TSR2000 Series

3 Axis Dispensing Robot

Teaching Pendant User Guide

Version 1.2

CONTENTS

1.	Introduction	3
2.	Keys Functions of the Keypad	4
3.	Classification of a Point	5
4.	Rapid Instruction of Teaching Pendant	5
5.	Examples of Typical Dispensing Patterns	6
6.	Programming	7-36
6.1	Operation – running a saved program	8
6.1.1	Home Adjust – Calibrating Program Position to the Dispense Tip	9
6.2	Programming by Jog Keys or Inputting Co-ordinates	10
6.3	How to Create a new Program	11-12
6.4	How to Delete a Program	13
6.5	How to Delete a Point in a Program	13
6.6	How to Delete Multiple Points in a Program	13
6.7	How to Edit a Program	14
6.8	How to Create a Single Point (Dot)	15
6.9	How to Create a Single Line (Bead)	16
6.10	How to Create an Elevated Line (Bead)	17
6.11	How to Create an Arc	18
6.12	How to Create a Circle (3-Point Method)	19
6.13	How to Create a Circle (Inputting Dimensions)	20
6.14	How to Create a Polyline (Multiple Joined Lines)	21
6.15	How to Create Parallel Lines Connected By Arcs	22
6.16	How to Create an Array Pattern	23-29
6.16.1	Array Pattern Directional Setting	24
6.16.2	Array Pattern Starting Position (can only be set in “Mode: Teach”)	25
6.16.3	Creating Array Pattern Outside of the Program	26
6.16.4	Creating Array Pattern Inside the Points List – Single Point Element	27
6.16.5	Creating Array Pattern Inside the Points List – Pattern Element	28
6.16.6	Creating Array Pattern Inside the Points List – 2 Point or 2 Pattern Element Method	29
6.17	How to Move Around or Over a Tall Object	30-31
6.18	Operating up to 4 Dispensing Valves	32
6.19	Definition of Additional Programming Features	33
6.20	Line Dispensing Adjustments	34-36
6.20.1	Valve Feed On Delay – Lines	34
6.20.2	Valve Feed On Delay – Dots	35
6.20.3	Line On/Off Distance	36
7.	Program Processing Menu	37-339
7.1	Speed Parameters	37
7.2	Teach Parameters	37
7.3	Distance Parameters	38
7.4	Park Location	38
7.5	#Set as Default	38
7.6	Insert Screen	39
8.	Set Menu	39-40
8.1	How to Set a Program to Run in a Loop	40
9.	File Transfer	41
9.1	How to Transfer Program to USB Stick	44
9.2	How to Transfer Program from USB Stick	41
10.	Troubleshooting	42

1. INTRODUCTION

Congratulations on the purchase of a Techcon Systems Automated Dispensing Robot. If you have not done so, see the installation guide provided with your system for installation instructions.

Now that your dispensing system is ready to use, take a few moments to get to know the parts of your dispensing system and software. This manual is designed to help you use the robot as quickly as possible.

We, here at Techcon Systems, hope you find this product beneficial. If you have any questions, please contact us at the details listed below:

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This manual is designed to provide information about Techcon Systems robot hardware. Every effort has been made to make this manual as complete and accurate as possible. There is no implied or expressed warranty as to the purpose, suitability or fitness of the information. The information is provided on an as-is basis. Techcon Systems reserves the right to improve and revise its products. This manual specifies and describes the product as it existed at the time of publication. As with any new programming software, a basic understanding of the vocabulary is necessary.

2. KEY FUNCTIONS OF THE KEYPAD

Button	Name	Description
F1, F2, F3, F4	Function Buttons	F1 – create new file, insert drawing, start/pause a process. F2 – Edit file or stop a process or group offset. F3 – Data check and file copy. F4 – Array, parameter setting and change file name.
X, Y, Z, R	Navigation Buttons	Control jog movements of X, Y, Z and R axis
0 – 9, A – Z	Alphanumeric Buttons	To create file names and set parameters.
.	Decimal Point Button	To input decimal point.
SHF	Switch Button	Change jog speed (low, med, high), or change parameters
+/-	Front Insert Button	To insert a new point or figure at the front of a selected point.
#	Group Button	Used in group edit and parameter settings.
GO	Go Button	When displayed, press to move valve to position.
ORG	Reset Button	Return to zero position (0, 0, 0, 0)
CLR	Delete Button	Delete a file or part of a file.
ESC	Escape Button	Cancel an operation and/or exit from current interface.
ENT	Enter Button	Download or process the current file, or save an edited file, etc.

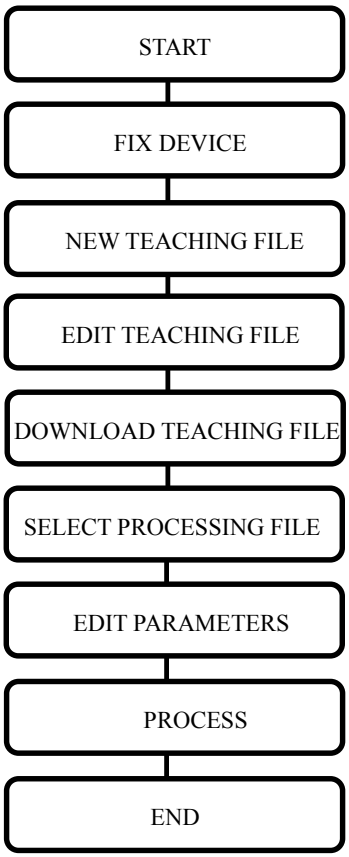
3. CLASSIFICATION OF A POINT

The programming has many types of point. Graphic points include point, line origin, etc. Non-graphic points include delay point, clean point, etc and can refer to the following table. When inserting a "point" the operator must select to insert the point at the front or back of the selected point.

No.	Point	Type	Instruction
1	Point	Graphic	The speed between points is the "jog move speed". Can set the lift height and delay time.
2	Line	Graphic	Includes Line start, Line middle and Line end points
3	Delay (Time)	Non-Graphic	Delay point is used to set delay time in the range of 0 – 65532ms.
4	Mark	Graphic	Mark point is a moving assistant point and is only used to move to another position and is also valid during simulated step.
5	Pause	Non-Graphic	When setting a pause point the robot will pause automatically until a start signal is sent.
6	Clean	Non-Graphic	Set the clean point location and parameters.
7	Subroutine	Non-Graphic	Subroutine is a teaching file and can be inserted into another teaching file but cannot be edited again.
8	Output	Non-Graphic	For setting an input/output by inserting an output point.
9	Origin	Graphic	Reference point. Also a basic pint when group skewing.

In the teaching pendant, the teaching file exists as points. A line is a special graphic point and has at least two points: Line-Start and Line-End. In this way it is made of segment lines. When processed it is a continual line.

4. RAPID INSTRUCTION OF TEACHING PENDANT



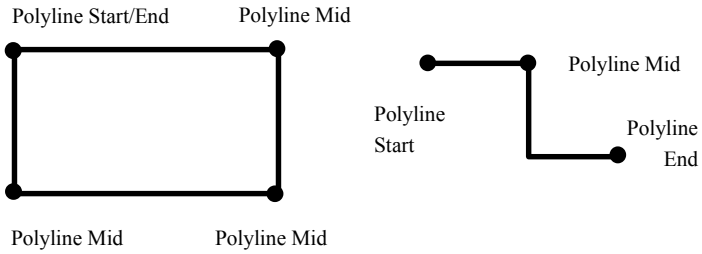
5. EXAMPLES OF TYPICAL DISPENSING PATTERNS

Dot

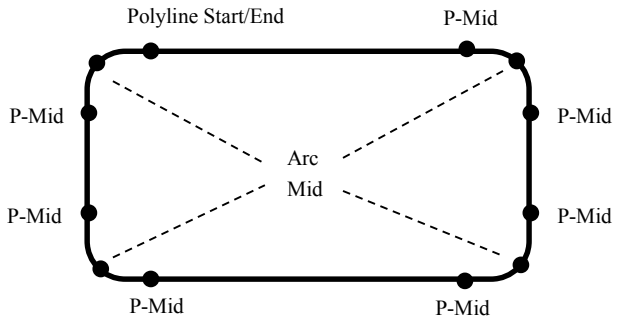
Increasing feed on time

Line

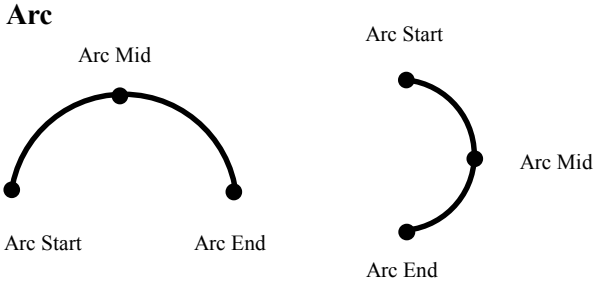
Polyline



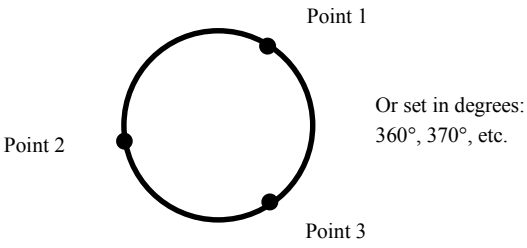
Polyline with round edges



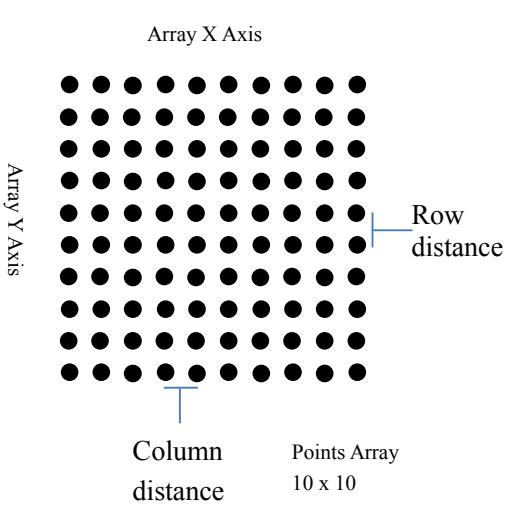
Arc

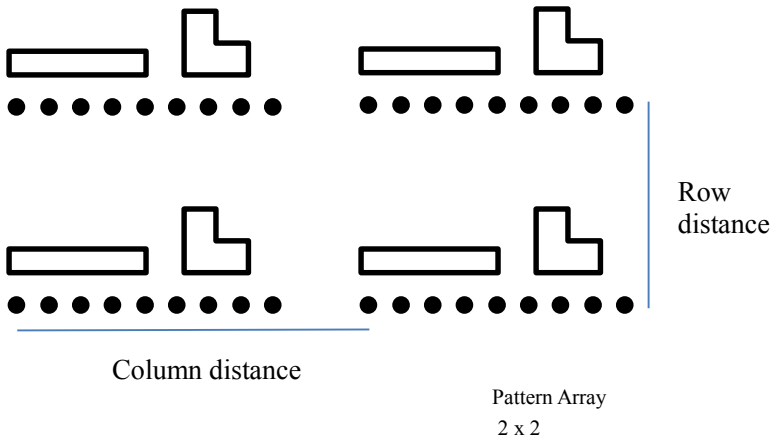


Circle



Array





6. PROGRAMMING

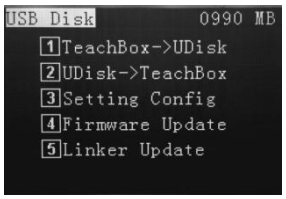
After connecting the teaching pendant to the robot, turn on the power switch. The system will initialize and move to the origin (0, 0, 0) location. For a brief moment the LCD screen will display:

System Name: XXX
System Version: XXX
System Updates Date: XXX
System initializing Rate of Process: XXX

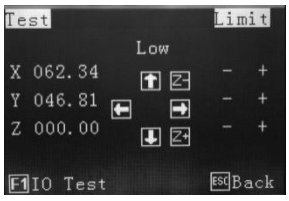
After initializing the main user interface is displayed:

1 – Operation – Select the saved program, apply home adjust, process file and delete file.

2 – Program – Select teaching file, edit parameters, copy, delete, download.

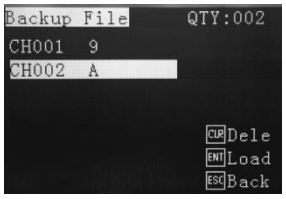


3 – USB Disk Edit – Download/Upload program to USB, process update.



4 – Test – For testing areas of the robot such as axis jogging and I/O ports.

5 – System Info – Device type, teach version, firmware version



6 – Backup – Load teaching file in robot to teaching pendant, or delete the teaching file in the robot.

6.1 Operation – Running a saved program

Press 1

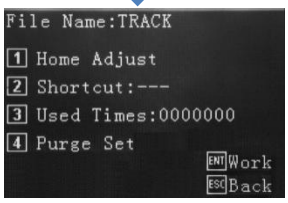
Select program to be used and press ENT

or

Select program to be deleted and press CLR then ENT

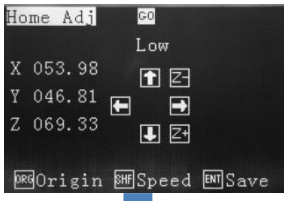
If selecting dispense cycle to load, press ENT twice.

This will go to the final step.

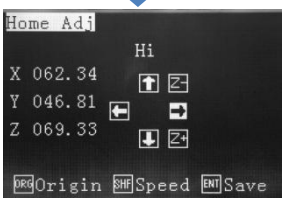


By pressing ENT once:
1 – Calibrate tip position
2 – Create shortcut
3 – Reset counter
4 – Set Purge Position

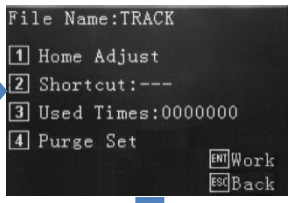
Note: Home Adjust is the process in which to adjust/offset the co-ordinates completely in cases such that: the dispensing tip has been changed or the dispensing valve has been removed and refitted. Due to very small differences from product to product or if the valve has been removed and put on at a slightly different position, the operator can calibrate the program to the new position. The entire program will offset to where the operator has set it to.



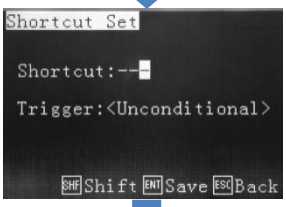
Press GO and then use alphanumeric keys to move to the correct location.



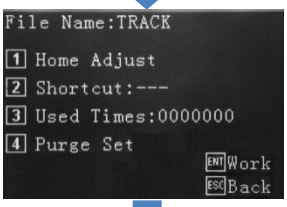
Press ENT



(Optional) Press 2



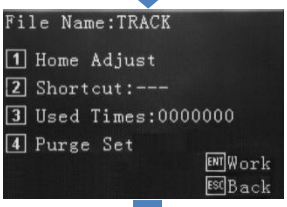
Change current state and press ENT



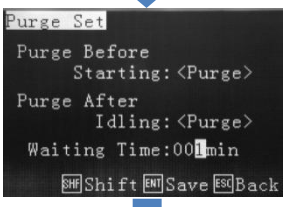
(Optional) Press 3

Change counter,

press ENT

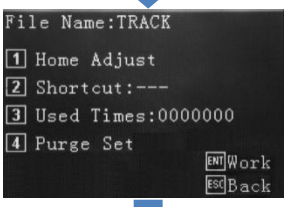


(Optional) Press 4

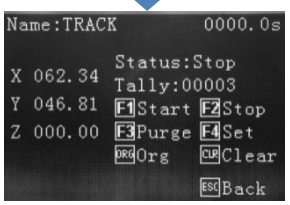


Using the # button, select if Purge is required at start or end of program, or not at all.

Press ENT



Press ENT



Press F1

This starts the dispensing cycle.

6.1.1 Home Adjust – Calibrating Program Position to the Dispense Tip

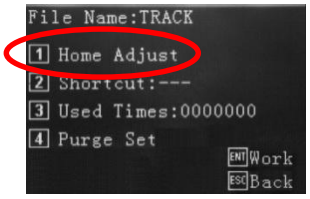
The Home Adjust is for position calibration, of the program, when a tip is changed or the valve is removed, for maintenance. It is normal for the tip to be slightly out of the original position, example 0.5mm, in these cases. By creating a physical calibration point, on the device or fixture, or by using the first dispensing location as the reference point, the program can be adjusted to suit the new tip position.

Other example: The program has been run with a 25.4mm length dispense tip. The customer then decides to use a 12.7mm length tip instead. This means the tip will now be too high for dispensing, at all co-ordinates. With the shorter tip attached and by using the Home Adjust function the program can be re-set, by lowing the tip position to the physical calibration point, on the device or fixture. This will automatically lower all dispensing positions, within the program.

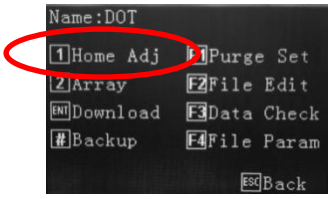
Note: The Home Adjust function does not change any other stored program positions, in the systems memory, except the one that is being altered.

Home Adjust can be found in the following screens:

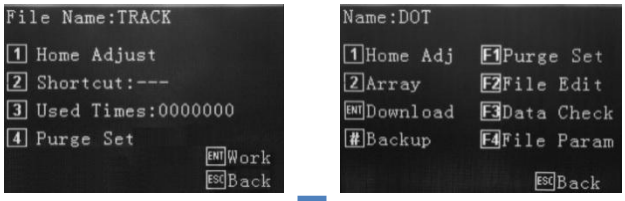
If this function is performed in the Editing screen the program will need to be Downloaded after the Home Adjust.



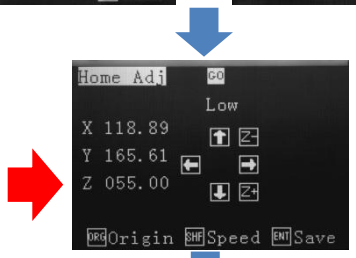
In Operation Menu



In Edit Screen

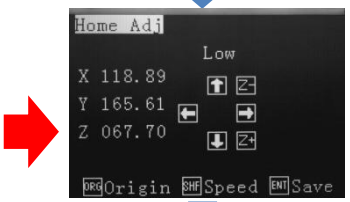


Select the Home Adjust from either Operation Menu or Edit screen.



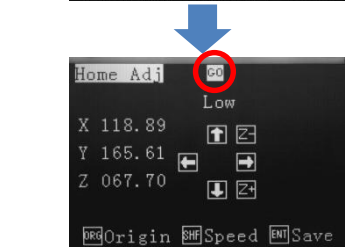
Press GO

The dispense tip will move to the stored Home Adjust position.
Note the position of "Z".



Use either the jog keys (arrows) or enter the co-ordinates of the axis that need changing. This example lowers the Z axis by 12.7mm.

If jog keys are used, press ENT to store.



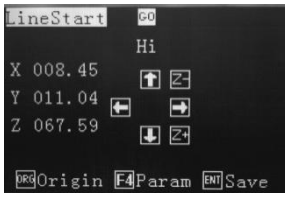
If co-ordinates have been entered, press "GO". This moves the head to the new position for verification.

Continue to change or press ENT to store.

6.2 Programming by Jog keys or Inputting Co-ordinates

The TSR2000 Series robot is designed to be programmed by either imputing co-ordinates (advanced user) or by using the jog keys (entry level user).

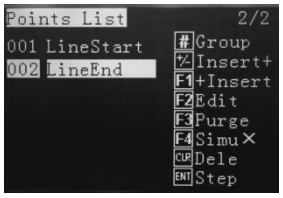
Inputting Co-ordinates – Advanced User (example of Line)



After selecting the type of dispensing (dot, line, arc…) input the X co-ordinate, using the number keys. Use the arrow keys to move down and input the Y and Z co-ordinates. When all 3 co-ordinates have been entered, press GO

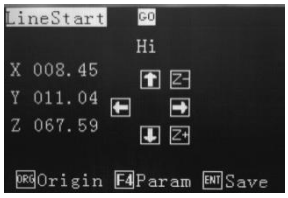
The dispensing valve will move to this location. Press ENT to save the position.

Repeat above process for the Line End.



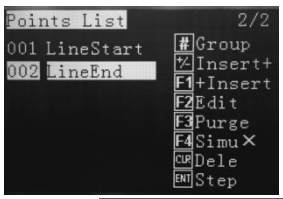
Once repeated, the Points List will show where more patterns can be inserted.

Inputting Co-ordinates – Entry Level User (example of Line)



After selecting the type of dispensing (dot, line, arc…) use the jog keys to move to the Line Start position. Press ENT to save the position.

Repeat above process for the Line End.



Once repeated, the Points List will show, where more patterns can be inserted.

Note: All pattern creation, over the following pages, are illustrated by the entry level method

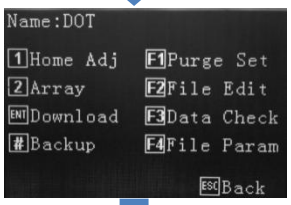
6.3 How to Create a New Program

Press 2

Press F1

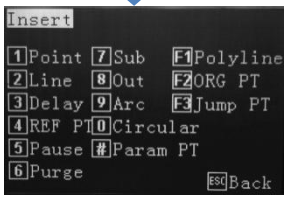
Enter a program name. Use the alphanumeric keypad and press ENT

Press F2



Press F2

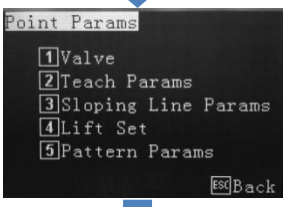
Press F1



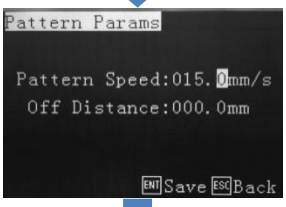
From the Insert screen, select one of the options. (for this Line example, select option 2)

Change the move speed with the SHF key.

When line start location is reached press F4

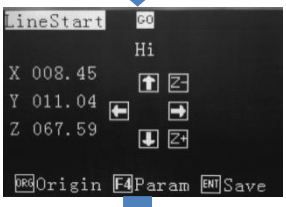


Press 5



Use alphanumeric keys to change dispense speed. (Pattern Speed).

Press ENT twice

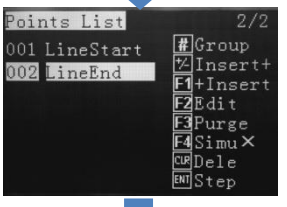


If "GO" is flashing at the top of screen, press

GO then press ENT

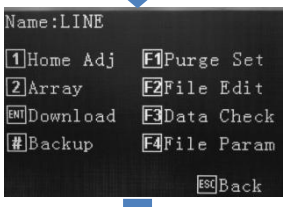
Use alphanumeric keys to move the line end location.

Press ENT



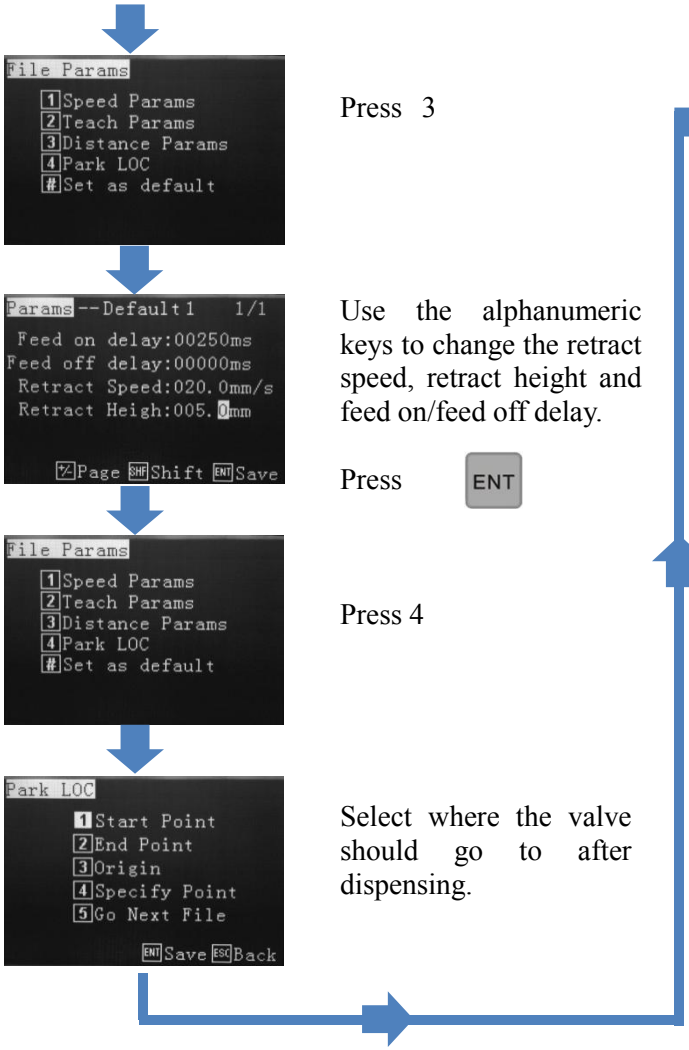
Press ESC twice.

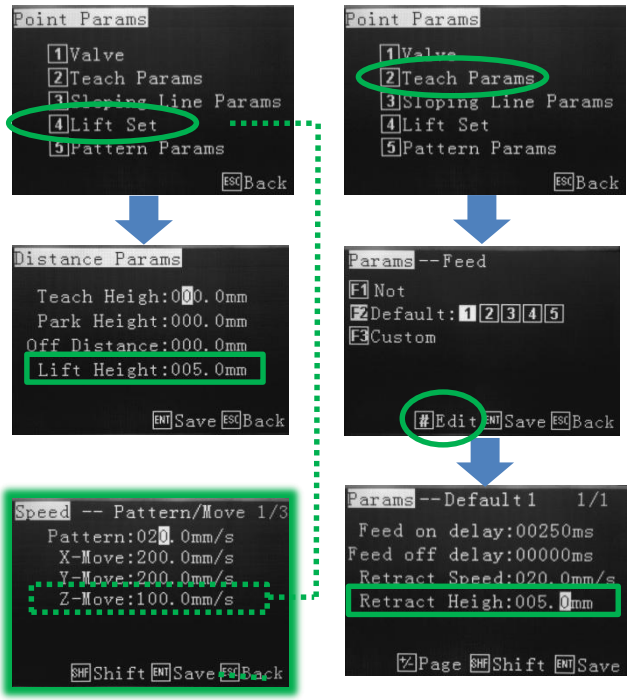
This will go to the file processing menu



Press F4

This enables changes to the file parameters.





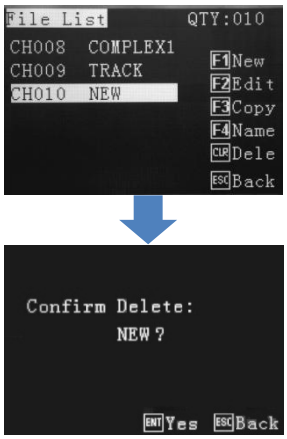
Understanding Lift Height and Retract Height

Lift Height - is found in the Point Parameters Menu under the the **Lift Set** option. After the dispensing cycle, the Z-axis will move up to the Lift Height at the normal moving (non-dispensing) speed of the machine. If required, a different Lift Height can be applied to any or all of the dispensing patterns, however, if the speed is set to slow this would also mean that when the robot is required to go to Origin (0, 0 ,0), the z-axis will take a long to time to home.

Retract Height - can be found within the Teach Parameters Menu. Retract Heights are applied to the Feed Slots used to created patterns. If a dot is created using Feed Slot 1 and a 2nd dot is created using the same feed slot, the same parameters will be applied to dot 2 including Retract Height. A **Retract Speed** can be applied to Retract Heights.

If Retract Height is greater than Lift Height, Retract Height Overides. If Lift Height is greater than Retract Height, Retract parameters will operate first (height and speed) then the Lift parameters will complete the up movement. If Retract and Lift Height are the same the Retract Height and Speed override the Lift Height and Speed.

6.4 How to Delete a Program



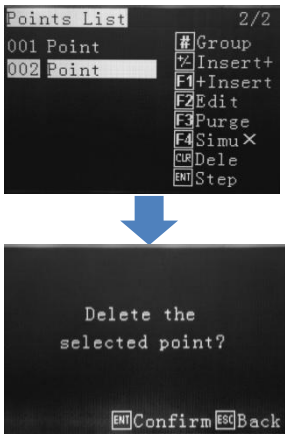
In the File List menu, select the program to delete.

Press CLR

Press ENT

This confirms deletion.

6.5 How to Delete a Point in a Program



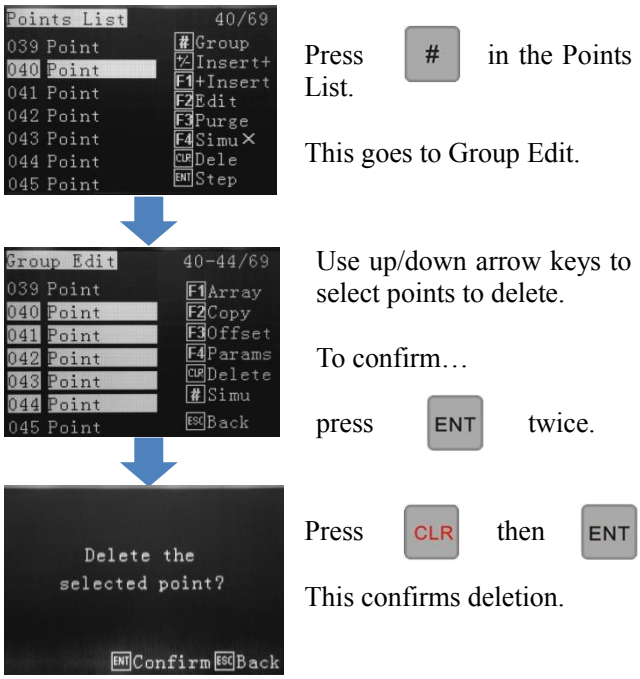
In the "Points List", within a Program, select a point in the Program to delete.

Press CLR

Press ENT

This confirms deletion.

6.6 How to Delete Multiple Points in a Program



Press # in the Points List.

This goes to Group Edit.

Use up/down arrow keys to select points to delete.

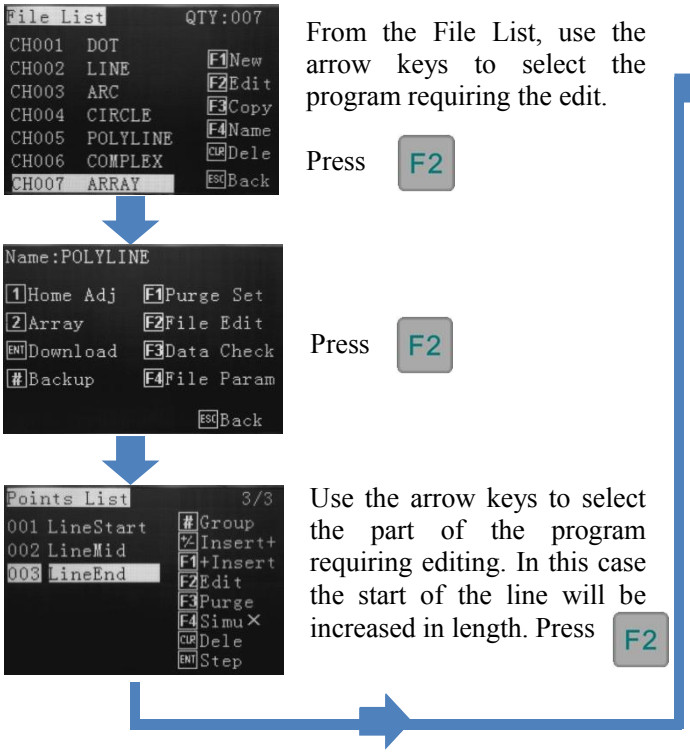
To confirm…

press ENT twice.

Press CLR then ENT

This confirms deletion.

6.7 How to Edit a Program



From the File List, use the arrow keys to select the program requiring the edit.

Press F2

Press F2

Use the arrow keys to select the part of the program requiring editing. In this case the start of the line will be increased in length. Press F2

Press "GO". The robot will move to the original start position. Use either jog keys or input the new dimensions.

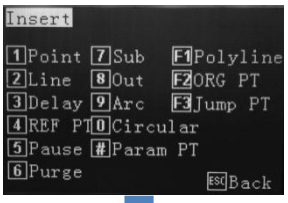
Press GO then ENT

Continue editing, when complete …

press ESC twice.

To save, press ENT

6.8 How to Create a Single Point (Dot)

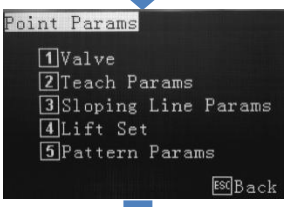


Reference Section 6.3
From the Insert screen, select option 1.

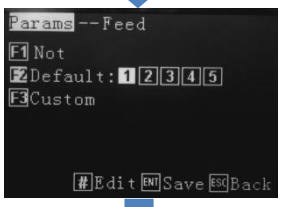
Change the move speed with the SHF key.

Press ENT at the dot location

Press F4

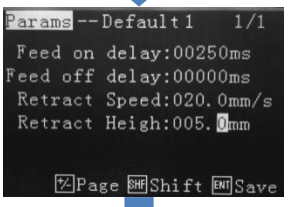


Press 2 – Teach Params

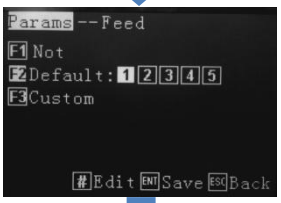


Ensure F2 is highlighted.

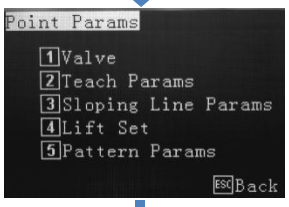
Press #



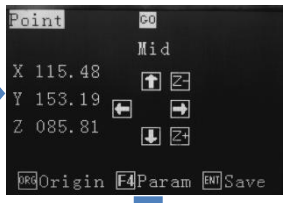
Set Feed on delay (dispensing time)
Set retract height and speed.
Press ENT



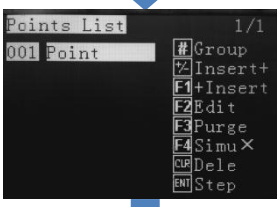
Press ENT



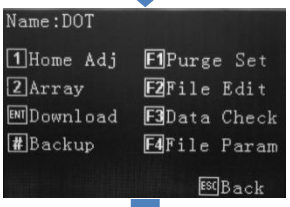
Press ENT



Press ENT

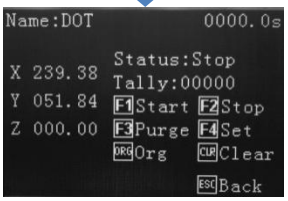


Press ESC twice



Continue to edit or…

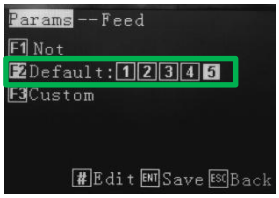
to save, press ENT



Press F1

This starts the dispensing cycle.

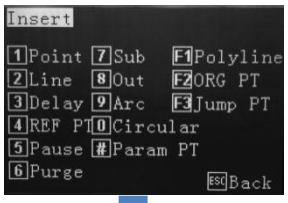
The above procedure will apply the same dispensing time (Feed On Delay) to all dots within the program. To create a different sized dot in the same program…



At the Feed screen, select any of the available feed slots (1 - 5).

The feed time can be changed by pressing #

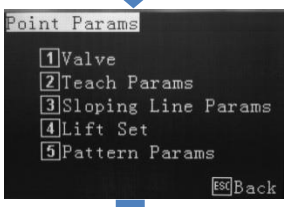
6.9 How to Create a Single Line (Bead)



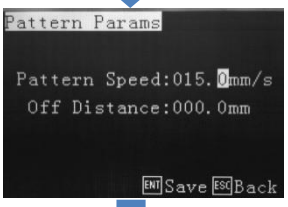
Reference Section 6.3 and 6.20. From the Insert screen, select option 2.

Change the move speed with the SHF key.

When line start location is reached press F4



Press 5.

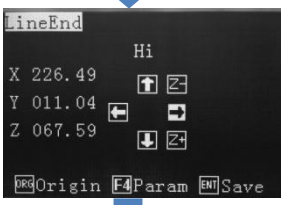


Use alphanumeric keys to change the dispense speed (pattern speed).

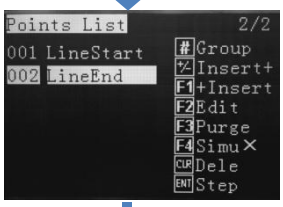
Press ENT twice.

If "GO" is flashing, at the top of the screen press

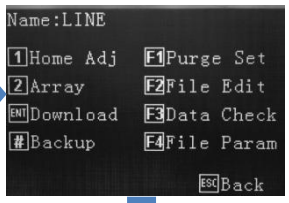
GO then press ENT



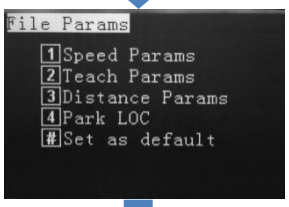
Use alphanumeric keys to move the line end location and press ENT



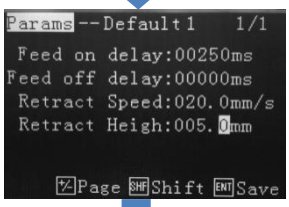
Press ESC twice



Press F4

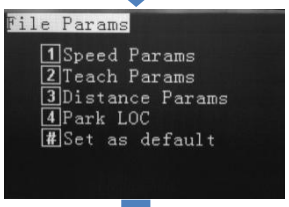


Press 2

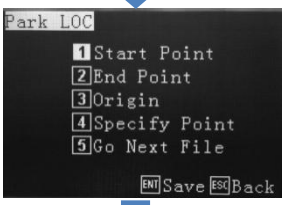


Use the alphanumeric keys to change the retract speed, retract height and feed on/feed off delay.

Press ENT



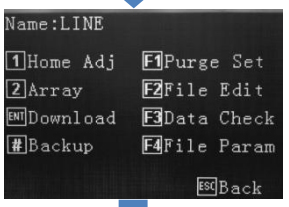
Press 4



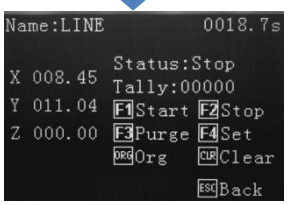
Select where the valve should go to after dispensing.

(Optional) Use the alphanumeric keys to select a park location.

ENT ENT then ESC



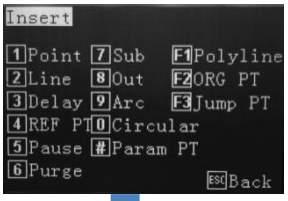
To save, press ENT



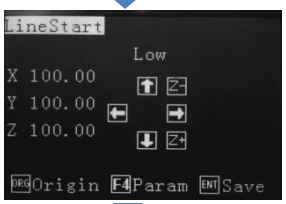
Press F1

This starts the dispensing cycle.

6.10 How to Create an Elevated Line (Bead)

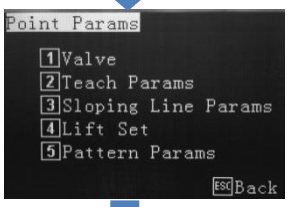


Reference Section 6.3 and 6.20 From the Insert screen, select option 2.

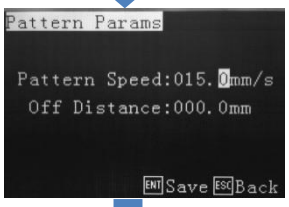


Change the move speed with the SHF key

When line start location is reached press F4

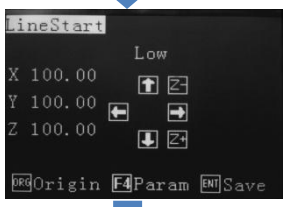


Press 5.

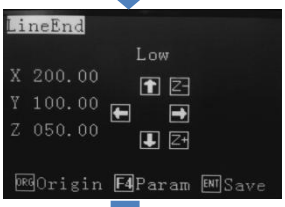


Use alphanumeric keys to change the dispense speed (pattern speed).

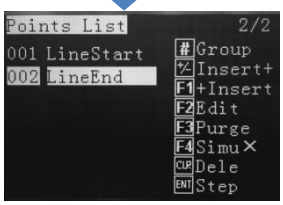
Press ENT twice.



If "GO" is flashing, at the top of the screen press GO then press ENT

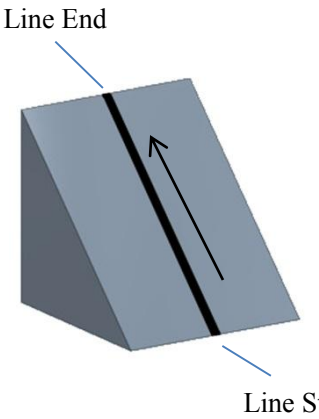


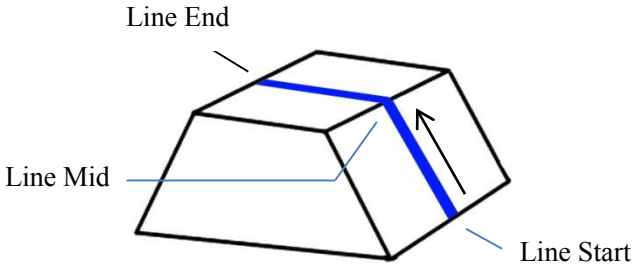
Use alphanumeric keys to move the line end location and press ENT



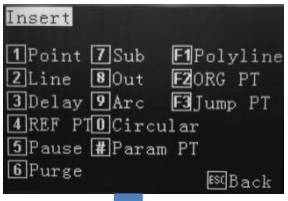
Press ESC twice

The program can now be downloaded or edited further.

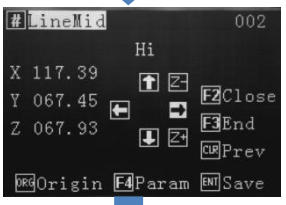




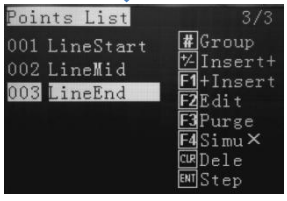
How to Create a Multiple Point Elevated Line



Reference Section 6.3 and 6.20
From the Insert screen, select option F1



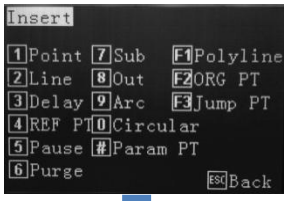
Follow the instructions in Section **6.14** for creating a Polyline.



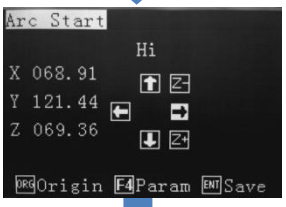
Press ESC twice

The program can now be downloaded or edited further.

6.11 How to Create an Arc

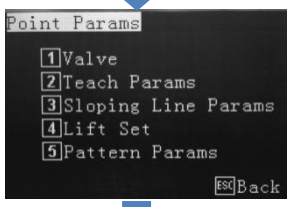


Reference Section 6.3 and 6.20. From the Insert screen, select option 9.

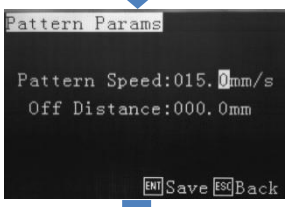


Change the move speed with the SHF key.

When arc start location is reached press F4



Press 5.

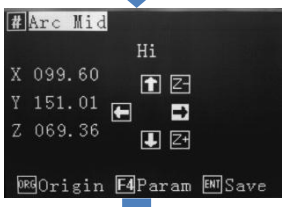


Use alphanumeric keys to change dispense speed (pattern speed).

Press ENT twice.

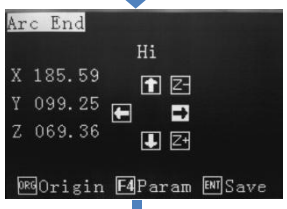
If "GO" is flashing at the top of the screen press

GO then press ENT



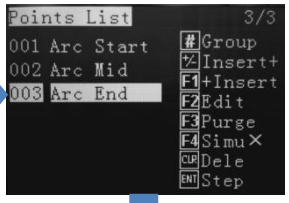
Use jog keys to move to Arc mid-point location.

Press ENT

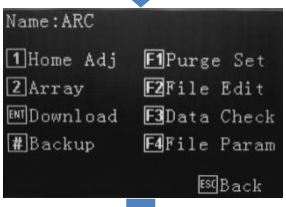


Use jog keys to move to Arc end-point location.

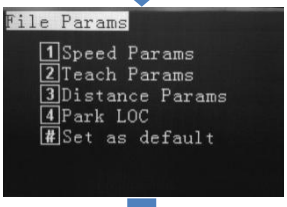
Press ENT



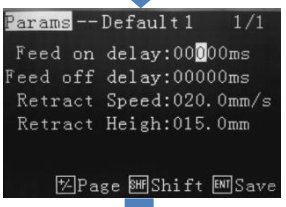
Press ESC twice.



Press F4

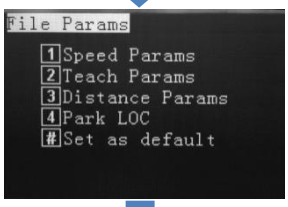


Press 2

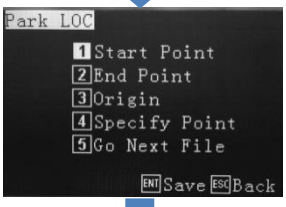


Use the alphanumeric keys to change the retract speed, retract height and feed on/feed off delay.

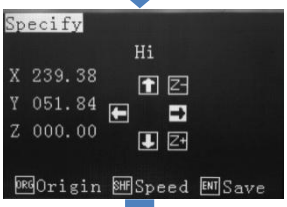
Press ENT



Press 4

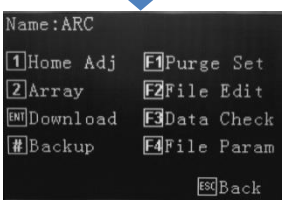


Select where the valve should go to after dispensing.



(Optional) Use the alphanumeric keys to select a park location.

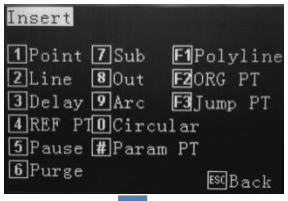
ENT ENT then ESC



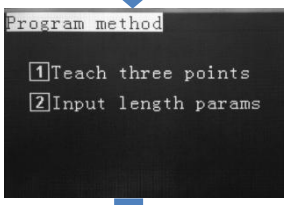
To save, press ENT

F1 Starts the dispensing cycle

6.12 How to Create a Circle (3-Point Method)



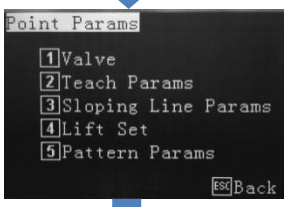
Reference Section 6.3
From the Insert screen, select option 0.



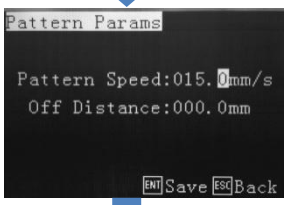
Select option 1.

Change the move speed with the SHF key.

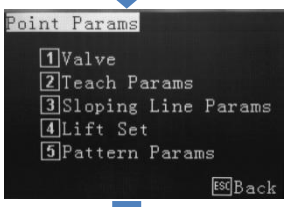
When circle start location is reached press F4



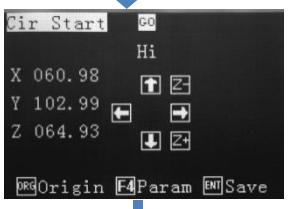
Press 5.



Use alphanumeric keys to change dispense speed. (Pattern Speed).

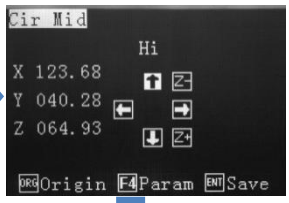


Press ENT twice.



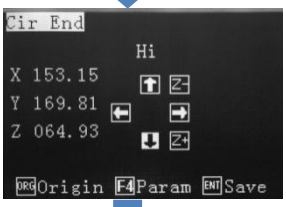
If "GO" is flashing at the top of the screen press

GO then press ENT



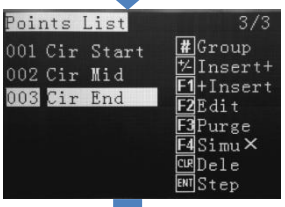
Use jog keys to move to circle mid point location.

Press ENT

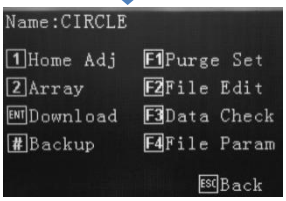


Use jog keys to move to circle mid point location.

Press ENT

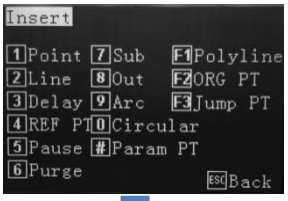


Press ESC twice.

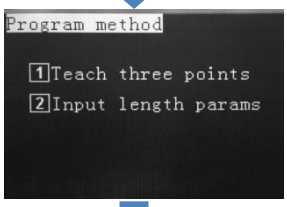


Follow instructions, on next page, by ●

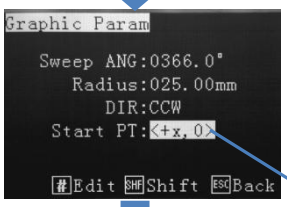
6.13 How to Create a Circle (Inputting Dimensions)



Reference Section 6.3
From the Insert screen,
Select option 0.

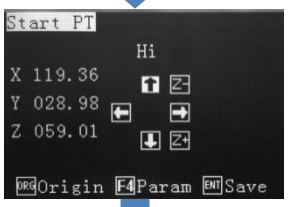


Select option 2.



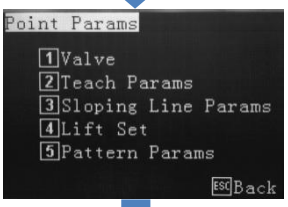
Use arrows to input data
Choose direction with
Choose start Point with
With SHF then press #

Refer to 6.19

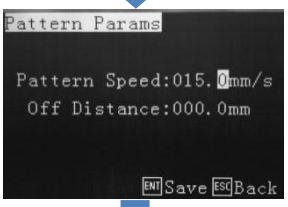


Use jog keys to move to circle start point location.

Press F4

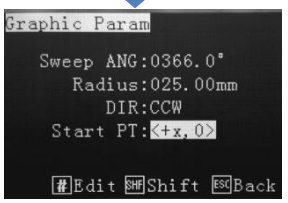


Press 5.

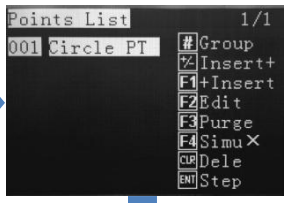


Use alphanumeric keys to change dispense speed. (Pattern Speed).

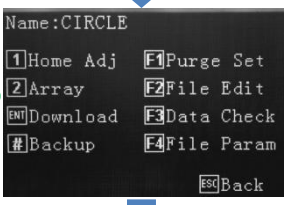
Press ENT



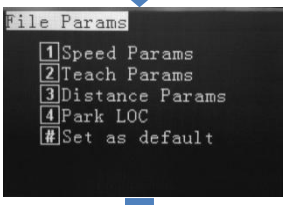
Press ENT



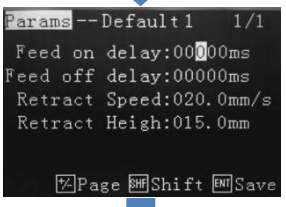
Press ESC twice



Press F4

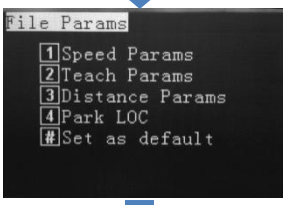


Press 2

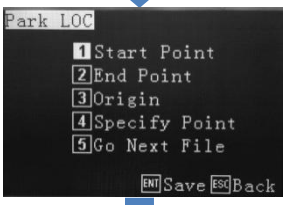


Use the alphanumeric keys to change the retract speed, retract height and feed on/feed off delay.

Press ENT



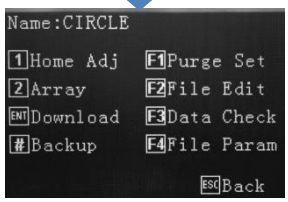
Press 4



Select where the valve should go to after dispensing.

(Optional) Use the alphanumeric keys to select a park location.

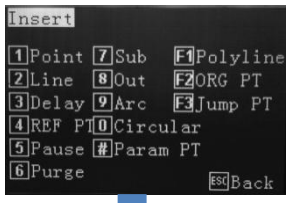
ENT ENT then ESC



To save, press ENT

F1 Starts the dispensing cycle

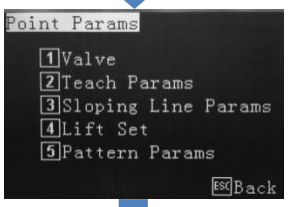
6.14 How to Create a Polyline (Multiple Joined Lines)



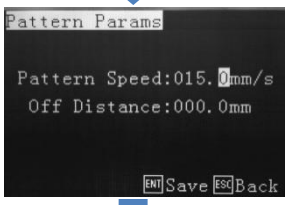
Reference Section 6.3 and 6.20. From the Insert screen, Select option F1

Change the move speed with the SHF key

When line start location is reached, press F4



Press 5



Use alphanumeric keys to change the dispense speed (Pattern Speed).

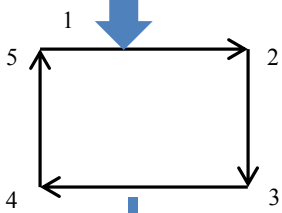
Press ENT twice.

If "GO" is flashing, at the top of the screen

GO then press ENT

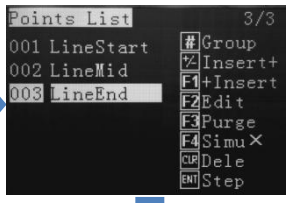
Use jog keys to move to next position.

Press ENT

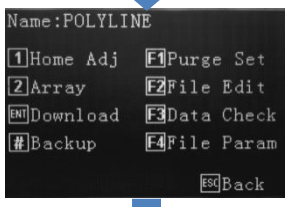


Continue moving to each location and press ENT

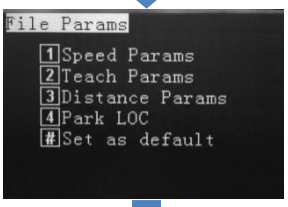
Press F3 at the final location to end the pattern.



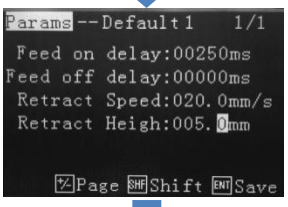
Press ESC twice.



Press F4

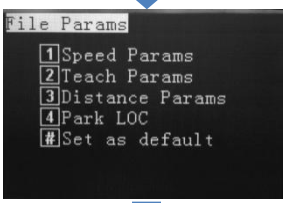


Press 2

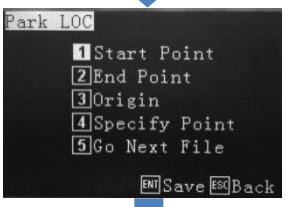


Use the alphanumeric keys to change the retract speed, retract height and feed on/feed off delay.

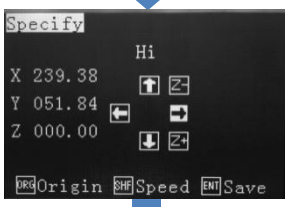
Press ENT



Press 4

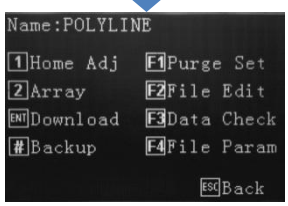


Select where the valve should go to after dispensing.



(Optional) Use the alphanumeric keys to select a park location.

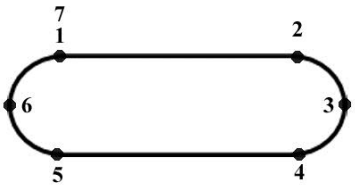
ENT ENT then ESC



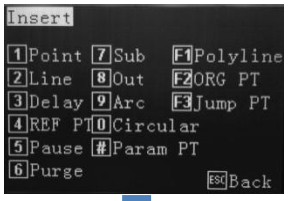
To save, press ENT

F1 Starts the dispensing cycle

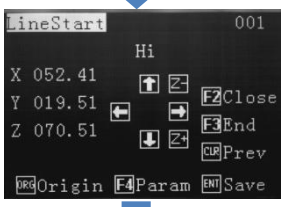
6.15 How to Create Parallel Lines Connected by Arcs



1 Line Start
2 Line Mid
3 Arc Mid
4 Line Mid
5 Line Mid
6 Arc Mid
7 End

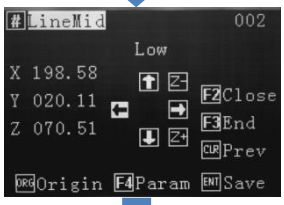


Reference Section 6.3 and 6.20 From the Insert screen, Select option F1



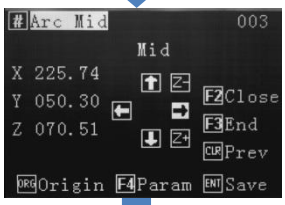
Change the move speed with the SHF key.

When line start location is reached (1), press ENT

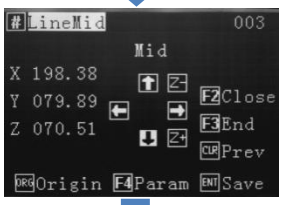


When line mid location is reached (2), press ENT

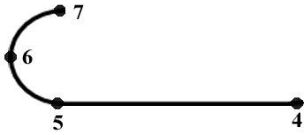
Press #



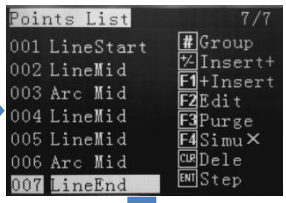
When arc mid location is reached (3), press ENT



When line mid location is reached (4), press ENT

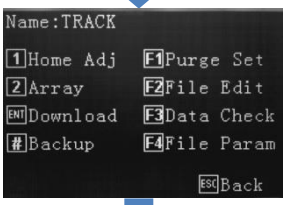


Repeat above process for Lines/Arc points 4 – 7. When at final position is Reached, press F3

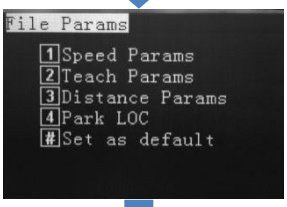


Lines are arcs are listed in the Points List.

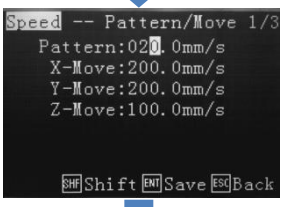
Press ESC twice



Press F4

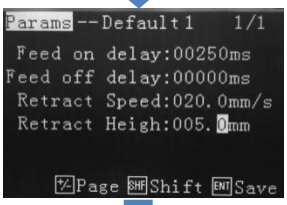


Press 1



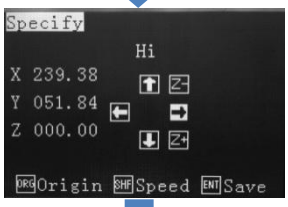
Input pattern speed…

press ENT

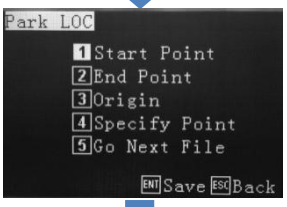


Press 2 and use the alphanumeric keys to change the retract speed, retract height and feed on/feed off delay.

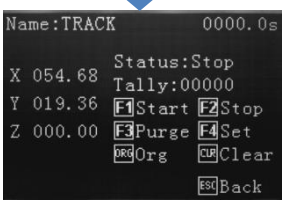
Press ENT



(Optional) Press 4 and use the alphanumeric keys to select a park location. ENT ENT then ESC



Press ENT then ESC

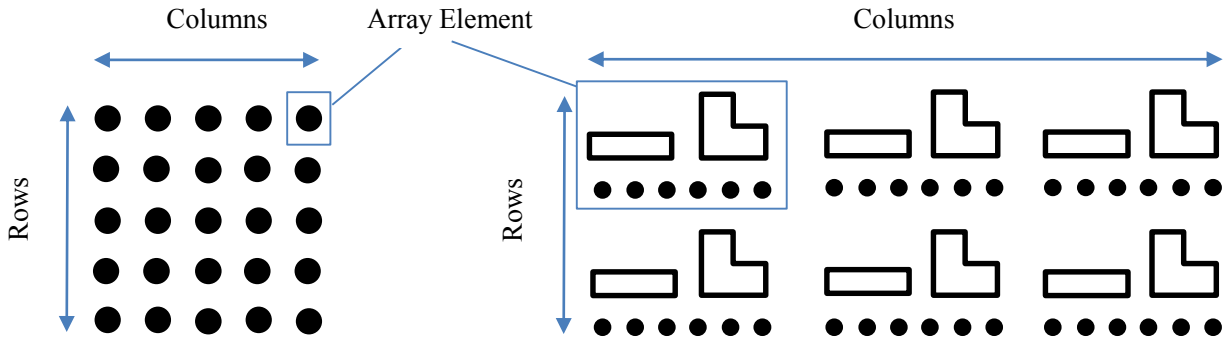


Press F1

This starts the dispensing cycle.

6.16 How to Create an Array Pattern

An Array Pattern is a series of dispensing parameters in a programmed number of rows and columns. The array can either be made up of rows and columns of dots, or rows and columns of multi-point patterns. Only 1 dot, or 1 pattern, is needed to be created and by using the Array function capability, the teaching pendant will plot the co-ordinates of each "array element".



Example of 25 (5 rows x 5 columns) bottles for filling with ink.

Example of 6 (2 rows x 3 columns) automotive switches for dispensing conductive grease onto.

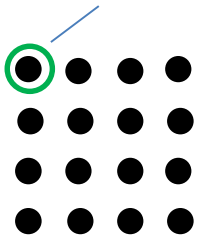
There are 2 options to create an Array Pattern:

1. **Array function outside of the main program**: This is a quick and simple way to create an array. All patterns in the main program will be set in the same Array function. The co-ordinates of each point in the array are not recorded in the main program so editing is limited. **Follow Section 6.16.3**

2. **Array function within the program "Points List"**- The co-ordinates of each point in the array is recorded in the program "Points List". This function also allows multiple arrays to be created within the program with the ability to edit any point, if required. **Follow Section 6.16.4**

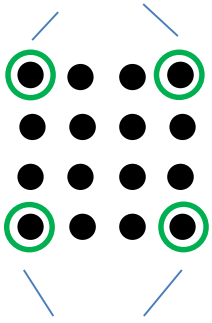
All array patterns will start at the top left co-ordinate first, unless set in teach mode and then any corner co-ordinate can be selected.

Fixed Start Point



In Mode: Not Teach

Optional Start Point



Optional Start Point

In Mode: Teach
Section 6.16.2

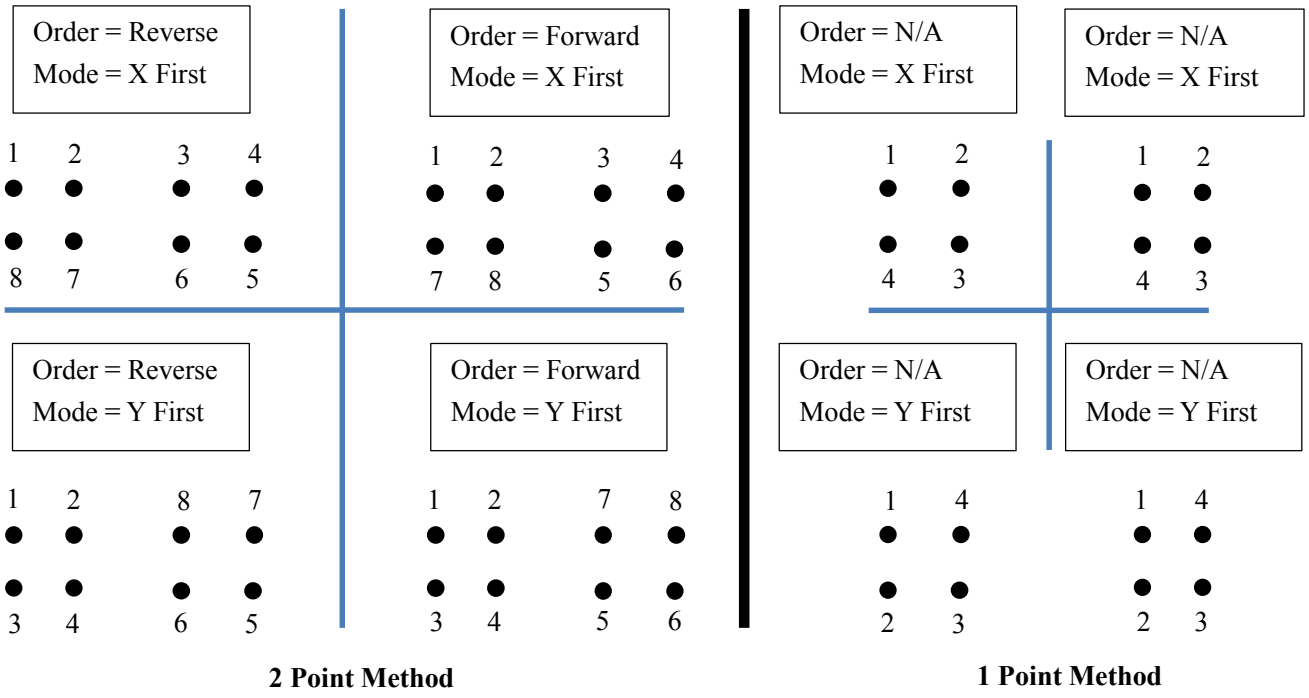
6.16.1 Array Pattern Directional Setting

Please note these instructions, they will be referred to in the following pages:

There are 4 pre-set options to set the array pattern move direction in the Points List array:

1. Order = Reverse; Mode = X First
2. Order = Forward; Mode = X First – works in 2 point method only
3. Order = Reverse; Mode = Y First
4. Order = Forward; Mode = Y First – works in 2 point method only

The examples below show the pattern move direction for each option. The Points List program was created with 2 points (1 and 2). The array pattern was created with 2 rows and 2 columns.



2 Point Method **1 Point Method**

Advantages of 1 Point and 2 Point Method

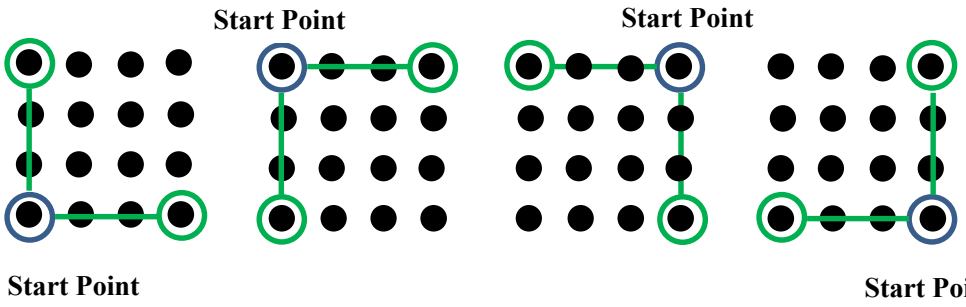
The 1 point method does not allow changes to the "Order", so the pattern on the right is followed whereby only Mode can be changed – Mode allows the pattern to follow a X or Y movement. This method is also used when the array pattern in an odd number of pattern elements (5 x 5, 9 x 9). Even patterrn elements work also but without the Order feature.

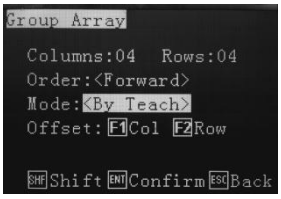
The 2 point method allows full use of directional Order in combination with the Mode, so the pattern on the left is followed. This methods will work with an even nukber of pattern elements only (4 x 4, 10 x 10).

If Order (Forward/Reverse) and/or Mode (X-first/Y-first) are not important to the dispensing application continue with the the 1 point method for ease of programming.

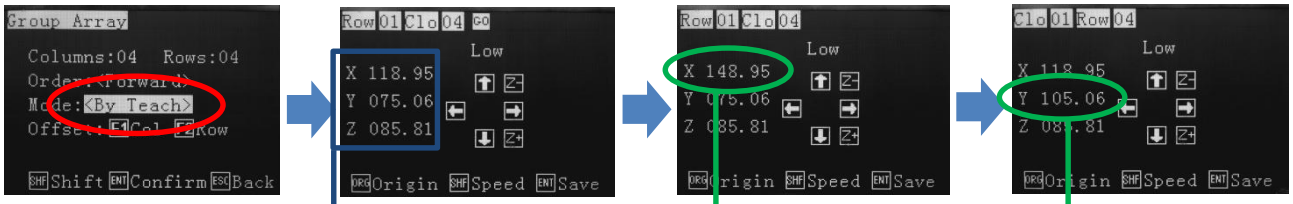
6.16.2 Array Pattern Starting Positon (can only be set in “Mode: Teach”)

The array pattern can be started in any corner co-ordinate. The robot should be moved to the starting positon and the co-ordinate saved. The furthestmost corner should then be set in the X and Y positions. The robot will automatically plot the other array co-ordinates based on the number of rows and columns set.





Note:
Columns: Set how many rows and columns – above example would be set to Column: 4 Row: 4
Order: Cannot be changed
Offset: F1 Col – <u>Only</u> set the furthestmost X column. Do not set the Y co-ordinate here.
Offset: F2 Row – <u>Only</u> set the Y furthestmost Y column. Do not set the X co-ordinate here.

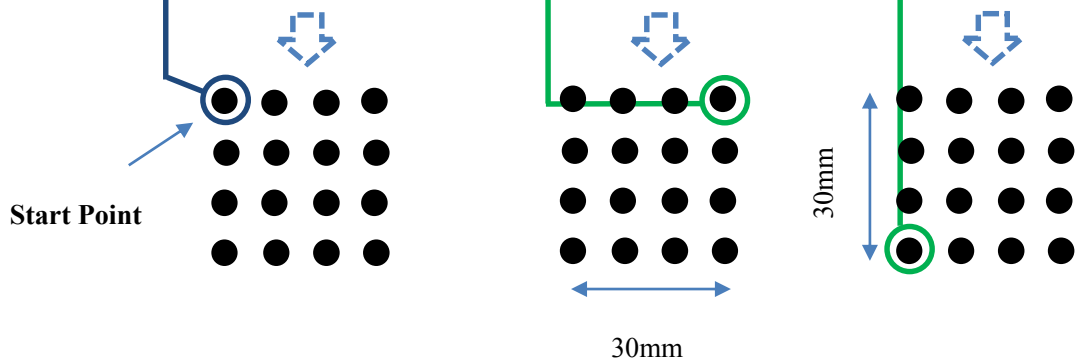


Insert number of rows and columns.

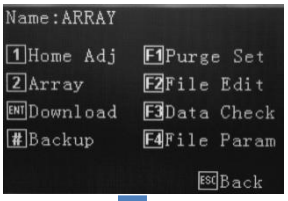
Press GO to move to the set start point co-ordinate

Set the furthestmost X column with F1

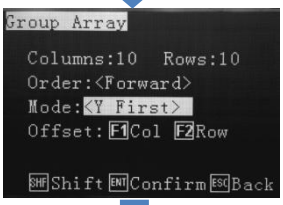
Set the furthestmost Y row with F2



6.16.3 Creating Array Pattern Outside of the Program

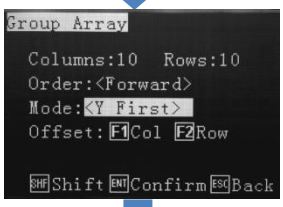


Create the array element (dot or pattern) in the Points List. On the Download screen Press 2 (Array)



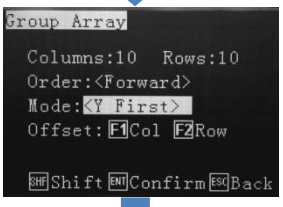
Input number of rows and columns.

Order cannot be changeds.

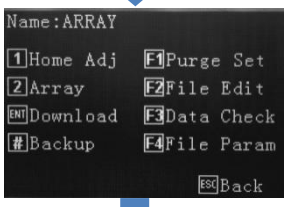


Select Mode: X First first, Y First or Teach. Press F1 and F2 to set row and column distances. For "Teach" follow instructions in 6.16.2 – press ENT

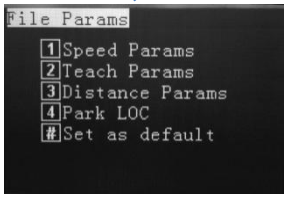
If X first or Y first was selected, input offset distances.
Press ENT



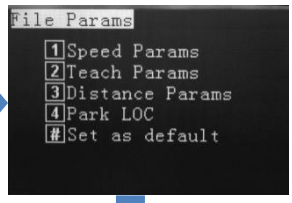
Press ENT to go back to the download screen.



Either press ENT to Download and run array program or select other options.

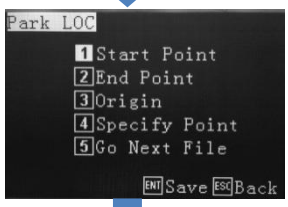


Press 4

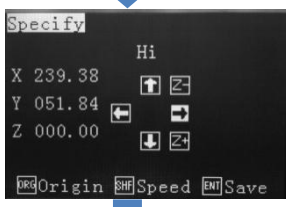


Use the alphanumeric keys to change the retract speed, retract height and feed on/feed off delay.

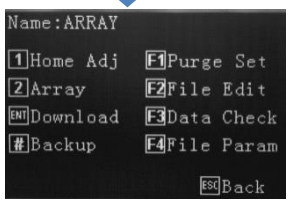
Press ENT



Press 4



Select where the valve should go to after dispensing. If 4 follow below.

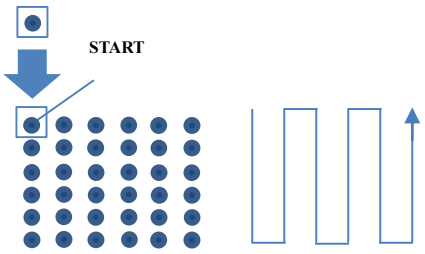


Make other changes

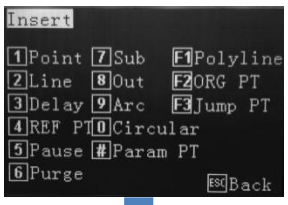
or

press ENT to Download

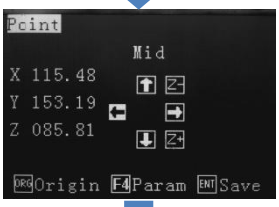
6.16.4 Creating Array Pattern Inside the Points List – Single Point Element



6 x 6 array to be created from a single dot element, showing start position and "Y" travel direction.



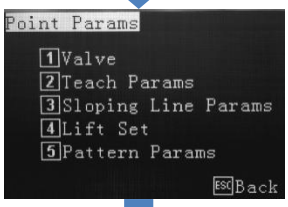
Reference Section 6.3
From the Insert screen, select option 1.



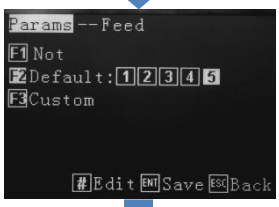
Change the move speed with the SHF key.

Press ENT at the dot location

Press F4

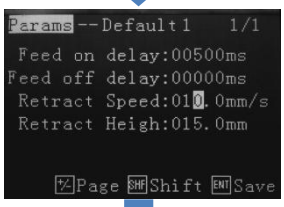


Press 2 – Teach Params

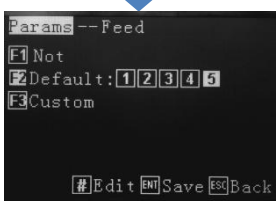


Ensure F2 is highlighted.

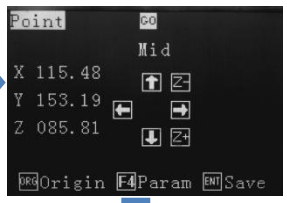
Press #



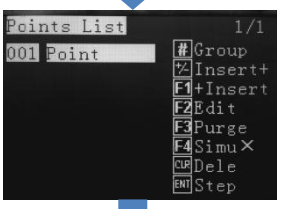
Set Feed on delay (dispensing time)
Set retract height and speed.
Press ENT



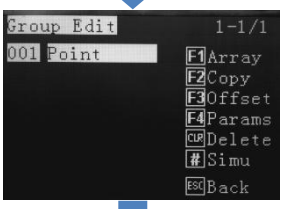
Press ENT twice.



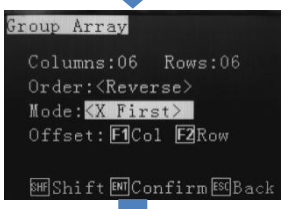
Press ENT



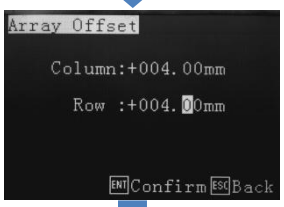
Press #



Press F1

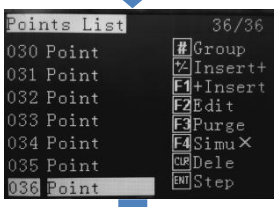


Input number of rows and columns. Order cannot be changed. Set "Mode" – dispensing direction.
Press either F1 or F2



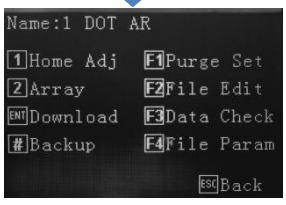
Input row and column distances.

Press ENT twice.



Continue editing or…

Press ESC twice.

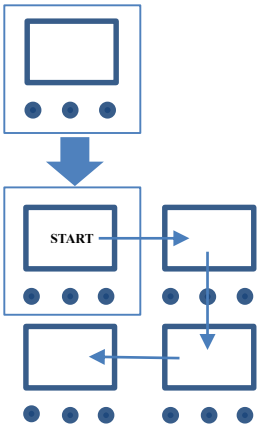


Continue editing or…

Press ENT to download.

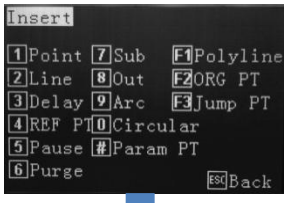
Press F1 to start.

6.16.5 Creating Array Pattern Inside the Points List – Pattern Element



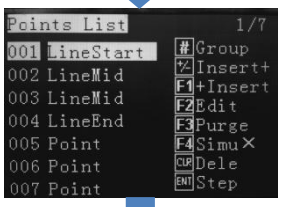
This is the pattern element to be created.

This is the 2 x 2 array to be created from the pattern element showing start position and "X" travel direction.



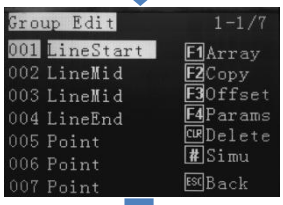
Reference Section 6.3
From the Insert screen, select option 1.

Create the pattern element.

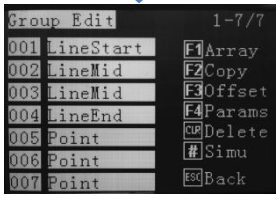


All co-ordinates are listed in the Poins List.

Press #

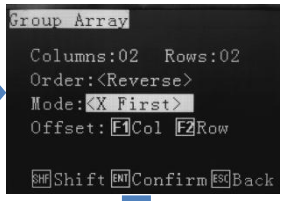


Use up/down arrow keys to select all co-ordinates.

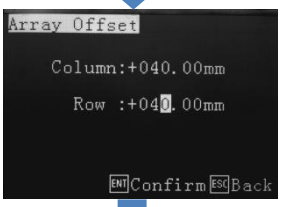


When all co-ordinates are selected press ENT

Press F1

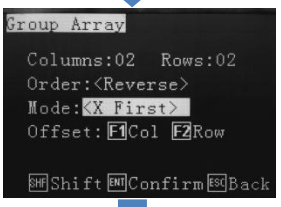


Input number of rows and columns. Order cannot be changed. Set "Mode" – dispensing direction.
Press either F1 or F2

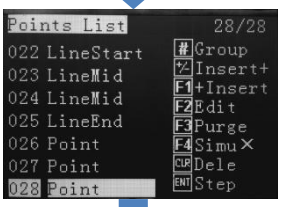


Input row and column distances.

Press ENT twice.

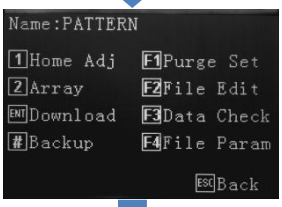


Press ENT



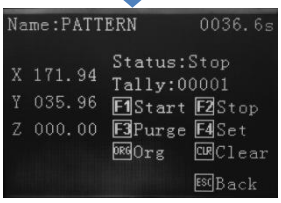
Continue editing or…

Press ESC twice.



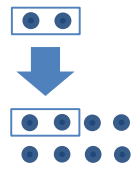
Continue editing or…

Press ENT to download.



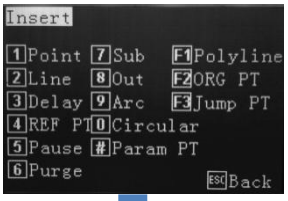
Press F1 to start.

6.16.6 Creating Array Pattern Inside the Points List – 2 Point or 2 Pattern Element Method

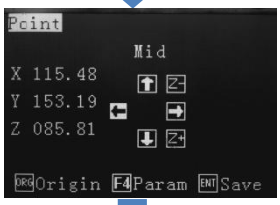


The Points List is made up of 2 dots. When applying row and column values the 2 dots will by arraying 2 dots by a 2 x 2 array the result will be a total of 8 dots.

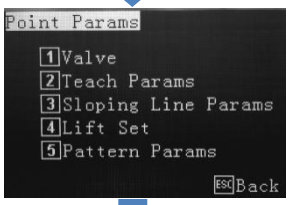
Advantage: Full Mode/Order directional movement as per section 6.17.1 – not suitable for an array with an odd number of elements, example 5 x 5 (25 positions), 7 x 7 (49 positions).



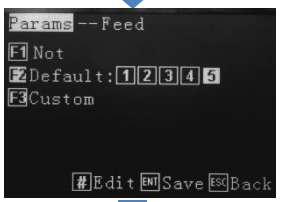
Reference Section 6.3
From the Insert screen, select option 1.



Insert the first dot co-ordinates

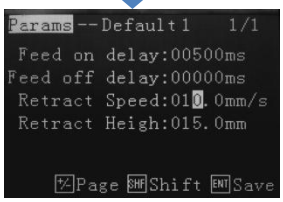


Press 2 – Teach Params

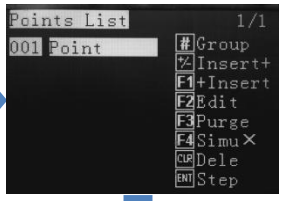


Ensure F2 is highlighted.

Press #

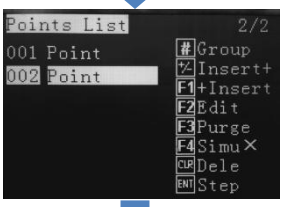


Set Feed on delay (dispensing time)
Set retract height and speed.
Press ENT



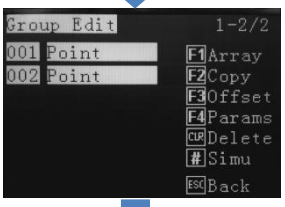
Press F1

Insert the second dot co-ordinates (as in the illustration.



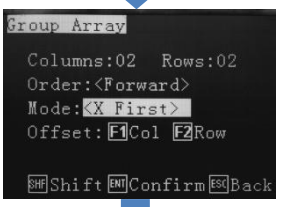
All co-ordinates are listed in the Points List.

Press #

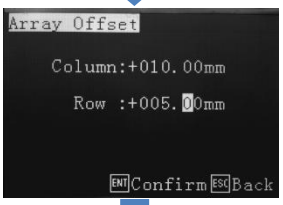


Use up/down arrow keys to select all co-ordinates.

Press F1

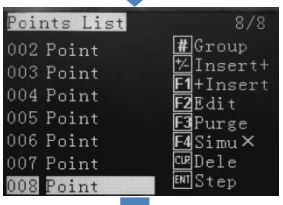


Input number of rows and columns. Order cannot be changed. Set "Mode" – dispensing direction.
Press either F1 or F2



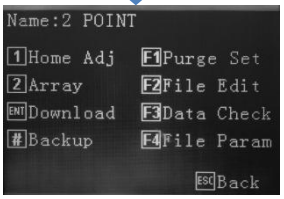
Input row and column distances, based on the pattern elelment.

Press ENT twice.



Continue editing or…

Press ESC twice.



Continue editing or…

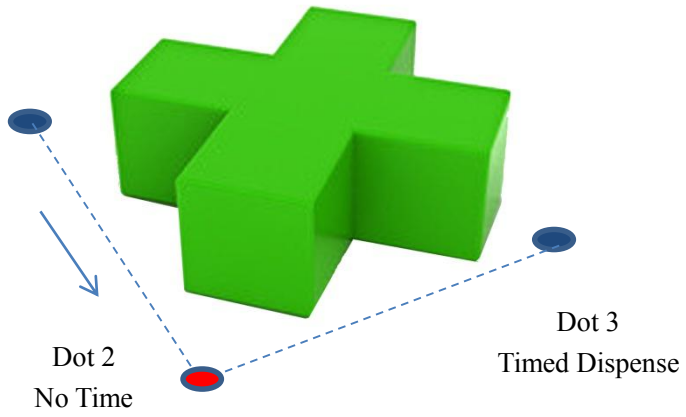
Press ENT to download.

Press F1 to start.

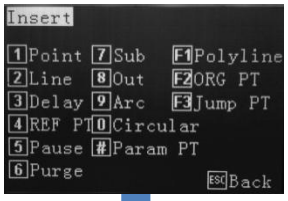
6.17 How to Move Around or Over a Tall Object

Option 1 – Move Around
Program "Points" around device.

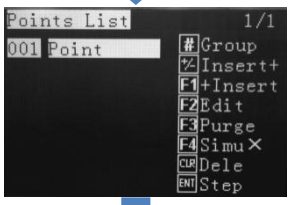
Option 2 – Move Over
Using "Lift" height to clear device height.



Option 1 – Move Around Device

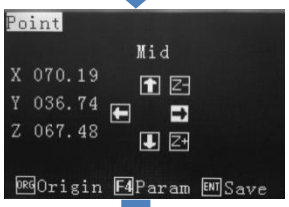


Reference Section 6.3
From the insert screen select option 1. Points will be used to create a movement, as well as dispensing co-ordinates.

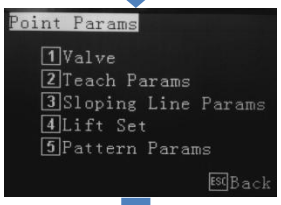


Insert Dot 1 (dispense), as per **6.8**.

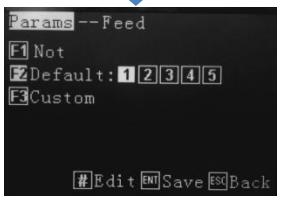
Press F2



Press F4

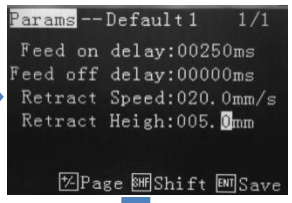


Press 2 – Teach Params

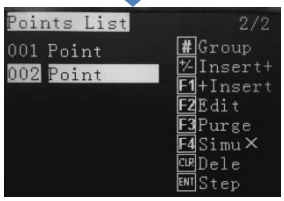


Up to 5 dispense times can be programmed and recalled. In this example Dot 1 and 3 will use slot 1. The movement Point will use the spare slot 5.

Press #

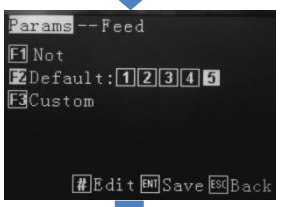


Input Feed on delay (dispense time), Retract Speed and Height for Dot 1. Cycle through to the Points List by pressing ENT

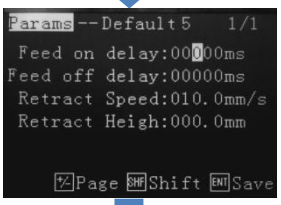


Insert move dot (Dot 2). Whilst in co-ordinate screen press "F4". Option 2 (Teach Params) allows the use of a spare Feed slot.

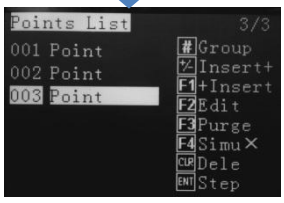
Note: dispense height of Dot 2 must be offset against the Dot 1 and 2 React Height so that Dot 2 passes through, without stopping and lowering at co-ordinate.



Press #



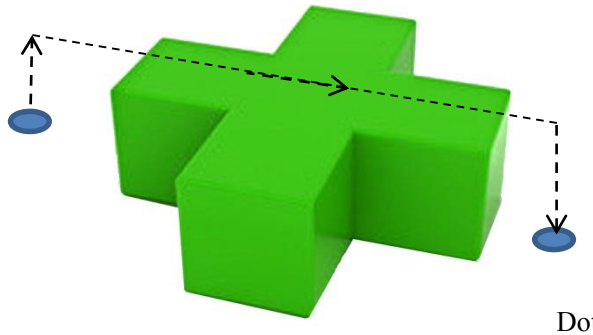
Input 0.0 time and 0.0 Retract Height - prevents valve from stopping at the Dot 2 thus creating the Move command. Cycle through to Points List by pressing ENTER.

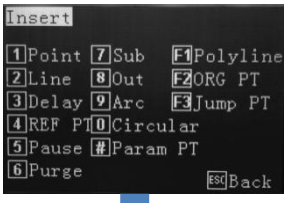


Repeat sequence for 003 Point (Dot 3). Use the same Feed slot as used for Dot 1 or antoher slot if dispense time is different.
Press F2 then F4

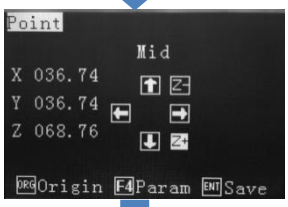
Contine to edit or download if complete

Option 2 – Move Over Device

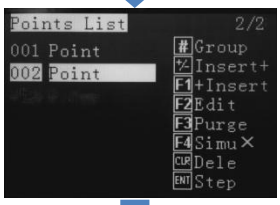




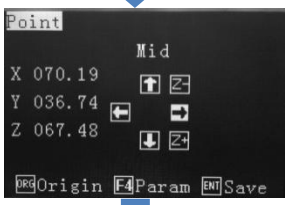
Reference Section 6.3
From the insert screen select option 1.



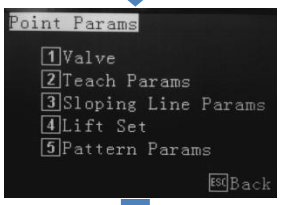
Create both points as per **Section 6.8**



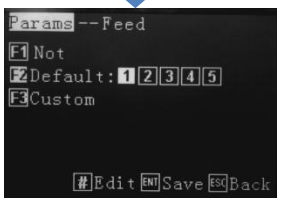
Press F2 to edit dot.



Press F4

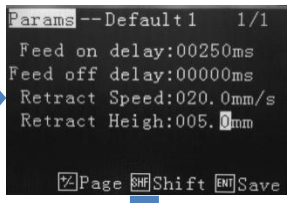


Press 2 – Teach Params

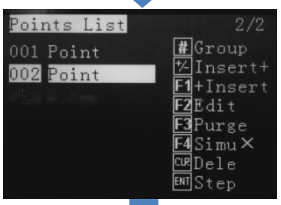


Up to 5 dispense times can be programmed and recalled. Dot 1 & 2 will use slot 1, in this example, meaning both dots will have the same dispense time.

Press #

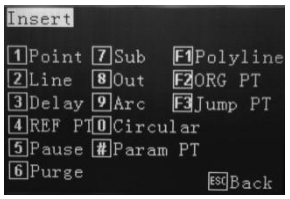


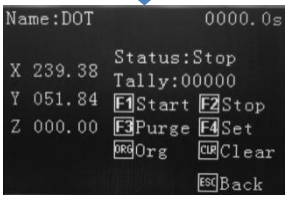
Set dispense time, for Dot 1 and/or, Retract Speed and Retract Height. **Ensure Retract Height is high enough to clear device.**



Repeat sequence for 002 Point (Dot 2). Feed slot 2 can be selected if the parameters are different, or continue to use Feed slot 1.

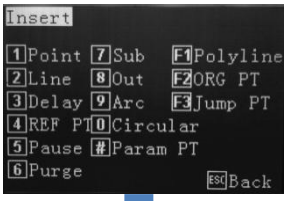
Either continue to insert patterns or press ESC twice to modify or download the program.



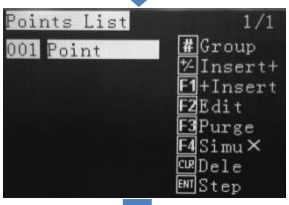


6.18 Operating up to 4 Dispensing Valves

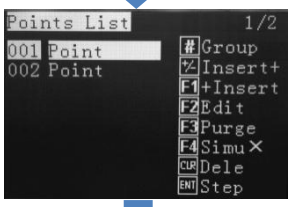
The TSR2000 Series robot has the capability to operate up to 4 dispensing valves independently, by using an advanced I/O cable, available from Techcon Systems. Each valve requires a separate controller to perform this function. Triggerering of each I/O signal is set in the editing screen. This example will demonstrate 2 valves dispensing different fluids, through 2 TS500R controllers, creating dots.



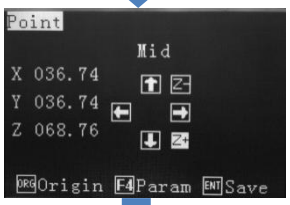
Reference Section 6.3 and 6.8
From the insert screen select option 1.



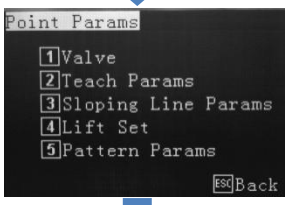
Move the **valve 1** to the dispensing location and save the point position.



Move the **valve 2** to the dispensing location and save the point position. Both Points need to be edited. Press F2



Press F4



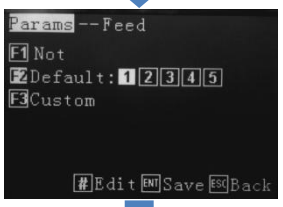
Press 1 – Valve

All outputs will become active and the user will need to switch off unused outputs.

3 Output Off
3 Output On

After switching off unused outputs:

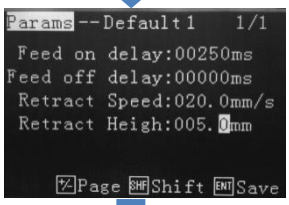
Press ENT



Press 2 – Teach Params.

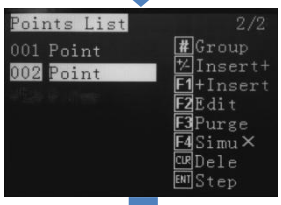
Select a Feed slot for dot 1. For this example slot 1 will be used.

Press #

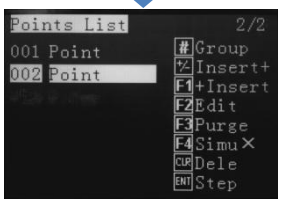


Input the dispensing time (Feed On Delay) for dot 1 along with Retract Speed and Height.

Press ENT until the Points List is shown. twice.



Repeat process for Dot 2 by using Valve 2 and Feed slot 2 and setting a different Dispensing Time (Feed On Delay).

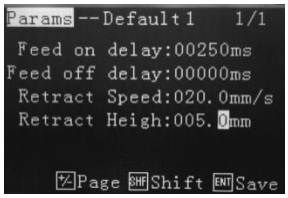


Repeat process for Dot 2 by using Feed slot 2 and setting a different Dispensing Time (Feed On Delay).

6.19 Definition of Additional Programming Features

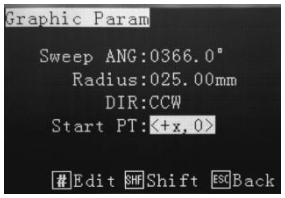
Dot Point – Feed on Delay

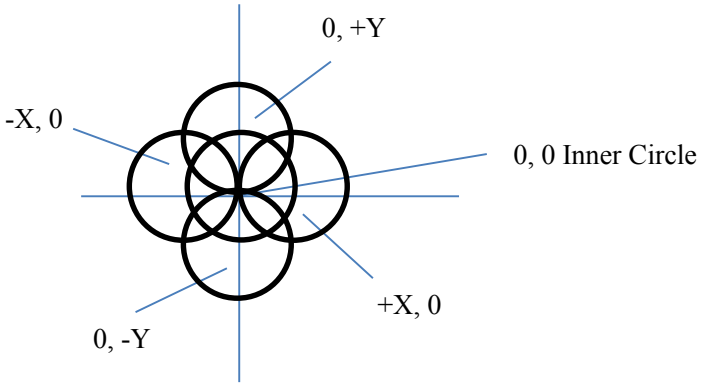
In the distance parameter screen, the Feed on Delay should only be used to set the dispensing time for a dot.



Circular – Start Point Definition

In the Graphic Parameter screen, whilst inputting circle dimensions the Start Points are as follows:

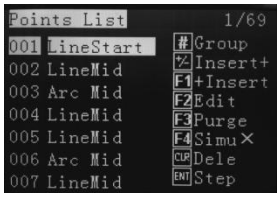




Program Step-Through

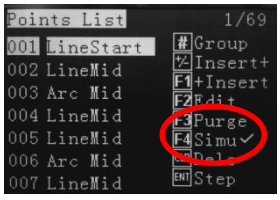
A simulated run can be performed within the points list, anytime throughout the program. Use the up/down jog keys to select where in the program the run is to be started. All co-ordinates will move at their programed speeds. To switch between Simu X and Simu √ press F4

By pressing ENT the robot will move to the next location and waiti until ENT is press again.



Simu X Mode (dry run)

This mode will move to locations so the operator can verify the position and speed of the co-ordinates. Editing can be performed by pressing on a selected line.



Simu √ Mode (wet run)

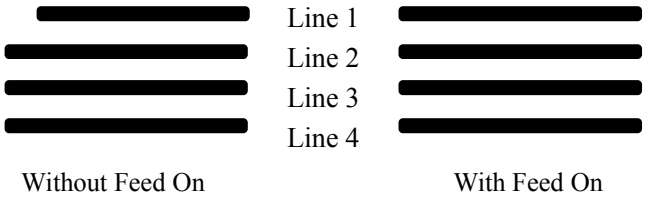
This mode will move to locations, whilst dispensing, so the operator can verify the position, speed and dispense quality of the co-ordinates. Editing can be performed by pressing F2 on a selected line.

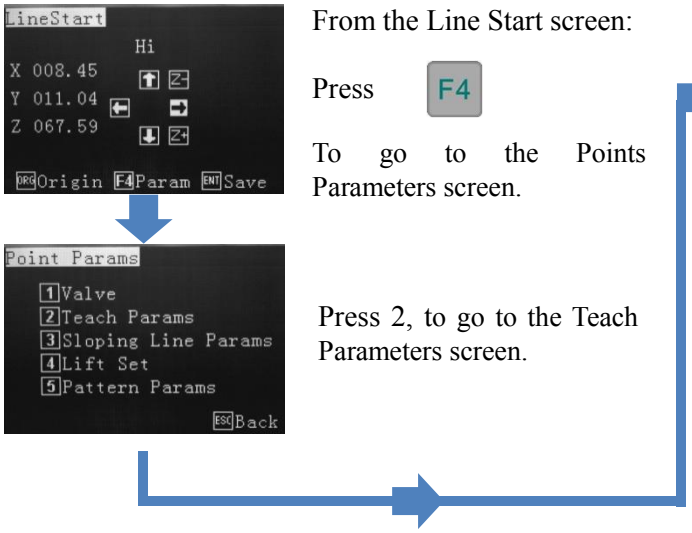
6.20 Line Dispensing Adjustments

6.20.1 Valve Feed On Delay - Lines

Usually, when a dispensing valve has been stationary for a period of time, for example at the beginning of a dispensing program, there is a requirement for the initial dispensing to have a delay applied. This delay is usually small, such as 50-100ms, which allows the fluid to flow and adhere to the correct position at the start of the pattern. If no delay is applied, to the first dispensing location, the dispensing will be smaller than the rest or the start of the line will be without adhesive.

Example of line with and without feed on delay:



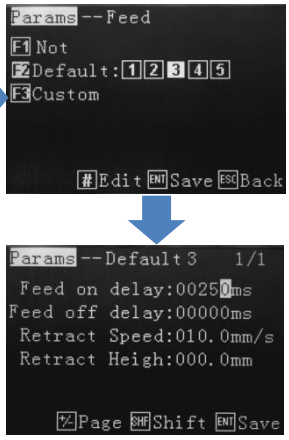


From the Line Start screen:

Press F4

To go to the Points Parameters screen.

Press 2, to go to the Teach Parameters screen.



Press F2

Select an available Feed function, 1-5.

Press #

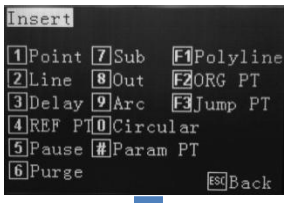
Input the Feed On delay time.

Press ENT until the Line Start screen is reached. Continue to program as normal.

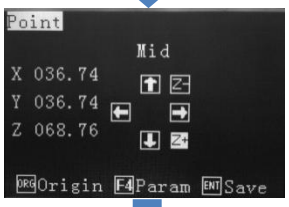
Up to 5 Feed On delay or 5 Feed Off delay times can be set per program. **Valve Feed Off Delay** is the time the robot will stay at the end of the dispensing location before moving to the next dispensing position. No fluid will be dispensed during to the Feed Off time period. Note that dots use a feed slot and could conflict will line start delay if the same slot is chosen for a dot and a line.

6.20.2 Valve Feed On Delay – Dots

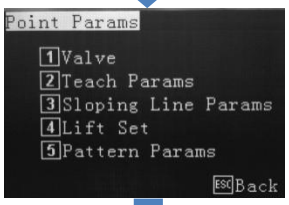
Feed on delay, for a dot, sets the dot dispensing time. Up to 5 dots sizes (set by time) can be inputted per program. Feed Off delay times can be set also. **Valve Feed Off Delay** is the time the robot will stay at the end of the dispensing location before moving to the next dispensing position. No fluid will be dispensed during to the Feed Off time period.



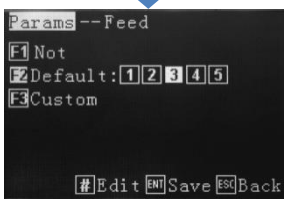
Ref: 6.3 and 6.8
From the Insert screen, select option 1, for a point



Move to the dots first location and press F4

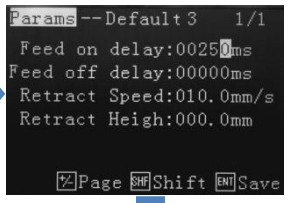


Press 2
(Teach Parameters)



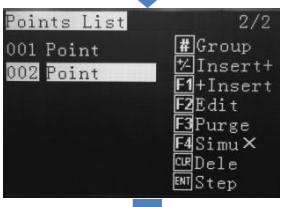
Press F2 to select an available "Feed On" function: 1-5. For a new program all 5 functions are available.

Press #

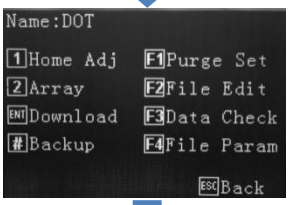


Input the dot dispensing time.

Press ENT 4 times to save location and return to the Points List

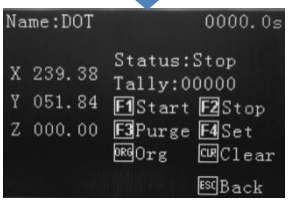


Repeat the process for additional dots, either selecting the same Feed On function or selecting a new one and inputting a different time.



File Parameters can be changed using F4

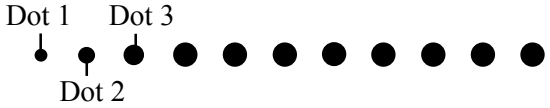
Or press ENT to save.



F1 starts the cycle.

It is common, when dispensing dots, to see that the first few dots, of a new program, are smaller than the rest, if all dots are programmed with the same dispensing time. This is due to the fluid being stationary, within the syringe or pressure tank, whilst the valve is idle. The above process can be used to program the few dots slightly longer in time to compensate but it is also common practice to dispense 2-3 test dots somewhere outside of the working area, to get the fluid moving at a normal pace.

Dots 1 -3 require more dispensing time (Feed ON Delay) to achieve the same volume as the other dots, in the program.



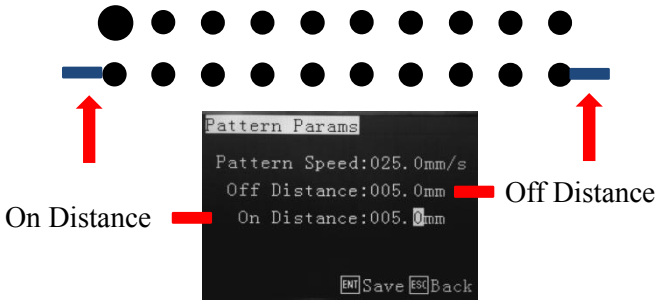
6.20.3 Line On/Off Distance

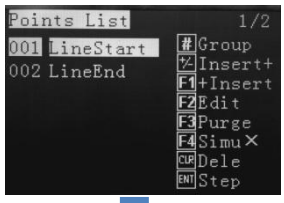
On Distance - the robot will move for a set distance before the valve starts dispensing. This prevents the first dispense being too large, for example in a jet valve line. By dispensing, whilst moving, the first dot is the same size as all other dots, within the jetted line.

Move and dispense and at the same time.

Move for preset distance and dispense whilst moving.

Off Distance – the robot will continue to move past the finished dispensing pattern, preventing a build of of fluid.

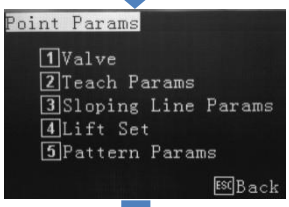




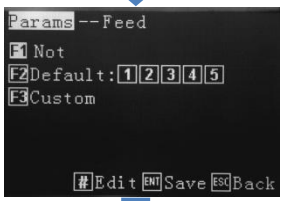
Create a Line as per Section 6.9

Press F2

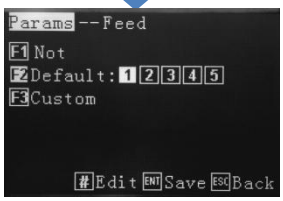
Press F4



Press 2 – Teach Params

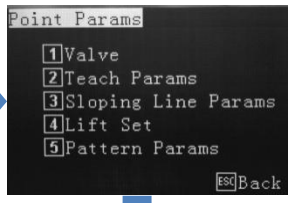


Press F2

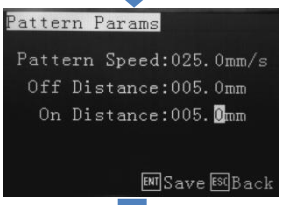


Ensure Feed slot 1 is highlighted.

Press ENT

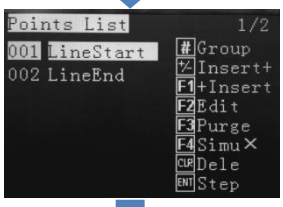


Press 5 – Pattern Params

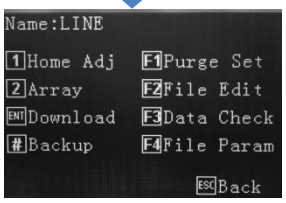


Change Speed
Set Off Distance.
Set On Distance.

Keep pressing ENT to get to Points List



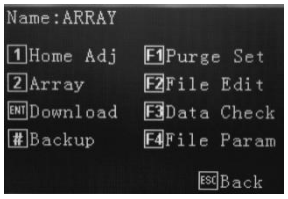
Press ESC twice.



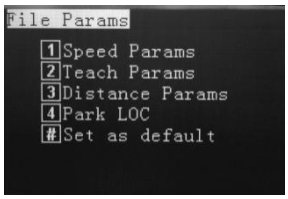
Continue to modify or press ENT to download

Note: If the pattern is 50mm in length and a 5mm On and Off Distance is set, the actual pattern will be 40mm (**50mm – 5mm On – 5mm Off = 40mm**). On/Off Distances should be added to the pattern length during programming or during editing.

7.0 PROGRAM PROCESSING MENU

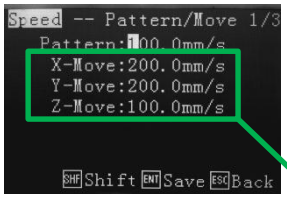


The File Parameters option is displayed once the program co-ordinates are completed – press F4



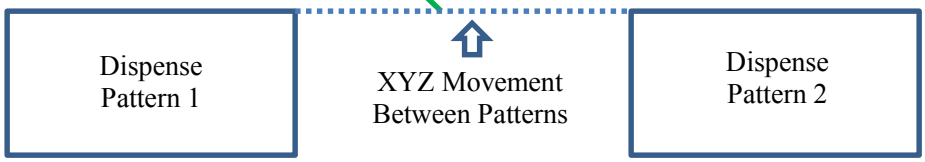
In this menu:
- Speed Parameters
- Teach Parameters
- Distance Parameters
- Park Location
- Default Setting

7.1 Speed Parameters:

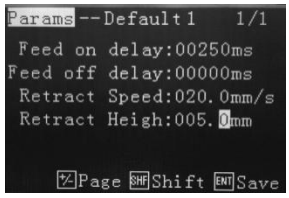


A change to the "Pattern" will apply this speed to all lines, polylines, circle and arcs, contained within the program. Individual speed changes can be changed by editing the program and selecting the co-ordinate (Line 1, Line 2, to edit.

Acceleration speeds can be changed by pressing SHF

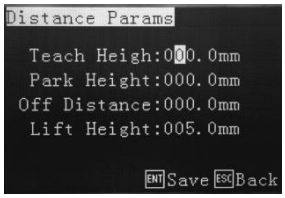


7.2 Teach Parameters:



The feed on delay relates the dispensing time for a dot. Feed off delay is the time the dispensing valve will stay at the end of the dispensing co-ordinate not dispensing, before moving to the next co-ordinate. Retract Speed is the speed of the tip retracting after a finished cycle and Retract height is the height the tip move up to after the dispensing of each position is complete, before moving to the next dispense location.

7.3 Distance Parameters:



Teach Height – during program it is usually set to 000.0, the height from moving from one point to the next is the Teach Height.
Park Height – when program is completed the Z-axis will lift to a safety height. If no co-ordinate is set the Z-axis will lift to 0 co-ordinate and back to finishing point. Before processing, the z-axis will also move to this safety point.
Off Distance – the distance at which the valve will stop dispensing **before** the finish point. Normally used when joining one line to another for a clean finish.
Lift Height – the distance the z axis will move up after a dispense cycle.
Refer to section 6.3 - Understanding Lift Height and Retract Height

Note:
Lift height = Z-retract Height, the default lift height is 5mm and can be changed in the "Distance Params" menu. The "Lift Speed" is the same speed as the Z-speed, and cannot be changed.

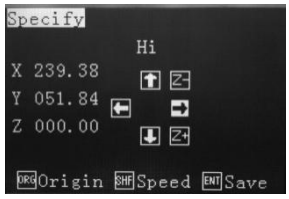
Retract height = Z-retract Height, no default setting. It can be changed in the "Teach Params" menu. The "Retract Speed" also can be set in the same menu.

If the Retract height is bigger than the lift height then the Z-retract speed will override the lift height speed.

If the Retract height is less than the lift height then the Z-retract speed will apply to the retract height first.

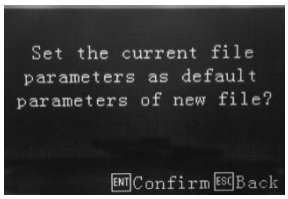
7.4 Park Location:

The Park Location is the position the dispensing tip should move to once the program has completed. For the tip to move the Start, End or Origin location, the operator must select option 1, 2 or 3. The operator to program a Specific Point, which is anywhere within the robots working area by using the same programming method used to create a dot. The operator can also choose to Go to next file be selecting option 5. This will display a File List and the next program to follow can be selected from the List. The selected next file will start dispensing once the original program has been completed.



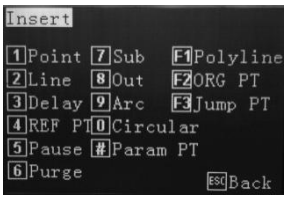
When selecting Specify, the display requires a position anywhere in the robots working area to be selected. At the end of the dispensing program the tip will move to this specified location.

7.5 # Set as Default:



By applying this option all speeds, delay times, lift heights dot dispensing time, etc, will be applied to all new programs being created.

7.6 Insert Screen:

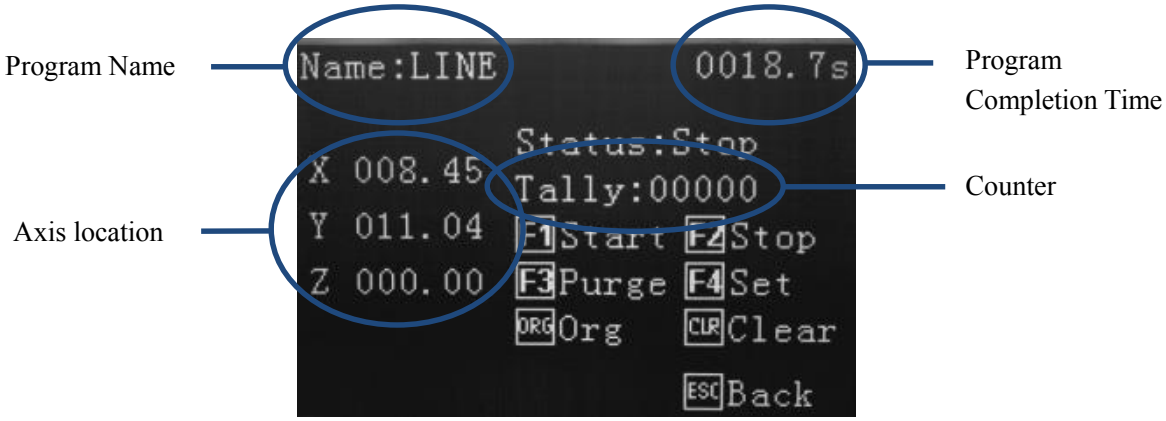


1 – a dispensing dot.
2 – a line consisting of a start and end position.
3 – the time delay from 1 location and another.
4 – mark point, normally first point can set reference point, but when downloaded the program will not run this reference point step.
5 – pause point and wait for receiving input signal, then run the next step.
6 – Setting a location for the valve to Purge.
7 – subroutine. Set a simple program, call a sub-routine with or without condition.
8 – turn on output signals.
9 – an arc using 3 point programming.
0 – a circle using 3 point programming or be inputting dimensions.
– setting movement speeds from one dispense location to another.
F1 – a series of lines connected with no dispensing interruption.
F2 – moves to origin position before moving to next location
F3 – to run the front dispensing again.

8. SET MENU

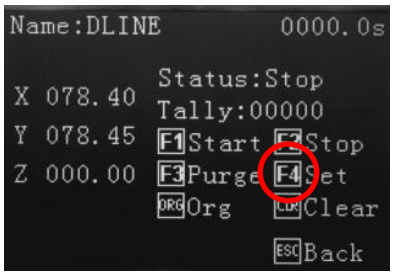
This display is shown once a program has been download. In the Set Menu the following can be achieved:

- Run the program by pressing
- Stop the program by pressing
- Perform a Purge function by pressing
- Set up a Looping sequence by pressing
- Go to Origin location by pressing
- Reset the program counter (Tally) by pressing

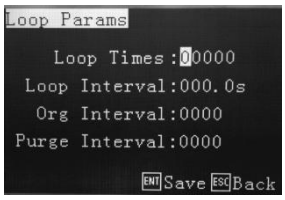


8.1 How to Set a Program to Run in a Loop

From the Program Processing Menu, which is displayed after the program has been saved,downloaded or selected, from the the Operation Menu, the following screen will be displayed.



Press F4



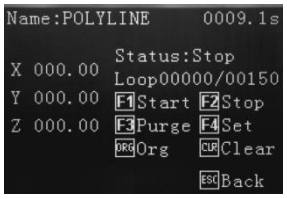
Set how many times the program is to loop. Set the time delay, which is the wait time between each repeated cycle.

Set the Origin Interval - the number of times the program will return to Origin.

Set the Purge Interval – the number of times the program performs a Purge function.

Note: The Loop, Origin and Purge functions cannot be saved as part of the program and must be set each time the robot is turned off or another program is selected.

Press ENT



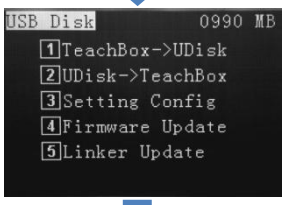
The display now shows the loop counter, ready to start. Press F1 to start the looped program.

9. FILE TRANSFER

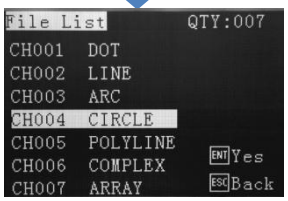
9.1 How to Transfer Program to USB Stick

This feature is particularly useful if more than 1 robot exists at a facility and are both running the same program. By copying the program, from 1 robot to another, will save the operator time by not having to duplicate the programming.

Insert USB stick into teach pendant. Press 3 to go to USB menu.



Press 1.



Select program to transfer from Teach Box to USB Stick.

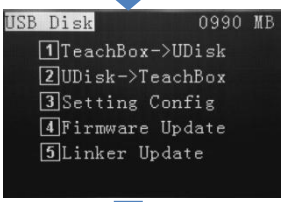
Press ENT

Continue transferring files, as above, if required.

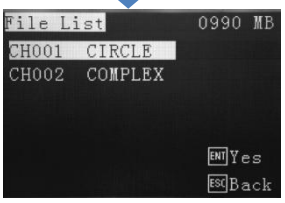
Press ESC twice to return to main menu.

9.2 How to Transfer Program from USB Stick

Press 3



Press 2



Select the program, stored on the USB stick.

Press ENT

Continue transferring files, as above, if required.

Press ESC twice to go back to main menu.

If the device that the operator is transferring the program to already has the same file name the following error message will be displayed:

Rename the program being transferred, using the alphanumeric keypad and press ENT

Press ESC twice to return to the main menu.

10. TROUBLESHOOTING

LCD is displaying "Please Reset"

1 – the emergency switch has been engaged.
- Check emergency switch and if engaged release to working condition.

2 – the communication cable is not connected fully.
- Check communication cable is correctly fitted and tightened.

3 – the "Stop" button on the teaching pendent has been pressed.
- Press "ORG" to reset the robot's positioning.

4 – the teaching pendent has developed a fault.
- Contact Techcon Systems.

Displaying unusual message after power up

1 – The hardware version is not correct.
- Check the version of teaching pendant and PCB.

2 – The teaching pendant cables may have become loose or damaged.
- If the teaching pendant cannot communicate normally, or the display is a little dark, disconnect the power supply and then disconnect and reconnect the teaching pendant.
  DO NOT DISCONNECT THE TECHING PENDANT WHILST THE POWER IS ON.

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