JUMO

More than sensors + automation

Industrial Furnace Construction

Innovative solutions for your success

Dear Reader,

Glass, ceramic, clay, and steel are the materials we encounter every day. However, only manufacturers are aware of the requirements the furnaces have to meet and the kinds of extreme process conditions they have to withstand during manufacturing and processing.

Here, JUMO is at your side as a reliable partner to help when you have questions and to provide you with quick solutions. This is so regardless of whether the temperature in the furnaces you manufacture has to be controlled, adjusted, monitored, recorded, or visualized.

So how do we do it? By applying years of experience and pro-fessional expertise. JUMO has been a leading manufacturer of measurement and control technology for more than 70 years. This has helped us to become an expert partner for industrial furnace construction.

We place special importance on making regular new developments, on constantly improving existing products, and on continually making production methods more economical. This is the only way that we can achieve the highest level of innovation.

For industrial furnace construction JUMO offers you a range of innovative solutions for different applications.

This brochure provides you with an overview of JUMO products and systems for industrial furnace construction. Of course, we would also be happy to develop individual solutions that are completely customized to your requirements.

For detailed information about our products arranged by type and product group number please visit **http://industry.jumo.info**.

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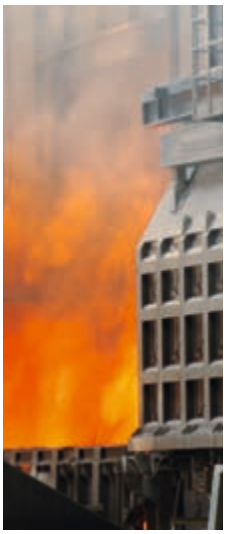
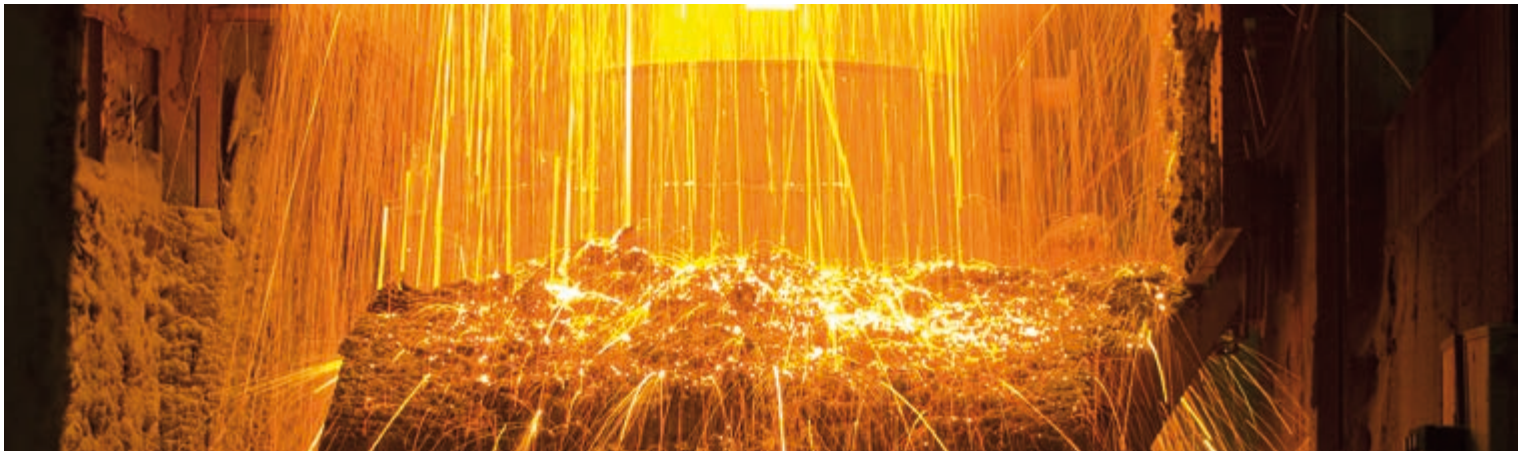




Temperature

Temperature is the most important measurand for industrial furnaces since it affects the materials being manufactured and because it must be regulated and monitored precisely to avoid quality variations in the end product. Products from JUMO support you in this task.

Approvals/standard requirements:

Temperature sensors for industrial furnaces

The high temperatures in industrial furnaces make it necessary to use thermocouples with the following combinations: “type L” and “type J” Fe-CuNi, “type K” NiCr-Ni, “type S” Pt10Rh-Pt, “type B” Pt30Rh-Pt6Rh, and “type N” NiCrSi-NiSi.

Depending on the operating location – batch/continuous/test furnaces or smelters – different materials are used for the protection tube. Metal protection tubes are made of steels which in part have a high percentage of nickel and chromium for reducing or oxidizing atmospheres. Some of the protection tube materials used here include: steel X 18 CrNi 28, material-no. 1.4749 and steel X 15 CrNiSi2520, material-no. 1.4841. These materials are suitable for use in temperatures up to 1150 °C. In addition, various coatings and materials such as HASTELLOY®, Kanthal®, Alloy 20, Inconel 600, and zirconium oxide are used.

Temperature sensors with ceramic protective tubes measure the temperature of gaseous mediums up to 1600 °C. The tubes are made of gas-proof ceramics out of C610, which contains a high percentage of aluminium oxide (for temperatures of up to 1300 °C) and C799, a highly fireproof material (for temperatures of up to 1600 °C). Even temperatures up to 1800 °C are possible.

The different thermocouples meet the AMS2750 and CQI-9 requirements which increases the process reliability of the plant and the quality of the products.

Generally, temperature probes can be supplied with plant or DAkkS certification (German national accreditation body). Our certified laboratory guarantees impartial measured values and a consistently high level of quality.

To ensure the highest safety levels in industrial furnaces, JUMO calculates the entire SIL safety chain for temperature sensors used in connection with JUMO safetyM devices and is able to provide the relevant certification with up to SIL 3/PL e approval.

JUMO mineral-insulated thermocouples
According to DIN EN 43710 and DIN EN 60584
Type 901250

JUMO mineral-insulated thermocouples
With standard tab connector according to DIN 43710 and DIN EN 60584
Type 901240

JUMO thermocouples
For DIN EN 14597
tested devices and plants
Type 901006

JUMO push-in thermocouples
With form A terminal head
Type 901110

JUMO push-in thermocouples
With terminal head form B
Type 901120

Control

High quality solutions for industrial furnaces can only be guaranteed when, apart from sensor technology, the control of the measurands is also correct. JUMO systems are perfect for this task.

Standard requirements:

AMS2750

CQI-9

Control – precise and efficient

Precise temperature curves are absolutely crucial during what are often highly complex processes when firing, annealing, or tempering various different materials.

The use of JUMO PID control algorithms has proven to be highly successful in industrial furnaces, regardless of whether they are used in continuously running or batch furnaces. The type of heating (oil, gas, or electricity) is not an important factor. Schedule programs make it possible to accurately depict the firing curves or process screen. Connections can be established with the JUMO SVS3000 visualization software via fieldbus interfaces, allowing the measurement data to be recorded and analyzed for each batch. Devices such as JUMO mTRON T or JUMO LOGOSCREEN 700 are supplied with an integrated batch function and batch reporting.

JUMO process controllers ensure that the most diverse of processes are controlled in an energy-efficient manner. Particularly those manufacturers who produce plants for the aerospace and automobile industry can find devices according to AMS2750 or CQI-9 at JUMO. Upon request, the devices can be supplied with a certificate according to the above-mentioned directives.

JUMO IMAGO 500

Multichannel process and program controller
Type 703590

JUMO dTRON 304/308/316

Compact controller
with program function
Types 703041/42/43/44

JUMO DICON touch

Two-channel/Four-channel process
and program controller
Type 703571

JUMO mTRON T – central processing unit

Measuring, control, and automation system with
controller module and input/output modules
Type 705000

JUMO mTRON T – multifunction panel 840

Measuring, control, and automation system
Type 705060

Recording

Are you familiar with JUMO's solutions for secure data recording? With the devices in the JUMO LOGOSCREEN family of paperless recorders and the JUMO mTRON T measured value recording system you are ideally equipped to collect, archive, and evaluate measured values subject to verification in an easy, tamper-proof way.

Approvals / standard requirements:

Recording, archiving, and evaluating

Using the devices in the JUMO LOGOSCREEN family of paperless recorders and JUMO mTRON T, process data is collected quickly as well as smoothly and then archived in a tamper-proof manner. Data can be evaluated directly on the device itself or on a computer by using JUMO PCA3000 evaluation software.

JUMO paperless recorders come in different power ratings. Various scalable systems are available for the multitude of recording tasks. The JUMO LOGOSCREEN 601 offers up to 24 channels and the JUMO mTRON T up to 54 channels. The JUMO LOGOSCREEN 700 even permits the use of up to 60 analog and digital channels in total. All recorders provide the following options: online visualization of process data, various limit value monitoring methods, a remote alarm in case of a malfunction, and the simultaneous recording of batch processes.

JUMO paperless recorders offer the highest levels of security in measured data recording, data archiving, and data evaluation. This level of security enables you to optimize process parameters and still guarantee the same level of product quality.

In addition, JUMO mTRON T and JUMO LOGOSCREEN 700 systems meet the measurement technology requirements stated in AMS2750 and CQI-9 with respect to tamper-proof data recording.

JUMO LOGOSCREEN 601
Paperless recorder with touchscreen
Type 706521

JUMO LOGOSCREEN 700
Highly-scalable paperless recorder
Type 706530

JUMO mTRON T – central processing unit
Measuring, control, and automation system with controller module and input/output modules
Type 705000, 705060

Monitoring

Ensuring the safety of people, the machine, and the product plays a key role in furnace construction. Here, the manufacturing process inside the furnace is influenced considerably by the temperature. JUMO offers you a variety of products to monitor the temperature with state of the art technology.

Approvals:

Plant monitoring with the JUMO safetyM series

Using compact and configurable temperature limiters/monitors or safety temperature limiters/monitors you can – early and safely – detect and avert dangers that could cause injury to people, be harmful to the environment, or destroy production plants and products.

The devices are primarily built to monitor thermotechnical processes accurately and switch the systems to an operational safe status in the event of malfunctions. Here, the basis is DIN EN 14597.

To ensure that our devices meet safety requirements all over the world, we have created our safety temperature limiters/monitors to comply with DIN EN 61508 (SIL) and DIN EN ISO 13849-1 (Performance Level).

The JUMO safetyM series offers you clear benefits:

The alarm relay switches the furnace into safe operating mode in the event of a malfunction. The limiting function allows the furnace to be enabled once more for operation when an internal or external unlocking button is actuated.

In addition, furnace process values can be transmitted to a recorder, controller, or superior control system via the analog output.

JUMO safetyM STB/STW

Safety temperature limiter, safety temperature monitor according to DIN EN 14597

Type 701150

JUMO safetyM TB/TW

Temperature limiter, temperature monitor according to DIN EN 14597 as a DIN rail device

Type 701160

JUMO safetyM TB/TW

Temperature limiter, temperature monitor according to DIN EN 14597 as a built-in device

Type 701170

JUMO safetyM STB/STW Ex

Safety temperature limiter, safety temperature monitor according to DIN EN 14597

Type 701155

JUMO exTHERM-AT

Explosion-proof surface-mounted thermostat for zones 1, 2, 21, and 22

Type 605055

Automation and visualization

Smooth processes require reliable systems, including their actuators. Given the various types of furnaces and thermal methods available, it is important for you that energy can be supplied reliably and safely so that power also reaches the place where you need it. Keeping an eye on all of the key data is also essential to ensure that different components interact as smoothly as possible with each other. This is where high-performance plant visualization software from JUMO comes into play.

Approvals:

Performance under control with JUMO solid state relay and thyristor controller

The maximum temperature that can be reached when heating electrically powered industrial furnaces – such as furnaces for case hardening, electric arc furnaces, or smelting furnaces – depends on the kinds of heat sources that are used.

JUMO offers you solid state relays and thyristor controllers suitable for resistive and resistive-inductive loads.

High temperature heating elements made out of silicon carbide or molybdenum disilicide can be controlled just the same as short, medium, and long-wave infrared radiators. The thyristor controllers have current limiting and optional control algorithms to ensure a consistent power output. Generous device dimensioning allows for a long, undisturbed operation of your plant.

Plant visualization software JUMO SVS3000

The plant visualization software SVS3000 with batch-related data reporting and evaluation enables efficient operation, visualization, and documentation. Preprogrammed graphic elements are stored in a library so that JUMO devices can be connected. This significantly reduces software project planning time. Per plant, batch reporting, an alarm and event list, recipes, group and flow charts, eight week timetables, and 16 trend pictures are available. You can also export your reporting data to another program such as Excel® using an export function.

JUMO TYA 201, TYA 202, TYA 203
Thyristor power controller
Types 709061, 709062, 709063

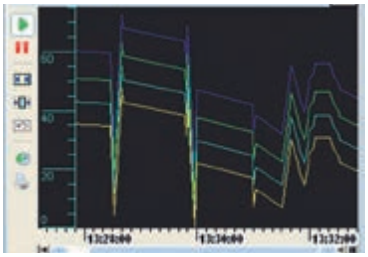
JUMO TYA 432
Thyristor power switch
Type 709010

JUMO TYA 432
Thyristor power switch
Type 709020

JUMO SVS3000
Plant visualization software with batch-related data reporting and evaluation in the network
Type 700755

Integrated batch reporting

Manageable group pictures



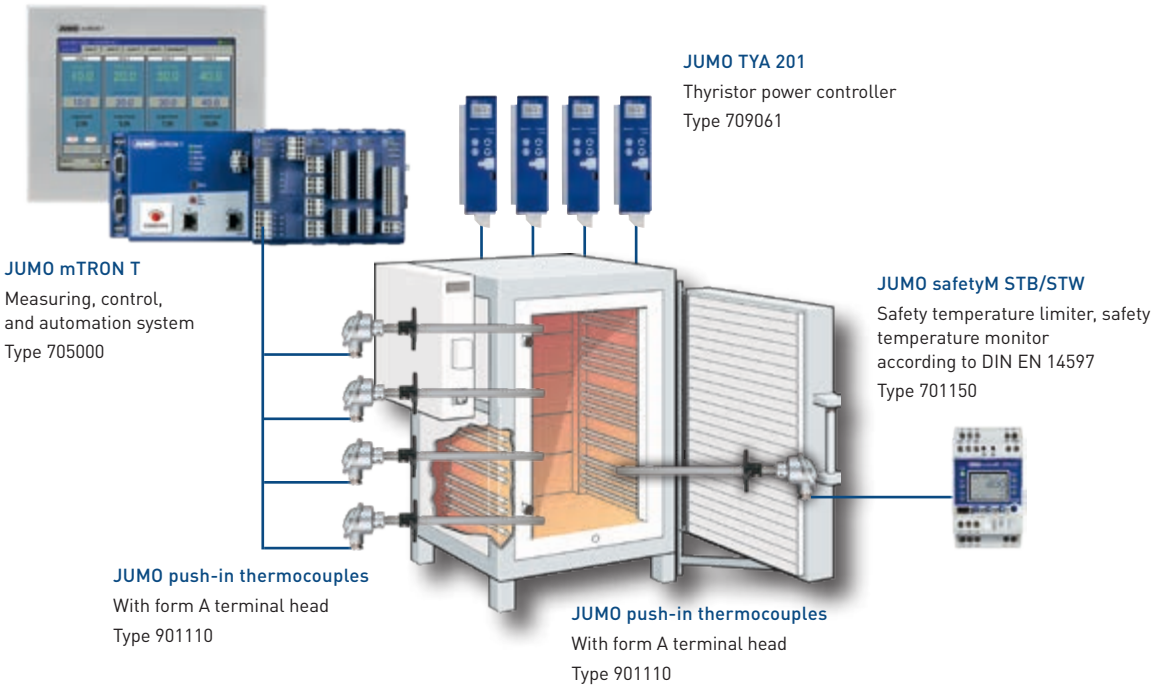
Maximization of trend pictures

Application

Industrial heat treatment according to AMS2750 and CQI-9

Increasing requirements for process reliability, data recording, and logging always introduce new challenges to users of modern measurement and control technology. Safe, reproducible operating procedures are required particularly in sensitive areas such as the aerospace or automobile industry.

With JUMO products your daily operating processes are in safe hands. Even the AMS2750 and CQI-9 requirements are no problem at all.
Both of these specifications set standards in accuracy and data security for operators as well as manufacturers of measurement and control technology. With the controller programs such as JUMO mTRON T and JUMO DICON touch along with digital recorder solutions such as JUMO LOGOSCREEN 700, JUMO offers – in combination with precise RTD temperature probes or thermocouples – the full spectrum for all applications in heat treatment.
In our own DAkkS-accredited laboratory (German national accreditation body) JUMO is able to calibrate the temperature probes as well as the entire measuring chain and provide certification of the calibration.
All in keeping with our motto: everything from a single source!



SAT and TUS tests with JUMO thermoCOR

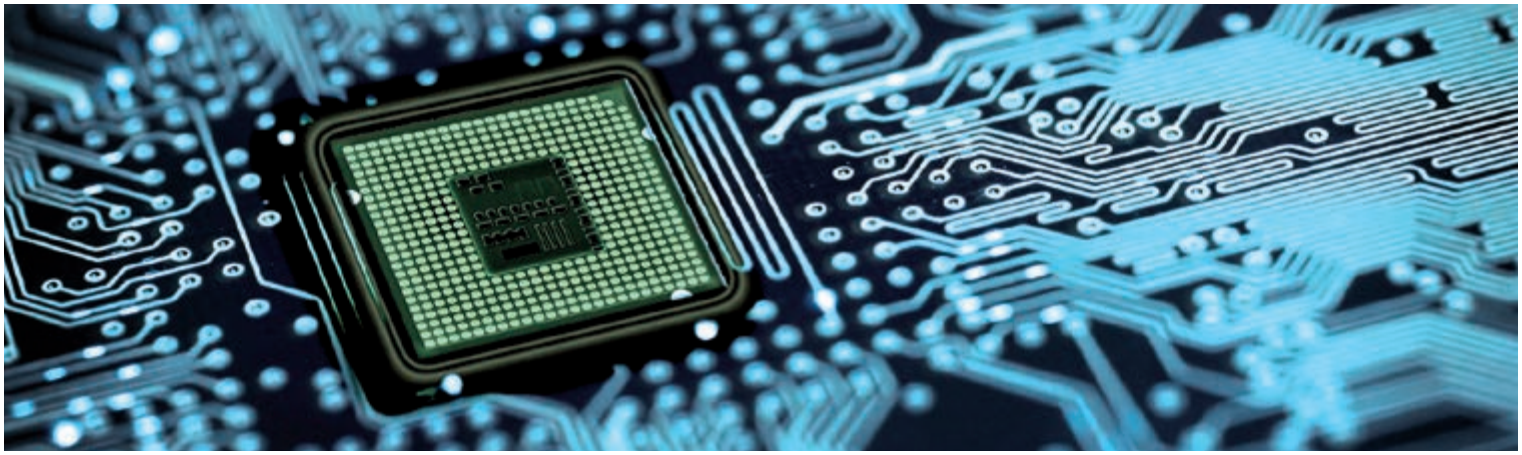
The JUMO thermoCOR is a portable measuring system with which plant operators can independently perform SAT and TUS tests on a regular basis with the usual accuracy. The device is DAkkS calibrated and meets the tolerance limit requirements according to the AMS2750 and CQI-9 standards. The core of the JUMO thermoCOR is a high-precision cold junction.

The test equipment has an overall capacity of up to 12 configurable thermocouple inputs and four configurable universal inputs to which such devices as RTD temperature probes or pressure transmitters can be connected. A touchscreen offers easy handling via process screens. A master and user management system enables all activities to be easily understandable and all measured values to be acquired so that they are tamper-proof. The data is transmitted via LAN or USB interface through the JUMO PCC communication software to the JUMO PCA evaluation software. A test report can be prepared after testing.

Example setup:
TUS test with JUMO thermoCOR (type 987050)

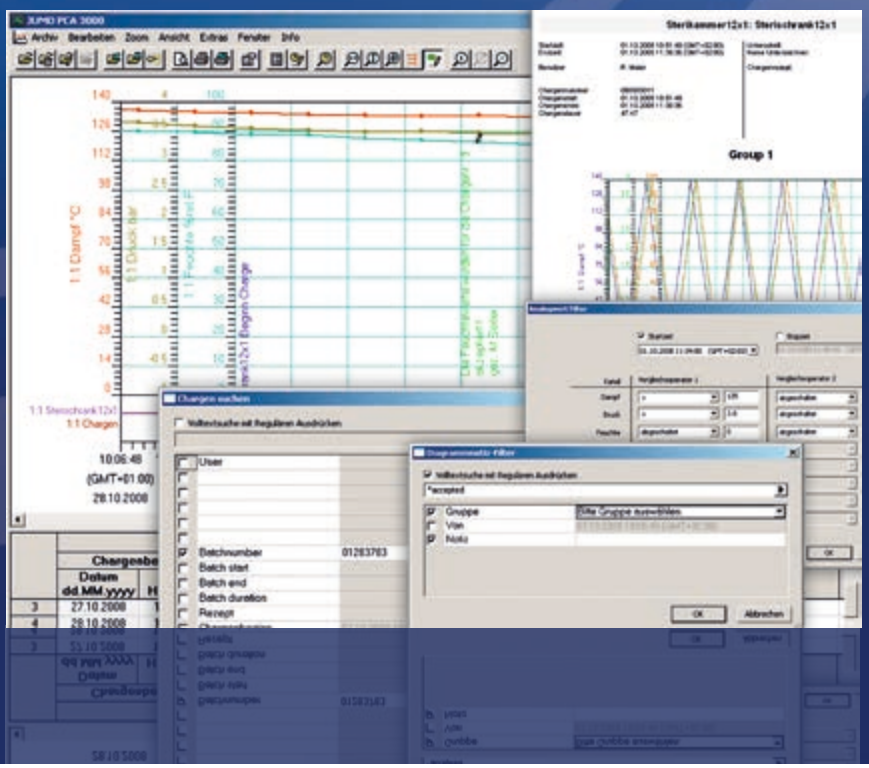
Service packages

Introduction package	Maintenance package	Comprehensive carefree package
Introduction package 1: ■ Renting possible between two weeks and six months ■ Independent implementation of all tests **Introduction package 2:** ■ Rent for one month ■ One day of support by a JUMO employee	■ Duration of 12 months ■ Recalibration ■ Firmware update ■ Complete functional test (mechanical and electrical) on the JUMO premises ■ Loan device for the duration of the recalibration or corrective maintenance ■ Phone support	**The following tasks are handled by JUMO:** ■ Temperature uniformity test in the usable space (TUS) ■ System accuracy tests (SAT) ■ Instrumentation (specification of the measurement and control device) ■ Calibration of the meter run from the controller via the measuring line up to the thermocouple ■ Creating the protocols ■ Monitoring the inspection dates



Software

The professional PC evaluation software PCA3000 can be used to manage, archive, visualize, and evaluate historical process data recorded by the JUMO mTRON T automation system or the paperless recorder series JUMO LOGOSCREEN.



PCA3000 evaluation software

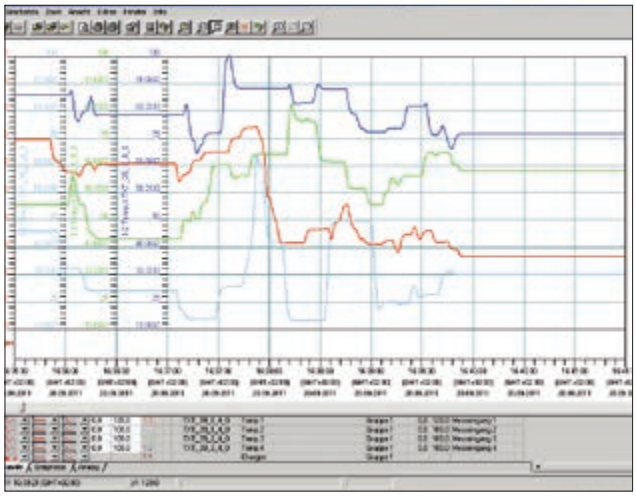
The PC-based, professional evaluation software PCA3000 can be used to manage, archive, visualize, and evaluate historical process data (measurement data, batch data, notifications, etc.). The data can be imported via USB flash drive or memory card. It can also be made available for central data processing via the PCC communication software.

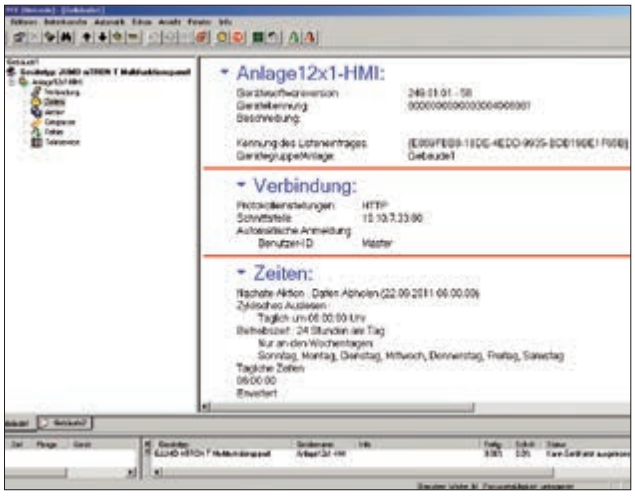
- Easy, straightforward backup and archiving of all process data in a data file
- Archived data can be read and visualized directly from a CD-ROM or DVD
- Graphic measured value processing: evaluation of measured data using a min./max. search and zoom function (magnifying glass icon)
- Data export with PCA3000 form issued in a range of formats (CSV, HTML, PDF)

PCA communication software PCC

PCC communication software is ideally geared towards PCA3000 and allows for easy data extraction via Ethernet, a serial interface (USB, RS485), or modem.

- Time-controlled, automatic data extraction via interface or modem
- Easy, straightforward archiving of all process data in a data file on a hard disk drive or a network server
- Diagnosis function (display of current process data, e.g. via modem or Ethernet)
- Can be launched as a Windows® system service
- Email notification in the event of communication failure





DAkkS calibration and JUMO Engineering

Accredited calibration laboratory for the measurand temperature

JUMO DAkkS calibration laboratory has been performing calibrations for the measurand temperature since 1992. The laboratory has been constantly expanded over time and has been accredited for on-site calibration since 2014. Based on our many years of experience and our diverse pool of clients, we can offer you calibration as a service for a wide variety of industries. As a result, we calibrate JUMO sensors as well as products from other manufacturers. We will gladly support you in creating your measurement uncertainty report. Here we offer cost-effective seminars which, upon request, can be held as an individual application-specific training workshop on your premises. Further information can be found at: http://seminars.jumo.info

Our range of services

In-house calibration

Calibration object	Temperature range	Measurement uncertainty[2]
RTD temperature probe[1]	-196 °C	0.05 K
	-80 to +500 °C	0.015 to 0.05 K
Thermocouple[1]	-196 °C	0.4 K
	-80 to +1100 °C	0.3 to 1 K
Transmitter with WTH/TE[1]	-196 °C	0.075 K
	-80 to +1100 °C	0.045 to 1.5 K
Mechanical thermometer	-196 °C	0.5 K
	-80 to +500 °C	0.3 to 1.5 K
Climatic chambers (temperature)	-80 to +300 °C	0.4 to 1 K
Temperature indicating devices	-200 to +2500 °C	0.03 to 0.2 K

On-site calibration

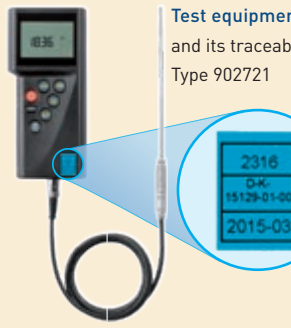
Calibration object	Temperature range	Measurement uncertainty[2]
RTD temperature probe[1]	-40 to +500 °C	0.25 to 2.5 K
Thermocouple[1]	-40 to +700 °C	0.75 to 2.5 K
Transmitter with WTH/TE[1]	-40 to +700 °C	0.25 to 2.5 K
Mechanical thermometer	-40 to +500 °C	0.5 to 3 K
Climatic chambers (temperature)	-80 to +300 °C	0.4 to 1 K
Temperature indicating devices	-200 to +2500 °C	0.03 to 0.2 K

[1] Also direct display

[2] The assignable measurement uncertainty depends on the testing temperature and the respective calibration object.

What information is included in a calibration certificate?

The calibration certificate documents all measurement results, the corresponding measurement conditions, and the calculated measurement uncertainties. It also includes all specifications that clearly identify the test piece to eliminate any confusion. Upon request, you can also receive a temperature resistance table showing the entire measuring range of the test piece in 1 Kelvin steps with the associated increase values.



Test equipment for temperature
and its traceability / temperature measuring chain
Type 902721

Serial number
DAkkS registration number
Year and month of the calibration

Additional information:

www.calibration.jumo.info
www.en.engineering.jumo.info

JUMO Engineering

Innovative system solutions with expertise

We always draw on the feedback from our customers around the world to improve our products. This strategy is reflected in our new developments. We view complex tasks as challenges that allow us to develop tailored solutions for you and at the same time improve our product portfolio. JUMO Engineering with its range of services completes this comprehensive approach.

Our services

- Feasibility analysis
- Creating a technical concept including product requirements specifications / specification sheet
- Complete project planning and documentation
- Project planning incl. PLC programming, visualization, network technology, etc.
- Continuous project management
- On-site startup
- Training and support

Your advantages

- JUMO, as the central contact partner, develops a technical system solution specifically for you
- You benefit from our extensive expertise with all measurement and automation devices
- A global network of support consisting of experienced specialists
- Flexible, tailored solutions to suit your individual needs and applications

In a nutshell

- Precise and prompt communication channels.
  This saves you time and prevents mistakes!
- Highly developed expertise for maximum flexibility:
  You benefit from fully reliable and secure project planning!
- Technology that has proven itself over decades reduces downtimes.
  As a result you get excellent plant availability and process reliability!

OneTemp pty ltd

measure | control | record

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