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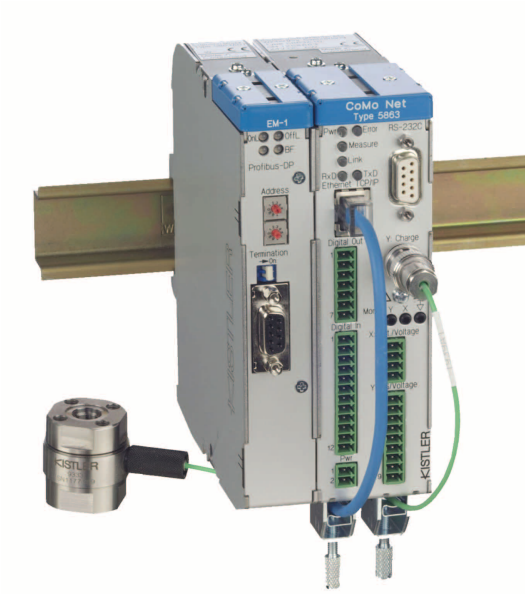
Control Monitor CoMo Net®

Type 5863A...

Web Server for Production Monitoring

Press-fit processes are frequently used joining techniques. However, subsequent nondestructive testing of these connections can be very problematic, virtually making in-process testing a must. CoMo Net is ideal for this purpose, recording the interdependent measurands, e.g. joining force and displacement distance, and evaluating their functional relationship. The evaluation results can then be used to separate nonconforming parts for reprocessing or to divide production into different tolerance classes. Designed as a web server, CoMo Net can be easily integrated into existing Ethernet networks.
A web browser running either on an existing visualization unit or on a PC is used for programming and visualizing the current process. The intuitive operating method guides the operator quickly and reliably through the setup procedure for the measuring process.

- Flexible monitoring of joining processes and product testing.
- Connection for piezoelectric and strain gauge sensors as well as sensors with voltage output.
- Measuring mode y(x) or y(t)
- 12 evaluation functions, which can be freely combined, for monitoring threading, curve shape, slope, hysteresis, blocking force and final position.
- Real-time thresholds for overload protection or for speed control.
- Monitors up to 20 cycles per second.
- Fast actuation via digital I/O of SPC
- Memory for storing the last 10 measured curves for error analysis, reference curve as well as for 16 measuring programs.
- Extensive process data compilation with statistical cp and cpk value analyses.
- Integral web server.
- Intuitive setup via Ethernet and standard web browser.
- Top-hat rail mounting.
- Options: Profibus DP



Description
The CoMo Net is a two-channel control monitor for DIN rail mounting for monitoring and classifying industrial processes and operates on a 24V industrial supply.

6 SPC-compatible digital inputs and outputs allow the system to be integrated into a machine control system. The CoMo Net can be networked via TCP/IP and Ethernet. The RS 232C interface is used solely for testing and servicing purposes.

The system is operated exclusively by means of a standard web browser via Ethernet on a PC or web terminal (parameter setting, visualization). The web server integrated in the CoMo Net controls the HTML pages for operation, with the data server controlling the exchange of process data with the outside world. Access to the various menu levels is controlled for operators, supervisors or service personnel, with authorization being required by password.

Measuring Amplifier y-channel (e.g. force)
Charge amplifier for piezoelectric sensors or voltage amplifiers for piezoresistive sensors, strain gauge bridges or sensors with voltage output.

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Measuring Amplifier x-channel (e.g. displacement)
Voltage amplifier for potentiometric displacement sensor; power supply through control monitor.

Depending on the application selected, the measurands saved are evaluated after the cycle.

Profibus DP (extension module)
System integration is possible via the Profibus (with a transmission rate up to 12Mbaud), which can be provided as an optional extra. The following functions can be controlled:

- Measuring cycle, Start/Stop
- Trigger, Start/Stop
- Taring x, y
- Parameter set switching
- Statistics/Trend deleting
- Query: Measuring readiness/status
- Read, process evaluation
- Read, real-time thresholds x,y

Calibration
The transmission factors of all amplifiers (charge, displacement and strain gauge) are checked within the scope of a function check against the capacitance and voltage references present in the CoMo Net. If these are outside the tolerances specified, the CoMo Net must be calibrated with an external charge or voltage source. All calibration values and other information such as the MAC address are stored in the EEPROM on the LVU card.

The CoMo Net has CE conformity and complies with EMC standards EN 61000-6-3 (interference emission, residential areas) and EN 61000-6-2 (interference immunity, industrial areas). Its interference immunity was tested with the grounding screw fitted. Inputs and outputs are protected with varistors against electrostatic charges. Its degree of protection is IP 20.

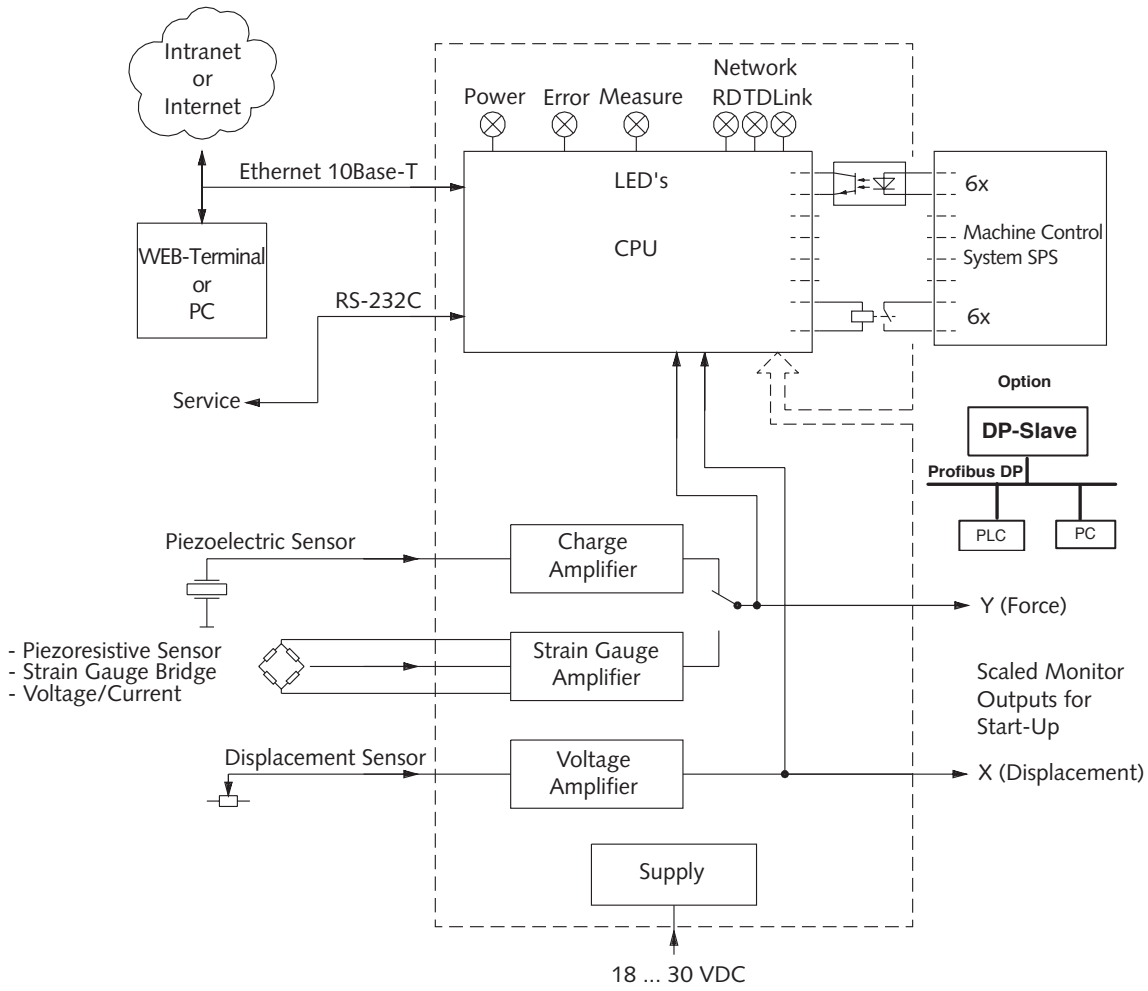

Fig. 1: Block schematic diagram of CoMo Net Type 5863A…

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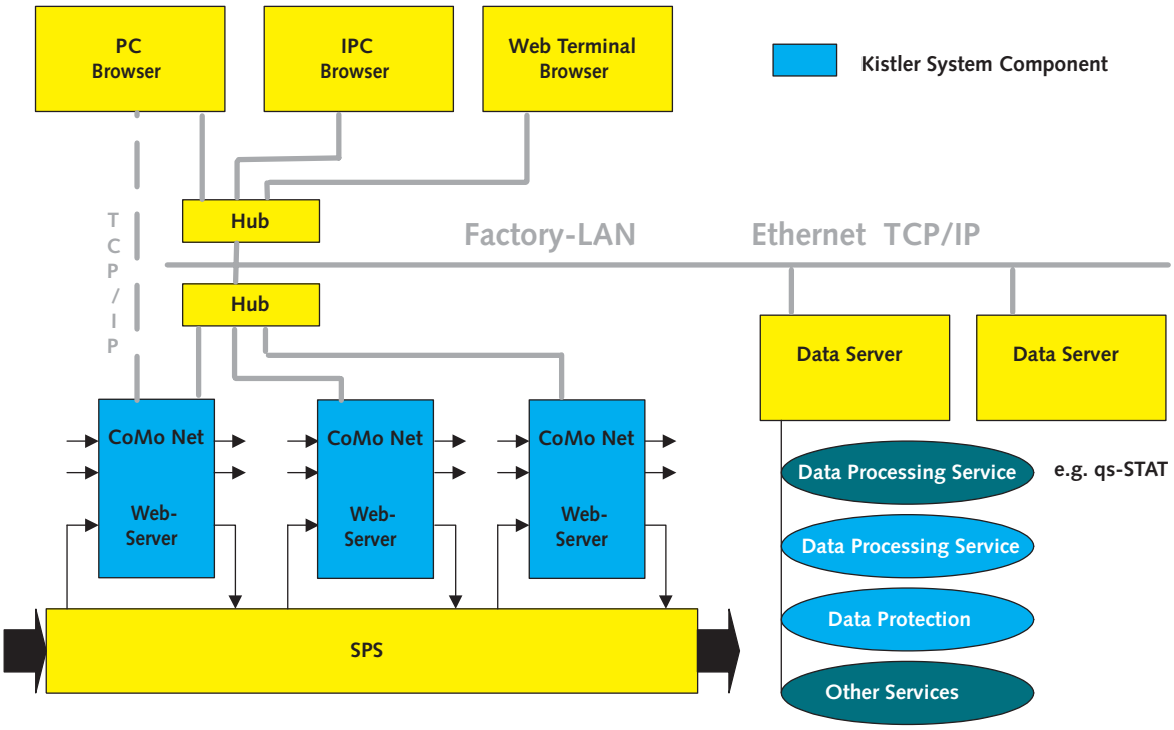
Process Arrangement



Operation

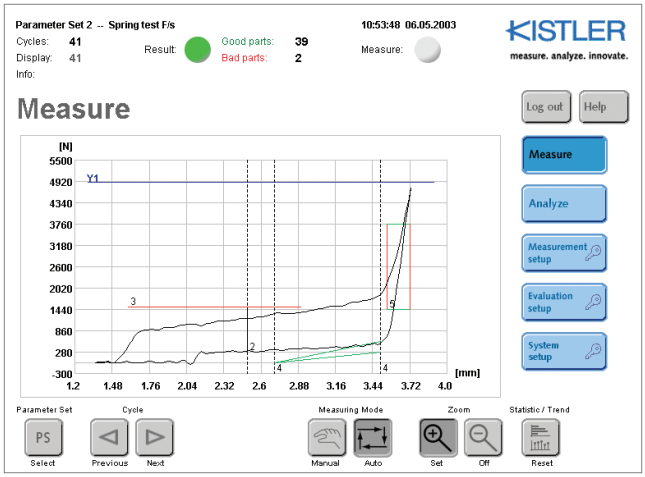


Fig. 2: Measurement

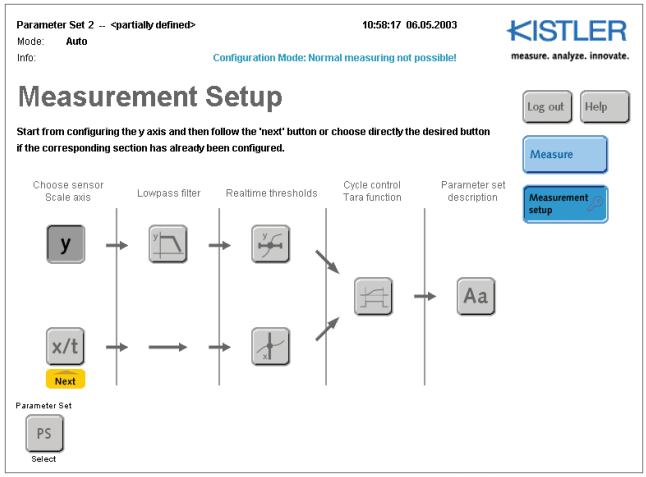


Fig. 3: Measurement setting

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Evaluation Functions

Up to 12 evaluation functions of varying types such as boxes, thresholds, limit positions, gradients dy or dx and hysteresis can be activated and freely combined for the purpose of process monitoring.
Various information can be displayed for each evaluation element, namely a trend, the distribution of the point of intersection of the curve with the element, or statistics such as the average, standard deviation cp or cpk value. The corresponding process values can be displayed and stored in numerical form. A control signal (conforming/nonconforming) is actuated and then fed to the interfaces (digital outputs, Profibus DP or Ethernet) for process evaluation.

Limit Value Monitoring in Real Time:

Real-time thresholds can be used to actuate trigger signals or, for example, to monitor safety criteria (e.g. overload protection).

Type of limit	Quantity
	2
	4

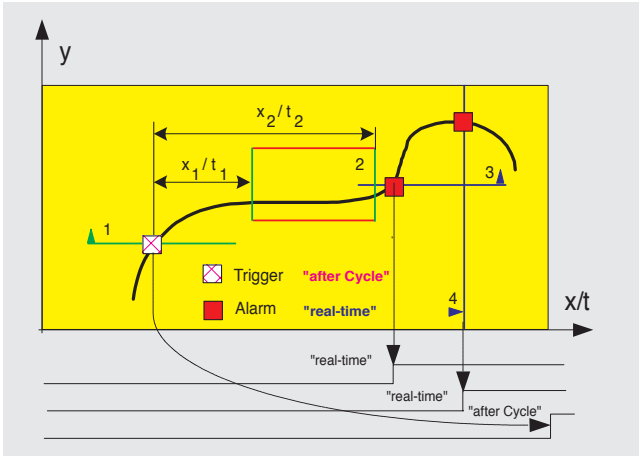

Fig. 4: Real-time threshold monitoring

Post-Cycle Evaluation Functions and Process Values

Evaluation function	Numeric process values
	Entry/exit point Minimum/maximum values
	Point of intersection
	y, x maximum y, x/t stop position
	Gradient dy/dx
	dy, dx hysteresis

Further thresholds are used to monitor various partial ranges of the signal characteristic. Evaluation takes place after the measuring cycle.

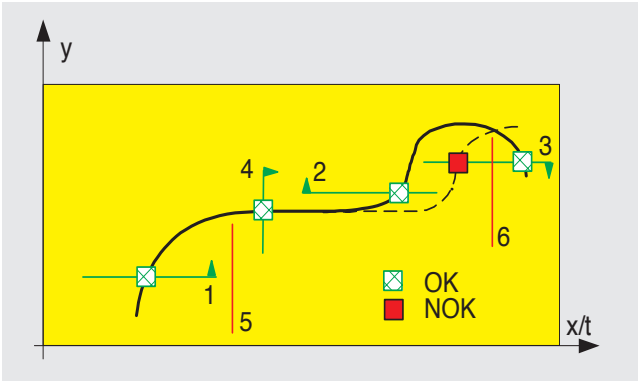

Fig. 5: Thresholds for monitoring partial ranges

Boxes

The box function is used to monitor whether the signal characteristic enters and exits the prescribed sides of the box. The other sides must not be touched.

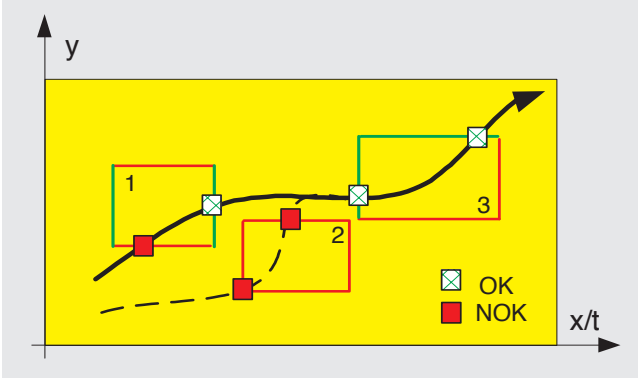

Fig. 6: Monitoring with box functions

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Boxes

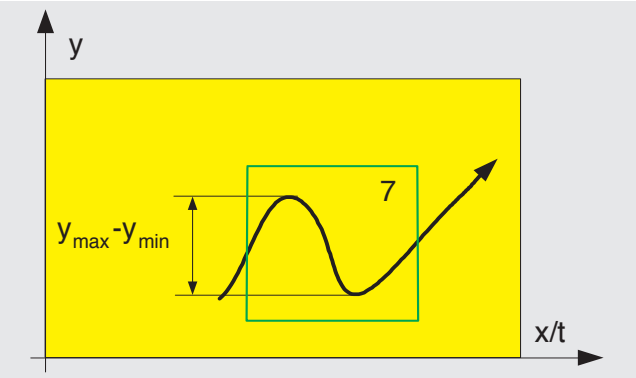

Fig. 7: Differential monitoring

Hysteresis

Monitoring function, e.g. for testing springs

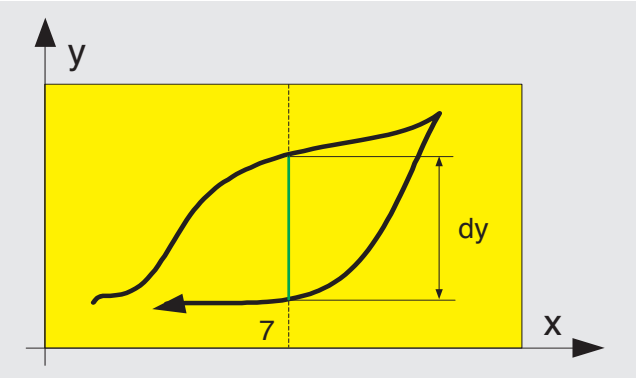

Fig. 8: Hysteresis Δy

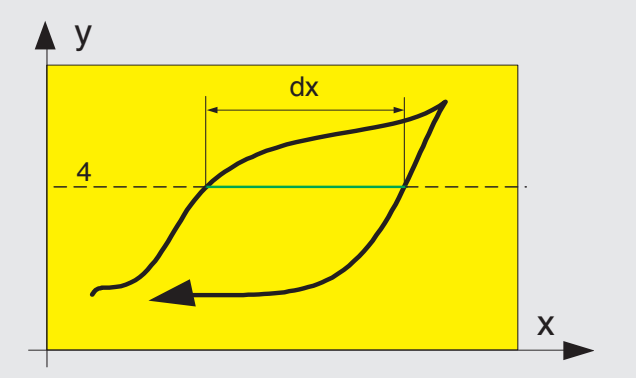

Fig. 9: Hysteresis Δx

Stop Position

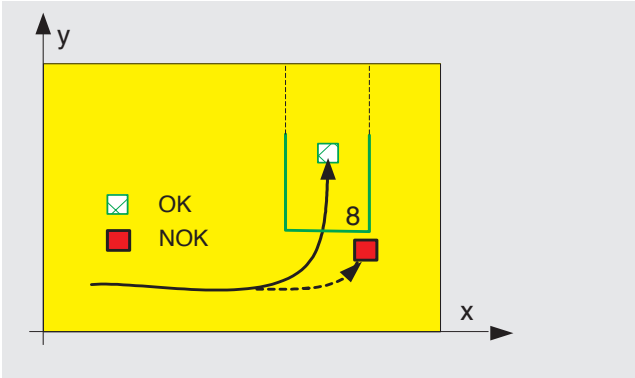

Fig. 10: Monitoring the stop position during press work

Limit Position

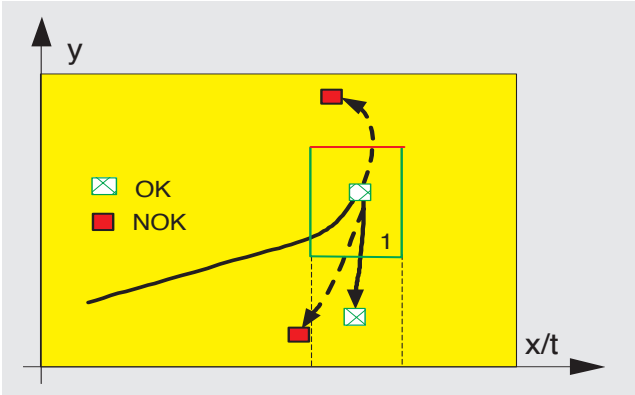

Fig. 11: Monitoring the limit position

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Setting Evaluation / Process Analysis

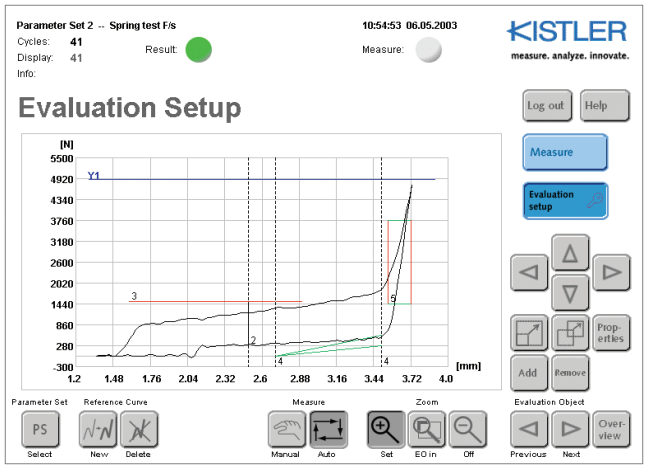

Fig. 12: Setting evaluation

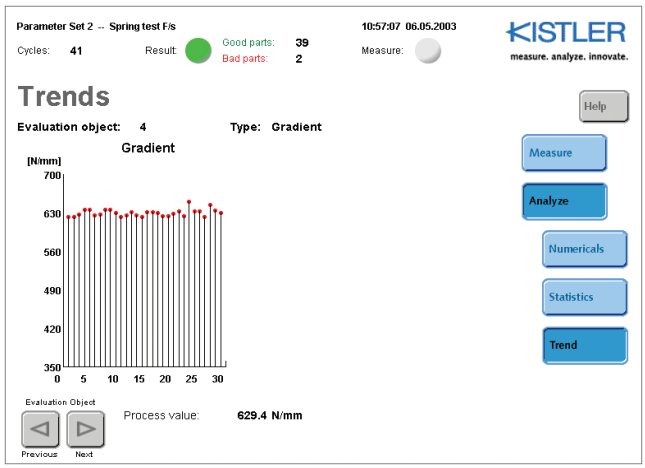

Fig. 13: Trend

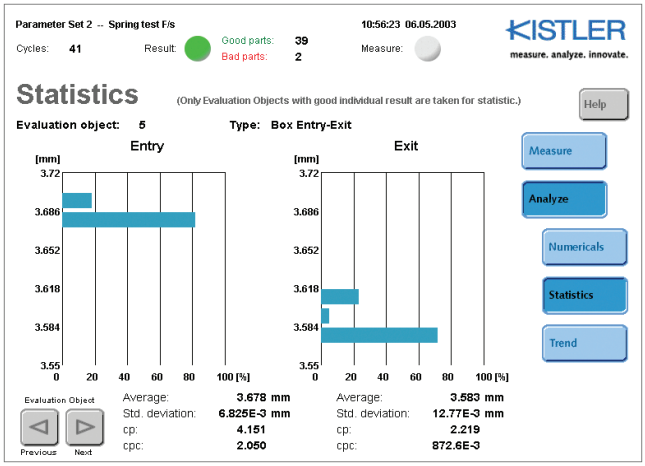

Fig. 14: Statistics

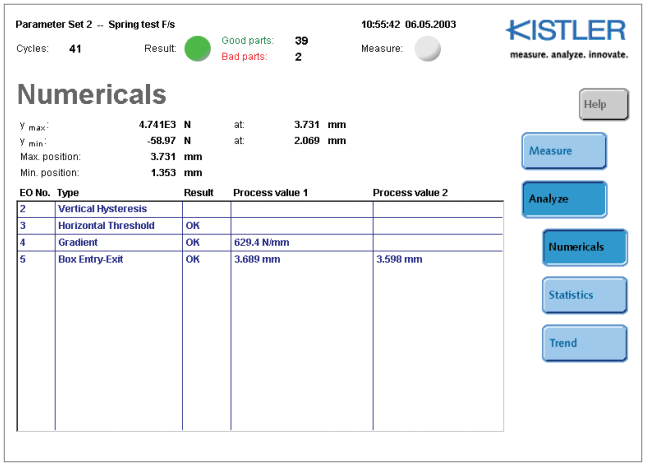

Fig. 15: Numeric

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Technical Data

Analog inputs (general data)		2
Sampling frequency per channel	kHz	10
Number of measuring points per cycle		250, 500 or 1000
Resolution of analog/digital converter (21 V_{pp})	Bit	12

Charge amplifier for piezoelectric sensor (BNC)		
Measuring range (divided into 4 decade partial ranges)	pC	±100 … 1'000'000
Error		
with calibration	%	<1
without calibration	%	<3
Repeat error	%FS	<0,1
Zero point error and zero transition (Reset/Operate)	SW correction	
Switching times		
Reset/Operate	ms	<5
Operate/Reset (residual charge <0,5 % FS)	ms	<15
Drift		
at 25 °C	pC/s	<0,1
at 50 °C	pC/s	<0,5

"Force" voltage amplifier for sensors with voltage output
(instead of charge amplifier)
Sensor types: Piezoresistive (current fed)
Strain gauge bridge (voltage-fed, 4 or 6 conductor)
Sensor with voltage or current output

Measuring range	V	±0,005 … ±10
Range subdivision		
Range 1	V	±0,005 … ±0,05
Range 2	V	±0,05 … ±0,5
Range 3	V	±0,1 … ±1,0
Range 4	V	±1,0 … ±10
Common mode of the differential input stage	V	±18
Input filter, passive	kHz	5
Error		
Range ±0,005 … ±0,05 V	%	<1,5
Range ±0,05 … ±10 V	%	<1
max. input voltage (continuous)	V	±20
Taring function (voltage feed after differential stage)		
Voltage source (2 ranges), Resolution	V	±1, ±0,1 (0,05 %)
Zero offset in relation to ±10 V Output		
Scaling amplifier 1 … 10	V	±1 … ±10
Scaling amplifier >10 … 100	V	±1 … ±10

Power source for piezoresistive sensor		
Supply voltage between +Ex (10 V) and $-I_{Ref}$		
Output current	mA	–4
Error	%	<0,5
Load resistance	kΩ	<4,7

Power source for strain gauge bridge		
Output voltage	V	5 or 10
Error	%	<0,5
Output current	mA	<40

Remarks
- The effective bridge voltage is measured and the result taken into account by the software (this is important for 6-conductor connections).
- Shunt calibration with selectable external resistance.
- The sum of the currents for the strain gauge bridge supply and the potentiometric displacement sensor must not exceed 60 mA because of the equipment power dissipation.

Voltage amplifier for potentiometric displacement sensor		
Measuring range	V	±0,5 … ±10
Error	%	<1
Zero offset of the input signal, resolution	V	±10 (±0,02)

Power sources for displacement sensor supply		2
Output voltage	V	–10/+10
Error	%	<0,2
Output current	mA	<20

Analog monitor outputs (2 mm sockets, general data)		2
Output current	mA	<3
Error (without error, measuring amplifier)	%	0,5
Monitor output y (Force)		
Output voltage for FS input signal	V	±10
Zero offset	mV	<±10
Zero transition (Reset / Operate)	pC	<±0,5
Monitor output X (displacement corrected)		
Output voltage for FS input signal	V	0 … +10
Zero offset	mV	<±20

Digital inputs (optocoupler, electrically isolated)		6
Functions: 1 cycle, 4 parameter sets, 1 reserve		
Bounce-masking	by software	
Logical input level, High	V	>14
Logical input level, Low	V	<8
Input current at 24 V	mA	5

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Digital outputs 6

(Photo MOS relay, electrically isolated, common feedback)

Functions: 1 Ready, 5 evaluation elements

Current loading, continuous	mA	<100
Current loading, pulse <0,1 s	mA	<300
Resistance when switched on	Ω	<50 (typ. 30)
Voltage	V	<40

Interface Ethernet 10Base-T (electrically isolated)

Transmission rate	Mbps	10
Topology	Twisted Pairs	2
LED displays for Receiver/Transmitter (RxD/TxD) and Link		2

Interface RS-232C

(No control leads, level according to standard, electrically isolated)

Baud rates		19'200
Data format	8 data bits, 1 stop bit, no parity	

Profibus-DP

Transmission of all control functions and process data. Measuring curves can also be transmitted with the later expansion DP-V1).

Interface	Type	RS-485A
Connector	Type	DSUB-9S
Max. transmission rate	MBaud	12
Line termination	Selectable	

General

Evaluation time (according to the number of functions)	ms	ca. 10 … <500
Parameter sets		16
Display for WEB terminal		SVGA (800x600)
Operating temperature range	°C	0 … 50
Power supply	VDC	18 … 30
	W	ca. 6
Voltage between supply connections and case	V_{rms}	<40
Case for DIN rail mounting,, Dimensions (WxHxD)	mm	40x150x127
Weight	kg	0,8

Connections

Charge input for piezoelectric sensor	Type	BNC neg.
"Force" voltage amplifier for sensors with voltage output (piezoresistive sensor, strain gauge bridge or other)	Type	Phoenix 3,5 mm
Monitor output	Type	Phoenix 3,5 mm
Monitor outputs x = displacement corrected y = force (charge amplifier or strain gauge)	Type	2 mm test socket
Digital outputs, qty. 6	Type	Phoenix 3,5 mm
Digital inputs, qty. 6	Type	Phoenix 3,5 mm
Equipment supply	Type	Phoenix 3,5 mm
Interface Ethernet 10Base-T	Type	RJ45

Remarks

- The recommendations in the operating instructions concerning EMC must be observed.
- For applications subject to EMC, the electrically isolated measuring circuit can be snugly connected to the case (protective ground). using the cheese-head screw M2,5 x 5 under the input BNC.

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Accessories Included only for Type 5863A10 and 5863A11	Type
• Test cable for monitor outputs, 2 mm sockets, red	5.590.097
• Test cable for monitor outputs, 2 mm sockets, black	5.590.096
• Ethernet cable, crossed, category 5 STP, 2xRJ45, 3 m	5.590.235

Optional Accessories	Type
• RS-232C cable, null modem, DSUB-9P/DSUB-9S, 5 m	1200A27
• Simulator for feeding in force/displacement signals	Z15822
• Cable to simulator Z15822	Z17862-1 Z17862-2

Ordering Key for the CoMo Net Control Monitor **Type 5863A** □□

CoMo Net, network link via Ethernet 10 Mbit/s interface, RJ45 connection, 2-channel amplifier, y measuring channel for charge, voltage and strain gauges, x measuring channel for voltage and potentiometric unit	**10**
EM-1 expansion module Profibus DP interface	**01**
CoMo Net, network link via Ethernet 10 Mbit/s interface, RJ45 connection, 2-channel amplifier, y measuring channel for charge, voltage and strain gauges, x measuring channel for voltage and potentiometric unit with mounted EM-1 expansion module Profibus DP interface	**11**

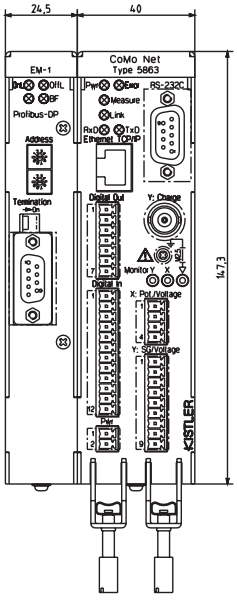

Fig. 16: Typ 5863A11

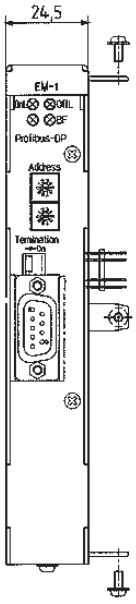

Fig. 17: Typ 5863A01

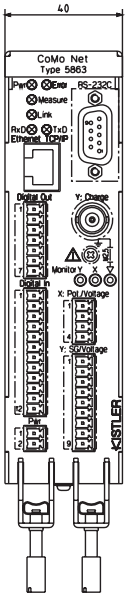

Fig. 18: 5863A10

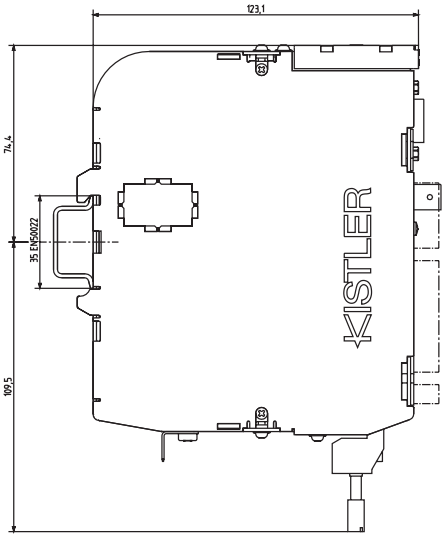

Fig. 19: Typ 5863A…