

HVAC Starters



7.1 Freedom Full Voltage HVAC Starters

Product Description	V10-T7-2
Features	V10-T7-2
Standards and Certifications	V10-T7-3
Additional Reference	V10-T7-3
Catalog Number Selection	V10-T7-3
Cover Control	V10-T7-3
Product Selection	V10-T7-4
Modification Codes	V10-T7-8
Wiring Diagram	V10-T7-9
Dimensions	V10-T7-10

Freedom Full Voltage HVAC Starters



7

Product Description

Eaton's ECH line of combination starters was developed specifically for customers in the HVAC industry. The ECH product combines the requirements of motor overload and short-circuit protection into one package. These starters were designed to be compact and to offer the basic features prevalent in the HVAC marketplace. The line includes the Freedom line of FVNR NEMA starters with either (C306) interchangeable heaters or solid-state overload relays, a CPT, HOA and red pilot light.

Features

- Compact design
- Type 1 enclosure
- CPT available
- Bimetal or solid-state overload options
- 30 mm pilot devices
- HOA
- Red RUN pilot
- Disconnect switch or HMCPE
- NEMA Sizes 0–2

Interchangeable Heater Features

C306 overload relays are designed for use with CE or CN non-reversing and reversing contactors. Four sizes are available for overload protection up to 144A.

- Selectable manual or automatic reset operation
- Interchangeable heater packs adjustable $\pm 24\%$ to match motor FLA and calibrated for use with 1.0 and 1.15 service factor motors. Heater packs for 32A overload relay will mount in 75A overload relay—useful in derating applications such as jogging
- Class 10 or 20 heater packs
- Load lugs built into relay base

Contents

Description

Freedom Full Voltage HVAC Starters

	<i>Page</i>
Standards and Certifications	V10-T7-3
Additional Reference	V10-T7-3
Catalog Number Selection	V10-T7-3
Cover Control	V10-T7-3
Product Selection	V10-T7-4
Modification Codes	V10-T7-8
Wiring Diagram	V10-T7-9
Dimensions	V10-T7-10

- Bimetallic, ambient compensated operated. Trip free mechanism
- Electrically isolated NO-NC contacts (pull RESET button to test). (Electrical Ratings see **Tab 17**)
- Overload trip indication
- Shrouded or fingerproof terminals to reduce possibility of electrical shock
- Meets UL 508 single-phasing requirements
- UL listed, CSA certified, NEMA compliance

Solid-State Overload Features

- Reliable, accurate, electronic motor protection
- Easy to select, install and maintain
- Flexible, intelligent design

Size/Range

- Broad FLA range (0.33–100A)
- Selectable trip class (10A, 10, 20, 30)
- Direct mounting to NEMA contactors
- Most compact electronic overload in its class

Motor Control

- Two B600 alarm (NO) and fault (NC) contacts
- Test/Trip button

Motor Protection

- Thermal overload
- Phase loss
- Selectable (ON/OFF) phase unbalance
- Selectable (ON/OFF) ground fault (if selected GF SSOL relay)

User Interface

- Large FLA selection dial
- Trip status indicator
- Operating mode LED
- DIP switch selectable trip class, phase unbalance and ground fault
- Selectable Auto/Manual reset

Feature Options

- Remote reset
- 120 Vac
- 24 Vac
- 24 Vdc
- Tamper-proof cover
- Communications modules

Standards and Certifications

Note: See **Tab 17** for additional information on standards and certifications that apply to all enclosed control products.

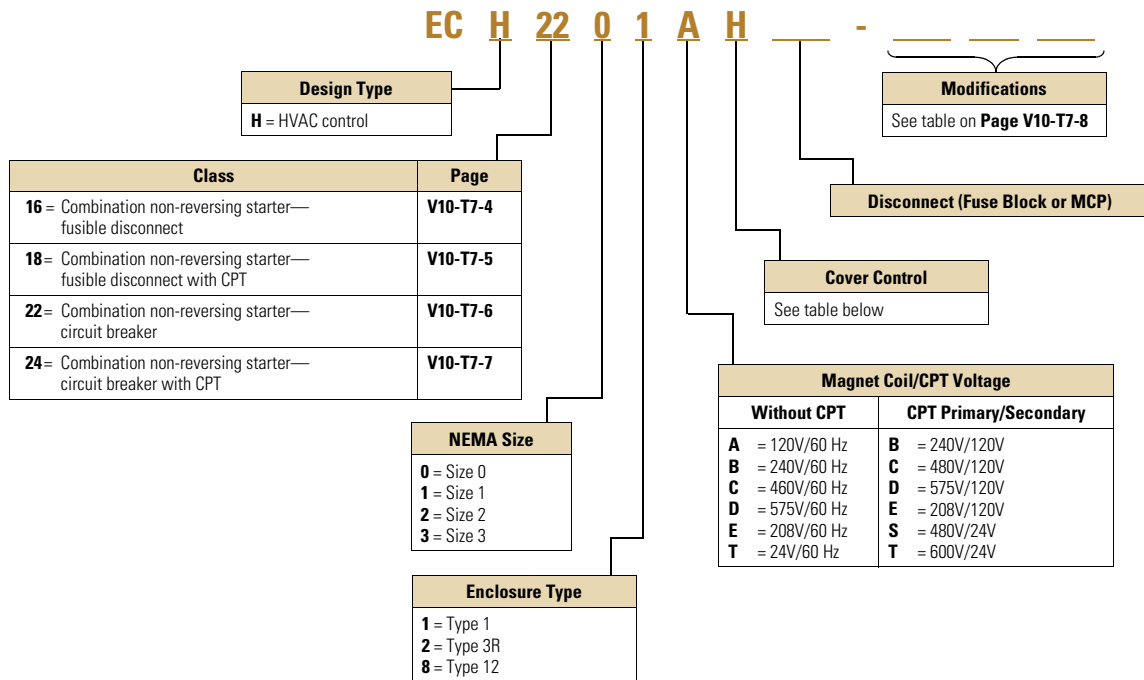
- UL Listed
- cUL Listed (indicates appropriate CSA Standard investigation)
- ABS Type Approved
- OSHPD Certified (OSP-0015-10)

Additional Reference

Modification Codes	V10-T7-8
Wiring Diagram	V10-T7-9
Dimensions	V10-T7-10

Catalog Number Selection

Freedom HVAC Starters



Cover Control

Pilot Device Factory Installation

Description	Position 9 Alpha
None	A
HAND/OFF/AUTO	H
HAND/OFF/AUTO with red RUN pilot	J

Product Selection

Class ECH16—Combination Non-Reversing Starter—Fusible Disconnect

NEMA Size	Motor Voltage	Maximum hp	Coil Voltage	Type 1 General Purpose Catalog Number ①	Type 3R Rainproof Catalog Number ①	Type 12 Dust-Tight Industrial Catalog Number ①	Type 1 with HOA Catalog Number ①	Type 1 with HOA and Red RUN Pilot Catalog Number ①	Component Starter (Open) Catalog Number ②
0	—	—	120	ECH1601AA_	ECH1602AA_	ECH1608AA_	ECH1601AH_	ECH1601AJ_	AN16BN0AC
	—	—	24	ECH1601TA_	ECH1602TA_	ECH1608TA_	ECH1601TH_	ECH1601TJ_	AN16BN0TC
	200	3	208	ECH1601EA_	ECH1602EA_	ECH1608EA_	ECH1601EH_	ECH1601EJ_	AN16BN0EC
	240	—	240	ECH1601BA_	ECH1602BA_	ECH1608BA_	ECH1601BH_	ECH1601BJ_	AN16BN0BC
	460	5	460	ECH1601CA_	ECH1602CA_	ECH1608CA_	ECH1601CH_	ECH1601CJ_	AN16BN0CC
	575	—	575	ECH1601DA_	ECH1602DA_	ECH1608DA_	ECH1601DH_	ECH1601DJ_	AN16BN0DC
1	—	—	120	ECH1611AA_	ECH1612AA_	ECH1618AA_	ECH1611AH_	ECH1611AJ_	AN16DN0AB
	—	—	24	ECH1611TA_	ECH1612TA_	ECH1618TA_	ECH1611TH_	ECH1611TJ_	AN16DN0TB
	200	7-1/2	208	ECH1611EA_	ECH1612EA_	ECH1618EA_	ECH1611EH_	ECH1611EJ_	AN16DN0EB
	240	—	240	ECH1611BA_	ECH1612BA_	ECH1618BA_	ECH1611BH_	ECH1611BJ_	AN16DN0BB
	460	10	460	ECH1611CA_	ECH1612CA_	ECH1618CA_	ECH1611CH_	ECH1611CJ_	AN16DN0CB
	575	—	575	ECH1611DA_	ECH1612DA_	ECH1618DA_	ECH1611DH_	ECH1611DJ_	AN16DN0DB
2	—	—	120	ECH1621AA_	ECH1622AA_	ECH1628AA_	ECH1621AH_	ECH1621AJ_	AN16GN0AB
	—	—	24	ECH1621TA_	ECH1622TA_	ECH1628TA_	ECH1621TH_	ECH1621TJ_	AN16GN0TB
	200	10	208	ECH1621EA_	ECH1622EA_	ECH1628EA_	ECH1621EH_	ECH1621EJ_	AN16GN0EB
	240	15	240	ECH1621BA_	ECH1622BA_	ECH1628BA_	ECH1621BH_	ECH1621BJ_	AN16GN0BB
	460	25	460	ECH1621CA_	ECH1622CA_	ECH1628CA_	ECH1621CH_	ECH1621CJ_	AN16GN0CB
	575	—	575	ECH1621DA_	ECH1622DA_	ECH1628DA_	ECH1621DH_	ECH1621DJ_	AN16GN0DB
3	—	—	120	ECH1631AA_	ECH1632AA_	ECH1638AA_	ECH1631AH_	ECH1631AJ_	AN16KN0A
	—	—	24	ECH1631TA_	ECH1632TA_	ECH1638TA_	ECH1631TH_	ECH1631TJ_	AN16KN0T
	200	25	208	ECH1631EA_	ECH1632EA_	ECH1638EA_	ECH1631EH_	ECH1631EJ_	AN16KN0E
	240	30	240	ECH1631BA_	ECH1632BA_	ECH1638BA_	ECH1631BH_	ECH1631BJ_	AN16KN0B
	460	50	460	ECH1631CA_	ECH1632CA_	ECH1638CA_	ECH1631CH_	ECH1631CJ_	AN16KN0C
	575	—	575	ECH1631DA_	ECH1632DA_	ECH1638DA_	ECH1631DH_	ECH1631DJ_	AN16KN0D

Notes

① A “—” denotes catalog numbers are incomplete without the fuse block code. To complete the catalog number, select the appropriate code from the following table:

Rating	Fuse Block Code
No block	A
30A/600V “J”	C
60A/600V “J”	E (Size 2 only)
100A/600V “J”	G

② If the solid-state overload option is selected, refer to Publication Number TD03408001E, Relay for MCCs and Enclosed Control Technical Data, for component selection.

Class ECH18—Combination Non-Reversing Starter—Fusible Disconnect with CPT

NEMA Size	Motor Voltage	Maximum hp	CPT Primary/Secondary (Coil Voltage)	Type 1 General Purpose Catalog Number ^①	Type 3R Rainproof Catalog Number ^①	Type 12 Dust-Tight Industrial Catalog Number ^①	Type 1 with HOA Catalog Number ^①	Type 1 with HOA and Red RUN Pilot Catalog Number ^①	Component Starter (Open) Catalog Number ^②
0	200	3	208/120	ECH1801EA_	ECH1802EA_	ECH1808EA_	ECH1801EH_	ECH1801EJ_	AN16BN0EC
			240/120	ECH1801BA_	ECH1802BA_	ECH1808BA_	ECH1801BH_	ECH1801BJ_	AN16BN0BC
	460	5	460/120	ECH1801CA_	ECH1802CA_	ECH1808CA_	ECH1801CH_	ECH1801CJ_	AN16BN0CC
			575/120	ECH1801DA_	ECH1802DA_	ECH1808DA_	ECH1801DH_	ECH1801DJ_	AN16BN0DC
1	200	7-1/2	208/120	ECH1811EA_	ECH1812EA_	ECH1818EA_	ECH1811EH_	ECH1811EJ_	AN16DN0EB
			240/120	ECH1811BA_	ECH1812BA_	ECH1818BA_	ECH1811BH_	ECH1811BJ_	AN16DN0BB
	460	10	460/120	ECH1811CA_	ECH1812CA_	ECH1818CA_	ECH1811CH_	ECH1811CJ_	AN16DN0CB
			575/120	ECH1811DA_	ECH1812DA_	ECH1818DA_	ECH1811DH_	ECH1811DJ_	AN16DN0DB
2	200	10	208/120	ECH1821EA_	ECH1822EA_	ECH1828EA_	ECH1821EH_	ECH1821EJ_	AN16GN0EB
			240/120	ECH1821BA_	ECH1822BA_	ECH1828BA_	ECH1821BH_	ECH1821BJ_	AN16GN0BB
	460	25	460/120	ECH1821CA_	ECH1822CA_	ECH1828CA_	ECH1821CH_	ECH1821CJ_	AN16GN0CB
			575/120	ECH1821DA_	ECH1822DA_	ECH1828DA_	ECH1821DH_	ECH1821DJ_	AN16GN0DB
3	200	25	208/120	ECH1831EA_	ECH1832EA_	ECH1838EA_	ECH1831EH_	ECH1831EJ_	AN16KN0E
			240/120	ECH1831BA_	ECH1832BA_	ECH1838BA_	ECH1831BH_	ECH1831BJ_	AN16KN0B
	460	50	460/120	ECH1831CA_	ECH1832CA_	ECH1838CA_	ECH1831CH_	ECH1831CJ_	AN16KN0C
			575/120	ECH1831DA_	ECH1832DA_	ECH1838DA_	ECH1831DH_	ECH1831DJ_	AN16KN0D

Notes

① A “-” denotes catalog numbers are incomplete without the fuse block code. To complete the catalog number, select the appropriate code from the following table:

Rating	Fuse Block Code
No block	A
30A/600V “J”	C
60A/600V “J”	E (Size 2 only)
100A/600V “J”	G

② If the solid-state overload option is selected, refer to Publication Number TD03408001E, Relay for MCCs and Enclosed Control Technical Data, for component selection.

Class ECH22—Combination Non-Reversing Starter—Circuit Breaker

NEMA Size	Motor Voltage	Maximum hp	Coil Voltage	Type 1 General Purpose Catalog Number ①	Type 3R Rainproof Catalog Number ①	Type 12 Dust-Tight Industrial Catalog Number ①	Type 1 with HOA Catalog Number ①	Type 1 with HOA and Red RUN Pilot Catalog Number ①	Component Starter (Open) Catalog Number ②
0	—	—	120	ECH2201AA_	ECH2202AA_	ECH2208AA_	ECH2201AH_	ECH2201AJ_	AN16BN0AC
	—	—	24	ECH2201TA_	ECH2202TA_	ECH2208TA_	ECH2201TH_	ECH2201TJ_	AN16BN0TC
	200	3	208	ECH2201EA_	ECH2202EA_	ECH2208EA_	ECH2201EH_	ECH2201EJ_	AN16BN0EC
	240	—	240	ECH2201BA_	ECH2202BA_	ECH2208BA_	ECH2201BH_	ECH2201BJ_	AN16BN0BC
	460	5	460	ECH2201CA_	ECH2202CA_	ECH2208CA_	ECH2201CH_	ECH2201CJ_	AN16BN0CC
	575	—	575	ECH2201DA_	ECH2202DA_	ECH2208DA_	ECH2201DH_	ECH2201DJ_	AN16BN0DC
1	—	—	120	ECH2211AA_	ECH2212AA_	ECH2218AA_	ECH2211AH_	ECH2211AJ_	AN16DN0AB
	—	—	24	ECH2211TA_	ECH2212TA_	ECH2218TA_	ECH2211TH_	ECH2211TJ_	AN16DN0TB
	200	7-1/2	208	ECH2211EA_	ECH2212EA_	ECH2218EA_	ECH2211EH_	ECH2211EJ_	AN16DN0EB
	240	—	240	ECH2211BA_	ECH2212BA_	ECH2218BA_	ECH2211BH_	ECH2211BJ_	AN16DN0BB
	460	10	460	ECH2211CA_	ECH2212CA_	ECH2218CA_	ECH2211CH_	ECH2211CJ_	AN16DN0CB
	575	—	575	ECH2211DA_	ECH2212DA_	ECH2218DA_	ECH2211DH_	ECH2211DJ_	AN16DN0DB
2	—	—	120	ECH2221AA_	ECH2222AA_	ECH2228AA_	ECH2221AH_	ECH2221AJ_	AN16GN0AB
	—	—	24	ECH2221TA_	ECH2222TA_	ECH2228TA_	ECH2221TH_	ECH2221TJ_	AN16GN0TB
	200	10	208	ECH2221EA_	ECH2222EA_	ECH2228EA_	ECH2221EH_	ECH2221EJ_	AN16GN0EB
	240	15	240	ECH2221BA_	ECH2222BA_	ECH2228BA_	ECH2221BH_	ECH2221BJ_	AN16GN0BB
	460	25	460	ECH2221CA_	ECH2222CA_	ECH2228CA_	ECH2221CH_	ECH2221CJ_	AN16GN0CB
	575	—	575	ECH2221DA_	ECH2222DA_	ECH2228DA_	ECH2221DH_	ECH2221DJ_	AN16GN0DB
3	—	—	120	ECH2231AA_	ECH2232AA_	ECH2238AA_	ECH2231AH_	ECH2231AJ_	AN16KN0A
	—	—	24	ECH2231TA_	ECH2232TA_	ECH2238TA_	ECH2231TH_	ECH2231TJ_	AN16KN0T
	200	25	208	ECH2231EA_	ECH2232EA_	ECH2238EA_	ECH2231EH_	ECH2231EJ_	AN16KN0E
	240	30	240	ECH2231BA_	ECH2232BA_	ECH2238BA_	ECH2231BH_	ECH2231BJ_	AN16KN0B
	460	50	460	ECH2231CA_	ECH2232CA_	ECH2238CA_	ECH2231CH_	ECH2231CJ_	AN16KN0C
	575	—	575	ECH2231DA_	ECH2232DA_	ECH2238DA_	ECH2231DH_	ECH2231DJ_	AN16KN0D

Notes

① A “—” denotes catalog numbers are incomplete without the magnetic circuit protector code. To complete the catalog number, select the appropriate code from the following table:

Rating	Magnetic Circuit Protector Code	Rating	Magnetic Circuit Protector Code
—	A	30A	E
3A	B	50A	F
7A	C	100A	G
15A	D		

② If the solid-state overload option is selected, refer to Publication Number TD03408001E, Relay for MCCs and Enclosed Control Technical Data, for component selection.

Class ECH24—Combination Non-Reversing Starter—Circuit Breaker with CPT

NEMA Size	Motor Voltage	Maximum hp	CPT Primary/Secondary (Coil Voltage)	Type 1 General Purpose Catalog Number ①	Type 3R Rainproof Catalog Number ①	Type 12 Dust-Tight Industrial Catalog Number ①	Type 1 with HOA Catalog Number ①	Type 1 with HOA and Red RUN Pilot Catalog Number ①	Component Starter (Open) Catalog Number ②
0	200	3	208/120	ECH2401EA_	ECH2402EA_	ECH2408EA_	ECH2401EH_	ECH2401EJ_	AN16BN0EC
			240/120	ECH2401BA_	ECH2402BA_	ECH2408BA_	ECH2401BH_	ECH2401BJ_	AN16BN0BC
	460	5	460/120	ECH2401CA_	ECH2402CA_	ECH2408CA_	ECH2401CH_	ECH2401CJ_	AN16BN0CC
			575/120	ECH2401DA_	ECH2402DA_	ECH2408DA_	ECH2401DH_	ECH2401DJ_	AN16BN0DC
1	200	7-1/2	208/120	ECH2411EA_	ECH2412EA_	ECH2418EA_	ECH2411EH_	ECH2411EJ_	AN16DN0EB
			240/120	ECH2411BA_	ECH2412BA_	ECH2418BA_	ECH2411BH_	ECH2411BJ_	AN16DN0BB
	460	10	460/120	ECH2411CA_	ECH2412CA_	ECH2418CA_	ECH2411CH_	ECH2411CJ_	AN16DN0CB
			575/120	ECH2411DA_	ECH2412DA_	ECH2418DA_	ECH2411DH_	ECH2411DJ_	AN16DN0DB
2	200	10	208/120	ECH2421EA_	ECH2422EA_	ECH2428EA_	ECH2421EH_	ECH2421EJ_	AN16GN0EB
			240/120	ECH2421BA_	ECH2422BA_	ECH2428BA_	ECH2421BH_	ECH2421BJ_	AN16GN0BB
	460	25	460/120	ECH2421CA_	ECH2422CA_	ECH2428CA_	ECH2421CH_	ECH2421CJ_	AN16GN0CB
			575/120	ECH2421DA_	ECH2422DA_	ECH2428DA_	ECH2421DH_	ECH2421DJ_	AN16GN0DB
3	200	25	208/120	ECH2431EA_	ECH2432EA_	ECH2438EA_	ECH2431EH_	ECH2431EJ_	AN16KN0E
			240/120	ECH2431BA_	ECH2432BA_	ECH2438BA_	ECH2431BH_	ECH2431BJ_	AN16KN0B
	460	50	460/120	ECH2431CA_	ECH2432CA_	ECH2438CA_	ECH2431CH_	ECH2431CJ_	AN16KN0C
			575/120	ECH2431DA_	ECH2432DA_	ECH2438DA_	ECH2431DH_	ECH2431DJ_	AN16KN0D

Notes

① A “-” denotes catalog numbers are incomplete without the magnetic circuit protector code. To complete the catalog number, select the appropriate code from the following table:

Rating	Magnetic Circuit Protector Code	Rating	Magnetic Circuit Protector Code
—	A	30A	E
3A	B	50A	F
7A	C	100A	G
15A	D		

② If the solid-state overload option is selected, refer to Publication Number TD03408001E, Relay for MCCs and Enclosed Control Technical Data, for component selection.

Modification Codes

HVAC Modification Codes

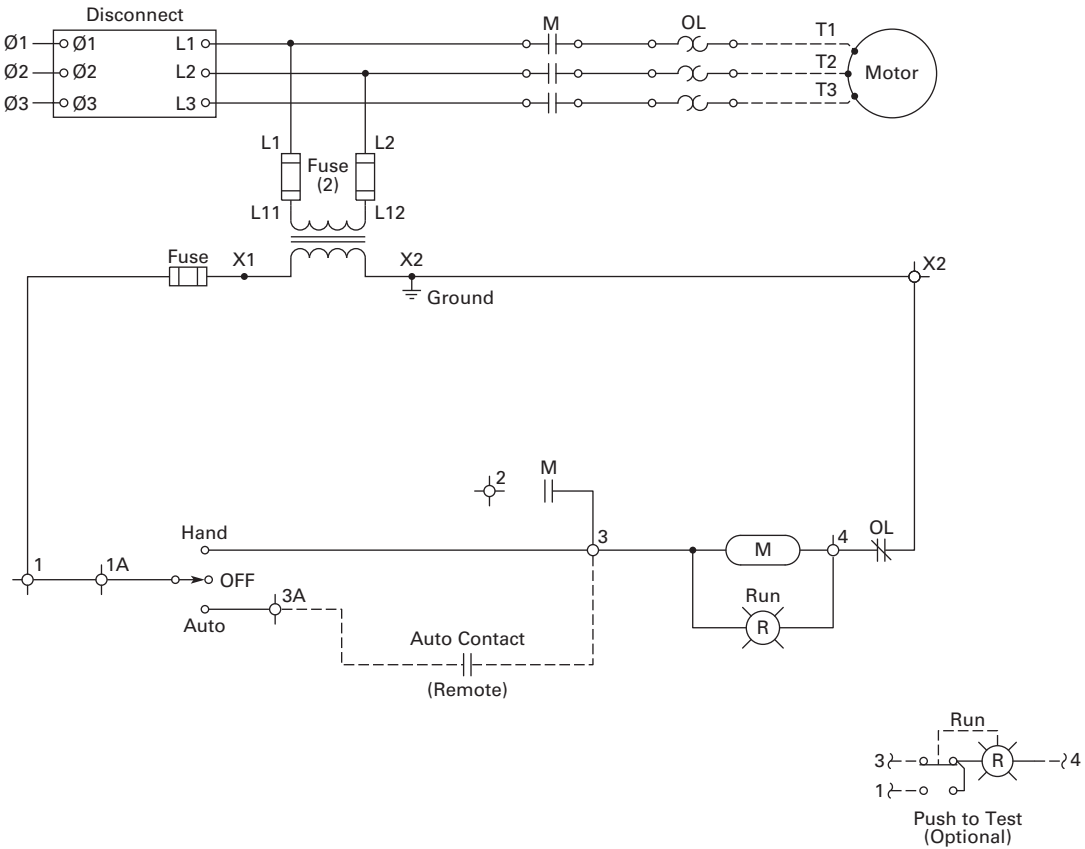
Modification	Description	Catalog Number Suffix
Auxiliary contacts	1NO—wired	A27
	1NC—wired	A28
	1NO 1NC—wired	A29
Solid-state overload (standard)	Size 0 and 1: 0.33–1.65 [Ⓢ]	R63/A
	Size 0 and 1: 1–5	R63/B
	Size 0 and 1: 4–20	R63/C
	Size 2: 9–45	R63/D
	Size 3: 20–100	R63/E
Solid-state overload (with ground fault)	Size 0 and 1: 0.33–1.65 [Ⓢ]	R64/A
	Size 0 and 1: 1–5	R64/B
	Size 0 and 1: 4–20	R64/C
	Size 2: 9–45	R64/D
	Size 3: 20–100	R64/E
Heaters	0.254–0.411A	H5/D1
	0.375–0.607A	H5/D2
	0.560–0.907A	H5/D3
	0.814–1.32A	H5/D4
	1.20–1.96A	H5/D5
	1.79–2.90A	H5/D6
	2.15–3.49A	H5/D7
	3.23–5.23A	H5/D8
	4.55–7.40A	H5/D9
	6.75–11.0A	H5/D10
	9.14–14.0A	H5/D11
	14.0–22.8A	H5/D12
	18.7–30.7A	H5/D13
	23.5–38.5A	H5/D14
	29.0–44.1A	H5/D15
	39.6–57.4A	H5/D16
	53.9–74.9A	H5/D17
	18.0–24.5A	H5/D18
	24.6–33.4A	H5/D19
	33.5–45.6A	H5/D20
45.7–62.1A	H5/D21	
62.2–84.6A	H5/D22	
Labels and timers	Carton label	L10
	Pneumatic timer (0.1–30 seconds maximum)	T1
	Pneumatic timer (10–180 seconds maximum)	T2
	Solid-state ON delay timer (1–30 seconds)	T4
	Solid-state ON delay timer (30–300 seconds)	T5

Note

[Ⓢ] Not UL Listed.

Wiring Diagram

HVAC Combination Starter with CPT, HOA and Indicating Light



7.1

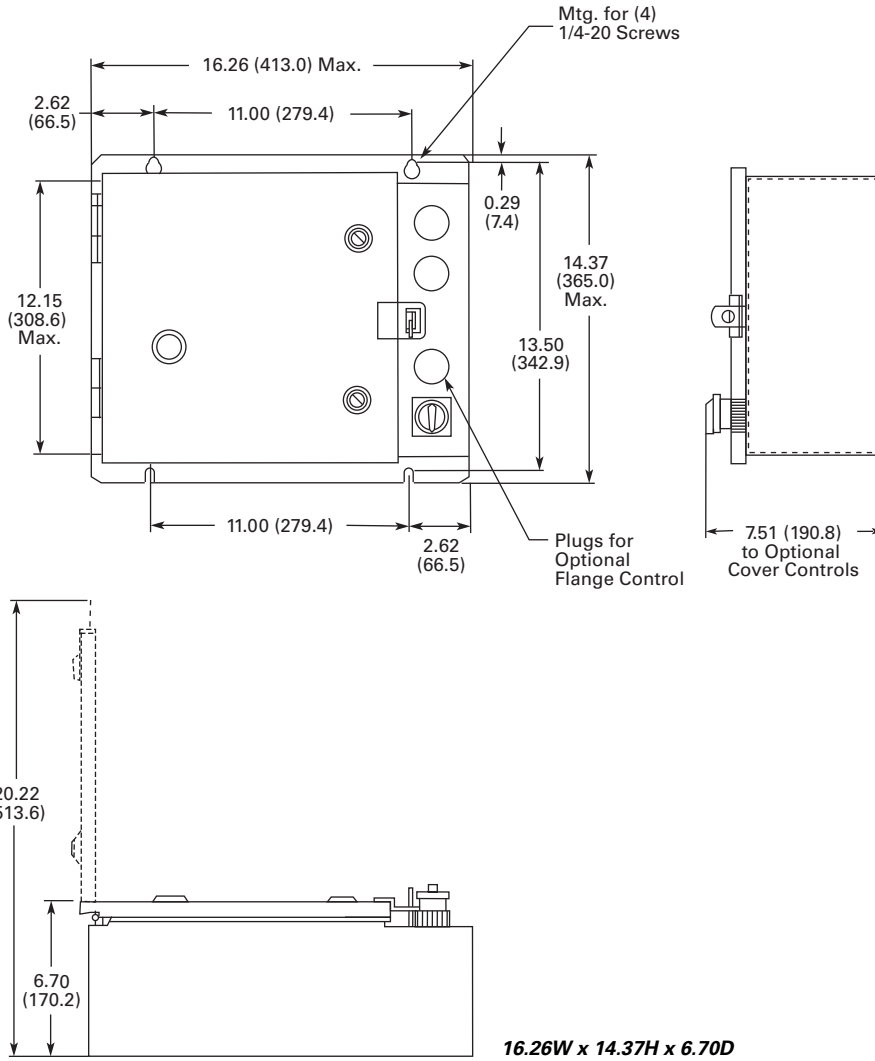
HVAC Control

Freedom Full Voltage HVAC Starters

Dimensions

Approximate Dimensions in Inches (mm)

Box 7, Type 1



7