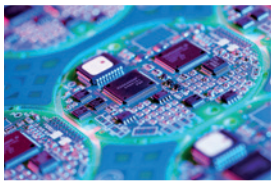Software package for data acquisition, evaluation and reports

M|C|P|S 7
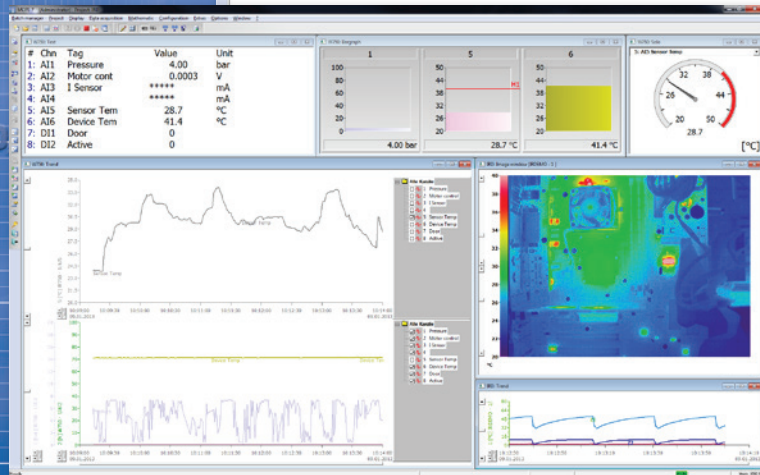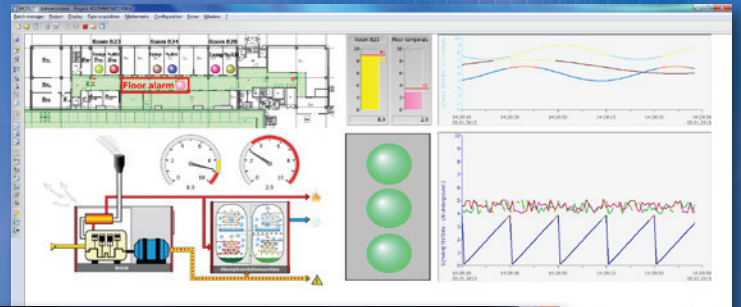
MULTI CHANNEL PROCESS SYSTEM

26°

0,50
0,40
0,30
0,20
0,10
0,6

✅ Modular

✅ Flexible

✅ Innovative

cad computer

One Software - Many solutions

MCPS is a powerful Windows software for data acquisition and evaluation. MCPS is user friendly, because all processes are just configured and no programming or flow charts are necessary.

As a result the software can be handled by ordinary users. One target of MCPS is to be administrated by the end user and not by technicians or programmers. This is the reason, why MCPS can be found in nearly every industrial area. With its modular design the software fits to your requirements and can easiliy expanded later on, if your application changes.

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

Measurement tasks are fast and simply definded in MCPS by creating a channel list. All devices and channels are added to this list which is called a project. A project is the basic element in MCPS similar to a document, which controls all further actions as data acquisition, data display, saving and evaluation. This concept simplifies many operations and allow 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 measurements at the same time. So it is possible to have your own project for each measurement task and to separate the data corresponding to different units, buildings, plants, processes or even users.

Settings for a channel:

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

Data vizualisation:

- Numeric, Trend, Bargraph and Profile windows, Analog meters
- 2 Cursors in Trend window for evaluations

Alarm monitoring

Alarms and related actions are part of the powerful alarm management system in MCPS. For each channel MCPS provides 8 independent alarm levels (H, L, DH, DL, ERR, OFL, UFL). For each level you can define up to 5 alarm actions like messages for the online alarm window, digital outputs, messages sent by SMS or email. 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 dataloggers and recorders have their own alarm monitoring, which is often used side by side to MCPS with 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 clients.

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]	
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]	
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]	
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]	
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]	
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]	
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]	
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]	

Mathematical functions

Mathematic is 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 as $\sin(x)+(x+2)/3$. It is possible to create new channels with math formulas or to add a math formula to an existing input channel to do scaling or offset compensation. In all windows the mathematical results will be displayed. Since MCPS stores only the measured raw data, math formulas can be added or changed during or even after the measurement. For all new created math channels you can use the same settings (color, tag, comment, alarms) as for regular channels.

Statistical computations can be done over any time range of the historical data. The results can be displayed, printed, exported or be used in extensive reports.

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 done to detect unwanted input offsets. MCPS can substract these offsets during the whole measurement.

Mathematical functions:

- Symbolic formulas
- $+,-,*,/,^\wedge$, ln, log, exp, sqrt, abs, sin, cos, tan, asin, ...
- Totalizer 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 measurements and values
- Standard deviation, Mean Kinetic Temperature (MKT)

Time range: 21.12.2012 11:34:44.006 - 18.01.2013 10:52:29.505: Counts: 4935

| #	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, fotos and process items as LEDs, bar graphs or analog meters. In MCPS you can implement your own bitmaps as static graphic or related to a channel value. This allows you to have on-off valves, tanks with different fuel level, alarm indicators and many more. It is possible to create several pages, which the user can select at runtime to see different machines, buildings or floors. Additionally MCPS supports buttons with several 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.
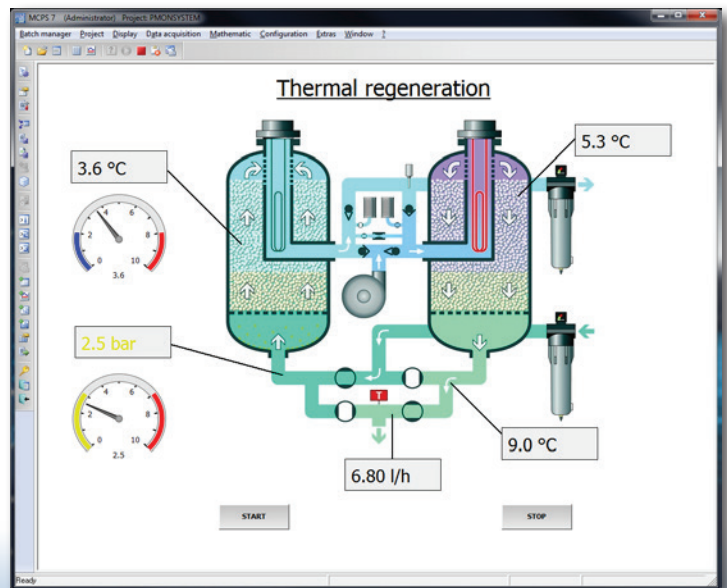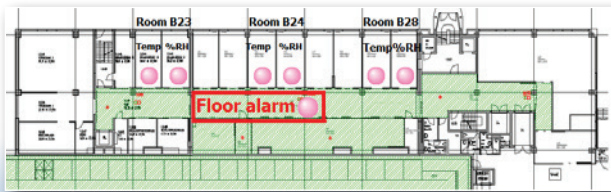
Client-Server-Mode

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 measurement PC to see online or historical data, alarms and events. Even the process monitor on the server can be seen on the client. The complete evaluation (cursors, print outs, exports and reports) can be done here without touching the main system. Today the server MCPS is often installed onto virtual machines. For all MCPS installations one unique user administration can be configured to enter logins and passwords only once. With active pharmaceutical option all actions from all users are saved into one audittrail.
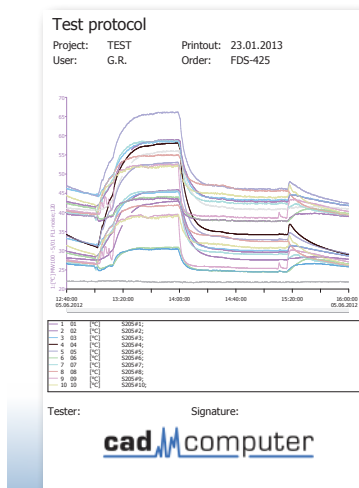
Reports

Reports can be printed in MCPS manually or automatically. There are two types of reports. The first one is completely done in and with MCPS. It can be used to print a trend, alarms or statistic. Therefore a print layout is created, which customizes the ouput with individual texts, bitmaps (company logo) or control codes to automatically insert project name, batch information, start and stop time. By using a custom specific script, nearly any 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 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, with all the monitoring units such as autoclaves, environmental chambers, ovens, sterilizers, etc. quickly and easily can be configured and controlled. When starting a new batch the input of various information such as batch serial number, customer, lot number, etc. is possible. 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. This database shows all the measurements collected and the information you entered and also allows you to search for any records. 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 and start and stop must not be done manually. By OPC, script, PLC or touch panel, this data can also be transferred automatically. 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. It appears the input mask (New Batch) and the user enters the information for the next measurement. Then you only push the start button and the measurement is running. After stopping the measurement the batch is displayed right in the database tree. In the info box below the batch information for the selected batch are shown.

During the measurement the batch information can be entered or changed.

The filter button opens a window with several search criterias to find one or several batches, for example all batches of a specific motor type.
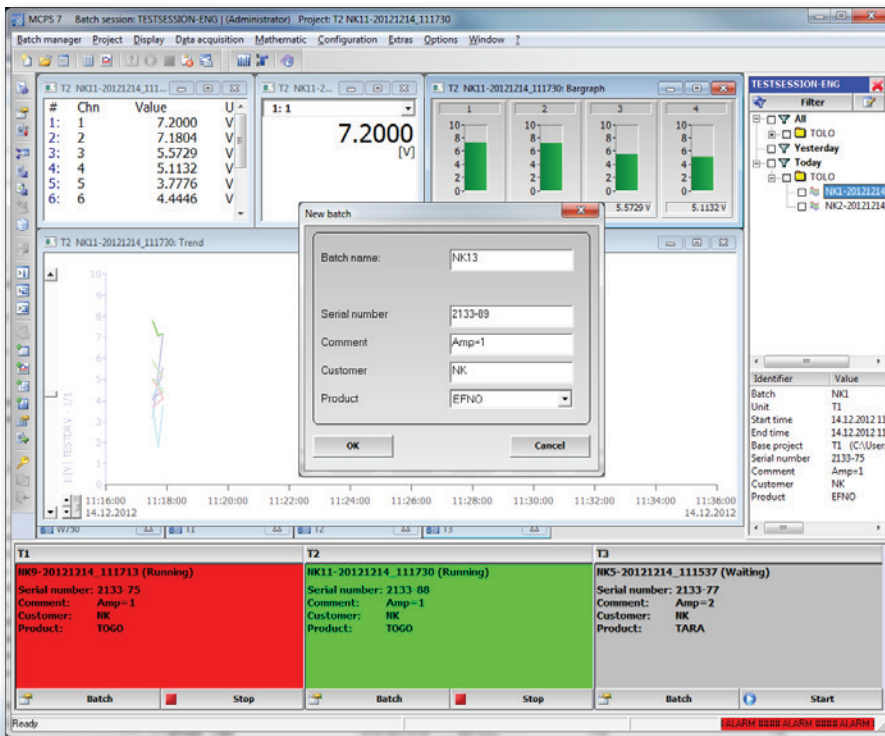
# Automatic file import

Automatic import of batch files: Many instruments create own data files on memory cards, which are often 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 necessary. Continuous monitoring with no gap between two batches is also supported by MCPS. These data file can be combined to daily, weekly or monthly batch files

This form of data collection is particularly interesting if true paper recorders are to be replaced, but the paper copy must continue to be used for documentation and signing.

Web server

Remote access to MCPS data is in addition to NetViews also possible with a standard web browser. MCPS has an embedded Web server that can build any page. These can be assembled 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.
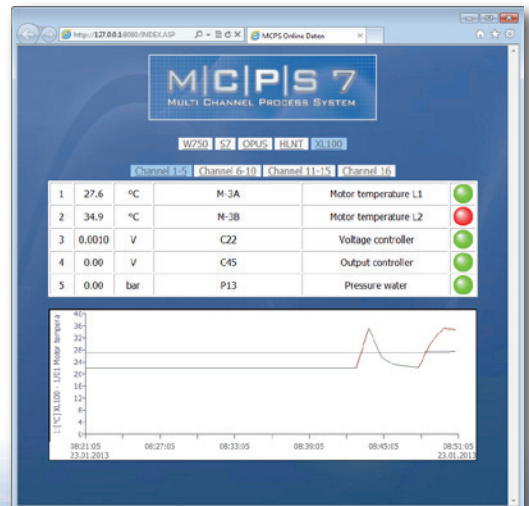
Conforms to 21CFR11

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

- Extensive user administration with login/password history
- Audittrail: Log user actions and changes
- Tamper-resistant files (Electronic records)
- Electronic signature with three levels
- Manual and automatic GAPFilling

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
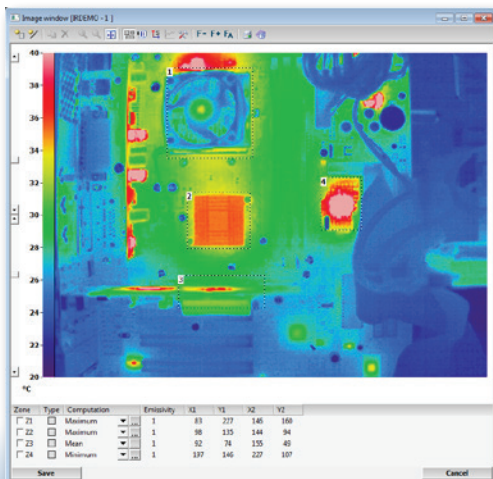
Infrared measurements

Thermography becomes more and more attractive to analyse 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 heating 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
- Sterilisators with F-Value computation
- Clean water

- Incubators
- Refrigerators
- Cryo systems
- Blood banks
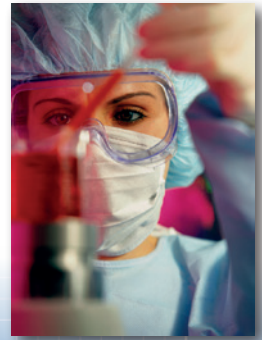
Energy effiency / Resource monitoring

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. The following quantities can inter alia 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 independant test steps
- Reports for each step and whole test
- Pattern function for analog outputs

- Several independant 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, clean 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
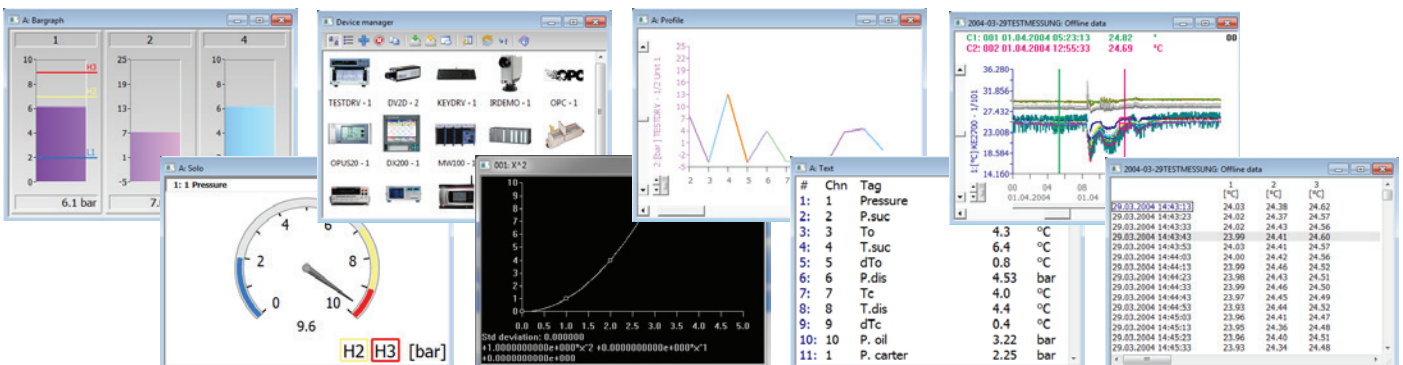
MCPS is available in German and English language. For system requirements, technical specifications, demos, more information and download visit WWW.MCPS.DE.

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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