

maXYmos NC

Type 5847A...

XY Monitor for Monitoring and Controlling NC Joining Modules

The maXYmos NC controls, monitors, evaluates and documents XY characteristics for joining and press-fitting processes in combination with NC joining modules and the associated servo amplifier IndraDrive.

- 128 independent programs, each with up to 10 evaluation objects using a variety of types with online and offline objects
- Integrated process control (sequencer) for maximum flexibility
- Real-time behavior through SERCOS III actuation of the servo amplifier
- On-board fieldbus interfaces for system control (PROFIBUS, PROFINET, EtherCAT, EtherNet/IP)
- Integrated curve memory for up to 500 curves
- Statistics and protocoling of the measurement results (Q-DAS®, CSV, PDF, XML)
- Self-monitoring and diagnosis, as well as visualization and remote control (VNC)

The shape of the measurement curves, allows the quality of individual manufacturing steps, assembly groups or even an entire product to be monitored and controlled in real-time.

Description

The maXYmos NC Type 5847A... not only handles the evaluation of curve characteristics and their documentation, but is also responsible the activation of the servo amplifier IndraDrive controlling the NC joining module. Communication takes place in real-time through SERCOS III guaranteeing high repeatability and maximum performance in process control. Commissioning is easy via PC or using the optional touch screen. Various fieldbus interfaces are available to connect to the control system. The integrated sequence control (sequencer) makes for easy, fast and versatile mapping of even complex processes. The monitor, which is cascable up to eight XY channel pairs, is designed primarily for the sophisticated user, leaving nothing more to be desired with respect to application management, operating convenience and flexibility. Aided by a multitude of high-performance evaluation elements, even very complex XY sequences can be monitored and controlled.



Important Features Per MEM:

- Curve acquisition in accordance with $Y = f(X)$, $Y = f(X, t)$, $Y = f(t)$, $X = f(t)$
- Curve evaluation with SPEED, TIME, UNI-BOX, HYSTERESIS-Y, HYSTERESIS-X, INFLEXION, ENVELOPE CURVE, LINE-X, LINE-Y, NO-PASS, GRADIENT-Y, GRADIENT-X, TUNNELBOX-X, TUNNELBOX-Y, BREAK, CALC, AVERAGE, GET-REF, INTEGRAL
- Dynamic referencing of the evaluation elements in X and Y direction
- Short evaluation time
- Ethernet TCP/IP for measurement data, remote maintenance and channel cascading
- Dig.-IO (24 V) freely configurable for application-specific control
- Channel X: Servo, Incremental, SSI, potentiometer, ± 10 V, LVDT
- Channel Y: DMS, ± 10 V or piezoelectric sensors
- Informative NOK cause diagnostics, process value trend sequences, etc.
- Process value table with freely selectable content
- Selected process values for curve graphs
- Warning and alarm messages, e.g. NOK-in-sequence
- Access protection with freely selectable rights

Technical Data

Measuring and Evaluation Module (MEM)

Number		1 X-channel, 1 Y-channel
Sample rate X/Y max.	kHz	10
Resolution per (analog) channel	bit	24
Accuracy class	%	0,3
Cut-off frequency per channel	Hz	5 000
Low-pass filter per channel	Hz	in stages 0,1 ... 2 000

Sensors channel X

Sensor Type 1		Potentiometer
Linearity error	%FS	0,05
Track resistance	kΩ	1 ... 5
Supply voltage	V	4,4 ±0,2
Connection system	3-cond.	
Wiper current	μA	<1,0
Sensor Type 2		Process signal ±10 V
Signal output	V	±10
Linearity error	%FS	0,05
Transmitter supply	VDC mA	24 ±5 % 500

Sensor Type 3		Incremental
Signal output		Sinus/Cos, RS-422C (A+B)
Reference marker		yes
Counting depth	bit	32
Counting frequency	MHz	10 (RS-422C)
	MHz	1,2 (Sin/Cos)
Sensor feed	VDC mA	5 ± 5 % 300

Sensor Type 4		Inductive
Principle		LVDT, half-, full-bridge
Sensor supply	Veff	1,8 ± 5 %
	kHz	5,2 ± 0,5 %
Linearity error	%FS	0,1
Frequency range (–3 dB)	kHz	0 ... 1

Sensor Type 5		SSI
Signal output		RS-422C
Clock frequency max.	MHz	1

Sensors channel Y

Sensor Type 1		Piezo
Measuring range	Number	4
Measuring range 1	pC	±100 ... ±1 000
Measuring range 2	pC	±1 000 ... ±10 000
Measuring range 3	pC	±10 000 ... ±100 000
Measuring range 4	pC	±100 000 ... ±1 000 000

Range selection		automatic
Drift	pC/s	0,05
Linearity error	%FS	0,05
TKE	ppm/K	<±100
Frequency range (–3 dB)	kHz	0 ... 5
Sensor Type 2		Strain gage
Measuring range	mV/V	0 ... ±5
Supply voltage	VDC	5 ± 5 %
Connection system		4-wire, 6-wire
Bridge resistance	Ω	≥300
Linearity error	%FS	0,05
Frequency range (–3 dB)	kHz	0 ... 5
Sensor Type 3		Process signal ±10 V
Signal output	V	±10
Linearity error	%FS	0,05
Transmitter supply	VDC mA	24 ±5 % 500

Monitor Outputs

Number		1 X-channel, 1 Y-channel
Nominal value	V	±10
Linearity error	%FS	0,05

Cycle Control

Start – Stop	Sequence / Fieldbus / Threshold X / Threshold Y / Time
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Measuring Functions

Measurement curve according to	$Y = f(X)$, $Y = f(t)$, $Y = f(X,t)$, $X = f(t)$
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Curve Memory

Current curve	XY-pairs	max. 8 000
Historic curves (for NOK diagnosis)		the last 500

Evaluation Objects (EOs)

EO types	SPEED, TIME, UNI-BOX, HYSTERESIS-Y, HYSTERESIS-X, ENVELOPE, LINE-X, LINE-Y, NO-PASS, INFLEXION, GRADIENT-Y, GRADIENT-X, TUNNELBOX-X, TUNNELBOX-Y, BREAK, CALC, AVERAGE, GET-REF, INTEGRAL
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Reference points	Absolute X, Dynamic: Block point X, Dynamic: X on trigger Y, Referencing in X and Y directions possible
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Editing	Remote, via touchpanel	
Evaluation time	ms	<20 (for 4 EOs)

Data Export

Format	Q-DAS®, XML, CSV, PDF
Destination	USB, Server
Medium	USB, Ethernet
Visualization	via VNC, or DIM

Interfaces

Ethernet	TCP/IP 100 Base TX with 2 Port Switch
USB	2x USB Host, 1x Device
BUS	PROFIBUS DP, PROFINET, EtherCat, EtherNet/IP, 2 Port Switch
Servo connection	Fieldbus master SERCOS III

Dig-In/Out

Norm		DIN EN61131
Level state "0"	V	0 ... 5
Level state "1"	V	10 ... 30
Number of inputs		16
Input current max.	mA	5 (at 24 V)
Number of outputs		16
Output current max. (per channel)	mA	500 (at 24 V)
Output current max. (in total)	mA	1500 (at 24 V)

Measurement Programs

Number		128
Switchover via		Menu/BUS
Switchover time	ms	<50

Switching Signals

Number		2
Channel assignment		X or Y (selectable)
Switching point		Threshold X reached Threshold Y reached
Output		Dig.-Out or Fieldbus
Mode		Free-running or latch
Influence on evaluation		No

Real-time Reactions

Switching signals, NO-PASS	ms	<1
BREAK, INFLEXION, TUNNELBOX-X, TUNNELBOX-Y		

Power Supply

Voltage VDC	24	(18 ... 30)
Power consumption (typical)	VA	45
Power consumption (max.)	VA	80
Screw-type/plug-in connector,	1 supplied with device	
	Wago, order no. 734-103/037-000	
	Housing: order no. 734-603	

Environment

Operating temperature range	°C	0 ... 45
Storage temperature range	°C	0 ... 50
IP degree of protection (EN 60529)		
– Connector and cable running downwards	IP	53
– Standard rail version	IP	20

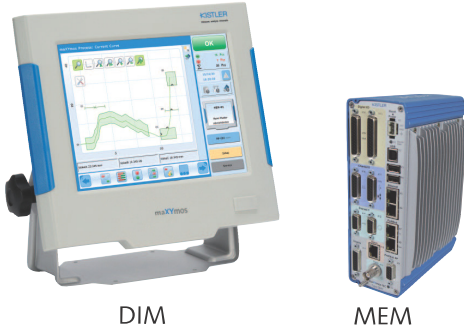
Display Module (DIM)

Size	In	10.4
Color		yes
Touchscreen		yes
Resolution	Pixels	600 x 800 (SVGA)
Technology		TFT-LCD
Backlighting		LED
Supply voltage (of MEM)	VDC	24
IP degree of protection (EN 60529)		
– Front	IP	65
– Rear	IP	53
Operating temperature range	°C	0 ... 45

The System Concept

Basic Components

The maXYmos NC consists of two basic components: the measuring and evaluation module (MEM), which works entirely autonomously and supports one XY channel pair each, and the display module (DIM).



DIM

MEM

MEM with Display Module

The MEM and DIM can either be installed separately from each other, connected via the optional connecting cable Type 1200A161A2,5/5.



... or they can be used as a compact unit. In this case the MEM is inserted into the rear slot of the DIM, forming a secure mechanical and electrical connection:



MEM as Black Box Module

Since the measuring and evaluation module (MEM) works entirely autonomously, it can also be operated without the DIM. In this case, setup and process visualization are carried out via the graphical user interface (GUI), which can be transferred onto a PC and accessible by VNC via the Ethernet interface or USB.



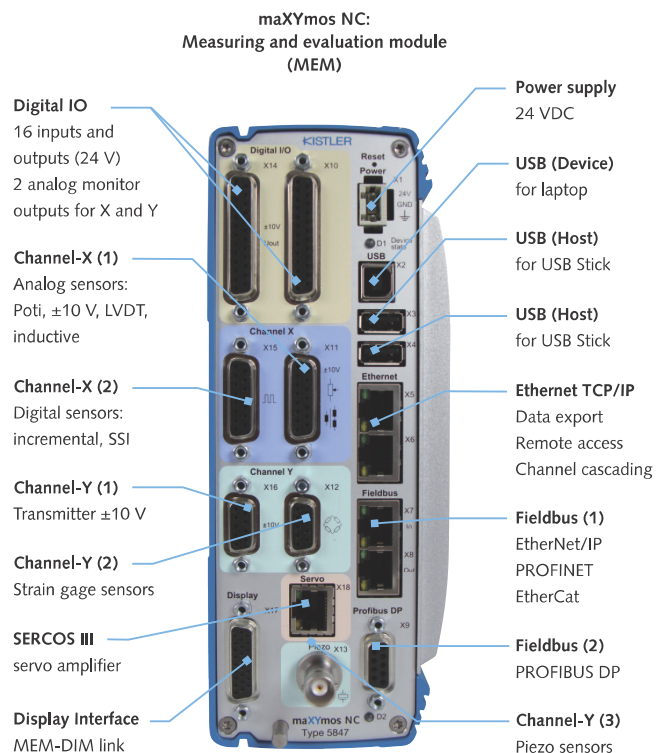
Expandable for up to Eight XY Channel Pairs

For this purpose, the MEMs are connected to the Ethernet interface via patch cables. External switches are not required. The Ethernet is simply looped through the MEMs via the In-Out sockets.

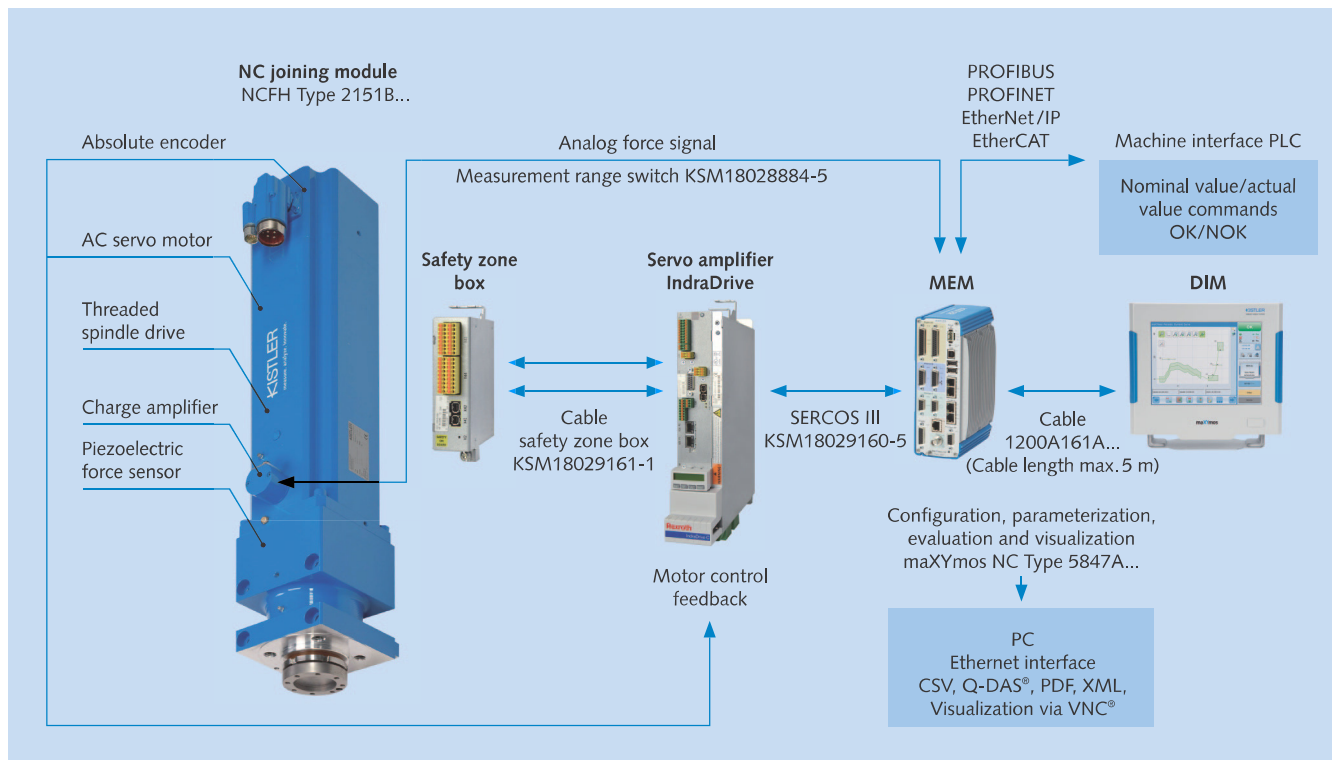
Measuring and Evaluation Module (MEM)

Interfaces

The module, which features an XY channel pair and all data and control interfaces, forms the heart of the XY monitor.

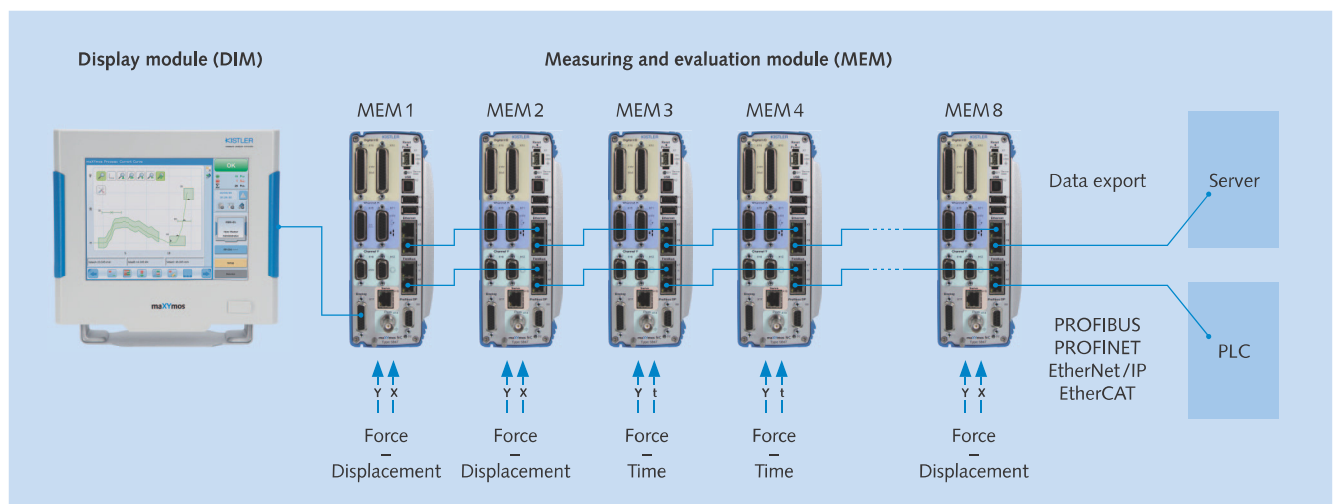


Functional Principle with maXYmos NC Type 5847A...



Functional principle of an NC joining system using the NC joining module NCFH Type 2151B... and maXYmos NC Type 5847A...

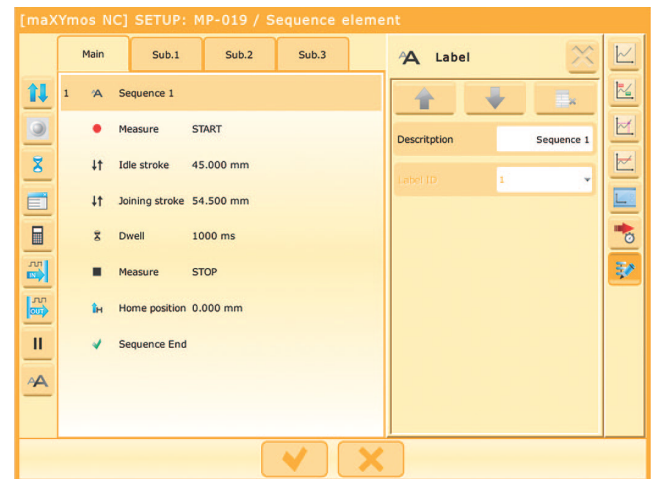
Functional Principle with Multi-Channel Applications



Networking/Multiview of maXYmos NC

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The maXYmos NC controls the NC joining module, via the servo amplifier through the integrated sequence control (sequencer). An independent sequence can be defined for each program. The sequence can be configured freely on the basis of the elements described below. Measurement and evaluation take place in the main routine. The 3 sub-routines can be used to define other sequences and execute these independently of the main routine. A total of 255 elements can be placed per program.



Motion Element: this element serves to actuate the NC joining module, e.g. to absolute/relative position, or force. In addition, force regulation, deflection compensation or stopping on an external signal, or the response to an inflexion point event can be configured.



Wait Element: when the sequence reaches this element, it is paused and acknowledgment must be obtained from the PLC before the sequence continues.



Label Element: this element provides interaction with the PLC. In the process, the label number is transferred to the PLC when the element Label is activated.



Measurement Start/Stop Element: this element starts and stops the measurement. When measurement stops, evaluation is performed according to the parameterized evaluation elements.



Timer Element: this element delays execution of the subsequent element by the configured time. Use as a dwell time under force, for example.



Dialog Element: this element enables interaction with the user; for example, to forward useful information. The dialog must be confirmed by the user at the visualization.



Calculation Element: this element can be used to calculate subsequent parameters for further use from existing parameters, such as actual values from evaluation elements.



Input Element: when this element is activated, the system waits for the configured digital input signal and then continues the sequence.



Output Element: when this element is activated, the corresponding configured output is set on the device.



Home Position Element: this element is contained once in the sequence and defines the basic settings. It is approached with the predefined speed when the element is activated or via the fieldbus.

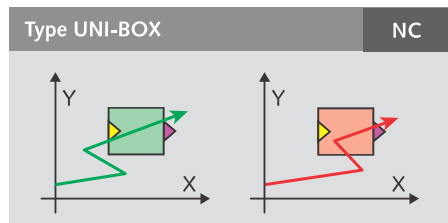


Sequence End Element: this element indicates that the sequence has been stopped. Subsequent elements are no longer executed.

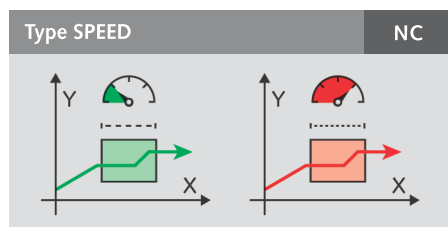
Evaluation Procedure

A large number of evaluation elements (EOs such as "Evaluation Objects") can be selected for evaluation of the curve progression:

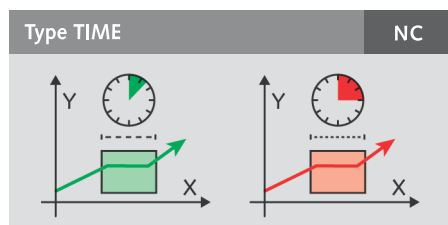
Examples:



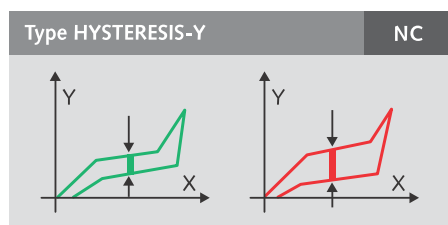
Entry and exit as specified. No crossing of "closed" sides allowed. Each side can be defined as entry or exit.



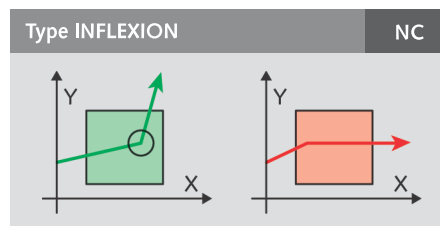
Evaluation criterion is the speed between the entry and exit points in a special box.



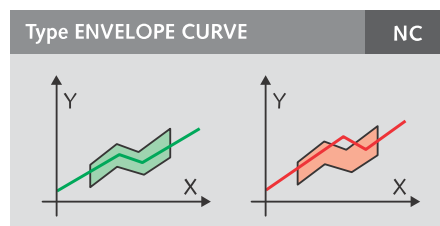
Evaluation criterion is the time between the entry and exit points in a special box.



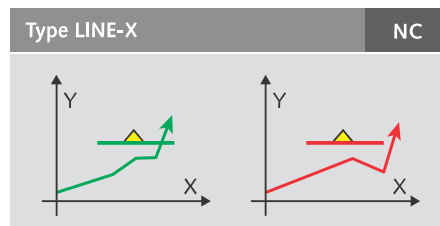
The Y-hysteresis is evaluated between one advancing and one returning curve at a vertical line.



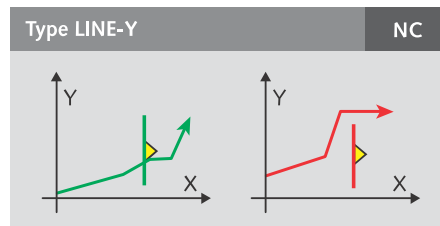
A defined gradient change is expected within the expectancy range (box) and can be used as a further switching condition in the sequence.



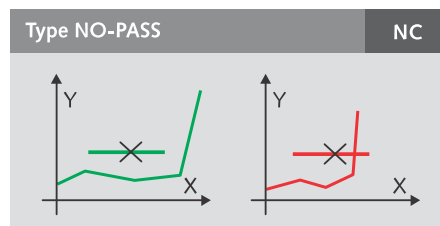
The measurement curve must not cross the upper or lower line of the envelope. This evaluation object is easy to master.



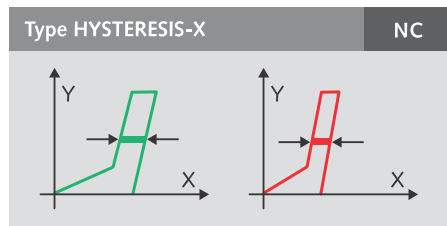
The line must be crossed once. An X-value at the point of intersection is monitored.



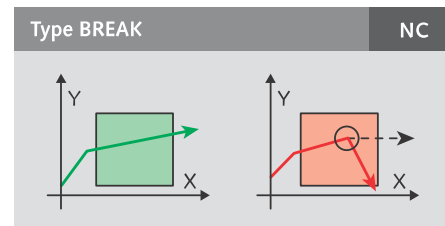
Line must be intersected once. One Y-value is monitored at the intersection point.



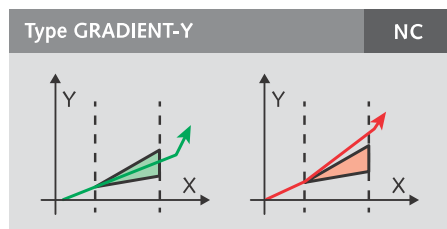
The line may not be crossed. Otherwise, NOK and "NO-PASS" real-time signal



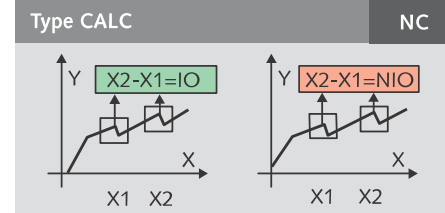
Evaluates the X-hysteresis between forward and reverse curves on a horizontal line.



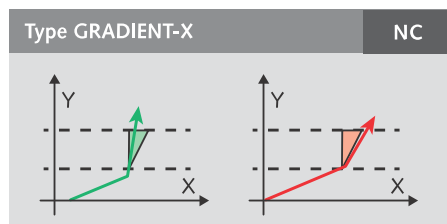
Provides NOK and online signal in case of sudden gradient change within an expectancy range (box), e.g. in case of tool breakage.



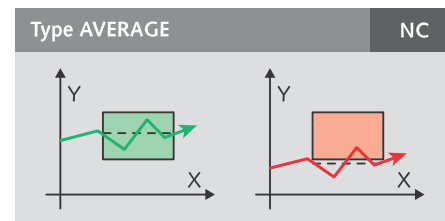
Evaluates the gradient dY/dX between two vertical lines.



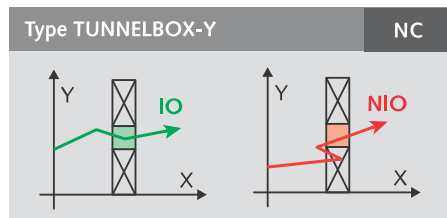
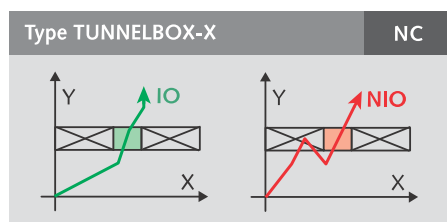
Object references two selectable process values and performs calculations, e.g. the X-difference between two ripples, and evaluates them.



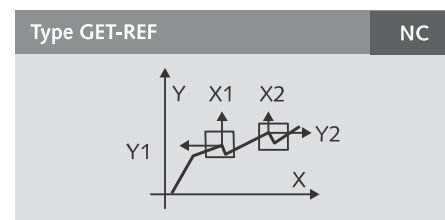
Evaluates the gradient dX/dY between two horizontal lines.



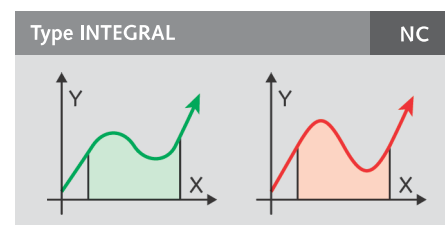
Evaluates the average of all Y-values in the box region.



Entry and exit are predefined. No violation of closed sides permitted. A violation of the closed sides supplies a real-time signal and stops the sequence.

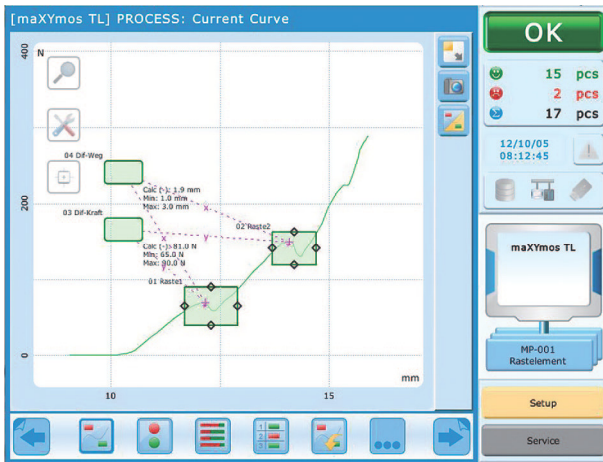


Box detects significant curve features and their XY coordinates in the expectancy range. This information can be used as reference points for other EOs or as an input for the CALC object.



The area beneath the curve is determined and evaluated.

Product Testing Example: Distance check between two snap-in points of a latch. The two GET-REF boxes supply the coordinates of the snap-in points to the CALC objects. These calculate and evaluate the distances in the X and Y directions.



Housing Concept and Installation Variants

With the universal housing concept, different mounting configurations can be achieved in a few easy steps. This allows the machine designer to change to a different mounting configuration at any time.

Desktop and Wall Mounting

A desktop unit can be converted into a wall-mounted version in just a few easy steps.



Front Panel Mounting

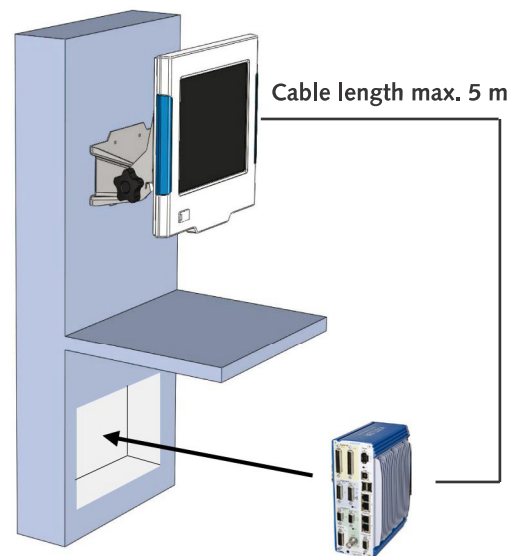
After removing the fixing bracket and rear frame, push the display through the front panel opening. Then screw the frame back on. The measuring module (MEM) can now be pushed into the slot of the display module if required.



DIN Rail Mounting

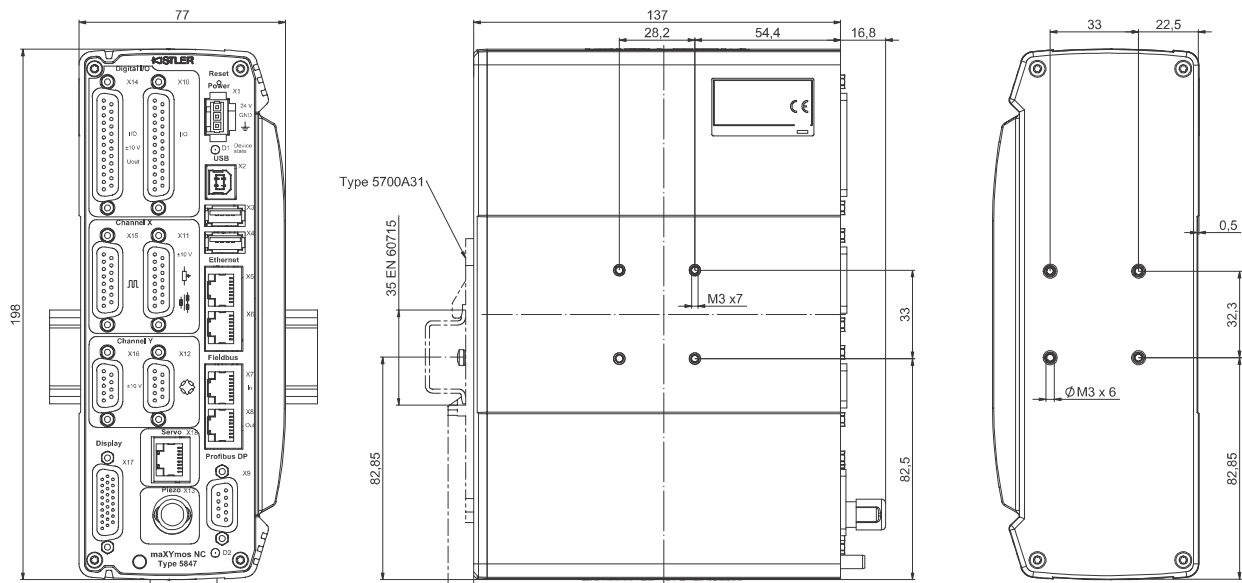
The measuring module (MEM) can be mounted on a DIN rail with an optional fastening clip. This makes it possible to house the sensitive connection area of the MEM inside the control cabinet, where it is well protected, while placing the better protected display module (DIM) in the visible area.

Advantages: There is only one monitor cable leading to the display. At the same time, the degree of protection in the monitor area is increased to IP65.

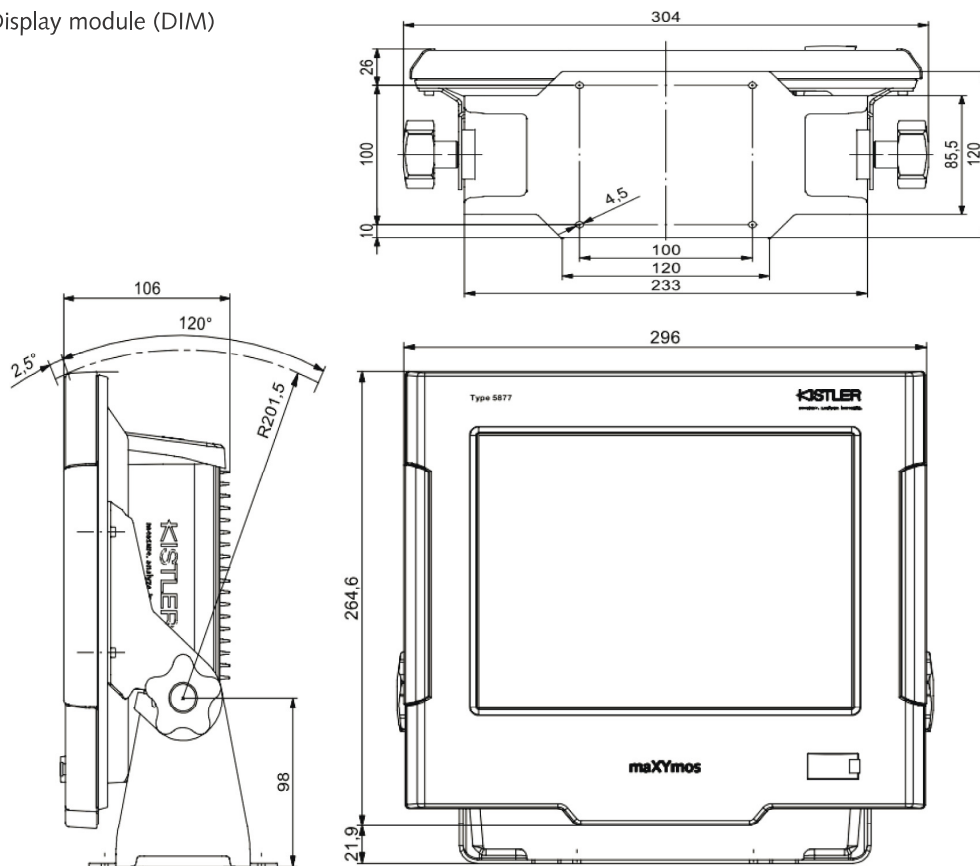


Dimensions

Measuring and evaluation module (MEM)



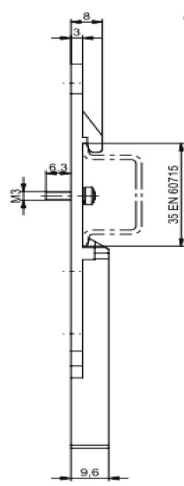
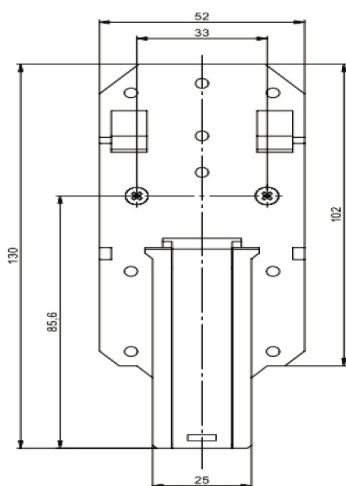
Display module (DIM)



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Accessories (not included)

• Display module (DIM)	Type 5877AZ000
• Set of connectors maXYmos NC for sensors, digital I/O and supply	Type 5877AZ010
• Connecting cable between MEM and DIM, length 2,5 m	Type 1200A161A2,5
• Connecting cable between MEM and DIM, length 5 m	Type 1200A161A5
• Ethernet connecting cable between MEM's, length 0,5 m	Type 1200A49A3
• Ethernet connecting cable between MEM's, length 5 m	Type 1200A49
• Power supply 220 VAC/24 VDC	Type 5867AZ012
• DIN rail clip for MEM control cabinet mounting	Type 5700A31



Ordering Key

XY monitor maXYmos NC	Type 5847A	<input type="checkbox"/>
Measuring and evaluation module (MEM)	0	<input type="checkbox"/>

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South Australia 5033
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info@si-instruments.com.au
www.si-instruments.com.au

Windows® Software maXYmos PC (Basic) Type 2830A1

- Organize firmware updates
 - Save device settings in a backup file
 - Restore settings to the device
- (included in the scope of delivery of the measuring and evaluation module Type 5847A0)

Windows® Software maXYmos PC (Plus) Type 2830B2*

Like Basic version, additional features:

- Log explorer opens and interprets exported test records
- Generation of an Excel® statistical file with selected process values
- Cursor measurement, bundle presentation of curves, etc.
- Final Y(X) curves can also be presented as Y(t) or X(t)
- PDF print function for test records

*Product availability: December 2014

Included Accessories for Type 5847A0 Type/Mat. No.

- Windows® software maXYmos PC (Basic) 2830A1

Accessory (not included) Type

• maXYmos force transmitter cable, length 5 m	Type KSM18028884-5
• maXYmos force strain gage cable, length 5 m	Type KSM18028883-5
• SERCOS III connection cable, length 5 m	Type KSM18029160-5
• Safety zone box cable, (2 cables required), length 1 m	Type KSM18029161-1

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