

## Extrusion Plastometers Aflow, Mflow and Cflow



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## 1 The new generation Xflows

For over 50 years, ZwickRoell has been developing innovative extrusion plastometers specifically tailored to customer requirements. The Xflow series includes the manually operated Cflow for goods inwards checks, the Mflow with weight lifting unit and pegging and travel measuring system, and the Aflow with cleaning and compaction unit and innovative load application for test loads up to 50 kg.

These electronics, ready for the next generation include and intuitive user interface and new functionalities that open the path to the network-connected world. Demands on the extrusion plastometer vary according to which processing stage in the plastics industry is involved. ZwickRoell has an extrusion plastometer to suit every testing volume.



### Cflow

- The manual instrument for goods inwards testing
- Fast, reliable tests to Method A

### Mflow

- The modular instrument for higher testing volumes
- Affordable to setup and gradually expand as needed

### Aflow

- The convenient all-rounder for 24-hour operation
- Efficient and reliable through optimum test sequence

Fig. 1: Cflow, Mflow, Mflow with weight selector and Aflow

## 2 The ideal extrusion plastometer for every test volume

### 2.1 Cflow - The Compact One

The Cflow is a compact instrument that allows rapid inspection of the melt mass flow rate of plastics to Method A.

It is especially designed for processors of plastics who do not perform extrusion tests often and who do not require a connection to a PC.

In the area of goods inwards checks only a small number of tests are performed. The manually operated Cflow tests plastics quickly and reliably in accordance with Method A.



Fig. 1: Extrusion plastometer Cflow

### 2.2 Mflow - The Modular One

A growing volume of tests creates a need for a greater degree of automation. The Mflow is a modular, expandable instrument with which the melt mass and melt volume flow rate can be determined.

The basic version of the Mflow is designed to perform MFR tests to Method A and can be expanded for MVR tests to Method B.



Fig. 2: The Mflow extrusion plastometer – modular for future upgrades

#### Pneumatic weight lifting unit

Depending on the plastic being tested, the Mflow can be fitted with different test weights. To ease the load on the operator, the weights can be raised and lowered with a pneumatic weight-lifting unit with no physical effort required.

The weights can also be automatically lifted after reaching the pre-heat position. This minimizes any premature flow of the plastic granulate during the preheating period.

#### Pneumatic weight lifting unit with cleaning function

This unit includes the pneumatic weight lifting device and an integrated device for compacting the plastics material as well as for cleaning the extrusion barrel. With use of an adjustable pneumatic valve, the pressure on the plastics material can be defined. Compacting occurs pneumatically up to a defined position, prior to the test.

The cleaning piston is required for cleaning. This allows cleaning of the extrusion barrel to be carried out with the press of a button. This is highly convenient and saves time.

## Pneumatic weight lifting unit with weight pegging device

With the pneumatic weight pegging device test weights can be easily and safely changed.

The device contains all commonly used test weights:

- 0.325 kg
- 1.2 kg
- 2.16 kg
- 3.8 kg
- 5 kg
- 8.7 kg
- 10 kg
- 12.5 kg
- 20 kg
- 21.6 kg

Optional 1.05 kg or 1 kg test weights can be used in place of 1.2 kg weight.

During the pre-heat time, the piston can be held in a freely adjustable position with the die. This minimizes any premature flow of plastic granulate with high flow rates during the preheating period.



Fig. 1: Mflow with weight selector

## 2.3 Aflow - The Allrounder

Speed, operator independence and high repeatability and reproducibility of test results are all important considerations in research and development, in 24-hour operation, as well as in production control.

The Aflow is noted for being highly automated: whether simple cleaning and defined pre-compaction at the press of a button, or steplessly settable test loads, the Aflow adapts to every test task.



Fig. 2: The Aflow extrusion plastometer

## Quick and fatigue-free cleaning and pre-compacting

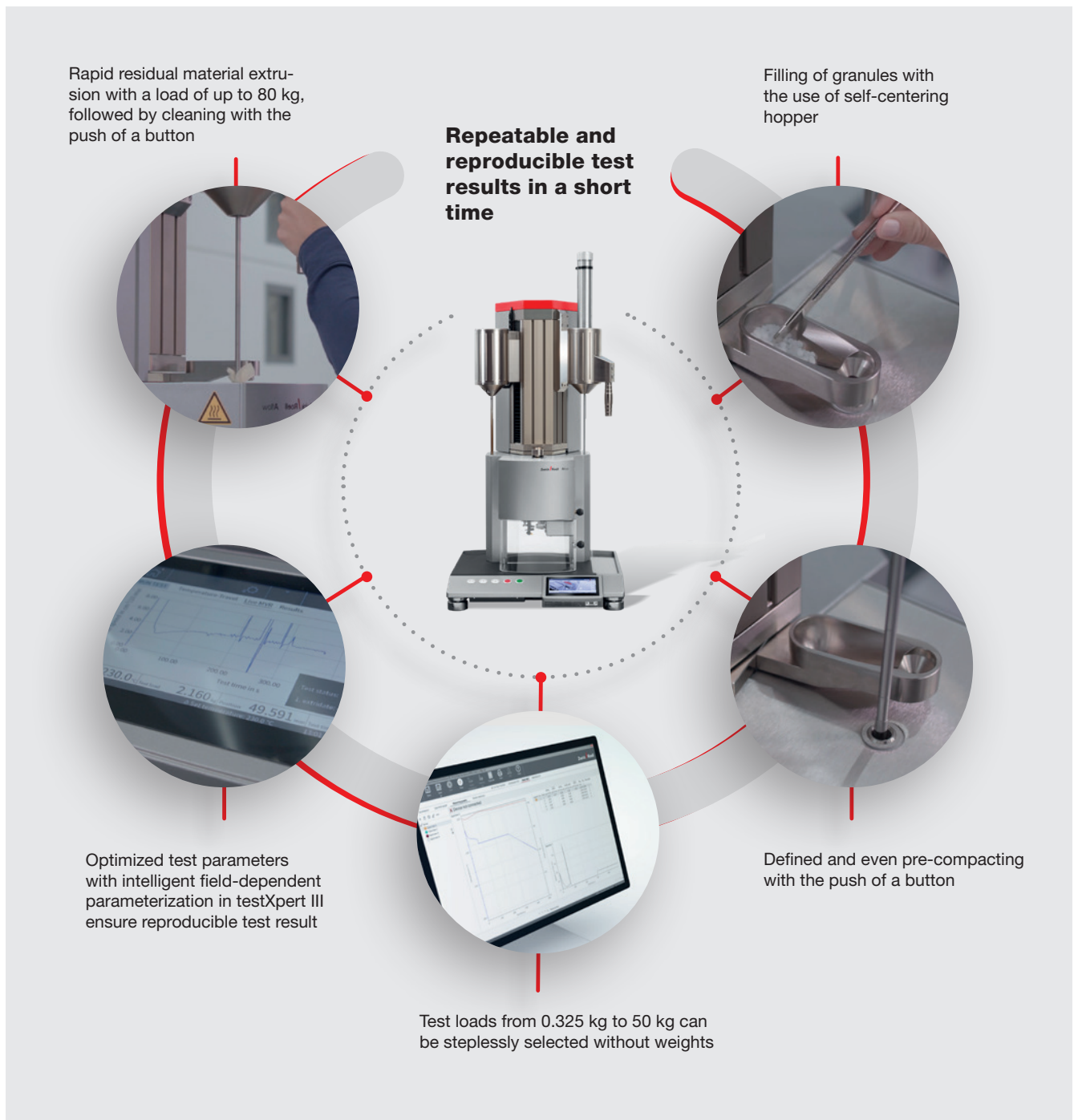
With the Aflow's pneumatic cleaning unit, cleaning and pre-compacting can be carried out with pre-set compression. With the cleaning and pre-compacting option, the cleaning and pre-compacting pressure can be variably set. In addition, a selection can be made between the two pressure stages via a switch on the cleaning device.

## Easy testing to Methods A, B, C and D

Through presets in the software, a multi-stage test to Method D can be effortlessly performed. Therefore, several tests with different weight stages can be carried out with a single barrel filling.

## Automatic, field-dependent parameterization with ZwickRoell's testXpert III testing software

This function allows for testing of unknown plastics for the determination of test parameters, without the need for pre-testing. If constantly changing types or grades of plastic are tested, it is also possible to determine the test parameters without a database. The device automatically selects the optimal test parameters and uses them to perform the test.



### 3 Flexible use with or without PC

The Mflow and the Aflow can be operated via their modern touch display, or through ZwickRoell's testXpert III testing software on a PC. The standardized operating philosophy ensures familiarity with both options, allowing the user to easily switch between the PC and the instrument.



Fig. 1: Touch operation

Reliable test results are achieved through integrated user management. User input options can be reduced to a minimum.

### 3.1 Intuitive and workflow oriented operation

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



Fig. 2: Integrated user management

Integrated user management reduces the number of operator input options to a minimum. Users see only what is important to them so they can focus on the task at hand right from the start.

### 3.2 Live demonstration of the melt volume flow rate MVR

The MVR is graphically demonstrated live, both stand-alone and in the ZwickRoell testXpert III testing software. This way both the melting progress and the behavior during measurement can be followed.

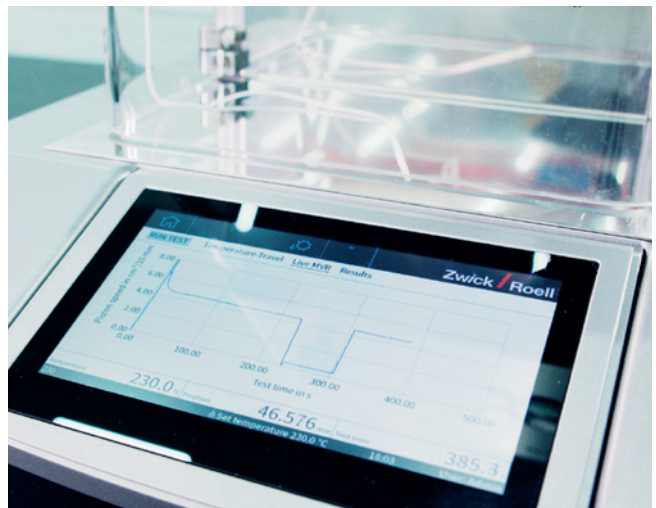
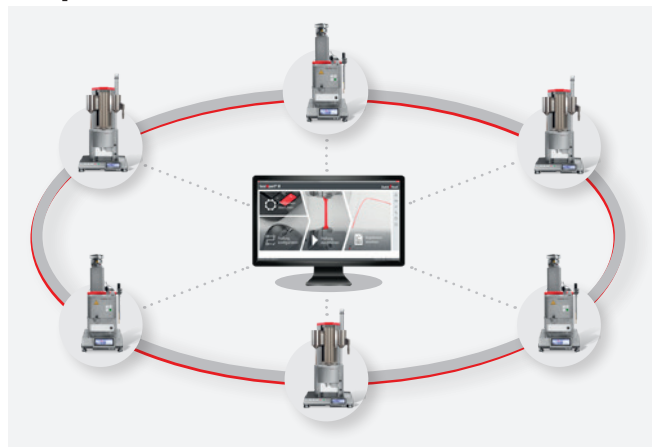


Fig. 3: Live demonstration of the melt volume flow rate MVR

### 3.3 Controlling multiple extrusion plastometers with one PC



Up to six extrusion plastometers can be controlled with one PC for multi-instrument operation. Central operation and the saving of results from a single workplace is efficient and affords a quick overview of all tests currently in progress.

## 4 Technical data of the extrusion plastometers



	Aflow	Mflow	Mflow (weight selector)	Cflow
Test Method	Methods A, B, C, D	Methods A, B, C	Methods A, B, C	Methods A
Weight Stages	0.325 - 50 kg	0.325 - 21.6 kg	0.325 - 21.6 kg	0.325 - 21.6 kg
Cleaning	Optional, to 80 kg	Optional	Manual	Manual
Compression and Material Extrusion Function	Optional, automatic force controlled	Optional, adjustable	Manual, with the use of weights	Manual
User Interface	Capacitive touch display	Capacitive touch display	Capacitive touch display	Temperature controller
Stand-Alone Version	MFR, ØMFR, MVR, ØMVR, density, live MVR graph	MFR, ØMFR, MVR, ØMVR, density	MFR, ØMFR, MVR, ØMVR, density	-
Export Interfaces	USB for USB stick, RS232	USB for USB stick, RS232	USB for USB stick, RS232	-
Printer Connection	Direct or via PC	Direct or via PC	Direct or via PC	-
Scale Connection	Direct or via PC	Direct or via PC	Direct or via PC	-
testXpert III Software	Optional	Optional	Optional	-
Expanded Version with testXpert III	Intrinsic Viscosity (IV), Flow Rate Ratio (FRR), MFR/MVR to Method D, apparent shear rate, apparent shear stress, apparent viscosity, general test statistics	Intrinsic Viscosity (IV), Apparent shear rate, apparent shear stress, apparent viscosity, general test statistics	Intrinsic Viscosity (IV), Apparent shear rate, apparent shear stress, apparent viscosity, general test statistics	-

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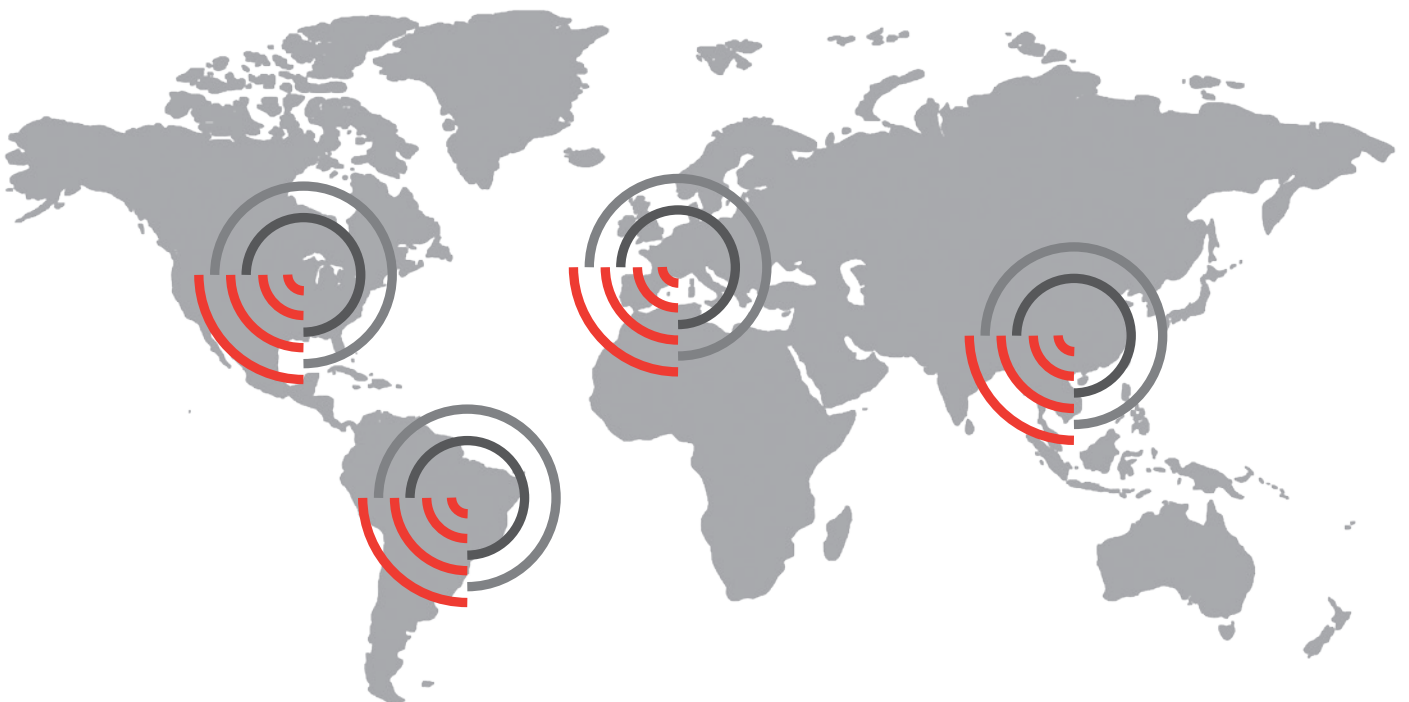
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