



Freedom AE19 IEC Size D  
with C395DNA DeviceNet Module

Cutler-Hammer's Freedom AE19 IEC starters and AN19 NEMA starters combine the proven Freedom contactor with the patented C395 solid state overload relay. In addition to electronic overload protection, advanced motor and load protection features are standard. With the optional C395DNA module, the starters are capable of being controlled, monitored and programmed over DeviceNet. The AE19 covers motors through 32A (20 hp at 460V); the AN19 covers NEMA sizes 00, 0 and 1.

### Motor Protection

- Solid-state overload protection with true RMS current sensing capability for accurate monitoring of loads with poor power quality. Digital FLA entry to exactly match motor requirements
- Phase Loss Trip (may be disabled)
- Phase Unbalance Trip (may be disabled)
- Mechanical Jam Trip (after motor start-up, trips at 400% full load current after a programmable time delay) (.1 to 25 seconds)
- Anti-recycle Delay (.1 to 300 seconds) to allow load to settle before motor restarts (with hand-held programmer [C395PHHDN] or DeviceNet only)

- Cause of Trip Indication on Faceplate (for example, overcurrent or phase loss)
- Class 10, 20, 30, Design E and Custom (Class 4-60) adjustable trip class settings
- Programmable Manual or Auto Reset ①
- Programmable Delay on Power Up (0.1 to 300 seconds) (with hand-held programmer [C395PHHDN] only)

### Communications Capability

The optional C395DNA module enables full DeviceNet communications:

- Programming of All Set Points
- ON/OFF Control
- Trip Reset
- Three Phase Motor Current
- Average Motor Current
- Starter Status (power on, off, running, tripped)
- True Contactor Status without auxiliary contacts
- Percent Thermal Capacity
- Percent Phase Unbalance
- Cause of Trip Indication
- Data at Time of Trip — percent motor thermal capacity, trip cause

### Programming Methods ②

- DeviceNet — the C395 DeviceNet module (Catalog #C395DNA) plugs into the starter to allow complete programming, monitoring and control over DeviceNet

① In auto reset mode, unit will reset 2 – 3 minutes after overload, phase unbalance or phase loss trip.

② In the absence of these programming methods, the reset pushbutton on the overload relay faceplate can be used as a backup programming method.

- Hand-held Programmer — (Catalog #C395PHHDN) is a small, portable keypad with digital display for complete programming and monitoring of individual starters
- Programming Key — (Catalog #C395HPKDN) plugs into individual starters for quick, easy programming. Set points are adjusted via DIP switches; the key is removed after programming and may be used for multiple starters

### Mounting, Installation and Use

- A single family of starters suitable for application in both the IEC and NEMA markets. "Two lines, One family" — the best of both worlds
- Push-to-Test feature — pressing the reset button for five seconds while the contactor is closed tests the trip function. This feature may be disabled with the hand-held programmer (C395PHHDN)
- A full line of snap-on accessories common to both IEC and NEMA devices, including top and side mounted auxiliary contacts
- Horizontal or vertical mounting on upright panel for application flexibility
- Screw type power terminals have captive, backed-out self-lifting pressure plates with  $\pm$  screws — reducing wiring time
- Accessible terminals for easy wiring. Optional fingerproof shields available to prevent electrical shock

## DeviceNet I/O Assembly Data Attributes

The following DeviceNet input/output assemblies are supported by Freedom AE19/AN19 starters with C395DNA communications module. 125 Kbaud master-slave poll (not bit strobe) I/O connections are supported.

Name	Input Data	Size in Bits	Output Data	Size in Bits
ODVA Basic Contactor ①	—	—	Run Status	1
ODVA Basic Overload ①	Tripped	1	Trip Reset	1
ODVA Basic Starter ①	Tripped	1	Run Status	1
	Running		Trip Reset	1
Freedom Starter	Tripped	1	Run Status	1
	Thermal Warning	1	Trip Reset	1
	Running	1		
	Ready	1		
	Control from Network	1		
Freedom Starter with Average Current	Tripped	1	Run Status	1
	Thermal Warning	1	Trip Reset	1
	Running	1		
	Ready	1		
	Control from Network	1		
	Auxiliary Feedback	1		
	% Thermal Capacity	8		
	Average Motor Current	16		
	% Phase unbalance	8		
Freedom Starter with Three Phase Currents	Tripped	1	Run Status	1
	Thermal Warning	1	Trip Reset	1
	Running	1		
	Ready	1		
	Control from Network	1		
	Auxiliary Feedback	1		
	Current Phase L1	16		
	Current Phase L2	16		
	Current Phase L3	16		

① As defined by the Open DeviceNet Vendors Association Starter SIG.



*NEMA Size 0 Non-reversing  
and Reversing Starters*

### NEMA Size 0 Non-reversing and Reversing Starters

Freedom NEMA starters are designed to NEMA standards. Their long electrical/mechanical life is extended through easy maintainability. Reversing starters consist of two contactors and a single overload relay assembled together. The contactors are mechanically and electrically interlocked to prevent line shorts and energization of both contactors simultaneously.

### Features

- Meets and exceeds all NEMA, UL, CSA and CE standards
- Easy coil change and inspectable/replaceable contacts
- Designed to 3,000,000 electrical operations at maximum hp ratings up through 25 hp at 600V
- One normally open right-side mounted auxiliary contact supplied as standard

#### NEMA Rated Open Type Starters Type AN19 Non-reversing and Reversing

NEMA Size	Motor Voltage	Maximum Horsepower		Magnet Coil Voltage (60 Hz)	Non-reversing Catalog Number	Reversing Catalog Number
		1 Phase	3 Phase			
00	115 200 230 460 575	.33 — 1 — —	— 1.5 1.5 2 2	120	AN19ANOADDN	AN59ANOADDN
0	115 200 230 460 575	1 — 2 — —	— 3 3 5 5	120	AN19BNOADDN	AN59BNOADDN
1	115 200 230 460 575	2 — 3 — —	— 7.5 7.5 10 10	120	AN19DNOAGHDN	AN59DNOAGHDN



*Freedom IEC Size D Non-reversing  
and Reversing Starters*

### Freedom IEC Size D Non-reversing and Reversing Starters

Freedom IEC non-reversing and reversing starters are designed to IEC standards and comply with International Standard IEC 947-4-1. IEC products are a perfect choice when electrical and mechanical application parameters are known. They are typically smaller in size and provide higher ratings in a smaller package.

Reversing starters consist of two contactors and a single overload relay assembled together. The contactors are mechanically and electrically interlocked to prevent line shorts and energization of both contactors simultaneously.

### Features

- Complies with IEC 947-4-1, EN, CENELEC, UL, VDE, BS, CSA and CE standards
- DIN rail mountable through 20 hp (45 mm)
- IP20 finger protection shields available
- One NO right-side mounted auxiliary contact supplied as standard
- Designed to 2,000,000 electrical and 20,000,000 mechanical operations through 20 hp at 460V

### IEC Rated Open Type Starters Type AE19 Non-reversing and Reversing

IEC Size	Max. UL Ampere Rating 600V AC ①	IEC 947 AC1 Thermal Current 600V	Motor Voltage	Maximum Horsepower ②		Magnet Coil Voltage (60 Hz)	Non-reversing Catalog Number	Reversing Catalog Number
				1 Phase	3 Phase			
A	7	20	115	.25	—	120	AE19ANSOAADDN	AE59ANOADDN
			200	—	1.5			
			230	.5	1.5			
			460	—	3			
			575	—	5			
B	10	20	115	.5	—	120	AE19BNSOAADDN	AE59BNOADDN
			200	—	2			
			230	1	2			
			460	—	5			
			575	—	7.5			
C	12	20	115	.5	—	120	AE19CNSOAADDN	AE59CNOADDN
			200	—	3			
			230	2	3			
			460	—	7.5			
			575	—	10			
D	18	32	115	1	—	120	AE19DNSOAADDN	AE59DNOADDN
			200	—	5			
			230	3	5			
			460	—	10			
			575	—	15			
E	25	32	115	2	—	120	AE19ENSOACFDN	AE59ENOACFDN
			200	—	5			
			230	3	7.5			
			460	—	10			
			575	—	15			
F	32	32	115	2	—	120	AE19FNSOACFDN	AE59FNOACFDN
			200	—	7.5			
			230	5	10			
			460	—	20			
			575	—	25			

① UL General purpose rating.

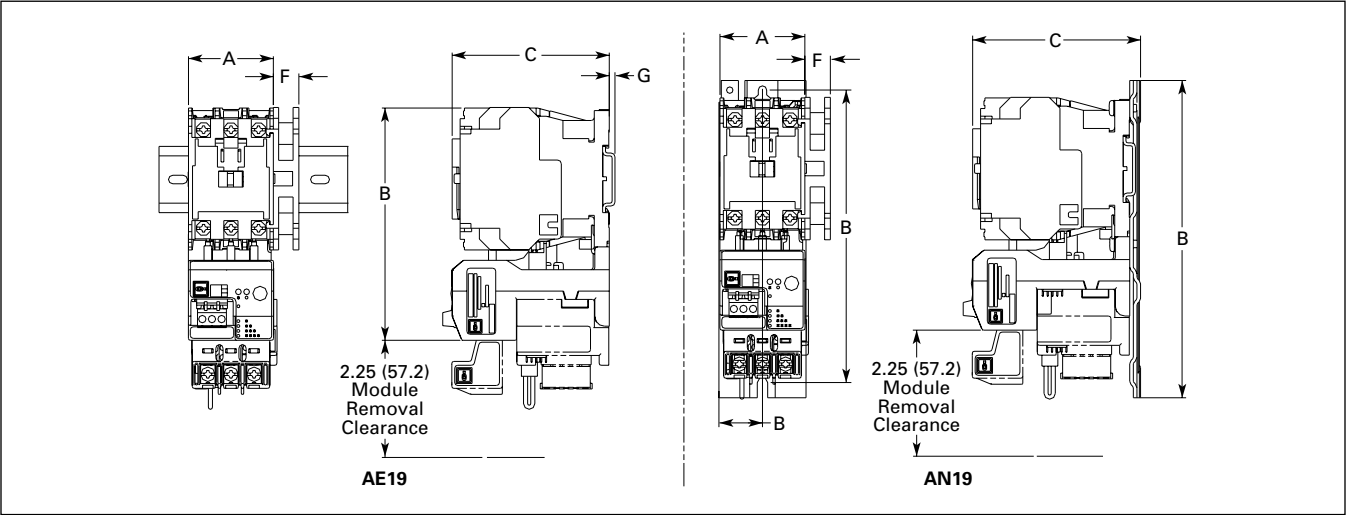
② For maximum horsepower rating of starters for 380V 50 Hz applications:

IEC Size	A	B	C	D	E	F
Horsepower	3	5	5	10	10	15

Non-reversing

Approximate Dimensions — Open Type

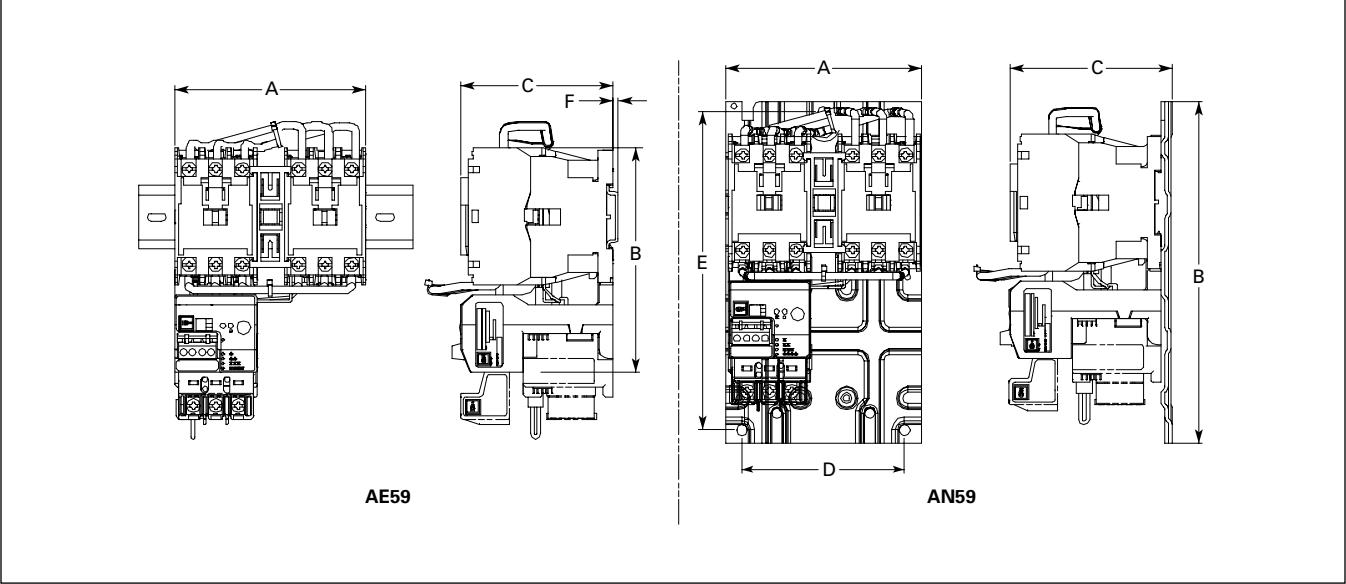
Size	Dimensions in Inches (mm)						
	A	B	C	D	E	F	G
AE19 A-F	45.5 (1.80)	168 (6.60)	89.5 (3.52)	—	154 (6.07)	13.7 (.54)	3.05 (.12)
AN19 00-1	45.5 (1.80)	149 (5.90)	89.5 (3.52)	22.8 (.90)	137 (5.39)	13.7 (.54)	—



Reversing

Approximate Dimensions — Open Type

Size	Dimensions in Inches (mm)					
	A	B	C	D	E	F
AE59 A-F	106.5 (4.20)	149 (5.90)	63.5 (3.28)	—	—	22.8 (.90)
AN59 00-1	106.5 (4.20)	187.5 (7.38)	89.5 (3.52)	89.0 (3.50)	174.5 (6.87)	—





C395DNA/installed on AE19



C395BELLDN/installed on AE19



C395PT45DN/installed on AE19



C395LD3DN/installed on AE19

### C395 Overload Relay Accessories

The **C395 DeviceNet Module** (C395DNA) is the DeviceNet interface for the AE19/AN19. The C395DNA module is designed to plug directly onto the AE19/AN19's C395 overload relay. The module provides DeviceNet users with the ability to control, monitor, and program at 125 Kbaud. A removable connector is provided so that a hand/off/auto hard contact may be used to selectively enable or disable the output of the control functions from the module without affecting its ability to monitor.

Three bi-color LEDs indicate:

- DeviceNet Address
- Network Status (including connected, not connected, not powered)
- Module Status (including normal operation, minor fault, needs commissioning)

The **C395 Bell Alarm** (C395BELLDN) is designed to attach directly to any AE19/AN19's C395 Overload Relay or Communication Module (C395DNA). NO and NC contacts in the Bell Alarm provide a hard contact indication of the trip status of the C395 Overload. These contacts transition from the untripped NC and NO positions in response to a fault detected by the C395 Overload.

The **Power Terminal Block** provides alternate termination for oversized motor wiring. It can be used in applications that require insulated wiring too large to pass through the Overload CT holes. For NEMA sizes 00 – 1 and IEC A – F, use catalog number C395PT45DN on wire diameters over .18 inches (typically 10 AWG). The C395PT45DN is rated for 14 AWG through 6 AWG wire.

The **C395 Load Modules** (C395LD3DN and C395LD5DN) are designed to attach directly to any C395 Overload/Controller at the control wiring interface. The purpose of these load modules is to provide adequate loading for PLC triac outputs so that the minimum

latching current will be drawn. A secondary benefit of these load modules is to reduce the apparent voltage at the "3" or "5" terminals of the C395 overload in the event that voltage coupling from unexpected sources occurs.

### Programming Tools

Cutler-Hammer AE19/AN19 starters may be fully programmed over DeviceNet. Starters which are not connected to DeviceNet should be programmed with one of the following tools:<sup>①</sup>



C395HPKDN/installed on AE19

The **C395 Hardware Program Key** (C395HPKDN) is designed to attach directly to an AE19/AN19's C395 Overload. The function of the Hardware Program Key is to provide a means of selecting the basic functions of the overload controller by means of dip switches. The C395HPKDN is not intended for permanent installation and must be removed after programming. The C395HPKDN allows the following settings to be programmed:

- Full Load Amperes
- Phase Unbalance enable/disable
- Phase Loss enable/disable
- Auto Reset enable/disable
- Mechanical Jam enable/disable

<sup>①</sup> In the absence of these programming methods, the reset pushbutton on the overload relay faceplate can be used as a backup programming method.



C395PHHDN

The **C395 Programmer Hand Held** (C395PHHDN) is designed to setup and monitor AE19/AN19 starters. The C395PHHDN is able to access and modify all of the programmable features of the AE19/AN19's C395 overload relay. These features may be accessed directly via the function select keys, or indirectly by means of stored setups. The C395PHHDN supports multiple customer definable setups, as well as an RS-232 link. In addition to the direct programming functions, the C395PHHDN also supports diagnostic and monitoring functions such as starter status and current display. The C395PHHDN is designed to provide enough voltage to the overload to power the logic circuits and to allow programming even when the overload is not installed.



C395TTIDN

The **C395 Trip Type Indicator** (C395TTIDN) is designed to attach remotely to any AE19/AN19 starter. The function of the Trip Type

Indicator is to provide a remote indication of the cause of trip. The display uniquely indicates the three most common motor faults — overload, phase unbalance and phase loss. A fourth indicator lights when a module or user selected option fault occurs. In addition, the Trip Type Indicator provides a reset point for the overload. The reset is active only when the starter's C395 overload is powered.



C395RSTLDN/C395RSTDN

The **C395 Reset** and **Reset Lighted** (C395RSTDN, C395RSTLDN) are designed to attach remotely to any AE19/AN19 starter. The function of the C395RSTDN is to provide a manual reset from the door of the enclosure. The C395RSTLDN adds overload trip status to the functionality of the C395RSTDN.



Cables

## Cables

The accessory cables are available in two types (Reset Cables and Dual-Ended Cables) and several lengths (up to 15'). The cables

interconnect between the C395 Overload and its option modules to remotely mounted accessories. The Reset Cables (C395C13DN, -16DN and -115DN) connect to the C395TTIDN, C395RSTDN and C395RSTLDN.

## Accessories

Description	Catalog Number
DeviceNet Interface, CAN Module	C395DNA
Programmer Hand-Held	C395PHHDN
Hardware Programming Key	C395HPKDN
Bell Alarm	C395BELLDN
Non-lighted Remote Reset (Note: requires reset cable)	C395RSTDN
Remote Reset with Light (Note: requires reset cable)	C395RSTLDN
Trip Type Indicator — Reset with trip LEDs (Note: requires reset cable)	C395TTIDN
3' Reset Cable — Molded connector on one end of 600V cable	C395C13DN
6' Reset Cable — Molded connector on one end of 600V cable	C395C16DN
15' Reset Cable — Molded connector on one side of 600V cable	C395C115DN
1' Accessory Cable — Molded connector on two ends of 600V cable	C395C21DN
3' Accessory Cable — Molded connector on two ends of 600V cable	C395C23DN
6' Accessory Cable — Molded connector on two ends of 600V cable	C395C26DN
Power Terminal Block: 45mm (NEMA 00/0; IEC A-F)	C395PT45DN
Load Module: Non-reversing	C395LD3DN
Load Module: Reversing	C395LD5DN



### Auxiliary Contacts



Side Mounted Auxiliary Contact



Top Mounted Auxiliary Contact

### NEMA Sizes 00 – 1 — IEC Sizes A – F

The auxiliary contacts listed below are designed for installation on Freedom Series starters and contactors. Snap-on design facilitates quick, easy installation.

These bifurcated design contact blocks, featuring silver cadmium alloy contacts, are well suited for use in very low energy (logic level) circuits.

Description	Contact Configuration Code <sup>①</sup>	Catalog Number
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#### Side Mounted

1NO	10	<b>C320KGS1</b>
1NC	01	<b>KGS2</b>
1NO – 1NC	11	<b>C320KGS3</b>
2NO	20	<b>KGS4</b>
2NC	02	<b>KGS5</b>
1NO – 1NCI	N/A	<b>KGS6</b>
1NO (E.C.) – 1NO (L.O.)	N/A	<b>KGS7</b>
1NCI	N/A	<b>KGS8</b>

#### Top Mounted

1NO	10	<b>C320KGT1</b>
1NC	01	<b>KGT2</b>
1NO – 1NC	11	<b>C320KGT3</b>
2NO	20	<b>KGT4</b>
2NC	02	<b>KGT5</b>
1NO – 1NCI	N/A	<b>KGT6</b>
1NO (E.C.) – 1NC (L.O.)	N/A	<b>KGT7</b>
1NCI	N/A	<b>KGT8</b>
3NO	30	<b>C320KGT9</b>
2NO – 1NC	31	<b>KGT10</b>
1NO – 1NC	12	<b>KGT11</b>
3NC	03	<b>KGT12</b>
4NO	40	<b>KGT13</b>
3NO – 1NC	31	<b>C320KGT14</b>
2NO – 2NC	22	<b>KGT15</b>
1NO – 3NC	13	<b>KGT16</b>
4NC	04	<b>KGT17</b>
3NO – 1NCI	N/A	<b>KGT18</b>
2NO – NCI – 1NC	N/A	<b>C320KGT19</b>
2NO – 1NO (E.C.) – 1NC (L.O.)	N/A	<b>KGT20</b>
1NO – 1NC – 1NO (E.C.) – 1NC (L.O.)	N/A	<b>KGT21</b>

NCI = Normally Closed early opening, designed for use in reversing applications.

E.C. = Early Closing      L.O. = Late Opening

<sup>①</sup> For Reference Only — not part of Catalog Number. See following.

### Contact Configuration Code

This two-digit code is found on the auxiliary contact to assist in identifying the specific contact configuration. The first digit indicates the quantity of NO contacts and the second indicates the quantity of NC contacts.

#### Auxiliary Contact Ratings (Amperes) — NEMA A600

Current	AC Volts			
	120V	240V	480V	600V
Make & Interrupting	60	30	15	12
Break	6	3	1.5	1
Continuous	10	10	10	10

#### NEMA P300

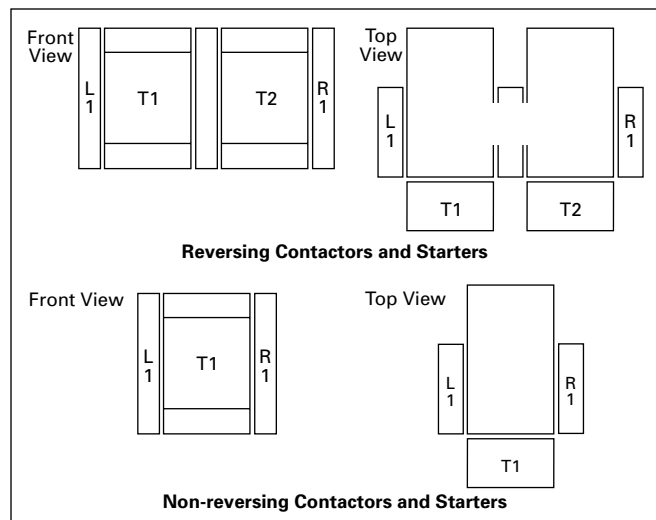
#### Continuous Thermal Rating: 5 Amperes

DC Volts	Make/Break Amperes
125	1.10
150	.55

#### Logic Level

#### Minimum Ratings for Logic Level and Hostile Atmosphere Application

Minimum Amperes	20 mA
Minimum Volts	24V AC/DC



### Auxiliary Contact Location

#### NEMA Sizes 00 – 1, IEC Sizes A – F

The sketches above illustrate the maximum number of auxiliary contacts that can be assembled to a contactor or starter and their locations.

Size	Poles	Available Mounting Positions <sup>①②</sup>		Catalog Number
		Open Type	NEMA 1 Enclosed	
A – C	3	T1, L1, R1	L1, R1	<b>AE19</b>
D – F	3	T1, L1	L1	<b>AN19</b>
00	3	T1, L1, R1	L1	<b>AE59</b>
0 – 1	3	T1, L1	L1	
A – F	3	L1, R1	L1, R1	<b>AN59</b>
00 – 1	3	T1, T2	—	

<sup>①</sup> Available positions on contactors or starters other than what is factory installed.

<sup>②</sup> When a pneumatic timer is mounted on contactor, only side mounted auxiliary contact positions are available. The solid-state timer, when added, takes up side mounted auxiliary contact position.

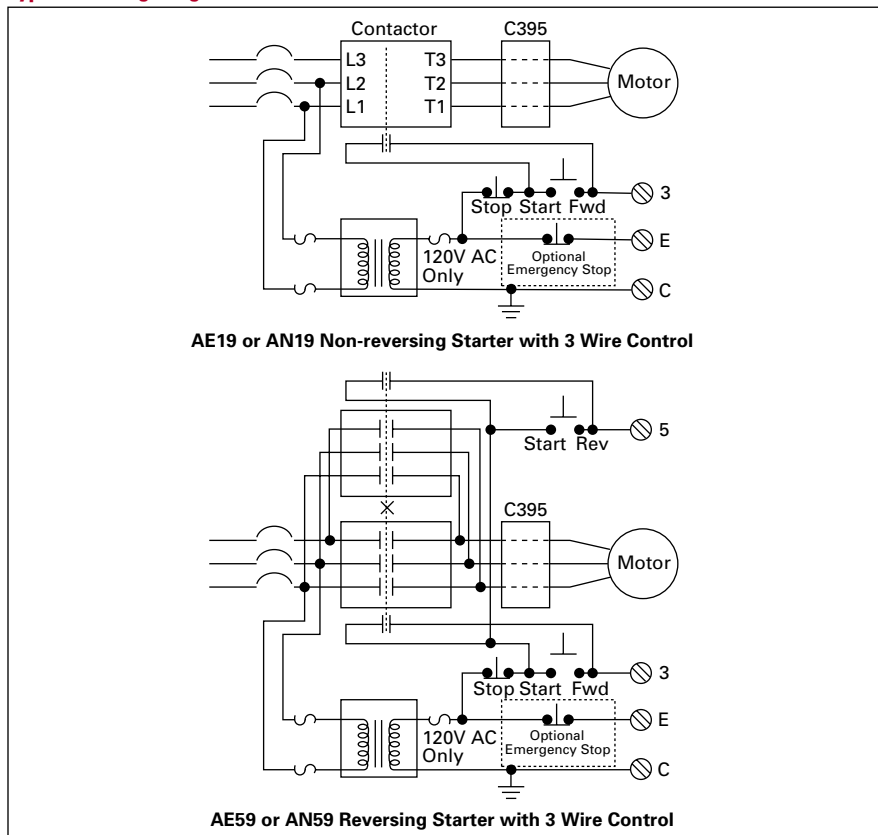


## Auxiliary Contact Markings — CENELEC EN50012

All auxiliary contact blocks are identified by a two digit contact configuration code. This number can be found in a box following the catalog number. The first digit indicates the quantity of NO contacts and the second indicates the quantity of NC contacts. The contact blocks may be ordered with this suffix code if desired.

Auxiliary contact terminals are also identified by a two digit number in accordance with International Standards approved by CENELEC (European Committee for Electrotechnical Standardization). These terminal numbers are used to identify location and status of the contacts. The first digit indicates the location of the auxiliary contact on the contactor, starter or relay. The numbering begins with 1 and continues without a break from left to right. The second digit indicates the status of the contacts (NO or NC). Terminal markings 1 and 2 indicated NC and 3 and 4 indicated NO. Top auxiliary contact location numbers utilize 5 through 8 (51-52, 63-64 etc.). Side auxiliary contacts leave a blank for the location number, to be completed in the field. See examples at right and Cutler-Hammer TIP sheets for additional information.

## Typical Wiring Diagrams



## Control Wire

- Size ..... 14-18
- Maximum Number ..... Two #14
- Strip Length ..... 3/16 – 1/4
- Torque ..... 5 lb-in

## Motor Wire

NEMA 00, 0

IEC Sizes A-F

.180" diameter wire ①

If larger wire needed, use Power

Terminal Block C395PT45DN

① .180" = 10 AWG wire of the following types: TF, TW, THHW, TFN, THHN, THWN, FEP, FEPB, FEPW, TFE, PF, PFA, PFAH, PGF, PTF, Z, ZF, XHHW, ZW, XHHW, KF-1, KF-2, KFF-1, KFF-2.

**Technical Data — Freedom AN19 Starters**

Description	Catalog Number/Size		
	NEMA Size 00	NEMA Size 0	NEMA Size 1
<b>Configuration:</b> Aux. contacts. std. Add on aux. contacts <b>Frame Size</b>	4th Pole NO (1) Top (4) or side (4) 45 mm	Side NO (1) Top (4) or side (3) 45 mm	Side NO (1) Top (4) or side (3) 45 mm
<b>Continuous Ampere Ratings</b>	9 Amperes	18 Amperes	27 Amperes
<b>Max. Horsepower (hp)</b> 1 Phase    115V 230V	.33 1	1 2	2 3
3 Phase    200V 230V 460V 575V	1.5 1.5 2 2	3 3 5 5	7.5 7.5 10 10
<b>AC Magnet Coil Data</b> Pickup Volts — Cold Pickup Volts — Hot Pickup Voltamperes Pickup Watts Sealed Voltamperes Sealed Watts	74% 78% 80 49 7.5 2.4	74% 78% 100 65 10 3.1	74% 78% 100 65 10 3.1
Dropout Volts Max. Operation Rate — Ops/Hour Pickup Time (mS) Dropout Time (mS)	65V AC 12,000 12 12	65V AC 12,000 12 12	65V AC 12,000 12 12
Coil Operating Range % of rated voltage	-15% to +10%	-15% to +10%	-15% to +10%
<b>Magnet Coil</b> <b>UL Insulation Rating</b>	Encapsulated—Class 130 (B) —105°C temperature rise		
<b>Operating Temperature</b> <b>Maximum Operating Altitude (ft.)</b> <b>Mechanical Life</b>	-20 to +40°C 6,000 20,000,000	-20 to +40°C 6,000 20,000,000	-20 to +40°C 6,000 20,000,000
<b>Electrical Life (480V/60 Hz)</b> AC3 AC4	4,000,000 90,000	3,000,000 85,000	3,000,000 88,000
<b>Wire Range</b> Power Terminals  Control Terminals	#12 – #16 stranded, #12 – #15 solid Cu  #12 – #16 stranded	#6 – #16 stranded, ① #10 – #14 solid Cu  #12 – #16 stranded	#6 – #16 stranded, #10 – #14 solid Cu  #12 – #16 stranded
<b>Control Kit Part No.</b>	None	None	None
<b>Auxiliary Contact Rating</b>	A600, P300		

① Use power terminal block (C395PT45DN) for wire diameters over .18 inches (typically up to 10 AWG).

## Technical Data — Freedom AE19 IEC Starters

Description	Catalog Number/Size														
	IEC Size A			IEC Size B			IEC Size C			IEC Size D			IEC Size E		
<b>Configuration:</b> Aux. contacts, std. Add on aux. contacts <b>Frame Size</b>	4th Pole NO (1) Top (4) or side (4) 45 mm			4th Pole NO (1) Top (4) or side (4) 45 mm			4th Pole NO (1) Top (4) or side (4) 45 mm			Side NO (1) Top (4) or side (3) 45 mm			Side NO (1) Top (4) or side (3) 45 mm		
<b>Finger Protection</b> ①	IP20									IP10					
<b>Insulation Voltage (Ui)</b>	690V														
<b>Impulse Withstand Voltage (Uimp)</b>	6 kV														
<b>Current Ratings (I)</b> IEC 947-4-1 AC1 Thermal Current Ith 230-380-460-575V	20 Amperes			20 Amperes			20 Amperes			32 Amperes			32 Amperes		
	<b>KW</b>	<b>hp</b>	<b>I</b>	<b>KW</b>	<b>hp</b>	<b>I</b>	<b>KW</b>	<b>hp</b>	<b>I</b>	<b>KW</b>	<b>hp</b>	<b>I</b>	<b>KW</b>	<b>hp</b>	<b>I</b>
AC3 (Ie) 230V	1.1	1.5	5.2A	1.5	2	6.8A	2.2	3	9.6A	4.0	5	16A	5.5	7.5	22A
380V	2.2	—	5.2A	4.0	—	9.1A	5.5	—	12 A	7.5	—	16A	11	—	23A
460V	2.2	3	4.8A	4.0	5	7.8A	5.5	7.5	11 A	7.5	10	14A	11	15	21A
575V	4.0	5	6.9A	5.5	7.5	9.4A	7.5	10	12 A	11	15	17A	15	20	23A
AC4 (Ie) 230V	1.1	—	5.2A	1.5	1	6.8A	3.0	1.5	9.6A	4.0	2	16A	5.5	3	22A
380V	2.2	—	5.2A	4.0	—	9.1A	5.5	—	12 A	7.5	—	16A	11	—	23A
460V	2.2	—	4.8A	4.0	2	7.8A	5.5	3	11 A	7.5	5	14A	11	7.5	21A
575V	4.0	—	6.9A	5.5	3	9.4A	7.5	5	9.4A	11	7.5	12A	15	10	17A
<b>AC Magnet Coil Data</b>															
Pickup Volts	65V AC			65V AC			65V AC			65V AC			65V AC		
Pickup Voltamperes	80			80			80			100			100		
Pickup Watts	49			49			49			65			65		
Sealed Voltamperes	7.5			7.5			7.5			10			10		
Sealed Watts	2.4			2.4			2.4			3.1			3.1		
Dropout Volts — Cold	45%			45%			45%			45%			45%		
Dropout Volts — Hot	46%			46%			46%			46%			46%		
Max. Operation Rate — Ops/Hour	12,000			12,000			12,000			12,000			12,000		
Pickup Time (mS)	12			12			12			12			12		
Dropout Time (mS)	12			12			12			12			12		
Coil Operating Range % of rated voltage	-15% to +10%			-15% to +10%			-15% to +10%			-15% to +10%			-15% to +10%		
<b>Magnet Coil</b>	Encapsulated — Class 130 (B)														
<b>UL Insulation Rating</b>	-105°C temperature rise														
	Tape Wound — Class 105 (A)														
	-85°C temperature rise														
<b>Mechanical Life</b>	20,000,000			20,000,000			20,000,000			20,000,000			20,000,000		
<b>Electrical Life (440/460V)</b>															
AC3	2,000,000			2,000,000			2,200,000			1,300,000			1,600,000		
AC4	46,000			70,000			90,000			60,000			50,000		
<b>Wire Range</b>															
Power Terminals	#12 — #16 stranded, #12 — #14 solid Cu			#12 — #16 stranded, #12 — #14 solid Cu			#12 — #16 stranded, #12 — #14 solid Cu			#6 — #16 stranded, ③ #10 — #14 solid Cu			#6 — #16 stranded, ③ #10 — #14 solid Cu		
Control Terminals	#12 — #16 stranded			#12 — #16 stranded			#12 — #16 stranded			#12 — #16 stranded			#12 — #16 stranded		
<b>Contact Kit Part No.</b>	None			None			None			None			None		
<b>Auxiliary Contact Ratings</b> ②	A600, P300 AC15, DC13														

① Without optional IP20 finger shields.

② See Accessory section for ratings.

③ Use power terminal block (C395PT45DN) for wire diameters over .18 inches (typically up to 10 AWG).

**Technical Data — Freedom AE19 IEC Starters**

Description	Catalog Number/Size		
	IEC Size F		
<b>Configuration:</b> Aux. contacts, std. Add on aux. contacts <b>Frame Size</b>	Side NO (1) Top (4) or side (3) 45 mm		
<b>Finger Protection</b> ①	IP10		
<b>Insulation Voltage (Ui)</b>	690V		
<b>Impulse Withstand Voltage (Uimp)</b>	6 kV		
<b>Current Ratings (I)</b> IEC 947-4-1 AC1 Thermal Current Ith 230-380-460-575V	32 Amperes		
	<b>KW</b>	<b>hp</b>	<b>I</b>
AC3 (Ie) 230V	7.5	10	28A
380V	15	—	30A
460V	15	20	27A
575V	18.5	25	28A
AC4 (Ie) 230V	5.5	5	22A
380V	11	—	23A
460V	11	10	21A
575V	15	15	19A
<b>AC Magnet Coil Data</b> Pickup Volts — Cold Pickup Voltamperes Pickup Watts Sealed Voltamperes Sealed Watts	65V AC 100 65 10 3.1		
Dropout Volts — Cold	45%		
Dropout Volts — Hot	46%		
Max. Operation Rate — Ops/Hour	12,000		
Pickup Time (mS)	12		
Dropout Time (mS)	12		
Coil Operating Range % of rated voltage	-15% to +10%		
<b>Magnet Coil</b> <b>UL Insulation Rating</b>	Encapsulated — Class 130 (B) — 105°C temperature rise		
<b>Mechanical Life</b>	20,000,000		
<b>Electrical Life (440/460V)</b> AC3 AC4	1,500,000 55,000		
<b>Wire Range</b> Power Terminals	#8 — #16 stranded, ③ #10 — #14 solid Cu		
Control Terminals	#12 — #16 stranded		
<b>Contact Kit Part No.</b>	None		
<b>Auxiliary Contact</b> <b>Ratings</b> ②	A600, P300 AC15, DC13		

① Without optional IP20 finger shields.

② See Accessory section for ratings.

③ Use power terminal block (C395PT45DN) for wire diameters over .18 inches (typically up to 10 AWG).

Overload relays are provided to protect motors, motor control apparatus and motor-branch circuit conductors against excessive heating due to motor overloads and failure to start. This definition does not include: 1) motor circuits over 600V, 2) short circuits, 3) ground faults and 4) fire pump control. (N.E.C. Art. 430-31)

### Control Voltage and Power Ratings

- 110/120V AC  $\pm$  10%
- 50/60 Hz
- 50 VA minimum
- C terminal should always be grounded
- Pickup 3 terminal 80V AC
- Dropout 3 terminal 65V AC

### Short-Circuit Protection

**Fuses and Inverse-Time Circuit Breakers** may be selected per Article 430, Part D of the National Electrical Code to protect motor branch circuits from fault conditions. If higher ratings or settings are required to start the motor, do **not** exceed the maximum as listed in Exception No. 2, Article 430-52.

#### Plugging and Jogging Service Horsepower Ratings<sup>①</sup>

NEMA Size	200 Volts	230 Volts	460 Volts	575 Volts
00	—	.5	.5	.5
0	1.5	1.5	2	2
1	3	3	5	5

① Maximum horsepower where operation is interrupted more than 5 times per minute, or more than 10 times in a 10 minute period.

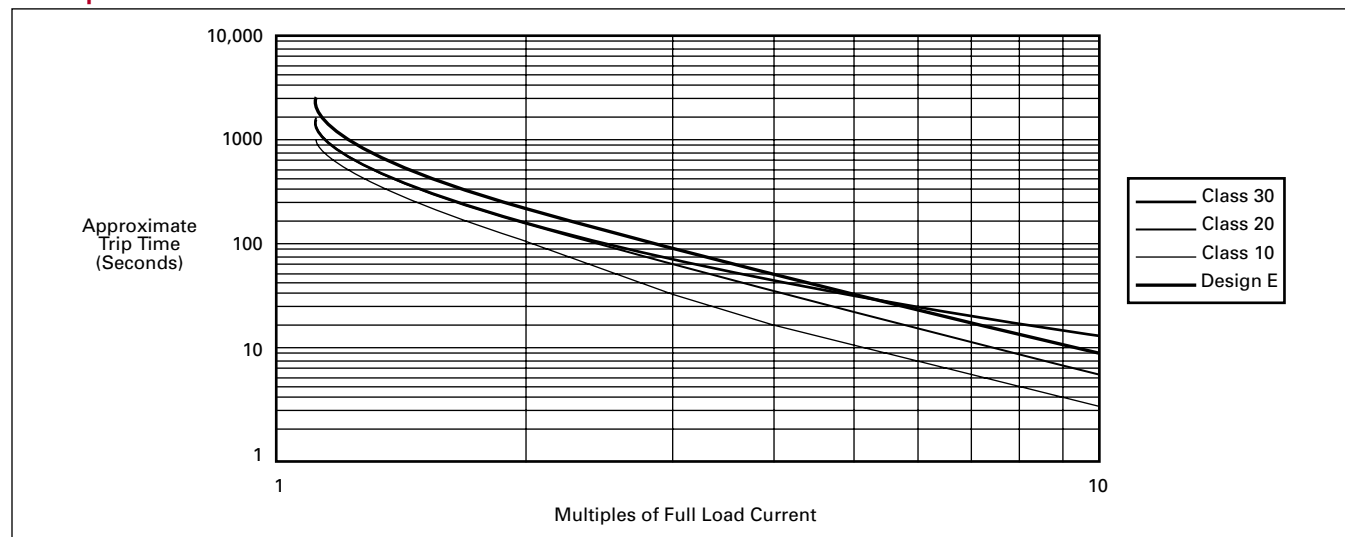
#### Plugging and Jogging Service Horsepower Ratings<sup>②</sup>

IEC Size	200 Volts	230 Volts	460 Volts	575 Volts
<b>Iec Style</b>				
IEC B	1	1	2	3
C	1.5	1.5	3	5
D	2	2	5	7.5
E	3	3	7.5	10
F	5	5	10	15

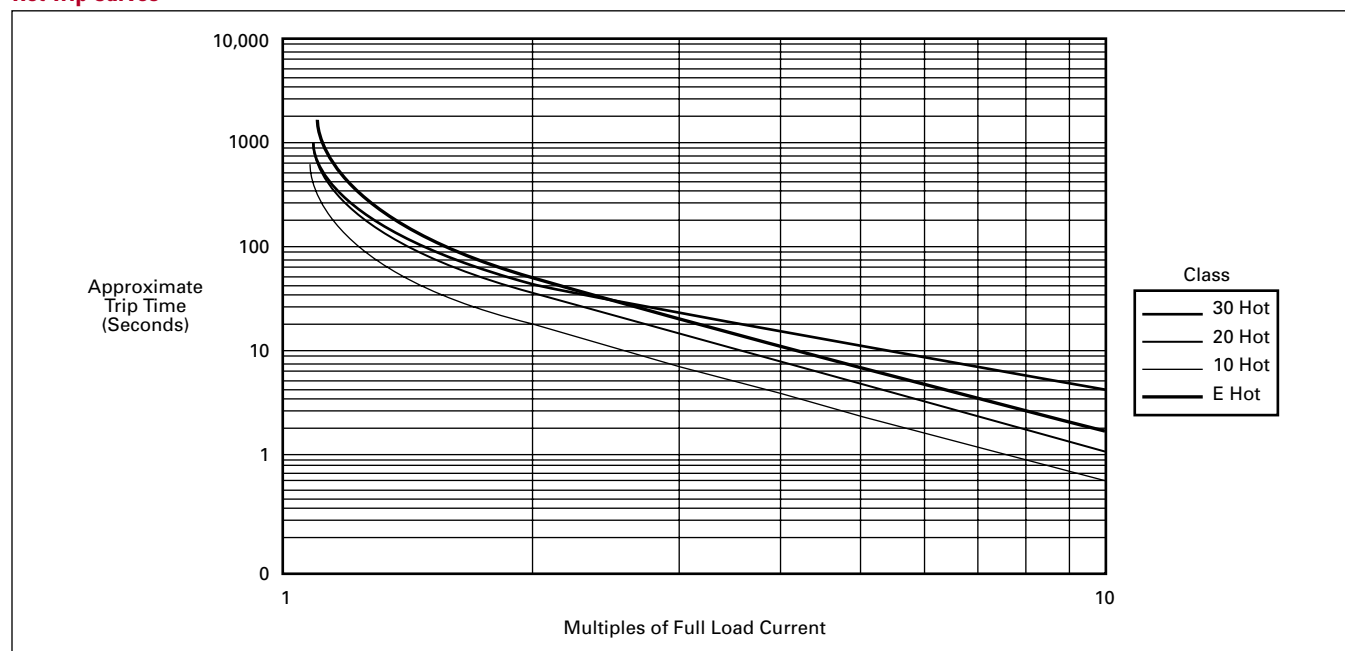
② Maximum horsepower where operation is interrupted more than 5 times per minute, or more than 20 times in a 10 minute period.

**Thermal** — Four basic curves are supported as well as warm start even after loss of power.

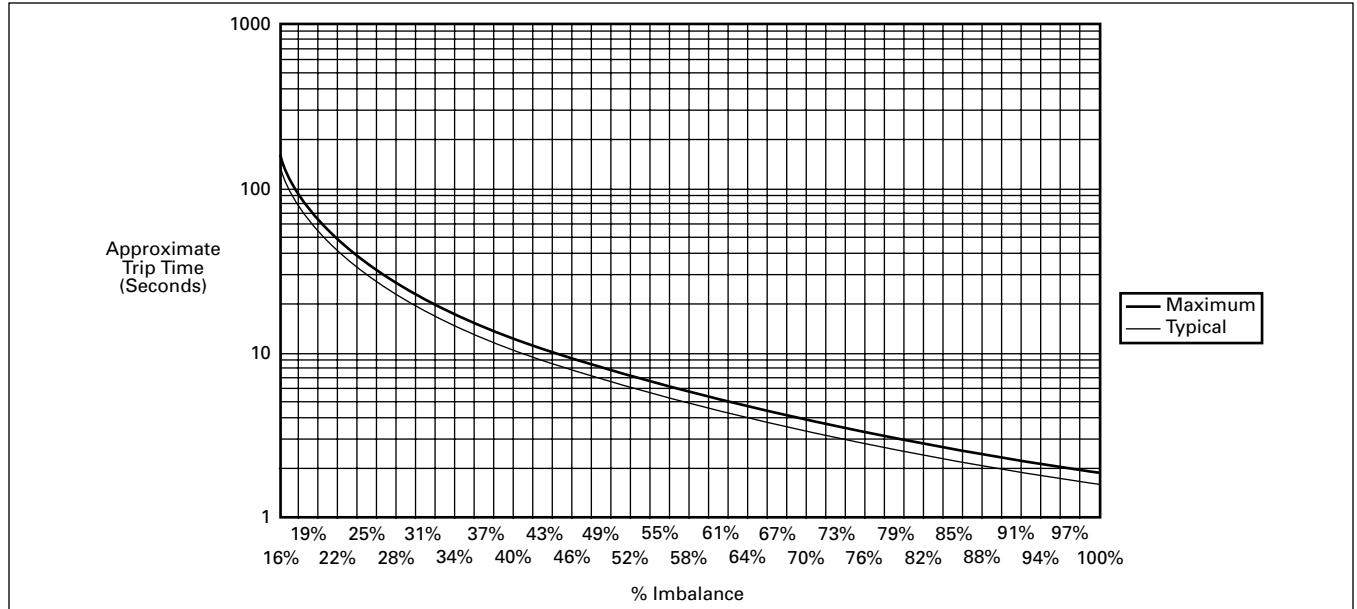
### Cold Trip Curves



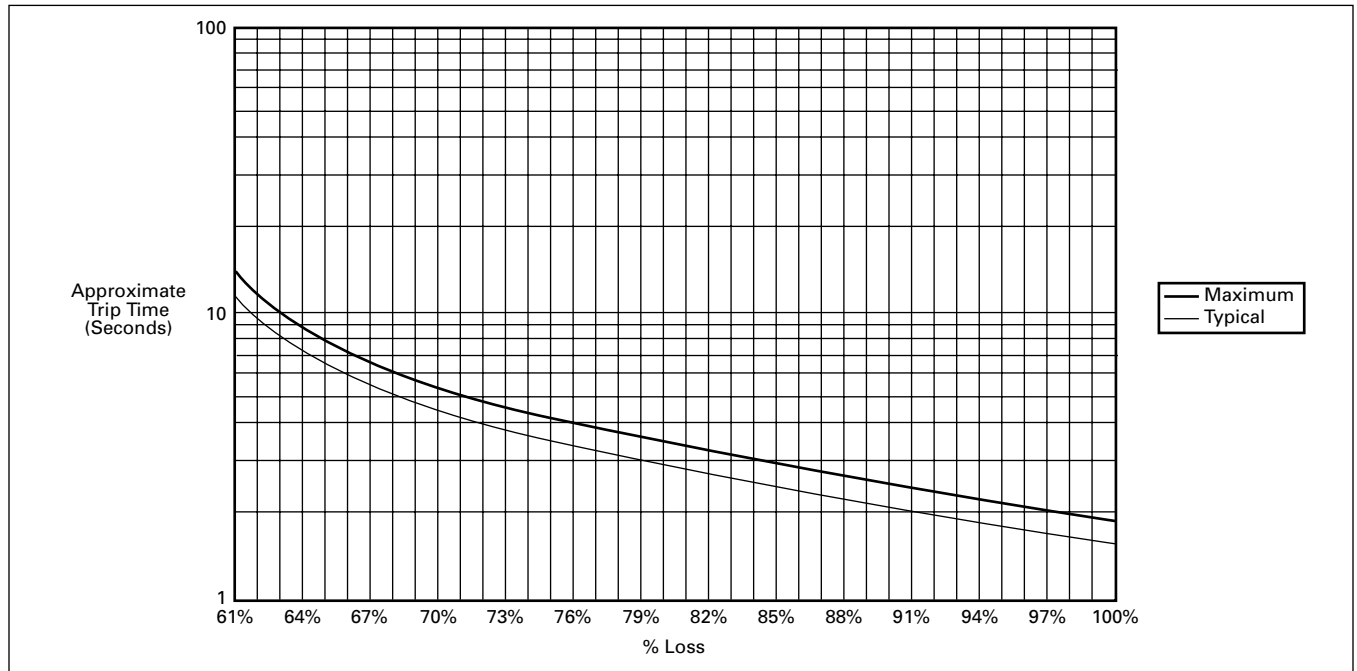
### Hot Trip Curves



### Percent Unbalance Curve



### Phase Loss Curve





### ECE71 – 74 IEC Combination Starters



### Features

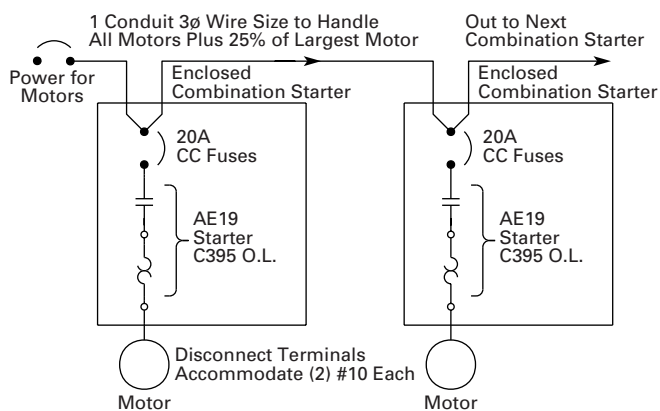
- DeviceNet Communications Module wired and installed
- Fusible Disconnect with 20A Class CC fuses installed
- IEC Size "D" AE19 Starter with electronic overload relay
- DeviceNet Connector installed — ready to plug into DeviceNet drop cable

### Benefits

- Can be applied on motors 1/4 – 10 hp (@ 460V)
- Eliminates stocking multiple starter sizes
- Reduced inventory
- Wire and Installation Savings: One conduit "daisy chained" to all starters replacing multiple conduits and long runs of motor leads. One DeviceNet cable replaces "homeruns" of control wiring
- Eliminate Control Cabinet and Local Safety Disconnect: With small enclosed combination starter
- Less Part Numbers to Order, Engineer and Stock: One combination enclosure for small horsepower motors
- Motor Data, Status and Diagnostics available over DeviceNet Advanced Motor Protection: RMS current sensing, phase unbalance, phase loss and mechanical jam

### Available Options

- Control Power Transformer
- Emergency Stop Relay with 24V DC coil
- Separate Source Disconnect
- Local Cover Control E22 Devices





### All ECE71 – 74 IEC Combination Starters Include:

- Starter and disconnect
- C395 solid-state overload
- C395DNA module
- Control panel receptacle — male

### Communication Capability

Included as a standard feature, the C395DNA module enables full DeviceNet communications:

- Programming of all set points
- ON/OFF control
- Trip reset
- Three phase motor current
- Average motor current
- Starter status (power on, off, running, tripped)
- True contactor status without auxiliary contacts
- Percent thermal capacity
- Percent phase unbalance
- Cause of trip indication
- Data at time of trip — percent motor thermal capacity, trip cause

Cutler-Hammer's ECE71 – 74 combination starters combine proven contactors with the patented C395 solid-state overload relay. In addition to electronic overload protection, advanced motor and load protection features are standard. With the C395DNA module, the starters are capable of being controlled, monitored and programmed over DeviceNet. The C395 overload relay can use a hand-held or a key switch programmer without a C395 module installed.

### Motor Protection

- Solid-State Overload Protection with true RMS current sensing capability for accurate monitoring of loads with poor power quality. Digital FLA entry to exactly match motor requirements.
- Phase Loss Trip (may be disabled)
- Phase Unbalance Trip (may be disabled)
- Mechanical Jam Trip (after motor start-up, trips at 400% full load current after a programmable time delay ranging from .1 to 25 seconds)
- Anti-Recycle Delay (.1 to 300 seconds) to allow load to settle before motor restarts (with hand-held programmable C395PHHDN or DeviceNet only)
- Cause of Trip indication on Faceplate (for example, overcurrent or phase loss)
- Class 10, 20, 30, Design E and Custom (Class 4-60) adjustable trip class settings
- Programmable Manual or Auto reset <sup>①</sup>
- Programmable Delay or Power Up (.1 to 300 seconds) (with hand-held programmer C395PHHDN only)

<sup>①</sup> In auto reset mode, unit will reset two-three minutes after overload, phase unbalance or phase loss trip.

### Programming Methods

- DeviceNet – the C395 DeviceNet module plugs into the starter to allow complete programming, monitoring and control over DeviceNet.
- Hand-Held Programmer – a small, portable keypad with digital display for complete programming and monitoring of individual starters.
- Programming Key – plugs into individual starters for quick, easy programming. Set points are adjusted via DIP switches; the key is removed after programming and may be used for multiple starters.

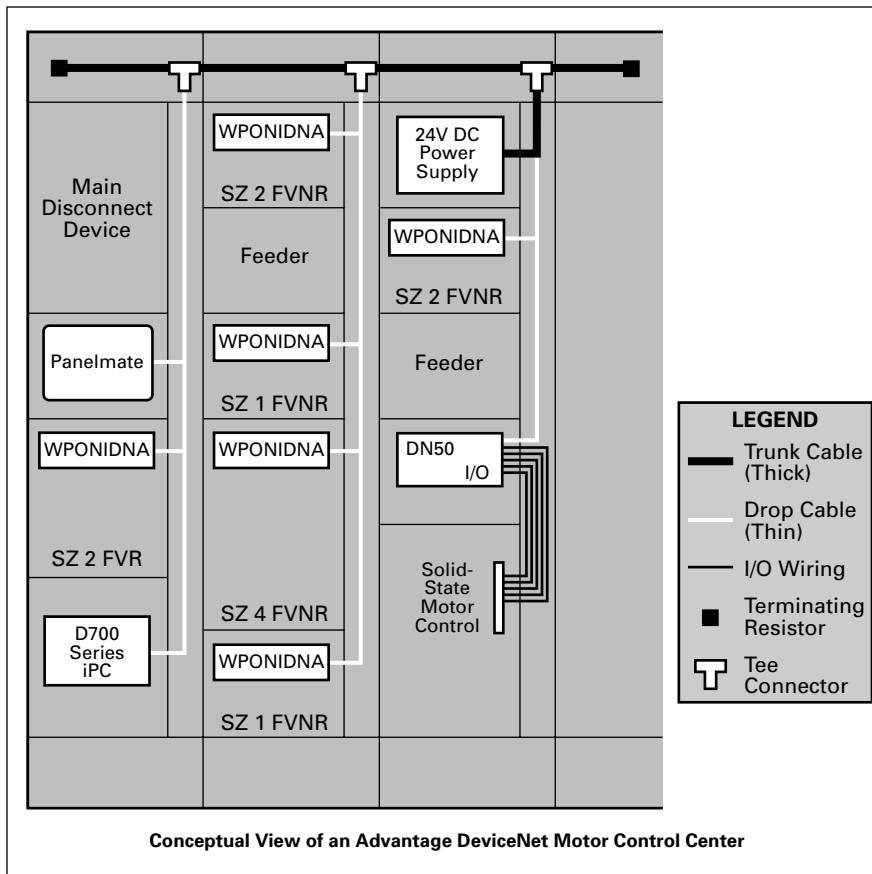
### Ordering Information

To order the combination starter with the "One Size Fits All" bill of material, refer to the chart below which includes a size "D" AE19 fusible combination starter complete with 20A Class CC fuses and separate 120V control voltage. For control power transformer<sup>②</sup>, control devices, separate source disconnect or other options see Enclosed Control IEC Product – Publication No. PG.32.T.E.02.

Description	Catalog Number
<b>3 Pole NEMA 1</b>	
Non-reversing	<b>ECE71D1AAC-Z1</b>
Reversing	<b>ECE73D1AAC-Z1</b>
<b>3 Pole NEMA 12</b>	
Non-reversing	<b>ECE71D8AAC-Z1</b>
Reversing	<b>ECE73D8AAC-Z1</b>
<b>3 Pole NEMA 3R</b>	
Non-reversing	<b>ECE71D2AAC-Z1</b>
Reversing	<b>ECE73D2AAC-Z1</b>

Non-reversing units supplied in Box J. Reversing units supplied in Box K.

<sup>②</sup> If control power transformer is supplied, add Modification Code and change 8th character.



### Possible Uses

- Control of variable frequency drives
- Control of soft starts
- True indication of breaker status

### PanelMate with Device Interface Card

Using the Device Interface Card, the PanelMate provides the ability to "monitor" status from other slave devices on the network without the need for active involvement from the master device. It can also input control (pushbuttons) operations or numeric information to the iPC (master). These capabilities permit PanelMate units to function as an input device controller or monitoring station on DeviceNet.

**NOTE:** The Windows Configuration Software is required for setup of the PanelMate products. See Section 5 for more details.

### 24V DC Power Supply

The DeviceNet network requires a 24V DC power supply. Cutler-Hammer's Motor Control Centers will mount and wire a specified power supply. Sizing and location of the power supply within the network must be provided.

### D700 Line of iPCs (Industrial Personal Computers — Mounted in Motor Control Centers)

Cutler-Hammer offers a complete line of iPCs. The iPC is the DeviceNet system controller. See Section 4 for more details.

Contact your local Cutler-Hammer Automation Sales Manager or Cutler-Hammer Automation Systems Distributor for information on pricing, system design support and application assistance.

## Product Descriptions

### WPONIDNA

Required on each Advantage Starter, the WPONIDNA communicates on DeviceNet. If local control is desired, the ACM modules will be included.

### DN50 I/O Blocks

Similar to PLC I/O in control, the DN50 I/O Blocks are programmed through the DeviceNet system. The DN50 allows devices without DeviceNet intelligence to be connected to the system. The I/O block acts as a slave device on the system, and with the additional expander chassis, provides up to 56 discrete I/O points on one node. Analog expanders can also be added — providing up to four analog inputs and two analog outputs. Total maximum I/O on one node: 56 discrete and 6 analog. See Section 6 for more details.

The Cutler-Hammer DeviceNet Motor Control Center is based upon the Advantage Motor Control Center product offering. Intelligent devices, Advantage Starters (through the WPONIDNA) and DN50 I/O modules for non-intelligent devices are mounted and pre-wired in the Motor Control Center.

DeviceNet is a device level open communication network linking control products, such as motor starters, sensors, limit switches, variable frequency drives and operator interfaces. Cutler-Hammer's DeviceNet Products provide unique capabilities that can reduce installation costs. The Cutler-Hammer DeviceNet Motor Control Center dramatically reduces control wiring, simplifies start-up and provides advanced diagnostics which minimize or eliminate downtime.