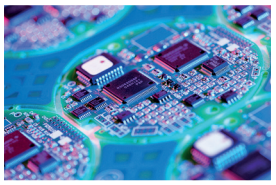


Software package for data acquisition, evaluation and reports

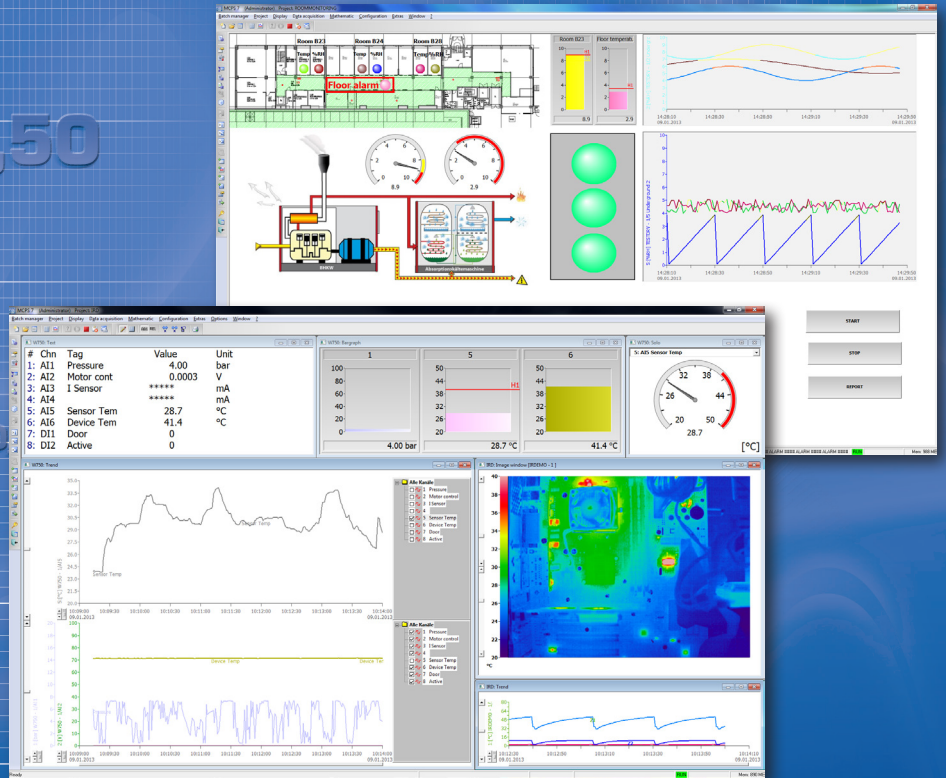
MICIPIS 7

MULTI CHANNEL PROCESS SYSTEM



0,50
0,40
0,30
0,20
0,10

26°



- ✓ Modular
- ✓ Flexible
- ✓ Innovative

One Software - many solutions

MCPS is a powerful Windows based software package for data acquisition, visualization and reporting. Setup of MCPS is user friendly as the software has been designed to be configured not engineered, thus no programming or flowcharting experience is required.

A key design requirement of MCPS is that it can be configured and operated by the end user and not just by technicians or programmers, this is the reason why MCPS can be found in nearly every industrial area. Designed as a modular software system MCPS can fulfill a wide variety of applications and can easily expanded later on, should your application change..

Application areas:

- Storage and (Clean) Room monitoring
- Climate chambers, incubators and cryo units
- Test stands and quality assurance
- Research and development, material tests
- Water and sewerage
- Test labs and certification centers
- (Nuclear) Power plants
- Energy efficiency and resource monitoring
- Infrared measurements

One project - many capabilities

Data acquisition projects

are easily defined in MCPS by creating a channel list. All devices and channels are added to this list known as a project. The project is the basic element in MCPS which controls all further actions such as data acquisition, data display, saving and evaluation. This concept simplifies many functions and allows the user to handle up to 1000 channels in one project.

A powerful group manager with groups and subgroups can be used to handle a greater number of channels in different display windows.

MCPS

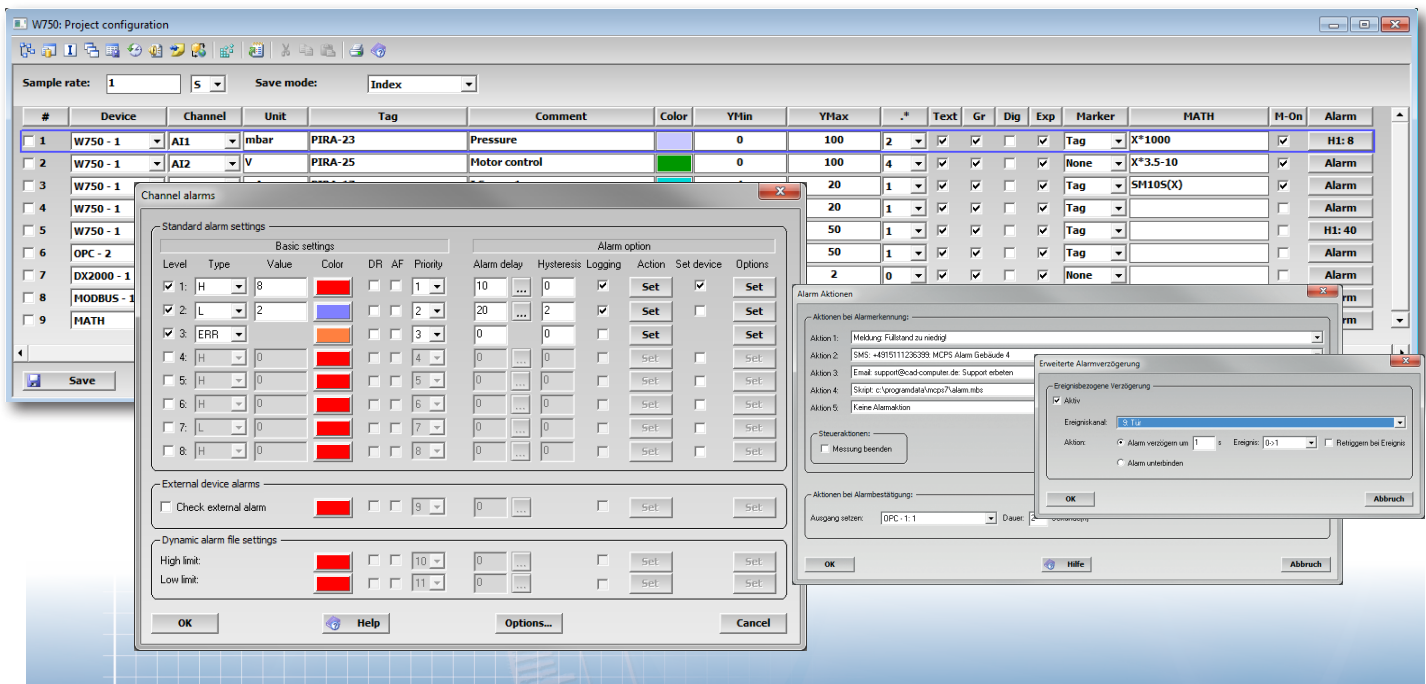
can run several independent projects at the same time. This makes it possible to associate a project with a specific function such as a particular area of plant or building etc. Having multiple projects allows users to separate the data for different areas keeping all reporting and data storage independent.

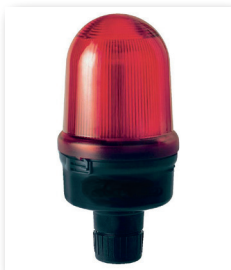
Settings for a channel:

- Comments and tags
- Curve color and marker
- Mathematical computation in symbolic format
- 8 alarm levels with outputs, SMS, E-mails or Scripts
- Data reduction
- Analog outputs
- Logarithmic display

Data visualization:

- Numeric, Trend, Bar graph and Profile windows, Analog meters
- 2 Cursors in Trend window for evaluations
- Absolute, Relative, X/Y display, Elapsed time display
- User defined window layouts





Alarm monitoring

Alarms and related actions are part of the powerful alarm management system in MCPS. MCPS provides 8 independent alarm levels (H, L, DH, DL, ERR, OFL, UFL) for each channel. For each alarm level you can define up to 5 alarm actions such as messages for the online alarm window, digital outputs, messages sent by SMS or e-mail. Alarms have to be acknowledged by the user, a comment can be entered to describe the reason for the alarm. By clicking on the <INFO> icon in the alarm window (see below) a document opens (e.g. PDF file). This document can contain detailed instructions for the user how to react to this specific alarm. In addition all alarms and acknowledgements are saved and provided in a historical alarm list, which can be exported or printed.

Some data loggers and recorders have their own alarm monitoring, which is often used side by side with MCPS using the same alarm limits. MCPS can update these settings in the device automatically, when the data acquisition is started or the alarm parameters of a MCPS channel are changed by the user.

In MCPS client/server systems the alarms can also be viewed and acknowledged on the client PC.

Alarm status	Time	Project	Channel	Tag	Comment	Type	Message	Limit	Info
Active	18.01.2013 10:44:52 - 18.01.2013 10:44:58	TD	001: 1	Motor K1		L1	Low engine speed	1.7143 L0.0435 [4]	[Info]
Inactive	18.01.2013 10:44:18 - 18.01.2013 10:44:49	TD	002: 2	Cooling fluid		L1	High temperature	8.8092 L7.0001 [8]	[Info]
Inactive	18.01.2013 10:44:14 - 18.01.2013 10:44:29	TD	001: 1	Motor K1		L1	Low engine speed	1.7143 L0.0667 [4]	[Info]
Inactive	18.01.2013 10:43:47 - 18.01.2013 10:43:57	TD	001: 1	Motor K1		L1	Low engine speed	1.7143 L0.0714 [4]	[Info]
Inactive+Ack	18.01.2013 10:43:24 - 18.01.2013 10:43:33	TD	001: 1	Motor K1		L1	Low engine speed	1.7143 L0.0952 [4]	[Info]
Inactive	18.01.2013 10:43:15 - 18.01.2013 10:43:46	TD	002: 2	Cooling fluid		L1	High temperature	8.8092 L7.3056 [8]	[Info]
Inactive	18.01.2013 10:42:48 - 18.01.2013 10:43:02	TD	001: 1	Motor K1		L1	Low engine speed	1.7143 L0.0000 [4]	[Info]
Inactive	18.01.2013 10:42:33 - 18.01.2013 10:42:34	TD	001: 1	Motor K1		L1	Low engine speed	1.7143 L3.4615 [4]	[Info]

Mathematical functions

Mathematics are used in many parts of MCPS. You can scale input values (e.g. from 4-20mA to 0-100bar), define new mathematical channels, compute statistics, use polynomials and so on. The math operations are easily defined in the channel configuration in symbolic form such as $\sin(x)+(x+2)/3$. It is possible to create new channels with math formula or to add a math formula to an existing input channel to do scaling or offset compensation. Mathematical results will be displayed in all windows. MCPS stores only the measured raw data, therefore math formulas can be added or changed during or even after the measurement. For all newly created math channels you can use the same settings (color, tag, comment, alarms) as for regular channels.

Statistical computations can be performed over any time range of historical data. The results can be displayed, printed, exported and be used in extensive reporting capability.

Polynomials with up to 20 x/y pairs allow you the regression of more complex characteristic curves to implement non linear sensors or to calibrate channels.

Reference measurements can be performed to detect unwanted input offsets. MCPS can subtract such offsets during the whole measurement.

Mathematical functions:

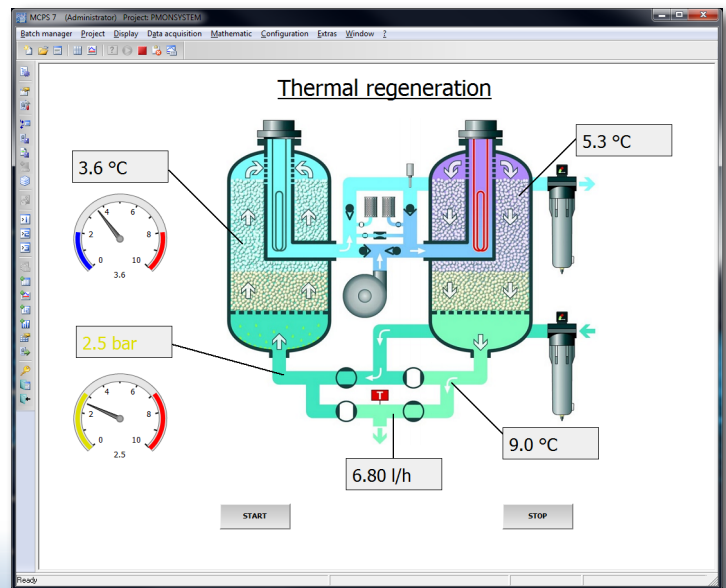
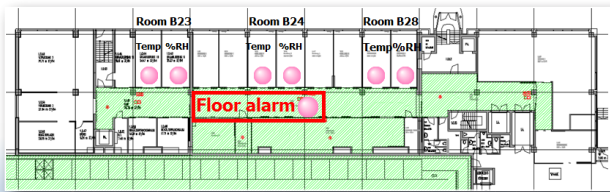
- Symbolic formulas
- +, -, *, /, ^, ln, log, exp, sqrt, abs, sin, cos, tan, asin,
- Totalizers and time related integrators
- F-Value computation for sterilization processes
- Comparisons
- Logical functions
- Moving average, minimum or maximum per channel
- Minimum, maximum and average over several channels
- Stability function (Time range)
- Registers or markers
- Replacement values
- Reference measurement values
- Standard deviation, Mean Kinetic Temperature (MKT)



#	Tag	Mean value	Maximum value / time	MKT	Unit
001	Motor K1	4.9645	10.8000 18.01.2013 10:50:10.005	5.4885	V
002	Cooling fluid	8.1955	9.0000 21.12.2012 11:34:58.705	8.2230	°C
003	Pressure in	5.0632	6.0000 21.12.2012 12:49:22.507	5.0930	bar
004	Pressure out	6.2172	7.0000 18.01.2013 10:47:57.505	6.2461	bar
005	L1	1.9233	3.9884 21.12.2012 11:38:03.205	2.0065	A
006	L2	4.5522	5.0922 18.01.2013 10:46:35.505	4.5585	A
007	L3	4.5543	5.0921 18.01.2013 10:47:46.505	4.5600	A
008		4.5255	5.0919 21.12.2012 11:37:59.705	4.5314	V
009		4.5538	5.0912 18.01.2013 10:49:25.505	4.5603	V
010		2.9976	4.1096 18.01.2013 10:42:40.505	3.0431	V

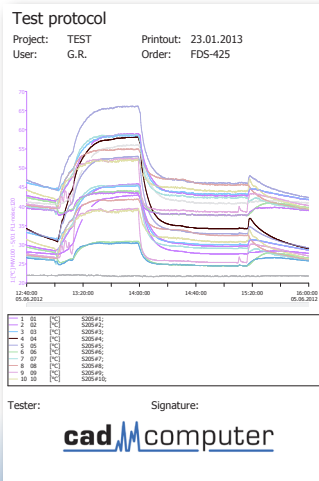
Process monitoring and control

Machines, rooms, test stands are often better visualized with graphics, photos and process items as LEDs, bar graphs or analog meters. In MCPS you can implement your own bitmaps as a static graphic or related to a channel value. This allows you to have on-off valves, tanks with different fuel levels, alarm indicators and much more. It is possible to create several screens, which the user can select during runtime to see different machines, buildings or floors. Additionally MCPS supports buttons with multiple actions. You can start / stop the data acquisition, set digital or analog outputs or run scripts. The process window can be a part of the screen beneath the standard MCPS windows or can run in full screen mode as in a SCADA system.



Client-Server-Mode

Network capabilities and virtual environments are required more and more and need a client-server based concept. In standard applications the data acquisition and evaluation is done with MCPS on one computer. This system can be expanded by MCPS clients, which typically run on office computers of the users. The clients can be connected to server PC to see online or historical data, alarms and events. In addition the process monitor on the server can be seen on client PC's. The complete evaluation (cursors, print outs, exports and reports) can be performed here without touching the main system. Typically the server MCPS is installed onto a virtual machine. For all MCPS installations one unique user administration can be configured to enter logins and passwords only once. With active pharmaceutical option all user operations are saved into the audit trail.



Reports

Reports can be printed from MCPS manually or automatically. There are two types of reports. The first is completely performed within MCPS. It can be used to print trends, alarms or statistics. Using a print layout the output can be customized with individual texts, bitmaps (company logos) or control codes to automatically insert project name, batch information, start and stop time. By using custom specific scripts, analysis of the historical data is possible. The results can again be printed by using the print layout or as the second type of report it can be transmitted to Excel. MCPS will write the analyzed values in specific cells, so that a custom Excel sheet with own bitmaps, formats and computations can be used. Both types of reports can be created automated e.g. every day.

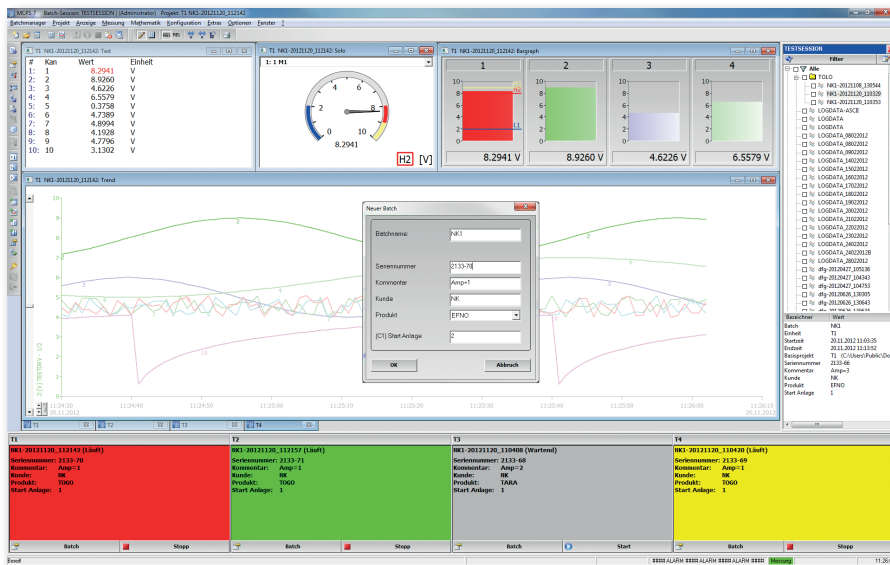


Batch administration

Lot numbers and other batch information are often used in time limited and automated processes and can be managed in MCPS with the corresponding measured data. The MCPS-Batch Manager provides a user-friendly interface to quickly and easily monitor autoclaves, environmental chambers, ovens, sterilizers, test stands, etc. When starting a new batch the input of various information is possible such as product code, serial number, customer, lot number, and many more. These fields are user configurable. The entered information is displayed in the corresponding batch window and saved after

completion of the batch in the batch database. The database contains all the measurements and the information you entered. In addition you can search for any records dependent on flexible filters. Thus, searching for a serial number, product code or a time range is possible and all batches matching the filter conditions are listed in an extra branch of the database tree.

The takeover of the batch information as well as start and stop can be done automatically by external components like OPC-systems, TCP/IP commands, PLCs or touch panels. The Batch Manager can be configured in the way, that it works without any user action.



Batchmanager with 3 autoclaves.

Should another batch be started the button <Batch> is pressed in the control window. The new batch window appears and the user enters the information for the next batch file. Once the start button is pressed the measurement is running. After stopping the measurement the batch is displayed in the database tree. The info box below the tree shows all the additional batch information along with electronic signature status. During measurement batch information can be entered or changed.

The filter button opens a window with several search criteria to find one or several batches e.g. all batches of a specific motor type or customer.

Automatic file import



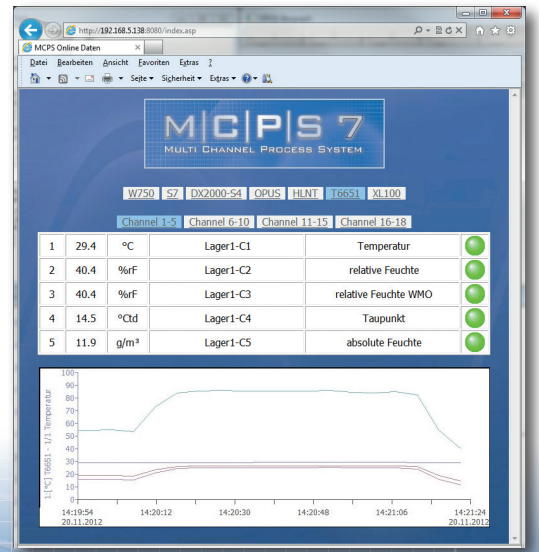
Automatic import of batch files: Many instruments create own data files on memory cards, which are usually sent to FTP servers.

This can be a recorder with start / stop button located directly at the machine or a data logger in the field, which sends data via GSM. MCPS can import these data files automatically and integrate them into the database. After importing the data files printouts can be created to have documentation on paper if required. Continuous monitoring with no gap between two data files is also supported by MCPS. These data files can be combined to daily, weekly or monthly batch files.

This form of data collection is particularly interesting if true paper recorders should be replaced by paperless recorders, but the paper printout is still used for documentation and signing.

Web server

Remote access to MCPS data is additionally possible with a standard web browser. MCPS has an embedded Web server that can build any page. These can be created according to customer specifications. It is possible to create dynamic pages at runtime, which depend on projects, channels, users, or even of the browser's IP address. Various graphic elements such as numeric data, LEDs, bar graphs or trends are available. In addition, by buttons or links, scripts can be started, which can cause a lot of action in the MCPS (set parameters that control measurements, generate reports, set outputs, etc.) Since this is standard HTML technology, it not only can be used with any browser on PCs, but also on smartphones for travel or touch panels, which are used directly in the plant. Practical application: On a compressor test stand, the parameters for the PID controller as well as start and stop inputs are done by a touch panel with HTML-browser. The measurement data, time and hour counters are shown on the panel and automatically updated by MCPS.



Conforms to 21CFR11

Pharmaceutical applications require a data acquisition with special capabilities defined by the FDA in 21CFRPart11 or similar regulations. MCPS complies to these specifications and has many references for companies with validated systems:

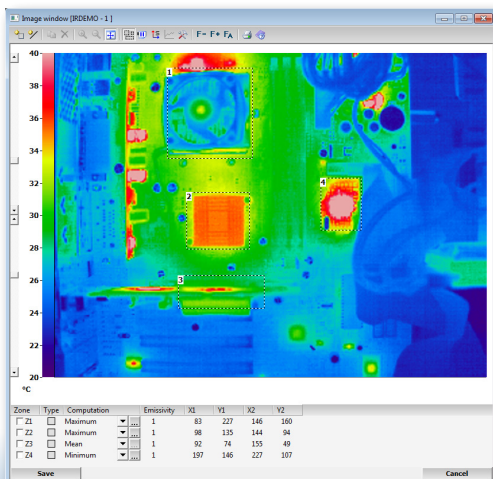
- Extensive user administration with login and user id
- Password history
- Audittrail: Log user actions and changes
- Tamper-resistant files (Electronic records)
- Electronic signature with three levels
- Manual and automatic GAP-Filling



Scripting

VBScript has been integrated into the MCPS and allows a very flexible adaptation to the requirements of specific applications and customer requirements. Both in the control area as well as in reporting very individual sequences and analyses are possible:

- Any analyses of historical data for reports
- Access to Excel tables for reading or writing
- Test sequences with several steps (Test stands)
- Switching of digital and analog outputs
- Dynamic page rendering in the web server



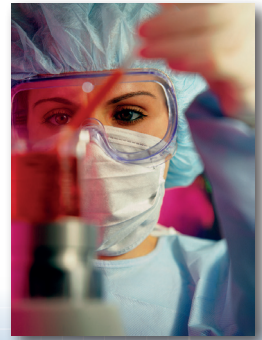
Infrared measurements

Thermography becomes more and more attractive to analyze areas or rotating parts of a machine. MCPS supports several infrared cameras and pyrometers for non-contact temperature measurement. In addition to the infrared images, zones can be defined, which provide minimum, maximum and average values of all points included. These are available in MCPS as normal channels like from a data logger and can be recorded in parallel with other instruments. Thus, not only the temperature of a motor can be seen from the camera, but also corresponding values as speed or power consumption from other instruments.

Applications in food and pharmaceutical industry

21CFR11-Compliance is achieved by MCPS for many years and is one reason that many well-known pharmaceutical companies worldwide use MCPS in various applications. The following objects are (alarm-) monitored for temperature, humidity, pressure, door contacts, etc.:

- Storage rooms
- Cleanrooms including particle counters
- Sterilisers with F-Value computation
- Purified water
- Incubators
- Refrigerators
- Cryo systems
- Blood banks



Energy efficiency / Resource monitoring

ISO50001 and other standards will determine our future significantly. Sustainability, energy efficiency and much lower consumption of environmental resources are important goals that need to be monitored accordingly. To identify opportunities for optimization and rate the corresponding results the standards (ISO50001) require a long-term monitoring of the different energies and resources. MCPS is well suited to perform this task and produce analyses and reports. Because of the broad device support, different data sources are combined, ie Energy and process data. Ambient temperatures and machine run times in the overall assessment must be considered as well. A simple summation of the energy (kWh) is not enough. Amongst others the following quantities can be recorded:

- Electric power
- Pressure
- Gas
- Water
- Temperatures
- Run times
- Speed



Automated test stands

Test equipments require a high degree of flexibility and openness. MCPS can run test sequences with different test steps, user inputs and control capabilities. Step and final reports are automated. MCPS serves not only as data acquisition system, but can independently set digital outputs, relays or analog outputs of different measurement hardware. So it can start and stop a heater or motor, change speed, level or temperature. A combination of MCPS and hardware controllers (PLCs) is also possible, so that the basic control can be performed in hardware (eg: PID-controller, emergency shutdown), while the step control, parameterisation and visualization is performed by MCPS:

- Several independent test steps
- Reports for each step and whole test
- Pattern function for analog outputs
- Several independent test benches in one
- Usage of existing PLCs
- Tests are administrated in batch database

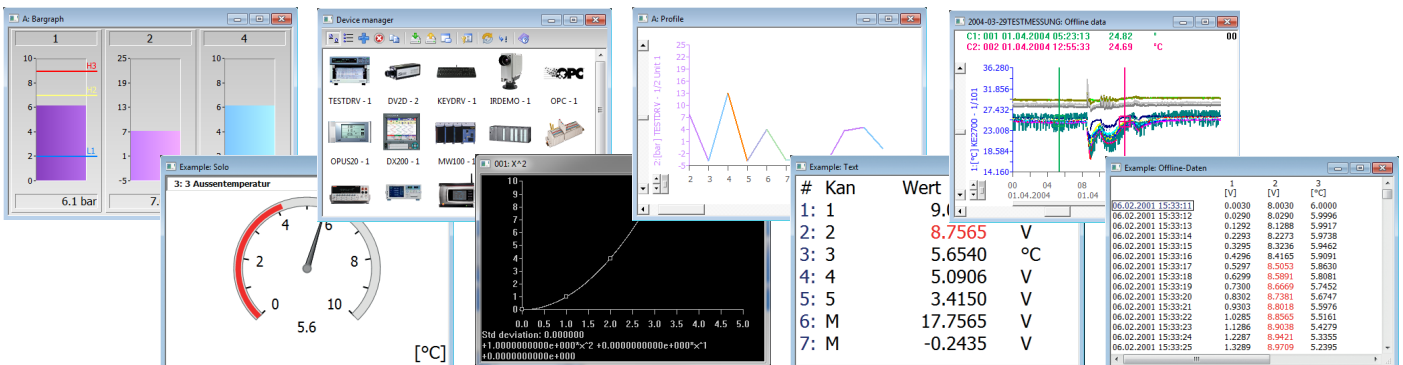


List of industrial applications

- Pharmaceutical / food industry (Clean rooms, incubators, sterilisators, refrigerators, purified water, ...)
- Energy efficiency (ISO50001, Power-, Water-, Gas-, Pressure consumption)
- Test benches and quality assurance (Cold heads, Generators, ...)
- Water and sewerage (pH, Oxygene,...)
- Test and certification centers (TÜV, VDE, LGA, ElectroSuisse,...)
- Power plants (Commissioning, Efficiency and mass flow calculations)
- Automotive Industry
- Railway engineering (weather test, track-laying)
- Environmental (Exhaust gas monitoring, pollution levels)
- Turbines and generators
- Computer technology
- Refrigeration (Freezer technology, Cryo machines, vehicle refrigeration)
- Nuclear technology
- Food industry (Ice cream, yogurt, ...)
- Deep drilling (Oil, geothermal, WITS communication)
- Colleges and Universities
- Production (glass wool, steel, silicon wafer, light bulbs, tablets, tires, plastics, lifts, ...)
- Research and development (biotechnology, aerospace, refrigeration systems, materials, ...)



www.mcps.de



MCPS is available in German and English language. For system requirements, technical specifications, demos, more information and downloads visit WWW.MCPS.DE.

WEBDemo: We would like to present you MCPS live on Internet. All you need is a web browser. There are no components to be installed. Thus a targeted personal demonstration at any time is possible.

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GmbH & Co. KG

Contact: sales@cad-computer.de