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Force/Displacement Measuring System   Type 4740A...

## Single-Channel Unit DMF-P A310 Universal for NC Joining Modules

The force/displacement evaluation device DMF-P A310 Universal is used for monitoring joining and pressing-in operations in connection with NC joining modules and associated IndraDrive servo controller. Thereby the electromechanical NC joining module model NCFH, NCFN, NCFT, NCFS and NCFB can be operated. In addition the evaluation device has a EtherNet/IP-master, which controls the servo controller and thus the NC joining module with the integrated sequence control.

- Integrated sequence control with jog, step and automatic mode
- More fieldbus interfaces for system control (optional)
- Forward-backward measurement
- Traction-compression applications
- Possibility of 4-quadrant measurement
- 32 programs with up to 8 evaluation functions each (tolerance windows)
- Additional window types: inflexion point, gradient, speed, mechanical work or selective teach-in operation
- Online- and offline evaluations
- Statistics with protocol functions
- Logging of measurement results (I-P.M., Q-DAS, csv, txt, ...)
- 100 curve memories, 1 000 measured value memories
- Self monitoring and diagnostics
- Web server for visualization, modification and filing as well as remote-control via PC by ethernet
- Master sample

Description

The force/displacement evaluation device has 32 programs. Each program has independently up to 8 tolerance windows, whereby selection can be made form more than 30 different window types, such as end window, joining window or also inflexion point window. In addition, per program 16 position sets can be assigned, consisting of position, speed and set relay in step or automatic mode.

The configurable fieldbus interface for system control enables reading and writing of almost every parameter into the DMF-P A310 Universal, thus increasing flexibility and offers a simple connection to the system control.
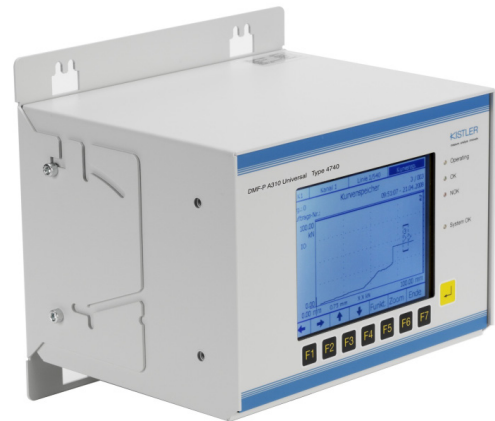
The configuration/commissioning is performed by the device with monitor or a PC with web browser.
It was taken care of presenting a clear and simple operator guidance. Continuity to the previous devices of the DMF-P series was maintained and extended by additional functions such as sequence control.

Application, Solution for Joining Processes

The characteristic for the joining processes is monitored by adjustable windows.
This allows the operator to define the critical part of the joining processes.

Among other things, the system monitors:
- Threading force
- End position
- Overload
- Variable windows

In addition the speed of the process and the slope of the measuring curve can also be measured and evaluated.

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SUNSTAR http://www.sensor-ic.com/ TEL: 0755-83376549 FAX 0755-83376182 E-MAIL: szss20@163.com

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Technical Data

General

Power supply	VDC	24 ±10 %
Power consumption	W	<20
Operating temperature range	°C	5 ... 50
Storage temperature range	°C	0 ... 60
Display		LCD 1/4 VGA with lighting background

Up- and download of setpoint records,
external visualization via PC

Access control		by password
Attributes		

    32 different programms selectable from PLC;

    Per program: 8 windows/16 position sets

    More than 30 window types available

    measured value storage, curve storage, statistics

Measuring Technology

Resolution of analog inputs	bit	12
Scan rate	kHz	5
Measuring points per curve		4 000

Y-Channel

Strain gage		
Supply	V	±1,25/2,5/5/10
	mV/V	0,25 ... 5
Accuracy	% FSO*	0,1
Active	V	±0,5 ... 10
Supply	V	24 (300 mA)**
Accuracy	% FSO*	0,1

X-Channel

Internal via Fieldbus		EtherNet/IP-Master
Incremental (counting range)	bit	32
Supply	V	24 (300 mA)**
SSI absolute (value range)	bit	24
Supply	V	24 (300 mA)**

Control Signals

Fieldbus	Profibus
EtherNet/IP, ProfiNet IO, DeviceNet, CANopen	optional
Parallel 1x16 I/O	on request

Interfaces

Ethernet	Mbit/s	10/100
RS-232C COM1, COM2	baud	9 600 ... 115 200
Keyboard		PS/2
Printer LPT		25 pin parallel

Housing Versions

Weight panel housing IP54	kg	4
Weight desktop housing IP40	kg	3,2
Weight wall mounted housing IP53	kg	4,3
Dimensions	mm	see figure 1

* without accuracy of the respective sensor

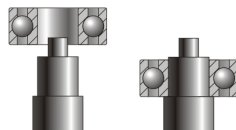** maximum current sum of X and Y channels

Monitoring Processes
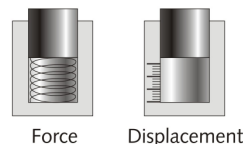
Monitoring of riveting operations

Press-fit monitoring

Monitoring of crimping operations

Classification of

Force   Displacement

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Force Displacement Measuring System – Single-Channel Unit DMF-P A310 NCF
for NC Joining Modules, Type 4740A...

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Dimensions

Housing version	B	H	T	AB	AH
Desktop housing	223	158	180	–	–
Panel housing	223	158	180	274	180
Wall mounted housing	228	217	180	–	158
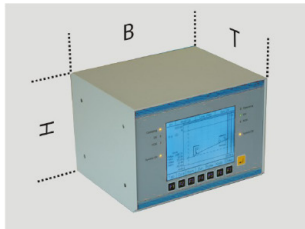
Desktop housing
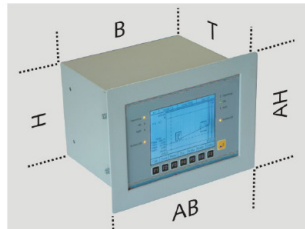
Panel housing

Wall mounted housing

Wall mounted housing with fixing hole

Wall mounted housing to the top

Wall mounted housing to the bottom

Fig. 1:   Dimensions housing versions DMF-P A310 NCF Type 4740A...

Functional Principle

NC Joining Module NCFH Type 2151B...

Absolute Encoder Displacement

AC-Servo Motor

Threaded Spindle Drive

Charge Amplifier

Piezoelectric Force Sensor

Analog Force Signal

IndraDrive C Servo Controller

Machine Interface SPS

Nominal Value/Actual Value Commands OK/NOK

Fieldbus

Range Changeover

EtherNet/IP

Configuration, Programming Evaluation, Visualization and Integrated Sequence Control DMF-P A310 Universal Type 4740A... Monitoring and Evaluation System

Motor Control Feedback

Printer

PC Ethernet Interface CSV, I-P.M. Protocol Q-DAS
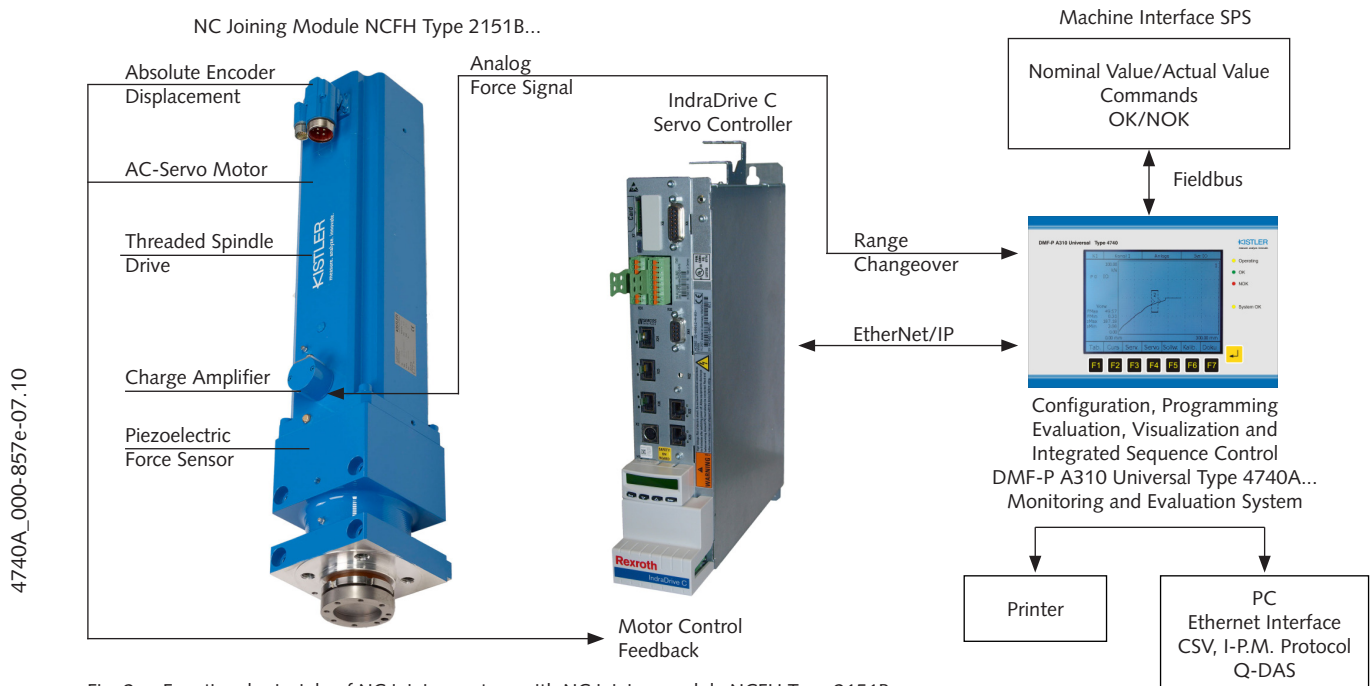
Fig. 2:   Functional principle of NC joining system with NC joining module NCFH Type 2151B...

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Measurement and Evaluation

DMF-P A310 Universal Type 4740A... records the force progression in dependance on displacement or time.
Evaluation is done according to the criteria online or after recording. The criteria are user programmable.

The start of a recording is done externally by the superordinated control, either absolute or depending on a programmable trigger threshold of the press force.

The teach-in procedure supports a punctual evaluation for force and displacement points according to a previously acquired reverence curve. Up to 8 force and displacement points may be defined and given a limit.
Further on all approved window types of the unit may be used.
The teach-in procedure may be done easily and fast by setting a bit via Fieldbus.
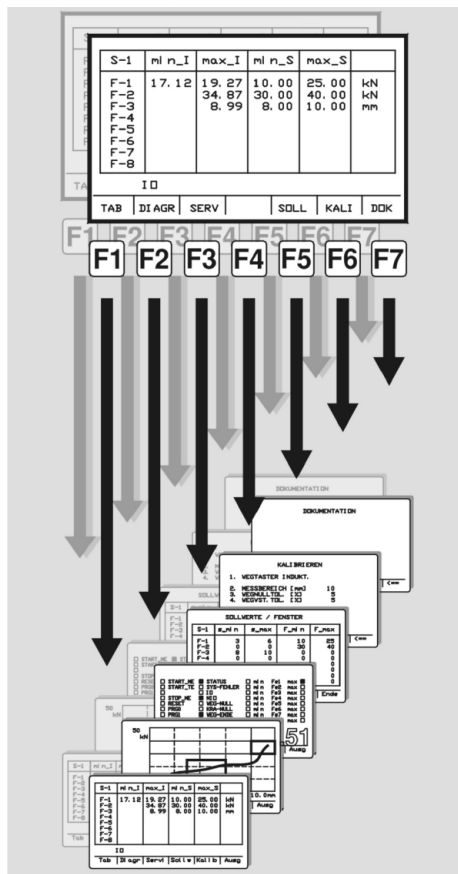
Menu Navigation

Fig. 3:　Users can easily arrive at the submenu by tapping the function keys

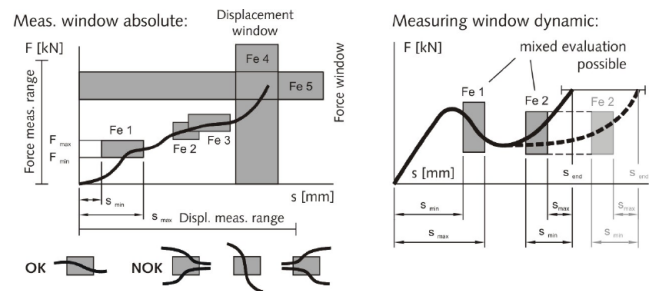## Example Tolerance Windows

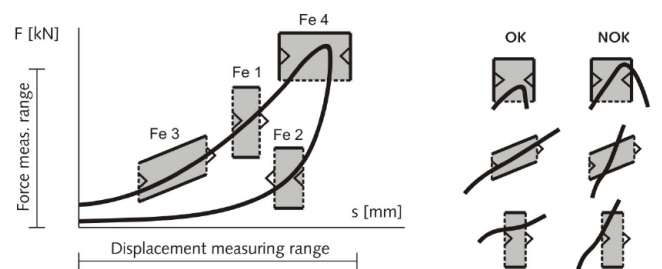

Fig. 4:　Tolerance window and dynamic measuring window

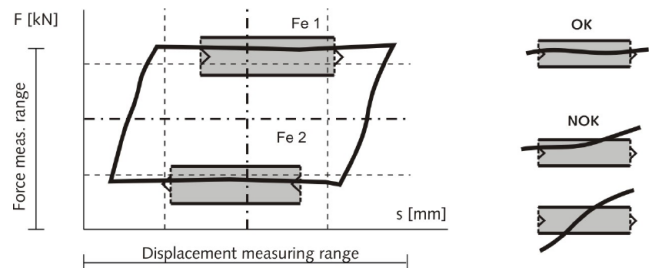Fig. 5:　Forward- and backward measurement

Fig. 6:　4-quadrant measurement

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Interfaces

Rear View
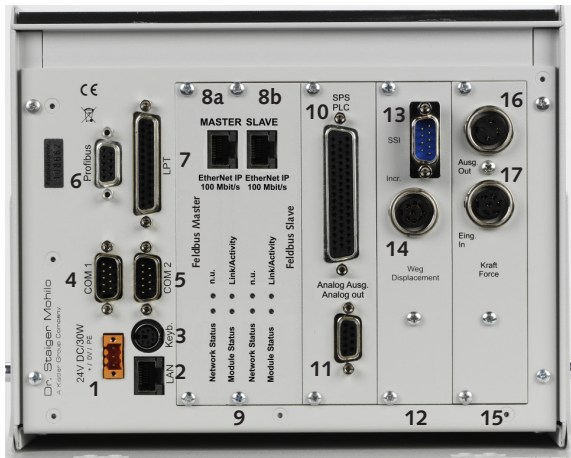
1 Supply (24 VDC)
2 LAN (Ethernet)
3 Keyboard
4 Serial interface (COM1)
5 Serial interface (COM2)
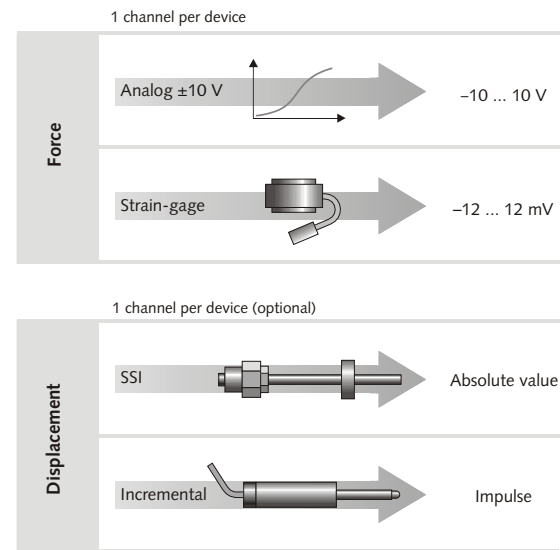6 Profibus
7 Parallel-printer HP compatible

8a: EtherNet/IP-Master for control, data transmission and path detection from NC joining module

8b: Fieldbus slave for PLC connection,
    e.g. Profinet, EtherNet/IP, etc. (optional)

9 ... 17   View of plug-in units 9, 12 und 15 are dependent on the configuration, further options are possible.

9 Digital module I/O (optional)
10 BMS 16 inputs and 16 outputs
11 Analog output

12 Displacement sensor module (optional for external dis-
   placement sensor)
13 SSI
14 Incremental

15 Force sensor module
16 Force monitor output
17 Force input

Measuring Modules

1 channel per device

| Force | Analog ±10 V | –10 ... 10 V |
| Force | Strain-gage | –12 ... 12 mV |

1 channel per device (optional)

| Displacement | SSI | Absolute value |
| Displacement | Incremental | Impulse |

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Included Accessories

	Type/Art. No.
• Power connector for supply voltage	KSM027661
• Cover for connector	KSM022694

Optional Accessories

	Type/Art. No.
• 24 V power supply (120 … 240 V)	KSM028659
• 24 V power supply (120 … 240 V) with US-plug	KSM028660
• Servo controller IndraDrive 12 A EI S2 MPC07, NCFT 1 kN	KSM036432
• Servo controller IndraDrive 28 A EI S2 MPC07, NCFB/S 50/25 kN	KSM036436
• Servo controller IndraDrive 54 A EI S2 MPC07, NCFH 10/15/30 kN	KSM036438
• Servo controller IndraDrive 54 A EI S2 MPC07, NCFN/S 30/35 kN	KSM036444
• Servo controller IndraDrive 70 A EI S2 MPC07, NCFH 60 kN	KSM036446
• Servo controller IndraDrive 70 A EI S2 MPC07, NCFN 60/100 kN	KSM036448
• Servo controller IndraDrive 100 A EI S2 MPC07, NCFN 200/300 kN	KSM036453

Cable

	Type/Art. No.
• Network cable A310 EtherNet/IP, length 5 m	KSM036457-5
• Network cable A310 EtherNet/IP, length 10 m	KSM036458-10
• Network cable A310 EtherNet/IP, length 20 m	KSM036459-20
• Network cable A310 EtherNet/IP, length 30 m	KSM036460-30

Ordering Key

Typ 4740A ☐ ☐ ☐ ☐

Housing versions

Wall mounted housing	W
Desktop housing	T
Panel housing	E

Sensor input force (y-channel)

Strain gage	Y1
Active ±0,5 … 10 V	Y2

Sensor input displacement (x-channel)

Internal	X0
SSI	X4
Incremental	X5

Interface for plant control

Profibus	B0
DeviceNet	B3
ProfiNet IO	B4
EtherNet/IP	B5
CANopen	B6
Parallel 1x16 I/O (projected)	B7
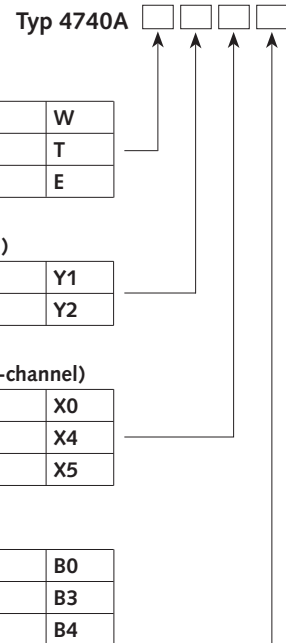
Order Example　　　　　　　　Type 4740AWY1X4B0

Single-channel force/displacement measuring system DMF-P A310 Universal **Type 4740A**… Housing version **W**: Wall mounted housing, **Y1**: Sensor input force y-channel strain gage, **X4**: x-channal SSI, **B0**: Profibus