

# **Bray** **CONTROLS**

A Division of BRAY INTERNATIONAL, Inc.



## Bray Electric Actuators & Accessories

### Technical Manual



# Bray Actuators & Accessories

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**Series 70**  
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**Series 70**  
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All statements, technical information, and recommendations in this bulletin are for general use only. Consult Bray representatives or factory for the specific requirements and material selection for your intended application. The right to change or modify product design or product without prior notice is reserved.

## Actuator Mounting Codes for S70 - Imperial (In)

Actuator Sizes	Inner Bolt Circle			Outer Bolt Circle			Stem Hole			
	Bolt Circle	No. Holes	Bolt Size	Bolt Circle	No. Holes	Bolt Size	Dia.	Across Flats	Depth	Keyway Width
70-03,06	F07/2.76	4	5/16-18	-	-	-	0.75	0.51	1.75	-
70-08,12,20	F07/2.76	4	5/16-18	F12/4.92	4	1/2-13	1.18	0.87	2.20	-
70-30,50,65	F12/4.92	4	1/2-13	F16/6.5	4	3/4-10	1.97	-	2.60	2 x 0.47
70-130,180	F12/4.92	4	1/2-13	F16/6.5	4	3/4-10	2.50	-	5.40	4 x 0.62
70-131,181	F12/4.92	4	1/2-13	F16/6.5	4	3/4-10	1.97	-	5.40	4 x 0.47

## Actuator Mounting Codes for S70 - Metric (mm)

Actuator Sizes	Inner Bolt Circle			Outer Bolt Circle			Stem Hole			
	Bolt Circle	No. Holes	Bolt Size	Bolt Circle	No. Holes	Bolt Size	Dia.	Across Flats	Depth	Keyway Width
70-03,06	F07/70.1	4	M8x1.25	-	-	-	19.05	12.95	44.45	-
70-08,12,20	F07/70.1	4	M8x1.25	F12/125	4	M12x1.25	29.97	22.10	55.88	-
70-30,50,65	F12/125	4	M12x1.75	F16/165.1	4	M20x1.75	50.04	-	66.04	50.8 x 11.94
70-130,180	F12/125	4	M12x1.75	F16/165.1	4	M20x1.75	63.50	-	137.16	101.6 x 15.75
70-131,181	F12/125	4	M12x1.75	F16/165.1	4	M20x1.75	50.04	-	137.16	101.6 x 11.94

### Standard Dimensional Drawings

#### Series 70

- [Imperial Standard - ES11A-0226](#)
- [Metric Standard - ES12A-0499](#)
- [Imperial Hazardous Duty - ES11A-0526](#)
- [Imperial 13,000-18,000 lb-in - ES11A-0708](#)
- [Metric 13,000-18,000 lb-in - ES12A-0708](#)

#### Series 73

- [Imperial Standard Sizes 1 & 3- ES11A-0474](#)
- [Imperial Standard Size 6 - ES11A-0475](#)

### Standard Wiring Diagrams

#### Series 70

- [120/220VAC On/Off w/ IRB - ES11A-0709](#)
- [120/220VAC Servo - ES11A-0565](#)
- [24 VAC On/Off w/ Aux Switch - ES11A-0711](#)
- [BBU 24V On/Off w/ Aux Switch - ES11A-0800](#)
- [BBU 24V Servo w/ Aux Switch - ES11A-0801](#)

For all other information such as dimensional drawings, wiring diagrams, and EDS files please visit <http://www.braycontrols.com> or contact your local Bray representative.

## Series 70 Nema 4 Actuator Specifications Sizes: 003-006

### CONSTRUCTION:

**Housing:**

- ASTM B85 Pressure Die Cast Aluminum
- Polyester Powder Coated
- Seacorr Coated

**Motor:**

- Single Phase, Reversible, Permanent Split Capacitor Induction Motor

**Capacitor:** Metalized Polyester

**Spur Gearing:** AGMA class 7, C12L14, Induction Hardened

**Worm Gearing:**

- Worm: 4140 heat treated, self locking
- Worm Gear: Aluminum Bronze

**Bearings:**

- Shaft: SAE 841 Sintered Bronze Bushing
- Gear: Sintered Bronze on floating Steel pins

**Lubrication:** High Temperature Synthetic Grease

**Override:** 17-4PH Stainless Steel Hardened to H 900

**Heater:** Optional, 5 Watt PTC style

**Terminal Strip:**

- Basic: 12 - 22 AWG (IEC 2 - 0.63)
- Servo: 14 - 24 AWG (IEC 1.6 - 0.5)

**Torque limiting:** Optional, open and closed preset at factory

**Limit Switches: SPDT**

- 120VAC -10A-1/3 HP
- 220VAC -10A-1/2 HP
- 250VDC - 1/4A
- 12VDC - 2A

**Exposed Fasteners:** Stainless Steel

**Travel Stops:** Externally adjustable at both 0 and 90 degrees

**Conduit Entries:** Two 1/2" NPT, Optional M20

**Weight:** 11 lbs. (5 kg.)

**Enclosure:** Designed to meet NEMA 4, 4x & IP65 Specifications

### PERFORMANCE:

**Output Torque:** 300 and 600 lb-in. (34 and 68 Nm)

- 90° travel times: (60 Hz)
- 15 sec intermittent
- 30 sec continuous

**Motor Gear Ratios:**

- 2413:1, and 11151:1

**Motor Insulation:**

- Class F, 311°F (155°C) Thermal Trip at 275°F (135°C)

**Voltages:**

- 115V or 220V, 50/60 Hz

**Temperature:**

- -20 to 150°F (-29° to 65°C)

**Continuous Duty:** Will operate continuously at a max. ambient temperature of 104°F (40°C)

**Intermittent Duty (25%):** Can maintain operation when cycled once per three similarly timed rest periods at a max. ambient temperature of 104°F (40°C)

**Manual Operation:**

- Pull to Engage, Push to Disengage
- Emergency shut-off disconnects power to motor
- 3.5" (89 mm) diameter handwheel with a 30:1 drive ratio
- Optional Spinner available
- Rim pull: 16 and 26 lb. (7.2 and 11.8 kg) respective to torque

**Current Draws in Amps: (Full Load / Locked Rotor)**

Travel Times	300 lb-in (34 Nm)	600 lb-in (68 Nm)
115v / 30 sec :	0.6 / 1.0	0.8 / 1.0
220v / 30 sec :	0.6 / 0.75	0.65 / 0.75

## Series 70 Nema 4 Actuator Specifications Sizes: 008-012-020

### CONSTRUCTION:

**Housing:**

- ASTM B85 Pressure Die Cast Aluminum
- Polyester Powder Coated
- Seacorr Coated

**Motor:**

- Single Phase, Reversible, Permanent Split Capacitor Induction Motor, 29 Fr

**Capacitor:** Metalized Polyester

**Spur Gearing:** AGMA class 9, C1144, Induction Hardened

**Worm Gearing:**

- Worm: 4140 heat treated, self locking
- Worm Gear: Aluminum Bronze

**Bearings:**

- Shaft: SAE 841 Sintered Bronze Bushing
- Gear: Sintered Bronze on floating steel pins

**Lubrication:** High Temperature Synthetic Grease

**Override:** 17-4PH Stainless Steel Hardened to H 900

**Heater:** Optional, 5 Watt PTC style

**Terminal Strip:**

- Basic: 12 - 22 AWG (IEC 2 - 0.63)
- Servo: 14 - 24 AWG (IEC 1.6 - 0.5)

**Torque limiting:** Optional, open and closed preset at factory

**Limit Switches: SPDT**

- 120VAC -10A-1/3 HP
- 220VAC -10A-1/2 HP
- 250VDC - 1/4A
- 12VDC - 2A

**Exposed Fasteners:** Stainless Steel

**Travel Stops:** Externally adjustable at both 0 and 90 degrees

**Conduit Entries:** Two 3/4" NPT, Optional M25

**Weight:** 25 lbs. (11.3 kg)

**Enclosure:** Designed to meet NEMA 4, 4x & IP65 Specifications

### PERFORMANCE:

**Output Torque:** 800, 1200 and 2000 lb-in.  
(90.4, 135.6 and 226 Nm)

- 90° travel times: (60 Hz)
- 6, 10 and 15 sec intermittent
- 30 sec continuous

**Motor Gear Ratios:**

- 681:1, 1080:1, 1640:1, and 3336:1

**Motor Insulation:**

- Class F, 311°F (155°C) Thermal Trip at 275°F (135°C)

**Voltages:**

- 115V or 220V, 50/60 Hz

**Temperature:**

- -20 to 150°F (-29° to 65°C)

**Continuous Duty:** Will operate continuously at a max. ambient temperature of 104°F (40°C)

**Intermittent Duty (25%):** Can maintain operation when cycled once per three similarly timed rest periods at a max. ambient temperature of 104°F (40°C)

**Manual Operation:**

- Pull to Engage, Push to Disengage
- Emergency shut-off disconnects power to motor
- 8" (203 mm) diameter handwheel with a 30:1 drive ratio
- Optional Spinner available
- Rim pull: 18, 28, and 46 lb. (8.1, 12.7 and 20.8 kg) respective to torque

**Current Draws in Amps: (Full Load / Locked Rotor)**

Travel Times	800 lb-in (90.4 Nm)	1200 lb-in (135.6 Nm)	2000 lb-in (226 Nm)
115v / 6 sec :	1.4 / 2.31	-	-
115v / 10 sec :	1.2 / 2.1	1.4 / 2.3	-
115v / 15 sec :	0.78 / 2.1	1.2 / 2.1	1.7 / 2.3
115v / 30 sec :	0.60 / 2.1	0.78 / 2.1	1.0 / 2.1
220v / 6 sec :	0.48 / 0.81	-	-
220v / 10 sec :	0.50 / 0.76	0.60 / 0.81	-
220v / 15 sec :	0.38 / 0.90	0.50 / 0.76	0.55 / 0.90
220v / 30 sec :	0.38 / 0.90	0.45 / 0.90	0.50 / 0.81

## Series 70 Nema 4 Actuator Specifications Sizes: 030-050-065

### CONSTRUCTION:

**Housing:**

- ASTM B85 Pressure Die Cast Aluminum
- Polyester Powder Coated
- Seacorr Coated

**Motor:**

- Single Phase, Reversible, Permanent Split Capacitor Induction Motor, 33 Fr

**Capacitor:** Metalized Polyester

**Spur Gearing:** AGMA class 9, C1144, Induction Hardened

**Worm Gearing:**

- Worm: 4140 heat treated, self locking
- Worm Gear: Aluminum Bronze

**Bearings:**

- Shaft: SAE 841 Sintered Bronze Bushing
- Gear: Sealed permanently lubricated ball bearings

**Lubrication:** High Temperature Synthetic Grease

**Override:** 17-4PH Stainless Steel Hardened to H 900

**Heater:** Optional, 5 Watt PTC style

**Terminal Strip:**

- Basic: 12 - 22 AWG (IEC 2 - 0.63)
- Servo: 14 - 24 AWG (IEC 1.6 - 0.5)

**Torque limiting:** Optional, open and closed preset at factory

**Limit Switches: SPDT**

- 120VAC -10A-1/3 HP
- 220VAC -10A-1/2 HP
- 250VDC - 1/4A
- 12VDC - 2A

**Exposed Fasteners:** Stainless Steel

**Travel Stops:** Externally adjustable at both 0 and 90 degrees

**Conduit Entries:** Two 3/4" NPT, Optional M25

**Weight:** 45 lbs. (20 kg)

**Enclosure:** Designed to meet NEMA 4, 4x & IP65 Specifications

### PERFORMANCE:

**Output Torque:** 3000, 5000 and 6500 lb-in.  
(339, 565 and 734.4 Nm)

- 90° travel times: (60 Hz)
- 18 sec intermittent
- 30 sec continuous

**Motor Gear Ratios:**

- 2078:1, and 3336:1

**Motor Insulation:**

- Class F, 311°F (155°C) Thermal Trip at 275°F (135°C)

**Voltages:**

- 115V or 220V, 50/60 Hz

**Temperature:**

- -20 to 150°F (-29° to 65°C)

**Continuous Duty:** Will operate continuously at a max. ambient temperature of 104°F (40°C)

**Intermittent Duty (25%):** Can maintain operation when cycled once per three similarly timed rest periods at a max. ambient temperature of 104°F (40°C)

**Manual Operation:**

- Pull to Engage, Push to Disengage
- Emergency shut-off disconnects power to motor
- 12" (300 mm) diameter handwheel with a 30:1 drive ratio
- Optional Spinner available
- Rim pull: 37, 61, and 80 lb. (16.7, 27.6 and 36.2 kg) respective to torque

**Current Draws in Amps: (Full Load / Locked Rotor)**

Travel Times	3000 lb-in (339 Nm)	5000 lb-in (565 Nm)	6500 lb-in (734.4 Nm)
115v / 18 sec :	1.8 / 3.0	2.3 / 3.1	-
115v / 30 sec :	1.2 / 3.0	1.6 / 3.0	2.3 / 3.1
220v / 18 sec :	0.78 / 1.4	1.1 / 1.4	-
220v / 30 sec :	0.75 / 1.2	0.90 / 1.4	1.1 / 1.4

## Series 70 Nema 4 Actuator Specifications Sizes: 130-180

### CONSTRUCTION:

**Housing:**

- ASTM B85 Pressure Die Cast Aluminum
- Polyester Powder Coated
- Seacorr Coated

**Motor:**

- Single Phase, Reversible, Permanent Split Capacitor Induction Motor, 33 Fr

**Capacitor:** Metalized Polyester

**Spur Gearing:** AGMA class 9, C1144, Induction Hardened

**Worm Gearing:**

- Worm: 4140 heat treated, self locking
- Worm Gear: Aluminum Bronze

**Bearings:**

- Shaft: SAE 841 Sintered Bronze Bushing
- Gear: Sealed permanently lubricated ball bearings

**Lubrication:** High Temperature Synthetic Grease

**Override:** 17-4PH Stainless Steel Hardened to H 900

**Heater:** Optional, 5 Watt PTC style

**Terminal Strip:**

- Basic: 12 - 22 AWG (IEC 2 - 0.63)
- Servo: 14 - 24 AWG (IEC 1.6 - 0.5)

**Torque limiting:** Standard, open and closed preset at factory

**Limit Switches: SPDT**

- 120VAC - 10A-1/3 HP
- 220VAC - 10A-1/2 HP
- 250VDC - 1/4A
- 12VDC - 2A

**Exposed Fasteners:** Stainless Steel

**Travel Stops:** Externally adjustable at both 0 and 90 degrees

**Conduit Entries:** Two 3/4" NPT, Optional M25

**Weight:** 118 lbs. (53.5 kg)

**Enclosure:** Designed to meet NEMA 4, 4x & IP65 Specifications

### PERFORMANCE:

**Output Torque:** 13000 & 18000 lb-in.  
(1470 & 2034 Nm)

- 90° travel times: (60 Hz)
- 110 sec continuous

**Motor Gear Ratios:**

- 10000:1

**Motor Insulation:**

- Class F, 311°F (155°C) Thermal Trip at 275°F(135°C)

**Voltages:**

- 115V or 220V, 50/60 Hz

**Temperature:**

- -20 to 150°F (-29° to 65°C)

**Continuous Duty:** Will operate continuously at a max. ambient temperature of 104°F (40°C)

**Manual Operation:**

- Pull to Engage, Push to Disengage
- Emergency shut-off disconnects power to motor
- 12" (300 mm) diameter handwheel with a 30:1 drive ratio
- Rim pull: 80 lb. (36.2 kg) respective to torque

**Current Draws in Amps: (Full Load / Locked Rotor)**

Travel Times	13000 lb-in (1470 Nm)	18000 lb-in (2034 Nm)
115v :	2.3 / 3.1	2.5 / 3.1
220v :	1.3 / 2.7	1.5 / 2.7

## Series 70 24VAC Nema 4 Actuator Specifications Sizes: 006-020-050

### CONSTRUCTION:

**Housing:**

- ASTM B85 Pressure Die Cast Aluminum
- Polyester Powder Coated
- Seacorr Coated

**Motor:**

- Permanent Magnet-Brush D.C. Motor

**Spur Gearing:** AGMA class 9, C1144, Induction Hardened

**Worm Gearing:**

- Worm: 4140 heat treated, self locking
- Worm Gear: Aluminum Bronze

**Bearings:**

- Shaft: SAE 841 Sintered Bronze Bushing
- Gear: Sealed permanently lubricated ball bearings

**Lubrication:** High Temperature Synthetic Grease

**Override:** 17-4PH Stainless Steel Hardened to H 900

**Heater:** Optional, 5 Watt PTC style

**Terminal Strip:**

- Basic: 12 - 22 AWG (IEC 2 - 0.63)
- Servo: 14 - 24 AWG (IEC 1.6 - 0.5)

**Torque limiting:** Optional, open and closed preset at factory

**Limit Switches: SPDT**

- 120VAC - 10A-1/3 HP
- 220VAC - 10A-1/2 HP
- 250VDC - 1/4A
- 12VDC - 2A

**Exposed Fasteners:** Stainless Steel

**Travel Stops:** Externally adjustable at both 0 and 90 degrees

**Conduit Entries:**

- Size 006 Two 1/2" NPT (BSP), Optional M20
- Size 020 & 050 Two 3/4" NPT, Optional M25

**Weight: Size:** 006 - 11 lbs. (5 kg)

**Size:** 020 - 27 lbs. (12.3 kg)

**Size:** 050 - 46 lbs (20.9 kg)

**Enclosure:** Designed to meet NEMA 4, 4x & IP65 Specifications

### PERFORMANCE:

**Output Torque:** 600, 2000 and 5000 lb-in.  
(68, 226 and 565 Nm)

- 90 Degree travel times: (60 Hz)
- 60 sec continuous

**Voltage:**

- 24VAC 50/60Hz

**Motor Insulation:**

- Class F

**Fuse:**

- Slow Blow Fuse 5A@250VAC

**Relays:**

- CR-Directional Control Relay  
10A@28VDC SPDT 24VAC coil
- MR-Motor Switching Relay  
10A@28VDC DPDT 24VAC coil

**Temperature:**

- -20 to 150°F (-29° to 65°C)

**Continuous Duty:** Will operate continuously at a max. ambient temperature of 104°F (40°C)

**Manual Operation:**

- Pull to Engage, Push to Disengage
- Emergency shut-off disconnects power to motor
- Size 006-3.5" (89 mm) / Size 020-8" (200 mm)/ Size 050-12" (300 mm) diameter handwheel with a 30:1 drive ratio
- Optional Spinner available
- Rim pull: 26, 46, and 61 lb. (11.7, 20.8 and 27.6 kg) respective to torque

**Current Draws in Amps: Full Load**

Travel Times	600 lb-in (68 Nm)	2000 lb-in (226 Nm)	5000 lb-in (565 Nm)
24 VAC / 60 sec	1.8	2.0	3.0



## Fail Open or Close Battery Backup Unit (BBU) Specifications

### CONSTRUCTION AND PERFORMANCE:

**Housing:**

- Weather Proof Enclosure (cover must not be left off when exposed to the weather or damage will occur to the unit)

**Batteries:**

- Two 12V 1.4AH Sealed Lead Acid Batteries wired in series

**Battery Monitoring:** Local LED Indicator and (2) wire voltage free normally open contact for remote monitoring

**Battery Charging:** Automatic Smart Charger

**Battery Conservation:** Shut-off batteries after 1 minute or when actuator stops.

**Operating Temperature:** -4°F (-20°C) to 122°F (50°C) LED light may not function below -20 °F

**Power Protection:** Two 5 amp fuses. One is for the external power output circuit and the other for the battery output circuit

**Current Draw @ 24 VAC:**

- BBU only Maximum 10mA standby (0.25 VA)
- Max. 420mA charging (10 VA)

**Current Draw of Actuator with BBU:**

- 600 lb-in - 1.9A (with Load)
- 2,000 lb-in - 2.7A (with Load)
- 5,000 lb-in - 4.1A (with Load)

**Power Requirements:** 24-27VAC or 30-38VDC (the minimum voltage is required to provide proper battery charging)

**Power Output:**

- BBU Output with 24VAC supply is 30-38 VDC
- On failure of AC supply, battery output is 24-25.5 VDC

Although charging will not work at -4°F, the batteries will still hold their charge for an extended period of time as described under shelf life.

### Battery Specifications

Two 12 volt 1.4 ampere-hour (AH) Rechargeable Sealed Lead Acid Battery wired in series

**Features**

- Valve regulated, spill proof construction allows safe operation in any position
- Rugged impact resistant ABS case and cover (UL94-HB)
- U.L. Recognized under file number MH 20845

**Specifications**

- Battery Case: ABS Plastic
- Maximum Discharge Current (7 minutes): 4.2 amperes
- Shelf Life (% of nominal capacity at 68°F (20°C))
  - 1 month = 97%
  - 3 months = 91%
  - 6 months = 83%

**Operating Temperature Range**

Charge: -4°F (-20°C) to 122°F (50°C)

Discharge: -40°F (-40°C) to 140°F (60°C)

The BBU should be powered up for a minimum of 12 hours to ensure batteries are fully charged.

**See “Bray Serious 70 BBU Operation and Maintenance Manual for detailed information.**

## Series 70 Hazardous Duty Actuator Specifications Sizes: 708-712-720

### CONSTRUCTION:

**Housing:**

- ASTM B85 Pressure Die Cast Aluminum
- Polyester Powder Coated

**Motor:**

- Single Phase, Reversible, Permanent Split Capacitor Induction Motor, 29 Fr

**Spur Gearing:** AGMA class 9, C1144, Induction Hardened

**Worm Gearing:**

- Worm: 4140 heat treated, self locking
- Worm Gear: Aluminum Bronze

**Bearings:**

- Shaft: SAE 841 Sintered Bronze Bushing
- Gear: Sealed permanently lubricated ball bearings

**Lubrication:** High Temperature Synthetic Grease

**Override:** 17-4PH Stainless Steel Hardened to H 900

**Heater:** Optional, 5 Watt PTC style

**Terminal Strip:**

- Basic: 12 - 22 AWG (IEC 2 - 0.63)
- Servo: 14 - 24 AWG (IEC 1.6 - 0.5)

**Torque limiting:** Optional, open and closed preset at factory

**Limit Switches: SPDT**

- 120VAC - 10A-1/3 HP
- 220VAC - 10A-1/2 HP
- 250VDC - 1/4A
- 12VDC - 2A

**Exposed Fasteners:** Stainless Steel

**Travel Stops:** Externally adjustable at both 0 and 90 degrees

**Conduit Entries:** Two 3/4" NPT, Optional M25

**Weight:** 25 lbs. (11.4 kg)

**Enclosure:** Designed to meet NEMA 4, 4x & IP65 Specifications

UL approved (USA & Canadian Std) for Hazardous Areas

- Class-I, GRPs C&D, DIV 1&2.
- Class-II, GRPs E,F&G, DIV 1&2.

### PERFORMANCE:

**Output Torque:** 800, 1200 and 2000 lb-in.  
(90.4, 135.6 and 226 Nm)

- 90° travel times: (60 Hz)
- 6, 10 and 15 intermittent
- 30 sec continuous

**Motor Gear Ratios**

- 681:1, 1080:1, 1640:1, and 3336:1

**Voltage:**

- 115V or 220V, 50/60Hz

**Motor Insulation:**

- Class F, 311°F (155°C) Thermal Trip at 275°F (135°C)

**Temperature:** -20 to 150°F (-29° to 65°C)

**Continuous Duty:** Will operate continuously at a max. ambient temperature of 104°F (40°C)

**Intermittent Duty (25%):** Can maintain operation when cycled once per three similarly timed rest periods at a max. ambient temperature of 104°F (40°C)

**Manual Operation:**

- Pull to Engage, Push to Disengage
- Emergency shut-off disconnects power to motor
- 8" (200 mm) diameter handwheel with a 30:1 drive ratio
- Optional Spinner available
- Rim pull: 18, 28, and 46 lb. (8.1, 12.7 and 20.8 kg) respective to torque

**Current Draws in Amps: (Full Load / Locked Rotor)**

Travel Times	800 lb-in (90.4 Nm)	1200 lb-in (135.6 Nm)	2000 lb-in (226 Nm)
115v / 6 sec :	1.4 / 2.3	-	-
115v / 10 sec :	1.2 / 2.1	1.4 / 2.3	-
115v / 15 sec :	0.78 / 2.1	1.2 / 2.1	1.7 / 2.3
115v / 30 sec :	0.60 / 2.1	0.78 / 2.1	1.0 / 2.1
220v / 6 sec :	0.48 / 0.81	-	-
220v / 10 sec :	0.50 / 0.76	0.60 / 0.81	-
220v / 15 sec :	0.38 / 0.90	0.50 / 0.76	0.55 / 0.90
220v / 30 sec :	0.38 / 0.90	0.45 / 0.90	0.50 / 0.81