



# EVOLUTE

INTELLIGENCE BY EVdirect

SMART MULTI-USER EV CHARGING SYSTEM

POWERED WITH  
**EATON**  
TECHNOLOGY™

 **EVdirect**  
*Power up your parking*



The **EVOLUTE™** is a Smart Multi-User Electric Vehicle Charging System, designed and developed to address the unique challenges associated with deploying Electric Vehicle Supply Equipment (EVSE) in both new and existing Multi-User Residential Buildings (MURBs). Currently, the main challenges facing this sector are limited capacity, remote control, billing, and consumer freedom. While other systems address some of these issues, the Evolute is the only system that addresses all four. The Evolute's advantage over other systems is its agnostic charging station compatibility; this gives consumers full freedom of choice, while still providing an interactive app to control, monitor and pay for usage. The Evolute software includes a cloud-based dashboard for administrators and management, with tools for remote control, monitoring, billing, and account management.

**Cost of Infrastructure** – In a retrofit Condo, only owners tapping into the system will pay for it. The cost of a 20 or 32 vehicle system can be divided amongst all users. The Condominium can charge end-users a one-time connection fee that represents 1/20 or 1/32 of the cost of the supply and installation. In a new construction Condo, the cost per parking spot of the system represents a fraction of the potential sell price for an EV ready parking spot. In new and existing rental and commercial buildings, the corporation can charge substantial monthly fees in addition to the electricity consumption costs.

Evolute is designed, developed, and manufactured in North America using cutting edge innovation and technology.

**Powered with Eaton Technology, Intelligence by EVdirect**

## KEY FEATURES

### COMPATIBILITY



All Level II charging stations are compatible with the Evolute system, as well as all standard 250V receptacles, such as NEMA 14-50, 6-50 etc.

### LOAD MANAGEMENT



The Evolute's sophisticated algorithm can be pre-set or adjusted in the future to meet a variety of load sharing ratios and minimum acceptable standards. Typical multipliers include 2X, 3X and 4X existing available power and distributing it fairly over an 8-12hr period.

### SMART MULTI-METERING



Built-in individual smart meters track the usage of each owner's consumption as well as the entire system. The data is stored in a secure Canadian-based cloud server.

### TOTAL CONTROL



Owners and system administrators can access their data through a user-friendly desktop or mobile application. The Evolute App gives each owner full ON/ OFF control of their charging station from any device.

### SURGE PROTECTION - OPTIONAL



The entire system and downstream charging stations are protected from unwanted electrical surges that may occur in the building. Many buildings already have system wide protection.

### MONITORING + BILLING



The automated billing platform is seamless and easy to set up. The Evolute is flexible and can charge owners based on time-of-use or flat rate, depending on the building's preferences.

### SEAMLESS OPERATION



A dedicated internet connection drives the Evolute's communication. In the unlikely event that the building's internet goes down, charging and load management will be uninterrupted. Once restored, all data and billing info will be available to view.

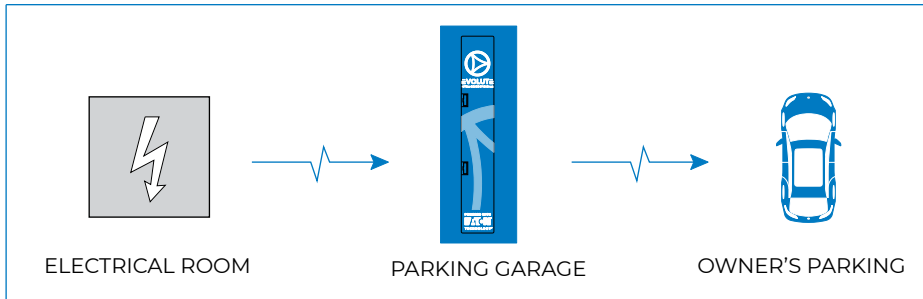
### NO CONTRACTS + FREE DATA



Data is free and always accessible to administrators and third-party billing companies at no extra cost.

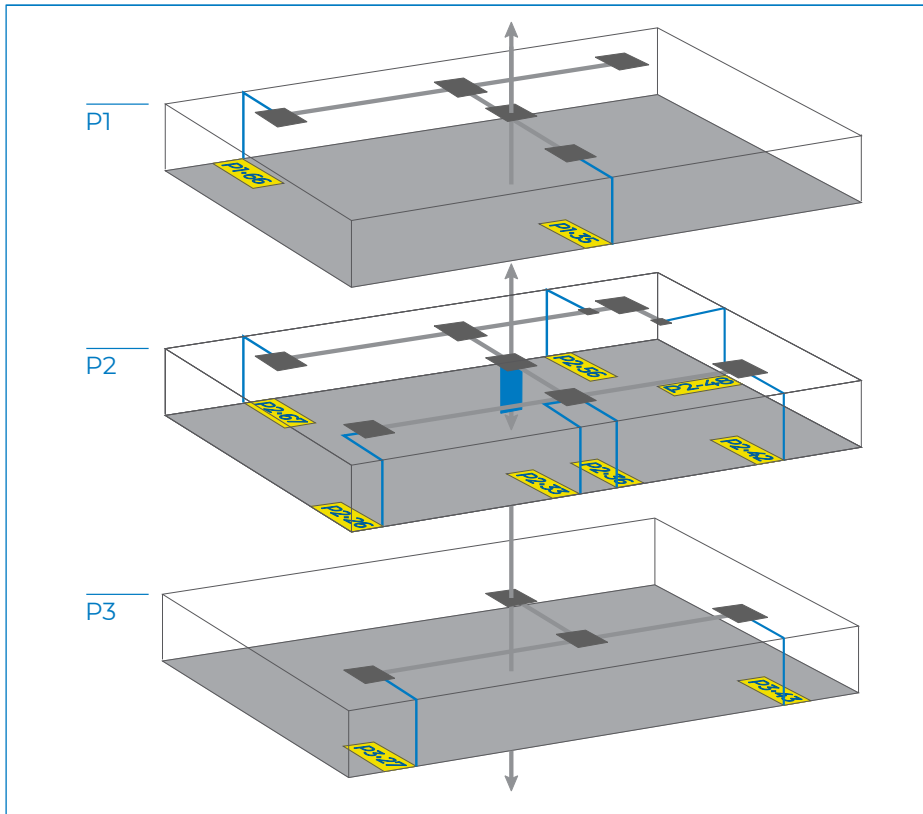
There are no contracts to sign and rates can be adjusted at any time.

# HOW IT WORKS



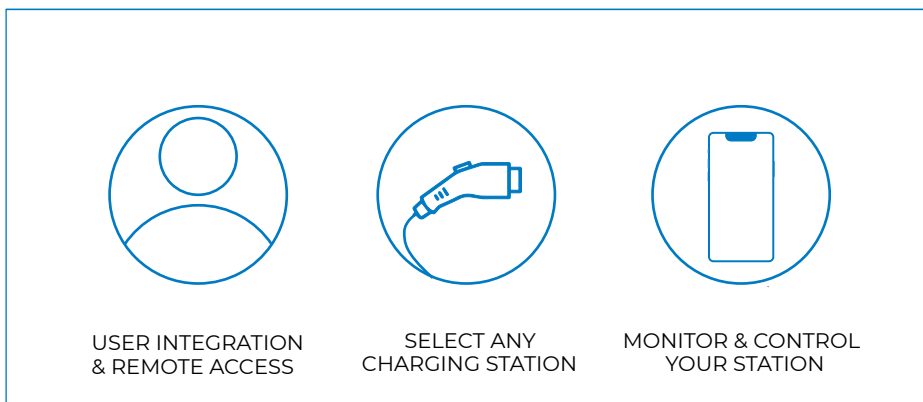
## SYSTEM FLOW

The **EVOLUTE™** is connected to the main switchboard in the main electrical room with a new or existing fused switch. All system components are installed in an unused corporate space in the garage, storage room or anywhere feasible.



## IMPLEMENTATION

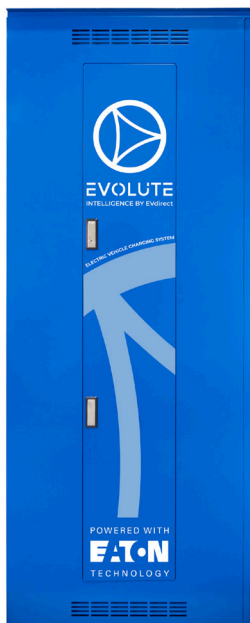
- Site visit and audit of electrical systems is arranged
- Proposal, load assessment, drawings and an estimate are given to the board
- Board meetings, Zoom meetings, and owner's meetings are scheduled
- Owner's survey is sent out to determine interest and adoption
- Interested owners provide parking spaces and specifics for a "Last Mile" estimate
- Management confirms all owners participating in initial bulk install
- EVdirect electricians begin the system and end-user installation
- System is energized, commissioned and inspected by ESA



## OWNER ACCESS

- On-boarding email received
- Account/passcode created
- Fees paid
- Station energized
- Charging begins

# EVOLUTE PRODUCTS



## EVOLUTE EVO-40042

### SPECIFICATIONS

400A, 42cct, 208Y/120V 3Ph 4W

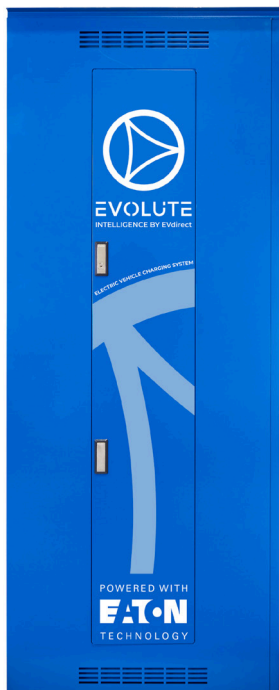
72"H x 28"W x 5.75"D

Main Lugs - Bottom Cable Entry

### HARDWARE/SOFTWARE - cUL/CSA

- Multi-Metering Module
- Breaker Control Bus
- Admin Dashboard
- Fixed CT Rails
- Ethernet Gateway
- End-user App

Max panel capacity vs Max active charging	20 CAR CAPACITY	Maximum Simultaneous Charging	
		Voltage / kW	
	208V	6.66kW	8.32kW
		40A Breaker	50A Breaker
When using a Step-down Transformer	75 kVA	10	6
	112.5 kVA	15	12
When using a Main Breaker @ 208-240V	200A	7	6
	250A	9	7
	400A	15	12



## EVOLUTE EVO-60072

### SPECIFICATIONS

600A, 72cct, 208Y/120V 3Ph 4W

90"H x 28"W x 5.75"D

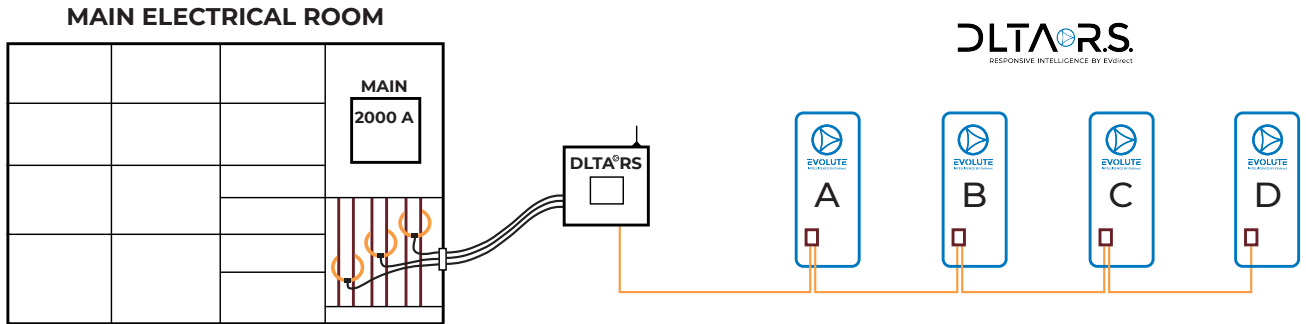
Main Lugs - Bottom Cable Entry

### HARDWARE/SOFTWARE - cUL/CSA

- Multi-Metering Module
- Breaker Control Bus
- Admin Dashboard
- Fixed CT Rails
- Ethernet Gateway
- End-user App

Max panel capacity vs Max active charging	32 CAR CAPACITY	Maximum Simultaneous Charging	
		Voltage / kW	
	208V	6.66kW	8.32kW
		40A Breaker	50A Breaker
When using a Step-down Transformer	112.5 kVA	15	12
	150 kVA	20	15
When using a Main Breaker @ 208-240V	400A	15	12
	500A	19	15
	600A	24	19

# DYNAMIC LOAD THROTTLING ARCHITECTURE<sup>®</sup> RESPONSE SYSTEM



## HOW DOES IT WORK

Dynamic Load Throttling Architecture Response System (DLTARS<sup>®</sup>) allows more charging stations to be installed than the peak capacity of the building can handle. DLTARS<sup>®</sup> monitors the main electrical service of the building and dynamically throttles down/up the Evolute's upper power limit during peak circumstances. All Evolute panels are networked together with Cat5 wiring, they communicate with each other, and throttle limits based on live active users. Once power in the building goes below the preset values, all Evolute panels will function normally.



### FUNCTIONALITY

A single master panel will communicate with any number of auxiliary panels to control their load shedding thresholds. Each panel, including the master panel, can still operate individually and separately from DLTARS<sup>®</sup> if desired. Additionally, panels do not need to be the same size or capacity, as the system will dynamically adjust load shedding limits based on each panel's preset configuration.



### LOAD SHEDDING ALGORITHM

The dynamic load shedding algorithm is based on the defined amps limit of the building. A soft current limit for the entire DLTARS<sup>®</sup> system is then set at 80% of this building limit. Furthermore, the load shedding limit for each individual panel will begin to lower exponentially after monitored building current is seen exceeding 85%\*\* of the soft limit (\*\*percentage subject to change). Finally, the logic will dynamically adjust individual upper load limits based on each panel's load capacity and active users.



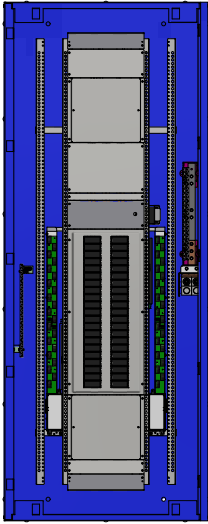
### FRONTEND CONTROL

DLTARS<sup>®</sup> can be activated and controlled from the Evolute web-app. Here, the max amps that a building is rated for can be set for determining the dynamic load shedding thresholds mentioned previously. Toggles for turning on and off the system for all or individual panels can also be switched to tailor the system for each building implementation.

## WHEN TO IMPLEMENT THE DLTARS<sup>®</sup> SYSTEM

The DLTARS<sup>®</sup> system can be installed at the same time as the Evolute panel installation or later as a retrofit. Hardware and software components can be added at any time. The same applies for the interconnected wiring, it can be added at any point that makes sense for both existing and new construction applications. DLTARS<sup>®</sup> should be implemented when there is a concern that the existing power within a building will not be sufficient for demand based on peak values.

# EVOLUTE INTELLIGENT SOFTWARE



The Evolute's load shedding algorithm is the primary focus of the panel's functionality. The panel will cycle through users over a predefined cycling time, permitting a limited number of vehicles to charge at any given time. However, all actively charging vehicles will not be throttled to a lower current limit, and will instead allow for maximum current flow in exchange for fewer active loads. The number of vehicles permitted to charge is based on a preset upper current limit for each phase of the panel, where this threshold will not be exceeded.

Each Evolute has a certain amount of power allocated to it for EV charging, typically this power is enough to allow half, a third or a quarter of the total connected cars to charge simultaneously. When the upper power limit is reached, the next car that comes to charge will be placed in a queue, and 2 parameters must be met before that car will start charging; 1) Is the car requesting power? 2) Have connected cars achieved a pre-established initial block of energy? If the answer is Yes to both, the car that started charging first, in relation to all other cars, will be removed from the power, allowing the new car to start charging. The new car will have an opportunity to achieve its block of energy before it is removed, if need be. The car that was removed now enters its queue for sharing. Cars will be rotated around in this way throughout the charge cycle of 8 to 12 hours, ensuring that all cars receive a minimum of 50% of the total charge cycle. Cars will remain connected and charging if the upper limit of each panel is not reached and will only drop off when the battery is full, or the owner disconnects their car.



## PROGRAMMABLE LOGIC CONTROLLER

The PLC controls all aspects of the panel's automated functionality. It is connected via ethernet connection to the meter to receive data about power usage throughout the panel. It then uses this information for managing what breakers are enabled or disabled at a given time, while gradually cycling through users based on the implemented load shedding algorithm and current user configurations. The PLC also receives commands from the frontend control allowing loads to be remotely controlled and monitored



## GATEWAY

The Gateway is a separate device, isolated from the main Evolute panel, and connected via another ethernet connection. It serves as the primary link between the PLC and the Evolute cloud server. This server connection allows for data from the panel to be stored in the cloud and accessed remotely by users. The gateway also has local storage to prevent data loss during internet or power outages. Additionally, the Gateway allows for user control to be passed from the user webapp to the PLC.



## SOFT BREAKER IMPLEMENTATION

To avoid overcurrent scenarios and tripping the physical thermal breaker, software-based breakers have been implemented to control automatic disabling of the remote-controlled breakers. In the event that a breaker is automatically disabled, an email alert is sent to the support team. Once the issue has been resolved the breaker can be turned on remotely by a superuser. By default, these soft breakers are set to be triggered if the detected current through a given breaker exceeds 5% of its upper limit. In the case where a 40A breaker installed, the breaker is disabled if readings exceed  $32A + 5\%$ . The 5% threshold can be adjusted depending on the scenario.

## APPLICATION VISUALIZATIONS



## CONTACT US TODAY

416.635.6854 | 1.855.EVOLUTE | info@EVdirect.ca | EVdirect.ca | Evolute.ca