Model: DL1/DL3

LegaC²™ Battery Charger Owner's Manual

To automatically be connected to your closest Service Center, call us toll-free at 1-800-DOUGLAS (1-800-368-4527)
Or, visit us at: http://www.douglasbattery.com/

I.B. 1660
Rev A (5/16)

IMPORTANT
Read and understand your user's manual before installing, operating or servicing this product.
DO NOT DESTROY THIS BOOK

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IMPORTANT SAFETY INSTRUCTIONS

1. This manual contains important safety and operating instructions. Before using the battery charger, read all instructions, **cautions** and **warnings** on the battery charger, the battery and the product using the battery.
2. This charger has been designed to charge lead-acid batteries. Read and understand all setup and operating instructions before using the battery charger to prevent damage to the battery and to the charger.
3. **Do not** touch non-insulated parts of the output connector or the battery terminals to prevent electrical shock.
4. During charge, batteries produce hydrogen gas which can explode if ignited. Never smoke, use an open flame or create sparks in the vicinity of the battery. Ventilate well when the battery is in an enclosed space.
5. **Do not** connect or disconnect the battery plug while the charger is on. Doing so will cause arcing and burning of the connector resulting in charger damage or battery explosion.
6. Lead-acid batteries contain sulfuric acid which causes burns. **Do not** get in eyes, on skin, or on clothing. In cases of contact with eyes, flush immediately with clean water for 15 minutes. Seek medical attention immediately.
7. Only factory qualified personnel can service this equipment. De-energize all AC and DC power connections before servicing the charger.
8. The charger is **not** for outdoor use.
9. Do not expose the charger to moisture. Operating **conditions** should be 32º to 113º F (0º to 45º C); 0 to 70% relative humidity.
10. Do not operate the charger if it has been dropped, received a sharp hit, or otherwise damaged in any way.
11. For continued protection and to reduce the risk of fire, install chargers on a floor of non-combustible material such as stone, brick or grounded metal.

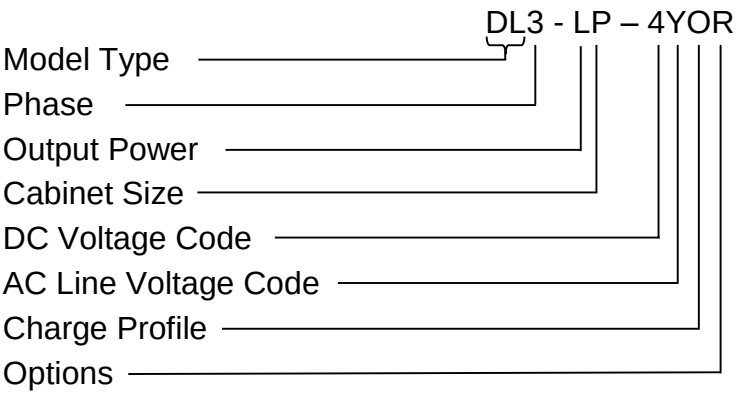
WARNING: The shipping pallet must be removed for proper and safe operation.

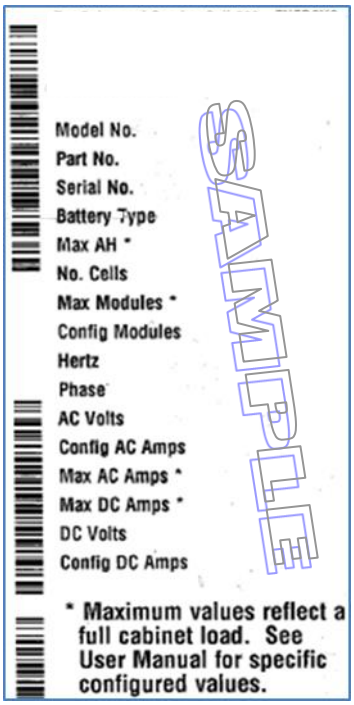
TECHNICAL INFORMATION

The nameplate, located on the outside of the charger, should be used to check this application before installation.

Part Number

This is the charger part number and specifies the characteristics of this particular charger and for this reason it is required in any discussion or correspondence regarding this unit.





Output Power Letter Codes

The following table describes the letter codes to be used in charger part numbers to indicate the Output Power of the charger.

Letter Code	Output Power (kW)	Number Modules	Module Power (kW)
A	1.0	1	1.0
B	2.0	2	1.0
C	3.0	3	1.0
D	4.0	4	1.0
E	5.0	5	1.0
F	6.0	6	1.0
G	3.5/2.5*	1	3.5/2.5*
H	7.0/5.0*	2	3.5/2.5*
I	10.5/7.5*	3	3.5/2.5*
J	14.0/10.0*	4	3.5/2.5*
K	17.5	5	3.5
L	21.0	6	3.5

*Three-phase/single-phase

Cabinet Size/Gauge Letter Codes

The following table describes the letter codes to be used in charger part numbers to indicate the number of slots and size of DC cables.

Letter Code	Module Positions	Standard Cable Gauge	Comments
K	1	10 AWG	Stand alone, 1kW cabinet
L	2	1/0	Two slots, 3.5kW cabinet
M	3	4 AWG	Three slots, 1kW cabinet
N	4	3/0	Four slots, 3.5kW cabinet
P	6	2/0	Six slots, 1kW cabinet
P	6	3/0	Six slots, 3.5kW cabinet

DC Voltage Number Codes

The following table describes the number codes to be used in charger part numbers to indicate the DC output voltage(s) of the charger.

Number Code	Output Voltage(s)
1	12
2	24
3	36/48
4	24/36/48
5	72/80

AC Line Voltage Letter Codes

The following table describes the letter codes to be used in charger part numbers to indicate the AC line voltage(s) and AC line frequency at which the charger can be operated.

Letter Code	Voltage(s) (Volts RMS)	Line Frequency (Hertz)	Comments
A	120	50/60	120 VAC only
C	600	50/60	600 VAC only
G	208/220/240	50/60	208/220/240 VAC
Y	480	50/60	480 VAC only

Charge Profile Letter Codes

The following table describes the letter codes to be used in charger part numbers to indicate the Charging profile of the charger.

Letter Code	Profile
C	Cold Storage
E	STD Flooded (IEI)
G	Gel-Bloc
O	Opportunity
V	VRLA

Specialty Charger Options List

Suffix	Description
C6	6' of #12AWG AC Cord
C10	10' of #12AWG AC Cord
C12	12' of #12AWG AC Cord
L10	10' of DC cable
L13	13' of DC cable
L15	15' of DC cable
L18	18' of DC cable
L20	20' of DC cable
L25	25' of DC cable
L30	30' of DC cable

Serial Number

This number indicates complete information about the specific charger. It must be supplied with the part number on any correspondence or discussion regarding this charger.

Battery Type

The chemical content construction of the battery this unit is designed to charge is given in this part of the nameplate. (L-A = Lead Acid)

Max AH

This is the maximum amp-hours capacity of this cabinet.

No. Cells

This is the number of battery cells this unit will charge. **This number must match exactly with any battery connected to the charger output.**

Max Modules

This is the maximum number of modules the cabinet can hold.

WARNING: THE NUMBER OF MODULES MUST MATCH THE NUMBER OF "CONFIG MODULES" ON THE NAMEPLATE. DO NOT ADD MORE MODULES IN THE FIELD. CONSULT THE MANUFACTURER IF MORE MODULES ARE NEEDED.

Config Modules
This is the number of modules this cabinet is configured for.

Hertz
This gives the frequency in cycles per second of the AC input voltage. Under no conditions operate the charger at a different frequency or from a generator with unstable frequency.

Phase
Number "3" indicates a Three Phase Charger and "1" indicates a Single Phase Charger.

AC Volts
This is the nominal voltage this charger is rated for. The charger will only operate on this voltage.

Config AC Amps
This is the AC Amps this charger is configured for.

Max AC Amps
This is the maximum AC Amps this cabinet is rated for.

Max DC Amps
This is the maximum output DC Amps this charger is rated for.

DC Volts
This gives the nominal DC output voltage of the charger.

Config DC Amps
This is the output DC Amps this charger is configured for to deliver to a battery that is over 20% discharged.

CEC
This logo is applied to chargers that are certified with the California Energy Commission in compliance with Appliance Efficiency Regulations:

cULus
This logo is applied to chargers that have been tested to applicable standards and requirements by Underwriters Laboratories (UL) and the Canadian Standards Association (CSA):

INSTALLATION

WARNING: The shipping pallet must be removed for proper and safe operation.

Location
For maximum safe operation, choose a location which is free of excess moisture, dust and corrosive fumes. Also, avoid locations where temperatures are high or where liquids will drip on the charger. Do not obstruct the ventilation openings or the space under the charger.

Wall Mount Cabinet Chargers
The charger must be mounted on a wall or stand in a vertical position. The minimum distance between two chargers must be 12".

The charger will be installed with four 5/16" bolts or with the bracket supplied. See the Wall Mounting Dimensions section at the end of this manual for proper bolt pattern.

NOTE: Ambient temperature at all levels cannot exceed 113° F (45° C).

Electrical Connections
To prevent failure of the charger, make sure it is connected to the correct line voltage.

Connecting Input Power

WARNING: Make sure the power to the charger is OFF and the battery is disconnected before connecting the input power to the terminals of the charger.

Connect the input power to the appropriate terminals, ***including ground***. Follow your local and National Electric Codes in making these connections.

AC Connection
The user must provide suitable branch circuit protection and a disconnect method from the AC power supply to the charger to allow for safe servicing.

Plug Polarity
The charging cable is connected to the DC output of the charger with the positive lead marked RED. The output polarity of the charger must be strictly observed when connecting to the battery (read warning above). Improper connection may open the DC fuse and/or damage the charger.

Grounding the Charger

DANGER: FAILURE TO GROUND THE CHARGER COULD LEAD TO FATAL ELECTRIC SHOCK. Follow National Electric Code for ground wire sizing.

Connect a grounding conductor to the Ground lug provided on the horizontal support panel. This lug is marked as shown:

DESCRIPTION OF OPERATION

General

Douglas LegaC²™ chargers are microprocessor-controlled. The processor calculates the battery's capacity so that the charging profile can be automatically adapted to the battery's actual state over a wide range of capacities. The charging coefficient is maintained absolutely on all types of batteries. LegaC²™ chargers adapt to the battery's capacity and its discharge level.

LegaC²™ chargers can easily be set to charge flooded batteries used in cold or freezer storage applications, IEI or opportunity profiles. This battery charger is also designed to charge flooded and valve regulated lead acid storage batteries within the range of the cell and ampere-hour rating as marked on the nameplate.

Starting the Charge Cycle

When a battery is connected to the charger, the control board senses the voltage and after a short delay, the charger starts charging the battery.

Charging Current

Charging current is determined by the battery voltage and its state of charge condition. Charging current declines automatically as battery voltage rises during the charge. As the battery charges, the LCD display will output various charge parameters including the percentage of battery capacity.

AC Power Fail

If the AC power fails with a battery connected to the charger during a charge cycle, the charger will reset and start a new charge cycle when power is restored. All charger settings as well as the time and date are preserved.

Series Charging

In series charging, the voltages of both batteries add up and must match charger's nameplate DC Volts rating. The charger's ampere-hour rating must be equal to each of the battery's ampere-hour rating. Charge cycle will not start unless both batteries are connected.

GLOSSARY

Charging Profile
The charging profile defines the rate of current charge over time. The charger adapts to the battery's age and level of discharge. Controlling the overcharge coefficient, whatever the battery's discharge level, reduces the amount of electricity consumed.

Cold Storage Profile
This is a charging profile that allows the configuration of the charger for use with batteries in cold storage application. The profile is an IEI (constant current, constant voltage, constant current) type with a number of user configurable parameters.

Equalization Charging
Equalization charging, performed after normal charging, balances the electrolyte densities in the battery's cells.

STD Flooded (IEI) Profile
The profile is an IEI (constant current, constant voltage, constant current) type with a number of user configurable parameters.

Gel-Bloc Profile
This charging profile is an IEI (constant current, constant voltage, constant current) charging profile designed for gelled electrolyte type sealed lead acid batteries.

VRLA Profile
This charging profile allows for valve regulated lead acid batteries to be charged. This charging profile is an IEIE (constant current, constant voltage, constant current, constant voltage) type.

Opportunity Profile
This charging profile is used when opportunity charging is desired. It has a start rate of 25% of the battery's rated amp hour capacity, requires one opportunity recharge in every 24 hours of service and must have an equalize charge done once a week which is programmed to run automatically.

> **Operation**
> During opportunity charging the user can plug the battery in and charge it during breaks, lunch or any work stoppage time. Sufficient time should be scheduled after the equalize charge to allow the battery to completely cool to ambient temperature before use.
>
> **Complete Charge Time**
> This is the time of day for a Complete charge.

NOTE: The factory default is complete charge disable, 6 hour Equalize, Sunday at 00 hour.

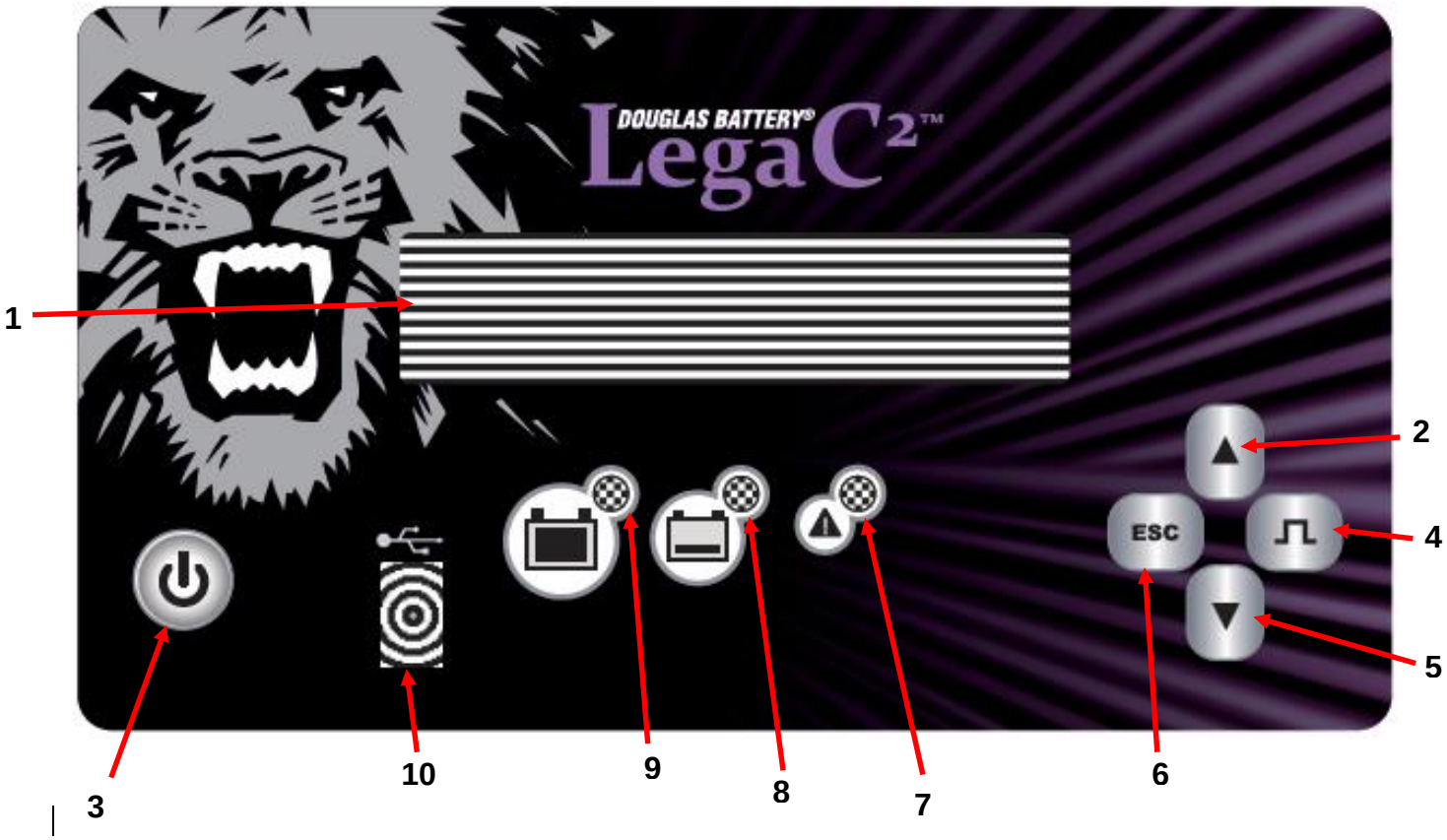
Refresh Charging
Refresh or maintenance charging enables the battery to be maintained at maximum charge all the time that it is connected to the charger.

OPERATING INSTRUCTIONS

The LegaC²™series of chargers are compatible with batteries of 12, 24, 36, 48, 64, 72 and 80 volts (depending on the version supplied).

Battery recognition (voltage, capacity and state of charge) is accomplished automatically by the microprocessor. Several charging profiles are available (Cold Storage, STD Flooded [IEI], Opportunity, Gel-Bloc, VRLA) based on the configuration chosen by the operator. Furthermore, equalization and refresh charges are integrated.

CONTROL PANEL



Ref.	Function	Description
1	LCD display	Display charger operation info/menus
2	Navigate UP button	Navigate menus/Change values
3	ENTER/STOP&START button	Select menu items/Enter values/Stop and restart battery charge
4	Navigate RIGHT/EQUALIZE button	Scroll right/Start equalize or desulfation
5	Navigation DOWN button	Navigate menus/Change values
6	Navigation LEFT/ESC button	Enter Main Menu/Scroll left/Exit menus
7	RED fault indicator	OFF = no fault FLASHING = ongoing fault detected ON = fault
8	YELLOW charging indicator	OFF = charger output is off ON = charging in progress
9	GREEN charge complete indicator	OFF = charger off or battery not available Flashing = cooling phase ON = battery ready and available
10	USB port	Download memos/Upload software

MENU ACCESS

When the charger is idle, press and hold <ESC>, the Main Menu is then displayed. The main menu is automatically exited after 60 seconds of inactivity or can be exited voluntarily by pressing the <ESC> button.

Main Menu

All menus are accessed from Main Menu; a detailed description of each menu is included in the next sections of this manual. The menus that require a password are not displayed until the correct password has been entered.

The menus provide access to the following functions:

- View last 200 charging cycles (**Memo** menu).
- View of faults, alarms, etc. (**Status** menu).
- USB functions (**USB** menu).
- Setting of date, language and others (**Parameters** menu).
- Management of password (**Password** menu)

MEMORIZATIONS

Memorizations Display Screen

The charger can display the details of the last 200 charge cycles.

The display below shows one charge stored in memory. MEMO 1 is the latest charge memorized. After memorizing the two-hundredth charge, the oldest record is deleted and replaced by the next oldest.

Displaying a Charge Cycle

Proceed as follows:

1. Select a record (MEMO x) using the ▲/▼ buttons.
2. Display the first History screen by pressing Enter.
3. Display the second History screen by pressing▼.
4. Return to the Main Menu by pressing Esc.

The charge history is displayed; use the ▲/▼ to scroll through the parameters.

Memorization Data

Memo	Description
Profile	Selected profile
Capacity	Rated battery capacity (AH)
U batt	Rated battery voltage (V)
Temp	Battery temperature at start of charge (F)
% init	State of charge at start of charge (%)
U start	Battery voltage at start of charge (Vpc)
U end	Battery voltage at end of charge (Vpc)
I end	Current at end of charge

Memo	Description
Chg Time	Time of the charge cycle (minutes)
Ah	Amp-hours returned during charge cycle
SoC	Start of charge date and time
DBa	Battery disconnect date and time
Status	Partial or complete
Fault	Fault Codes
CFC	Termination code (for service tech)

STATUS

This menu displays the status of the charger's internal counters (number of normal and partial charges, faults by type, etc.).

Status Screen

Status	Description
Charge	Total number of charges – corresponds to the total of normally terminated charges and charges terminated with or by faults
	Number of charges normally terminated
	Number of charges terminated abnormally
DF1 etc.	Number of faults recorded by the charger (see Fault Codes)
TH	Number of charger temperature faults

USB

This menu provides access to the USB function to update software.

Update Software
Updates charger's internal software. The software is provided by EnerSys®.

PARAMETERS

Date/Hour
Sets date and time of the charger. The clock has a battery backup which will preserve the time when power to the charger is off.

Language
Selects the language displayed in the menus.

Region
Selects the format for date, metric (EU) or imperial (US) units for temperature, length and cable gauge.

Display
Set screen saver function.

> **Contrast**
> Modifies the display contrast level (20 to 29).
>
> **Screen Saver**
> Enable or Disable the screen saver function.
>
> **Delay**
> Set the time the screen stays illuminated. The delay time is adjustable in minutes up to one hour and 59 minutes.

DayLight
Enables or disables automatic clock adjustment for daylight savings time. When enabled, time will move ahead on hour at 02:00 on the second Sunday in March and will move back one hour at 02:00 on the first Sunday of November. The charger must be powered up at the time of the change for it to take effect.

PASSWORD

This is where the password is entered to gain access to service level menus by authorized EnerSys® service personnel.

CHARGING THE BATTERY

At this point, the charger should have been set up by a qualified service person. Charging can only begin when a battery of the proper type, capacity and voltage is connected to the charger.

With the charger in wait mode (no battery connected) and without pressing the Stop/Start button, the display will show the following information:

Charger Idle Display

Ref.	Description
1	Charger DC voltage
2	Firmware version
3	Selected charge profile
4	System time
5	System date
6	Connect battery

Starting a Charge Cycle

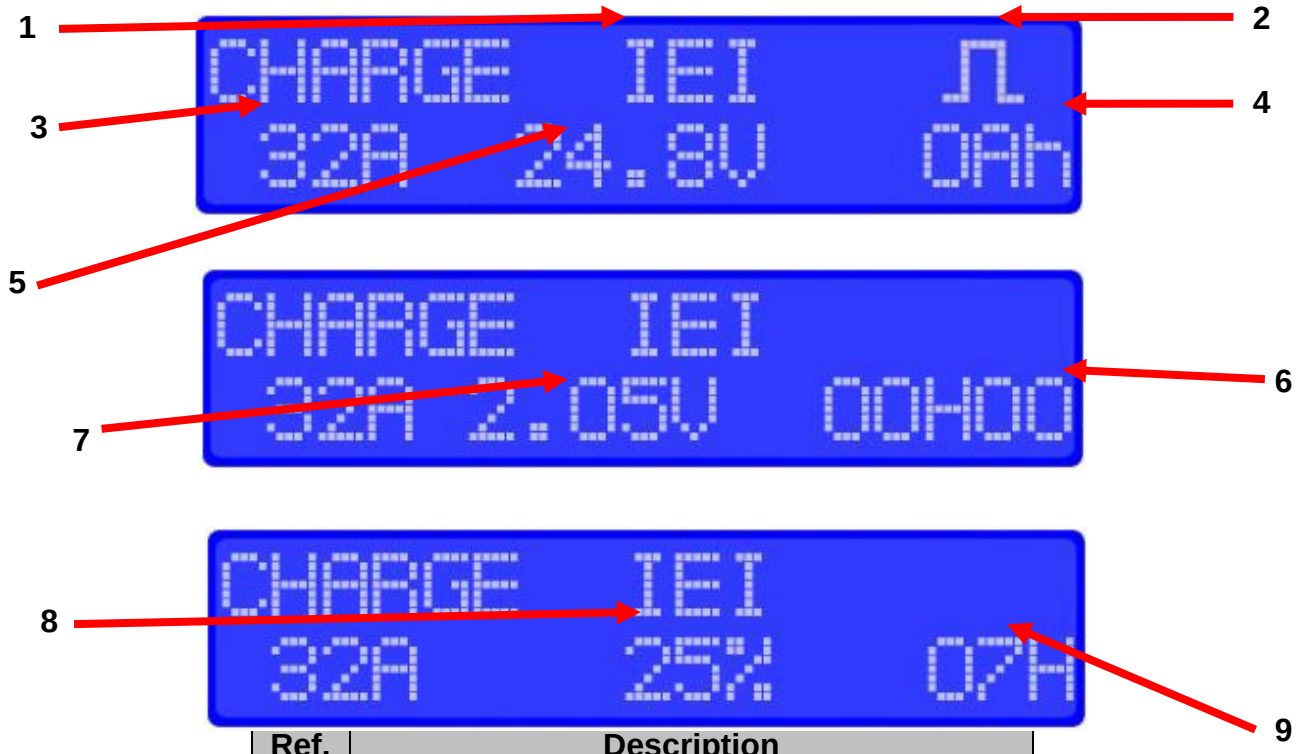
The charger will start automatically when a battery is connected or push the Stop/Start button if the battery is already connected.

Delayed Start

If the charger was programmed for delayed start, charging will begin following that delay. When the battery is plugged in to the charger, the display shows the time remaining before the programmed charging starts.

Effective Charge

A few moments into the effective charge, the display will begin alternating between the following charging information:



Ref.	Description
1	Charge profile
2	Pending equalize symbol (if selected)
3	Charge current
4	Charge AH
5	Charge voltage (total V)
6	Charge time
7	Charge voltage (V/c)
8	Percent of charge
9	Estimated remaining charge time

End of Charge without Equalization

The green complete LED comes on after proper end of charge. The green complete LED is on and the display shows AVAIL. The display alternates between:

- Total charging time
- Amp/hrs restored to the battery

Any other lit LED indicates a problem during charging. Please refer to paragraph *Control Panel* for more information.

If the battery remains plugged in and refresh charge has been enabled, refreshes will occur to maintain an optimal charge.

The battery is now ready for use. Push the ON/OFF button before unplugging the battery.

End of Charge with Equalization

An Equalize charge can be started manually or automatically.

Manual Equalization Start

1. At the end of charge (green LED on or flashing), press on the <EQUALIZE> button. The equalize button can also be pressed any time during the charge and an equalize charge will be started after charging is complete.

NOTE: When an Equalize is manually started, the output current will be set to the value saved in the charger configuration.

2. The start of the equalization charge is indicated by the message **EQUAL**. During the equalization charge, the charger displays the output current and alternates, the battery voltage and, voltage per cell, and remaining time.

3. The battery will be available when the green LED comes back on and the display shows AVAIL.

4. The battery is now ready for use. If the battery remains plugged in and refresh charge has been enabled, refreshes will occur to maintain an optimal charge. Push the ON/OFF button before unplugging the battery.

Automatic Equalization Start

If an equalization day has been programmed in Charger configurations the equalization charge will start automatically on the programmed day of the week after charging is complete.

NOTE: The factory default IEI Equalize, 6 hour Equalize, Sunday at 00 hour.

The battery will be available when the green LED comes back on and the display shows AVAIL. The battery is now ready for use. If the battery remains plugged in and refresh charge has been enabled, refreshes will occur to maintain an optimal charge. Push the ON/OFF button before unplugging the battery.

FAULT CODES

In case of a fault, one of the corresponding fault codes listed below will appear on the display. If it is a critical fault, charging will stop and the red Fault LED will be illuminated.

Fault Display

Fault	Critical	Cause	Solution
DF1	Yes	Low output current	Check input voltage and fuses. Call for service.
DF2	Yes	Output fault	Check for proper battery connection (reversed polarity). Check output fuse. Call for service.
DF3	Yes	Improper battery	Battery voltage too high (>2.4 Vpc) or too low (<1.6 Vpc). Use proper charger for battery.
DF4	No	The battery has been discharged more than 80% of its capacity	Prevent future over discharging of battery. Battery charge gauges and lift interrupts may need calibration.
DF5	No	Battery requires inspection	Non critical fault. Check battery cables for condition and size, check for loose connections, check for defective cells.
DF7	No	Inspect battery	Non critical fault. This will cause the charge to terminate early. Battery may require service. Check the battery (temperature, specific gravity…). Check the battery condition of use. Check the configuration in the menu (charge cables parameters).
TH	Yes	Charger overheating	Check that fans are working. Verify that ambient temperature is not too high. Inspect to see if charger ventilation is obstructed or impaired.
MOD TH	No	Alternating with charge parameters – one or more module in thermal fault – the charge process continues – the fault module(s) is(are) displayed + red led flashing.	Check that the fan(s) is(are) working correctly and/or that the ambient temperature is not too high or or whether there is poor natural ventilation to the charger. If all modules are in thermal fault a TH fault will follow.
MOD DFC	Yes	Alternating with charge parameters – one or more	Check power modules. If all modules in DF1 fault a DF1 error will follow.

		module in DF1 fault – the charge process continues – the fault module(s) is(are) displayed + red led flashing.	
DEF ID	Yes	Blocking fault – one or more modules are not compatible with the charger configuration (for example 24V charger with one 48V module). This can happen if the user replaces one module with another one with a different voltage setting.	Use correct module(s).

MAINTENANCE AND SERVICE

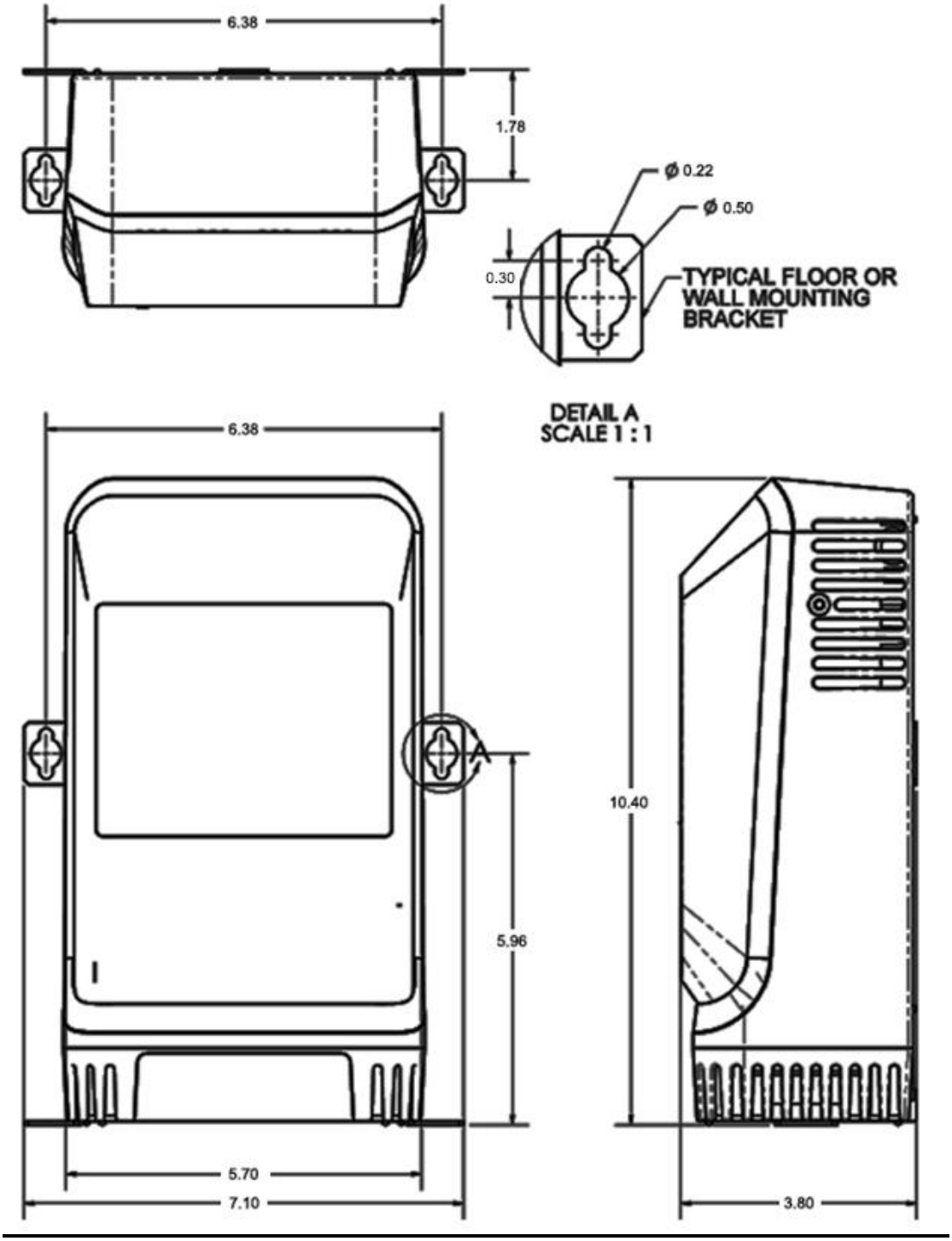
CAUTION: There are dangerous voltages within the battery charger cabinet. Only qualified personnel should attempt to adjust or service this battery charger.

The charger requires a minimum of maintenance. Connections and terminals should be kept clean and tight. The unit (especially the heatsink) should be periodically cleaned with an air hose to prevent any excessive dirt build up on components. Care should be taken not to bump or move any adjustments during cleaning. Make sure that both the AC lines and the battery are disconnected before cleaning. The frequency of this type of maintenance depends on the environment in which this unit is installed.

For service, contact your sales representative or call:

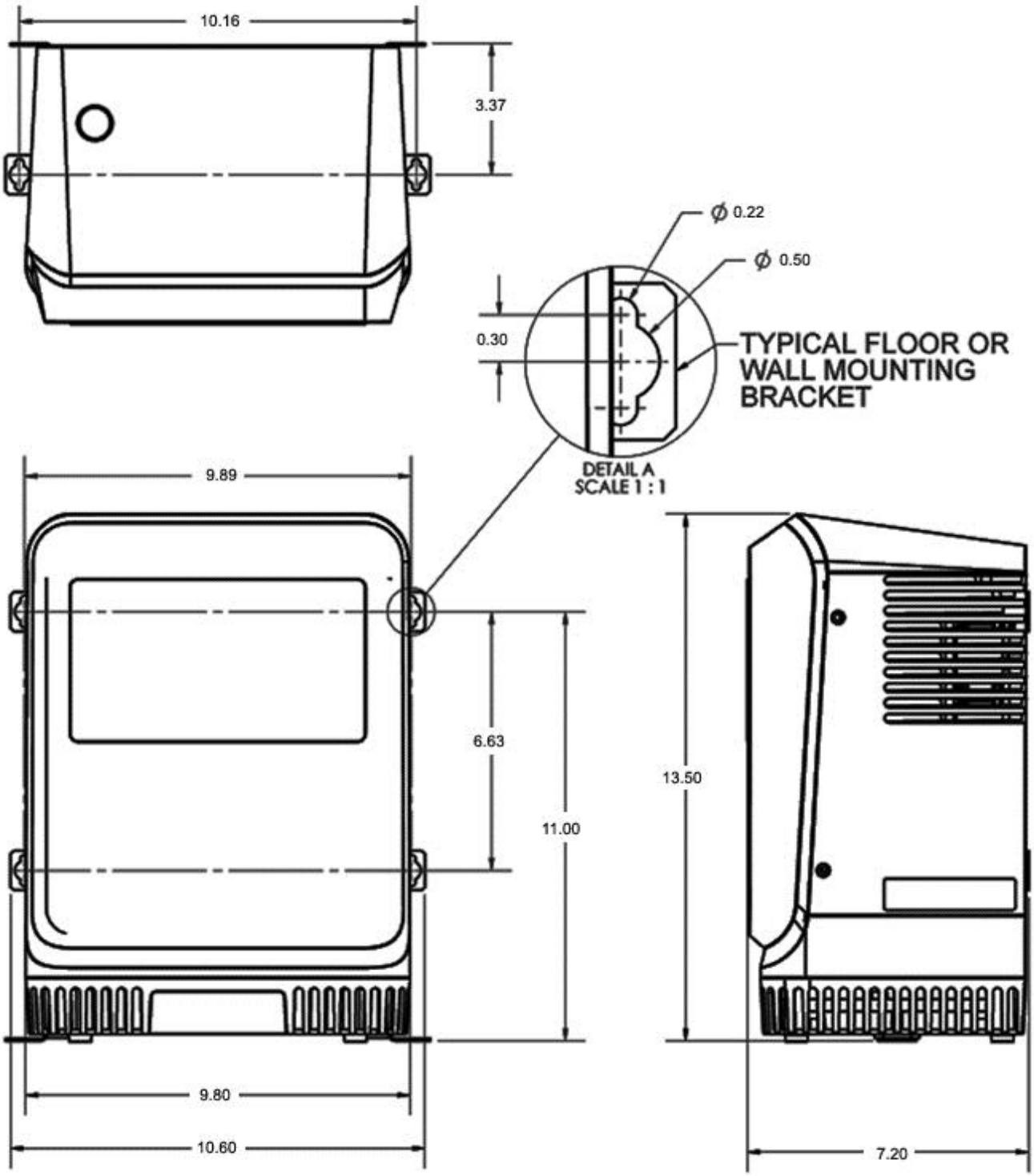
1-800-DOUGLAS (1-800-368-4527)
Or, visit us at: http://www.douglasbattery.com/

1 kW STAND ALONE CABINET MOUNTING DIMENSIONS



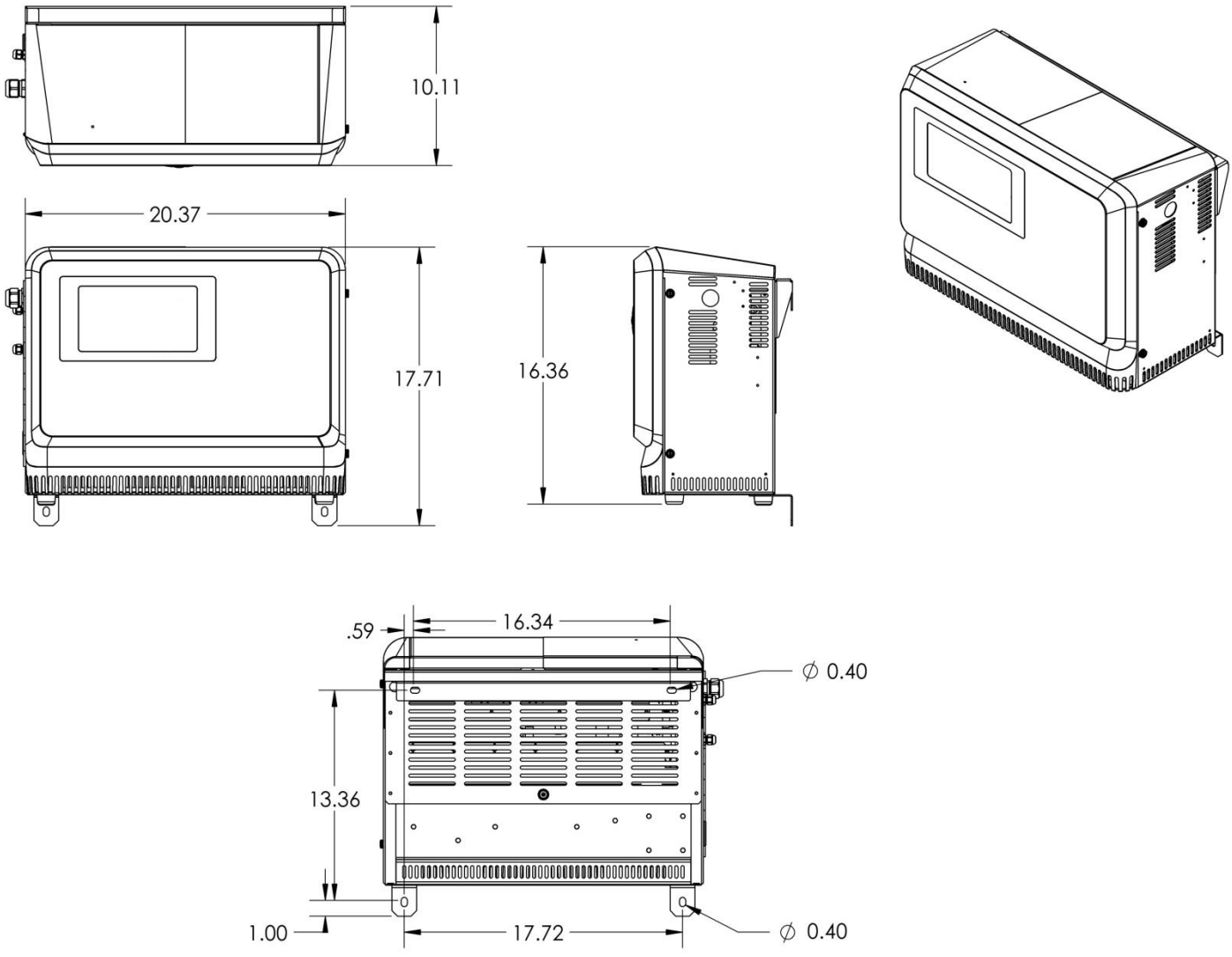
Dimensions shown are in inches.

1 kW 3 BAY CABINET MOUNTING DIMENSIONS



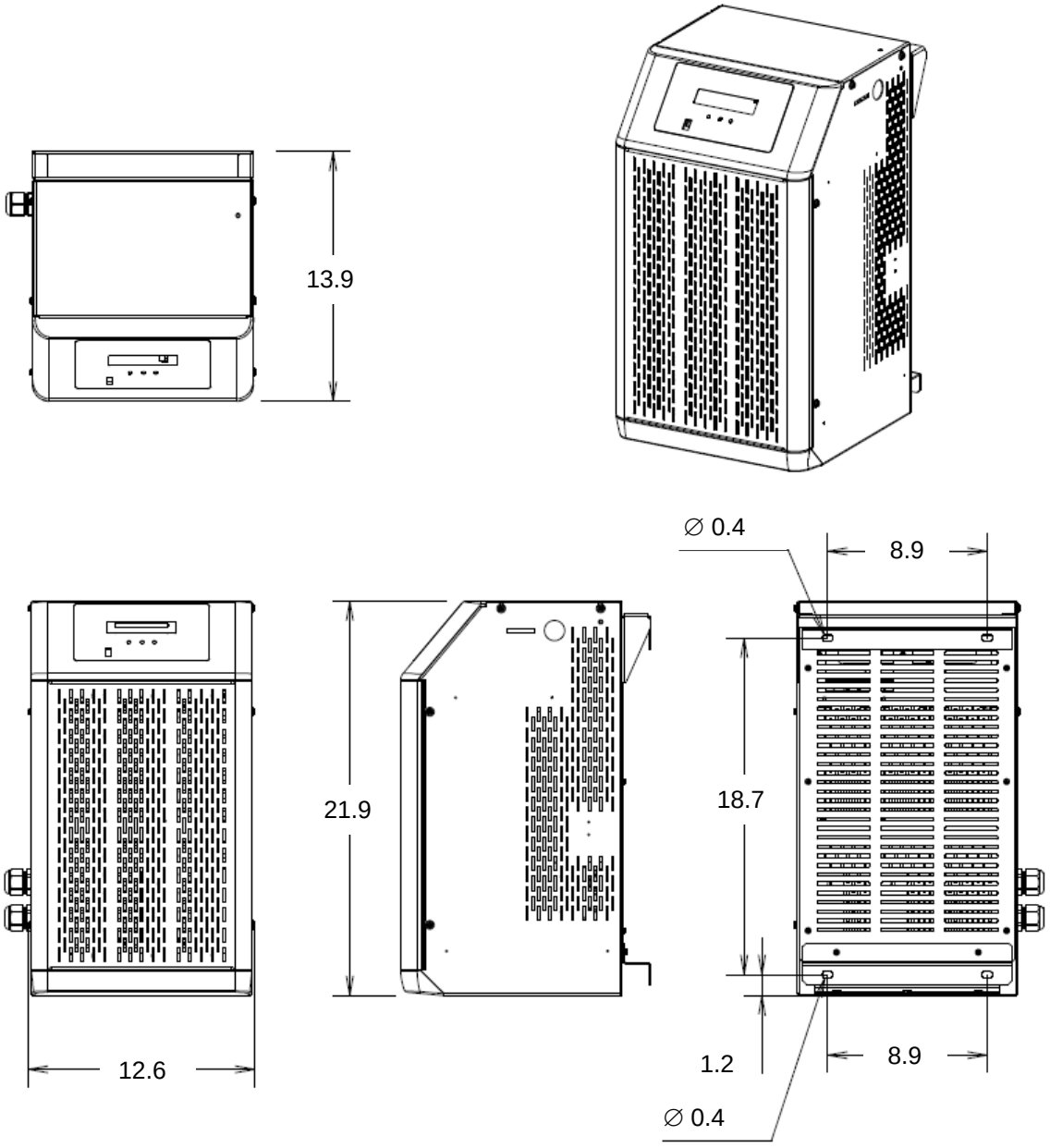
Dimensions shown are in inches.

1 kW 6 BAY CABINET MOUNTING DIMENSIONS



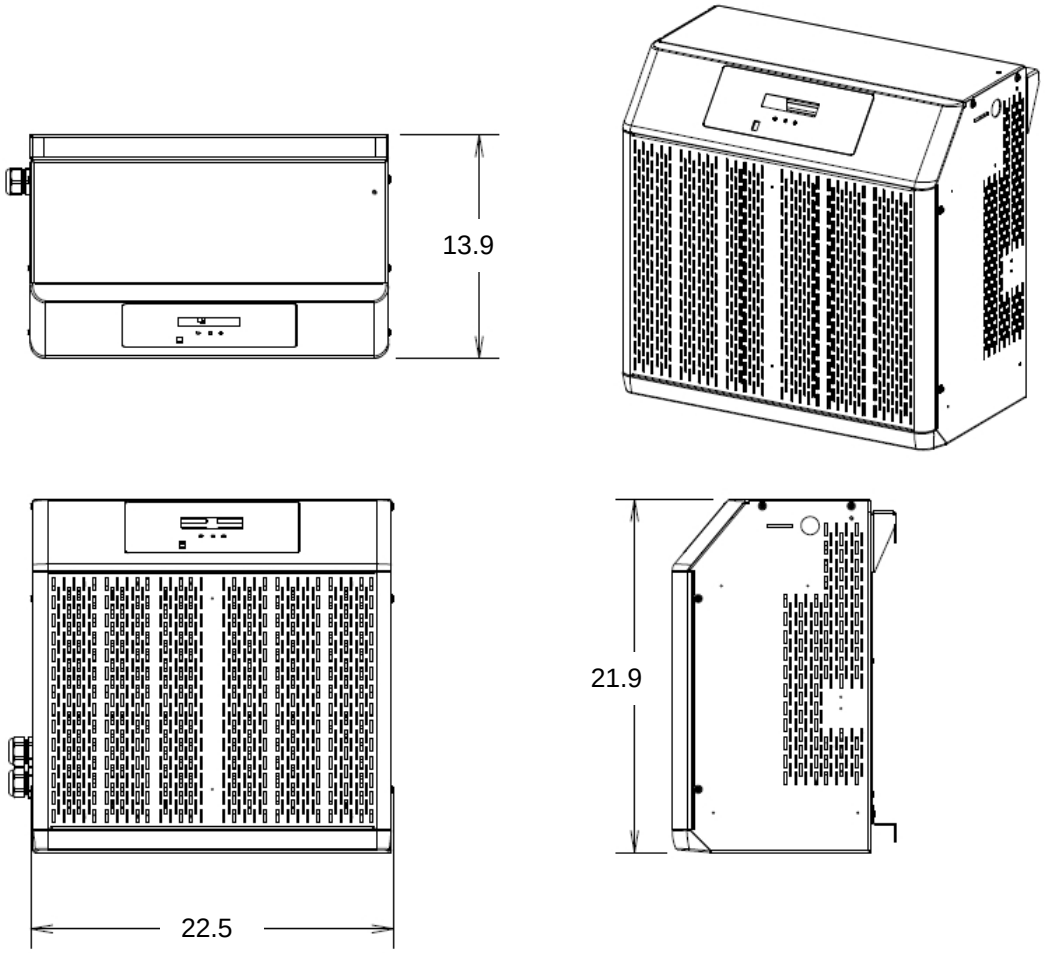
Dimensions shown are in inches.

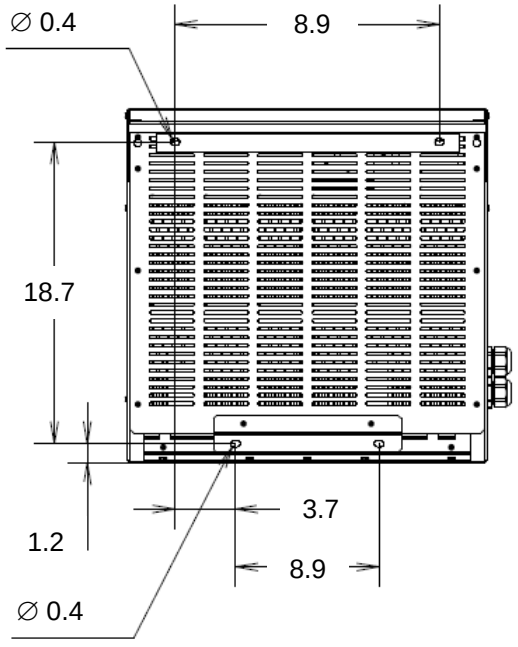
3.5 kW 3 BAY CABINET MOUNTING DIMENSIONS



Dimensions shown are in inches.

3.5 kW 6 BAY CABINET MOUNTING DIMENSIONS





Dimensions shown are in inches.

1 kW TECHNICAL SPECIFICATIONS

Part Number	AC Input					DC Output			Max 8 Hour Capacity (Ah)	Charger Cable AWG
	Voltage	Max Amps	Phase	Min Cord AWG	NEMA Plug	Cells	kW	Max Current (A)		
DL1-AK-1A	120	4.7	1	16	5-15	6	1	35	220	10 AWG
DL1-AK-2A	120	5.4	1	16	5-15	12	1	20	125	10 AWG
DL1-AK-3A	120	6	1	16	5-15	18/24	1	14/11	90/70	10 AWG
DL1-AM-1A	120	4.7	1	16	5-15	6	1	35	220	4 AWG
DL1-BM-1A	120	9.4	1	16	5-15	6	2	70	440	4 AWG
DL1-BM-2A	120	10.8	1	16	5-15	12	2	40	250	4 AWG
DL1-BM-3A	120	12	1	16	5-15	18/24	2	28/22	175/140	4 AWG
DL1-CM-1A	120	14.4	1	14	5-20	6	3	105	660	4 AWG
DL1-CM-2A	120	16.2	1	12	5-20	12	3	60	375	4 AWG
DL1-CM-3A	120	18	1	12	5-30	18/24	3	42/33	265/210	4 AWG
DL1-BP-1A	120	9.4	1	16	5-15	6	2	70	440	2/0
DL1-BP-2A	120	10.8	1	16	5-15	12	2	40	250	2/0
DL1-BP-3A	120	12	1	16	5-15	18/24	2	28/22	175/140	2/0
DL1-CP-1A	120	14.4	1	14	5-20	6	3	105	660	2/0
DL1-CP-2A	120	16.2	1	12	5-20	12	3	60	375	2/0
DL1-CP-3A	120	18	1	12	5-30	18/24	3	42/33	265/210	2/0
DL1-DP-1A	120	18.8	1	12	5-30	6	4	140	875	2/0
DL1-DP-2A	120	21.6	1	12	5-30	12	4	80	500	2/0
DL1-DP-3A	120	24	1	12	5-30	18/24	4	56/44	350/275	2/0
DL1-EP-1A	120	23.5	1	12	5-30	6	5	175	1095	2/0
DL1-EP-2A	120	27	1	8	5-50	12	5	100	625	2/0
DL1-EP-3A	120	30	1	8	5-50	18/24	5	70/55	440/345	2/0
DL1-FP-1A	120	28.2	1	8	5-50	6	6	210	1315	2/0
DL1-FP-2A	120	32.4	1	8	5-50	12	6	120	750	2/0
DL1-FP-3A	120	36	1	8	5-50	18/24	6	84/66	525/415	2/0

Part Number	AC Input					DC Output			Max 8 Hour Capacity (Ah)	Charger Cable AWG
	Voltage	Max Amps	Phase	Min Cord AWG	NEMA Plug	Cells	kW	Max Current (A)		
DL1-AM-1G	208/220/240	2.8/2.6/2.4	1	16	6-15	6	1	35	220	4 AWG
DL1-AM-2G	208/220/240	5.4/5.1/4.7	1	16	6-15	12	1	35	220	4 AWG
DL1-BM-1G	208/220/240	5.6/5.2/4.8	1	16	6-15	6	2	70	440	4 AWG
DL1-BM-2G	208/220/240	10.8/10.2/9.4	1	16	6-15	12	2	70	440	4 AWG
DL1-BM-3G	208/220/240	11.6/11.2/10	1	16	6-15	18/24	2	48/36	300/225	4 AWG
DL1-CM-1G	208/220/240	8.4/7.8/7.2	1	16	6-15	6	3	105	660	4 AWG
DL1-CM-2G	208/220/240	16.2/15.3/14.1	1	12	6-20	12	3	105	660	4 AWG
DL1-CM-3G	208/220/240	17.4/16.8/15	1	12	6-30	18/24	3	72/54	450/340	4 AWG
DL1-BP-1G	208/220/240	5.6/5.2/4.8	1	16	6-15	6	2	70	440	2/0
DL1-BP-2G	208/220/240	10.8/10.2/9.4	1	16	6-15	12	2	70	440	2/0
DL1-BP-3G	208/220/240	11.6/11.2/10	1	16	6-15	18/24	2	48/36	300/225	2/0
DL1-CP-1G	208/220/240	8.4/7.8/7.2	1	16	6-15	6	3	105	660	2/0
DL1-CP-2G	208/220/240	16.2/15.3/14.1	1	12	6-20	12	3	105	660	2/0
DL1-CP-3G	208/220/240	17.4/16.8/15	1	12	6-30	18/24	3	72/54	450/340	2/0
DL1-DP-1G	208/220/240	11.2/10.4/9.6	1	16	6-15	6	4	140	875	2/0
DL1-DP-2G	208/220/240	21.6/20.4/18.8	1	12	6-30	12	4	140	875	2/0
DL1-DP-3G	208/220/240	23.2/22.4/20	1	12	6-30	18/24	4	96/72	600/450	2/0
DL1-EP-1G	208/220/240	14/13/12	1	14	6-20	6	5	175	1095	2/0
DL1-EP-2G	208/220/240	27/25.5/23.5	1	8	6-50	12	5	175	1095	2/0
DL1-EP-3G	208/220/240	29/28/25	1	8	6-50	18/24	5	120/90	750/565	2/0
DL1-FP-1G	208/220/240	16.8/15.6/14.4	1	12	6-30	6	6	210	1315	2/0
DL1-FP-2G	208/220/240	32.4/30.6/28.2	1	8	6-50	12	6	210	1315	2/0
DL1-FP-3G	208/220/240	34.8/33.6/30	1	8	6-50	18/24	6	144/108	900/675	2/0

3.5 kW TECHNICAL SPECIFICATIONS

Part Number	AC Input					DC Output			Max 8 Hour Capacity (Ah)	Charger Cable AWG
	Voltage	Max Amps	Phase	Min Cord AWG	NEMA Plug	Cells	kW	Max Current (A)		
DL3-GM-4G	208/220/240	7.4/7.0/6.4	3	14	L15-20	12, 18, 24	3.5	40/40/40	250/250/250	2/0
DL3-HM-4G	208/220/240	14.8/14.0/12.8	3	14	L15-20	12, 18, 24	7	80/80/80	500/500/500	2/0
DL3-IM-4G	208/220/240	22.2/21.0/19.2	3	10	L15-30	12, 18, 24	10.5	120/120/120	750/750/750	2/0
DL3-IP-4G	208/220/240	22.2/21.0/19.2	3	10	L15-30	12, 18, 24	10.5	120/120/120	750/750/750	3/0
DL3-JP-4G	208/220/240	29.6/28.0/25.6	3	8	CS8365C*	12, 18, 24	14	160/160/160	1000/1000/1000	3/0
DL3-KP-4G	208/220/240	37.0/35.0/32.0	3	8	HW**	12, 18, 24	17.5	200/200/200	1250/1250/1250	3/0
DL3-LP-4G	208/220/240	44.4/42.0/38.4	3	6	HW**	12, 18, 24	21	240/240/240	1500/1500/1500	3/0
DL3-GM-5G	208/220/240	7.7/7.3/6.7	3	14	L15-20	36, 40	3.5	25/25	160/160	2/0
DL3-HM-5G	208/220/240	15.4/14.6/13.4	3	10	L15-30	36, 40	7	50/50	315/315	2/0
DL3-IM-5G	208/220/240	23.1/21.9/20.1	3	10	L15-30	36, 40	10.5	75/75	470/470	2/0
DL3-IP-5G	208/220/240	23.1/21.9/20.1	3	10	L15-30	36, 40	10.5	75/75	470/470	3/0
DL3-JP-5G	208/220/240	30.8/29.2/26.8	3	8	CS8365C*	36, 40	14	100/100	625/625	3/0
DL3-KP-5G	208/220/240	38.5/36.5/33.5	3	6	HW**	36, 40	17.5	125/125	785/785	3/0
DL3-LP-5G	208/220/240	46.2/43.8/40.2	3	6	HW**	36, 40	21	150/150	940/940	3/0

***Non-NEMA plug**
**** Hard-Wired only**

Part Number	AC Input					DC Output			Max 8 Hour Capacity (Ah)	Charger Cable AWG
	Voltage	Max Amps	Phase	Min Cord AWG	NEMA Plug	Cells	kW	Max Current (A)		
DL3-GM-4Y	480	4.8	3	14	L16-20	12, 18, 24	3.5	80/80/60	500/500/375	2/0
DL3-HM-4Y	480	9.6	3	14	L16-20	12, 18, 24	7	160/160/120	1000/1000/750	2/0
DL3-IM-4Y	480	14.4	3	14	L16-20	12, 18, 24	10.5	240/240/180	1500/1500/1125	2/0
DL3-IP-4Y	480	14.4	3	14	L16-20	12, 18, 24	10.5	240/240/180	1500/1500/1125	3/0
DL3-JP-4Y	480	19.2	3	10	L16-30	12, 18, 24	14	320/320/240	2000/2000/1500	3/0
DL3-KP-4Y	480	24	3	10	L16-30	12, 18, 24	17.5	320/320/300	2000/2000/1875	3/0
DL3-LP-4Y	480	28.8	3	8	CS8165C*	12, 18, 24	21	320/320/320	2000/2000/2000	3/0
DL3-GM-5Y	480	4.8	3	14	L16-20	36, 40	3.5	40/36	250/225	2/0
DL3-HM-5Y	480	9.6	3	14	L16-20	36, 40	7	80/72	500/450	2/0
DL3-IM-5Y	480	14.4	3	14	L16-20	36, 40	10.5	120/108	750/675	2/0
DL3-IP-5Y	480	14.4	3	14	L16-20	36, 40	10.5	120/108	750/675	3/0
DL3-JP-5Y	480	19.2	3	10	L16-30	36, 40	14	160/144	1000/900	3/0
DL3-KP-5Y	480	24	3	10	L16-30	36, 40	17.5	200/180	1250/1125	3/0
DL3-LP-5Y	480	28.8	3	8	CS8165C*	36, 40	21	240/216	1500/1350	3/0

***Non-NEMA plug**

Part Number	AC Input					DC Output			Max 8 Hour Capacity (Ah)	Charger Cable AWG
	Voltage	Max Amps	Phase	Min Cord AWG	NEMA Plug	Cells	kW	Max Current (A)		
DL3-GM-4C	600	3.8	3	10	L17-30	12, 18, 24	3.5	80/80/60	500/500/375	2/0
DL3-HM-4C	600	7.6	3	10	L17-30	12, 18, 24	7	160/160/120	1000/1000/750	2/0
DL3-IM-4C	600	11.4	3	10	L17-30	12, 18, 24	10.5	240/240/180	1500/1500/1125	2/0
DL3-IP-4C	600	11.4	3	10	L17-30	12, 18, 24	10.5	240/240/180	1500/1500/1125	3/0
DL3-JP-4C	600	15.2	3	10	L17-30	12, 18, 24	14	320/320/240	2000/2000/1500	3/0
DL3-KP-4C	600	19.0	3	10	L17-30	12, 18, 24	17.5	320/320/300	2000/2000/1875	3/0
DL3-LP-4C	600	22.8	3	10	L17-30	12, 18, 24	21	320/320/320	2000/2000/2000	3/0
DL3-GM-5C	600	3.8	3	10	L17-30	36, 40	3.5	40/36	250/225	2/0
DL3-HM-5C	600	7.6	3	10	L17-30	36, 40	7	80/72	500/450	2/0
DL3-IM-5C	600	11.4	3	10	L17-30	36, 40	10.5	120/108	750/675	2/0
DL3-IP-5C	600	11.4	3	10	L17-30	36, 40	10.5	120/108	750/675	3/0
DL3-JP-5C	600	15.2	3	10	L17-30	36, 40	14	160/144	1000/900	3/0
DL3-KP-5C	600	19.0	3	10	L17-30	36, 40	17.5	200/180	1250/1125	3/0
DL3-LP-5C	600	22.8	3	10	L17-30	36, 40	21	240/216	1500/1350	3/0

Part Number	AC Input					DC Output			Max 8 Hour Capacity (Ah)	Charger Cable AWG
	Voltage	Max Amps	Phase	Min Cord AWG	NEMA Plug	Cells	kW	Max Current (A)		
DL1-GM-2Y	480	5.8	1	14	L8-20	12	3.5	80	500	2/0
DL1-GM-3Y	480	7.1	1	14	L8-20	18/24	3.5	50/50	315/315	2/0
DL1-HM-2Y	480	11.6	1	14	L8-20	12	7	160	1000	2/0
DL1-HM-3Y	480	14.2	1	14	L8-20	18/24	7	100/100	625/625	2/0
DL1-IM-2Y	480	17.4	1	12	L8-30	12	10.5	240	1500	2/0
DL1-IM-3Y	480	21.3	1	12	L8-30	18/24	10.5	150/150	940/940	2/0

MAINTENANCE LOG

1. Modifications to Factory Settings

Date	Variable	Change	Service Technician

2. Service

Date	Description	Service Technician

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