

# LVD20 Series

## Low Voltage Disconnects



**Solid-state high current low voltage disconnects with over current shutdown protection.**

### Technical Description

InPower's Model LVD20 Series *Low Voltage Disconnects (LVD)* automatically disconnects 12 volt loads from the battery when the battery voltage drops below a critical level, leaving enough charge for the vehicle to be restarted.

The LVD contains a solid-state disconnect switch that is rated for 100, 150 or 200 amps, and provides automatic fault shutdown protection for over current, short circuit, high temperature and loss of ground conditions. When the fault is cleared the control input voltage must be removed and re-applied to activate the disconnect switch.

When positive voltage is applied to the control terminal, the disconnect switch turns on, applying battery voltage to its load output. When the disconnect switch is on, its controller monitors the battery voltage at its battery terminal. When the battery voltage drops below 11.5 volts for 60 seconds\* the disconnect switch turns off, removing power from its load terminal. This removes the power draw on the battery. When the battery has been recharged and the battery voltage exceeds the shut off preset voltage the disconnect can be manually re-actuated by removing the control input voltage and re-applying it, though an automatic turn on may be custom programmed.

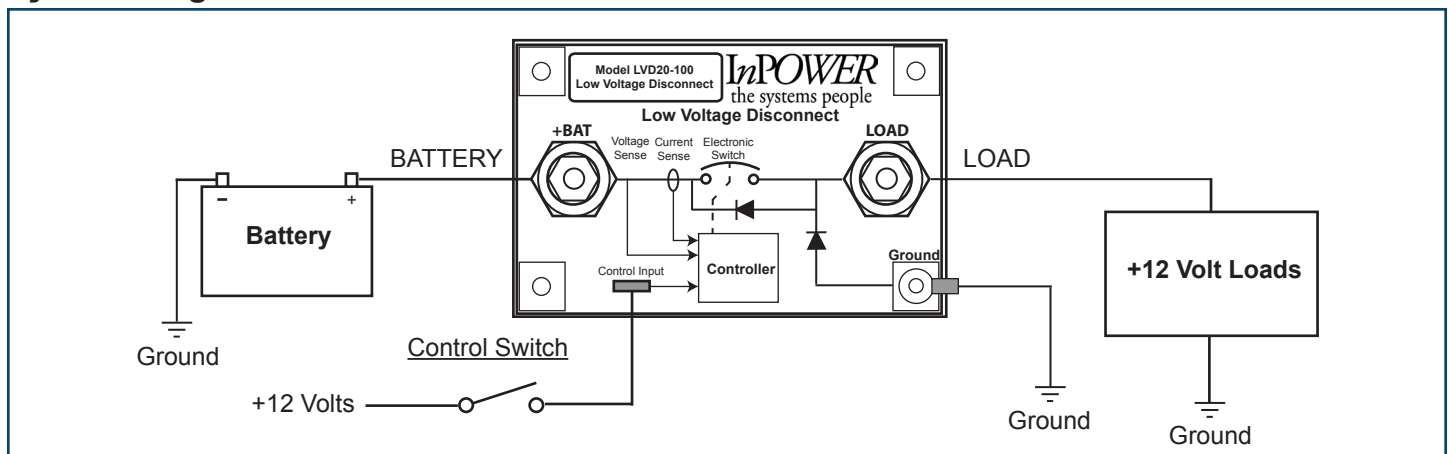
The low voltage disconnects are sealed and packaged in an anodized aluminum case. Four corner mounting hole pads provide the required connection to ground. The control input utilizes a ¼ inch Faston blade terminal. Connections for the high current DC cable utilize ⅜"-16 threaded stainless steel studs with brass contact pads for low contact resistance.

\* other voltage and time set points and functions may be customized. Please call InPower for more details at (740) 548-0965.

### Key Features

- Prevents excessive battery discharge by automatically disconnecting loads.
- 100% solid-state design - No moving parts to cause arcing and electrical noise.
- Automatic shutdown protection for short circuit, over current, loss of ground and high temperature.
- Sealed construction is resistant to mechanical shock and vibration.
- Compact size and low profile.
- Protective Terminal Boot Option

### System Diagram



### Specifications for Select Models

Maximum Current Rating:	<u>LVD20-100-SPC48</u> 100 Amps	<u>LVD20-150-SPC58</u> 150 Amps	<u>LVD20-200-SPC49</u> 200 Amps
Operating Voltage Range:	+9.5 to +18.5 volts		
Shut-Off Voltage:	<11.5 Vdc		
Shut-Off Time Period:	60 Seconds		
	The disconnect switch will shut off when the battery voltage remains below 11.5 volts for 60 seconds. To reset and activate the disconnect switch the control input voltage must be removed and re-applied.		
Control Input Voltage:	>9.5 volts to activate; <8.5 volts to deactivate.		
Control Terminal:	0.250 Inch male push-on blade terminal		
Power Terminals:	Two 3/8 - 16 threaded stainless steel studs, with locking nuts.		
Fault Shutdown Reset:	For over current, short circuit, over temperature or loss of ground shutdowns the fault must be cleared, then the control input voltage must be removed and re-applied to activate the disconnect switch.		
Weight:	0.40 lbs (0.181 kg)		
Dimensions:	2.85 (72.29 mm) x 4.35 (110.49) x 1.10 inches (27.94 mm)		
Status LED Indicator:	On steady when disconnect switch is on. Flashes during fault or low voltage shut down. Off when disconnect switch is off.		
Fault Shutdown Conditions:			
Over Current:	100% to 110% of rated amperage for 500 milliseconds		
Loss of Ground:	250 milliseconds		
Maximum Temperature Trip:	Case Temperature > 185° F (85° C)		

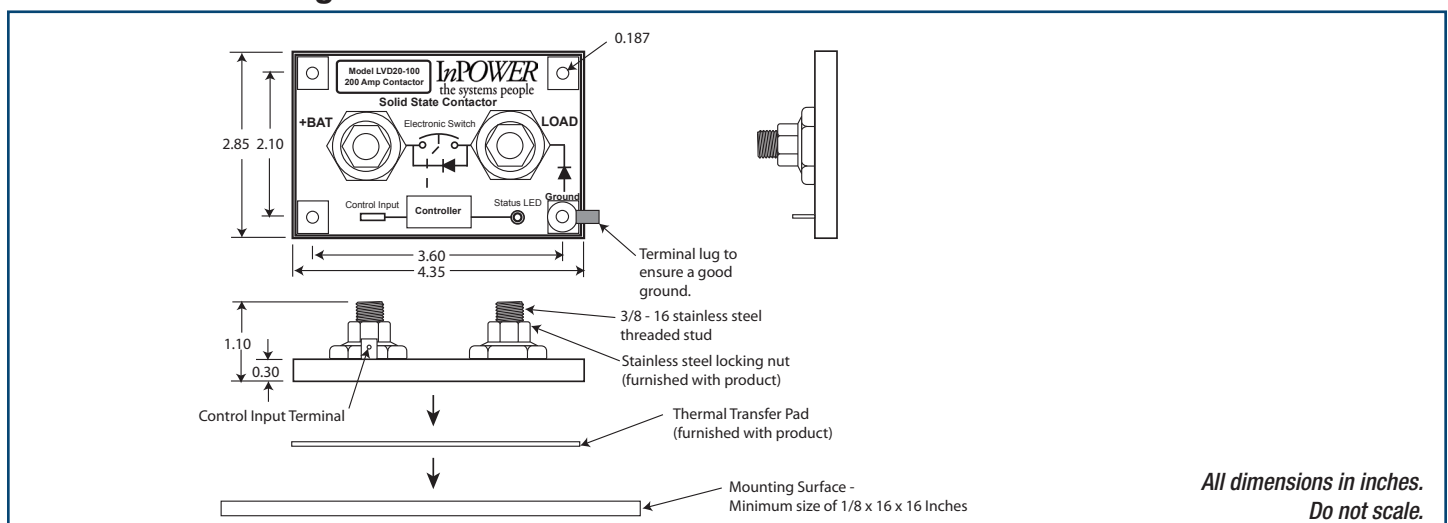
### Product Customization

LVD20 Series *Low Voltage Disconnects* can be customized to meet your exact specifications. Typical modifications include changes to the low voltage setpoint, low voltage shutdown timer and disabling the control input for completely automatic operation. Contact InPower for more details at (740) 361-8920.

### Ordering Guide for Select Models

<u>Model</u>	<u>Description</u>
LVD20-100-SPC48	Low Voltage Disconnect, 100 Amp
LVD20-150-SPC58	Low Voltage Disconnect, 150 Amp
LVD20-200-SPC49	Low Voltage Disconnect, 200 Amp

### Mechanical Drawing



# VCM-12 Series

# Vehicle Control Module

## VCM-12 Low Voltage Disconnect



### Key Features

- Voltage >13.25 - Output On
- Voltage <12.8 - Output Off After Shut Off Time Delay
- Voltage <11.8 - Output Instant Off
- 12 Volt 20 Amp Solid State Output
- Over Current Fault Shutdown Protection
- 4-Wire Terminal Configuration
- Compact Size
- Durable Metal Case

### Ordering Guide

Model	Shut Off Timer Value	Model	Shut Off Timer Value
VCM-12-1-60MF	60 Minutes Fixed	VCM-12-1-05MF	5 Minutes Fixed
VCM-12-1-01MF	1 Minute Fixed	VCM-12-1-02H	2 Hour Fixed
VCM-12-1-03MF	3 Minutes Fixed		

InPower's VCM Series *Vehicle Control Modules* are a set of tools for the designers of vehicle electrical control systems. Made to withstand the environments typically found on trucks, emergency vehicles, buses, coaches and speciality vehicles, these modules are available in a variety of standard and custom configurations and functions.

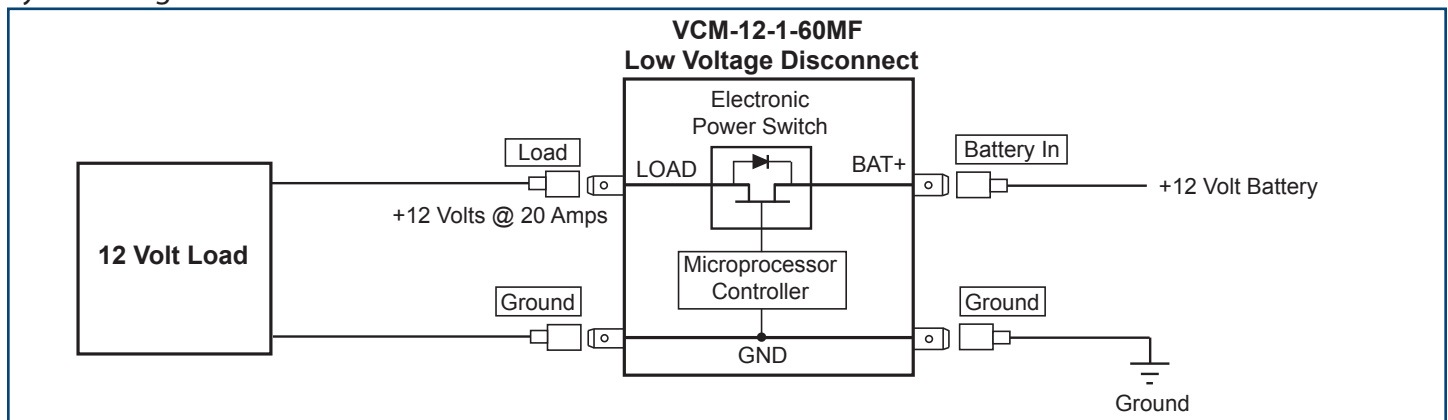
### Technical Description

InPower VCM-12 Series are solid state low voltage disconnects for 12 volt vehicle applications. Their 4-wire terminal configuration allows easy installation with two-conductor power cables typically used with 12 volt power point supplies. VCM-12 LVDs protect against draining the battery when the engine is not running by automatically disconnecting loads when the battery voltage reaches a critical level.

The LVD modules contains a microprocessor controller and a solid state 20 amp power switch for powering the output loads. The output provides over current fault shut down protection. The LVD continuously monitors the voltage level of the 12 volt power input. When the voltage is above 13.25 volts, the power switch will turn on to supply up to 20 amps on the output terminal to power the loads. If the voltage drops below 12.8 volts, a timer is started. If the voltage remains below 12.8 volts until the timer expires, the power switch will turn off, disconnecting the power to the loads. If the voltage drops below 11.8 volts with the timer running, the power switch is shut off immediately. Any time the input voltage increases to above 13.25 volts, the power switch will turn on to supply power to the loads and the timer will be reset.

See the ordering guide for standard models. Please call if you require other time values.

### System Diagram



### Specifications

Power Input (BAT+): +8 to 16 Vdc @ 20 amps  
 Module Output (LOAD): +12 volts @ 20 amps, with over current fault shutdown protection

Output Disconnect Operation:  
 Input voltage >13.25 - Output on  
 Input voltage <12.8 - Output off after the shut off timer expires\*  
 Input Voltage <11.8 - Output instant off

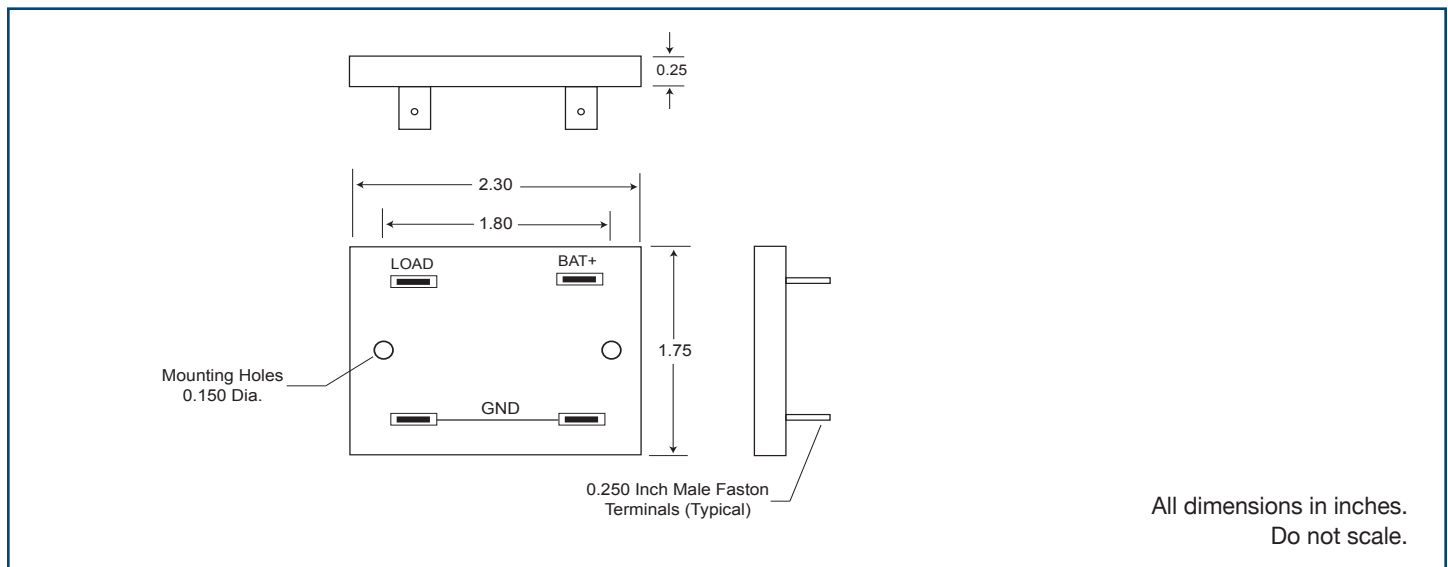
**Mechanical**  
 Weight: 0.10 lbs.  
 Operating Temperature: -40° C to +85° C  
 Dimensions: 1.75" H x 2.30" W x 0.65"

\* Time value per model number suffix:  
 VCM-12-1-60M 60 minutes fixed  
 VCM-12-1-05M 5 minutes fixed

### Installation

1. We recommend that the module be installed by a person trained and skilled in vehicle electrical systems. The installation should comply with SAE (Society of Automotive Engineers) and the vehicle manufacturer's electrical wiring procedures (e.g. Ford, General Motors, etc.).
2. The module should be installed on the inside of the vehicle in a dry and protected environment.
3. For optimum power output performance the product should be mounted to a metal surface.
4. Do not connect loads to the output that will exceed the output current rating of the module.
5. The 12 volt power input must be from a properly fused +12 volt power source.
6. Wiring must be of the proper gage and type to handle the intended load currents.
7. We recommend the use of insulated 1/4 inch female blade terminals that connect to the terminals on the module. Be sure to properly crimp these terminals. **Do not solder wires directly to the module terminals.**
8. If you are experiencing problems with the installation or need troubleshooting assistance, contact InPower Customer Service at 740-548-0965.

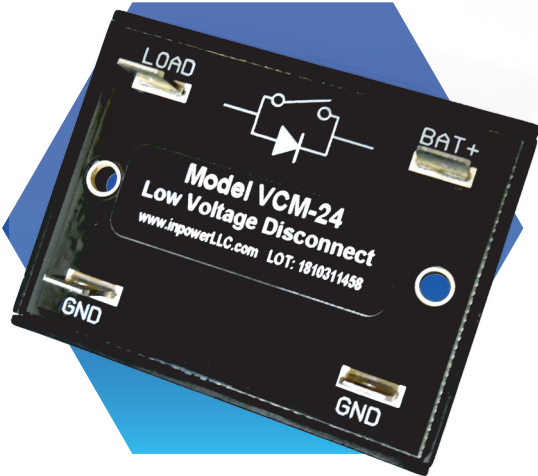
### Mechanical Drawing



# VCM-24 Series

# Vehicle Control Module

## VCM-24 24 Vdc Low Voltage Disconnect



### Key Features

- Voltage >26.5 - Output On
- Voltage <25.6 - Output Off with Time Delay
- Voltage <23.6 - Output Instant Off
- 24 Volt 10 Amp Solid State Output
- Over Current Fault Shutdown Protection
- 4-Wire Terminal Configuration
- Compact Size
- Durable Metal Case

InPower's VCM Series Vehicle Control Modules are a set of tools for the designers of vehicle electrical control systems. Made to withstand the environments typically found on trucks, emergency vehicles, buses, coaches and speciality vehicles, these modules are available in a variety of standard and custom configurations and functions.

### Technical Description

InPower VCM-24 Series are solid state low voltage disconnects for 24 volt vehicle applications. Their 4-wire terminal configuration allows easy installation with two-conductor power cables typically used with 24 volt power point supplies. VCM-24 LVDs protect against draining the battery when the engine is not running by automatically disconnecting loads when the battery voltage reaches a critical level.

The LVD modules contains a microprocessor controller and a solid state 10 amp power switch for powering the output loads. The output provides over current fault shut down protection. The LVD continuously monitors the voltage level of the 24 volt power input. When the voltage is above 26.5 volts, the power switch will turn on to supply up to 10 amps on the output terminal to power the loads. If the voltage drops below 25.6 volts, a timer is started. If the voltage remains below 25.6 volts until the timer expires, the power switch will turn off, disconnecting the power to the loads. If the voltage drops below 23.6 volts with the timer running, the power switch is shut off immediately. Any time the input voltage increases to above 26.5 volts, the power switch will turn on to supply power to the loads and the timer will be reset.

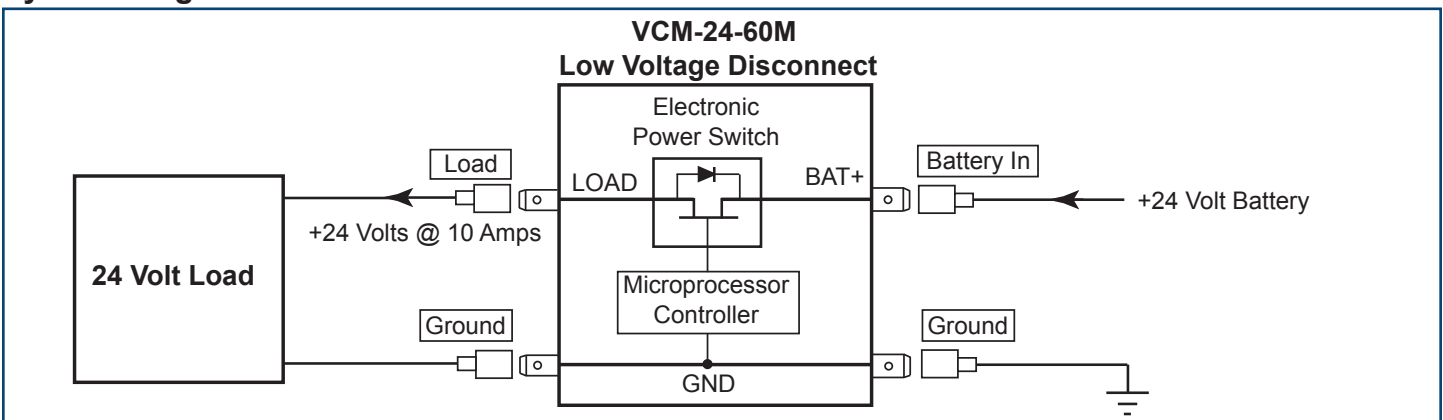
See the ordering guide for standard models. Please call if you require other Time Values or Voltage Thresholds.

### Ordering Guide

Model*	Shut Off Timer Value	Model	Shut Off Timer Value
VCM-24-60M	60 Minutes	VCM-24-05M	5 Minutes
VCM-24-01M	1 Minute	VCM-24-02H	2 Hour
VCM-24-03M	3 Minutes		

\*Programmable Voltage Thresholds also Available

### System Diagram



## Specifications

Power Input (BAT+): +8 to 32 Vdc @ 10 amps  
 Module Output (LOAD): BAT+ volts @ 10 amps, with over current fault shutdown protection

Output Disconnect Operation:  
 Input voltage >26.5 - Output on  
 Input voltage <25.6 - Output off after the shut off timer expires\*  
 Input Voltage <23.6 - Output instant off

**Mechanical**  
 Weight: 0.10 lbs.  
 Operating Temperature: -40° C to +85° C  
 Dimensions: 1.75" H x 2.30" W x 0.65"

\* Time value per model number suffix:  
 VCM-24-60M 60 minutes  
 VCM-24-05M 5 minutes

## Installation

1. We recommend that the module be installed by a person trained and skilled in vehicle electrical systems. The installation should comply with SAE (Society of Automotive Engineers) and the vehicle manufacturer's electrical wiring procedures (e.g. Ford, General Motors, etc.).
2. The module should be installed on the inside of the vehicle in a dry and protected environment.
3. For optimum power output performance the product should be mounted to a metal surface.
4. Do not connect loads to the output that will exceed the output current rating of the module.
5. The BAT+ power input must be from a properly fused power source.
6. Wiring must be of the proper gage and type to handle the intended load currents.
7. We recommend the use of insulated 1/4 inch female blade terminals that connect to the terminals on the module. Be sure to properly crimp these terminals. **Do not solder wires directly to the module terminals.**
8. If you are experiencing problems with the installation or need troubleshooting assistance, contact InPower Customer Service at 740-548-0965.

## Mechanical Drawing

