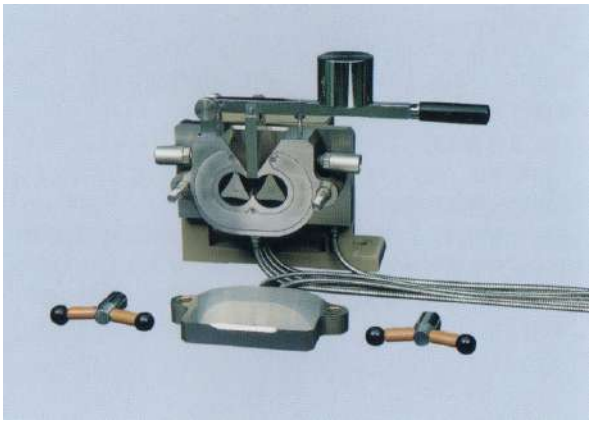
Toyo Seiki Seisaku-sho, Ltd. 5-15-4, Takinogawa, Kita-ku, Tokyo 114-8557, Japan

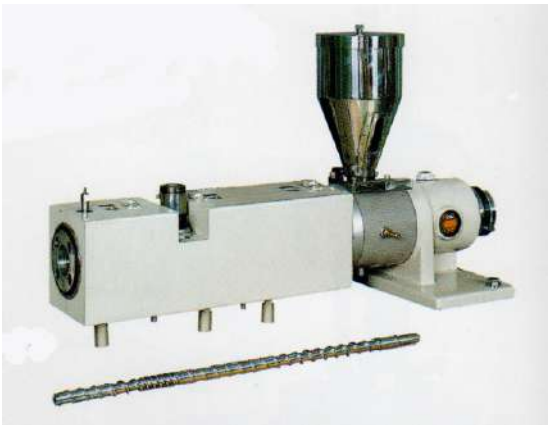
No.655 LABO PLASTOMILL

Laboratory mixer & extruder system

Base unit + Extruder

Base unit + Mixer





APPLICATION

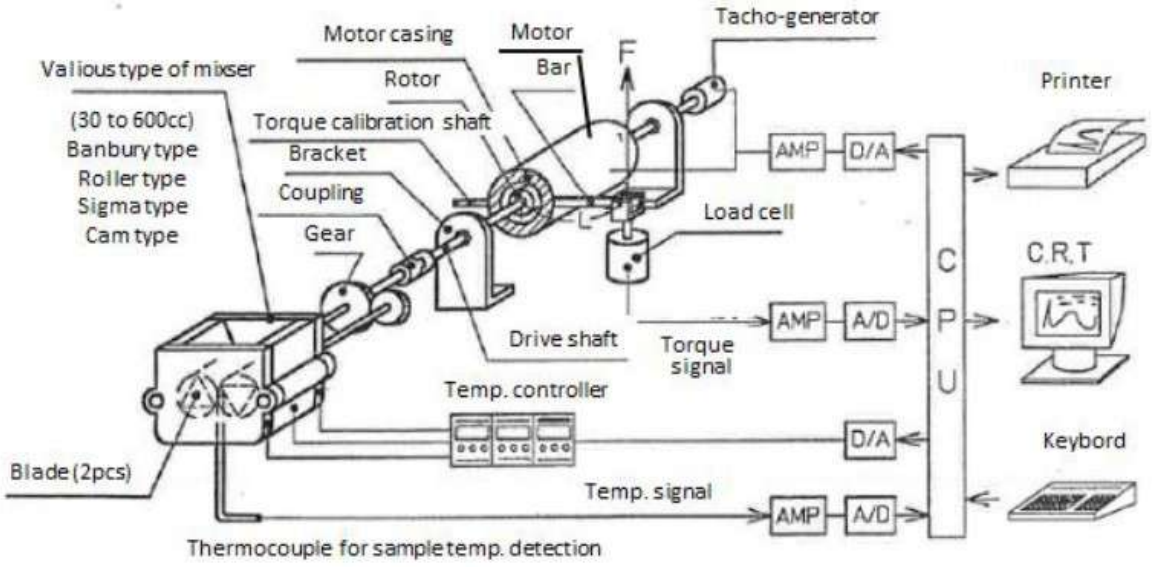
Knowing processing characteristics of polymer materials such as thermoplastic resins, thermosetting resins and elastomers is very important for cost reduction and quality control.

In developing of new materials in addition to knowing the processing characteristics it is also important to find out through simulation whether the material can be molded or not and determine appropriate processing conditions.

This Labo Plastomill perform these tests on small quantities of samples, mainly the following tests.

- Processing characteristics evaluation test by small mixer (30 to 90cm^3)
- Simulation and other evaluation tests by small extruder (ø20mm)

The Labo Plastomill is a practical testing machine (shear force acts) which provides many reliable information necessary for molding process and is already being used in numerous industries and related fields for this purpose.



Principle (Base unit and Mixer)

1. BASE UNIT (Drive Unit)

Model S

The computer controls the machine and performs data processing of various characteristic values taking torque, resin temperature and pressure as parameters.
All controls and data processing are performed by computer. By recalling already registered testing conditions, filling sample and then starting the machine, waveform graphs of torque, pressure, resin temperature and energy, etc. are displayed and measurement proceeds according to the testing conditions.
In mixer test, programmed control operation of temperature and revolution is also possible.
In addition to allowing enlargement and reduction of waveform graph, data analysis processes the function of computing characteristic values of various patterns separately for each mode and allows multiplotting of up to 8 data.
Characteristic value points can be arbitrarily specified form waveform graph and in mixer test automatic detection by automatic calculation function is also possible.
(Mixer shown is option)

Model	3S150	10S100	3S500
Operation & data processing	Personal Computer		
Max. torque	300Nm	1000Nm	300N.m
Speed range	0.1 to 150rpm	0.1 to 100rpm	0.1 to 500rpm
Motor power	3.5kW	5.5kW	15kW
Torque detection	Load cell		Torque meter
Torque measurement accuracy	±0.1% within FS		
Pressure & temperature amplifier	4 each of pressure & temperature		
Temperature controller	6 channel		
Safety guards	Torque limiter, Pressure limiter, Temperature limiter, Heater disconnection alarm, Emergency stop switch, Coupling safety cover, Earth leakage breaker etc.		
Power supply (Base unit only. Power supply for each measuring heads are required as well)	Three-phase, AC200V, 60A		Three-phase, AC200V, 100A
Dimensions (Base unit only)	W525 x D790 x H1300mm		
Net weight (Base unit only)	3S150: Approx. 215kg 10S100: Approx. 235kg 3S500: Approx. 285kg		

SOFTWARE

Common Specifications

- Register, delete and retrieve test conditions.
- Enlarge and reduce waveform graph, select and display waveform data according to kind, change display color.
- Save, delete and transfer measured data and search according to character or date.
- Multiplot (overlap plotting) up to 8 measured data.
- Measured data can be read in spreadsheet software such as Excel.
- Select unit system from SI and MKS unit systems.
- Turn cooling solenoid valve ON/OFF from personal computer.
- Automatic setting function for torque and pressure limiters according to kind of measuring head.
- Specify temperature limiter value as absolute value or deviation value.
- Auto scale function in waveform graph.
- Provides higher sampling speed and higher accuracy data than before.

Mixer Test

Allows selection of 8 test modes in mixer test, equipped with characteristic value calculating function for each pattern.

1. Manual operation of mixer test
2. PVC plasticization evaluation test
3. PVC thermal stability evaluation test
4. Thermal stability evaluation test (torque reduction type)
5. Hardening reaction evaluation test
6. Curing reaction evaluation test
7. Carbon dispersion evaluation test
8. Plasticizer absorption evaluation test (PVC)

- Change revolutions, change set temperature, stop test, extend measuring time during testing.
- Specify temperature and revolutions program control operation in test conditions setting.
- In test model 1 you can calculate characteristic value by arbitrarily specifying maximum 6 points according to direct method, peak point method, tangent method, time method, etc. from waveform graph.
- In test modes 2~8, you can arbitrarily specify characteristic value point. The auto calculation function allows you to automatically detect characteristic value point.

<Waveform Date Items>

- Torque (raw data and average data>
- Resin temperature (raw data)
- Mixer No.2 temperature (raw data)
- Consumed energy
- Set temperature
- Set revolutions

Extruder Test (Extruder Test Data Example 1)

- Change revolutions, change set temperature, stop test, extend measuring time during testing.
- Specify 2 arbitrary points from waveform graph and calculate the torque, pressure, resin temperature average value and standard deviation in between these points. Moreover, specific energy can also be calculated by inputting the sample discharge quantity between these points. (Each calculation up to 10 steps.)
- As regards sampling of discharge amount, perform calculation with regard to sampling at arbitrary time interval by using the foot switch.

<Waveform Data Items>

- Torque (raw data and average data)
- Resin temperature max. 4 points (raw data)
- Resin pressure max. 4 points (raw data and average data)
- Set revolutions

Slit Die Viscosity Test (Extruder Test Data Example 2)

- By specifying revolutions of maximum 10 steps in test conditions, test automatically changes to revolutions of each step.
- Apparent and true flow curves (shear rate – shear stress – viscosity) are calculated by inputting sample discharge amount for each step.
- As regards sampling of discharge amount, perform calculation with regard to sampling at arbitrary time interval by using the foot switch.

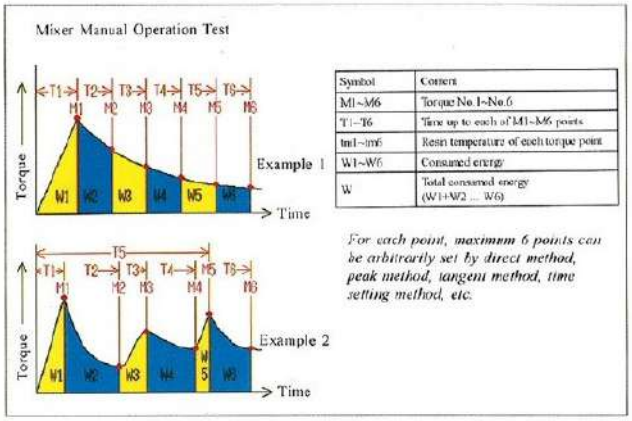
<Waveform Data Items>

- Torque (raw data and average data)
- Resin temperature max. 4 points (raw data)
- Resin pressure max. 4 points (raw data and average data)
- Set revolutions

Analysis Content and Data Example of Each Test Mode

Mixer Test

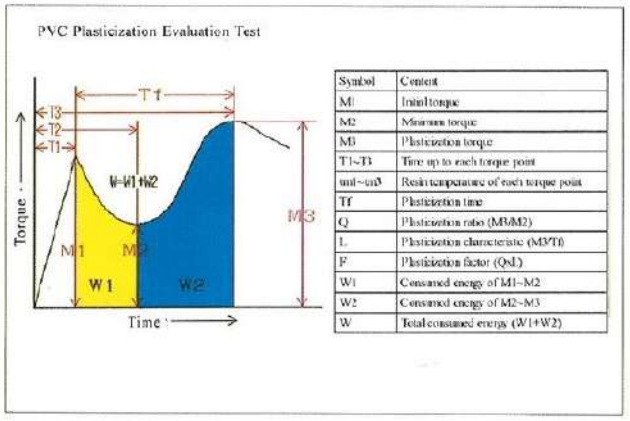
Analysis Content of Mixer Test 1



Symbol	Content
M1~M6	Torque No.1~No.6
T1~T6	Time up to each of M1~M6 points
tm1~tm6	Resin temperature of each torque point
W1~W6	Consumed energy
W	Total consumed energy (W1+W2 ... W6)

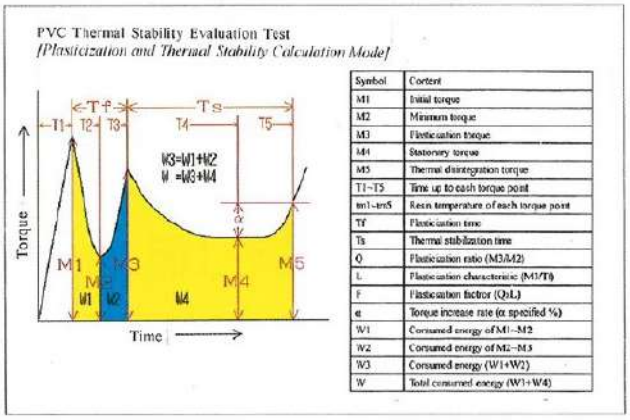
For each point, maximum 6 points can be arbitrarily set by direct method, peak method, tangent method, time setting method, etc.

Analysis Content of Mixer Test 2



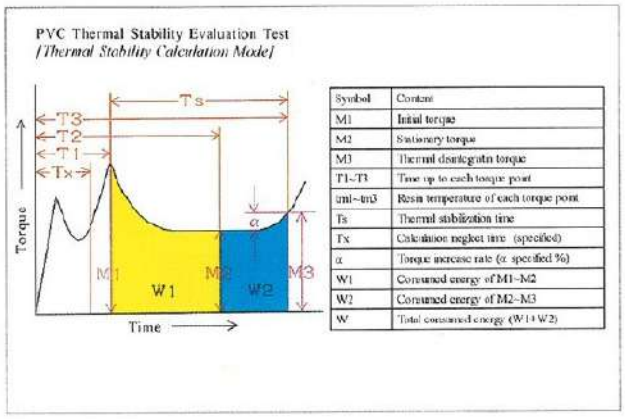
Symbol	Content
M1	Initial torque
M2	Minimum torque
M3	Plasticization torque
T1~T3	Time up to each torque point
tm1~tm3	Resin temperature of each torque point
Tf	Plasticization time
Q	Plasticization ratio (M3/M2)
L	Plasticization characteristic (M3/Tf)
F	Plasticization factor (Q/L)
W1	Consumed energy of M1~M2
W2	Consumed energy of M2~M3
W	Total consumed energy (W1+W2)

Analysis Content of Mixer Test 3



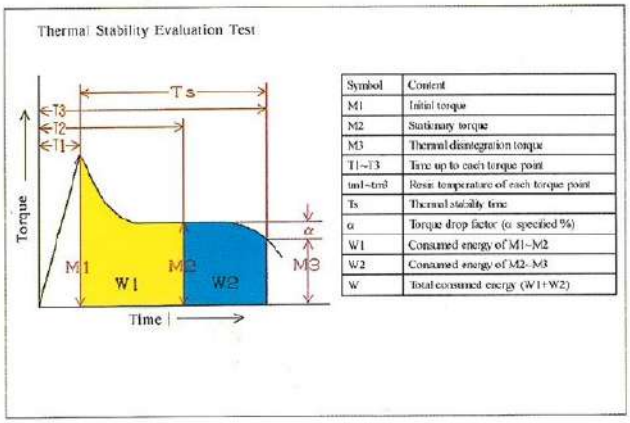
Symbol	Content
M1	Initial torque
M2	Minimum torque
M3	Plasticization torque
M4	Stationery torque
M5	Thermal disintegration torque
T1~T5	Time up to each torque point
tm1~tm5	Resin temperature of each torque point
Tf	Plasticization time
Ts	Thermal stabilization time
Q	Plasticization ratio (M3/M2)
L	Plasticization characteristic (M3/Tf)
F	Plasticization factor (Q/L)
α	Torque increase rate (α specified %)
W1	Consumed energy of M1~M2
W2	Consumed energy of M2~M3
W3	Consumed energy (W1+W2)
W	Total consumed energy (W1+W4)

Analysis Content of Mixer Test 4



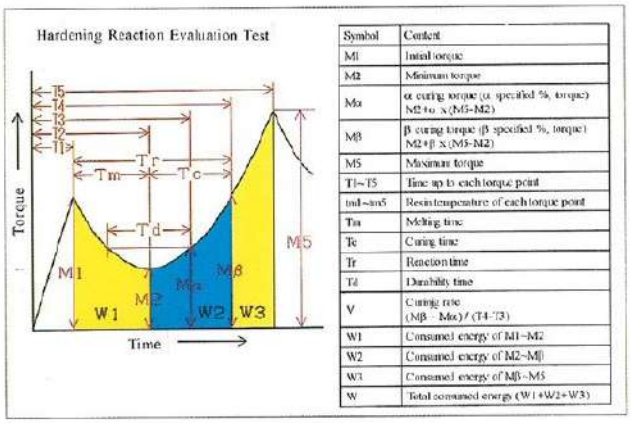
Symbol	Content
M1	Initial torque
M2	Stationery torque
M3	Thermal disintegratin torque
T1~T3	Time up to each torque point
tm1~tm3	Resin temperature of each torque point
Ts	Thermal stabilization time
Tx	Calculation neglect time (specified)
α	Torque increase rate (α specified %)
W1	Consumed energy of M1~M2
W2	Consumed energy of M2~M3
W	Total consumed energy (W1+W2)

Analysis Content of Mixer Test 5



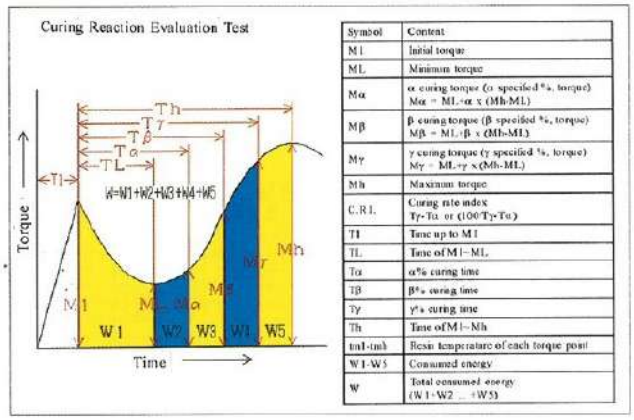
Symbol	Content
M1	Initial torque
M2	Stationary torque
M3	Thermal disintegration torque
T1~T3	Time up to each torque point
tm1~tm3	Resin temperature of each torque point
Ts	Thermal stability time
α	Torque drop factor (α specified %)
W1	Consumed energy of M1~M2
W2	Consumed energy of M2~M3
W	Total consumed energy (W1+W2)

Analysis Content of Mixer Test 6



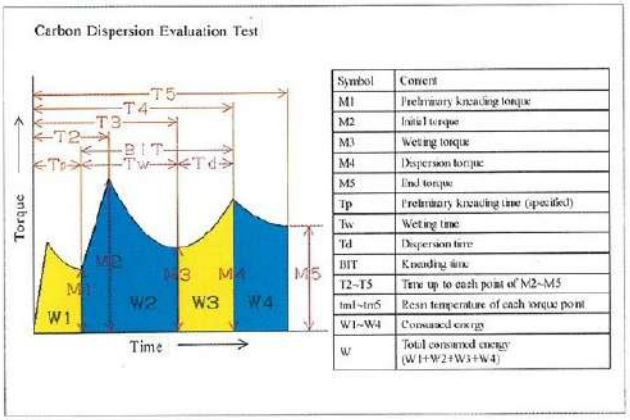
Symbol	Content
M1	Initial torque
M2	Minimum torque
Mα	α curing torque (α specified %, torque) M2+α X(M5-M2)
Mβ	β curing torque (β specified %, torque) M2+β X(M5-M2)
M5	Maximum torque
T1~T5	Time up to each torque point
tm1~tm5	Resin temperature of each torque point
Tm	Melting time
Tc	Curing time
Tr	Reaction time
Td	Durability time
V	Curing rate (Mβ - Mα) / (T4-T3)
W1	Consumed energy of M1~M2
W2	Consumed energy of M2~Mβ
W3	Consumed energy of Mβ~M5
W	Total consumed energy (W1+W2+W3)

Analysis Content of Mixer Test 7



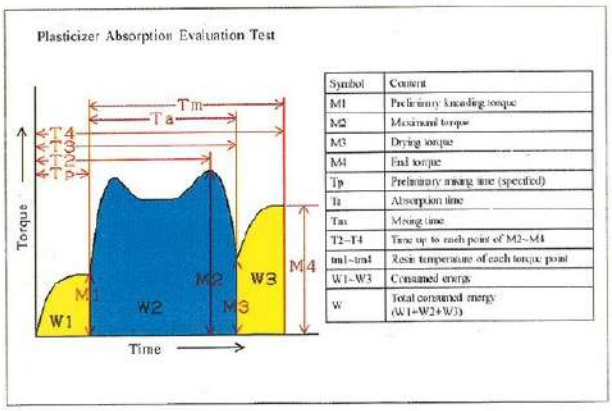
Symbol	Content
M1	Initial torque
ML	Minimum torque
Mα	α curing torque (α specified %, torque) Mα = ML+α x (Mh-ML)
Mβ	β curing torque (β specified %, torque) Mβ = ML+β x (Mh-ML)
Mγ	γ curing torque (γ specified %, torque) Mγ = ML+γ x (Mh-ML)
Mh	Maximum torque
C.R.I.	Curing rate index Tγ-Tα or (100/Tγ-Tα)
T1	Time up to M1
TL	Time of M1~ML
Tα	α% curing time
Tβ	β% curing time
Tγ	γ% curing time
Th	Time of M1~Mh
tm1-tmh	Resin temperature of each torque point
W1-W5	Consumed energy
W	Total consumed energy (W1+W2 ... +W5)

Analysis Content of Mixer Test 8



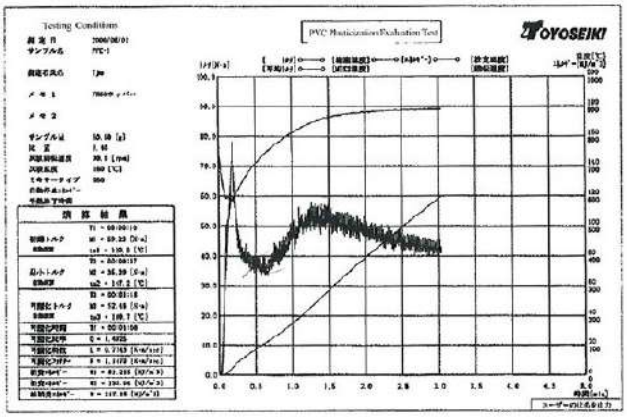
Symbol	Content
M1	Preliminary kneading torque
M2	Initial torque
M3	Wetting torque
M4	Dispersion torque
M5	End torque
Tp	Preliminary kneading time (specified)
Tw	Wetting time
Td	Dispersion time
BIT	Kneading time
T2~T5	Time up to each point of M2~M5
tm1~tm5	Resin temperature of each torque point
W1~W4	Consumed energy
W	Total consumed energy (W1+W2+W3+W4)

Analysis Content of Mixer Test 9

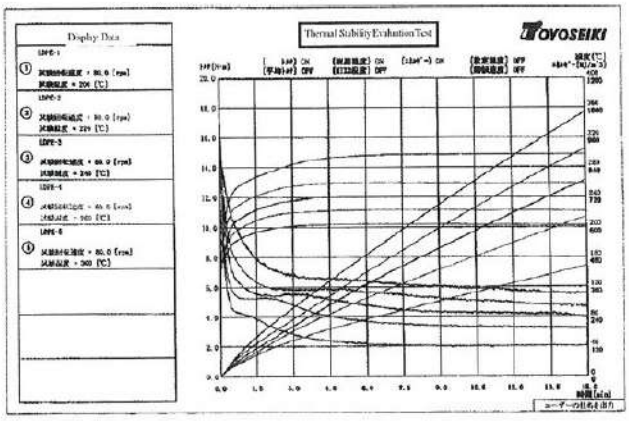


Symbol	Content
M1	Preliminary kneading torque
M2	Maximum torque
M3	Drying torque
M4	End torque
Tp	Preliminary mixing time (specified)
Ta	Absorption time
Tm	Mixing time
T2~T4	Time up to each point of M2~M4
tm1~tm4	Resin temperature of each torque point
W1~W3	Consumed energy
W	Total consumed energy (W1+W2+W3)

Mixer Test Data Example
PVC Plasticizatinon Evaluation Test

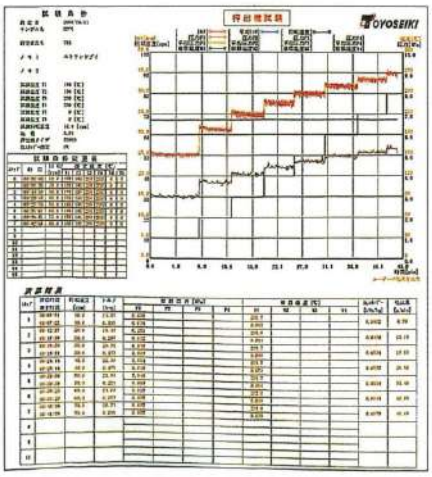


Mixer Test Data Example
Multiplotting of 5 Data

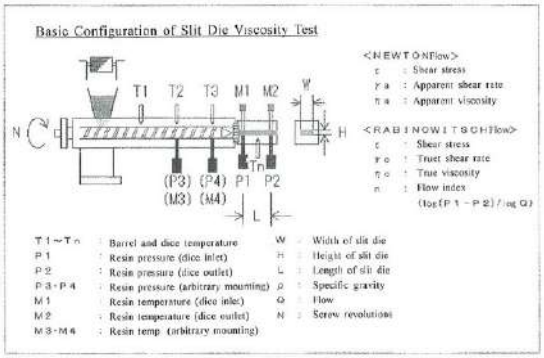


Extruder Test

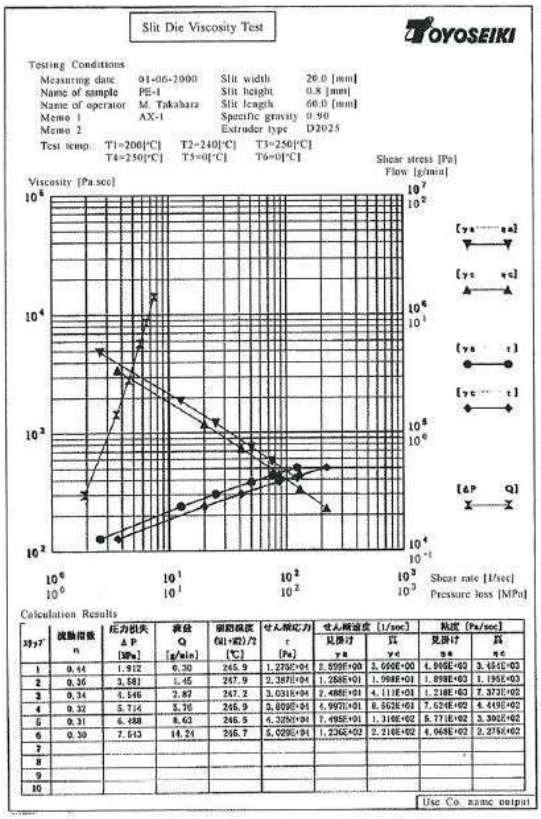
Extruder Test Data Example 1
Extruder Characteristic Test

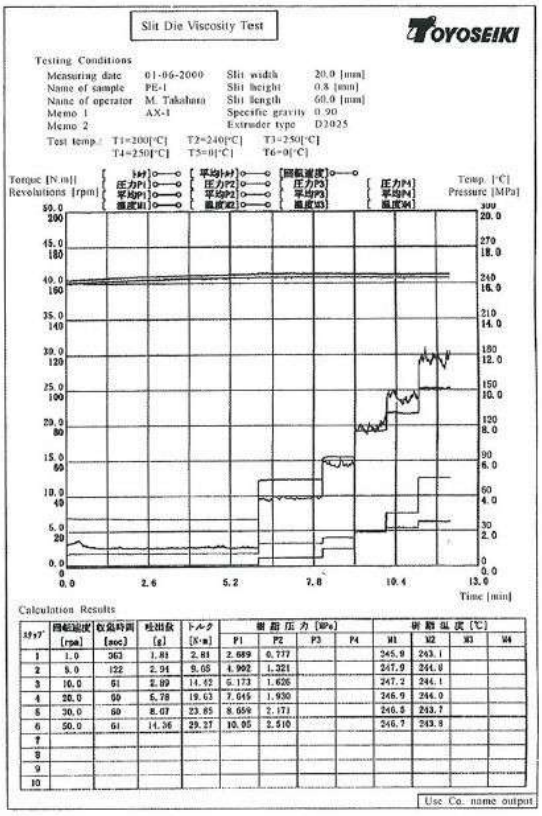


Extruder Test Analysis Contents 2



Extruder Test Data Example 2 ..... Slit Die Viscosity Test





Labo Plastomill Micro (Cat. No.666)

For evaluating kneading and extrusion characteristics of very small quantity of materials.

Research is being conducted in thermoplastic resins, thermosetting resins, elastomers, etc. to develop composite materials by various composition techniques such as blending, alloying or filling of different polymer materials and intensive research is going on to develop high function and high performance compound materials.
Recently in fillers, miniaturization is progressing, materials of nano order are being used and through uniform dispersion instead of cohesion of these materials, composite materials are heading towards noncomposition in order to achieve rapid improvement of characteristics that could not be realized until now and we are entering into nanotechnology age.

Labo Plastomill Micro is a testing machine manufactured to respond to the needs of the time. It is a desktop type tester designed to evaluate kneading and extrusion characteristics of very small quantities of materials produced these days by composition at laboratory leve, special high cost materials or, for example, materials that can be obtained only in very small quantities in application and research, etc. of compound materials of nature being marked as compound materials of next generation.

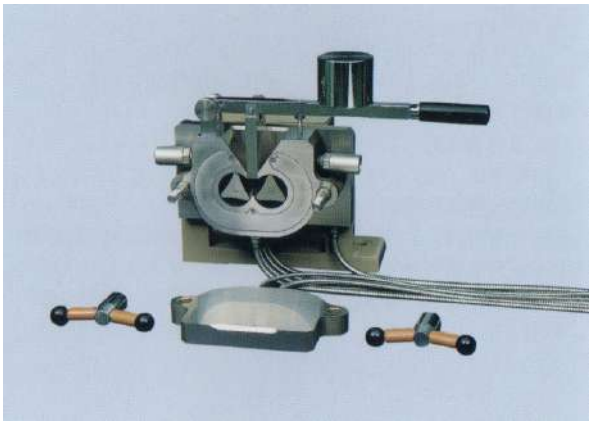
(Mixer and Mini printer shown is option)

Model	**Labo Plastomill Micro**
Operation	Manual operation
Data Processing	*Option (MPC)*
Max. Torque	40Nm
Speed Range	0 ~ 100rpm (±0.1% / FULL)
Motor Power	0.4kW
Torque Detection	Electric current conversion
Torque Measurement Accuracy	±10% (in range of 10% or greater against max. torque)
Pressure & Temperature Amplifier	1 channel each (Standard)
Temperature Controller	3 channel
Safety Guards	● Torque & Temperature limiter ● Emergency stop switch
Power Supply	Single-phase, AC100V, 5A
Dimensions	W400 x D600 x H630mm
Net Weight	Main unit: approx. 50kg

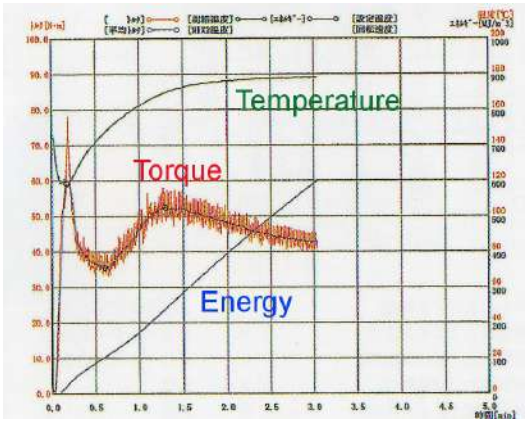
Base Unit Options

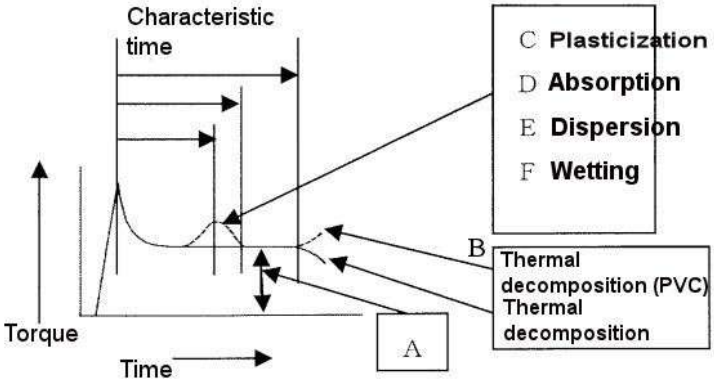
Name	Model	Descriptions	
Mini Thermal Printer for Labo Plastomill Micro	MPR	For Labo Plastomill Micro Paper width: 80mm	
Data Processing Unit for Labo Plastomill Micro	MPC	For Labo Plastomill Micro	
Data Processing Software for Labo Plastomill Micro	MSOFT	For Labo Plastomill Micro	

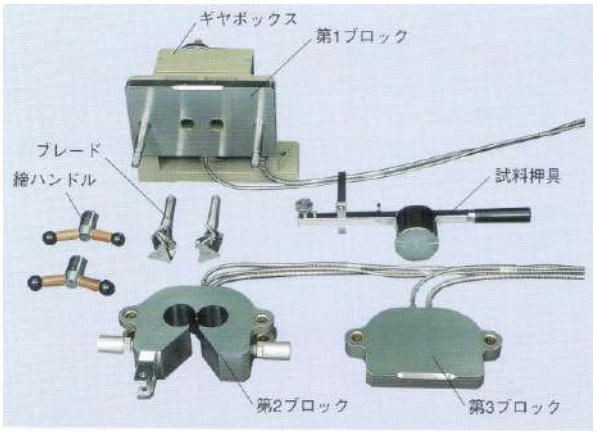
2. MIXERS

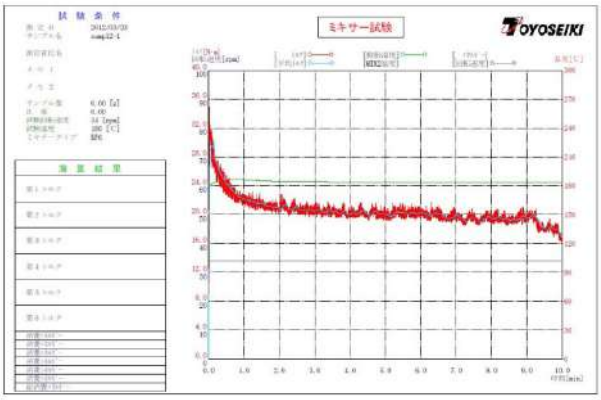


Mixer's heating block, that is the sample kneading part of Labo Plastomill, contains 2 kneading blades rotating in same direction or two kneading blades rotating in different directions and resin temperature sensors.
Mixing and kneading of sample filled in the mixer proceeds as it receives heat and shear from the blade and its state of melting, dispersion, distribution, steadiness, deterioration, curing reaction, cross-linking, heat generation, etc. changes in various forms according to the characteristics of the sample.
Since these changes in state appear as change in the torque acting mechanically on the blade, the behavior of torque and resin temperature are continuously detected and displayed on the monitor.
In mixer test, processing characteristics such as gelling characteristic, dynamic thermal stability, curing characteristic, dispersion characteristic, etc. can be determined as index.
Moreover, since mechanically provided energy (MH/m^3) consumed per unit volume is calculated, information regarding mixer scale up and comparison among samples can also be obtained. The middle size mixer (100cm3 or larger) is generally used to collect large quantity of kneaded substances as secondary sample in addition to conducting above-mentioned tests.









Example of application

<Thermoplastics>

- Relative melt viscosity
- Dynamic thermal stability
- Thermoplastic characteristic (PVC)
- Dispersion of magnetic material, metallic powder, reinforcement, etc.
- Nano particle dispersion evaluation test
- Ceramic wetting characteristic
- Consumed energy
- Effect of additives such as stabilizer, lubricant, plasticizer, compatibility agent, etc. with regard to above-mentioned items.
- Compounding, pelletization, etc.

<Elastomers>

- Relative melt viscosity
- Dynamic curing characteristic
- Carbon black dispersion
- Nano particle dispersion evaluation test
- Effect of curing agent, kind of carbon, filler, etc. with regard to above-mentioned items.
- Consumed energy
- Sample kneading for evaluation (JIS K 6299)
- Compounding, etc.

<Thermosetting resins>

- Relative melt viscosity
- Dynamic curing characteristic
- Consumed energy
- Effect of curing accelerator, retarding agent, filler, etc. on above mentioned items.

<Paints>

- Oil absorption characteristic of paints

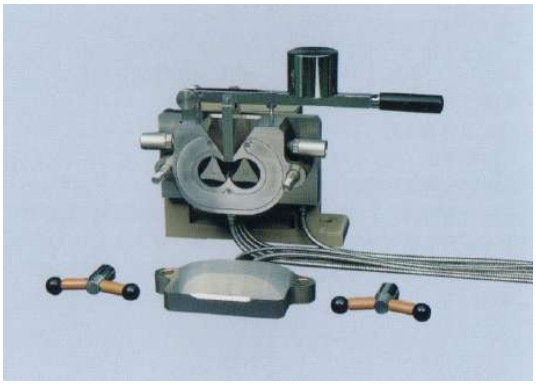
(Roller type mixer model R60)

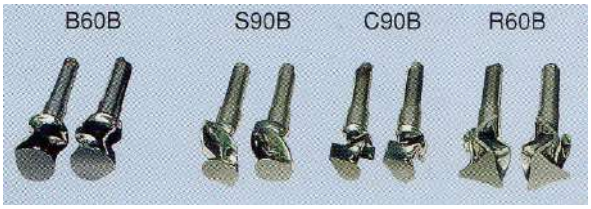
(Banbury type mixer model BR250 mixer with oil circulation bath
Note: Base unit shown is old generation model)

Mixers for Thermosetting Resins (Roller & Delta type)

Model	**R30 / R30H**	**D30 / D30H**
Chamber Capacity (Approx.)	30cm^3	
Blade shape	Roller type 	Delta type 
Main Application	Thermosetting resins	
Shear Strength	High	
Rotation Speed	Same speed of motor rotation	
Blade Revolution Ratio	2 : 3	
Sample Insertion System	Lever type	
Heating System	Electric	
Max. Temperature	250°C (R30H: 400°C)	250°C (D30H: 400°C)
Max. Permissible Torque	200N.m	300N.m
Cooling Device (Air)	Option	
Power Supply	Single-phase, AC200V, 3.2A (R30H: 6.3A)	Single-phase, AC200V, 3.2A (D30H: 6.3A

Mixers for Thermoplastic Resins (Roller type etc.)



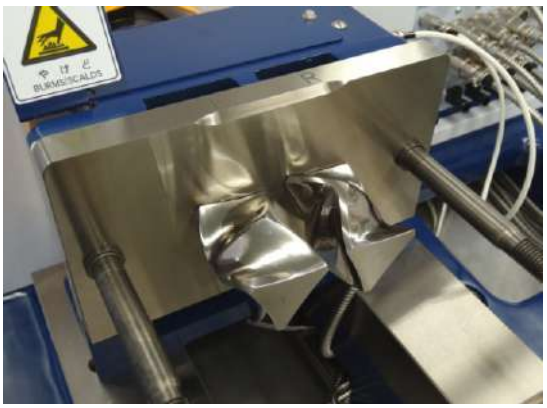


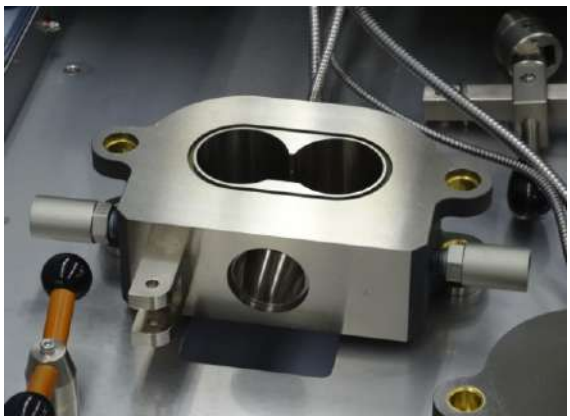
Features of Roller mixer (R60)

- Capacity: Approx. 60cm^3
- Blade rotation ratio: 2:3 (Left : Right)

Rotating different direction

- Electric heating
- Cooling by compressed air (Option)
- 3 heating zones :
- Temperature range up to 250°C (400°C optional)
- Exchangeable rotor blades
  - -Roller rotor blade (R60B)
  - -Cam rotor blade (C90B)
  - -Sigma rotor blade (S90B)
  - -Banbury rotor blade (B60B)

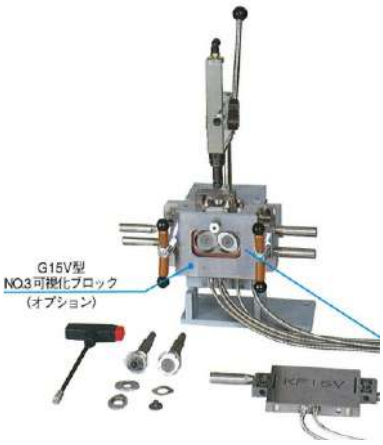




Model	R60 / R60H	C90 / C90H	S90 / S90H
			
Chamber Capacity (Approx.)	60cm^3	90cm^3	
Blade Shape	Roller type 	Cam type 	Sigma type 
Main Application	Thermoplastics		
Shear Strength	High	Middle	Low
Rotation Speed	Same speed of motor rotation		
Blade Revolution Ratio	2 : 3		
Heating System	Electric		
Max. Temperature	250°C (R60H: 400°C)	250°C (C90H: 400°C)	250°C (S90H: 400°C)
Max. Permissible Torque	200N.m		300N.m
Cooling Device (Air)	Option		
Power Supply	Single-phase, AC200V, 3.7A (R60H: 8.7A)	Single-phase, AC200V, 3.7A (C90H: 8.7A)	Single-phase, AC200V, 3.7A (S90H: 8.7A)

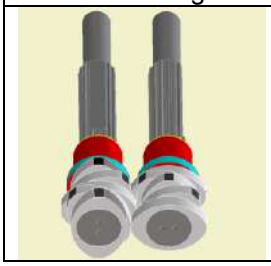
Model	R100 / R100H	R200 / R200H	R500 / R500H
			
Chamber Capacity (Approx.)	100cm^3	200cm^3	500cm^3
Blade Shape	Roller type		
Main Application	Thermoplastics		
Shear Strength	High		
Rotation Speed	Same speed of motor rotation		
Blade Revolution Ratio	2 : 3		
Heating System	Electric		
Max. Temperature	250°C (R100H: 400°C)	250°C (R200H: 400°C)	250°C (R500H: 400°C)
Max. Permissible Torque	300N.m	750N.m	1000N.m
Cooling Device (Air)	Option	Standard	
Power Supply	Single-phase, AC200V, 4.1A (R100H: 8.7A)	Single-phase, AC200V, 10.5A (R200H: 16A)	Single-phase, AC200V, 15.3A (R500H: 19.7A)

Mixers for Thermoplastic Resins (Segment type)



Features of Segment Mixer (KF6/KF6V)

- Heavy kneading test by means of intermeshing type co-rotary blades.
- Arbitrary adjustment of heavy/light kneading by changing disk phase composition of blades.
- Disk phase of blade is possible to change

Low shearing disk phase	High shearing disk phase
Max share rate: 450 s^{-1} Dispersion: Low Distribution: High	Max share rate: 1173 s^{-1} Dispersion: High Distribution: Low
	

Model	KF6 / KF6V	KF15V	KF70V2
			
Disk model	Disk I (option) and Disk II (standard) Please select Disk I or Disk II		Disk I (standard)
Chamber capacity	Disk I: Approx. 6cm^3 Disk II: Approx. 5cm^3	Disk I: Approx. 15cm^3 Disk II: Approx. 14cm^3	Disk I: Approx. 70cm^3
Shape of blade	Disk		
Chip clearance	Disk I: 0.75mm Disk II: 0.3mm	Disk I: 0.88mm Disk II: 0.3mm	Disk I: 0.4mm
Rotation speed	Triple speed (3 times of motor rotation speed)		Double speed (2 times of motor rotation speed)
Blade revolution ratio	1:1		
Sample insertion system	Rack and pinion type lever (KF6: Lever type)		
Heating system	Electric		
Max. temperature	350°C		
Main application	Thermoplastic (Very high shear)		
Max. permissible torque	40N.m	100N.m	300N.m
Cooling device (Equipped as standard)	Compressed air cooling (Water cooling is possible under 100°C)		
Power supply	Single-phase, AC100V, 15A	Single-phase, AC200V, 12.9A	Single-phase, AC200V, 14.3A

Mixers for Elastomers (Banbury type)

Electric heating type

Model	B75	B250 / B250H	B600 / B600H
			
Chamber Capacity (Approx.)	75cm^3	250cm^3	600cm^3
Blade Shape	Banbury type		
Main Application	Elastomers		
Blade Revolution Ratio	7 : 8	8 : 9	7 : 8
Sample Insertion System	Lever type (Air cylinder: option)	Air cylinder	
Heating System	Electric		
Max. Temperature	250°C	250°C (B250H: 400°C)	250°C (B600H: 400°C)
Max. Permissible Torque	300N.m	750N.m	1000N.m
Cooling Device (Air)	Option	Standard	
Power Supply	Single-phase, AC200V, 4A	Single-phase, AC200V, 10.5A (B250H: 16A)	Single-phase, AC200V, 15.3A (B600H: 19.7A)

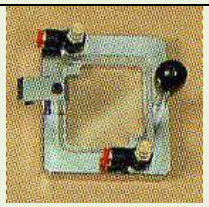
Oil heating type

Model	BR250	BR600
		
Chamber Capacity (Approx.)	250 cm^3	600cm^3
Blade Shape	Banbury type	
Main Application	Elastomers	
Blade Revolution Ratio	8 : 9	7 : 8
Sample Insertion System	Air cylinder	
Heating System	Oil heating	
Max. Temperature	180°C	
Max. Permissible Torque	750N.m	1000N.m
Cooling Device (Air)	N/A	
Power Supply	Single-phase, AC200V, 28A (Oil circulation bath, model OP)	

Mixer for PVC Dry blend (Planetary type)

Model	P600F
	
Chamber Capacity (Approx.)	600cm^3
Main Application	PVC dry blend
Heating System	Electric
Max. Temperature	150°C
Max. Permissible Torque	30N.m
Cooling Device (Air)	N/A
Power Supply	Single-phase, AC200V, 4A

Mixer Options

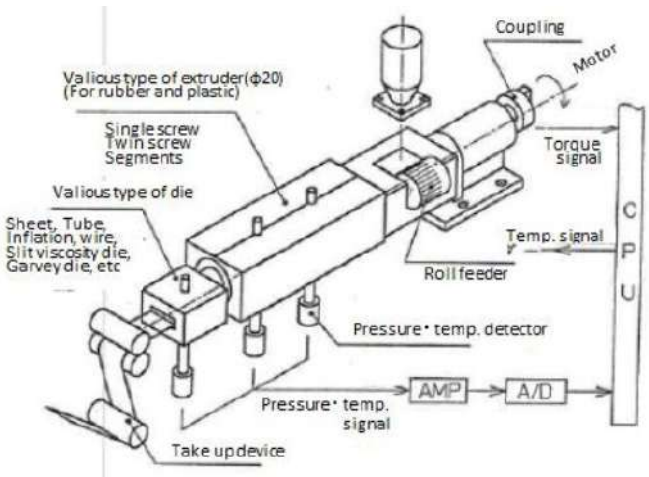
Name	Model	Descriptions	
Trolley for mixer (Necessary option) **Note:** KMIX1 should be selected when existing old generation mixer is used.	KMIX1	■ Power supply: Single-phase, AC100V, 30A ■ Heater: 100V, 3ch & 200V, 3ch ■ Dimensions: W550 x D660 x H935mm ■ Net weight: 100kg ■ Applicable models: R30, D30, R60, C90, S90, R100, R200, B75, B250, B600, R500, KF70V2, KF15V, KF6 *(Not possible to use with BR250, BR600, P600F)*	
Trolley for mixer (Necessary option)	KMIX2	■ Power supply: Supplied from base unit ■ Heater: 200V, 3ch ■ Dimensions: W550 x D660 x H935mm ■ Net weight: 95kg ■ Applicable models: R30, D30, R60, C90, S90, R100, R200, B75, B250, B600, R500, KF70V2, KF15V, KF6 *(Not possible to use with BR250, BR600, P600F)*	
Cooling Device	AC	Device for cooling down overheating of mixer by the heat generated by shearing of resin. Available for following models ● R60(H) ● C90(H) ● S90(H), ● R100(H) ● B75 Note: Supplied as standard for Following models ● R200(H) ● R500(H) ● B250(H) ● B600(H) ● KF15V ● KF70V2	
Nitrogen Purge Cover	N, GN	For preventing oxidation of sample. The cover has inlet and outlet for nitrogen gas. Available without observation window (model N9) and with observation window of heat-resistant glass (model GN)	

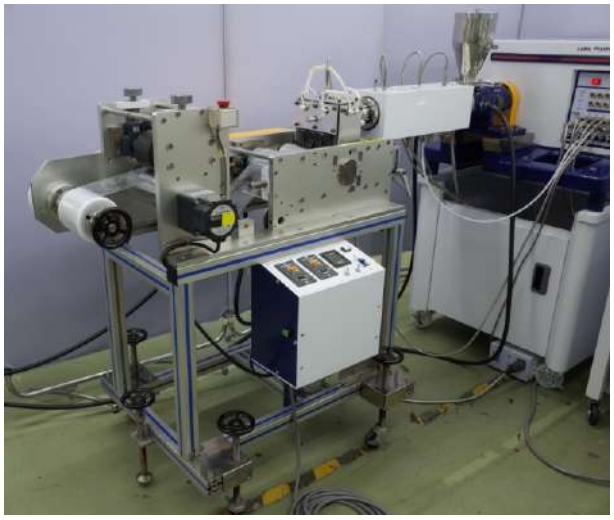
Vertical Hopper	VH	Available for following models ● R30(H) ● D30(H) ● R60(H) ● C90(H) ● S90(H) ● R100(H)	
Nitrogen Purge Vertical Hopper	VHN	Available for following models ● R60(H) ● C90(H) ● S90(H) ● R100(H) Note: Supplied as standard for following models ● P600F ● KF70V2	
Cylindrical Hopper (Pneumatic)	VHC	Available for following models ● R60(H) ● C90(H) ● S90(H) ● R100(H) ● B75 Note: Supplied as standard for Following models ● R200(H) ● R500(H) ● B250(H) ● B600(H) ● BR250 ● BR600	
Nitrogen Purge Cylinder Hopper	VHCN	Available for following models ● R60(H) ● C90(H) ● S90(H) ● R100(H)	
Oil Circulation Bath	OP	For BR250, BR600 Dimensions: Approx. W380 x D830 x H1210mm Net weight: Approx. 75kg Power supply: Single-phase, AC200V, 28A	

Trolley for mixer	CMX	Available for R200(H), B250(H), B600(H), R500(H), BR250, BR600, KF70V2	
	CMXP	Available for P600F	

3. EXTRUDERS

In small size extruder test of Labo Plastomill, in addition to detecting torque, the pressure and temperature (maximum 4 points each) are also continuously detected during molding by installing resin temperature sensor and resin pressure sensor in the cylinder or die and the values are displayed on the monitor.
Various kinds of molding dies and take-off devices are also available, allowing you to determine molding conditions by simulating and obtain various information such as pressure, temperature, torque, specific energy (MJ/m^3) and extrusion amount at each rpm (each shear rate) in addition to detecting mold status such as extrusion mold product's fish eye, dispersion, transparency and gloss by using a small quantity of sample.





(Single screw extruder with T-die & film take-off device)

Example of application

- Simulation test using various kinds of molding die head
- Viscosity measuring test by slit die (measuring apparent and true values of shear rate, shear stress, viscosity)
- Specific energy measuring test (evaluation of productivity)
- Filter pressure resin test (measuring gel substance in resin)
- Die swell measuring test (resin(s elasticity recovery swelling test)
- Melt strength test (measuring melt tension and breaking speed)
- Garvey die test (ASTM D 2230, rubber moldability evaluation)
- Compounding and pelletization
- Fixed quantity extrusion test by gear pump (pressure/revolution control)
- Inflation take-off bubble tension measuring test (Take-off device with tension measuring device)

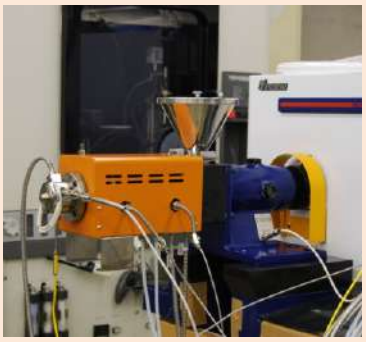
Single Screw Extruders for Elastomers

Model	D2010	D2015
Screw Diameter	20mm	
L/D	10	15
Max. Temperature	250°C	
Heating System	Electric	
Heating Zone (Cylinder)	1	2
Air cooling (Cylinder)	Possible	
Vent Port	N/A	
Pressure/Temperature Measurement Hole	2	
Standard Die Head	Garvey die	
Standard Screw	Full flight screw (CR=1.6)	
Standard Hopper	Roll feeder	
Max. Permissible Torque	200N.m	
Power Supply	Single-phase, AC200V, 3.2A	Single-phase, AC100V, 3.2A

Single Screw Extruders for Thermoplastics

Model	D2020	D2025
		
Screw Diameter	20mm	
L/D	20	25
Max. Temperature	350°C	
Heating System	Electric	
Heating Zone (Cylinder)	3	
Air cooling (Cylinder)	Possible	
Vent Port	N/A	1
Pressure/Temperature Measurement Hole	4	
Standard Die Head	Strand die (Ø3mm x 1)	
Standard Screw	Full flight screw (CR:2.5)	Vent screw (CR:No.1=2.5, No.2=3.0) (Full flight screw is available as option)
Standard Hopper	Steel hopper	
Max. Permissible Torque	200N.m	
Power Supply	Single-phase, AC200V, 9.0A	Single-phase, AC200V, 9.8A
Dimensions	W230 x L830 x H450mm	W230 x L930 x H450mm

Single screw extruder for thermoplastics (for Labo Plastomill Micro)

Model	**D1220**
	
Screw Diameter	12mm
L/D	20
Max. Temperature	350°C
Heating System	Electric
Heating Zone (Cylinder)	2
Air cooling (Cylinder)	Possible
Vent Port	N/A
Pressure Measurement Hole	1
Standard Die Head	Strand die (Ø2.5mm x 1)
Standard Screw	Full flight screw (CR=2.5)
Standard Hopper	Steel hopper
Max. Permissible Torque	
Power Supply	Single-phase, AC100V, 12A

Extruder Options

Trolley

Name	Model	Descriptions	
Trolley for extruder (Necessary option)	KEXT1		
Trolley for extruder (Necessary option)	KEXT2		

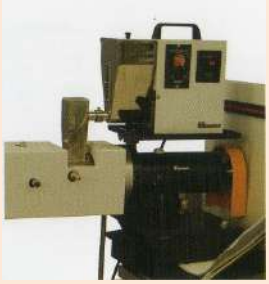
Die Heads

Name	Model	Main spec.	Remarks	Power supply	
Strand die	ST1	1 string type, ø1.5, 2, 3, 4, 5, 6, 2.095mm	For extruding rod, filament	Single-phase, AC100V, 4A	
	ST3S	3 string type, ø3mm			
T die	T25F	W=25, t=0.5~1.5 (Fish tail type)	For extruding sheet & film	Single-phase, AC100V, 4A	
	T60F	W=60, t=0.5~1.5 (Fish tail type)		Single-phase, AC100V, 7A	
	T120C	W=120, t=0~1.5 (Coat hanger type)		Single-phase, AC200V, 8A	
	T150C	W=150, t=0~1.5 (Coat hanger type)			
	MT60B	W=60, t=0.3~0.8mm (Coat hanger type)	For Labo Plastomill Micro		
Inflation die	I25C	ø25mm, slit 0.7 (Cross type)…for PVC	For extruding blown film	Single-phase, AC100V, 4A	
	I25S	ø25mm, slit 0.7 (spiral type)		Single-phase, AC200V, 6A	
Tube die	TU10	ø8x10mm (spider type)	For extruding tube	Single-phase, AC100V, 5A	
	TU20	ø8x20mm (spider type)			
Wire coating die	WD	ø2mm, wire diameter=ø1mm (cross)	For electric wire	Single-phase, AC100V, 8A	
Slit die	CAPF2	W=20, L=100 t=0.5, 0.8, 1, 1.5mm (set)	For viscosity measurement	Single-phase, AC100V, 9A	
Capillary die	CAPR	Orifice ø 1x5mm, 1x10mm, 1x20mm	For die swell measurement	Single-phase, AC100V, 8A	
Garvey die	GD		For testing conforms to ASTM D2230 (elastomers)	Single-phase, AC100V, 4A	

Pressure and Temperature Sensors

Name	Model	
Pressure sensor	PS	
Temperature sensor	TS	

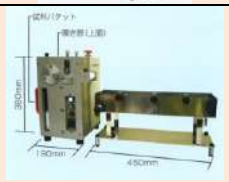
Hoppers and Feeders

Name	Model	Remarks	
Forced feed hopper	FH2	Screw type under mixing blade, sample is forced fed by means of variable motor.	
Constant quantity feeder	F3	Resin vent up due to deaeration is suppressed by decreasing the supply by means of this fixed quantity feeder.	

Film Take-off Devices

Name	Model	Power supply	Dimensions	Net weight	
Film Take-off Device	FT2W20	Single-phase, AC100V, 3A	Approx. W1200 x D720 x H1200mm		
Film & Sheet Take-off Device	FT3W20	Single-phase, AC100V, 3A	Approx. W1200 x D720 x H1200mm	Approx. 150kg	
Film Take-off Device for Labo Plastomill Micro	FT2B8				
Inflation Take-off Device	INT	Single-phase, AC100V, 2A	Approx. W800 x D800 x H2400mm	Approx. 250kg	

Pelletizers

Name	Model	Power supply	Dimensions	Net Weight	
Cold Cut Pelletizer	PETEC3	Three-phase, AC200V, 4A	Approx. W460 x D1030 x H1230mm	Approx. 75kg	
Hot Cut Pelletizer	PETEH	Three-phase, AC200V, 4A	Approx. W500 x D900 x H1450mm		
Cold Cut Pelletizer for Labo Plastomill Micro	MPETC1				

Others

Name	Model	Power supply	Dimensions	Net weight	
Conveyor + Cooling Roll	CON + R-1	Single-phase, AC100V, 1A	Approx. W550 x D1540 x H900~1100mm (Belt: W150 x L1500mm)		
Gear Pump Note: 2 pcs of pressure sensors required	GP		Approx. W650 x D730 x H1300mm		
Trolley for Extruder	CE1~CE5				

Note:

Specifications are subject to change without notice.

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