

Type P9521

Compact Single Axis Controller

- Program Memory (10 lines)
- Integrated Relay Output
- Integrated 115 / 230 VAC Power Supply
- Manual inching



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1. General

Features of the P9521 controller:

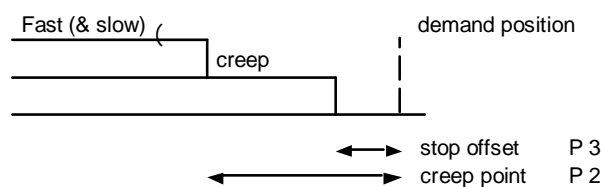
- 2 or 3 speed positioning
- Absolute and incremental positioning modes
- Program line operation (10 lines)
- Operation in Single positioning mode
- Manual inching mode (fast and slow speed)
- Quantity counting with completed output
- Flexible multiplier for Display calibration
- Datum precept routines
- Tool offset compensation in incremental mode
- Incremental error compensation
- Backlash compensation
- Tolerance window blanking
- Encoder and drive failure detection
- Maximum Encoder frequency 20 kHz

The unit is suitable for operation with any type of 2 or 3 speed bi-directional drive or any variable speed drive with 1,2 or 4 quadrant of control. The performance and accuracy obtained is dependent on the type of drive chosen. The outputs for stepped speed drives are relays. These outputs can be configured in a number of ways to suit all types of control circuits. Actual position is monitored by incremental Encoder. The power supply unit is integrated. The controller can be used to position machinery to any desired absolute position. Alternatively, the controller can be used to feed material through a process.

2. Features

2.1 Two Speed operation

The positioning is effected using a two-speed drive



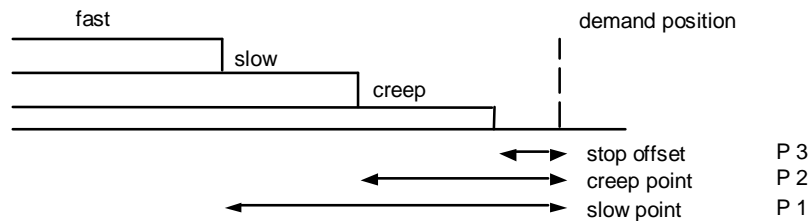
NB: Set $P1 = P2 > P3$

The actual position of the axis is displayed at all times and the demanded position is entered in the bottom display. When start is activated, the controller calculates the difference between the two dimensions and sets the outputs to give the desired direction and speed, to move towards the desired position. If the distance is greater than the value set in Parameter P1, the drive will first set high speed. As it reaches a distance from its destination equal to P1, it will drop out the high speed signal and the drive will drop to its preset slow speed.

2.2 Three Speed Operation

There are a small number of applications where 3 speed operation is desirable. If, for instance, the load inertia is high and the friction is low, the slowdown point must be set at a high value. This means that any required distance to move within this distance, is executed at slow speed only - making machine ponderous. A middle speed can be chosen, to speed up operation.

Positioning is effected as follows:-



NB: Set $P1 > P2 > P3$

In principle, it operates in exactly the same way as the two speed operation.

2.3 Standard Functions

2.3.1 Setting Datum/Go to Datum

Datum can be set in a variety of ways. The method is selected in Parameter P8/3.

- value = 0: Datum to P7.
Closing input St1/10, transfers the value set in P7 into Actual Value Display.
- value = 1: Setting to Preset.
Closing external input, transfers Demand Display value into Actual Value Display.
- value = 2: Automatic Datuming - direction positive
- value = 3: Automatic Datuming - direction negative
- value = 4: Datum to P7 using Keypad instead of St1/10
The value of P7 is transferred to Actual Display by pressing buttons > followed by F.

Automatic Datuming.

If P8/3 is set to either 2 or 3, activating input St1/10 will cause the drive to rotate forwards (or backwards). When the end limit switch is activated (and maintained), the drive will continue for a time as set in P10. It will then reverse and move at slow speed. When the Encoder marker pulse is sensed, the drive will stop and value of P7 will be loaded into the Actual Value Display.

2.3.2 Encoder Monitoring

If, after positioning is activated, no Encoder pulses are sensed after a time set in P19 (0.1 to 9.9 s), positioning will be aborted and fault 01 will be displayed. Setting P19 to 0.0s, disables this feature.

2.3.3 Quantity Counter

The Quantity Counter is programmable. The method of counting is set in Parameter P18/6. The counter is loaded with preset value and counts down to zero. When it reaches zero, a quantity complete output is give. Counting can be automatic or from external input.

2.3.4 Fault Monitoring

When a fault occurs, it's number flashes in Actual Value Display.

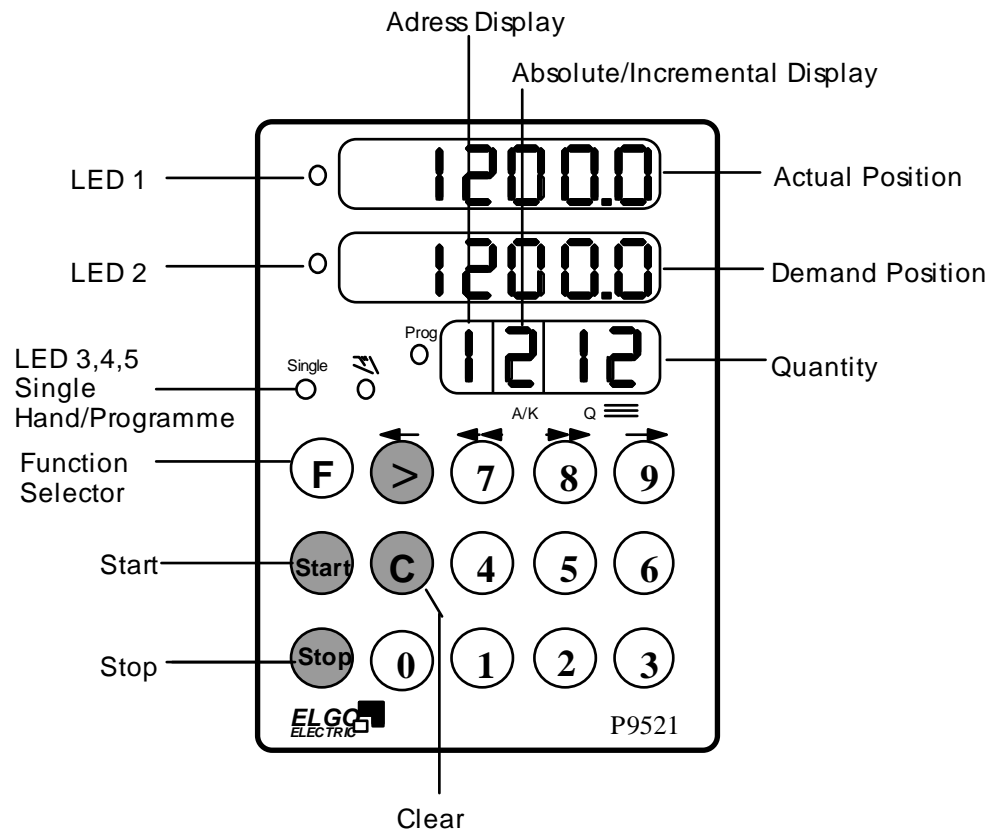
Fault Number:	01	=	Encoder
	02	=	End Limit minimum
	03	=	End Limit maximum
	04	=	Actual Position < Min Software Limit (P13) - Manual Demand Position < Min Software Limit (P13) - Single
	05	=	Actual Position > Max Software limit (P14) - Manual Demand Position < Max Software limit (P14) - Single
	06	=	Software fault
	*STOP	=	External Stop input activated or wire break

The fault message is cleared by pressing any button.

* NB: External stop input must be linked out before system can operate.
Therefore, if external n/c pushbutton is not fitted, then insert a wire link.

Stop also flashes if Stop on front of panel is activated in middle of move.

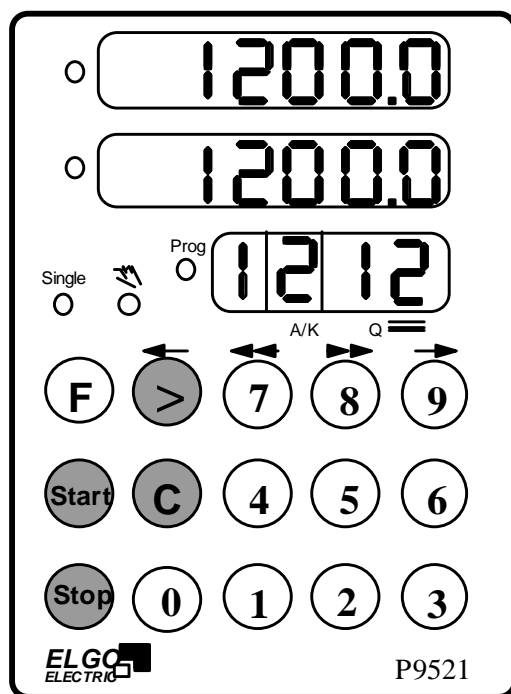
3. Front Panel



3.1 Displays

Actual Position	Shows the actual position of the Axis
Demand Position	Here you can enter the required position
Quantity	Shows how many pieces are left to be cut; (or) How many incremental moves yet to be complete
Address Number Display	Shows which address is operating
Absolute/Incremental	Indicates condition of Demand Display 0 = Absolute value 1 = Incremental +ve value 2 = Incremental -ve value
LED1	Negative sign symbol Also illuminates when Parameter entry mode selected
LED2	Illuminates when Demand Position or Parameter input can be entered
LED3 4 + 5	Illuminates to indicate function Single/Manual/Prog as selected by Button F

3.2 Function of the Keypad



- F** Pressing this button, will sequentially select Single, Manual or Program mode. Depressing this button for 3 sec will switch the controller from Operation to Parameter setting mode.
- START** Start positioning action.
Start is inactive in Parameter setting mode and manual mode.
- STOP** Stop positioning action.
In programming mode, sets end-of-Program.
- >** The Cursor Button will :-
 In Prog mode selects: Address
 Absolute/Incremental
 Quantity
 Functions
 In Parameter setting mode selects alternately and sequentially
 Parameter Number
 Parameter Value
- C** Clears selected function or parameter value.
Also clears Demand Value in Single and Program modes
- 0-9** Numerical Keypad for entry of values at all times.

4. Controller in Operation

4.1 Single operation

(A/I and Q windows without function)

Select Single by pressing F sequentially

Press: Keys 1-9 to enter the desired position into Demand Window

Press: Start, for positioning to take place

4.2 Manual inching

Select the manual mode by pressing F sequentially

Use Buttons > **7 8 9** for inching then

Button > Slow backwards (forwards)

Button 7 Fast backwards (forwards)

Button 8 Fast forwards (backwards)

Button 9 Slow forwards (backwards)

4.3 Program line operation

Select Program mode by pressing F.

Press Start to activate each move in a programmed sequence. Alternatively, pressing F again, initiates Program entry mode. Address number will now flash. 10 Addresses can now be programmed (0 to 9)

Each Address comprises	Address Number
	Absolute or Incremental move
	Quantity
	Required value

Proceed to Program as follows:-

Press F repeatedly, till Address window flashes

Press 0-9 to select required address (always start at 0)

Press >	A/I window flashes, enter	0 = Absolute
		1 = Incremental +ve
		2 = Incremental -ve

Press > Quantity window flashes

Press C to clear old quantity value

Press 0-9 To enter new quantity

Press > Demand window flashes

Press C to clear old demand value

Press 0-9 to enter new demand value

Press > to move to next address

or

Press Stop to end Program at that address

5. Parameter input

Press F for 3 seconds. LED1 illuminates
Actual Value Window now shows Parameter Address
Demand Window shows value of that Parameter
The Parameter 98 (Security Parameter) is initially displayed
Parameter values cannot be changed until a Security Code is entered.

Press > Demand Window shows all zeros
Enter 250565 (the Security Code)
Press > Actual Value Window now shows 01 (ie Parameter 1)
Press 0-9 → to enter the desired Parameter number
Press > The value of that Parameter is now displayed in Demand Window
LED 2 is also illuminated
Press C → to clear an existing value
Press 0 - 9 → to enter new parameter value
Press > The new value is stored
The next Parameter number is displayed in Actual Window
Press > The value of the new Parameter is displayed in Demand Window

etc.

Use > → To scroll through parameter list
→ To exit Parameter setting mode, Press F
→ The Actual Position will again be displayed.

The Parameters can once again be accessed, by pressing F for 3 s.

The Parameters can be locked away, by either

- Powering down
- Selecting Parameter 98, press >, press F

6 Parameter List

Par.	Function	Range	Default	Customer
01	Slow speed distance	0.1 mm	10.0*	
02	Creep speed distance	0.1 mm	5.0*	
03	Stop offset	0.1 mm	0.0	
04	Backlash compensation	0.1 mm	1.0	
05	Retract distance	0.1 mm	0.0	
06	Tool width	0.1 mm	0.0	
07	Datum value		0.1 mm	
08	System Param 1	--	000000	
09	Position reached pulse	0.1 s	1.0 (0=held)	
10	Backlash dwell time	0.1 s	1.0	
11	Quantity reached pulse	0.1 s	1.0 (0=held)	
12	Tolerance window	0.1 mm	0.0	
13	Min software limit	0.1 mm	0.0	
14	Max software limit	0.1 mm	100000	
15	Encoder pulse multiplication	0.00-9.9	100000	
17	Display brightness	0.0 to 9.9	5.0	
18	System Param 2	--	000005	
19	Encoder pulse monitor time	0.1 s	0.0	
20	Decimal point	0,1,2	1	
27	Offset positive		0,1	
28	Offset negative	0,1	0	
56	Encoder edge multiplier	1,2,4	1	
64	Direction of manual buttons	0,1	0	
70	Time delay for relays 2,3,4 (when P08/5 is set to 9)	0.1 s	0,0	
80	Input St3/13 definition	1-12	000002	
81	Input St3/12 definition	1-12	000003	
82	Input St3/11 definition	1-12	000004	
83	Input St3/10 definition	1-12	000005	
84	Input St3/9 definition	1-12	000006	
86	Deadman interlock - ve	0.1 mm	0.0	
87	Deadman interlock + ve	0.1 mm	99999.9	
88	System Param 3	000000		
98	Security code	250565		
99	Service			

- Logical sequence values such as these must always be present, regardless whether 3, 2 or 1 speed drive is used.
P1 > P2 > P3 for 3 speed drive
P1 = P2 > P3 for 2 speed or 1 speed drive

7. Description of Parameters

P01 Slow speed distance

Distance at which the controller switches from high speed to slow speed. The output high speed will be switched off.

P02 Creep speed distance

Distance to demand position at which the controller switches from slow to creep speed.

P03 Stop offset distance

The overrun distance can be programmed to compensate for the distance from the switch-off point of the motor, to standstill. For exact positioning, the correction distance should be very small (0.0 to 0.5 mm). Therefore the mechanical friction should be steady and the creep speed should be very slow.

P04 Backlash overrun

To correct for screw or pinion backlash, the Demand position should be approached from one direction only. In positive direction therefore, the Demand position will be overrun by the value of P4 and driven back at slow speed, after a time delay of P10, to the Demand position.

P05 Retract distance

There are different modes available in the P9521, selectable by Parameter P18/2.

If $P18/2 = 0$ Retract Position = Actual + P5

If $P18/2 = 1$ Retract Position = Value of P5

Whilst the input St1/11 is held on, the Slide will move to the "Retract" position. On release of input, slide will return to the original position.

If $P18/2 = 6$ Retract Position = Value of P5

When input St1/11 is activated, the slide moves to position as set in P5 and will not return to original position on release of input.

P06 Tool offset compensation

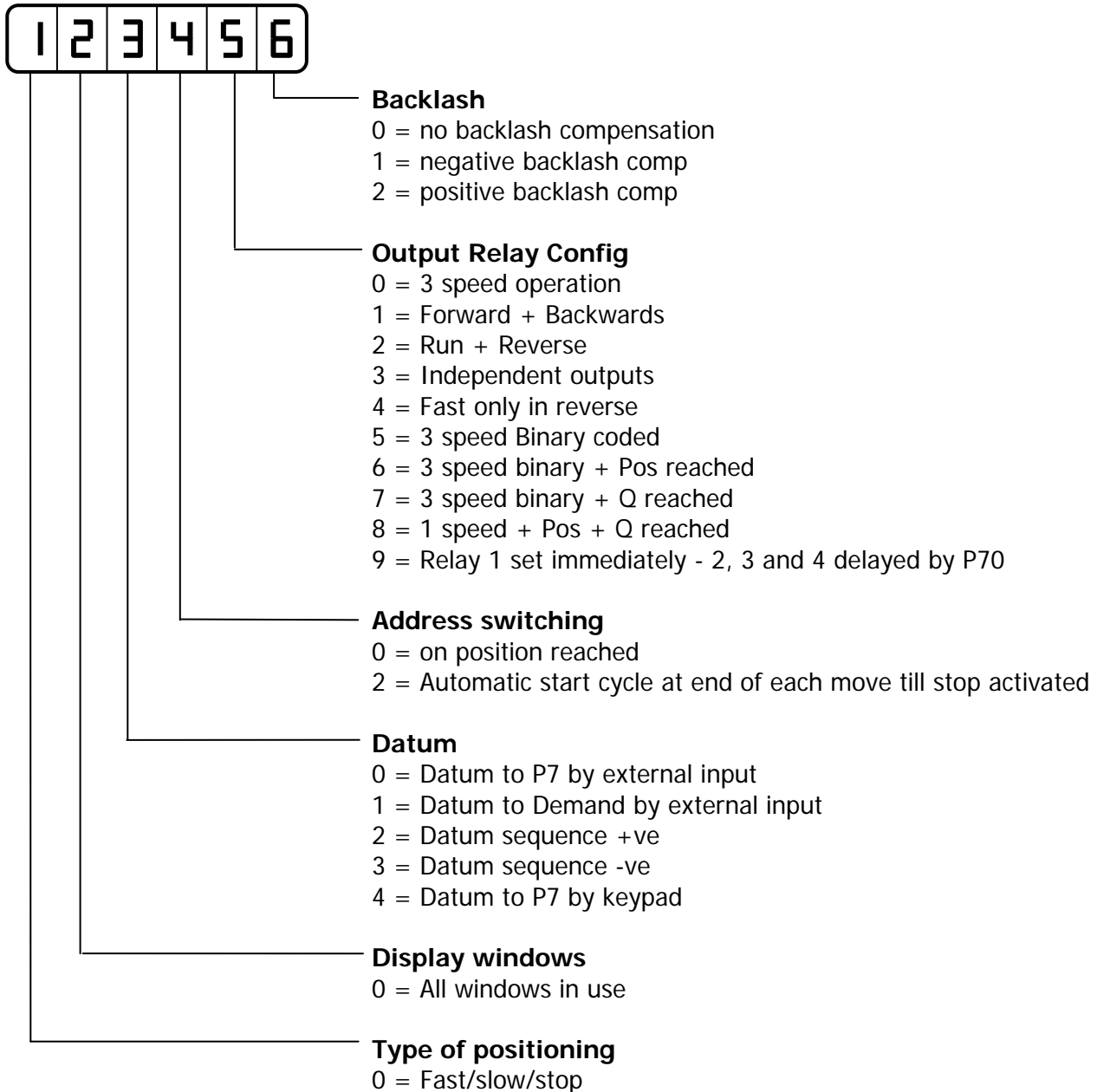
When moving in incremental, it is often the case that the subsequent function is a cut that removes part of the material. Thus to cut accurate preset lengths, it is necessary to move the demanded distance plus the "Tool Offset".

P07 Datum

The Datum value is stored in this Parameter. The value is used in different ways, in accordance with setting of P8/3

P08 Systemparameter 1

This Parameter sets the basic operating functions of the unit.



P09 Time position reached

At the end of each move, the controller gives an output, to signal "in position". The length of this pulse is set in P9. Setting 0.0 gives a maintained output.

P10 Backlash dwell time

When the machine stops at the end of the overrun, it is usually desirable to have a short delay. The time is set in this Parameter.

P11 Pulse "Quantity complete"

When the quantity counter goes from 1 to 0, a pulse output is given. The length of this pulse is set in P11. Setting 0.0 gives a maintained output.

P12 Tolerance window

It is possible to enter a value in Parameter P12 which represents an acceptable tolerance eg 0.1 mm. When the Actual Position is within the Tolerance window, the actual position displayed is made equal to the Demand position. The actual error is not lost, as the controller knows the true position.

P13/P14 Min/Max software limits

		Fault Message
Demand < Limit P13	=	04
Demand > Limit P14	=	05

Immediately after start signal, the controller checks the software limits. If the Demand position is greater or smaller than the corresponding limit, the controller will stop and show the error message on the display. The backlash distance in P4 is considered at the check of the Max software limit, if the backlash distance is activated in P8/6.

P15 Pulse multiplication

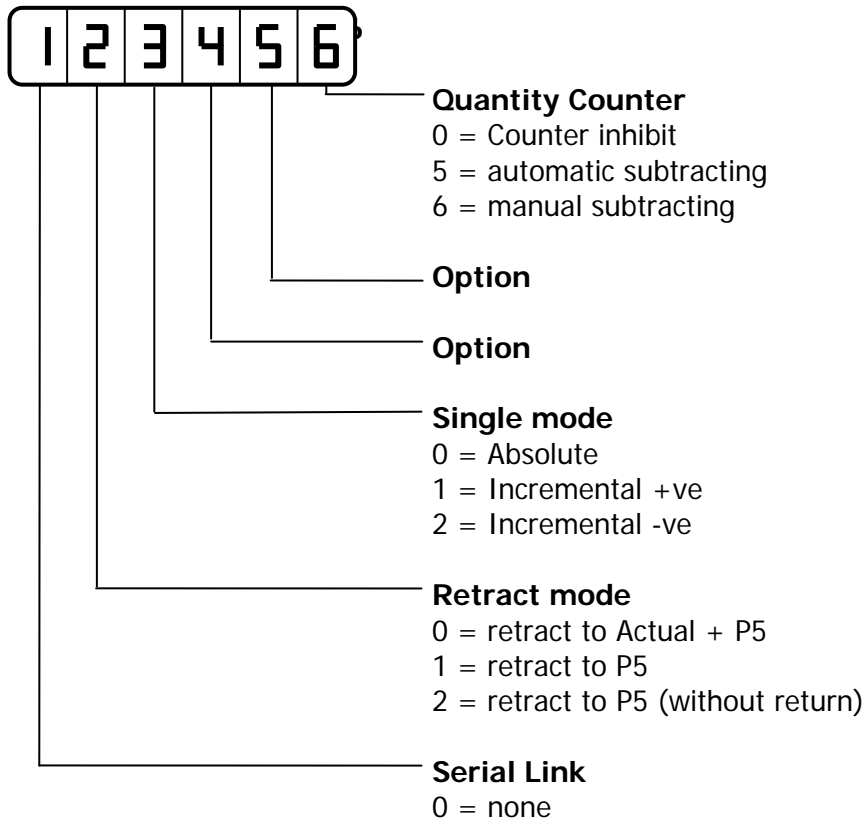
In this Parameter can be entered a factor (0.00001 to 9.99999). The incoming pulses will be multiplied by this factor, to manipulate the display in required dimensions. If no multiplication is required, this Parameter must be set to 1.00000.

P17 Display brightness

With the setting of this Parameter, the brightness of the displays can be altered. 0.0 = dark, 9.9 = max brightness.

P18 Systemparameter 2

This Parameter also sets the functions of the controller.



P19 Encoder monitoring

If after positioning is initiated, no Encoder pulses are sensed after a time set in P19, positioning will be aborted and Fault 01 will be displayed. Setting P19 to 0.0, disables Encoder pulse monitoring.

P20 Decimal point

The decimal point is placed in a fixed position and is optical only. It does not change the resolution of the system.

0 = no decimal point 1 = 0.0 2 = 0.00 3 = 0.000

0 = without 2 = 1/100 mm
 1 = 1/10 mm 3 = 1/1000 mm

R 27 Offset positive

The value, stored in this parameter is added to the actual position at the activation of an input. (The input is selected by code 13)

R 28 Offset negative

The value, stored in this parameter is subtracted from the actual position at the activation of an input. (The input is selected by code 14).

P56 Multi edge counter

Settings: 1 = x 1	2 = x 2	4 = x 4
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P64 Manual mode: Direction settings of the front keys

	Setting 0	Setting 1
key >	Slow backwards	Slow forwards
key 7	Fast backwards	Fast forwards
key 8	Fast forwards	Fast backwards
key 9	Slow forwards	Slow backwards

P70 Relay delay

The operation of relays 1, 2, 3, and 4 can be delayed, if required. The time delay is set in this Parameter. This time is only active when P8/5 is set to 9.

P80-84 Configuration of inputs

The input functions can be selected in these Parameters. The Parameters select which function will be allocated to each input.

Allocation: Parameter

80 > Pin13	(Default value = 2)
81 > Pin12	= 3
82 > Pin11	= 4
83 > Pin10	= 5
84 > Pin9	= 6

The functions are defined as:-

Marker pulse	value = 1 (only settable in P80)
Start	2
Stop	3
Retract	4
Datum	5
Quantity counter	6
End limit - ve	8
End limit + ve	9
Start incremental + ve	10
Start incremental - ve	11
Start to zero	12
Offset positive	13
Offset negative	14

NB: The Stop input is secure against cable break. It must be active for enable a positioning.

P86 Deadman's interlock direction - ve

Only active when P88/5 = 2

Front Start must be inhibited by setting P88/3 = 1.

The external start input in backwards direction will operate as start/stop, below this value.

P87 Deadman's interlock direction + ve

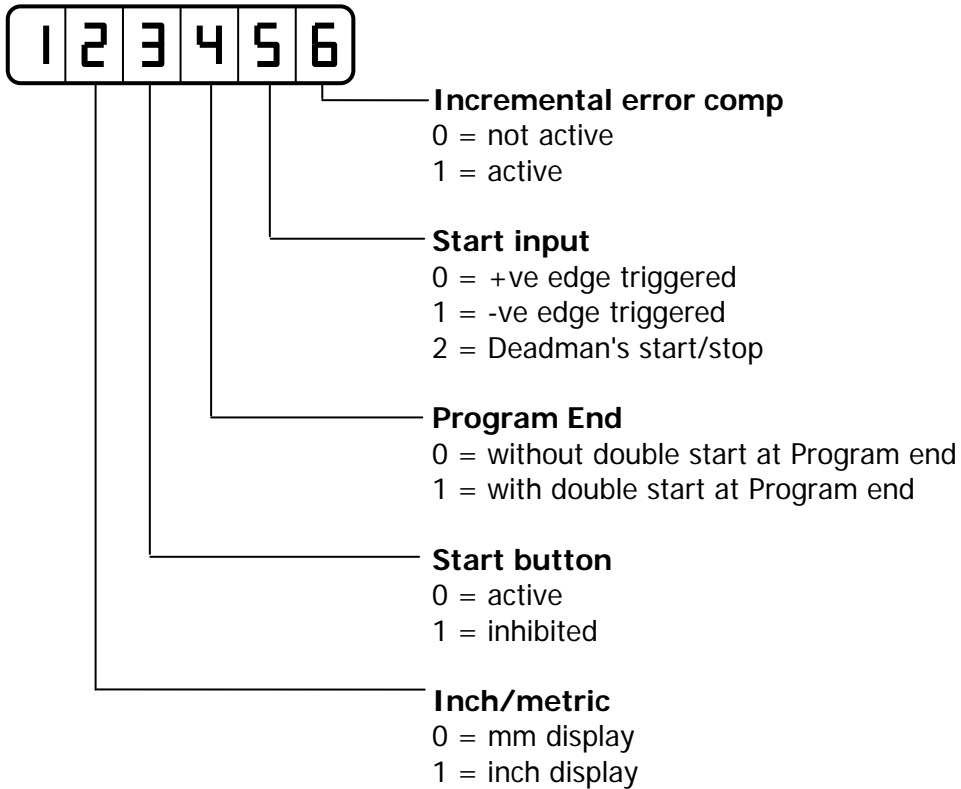
Only active when P88/5 = 2

Front Start must be inhibited by setting P88/3 = 1

The external start input in forwards direction will operate as start/stop, above this value.

P88 Systemparameter 3

This Parameter sets further basic functions of the controller.



P98 Security code

Enter 250565 to unlock and change Parameters

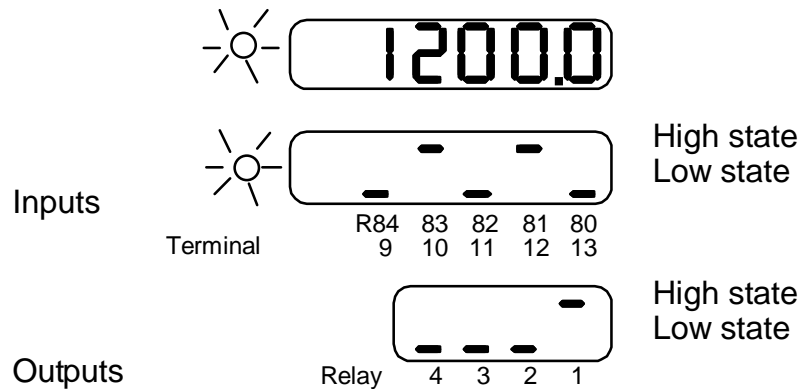
P99 Service Parameter

Only active when P98 is unlocked.

P99 must be reselected after activating any select button as shown below.

Button 0 - Pressing this button loads default values into all Parameters

Button 6 - Selects display of hardware inputs and outputs, for testing purposes



To test outputs:

1. Enter demand value
2. Press start → The states of the specific in- and outputs will change in the displays
3. On position reached, new demand value can be entered

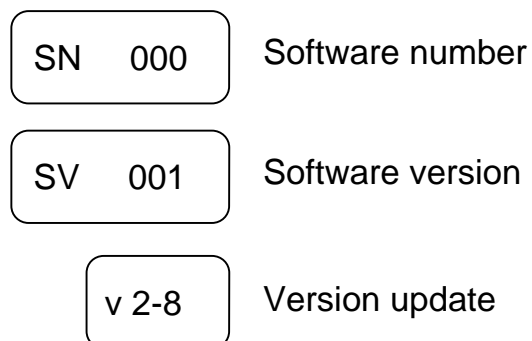
To test inputs:

Activate external input and note change in display

End test operation with button „C„

Button 7 - gives details of the software inside unit

e.g.:



8. Relay Configurations

These depend on setting of Parameter P8/5

Value = 0 3 speed operation (Elgo standard default)
 3 speed selected by relays 1,2&3. Relay 4 sets direction reverse

Relay	1	2	3	4
Creep forwards	x			
Slow forwards	x	x		
Fast forwards	x	x	x	
Creep reverse	x			x
Slow reverse	x	x		x
Fast reverse	x	x	x	x

R1 = Run. R2 & R3 are Slow & Fast combined with Run. If used with 2 speed, you can use either R1 or R2 for Fast. Can also be used with single speed.

Value = 1 2 speed operation. Independent outputs forward and reverse
 Independent outputs fast and slow

Relay	1	2	3	4
Creep forwards	x	x		
Slow forwards				
Fast forwards	x		x	
Creep reverse		x		x
Slow reverse				
Fast reverse			x	x

R1 = Run For, R4 = Run Rev. R2 & R3 independent

Value = 2 2 speed operation. Speed set by Relays 2 & 3. Direction set by Relay 4

Relay	1	2	3	4
Creep forwards	x	x		
Slow forwards				
Fast forwards	x		x	
Creep reverse	x	x		x
Slow reverse				
Fast reverse	x		x	x

R1 = Positioning (Drive inhibit or Brake) R2 & R3 independent

Value = 3 2 speed operation. Independent outputs for direction and speed

Relay	1	2	3	4
Creep forwards	x			
Slow forwards				
Fast forwards		X		
Creep reverse			x	
Slow reverse				
Fast reverse				X

Value = 4 3 speed operation. Forwards - 3 relays set speeds.
Reverse - always fast. Output 4 = reverse

Relay	1	2	3	4
Creep forwards	X			
Slow forwards	X	X		
Fast forwards	X	X	X	
Creep reverse	X	X	X	X
Slow reverse	X	X	X	X
Fast reverse	X	X	X	X

Value = 5 3 speed operation. Binary coded

Relay	1	2	3	4
Creep forwards	X			
Slow forwards		X		
Fast forwards	X	X		
Creep reverse	X		X	
Slow reverse		X	X	
Fast reverse	X	X	X	

Value = 6 3 speed operation (binary coded) with "Position Reached" output "P"

Relay	1	2	3	4
Creep forwards	X		P	
Slow forwards		X	P	
Fast forwards	X	X	P	
Creep reverse	X		P	X
Slow reverse		X	P	X
Fast reverse	X	X	P	X

For 2 speed (P1 = P2): R1 = Run, R2 = Fast. Can also be used with 1 speed.

Value = 7 3 speed operation (binary coded) with "Quantity Reached" output "Q"

Relay	1	2	3	4
Creep forwards	X		S	
Slow forwards		X	S	
Fast forwards	X	X	S	
Creep reverse	X		S	X
Slow reverse		X	S	X
Fast reverse	X	X	S	X

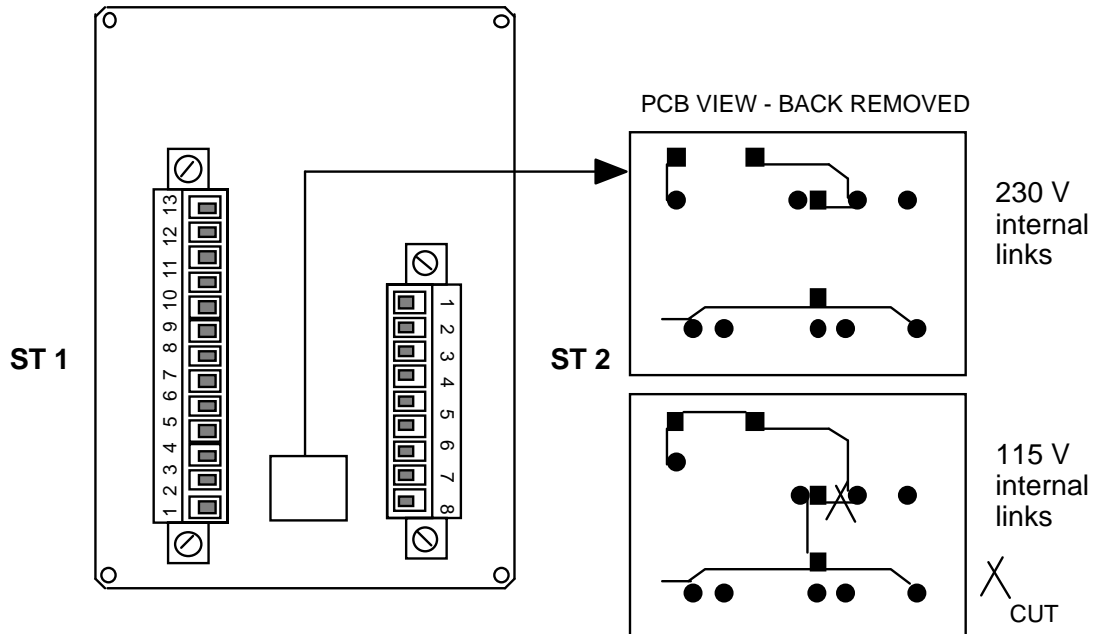
Value = 8 1 speed operation with "Position Reached" output "P"
with "Quantity Reached" output "S"

Relay	1	2	3	4
Creep forwards	X		S	P
Slow forwards	X		S	P
Fast forwards	X		S	P
Creep reverse		X	S	P
Slow reverse		X	S	P
Fast reverse		X	S	P

Value = 9 3 speed operation. Speed set by Relays 1-3. Output 4 sets reverse
Relay 1 is set immediately. Relays 2, 3 & 4 are set after delay P70

Relay	1	2	3	4
Creep forwards	X			
Slow forwards	X	X		
Fast forwards	X	X	X	
Creep reverse	X			X
Slow reverse	X	X		X
Fast reverse	X	X	X	X

9. Connections / Rear



Connector ST1 13 pole Inputs

Pin	Function (Defaults)
13	Start (PNP)
12	Stop (PNP)
11	Retract (PNP)
10	Datum (PNP)
9	Quantity (PNP)
8	+24 VDC
7	Channel A
6	Channel B
5	Encoder +24v supply
4	Encoder 0v supply
3	Earth & Screens
2	24 VDC, 230/115v ac supply
1	0 v supply

Connector ST2 8 pole Output relays

Pin	Function (Defaults)
1	Relay 1 (Creep = Run)
2	Relay 2 (Slow)
3	Relay 3 (Fast)
4	Relay 4 (Rev)
5	
6	
7	
8	
n/o	contact

Pull Terminals 9 to 13 up to 24v (Terminal 8), to activate.

10. Technical specifications

Power supply	24 VDC, 230/115 v ac 50/60 Hz (selected by internal links)
Consumption	450 mA
Encoder supply	24 VDC, max load 130 mA
Counting frequency	20 kHz, higher on request
Input signals	PNP standard min. pulse time 300 ms (NPN as option "EN")
Outputs	potential free shutter relays (250 V / 1 A)
Memory	NOV-Ram, 10 years
Connectors	RIA
Display	Low power LED, 7 segment, 8 mm high
Hardware	16 bit Microprocessor with 32 Kbytes E-Prom and 16 Kbytes RAM
System accuracy	+/- 1 bit
Enclosure	Black metal, for fitting into control panels
Dimensions in	W x H x D = 72 x 96 x 90 (+ 30 mm for connectors)
Cut-out in mm	67 x 93 mm
Operation temperature	0... 45 ° C

11. Type designation code

P 95 2 1 - 000 - 230 - 0 - XXXXXXXX

P = Position Controller

Series

P9521 with program memory

Program Memory

2 = with

Number of Axes

Construction

000 = standard

001 = 1st special version

etc.

Supply voltage

024 = 24 V DC

115 = 115 V AC

230 = 230 V AC

Encoder input

0 = A / B - 24 V / 24 V (20 KHz, PNP)

1 = A / B / Z - 24 V / 24 V (20 KHz, PNP)

M* = A / B - High-speed counting for EMIX and MIX System

N* = A / B / Z - High-speed counting for EMIX and MIX System with index signal

Special Features

EN = input NPN

*under construction

13. Liability exclusion / Guarantee

We have checked the contents of this instruction manual carefully, to the best of our knowledge and belief for conformity with the described hardware and software. Nevertheless errors, mistakes or deviations can not be excluded, therefore we do not guarantee complete conformity. Necessary corrections will be included in the subsequent editions. We appreciate your ideas and improvement suggestions very much. Reprint, duplication and translation, even in extracts, are only allowed with a written authorization by the company ELGO Electric GmbH. We constantly strive for improving our products, therefore we keep all rights reserved for any technical modifications without any notice.

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