

## LCX9000 Liquid Cooled Adjustable Frequency Drives



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**Product Description**

The LCX9000 Liquid Cooled Drive family continues Eaton's tradition of providing state-of-the-industry products, by taking advantage of liquid cooling technology in lieu of air-cooling techniques.

The LCX9000 drives are liquid-cooled products that utilize potable water or a water-glycol mixture as a cooling medium.

**Features and Benefits**

- Compact size and low heat transfer rates allow enclosure size to be greatly reduced, which is especially beneficial in UL Type 4X applications
- Design is modular, with control and power modules independent of each other. Connection between power and control modules can be direct or extended via a fiber optic cable
- Same reliable control module and operating system as the SPX9000 air-cooled drives
- CE mark ensures compliance with the Electromagnetic Compatibility Directive (EMC) and the Low Voltage Directive (LVD)
- Reliable drive with over 500,000 hours MTBF based on MIL 217
- Currently supports DeviceNet, PROFIBUS-DP, Modbus RTU and Modbus TCP communication protocols
- Separately mounted line reactor included with AC fed models

**Standards and Certifications**

- CE



#### Catalog Number Selection

#### LCX9000 Liquid Cooled Adjustable Frequency Drives

2

**LCX 016 A 0 - 4 A 3 B 2**

Product Family
LCX = High performance, liquid-cooled drive

Current Rating	
480V	
016 = 16A	385 = 385A
022 = 22A	460 = 460A
031 = 31A	520 = 520A
038 = 38A	590 = 590A
045 = 45A	650 = 650A
061 = 61A	730 = 730A
072 = 72A	820 = 820A
087 = 87A	920 = 920A
105 = 105A	H10 = 1030A
140 = 140A	H11 = 1150A
168 = 168A	H13 = 1370A
205 = 205A	H16 = 1640A
261 = 261A	H20 = 2060A
300 = 300A	H23 = 2300A
690V	
170 = 170A	590 = 590A
208 = 208A	650 = 650A
261 = 261A	750 = 750A
325 = 325A	820 = 820A
385 = 385A	H10 = 1030A
416 = 416A	H11 = 1180A
460 = 460A	H13 = 1300A
502 = 502A	H15 = 1500A

Software Series
A = Standard

Enclosure Rating
0 = Open chassis

Voltage Rating
4 = 380–500V
5 = 520–690V

Keypad
A = Alphanumeric

Input Options
3 = Three-phase, EMC T
7 = DC Input

Options
List options in alphabetical order.
Extended I/O Card Options
<b>A3</b> = 2 RO, therm <b>A4</b> = Encoder low volt +5V/15V/24V <b>A5</b> = Encoder high volt +15V/24V <b>A7</b> = Dual encoder +15V/24V <b>A8</b> = 6 DI, 1 DO, 2 AI, 1AO <b>AE</b> = Encoder with 2 DOs <b>B1</b> = 6 DI, 1 ext +24 Vdc/EXT +24 Vdc <b>B2</b> = 1 RO (NC-NO), 1 RO (NO), 1 therm <b>B4</b> = 1 AI (mA isolated), 2 AO (mA isolated), 1 ext +24 Vdc/EXT + 24 Vdc <b>B5</b> = 3 RO (NO) <b>B8</b> = 1 ext +24 Vdc/EXT +24 Vdc, 3 Pt100 <b>B9</b> = 1 RO (NO), 5 DI 42–240 Vac input <b>BB</b> = SPI, absolute encoder
Communication Cards
<b>CA</b> = Johnson Controls N2 <b>CI</b> = Modbus TCP <b>C2</b> = Modbus <b>C3</b> = PROFIBUS DP <b>C4</b> = LonWorks <b>C5</b> = PROFIBUS DP (D9 Connector) <b>C6</b> = CANopen (Slave) <b>C7</b> = DeviceNet <b>C8</b> = Modbus (D9 Type Connector) <b>D1</b> = Adapter <b>D2</b> = Adapter <b>D3</b> = RS-232 with D9 Connection

Board Modifications
2 = Varnished boards

Brake Chopper Options <sup>①</sup>
N = No brake chopper circuit
B = Internal brake chopper

**Note**

① Brake chopper is only available in 480V CH3 drives.

## Product Selection

## LCX9000 Liquid Cooled Drives



## 380–500 Vac Liquid Cooled Drives

## Motor Output

## Current

Thermal, I <sub>th</sub> (A)	I <sub>L</sub> (A)	I <sub>H</sub> (A)	kW	Chassis	Catalog Number
16	15	11	7.5	CH3	LCX016A0-4A3N2
22	20	15	11	CH3	LCX022A0-4A3N2
31	28	21	15	CH3	LCX031A0-4A3N2
38	35	25	18.5	CH3	LCX038A0-4A3N2
45	41	30	22	CH3	LCX045A0-4A3N2
61	55	41	30	CH3	LCX061A0-4A3N2
72	65	48	37	CH4	LCX072A0-4A3N2
87	79	58	45	CH4	LCX087A0-4A3N2
105	95	70	55	CH4	LCX105A0-4A3N2
140	127	93	75	CH4	LCX140A0-4A3N2
168	153	112	90	CH5	LCX168A0-4A3N2
205	186	137	110	CH5	LCX205A0-4A3N2
261	237	174	132	CH5	LCX261A0-4A3N2
300	273	200	160	CH61	LCX300A0-4A3N2
385	350	257	200	CH61	LCX385A0-4A3N2
460	418	307	250	CH72	LCX460A0-4A3N2
520	473	347	250	CH72	LCX520A0-4A3N2
590	536	393	315	CH72	LCX590A0-4A3N2
650	591	433	355	CH72	LCX650A0-4A3N2
730	664	487	400	CH72	LCX730A0-4A3N2
820	745	547	450	CH63	LCX820A0-4A3N2
920	836	613	500	CH63	LCX920A0-4A3N2
1030	936	687	560	CH63	LCXH10A0-4A3N2
1150	1045	766	600	CH63	LCXH11A0-4A3N2
1370	1245	913	700	CH74	LCXH13A0-4A3N2
1640	1491	1093	900	CH74	LCXH16A0-4A3N2
2060	1873	1373	1100	CH74	LCXH20A0-4A3N2
2300	2091	1533	1200	CH74	LCXH23A0-4A3N2

**LCX9000 Liquid Cooled Drives**



#### 525–690 Vac Liquid Cooled Drives

**Motor Output**

**Current**

Thermal, I <sub>th</sub> (A)	I <sub>L</sub> (A)	I <sub>H</sub> (A)	kW	Chassis	Catalog Number
170	155	113	110	CH61	<b>LCX170A0-5A3N2</b>
208	189	139	132	CH61	<b>LCX208A0-5A3N2</b>
261	237	174	160	CH72	<b>LCX261A0-5A3N2</b>
325	295	217	200	CH72	<b>LCX325A0-5A3N2</b>
385	350	257	250	CH72	<b>LCX385A0-5A3N2</b>
416	378	277	250	CH72	<b>LCX416A0-5A3N2</b>
460	418	307	300	CH72	<b>LCX460A0-5A3N2</b>
502	456	335	355	CH72	<b>LCX502A0-5A3N2</b>
590	536	393	400	CH63	<b>LCX590A0-5A3N2</b>
650	591	433	450	CH63	<b>LCX650A0-5A3N2</b>
750	682	500	500	CH63	<b>LCX750A0-5A3N2</b>
820	745	547	560	CH74	<b>LCX820A0-5A3N2</b>
920	836	613	650	CH74	<b>LCX920A0-5A3N2</b>
1030	936	687	700	CH74	<b>LCXH10A0-5A3N2</b>
1180	1073	787	800	CH74	<b>LCXH11A0-5A3N2</b>
1300	1182	867	900	CH74	<b>LCXH13A0-5A3N2</b>
1500	1364	1000	1000	CH74	<b>LCXH15A0-5A3N2</b>

#### 540–675 Vdc Liquid Cooled Inverter Units

**Drive Output**

**Current**

Thermal I <sub>th</sub> (A)	Rated Cont. I <sub>L</sub> (A)	Rated Cont. I <sub>H</sub> (A)	Motor Output Power		Power Loss c/a/T (kW)	Chassis	Catalog Number
			Optimum Motor at I <sub>th</sub> 400V (kW)	Optimum Motor at I <sub>th</sub> 500V (kW)			
16	15	11	7.5	11	0.4/0.2/ <b>0.6</b>	CH3	<b>LCX016A0-4A7B2</b>
22	20	15	11	15	0.5/0.2/ <b>0.7</b>	CH3	<b>LCX022A0-4A7B2</b>
31	28	21	15	18.5	0.7/0.2/ <b>0.9</b>	CH3	<b>LCX031A0-4A7B2</b>
38	35	25	18.5	22	0.8/0.2/ <b>1.0</b>	CH3	<b>LCX038A0-4A7B2</b>
45	41	30	22	30	1.0/0.3/ <b>1.3</b>	CH3	<b>LCX045A0-4A7B2</b>
61	55	41	30	37	1.3/0.3/ <b>1.5</b>	CH3	<b>LCX061A0-4A7B2</b>
72	65	48	37	45	1.2/0.3/ <b>1.5</b>	CH4	<b>LCX072A0-4A7N2</b>
87	79	58	45	55	1.5/0.3/ <b>1.8</b>	CH4	<b>LCX087A0-4A7N2</b>
105	95	70	55	75	1.8/0.3/ <b>2.1</b>	CH4	<b>LCX105A0-4A7N2</b>
140	127	93	75	90	2.3/0.3/ <b>2.6</b>	CH4	<b>LCX140A0-4A7N2</b>
168	153	112	90	110	2.5/0.3/ <b>2.8</b>	CH5	<b>LCX168A0-4A7N2</b>
205	186	137	110	132	3.0/0.4/ <b>3.4</b>	CH5	<b>LCX205A0-4A7N2</b>
261	237	174	132	160	4.0/0.4/ <b>4.4</b>	CH5	<b>LCX261A0-4A7N2</b>
300	273	200	160	200	4.5/0.4/ <b>4.9</b>	CH61	<b>LCX300A0-4A7N2</b>
385	350	257	200	250	5.5/0.5/ <b>6.0</b>	CH61	<b>LCX385A0-4A7N2</b>
460	418	307	250	315	5.5/0.5/ <b>6.0</b>	CH62	<b>LCX460A0-4A7N2</b>
520	473	347	250	355	6.5/0.5/ <b>7.0</b>	CH62	<b>LCX520A0-4A7N2</b>
590	536	393	315	400	7.5/0.6/ <b>8.1</b>	CH62	<b>LCX590A0-4A7N2</b>

## LCX9000 Liquid Cooled Drives



## 540–675 Vdc Liquid Cooled Inverter Units, continued

## Drive Output

Current			Motor Output Power		Power Loss c/a/T (kW)	Chassis	Catalog Number
Thermal $I_{th}$ (A)	Rated Cont. $I_L$ (A)	Rated Cont. $I_H$ (A)	Optimum Motor at $I_{th}$ 400V (kW)	Optimum Motor at $I_{th}$ 500V (kW)			
650	591	433	355	450	8.5/0.6/9.1	CH62	LCX650A0-4A7N2
730	664	487	400	500	10.0/0.7/10.7	CH62	LCX730A0-4A7N2
820	745	547	450	560	12.5/0.8/13.3	CH63	LCX820A0-4A7N2
920	836	613	500	600	14.4/0.9/15.3	CH63	LCX920A0-4A7N2
1030	936	687	560	700	16.5/1.0/17.5	CH63	LCXH10A0-4A7N2
1150	1045	766	600	750	18.4/10.1/19.5	CH63	LCXH11A0-4A7N2
1370	1245	913	700	900	15.5/1.0/16.5	CH64	LCXH13A0-4A7N2
1640	1491	1093	900	1100	19.5/1.2/20.7	CH64	LCXH16A0-4A7N2
2060	1873	1373	1100	1400	26.5/1.5/28.0	CH64	LCXH20A0-4A7N2
2300	2091	1533	1250	1500	29.6/1.7/31.3	CH64	LCXH23A0-4A7N2
2470	2245	1647	1300	1600	36.0/2.0/38.0	2*CH64	LCXH24A0-4A7N2
2950	2681	1967	1550	1950	39.0/2.4/41.4	2*CH64	LCXH29A0-4A7N2
3710	3372	2473	1950	2450	48.0/2.7/50.7	2*CH64	LCXH37A0-4A7N2
4140	3763	2760	2150	2700	53.0/3.0/66.0	2*CH64	LCXH41A0-4A7N2

## 710–930 Vdc Liquid Cooled Inverter Unit

## Drive Output

Current			Motor Output Power		Power Loss c/a/T (kW)	Chassis	Catalog Number
Thermal $I_{th}$ (A)	Rated Cont. $I_L$ (A)	Rated Cont. $I_H$ (A)	Optimum Motor at $I_{th}$ 400V (kW)	Optimum Motor at $I_{th}$ 500V (kW)			
170	155	113	110	160	4.5/0.2/4.7	CH61	LCX170A0-5A7N2
208	189	139	132	200	5.5/0.3/5.8	CH61	LCX208A0-5A7N2
261	237	174	160	250	5.5/0.3/5.8	CH61	LCX261A0-5A7N2
325	295	217	200	300	6.5/0.3/6.8	CH62	LCX325A0-5A7N2
385	350	257	250	355	7.5/0.4/7.9	CH62	LCX385A0-5A7N2
416	378	277	250	355	8.0/0.4/8.4	CH62	LCX416A0-5A7N2
460	418	307	300	400	8.5/0.4/8.9	CH62	LCX460A0-5A7N2
502	456	335	355	450	10.0/0.5/10.5	CH62	LCX502A0-5A7N2
590	536	393	400	560	10.0/0.5/10.5	CH63	LCX590A0-5A7N2
650	591	433	450	600	13.5/0.7/14.2	CH63	LCX650A0-5A7N2
750	682	500	500	700	16.0/0.8/16.8	CH63	LCX750A0-5A7N2
820	745	547	560	800	16.0/0.8/16.8	CH64	LCX820A0-5A7N2
920	836	613	650	850	18.0/0.9/18.9	CH64	LCX920A0-5A7N2
1030	936	687	700	1000	19.0/1.0/20.0	CH64	LCXH10A0-5A7N2
1180	1073	787	800	1100	21.0/10.1/20.1	CH64	LCXH11A0-5A7N2
1300	1182	867	900	1200	27.0/1.4/28.4	CH64	LCXH13A0-5A7N2
1500	1364	1000	1050	1400	32.0/1.6/33.6	CH64	LCXH15A0-5A7N2
1700	1545	1133	1150	1550	N/A	CH64	LCXH17A0-5A7N2
1850	1682	1233	1250	1650	34.2/1.8/36.0	2*CH64	LCXH18A0-5A7N2
2120	1927	1413	1450	1900	37.8/2.0/39.8	2*CH64	LCXH21A0-5A7N2
2340	2127	1560	1600	2100	48.6/2.5/51.1	2*CH64	LCXH23A0-5A7N2
2700	2455	1800	1850	2450	57.6/3.0/60.6	2*CH64	LCXH27A0-5A7N2
3100	2818	2066	2150	2800	N/A	2*CH64	LCXH31A0-5A7N2

#### Options

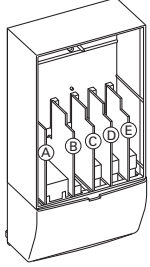
#### 9000X Series Option Board Kits

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The 9000X Series drives can accommodate a wide selection of expander and adapter option boards to customize the drive for your application needs. The drive's control unit is designed to accept a total of five option boards.

The 9000X Series factory installed standard board configuration includes an A9 I/O board and an A2 relay output board, which are installed in slots A and B.

#### Option Boards



#### Option Board Kits

Option Kit Description <sup>①</sup>	Allowed Slot Locations <sup>②</sup>	Field Installed Catalog Number	Factory Installed Option Designator	SVX Ready Programs						
				Basic	Local/Remote	Standard	MSS	PID	Multi-P.	PFC
<b>Standard I/O Cards</b>										
2 RO (NC-NO)	B	<b>OPTA2</b>	—	■	■	■	■	■	■	■
6 DI, 1 DO, 2 AI, 1AO, 1 +10 Vdc ref, 2 ext +24 Vdc/EXT +24 Vdc	A	<b>OPTA9</b>	—	■	■	■	■	■	■	■
<b>Extended I/O Cards</b>										
2 RO, therm	B	<b>OPTA3</b>	<b>A3</b>	—	■	■	■	■	■	■
Encoder low Volt +5V/15V/24V	C	<b>OPTA4</b>	<b>A4</b>	—	■	■	■	■	■	■
Encoder high Volt +15V/24V	C	<b>OPTA5</b>	<b>A5</b>	—	■	■	■	■	■	■
Dual encoder +15V/24V	C	<b>OPTA7</b>	<b>A7</b>	—	■	■	■	■	■	■
6 DI, 1 DO, 2 AI, 1 AO	A	<b>OPTA8</b>	<b>A8</b>	—	■	■	■	■	■	■
3 DI (encoder 10–24V), out +15V/+24V, 2 DO (pulse+direction)—SPX only	C	<b>OPTAE</b>	<b>AE</b>	■	■	■	■	■	■	■
6 DI, 1 ext +24 Vdc/EXT +24 Vdc	B, C, <b>D</b> , E	<b>OPTB1</b>	<b>B1</b>	—	—	—	—	—	■	■
1 RO (NC-NO), 1 RO (NO), 1 therm	B, C, <b>D</b> , E	<b>OPTB2</b>	<b>B2</b>	—	—	—	—	—	■	■
1 AI (mA isolated), 2 AO (mA isolated), 1 ext +24 Vdc/EXT +24 Vdc	B, C, <b>D</b> , E	<b>OPTB4</b>	<b>B4</b>	—	■	■	■	■	■	■
3 RO (NO)	B, C, <b>D</b> , E	<b>OPTB5</b>	<b>B5</b>	—	—	—	—	—	■	■
1 ext +24 Vdc/EXT +24 Vdc, 3 Pt100	B, C, <b>D</b> , E	<b>OPTB8</b>	<b>B8</b>	—	—	—	—	—	—	—
1 RO (NO), 5 DI 42–240 Vac input	B, C, <b>D</b> , E	<b>OPTB9</b>	<b>B9</b>	—	—	—	—	—	■	■
SPI, absolute encoder	C	<b>OPTBB</b>	<b>BB</b>	—	—	—	—	—	—	—
<b>Communication Cards <sup>③</sup></b>										
Modbus	D, <b>E</b>	<b>OPTC2</b>	<b>C2</b>	■	■	■	■	■	■	■
Johnson Controls N2	D, <b>E</b>	<b>OPTC2</b>	<b>CA</b>	—	—	—	—	—	—	—
PROFIBUS DP	D, <b>E</b>	<b>OPTC3</b>	<b>C3</b>	■	■	■	■	■	■	■
LonWorks	D, <b>E</b>	<b>OPTC4</b>	<b>C4</b>	■	■	■	■	■	■	■
PROFIBUS DP (D9 connector)	D, <b>E</b>	<b>OPTC5</b>	<b>C5</b>	■	■	■	■	■	■	■
CANopen (slave)	D, <b>E</b>	<b>OPTC6</b>	<b>C6</b>	■	■	■	■	■	■	■
DeviceNet	D, <b>E</b>	<b>OPTC7</b>	<b>C7</b>	■	■	■	■	■	■	■
Modbus (D9 Type connector)	D, <b>E</b>	<b>OPTC8</b>	<b>C8</b>	■	■	■	■	■	■	■
Modbus TCP	D, <b>E</b>	<b>OPTC1</b>	<b>C1</b>	■	■	■	■	■	■	■
Adapter—SPX only	D, <b>E</b>	<b>OPTD1</b>	<b>D1</b>	■	■	■	■	■	■	■
Adapter—SPX only	D, <b>E</b>	<b>OPTD2</b>	<b>D2</b>	■	■	■	■	■	■	■
RS-232 with D9 connection	D, <b>E</b>	<b>OPTD3</b>	<b>D3</b>	■	■	■	■	■	■	■
<b>Keypad</b>										
9000X Series standard keypad	—	<b>KEYPAD-STD</b>	—	—	—	—	—	—	—	■
9000X Series remote mount keypad unit (keypad not included, includes 10 ft cable, keypad holder, mounting hardware)	—	<b>OPTRMT-KIT-9000X</b>	—	—	—	—	—	—	—	—

#### Notes

- ① AI = Analog Input; AO = Analog Output, DI = Digital Input, DO = Digital Output, RO = Relay Output
- ② Option card must be installed in one of the slots listed for that card. Slot indicated in bold is the preferred location.
- ③ OPTC2 is a multi-protocol option card.

## Line Reactors

The line reactor carries out several functions in the liquid cooled drive. Connection of the line reactor is necessary except if you have a component in your system that performs the same tasks (e.g. a transformer). The line

reactor is needed as an essential component for motor control, to protect the input and DC-link components against abrupt changes of current and voltage as well as to function as a protection

against harmonics. The line reactors are included in the standard delivery of liquid-cooled drives (not inverters). However, you can also order your drive without a line reactor.

## Line Reactor Specifications

Drive Rating 480V	Drive Rating 690V	Thermal Current (A)	Nominal Inductance ( $\mu$ H) A/B <sup>①</sup>	Calculated Loss (W)	Choke Catalog Number (690 Vac)
16 to 22A	12 to 23A	23	1900	145	<b>CHK0023N6A0</b>
31 to 38A	31 to 38A	38	1100	170	<b>CHK0038N6A0</b>
45 to 61A	46 to 62A	62	700	210	<b>CHK0062N6A0</b>
72 to 87A	72 to 87A	87	480	250	<b>CHK0087N6A0</b>
105 to 140A	105 to 140A	145	290	380	<b>CHK0145N6A0</b>
168 to 261A	170 to 261A	261	139/187	460	<b>CHK0261N6A0</b>
300 to 385A	325 to 385A 820 to 1180A <sup>②</sup>	400	90/126	570	<b>CHK0400N6A0</b>
460 to 520A 1370A <sup>②</sup>	416 to 502A 1300 to 1500A <sup>②</sup>	520	65/95	610	<b>CHK0520N6A0</b>
590 to 650A 1640A <sup>②</sup>	590 to 650A	650	51/71	840	<b>CHK0650N6A0</b>
730A 2060A <sup>②</sup>	—	730	45/61	850	<b>CHK0730N6A0</b>
820A 2300A <sup>②</sup>	750A	N/A	N/A	N/A	<b>CHK0820N6A0</b>
920 to 1030A	—	1000	30/41	950	<b>CHK1030N6A0</b>
1150A	—	1150	26/36	1000	<b>CHK1150N6A0</b>

**Dimensions**, see **Page V6-T2-273**.

### Notes

- <sup>①</sup> Inductances for different supply voltages: A = 400–480 Vac; B = 500–690 Vac.  
<sup>②</sup> Drives require three chokes of the designated catalog number with six-pulse supply.

## Technical Data and Specifications

## 2

### LCX9000 Products

Description	Specification
<b>General Specifications</b>	
Line voltage	400 to 500 Vac; 525 to 690 Vac; (–10% to 10%) 465 to 800 Vdc; 640 to 1100 Vdc; (–0 to 0%)
Frequency	50/60 Hz
Line voltage variation	–10% to 10%
Input frequency variation	45–66 Hz
Continuous output current	Rated current at incoming cooling liquid temperature of 30°C
Output frequency	0–320 Hz
Drive efficiency	>95%
Power factor (displacement)	0.96
Liquid coolant pressure	87 psi (6 bar) maximum
Liquid coolant flow rate	1.3 to 7.9 gal./min. (5 to 30 liter/min.) minimum depending on drive size
Liquid coolant fittings	Standard quick connect, NPT
Operating ambient temperature	–10/50°C
Storage temperature	–40/70°C
Humidity	95% maximum (non-condensing)
Altitude	3300 ft (1000 m) maximum without derating
Enclosure	IP00
Warranty	Standard terms, 3 years with certified start-up
<b>Mains Connection</b>	
Input voltage ( $V_{in}$ )	400–500 Vac; 525–690 Vac; (–10%–10%) 465–800 Vdc; 640–1100 Vdc; (–0–0%)
Input frequency ( $f_{in}$ )	45–66Hz
Connection to mains	Once per minute or less (normal case)
<b>Motor Connection</b>	
Output voltage	0– $V_{in}$
Continuous output current	Rated current at nominal inflow cooling water temperature of 30°C; Overload 2 sec./20 sec.
Starting current	Rated current at 2 sec./20 sec. if output frequency <30 Hz and temperature of heatsink <149°F (65°C)
Output frequency	0–320 Hz (standard); 7200 Hz (special software)
Frequency resolution	Application dependent
<b>Control Characteristics</b>	
Control method	Frequency control (V/f) Open loop: Sensorless vector control Closed loop: Frequency control Closed loop: Vector control
Switching frequency 480V ①	Adjustable with parameter 2.6.9 Up to and including 61-Amp size: 1–16 kHz (factory default, 10 kHz) From 72-Amp size: 1–12 kHz (factory default, 3.6 kHz)
575V ①	1–6kHz (factory default, 1.5kHz)
Frequency reference	Analog input: resolution 0.1% (10 bits); accuracy ±1% Panel reference: resolution 0.01 Hz
Field weakening point	30–320 Hz
Acceleration time	0.1–3000 seconds
Deceleration time	0.1–3000 seconds
Braking torque	DC brake: 30% x $T_n$ (without brake option)

Description	Specification
<b>Ambient Conditions</b>	
Ambient operating temperature	14°F (–10°C), no frost to 122°F (50°C) at $I_{th}$ 122 to 158°F (50 to 70°C), derating required
Storage temperature	–40°F to 158°F (–40 to 70°C) No liquid in heatsink under 32°F (0°C)
Relative humidity	5–96% RH, noncondensing, no dripping water
Air quality	Chemical vapors: IEC 721-3-3, unit in operation, class 3C2 Mechanical particles: IEC 721-3-3, unit in operation, class 3S2 (no conductive dust allowed); No corrosive gases
Altitude	Up to 1,000m: 100% load capacity (no derating) Above 1,000m: Derating of 1% per each 100m required
Vibration	EN 50178, EN 60068-2-6; 5–150 Hz Displacement amplitude: 0.25 mm (peak) at 3–31 Hz Max. acceleration amplitude: 1G at 31–150 Hz
Shock	EN 50178, EN 60068-2-27, UPS drop test (for applicable UPS weights) Storage and shipping: Max. 15G, 11 ms (in package)
Enclosure class	IP00 open frame standard in entire kW/hp range
<b>EMC</b>	
Immunity	Fulfills all EMC immunity requirements
Emissions	EMC level N; EMC level T for IT networks
<b>Safety</b>	
Approvals	EN 50178, EN 60204-1, CE, UL, CUL, FI, GOST R, IEC 61800-5 (See unit nameplate for more detailed approvals.)
<b>Control Connections</b>	
Analog input voltage	0 to +10V, $R_i = 200$ kohm (–10V to +10V joystick control) Resolution 0.1%; accuracy ±1%
Analog input current	0(4)–20 mA, $R_i = 250$ ohm differential
Digital inputs	6 positive or negative logic; 18–24 Vdc
Auxiliary voltage	+24V, ±15%, max. 250 mA
Output reference voltage	+10V, +3%, max. load 10 mA
Analog output	0(4)–20 mA, $R_i$ max. 500 ohm Resolution 10 bits; accuracy ±2%
Digital outputs	Open collector output, 50 mA/48V
Relay outputs	Two programmable change-over relay outputs Switching capacity: 24 Vdc/8A, 250 Vac/8A, 125 Vdc/0.4A Min. switching load: 5V/10 mA

#### Note

① Derating required if higher switching frequency than the default is used.



## LCX9000 Products, continued

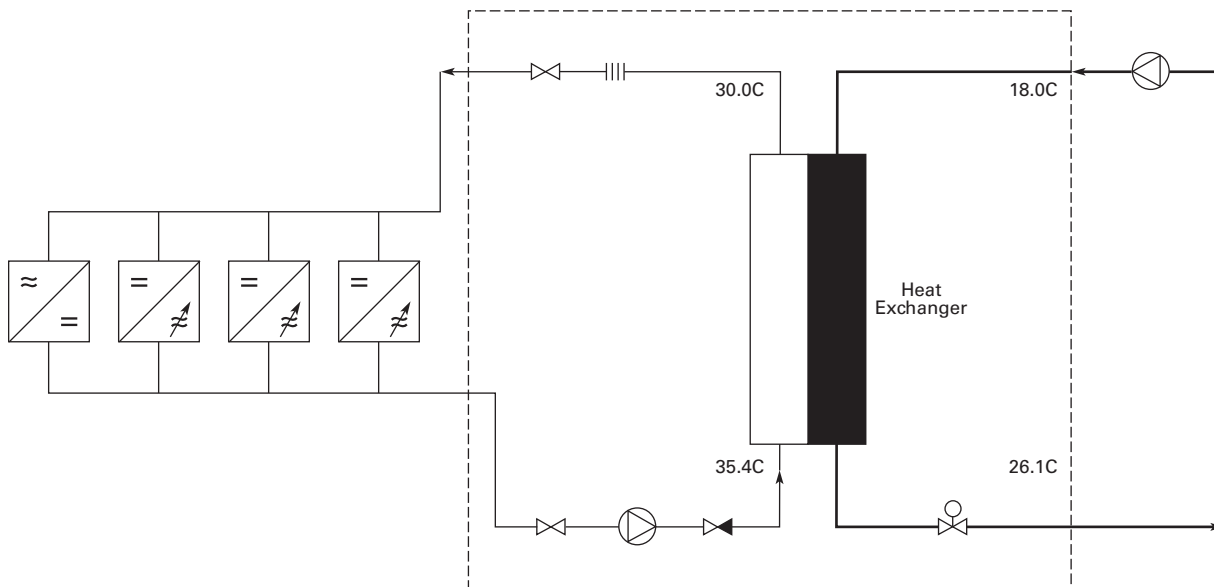
Description	Specification
<b>Protections</b>	
Overvoltage protection	
480V	911V
575V	1200V
Undervoltage protection	
480V	333V
575V	461V
Ground fault protection	In case of ground fault in motor or motor cable, only the drive is protected
Mains supervision	Trips if any of the input phases are missing (drives only)
Motor phase supervision	Trips if any of the output phases are missing
Unit overtemperature protection	
Alarm limit	149°F (65°C) for heatsink, 158°F (70°C) for circuit boards
Trip limit	158°F (70°C) for heatsink, 185°F (85°C) for circuit boards

Description	Specification
<b>Protections, continued</b>	
Overcurrent protection	Yes
Motor overload protection	Yes
Motor stall protection	Yes
Motor underload protection	Yes
Short-circuit protection	Yes (+24V and +10V reference voltages)
<b>Liquid Cooling</b>	
Allowed cooling agents	Drinking water Water-glycol mixture
Temperature of cooling agent	32 to 86°F (0 to 30°C) at $I_{th}$ for input; 86 to 149°F (30 to 65°C) Max. temperature rise during circulation: 9°F (5°C), no condensation allowed
System max. working pressure	87 psi (6 bar)
System max. peak pressure	580 psi (40 bar)
Pressure loss (at nominal flow)	Varies according to size

## Wiring Diagrams

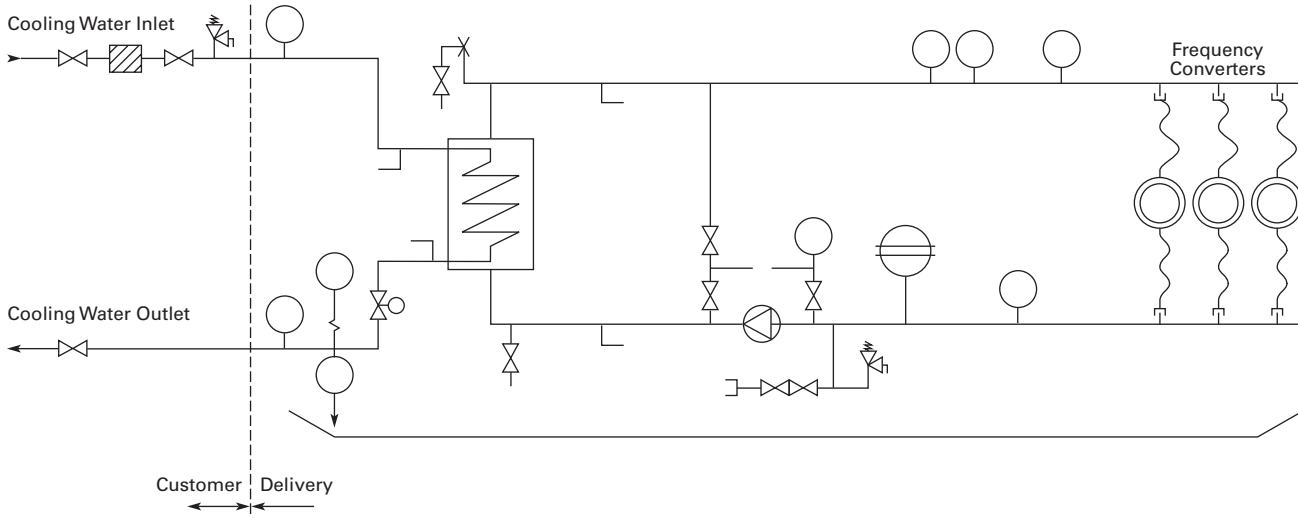
## Cooling System Diagrams

## Example of a Typical Cooling System



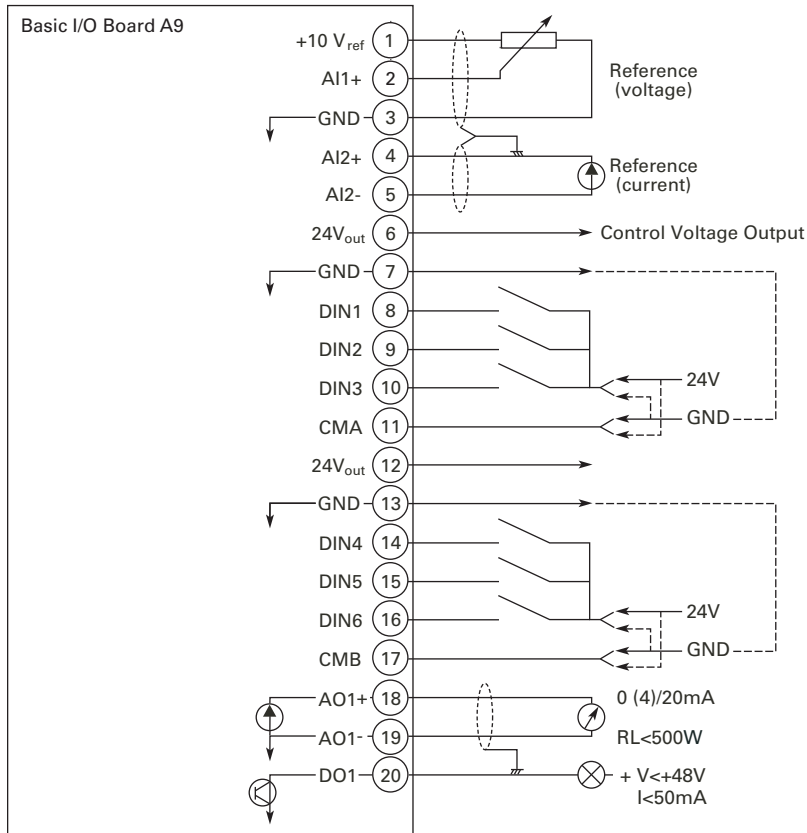
#### Example PI-Diagram of a Typical Cooling System and Connections

2



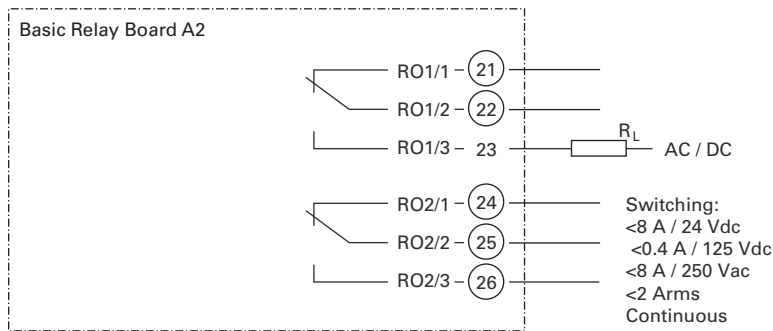
#### I/O Board Diagrams

##### A9 Option Board Control Wiring



Dotted lines indicate the connections for inverted signals

## A2 Option Board Wiring

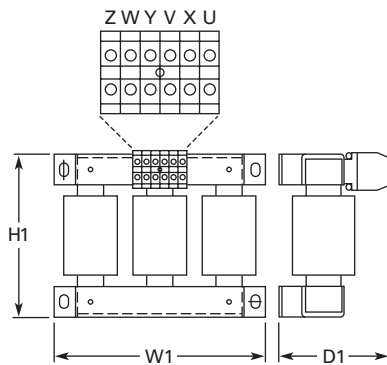


## Dimensions

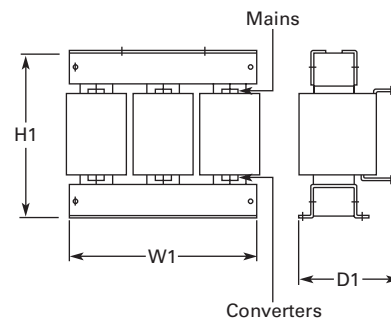
Approximate Dimensions in Inches (mm)

## Line Reactors

## Sizes Up To 61A



## Sizes Larger Than 61A



Catalog Number	H1	W1	D1	Weight Lbs (kg)
CHK0023N6A0	7.01 (178)	9.06 (230)	4.76 (121)	22 (10)
CHK0038N6A0	8.23 (209)	10.63 (270)	5.71 (145)	33 (15)
CHK0062N6A0	8.39 (213)	11.81 (300)	6.30 (160)	44 (20)
CHK0087N6A0	9.13 (232)	11.81 (300)	6.69 (170)	57 (26)
CHK0145N6A0	11.50 (292)	11.81 (300)	7.28 (185)	82 (37)
CHK0220N6A0	12.05 (306)	13.86 (352)	7.28 (185)	119 (54)
CHK0325N6A0	13.66 (347)	13.86 (352)	7.28 (185)	132 (60)
CHK0460N6A0	16.54 (423)	13.70 (348)	9.41 (239)	203 (92)
CHK0520N6A0	17.60 (447)	15.51 (394)	10.71 (272)	231 (105)
CHK0590N6A0	20.43 (519)	15.51 (394)	10.71 (272)	276 (125)
CHK0650N6A0	20.51 (521)	15.51 (394)	10.71 (272)	276 (125)
CHK0750N6A0	24.72 (628)	15.51 (394)	11.10 (282)	331 (150)
CHK0820N6A0	24.72 (628)	15.51 (394)	11.10 (282)	331 (150)
CHK1000N6A0	22.68 (576)	19.57 (497)	11.85 (301)	441 (200)
CHK1150N6A0	22.83 (580)	19.57 (497)	11.85 (301)	441 (200)

# 2.9

## Adjustable Frequency Drives

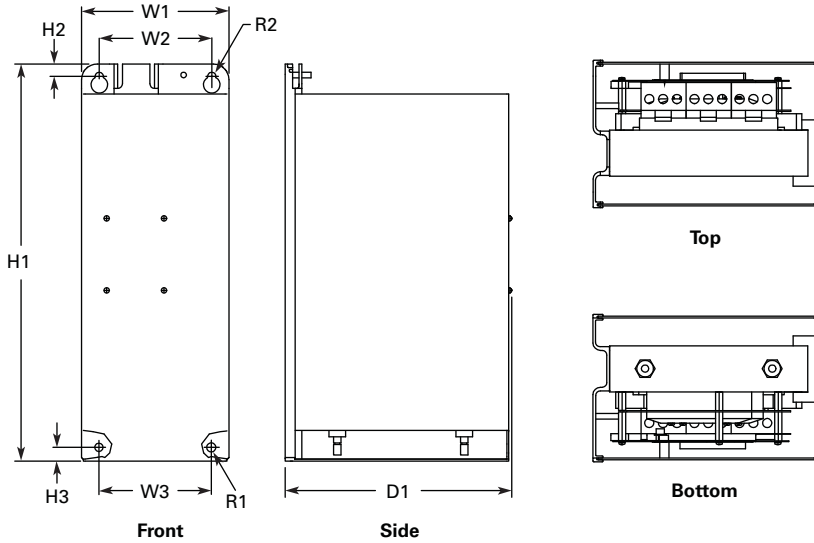
### LCX9000 Liquid Cooled Drives

Approximate Dimensions in Inches (mm)

#### LCX9000 Drives

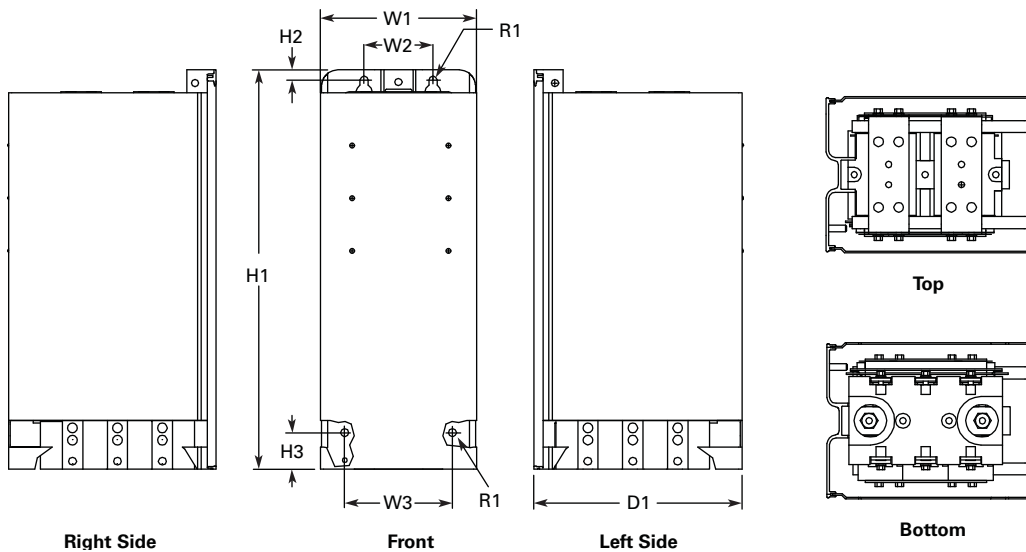
2

#### Chassis Size, CH3



Voltage	Amps	H1	H2	H3	D1	W1	W2	W3	R1 Dia.	R2 Dia.	Weight Lbs (kg)
380–500 Vac	16–61	16.97 (431.0)	0.53 (13.5)	0.59 (15.0)	9.69 (246.0)	6.30 (160.0)	4.80 (122.0)	4.80 (122.0)	0.39 (10.0)	0.35 (9.0)	66 (30)

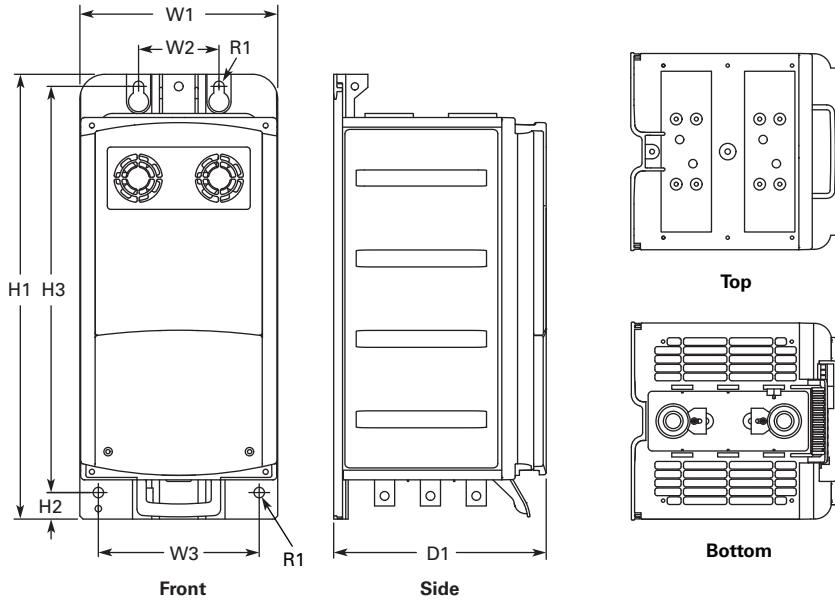
#### Chassis Size, CH4



Voltage	Amps	H1	H2	H3	D1	W1	W2	W3	R1 Dia.	R2 Dia.	Weight Lbs (kg)
380–500 Vac	72–140	19.41 (493.0)	0.49 (12.5)	1.77 (45.0)	10.14 (257.5)	7.60 (193.0)	3.35 (85.0)	5.24 (133.0)	0.39 (10.0)	—	77 (35)

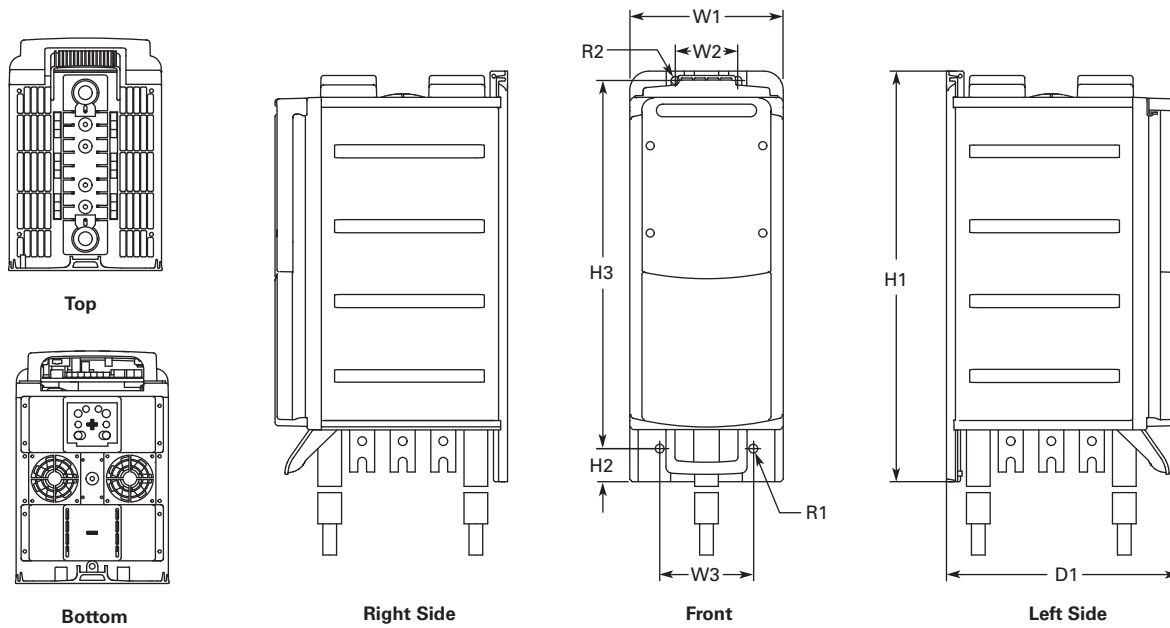
Approximate Dimensions in Inches (mm)

### Chassis Size, CH5



Voltage	Amps	H1	H2	H3	D1	W1	W2	W3	R1 Dia.	R2 Dia.	Weight Lbs (kg)
380–500 Vac	168–261	21.77 (553.0)	1.30 (33.0)	19.88 (505.0)	10.39 (264.0)	9.69 (246)	3.94 (100.0)	7.87 (200.0)	0.51 (13.0)	—	88 (40)

### Chassis Size, CH61



Voltage	Amps	H1	H2	H3	D1	W1	W2	W3	R1 Dia.	R2 Dia.	Weight Lbs (kg)
380–500 Vac	300–385	25.91 (658.0)	2.09 (53.0)	23.23 (590.0)	14.69 (373.0)	9.69 (246.0)	3.94 (100.0)	5.91 (150.0)	0.55 (14.0)	0.51 (13.0)	121 (55)
525–690 Vac	170–208										

# 2.9

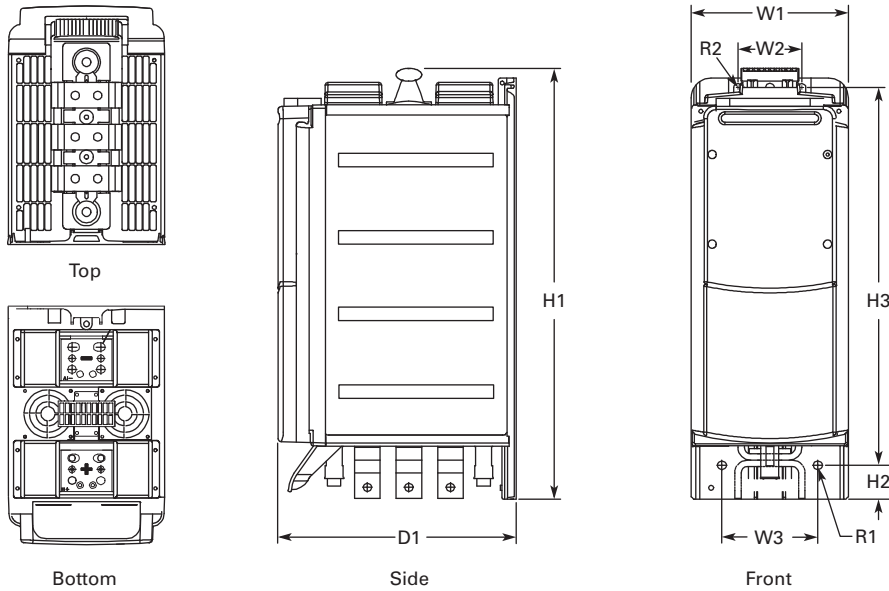
## Adjustable Frequency Drives

### LCX9000 Liquid Cooled Drives

Approximate Dimensions in Inches (mm)

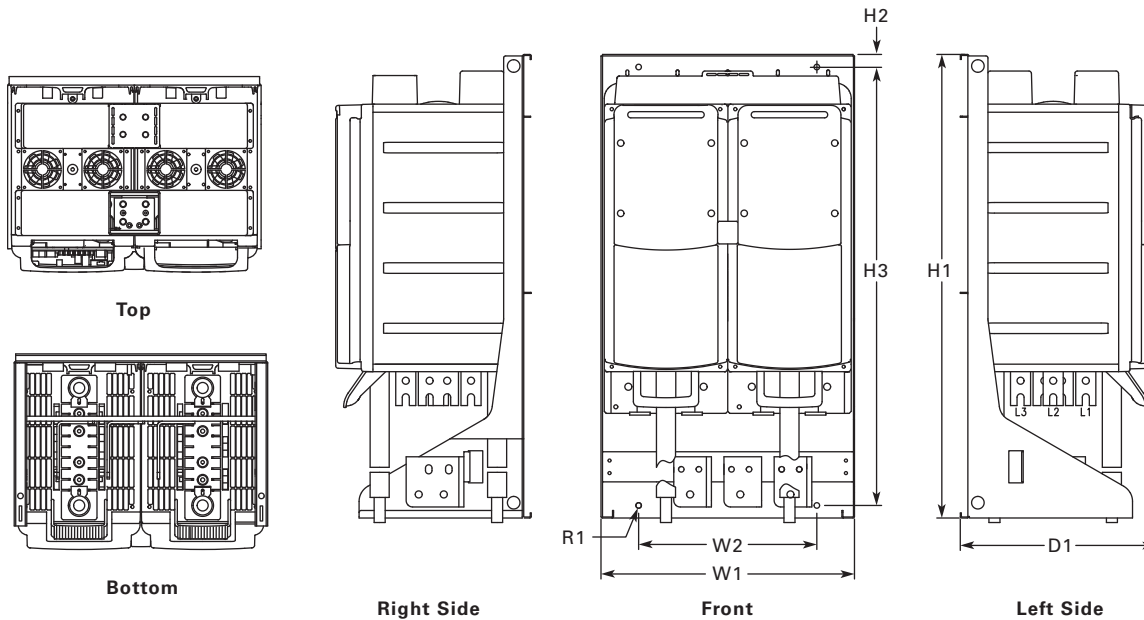
2

#### Liquid-Cooled Inverter—Chassis Size, CH62



Voltage	Amps	H1	H2	H3	D1	W1	W2	W3	R1 Dia.	R2 Dia.
540–675 Vdc	460–730	26.50	2.0	23.23	14.69	9.69	3.94	5.91	0.55	0.51
710–930 Vdc	325–502	(673)	(53)	(590)	(373)	(246)	(100)	(150)	(14)	(13)

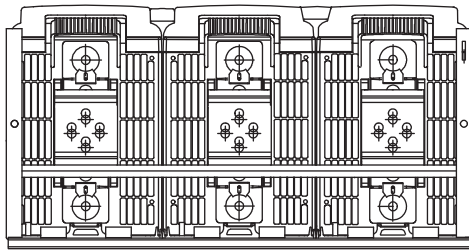
#### Chassis Size, CH63



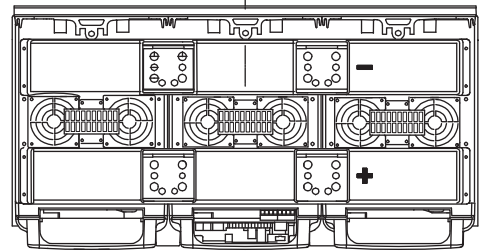
Voltage	Amps	H1	H2	H3	D1	W1	W2	R1 Dia.	Weight Lbs (kg)
380–500 Vac	820–1030	36.36	0.91	34.39	15.35	19.88	13.98	0.43	264 (120)
525–690 Vac	590–750	(923.5)	(23.0)	(873.5)	(390.0)	(505.0)	(355.0)	(11.0)	

Approximate Dimensions in Inches (mm)

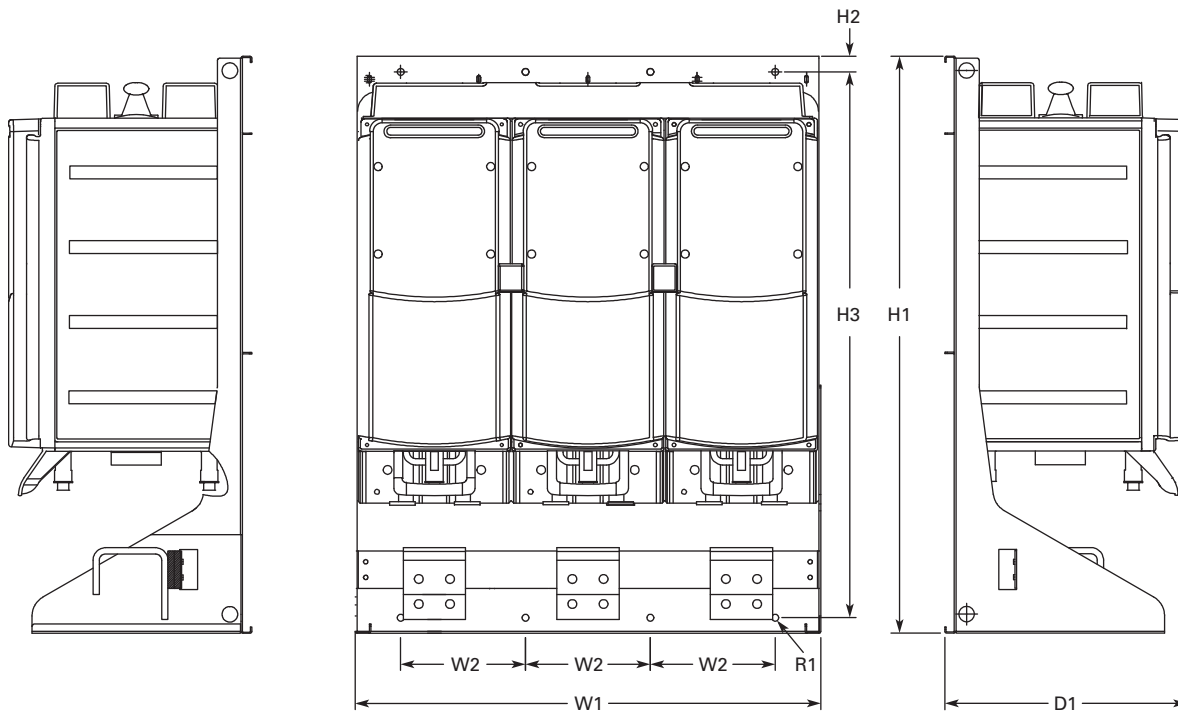
**Liquid-Cooled Inverter with Mounting Bracket, Chassis Size CH64, IP90**



Bottom



Top



Right Side

Front

Left Side

Voltage	Amps	H1	H2	H3	D1	W1	W2	R1 Dia.
540–675 Vdc	1370–4140	36.38	1.03	34.37	15.35	29.37	7.87	0.43
710–930 Vdc	820–3100	(924)	(26)	(873)	(390)	(746)	(200)	(11)

# 2.9

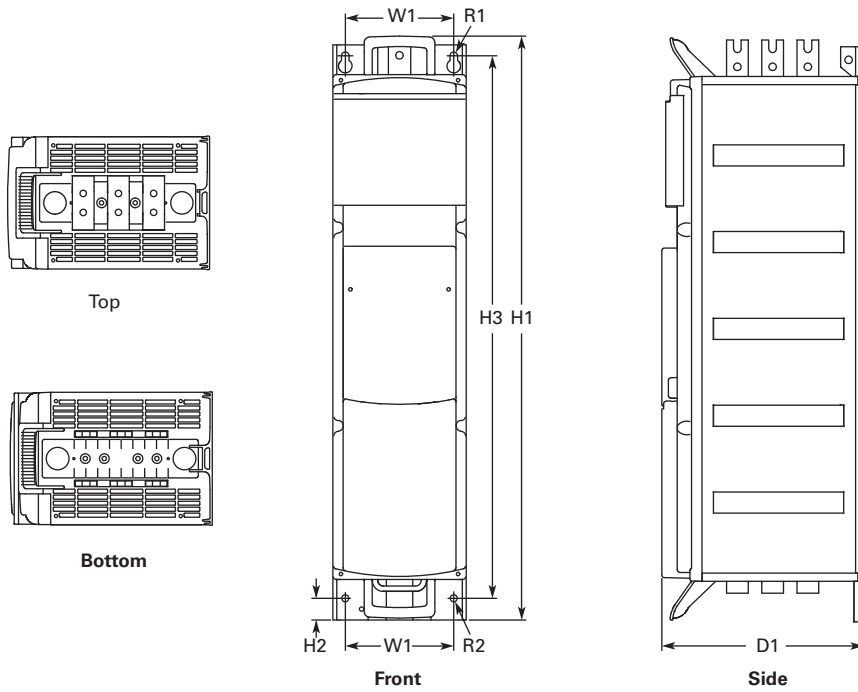
## Adjustable Frequency Drives

### LCX9000 Liquid Cooled Drives

Approximate Dimensions in Inches (mm)

#### Chassis Size, CH72

2

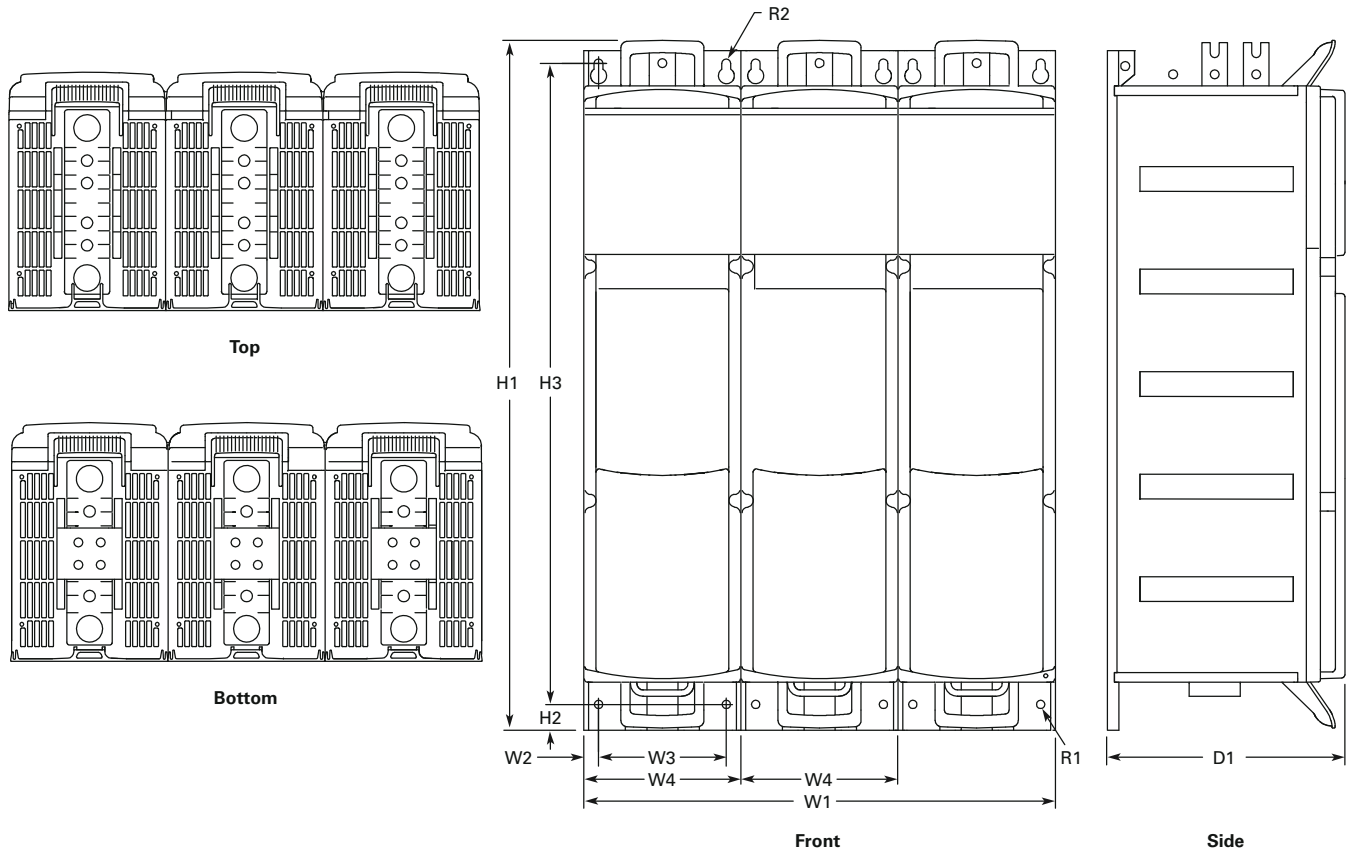


Voltage	Amps	H1	H2	H3	D1	W1	R1 Dia.	R2 Dia.	Weight Lbs (kg)
380–500 Vac	460–730	42.38	1.57	39.37	14.65	7.87	0.55	0.51	198 (90)
525–690 Vac	261–502	(1076.5)	(40.0)	(1000.0)	(372.0)	(200.0)	(14.0)	(13.0)	



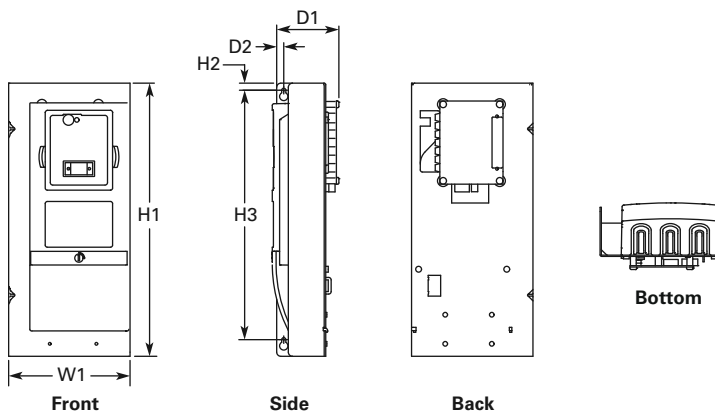
Approximate Dimensions in Inches (mm)

### Chassis Size, CH74



Voltage	Amps	H1	H2	H3	D1	W1	W2	W3	W4	R1 Dia.	R2 Dia.	Weight Lbs (kg)
380–500 Vac	1370–2300	42.38	1.57	39.37	14.65	29.06	0.91	7.87	9.69	0.51	0.55	617 (280)
525–690 Vac	820–1500	(1076.5)	(40.0)	(1000.0)	(372.0)	(738.0)	(23.0)	(200.0)	(246)	(13.0)	(14.0)	

### Control Unit



H1	H2	H3	D1	D2	W1
12.93	0.33	11.81	2.95	0.33	5.75
(328.5)	(8.5)	(300.0)	(75.0)	(8.5)	(146.0)