

tyco

Flow Control

KEYSTONE

Compact electric actuators for 90° operation of 1/4 turn valves providing a range of torque outputs up to 1645 Nm.

Features

- Gearcasing and enclosure is ESPC coated anodised aluminium, except Model 003 which has a lightweight, durable, corrosion resistant & compact ABS cover.
- All models incorporate simple manual override facility.
- Quick connect terminal strips for ease of electrical wiring.
- Simple limit switch setting, using adjusting cams.
- Cam operated Torque Limit Switches, factory set (Sizes 012 – 150).
- Mechanical travel stops (Sizes 006 – 150)
- Direct mounting to 1/4 turn valves.
- Incorporates local visual indication of valve position.
- All gears turn in permanently lubricated bearings.
- Suitable for On/Off or Modulating duty.
- Weatherproof to minimum IP 65.
- Explosion proof versions available.
- Utilises reversible electric motor driving compound epicyclic gears.
- Thermal overload motor protection (set at 130°C), except on Model 003 where this is not necessary.
- Gasket and O-ring sealing.
- Intelligent network interfaces for ProfiBus, AS Interface, LonWorks, DeviceNet and Fieldbus Foundation.

General Application

Economical actuation of small, 1/4 turn valves or dampers.

Particularly suitable for applications within process and associated markets.



Mounting Standards

Model 777 : Keystone Standard
Model 778 : ISO 5211

Electronic Accessories

The following electronic accessories are available for all EPI Actuators:

- Current Loop Retransmission Module
- Hard Wired Module for Servo-Amp with Speed Control
- Hard Wired Module for Speed Control only
- Anti Condensation Heater
- 6-8 Limit Switch Pack
- 1-2 Potentiometers
- Network interfaces



DeviceNet.



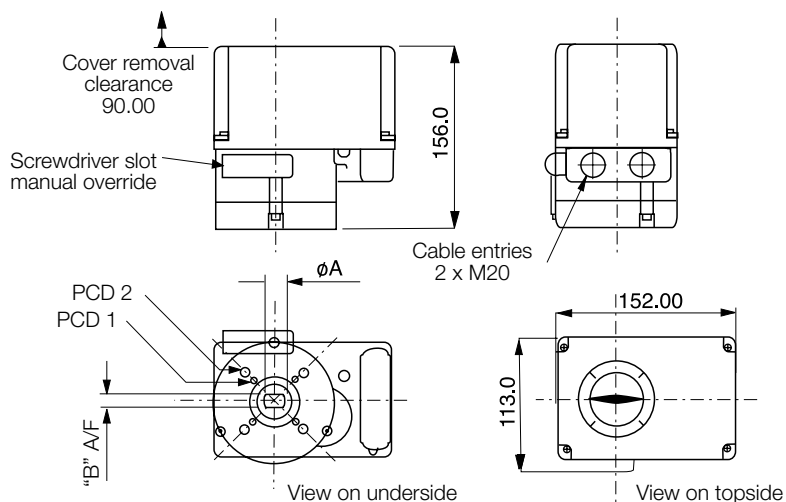
General Applications

Compact electric actuator for the operation of 1/4 turn valves requiring a torque of up to 40Nm.

Features

- Electratorc 3 uses a continuous rated, reversible synchronous motor driving a compound epicyclic gearbox.
- Manual override, independent of motor drive, operated by screwdriver.
- Simple limit switch setting using top adjusting cams.
- Low power, synchronous motor will sustain full mains voltage indefinitely. Thermal protection is, therefore, not required.
- Position indicator window.

Dimensions



Model	PCD1 (hole size)	PCD	PCD2 (hole size)	PCD	A	B
777-003	M6	44.45	M10	82.55	19.05	12.70
778-003 (F05)	M6	50.00	-	-	12	8
778-003 (F07)	-	-	M8	70.00	16	11

Notes

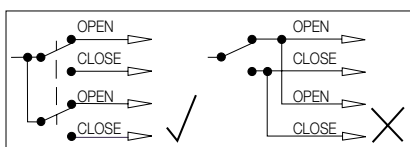
- Figure 777-003 has mounting details to Keystone standards.
- Figure 778-003 has mounting details to ISO 5211 (F05 or F07).

Wiring diagram

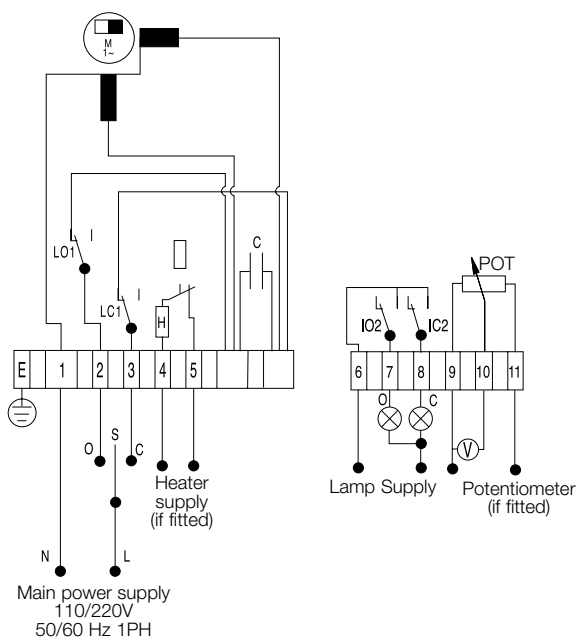
- M1~ : single phase synchronous motor
- C : capacitor
- H : heater with thermostat (opt.)
- POT : potentiometer (opt.)
- V : voltmeter
- LO1 : limit switch open
- LC1 : limit switch closed
- IO2 : indicator open
- IC2 : indicator closed

Notes

1. CAUTION: No more than one actuator can be operated from a single switched power input.



Wiring Diagram



Note: diagram drawn in mid-travel position

Limit switches

- Type V9
- Rating 10A at 240V
- Function 2-N.C. for limit & 2-N.O. for indication or auxiliary.

Environmental protection

All actuators are weatherproof to IP65.

Options

- An Anti-condensation heater prevents condensation within the actuator, due to wide variations in ambient temperature during periods when the actuator is not being operated.
- Feedback potentiometer – used to drive remote position indicators and give feedback of actuator position to external control devices. Voltmeter circuit shown is a typical technique.



Technical Data

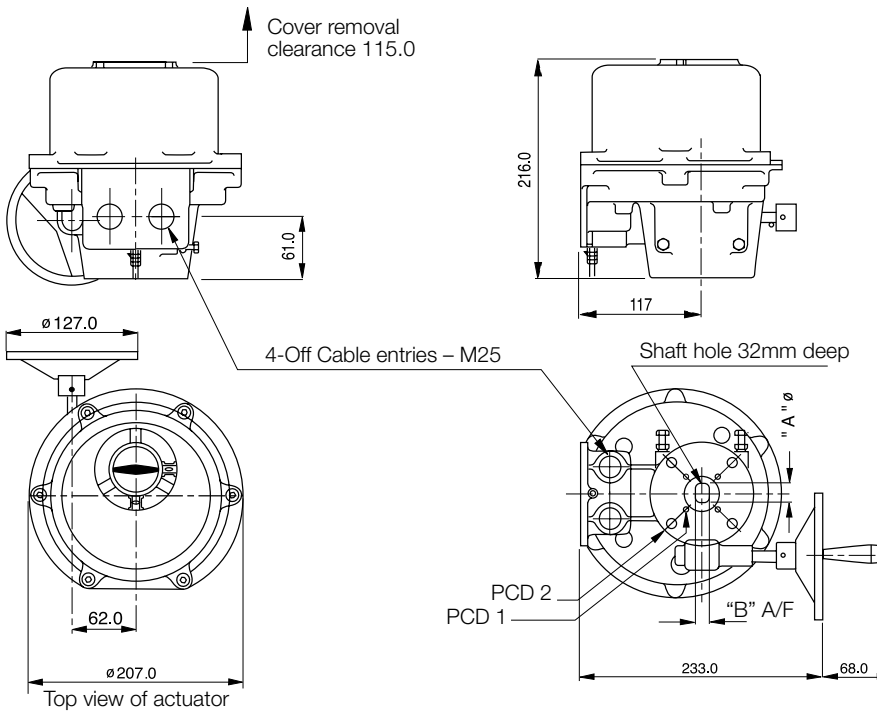
Materials of Construction	cover	A.B.S.(acrylanitrile butadene styrene)
	body	die cast aluminium LM24 (anodised & ESPC coated)
	baseplate	Zytel (35% glass filled nylon)
	cams	acetal
	gears	sintered copper/steel epicyclic gears glass filled nylon motor input gearing
	position	indicator A.B.S. (acrylanitrile butadene styrene)

Operating Specification	temp. range	-15°C to + 40°C
	noise level	maximum decibel reading at 1000Hz & 30cm = 25 [dB(A)]
	output torque	350 lbs/ins (40Nm) at 65 seconds
	cycle time for 90°	160 lbs/ins (18Nm) at 18 seconds
	voltages	110/230v 50/60Hz - 1 Phase (others on request)
	current	164 mA at 110V
	current	78.2 mA at 230V
	capacitor	2.2 µF at 110V
	capacitor	0.47 µF at 230V
	motorwindings	class B to VDE 0530
	rating	S4 100% at up to 40°C

Weight 5.5lb (2.5Kg)



Dimensions



Model	PCD1 (hole size)	PCD(1)	PCD2 (hole size)	PCD(2)	A	B
777-006	M6	44.45	M10	82.55	19.05	12.70
778-006 (F05)	M6	50.00	-	-	12	8
778-006 (F07)	-	-	M8	70.00	16	11

General Applications

Compact electric actuation for the operation of 1/4 turn valves requiring a torque of up to 68 Nm.

Suitable for on/off, modulating control and Intelligent communication.

Features

- Electrator 6 uses a permanent capacitor, split phase, reversible electric motor, driving compound epicyclic gears.
- Manual override requires no switch between manual and automatic drive. Handwheel operation will position the valve as required.
- Position indication window.
- Hard wired modules for position or speed control are available.
- Limit and positional switches easily set using top adjusting cams.
- Mechanical travel stops, adjustable to $90^\circ \pm 15^\circ$.
- Thermal overload motor protection (set at 130°C).
- Suitable for network interfaces.

Notes

- Figure 777-006 has mounting details to Keystone standards.
- Figure 778-006 has mounting details to ISO 5211 (F05 or F07).
- All Dimensions in Millimetres.

Limit switches

Type V9
 Rating 10A at 240V a.c.
 Function 2-N.C. for limit & 2-N.O. for indication or auxiliary.

Environmental protection

IP68 (2 metres for 48 hours).

Optional extras

- Servo amplifier with speed control hard wired module.
- Speed control hard wired module.
- Current loop retransmission module.
- Anti condensation heater.
- Feed back potentiometer(s).
- Network interfaces.
- 6 or 8 limit switch pack

Notes (Wiring Diagrams)

See page 6 for the relevant wiring diagrams.

1. All options are available separately.
 All diagrams show mid-travel position.
2. The potentiometer option is available with the Servo Amplifier.
3. The retransmission option is available with Speed Control.
4. Speed Control and Servo Amplifier are not available together.



Technical data

Materials of Construction	cover & body	die cast aluminium LM24 (hard anodised & ESPC coated)*
	switchplate	die cast aluminium LM24 (anodised)
	cams	acetal
	gears	steel
	position indicator	A.B.S.(acrylonitrile butadene styrene)

Motor single phase, permanent capacitor, split phase reversible

Switch Adjustment	standard	4 off SPDT
	special	up to 8 off available (up to 6 off on hard wired module)


Operating Specification	temp. range	-25°C to + 65°C
	output torque	600 lbs-ins (68Nm).
	cycle time for 90°	20 seconds (10 seconds optional) 40 seconds
	voltages	110/230v 50/60Hz - 1 Phase (others on request)
	current	400 mA at 110V
	current	200 mA at 230V
	capacitor	6 µF at 110V
	capacitor	1.5 µF at 230V
	motorwindings	class F
	leads	class B
	rating (continuous)	S4 100% at up to 40°C will de-rate to S4 80% at 65°C

Weight 13.2lbs (6.0Kg)

* Electro Static Powder Coating

Wiring Diagrams – Key

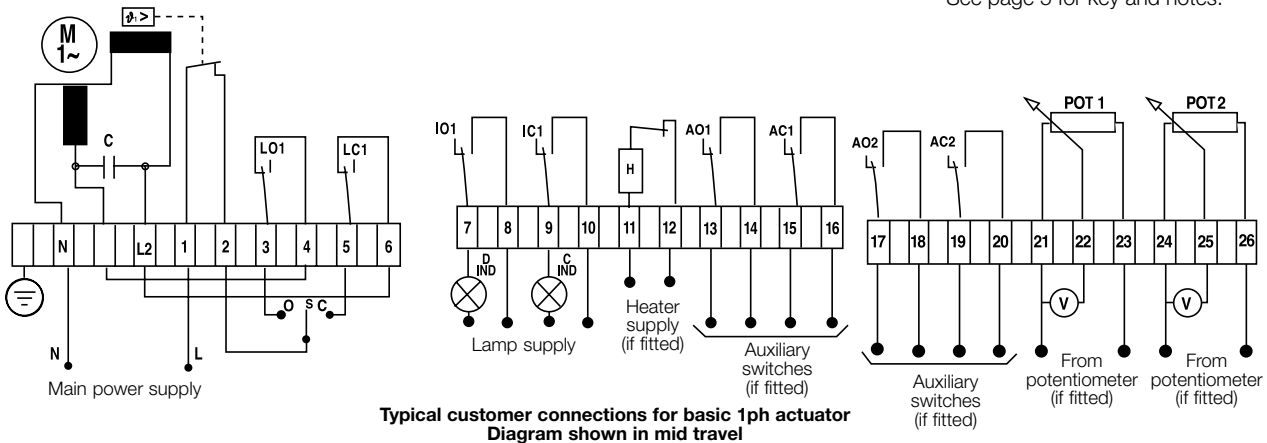
See page 6 for the relevant wiring diagrams.

- M1~ : single phase motor
-  : thermostat in motor
- C : capacitor
- H : heater with thermostat (opt.)
- POT1 : potentiometer (opt.)
- POT2 : potentiometer
- V : voltmeter
- LO1 : limit switch open
- LC1 : limit switch closed
- IO1 : indication open
- IC1 : indication closed
- AO1 : auxiliary limit switch open
- AC1 : auxiliary limit switch closed
- AO2 : auxiliary limit switch open
- AC2 : auxiliary limit switch closed

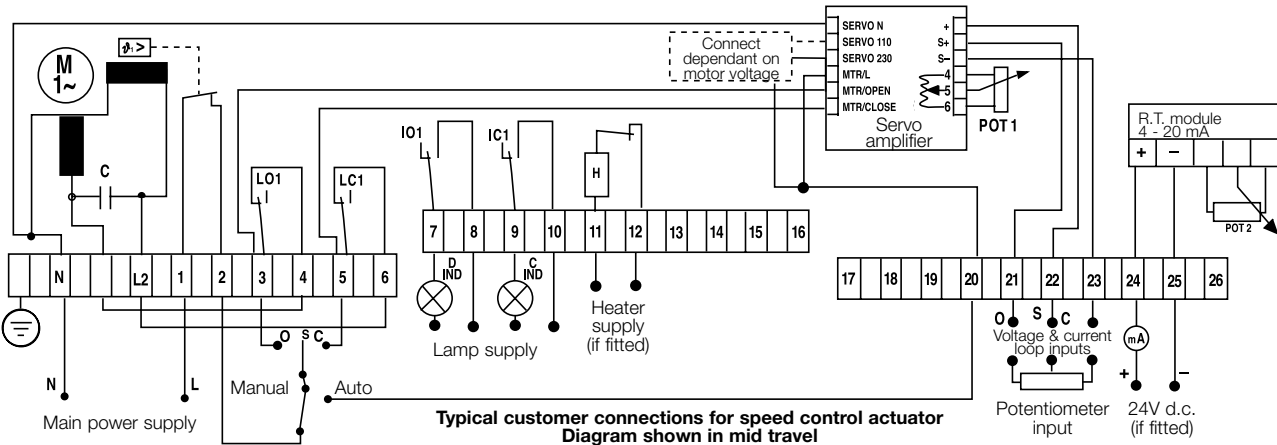
Wiring Diagram – Connections for Basic IPH Actuator

Notes (Wiring Diagrams)

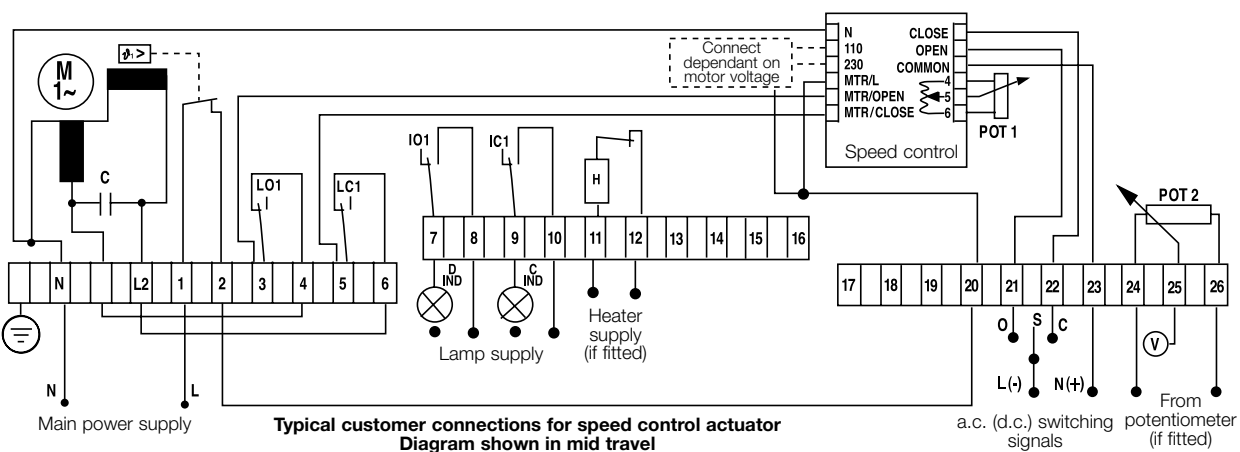
See page 5 for key and notes.



Wiring Diagram – Connections for Actuator with Servo Amplifier

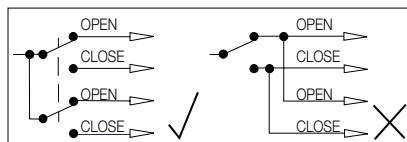


Wiring Diagram – Connections for Actuator with Speed Control



Notes

1. CAUTION: No more than one actuator can be operated from a single switched power input.



General Application

Electric actuation of 1/4 turn valves requiring torques of up to 1695 Nm.
 Suitable for on/off or modulating control duties.

Suitable for on/off, modulating control and Intelligent communication.

Features

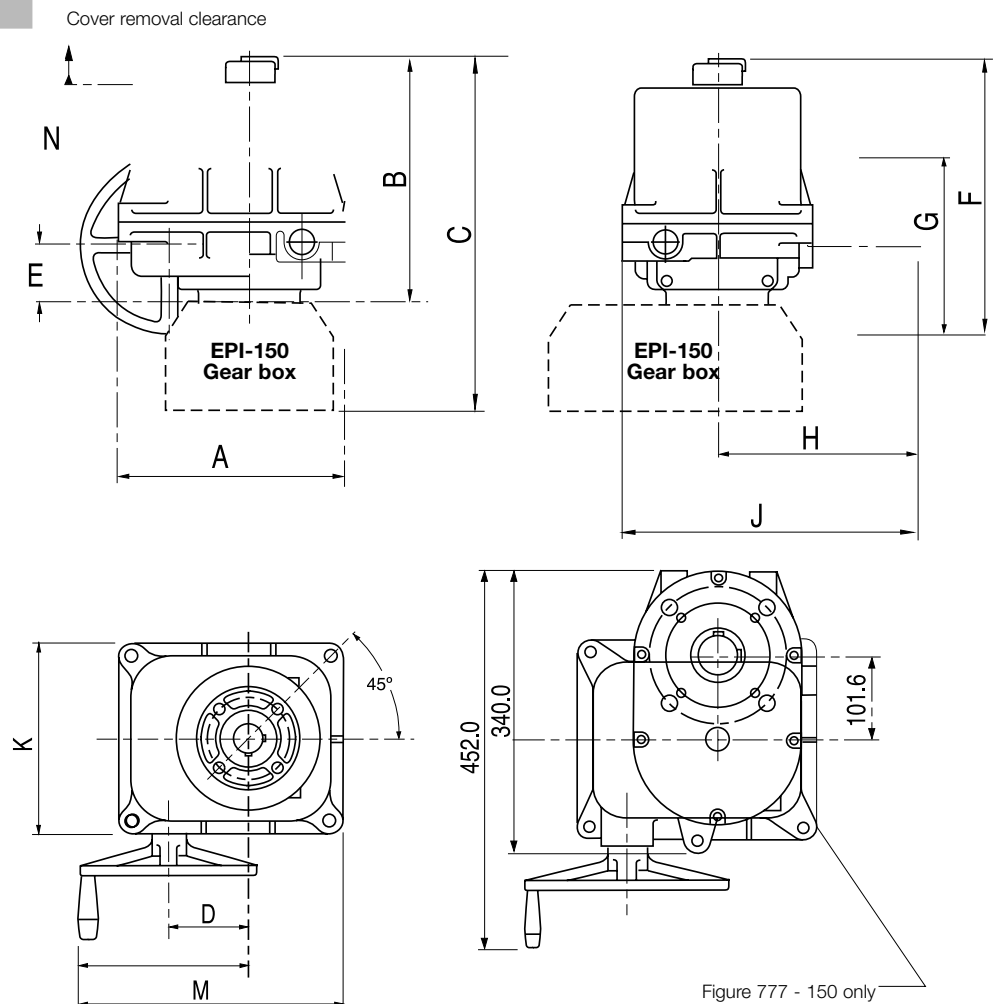
- Electric motor-permanent-split capacitor, reversible type, driving epicyclic compound gears.
- Manual override requires no switching between manual and automatic drive. Handwheel operation will position valve as required.
- Local position indication.
- Hard wired modules for positional or speed control, are available.
- Limit and positional switches easily set using adjusting cams.
- 2 off M25 cable entries.
- Mechanical travel stops, adjustable to $90^{\circ} \pm 15^{\circ}$.
- Thermal overload motor protection (set at 130°C).
- Single and three phase supply voltages available as standard. Others on request.
- Network interfaces.

Notes

See page 8 for dimensional data.



Dimensions



EPI Electric Actuators Figure 777/778

Sizes 012 to 150

Actuator dimensions

Type	A	B	C	D	E	F	G	H	J	K	L	M	N	Depth of Coupling
12-018	227	241	-	80	59	277	179	201	297	192	181	277	146	31.75
050-070	292	319	-	109	97	356	252	248	385	273	242	362	171	50.8
150	292	311	443	109	229	348	252	248	385	273	242	362	171	70/0

Figure 777 (Keystone standard)

Type	Shaft hole	Fixing holes on P.C.D.
012-018	ø28.6 x 6.35 KEY	4 x M10 on 82.55
050-070	ø28.6 x 6.35 KEY	4 x M10 on 82.55 / 4 x M12 on 127
150	ø47.7 x 12.7 KEY ø41.3 x 9.53 KEY	4 x M12 on 127 / 4 x M20 on 165.1

Figure 778 (ISO 5211 standard)

Type	Shaft hole	Fixing holes on P.C.D.
012-018	ø20 x 14 A/F	4 x M8 on 70
050-070	ø30 x 22 A/F	4 x M12 on 125
150	ø50 x 14 KEY	4 x M12 on 125 / 4 x M20 on 165

Materials of Construction

Item	Material (BS)	Material (DIN or equivalent)
Body & Cover	Alum. BS 1490 LM24	Werkstoff No. 3.2162 GD-ALSI 8CU3 DIN 1725
Switchplate	Alum. BS 1490 LM24	Werkstoff No. 3.2162 GD-ALSI 8CU3 DIN 1725
Shafts	Steel BS 970 220M07	Werkstoff No. 1.0711 G-9S20 DIN 1651
Worm	Steel BS 970 220M07	Werkstoff No. 1.0711 G-9S20 DIN 1651
Input Gear	Mineral Filled Nylon	—
Compound Gear	Alum. BS 1490 LM6	Werkstoff No. 3.2581 G-ALSI 12 DIN 1725
Fixed Annulus *	Steel BS 970 080M40	Werkstoff No. 1.0511 C40 DIN 17200
Output Gear	Alum. BS 1490 LM6	Werkstoff No. 3.2581 G-ALSI 12 DIN 1725
O-ring	Medium Nitrile Rubber BS 1806	DIN 4518
Fasteners	St.St. BS 970 304S15	Werkstoff No. 1.4301 X5CrNi 18.9 DIN 17440

* On 012 only, the Fixed Annulus is of Alum. BS 1474 6082

Technical data

Motor	permanent split capacitor, reversible type	
Switch Adjustment	standard	4 off SPDT
	special	up to 8 off available (up to 6 off on hard wired module)
Operating Specification	temp. range	-25°C to + 65°C
	output torque	up to 1695 Nm
	cycle time for 90°	11 to 165 seconds (see table on page 11)
	voltages	110/230v 50/60Hz - 1 Phase 400/440V 3ph
	rating (continuous)	20% for on/off duty 80% for modulating duty

Weight see table on page 11

* Electro Static Powder Coating

Limit switches

Type V9

Rating 10A at 240V a.c.

Function 2-N.C. for limit & 2-N.O. for indication or auxiliary.

Environmental protection


IP65

Optional extras

- Servo amplifier with speed control hard wired module.
- Speed control hard wired module.
- 6 or 8 limit switch pack.
- Current loop retransmission module.
- Anti-condensation heater.
- Feed back potentiometer(s).
- Intermittent/Extended/Electronic options.
- Extended duty motors for modulating service.
- Network interfaces.
- Explosion proof enclosure to EExd IIB T6

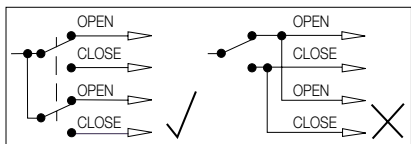


Key

- M1~ : single phase motor
-  : thermostat in motor
- C : capacitor
- H : heater with thermostat (opt.)
- POT1 : potentiometer (opt.)
- POT2 : potentiometer
- V : voltmeter
- TO1 : torque switch open
- TC1 : torque switch closed
- LO1 : limit switch open
- LC1 : limit switch closed
- IO1 : indication open
- IC1 : indication closed
- R : relay

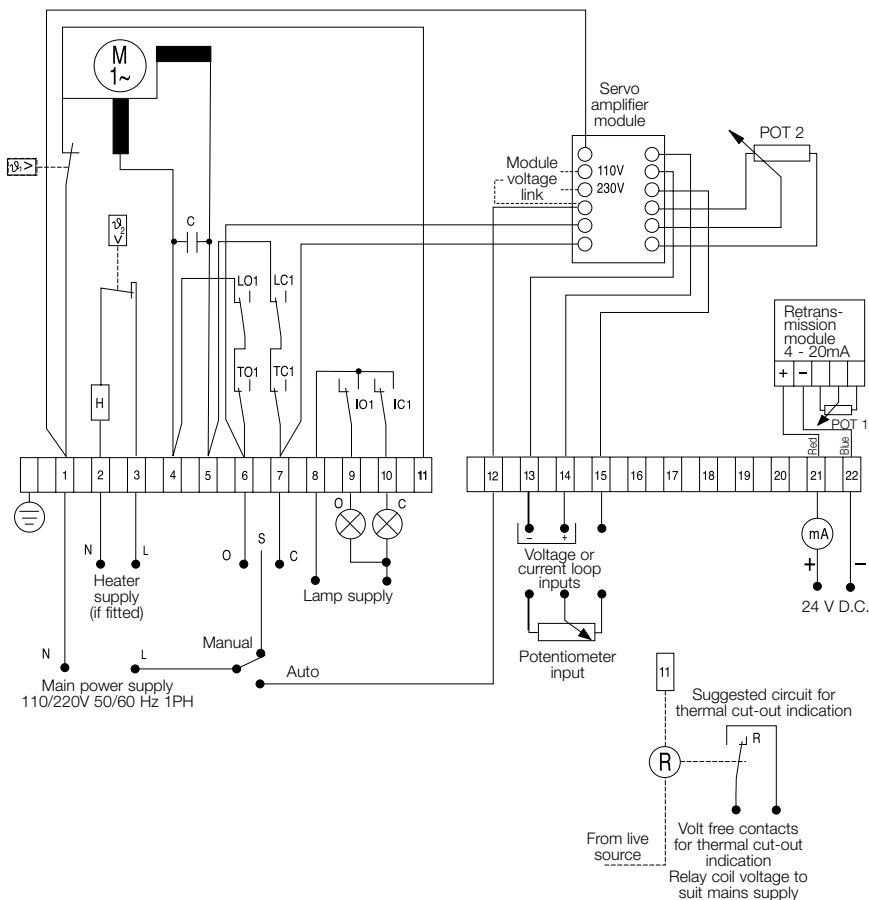
Notes

1. CAUTION: No more than one actuator can be operated from a single switched power input.

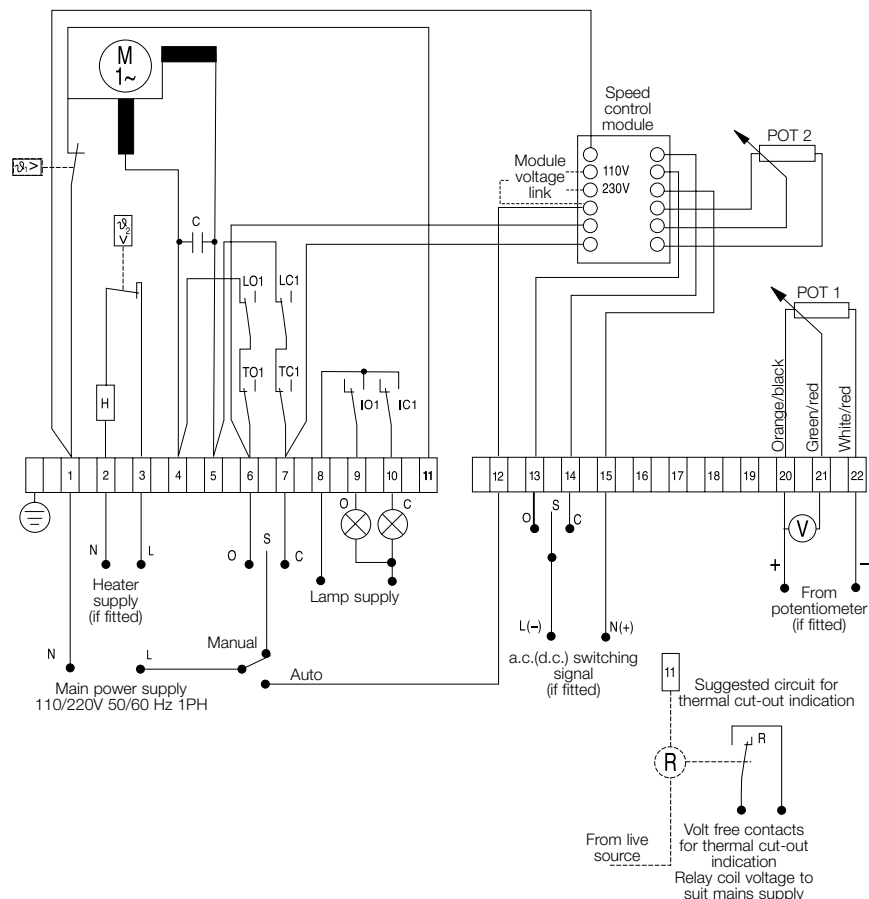


2. All options are available separately.
3. The potentiometer option is available with the Servo Amplifier.
4. The retransmission option is available with Speed Control.
5. Speed Control and Servo Amplifier are not available together.
6. All diagrams show mid-travel position.

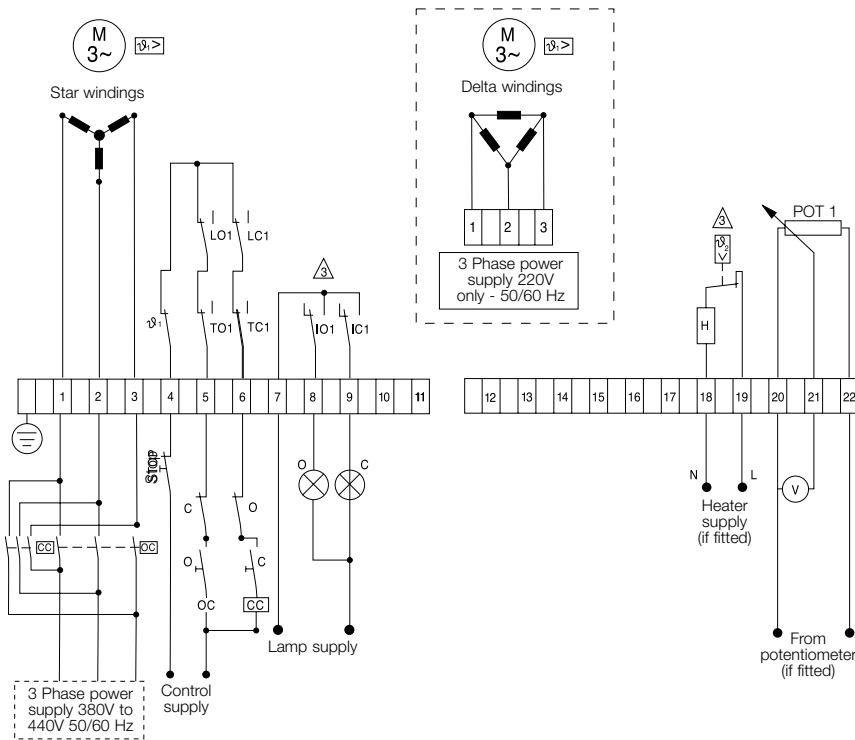
Wiring Diagram – Single Phase – with Servo Amp/Retransmission



Wiring Diagram – Single Phase – with Speed Control Module



Wiring Diagram – 3 Phase – DIN Standard

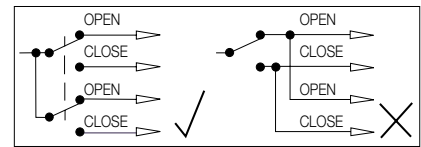


Key

- M3~ : three phase motor
- : thermostat in motor
- O & C : open & close
- H : heater with thermostat (opt.)
- POT1 : external potentiometer (opt.)
- V : voltmeter
- OC : open contactor
- CC : close contactor
- TO1 : torque switch open
- TC1 : torque switch closed
- LO1 : limit switch open
- LC1 : limit switch closed
- IO1 : indication open
- IC1 : indication closed

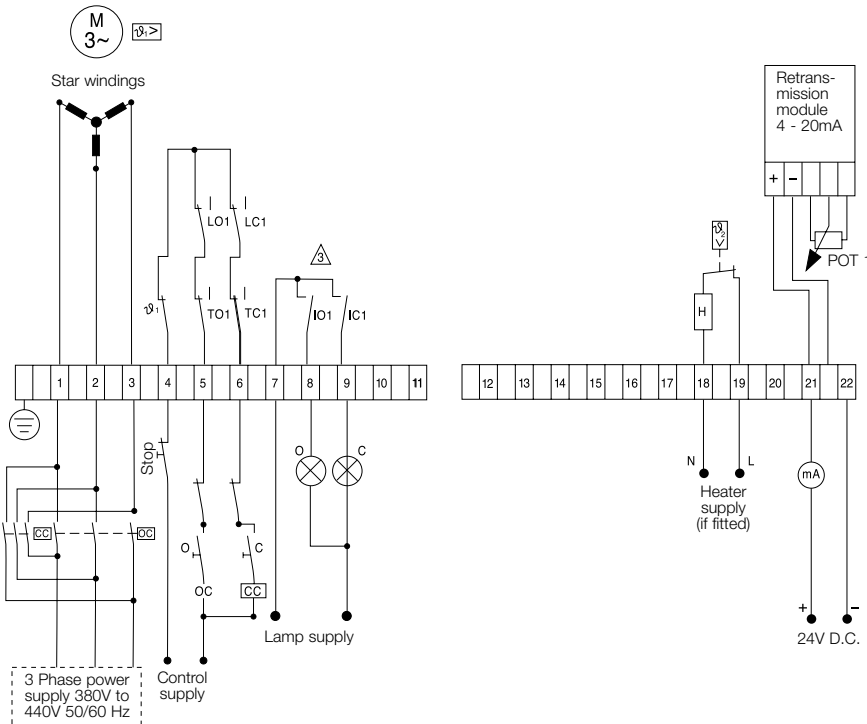
Notes

1. CAUTION: No more than one actuator can be operated from a single switched power input.



2. All options are available separately.
3. The potentiometer option is available with the Servo Amplifier.
4. The retransmission option is available with Speed Control.
5. Speed Control and Servo Amplifier are not available together.
6. All diagrams show mid-travel position.

Wiring Diagram – 3 Phase – with Retransmission Module



EPI Electric 'Actuators' Figure 777/778

Mechanical and Electrical Details

Mechanical Details

Actual Size	Duty %	Torque Nm	Time for 90 Deg - Secs	Weight Kg
003	100	18	18	2.5
003	100	40	65	
006	100	68	10	6.0
006	100	68	20	
006	100	68	40	
012	20	136	11	9.0
012	80	136	22	
012	80	136	65	
018	20	200	22	11.0
050	20	565	12	24.0
050	80	565	24	
050	80	565	55	
070	20	790	24	24.0
150	20	1695	36	33.0
150	80	1695	72	
150	80	1695	165	

Electrical Details – 110V-50Hz-1ph

Actual Size	Duty %	Full Load Amps	Inrush Amps	Capacitor
003	100	0.164	n/a	2.2
003	100	0.164	n/a	2.2
006	100	0.4	2.4	6.0
006	100	0.4	2.4	6.0
006	100	0.4	2.4	6.0
012	20	2.5	15.0	30.0
012	80	1.5	8.0	15.0
012	80	1.5	8.0	15.0
018	20	2.5	15.0	30.0
050	20	4.0	20.0	60.0
050	80	3.75	12.0	30.0
050	80	3.75	12.0	30.0
070	20	4.0	20.0	60.0
150	20	4.0	20.0	60.0
150	80	3.75	12.0	30.0
150	80	3.75	12.0	30.0

Electrical Details – 240V-50Hz-1ph

Actual Size	Duty %	Full Load Amps	Inrush Amps	Capacitor
003	100	0.0782	n/a	0.47
003	100	0.0782	n/a	0.47
006	100	0.2	1.2	1.5
006	100	0.2	1.2	1.5
006	100	0.2	1.2	1.5
012	20	1.05	7.3	7.5
012	80	0.65	4.0	4.0
012	80	0.65	4.0	4.0
018	20	1.05	7.3	7.5
050	20	1.75	15.0	12.5
050	80	1.65	7.3	7.5
050	80	1.65	7.3	7.5
070	20	1.75	15.0	12.5
150	20	1.75	15.0	12.5
150	80	1.65	7.3	7.5
150	80	1.65	7.3	7.5

Electrical Details – 230V-50Hz-1ph

Actual Size	Duty %	Full Load Amps	Inrush Amps	Capacitor
003	100	0.0782	n/a	0.47
003	100	0.0782	n/a	0.47
006	100	0.2	1.2	1.5
006	100	0.2	1.2	1.5
006	100	0.2	1.2	1.5
012	20	1.2	7.3	10.0
012	80	0.7	4.0	5.0
012	80	0.7	4.0	5.0
018	20	1.2	7.3	10.0
050	20	1.9	15.0	15.0
050	80	1.8	7.3	10.0
050	80	1.8	7.3	10.0
070	20	1.9	15.0	15.0
150	20	1.9	15.0	15.0
150	80	1.8	7.3	10.0
150	80	1.8	7.3	10.0

Electrical Details – 440V-50Hz-1ph

Actual Size	Duty %	Full Load Amps	Inrush Amps
012	20	0.45	3.0
012	80	0.25	1.6
012	80	0.25	1.6
018	20	0.45	3.0
050	20	0.8	6.5
050	80	0.5	3.0
050	80	0.5	3.0
070	20	0.8	6.5
150	20	0.8	6.5
150	80	0.5	3.0
150	80	0.5	3.0

Electrical Details – 380V-50Hz-1ph

Actual Size	Duty %	Full Load Amps	Inrush Amps
012	20	0.55	3.5
012	80	0.3	1.8
012	80	0.3	1.8
018	20	0.55	3.5
050	20	1.0	7.5
050	80	0.6	3.5
050	80	0.6	3.5
070	20	1.0	7.5
150	20	1.0	7.5
150	80	0.6	3.5
150	80	0.6	3.5

Note

n/a = not available

Optional Extras for Figure 777/778

Epicyclic electric actuator



Anti-condensation heaters

Prevents condensation within the actuator enclosure due to wide variations in ambient temperature during periods when actuator is not being operated.

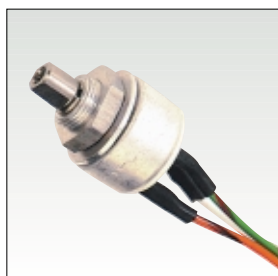
Note

For all items see separate data sheets.



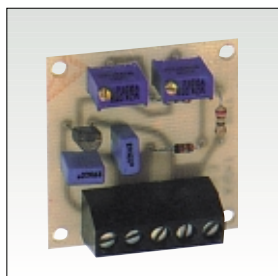
6 or 8 limit switch pack

Replaces standard 4 switch pack to give additional auxiliary switching.



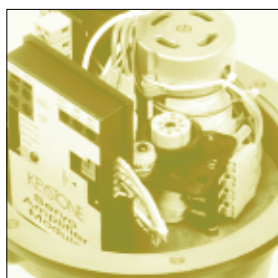
1 or 2 potentiometers

Gives continuous potentiometric feedback of actuator position.



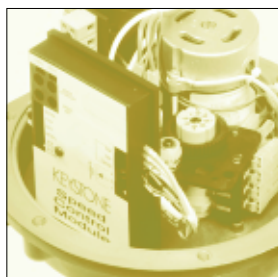
Retransmission module

Gives continuous current loop feedback of actuator position.



Hard wired module for servo amplifier with speed control

Gives positional and speed control of actuator in response to analogue input signals.



Hard wired module for speed control only

Gives independently adjustable control of actuator speed in opening and closing directions.



Network interfaces

All Keystone electric actuators are suitable for the incorporation of intelligent network interfaces, including Profibus, AS Interface, LonWorks, DeviceNet and Fieldbus Foundation.