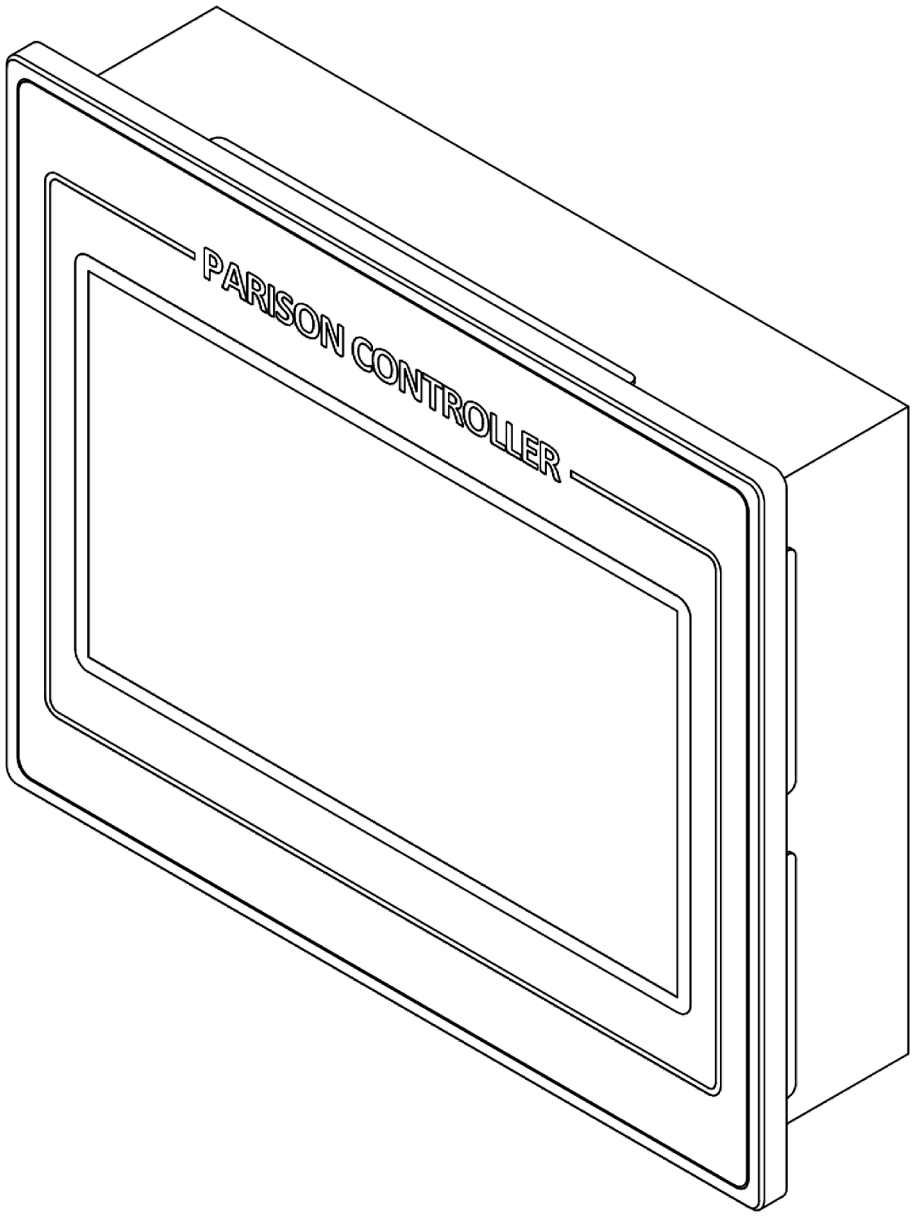
FUFENG Automation
100 Point Parison Controller



FUFENG Automation Co.,LTD

V1.0d

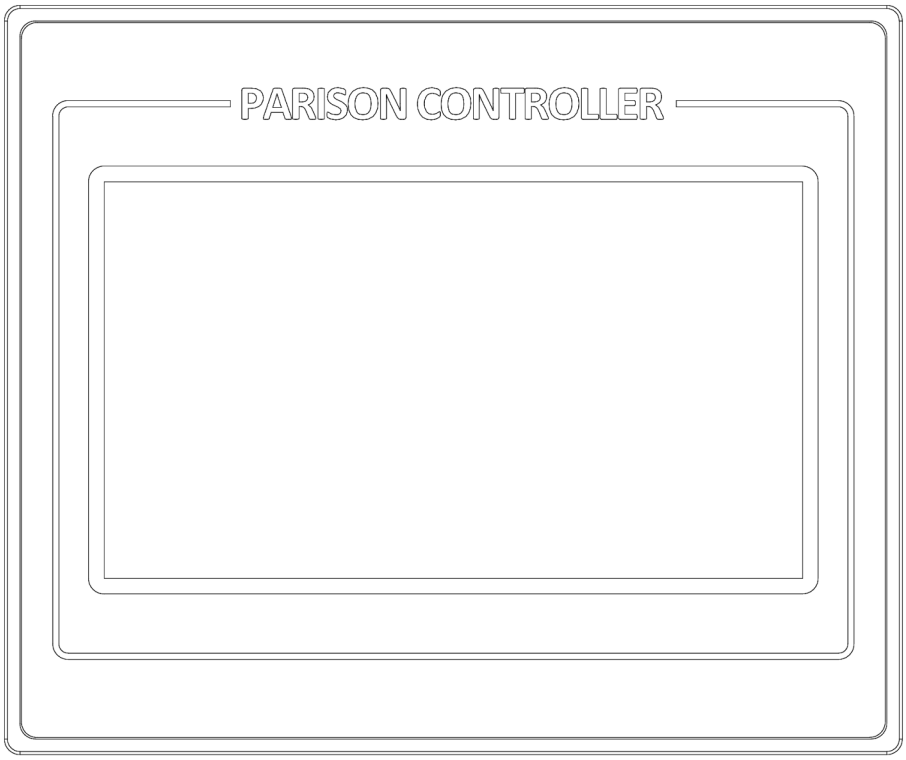
Introduction

This controller is a 100-point parison controller, which is used to control the material extrusion thickness of the blow molding machine. It controls the thickness of the extruded material by moving the position of the control core. It can be used to control accumulator or continuous mode machines. The controller is a full-touch operator interface that provides a simple and intuitive operating experience.

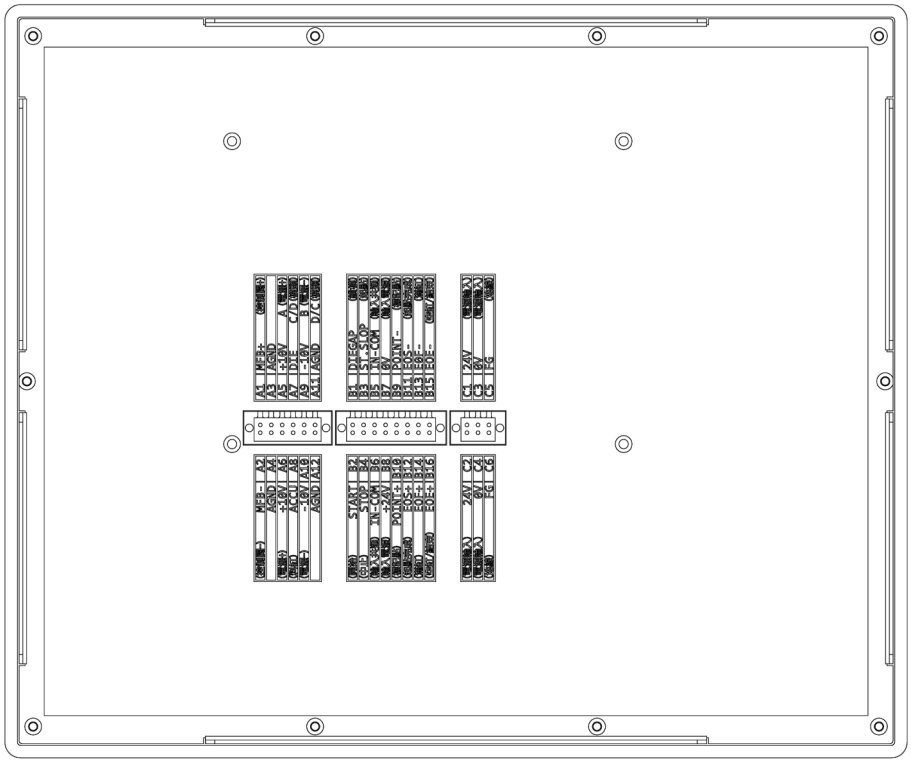
Specification

Model	:	ML-PC100A
Function	:	Control material thickness of blow molding machine.
Parison profiles	:	100 points, linear or smooth interpolation optional.
Core type	:	Divergent, Convergent.
Control mode	:	Closed loop control mode.
Core feedback	:	DCDT, DC±10V.
Accumulator feedback	:	Linear potentiometer, DC±10V.
Operation	:	Full screen touch operation.
Display	:	TFT LCD, multiple languages.
Storage	:	200 sets of parison profiles.
Marker output	:	Pulse signal output.
Feeding amount	:	5% ~ 100%, interval 0.1%
Feeding cycle	:	0.1 ~ 200 sec., interval 0.1 sec. fixed or auto feeding.
Other functions	:	Delay, Cushion, Die Gap, weight adjustment, range max adjustment, range min adjustment.
Valve current	:	±100mA(MFB)
I/O signal	:	Opto-isolated input, 24V DC (4mA/Ch.) Opto-isolated output, 24V DC (150mA/Ch.)
Power supply	:	24V DC 2A

Front view



Rear view



Wiring description

Analog I/O Terminals

Wiring description	Name	No.
MFB Servo valve (D / A)	MFB-	A2
MFB Servo valve (Shield)	AGND	A4
ACC Potentiometer (+)	+10V	A6
ACC Potentiometer (Pot)	ACCU	A8
ACC Potentiometer (-)	-10V	A10
ACC Potentiometer (Shield)	AGND	A12

No.	Name	Wiring description
A1	MFB+	MFB Servo valve (A / D)
A3	AGND	MFB Servo valve (Shield)
A5	+10V	Core DCDT (P+) A
A7	DIE	Core DCDT (S+) C/D
A9	-10V	Core DCDT (P-) B
A11	AGND	Core DCDT (S-) D/C

Digital I/O Terminals

Wiring description	Name	No.
Cycle Start - input	START	B2
Stop operation - input	STOP	B4
Input Common (NPN/PNP)	IN-COM	B6
Power output (24VDC)	+24V	B8
Point mark output (+)	POINT+	B10
End of ST.SLOP output (+)	EOS+	B12
End of Filling output (+)	EOF+	B14
End of Extrusion output (+)	EOE+	B16

No.	Name	Wiring description
B1	DIEGAP	Die gap - input
B3	ST.SLOP	Move to 1st point - input
B5	IN-COM	Input Common (NPN/PNP)
B7	0V	Power output (0V DC)
B9	POINT-	Point mark output (-)
B11	EOS-	End of ST.SLOP output (-)
B13	EOF-	End of Filling output (-)
B15	EOE-	End of Extrusion output (-)

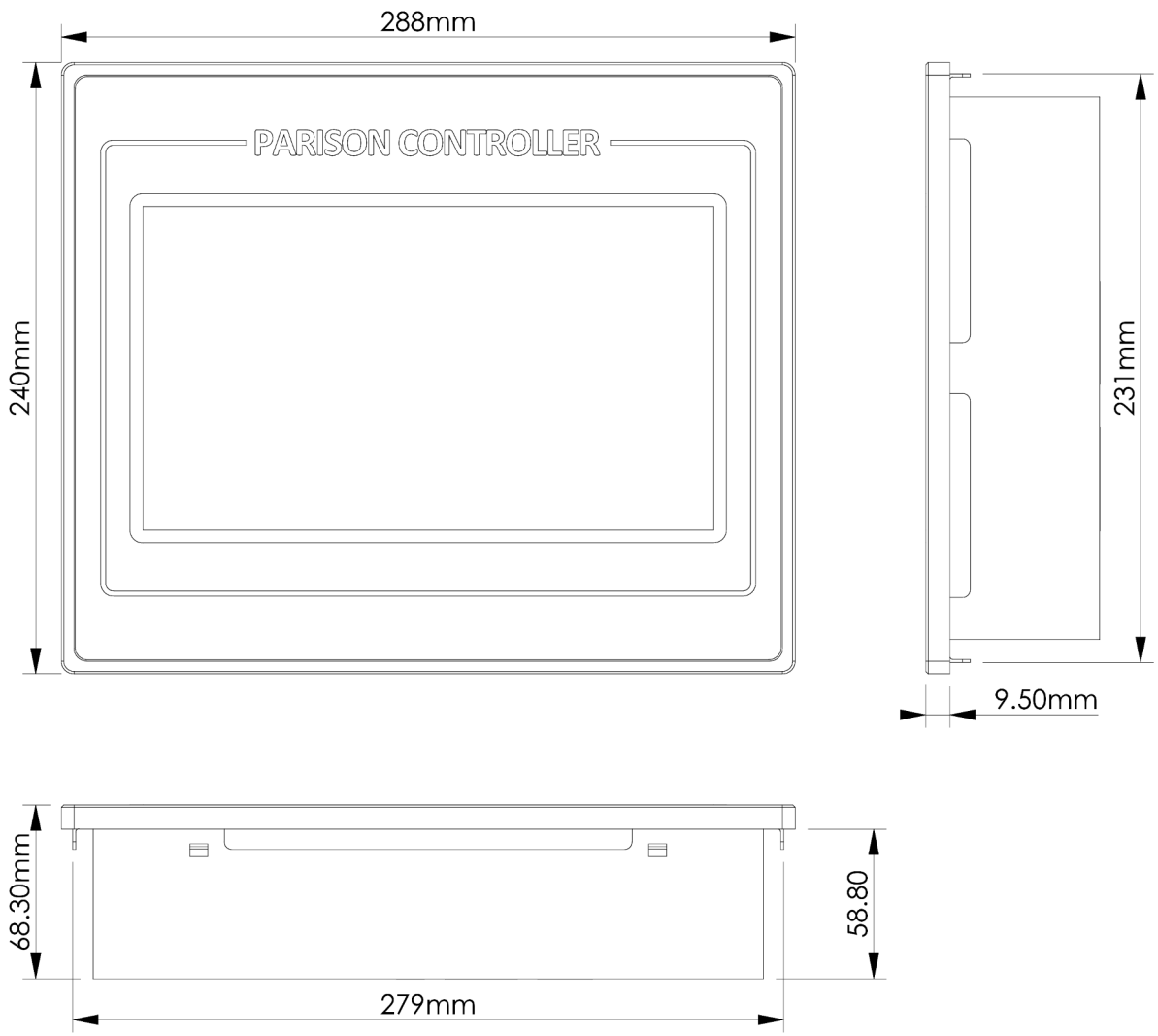
Power supply terminals

Wiring description	Name	No.
24V Power input	24V	C2
0V Power input	0V	C4
Power Ground	FG	C6

No.	Name	Wiring description
C1	24V	24V Power input
C3	0V	0V Power input
C5	FG	Power Ground

MFB
Servo Valve
Die Gap Sensor
DCDT
ACC
Position Sensor
A1 MFB+
A2 MFB-
A4 AGND
A3 AGND
A5 +10V
A7 DIE
A9 -10V
A11 AGND
A6 +10V
A8 ACCU
A10 -10V
A12 AGND
D/A
A/D
B1 DIEGAP
B2 START
B3 ST.SLOP
B4 STOP
B5 IN-COM
B6 IN-COM
B7 0V
B8 +24V
B9 POINT-
B10 POINT+
B11 EOS-
B12 EOS+
B13 EOF-
B14 EOF+
B15 EOE-
B16 EOE+
Sink (NPN) Type
Source (PNP) Type
DI
DO
C1 24V
C2 24V
C3 0V
C4 0V
C5 FG
C6 FG
24VDC
Power Supply

Installation

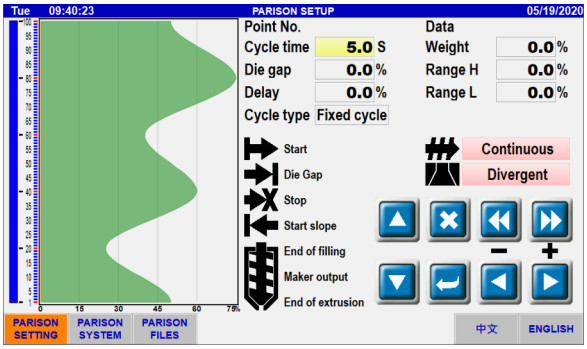


Panel size : 288mm X 240mm

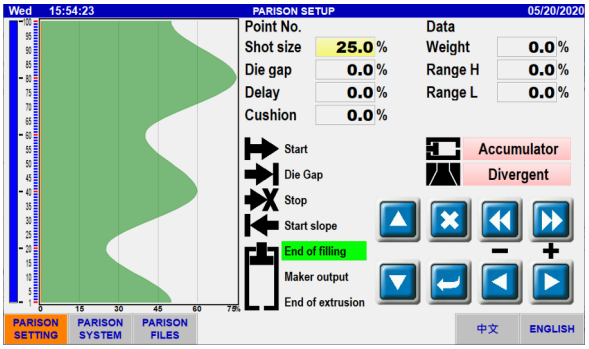
Cut out size : 280mm X 232mm

Functions description

PARISON SETUP - Continuous



PARISON SETUP - Accumulator



PARISON SETUP :

1. / : Move the cursor **[up]** / **[down]**.

   Click to select parameters or parison profile setpoints.
   Click the button to execute once, press for 1 second to execute continuously.

2. : **[Cancel]** or **[delete]** setting value.

   Click to cancel the operation or delete the parison profile setpoint.

3. / : **[set]** the value.

   : No value changed,
   : There are values to be set.

4. / : **[Decrease]** the value.

   Click to decrease the value, Decrease by 10, Decrease by 1.
   Click the button to execute once, press for 1 second to execute continuously.

5. / : **[Increase]** the value.

   Click to increase the value, Increase by 10, Increase by 1.
   Click the button to execute once, press for 1 second to execute continuously.

6. **Cycle time** **5.0** **S** : Cycle time setting. (Only in continuous mode)

The cycle time is the extrusion time from point 1 to point 100.
Click the ▲ ▼ button or touch the value area to move the cursor there,
and the ◀◀ ◀ ▶▶ ▶ button increase or decrease the value, click ↵ to set.
Unit: Sec., Setting range: 0.1 ~ 200.0 Sec., Setting interval: 0.1 Sec.

7. **Shot size** **25.0** **%** : Shot size setting. (Only in accumulator mode)

The Shot size is the volume of accumulator extrusion from point 1 to point 100,
The accumulator piston extrudes from full to empty is 100%.
Click the ▲ ▼ button or touch the value area to move the cursor there,
and the ◀◀ ◀ ▶▶ ▶ button increase or decrease the value, click ↵ to set.
Unit: %, Setting range: 5.0 ~ 100.0 %, Setting interval: 0.1 %
Extrusion volume = **Shot size** X (**Accum full** – **Accum empty**)

8. **Die gap** **0.0** **%** : Die gap setting.

When the DIEGAP signal is on, the control core moves to the setting position.
Click the ▲ ▼ button or touch the value area to move the cursor there,
and the ◀◀ ◀ ▶▶ ▶ button increase or decrease the value, click ↵ to set.
Unit: %, Setting range: 0.0 ~ 100.0%, Setting interval: 0.1%

9. **Delay** **0.0** **%** : Delay setting.

Click the ▲ ▼ button or touch the value area to move the cursor there,
and the ◀◀ ◀ ▶▶ ▶ button increase or decrease the value, click ↵ to set.

Continuous mode:

When the START signal is on, the control core moves to the point 1 of the parison profile, and starts to run the profile after a delay of the setting time.
Unit: %, Setting range: 0.0 ~ 100.0%, Setting interval: 0.1%
Delay time = **Delay** X **Cycle time**

Accumulator mode:

When the START signal is on, the control core moves to the point 1 of the parison profile, and starts to run the profile after extruding the volume of material setting by the delay setting.
Unit: %, Setting range: 0.0 ~ 100.0%, Setting interval: 0.1%
Delay volume = **Delay** X **Shot size** X (**Accum full** – **Accum empty**)

10. **Weight** **0.0** % : Weight adjustment.

Increase or decrease all points of the parison profile to increase or decrease the overall weight of the product.
The parison profile will be limited between 0 and 100%.
Click the ▲ ▼ button or touch the value area to move the cursor there,
and the ◀◀ ◀ ▶▶ ▶ button increase or decrease the value, click ↵ to set.
Unit: %, Setting range: -100.0 ~ 100.0%, Setting interval: 0.1%
Adjusted weight = original weight X (100% + **Weight**)

11. **Range H** **0.0** % : Higher range adjustment.

The parison profile (maximum value - minimum value) is regarded as 100%, the minimum value remains unchanged, and the other points are increased or decreased according to the setting value ratio.
The parison profile will be limited between 0 and 100%.
Click the ▲ ▼ button or touch the value area to move the cursor there,
and the ◀◀ ◀ ▶▶ ▶ button increase or decrease the value, click ↵ to set.
Unit: %, Setting range: -100.0 ~ 100.0%, Setting interval: 0.1%
Adjusted value = min value + (original value - min value) X (100% + Range H)

12. **Range L** **0.0** % : Lower range adjustment.

The parison profile (maximum value - minimum value) is regarded as 100%, the maximum value remains unchanged, and the other points are increased or decreased according to the setting value ratio.
The parison profile will be limited between 0 and 100%.
Click the ▲ ▼ button or touch the value area to move the cursor there,
and the ◀◀ ◀ ▶▶ ▶ button increase or decrease the value, click ↵ to set.
Unit: %, Setting range: -100.0 ~ 100.0%, Setting interval: 0.1%
Adjusted value = max value - (max value - original value) X (100% - Range L)

13. **Cushion** **0.0** % : Cushion setting. (Only in accumulator mode)

Cushion is set to the volume of material left in the accumulator piston after the extrusion runs.
Click the ▲ ▼ button or touch the value area to move the cursor there,
and the ◀◀ ◀ ▶▶ ▶ button increase or decrease the value, click ↵ to set.
Unit: %, Setting range: 0.0 ~ 100.0%, Setting interval: 0.1%
Cushion volume = **Cushion** X **Shot size** X (**Accum full** – **Accum empty**)

14. **Cycle type** **Fixed cycle** / **Auto cycle** : Cycle type. (Only in continuous mode)

Press **Fixed cycle** / **Auto cycle** button for 2 seconds to switch the mode.

Fixed cycle :

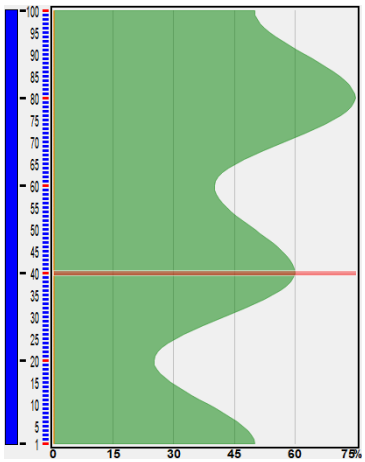
The extrusion running time is fixed according to the cycle time setting.

Auto cycle :

The cycle time is the time difference between the START signals, The time will be re-counted when the START signal is on, and automatically change the cycle time setting to this value.

15. **Point Mark** **Off** / **On** : Point Mark output enable.

This setting is only displayed when the cursor is in the parison profile area.
Move the cursor to the parison profile point to set or cancel the mark,
Press **Off** / **On** button for 2 seconds to switch the mark.
When the cycle is running, the stroke passes through the marked point, and the POINT+/- outputs are turned on for 50ms.

16. 

Blue vertical bar : Extrusion stroke indicator.

Black mark : Point mark output enabled.

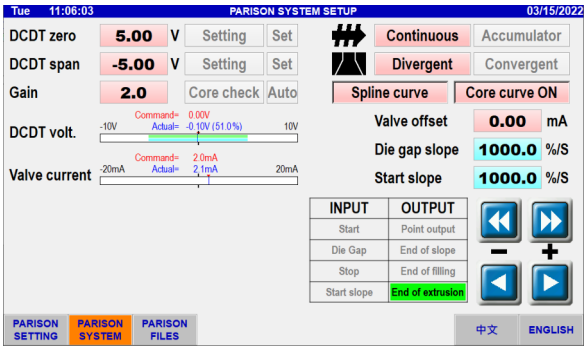
Black numbers : Parison profile point numbers.

Red mark : Set point for the parison profile.

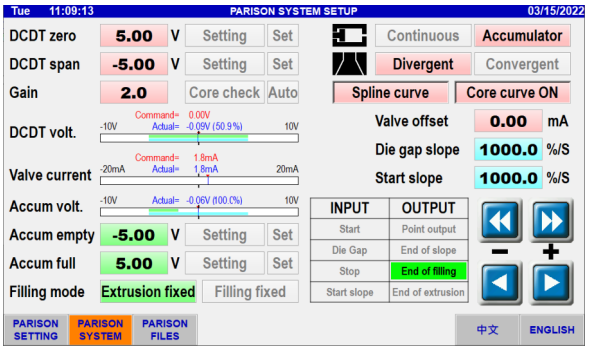
Blue mark : Interpolate points.

Green area : The parison profile.
Click the ▲ ▼ button or touch it to move the cursor there, and the ◀◀ ◀ ▶▶ ▶ button increase or decrease the value, click ↵ to set.

PARISON SYSTEM - Continuous



PARISON SYSTEM - Accumulator



PARISON SYSTEM :

1. **DCDT zero** **5.00** **V** : DCDT zero setting. (Invalid during cycle running)

Press Setting / **Setting** button for 2 seconds to switch the state.
In **Setting** state, press ⏪ ◀ ⏩ ▶ button to move the control core to the minimum die gap position, click Set to set. or touch the value area to set the value via the numeric keys.
Unit: V, Setting range: -10.00 ~ 10.00V, Setting interval: 0.01V

2. **DCDT span** **-5.00** **V** : DCDT span setting. (Invalid during cycle running)

Press Setting / **Setting** button for 2 seconds to switch the state.
In **Setting** state, press ⏪ ◀ ⏩ ▶ button to move the control core to the maximum die gap position, click Set to set. or touch touch the value area to set the value via the numeric keys.
Unit: V, Setting range: -10.00 ~ 10.00V, Setting interval: 0.01V

3. **Gain** **2.0** : Control core feedback gain setting.

Touch the value area to set the value via the numeric keys.
The gain is the sensitivity of the control core to follow the shape of the parison profile, The higher the setting value, the closer the control core is to the shape of the parison profile. If the set value is too high, the control core will oscillate, shake or become unstable. If the setting value is too low, the control core will not be able to follow the change of the parison profile. Please set it according to the situation, usually between 5.0 and 10.0.
Setting range: 0.1 ~ 20.0, Setting interval: 0.1
Valve current = (DCDT command voltage - DCDT actual voltage) X **Gain**

4. Core check Auto : Core check / Auto-ranging. (Invalid during cycle running)

Press Core check / Core check button for 2 seconds to switch the state.
In Core check state, press ⏪ ◀ ⏩ ▶ button to move the control core.
Check that the control core operates stably in all ranges, if there is vibration, jitter or instability, lower the gain value, if the control core lags, increase the gain value slightly and recheck.

Auto-ranging :

In Core check state, press Auto button for 2 seconds to start auto-ranging.
In Auto state, The control core automatically jogging to the minimum die gap to find the zero position, and setting the DCDT zero value, then jogging to the maximum die gap to find the span position, and setting the DCDT span value. Next, the control core jogging to 50% of the die gap, and then the auto-ranging is completed. The screen is locked while auto-ranging is in progress, do not do anything until it is complete.
When auto-ranging is complete, the result Success / Fail will be displayed in the center of the screen. Click it to close.
When the result shows Fail , Please go back to Core check to confirm that the control core can operate correctly, And confirm that the DCDT does not exceed the detection range, and perform the auto-ranging again.

5. Continuous Accumulator : Continuous / Accumulator mode setting.

Press Continuous button for 2 seconds to switch to Continuous mode.
Press Accumulator button for 2 seconds to switch to Accumulator mode.
This mode will be enabled after the START signal is on.
Do not switch it while cycle is running.

6. Divergent Convergent : Divergent / Convergent mode setting.

Press Divergent button for 2 seconds to switch to Divergent mode.
Press Convergent button for 2 seconds to switch to Convergent mode.
This mode will be enabled after the START signal is on.
Do not switch it while cycle is running.

7. Linear curve / Spline curve : Linear / Spline interpolation setting.

Press Linear curve / Spline curve button for 2 seconds to switch the setting.
Linear curve : The parison profile is linear interpolated.
Spline curve : The parison profile is spline interpolated.

8. Core curve OFF / **Core curve ON** : Curve of control core follows the profile.

Press Core curve OFF / **Core curve ON** button for 2 seconds to switch the setting.
Core curve OFF : The core curve is hidden.
Core curve ON : The core curve is displayed.

9. **Valve offset** **0.00** **mA** : Servo valve offset correction.

In **Core check** state, touch the value area to set the value via the numeric keys. This value is set to the current offset of the servo valve to correct the position offset of the control core. Usually set to 0.00, or enter the actual value of the valve current.
Unit: mA, Setting range: -10.00 ~ 10.00 mA, Setting interval: 0.01 mA

10. **Die gap slope** **1000.0** **%/S** : Die Gap Slope.

Touch the value area to set the value via the numeric keys.
The Die gap slope is the speed at which the control core moves from the current position to the Die gap setting position when the DIEGAP signal is on.
Unit: %/S, Setting range: 0.1 ~ 1000.0 %/S, Setting interval: 0.1 %/S
Moving time = | (Core position - **Die gap**) | / **Die gap slope**

11. **Start slope** **1000.0** **%/S** : Start slope.

Touch the value area to set the value via the numeric keys.
The Start slope is the speed at which the control core moves from the current position to the point 1 setting position when the ST.SLOP signal is on.
Unit: %/S, Setting range: 0.1 ~ 1000.0 %/S, Setting interval: 0.1 %/S
Moving time = | (Core position – **Point 1** position) | / **Start slope**

12. **Accum empty** **-5.00** **V** : Accumulator empty. (Invalid during cycle running)

Press Setting / **Setting** button for 2 seconds to switch the state.
In **Setting** state, extrude the accumulator to empty. click Set to set. or touch the value area to set the value via the numeric keys.
Unit: V, Setting range: -10.00 ~ 10.00V, Setting interval: 0.01V

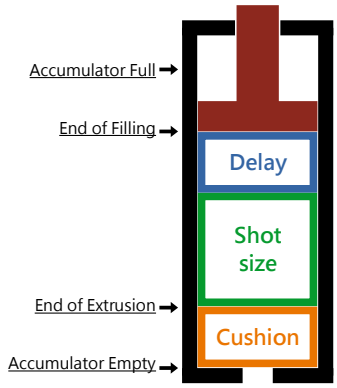
13. Accum full **5.00** V : Accumulator full. (Invalid during cycle running)

Press Setting / **Setting** button for 2 seconds to switch the state.
In **Setting** state, fill up the accumulator. click Set to set. or touch the value area to set the value via the numeric keys.
Unit: V, Setting range: -10.00 ~ 10.00V, Setting interval: 0.01V

14. Filling mode **Extrusion fixed** Filling fixed : Filling mode.

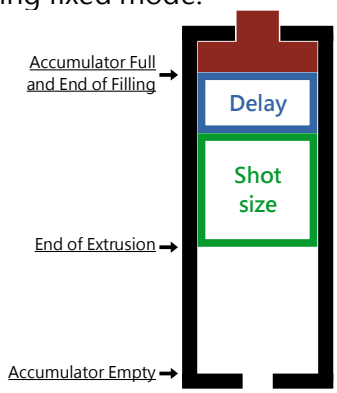
Press Extrusion fixed button for 2 seconds to switch to **Extrusion fixed** mode.
Press Filling fixed button for 2 seconds to switch to **Filling fixed** mode.

Extrusion fixed mode:



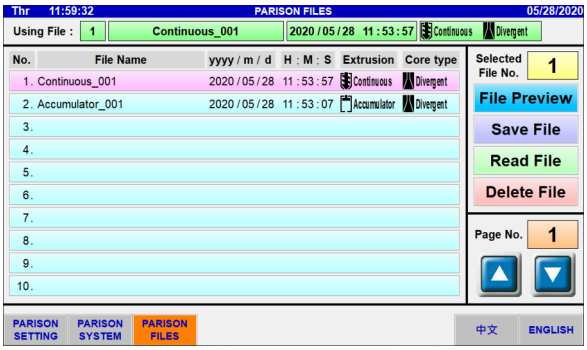
The extrusion starts position determined by the sum of Cushion, Shot size and Delay.
The End of Extrusion is the Cushion position.
The End of filling position is the Shot size stroke plus Delay stroke plus the Cushion stroke.

Filling fixed mode:

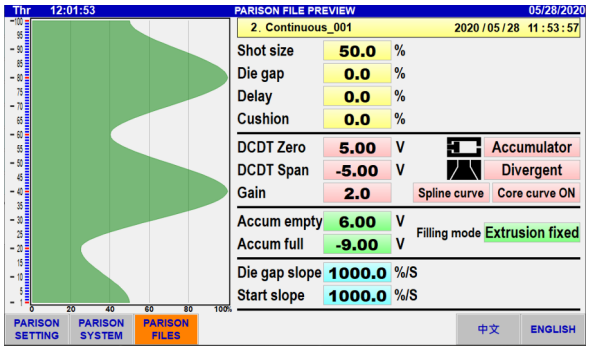


The extrusion starts at the Accumulator full position (End of Filling).
The length of stroke is determined by the sum of Shot size plus Delay.
The End of filling position is the Accumulator full position.

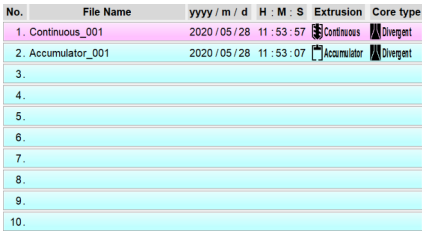
PARISON FILES



PARISON FILE PREVIEW



PARISON FILES :

1. 

File list :
Click the file list bar on the screen to select the file.
The selected file list bar will be displayed in light red, the rest in light blue.
If the file list bar is blank, it is an empty file.

2. / : Page **[up]** / **[down]**.

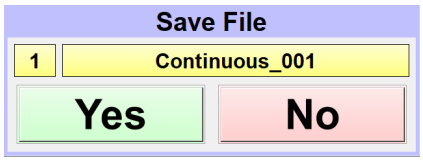
The controller can store 200 files, divided into 20 pages for display, and each page displays 10 file lists.
Click the button to execute once, press for 1 second to execute continuously.

3. **File Preview** : File Preview.

Click **File Preview** button, The screen will switch to the preview page of the selected file in the file list. If the file selected in the file list is an empty file, this function is invalid. Click the PARISON FILE button below to return to the file list page.

4. **Save File** : Save File.

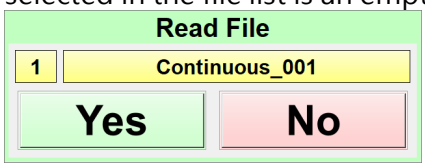
Click **Save File** button, The screen will display the Save File dialog box.



Click on the yellow text area to enter or change the file name,
Click the "Yes" button to saving the file,
Click the "No" button to cancel.

5. Read File : Read File.

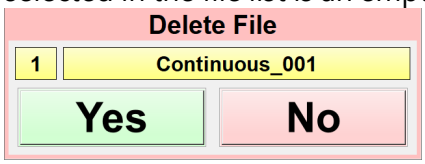
Click Read File button, The screen will display the Read File dialog box. If the file selected in the file list is an empty file, this function is invalid.



Click the "Yes" button to read the file,
Click the "No" button to cancel.
Note: Please operate this function when the machine is stopped.

6. Delete File : Delete File.

Click Delete File button, The screen will display the Delete File dialog box. If the file selected in the file list is an empty file, this function is invalid.



Click the "Yes" button to delete the file,
Click the "No" button to cancel.
Note: Deleted files will not be able to recover, please be careful.