

Technical data	MFL 300-B	MFL 500-B	MFL 800-B
Accuracy class EN ISO 9513	0.5		
Measurement principle	opto - incremental		
Travel	300 mm minus L_e	500 mm minus L_e	800 mm minus L_e
Position travel	200 mm		
Gauge length (L_e)	10 ... 300 mm	10 ... 500 mm	10 ... 800 mm
Indication error (rel.)*	0.5 %		
Indication error*	1.5 μ m		
Error in linearity	0.005 %		
Error in gauge length (L_e)	\pm 0.5 %		
Resolution	1 or 0.1 μ m		
Activating force	< 0.1 N		
Clamping force **	ca. 0.5 N		
Operating temperature range	0 - 50 °C		
Weight	approx. 26 kg	approx. 31 kg	approx. 38 kg

* The larger of the values is admissible

** The clamping force can be adjusted by changing the tension spring

Sample dimensions

maximum sample thickness	30 mm
maximum sample width	50 mm
maximum sample diameter	80 mm

MFL electronic

Connection	RS 232 (V24) [can be configured up to 38400 baud] or USB, dialog mode in ASCII-format
Output of measurement values	a. RS 232 (V24) [can be configured up to 38400 baud] b. USB c. RS 422-output (incremental signal, square wave phase Ua1 and Ua2 with 90°-phase shift as well as their inverted impulses)

MFL 300/500/800-B

Extensometer - fully automated -



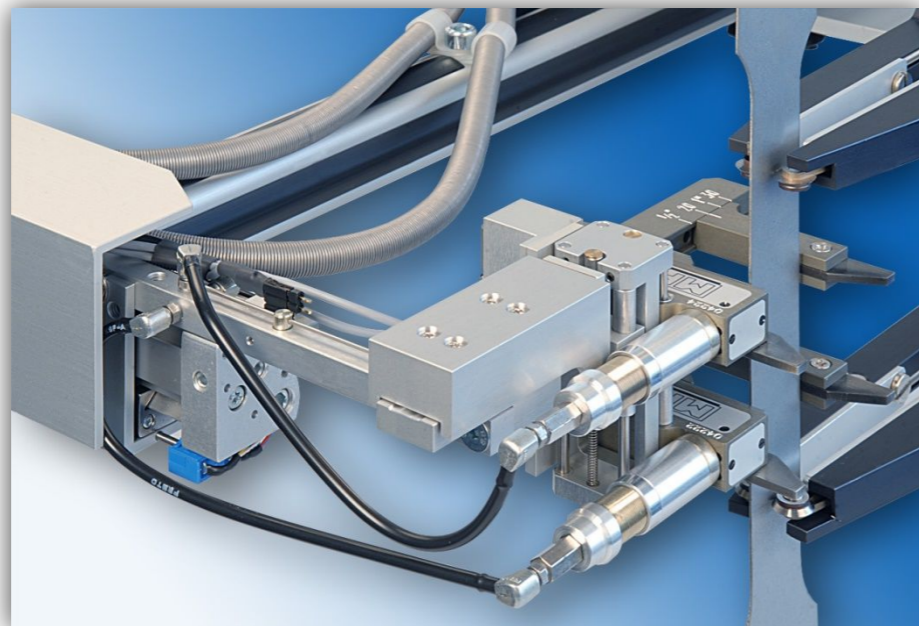
M e s s - & F e i n w e r k t e c h n i k G m b H



P r e c i s i o n t e s t i n g o f l i n e a r s t r a i n

Area of application

The extensometers MFL 300-B, MFL500-B and MFL 800-B (in the following named MFL) are suitable for almost all samples of an initial gauge length (L_e) from 10 mm. Its low clamping forces combined with high measurement accuracy makes it highly suitable even for small, notch sensitive test samples. The MFL can be connected to partly or fully automatic testing machines with hydraulic grips. The strain can be measured from the elastic range to fracture for almost all types of samples. When used in combination with the MFQ (as shown in the figure), the MFL is highly suitable for testing the deep-drawing properties (vertical anisotropy r) of thin sheets.



Picture 1: MFL and MFQ-A

Design and function

Each one of the four measuring arms of the MFL has a measuring spring bonded with a full bridge strain gauge. The measuring springs of a right and left arm pair are connected in parallel to obtain an average value which is important if the sample deforms non-homogeneously. DC motors compensate the changes in the measuring spring signal initiated through the sample elongation by a ball-bearing gear ensuring that the measuring heads move according to the sample elongation and make the measuring heads follow the sample extension. The elongation is recorded by an opto-incremental measuring system. The measuring heads mounted on the measuring arms show an exact parallel movement which is achieved through a zero-backlash linear guidance system. Using this principle avoids errors which occur for measuring sensors with fixed points of rotation through angle changes and also errors due to tilting of the knife edges on the sample. The measuring heads and arms can be separated from the linear guidance system as well as they can be changed easily and quickly. It is possible to change the arms by just one screw fitting, ensuring the simplicity of maintenance.

Controlling

The MFL is controlled through an integrated electronic unit. It is a fully automatic control which can be used via a serial interface (RS 232 or USB). All movements can be initiated at any time required. The output of the

measurement value is made via the RS 232 or USB or RS 422 (two rectangular signals which are shifted for 90°). The measuring arms can be positioned parallelly within the available interval under computer control and thus can quickly be adjusted symmetrically to different sample lengths. The gauge length (L_e) can be set from 10 mm to the maximum possible measuring stroke. For example at the MFL300-B the travel is calculated from the measurement range of 300 mm minus gauge length. The MFL has an additional positioning range of 190 mm for the symmetrical adjustment of L_e . With the arms open the required measurement position can be approached. Before the approach of the measuring position the digital measurement system is calibrated by reference marks. The opening and closing of the arms can be initiated at any time required. The electronic control of the MFL is designed to work together with the MFQ control unit and can become the master control.

Computer control

An RS 232 interface (V24) or USB is used for sending commands and transfer data. It connects the customers control computer to the MFL electronic unit. The MFL interface can be configured up to 38400 baud and may be connected to virtually all computers with an RS 232. The commands are in ASCII-format which makes it easy to

adapt the software and check an error.

For checking purposes, the MFL control unit can be operated and tested even with a simple terminal program. The command set of the MFL electronics permits the setting of the measurement parameters as well as the changing of the numeric format of the output of measurement value. A status check is also provided.

Advantages of the MFL

- Two-sided measurement by means of 4 measuring sensors.
- Very high resolution up to 0.1 μm is possible over the complete measuring range.
- Very low clamping forces even allow testing of foils and thin wires
- The L_e position (symmetrically placed measuring arms with respect to the sample centre) and L_e value can be exactly set under computer control.
- The round knife edges can be utilized along their entire perimeter by turning them.

Options

- Measuring direction downward: travel on inquiry.
- Different lengths of measuring arms and travels on inquiry.
- The installation of a ventilator is recommended if used in dirty environments.

Delivery scope

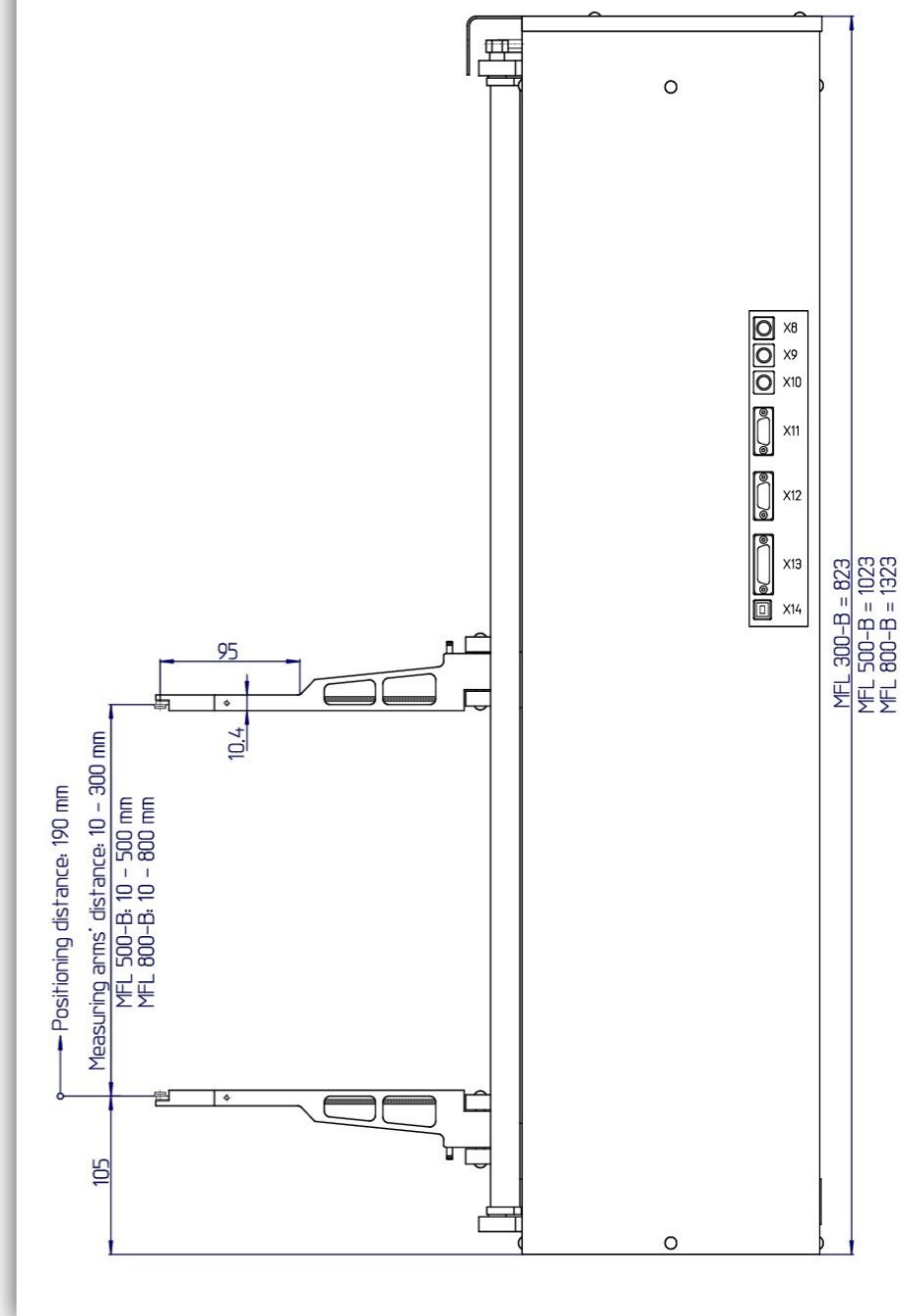
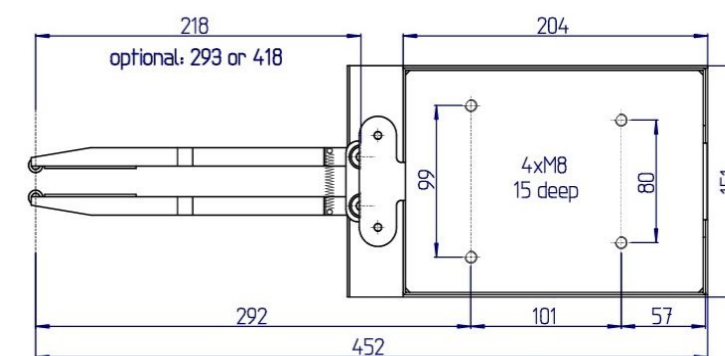
- | | |
|---|--|
| 1 | MFL 300-B / MFL 500-B / MFL 800-B |
| 1 | Connecting cable X11 (MFL electronic unit \leftrightarrow PC), 3 m |
| 1 | plug for RS422 measuring value out put X13 |
| 1 | Hexagon key 2 mm |
| 1 | Hexagon key 5 mm |
| 1 | Screw driver TORX T10 |
| 1 | Instruction Manual |
| 1 | Test report |

Recommendation

The calibration instrument KMF 100 is suitable for checking the MFL and other measuring devices like hand-clamped extensometers, inductive detectors, dial gauges etc. Additionally, the exact sensitivity calibration of measurement amplifiers can be easily performed for analogue sensors corresponding to their rated lengths.

Electrical

- | | |
|-----|--------------------------------------|
| X8 | Reset |
| X9 | MFQ-control |
| X10 | without function (must not be used) |
| X11 | RS232-control |
| X12 | without function (must not be used) |
| X13 | RS422-measuring values |
| X14 | USB-control |
| X15 | Power / 88 ... 264 VAC / 47... 63 Hz |



Picture 2: MFL 300-B (MFL 500-B and MFL 800-B) - Dimensions