

HYDRA-R

SITE PREPARATION MANUAL

HYDRA-R Plug-in Vehicle Charging Control System

Access Control, Metering, Reporting and Billing
for Workplaces, Multi-Unit Dwellings and other Shared Parking Areas

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This Manual provides information required to design and prepare a site for the HYDRA-R Plug-in Vehicle Charging Control System. All installations must be performed by a licensed electrician and in compliance with all national and local electrical codes.

READ THIS ENTIRE MANUAL PRIOR TO INSTALLATION.

AVOID INSTALLATIONS WITH CONTINUOUS EXPOSURE TO DIRECT SUN IN HOT CLIMATES.

Document Revisions

Version	Date	Author	Updates
V 1.0	09/01/2016	Jeff Bates	Original
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This document contains the latest information for Liberty PlugIns products. Liberty PlugIns reserves the right to make changes to its products without notice. Any modification of this product by anyone other than authorized Liberty PlugIns service personnel will void the product safety-certification and product warranty. If you have questions about this product, contact Liberty PlugIns or a licensed electrical contractor.

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Safety Notice

Before providing any power to this product, read this document completely.

The following symbols are designed to draw your attention to especially important information:

NOTE	Notes provide helpful information and guidance to facilitate your installation process.
	The CAUTION symbol emphasizes information needed to minimize the risk of harm and/or equipment malfunction.
	The DANGER symbol emphasizes information to minimize the risk of electrical shock.

The HYDRA-R product is designed exclusively to control **electric vehicle (EV) charging equipment (“EVSE”)** safety-certified by Underwriters Laboratory (UL), Intertek (ETL) or other nationally recognized testing laboratory (NRTL) - do not use this product with any other type of electrical device.

-  This product contains high voltage components; allow only licensed electricians to service this product. o All supply power must be turned off prior to opening the front cover for any service.
-  Use this product only with safety-certified EV charging units (e.g. UL, ETL, CE) rated for **no more than** 240 Volts at 32 Amperes continuous current. **DO NOT EXCEED THE 40A RATING OF THE HYDRA-R INTERNAL RELAYS (Relay Meter Modules, “RMM”) UNDER ANY CIRCUMSTANCES.**
 - o Do not operate this product until all EV charging units are installed in accordance with manufacturer specifications and all local and national electric codes and standards.

Overview

The HYDRA-R provides access control, usage reporting and load management capabilities for low cost, non-networked electric vehicle charging stations installed in shared parking areas typically found in workplaces and multi-unit dwellings. The system operates by simply switching and metering each EV-charger supply circuit. Each EV-charger circuit is routed through a dedicated relay and meter unit inside the HYDRA-R enclosure. A central controller board, and Ethernet or cellular modem communications, are used to control the relays and read the meter data.

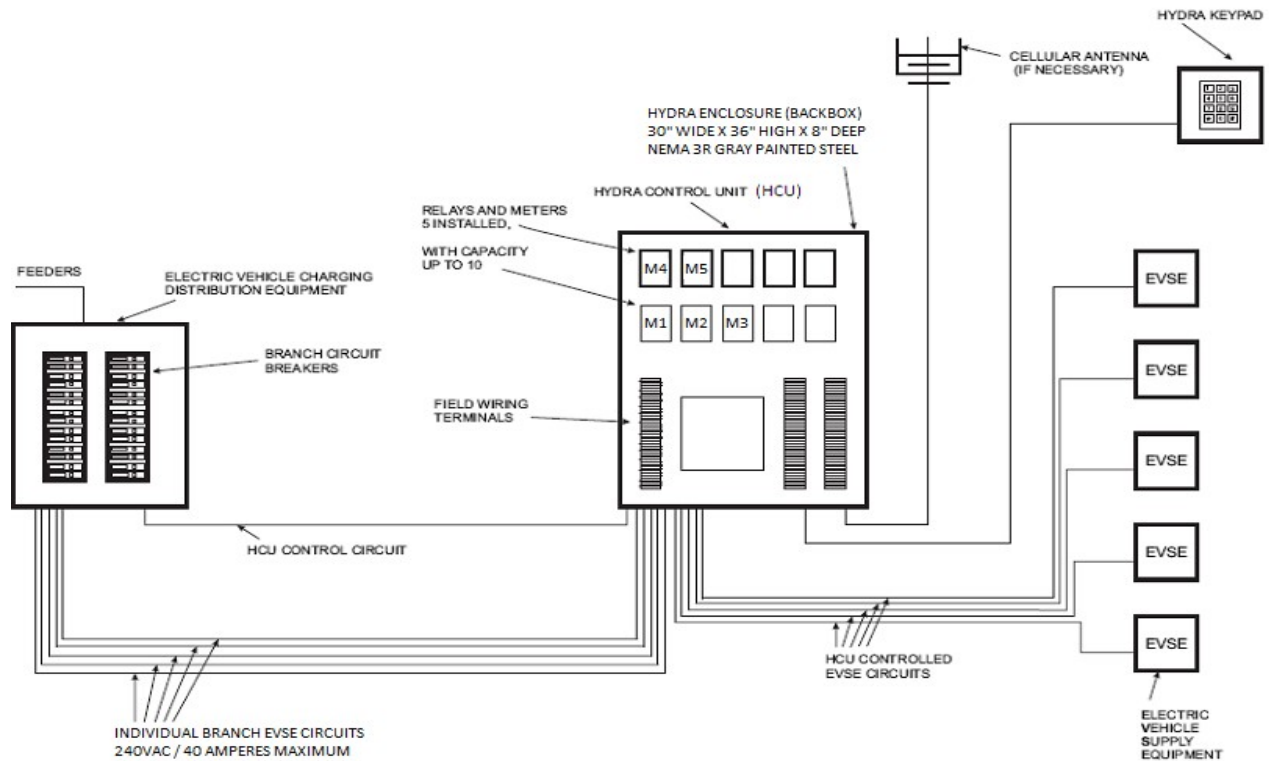


Figure 1.0: Hydra Controller

The HYDRA-R reduces equipment costs by centralizing components that facilitate control, data recording and communications into a single device instead of replicating these components across multiple EV chargers. Electric Vehicle drivers simply select a particular charging unit, and then enter their charging code (or “PIN#”) using a numeric keypad, or by using a Smartphone application. A valid PIN and charging unit number closes the corresponding relay and starts the flow and measurement of electricity. The data for each charging session is securely transmitted and stored (via wired or wireless communications), and is made available to authorized individuals via Liberty PlugIns’ secure Web site.

NOTE: the HYDRA-R will not work properly when connected to EV charging units equipped with “cold load pickup.” This feature prevents the HYDRA-R from working properly, by randomizing the amount of time it takes to resume vehicle charging following an electrical outage. **This feature must be disabled.** Check with your EV charger manufacturer to determine if your charger is equipped with this feature.

Specifications

- Each HYDRA-R unit can support up to ten (10) 120/240VAC, “Level 2” EVSE requiring no more than 32 Amperes each.



DO NOT EXCEED THE 40A MAXIMUM RATING OF THE HYDRA-R INTERNAL RELAY METER MODULES (“RMM”) UNDER ANY CIRCUMSTANCES.

- The HYDRA-R controller board requires one 120VAC Single Phase, 60 Hz circuit (Any breaker 5 Amp or greater is acceptable).

Installation Planning

Successful installations require careful planning. This guide discusses the various things to consider when planning and designing your installation. Many electrical utility companies offer assistance in planning your installation, and some jurisdictions offer financial assistance. Check with your local energy utility, as well as state and local governments for any incentive programs that may help with the costs of the installation.

Types of Installations

Applications for the Hydra system can be broadly classified into four categories:

1. **Public Access:** These are installations that are intended to be used by the general public.
2. **MUD (Multi-unit Dwelling):** These include condominiums and apartment buildings, and are accessible to residents and guests.
3. **Work-place charging:** These are for employees and guests at businesses and government facilities.
4. **Fleet charging:** These are for businesses and government facilities that operate a fleet of electric vehicles.

Policies for Usage

Running out of energy while on the road in an electric vehicle is a substantial inconvenience. EV drivers quickly learn they must cope with two factors that impact their driving habits: the relative scarcity of publicly accessible EV charging stations and the long period of time it takes to obtain a substantial charge. Owners of EV charging systems must therefore carefully consider the impact of any proposed restrictions on their employees, tenants and guests. Policies such as limiting the amount of time each user can occupy the charging space and prohibiting plug-in hybrids should be weighed carefully. Drivers with long commutes in electric vehicles may depend on workplace charging to get home and so should have the highest priority.

Location Selection

The following should be considered when determining the location of the HYDRA Control Unit (HCU), access control keypad and individual EVSE:

- In order to encourage use of the system, it should be installed in a location that is highly visible, particularly if the system is accessible to the public.
- Insure that there is adequate room for mounting the EVSE's and keypad(s) without interfering with the parking space area, and out of harm's way from collisions from vehicles. Consider using bollards in addition to wheel stops when appropriate. EVSE's and keypads can be mounted on a wall, or on posts or pedestals.
- Mount the keypad in a location that is convenient to the users, even when all the spaces are occupied by vehicles.

- Consider the cost of running the electrical supply to the Hydra.
- Locating the Hydra closer to the EVSE's may reduce installation costs.
- Local electrical codes may specify the proximity of the supply cabinet and the EVSE's, and may require an accessible shut off switch.
- Locate the EVSE's in areas that are visible to parking attendants or law enforcement if they are to monitor the use of the EVSE spaces. Consider using security cameras in the area.
- Locate the EVSE's to help prevent confusion about which cord belongs to which parking space.
- In areas with snow and ice, position the keypad and EVSE's to minimize problems with the keypad getting iced over, and the cord or connector on the EVSE getting frozen to the EVSE or to the ground. Provide a hanger or wire management system to keep the cable off the ground.
- In areas with rain, consider locating the entire installation in protected areas.
- The system should be located in an area with adequate lighting for the operation of the equipment.
- The Hydra needs access to either a cellular network, or to Ethernet access to the Internet. The Hydra has a cellular antenna mounted on the top of the chassis. If there is not adequate cellular signal strength where the Hydra is installed, the antenna can be remotely mounted, and the antenna lead can be run through conduit. If a cellular network is not an option, then a cable modem or DSL modem can be installed inside the Hydra to provide access.
- Consideration need to be given to access for persons with disabilities, including access to the keypad.
- An option to consider in employee charging locations is providing two parking spaces for each EVSE. Since employee charging sessions may not last more than half a day, one car can be charging while the other is queued. And when the first complete, the second car can be charged without moving any cars.
- It is possible to install two keypads on a single Hydra. An example of this is one Hydra feeding EVSE's that are located on two floors of a parking structure; each floor has its own keypad located near the EVSE's on that floor.

Electrical Supply

- Always comply with all applicable electrical codes.
- Consider Sizing transformers, conduits and supply panels for future expansion.
- The Hydra chassis does not come with holes or knockouts for connecting the conduit. These must be cut during installation.
- Each EVSE requires its own branch circuit from the supply panel, of adequate current to continuously supply the EVSE at rated current. These are fed to the Hydra, through a meter and relay inside the Hydra, and then out to the EVSE's.
- Ideally, the first 5 EVSE's are fed from the bottom on the left side of the Hydra, and the second 5 from the bottom on the right side.
- The Hydra itself also requires one 120VAC 15A circuit to power itself.

- Since the EVSE current draw is continuous for long periods, size each EVSE breaker for greater than or equal to 1.2X the EVSE draw, or as required by electrical codes. And size the wire for the breaker size, not the EVSE draw. So for a 30A EVSE, use a 40 or 50 A breaker.
- If all the EVSE's are to be operated at the same time, size the breaker supplying all the EVSE breakers at least as large as the sum of all the EVSE draw times 1.2. If curtailment is implemented, size the breaker for 1.2X the maximum allowed current draw.
- The keypad module requires 13 low voltage conductors. They must be run in a separate conduit. Since the current in these wires is very small, any wire 22AWG or larger and 300 Volt or better will work. These wires should be labeled A, B, C, D, E, F, G, 12V, RED, GRN, SPK, 5V and GND at each end.

Mechanical

- The HYDRA measures 36-inches high, by 30-inches wide, by 9 inches deep and weighs approximately 100 lbs. There are 0.44 inch diameter holes for mounting in the four corner inside the cabinet back. See the illustration below.
- The quarter turn latches on the Hydra unit door can be opened with a slotted screwdriver. Optional key locks can be ordered from Liberty.
- There are no cutouts or knockouts provided on the Hydra. Holes for conduit must be cut by the installer.



Figure 2.0: Hydra Unit

The HYDRA Control Unit (HCU). In this installation, the supply is coming in on the left, the conduit to the keypad is on the left, and the conduit to the EVSE's is on the bottom.

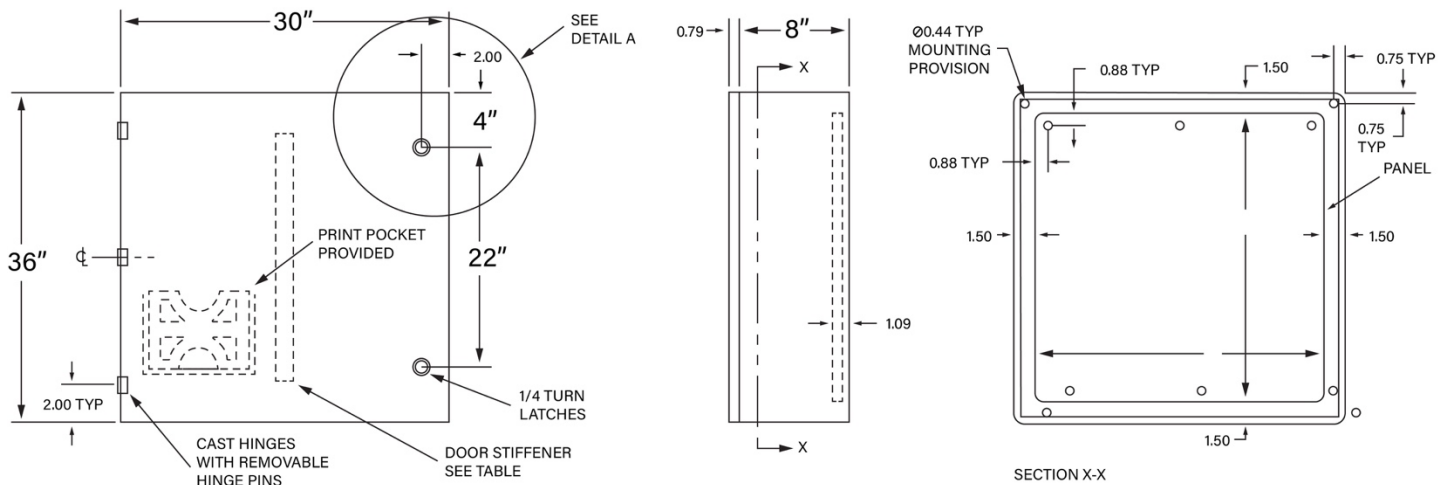


Figure 3.0: Enclosure Dimensions

Stall Marking and Signage

Some jurisdictions have mandatory or recommended signage and pavement markings for EV charging stations. Refer to California's 'Traffic Operations Policy Directive 13-01' as an example. As a minimum, the stalls should be marked with a sign on each stall, and pavement markings for each stall. If there are restrictions on times or vehicle types these should also be indicated at each stall.

The pavement in the stalls is commonly painted blue or green with a white EV charging symbol, and if there is a wall in front of the EV space that can be painted green or in other distinguishing ways to aid in identifying the spot.

Each EVSE needs to be marked with the EVSE number (1 thru 10) to uniquely identify each EVSE. If multiple HYDRA Control Units are installed then it may be wise to label them as well. It is also useful to identify each plug with the corresponding EVSE number to avoid confusion when the cables are crossed or tangled.

Instructions for the use of the system, and a phone number to call if there are problems should be displayed near the keypad. Signs indicating the location of the keypad can be helpful in installations where it is not obvious, or there are a larger number of EVSE's.

Following are examples of pavement markings and signage:



Photo 1.0: Parking Signage

Example of typical graphic for marking the pavement in the stall.



Photo 2.0: Parking Signage

Examples of signage for the parking stalls.



Photo 3.0: Parking Signage

Wayfaring sign on the street indicating the location of a nearby EV charging station.



Photo 4.0: Parking Lot Example

Shown is an installation with a dual pedestal mounted EVSE serving two parking stalls in a fleet charging application. The Hydra, keypad, and breaker panel are mounted strut channel on the wall near the EVSE.



Photo 5.0: Parking Lot Example

Shown is an installation accessible to the general public. Note the use of a bollard to protect the pedestal mounted EVSE. The keypad, Hydra unit, and breaker panel are mounted on strut channel against a chain link fence.

Installation Planning Checklist

General

- ☐ Use EVSE's with no "Cold Load Pickup", or disable it. See EVSE manufacturer's specifications.
- ☐ The Hydra is designed to be used with 40A Max, 32A continuous 240V Level 2 EVSE's.
- ☐ HYDRA can also control Level 1 (110v) EVSE and electrical outlets for use by EV drivers who wish to use their own charging cable.
- ☐ Provide cable management, such as a hanger or retractor.
- ☐ Provide protective bollards and wheel stops if appropriate
- ☐ Consider shelter for outdoor installations if the HCU is exposed to direct sunlight

Electrical Service

- ☐ One feed to the Hydra for each EVSE supported or planned. Circuit must accommodate full load for extended periods of time. Ideally coming in on the bottom of the Hydra.
- ☐ For the EVSE power, use only the two phases with 120 Volts to ground. ***Do not use the hi-leg of a mid-point grounded delta configuration.***
- ☐ One feed from the Hydra to each EVSE installed. Ideally, the first 5 EVSE's are fed from the bottom on the left side of the Hydra, and the second 5 from the bottom on the right side.
- ☐ Consider sizing the supply panel and conduits for future expansion.
- ☐ 120 VAC 15 Amp circuit for Hydra, from same panel as EVSE supplies. A neutral is required.
- ☐ Run conduit to Keypad module, or mount the Keypad module to Hydra.
- ☐ Communications require cellular reception at the Hydra, or DSL or Cable Internet connection, or a remotely mounted cellular antenna with conduit run for antenna cable and a box for antenna mounting.

Installation Location

- ☐ Mount the Hydra out of midday sun in hot climates.
- ☐ Provide clearance to open the door on the Hydra cabinet at least 90 degrees. The cabinet door can be hinged on either side.
- ☐ Provide adequate lighting.
- ☐ Adequate access to parking, EVSE, and Keypad for disabled persons.
- ☐ For public accessible installations:
 - ☐ Select locations that are easy to find.
 - ☐ Add wayfaring signage on nearby streets and driveways.
 - ☐ Consider time limits for use.

- ☐ For Multi-unit dwelling installations
 - ☐ Consider guest and visitor needs as well as tenant usage.

Signage

- ☐ Safety requirements
- ☐ Add wayfaring signage on nearby streets and driveways.
- ☐ Consider time limits for use.
- ☐ Mark the pavement at each parking place
- ☐ Add signs with instructions for use, and phone numbers for service

NOTES: