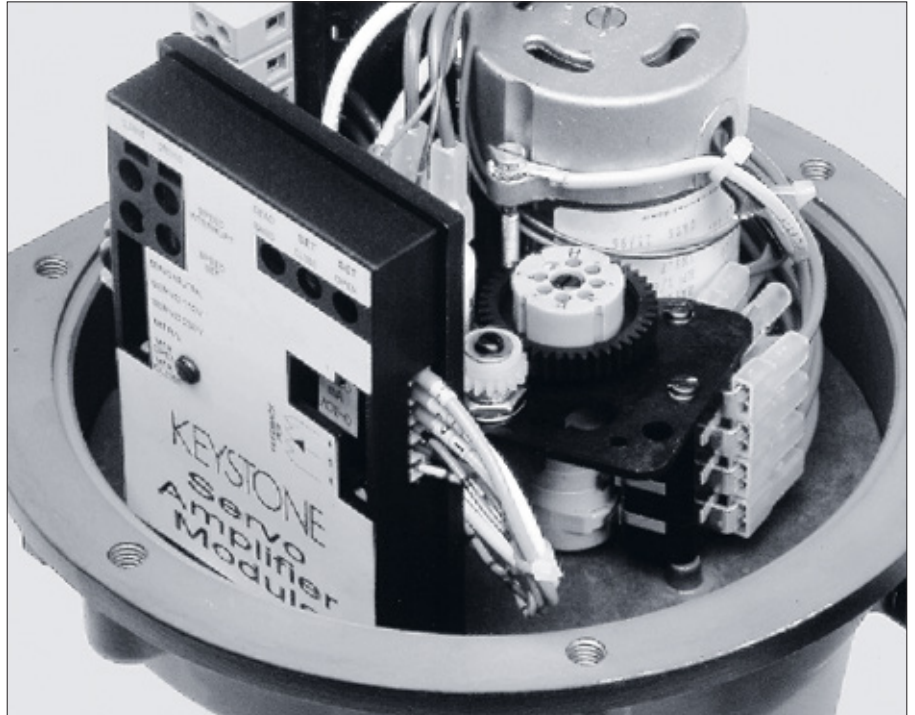**PENTAIR**

KEYSTONE

The Keystone Servo Amplifier module is designed to control valves in modulating service and can be fitted to the full range of electric actuators with the exception of the electratorc 3. The module can be operated with various input signals and also has speed control & speed control interrupt functions as standard.

Basic parameters - servo amplifier with speed control

Mains supply - 230/240V or 110/115V 50/60 Hz

Command signals - (supplied standard)
4-20 mA - 56R input impedance
0-10 volt - 110K input impedance

Other command signals available on request.

Sensitivity minimum 1%
Deadband adjustable 1% min.
Repeatability +/- 1%

Temperature stability
+/- 0.05% per degree celsius.
NOTE: All quoted values of sensitivity, deadband, repeatability and temperature stability are percentages of full scale values of the command signal.

Protection
Opto coupled output from logic.
Switch mode power supply gives full mains isolation.

Input signal scaling

Input scaling is achieved by changing the input selector module. The actuator is
supplied with 4 - 20 mA module fitted as standard. The input type can be seen through aperture in
the cover. Each module is capable of providing two ranges.

Changing from 4 - 20 mA to 0 to 10V
The 4 - 20 mA signal input can be changed to a 0 to 10V range by turning the input module by 180°.
1. Remove cover as per instructions below.
2. Carefully remove module from DIL plug ensuring that the pins are not bent.
3. Rotate module by 180°.
4. Re-insert module ensuring that the pins are not bent.
5. Replace cover and ensure that the correct range is visible through the cover aperture.
Consult Keystone for other ranges available.

Cover Removal
It is advised to remove module from the actuator in order to remove the cover.
1. Remove cover by removing single self tapping screw.
2. Grip the top of the cover at the sides and squeeze.
3. Pull top of cover away from the base and unhook the bottom clips.
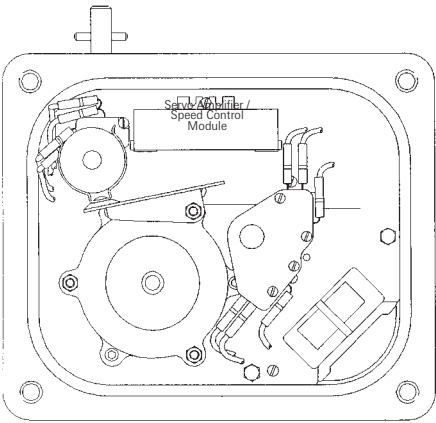4. Refit by rehooking at bottom clips, pressing in top clips and refitting single self tapping screw.

Dimensions and
Terminal Identification

22.5

M3 fixing

30.5
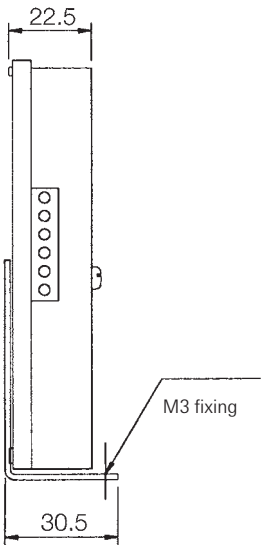
Location diagrams
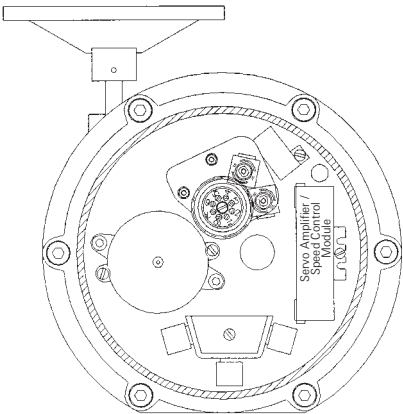
Typical Layout of 777/778 006
Actuator with Servo-Amplifier/Speed
Control Module Fitted

Typical Layout of 777/778 012 - 150
Actuator with Servo-Amplifier/Speed
Control Module Fitted

Trouble shooting

The module has been designed to give as little trouble as possible and most
problems will be caused by external faults. The following is a list of possible causes and cures.

Problem	Cause	Cure
Motor will not run	1. No mains power	Check supply
Motor runs in one direction only	1. No signal	Check signal source
	2. Signal connected wrongly, wrong polarity	Connect correctly
	3. Potentiometer connected wrongly	Interchange outer leads potentiometer on terminal block
Poor repeatability or sensitivity	1. Slack gear on potentiometer	
	2. Unstable signal	Secure potentiometer gear Check signal source

80.0

Input signal scaling module

115

Closing Opening

Dead Band | Set Close | Set Open

Speed interrupt

Speed setting

Servo neutral
Servo 110V
Servo 230V
MTR/L
Mtr open
Mtr close

Actuator feedback pot.

4←20 mA

1. Orange (+)
2. White (S+)
3. Yellow (S-)
4. Orange/black
5. Green/red
6. White/red

**Keystone
Servo
Amplifier
Module**

Settings Procedures

Open And Close Position Setting

In the following instructions, and on the Servo Amplifier label, Open means fully anti-clockwise and Close means fully clockwise. With a 4mA control signal the Actuator will move towards the close position unless the reverse acting selector switch is set to ON. See section 'Selector Switch Setting' in manual.

1. Adjust all pots anti-clockwise.
2. Apply 12 mA to the unit.
3. Turn the deadband pot fully clockwise and adjust until stable (no hunting).
    Turning clockwise decreases the deadband and anticlockwise increases the deadband.
4. Apply 4mA to the unit. Adjust the Set Close pot until the Actuator reaches the desired close position. Turning the Set Close pot clockwise moves the actuator towards the close position.
5. Apply 20mA to the unit. Adjust the Set Open until the Actuator reaches the desired open position. Turning the Set Open pot clockwise moves the actuator towards the open position.
6. Check that the Actuator reaches open and close with the appropriate control signal. Repeat steps 4 & 5 as necessary.

Speed Control Setting

Both speed and speed interrupt position can be set for open and close positions.
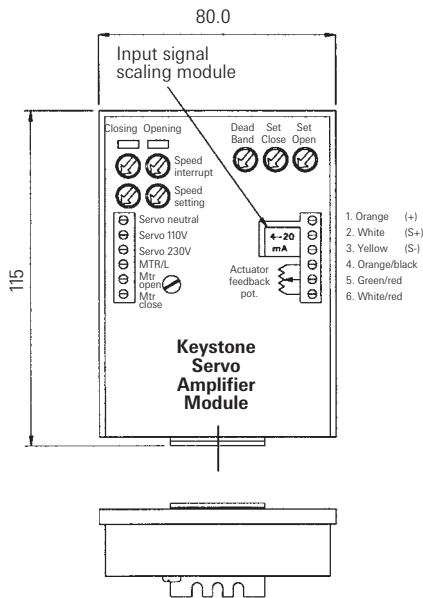Two LEDs are provided to aid setting, one for open and one for close.
The LEDs are green between the Close position and the Speed Interrupt position and red between the Speed Interrupt position and the Open position. See Selector Switch Setting instructions in the manual for fuller explanation.
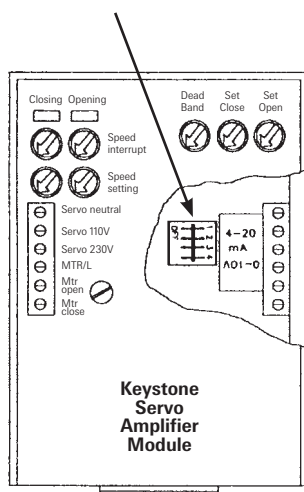Actuators are supplied with the speed control adjustment when the LEDs are Green and full speed when the LEDs are Red.
If the default settings are not suitable see Selector Switch Setting in Manual.

1. Move Actuator to the position at which the speed is required to change from Slow to Fast.
2. Turn the appropriate Speed Interrupt pot clockwise until LED changes from Red to Green.
3. Repeat steps 1 and 2 for the other direction.
4. With the Actuator operating in the Green LED region adjust the appropriate Speed Setting pot to until the desired speed is obtained. Turning pots clockwise reduces the Actuator speed.
5. If slow speed is required throughout the Actuator stroke turn Speed Interrupt pots fully clockwise. The LEDs will remain Green from Open to Close.ž
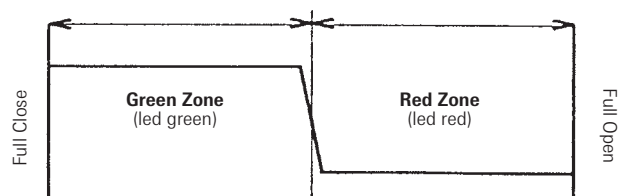
Selector Switch

Closing Opening

Dead Band | Set Close | Set Open

Speed interrupt

Speed setting

Servo neutral
Servo 110V
Servo 230V
MTR/L
Mtr open
Mtr close

4←20 mA
0-10V

**Keystone
Servo
Amplifier
Module**

Open and Close Speed Control/Interrupt settings

Selector Switch Setting

The selector switch is located under the cover - (see opposite). The switch allows for selection of Normal Action/Reverse Acting and the setting of the Speed Interrupt modes.

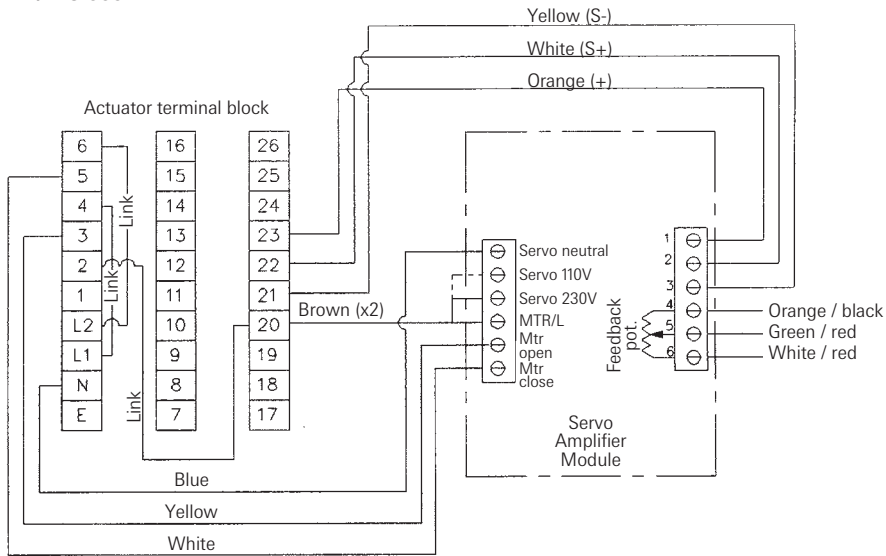| Switch	Servo Amp.	Speed Control	OFF	ON
1	Applicable	Non Applicable	Normal acting (4mA = close)	Reverse acting (4mA = close)
2	Applicable	Applicable	Opening slow speed in Green Zone	Opening slow speed in Red Zone
3	Applicable	Applicable	Closing slow speed in Green Zone	Closing slow speed in Red Zone
4	Not Used			

Speed interrupt settings

Full Close

Green Zone
(led green)

Red Zone
(led red)

Full Open

Schematic Wiring Diagram

777/778-006

Yellow (S-)
White (S+)
Orange (+)

Actuator terminal block

Servo neutral
Servo 110V
Servo 230V
MTR/L
Mtr open
Mtr close

Brown (x2)

Feedback pot.

Orange / black
Green / red
White / red

Servo Amplifier Module

Blue
Yellow
White

**Electratorc 6 Servo Amplifier Connection details
to main terminal strip**

777/778-012-150

Yellow (S-)
White (S+)
Orange (+)

Actuator terminal block

Servo neutral
Servo 110V
Servo 230V
MTR/L
Mtr open
Mtr close

Brown (x2)

Feedback pot.

Orange / black*
Green / red
White / red*

Servo Amplifier Module

* Note
  For model 150 reverse
  Orange/black
  and White/red wires

Blue
Yellow
White
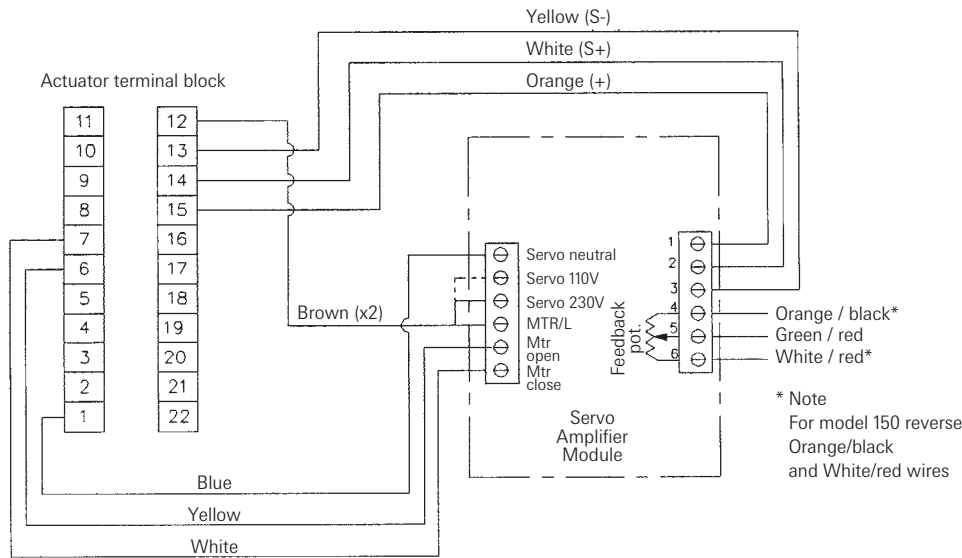
**F 777/8 012 - 150 Servo Amplifier Connection details
to main terminal strip**