Position Controller
PS312P_LCD_v2.2

INSTRUCTION MANUAL

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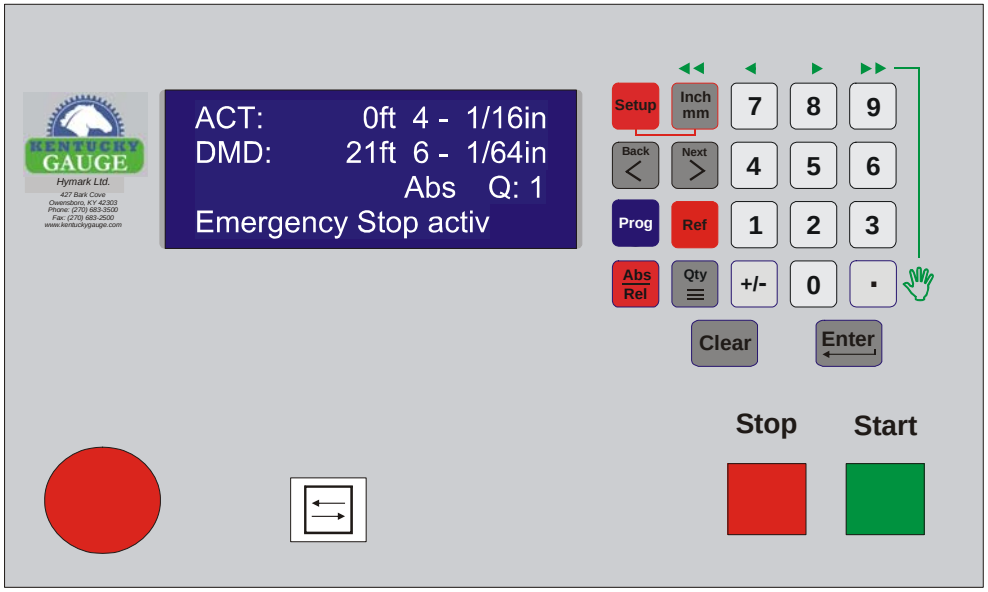
1. Functions of the Displays



First display line:	1.“999ft 11-63/64in” Actual value ft-in-fractional mode 2.“99999-63/64in” Actual value in-fractional mode 3.”12345.678” Actual value (8 digits) in decimal mode 4.Name of parameter level selected with “Setup” 5.Program number when selected with “Prog”
Second display line:	1.“999ft 11-63/64in” Demand value ft-in-fract. mode 2.“99999-63/64in” Demand value in-fractional mode 3.”12345.678” Demand value in decimal mode 4.”Hand Mode selected” for “manual mode” activated 5.Parameter number and value for selected level
Third display line:	1.Abs = (absolute) or Rel = (relative) move indicator 2.Q = (quantity value) displayed 3.Address line of program
Fourth display line:	1.”Emergency Stop activ”, E-Stop button is activated 2.Instructions for operation and fault monitoring status

2. Functions of the Keypads

[Start]	To start positioning
[Stop]	To stop positioning
[Retract]	To extend and retract arm / carriage
[Emergency Stop]	(optional) To stop carriage immediately. Lower display shows “Emergency Stop activ”

2. Functions of the Keypads (continued)

Keypad	Function/Display
7 8 keypad [0] to [9]	To enter data (entering values into demand lines, program lines, parameter values, or quantity values)
Clear	To delete entered value; Press and hold to cancel and exit a running program
Enter	To select a desired parameter level; To store a value when entering or programming; To select a desired program
REF Reference (Set datum)	To enter datum value (this is the value for setting the known reference for starting point)
Quantity	To enter and exit quantity display (this value represents the quantity to be cut or number of incremental moves)
SETUP Setup	To enter and exit Parameter levels; To activate “tool outputs” when programming
PROG Program mode	To enter and exit for running program (press once); Press & hold for 2 sec to enter editing program mode
Cursor back	Select previous program, address line or parameter
Cursor next	Select next program, address line or parameter
ABS REL Absolute/Relative	Absolute / Relative (incremental) switching to be activated (Parameter All, P45 = 1)
+/ -	To switch to (-) minus sign for single demand position or programming mode
.	To enter and exit Manual “Hand” mode; To advance when entering data for fractional mode
Inch mm	To switch from inch to metric decimal (when in decimal mode, User Level, P0 = 0); To switch from ft-in-fraction to in-fraction (when in fractional mode, User Level, P0 = 1); To scroll for selecting parameter level (Datuming, User Level, Parameter All, Parameter Axis 1); To switch to encoder frequency measuring (Parameter All P35 = 3); To activate editor for measuring error compensation (Parameter All P35 = 5)

3. Set the User Level (Fractional or Decimal)

Determine which form (fractional or decimal) is preferred for having the values displayed.
Upon power up, the display will be in Single Position Mode and exhibit similar the example below:

A	C	T:				2	Ft	06	-	1	/	4	in
D	M	D:				21	ft	06	-	1	/	64	in
								A	b	s		Q:	1

Press the SETUP button to enter Parameter Levels and the display will exhibit:

D	A	t	u	m	i	n	g

Press the Inch mm button to scroll and find the User Level, the display will exhibit:

U	s	e	r		L	e	v	e	l

Press the **Enter** button to enter the User Level, the display exhibits:

User Level
0
Enter Code

Enter “1492” and press the **Enter**, the display exhibits:

	U	s	e	r		L	e	v	e	l			
P		0									0	or	1

Press the **1** button for fractional or press the **0** button for decimal mode:
(example below: press 1 for fractional), display exhibits:

	U	s	e	r		L	e	v	e	l			
P		0									1		

Press the **Enter** button to save the value and press **Enter** again to scroll to “P1”:

	U	s	e	r		L	e	v	e	l			
P		1								0.	0	0	0

Exit the User Level by pressing the SETUP button to display:

U	s	e	r		L	e	v	e	l

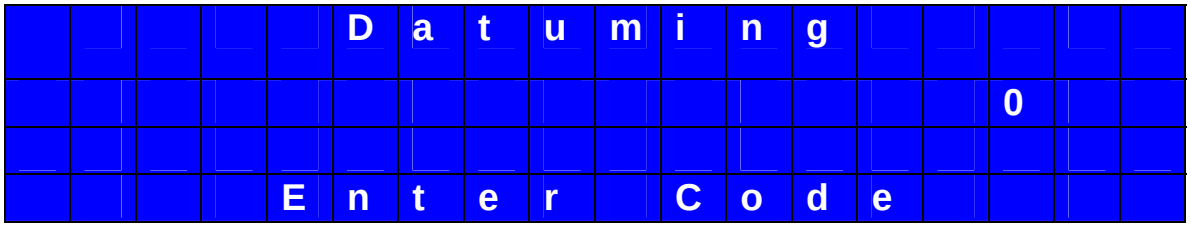
Press the SETUP button again to exit Parameter Levels and return to Single Position Mode.
The lower display will flash “Store to EEprom” as exiting Parameter Levels.

From Single Position Mode, Press the Inch mm button to toggle between Foot-Inch-Fractional and Inch-Fractional (User Level P0 = 1) or between inch decimal and mm decimal (User Level P0 = 0)

4. Set datum

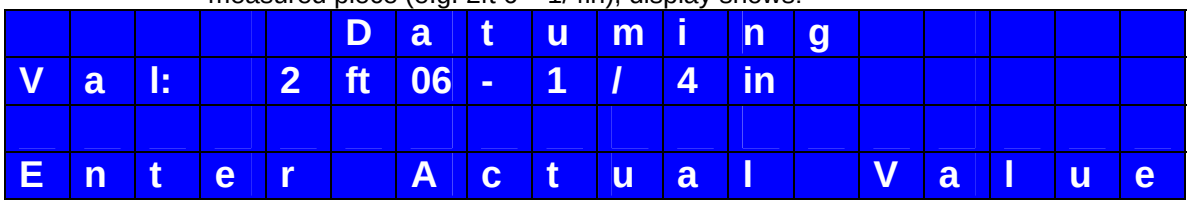
☞ Measure the distance to be entered.

☞ Press REF button, Display shows:



Enter security code "**1 7 7 6**" (= default value, or code as entered in parameter P44/All → see parameter list), press the **Enter** button to enter "Datuming" mode

☞ Press 0 to 9 buttons to enter measured datum value or length of measured piece (e.g. 2ft 6 – 1/4in), display shows:



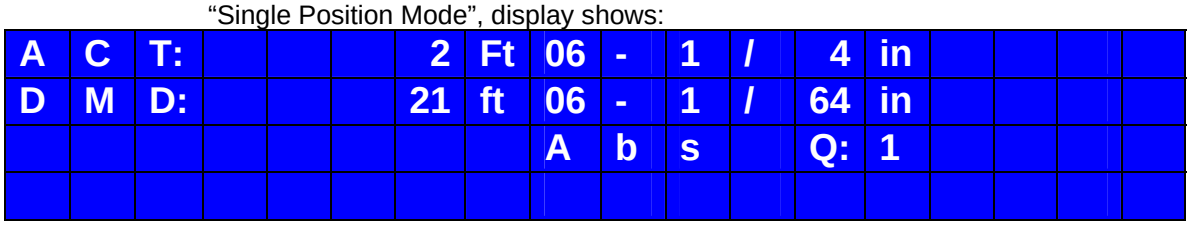
Note: For entering values in Foot – Inch – Fractional or Inch – Fractional modes, press . to advance from foot to inch to fractional.

The above example is entered by pressing 2 . 6 . 1 . 4

Note: In fractional mode, when finished entering values, press REF only to store, **not** Enter

☞ Press 0 button (in fractional mode) or **Clear** button (in decimal mode) at any time to prior to pressing REF to delete entered datum values

☞ Press REF button again if needed to exit "Set datum" mode and to return to "Single Position Mode", display shows:



☞ Controller is back in "Single Position Mode"

Press REF button at any time to exit "Set datum" mode without changing value.

5. Manual Mode

In Manual Mode the operator can move the carriage in fast and slow speed in both directions by using the Inch mm, 7, 8 and 9 buttons:

Manual mode may only be entered from “Single Position Mode”, not from “Program Mode” or “Parameter Mode”

☞ Press . button to enter Manual mode, display shows:

A	C	T:				2	Ft	06	-	1	/	4	in				
H	a	n	d		M	o	d	e		S	e	l	e	c	t	e	d
								A	b	s		Q:	1				

☞ Press [inch / mm], [7], [8] or [9] button to move gauge manually:

Inch mm	Fast speed in + direction
7	Slow speed in + direction
8	Slow speed in - direction
9	Fast speed in - direction

☞ Press . at any time to exit Manual Mode, returning to “Single Position Mode”

6. Positioning Modes and Demand Value options

There are 3 different positioning modes:

1. Single Position Mode without Quantity counter → see chapter 7
2. Single Position Mode with Quantity counter → see chapter 8
3. Program Mode → see chapter 9

For each positioning mode you have 3 different options for demand values to be entered:

4. (Abs) Absolute position

5. (Rel) Relative/incremental position in (+) direction → select relative mode with 

6. (Rel) Relative/incremental position in (-) direction → select (-) minus sign with 

<u>Example below is Inch decimal display (see chapter 4 for entering fractional data):</u>

☞ Enter the required **absolute position** (e.g. 300.000) in demand value display:

220.500 = *Actual value*

300.000 = *Demand value*

Abs=*absolute position* ***0*** = *no Quantity entered*

or

☞ Enter the required **relative position** in **(+)** direction, e.g. 20.000 in demand value display by pressing the “F1” button:

220.500 = *Actual value*

20.000 = *Demand value*

0 = *no Quantity entered*

Rel= *relative/incremental position, press “Abs/Rel” button to switch*

or

☞ Enter the required **relative position** in **(-)** direction, e.g. “- 5.000” in demand value display by pressing the “ABS/REL” and “+/-” button:

220.500 = *Actual value*

- 5.000 = *Demand value*

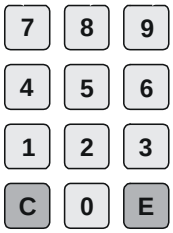
0 = *no Quantity entered*

Rel= *relative/incremental position, press “ABS/REL” button to switch*

Press ***“+/-”*** *button to select (-) minus sign to move towards “0”*

7. Single Position Mode without Quantity counter

After turning power on controller will always start with “Single Position Mode”. Single position mode means you can enter one demand value and press the “Start” button. Use the numeric keypad to enter your demand value



Press **Clear** button at any time to delete entered value

☞ Enter the required **absolute position** (e.g. 300.000) in demand value display:

220.500 = *Actual value*

300.000 = *Demand value*

***Abs**=absolute position* ***0** = no Quantity entered*

☞ Press [**Start**] button, carriage moves to entered position, display shows:

300.000 = *New Actual value*

300.000 = *Last entered Demand value*

Abs=absolute position 0 = no Quantity entered
Rel= relative/incremental position, press “ABS/REL” button to switch
*Press **“+/-”** button to select (-) minus sign to move towards “0”*

☞ Enter new position (e.g. 450.000) in demand value display and press [Start] again

☞ Press . button to enter Manual mode → see chapter 5

☞ Press PROG button to enter Program mode → see chapter 9

☞ Press SETUP button to enter Parameter level → see chapter 19

☞ Press ABS REL button to switch from absolute to relative (incremental) (All / P45 = 1)

Note: Enter saw blade width before moving in incremental mode when needed.
User Level: P1 = saw blade width.

8. Single Position Mode with Quantity

Example below is for Fractional display (see chapters 6 and 7 for entering decimal data):

Enter the required position in demand value display (e.g. 258 – 1/64in) and press start:

A	C	T:						6	-	1	/	4	in				
D	M	D:				2	5	8	-	1	/	64	in				
								A	b	s		Q:	0				

The above example is entered by pressing [2] [5] [8] [.] [1] [.] [6] [4]

Below is an example of using a quantity counter for decrementing cuts or cycles upon reaching demand value:

A	C	T:				2	5	8	-	1	/	64	in				
D	M	D:				2	5	0	-	0	/	64	in				
								A	b	s		Q:	130				

The above example is entered by pressing 250.0 and then **Enter** . Then press ☰ to enter “130” for “New Quanty->”. Press ☰ again to display the screen above.

- ☞ Press **Clear** button at any time to delete entered value
- ☞ Press [**Start**] button, gauge moves to entered demand position
- ☞ After each working process Quantity counter decrements (e.g. 129, 128,…0)
- ☞ When Quantity = 0, new demand position and quantity may be entered
- ☞ Press ABS REL button to switch from absolute to relative/incremental mode
- ☞ Press +/ - button to select (-) minus sign to move incrementally towards “0”

Note: Enter saw blade width before moving in incremental mode when needed.

User Level: P1 = saw blade width in 000.000” (e.g. 1/16 blade kerf is 0.062”)

9. Enter a new program

SPECIAL NOTES FOR FULLY AUTOMATIC APPLICATION:
In order to run in a fully automatic mode (cycling a semi automatic saw / punch to run fully automatic and auto start of the PS312), please set ALL P29, P37 and AXIS P46 to required configuration. Also wire CON 3 and CON 10 in conjunction with saw / punch. IMPORTANT: NEVER INTRODUCE AN OUTSIDE POWER source to CON 3, use the 24v supplied on pin 2 for dry contact switch.

The PS312 has a total of 3,000 address lines with 99 maximum programs. The number of programs you require can be selected in Parameter Level "ALL" / Parameter P60 (see chapter 19 **Setting of Parameters** for how to change)

Example: P60 = 20 means you have a total of 150 address lines available for each of the 20 programs (20x150=3,000 address lines)

☞ Press PROG button for 2 seconds to enter Program mode, display shows:

P	r	o	g	r	a	m		N	u	m	b	e	r:			1	
P	r	o	g	r	a	m		f	r	e	e						
P	r	e	s	s		E		t	o		o	p	e	n		Prog	

☞ If the display reads Program **occupied**, press > button to select next available program number where program is free (unoccupied) and press **Enter**

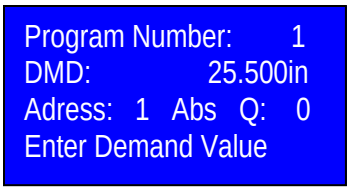
NOTE: You may also override an occupied program values if desired.

The display below will appear:

P	r	o	g	r	a	m		N	u	m	b	e	r:			1	
D	M	D:							0.	0	0	0	in				
A	d	r	e	s	s:			1		Abs		Q:				0	
E	n	t	e	r		D	e	m	a	n	d		V	a	l	u	e

9. Enter a new program (cont.)

☞ Press **0** to **9** buttons to enter Demand value (e.g. 25.500), display shows:

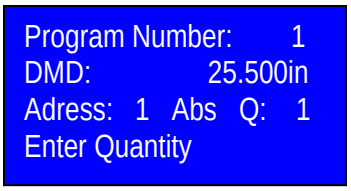


Program Number = 1 (this is program #1)

25.500 = New Demand value

1 = Address line "1" (line 1 of program 1)0 = Quantity "0"
***Abs**=absolute position; Rel= relative/incremental position, press "ABS/REL" button to switch*
*Press **"+/-"** button" button to switch (-) minus sign to move towards "0"*

☞ Press **Enter** button to store entered demand value, Quantity display is now activated. Enter Quantity required (at least a "1" must be entered), display shows:



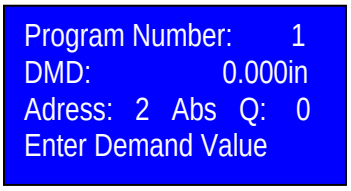
Program Number = 1 (this is program #1)

25.500 = New Demand value

1 = Address line "1" (line 1 of program 1)1 = Quantity "1"
***Abs**=absolute position; Rel= relative/incremental position, press "ABS/REL" button to switch*
*Press **"+/-"** button" button to switch (-) minus sign to move towards "0"*

Note: Quantity = "0" must be entered to the last address line of the program to indicate a parking position for loading new material (no "in position" output will be activated to start machine and no quantity input is necessary to exit program. Additional offset for the parking position may be entered in Parameter Axis 1/P47, see parameter list in Chapter 20)

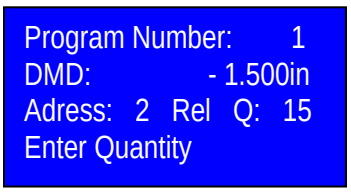
☞ Press **Enter** button again to store entered quantity. Controller automatically goes to address line "2", display shows:



Program Number = 1 (this is program #1)

0.000 = New Demand value

2 = Address line "2" (line 2 of program 1)0 = Quantity "0"
***Abs**=absolute position; Rel= relative/incremental position, press "ABS/REL" button to switch*
*Press **"+/-"** button" button to switch (-) minus sign to move towards "0"*



Program Number = 1 (this is program #1)

-1.500 = New Demand value

2 = Address line "2" (line 2 of program 1)15 = Quantity "15"
***Rel**= relative/incremental position*

This is 15 relative moves towards the saw / punch

☞ Repeat the last steps to enter all required address lines (demand values and quantity) for this program

9. Enter a new program (cont.)

☞ Enter “0” to Qty display to indicate a parking position as the last step of a program (only absolute position), display shows:

Program Number: 1 DMD: 1.000in Adress: 3 Abs Q: 0 Enter Quantity	*Program Number = 1 (this is program #1)* *1.000 = New Demand value* *3 = Address line “3” (line 3 of program 1)0 = Quantity “0”* ***Abs**=absolute position* *This is the last line of the program*

Press **Enter** button again after entering the last demand value and quantity of the program **(Demand value and Qty display must be zero to indicate end of program):**

Program Number: 1 DMD: 0.000in Adress: 4 Abs Q: 0 Enter Quantity	*Program Number = 1 (this is program #1)* *0.000 = New Demand value* *4 = Address line “4” (line 4 of program 1)0 = Quantity “0”* ***Abs**=absolute position* *This line ends the program*

Press PROG button to store and exit the entered program, the display will now exhibit single demand position:

ACT: 220.500in DMD: 300.000in Abs Q: 0	*220.500*	*= Actual value*
	300.000	*= Demand value*
	***Abs**=absolute position*	***0** = no Quantity entered*

Note:

Press ABS REL button any time to select relative move (incremental position)

Press +/- button to select (-) minus sign to move incrementally towards “0” (machine)

SPECIAL NOTES FOR FULLY AUTOMATIC APPLICATION:
In order to run in a fully automatic mode (cycling a semi automatic saw / punch to run fully automatic and auto start of the PS312), please set ALL P29, P37 and AXIS P46 to required configuration. Also wire CON 3 and CON 10 in conjunction with saw / punch. IMPORTANT: NEVER INTRODUCE AN OUTSIDE POWER source to CON 3, use the 24v supplied on pin 2 for dry contact switch.

10. Tool output activation:

The position controller has a total of 15 different tool outputs. For each address line you can select one of these 15 tool outputs (**Parameter All/P6 must be "0" to activate this feature)**. **Also, see chapter 17 for configuration / usage.**

Press SETUP button any time while in program mode to activate and select a "tool output" with any address line. Display shows:

Program Number: 1
DMD: 25.500in
Adress: 1 Abs Q: 0
Enter Demand Value

Press SETUP to

Program Number: 1
DMD: 25.500in
Enter Tool → 4

Tool "4"

Press SETUP button again to save & return to address line "1', display shows:

Program Number: 1
DMD: 25.500in
Adress: 1 Abs Q: 0
Enter Demand Value

Press **Enter** button again to scroll to the next sequential address line in order to save this TOOL value.

Note:

→ **You must press Enter to scroll to the next sequential address line in order to save the tool output entry.**

→ Tool outputs are only available in Program mode, not in Single mode.

→ Tool outputs are only activated in Program Run Mode.

→ Static Tool output (Parameter All/P39 = 0.00) goes high when specific address line is showing up in the display and goes low when display is switching to next address line

→ At the end of program and when exiting a running program the Tool output will be deactivated automatically

→ Press "SETUP" in **Program Run Mode** to see activated tool output. Display shows:

Program Number: 1
DMD: 25.500in
Enter Tool → 0

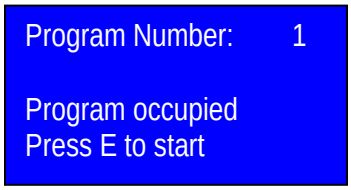
Program Number = 1 (this is program #1)

25.500 = Demand value

Tool output value to be entered

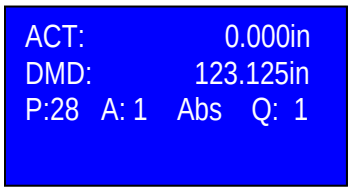
11. Run an existing program

☞ Press PROG button to enter Program mode (DO NOT HOLD, ONLY PRESS ONCE), display shows first program no:



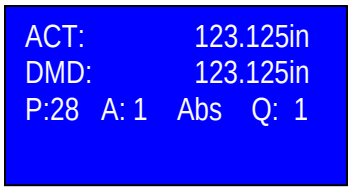
☞ Press < or > buttons to step through all Program numbers, display shows selected program no (e.g. P28):

☞ Press **Enter** button to enter selected program P28, display shows:



Actual: 0.000
Demand value of Address line "1" = 123.125in
Program 28 Address line "1" 1 = Quantity "1"

☞ Press [**Start**] button, gauge moves to first position "123.125", display shows:

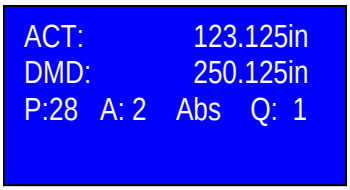


At the end of the working process at the machine Quantity will be decremented from "1" to "0" and display goes to address line no. 2

Note: Depending on the selected positioning mode in Parameter Axis 1/P46 the controller starts automatically to demand position of address line no. 2 (Axis 1/P46=1) or operator must to push the "Start" button any time to move to next position as entered in address line no. 2 (Axis 1/P46=0)

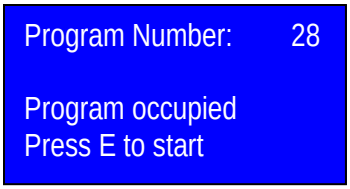
11. Run an existing program (cont.)

☞ Press [**Start**] button again, gauge moves to second position “250.125”, display shows:



Actual: 123.125
Demand value of Address line “2 = 250.125in
Program 28 Address line “2” Abs 1 = Quantity “1”

At the end of program (Quantity display of last address line = ”0”) display shows Program no “P28” again:



☞ Press **Enter** and then [**Start**] button to run same program again (Controller moves to first position in address line no. 1)

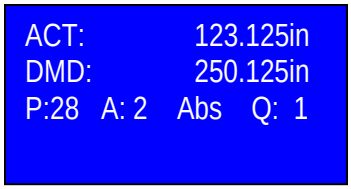
or

☞ Press < or > buttons to select a different program

or

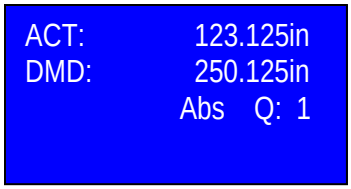
☞ Press PROG button to exit Program mode and to return to “Single Position Mode”

12. Exit a running program



Actual: 123.125
Demand value of Address line "2 = 250.125in
Program 28 Address line "2"; 1 = Quantity "1"

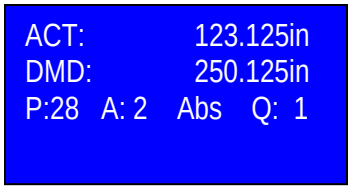
☞ Press PROG button at any time to exit the running program and to return to "Single Position Mode". Display shows:



Actual: 123.125
Demand value = 250.125in
Absolute position; 1 = Quantity "1"

You can now enter a "Single position" outside the program and hit the [Start] button or use the manual mode to move the gauge.

Press PROG button again to re-enter and continue the same program with same line and Quantity as left before. Display shows:



Actual: 123.125
Demand value of Address line "2 = 250.125in
Program 28 Address line "2"; 1 = Quantity "1"

☞ Press [**Start**] button to restart same program at same line again

Note: To exit a running program in order to select and run a different program number press Clear button for 2 seconds.

13. Edit an existing program

☞ Press PROG button for 2 seconds to enter Program mode, display shows :

```
Program Number:      1

Program occupied
Press E to open  Prog
```

☞ Use < or > buttons to select program to be edited, display shows selected program no (e.g. P28):

```
Program Number:      28

Program occupied
Press E to open  Prog
```

☞ Press **Enter** button to enter selected program P28, display shows:

```
Program Number:      28
DMD:              25.500in
Adress:  1  Abs  Q:   0
Enter Demand Value
```

Program: 28
Demand value of Address line "1" = 25.500in
Address line "1"; Absolute; Quantity "1"

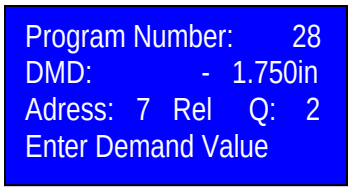
☞ Press < or > buttons to step through all address lines, display shows selected Address line (e.g. "7"):

```
Program Number:      28
DMD:              -  1.500in
Adress:  7  Rel  Q:   2
Enter Demand Value
```

Program: 28
Demand value of Address line "7" = -1.500in
Address line "7"; Relative; Quantity "2"

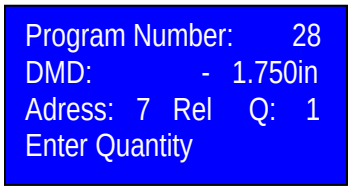
13. Edit an existing program (cont.)

☞ Press **0** to **9** buttons to edit Demand value of Address line No “7”, e.g. “-1.750”. Display shows:



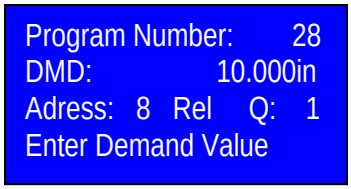
Program: 28
Demand value of Address line “7” = -1.750in
Address line “7”; Relative; Quantity “2”

☞ Press **Enter** button to store edited demand value, Quantity display is now activated. Edit Quantity if necessary (e.g.“1”), display shows:



Program: 28
Demand value of Address line “7” = -1.750in
Address line “7”; Relative; Quantity “1”

☞ Press **Enter** button again to store edited quantity. Controller automatically goes to address line “8”, display shows:



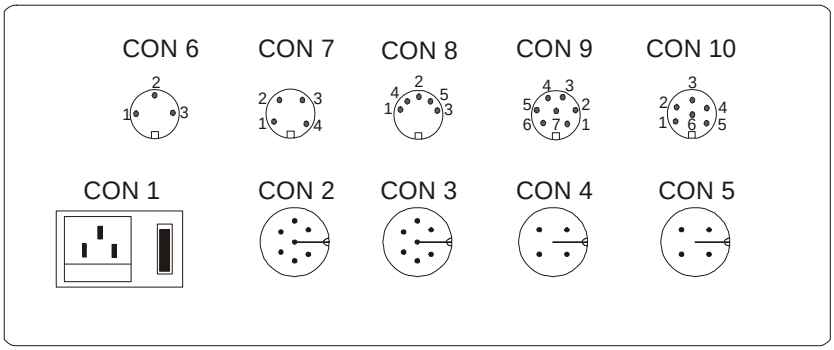
Program: 28
Demand value of Address line “8” = 10.000in
Address line “8”; Absolute; Quantity “1”

☞ Press **<** or **>** buttons to select another address line to be edited

or

☞ Press PROG button to exit “Program mode” and to store and return to “Single Position Mode”.

14. Connections



Rear view

CON1	Power supply
	Connector with fuse
Pin 1	L, 115V, max. 100 mA
Pin 2	N, 115V, max. 100 mA
Pin 3	PE

CON2	Encoder 5v A, /A, B, /B	Encoder 24v A, B, Z
	7 pin female connector	7 pin female connector
Pin 1	GND	GND
Pin 2	+ 5v max. 150mA	+ 24V max. 150 mA
Pin 3	A channel	A channel
Pin 4	B channel	B channel
Pin 5	/A channel	Z zero or index pulse
Pin 6	/B channel	NC
Pin 7	Shield	Shield

CON3	Inputs
	7 pin male connector
Pin1	GND
Pin 2	+ 24V max. 50 mA
Pin 3	Limit switch + direction
Pin 4	Limit switch - direction
Pin 5	Quantity
Pin 6	GND
Pin 7	Shield

14. Connections (cont.)

CON4	Brake
	4 pin male connector
Pin 1	No connection
Pin 2	Brake activated / deactivated
Pin 3	GND
Pin 4	Shield

CON5	Motor
	4 pin female connector
Pin 1	Motor +
Pin 2	Motor -
Pin 3	No connection
Pin 4	Shield

CON6	Outputs (1)
	3 pin female connector
Pin 1	Auxiliary output “3” (P06/ALL = 0) Pneumatic arm extend (P06/ALL = 1)
Pin 2	Auxiliary output “4” (P06/ALL = 0) Pneumatic arm retract (P06/ALL = 1)
Pin 3	GND

CON7	RS232 (Option)
	4 pin female connector
Pin 1	Shield
Pin 2	RxD
Pin 3	TxD
Pin 4	GND

14. Connections (cont.)

CON8	Outputs (2)
	5 pin female connector
Pin 1	No connection
Pin 2	No connection
Pin 3	GND
Pin 4	Auxiliary output “1” (P06/ALL = 0) Pneumatic arm lift (P06/ALL = 1)
Pin 5	Auxiliary output “2” (P06/ALL = 0) Pneumatic arm lower (P06/ALL = 1)

CON9	E-stop option
	6 pin female connector
Pin 1	No connection
Pin 2	No connection
Pin 3	No connection
Pin 4	E-stop
Pin 5	No connection
Pin 6	No connection
Pin 7	E-stop

CON10	Outputs (Option)
	6 pin female connector
Pin 1	Position reached
Pin 2	Coded pin
Pin 3	No connection
Pin 4	End of program
Pin 5	Quantity reached
Pin 6	GND

15. Fault monitoring

Info	Display	Function
Emergency Stop	Demand Value	**E-Stop button** activated. Pull E-Stop button to clear display
CurrEnt	Demand Value	**Motor current** consumption higher than P07 (Ach1) for 2 to 4 sec. Positioning stops automatically.
Ub S1	Actual Value + Demand Value	**Short circuit** with motor or drive. Check motor, motor cable/wiring. Turn power off and on to clear message. Controller has to be referenced after power on.
EncodEr	Demand Value	Controller didn't receive encoder Pulses. Check encoder, encoder Cable or encoder coupling
EndU	Demand Value	Mechanical limit switch in - direction is activated. Press "E"-button to enter manual mode to release limit switch
EndO	Demand Value	Mechanical limit switch in + direction is activated. Press "E"-button to enter manual mode to release limit switch
PdError	Demand Value	Actual value or parameters have not been saved properly on power down. Double check actual value and all parameters. Press "E" button twice to clear Message.

16. Measuring error compensation

To compensate mechanical measuring errors you may enter a list of up to 100 compensation values over your entire measuring length. The position controller automatically calculates linear error compensation between each entered compensation value. The compensation value is the value you want to read in your actual value display instead of the actual shown value.
Before activating the measuring error compensation prepare your list of actual and compensation values. You have to enter at least two data lines (min. and max. software limit)
Here is an example with 2 compensation values:

Min. software limit (Axis 1/P3) = 0.000
Max. software limit (Axis 1/P4) = 100.000

Displayed value	Real compensation value
50.000	50.031
70.000	70.031

Upon power up, the in normal single demand function mode, you must be in decimal mode (mm or inch decimal) for entering the compensation table.

A	C	T:							3	.0	0	0	in
D	M	D:							3	.0	0	0	in
								A	b	s		Q:	1

Press the SETUP button to enter Parameter Levels and the display will exhibit:

D	A	t	u	m	i	n	g

Press the Inch mm button to scroll and find the Parameter ALL, the display will exhibit:

Pa	r	a	me	ter			A	L	L

Press the Enter button to enter the Paramter All the display exhibits (similar to below):

			P	a	r	a	m	e	t	e	r		A	l	l	
			P	0											1	

Use the > and < buttons to scroll through the Parameters, P0 – P99 (see description of parameters in Chapter 20. Parameter list). **Scroll to "P35"**

			P	a	r	a	m	e	t	e	r		A	l	l	
			P	3	5										2	

Press "5" button to enter desired value "5" for measuring table, then

Press **Enter** to save the entry:

			P	a	r	a	m	e	t	e	r		A	l	l		
			P	3	5										5		

Press **Enter** to scroll to next and confirm:

			P	a	r	a	m	e	t	e	r		A	l	l		
			P	3	6								0.	2	0		

Use the **>** and **<** buttons to scroll through the Parameter 41

			P	a	r	a	m	e	t	e	r		A	l	l		
			P	4	1										0		

Press “1” button to change value to “1” the Parameter 41

			P	a	r	a	m	e	t	e	r		A	l	l		
			P	4	1										1		

Press **Enter** to save the entry:

			P	a	r	a	m	e	t	e	r		A	l	l		
			P	4	1										1		

Press **Enter** to scroll to next and confirm:

			P	a	r	a	m	e	t	e	r		A	l	l		
			P	4	2										0		

Exit the Parameter ALL by pressing the SETUP button to display:

Pa	r	a	me	ter			A	L	L

Press the SETUP button **again** to exit Parameter Levels and return to Single Position Mode.
The lower display will flash “Store to EEprom” as exiting Parameter Levels.

A	C	T:							3	.0	0	0	in	
D	M	D:							3	.0	0	0	in	
								A	b	s		Q:	1	

Now we will enter our measuring comp table:

Line 1: Must be = to low software limit: 0.000in (value in P3 / AXIS 1)

Press the Inch mm button to enter the measuring comp table in mm mode:

Dis	Value	:							0	.0	0	0	in
Real	Value	:							0	.0	0	0	in
Comp	Point	Nr											1
Enter	Display	Value											

Every 50 inches must require a Value Entry, even if even.

Line 2: Must be = Displayed =50.000in; Real Value =50.031in

Dis	Value	:						5	0	.0	0	0	in
Real	Value	:						5	0	.0	3	1	in
Comp	Point	Nr											2
Enter	Display	Value											

Line 3: Must be Displayed =70.000in, Real Value =70.031in

Dis	Value	:						7	0	.0	0	0	in
Real	Value	:						7	0	.0	3	1	in
Comp	Point	Nr											3
Enter	Display	Value											

Line 4: Must be Software High Limit = 100.000 (value in P3 / AXIS 1)

Dis	Value	:					1	0	0	.0	0	0	in
Real	Value	:					1	0	0	.0	0	0	in
Comp	Point	Nr											4
Enter	Display	Value											

Line 5: Enter through next line to finish the comp table

Dis	Value	:									.	0	in
Real	Value	:									.	0	in
Comp	Point	Nr											5
Enter	Display	Value											

Press the Inch mm button to Save the measuring comp table in mm mode, and below appears in a flash:

The lower display will flash “Store Datas” as returning to normal single mode.

Please change ALL P35 back to value “2” upon completion of comp table entry, P41 of ALL must be = 1 for activation.

17. Tool outputs / Auxiliary outputs

→ Parameter P06/ALL must be set to “0”
→ Tool outputs are binary coded (4 hardware transistor outputs = 15 binary coded outputs

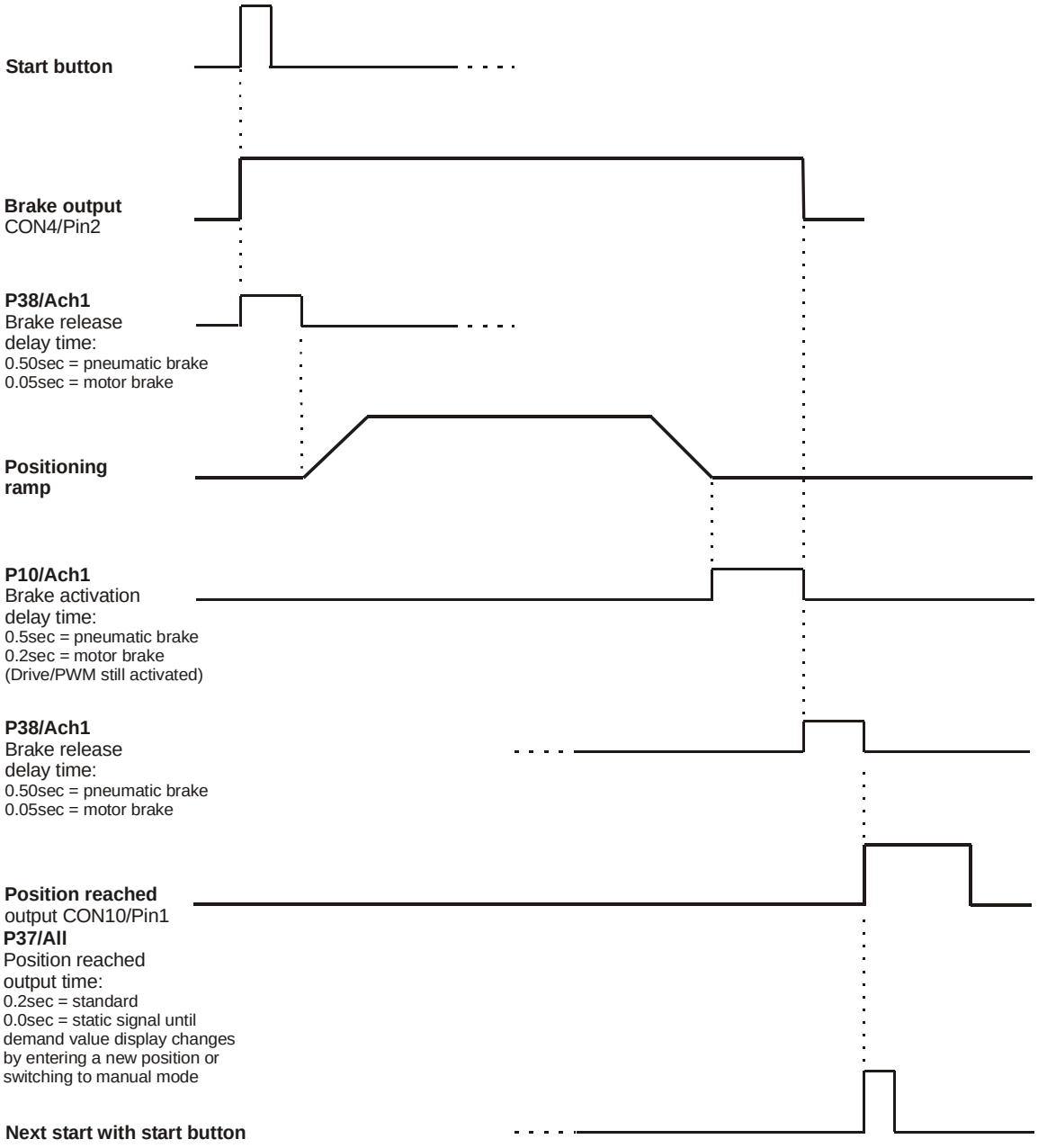
CON6	Outputs (1)
	3 pin female connector
Pin 1	Auxiliary output “3” (P06/ALL = 0)
Pin 2	Auxiliary output “4” (P06/ALL = 0)
Pin 3	GND

CON8	Outputs (2)
	5 pin female connector
Pin 1	NC
Pin 2	NC
Pin 3	GND
Pin 4	Auxiliary output “1” (P06/ALL = 0)
Pin 5	Auxiliary output “2” (P06/ALL = 0)

Setting	Activated pins
0	No output activated
1	Con 8, Pin4
2	Con 8, Pin5
3	Con 8, Pin4 + Pin5
4	Con 6, Pin1
5	Con 6, Pin1 Con 8, Pin4
6	Con 6, Pin1 Con 8, Pin5
7	Con 6, Pin1 Con 8, Pin4 + Pin5
8	Con 6, Pin2
9	Con 6, Pin2 Con 8, Pin4
10	Con 6, Pin2 Con 8, Pin5
11	Con 6, Pin1 Con 8, Pin4 + Pin5
12	Con 6, Pin1 + Pin2
13	Con 6, Pin1 + Pin2 Con 8, Pin4
14	Con 6, Pin1 + Pin2 Con 8, Pin5
15	Con 6, Pin1 + Pin2 Con 8, Pin4 + Pin5

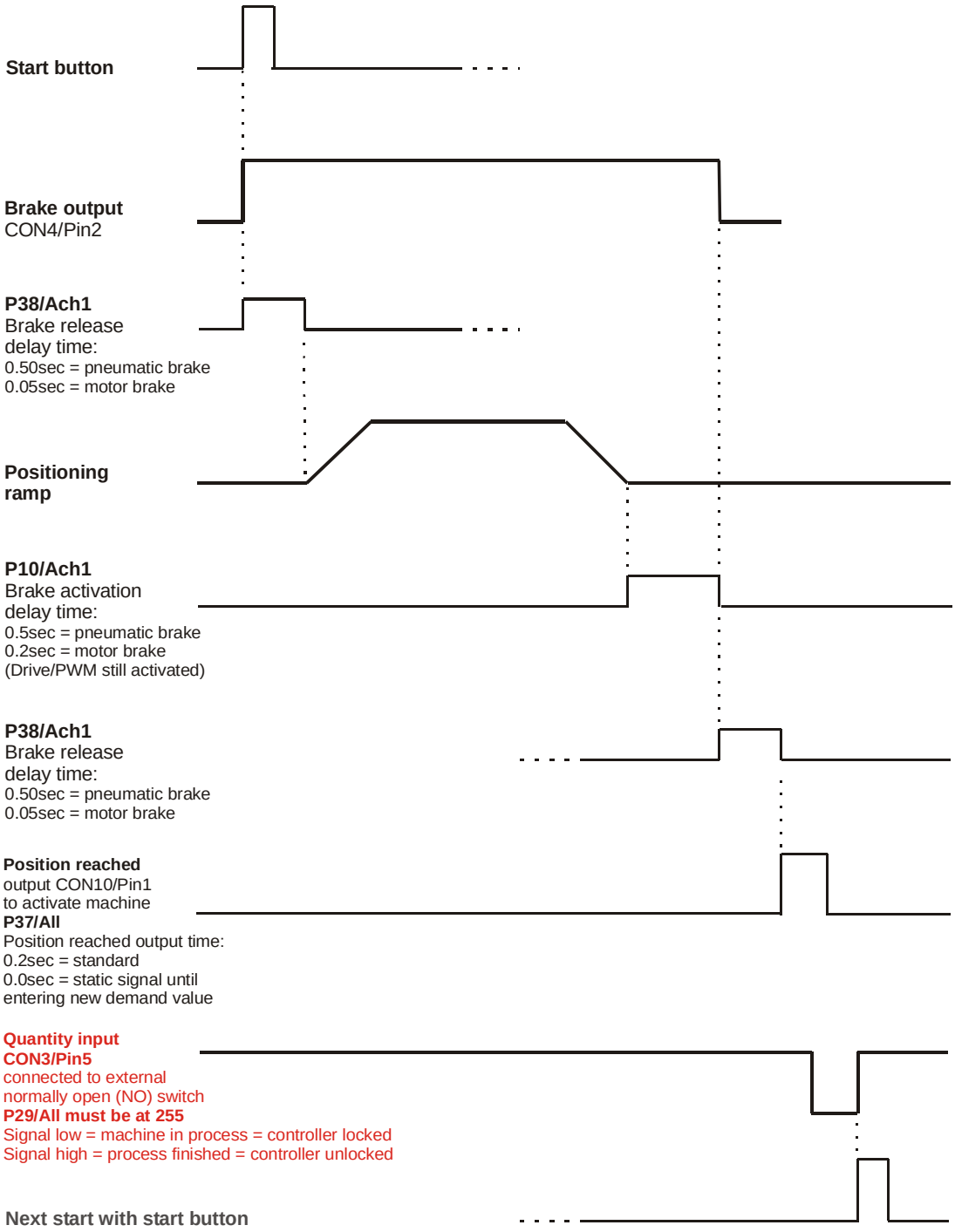
18. Timing diagrams

Single positioning, no Qty switch connected to Qty input CON3/Pin5 (P29/All = 247)



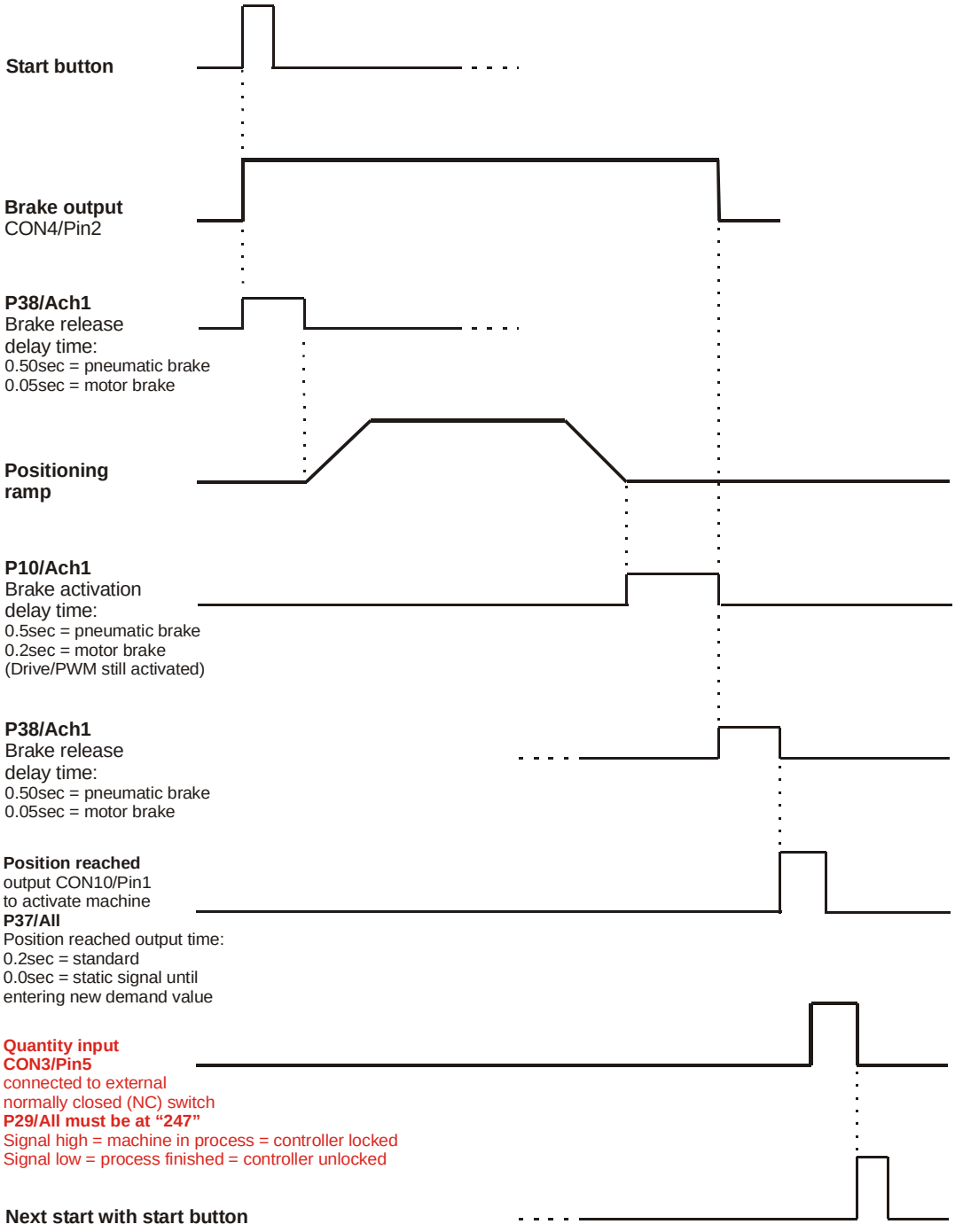
18. Timing diagrams (cont.)

Single positioning <u>with</u> Qty switch, Qty switch = normally open (NO), P29/All = 255



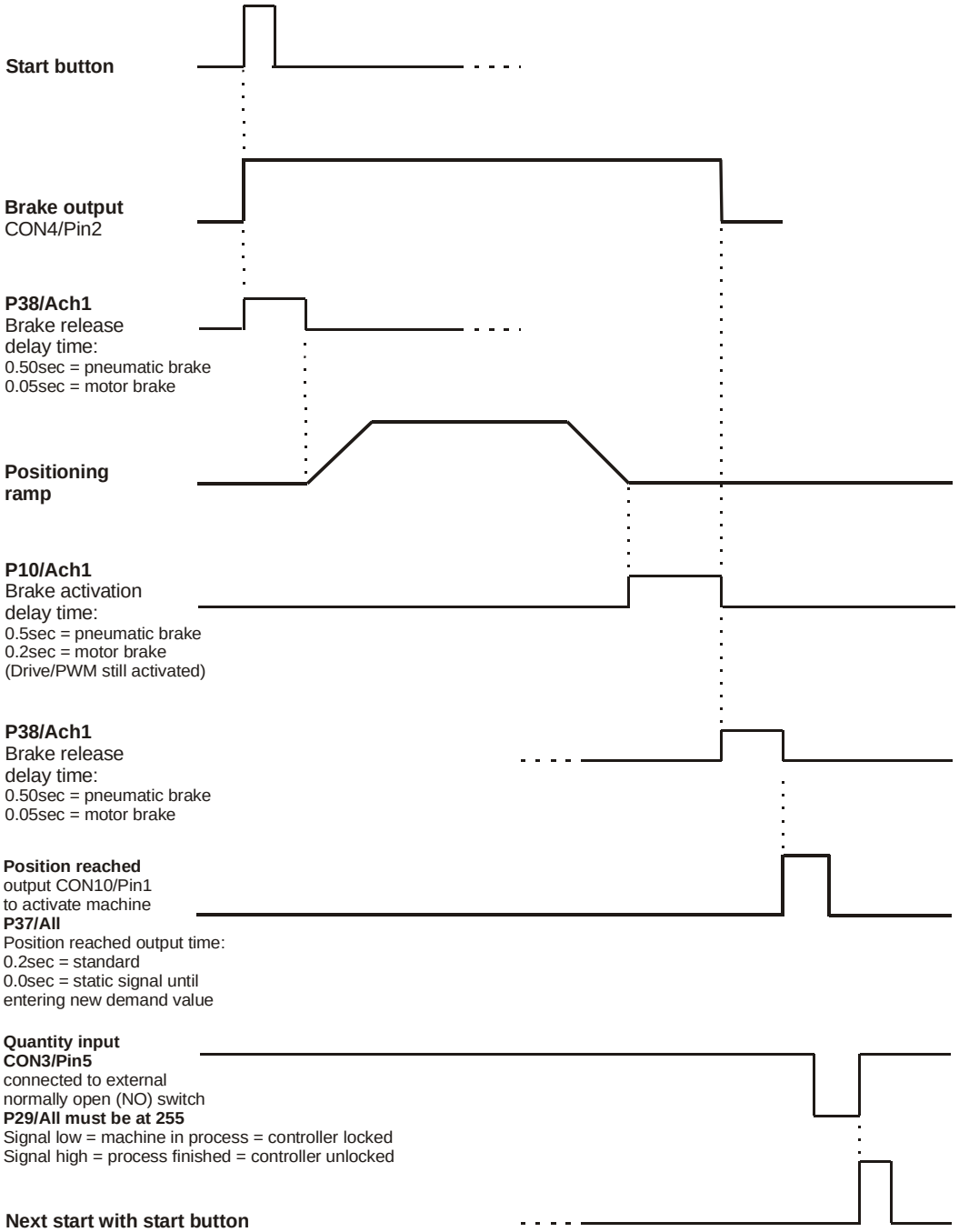
18. Timing diagrams (cont.)

Single positioning <u>with</u> Qty switch, Qty switch = normally closed (NC), P29/All = 247



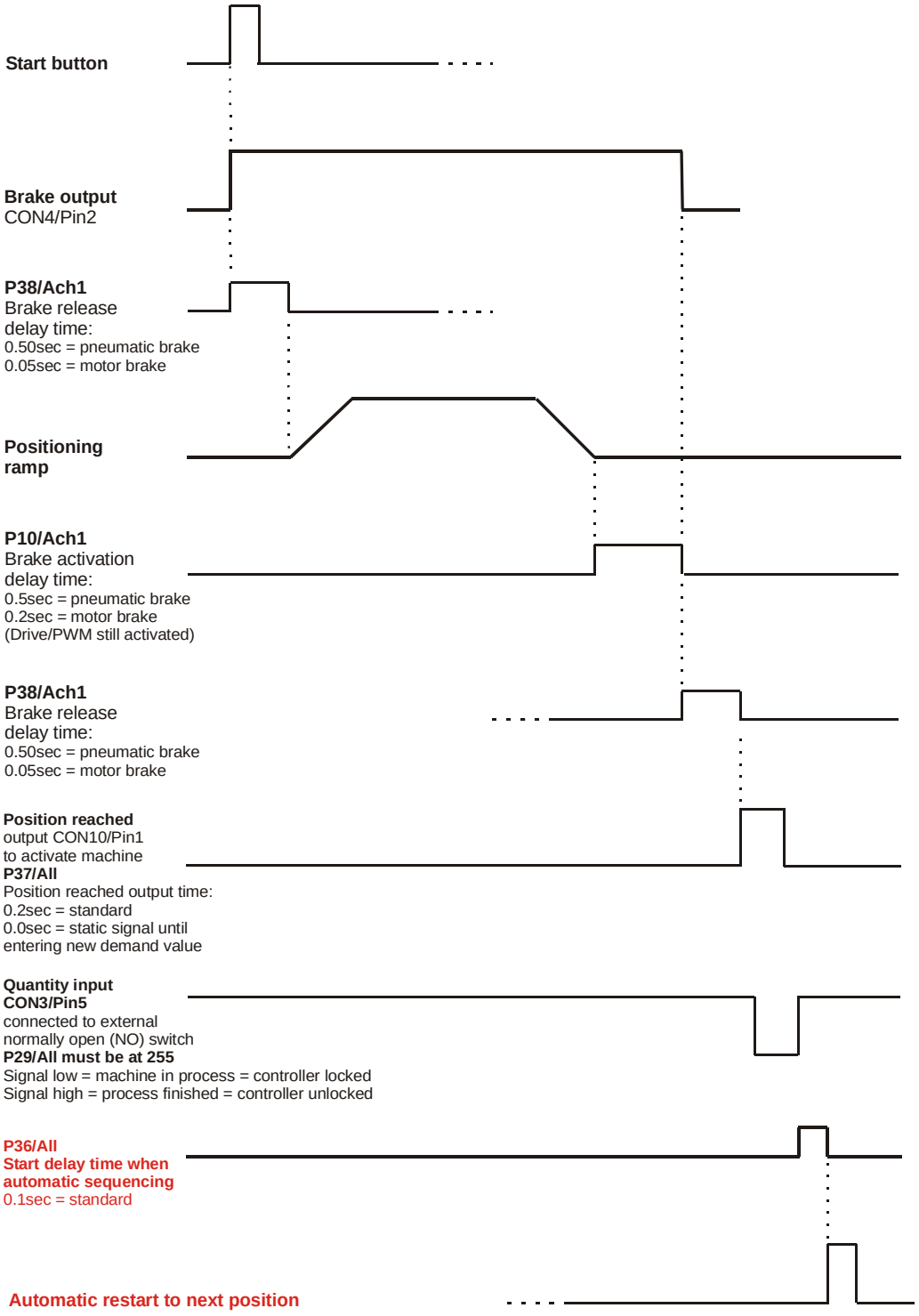
18. Timing diagrams (cont.)

<u>Manual</u> Sequencing in Program Mode, Qty switch = normally open (NO), P29/All = 255
P46/Ach1 = 0 = automatic sequencing deactivated



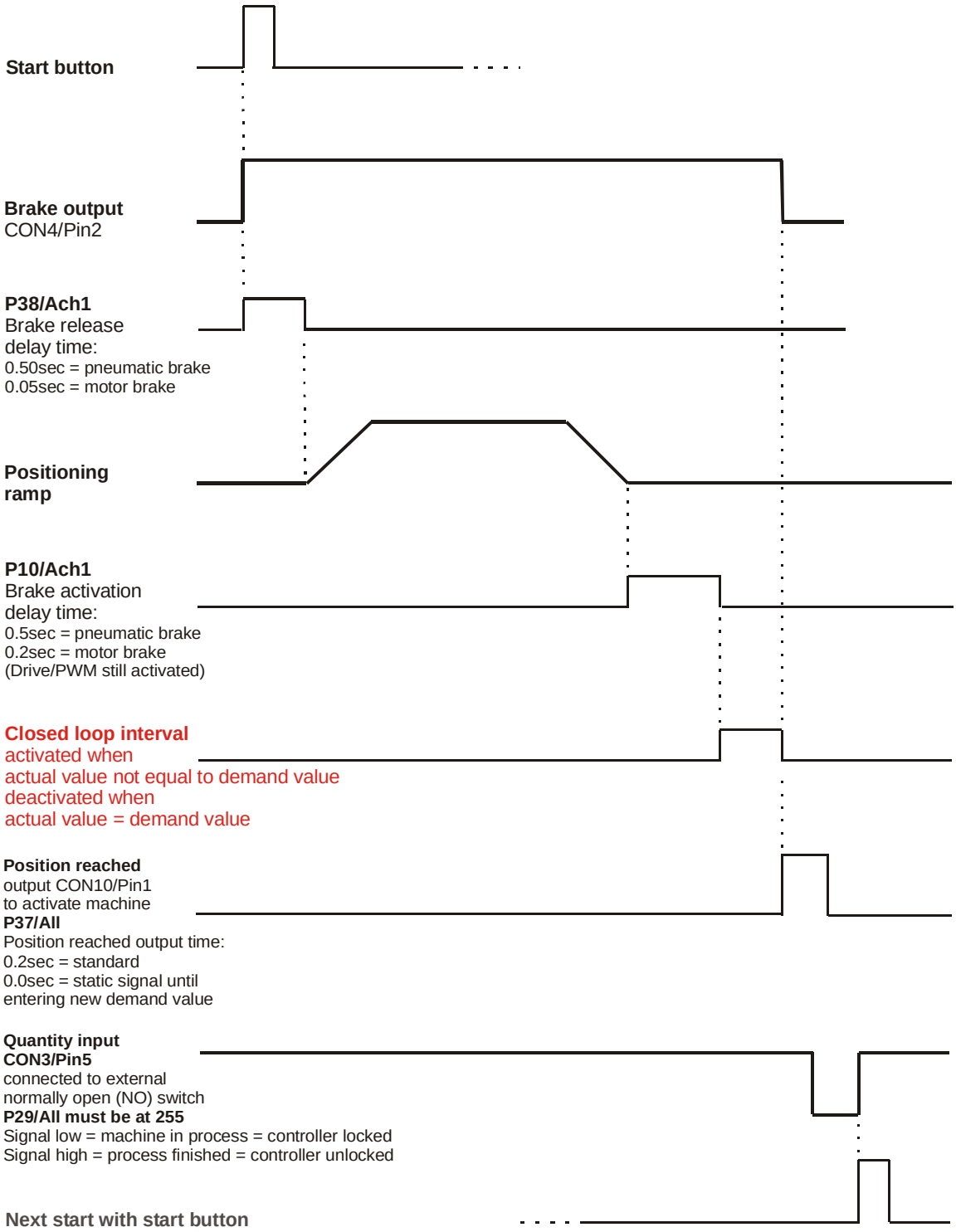
18. Timing diagrams (cont.)

<u>Automatic</u> Sequencing in Program Mode, Qty switch = normally open (NO), P29/All = 255
P46/Ach1 = 1 = automatic restart after Qty input signal



18. Timing diagrams (cont.)

Closed loop positioning (Parameter P48/Ach1 = 1)



19. Setting of Parameters (and User Level parameter list)

There are 7 different Parameter Levels, only the 4 listed blue Levels are applicable:

"Datuming"	To reference position
"User Level"	To select fractional / decimal mode and to enter saw blade width
"Parameter All"	General parameters
"Parameter Axis 1"	Related to function of specific application

"Factory Level"	(Not applicable for Kentucky Gauge)
"Hardware Test"	(Not applicable for Kentucky Gauge)
"Adjust Motor"	(Not applicable for Kentucky Gauge)

Press the SETUP button to enter Parameter Levels and the display will exhibit:

D	A	t	u	m	i	n	g

From this point, either enter the Datuming Level as desired to change the reference value (this may also be accomplished by Set Datum as described in Chapter 4, page 6) or scroll to the next desired Parameter Level.

To enter Datuming Level, press **Enter** and follow instructions in Chapter 4 (page 6).

To scroll to User Level, press the Inch mm button and find the User Level, the display will exhibit:

U	s	e	r		L	e	v	e	l

To enter User Level, press **Enter** and follow instructions in Chapter 3 (page 5).

To scroll to Parameter All Level, press the Inch mm button and find the User Level, the display will exhibit:

P	a	r	a	m	e	t	e	r		A	l	l

To enter All Level, press **Enter** and the display will exhibit:

			P	a	r	a	m	e	t	e	r		A	l	l		
			P	0											1		

Use the > and < buttons to scroll through the Parameters, P0 – P99 (see description of parameters in Chapter 20. Parameter list).

19. Setting of Parameters (cont.)

Upon reaching the desired parameter to be changed (for example, P48 quantity counter function), Press 0 to 9 buttons to enter desired value (e.g. 1 for automatic decrementing), then Press Enter to save the entry, the display advances to the next parameter (49) and exhibits:

			P	a	r	a	m	e	t	e	r		A	l	l	
			P	4	9								0.	0	0	0

After entering the require values for desired functions, exit the Parameter All Level by pressing the SETUP button to display:

			P	a	r	a	m	e	t	e	r		A	l	l	

Press the SETUP button again to exit Parameter Levels and return to Single Position Mode. The lower display will flash “Store to EEprom” as exiting Parameter Levels.

This procedure is also performed for entering / changing parameter values in “Parameter Axis 1”, which is next in scroll order after Parameter All.

User Level Parameters:

“User Level” Parameters	Default	User Settings
P 0 Fractional / Decimal mode	1	1
P 1 Saw Blade Width	**0.000**	**0.000 (inch)**

Parameter 0 User setting description:

User setting	Display
0	The display shows the actual and demand values in decimal. With the Inch mm key, the user can switch between inch and mm.
1	The display shows the actual and demand values in fractional. To switch from foot to inch to fractional the key with the decimal point is used. The actual value in the display is blinking. When the enter or the start key is pressed, the input is finished. The Inch mm key is used to switch the display between foot, inch, fractional and inch, fractional.

20. Parameter List (ALL and Axis 1)

Parameter All	Default	User Settings
P 0 Number of axis	1	1
P 1 Serial No	0.312	0.312
P 2 Software No	0.001	0.008
P 3 Customer No	0.000	0.000
P 4 Distance reference switch to Zero pulse of the ncoder	0.000	0.000
P 5 Automatic “go-to datum” Routine activation	0 = deactivated 1 = activated	0
P 6 Operation mode	0 = with auxiliary outputs for tool activation via connector CON6, Pin 1+2 and CON8, Pin 4+5 1 = with pneumatic retract and pneumatic arm lift/lower via connector CON6 + CON8	1
P7 Accuracy Multiplier	0	0
P29 Function input configuration (see example at the end of the parameter list)	247 (Qty=NC) (without or with NC Qty switch) 255 (Qty=NO) (with NO Qty switch)	255
P30	0	0
P33 Encoder signal input	0 = GND 1 = +24v	0
P34 Function input level	0 = GND 1 = +24v	1
P35 Function of the “inch/mm” button	2 = inch/mm conversion 3 = frequency measuring 5 = editor for error compensation	2
P36 Positioning start delay time when automatic sequencing	1.00	0.2
P37 In Position output time	1.00 0.00= static	0.20
P38 Qty reached output time	1.00	0.20
P39 Auxiliary output time	0.00 = static 0.20 to 2.50 sec = pulse length	0.50
P40 Retract function (“1” and “2” only when P29 = 255, qty input = NO	0 = by push button only 1 = automatic retract when qty input deactivated, extend only with button 2 = automatic retract when qty input deactivated, automatic extend when qty input activated again 4 = automatic qty decrement when pushing the “arm extend” button	0
P41 Measuring error Compensation	0 =Not activated 1 =Activated	0
P42 Security Code for level	0	0

ALL, BUS and Ach1		
P43 Security Code “Measuring Error compensation”	1492	1492
P44 Security Code for level rEF + „R“ button	1776	1776
P45 Function of “Abs/Rel” button	0 = disabled 1 = abs/rel switching	1
P46 Function of “In Position “ output	0 = always activated 4 = only active in program mode	4
P48 Quantity counter function	0 = decrementing only with external Qty switch via Qty input CON3/Pin5 1 = automatically decrementing when “position reached” output is activated	0
P49 Arm lift disable position	0.000	0.000
P60 Number of programs (1-99)	50	50
P61 Program sequence mode	0 = first address line always absolute position 1 = first address line as entered 2 = Automatic program restart at end of progr am 3 = combined features (2+1) 4 = < and > buttons are activated in “program running” mode to select different address line 5 = combined features (4+1) 6 = combined features (4+2) 7 = combined features (4+2+1)	1
P62 Actual program number	read only	--
P63 Demand value status	read only (0=abs / 1=inc)	--
P64 Software limit monitoring when pushing the “Prog” button to exit the program	0 = deactivated 1 = activated when entering incremental positions. After pushing the “P” button controller will jump to the address line that violates the software limit (Ach1 P3+4)	0
P65 Position Reached Output enable for first program position	0 = position reached signal enabled for all program positions 1 = position reached signal disabled for the first line of the program	0

P66 Tolerance window mode	0 = tolerance window calculation only within brake release delay time (Ach1/P38) 1 = tolerance window calculation always activated 2 = Pushing “Start” again within tolerance window activates “In Position” output again when positioning in absolute mode (combined with tolerance window mode “0”) Note: “In position output time (All/P37) must be greater than zero (zero = static) 3 = Pushing “Start” again within tolerance window activates “In Position” output again when positioning in absolute mode (combined with tolerance window mode “1” Note: “In position output time (All/P37) must be greater than zero (zero = static)	1
P67 Brake activation mode	0 = after Ach1/P10 delay time (for pneumatic brake) 1 = immediately after position is reached (motor brake only)	0
P68 Start Button enable in program mode	0 = Start button enabled in program mode 1 = Start button disabled in program mode (only quantity input will advance program)	0
P90 Serial address	11	11
P91 Baud rate	0 = 4800, 1 = 9600 (for barcode) 2 = 19200, 3 = 38400	3
P92 Serial protocol	0 = standard serial protocol 1 = protocol for barcode scanner	1
P93 Barcode scanning in program mode	0 = only demand value is set 1 = demand value is set, quantity is set to 1 and the next step is activated.	1
P94 Serial output activation	0	0
P95 Serial output configuration	0	0
P98 “P” button activation	0 = “P” button enabled (with program) 1 = “P” button disabled (without program)	0
P99 Automatic demo mode	0 = deactivated 1 = activated	0

Parameter Axis 1	Default	User settings
P 0 Actual value for RS232	Read only	Read only
P 1 Demand value for RS232	Read only	Read only
P 2 Datum value for RS232	Read only	Read only
P 3 Software limit -	0.000	0.000
P 4 Software limit +	999.000	120.000
P 5 Distance for Multiplication	**3.937=inch (For Kentucky Gauge PD50, PD100, PDE, PD1000)** 7.874=inch (TSR70B / 8:1) **100.0=mm For Kentucky Gauge PD50, PD100, PDE, PD1000)**	3.937 (inch) 100.0 (mm)
P 6 Number of increments (max. 30,000)	7200 (PD40P) + up to 11/2003 10000 (PDxx) **20000 (For Kentucky Gauge PD50, PD100, PDE, PD1000)** 29091 (TSR70B / 8:1) 27273 (TSR70B / 15:1) 5080 (5micron linear)	20000
P 7 Max. Permanent current in Amps (+/- 10% measuring tolerance)	4.00 = PD50, PD100, PD100Q, PDE, TSR70B 6.00 = TSR80S, PD100P, PDE-P PD1000 7.00 = PD1000P	4.00
P 8 No. of automatic restarts (Must be “0” when closed loop feature activated, Ach1/P48=1)	1 = PDxx 0 = PDxx, no gripper but pusher 0 = TSR70B + TSR80S	0
P 9 Tolerance window	6 = TSR70B 4 = TSR80S 6 = PDxx	6
P10 Brake activation delay time when position reached and All/P67=0, and Automatic restart delay time (P8>0) motor over-heating	0.50 = PDxx with pneumatic brake 0.20 = PDxx no brake/motor brake 0.20 = TSRxx	0.20
P11 Max. Ramp distance (P70 = 0, only for stop applications)	15000 = PD50 (30v) 8000 = PD100 10000 = PD100P 45000 = PD100Q (30v) 16000 = PDE 15000 = TSR80S	--
P11* Max. Ramp distance (*when using time controlled drive / P70=1 for pusher applications, enter here: “P61xP71” = ramp distance	37500 (TSR70 / 80) 40850 (PD40P) 56000 (PD40 & PD100 / 15:1) 52000 (PD100-Q / 8:1/80% speed) 45000 (PD100-P / 15:1/180lbs) (PDE / 8:1) 84000 (PDE-P / 8:1/220lbs) 45000 (PDE-P / 15:1/440lbs) (PDE-P old / 21:1/440lbs) (PD1000 / 8:1) (PD1000-P/23.2:1/2,000lbs)	56000
P12 Drive mode after position reached	0 = drive is turned off after position is reached (motor can	1

	easily be moved out of position when no brake is activated; generated overvoltage can harm the motor) 1 = Motor pins are automatically connected to ground when position is reached (transistor short circuit bridge to avoid overvoltage. Motor cannot be moved out of position anymore)	
P13 Fast speed Forward + backwards (Percentage of max speed)	100 80 = PD100Q	100
P14 Manual slow speed (Percentage of max speed)	20	20
P15 Deceleration ramp Time interval (msec)	0.200	0.200
P16 Fast speed backwards only	0 = as entered in P13	0
P17 Backlash compensation Dwell time	0.00 (= deactivated) 0.02 (TSR70B)	0.00
P18 Backlash compensation Distance (**P18 > P9**)	0.002 0.015 (TSR70B motor at far end) -0.015 (TSR70B motor next to machine)	0.002
P19 Integral term 1	1 (= max. ramp)	1
P20 Integral term 2 at automatic restart (P8>0)	1	1
P21 Differential term	0	0
P22 Feedback monitoring Interval (msec) 1/P22 x P23/P24 = max. drive frequency in kHz (P74 Integral term monitoring time interval)	PDxx = 0.20 TSR70B = 0.10 TSR80S = 0.10	0.20
P23 Feedback acceleration Ramp pulse no.	1	1
P24 Feedback deceleration Ramp pulse no.	1	1
P25 Edge counting mode	4	4
P26 Counting direction	0 = right side mounting 1 = left side mounting	1
P34 Brake amplification	0	0
P35 Deadman zone -	0.000	0.000
P36 Deadman zone +	0.000	0.000
P37 Counting direction for Manual mode	0 = right side mounting 1 = left side mounting	0
P38 Brake release delay time (tolerance window calculation time, P66=0)	0.20 (PDxx) 0.05 (TSR70B + TSR80S)	0.20
P39 Retract distance	0.000 (=pneumatic)	0.000

P40 Decimal place	3	3
P41 Display brightness	15	15
P42 Positioning mode	0 = absolute 1 = incremental	0
P43 Incremental move mode 0 = without incremental error compensation for saw and cutting applications 1 = with incremental error compensation for punching and drilling applications	0 = no incremental error compensation 1 = with incremental error compensation 2 = same as 0 and relative moves are always toward zero 3 = same as 1 and relative moves are always toward zero	0
P45 Parking position (teach) only with Pusher software	0 = not activated	0
P46 Automatic Program sequence	0 = not activated 1 = automatic restart after Qty input)	0
P47 Offset parking position (Parking position = last address line of a program with Qty = 0)	0	0.000
P48 Closed loop feature (Ach1/P8, automatic restart must be “0” when closed loop feature activated (=1)	0 = deactivated (Stop with brake) 1 = activated (Stop without brake or Pusher with brake) 2 = closed loop function as a proportional and integral controller	0
P49 Closed loop response time in msec	1 = fastest response time	1
P50 Closed loop window (automatic feedback when outside this window) < than P09 with separate encoder	5 = PDxx 3 = TSR80S 9 = TSR70B	0.003

P51 Closed loop mode	0 = only activated after each positioning (closed loop to demand value only) 1 = also activated after hitting Stop button or when turning power on (closed loop to actual value) 2 = for pusher with brake. Closed loop mode also activated during P10 delay time after position is reached (to avoid carriage moving out of position by material gravity while brake is not activated yet.	0
P53 "Go-to-datum" direction	0 = in (-) direction 1 = in (+) direction	1
P54 Zero pulse edge trigger	0 = falling edge 1 = rising edge	1
P55 "Go-to-datum" offset New actual value (P00) = Datum value (P2) + P55	0	0.000
P56 Parking position after "Go-To-datum" routine	0	0.000
P57 Encoder monitoring interval in 0.000 sec	0=not activated	0.000
P58 Ramp threshold to activate Encoder monitoring interval	30%	30%
P59 "Go-to-datum" speed (%) Percentage of max speed	100%	100%
P60 Motor rotation direction	0 = left side mounting 1 = right side mounting	0
P61 Max. encoder counting Frequency at 100% max. Speed (P13=100). To be measured when time Controlled drive required (P70=1) → via "M" button (All/P35=3/see installation guide)	150000 (TSR70B) (TSR80S) 40850 (PD40P / 15:1) 56000 (PD40 / 15:1) (PD100 / 15:1) 52000 (PD100-Q / 8:1/80% speed) 45000 (PD100-P / 15:1/180lbs) (PDE / 8:1) 84000 (PDE-P / 8:1/220lbs) 45000 (PDE-P / 15:1/440lbs) (PDE-P old / 21:1/440lbs) (PD1000 / 8:1) (PD1000-P/23.2:1/2,000lbs)	111928
P62 Encoder pulse time interval to be compared with P61	0 = P61/62 deactivated	0.0000
P70 Time controlled PI drive activation (measure counting frequency P61 first)	0 = standard drive (via P11) 1 = P71 to P76 activated	1
P71 Ramp time	(0 to max speed, don't enter values	0.5000

	less than min motor ramp time)	
P72 Proportional Gain 1	(Acceleration ramp) Increase value in 0.0050 increments when stopping with max. material weight before reaching demand position when using as a pusher	0.3000
P73 Proportional Gain 2	(Deceleration ramp) Increase value in 0.0050 increments when over-shooting with max. material weight when using as a pusher	0.3000
P74 Integral term	To ensure: a) smooth positioning for the last ¼ to ½ inch of deceleration ramp) b) precise positioning for very short (< 1inch) distances	0.0040
P75 Differential gain (0-100%)	0 = not activated	0
P76 Automatic Proportional Gain limitation	0 = deactivated 1 = activated	1
P77 Ramp adjustment factor	1.00 (ideal, high dynamic motor) (>1.00 when overshooting <1.00 when not reaching position)	1.00
P78 Stop arm offset mode (when additional arm extension is required to get closer to the tool)	0 = not activated 1 = via "**<**" button offset value as entered in P64 will be subtracted from actual value ("**I-**" will be shown in demand value display) "**>**" button deactivates offset (offset value P64 will be added again to actual value 2 = offset activation via external proxy switch to recognize mounted arm extension (optional connector CON9 with offset input required) 3 = Homing function. Pressing the "Back" Key will automatically display the value stored in P79 in the demand display	0
P79 Offset value for stop arm extension (see P78 = 3)	0.000 (=length of arm extension)	0.000
P80 Controller status Only activated with RS232	0 = not ready 1 = ready to operate 2 = controller is positioning 4 = controller in position 8 = go-to-datum routine active 16 = over-current 32 = short-circuit 64 = encoder error 128 = software limit reached 256 = program run mode activated	read only

21. Description of All/P29 -Input configuration

Input	0	1	2	3	4	5	6	7
NC/NO	NO	NO	NC	NC/NO	NC/NO	NO	NC/NO	NC/NO
Binary	1	1	0	0/1	0/1	1	0/1	0/1
Decimal	1	2	4	8	16	32	64	128

NO = Normally Open (binary value = 1)
NC = Normally closed (binary value = 0)
Parameter All/P34 must be at "1" (Input level = 24v, 24v activates input)

Input	Function	Decimal
0	Start	1
1	Stop	2
2	Zero/Index pulse enable	4
3	Quantity	8
4	Arm lift/lower	16
5	Arm retract/extend	32
6	Limit switch (-)	64
7	Limit switch (+)	128

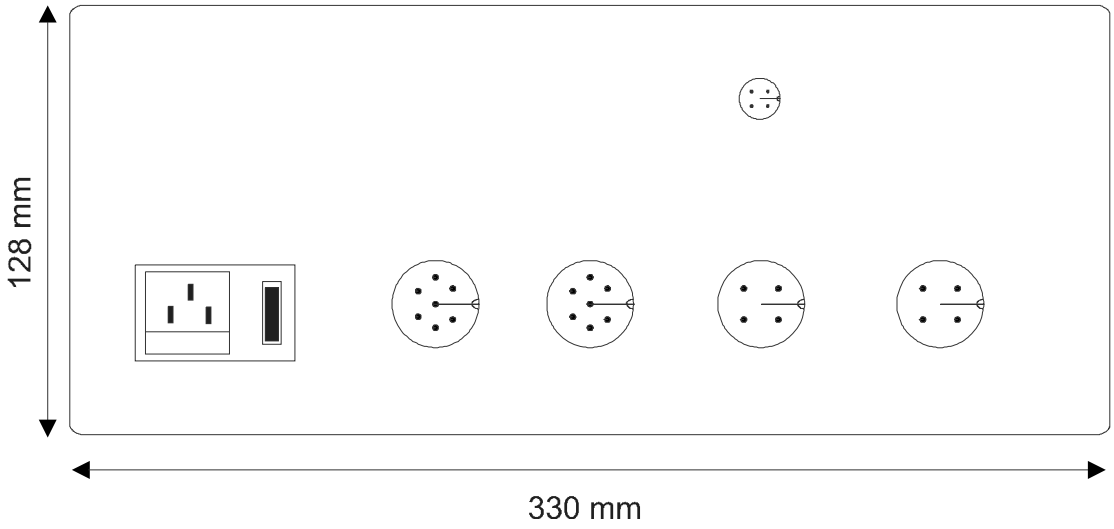
To get parameter value to be entered determine if input 3, 4, 6 and 7 is needed as NO or NC. Then multiply the binary value with the decimal value for each input and add up the results of each input.

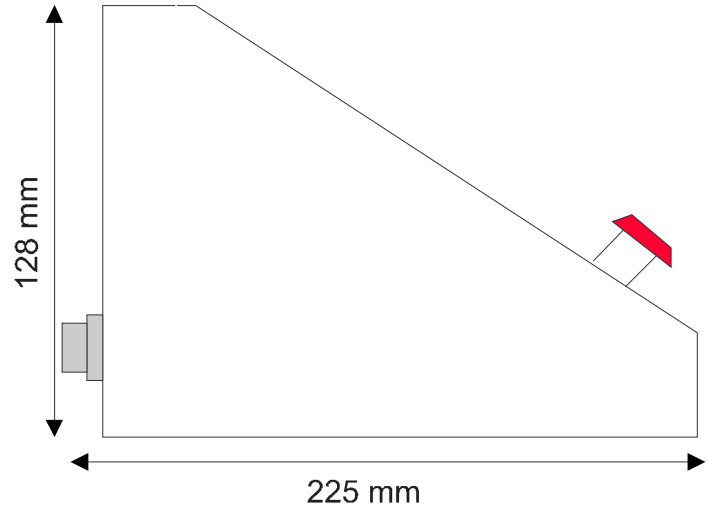
Example: Input 3 and 4 = NO, Input 6 and 7 = NC

Input	NC / NO	Binary	Decimal	Binary x Decimal	
0	NO	1	1	1	+
1	NO	1	2	2	+
2	NC	0	4	0	+
3	**NO**	**1**	**8**	**8**	**+**
4	**NO**	**1**	**16**	**16**	**+**
5	NO	1	32	32	+
6	**NC**	**0**	**64**	**0**	**+**
7	**NC**	**0**	**128**	**0**	**=**
			Total	**59**	

Enter "59" in parameter All/P29 to get required input configuration

22. Dimensions





23. Specifications

Power supply	115vac ± 10%
Consumption	Max. 200mA without encoder and motor current
Max. permanent motor current	6 amps, intermittent current 20 amps
Encoder signal	A, B, at 24v level
Counting frequency	100kHz (4 edge counting mode) 250kHz (1/2 edge counting mode)
Display	LCD digits, white with blue backlight
Operating temperature	0° to 40°C (32° to 104°F)
Condensation	Max. 90 %
Outputs	Max. 8 transistor outputs 0.7A / 30vdc
Function Inputs	4
Protection	IP 54

24. Warranty

Hymark Ltd Co (henceforth Hymark), warrants this product for a period of twenty-four (24) months from the date of shipment. During the warranty period, under authorized return component parts to Hymark freight prepaid, the company will repair, or at its option, replace any part found to be defective in material or workmanship, without charge to the owner for parts, service labor, or associated customary shipping costs.
This same protection will extend to any subsequent owner during the warranty period. It does not apply to damage caused by accident, misuse, fire, flood or acts of God, or from failure to properly install, operate, or maintain the product in accordance with the printed instructions provided.

This warranty is in lieu of any other warranties, expressed or implied, including merchantability or fitness for a particular purpose, which are expressly included. The owner agrees that Hymark´s liability with respect to this product shall be set forth in this warranty, and incidental or consequential damages are expressly excluded.