

## Multifunctional Measurement Technology

IMTRON is offering a variety of hardware and software for simple and comfortable data acquisition.



There are two computer controlled systems available: **DASIM** (extremely universal amplifiers for many sensors) and **SIQUAD** (modular amplifiers with excellent cost/performance ratio).

Amplifier / System	DASIM	SIQUAD
Channels / amplifier	2	4 (Universal 2)
Channels / 19" chassis	up to 32	up to 64
Sample rate / channel	1 Hz - 20 kHz, 1 Hz - 40 kHz	1 Hz - 20 kHz
Sample rate / chassis	appr. 500 kS/s	appr. 500 kS/s
Sensor connection	Chassis back panel	Amplifier front panel
Universal amplifier	Strain gauge full/half/quarter bridge DC voltage, current Thermo couples K, L, etc. Pt100, Pt1000 Frequency analog Frequency digital Incremental encoder PWM Torque ICP <sup>®</sup>	Strain gauge full/half/quarter bridge DC voltage, current Thermo couples K, L, etc. Pt100, Pt1000 Frequency analog Frequency digital Incremental encoder PWM Torque ICP <sup>®</sup>
CF amplifier 5 kHz	Strain gauge, LVDT, Torque	--
AD conversion	16 bit	16 bit
Strain gauge amplifier	--	Strain gauge full/half/quarter bridge
DC amplifier	--	DC voltage, current
TC amplifier	--	Thermo couples K, L, etc.
RTD amplifier	--	Pt100
FV (2-channel) amplifier	--	Frequency digital, incremental
ICP <sup>®</sup> amplifier	--	ICP <sup>®</sup>
AD conversion	--	24 bit
CAN Interface	2 CAN nodes (front panel)	2 CAN nodes (front panel)
DIO	8 x DI, 8 x Relays O (front panel)	8 x DI, 8 x Relays O (front panel)
AO	4 x $\pm 10$ V (front panel)	4 x $\pm 10$ V (front panel)
Interfaces	RS 232, CAN, Ethernet	RS 232, CAN, Ethernet
Data output		
Digital	CAN, Ethernet	CAN, Ethernet
Analog	$\pm 10$ V	(optional $\pm 10$ V)
Privileged use	Often changing applications in test benches, Lab experiments	Fixed multi-channel, permanent test bench applications, decentral use
Power supply	110 - 230 V AC; 9 - 36 V DC	110 - 230 V AC; 9 - 36 V DC
Cost/performance ratio	+	++

The 2- resp. 4-channel amplifiers (details see above) are developed for the various sensors in test benches of the automotive industry, machine manufacturing and installation, research and development. They offer sensor excitation, isolation, signal conditioning, analog and/or digital data acquisition with highest precision.

A **CAN Interface** unit serves for synchronous acquisition of messages from CAN bus. These are available on the internal bus and can be processed together with the other measurement data by the acquisition software. Each unit has two independent CAN nodes transmitting 24 values in different formats at 16 bit each synchronously. Both nodes can be switched together. A bus termination is switched in by the parameter setting software.

A **DIO** plug-in unit is available for 8 digital input signals (e.g. logical states) with an output of switching signals by relays. An extended version provides acquisition of signals from frequency generators and incremental encoders.

An **AO** unit supplies adjustable voltages up to  $\pm 10$  V.

For output of **PWM** signals a 4-channel unit delivers up to 5 A.

All standard 19" chassis are laid out for either mobile (DC supply 9 - 36 V) or stationary use (AC supply 110 - 230 V). They have an Ethernet interface for data acquisition and parameter setting, as well as a CAN socket for access to a CAN bus. Parameter setting of the amplifiers can also be done via a serial (RS 232 / RS 485) interface. Several chassis can be interlinked synchronously by the Ethernet interface to up to 600 channels. 2 to 16 amplifier bays are available for both systems in one 19" housing or 84 TE rack.

Especially designed for **distributed applications** and/or a few channels, the SIQUAD line offers **compact** modules and **miniature** systems with 2 resp. 3 amplifier units. The amplifiers are integral part with the compact modules; with the miniature systems they can be exchanged by the user.



There are 2 variations of the compact modules: 8 channels (optional 16 for TC) with back panel CAN interface, or 8 (16) channels with front panel CAN and back panel RS 232 interface. The type of amplifier has to be specified when ordering as it is built in firmly by factory. Housing types are flange, DIN-Rail, or box.

Mini systems have 2 (box) housing sizes for 2 or 3 amplifier units with CAN and Ethernet interface on the front panel. Amplifiers can be easily plugged in and out by the user as required.

Parameter setting of the amplifiers is done via the serial or (if available) Ethernet interface. Data acquisition can be simply done already via the CAN interface with a suitable data logger. Via the Ethernet interface comfortable data acquisition and online visualisation of measurement data can be performed PC-based with DAQSoft. Drivers for other measurement software like DASyLab, DIAdem, and LabVIEW are optional available.

**DaSoft** is the parameter setting software, and **DAQSoft** is for data acquisition and visualisation with the computer-controlled measurement systems DASIM und SIQUAD.

Parameter setting for all amplifiers is first done with **DaSoft**. Sensor data can be stored in a sensor database for automatic system configuration. Integration into a customer-specific parameter setting software is possible via a communication DLL.

The following settings are done with DaSoft:

- Type of sensor, measurement ranges, sensor excitation and further options for the functionality of the amplifiers
- Sample rate 1 Hz to 40 kHz (depending on amplifier type), sensor range (nominal value) and physical unit

There is a defined structure (see also next page): DaSoft provides the system settings and generates an interface file "DDL.int" with the necessary specifications for data acquisition. DAQSoft takes this information of the "DDL.int" automatically. The file is always updated with actual data after each communication of DaSoft with the measurement system. If changes were done in the system with DaSoft, it will be automatically recognised by DAQSoft and notified. Therefore it is not possible to measure with wrong parameters.

DAQSoft offers essentially the following features:

**Measurement:**

- Measurement over time, X/Y measurement
- Measurement with several systems and different IP addresses
- Signal acquisition of various data formats from a CAN Interface
- Different settings for triggers, combined with level monitoring
- Recurring measurement (serial measurement)
- Setting of automatic saving intervals
- Measurement with online view and pre-monitoring
- Online calculation (basic arithmetical operation) for individual channels
- Acquisition of Video data from a DigiCam synchronous with measurement data
- Acquisition of GPS data and route tracing synchronous with measurement data

**Visualisation and processing:**

- Visualisation of data in a graph (main, side, stacked graphs)
- Visualisation as instantaneous value (analog, numerical) and in tabular form
- Visualisation of video data as single pictures
- Import of video data in AVI format
- Real time information
- Analysis of saved measurements with zoom and cursor modes
- Comparison of measurements
- Combination of measurements
- Mathematical post-processing of selected measurement channels
- Post-filtering of selected measurement channels
- Analysis with FFT and power spectrum

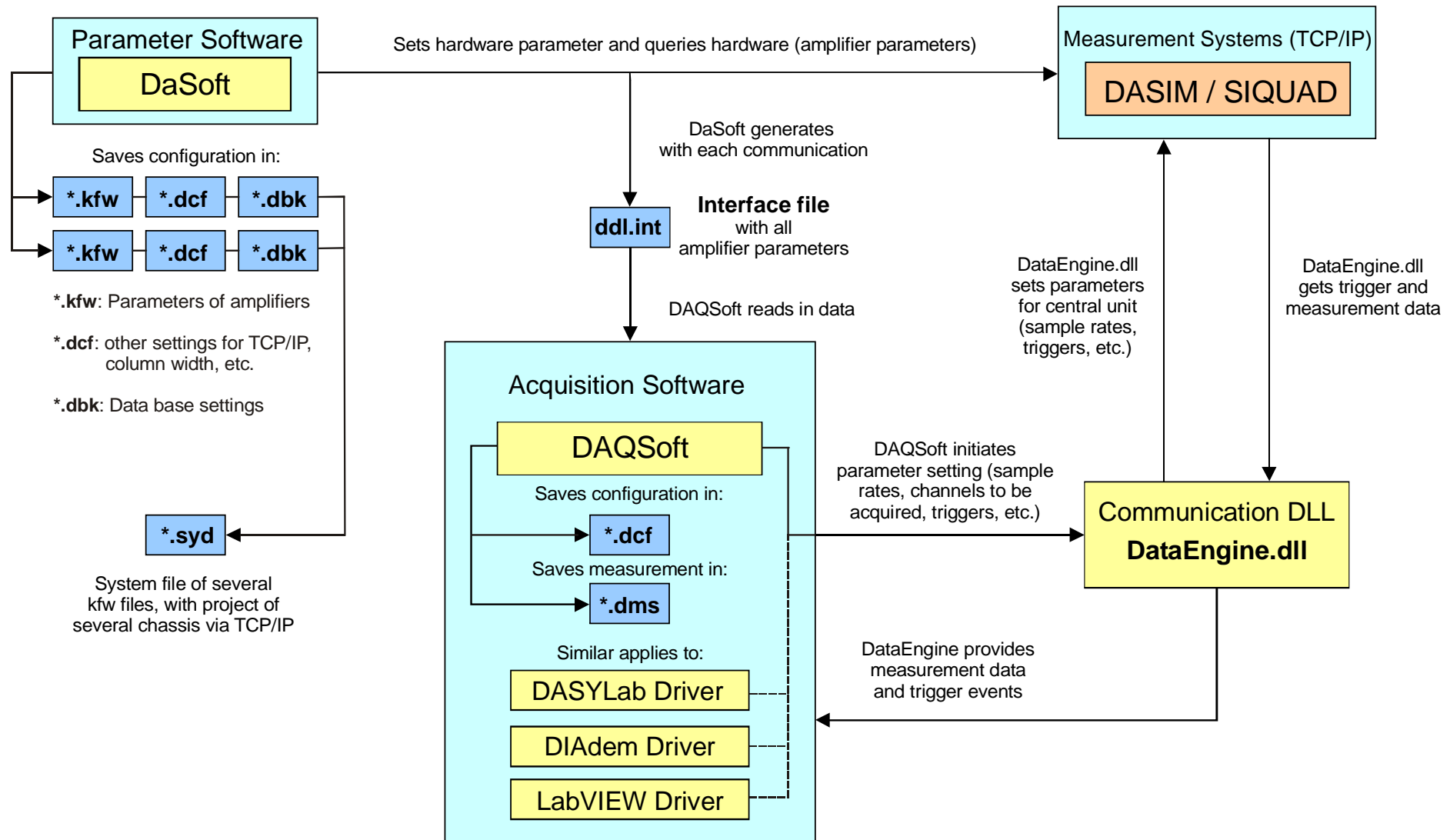
**Exports, reports, miscellaneous:**

- Export function into other data formats like Famos, DIAdem, ASCII, MATLAB
- Export of video data in AVI format or as single picture
- Generating different reports as HTML or Crystal report with different layouts
- Event logging with log file
- Project based directory structure

Drivers for other acquisition software like DASyLab, DIAdem, and LabVIEW are optional available.

An extensive functional library "DataEngine.dll" is available for integrating the systems into an own data acquisition software or environment. It transmits triggers and measurement data, and receives the other way parameters for the central unit like sample rates, trigger conditions and information about the selected channels.

# Relation between Software, Drivers, and Measurement Systems



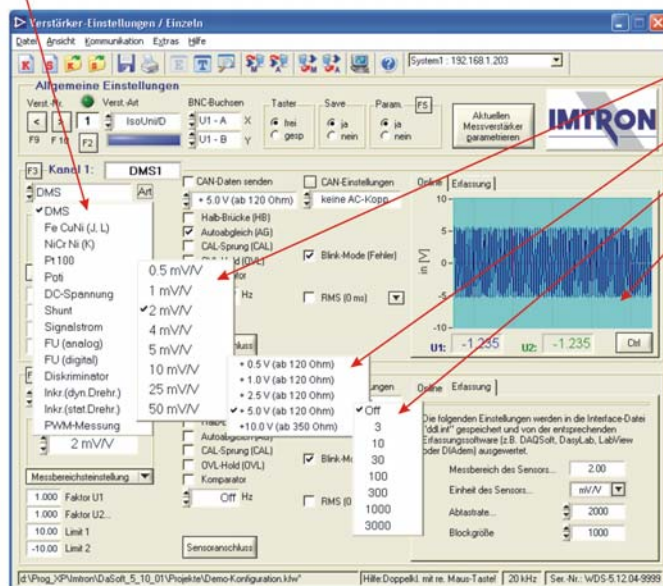


A **Measurement** needs only 4 steps:

## 1. Parameter setting of the system with DaSoft

Parameter setting is done by channel or table-driven in DaSoft. After selecting the type of sensor, the corresponding measurement range is set, and if necessary excitation voltage as well as cut-off frequency selected. Checking of the signal can be done by means of an online display function.

Clear selection of all types of sensors



For each sensor:

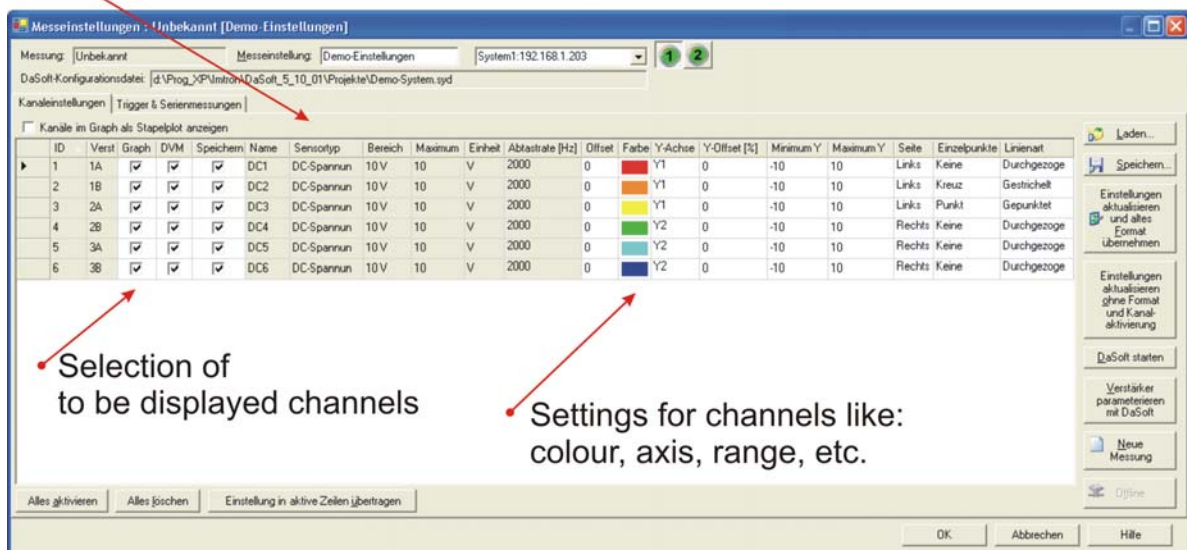
- Matching ranges
- Matching excitation supply
- Filter settings
- Online display

Additional features:

- Level monitoring
- AC coupling
- RMS
- CAN output

## 2. Set-up of channels in DAQSoft

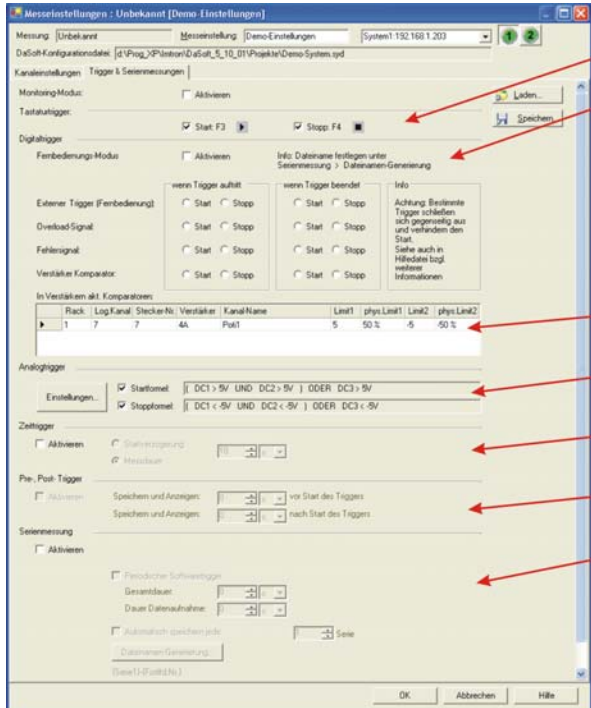
Transferring device settings



Parameters set with DaSoft are automatically taken over by DAQSoft. Now the to be displayed and saved channels can be selected, and their settings like colour, axis, range be fixed.

### 3. Setting triggers, recurring measurements, and online calculation with DAQSoft

Besides the amplifier-selectable levels, further trigger conditions and combinations of digital and analog values can be set in DAQSoft, as well as time-trigger points and parameters for periodical respectively recurring measurements.



Start/Stop with keyboard,  
digital triggers and remote control

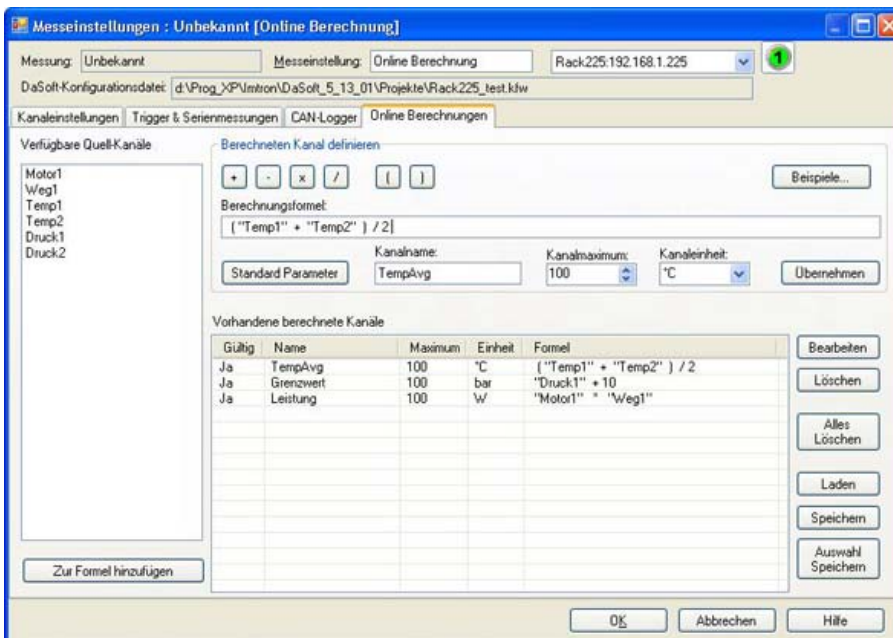
Level monitoring by amplifier

Analog trigger

Time trigger

Pre-, post-trigger

Recurring measurement with automatic generation of file name



Berechneten Kanal definieren

Berechnungsformel:  $(\text{"Temp1"} * \text{"Temp2"}) / 2$

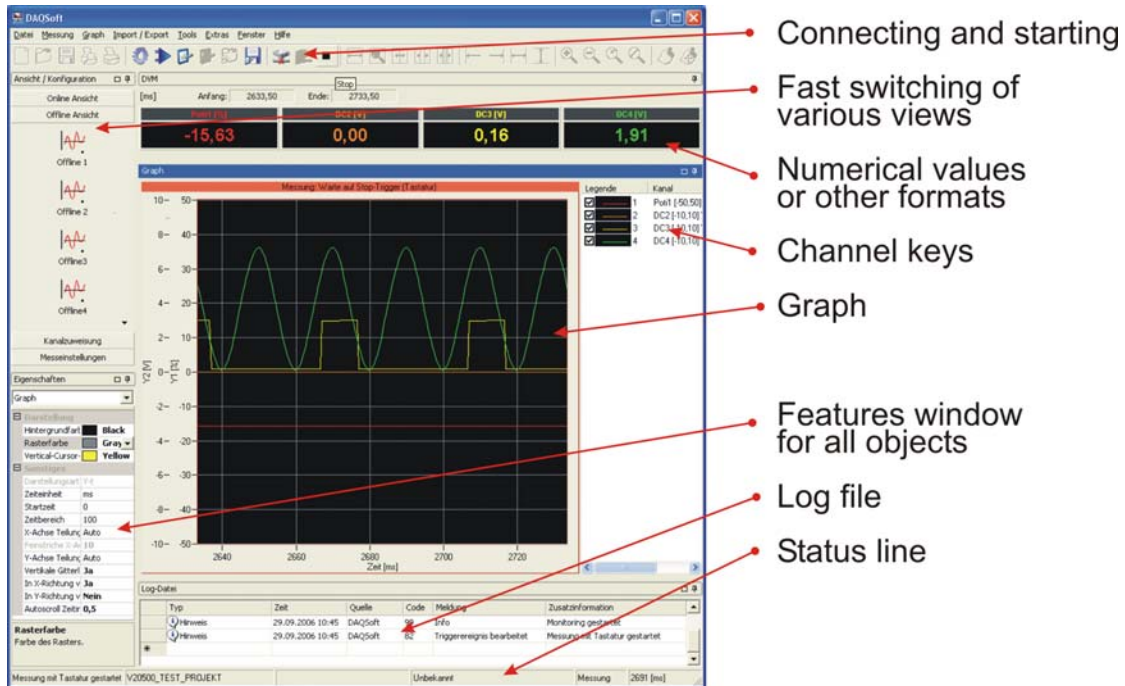
Kanalname: TempAvg Kanalmaximum: 100 Kanaleinheit: °C

Gültig	Name	Maximum	Einheit	Formel
Ja	TempAvg	100	°C	$(\text{"Temp1"} * \text{"Temp2"}) / 2$
Ja	Grenzwert	100	bar	$\text{"Druck1"} * 10$
Ja	Leistung	100	W	$\text{"Motor1"} * \text{"Weg1"}$

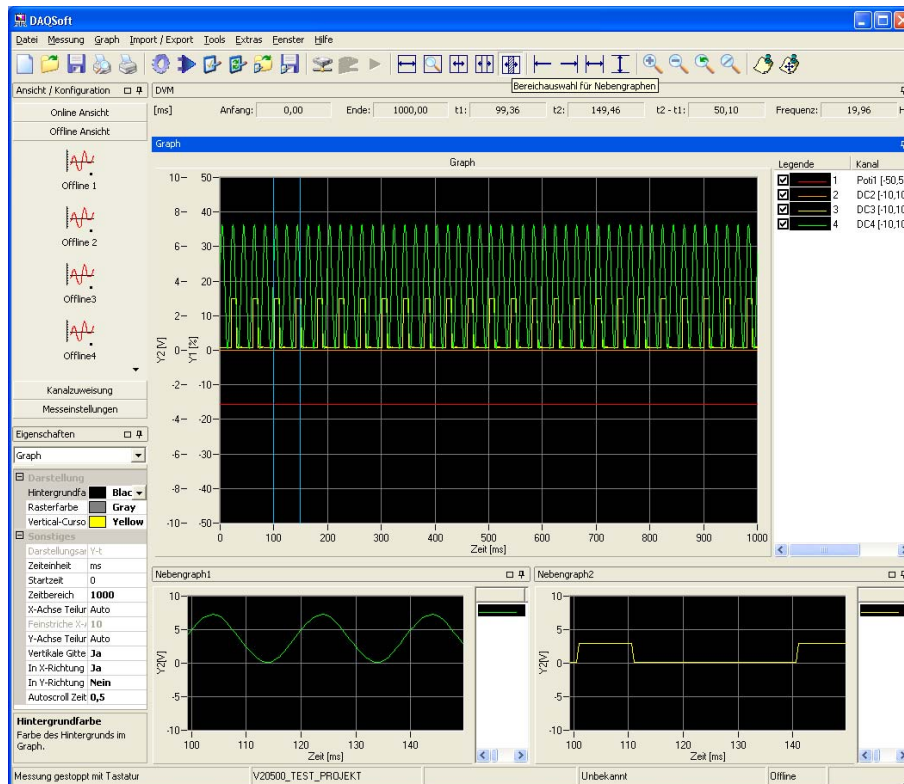
For online calculation of channels basic arithmetical operations can be used with arbitrary combinations. The calculated channel can have a suggested standard or a freely chosen name.

#### 4. Measuring with DAQSoft

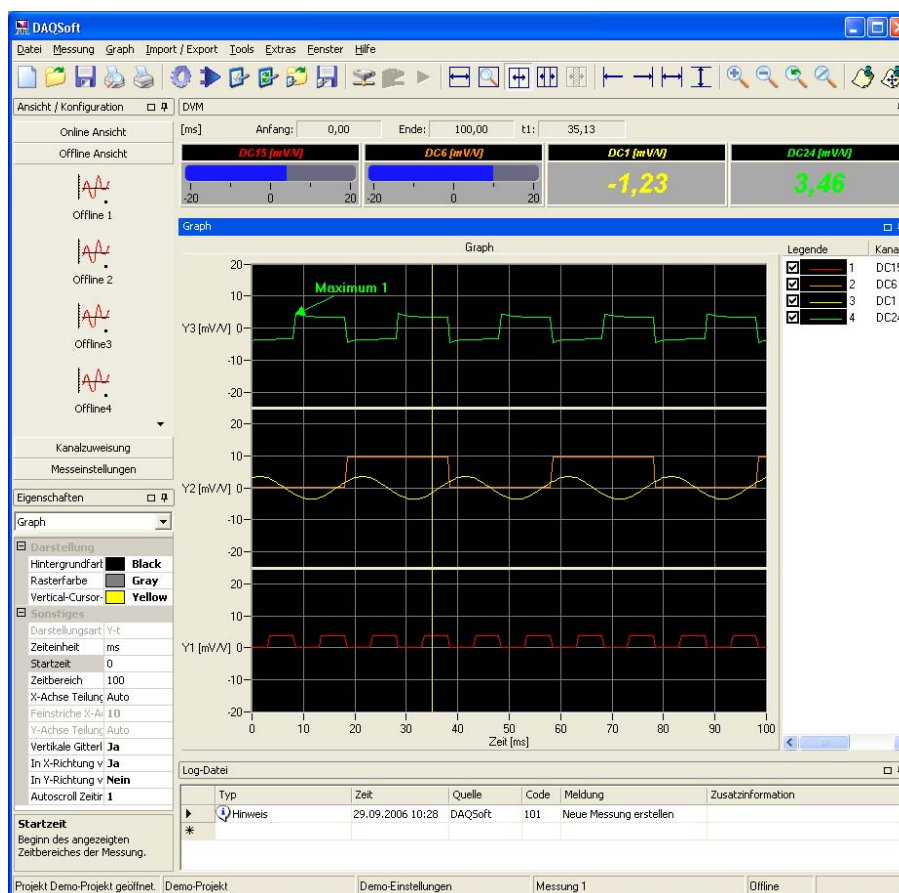
Activating the TCP/IP connection and pressing the start button will start the measurement. Selected channels will be automatically displayed. The docking windows for views, values, graph, features, log file, etc., can be arranged any way or faded in and out.



DAQSoft has manifold ways of **visualising** measurement values:

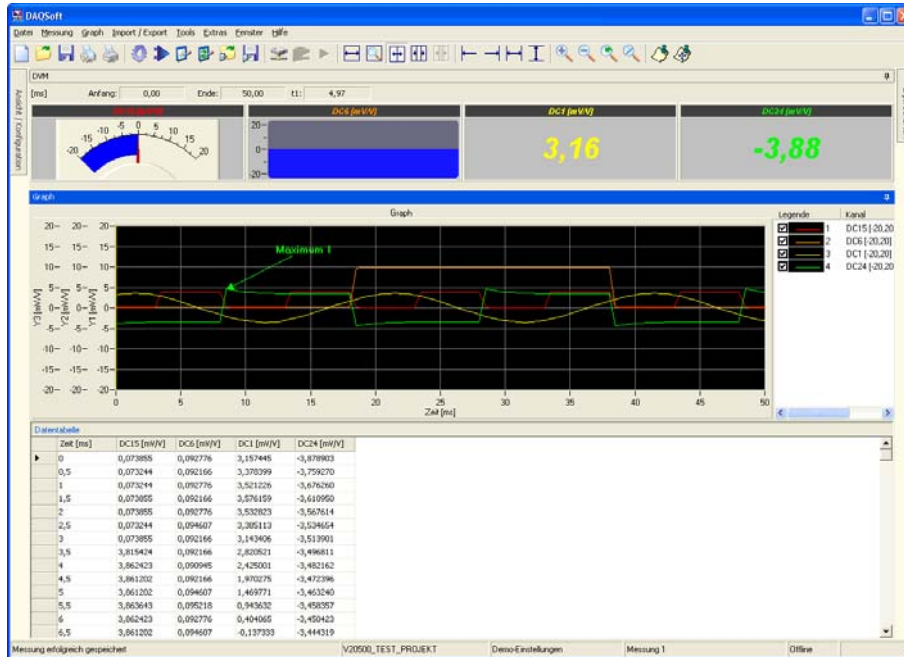


All channels can be displayed in the main graph, but also single or grouped in side graphs. For a higher resolution a different time base compared to the main graph can be chosen; the Y-axis however has the same scale. This presentation works in online and offline mode.

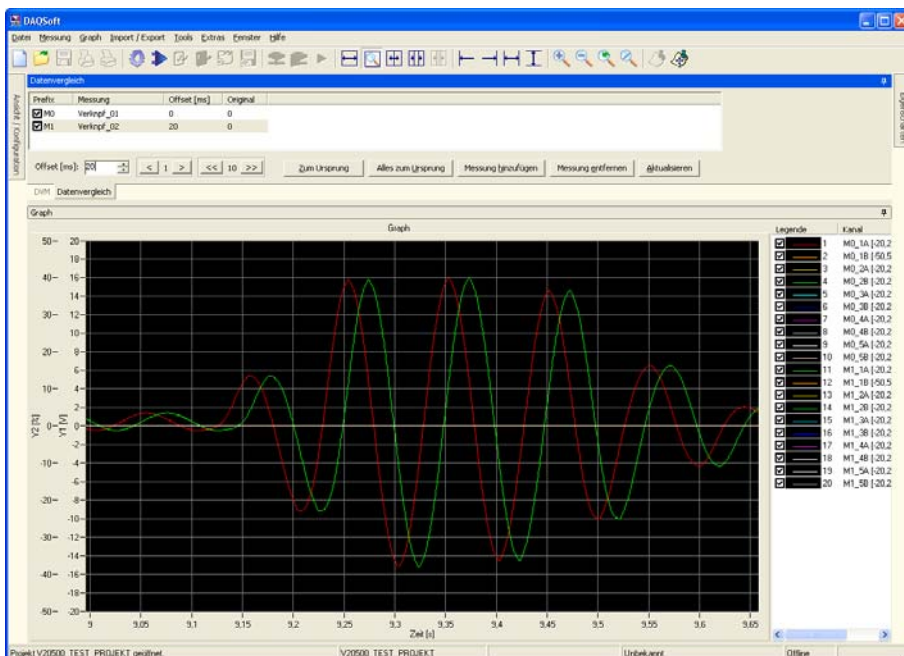


Alternatively the signals can be displayed in stacked plots. All stacked plots have a common time axis; the Y-axes can have individual graduations. The measurement values can be displayed numerically, or in bar respectively round reading instruments.

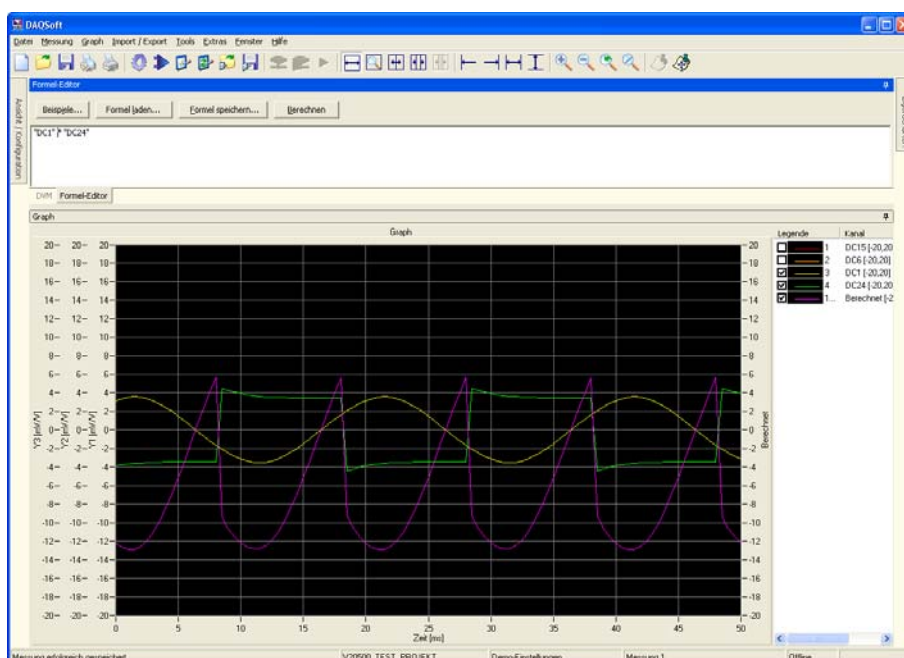




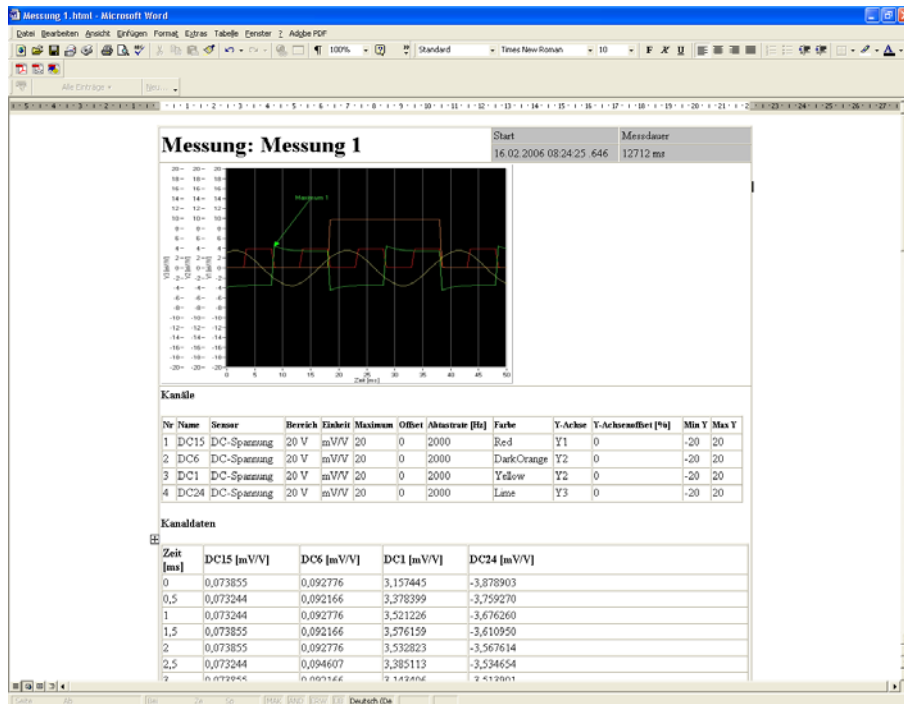
Minimum and maximum values can be analysed in offline mode and documented with an annotation. Parallel to the numerical and graphical presentation of the values, a visualisation in tabular form is possible.



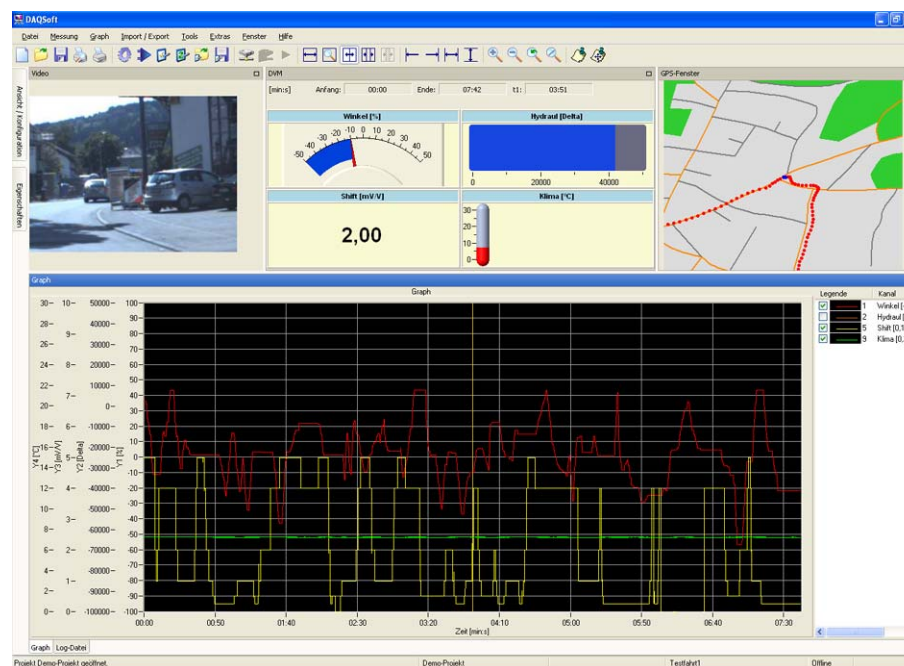
Direct comparison of signals is also easy in offline mode. By entering time offset values, signal curves can be shifted against each other any way.



Besides the comparison of signals, the combination and mathematical post-processing of channels is possible. Also post-filtering of channels as well as analysis with FFT or power spectrum can be realised.



DAQSoft also has an export function for its measurement data into other formats like Famos, DIAdem, MATLAB, and ASCII. Further on HTML reports (in Internet Explorer, Word or Excel) can be generated. These reports can be adapted individually for heading, graphical display and selected data. Crystal reports do generate several output formats like pdf.



An extended version of DAQSoft acquires GPS and video data via suitable hardware synchronous with other measurement data. This allows optical and spatial coordination of events. Video data capturing is also used in test beds to monitor critical events.

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