

Meter Test Equipment



PTS 400.3, class 0.02
Modular three-phase Portable Test System

PTS 400.3 Three-phase, fully automatic test system with class 0.02 reference standard and integrated three-phase current and voltage source available in two versions.

For many years, electricity utility companies 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 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.

Three modules allowing combinations for many applications

The highly accurate, portable test system PTS 400.3, comprises of various interchangeable modules.

The PTS 400.3 system consists of a reference standard PRS 400.3 of class 0.02, a programmable power source PPS 400.3, which is available in two versions of up to 12 A or 120 A, as well as a control module PCS 400.3.

The control module serves for controlling the other modules either separately or as a combination of reference standard and source. All modules are easily assembled and controlled. The control module automatically recognizes the modules it is connected to, therefore a reference meter PRS 400.3 may be simply and quickly upgraded with a source PPS 400.3 thereby producing a one-position portable test system. Operation of the system may begin immediately after connecting both modules.

The reference standard or source if used without the control module can be controlled and test values retrieved via the serial interface RS 232 C. It is therefore possible to easily apply modules unchanged into stationary test systems.

PCS 400.3 Portable Control Module



Although the reference standard and the power source are equipped with many functions, their features in portable application are most efficient when used in combination with the control module PCS 400.3.

The control module automatically detects the modules connected to it. It is user friendly and is equipped with a keypad, a rotary switch and a large graphical colour display. Values may be entered using the keypad.

The graphical display is arranged so as to display and represent all the functions in the system PTS 400.3. The overall functionality is comparable to modern stationary meter test systems.

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



However, due to the unique module recognition system the user is not overwhelmed with unnecessary information on the display when using the separate source or separate reference standard.

PRS 400.3 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 400.3 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 hot sticks
- 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
- Measuring of current, voltage and power transducers

PPS 400.3 Portable Power Source

The PPS 400.3, portable power source may be used as enhancement of the reference standard PRS 400.3 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. three-phase four-wire, two-phase three-wire, single-phase two-wire, T-net or others. Generation of harmonics in both voltage and current circuits as well as ripple control signals are optionally available.

The 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 controlling the reference meter, by use of the control module or via RS 232 C.

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

Communication between the modules



The Portable Control Module PCS 400.3 can be operated on a stand-alone basis. The other modules are in this application controlled via blue-tooth. The innovative technology allows easy and comfortable measurements and tests on site even in difficult accessible situations.

The Reference Standard and if required the Portable Power Source are directly connected to the installation whereas the Portable Control Module PCS 400.3 can be operated and controls the modules from distance.

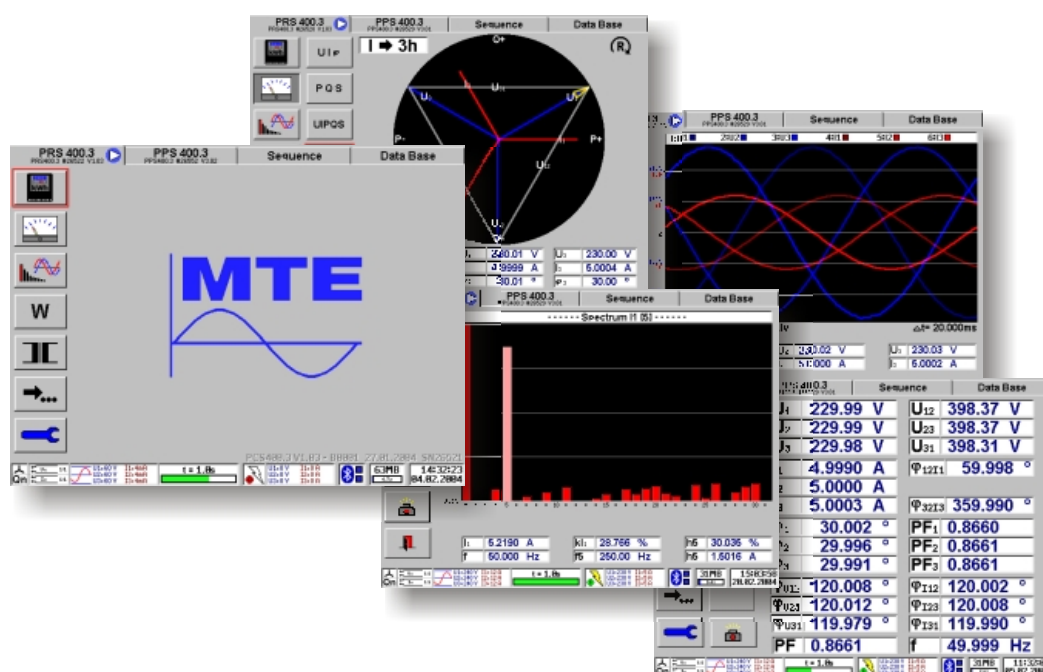
Operation of the system

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

The operation concept is based on self-explaining functional software buttons combined with a rotary selector button.

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 pre-programmed in the instrument and allocated when carrying out meter tests



Clamp-on Current Transformers to the Portable Test System PTS 400.3

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

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



Error compensated clamp-on CTs for measurements in the range 0.5 A ... 100 A with a maximum error of 0.2 %



Clamp-on CTs for measurements in the range of 2 A up to 1000 A



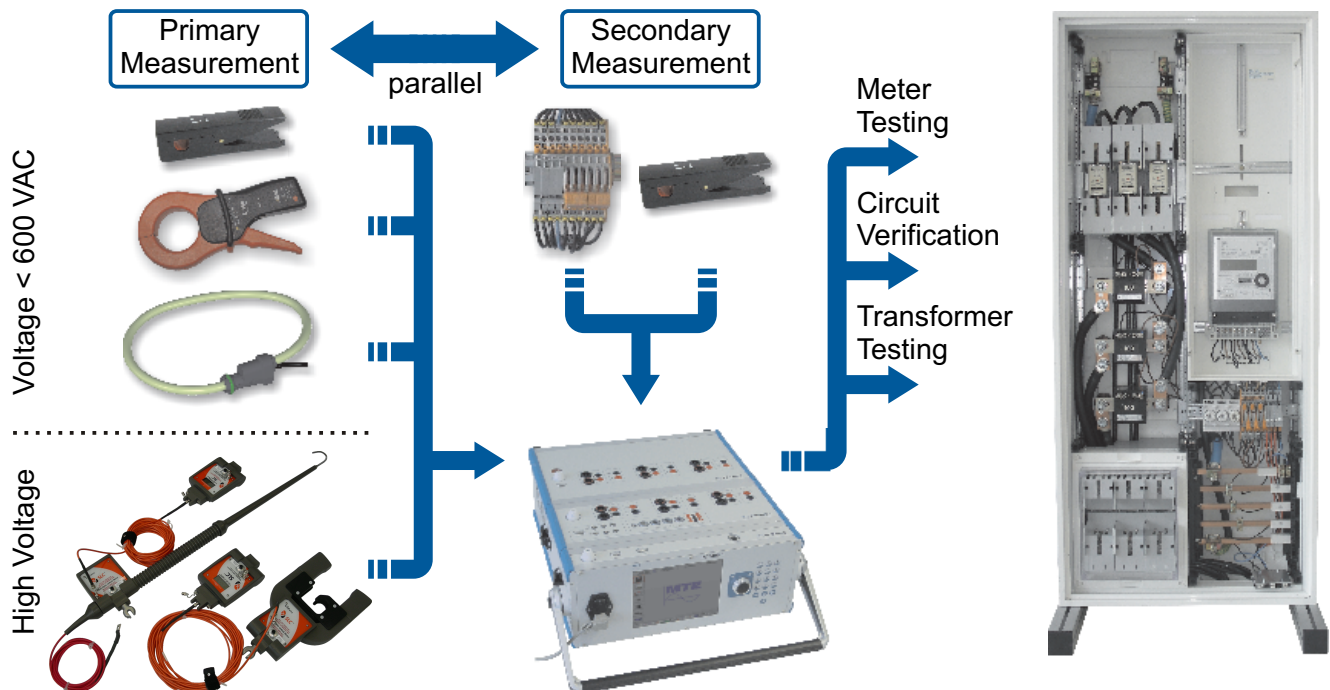
Hot sticks for voltage and current measurements on high voltage potential up to 40 kV and currents up to max. 2000 A



Flexible current transformers FLEX 3000 for current up to 30 / 300 / 3000 A

Testing of CTs, PTs in Operating State

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

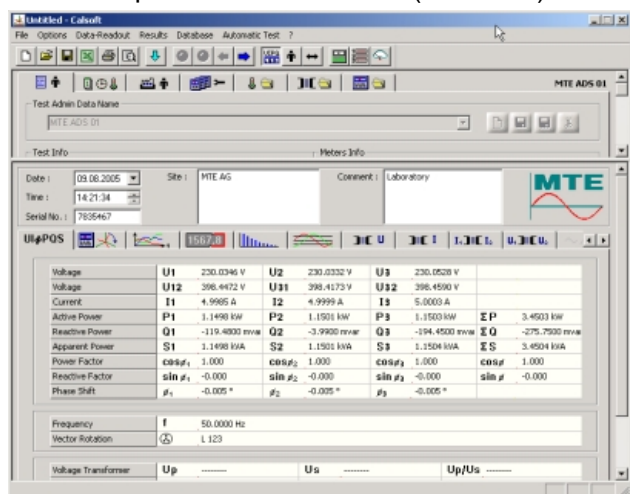


Software package CALSOFT

The CALSOFT Software Package for extended functionality

The CALSOFT I and CALSOFT II software packages are designed to control and read data from portable test instruments, as well as displaying and processing measurement results on a PC or notebook and offers following features:

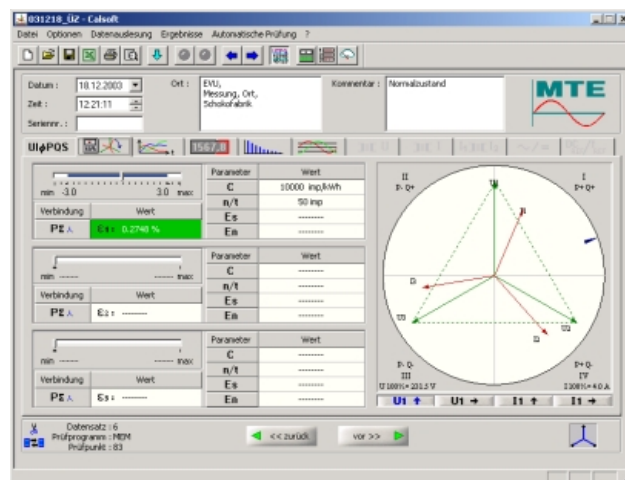
- Schematic diagrams of all relevant values for burden and ratio measurement
- Applications include meter test, recording of load values and detection of installation errors
- Single or continues measurement with storing of the results in a file
- Operator interface available in several languages, easy to translate
- Data export in standard format (MS Excel)



CALSOFT I allows the user to record measurement results while directly controlling the test device on site, to read the internal memory, and to display and process the data.

CALSOFT II has an additional database with meter and test sequence definitions enabling the user to prepare and standardize measurements. Automatic tests can be carried out when used together with a suitable controllable power source. The user friendly read-out and control software complements the functionality of the PTS 400.3.

Additional features with CALSOFT

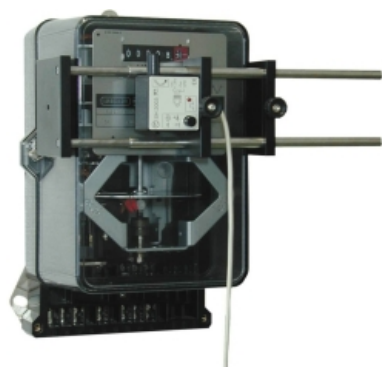


- **Database** to predefine meters, CT/PT transformers, data of the measuring test points and to set-up automatic test sequences
- **Automatic measurement** of test sequences is possible
- **Read out** of stored data from the instrument's built-in memory, and presentation and processing of the information
- **Recording** the actual measurement values by direct periodic sampling of the unit, and presentation and processing of the information



Scanning Heads

The SH 2003 and SH 11 photoelectric scanning heads are suitable for scanning the marks of mechanical rotating disc meters or the detection of light emitting diodes (LED's) of electronic meters plus simulated pulses on LCD displays (SH 11). Mode of operation is selectable via a switch.



Scanning Head Supports

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



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.



Transport Cases

The transport cases has been especially designed for the portable test system PTS 400.3 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 400.3 and the control module PCS 400.3. In the other case allows the transport of the portable source PPS 400.3.



PPS 400.3-12 A Three-phase Portable Power Source

- Current range: 1 mA ... 12 A
- Voltage range: 0 V ... 300 V
- Power: 50 VA (Voltage) / 30 VA (Current)
- Phase angle: -180° ... $+180^\circ$
- Frequency: 45 ... 400 Hz
- Harmonics: up to 20th
- Dimensions: W 520 x H 195 x D 365 mm
- Weight: approx. 20.5 kg



PRS 400.3 Three-phase Portable Reference Standard

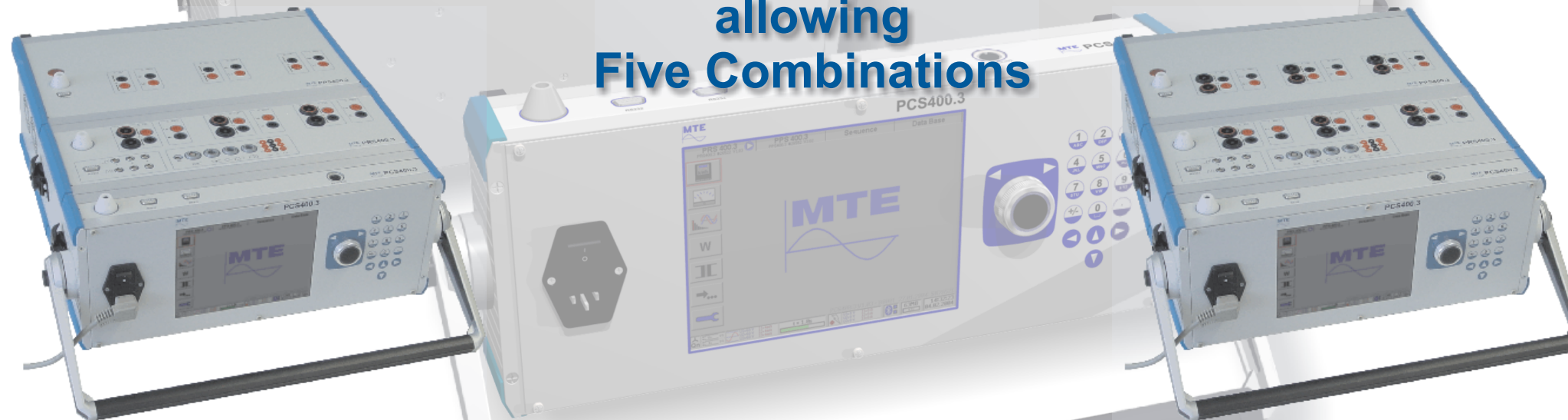
- Current range: 1 mA ... 120 A
- Voltage range: 5 V ... 520 V
- Accuracy: 0.02 %
- Frequency: 45 ... 70 Hz
- Dimensions: W 520 x H 195 x D 275 mm
- Weight: approx. 11.5 kg



PPS 400.3-120 A Three-phase Portable Power Source

- Current range: 1 mA ... 120 A
- Voltage range: 0 V ... 300 V
- Power: 50 VA (Voltage) / 80 VA (Current)
- Phase angle: -180° ... $+180^\circ$
- Frequency: 45 ... 400 Hz
- Harmonics: up to 20th
- Dimensions: W 520 x H 195 x D 365 mm
- Weight: approx. 23.5 kg

**Three Modules
allowing
Five Combinations**



PTS 400.3-12 A Three-phase Portable Test System

- Reference standard module PRS 400.3 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
- Burden measurement and ratio test of PTs and CTs
- Dimensions: W 520 x H 195 x D 525 mm
- Weight: approx. 26.5 kg

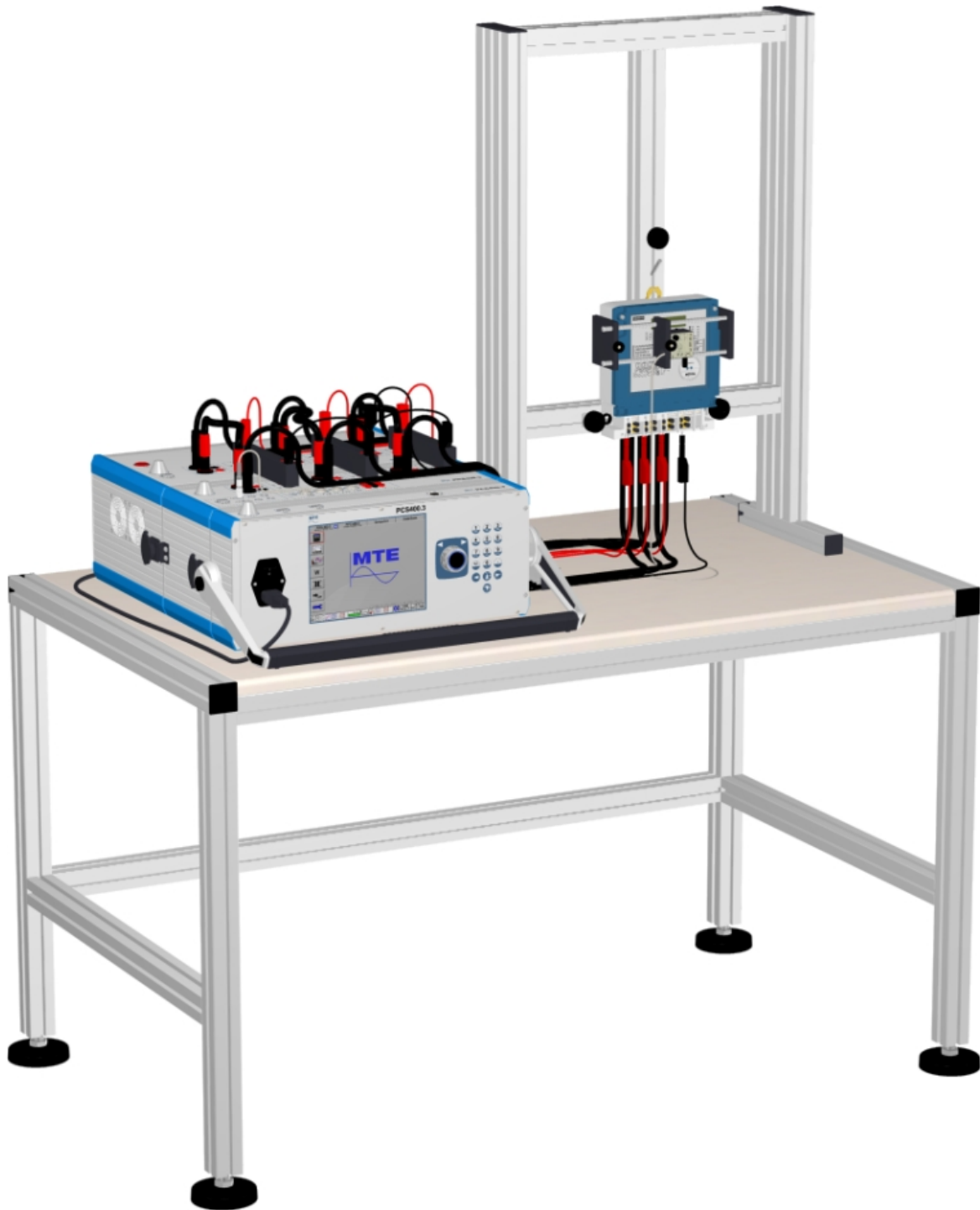
PTS 400.3-120 A Three-phase Portable Test System

- Reference standard module PRS 400.3 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
- Burden measurement and ratio test of PTs and CTs
- Dimensions: W 520 x H 195 x D 525 mm
- Weight: approx. 29.5 kg

Stationary single position test system PTS 400.3-1

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

- Test system PTS 400.3-1 consists of the 3 phase reference standard PRS 400.3, the 3 phase voltage and current source PPS 400.3, the control module PCS 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 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- or ANSI standard, which allow fast suspension and connection of meters

Stationary single position test system PTS 400.3-2

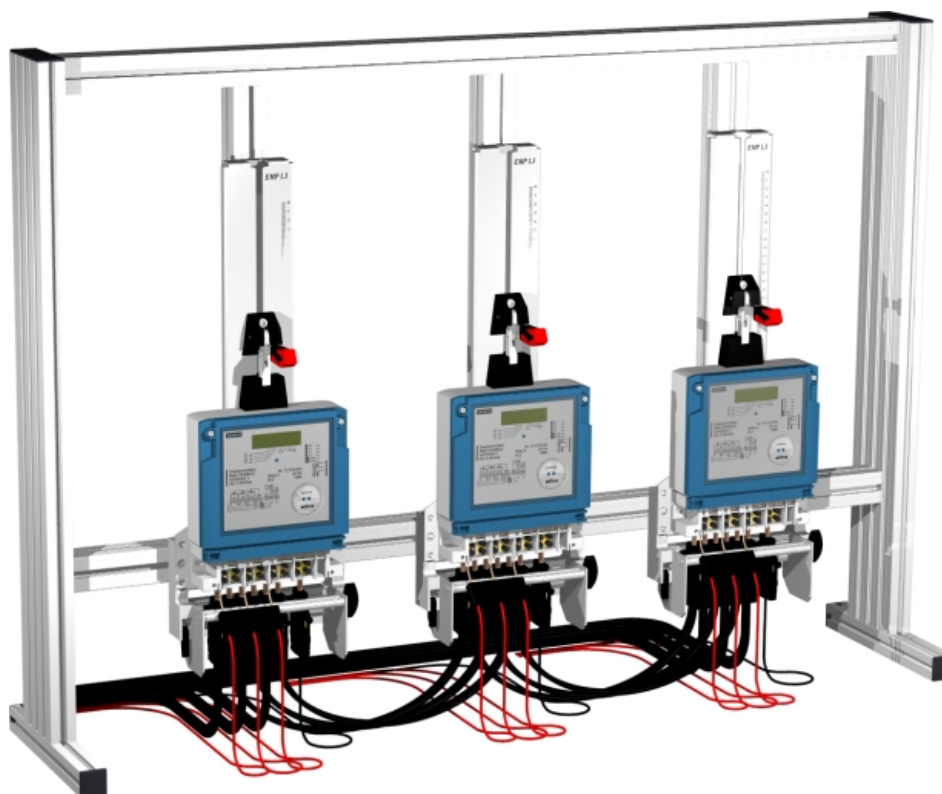
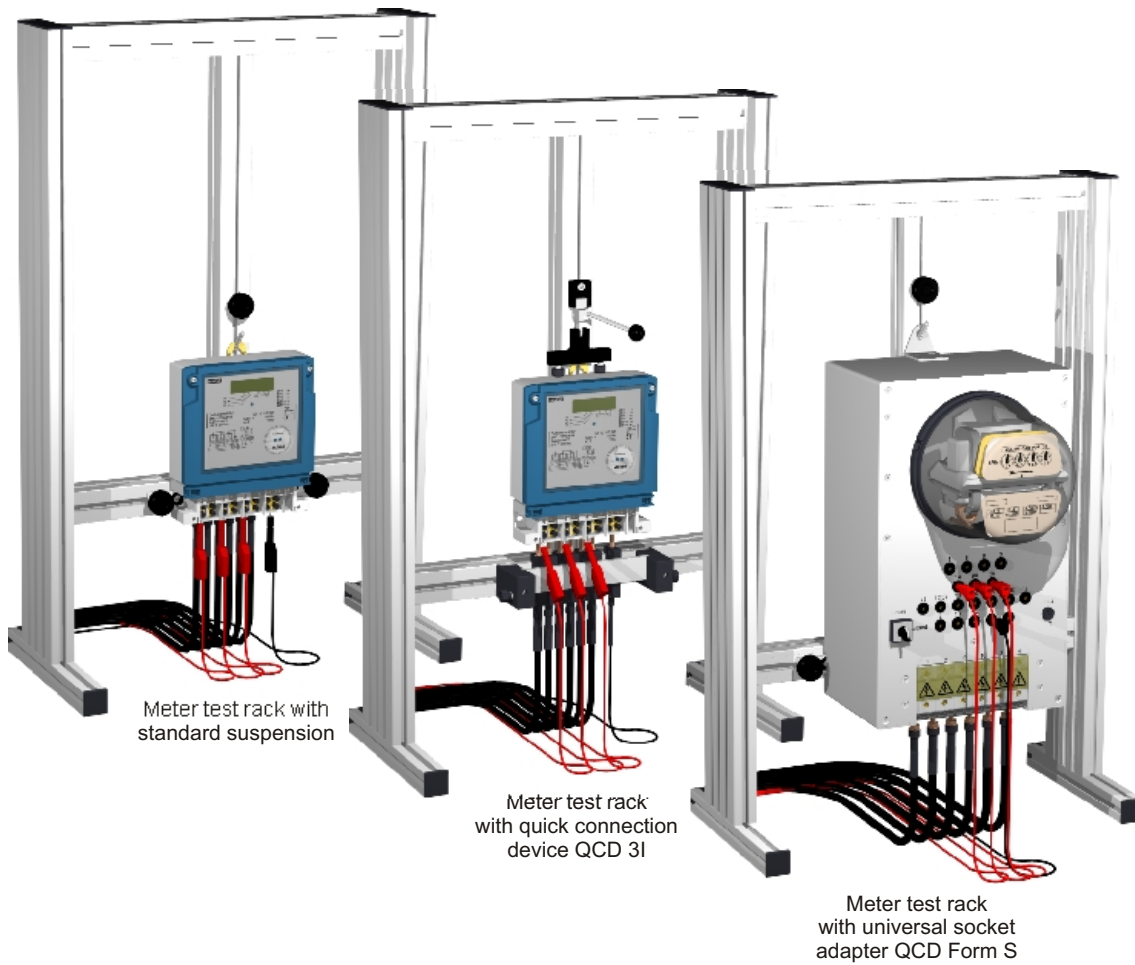
The static system type PTS 400.3-2 allows the testing of a single, complex, multifunction meter fully automatically and has the following characteristics:

- Test system PTS 400.3-2 consists of the 3 phase reference standard PRS 400.3, the 3 phase voltage and current source PPS 400.3, the control module PCS 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



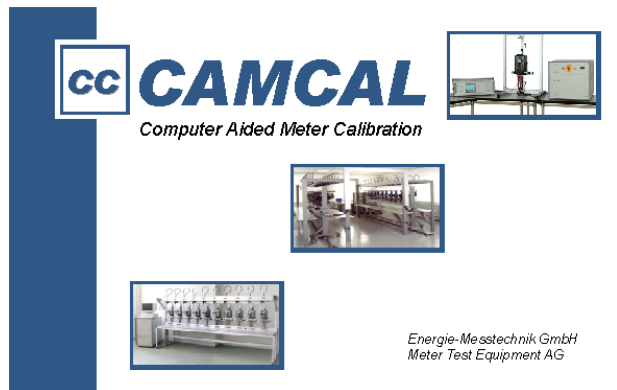
- Modular evaluation system SMM 400 for meter error display, inputs for the testing of output contacts or pulses plus a serial interface for meter communications and programming
- Software package CAMCAL® for Windows provides a PC controlled fully automatic measuring test system
- Optional quick connection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

Types of meter test racks



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

CAMCAL® for WINDOWS is a comprehensive software package designed to fulfil the requirements of the modern meter testing environment but also provides the flexibility to easily incorporate future meter testing requirements.



CAMCAL® for WINDOWS software allows the control of both static and portable meter test equipment, including the recording and evaluation of meter and measurement data.

CAMCAL® for WINDOWS software can be used throughout the meter test environment.

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

The user interface of the basic version shows all essential information required, therefore making the system easily understandable to operators with limited technical knowledge.

Advantages of CAMCAL® for Windows

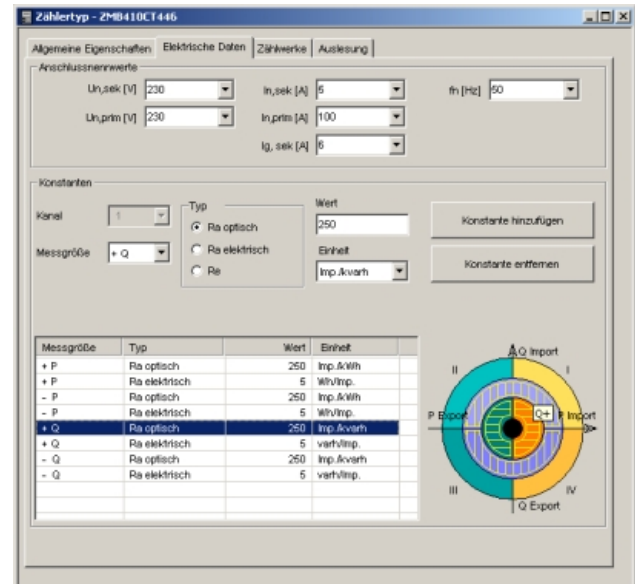
- User-friendly operation
- Database for meters and test sequences
- Fully-automatic test sequences for meter testing
- Transparent evaluation and presentation of results and statistics
- Suitable for use with various hardware combinations
- Modular system allows the integration of customer specific applications
- Operator interface available in several languages

Meter type description

The meter type description contains the electrical and functional definitions of meters under test (connection values, constants, registers, ...).

For the tariff device communication, a communication module is assigned to the meter types.

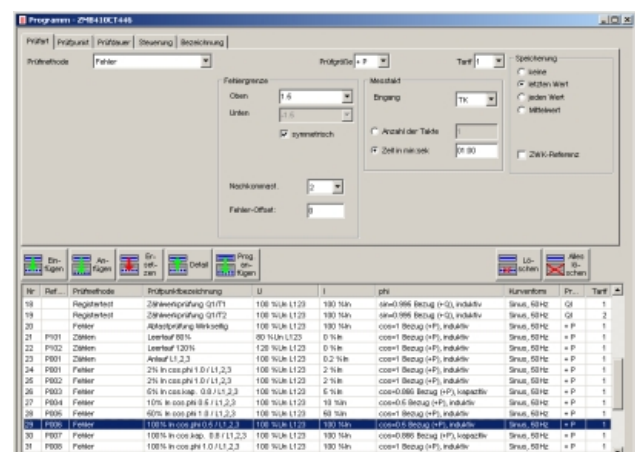
This defines the data to be selected or programmed plus the dispatching commands, adaptable by the customer, makes the fully automatic examination of high-functional meters and tariff devices possible.



The basic version supports the communication protocol in accordance with that described in the IEC 62056-21 Mode C standard. As an additional option the communication protocol is prepared according to dlms / COSEM.

Test sequence

A test sequence describes the order and content of the various test steps in a sequence. For each test step the desired test quantities (current, voltage, phase angle, frequency, ...) are specified.

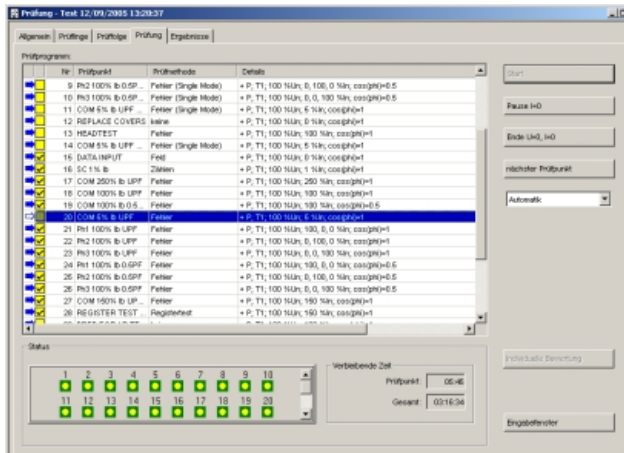


In addition to the respective test method (e.g. error measurement, register tests, ...) each checkpoint can be linked with control commands. Control commands display for instance instructions to the operator, switching of tariff relays or dispatching of commands e.g. to adjust time, ...

Software package CAMCAL® for Windows

Meter testing

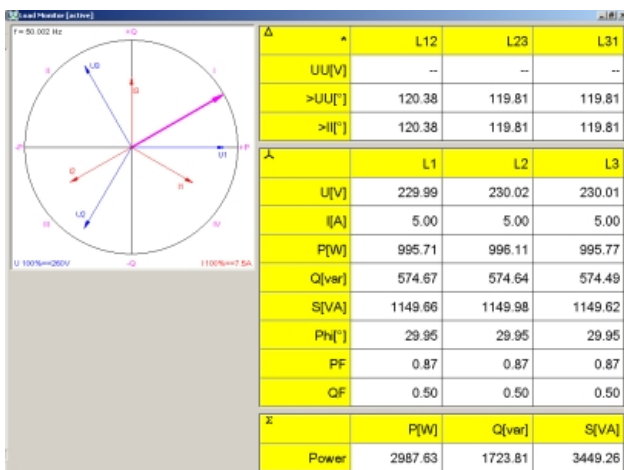
The user allocates to each active measurement position a meter type and selects a test sequence. Subsequently the user will comfortably be guided through the test. The actual status of the test and active test point is clearly indicated at all times.



It is possible to display simultaneously the actual test values and/or results in their own windows using large, easily visible fonts.

Results

After executing an automatic test sequence all saved results are available for further data processing, such as creating an individual test report or export to Excel tables. The results can also be viewed and evaluated directly using several sort criteria in the database.



The CAMCAL Report Generator, enables the user to create and define their own protocol masks (calibration certificates, pass/fail reports, statistical reports, customer reports etc).

Furthermore the CAMCAL Report Generator has the flexibility to add to reports logos, diagrams and fields (e.g. for signatures) etc.

Additional standard functions of the CAMCAL® for Windows Software

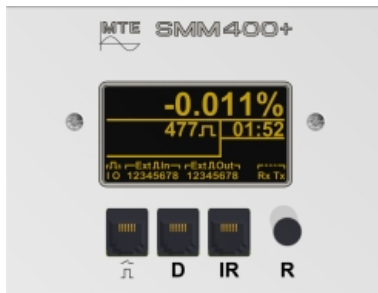
Testing of modern meters requires an adaptable and flexible software package. Because of its modular design, CAMCAL® for Windows covers this requirement.

CAMCAL® for Windows Software meets the following requirements:

- Modular extensions of semi-automatic and fully automatic systems are possible without extensive software adaptations
- Demonstration programmes allow training to be given before delivery of the test system
- Standardized meter type and test sequence definitions considerably reduce the need for extensive training and familiarisation
- Data export modules support data transfer to other systems
- The operator interface is available in many different languages
- Password protection is provided for different user levels
- Import and export function enable the easy transfer of meter types, test sequences, report protocol masks etc. between test systems or across sites or between manufacturers and customers for instance

Optional Software Modules

- Tariff device communication / dlms
- Generation of harmonics
- Tariff device testing with pulse transmitter
- Error compensation
- Generation of ripple control signals
- Generation of special test signals and wave forms according to IEC 62052-11
IEC 62053-11/-21/-22



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 scanning the marks of mechanical rotating disc meters or the detection of light emitting diodes (LED's) of electronic meters plus simulated pulses on LCD displays (SH 11). Mode of operation is selectable via a switch.



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 Terminals

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

The following MTE brochures are available:

| | |
|---------------------------------|---|
| Stationary Meter Test Systems: | Fixed Rack Systems / Gantry-Trolley System / Customized System |
| Comparator: | K2006 |
| Portable Reference Standards: | PRS 400.3 / CALPORT 300 |
| Portable Working Standards: | PWS 3.3 / PWS 2.3 PLUS |
| Portable Standard Meters: | CheckMeter 2.3 / CheckMeter 2.1 |
| Portable Power Sources: | PPS 400.3 / PPS 3.3 C / CheckSource 2.3 |
| Portable Test Systems: | PTS 2.3 C / PTS 3.1 C / PTS 3.3 C / PTS 400.3 / CheckSystem 2.1 / CheckSystem 2.3 |
| Instrument Transformer Tester: | PTT 2.1 |
| Transformer Monitoring Systems: | HYDROCAL 1001 / HYDROCAL 1003 / HYDROCAL 1005 / HYDROCAL 1008 |
| Software: | CAMCAL for Windows / CALSOFT I / II |

MTE Meter Test Equipment

MTE Meter Test Equipment AG

Dammstrasse 16
P.O. box 4544
CH-6304 Zug, Switzerland
Phone: +41 (41) 724 24 48
Fax: +41 (41) 724 24 25
Internet: www.mte.ch
e-mail: info@mte.ch

EMH Energie-Messtechnik GmbH

Vor dem Hassel 2
D-21438 Brackel, Germany
Phone: +49 (4185) 58 57 0
Fax: +49 (4185) 58 57 68
Internet: www.emh.de
e-mail: info@emh.de

MTE - India Office

115, Navjiwan Vihar
New Delhi - 110017, India
Phone: +91 (11) 2669 10 17
Mobile: +91 (98) 911 12000
Fax: +91 (11) 2669 24 91
e-mail: vinarora@vsnl.com

EMH Energie-Messtechnik (Beijing) Co. Ltd.

Section 305, Building 2, Ke-Ji-Yuan
Nr.1 Shangdi-Si-Jie, Shangdi-Information-Industry-Base
Haidian District
Beijing 100 085
P.R. China
Phone: +86 (10) 629 81 227
Mobile: +86 (139) 0 103 6875
Fax: +86 (10) 629 88 689
e-mail: guo@emh.com.cn

MTE Meter Test Equipment (UK) Ltd

4 Oval View
Woodley Stockport
Cheshire SK6 1JW, England
Phone: +44 (161) 406 9604
Fax: +44 (161) 406 9605
Internet: www.mte.ch
e-mail: info@mte.uk.net

OOO MTE

Pochtovaja Bolshaja str., 26, bld. 1, office 501
105082 Moscow, Russian Federation
Phone: +7 (495) 640 07 25
Internet: www.meter-test.ru
e-mail: info@meter-test.ru

MTE Meter Test Equipment AG



Dammstrasse 16 • P.O. box 4544 • 6304 Zug • Switzerland
Phone +41 (41) 724 24 48 • Fax +41 (41) 724 24 25 • Internet www.mte.ch

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