
TPM
EQUIPOS
S.A. DE C.V.

Ⅰ. Applications:

XNR-400D Melt Flow Indexer meets the requirement of GB/T3682-2000 and ASTM D1238-98.And also ,we design and manufacture the instrument after we made a reference of similar standards ,such as JB/T5456 and ISO 1133 .It is used to determine the melt mass-flow rate (MFR) and the melt volume-flow rate (MVR) of thermoplastics materials .It adopts auto sampling method and the cut samples are weighed up by balance when it is used to determine MFR .When it is used to determine MVR ,it measures the time which the piston is used to move the specified distance first through the displacement transducer and auto timer system and calculates MVR according to the formula later. The final results of the two methods are all displayed on the machine's LCD screen and printed and exported by computer .The instrument has high accuracy on data measurement with simple operation and stable capability. It is not only suitable for the tests of engineering plastics with higher melt temperature ,such as PC ,FI plastics, nylon ,but also for the plastics with lower melt temperature ,such as PE ,PP ,POM ,PS ,ABS resin and poly carbonic acid ester ,etc .It has wide range of applications in some industries ,such as plastic fabrication ,plastic goods ,petrochemical industry ;collage and university and science and research institute and commodity inspection department .

Ⅱ. Specifications :

1. **Extrusion section :**

Die diameter: Φ2.095±0.005mm

Die length : 8.000±0.025mm

Cylinder diameter : Φ9.550±0.025mm

Cylinder length : 152±0.1 mm

Diameter of piston head: 9.475±0.015 mm

Length of piston head : 6.350±0.100mm

2 . Standard test load (kg ,8 grades)

1st grade :0.325kg = (piston stem +weight tray +heat insulation sheath +weight # 1) = 3.187N

2nd grade :1.200kg = (0.325+weight # 2 0.875) = 11.77N

3rd grade :2.160kg = (0.325+weight # 3 1.835) = 21.18N

4th grade :3.800kg = ((0.325+weight #4 3.475) =37.26N

5th grade :5.000kg = (0.325+weight #5 4.675) = 49.03N

6th grade :10.000kg = (0.325+weight #5 4.675+weight #6 5.000) =98.07N

7th grade :12.500kg = (0.325+ weight #5 4.675+weight #6 5.000+ weight #7 2.500) =122.58N

8th grade :21.600kg = (0.325+ weight #2 0.875+ weight #3 1.835+ weight #4 3.475+ weight #5 4.675+weight #6 5.000+ weight #7 2.500+weight #8 2.915) =211.82N

The test load relative error shall not be more than ±0.5% .

3.Temperature range :50℃-450℃

4. Temperature constant accuracy : ±0.2℃

5. Resolution :0.1℃

6. Power :220V±10%　60Hz

7. Working Condition :

The ambient temperature shall be 10-40℃ and the relative humidity shall be 30%~80% .It shall be installed properly on stable foundation and adjusted to be level without corrosive media in ambient . There shall be no strong magnetic field disturbance and air convection when it runs .

8.Size:510X370X600

9.weight:　25KG　grades:21.6KG

Ⅲ. Theory and Structure

Melt Flow Indexer is a kind of Extrusion Plastometer .It can make the sample melt through high temperature oven in specified temperature conditions .The melt sample can be extruded from a die under specified load from the weights .(Fig. 1 shows the theory of the Extrusion Plastometer .) Melt Flow Indexer is the mass or volume that the melt sample of the thermoplastics passes through standard die every 10min under definite temperature and pressure .The former one is called melt mass-flow rate (MFR) in the unit of g/10min ;the latter one is called melt volume-flow rate (MVR) in the unit of cm^3/10min .Melt Flow Rate is not the basic property of the polymer ,it is only used to show the melt flow

capability of polymer .In this way ,we can know the molecular weight of polymer and its distribution ,machining capability.

The apparatus consists of oven and temperature controlling system installing on the column and base .The temperature-control system adopts PC computer to change the heating power .It has high and stable accuracy with high anti-disturbance ability .The heating thread in oven twists on heating stem as certain orderliness so that it can remain the Min. temperature grads to meet the requirement of the standard .

The apparatus contains six parts : (as shown in Fig.1)

1. Basic part : 4 adjustment screws used to adjust the level of the instrument and basic plate at the bottom of the machine.

2.Oven :It is the core of the Extrusion Plastometer including cylinder which is used to charge the sample ;die (as shown in Fig. 6) at the bottom of the cylinder ;cylinder-shaped oven and the sheath covering on it .There is a temperature transducer equipped in the oven to measure and control the temperature in the oven .

3.Sample cut-off (as shown in Fig. 4) :It is at the bottom of the oven containing cutting tool ,cutting tool axis ,cut-off electrical engine and its support.The sample extruded from the die can be cut by electrical engine manually and automatically .

4.Temperature measurement and control system (as shown in Fig. 1-9):The temperature inspection unit of the system adopts Pt100 platinum

resistance .The analog amplifier transforms the platinum resistance value into voltage signal and it changes into digital signal through A/D converter and transformed to PC .PC will display the actual temperature in display units after data processing. PC will get the system deflection according to the set-up temperature and the actual temperature in the oven and get the send out by PID numeration and converts it into power adjustment mode .The temperature can be controlled by controlling the connect and break times of the solid relay.

5.Displacement setting and time measurement equipment :It is located on the right side of the oven containing of displacement transducer(as shown in Fig1-4) ,transducer contact piece ,support ,locknut ,etc .The equipment is used to determine MVR .Put transducer contact piece on the stem of the transducer onto the guide stem of the weight #1 to measure .After the test is completed ,loosen the locknut ,rotate it to the back of the oven and tighten it .

6.The result export section (as shown in Fig 2-6):After the test is completed ,import relative data into the instrument through the buttons on the operation panel .The printer will export and print the result after it is calculated by computer.

Ⅳ. Instruction manual for operation panel

1. Figure buttons , “**.**”decimal button and “+/−” button .

The operation panel consists of 10 figure buttons from 0 to 9 "**.**"decimal button and "±" button for inputting figures .

2. The usage of the function buttons :

(Ⅰ) **"←", "→" , " ↑ " , " ↓ " , "Ent "** and **"ESC "** buttons :

(1) The following is the instruction of the LCD screen display :

The LCD screen display includes 9 page layouts ,they are initial page ,menu page ,test parameters set page ,test display page ,temperature cal set page ,displacement cal set page ,time set page ,pid set page and password page as shown in the following figures (The sketch map of LCD screen interfaces).

XNR-400D
Melt Flow Indexer

Initial Page (P_1)

Menu	
Test Parameters Set	Displacement Cal
Test Display	Time Set
Temp Cal	PID Set

Menu Page (P_2)

Test Parameters Set			
Mode :MFR		θ :	℃
Wise :AUTO		t :	s
No :		d :	
Sn :		L :	mm
Mnom :	kg	ρ :	g/cm^3

Test Parameters Set Page (P_3)

Mode :MFR Wise :AUTO			10:35:20
Temp. :	125.0	℃	m1 =
Displacement :	+00.00	mm	
Time :	000.00	s	MFR =
			(g/10min)

MFR Test Display Page (P4)

Mode :MVR Wise :AUTO			10:35:20
Temp. :	125.0	℃	T1 =
Displacement :	+00.00	mm	MVR =
Time :	000.00	s	(cm^3/10min)
			MFR =
			(g/10min)

MVR Test Display Page (p5)

Temp Cal Set (℃)	
125 :+0.00	400 :+0.00
190 :+0.00	450 :+0.00
230 :0.00	
300 :+0.00	
360 :+0.00	

Temp Cal Set Page (P6)

Displacement Cal Set (mm)
10mm :+0.00
20mm :+0.00
30mm :+0.00
40mm :+0.00
50mm :+0.00

Displacement Cal Set Page (P7)

Time Set		
Ye : 05	Mo :03	Da : 18
Ho :11	Mi : 08	Se. : 30

Time Set Page (P8)

PID Set			
1	2	3	4
P :6	P :9	P :9	P :9
I:240	I:240	I:240	I:240
D :40	D :40	D :40	D :40

PID Set Page (P_9)

Pass :12345

Password Page (P_{10})

(2) LCD screen will display the Initial Page after you turn on the power or press **"Reset"** button .The LCD screen interface will enter into Menu Page after you press "→" button .Press " ↑ " or " ↓ " button time and again ,the six option (Test Parameters Set ,Test Display ,Temperature Cal ,Displacement Cal ,Time Set ,PID Set) in the Menu Page will be

displayed in reverse video circularly (Reverse video refers that the displayed colour reverses to the normal displayed colour).Press "→" button after selecting one among them ,you will enter into relative LCD screen display interfaces .Press "→" button ,you will enter into Pass Page .You will enter into Temp Cal Page ,Displacement Cal Page or PID Set Page after you enter correct password and it is confirmed .The correct password is 12345 .You will return to Menu Page after you press "←" button .Press "←" button again and you will return to Initial Page .

(3) Test Parameters Set Page

LCD screen will display P_3 after you enter into Test Parameters Set Page .The cursor in the page will flash .Press " ↑ " or " ↓ " button time and again ,the cursor will flash circularly after the ten option in the page .It shows that the option is selected if the cursor flashes after some option .

The option in the P_3 is shown as following :

Mode ----Test method option .It is MFR or MVR .Press figure button 1 to select MFR method ,LCD screen will display **Mode :MFR** ; Press figure button 2 to select MVR method ,LCD screen will display **Mode :MVR** .

Wise---- Sample cutting method option .That is auto sample cutting or manually sample cutting .Press figure button 3 to select auto sample cutting ,LCD screen will display **Wise ;AUTO** ; Press figure button 4 to select auto sample cutting ,LCD screen will display **Wise ;MANUAL** .

No ---- Sample serial number from 0~9999 .

Sn ---- Sample code from 0~9999 .

Mnom ----Nominal load .It is set by figure buttons according to sample standard .

Note :It is not necessary to press **"Ent"** button for the figure setting of the above mentioned 5 option .

θ ---- Test temperature

t---- The cut-off time-interval

d ---- Sampling times

L ---- Displacement

ρ ---- Melt density

The set value of the five parameters about test temperature ,cut-off time-interval ,sampling times ,displacement ,melt density are as following :

Enter the value by figure button after you have selected one of the option and press **"Ent"** button .If you enter a error value ,press **"ESC"** button and enter a correct one . press **"Ent"** button if it is necessary to modify a data .

The set value of the five option are as following :

Test temperature :50~450℃

The cut-off time-interval :1~600S

The sampling times :1~99

The displacement :1~30mm .

The melt density is specified according to the material of the sample .

It is necessary to set the value of test temperature ,cut-off time-interval and sampling times in MFR method ;it is recommended to set the value of test temperature ,sampling times ,displacement and melt density in MVR method .

(5) The set of the average weight of individual cut-off samples in Test Display Page

Enter the value by figure buttons and press **"ENT"** button after one group of tests is finished and the average weight of individual cut-off samples is calculated .

(6) Temperature Cal Set Page

LCD screen will display P_5 after you enter into Temperature Cal Set Page .The cursor in P6 will flash .Press "↑" or "↓" button time and again ,the cursor will flash circularly after the 7option in the page .It shows that the option is selected if the cursor flashes after some option .

125 refers to 125℃ test Temp Cal ;190 refers to 190℃Temp Cal ;230 refers to 230℃Temp Cal ;300 refers to 300℃Temp Cal ;400 refers to 400℃Temp Cal and 450 refers to 450℃Temp Cale.

The test Temp Cale of the above mentioned points equals to actual Temp. minus displayed Temp. plus manufacturer's Temp. deviation value .For example :the test Temp. constant point is set to be

125℃ .Then ,the displayed test Temp. is 125℃ after the temperature is constant ,but the actual measured test Temp. is 124℃ .So ,the Temp. correction value is (124-125) equals to –1.0℃ .The manufacturer's test Temp. deviation is 0.2℃ and the final Temp. correction value is (–1.0+0.2)℃ equals to 0.8℃ .If the actual measured test Temp. is 125.8℃ ,the 125℃ test Temp. correction value is (125.8-125)℃ equals to 0.8℃ ,the manufacturer's Temp. deviation value is 0.2℃ ,so the final Temp. correction value is (0.8+0.2)℃ equals to 1.0℃ .The set method is as following :

Press **"Esc"** button to cancel the manufacturer's test Temp. correction value after you have selected 125℃ test Temp. correction value option .Enter positive sign or negative sign by "+/-" button ,final test Temp. correction value by figure button and decimal button and press **"Ent"** button .Press **"Esc"** button and enter a needed data and press **"Ent"** button if it is necessary to modify a data .You must enter to one-digit and enter two figures after decimal point for every test Temp. correction value ,that is ,you must press figure button "0" to enter even if the two figures after decimal point are Zero .It is applied to enter any test Temp. correction value .The set range of every test Temp. correction value is from –9.99℃ to +9.99℃ .

After you have finished to set every test Temp. correction value ,you must press **"Reset"** button or turn off the power of the apparatusand turn

on it again so that the new correction value can be efficient .

(7) Displacement Cal Set

LCD screen will display P7 after you enter into Displacement Cal Set Page .The cursor in P7 will flash .Press “↑” or “↓” button time and again ,the cursor will flash circularly after the 5 option in the page .It shows that the option is selected if the cursor flashes after some option .

10mm refers to 10mm displacement correction value ; 20mm refers to 20mm displacement correction value ; 30mm refers to 30mm displacement correction value ; 40mm refers to 40mm displacement correction value and 50mm refers to 50mm displacement correction value .

The above mentioned displacement correction value at every point equals to the displayed displacement value minus nominal displacement value plus manufacturer’s displacement deviation value .For example :the displacement measurement point is 10mm and the displayed displacement value is 9.81mm ,then ,the displacement correction value at 10mm is 9.81mm minus 10mm equals to –0.19mm ,but the manufacturer’s displacement correction value at 10mm is –0.12mm ,so the final displacement correction value is –0.19mm plus –0.12mm equals to –0.31mm .The set method is as following :

Press **“ESC”** button to cancel the manufacturer’s displacement correction value after you have selected 10mm displacement correction

value option .Enter positive sign or negative sign by “+/-” button ,final displacement correction value by figure button and decimal button and press **“Ent”** button .Press **“Esc”** button and enter a needed data and press **“Ent”** button if it is necessary to modify a data .You must enter to one-digit and enter two figures after decimal point for every displacement correction value ,that is ,you must press figure button “0” to enter even if the two figures after decimal point are Zero .It is applied to enter any displacement correction value .The set range of every displacement correction value is from –5.00mm to +5.00mm .

After you have finished to set every test Temp. correction value ,you must press **“Reset”** button or turn off the power of the apparatusand turn on it again so that the new correction value can be efficient .

(8) Time Set Page

LCD screen will display P_8 after you enter into Time Parameters Set Page .The cursor in P_8 will flash .Press “↑” or “↓” button time and again ,the cursor will circularly flash in reverse video after the 7 option in the page .It shows that the option is selected if the cursor flashes in reverse video after some option .

Enter the value by figure button after you have selected one option among them .Notice that you can press **“Ent”** button at last after you have finished to set the whole 6 option . You shall select the relative option if it is necessary to modify a data and press **“ESC”** button to

cancel the data .Enter a needed value and press **“Ent”** button .You must enter tens digit and one-digit for every time correction value ,that is ,you must press figure button “0” to enter even if the tens digit is Zero .

(9) PID Set Page

LCD screen will display P_9 after you enter into PID Set Page .You can see four rows of the same P (proportion value) ,I (integral value) and D (differential coefficient value) in the page .And there are number 1 ,2 ,3 and 4 marked on the top of each P ,I and D row .They represent PID parameters corresponding to different test Temp. section .The first group is the PID parameters when the test Temp. constant is set to be 0~149.9℃ ;the second group is the PID parameters when the test Temp. constant is set to be 150~199.9℃ ; the third group is the PID parameters when the test Temp. constant is set to be 200~299.9℃ ; the fourth group is the PID parameters when the test Temp. constant is set to be 300~400℃ ;The cursor in P_8 will flash .Press **“↑”** or **“↓”** button time and again ,the cursor will circularly flash after the 12 option in the page .It shows that the option is selected if the cursor flashes after some option .

Enter the value by figure button after you have selected one option among them and press **“Ent”** button .Press **“Esc”** button and enter a needed value if the entered value is error . Press **“Esc”** button after you have selected corresponding option if it is necessary to modify a

data .Enter a needed data and press **“Ent”** button .The set range of P (proportion value) ,I (integral value) and D (differential coefficient value) is 1~100 ,0~3600S and 0~3600S respectively .It is recommended to modify PID parameters by professional engineers or contact manufacturer .

After you have finished to set every group of PID parameters ,you must press **“Reset”** button or turn off the power of the apparatusand turn on it again so that the new PID parameters can be efficient .

（Ⅱ） The usage of **“Run”** button

(1) The usage of **“Run”** button in MFR mode

Press **“Run”** button and the cut-off electrical engine will cut the sample once under **Wise :AUTO** mode in Test Display Page .The Time Set in the page will be circularly displayed according to the set cut-off time-interval .The cut-off electrical engine will cut the sample once as soon as the time is up to cut-off time-interval .The cut-off time-interval stops display and the cut-off electrical engine stops to cut when the sampling reaches the needed times .Press **“Run”** button under Wise :MANUAL mode ,the Time Set in the page will be circularly displayed according to the set cut-off time-interval .The buzzer will alarm as soon as time reaches to cut-off time-interval .There is need to rotate the knob at the rear part of the cut-off electrical engine manually to cut the sample .The cut-off time-interval stops when the sampling reaches the

selected times .After the test is finished ,weigh the mass of the cut-offs individually and calculate the average mass .Enter the average mass by figure buttons ,that is ,ml=_____g .The apparatuswill calculate the MFR value automatically ,that is ,MFR =_____g/10min .

(2) The usage of **“Run”** button in MVR mode

Press **“Run”** button and the apparatus will measure the needed time according to the set displacement under **Wise :AUTO** mode in Test Display Page .For example : the piston displacement is set to be 6.35mm and the selected sampling time is 3 .Then ,press **“Run”** button ,the cut-off engine will cut the sample .The displacement value reset and the apparatus starts to display piston actual movement distance .The cut-off engine will cut the sample the first time when the displacement reaches 2mm .The time starts to display in the Time Set Page at the same time .The cut-off engine will cut the sample the second time when the piston movement distance reaches 8.35(=6.35+2)mm .The apparatus will records the needed time automatically and begin to time again .The cut-off engine will cut the sample the third time when the piston movement distance reaches 14.7(=2+6.35+6.35)mm .The apparatus will records the needed time automatically and begin to time again .The timer and the cut-off engine stops till the sampling reaches the selected times .The average time will be displayed at the top right corner of Test Display Page .That is ,T_1=_____S.

The following data will be displayed at the bottom right corner of Test Display Page :

MVR=_____CM^3/10min MFR=_____g/10min

The electrical engine doesn't work under manually cut-off mode .The cut-off must be finished by rotating the knob at the rear part of the electrical engine manually .

(Ⅲ) The usage of **"Start"** button

Press **"Start"** button in Test Display ,the apparatusstarts to heat and carries out temperature constant process according to constant temperature point .

(Ⅳ) The usage of **"Print"** button

Press **"Print"** button to print the test report after one group of tests are finished .

(Ⅴ) The usage of **"Reset"** button

Press **"Reset"** button ,the apparatusbegins initialization again .

(Ⅵ) The usage of **"MANUAL CUT-OFF"** button at the right side of the apparatus

Press **"MANUAL CUT-OFF"** button once , the cut-off engine will rotate one circle and one cut-off is finished .

Ⅴ .Installation and adjustment :

You shall disassembled some parts and components of the apparatus and pack them separately in case of the damage of them during the

transportation .After the disassemble of the package ,you shall check the main engine ,parts and components ,accessories and technical document accurately according to the packing list and the description and quantity specified in Fig.5 .If it is found that something is not in the package ,please contact us .Put the apparatus on the stable platform after check .Install the accessories drawer on the slideway which is under the base plate. Connect the power wires properly .

Push the push-and-pull stem(Fig.3-3) which is connected with the die-retaining plate into the oven .You can see that the die-retaining plate covers two thirds of the bottom caliber of the cylinder from the top of it .And then ,insert the support stem of bubble level into the cylinder from the top. Take the bubble as reference ,adjust the four screws at the back of the base so that the cylinder can be vertical and disassemble the bubble level .

Notice :During the adjustment ,the oven shall not be heated .Otherwise ,the water level will be damaged.

Ⅵ. Measurement and operation

1. MFR Determination

You can install die to begin the test after the adjustment of the apparatus.

(1) Die Installation

Install die from the top of the cylinder and press it by charging bar till

it touches die-retaining plate.

(2) Put the piston stem (compounding part) into the cylinder from the top .

(3) Insert power jack and turn on the power switch ,the power light flashes,Set test constant temperature point ,cut-off time-interval ,sampling times ,nominal test load according to the statement in **Part Ⅳ** .Press **"Start"** button after you enter into the test main page .The apparatus begins to heat .Ensure that the cylinder has been at the selected temperature for less than 15min .

(4) Wear gloves (in case of scald) and take out piston stem after 15min .Charge the sample into the cylinder and compress it by charging hopper and packing rod within 1min .Put the piston stem into the cylinder again .The nominal test load can be added onto the piston stem after 4min.

Pre-estimate melt flow rate ,sample mass in cylinder and cut-off time-interval (See Appendix Ⅰ) .

The test material corresponding to test Temp. and nominal test load is shown as Appendix Ⅱ .

(5) Extruded samples' cut-off .The set is shown as the above mentioned **AUTO** or **MANUAL** option .

A. **AUTO** cut-off

Put the tray under the die .Press **"Run"** button when the lower

reference mark on the piston stem has reaches the top edge of the cylinder ,the cutting tool cut the samples automatically according to the selected sampling times and cut-off time-intervals .

B. **MANUAL** cut-off

Put the tray under the die Set the sampling manner to be **MANUAL** .When the lower reference mark on the piston stem has reached the top edge of the cylinder ,press **"Run"** button ,the cut-off time-interval has been reached and the apparatus alarms .Rotate manual knob to cut .

Note :(The cut-off shall be carried out between the upper and lower reference marks on the piston stem) .

(6)Result calculation

Select 3~5 no air bubble cut-offs and put them on the balance after cooling and weigh individually (The balance shall be accurate to 0.5mg .) ,calculate their average mass .Enter average mass in Test Display Page and press "Confirm" button .The apparatus will calculate MFR value and displays it in the main interface page .Press **"Print"** button to print test report .

2. MVR determination :

According to GB/T3682-2000, measure "the time taken by the reference mark to cover a specified distance" first ,then calculate the MVR value .When MFR is not more than 10g/10min ,we measure the

time taken by the piston moving to 6.35±0.25mm distance ;when MFR is more than 10g/10min ,we measure the time taken by the piston moving to 25.4±0.25mm distance (according to ASTM1238-98).

(1) Die Installation

Install die from the top of the cylinder and press it by charging stem till it touches die-retaining plate .

(2) Put the piston stem (compounding part) into the cylinder from the top .

(3) Insert power jack and turn on the power switch ,the power light flashes Set test constant temperature point ,sampling times ,displacement ,melt density and nominal test load according to the statement in **Part Ⅳ** .Press **"Start"** button after you enter into the main page of test .The apparatus begins to heat . Ensure that the cylinder has been at the selected temperature for less than 15min .

(4) Wear gloves (in case of scald) and take out piston stem after 15min .Charge the sample into the cylinder and compress it by charging hopper and packing rod within 1min .Put the piston stem into the cylinder again .The nominal test load can be added onto the piston stem after 4min.

(5) Measure the time taken by the reference mark to cover a specified distance by displacement transducer and auto-timing system

When the lower reference mark on the piston stem has reached to the

5~10mm position to the top edge of the cylinder ,loosen the locknut on the transducer support .Turn the transducer box from the back of the oven to the Left side of it .Lift the transducer stem softly and contact guide rod head of $1^{\#}$ weight on the contact piece magnet of transducer so that the contact piece can move down simultaneously with the weight ,and then tighten the transducer box as shown in Fig1-3 .

Attention to position the contact piece in the middle of the notch of the transducer box in case of the friction between the contact piece and the transducer box .

Press **"Run"** button on the operation panel when the lower reference mark on the piston stem has reached the top edge of the cylinder .

For example : the piston displacement is set to be 6.35mm and the selected sampling time is 3 .Then ,press **"Run"** button ,the cut-off engine will cut the sample .The displacement value reset and the apparatus starts to display piston actual movement distance .The cut-off engine will cut the sample the first time when the displacement reaches 2mm .The time starts to display in the Time Set Page at the same time .The cut-off engine will cut the sample the second time when the piston movement distance reaches 8.35(=6.35+2)mm .The apparatus will records the needed time automatically and begin to time again .The cut-off engine will cut the sample the third time when the piston movement distance reaches 14.7(=2+6.35+6.35)mm .The apparatus will records the needed time

automatically and begin to time again .The timer and the cut-off engine stops till the sampling reaches the selected times .The average time will be displayed at the top right corner of Test Display Page .That is ,T_1=_____S.

The following data will be displayed at the bottom right corner of Test Display Page :

MVR=_____cm^3/10min MFR=_____g/10min

Appendix :The equations to calculate MFR and MVR are shown as the following :

(1) The melt mass-flow rate (MFR) ,expressed in grams per 10min ,is given by the equation :

MFR(θ 、 m_{nom})= t_{ref}× m/t

Where :

θ ---- test temperature ,in degrees Celsius ;

m_{nom} ---- nominal load ,in kilograms ;

m ---- the average mass of the cut-offs in grams ;

t_{ref} ---- the reference time (10min) ,in seconds (600S) ;

t ---- the predetermined time of measurement ,in seconds .

(2) The melt mass-volume rate (MVR) ,expressed in cubic centimeters per 10min ,is given by the equation :

MVR(θ 、 m_{nom})=A.t_{ref} • L/t =427L/t

Where :

θ ---- test temperature , in degrees Celsius ;

m_{nom} ---- nominal load , in kilograms ;

A ---- the mean cross-sectional area ,in square centimeters of the piston and the cylinder($0.711cm^2$)

t_{ref} ---- reference time (10min) ,in seconds (600S)

t ---- the predetermined time of measurement ,in seconds ;

L ---- the predetermined distance moved by the piston (0.635cm or 2.54cm) ,in centimeters .

The melt mass-flow rate (MFR) ,expressed in grams per 10min ,is given by the equation :

$$MFR(\theta 、 m_{nom})=A.t_{ref} \cdot \rho L /t =427L \rho /t$$

Where :

θ ---- test temperature , in degrees Celsius ;

m_{nom} ---- nominal load , in kilograms ;

A ---- the mean cross-sectional area ,in square centimeters of the piston and the cylinder($0.711cm^2$)

t_{ref} ---- reference time (10min) ,in seconds (600S)

t ---- the predetermined time of measurement ,in seconds ;

L ---- the predetermined distance moved by the piston (0.635cm or 2.54cm) ,in centimeters ;

ρ ---- the density ,in grams per cubic centimeter ,of the melt at the test temperature and is given by the equation :

$\rho = m/0.711V$

m ---- being the mass ,determined by weighing ,of extrudate by a piston movement of Lcm .

Ⅶ. Cleaning after tests :

The apparatus shall be cleaned thoroughly after each determination .

(1) Wear gloves (in case of scald) and remove the weight and piston stem after all the samples in the cylinder is extruded .Clean the piston stem .

(2) Pull the push-and-pull rod out and take the die out carefully by the packing rod ;take out the left sample in the die by die cleaning bar and clean die hole ,the die and the feeding bar with cotton.

(3) Wrap the gauze onto the cylinder cleaning bar to clean the cylinder while it is hot .Turn off the power of the apparatus and pull out the jack .

Ⅷ.Attention

(1) The single-phase power jack shall have grounding hole and is stable grounded.

(2) Press “Reset” button if LCD screen displays abnormally .Set the test temperature again and press **“Run”** button .

(3) If the temperature is more than 450℃ during the normal test ,the software will be protected ,the apparatus stops to heat and alarms .

(4) If the abnormal phenomenon are such that the apparatus can’t control temperature or can’t display appear ,measures shall be taken to turn off the power and check the apparatus .

(5) Check if the cutting tool is correctly adjusted .The method is :install the die ,piston rod and sheath (as shown in Fig.3 and Fig.4). After loading the nominal test load onto the piston stem ,adjust the cutting tool to make its edges plane tangency with the die and pass through successfully.Pay attention to grind the blunt edge of the cutting tool in time.

(6) Press the sample with the packing rod in case of bubble.

(7) Wear gloves during cleaning and measurement operation in case of scald.

(8) Abrasives or material likely shall not be used when cleaning the piston stem .

IX: Appendix Ⅰ:

MFR (g/10min)	Sample Mass in Cylinder (g)	Extruded Cut-off Time-interval (s)
0.1~0.5	3~5	240
>0.5~1	4~6	120
>1~3.5	4~6	60
>3.5~10	6~8	30
>10	6~8	5~15

1) It is recommended that a melt flow rate shall not be measured if the value obtained in this test is less than 0.1g/10min or great than 100g/10min .

2) When the density of the material is greater than 1.0g/cm^3 ,it may be necessary to increase the mass of the test portion .

3) To achieve adequate repeatability when testing materials having an MFR greater than 25g/10min ,it may be necessary either to control and measure cut-off intervals automatically to less than 0.1s or to use MVR method .

X:Appendix Ⅱ：

Materials	Test Temp. θ ,(℃)	Normal Load m_{nom} ,(kg)
PS	200	5.00
PE	190	2.16
PE	190	0.325
PE	190	21.60
PE	190	5.00
PP	230	2.16
ABS	220	10.00
PS-1	200	5.00
E/VAC	150	2.16
E/VAC	190	2.16
E/VAC	125	0.325
SAN	220	10.00
ASA ,ACS ,AEC	220	10.00
PC	300	1.2
PMMA	230	3.8
PB	190	2.16
PB	190	10.00
POM	190	2.16
MABS	220	10.00

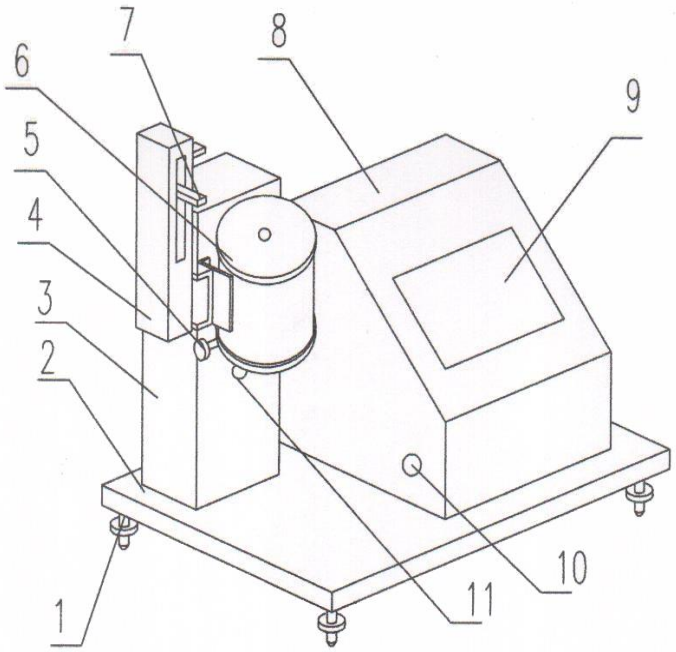

Figure I (Instrument diagram)

1. Tune the level of screw 2. Backplane 3. Column 4. Displacement Sensor
5. Push rod 6. Crisol 7. Displacement Sensor connector 8. Electronic Control Box
9. Control Panel 10. Scraper manually 11. Scraper motor

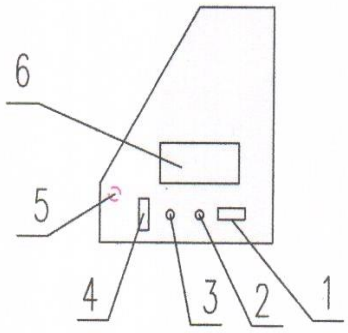

Figure II (right as the)

1. Power 2. Insurance 3. Insurance
4. Power switch 5. Scraper manually 6. Printer

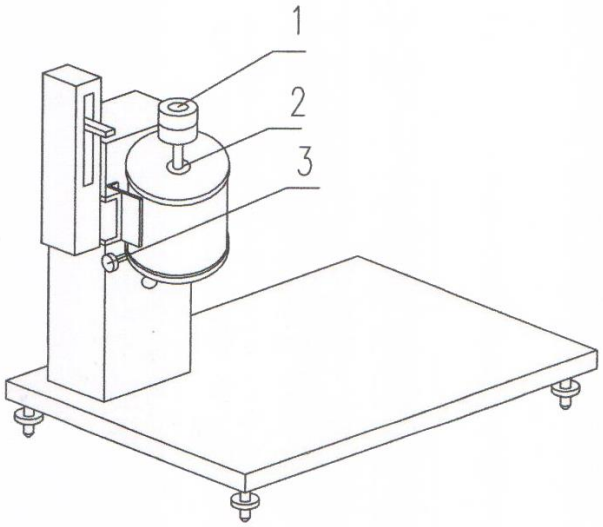

Figure III (The adjustment of the level of equipment)

1. Level 2. Level Support 3. Push rod

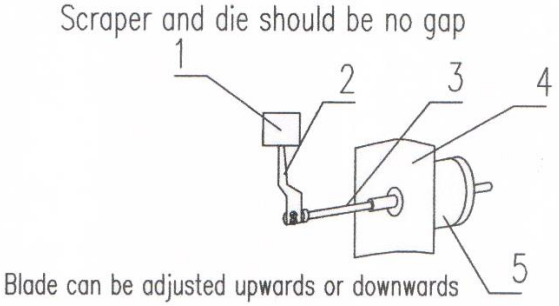

Figure IV (part of the scraper adjusted)

1. die 2. Scraper 3. Scraper shaft 4. Column
5. Scraper motor

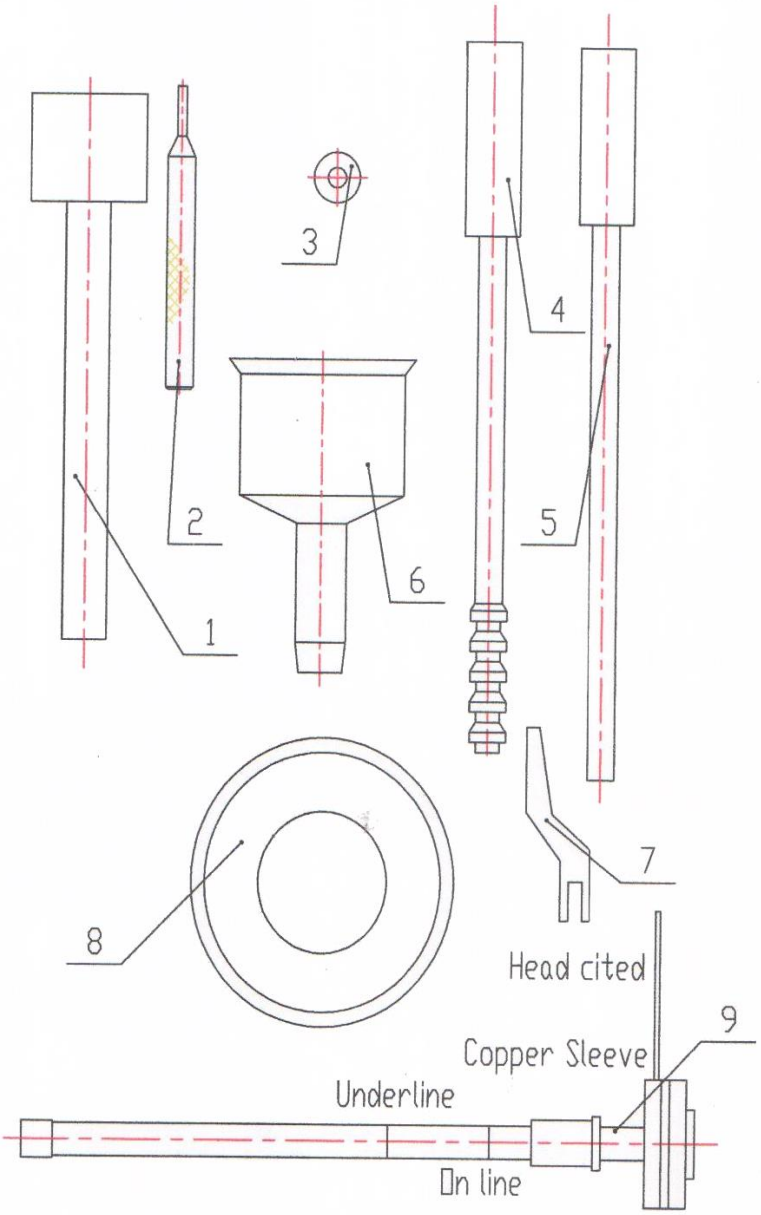

Figure V

1. Level 2. Die cleaning rod 3. Die 4. Barrel cleaning rod
5. Loading bar 6. Hopper 7. Scraper 8. sampling tray
9. Piston rod and the weight on the 1st

Certificate of Conformity

Product: Melt Flow Index Tester

Model： XNR-400D

Manufacture No ： _____

This equipment is qualified and granted to out of factory.

Verification officer：

Check member：

Date：

XNR-400D
Melt Flow INDEXER
Packing List

1, host a Taiwan

2, weight 8

3, Level 1

4, die 1

5, mouth stick a mold clean-up

6, barrel cleaning rod 1

7, loading rod 1

8, hopper 1

9, sample plate 1

10, manuals, packing lists, a set of certification

Packing Members: _____ Packing Date:_____