

## PET*Plus* Test Instrument For The Intrinsic Viscosity (IV) Measurement of PET Polymers

The Davenport PET*Plus* from Lloyd Instruments is a unique test instrument designed for the safe solvent-free intrinsic viscosity (IV) measurement of moisture-sensitive polyethylene terephthalate (PET). It can be operated in stand alone mode or used with our powerful data analysis software package NEXYGEN*Plus* PET.

Most instruments available for determining IV use the solvent method of testing. However, not only is this method expensive, but critically it involves the handling and disposal of toxic solvents. The Davenport PET*Plus* test instrument by contrast offers significant cost and environmental benefits using a non-solvent method, which is kinder to the environment, and saves on the high cost of purchase and disposal of solvents.

Unlike other IV measurement instruments, the PET*Plus* can test polymers at virtually all stages of the process: from incoming resin, powder, dry granules, molten polymer, preforms, PET bottles, films and even re-ground material, thereby eliminating scrap.

Tests can be completed in less than 20 minutes. Rapid testing at the different stages can be carried out using ancillary equipment for controlled sample collection and preparation. The instrument's compact construction occupies significantly less bench space than earlier models and makes it easier and quicker to load samples.

The microprocessor controlled stand-alone system provides high accuracy measurements, temperature control to  $\pm 0.1^\circ\text{C}$  and storage of up to 600 test results. A backlit LCD displays instructions for the test in a variety of languages as well as the results. An RS-232 interface allows connection to a computer for fully automated software control and/or downloading of results.

Molten PET is extruded through a calibrated die by nitrogen gas under pressure and the LVDT probe movement against time is recorded and displayed. The system measures the optimum flow rate and calculates intrinsic viscosity. The PET*Plus* also measures the degradation factor and provides the mean and standard deviation for the batch.

### Features

- Unique microprocessor-controlled instrument for solvent-free intrinsic viscosity testing of moisture-sensitive PET
- Safe testing method, avoiding the environmental hazard of handling and disposal of toxic solvents
- Saves on cost of purchase and disposal of solvents
- Unique stand alone operation with full analysis of results on screen (including statistics) allowing constant visibility of last 600 results
- RS232 output available allowing connection to NEXYGEN*Plus* PET, our powerful data analysis software
- Simple set-up, operation and maintenance
- Fast analysis of samples (within 20 minutes)
- Ideal for use on the shop floor in QC and R&D
- Small footprint - takes up minimal bench space
- Unlike other solvent-type IV measurement instruments, the PET*Plus* can be used for testing product throughout the process, not just for incoming raw materials, providing overall greater control of the production process.
- Tests reground material; ideal for recycled PET
- Supplied with an integral nitrogen regulation valve, the PET*Plus* requires only power and a pressurised nitrogen supply for operation. Easy pressure adjustment when testing different materials
- Includes training mode as standard, ideal for instruction of operators
- The PET*Plus* has common electronics and software used with other Lloyd Instruments material test machines providing the perfect partner in the laboratory with such benefits as operator familiarity, ease of use and integration of results from both the IV test instrument and the tensile test machine



**PET*Plus*** - Unique test instrument for the Intrinsic Viscosity Measurement of PET .

## Specifications

Intrinsic Viscosity (IV) Measurement Range:	0.43-1.43 depending on die selection (Die must be specified at time of order. See table overleaf for suitable IV range: 'Which die size to choose?')
Barrel:	Insulated stainless steel barrel with replaceable stainless steel liner.
Heaters:	3 x 250 watt cartridge type symmetrically positioned for optimum temperature control
Temperature Range:	50°C - 400°C
Temperature Control:	PT100 with microprocessor-controlled solid state relay
Over Temperature Device:	Thermocouple with parallel backup solid state relay
Nitrogen Gas:	Requires a supply limited at source to min. 30 bar to max. 35 bar.
Nitrogen Specification:	99.9% oxygen-free and <5ppm water
Pressure Range and Control:	100 - 500 psi (6.8 - 30 bar), controlled by local nitrogen regulation valve fitted as standard
Pressure Measurement:	Microprocessor via pressure transducer
Displacement Measurement:	Probe movement with intelligent plug & play LVDT. Plug programmed with highly accurate calibration data
Electrical Supply:	115V or 230Vac $\pm$ 10% 50 - 60Hz (Must be specified at time of order)
Net Weight:	30 kg



## Essential and Recommended System Accessory Components

### Essential Components for all Intrinsic Viscosity (IV) Tests:

For operation of the **PET Plus** instrument, a **Vacuum Pump** and **Polymer Dryer** are essential to ensure correct sample drying conditions.

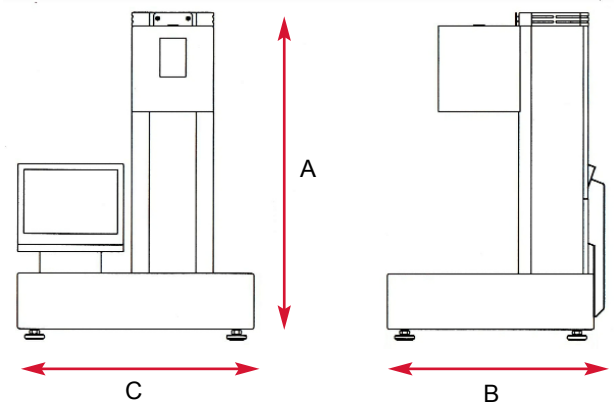
For faster drying (within 50 minutes), we recommend that raw material is ground to a fine powder using the **Quick Test Polymer Chip Grinder**.

### Recommended PET Plus Accessories for performing IV Tests on the following items:

Raw Material*	Finished Product/ Pre-forms*	Production Dryer System Check
Vacuum Pump	Vacuum Pump	Polymer Chip Transfer Vessel
Polymer Dryer	Polymer Dryer	(carries dried PET from the process dryer directly to machine for instant testing)
Polymer Grinder	Polymer Grinder	
	Industrial Grinder	

\*For faster drying, we also recommend the Quick Test Polymer Chip Grinder

## Product Dimensions



		mm	in
A	Height	621	24.5
B	Depth	404	16.9
C	Width	463	18.2



Quick Test Polymer Chip Grinder



Polymer Dryer



Polymer Chip Transfer Vessel



Nitrogen Regulation Valve (fitted as standard)

## Ordering Information

Model	Part No	Description
PETPlus/115V	01/3460	PETPlus Test Instrument (115V) for the Intrinsic Viscosity Measurement of PET
PETPlus/230V	01/3440	PETPlus Test Instrument (230V) for the Intrinsic Viscosity Measurement of PET

## Standard Accessories supplied with the PETPlus Instrument

Item	Part No	Item	Part No
284°C Thermometer	338/104/10	Cleaning Brush	750/1020
295°C Thermometer	338/104/1032	Die Nut Tightening Tool	778/35
Cleaning Patches	338/132	Die Nut Sealing Washer	778/54
Die O Ring Fitting Tool	750/41	Standard Funnel for Granules	778/50
Followers	750/45	Cleaning Tool	778/55
Probe Assembly	750/48	Die Tweezers	92/0404
Die O Rings	750/1019	Long Reach Funnel for Powder	FND/0114/00

## Which Die Size to Choose?

Die Size	Part No	IV at 284°C	IV at 295°C
15 thou	778/81	0.43 to 0.62	-
20 thou	778/82	0.53 to 0.70	0.70 to 0.83
30 thou	778/83	-	0.74 to 1.14
40 thou	778/84	-	0.93 to 1.43

## Optional Accessories

Item	Model	Part No	Item	Model	Part No
Industrial Grinder (115V)	MV/IG115	778/110	Vacuum Pump for Dryer (115V)	MV/VP115	01/2751
Industrial Grinder (230V)	MV/IG230	778/100	Vacuum Pump for Dryer (230V)	MV/VP230	01/2748
Quick Test Polymer Chip Grinder	MV/PG	753/A	Polymer Chip Transfer Vessel	MV/TV	750/58
Polymer Dryer (115V)	MV/PD115	01/2777	NEXYGENPlus PET Data Analysis Software	NEXYGEN PET	40/0780
Polymer Dryer (230V)	MV/PD230	01/2776			



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