## Heavy-Duty Fully Automatic Extensometer Series MFL

The extensometers series MFL are fully digital, high precision and high resolution units suitable for almost all specimens and materials with an initial gauge length starting from 10 mm.

There low clamping force combined with high measurement accuracy makes them suitable for a wide range of specimens and materials, even for small, notch sensitive test samples.

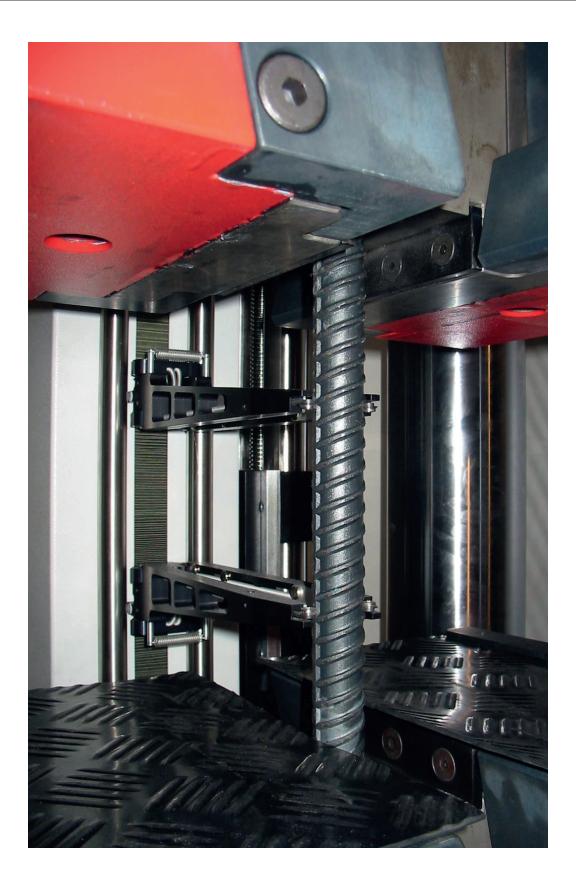
The MFL can be connected to partly or fully automatic testing machines with hydraulic grips. The strain can be measured from the elastic range to fracture for almost all types of samples. The strain can be measured from the elastic range to fracture for nearly all types of samples. When used in combination with the transverse models, the MFL extensometers are ideal for testing the deep-drawing properties of thin sheets.



#### **Key Features**

- Two-sided measurement by means of four measuring ensors
- Very low clamping forces even allow testing of thin wires and foils
- $\bullet\,$  Very high resolution of up to 0.1  $\mu m$  over the complete measuring range
- The gauge length position and value can be precisely set under computer control
- The round knife edges can be utilized along their whole perimeter by rotating them
- Accuracy class 0.5 (EN ISO 9513)
- The gauge length (Le) is adjusted automatically set through the Application Software and the measuring levers are automatically open and closed
- Measuring until sample failure or to a reference load, stress, strain or drop of a load or stress
- Automatic returning to initial position and adjustment of Le ready for the next test
- 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 none homogeneously
- Initial gauge length from 10 mm
- Automatic movement to the position and gauge length
- Automatic attachment to specimen
- Very low clamping forces (ca. 0.5 N)
- Measuring displacement of 300 (MFL-300), 500 (MFL-500) or 800 mm (MFL-800) mm minus gauge length
- Lowest activating forces (<1 cN)

# w+b



#### Option

- Measurement in compression or deflection. The MFL models work in tension or compression, however, an optional module can be incorporated that will permit the models to work in both directions.
- Different lengths of measuring arms, and higher travel available. Measuring arms of either an extra 75 mm or 200 mm length (additional to the standard length of 254 mm) can be used to follow the specimen movement, enabling the extensometer to be used at a greater distance from the specimen.
- The installation of a fan/ventilator for use in dusty/dirty environments. Any dust or dirt can be disastrous with electronics and fine measuring systems, so putting the extensometer under a positive pressure prevents the ingress of dirt and dust.

Type MFL	300	500	800
Accuracy class EN ISO 9513	0.5	0.5	0.5
Accuracy class ASTM E83	B1	B1	B1
Measurement principle	opto-incremental	opto-incremental	opto-incremental
Travel (minus gauge length)	300 mm	500 mm	800 mm
Positioning distance	190 mm	190 mm	190 mm
Gauge length (L0)	10 - 300 mm	10 – 500 mm	10 – 800 mm
Indication error (rel.)*	0.5 %	0.5 %	0.5 %
Indication error *	1.5 μm	1.5 μm	1.5 μm
Error in full range value	0.010 %	0.010 %	0.010 %
Error in linearity	0.005 %	0.005 %	0.010 %
Error in gauge length (L0)	± 0.5 %	± 0.5 %	± 0.5 %
Resolution	1 or 0.1 μm	1 or 0.1 µm	0.1 µm
Activating force	< 0.01 N	< 0.01 N	< 0.01 N
Clamping force **	0.5 N	0.5 N	0.5 N
Operating temperature range	0 – 50 °C	0 – 50 °C	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 springs up to 1 N.

Sample Dimensions		
Specimen diameter	Up to Ø 80 mm	
	Up to thickness 30 mm x width 50 mm Option for thicker specimen with wider width available	



# The MFL Series is compatible and supplied with mounting bracket to all our electromechanical and hydraulic testing machines.

#### Available are the following mounting brackets:

- Mounting Bracket which allows to swivel the extensioneter out of the testing space as well as adjust the height of the extensioneter.
- **Mounting Bracket** which allows withdrawing of the extensometer from the testing space as well as to adjust the height of an extensometer.
- Motorized Mounting Bracket which allows withdrawing of the extensometer from the testing space with motorized height adjustment of the extensometer.
- Mounting Bracket for Multiple Test Rooms

for the installation on the testing machine, allows to swivel the extensometer out of the testing space, adjust the height of the unit and allows the translation of the extensometer from one test space to another (designed for machines with several testing rooms)

### **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. By using this principle, errors are avoided, 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 changed easily and quickly. It is possible to change the arms by just one screw fitting, ensuring the simplicity of maintenance.

## Control

The MFL is controlled through our Dion software via a serial interface (RS 232).

All movements can be initiated at any time required. All movements can be commenced whenever required. The measuring arms can be positioned parallelly within the available interval under computer control and therefore can quickly be attuned symmetrically to different sample lengths. The gauge length (L0) can be fixed from 10 mm to the maximum possible measuring stroke. The travel is easily calculated from the maximum measurement range of 300 mm, 500 mm or 800 mm less the gauge length.

The MFL models have an extra positioning range of 190 mm for the symmetrical adjustment of the initial gauge length. 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) 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 19400 baud and can connected to virtually all computers with an RS 232. The commands are in ASCII format which makes software adaptation and error checking easy. For checking purposes, the MFL control 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

- Folding bellows alongside the casing protect the measuring system and the parallel guide against any foreign particles.
- The round knife edges can be utilized along their entire perimeter by turning them.
- The L0 position (symmetrically placed measuring arms with respect to the sample centre) and L0 value can be exactly set under computer control.
- Very low clamping forces even allow testing of foils and thin wires
- Very high resolution up to 0.1  $\mu m$  is possible.

## Options

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

## Parts supplied

- 1 MFL
- 1 Connecting cables 5 m
- 1 Spare fastening screws M3x4, 5 T10
- 1 TORX screw driver T10

