



ThinkRF P120

Vehicular Power Conditioner

User Guide

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Read this warranty carefully before you use the product.

ThinkRF P120 Vehicular Power Conditioner are warranted for workmanship and materials for a period of one (1) year from the date of shipment as identified by the Customer's packing slip or carrier waybill. ThinkRF reserves the right to void the warranty on any equipment that has been altered or damaged due to Customer negligence, unauthorized repair, misuse of equipment, evidence of physical or environmental damage, transportation abuse or removal of any ThinkRF identification labels or serial numbers.

It will remain the responsibility of the Customer, having obtained a Return Material Authorization (RMA) and shipping instructions from ThinkRF, to return, at the Customer's expense, the defective unit to ThinkRF's repair facilities. ThinkRF will incur shipping charges for the return of warranty repaired equipment. The RMA number can be secured by contacting ThinkRF Customer Service and Support (support@thinkrf.com). If the product does not fall within ThinkRF's warranty period or the product is found to be functioning as designed, then under the terms of ThinkRF's warranty policy, all costs of repairs and shipping will be charged directly to the Customer. ThinkRF will warrant repaired units for a period of 90 days from date of shipment from ThinkRF to the Customer. If the remaining period on the original hardware warranty is greater than 30 days, then ThinkRF will honor this remaining warranty period.

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Preface

This preface describes the audience for, the organization of, and conventions used in this document. It also identifies related documentation and explains how to access electronic documentation.

Audience

This document is written for technical people who have basic understanding, familiarity and experience with test and measurement equipment.

Conventions

This section describes the conventions used in this document.

Grayed-out Font

Indicates a command or a feature is not yet available in the current release.

Courier Font

Illustrates this is an example for a command or a concept.

Light Blue Font

Contains hyperlink to the referenced source that can be clicked on.

Normal Bold Font

When used within a sentence or a paragraph, it emphasizes an idea to be paid attention to particularly.

Red Font

Conveys special information of that section.



Note: This symbol means **take note**. Notes contain helpful suggestions or references to additional information and material.



Caution: This symbol means **be careful**. In this situation, you might do something that could result in equipment damage or loss of data.



Warning: This symbol means **danger**. You are in a situation that could cause bodily injury. Before you work on any equipment, be aware of the hazards involved with electrical circuitry and be familiar with the standard practices for preventing accidents.

Obtaining the Latest Documentation

Please visit our website's resource page at <http://www.thinkrf.com/resources/> to obtain the latest documentation.

Document Feedback

Please send your comments about this document or our other documentation to support@thinkrf.com.

Thank you, we appreciate your comments.

Obtaining Technical Assistance

For all customers who hold a valid end-user license, ThinkRF provides technical assistance 9 AM to 5 PM Eastern Time, Monday to Friday. Please send your technical support request through <http://www.thinkrf.com/support/>.

Before contacting Support, please have the following information available:

- P120 serial number and product version, which are located on the product's identification label.

For any other information, contact ThinkRF at:

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Overview of P120

ThinkRF P120 is a small form factor Vehicular Power Conditioner (VPC) product, designed to provide a regulated and stable +12VDC ($\pm 5\%$) 36W power source to electrical equipments, including ThinkRF RTSA products, employed in a vehicular environment. The VPC is design to protect the equipment from vehicular power transients.

The P120 outputs a single regulated +12VDC under different input voltages ranging from +8V to +32V, but can easily be modified for different output voltages (contact ThinkRF for alternatives). The inputs and outputs are provided via strain-relieved 16 AWG cables with 2-pin ML-XT Molex connectors. The product has been tested to meet high and low temperature requirements, shock, and vibration based on MIL-STD-PRF-28800.

Setting Up the P120

Ensure that you read and understand the following information about safety and electrostatic discharge before you unpack and set up the P120.



Warning: Read the installation instructions before you connect the product to its power source.

Preventing Electrostatic Discharge Damage

Electrostatic Discharge (ESD) is a single-event, rapid transfer of electrostatic charge between two objects, such as an operator and a piece of electrical equipment. ESD can occur when a high electrostatic field develops between two objects in close proximity. ESD occurs when electronic components are improperly handled and is one of the major causes of device failures in the semiconductor industry. Always follow the steps in this document to prevent ESD.



Warning: Never open the P120 casing as personal injury may result and opening the casing will void the warranty. There are no user-serviceable parts inside. Always contact ThinkRF support for service through the online support form at <http://www.thinkrf.com/support/>.



Caution: Do not touch any exposed contact pins with bare hands, nor touching the two exposed leads from a cable together when an active power source is running through the

setup. If cables are connected at one end to an active power source only, do not touch the exposed pins at the unconnected end of the cable.

Unpacking the Box

The following table lists the items that come with your P120 package. If any of the items in the Purchase Order are missing or damaged, please contact your ThinkRF customer service representative.

P120 Shipping Box Contents:

- P120 Vehicular Power Conditioner

Accessories, box items vary depending on your Purchase Order:

- 4' Car Cigarette Lighter Plug to Female ML-Xt Plug **Power In** Cable
 - 12' Loose Leads, Stranded Solder to Female ML-Xt Plug **Power In** Cable
 - 4' Male ML-Xt to LEMO Plug **Power Out** Cable
 - 4' Male ML-Xt to Barrel-Type Plug **Power Out** Cable
-

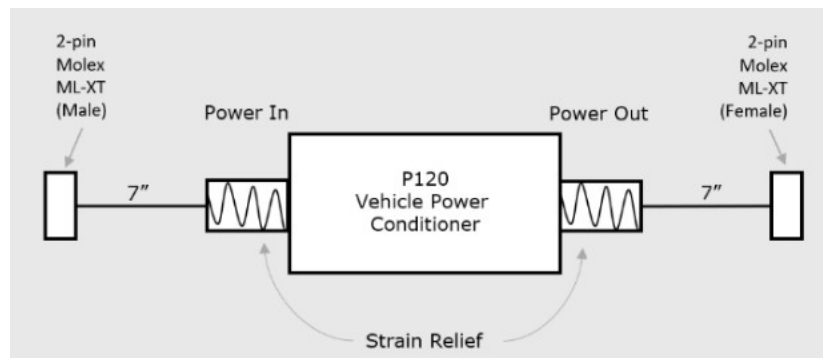


Note: All the accessory cables are intended to be used with P120 only. Using the cables in manner not intended for P120 or as described in this document will risk voiding the warranty or any liability from ThinkRF.

Getting Familiar with the P120

This section provides information about the P120, the identification label, and the associated P120 mating cables.

P120 Vehicular Power Conditioner Unit



As shown in the images above, the P120 box consists of:

- 7" 16 AWG strain relief cables, one on each end of the P120 box;
- a male ML-XT receptacle connector at the Power Input cable end;
- a female ML-XT plug connector at the Power Output cable end;
- a label on the P120 box that provides a clear indication of the input and output, along with the serial number (S/N) needed for support service should that be required.

The rugged ML-XT connectors, designed for critical vehicle wiring, provide a tightly sealed connection to their mating counterparts.



Note: The ML-XT connectors have a wedgelock attached to secure the pins, and particularly conceal the exposed the pins on the female plug. DO NOT remove these wedgelocks.

Power Input Cables

On the power input end of the P120, there are two cable options as mentioned below. Follow [Connecting P120 and Cables](#) section for the proper instructions on putting together the cables.

4' Cigarette Lighter Plug to Female MX-LT Connector Cable

The 4' 16 AWG cigarette lighter plug to female ML-XT Plug cable allows users to conveniently make use of a car cigarette lighter receptacle (also known as 12V socket port) to provide the required voltage to the P120.



Warning: DO NOT connect this 12V source from the car directly to the 12V port of any electrical equipment (such as RTSAs) in any way without using the P120. The voltage output from the 12V socket will fluctuate, potentially causing damage to the equipment.



12' Loose Leads, Stranded Solder to Female MX-LT Plug Cable

As shown in the following picture, this Power Input cable consists of Red and Black loose leads, stranded solder attached to a 12' 14 AWG cable, which is then terminated with a Female Molex ML-XT Plug. This cable allows user to attach to any power source that meets the output power range specified in P120 Datasheet. Some examples of such source are a car battery or a programmable DC power supply.



Power Output Cables

Similarly, on the Power Output end, the following cables are available. They can be used to connect to a ThinkRF R5700, RTSAs or your equipment.

4' Male MX-LT Connector to LEMO Plug Cable

The 4' male MX-LT connector to LEMO 2B plug 14 AWG cable connects the Power Output of the P120 unit to electrical equipment, such as ThinkRF R5700, that has a LEMO receptacle as its Power Input port. The push-pull self-latching LEMO plug of type 2B provides a secure connection to its mating connector against vibration, shock or pull on the cable. Along with the rugged MX-LT, such cable setup is necessary in a mobile setting.



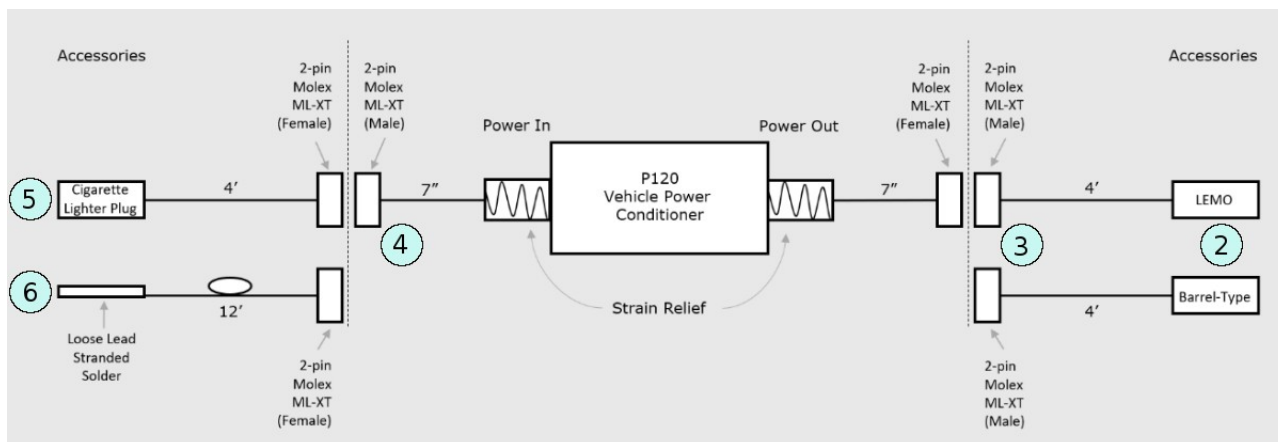
4' Male MX-LT Connector to Barrel-Type Plug Cable

The 4' male MX-LT connector to Barrel-type plug 14 AWG cable connects the Power Output of the P120 unit to electrical equipment with Barrel-type receptacle Power Input port, such as ThinkRF RTSA products.



Connecting P120 and Cables

Follow the steps in this section to connect the P120 and the cables. The diagram below illustrates the setup steps, starting from right to left. The circled numbers shown in the diagram refer to the particular steps of the setup instruction.



As mentioned before, there is a choice of Power Input cables terminated with either a vehicle cigarette lighter plug or two loose leads stranded solder. The Power Output cable choices depend on the equipment's power port type, LEMO or Barrel type. Use the appropriate cables for your setup.

1. Before connecting the P120 output to an equipment or RTSA, verify the power source to be applied to the P120 is indeed within **+8V to +32V DC range**. If possible, do not turn on the power source nor the equipment until the complete connection is established.



Caution: Do not supply an input voltage level **exceeding +32VDC** or an input current level **exceeding 8.0A** to the P120. Exceeding either of these limits can cause serious damage to the device.

2. Connect the Power Output cable with either LEMO or Barrel-type plug to the mating connector on the equipment side. For examples:
 - to connect to the ThinkRF R5700, attached the Power Output cable with the LEMO plug to its receptacle on the R5700;
 - similarly, connect the Barrel-type plug cable to 12V power port on the R5500.
3. Attach the male MX-TL connector of the Power Output cable to the female MX-TL connector on the P120's Output end.
4. Connect the male MX-TL connector on the P120's Input end to the female MX-TL connector of the Power Input cable. Then follow either Step 5 or Step 6, depending on the Power Input cable used.
5. If the *Power Input cable with cigarette lighter plug* is used, plug the lighter connector into the vehicle cigarette lighter port.

Setting Up the P120

6. If the *loose leads stranded Power Input cable* is used, **first** connect the **black** lead of the cable to the ground terminal of the power source. Then, connect the **red** lead of the cable to the positive terminal of the power source.



Caution: This connection order is important to prevent accidental damage to equipments and injury when touching of the two leads together to the positive power source.

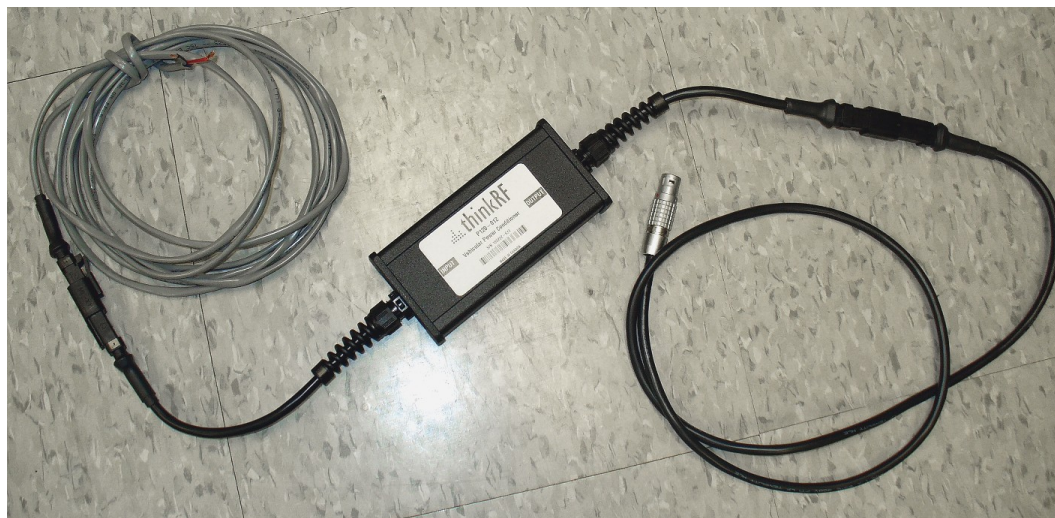
7. Now the power source and then the equipment could be turned on.

To disconnect, first power off the equipment and then the power source (if possible).



Caution: If the Power Input cable with *loose leads* is used, **first remove the red lead, follow by the black lead**. Again, this disconnection order is important.

The next figure is an example setup of the P120 with loose lead stranded at the input end and LEMO connector at the output.



Operation Consideration and Maintenance

The P120 should be operated only within its specified operating temperature range of 14 to 131°F (-10 to 55°C). The unit should be store within its specified non-operating temperature range of -40 to 160°F (-40 to 71°C).



Caution: Do not expose the device to water in any condition or operate in prolong high humidity environment, as doing so might result in personal injury due to electrical shock as well as damage to the device.

Some regular maintenance is needed to maintain the unit in its good working state. This includes cleaning the connector contacts from time to time in a safe manner to eliminate any dust or debris collected. When performing such maintenance duty, do not have any cables or P120 connected to a power source.

Hardware Reference

This section provides physical and electrical specifications, and connectors reference for the P120.

P120 Specifications

The following table outlines the physical and electrical specifications for the P120 unit only, with no other cables attached.

Description	Design Specification
Dimensions (W x L x H)	5.16 x 2.44 x 1.34 in. (13.1 x 6.2 x 3.4 cm)
Weight (approximately)	~340g or 12 oz
Input port	Molex Male 2-pin MX-LT
Output port	Molex Female 2-pin MX-LT
Input supply voltage	+8 to +32 VDC
Input supply current	8.0 A maximum
Output supply voltage	12 VDC $\pm 5\%$
Output power	36 Watts
Operating temperature	14 to 131°F (-10 to 55°C)
Storage temperature	-40 to 160°F (-40 to 71°C)

Connectors Reference

This section provides source links to the P120 related connectors for references.

LEMO Plug Connector

For more information on the LEMO plug of type 2B, see LEMO's site:
<https://www.lemo.com/en/products/low-voltage-connector/b-connector>

Molex Connectors

For more information on the Molex 2-pin ML-XT sealed connectors, see Molex's site:
https://www.molex.com/molex/products/family?key=mlxt_sealed_connection_system

Document Revision History

This section summarizes document revision history.

Document Version	Release Date	Revisions and Notes
v1.0	May 15, 2018	First release
V1.1	Mar 6, 2019	Typo Correction
