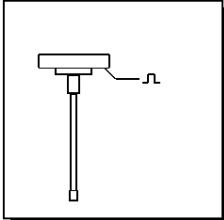


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## MI-4 Melt Flow Indexer

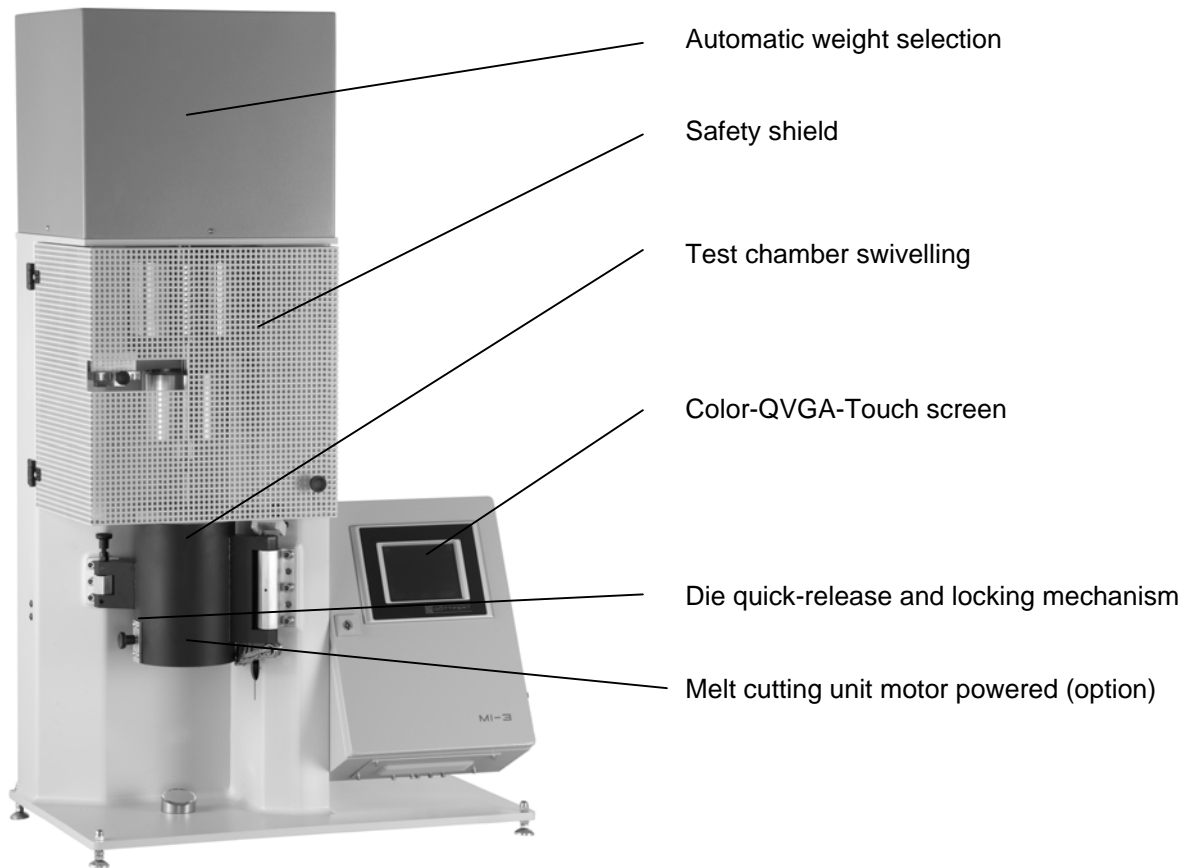
**This unique melt indexer with automatic weight selection can carry out a single weight test according to ISO 1133 and ASTM D1238, procedures B, as well as ISO 1133 and ASTM D1238 Procedure C for the “Half Height / Half Diameter” standard.**

**Tests can be made either with one test load (single load mode) or with several test loads per barrel filling (multiple test load mode).**

**The Melt Indexer MI-4 has the following features:**

- Brilliant 5.7“ Color-QVGA Touch screen display for the operation, program control and display of the measurement results
- Single load mode for tests with one load
- Multiple test load mode for test with several different loads per barrel filling
- Two heater elements / zones, resolution 0.01°C
- 5 Calibration settings for set temperatures with dedicated parameter files
- High-resolution position transducer to measure volume output
- High-precision timer with a resolution better than 0.001 s
- Built-in USB-connection (Data Stick) for data back-up
- USB printer port
- Serial connection to communicate with the MFR Host software or the optional scale
- Ethernet-connection (LAN, WEB-Server)
- Integrated Web-Server
- Electrically heated test chamber with easily exchangeable test channel and die quick closure
- Capillary/die quick-release and locking mechanism
- Base weight 1.200 kg, (1.000 kg and 1.050 kg option)
- Test weights from 2.160 kg to 21.600 kg integrated into the machine and user selectable

- Electric weight handling system
- Manual or automated melt cutting unit (option)
- Die plug (option)
- Extrudate swell measurement (option)
- Nitrogen purge (option)



Picture: Total view of MI-4

The Melt Indexer consists of the following components:

### **Housing**

Sturdy frame on 4 feet. The feet are adjustable in height, which facilitates leveling of the equipment.

### **Test chamber**

The insulated test chamber is heated with two heating circuits and is easily accessible from top and below for cleaning, especially since it can be swivelling out to aid the process.

### **Test channel**

The test channel is easily replaceable. Diameter 9.55 mm.

### **Die**

Die, 2.095 mm diameter, 8 mm length, constructed from tungsten carbide and serial number engraved.

### **Die quick release and locking mechanism**

The die is held and released by the quick-locking mechanism, which works simply and fast. Thus the test channel can be cleaned easily.

### **Test Weights**

The MI-4 features a base weight of 1.200 kg (1.000 or 1.050 kg see options) and permanently installed weights of 2.160 / 3.800 / 5.00 / 10.000 / (12.500 / 15.000 see options) and 21.600 kg. The user can select the needed weight with a lever.

### **Digital position transducer**

High-resolution digital encoder to measure volume output.

### **Color-QVGA-Touch screen**

For the input of parameters, for program control and for the display of results.

### **Compact I/O-Module**

For control and to receive input signals.

### **Temperature Controller**

The test chamber temperature is regulated with a microprocessor-controlled temperature controller, regulating two zones. The temperature set points are entered via the touch screen display. During the test, the temperatures are displayed on the screen with a 0.01 °C resolution.

## USB Connections (USB 1.1)

1. to connect to a printer (port 2). Suitable printers, please see options.
2. to communicate with a PC, or to connect to a data stick for data back-up in ASCII-Format.

## Ethernet-connection

LAN connection and communication with HOST software via TCP/IP, FTP, or Web-Server

## Serial Connection

Connection to a scale or PC. The HOST software program is available as an option (see separate product description).

## Technical Data

Test chamber:	Two heater circuits, electrically heated, Temperature transducer PT 100 1/3 DIN Temperature deviation over time: less than $\pm 0.1$ °C Spatial temperature distribution over the used barrel range: <i>0-70mm before the die</i> $\leq \pm 0.2$ °C of operating temperature ( 60 ... 400 °C) $\leq \pm 0.3$ °C of operating temperature ( 400 500 °C - option)
Temperature controller:	Regulates two independent heater elements / zones
Temperature input:	With touch screen from 60.0 ... 400.0 °C (Extended range to 500.0 °C see options)
Display of temperature:	000.00 – 500.00 °C on Touch screen Display
Temperature Acquisition:	via 16 Bit converter. Temperature resolution from 0 to 320°C: 0.01°C, from 320 to 500°C: 0.1°C
Test barrel:	9.555 - 0.01 mm diameter
Die:	2.095 $\pm$ 0.003 mm diameter, 8 $\pm$ 0,025 mm length Material: tungsten carbide
Die ASTM D1238 Methode C:	1.048 $\pm$ 0.005 mm diameter, 3,985 $\pm$ 0,025 mm length (Option) Material: tungsten carbide
Weights:	1.200 kg (Option 1.000kg or 1.050 kg ; 12.5 kg / 15.000) 2.16 kg / 3.8 kg / 5.0 kg / 10.0 kg / kg / 21.6 kg tolerance $\pm 0.5$ %
Digital position transducer:	Digital encoder, resolution 0.006 mm/impulse
Color touch screen display:	5.7" color-QVGA touch screen
Power supply:	See Options. Please note that the Melt Indexer is fitted with microprocessors. The power supply must be free of any interference in order to guarantee trouble-free operation. Mains filters or stabilizers must be connected on the line side if any interference occurs.

Ambient temperature:	+ 10 to + 40 °C
Air humidity:	Max. 90% not condensating
Dimensions:	Width: 700 mm, Depth: 450 mm, Height: 1220 mm
Color:	Cover plates: beige-matte Hood: pastel orange RAL 2003
Weight:	Approximately 60 kg

**GOETTFERT provides full warranty for machines that have been supplied as a complete system, that means with PC and printer by Goettfert. PC means generally the complete system comprising of PC, monitor, keyboard, interfaces and if applicable joysticks. In general, we do not give a functioning guarantee for connecting externally supplied PCs and printers (non-Goettfert supply).**

**If the customer provides the PC by themselves, Goettfert cannot guarantee the trouble free functioning of the PC and the Goettfert unit. Service work, which may become necessary due to appearing problems in regard to configuration, serial interfaces, connection cables, communication etc., are not covered by warranty and will therefore be invoiced on an actual expense basis.**

**Due to the various printer executions that are available on the market, we do not give any function guarantee for printers not supplied by Goettfert. Support for possible adjustments will be charged on an actual expense basis.**

### **Accessories**

- 1 Material filler
- 1 Die scraper
- 1 Barrel scraper
- 1 Steel brush with handle
- 1 Cleaning piston with handle
- 1 Wrench for removing the piston nuts
- 1 Material compressor
- 1 Tweezers
- 1 Set of micro fuse
- 1 Mains cable
- 1 User Information

### **Melt Indexer MI-4**

Base Unit

Order Number.....5.07.400

# Options

The base instrument is not a functioning device without adding the following units:

- German Version or English Version**
- Power supply 230 V or power supply 115 V** with the corresponding test temperature range.

## English Version

English lettering and user information.

Order Number.....5.07.402

## German Version

German lettering and user information.

Order Number.....5.07.401

## English User Information

Additional user information.

(One user information is by standard supplied with the basic instrument.)

Order Number.....5.07.404

## German User Information

Additional user information.

(One user information is by standard supplied with the basic instrument.)

Order Number.....5.07.403

The user information contains operating manual and technical documentation.

## Power Supply 230 V and Test Temperature up to 400 °C

Voltage: 230V, + PE

Permissible voltage fluctuations: ± 10%

Frequency: 50 Hz ± 1%

Power consumption: approx. 870 W

Order Number.....5.07.305

## Power Supply 115 V and Test Temperature up to 400 °C

Voltage: 115V, + PE

Permissible voltage fluctuations: ± 10%

Frequency: 60 Hz ± 1%

Power consumption: approx. 870 W

Order Number.....5.07.306

If you work with tests temperatures above 400 °C, you need a special test chamber with ceramic heaters. Please note that at temperatures from 60°C to 500°C the spatial temperature deviation is  $\leq \pm 0.3$  °C:

**Power Supply 230 V and Test Temperature up to 500 °C**

Voltage: 230V, + PE  
Permissible voltage  
fluctuations:  $\pm 10\%$   
Frequency: 50 Hz  $\pm 1\%$   
Power consumption: approx. 1000 W  
With this option, temperatures up to 500 °C can be used.  
Order Number.....5.07.307

**Power Supply 115 V and Test Temperature up to 500 °C**

Voltage: 115V, + PE  
Permissible voltage  
fluctuations:  $\pm 10\%$   
Frequency: 60 Hz  $\pm 1\%$   
Power consumption: approx. 1000 W  
With this option, temperatures up to 500 °C can be used.  
Order Number.....5.07.308

**Capillary**

2,095  $\pm$  0,003 mm diameter, 8  $\pm$  0,025 mm length, constructed from tungsten carbide.  
Order Number.....4.23.000

**Capillary ASTM D 1238 Method C**

1,048  $\pm$  0,005 mm diameter, 3,985  $\pm$  0,025 mm length, constructed from tungsten carbide.  
As replacement for the optional unit ASTM D 1238 method C, article No. 5.02.586.  
Order Number.....4.23.043

**Base weight 1.000 kg**

Instead of base weight 1.200 kg  
Order Number.....5.07.370

or

**Base weight 1.050 kg**

Instead of base weight 1.200 kg  
Order Number.....5.07.369

**Additional test weights 12.500 and 15.000 kg**

Are used in the base system between the test weight 10.000 and 21.600 kg. Selectable with the test weight selection lever.  
Order Number.....5.07.359

### **ASTM D1238 Procedure-C (Half-Height, Half Diameter Die) – Set**

Standard-capillary, 1.048 mm diameter, 3.985 mm length, made of tungsten carbide. Test piston to bridge length differences.

Order Number.....5.07.358

### **Melt cutting tool - manual**

Cutting the strand is done by a tool mounted close to the die. The cutter is operated manually by the user. The cutting device has been proven to operate with a number of polymers over a wide MFR/MVR range.

Nevertheless, some polymers cannot be cut properly because of their material characteristics (e.g. sticky, adhesive materials, or rheological complex materials). For such materials it is not possible to guaranty that the cutting device will operate properly. Please ask for details.

Order Number.....5.07.175

### **Melt cutting tool – motor powered**

Cutting the strand is done by a motor powered tool mounted close to the die. The cutter is activated via program control. The cutting device has been proven to operate with a number of polymers over a wide MFR/MVR range.

Nevertheless, some polymers cannot be cut properly because of their material characteristics (e.g. sticky, adhesive materials, or rheological complex materials). For such materials it is not possible to guaranty that the cutting device will operate properly. Please ask for details.

Order Number.....5.07.251

### **Scale**

Analytical scale with serial connection for connection to the MI-3.

In combination with the automated cutter, the program control can calculate the density of the material measured.

Order Number.....5.07.309

### **HP Deskjet**

Printer for measurement data.

Included:     1 Printer cartridge, black  
                  1 Mains cable  
                  1 Manual

Printer with AC 100-240V / 50-60Hz and Manual (or similar system)

Order Number.....8.94.054



### **USB-Printer cable**

Cable to connect to the MI-4

Order Number.....8.90.066

### **Pneumatic Cleaning Device**

Air driven rotary cleaning tool for quick, easy and thorough cleaning of the test barrel.  
The device need a air supply of 4- 6 bar . The air supply must be oiled and water free.

Accessories supplied:     1 Quick connect coupling for a 9 mm air hose (NW9)  
                                  1 Air hose

Order Number.....5.11.082

### **Cleaning Brush**

For the cleaning of the test barrel, with coupling part for the pneumatic cleaning device.

Order Number.....5.03.188

### **Cleaning Piston**

For cleaning the test barrel with a cloth patch, with coupling part for the pneumatic cleaning device.

Order Number.....5.03.189

### **Die plug (heatable)**

To manually close the die while system is packed and material melted. Recommended for certain high flow materials.

Order Number.....5.07.160

### **Nitrogen purge**

Contains ring injection nozzle with socket for nitrogen purge to mount to the top of the test chamber.

Material must be appropriately conditioned by user and carefully loaded.

Order Number.....5.07.165

### **Special Table I**

For reception of the test machine and accessories.

The table includes a European style multiple socket outlet (6x).

Width: 1100 mm, depth: 750 mm, height: 720 mm.

Order Number.....5.13.300

### **Special Table II**

For reception of the test machine and accessories.

The table includes a European style multiple socket outlet (6x).

Width: 1600 mm, depth: 750 mm, height: 720 mm.

Order Number.....5.04.810

Following calibration thermometers are available to check the test chamber, all of which come with a 90° angle for ease of use.

**Calibration mercury thermometer +50 °C to +100 °C**

Resolution 0.1 °C.

Order Number.....4.55.100

**Calibration mercury thermometer +100 °C to +150 °C**

Resolution 0.1 °C.

Order Number.....4.55.101

**Calibration mercury thermometer +150 °C to +200 °C**

Resolution 0.1 °C.

Order Number.....4.55.102

**Calibration mercury thermometer +200 °C to +250 °C**

Resolution 0.1 °C.

Order Number.....4.55.103

**Calibration mercury thermometer +250 °C to +300 °C**

Resolution 0.1 °C.

Order Number.....4.55.104

**Calibration mercury thermometer +300 °C to +350 °C**

Resolution 0.1 °C.

Order Number.....4.55.105

**Calibration mercury thermometer +350 °C to +400 °C**

Resolution 0.1 °C.

Order Number.....4.55.106

**Calibration mercury thermometer +400 °C to +500 °C**

Resolution 0.5 °C.

Order Number.....4.55.107

**Die swell measurement**

On request.

Subject to change due to technical developments

**MI-4**

Short text for quotation, delivery note and invoicing

Order Number	Description
5.07.400	<b>Melt Indexer MI-4</b> Basic model
5.07.401	<b>German version</b> For MI-4 basic model
5.07.402	<b>English version</b> For MI-4 basic model
5.07.403	<b>German user information</b> For MI-4 basic model German
5.07.404	<b>German user information</b> For MI-4 basic model English
5.07.305	<b>Power supply 230V/50 Hz</b> Test temperature to 400 °C For MI-4 basic model
5.07.306	<b>Power supply 115V/60 Hz</b> Test temperature to 400 °C For MI-4 basic model
5.07.307	<b>Power supply 230V/50 Hz</b> Test temperature to 500 °C For MI-4 basic model
5.07.308	<b>Power supply 115V/60 Hz</b> Test temperature to 500 °C For MI-4 basic model
4.23.000	<b>Capillary</b>
4.23.043	<b>Capillary ASTM D 1238 method C</b>
5.07.370	<b>Base weight 1.000 kg</b>
or	
5.07.369	<b>Base weight 1.050 kg</b>
5.07.359	<b>Additional test weight 1.200 and 15.000kg</b>
5.07.358	<b>Capillary L/D = 4/1,05 - set</b>

- 5.07.175 **Melt cutting tool - manual**
- 5.07.251 **Melt cutting tool - motor powered**
- 5.07.309 **Scale**
- 8.94.054 **HP Deskjet 110-240V/50-60Hz**
- 8.90.066 **USB printer cable**
- 5.11.082 **Pneumatic cleaning device**  
With quick connection coupling and  
Hose extension.
- 5.03.188 **Wire brush with coupling part**  
For pneumatic cleaning device.
- 5.03.189 **Cleaning piston with coupling part**  
For pneumatic cleaning device.
- 5.07.160 **Die plug heatable**
- 5.07.165 **Nitrogen purge**
- 5.13.300 **Special table I**  
Width: 1100 mm, depth: 750 mm, height: 720 mm
- 5.04.810 **Special table II**  
Width: 1600 mm, depth: 750 mm, height: 720 mm
- 4.55.100 **Control thermometer +50°C to +100°C**  
90° bent, 0.1°C division
- 4.55.101 **Control thermometer +100°C to +150°C**  
90° bent, 0.1°C division
- 4.55.102 **Control thermometer +150°C to +200°C**  
90° bent, 0.1°C division
- 4.55.103 **Control thermometer +200°C to +250°C**  
90° bent, 0.1°C division
- 4.55.104 **Control thermometer +250°C to +300°C**  
90° bent, 0.1°C division
- 4.55.105 **Control thermometer +300°C to +350°C**  
90° bent, 0.1°C division

4.55.106    **Control thermometer +350°c to +400°c**  
90° bent, 0.1°C division

4.55.107    **Control thermometer +400°c to +500°c**  
90° bent, 0.1°C division

Subject to change due to technical developments