CPAT FLEX

user manual

IRXP
Portable Ingress Digital Receiver

Please direct all questions to your local CPAT Flex sales office representative, or distributor, or contact CPAT Flex technical support at: www.cpatflex.com.

IRXP User Manual

First edition (v1.0): September 2021
Second edition (v1.1) July 2024

Part No. 100-00012-001

Published by: CPAT Flex
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www.cpatflex.com

Contents

1. GENERAL INFORMATION

1.1 About this Manual

This manual describes the components, installation, and operation of the CPAT Flex IRXP unit.

You will find important safety information in this manual. We strongly recommend that all users read this manual. Use of this product other than for its intended application may compromise the unit's safety features.

1.2 Certification

This section describes the certifications that the IRXP complies with.

1.2.1 EMC Compliance

FCC Part 15 Subpart B (2019)
ICES-001 - Issue 5(2020)
CISPRE11(2015) A1(2016) and EN61326-1(2013)
EN61326-1(2013)

1.2.2 Safety Compliance

5,2 Classification of Electrical Energy Sources
UL/CSA/IEC 62368-1 EN 62368-1

1.2.3 Note

This device may not cause harmful interference.
This device must accept any interference received, including interference that may cause undesired operation.

NOTE
This equipment has been tested and found to comply with the limits for a Class B digital device, according to Part 15 of the FCC Rules. These limits are designed to offer reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can emit radio frequency energy. Failure to install and use it according to the instruction manual may result in harmful interference to radio communications. Using this equipment in a residential area is likely to cause harmful interference. In such instances, the user will be responsible for resolving the interference at their own cost.

NOTE
Any modifications made to this device that are not approved by CPAT Flex may invalidate the user's authority granted by the FCC to operate this equipment.

1.3 Technical Support

CPAT Flex Technical Support Service is available Monday through Friday from 9:00 AM to 5:00 PM Eastern Time.
Toll-free from the U.S. and Canada: 1-888-307-2728 / International: +1-514-307-2728

support@cpatflex.com

1.4 Calibration

Your IRXP unit has been calibrated and tested in the factory and does not require further calibration before use.

However, if the unit sustains damage and requires repair, it is advisable to return it to an authorized CPAT Flex service center for proper recalibration.

If your company needs regular calibration for all equipment or a calibration certificate for the IRXP, a calibration service is provided by CPAT Flex.

For further details on calibration services, kindly reach out to your CPAT Flex representative.

1.5 Explanation of Symbols Used

The following symbols are used on the IRXP label and in this manual:


Caution. Indicates that operations or procedures, if carried out without caution, may cause personal injury or damage to the unit.


Note. Indicates additional information about the product.

1.6 CPAT Flex Website

CPAT Flex's website contains product specifications, information, press releases, brochures, downloads, and Frequently Asked Questions (FAQ). Please visit our website at:
www.cpatflex.com

2. Ingress Detection in the Field

The strand-mounted Portable Ingress Receiver IRXP detects, measures, and localizes ingress event data on a continuous basis from ITX2 field devices. The IRXP transmits the identified capture points to the CPAT WEB cloud application via an integrated cellular data connection.

Readings are also available remotely in real-time through the RIM service (see section 8 - RIM). The IRXP enables the cable operator to reduce deployment time and focus on the find-and-fix equation immediately, diminishing subscriber downtime and hardening the HFC Outside Plant.

Once identified, the signal is decoded and measured by the IRXP, and the information is forwarded to the CPAT WEB Cloud application, which in turn will precisely log the geographical location of capture points in post-processing. Readings are also available remotely in real-time through the RIM service (see section 8 - RIM).

3. System Components

The IRXP serves as the receiver component of a find-and-fix ingress and monitoring solution for broadband operators. It detects signals transmitted over the air via the ITX2 that enter the cable network. The IRXP RF entry is connected via a test point in the field. The main operational status is displayed on the LED button located on the front panel. After installation, it requires no additional intervention to monitor and transmit results through the CPAT WEB cloud application.

This section provides a detailed description of the IRXP unit, including its accessories, and assists you in getting started by explaining the unit's features, power supply, and data interface.

3.1 Initial Verification

Your IRXP unit is validated and ready to use straight out of the box. Upon receipt, visually inspect each item for any shipping-related damage. If you notice any physical damage, please contact CPAT Flex:

- Callers from the U.S. and Canada can dial 1-888-307-2728 (toll-free number).
- International callers can dial +1-514-307-2728

Ensure no items are missing. Your package should include all standard items and any accessories you ordered. The IRXP - Ingress receiver digital includes the following items:

- IRXP
- AC Adapter
- Cellular Antenna.
- User manual-downloadable via our CPAT web application resource center.

If any of the standard accessories are lost or damaged, you can order a replacement for the IRXP. Please quote the following part numbers when placing an order:

Part No.	Accessory Description
110-00005-001	12V AC Adapter
111-00017-001	Cellular Antenna
008-00010-001	Battery pack

For orders, contact CPAT Flex at 1-888-307-2728 or +1-514-307-2728

4. Physical Overview

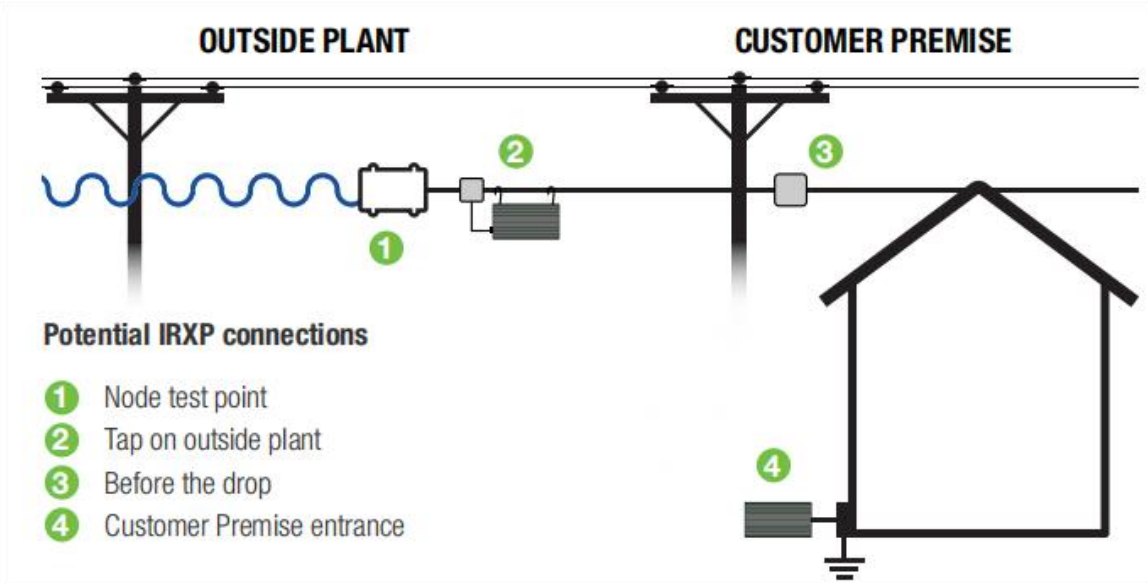
Front View	
12 VDC	Power barrel connector jack 0.7x2.35mm (28x93 mils)
POWER	Button with LED
ANTENNA	Cellular antenna connector
INPUT	Coaxial RF Input

Rear View	
USB	Host USB port (Type A)
ETHERNET	RJ45 connector
SIM	SIM card slot

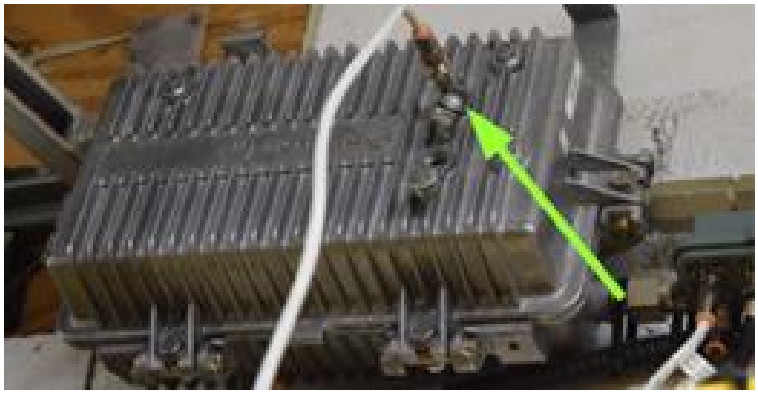
5. Setup

5.1 Installation

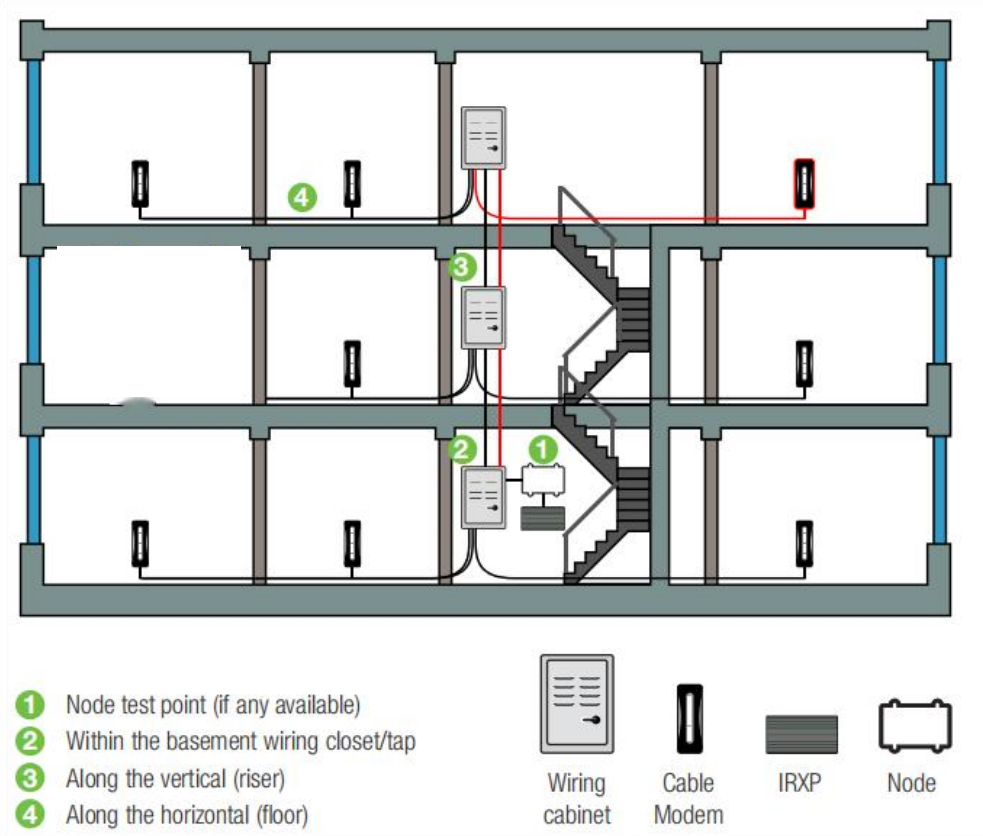
Being lightweight, the IRXP can be installed almost anywhere along the outside plant. It is strand-mountable and can safely be left without surveillance. The IRXP is nonservice affecting when connected to a test point: on an optical node, an amplifier test point, or a tap entry port. The IRXP can be used in multiple scenarios: along the outside plant, within a multi-dwelling unit (MDU) or as a home wiring certification tool.



IRXP applications and connection points on the outside plant and in-home certification.



Here is an example of IRXP connected at the node test point



RXP applications within an MDU

In certain network segments, the coaxial cable carries electricity to power the active devices situated in that segment. To prevent electrical signal reflections, it is highly advised to isolate the IRXP from the network using a test probe. The model illustrated below operates in the 5 MHz to 1 GHz range and introduces a - 20 dB attenuation.

The maximum RF level entry is 35dBmV in the RF input. This is, however, the total RF level between 5~45 MHz.

If you want to combine nodes on the same RF entry, be aware that the IRXP sensitivity performance might be affected: since the IRXP tries to detect ingress, the incoming digital ingress signal is not always at the same level.

CAUTION!
Levels over this limit can distort the signal or damage the receiver's RF front-end. Contact the CPAT technical support for more information.

5.2 Ingress Frequency

IRXP supports three ingress frequencies: 6.78MHz, 27.12MHz and 40.68MHz. The frequency is selected through the CPAT Web interface. IRXP checks for a new configuration only once after booting.

5.3 Electrical

The AC/DC adapter is supplied with the equipment. It is compatible with 110V/220 VAC voltages and 50/60Hz.

6 System Operation

6.1 Power On

To power on the unit, press the ON/OFF button on the front panel. You should observe the LED button on the front panel turn solid yellow.

6.2 LED Information

The button LED indicates the unit's status.

Power ON:

- When the YELLOW LED is solid, the system is booting (takes about 15 seconds to boot).
- When the GREEN LED flashes three times per second, the FPGA is programming.
- When the GREEN LED flashes twice per second, the cellular modem attempts to connect to the network.
- When the GREEN LED flashes once per second, the system is ready to detect ingress.

Warning:

- When the YELLOW LED flashes once per second, the temperature is too cold (<-10°C) or too hot (>55°C).
- When the YELLOW LED flashes twice per second, the battery is too low (<15% of charge).
- When the YELLOW LED flashes three times per second, there are problems with file transfer (SFTP).

Error:

- When the RED LED flashes once per second, the SIM card is missing.
- When the RED LED flashes twice per second, the battery voltage is lower than 6.95V and IRXP is in the shutdown process.
- When the RED LED flashes three times per second, the FPGA is not responding.

Ingress

- When the BLUE LED flashes, an ingress fault has been detected.
- Once per second, the ingress level is <= -12dBmV.
- Twice per second, the ingress level is > -12dBmV and <= 0 dBmV.
- Once per second, the ingress level is > 0dBmv.

Power OFF/Reboot:

- When the WHITE LED flashes, the system is in the shutdown (or reboot) process while transferring its files to the CPAT servers. If IRXP doesn't have access to the Internet, the maximum waiting time is 30 seconds before it shuts down.
- Once per second, this is a shutdown process.
- Twice per second, this is a reboot process (usually after an update).

6.3 Communication

The IRXP uses a cellular modem to communicate with CPAT servers. This allows measurements and warning messages to be accessed through the RIM website and CPAT mobile app (see section 8).

6.4 Find & Fix

Once the IRXP is connected to the plant and to the mobile network, the technician can start the find-and-fix using the ITX2. Here is a video explaining the CPAT ingress solution with an IRX1 (headend equivalent of the IRXP):

https://youtu.be/fh9fFAtc8F8?si=ZPU_KJA9rSYJYVny

6.5 Shutdown

To power off the unit, there are two modes: Normal and Force shutdown. Usually, the user should prefer the normal shutdown mode to avoid undesired flash memory corruption; force shutdown should be used **ONLY** in case the device is not responding.

Normal Shutdown:

In normal mode, the user should press the button on the front panel ON/OFF for 1 second, then let the IRXP initiate its shutdown process, and the button LED flashes white, indicating the device will turn off.

Force Shutdown (**not recommended**):

To force the IRXP to power down when running, press the ON/OFF button on the front panel for 3 seconds. When the unit shuts down, you can release the button. This is not the recommended shutdown method.

7. System Maintenance

7.1 Cleaning the Equipment

Your IRXP unit can be wiped clean with a damp cloth. Do not immerse the unit in water. Avoid the use of solvents and commercial cleaners.

8. Real-time Ingress Monitor (RIM)

The RIM service is available through our CPAT Mobile Application and our RIM website. It provides remote access, in real-time, to the ingress measurements captured by IRXP. It offers field technicians visual readings to precisely locate the source of Ingress entering the cable network. Furthermore, the RIM web site gives the IRXP status.

8.1 Login the RIM Website

To access data on the RIM the user must have a smartphone or a laptop with internet access. The user needs a CPAT profile, which includes a username and password to login on the website:

www.cpat-solution.com/RIM.

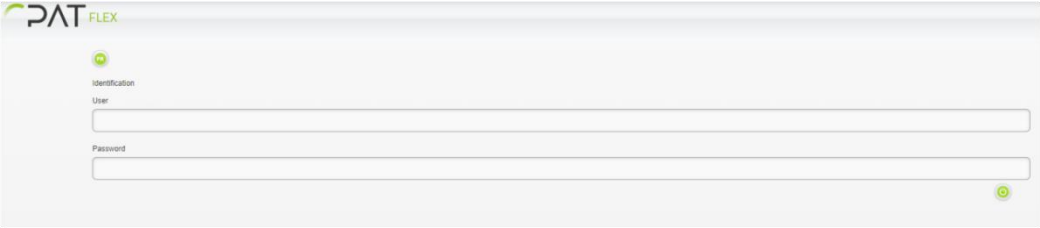


Figure 1: RIM Login page on the Mobile App or through the website

NOTE
The RIM is also available as a mobile application for iOS and Android. To download it, connect to the Apple App Store (iTunes) or the Android App Store (Google Play), and download the “CPAT” app.

8.2 Choose the Proper ITX

Once the user is logged into the application or website, they must select their ITX from the list, and then they will be able to view all the data available from their ITX. Remember that the higher the value, the closer the ingress data point.

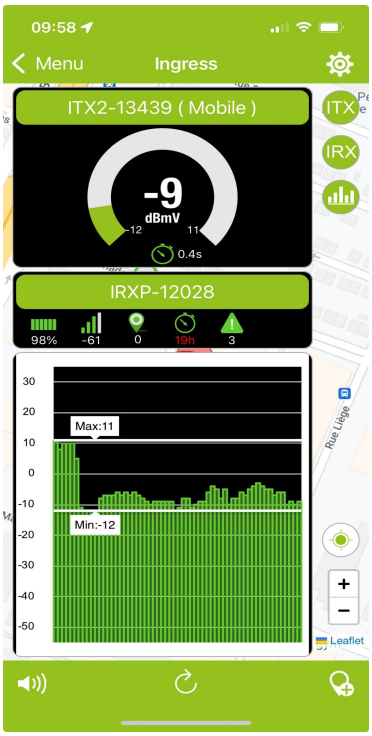


Figure 2: Chose an ITX from the list.

Then, it is possible to view the IRXP status: mobile signal strength, battery level, and minutes since the last IRXP status update. Furthermore, IRXP logs are available at the bottom. IRXP information is refreshed every 5 minutes.

NOTE
The list of available ITX will differ from one user to another depending on their respective access granted

9. Update and Recovery

The IRXP- device can be updated automatically or manually. Typically, the system should update its firmware as necessary through updates provided on our FTP website.

9.1 Automatic Update

The IRXP- device is usually automatically updated when needed. The updates are distributed from our FTP server to the device. All updates undergo testing to ensure high quality and efficiency in our product. No external intervention is required on the device to update it automatically.

Appendix A – Specifications

TECHNICAL	DETAILS
Operating Frequency	6.78, 27.12 or 40.68 MHz
Measurement Range	-23 to 20 dBm
Sensitivity	-23 dBmV (BER <10¯6) (attenuator @ 0dB)
RF input type	1x “F” ohm female connector
Maximum input level	35 dBmV per RF input
Casing Rating	IPC 63
Level Accuracy	± 2dB on signal pulses
Monitoring Mode	Continuous detection on the signal RF port
Frame Capture Time	10 ms (milliseconds)
Power	7.2 V battery pack (Li-ion cells 4,400 mAh)
Mobile data Usage	Min. 375 kB/hrs and Max. 850 kB/hrs Ingress: 20% of time 565 kB/hrs Usage 10h/day, 5 day/week 110MB/Month
AC battery charger	Input: 100-240VAC ~50-60 Hz 0.7A Output: +12VDC 1.66 A Transient overvoltage II rated pollution degree 2
Main Supply voltage fluctuations	Up to ±10% of the nominal voltage
Operation Time	8 hours nominal on battery power at 20°C/68°F
Operating Temperature	0° to +55°C / 32° to +131°F
Communications	Ethernet port RJ45, Cellular data Category M1/NB1, IOT data plan
Max. Relative humidity	80% for temperatures up to 31°C (88°F) decreasing linearly to 50% relative humidity at 40°C (104°F)
PHYSICAL	**DETAILS**
Dimensions (H x W x D)	3.3cm x 11.2 cm x 22.3 cm / 1.3“ x 4.4“ x 8.8“
Weight	925g / 33 oz

** Specifications subject to change without prior notice.*

Appendix B. Our Services

CPAT Flex offers a range of services to deploy and support purchased equipment through its Customer Support organization. Customer Support is included with every product sale and comprises business hour technical assistance, in-warranty repair, and calibration.

B.1 Customer Support
Customer Support is available with the sale of every CPAT Flex product. Customer Support services include:

- Product and Service Literature
- Technical Assistance (Business Hour)
- Equipment Repair (Under Warranty Repair and Calibration Services)
- Equipment Return Authorizations (RA)

Contact a Customer Support representative through your local distributor or by accessing www.cpatflex.com for information on calibration and warranty policies.

B.1.1 Equipment Return Instructions

Please contact your local Customer Support location via telephone for a Return Authorization to accompany your equipment. For each piece of equipment returned for repair, attach a tag that includes the following information:

- Owner's name, address, and telephone number
- The serial number, product type, and model
- Warranty status (If you are unsure of the warranty status of your instrument, contact CPAT Flex's Customer Support.)
- A detailed description of the problem or service requested.
- The name and telephone number of the person to contact regarding questions about the repair.
- The return authorization (RA) number

If possible, return the equipment using the original shipping container and materials. If the original container is not available, pack the unit carefully to prevent damage during transit. If necessary, suitable packing materials can be obtained by contacting CPAT Flex Support.

CPAT Flex is not responsible for any damage that may occur during shipping. The customer should clearly mark the RA or reference number issued by CPAT Flex on the outside of the package and ship it prepaid and insured to CPAT Flex.

Equipment repaired or replaced under warranty will be returned at CPAT Flex's expense to the Customer (Canada/USA) or CPAT Flex's representative (all other countries).
All other non-warranty repairs will be returned at the customer's expense to the customer (Canada/ USA) or CPAT Flex's representative (all other countries).

B.2 Limited Product Warranty

B.2.1 Hardware

CPAT Flex warrants to the original end user (Customer) that the new CPAT Flex branded products will be free from defects in workmanship and materials, under normal use, for one (1) year from the date of original shipment.

CPAT Flex warrants repaired products for ninety (90) days from the date of shipment. Any product repaired or replaced under warranty is only warranted for the period of time remaining on the original warranty for the product.

Any third-party products, including software, included with CPAT Flex products are not covered by this CPAT Flex warranty, and CPAT Flex makes no representations or warranties on behalf of such third parties. Any warranty on such products is from the supplier or licensor of the product.

B.2.2 Software

CPAT Flex warrants to the customer that new CPAT Flex branded software and firmware will perform in substantial conformance with program specifications for a period of ninety (90) days from the date of original shipment.
CPAT Flex warrants the media containing software against failure during the warranty period.
CPAT Flex makes no warranty or representation that the operation of the software products will be uninterrupted or error-free, or that all defects in the software products will be corrected.

B.2.3 Exclusions

This warranty excludes:

- Damage to the physical surface of the product, including cracks or scratches to any part.
- Damage caused by misuse, neglect, improper installation or testing, unauthorized attempts to open, repair, or modify the product, or any other cause beyond the intended use.
- Use of the product with any non-recommended device or service if such device or service causes the problem.
- Installation or maintenance of the product by someone other than CPAT Flex or persons certified
  by CPAT Flex.
- Changes to the customer environment in which the product was installed.
- Damage caused by accidents, fire, power changes, other hazards, or acts of nature.
- Consumable product or parts thereof (e.g., parts with an expected useful life of less than ninety (90) days, such as certain batteries).
- Product not returned following CPAT Flex's RA procedure.

B.2.4 Refurbished Parts and Prior Testing

The product may incorporate reconditioned or refurbished parts or subassemblies and may have undergone testing before being sold.

B.2.5 Exclusive Remedies

If any product materially fails to conform to the limited warranty set forth in this section (Limited Warranty) and actually fails during the applicable warranty period and under normal use, CPAT Flex shall, at its sole discretion, (i) repair or replace the non-conforming product to remedy the nonconformity identified by the customer in accordance with this section (Limited Product Warranty); or (ii) issue a credit to the customer for the amounts paid for the product in exchange for the return of the non-conforming product, in which case the customer's licenses to any firmware shall be automatically revoked. The customer hereby transfers to CPAT Flex title and ownership of any parts that CPAT Flex replaces.

B.2.6 Disclaimer

THE REMEDIES EXPRESSLY PROVIDED IN THIS SECTION WILL BE CUSTOMER'S SOLE AND EXCLUSIVE REMEDIES AND SHALL BE IN LIEU OF ANY OTHER RIGHTS OR REMEDIES CUSTOMER MAY HAVE AGAINST CPAT FLEX WITH RESPECT TO ANY NON-CONFORMANCE OF PRODUCTS. EXCEPT AS SPECIFIED IN THIS LIMITED PRODUCT WARRANTY, CPAT FLEX MAKES NO EXPRESS REPRESENTATIONS OR WARRANTIES WITH REGARD TO ANY PRODUCT.

CPAT FLEX DISCLAIMS ALL IMPLIED WARRANTIES, CONDITIONS, AND REPRESENTATIONS INCLUDING, BUT NOT LIMITED TO, ANY WARRANTIES OR CONDITIONS OF MERCHANTABILITY, SATISFACTORY QUALITY, FITNESS FOR A PARTICULAR PURPOSE, AND NON-INFRINGEMENT, REGARDLESS OF THE LEGAL THEORY ON WHICH SUCH IMPLIED WARRANTY MAY BE BASED, INCLUDING, WITHOUT LIMITATION, CONTRACT, COURSE OF DEALING, USAGE, OR TRADE PRACTICE.

Published by CPAT Flex
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