Product Information

Mflow extrusion plastometer

CTA: 168424 169603

Mflow extrusion plastometer

Applications

As the volume of testing increases, so does the need for a greater degree of automation (compared to Cflow). Mflow is capable of modular expansion and can be used to determine melt mass flow rate and melt volume flow rate.

The basic version of the Mflow extrusion plastometer is designed to perform MFR tests in accordance with Method A and can be upgraded for MVR tests as per Method B. Tests to the following standards are possible:

- Methods A and B, ISO 1133
- Methods A, B and C, ASTM D1238
- ASTM D3364
- JIS K 7210

You can optionally upgrade Mflow, for example by adding the pneumatic weight-lifting unit with or without cleaning function, or the weight selector.

Mflow can be operated in stand-alone mode via a modern touch display or on a PC with ZwickRoell testing software.

Advantages and features

Precision time and travel measuring devices for reliable test results

A precision piston transducer ensures accurate measurement of piston stroke when determining MVR. The contact point is very close to the piston, minimizing possible angle errors from the outset. The accuracy with which the flow rate is determined in Method B depends on the synchronization of the time-travel data pairs and on the accuracy of the time determination. As both measured quantities (time and travel) are available in digital form from the outset, there is no need for analog to digital conversion. This also eliminates synchronization errors. Quartz accurate time measurement also enables measurement of materials with high flow-rates.

Flexible - use with or without PC

The new standardized operating philosophy allows the operator to move easily between instrument and PC and always feel at home.

Intuitive, workflow-based touch operation

All test-related settings are grouped logically and are separated from higher-level system settings. The operator is guided through test configuration step by step. The saved test configuration can easily be exported and transferred to other instruments.

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Rapid familiarization with user management, including stand-alone mode
Integrated user management allows the operator's input options to be reduced to a minimum. Users see only what is important to them, allowing them to focus on the task at hand right from the start.

Live MVR
The MVR is shown "live" in graphic form in stand-alone mode and in the ZwickRoell testing software. This allows both melting process and behavior to be followed precisely during measurement.

Managing multiple extrusion plastometers via one PC
With multi-instrument operation up to 6 extrusion plastometers can be controlled from one PC. Central operation and results saving from a single work station makes for efficiency and provides a quick overview of all tests currently in progress. For multi-instrument operation the required Ethernet interfaces must be available on the PC; otherwise Ethernet hubs must be used.

All data at ambient temperature.

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Technical data

Basic instruments

Type Item No.	Mflow extrusion plastometer (230 V) 1043951	Mflow extrusion plastometer (110 V) 1043953	
Test load	0.325 ... 21.6	0.325 ... 21.6	kg
Compressed air, oiled, dry(option for pneumatic weight lifting unit)	6 ... 10	6 ... 10	bar
Dimensions			
Height	510	510	mm
Width	360	360	mm
Depth	419	419	mm
Weight, approx.	43	43	kg
Test temperature	+50 ... +450	+50 ... +450	°C
Display	Capacitive touch display	Capacitive touch display	
Resolution of the temperature display	<0.1	<0.1	K
Number of savable parameter sets	>100	>100	
Interfaces	• **Ethernet port** to connect a PC • **2 x USB port** to connect a printer or USB stick • **RS-232 port** for raw data export, data output: serial number, specimen number, number of extrudates, density (user specifications) density at test temperature, overall weight of the extrudates, MFR average value, MVR average value, MFR and MVR individual values • **RS-232 port** for connecting the analytical scale (from the ZwickRoell product range)		
Temperature accuracy in the range of 0 ... 75 mm above the die in the temperature range of 50 °C ... 450 °C	<0.3[1)]	<0.3[1)]	K
Time measurement:			
Error limit (Method A)	±0.02 (with automated extrudate cutter)	±0.02 (with automated extrudate cutter)	s
Error limit (Method B)	± 0.01	± 0.01	s
Displacement measurement			
Error limit (Method B)	±0.02 mm (ISO 1133) / ±0.4% of 6.25 mm (ASTM D1238)	±0.02 mm (ISO 1133) / ±0.4% of 6.25 mm (ASTM D1238)	
Resolution	<0.005	<0.005	mm
Multi-instrument operation on one PC:			
Available main memory, min.	1.54	1.54	GB
Clock frequency	3	3	GHz
Connectible Mflow extrusion plastometer per PC	6	6	
Scope of delivery	• Ethernet cable • Test weight for the load stages 325 g and 2.16 kg • Filler funnel	• Ethernet cable • Weights for load stages 325 g and 2.16 kg • Filler funnel	

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We reserve the right to make technical changes in the course of ongoing development.

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Type Item No.	Mflow extrusion plastometer (230 V) 1043951	Mflow extrusion plastometer (110 V) 1043953	
	• Cleaning accessories (cleaning piston, cleaning brush, cleaning pads (500 pieces)) for barrel • Test granulate and filling chute for granulate	• Cleaning accessories (cleaning piston, cleaning brush, cleaning pads (500 pieces)) for barrel • Test granulate and filling chute for granulate	
Power input specifications			
Power supply	220 to 240 V, 1L/PE/N	100 to 127 V, 1L/PE/N	
Power consumption (full load), approx.	0.6	0.6	kVA
Leakage current, approx.	0.4	0.4	mA
Power frequency	50/60	50/60	Hz

1) Spatial and temporal, to ISO 1133-2

Accessories required

Extrusion barrel (1 x required)

An extrusion barrel must be chosen to suit the materials to be tested. Different plastics containing fluoride, such as PTFE and PFA, release hydrofluoric acid, which corrodes the material of the extrusion barrel. For these types of plastics, extrusion barrels made from a special type of steel alloy are used.

Test material	Diameter, inner [mm]	Properties	Item No.
Plastic, not containing fluorine	9.55	Wear-resistant	087025
Plastic, containing fluorine / not containing fluorine	9.55	Acid-resistant, wear-resistant	1069371

Piston (1 x required)

At least one piston must be selected, in accordance with the materials to be tested. Various plastics (e.g. PTFE and PFA) which contain fluorine release hydrofluoric acid, which attacks the extrusion barrel material. For these plastics pistons made of a special steel alloy are used. These pistons have only limited suitability for filled plastics. For these the wear-resistant version is recommended. For tests to ISO 1133-1997, a piston with non-rounded edges (sharp-edged) is required.

Test material	Standard	Test load [kg]	Properties	Item No.
Plastic, fluorine-free	ISO 1133	0.325	Wear-resistant	001336
Plastic, containing fluorine	ISO 1133	0.325	Acid-resistant	001340
Plastic, fluorine-free	ISO 1133 (1997)	0.325	Sharp edged, wear resistant	001350
Plastic, fluorine free	ASTM D1238	0.325	Wear-resistant, Generation 1	1007541
Plastic, not containing fluorine	ASTM D1238	0.325	Wear-resistant, Generation 2, with guide sleeve	1067173

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Dies (scope of supply 2 pieces, 1 x required)

At least one die pair must be selected. It should suit the materials to be tested. Scope of delivery: 2 pieces + cleaning rod.

Item No.	312342	325554	001351	092326	
Material	Sintered material	Sintered material	Sintered material	Sintered material	
Test material	Plastic, containing fluorine, not containing fluorine	Plastic, containing fluorine, not containing fluorine	Plastic, containing fluorine, not containing fluorine	PVC	
Standard	ISO 1133 and ASTM D1238	ISO 1133 and ASTM D1238 Method C	BS 2782-7, Method 720A-1997	ASTM D3364	
Dimensions					
Length	8	4	8	25.4	mm
Diameter, inner	2.095	1.05	1.18	2.095	mm
Properties	Wear-resistant, acid-resistant	Wear-resistant, acid-resistant	Wear-resistant, acid-resistant	Wear-resistant, acid-resistant	

Optional accessories

Piston transducer

Description	Item number
Piston transducer for tests to ISO 1133 Method B and ASTM D1238 Method B	**087698**
Check gauges for checking piston stroke	**001396**

Extrudate cutters

The manual extrudate cutter is recommended for cutting intervals greater than one minute. For short cutting intervals use of the automatic extrudate cutter is recommended in order to obtain precisely timed cuts.

Description	Item number
Extrudate cutters	
Extrudate cutter, manually operated	**087032**
Extrudate cutter, automatic operation, automatic control via time interval or manually via push-button, including replacement blades (4x)	**087035**

Die plug

The die plug prevents premature outflow of the material when plastics with high flow-rates (> 10 cm3/10 min at load 0.325 kg) are being tested. When the die plug is in use, an extrudate cutter is required in order to eject the die plug automatically when the test begins.

Description	Item number
Die plug for testing plastics with high flow-rate; ceramic plug included[1)]	**087031**

1) Required: 1x extrudate cutter

All data at ambient temperature.

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Separating pane

Description	Item number
Separating pane for automatic extrudate cutter, for collecting individual extrudates	**087036**
Separating pane for manual extrudate cutter, for collecting individual extrudates	**087039**

Pneumatic weight lifting unit

Mflow can be fitted with weights according to the plastic in use. To ease the load on the operator, the weights can easily be raised and lowered by means of the pneumatic weight-lifting unit. The weights can automatically be raised when the pre-heat position has been reached. This minimizes any premature flow of the plastic during the preheat period.

Dimensions of pneumatic weight-lifting unit, including basic unit: 930 x 360 x 520 mm (H x W x D)

Description	Item number
Pneumatic weight-lifting unit, requires dry, oiled air	**001472**
Service unit for weight lifting unit, for drying and oiling non-conditioned compressed air	**004854**

Pneumatic weight-lifting unit with cleaning function

This unit consists of the pneumatic weight-lifting unit plus an integrated unit for compacting the plastic and cleaning the extrusion barrel. The pressure on the plastic can be set to a defined level via an adjustable pneumatic valve. Compacting to a defined position is performed pneumatically before the test. The cleaning piston allows the extrusion barrel to be cleaned at the push of a button.

Description	Item number
Pneumatic weight-lifting unit with cleaning function[1)2)]	**1050009**
Cleaning piston[3)]	**1007869**
Service unit for weight lifting unit, for drying and oiling non-conditioned compressed air	**004854**

1) Function supported from testXpert II V3.61 onwards.
2) Can only be used in conjunction with piston transducer
3) 1x required

Pneumatic weight-lifting unit with weight selector

This unit consists of the pneumatic weight lifting unit plus an integrated weight selector. All the weights listed below are already incorporated into this unit. If test weights are changed frequently we recommend use of the weight selector. The weight selector also provides a safe storage option for the weights.

Dimensions of weight selector, including basic unit: 1078 x 360 x 597 mm (H x W x D)

Description	Item number
Weight selector, including the following weights: 1.2 kg; 2.16 kg; 3.8 kg; 5 kg; 8.7 kg; 10 kg; 12.5 kg; 20 kg; 21.6 kg; requires dry, oiled air	**032418**
1kg weight for pneumatic weight lifting unit with selector	**032420**
1.05 kg weight for pneumatic weight lifting unit with selector	**032449**
Device for retaining the piston in the preheat position	**032419**
Service unit for weight lifting unit, for drying and oiling non-conditioned compressed air	**004854**

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Weights

Depending on the plastic being used, the extrusion plastometer can be fitted with different test weights. 2.16 kg are included in the delivery of a basic instrument.

Test load [kg]	Required for this	Item No.
5	-	001380
5/10	-	001381
5/10/15/21.6	-	001443
1	-	001385
1.05	-	001386
1.2	-	001387
3.8	-	001459
12.5	Test weights with test loads 5/10 kg (Item No. 001381)	001389
(ASTM D3364) 20	Test weights with test load 5/10/15/21.6 kg (Item No. 001443)	008077

Re-cooling

Cooling of the extrusion plastometer can be reduced by 50% on average by using re-cooling. Use of re-cooling is particularly recommended in the case of frequent temperature changes. Compressed air required.

Description	Item number
Re-cooling unit for fast cooling of the extrusion barrel with compressed air	**090173**

All data at ambient temperature.