Westinghouse Electric Corporation
General Control Division
Asheville, N.C./Buffalo, N.Y. 14240

Price List
9220

Page 1

May 17, 1977
Supersedes PL 9220, pages 1-16, dated October 8, 1973 and February 26, 1974
Prices effective May 17, 1977 and subject to change without notice.
Discount Symbol C10-G3
(Refer to Selling Policy 7000)
Mailed to E, D, C/1806/PL

Non-Reversing, Reversing
Up to 600 Volts,
3 Phase, 60 Hertz

Ac Magnetic Reduced Voltage Starters

Starter Selection

In general, the application will determine the type of starter required. In cases where more than one type starter will meet the application requirements, reference to the table below will show which starter is best qualified for the application. For additional information, see page 2, "Comparison of Starting Methods."

Starter Type	Starting Characteristics Expressed in % of Rated Values (Approx.)				Remarks	Pages
	Motor Voltage	Motor Current	Line Current	Torque		
Primary Resistor Class 11-400	80	80	80	64	Values shown are typical and depend on the motor. Starters provide closed transition and are ideally applicable where starting torque must be reduced.	6-7
Multi-Point Network Starters Class 11-440	Will depend on number of points.				Used primarily to limit inrush current increments rather than the maximum inrush current.	8
Autotransformer Class 11-600						9-10
80% Tap	80	80	67②	64	The adjustable voltage taps permit wide adjustment of characteristics in the field.	
65% Tap	65	65	45②	42		
50% Tap	50	50	28②	25		
Part Winding Class 11-700	100	65	65	50	Requires standard 230/460 volt dual voltage motor on 230 volts or special part winding motor. Closed transition.	11-12
Part Winding Class 11-740	50	33	33	12		
Star-Delta Class 11-800 Class 11-890	100	33	33	33	Requires delta wound motor with star connections. Ideal for long accelerations. Closed transition is available.	13-14
All Classes Reduced Voltage Combination Starters						4-14
Modifications						15-17
Heater Tables						18

② Includes autotransformer magnetizing current.

Ordering Information

Order starters by catalog number wherever possible. A complete catalog number consists of the starter class number (11400, 11600, etc.) at the top of the catalog number column, and the six digit number (S1ANNB, S2ENNC, etc.) appearing in the catalog number column opposite horsepower rating of the desired starter. Example: 11400S1ANNB is the catalog number for a size 1, 5 hp non-reversing class 11400 starter rated 230 volts, in a standard NEMA 1 enclosure; 11604S2DN1C is the catalog number for a size 2, 15 hp non-reversing class 11604 starter rated 460 volts, having a fusible disconnect in a standard NEMA 1 enclosure.

Some modifications to catalog numbers listed in price tables can be made by inserting the symbol for modification desired (from page 17) in the catalog number.

Select heaters from tables on page 18 and list as separate item.

When ordering starter by description, include:
- Class number or type.
- Service, non-reversing or reversing.
- Type disconnect or short circuit protection.
- NEMA enclosure type.
- NEMA size.
- Horsepower and service factor.
- System voltage.
- Modifications.

If resistance type starters are required to limit the starting current to an exact value, either the actual locked rotor amperes and locked kilowatts (or power factor) of the motor, must be included; or if the starter is to be used with a Westinghouse motor, the style or order number must be included so that this data can be determined. This motor information is required with all class 11-440 and class 11-740 orders.

Catalog Numbers

All starters listed in this price list have been assigned an 11 digit catalog number, with each digit having a specific function. A breakdown of the complete number with an explanation of each digit is shown here.

1 1 - 6 0 0 S 5 W N N C CATALOG NUMBER

1 2 3 4 5 6 7 8 9 10 11 DIGITS

DIGIT #1 = STARTER MANUFACTURE
- 1 = Buffalo/Asheville
- A = Beaver

DIGIT #2 = STARTER TYPE OR RATING
- 0 = Manual reduced voltage
- 1 = Magnetic-full or reduced voltage – NEMA rated
- 7 = Magnetic-full or reduced voltage – definite purpose rated
- 3 = Magnetic-wound rotor starter
- BLANK = 2nd digit left blank for Beaver starter only – do not use this catalog number – Contact Beaver for correct catalog number.

DIGIT #3 = FULL OR REDUCED VOLTAGE STARTER – WESTINGHOUSE STARTER CLASS
- 2 = Full voltage – single speed
- 9 = Full voltage – multi speed
- 4 = Reduced voltage – primary resistance type
- 6 = Reduced voltage – auto transformer type
- 7 = Reduced voltage – part winding type
- 8 = Reduced voltage – star delta type

DIGIT #4 = STARTER ADDITIONS
- 0 = Non-reversing
- 1 = Reversing adder
- 4 = Multi step starting (primary resistance and part winding)
- 9 = Closed transition (star delta only)

DIGIT #5 = COMBINATION – TYPE SHORT CIRCUIT PROTECTION
- 0 = Non combination starter – no short circuit protection
- 3 = Combination starter – non fused disconnect
- 4 = Combination starter – fused disconnect
- 6 = Combination starter – breaker
- 7 = Combination starter – motor circuit protector (MCP)
- 2 = Combination starter – no load break switch

DIGIT #6 = ENCLOSURE TYPE
- S = NEMA 1 – standard (bolted)
- V = NEMA 1A – (gasketed door only)
- R = NEMA 3R – (bolted, gasketed) – rain resistance
- 3 = NEMA 3 – (welded) water resistance
- 4 = NEMA 4 – (welded) watertight
- U = NEMA 7 – (cast) explosionproof
- Y = NEMA 9 – (cast) explosionproof
- J = NEMA 12 – (bolted gasketed) – dusttight
- M = Motor control center type "W" – line up
- C = Motor control center type 5 – line up
- K = Open frame – no enclosure

DIGIT #7 = STARTER SIZE
- 1 = NEMA size 1
- 2 = NEMA size 2
- 3 = NEMA size 3
- 4 = NEMA size 4
- 5 = NEMA size 5
- 6 = NEMA size 6
- 7 = NEMA size 7
- 8 = NEMA size 8
- 9 = NEMA size 8L

DIGIT #8 = RATED HORSEPOWER

U =	3 HP	X =	225 HP
A =	5 HP	Y =	250 HP
B =	7.5 HP	0 =	300 HP
C =	10 HP	1 =	350 HP
D =	15 HP	2 =	400 HP
E =	20 HP	3 =	450 HP
F =	25 HP	4 =	500 HP
G =	30 HP	5 =	600 HP
H =	40 HP	6 =	700 HP
J =	50 HP	7 =	800 HP
K =	60 HP	8 =	900 HP
L =	75 HP	9 =	1000 HP
M =	100 HP	I =	1250 HP
N =	125 HP	Q =	1500 HP
P =	150 HP	R =	Separate control – no HP rating
V =	175 HP		
W =	200 HP		

DIGIT #9 = MODIFICATIONS
- N = No modifications
- C = Separate control
- S = Two speed single winding
- T = Two speed two windings
- 3 = Three speed two windings
- 4 = Four speed two windings

DIGIT #10 = COMBINATION INFORMATION ON SHORT CIRCUIT PROTECTION MODIFICATIONS
- N = No modifications or non fused disconnect
- C = Current limiting fuses supplied
- F = FB breaker supplied
- K = KB breaker
- L = LB breaker
- M = MA breaker
- B = NB breaker
- P = PB breaker
- 0 = 60 Amp max fuse clips only supplied
- 1 = 100 Amp max fuse clips only supplied
- 2 = 200 Amp max fuse clips only supplied
- 4 = 400 Amp max fuse clips only supplied
- 6 = 600 Amp max fuse clips only supplied

DIGIT #11 = SYSTEM VOLTAGE
- A = Separate control 115 volt coils
- B = 230 Volts 60 Hertz
- C = 460 Volts 60 Hertz
- D = 575 Volts 60 Hertz
- H = 380 Volts 50 Hertz
- W = 240 Volts 60 Hertz
- X = 480 Volts 60 Hertz
- Z = 200/208 Volts 60 Hertz

The function of digits 1-5, 7, 8-11 is incorporated in the catalog numbers shown in the price tables and need not be changed. Digit 6 is variable to allow purchaser to specify NEMA enclosure. Modifications should be ordered by description.

Comparison of Starting Methods

STARTING METHOD	OPERATION	ADVANTAGES	LIMITATIONS
ACROSS-THE-LINE	Connects motor directly across lines.	1. Lowest Cost 2. Highest Starting Torque 3. Used With Any Standard Motor 4. Least Maintenance	1. High Starting Current 2. High Torque Starting May Damage Driven Machine
PRIMARY RESISTANCE REDUCED VOLTAGE	Inserts resistance units in series with motor during first step(s).	1. Medium Cost Up To Size 3 2. Smoothest Starting 3. Least Shock To Driven Machine 4. Most Flexible In Application 5. Highest Starting Power Factor 6. Used With Any Standard Motor	1. High Power Loss Because of Heating Resistors 2. Heat Must Be Dissipated 3. Low Torque Per Ampere Input 4. High Maintenance Cost
AUTOTRANSFORMER (MANUAL AND AUTOMATIC) REDUCED VOLTAGE	Uses autotransformer to reduce voltage applied to motor Tap: 50%, 65%, 80%	1. Low Cost (Manual) 2. Medium Cost (Automatic) 3. Best For Hard To Start Loads 4. Adjustable In Field 5. Used With Any Standard Motor	1. Not Smooth Starting 2. May Shock Driven Machine
STAR-DELTA	Starts motor with windings star (Y) connected, then reconnects them in delta connection for running.	1. Low Cost 2. Low Starting Current	1. Low Starting Torque 2. Requires Delta Wound Motors 3. Not Adjustable In Field
PART WINDING	Starts motor with only part of windings connected, then adds remainder for running.	1. Lowest Cost 2. Low Inrush Current For Increment Starting 3. Popular Method For Low Starting Torque Applications 4. Least Maintenance	1. Not Good For Frequent Starts 2. Can Be Noisy 3. May Require Special Wound Motors 4. Low Pull-Up Torque 5. May Not Come Up To Speed On First Step When Started With Load Applied

General Application

The following factors should be considered when applying reduced voltage starters to a squirrel cage motor driven load.

1. The motor characteristics which will satisfy the starting requirements of the load.

2. The source of power and the effect the motor starting current will have on the line voltage.

3. The load characteristics and the effect the motor starting torque will have on the driven parts during acceleration.

4. The starter protection required to protect the load, motor, starter, cables and power source during overload, undervoltage, and fault conditions.

A typical NEMA B motor started with full voltage will develop as much as 150% full load torque when started with a starting current of around 600% full load current. These values may exceed the mechanical limitations of the load or electrical limitations of the source, or both.

A reduced voltage or reduced inrush starter will reduce both starting current and starting torque. Care must be taken when meeting power company limitations that the motor will produce sufficient torque to accelerate the load to near rated speed.

As an example, if a part winding starter is applied to a motor to reduce the current inrush to approximately 410% of full load current (600% x 65%=390%), and the torque requirements to accelerate the load exceed 75% of full load torque (150% x 50% =75%), the motor and load will not accelerate. An autotransformer starter on the 80% voltage tap would satisfy these requirements. The current inrush would be 402% (600% x 67%) and the torque produced would be 96% (150% x 64%). If, however, the power company limited the "increments" of current drawn from line to allow voltage regulators to react to the added load, the part winding starter would meet the requirements.

Class 11-440 and class 11-740 starters are primarily increment starters. Class 11-700 starters are also ideally suited to low starting torque loads such as fans, blowers and m-g sets. Class 11-600 starters should be used with "hard to start" loads such as reciprocating compressors, grinding mills, and pumps. Class 11-400 starters provide a "cushioned" torque start and are applicable to conveyors and textile machines. Class 11-800 starters are applicable to high inertia loads with long acceleration such as centrifugal compressors and centrifuges.

All starters, in addition to overload protection, will provide either low voltage release or low voltage protection depending upon the pilot device used with the starter. Low voltage release, where power is applied to the motor after a power failure, can be obtained by using a 2-wire pilot device. Low voltage protection where power is not applied to the motor after a power failure until restarted by an operator can be obtained by using a 3-wire pilot device.

Primary resistor and closed transition Star Delta types require adequate ventilation to remove resistor heat.

Heaters

Heaters for starters listed in this price list should be selected from tables on page 18. Heaters should be ordered by style number on the basis of adjusted full load current and starter size. They should be listed as a separate item on the order.

Modifications

Modifications listed on pages 15, 16, 17 can be added to all classes of starters unless indicated otherwise. Changes in type of enclosure can be made by inserting the symbol for the desired enclosure in column 6 in the catalog number replacing the "S".

Other modifications should be ordered by description.

Combination Starters

All starter installations require a means of disconnecting the starter from the incoming power supply. The disconnecting device, which can also provide short circuit protection, can either be separate from the starter or included with the starter in a common enclosure. If it is included with the starter, the assembly is known as a combination starter.

Combination starters offer several features, such as:

a. Ease of installation: A single piece of equipment simplifies wiring and conduit requirements.

b. Safety: Disconnect device is interlocked with the enclosure door.

c. Coordination: Correct size disconnect is included with the starter.

Types of Combination Starters

Non-Fused Disconnect: (Fig. 1) Used where external short circuit protection is available and a disconnect is desired in starter. This type disconnect can be opened under load and padlocked in the open position. The disconnect has an external operating handle interlocked with the door so that the door cannot be opened until the disconnect is opened.

Fusible or Fused Disconnect: (Fig. 2) Used where short circuit protection is required in the starter. Fuse clips will accommodate both NEC and current limiting fuses. The externally operated disconnect handle is interlocked with the door so that the door cannot be opened until the disconnect is opened. Current limiting fuses are included in size 8 and larger.

Disconnecting Type Fuses: (Fig. 3) Used as an alternate for a fusible disconnect. Hook stick-operated current limiting fuses are included. The starter is electrically interlocked with the door so that the disconnecting fuses will not be accidently opened under load.

Circuit Breaker: (Fig. 4) Used where short circuit protection is required in the starter. Operation of any trip opens all three lines, avoiding single-phasing. Unless otherwise specified, molded case air circuit breakers will have magnetic trip only, rated as follows:

Breaker Frame	Amperes
FB	490- 1550
KB	1050- 2250
LB	2000- 4000
MA	4000- 8000
NB	6000-12000
PB	4000-12000

Mark 75 or TRI-PAC breakers can be substituted for the standard molded case breaker where higher interrupting capacities are required. Where price additions are not specifically shown, contact Westinghouse.

All molded case breaker external operating handles are interlocked with the door so that the door cannot be opened until the breaker is opened. The breaker can be padlocked in the open position. Switchboard type circuit breakers have thermal-magnetic trips and will be selected based on 125% full load current.

Circuit Breaker and Fuses: (Fig. 5) Used to obtain circuit breaker interruption of low magnitude faults, and current limiting fuse interruption of high magnitude faults. The circuit breaker opens on all faults and prevents single-phasing caused by one blown fuse. The circuit breaker saves the cost of fuse replacement on low magnitude faults. Contact Westinghouse for prices.

Fig. 1

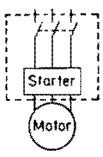


Fig. 2

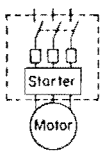


Fig. 3

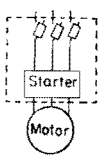


Fig. 4

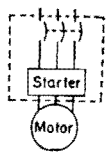
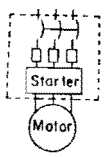


Fig. 5

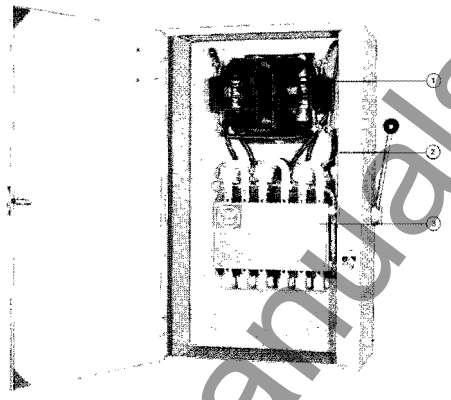


Application

Type JF autostarters are designed for application wherever across-the-line starting current of squirrel-cage induction motors is likely to exceed local power company restrictions or interfere with plant operations. These starters provide the least expensive method of keeping current inrush within limits and still give a maximum starting torque. Open transition reduced-voltage starting is provided by a dry-type auto transformer. Accessory equipment includes time-delay low-voltage protection, an electrical interlock, emergency pushbutton, an ammeter, or special NEMA **4** watertight enclosure. For mild dust conditions, a neoprene gasket can be added to the door of the standard NEMA 1 general-purpose enclosure. Duty cycle is one 15 second "on" period each 4 minutes for a total of 4 cycles, repeated after 2 hours.

① Autotransformer is conservatively rated, two-coil type. Simple construction with non-aging silicon steel laminations and copper coils impregnated with a moisture-resistant insulating compound assures long life. The transformer is completely disconnected from the line and motor when the starter is in the "off" or "run" position. Taps for starting voltages of 65% and 80% of the line voltage are available on all sizes. Starters larger than 50 hp also provide a 50% tap. Starter is shipped connected to 65% tap.

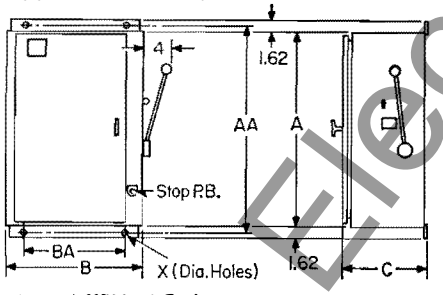
② A sequence and holding mechanism requires that the starter handle be placed in the "start" position prior to being placed in the "run" position and also that the transfer from "start" to "run" be made quickly to avoid a serious second inrush. The acceleration period is dependent only on the judgment of the operator to account for possible changing motor and load conditions and is limited only by the duty cycle of the autotransformer. On long accelerations the operator must be cautioned not to relax his pressure on the handle. He must maintain sufficient contact pressure to avoid burning or pitting of the contacts. A notch position is provided to indicate the maximum hand relaxation allowed to maintain sufficient contact pressure on the start contacts. If the handle is released at any time in the starting sequence it will return to the "off" position. The heart of the mechanism is a ferrous casting gravity latch which will not become distorted. Low friction needle bearings are used to assure lasting protection and positive operation. The starter is held in the "run" position by a solenoid operated latch which uses an encapsulated coil to eliminate the common causes of coil failure.



③ Air-break contacts of double break silver-alloy construction provide high interrupting capacity in air, which eliminates the need for oil immersion even in the largest size. For additional interrupting capacity and longer contact life, the size **4**, 5, 5M and 5MM starters have De-ion arc quenchers on the start contacts. Moving and stationary contacts are easily removable from the front for servicing. Long contact life is assured by the use of a silver-alloy material whose oxide has the same conductivity as the original material. Overload protection is provided by automatic reset overload relays.

Dimensions and Weights

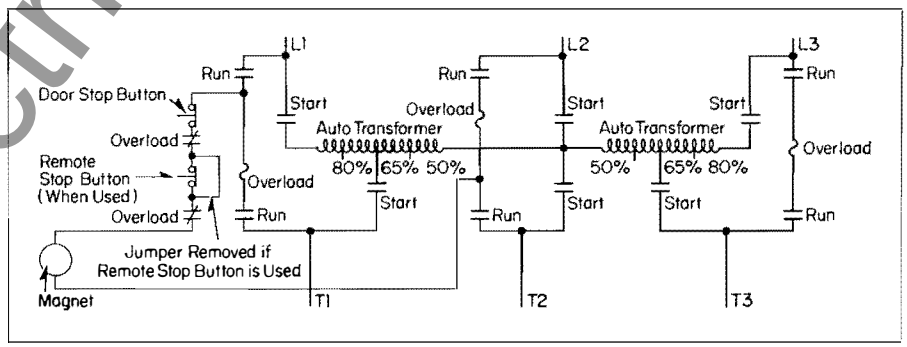
Approximate Only



Size	NEMA 1 Enclosure						
	A	B	C	AA	BA	X Diam.	Approx. Wt., Lbs.
2	26	18	11	28	14	⅜	115
3	26	18	11	28	14	⅜	165
4	40	24	13	42	20	⁹⁄₁₆	325
5	40	24	13	42	20	⁹⁄₁₆	375
5M	40	24	13	42	20	⁹⁄₁₆	450
5MM	64①	28	21	...	..	..	800

① 64 inch enclosure is floor mounted.

Typical Schematic Diagram



Ordering Information

1. Order by catalog number – catalog number consists of class number at top of column plus 6 digit suffix in column. Example:
   10600 plus S2DNNB = catalog number 10600S2DNNB.
2. List hp, volts, phase and frequency.
3. List heaters by style number, as separate item. (3 required)
4. Add modifications to catalog number as directed.
5. List field modification kits as separate item and give catalog number.

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May 17, 1977
New Information
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(Refer to Selling Policy 7000)
Mailed to: E, D, C/1806/PL

Non-Reversing, Reversing
Up to 600 Volts,
3 Phase, 60 Hertz

Ac Magnetic Reduced Voltage Starters

Reduced Voltage Magnetic Starters – Manual

List Prices – Heaters Not Included

Class 10-600 Non-Reversing Starter in NEMA 1 Enclosure

Volts 60 Hertz	Max. Hp	Size	Catalog Number 10600	Style Number	List Price
200	10	2	S2CNNZ	.....	$ 810
	25	3	S3FNNZ	.....	846
	40	4	S4HNNZ	.....	1502
230	15	2	S2DNNB	.....	810
	25	3	S3FNNB	2065A23G01⑧	846
	30	3	S3GNNB	.....	874
	50	4	S4JNNB	2065A27G01⑧	1502
	75	5	S5LNNB	2065A29G01⑧	1664
	125	5M	S6NNNB	2065A32G01⑧	2444
	150	5MM	S7PNNB	2065A33G01⑧	5386
460	15	2	S2DNNC	.....	810
	25	2	S2FNNC	.....	846
	30	3	S3GNNC	2065A25G01⑧	874
	50	3	S3JNNC	2065A26G01⑧	918
	100	4	S4MNNC	2065A28G01⑧	1664
	150	5	S5PNNC	2065A30G01⑧	1794
	250	5M	S6YNNC	2065A34G01⑧	2664
	300	5MM	S7ONNC	2065A35G01⑧	5970
575	15	2	S2DNND	.....	810
	25	2	S2FNND	.....	846
	30	3	S3GNND	.....	874
	50	3	S3JNND	.....	918
	100	4	S4MNND	.....	1664
	150	5	S5PNND	.....	1794
	250	5M	S6YNND	.....	2664
	300	5MM	S7ONND	.....	5970

For 50 Hertz, 380 volts add **6%** to the 460 volt prices.

⑧ Stock item.

Modifications

Modifications to the starters listed in the price table can be made from the following listing by substituting the proper symbol for the "S" as digit 6. Other modifications – order by description.

Factory Modifications

Description	Catalog No. Digit	Catalog No. Symbol	List Price Addition Starter Size 2	3	4	5	5M	5MM
Time delay undervoltage			$188	$188	$188	$188	$188	$188
Electrical interlock②			64	64	64	64	64	64
Ammeter			396	396	396	396	396	396
Third overload relay			Std.	Std.	Std.	Std.	Std.	Std.
Control transformer			196	196	196	196	196	196
NEMA 4, watertight enclosure	6	A	Refer to Westinghouse					
NEMA 1, neoprene gasketed door	6	V	80	80	80	80	80	200
Omission of enclosure Deduction	6	K	48	48	152	152	152	220

Field Modification Kits

Description	Catalog Number	List Price
Electrical interlocks, all sizes	JF-EL	$22⑧

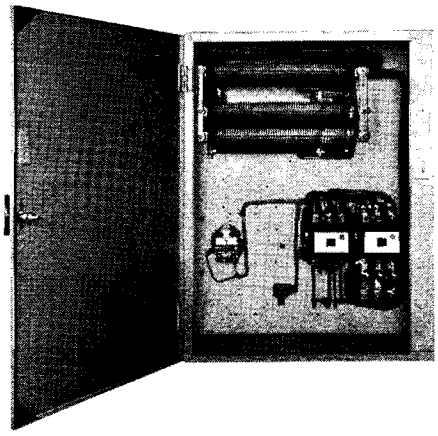
⑧ Stock Item.
② One maximum, either NO or NC.

Heater Elements

Prices do not include heater elements, starters require 3 overload relay heater elements at **$3.00** list each. Refer to selection tables page 18.

Reduced Voltage Magnetic Starters

Application



Class 11-400 Size 4

Primary resistor type starters, sometimes known as "cushion type" starters, will reduce the motor torque and starting inrush current to produce a smooth, cushioned acceleration with closed transition. Although not as efficient as other methods of reduced voltage starting, primary resistor-type starters are ideally suited to applications such as conveyors, textile machines, or other delicate machinery where reduction of starting torque is of prime consideration. Starters through size 5 will limit inrush to approximately 80% of locked rotor current and starting torque to approximately 64% of locked torque. Larger sizes will be custom designed to the application.

Description

Class 11-400 Non-Reversing, Two-Point Starters Contain:

1 – Three pole starting contactor with necessary relays and interlocks (see table below for type).

1 – Three pole running contactor with necessary relays and interlocks (see table below for type).

Starter Size	Contactor Type	
	Starting	Running
1	A-201-K1	A-201-K1
2	A-201-K2	A-201-K2
3	A-201-K3	A-201-K3
4	A-201-K4	A-201-K4
5	GCA-530	GCA-530
6	GCA-530	GCA-630
7	GCA-630	GPD-730
8	GPD-730	GPD-830
8L	GPD-830	105-FD

1 – Pneumatic timing relay.

1 – 3 pole adjustable type AN overload relay on sizes 1 through 4. This same overload relay is used with associated current transformers on size 5 and larger.

1 – Silicon rectifier to provide dc control voltage for size 7 and larger.

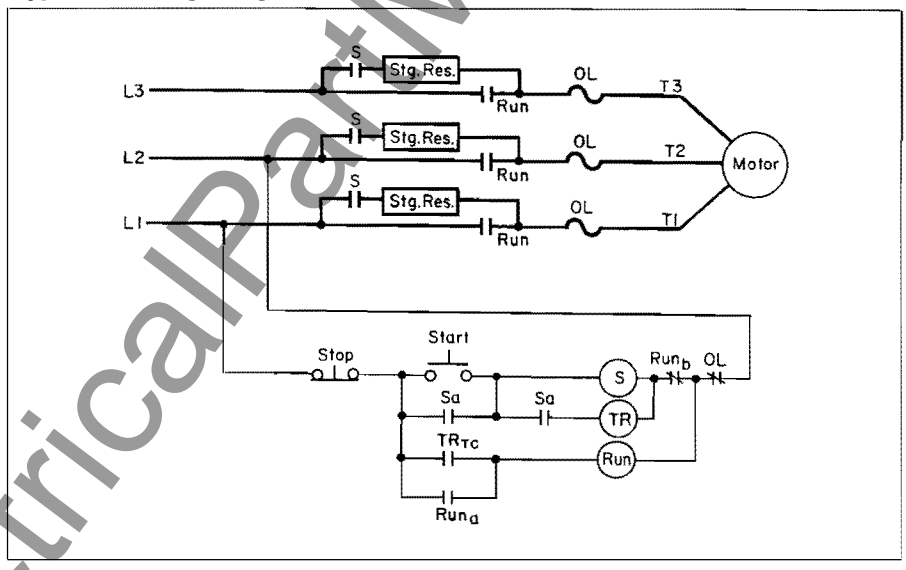
1 – Resistor frame of stainless steel tube type resistors mounted and wired in the enclosure in all sizes. Resistor class A.S. 116 is intended for general starting duty where starting time is no more than 5 seconds out of 80 seconds. For applications that exceed this duty cycle, resistor class A.S. 156 resistors good for 15 seconds out of 60 seconds are recommended.

Classes 11-403, 11-404, 11-406: These combination starters are similar to class 11-400 starters except that they include a disconnect switch or circuit breaker.

Class 11-410: This is a reversing type, two point starter which contains two mechanically interlocked running contactors. Otherwise, it is the same as a class 11-400 starter.

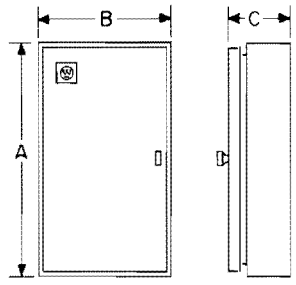
Classes 11-413, 11-414, 11-416: These are reversing type combination starters similar to the class 11-410 starter except that a disconnect switch or circuit breaker is included.

Typical Wiring Diagram



Dimensions, Inches; Approximate Only

(Class 116 Resistors)



Starter Class	Size	Dimensions A①	B	C	Max. Shipping Wt., Lbs.
11-400	1-2	29	18	10	120
	3-4	35	24	12	400
	5	64	28	14	750
	6-7-8	90	28	28	1300
11-403 / 11-406	1	64	28	14	300
	2	64	28	14	350
	3-4	64	28	14	800
	5	64	36	14	900
11-404	1	64	28	14	375
	2-3-4	64	28	14	475
	5	76	36	14	950

① 64 and 90 inch high enclosures are floor mounted.

Reduced Voltage Magnetic Starters

List Prices – Heaters Not Included

Classes 11-400, 11-403, 11-404, 11-406 Starters Non-Reversing in NEMA 1 Enclosure

Max. Hp.	Volts 3-Phase 60 Hertz ④	NEMA Size	Starter Type with Class A.S. 116 Resistor									Add for Class A.S. 156 Resistor for High Inertia Starting Duty
			Without Short Circuit Protection		With Non-Fusible Disconnect		With Fusible Disconnect or Current-Limiting Fused Disconnect			With Molded Case Circuit Breaker②		
			Catalog Number 11400	List Price	Catalog Number 11403	List Price	Fuse Clip③ Amps	Catalog Number 11404	List Price	Frame	Catalog Number 11406	List Price	
5	230	1	S1ANNB	$ 571	S1ANNB	$ 759	60	S1AN0B	$ 791	FB	S1ANFB	$ 853	$ 248
	460-575	1	S1ANNC	571	S1ANNC	759	60	S1AN0C	791	FB	S1ANFC	853	248
7½	200-230	1	S1BNNB	591	S1BNNB	779	60	S1BN0B	811	FB	S1BNFB	873	372
	460-575	1	S1BNNC	591	S1BNNC	779	60	S1BN0C	811	FB	S1BNFC	873	372
10	200-230	2	S2CNNB	839	S2CNNB	1079	100	S2CN1B	1137	FB	S2CNFB	1183	496
	460-575	1	S1CNNC	631	S1CNNC	815	60	S1CN0C	851	FB	S1CNFC	913	496
15	230	2	S2DNNB	899	S2DNNB	1139	100	S2DN1B	1197	FB	S2DNFB	1243	492
	460-575	2	S2DNNC	899	S2DNNC	1139		S2DN1C	1197	FB	S2DNFC	1243	492
20	230	3	S3ENNB	1199	S2ENNB	1503	200	S3EN2B	1607	FB	S3ENFB	1573	424
	460-575	2	S2ENNC	967	S2ENNC	1207	100	S2EN1C	1265	FB	S2ENFC	1311	424
25	200-230	3	S3FNNB	1219	S3FNNB	1523	200	S3FN2B	1627	FB	S3FNFB	1593	444
	460-575	2	S2FNNC	1007	S2FNNC	1247	100	S2FN1C	1305	FB	S2FNFC	1351	444
30	230	3	S3GNNB	1275	S3GNNB	1579	200	S3GN2B	1683	FB	S3GNFB	1649	510
	460-575	3	S3GNNC	1275	S3GNNC	1579	100	S3GN1C	1683	FB	S3GNFC	1649	510
40	200	4	S4HNNZ	2591	S4HNNZ	3011	200	S4HN2Z	3315	KB	S4HNKZ	3275	510
	230	4	S4HNNB	2591	S4HNNB	3011	200	S4HN2B	3315	KB	S4HNKB	3275	510
	460-575	3	S3HNNC	1323	S3HNNC	1627	100	S3HN1C	1731	FB	S3HNFC	1697	510
50	230	4	S4JNNB	2591	S4JNNB	3011	200	S4JN2B	3315	KB	S4JNKB	3275	736
	460-575	3	S3JNNC	1367	S3JNNC	1671	100	S3JN1C	1775	FB	S3JNFC	1741	736
75	200	5	S5LNNZ	4115	S5LNNZ	4867	400	S5LN4Z	5221	KB	S5LNKZ	5445	888
	230	5	S5LNNB	4115	S5LNNB	4867	400	S5LN4B	5221	KB	S5LNKB	5445	888
	460-575	4	S4LNNC	2639	S4LNNC	3059	200	S4LN2C	3363	KB	S4LNKC	3323	888
100	230	5	S5MNNB	4427	S5MNNB	5178	400	S5MN4B	5533	LB	S5MNLB	5757	972
	460-575	4	S4MNNC	2639	S4MNNC	3059	200	S4MN2C	3363	KB	S4MNKC	3323	972
125	230	6	S6NNNB	7613	S6NNNB	9339	CL	S6NNCB	10441	LB	S6NNLB	9571	1060
	460-575	5	S5NNNC	4259	S5NNNC	5011	200	S5NN2C	5365	KB	S5NNKC	5589	1060
150	200-230	6	S6PNNB	7937	S6PNNB	9663	CL	S6PNCB	10767	MA	S6PNMB	9895	1060
	460-575	5	S5PNNC	4259	S5PNNC	5011	400	S5PN4C	5365	KB	S5PNKC	5589	1060
200	230	6	S6WNNB	8221	S6WNNB	9947	CL	S6WNCB	11051	MA	S6WNMB	10179	1360
	460-575	5	S5WNNC	4815	S5WNNC	5567	400	S5WN4C	5921	LB	S5WNLC	6145	1360

For larger horsepower ratings use prices for equivalent rated class 11-600 starters on page 10.

② To substitute breakers, see page 16.

③ "CL" indicates that current limiting type fuses are included to provide 100,000 asymmetrical amperes interrupting capacity. A load break disconnect is provided in all ratings. Fuses not included up to and including size 5. Sizes 6-9 includes current limiting fuses.

④ Catalog numbers shown for 200-230 volts are for 230 volt designs. For 200 volts, change last digit from B to Z. Catalog numbers shown for 460-575 volts are for 460 volt designs. For 575 volts, change last digit from C to D.

Ordering Information

Order starters by catalog number and description, include:

Class number or type.
Service, non-reversing or reversing.
Type disconnect or short circuit protection.
NEMA enclosure type
NEMA size.
Horsepower and service factor.
Application and Duty Cycle.
System voltage.
Specify external reset button, if required.
Modifications.

If resistance type starters are required to limit the starting current to an exact value, either the actual locked rotor amperes and locked kilowatts (or power factor) of the motor, must be included; or if the starter is to be used with a Westinghouse motor, the style or order number must be included so that this data can be determined. This motor information is required with all class 11-440 orders.

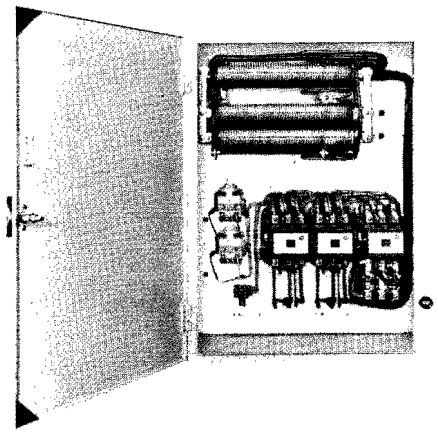
Modifications: Select modifications from pages 15, 16, 17 and order by description.

Heater Elements

Prices do not include heater elements. Starters require 3 overload relay heater elements at **$3.00 list each.** Refer to selection tables page 18.

Reduced Voltage Magnetic Starters

Multi-Point Network Starter



Class 11-440 3 point starter

Multi-point Acceleration: These starters are designed for use on network distribution systems where the starting current limitations of the power company are such that standard across-the-line or 2-point resistance type starters will not give small enough increments of starting current.

They are designed to provide approximately 3 seconds per point on a two-point starter and approximately 2 seconds per point on the others.

Power company requirements usually specify a certain value of current which may be drawn from the line in starting the motor, and which may be increased by the same amount in successive steps at short time intervals, provided that the circuit is not interrupted during the switching.

Number of Points Required: It is usually considered that the resistor starter must complete its entire sequence with the motor at standstill. That is, the necessary number of points is determined by dividing the full voltage locked rotor current of the motor by the permissible increment value and allowing one point for each graduation or fraction thereof.

Low Starting Torque: In certain instances it is possible to omit one or more starting contactors when the accelerating torque of the load is very light, so that the motor is able to accelerate to practically full speed on reduced voltage. However, in order to do this complete specifications must be given, including the following:

(1) Variation of load torque with speed during acceleration.

(2) Inertia of driven machine and its full load speed.

(3) Complete information regarding starting current limitations to be met.

(4) Complete information on the motor which will be used, so that the motor inertia, the variation of the motor torque current and speed of acceleration can be determined.

Ordering Information

See page 7 for ordering information, modification and heater selection. – See pages 15 to 18.

List Prices – Heaters Not Included
Class 11-440, Including Class 116 Resistors and NEMA 1 Enclosure

Hp	200-230 Volts, 3 Phase, 60 Hertz					380-460-575 Volts, 3 Phase, 60 Hertz				
	3-Point	4-Point	5-Point	6-Point	7-Point	3-Point	4-Point	5-Point	6-Point	7-Point
10	$ 1437	$ 1793	$ 2151	$ 2503	$ 2859	$ 1437	$ 1793	$ 2151	$ 2503	$ 2859
15	1469	1827	2179	2537	2893	1469	1827	2179	2537	2893
20	1743	2095	2453	2809	3167	1565	1921	2279	2631	2987
25	1781	2133	2491	2847	3201	1577	1935	2287	2645	3001
30	1827	2183	2541	2897	3251	1827	2183	2541	2897	3251
40	3293	3989	4689	5389	6085	1929	2281	2639	2995	3349
50	3293	3989	4689	5389	6085	1929	2281	2639	2995	3349
60	4793	5489	6187	6893	7588	3341	4037	4737	5437	6133
75	4793	5489	6187	6893	7588	3341	4037	4737	5437	6133
100	5149	5847	6545	7245	7943	3341	4037	4737	5437	6133
125	8733	10611	12485	14363	16239	4937	5633	6331	7037	7733
150	9149	11027	12899	14777	16655	4937	5633	6331	7037	7733
200	10295	12081	13955	15829	17705	5537	6235	6933	7633	8331
250	19175	21847	24517	27185	29855	9121	10999	12873	14749	16627
300	20233	22905	25579	28247	30919	9677	11555	13427	15305	17183
400	20477	23153	25823	28495	31161	10783	12569	14443	16317	18193

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Westinghouse Electric Corporation
General Control Division
Asheville, NC/Buffalo, NY 14240

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General Control Division
Asheville, NC/Buffalo, NY 14240

Price List
9220

Page 9

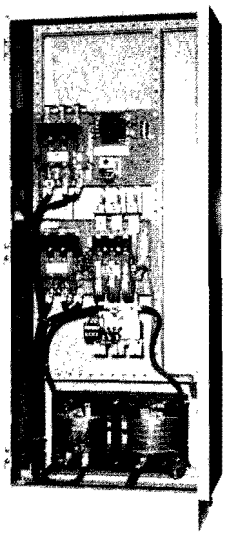
July 28, 1977
Supersedes PL 9220, pages 9-12, dated May 17, 1977
Prices effective May 17, 1977 and subject to change without notice.
Discount Symbol C10-G3
(Refer to Selling Policy 7000)
Mailed to: E, D, C/1806/PL

Non-Reversing, Reversing
Up to 600 Volts,
3 Phase, 60 Hertz

Ac Magnetic Reduced Voltage Starters

Reduced Voltage Magnetic Starters

Application



Class 11-600, Size 6

Autotransformer type starters are the most widely used reduced voltage starter because of their efficiency and flexibility. All power taken from the line, except transformer losses, is transmitted to the motor to accelerate the load. Taps on the transformer allow adjustment of the starting torque and inrush to meet the requirements of most applications. The following characteristics are produced by the three voltage taps:

Tap	Starting Torque % Locked Torque	Line Inrush % Locked Ampere
②50%	25%	③28%
65%	42%	③45%
80%	64%	③67%

② Not included 50 hp and below
③ Includes transformer magnetizing current

Closed transition is standard on all sizes assuring a smooth transition from reduced to full voltage. Since the motor is never disconnected from the line there is no interruption of line current which can cause a second inrush during transition.

Duty cycle of these starters is as follows: up to 200 hp, 15 seconds on each 4 minutes for 1 hour, repeated after 2 hours. Over 200 hp, three periods of 30 seconds on, 30 seconds off repeated after 1 hour.

Description

Class 11-600 Non-Reversing Starters Contain:

2 – Three pole starting contactors with auxiliary relays and interlocks, except size 7-8, one two pole and one three pole starting contactors (see table below for type).

1 – Three pole running contactor with auxiliary relays and interlocks (see table below for type).

Starter Size	Contactor Type	
	Starting	Running
2	A-201-K2	A-201-K2
3	A-201-K3	A-201-K3
4	A-201-K4	A-201-K4
5	GCA-530	GCA-530
6	GCA-530 & GCA-530	GCA-630
7	GCA-620 & GCA-630	GPD-730
8	GPD-720 & GPD-730	GPD-830
8L	GPD-820 & GPD-830	105-FD

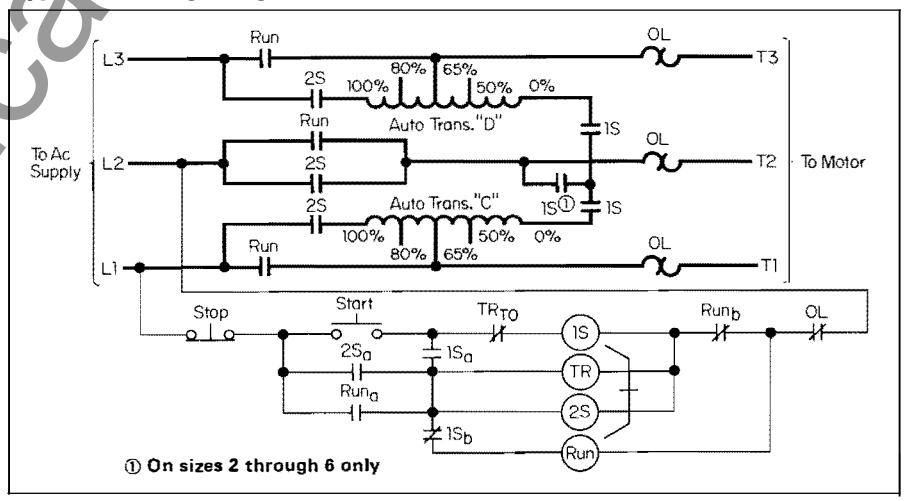
1 – Pneumatic timing relay.
1 – 3 pole adjustable type AN overload relay on size 1 through 4. This same overload relay is used with associated current transformers on size 5 and larger.
1 – Silicon rectifier to provide dc control voltage for size 7.
1 – Type A dry type two winding open delta connected auto-transformer mounted and wired in the enclosure in all sizes. All ratings have 65% and 80% voltage taps. Above 50 horsepower a 50% tap is also provided.

Classes 11-603, 11-604, 11-606: These non-reversing combination starters are similar to class 11-600 except that a disconnect switch or circuit breaker is added.

Class 11-610: This is a reversing type starter similar to the class 11-600 with two additional 2-pole contactors to furnish the reversing service.

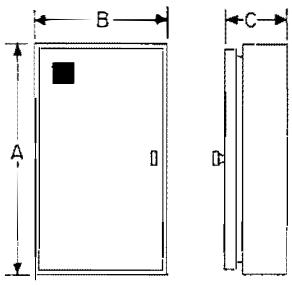
Classes 11-613, 11-614, 11-616: These are reversing type combination starters similar to class 11-610. In addition, they include either a disconnect switch or a circuit breaker.

Typical Wiring Diagram



① On sizes 2 through 6 only

Dimensions, Inches; Approximate Only



Starter Class	Size	Dimensions A④	B	C	Max. Shipping Wt., Lbs.
11-600	2-3-4	35	24	12	450
	5	64	28	14	750
	6	90	36	21	1250
	7-8	90	56	28	1400
11-603 / 11-606	2-3-4	35	24	12	500
	5	64	28	14	800
	6	90	36	21	1300
	7-8	90	56	28	1500
11-604	2-3-4	64	28	14	600
	5	64	36	14	850
	6	90	36	21	1450
	7-8	90	84	28	1750

④ 64 and 90 inch high enclosures are floor mounted.

Reduced Voltage Magnetic Starters

List Prices – Heaters Not Included

Classes 11-600, 11-603, 11-604, 11-606 Non-Reversing in NEMA 1 Enclosure

Max. Hp.	Volts 3-Phase 60 Hertz ②	Size	Starter Type: Without Short Circuit Protection — Catalog Number 11600	List Price	With Non-Fusible Disconnect — Catalog Number 11603	List Price	With Fusible Disconnect or Current Limiting Fused Disconnect — Fuse Clip Amps④	Catalog Number 11604	List Price	With Molded Case Circuit Breaker③ — Frame	Catalog Number 11606	List Price
10	200	2	S2CNNZ	$ 1139	S2CNNZ	$ 1379	100	S2CN1Z	$ 1437	FB	S2CNFZ	$ 1483
15	230	2	S2DNNB	1139	S2DNNB	1379	100	S2DN1B	1437	FB	S2DNFB	1483
	460-575	2	S2DNNC	1139	S2DNNC	1379		S2DN1C	1437	FB	S2DNFC	1483
20	230	3	S3ENNB	1339	S3ENNB	1643	200	S3EN2B	1747	FB	S3ENFB	1713
	460-575	2	S2ENNC	1139	S2ENNC	1379	100	S2EN1C	1437	FB	S2ENFC	1483
25	200-230	3	S3FNNB	1339⑤	S3FNNB	1643	200	S3FN2B	1747	FB	S3FNFB	1713
	460-575	2	S2FNNC	1139	S2FNNC	1379	100	S2FN1C	1437	FB	S2FNFC	1483
30	200	4	S4GNNZ	2591	S4GNNZ	3011	200	S4GN2Z	3315	KB	S4GNKZ	3275
	230	3	S3GNNB	1395⑤	S3GNNB	1699	200	S3GN2B	1803	FB	S3GNFB	1769
	460-575	3	S3GNNC	1395⑤	S3GNNC	1699	200	S3GN2C	1803	FB	S3GNFC	1769
40	200	4	S4HNNZ	2591	S4HNNZ	3011	200	S4HN2Z	3315	KB	S4HNKZ	3275
50	230	4	S4JNNB	2591⑤	S4JNNB	3011	200	S4JN2B	3315	KB	S4JNKB	3275
	460-575	3	S3JNNC	1443⑤	S3JNNC	1748	100	S3JN1C	1851	FB	S3JNFC	1817
75	200	5	S5LNNZ	4115	S5LNNZ	4867	400	S5LN4Z	5221	KB	S5LNKZ	5445
	230	5	S5LNNB	4115⑤	S5LNNB	4867	400	S5LN4B	5221	KB	S5LNKB	5445
	460-575	4	S4LNNC	2639⑤	S4LNNC	3059	200	S4LN2C	3363	KB	S4LNKC	3323
100	230	5	S5MNNB	4427⑤	S5MNNB	5179	400	S5MN4B	5533	LB	S5MNLB	5757
	460-575	4	S4MNNC	2639⑤	S4MNNC	3059	200	S4MN2C	3363	KB	S4MNKC	3323
125	230	6	S6NNNB	7611⑤	S6NNNB	9337	CL	S6NNCB	10441	LB	S6NNLB	9569
	460-575	5	S5NNNC	4259⑤	S5NNNC	5011	200	S5NN2C	5365	KB	S5NNKC	5589
150	200-230	6	S6PNNB	7935⑤	S6PNNB	9661	CL	S6PNCB	10765	MA	S6PNMB	9893
	460-575	5	S5PNNC	4259⑤	S5PNNC	5011	400	S5PN4C	5365	KB	S5PNKC	5589
200	230	6	S6WNNB	8219⑤	S6WNNB	9945	CL	S6WNCB	11049	MA	S6WNMB	10177
	460-575	5	S5WNNC	4815⑤	S5WNNC	5567	400	S5WN4C	5921	LB	S5WNLC	9145
250	230	7	S7YNNB	12845	S7YNNB	14671	CL	S7YNCB	16603	MA	S7YNMB	15559
	460-575	6	S6YNNC	7999⑤	S6YNNC	9725	CL	S6YNCC	10555	LB	S6YNLC	9957
300	230	7	S70NNB	13271	S70NNB	15097	CL	S70NCB	17029	NB	S70NBB	15985
	460-575	6	S60NNC	8463⑤	S60NNC	10189	CL	S60NCC	11293	MA	S60NMC	10421
400	230	8	S82NNB	17463	S82NNC	19679	CL	S82NCB	22751	NB	S82NBB	22063
	460-575	6	S62NNC	8707⑤	S62NNC	10433	CL	S62NCC	11537	MA	S62NMC	10665
450	230	8	S83NNB	18583	S83NNB	20799	CL	S83NCB	24765	PB	S83NPB	23183
	460-575	7	S73NNC	13881	S73NNC	15707	CL	S73NCC	17639	MA	S73NMC	16595
500	230	8L	S94NNB	24407	S94NNB	28647	CL	S94NCB	37949	PB	S94NPB	29007
	460-575	7	S74NNC	13881	S74NNC	15707	CL	S74NCC	17639	MA	S74NMC	16595
600	230	8L	S95NNB	25197	S95NNB	41303	CL	S95NCB	43615	....	.....	.....
	460-575	7	S75NNC	14205	S75NNC	16031	CL	S75NCC	17963	NB	S75NBC	16919
700	230	8L	S96NNB	27011	S96NNB	43119	CL	S96NCB	45429	....	.....	.....
	460-575	8	S86NNC	19135	S86NNC	21351	CL	S86NCC	24423	NB	S86NBC	23735
800	460-575	8	S87NNC	19803	S87NNC	22019	CL	S87NCC	25091	NB	S87NBC	24403
900	460-575	8	S88NNC	20505	S88NNC	24745	CL	S88NCC	26687	PB	S88NPC	25105
1000	460-575	8L	S99NNC	27447	S99NNC	29487	CL	S99NCC	33629	PB	S99NPC	32047
1250	460-575	8L	.....	28399	.....	44507	CL	.....	46823	....	.....	.....
1500	460-575	8L	.....	30093	.....	46201	CL	.....	48517	....	.....	.....

Ⓢ Stock item. (See SS-7015 for style number.) Stock at 230 volts and 460 volts only.
Note: Catalog numbers shown for 200-230 volts are for 230 volt designs. For 200 volts change last digit from B to Z. Catalog numbers for 460-575 volts are for 460 volts. For 575 volts, change last digit from C to D.
② For other voltages, refer to Westinghouse. For 3-phase, 50-Hertz, 380 volts, **add 5%** to 460-575 volt prices and order by description.
③ To substitute breakers, see page 16.
④ "CL" indicates that current limiting type fuses are included to provide 100,000 asymmetrical amperes interrupting capacity. A load break disconnect is provided in all ratings. Fuses not included up to and including size 5, sizes 6 to 9 include current limiting fuses.

Ordering Information

Order starters by catalog number and description, include:

Class number or type
Service, non-reversing or reversing.
Type disconnect or short circuit protection.
NEMA enclosure type.
NEMA size.
Horsepower and service factor.
Application and Duty Cycle.
System voltage.
Specify external reset button, if required.
Modifications.

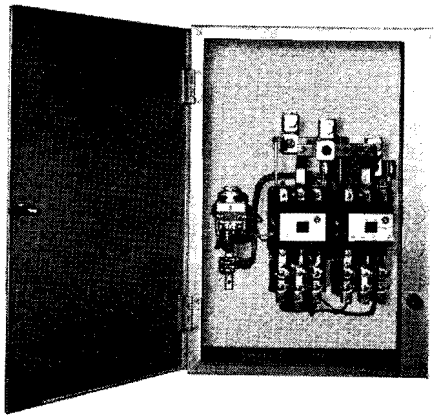
Modifications: Select modifications from pages 15, 16, 17 and order by description.

Heater Elements

Prices do not include heater elements. Starters require 3 overload relay heater elements at **$3.00 list each.** Refer to selection tables page 18.

Reduced Voltage Magnetic Starters

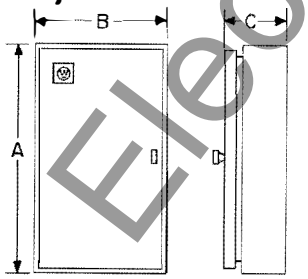
Application



Class 11-700, Size 4PW

Part winding starting provides convenient economical one-step acceleration at reduced current where the power company specifies a maximum, or limits the increments of current drawn from the line. These starters can be used with standard dual-voltage motors on the lower voltage and with special part-winding motors designed for any voltage. When used with standard dual-voltage motors, it should be established that the torque produced by the first half-winding will accelerate the load sufficiently so as not to produce a second undesirable inrush when the second half-winding is connected to the line. Most motors will produce a starting torque equal to between ½ to ⅔ of NEMA standard values with half of the winding energized and draw about ⅔ of normal line current inrush.

Dimensions, Inches; Approximate Only



Starter Class	Size	Dimensions A①	B	C	Max. Shipping Wt., Lbs.
11-700	1-2 PW	21	14	7	100
	3-4 PW	29	18	10	160
	5 PW	40	24	13	500
	6 PW	64	28	21	600
	7 PW	76	56	21	1000
11-704	1-2-3 PW	35	24	12	200
	4-5 PW	64	28	14	550
	6 PW	90	28	21	700
	7 PW	90	56	21	1200
11-703 11-706	1, 2, 3, 4 PW	35	24	12	200
	5 PW	64	28	14	550
	6 PW	90	28	21	700
	7 PW	90	56	21	1200

①64, 76 and 90 inch high enclosures are floor mounted.

Description

Class 11-700 Non-Reversing Two-Point Starters Contain:

2 – Three-pole starting contactors with auxiliary relays and interlocks (see table below).

Starter Size	Contactor Type
1PW	A-201-K1
2PW	A-201-K2
3PW	A-201-K3
4PW	A-201-K4
5PW	GCA-530
6PW	GCA-630
7PW	GPD-730

1 – Pneumatic timing relay.

3 pole adjustable type AN overload relay on sizes 1 through 4. This same overload relay is used with associated current transformers on size 5 and larger.

1 – Set of line terminals.

1 – Silicon rectifier to provide dc control voltage for size 7.

Class 11-706: This is a non-reversing combination starter similar to the class 11-700 starter except that it includes a molded case circuit breaker.

Class 11-740: This is a non-reversing, Three-point starter. In addition to devices listed for the class 11-700 two-point starter, it contains:

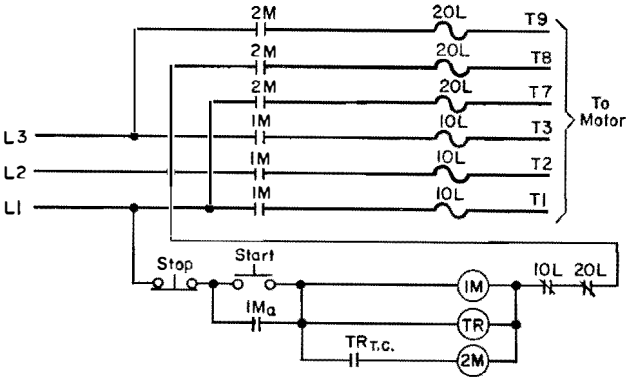
1 – Accelerating contactor (see table below) and additional timing relay.

Starter Size	Contactor Type
1PW	A-201-K1
2PW	A-201-K2
3PW	A-201-K3
4PW	A-201-K4
5PW	GCA-530

1 – Resistor frame of stainless steel tube type resistors mounted and wired in the enclosure in all sizes.

Class 11-746: This is a non-reversing combination starter similar to the class 11-740 and includes a molded case circuit breaker.

Typical Wiring Diagram



Reduced Voltage Magnetic Starters

List Prices – Heaters Not Included

Classes 11-700, 11-703, 11-706, 11-740 Non-Reversing, in NEMA 1 Enclosure

Max. Hp.	Volts 3-Phase 60 Hz ①	NEMA Size	Starter Type: Without Short Circuit Protection — Catalog Number 11-700	List Price	With Non-Fusible Disconnect — Catalog Number 11-703	List Price	With Fusible Disconnect or Current Limiting Fused Disconnect — Fuse Clip Amps②	Catalog Number 11-704	List Price	With Molded Case Circuit Breaker③ — Frame	Catalog Number 11-706	List Price	Class 11-740 3 Point Starter — List Price
10	200-230	1 PW	S1CNNB	**$ 448**	S1CNNB	**$ 688**	100	S1CN1B	**$ 746**	FB	S1CNFB	**$ 792**	**$1056**
15	460-575	1 PW	S1DNNC	**448**	S1DNNC	**688**	100	S1DN1C	**746**	FB	S1DNFC	**792**	**1056**
20	200	2 PW	S2ENNZ	**634Ⓢ④**	S2ENNZ	**938**	200	S2EN2Z	**1042**	FB	S2ENFZ	**1008**	**1392**
25	230	2PW	S2FNNB	**634Ⓢ④**	S2FNNB	**938**	200	S2FN2B	**1042**	FB	S2FNFB	**1008**	**1392**
40	200	3PW	S3HNNZ	**890Ⓢ**	S3HNNZ	**1310**	200	S3HN2Z	**1641**	KB	S3HNKZ	**1574**	**2002**
	460-575	2PW	S2HNNC	**634Ⓢ④**	S2HNNC	**938**	200	S2HN2C	**1042**	FB	S2HNFC	**1008**	**1452**
50	230	3PW	S3JNNB	**890Ⓢ**	S3JNNB	**1642**	200	S3JN2B	**1996**	KB	S3JNKB	**2220**	**2058**
75	200-230	4PW	S4LNNB	**1892Ⓢ**	S4LNNB	**2644**	400	S4LN4B	**2998**	KB	S4LNKB	**3222**	**4152**
	460-575	3PW	S3LNNC	**890Ⓢ**	S3LNNC	**1310**	100	S3LN1C	**1614**	FB	S3LNFC	**1574**	**2058**
150	200-230	5PW	S5PNNB	**3942Ⓢ**	S5PNNB	**5668**	CL	S5PNCB	**6772**	MA	S5PNMB	**5900**	**7216**
	460-575	4PW	S4PNNC	**1892Ⓢ**	S4PNNC	**2644**	400	S4PN4C	**2998**	KB	S4PNKC	**3222**	**4200**
300	230	6PW	S6ONNB	**8348**	S6ONNB	**10564**	CL	S6ONCB	**13636**	NB	S6ONBB	**12948**	....
350	460-575	5PW	S51NNC	**3942Ⓢ**	S51NNC	**5668**	CL	S51NCC	**6772**	MA	S51NMC	**5900**	**7604**
600	460-575	6PW	S65NNC	**8348**	S65NNC	**10174**	CL	S65NCC	**12106**	NB	S65NBC	**11062**	....

For larger ratings, refer to Westinghouse

Ⓢ Stock item. (See SS-7015 for style number.) Stock at 230 volts and 460 volts only.
① Catalog numbers shown for 200-230 volts are for 230 volt designs, for 200 volts change last digit from B to Z. Catalog numbers for 460-575 volts are for 460 volts. For 575 volts change the last digit from C to D.
For other voltages refer to Westinghouse. For 3-phase, 50-Hertz 380 or 460 volts, use 3-phase, 60-Hertz 460 volt prices and order by description.
② "CL" indicates that current limiting type fuses are included to provide 100,000 asymmetrical amperes interrupting capacity. A load break disconnect is provided in all ratings. Fuses not included up to and including size 4. Sizes 5 and 6 include current limiting fuses.
③ To substitute breakers, see page 84.
④ Stocked with separate control 115 volt.

Ordering Information

Order starters by catalog number and description, include:

Class number or type.
Service, non-reversing or reversing.
Type disconnect or short circuit protection.
NEMA enclosure type.
NEMA size.
Horsepower and service factor.
Application and Duty cycle.
System voltage.
Specify external reset button, if required.
Modifications.

For a class 11-740 starter, either the actual locked rotor amperes and locked kilowatts (or power factor) must be included; if starter is to be used with a Westinghouse motor, the style or order number must be included so that this data can be obtained.

Modifications: Select modifications from pages 15, 16, 17 and order by description.

Heater Elements

Prices do not include heater elements. Starters require 6 overload relay heater elements at **$3.00 list each.** Refer to page 18 for selection tables.

Printed in U.S.A.

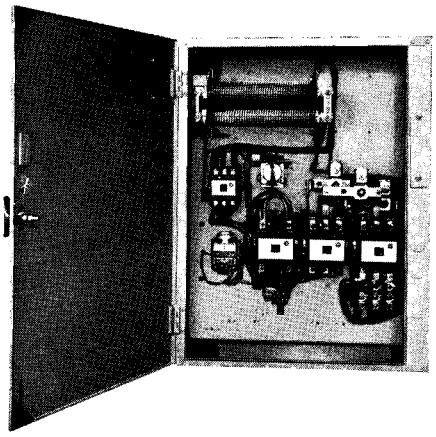
May 17, 1977
New Information
Prices effective May 17, 1977 and subject to change without notice.
Discount Symbol C10-G3
(Refer to Selling Policy 7000)
Mailed to: E, D, C/1806/PL

Non-Reversing, Reversing
Up to 600 Volts,
3 Phase, 60 Hertz

Ac Magnetic Reduced Voltage Starters

Reduced Voltage Magnetic Starters

Application



Class 11-890, Size 4YD

Star-Delta type starters have been applied extensively to industrial air conditioning installations because they are particularly applicable to starting motors driving high inertia loads with resulting long acceleration times. They are not, however, limited to this application. When six or twelve lead delta-connected motors are started star-connected, approximately 58% of full line voltage is applied to each winding and the motor develops 33% of full voltage starting torque and draws 33% of normal locked rotor current from the line. When the motor has accelerated, it is re-connected for normal delta operation.

Class 11-800 and 11-890 starters are suitable for air conditioning application, provided the motors used are open type and horsepower rated. For current rated motor starters for use with hermetic centrifugal air conditioning and refrigeration compressors, refer to Westinghouse.

Description

Class 11-800 Non-Reversing, Open Transition Starters Contain:
2 – Three pole delta contactors with auxiliary relays and interlocks (see table below).
1 – Three pole star contactor with auxiliary relays and interlocks (see table below).
1 – Mechanical interlock to interlock one delta contactor and the star contactor.

Starter Size	Contactor Type	
	Delta	Star
1YD	A-201-K1	A-201-K1
2YD	A-201-K2	A-201-K2
3YD	A-201-K3	A-201-K3
4YD	A-201-K4	A-201-K4
5YD	GCA-530	GCA-530
6YD	GCA-630	GCA-530
7YD	GPD-730	GCA-620
8YD	GPD-830	GPD-720

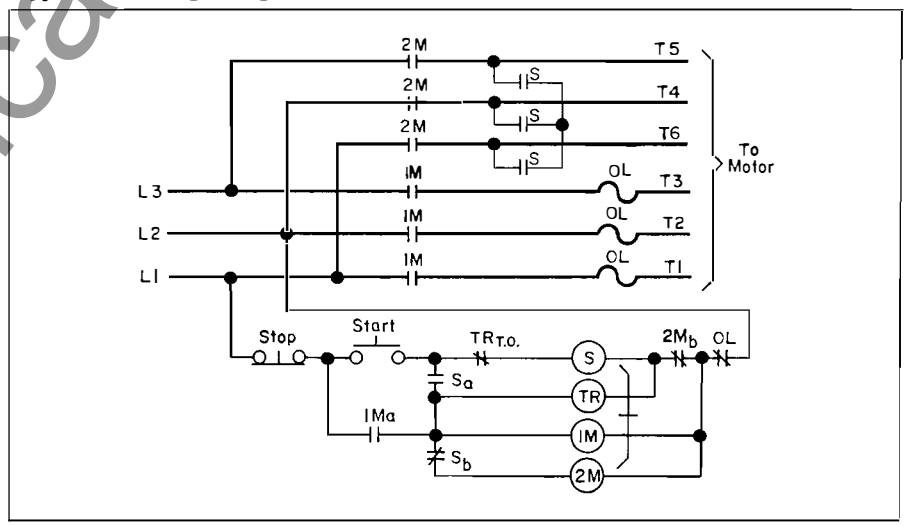
1 – Pneumatic timing relay.
1 – Three pole adjustable type AN overload relay on sizes 1 through 4. The same overload relay is used with associated current transformers on size 5 and larger.
1 – Silicon rectifier to provide dc control voltage for size 7 and larger.

Classes 11-803, 11-804, 11-806: These open transition type combination starters are similar to the class 11-800, except that they include either a disconnect switch or a circuit breaker for short circuit protection.

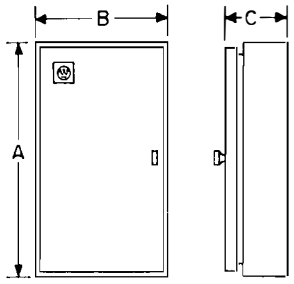
Class 11-890: This is a closed transition starter which contains, in addition to the devices listed for class 11-800 starters:
1 – Three pole transition contactor.
1 – Transition resistor frame of edgewound resistors mounted and wired in the enclosure in all sizes.
1 – TRP synchronous timer to assure proper transition.

Classes 11-893, 11-894, 11-896: These closed transition combination starters are similar to the class 11-890 except that they include either a disconnect switch or a circuit breaker.

Typical Wiring Diagram, Class 11-800



Dimensions, Inches; Approximate Only



Starter Class	Size	Dimensions A①	B	C	Max. Shipping Wt., Lbs.
11-800	1-2-3-4 YD	35	24	12	210
	5 YD	64	28	14	600
	6 YD	64	28	21	850
11-890	1-2-3-4 YD	35	24	12	400
	5 YD	76	28	14	900
	6 YD	90	28	21	1100

① 64, 76 and 90 inch high enclosures are floor mounted.

Reduced Voltage Magnetic Starters

List Prices – Heaters Not Included

Classes 11-800, 11-806, 11-890, 11-896 Non-Reversing in NEMA 1 Enclosure

Max. Hp. ②	Volts 3-Phase 60 Hertz ③	Size	Without Short Circuit Protection				With Molded Case Circuit Breaker				Breaker Frame Size
			Class 11-800 Open Transition		Class 11-890 Closed Transition		Class 11-806 Open Transition		Class 11-896 Closed Transition		
			Catalog Number 11800	List Price	Catalog Number 11890	List Price	Catalog Number 11806	List Price	Catalog Number 11896	List Price	
10	200-230	1YD	S1CNNB	$ 695	S1CNNB	$ 1057	S1CNFB	$ 1039	S1CNFB	$ 1401	FB
	460-575	1YD	S1CNNC	695	S1CNNC	1057	S1CNFC	1039	S1CNFC	1401	FB
15	460-575	1YD	S1DNNC	695	S1DNNC	1057	S1DNFC	1039	S1DNFC	1401	FB
20	200	2YD	S2ENNZ	821	S2ENNZ	1183	S2ENFZ	1195	S2ENFZ	1557	FB
25	230	2YD	S2FNNB	821	S2FNNB	1195	S2FNFB	1195	S2FNFB	1569	FB
	460-575	2YD	S2FNNC	821	S2FNNC	1195	S2FNFC	1195	S2FNFC	1569	FB
30	200-230	3YD	S3GNNB	1191	S3GNNB	1603	S3GNKB	1875	S3GNKB	2287	KB
	460-575	2YD	S2GNNC	821	S2GNNC	1195	S2GNFC	1195	S2GNFC	1569	FB
40	200	3YD	S3HNNZ	1191	S3HNNZ	1647	S3HNKZ	1875	S3HNKZ	2331	KB
	460-575	2YD	S2HNNC	821	S2HNNC	1239	S2HNFC	1195	S2HNFC	1613	FB
50	230	3YD	S3JNNB	1191	S3JNNB	1647	S3JNKB	1875	S3JNKB	2331	KB
	460-575	3YD	S3JNNC	1191	S3JNNC	1647	S3JNFC	1875	S3JNFC	2331	FB
60	200	4YD	S4KNNZ	2475	S4KNNZ	3141	S4KNKZ	3805	S4KNKZ	4471	KB
	460-575	3YD	S3KNNC	1191	S3KNNC	1695	S3KNFC	1875	S3KNFC	2379	FB
75	230	4YD	S4LNNB	2475	S4LNNB	3238	S4LNKB	3805	S4LNKB	4567	KB
	460-575	3YD	S3LNNC	1191	S3LNNC	1861	S3LNKC	1875	S3LNKC	2545	KB
100	200-230	5YD	S5MNNB	4515	S5MNNB	5467	S5MNLB	6173	S5MNLB	7125	LB
	460-575	4YD	S4MNNC	2475	S4MNNC	3365	S4MNKC	3805	S4MNKC	4695	KB
150	200-230	5YD	S5PNNB	4515	S5PNNB	5515	S5PNMB	6173	S5PNMB	7173	MA
	460-575	4YD	S4PNNC	2475	S4PNNC	3413	S4PNKC	3805	S4PNKC	4743	KB
250	200-230	6YD	S6YNNB	9631	S6YNNB	12079	S6YNMB	11589	S6YNMB	14037	MA
	460-575	5YD	S5YNNC	4515	S5YNNC	5647	S5YNLC	6173	S5YNLC	7305	LB
300	200-230	6YD	S60NNB	9631	S60NNB	12079	S60NBB	12345	S60NBB	14793	NB
	460-575	5YD	S50NNC	4515	S50NNC	5949	S50NMC	6173	S50NMC	7607	MA
350	230	6YD	S61NNB	9631	S61NNB	12079	S61NMB	12345	S61NMB	14793	MA
	460-575	6YD	S61NNC	9631	S61NNC	12079	S61NMC	11589	S61NMC	14037	MA
500	200-230	7YD	.....	13231	.....	17209	.....	....	.....	.....	...
	460-575	6YD	S64NNC	9631	S64NNC	12079	S64NMC	11589	S64NMC	14037	MA
700	460-575	6YD	S66NNC	9631	S66NNC	12079	S66NBC	12345	S66NBB	14793	NB
750	200	8YD	.....	18145	.....	22281	.....	....	.....	.....	...
800	230	8YD	.....	18145	.....	22857	.....	....	.....	.....	...
	460-575	7YD	.....	13231	.....	17209	.....	....	.....	.....	...
1000	460-575	7YD	.....	13231	.....	17209	.....	....	.....	.....	...
1250	460-575	8YD	.....	18145	.....	23159	.....	....	.....	.....	...
1500	460-575	8YD	.....	18145	.....	23159	.....	....	.....	.....	...

② For current rated starters for air conditioning application, refer to Westinghouse.
③ Catalog numbers shown for 200-230 volts are 230 volt designs. For 200 volts change last digit from B to Z. Catalog numbers for 460-575 volts are for 460 volts. For 575 volts change the last digit from C to D. For 3-phase, 50-Hertz 380 or 460 volts, use 3-phase. 60 Hertz 460 volt prices and order by description. For other voltages refer to Westinghouse.

Ordering Information

Order starters by catalog number and description, include:

Class number or type.
Service, non-reversing or reversing.
Type disconnect or short circuit protection.
NEMA enclosure type.
NEMA size.
Horsepower and service factor.
Application and duty cycle.
System voltage.
Specify external reset button, if required.
Modifications.

Modifications: Select modifications from pages 15, 16, 17 and order by description.

Heater Elements

Prices do not include heater elements. Starters require 3 overload relay heater elements at **$3.00 list each.** Refer to page 18 for selection tables.

Modifications and Accessories

Factory Modifications

Modifications	List Price Additions NEMA Size 1	2	3	4	5	6	7	8	8L
Reversing Starters									
Reduced Voltage	$288	$788	832	$1808	$2156	$3690	$4950	$7372	$10840
Wound Rotor	288	420	668	1024	1734	3012	4212	6168	9590
Control Circuit Devices									
Auxiliary Control Relay	152	152	152	152	152	152	152	152	152
Auxiliary Pneumatic Timer or Compelling Relay	168	168	168	168	168	168	168	168	168
Auxiliary Motor Operated Timer	352	352	352	352	352	352	352	352	352
Extra Electrical Interlock①	22	22	22	22	22	66	66	66	66
Incomplete Sequencing	238	238	238	238	238	238	238	238	238
Reverse Phase and Phase Failure Relay	612	612	612	612	612	760	760	760	760
Third Overload②	Std.	Std.	Std.	Std.	Std.	Std.	Std.	Std.	Std.
Ambient Compensated Overload Relay	8	8	8	8	8	8	64	64	64
Guardistor, Mount and Wire③	44	44	44	44	44	44	44	44	44
Undervoltage protection④	182	182	182	182	182	182	182	182	182
Time Delay Undervoltage	352	352	352	352	352	352	352	352	352
Solid State Overload Protection (MOR)⑧	654	732	804	824	869	869	869	869	869
Control Circuit Supply									
Control Fuses	44	44	44	44	44	44	44	44	44
Control Breaker⑤	174	174	174	174	174	174	174	174	174
Control Transformer⑥	96	124	156	176	196	196	196	196	196
Control Transformer with 300 Va extra capacity⑥	164	200	232	252	272	272	272	272	272
Separate Control Circuit⑦	No Charge								
Operator's and Pilot Devices									
Start-Stop Pushbutton or H-O-A Selector Switch	100	100	100	100	100	100	100	100	100
Extra pushbutton	30	30	30	30	30	66	66	66	66
Indicating lights	60	60	60	60	60	60	60	60	60

① Specify normally open or normally closed.
② Standard on all sizes of magnetically operated starters.
③ Guardistor Relay must be ordered with the motor.
④ Required on other than start-stop momentary circuits.
⑤ Internally operated.
⑥ Includes secondary fuse.
⑦ For a low voltage control circuit, we recommend the addition of a control circuit transformer to the starter. If a separate source of low voltage is used for the control circuit, there is a possibility of having a full voltage start after a line voltage failure that does not open the low voltage control circuit. If the low voltage control circuit source is wired so that it will be de-energized by any motor voltage failure, linestarting cannot occur.
⑧ Includes "HTM" heater and "LAM" long acceleration module.

Note: Add modifications to basic starter prices and apply appropriate starter discount symbol.

Modifications and Accessories

Factory Modifications

Modification	List Price Additions NEMA Size 1	2	3	4	5	6	7	8	8L
Meters									
Ammeter	$ 460	$ 460	$ 460	$ 460	$ 460	$ 460	$ 460	$ 460	$ 460
Voltmeter	460	460	460	460	460	460	460	460	460
Ammeter switch or voltmeter switch	204	204	204	204	204	204	204	204	204
Wattmeter	918	918	918	918	918	918	918	918	918
Watthour meter (2 element)	840	840	840	840	840	840	840	840	840
Demand attachment – Add	180	180	180	180	180	180	180	180	180
Elapsed time meter	116	116	116	116	116	116	116	116	116
Extra current transformer	....	332	332	332	332	488	488	488	488
Bus									
Ac main bus 1000 Amperes Max.	800	800	800	800	800	800	1000	1000	1200
Ac main bus 2000 Amperes Max.	1000	1000	1000	1000	1000	1000	1200	1200	1500
Ground bus	70	70	70	70	70	70	100	100	100
Silver plated bus	200	200	200	200	200	200	250	250	250
Enclosure									
Fungus Treatment	$200								
Special Paint – all sizes	200								
Space Heater – all sizes	140								
Space Heater Protective Switch for Separate Power Source – all sizes	74								
Space Heater Thermostat – all sizes	150								
Cylinder Lock – all sizes	132								
Kirk Key Lock – all sizes	332								

Substitution Air Circuit Breakers

Standard Breaker Frame	Price Addition Substitute Breaker Frame Mark 75		TriPac		Oversize	
FB	HFB	$ 180	FB	$ 280①	..	....
KB	HKB	590	LA	1440	..	....
LB	HLB	340	LA	540②	MA	$ 440
MA	HMA	340	NB	1400	NB	1300
NB	HNB	340	PB	2670	PB	1820③
PB③	...	....	PB	850④	PB	2940

① 100 amperes maximum.
② 400 amperes maximum.
③ 2000 amperes maximum.
④ 1600 amperes maximum.

Note: Add modifications to basic starter prices and apply appropriate starter discount symbol.

Westinghouse Electric Corporation
General Control Division
Asheville, NC/Buffalo, NY 14240

Printed in U.S.A.

May 17, 1977
New Information
Prices effective May 17, 1977 and subject to change without notice.
Discount Symbol C10-G3
(Refer to Selling Policy 7000)
Mailed to: E, D, C/1806/PL

Non-Reversing, Reversing
Up to 600 Volts,
3 Phase, 60 Hertz

Ac Magnetic Reduced Voltage Starters

Modifications and Accessories

Enclosures

Enclosure Type	Starter Class (Includes Combination Type)	Cat. No. Symbol 6th Digit	List Price Addition Starter Size 1	2	3	4	5	6 and Larger
Omission of Enclosure **(Price Deduction)**	11-400	K	**$− 20**	**$− 48**	**$−152**	**$−220**	**$−444**	**$− 712**
	11-600	K	**− 20**	**− 48**	**−152**	**−220**	**−444**	**− 712**
	11-700	K	**− 20**	**− 48**	**−152**	**−220**	**−444**	**− 712**
	11-800	K	**− 20**	**− 48**	**−152**	**−220**	**−444**	**− 712**
	13-200	K	**− 20**	**− 48**	**−152**	**−220**	**−444**	**− 712**
NEMA 1 Gasketed Door	All Classes	V	**80**	**80**	**80**	**80**	**110**	**200**
NEMA 3 Water Resistant (Ferrous Metal Construction)	11-400	3	**570**	**570**	**570**	**1090**	**1090**	**1450**
	11-600	3	**570**	**570**	**570**	**1090**	**1090**	**1450**
	11-700	3	**235**	**265**	**370**	**1090**	**1090**	**1450**
	11-800	3	**235**	**265**	**370**	**1090**	**1090**	**1450**
	13-200	3	**570**	**570**	**620**	**1090**	**1090**	**1450**
NEMA 3R Rain Resistant (Ferrous Metal Construction) ②	11-400	R	**450**	**510**	**530**	**630**	**1050**	**1150**
	11-600	R	**450**	**510**	**530**	**630**	**1050**	**1150**
	11-700	R	**230**	**260**	**350**	**550**	**1050**	**1150**
	11-800	R	**230**	**260**	**350**	**550**	**1050**	**1150**
	13-200	R	**450**	**510**	**530**	**630**	**1050**	**1150**
NEMA 4 Watertight-Dust-Tight (Ferrous Metal Construction) ②	11-400	4	**620**	**620**	**620**	**1140**	**1140**	**1500**
	11-600	4	**620**	**620**	**620**	**1140**	**1140**	**1500**
	11-700	4	**240**	**270**	**390**	**740**	**1140**	**1500**
	11-800	4	**240**	**270**	**390**	**740**	**1140**	**1500**
	13-200	4	**620**	**620**	**620**	**1140**	**1140**	**1500**
NEMA 12① Dust-Tight Industrial (Ferrous Metal Construction)	11-400	J	**300**	**360**	**380**	**480**	**900**	**1000**
	11-600	J	**300**	**360**	**380**	**480**	**900**	**1000**
	11-700	J	**200**	**250**	**300**	**400**	**900**	**1000**
	11-800	J	**200**	**250**	**300**	**400**	**900**	**1000**
	13-200	J	**300**	**360**	**380**	**480**	**900**	**1000**
NEMA 7 Class 1, Group D Hazardous Vapors	All Reduced Voltage	U	**Refer to Westinghouse**					
NEMA 9 Class 2, Group G Hazardous Vapors	All Reduced Voltage	Y	**Refer to Westinghouse**					

① To meet J.I.C. specifications, starter must also have control circuit transformer and disconnect switch or breaker, refer to Westinghouse.
② Stainless Steel Construction, refer to Westinghouse.

Note: Add modifications to basic starter prices and apply appropriate starter discount symbol.

Standard Heater Tables – Non-Ambient Compensated Overload Relay

Magnetic Full Voltage Starters-Size 5 and Larger, Class 11-200

Enclosed Starters With Type AN
Non-Ambient Compensated 3-Pole Block Overload Relay

Adjusted Full Load Current	Heater Catalog Number	Heater Style Number
Size 5 (with 300/5 current transformers)		
100 to 109	FH23	177C524G23
110 to 119	FH24	177C524G24
120 to 131	FH25	177C524G25
132 to 143	FH26	177C524G26
144 to 157	FH27	177C524G27
158 to 173	FH28	177C524G28
174 to 190	FH29	177C524G29
191 to 208	FH30	177C524G30
209 to 227	FH31	177C524G31
228 to 246	FH32	177C524G32
247 to 270	FH33	177C524G33
Size 6 (with 600/5 current transformers)		
199 to 217	FH23	177C524G23
218 to 239	FH24	177C524G24
240 to 263	FH25	177C524G25
264 to 287	FH26	177C524G26
288 to 316	FH27	177C524G27
317 to 346	FH28	177C524G28
347 to 380	FH29	177C524G29
381 to 416	FH30	177C524G30
417 to 455	FH31	177C524G31
456 to 493	FH32	177C524G32
494 to 540	FH33	177C524G33

Size 7 and Larger: Advise Full Load Current

Magnetic Reduced Voltage Starters Classes 11-400, 11-600, 11-700, 11-800

Enclosed Starters With Type AN
Non-Ambient Compensated 3-Pole Block Overload Relay

Class	Multiply actual motor full load current by factor below and refer to adjusted full load current column in tables	No. heaters required per starter
11-400	1	3
11-600	1	3
11-700	.5①	6
11-800	.575	3

① For Wye wound dual voltage and special part winding motors only. For Delta wound dual voltage motors, refer to motor manufacturer.

Adjusted Full Load Current	Heater Catalog Number	Heater Style Number
Sizes 1 and 2		
15.2 to 16.7	FH47	177C524G47
16.8 to 18.3	FH48	177C524G48
18.4 to 20.2	FH49	177C524G49
20.3 to 22.2	FH50	177C524G50
22.3 to 24.3	FH51	177C524G51
24.4 to 26.6	FH52	177C524G52
26.7 to 29.1	FH53	177C524G53
29.2 to 32.0	FH54	177C524G54
32.1 to 35.2	FH55	177C524G55
35.3 to 38.5	FH56	177C524G56
38.6 to 42.3	FH57	177C524G57
42.4 to 45.0	FH58	177C524G58
Sizes 3 and 4		
17.5 to 19.1	FH72	179C319G02
19.2 to 21.1	FH73	179C319G03
21.2 to 23.2	FH74	179C319G04
23.3 to 25.6	FH75	179C319G05
25.7 to 28.1	FH76	179C319G06
28.2 to 30.8	FH77	179C319G07
30.9 to 34.5	FH78	179C319G08
34.6 to 38.2	FH79	179C319G09
38.3 to 42.6	FH80	179C319G10
42.7 to 46	FH81	179C319G11
47 to 51	FH82	179C319G12
52 to 56	FH83	179C319G13
57 to 61	FH84	179C319G14
62 to 67	FH85	179C319G15
68 to 73	FH86	179C319G16
74 to 80	FH87	179C319G17
81 to 87	FH88	179C319G18
88 to 95	FH89	179C319G19
96 to 105	FH90	179C319G20
106 to 116	FH91	179C319G21
117 to 127	FH92	179C319G22
128 to 135	FH93	179C319G23
Size 5 (with 300/5 current transformers)		
100 to 109	FH23	177C524G23
110 to 119	FH24	177C524G24
120 to 131	FH25	177C524G25
132 to 143	FH26	177C524G26
147 to 157	FH27	177C524G27
158 to 173	FH28	177C524G28
174 to 190	FH29	177C524G29
191 to 208	FH30	177C524G30
209 to 227	FH31	177C524G31
228 to 246	FH32	177C524G32
247 to 270	FH33	177C524G33
Size 6 (with 600/5 current transformers)		
199 to 217	FH23	177C524G23
218 to 239	FH24	177C524G24
240 to 263	FH25	177C524G25
264 to 287	FH26	177C524G26
288 to 316	FH27	177C524G27
317 to 346	FH28	177C524G28
347 to 380	FH29	177C524G29
381 to 416	FH30	177C524G30
417 to 455	FH31	177C524G31
456 to 493	FH32	177C524G32
494 to 540	FH33	177C524G33

Size 7 and Larger: Advise Full Load Current.

Manual Reduced Voltage Starters Class 10-600

Enclosed Starters With Type AN
Non-Ambient Compensated 3-Pole Overload Relay

Full Load Current of Motor (Amps) 125% Overload Protection	Heater Catalog Number	Heater Style Number
Size 2 Starter		
14.8 to 16.2	FH45	177C524G45
16.3 to 17.8	FH46	177C524G46
17.9 to 19.5	FH47	177C524G47
19.6 to 21.5	FH48	177C524G48
21.6 to 23.6	FH49	177C524G49
23.7 to 25.9	FH50	177C524G50
26.0 to 28.5	FH51	177C524G51
28.6 to 31.1	FH52	177C524G52
31.2 to 34.2	FH53	177C524G53
34.3 to 37.5	FH54	177C524G54
37.6 to 41.3	FH55	177C524G55
41.4 to 45.1	FH56	177C524G56
45.2 to 49.5	FH57	177C524G57
49.6 to 54.0	FH58	177C524G58

Full Load Current of Motor (Amps) 125% Overload Protection	Heater Catalog Number	Heater Style Number
Size 3 and 4 Starter		
17.5 to 19.1	FH72	179C319G02
19.2 to 21.1	FH73	179C319G03
21.2 to 23.2	FH74	179C319G04
23.3 to 25.6	FH75	179C319G05
25.7 to 28.1	FH76	179C319G06
28.2 to 30.8	FH77	179C319G07
30.9 to 34.5	FH78	179C319G08
34.6 to 38.2	FH79	179C319G09
38.3 to 42.6	FH80	179C319G10
42.7 to 46	FH81	179C319G11
47 to 51	FH82	179C319G12
52 to 56	FH83	179C319G13
57 to 61	FH84	179C319G14
62 to 67	FH85	179C319G15
68 to 73	FH86	179C319G16
74 to 80	FH87	179C319G17
81 to 87	FH88	179C319G18
88 to 95	FH89	179C319G19
96 to 105	FH90	179C319G20
106 to 116	FH91	179C319G21
117 to 127	FH92	179C319G22
128 to 135	FH93	179C319G23
Size 5 and 5M Starter with 400/5 Current Transformer		
69 to 74	FH16	177C524G16
75 to 82	FH17	177C524G17
83 to 90	FH18	177C524G18
91 to 100	FH19	177C524G19
101 to 110	FH20	177C524G20
111 to 121	FH21	177C524G21
122 to 132	FH22	177C524G22
133 to 145	FH23	177C524G23
146 to 159	FH24	177C524G24
160 to 175	FH25	177C524G25
176 to 191	FH26	177C524G26
192 to 210	FH27	177C524G27
211 to 231	FH28	177C524G28
232 to 253	FH29	177C524G29
254 to 277	FH30	177C524G30
278 to 301	FH31	177C524G31
302 to 329	FH32	177C524G32
330 to 364	FH33	177C524G33
Size 5MM Starter with 600/5 Current Transformer		
199 to 217	FH23	177C524G23
218 to 239	FH24	177C524G24
240 to 263	FH25	177C524G25
264 to 287	FH26	177C524G26
288 to 316	FH27	177C524G27
317 to 347	FH28	177C524G28
348 to 380	FH29	177C524G29

Price of heaters, each . . . . . **$3.00 list**

Ac Magnetic
Reduced Voltage Starters

Class 11-700 Part-Winding
Non-Reversing, Reversing
Up to 600 Volts, 3-Phase, 60 Hertz

List Prices – Heaters Not Included

Classes 11-700, 11-703, 11-706, 11-740 Non-Reversing, in NEMA 1 Enclosure

Max. Hp.	Volts 3-Phase 60 Hz ①	NEMA Size	Starter Type: Without Short Circuit Protection — Catalog Number 11-700	List Price	With Non-Fusible Disconnect — Catalog Number 11-703	List Price	With Fusible Disconnect or Current Limiting Fused Disconnect — Fuse Clip Amps②	Catalog Number 11-704	List Price	With Molded Case Circuit Breaker③ — Frame	Catalog Number 11-706	List Price	Class 11-740 3 Point Starter — List Price
10	200-230	1 PW	S1CNNB	**$ 448**	S1CNNB	**$ 688**	100	S1CN1B	**$ 746**	FB	S1CNFB	**$ 792**	**$1056**
15	460-575	1 PW	S1DNNC	**448**	S1DNNC	**688**	100	S1DN1C	**746**	FB	S1DNFC	**792**	**1056**
20	200	2 PW	S2ENNZ	**634Ⓢ④**	S2ENNZ	**938**	200	S2EN2Z	**1042**	FB	S2ENFZ	**1008**	**1392**
25	230	2PW	S2FNNB	**634Ⓢ④**	S2FNNB	**938**	200	S2FN2B	**1042**	FB	S2FNFB	**1008**	**1392**
40	200	3PW	S3HNNZ	**890Ⓢ**	S3HNNZ	**1310**	200	S3HN4Z	**1641**	KA	S3HNJZ	**1574**	**2002**
	460-575	2PW	S2HNNC	**634Ⓢ④**	S2HNNC	**938**	200	S2HN2C	**1042**	FB	S2HNFC	**1008**	**1452**
50	230	3PW	S3JNNB	**890Ⓢ**	S3JNNB	**1642**	200	S3JN6B	**1996**	KA	S3JNJB	**2220**	**2058**
75	200-230	4PW	S4LNNB	**1892Ⓢ**	S4LNNB	**2644**	400	S4LN6B	**2998**	LA	S4LNLB	**3222**	**4152**
	460-575	3PW	S3LNNC	**890Ⓢ**	S3LNNC	**1310**	100	S3LN4C	**1614**	FB	S3LNFC	**1574**	**2058**
150	200-230	5PW	S5PNNB	**3942Ⓢ**	S5PNNB	**5668**	CL	S5PNCB	**6772**	MA	S5PNMB	**5900**	**7216**
	460-575	4PW	S4PNNC	**1892Ⓢ**	S4PNNC	**2644**	400	S4PN6C	**2998**	LA	S4PNLC	**3222**	**4200**
300	230	6PW	S6ONNB	**8348**	S6ONNB	**10564**	CL	S6ONCB	**13636**	PB	S6ONPB	**12948**	....
350	460-575	5PW	S51NNC	**3942Ⓢ**	S51NNC	**5668**	CL	S51NCC	**6772**	MA	S51NMC	**5900**	**7604**
600	460-575	6PW	S65NNC	**8348**	S65NNC	**10174**	CL	S65NCC	**12106**	MA	S65NMC	**11062**	....

For larger ratings, refer to Westinghouse

Ⓢ Stock item. (See SS-7015 for style number.) Stock at 230 volts and 460 volts only.
① Catalog numbers shown for 200-230 volts are for 230 volt designs, for 200 volts change last digit from B to Z. Catalog numbers for 460-575 volts are for 460 volts. For 575 volts change the last digit from C to D.
For other voltages refer to Westinghouse. For 3-phase, 50-Hertz 380 or 460 volts, use 3-phase, 60-Hertz 460 volt prices and order by description.
② "CL" indicates that current limiting type fuses are included to provide 100,000 asymmetrical amperes interrupting capacity. A load break disconnect is provided in all ratings.
③ To substitute breakers, see page 14.
④ Stocked with separate control 115 volt.

Ordering Information

Order starters by catalog number and description, include:

- Class number or type.
- Service, non-reversing or reversing.
- Type disconnect or short circuit protection.
- NEMA enclosure type.
- NEMA size.
- Horsepower and service factor.
- Application and Duty cycle.
- System voltage.
- Specify external reset button, if required.
- Modifications.

For a class 11-740 starter, either the actual locked rotor amperes and locked kilowatts (or power factor) must be included; if starter is to be used with a Westinghouse motor, the style or order number must be included so that this data can be obtained.

Modifications: Select modifications from pages 13-15, and order by description.

Heater Elements

Prices do not include heater elements. Starters require 6 overload relay heater elements at **$3.00 list each.** Refer to page 16 for selection tables.

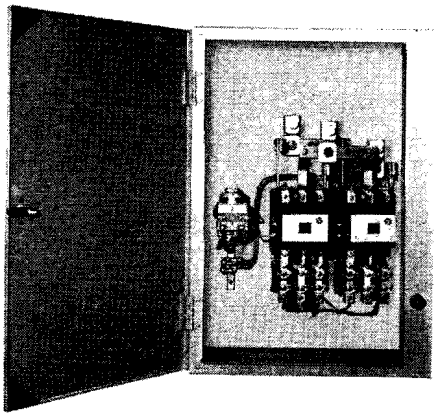
Westinghouse Electric Corporation
General Control Division, Buffalo, N. Y. 14240
Printed in USA

Westinghouse

Ac Magnetic Reduced Voltage Starters

Class 11-700 Part-Winding
Non-Reversing, Reversing
Up to 600 Volts, 3-Phase, 60 Hertz

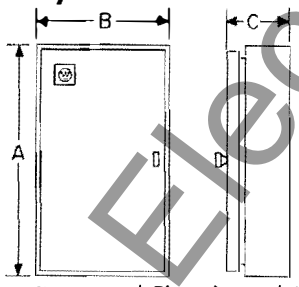
Application



Class 11-700, Size 4PW

Part winding starting provides convenient, economical one-step acceleration at reduced current where the power company specifies a maximum, or limits the increments of current drawn from the line. These starters can be used with standard dual-voltage motors on the lower voltage and with special part-winding motors designed for any voltage. When used with standard dual-voltage motors, it should be established that the torque produced by the first half-winding will accelerate the load sufficiently so as not to produce a second undesirable inrush when the second half-winding is connected to the line. Most motors will produce a starting torque equal to between ½ to ⅔ of NEMA standard values with half of the winding energized and draw about ⅔ of normal line current inrush.

Dimensions, Inches; Approximate Only



Starter Class	Size	Dimensions A①	B	C	Max. Shipping Wt., Lbs.
11-700	1-2 PW	21	14	7	100
	3-4 PW	29	18	10	160
	5 PW	35	24	12	500
	6 PW	64	28	21	600
	7 PW	76	56	21	1000
11-703	1-2-3 PW	35	24	12	200
11-704	4-5 PW	64	28	14	550
11-706	6 PW	90	28	21	700
	7 PW	90	56	21	1200

① 64, 76 and 90 inch high enclosures are floor mounted.

Description of Starters

Class 11-700 Non-Reversing Two-Point Starters Contain:

2 – Three-pole starting contactors with auxiliary relays and interlocks (see table below).

Starter Size	Contactor Type
1PW	A-201-K1
2PW	A-201-K2
3PW	A-201-K3
4PW	A-201-K4
5PW	GCA-530
6PW	GCA-630
7PW	GPD-730

1 – Pneumatic timing relay.

3 pole adjustable type AN overload relay on sizes 1 through 4. This same overload relay is used with associated current transformers on size 5 and larger.

1 – Set of line terminals.

1 – Silicon rectifier to provide dc control voltage for size 7.

Class 11-706: This is a non-reversing combination starter similar to the class 11-700 starter except that it includes a molded case circuit breaker.

Class 11-740: This is a non-reversing, Three-point starter. In addition to devices listed for the class 11-700 two-point starter, it contains:

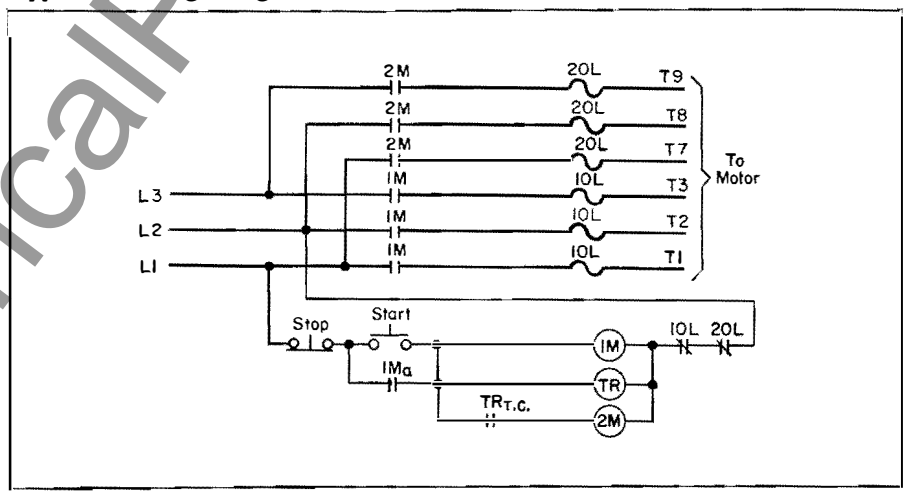
1 – Accelerating contactor (see table below) and additional timing relay.

Starter Size	Contactor Type
1PW	A-201-K1
2PW	A-201-K2
3PW	A-201-K3
4PW	A-201-K4
5PW	GCA-530

1 – Resistor frame of stainless steel tube type resistors mounted and wired in the enclosure in all sizes.

Class 11-746: This is a non-reversing combination starter similar to the class 11-740 and includes a molded case circuit breaker.

Typical Wiring Diagram



Prices effective July 6, 1971; subject to change without notice.
Discount Symbol C10-G3
Selling Policy 7000

February 26, 1974
Supersedes PL 9220, pages 9-10, dated October 8, 1973
E. D. C/1806/PL

Ac Magnetic
Reduced Voltage Starters

Class 11-600 Autotransformer
Non-Reversing, Reversing
Up to 600 Volts, 3-Phase, 60 Hertz

List Prices – Heaters Not Included

Classes 11-600, 11-603, 11-604, 11-606 Non-Reversing in NEMA 1 Enclosure

Max. Hp.	Volts 3-Phase 60 Hertz ②	Size	Starter Type: Without Short Circuit Protection — Catalog Number 11600	List Price	With Non-Fusible Disconnect — Catalog Number 11603	List Price	With Fusible Disconnect or Current Limiting Fused Disconnect — Fuse Clip Amps④	Catalog Number 11604	List Price	With Molded Case Circuit Breaker③ — Frame	Catalog Number 11606	List Price
10	200	2	S2CNNZ	$ 1139	S2CNNZ	$ 1379	100	S2CN1Z	$ 1437	FB	S2CNFZ	$ 1483
15	230	2	S2DNNB	1139	S2DNNB	1379	100	S2DN1B	1437	FB	S2DNFB	1483
	460-575	2	S2DNNC	1139	S2DNNC	1379		S2DN1C	1437	FB	S2DNFC	1483
20	230	3	S3ENNB	1339	S3ENNB	1643	200	S3EN2B	1747	FB	S3ENFB	1713
	460-575	2	S2ENNC	1139	S2ENNC	1379	100	S2EN1C	1437	FB	S2ENFC	1483
25	200-230	3	S3FNNB	1339Ⓢ	S3FNNB	1643	200	S3FN2B	1747	FB	S3FNFB	1713
	460-575	2	S2FNNC	1139	S2FNNC	1379	100	S2FN1C	1437	FB	S2FNFC	1483
30	200	4	S4GNNZ	2591	S4GNNZ	3011	200	S4GN4Z	3315	KA	S4GNJZ	3275
	230	3	S3GNNB	1395Ⓢ	S3GNNB	1699	200	S3GN2B	1803	FB	S3GNFB	1769
	460-575	3	S3GNNC	1395Ⓢ	S3GNNC	1699	200	S3GN2C	1803	FB	S3GNFC	1769
40	200	4	S4HNNZ	2591	S4HNNZ	3011	200	S4HNNZ	3315	KA	S4HNNZ	3275
50	230	4	S4JNNB	2591Ⓢ	S4JNNB	3011	200	S4JN4B	3315	KA	S4JNJB	3275
	460-575	3	S3JNNC	1443Ⓢ	S3JNNC	1748	100	S3JN2C	1851	FB	S3JNFC	1817
75	200	5	S5LNNZ	4115	S5LNNZ	4867	400	S5LN6Z	5221	LA	S5LNLZ	5445
	230	5	S5LNNB	4115Ⓢ	S5LNNB	4867	400	S5LN6B	5221	LA	S5LNLB	5445
	460-575	4	S4LNNC	2639Ⓢ	S4LNNC	3059	200	S4LN4C	3363	KA	S4LNJC	3323
100	230	5	S5MNNB	4427Ⓢ	S5MNNB	5179	400	S5MN6B	5533	LA	S5MNLB	5757
	460-575	4	S4MNNC	2639Ⓢ	S4MNNC	3059	200	S4MN4C	3363	KA	S4MNJC	3323
125	230	6	S6NNNB	7611Ⓢ	S6NNNB	9337	CL	S6NNCB	10441	LA	S6NNLB	9569
	460-575	5	S5NNNC	4259Ⓢ	S5NNNC	5011	200	S5NN6C	5365	KA	S5NNJC	5589
150	200-230	6	S6PNNB	7935Ⓢ	S6PNNB	9661	CL	S6PNCB	10765	MA	S6PNMB	9893
	460-575	5	S5PNNC	4259Ⓢ	S5PNNC	5011	400	S5PN6C	5365	LA	S5PNLC	5589
200	230	6	S6WNNB	8219Ⓢ	S6WNNB	9945	CL	S6WNCB	11049	MA	S6WNMB	10177
	460-575	5	S5WNNC	4815Ⓢ	S5WNNC	5567	400	S5WN6C	5921	LA	S5WNLC	6145
250	230	7	S7YNNB	12845	S7YNNB	14671	CL	S7YNCB	16603	MA	S7YNMB	15559
	460-575	6	S6YNNC	7999Ⓢ	S6YNNC	9725	CL	S6YNCC	10555	LA	S6YNLC	9957
300	230	7	S70NNB	13271	S70NNB	15097	CL	S70NCB	17029	MB	S70NBB	15985
	460-575	6	S60NNC	8463Ⓢ	S60NNC	10189	CL	S60NCC	11293	MA	S60NMC	10421
400	230	8	S82NNB	17463	S82NNC	19679	CL	S82NCB	22751	MB	S82NBB	22063
	460-575	6	S62NNC	8707Ⓢ	S62NNC	10433	CL	S62NCC	11537	MA	S62NMC	10665
450	230	8	S83NNB	18583	S83NNB	20799	CL	S83NCB	24765	PB	S83NPB	23183
	460-575	7	S73NNC	13881	S73NNC	15707	CL	S73NCC	17639	MA	S73NMC	16595
500	230	BL	S94NNB	24407	S94NNB	28647	CL	S94NCB	37949	PB	S94NPB	29007
	460-575	7	S74NNC	13881	S74NNC	15707	CL	S74NCC	17639	MA	S74NMC	16595
600	230	BL	S95NNB	25197	S95NNB	41303	CL	S95NCB	43615	....	.....	.....
	460-575	7	S75NNC	14205	S75NNC	16031	CL	S75NCC	17963	NB	S75NBC	16919
700	230	BL	S96NNB	27011	S96NNB	43119	CL	S96NCB	45429	....	.....	.....
	460-575	8	S86NNC	19135	S86NNC	21351	CL	S86NCC	24423	NB	S86NBC	23735
800	460-575	8	S87NNC	19803	S87NNC	22019	CL	S87NCC	25091	NB	S87NBC	24403
900	460-575	8	S88NNC	20505	S88NNC	24745	CL	SBBNCC	26687	PB	S88NPC	25105
1000	460-575	8L	S99NNC	27447	S99NNC	29487	CL	S99NCC	33629	PB	S99NPC	32047
1250	460-575	8L	.....	28399	.....	44507	CL	.....	46823	....	.....	.....
1500	460-575	8L	.....	30093	.....	46201	CL	.....	48517	....	.....	.....

Ⓢ Stock item. (See SS-7015 for style number.) Stock at 230 volts and 460 volts only.
Note: Catalog numbers shown for 200-230 volts are for 230 volt designs. For 200 volts change last digit from B to Z. Catalog numbers for 460-575 volts are for 460 volts. For 575 volts, change last digit from C to D.
② For other voltages, refer to Westinghouse. For 3-phase, 50-Hertz, 380 volts, **add 5%** to 460-575 volt prices and order by description.
③ To substitute breakers, see page 14.
④ "CL" indicates that current limiting type fuses are included to provide 100,000 asymmetrical amperes interrupting capacity. A load break disconnect is provided in all ratings.

Ordering Information

Order starters by catalog number and description, include:

Class number or type
Service, non-reversing or reversing.
Type disconnect or short circuit protection.
NEMA enclosure type.
NEMA size.
Horsepower and service factor.
Application and Duty Cycle.
System voltage.
Specify external reset button, if required.
Modifications.

Modifications: Select modifications from pages 13-15, and order by description.

Heater Elements

Prices do not include heater elements. Starters require 3 overload relay heater elements at **$3.00 list each.** Refer to selection tables page 16.

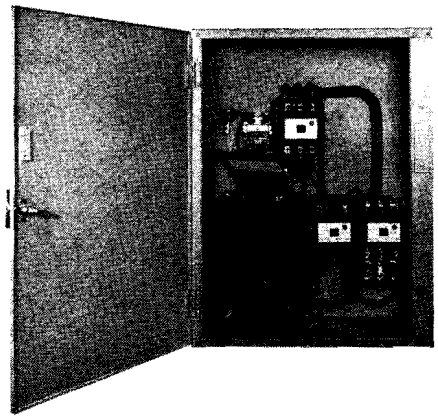
Westinghouse Electric Corporation
General Control Division, Buffalo, N. Y. 14240
Printed in USA

Westinghouse

Ac Magnetic Reduced Voltage Starters

Class 11-600 Autotransformer
Non-Reversing, Reversing
Up to 600 Volts, 3-Phase, 60 Hertz

Application



Class 11-600, Size 4

Autotransformer type starters are the most widely used reduced voltage starter because of their efficiency and flexibility. All power taken from the line, except transformer losses, is transmitted to the motor to accelerate the load. Taps on the transformer allow adjustment of the starting torque and inrush to meet the requirements of most applications. The following characteristics are produced by the three voltage taps:

Tap	Starting Torque % Locked Torque	Line Inrush %Locked Ampere
②50%	25%	③28%
65%	42%	③45%
80%	64%	③67%

② Not included 50 hp and below.
③ Includes transformer magnetizing current.

Closed transition is standard on all sizes assuring a smooth transition from reduced to full voltage. Since the motor is never disconnected from the line there is no interruption of line current which can cause a second inrush during transition.

Duty cycle of these starters is as follows: up to 200 hp, 15 seconds on each 4 minutes for 1 hour, repeated after 2 hours. Over 200 hp, three periods of 30 seconds on, 30 seconds off repeated after 1 hour.

Description of Starters

Class 11-600 Non-Reversing Starters Contain:

1 – Three pole and one two pole starting contactors with auxiliary relays and interlocks (see table below for type).

1 – Three pole running contactor with auxiliary relays and interlocks (see table below for type).

Starter Size	Contactor Type	
	Starting	Running
2	A-201-K2	A-201-K2
3	A-201-K3	A-201-K3
4	A-201-K4	A-201-K4
5	GCA-530	GCA-530
6	GCA-530 & GCA-530	GCA-630
7	GCA-620 & GCA-630	GPD-730
8	GPD-720 & GPD-730	GPD-830
8L	GPD-820 & GPD-830	105-FD

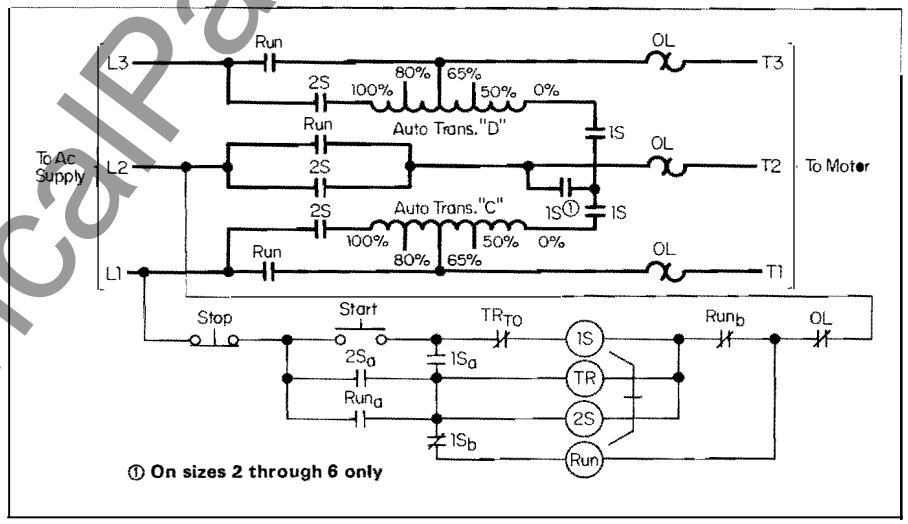
1 – Pneumatic timing relay.
1 – 3 pole adjustable type AN overload relay on size 1 through 4. This same overload relay is used with associated current transformers on size 5 and larger.
1 – Silicon rectifier to provide dc control voltage for size 7.
1 – Type A dry type two winding open delta connected auto-transformer mounted and wired in the enclosure in all sizes. All ratings have 65% and 80% voltage taps. Above 50 horsepower a 50% tap is also provided.

Classes 11-603, 11-604, 11-606: These non-reversing combination starters are similar to class 11-600 except that a disconnect switch or circuit breaker is added.

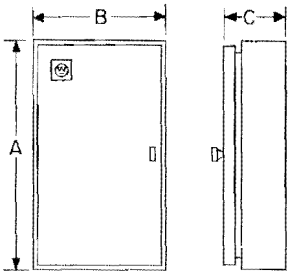
Class 11-610: This is a reversing type starter similar to the class 11-600 with two additional 2-pole contactors to furnish the reversing service.

Classes 11-613, 11-614, 11-616: These are reversing type combination starters similar to class 11-610. In addition, they include either a disconnect switch or a circuit breaker.

Typical Wiring Diagram



Dimensions, Inches; Approximate Only



Starter Class	Size	Dimensions A①	B	C	Max. Shipping Wt., Lbs.
11-600	2-3-4	35	24	12	450
	5	64	28	14	750
	6	90	36	21	1250
	7-8	90	56	28	1400
11-603 / 11-606	2-3-4	35	24	12	500
	5	64	28	14	800
	6	90	36	21	1300
	7-8	90	56	28	1500
11-604	2-3-4	64	28	14	600
	5	64	36	14	850
	6	90	36	21	1450
	7-8	90	84	28	1750

① 64 and 90 inch high enclosures are floor mounted.

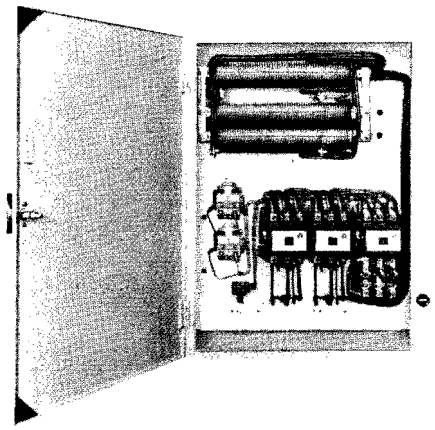
Prices effective July 6, 1971; subject to change without notice.
Discount Symbol C10-G3
Selling Policy 7000

February 26, 1974
Supersedes PL 9220, pages 7-8, dated October 8, 1973
E, D, C/1806/PL

Ac Magnetic
Reduced Voltage Starters

Class 11-440 Network Starters
Non-Reversing, Reversing
Up to 600 Volts, 3-Phase, 60 Hertz

Multi-Point Network Starter



Class 11-440 3 point starter

Multi-point Acceleration: These starters are designed for use on network distribution systems where the starting current limitations of the power company are such that standard across-the-line or 2-point resistance type starters will not give small enough increments of starting current.

They are designed to provide approximately 3 seconds per point on a two-point starter and approximately 2 seconds per point on the others.

Power company requirements usually specify a certain value of current which may be drawn from the line in starting the motor, and which may be increased by the same amount in successive steps at short time intervals, provided that the circuit is not interrupted during the switching.

Number of Points Required: It is usually considered that the resistor starter must complete its entire sequence with the motor at standstill. That is, the necessary number of points is determined by dividing the full voltage locked rotor current of the motor by the permissible increment value and allowing one point for each graduation or fraction thereof.

Low Starting Torque: In certain instances it is possible to omit one or more starting contactors when the accelerating torque of the load is very light, so that the motor is able to accelerate to practically full speed on reduced voltage. However, in order to do this complete specifications must be given, including the following:

(1) Variation of load torque with speed during acceleration.

(2) Inertia of driven machine and its full load speed.

(3) Complete information regarding starting current limitations to be met.

(4) Complete information on the motor which will be used, so that the motor inertia, the variation of the motor torque current and speed of acceleration can be determined.

Ordering Information

See page 5 for ordering information, modification and heater selection.

List Prices – Heaters Not Included
Class 11-440, Including Class 116 Resistors and NEMA 1 Enclosure

Hp	200-230 Volts, 3 Phase, 60 Hertz					380-460-575 Volts, 3 Phase, 60 Hertz				
	3-Point	4-Point	5-Point	6-Point	7-Point	3-Point	4-Point	5-Point	6-Point	7-Point
10	$ 1437	$ 1793	$ 2151	$ 2503	$ 2859	$ 1437	$ 1793	$ 2151	$ 2503	$ 2859
15	1469	1827	2179	2537	2893	1469	1827	2179	2537	2893
20	1743	2095	2453	2809	3167	1565	1921	2279	2631	2987
25	1781	2133	2491	2847	3201	1577	1935	2287	2645	3001
30	1827	2183	2541	2897	3251	1827	2183	2541	2897	3251
40	3293	3989	4689	5389	6085	1929	2281	2639	2995	3349
50	3293	3989	4689	5389	6085	1929	2281	2639	2995	3349
60	4793	5489	6187	6893	7588	3341	4037	4737	5437	6133
75	4793	5489	6187	6893	7588	3341	4037	4737	5437	6133
100	5149	5847	6545	7245	7943	3341	4037	4737	5437	6133
125	8733	10611	12485	14363	16239	4937	5633	6331	7037	7733
150	9149	11027	12899	14777	16655	4937	5633	6331	7037	7733
200	10295	12081	13955	15829	17705	5537	6235	6933	7633	8331
250	19175	21847	24517	27185	29855	9121	10999	12873	14749	16627
300	20233	22905	25579	28247	30919	9677	11555	13427	15305	17183
400	20477	23153	25823	28495	31161	10783	12569	14443	16317	18193

Westinghouse Electric Corporation
General Control Division, Buffalo, N. Y. 14240
Printed in USA

Westinghouse

Ac Magnetic Reduced Voltage Starters

Class 11-400 Primary Resistor
Non-Reversing, Reversing
Up to 600 Volts, 3-Phase, 60 Hertz

List Prices – Heaters Not Included

Classes 11-400, 11-403, 11-404, 11-406 Starters Non-Reversing in NEMA 1 Enclosure

Max. Hp.	Volts 3-Phase 60 Hertz ④	NEMA Size	Starter Type with Class A.S. 116 Resistor: Without Short Circuit Protection — Catalog Number 11400	List Price	With Non-Fusible Disconnect — Catalog Number 11403	List Price	With Fusible Disconnect or Current-Limiting Fused Disconnect — Fuse Clip③ Amps	Catalog Number 11404	List Price	With Molded Case Circuit Breaker② — Frame	Catalog Number 11406	List Price	Add for Class A.S. 156 Resistor for High Inertia Starting Duty
5	230	1	S1ANNB	$ 571	S1ANNB	$ 759	60	S1AN0B	$ 791	FB	S1ANFB	$ 853	$ 248
	460-575	1	S1ANNC	571	S1ANNC	759	60	S1AN0C	791	FB	S1ANFC	853	248
7½	200-230	1	S1BNNB	591	S1BNNB	779	60	S1BN0B	811	FB	S1BNFB	873	372
	460-575	1	S1BNNC	591	S1BNNC	779	60	S1BN0C	811	FB	S1BNFC	873	372
10	200-230	2	S2CNNB	839	S2CNNB	1079	100	S2CN1B	1137	FB	S2CNFB	1183	496
	460-575	1	S1CNNC	631	S1CNNC	815	60	S1CN0C	851	FB	S1CNFC	913	496
15	230	2	S2DNNB	899	S2DNNB	1139	100	S2DN1B	1197	FB	S2DNFB	1243	492
	460-575	2	S2DNNC	899	S2DNNC	1139		S2DN1C	1197	FB	S2DNFC	1243	492
20	230	3	S3ENNB	1199	S2ENNB	1503	200	S3EN2B	1607	FB	S3ENFB	1573	424
	460-575	2	S2ENNC	967	S2ENNC	1207	100	S2EN1C	1265	FB	S2ENFC	1311	424
25	200-230	3	S3FNNB	1219	S3FNNB	1523	200	S3FN2B	1627	FB	S3FNFB	1593	444
	460-575	2	S2FNNC	1007	S2FNNC	1247	100	S2FN1C	1305	FB	S2FNFC	1351	444
30	230	3	S3GNNB	1275	S3GNNB	1579	200	S3GN2B	1683	FB	S3GNFB	1649	510
	460-575	3	S3GNNC	1275	S3GNNC	1579	100	S3GN2C	1683	FB	S3GNFC	1649	510
40	200	4	S4HNNZ	2591	S4HNNZ	3011	200	S4HN4Z	3315	KA	S4HNJZ	3275	510
	230	4	S4HNNB	2591	S4HNNB	3011	200	S4HN4B	3315	KA	S4HNJB	3275	510
	460-575	3	S3HNNC	1323	S3HNNC	1627	100	S3HN2C	1731	FB	S3HNFC	1697	510
50	230	4	S4JNNB	2591	S4JNNB	3011	200	S4JN4B	3315	KA	S4JNJB	3275	736
	460-575	3	S3JNNC	1367	S3JNNC	1671	100	S3JN2C	1775	FB	S3JNFC	1741	736
75	200	5	S5LNNZ	4115	S5LNNZ	4867	400	S5LN6Z	5221	LA	S5LNLZ	5445	888
	230	5	S5LNNB	4115	S5LNNB	4867	400	S5LN6B	5221	LA	S5LNLB	5445	888
	460-575	4	S4LNNC	2639	S4LNNC	3059	200	S4LN4C	3363	KA	S4LNJC	3323	888
100	230	5	S5MNNB	4427	S5MNNB	5178	400	S5MN6B	5533	LA	S5MNLB	5757	972
	460-575	4	S4MNNC	2639	S4MNNC	3059	200	S4MN4C	3363	KA	S4MNJC	3323	972
125	230	6	S6NNNB	7613	S6NNNB	9339	CL	S6NNCB	10441	LA	S6NNLB	9571	1060
	460-575	5	S5NNNC	4259	S5NNNC	5011	200	S5NN6C	5365	KA	S5NNJC	5589	1060
150	200-230	6	S6PNNB	7937	S6PNNB	9663	CL	S6PNCB	10767	MA	S6PNNB	9895	1060
	460-575	5	S5PNNC	4259	S5PNNC	5011	400	S5PN6C	5365	LA	S5PNNC	5589	1060
200	230	6	S6WNNB	8221	S6WNNB	9947	CL	S6WNCB	11051	MA	S6WNMB	10179	1360
	460-575	5	S5WNNC	4815	S5WNNC	5567	400	S5WN6C	5921	LA	S5WNLC	6145	1360

For larger horsepower ratings use prices for equivalent rated class 11-600 starters on page 7.

② To substitute breakers, see page 14.

③ "CL" indicates that current limiting type fuses are included to provide 100,000 asymmetrical amperes interrupting capacity. A load break disconnect is provided in all ratings. Fuses not included up to and including size 5. Sizes 6-9 includes current limiting fuses.

④ Catalog numbers shown for 200-230 volts are for 230 volt designs. For 200 volts, change last digit from B to Z. Catalog numbers shown for 460-575 volts are for 460 volt designs. For 575 volts, change last digit from C to D.

Ordering Information

Order starters by catalog number and description, include:

Class number or type.
Service, non-reversing or reversing.
Type disconnect or short circuit protection.
NEMA enclosure type.
NEMA size.
Horsepower and service factor.
Application and Duty Cycle.
System voltage.
Specify external reset button, if required.
Modifications.

If resistance type starters are required to limit the starting current to an exact value, either the actual locked rotor amperes and locked kilowatts (or power factor) of the motor, must be included; or if the starter is to be used with a Westinghouse motor, the style or order number must be included so that this data can be determined. This motor information is required with all class 11-440 orders.

Modifications: Select modifications from pages 13-15 and order by description.

Heater Elements

Prices do not include heater elements. Starters require 3 overload relay heater elements at **$3.00 list each.** Refer to selection tables page 16.

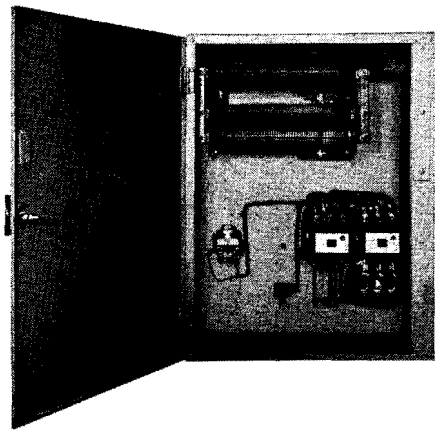
Prices effective July 6, 1971; subject to change without notice.
Discount Symbol C10-G3
Selling Policy 7000

February 26, 1974
Supersedes PL 9220, pages 5-6, dated October 8, 1973
E. D. C/1806/PL

Ac Magnetic Reduced Voltage Starters

Class 11-400 Primary Resistor
Non-Reversing, Reversing
Up to 600 Volts, 3 Phase, 60 Hertz

Application



Class 11-400 Size 4

Primary resistor type starters, sometimes known as "cushion type" starters, will reduce the motor torque and starting inrush current to produce a smooth, cushioned acceleration with closed transition. Although not as efficient as other methods of reduced voltage starting, primary resistor-type starters are ideally suited to applications such as conveyors, textile machines, or other delicate machinery where reduction of starting torque is of prime consideration. Starters through size 5 will limit inrush to approximately 80% of locked rotor current and starting torque to approximately 64% of locked torque. Larger sizes will be custom designed to the application.

Description of Starters

Class 11-400 Non-Reversing, Two-Point Starters Contain:

1 – Three pole starting contactor with necessary relays and interlocks (see table below for type).

1 – Three pole running contactor with necessary relays and interlocks (see table below for type).

Starter Size	Contactor Type	
	Starting	Running
1	A-201-K1	A-201-K1
2	A-201-K2	A-201-K2
3	A-201-K3	A-201-K3
4	A-201-K4	A-201-K4
5	GCA-530	GCA-530
6	GCA-530	GCA-630
7	GCA-630	GPD-730
8	GPD-730	GPD-830
8L	GPD-830	105-FD

1 – Pneumatic timing relay.

1 – 3 pole adjustable type AN overload relay on sizes 1 through 4. This same overload relay is used with associated current transformers on size 5 and larger.

1 – Silicon rectifier to provide dc control voltage for size 7 and larger.

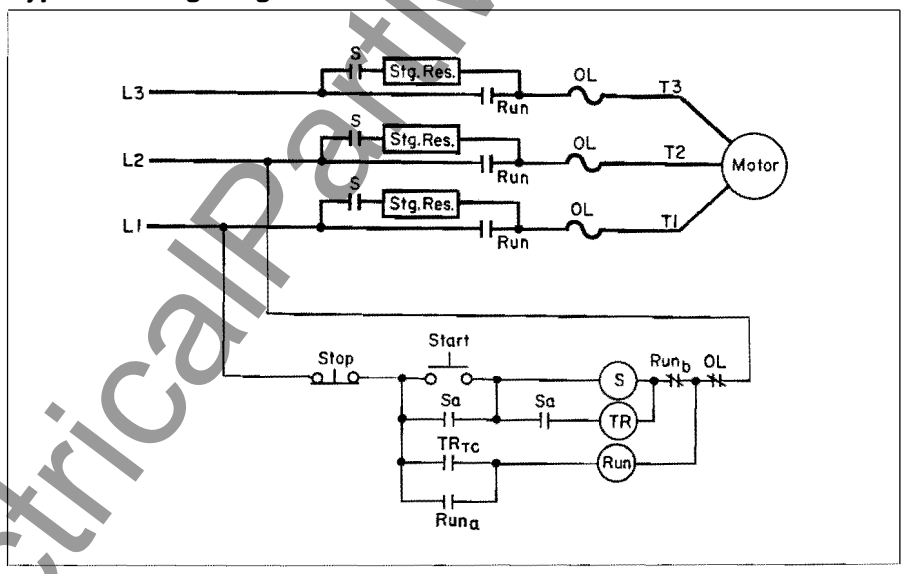
1 – Resistor frame of stainless steel tube type resistors mounted and wired in the enclosure in all sizes. Resistor class A.S. 116 is intended for general starting duty where starting time is no more than 5 seconds out of 80 seconds. For applications that exceed this duty cycle, resistor class A.S. 156 resistors good for 15 seconds out of 60 seconds are recommended.

Classes 11-403, 11-404, 11-406: These combination starters are similar to class 11-400 starters except that they include a disconnect switch or circuit breaker.

Class 11-410: This is a reversing type, two point starter which contains two mechanically interlocked running contactors. Otherwise, it is the same as a class 11-400 starter.

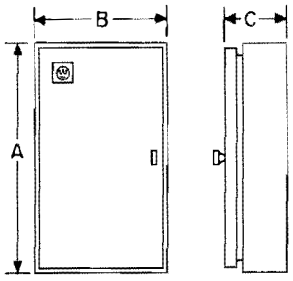
Classes 11-413, 11-414, 11-416: These are reversing type combination starters similar to the class 11-410 starter except that a disconnect switch or circuit breaker is included.

Typical Wiring Diagram



Dimensions, Inches; Approximate Only

(Class 116 Resistors)



Starter Class	Size	Dimensions A①	B	C	Max. Shipping Wt., Lbs.
11-400	1-2	29	18	10	120
	3-4	35	24	12	400
	5	64	28	14	750
	6-7-8	90	28	28	1300
11-403 / 11-406	1	64	28	14	300
	2	64	28	14	350
	3-4	64	28	14	800
	5	64	36	14	900
11-404	1	64	28	14	375
	2-3-4	64	28	14	475
	5	76	36	14	950

① 64 and 90 inch high enclosures are floor mounted.

Westinghouse Electric Corporation
General Control Division, Buffalo, N. Y. 14240
Printed in USA

Westinghouse

Ac Magnetic Reduced Voltage Starters

Non-Reversing, Reversing
Up to 600 Volts, 3-Phase, 60 Hertz

Combination Starters

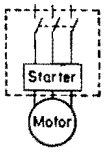
All starter installations require a means of disconnecting the starter from the incoming power supply. The disconnecting device, which can also provide short circuit protection, can either be separate from the starter or included with the starter in a common enclosure. If it is included with the starter, the assembly is known as a combination starter.

Combination starters offer several features, such as:

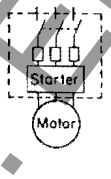
a. Ease of installation: A single piece of equipment simplifies wiring and conduit requirements.
b. Safety: Disconnect device is interlocked with the enclosure door.
c. Coordination: Correct size disconnect is included with the starter.

Types of Combination Starters

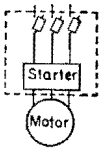
Non-Fused Disconnect: Used where external short circuit protection is available and a disconnect is desired in starter. This type disconnect can be opened under load and padlocked in the open position. The disconnect has an external operating handle interlocked with the door so that the door cannot be opened until the disconnect is opened.



Fusible or Fused Disconnect: Used where short circuit protection is required in the starter. Fuse clips will accommodate both NEC and current limiting fuses. The externally operated disconnect handle is interlocked with the door so that the door cannot be opened until the disconnect is opened. Current limiting fuses are included in size 6 and larger.



Disconnecting Type Fuses: Used as an alternate for a fusible disconnect. Hook stick-operated current limiting fuses are included. The starter is electrically interlocked with the door so that the disconnecting fuses will not be accidently opened under load.

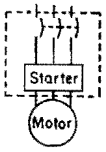


Circuit Breaker: Used where short circuit protection is required in the starter. Operation of any trip opens all three lines, avoiding single-phasing. Unless otherwise specified, molded case air circuit breakers will have magnetic trip only, rated as follows:

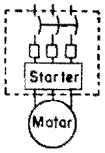
Breaker Frame	Amperes
FB	490- 1550
JA	1050- 2250
LA	2000- 4000
MA	4000- 8000
NB	6000-12000
PB	4000-12000

Mark 75 or TRI-PAC breakers can be substituted for the standard molded case breaker where higher interrupting capacities are required. Where price additions are not specifically shown, contact Westinghouse.

All molded case breaker external operating handles are interlocked with the door so that the door cannot be opened until the breaker is opened. The breaker can be padlocked in the open position. Switchboard type circuit breakers have thermal-magnetic trips and will be selected based on 125% full load current.



Circuit Breaker and Fuses: Used to obtain circuit breaker interruption of low magnitude faults, and current limiting fuse interruption of high magnitude faults. The circuit breaker opens on all faults and prevents single-phasing caused by one blown fuse. The circuit breaker saves the cost of fuse replacement on low magnitude faults. Contact Westinghouse for prices.



Ac Magnetic Reduced Voltage Starters

Non-Reversing, Reversing
Up to 600 Volts, 3-Phase, 60 Hertz

General Application

The following factors should be considered when applying reduced voltage starters to a squirrel cage motor driven load.

1. The motor characteristics which will satisfy the starting requirements of the load.

2. The source of power and the effect the motor starting current will have on the line voltage.

3. The load characteristics and the effect the motor starting torque will have on the driven parts during acceleration.

4. The starter protection required to protect the load, motor, starter, cables and power source during overload, undervoltage, and fault conditions.

A typical NEMA B motor started with full voltage will develop as much as 150% full load torque when started with a starting current of around 600% full load current. These values may exceed the mechanical limitations of the load or electrical limitations of the source, or both.

A reduced voltage or reduced inrush starter will reduce both starting current and starting torque. Care must be taken when meeting power company limitations that the motor will produce sufficient torque to accelerate the load to near rated speed.

As an example, if a part winding starter is applied to a motor to reduce the current inrush to approximately 410% of full load current (600% x 65%=390%), and the torque requirements to accelerate the load exceed 75% of full load torque (150% x 50% =75%), the motor and load will not accelerate. An autotransformer starter on the 80% voltage tap would satisfy these requirements. The current inrush would be 402% (600% x 67%) and the torque produced would be 96% (150% x 64%). If, however, the power company limited the "increments" of current drawn from line to allow voltage regulators to react to the added load, the part winding starter would meet the requirements.

Class 11-440 and class 11-740 starters are primarily increment starters. Class 11-700 starters are also ideally suited to low starting torque loads such as fans, blowers and m-g sets. Class 11-600 starters should be used with "hard to start" loads such as reciprocating compressors, grinding mills, and pumps. Class 11-400 starters provide a "cushioned" torque start and are applicable to conveyors and textile machines. Class 11-800 starters are applicable to high inertia loads with long acceleration such as centrifugal compressors and centrifuges.

All starters, in addition to overload protection, will provide either low voltage release or low voltage protection depending upon the pilot device used with the starter. Low voltage release, where power is applied to the motor after a power failure, can be obtained by using a 2-wire pilot device. Low voltage protection where power is not applied to the motor after a power failure until restarted by an operator can be obtained by using a 3-wire pilot device.

See page 3 for discussion of short circuit protection and combination starters.

Primary resistor and closed transition Star Delta types require adequate ventilation to remove resistor heat.

Catalog Numbers

All starters listed in this price list have been assigned an 11 digit catalog number, with each digit having a specific function. A breakdown of the complete number with an explanation of each digit is shown here.

Cat. No.: **11600 S 2 A NN C**

Digits 1-5	Digit 6	Digit 7	Digit 8	Digits 9-10	Digit 11
11600	S	2	A	NN	C

Digit	Function
1-5	Starter class number
6	NEMA enclosure type ("S" will appear in all catalog numbers in price tables and indicates enclosure is NEMA I general purpose)
7	Starter size
8	Horsepower rating of starter
9-10	Modifications
11	System voltage

The function of digits 1-5, 7, 8-11 is incorporated in the catalog numbers shown in the price tables and need not be changed. Digit 6 is variable to allow purchaser to specify NEMA enclosure. Modifications should be ordered by description.

Horsepower rating, while incorporated in catalog numbers in the price tables, is sometimes a maximum hp rating and the symbol in the catalog number will be for a rating different than that shown in the hp column of each price table. Hp ratings and the symbol for each are shown here, but there should be no change in the catalog number:

Hp	Symbol	Hp	Symbol
5	A	175	V
7½	B	200	W
10	C	225	X
15	D	250	Y
20	E	300	0
25	F	350	1
30	G	400	2
40	H	450	3
50	J	500	4
60	K	600	5
75	L	700	6
100	M	800	7
125	N	900	8
150	P	1000	9

System voltage (digit 11) will be indicated in the catalog number. Symbols and voltages are as follows:

B – 230 volts, 60 Hertz
C – 460 volts, 60 Hertz
D – 575 volts, 60 Hertz
H – 380 volts, 50 Hertz
W – 240 volts, 60 Hertz
X – 480 volts, 60 Hertz
Z – 200 volts, 60 Hertz

Heaters

Heaters for starters listed in this price list should be selected from tables on page 16. Heaters should be ordered by style number on the basis of adjusted full load current and starter size. They should be listed as a separate item on the order.

Modifications

Modifications listed on pages 13-15 can be added to all classes of starters unless indicated otherwise. Changes in type of enclosure can be made by inserting the symbol for the desired enclosure in column 6 in the catalog number replacing the "S".

Other modifications should be ordered by description.

Westinghouse Electric Corporation
General Control Division, Buffalo, N. Y. 14240
Printed in USA

Westinghouse

Ac Magnetic Reduced Voltage Starters

Non-Reversing, Reversing
Up to 600 Volts, 3-Phase, 60 Hertz

Starter Selection

In general, the application will determine the type of starter required. In cases where more than one type starter will meet the application requirements, reference to the table below will show which starter is best qualified for the application. For additional information, see page 2.

Starter Type	Starting Characteristics Expressed in % of Rated Values (Approx.)				Remarks	Pages
	Motor Voltage	Motor Current	Line Current	Torque		
Primary Resistor Class 11-400	80	80	80	64	Values shown are typical and depend on the motor. Starters provide closed transition and are ideally applicable where starting torque must be reduced.	4-5
Multi-Point Network Starters Class 11-440	Will depend on number of points.				Used primarily to limit inrush current increments rather than the maximum inrush current.	6
Autotransformer Class 11-600						7-8
80% Tap	80	80	67②	64	The adjustable voltage taps permit wide adjustment of characteristics in the field.	
65% Tap	65	65	45②	42		
50% Tap	50	50	28②	25		
Part Winding Class 11-700	100	65	65	50	Requires standard 230/460 volt dual voltage motor on 230 volts or special part winding motor. Closed transition.	9-10
Part Winding Class 11-740	50	33	33	12		
Star-Delta Class 11-800 Class 11-890	100	33	33	33	Requires delta wound motor with star connections. Ideal for long accelerations. Closed transition is available.	11-12

All Classes Reduced Voltage Combination Starters 3
Modifications 13-15
Heater Tables 16

② Includes autotransformer magnetizing current.

Ordering Information

Order starters by catalog number wherever possible. A complete catalog number consists of the starter class number (11400, 11600, etc.) at the top of the catalog number column, and the six digit number (S1ANNB, S2ENNC, etc.) appearing in the catalog number column opposite horsepower rating of the desired starter. Example: 11400S1ANNB is the catalog number for a size 1, 5 hp non-reversing class 11400 starter rated 230 volts, in a standard NEMA 1 enclosure; 11604S2DNNC is the catalog number for a size 2, 15 hp non-reversing class 11604 starter rated 460 volts, having a fusible disconnect in a standard NEMA 1 enclosure.

Some modifications to catalog numbers listed in price tables can be made by inserting the symbol for modification desired (from page 13) in the catalog number.

Select heaters from tables on page 16 and list as separate item.

When ordering starter by description, include:
- Class number or type.
- Service, non-reversing or reversing.
- Type disconnect or short circuit protection.
- NEMA enclosure type.
- NEMA size.
- Horsepower and service factor.
- System voltage.
- Modifications.

If resistance type starters are required to limit the starting current to an exact value, either the actual locked rotor amperes and locked kilowatts (or power factor) of the motor, must be included; or if the starter is to be used with a Westinghouse motor, the style or order number must be included so that this data can be determined. This motor information is required with all class 11-440 and class 11-740 orders.

Select heaters from tables on page 16 and list as separate item.

Prices effective July 6, 1971; subject to change without notice.
Discount Symbol C10-G3
Selling Policy 7000

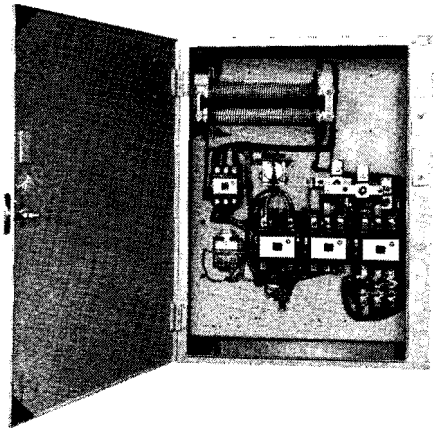
October 8, 1973
Supersedes PL 9220, pages 1-2, dated November 1, 1971
E. D. C/1806/PL

Westinghouse

Ac Magnetic Reduced Voltage Starters

Class 11-800 Star Delta Open Transition
Class 11-890 Star Delta Closed Transition
Non-Reversing, Reversing
Up to 600 Volts, 3-Phase, 60 Hertz

Application



Class 11-890, Size 4YD

Star-Delta type starters have been applied extensively to industrial air conditioning installations because they are particularly applicable to starting motors driving high inertia loads with resulting long acceleration times. They are not, however, limited to this application. When six or twelve lead delta-connected motors are started star-connected, approximately 58% of full line voltage is applied to each winding and the motor develops 33% of full voltage starting torque and draws 33% of normal locked rotor current from the line. When the motor has accelerated, it is re-connected for normal delta operation.

Class 11-800 and 11-890 starters are suitable for air conditioning application, provided the motors used are open type and horsepower rated. For current rated motor starters for use with hermetic centrifugal air conditioning and refrigeration compressors, refer to Westinghouse.

Description of Starters

Class 11-800 Non-Reversing, Open Transition Starters Contain:

2 – Three pole delta contactors with auxiliary relays and interlocks (see table below).
1 – Three pole star contactor with auxiliary relays and interlocks (see table below).
1 – Mechanical interlock to interlock one delta contactor and the star contactor.

Starter Size	Contactor Type	
	Delta	Star
1YD	A-201-K1	A-201-K1
2YD	A-201-K2	A-201-K2
3YD	A-201-K3	A-201-K3
4YD	A-201-K4	A-201-K4
5YD	GCA-530	GCA-530
6YD	GCA-630	GCA-530
7YD	GPD-730	GCA-620
8YD	GPD-830	GPD-720

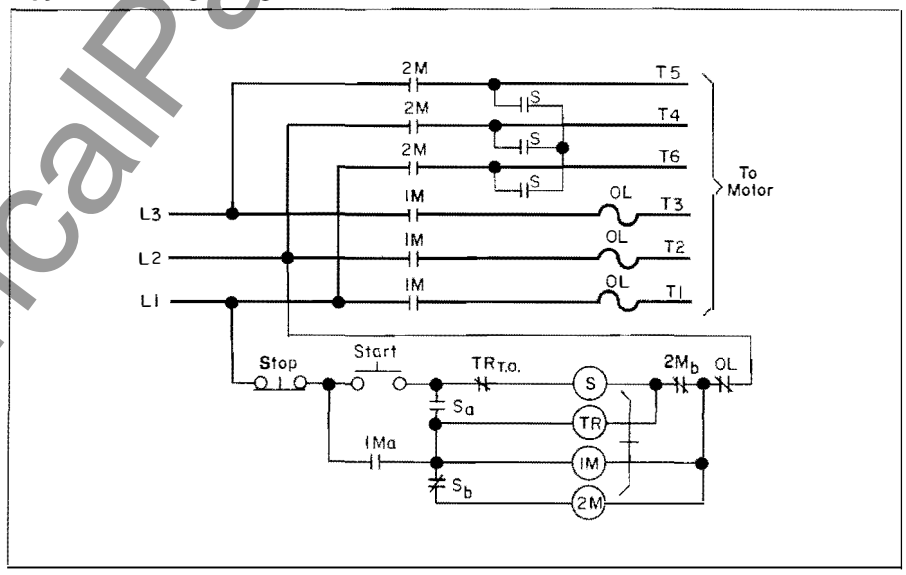
1 – Pneumatic timing relay.
1 – Three pole adjustable type AN overload relay on sizes 1 through 4. The same overload relay is used with associated current transformers on size 6 and larger.
1 – Silicon rectifier to provide dc control voltage for size 7 and larger.

Classes 11-803, 11-804, 11-806: These open transition type combination starters are similar to the class 11-800, except that they include either a disconnect switch or a circuit breaker for short circuit protection.

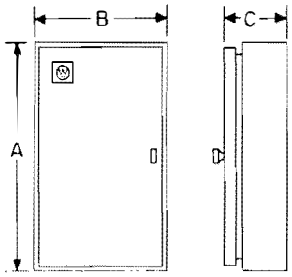
Class 11-890: This is a closed transition starter which contains, in addition to the devices listed for class 11-800 starters:
1 – Three pole transition contactor.
1 – Transition resistor frame of edgewound resistors mounted and wired in the enclosure in all sizes.
1 – TRP synchronous timer to assure proper transition.

Classes 11-893, 11-894, 11-896: These closed transition combination starters are similar to the class 11-890 except that they include either a disconnect switch or a circuit breaker.

Typical Wiring Diagram, Class 11-800



Dimensions, Inches; Approximate Only



Starter Class	Size	Dimensions A①	B	C	Max. Shipping Wt., Lbs.
11-800	1-2-3-4 YD	35	24	12	210
	5 YD	64	28	14	600
	6 YD	64	28	21	850
11-890	1-2-3-4 YD	35	24	12	400
	5 YD	76	28	14	900
	6 YD	90	28	21	1100

① 64, 76 and 90 inch high enclosures are floor mounted.

Prices effective July 6, 1971; subject to change without notice.
Discount Symbol C10-G3
Selling Policy 7000

February 26, 1974
Supersedes PL 9220, pages 11-12, dated October 8, 1973
E. D. C/1806/PL

Ac Magnetic Reduced Voltage Starters

Class 11-800 Star Delta Open Transition
Class 11-890 Star Delta Closed Transition
Non-Reversing
Up to 600 Volts, 3-Phase, 60 Hertz

List Prices – Heaters Not Included

Classes 11-800, 11-806, 11-890, 11-896 Non-Reversing in NEMA 1 Enclosure

Max. Hp. ②	Volts 3-Phase 60 Hertz ③	Size	Without Short Circuit Protection				With Molded Case Circuit Breaker				Breaker Frame Size
			Class 11-800 Open Transition		Class 11-890 Closed Transition		Class 11-806 Open Transition		Class 11-896 Closed Transition		
			Catalog Number 11800	List Price	Catalog Number 11890	List Price	Catalog Number 11806	List Price	Catalog Number 11896	List Price	
10	200-230	1YD	S1CNNB	$ 695	S1CNNB	$ 1057	S1CNFB	$ 1039	S1CNFB	$ 1401	FB
	460-575	1YD	S1CNNC	695	S1CNNC	1057	S1CNFC	1039	S1CNFC	1401	FB
15	460-575	1YD	S1DNNC	695	S1DNNC	1057	S1DNFC	1039	S1DNFC	1401	FB
20	200	2YD	S2ENNZ	821	S2ENNZ	1183	S2ENFZ	1195	S2ENFZ	1557	FB
25	230	2YD	S2FNNB	821	S2FNNB	1195	S2FNFB	1195	S2FNFB	1569	FB
	460-575	2YD	S2FNNC	821	S2FNNC	1195	S2FNFC	1195	S2FNFC	1569	FB
30	200-230	3YD	S3GNNB	1191	S3GNNB	1603	S3GNJB	1875	S3GNJB	2287	KA
	460-575	2YD	S2GNNC	821	S2GNNC	1195	S2GNFC	1195	S2GNFC	1569	FB
40	200	3YD	S3HNNZ	1191	S3HNNZ	1647	S3HNJZ	1875	S3HNJZ	2331	KA
	460-575	2YD	S2HNNC	821	S2HNNC	1239	S2HNFC	1195	S2HNFC	1613	FB
50	230	3YD	S3JNNB	1191	S3JNNB	1647	S3JNJB	1875	S3JNJB	2331	KA
	460-575	3YD	S3JNNC	1191	S3JNNC	1647	S3JNFC	1875	S3JNFC	2331	FB
60	200	4YD	S4KNNZ	2475	S4KNNZ	3141	S4KNJZ	3805	S4KNJZ	4471	KA
	460-575	3YD	S3KNNC	1191	S3KNNC	1695	S3KNFC	1875	S3KNFC	2379	FB
75	230	4YD	S4LNNB	2475	S4LNNB	3238	S4LNLB	3805	S4LNLB	4567	LA
	460-575	3YD	S3LNNC	1191	S3LNNC	1861	S3LNJC	1875	S3LNJC	2545	KA
100	200-230	5YD	S5MNNB	4515	S5MNNB	5467	S5MNLB	6173	S5MNLB	7125	LA
	460-575	4YD	S4MNNC	2475	S4MNNC	3365	S4MNJC	3805	S4MNJC	4695	KA
150	200-230	5YD	S5PNNB	4515	S5PNNB	5515	S5PNMB	6173	S5PNMB	7173	MA
	460-575	4YD	S4PNNC	2475	S4PNNC	3413	S4PNLC	3805	S4PNLC	4743	LA
250	200-230	6YD	S6YNNB	9631	S6YNNB	12079	S6YNMB	11589	S6YNMB	14037	MA
	460-575	5YD	S5YNNC	4515	S5YNNC	5647	S5YNLC	6173	S5YNLC	7305	LA
300	200-230	6YD	S60NNB	9631	S60NNB	12079	S60NBB	12345	S60NBB	14793	NB
	460-575	5YD	S50NNC	4515	S50NNC	5949	S50NMC	6173	S50NMC	7607	MA
350	230	6YD	S6INNB	9631	S6INNB	12079	S6INMB	12345	S6INMB	14793	MA
	460-575	6YD	S61NNC	9631	S61NNC	12079	S61NMC	11589	S61NMC	14037	MA
500	200-230	7YD	.....	13231	.....	17209	.....	....	.....	.....	...
	460-575	6YD	S64NNC	9631	S64NNC	12079	S64NMC	11589	S64NMC	14037	MA
700	460-575	6YD	S66NNC	9631	S66NNC	12079	S66NBC	12345	S66NBB	14793	NB
750	200	8YD	.....	18145	.....	22281	.....	....	.....	.....	...
800	230	8YD	.....	18145	.....	22857	.....	....	.....	.....	...
	460-575	7YD	.....	13231	.....	17209	.....	....	.....	.....	...
1000	460-575	7YD	.....	13231	.....	17209	.....	....	.....	.....	...
1250	460-575	8YD	.....	18145	.....	23159	.....	....	.....	.....	...
1500	460-575	8YD	.....	18145	.....	23159	.....	....	.....	.....	...

② For current rated starters for air conditioning application, refer to Westinghouse.
③ Catalog numbers shown for 200-230 volts are 230 volt designs. For 200 volts change last digit from B to Z. Catalog numbers for 460-575 volts are for 460 volts. For 575 volts change the last digit from C to D. For 3-phase, 50-Hertz 380 or 460 volts, use 3-phase, 60 Hertz 460 volt prices and order by description. For other voltages refer to Westinghouse.

Ordering Information

Order starters by catalog number and description, include:

Class number or type.
Service, non-reversing or reversing.
Type disconnect or short circuit protection.
NEMA enclosure type.
NEMA size.
Horsepower and service factor.
Application and duty cycle.
System voltage.
Specify external reset button, if required.
Modifications.

Modifications: Select modifications from pages 13-15, and order by description.

Heater Elements

Prices do not include heater elements. Starters require 3 overload relay heater elements at **$3.00 list each.** Refer to page 16 for selection tables.

Westinghouse Electric Corporation
General Control Division, Buffalo, N. Y. 14240
Printed in USA

Westinghouse

Ac Magnetic Reduced Voltage and Wound Rotor Starter Mondifications

Factory Modifications

Modifications	List Price Additions NEMA Size 1	2	3	4	5	6	7	8	8L
Reversing Starters									
Wound Rotor	$288	$420	$668	$1024	$1734	$3012	$4212	$6168	$ 9590
Reduced Voltage	288	788	832	1808	2156	3690	4950	7372	10840
Control Circuit Devices									
Auxiliary Control Relay	152	152	152	152	152	152	152	152	152
Auxiliary Pneumatic Timer or Compelling Relay	168	168	168	168	168	168	168	168	168
Auxiliary Motor Operated Timer	352	352	352	352	352	352	352	352	352
Extra Electrical Interlock①	22	22	22	22	22	66	66	66	66
Incomplete Sequencing	238	238	238	238	238	238	238	238	238
Reverse Phase and Phase Failure Relay	612	612	612	612	612	760	760	760	760
Third Overload②	Std.	Std.	Std.	Std.	Std.	Std.	Std.	Std.	Std.
Ambient Compensated Overload Relay	8	8	8	8	8	8	64	64	64
Guardistor, Mount and Wire③	44	44	44	44	44	44	44	44	44
Undervoltage protection④	182	182	182	182	182	182	182	182	182
Time Delay Undervoltage	352	352	352	352	352	352	352	352	352
Control Circuit Supply									
Control Fuses	44	44	44	44	44	44	44	44	44
Control Breaker⑤	174	174	174	174	174	174	174	174	174
Control Transformer⑥	96	124	156	176	196	196	196	196	196
Control Transformer with 300 Va extra capacity⑥	164	200	232	252	272	272	272	272	272
Separate Control Circuit⑦	No Charge								
Operator's and Pilot Devices									
Start-Stop Pushbutton or H-O-A Selector Switch	100	100	100	100	100	100	100	100	100
Extra pushbutton	30	30	30	30	30	66	66	66	66
Indicating lights	60	60	60	60	60	60	60	60	60

① Specify normally open or normally closed.

② Standard on all sizes of magnetically operated starters.

③ Guardistor Relay must be ordered with the motor.

④ Required on other than start-stop momentary circuits.

⑤ Internally operated.

⑥ Includes secondary fuse.

⑦ For a low voltage control circuit, we recommend the addition of a control circuit transformer to the starter. If a separate source of low voltage is used for the control circuit, there is a possibility of having a full voltage start after a line voltage failure that does not open the low voltage control circuit. If the low voltage control circuit source is wired so that it will be de-energized by any motor voltage failure, linestarting cannot occur.

Note: Add modifications to basic starter prices and apply appropriate starter discount symbol.

Prices effective July 6, 1971; subject to change without notice.
Selling Policy 7000

October 8, 1973
Supersedes PL 9220, pages 13-14, dated November 1, 1971
E. D. C/1806/PL

Ac Magnetic Reduced Voltage and Wound Rotor Starter Modifications

Factory Modifications

Modification	List Price Additions NEMA Size 1	2	3	4	5	6	7	8	8L
Meters (include instrument transformer)									
Ammeter	$ 460	$ 460	$ 460	$ 460	$ 460	$ 460	$ 460	$ 460	$ 460
Voltmeter	460	460	460	460	460	460	460	460	460
Ammeter switch or voltmeter switch	204	204	204	204	204	204	204	204	204
Wattmeter	918	918	918	918	918	918	918	918	918
Watthour meter (2 element)	840	840	840	840	840	840	840	840	840
Demand attachment – Add	180	180	180	180	180	180	180	180	180
Elapsed time meter	116	116	116	116	116	116	116	116	116
Extra current transformer	....	332	332	332	332	488	488	488	488
Bus									
Ac main bus 1000 Amperes Max.	800	800	800	800	800	800	800	800	800
Ac main bus 2000 Amperes Max.	1000	1000	1000	1000	1000	1000	1000	1000	1000
Ground bus	70	70	70	70	70	70	70	70	70
Enclosure									
Special Paint – all sizes	$200								
Space Heater – all sizes	140								
Space Heater Protective Switch for Separate Power Source – all sizes	74								
Space Heater Thermostat – all sizes	150								
Cylinder Lock – all sizes	132								
Kirk Key Lock – all sizes	332								

Substitution Air Circuit Breakers

Standard Breaker Frame	Price Addition Substitute Breaker Frame Mark 75		TriPac		Oversize	
FB	HFB	$ 180	FB	$ 280①	..	....
JA	HKA	590	LA	1440	..	....
LA	HLA	340	LA	540②	MA	$ 440
MA	HMA	340	NB	1400	NB	1300
NB	HNB	340	PB	2670	PB	1820③
PB③	...	....	PB	850④	PB	2940

① 100 amperes maximum.
② 400 amperes maximum.
③ 2000 amperes maximum.
④ 1600 amperes maximum.

Note: Add modifications to basic starter prices and apply appropriate starter discount symbol.

Westinghouse Electric Corporation
General Control Division, Buffalo, N. Y. 14240
Printed in USA

Westinghouse

Ac Magnetic Reduced Voltage and Wound Rotor Starter Modifications

Enclosures

Enclosure Type	Starter Class (Includes Combination Type)	Cat. No. Symbol 6th Digit	List Price Addition Starter Size 1	2	3	4	5	6 and Larger
Omission of Enclosure **(Price Deduction)**	11-400	K	**$– 20**	**$– 48**	**$–152**	**$–220**	**$–444**	**$– 712**
	11-600	K	**– 20**	**– 48**	**–152**	**–220**	**–444**	**– 712**
	11-700	K	**– 20**	**– 48**	**–152**	**–220**	**–444**	**– 712**
	11-800	K	**– 20**	**– 48**	**–152**	**–220**	**–444**	**– 712**
	13-200	K	**– 20**	**– 48**	**–152**	**–220**	**–444**	**– 712**
NEMA 1 Gasketed Door	All Classes	V	**80**	**80**	**80**	**80**	**80**	**200**
NEMA 3-4 Watertight (Ferrous Metal Construction)	11-400	W	**620**	**620**	**620**	**1140**	**1140**	**1500**
	11-600	W	**620**	**620**	**620**	**1140**	**1140**	**1500**
	11-700	W	**240**	**270**	**390**	**1140**	**1140**	**1500**
	11-800	W	**240**	**270**	**390**	**1140**	**1140**	**1500**
	13-200	W	**620**	**620**	**620**	**1140**	**1140**	**1500**
NEMA 5-12① Dust-Tight Industrial	11-400	J	**300**	**360**	**380**	**480**	**900**	**1000**
	11-600	J	**300**	**360**	**380**	**480**	**900**	**1000**
	11-700	J	**200**	**250**	**300**	**400**	**900**	**1000**
	11-800	J	**200**	**250**	**300**	**400**	**900**	**1000**
	13-200	J	**300**	**360**	**380**	**480**	**900**	**1000**
NEMA 7 Class 1, Group D Hazardous Vapors	All Reduced Voltage	U	**Refer to Westinghouse**					
NEMA 9 Class 2, Group G Hazardous Vapors	All Reduced Voltage	Y	**Refer to Westinghouse**					

① To meet J. I. C. specifications, starter must also have control circuit transformer and disconnect switch or breaker.

Note: Add modifications to basic starter prices and apply appropriate starter discount symbol.

Prices effective July 6, 1971; subject to change without notice.
Selling Policy 7000

October 8, 1973
Supersedes PL 9220, pages 15-16, dated November 1, 1971
E. D. C/1806/PL

Ac Magnetic Reduced Voltage Starters

Heater Tables
Non-Reversing, Reversing
Up to 600 Volts, 3-Phase, 60 Hertz

Heater Selection Tables, Select Heaters as Follows:

Each heater is identified by a code marking stamped on one terminal. The heater application table indicates the range of full load motor current to which a given heater may be applied. Heaters should be applied based on motor nameplate rating. This range is so selected that the current to produce ultimate tripping of the relay will be approximately 105% to 125% of rated motor current. The rating of a heater is 125% of the minimum full load current.

The data listed in this table is for starters at an ambient temperature of 40°C. Standard motor ratings are also based on an ambient temperature of 40°C. For protection of the motor when it and the starter are operated in a common ambient temperature, heaters should be applied according to Heater Table for average applications. When the room temperature surrounding the motor exceeds that at the starter, assume a decreased motor current of 1% for each degree C. difference in temperature and select heaters accordingly. When the room temperature at the starter exceeds that at the motor, assume an increased motor current of 1% for each degree C. difference in temperature and select heaters accordingly.

The following heater selection information is for motors with 1.15 service factor. For heater selection information on all other motors refer to General Catalog Section 2900.

Class	Multiply actual motor full load current by factor below and refer to adjusted full load current column in tables	No. heaters required per starter
11-400	1	3
11-600	1	3
11-700	.5②	6
11-800	.575	3

② For Wye wound dual voltage and special part winding motors only. For Delta wound dual voltage motors, refer to motor manufacturer.

For Classes 11-400, 11-600, 11-700 and 11-800

Starter Size	Type AN Non-Compensated Enclosed Starters — 3 Pole Block Type — Adjusted Full Load Current	Heater Catalog Number	Heater Style Number
Sizes 1 and 2	15.2 to 16.7	H47	503C553G47
	16.8 to 18.3	H48	503C553G48
	18.4 to 20.2	H49	503C553G49
	20.3 to 22.2	H50	503C553G50
	22.3 to 24.3	H51	503C553G51
	24.4 to 26.6	H52	503C553G52
	26.7 to 29.1	H53	503C553G53
	29.2 to 32.0	H54	503C553G54
	32.1 to 35.2	H55	503C553G55
	35.3 to 38.5	H56	503C553G56
	38.6 to 42.3	H57	503C553G57
	42.4 to 45.0	H58	503C553G58
Sizes 3 and 4	17.5 to 19.1	H72	504C972G02
	19.2 to 21.1	H73	504C972G03
	21.2 to 23.2	H74	504C972G04
	23.3 to 25.6	H75	504C972G05
	25.7 to 28.1	H76	504C972G06
	28.2 to 30.8	H77	504C972G07
	30.9 to 34.5	H78	504C972G08
	34.6 to 38.2	H79	504C972G09
	38.3 to 42.6	H80	504C972G10
	42.7 to 46	H81	504C972G11
	47 to 51	H82	504C972G12
	52 to 56	H83	504C972G13
	57 to 61	H84	504C972G14
	62 to 67	H85	504C972G15
	68 to 73	H86	504C972G16
	74 to 80	H87	504C972G17
	81 to 87	H88	504C972G18
	88 to 95	H89	504C972G19
	96 to 105	H90	504C972G20
	106 to 116	H91	504C972G21
	117 to 127	H92	504C972G22
	128 to 135	H93	504C972G23
Size 5 (with 300/5 current transformers	Type AN Non-Compensated Enclosed Starters — Adjusted Full Load Current	Heater Catalog Number	Heater Style Number
	100 to 109	H23	503C553G23
	110 to 119	H24	503C553G24
	120 to 131	H25	503C553G25
	132 to 143	H26	503C553G26
	147 to 157	H27	503C553G27
	158 to 173	H28	503C553G28
	174 to 190	H29	503C553G29
	191 to 208	H30	503C553G30
	209 to 227	H31	503C553G31
	228 to 246	H32	503C553G32
	247 to 270	H33	503C553G33
Size 6 (with 600/5 current transformers)	199 to 217	H23	503C553G23
	218 to 239	H24	503C553G24
	240 to 263	H25	503C553G25
	264 to 287	H26	503C553G26
	288 to 316	H27	503C553G27
	317 to 346	H28	503C553G28
	347 to 380	H29	503C553G29
	381 to 416	H30	503C553G30
	417 to 455	H31	503C553G31
	456 to 493	H32	503C553G32
	494 to 540	H33	503C533G33

Size 7 and Larger: Advise Full Load Current

Price of heaters, each..... **$3.00 list**

Westinghouse Electric Corporation
General Control Division, Buffalo, N. Y. 14240
Printed in USA

Reduced Voltage Magnetic Starters

List Prices – Heaters Not Included

Classes 11-700, 11-703, 11-706, 11-740 Non-Reversing, in NEMA 1 Enclosure

Max. Hp.	Volts 3-Phase 60 Hz ①	NEMA Size	Starter Type: Without Short Circuit Protection — Catalog Number 11-700	List Price	With Non-Fusible Disconnect — Catalog Number 11-703	List Price	With Fusible Disconnect or Current Limiting Fused Disconnect — Fuse Clip Amps②	Catalog Number 11-704	List Price	With Molded Case Circuit Breaker③ — Frame	Catalog Number 11-706	List Price	Class 11-740 3 Point Starter — List Price
10	200-230	1 PW	S1CNNB	**$ 448**	S1CNNB	**$ 688**	100	S1CN1B	**$ 746**	FB	S1CNFB	**$ 792**	**$1056**
15	460-575	1 PW	S1DNNC	**448**	S1DNNC	**688**	100	S1DN1C	**746**	FB	S1DNFC	**792**	**1056**
20	200	2 PW	S2ENNZ	**634Ⓢ④**	S2ENNZ	**938**	200	S2EN2Z	**1042**	FB	S2ENFZ	**1008**	**1392**
25	230	2PW	S2FNNB	**634Ⓢ④**	S2FNNB	**938**	200	S2FN2B	**1042**	FB	S2FNFB	**1008**	**1392**
40	200	3PW	S3HNNZ	**890Ⓢ**	S3HNNZ	**1310**	200	S3HN2Z	**1641**	KB	S3HNKZ	**1574**	**2002**
	460-575	2PW	S2HNNC	**634Ⓢ④**	S2HNNC	**938**	200	S2HN2C	**1042**	FB	S2HNFC	**1008**	**1452**
50	230	3PW	S3JNNB	**890Ⓢ**	S3JNNB	**1642**	200	S3JN2B	**1996**	KB	S3JNKB	**2220**	**2058**
75	200-230	4PW	S4LNNB	**1892Ⓢ**	S4LNNB	**2644**	400	S4LN4B	**2998**	KB	S4LNKB	**3222**	**4152**
	460-575	3PW	S3LNNC	**890Ⓢ**	S3LNNC	**1310**	100	S3LN1C	**1614**	FB	S3LNFC	**1574**	**2058**
150	200-230	5PW	S5PNNB	**3942Ⓢ**	S5PNNB	**5668**	CL	S5PNCB	**6772**	MA	S5PNMB	**5900**	**7216**
	460-575	4PW	S4PNNC	**1892Ⓢ**	S4PNNC	**2644**	400	S4PN4C	**2998**	KB	S4PNKC	**3222**	**4200**
300	230	6PW	S6ONNB	**8348**	S6ONNB	**10564**	CL	S6ONCB	**13636**	NB	S6ONBB	**12948**	....
350	460-575	5PW	S51NNC	**3942Ⓢ**	S51NNC	**5668**	CL	S51NCC	**6772**	MA	S51NMC	**5900**	**7604**
600	460-575	6PW	S65NNC	**8348**	S65NNC	**10174**	CL	S65NCC	**12106**	NB	S65NBC	**11062**	....

For larger ratings, refer to Westinghouse

Ⓢ Stock item. (See SS-7015 for style number.) Stock at 230 volts and 460 volts only.
① Catalog numbers shown for 200-230 volts are for 230 volt designs, for 200 volts change last digit from B to Z. Catalog numbers for 460-575 volts are for 460 volts. For 575 volts change the last digit from C to D.
For other voltages refer to Westinghouse. For 3-phase, 50-Hertz 380 or 460 volts, use 3-phase, 60-Hertz 460 volt prices and order by description.
② "CL" indicates that current limiting type fuses are included to provide 100,000 asymmetrical amperes interrupting capacity. A load break disconnect is provided in all ratings. Fuses not included up to and including size 4. Sizes 5 and 6 include current limiting fuses.
③ To substitute breakers, see page 84.
④ Stocked with separate control 115 volt.

Ordering Information

Order starters by catalog number and description, include:

- Class number or type.
- Service, non-reversing or reversing.
- Type disconnect or short circuit protection.
- NEMA enclosure type.
- NEMA size.
- Horsepower and service factor.
- Application and Duty cycle.
- System voltage.
- Specify external reset button, if required.
- Modifications.

For a class 11-740 starter, either the actual locked rotor amperes and locked kilowatts (or power factor) must be included; if starter is to be used with a Westinghouse motor, the style or order number must be included so that this data can be obtained.

Modifications: Select modifications from pages 15, 16, 17 and order by description.

Heater Elements

Prices do not include heater elements. Starters require 6 overload relay heater elements at **$3.00 list each.** Refer to page 18 for selection tables.

Printed in U.S.A.

Westinghouse Electric Corporation
General Control Division
Asheville, NC/Buffalo, NY 14240

Price List
9220

Page 9

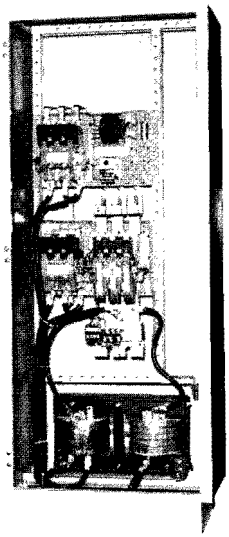
May 17, 1977
New Information
Prices effective May 17, 1977 and subject to change without notice.
Discount Symbol C10-G3
(Refer to Selling Policy 7000)
Mailed to: E, D, C/1806/PL

Non-Reversing, Reversing
Up to 600 Volts,
3 Phase, 60 Hertz

Ac Magnetic Reduced Voltage Starters

Reduced Voltage Magnetic Starters

Application



Class 11-600, Size 6

Autotransformer type starters are the most widely used reduced voltage starter because of their efficiency and flexibility. All power taken from the line, except transformer losses, is transmitted to the motor to accelerate the load. Taps on the transformer allow adjustment of the starting torque and inrush to meet the requirements of most applications. The following characteristics are produced by the three voltage taps:

Tap	Starting Torque % Locked Torque	Line Inrush % Locked Ampere
② 50%	25%	③28%
65%	42%	③45%
80%	64%	③67%

② Not included 50 hp and below.
③ Includes transformer magnetizing current.

Closed transition is standard on all sizes assuring a smooth transition from reduced to full voltage. Since the motor is never disconnected from the line there is no interruption of line current which can cause a second inrush during transition.

Duty cycle of these starters is as follows: up to 200 hp, 15 seconds on each 4 minutes for 1 hour, repeated after 2 hours. Over 200 hp, three periods of 30 seconds on, 30 seconds off repeated after 1 hour.

Description

Class 11-600 Non-Reversing Starters Contain:

2 – Three pole starting contactors with auxiliary relays and interlocks, except size 7-8, one two pole and one three pole starting contactors (see table below for type).

1 – Three pole running contactor with auxiliary relays and interlocks (see table below for type).

Starter Size	Contactor Type	
	Starting	Running
2	A-201-K2	A-201-K2
3	A-201-K3	A-201-K3
4	A-201-K4	A-201-K4
5	GCA-530	GCA-530
6	GCA-530 & GCA-530	GCA-630
7	GCA-620 & GCA-630	GPD-730
8	GPD-720 & GPD-730	GPD-830
8L	GPD-820 & GPD-830	105-FD

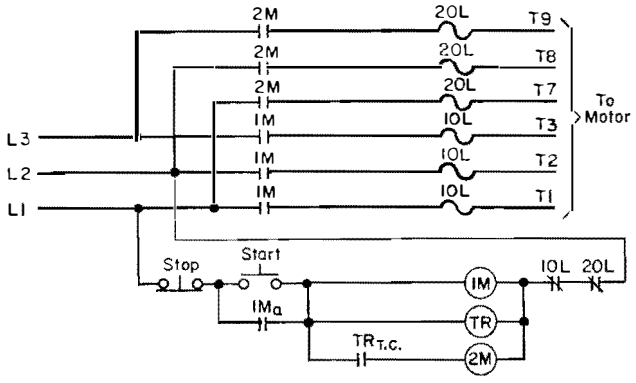
1 – Pneumatic timing relay.
1 – 3 pole adjustable type AN overload relay on size 1 through 4. This same overload relay is used with associated current transformers on size 5 and larger.
1 – Silicon rectifier to provide dc control voltage for size 7.
1 – Type A dry type two winding open delta connected auto-transformer mounted and wired in the enclosure in all sizes. All ratings have 65% and 80% voltage taps. Above 50 horsepower a 50% tap is also provided.

Classes 11-603, 11-604, 11-606: These non-reversing combination starters are similar to class 11-600 except that a disconnect switch or circuit breaker is added.

Class 11-610: This is a reversing type starter similar to the class 11-600 with two additional 2-pole contactors to furnish the reversing service.

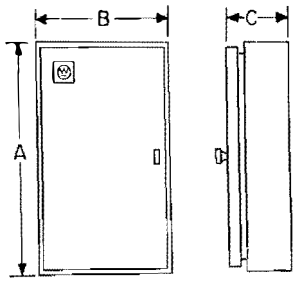
Classes 11-613, 11-614, 11-616: These are reversing type combination starters similar to class 11-610. In addition, they include either a disconnect switch or a circuit breaker.

Typical Wiring Diagram



① On sizes 2 through 6 only

Dimensions, Inches; Approximate Only



Starter Class	Size	Dimensions A④	B	C	Max. Shipping Wt., Lbs.
11-600	2-3-4	35	24	12	450
	5	64	28	14	750
	6	90	36	21	1250
	7-8	90	56	28	1400
11-603 / 11-606	2-3-4	35	24	12	500
	5	64	28	14	800
	6	90	36	21	1300
	7-8	90	56	28	1500
11-604	2-3-4	64	28	14	600
	5	64	36	14	850
	6	90	36	21	1450
	7-8	90	84	28	1750

④ 64 and 90 inch high enclosures are floor mounted