MTE

Meter Test Equipment



PTS 400.3 PLUS, class 0.02
Modular Portable Test System

Modules

The portable, fully automatic PTS 400.3 PLUS is a modular three-phase test system available in two versions.

For many years, utilities have realized the importance of performing measurements and tests, on-site, at the metering installation. MTE continually supplies and develops new and improved products that reduces and simplifies the on-site efforts. The test system PTS 400.3 PLUS with enhanced functionality and high measurement accuracy does not only determine the accuracy of meters, but also provides additional information relating to the conditions at the respective mains points.

Two modules allowing combinations for many applications

The PTS 400.3 PLUS system consists of the reference standard PRS 600.3 of class 0.02 and the power source module PPS 400.3, which is available in two versions of up to 12 A or 120 A.

The reference standard PRS 600.3 may be simply and quickly connected with the power source module PPS 400.3 thereby producing a portable test system with 1 up to 3 positions. Operation of the system may begin immediately after connecting both modules.

In this combination, the reference standard controls the source via blue-tooth.

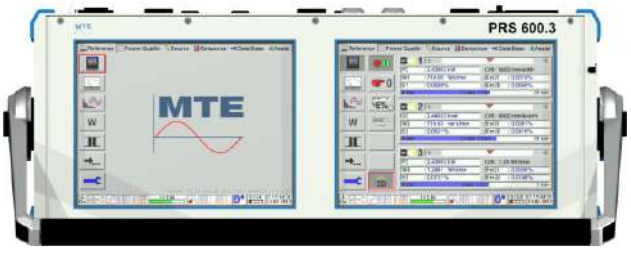
Due to the extended power quality analyzer functions of the reference standard PRS 600.3, the test system can also be used to resolve disputes at contractual applications, for statistical surveys, including EN 50160 reporting, and for online troubleshooting of different kind of power quality problems.

The power source module, if used without the PRS 600.3, can be controlled via the serial interface RS 232 C. It is therefore possible to easily apply the source module unchanged in a stationary test system.

Operation of the system

The PRS 600.3 is the operation interface for the two system modules of the Portable Test System PTS 400.3 PLUS and allows direct operation of the reference standard and / or one of the available portable power source modules PPS 400.3-12A or PPS 400.3-120A.

The operation concept is based on touch screen operation with self-explaining functional software buttons.



The two displays with identical graphical user interface can be used to control the reference standard and the power source each with a separate display or they can be used to show different functions of the same unit on two displays.

The same functionality is available on both sides, left and right, freely selectable by the user.

The operator can not only perform single test steps but also easily predefine and store automatic test runs using the sequence function and advanced database functions of the system.

The overall functionality is comparable to modern stationary meter test systems.

In case the touch operation is not possible (e.g. if gloves must be worn for safety reasons at on-site tests), the system can also be operated with the integrated pen on the right side of the housing.



Further the system can alternatively also be comfortably operated with a keyboard or a mouse connected to the USB type A connector of the PRS 600.3. This is especially useful, if the system is operated in the laboratory.

PRS 600.3 Portable reference standard



The reference standard of the modular system is based on the well-known digital measurement value retrieval, fast analogue-digital conversion and calculation of the values using fast signal processors. As opposed to the past, reference standards are not only used as standards for meter testing in a stationary meter test installation, but predominantly in the field for the measurement of all main parameters.

In order to meet these requirements, the PRS 600.3 offers the following main functions:

- Simultaneous testing of up to three meters or registers of a multi-functional meter
- Internal memory for measurement results and customer data
- Vector diagram, harmonics spectrum, wave form and rotary field display for analysis of the mains conditions
- Active, reactive and apparent energy measurement in three-wire or four-wire circuits with integrated error measurement and pulse output for energy
- Voltage measurement
- Current measurement, direct and with current transformer clamps up to 3000 A or sensors for voltage and current measurements on high voltage potential
- Active, reactive and apparent power measurement per phase and sum of all phases
- Phase angle, power factor and frequency measurement
- Burden measurement and ratio test of PTs and CTs
- Power quality recording and analysis regarding standard IEC 61000-4-30 class A

PPS 400.3 Portable power source module

The PPS 400.3 portable power source module may be used as enhancement of the reference standard PRS 600.3 as well as independently. Following the different demands of the customers, this source is available in two versions, for the supply of transformer meters with a maximum current up to 12 A as well as a wider range source up to 120 A. The source is designed to generate any network independent of its supply voltage, e.g. 3-phase 4-wire Y or Δ, 3-phase 3-wire, 1-phase 2-wire or others. Generation of harmonics in both voltage and current circuits as well as ripple control signals are available.

The power source module may be connected to the reference meter with little effort. The control software automatically recognises the module. It may therefore immediately be put into operation, and automatic measurement of a load curve of the meter may begin.



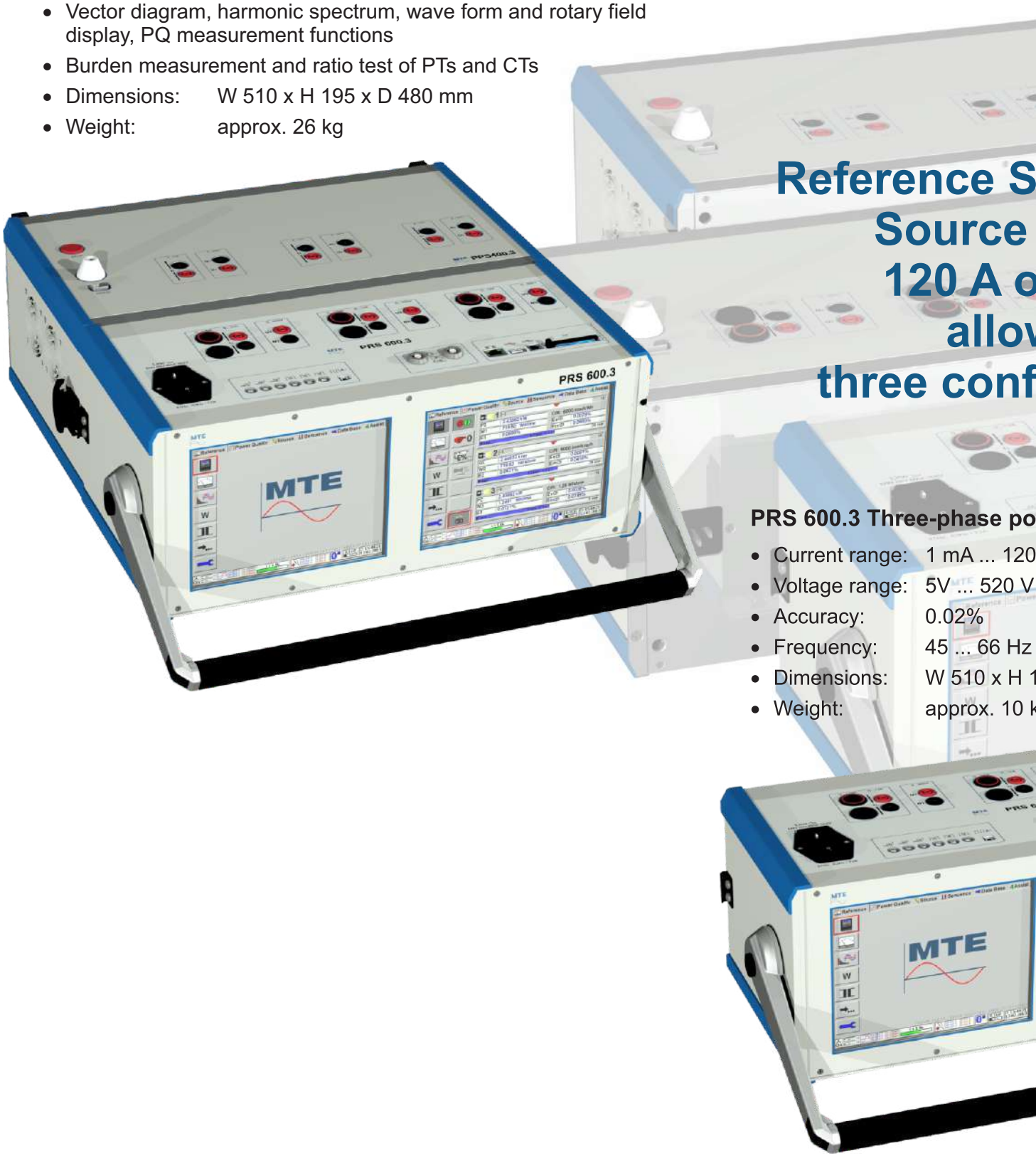
Controlling the source is carried out in a similar way as to control the reference meter, by use of one of the PRS 600.3 touch displays or via RS 232 C.

The PPS 400.3 source is developed such as to be fully operational without the reference meter.

Combinations for various applications

PTS 400.3 PLUS-12 A Three-phase portable test system

- Reference standard module PRS 600.3, accuracy class 0.02
- Current and voltage measurement up to 120 A and 520 V
- Current and voltage generation up to 12 A and 300 V
- Vector diagram, harmonic spectrum, wave form and rotary field display, PQ measurement functions
- Burden measurement and ratio test of PTs and CTs
- Dimensions: W 510 x H 195 x D 480 mm
- Weight: approx. 26 kg



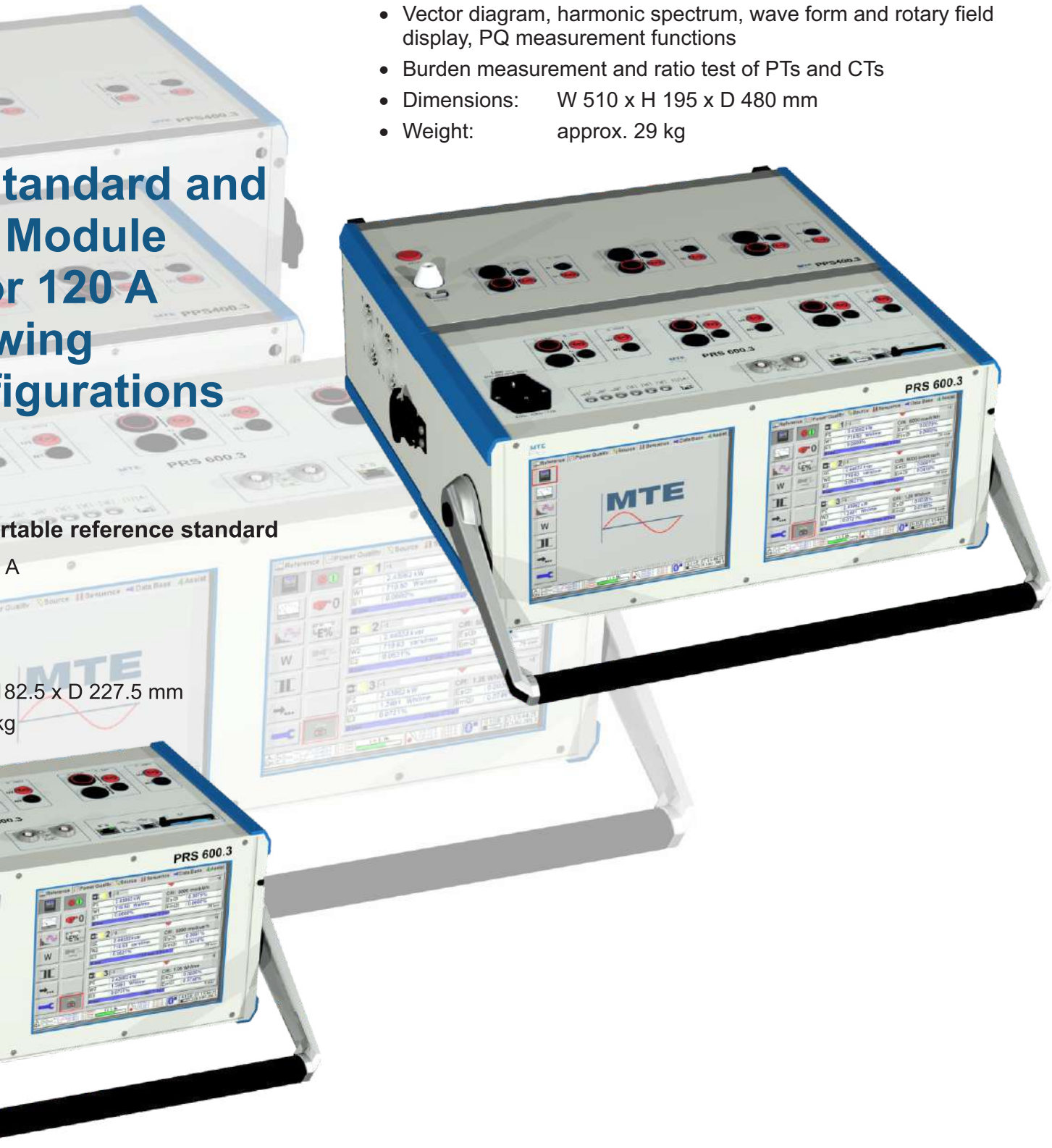
Reference S
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PRS 600.3 Three-phase po

- Current range: 1 mA ... 120
- Voltage range: 5V ... 520 V
- Accuracy: 0.02%
- Frequency: 45 ... 66 Hz
- Dimensions: W 510 x H 1
- Weight: approx. 10 k

PTS 400.3 PLUS-120 A Three-phase portable test system

- Reference standard module PRS 600.3 accuracy class 0.02
- Current and voltage measurement up to 120 A and 520 V
- Current and voltage generation up to 120 A and 300 V
- Vector diagram, harmonic spectrum, wave form and rotary field display, PQ measurement functions
- Burden measurement and ratio test of PTs and CTs
- Dimensions: W 510 x H 195 x D 480 mm
- Weight: approx. 29 kg



Communication between the modules



The portable reference standard PRS 600.3 can be operated on a stand-alone basis or together with the portable power source PPS 400.3 module, which is in this application controlled via bluetooth.

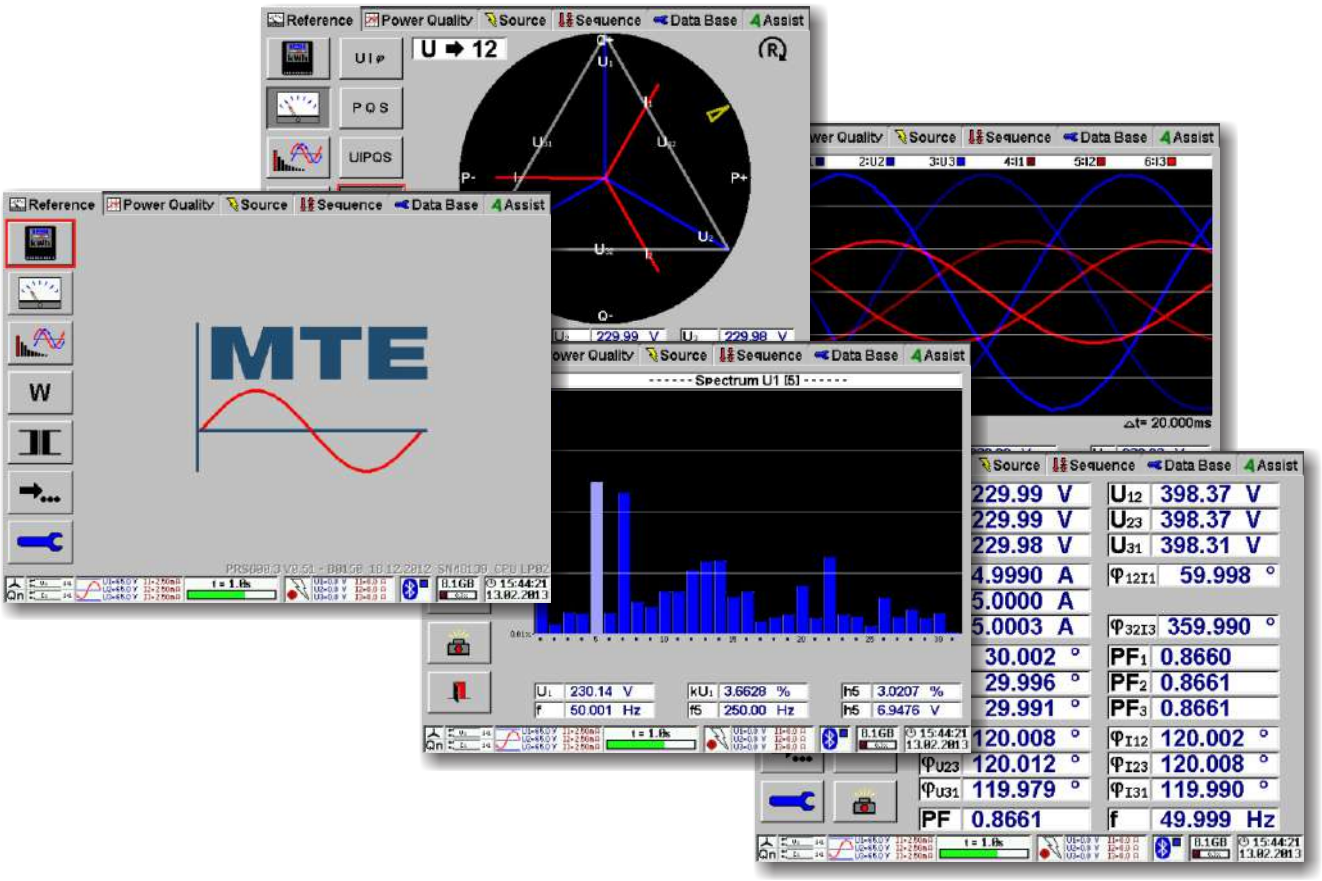
The innovative technology allows easy and comfortable measurements and tests on-site even in difficult accessible situations.

The reference standard and the portable power source can be arranged separately in different ways for optimal connections to the installation.

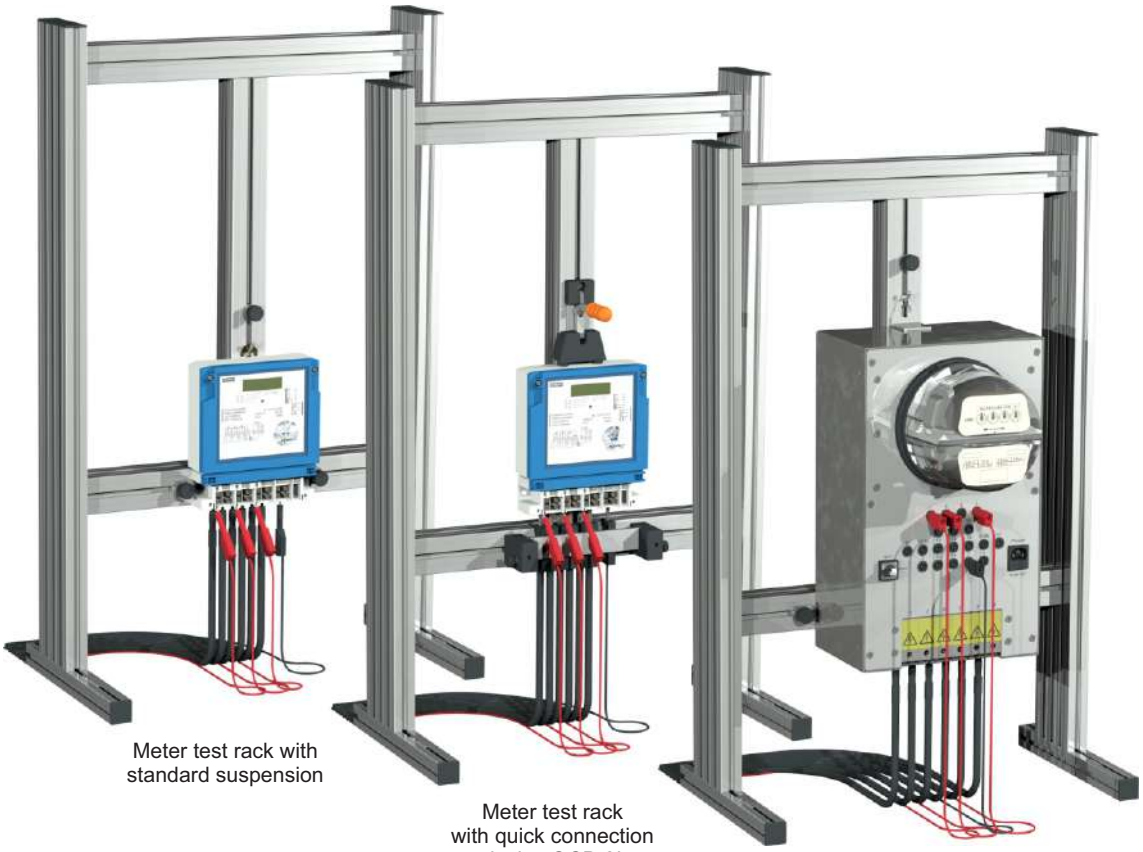
The PPS 400.3 module is operated and controlled from distance in such a configuration.

Features and functions

- Automatic test procedures (if PPS 400.3-12A or PPS 400.3-120A are used)
- Database for meter types, test procedures and customers that can be preprogrammed in the instrument and allocated when carrying out meter tests



Types of meter test racks and quick connection devices



Meter test rack with standard suspension

Meter test rack with quick connection device QCD 3I

Meter test rack with universal socket adapter QCD Form S



Meter test rack for 3 measurement positions with quick connection devices EMP 1.3

Stationary single position test system PTS 400.3 PLUS-1

The stationary system type PTS 400.3 PLUS-1 allows the automatic testing of a single meter, without the need of an additional personal computer and has the following characteristics:

- Test system PTS 400.3 PLUS-1 consists of the three-phase reference standard PRS 600.3, the three-phase voltage and current source PPS 400.3 plus a single position meter suspension rack
- The suspension rack provides a fast and easy mounting of the meter
- Scanning head support SCD 2003 with scanning head SH 2003 for scanning the marks of mechanical rotating disc meters or the detection of light emitting diodes (LED's) of electronic meters



- The PTS 400.3 PLUS is supplied with integrated software, allowing automatic measuring runs with (programmable) predefined load points to be carried out
- Optional quick connection devices according to IEC-, BS- or ANSI standard, which allow fast suspension and connection of meters

Stationary single position test system PTS 400.3 PLUS-2

The stationary system type PTS 400.3 PLUS-2 allows the testing of a a simple meter, a high presicion multifunction meter or a smart meter fully automatic and has the following characteristics:

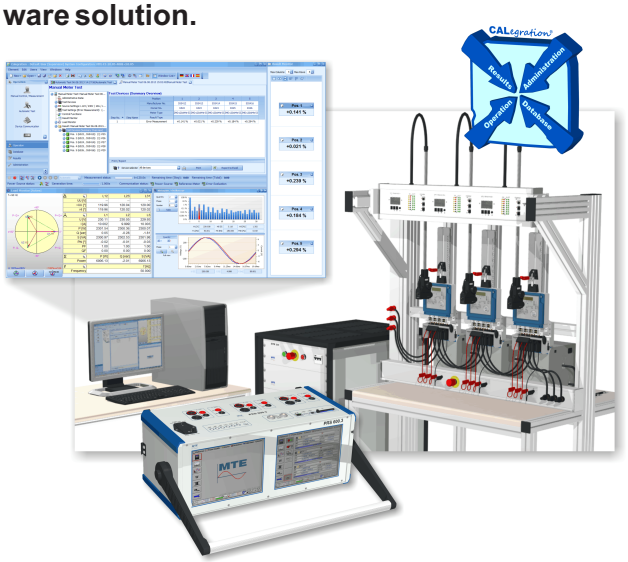
- Test system PTS 400.3 PLUS-2 consists of the three-phase reference standard PRS 600.3, the three-phase voltage and current source PPS 400.3, plus a single position meter suspension rack
- Scanning head support SHC x.x with scanning head SH 2003 or SH 11 for scanning the marks of mechanical rotating disc meters or the detection of light emitting diodes (LED's) of electronic meters. The scanning head is adjustable in all 3 axis (left to right, up and down, in and out) as required to align with all normal configurations of meters



- Modular evaluation system SMM 400 for meter error display, inputs for the testing of output contacts or pulses plus a serial interface for meter communications and programming
- Software package CALegration® provides a PC controlled fully automatic measuring test system
- Optional quick connection devices according to IEC-, BS- or ANSI standard, which allow fast suspension and connection of meters

Software package CALegration®

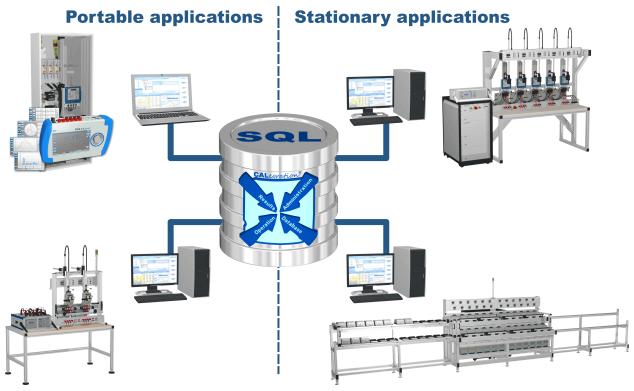
CALegration® is an all-in-one software package designed to operate MTE´s portable and stationary test equipment product lines with the same software and on a common database. It bundles the functionalities and advantages in a new and comprehensive software solution.



The philosophy of CALegration® is to integrate all basic test elements (administration, database, operation, results) into one single software and to use it with both MTE´s portable and stationary test devices.

While testing with CALegration®, the results are stored in a centralized SQL based database giving the user the flexibility to access the data wherever they are testing: On-site (portable test equipment), in the laboratory or in the meter production plant (stationary equipment).

Moreover, CALegration® provides the user with its database a complete history and overview of all tested meters, giving the opportunity to track the meters respectively their test results over its full life cycle.



Covering all requirements of the modern meter testing environment, CALegration® provides the flexibility to easily incorporate future meter testing requirements as well.

Tests can be carried out for simple or highly complex (smart) meters in accordance with customer requirements and national / international test and calibration regulations (e.g. PTB, IEC, BS, ANSI).

Key advantages of CALegration®

- **Reduced complexity** due to an all-in-one software for the entire MTE product portfolio
- **User-friendly operations** and clearly arranged user interface making the system easy understandable, also to operators with limited computer knowledge
- **SQL based database** with stable access, organized backups, extended database size and server installation support
- **Full database interchange** between portable devices and CALegration® with control of portable functions by external PC
- **Flexible access** to database and **fast storage and interchange** of new testing data packages
- **Fully-automatic test sequences** for meter testing with clearly laid out database structure
- **Manual control module** for testing various individual functions such as meter test, recording of load values, detection of installation errors and many more
- Prepared for **power quality testing** and analysis functions according to IEC 62586 and IEC 61000-4-30 for specific MTE devices
- Transparent evaluation and presentation of results, **statistics and schematic diagrams** of all relevant values in an individual created protocol
- **Modular system** allows the integration of customer specified applications
- Suitable for use with **various hardware combinations**
- **Data export** in standard format (e.g. MS Excel)
- Operator interface available in **several languages** and in different **color profiles**

CALegration® combines the various functional modules required in modern stationary and portable test devices, with a common and consistent user interface.

The modular system allows the control of various hardware units with a common software platform. Functions for laboratory or on-site measurement are provided together with the ability to test highly complex modern meters (smart meters) with integral tariff devices.

For any test equipment, test sequence or meter type, CALegration® is structured along the following basic test elements:

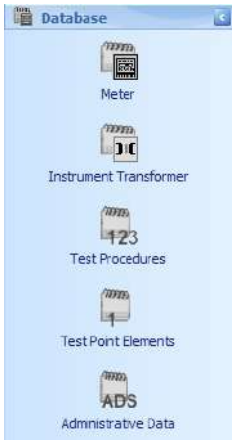
Administration



With the **Software Configuration** the user interface can be adapted individually to the specific customer requirements, access levels and rights of particular user. On the basis of User Profiles the interface of the software can be customized (Software Profile, Color Profile) and task-oriented user rights and access levels (Tester, Supervisor, Service) can be assigned to a user.

In the **System Configuration** the user himself can adapt CALegration® to the actual test system. The test system devices (e.g. reference meter, power source, error evaluation system, handheld) are configured here and can be combined and saved as various system configurations (e.g. portable reference meters up to complex full automatic test systems). A demo system configuration is also included for training purposes.

Database



The **Meter** and **Meter Type** definition function is used to define and administrate any kind of meters. The meter type definition contains the electrical and functional definitions of meters under test (connection values, meter constants registers etc.). The type definitions can further be called up and allocated to the meter stock / inventory of the customer (meter name, manufacturer number etc.).

By setting up new **Administrative Data (ADS)** such as e.g. contact details of energy customers, also client information can be added to the meter stock. **Instrument Transformers** can be defined and called out for testing on-site installations. With CALegration® various **Test Procedures** can be defined. A test procedure or test sequence describes the order and content of different **Test Point Elements** in a whole procedure. For each test step the desired Source Settings (current, voltage, phase angle, frequency etc.), Test Settings (e.g. error measurement) and Control Functions (e.g. automatic meter readout) can be specified.

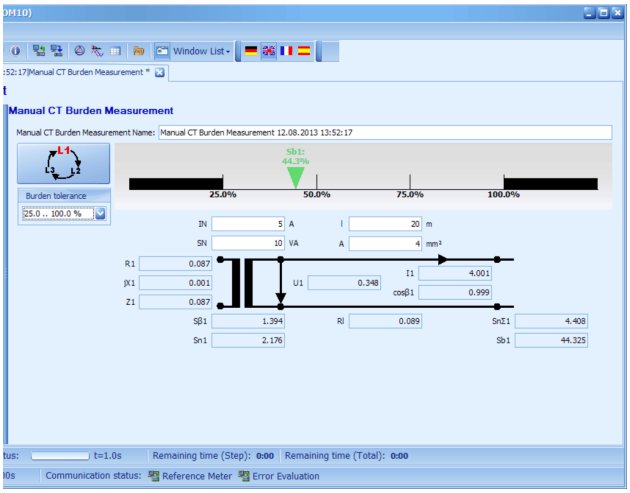
Operation



After defining the settings and basic parameters, the actual testing can be executed.

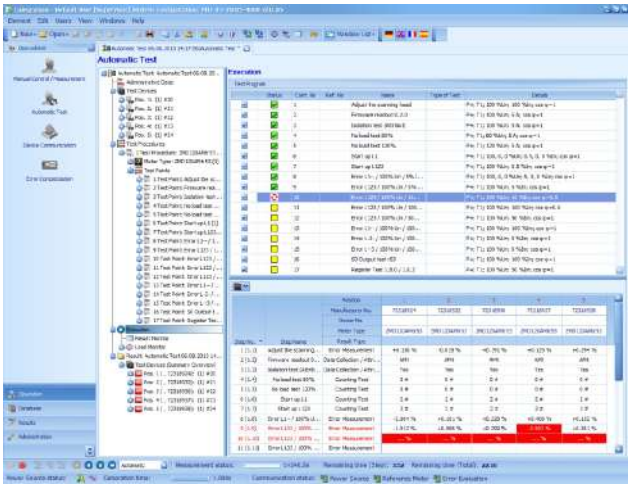
The **Manual Control / Measurement** module allows a simple quick check of the installation on-site (e.g. Manual Meter Test, Manual CT / PT Burden and Ratio Measurements, Manual Source Control) without the necessity to integrate these test procedures into a full test sequence.

For instance, CALegration® shows the user at CT Burden Measurement a schematic diagram and all relevant settings and results readout from the portable test device.



With the **Device Communication** CALegration® allows the user to readout measurement results stored in portable test devices or to preload database elements (Administrative Data, Meters, Instrument Transformers, Test Procedures, Test Point Elements) into the test devices.

By undertaking an **Automatic Test** the user allocates to each active measurement position a meter type and selects a test procedure. Subsequently the user will comfortably be guided through the test. It is possible to display simultaneously the actual test values, wave forms and results in their own windows using large, good visible and configurable fonts.



Results



After executing an Automatic Test or a Manual Control / Measurement all saved results are centralized on the SQL database and available for further data processing, such as creating an individual detailed test report or export to MS Excel tables. This is particularly useful for new meter evaluation, long running problem meter analysis and duplicating field conditions.

The CALegration® **Report Designer** enables the user to create and define their own protocol masks (calibration certificates, pass / fail reports, statistical reports, customer reports etc). With its flexibility to add on logos, diagrams and text fields (e.g. for signatures), the Report Designer meets individual and different requirements. Furthermore, on the basis of the SQL database, full result histories and protocols of meter types or particular meters can be generated and stored.



Optional software modules

- Tariff device communication / dlms
- Reference meter testing
- Tariff device testing with pulse transmitter
- Error compensation
- Sample test modules
- Archiving databases
- Generation of ripple control signals
- Generation of special test signals and wave shapes according to IEC 62052-11 and IEC 62053-11/-21/-22
- Generation of harmonics

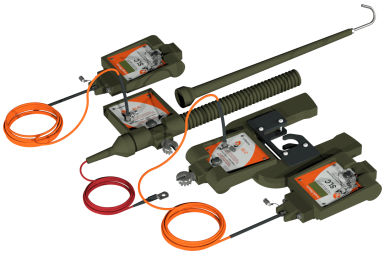
Customer specified adaptations

MTE provides customer specified modules which can be integrated into the standard software for fully automatic calibration of modern (smart) meters. MTE also supports the integration of alternative communication protocols for tariff devices.

Clamp-on current transformers to the portable test system PTS 400.3 PLUS

The PTS 400.3 PLUS allows to use several clamp-on CTs in the range of 100 A up to 3000 A or sensors for voltage and current measurements on high voltage potential.

The clamp-on CTs and high voltage sensors are “clamped” around conductors to perform non-contact / intrusive measurements without interrupting the circuit under test.



AmpLiteWire and VoltLiteWire sensors for voltage and current measurements on high voltage potential up to 40 KV and currents up to 2000 A.



UCT 120.3 active error compensated clamp-on CTs for measurements in the range 0.1 A ... 120 A.



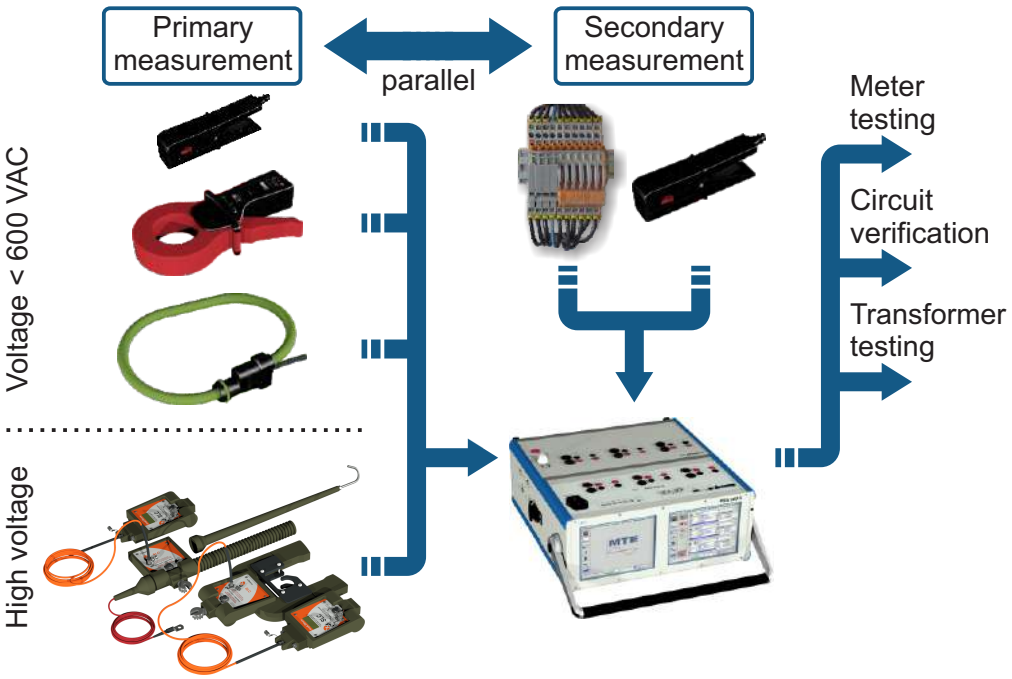
UCT 1000.3 clamp-on CTs for measurements in the range of 1 A up to 1000 A.



UCT LEM.3 flexible current probes FLEX 3000 for currents up to 30 / 300 / 3000 A.

Testing of CTs, PTs in operating state

The portable test system PTS 400.3 PLUS features wide-ranging alternatives for the testing of instrument transformers during normal measuring equipment operations, i.e. without any shutdowns or safety disconnections.





Accessories



Scanning head supports

The SCD 2003 and TVU 7.2 scanning head supports are for on-site meter testing with the SH2003 or SH 11 photoelectric scanning heads.



Impulse interface adapter

The IMP-IF1 interface adapter is suitable to interface MTE reference standards with meters having retransmitting contacts, open-collector transistor outputs or true S0-outputs to allow full testing of meters with these types of outputs interfaces.



OKK optical communication head

The communication to sophisticated electronic tariff devices / meters is performed according to IEC 62056-21 (IEC 61107) mode C, using an OKK optical communication head.

The OKK is directly connected to the corresponding interface of the standard evaluation system SMM 400.



Transport cases

The transport cases have been especially designed for the portable test system PTS 400.3 PLUS and allows transporting the test system well protected and comfortable to the usage site.

One case is meant for transport of the portable reference standard PRS 600.3. A second case allows the transport of the portable power source module PPS 400.3.



Error evaluation system

The modular evaluation system **SMM 400 performs error calculation**, testing of emitting contacts and communication to tariff device units to the meter under test.

Four different versions covering customer´s requirements are available.



Scanning heads

The SH 2003 and SH 11 photoelectric scanning heads are suitable for use with both LED impulses from static / electronic meters and also for detecting the marks on mechanical rotating disc meters plus simulated pulses on LCD displays (SH 11). The choice of operation mode with mechanical or electronic meters is made by a simple selection switch.

With the integrated teach function of the scanning head SH 11, the optimal set-up is automatically learned. The teach function can be activated by the rotary switch or an external control signal.



Scanning head carriages SHC 1.2 and SHC 2.2

The SHC range of scanning head carriages has been designed for use with the SH 2003 and SH 11 model scanning heads. The range is user friendly and offers a high degree of flexibility.



Hand held terminal

The HT 2010 cordless hand held terminal with an integrated bar code reader is designed for recording meter specific data at meter test systems.

The following MTE leaflets are available:

Overviews:	Company Portrait / Portable Test Equipment / Stationary Meter Test Systems Automatic Test Systems / Transformer Monitoring / E-Mobility Testing
Comparator:	K2008
Portable Reference Standards:	PRS 600.3 / CALPORT 300
Portable Working Standards:	PWS 3.3 *genX* / PWS 2.3 *genX*
Portable Standards:	CheckMeter 2.3 *genX*
Portable Test Systems:	PTS 400.3 PLUS / PTS 3.3 *genX* / PTS 2.3 *genX* CheckSystem 2.3 / CheckSystem 2.1 / CheckSystem 2.1 S
Portable Power Sources:	PPS 400.3 / PPS 3.3 *genX* / CheckSource 2.3
Software:	CAL*egration*®

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Test it!