Testing, measuring, analyzing, evaluating – this is what the MESSKO® brand stands for. The MESSKO® product brand is defined by the constant pursuit of precision and perfection. As a result, it has developed since 1911 from a small, local brand for cooler thermometers, air pressure gauges and remote thermometers into a product brand setting global standards for all aspects of monitoring, protection, open and closed-loop control and automation technology that relate to transformers. The current range covers thermometers, oil level indicators, pressure relief devices, dehydrating breathers, flow indicators, sensor systems for oil analysis, and a complete range of services focusing on up-to-date laboratory analysis and diagnosis. MESSKO® products, systems and services contribute towards a reliable power supply, making utility companies and industrial enterprises fit for the future and ensuring that their systems run smoothly and reliably even under the most demanding conditions.

A few highlights from our company history:

1911
Dr. Albert Hauser founds the "Feinmechanische Anstalt für Präzisionswaagen und Gewichte" (Precision-engineering institute for precision scales and weights).

1932
The company develops the first remote thermometer that applies the Bourdon measuring principle and in so doing sets the definitive standard that still lays the foundation for today’s celebrated line of thermometers.

1935
The MESSKO® brand is created from combining the German terms "Messsen" (measuring) and "Kontrollieren" (monitoring).

1960
Thermometers for power transformers capture the attention of the market.

1999
MR acquires the company and transforms Messko into one of the most renowned suppliers of measurement equipment for energy utility companies and industry worldwide.

2011
100-year anniversary

2013
The new MESSKO® PrimeLab®—Diagnostic Services program offers comprehensive, professional condition analysis.

What does MESSKO products stand for?

Secure
We make no compromises when it comes to quality, which starts with selecting premium materials and continues through to thorough quality and functional testing carried out on state-of-the-art production test rigs developed in house. Every product is inspected in detail. The results speak for themselves as our products are durable, highly precise, and versatile. With testcertificate.

Reliable
Total reliability doesn’t stop at the products we offer. Our production lines, testing procedure, and research program are also characterized by painstakingly high levels of detail and accuracy. Ongoing product advancement and development activities testify to our commitment to listening to what customers want and delivering the innovative solutions they need. Nothing less is expected of us, since we are the centre of excellence regarding sensor technology within the MR.

Networked
Focus on the customer – We have established an efficient sales and service network to ensure that we always stay close to our customers. We pride ourselves in offering thorough analyses, individual consulting, and first-class support. This, in turn, allows us to devise exactly the solution a customer needs.
MESSKO® PORTFOLIO

Product and service cycle

SYSTEMS
- Monitoring and analysis systems
- Testing, measuring, and service systems

SERVICE
- Services

These products are also available in an offshore configuration.

These products are ideal for retrofit solutions.
MESSKO® TRASY2

Modular temperature measuring system with a wide variety of matching accessories

The MESSKO® TRASY2 temperature measuring system is specially designed for measuring oil and winding temperatures (thermal image) in medium and large-sized distribution transformers, power transformers, reactors, and similar applications. The indicator thermometer comprises a temperature sensor that connects to a measurement unit (Bourdon spring) via a capillary tube.

Advantages

- Bourdon tube measuring system with no additional mechanical parts
- Extremely durable and reliable
- No readjustment or recalibration ever needed
- Reliable operation, even when subjected to vibrations and extreme outdoor conditions
- Quick and easy configuration of gradients via DIP switches in the ZT-F2.1 (thermal image of winding temperature)
- Automatic compensation for ambient temperature
- Laminated safety glass with built-in UV filter
- Installation in thermometer pockets as per EN 50216-4 (previously DIN 42554) possible

Variants and options

- Oil temperature measurement: –20 to +140 °C
- Winding temperature measurement (thermal image): 0 to +160 °C
- 2, 4, 5, or 6 micro-switches
- Two redundant measurement points in conjunction with combi well or ZT-F2.1 winding temperature transmitter
- Offshore configuration
- Protective tube made from PVC or V4A stainless steel

Sample configurations

TRASY2 MT-ST160F
Indicator thermometer for measuring oil temperature, with direct display

Matching accessories

- MOUNTING WELL
  For measuring oil temperature
- COMBI WELL
  For measuring oil temperature
- ZT-F2.1 TEMPERATURE TRANSMITTER
  For measuring winding temperature
- Pt-MU MEASURING TRANSDUCER
- EI100/160 ELECTRONIC INDICATOR
- D1272AT DIGITAL INDICATOR
  For digital remote indication
- PQ96/PQ144 MOVING COIL METER
  For analog remote indication
- PSLC242 POWER SUPPLY
- MULTI-BALLAST TRANSFORMER

Additional information
www.reinhausen.com/messko-trasy2
The MESSKO® COMPACT line of thermometers is specially designed for measuring oil and winding temperatures (thermal image) in medium and large-sized distribution transformers, power transformers, reactors, and similar applications. The temperature sensor of the indicator thermometer connects to the measurement unit (Bourdon spring) via a capillary tube.

**Advantages**

- Bourdon tube measuring system with no additional mechanical parts
- Extremely durable and reliable
- No readjustment or recalibration ever needed
- Closed system with pressure cell to protect against external influences such as dust and humidity
- Reliable operation, even when subjected to vibrations and extreme outdoor conditions
- Temperature sensor compatible with all common thermometer pockets and wells
- Quick and easy configuration of gradients via potentiometer (thermal image of winding temperature)
- Laminated safety glass with built-in UV filter

**Variants and options**

- Oil temperature measurement: –20 to +140 °C or 0 to +160 °C
- Winding temperature measurement: 0 to +160 °C or 0 to +180 °C
- 2, 4, 5, or 6 micro-switches
- With temperature transmitter (analog output 4–20 mA) for remote transmission of measured values
- With IEC- or ANSI-compliant design
- Offshore configuration
- Protective tube made from PVC or V4A stainless steel

**Sample configurations**

- **COMPACT MT-ST160WR** for measuring winding temperatures, with direct display and stainless steel protective tube
- **COMPACT MT-ST160RM** for measuring oil temperature, with direct display and with IEC- or ANSI-compliant design
- **COMPACT MT-ST160SK/TT** for measuring oil temperature, with temperature transmitter (analog output)
MESSKO® BeTech
Thermometer with bellow type technology

MESSKO® BeTech thermometers are designed for measuring oil and winding temperatures (thermal image) in power transformers.

The thermometers comprise a temperature sensor that connects to the expansion bellows via a capillary tube for displaying measurements and a separate expansion bellows that compensates for ambient temperature.

**Advantages**
- Expansion bellows technology
- Extremely durable and reliable
- No readjustment or recalibration ever needed
- Multiple gradients
- Contacts individually adjustable
- Hysteresis selectable
- Compensation for ambient temperature
- Laminated safety glass with built-in UV filter
- Multiple gradients
- Contacts individually adjustable

**Variants and options**
- Measuring range: 0 to +150 °C, –20 to +130 °C, 0 to +160 °C, or –40 to +160 °C
- Measuring accuracy: ±3 °C (+30 to +150 °C), ±2 °C, or ±1.5 °C (optional)
- 2, 3, 4, or 5 micro-switches
- Laminated safety glass with built-in UV filter
- Degree of protection as per EN 60529: IP 55 or IP 65 (optional)
- Analog output: 4–20 mA, 0–5 V DC, Pt100, or 4–20 mA and 0–5 V DC
- Magnetic blow out (MBO)
- Micro-switches: Single-pole or double-pole changeover switches, magnetic blow out (MBO), or single-pole changeover switches with gold-plated contacts
- Threaded sensor connection: G 3/4", G 1", 7/8" - 14 UNF
- Offshore configuration

**Sample configurations**

**Matching accessories**
- Pt-MU MEASURING TRANSDUCER
- D1272AT DIGITAL INDICATOR
- For digital remote indication
- SNT36 POWER SUPPLY
- PSLC242 POWER SUPPLY
- MULTI-BALLAST TRANSFORMER

**Combinable products**
- MESSKO® MZT1650S Calibration bath Page 18
- MESSKO® MCTA-5 CT current simulator Page 18

Additional information
www.reinhausen.com/messko-betech
MESSKO® MTO
Oil level indicator for transformers

MESSKO® MTO oil level indicators indicate the oil level in the transformer oil conservator.

Separating the sensor from the display unit prevents any possibility of the oil escaping from the oil conservator.

The oil level is permanently monitored and operation errors (improper filling of the transformer in particular) are avoided.

Advantages

- Extremely durable and reliable
- No readjustment or recalibration ever needed
- 160 mm version suitable for distribution and power transformers
- Laminated safety glass with built-in UV filter
- With additional EI100/160 indicator for good legibility at eye level, even in applications involving larger transformers

Variants and options

- Radial or axial design with different floats to adapt to different tank geometries
- Switchless or with up to 3 fixed switches or 2 variable switches that can be freely adjusted over the scale range
- Individual scales possible
- Horizontal or angled installation position (inclination angles of 15, 30, and 45 degrees)
- IEC- or ANSI-compliant design
- Integrated signal converter for remote transmission of measured values (TT model)
- Analog output 0–1 mA, 0–20 mA, or 4–20 mA
- RS-485 interface
- Offshore configuration

Sample configurations

MTO-STF/TT
with integrated signal converter for remote transmission of measured values

MTO-STF-RM
with IEC- or ANSI-compliant design

Matching accessories

- EI100
  ELECTRONIC INDICATOR with bracket
- EI100
  ELECTRONIC INDICATOR with clamping bracket
- EI100/160
  ELECTRONIC INDICATOR
- SNT36 POWER SUPPLY

Additional information
www.reinhausen.com/messko-mto
MESSKO® MMK
Oil level indicator with magnetic flaps for transformers

The oil level indicator MESSKO® MMK with magnetic flaps allows the fill level to be displayed without having to position a float in the reservoir and uses existing connections.

This makes the device a suitable replacement for an oil level indicator with a glass tube.

Matching accessories

Advantages

- No external power supply required
- Indicator rail made from impact-resistant and torsionally rigid Makrolon, weatherproof and clear as glass for many years
- Easy replacement of indicator rail (oil conservator does not need to be drained)
- Limit switch and equipment for remote transmission of measured values can be retrofitted
- Fill level is easy to read, including when viewed from the side or below

Variants and options

- Switchless or with limit value switch
- Integrated signal converter for remote transmission of measured values
- Analog output 4–20 mA
- RS-485 interface

Complementary products

MESSKO® MTO
Oil level indicator
Page 8

Additional information
www.reinhausen.com/messko-mmk
MESSKO® MPreC®
Pressure relief device for protecting transformers and tap changers

MESSKO® MPreC® pressure relief devices protect medium and large-sized distribution transformers, power transformers, and tap changers during periods of increased oil system pressure.

When the permissible tripping pressure of the valve is exceeded, the valve opens – all within milliseconds.

As soon as the value drops below this pressure, the valve closes again and forms an impermeable seal.

Advantages
- Opens in 2 ms; closes within 70 ms
- Valve stroke of approx. 4 mm up to forced activation of switching contacts
- Aluminum signal pin with two notches to prevent fallback of a pin that has not fully extended
- Protection for micro-switches and springs via protective cover made from marine-grade aluminum
- CDP-coated springs as per DIN 2095 (cathodic corrosion protection) and additional, internal seals
- Reliable foot step protection
- Computer-controlled (trip) tests, including plant certificate for every valve
- Helium leak detection tests
- Clear signal indication, no false tripping or wear-related faults
- Easy to exchange

Variants and options
- Triggering pressure of 4–30 psi (0.28–2.07 bar)
- With cable connection inclusive cable gland, terminal box, ANSI or Westinghouse connector
- Up to two micro-switches
- Seals made from Perbunan or Viton
- Cover for defined oil drainage
- Semaphore
- Offshore configuration

Sample configurations

Matching accessories

- FLANGE WITH INTERNAL THREAD for MESSKO® MPreC® LMPRD OD
- WELDING FLANGE for MESSKO® MPreC® LMPRD OD

Combinable products

- MESSKO® MPreC® TEST BENCH

Additional information
www.reinhausen.com/messko-mprec
MESSKO® MTraB®

Maintenance-free dehydrating breather with self-regulating heating element for regenerating the desiccant

The maintenance-free MESSKO® MTraB® dehydrating breather is used in oil-insulated transformers, reactors or tap changers to dry the air which is suctioned in by the oil conservator.

Incoming air is directed toward the desiccant (silica gel) and dried.

The desiccant is regenerated/dehumidified by an installed heating element that is sensor-controlled and self-regulating.

Advantages

- No routine, expensive replacement and no environmental impact as a result of used desiccant
- Use of glass cylinders to optimize the regeneration process and for excellent weather resistance
- Easy retrofitting thanks to a variety of flange solutions
- Sensor-controlled heating apparatus
- All measured values queried via RS–485 interface
- Intelligent data recording
- Self-monitoring of system with output of operational condition
- Full protection against external influences

Variants and options

- Optional α, β, or γ control for transformers in different rated power classes
- Supply voltage of 230 V AC/DC or 120 V AC
- Additional overvoltage protection
- Cable connection M20 x 1.5 or 1/2” (14 NPT)
- Analog output 0–1 mA, 0–20 mA, or 4–20 mA
- DIN flange, RM flange, or flange for 1/2” bolts
- Offshore configuration
- Test button for initiating the device self test and verifying functionality
- Additional filter heating for ambient temperatures permanently below –5 °C over a period of 20 days (HT version)
- Lateral mounting
- Protection of electrical cables from damage such as animal bite

Sample configurations

- MTraB® DB200T for transformers in rated power classes >40 to ≤200 MVA, β control
- MTraB® DB200D-T for transformers in rated power classes >200 MVA, β control and filter heating
- MTraB® DB200 G with γ control for oven and cavern transformers as well as GSU machine transformers

Additional information

www.reinhausen.com/messko-mtrab
The MESSKO® MFloC® flow indicator monitors the flow of coolant through the oil-water-cooling circuit of transformers. It reliably detects and reports a pump failure as soon as it occurs.

**MESSKO® MFloC®**

Flow monitor for the oil-water-cooling circuit of transformers

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**Advantages**

- Specially formed, spoon-shaped paddle
- To increase the reliability in laminar as well as non-laminar (turbulent) flows
- Operational from –50 to +80 °C
- For cooling media from –30 to +120 °C
- Laminated safety glass with built-in UV filter
- Guaranteed leaktight connection to the coolant circuit thanks to separation of the transmitter and display parts
- Suitable for all common pipe diameters and flow directions
- Easy assembly
- Convenient adaptation for different flow directions with swiveling display part
- Easy to exchange

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**Variants and options**

- For mineral-based insulating oil as per IEC 60296, alternative insulating oil or water
- With standard flange (DN100–DN300) or retrofit flange
- Terminal box with terminal strip, ANSI or MIL connector
- Different housing colors and dials
- Offshore configuration

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**Sample configurations**

- **MFloC® MF100-W**
  - For water with flange DN100 and terminal box with terminal strip

- **MFloC® MF100-O**
  - For insulating oil with DN100 flange and terminal box with terminal strip

- **MFloC® MF100-O MR**
  - With IEC- or ANSI-compliant design

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**Complementary products**

**MESSKO® MSafe® Buchholz relay**

Page 16

Additional information

www.reinhausen.com/messko-mfloc
MESSKO® MLog®
Transport monitoring: Measuring, saving, and transmitting transport conditions worldwide

MESSKO® MLog® reliably monitors the transport and condition of goods of all types.

**Advantages**
- Saves and displays acceleration/shock forces (X, Y, and Z-axes), ambient temperature, and humidity
- Temperature measurement from –40 to +125 °C
- Humidity measurement from 0 to 100 % RH
- Storage capacity of up to one year and efficient power supply with commercially available batteries
- No hazardous goods labeling required
- Resistant to UV rays, sea water, and oil
- Resistant to water spray and dust as per IP 65, no additional protective housing required
- Intuitive user interface and PC software
- USB port
- Manipulation-proof data format
- Calibration and update service

**Variants and options**
- LCD display, black/white
- Global positioning via GPS
- GSM module to send status and alarm messages via SMS (worldwide)
- Bluetooth interface for wireless data transmission
- 2 digital inputs: <0.8 V, >2.4 V
- 2, 4, or 6 universal inputs (0–5 V DC)

**Sample configurations**

* MLog® IM50 Basic Control with GPS positioning and temperature, humidity, and acceleration measurement
* MLog® IM100 Premium Control with display, 2 digital and up to 6 universal inputs, Bluetooth interface, and GSM module

**Matching accessories**
- MLOG ANALYSER SOFTWARE
- MOUNTING PLATE
- ASSEMBLY KIT
- LR14 BATTERIES
- USB CABLE

Additional information
www.reinhausen.com/messko-mlog
MESSKO® MTeC® EPT303

Forward-looking temperature management system for transformers

The modularly expandable, digital control unit MESSKO® MTeC® EPT303 impresses with highly intelligent solutions in the areas of safety, functionality and user-friendliness: from the modern design of the user interface and the optional MESSKO® MControl® with touch display to compliance with all conventional communication standards.

Advantages

- Simple parameterization, intuitive user guidance and individual configuration of the user interface thanks to a modern design and operating concept
- User interface in 8 languages guarantees safe use worldwide
- Minimum risk of setting incorrect parameters due to a 3-level role concept and the simulation mode
- Freely configurable alarm levels, triggers and warning instructions
- No software installation for customers thanks to the unit’s built-in operating system and the ability to call up the application in any conventional web browser
- Precise determination of the winding temperature thanks to measurement of the top oil temperature (carried out up to twice) and the load measurement in up to 3 phases
- Measurement of the ambient temperature and oil level
- 2 additional, freely selectable temperature differences
- Activation of up to 7 freely configurable cooling stages
- Optional load-dependent or periodic activation, or intermittent cooling group change adjustable
- All conventional communications standards come standard: DNP3, IEC 60870, IEC 61850, Modbus
- Calculation and display of estimated remaining service life

Variants and options

- Visualization and operation on one user interface thanks to optional MESSKO® MControl® 7-inch color touch display
- Maximum measuring accuracy as the MSpot® sensors and combinable FO module make it possible to take measurements directly in the windings using fiber optics (see MESSKO® MTeC® EPT303 FO on page 15)
- Flexibility in terms placement for integration into existing control cabinets thanks to modular design
- Available as a standalone product or integrated into a customized control cabinet solution
- Option for upgrading and retrofitting

Matching accessories

Compatible products

Additional information

www.reinhausen.com/messko-mtec
**MESSKO® MTeC® EPT303 FO**

Pinpoint temperature management with fiber optic technology

The MESSKO® MTeC® EPT303 FO combines the advantages of the base module from the MTeC® EPT303 series with state-of-the-art fiber optic temperature measurement technology. As the measurements can be taken directly in the windings, temperature management is always based on highly precise hot spot temperature values.

### Advantages
- Fiber optic measurement using fiber Bragg grating technology
- Multiple measuring head with 3 measurement points per MSpot® sensor
- Sensors do not suffer from the effects of aging
- Up to 32 MSpot® sensors can be used
- Stainless steel flange suitable for use offshore
- Extremely stable connecting lead made up of 8 fiber optic cables in one armor

### Variants and options
- Variants and options available as for the MTeC® EPT303 (see page 14)
- Please note: Upgrading and retrofitting not possible

**MESSKO® MTeC® EPT202**

Robust solution for intelligent cooling control

The MESSKO® MTeC® EPT202 is a cooling control system that is both rugged and cost-effective. It includes all necessary functions for independently protecting and extending the service life of the transformer for years to come. Both the top oil temperature and load current are measured. The hot spot temperature and the estimated remaining service life of the transformer are calculated using these two values.

### Advantages
- Measurement/display of oil temperature
- Winding and ambient temperature display
- Remaining service life calculation in accordance with the IEC and ANSI standard
- Internal data storage for up to 32,000 data records
- Cooling-type dependent and load-dependent cooling stage activation
- Parameterization of individual cooling stages possible
- Load cycle mode for uniform fan load
- Information on the status, alarm and trip visible on the device LEDs
- Analog outputs for remote transmission of measurement values

### Variants and options
- DIN rail mounting, control panel mounting or installation in 19-inch plug-in housing
- Supply voltage of 100 to 240 V AC with 50 to 400 Hz or 100 to 353 V DC
- Input range of temperature sensor and analog output for oil temperature selectable from -20 to +160 °C
- Analog output for winding temperature 0 to +180 °C
- Option for upgrading and retrofitting
The MESSKO® MSafe® Buchholz relay is used as a central protective device for fluid-filled transformers and reactors with an oil conservator.

It triggers in the case of gas accumulation, abrupt increase of the flow rate, as well as the loss of oil. As a result potential damages to the transformer are avoided early.

**Advantages**
- High quality materials provide long service life
- Helium leak test for oil and gas tightness
- Avoids false tripping via dry-reed magnetic switch
- Switches can be replaced without having to access the oil circuit
- Additional functional safety provided by solid floats
- Two main switching contacts (NO contact, NC contact, or changeover contact)
- Test line connection/remote verification

**Variants and options**
- DN25, DN50, or DN80 connecting flange
- Two or four switching contacts (NO contact, NC contact, or changeover contact)
- Response speed of flap valve 0.65 m/s to 3 m/s
- Mineral-based insulating oil as per IEC 60296 or alternative insulating oil
- M25 or NPT 1/2” threaded cable glands
- Offshore configuration
- Inspection glass cover
- Manual reset for function test
- Remote verification of operational readiness via a compressed-air line (optional)

**Sample configurations**

**Matching accessories**

- GAS SAMPLER
- GAS QUICK TEST
  For verifying H₂ and CO levels

Additional information
www.reinhausen.com/messko-msafe
With hydrogen, carbon monoxide, and moisture in the insulating oil of power transformers, the MESSKO® MSense® product family monitors the primary early indicators of possible damage in the transformer with thermal or electrical causes.

Continual functional safety and reliable measurements are ensured by components which are just as robust as they are technically refined and by the new 2-stage measurement procedure directly in the oil flow.

False alarms, downtimes, and results distorted by environmental influences are therefore a thing of the past.

Advantages

- Long-term functional safety thanks to capillary gas extraction unit, stainless steel pipe to protect the measuring technology, and robust housing
- High-precision measurements thanks to semiconductor sensors, capacitive moisture sensor, inert measurement chamber, 2-stage measurement procedure directly in the oil flow
- Interfaces to all common SCADA systems for continuous remote monitoring
- The internal memory makes available for long-term analyses all measurements from up to 4 years in the past
- Needs-based parameterization using the MESSKO® MSet® software provided
- Manual sampling directly at the point of measurement using integrated Luer lock connection
- Two free DGA and moisture analyses in the MESSKO lab included
- Installation options for all common equipment scenarios: Initial fitting and retrofitting
- Rapid on-site assistance from global, quality-certified service network

Variants and options

- Monitoring of the most important early indicators:
  - x1.5 - Hydrogen and moisture
  - x2.5 - Hydrogen, Carbon monoxide and moisture
- Integrated display on housing
- Installation with flange screw connection for direct inlet or using oil loop for retrofitting (optional)
- Offshore version
- Optional: MESSKO® MSense® protocol converter - converting data from Modbus RTU to the following protocols: DNP 3.0, Modbus TCP, and IEC 61850-8-1 MMS
- Housing color RAL 7033 or RAL 7038

Sample configurations
MESSKO® MCTA-5
CT current simulator for verifying and setting CT current-operated temperature measurements at transformers

The MESSKO® MCTA-5 CT current simulator is used in testing facilities for commissioning or maintenance work. Using this device CT currents are simulated at the switched off transformer to verify and adjust measuring instruments via the created thermal image.


Advantages
- Mobile application
- Constant alternating current (adjustable from 0 to 5 A) up to 40 VA load
- Housing with built-in handle

- Alternating current adjustable via a control button, display window for displaying information


MESSKO® MZT1650S
Calibration bath for checking temperature sensors

The MESSKO® MZT1650S is a highly precise calibration bath for checking and verifying temperature sensors at the transformer or in the laboratory.


Advantages
- Compact, mobile unit for carrying out on-site checks
- Lightweight and easy to transport in the service and transport case
- Programmable temperature profile

- Easy to operate thanks to an intuitive user interface
- Sample holder in integrated liquid bath
MESSKO® MPreC® TEST BENCH

Mobile test bench for pressure relief devices

The MESSKO® MPreC® test bench tests and logs the accuracy and functionality of new and used pressure relief devices. Commissioning, maintaining, and servicing these devices become much easier as a result.

Advantages

- For use in a laboratory or testing facility, or for commissioning or maintenance work
- V4A stainless steel and IP 65 control unit for applications involving extreme ambient conditions
- Measuring range 4 psi to 30 psi
- Ambient conditions -10 to +50 °C
- Straightforward commissioning and easy and safe operation
- Pressure ranges and number of test cycles individually selectable
- Intuitive MESSKO® MPreC® test bench software in English and Chinese for reliable evaluation, processing, and administration of data
- Graphic display, saving and printing of test results

Combinable products

MESSKO® MPreC® Pressure relief device

Additional information
www.reinhausen.com/messko
TEMPERATURE MEASUREMENT

**ZT-F2.1 TEMPERATURE TRANSMITTER**
- Core component of the MESSKO® TRASY2 temperature measuring system
- Variety of functions, depending on the connection

**MOUNTING WELL**
- Mounting well for placing the oil thermometer in the thermometer pocket as per DIN 42 554
- With leadthrough to immersion tube for the temperature sensor of the indicator thermometer

**COMBI WELL**
- Mounting well for placing the oil thermometer in the thermometer pocket as per DIN 42 554
- With leadthrough to immersion tube for the temperature sensor of the indicator thermometer
- Integrated Pt100 laboratory resistor as per DIN 43 760 facilitates remote transmission of measured values

**Pt100 TEMPERATURE SENSOR**
- Pt100 temperature sensor

REMOTE TRANSMISSION AND PROCESSING OF MEASURED VALUES

**TT30 SIGNAL CONVERTER**
- For converting a variety of sensor signals into process signals
- Adaptable, on the input side, to different mechanical and electrical sensors
- Maximum safety and functionality at the transformer when combined with mechanical base units
- Connects to control room systems for process monitoring while safety-relevant mechanical switching functions are maintained
- Current bus technology

**Pt-MU MEASURING TRANSDUCER**
- Converts the signal of a Pt100 temperature sensor into a standardized signal proportional to the temperature
- Connects to the Pt100 connectors in the ZT-F2.1 transformer temperature transmitter or to the combi well, for example
- Conditions the output signals of these devices for further processing via a computer or for electric/electronic display
- For transferring measured values across large distances or disturbance fields

Suitable for
- MESSKO® TRASY2 Temperature measuring system Page 4
- MESSKO® COMPACT Temperature measuring system Page 5
- MESSKO® BeTech Thermometer Page 6
- PQ96/PQ144 Moving coil meter Page 22
MEASURED VALUE DISPLAYS

**EI100/160 ELECTRONIC INDICATOR**
- Analog pointer instrument with digital LCD display
- For installation in a control cabinet or directly on the transformer
- Displays the temperature or a percentage output of any sensor
- Input signal 4–20 mA, supply voltage 24 V DC
- Can be used in conjunction with the TT30 signal converter

**EI110 ELECTRONIC INDICATOR WITH BRACKET**
- Analog pointer instrument with digital LCD display
- For installation in a control cabinet using a bracket
- Displays the temperature or a percentage output of any sensor
- Input signal 4–20 mA, supply voltage 24 V DC
- Can be used in conjunction with the TT30 signal converter

**EI110 ELECTRONIC INDICATOR WITH CLAMPING BRACKET**
- Analog pointer instrument with digital LCD display
- For installation in a control cabinet using a clamping bracket
- Displays the temperature or a percentage output of any sensor
- Input signal 4–20 mA, supply voltage 24 V DC
- Can be used in conjunction with the TT30 signal converter

**D1272AT DIGITAL INDICATOR**
- Remote digital indicator of oil or winding temperature
- Connects to the analog output (Pt100 or 4–20 mA) of the combi well or to the ZT-F2.1 temperature transmitter
- Two freely adjustable limit contacts and different output signals (4–20 mA, 0–5 V, 0–10 V) for further signal processing optionally available

**Suitable for**
- MESSKO® TRASY2
  - Temperature measuring system
  - Page 4
- MESSKO® COMPACT
  - Temperature measuring system
  - Page 5
- MESSKO® MTO
  - Oil level indicator
  - Page 8
- MESSKO® MMK
  - Oil level indicator
  - Page 9
- MESSKO® TRASY2
  - Temperature measuring system
  - Page 4
- MESSKO® COMPACT
  - Temperature measuring system
  - Page 5
- MESSKO® BeTech
  - Thermometer
  - Page 6

**Additional information**
www.reinhausen.com/messko
### POWER SUPPLY

**SNT36 POWER SUPPLY**
- Wide-range power supply unit for input voltages of 85 to 270 V AC and 110 to 400 V DC
- Output 24 V DC

**PSLC242 POWER SUPPLY**
- Turn-key, unregulated power supply unit
- For installation on 35 mm DIN rail profile and bolting to an assembly and support surface
- For line voltages of 230 V AC and 115 V AC
- Output with sustained short circuit-proof protection and potential-free as per VDE 0551
- Compatible with tropical environments thanks to resin encapsulation

### Suitable for
- MESSKO® TRASY2
  - Temperature measuring system
  - Page 4
- MESSKO® COMPACT
  - Temperature measuring system
  - Page 5
- MESSKO® BeTech
  - Thermometer
  - Page 6
- MESSKO® MTO
  - Oil level indicator
  - Page 8
- ZT-F2.1 TEMPERATURE TRANSMITTER
  - Page 20
- COMBI WELL
  - Page 20

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**Additional information**
www.reinhausen.com/messko
### PROTECTIVE DEVICES

<table>
<thead>
<tr>
<th>PROTECTIVE GRILLE</th>
<th>Constructed from V4A stainless steel</th>
<th>MESSKO® MTraB® Maintenance-free dehydrating breather Page 11</th>
</tr>
</thead>
<tbody>
<tr>
<td>INSECT GRILLE</td>
<td>Constructed from V4A stainless steel</td>
<td>MESSKO® MTraB® Maintenance-free dehydrating breather Page 11</td>
</tr>
<tr>
<td>For stainless steel filter</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FOOT STEP PROTECTION</td>
<td>Constructed from galvanized steel</td>
<td>MESSKO® TRASY2 Temperature measuring system Page 4 MESSKO® COMPACT Temperature measuring system Page 5</td>
</tr>
</tbody>
</table>

### MATCHING ACCESSORIES

<table>
<thead>
<tr>
<th>MESSKO® MLOG® ANALYSER SOFTWARE</th>
<th>Configure the MESSKO® MLog® transport monitor from a PC Evaluate recorded data Optional 3-level password protection</th>
<th>MESSKO® MLog® Transport monitor Page 13</th>
</tr>
</thead>
<tbody>
<tr>
<td>MOUNTING PLATE</td>
<td>Constructed from V4A stainless steel</td>
<td>MESSKO® MLog® Transport monitor Page 13</td>
</tr>
<tr>
<td>MULTI-BALLAST TX</td>
<td>Conversion of the CT current</td>
<td>MESSKO® TRASY2 Temperature measuring system Page 4 MESSKO® COMPACT Temperature measuring system Page 5 MESSKO® BeTech Thermometer Page 6</td>
</tr>
<tr>
<td>Multi-ballast transformer</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| MControl® | Configure and visualize parameters on site without any service computer Full visualization convenience regardless of the degree of expansion | MESSKO® MTeC EPT303 Digital temperature management system Page 14 |

**Additional information**
www.reinhausen.com/messko
MESSKO® CONTROL CABINET SYSTEMS

Customized control cabinet solutions for special customer requirements

MESSKO develops application and customer-specific control cabinets and control cabinet systems to meet individual requirements and configurations.

To this end, special attention is paid to ensuring that all modules and components are arranged in a maintenance-friendly and ergonomic fashion as soon as initial design work for the control cabinet begins.

Advantages

- Customer-specific solutions – from planning through to production
- Production based on electrical wiring diagrams drafted in house or by the customer
- Maintenance-friendly and logically organized arrangement of modules and components
- Easy to upgrade and expand, and lightweight construction thanks to the modular system
- Ongoing compliance with current standards and guidelines
- High-quality, reliable materials
- Operation possible even under extreme ambient conditions
- Single contact appointed to offer professional assistance throughout the entire project
- Comprehensive functional test prior to delivery

Individual control cabinet solutions – the full-service package from MESSKO®
MESSKO® PrimeLab®

Gas-in-oil analysis for transformers and tap changers

PrimeLab® gas-in-oil analysis from MESSKO is a safe, reliable, and proven method for assessing the internal status of transformers and oil-filled electrical equipment.

PrimeLab® sampling kit

**Advantages**
- Complete sampling kit with sampling guide
- Easy and clean sample taking
- Analysis in modern MESSKO oil laboratory
- Information provided about the status of transformers, tap changers, and other equipment
- Verification of the measuring accuracy of multi-gas sensors in monitoring systems
- Efficient, early error detection
- Malfunctions and downtime are avoided
- Comprehensive test reports and graphical formatting of the data
- Derivation of economically sensible courses of action, maintenance schedules (oil conditioning), and counter-measures (cooling)

Range of tests available for oil sample provided
- Concentration of fault gases dissolved in oil (DGA) as per IEC 60567
  \(\text{H}_2, \text{CO}, \text{CO}_2, \text{O}_2, \text{N}_2, \text{CH}_4, \text{C}_2\text{H}_6, \text{C}_2\text{H}_4, \text{C}_2\text{H}_2, \text{C}_3\text{H}_8, \text{C}_3\text{H}_6\)
- Moisture analysis (water concentration in insulating oil) as per IEC 60814
- Disruptive discharge voltage (min. 30 kV) as per DIN EN 60156
- Dielectric loss \((\tan \delta)\) as per IEC 60247
- Permittivity (dielectric number) as per IEC 60247
- Specific electrical DC resistance as per IEC 60247
- Electrical conductivity
- Total solid matter count as per IEC 60422, appendix C
- Wear metal content (Fe, Cr, Sn, Al, Ni, Cu, Pb, Mo)
- Additive content (Ca, Mg, Zn, P, Ba, B)
- Impurity content (Si, K, Na, Li)
- Viscosity at 40 and 100 °C
- Viscosity index
- Degree of oxidation
- Appearance (visual inspection)
- Color number
- Neutralization number
- Surface tension
- Total particulate count via microscopical counting
- Flashpoint as per DIN EN ISO 2719, DIN 51758
- Pour point as per DIN ISO 3016, ASTM D97
- Furfuroil/furan content as per DIN EN 61198
- Degree of depolymerization (DP) of paper insulation as per DIN EN 61198
- Polychlorinated biphenyl (PCB) content as per DIN EN 12766-2
- Corrosive sulfur content as per ASTM D 127
- Density at 15 °C as per DIN EN ISO 12185

Additional information
www.reinhausen.com/messko-primelab
MESSKO® – WORLDWIDE CONNECTED
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