8 PC software package for MS Windows

The Calmet TB30 Test Bench is controlled by means of personal computer with installed MPX8 PC software in MS Windows operating system.

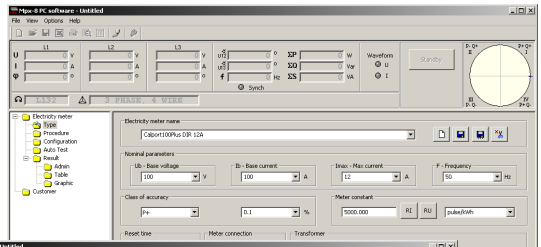
MPX8 PC Soft features:

- using a modern concept, which allows the operator to create own test procedures - this is very important because new requirements for new meter generations can be realized easily without changing the complete software,
- the automated mode - direct execution of the complete test procedure automatically and requires no more additional handling by operator unless it will not be defined in the test procedure,
- the manual mode - direct execution of single test step. It offers an ideal solution for tests and evaluation of entire specifications for devices under test without generating the complete test procedure,
- computer database of customers, devices, measurement procedures as well as edition of results, diagrams, tables of results and reports,
- export of results to MS Excel,
- traditional manual settings the value of all parameters of output signals.

Advantages of ***MPX8* PC Soft**:

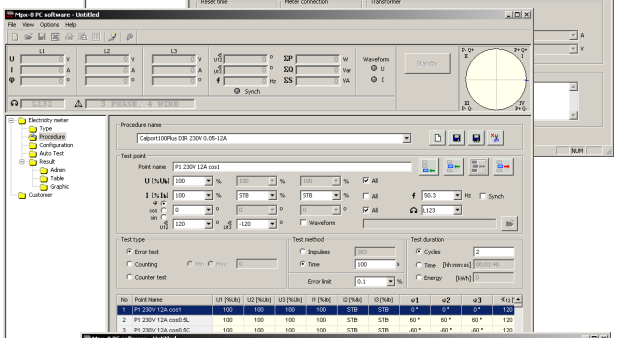
- user-friendly operation,
- database for meters and test procedures,
- fully-automatic test procedures,
- continuous monitoring of the test,
- tables and graphics for presentation of results,
- operator interface available in several languages,
- automatic measurements report generation.

Meter type window for entering data to tested devices database, contains the electrical and functional definitions of the device under test – DUT (base voltage and current values, maximal current value, accuracy class of the DUT, meter constant, meter connection,…).



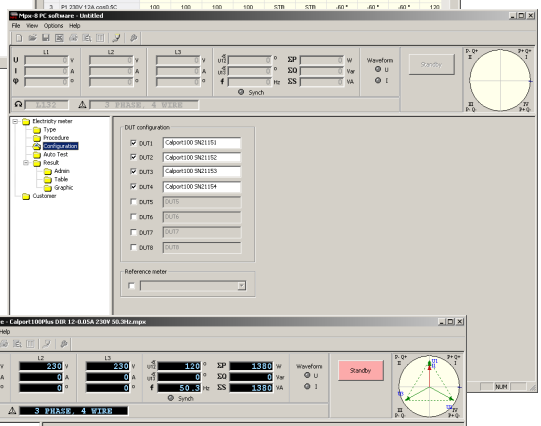
Procedure window for entering data to measuring procedures database, describes the order and content of the various test steps in a sequence. For each test step are specified following data:

- parameters of test point (point name, percentage value of the base voltage and current, phase angle or power factor, frequency, waveform of the voltages and currents,…),
- test type (error test, counting test, counter test),
- test method (impulses counting or time counting for error test) and percentage error limit of the DUT
- test duration for calculating of the standard deviation of error (number of cycles, time of the test point, energy dosage to counting).

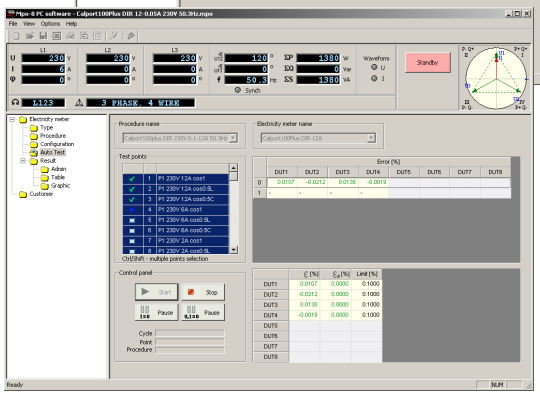


Configuration window describes configuration of the MPX8 Multiplexer inputs (active / not active) and description of connected DUT (name, serial number and other necessary information).

Additionally the configuration window allows to set the external reference meter (option) connected to the 8th of the MPX8 input.



Autotest window for performing test of the DUT (tests of accuracy at reference conditions, repeatability, meter constant, starting and no-load condition, effect of influence quantities and tests of effect of disturbances of long duration as reversed phase sequence, voltage unbalance, self-heating, odd harmonics, even harmonics, sub-harmonics,…) according to measuring procedure in the manual mode or in the automated mode. The autotest function allows to allocate to a measurement procedure a meter type and select a test sequence.



During the test, the operator will be informed about:

- point status (passed / not passed, active point),
- progress indicator (cycle, point and procedure)
- error values for all DUTs in consecutive cycles,
- values of average error, standard deviation and error limit for all DUTs.

Additionally, in any time, the operator can pause or stop a procedure and repeat selected point.

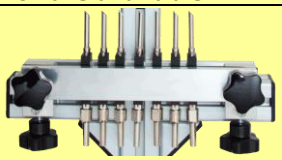
Table result window makes possible visualization and edition measured results in form of table and consists of measured results of DUTs in two kinds of table: table of individual DUTs results and table of all DUTs results.

During an automatic test sequence it is possible to view test results and after executing an automatic test sequence all saved results are available for further data processing (printing and exporting data to MS Excel).

Graphic result window makes possible visualization of measured results in form of diagram of error function with error limits.

The graphic result is fully customizable. The operator can change:

- add or hide graph of selected DUT to diagram,
- color of any graph,
- quantity of X axis (no, time, current, voltage,…),
- zoom in and out of diagram.

Calmet TB30	
All completed Calmet TB30 Test Bench's set consists of:	
• C300B calibrator class 0.02 or 0.05, • MPX8 Eight Inputs Multiplexer, • Mpx8 PC software, • Calpro 300 Basic + TS software – for automatic test of electric equipment, • ER30 three position rack for hanging of meter under test • CF106H photo head with holder for inductive meter and meter with LED, • set of safety voltage cables (6units), • set of safety current cables up to 20A (12units), • set of accessories for safety cables (12units banana plug +12units Cu), • AKD300 current cables up to 120A (12units) with set (48units) of replaceable terminals • AD300 sockets adapter, • power cord, • USB / RS232 adapter, • fuse T4A, 250V, 5x20 (2units), • C091A T3475-001 plug Amphenol for Calibrator inputs, • operation manual of calibrator and software (3units), • warranty card, • calibration certificate.	
Optionally for Calmet TB30 Test Bench are available:	
•EH10.3 quick connection device, 	• *Calpro 300PQ* PC Soft for Power Quality measurement devices testing,
•External reference meter Radian Research,	• Computer Laptop PC with PC software,
•RS232 – Bluetooth adapter for wireless connection,	• C091A T3475-001 plug Amphenol for Calibrator inputs,

Calmet sp. z o.o.
Kukulcza 18, 65-472 Zielona Gora, Poland
Phone +48 68 324 04 56 Fax +48 68 324 04 57
E-mail: mail@calmet.com.pl Web access: http://www.calmet.com.pl