

## 85 P series

- Simple, fast and user friendly input for a single position and quantity
- Available as a switching position controller, ie Fast/Slow/Creep/Stop, or as a closed loop controller with analogue output
- Addressable by a computer or PLC



## Essential Features

The 85P Position Controller is designed to provide the following functions.

- A simple and fast means of entering position and quantity data. This obviates the need for a programmable system.

- Operation is possible with an external data input. The unit can be connected to supervisory controllers such as computers or PLC's.

The 85P can then act as a satellite position controller and a number of units can be used to form a multi-axis system.

- The drive control is usually through switching (Fast, Slow, Creep, Stop). Alternatively an analogue module giving an output + or - 10v can be fitted for direct connection to 4 quadrant drive.

- The desired operational functions and features can be preset at the back of the unit. For example, one can preset absolute or incremental operation and the direction (+ or -) of the incremental moves.

- Large dustproof easy to operate keyboard is used and total depth of unit is only 55mm.

- For use as a position controller or for feeding materials into a process.

## Functions and Concepts

- **Absolute mode**

In absolute measurement mode, the unit calculates the direction, speed and distance to move from the actual position to the selected destination.

- **Incremental mode**

In incremental measurement mode, the unit calculates the desired destination from the demanded incremental input and the actual position. The direction of movement can be selected.

- **Switch mode positioning**

It is most usual for the 85P controller to be used with commercial 2 or 3 speed drives. To reduce the effect of mechanical errors, a brake should be fitted.

- **Backlash compensation**

The position can be reached from either direction. Alternatively, backlash compensation is available. The approach then is from one direction only; in the other direction the drive overruns the position and returns.

Normally the overrun is in the direction of a greater value. The destination point X is overrun a distance controlled by the T potentiometer set at the back of the unit. The drive then stops, reverses and moves to the final position in slow/creep mode.

- **Automatic retract**

Should it be necessary to retract the backstop during cutting, this can be effected by closing a contact. Opening the contact again returns the backstop to its demanded position.

The retract distance is set by means of the T potentiometer at the back of the unit.

- **Datum Setting**

The machine is set to any convenient position and this position is accurately measured. This value is entered as the demand position and an external reference keyswitch is activated. This transfers the dimension to the actual value display.

The unit need in principle only be datumed once during commissioning, since the actual value has a battery backed memory on power removal.

- **Closed loop position control**

An optional analogue output module can be fitted to enable the unit to be used with four quadrant servodrives. Backlash must be fully eliminated in the mechanical system.

- **Inch/Metric**

An additional card can be fitted to enable the unit to operate in both modes. Independent slowdown and stop offset setting switches are fitted. The unit must be redatumed after each changeover.

- **Overrun security**

In case of mains failure, encoder and controller are supplied for about 4 seconds from a battery, before memorising the actual position.

- **Special features**

The 85P is a microprocessor controlled device with a programme that can be modified to suit customer requirements.

Many features are already available e.g.:-

- Tolerance band indication suppression

- Forward and reverse output contacts (instead of run and reverse)

- Maintained quantity signal

- Positioning signal in place of in position pulse

- Roll wear compensation

We are pleased to look at all ideas to give the customer exactly the performance he requires for his machine.

## Operation and Input Setting



### Switch on conditions

On power up, the unit indicates zero in the demand position display. The actual position display indicates the memorised value on previous switch off.

### Datum Setting

Press button C. Key in the desired datum value and close an external contact (keyswitch, button or reference switch). The demand value is now transferred to the actual value display and the system is datummed.

### Desired Position/Length

Press button C. Key in the desired value. When the start signal is given, the drive will now move to this position.

### Desired Quantity

Quantity value can be preset when the button \* is pressed. The respective LED illuminates. Press button \* (LED illuminates). Key in the desired quantity. Press button \* again. The LED is extinguished. The unit is now ready for a start signal.

**NB:** The start is inhibited so long as the \* LED is illuminated.

### Quantity Indicator

The value is reduced by 1 each time the quantity pulse is given. On reaching zero, the output contact (quantity reached) operates.

### Start Button

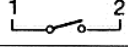
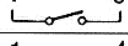
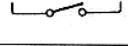
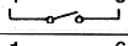
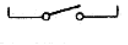
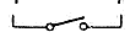

The start pulse initiates the control process that reads the demanded value and inhibits operation of the keypad. The inhibit is automatically cancelled on reaching the new position.

### Stop Button

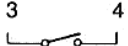

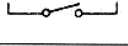
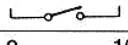
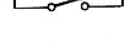
The stop signal cancels start. The keypad becomes operative, the output relays drop out and motor stops.

## Connections



### Input Signals - Connector St 3

Event	Terminal	Function
Start	1 2 	Initiates Micro to set distance to be run and direction.
Stop	1 3 	Resets output signals. Micro control is ended and a new input is required.
Datum	1 4 	The preset demand value will be transferred to the actual position indicator when this contact is closed.
Incremental Operation	1 5 	The system runs in incremental mode with this contact closed.
Automatic Retract	1 6 	The drive moves a defined distance back and forth when this contact is closed and opened.
Quantity Pulse	1 7 	The quantity indicator is reduced by 1 each time the contact is closed. When zero is reached, relay contact 1-2 operates as a pulse.
Incremental Operation in positive direction	1 8 	The drive operates in forward incremental mode with this contact closed. (If inch/metric is fitted, this input is used for selection. Closed for mm, with S9 open).

### Output Signals - Connector St 4

Event	Terminal	Function
Run	3 4 	Enable contact for the drive closes when demanded value is more or less than actual value. Opens at overrun during backlash compensation.
Fast	5 6 	Contact closes when distance to be run is greater than the preset slowdown point. Opens when slowdown point is reached.
Reverse	7 8 	Closes when destination is less than the actual position.
In Position (*Programme end)	9 10 	The contact closes (pulse of 0.1 to 2S) when demanded position is reached. *Alternatively contact opens during positioning and closes when position is reached. <b>*NB:</b> Software option to be specified at order stage.
Quantity reached (or creep signal)	1 2 	Selection of switch "1" gives the desired function

### Encoder Connections - Connector St 2

Signal	Terminal	Function
	4	Forwards (channel A) Encoder terminal 4
	3	Backwards (channel B) Encoder terminal 3
Power supply	2	+14v of power supply Encoder terminal 2
Power supply	1	0 V of power supply Encoder terminal 1

### External Power Supply Unit - Connector St 1

Terminal	Function
2	Earth
1	15v DC
3	0 v

### Power Supply Unit NG 12.0

The position controller is supplied as standard with a separately mounting power supply.

Connections:

Terminals a/b = 220 v (or 110 v) 50Hz  
(other voltages on request)

Terminal 5 = 0 v  
Terminal 6 = + 15 v DC, 500mA.

Snap-on plastic enclosure for DIN rail.

Dimensions:  
H = 75mm  
W = 50mm  
D = 110mm

## General Information

The position controller is constructed for use in arduous industrial environments. The use of the latest components ensures a most up-to-date construction and technique.

Care should however be taken when fitting electronic equipment into machinery.

### Mounting

- electronic units should be kept away from inductive and capacitive interference.
- avoid overheating.

### Power Supply

- ensure it is within specification.
- Protect if overvoltages can be present.

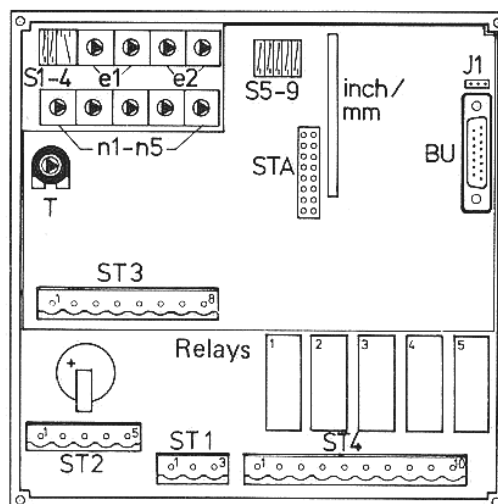
### Connections

- run low voltage cables separate to high voltage.
- control and encoder cables should be screened and tied to 0 v at controller.

### Output Contacts

- the output contacts are protected internally with varistors. However, external suppressors should also be used and all coils in cabinet and machine.
- do not overload.

## Switch Functions



(rear view with back removed)

- Relay 1 = Quantity (pulse) or creep
- Relay 2 = Run (motor start)
- Relay 3 = Fast
- Relay 4 = Reverse (in direction towards zero)
- Relay 5 = In position (pulse)

**BU** = Connector for external demand input

**STA** = Connector for analogue output card

**Inch/mm** = Connector for card

### Switches n1 to n5

These decade switches have the following alternative functions and resolutions:

#### 1. With creep signal

Switch S1 closed

**VS** = Preset slowdown point

n1 = 10.0mm

n2 = 1.0mm

**KGS** = Preset creep point

n3 = 1.0mm

n4 = 0.1mm

**KS** = Stop offset point (overrun compensation)

n5 = 0.1mm

#### 2. Without creep signal

Switch S1 open

**VS** = Preset slowdown point

n1 = 100.0mm

n2 = 10.0mm

n3 = 1.0mm

**KS** = Stop offset point

n4 = 1.0mm

n5 = 0.1mm

**T** = This potentiometer sets the following parameters:

-overrun distance for backlash compensation

-retract distance for automatic retract

-time of in position pulse

### Operation of Switches S1 to 9

Nr	State	Function/Operation
1	open	<b>Quantity output signal:</b> the output contact St 4 1/2 gives a signal when desired quantity has been reached.
	closed	<b>Creep signal:</b> the output contact St 4 1/2 opens when the value set on switches N3/N4 is reached. This gives the creep distance to position. NB: When operating with "Analogue Output" option this switch, as well as switch "2", must be closed
2	open	<b>With backlash compensation</b>
	closed	<b>Without backlash compensation</b>
3/4	left	Decimal point at 0.0
	right	Decimal point at 0.00
5	open	See note below*
	closed	<b>Pulse multiplication X 1</b>
6	open	See note below*
	closed	<b>Pulse multiplication X 2</b>
7	open	See note below*
	closed	<b>Pulse multiplication X 4</b> NB: If switches 5, 6 and 7 are all set to open, the input channels A and B act as up/down inputs respectively.
8	open	No function
	closed	Reverse direction of count.
9	open	Operation in inches
	closed	Operation in mm NB: Switch 9 is only used if inch/metric card is fitted. Decimal point is automatically moved one place.

### Optional Switches e1 and e2

The preset decade switches are determined by unit option and have the following functions, eg

**e2** = 2 decade preset for an automatic saw width correction (0.0 to 9.9 mm)

**e1 + e2** = stroke distance for multi stroke feeders

**e1 + e2** = slowdown and stop offset in inch mode.

## Technical Data

**Input Supply:**  
15V DC + or -5% (other on request)

**Power Consumption:**  
10VA

**Encoder Supply Available:**  
14V DC, 100mA

**Encoder Signals:**  
NPN switching (other on request)

**Actual Value Display:**  
6 digit red LED, 10mm high

**Demand Position Display:**  
6 digit red LED, 8mm high

**Quantity Display:**  
3 digit red LED, 8mm high

**Memory of Actual Value:**  
about 1 year from switch off

**System Accuracy:**  
+ or - 1 increment

**Positioning Speed:**  
60m/min at 0.1 mm resolution  
(10 k Hz)

**Acquisition time of Reference:**  
10 mS

**Output Signals:**  
Potential free contacts,  
220 V 0.5A ac

**Self Heating:**  
30° C

**Ambient Temperature:**  
-5° C to +45° C

**Connections:**  
Plug in terminal blocks

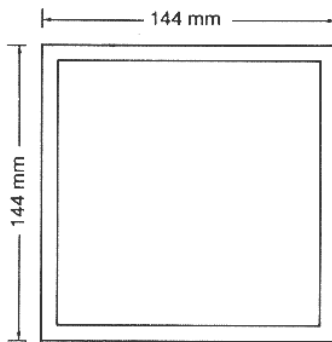
**Mounting Attitude:**  
Any

**Mechanical Data:**  
Polycarbonate glassfibre enclosure  
suitable for mounting into control  
panels or as free standing units.

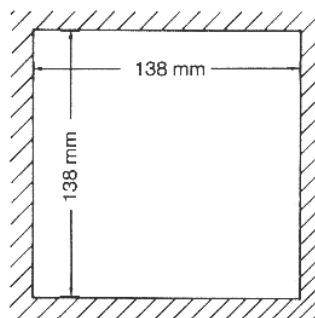
**Keyboard:**  
Dust tight IP55, capable of being  
operated with gloved hands.

### Dimensions (mm)

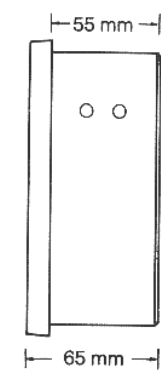
#### Front



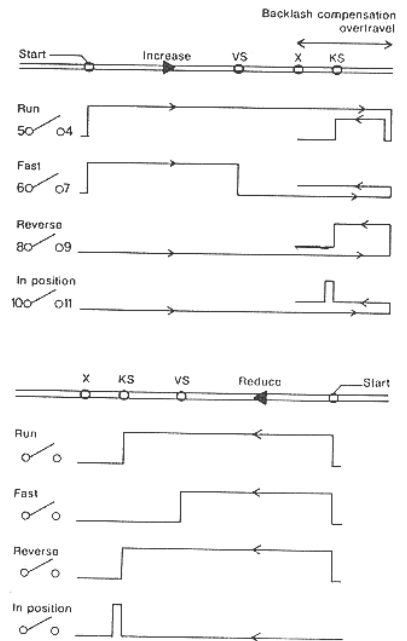
#### Cut out



#### Depth

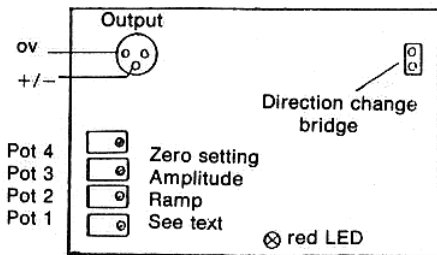


## Switching Sequence



X = Required position  
VS = Slowdown point  
KS = Stop offset point

## Analogue Module



### Pot 4: Zero Setting

Using this potentiometer the output voltage can be set to 0v when in position, i.e. when required and actual position values are equal.

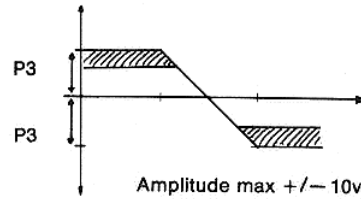
The red LED on the board must illuminate when in position, so no external instruments are necessary. The setting range spans one millivolt.

### Pot 3: Amplitude

Setting for maximum positive and negative output voltage, i.e. maximum speed in the range available. Clockwise increases voltage, anti-clock decreases volts.

Full clock gives +/- 10v.

Full anticlock gives 0v. The voltages are equal in both directions.



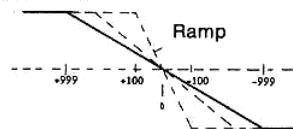
### Pot 2: Ramping Range (Positional Loop Gain)

Potentiometer for setting the ramp rate (proportional band).

The gentlest ramp is set when the break point is +/- 999 bits from the required position point.

The sharpest ramp is set when the break point is approx. +/- 100 bits away.

Turn the potentiometer clockwise to steepen the rate.



Too sharp a ramp causes instability; too long a ramp causes sloppy positioning.

### Pot 1: Offset Voltage of D/A Converter

This potentiometer is normally set in the works and sealed.

The customer should not need to operate it.

An incorrect setting will upset the setting of the zero point of the regulator.

If it is absolutely essential that resetting must be done, proceed as follows:

- Disconnect encoder.
- Press reset pushbutton (Red LED on on the analogue card must illuminate).
- Monitor analogue output voltage on oscilloscope (millivolt range).
- Plug out and in the direction bridge and note the voltage on the scope.
- Proceed carefully. Turning the potentiometer causes a considerable voltage change (in millivolts). The accuracy is dependent on the correct setting!
- The offset is correctly set, when changing the direction bridge produces no change in output voltage.
- Having reset the offset correctly, the zero setting (Pot 4) can be adjusted.
- On completion of this operation, reseal Pot 1 and check the direction bridge is firmly plugged in.

## Optional Features

### External Data Input

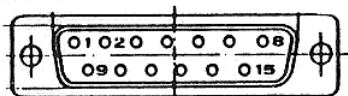
When this option is fitted, the unit can be addressed from a PLC or computer. This supervisory controller can set the position and quantity data and provide a programme of moves.

The preset value comprises 4 data and 4 control lines as inputs, as well as 4 outputs. Inputs and outputs are transmitted via optocouplers. The bus must be connected with an external 5, 12 or 24 volt power supply (specify voltage at time of order). The inputs can be PNP or NPN switching according to requirements (specify with order).

The maximum current for each input is 15 mA. The current of the output transistors must not exceed 20 mA.

Inadequate power supply, noisy environment, lack of suppression and screening can cause corrupt data to be transmitted.

### Connector



15 pole "D" type

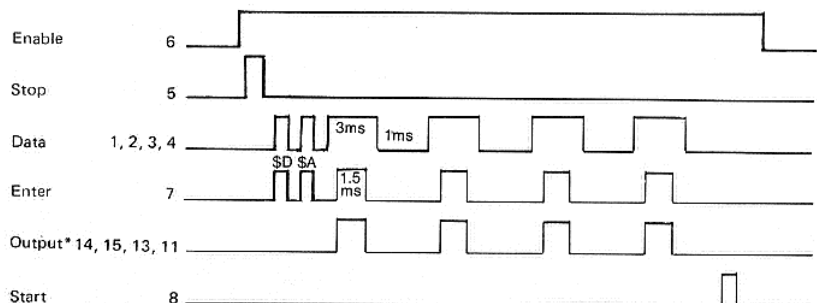
Signals should always be sent as follows:

- Enable
- Stop pulse
- Select length
- Clear
- Sequentially load data (and read back)
- Start
- Disable

Pin	Designation	Function
1, 2, 3, 4	D, C, B, A	<b>Inputs:</b> Data lines (4=LSB, 1=MSB) The data is given in Hex code 0-9 = digits \$A = clear (erase input) \$B = select quantity \$D = select length
5	Stop	The output relays are de-energised.
6	Enable	When this input is activated, the keypad is inhibited and the input of data is via the connector from the computer
7	Enter	When this input is activated, data is read
8	Start	The controller start is activated.
9	+V	From external power supply.
10 14, 15, 13, 11	+V D, C, B, A	<b>Outputs:</b> From external power supply. Data lines (11=LSB, 14=MSB) The output transistors must be protected against overload by external resistors.

### Operation

To ensure that correct data is transmitted, outputs are available, such that the computer can check data received. Timing and sequence of signals is very important.



\*The output is configured as follows:-

- During enter pulse—sends back data being entered
- Between enter pulses—sends number of decade read

## Commissioning

### Without Analogue Closed Loop Control

First of all it is necessary to set up the drive. If a variable speed drive is used, a consistent low speed must be achieved, before proceeding with adjustment of position controller. A simple guide to putting the unit into operation is as follows:

1. Switch out of operation
  - (a) backlash compensation (S2 on)
  - (b) saw blade compensation (set to 0.0)
2. Set datum to zero at any arbitrary point. Rotate encoder in manual mode to check that encoder gives correct direction of count for corresponding increasing and decreasing position. Note that negative sense is designated by a red LED on the left of actual value display. This LED must **never** be on during operation. Change A and B encoder channels (or S8) if incorrect sense of count exists.
3. Set datum. Either put machine to mechanical zero or to a measurable position and set datum as per instructions.
4. Set Overrun distance (KS) to 0.0
5. Set Slowdown distance (VS) to some fairly large number, e.g. 50.
6. Work in absolute mode.
7. Key in a position e.g. 100.0 Press start and note machine runs at fast speed, slow speed and stops on a reading other than 100.0 in actual value display. Note this reading e.g. 101.3 and the error i.e. 1.3 mm. Repeat at 200.0, 300.0 etc. in the upward direction and then the same positions in downward direction. Note the error at each position. It should be consistent to  $\pm 0.1$ . Take an average of this error and set KS to this value. Repeat the positions and note that machine stops accurately to  $\pm 0.1$ . You may need to trim KS another + or - 0.1 to get best results.

If stopping error is **not** consistent to  $\pm 0.1$  in all positions, then accuracy of  $\pm 0.1$  cannot be achieved. The problem is that friction is not constant throughout and improvement can only be made by reducing the slow (creep) speed, till consistent errors are seen.

8. When accuracy has been achieved, the slow speed point can be reduced so that cycle times are improved. Progressively reduce value of VS until the machine creeps only for the shortest time, before KS (stop) is activated.

NB: VS must never be set to 00

If VS is reduced too far, errors in positioning will now start appearing.

9. You may now select the mode of operation (if required) i.e.:
  - (a) Incremental mode
  - (b) Backlash compensation
  - (c) Saw blade compensation

10. The overrun distance on backlash compensation is adjusted by potentiometer T. Adjust such that machine stops at a value past the desired point approximately equal to the setting of VS previously set, and/or drive stops for about 1 second.

11. If inch/metric feature is provided, repeat steps 3 to 8 in inch mode before proceeding with step 9.

### With Analogue Closed Loop Control

First of all it is necessary to set up the 4 quadrant drive on its own such that it is stable and gives correct full speed for  $\pm 10v$  reference signal. The drive and 85P can now be coupled.

Proceed commissioning as follows:

1. Set machine slide in mid position. Set P3 on analogue card to 90% anticlock.
- Delete backlash compensation (S2 on).
2. Switch power on. The drive should stand still. If it runs away, switch off immediately. Reverse direction of encoder on S8.

3. Turn P3 to full clockwise. Set KS to 0.0 Set VS to 10. Ensure slide is still in middle.

4. Switch on Set datum to 0.0 (see instructions). This is an arbitrary datum, for initial commissioning only.

Key in a reasonable position e.g. 100.0 Press start. Note that drive moves towards 100.0. Check that this is in correct sense for your machine for increasing values. If not, switch off and reverse encoder, Armature and Tacho.

5. Switch on Key in position 0.0 Press Start

Note correct sense of direction. When correctly set, the drive will run firmly into position without overshoot and the actual value display will jitter 0:1:0:1 etc.

6. If drive fails to reach zero position:
  - (a) Press stop
  - (b) Increase gain Pot P2, 2 turns clockwise.
  - (c) Key in 100.0
  - (d) Press start.

If it does not reach position repeat (a) to (d) keying in 0.0 and 100.0 alternately, until position is reached.

7. If gain is set too high, the position will overshoot to negative before coming back into position.

8. If the desired position cannot be achieved by use of the gain pot, then the offset is incorrect. This condition can be confirmed by noting that red LED is illuminated on analogue card but actual value is not correct.

Proceed to adjust offset, first in the drive and final fine trim on pot P4. The correct conditions are reached when jitter is -1:0:1:0:-1:0 etc.

9. It is now permissible to set the proper datum. A series of positions can be tried and accuracy of positioning noted.

Final trimming of top speed can be effected using Pot P3 and gain Pot P2 and also offset Pot P4.



## 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.

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