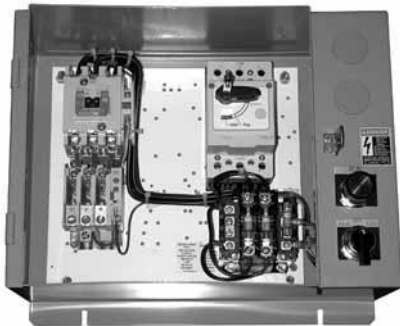


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HVAC Starter



*HVAC Panel with Bimetallic
Overload and HMCPE*

9

Product Description

Eaton's Cutler-Hammer® 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.
- Bimetallic, ambient compensated operated. Trip free mechanism.
- Electrically isolated NO-NC contacts (pull RESET button to test). (Electrical Ratings see **Table 18-15** on **Page 18-12**).
- 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

Eaton's Cutler-Hammer Motor Control Center and Enclosed Control Product Lines now offer the latest in motor protection through the use of the solid-state overload relay. It provides higher accuracy, less heat dissipation and enhanced protection through the use of state-of-the-art microelectronic packaging technology. Solid-state overload relays are standard with Trip Class 5, 10, 20 and 30 Manual/Automatic Reset. Key features of the solid-state overload relays include:

- Standard Version: Selectable trip class (5, 10, 20, 30) with Selectable Manual or Auto Reset
- Broad 5:1 FLA range
- Self-Powered Design, will accept AC voltages from 12 – 690V 50/60 Hz
- Ambient Temperature Compensation
- Low Heat Generation
- Phase Loss Protection
- Phase Unbalance Protection
- Electrically Isolated 1NO-1NC Contacts (Push-to-Test)
- Trip Status Indicator
- FLA Range of 0.1 – 1500 Amps

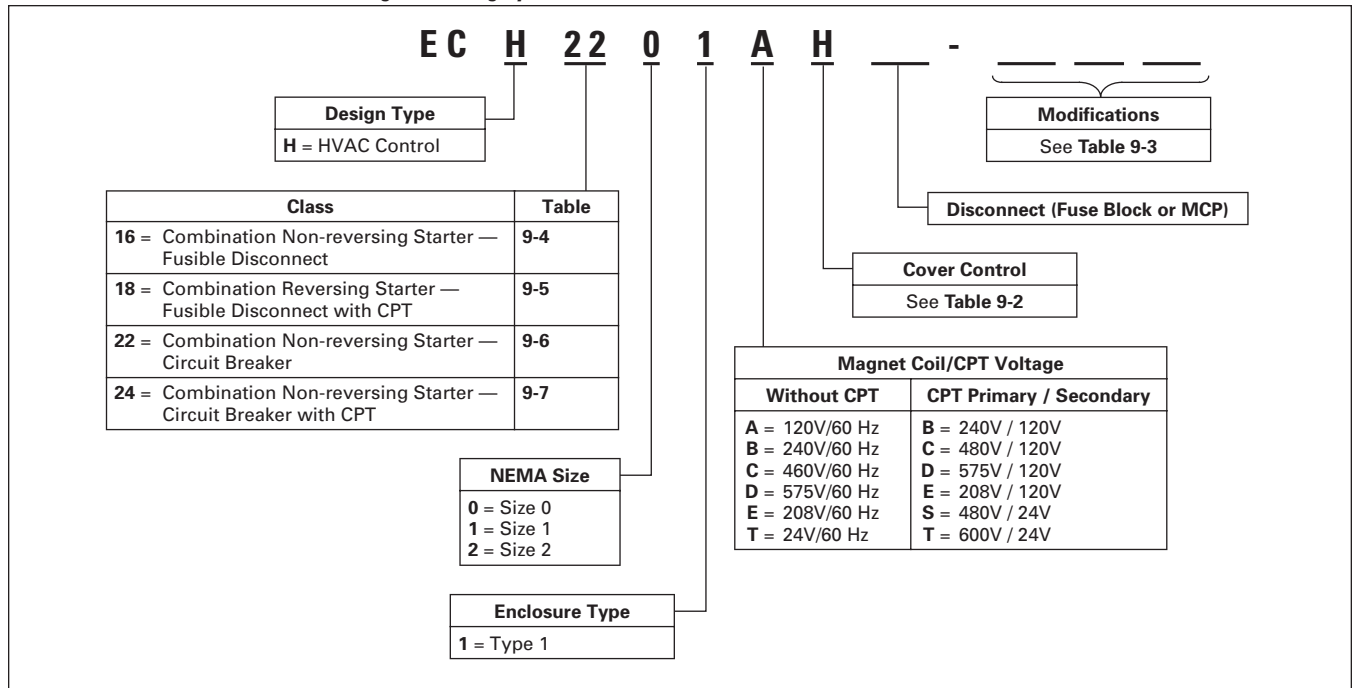
Standards and Certifications

Note: See **Page 18-2** for additional information on Standards and Certifications that apply to all Cutler-Hammer Enclosed Control products.

- UL Listed
- cUL Listed (indicates appropriate CSA Standard investigation)
- ABS Type Approval

Catalog Number Selection

Table 9-1. Freedom HVAC Starters Catalog Numbering System



Cover Control

Table 9-2. Pilot Device Factory Installation

Description	Position 9 Alpha
None	A
HAND/OFF/AUTO	H
HAND/OFF/AUTO with Red RUN Pilot	J

Modification Codes

Table 9-3. HVAC Modification Codes

Modification	Catalog Number Suffix	Description
Auxiliary Contacts	A27	1NO — Wired
	A28	1NC — Wired
	A29	1NO 1NC — Wired
Solid-State Overloads	R61/A	Size 0 — 0.1 – 0.5A
	R61/B	Size 0 — 0.2 – 2.0A
	R61/C	Size 0 — 1.0 – 5.0A
	R61/D	Size 1 — 1.6 – 8.0A
	R61/E	Size 1 — 6.4 – 32A
	R61/F	Size 2 — 9.0 – 45A
Heaters	H5/D1	.254 – .411A
	H5/D2	.375 – .607A
	H5/D3	.560 – .907A
	H5/D4	.814 – 1.32A

Modification	Catalog Number Suffix	Description
Heaters, continued	H5/D5	1.20 – 1.96A
	H5/D6	1.79 – 2.90A
	H5/D7	2.15 – 3.49A
	H5/D8	3.23 – 5.23A
	H5/D9	4.55 – 7.40A
	H5/D10	6.75 – 11.0A
	H5/D11	9.14 – 14.0A
	H5/D12	14.0 – 22.8A
	H5/D13	18.7 – 30.7A
	H5/D14	23.5 – 38.5A
Labels and Timers	L10	Carton Label
	T1	Pneumatic Timer (.1 – 30 sec. max.)
	T2	Pneumatic Timer (10 – 180 sec. max.)
	T4	Solid-State ON Delay Timer (1 – 30 secs.)
	T5	Solid-State ON Delay Timer (30 – 300 secs.)

Combination Starters — Fusible and Non-fusible

Product Selection

Table 9-4. Class ECH16 — Combination Non-reversing Starter — Fusible Disconnect

NEMA Size	Motor Voltage	Max. hp	Coil Voltage	Type 1	Type 1 with HOA	Type 1 with HOA & Red RUN Pilot	Component Starter (Open)
				Catalog Number ①	Catalog Number ①	Catalog Number ①	Catalog Number ②
0	230	3	120 240 460	ECH1601AA_ ECH1601BA_ ECH1601CA_	ECH1601AH_ ECH1601BH_ ECH1601CH_	ECH1601AJ_ ECH1601BJ_ ECH1601CJ_	AN16BN0AC AN16BN0BC AN16BN0CC
	480	5	575 208 24	ECH1601DA_ ECH1601EA_ ECH1601TA_	ECH1601DH_ ECH1601EH_ ECH1601TH_	ECH1601DJ_ ECH1601EJ_ ECH1601TJ_	AN16BN0DC AN16BN0EC AN16BN0TC
1	230	7-1/2	120 240 460	ECH1611AA_ ECH1611BA_ ECH1611CA_	ECH1611AH_ ECH1611BH_ ECH1611CH_	ECH1611AJ_ ECH1611BJ_ ECH1611CJ_	AN16DN0AB AN16DN0BB AN16DN0CB
	480	10	575 208 24	ECH1611DA_ ECH1611EA_ ECH1611TA_	ECH1611DH_ ECH1611EH_ ECH1611TH_	ECH1611DJ_ ECH1611EJ_ ECH1611TJ_	AN16DN0DB AN16DN0EB AN16DN0TB
2	230	15	120 240 460	ECH1621AA_ ECH1621BA_ ECH1621CA_	ECH1621AH_ ECH1621BH_ ECH1621CH_	ECH1621AJ_ ECH1621BJ_ ECH1621CJ_	AN16GN0AB AN16GN0BB AN16GN0CB
	480	25	575 208 24	ECH1621DA_ ECH1621EA_ ECH1621TA_	ECH1621DH_ ECH1621EH_ ECH1621TH_	ECH1621DJ_ ECH1621EJ_ ECH1621TJ_	AN16GN0DB AN16GN0EB AN16GN0TB

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)

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.

Table 9-5. Class ECH18 — Combination Reversing Starter — Fusible Disconnect with CPT

NEMA Size	Motor Voltage	Max. hp	Coil Voltage	Type 1	Type 1 with HOA	Type 1 with HOA & Red RUN Pilot	Component Starter (Open)
				Catalog Number ③	Catalog Number ③	Catalog Number ③	Catalog Number ④
0	230	3	120 240 460	ECH1801BA_ ECH1801CA_ ECH1801DA_	ECH1801BH_ ECH1801CH_ ECH1801DH_	ECH1801BJ_ ECH1801CJ_ ECH1801DJ_	AN16BN0AC AN16BN0BC AN16BN0CC
	480	5	575 208 24	ECH1801EA_ ECH1801SA_ ECH1801TA_	ECH1801EH_ ECH1801SH_ ECH1801TH_	ECH1801EJ_ ECH1801SJ_ ECH1801TJ_	AN16BN0DC AN16BN0EC AN16BN0TC
1	230	7-1/2	120 240 460	ECH1811BA_ ECH1811CA_ ECH1811DA_	ECH1811BH_ ECH1811CH_ ECH1811DH_	ECH1811BJ_ ECH1811CJ_ ECH1811DJ_	AN16DN0AB AN16DN0BB AN16DN0CB
	480	10	575 208 24	ECH1811EA_ ECH1811SA_ ECH1811TA_	ECH1811EH_ ECH1811SH_ ECH1811TH_	ECH1811EJ_ ECH1811SJ_ ECH1811TJ_	AN16DN0DB AN16DN0EB AN16DN0TB
2	230	15	120 240 460	ECH1821BA_ ECH1821CA_ ECH1821DA_	ECH1821BH_ ECH1821CH_ ECH1821DH_	ECH1821BJ_ ECH1821CJ_ ECH1821DJ_	AN16GN0AB AN16GN0BB AN16GN0CB
	480	25	575 208 24	ECH1821EA_ ECH1821SA_ ECH1821TA_	ECH1821EH_ ECH1821SH_ ECH1821TH_	ECH1821EJ_ ECH1821SJ_ ECH1821TJ_	AN16GN0DB AN16GN0EB AN16GN0TB

③ 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)

④ If the solid-state overload option is selected, refer to Publication Number TD03408001E, Relay for MCCs and Enclosed Control Technical Data, for component selection.

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Product Selection

Table 9-6. Class ECH22 — Combination Non-reversing Starter — Circuit Breaker

NEMA Size	Motor Voltage	Max. hp	Coil Voltage	Type 1	Type 1 with HOA	Type 1 with HOA & Red RUN Pilot	Component Starter (Open)
				Catalog Number ①	Catalog Number ①	Catalog Number ①	Catalog Number ②
0	230	3	120 240 460	ECH2201AA_ ECH2201BA_ ECH2201CA_	ECH2201AH_ ECH2201BH_ ECH2201CH_	ECH2201AJ_ ECH2201BJ_ ECH2201CJ_	AN16BN0AC AN16BN0BC AN16BN0CC
	480	5	575 208 24	ECH2201DA_ ECH2201EA_ ECH2201TA_	ECH2201DH_ ECH2201EH_ ECH2201TH_	ECH2201DJ_ ECH2201EJ_ ECH2201TJ_	AN16BN0DC AN16BN0EC AN16BN0TC
1	230	7-1/2	120 240 460	ECH2211AA_ ECH2211BA_ ECH2211CA_	ECH2211AH_ ECH2211BH_ ECH2211CH_	ECH2211AJ_ ECH2211BJ_ ECH2211CJ_	AN16DN0AB AN16DN0BB AN16DN0CB
	480	10	575 208 24	ECH2211DA_ ECH2211EA_ ECH2211TA_	ECH2211DH_ ECH2211EH_ ECH2211TH_	ECH2211DJ_ ECH2211EJ_ ECH2211TJ_	AN16DN0DB AN16DN0EB AN16DN0TB
2	230	15	120 240 460	ECH2221AA_ ECH2221BA_ ECH2221CA_	ECH2221AH_ ECH2221BH_ ECH2221CH_	ECH2221AJ_ ECH2221BJ_ ECH2221CJ_	AN16GN0AB AN16GN0BB AN16GN0CB
	480	25	575 208 24	ECH2221DA_ ECH2221EA_ ECH2221TA_	ECH2221DH_ ECH2221EH_ ECH2221TH_	ECH2221DJ_ ECH2221EJ_ ECH2221TJ_	AN16GN0DB AN16GN0EB AN16GN0TB

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	15 Amp	D
3 Amp	B	30 Amp	E
7 Amp	C	50 Amp	F

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.

Table 9-7. Class ECH24 — Combination Non-reversing Starter — Circuit Breaker with CPT

NEMA Size	Motor Voltage	Max. hp	Coil Voltage	Type 1	Type 1 with HOA	Type 1 with HOA & Red RUN Pilot	Component Starter (Open)
				Catalog Number ③	Catalog Number ③	Catalog Number ③	Catalog Number ④
0	230	3	120 240 460	ECH2401BA_ ECH2401CA_ ECH2401DA_	ECH2401BH_ ECH2401CH_ ECH2401DH_	ECH2401BJ_ ECH2401CJ_ ECH2401DJ_	AN16BN0AC AN16BN0BC AN16BN0CC
	480	5	575 208 24	ECH2401EA_ ECH2401SA_ ECH2401TA_	ECH2401EH_ ECH2401SH_ ECH2401TH_	ECH2401EJ_ ECH2401SJ_ ECH2401TJ_	AN16BN0DC AN16BN0EC AN16BN0TC
1	230	7-1/2	120 240 460	ECH2411BA_ ECH2411CA_ ECH2411DA_	ECH2411BH_ ECH2411CH_ ECH2411DH_	ECH2411BJ_ ECH2411CJ_ ECH2411DJ_	AN16DN0AB AN16DN0BB AN16DN0CB
	480	10	575 208 24	ECH2411EA_ ECH2411SA_ ECH2411TA_	ECH2411EH_ ECH2411SH_ ECH2411TH_	ECH2411EJ_ ECH2411SJ_ ECH2411TJ_	AN16DN0DB AN16DN0EB AN16DN0TB
2	230	15	120 240 460	ECH2421BA_ ECH2421CA_ ECH2421DA_	ECH2421BH_ ECH2421CH_ ECH2421DH_	ECH2421BJ_ ECH2421CJ_ ECH2421DJ_	AN16GN0AB AN16GN0BB AN16GN0CB
	480	25	575 208 24	ECH2421EA_ ECH2421SA_ ECH2421TA_	ECH2421EH_ ECH2421SH_ ECH2421TH_	ECH2421EJ_ ECH2421SJ_ ECH2421TJ_	AN16GN0DB AN16GN0EB AN16GN0TB

③ 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	15 Amp	D
3 Amp	B	30 Amp	E
7 Amp	C	50 Amp	F

④ If the solid-state overload option is selected, refer to Publication Number TD03408001E, Relay for MCCs and Enclosed Control Technical Data, for component selection.

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Wiring Diagrams

9

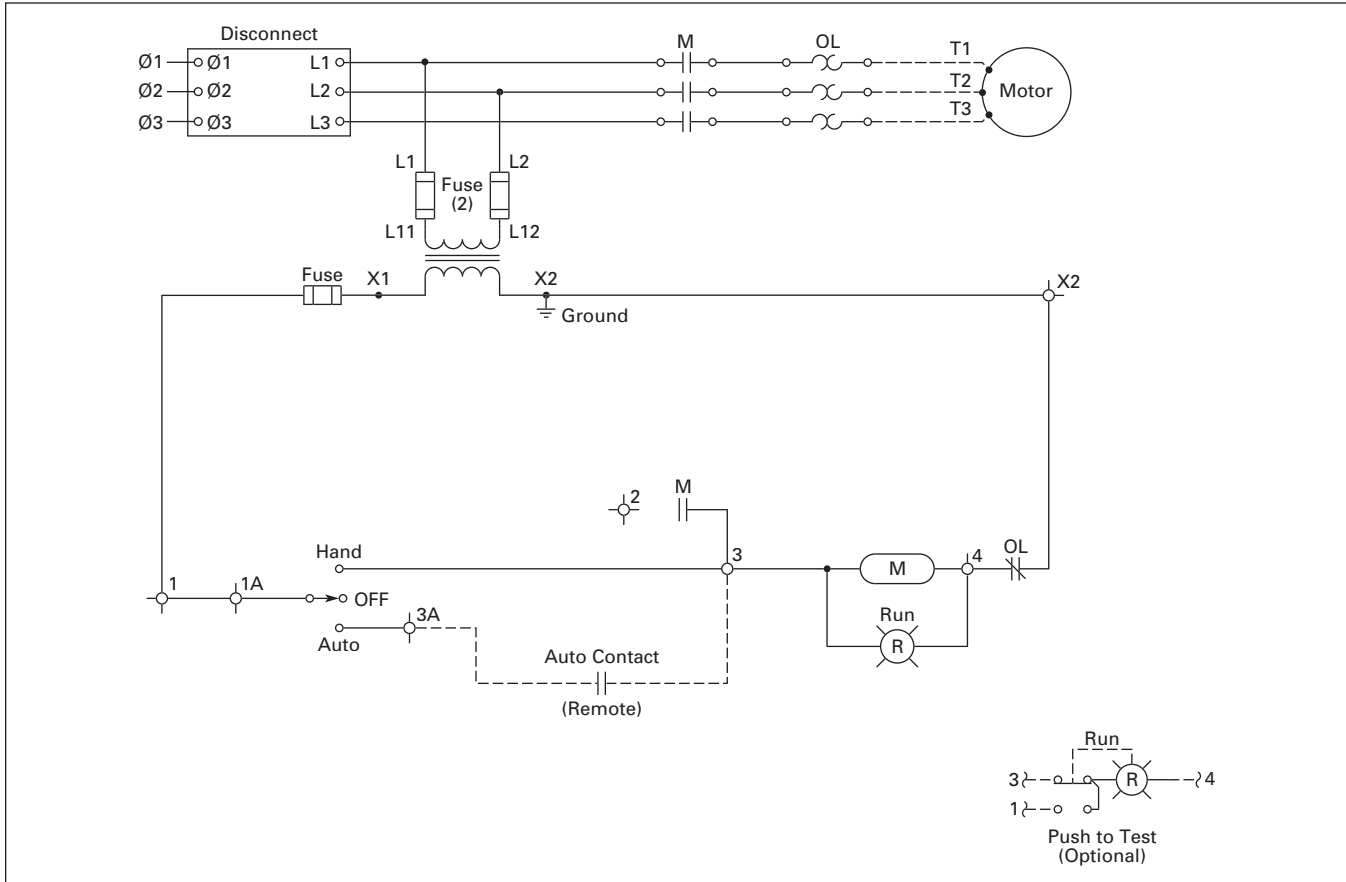


Figure 9-1. HVAC Combination Starter with CPT, HOA and Indicating Light

Dimensions

Dimensions

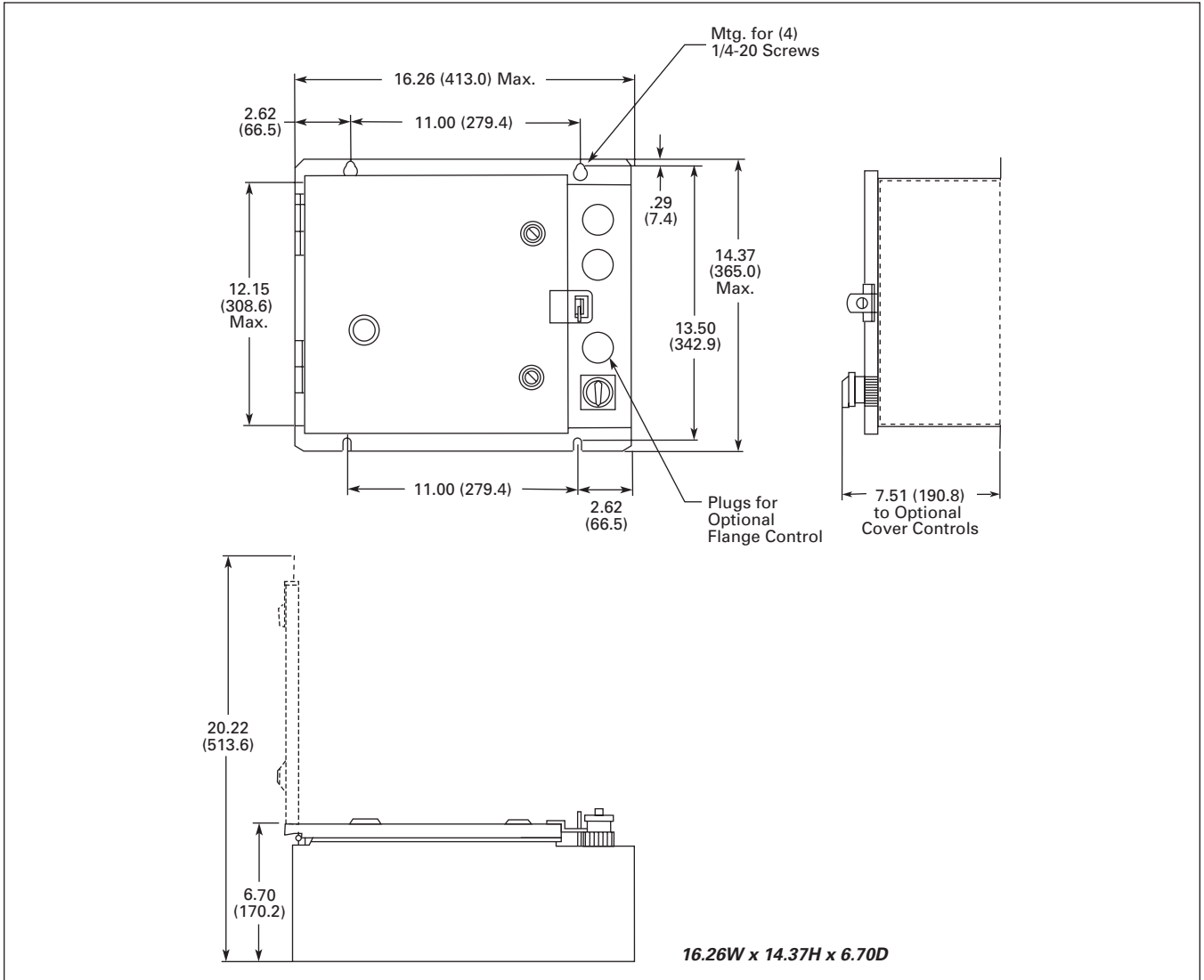


Figure 10. Box 7, Type 1 — Approximate Dimensions in Inches (mm)