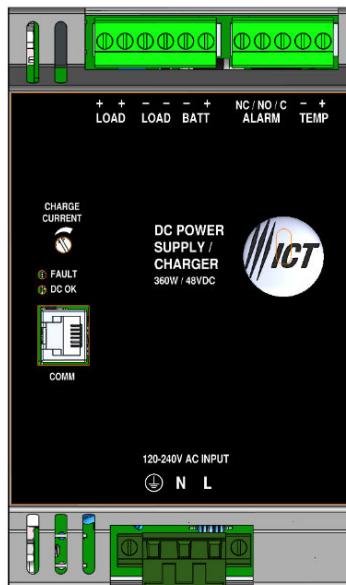




## Innovative Circuit Technology Ltd.



### ICT DIN SERIES POWER SUPPLY INSTRUCTION MANUAL

855-361-000

Models:

**ICT360-24DIN**

**ICT360-48DIN**

## **WARNING**

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**Risk of serious personal injury or damage to equipment and property! Always observe the following:**

- Install and operate unit in a restricted access location, such as an enclosed equipment rack or cabinet
- Operate the supply from a grounded 3-pin 120Vac or 240Vac outlet (50 or 60Hz) with a branch circuit breaker rated 20A or less
- Use only a Lead-Acid battery with rating and capacity appropriate for the model of supply in use
- Use an appropriate DC over-current protection device in line with the back-up battery connection
- Use a disconnect switch or circuit breaker in series with the battery connection, to ensure installation and service is done with the battery de-energised
- Use wire and connectors rated for the maximum load current and size of battery fuse or circuit breaker
- Ensure battery polarity is correct before connecting
- Do not attempt to charge a frozen battery
- Handle batteries with care, never short circuit battery terminals

## **CAUTION**

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**Risk of personal injury or damage to equipment! Always observe the following:**

- Install in a protected environment, keep sources of moisture away from unit
- Ensure the total power consumption of the load does not exceed the continuous rated capacity of the power supply output
- Do not block air inlet or outlet openings in the unit
- Do not place the power supply directly above or below an exposed battery, due to possible presence of corrosive and/or flammable gasses

Rev. 0.0 (2023)

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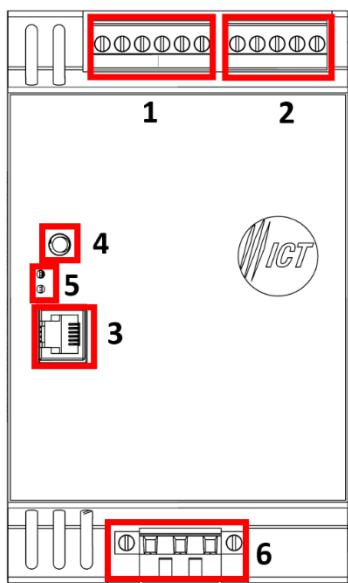
## PRODUCT DESCRIPTION

The **ICT DIN Power Supply** with integrated battery charging and low voltage disconnect provides 360 watts of 48- or 24volt DC output. It features wide-ranging AC input, low-noise emissions, temperature-compensated charging, adjustable charge current, and Form C alarm contacts.

The power supply can be paired with the ICT DIN Power Distribution Unit (ICT-DIN-PDU6) to allow remote monitoring of voltage, current, temperature and alarms over Ethernet.

Features include:

- Wide-range Power Factor corrected AC input supports operation worldwide.
- Dedicated independently controlled backup battery port with LVD relay.
- Adjustable battery charge current to accommodate lower capacity batteries.
- Floating Form-C alarm contact output supports remote monitoring of unit operation.
- Serial communication with ICT-DIN-PDU6 for remote monitoring.



1. 6-pin output / battery terminal
2. Form C / Temperature sensor connector
3. RJ11 serial port for communication with ICT DIN Power Distribution Unit
4. Selector dial for battery charging current
5. Status LEDs
6. AC input terminal

Figure 1. Front view of ICT DIN Power supply

Model <sup>1</sup>	Output Voltage (V)	Max Output Current (A)	Continuous Current (A)
ICT360-24DIN	27.6	15	13.5
ICT360-48DIN	55.2	7.5	6.5

## ! WARNING

**Risk of serious personal injury or damage to equipment and property! Always observe the following!**

- If a battery is used ensure the nominal battery voltage is correct for the model of power supply, and that the battery positive is connected to the BAT positive (+) terminal and the battery negative is connected to the NEG (-) terminal.
- Use an appropriate DC over-current protection device such as a fuse or circuit breaker in line with the battery connection.
- Do not tie the LOAD and +BAT terminals together, as this will bypass the internal LVD circuitry.
- Make Ground connection to only a single LOAD or BATT terminal if required. Do not ground both LOAD and BATT as this may bypass the internal circuitry.
- The internal LVD relay switches the BATT + terminal. Do not connect the battery + to any other terminal.
- AC input wiring to the ICT DIN Power Supply must be protected using an outlet with a branch rated circuit breaker of 20A or lower value.

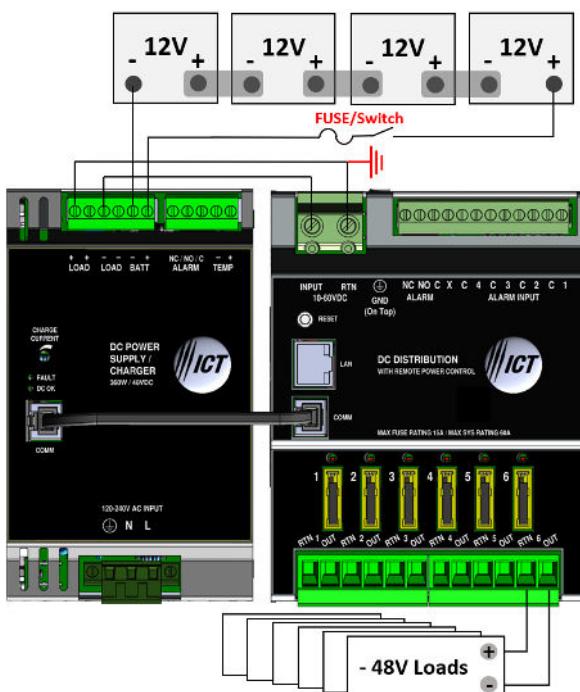


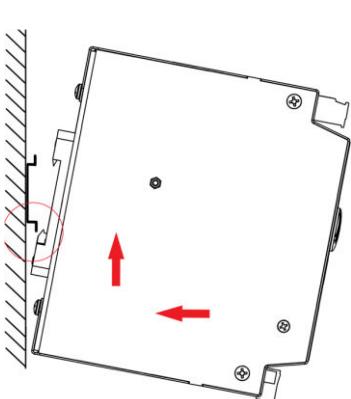
Figure 2. - 48V system Connection Diagram of ICT DIN Series (POS Ground System)

## INSTALLATION

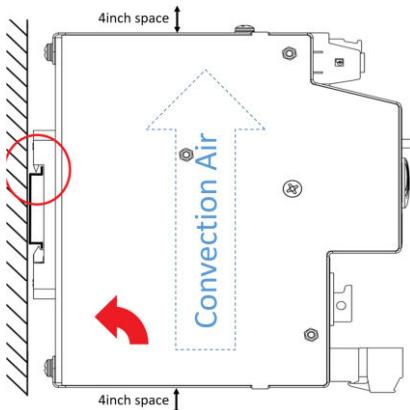
Inspect the power supply and accessories to make sure everything is complete and in good condition.

Make the following connections using wire and connectors appropriately rated for the maximum input and output current rating of the unit. The unit should be placed near the backup battery in a location that restricts access to the wiring and battery terminals, such as in an enclosed equipment cabinet. The unit is designed for the DIN Rail TS-35(EN5002) standard DIN rail in an enclosure and relies on convection cooling. Therefore, to ensure sufficient air flow there must be a minimum 4" of open space above and below the ICT DIN Power Supply.

- Install DIN Power Supply on DIN Rail TS-35(EN5002) standard DIN rail.



Step 1. Push device from bottom while also pushing towards mounting rail to engage spring loaded clip



Step 2. Pivot the device towards the wall so that the top hook clips into the mounting rail as illustrated

Figure 3. Installation of ICT DIN Power supply and Distribution unit

- For a Positive-ground system, connect the power supply LOAD (+) output terminal to the "RTN" terminal which is connected to the earth ground and connect the power supply LOAD (-) output terminal to the input terminal like figure 2. Note that the ICT DIN Power Supply can be connected to an ICT DIN Power Distribution Unit as either a negative or positive-ground system.
- If the power supply is used in combination with an ICT DIN Power Distribution Unit (ICT-DIN-PDU6), the serial data cable (provided with the PDU6) can be installed to allow the Power Distribution Unit to monitor the status of the power supply. Install the power supply and Power Distribution Unit side by side, then connect the two RJ-11 COMM ports together using the data cable, as shown in Figure 2. The green "DC OK" LED will blink once every 10 seconds if the data connection is functioning properly.

For further information about remotely monitoring the power supply, download the ICT DIN Power Distribution Unit instruction manual from <http://www.ict-power.com>

- **Battery Backup:**
  - ✓ Choose a lead-acid battery with a nominal voltage rating (24/48V) that matches the ICT DIN Power Supply output voltage, and has an Amp-hour (Ahr) capacity rating of at least 3 times the maximum charge current setting of the power supply (e.g. Use a 45Ahr or larger rated battery (3 x 15A) with a 15A max charge setting)
  - ✓ Connect the battery negative to the BATT (-) terminal.
  - ✓ Connect the battery positive to an over-current protection device (fuse or breaker) and disconnect switch
  - ✓ With the battery fuse removed or disconnect switch open, connect the fuse or switch to the BATT (+) terminal
  - ✓ Plug the AC connector at the bottom of the front face of the unit. The earth ground is connected through AC power cable
  - ✓ The internal LVD contactor is always connected to the battery positive though the integrated fuse (20A)

Set the charge current to be supplied to the battery by rotating the selector dial with small slotted screwdriver. Note that actual current flow to the battery may be less than the setting, and is determined by the battery state of charge and temperature.

The default Low voltage disconnect (LVD) setpoints are listed in the following chart:

LVD Setting	24V	48V
Disconnect V (Default)	22	44
Reconnect V (Default)	25	50

## WIRING

The unit has dual output circuits (Load & Battery) in a 6-pin connector. Utilize dual wiring for the LOAD connection to minimize the voltage drop due to cable length in cases where load cable is more than 15 feet from the unit. For the battery connection, utilize single wiring. Refer to the following table for the appropriate wire gauge (AWG).

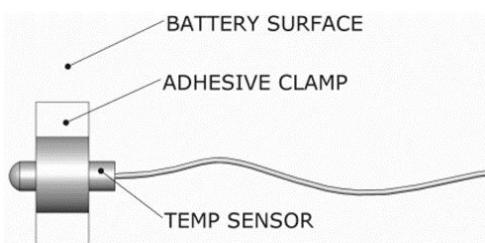
Location	Socket / Plug	Wire (AWG)
AC input	Socket: 3EHDVM-03P Plug: 3ESDVM-03P	12 - 16
Output Load / BATT	Socket: 2EHDVC-06P Plug: 2ESDP-06P	12 - 14
Form C / Temp. sensor	Socket: 2EHDVC-05P Plug: 2ESDP-05P	22 - 26

Make a Ground connection (if required) to only a single +/- battery or load terminal (Load side preferred). Do not connect both the load and battery to ground as this will bypass critical internal circuitry disabling the charge control functions. The internal LVD relay is in series with the BATT + terminal.

**Connect the external alarm monitoring** wiring to the Form-C alarm contact output if desired, using 22-26AWG wire clamped in the removable Alarm/Temp plug. (See Alarm Output Contacts table below)

ALARM Pin	Name	Description	Wire (AWG)
1	NC	Alarm State Normally Closed contact	22 - 26
2	NO	Alarm State Normally Open contact	22 - 26
3	C	Alarm output, Common	22 - 26

#### Connect the optional remote battery temperature sensor:



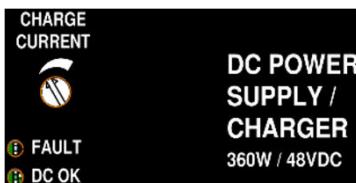
Connect the temperature sensor (ICT-TMP) to the TEMP input on the removable connector. Using the temperature sensor will enable the unit to compensate the charge Float voltage according to the battery case temperature, to help fully charge cold batteries and ensure

warm batteries are not over charged. Connect each of the two wires on the remote temperature probe to the two TEMP inputs on the connector (polarity does not matter). Affix the probe body to a side midpoint on one of the battery cases using the adhesive backed plastic clip included with the sensor.

## OPERATION

Plug the AC input connector into the unit and check that the green “DC OK” LED on the front of the unit is lit. Verify the supply output voltage using a handheld digital voltmeter. If a battery is connected, install the external fuse, and close the disconnect switch. If the external back-up battery is connected, disconnect AC power and use a handheld digital voltmeter to verify that the battery voltage is provided to the output load terminal. Reconnect AC power and verify the output supply voltage rises to the normal output rating as the battery charges.

The unit can now be left operating normally. As long as the external back-up battery voltage is greater than the low voltage disconnect (LVD) level, the battery will be connected directly to the supply output and will instantly power the load in case of an AC power failure. When AC power is lost, the battery will gradually be discharged by the load. When the battery voltage drops below the LVD disconnect level the internal relay will open preventing the battery from being excessively discharged.



When AC power returns, the unit will close the LVD relay and charge the battery to bring the voltage back up to the float voltage level. Battery charge current is adjusted by rotating the “CHARGE CURRENT” selector dial with slotted screwdriver. The adjustable level of battery

charge current is 25%/50%/75%/100% of available output current, and the factory default is 25%. Batteries will be charged to the supply output voltage level with current limited to the maximum supply output rating. To increase the battery charging current, rotate the selector dial clockwise. Combined with the ICT DIN Power Distribution Unit, remote monitoring is available through the Ethernet controller and user interface showing in figure 4.

The screenshot displays the 'DIN Rail PDU Distribution Panel - Status &amp; Control' interface. On the left, a sidebar menu includes: Status &amp; Control (selected), Alarm Status, Power Supply, Device Setup, Output Setup, Network Setup, E-mail Setup, Alarm Setup, User Setup, Maintenance, Help. The main area has a red banner: 'Important: Set the Administrator password for this device.' It shows six output sections (Output #1 to #6) with status buttons (Enabled/Off) and current readings (0.0A). Below is a 'Power Supply Status' section with: Output Voltage: 27.6VDC, Output Current: 0.0A, Alarm Status: OK; and Battery Voltage: 27.6VDC, Battery Current: 0.1A, Battery Temperature: -, LVD Status: Closed. The top right shows the device's IP address (192.168.0.32), firmware version (v0.32), and a 'Logout' button. The bottom footer says 'Copyright © 2022 Innovative Circuit Technology Ltd.'

Figure 4. GUI with Power Supply and Battery status



## Risk of damage to equipment!

- Ensure battery current supplied through the internal LVD contactor cannot exceed the current rating of the unit
- Do not use the internal LVD contactor for parallel applications where load current can exceed the maximum rating of a single unit

## Status Indicators and Alarms

The 2 LEDs on the front of the unit and the Form-C alarm contact indicates the status of the power supply:

Alarm or Notification	Trigger Condition	LOAD Output	BATT LVD	Red FAULT LED	DC OK LED
Input AC OK, battery charging	Normal operation, battery charging	Enabled	CLOSED	-	ON
Input AC OK, battery charged	Normal operation, battery charged	Enabled	CLOSED	-	ON
AC Voltage Failure	AC input power fails	Battery power only	CLOSED	ON	-
Over temperature	Triggers when internal temperature is too high. Clears when back to normal range.	Battery power only	CLOSED	ON	-
		Limited output voltage	OPEN	ON	-
DC Output Failure (Overvoltage)	Triggers when Output Voltage rises above 33/66.0 V for 3 sec. Clears when Input power cycled off/on	Battery power only	CLOSED	ON	-
Battery Over temperature	Triggered when Battery Temperature is over 50°C Clears when Battery Temperature drops below 45°C for 25 sec.	Enabled	Open	ON	-
Battery Disconnected by LVD	Triggers when the LVD disconnects the Battery due to fault conditions Clears when the fault condition is removed	Enabled	Open	ON	-
Battery Overcurrent (requires DIN PDU)	Triggers when Battery Current rises above Overcurrent threshold (configurable in Web GUI) for 10 sec. Clears when Battery Current drops 0.5A below Overcurrent threshold for 10 sec.	Enabled	CLOSED	ON	-

The Form-C alarm contact will be triggered for any condition that lights the red FAULT LED or shuts down the output of the unit.

## PRODUCT SPECIFICATIONS

AC Input Operating Range:	108 to 264Vac 50/60Hz
AC Input Nominal Range:	120 to 240Vac 50/60Hz
Input Power Factor:	TYP. 0.99 (120Vac input)
Efficiency (typical):	90%
Output V Line Regulation:	+/- 0.5%
Output V Load Regulation:	+/- 0.5%

Model:	ICT360-24DIN	ICT360-48DIN
Output Voltage	27.6V	55.2V
Max Current Limit (+/- 5%)	15A	7.5A
Continuous Current Rating	13.5A	6.5A
Output Power (max)	360W	
Output Noise (mV)	< 100mV p-p	
Input Current (max at 120Vac)		< 4.5A
LVD Threshold V (Default)	22V	44V
LVD Reconnect V (Default)	25V	50V

Output Grounding:	Earth ground is connected by AC terminal
Alarm Output:	Form-C contact, 0.5A 60Vdc max
DC Connectors: (Output, Battery)	6 pin connector
Alarm / Temp. Connector	5 pin connector
Operating Temperature Range:	-30°C to +60°C <sup>2</sup>
Storage Temperature Range:	-40°C to +70°C
Humidity: (Operating) (Storage)	10 – 90% (non-condensing) 5 – 95% (non-condensing)
Cooling:	Convection cooled

<sup>2</sup> De-rate output 2% per °C above 40°C

Regulatory Compliance (Safety):

Designed to meet

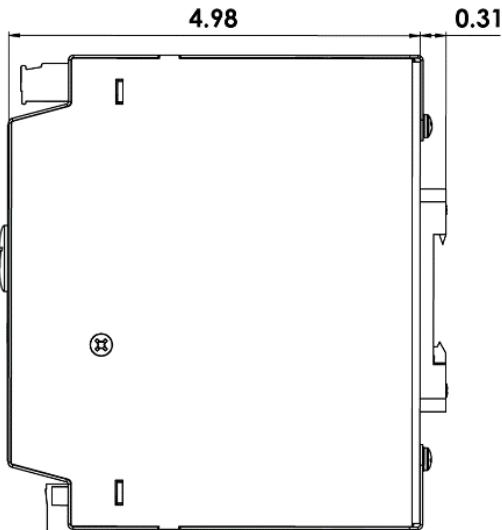
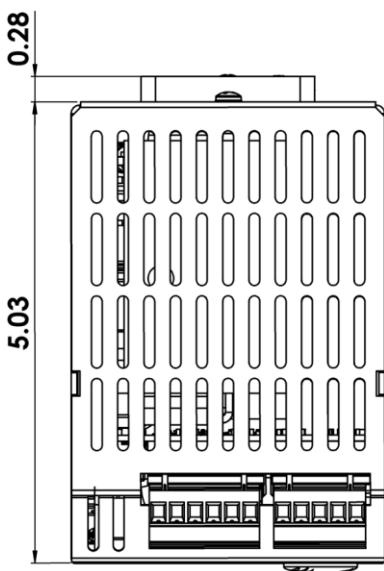
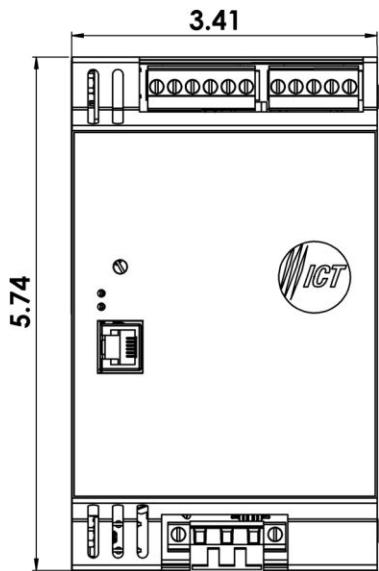
UL/CSA62368

Regulatory Compliance (EMC):

Designed to meet

FCC Part 15 Class B limits

Dimensions (inches):



Weight:

1.65kg/3.6lbs

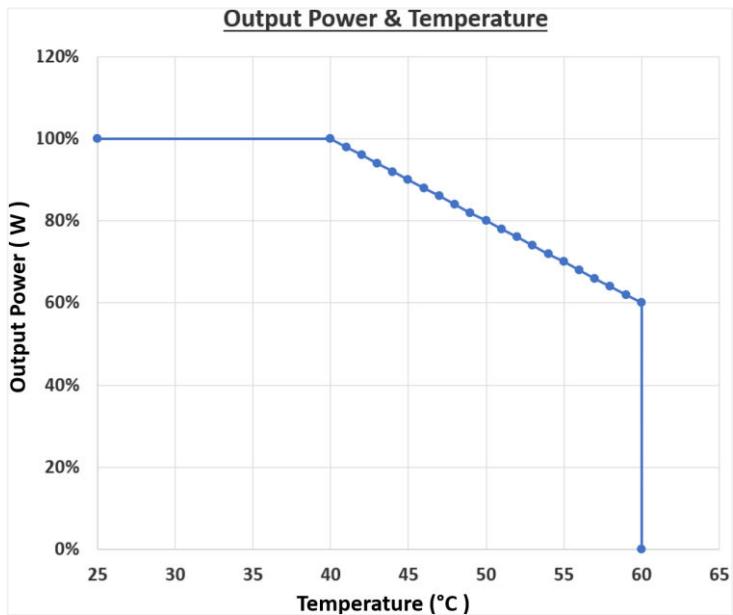


Figure 5. De-rating Curve of Output Power VS Temperature

## **ICT LIMITED WARRANTY**

The warranty period on ICT products purchased new from ICT is two years. The warranty period for a repaired product or part thereof is ninety (90) days or the remainder of the unexpired term of the new product warranty period, whichever is greater. Repair or replacement of a defective product or part does not extend the original warranty coverage period.

ICT Limited Warranty is only intended for the benefit of the original Purchaser of this product. This Warranty is not transferable or assignable without the prior written permission of ICT. ICT's sole obligation and liability under this warranty is limited to either repairing or replacing defective products at the sole discretion of ICT. When repairing or replacing the products, ICT may use products or parts that are new, equivalent to new or re-conditioned. Parts repaired or replaced during the warranty period will be under warranty for the remainder of the warranty period.

No claim will be accepted unless written notice of the claim is received by ICT in accordance with ICT's Return Material Authorization (RMA) procedure, as soon as reasonably possible after the defect is discovered. A valid product serial number must be provided with the RMA claim to prove eligibility. The RMA procedure is available on the ICT website at [www.ict-power.com/support/warranty-repair/](http://www.ict-power.com/support/warranty-repair/).

The Purchaser shall at their own risk and cost return the defective product to ICT's factory or designated repair center once an RMA is issued by ICT. Return of the products to the customer after repair is completed shall be prepaid by ICT unless otherwise mutually agreed between the parties. Products shipped to ICT which have incurred freight damage will not be covered by this Warranty and any repairs or replacement parts, components or products needed will be invoiced in the full current price amount and returned freight collect to Purchaser. It is the Purchaser's responsibility to check the product upon receipt for any damage during shipping and to contact the carrier or shipper regarding such damage. Product that is returned as defective, which is determined to operate within published specifications will be returned to the Purchaser freight collect.

Warranty commences on the date the product is shipped from the ICT manufacturing facility, or in the case of purchase through an authorized ICT reseller, not more than ninety (90) days after original shipment of this product by ICT.

ICT assigns to Purchaser any warranties which are made by manufacturers and suppliers of components of, or accessories for, the ICT product and which are assignable. ICT makes no representations as to the effectiveness or extent of such warranties, assumes no responsibility for any matters which may be warranted by such manufacturers or suppliers and extends no additional coverage under this Warranty to such components or accessories.

In no event shall ICT be liable for any special, indirect or consequential damages such as, but not limited to, loss of use, business or goodwill, loss of revenue, or loss of profits, which may result, either directly or indirectly, from defects in products provided by ICT.

This Warranty will be void if the product has been subjected to misuse, neglect, accident, exposure to environmental conditions not conforming to the products' limits of operation, improper installation or maintenance, improper use of an electrical source, defects caused by sharp items or by impact pressure, a force majeure event, has been modified or repaired by anyone other than ICT or its authorized representative, has been subjected to unreasonable physical, thermal or electrical stress, improper maintenance, or causes external to the unit including but not limited to general environmental conditions such as rust, corrosive atmospheres, sustained temperatures outside the specified operating range of the equipment, exposure to power surges and/or electrical surges, improper grounding, mould or dust, animal or insect damage, water damage or immersion in liquid of any kind, or if the serial number has been altered, defaced, or removed.

ICT does not control the installation and use of any ICT product. Accordingly, it is understood this does not constitute a warranty of performance or a warranty of fitness for a particular purpose. This Warranty represents the entire agreement between ICT and Purchaser with respect to the subject matter herein and supersedes all prior verbal or written communications, representations, understandings or agreements relating to this subject.

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