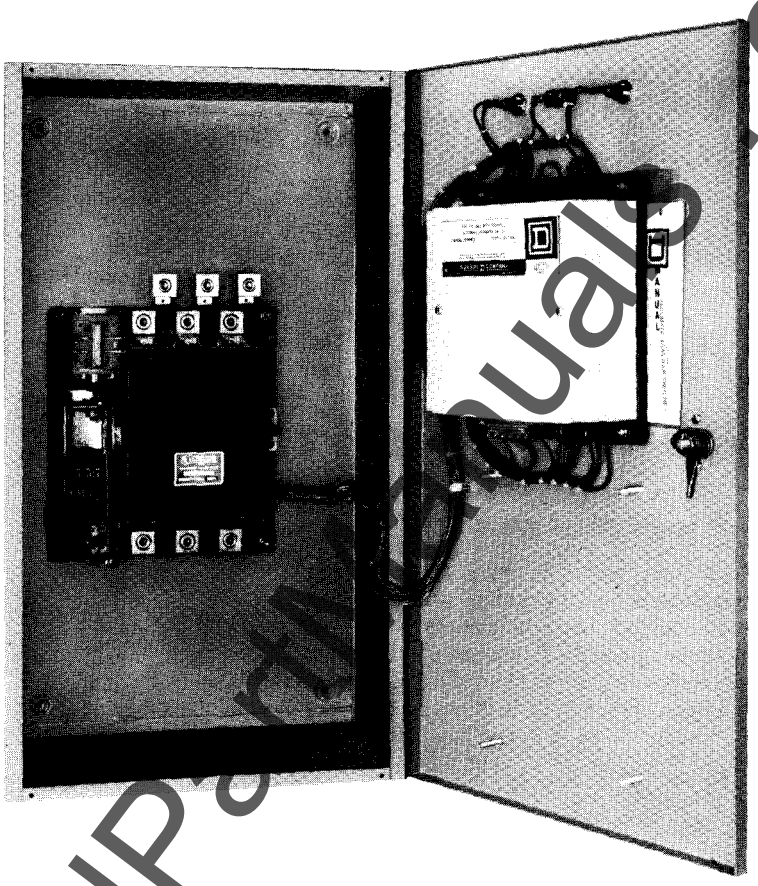


Automatic Transfer Switches

TYPE A

CONTENTS

SQUARE D COMPANY

SQUARE D COMPANY

10/82 FP Printed in U.S.A.

AC AUTOMATIC TRANSFER PANELS

Without Overload Protection
Tungsten and Fluorescent Lamp Loads — 480 Volts Maximum
Horsepower Rated Loads — 600 Volts Maximum

ELECTRICALLY HELD — GENERAL PURPOSE ENCLOSURES

Tungsten Lamp Load Rating	INDUCTIVE LOADS			†AC SERVICE — NORMAL AND EMERGENCY											
		Horsepower		1 ϕ, 2 W.		1 ϕ, 3 W. (S/N)		1 ϕ, 3 W. (SWN)		3 ϕ, 3 W.		3 ϕ, 4 W. (S/N)		3 ϕ, 4 W. (SWN)	
	Volts	Single Phase	Poly-Phase	Type No.	Price	Type No.	Price	Type No.	Price	Type No.	Price	Type No.	Price	Type No.	Price
30 A.	110 208–220 440–550	**2** **3** **5**	**3** **7½** **10**	MG-1	**$ 146.**	MG-2	**$ 150.**	MG-3	**$ 148.**	MG-3	**$ 148.**	MG-4	**$ 152.**	MG-5	**$ 169.**
60 A.	110 208–220 440–550	**3** **7½** **10**	**7½** **15** **25**	PG-1	**220.**	PG-2	**228.**	PG-3	**232.**	PG-3	**232.**	PG-4	**240.**	PG-5	**274.**
100 A.	110 208–220 440–550	**7½** **15** **25**	**15** **30** **50**	QG-1	**331.**	QG-2	**343.**	QG-3	**347.**	QG-3	**347.**	QG-4	**359.**	QG-5	**418.**
200 A.	110 208–220 440–550	... ...	**25** **50** **100**	VG-1	**712.**	VG-2	**736.**	VG-3	**758.**	VG-3	**758.**	VG-4	**782.**	VG-5	**948.**
300 A.	110 208–220 440–550	... ...	... **100** **200**	XG-1	**1442.**	XG-2	**1492.**	XG-3	**1526.**	XG-3	**1526.**	XG-4	**1576.**	XG-5	**1817.**

S/N — Solid Neutral.
SWN — Switched Neutral.
†Transfer panels for use on DC normal, emergency, or both are also available on special order.

MECHANICALLY HELD — GENERAL PURPOSE ENCLOSURES

Tungsten Lamp Load Rating	INDUCTIVE LOADS			†AC SERVICE — NORMAL AND EMERGENCY											
		Horsepower		1 ϕ, 2 W.		1 ϕ, 3 W. (S/N)		1 ϕ, 3 W. (SWN)		3 ϕ, 3 W.		3 ϕ, 4 W. (S/N)		3 ϕ, 4 W. (SWN)	
	Volts	Single Phase	Poly-Phase	Type No.	Price	Type No.	Price	Type No.	Price	Type No.	Price	Type No.	Price	Type No.	Price
30 A.	110 208–220 440–550	**2** **3** **5**	**3** **7½** **10**	MG-6	**$ 214.**	MG-7	**$ 218.**	MG-8	**$ 216.**	MG-8	**$ 216.**	MG-9	**$ 220.**	MG-10	**$ 237.**
60 A.	110 208–220 440–550	**3** **7½** **10**	**7½** **15** **25**	PG-6	**296.**	PG-7	**304.**	PG-8	**308.**	PG-8	**308.**	PG-9	**316.**	PG-10	**350.**
100 A.	110 208–220 440–550	**7½** **15** **25**	**15** **30** **50**	QG-6	**417.**	QG-7	**429.**	QG-8	**433.**	QG-8	**433.**	QG-9	**445.**	QG-10	**504.**
200 A.	110 208–220 440–550	... ...	**25** **50** **100**	VG-6	**848.**	VG-7	**872.**	VG-8	**894.**	VG-8	**894.**	VG-9	**918.**	VG-10	**1084.**
300 A.	208–220 440–550	... ...	**100** **200**	XG-5	**1592.**	XG-7	**1642.**	XG-8	**1676.**	XG-8	**1676.**	XG-9	**1726.**	XG-10	**1967.**

S/N — Solid Neutral.
SWN — Switched Neutral.
†Transfer panels for use on DC normal, emergency, or both are also available on special order.

ORDERING INFORMATION REQUIRED

1—Class and Type number.
2—Type of load, load amperes or horsepower.
3—Voltage, frequency, phases, and No. of wires for both normal and emergency source.
4—Additions and special features desired.
5—Wiring sketch, if different from typical circuits shown on Page 3 of Descriptive Section.

Additions and Special Features — Refer to Tab "Additions and Special Features"

DECEMBER, 1966

AC Automatic Transfer Panels

APPLICATION

Automatic transfer panels are used when it is necessary to maintain continuous power service, such as in a hospital operating room or for emergency lighting in public places. The panels automatically switch the load from the normal source to an emergency source where the former fails, and automatically restores the load to the normal service when it is again available. Installation of such panels is usually required by law in places of public assembly such as theaters, churches, stores, industrial plants, and auditoriums, to prevent panic conditions. The possibility of theft, property damage, and personal liability claims arising from accidents sustained during a power failure are also virtually eliminated.

Operation — The automatic transfer panel consists of twomechanically interlocked magnetic contactors which operate in conjunction with a pilot transfer relay. The line side of one contactor is connected to the normal supply while the line side of the other contactor is connected to the emergency or standby power service. Load side of both contactors are suitable wired for connection to the load. The transfer relay operating coil is energized by voltage from the normal service. Its contacts determine which contactor shall be closed and therefore which power supply will be in use. The mechanical interlock prevents closing of both contactors at the same time to avoid connecting of both power supplies to the load.

As long as the transfer relay remains energized by voltage from the normal source, the normal service contactor will remain closed and the load will be fed from the normal source. Failure of the normal voltage supply will de-energize the transfer relay, allowing its normally closed contact to complete the circuit to the emergency contactor magnet coil. Therefore, as soon as the transfer relay is de-energized, the emergency contactor will close to connect the load to the emergency power service.

Resumption of the normal service will again energize the transfer relay causing the emergency contactor to drop open and the normal contactor to close, thus providing complete automatic operation.

Electrically Held or Mechanically Held — Both electrically held and mechanically held panels are listed. Electrically held panels are simpler and less expensive than the mechanically held type. Mechanically held panels have the advantage of quietness; during operation the main coils are deenergized. Therefore, except for one small pilot relay, there can be no magnetic hum.

System Rating — Transfer panels are designed to transfer a given load from one power supply to another. Usually the emergency supply is identical to the normal supply in voltage, frequency, number of wires and number of phases. Sometimes the two systems will differ. For that reason all orders for transfer panels must indicate voltage, frequency, number of wires, and number of phase for **both** systems.

Panel Rating and Selection — Class 8901 Transfer panels have ratings for both lighting loads to 480 volts and horsepower loads to 600 volts. When the connected load is all lighting, or all motors, the contactor selection is simple; merely select by ampere rating or horsepower rating, as the case may be. When the load is mixed, a simple calculation is necessary to insure that neither the continuous rating of the panel, nor the interrupting rating, is exceeded. The steps involved are:

Step 1: Continuous Capacity

a. Determine connected lighting load in amperes.
b. Determine total motor full load current.

The sum of the two values must not exceed the continuous rating of the panel in amperes.

Step 2: Interrupting Capacity

a. Multiply sum of motor full load currents by 6.
b. Add to that product the connected lighting load in amperes.

With the value determined above, tentatively select ampere rating of the panel from the table below:

Continuous Rating of Panel Amperes	Interrupting Capacity				
	1 Ph.		3 Ph.		
	115 V.	230 V.	220 V.	440 V.	550 V.
30	130 A.	90 A.	140 A.	88 A.	70 A.
60	190 A.	190 A.	255 A.	210 A.	168 A.
100	.....	.....	500 A.	418 A.	334 A.
200	.....	.....	835 A.	835 A.	668 A.
300	.....	.....	1670 A.	1670 A.	1334 A.

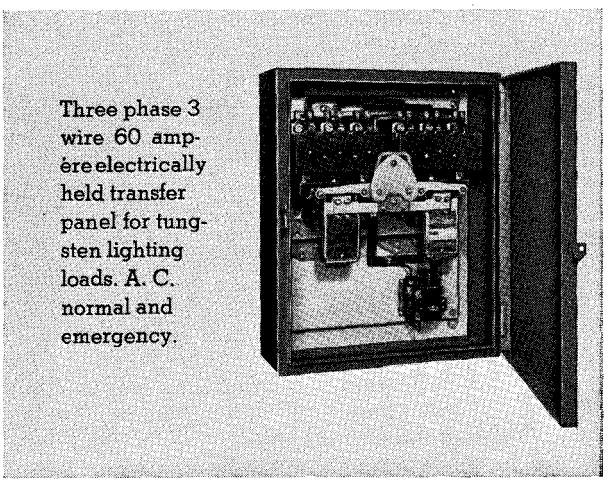
Step 3: Final Selection

In case panel ratings in Step 1 and Step 2 differ, use the larger of the two ratings.

Modifications — Many modifications of standard transfer panels are available to provide other than standard transfer features.

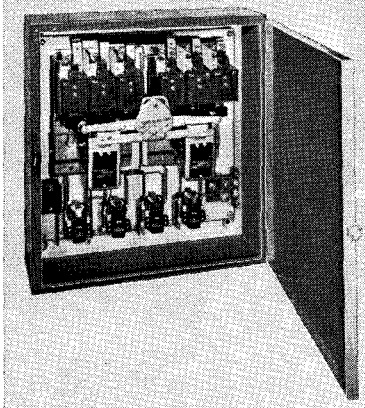
Time Delay Relays — Form K, Timing relays, adjustable to as long as 3 minutes, may be used to accomplish several functions. The most commonly used is to delay the transfer from Emergency to the Normal supply. Such a relay, specified as **Form K,** allows the Normal power supply to stabilize following restoration of power. Other timing relays may be used to delay initiation of engine cranking following failure of the Normal supply, or may delay connecting the load to the Emergency supply, to permit voltage and frequency to stabilize.

Motor Driven Timer — Form K5. Where the return to the normal supply is to be delayed more than 3 minutes, a motor driven timer can be provided. As standard it will be provided with a 30 minute dial, adjustable from 1 to 30 minutes. Other dial ranges are available. The time setting is adjustable by turning a knob on the front of the dial. Pointers indicate the time setting, as well as the unexpired time.

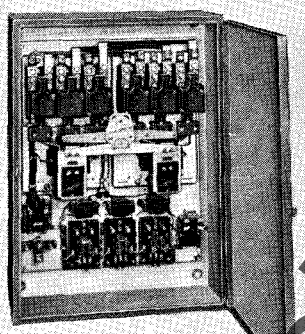


Three phase 3 wire 60 ampère electrically held transfer panel for tungsten lighting loads. A. C. normal and emergency.

AC Automatic Transfer Panels — DECEMBER, 1966



Three phase 4 wire solid neutral 100 ampere electrically held transfer panel for inductive motor loads. Panel includes full phase protection and test switch. A.C. normal and emergency.



Three phase 4 wire solid neutral 150 ampere electrically held transfer panel for lighting loads. Panel includes timer for de ayed transfer back to normal and voltage sensitive relay protection. A.C. normal and em rgency.

Test Switch — Form Y29. To insure that the transfer panel is in proper operating condition and will operate as required when called upon, it should be tested periodically. A Form Y29 test button creates an artificial voltage failure of the normal source, when operated. This momentary contact switch is mounted on the panel inside the enclosure to discourage unauthorized use.

Full Phase Protection — Form Y27. Standard transfer panels will transfer the load to the emergency source only when the complete feeder fails, or when the voltage between the lines to which the transfer relay is connected drops to 50% or less of nominal value. On a three phase system, the load could remain on the normal service even though two of the three phases had failed.

Full phase protection insures a transfer to the emergency source when **any** source fails. In addition, full phase protection causes a transfer when any phase voltage drops to 70%, and will hold the load on the emergency source until all phases of the normal service have been restored to at least 90% of nominal value.

Voltage Sensitive Relays — Form Y15. When control closer than 70% transfer — 90% return provided by Form Y27 full phase protection relays is desired. the Form Y15 voltage sensitive relays should be specified. The adjustable, voltage sensitive, relays provided will permit a transfer at as low as 3% differential between dropout and pick-up. The dropout and pick-up are independently adjustable by variable resistors. The pick-up point may be adjusted between 73 — 100% of rated voltage, while dropout may be set anywhere between 70 — 97% of rated voltage. Relays are factory set at 95% pick-up, 90% dropout, but may be changed in the field for other values.

Pilot Lights — Form P1 or P2. Pilot lights may be furnished in the cover of the enclosure to indicate to which source the load is connected. **Form P1** covers a red pilot light which burns when the load is connected to the emergency source. **Form P2** covers a green pilot light which burns when the load is connected to the normal source.

Extra Electrical Interlocks — Form X. Transfer panels are provided, as standard, with an extra normally open interlock on the emergency contactor for remote indication of the operating source. Additional interlocks, either normally open or normally closed can be furnished for use in remote signaling, initiation of generator cranking etc.

ENCLOSURES

Transfer panels, as standard, are furnished NEMA 1 surface mounting enclosures. On special order they may be obtained in flush mounting enclosures, in NEMA 4 watertight enclosures or in NEMA 12, dust tight enclosures.

CONSTRUCTION OF MAGNETIC CONTACTORS

All contactors used on automatic transfer panels have straight line action from magnet to contacts. Parts are mounted on individual rigid steel bases, and floating armatures are guided to insure free and unhindered movement.

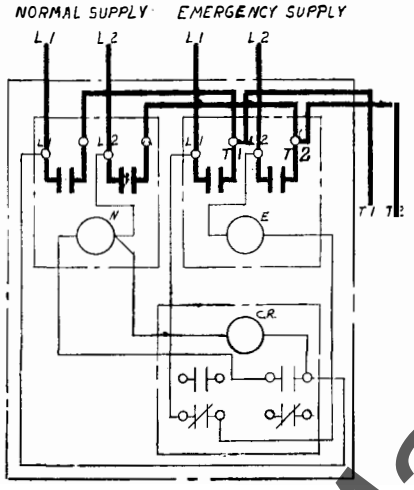
Double break silver contacts have low contact resistance, give extremely long life, do not corrode, never require cleaning or dressing. The contactors have modified "E" type magnets equipped with two shading coils to minimize ac magnetic hum. Magnetic yokes increase interrupting ability and reduce contact burning.

Transfer panels are also available for dc operation, which are similar in construction to the ac devices except that they include resistors in series with the magnet coils. A normally closed interlock on the contactor shorts out this resistor during the pick-up period. As the contactor closes, this interlock opens to insert the resistance. The lower coil current obtained with the resistor in series is sufficient to hold the contactor closed, but full strength without the resistor shorted out is necessary to close it.

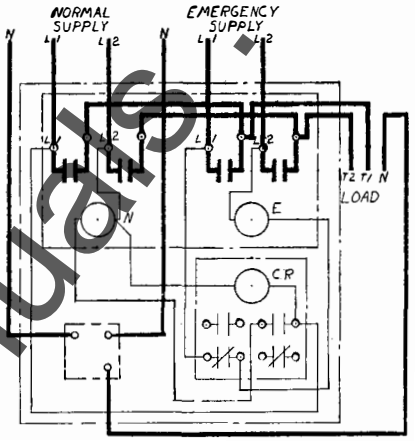
JULY, 1959

AC AUTOMATIC TRANSFER PANELS

TYPICAL WIRING DIAGRAMS

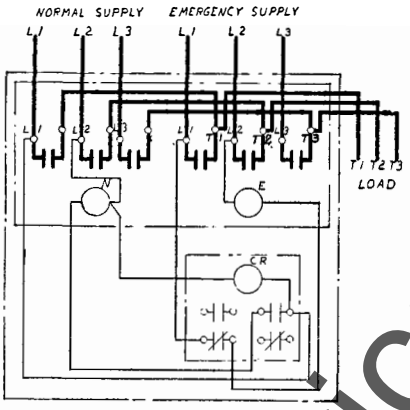


1 Phase, 2 Wire

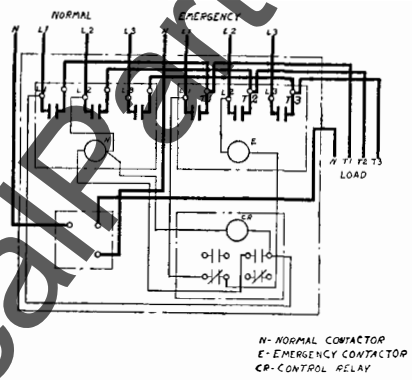


1 Phase, 3 Wire S/N

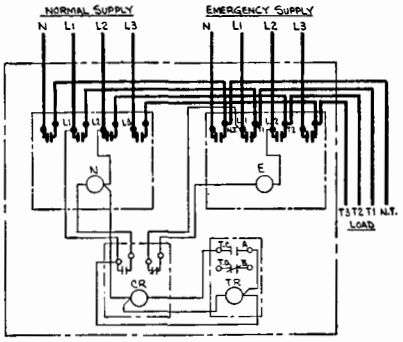
NOTE:
WHEN USED AS SINGLE PHASE 3 WIRE SYSTEM CONNECT NEUTRAL TO L3 & T3



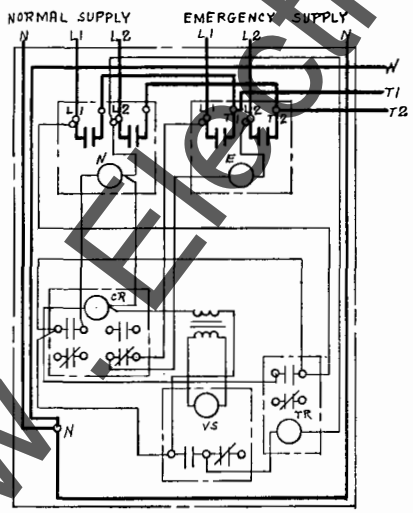
1 Phase, 3 Wire SWN
or 3 Phase, 3 Wire



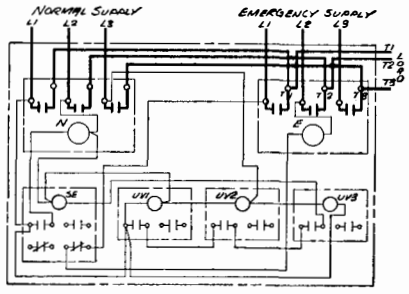
3 Phase, 4 Wire S/N



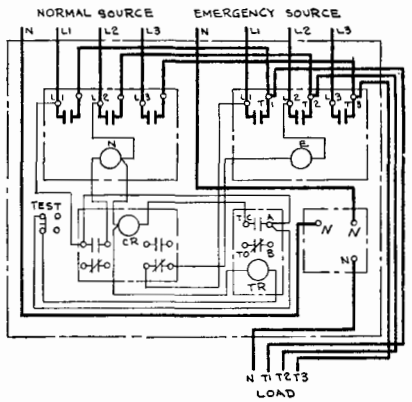
3 Phase, 4 Wire SWN
with Time Delay Transfer



1 Phase, 3 Wire S/N
with Voltage Sensistive Relay
and Time Delay Transfer



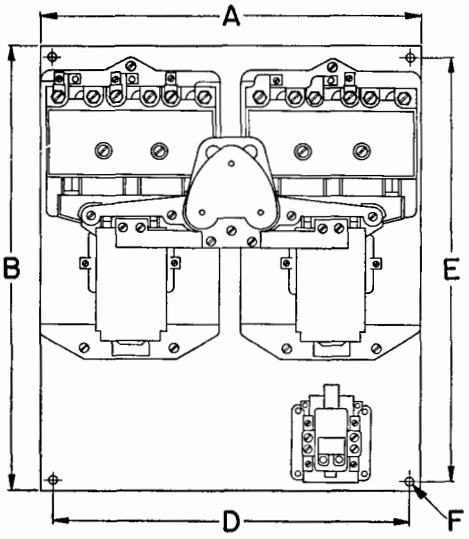
3 Phase, 3 Wire
with Full Phase Protection

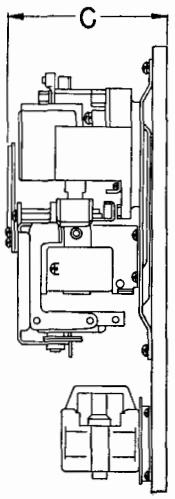


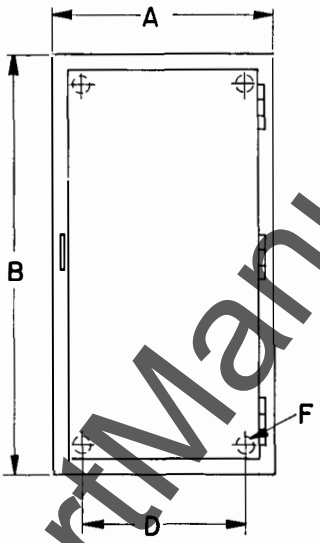
3 Phase, 4 Wire S/N with
Time Delay Transfer and Test Switch

AC Automatic Transfer Panels — JULY, 1959

Approximate Dimensions — Not For Construction







APPROXIMATE DIMENSIONS — ELECTRICALLY HELD — CLASS 8901

Service	Type	NEMA Type 1 General Purpose Enclosure A	B	C	D	E	F	Open Type A	B	C	D	E	F
1φ, 2 W. 1φ, 3 W. S/N	C or M D or P E or Q F or V G or X	12 1/8 15 1/8 18 1/4 22 1/4	15 1/8 18 1/8 22 1/4 27 1/4	6 3/8 7 8 10	10 13 15 1/2 19 1/2	13 16 19 1/2 24 1/2	9/32 9/32 7/16 7/16	10 1/4 13 1/4 16 1/4 20 1/4	12 1/4 15 1/4 18 1/4 21 1/4	4 7/8 5 5/8 6 5/8 8 1/4	9 1/4 12 1/4 15 1/4 19	11 1/4 14 1/4 17 1/4 20	5/16 5/16 3/8 7/16
1φ, 3 W. SWN 3φ, 3 W. 3φ, 4 W., S/N	C or M D or P E or Q F or V G or X	12 1/8 15 1/8 18 1/4 22 1/4	15 1/8 18 1/8 22 1/4 27 1/4	6 3/8 7 8 10	10 13 16 1/2 19 1/2	13 16 19 1/2 24 1/2	9/32 9/32 7/16 7/16	10 1/4 13 1/4 16 1/4 20 1/4	12 1/4 15 1/4 18 1/4 21 1/4	4 7/8 5 3/8 6 5/8 8 1/4	9 1/4 12 1/4 15 1/4 19	11 1/4 14 1/4 17 1/4 20	5/16 5/16 3/8 7/16
3φ, 4 W. SWN	C or M D or P E or Q F or V G or X	12 1/8 19 1/8 22 1/4 28 1/4	15 1/8 18 1/8 22 1/4 27 1/4	6 3/8 7 8 10	10 17 19 1/2 25 1/2	13 16 19 1/2 24 1/2	9/32 9/32 7/16 7/16	10 1/4 17 1/4 20 1/4 26 1/4	12 1/4 15 1/4 18 1/4 21 1/4	4 7/8 5 5/8 6 3/8 8 1/4	9 1/4 16 1/4 19 1/4 25	11 1/4 14 1/4 17 1/4 20	5/16 5/16 3/8 7/16

NOTE—Dimensions are in inches.

APPROXIMATE DIMENSIONS — MECHANICALLY HELD — CLASS 8901

Service	Type	NEMA Type 1 General Purpose Enclosure A	B	C	D	E	F	Open Type A	B	C	D	E	F
1φ, 2 W. 1φ, 3 W. S/N	C or M D or P E or Q F or V G or X	14 1/8 15 1/8 18 1/8 22 1/8	19 1/8 22 1/8 25 1/8 31 1/8	6 3/8 7 1/4 8 3/8 10	12 13 15 1/2 19 1/2	17 20 22 1/2 28 1/2	5/16 5/16 7/16 7/16	12 1/4 13 1/4 16 1/4 20 1/4	16 1/4 19 1/4 21 1/4 25 1/4	5 5 1/8 6 1/2 8 3/8	11 1/4 12 1/4 15 1/4 19	15 1/4 18 1/4 20 1/4 24	5/16 5/16 3/8 7/16
1φ, 3 W. SWN 3φ, 3 W. 3φ, 4 W. S/N	C or M D or P E or Q F or V G or X	14 1/8 15 1/8 18 1/8 22 1/8	19 1/8 22 1/8 25 1/8 31 1/8	6 7 1/4 8 3/8 10	12 13 15 1/2 19 1/2	17 20 22 1/2 28 1/2	5/16 5/16 7/16 7/16	12 1/4 13 1/4 16 1/4 20 1/4	16 1/4 19 1/4 21 1/4 25 1/4	5 5 1/8 6 1/2 8 3/8	11 1/4 12 1/4 15 1/4 19	15 1/4 18 1/4 20 1/4 24	5/16 5/16 3/8 7/16
3φ, 4 W. SWN	C or M D or P E or Q F or V G or X	14 1/8 19 1/8 22 1/4 28 1/4	19 1/8 22 1/8 25 1/8 31 1/8	6 3/8 7 1/4 8 3/8 10	12 17 19 1/2 26 1/4	17 20 22 1/2 28 1/2	5/16 5/16 7/16 7/16	12 1/4 17 1/4 20 1/4 26 1/4	16 1/4 19 1/4 21 1/4 25 1/4	5 5 1/8 6 1/2 8 3/8	11 1/4 16 1/4 19 1/4 25	15 1/4 18 1/4 20 1/4 24	5/16 5/16 3/8 7/16

Note—Dimensions are in inches.