



MODEL 18DZ/EZ

Description: Zero-Fire SCR Power Controls

Product Range: 120-600 VAC, Single- or Three-Phase, 10-1200 Amps

Application: Constant Resistance Loads

FEATURES

- All Solid State Construction
- Exclusive "2 Millisecond" Fuses for Short Circuit Protection
- Exclusive " V_{bo} Clamping" Transient Voltage Protection
- Exclusive Full Rated Operation in 50°C (122°F) Ambients Without Fans Through 450 Amps
- Exclusive Proprietary Heatsinks Zero-Fired Operation
- Silent, Arcless Switching
- Minimizes RFI
- 100% Power Factor
- Open-Chassis or Enclosed
- Full Range of Control Options and Accessories

TYPICAL APPLICATIONS

- Electric Furnaces and Ovens
- Heat Sealing and Packaging
- Plastic Extruding and Molding
- Injection Molding
- Paint and Ink Drying
- Autoclaves
- Heat Treating

Model 18DZ/EZ SCR controls provide zero-fired proportional control of single-phase (18DZ) and three-phase (18EZ) a.c. voltages to constant resistance heating elements. These units are solid state replacements for variable transformers, saturable core reactors, mercury relays, and electromechanical contactors. Power semiconductors replace contacts and brushes to switch electric power without moving parts, and, when operated within their stated ratings for current, voltage, and temperature, have no known MTBF or life expectancy rating.

INNOVATIVE ADVANCED TECHNOLOGY: Three Pillars Of Protection

18DZ/EZ SCR controls incorporate exclusive design features to protect power semiconductor components against damage:

- 1> Unique " V_{bo} Clamping" provides unmatched protection for power semiconductors against transient voltage spikes common on industrial power mains.
- 2> "2 millisecond" fuses protect semiconductors against short-circuit faults. Payne Engineering SCR controls are the only power controls in the industry equipped with factory tested and approved fuses coordinated with power semiconductors.
- 3> Proprietary heatsinks are engineered in-house coordinating finite-element analysis (FEA) with on-site lab tests. Payne Engineering SCR controls operate at 50°C (122°F) ambient temperatures with no derating.

APPLICATION FLEXIBILITY

Standard configuration of all 18DZ/EZ units is for manual control via a 270° turn potentiometer (included). Standard option allows configuration for open- or closed-loop automatic control in response an analog control signal from a temperature controller, PLC I/O module, or

other external source. Other standard options allow controls to be configured for the specific requirements of each application.

SPECIFICATIONS

Power Circuit: inverse-parallel thyristors selected for V_{bo} Clamping transient protection, with parallel R-C circuit for dv/dt protection. Current-clamping 2 millisecond power fuses in series with power semiconductors provide short-circuit protection.

Control Circuit: all solid state circuitry utilizes optically isolated ICs to switch thyristors and provide optical isolation for the control input signal.

Mains Frequency: 50/60 Hz standard. Other frequencies available on special order (consult factory).

Cycle Time Base: adjustable from 10 to 120 cycles (factory-set for 60 cycles unless otherwise specified).

Overall Efficiency: 98.5 to 99.5%.

Power Loss: approximately 1-2 watts/ampere/switched pole.

Voltage Drop Across Power Circuit at 100% Output: 1-2 volts maximum per switched pole.

Proof Voltage: (isolation between power circuit, control circuit and ground) greater than 2 kV.

Control Input: manual control via 10K Ohm, 2 watt potentiometer with indicating dial plate standard.

Control Power: 5 watts maximum, derived from 12 VA isolation control transformer on all units.

Fuse Protection: 2 millisecond I²t fuses are factory tested and coordinated with all power semiconductors, considering:

- a. fuse element melt time t_{melt} ;
- b. peak melt current I_{melt} ;
- c. arc quench time I_{arc} ;
- d. peak arc current I_{arc} .

Transient Voltage Protection: voltage breakover (V_{bo}) protection with R-C filters for dv/dt protection.

Ambient Temperature Range: 10 to +50°C (122°F).

Terminal Connections: 10-30 amp use Bakelite or thermoplastic blocks; 50 amps and larger use screw lugs or stud bolts.

STANDARD OPTIONS

Isolated Chassis Construction: electrically isolated chassis available through 80 amp size.

Thermistor Control: control circuit accepts direct input from temperature-sensing thermistor probe and automatically adjusts power control cycle rates to maintain load temperature at level selected on temperature set potentiometer in closed-loop control scheme. Available temperature ranges: 0-90°C and 90-240°C. Thermistor probe, 3 ft. of cable and set-point potentiometer included.

Optically Isolated main Control: optically isolated circuitry integral to main control board that allows output to the load to be controlled by an external analog signal in an open- or closed-loop control scheme. Number of integral cycles ON within the set time base is proportional to the control input signal. Multiturn SPAN and GAIN trimmers are provided for signal response calibration or field adjustments to the signal response range.

Heatsink Overtemperature Switch: temperature sensor mounted to heatsink chassis switches if heatsink temperature exceeds maximum allowable level. Available either to turn control off or to drive external indicating signal.

120 V Pilot: 120 VAC voltage signal used to actuate control.

70-400 Hz: control configured for operation at frequencies ranging from 70-400 Hz or 16-2/3 and 25 Hz.

277 VAC Input: 277 VAC input voltage rating.

550 VAC Input: 550 VAC input voltage rating (+10% max.).

600 VAC Input: 600 VAC input voltage rating (+10% max.).

ENCLOSURES

18DZ/EZ power controls can be supplied in a steel electrical enclosure with a hinged front cover. Enclosures are ventilated to facilitate proper cooling of the control. Ventilation openings are covered by expanded metal mesh, and are located in the bottom and at the top of the side panels. Enclosure fans are not required. For non-ventilated enclosure requirements, consult the local sales office.

SIZING CONSIDERATIONS

Series 18DZ and 18EZ SCR power controls are designed for use on constant-resistance loads only. Size units by actual load current, not kW.

1> Always use maximum possible load current for sizing purposes.

2> The amp rating on all power controls is determined by the fuse(s). Current draw must not exceed fuse rating at any time.

3> Rated voltage of the connected load should match the input voltage to the power control.

SIZING EXAMPLE

Application: zero-fire proportional control of three-phase, 240 VAC, delta-connected 35 kW nichrome heating elements; 240 VAC, three-phase, 60 Hz input voltage.

Model Number Selection:

- Variable-voltage: 18
- Three-phase: E
- Zero-fired operation: Z
- 240VAC input: -2-
- Amp rating, calculated as follows:
$$\frac{35 \times 1000}{240 \times 1.73} = 84.29 \text{ amps/phase}$$

Since $84.29 < 120$, amp rating: 120

Model Number: 18EZ-2-120

Options: as required.

Model Number

Input Voltage

Frequency

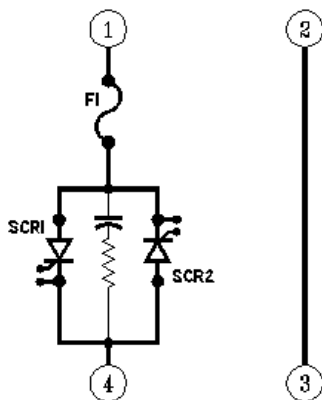
Load Specifications

Options

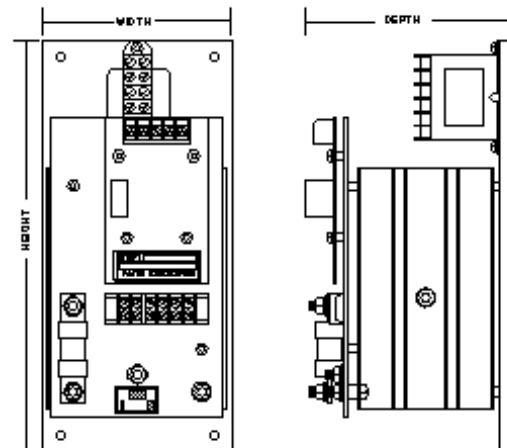
Enclosure Requirements

WHEN ORDERING, SPECIFY:

Model Number	Amps (Fuse)	KVA @ Max. Rated Voltage	Fuse	Open Dimensions Inches (millimeters)			Enclosed Dimensions Inches (millimeters)		
				Height	Width	Depth	Height	Width	Depth
120 VAC, 50/60 Hz Input, 118 VAC Output									
18DZ-1-10	10	1.2	49B25-10	9.8 (249)	3.5 (89)	4.62 (118)	12 (305)	10 (254)	6 (153)
18DZ-1-20	20	2.4	49B25-20	9.8 (249)	3.5 (89)	4.62 (118)	12 (305)	10 (254)	6 (153)
18DZ-1-30	30	3.6	49B25-30	9.8 (249)	4.25 (108)	5.62 (140)	12 (305)	10 (254)	6 (153)
18DZ-1-50	50	5.9	49A50-50	12 (305)	5.5 (140)	7 (178)	14 (356)	12 (305)	8 (204)
18DZ-1-80	80	9.4	49A50-80	12 (305)	5.5 (140)	7 (178)	14 (356)	12 (305)	8 (204)
18DZ-1-120	120	14.1	49A50-125	12.5 (318)	6.5 (165)	8 (204)	20 (508)	16 (407)	9 (229)
18DZ-1-150	150	17.7	49A50-150	15 (381)	9.5 (242)	8 (204)	20 (508)	16 (407)	9 (229)
18DZ-1-250	250	30.0	49A50-250	25 (635)	9.5 (242)	8 (204)	30 (762)	20 (508)	9 (229)
18DZ-1-350	350	41.3	49A50-350	21 (534)	13 (331)	10.5 (267)	36 (915)	24 (610)	12 (305)
208/220/240 VAC, 50/60 Hz Input, 206/218/238 VAC Output									
18DZ-2-10	10	2.4	49B25-10	9.8 (249)	3.5 (89)	4.62 (118)	12 (305)	10 (254)	6 (153)
18DZ-2-15	15	3.6	49B25-15	9.8 (249)	3.5 (89)	4.62 (118)	12 (305)	10 (254)	6 (153)
18DZ-2-20	20	4.8	49B25-20	9.8 (249)	3.5 (89)	4.62 (118)	12 (305)	10 (254)	6 (153)
18DZ-2-30	30	7.2	49B25-30	9.8 (249)	4.5 (115)	5.62 (143)	12 (305)	10 (254)	6 (153)
18DZ-2-50	50	11.9	49A50-50	12 (305)	5.5 (140)	7 (178)	14 (356)	12 (305)	8 (204)
18DZ-2-80	80	19.0	49A50-80	12 (305)	5.5 (140)	7 (178)	14 (356)	12 (305)	8 (204)
18DZ-2-120	120	28.5	49A50-120	12.5 (318)	6.5 (165)	8 (204)	20 (508)	16 (407)	9 (229)
18DZ-2-150	150	35.7	49A50-150	15 (381)	9.5 (242)	8 (204)	20 (508)	16 (407)	9 (229)
18DZ-2-250	250	60.0	49A50-250	25 (635)	9.5 (242)	8 (204)	30 (762)	20 (508)	9 (229)
18DZ-2-350	350	83.3	49A50-350	21 (534)	13 (331)	10.5 (267)	36 (915)	24 (610)	12 (305)
380/415/440/480 VAC, 50/60 Hz Input, 378/413/438/478 VAC Output									
18DZ-4-10	10	4.8	49B70-10	10 (254)	5.5 (140)	4.62 (118)	12 (305)	10 (254)	6 (153)
18DZ-4-20	20	9.6	49B70-20	10 (254)	5.5 (140)	4.62 (118)	12 (305)	10 (254)	6 (153)
18DZ-4-30	30	14.4	49B70-30	10 (254)	5.5 (140)	5.62 (143)	12 (305)	10 (254)	6 (153)
18DZ-4-50	50	23.9	49A50-50	12 (305)	5.5 (140)	7 (178)	14 (356)	12 (305)	8 (204)
18DZ-4-80	80	38.2	49A50-80	12 (305)	5.5 (140)	7 (178)	14 (356)	12 (305)	8 (204)
18DZ-4-120	120	57.3	49A50-120	12.5 (318)	6.5 (165)	8 (204)	20 (508)	16 (407)	9 (229)
18DZ-4-150	150	71.7	49A50-150	15 (381)	9.5 (242)	8 (204)	20 (508)	16 (407)	9 (229)
18DZ-4-250	250	120.0	49A50-250	25 (635)	9.5 (242)	8 (204)	30 (762)	20 (508)	9 (229)
18DZ-4-350	350	167.0	49A50-350	21 (534)	13 (331)	10.5 (267)	36 (915)	24 (610)	12 (305)
18DZ-4-450	450	215.0	49A50-450	27 (686)	17 (432)	10.5 (267)	36 (915)	24 (610)	12 (305)
18DZ-4-600	600	288.0	49A50-600	27 (686)	17 (432)	10.5 (267)	36 (915)	24 (610)	12 (305)
18DZ-4-1200	1200	576.0	(2) 49A50-600	47 (1194)	21 (534)	10.5 (267)	72 (1829)	36 (915)	12 (305)



POWER CIRCUIT SCHEMATIC



OPEN CHASSIS DIMENSIONS

Model Number	Amps (Fuse)	KVA @ Max. Rated Voltage	Fuse Number	Open Dimensions Inches (millimeters)			Enclosed Dimensions Inches (millimeters)		
				Height	Width	Depth	Height	Width	Depth
Three-Phase, 208/220/240 VAC, 50/60 Hz Input, 0-206/218/238 VAC Output									
18EZ-2-10	10	4	49B25-10	11 (280)	9 (229)	5.37 (137)	16 (407)	14 (356)	8 (204)
18EZ-2-20	20	8	49B25-20	11 (280)	9 (229)	5.37 (137)	16 (407)	14 (356)	8 (204)
18EZ-2-30	30	12	49B25-30	12.5 (318)	10.25 (261)	6.37 (162)	16 (407)	14 (356)	8 (204)
18EZ-2-50	50	20	49A50-50	13.25 (337)	11.25 (286)	6.5 (166)	16 (407)	14 (356)	8 (204)
18EZ-2-80	80	33	49A50-80	13.25 (337)	11.25 (286)	6.5 (166)	16 (407)	14 (356)	8 (204)
18EZ-2-120	120	49	49A50-125	14 (358)	14 (358)	9 (229)	20 (508)	16 (407)	9 (229)
18EZ-2-150	150	62	49A50-150	21 (533)	21 (533)	9 (229)	24 (610)	24 (610)	12 (305)
18EZ-2-250	250	103	49A50-250	27 (685)	21 (533)	9.62 (245)	36 (915)	24 (610)	12 (305)
18EZ-2-350	350	144	49A50-350	27 (685)	21 (533)	12 (305)	36 (915)	30 (762)	12 (305)
18EZ-2-450	450	185	49A50-450	27 (685)	21 (533)	12 (305)	42 (1067)	30 (762)	12 (305)
18EZ-2-600	600	247	49A50-600	33 (839)	21 (533)	12 (305)	42 (1067)	36 (915)	12 (305)
18EZ-2-1200	1200	494	(2) 49A50-600	57 (1448)	33 (839)	12.5 (308)	90 (2286)	36 (915)	20 (508)
Three-Phase, 380/415/440/480 VAC, 50/60 Hz Input, 0-378/413/438/478 VAC Output									
18EZ-4-10	10	8.3	49B70-10	11 (280)	9 (229)	5.37 (137)	16 (407)	14 (356)	8 (204)
18EZ-4-20	20	16.6	49B70-20	11 (280)	9 (229)	5.37 (137)	16 (407)	14 (356)	8 (204)
18EZ-4-30	30	25.0	49B70-30	12.5 (318)	10.25 (261)	6.37 (162)	16 (407)	14 (356)	8 (204)
18EZ-4-50	50	41.0	49A50-50	13.25 (337)	11.25 (286)	6.5 (166)	16 (407)	14 (356)	8 (204)
18EZ-4-80	80	66.0	49A50-80	13.25 (337)	11.25 (286)	6.5 (166)	16 (407)	14 (356)	8 (204)
18EZ-4-120	120	99.0	49A50-125	14 (358)	14 (358)	9 (229)	20 (508)	16 (407)	8 (204)
18EZ-4-150	150	124.0	49A50-150	21 (533)	21 (533)	9 (229)	24 (610)	24 (610)	12 (305)
18EZ-4-250	250	206.0	49A50-250	27 (685)	21 (533)	9.62 (245)	36 (915)	24 (610)	12 (305)
18EZ-4-350	350	288.0	49A50-350	27 (685)	21 (533)	12 (305)	36 (915)	30 (762)	12 (305)
18EZ-4-450	450	375.0	49A50-450	27 (685)	21 (533)	12 (305)	42 (1067)	30 (762)	12 (305)
18EZ-4-600	600	500.0	49A50-600	33 (839)	21 (533)	12 (305)	42 (1067)	36 (915)	12 (305)
18EZ-4-1200	1200	994.0	(2) 49A50-600	57 (1448)	33 (839)	12.5 (308)	90 (2286)	36 (915)	20 (508)

