ServiceFirst™

Controls Catalog

Siemens and Furnas Brands
Contactors – Starters,
Overload Relays – Control Relays

SIEMENS

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Contents

General Information

North American Approvals

Installation Considerations

The control products described in this catalog have been designed, tested and manufactured in accordance with a wide variety of standards including but not limited to those issued by UL, CSA, NEMA and IEC. These standards typically apply to the control product as a component and not the installation or use of the product. It is the responsibility of the end user of the control product to make sure each installation complies with all of the applicable safety requirements, laws, regulations, codes and standards (some examples of which are the N.E.C., the C.E.C. and OSHA regulations). Note that local authorities may impose further jurisdiction over each installation. When in doubt, consult with the local inspection authorities.

Unless otherwise specified, the control products described in this catalog are designed to operate under "usual service conditions" as defined in NEMA Standards Publication — Part ICS 1-108. Open type devices are intended for installation in enclosures that provide environmental protection as needed for the specific application. See page 14 for definitions of the various enclosure types.

Performance Data

Where given in this catalog, performance data should only be used as a guide to determine the suitability of the product for an application. The data may be the result of accelerated testing or elevated stress levels under controlled conditions. The user must take care in correlating this data to actual application or service conditions.

UL and CSA—File Numbers and Guide Card Numbers

Most control equipment listed in this catalog is designed, manufactured and tested in accordance with the relevant UL and CSA standards as listed in the table below.

Furnas Brand Devices Class	Guide No	File No	Guide No	File No	Guide No	File No
14, 22, 30, 40, 43 Starters and Contactors	Class 3211	LR 6535	NLDX	E 14900	NLDX2	E 14900
16, 41, 42, 45 Definite Purpose Controls	Class 3211	LR 6535	—	—	NLDX2	E 14900
48, 948, 958 Overload Relays	Class 3211	LR 6535	NKCR	E 22655	NKCR2	E 22655

General Information

International Approvals

Siemens control is designed, manufactured and tested in accordance with relevant IEC standards, CENELEC Agreement Documents and DIN VDE 0660 requirements. This global design philosophy assures that most all Siemens low-voltage equipment can be used worldwide. Occasionally, there may be some restrictions on maximum permitted voltages, currents and ratings and, in others, special approval or markings may be necessary.

National Authorities for Standards and Specifications

Abbreviation	Approval Identification	Meaning
ANSI		**American National Standards Institute** Publishes specifications and standards in virtually all fields (not only electrical). For low-voltage switchgear, the ANSI has adopted the American NEMA and UL specifications to a large extent
AS		**Australian Standards** Already partially adapted to IEC
BS		**British Standard** Already partially adapted to IEC
CE		**Communautés Européenes** European conformity marking. Certifies the conformance of a product with all the product related standards of the European Union (EU)
CEE		**International Commission on Rules for the Approval of Electrical Equipment** Partially used by the Scandinavian countries as a basis for low-voltage switchgear with rated currents up to 63A
CEI		**Comitato Elettrotecnico Italiano** Italian electrotechnical committee
CEMA		**Canadian Electrical Manufacturers Association**
CEN		**Comité Européen de Normalisation** European committee for standardization
CENELEC		**Comité Européen de Normalisation Electrotechnique** European committee for electrotechnical standardization (general secretariat in Brussels)
CSA		**Canadian Standards Association** Responsible for publishing standards and granting approvals
DEMKO		**Danmarks Elektriske Materielkontrol** Danish board of control for electrotechnical products. Responsible for publishing standards and granting approvals
DIN		**Deutsches Institut für Normung e.V (German Industrial Standards)**
EEMAC		**Electrical and Electronic Manufactures Association Canada**
IEC		**International Electrotechnical Commission** (French: CEI) All the major industrialized countries are involved in the work of the International Electrotechnical Commission. The resulting IEC recommendations are to some extent either adopted directly into national specifications and standards, or the national specifications and standards are adapted to harmonize with these recommendations
IEEE		**Institute of Electrical and Electronics Engineers**
IS		**Indian Standard (Indische Bestimmungen)** Already partially adapted to IEC
ISO		**International Organization for Standardization**
JIS		**Japanese Industrial Standard**
KEMA		**Keuring van Elektrotechnische Materialen** Dutch testing authority, which also performs CSA approval tests for European manufacturers
NBN		**Normes de l'Institut Belge de Normalisation** Standards issued by the Belgian standards institute (already partially adapted to IEC)
NEMA		**National Electrical Manufacturers Association**
NEMKO		**Norges Elektriske Materiellkontroll** Norwegian controls authority for electrotechnical products, responsible for publishing standards and granting approvals
NEN		**Nederlandse Norm** Dutch standard
ÖVE		**Österreichischer Verband für Elektrotechnik** Austrian association for electrotechnology. Conforms to a large extent with the DIN VDE and IEC specifications
RER		**Rafmagnseftrilit rikisins** Finnish testing authority for electrotechnical products
SABS		**South African Bureau of Standards**
SASO		**Saudi Arabien Standard Organization**
SEMKO		**Svenska Electriska Materielkontrollanstalten** Swedish controls authority for electrotechnical products, responsible for publishing standards and granting approvals
SEN		**Svenska Elektrotekniska Normer** Swedish electrotechnical standards
SETI		**Finnish electrotechnical testing authority**
SEV		**Swiss electrotechnical association**
UL		**Underwriters' Laboratories Inc.:** Testing authority of the national fire insurance in the USA. Among other activities, it carries out testing on electrotechnical products, and issues the corresponding specifications and regulations
UTE		**Union Technique de l'Électricité:** French electrotechnical association
VDE		**Verband Deutscher Elektrotechniker e.V. (Association of German Electrical Engineers)**

General Information

NEMA Enclosure Descriptions

NEMA Standard Publications No. 250-1979

Type 1
Type 1 enclosures are intended for indoor use primarily to provide a degree of protection against contact with the enclosed equipment in locations where unusual service conditions do not exist. The enclosures shall meet the rod entry and rust resistance design tests.

Type 3
Type 3 enclosures are intended for outdoor use primarily to provide a degree of protection against windblown dust, rain and sleet; and to be undamaged by the formation of ice on the enclosure. They shall meet rain, external icing, dust, and rust resistance design tests. They are not intended to provide protection against conditions such as internal condensation or internal icing.

Type 3R
Type 3R enclosures are intended for outdoor use primarily to provide a degree of protection against falling rain; and to be undamaged by the formation of ice on the enclosure. They shall meet rod entry, rain, external icing, and rust resistance design tests. They are not intended to provide protection against conditions such as dust, internal condensation, or internal icing.

Type 4
Type 4 enclosures are intended for indoor or outdoor use primarily to provide a degree of protection against windblown dust and rain, splashing water, and hose directed water; and to be undamaged by the formation of ice on the enclosure. They shall meet hosedown, external icing, and rust resistance design tests. They are not intended to provide protection against conditions such as internal condensation or internal icing.

Type 4X
Type 4X enclosures are intended for indoor or outdoor use primarily to provide a degree of protection against corrosion, windblown dust and rain, splashing water, and hose-directed water; and to be undamaged by the formation of ice on the enclosure. They shall meet hosedown, external icing, and corrosion-resistance design tests. They are not intended to provide protection against conditions such as internal condensation or internal icing.

Shall be manufactured of American Iron and Steel Institute Type 304 Stainless steel, polymerics, or materials with equivalent corrosion resistance, to provide a degree of protection against specific corrosive agents.

Type 6
Type 6 enclosures are intended for indoor or outdoor use primarily to provide a degree of protection against the entry of water during occasional temporary submersion at a limited depth.

Type 6P enclosures are intended for indoor or outdoor use primarily to provide a degree of protection against the entry of water during prolonged submersion at a limited depth.

Type 7
Type 7 enclosures are for indoor use in locations classified as Class I, Groups A, B, C or D, as defined in the National Electrical Code.

Type 7 enclosures shall be capable of withstanding the pressures resulting from an internal explosion of specified gases, and contain such an explosion sufficiently that an explosive gas-air mixture existing in the atmosphere surrounding the enclosure will not be ignited. Enclosed heat generating devices shall not cause external surfaces to reach temperatures capable of igniting explosive gas-air mixtures in the surrounding atmosphere. Enclosures shall meet explosion, hydrostatic, and temperature design tests.

Type 9
Type 9 enclosures are intended for indoor use in locations classified as Class II Groups E or G, as defined in the National Electrical Code.

Type 9 enclosures shall be capable of preventing the entrance of dust. Enclosed heat generating devices shall not cause external surfaces to reach temperatures capable of igniting or discoloring dust on the enclosure or igniting dust-air mixtures in the surrounding atmosphere. Enclosures shall meet dust penetration and temperature design tests, and aging of gaskets (if used).

Class I — Flammable gases or vapors.

Class II — Combustible dust.

Class III — Ignitable fibers or flyings.

Division I — Normal situation; the hazard would be expected to be present in everyday repair and maintenance.

Division II — Abnormal situation; the material is expected to be confined within closed containers or closed systems and will be present only during accidental rupture, breakage or unusual faulty operation.


Type 1


Type 4


Type 4X


Type 7 & 9


Type 12 & 13

General Information

Groups

Class I — Gases and vapors are broken into 4 groups, A, B, C, and D, depending on the ignition temperature of the substance, its explosion pressure and other flammable characteristics.

Class II — Dust locations are broken into groups E, F, and G, according to the ignition temperature and conductivity of the hazardous substance.

Type 12

Type 12 enclosures are intended for indoor use primarily to provide a degree of protection against dust, falling dirt, and dripping non-corrosive liquids. They shall meet drip, dust, and rust resistance design tests. They are not intended to provide protection against conditions such as internal condensation.

Siemens-Furnas NEMA 12 may be field modified for outdoor use. NEMA 3 requires the use of watertight conduit hubs. NEMA 3R requires the use of watertight conduit hubs at a level above the lowest live part and drain holes of 1/8" diameter shall be added at the bottom of the enclosure.

Type 13

Type 13 enclosures are intended for indoor use primarily to provide a degree of protection against dust, spraying of water, oil, and non-corrosive coolant. They shall meet oil explosion and rust resistance design tests. They are not intended to provide protection against conditions such as internal condensation.

General Information

IEC Enclosure Description

Comparison of NEMA Enclosures

This table summarizes the information provided on the previous page.

Provides Provides a Degree of Protection Against the Following Environmental Conditions	1	3R	4	4X	12	13
Incidental contact with the enclosed equipment	X	X	X	X	X	X
Rain, snow, and sleet	—	X	X	X	—	—
Windblown dust	—	—	X	X	—	—
Falling dirt	X	—	X	X	X	X
Falling liquids and light splashing	—	—	X	X	X	X
Circulating dust, lint, fibers, and flyings	—	—	X	X	X	X
Settling airborne dust, lint, fibers, and flyings	—	—	X	X	X	X
Hosedown and splashing water	—	—	X	X	—	—
Oil and coolant seepage	—	—	—	—	X	X
Oil or coolant spraying and splashing	—	—	—	—	—	X
Corrosive agents	—	—	—	X	—	—

IEC Environmental Enclosure Ratings for Global Applications

IEC enclosures use a two digit numbering system to define the degree of protection they provide. The first digit specifies the degree of protection against incidental contact and penetration of solid objects. The second digit specifies the level of protection against the ingress of water.

Example: An IP 65 enclosure is dust tight and protected against water jets. An IP66 enclosure is dust tight and protected against powerful water jets.

First Numeral		Second Numeral	
Protection of persons against access to hazardous parts and protection against penetration of solid foreign objects.		Protection against ingress of water under test conditions specified in IEC 529.	
0	Non-protected	0	Non-protected
1	Back of hand; objects greater than 50 mm in diameter	1	Vertically falling drops of water
2	Finger; objects greater than 12.5 mm in diameter	2	Vertically falling drops of water with enclosure tilted 15 degrees
3	Tools or objects greater than 2.5 mm in diameter	3	Spraying water
4	Tools or objects greater than 1 mm in diameter	4	Splashing water
5	Dust-protected (Dust may enter but must not interfere with operation of the equipment or impair safety)	5	Water jets
6	Dust tight (No dust observable inside enclosure at end of test)	6	Powerful water jets
		7	Temporary submersion
		8	Continuous submersion

Conversion of NEMA Type Numbers to IEC Classification Designations

This table shows the IP classification designation that NEMA enclosures may be applied to. The table cannot be used to convert IEC designations to NEMA type numbers.

NEMA Enclosure Type Number	IEC Enclosure Classification Designation
1	IP10
3	IP54
3R	IP14
4 and 4X	IP56
6 and 6P	IP67
12	IP52
13	IP54

General Information

IEC Contactor Utilization Categories

Contactors designed for international applications are tested and rated per IEC 947-4. The IEC rating system is broken down into different utilization categories that define the value of the current that the contactor must make, maintain, and break. The following category definitions are the most commonly used for IEC Contactors.

Ratings for Siemens contactors per these categories can be found in Section 4 on IEC Control.

AC Categories

AC-1
This applies to all AC loads where the power factor is at least 0.95. These are primarily non-inductive or slightly inductive loads. Breaking remains easy.

AC-3
This category applies to squirrel cage motors where the breaking of the power contacts would occur while the motor is running. On closing, the contactor experiences an inrush which is 5 to 8 times the nominal motor current, and at this instant, the voltage at the terminals is approximately 20% of the line voltage. Breaking remains easy.

AC-4
This applies to the starting and breaking of a squirrel cage motor during an inch or plug reverse. On energization, the contactor closes on an inrush current approximately 5 to 8 times the nominal current. On de-energization, the contactor breaks the same magnitude of nominal current at a voltage that can be equal to the supply voltage. Breaking is severe.

DC Categories

DC-1
This applies to all DC loads where the time constant (L/R) is less than or equal to one msec. These are primarily noninductive or slightly inductive loads.

DC-3
This applies to the starting and breaking of a shunt motor during inching or plugging. The time constant shall be less than or equal to 2 msec. On energization, the contactor sees current similar to that in Category DC2. On de-energization, the contactor will break around 2.5 times the starting current at a voltage that may be higher than the line voltage. This would occur when the speed of the motor is low because the back e.m.f. is low. Breaking is severe.

DC-5
This applies to the starting and breaking of a series motor during inching or plugging. The time constant being less than or equal to 7.5 msec. On energization, the contactor sees about 2.5 times the nominal full load current. On de-energization, the contactor breaks the same amount of current at a voltage which can be equal to the line voltage. Breaking is severe.

Special Contactor Utilization Categories
Some contactors also have ratings for the following specialty utilization categories.
For specific applications, please contact your local Siemens-Furnas sales office.

Kind of Current	Utilization Categories	Typical Applications
AC	AC-2	Slip-ring motors: starting, switching off
	AC-5a	Switching of electric discharge lamp controls
	AC-5b	Switching of incandescent lamps
	AC-6a	Switching of transformers
	AC-6b	Switching of capacitor banks
	AC-7a	Slightly inductive loads in household appliances and similar applications
	AC-7b	Motor-loads for household applications
	AC-8a	Hermetic refrigerant compressor motor1 control with manual resetting of overload releases
	AC-8b	Hermetic refrigerant compressor motor1 control with automatic resetting of overload releases
DC	DC-6	Switching of incandescent lamps

Electrical Quantities Symbols According to DIN, VDE and IEC

Symbol	Characteristic Electrical Quantity
U_i	Rated insulation voltage to DIN VDE 0110/DIN VDE 0660
U_e	Rated operational voltage
U_c	Rated control voltage (IEC 947-1) at which an operating mechanism or release is rated, e.g. coil voltage to DIN VDE 0660 Part 102
U_s	Rated control supply voltage (Control voltage) to DIN VDE 0660 Part 102, IEC 947-1
U	No-load voltage to IEC 947-2, -3, -5
U_r	Power-frequency recovery voltage (IEC 947-.)
U_o	Transformer no-load voltage to DIN VDE 0532
U_k	Short-circuit impedance voltage to DIN VDE 0532
U_{kr}	Rated value of the impedance voltage in % to DIN VDE 0102, 01.90
I_n	Rated current to IEC 947-.
I_{th}	Eight-hour-current to DIN VDE 0660, conventional free-air thermal current to IEC 947- (defined as eight-hour-current) thermally equivalent short-time current (r.m.s. value) to DIN VDE 0103
I_{the}	Conventional enclosed thermal current
I_u	Rated uninterrupted current to IEC 947-1
I_e	Rated operational current
I_s	Selectivity (discrimination) limit current (DIN VDE 0660, IEC 947-1)
I_{cm}	Rated short-circuit making capacity to IEC 947-1
I_{cn}	Rated short-circuit breaking capacity to IEC 947-
I_{cm}	Rated ultimate short-circuit breaking capacity to IEC 947-1

Symbol	Characteristic Electrical Quantity
I_{cw}	Rated short-time current withstand capacity to IEC 947-1
I_p	Test current (general) to DIN VDE 0660, prospective current to DIN VDE 0636
I_n	Breaking current (r.m.s. value) to DIN VDE 0102
i_p	Peak short-circuit current (maximum instantaneous value) to DIN VDE 0102
I_k	Sustained (symmetrical) short-circuit current (r.m.s. value), DIN VDE 0102.
	Rated short-time withstand current to DIN VDE 0660
i_p	Let-through current of fuses and rapidly operating switching devices (maximum instantaneous value during the break time) to DIN VDE 0102
I_o	No-load current at the input side of a transformer (unloaded output side) to DIN VDE 0532
I_x	Current carrying capacity (ampacity)
I_{sr}	Rated rotor operational current (DIN VDE 0660, IEC 947-1)
I_r	Setting current ("current setting") to DIN VDE 0660
I_B	Take-over current
R	Ohmic resistance
S''_k	Initial symmetrical AC short-circuit power (simplified: apparent short-circuit power)
X	Reactance, reactive impedance
Z	Impedance (apparent resistance)
x	Factor to determine the peak short-circuit current ip

[1]Hermetic refrigerant compressor motor is a combination consisting of a compressor and a motor, both of which are enclosed in the same housing, with no external shaft or shaft seals, the motor operating in the refrigerant.

General Information

Control Circuit Classifications

AC-Control Circuit Classifications—NEMA

NEMA designates Control Circuit Rating with a code letter (for current) and a voltage code.

Ratings & Test Values for AC Control Circuit Contacts at 50 or 60Hz

Contact Rating Designation	Thermal Continuous Test Current, Amperes	Maximum Current, Amperes									
		120 Volts		240 Volts		480 Volts		600 Volts		Voltamperes	
		Make	Break	Make	Break	Make	Break	Make	Break	Make	Break
A150	10	60	6	—	—	—	—	—	—	7200	720
A300	10	60	6	30	3	—	—	—	—	7200	720
A600	10	60	6	30	3	15	1.5	12	1.2	7200	720
B150	5	30	3	—	—	—	—	—	—	3600	360
B300	5	30	3	15	1.5	—	—	—	—	3600	360
B600	5	30	3	15	1.5	7.5	0.75	6	0.6	3600	360
C150	2.5	15	1.5	—	—	—	—	—	—	1800	180
C300	2.5	15	1.5	7.5	0.75	—	—	—	—	1800	180
C600	2.5	15	1.5	7.5	0.75	3.75	0.375	3	0.3	1800	180
D150	1	3.6	0.6	—	—	—	—	—	—	432	72
D300	1	3.6	0.6	1.8	0.3	—	—	—	—	432	72
E150	0.5	1.8	0.3	—	—	—	—	—	—	216	36

DC-Control Circuit Classifications—NEMA

Rating codes for DC Control Circuit Contacts

Contact Rating Designation[2]	Thermal Continuous Test Current, Amperes	Maximum Make or Break[1] Current, Amperes			Maximum Make or Break Voltamperes at 300 Volts or Less
		125 Volt	250 Volt	301 to 600 Volt	
N150	10	2.2	—	—	275
N300	10	2.2	1.1	—	275
N600	10	2.2	1.1	0.4	275
P150	5	1.1	—	—	138
P300	5	1.1	0.55	—	138
P600	5	1.1	0.55	0.2	138
Q150	2.5	0.55	—	—	69
Q300	2.5	0.55	0.27	—	69
Q600	2.5	0.55	0.27	0.1	69
R150	1	0.22	—	—	28
R300	1	0.22	0.11	—	28

Control Circuit Classifications—IECc

IEC 947-5-1 Uses Utilization Categories AC-15 to Specify Control Circuit Ranges. Current at each voltage is specified by the manufacturer, not by the standard.

AC Control Circuit Utilization Categories per IEC 947-5-1	Make		Break	
	I/I_e	U/U_e	I/I_e	U/U_e
AC-12	1	1	1	1
AC-13	2	1	1	1
AC-14	6	1	1	1
AC-15	10	1	1	1

DC Control Circuit Utilization Categories per IEC 947-5-1	Make		Break	
	I/I_e	U/U_e	I/I_e	U/U_e
DC-12	1	1	1	1
DC-13	1	1	1	1
DC-14	10	1	1	1

Example of a Typical IEC Control Circuit Ratings Table[4]

AC

I_e/AC-12 (Continuous Amps)	U_e AC Voltage	I_e/AC-15 Amps
10	24V	6A
	110V	6A
	220/230V	6A
	380/440V	4A

DC

Voltage	I_e/DC-12	I_e/DC-13
24	6A	3A
60	5A	1.5A
110	2.5A	0.7A
230	1A	0.3A

[1]For maximum ratings at 300 volts or less, the maximum make and break ratings are to be obtained by dividing the volt-ampere rating by the application voltage, but the current value are not to exceed the thermal continuous test current.

[2]The numerical suffix designates the maximum voltage design values, which are to be 600, 300, and 150 volts for suffixes 600, 300, and 150 respectively. Test voltage shall be 600, 250, or 125 volts.

[3]I_e Rated operational current
U_e Rated operational voltage
I Current to be made or broken
U Voltage before make

[4]Example: A control circuit contact having an AC-15 rating of 6 amps at 230 volts is capable of making 60 amps and breaking 6 amps at 230 volts.

General Information

Ampere Ratings For 3 Phase AC Induction Motors

		Full Load Current				
		60Hz				50Hz
HP	RPM	200V	230V	460V	575V	380V
	1800	1.1	0.96	0.48	0.38	0.55
0.25	1200	1.33	1.16	0.58	0.46	0.81
	900	1.67	1.45	0.73	0.58	0.93
	1800	1.33	1.16	0.58	0.47	0.69
0.3	1200	1.64	1.43	0.72	0.58	0.92
	900	2.01	1.75	0.88	0.71	1.04
	1800	1.93	1.68	0.84	0.67	0.99
0.5	1200	2.38	2.07	1.04	0.83	1.24
	900	3.34	2.9	1.45	1.16	1.38
	1800	2.68	2.33	1.17	0.93	1.42
0.75	1200	3.28	2.85	1.43	1.14	—
	900	3.97	3.45	1.73	1.38	1.88
	3600	3.16	2.75	1.38	1.1	1.7
1	1800	3.51	3.05	1.53	1.22	2.06
	1200	4.07	3.54	1.77	1.42	2.28
	900	4.3	3.74	1.87	1.5	2.6
	3600	4.8	4.17	2.09	1.67	2.64
1.5	1800	4.92	4.28	2.14	1.71	2.94
	1200	5.58	4.85	2.43	1.94	3.2
	900	6.68	5.81	2.91	2.32	3.39
	3600	6.39	5.56	2.78	2.22	3.39
2	1800	6.62	5.76	2.88	2.3	3.87
	1200	7.3	6.35	3.18	2.54	4.14
	900	8.29	7.21	3.61	2.88	4.77
	3600	9.05	7.87	3.94	3.14	5.02
3	1800	9.53	8.29	4.14	3.32	5.70
	1200	10.3	8.92	4.46	3.56	6.2
	900	11.7	10.2	5.09	4.08	6.9
	3600	14.6	12.7	6.34	5.08	8.2
5	1800	15.2	13.2	6.6	5.28	8.74
	1200	16.2	14.1	7.05	5.64	9.59
	900	17.9	15.6	7.8	6.24	9.6
	3600	22.1	19.2	9.6	7.68	11.8
7.5	1800	22.2	19.3	9.7	7.72	13
	1200	23.3	20.3	10.2	8.12	13.2
	900	27.4	23.8	11.9	9.51	13.9
	3600	28.2	24.5	12.3	9.8	15.4
	1800	29	25.2	12.6	10.1	16.3
10	1200	30.6	26.6	13.3	10.6	16.9
	900	33.2	28.9	14.5	11.6	18.5
	600	38.9	33.8	16.9	13.5	—
	3600	42.2	36.7	18.4	14.7	22
	1800	43.8	38.1	19.1	15.2	23.7
15	1200	45.9	39.9	20	16	25
	900	48.2	41.9	21	16.8	26.9
	600	55.5	48.3	24.2	19.3	—
	3600	56.4	49	24.5	19.6	30.5
	1800	58.1	50.5	25.3	20.2	31
20	1200	59.5	51.7	25.9	20.6	31.9
	900	62.8	54.6	27.3	21.8	33.2
	600	70.7	61.5	30.8	24.6	—
	3600	68.1	59.2	29.6	23.6	36.8
	1800	72.1	62.7	31.3	25	39.2
25	1200	74.4	64.7	32.3	25.8	39.6
	900	77.5	67.4	33.7	27	40.7
	600	82.7	71.9	35.9	28.8	—

		Full Load Current				
		60Hz				50Hz
HP	RPM	200V	230V	460V	575V	380V
	1800	83.7	72.8	36.4	29.2	45.7
30	1200	88.7	77.1	38.8	30.8	47.6
	900	91.3	79.4	39.7	31.8	49.5
	600	101.1	87.9	43.9	35.2	—
	1800	112.7	98	49	39.2	61
40	1200	113.9	99	49.5	39.6	61.2
	900	119.6	104	52	41.6	63.2
	600	130.0	113	56.5	45.2	—
	1800	139.2	121	60.5	48.4	75.2
50	1200	140.3	122	61	48.8	76.2
	900	146.1	127	63.5	50.8	78.5
	600	158.7	138	69	55.2	—
	1800	164.5	143	71.5	57.2	90
60	1200	170.2	148	74	59.2	91
	900	173.7	151	75.5	60.4	93.1
	600	186.3	162	81	64.8	—
	1800	204.7	178	89	71.2	111
75	1200	208.2	181	90.5	72.4	112
	900	215.1	187	93.5	74.8	117
	600	228.9	199	99.5	79.6	—
	1800	268	233	116	93.2	144
	1200	274.9	239	120	95.6	145
100	900	281.8	245	123	98	153
	600	295.6	257	128	103	—
	450	333.5	290	145	116	—
	1800	332.4	289	144	115	177
	1200	342.7	298	149	119	180
125	900	350.8	305	153	122	186
	720	361.1	314	157	126	—
	600	368	320	160	128	—
	450	403.7	351	175	140	—
	1800	397.9	346	173	138	210
	1200	402.5	350	175	140	210
150	900	417.5	363	182	145	211
	720	432.4	376	188	150	—
	600	434.7	378	189	151	—
	450	480.7	418	209	166	—
	1800	529	460	230	184	274
	1200	535.9	466	233	186	266
200	900	563.2	490	245	196	279
	720	568.1	494	247	197	—
	600	572.7	498	249	199	—
	450	607.2	528	264	211	—
	1800	657.8	572	286	229	343
	1200	667.0	580	290	232	345
	900	694.6	604	302	242	347
250	720	718.8	625	312	250	—
	600	724.5	630	315	252	—
	450	—	—	—	—	—
	360	777.4	676	338	270	—
	1800	787.8	685	342	274	392
	1200	800.4	696	348	278	395
300	900	830.3	722	361	289	—
	600	—	—	—	—	—
	450	874	760	380	304	—
	360	954.5	830	415	332	—

Full load ampere ratings of motors vary depending upon a number of factors. The full load currents listed above are "average values" for horsepower rated motors of several manufacturers at the most commonly rated voltages and speeds. These "average values" along with the similar values listed in the N.E.C. should be used as a guide only for selecting suitable components for the motor branch circuit. The rated full load current shown on the motor nameplate may vary considerably from the listed value, depending on the specified motor design.

Note: RPM shown for 60Hz motors. For 50Hz motors, multiply the 60 Hz FLA value by 1.2.

Overload Relay Selection Multi-Speed/ Part-Winding/Wye-Delta

Special attention should be given to the selection of the overload relay adjustment range for multi-speed, part-winding and wye-delta controllers, as follows:

Multi-Speed Controllers: Each speed requires a separate set of overloads. The adjustment range must be selected on the basis of the full-load current for each particular speed.

Part-Winding Controllers: Each winding of the motor must have its own set of overloads. The adjustment range should be selected on the basis of one-half the motor full-load current; that is, the full load current of each winding current.

Wye-Delta Controllers: Only one set of overloads is required. Since the overload relay is located electrically "inside the delta connection," the adjustment range must be selected on the basis of the full-load motor current (delta connection) divided by 1.73.

General Information

Control Circuit Schematics

Figure 1 Three Wire Control Giving Low Voltage Protection Using Single Two Button Station

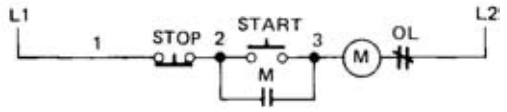


Figure 2 Three Wire Control Giving Low Voltage Protection Using Multiple Two Button Station

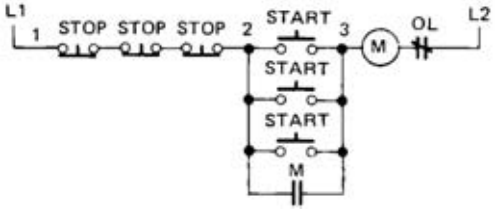


Figure 3 Three Wire Control Giving Low Voltage Protection with Safe-Run Selector Switch

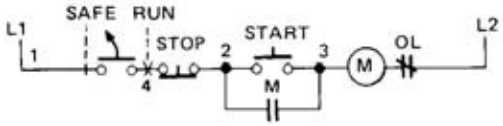


Figure 4 Three Wire Control for Jog or Run Using Start Stop Push Buttons and Jog-Run Selector Switch

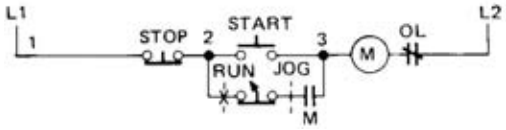


Figure 5 Control for Jog or Run Using Stop Push Button and Jog-Run Selector Push Selector Switch. Selector Push Contacts are Shown for "Run" (Three Wire Operation). Rotate Switch Sleeve and Selector Contact Opens Between "2" and "Stop" Button (Two Wire Operation).

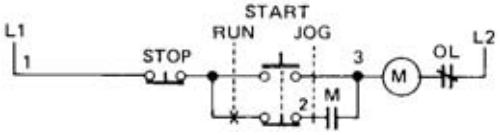


Figure 6 Three Wire Control for Jogging, Start, Stop Using Push Buttons

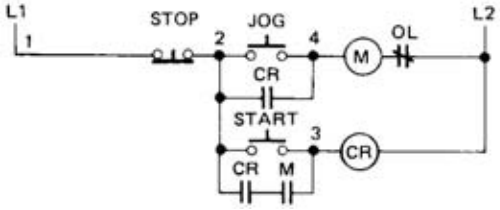


Figure 7 Two Wire Control Giving Low Voltage Release Only Using Hand-Off-Auto Selector Switch

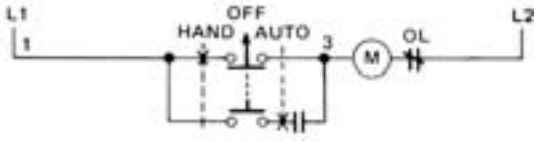


Figure 8 Two Wire Control for Reversing Jogging Using Single Two Button Station

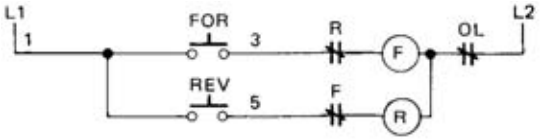


Figure 9 Three Wire Control for Instant Reversing Applications Using Single Three Button Station

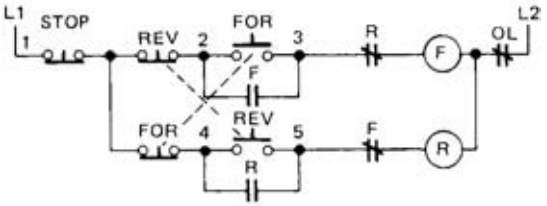


Figure 10 Three Wire Control for Reversing After Stop Using Single Three Button Station

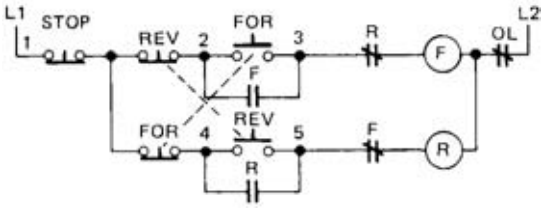


Figure 11 Control for Three Speed with Selective Circuitry to Insure the Stop Button is Pressed Before Going to a Lower Speed

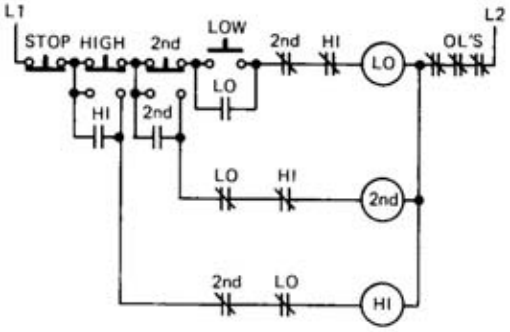
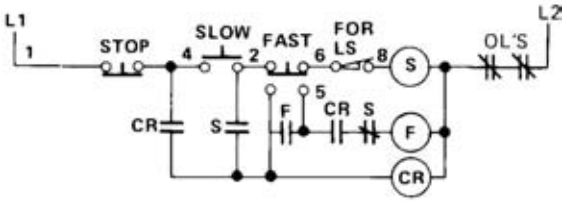


Figure 12 Three Wire Control for Two Speed with a Compelling Relay to Insure Starting on Slow Speed



General Information

Control Circuit Schematics and Wiring Diagrams with Transformers

Figure 13 Control for Three Speed with a Compelling Relay to Insure Starting on Low Speed

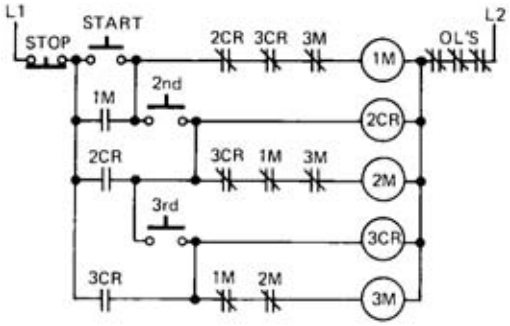


Figure 14 Control for Two Speed to Provide Automatic Acceleration from Low to High Speed

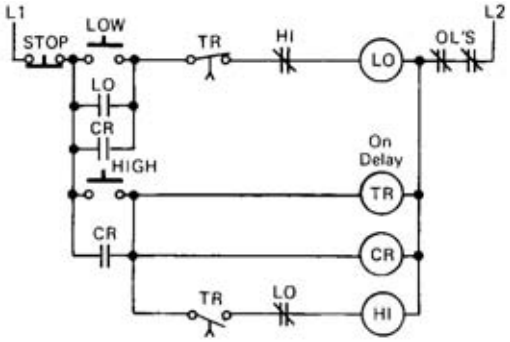


Figure 14 Control for Two Speed to Provide Automatic Acceleration from Low to High Speed

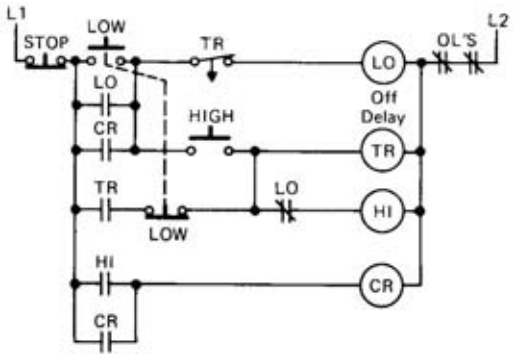
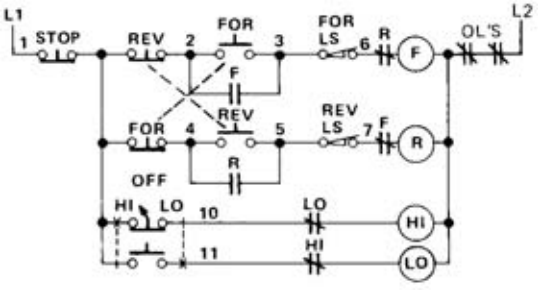
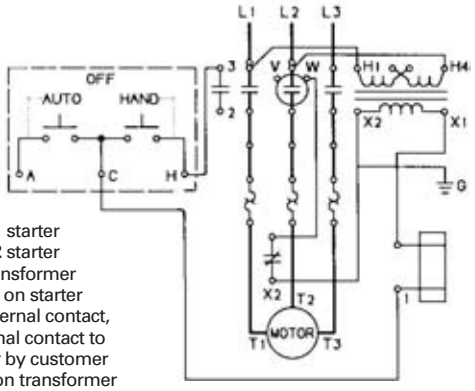


Figure 16 Control for Two Speed Reversing Starter Using Forward, Reverse, Stop Push Buttons and High-Low-Off Selector Switch

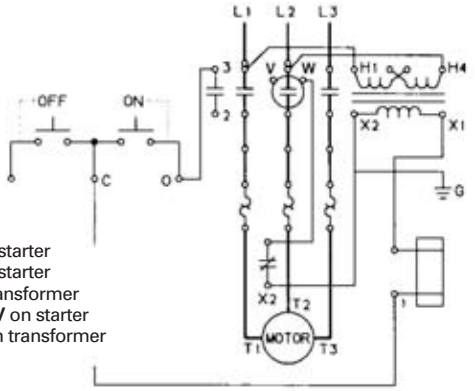


Size 0–2¹/₂ Starter with Transformer and 3 Position Selector Switch



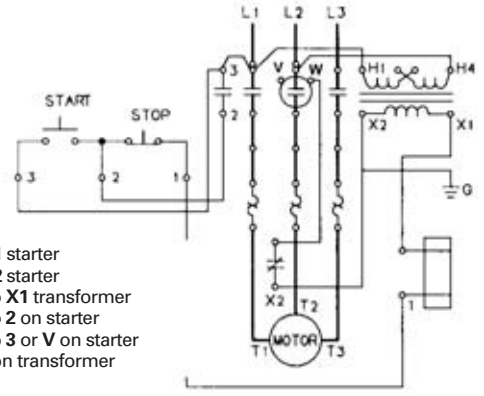
H1 transformer to **L1** starter
H4 transformer to **L2** starter
C on H-O-A to **X1** transformer
H on H-O-A to **3** or **V** on starter
A by customer to external contact, other side of external contact to **3** or **V** transformer by customer
X2 on starter to **X2** on transformer

Size 0–2¹/₂ Starter with Transformer and 2 Position Selector Switch



H1 transformer to **L1** starter
H4 transformer to **L2** starter
C on 0N-OFF to **X1** transformer
O on 0N-OFF to **3** or **V** on starter
X2 on starter to **X2** on transformer

Size 0–2¹/₂ Starter with Transformer and START-STOP Push Button



H1 transformer to **L1** starter
H4 transformer to **L2** starter
1 on START-STOP to **X1** transformer
2 on START-STOP to **2** on starter
3 on START-STOP to **3** or **V** on starter
X2 on starter to **X2** on transformer

ESP100 Heavy Duty Motor Starter Cross Reference

Max Horse Power									Melting Alloy Overload				
200 Volts	230 Volts	460 Volts	575 Volts	Size	Phase	AMP Range	ServiceFirst Item #	ESP100 Siemens-Furnas	Siemens-Furnas	Allen-Bradley	SquareD Class 8536	Cutler-Hammer Citation	General Electric
1-1/2	1-1/2	2	2	00	3				14BP32A*	509-T0*	SA0-12[2]	A10AN0*C	CR306A0**
1/8	1/8	1/3	1/2	0	3	.25-1	**OLD00343**	**14CSA32A***					
1/2	3/4	1-1/2	2	0	3	.75-3	**OLD00344**	**14CSB32A***					
2	2	5	5	0	3	2.5-10	**OLD00345**	**14CSD32A***					
3	3	-	-	0	3	9-18	**OLD00346**	**14CSE32A***					
3	3	5	5	0	3				14CP32A*	509-A0*	SB0-2[2]	A10BN0*	CR306B0**
1/6	1/6	1/3	1/2	1	3	.25-1	**OLD00347**	**14DSA32A***					
1/2	3/4	1-1/2	2	1	3	.75-3	**OLD00348**	**14DSB32A***					
2	2	5	5	1	3	2.5-10	**OLD00349**	**14DSD32A***					
3	3	10	10	1	3	9-18	**OLD00350**	**14DSE32A***					
7-1/2	7-1/2	-	-	1	3	13-27	**OLD00351**	**14DSF32A***					
				1	3				14DP32A*	509-B0*	SC0-3[2]	A10CN0*	CR306C0**
-	-	15	15	1-3/4	3	13-27	**OLD00359**	**14ESF32A***					
10	10	-	-	1-3/4	3	20-40	**OLD00360**	**14ESG32A***					
				1-3/4	**3**				**14EP32A***	N/A	N/A	N/A	N/A
-	-	15	20	2	3	13-27	**OLD00352**	**14FSF32A***					
10	15	25	25	2	3	22-45	**OLD00353**	**14FSH32A***					
				2	3				14FP32A*	509-C0*	SD0-1[2]	A10DN0*B	CR306D0**
-	-	30	40	2-1/2	3	22-45	**OLD00361**	**14GSH32A***					
15	20	-	-	2-1/2	3	30-60	**OLD00362**	**14GSJ32A***					
				2-1/2	**3**				**14GP32A***	N/A	N/A	N/A	N/A
-	-	30	40	3	3	30-60	**OLD00354**	**14HSJ32A***					
25	30	50	50	3	3	45-90	**OLD00355**	**14HSK32A***					
				3	3				14HP32A*	509-D0*	SE0-1[2]	A10EN0*B	CR306E0**
30	40	75	75	3-1/2	3	57-115	**OLD00363**	**14ISL32A***					
				3-1/2	**3**		**OLD00366**		**14IP32A***	N/A	N/A	N/A	N/A
40	50	100	100	4	3	67-135	**OLD00356**	**14JTM32A***					
				4	3				14JG32A*	509-E0*	SF0-1[2]	A10FN0*B	CR306F0**
75	100	200	200	5	3	100-270	**OLD00357**	**14LTU32A***					
				5	**3**				**14RF32A***	N/A	N/A	N/A	N/A
				5	3	100-270	**OLD00357**	**14LTU32A***					
				5	3				14KF32A*	509-F0*	SG0-1[2]	A10GN0*	CR306G0**
150	200	400	400	6	3	200-540	**OLD00358**	**14MTX32A***					
				6	3				14MF32A*	509-G0*	SH0-2[2]	A10JN0*	CR386H0**AA1A
				00	1				14BP12A*	509-T0X*	SA0-11[2]	N/A	CR306H0**
	1/4			0	1	.75-3	**OLD00365**	**14CSB12A***	14CP12A*	509-A0X*	SB0-1[2]	B10BN0F[3]	CR306J0**
	1/2					2.5-10	**OLD00366**	**14CSD12A***					
	2					5.0-16	**OLD00367**	**14CSE12A***					
	1/4			1	1	.75-3	**OLD00368**	**14DSB12A***	14DP12A*	509-B0X*	SC0-1[2]	B10CN0F[3]	CR306K0**
	1/2					2.5-10	**OLD00369**	**14DSD12A***					
	2					5.0-16	**OLD00370**	**14DSE12A***					
				1P	1			**N/A**	14EP12A*	509-X0X*	SC0-2[2]	B10PN0F[3]	CR306K0**BMA
				2	1			**N/A**	14FP12A*	509-C0X*	SD0-6[2]	B10DN0FB[3]	CR306L0**
				2-1/2	**1**			**N/A**	**14GP12A***	N/A	N/A	N/A	N/A
				3	1			**N/A**	N/A	509-D0X*	SE0-6[2]	B10EN0FB[3]	N/A

ESP100 Heavy Duty Motor Starter Cross Reference

Max Horse Power									Bimetal Overload				
200 Volts	230 Volts	460 Volts	575 Volts	Size	Phase	AMP Range	ServiceFirst Item #	ESP100 Siemens-Furnas	Siemens-Furnas[5]	Allen-Bradley	SquareD Class 8536	Cutler-Hammer Citation	General Electric
1-1/2	1-1/2	2	2	00	3				14BP32A*71	509-TO*7	N/A	A11AN0*B	CR306A0**[4]
1/8	1/8	1/3	1/2	0	3	.25-1	**OLD00343**	**14CSA32A***					
1/2	3/4	1-1/2	2	0	3	.75-3	**OLD00344**	**14CSB32A***					
2	2	5	5	0	3	2.5-10	**OLD00345**	**14CSD32A***					
3	3	-	-	0	3	9-18	**OLD00346**	**14CSE32A***					
3	3	5	5	0	3				14CP32A*71	509-A0*7	SB0-2B2[2]	A11BN0*	CR306B0**[4]
1/6	1/6	1/3	1/2	1	3	.25-1	**OLD00347**	**14DSA32A***					
1/2	3/4	1-1/2	2	1	3	.75-3	**OLD00348**	**14DSB32A***					
2	2	5	5	1	3	2.5-10	**OLD00349**	**14DSD32A***					
3	3	10	10	1	3	9-18	**OLD00350**	**14DSE32A***					
7-1/2	7-1/2	-	-	1	3	13-27	**OLD00351**	**14DSF32A***					
				1	3				14DP32A*71	509-B0*7	SC0-3B2[2]	A11CN0*	CR306C0**[4]
-	-	15	15	1-3/4	3	13-27	**OLD00359**	**14ESF32A***					
10	10	-	-	1-3/4	3	20-40	**OLD00360**	**14ESG32A***					
				1-3/4	**3**				**14EP32A*71**	N/A	N/A	N/A	N/A
-	-	15	20	2	3	13-27	**OLD00352**	**14FSF32A***					
10	15	25	25	2	3	22-45	**OLD00353**	**14FSH32A***					
			2	3				**14FP32A*71**	509-C0*7	SD0-1B2[2]	A11DN0*B	CR306D0**[4]	
-	-	30	40	2-1/2	3	22-45	**OLD00361**	**14GSH32A***					
15	20	-	-	2-1/2	3	30-60	**OLD00362**	**14GSJ32A***					
				2-1/2	**3**				**14GP32A*71**	N/A	N/A	N/A	N/A
-	-	30	40	3	3	30-60	**OLD00354**	**14HSJ32A***					
25	30	50	50	3	3	45-90	**OLD00355**	**14HSK32A***					
				3	3				14HP32A*71	509-D0*7	SE0-1B5[2]	A11EN0*B	CR306E0**[4]
30	40	75	75	3-1/2	3	57-115	**OLD00363**	**14ISL32A***					
				3-1/2	**3**		**OLD00366**		**14IP32A*71**	N/A	N/A	N/A	N/A
40	50	100	100	4	3	67-135	**OLD00356**	**14JTM32A***					
				4	3				14JG32A*71	509-E0*7	SF0-1B5[2]	A11FN0*B	CR306F0**[4]
75	100	200	200	5	3	100-270	**OLD00357**	**14LTU32A***					
				5	**3**				**14RF32A*71**	N/A	N/A	N/A	N/A
				5	3	100-270	**OLD00357**	**14KSU32A***					
				5	3				14KF32A*71	509-F0*7	SG0-1B5[2]	A11GN0*	CR306G0**[4]
150	200	400	400	6	3	200-540	**OLD00358**	**14MTX32A***					
				6	3				14MF32A*71	509-G0*7	SH0-2B2[2]	A11JN0*	CR386H0**AA1A[4]
				00	1				14BP12A*7	509-T0X*7	N/A	N/A	CR306H0**[4]
				0	1	.75-3	**OLD00365**	**14CSB12A***	14CP12A*7	509-A0X*7	SB0-1B1[2]	B11BN0F[3]	CR306J0**[4]
						2.5-10	**OLD00366**	**14CSD12A***					
						5.0-16	**OLD00367**	**14CSE12A***					
				1	1	.75-3	**OLD00368**	**14DSB12A***	14DP12A*7	509-B0X*7	SC0-1B1[2]	B11CN0F[3]	CR306K0**[4]
						2.5-10	**OLD00369**	**14DSD12A***					
						5.0-16	**OLD00370**	**14DSE12A***					
				1P	1			**N/A**	14EP12A*7	509-X0X*7	SC0-2B1[2]	B11PN0F[3]	CR306K0**BMA[4]
				2	1			**N/A**	14FP12A*7	509-C0X*7	SD0-6B1[2]	B11DN0FB[3]	CR306L0**[4]
				2-1/2	**1**			**N/A**	**14GP12A*7**	N/A	N/A	N/A	N/A
				3	1			**N/A**	14HP12A*7	509-D0X*7	SE0-6B5[2]	B11EN0FB[3]	N/A

ESP100 Heavy Duty Motor Starter Cross Reference

Max Horse Power									Ambient Compensated Bimetal Overload					
200 Volts	230 Volts	460 Volts	575 Volts	Size	Phase	AMP Range	ServiceFirst Item #	ESP100 Siemens-Furnas	Siemens-Furnas[5]	Allen-Bradley	SquareD Class 8536	Cutler-Hammer Citation	General Electric	Westinghouse A200
1-1/2	1-1/2	2	2	00	3				14BP32A*81	N/A	N/A	AN16AN0*	CR306A0**[4]	A200MAC*
1/8	1/8	1/3	1/2	0	3	.25-1	**OLD00343**	**14CSA32A***						
1/2	3/4	1-1/2	2	0	3	.75-3	**OLD00344**	**14CSB32A***						
2	2	5	5	0	3	2.5-10	**OLD00345**	**14CSD32A***						
3	3	-	-	0	3	9-18	**OLD00346**	**14CSE32A***						
3	3	5	5	0	3				14CP32A*81	509-A0*[6]	SB0-2B[2]	AN16BN0*	CR306B0**[4]	A200MOC*
1/6	1/6	1/3	1/2	1	3	.25-1	**OLD00347**	**14DSA32A***						
1/2	3/4	1-1/2	2	1	3	.75-3	**OLD00348**	**14DSB32A***						
2	2	5	5	1	3	2.5-10	**OLD00349**	**14DSD32A***						
3	3	10	10	1	3	9-18	**OLD00350**	**14DSE32A***						
7-1/2	7-1/2	-	-	1	3	13-27	**OLD00351**	**14DSF32A***						
				1	3				14DP32A*81	509-B0*[6]	SC0-3B[2]	AN16DN0*	CR306C0**[4]	A200MIC*
-	-	15	15	1-3/4	3	13-27	**OLD00359**	**14ESF32A***						
10	10	-	-	1-3/4	3	20-40	**OLD00360**	**14ESG32A***						
				1-3/4	3				14EP32A*81	N/A	N/A	N/A	N/A	N/A
-	-	15	20	2	3	13-27	**OLD00352**	**14FSF32A***						
10	15	25	25	2	3	22-45	**OLD00353**	**14FSH32A***						
				2	3				14FP32A*81	509-C0*[6]	SD0-1B[2]	AN16GN0*	CR306D0**[4]	A200M2C*
-	-	30	40	2-1/2	3	22-45	**OLD00361**	**14GSH32A***						
15	20	-	-	2-1/2	3	30-60	**OLD00362**	**14GSJ32A***						
				2-1/2	3				14GP32A*81	N/A	N/A	N/A	N/A	N/A
-	-	30	40	3	3	30-60	**OLD00354**	**14HSJ32A***						
25	30	50	50	3	3	45-90	**OLD00355**	**14HSK32A***						
				3	3				14HP32A*81	509-D0*[6]	SE0-1Y59[2]	AN16KN0*	CR306E0**[4]	A200M3C*
30	40	75	75	3-1/2	3	57-115	**OLD00363**	**14ISL32A***						
				3-1/2	3		**OLD00366**		14IP32A*81	N/A	N/A	N/A	N/A	N/A
40	50	100	100	4	3	67-135	**OLD00356**	**14JTM32A***						
				4	3				14JG32A*81	509-E0*[6]	SF0-1Y59[2]	AN16NN0*	CR306F0**[4]	A200M4C*
75	100	200	200	5	3	100-270	**OLD00357**	**14LTU32A***						
				5	3				14RF32A*81	N/A	N/A	N/A	N/A	N/A
				5	3	100-270	**OLD00357**	**14KSU32A***						
				5	3				14KF32A*81	509-F0*[6]	SG0-1B[2]	AN16SN0*	CR306G0**[4]	A200M5C*
150	200	400	400	6	3	200-540	**OLD00358**	**14MTX32A***						
				6	3				14MF32A*81	N/A	SH0-2B[2]	AN16TN0*	CR386H0**AA1A[4]	A200M6C*
				00	1				14BP12A*8	N/A	N/A	N/A	CR306H0**[4]	N/A
	1/4		0	1	.75-3		**OLD00365**	**14CSB12A***	14CP12A*8	509-A0X*[6]	N/A	N/A	CR306J0**[4]	N/A
	1/2				2.5-10		**OLD00366**	**14CSD12A***						
	2					5.0-16	**OLD00367**	**14CSE12A***						
	1/4			1	1	.75-3	**OLD00368**	**14DSB12A***	14DP12A*8	509-B0X*[6]	N/A	N/A	CR306K0**[4]	N/A
	1/2					2.5-10	**OLD00369**	**14DSD12A***						
	2					5.0-16	**OLD00370**	**14DSE12A***						
				1P	1			N/A	14EP12A*8	509-X0X*[6]	N/A	N/A	CR306K0**BMA[4]	N/A
				2	1			N/A	14FP12A*8	509-C0X*[6]	N/A	N/A	CR306L0**[4]	N/A
				2-1/2	1			N/A	14GP12A*8	N/A	N/A	N/A	N/A	N/A
				3	1			N/A	14HP12A*8	509-D0X*[6]	N/A	N/A	N/A	N/A

Definite Purpose Contactor Cross Reference

Poles	Amps	Volts	ServiceFirst Item #	Siemens-Furnas	Cutler Hammer	Arrow Hart	Honeywell DP-Series PowerPro	Honeywell DP-Series Economy	Joselyn Clark
1-1/2	25	24	**CTR01057**	**45DG10AJD8A**	C25CNB125T	C251NU10	DP1025A5005	-	A77-306654A-3
-	25	120	**CTR01144**	**45DG10AFD8A**	C25CNB125A	C251NU20	DP1025B5046	-	A77306654A-1
-	25	208/240	**CTR01145**	**45DG10AGA**	C25CNB125B	C251NU30	DP1025C5045	-	A77-306654A-2
1-1/2	30	24	**CTR01143**	**45EG10AJA**	C25CNB130T	C301NU10	DP1030A5013	-	A77-306653A-3
-	30	120	**CTR01144**	**45EG10AFA**	C25CNB130A	C301NU20	DP1030B5020	-	A77-306653A-1
-	30	208/240	**CTR01145**	**45EG10AGA**	C25CNB130B	C301NU30	DP1030C5029	-	A77-3066531-2
1-1/2	40	24	**CTR01152**	**45GG10AJA**	-	-	DP1040A5004	-	-
-	40	120	**CTR01153**	**45GG10AFA**	-	-	DP1040B5003	-	-
-	40	208/240	**CTR01154**	**45GG10AGA**	-	-	DP1040C5002	-	-
2	20	24	**CTR01137**	**45CG20AJ**	C25BNB22OT	C202U10	DP2020A5021	-	A77-306680A-3
-	20	120	**CTR01138**	**45CG20AF**	C25BNB22OA	C202U20	DP2020B5038	-	A77-306680A-1
-	20	208/240	**CTR01139**	**45CG20AG**	C25BNB22OB	C202U30	DP2020C5037	-	A77-306680A-2
-	20	277	**CTR01359**	**45CG20AL**	-	-	DP2020D5028	-	-
2	30	24	**CTR01146**	**45EG20AJ**	C25BNB23OT	C302U10	DP2030A5004	DP2030A1003	A77-306657A-3
-	30	120	**CTR01147**	**45EG20AF**	C25BNB23OA	C302U20	DP2030B5003	DP2030B1002	A77-306657A-1
-	30	208/240	**CTR01148**	**45EG20AG**	C25BNB23OB	C302U30	DP2030C5002	DP2030C1001	A77-306657A-2
-	30	277	**CTR01360**	**45EG20AL**	-	C302050	DP2030D5001	-	-
2	40	24	**CTR01155**	**45GG20AJ**	C25BNF240T	CA01NU10	DP2040A5003	-	-
-	40	120	**CTR01156**	**45GG20AF**	C25BNF240A	CA01NU20	DP2040B5002	-	-
-	40	208/240	**CTR01157**	**45GG20AG**	C25BNF240B	CA01NU30	DP2040C5001	-	-
3	25	24	**CTR01140**	**42AF35AJ**	C25DND325T	ACC230UM10	DP3025A5003	DP3025A1002	-
-	25	120	**CTR01141**	**42AF35AF**	C25DND325A	ACC230UM20	DP3025B5002	DP3025B1001	-
-	25	208/240	**CTR01142**	**42AF35AG**	C25DND325B	ACC230UM30	DP3025C5001	DP3025C1000	-
3	30	24	**CTR01149**	**42BE35AJ06**	C25DND330T	ACC330UM10	DP3030A5003	DP3030A1002	A77-309044A-3
-	30	120	**CTR01150**	**42BF35AF**	C25DND330A	ACC330UM20	DP3030B5002	DP3030B1001	A77-309044A-1
-	30	208/240	**CTR01151**	**42BF35AG**	C25DND330B	ACC330UM30	DP3030B5001	DP3030C1000	A77-309044A-2
3	40	24	**CTR01164**	**42CF35AJ**	C25DNF340T	ACC430UM10	DP3040A5002	DP3040A1001	A77-309046A-3
-	40	120	**CTR01165**	**42CF35AF**	C25DNF340A	ACC430UM20	AP3040B5001	DP3040B1000	A77-309046A-1
-	40	208/240	**CTR01166**	**42CF35AG**	C25DNF340B	ACC430UM30	D[3040C5000	DP3040C1009	A77-309046A-2
3	50	24	**CTR01167**	**42DF35AJ**	C25FNF350T	ACC530U10	DP3050A5001	DP3050A1000	A77-288514A-3
-	50	120	**CTR01168**	**42DF35AF**	C25FNF350A	ACC530U20	DP3050B5000	DP3050B1009	A77-288514A-1
-	50	208/240	**CTR01169**	**42DF35AG**	C25FNF350B	ACC530U30	DP3050C5009	DP3050C1008	A77-288514A-2
3	60	24	**CTR01170**	**42EF35AJ**	C25FNF360T	ACC630U10	DP3060A5000	DP3060A1009	A77-288517A-3
-	60	120	**CTR01171**	**42EF35AF**	C25FNF360A	ACC630U20	DP3060B5009	DP3060B1008	A77-288517A-1
-	60	208/240	**CTR01172**	**42EF35AG**	C25FNF360B	ACC630U30	DP3060C5008	DP3060C1007	A77-288517A-2
3	75	24	**CTR00934**	**42FE35AJ**	C25FNF375T	ACC730U10	DP3075A5008	DP3075A1007	A77-288520A-3
-	75	120	**CTR00535**	**42FE35AF**	C25FNF375A	ACC730U20	DP3075B5007	DP3075B1006	A77-288520A-1
-	75	208/240	**CTR00536**	**42FE35AG106**	C25FNF375B	ACC730U30	DP3075C5006	DP3075C1005	A77-288520A-2
3	90	24	**CTR01325**	**42GE35AJ106**	-	-	-	DP3090A1006	-
-	90	120	**CTR00538**	**42GE35AF106**	C25GNF390A	ACC930U20	-	DP3090B1005	-
-	90	208/240	**CTR00539**	**42GE35AG106**	C25GNF390B	ACC930U30	-	DP3090C1004	-
3	120	24	**N/A**	**42HF35AJ**	-	-	-	DP3120A1001	-
-	120	120	**CTR00540**	**42HF35AF**	C25HNF3120A	ACC1230U20	-	DP3120B1000	-
-	120	220/240	**CTR00545**	**42HF35AG**	C25HNF3120B	ACC1230U20	-	DP3120C1009	-
4	40	24	**CTR01164**	**42CF25AJ**	C25ENF440T	ACC440UM10	-	DP4040A1000	-
-	40	120	**CTR01165**	**42CF25AF**	C25ENF440A	ACC440UM20	-	DP4040B1009	-
-	40	208/240	**CTR01166**	**42CF25AG**	C25ENF440B	ACC440UM30	-	DP4040C1008	-

(See following page for additional manufacturers)

Definite Purpose Contactor Cross Reference

Poles	Amps	Volts	ServiceFirst Item #	Siemens-Furnas	Fasco	General Electric	Square D	Steveco	Products Unlimited (OEM)
1-1/2	25	24	**CTR01057**	**45DG10AJD8A**	1S25-A	CR353CB3AH1	8910DP21	94385	3100-15QO1XXXA
-	25	120	**CTR01144**	**45DG10AFD8A**	1S25-B	CR353CB3AA1	-	94386	3100-15T01XXXA
-	25	208/240	**CTR01145**	**45DG10AGA**	1S25-C	CR353CB3AB1	-	94387	3100-15UO1XXXA
1-1/2	30	24	**CTR01143**	**45EG10AJA**	1S30-A	CR353CD3AH1	8910DP12	94388	3100-15Q02XXXA
-	30	120	**CTR01144**	**45EG10AFA**	1S30-B	CR353CD3AA1	-	94389	3100-15TO2XXXA
-	30	208/240	**CTR01145**	**45EG10AGA**	1S30-C	CR353CB3AB1	-	94390	3100-15UO2XXXA
1-1/2	40	24	**CTR01152**	**45GG10AJA**	-	-	-	-	3100-15Q19XXXA
-	40	120	**CTR01153**	**45GG10AFA**	-	-	-	-	3100-15T19XXXA
-	40	208/240	**CTR01154**	**45GG10AGA**	-	-	-	-	3100-15U19XXXA
2	20	24	**CTR01137**	**45CG20AJ**	2S20-A	CR353CA2AH1	8910DP32	90234	3100-20Q03XXXA
-	20	120	**CTR01138**	**45CG20AF**	2S20-B	CR353CA2AA1	-	90235	3100-20T03XXXA
-	20	208/240	**CTR01139**	**45CG20AG**	2S20-C	CR353CA2AB1	-	90236	3100-20U03XXXA
-	20	277	**CTR01359**	**45CG20AL**	-	CR353AB2AH1	-	-	3100-20V03XXXA
2	30	24	**CTR01146**	**45EG20AJ**	2S30-A	CR353CC2AH1	8910DPA32	90244	3100-20Q06XXXA
-	30	120	**CTR01147**	**45EG20AF**	2S30-B	CR353CC2AA1	-	90245	3100-20T06XXXA
-	30	208/240	**CTR01148**	**45EG20AG**	2S30-C	CR353CC2AB1	-	90246	3100-20U06XXXA
-	30	277	**CTR01360**	**45EG20AL**	-	-	-	-	3100-20V06XXXA
2	40	24	**CTR01155**	**45GG20AJ**	-	-	-	-	3100-20Q18XXXA
-	40	120	**CTR01156**	**45GG20AF**	-	-	-	-	3100-20T18XXXA
-	40	208/240	**CTR01157**	**45GG20AG**	-	-	-	-	3100-20U18XXXA
3	25	24	**CTR01140**	**42AF35AJ**	3M25-A	-	8910DPA23	90160	3100-30Q8XXXAH
-	25	120	**CTR01141**	**42AF35AF**	3M25-B	-	-	90161	3100-30T8XXXAH
-	25	208/240	**CTR01142**	**42AF35AG**	3M25-C		-	90162	3100-30U8XXXAH
3	30	24	**CTR01149**	**42BE35AJ06**	3M30-A	CR353AC3AH1	8910DPA33	90163	3100-30Q9XXXAH
-	30	120	**CTR01150**	**42BF35AF**	3M30-B	CR353AC3AA1	-	90164	3100-30T9XXXAH
-	30	208/240	**CTR01151**	**42BF35AG**	3M30-C	CR353AC3AB1	-	90165	3100-30U9XXXAH
3	40	24	**CTR01164**	**42CF35AJ**	3M40-A	CR353AD3BH1	8910L0-3	90170	3100-30Q10XXXAH
-	40	120	**CTR01165**	**42CF35AF**	3M40-B	CR353AD3BA1	-	90171	3100-30T10XXXAH
-	40	208/240	**CTR01166**	**42CF35AG**	3M40-C	CR353AD3BB1	-	90172	3100-30U10XXXAH
3	50	24	**CTR01167**	**42DF35AJ**	3L50-A	CR353FE3BH1	8910MO-3	92459	3100-30Q16XXXCG
-	50	120	**CTR01168**	**42DF35AF**	3L50-B	CR353FE3BA1	-	92460	3100-30T16XXXCG
-	50	208/240	**CTR01169**	**42DF35AG**	3L50-C	CR353FE3BB1	-	92461	3100-30U16XXXCG
3	60	24	**CTR01170**	**42EF35AJ**	3L60-A	CR353FF3BH1	8910NO-3	92462	3100-30Q17XXXCG
-	60	120	**CTR01171**	**42EF35AF**	3L60-B	CR353FF3BA1	-	92463	3100-30T17XXXCG
-	60	208/240	**CTR01172**	**42EF35AG**	3L60-C	CR353FF3BB1	-	92464	3100-30U17XXXCG
3	75	24	**CTR00934**	**42FE35AJ**	-	CR353EG3BH1	-	92465	3100Y30Q75XXXCG
-	75	120	**CTR00535**	**42FE35AF**	-	CR353EG3BA1	8910PO-3	92467	3100Y30T75XXXCG
-	75	208/240	**CTR00536**	**42FE35AG106**	-	CR353EG3BB1	-	92468	3100Y30U75XXXCG
3	90	24	**CTR01325**	**42GE35AJ106**	-	-	-	92469	3100Y30Q90XXXCG
-	90	120	**CTR00538**	**42GE35AF106**	-	CR353EH3BA1	8910QO-3	-	3100Y30T90XXXCG
-	90	208/240	**CTR00539**	**42GE35AG106**	-	CR353EH3BB1	-	-	3100Y30U90XXXCG
3	120	24	**N/A**	**42HF35AJ**	-	-	-	-	3000Y30Q12XXXCG
-	120	120	**CTR00540**	**42HF35AF**	-	CR3535GJ3AA1	-	-	3000Y30T12XXXCG
-	120	220/240	**CTR00545**	**42HF35AG**	-	-	-	-	3000Y30U12XXXCG
4	40	24	**CTR01164**	**42CF25AJ**	-	CR353AD4BH1	8910LO-4	-	3000-40Q10XXXCG
-	40	120	**CTR01165**	**42CF25AF**	-	CR353AD4BA1	-	-	3000-40T10XXXCG
-	40	208/240	**CTR01166**	**42CF25AG**	-	CR353AD4BB1	-	-	3000-40U10XXXCG

Features and Applications

LOGO! the universal logic module from Siemens, makes even your difficult control applications seem easy. This unit enables you to save space, time, and money by offering an alternative means of wiring numerous control components. The modularity allows the exact needs of your application to be addressed with virtually no limit to its range of applications. LOGO! is a perfect solution for switching and control.

Applications

LOGO! has universal applications:
- Manufacturing of machines and appliances (compressors, pumps, valves, small presses, conveyors)
- Panel builders and original equipment manufacturers
- Building services and installation (lighting, blinds, awnings, gates/doors, security systems, barriers, HVAC, sprinklers)
- Preprocessing of signals for other controllers

Features

Everything is integrated into one unit:
- Operator keypad and display panel
- Programming software – connect function blocks to create desired circuits
- Non-volatile storage of control program and parameters on internal EEPROM
- Power supply and connectors built in
- Reserve power for 80 hours on all clock models
- LOGO! 12/24 VDC with analog has 8 digital inputs (2 analog inputs) 4 outputs
- LOGO! Basic has 8 digital inputs and 4 outputs
- LOGO! Expansion modules, 4 digital inputs and 4 digital outputs
- LOGO! Expansion modules with 2 Analog input
- Password protection
- UL listed, CSA certified, CE mark, and FM approval

LOGO! is extremely compact:
- LOGO! Basic – 72 x 90 x 55 mm (2.84 x 3.54 x 2.17 in.) (W x H x D)
- LOGO! Expansion modules – 126 x 90 x 55 mm (4.96 x 3.54 x 2.17 in.) (W x H x D)

LOGO! is highly flexible:
- Simply link the functions by pressing a key (eliminates time consuming wiring)

LOGO! can communicate:
- LOGO! ASi Expansion module can be used for data exchange with higher level controllers like SIMATIC S7-200 through AS-interface (not available yet – order LOGO! Bus for ASi connectivity)

Additional Features
- Analog Processing (12/24 VDC UNITS and Expansion Modules)
- Retentively standard on all devices
- Expanded memory to 130 blocks
- Faster operating speeds – last 2 inputs at 2 kHz each on all 12 VDC and 24 VDC units (excluding 24RC version)
- Automatic Daylights Savings Time correction possible
- 33 functions on all units – 8 basic functions and 25 special functions
- Clock and annual clock included on all models with relay outputs
- Relay outputs have max. 10A resistive/ 3A inductive current rating (note: models 24 and 24L have transistor outputs)
- 3 elapsed time meters and 4 latching relays possible in one program
- 8 bit memories (Including restart flags)
- Message display - 4 x 12 characters
- Soft Key Input Function

LOGO! Capabilities
- Unlimited timer function combinations
- Unlimited counter function combinations
- 8 time switches
- 3 operating hours counters
- 42 current impulse relays
- 42 latching relays

Design

LOGO! is available in different supply voltages:
- 12/24 VDC
- 24 VDC
- 115/230 VAC

Integral Functions

All models feature:
- Basic functions – AND, OR, NOT, NAND, NOR, XOR, AND (with edge evaluation), NAND (with edge evaluation)
- Special functions – on-delay, off delay, latching relay, yearly timer, retentive on-delay, hours counter, pulse relay, up/down counter, random generator, on-/off-delay, analog threshold trigger, threshold trigger, analog comparator, stairway lighting switch, multiple function switch, wiping relay (pulse output), edge triggered wiping relay, asynchronous pulse generator, weekly timer, analog differential trigger, analog value monitoring, analog amplifier, message texts, softkey, shift register

Optional Functions

Software:
- LOGO! Soft Comfort 4.0 – updated software with "drag and drop" programming and improved functionality
- PC cable – transfer program from PC to LOGO! or vice versa

Program Module Cards:
- Yellow card – easy data backup and duplication of program, with password protection

LOGO! Contact:
- Control module for direct control of resistive loads up to 20 A and motors up to 4 kW without noise interference ("hum-free")
- Used for building services/installation, industry, and commerce.
- Available in two versions – 24 VDC and 230 VAC, 50/60 Hz

LOGO! Power:
- Power supply module optimally matched to LOGO! • Converts 115/230 VAC to relevant operating DC voltage
- 12 VDC – output current 1.9A or 4.5A
- 24 VDC – output current 1.3A or 2.5A
- Can be used with all LOGO! 12 VDC or 24 VDC models

LOGO!
The Universal Logic Module

ServiceFirst Item #	Model	Version				Description of New Products All CPUs have 30 integrated functions, 56 blocks, annual clock(except where noted, 2 analog inputs(DC models)
		Relay	Tran	Clock	Comm	
RLY02395	LOGO! 12/24RC	X		X		12/24 VDC, 8I/4O, 2 Analog inputs, relay outputs
RLY02397	LOGO! 24		X			24 VDC, 8I/4O, transistor outs, no clock, 2 analog inputs
RLY02409	LOGO! 24RC	X		X		24 VAC, 8I/4O, relay outputs
RLY02417	LOGO! 230RC	X		X		115/230 VAC, 8I/4O, relay outputs
MOD01291	LOGO! DM8 24		X			24 VDC, 4I/4O, transistor output, expansion module
MOD01292	LOGO! DM8 24R	X				24VAC, 4I/4O, relay output, expansion module
MOD01293	LOGO!DM8 12/24R	X				12/24 VDC, 4I/4O, relay output NEW! 0-55 C, expansion module
MOD01294	LOGO! DM8 230R	X				115/230 VAC, 4I/4O, relay output NEW! 0-55 C, expansion module
MOD01295	LOGO! AM2					24VDC, 2 analog inputs, expansion module
MOD01296	LOGO! 12/24 RC Starter Kit	X		X		12/24V DC, 8I/4O, with 2 analog inputs, relay starter kit
MOD01297	LOGO! 230 RC Starter Kit	X		X		115/230 VAC , 8i/4O, relay output starter kit
GID00089	LOGO! Manual					User's Manual, updated version 4.0
MOD00933	LOGO! Soft Comfort v4.0					Drag and drop programming, on CD , version 4.0
MOD00934	LOGO! PC Cable					Moves programs between LOGO! and PC
MOD01406	LOGO! Card					Copies and saves programs, adds password protection
MOD00938	LOGO! Contact 24					Compact relay – 20 A resistive, 8.4 A inductive 24 VDC coil, 3 hp @ 230 VAC, 5 hp @ 460 VAC
MOD00939	LOGO! Contact 230					Compact relay – 20 A resistive, 8.4 A inductive 230 VAC coil, 3 hp @ 230 VAC, 5 hp @ 460 VAC
MOD00940	LOGO! Power 1.3					Switch-mode power supply - 1.3 A , 115/230VAC to 24VDC
MOD00941	LOGO! Power 2.5					Switch-mode power supply – 2.5 A, 115/230VAC to 24VDC
PWR00120	LOGO! Power 4.5					Switch-mode power supply - 4.5 A, 115/230VAC to 12VDC
BRK03258	LOGO! Bracket					Front panel mounting bracket for LOGO! basic units only

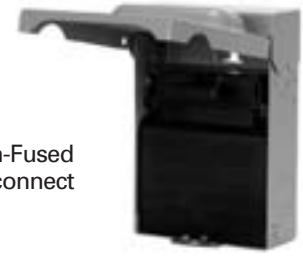
AC Disconnects

Features
- Ample wiring space
- Rugged design
- Numerous knockouts
- Raised mounting embosses
- Copper conductors
- Pullout switch*
- Fuse holder**
- Removable door
- Meets national electrical code requirements

Benefits
- The larger enclosure allows for ample wiring space.
- Manufactured with powder coated G90 galvanized steel for fade, scratch and corrosion resistance.
- All (6) knockouts are easy to remove. The sidewall knockouts provide access from the sides of the device. Every knockout has 1/2", 3/4" and 1" provisions.
- (4) Raised mounting embosses keep the unit away from the wall, preventing dirt build-up. The upper mounting hole is shaped to be used as a hanger.
- Copper current carrying part allows for a cooler, longer lasting operation.
- The pullout switch design allows you to safely and easily de-energize the load terminals.*
- The easily removable door makes it possible to wire the device with absolutely no interference.
- The easy to remove pullout securely holds the fuses in place. The fuse holder design allows you to safely and easily de-energize the load terminals without the need to remove the fuses.**
- Siemens air conditioning disconnects provide the ideal means to comply to articles 440-14 and 110-3(b) of the 1999 National Electrical Code.

*Non-fused only
**Fused only

Fused Disconnect



Non-Fused Disconnect

Disconnects by Siemens

UL Listed, NEMA Type 3R Enclosure 240 Volts

ServiceFirst Item #	Catalog Number	Ampere Rating	Maximum Horsepower	Disconnect Type	Std. Pkg.
SWT02385	WN2060TR	60	10	Non-Fusible Pullout	6

UL Listed, NEMA Type 3R Enclosure 240 Volts

ServiceFirst Item #	Catalog Number	Ampere Rating	Maximum Horsepower	Fuse[1] Class	Std. Pkg.
SWT02386	WF2030TR[2]	30	3	H	6
SWT02387	WF2060TR[2]	60	10	H	6

1. Fuses not included.
2. Service Entrance rated.

Features and Applications

Definite Purpose Contactors

Definite Purpose Contactors

Centurion 2000, Premium Line

- 25-210A
- 210 FLA 60 Hz 600VAC Max
- Compact Size
- Interchangeable Mounting
- Snap-On Electrical/Mechanical Interlocks
- Oversize Lugs Available on 25A and 30A
- Sems Screws Available on 25A, 30A and 40A
- Binding Head Screws Optional on 40-60A
- Class H Coil Insulation
- Optional Electronic Timers, Surge Suppressors and Step Down DC Coil Drivers Built into Coils
- Snap-On Electronic Accessories
- Meets ARI-780, UL and CSA Standards

Application

The Furnas Centurion 2000 offers a high new standard in definite purpose control. The largest, most complete line of definite purpose motor controls in the industry, it is ideal for many applications including:

HVAC	Welding
Refrigeration	Lighting
Elevators	Pools & Spas
Hoists & Cranes	
Food Processing	
Data Processing	
Pumps & Compressors	

When used with an appropriate pilot device they can provide either low voltage protection or low voltage release. These controls have been designed with a low drop out voltage making them ideal for air conditioning, heating and refrigeration applications.

Construction

The Centurion 2000 was designed to be a tougher, more compact, more versatile and quieter contactor than ever before. Product features include:

Tougher Materials – The housing and all other non-metal body parts are made of bulk molding compound for greater strength and durability.

Compact – Space saving dimensions allow for smaller panels and more wiring room.

Straight Thru Wiring – Line terminals are located at the top and load terminals at the bottom. This construction eliminates looping wires around the control and reduces wiring costs.

Interchangeable Mounting – The combination of multiple mounting holes and slots allows these contactors to be fastened onto panels and provide interchangeable mounting with many competitive contactors.

25A, 30A, 40A

50A, 60A

75A, 90A

Definite Purpose Contactors

Centurion 2000, Premium Line

- 25-210A
- 210 FLA 60 Hz 600VAC Max

Terminals – Line and load terminals are supplied with pressure connectors. Pilot control wires can attach to the line terminals by using integral auxiliary connections. Oversize lugs are standard on 40A and optional on 25A and 30A. You also have a choice of three terminal styles – box lug, binding head screws, or sems clamp.

Coils – Class H high temperature insulated coils are standard on 25A-60A contactors. Vibration has been minimized by cushioning the coil and the enclosed construction reduces the possibility of failure due to contaminants. Coils on 25-60A are equipped with combination pressure and quick connect terminals. Electronic timers, surge suppressors or DC coil drivers are available built into the coils. This option simplifies wiring and allows less panel space to be used.

Coils on 75A-210A contactors are encapsulated in a moisture proof epoxy.

Some coils are equipped with combination pressure and quick connect terminals. Connections are made by inserting the stripped wire under the screw head and tightening or by pressing on a quick connector.

Single voltage coils are standard for all popular voltages and frequencies. Dual voltage, 120/240 or 240/480 volts, 50-60 Hz coils are available at an additional cost. Dual voltage coils are standard on the 120A - 210A contactors.

The 75A and 90A devices are also available with DC magnet and coil as an optional feature. Magnet and coil assemblies are available for 6, 12, 24, 32, 115 and 230VDC.

Magnet – The magnet is constructed of laminations of silicon steel. A shading coil insures a positive sealing of the armature.

Snap-On Accessories – Two snap-on electrical interlocks provide up to four SPST or SPDT circuits. Interlocks snap on each side and are optional. An optional mechanical interlock is also available. Other accessories such as timers, coil snubbers, coil drivers and others provide versatile, expandable control.

Auxiliary Electrical Interlocks – Furnas supplies one or two interlocks as a factory modification or for field installation on 75A and 90A contactors. Four auxiliary interlocks can accept 120A-210A contactors.

Available with either normally open or normally closed contacts, they are mounted in a molded guide and held in place with a single screw.

Arc Box – Molded of a glass filled thermoset material, it withstands tracking and prevents flash over.

Cross Arm – This rugged, molded part resists the stresses of high temperatures and impacts.

Contacts – Made of silver cadmium oxide that resists welding, arc erosion and mechanical wear, these critical components are bonded to rugged backing material.

REFERENCE LITERATURE

Instruction Sheets and Replacement Parts

Size FLA	Instruction Sheet	Replacement Parts
25, 30, 40	PM-60.1	42-GBF
50,60	PM-60.1	42-GDF
75, 90	PM-60.1	42-GFE
120, 150	PM-60.1	16-GHF
210	PM-60.1	42-GJB

120A, 150A

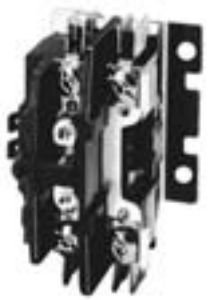
210

Features and Applications

Definite Purpose Contactors

Standard Line

- 20-40 FLA 60 Hz 600VAC Max
- For Contactors Thru 210 FLA, see Centurion 2000 Premium line.



Single Pole

2 Pole

- Compact Size
- Straight Thru Wiring
- Long Life
- Non Tracking Contact Board
- Interchangeable Mounting Base
- Quick Connect Terminals
- Weld Resistant Contacts
- UL File E14900
- CSA File LR6535 and 42531
- TUV/VDE Approved – Contact Factory

Application

Furnas compact definite purpose contactors are designed for controlling air conditioning, heating, welding, data processing and refrigeration equipment. They provide reliable full voltage control of compressor motors and electric heating loads. When used with an appropriate pilot device they can provide either low voltage protection or low voltage release. These controls have been designed with a low drop out voltage making them ideal for air conditioning, heating and refrigeration applications.

Construction

Compact – Space saving dimensions allow for smaller panels and more wiring room.

Straight Thru Wiring – Line terminals are located at the top and load terminals at the bottom. This construction eliminates looping wires around the control and reduces wiring costs.

Mounting – Contactors are designed for mounting on a vertical service. Side by side grouping is possible since all terminals are front accessible and isolated from adjacent controls by molded barriers.

Interchangeable Mounting – The combination of multiple mounting holes and slots allows these contactors to be fastened onto panels and provide interchangeable mounting with many competitive contactors.

Terminals – Line and load terminals are supplied with pressure connectors. Pilot control wires attach to the line terminals by using integral auxiliary connections.

Definite Purpose Contactors

Centurion 2000, Premium Line

- 25-210A
- 210 FLA 60 Hz 600VAC Max

25A, 30A, 40A

50A, 60A

75A, 90A

ServiceFirst Item #	Mfg. #	FLA	120V Hp	240V LRA	240V Hp	277V LRA	277V Hp	480V LRA	480V Hp	600V LRA	600V Hp	Non Inductive Amps	Poles Phase	Coil Voltage
						60 FLA 60 Hz 600VAC Max								
CTR01140	42AF35AJ	25	-	150	5	-	-	125	7-1/2	100	7-1/2	35	3,3 Ph	24
CTR01362	42AF35AJ w/lugs													
CTR01141	42AF35AF													110-120
CTR01363	42AF35AF w/lugs													
CTR01142	42AF35AG													200-208
CTR01364	42AF35AG w/lugs													
CTR01730	42BF15AJ	30	2	180	5	-	-	150	-	120	-	40	2,1 Ph	24
CTR01731	42BF15AF													110-120
CTR01732	42BF15AG													200-208
CTR01149	42BF35AJ	30	-	180	7-1/2	-	-	150	10	120	10	40	3,3 Ph	24
CTR01365	42BF35AJ w/lugs													
CTR01150	42BF35AF													110-120
CTR01366	42BF35AF w/lugs													
CTR01151	42BF35AG													200-208
CTR01367	42BF35AG w/lugs													
CTR01158	42CF15AJ	40	3	240	7-1/2	-	-	200	-	160	-	50	2,1 Ph	24
CTR01159	42CF15AF													110-120
CTR01160	42CF15AG													200-208
CTR01161	42CF35AJ	40	-	240	10	-	-	200	15	160	15	50	3,3 Ph	24
CTR01162	42CF35AF													110-120
CTR01163	42CF35AG													200-208
CTR01164	42CF25AJ	40	-	240	10	-	-	200	15	160	15	50	4,3 Ph	24
CTR01165	42CF25AF													110-120
CTR01166	42CF25AG													200-208
CTR01167	42DF35AJ	50	-	300	15	-	-	250	25	200	25	63	3,3 Ph	24
CTR01168	42DF35AF													110-120
CTR01169	42DF35AG													200-208
CTR01170	42EF35AJ	60	-	360	20	-	-	300	30	240	30	75	3,3 Ph	24
CTR01171	42EF35AF													110-120
CTR01172	42EF35AG													200-208
						150 FLA 60Hz 600VAC Max								
CTR00534	42FE35AJ106	75	-	450	25	-	-	375	40	300	40	93	3,3 Ph	24
CTR00535	42FE35AF106													110-120
CTR00536	42FE35AG106													200-208
CTR00538	42GE35AF106	90	-	540	30	-	-	450	50	360	50	120	3,3 Ph	110-120
CTR00539	42GE35AG106													200-208
CTR00540	42HF35AA	120	-	720	-	-	-	600	-	480	-	150	3,3 Ph	110-120/220-240
CTR00541	42HF35AC													220-240/440-480
CTR00542	42IF35AA	150	-	900	-	-	-	750	-	600	-	160	3,3 Ph	110-120/220-240
CTR00543	42IF35AC													208-240/480
						210 FLA 60Hz 600VAC Max								
CTR01843	3RT1064-6AF36	225			75				150				3,3 pH	120
CTR01844	3RT1064-6AP36	225			75				150				3,3 pH	240
CTR01845	3RT1064-6AR36	225			75				150				3,3 pH	480

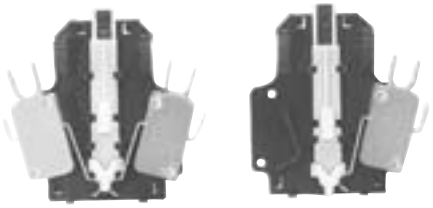
*Terminal Kit for 3RT106 225 A contactor - use TER01072 (3RT1966-4G). Kit includes 3 terminals for line or load. 2 required per 3RT106 contactor.

Definite Purpose Contactors

Centurion 2000 Accessories
- Field Modification Kits
- Snap-On Side Mounted Auxiliary Interlocks

ServiceFirst Item #	Mfg. #	Description	Class	Contactor FLA	Interlock Contacts
SWT01730	49D36098001		42	25-60	1 SPDT
SWT01732	49ACRO				1NO
SWT01733	49ACRC	Auxiliary			1NC
SWT01731	49D36098003	Interlocks			2 SPDT
SWT00531	49D22125001	Auxiliary	42	75-90	NO
SWT00532	49D22125002	Interlocks			NC
SWT00529	49CE42SPDT				SPDT
SWT00533	49D54682NO	Auxiliary	42	120-150	NO
SWT00534	49D54682NC	Interlocks			NC
SWT00535	3RH1921-1EA11	Auxiliary	3RT106	225	NO & NC (First Side)
SWT00536	3RH1921-1KA11	Interlocks			NO & NC (Second Side)

Mechanical Interlock					
KIT01048	49D70035001	Mech. Interlock	42	25-60	



Definite Purpose Contactors

Centurion 2000 Accessories
• Replacement Parts
• AC Coils

ServiceFirst Item #	Mfg. #	Third Character of Cat. No.	Fourth Character of Cat. No.	Volts 60 Hz
		Class 42		
COL08309	75D70233J	A,B,C,D,E	F	24
COL08310	75D70233F			110-120
COL08311	75D70233D			200-208
COL08312	75D70233G			208-240
COL08313	75D70233L			277
COL08314	75D70233H			440-480
COL08315	75D70233E			550-600
COL03601	75D56630J	B,C,D,E	E	24
COL03602	75D56630F			110-120
COL03603	75D56630G			208-240
COL04043	75D56630L			277
COL03604	75D54822H			440-480
COL03705	75D55123E			575
COL03605	75D54772J	F,G	E	24
COL03606	75D54772F			110-120
COL03607	75D54772G			208-240
COL04094	75D54772L			277
COL03608	75D54772H			440-480
COL03706	75D54772E			550-600
COL03609	75D73251A	H,I	F	110-120/220-240
COL04097	75D73251D			200-208
COL04045	75D73251L			277
COL03610	75D73251C			220-240/440-480
COL03611	D71628031	J	B	110-120/220-240
COL04098	D71628048			208
COL03612	D71628032			220-240/440-480
COL03707	D71628033			550-600
COL11208	3RT1065-5AF31			110-127
COL11209	3RT1065-5AM31			200-220
COL11210	3RT1065-5AP31			220-240
COL11211	3RT1065-5AU31			240-277
COL11212	3RT1065-5AR31			440-480
COL11213	3RT1065-5AT31			575-600

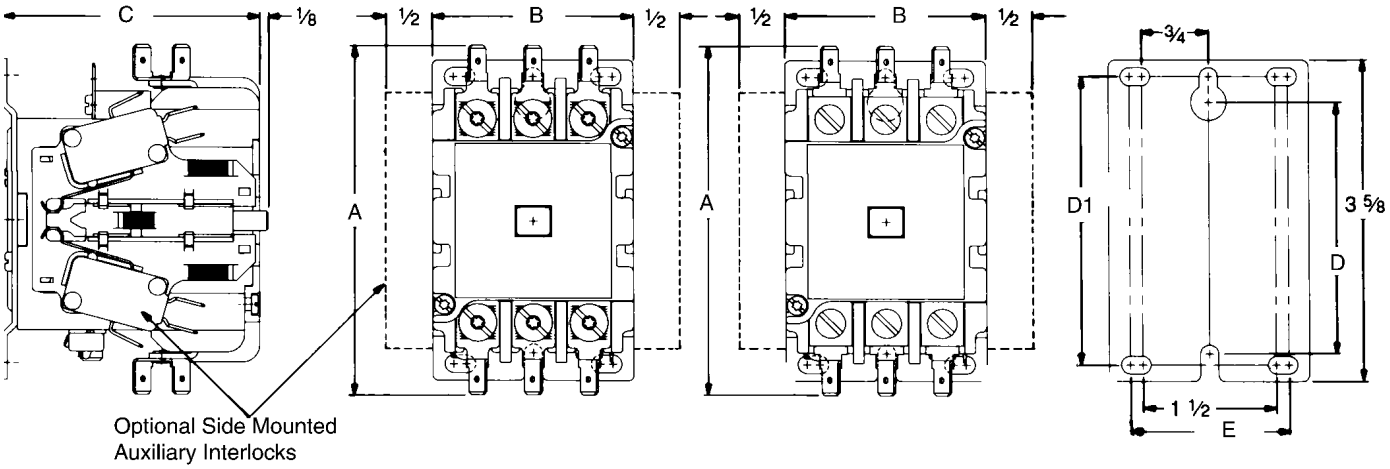
• Contact Kits

		Class 42	
KIT01223	75EF42	F	E
KIT01234	75GE42	G	E
KIT01235	75HF14	H	F
KIT01236	75IF14	I	F
KIT01237	75JB14	J	B

Diagrams

Class	FLA	Watts	VA (Nominal) Inrush	VA (Nominal) Sealed	Volts (Nominal) Pick-up	Volts (Nominal) Drop-out
Class 42 (2P-3P)	25-40	2.5	52	6.2	80%	50%
Class 42 (4P)	25-40	4.2	91	15.6	80%	50%
Class 42 (2P-3P)	50-60	4.2	91	15.6	80%	50%
Class 42 (2P-3P)	75-90	13.5	200	31	85%	53%
Class 42 (2P-3P)	120, 150	14	310	26	85%	50%

Class 42, 25-40A 2, 3 Pole

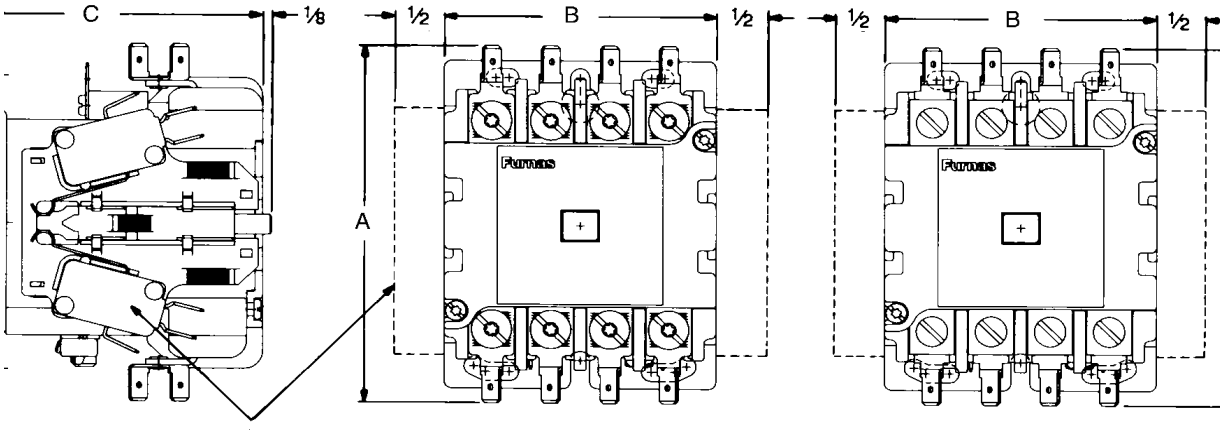


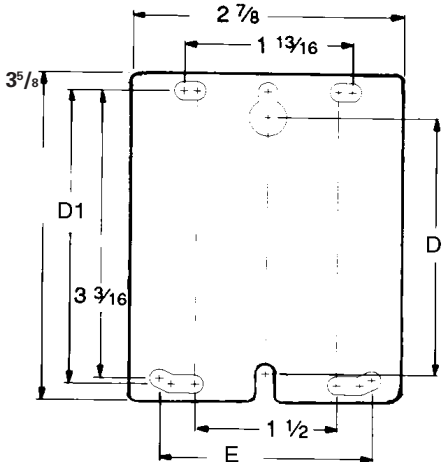
	Size FLA	Third Character of Cat No	Poles	Outline Dimensions A	B	C	C1	Mtg Dimensions D	D1	E	Mtg Screw G	Max Wire Size	Approx Ship Wt Lbs	Ref Dwg
Open	25-30	A, B	3	3 31/32	2 1/4	2 7/8	–	3 1/8	3 1/4	1 13/16	10	8	1 1/2	D70182
Type	40	C	3	3 31/32	2 1/4	2 7/8	–	3 1/8	3 1/4	1 13/16	10	2	1 1/2	D70182

Diagrams

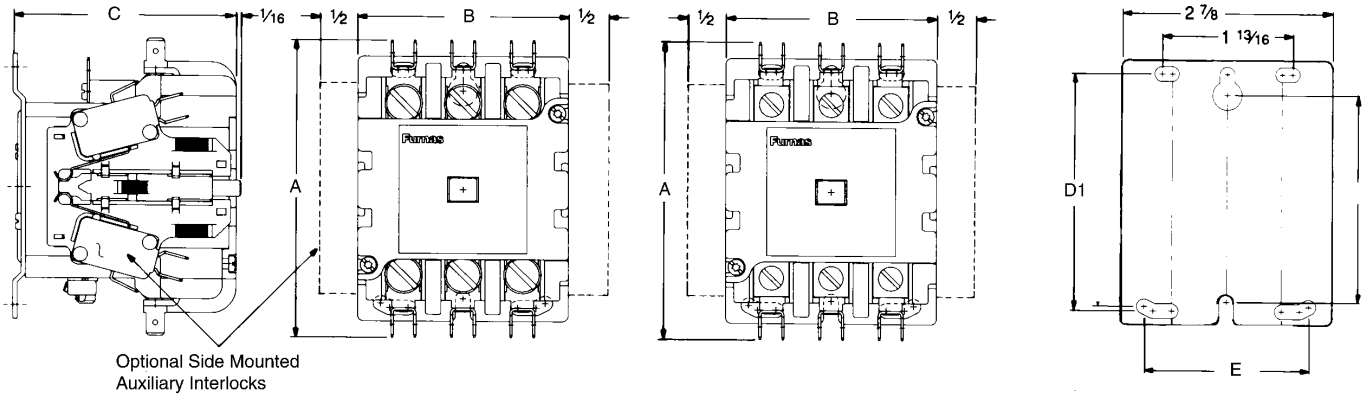
Contactors

Class 42, 25-40A 4 Pole





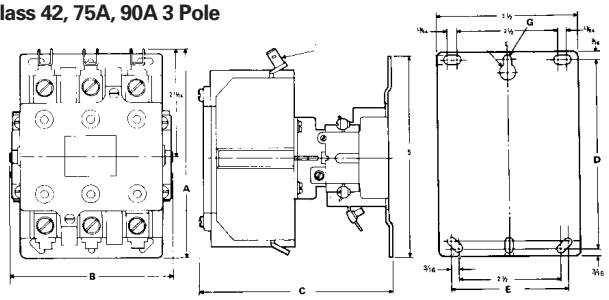
Class 42, 50A, 60A 3 Pole



	Size FLA	Third Character of Cat No	Poles	Outline Dimensions A	B	C	Mtg Dimensions D	D1	E	Mtg Screw G	Max Wire Size	Approx Ship Wt Lbs	Ref Dwg
Open	25-30	A, B	4	3 31/32	2 7/8	2 7/8	3 1/8	3 1/4	2 1/4	10	8	1 1/2	D70184
Type	40	C	4	3 31/32	2 7/8	2 7/8	3 1/8	3 1/4	2 1/4	10	2	2	D70184
	50-60	D, E	3	4 1/16	2 7/8	3 1/16	3 1/8	3 1/4	2 1/4	10	2	1 1/2	D70183

Diagrams

Class 42, 75A, 90A 3 Pole

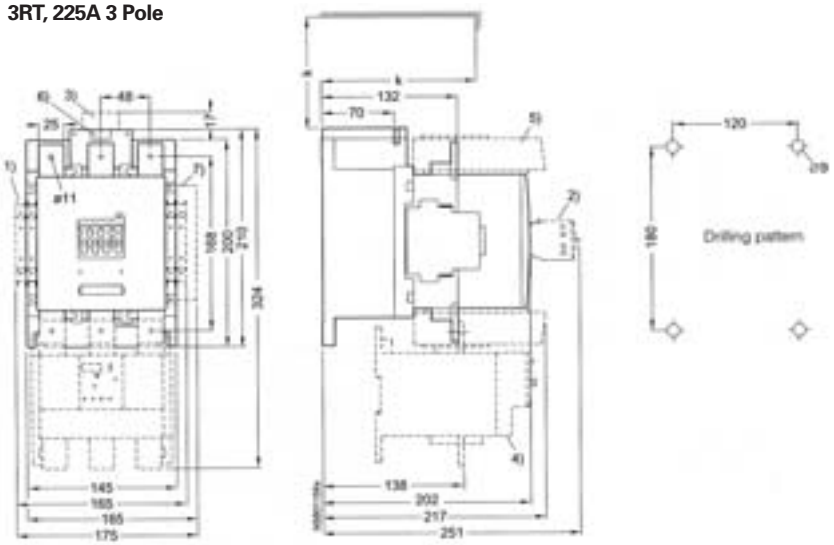


With Two Electrical Innerlocks Front

Side

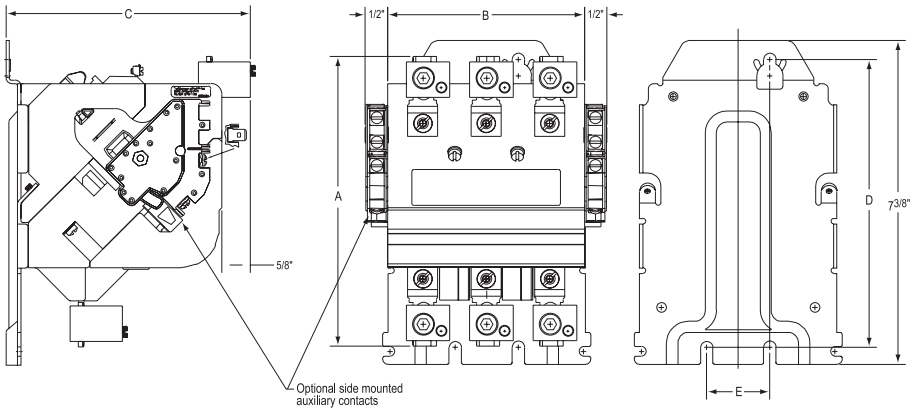
Mounting Hole Pattern

3RT, 225A 3 Pole



Class 42, 120A, 150A 3 Pole

120A-150A 3 Pole



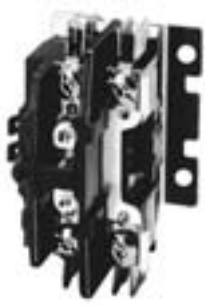
	Size FLA	Third Character of Cat No	Outline Dimensions A	B	C	Mtg Dimensions D	E	Mtg Screw G	Max Wire Size	Approx Ship Wt Lbs
Open	75	F	5 3/16	4	4 3/4	4 5/8	2 7/8	10	1/0	3½
Type	90	G	5 3/16	4	4 3/4	4 5/8	2 7/8	10	1/0	3½
	120	H	6 5/8	4 1/2	5 9/16	6 5/16	1 7/16	¼	3/0	6¼
	150	I	6 5/8	4 1/2	5 9/16	6 5/16	1 7/16	¼	3/0	6¼

Dimensions for reference, not for construction. Third character of catalog number identifies contactor rating.

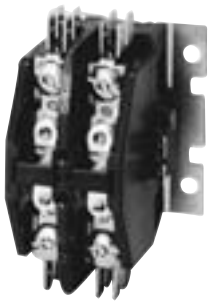
Definite Purpose Contactors

Standard Line

• Class 45



Single Pole

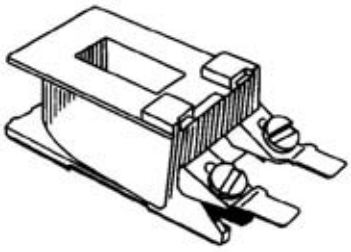


2 Pole

ServiceFirst Item #	Mfg. #	FLA	120V Hp	240V LRA	240V Hp	277V LRA	277V Hp	480V LRA	480V Hp	600V LRA	600V Hp	Non Inductive Amps	Poles Poles	Coil Voltage
						40 FLA 60 Hz 600VAC Max								
CTR01134	45CG10AJA	20	-	120	-	110	-	100	-	80	-	25	1	24
CTR01135	45CG10AFA													110-120
CTR01136	45CG10AGA													208-240
CTR01137	45CG20AJ	20	-	-	-	120	-	100	-	80	-	30	2	24
CTR01138	45CG20AF													110-120
CTR01139	45CG20AG													208-240
CTR01359	45CG20AL													277
CTR01143	45EG10AJA	30	-	180	-	180	-	150	-	120	-	40	1	24
CTR01144	45EG10AFA													110-120
CTR01145	45EG10AGA													208-240
CTR01146	45EG20AJ	30	-	-	-	180	-	135	-	110	-	40	2	24
CTR01147	45EG20AF													110-120
CTR01148	45EG20AG													208-240
CTR01360	45EG20AL													277
CTR00736	45FG10ALA	35	-	180	-	180	-	150	-	120	-	50	1	277
CTR01152	45GG10AJA	40	-	200	-	200	-	160	-	140	-	55	1	24
CTR01153	45GG10AFA													110-120
CTR01154	45GG10AGA													208-240
CTR01155	45GG20AJ	40	-	-	-	200	-	135	-	110	-	55	2	24
CTR01156	45GG20AF													110-120
CTR01157	45GG20AG													208-240
CTR01361	45GG20AL													277

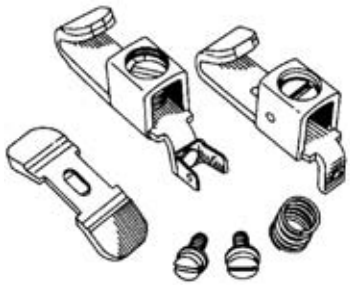
Replacement Parts Series 31 Wholesale Contactors

• AC Coils



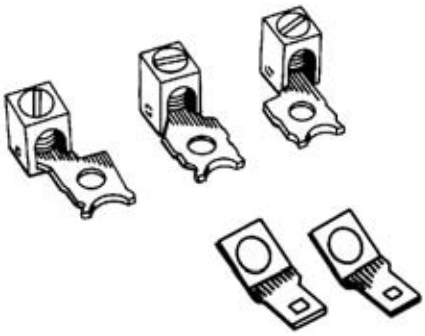
ServiceFirst Item #	Mfg. #	Amps	Poles	Volts 60 Hz
		Series 31		
COL03601	75D56630J	25, 30 & 40	1, 2 & 3	24
COL03602	75D56630F			110-120
COL03603	75D56630G			208-240
COL04043	75D56630L			277
COL03604	75D54822H			440-480
COL03705	75D55123E			575

• Contact Kits



		Series 31
KIT01223	75FE42	75
KIT01234	75GE42	90
KIT01235	75HF14	120
KIT01236	75IF14	150
KIT01237	75JB14	210

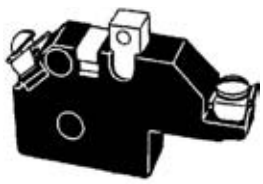
• Box Lugs & Quick Connects

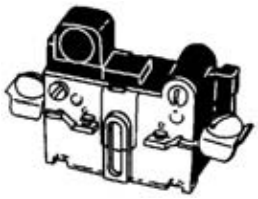


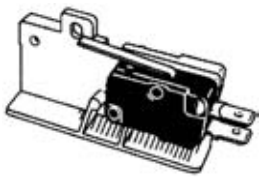
TER00268	75L108694	30	3
TER00269	75L108695	Series 31 Quick Cnt	

• Auxiliary Switches

	Series 31
SWT00533	SPST-NO 10A/600V fuse on 120 & 150amp
SWT00534	SPST-NC 10A/600V fuse on 120 & 150 amp
SWT00535	SPDT 10A/600V fuse on 210 amp; Right Hand installation
SWT00536	SPDT 10A/600V fuse on 210 amp; Left Hand installation
SWT00529	SPDT 10A/250V fuse on 2 pole 40 amp, 3 pole 30 through 90 amp
SWT00530	SPDT .1A/125V (Gold Contacts) fuse on low amp draws 2 pole 40 amp, 3 pole 30 thru 90 amp
SWT00528	(2) SODT 10A/250V fuse on 2 pole 40 amp, 3 pole 30 thru 90 amp
SWT00531	SPST-NO 10A/600V fuse on 2 pole 40 amp, 3 pole 30 thru 90 amp
SWT00532	SPST-NC 10A/600V fuse on 2 pole 40 amp, 3 pole 30 thru 90 amp







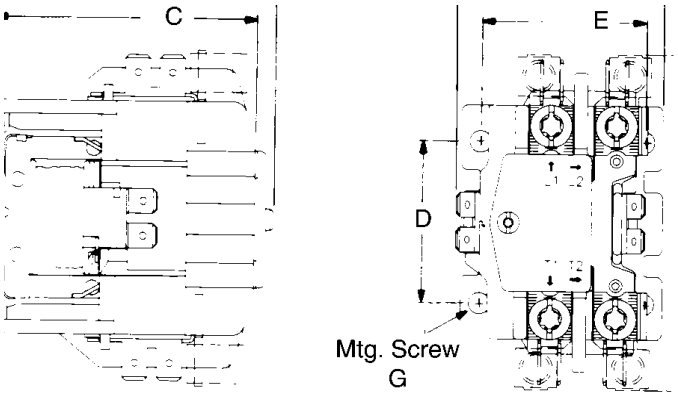
Diagrams

Contactors

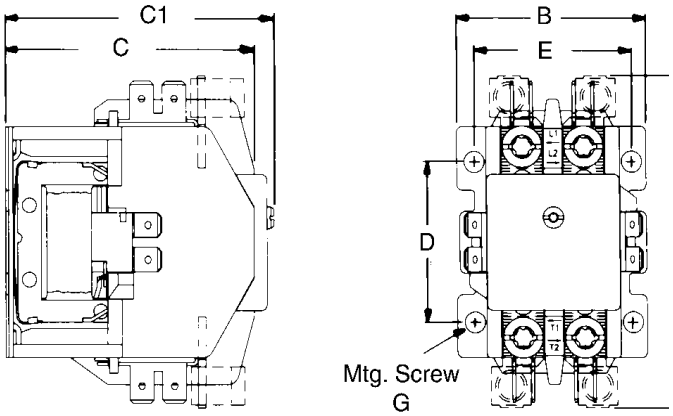
Class	FLA	Watts	VA (Nominal) Inrush	VA (Nominal) Sealed	Volts (Nominal) Pick-up	Volts (Nominal) Drop-out
Class 45 (1P-2P)	20-40	2.6	27	7.3	80%	50%

Dimensions

Class 45, 20-40A 1 Pole



Class 45, 20-40A 2 Pole



	Size FLA	Third Character of Cat No	Poles	Outline Dimensions A	B	C	C1	Mtg Dimensions D	D1	E	Mtg Screw G	Max Wire Size	Approx Ship Wt Lbs	Ref Dwg
Open	20-40	C, D, E, F, G	1	3 3/8	2 1/16	2 5/8	2 13/16	1 5/8	–	1 5/8	10	10	1	D36304
Type	20-40	C, D, E, F, G	2	3 3/8	2	2 11/16	2 13/16	1 5/8	–	1 5/8	10	10	1	D36304

Features and Applications

Contactors

Magnetic Contactors

Full Voltage

- Rugged Industrial Design
- Dual Voltage, Dual Frequency Coils
- Front Removable Auxiliary Interlocks
- Easy Coil Access
- Horsepower Rating
- Resistance Heating kW Ratings
- Lighting Ampere Ratings
- Capacitor and Transformer Switching Applications
- Motor Matched Sizes
- Straight Thru Wiring
- Gravity Dropout
- UL Listed 508 File #E14900
- CSA Certified File #LR6535

Applications

Class 40 industrial magnetic contactors are designed for electrical loads such as heating, lighting, transformer and capacitor switching and AC motor starting. They control motors already protected by inherent or other types of overload devices. Used with appropriate pilot control, a contactor provides a choice of undervoltage protection or release.

Class 40 contactors size 0 thru 6 feature carefully wound coils encapsulated to seal out moisture. Encapsulation also promotes heat transfer and resists electrical, mechanical and thermal stresses.

Features

Horsepower rated contactors are available in NEMA sizes 00 through 6, plus three Furnas M-M motor matched sizes: 1¾, 2½, and 3½. These contactors can also be used on capacitor and transformer switching applications. See Application Data Section for rating information.

Auxiliary Equipment

- Field modifications such as auxiliary electrical interlocks, pilot lights, push buttons, selector switches and fuse blocks for low voltage pilot control are available to meet particular application requirements.
- Normally open or normally closed power pole kits are available for sizes 0 through 1¾.
- A full line of replacement parts is available including contact kits, coils and overload relays.

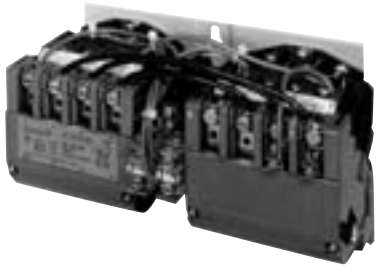
Coil Data

Class Size	14 Watts	Volts 60Hz	Inrush (Open Magnet) Amps	VA	Normal (Sealed Magnet) Amps	VA
		24	2.63		.37	
		120	.59		.08	
		208	.34		.05	
00	13.3	240	.305	70	.045	10
		277	.25		.03	
		480	1.49		.02	
		600	.121		.02	
		24	9.08		1.04	
		120	1.82		.21	
0		208	1.05		.12	
thru	8.6	240	.91	218	.105	25
2½		27	.79		.090	
		480	.45		.052	
		600	.36		.042	
		24	12.9		1.08	
		120	2.58		.217	
		208	1.49		.125	
3, 3½	14	240	1.29	210	.108	26
		277	1.12		.094	
		480	.646		.054	
		600	.516		.043	
		120	4.25		.425	
		208	2.45		.245	
		240	2.15		.215	
4	22	277	1.77	510	.183	51
		480	1.08		.112	
		600	.85		.085	
		120	12.65		.96	
		240	6.32		.48	
5	63	480	3.16	1518	.24	116
		600	2.53		.193	
		240	1.45		.25	
6	40	480	.73	350	.12	60
		600	.58		.10	

Features and Applications

Magnetic Reversing Contactors

Full Voltage



- Rugged Industrial Design
- Dual Voltage, Dual Frequency Coils
- Compact Design
- Front Removable Auxiliary Interlocks
- Easy Coil Access
- Straight Thru Wiring
- Gravity Dropout
- UL Listed 508 File #E14900
- CSA Certified File #LR6535

Application
Class 43 industrial magnetic reversing contactors are designed for across the line starting of single phase and polyphase motors which do not require overload protection.

These controls are available in NEMA sizes 00 through 6. In addition to the usual NEMA starter sizes Furnas offers four exclusive Motor Matched **M•M** sizes; 1¾, 2½, 3½ and 4½. These half sizes offer the same rugged, industrial construction as our NEMA sizes and ensure efficient operating performance. Furnas **M•M** sizes provide a real cost savings by cutting down on wasteful over capacity when NEMA sizes exceed the motor ratings.

Typical applications include use with machine tools, material handling equipment, hoists and various production and industrial equipment as well as demanding automotive applications. These controls may also be used as changeover contactors on emergency power panels to transfer from commercial to standby power.

Features
Furnas reversing contactors size 0-6 include the following as standard.

Molded Coil — Magnet coils are carefully wound and then sealed in epoxy. Encapsulation helps seal out moisture, promotes heat transfer and resists electrical, mechanical and thermal stresses.

Dual Voltage/Frequency — Furnas contactors size 0-6 are available with dual voltage, dual frequency coils and are designed to operate on 50/60 Hz.

Field Modifications Kits/Accessories — All reversing contactors can be modified in the field with a complete range of accessories. These include push buttons, selector switches, pilot lights, auxiliary electrical interlocks and surge suppressors.

Size 0 through 4
Reversing Contactors
The following features are characteristic of size 0 through 4.

Gravity Dropout — For added reliability, the gravity drop out of the armature and contacts is assisted by stainless steel springs which help provide quick, precise opening of the contacts.

45 Degree, Wedge Action — The 45 degree, wedge action contacts reduce tracking and provide faster arc quenching. The resulting self cleaning and reduced contact bounce mean cooler operation and longer life for the silver cadamium oxide contacts.

Terminal Design — Control terminals are self rising pressure type. Power terminal points are provided for use with power factor correction capacitors.

Interlocks — Cross electrical interlocks prevent the simultaneous energization of both contactors.

Mechanical Interlock — A mechanical interlock is provided to prevent both contactors from closing at the same time.

Size 5 through 6
Reversing Contactors
In addition to the standard features, size 5 through 6 reversing contactors incorporate many of the additional features listed for size 0 through 4 including side mounting auxiliary interlocks. Furnas size 5 through 6 reversing contactors use the reliable vertical lift magnetic action which has proven long life and trouble free performance.

Selection Procedure

Contactors

Heavy-Duty Full Voltage Non-Reversing

Ordering Instructions
- See Field Modification Kits.
- See 380 Volt 50 Hertz information.
- See Replacement Parts.
- See Dimensions.
- See Wiring Diagrams.
- See Application Data

Coil Table

60 Hz Voltage	Letter
110–120/220–240	A

For other voltages and frequencies, coil may be purchased separately.

*120V coil

3 Pole, 3 Phase

ServiceFirst Item #	Mfg. #	Max HP 200 Volts	Max HP 230 Volts	Max HP 460 Volts	Max HP 575 Volts	NEMA Size	Half Size	Cont Amp Rating
CTR01647	40BG32AA	1 1/2	1 1/2	2	2	0	—	9
CTR01648	40CP32AA	3	3	5	5	0	—	18
CTR01649	40DP32AA	7 1/2	7 1/2	10	10	1	—	27
CTR01655	40EP32AA	10	10	15	15	—	1 3/4	40
CTR01650	40FP32AA	10	15	25	25	2	—	45
CTR01656	40GP32AA	15	20	30	30	—	2 1/2	60
CTR01651	40HP32AA	20	30	50	50	3	—	90
CTR01657	40IP32AA	30	40	75	75	—	3 1/2	115
CTR01652	40JG32AA	40	50	100	100	4	—	135
CTR01653	40LG32A*	75	100	200	200	5	—	270
CTR01654	40MG32A*	150	200	400	400	6	—	540

Heavy-Duty Full Voltage Non-Reversing

Ordering Instructions

- See Field Modification Kits.
- For 380 Volt 50 Hertz information, see Application Data Section.
- See Replacement Parts.
- Other information see Application Data Section.
- See Dimensions.
- See Wiring Diagrams.
- See Application Data

Coil Table

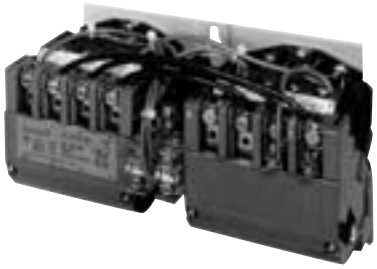
60 Hz Voltage	Letter
110–120/220–240	A

For other voltages and frequencies, coil may be purchased separately.

2 Pole, 1 Phase

ServiceFirst Item #	Mfg. #	Max. HP 200 Volts	Max. HP 230 Volts	NEMA Size	Half Size	Cont Amp Rating
CTR01658	40BG12AA	1/3	1	00	—	9
CTR01691	40CP12AA	1	2	0	—	18
CTR01660	40DP12AA	2	3	1	—	27
CTR01661	40EP12AA	3	5	1P	—	35
CTR01662	40FP12AA	3	7 1/2	2	—	45
CTR01667	40GP12AA	5	10	—	2 1/2	60
CTR01689	40HP12AA	7 1/3	15	3	—	90
CTR01668	40IP12AA	—	—	—	3 1/2	115
CTR01664	40JG12AA	—	—	4	—	135

Selection Procedure



Heavy-Duty Full Voltage Reversing

Ordering Instructions
- See Field Modification Kits.
- For 380 Volt 50 Hertz information, see Application Data Section.
- See Dimensions.
- See Wiring Diagrams.

Coil Table

60 Hz Voltage	Letter
110–120/220–240	A
120	F

For other voltages and frequencies, coil may be purchased separately.

ServiceFirst Item #	Mfg. #	Max. HP 200 Volts	Max. HP 230 Volts	Max. HP 460 Volts	Max. HP 575 Volts	NEMA Size	Half Size	Cont Amp Rating
CTR01669	43BG32AA	1 1/2	1 1/2	2	2	00	—	9
CTR01670	43CP32AA	3	3	5	5	0	—	18
CTR01671	43DP32AA	7 1/2	7 1/2	10	10	1	—	27
CTR01677	43EP32AA	10	10	15	15	—	1 3/4	40
CTR01672	43FP32AA	10	15	25	25	2	—	45
CTR01678	43GP32AA	15	20	30	30	—	2 1/2	60
CTR01673	43HP32AA	25	30	50	50	3	—	90
CTR01679	43IP32AA	30	40	75	75	—	3 1/2	115
CTR01674	43JG32AA	40	50	100	100	4	—	135
CTR01675	43LG32AF	75	100	200	200	5	—	270
CTR01676	43MG32AF	100	200	400	400	6	—	540

Heavy Duty Controls Modifications

Field Modification Kits

Auxiliary Contact Kits

ServiceFirst Item #	Mfg. #	Description			Class	Controller Size	Enclosure Type
CTR01626	49AB10	Auxiliary Contact	NEMA A600	NO		0–4	
CTR01627	49AB01		Front Mtg	NC	14,22		All
			SPST		40,43		
CTR01932	49AB11		1 NO, 1 NC				
CTR01933	49AB20		2 NO				
CTR01628	3TY7561-1K4		1-NO/1-NC Auxiliary Cont Block-Left		14,22	4 1/2, 5	—
CTR01629	3TY7561-1L4		1-NO/1-NC Auxiliary Cont Block-Right		40,43		

Heavy Duty Controls Modifications Non-Combination Enclosure Kits

Type 1

Non-Reversing Contactors

ServiceFirst Item #	Mfg. #	Size
KIT06558	49EC14EB110705R	00-1¾
KIT06559	49EC14GB140807R	2-2½
KIT06560	49EC14IB201208R	3-3½
KIT06561	49EC14JB251409R	4

Reversing Contactors

ServiceFirst Item #	Mfg. #	Size
KIT06560	49EC14IB201208R	00-2½
KIT06561	49EC14JB251409R	3-4

Pilot Devices

	ServiceFirst Item #	Mfg. #	Description	Class	Controller Size	Enclosure Type
Push Buttons	SWT02666	49SAPB5	Start, Stop	14, 40	00-3 1/2	1
	SWT02667	49SAP05		14, 40	4-8	1
Selector Switches	SWT02542	49SASB1	Hand-Off-Auto	14, 40	00-3 1/2	1
	SWT02668	49SAS01		14, 40	4-8	1

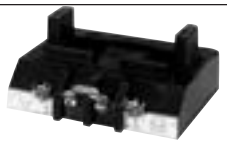
Selection Procedure

Contactors

Miscellaneous Kits

	ServiceFirst Item #	Mfg. #	Description		Class	Controller Size	Enclosure Type
	CTR01634 CTR01635 CTR01636 CTR01638	49CCF22H 49EEF22H 49GGF22H 49HHP22H	Mechanical Interlock	Includes wire		0–1 1 3/4 2, 2 1/2 3, 3 1/2	
		49JJG22H	Horizontal		14, 40	4	Open
	CTR01639	49D26344	Surge Suppressor	Surge Suppressor for 120V AC coil. Limits transient voltage produced by the coil to 220% maximum peak line volts.	14,22 40,43	0–31/2	All
	CTR01640 CTR01641	49SAF0 49SAFC	Auxiliary Power Pole	NO 36A at 600V AC Max NC 25A at 600V AC Max	14,22 40,43	0–13/4	All
	CTR01642	49SAE	Load Side Power Take Off Kit	Includes 3 power lugs for making extra connections to the load side of the contactor	14,22 40,43	0–1	All

AC COILS—For Class 14, 22, 40, 43

	ServiceFirst Item #	Mfg. #	Size	Model	Volts 60Hz	Volts 50Hz
	COI00954	75D73070J			24	24
	COI00955	75D73070A	00-2 1/2		110–120/220–240	110/190–220
	COI00956	75D73070D		F, P	208	—
	COI00957	75D73070C		R, S (ESP100)	220–240/440–480	190–220/380–440
	COI00958	75D73251J			24	24
	COI00959	75D73251A	3,3 1/2		110–120/220–240	110/190–220
	COI00960	75D73251D		F, P	208	—
	COI00961	75D73251C		R, S (ESP100)	220–240/440–480	190–220/380–440
	COI00962	75D70131J			24	24
	COI00963	75D70131A			120/220–240	110/190–220
	COI00964	75D70131D	4	G, P	208	—
	COI00965	75D70131C		R, T (ESP100)	220–240/440–480	190–220/380–440
	COL03611	D71628031			110–120/220–240	110/190–220
	COL04098	D71628048NB	4	B	208	—
	COL03612	D71628032NB			220–240/440–480	190–220/380–440
	COI00966	D72069031			110–120/220–240	110/190–220
	COI00967	D72069047	4 1/2,5	B, F	208	—
	COI00968	D72069032		R, S (ESP100)	220–240/440–480	190–220/380–440
		D72069045			440–480	380–440

Contact Kits—Single Pole Stationary and Movable Contacts, Contact Spring[1]

Description	ServiceFirst Item #	Mfg. #	Size	No of Poles in Kit	Model (4th position in part number)
	KIT06542	75AF14	Interlock		
		N/A (replace contactor)	0	1	G
	KIT06543	75BF14	0		F, P
	KIT06544	75CF14	0		F, P, S
	KIT06545	75DF14	1	1	F, P, S
	KIT06546	75EF14	1 3/4–1P		F, P, S
	KIT06547	75FF14	2	1	F
	KIT06548	75FP14			P, S
	KIT06549	75GF14	2 1/2	1	F
	KIT06550	75GP14			P, S
Class 14, 40, 43	KIT06551	75HF14	3		F, P, S
	KIT06552	75IF14	3 1/2	1	F, P, S
	KIT06553	75JG14	4	1	G, P, T
	KIT06554, KIT01237	75JB14	4		B
	KIT06555	75RB14	4 1/2	1	B, F, S
	KIT06556	75KB14	5	1	B, F, S
	KIT06557	75MB14	6	1	B, F, S

[1]On 3 phase controls, all 3 poles should be replaced— 3 kits required.

Full Voltage Open Type NEMA Contactor Size 00-6

Figure 1

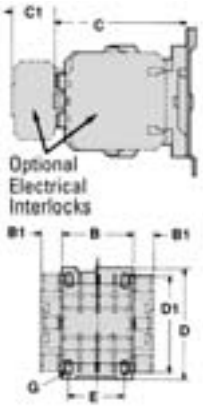


Figure 2

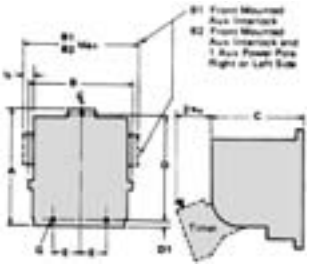
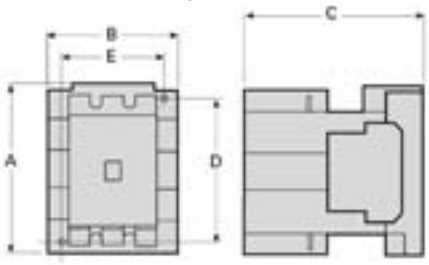


Figure 3



Open Type

Size	3rd Character of Catlog No	Outline Dimensions Fig	A	B	B1	B2	C	D	Mtg Dimensions D1	E	Mtg 1Screw G	Max Wire Size	Approx Ship Wt Lbs (Kg)	Ref Dwg
00	B	1	3.75 (95)	2.25 (57)	4.50 (114)	5.50 (140)	3.19 (81)	2.38 (60)	2.75 (70)	1.38 (35)	8 (203)	12	2 (1)	D29340
0–1	C, D	2	4.31 (110)	3.94 (100)	4.25 (108)	4.75 (121)	3.75 (70)	3.94 (100)	0.19 (5)	1.00 (25)	10 (254)	8	4 (2)	D56273
1 3/4	E	2	4.31 (110)	3.94 (100)	4.25 (108)	4.75 (121)	3.75 (70)	3.94 (100)	0.19 (5)	1.00 (25)	10 (254)	6	4 (2)	D56273
2	F	2	4.88 (124)	3.94 (100)	4.25 (108)	—	4.00 (102)	4.50 (114)	0.19 (5)	1.00 (25)	10 (254)	4	11 (5)	D56274
2 1/2	G	2	4.88 (124)	3.94 (100)	4.50 (114)	—	4.00 (102)	4.50 (114)	0.19 (5)	1.00 (25)	10 (254)	2	11 (5)	D56274
3	H	2	6.13 (156)	5.13 (130)	5.50 (140)	—	5.06 (129)	5.63 (143)	0.25 (6)	0.75 (19)	0.25 (6)	0	14 (6)	D56275
3 1/2	I	2	6.13 (156)	5.13 (130)	5.50 (140)	—	5.06 (129)	5.63 (143)	0.25 (6)	0.75 (19)	0.25 (6)	00	14 (6)	D56275
4	J	2	7.81 (198)	5.19 (132)	5.50 (140)	—	5.75 (146)	6.56 (167)	0.81 (21)	0.75 (19)	0.5 (13)	250 MCM	15 (7)	D70097
4, 5	K,L	3	7.89 (200)	6.30 (160)	—	—	8.74 (222)	7.09 (180)	—	5.12 (130)	—	1–500 MCM or 2–300 MCM	—	—
6	M	3	8.78 (223)	8.62 (219)	—	—	8.90 (226)	7.87 (200)	—	6.69 (170)	—	2–500 MCM	—	—

Magnetic Reversing Contactors - Class 43

Figure 1

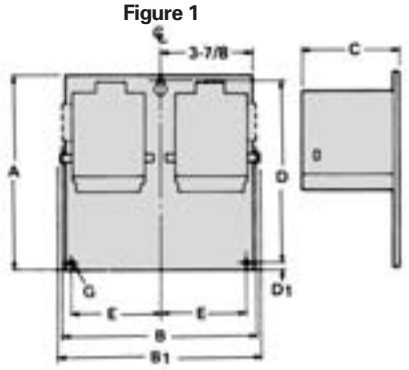


Figure 2

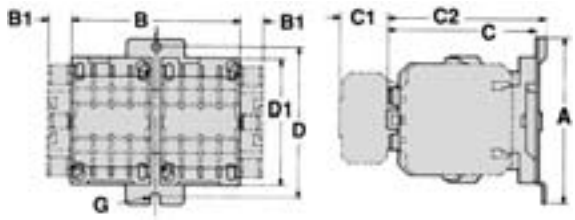
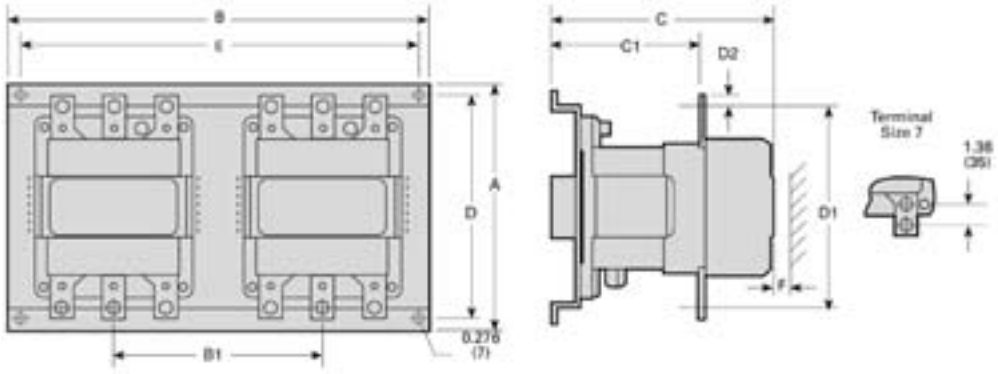


Figure 3



Open Type Horizontal Mounted

		Outline Dimensions					Mtg Dimensions				Mtg Screw	Approx Ship Wt	Max Wire	
Size	Fig	A	B	B1	C	C1	D	D1	E	F	G	Lbs (Kg)	Size	Ref Dwg
00	1	2.75 (70)	3.69 (94)	0.50 (13)	3.44 (87)	1.06 (27)	3.25 (83)	2.75 (70)	—	—	10	4 (2)	12	D29474
0–1	2	7.69 (195)	7.75 (197)	9.25 (235)	3.88 (98)	—	7.25 (184)	0.25 (6)	3.63 (92)	—	10	8 (4)	8	D73838
1 3/4	2	7.69 (195)	7.75 (197)	9.25 (235)	3.88 (98)	—	7.25 (184)	0.25 (6)	3.63 (92)	—	10	8 (4)	6	D73838
2, 2 1/2	2	8.94 (227)	7.75 (197)	9.25 (235)	4.56 (116)	—	8.5 (216)	0.25 (6)	3.63 (92)	—	10	13 (6)	2	D73839
3	2	11.44 (291)	10.94 (278)	11.50 (292)	5.19 (132)	—	10.75 (273)	0.38 (6)	5.13 (130)	—	0.25	33 (15)	0	D74585
3 1/2	2	11.44 (291)	10.94 (278)	11.50 (292)	5.56 (141)	—	10.75 (273)	0.38 (6)	5.13 (130)	—	0.25	33 (15)	00	D74585
4	2	8.50 (216)	10.94 (278)	11.50 (292)	6.25 (159)	—	7.81 (198)	0.38 (6)	5.13 (130)	—	0.25	35 (16)	250 MCM	D56955
4, 5	3	18.07 (459)	14.20 (361)	—	9.44 (240)	—	17.20 (437)	—	9.61 (244)		—	—	—	—
6	3	11.61 (295)	18.88 (480)	9.45 (240)	10.85 (276)	7.44 (189)	10.44 (265)	10.71 (272)	17.72 (450)	1.18 (30)	—	—	—	—

Heavy Duty Motor Starters and Contactors Dimensions/Enclosures Class 14, 22, 40, 43

Figure 1

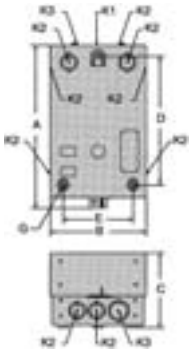


Figure 2

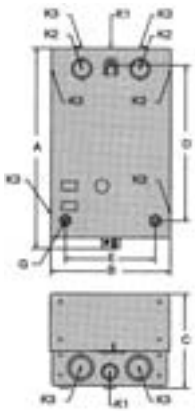


Figure 3

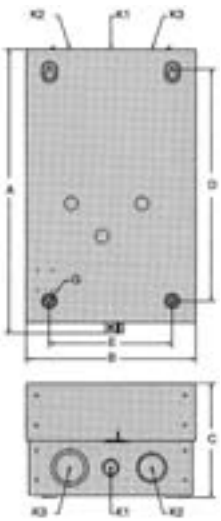
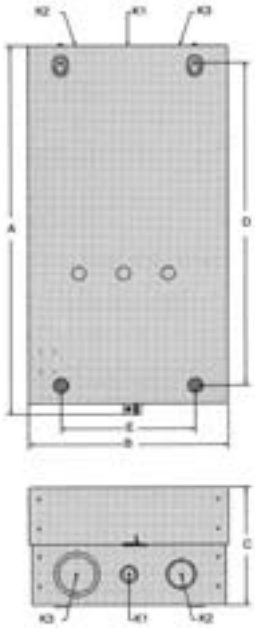


Figure 4



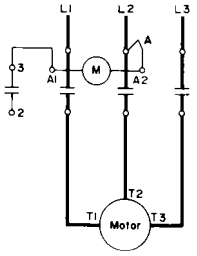
NEMA 1 General Purpose Enclosures

		Outline Dimensions			Mtg Dimensions		Mtg Screw	Conduit Size				Approx Ship Wt	
Size	Fig	A	B	C	D	E	G	K1	K2	K3	K4	K5	Lbs (Kg)	Ref Dwg
00-1¾	1	10 31/32 (279)	6 13/32 (163)	5 1/32 (128)	8 7/32 (209)	4 5/8 (117)	¼	½	½- ¾	¾-1	—	—	10 (5)	D68870
2-2½	2	13 17/32 (344)	7 31/32 (202)	6 3/8 (162)	10¼ (260)	6 (152)	¼	½-¾	¾–1	1-1¼	—	—	15 (7)	D68870
3-3½	3	19 1/8 (486)	11 3/8 (289)	7 11/16 (195)	15 5/8 (397)	8¼ (210)	¼	½-¾	1-1¼	1½- 2	—	—	26 (12)	D68870
4	4	24 7/8 (632)	13 3/8 (340)	8 1/8 (206)	21¾ (552)	9 (229)	¼	½-¾	1¼-1½	2-2½	—	—	37 (17)	D68870

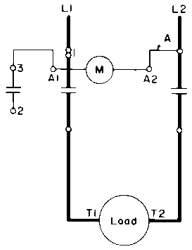
Magnetic Contactors and Reversing Contactors - Class 40, 43

3 Pole 3 Phase Magnetic Contactors

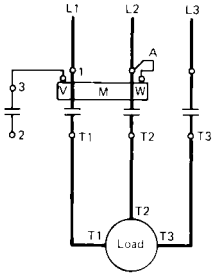
Size 00



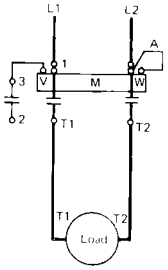
Size 00



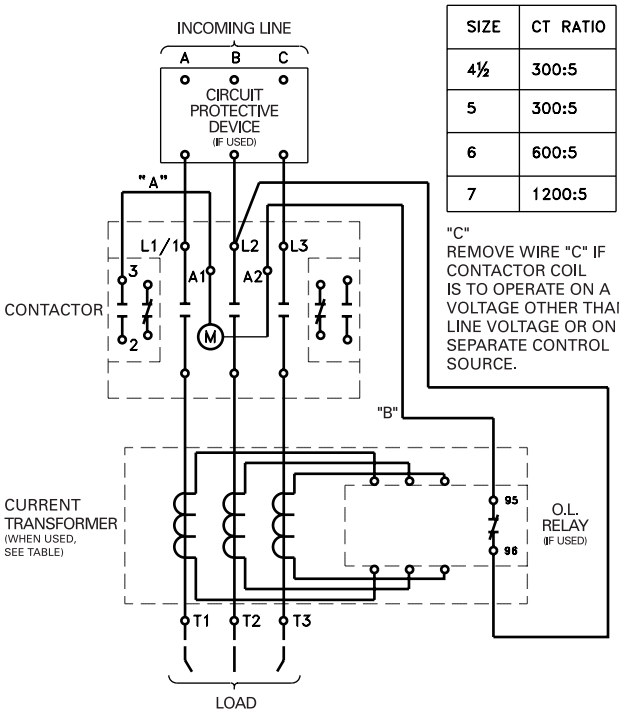
Size 0-4



Size 0-3 1/2

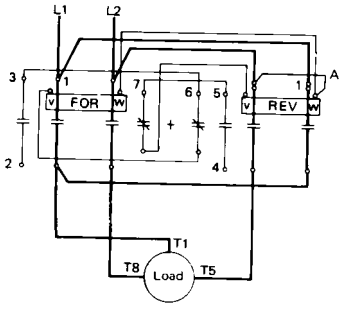


Size 4-5

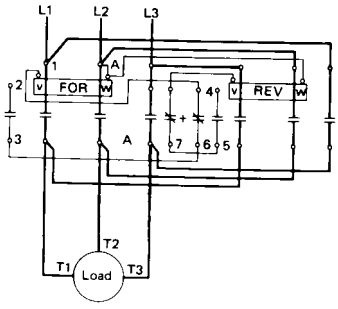


SIZE	CT RATIO
4½	300:5
5	300:5
6	600:5
7	1200:5

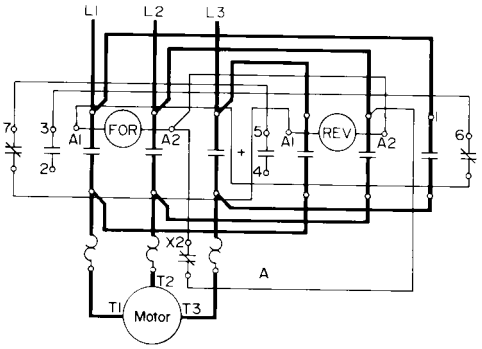
Single Phase Reversing Contactors - Size 0- 1¾



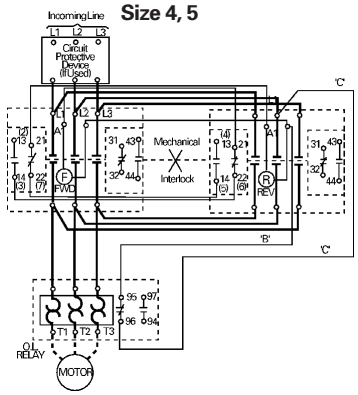
3 Phase Reversing Contactors - Size 0-4



3 Phase Reversing Contactors - Size 00



Size 4, 5



ESP100 Solid State Overload

Panel Mounted Class 48

Features

- Broadest Line in the Industry
- NEMA Class 10, 20 and 30 Trip Curves
- Trip Free Design
- Solid State Overload
  - — Phase Loss Protection
  - — w2% Repeat Trip Accuracy
  - — Manual Reset
  - — FLA Adjustment Dial with Wide Adjustment Range
  - — Heaterless Design
- UL Listed File #E22655 or Component Recognized
- CSA Certified File #LR6535

Application

Furnas ESP100 solid state overload relays are self powered, requiring no separate 120V source to power the circuit board. They provide phase loss protection, fewer connection points and high repeat trip accuracy which results in longer motor life and cost savings. NEMA Class 10, 20 and 30 trip curves are available for a variety of applications.

The heaterless construction of these overloads minimizes energy costs and the costs of cabinet ventilation or cooling. Solid state overloads can be used at temperatures from –30°C to 70°C and are rated for 50Hz and 60Hz applications.

ESP100 panel mounted overloads can be used to upgrade existing starter applications where panel mounted thermal overloads are used. In addition, ESP100 overloads can be panel mounted when used with other types of controllers, such as DP, IEC contactors, and soft starts.

ESP100 overloads can be used on high voltage applications, making them ideal for use with vacuum contactors and other high voltage control.

ESP100 overloads can be retrofitted on existing Furnas contactors using the retrofit plate suffixes or on other brands using the plates listed in the competitive retrofit plates table.

Thermal overload relays are used to protect motors from excessive heat resulting from sustained motor overload, too rapid cycling and stalled rotor. The percentage of overload determines the length of time required to open the circuit.

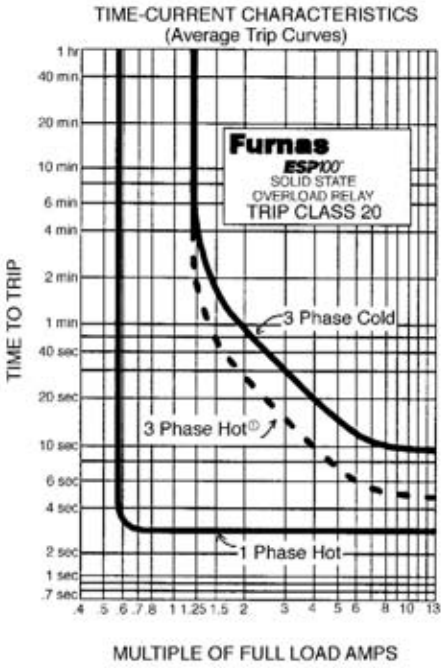
Features

The ESP100 solid state overload provides phase loss protection for the motor by tripping within three seconds upon complete loss of one phase of a three phase motor branch circuit.

Each overload has at least a 2:1 current adjustment range with the adjustment dial reading out in full load amps. In addition to the markings on the dial there are audible clicks which allow for extremely fine tuning.

1. NEMA Class 10 for protecting submersible pump motors, hermetically sealed refrigeration motors, etc., trips in less than 10 seconds at 6 times trip current.
2. NEMA Class 20 for protecting standard motors trips in less than 20 seconds at 6 times trip current.
3. NEMA Class 30 trips in less than 30 seconds at 6 times trip current.

Note: The trip current in a 40°C ambient temperature is 125% of the minimum full load current listed in the heater tables, unless otherwise shown.



Solid State Overloads and Field Modification Kits, Class 48

Ordering Instructions

- Determine overload range for specific voltage and Hp rating.
- To retrofit existing Thermal Innova Starters with the ESP100 Solid State Overload Relay add the appropriate suffix to the end of the catalog number from the Retrofit Plates table shown below. Example: 48ASE3M201P.

Additional References

- Trip Curves.
- Dimensions .
- Wiring Diagrams.

Solid State, 3 Phase

ServiceFirst Item #	Manual Reset Class 20 Mfg. #	Full Load Amp Current Range	Phase	Frame[1] Size
RLY02304	48ASA3M20	0.25–1	3	A
RLY02305	48ASB3M20	0.75–3	3	A
RLY02306	48ASD3M20	2.5–10	3	A
RLY02307	48ASE3M20	9–18	3	A1
RLY02308	48ASF3M20	13–27	3	A1
RLY02309	48ASG3M20	20–40	3	A1
RLY02310	48BSF3M20	13–27	3	B
RLY02311	48BSH3M20	22–45	3	B
RLY02312	48BSJ3M20	30–60	3	B
RLY02313	48BSK3M20	45–90	3	B
RLY02314	48BSL3M20	57–115	3	B
RLY02315	48BSM3M20	67–135	3	B
RLY02316	48BSN3M20	81–162[2]	3	B
RLY02317	48ASS3M20	100–210[3]	3	A
RLY02318	48ASU3M20	100–270[3]	3	A
RLY02319	48ASX3M20	200–540[4]	3	A
		420–1220[5]	3	A

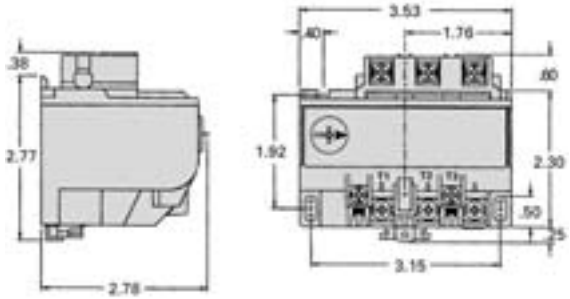
Field Modification Kits

ServiceFirst Item #	Mfg. #	Description		Frame Size
KIT06529	49ASNO	Auxiliary Contact Kit[6]	NO Contact	All
KIT06530	49ASNC		NC Contact	All

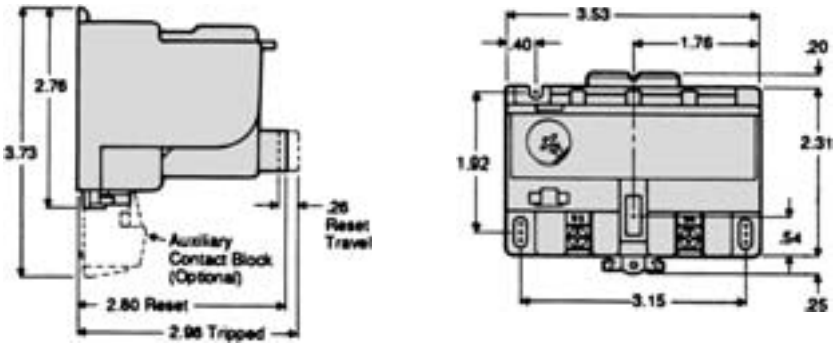
[2]Temperature rating - 20° to 60°C.
[3]Requires use of 300:5 Current Transformers–3 of 97CT005.
[4]Requires use of 600:5 Current Transformers–3 of 97CT008.
[5]Requires use of 1200:5 Current Transformers–3 of 97CT012.
[6]Not available on self-reset versions.

Solid State Overload Manual Reset Version

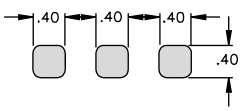
Dimensions "A" Frame—ESP100 Solid State Overload (0.25–10 Amps & 100–1000 Amps 3 Phase, 0.25–16 Amps Single Phase)



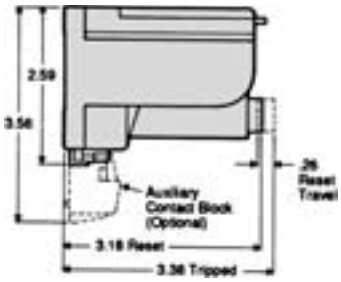
Dimensions "A1" Frame—ESP100 Solid State Overload (9–40 Amps), 958 (15–44 Amps), 958L (5.6–40 Amps, 84–528 Amps)

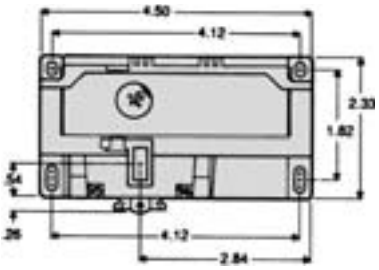


ESP100 Overload
Motor lead Windows



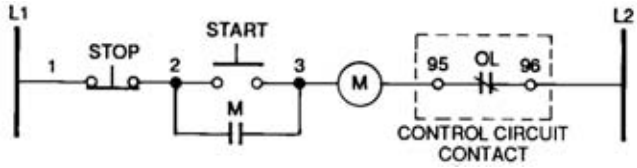
Dimensions "B" Frame—ESP100 Solid State Overload (13–162 Amps), 958 (33–180 Amps), 958L (18–150 Amps)





ESP100 Overload
Motor lead Windows

Manual Reset Wiring Diagram



Special Use Solid State Overloads, Class 958

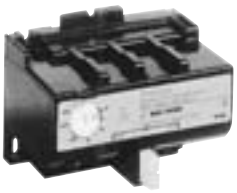
Features
- Hermetically Sealed Compressor Motor Applications
- Phase Loss Protection—Trips Within 3 Seconds
- w/2% Repeat Trip Accuracy
- Manual Reset
- "Must Hold Amps" Adjustment Dial
- Wide Adjustment Range
- Self Powered Overload
- Heaterless Design
- Rated 50/60Hz
- –22°F to 159°F (-30°C to 70°C)
- Output Contact Rated NEMA A600, P600 (10 Amps 600VAC Max, 5 Amps 600VDC Max)
- Self-Reset Output Contact Rated NEMA B300, P150 (5 Amps, 300VAC Max, 5 Amps, 150VDC Max)
- UL Listed File #E22655
- CSA Certified File #LR6535

Application
Furnas special use solid state overload relays are self powered requiring no separate source to power the circuit board. They provide excellent protection of hermetically sealed compressors and artificially cooled motors which require ambient insensitivity and quick trip response times. Combined with a series lockout relay, they can provide unsurpassed protection for hermetically sealed compressor motors in air conditioning applications. The combination of high trip speed, current adjustment, and ease of installation makes it suitable for these applications. The trip curves have been custom tailored to provide proper overload protection on such loads without nuisance tripping.

Features
The overload provides phase loss protection for the motor by tripping in three seconds upon complete loss of one phase of a three phase motor branch circuit.

The heaterless construction of these overloads minimizes energy costs and the costs of cabinet ventilation or cooling. While thermal overloads require a heater selection based on a relatively wide range, these overloads have many clicks covering the same ampere range (see Figure 1 below).

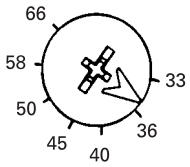
Each overload has a 4:1 or 2:1 current adjustment range with the adjustment dial reading out must hold amps. Must trip amps are 112% of the must hold setting. In addition to the markings on the dial there are audible clicks which allow for extremely fine tuning.



A1 Frame 958 Series

B Frame 958 Series

Figure 1



TYPICAL SOLID-STATE OVERLOAD ADJUSTMENT DIAL MARKINGS

Special Use, Class 948

Reference Literature

- Class 958 Solid State Overload Relays are functional replacements to Class 948 Electronic Overload Relays. A cross reference is listed below. See information on 958 overloads.

948 to 958 Cross Reference

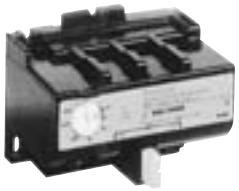
948 Manual-Reset Overloads				958 Manual-Reset Overloads			
ServiceFirst Item #	Mfg. #	Frame Size	Amp Range	ServiceFirst Item #	Mfg. #	Frame Size	Amp Range
RLY01636	948AA32A	"A" Trip 60Hz	16–24	RLY02354	958AA32A	A1	15–30
			24–36	RLY02355	958BA32A	A1	22–44
RLY01638	948CA32A		36–54	RLY02356	958CA32A	B	33–66
			52–78	RLY02357	958DA32A	B	50–100
			76–114	RLY02358	958EA32A	B	75–150
RLY02261	948FA32A		112–168	RLY02359	958FA32A	B	90–180
RLY02360	948AA32B	"B" Trip 60Hz	16–24	RLY02354	958AA32A	A1	15–30
			24–36	RLY02355	958BA32A	A1	22–44
RLY00863	948CA32B		36–54	RLY02356	958CA32A	B	33–66
RLY01957	948DA32B		52–78	RLY02357	958DA32A	B	50–100
OLD00302	948EA32B		76–114	RLY02358	958EA32A	B	75–150
RLY02260	948FA32B		112–168	RLY02359	958FA32A	B	90–180
RLY01636	948AA32E	"E" Trip 60Hz	16–24	Use Class 48 ESP100® Overloads (Class 10)			
RLY01637	948BA32E		24–36				
RLY01638	948CA32E		36–54				
RLY01639	948DA32E		52–78				
RLY01640	948EA32E		76–114				
	948FA32E		112–168				
	948AB32A	"A" Trip 50Hz	16–24	RLY02354	958AA32A	A1	15–30
	948BB32A		24–36	RLY02355	958BA32A	A1	22–44
	948CB32A		36–54	RLY02356	958CA32A	B	33–66
	948DB32A		52–78	RLY02357	958DA32A	B	50–100
	948EB32A		76–114	RLY02358	958EA32A	B	75–150
	948FB32A		112–168	RLY02359	958FA32A	B	90–180
RLY01353	948AB32B	"B" Trip 50Hz	16–24	RLY02354	958AA32A	A1	15–30
	948BB32B		24–36	RLY02355	958BA32A	A1	22–44
	948CB32B		36–54	RLY02356	958CA32A	B	33–66
	948DB32B		52–78	RLY02357	958DA32A	B	50–100
	948EB32B		76–114	RLY02358	958EA32A	B	75–150
	948FB32B		112–168	RLY02359	958FA32A	B	90–180
	948AB32E	"E" Trip 50Hz	16–24	Use Class 48 ESP100® Overloads (Class 10)			
	948BB32E		24–36				
	948CB32E		36–54				
	948DB32E		52–78				
	948EB32E		76–114				
	948FB32E		112–168				

Special Use, Class 948 (Continued)

948 to 958 Cross Reference

948 Manual-Reset Overloads				958 Manual-Reset Overloads			
ServiceFirst Item #	Mfg. #	Size	Range	ServiceFirst Item #	Mfg. #	Size	Range
RLY01136	948AA31A	"A" Trip 60Hz	16–24	RLY02379	958AA31A	15–30	A1
RLY01303	948BA31A		24–36	RLY02380	958BA31A	22–44	A1
RLY01140	948CA31A		36–54	RLY02381	958CA31A	33–66	B
RLY01135	948DA31A		52–78	RLY02382	958DA31A	50–100	B
RLY01138	948EA31A		76–114	RLY02383	958EA31A	75–150	B
RLY01137	948FA31A		112–168	RLY02384	958FA31A	90–180	B
	948AA31B	"B" Trip 60Hz		RLY02379	958AA31A	15–30	A1
RLY00531	948BA31B		24–36	RLY02380	958BA31A	22–44	A1
RLY00450	948CA31B		36–54	RLY02381	958CA31A	33–66	B
RLY00453	948DA31B		52–78	RLY02382	958DA31A	50–100	B
RLY00467	948EA31B		76–114	RLY02383	958EA31A	75–150	B
RLY00526	948FA31B		112–168	RLY02384	958FA31A	90–180	B
	948AA31E	"E" Trip 60Hz	16–24	Use Class 48 ESP100® Overloads (Class 10)			
	948BA31E		24–36				
	948CA31E		36–54				
	948DA31E		52–78				
	948EA31E		76–114				
	948FA31E		112–168				
RLY00552	948AB31A	"A" Trip 50Hz	16–24	RLY02379	958AA31A	15–30	A1
RLY00551	948BB31A		24–36	RLY02380	958BA31A	22–44	A1
RLY00553	948CB31A		36–54	RLY02381	958CA31A	33–66	B
RLY00554	948DB31A		52–78	RLY02382	958DA31A	50–100	B
RLY00604	948EB31A		76–114	RLY02383	958EA31A	75–150	B
RLY00606	948FB31A		112–168	RLY02384	958FA31A	90–180	B
	948AB31B	"B" Trip 50Hz	16–24	RLY02379	958AA31A	15–30	A1
	948BB31B		24–36	RLY02380	958BA31A	22–44	A1
	948CB31B		36–54	RLY02381	958CA31A	33–66	B
	948DB31B		52–78	RLY02382	958DA31A	50–100	B
	948EB31B		76–114	RLY02383	958EA31A	75–150	B
	948FB31B		112–168	RLY02384	958FA31A	90–180	B
	948AB31E	"E" Trip 50Hz	16–24	Use Class 48 ESP100® Overloads (Class 10)			
	948BB31E		24–36				
	948CB31E		36–54				
	948DB31E		52–78				
	948EB31E		76–114				
	948FB31E		112–168				

Special Use Solid State Overloads, Class 958



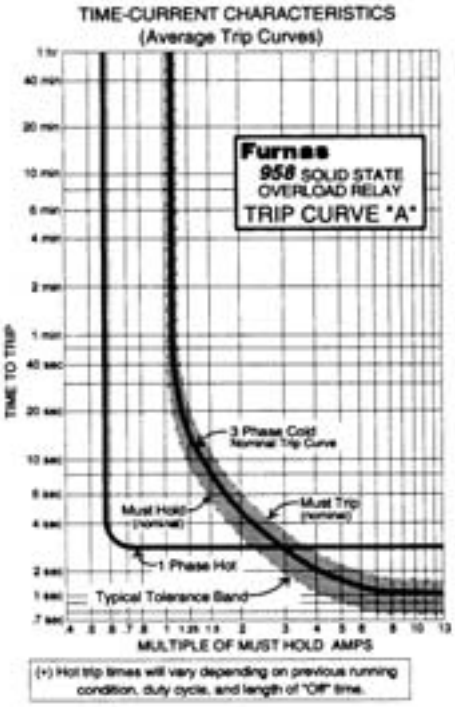
Ordering Instructions
- See specific Hp rating to determine overload range.

Additional References
- See Dimensions.
- See Wiring Diagrams.
- See 948 to 958 cross references.

Trip Curve A

Manual Reset ServiceFirst Item #	Mfg. #	Amp Range	Frame Size
RLY02354	958AA32AX625	15–30	A1
RLY02355	958BA32AX625	22–44	A1
RLY02356	958CA32AX625	33–66	B
RLY02357	958DA32AX625	50–100	B
RLY02358	958EA32AX625	75–150	B
RLY02359	958FA32AX625	90–180	B

Trip Curve A



Adapter plate for replacing 948C through F styles with 958C through F styles – 49D57124
[1]Temperature rating S20° to R60°C.

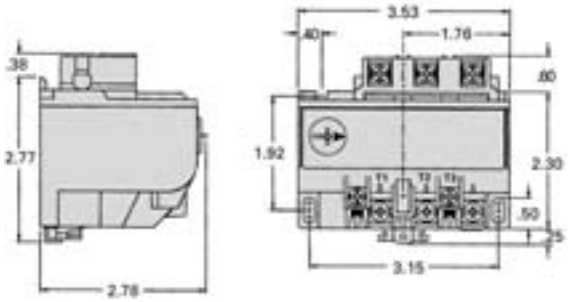
Field Modification Kits, Class 958

Field Modification Kits

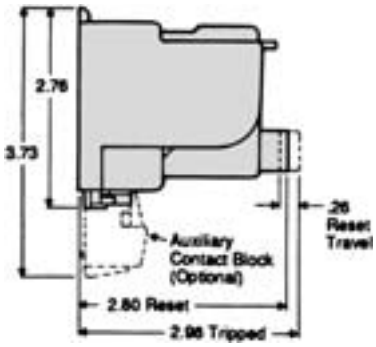
ServiceFirst Item #	Mfg. #	Description		Frame Size
KIT06529	49ASNO	Auxiliary Contact Kit[6]	NO Contact	All
KIT06530	49ASNC		NC Contact	All

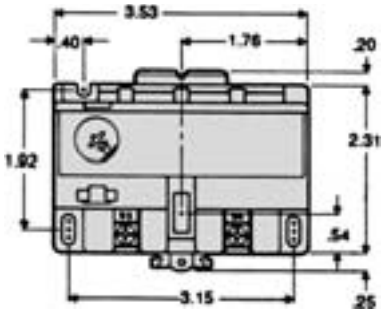
Solid State Overload Manual Reset Version

Dimensions "A" Frame—ESP100 Solid State Overload (0.25–10 Amps & 100–1000 Amps 3 Phase, 0.25–16 Amps Single Phase)

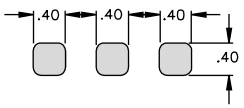


Dimensions "A1" Frame—ESP100 Solid State Overload (9–40 Amps), 958 (15–44 Amps), 958L (5.6–40 Amps, 84–528 Amps)

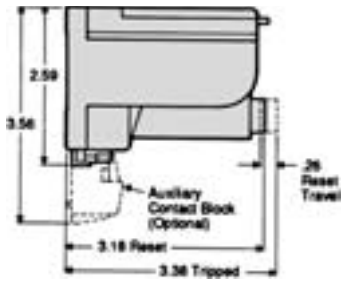


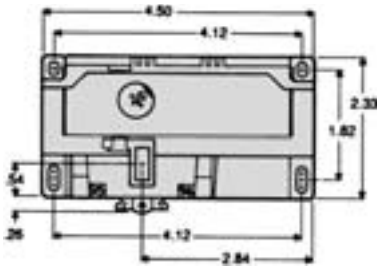


ESP100 Overload
Motor Lead Windows



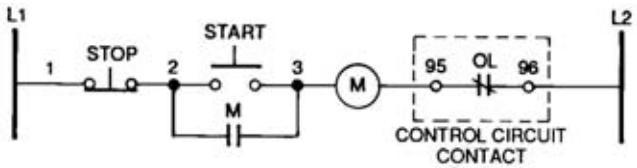
Dimensions "B" Frame—ESP100 Solid State Overload (13–162 Amps), 958 (33–180 Amps), 958L (18–150 Amps)





ESP100 Overload
Motor Lead Windows

Manual Reset Wiring Diagram



Features and Applications

Heavy Duty Starters

Size 0–4 Starter Features, Application

Standard Features
Size 0–4 magnetic starters include the following standard features:
- Rugged Industrial Design
- Dual Voltage, Dual Frequency Coils
- Overload Test Feature
- Front Removable Auxiliary Contacts
- Wide Range of Accessories
- Easy Coil Access
- Solid State or Bimetal Ambient Compensated Overload Protection
- Half Sizes for Costs and Space Savings
- Straight Thru Wiring
- Gravity Dropout
- Large Silver Cadmium Contacts

Application

These controls are available in NEMA Sizes 00 through 8. In addition to the usual NEMA Starter Sizes, Siemens-Furnas offers four exclusive Half Sizes; 1¾, 2½, 3½ and 4½. These integral sizes offer the same rugged, industrial construction as our NEMA Sizes and ensure efficient operating performance. Half Sizes provide a real cost savings by cutting down on over capacity when NEMA Sizes exceed the motor ratings. All Innova controls, including our popular Half Sizes comply with applicable NEMA and UL tests.

Furnas magnetic starters are ideal for applications requiring dependability and durability. Typical applications include use with machine tools, air conditioning equipment, material handling equipment, compressors, hoists and various production and industrial equipment as well as in demanding automotive applications.

Starters are available as an open type or in NEMA 1, 3, 4, 4X, 7 & 9, and 12 enclosures.

Size 00 starters are intended for motors rated at 2 Hp or less. These controls offer the same rugged, dependable quality as 0–8, in a compact panel saving design.

Gravity Dropout
For added reliability, the gravity dropout of the armature and contacts is assisted by stainless steel springs which help provide quick, precise opening of the contacts. Also provides straight through wiring.

45 Degree, Wedge Action Contacts
The 45 degree, wedge action contacts reduce tracking and provide faster arc quenching. The resulting self-cleaning and reduced contact bounce mean cooler operation and longer life for the large silver cadmium oxide contacts.

Terminal Design
Control terminals are self rising pressure type.

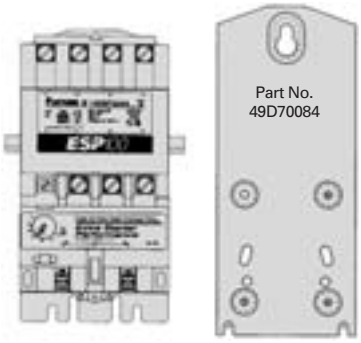
Molded Coil
Magnetic coils are carefully wound and then sealed in epoxy. Encapsulation helps seal out moisture, promotes heat transfer and resists electrical, mechanical and thermal stresses.

Dual Voltage/Frequency Coil
Starters are available with dual voltage, dual frequency coils. They are designed to operate on either 50 or 60 Hertz.

Molded Stationary Contact Block
Thermoset materials resist arc tracking and the stresses of heat and severe impact.

Field Modification Kits
All starters can be modified in the field with a complete range of accessories. These include pushbuttons, selector switches, pilot lights, auxiliary contacts and surge suppressors.

Auxiliary Equipment
- Furnas starters are available with built-in START-STOP push buttons for 3 wire control or a HAND-OFF-AUTO selector switch for 2 wire control.
- Field modifications such as auxiliary contacts, pilot lights, push buttons, selector switches, and fuse blocks are available to meet particular application requirements.
- Normally open or normally closed auxiliary power pole kits are available for Sizes 0 through 1¾.
- Transformers and pneumatic timers can be ordered as either factory or field modifications. In some cases these may require a larger enclosure.
- A full line of replacement parts are available including contact kits, coils, and overload relays.



The Furnas FVNR Sizes 0–1¾ have as standard, universal mounting which fits the following:

Cutler Hammer	— Citation Series — Freedom Series
GE	— 300 Line
Square D	— Type S

The Starter with its existing backplate mounts onto the piggyback mounting plate and is secured in place with three mounting screws. The piggyback mounting plate fits the following:

Allen-Bradley	— Bulletin 509 — Bulletin 709
Westinghouse	— Series A200

Heavy Duty Starters

Size 0–4 Starter Features, Application

Size 0–1¾
ESP100 Solid State Starter

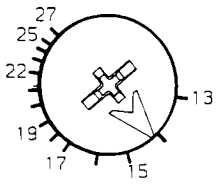
ESP100 Solid State Overload Relays
These standard features of the ESP100 provide Extra Starter Performance.

- True phase loss protection; trips within 3 seconds.
- High accuracy trip curves; ± 2% repeat trip accuracy.
- Ease of use. Mount, wire, and set FLA.
- Overload is self protected against short circuits.
- Overload is self powered and requires no hard wiring or separate power source.
- Simple, versatile adjustment; minimum of 2:1 FLA adjustment range. (4:1 in lower FLA ranges.)
- Heaterless construction minimizes energy costs and the costs of cabinet ventilation or cooling.
- Class 20 protection is standard. Class 10 and 30 protection are available.
- Provides motor protection for 50/60 Hertz.

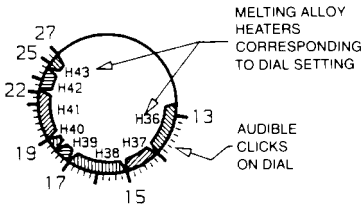
ESP100 starters combine the rugged characteristics of a NEMA rated contactor with a solid state overload which provides phase loss protection. It offers the industrial user greater protection and added life for motors in heavy duty applications. The inherent benefits of the ESP100 result in cost savings as well.

ESP100 FLA Adjustment Dial—Set the adjustment dial on the overload to the FLA of the motor.

Figure 1



Typical Solid-State Overload Adjustment Dial Markings

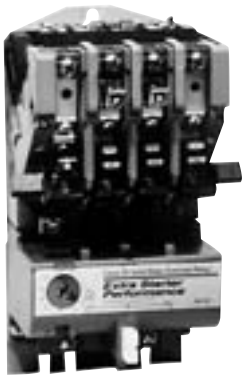


Typical Number of Heater Elements Needed for Alloy Overloads

Each overload is precisely calibrated and labels are individually laser printed and then custom applied for each particular calibration.

- No need for heater coil selection or installation.
- No heater elements to stock.
- More precision.

Heavy Duty Starters
Half-Size Heavy Duty Starters



Furnas Half-Size starters feature all the rugged performance characteristics of our NEMA rated starter sizes, but are fractionally sized to more closely match your exact motor rating. As a result, significant economic savings are made possible, without sacrificing the reliability you expect from a heavy duty starter.

These additional starter sizes have the reserve capacity to handle occasional plugging and jogging applications without derating. Superior operating performance in heavy duty applications is assured by the large current carrying parts, not by derating the device.

Exclusive "half-sizes" save potentially hundreds, even thousands of dollars per project.

Simply match the specific size starter to the horsepower rating of your motor. Every half-size starter saves you money—up to 31%.

Innova starters, including our exclusive "half-sizes," comply to applicable NEMA and UL standards.

Savings for Innova "Half-Size" Starters in NEMA 1 Enclosures, FVNR

Motor Size		Starter	Half	"Half-Size" Savings Over
230V	460V	Size	Size	Next Full Size
7½	10	1	—	—
10	15	—	1¾	31%
15	25	2	—	—
20	30	—	2½	20%
30	50	3	—	—
40	75	—	3½	13%
50	100	4	—	—
100	200	5	—	—

Magnetic Motor Controls
NEMA Catalog Numbering System

14	F	S	F	3	2	A	F
1,2	3	4	5	6	7	8	9

Digits 1,2 – Class
14 – Across the Line NEMA Motor Starter
22 – Reversing NEMA Motor Starter
40 – Across the Line NEMA Magnetic Contactor
43 – Reversing NEMA Magnetic Contactor

Digit 3 – Size
B – 00
C – 0
D – 1
E – 1¾ & 1P
F – 2
G – 2½
H – 3
I – 3½
J – 4
K – 4½
L – 5
M – 6
N – 7
P – 8

Digit 4 – Model
P – Innova Plus size 0–3½
G – Compact size 00 Innova Plus size 4
S – ESP100 size 0–3½
T – ESP100 size 4–8
R – ESP100 Self-Reset size 0–5

Digit 5 – ESP 100 Current Range[5]
Three Phase
A – ¼–1
B – ¾–3
C – 3–6
D – 2½–10
E – 9–18
F – 13–27
G – 20–40
H – 22–45
J – 30–60
K – 45–90
L – 57–115
M – 67–135
S – 100–210
U – 100–270
X – 200–540
Y – 420–820
Z – 420–1220
Single Phasea
A – ¼-1
B – ¾–3
D – 2½-10
E – 5-16

Digit 6 – Power Poles
1 – 2 power poles,1 phase
3 – 3 power poles, 3 phase

Additional Options
1 Phase Reversing
(Class 22 & 43 only)
5 – 4 power poles 4 wire split phase all leads broken
8 – 3 power poles 4 wire split repulsion induction
9 – 3 power poles 4 wire split phase one line direct

Digit 7 – Pilot Control Circuit
2 – Suitable for 3 wire control (NO aux. contact incl.)
5 – 2 wire control (NO aux. contact not Incl.)

Digit 8 – Enclosure Type
A – Open
B – NEMA 1
D – NEMA 3 (sizes 0–1¾)
F – NEMA 4X
H – NEMA 7 & 9, bolted
O – NEMA 12 Convertible to 3/3R
W – NEMA 4/4X Stainless Steel Coil

Digit 9 – Coil
A[3]– 110–120V/220–240V@60Hz
110V/190–220V@50Hz
C[3]– 220–240V/440–480V@60Hz
190–220V/380–440V@50Hz
D – 200–208V@60Hz
E – 550–600V@60Hz
550V@50Hz
F – 120V@60Hz
110V@50Hz
G – 220–240V@60Hz
190–220V@50Hz
H – 440–480V@60Hz
380–440V@50Hz
J[3] – 24V@60Hz
24V@50Hz
L – 277V@60Hz
240V@50Hz

Class
36 – Non Combo Reduced Voltage Starter
37 – Combo Reduced Voltage Starter

Size
C – 0
D – 1
E – 1¾
F – 2
G – 2½
H – 3
I – 3½
J – 4
K – 4¼
L – 5
M – 6
N – 7
P – 8

Model
ESP 100 Current Range[5]
S – ESP100 size 0–4
T – ESP100 size 4½–8

Type
T – Auto XFMR
P – Part Wind.
O – Wye Delta Open Trans.
C – Wye Delta Closed Trans.

Line Volts
2 – 230
3 – 380
4 – 460
5 – 575
6 – 200/208

Enclosure Type
A – Open
B – NEMA 1
W – NEMA 4/4X Stainless Steel
O – NEMA 12

Coil

Disconnect Type[4]
D – Non Fused Disc.
F – Fusible Disc.
P – MCP
T – Thermal Magnetic

[1]Single phase ESP100 available on Class 14 Starters only.
[2]Not used on Class 17, 25 or with ESP100 versions.
[3]Not available on sizes 4½-8.
[4]For Class 37 only.
[5]Position used for ESP100 only.

Heavy Duty Motor Starters
Solid State Overload, Manual Reset Class 14

Ordering Instructions
- See Field Modification Kits
- See 380V, 50 HZ information
- See Dimensions
- See Wiring Diagrams

Coil Table

60 HZ Voltage	Letter
110-120/220-240[1]	A
120	F

For other voltages and frequencies, coil may be purchased separately.

3 Phase, 3 Pole

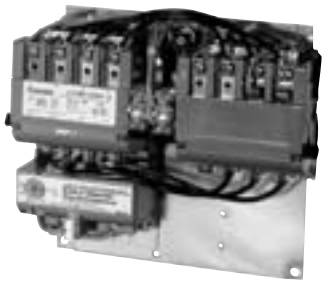
ServiceFirst Item #	Mfg. #	Max Hp 200 Volts	Max Hp 230 Volts	Max Hp 460 Volts	Max Hp 575 Volts	NEMA Size	Half Size	Overload Amp Range
OLD00343	14CSA32AA	1/6	1/6	1/3	1/2	0	—	0.25–1
OLD00344	14CSB32AA	1/2	3/4	1 1/2	2	0	—	0.75–3
OLD00345	14CSD32AA	2	2	5	5	0	—	2.5–10
OLD00346	14CSE32AA	3	3	—	—	0	—	9–18
OLD00347	14DSA32AA	1/6	1/6	1/3	1/2	1	—	0.25–1
OLD00348	14DSB32AA	1/2	3/4	1 1/2	2	1	—	0.75–3
OLD00349	14DSD32AA	2	2	5	5	1	—	2.5–10
OLD00350	14DSE32AA	3	3	10	10	1	—	9–18
OLD00351	14DSF32AA	7 1/2	7 1/2	—	—	1	—	13–27
OLD00359	14ESF32AA	—	—	15	15	—	1 3/4	13–27
OLD00360	14ESG32AA	10	10	—	—	—	1 3/4	20–40
OLD00352	14FSF32AA	—	—	15	20	2	—	13–27
OLD00353	14FSH32AA	10	15	25	25	2	—	22–45
OLD00361	14GSH32AA	—	—	30	30	—	2 1/2	22–45
OLD00362	14GSJ32A*	15	20	—	—	—	2 1/2	30–60
OLD00354	14HSJ32AA	—	—	30	40	3	—	30–60
OLD00355	14HSK32AA	25	30	50	50	3	—	45–90
OLD00363	14ISL32AA	30	40	75	75	—	3 1/2	57–115
OLD00356	14JTM32AA	40	50	100	100	4	—	67–135
OLD00357	14LTU32AF	75	100	200	200	5	—	100–270
OLD00358	14MTX32AF	150	200	400	400	6	—	200–540

Single Phase, 2 Pole

ServiceFirst Item #	Mfg. #	Max Hp 115 Volts	Max Hp 230 Volts	NEMA Size	Overload Amp Range
OLD00365	14CSB12AA	1/8	1/4	0	0.75–3
OLD00366	14CSD12AA	1/4	1/2	0	2.5–10
OLD00367	14CSE12AA	1	2	0	5.0–16
OLD00368	14DSB12AA	1/8	1/4	1	0.75–3
OLD00369	14DSD12AA	1/4	1/2	1	2.5–10
OLD00370	14DSE12AA	1	2	1	5.0–16

Note:
Hp's shown above are based on the overload amp range for the FLA's (per the National Electric Code) of typical industrial motors. All Starter Sizes carry one maximum Hp rating. For higher Hp single phase motors, use 3 phase starters, wire and set per diagram.
[1]24V and dual voltage coils not available on size 4 1/2–5 Starters.

Reversing Heavy Duty Motor Starters
Solid State Overload, Manual Reset Class 22



Ordering Instructions
- See Field Modification Kits.
- See Factory Modifications .
- See Dimensions.
- See Wiring Diagrams.

Coil Table

60 HZ Voltage	Letter
110-120/220-240	A
120	F

For other voltages and frequencies, coil may be purchased separately.

3 Phase, 3 Pole

ServiceFirst Item #	Mfg. #	Max Hp 200 Volts	230 Volts	460 Volts	575 Volts	NEMA Size	Half Size	Overload Amp Range
OLD00371	22CSA32AA	1/6	1/6	1/3	1/2	0	—	0.25–1
OLD00372	22CSB32AA	1/2	3/4	1 1/2	2	0	—	0.75–3
OLD00373	22CSD32AA	2	2	5	5	0	—	2.5–10
OLD00374	22CSE32AA	3	3	—	—	0	—	9–18
OLD00375	22DSA32AA	1/6	1/6	1/3	1/2	1	—	0.25–1
OLD00376	22DSB32AA	1/2	3/4	1 1/2	2	1	—	0.75–3
OLD00377	22DSD32AA	2	2	5	5	1	—	2.5–10
OLD00378	22DSE32AA	3	3	10	10	1	—	9–18
OLD00379	22DSF32AA	7 1/2	7 1/2	—	—	1	—	13–27
OLD00387	22ESF32AA	—	—	15	15	—	1 3/4	13–27
OLD00388	22ESG32AA	10	10	—	—	—	1 3/4	20–40
OLD00380	22FSF32AA	—	—	15	20	2	—	13–27
OLD00381	22FSH32AA	10	15	25	25	2	—	22–45
OLD00389	22GSH32AA	—	—	30	30	—	2 1/2	22–45
OLD00390	22GSJ32AA	15	20	—	—	—	2 1/2	30–60
OLD00382	22HSJ32AA	—	—	30	40	3	—	30–60
OLD00383	22HSK32AA	25	30	50	50	3	—	45–90
OLD00391	22ISL32AA	30	40	75	75	—	3 1/2	57–115
OLD00384	22JTM32AA	40	50	100	100	4	—	67–135
OLD00385	22LTU32AF	75	100	200	200	5	—	100–270
OLD00386	22MTX32AF	150	200	400	400	6	—	200–540

Heavy Duty Controls Modifications
Non-Combination Enclosure Kits

Non-Reversing Contactors

ServiceFirst Item #	Mfg. #	Size
KIT06558	49EC14EB110705R	00-1¾
KIT06559	49EC14GB140807R	2-2½
KIT06560	49EC14IB201208R	3-3½
KIT06561	49EC14JB251409R	4

Type 1

Reversing Contactors

ServiceFirst Item #	Mfg. #	Size
KIT06560	49EC14IB201208R	00-2½
KIT06561	49EC14JB251409R	3-4

Pilot Devices

	ServiceFirst Item #	Mfg. #	Description	Class	Controller Size	Enclosure Type
Push Buttons	SWT02666	49SAPB5	Start, Stop	14, 40	00-3 1/2	1
	SWT02667	49SAP05		14, 40	4-8	1
Selector Switches	SWT02542	49SASB1	Hand-Off-Auto	14, 40	00-3 1/2	1
	SWT02668	49SAS01		14, 40	4-8	1

Heavy Duty Controls Modifications

Field Modification Kits

Auxiliary Contact Kits

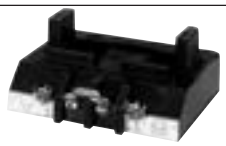
	ServiceFirst Item #	Mfg. #	Description			Class	Controller Size	Enclosure Type
	CTR01626 CTR01627	49AB10 49AB10 49AB11 49AB20	Auxiliary Contact For maximum additional contacts, see page 126.	NEMA A600 Front Mtg SPST 1 NO, 1 NC 2 NO	NO NC	14,22,40 43	0–4	 All
	CTR01628 CTR01629	3T47561-1K4 3T47561-1L4		1-NO/1-NC Auxiliary Cont Block-Left 1-NO/1-NC Auxiliary Cont Block-Right		14,22 40,43	41/2, 5	—
	CTR06529 CTR06530	49ASNO 49ASNC	No Contact Kits	NEMA A600		ESP100 Overload Relay ESP100 Overload Relay	0–8 0–8	 All

Miscellaneous Kits

	ServiceFirst Item #	Mfg. #	Description		Class	Controller Size	Enclosure Type
	CTR01632	49D70084	Mounting Adapter Plate	Westinghouse A200 Allen Bradley 509, 709	14	0-1	Open
	CTR01633	49ASLE	Overload Lug Extender	Includes terminal block and stabs for connection to contactor terminals to provide connections at bottom of ESP100	—	0–1 9–40A Ranges	All
	CTR01634 CTR01635 CTR01636 CTR01637 CTR01638	49CCF22H 49EEF22H 49GGF22H 49HHF22HP 49JJG22H	Mechanical Interlock Horizontal	 Includes wire 	 14, 40	0–1 1 3/4 2, 2 1/2 3, 3 1/2 4	 Open
	CTR01639	49D26344	Surge Suppressor	Surge Suppressor for 120V AC coil. Limits transient voltage produced by the coil to 220% maximum peak line volts.	14,22 40,43	0–31/2	All
	CTR01640 CTR01641	49SAF0 49SAFC	Auxiliary Power Pole	NO 36A at 600V AC Max NC 25A at 600V AC Max	14,22 40,43	0–13/4	All
	CTR01642	49SAE	Load Side Power Take Off Kit	Includes 3 power lugs for making extra connections to the load side of the contactor	14,22 40,43	0–1	All

Replacement Parts
AC Coils – For INNOVA Heavy Duty Starters

AC COIls—For Class 14, 22, 40, 43

	ServiceFirst Item #	Mfg. #	Size	Model	Volts 60Hz	Volts 50Hz
	COI00925	75D73070J			24	24
	COI00955	75D73070A	00-2 1/2		110–120/220–240	110/190–220
	COI00956	75D73070D		F, P	208	—
	COI00957	75D73070C		R, S (ESP100)	220–240/440–480	190–220/380–440
	COI00958	75D73251J			24	24
	COI00959	75D73251A	3,3 1/2		110–120/220–240	110/190–220
	COI00960	75D73251D		F, P	208	—
	COI00961	75D73251C		R, S (ESP100)	220–240/440–480	190–220/380–440
	COI00962	75D70131J			24	24
	COI00963	75D70131A			120/220–240	110/190–220
	COI00964	75D70131D	4	G, P	208	—
	COI00965	75D70131C		R, T (ESP100)	220–240/440–480	190–220/380–440
	COL03611	D71628031			110–120/220–240	110/190–220
	COL04098	D71628048	5	B	208	—
	COL03612	D71628032			220–240/440–480	190–220/380–440
	COI00966	D72069031			110–120/220–240	110/190–220
	COI00967	D72069047	4 1/2,5	B, F	208	—
	COI00968	D72069032		R, S (ESP100)	220–240/440–480	190–220/380–440
		D72069045			440–480	380–440

Replacement Parts
Contact Kits – INNOVA

Contact Kits—Single Pole Stationary and Movable Contacts, Contact Spring[a]

Description	ServiceFirst Item #	Mfg. #	Size	No of Poles in Kit	Model (4th position in part number)
 Class 14, 22, 40, 43	KIT06542	75AF14	Interlock		
		N/A (replace contactor)	0	1	G
	KIT06543	75BF14	0		F, P
	KIT06544	75CF14	0		F, P, S
	KIT06545	75DF14	1	1	F, P, S
	KIT06546	75EF14	1 3/4–1P		F, P, S
	KIT06547	75FF14	2	1	F
	KIT06548	75FP14			P, S
	KIT06549	75GF14	2 1/2	1	F
	KIT06550	75GP14			P, S
	KIT06551	75HF14	3		F, P, S
	KIT06552	75IF14	3 1/2	1	F, P, S
	KIT06553	75JG14	4	1	G, P, T
	KIT06554, KIT01237	75JB14	4		B
	KIT06555	75RB14	4 1/2	1	B, F, S
	KIT06556	75KB14	5	1	B, F, S
	KIT06557	75MB14	6	1	B, F, S

[a]On 3 phase controls, all 3 poles should be replaced— 3 kits required.

Dimensions with Solid State Overload Class 14

Figure 1

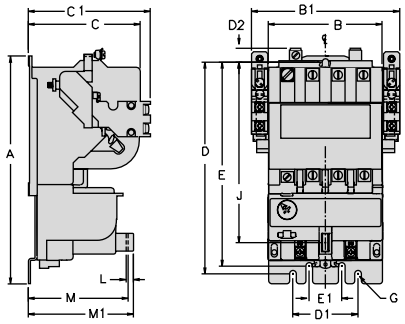


Figure 2

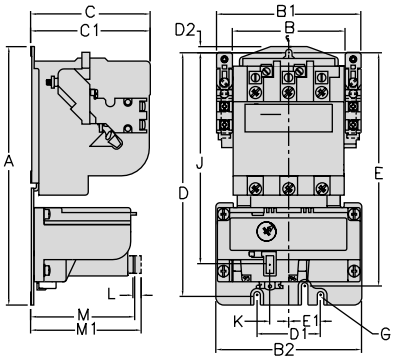


Figure 3

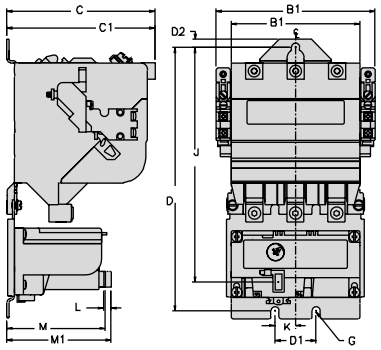


Figure 4

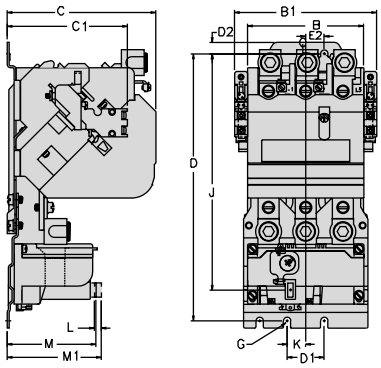


Figure 5

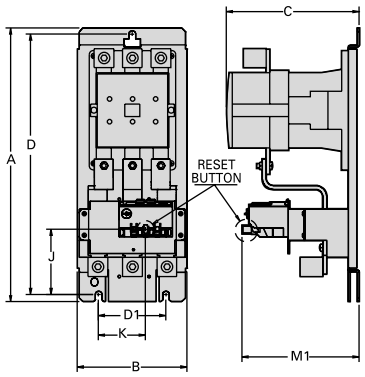
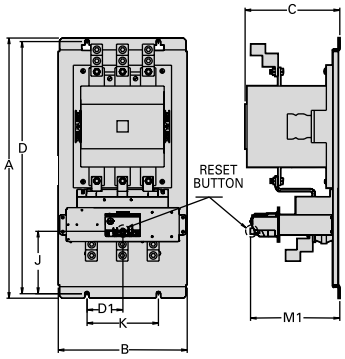


Figure 6



Open Type Solid State Overload

		Outline Dimensions						Mtg Dimensions						Mtg Screw	Reset Dimensions					Max Wire	Approx Ship Wt	Ref
Size	Fig	A	B	B1	B2	C	C1	D	D1	D2	E	E1	E2	G	J	K	L	M	M1	Size	Lbs (Kg)	Dwg
0–1	1	7 (178)	3 1/2 (89)	4 1/2 (114)	—	3 1/2 (89)	3 3/4 (95)	6 1/2 (191)	2 (51)	7/16 (11)	6 1/4 (184)	1 (25)	—	10 (254)	5 9/16 (141)	—	1/4 (6)	3 1/16 (78)	3 1/4 (83)	8	4(2)	D56839
1 3/4	1	7 (178)	3 1/2 (89)	4 1/2 (114)	—	3 1/2 (89)	3 3/4 (95)	6 1/2 (191)	2 (51)	7/16 (11)	6 1/4 (184)	1 (25)	—	10 (254)	5 9/16 (141)	—	1/4 (6)	3 1/16 (78)	3 1/4 (83)	6	4(2)	D56840
2	2	8 1/8 (206)	3 1/2 (89)	4 1/2 (114)	4 5/8 (117)	3 3/4 (95)	3 11/16 (94)	7 3/4 (197)	2 (51)	3/16 (5)	7 3/8 (187)	1/2 (13)	—	10 (254)	6 11/16 (170)	5/8 (16)	1/4 (6)	3 5/16 (84)	3 1/2 (89)	4	5(2)	D56841
2 1/2	2	8 1/8 (206)	3 1/2 (89)	4 1/2 (114)	4 5/8 (117)	3 3/4 (95)	3 11/16 (94)	7 3/4 (197)	2 (51)	3/16 (5)	7 3/8 (187)	1/2 (13)	—	10 (254)	6 11/16 (170)	5/8 (16)	1/4 (6)	3 5/16 (84)	3/2 (89)	2	5(2)	D56841
3	3	9 3/4 (248)	4 1/2 (114)	5 1/2 (140)	—	5 3/16 (132)	4 9/16 (116)	9 1/4 (235)	1 1/2 (38)	1/4 (6)	—	—	—	1/4 (6)	8 3/16 (208)	5/8 (16)	1/4 (6)	3 7/16 (87)	35/8 (92)	0	8(4)	D70119
3 1/2	3	9 3/4 (248)	4 1/2 (114)	5 1/2 (140)	—	5 3/16 (132)	4 9/16 (116)	9 1/4 (235)	1 1/2 (38)	1/4 (6)	—	—	—	1/4 (6)	8 3/16 (208)	5/8 (16)	1/4 (6)	3 7/16 (87)	3 5/8 (92)	00	8(4)	D70119
4	4	11 1/16 (281)	4 1/2 (114)	5 1/2 (140)	—	5 3/4 (146)	4 5/8 (117)	10 3/8 (266)	1 1/2 (38)	7/16 (11)	—	—	3/4 (19)	1/4 (6)	9 3/16 (233)	5/8 (16)	1/4 (6)	3 7/16 (87)	3 5/8 (92)	250MCM	11(5)	D70100
5	5	18 1/16 (459)	7 (178)	—	—	8 1/2 (216)	—	17 3/16 (437)	4 7/16 (113)	—	—	—	—	3/8 (10)	4 7/16 (113)	3 1/16 (78)	—	—	7 7/16 (189)	1-500MCM or 2-300MCM	—	—
6	6	26 3/8 (670)	13 1/16 (332)	—	—	9 5/8 (244)	—	25 1/2 (648)	3 5/8 (92)	—	—	—	—	—	6 5/16 (160)	7 3/16 (183)	—	—	9 (229)	2-500MCM	—	—

Reversing and Multispeed Heavy Duty Motor Starters
Dimensions with Solid State Overload Class 22, 30

Figure 1

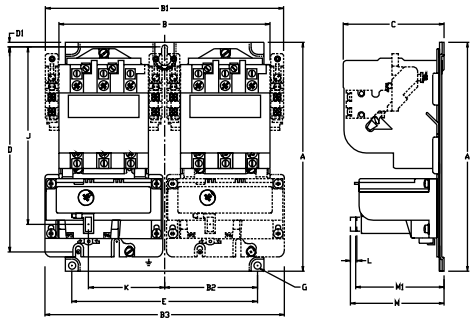


Figure 2

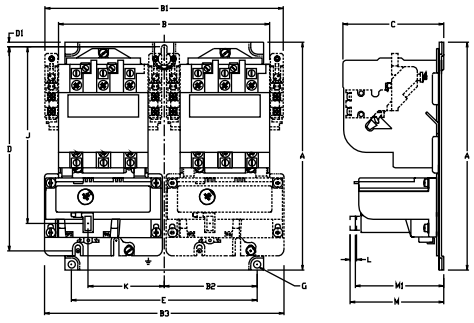


Figure 3

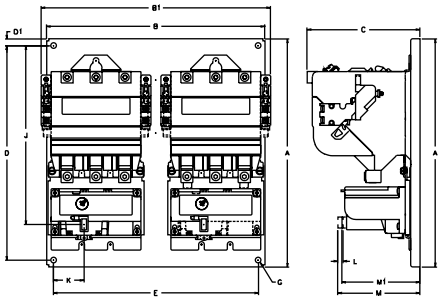


Figure 4

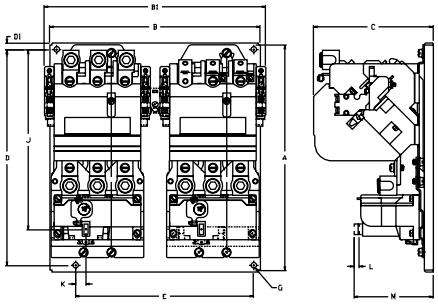
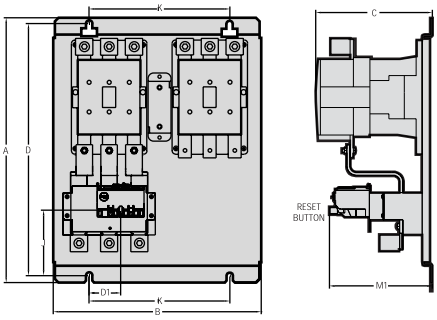


Figure 5



Open Type Solid State Overload/Melting Alloy

		Outline Dimensions					Mtg Dimensions				Mtg Screw	Reset Dimensions				Max Wire	Approx Ship Wt	Ref
Size	Fig	A	B	B1	B2	B3	C	D	D1	E	G	J	K	L	M	Size	Lbs (Kg)	Dwg
0-1	1	7 11/16 (195)	8 5/16 (211)	9 5/16 (237)	3 5/8 (92)	—	3 7/8 (98)	7 1/4 (184)	1/4 (6)	7 1/4 (184)	10 (254)	5 3/4 (146)	2 3/8 (60)	1/4 (6)	3 3/8 (86)	8	9 (4)	D70125
1 3/4	1	7 11/16 (195)	8 5/16 (211)	9 5/16 (237)	3 5/8 (92)	—	3 7/8 (98)	7 1/4 (184)	1/4 (6)	7 1/4 (184)	10 (254)	5 3/4 (146)	2 3/8 (60)	1/4 (6)	3 3/8 (86)	6	9 (4)	D70125
2-2 1/2	2	8 15/16 (227)	8 5/16 (211)	9 5/16 (237)	3 5/8 (92)	9 3/8 (238)	3 15/16 (100)	8 1/2 (216)	1/4 (6)	7 1/4 (184)	10 (254)	6 7/8 (175)	3 1/16 (78)	1/4 (6)	3 11/16 (94)	2	13 (6)	D70126
3	3	11 7/16 (291)	10 15/16 (278)	11 1/2 (292)	—	—	5 11/16 (144)	10 3/4 (273)	3/8 (10)	10 1/4 (260)	1/4 (6)	8 15/16 (227)	1 1/2 (38)	1/4 (6)	4 1/8 (105)	0	33 (15)	D70127
3 1/2	3	11 7/16 (291)	10 15/16 (278)	11 1/2 (292)	—	—	5 11/16 (144)	10 3/4 (273)	3/8 (10)	10 1/4 (260)	1/4 (6)	8 15/16 (227)	1 1/2 (38)	1/4 (6)	4 1/8 (105)	00	33 (15)	D70127
4	4	11 15/16 (303)	10 15/16 (278)	11 1/2 (292)	—	—	6 1/4 (159)	11 1/4 (286)	3/8 (10)	9 1/4 (235)	1/4 (6)	9 3/8 (238)	1/2 (13)	1/4 (6)	4 1/8 (105)	250MCM	59 (27)	D74686
5	5	18 1/16 (459)	14 3/16 (361)	12 1/16 (306)	2 5/8 (67)	2 7/16 (62)	9 7/16 (240)	17 3/16 (437)	3/8 (10)	9 5/8 (244)	— —	— —	— —	— —	— —	1-500MCM 2-300MCM	—	—

Heavy Duty Motor Starters and Contactors Dimensions/Enclosures Class 14, 22, 40, 43

Figure 1

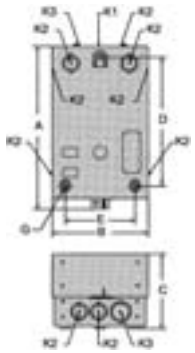


Figure 2

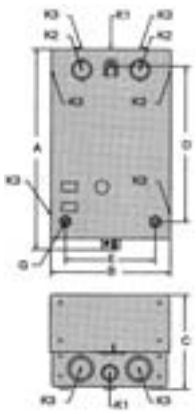


Figure 3

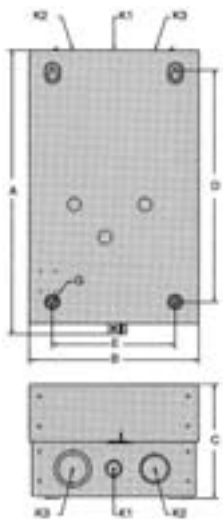
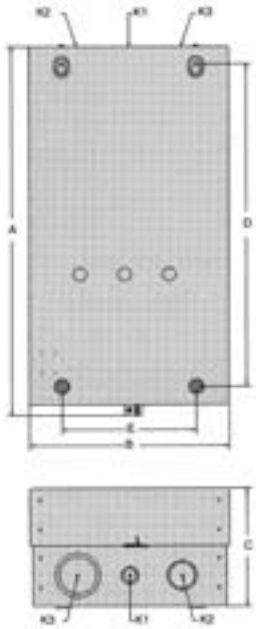


Figure 4



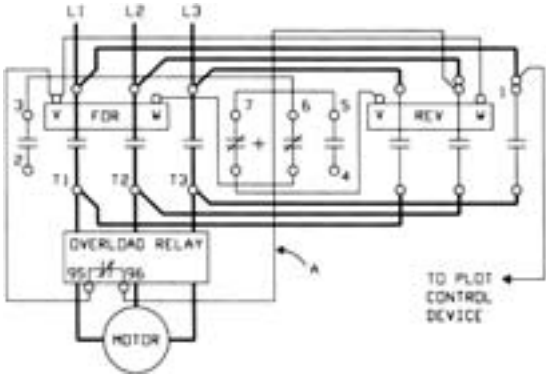
NEMA 1 General Purpose Enclosures

		Outline Dimensions			Mtg Dimensions		Mtg Screw	Conduit Size					Approx Ship Wt	
Size	Fig	A	B	C	D	E	G	K1	K2	K3	K4	K5	Lbs (Kg)	Ref Dwg
00-1¾	1	10 31/32 (279)	6 13/32 (163)	5 1/32 (128)	8 7/32 (209)	4 5/8 (117)	¼	½	½- ¾	¾-1	—	—	10 (5)	D68870
2-2½	2	13 17/32 (344)	7 31/32 (202)	6 3/8 (162)	10¼ (260)	6 (152)	¼	½-¾	¾–1	1-1¼	—	—	15 (7)	D68870
3-3½	3	19 1/8 (486)	11 3/8 (289)	7 11/16 (195)	15 5/8 (397)	8¼ (210)	¼	½-¾	1-1¼	1½- 2	—	—	26 (12)	D68870
4	4	24 7/8 (632)	13 3/8 (340)	8 1/8 (206)	21¾ (552)	9 (229)	¼	½-¾	1¼-1½	2-2½	—	—	37 (17)	D68870

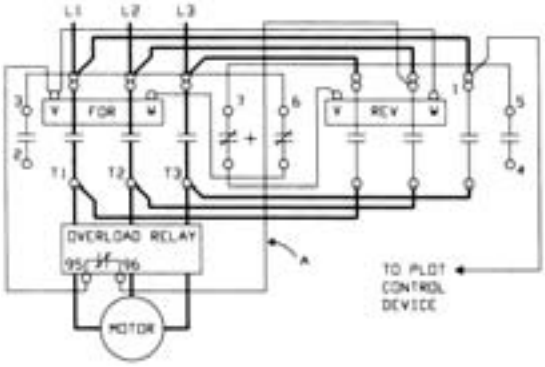
Reversing Heavy Duty Starters Class 22

Three Phase Solid State Overload

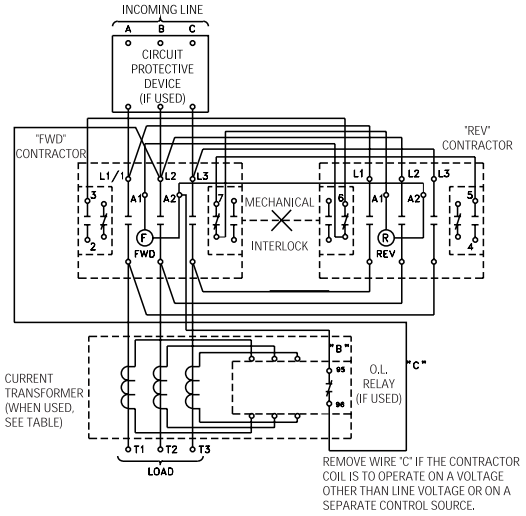
Sizes 0–1¾



Sizes 2-4



Size 5



SIZE	CT RATIO
4½	300:5
5	300:5
6	600:5
7	1200:5

SERVICEFIRST™

Literature Order Number	RSP-PRC003-EN
Filing Hierarchy	Service Products/Controls
Date	December 2003
Supersedes	RSP-PRC003-EN 0300
Stocking Location	Inland

Trane has a policy of continuous product and product data improvement and reserves the right to change design and specifications without notice.