Level | Pressure | Flow | Temperature | Liquid Analysis | Registration | Systems Components | Services | Solutions

Memosens Technology

Memosens Platform Concept

Endress+Hauser
People for Process Automation

Level | Pressure | Flow | Temperature | Liquid Analysis | Registration | Systems Components | Services | Solutions

Technology

Digital, intelligent, contactless

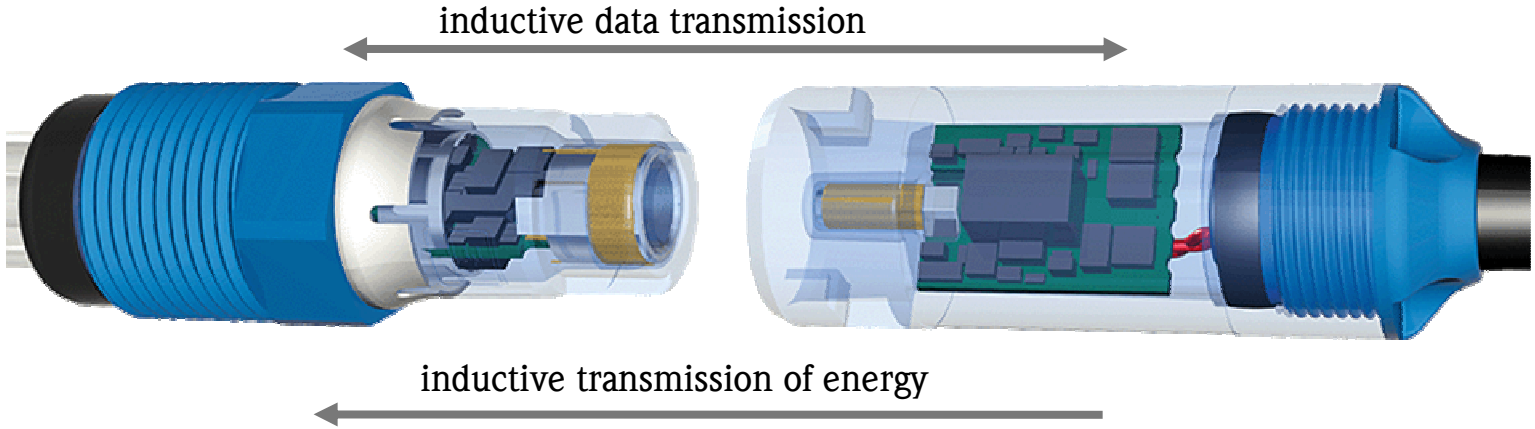
Endress+Hauser
People for Process Automation

Digital Sensor with Memory

Memosens turns every sensor into a digital sensor with integrated memory

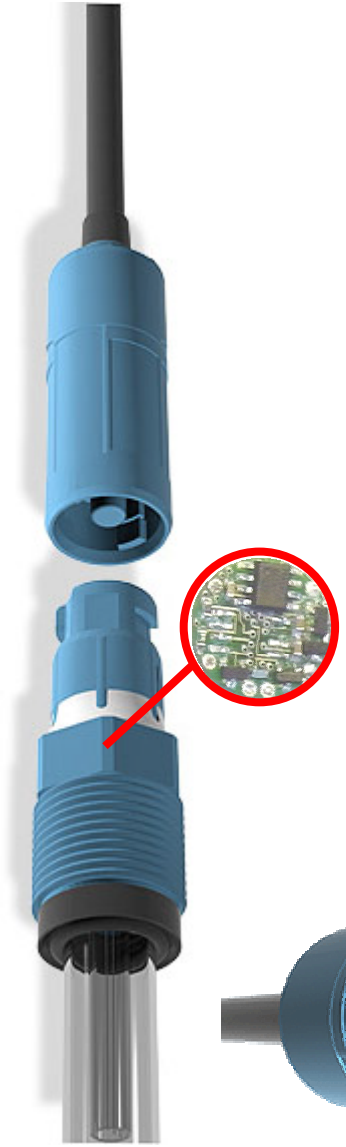
Sensors with Memosens technology store the actual calibration data as well as other information used for predictive maintenance eg. overall time in operation, time in operation within specified pH and temperature limits.

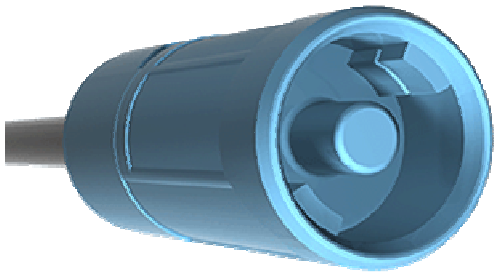
Memosens function principle



- The electric connection between cable and sensor is made inductive
- This inductive connection powers the sensor head with energy
- Additionally it allows a bidirectional and sophisticated data transmission between sensor head and cable coupling

Convenient digital sensor





Memosens converts the glass electrode into a digital sensor with integrated memory:

- Simple sensor exchange with calibrated sensors
- No calibration in the field, but high quality calibration in the laboratory
- Simplified installation through increased distance between sensor and transmitter
- Increased availability of measuring loop by predictive maintenance through stored sensor data

Digital pH sensors with Memosens

Safe connection to transmitter and easy installation

Memosens with inductive data transmission

- Uses digital data transmission cable instead of special pH-cable.
- Has just 4 wires to connect to transmitter.
- Causes no risk of faulty connection.
- Shows either **correct** value or **no** value.
- Does not need solution ground to be connected.

Memosens – electrical advantages

Cable design and attribute does not affect the measurement

➔ Semiconductor coated cables are not any more necessary,
cable length is not any more important.

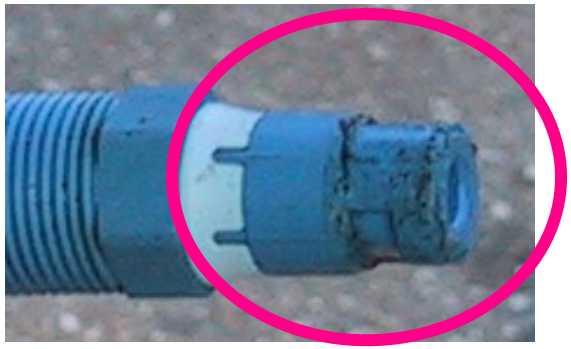
The pH electrode is a well-defined and complete sensor

➔ The sensor is self-checking,
cable attributes do not affect the sensor checks

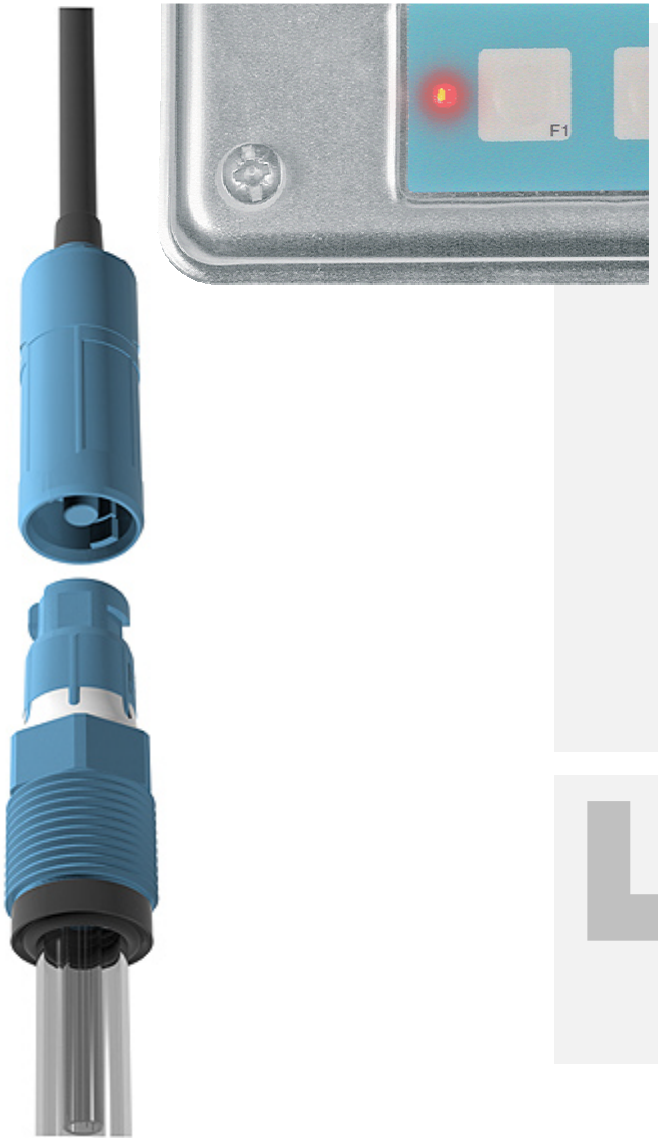
Memosens – controlled sensor power supply

- Low power for sensor electronic ?
- Wrong value caused by extended cable length ?
- Wrong value caused by coated coupling ?

Sensor electronic and electronic of cable coupling are self-checking systems.
They control on correct voltage of power supply and give alarm in case of deviation or interrupt the communication by themselves.



Memosens – control of data transmission



- Cable pinched off ?
- Cable defective ?
- Cable disconnected from sensor ?

Analog pH-sensor:
No alarm,
pH-value shows around pH 7 (0mV)

Digital pH-sensor (Memosens):
Alarm,
measured value is fixed („frozen“)

No communication between sensor and transmitter results in an alarm: automatically !

Calibration independent from measuring point

pH sensors with Memosens technology are the very first sensors to allow a calibration of the sensor independant from the actual measuring point in the laboratory.

The result:

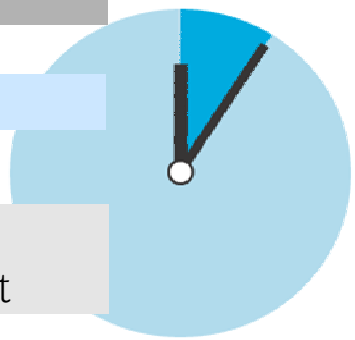
A system breakdown caused by a faulty pH sensor is reduced to the time between recognizing and sensor exchange.

Cost saving thanks to Memosens technology

Expenditure of time for maintenance / recalibration

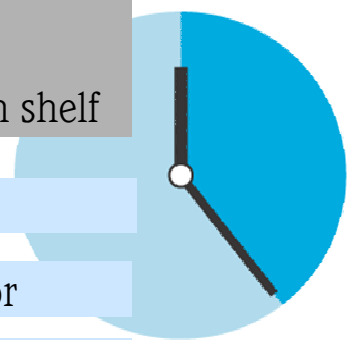
Memosens sensors

- Error message: maintenance needed
- Take calibrated sensor
- Remove sensor
- Install sensor
  Release measuring point

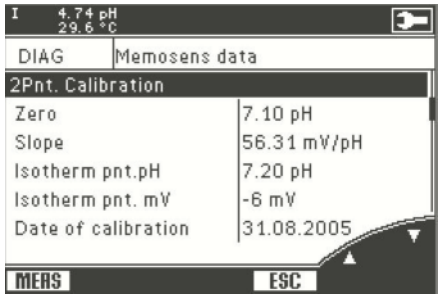


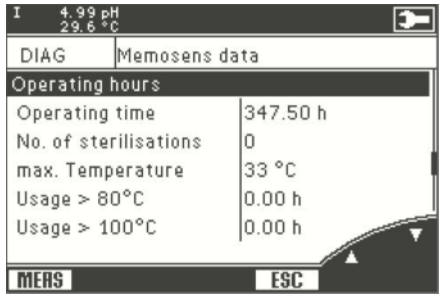
Standard sensors

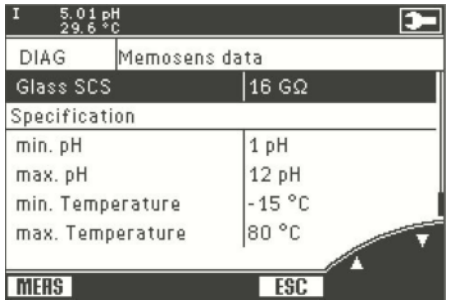
- Error message: maintenance needed
- Take cleaning agent
  Take buffers
  Take new sensors from shelf
- Remove sensor
- Clean/exchange sensor
- Calibrate sensor with buffer 1
- Calibrate sensor with buffer 2
- Install sensor
  Release measuring point



Memosens – Data stored in pH sensors

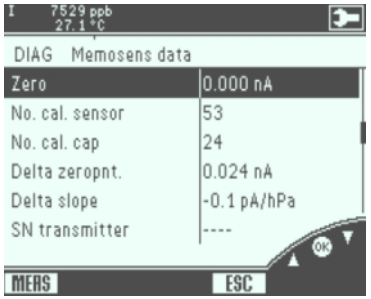


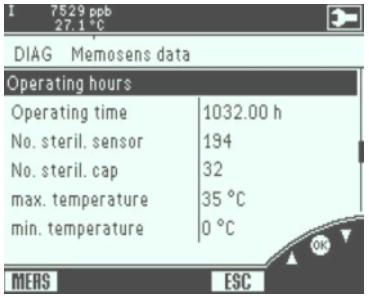


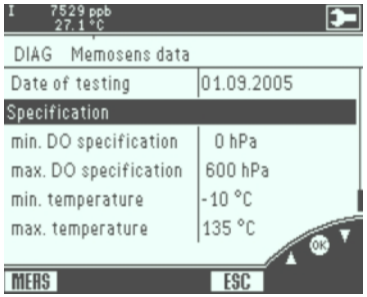


slope [mV/pH]:	**slope** of the digital sensor
Zero point [pH]:	**Zero point** of the digital sensor
No. Calibrations:	**Number of calibrations**, performed with the digital sensor
Date of calib:	**Date of the last calibration** of the digital sensor
Buffer 1 [pH]:	**pH-value of the first buffer**, used for the last calibration
Buffer 2 [pH]:	**pH-value of the second buffer**, used for the last calibration
Δ slope [mV/pH]:	**Change of slope** from preceding to last calibration
Δ zero point [pH]:	**Change of zero point** from preceding to last calibration

Memosens – Data stored in DO sensors







Slope [pA/hPa]:	**Slope** of the digital sensor
Zero [nA]:	**Zero point** of the digital sensor
No. Calibrations:	**Number of calibrations**, performed with the digital sensor both for slope and zero point
Date of Cal.:	**Date of the last calibration** of the digital sensor both for slope and zero point
No. Cal. sensor:	**Number of calibrations** which have been cariied out with this sensor
No. Cal. cap:	Number of calibrations which have been cariied out with this membrane cap
Δ zeropoint [nA]:	**Change of zero point** from preceding to last calibration
Δ slope [pA/hPa]:	**Change of slope** from preceding to last calibration

Memosens – Information stored in the pH sensor

Operation time [h]:	**Total operation time** of the sensor
No. Steril.:	**Number of sterilizations**, applied to the sensor: criteria: T > 121 °C, mind. 20 min
T (max) [°C]:	**maximum temperature**, applied to the sensor

Operating hours of the sensor under specific conditions:

above 80 °C:	**Operating time** of the sensor at temperatures **above 80 °C**
above 100 °C:	**Operating time** of the sensor at temperatures **above 100 °C**
<-300 mV:	**Operating time** of the sensor at pH below **-300 mV** Δ to zero/working point (= pH 12 @ 25 °C).
>+300 mV:	**Operating time** of the sensor at pH above **+300 mV** Δ to zero/working point (= pH 2 @ 25 °C)
1. Commissioning:	**Date of first commissioning** at a transmitter
Ri GSCS [Ohm]:	**actual impedance of glass membrane**

Order code:	**Order code** of the sensor
Serial Number:	**Serial number** of the sensor

HW-version:	**Hardware-Version** of the sensor
SW-version:	**Software-Version** of the sensor
Check date:	**Datum of factory check** of the sensor
SAP:	**SAP-Number** of the sensor

Memosens – Information stored in the pH sensor

Operation time [h]:	**Total operation time** of the sensor
No steril sensor:	**Number of sterilizations**
No steril cap:	**Number of sterilizations**
T (max) [°C]:	**maximum temperature**, applied to the sensor
T (min) [°C]:	**minimum temperature**, applied to the sensor

Operating hours of the sensor under specific conditions:

> 40 °C:	**Operating time** of the sensor at temperatures **above 40 °C**
> 80 °C:	**Operating time** of the sensor at temperatures **above 80 °C**
> 10nA:	**Operating time** of the sensor with currents higher than **10 nA**
> 40nA:	**Operating time** of the sensor with currents higher than **40 nA**
Commissioning:	**Date of first commissioning** at a transmitter

Operating values

Polarisation voltage [mV]: **650mV** for COS21D-A, C; **0mV** for COS21D-B,

Charge:	**Electrolyte consumption**, current multiplied time

Specified limit values per sensor

min DO:	**minimum** DO specification
max. DO:	**maximum** DO specification
min Temp.:	**minimum temperature**, specified
max Temp.:	**maximum temperature**, specified

Order code:	**Order code** of the sensor
Serial Number:	**Serial number** of the sensor
HW-version:	**Hardware-Version** of the sensor
SW-version:	**Software-Version** of the sensor

Level | Pressure | Flow | Temperature | Liquid Analysis | Registration | Systems Components | Services | Solutions

Sensor simulation

Memocheck Plus CYP01D

Memocheck CYP02D

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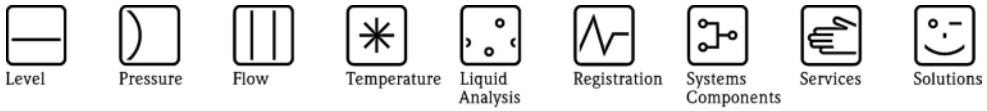
People for Process Automation



Memocheck Plus CYP01D
Memocheck CYP02D

Strategy

Endress+Hauser
People for Process Automation

Liquid Analysis

Endress+Hauser

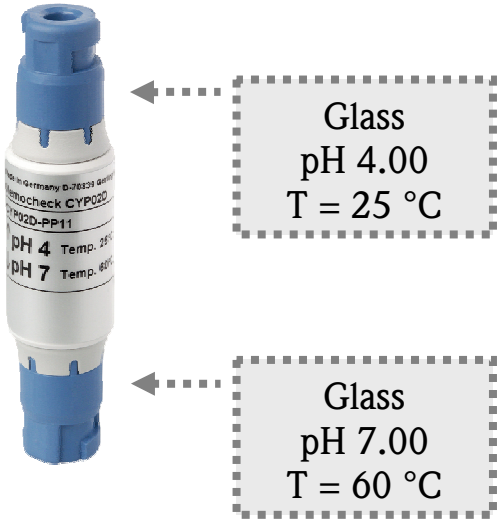
The Memocheck (Plus) Portfolio at a glance

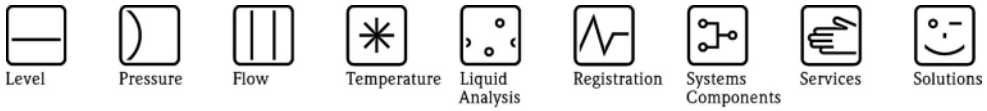
Memocheck Plus CYP01D

- Qualification tool
- Qualification of measuring system at plant qualification
  - IQ – Installation Qualification
  - OQ - Operational Qualification
- Target group:
  Quality manager

Memocheck CYP02D

- Service tool
- Easy & fast check of measuring loop
  - for commissioning / installation
  - For trouble shooting
- Target group:
  Plant and service staff





Memocheck Plus CYP01D
Memocheck CYP02D

Technology

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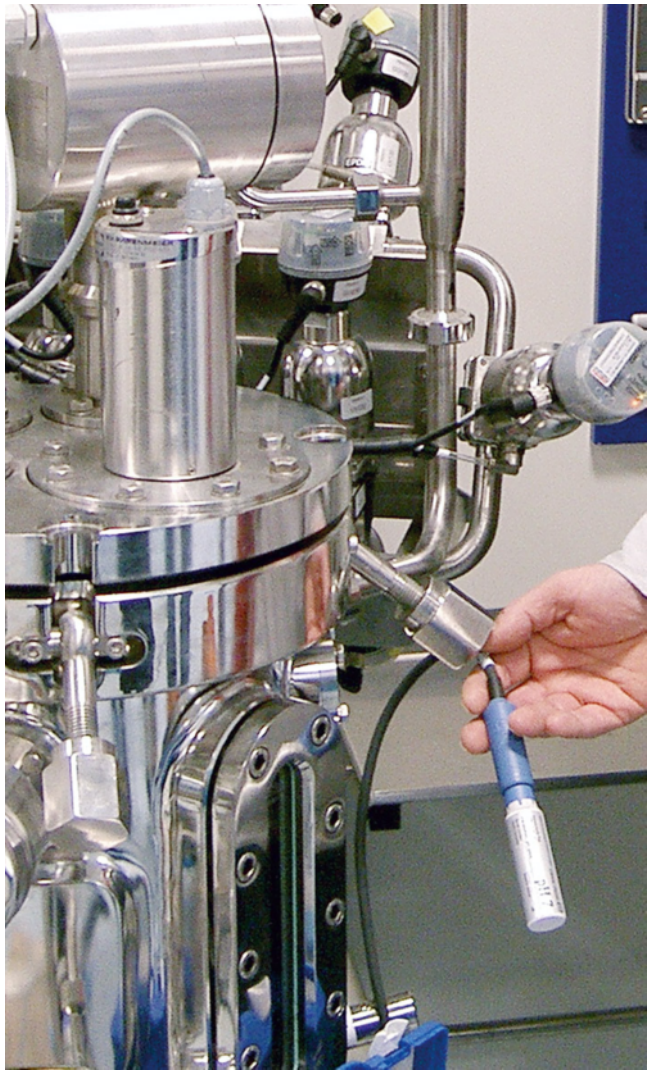
People for Process Automation

Liquid Analysis

Endress+Hauser

General Features

- Simulation of predefined pH and temperature values
  - From cable coupling to process control systems
  - For pH glass electrodes
  - Checks the complete Memosens functionality
  - For Liquiline M CM42, Mycom S CPM153 and Liquisys M CPM2x3 transmitters with Memosens technology



Liquiline – Memosens Systems

- Additional Features for Liquiline – Memosens systems
  - Upon connection of a plug-in head, the simulation icon is displayed 

  - Simulation status of the transmitter is also transmitted to the process control system
  - Memosens data can be exported

Liquid Analysis

Endress+Hauser

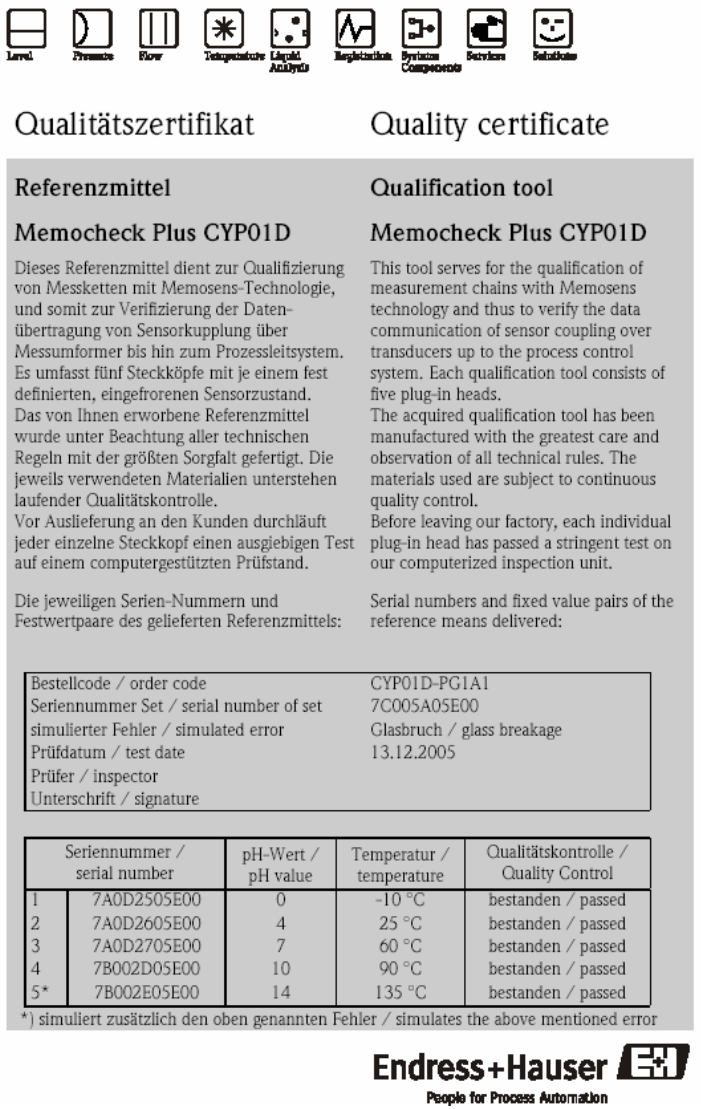
Memocheck Plus CYP01D

- Set of 5 plug-in heads
- Simulation of fixed, defined sensor statuses
- Values cannot be overwritten
- 1 pair of fixed values each:
  - pH; glass + temperature
  - pH; ISFET+ temperature
  - Dissolved oxygen + temperature
- 1 plug-in head-in simulates error, e.g. glass breakage for pH; glass
- Each plug-in head is traceable to serial number –> Lot
- Set has also a serial number –> CER

Endress+Hauser

Quality certificate CYP01D

- Each individual plug-in head has passed a stringent test on our computerized inspection unit
- Simulation data for pH and temperature cannot be changed
- Simulation of default Memosens data, which cannot be changed, too



Qualitätszertifikat — Quality certificate

Referenzmittel — **Qualification tool**

Memocheck Plus CYP01D — **Memocheck Plus CYP01D**

Dieses Referenzmittel dient zur Qualifizierung von Messketten mit Memosens-Technologie, und somit zur Verifizierung der Datenübertragung von Sensorkupplung über Messumformer bis hin zum Prozessleitsystem. Es umfasst fünf Steckköpfe mit je einem fest definierten, eingefrorenen Sensorzustand. Das von Ihnen erworbene Referenzmittel wurde unter Beachtung aller technischen Regeln mit der größten Sorgfalt gefertigt. Die jeweils verwendeten Materialien unterstehen laufender Qualitätskontrolle. Vor Auslieferung an den Kunden durchläuft jeder einzelne Steckkopf einen ausgiebigen Test auf einem computergestützten Prüfstand.

This tool serves for the qualification of measurement chains with Memosens technology and thus to verify the data communication of sensor coupling over transducers up to the process control system. Each qualification tool consists of five plug-in heads. The acquired qualification tool has been manufactured with the greatest care and observation of all technical rules. The materials used are subject to continuous quality control. Before leaving our factory, each individual plug-in head has passed a stringent test on our computerized inspection unit.

Die jeweiligen Serien-Nummern und Festwertpaare des gelieferten Referenzmittels:

Serial numbers and fixed value pairs of the reference means delivered:

Bestellcode / order code	CYP01D-PG1A1
Seriennummer Set / serial number of set	7C005A05E00
simulierter Fehler / simulated error	Glasbruch / glass breakage
Prüfdatum / test date	13.12.2005
Prüfer / inspector	
Unterschrift / signature	

	Seriennummer / serial number	pH-Wert / pH value	Temperatur / temperature	Qualitätskontrolle / Quality Control
1	7A0D2505E00	0	-10 °C	bestanden / passed
2	7A0D2605E00	4	25 °C	bestanden / passed
3	7A0D2705E00	7	60 °C	bestanden / passed
4	7B002D05E00	10	90 °C	bestanden / passed
5*	7B002E05E00	14	135 °C	bestanden / passed

*) simuliert zusätzlich den oben genannten Fehler / simulates the above mentioned error

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Liquid Analysis

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Memocheck CYP02D

- Service tool
  Check of measuring systems with Memosens technology
  - Commissioning / installation
  - Trouble shooting
- Concept
  - Fast and simple on-site check
  - Memosens ‚double plug head'
  - Simulates fixed sensor status
  - Combination:
    - pH; glass + pH; glass
    - pH; glass + pH; IsFET
    - pH; glass + ORP
    - pH; glass + Dissolved oxygen

Glass
pH 4.00
T = 25 °C

Glass
pH 7.00
T = 60 °C

Memocheck Plus CYP01D

Strategy for System Qualification

Liquid Analysis

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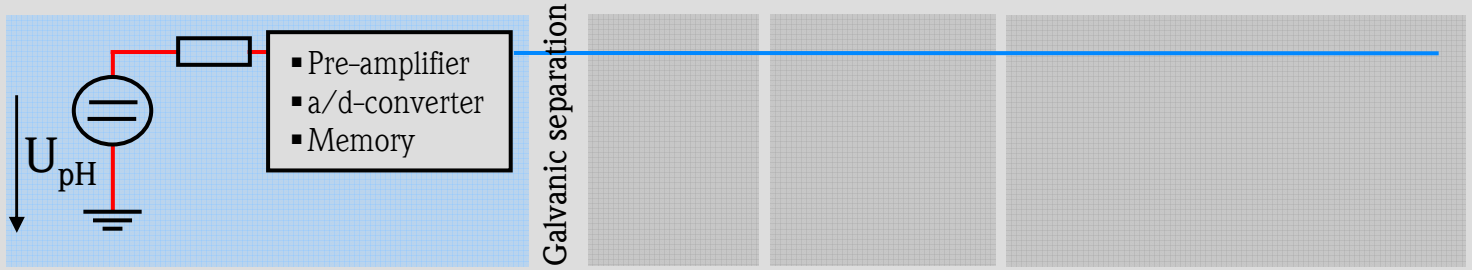
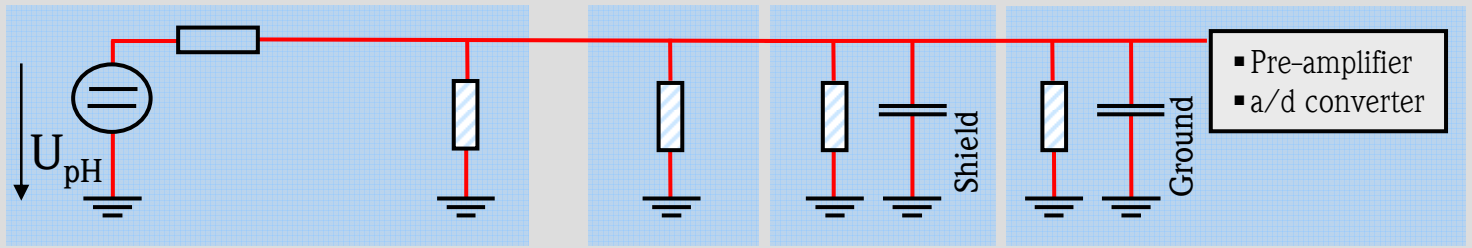
Functional Diagram Memosens vs. analog sensors

Memosens digital sensor: → Interference-free, digital data transfer



Analog sensor: (e.g. ISM)



Measuring chain to be calibrated !

Liquid Analysis

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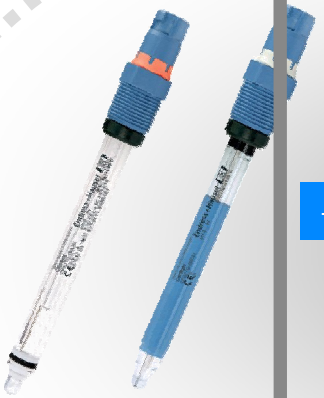
The Complete Measuring System

Measuring chain
Calibration
Central in lab

Possibility to separate

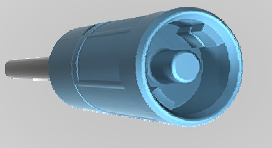
Digital data transfer
Qualification
on-site

PCS



CPSx1D

+



CYK10

+

Liquiline M
CM42

Liquid Analysis

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Impact of Lab Calibration Concept on Qualification

- Lab calibration concept separates the measuring system (on-site) from the calibration system (lab)
- Creation of a new data transfer interface in the measuring system to be qualified
- Qualification with qualification tool Memocheck Plus CYP01D

On-site:
- Exchange

Indoor:
- Cleaning
- Regeneration
- Calibration

Liquid Analysis

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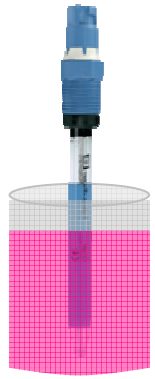
Qualification of Lab System

Laboratory system
(Lab1)

valid

Lab1
+ CYP01D / pH10
(Sim10)
= valid

valid



Lab1
+ calibrated CPSx1D
in buffer pH 4.01
(Sensor A)
= valid

Liquid Analysis

Endress+Hauser

Qualification of On-site online System

On-site online System
(TAG1)

valid

TAG1
+ CYP01D / pH10
Sim10
= valid

valid

TAG1
+ calibrated CPSx1D
in medium
Sensor A
= valid

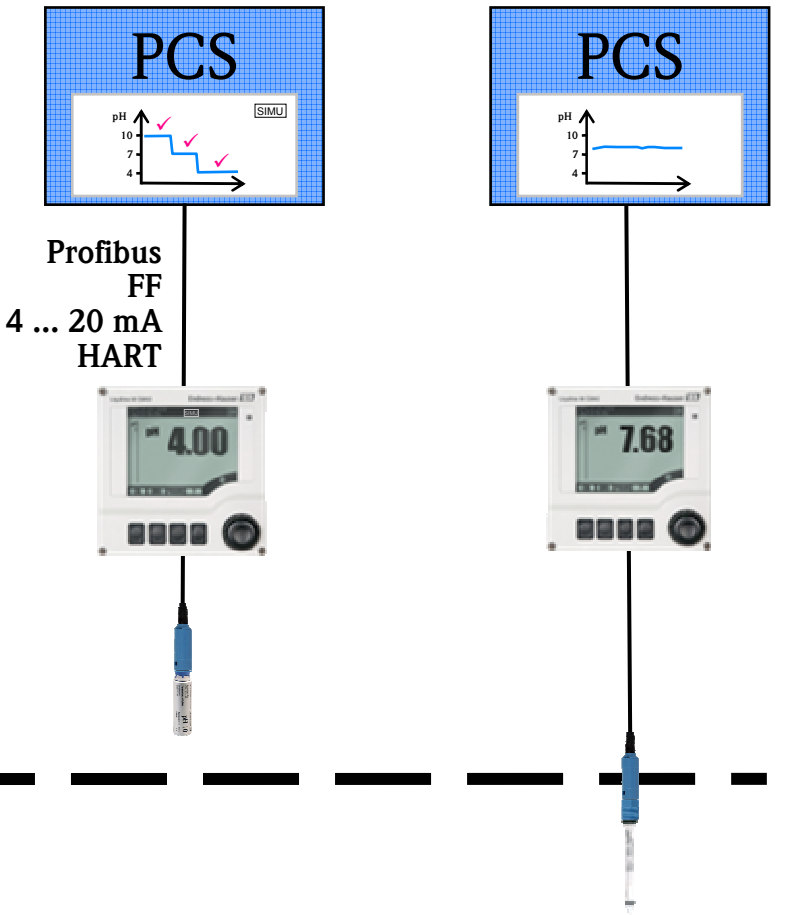
Liquid Analysis

Endress+Hauser

System Qualification with Memocheck Plus

Data transfer to PCS:

Qualification with
Memocheck Plus CYP01D



Measuring chain:

consists only of sensor –>
Calibration under ideal conditions in the lab possible

Level | Pressure | Flow | Temperature | Liquid Analysis | Registration | Systems Components | Services | Solutions

Memosens

Overview platform concept

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Memosens Portfolio

pH / glass	ORP	pH / ISFET	DO
			
CPS11D CPS71D CPS41D CPS91D	CPS12D CPS72D CPS42D	CPS471D CPS491D CPS441D	COS21D

Memosens platform is and will be extended continuously

Memosens – a platform concept

- Memosens is no pH specific concept
- Memosens is more than a plug-in head system
- Memosens is not dependant on a specific transmitter
- Memosens – Liquiline is the combined platform for all our products

Memosens Liquiline loops

- Liquiline CM44
- Precalibrated sensors to allow lab calibration
- 4 relays, 6 current outputs
- Profibus, Hart, Fieldbus

CUS70D
ultrasonic
sludge level

Helios
Ammonia
Phosphate

STIP-scan
Nitrate + SAC + Sludge
parameter (CM74 only)

Level | Pressure | Flow | Temperature | Liquid Analysis | Registration | Systems Components | Services | Solutions

Memosens

Cost-saving through central calibration

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Aims and scope of Memobase

Memobase is a database for data and sensor management

- Memosens data management
  - Complete documentation of sensor life cycle from commissioning through to disposal
- Memosens sensor management
  - Assignment of new sensors to specific measuring points (TAG) or groups of equal measuring points (TAG group)
  - Assigning broken sensors out-of-service

➔ Predictive Maintenance coupled with improved asset management becomes an integrated component of any new maintenance strategy

Compare full costing Memosens vs. Analog (1)

Maintenance costs for 10 measuring points and 10 calibrations per month

Acquisition costs (one-off)

	Conventional measuring point		Memosens measuring point	
Transmitter, cable, pH sensor	Transmitter, cable, pH sensor		Transmitter, cable, pH sensor	
Laboratory workstation	not possible		Bench-top instrument, cable, data tool	
Number of measuring points	10		10	
Calibration costs	conventional		Memosens	
Total cost of acquisition		€ 15,000		€ 19,000

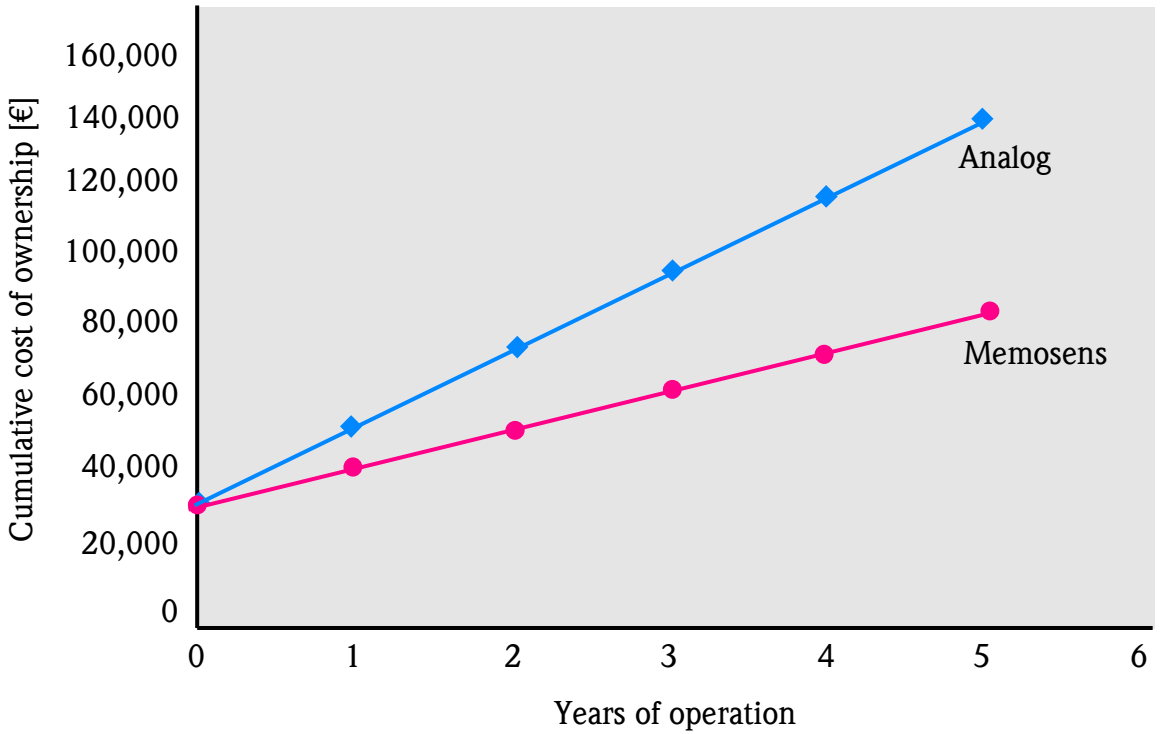
Maintenance costs for a measuring point

	Conventional measuring point		Memosens measuring point	
Calibration in laboratory by specialist personnel	not possible		10 minutes	€ 20
Calibration on site by specialist personnel		€ 60	not necessary	
Sensor replacement on site by maintenance man	not necessary			€ 10
Number of calibration per month	10		10	
Costs of calibration per month	10 x € 60	€ 600	10 x € 30	€ 300
Costs of calibration per year	12 x € 600	€ 7,200	12 x € 300	€ 3,600

Source: Bayer Technology Services, Lanxess

Compare full costing Memosens vs. Analog (3)

Cumulative cost of ownership for 20 measuring points and 30 calibrations per month



- Acquisition costs are roughly equal: 30,000 €
- Maintenance cost saving over 5 years: > 50,000 €

Source: Bayer Technology Services, Lanxess

Classical off-line system

Manual, discontinuous transport

Plant sampling	Transport of sample	Laboratory

- Possibilities of online analysis are not yet exploited
- Possible change of pH value during the transport caused by
  - Shift of chemical equilibrium
  - Absorption/outgassing of volatile compounds (eg. CO_2)

Conventional online measuring system

Outdoor:
- Exchange
- Cleaning
- Regenerating
- Calibrating

Analog sensor

Error message:
Maintenance needed

Take cleaning agent
Take buffers
Take new sensor

Register at control station

Remove sensor

Clean & exchange sensor

Calibrate sensor buffer 1

Calibrate sensor buffer 2

Install sensor
Release measuring point

Take the minutes

Calibration in the field is obligatory

Memosens revolutionizes your calibration strategy

Outdoor:
- Exchange

Laboratory:
- Cleaning
- Regenerating
- Calibrating
- Autom. minutes

Digital sensor

Error message:
Maintenance needed

Take new sensor

Register at control station

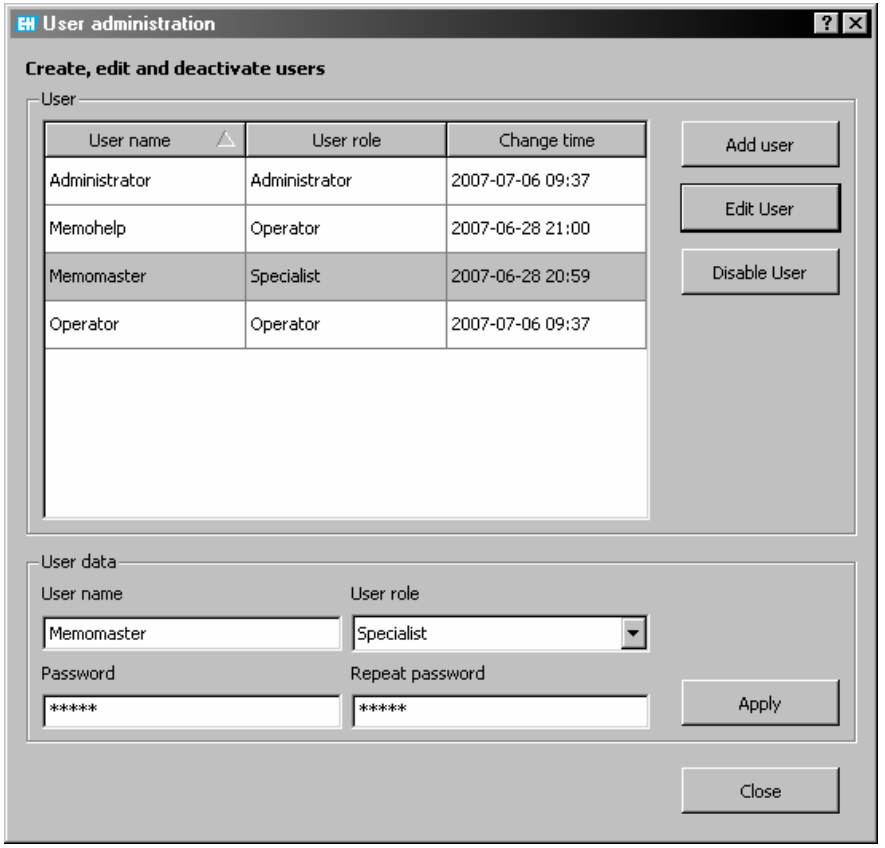
Remove sensor

Install sensor
Release measuring point

User Management

User Roles

- Operator
  save new Memosens data in Memobase or modify stored data records
- Specialist
  Operator rights plus TAG assignment
- Administrator
  Specialist rights plus user administration



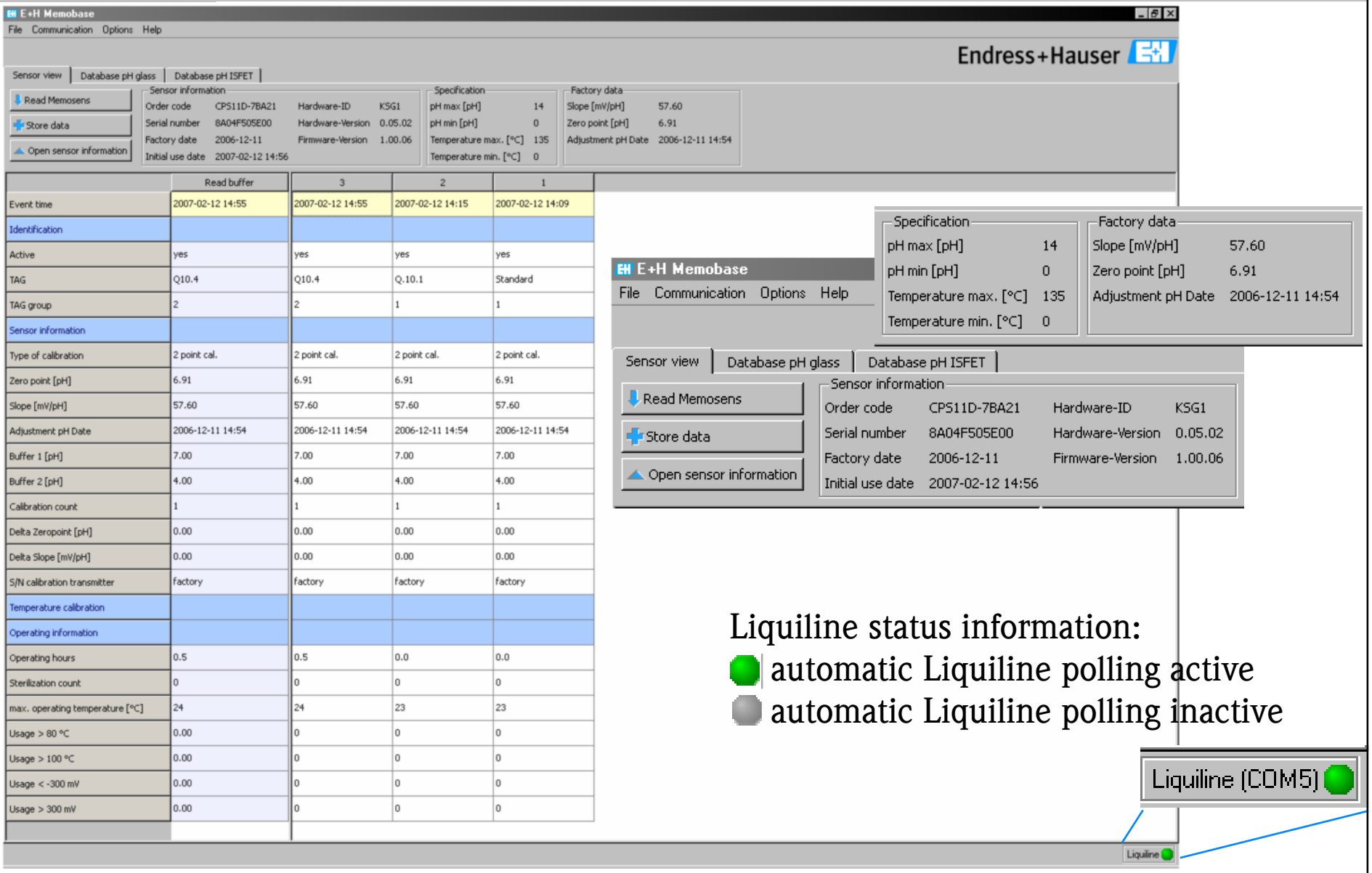
➡ Each user can be identified unambiguously by user name and user role

Liquid Analysis

Launch Memobase CYZ41D

Sensor view

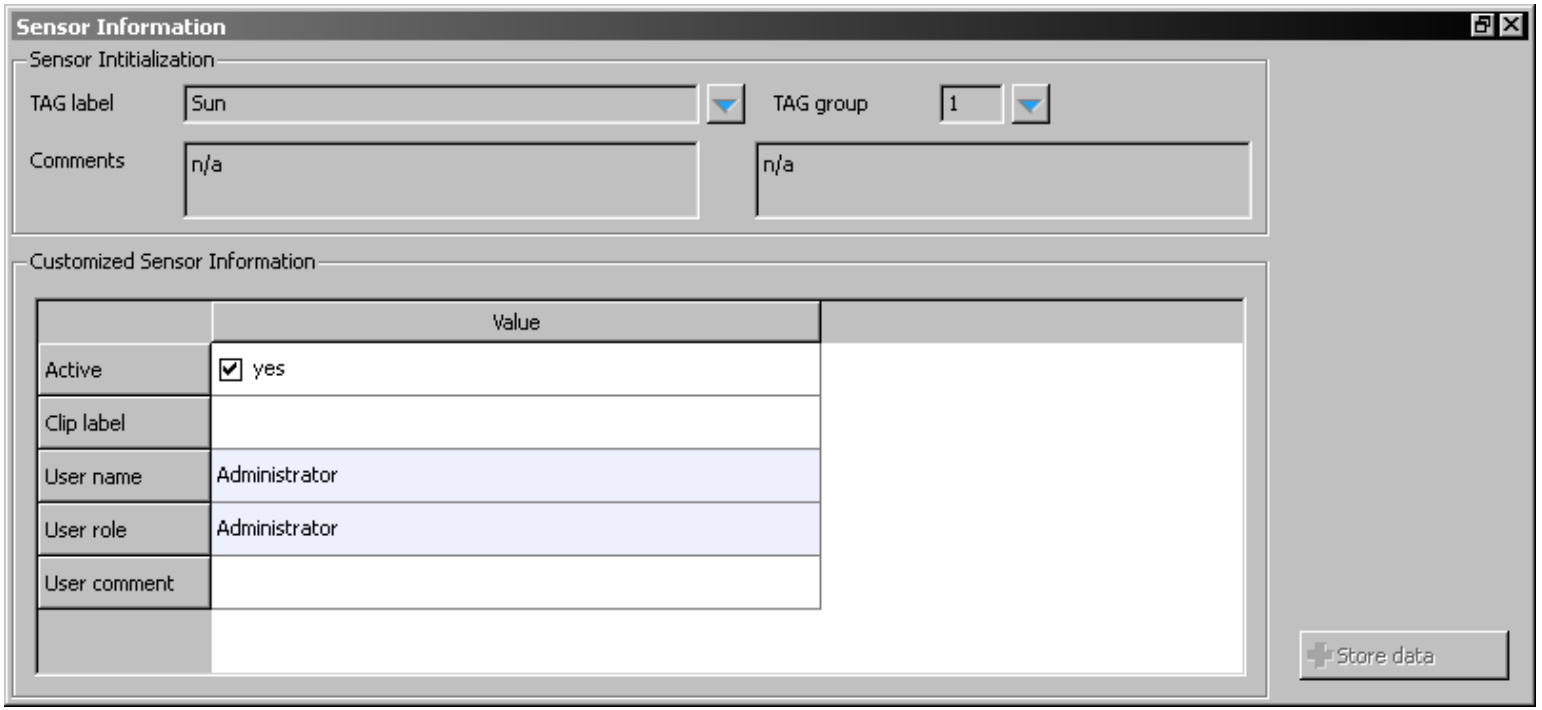
Endress+Hauser



	Read buffer	3	2	1
Event time	2007-02-12 14:55	2007-02-12 14:55	2007-02-12 14:15	2007-02-12 14:09
Identification				
Active	yes	yes	yes	yes
TAG	Q10.4	Q10.4	Q.10.1	Standard
TAG group	2	2	1	1
Sensor information				
Type of calibration	2 point cal.	2 point cal.	2 point cal.	2 point cal.
Zero point [pH]	6.91	6.91	6.91	6.91
Slope [mV/pH]	57.60	57.60	57.60	57.60
Adjustment pH Date	2006-12-11 14:54	2006-12-11 14:54	2006-12-11 14:54	2006-12-11 14:54
Buffer 1 [pH]	7.00	7.00	7.00	7.00
Buffer 2 [pH]	4.00	4.00	4.00	4.00
Calibration count	1	1	1	1
Delta Zeropoint [pH]	0.00	0.00	0.00	0.00
Delta Slope [mV/pH]	0.00	0.00	0.00	0.00
S/N calibration transmitter	factory	factory	factory	factory
Temperature calibration				
Operating information				
Operating hours	0.5	0.5	0.0	0.0
Sterilization count	0	0	0	0
max. operating temperature [°C]	24	24	23	23
Usage > 80 °C	0.00	0	0	0
Usage > 100 °C	0.00	0	0	0
Usage < -300 mV	0.00	0	0	0
Usage > 300 mV	0.00	0	0	0

Sensor view: initial Set-up of sensor

- Transferring Memosens data from sensor to database
- Initial calibration / adjustment
- Assignment of TAG and or TAG group



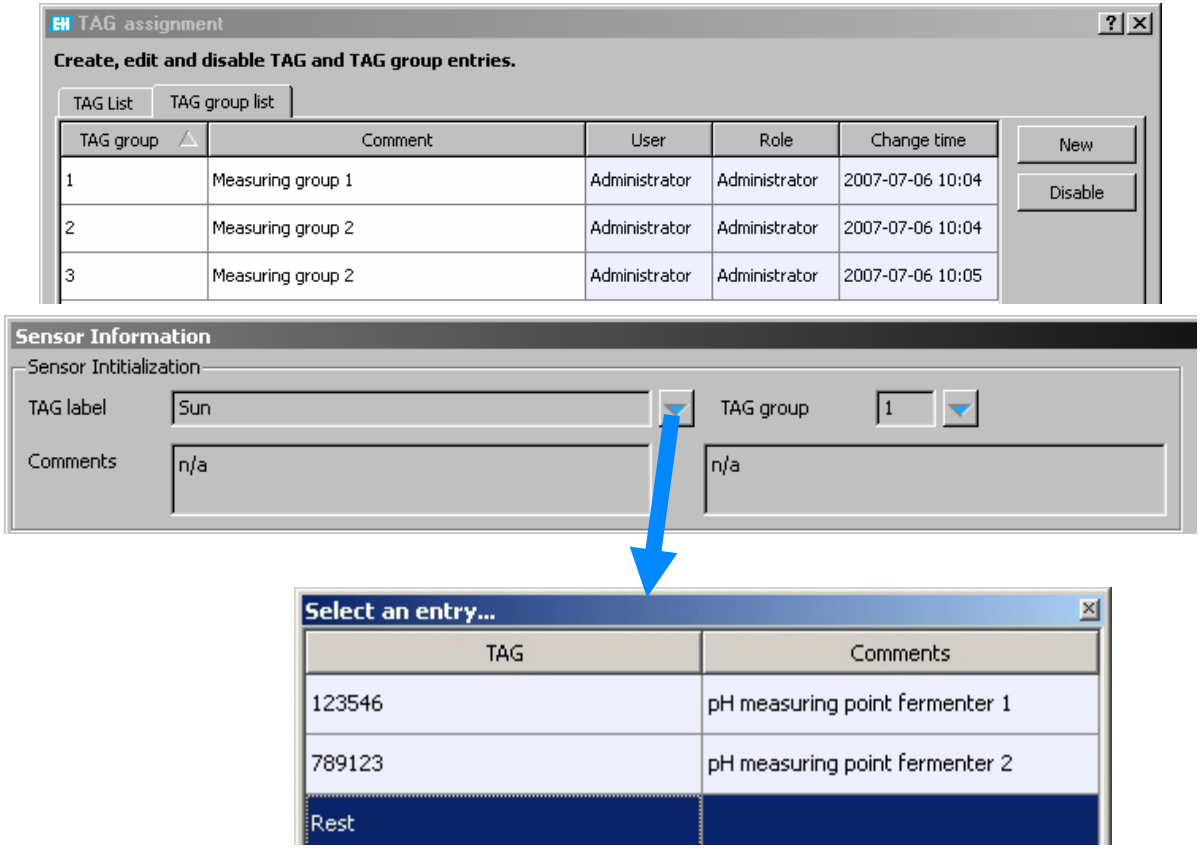
Sensor assignment and control

The correct assignment of the sensor to the measuring point is controlled by the transmitter

- Single application
  - Often quality relevant measuring point
  - Sensor A is applied exclusively at a defined measuring point, e.g. TAG XY
- Group application
  - Group of measuring points, e.g. internal
  - Sensor A is used in a group of equivalent measuring points, e.g. TAG group 42
- Pool application
  - No control of sensor assignment
  - Sensor A is applied in standard applications

The information about the application at the last measuring point is recorded in the sensor

Sensor assignment



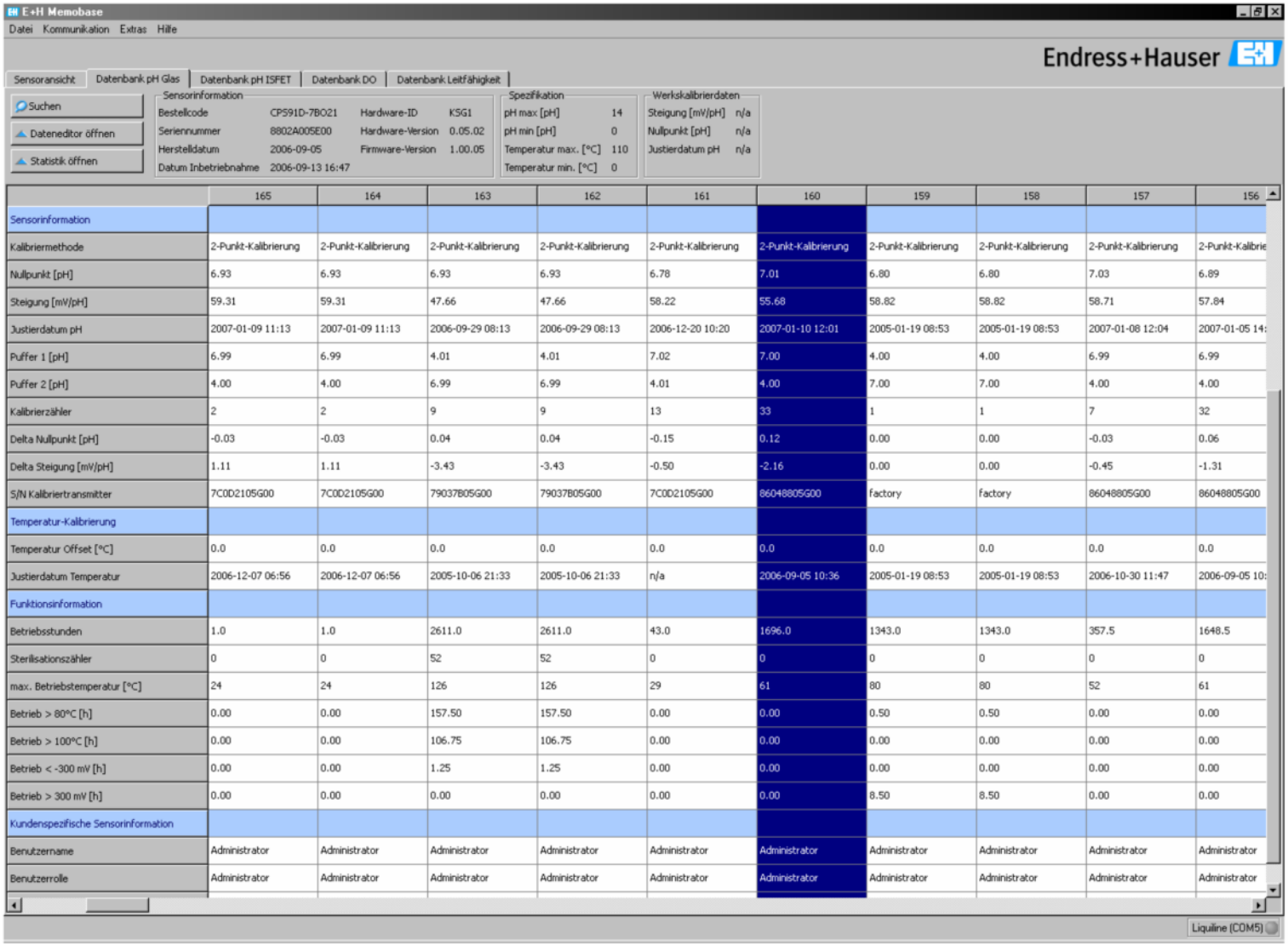
- Sensors can be assigned to dedicated measuring points (TAG or TAG-groups) with Memobase
- Assigned data are stored in sensor and database

Liquid Analysis

Launch Memobase CYZ41D

Endress+Hauser

Database pH glass



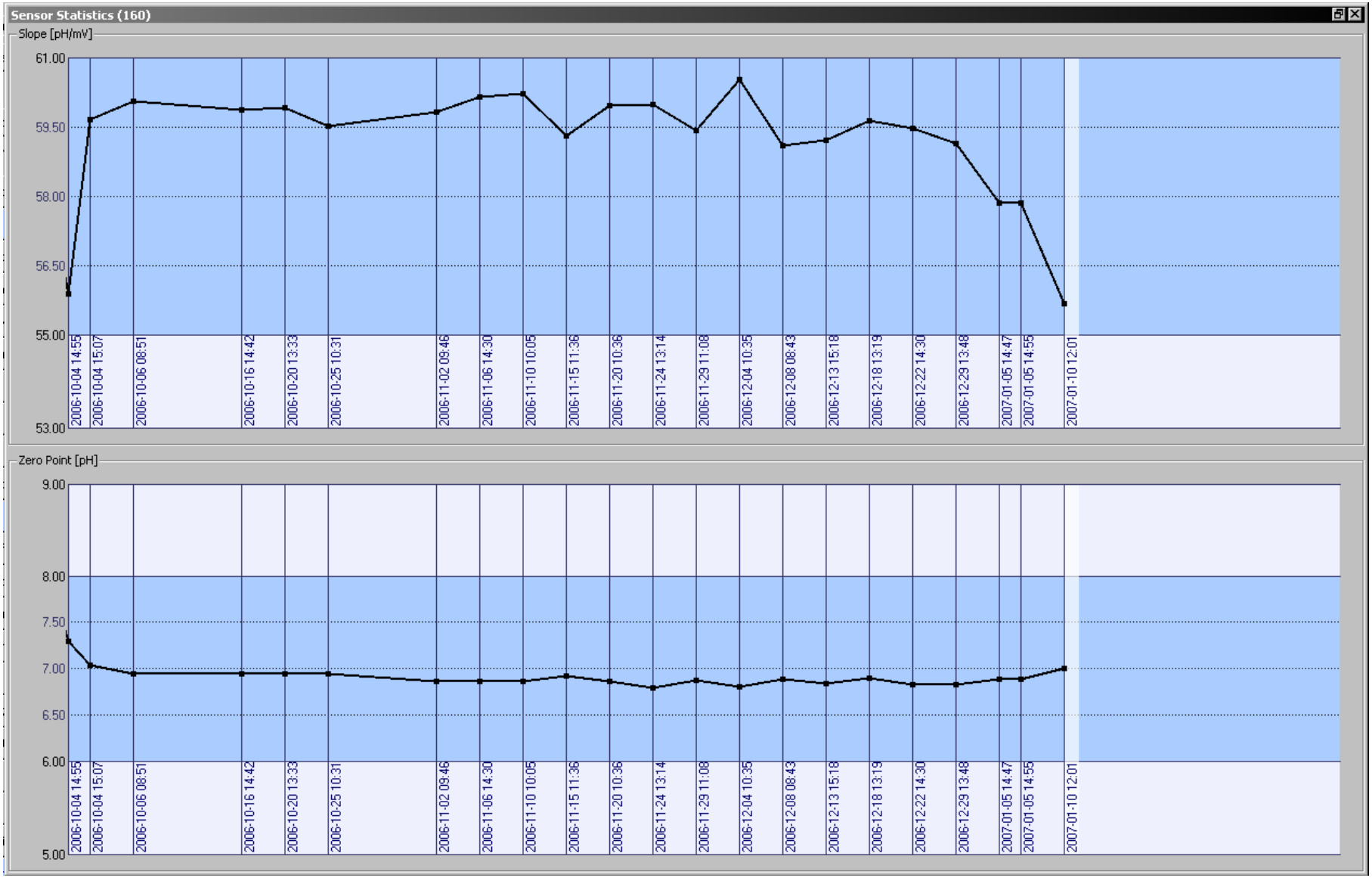
	165	164	163	162	161	160	159	158	157	156
Sensorinformation										
Kalibriermethode	2-Punkt-Kalibrierung	2-Punkt-Kalibrierung	2-Punkt-Kalibrierung	2-Punkt-Kalibrierung	2-Punkt-Kalibrierung	2-Punkt-Kalibrierung	2-Punkt-Kalibrierung	2-Punkt-Kalibrierung	2-Punkt-Kalibrierung	2-Punkt-Kalibrie
Nullpunkt [pH]	6.93	6.93	6.93	6.93	6.78	7.01	6.80	6.80	7.03	6.89
Steigung [mV/pH]	59.31	59.31	47.66	47.66	58.22	55.68	58.82	58.82	58.71	57.84
Justierdatum pH	2007-01-09 11:13	2007-01-09 11:13	2006-09-29 08:13	2006-09-29 08:13	2006-12-20 10:20	2007-01-10 12:01	2005-01-19 08:53	2005-01-19 08:53	2007-01-08 12:04	2007-01-05 14:
Puffer 1 [pH]	6.99	6.99	4.01	4.01	7.02	7.00	4.00	4.00	6.99	6.99
Puffer 2 [pH]	4.00	4.00	6.99	6.99	4.01	4.00	7.00	7.00	4.00	4.00
Kalibrierzähler	2	2	9	9	13	33	1	1	7	32
Delta Nullpunkt [pH]	-0.03	-0.03	0.04	0.04	-0.15	0.12	0.00	0.00	-0.03	0.06
Delta Steigung [mV/pH]	1.11	1.11	-3.43	-3.43	-0.50	-2.16	0.00	0.00	-0.45	-1.31
S/N Kalibriertransmitter	7C0D2105G00	7C0D2105G00	79037B05G00	79037B05G00	7C0D2105G00	86048805G00	factory	factory	86048805G00	86048805G00
Temperatur-Kalibrierung										
Temperatur Offset [°C]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Justierdatum Temperatur	2006-12-07 06:56	2006-12-07 06:56	2005-10-06 21:33	2005-10-06 21:33	n/a	2006-09-05 10:36	2005-01-19 08:53	2005-01-19 08:53	2006-10-30 11:47	2006-09-05 10:
Funktionsinformation										
Betriebsstunden	1.0	1.0	2611.0	2611.0	43.0	1696.0	1343.0	1343.0	357.5	1648.5
Sterilisationszähler	0	0	52	52	0	0	0	0	0	0
max. Betriebstemperatur [°C]	24	24	126	126	29	61	80	80	52	61
Betrieb > 80°C [h]	0.00	0.00	157.50	157.50	0.00	0.00	0.50	0.50	0.00	0.00
Betrieb > 100°C [h]	0.00	0.00	106.75	106.75	0.00	0.00	0.00	0.00	0.00	0.00
Betrieb < -300 mV [h]	0.00	0.00	1.25	1.25	0.00	0.00	0.00	0.00	0.00	0.00
Betrieb > 300 mV [h]	0.00	0.00	0.00	0.00	0.00	0.00	8.50	8.50	0.00	0.00
Kundenspezifische Sensorinformation										
Benutzername	Administrator	Administrator	Administrator	Administrator	Administrator	Administrator	Administrator	Administrator	Administrator	Administrator
Benutzerrolle	Administrator	Administrator	Administrator	Administrator	Administrator	Administrator	Administrator	Administrator	Administrator	Administrator

Liquid Analysis

Launch Memobase CYZ41D

Endress+Hauser

Memobase graphics sensor statistics – slope & zero point

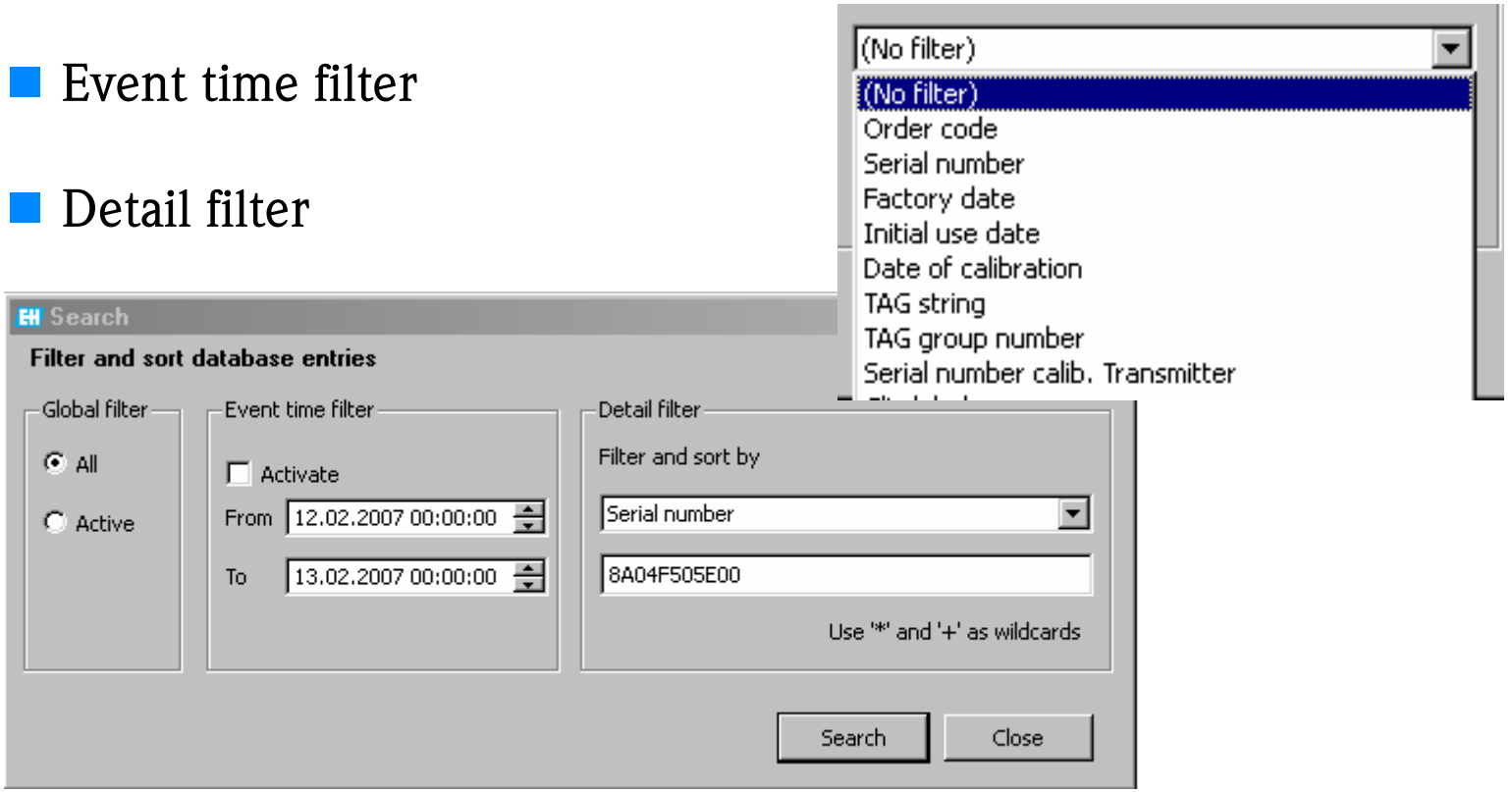


Liquid Analysis

Endress+Hauser

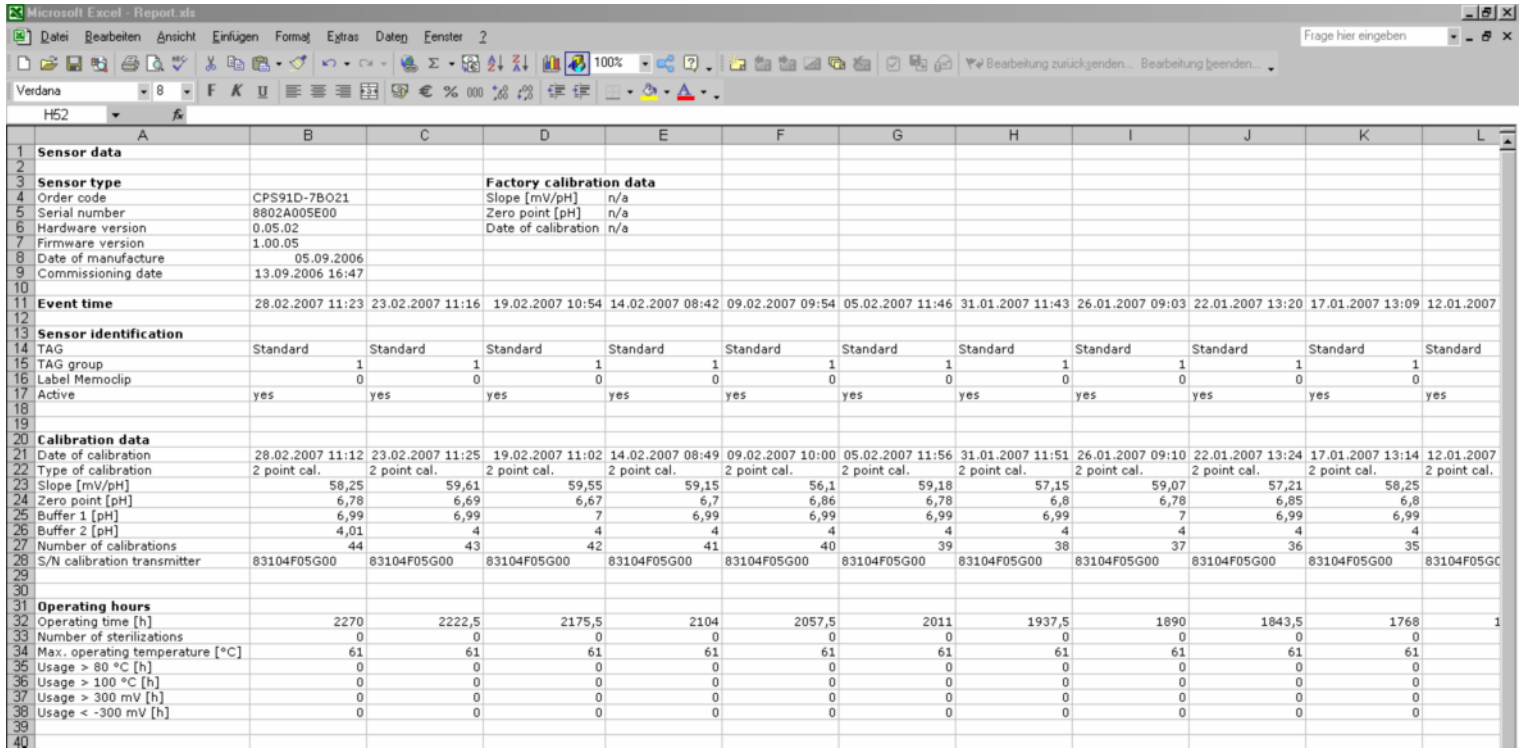
Filter criteria

- Global filter
  - All or active (only sensors in circulation)
- Event time filter
- Detail filter



Possibility of copy and paste in database cells by ‘Ctrl+c’ and Ctrl+v

Sensor report with Excel macro



	A	B	C	D	E	F	G	H	I	J	K	L
1	**Sensor data**											
2												
3	**Sensor type**			**Factory calibration data**								
4	Order code	CPS91D-7BO21		Slope [mV/pH]	n/a							
5	Serial number	8802A005E00		Zero point [pH]	n/a							
6	Hardware version	0.05.02		Date of calibration	n/a							
7	Firmware version	1.00.05										
8	Date of manufacture	05.09.2006										
9	Commissioning date	13.09.2006 16:47										
10												
11	**Event time**	28.02.2007 11:23	23.02.2007 11:16	19.02.2007 10:54	14.02.2007 08:42	09.02.2007 09:54	05.02.2007 11:46	31.01.2007 11:43	26.01.2007 09:03	22.01.2007 13:20	17.01.2007 13:09	12.01.2007
12												
13	**Sensor identification**											
14	TAG	Standard	Standard	Standard	Standard	Standard	Standard	Standard	Standard	Standard	Standard	Standard
15	TAG group	1	1	1	1	1	1	1	1	1	1	
16	Label Memoclip	0	0	0	0	0	0	0	0	0	0	
17	Active	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
18												
19												
20	**Calibration data**											
21	Date of calibration	28.02.2007 11:12	23.02.2007 11:25	19.02.2007 11:02	14.02.2007 08:49	09.02.2007 10:00	05.02.2007 11:56	31.01.2007 11:51	26.01.2007 09:10	22.01.2007 13:24	17.01.2007 13:14	12.01.2007
22	Type of calibration	2 point cal.	2 point cal.	2 point cal.	2 point cal.	2 point cal.	2 point cal.	2 point cal.	2 point cal.	2 point cal.	2 point cal.	2 point cal.
23	Slope [mV/pH]	58,25	59,61	59,55	59,15	56,1	59,18	57,15	59,07	57,21	58,25	
24	Zero point [pH]	6,78	6,69	6,67	6,7	6,86	6,78	6,8	6,78	6,85	6,8	
25	Buffer 1 [pH]	6,99	6,99	7	6,99	6,99	6,99	6,99	7	6,99	6,99	
26	Buffer 2 [pH]	4,01	4	4	4	4	4	4	4	4	4	
27	Number of calibrations	44	43	42	41	40	39	38	37	36	35	
28	S/N calibration transmitter	83104F05G00	83104F05G00	83104F05G00	83104F05G00	83104F05G00	83104F05G00	83104F05G00	83104F05G00	83104F05G00	83104F05G00	83104F05G0
29												
30												
31	**Operating hours**											
32	Operating time [h]	2270	2222,5	2175,5	2104	2057,5	2011	1937,5	1890	1843,5	1768	1
33	Number of sterilizations	0	0	0	0	0	0	0	0	0	0	
34	Max. operating temperature [°C]	61	61	61	61	61	61	61	61	61	61	
35	Usage > 80 °C [h]	0	0	0	0	0	0	0	0	0	0	
36	Usage > 100 °C [h]	0	0	0	0	0	0	0	0	0	0	
37	Usage > 300 mV [h]	0	0	0	0	0	0	0	0	0	0	
38	Usage < -300 mV [h]	0	0	0	0	0	0	0	0	0	0	
39												
40												

- All data entries of an individual sensor can be exported into Excel for further analysis
- Master file can be customized, e.g. for company label

Liquid Analysis

Memosens Platform Concept

Sensor history with Excel macro

Endress+Hauser