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maXYmos NC

Type 5847B...

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 5 000[1)] curves
- Statistics and protocoling of the measurement results (Q-DAS®, CSV, PDF, XML, IPM 5.0, QDA9)
- 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 5847B... 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 cascadable 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, LINE-X, LINE-Y, NO-PASS, GRADIENT-Y, GRADIENT-X, TUNNELBOX-X, TUNNELBOX-Y, BREAK, CALC, AVERAGE, GET-REF, INTEGRAL, INFLEXION, DIG-IN, DELTA-Y, TRAPEZOID-Y[1)], TRAPEZOID-X[1)]
- 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 TTL, ±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

[1)] not available at Type 5847B1

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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	24 ±5 %
max. mA X+Y Channel	mA	500

Sensor Type 3		Incremental TTL
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	5 ±5 %
	mA	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, ±10 (2 measuring ranges)
Linearity error	%FS	0,05
Transmitter supply	VDC	24 ±5 %
max. mA X+Y Channel	mA	500

Monitor Outputs

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

Cycle Control

Start – Stop	Dig.-Input/Sequence / Fieldbus / Threshold X / Threshold Y / Time/Manual

Measuring Functions

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

Curve Memory

Current curve	XY-pairs	max. 8 000
Historic curves (for NOK diagnosis)	the last 5 000[1] (from v1.5.x)	

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, INFLEXION, DIG-IN, DELTA-Y, TRAPEZOID-Y[1], TRAPEZOID-X[1]
Reference points	Absolute X, Dynamic: Block point X, Dynamic: X on trigger Y, Referencing in X and Y directions possible
Editing	Remote VNC®, via touchpanel

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Data Export	
Protocol	Q-DAS®, QDA9, IPM 5.0
Format	XML, CSV, PDF
Destination	USB, Server
Medium	USB, Ethernet
Visualization	via VNC®, or displax modul (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
Power loss (MEM)	W	18
Screw-type/plug-in connector,		1 supplied with device Wago, order no. 734-103/037-000 Housing: order no. 734-603

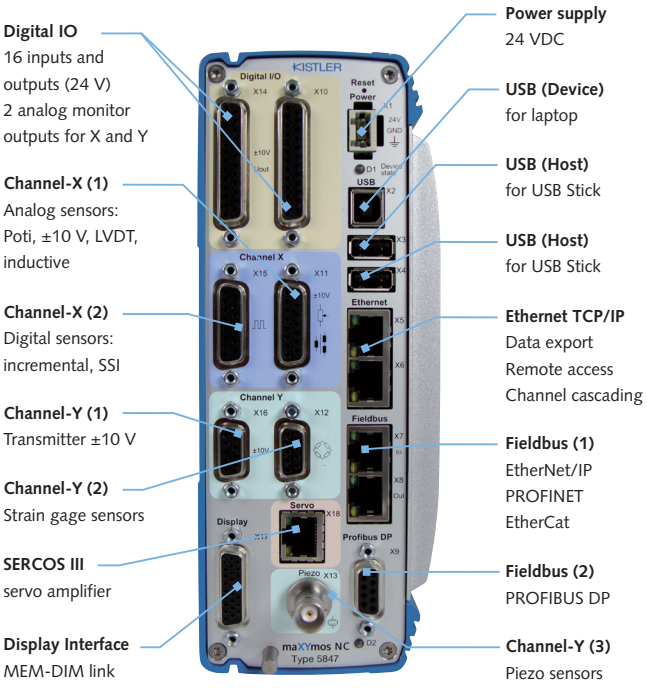
Environment		
Operating temperature range	°C	0 ... 45
Storage temperature range	°C	0 ... 50
IP degree of protection (EN 60529)		
– Connector and cable running downwards	IP	53
– Standard rail version	IP	20

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

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.



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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).

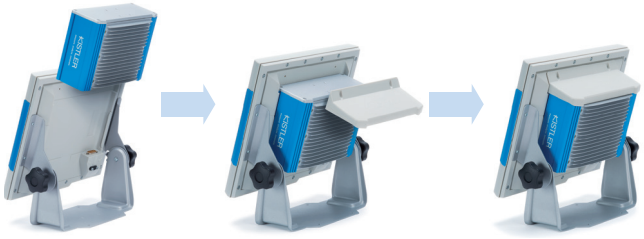
DIM

MEM

MEM with Display Module

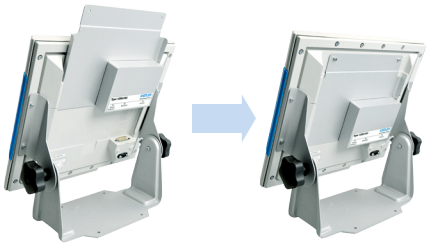
The MEM and DIM can either be installed separately from each other, connected via the optional connecting cable Type 1200A161A2,5/5.

… 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:



Functional Principle

DIM Cable Extender as an active cable extension between maXYmos MEM and Display DIM with a range of up to 100 m. The DIM Cable Extender Type 1200A163 is inserted into the rear panel of the maXYmos DIM Type 5877AZ000 display and fixed in place with two screws.



The DIM Cable Extender is inserted at the rear portion of the display. The DIM Cable Extender is supplied with 24 V of power (the display is then supplied by the DIM Cable Extender). The DIM Cable Extender is connected to one or several maXYmos units via an Ethernet cable.

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.

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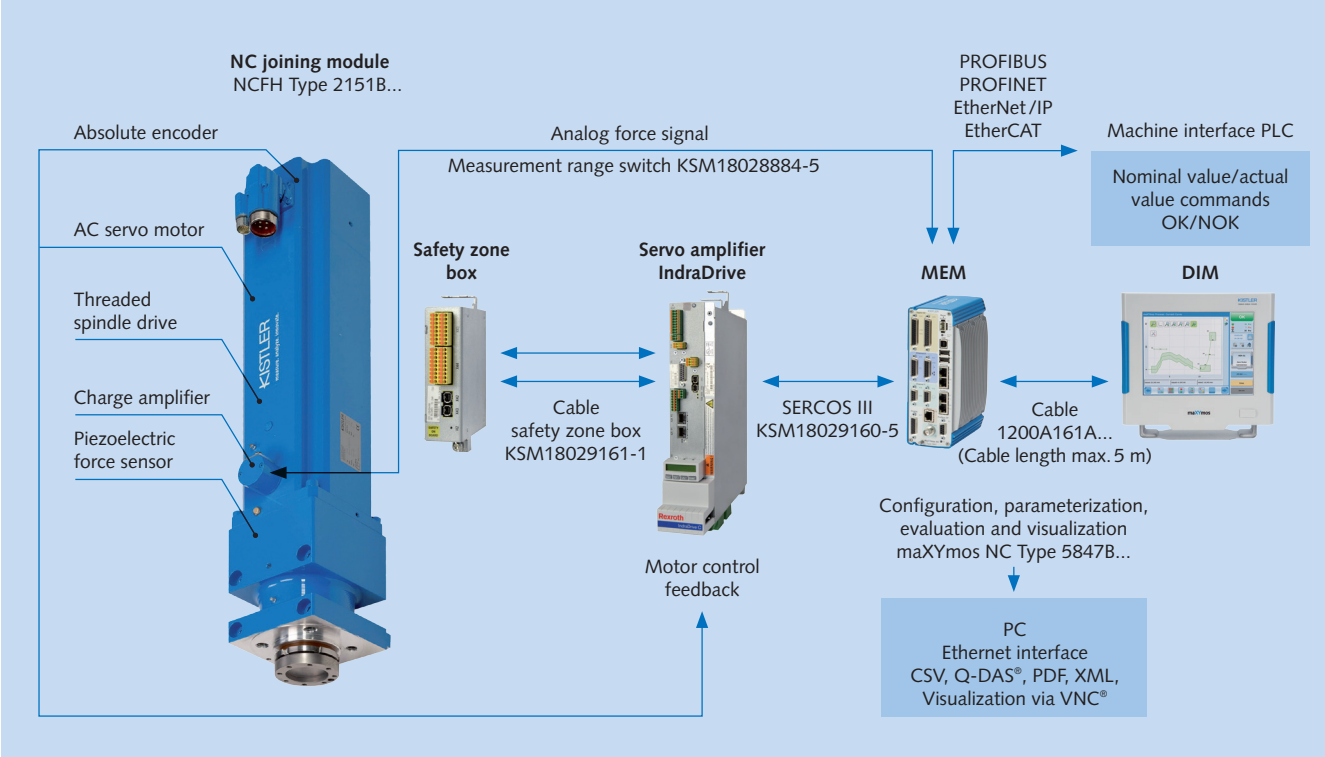
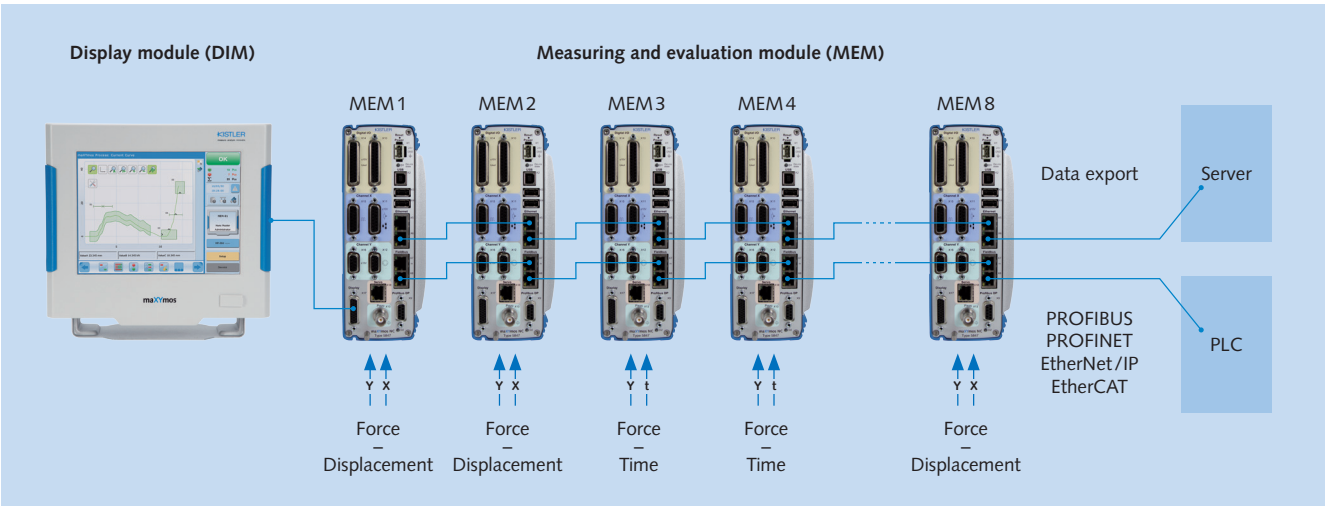
Functional Principle with maXYmos NC Type 5847B0



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

Functional Principle with Multi-Channel Applications



Networking/Multiview of maXYmos NC

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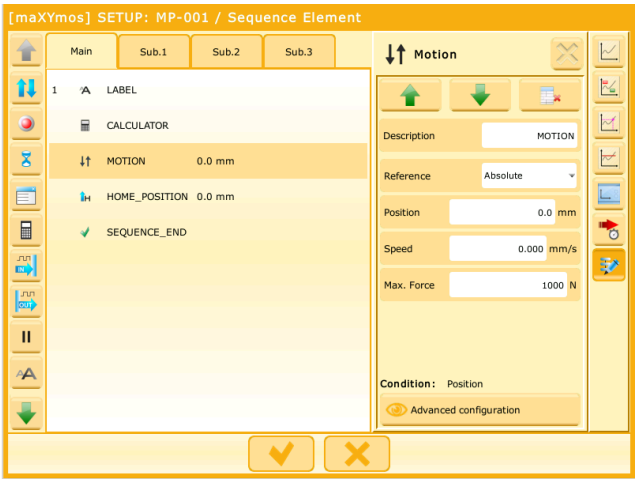
Sequencer Mode

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 inflextion 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.

IF/ELSE Element: this element permits a conditional branch, i.e. a branch in the sequential program according to the query condition or result.

Piezo Operate Element: this element is used to perform a variable measurement measure/reset of the integr. charge amplifier included in the sequence.

JUMP Element, this element jumps to the desired label Number.

Zero Tara Element[1)], this ZERO TARA element can be used to set the sensor to zero on the X or Y channel in the sequence.

BARCODE-Reader[1)] **Element**, this element can be used to read a barcode.

[1)] not available at Type 5847B1

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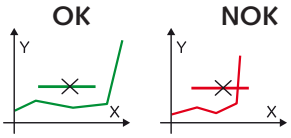
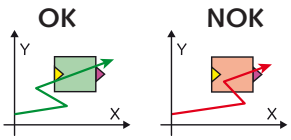
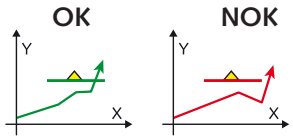
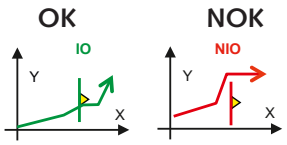
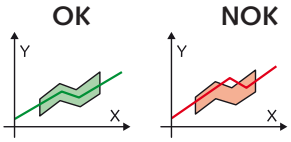
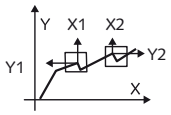
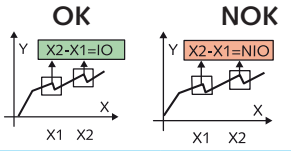
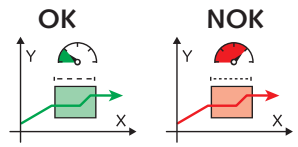
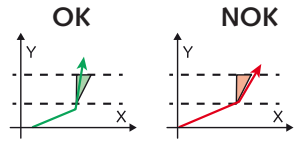
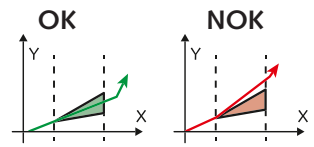
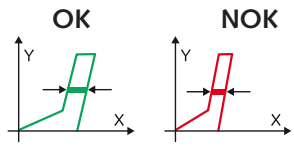
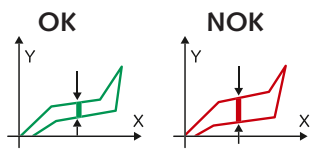
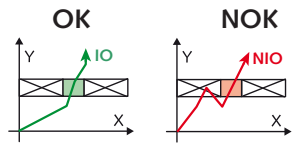
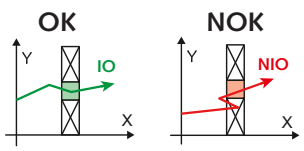
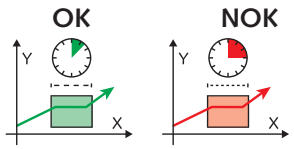
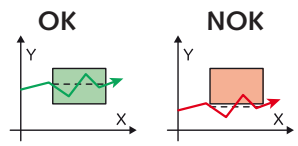
Evaluation Procedure

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

The line may not be crossed. Otherwise, NOK and "NO-PASS" real-time signal.	**Type NO-PASS** OK NOK 	*Entry and exit as specified. No crossing of "closed" sides allowed. Each side can be defined as entry or exit.*	**Type UNI-BOX** OK NOK 
The line must be crossed once. An X-value at the point of intersection is monitored.	**Type LINE-X** OK NOK 	*The line must be crossed once. An Y-value at the point of intersection is monitored.*	**Type LINE-Y** OK NOK 
The measurement curve must not cross the upper or lower line of the envelope. This evaluation object is easy to master.	**Type ENVELOPE** OK NOK 	*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*	**Type GET-REF** 
Object references two selectable process values and performs calculations, e.g. the X-difference between two ripples, and evaluates them.	**Type CALC** OK NOK 	*Evaluation criterion is the speed between the entry and exit points in a special box.*	**Type SPEED** OK NOK 
Evaluates the gradient dX/dY between two horizontal lines.	**Type GRADIENT-X** OK NOK 	*Evaluates the gradient dX/dY between two vertical lines.*	**Type GRADIENT-Y** OK NOK 
Evaluates the X-hysteresis between forward and reverse curves on a horizontal line.	**Type HYSTERESIS-X** OK NOK 	*Evaluates the Y-hysteresis between forward and reverse curves on a vertical line.*	**Type HYSTERESIS-Y** OK NOK 
Entry and exit as specified. Crossing of the "closed" sides generates a real-time signal.	**Type TUNNELBOX-X** OK NOK 	*Entry and exit as specified. Crossing of the "closed" sides generates a real-time signal.*	**Type TUNNELBOX-Y** OK NOK 
Evaluation criterion is the time between the entry and exit points in a special box.	**Type TIME** OK NOK 	*Evaluates the average of all Y-values in the box region.*	**Type AVERAGE** OK NOK 

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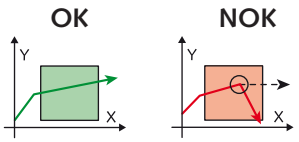
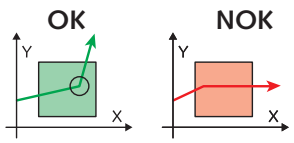
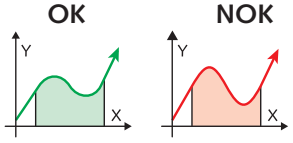
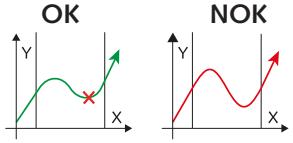
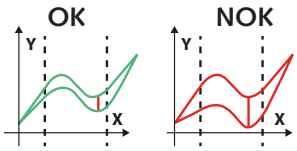
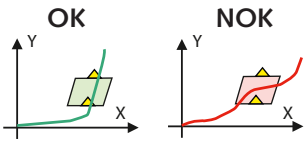
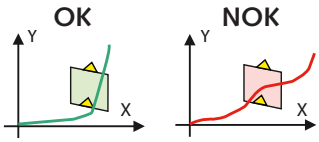
Provides NOK and online signal in case of sudden gradient change within an expectancy range (box), e.g. in case of tool breakage.	**Type BREAK** OK NOK 	*A defined gradient change is expected within the expectancy range (box) and can be used as a further switching condition in the sequence.*	**Type INFLEXION** OK NOK 
The area beneath the curve is determined and evaluated.	**Type INTEGRAL** OK NOK 	*If the curve throughput is within the defined range, the system checks for the presence of a digital signal.*	**Type DIG-IN** OK NOK 
If the curve throughput is within the defined range, the maximum curve displacement is determined and verified between the advancing and the returning curve.	**Type DELTA-Y** OK NOK 	*Entry and exit as specified. No crossing of "closed" sides allowed. Each side can be defined as entry or exit.*	**Type TRAPEZOID-X**[1)] OK NOK 
Entry and exit as specified. No crossing of "closed" sides allowed. Each side can be defined as entry or exit.	**Type TRAPEZOID-Y**[1)] OK NOK 	*No EO selection*	**Type OFF**

[1)] not available at Type 5847B1

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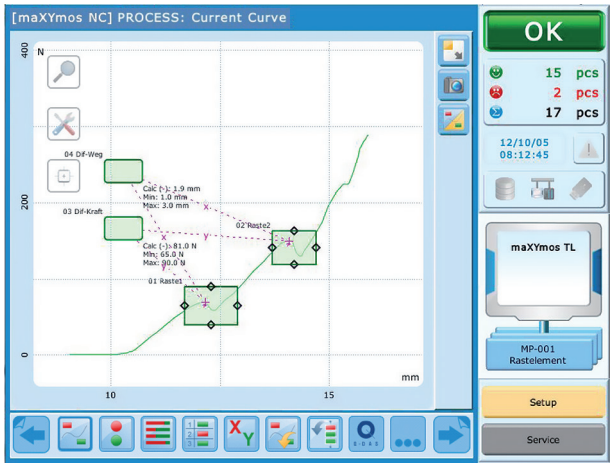
Product Testing Example: Distance check between two snap-in points of a latch. The two GET-REF boxes supply the co-ordinates of the snap-in points to the CALC objects. These calculate and evaluate the distances in the X and Y directions.



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.

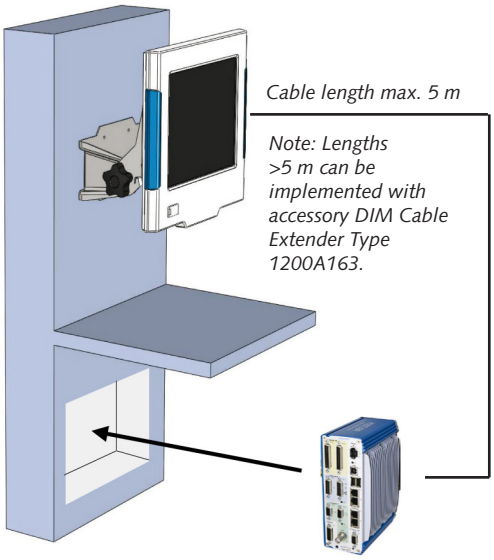
Front Panel Mounting

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.



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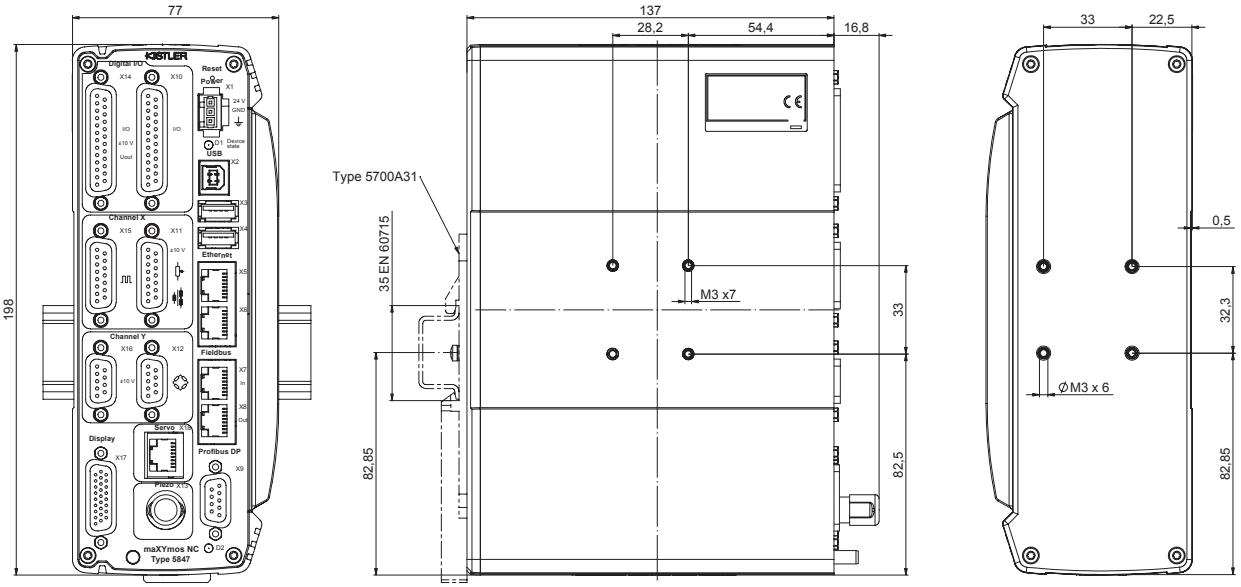
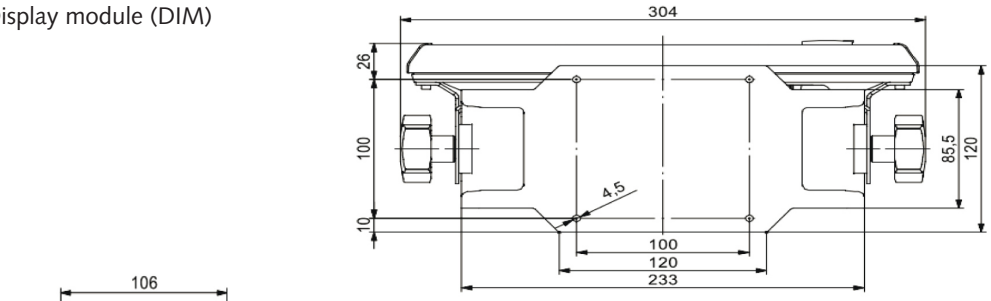
Dimensions

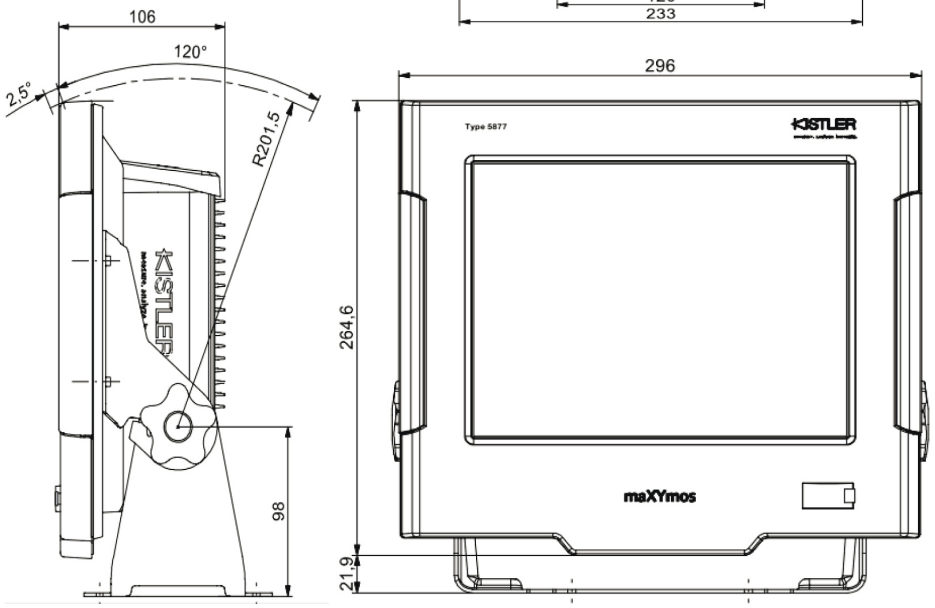
Measuring and evaluation module (MEM)



Note: Observe minimum spacing of >10 mm between the MEM's!

Display module (DIM)





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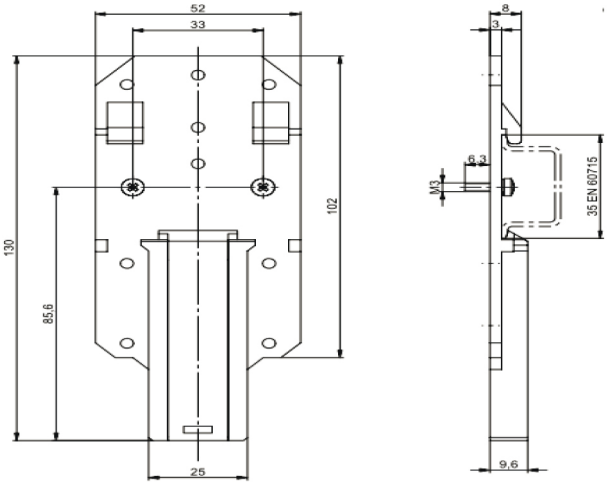
Accessories (not included)	Type
• Display module (DIM)	5877AZ000
• Set of connectors maXYmos NC for sensors, digital I/0 and supply	5877AZ010
• Connecting cable between MEM and DIM, length 2,5 m	1200A161A2,5
• Connecting cable between MEM and DIM, length 5 m	1200A161A5
• Ethernet connecting cable between MEM's, length 0,5 m	1200A49A3
• Ethernet connecting cable between MEM's, length 5 m	1200A49
• Power supply 220 VAC/24 VDC	5867AZ012
• DIN rail clip for MEM control cabinet mounting	5700A31
• DIM Cable Extender	1200A163



Ordering Key

XY Monitor maXYmos NC **Type 5847B** ☐

Measuring and evaluation module (MEM)	**0**
Measuring and evaluation module (MEM) NCFR	**1**

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 5847B0)

Windows® Software maXYmos PC (Plus) **Type 2830A2**[1)]

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

[1)] not available at Type 5847B1

Included Accessories for Type 5847B0	Type/Mat. No.
• Windows® software maXYmos PC (Basic)	2830A1

Accessory (not included)	Type
• maXYmos force transmitter cable, length 5 m	KSM18028884-5
• maXYmos force strain gage cable, length 5 m	KSM18028883-5
• SERCOS III connection cable, length 5 m	KSM18029160-5
• Safety zone box cable, (2 cables required), length 1 m	KSM18029161-1

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