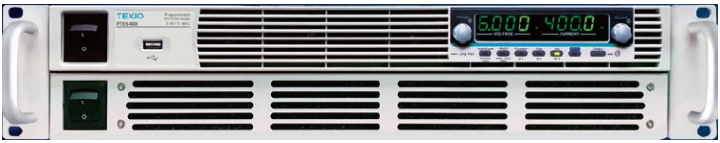
TEXIO
Test and Measurement Solutions

INSTRUCTION MANUAL

Programmable DC POWER SUPPLY
PTE SERIES



B71-0513-01

■ About Brands and Trademarks

"TEXIO" is the product brand name of our industrial electronic devices.
All company names and product names mentioned in this manual are the trademark or the registered trademark of each company or group in each country and region.

■ About the Instruction Manual

 Be aware that the product specifications and the contents of this manual are subject to change for the purpose of improvement.

CONTENTS

USING THE PRODUCT SAFELY

■ Preface

To use the product safely, read instruction manual to the end. Before using this product, understand how to correctly use it. If you read the manuals but you do not understand how to use it, ask us or your local dealer. After you read the manuals, save it so that you can read it anytime as required.

■ Pictorial indication

The manuals and product show the warning and caution items required to safely use the product. The following pictorial indication is provided.

Pictorial indication	
	Some part of this product or the manuals may show this pictorial indication. In this case, if the product is incorrectly used in that part, a serious danger may be brought about on the user's body or the product. To use the part with this pictorial indication, be sure to refer to the manuals.
	If you use the product, ignoring this indication, you may get killed or seriously injured. This indication shows that the warning item to avoid the danger is provided.
	If you incorrectly use the product, ignoring this indication, you may get slightly injured or the product may be damaged. This indication shows that the caution item to avoid the danger is provided.

Please be informed that we are not responsible for any damages to the user or to the third person, arising frommalfunctions or other failures due to wrong use of the product or incorrect operation, except such responsibility for damages as required by law.

USING THE PRODUCT SAFELY

■ Do not remove the product's covers and panels

Never remove the product's covers and panels for any purpose. Otherwise, the user's electric shock or fire may be incurred.

■ Warning on using the product

Warning items given below are to avoid danger to user's body and life and avoid the damage or deterioration of the product. Use the product, observing the following warning and caution items.

■ Warning items on power supply

● Power supply voltage

The rated power supply voltages of the product are 100VAC. The rated power supply voltage for each product should be confirmed by reading the label attached on the back of the product or by the “rated” column shown in the instruction manual. The specification of power cord attached to the products is rated to 125VAC for all products which are designed to be used in the areas where commercial power supply voltage is not higher than 125VAC. Accordingly, you must change the power cord if you want to use the product at the power supply voltage higher than 125VAC. If you use the product without changing power cord to 250VAC rated one, electric shock or fire may be caused. When you used the product equipped with power supply voltage switching system, please refer to the corresponding chapter in the instruction manuals of each product.

● Power cord

(IMPORTANT) The attached power cord set can be used for this device only.

If the attached power cord is damaged, stop using the product and call us or your local dealer. If the power cord is used without the damage being removed, an electric shock or fire may be caused.

● Protective fuse

If an input protective fuse is blown, the product does not operate. For a product with external fuse holder, the fuse may be replaced. As for how to replace the fuse, refer to the corresponding chapter in the instruction manual. If no fuse replacement procedures are indicated, the user is not permitted to replace it. In such case, keep the case closed and consult us or your local dealer. If the fuse is incorrectly replaced, a fire may occur.

USING THE PRODUCT SAFELY

■ Warning item on Grounding

If the product has the GND terminal on the front or rear panel surface, be sure to ground the product to safely use it.

■ Warnings on Installation environment

● Operating temperature and humidity

Use the product within the operating temperature indicated in the “rating” temperature column. If the product is used with the vents of the product blocked or in high ambient temperatures, a fire may occur. Use the product within the operating humidity indicated in the “rating” humidity column. Watch out for condensation by a sharp humidity change such as transfer to a room with a different humidity. Also, do not operate the product with wet hands. Otherwise, an electric shock or fire may occur.

● Use in gas

Use in and around a place where an inflammable or explosive gas or steam is generated or stored may result in an explosion and fire. Do not operate the product in such an environment. Also, use in and around a place where a corrosive gas is generated or spreading causes a serious damage to the product. Do not operate the product in such an environment.

● Installation place

Do not insert metal and inflammable materials into the product from its vent and spill water on it. Otherwise, electric shock or fire may occur.

■ Do not let foreign matter in

Do not insert metal and inflammable materials into the product from its vent and spill water on it. Otherwise, electric shock or fire may occur.

■ Warning item on abnormality while in use

If smoke or fire is generated from the product while in use, stop using the product, turn off the switch, and remove the power cord plug from the outlet. After confirming that no other devices catch fire, ask us or your local dealer.

USING THE PRODUCT SAFELY

■ Input / Output terminals

Maximum input to terminal is specified to prevent the product from being damaged. Do not supply input, exceeding the specifications that are indicated in the "Rating" column in the instruction manual of the product. Also, do not supply power to the output terminals from the outside. Otherwise, a product failure is caused.

■ Calibration

Although the performance and specifications of the product are checked under strict quality control during shipment from the factory, they may be deviated more or less by deterioration of parts due to their aging or others.
It is recommended to periodically calibrate the product so that it is used with its performance and specifications stable. For consultation about the product calibration, ask us or your local dealer.

■ Daily Maintenance

When you clean off the dirt of the product covers, panels, and knobs, avoid solvents such as thinner and benzene. Otherwise, the paint may peel off or resin surface may be affected. To wipe off the covers, panels, and knobs, use a soft cloth with neutral detergent in it.
During cleaning, be careful that water, detergents, or other foreign matters do not get into the product.
If a liquid or metal gets into the product, an electric shock and fire are caused.
During cleaning, remove the power cord plug from the outlet.

Use the product correctly and safely, observing the above warning and caution items. Because the instruction manual indicates caution items even in individual items, observe those caution items to correctly use the product.

If you have questions or comments about the manuals, ask us or E-Mail us.

1. GETTING STARTED

This chapter describes the power supply in a nutshell, including its main features and front / rear panel introduction. After going through the overview, please read the theory of operation to become familiar with the operating modes, protection modes and other safety considerations.

1-1. Overview

1-1-1. Series lineup 1U Series

The PTE 1U series consists of 15 models, covering a number of different current, voltage and power capacities:

Model name	Voltage Rating[1]	Current Rating[2]	Power
PTE6-200	6V	200A	1200W
PTE8-180	8V	180A	1440W
PTE12.5-120	12.5V	120A	1500W
PTE15-100	15V	100V	1500W
PTE20-76	20V	76A	1520W
PTE30-50	30V	50A	1500W
PTE40-38	40V	38A	1520W
PTE50-30	50V	30A	1500W
PTE60-25	60V	25A	1500W
PTE80-19	80V	19A	1520W
PTE100-15	100V	15A	1500W
PTE150-10	150V	10A	1500W
PTE300-5	300V	5A	1500W
PTE400-3.8	400V	3.8A	1520W
PTE600-2.6	600V	2.6A	1560W

[1]Minimum voltage guaranteed to 0.2% of rating voltage.

[2]Minimum current guaranteed to 0.4% of rating current.

1-1-2. Series lineup 2U Series

The PTE 2U series consists of 15 models, covering a number of different current, voltage and power capacities:

Model name	Voltage Rating[1]	Current Rating[2]	Power
PTE6-400	6V	400A	2400W
PTE8-360	8V	360A	2880W
PTE12.5-240	12.5V	240A	3000W
PTE15-200	15V	200A	3000W
PTE20-152	20V	152A	3040W
PTE30-100	30V	100A	3000W
PTE40-76	40V	76A	3040W
PTE50-60	50V	60A	3000W
PTE60-50	60V	50A	3000W
PTE80-38	80V	38A	3040W
PTE100-30	100V	30A	3000W
PTE150-20	150V	20A	3000W
PTE300-10	300V	10A	3000W
PTE400-7.6	400V	7.6A	3040W
PTE600-5.2	600V	5.2A	3120W

[1]Minimum voltage guaranteed to 0.2% of rating voltage.

[2]Minimum current guaranteed to 0.4% of rating current.

1-1-3. Series lineup 3U Series

The PTE 3U series consists of 15 models, covering a number of different current, voltage and power capacities:

Model name	Voltage Rating[1]	Current Rating[2]	Power
PTE6-600	6V	600A	3600W
PTE8-540	8V	540A	4320W
PTE12.5-360	12.5V	360A	4500W
PTE15-300	15V	300A	4500W
PTE20-228	20V	228A	4560W
PTE30-150	30V	150A	4500W
PTE40-114	40V	114A	4560W
PTE50-90	50V	90A	4500W
PTE60-75	60V	75A	4500W
PTE80-57	80V	57A	4560W
PTE100-45	100V	45A	4500W
PTE150-30	150V	30A	4500W
PTE300-15	300V	15A	4500W
PTE400-11.4	400V	11.4A	4560W
PTE600-7.8	600V	7.8A	4680W

[1]Minimum voltage guaranteed to 0.2% of rating voltage.

[2]Minimum current guaranteed to 0.4% of rating current.

1-1-4. Series lineup 4U Series

The PTE 4U series consists of 15 models, covering a number of different current, voltage and power capacities:

Model name	Voltage Rating[1]	Current Rating[2]	Power
PTE6-800	6V	800A	4800W
PTE8-720	8V	720A	5760W
PTE12.5-480	12.5V	480A	6000W
PTE15-400	15V	400A	6000W
PTE20-304	20V	304A	6080W
PTE30-200	30V	200A	6000W
PTE40-152	40V	152A	6080W
PTE50-120	50V	120A	6000W
PTE60-100	60V	100A	6000W
PTE80-76	80V	76A	6080W
PTE100-60	100V	60A	6000W
PTE150-40	150V	40A	6000W
PTE300-20	300V	20A	6000W
PTE400-15.2	400V	15.2A	6080W
PTE600-10.4	600V	10.4A	6240W

[1]Minimum voltage guaranteed to 0.2% of rating voltage.

[2]Minimum current guaranteed to 0.4% of rating current.

1-1-5. Main Features

Performance 1U / 1500W	High power density: 1500W in 1U Output voltage up to 600V, current up to 200A. Input voltage 85~265Vac at single phase, continuous operation.
Performance 2U / 3000W	High power density: 3000W in 2U Output voltage up to 600V, current up to 400A. Input voltage 175~265Vac at single phase, continuous operation.
Performance 3U / 4500W	High power density: 4500W in 3U Output voltage up to 600V, current up to 600A. Input voltage 175~265Vac at single phase (TYPE B) or 180~ 265Vac at three phase (TYPE C), continuous operation.
Performance 4U / 6000W	High power density: 6000W in 4U Output voltage up to 600V, current up to 800A. Input voltage 175~265Vac at single phase (TYPE B) or 180~ 265Vac at three phase (TYPE C), continuous operation.
Features	Active power factor correction. Parallel operation with active current sharing (1U model). Remote sensing to compensate for voltage drop in load leads. 19” rack mounted ATE applications. A built-in Web server. OVP, OCP and OHP protection. Preset memory function. Adjustable voltage and current slew rates. Bleeder circuit ON/OFF setting. CV, CC priority start function. (Prevents overshoot with output ON) Supports test scripts.
Interface	Built-in RS-232C/RS-485, LAN and USB interface. Analog output programming and monitoring. Optional interface: GP-IB

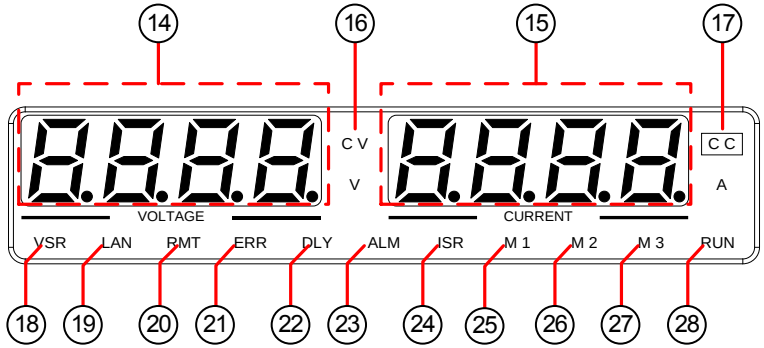
1-1-6. Accessories

Standard Accessories	Part number	Description	Qty.
		1U Output terminal cover	1
		Analog connector plug kit	1
		1U Output terminal M8 bolt set (6V~60V model)	1
		Input terminal cover	1
		1U Power Cord (230VAC/10A, 1.8M, provide for some region only)	1

	82GW1SAFE0M*1	Safety Guide	1
	62SB-8K0HD1*1	1U Handle, ROHS	2
	62SB-8K0HP1*1	1U BRACKET (LEFT), RoHS	1
	62SB-8K0HP2*1	1U BRACKET (RIGHT), RoHS	1
	CD-ROM	User manual, Programming manual	1 set
Factory Options	Part number	Description	
	PTE-VG	GP-IB interface	
	PSU-001	Front Panel Filter Kit (Operation Temperature is guaranteed to 40˚C)	
	PSU-002	Foot holder kit (Option for table use)	
Optional Accessories	Part number	Description	
	PSU-01C	Cable for 2 units in parallel mode connection	
	PSU-01B	Bus Bar for 2 units in parallel mode connection	
	PSU-01A	Joins a vertical stack of 2 units together. 2U-sized handles x2, joining plates x2.	
	PSU-02C	Cable for 3 units in parallel mode connection	
	PSU-02B	Bus Bar for 3 units in parallel mode connection	
	PSU-02A	Joins a vertical stack of 3 units together. 3U-sized handles x2, joining plates x2.	
	PSU-03C	Cable for 4 units in parallel mode connection	
	PSU-03B	Bus Bar for 4 units in parallel mode connection	
	PSU-03A	Joins a vertical stack of 4 units together. 4U-sized handles x2, joining plates x2.	
	PSU-232	RS-232C cable with DB9 connector kit. It Includes RS-232C cable with DB9 connector, RS-485 used master cable (gray plug), slave cable (black plug), intermediate connector and end terminal connector.	
	PSU-485	RS-485 cable with DB9 connector kit. It Includes RS-485 cable with DB9 connector, RS-485 used master cable (gray plug), slave cable (black plug), intermediate connector and end terminal connector.	
	GRM-001	Rack-mount slides (General Devices P/N: C-300-S-116-RH-LH)	
	GTL-246	USB Cable 2.0-A-B Type, Approx. 1.2M	
	PTE-Y1	Logging option for PTE Series	

1-1-1. PTE Series Display and Operation Panel

Display Area

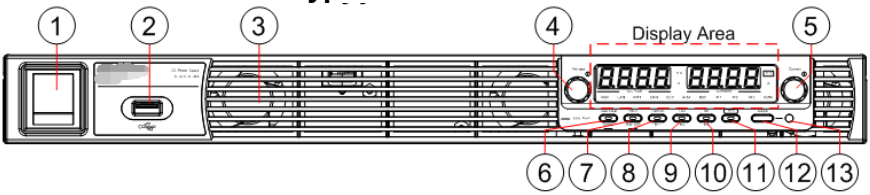


14. Voltage Meter — Displays the voltage or the parameter number of a Function parameter.
15. Current Meter — Displays the current or the value of a Function parameter.
16. CV LED — Lights in green during constant voltage mode.
17. CC LED — Lights in green during constant current mode.
18. VSR LED — Lights up when CV Slew Rate Priority is enabled.
19. LAN LED — Lights up when the LAN interface is connected.
20. RMT LED — Lights in green during remote control.
21. ERR LED — Lights in red when an SCPI error has occurred.
22. DLY LED — The Output On/Off Delay indicator LED.
23. ALM LED — Lights in red when a protection function has been activated.
24. ISR LED — Lights up when CC Slew Rate Priority is enabled.
25. M1 LED — Lights in green when the memory value are being recalled or saved.
26. M2 LED — Lights in green when the memory value are being recalled or saved.
27. M3 LED — Lights in green when the memory value are being recalled or saved.
28. RUN LED — Lights up when a Test Script has been activated.

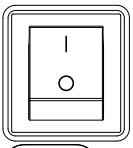
Note — Only the ERR and ALM LED's are red. All the others are green.

1-2. Appearance

1-2-1. PTE Series 1U type Front Panel



1. Power Switch



Used to turn the power on/off.

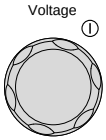
2. USB A Port

USB A port for data transfer, loading test scripts etc.

3. Air Inlet

Air inlet for cooling the inside of the PTE series.

4. Voltage Knob

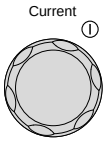


Used to set the voltage value or select a parameter number in the Function settings.

Display Area

The display area shows setting values, output values and parameter settings. The function LEDs below show the current status and mode of the power supply. See page 7 for details.

5. Current Knob



Used to set the current value or change the value of a Function parameter.

6. Lock/Local Button

Used to lock all front panel buttons other than the Output Button or it switches to local mode.

Unlock Button

(Long push) Used to unlock the front panel buttons.

7. PROT Button

Used to set and display OVP, OCP and UVL.

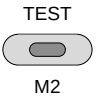
ALM_CLR Button

(Long push) Used to release protection functions that have been activated.

8. Function Button / M1 Button

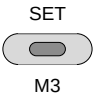
Used to configure the various functions.
(+Shift) Used to recall the M1 setup.
(+Shift and hold) Used to save the current setup to M1.

9. Test Button / M2 Button



Used to run customized scripts for testing.
(+Shift) Used to recall the M2 setup.
(+Shift and hold) Used to save the current setup to M2.

10. Set Button / M3 Button

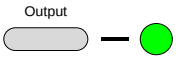


Used to set and confirm the output voltage and output current.
(+Shift) Used to recall the M3 setup.
(+Shift and hold) Used to save the current setup to M3.

11. Shift Button

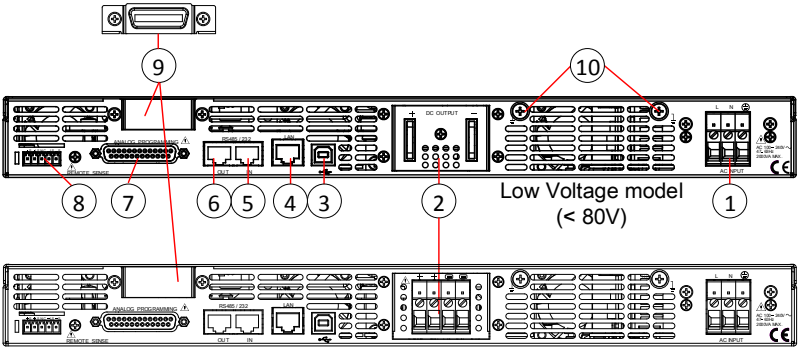
Used to enable the functions that are written in blue characters below certain buttons.

12. Output Button
13. Output ON LED

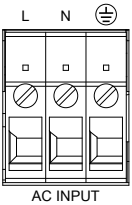


Used to turn the output on or off.
Lights in green when the output is on.

1-2-2. 1U type Rear Panel

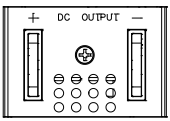


1. AC Input

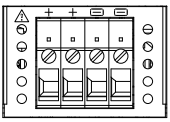


Wire clamp connector.

2. DC Output

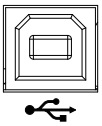


Output terminals for Low Voltage (6V to 60V) models.



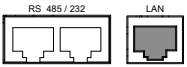
Output terminals for High Voltage (80V to 600V) models.

3. USB



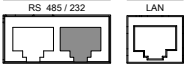
USB port for controlling the PTE remotely.

4. LAN



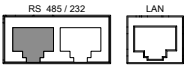
Ethernet port for controlling the PTE remotely.

5. Remote-IN



Two different types of cables can be used for RS-232C or RS-485-based remote control.
PSU-232: RS-232C cable
with DB9 connector kit.
PSU-485: RS-485 cable
with DB9 connector kit.

6. Remote-OUT

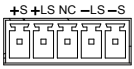


RJ-45 connector that is used to daisy chain power supplies with the Remote-IN port to form a communication bus.
PSU-485: Serial link cable
with RJ-45 shielded connector.

7. Analog Control

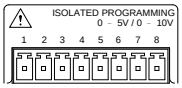
External analog control connector.

8. Remote Sense



Compensation of load wire drop.

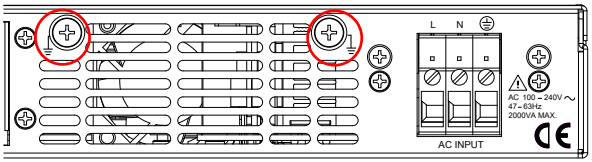
9. Option Slot



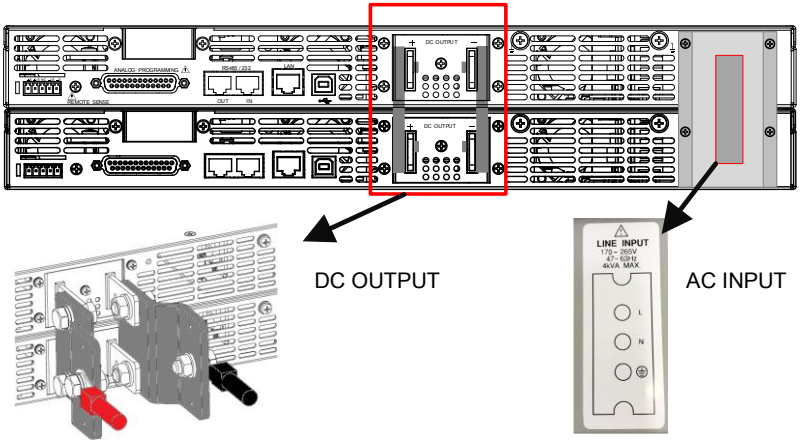
Blank sub-plate for standard units.
Isolated Analog connector for units equipped with Isolated Current and Voltage Programming and Monitoring option.
GP-IB connector for units equipped with IEEE programming option.

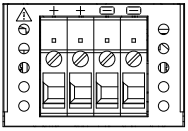
10. Ground Screw

Connectors for grounding the output (two positions, shown in red).



1-2-1. 2U type Rear Panel



1.	AC Input	Terminal block	
		Type B model	Single phase 200V input Connect to Line/Neutral/Ground.
		Type C model	Three pahse 200V input Connect to L1/L2/L3/Ground.
2.	DC Output Low voltage model	Busbar	Connect the busbar and load.
	High voltage model		Connect the output of each unit to the load.

3U type and 4U type connections are equivalent to 2U type connections.

1-3. Theory of Operation

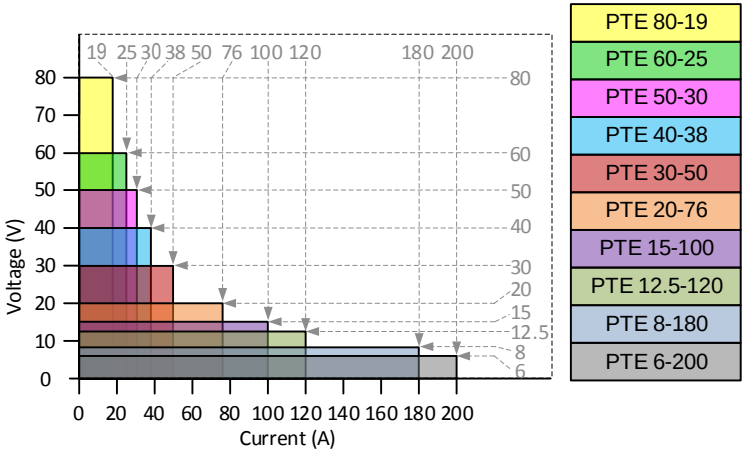
The theory of operation chapter describes the basic principles of operation, protection modes and important considerations that must be taken into account before use.

1-3-1. Operating Area Description

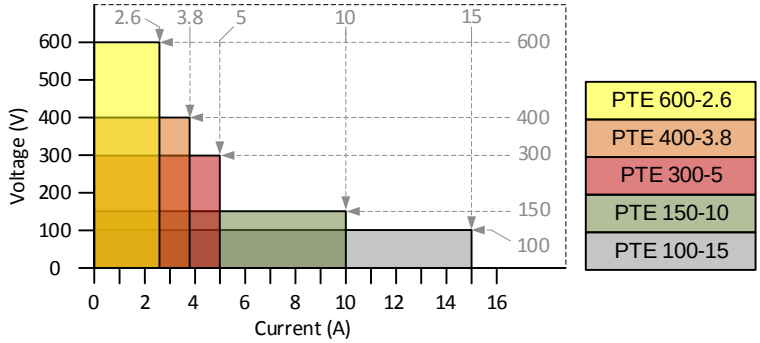
Background

The PTE power supplies are regulated DC power supplies with a high voltage and current output. These operate in CC or CV mode within a wide operating range limited only by the voltage or current output.
The operating area of each power supply is determined by the rated output power as well as the voltage and current rating.
Below is a comparison of the operating areas of each power supply.

PTE Series Operating Area (1U 6-80V models)



PTE Series Operating Area (1U 100-600V models)



1-3-2. CC and CV Mode

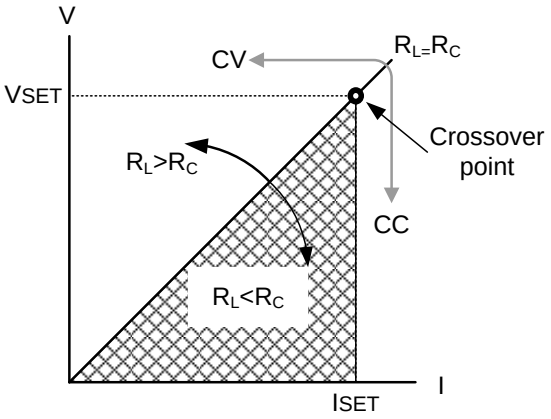
CC and CV mode Description

When the power supply is operating in constant current mode (CC) a constant current will be supplied to the load. When in constant current mode the voltage output can vary, whilst the current remains constant. When the load resistance increases to the point where the set current limit (I_{SET}) can no longer be sustained the power supply switches to CV mode. The point where the power supply switches modes is the crossover point.

When the power supply is operating in CV mode, a constant voltage will be supplied to the load, whilst the current will vary as the load varies. At the point that the load resistance is too low to maintain a constant voltage, the power supply will switch to CC mode and maintain the set current limit.

The conditions that determine whether the power supply operates in CC or CV mode depends on the set current (I_{SET}), the set voltage (V_{SET}), the load resistance (R_L) and the critical resistance (R_C). The critical resistance is determined by V_{SET}/I_{SET}. The power supply will operate in CV mode when the load resistance is greater than the critical resistance. This means that the voltage output will be equal to the V_{SET} voltage but the current will be less than I_{SET}. If the load resistance is reduced to the point that the current output reaches the I_{SET} level, the power supply switches to CC mode.

Conversely the power supply will operate in CC mode when the load resistance is less than the critical resistance. In CC mode the current output is equal to I_{SET} and the voltage output is less than V_{SET}.



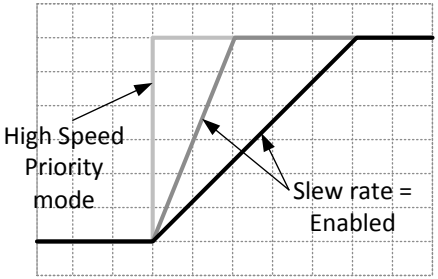
Note

For loads that generate a transient surge voltage, V_{SET} must be set so that the surge voltage does not reach the voltage limit.
For loads in which transient peak current flows, I_{SET} must be set so that the peak value does not reach the current limit.

1-3-3. Slew Rate

Theory

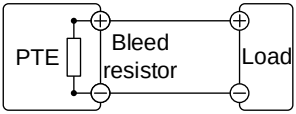
The PTE has selectable slew rates for CC and CV mode. This gives the PTE power supply the ability to limit the current/voltage draw of the power supply. Slew rate settings are divided into High Speed Priority and Slew Rate Priority. High speed priority mode will use the fastest slew rate for the instrument. Slew Rate Priority mode allows for user adjustable slew rates for CC or CV mode. The rising and falling slew rate can be set independently.



1-3-4. Bleeder Control

Background

The PTE DC power supplies employ a bleed resistor in parallel with the output terminals.



Bleed resistors are designed to dissipate the power from the power supply filter capacitors when power is turned off and the load is disconnected. Without a bleed resistor, power may remain charged on the filter capacitors for some time and be potentially hazardous.
In addition, bleed resistors also allow for smoother voltage regulation of the power supply as the bleed resistor acts as a minimum voltage load.
The bleed resistance can be turned on or off using the configuration settings.

Note

By default the bleed resistance is on. For battery charging applications, be sure to turn the bleed resistance off as the bleed resistor can discharge the connected battery when the unit is off.

1-3-5. Internal Resistance

Background	On the PTE, the internal resistance of the power supply can be user-defined in software. (Internal Resistance Setting, see the Normal Function Settings on page 61.) When the internal resistance is set it can be seen as a resistance in series with the positive output terminal. This allows the power supply to simulate power sources that have internal resistances such as lead acid batteries. By default the internal resistance is 0Ω.	
Internal Resistance Range(1U)	Unit Model	Internal Resistance Range
	PTE 6-200	0.000 ~ 0.030Ω
	PTE 8-180	0.000 ~ 0.044Ω
	PTE 12.5-120	0.000 ~ 0.104Ω
	PTE 15-100	0.000 ~ 0.150Ω
	PTE 20-76	0.000 ~ 0.263Ω
	PTE 30-50	0.000 ~ 0.600Ω
	PTE 40-38	0.000 ~ 1.053Ω
	PTE 50-30	0.000 ~ 1.667Ω
	PTE 60-25	0.000 ~ 2.400Ω
	PTE 80-19	0.000 ~ 4.210Ω
	PTE 100-15	0.000 ~ 6.667Ω
	PTE 150-10	0.00 ~ 15.00Ω
	PTE 300-5	0.00 ~ 60.00Ω
	PTE 400-3.8	0.0 ~ 105.3Ω
	PTE 600-2.6	0.0 ~ 230.8Ω

1-3-6. Alarms

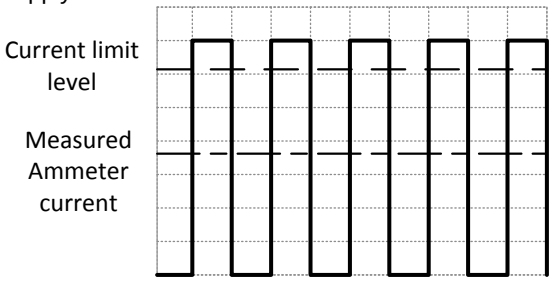
The PTE power supplies have a number of protection features. When one of the protection alarms is tripped, the ALM icon on the display will be lit and the type of alarm that has been tripped will be shown on the display. When an alarm has been tripped the output will be automatically turned off. For details on how to clear an alarm or to set the protection modes, please see page 30.

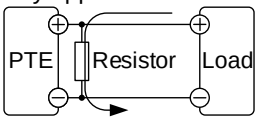
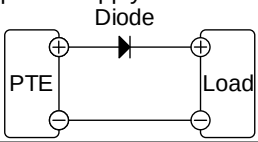
OVP	Over voltage protection (OVP) prevents a high voltage from damaging the load. This alarm can be set by the user.
OCP	Over current protection prevents high current from damaging the load. This alarm can be set by the user.
UVL	Under voltage limit. This function sets a minimum voltage setting level for the output. It can be set by the user.
OHP	Over temperature protection for slave and master board. OHP is a hardware protection function. Only when the unit has cooled can the over temperature protection alarms be cleared.
OH1	Master board over temperature protection.
OH2	Slave board over temperature protection.
ALM SENS	Sense alarm. This alarm will detect if the sense wires have been connected to the wrong polarity.

HW OVP	Hardware over voltage protection. This is a hardware OVP that is fixed at approximately 120% of the rated voltage output.
AC	AC Fail. This alarm function is activated when a low AC input is detected.
FAN FAIL	Fan failure. This alarm function is activated when the fan RPMs drop to an abnormally low level.
Shutdown	Force Shutdown is not activated as a result of the PTE series detecting an error. It is a function that is used to turn the output off through the application of a signal from the rear-panel analog control connector when an abnormal condition occurs.
Alarm output	Alarms are output via the analog control connector. The alarm output is an isolated open-collector photo coupler output.

1-3-7. Considerations

The following situations should be taken into consideration when using the power supply.

Inrush current	When the power supply switch is first turned on, an inrush current is generated. Ensure there is enough power available for the power supply when first turned on, especially if a number of units are turned on at the same time.
Pulsed or Peaked loads	When the load has current peaks or is pulsed, it is possible for the maximum current to exceed the mean current value. The PTE power supply ammeter only indicates mean current values, which means for pulsed current loads, the actual current can exceed the indicated value. For pulsed loads, the current limit must be increased, or a power supply with a greater capacity must be chosen. As shown below, a pulsed load may exceed the current limit and the indicated current on the power supply ammeter. 

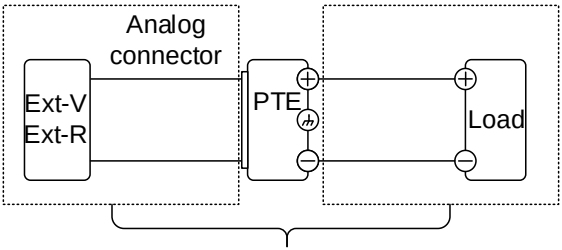
Reverse Current: Regenerative load	When the power supply is connected to a regenerative load such as a transformer or inverter, reverse current will feed back to the power supply. The PTE power supply cannot absorb reverse current. For loads that create reverse current, connect a resistor in parallel to the power supply to bypass the reverse current. This description only applies when the bleed resistance is off.  Reverse current
⚠ Note	The current output will decrease by the amount of current absorbed by the resistor. Ensure the resistor used can withstand the power capacity of the power supply/load.
Reverse Current: Accumulative energy.	When the power supply is connected to a load such as a battery, reverse current may flow back to the power supply. To prevent damage to the power supply, use a reverse-current-protection diode in series between the power supply and load. 
⚠ CAUTION	Ensure the reverse withstand voltage of the diode is able to withstand 2 times the rated output voltage of the power supply and the forward current capacity can withstand 3 to 10 times the rated output current of the power supply. Ensure the diode is able to withstand the heat generated in the following scenarios. When the diode is used to limit reverse voltage, remote sensing cannot be used.

1-3-8. Grounding

The output terminals of the PTE power supplies are isolated with respect to the protective grounding terminal. The insulation capacity of the load, the load cables and other connected devices must be taken into consideration when connected to the protective ground or when floating.

Floating

As the output terminals are floating, the load and all load cables must have an insulation capacity that is greater than the isolation voltage of the power supply.



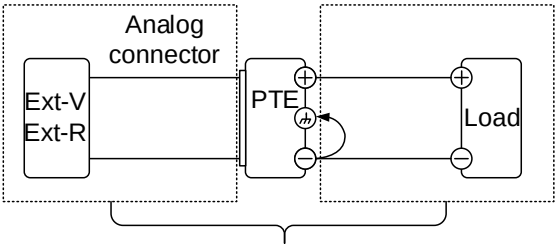
(·····) Insulation capacity ≥ isolation voltage of power supply

⚠ WARNING

If the insulation capacity of the load and load cables are not greater than the isolation voltage of the power supply, electric shock may occur.

Grounded output terminal

If the positive or negative terminal is connected to the protective ground terminal, the insulation capacity needed for the load and load cables is greatly reduced. The insulation capacity only needs to be greater than the maximum output voltage of the power supply with respect to ground.

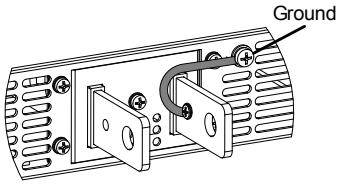


(·····) Insulation capacity ≥ voltage of power supply with respect to ground

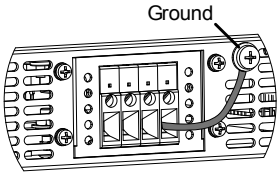
⚠ CAUTION

If using external voltage control, do not ground the external voltage terminal as this will create a short circuit.

Example of grounded output terminals



For low voltage models

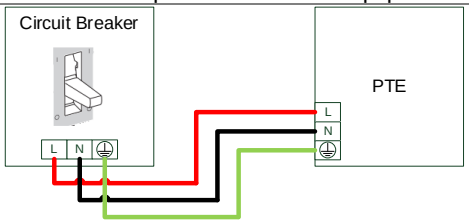


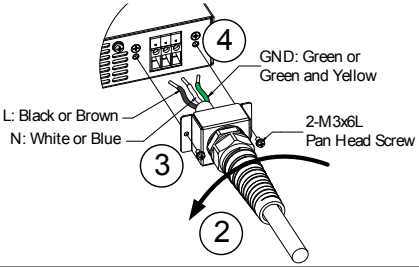
For high voltage models

2. OPERATION

2-1. Set Up

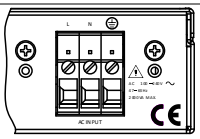
2-1-1. 1U Series Line Voltage Connection

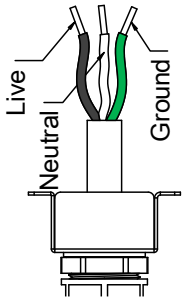
Background	The PTE power supplies use a universal power input that can be used with 100 and 240 Vac systems. To connect or replace the power cord (user supplied, specification below), use the procedure below:
⚠Warning	Ask for professional technician for installation. The permanently connected power input is used as the disconnecting device and shall remain readily operable. a. A switch or circuit-breaker must be included in the installation. b. It must be suitably located and easily reached. c. It must be marked as the disconnecting device for the equipment. d. It shall be located near the equipment. f. Do not position the equipment so that it is difficult to operate the disconnecting device. g. It shall not interrupt the protective earth conductor. h. It shall be complied with EN 60947 series, the rated voltage shall be at least equal to the rated input voltage of the equipment and the rated current shall be equal to the rated input current of the equipment.
	
Recommended Power Cord Specifications	25A 250V, 3x12 AWG, outer diameter: 9-11mm, rated 60 ºC min., 3mmaximum length and approved by the national safety standards for the country of use.
⚠Note	There are two type power cord protective sheaths in the standard accessories. One is black color and it is used for outer diameter: 8~13.5mm power cord. The other is gray color and it is used for outer diameter: 5.5~11.2mm power cord. The PTE has a number of power cord options available.
Removal	1. Turn off the power switch and circuit breaker. 2. Unscrew the power cord protective sheath. 3. Remove the 2 screws holding the power cord cover and remove. 4. Remove the AC power cord wires with a flat head screwdriver.



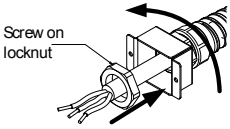
Installation

1. Connect the AC power cord wires to the AC input terminals.
   Black/Brown → Live (L)
   White/Blue → Neutral (N)
   Green /Green & Yellow → Ground (⏚)
   Wire gauge: Awg12 to Awg10.
   Wire diameter: 2.05mm-2.588mm.





2. Make sure the sheath is tightened to the lock nut.
3. Re-install the power cord cover.



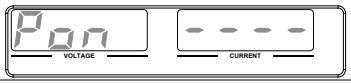
2-1-2. 1U Series Power Up

Steps

1. Connect the power cord to the universal power input.
2. Press the POWER switch on.

Page 19

3. The power supply will show the Power On settings (Pon) at start up. If no Power On settings are configured, the PTE will recover the state right before the power was last turned OFF. If used for the first time, the default settings will appear on the display.



Note	You may also configure how the PTE will behave on startup by altering the Power On Configuration settings, see page 67.
Power Down	To turn the PTE power supply off, press the power switch again (0 position). It may take a few seconds for the power supply to fully turn off.
CAUTION	The power supply takes around 8 seconds to fully turn on or shutdown. Do not turn the power on and off quickly. Please wait for the display to fully turn off. The power switch that is included in the instrument is not considered a disconnecting device. The circuit breaker/switch on the fixed wiring is used as the disconnecting device.

2-1-3. Wire Gauge Considerations

Background

Before connecting the output terminals to a load, the wire gauge of the cables should be considered.
It is essential that the current capacity of the load cables is adequate. The rating of the cables must equal or exceed the maximum current rated output of the instrument.

Recommended wire gauge

Wire Gauge	Nominal Cross Section	Maximum Current
20	0.5	9
18	0.75	11
18	1	13
16	1.5	18
14	2.5	24
12	4	34
10	6	45
8	10	64
6	16	88
4	25	120
2	32	145
1	50	190
00	70	240
000	95	290
0000	120	340

The maximum operation current depends on the maximum allowable temperature of the insulation on the cable.
Under this condition, above table figures the maximum current that insulation’s temperature rise should be under 60 degree and ambient temperature must be less than 30 degrees.
To minimize noise pickup or radiation, the load wires and remote sense wires should be twisted-pairs of the shortest possible length. Shielding of the sense leads may be necessary in high noise environments. Where

shielding is used, connect the shield to the chassis via the rear panel ground screw. Even if noise is not a concern, the load and remote sense wires should be twisted-pairs to reduce coupling, which might impact the stability of the power supply. The sense leads should be separated from the power leads.

2-1-4. 1U Series Output Terminals

Background

Before connecting the output terminals to the load, first consider whether voltage sense will be used, the gauge of the cable wiring and the withstand voltage of the cables and load.

The output terminals are of two types:

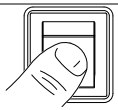
- Two solid bars equipped with M8 sized bolt and nuts for low voltage models (PTE 6-200, 8-180, 12.5-120, 15-100, 20-76, 30-50, 40-38, 50-30, 60-25)
- Clamp block terminals for medium and high voltage models (PTE 80-19, 100-15, 150-10,300-5, 400-3.8, 600-2.6).

WARNING

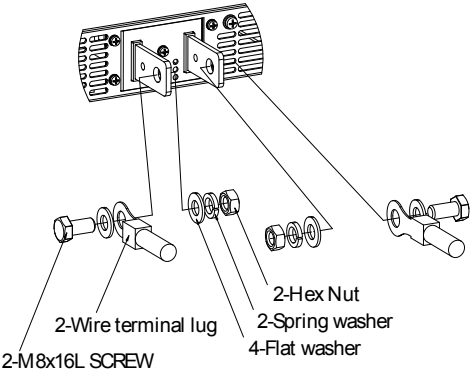
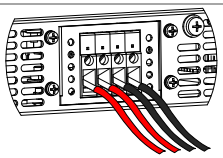
Dangerous voltages. Ensure that the power to the instrument is disabled before handling the power supply output terminals. Failing to do so may lead to electric shock.

Steps

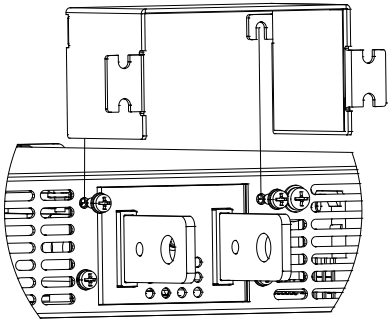
1. Turn the power switch off.



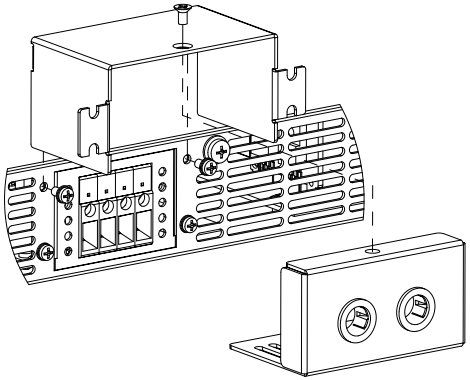
2. Remove the output terminal cover. Page 23
3. If necessary, connect the chassis ground terminal to either the positive or negative terminal. See the grounding chapter for details. Page 16
4. Choose a suitable wire gauge and crimping terminal for the load cables. Page 21
5. Connect the positive load cable to the positive output terminal and the negative cable to the negative output terminal.
6. Reattach the output terminal cover. Page 23

Connection Example (PTE 6-200, 8-180, 12.5-120, 15-100, 20-76, 30-50, 40-38, 50-30, 60-25)	Use the included M8-sized bolt set to connect the load cables to the output terminals. Make sure that the connections are tight and that washers and spring washers are used to ensure a good connection. 
(PTE 80-19, 100-15, 150-10, 300-5, 400-3.8, 600-2.6)	Simply secure the stripped connectors inside each terminal. Wire gauge: Awg14 to Awg10 Wire diameter: 1.63mm-2.588mm 

2-1-5. 1U Series Using the Output Terminal Cover

Steps	1. Partially unscrew the 2 screws beside the terminals. 2. Line-up the notches in the cover with the 2 screws. 3. Tighten the screws to secure the cover over the terminals.
(PTE 6-200, 8-180, 12.5-120, 15-100, 20-76, 30-50, 40-38, 50-30, 60-25)	

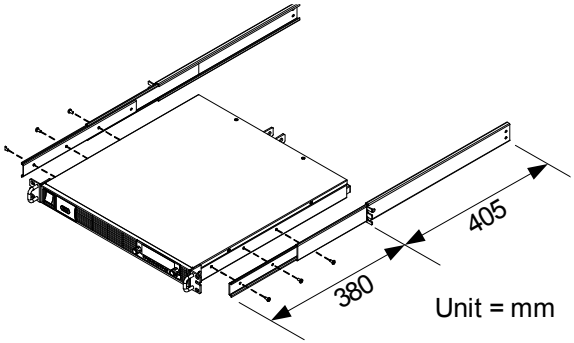
(PTE 80-19, 100-15, 150-10, 300-5, 400-3.8, 600-2.6)



Removal	Reverse the procedure to remove the terminal covers.

2-1-6. 1U Series Using the Rack Mount Kit

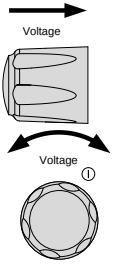
Background	The PTE series are designed to be directly mounted into 19 inch 1U rack mounts. The PTE can be installed using the sliding mounts (GW Part number: GRM-001). See the GRM-001 manual for installation instructions.
Rack mount diagram: Sliding mounts	The following diagram shows the approximate dimensions of the GRM-001 sliding mounts. These sliding mounts should only be used within racks with a depth of 500mm.

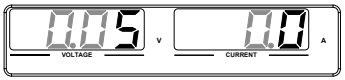


2-1-7. How to Use the Instrument

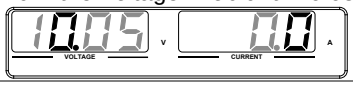
Background	The PTE power supplies use a novel method of configuring parameter values only using the voltage or current knobs. The knobs are used to quickly edit parameter values at 0.01, 0.1 or 1 unit steps at a time. When the user manual says to set a value or parameter, use the steps below.
Example	Use the Voltage knob to set a voltage of 10.05 volts.

1. Repeatedly press the Voltage knob until the least significant digit is highlighted. This will allow the voltage to be edited in 0.01 volt steps.
2. Turn the Voltage knob till 0.05 volts is shown on the voltage display.





3. Repeatedly press the Voltage knob until the most significant digit is highlighted. This will allow the voltage to be edited in 1 volt steps.
4. Turn the Voltage knob until 10.05 is shown.



Note

Notice the Set key becomes illuminated when setting the current or voltage.
If the voltage or current knobs are unresponsive, press the Set key first.

2-1-8. Reset to Factory Default Settings

Background

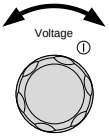
The F-88 configuration setting allows the PTE to be reset back to the factory default settings.

Steps

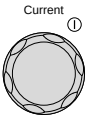
1. Press the Function key. The Function key will light up.

2. The display should show F-01 on the top and the configuration setting for F-01 on the bottom.

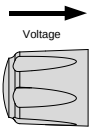
3. Rotate the Voltage knob to change the F setting to F-88 (Factory Set Value).



4. Use the Current knob to set the F-88 setting to 1 (Return to factory default settings).



5. Press the Voltage knob to confirm. ConF will be displayed when it is configuring.



6. Press the Function key again to exit. The Function key light will turn off.

2-1-9. View System Version and Build Date

Background

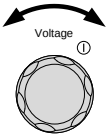
The F-89 configuration setting allows you to view the PTE version number, build date, keyboard version, analog-control version, kernel build, test command version and test command build date.

Steps

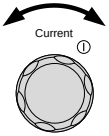
1. Press the Function key. The Function key will light up.

2. The display should show F-01 on the top and the configuration setting for F-01 on the bottom.

3. Rotate the Voltage knob to change the F setting to F-89 (Show Version).



4. Rotate the Current knob to view the version and build date for the various items.



F-89
- 0-XX: Version (1/2)
- 1-XX: Version (2/2)
- 2-XX: Build On-Year. (1/2)
- 3-XX: Build On-Year. (2/2)
- 4-XX: Build On-Month.
- 5-XX: Build On-Day.
- 6-XX: Keyboard CPLD. (1/2)
- 7-XX: Keyboard CPLD. (2/2)
- 8-XX: Analog Board CPLD. (1/2)
- 9-XX: Analog Board CPLD. (2/2)
- A-XX: Analog Board FPGA (1/2)
- B-XX: Analog Board FPGA. (1/2)
- C-XX: Kernel Build On-Year. (1/2)
- D-XX: Kernel Build On-Year. (2/2)
- E -XX: Kernel Build On-Month.
- F-XX: Kernel Build On-Day.
- G-XX: Test Command Version. (1/2)
- H-XX: Test Command Version. (2/2)
- I-XX: Test Command Build On-Year. (1/2)
- J-XX: Test Command Build On-Year. (2/2)
- K-XX: Test Command Build On-Month.

L-XX: Test Command Build On-Day.
M-XX: Reserved. (1/2)
N-XX: Reserved. (2/2)
O-XX: Option version. (1/2)
P-XX: Option version. (2/2)

5. Press the Function key again to exit.
   The Function key light will turn off.

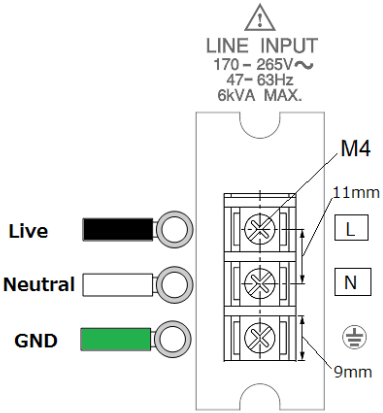
Example	Main Program Version: V01.00, 2013/06-01 0-01: Version 1-00: Version 2-20: Build On-Year. 3-13: Build On-Year. 4-06: Build On-Month. 5-01: Build On-Day.
Example	Keyboard CPLD Version: 0x030C 6-03: Keyboard CPLD Version. 7-0C: Keyboard CPLD Version.
Example	Analog CPLD Version: 0x0421 8-04: Analog CPLD Version. 9-21: Analog CPLD Version.
Example	Analog Board FPGA: 0x0241 A-02: Analog FPGA Version. B-41: Analog FPGA Version.
Example	Kernel Version: 2013/01/22 C-20: Kernel Build On-Year. D-13: Kernel Build On-Year. E-01: Kernel Build On-Month. F-22: Kernel Build On-Day.
Example	Test Command Version: V01:00, 2013/06/01 G-01: Test Command Version. H-00: Test Command Version. I-20: Test Command Build On-Year. J-13: Test Command Build On-Year. K-06: Test Command Build On-Month. L-01: Test Command Build On-Day.
Example	Reserved: M-XX: Reserved. N-XX: Reserved.
Example	Option version O-XX: Option version. (1/2) P-XX: Option version. (2/2)

2-1-10. 2U/3U/4U Series line Voltage Connection

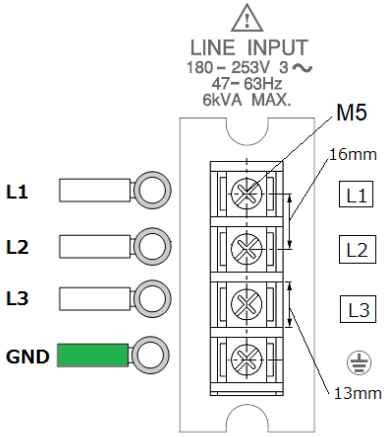
Installation

1. Press the POWER switch off.

2. Connect an AC source that matches the type from the terminal block.



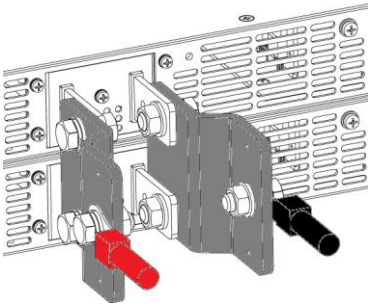
Type B:1P2W 200V



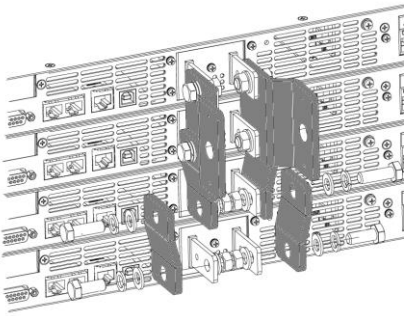
Type C:3P3W 200V

2-1-11. 2U/3U/4U Series Output Terminal

Different models have different outputs.

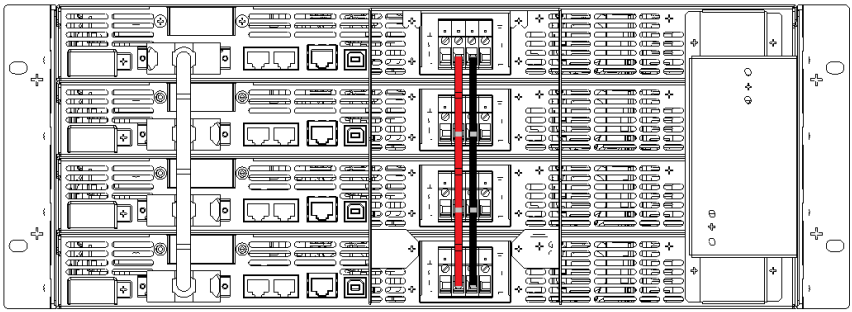


Low Voltage type (2U)



Low Voltage type (4U)

Low voltage models have output connections with busbars.
Connect a cable that matches the output capacity to the bar.
The screw uses M8.



High Voltage Type(4U)

The high voltage model has a wired output terminal.
Connect each output to a load.

2-2. Basic Operation

This section describes the basic operations required to operate the power supply.

Before operating the power supply, please see the Getting Started chapter, page 1.

2-2-1. Setting OVP/OCP/UVL Levels

The OVP level and OCP level has a selectable range that is based on the output voltage and output current, respectively. The OVP and OCP level is set to the highest level by default. The actual selectable OVP and OCP range depends on the PTE model.

When one of the protection measures are on, ALM indicator is lit red on the front panel and the type of alarm is also shown on the display. The ALM_CLR button can be used to clear any protection functions that have been tripped. By default, the output will turn off when the OVP or OCP protection levels are tripped.

The UVL will prevent you from setting a voltage that is less than the UVL setting. The UVL setting range is from 0% ~ 105% of the rated output voltage.

Example: OVP alarm

Before setting the protection settings:

Ensure the load is not connected.

Ensure the output is turned off.

Note

You can use the Function settings (F-13 and F-14) to apply limits to the voltage and current settings, respectively. You can set limitations so that the values do not exceed the set OVP and the set OCP level, and so that the values are not lower than the set UVL trip point. By using this feature, you can avoid turning the output off by mistakenly setting the voltage or current to a value that exceeds the set OVP or OCP level or to a value that is lower than the set UVL trip point.

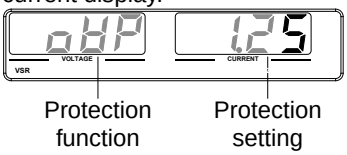
If you have selected to limit the voltage setting (F-14), you will no longer be able to set the output voltage to a value that is above about 95% of the OVP trip point or to a value that is lower than the UVL trip point.

If you have selected to limit the current setting (F-13), you will no longer be able to set the output current to a value that is above about 95% of the OCP trip point.

Steps

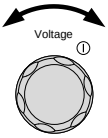
3. Press the PROT key. The PROT key lights up.

4. The OVP protection function will be displayed on the voltage display and the setting will be displayed on the current display.



Choose a Protection Function

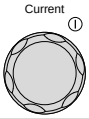
5. Use the Voltage knob to select a protection function.



Range OVP, OCP, UVL

Setting the Protection Level

6. Use the Current knob to set the protection level for the selected function.

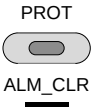


	Setting Range		
PTE Model	OCP	OVP	UVL
6-200	5~220	0.6~6.6	0~6.3
8-180	5~198	0.8~8.8	0~8.4
12.5-120	5~132	1.25~13.75	0~13.12
15-100	5~110	1.5~16.5	0~15.75
20-76	5~83.6	2~22	0~21
30-50	5~55	3~33	0~31.5
40-38	3.8~41.8	4~44	0~42
50-30	3~33	5~55	0~52.5
60-25	2.5~27.5	5~66	0~63
80-19	1.9~20.9	5~88	0~84
100-15	1.5~16.5	5~110	0~105
150-10	1~11	5~165	0~157.5
300-5	0.5~5.5	5~330	0~315
400-3.8	0.38~4.18	5~440	0~420
600-2.6	0.26~2.86	5~660	0~630

7. Press PROT again to exit. The PROT key light will turn off.

Clear OVP/OCP/UVL protection

The OVP, OCP or UVL protection can be cleared after it has been tripped by holding the ALM_CLR button for 3 seconds.

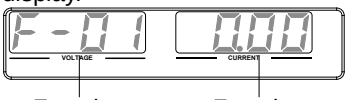


2-2-2. Set to C.V. Priority Mode

When setting the power supply to constant voltage mode, a current limit must also be set to determine the crossover point. When the current exceeds the crossover point, the mode switches to C.C. mode. For details about C.V. operation, see page 11. C.C. and C.V. mode have two selectable slew rates: High Speed Priority and Slew Rate Priority. High Speed Priority will use the fastest slew rate for the instrument while Slew Rate Priority will use a user-configured slew rate.

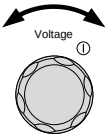
Background	Before setting the power supply to C.V. mode, ensure: The output is off. The load is connected.
Steps	1. Press the Function key. The Function key will light up.

2. The display will show the function (F-01) on the voltage display and the setting for the function in the current display.

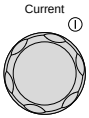


Function number — Function setting

3. Rotate the Voltage knob to change the F setting to F-03 (V-I Mode Slew Rate Select).



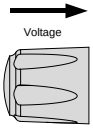
4. Use the Current knob to set the F-03 setting.

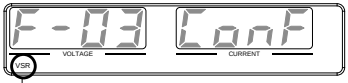


Set F-03 to 0 (CV High Speed Priority) or 2 (CV Slew Rate Priority).

F-03 0 = CV High Speed Priority
2 = CV Slew Rate Priority

5. Press the Voltage knob to save the configuration setting. ConF will be displayed when it is configuring.





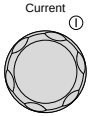
VSR indicator for CV Slew Rate Priority (F-03=2)

6. If CV Slew Rate Priority was chosen as the operating mode, set F-04 (Voltage Slew Rate Up) and the F-05 (Voltage Slew Rate Down) and save.

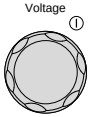
F-04 / F-05 0.001V~0.060V/msec (PTE 6-200)
0.001V~0.080V/msec (PTE 8-180)
0.001V~0.125V/msec (PTE 12.5-120)
0.001V~0.150V/msec (PTE 15-100)
0.001V~0.200V/msec (PTE 20-76)
0.001V~0.300V/msec (PTE 30-50)
0.001V~0.400V/msec (PTE 40-38)
0.001V~0.500V/msec (PTE 50-30)
0.001V~0.600V/msec (PTE 60-25)
0.001V~0.800V/msec (PTE 80-19)
0.001V~1.000V/msec (PTE 100-15)
0.001V~1.500V/msec (PTE 150-10)
0.001V~1.500V/msec (PTE 300-5)
0.001V~2.000V/msec (PTE 400-3.8)
0.001V~2.400V/msec (PTE 600-2.6)

7. Press the Function key again to exit the configuration settings. The function key light will turn off.

8. Use the Current knob to set the current limit (crossover point).



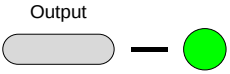
9. Use the Voltage knob to set the voltage.



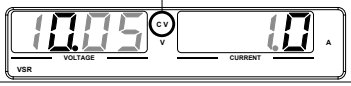
Note

Notice the Set key becomes illuminated when setting the current or voltage. If the Voltage or Current knobs are unresponsive, press the Set key first.

10. Press the Output key. The Output ON LED becomes lit.



CV will become illuminated (center)



Note

Only the voltage level can be altered when the output is on. The current level can only be changed by pressing the Set key.

For more information on the Normal Function Settings, see page 61.

2-2-3. Set to C.C. Priority Mode

When setting the power supply to constant current mode, a voltage limit must also be set to determine the crossover point. When the voltage exceeds the crossover point, the mode switches to C.V. mode. For details about C.C. operation, see page 11. C.C. and C.V. mode have two selectable slew rates: High Speed Priority and Slew Rate Priority. High Speed Priority will use the fastest slew rate for the instrument while Slew Rate Priority will use a user-configured slew rate.

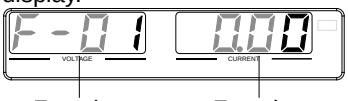
Background

Before setting the power supply to C.C. mode, ensure:
The output is off.
The load is connected.

Steps

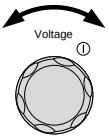
1. Press the Function key. The Function key will light up.

2. The display will show the function (F-01) on the voltage display and the setting for the function in the current display.

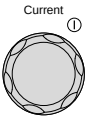


Function number — Function setting

3. Rotate the Voltage knob to change the F setting to F-03 (V-I Mode Slew Rate Select).

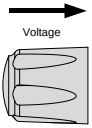


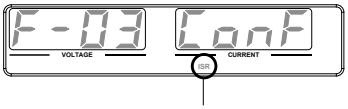
4. Use the Current knob to set the F-03 setting.
Set F-03 to 1 (CC High Speed Priority) or 3 (CC Slew Rate Priority) and save.



F-03 1 = CC High Speed Priority
3 = CC Slew Rate Priority

5. Press the Voltage knob to save the configuration setting. ConF will be displayed when it is configuring.





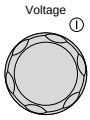
ISR indicator for CC Slew Rate Priority (F-03=3)

6. If CC Slew Rate Priority was chosen as the operating mode, set F-06 (Current Slew Rate Up) and F-07 (Current Slew Rate Down) and save.

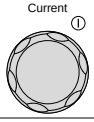
F-06 / F-07 0.001A~2.000A / msec (PTE 6-200)
0.001A~1.800A / msec (PTE 8-180)
0.001A~1.200A / msec (PTE 12.5-120)
0.001A~1.000A / msec (PTE 15-100)
0.001A~0.760A / msec (PTE 20-76)
0.001A~0.500A / msec (PTE 30-50)
0.001A~0.380A / msec (PTE 40-38)
0.001A~0.300A / msec (PTE 50-30)
0.001A~0.250A / msec (PTE 60-25)
0.001A~0.190A / msec (PTE 80-19)
0.001A~0.150A / msec (PTE 100-15)
0.001A~0.100A / msec (PTE 150-10)
0.001A~0.025A / msec (PTE 300-5)
0.001A~0.008A / msec (PTE 400-3.8)
0.001A~0.006A / msec (PTE 600-2.6)

7. Press the Function key again to exit the configuration settings. The Function key light will turn off.

8. Use the Voltage knob to set the voltage limit (crossover point).



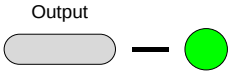
9. Use the Current knob to set the current.



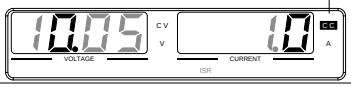
Note

Notice the Set key becomes illuminated when setting the current or voltage. If the Voltage or Current knobs are unresponsive, press the Set key first.

10. Press the Output key. The Output key becomes illuminated.



CC will become illuminated (right)



Note

Only the current level can be altered when the output is on. The voltage level can only be changed by pressing the Set key.

For more information on the Normal Function Settings, see page 61.

2-2-4. Panel Lock

The panel lock feature prevents settings from being changed accidentally. When activated, the Lock/Local key will become illuminated and all keys and knobs except the Lock/Local key and Output key (if active) will be disabled.
If the instrument is remotely controlled via the USB/LAN interface, the panel lock is automatically enabled.

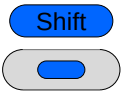
Activate the panel lock	Press the Lock/Local key to active the panel lock. The key will become illuminated.	Lock/Local 
Disable the panel lock	Hold the Lock/Local key for ~3 seconds to disable the panel lock. The key's light will turn off.	Lock/Local  Unlock

2-2-5. Save Setup

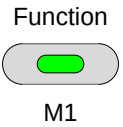
The PTE has 3 dedicated keys (M1, M2, M3) to save the set current, set voltage, OVP, OCP and ULV settings.

Save Setup

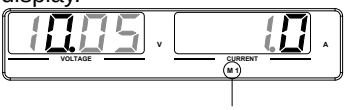
1. Press the SHIFT key. The shift key will light blue.



2. Hold the desired memory key for >3 seconds (M1, M2, M3).



3. When the setup is saved the unit will beep, the setup will be saved and the memory number will be shown on the display.



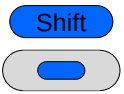
Saved setup

2-2-6. Recall Setup

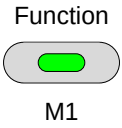
The PTE has 3 dedicated keys (M1, M2, M3) to recall setups.

Save Setup

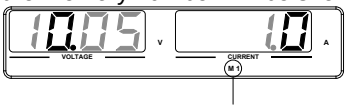
1. Press the SHIFT key. The shift key will light blue.



2. Hold the desired memory key to recall the desired setup (M1, M2, M3).



3. When the setup is recalled the setup will be loaded and the memory number will be shown on the display.



Recalled setup

⚠ Note	The F-15 function setting will determine whether the saved contents of the recalled memory setting are displayed or not.

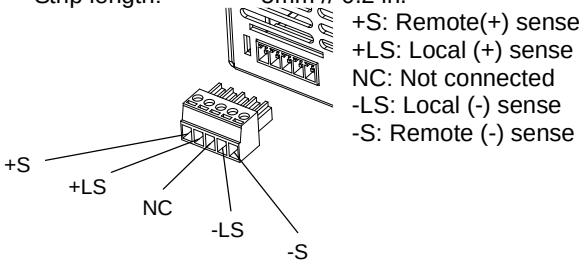
2-2-7. Voltage Sense

The PTE power supplies can be operated using local or remote voltage sense. By default the PTE ships configured for local sense.

2-2-7-1. Remote Sense Connector

The Remote Sense connector includes a detachable plug to facilitate making the sense connections. The remote sense connector also has a safety cover.

⚠ WARNING	Ensure the output is off before handling the remote sense connector. Use sense cables with a voltage rating exceeding the isolation voltage of the power supply. Never connect sensing cables when the output is on. Electric shock or damage to the power supply could result.
Remote Sense Connector Overview	When using the remote sense connector make sure the wires that are used follow the following guidelines: Wire gauge: AWG 28 to AWG 16 Wire diameter: 0.320mm-1.29mm Strip length: 5mm // 0.2 in.



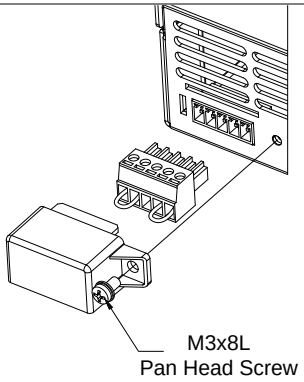
2-2-7-2. Remote Sense Cover

⚠ WARNING	Ensure the output is off before handling the remote sense connector. Use sense cables with a voltage rating exceeding the isolation voltage of the power supply. Never connect sensing cables when the output is on.

Electric shock or damage to the power supply could result. Always operate the PTE with the remote sense cover.

Connector

1. Place the cover over the remote sense connector.
2. Secure the cover with the provided screw.

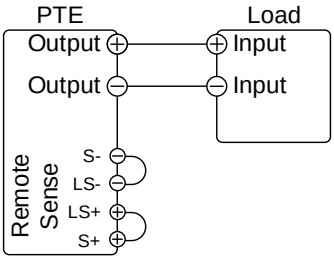


2-2-7-3. Local Sense

When using local sense, the sensing terminals are connected to the local sense terminals (via the local sense connections) and thus do not compensate for any possible voltage drop that is seen on the load cables. Local sense is only recommended when the voltage drop is of no consequence or for load-current applications. By default, the sense plug is already configured to local sensing.

Local Sense Connection

Page 37



2-2-7-4. Remote Sense

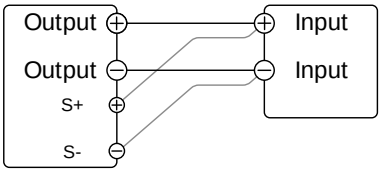
Remote sense is used to compensate for the voltage drop seen across load cables due to the resistance inherent in the load cables. The remote sense terminals are connected to the load terminals of the DUT to determine the voltage drop across the load cables.

Remote sense can compensate up to 1 volt (PTE 6-200/8-180/ 12.5-120/15-100/20-76), 1.5 volts (PTE 30-50), 2 volts (PTE 40-38 /50-30), 3 volts (PTE 60-25), 4 volts (PTE 80-19) or 5 volts (PTE 100-15/150-10/300-5/400-3.8/ 600-2.6) (compensation voltage, single line). Load cables should be chosen with a voltage drop less than the compensation voltage.

Although you can use remote sense to compensate up to 5V for a single line, it is recommended that the voltage drop is minimized to a maximum of 1V to prevent excessive output power consumption from the power supply and poor dynamic response to load changes.

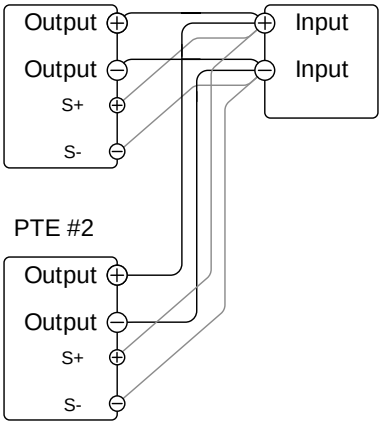
⚠ WARNING		Ensure the output is off before connecting any sense cables. Use sense cables with a voltage rating exceeding the isolation voltage of the power supply. Never connect sensing cables when the output is on. Electric shock or damage to the power supply could result.
⚠ Note		Be sure to remove the sense jumpers from the remote sense connector so the unit is not using local sensing.
Single Load	1.	Connect the S+ terminal to the positive potential of the load. Connect the S- terminal to the negative potential of the load.

PTE Load Page 37



	2.	Operate the instrument as normal. See the Basic Operation chapter for details. Page 28
Parallel PTE Units	3.	Connect the S+ terminals to the positive potential of the load. Connect the S- terminals to the negative potential of the load.

PTE #1 Load Page 37

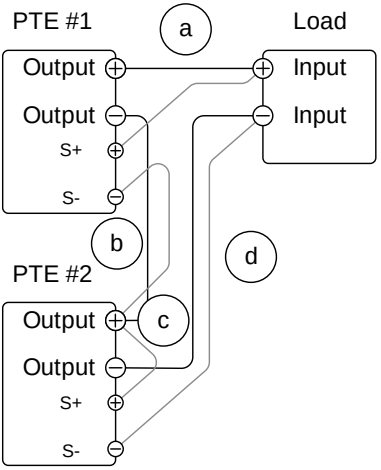


	4.	Operate the instrument as normal. See the Parallel Operation chapter for details. Page 41

Serial PTE Units

5. a. Connect the 1st S+ terminal to the positive potential of the load.
   b. Connect the 1st S- terminal to the positive output terminal of the second PTE unit.
   c. Connect the 2nd S+ terminal to the positive terminal of the second PTE unit.
   d. Connect the 2nd S- terminal to negative terminal of the load.

Page 37

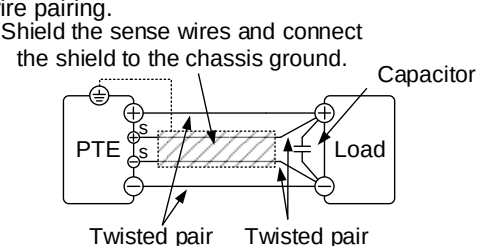


6. Operate the instrument as normal. See the Serial Operation chapter for details.

Page 47

Wire Shielding and Load line impedance

To help to minimize the oscillation due to the inductance and capacitance of the load cables, use an electrolytic capacitor in parallel with the load terminals.
To minimize the effect of load line impedance use twisted wire pairing.



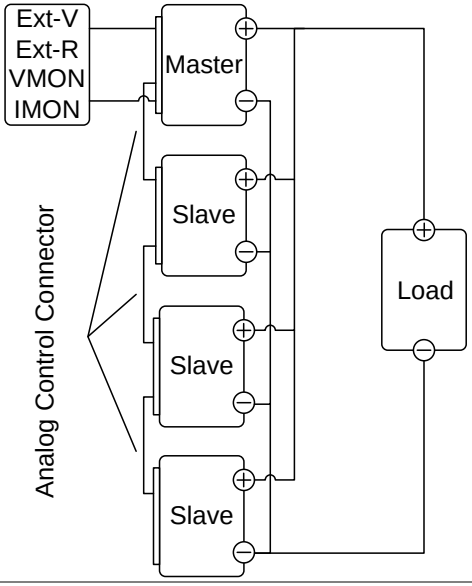
2-3. Parallel / Series Operation

This section describes the basic operations required to operate the power supply in series or parallel. Operating the PTE series in parallel increases the total current output of the power supply units. When used in series, the total output voltage of the power supplies can be increased.

When the units are used in parallel or in series, a number of precautions and limitations apply. Please read the following sections before operating the power supplies in parallel or series.

2-3-1. Master-Slave Parallel Overview

Background	When connecting the PTE power supplies in parallel, up to 4 units can be used in parallel and all units must be of the same model with similar output settings. To use the power supplies in parallel, units must be used in a “master-slave” configuration. In the master-slave configuration a “master” power supply controls any other connected “slave” power supplies. In order for the master unit to control the slave units, the master unit must use the analog control connector to control the slave units. When using the Analog Control Connector, the connector must be wired correctly between the master and each of the slave units. For the complete connector pin assignment, see page 72, or alternatively, the PSU-01C, PSU-02C and the PSU-03C cables can be used to connect a master to unit to 1, 2 or 3 slave units, respectively.



Limitations

Display

Only the master unit will display the voltage and current.

OVP/ OCP/UVL

Slave units follow the settings of the master when OVP/OCP/UVL is tripped on the master unit.

Remote monitoring

Voltage monitoring (VMON) and current monitoring (IMON) are only supported on the master unit.

The IMON current represents the total current of the all the parallelized units.

Remote Sense

Please see the remote sense chapter for details, page 38.

Parallel Calibration

The parallel calibration function can be used to offset cables losses.

External Voltage and Resistance Control

Voltage/Resistance controlled remote control can only be used with the master unit.

The full scale current (in parallel) is equivalent to the maximum external voltage or resistance.

Internal Resistance

For 2 units in parallel, the internal resistance is actually half of the setting value.

For 3 units in parallel, the internal resistance is actually a third of the setting value.

For 4 units in parallel, the internal resistance is actually a fourth of the setting value.

See function setting F-08 for internal resistance settings, page 63.

Bleeder Control

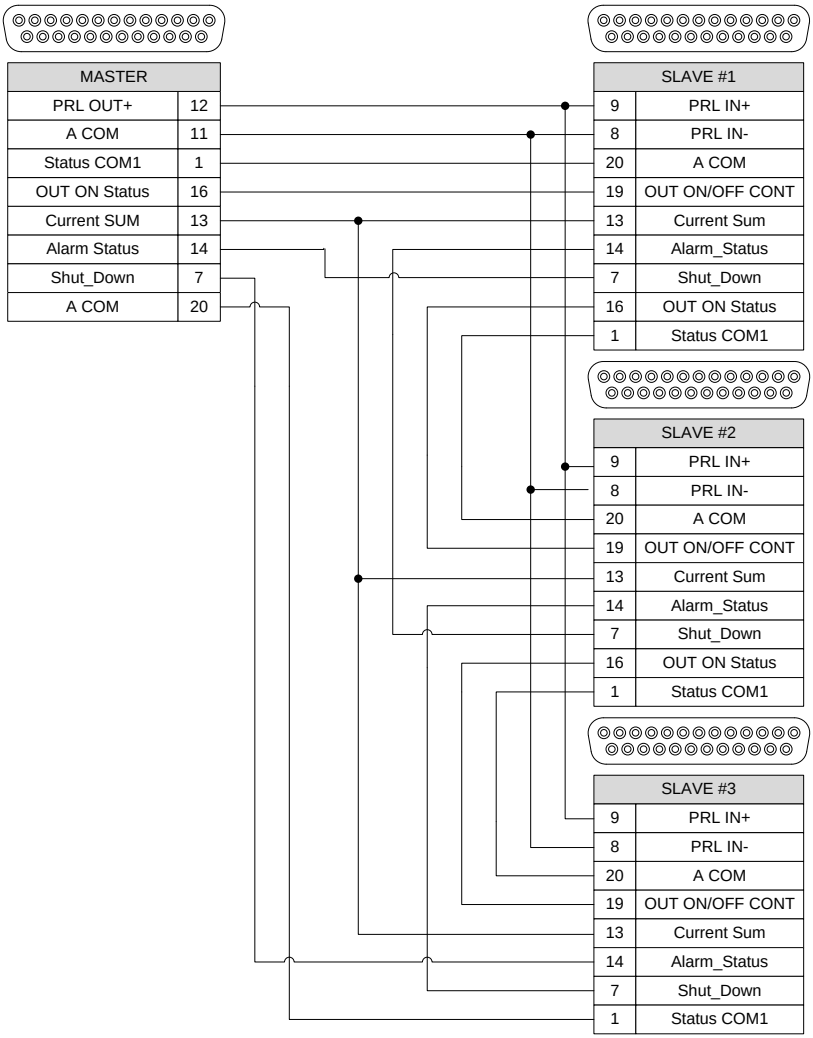
The Master unit is used to control the bleeder settings. The bleeder resistors in all the slave units are always turned off when in parallel mode.

Output Voltage/ Output Current	Model	1 unit	2 units	3 units	4 units
	PTE 6-200	6V 200A	6V 400A	6V 600A	6V 800A
	PTE 8-180	8V 180A	8V 360A	8V 540A	8V 720A
	PTE 12.5-120	12.5V 120A	12.5V 240A	12.5V 360A	12.5V 480A
	PTE 15-100	15V 100A	15V 200A	15V 300A	15V 400A
	PTE 20-76	20V 76A	20V 152A	20V 228A	20V 304A
	PTE 30-50	30V 50A	30V 100A	30V 150A	30V 200A
	PTE 40-38	40V 38A	40V 76A	40V 114A	40V 152A
	PTE 50-30	50V 30A	50V 60A	50V 90A	50V 120A
	PTE 60-25	60V 25A	60V 50A	60V 75A	60V 100A
	PTE 80-19	80V 19A	80V 38A	80V 57A	80V 76A
	PTE 100-15	100V 15A	100V 30A	100V 45A	100V 60A
	PTE 150-10	150V 10A	150V 20A	150V 30A	150V 40A
	PTE 300-5	300V 5A	300V 10A	300V 15A	300V 20A
	PTE 400-3.8	400V 3.8A	400V 7.6A	400V 11.4A	400V 15.2A
	PTE 600-2.6	600V 2.6A	600V 5.2A	600V 7.8A	600V 10.4A

2-3-2. Master-Slave Parallel Connection

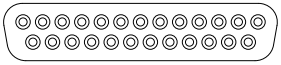
Analog Control Connection

To operate the power supplies in parallel with the analog connectors, connect the analog connectors on the master and slave units as shown in the diagrams below. Alternatively, preconfigured cables can be used:
PSU-01C: 1 master with 1 slave
PSU-02C: 1 master with 2 slaves
PSU-03C: 1 master with 3 slaves



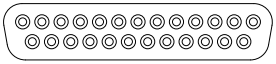
Note

After the power supplies are connected in parallel, if you want to use the analog connector to control the power supplies, you must disassemble the cable of the master and then wire it yourself for control.
Pin signal diagram is as shown below.



MASTER	
EXT-V/R CV CONT	22
A COM	23
EXT-V/R CC CONT	21
A COM	23
OUT ON/OFF CONT	19
A COM	20

The model of connecting in parallel has no place voltage problem and can be used in common ground.
The model of connecting in series has high voltage due to the location. If analog control is to be used, it cannot be used in common ground and requires isolation control.
Pin signal diagram is as shown below.

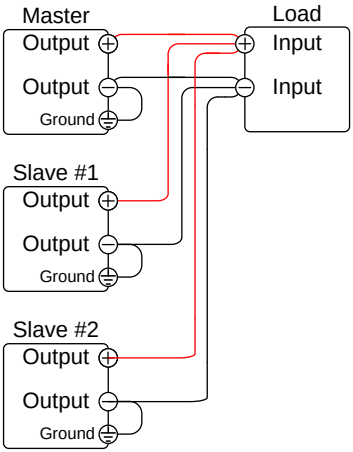


MASTER	
Isolated Analog	22
0-10V	23
Isolated Analog	21
0-10V	23
NO relay driven	19
By 24V DO	20

Parallel Output Connection

If grounding the positive or negative terminals to the reference ground, be sure to ground the appropriate terminal on each unit (either positive or negative).

Example with negative terminal connected to ground



Steps

1. Ensure the power is off on all power supplies.
2. Choose a master and a slave unit(s).
3. Connect the analog connectors for the master and slave units as shown above.
4. Remove the Output Terminal covers. Page 23
5. Connect the master and slave unit in parallel as shown above.
6. Reattach the terminal covers. Page 23

Note

Ensure the load cables have sufficient current capacity. Page 21
The load wires and remote sense wires should use twisted-paired wiring of the shortest possible length.

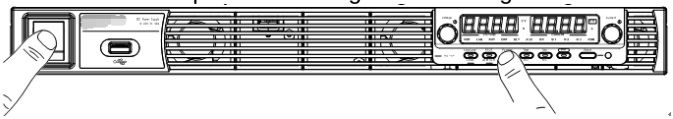
2-3-3. Master-Slave Parallel Operation

Master-Slave Configuration

Before using the power supplies in parallel, the master and slave units need to be configured.

Steps

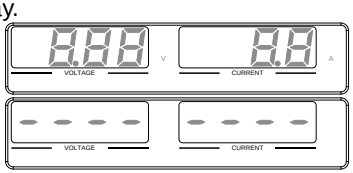
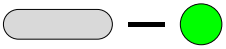
1. Configure the OVP, OCP and ULV settings for the master unit. Page 30
2. For each unit, hold the Function key while turning the power on to enter the power on configuration settings.



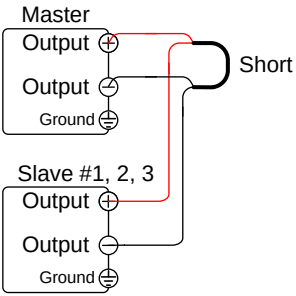
3. Configure F-93 (Master/Slave) setting for each master/slave unit. Page 70

Unit	F-93
Independent (default setting)	0
Master unit with 1 slave in parallel	1
Master unit with 2 slaves in parallel	2
Master unit with 3 slaves in parallel	3
Slave (parallel)	4

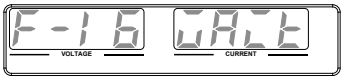
4. Cycle the power on the units (reset the power).

⚠ Note	Configuration settings can be checked on both the master and slave units by pressing the Function key and checking F-93. Only the Master OVP, OCP and UVL settings are used for protection. Slave protection levels are disregarded. OHP works independently for each unit.
Master-Slave Operation	Only operate the power supplies in parallel if the units are configured correctly.
Steps	5. Turn on the master and slave units. The slave unit(s) will show a blank display. Master unit Slave units  6. Operation of all units is controlled via the master unit. Operation of the master unit is the same as for a single unit. See the Basic Operation chapter. Page 28. 7. Press the Output key to begin. The output LED will become lit. Output 
⚠ Caution	Only operate the power supplies in parallel if using units of the same model number.
⚠ Note	The panel controls are disabled on slave units, including the output key. On slave units, only the Function key can be used to view the current settings.

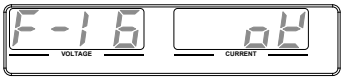
2-3-4. Master-Slave Parallel Calibration

Master-Slave Configuration	The F-16 function setting can be used to calibrate the output of PTE units connected in parallel. If you feel the accuracy is not good enough when you measure the accuracy in parallel mode, the parallel calibration can be used to get better measurement accuracy.
Steps	1. Short all the terminals together. This is best accomplished by connecting the master and all the slave units in parallel and then shorting the output terminals. 

2. Connect the slave units to the master unit using the analog control connectors as described previously. Page 44
3. Configure F-93 (Master/Slave) setting for each master/slave unit, as described previously. Page 46
4. Cycle the power on the units (reset the power).
5. On the master unit, set F-16 (Auto Calibration Parallel Control) to 2 to turn on the parallel calibration. Calibration will begin immediately. Page 63
6. Whilst calibration is being performed, *WAIT* will be displayed on the master screen. Calibration will take a few moments.



7. When the calibration has finished, *OK* will be displayed on the master screen.



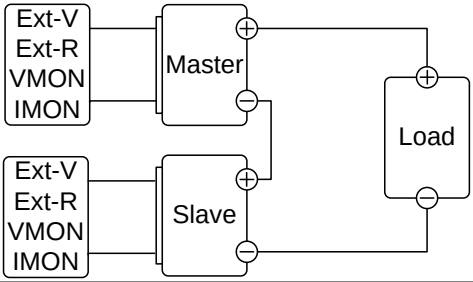
8. Remove the shorts from the terminals, and proceed with parallel operation.

Note When performing parallel calibration, make sure the terminals are connected with cables or bus bars that are able to withstand the combined current capacity of all the units in parallel.

2-3-5. Master-Slave Series Overview

Background

When connecting PTE power supplies in series, up to 2 units can be used in series and all units must be of the same model. When operated in series, the power supplies can be used to increase the voltage output or setup the power supplies to output both positive and negative polarities. Unlike with the parallel operation, the series operation does not require any special configuration as each power supply is operated and controlled individually.
When the units are used in series, a number of precautions and limitations apply. Please read this overview before operating the power supplies in series.

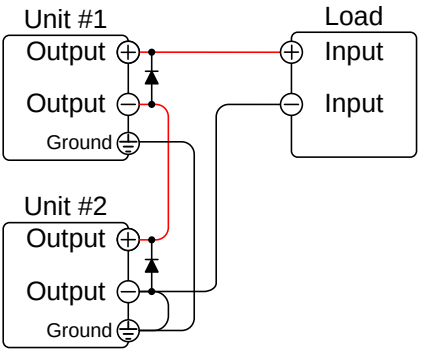


Limitations	Display Master and slave units display both the current and the voltage. The total voltage is the sum of the units. OVP/OCP/UVL OVP, OCP and UVL level for each unit must be set separately. The OVP and OCP protections are tripped independently on the master and slave. Remote monitoring Voltage monitoring (VMON) and current monitoring (IMON) should be performed on both units. The VMON voltage represents the voltage of that particular unit. Remote Sense Please see the voltage sense chapter for details, page 37. External Voltage and Resistance Control Voltage/Resistance controlled remote control should be used on both units separately. The full scale voltage (in series) is equivalent to the maximum external voltage or resistance. Slew Rate The slave rate should be set for both units. Internal Resistance The internal resistance should be set for both units. Bleeder Control The bleeder resistor setting should be set equally on both units.
⚠ CAUTION	When using analog control connector to program or measure with PTE power supplies connected in series, make sure that each unit is separated and floating from each other.
⚠ WARNING	When PTE power supplies are connected in series and the load or one of the output terminals is grounded, no point on the output shall be more than ±600VDC above or below chassis ground.

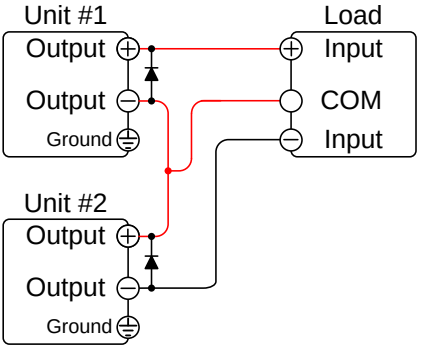
2-3-6. Series Connection

If using the PTE in series, please be aware that each unit acts independently and thus there are no special communication buses for serial connections.

Series Connection to increase Voltage Output



Series Connection to Output Positive and Negative Polarity



Note — The output reference ground (COMMON) can be grounded at the power supply side instead of the load, depending on the requirements. Local sensing should be used in this configuration.

Caution — When connecting the units in series, diodes should be connected across each output to prevent reverse voltage.

Steps

1. Ensure the power is off on both power supplies.
2. Connect the master and slave unit in series as shown above to either increase the voltage output or to create a positive and negative output. Remember that how the units are grounded depends on the configuration of the series connection.
3. Use diodes across the output terminals to prevent reverse voltage at startup or if one of the units unexpectedly shuts down. Ensure the diodes are rated to withstand the voltage and current output of the power supply.
4. Reattach the terminal cover. Page 23

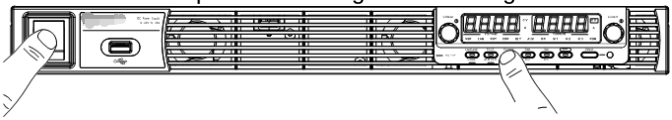
Note — Ensure load cables have sufficient current capacity. Page 21

2-3-7. Series Operation

Series Configuration

Before using the power supplies in series, the master and slave units need to be configured.

1. Configure the OVP, OCP and UVL settings for each unit. Page 30
2. For each unit, hold the Function key while turning the power on to enter the power on configuration settings.



3. Make sure each unit is set to Independent (F-93 = 0). When using the power supplies in series, each unit is operated individually, and thus no unit is considered the master or slave. Page 70

Unit	F-93
Independent	0

4. Cycle the power on the units (reset the power).

Note

Configuration settings can be checked for both the master and slave units by pressing the Function key.

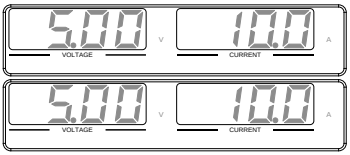
Series Operation

Only operate the power supplies in series if the units are configured correctly.

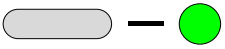
5. Turn on both units. When connected in series unit will only show the voltage and current of their own unit.

Unit #1

Unit #2



6. Operation of both units is the same as for a single unit. Each unit will only draw as much power as is programmed. Please see the basic operation chapter for details. Page 28
7. Press the Output key on each unit to begin. The output LED will become lit.



CAUTION

Only operate the power supplies in series if using units of the same model number.
Only a maximum of 2 units can be used in series.

CAUTION

Ensure that the insulation capacity of the wiring is sufficient when connected in series. See page 16 for insulation capacity and grounding details.

2-4. Test Scripts

This section describes how to use the Test function to run, load and save test scripts for automated testing. The Test function is useful if you want to perform a number of tests automatically. The PTE test function can store ten test scripts in memory.
Each test script is programmed in a scripting language. For more information on how to create test scripts, please contact TEXIO TECHNOLOGY.

2-4-1. Test Script File Format

Background	The test files are saved in *.tst file format. Each file is saved as tXXX.tst, where XXX is the save file number 001~010.

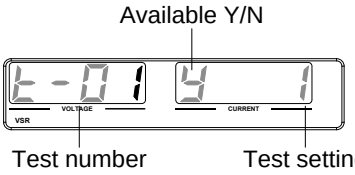
2-4-2. Test Script Settings

Test Run	Runs the chosen test script from the internal memory. A script must first be loaded into the internal memory before it can be run. See the test function Test Save, below. The script will run as soon as the test function is started. T-01 1~10
Test Copy	Copies a test script from the USB drive to the designated save slot in memory. A script must first be copied into internal memory before it can be run. T-02 1~10 (USB→PTE)
Test Export	Exports a script from the designated memory save slot to the USB drive. T-03 1~10 (PTE→USB)
Test Remove	Deletes the chosen test file from the PTE internal memory. T-04 1~10
Available Test Memory	Shows the amount of space left in memory for tests. T-05 Displays the available memory in bytes.

2-4-3. Setting the Test Script Settings

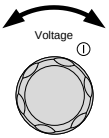
Steps	The test script settings (T-01~T-10) are set with the Test key. 1. Press the Test key. The Test key will light up.

2. The display will show T-01 on the left and the memory no. for T-01 on the right.
   The middle of the display will indicate if the desired file is available in memory or not. Y indicates Yes, N indicates No.

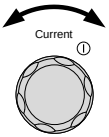


3. Rotate the Voltage knob to change the T setting (Test setting).

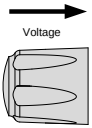
Test Run	T-01
Test Copy	T-02
Test Export	T-03
Test Remove	T-04



4. Rotate the Current knob to choose a memory number. (Excluding T-05)
   Range 1~10



5. Press the Voltage knob to complete the setting.



Exit — Press the Test key again to exit the Test settings. The Test key light will turn off.

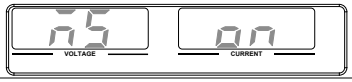
2-4-4. Load Test Script from USB

Overview — Before a test script can be run, it must first be loaded into a one of the 10 memory save slots. Before loading a test script into memory:
Ensure the script file is placed in the root directory.
Ensure the file name number corresponds to the memory number that you wish to save to. For example t001.tst can only be loaded into memory number #01, t002.tst into memory number #02, and so on.
Use the T-05 setting to see how much memory is available in internal memory.

Steps

1. Insert a USB flash drive into the front panel USB-A slot. Ensure the flash drive contains a test script in the root directory.

2. Turn on the power. MS ON (Mass Storage) will be displayed on the screen after a few seconds if the USB drive is recognized. Conversely, MS OFF will be displayed if removed.



Note

If the USB drive is not recognized, check to see that the function settings for F-20 = 1 (page 64). If not, reinsert the USB flash drive.

3. Configure T-02 (Test Copy) to 1~10 (save memory slot) Page 52
   T-02 range 1~10
4. OK will be displayed when completed.
5. The script will now be available in the memory slot the script was saved to.

Note

Error messages: If you load a file that is not present on the USB drive “Err 002” will be displayed on the display.

2-4-5. Run Test Script

Overview

A test script can be run from one of ten memory slots.

Steps

1. Before a test script can be run, it must first be loaded into one of the 10 memory save slots. Page 53
2. Configure T-01 (Run Test) to 1~10 (save memory slot no. to run) Page 52
   T-01 range 1~10
3. The test script will automatically start to run.

Note

Error messages: If you try to run a test script from an empty memory location “Err 003” will be displayed on the display.

Stop a Test

To stop (abort) a running test at any time, press the Test key. TEST STOP will be displayed and the unit will return to normal operation after a few moments.

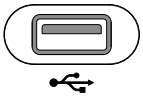
2-4-6. Export Test Script to USB

Overview

The Export Test function saves a test file to the root directory of a USB flash drive.
Files will be saved as tXXX.tst where XXX is the memory number 001~010 from which the test script was exported from.
Files of the same name on the USB flash drive will be written over.

Steps

1. Insert a USB flash drive into the front panel USB-A slot.



2. Turn on the power. MS (Mass Storage) will be displayed on the screen after a few seconds if the USB drive is recognized.

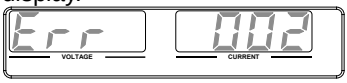
Note

If the USB drive is not recognized, check to see that the function settings for F-20 = 1 (page 63). If not, reinsert the USB flash drive.

3. Configure T-03 (Test Export) to 1~10 (save memory slot)
   T-03 range 1~10
   Page 52
4. The script will now be copied to the USB flash drive. OK will be displayed when completed.

Note

Error messages: If you try to export a test script from an empty memory location “Err 002” will be displayed on the display.



2-4-7. Remove Test Script

Overview

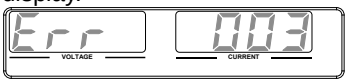
The Remove Test function will delete a test script from the internal memory.

Steps

1. Select T-04 (Test Remove) and choose which test script to remove from the internal memory.
   T-04 range 1~10
   Page 52
2. The test script will be removed from the internal memory. OK will be displayed when completed.

Note

Error messages: If you try to remove a test script from an empty memory location “Err 003” will be displayed on the display.



3. CONFIGURATION

3-1. Configuration Overview

Configuration of the PTE power supplies is divided into five different configuration settings: Normal Function, USB/GP-IB, LAN, UART, System Configuration Settings, Power ON Configuration, Trigger Input/Output Configuration Settings and Special Function Settings. Power ON Configuration differs from the other settings in that the settings used with Power ON Configuration settings can only be set during power up. The other configuration settings can be changed when the unit is already on. This prevents some important configuration parameters from being changed inadvertently. Power On Configuration settings are numbered F-90 to F-98 and the other configuration settings are numbered F-00 to F-61, F-70 to F-78, F-88 to F-89 and F100 to F122. The Special Function Settings are used for calibration, firmware updated and other special functions; these functions are not supported for end-user use.

3-1-1. Configuration Table

Please use the configuration settings listed below when applying the configuration settings.

Normal Function Settings	Setting	Setting Range
Output ON delay time	F-01	0.00s~99.99s
Output OFF delay time	F-02	0.00s~99.99s
V-I mode slew rate select	F-03	0 = CV high speed priority (CVHS) 1 = CC high speed priority (CCHS) 2 = CV slew rate priority (CVLS) 3 = CC slew rate priority (CVLS)
Rising voltage slew rate	F-04	0.001~0.060V/msec (PTE 6-200) 0.001~0.080V/msec (PTE 8-180) 0.001~0.125V/msec (PTE 12.5-120) 0.001~0.150V/msec (PTE 15-100) 0.001~0.200V/msec (PTE 20-76) 0.001~0.300V/msec (PTE 30-50) 0.001~0.400V/msec (PTE 40-38)

		0.001~0.500V/msec (PTE 50-30) 0.001~0.600V/msec (PTE 60-25) 0.001~0.800V/msec (PTE 80-19) 0.001~1.000V/msec (PTE 100-15) 0.001~1.500V/msec (PTE 150-10) 0.001~1.500V/msec (PTE 300-5) 0.001~2.000V/msec (PTE 400-3.8) 0.001~2.400V/msec (PTE 600-2.6)
Falling voltage slew rate	F-05	0.001~0.060V/msec (PTE 6-200) 0.001~0.080V/msec (PTE 8-180) 0.001~0.125V/msec (PTE 12.5-120) 0.001~0.150V/msec (PTE 15-100) 0.001~0.200V/msec (PTE 20-76) 0.001~0.300V/msec (PTE 30-50) 0.001~0.400V/msec (PTE 40-38) 0.001~0.500V/msec (PTE 50-30) 0.001~0.600V/msec (PTE 60-25) 0.001~0.800V/msec (PTE 80-19) 0.001~1.000V/msec (PTE 100-15) 0.001~1.500V/msec (PTE 150-10) 0.001~1.500V/msec (PTE 300-5) 0.001~2.000V/msec (PTE 400-3.8) 0.001~2.400V/msec (PTE 600-2.6)
Rising current slew rate	F-06	0.001~2.000A/msec (PTE 6-200) 0.001~1.800A/msec (PTE 8-180) 0.001~1.200A/msec (PTE 12.5-120) 0.001~1.000A/msec (PTE 15-100) 0.001~0.760A/msec (PTE 20-76) 0.001~0.500A/msec (PTE 30-50) 0.001~0.380A/msec (PTE 40-38) 0.001~0.300A/msec (PTE 50-30) 0.001~0.250A/msec (PTE 60-25) 0.001~0.190A/msec (PTE 80-19) 0.001~0.150A/msec (PTE 100-15) 0.001~0.100A/msec (PTE 150-10) 0.001~0.025A/msec (PTE 300-5) 0.001~0.008A/msec (PTE 400-3.8) 0.001~0.006A/msec (PTE 600-2.6)

Falling current slew rate	F-07	0.001~2.000A/msec (PTE 6-200) 0.001~1.800A/msec (PTE 8-180) 0.001~1.200A/msec (PTE 12.5-120) 0.001~1.000A/msec (PTE 15-100) 0.001~0.760A/msec (PTE 20-76) 0.001~0.500A/msec (PTE 30-50) 0.001~0.380A/msec (PTE 40-38) 0.001~0.300A/msec (PTE 50-30) 0.001~0.250A/msec (PTE 60-25) 0.001~0.190A/msec (PTE 80-19) 0.001~0.150A/msec (PTE 100-15) 0.001~0.100A/msec (PTE 150-10) 0.001~0.025A/msec (PTE 300-5) 0.001~0.008A/msec (PTE 400-3.8) 0.001~0.006A/msec (PTE 600-2.6)
Internal resistance setting	F-08	0~0.030Ω (PTE 6-200) 0~0.044Ω (PTE 8-180) 0~0.104Ω (PTE 12.5-120) 0~0.150Ω (PTE 15-100) 0~0.263Ω (PTE 20-76) 0~0.600Ω (PTE 30-50) 0~1.053Ω (PTE 40-38) 0~1.667Ω (PTE 50-30) 0~2.400Ω (PTE 60-25) 0~4.210Ω (PTE 80-19) 0~6.667Ω (PTE 100-15) 0~15.00Ω (PTE 150-10) 0~60.00Ω (PTE 300-5) 0~105.3Ω (PTE 400-3.8) 0~230.8Ω (PTE 600-2.6)
Bleeder circuit control	F-09	0 = OFF, 1 = ON, 2 = AUTO
Buzzer ON/OFF control	F-10	0 = OFF, 1 = ON
OCP Delay Time	F-12	0.1 ~ 2.0 sec
Current Setting Limit (I-Limit)	F-13	0 = OFF, 1 = ON
Voltage Setting Limit (V-Limit)	F-14	0 = OFF, 1 = ON
Display memory parameter when recalling (M1, M2, M3)	F-15	0 = OFF, 1 = ON
Auto Calibration Parallel Control	F-16	0 = Disable, 1 = Enable, 2 = Execute Parallel Calibration and set to Enable. Note: Must be a short between each unit before starting.
Measurement Average Setting	F-17	0 = Low, 1 = Middle, 2 = High
Alarm Recovery and Output Status	F-18	0 = Safe Mode, 1 = Force Mode

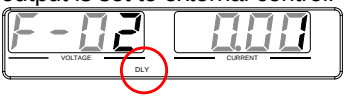
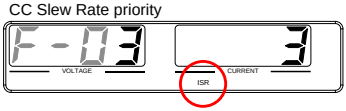
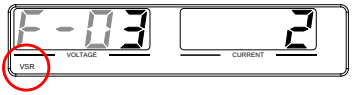
Lock Mode	F-19	0:Lock Panel, Allow Output OFF 1:Lock Panel, Allow Output ON/OFF
USB/GP-IB Settings		
Show front panel USB status	F-20	0 = None, 1 = Mass Storage
Show rear panel USB status	F-21	0 = None, 1 = Linking to PC
Setup rear USB Speed	F-22	0 = Disable USB, 1 = Full Speed, 2 = Auto Detect Speed
GP-IB Address	F-23	0 ~ 30
GP-IB Enable/Disable	F-24	0 = Disable GP-IB, 1 = Enable GP-IB
Show GP-IB available status	F-25	0 = No GP-IB, 1 = GP-IB is available
SCPI Emulation	F-26	0 = Normal, 1 = PU Series, 2 = Agilent 5700, 3 = Kikusui PWX, 4 = AMREL SPS
LAN Settings		
Show MAC Address-1	F-30	0x00~0xFF
Show MAC Address-2	F-31	0x00~0xFF
Show MAC Address-3	F-32	0x00~0xFF
Show MAC Address-4	F-33	0x00~0xFF
Show MAC Address-5	F-34	0x00~0xFF
Show MAC Address-6	F-35	0x00~0xFF
LAN Enable	F-36	0 = OFF, 1 = ON
DHCP	F-37	0 = OFF, 1 = ON
IP Address-1	F-39	0~255
IP Address-2	F-40	0~255
IP Address-3	F-41	0~255
IP Address-4	F-42	0~255
Subnet Mask-1	F-43	0~255
Subnet Mask-2	F-44	0~255
Subnet Mask-3	F-45	0~255
Subnet Mask-4	F-46	0~255
Gateway-1	F-47	0~255
Gateway-2	F-48	0~255
Gateway-3	F-49	0~255
Gateway-4	F-50	0~255
DNS address -1	F-51	0~255
DNS address -2	F-52	0~255
DNS address-3	F-53	0~255
DNS address-4	F-54	0~255
Socket Server Enable/Disable	F-57	0 = Disable, 1 = Enable
Show Socket Server Port	F-58	No setting
Web Server Enable/Disable	F-59	0 = Disable, 1 = Enable
Web Password Enable/Disable	F-60	0 = Disable, 1 = Enable
Web Enter Password	F-61	0000~9999

UART Settings		
UART Mode	F-70	0 = Disable UART, 1 = RS-232C, 2 = RS-485 4W
UART Baud Rate	F-71	0 = 1200, 1 = 2400, 2 = 4800, 3 = 9600, 4 = 19200, 5 = 38400, 6 = 57600, 7 = 115200
UART Data Bits	F-72	0 = 7 bits, 1 = 8 bits
UART Parity	F-73	0 = None, 1 = Odd, 2 = Even
UART Stop Bit	F-74	0 = 1 bit, 1 = 2 bits
UART TCP	F-75	0 = SCPI, 1 = PU Series (emulation mode)
UART Address (For multi-unit remote control)	F-76	00 ~ 30
UART Multi-Drop control	F-77	0 = Disable, 1 = Master, 2 = Slave, 3 = Display information
UART Multi-Drop status	F-78	Displayed parameter: AA-S AA: 00~30 (Address), S: 0~1 (Off-line/On-line status).
System Settings		
Factory Set Value	F-88	0 = None 1 = Return to factory default settings
Show Version	F-89	0, 1 = Version 2, 3, 4, 5 = Build date (YYYYMMDD) 6, 7 = Keyboard CPLD 8, 9 = Analog Board CPLD A, B = Analog Board FPGA C, D, E, F = Kernel Build (YYYYMMDD) G, H = Test Command Version I, J, K, L = Test Command Build (YYYYMMDD) M,N = Reserved O,P = Option module
Power On Configuration Settings*		
CV Control	F-90	0 = Control by Local 1 = Control by External Voltage 2 = Control by External Resistor - Rising  3 = Control by External Resistor -Falling  4 = Control by Isolated Board
CC Control	F-91	0 = Control by Local 1 = Control by External Voltage 2 = Control by External Resistor - Rising  3 = Control by External Resistor - Falling  4 = Control by Isolated Board

Output Status when Power ON	F-92	0 = Safe Mode (Always OFF), 1 = Force Mode (Always ON), 2 = Auto Mode (Status before last time power OFF)
Master/Slave Configuration	F-93	0 = Independent 1 = Master with 1 slave in parallel 2 = Master with 2 slaves in parallel 3 = Master with 3 slaves in parallel 4 = Slave (parallel)
External Output Logic	F-94	0 = High ON, 1 = Low ON
Monitor Voltage Select	F-96	0 = 5V , 1 = 10V
Control Range	F-97	0 = 5V [5kΩ], 1 = 10V [10kΩ]
External Output Control Function	F-98	0 = OFF, 1 = ON
Trigger Input and Output Configuration Settings		
Trigger Input Pulse Width	F100	0~60ms. 0 = trigger controlled by trigger level.
Trigger Input Action	F102	0 = None 1 = Output ON/OFF (refer to F103) 2 = Setting (refer to F104 & F105) 3 = Memory (refer to F106)
Output State When Receiving Trigger	F103	0 = OFF 1 = ON
Apply Voltage Setting on Trigger	F104	0 ~ rated voltage (only applicable when F102 =2)
Apply Current Setting on Trigger	F105	0 ~ rated current (only applicable when F102 =2)
Recall memory number	F106	1 ~ 3 (M1 ~ M3)
Trigger Output Pulse Width	F120	0 ~ 60ms. 0 = trigger output is set to the active level, not pulse width.
Trigger Output Level	F121	0 = LOW, 1 = HIGH (If F120 = 0)
Trigger Source	F122	0 = None 1 = Switching the output on or off 2 = Changing a setting 3 = Recalling a memory
Special Function Settings*		
Calibration	F-00	0000 ~ 9999
⚠ *Note	Power on configuration settings only can be set during power up. Under normal operation they only can be viewed.	

3-1-2. Normal Function Settings

Output ON Delay Time	Delays turning the output on for a designated amount of time. The Delay indicator will light when the Delay time is not 0.

Note	The Output ON Delay Time setting has a maximum deviation (error) of 20ms.
	The Output ON Delay Time setting is disabled when the output is set to external control.  F-01 0.00s~99.99s
Output OFF Delay Time	Delays turning the output off for a designated amount of time. The Delay indicator will light when the Delay time is not 0.
Note	The Output OFF Delay Time setting has a maximum deviation (error) of 20ms.
	The Output OFF Delay Time setting is disabled when the output is set to external control.  F-02 0.00s~99.99s
V-I Mode	Selects High Speed Priority or Slew Rate Priority for CV or CC mode. The voltage or current slew rate can only be edited if CC/CV Slew Rate Priority is selected. The ISR indicator will be lit for CC Slew Rate Priority and the VSR indicator will be lit for CV Slew Rate Priority.
Note	CC and CV Slew Rate Priority mode are disabled when voltage/current output is set to external control.
	CC Slew Rate priority  CV Slew Rate Priority  F-03 0 = CV high speed priority 1 = CC high speed priority 2 = CV slew rate priority 3 = CC slew rate priority
Rising Voltage Slew Rate	Sets the rising voltage slew rate. Only applicable if V-I Mode is set to CV Slew Rate Priority. F-04 0.001 ~ max. V/msec
Falling Voltage Slew Rate	Sets the falling voltage slew rate. Only applicable if V-I Mode is set to CV Slew Rate Priority. F-05 0.001 ~ max. V/msec

Rising Current Slew Rate	Sets the rising current slew rate. Only applicable if V-I Mode is set to CC Slew Rate Priority.	
	F-06	0.001 ~ max. A/msec
Falling Current Slew Rate	Sets the falling current slew rate. Only applicable if V-I Mode is set to CC Slew Rate Priority.	
	F-07	0.001 ~ max. A/msec
Internal Resistance Settings	Sets the internal resistance of the power supply.	
	F-08	0.000Ω ~ X.XXXΩ (Where X.XXX = Rating Voltage / Rating Current)
Bleeder Control	Bleeder control turns ON/OFF the bleeder resistor. Bleeder resistors discharge the filter capacitors after power is turned off as a safety measure.	
	F-09	0 = OFF, 1 = ON, 2 = AUTO
Buzzer ON/OFF	Turns the buzzer sound on or off. The buzzer is associated with alarm sounds and keypad entry sounds.	
	F-10	0 = OFF, 1 = ON
OCP Delay Time	Sets the OCP delay time. This parameter will delay the amount of time it takes to trigger the over current protection. This function can be useful to prevent current overshoot from triggering OCP.	
	F-12	0.1 ~ 2.0 sec
Current Setting Limit (I-limit)	Turns the current setting limit (I-limit) on or off. Turning this function on will prevent you from accidentally setting the current limit above the set OCP level.	
	F-13	0 = OFF, 1 = ON
Voltage Setting Limit	Turns the voltage setting limit (V-limit) on or off. Turning this function on will prevent you from accidentally setting the voltage limit above the OVP level.	
	F-14	0 = OFF 1 = ON
Display Memory Parameter	Displays which memory setting is recalled (M1, M2 or M3) when recalling a setup.	
	F-15	0 = OFF, 1 = ON
Auto Calibration Parallel Control	This function performs offset calibration for parallel control. There must be a short between each unit before starting the calibration. See page 47 for details.	
	F-16	0 = Disable, 1 = Enable, 2 = Execute Parallel Calibration and set to Enable
Measurement Average Setting	Determines the level of smoothing for the average setting.	
	F-17	0 = Low, 1 = Middle, 2 = High
Alarm Recovery and Output Status	Set the output status when OHP, FAN and AC-Fail alarm be cleared.	
	F-18	0 = Safe Mode, 1 = Force Mode
Lock Mode	When the front panel is locked, the Lock Mode function determines the behavior of the Output key.	
	F-19	0: Lock Panel, Allow Output OFF 1: Lock Panel, Allow Output ON/OFF

3-1-3. Interface Configuration Settings

3-1-3-1. USB / GP-IB Settings

Show Front Panel USB Status	Displays the front panel USB-A port state. This setting is not configurable. F-20	0 = None, 1 = Mass Storage
Show Rear Panel USB Status	Displays the rear panel USB-B port state. This setting is not configurable. F-21	0 = None, 1 = Linking to PC
Setup Rear USB Speed	Sets the rear panel USB speed or turns the rear USB port off. F-22	0 = Disable USB, 1 = Full Speed, 2 = Auto Detect Speed
GP-IB Address	Sets the GP-IB address. F-23	0 ~ 30
GP-IB Disable/Enable	Enable or disables the GP-IB port. F-24	0 = Disable GP-IB, 1 = Enable GP-IB
Show GP-IB available Status	Shows the status of the GP-IB option port. F-25	0 = No GP-IB, 1 = GP-IB is available
SCPI Emulation	Sets the SCPI emulation mode. The emulation modes allow you to emulate the remote commands of legacy equipment that is used in a test environment. Parameter 2, 3 and 4 are only supported as use stand alone. F-26	0 = TEXIO TECHNOLOGY, 1 = PU Series, 2 = Agilent N5700, 3 = Kikusui PWX, 4 = AMREL SPS

3-1-3-2. LAN Settings

Show MAC Address-1~6	Displays the MAC address in 6 parts. This setting is not configurable. F-30~F-35	0x00~0xFF
LAN	Turns LAN on or off. F-36	0 = OFF, 1 = ON
DHCP	Turns DHCP on or off. F-37	0 = OFF, 1 = ON
IP Address-1~4	Sets the default IP address. IP address 1~4 splits the IP address into four sections. (F-39 : F-40 : F-41 : F-42) (0~255 : 0~255 : 0~255 : 0~255)	
Subnet Mask 1~4	Sets the subnet mask. The subnet mask is split into four parts. (F-43 : F-44 : F-45: F-46) (0~255 : 0~255 : 0~255 : 0~255)	
Gateway 1~4	Sets the gateway address. The gateway address is split into 4 parts. (F-47 : F-48 : F-49 : F-50) (0~255 : 0~255 : 0~255 : 0~255)	

DNS Address 1~4	Sets the DNS address. The DNS address is split into 4 parts. (F-51 : F-52 : F-53 : F-54) (0~255 : 0~255 : 0~255 : 0~255)
Socket Server Enable/Disable	Enables web socket connections. F-57 0 = Disable, 1 = Enable
Show Socket Server	Shows the socket server port. F-58 No setting
Web Server Enable/Disable	Turns web server control on/off. F-59 0 = Disable, 1 = Enable
Web Password Enable/Disable	Turns a web password on/off. F-60 0 = Disable, 1 = Enable
Web Password	Sets the web password. F-61 0000 ~ 9999

3-1-3-3. UART Settings

UART Mode	Sets the UART mode or disables UART. F-70 0 = Disable UART, 1 = RS-232C, 2= RS-485 4W
UART Baud Rate	Sets the UART baud rate. F-71 0 = 1200, 1 = 2400, 2 = 4800, 3 = 9600, 4 = 19200, 5 = 38400, 6 = 57600, 7 = 115200
UART Data Bits	Sets the number of data bits. F-72 0 = 7 bits, 1 = 8 bits
UART Parity	Sets the parity. F-73 0 = None, 1 = Odd, 2 = Even
UART Stop Bit	Sets the number of stop bits. F-74 0 = 1 bit, 1 = 2 bits
UART TCP	UART transmission control protocol TCP settings. This is used primarily for multi-unit remote control, see page 93. F-75 0 = SCPI, 1 = PU Series(emulation mode)
⚠ Note	Please refer to the PU Series user manual .
UART Address (For multi-unit remote control)	UART Address: this is used to set the address of a unit when using multi-unit remote control, see page 93 for details. F-76 0 ~ 30

UART Multi-Drop control	Sets the master/slave/display-information parameters of a unit when using Multi-Drop remote control, see page 93 for details. F-77 0 = Disable, 1 = Master, 2 = Slave, 3 = Display Information
UART Multi-Drop status	Displays the Multi-Drop status on the master unit for each slave unit belonging to the Multi-Drop bus, see page 93 for details. F-78 Displayed parameter: AA-S AA: 00~30 (Address), S: 0~1 (Off-line/On-line status).

3-1-4. System Settings

Factory Default Configuration	Returns the PTE to the factory default settings. F-88 0 = None, 1 = Factory Default.
Show Version	Displays the PTE version number, build date, keyboard CPLD, analog board CPLD, analog board FPGA, kernel build date, test command version and test command build date. F-89 0-XX = Version (1/2) 1-XX = Version (2/2) 2-XX = Build year (1/2) 3-XX = Build year (2/2) 4-XX = Build month 5-XX = Build day 6-XX = Keyboard CPLD (1/2) 7-XX = Keyboard CPLD (2/2) 8-XX = Analog board CPLD (1/2) 9-XX = Analog board CPLD (2/2) A-XX = Analog board FPGA (1/2) B-XX = Analog board FPGA (2/2) C-XX = Kernel build year (1/2) D-XX = Kernel build year (2/2) E-XX = Kernel build month F-XX = Kernel build day G-XX = Test command version (1/2) H-XX = Test command version (2/2) I-XX = Test command build year (1/2) J-XX = Test command build year (2/2) K-XX = Test command build month L-XX = Test command build day M-XX = Reserved (1/2) N-XX = Reserved (2/2) O-XX = Option module (1/2) P-XX = Option module (2/2)

3-1-5. Power On Configuration Settings

CV Control	Sets the constant voltage (CV) control mode between local and external voltage/resistance control. For external voltage control, see page 74 (External Voltage Control of Voltage Output) and page 77 (External Resistance Control of Voltage Output). F-90 0= Control by local 1 = Control by external voltage 2 = Control by external resistor - rising  3 = Control by external resistor- falling  4 = Control by isolated board
CC Control	Sets the constant current (CC) control mode between local and external voltage/resistance control. For details on external voltage control, see page 75 (External Voltage Control of Current Output) and 78 (External Resistance Control of Current Output). F-91 0 = Control by local 1 = Control by external voltage 2 = Control by external resistor - rising  3 = Control by external resistor- falling  4 = Control by isolated board
Output Status when Power-ON Output	Sets the power supply to turn the output on or off at power up. F-92 0 = Safe Mode (Always OFF), 1 = Force Mode (Always ON), 2 = Auto Mode (Status before last time Power OFF)
Master/Slave Configuration	Sets the power supply as master or slave. See the parallel/series operation for details, page 41. F-93 0 = Independent 1 = Master with 1 slave in parallel 2 = Master with 2 slaves in parallel 3 = Master with 3 slaves in parallel 4 = Slave (parallel)
External Output Logic	Sets the external logic as active high or low for analog control pin 19. F-94 0= High ON, 1 = Low ON
Monitor Voltage Select	Selects the voltage monitor output range. F-96 0 = 5V, 1 = 10V
Control Range	Selects the external control range for external voltage or resistance control. F-97 0 = 5V [5kΩ], 1 = 10V [10kΩ]
External Output Control Function	Set external output control on or off. F-98 0 = OFF, 1 = ON

3-1-6. Trigger Input and Output Configuration Settings

Trigger Input Width	Sets the trigger input width in milliseconds. If the width is set to 0 then the input trigger is controlled by the input active level.	
	F100	0 ~ 60ms. 0 = trigger controlled by trigger level.
Trigger Input Action	Determines what actions are performed when a trigger is received.	
	F102	0 = None 1 = Output ON/OFF (refer to F103) 2 = Setting (refer to F104 & F105) 3 = Memory (refer to F106)
Output State When Receiving Trigger	Applies the output state when receiving a trigger.	
	F103	0 = OFF 1 = ON
Apply Voltage Setting on Trigger	Applies the setting voltage when a trigger is received. Only applicable when F102 = 2.	
	F104	0 ~ the rated voltage
Apply Current Setting on Trigger	Applies the setting current when a trigger is received. Only applicable when F102 = 2.	
	F105	0 ~ the rated current
Recall memory number	Recalls the selected memory when a trigger is received.	
	F106	1 = M1 2 = M2 3 = M3
Trigger Output Pulse Width	Trigger output pulse width. A setting of 0 will output the active level.	
	F120	0 ~ 60ms. 0 = output active level
Trigger Output Level	Sets the active level of the output trigger if the trigger output pulse width (F120) = 0.	
	F121	0 = LOW 1 = HIGH
Trigger Source	Sets the trigger source.	
	F122	0 = None 1 = Switching the output on/ off 2 = Changing a setting 3 = Recalling a memory

3-1-7. Special Function

Special Function

The special function setting is used to access calibration, firmware updates and other special functions. The special function setting has a password that is used to access the special function menu. The password used determines which function is accessed. Please see your distributor for details.

F-00 0000 ~ 9999

3-1-8. Setting Normal Function Settings

The Normal Function settings, F-01~F-61, F-70~F-78, F-88~F-89 and F100~F122 can be easily configured with the Function key.

Ensure the load is not connected.
Ensure the output is off.
Function settings F-90~98 can only be viewed.

Note

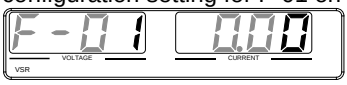
Function setting F-89 (Show Version) can only be viewed, not edited.

Configuration settings F-90~ F-98 cannot be edited in the Normal Function settings. Use the Power On Configuration settings. See page 70 for details.

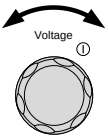
Steps

1. Press the Function key. The function key will light up.

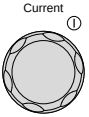
2. The display will show F-01 on the left and the configuration setting for F-01 on the right.



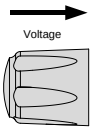
3. Rotate the Voltage knob to change the F setting.
   Range F-00~F-61, F-70~F-78, F-88~F-98, F100~F122

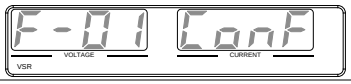


4. Use the Current knob to set the parameter for the chosen F setting.



Press the Voltage knob to save the configuration setting. ConF will be displayed when it is configuring.





Exit

Press the Function key again to exit the configuration settings. The Function key light will turn off.

3-1-9. Setting Power On Configuration Settings

Background

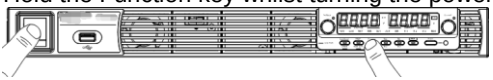
The Power On Configuration settings can only be changed during power up to prevent the configuration settings being inadvertently changed.

Ensure the load is not connected.

Ensure the power supply is off.

Steps

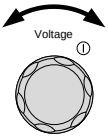
1. Hold the Function key whilst turning the power on.



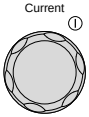
2. The display will show F-90 on the left and the configuration setting for F-90 on the right.

3. Rotate the Voltage knob to change the F setting.

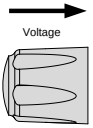
   Range F-90 ~ F-98

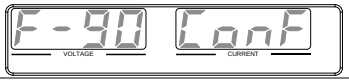


4. Use the Current knob to set the parameter for the chosen F setting.



   Press the Voltage knob to save the configuration setting. ConF will be displayed when it is configuring.





Exit

Cycle the power to save and exit the configuration settings.

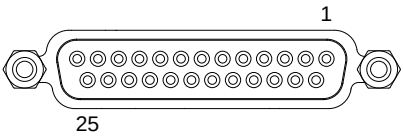
4. ANALOG CONTROL

The Analog Control chapter describes how to control the voltage or current output using an external voltage or resistance, monitor the voltage or current output as well as remotely turning off the output or shutting down the power supply.

4-1. Analog Remote Control Overview

The PTE power supply series have a number of analog control options. The Analog Control connectors are used to control output voltage and current using external voltage or resistance. The power supply output can also be controlled using external switches.
There is also an isolated analog control option. The Isolated analog connector is used to control the output voltage and current using an isolated external voltage or current source. Like the analog connector, it can also be used to monitor the current and voltage output as well. Use TEXIO TECHNOLOGY part number PTE-ISO-V for voltage control and monitoring, and use PTE-ISO-I for current control and monitoring.

4-1-1. Analog Control Connector Overview

Overview	The Analog Control Connector is a 25 pin connector that can be used with the ARC (analog remote control) kit for wiring connections. The connector is used for all analog remote control. The pins used determine what remote control mode is used.
Pin Assignment	

Pin name	Pin number	Description
Status COM1	1	This is the common line for the status signal pins 2 to 3 and 14 to 16.
CV Status	2	This line is on when the PTE is in CV mode (photocoupler open collector output)[1].
CC Status	3	This line is on when the PTE is in CC mode (photocoupler open collector output)[1].
TRIG IN	4	Trigger signal input line (for test script only).
Status COM2	5	This is the common line for status signal pins 4 and 17.
N.C.	6	Not connected.
Shutdown	7	Output shutdown control line. The output is turned off when a low level TTL signal is applied.
PRL IN-	8	Negative input line for master-slave parallel operation.
PRL IN+	9	Positive input line for master-slave parallel operation.
Alarm Clear	10	Alarm clear line. Alarms are cleared when a low level TTL signal is applied.

A COM	11	This is the common line for the external signal pins 7 to 10, 12, 13, 19, 21, 22, 24, and 25. It is connected internally to the negative output.
PRL OUT+	12	Positive output line for master-slave parallel operation.
Current Sum	13	Current signal line for master-slave parallel operation.
Alarm Status	14	On when a protection function (OVP, HW OVP, OCP, OHP, FAN or SEN) has been activated or when an output shutdown signal is being applied (open-collector photocoupler output).[1]
PWR ON Status	15	Outputs a low level signal when power is turned on. (open-collector photocoupler output).[1]
OUT ON Status	16	On when the output is on (open-collector photocoupler output).[1]
TRIG OUT	17	Trigger signal output line (for test script only).
N.C.	18	Not connected.
OUT ON/OFF CONT	19	Output on/off line. On when set to a low level TTL signal, Off when set to a high level TTL signal. (F-94: 1) On when set to a high level TTL signal, Off when set to a low level TTL signal. (F-94: 0)
A COM	20	This is the common line for the external signal pins 7 to 10, 12, 13, 19, 21, 22, 24, and 25. It is connected internally to the negative output.
EXT-V/R CC CONT	21	This line uses an external voltage or resistance to control the output current. External voltage control (F-91: 1); External resistor control (F-91: 2, F-91: 3). 0 to 5V or 0 to 5kΩ; 0 % to 100 % of the rated output current (F-97: 0). 0 to 10V or 0 to 10kΩ; 0 % to 100 % of the rated output current (F-97: 1).
EXT-V/R CV CONT	22	This line uses an external voltage or resistance to control the output voltage. External voltage control (F-90: 1); External resistor control (F-90: 2, F-90: 3). 0 to 5V or 0 to 5kΩ; 0 % to 100 % of the rated output voltage (F-97: 0). 0 to 10V or 0 to 10kΩ; 0 % to 100 % of the rated output voltage (F-97: 1).
A COM	23	This the common line for the external signal pins 7 to 10, 12, 13, 19, 21, 22, 24, and 25. It is connected internally to the negative output.
I MON	24	Output current monitor. 0 % to 100 % of the rated output current is generated as a voltage between 0V and 5V (F-96: 0) or a voltage between 0V and 10V (F-96: 1).

V MON	25 Output voltage monitor. 0 % to 100 % of the rated output voltage is generated as a voltage between 0V and 5V (F-96: 0) or a voltage between 0V and 10V (F-96: 1).

1. Open collector output: 30V max, 8mA max.
   The common line for the status pins is floating (isolated voltage of 60 V or less). It is isolated from the control circuit.

4-1-2. External Voltage Control of Voltage Output

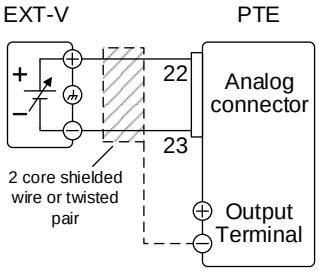
Background

External voltage control of the voltage output is accomplished using the analog control connector on the rear panel. There are two external voltage control ranges, 0~5V and 0~10V, depending on the F-97 configuration. See page 67 for details.

For 0~10V:
Output voltage = full scale voltage x (external voltage/10)
For 0~5V:
Output voltage = full scale voltage x (external voltage/5)

Connection

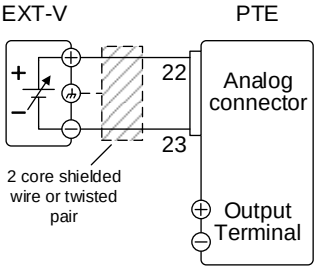
When connecting the external voltage source to the analog connector, use shielded or twisted paired wiring.



Pin23 → EXT-V (-)
Pin22 → EXT-V (+)
Wire shield → negative (-) output terminal

Connection- alt. shielding

If the wire shield needs to be grounded at the voltage source (EXT-V), then the shield cannot also be grounded at the negative (-) terminal output of the PTE power supply. This would short the output.

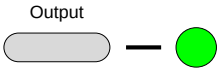


Pin23 → EXT-V(-)
Pin22 → EXT-V(+)
Wire shield → EXT-V ground (GND)

Panel operation

1. Connect the external voltage according to the connection diagrams above.
2. Set the F-90 power on configuration setting to 1 (CV control – Ext voltage). Page 70
   Be sure to cycle the power after the power on configuration has been set.
3. Press the Function key and confirm the new configuration settings (F-90=1).

4. Press the Output key. The voltage can now be controlled with the External voltage.



Note

The input impedance for external voltage control is 1MΩ. Use a stable voltage supply for the external voltage control.

Note

CV and CC Slew Rate Priority are disabled for V-I mode (F-03) when using external voltage control. See the normal function settings on page 61.

CAUTION

Ensure no more than 10.5V (F-97 = 1) or 5.25 (F-97 = 0) volts are input into the external voltage input.
Ensure the voltage polarity is correct when connecting the external voltage.

4-1-3. External Voltage Control of Current Output

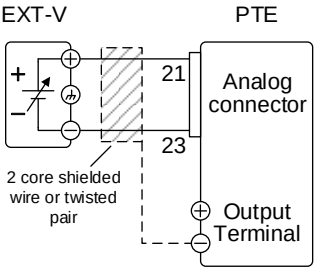
Background

External voltage control of the current output is accomplished using the analog control connector on the rear panel. There are two external voltage control ranges, 0~5V and 0~10V, depending on the F-97 configuration. See page 67 for details.

For 0~10V:
Output current = full scale current x (external voltage/10)
For 0~5V:
Output current = full scale current x (external voltage/5)

Connection

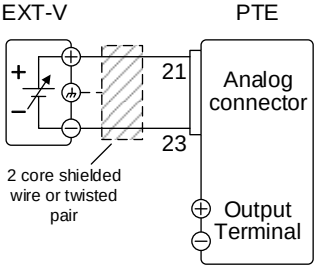
When connecting the external voltage source to the connectors, use shielded or twisted paired wiring.



Pin23 → EXT-V (-)
Pin21 → EXT-V (+)
Wire shield → negative (-) output terminal

Connection- alt. shielding

If the wire shield needs to be grounded at the voltage source (EXT-V), then the shield cannot also be grounded at the negative (-) terminal output of the PTE power supply. This would short the output.

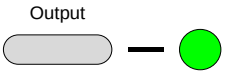


Pin23 → EXT-V (-)
Pin21 → EXT-V (+)
Wire shield → EXT-V ground (GND)

Steps

1. Connect the external voltage according to the connection diagrams above.
2. Set the F-91 power on configuration setting to 1 (CC control – Ext voltage). Page 70
   Be sure to cycle the power after the power on configuration has been set.
3. Press the Function key and confirm the new configuration settings (F-91=1).

4. Press the Output key. The current can now be controlled with the External voltage.

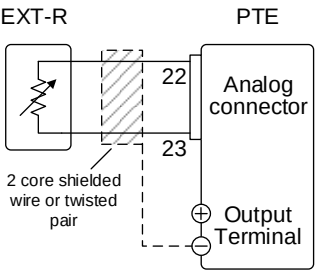


Note	The input impedance for external voltage control is 1MΩ. Use a stable voltage supply for the external voltage control.
Note	CV and CC Slew Rate Priority are disabled for V-I mode (F-03) when using external voltage control. See the normal function settings on page 61.
CAUTION	Ensure the voltage polarity is correct when connecting the external voltage. Ensure no more than 10.5V (F-97 = 1) or 5.25 (F-97 = 0) volts are input into the external voltage input.

4-1-4. External Resistance Control of Voltage Output

Background	External resistance control of the voltage output is accomplished using the analog control connector on the rear panel. There are two external resistance control ranges, 0~5kΩ and 0~10kΩ, depending on the F-97 configuration. See page 67 for details. The output voltage (0 to full scale) can be controlled with the external resistance rising 0kΩ~5kΩ/0kΩ~10kΩ or falling 5kΩ~0kΩ/10kΩ~0kΩ. Rising: For 0kΩ~10kΩ: Output voltage = full scale voltage × (external resistance/10) For 0kΩ~5kΩ: Output voltage = full scale voltage × (external resistance/5) Falling: For 10kΩ~0kΩ: Output voltage = full scale voltage × ([10-external resistance]/10) For 5kΩ~0kΩ: Output voltage = full scale voltage × ([5-external resistance]/5)
Note	The falling resistance configuration is recommended for safety reasons. In the event that the cables become accidentaly disconnected (high Ω), the voltage output will drop to zero. Under similar circumstances using the rising resistance configuaration, an unexpectedly high voltage would be output. If swtiches are used to switch between fixed resistances, use switches that avoid creating open circuits. Use short-circuit or continous resistance switches.

Connection

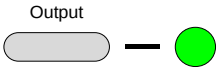


Pin22 → EXT-R
Pin23 → EXT-R
Wire shield → negative (-) output terminal

Steps

1. Connect the external resistance according to the connection diagrams above.
2. Set the F-90 (CV Control) configuration settings to 2 for Ext-R rising or 3 for Ext-R falling. Page 70
   Be sure to cycle the power after the power on configuration has been set.
3. Press the Function key and confirm the new configuration settings (F-90=2 or 3).

4. Press the Output key. The voltage can now be controlled with the External resistance.



Note — Ensure the resistor(s) and cables used exceed the isolation voltage of the power supply. For example: insulation tubes with a withstand voltage higher than the power supply can be used.
When choosing an external resistor ensure the resistor can withstand a high degree of heat.

Note — CV and CC Slew Rate Priority are disabled for V-I mode (F-03) when using external resistance control. See the normal function settings on page 61.

4-1-5. External Resistance Control of Current Output

Background

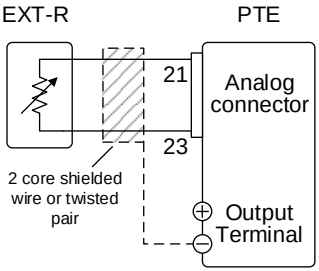
External resistance control of the current output is accomplished using the analog connector on the rear panel.
There are two external resistance control ranges, 0~5kΩ and 0~10kΩ, depending on the F-97 configuration. See page 67 for details.
The output current (0 to full scale) can be controlled with the external resistance rising 0kΩ~5kΩ/0kΩ~10kΩ or falling 5kΩ~0kΩ/10kΩ~0kΩ.
Rising:
For 0kΩ~10kΩ: Output current = full scale current ×

(external resistance/10)
For 0kΩ~5kΩ: Output current = full scale current × (external resistance/5)
Falling:
For 10kΩ~0kΩ: Output current = full scale current × ([10-external resistance]/10)
For 5kΩ~0kΩ: Output current = full scale current × ([5-external resistance]/5)

Note

The falling resistance configuration is recommended for safety reasons. In the event that the cables become accidentaly disconnected, the current output will drop to zero (high Ω). Under similar circumstances using the rising configuration, an unexpectedly high current would be output.
If swtiches are used to switch between fixed resistances, use switches that avoid creating open circuits. Use short-circuit or continous resistance switches.

Connection

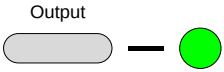


Pin21 → EXT-R
Pin23 → EXT-R
Wire shield → negative (-) output terminal

Steps

1. Connect the external resistance according to the connection diagrams above.
2. Set the F-91 (CC Control) configuration settings to 2 for external resistor rising or to 3 for external resistor falling. Page 70
   Be sure to cycle the power after the power on configuration has been set.
3. Press the Function key and confirm the new configuration settings (F-91 = 2 or 3).

4. Press the Output key. The current can now be controlled with the External resistance.



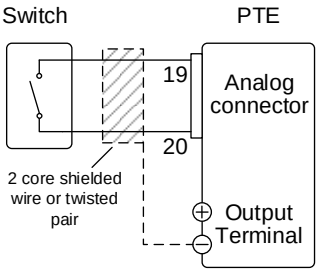
⚠ Note	Ensure the resistor(s) and cables used exceed the isolation voltage of the power supply. For example: insulation tubes with a withstand voltage higher than the power supply can be used. When choosing an external resistor ensure the resistor can withstand a high degree of heat.
⚠ Note	CV and CC Slew Rate Priority are disabled for V-I mode (F-03) when using external resistance control. See the normal function settings on page 61.

4-1-6. External Control of Output

Background

The output can be turned on or off externally using a switch. The analog control connector can be set to turn the output on from a high or low signal. The voltage across pins 19 and 20 are internally pulled up to +5V ±5% @ 500uA with 10kΩ pull-up resistor. A short (closed switch) produces a low signal.
When set to High = On, the output is turned on when the pins 19-20 are open.
When Low = On, the output is turned on when pins 19-20 are shorted.

Connection



Pin19 → Switch
Pin20 → Switch
Wire shield → negative (-) output terminal

Steps

1. Connect the external switch according to the connection diagrams above.
2. Set F-94 (External output logic) in the power on configuration settings to 0 (High = On) or 1 (Low = On) and set F-98 (External output control function) to 1(On).

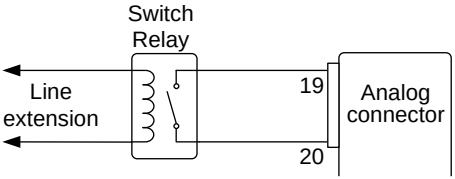
Page 70

Be sure to cycle the power after setting the power on configuration settings.

3. Press the Function key and confirm the new configuration settings (F-94 = 0 or 1 and F-98=1).

4. The switch is now ready to set the output on or off.

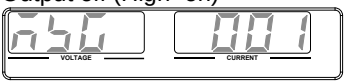
Note	When using a switch over long distances, please use a switch relay to extend the line from the coil side of the relay.



If a single switch control is to be used for multiple units, please isolate each instrument. This can be achieved by using a relay.

Warning	Ensure the cables used and the switch exceed the isolation voltage of the power supply. For example: insulation tubes with a withstand voltage higher than the power supply can be used.
Note	Messages: If F-94 = 0 (High = on) and pin 19 is low (0) “MSG 001” will be displayed on the display. If F-94 = 1 (Low = on) and pin 19 is high (1) “MSG 002” will be displayed on the display.

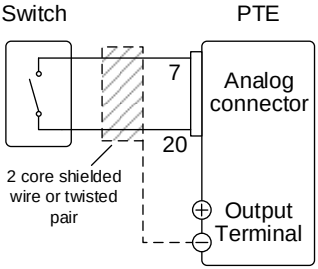
Output off (High=on)



Output off (Low=on)

4-1-7. External control of Shutdown

Background	The output of the power supplies can be configured to shut down via an external switch. The voltage across pins 7 and 20 are internally pulled to +5V ±5% @ 500uA with 10kΩ pull-up resistor. The output is turned off when a low TTL level signal is applied.
Connection	



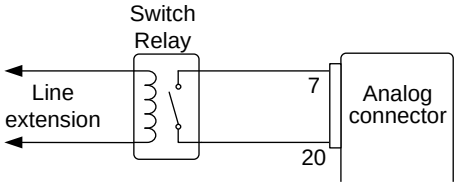
Pin7→ Switch
Pin20 → Switch
Wire shield → negative (-) output terminal

Steps

1. Connect the external switches according to the connection diagrams above.
2. The switch will now shut down the power supply when shorted.

Note

When using a switch over long distances, please use a switch relay to extend the line from the coil side of the relay.



If a single switch control is to be used for multiple units, please isolate each instrument. This can be achieved by using a relay.

Warning

Ensure the cables and switch used exceed the isolation voltage of the power supply. For example: insulation tubes with a withstand voltage higher than the power supply can be used.

4-2. Remote Monitoring

The PTE power supplies have remote monitoring support for current and voltage output. They also support monitoring of operation and alarm status.

External monitoring of output voltage and current → from page 82
External monitoring of operation mode and alarm status → from page 83
External Trigger In/Out → from page 85

4-2-1. External Voltage and Current Monitoring

Background

The analog connector is used to monitor the current (IMON) or voltage (VMON) output.
An output of 0~10V or 0~5V (depending on the configuration) represents the voltage or current output of 0~ rated current/voltage output.
IMON = (current output/full scale) × 10 or 5.
VMON = (voltage output/full scale) × 10 or 5.

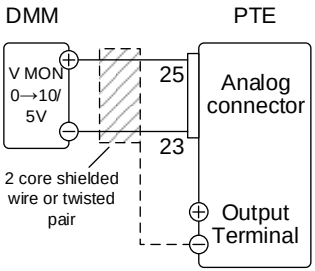
Configuration

The PTE doesn't need to be configured to use external voltage or current monitoring, however the voltage or current output range does need to be configured. The monitor output voltage can be configured as either 0~10V or 0~5V.
Set F-96 (Monitor Voltage Select) in the power on configuration settings to 0 (5V) or 1 (10V). Page 70
Be sure to cycle the power after setting the power on configuration settings.

1. Press the Function key and confirm the new configuration settings (F-96 = 0 or 1).

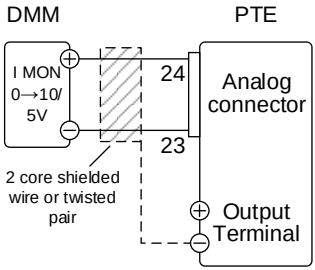
2. An external DMM can now be used to monitor the voltage or current output.

VMON Connection



Pin25 → Pos (+)
Pin23 → Neg (-)

IMON Connection



Pin24 → Pos (+)
Pin23 → Neg (-)

Note

Maximum current is 5mA. Ensure the sensing circuit has input impedance greater than 1MΩ.
The monitor outputs are strictly DC and should not be used to monitor analog components such as transient voltage response or ripple etc.

CAUTION

Ensure IMON (pin 24) and VMON (pin 25) are not shorted together. This may cause damage to the unit.

4-2-2. External Operation and Status Monitoring

Background

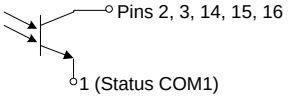
The analog control connector can also be used to monitor the status operation and alarm status of the instrument. The pins are isolated from the power supply internal circuitry by photo couplers. Status Com1 (Pin 1) and Status Com2 (Pin 5) are photo coupler emitter outputs, whilst pins 2~3, 14~17 are photo coupler collector outputs. A maximum of 30V and 8mA can be applied to each pin. The Status Com pin is floating with an isolation voltage of 60V.

Pinout

Name and Pin		Description
STATUS COM1	1	Common (photo coupler emitter) for status signals 2, 3, 14, 15 and 16.
CV STATUS	2	Low when CV mode is active.
CC STATUS	3	Low when CC mode is active.

	ALM STATUS	14	Low when any of the protection modes are tripped (OVP, OCP, Sense_ALM, OTP_M, AC Fail, OTP_S, Fan_Fail, HW_OVP, and Shutdown). Active low.
	PWR ON STATUS	15	Active low.
	OUT ON STATUS	16	Low when the output is on.

Schematic

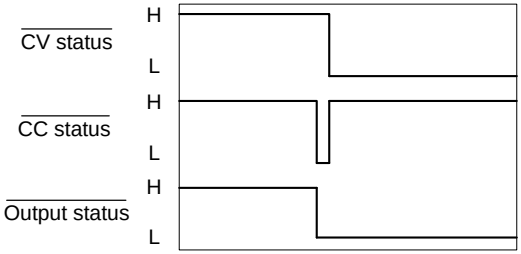


Timing diagrams

Below are 4 example timing diagrams covering a number of scenarios. Note that pins 14~16 are all active low.

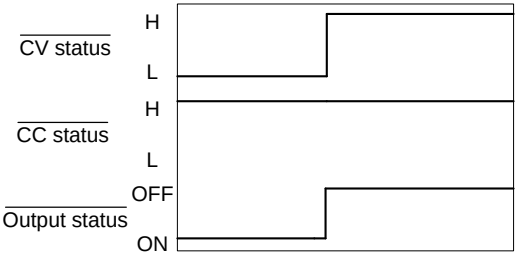
CV MODE: Output turned on

The diagram below shows the timing diagram when the output is turned on when the PTE is set to CV mode.



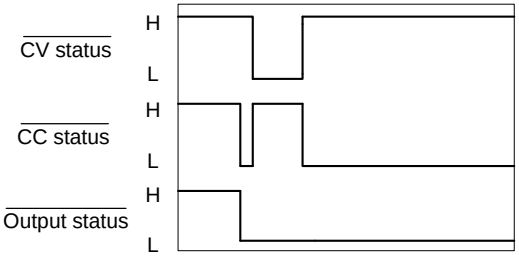
CV MODE: Output turned off

The diagram below shows the output status lines when the output is turned off in CV mode.



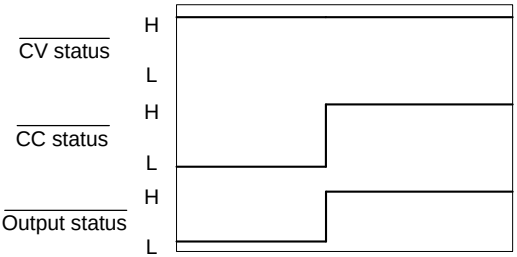
CC MODE: Output turned on

The diagram below shows the timing diagram when the output is turned on when the PTE is set to CC mode.



CC MODE: Output turned off

The diagram below shows the output status lines when the output is turned off in CC mode.



4-2-3. External Trigger In/Out

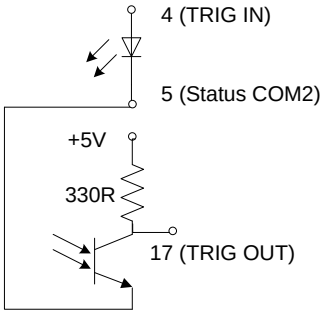
Background

Pin 4 is used for the external trigger input and pin 17 is used as the trigger output. Pin 5 is the common for both pins.
The trigger input can be configured to perform an action such as toggling the output on/off, load a memory setting or apply a voltage/current setting when a trigger is received. The trigger input pulse width can also be configured.
The trigger output can be configured to be active when the output is turned on/off, a setting is changed or when a memory setting has been recalled. The trigger output pulse width or level polarity can also be configured.
See page 68 for details on the trigger input and trigger output configuration settings.

Pinout

Name and Pin		Description
STATUS COM2	5	Common (photo coupler emitter) for trigger pins 4, 17.
TRIG IN	4	External trigger input
TRIG OUT	17	The TRIG OUT signal is held high by an internal 330Ω resistor. The trigger output is pulsed or held high/low for each trigger (depending on the trigger configuration).

Schematic



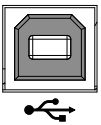
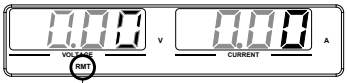
5. COMMUNICATION INTERFACE

This chapter describes basic configuration of IEEE488.2 based remote control. For a command list, refer to the programming manual, downloadable from TEXIO TECHNOLOGY website.

5-1. Interface Configuration

5-1-1. USB Remote Interface

5-1-1-1. Configuration

USB Configuration	PC side connector	Type A, host
	PTE side connector	Rear panel Type B, slave
	Speed	1.1/2.0 (full speed/high speed)
	USB Class	CDC (communications device class)
Steps	1. Connect the USB cable to the rear panel USB B port.	
	2. Change the Rear panel-USB (F-22) setting to 2 (Auto Detect Speed) or 1 (USB Full Speed).	Page 69
Note	If you are not using the rear panel USB device port, set F-22 to 0 (Disable USB).	Page 69
	3. The RMT indicator will turn on when a remote connection has been established.	 RMT indicator

5-1-1-2. Function Check

Functionality check	Invoke a terminal application such as Realterm. To check the COM port No., see the Device Manager in the PC.
	Run this query command via the terminal application after the instrument has been configured for USB remote control (page 87). *idn? This should return the Manufacturer, Model number, Serial number, and Firmware version in the following format. TEXIO TECHNOLOGY,PTE40-38,TW123456,T0.01.12345678 Manufacturer: TEXIO TECHNOLOGY Model number : PTE40-38 Serial number : TW123456 Firmware version : T0.01.12345678

5-1-2. GP-IB Remote Interface

5-1-2-1. Configuration

To use GP-IB, the optional GP-IB option (part number: +VG) must be installed. This is a factory installed option and cannot be installed by the end-user. Only one GP-IB address can be used at a time.

Configure GP-IB

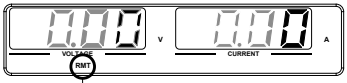
1. Ensure the PTE is off before proceeding.
2. Connect a GP-IB cable from a GP-IB controller to the GP-IB port on the PTE.
3. Turn the PTE on.
4. Press the Function key to enter the Normal configuration settings. Page 69
5. Set the following GP-IB settings.

F-24 = 1	Enable the GP-IB port
F-23 = 0~30	Set the GP-IB address (0~30)

6. Check to see that the GP-IB option is detected by the PTE. The F-25 setting indicates the GP-IB port status.

F-25 = 1	Indicates that the GP-IB port is available.
F-25 = 0	Indicates that the GP-IB port is not detected.

7. The RMT indicator will turn on when a remote connection has been established.



RMT indicator

GP-IB constraints

Maximum 15 devices altogether, 20m cable length, 2m between each device
Unique address assigned to each device
At least 2/3 of the devices turned On
No loop or parallel connection

5-1-2-2. GP-IB Function Check

Background

To test the GP-IB functionality, National Instruments Measurement and Automation Explorer can be used. This program is available on the NI website, www.ni.com., via a search for NI-488.2 page, or “downloads” at the following URL, http://www.ni.com/

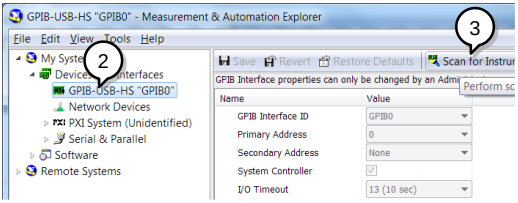
Requirements

Operating System: Windows 10

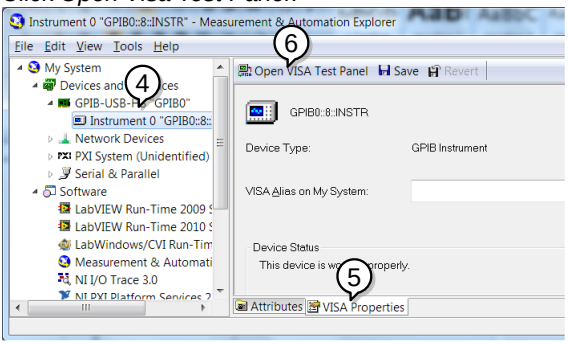
Functionality check

1. Start the NI Measurement and Automation Explorer (MAX) program. Using Windows, press:
   Start>All Programs>National Instruments>Measurement & Automation

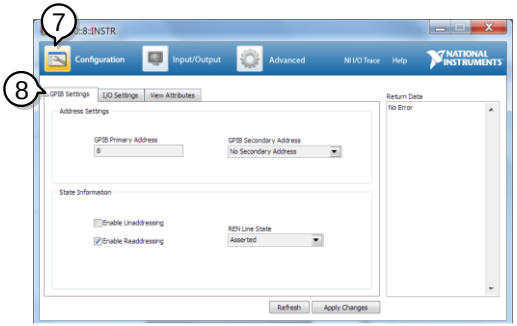
2. From the Configuration panel access;
   My System>Devices and Interfaces>GPIB
3. Press *Scan for Instruments.*



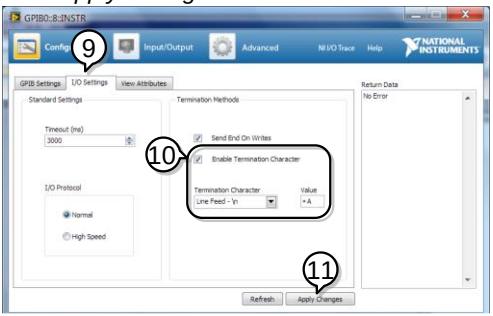
4. Select the device (GP-IB address of PTE) that now appears in the *System>Devices and Interfaces > GPIB-USB-HS "GPIBX"* node.
5. Click on the *VISA Properties* tab on the bottom.
6. Click *Open Visa Test Panel*.



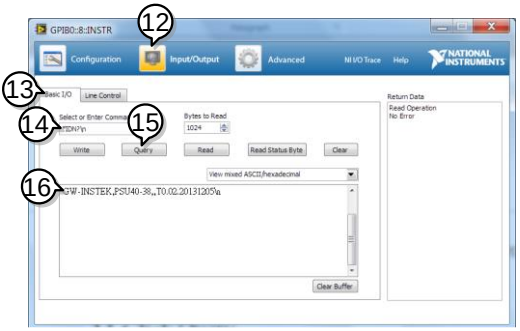
7. Click on *Configuration*.
8. Click on the *GPIB Settings* tab and confirm that the GP-IB settings are correct.



9. Click on the *I/O Settings* tab.
10. Make sure the *Enable Termination Character* check box is checked, and the terminal character is \n (Value: xA).
11. Click *Apply Changes*.



12. Click on *Input/Output*.
13. Click on the *Basic/IO* tab.
14. Enter *IDN? in the *Select or Enter Command* drop down box.
15. Click *Query*.
16. The *IDN? query will return the Manufacturer, model name, serial number and firmware version in the dialog box.
    TEXIO,PTE40-38, TW123456,T0.02.20131205



5-1-3. UART Remote Interface

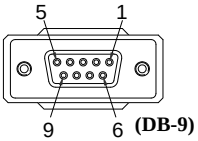
5-1-3-1. Configure UART

Overview

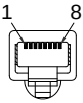
The PTE uses the IN & OUT ports for UART communication coupled with RS-232C (Part number PSU-232) or RS-485 adapters (part number PSU-485). The pin outs for the adapters are shown below.

PSU-232 RS-232C cable with DB9 connector

DB-9 Connector			Remote IN Port(RJ-45)		Remark
Pin No.	Name		Pin No.	Name	
Housing	Shield		Housing	Shield	
2	RX		7	TX	Twisted pair
3	TX		8	RX	
5	SG		1	SG	



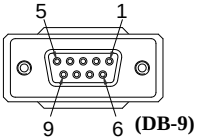
(DB-9)



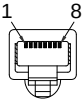
(RJ-45)

PSU-485 RS-485 cable with DB9 connector

DB-9 Connector			Remote IN Port(RJ-45)		Remark
Pin No.	Name		Pin No.	Name	
Housing	Shield		Housing	Shield	
9	TXD-		6	RXD-	Twisted pair
8	TXD+		3	RXD+	
1	SG		1	SG	
5	RXD-		5	TXD-	Twisted pair
4	RXD+		4	TXD+	

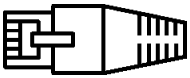


(DB-9)



(RJ-45)

Diagram of End terminal connector

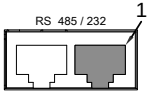


End terminal connector from PSU-232 or PSU-485 connection kit.

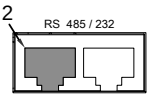
End terminal connector	
8 Pin Connector	
Pin No.	Remarks
3	Internal shorted
7	
4	Internal shorted
8	

Steps

1. Connect the RS-232C serial cable or RS-485 serial cable to the Remote IN port on the real panel. Connect the other end of the cable to the PC.



2. Connect the end terminal connector (include in the PSU-232 or RS-485 connection kit) to the Remote OUT port on the rear panel.

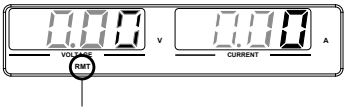


3. Press the Function key to enter the Normal configuration settings.
Set the following UART settings:

Page 69

F-70 = 1~3	Interface: 0= Disable UART, 1=RS-232C, 2=RS-485 4W
F-71 = 0 ~ 7	Set the baud rate: 0=1200, 1=2400, 2=4800, 3=9600, 4=19200, 5=38400, 6=57600, 7=115200
F-72 = 0 or 1	Data bits: 0=7 or 1=8
F-73 = 0 ~3	Parity: 0 = none, 1 = odd, 2 = even
F-74 = 0 or 1	Stop bits: 0 = 1, 1 = 2
F-75 = 0	TCP: 0 = SCPI
F-76 = 00~30	UART address for multi-unit remote connection.
F-77 = 0	Disable Multi-Drop mode.

4. The RMT indicator will turn on when a remote connection has been established.



RMT indicator

5-1-3-2. UART Function Check

Functionality check

Invoke a terminal application such as Realterm.
To check the COM port No, see the Device Manager in the PC. Control panel → System → Hardware tab. Run this query command via the terminal application after the instrument has been configured for either RS-232C or RS-485 remote control (page 91).

SCPI commands

Command or response	Status
*IDN?	Typing
TEXIO TECHNOLOGY, PTE40-38, TW123456, T0.01.12345678	Return
Return the manufacturer, model, serial number, and firmware version in the above format. Manufacturer: TEXIO TECHNOLOGY Model: PTE40-38 Serial number: TW123456 Firmware version: T0.01.12345678	Note

5-1-4. Multiple Unit Connection

The PTE power supplies can have up to 31 units daisy chained together using the 8 pin connectors (IN OUT ports) on the rear panel. The first unit (master) in the chain is remotely connected to a PC using RS-232C or RS-485 (Legacy Multi-Drop mode), or USB, GP-IB or LAN (Multi-Drop mode). Each subsequent unit (slave) is daisy chained to the next using a RS-485 local bus. The OUT port of the first unit must be connected to intermediate connector and the OUT port of the last unit must be connected to end terminal connector.

There are two modes for controlling multiple units. In the first mode (Legacy Multi-Drop mode), the PC is only allowed to use RS-232C or RS-485 to connect to the first device, and all UART parameters must be executed in this mode Configuration. The remote command supports the SCPI commands or PU Series commands.

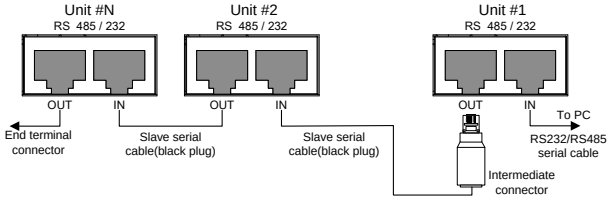
In the second mode (Multi-Drop mode), the PC is allowed to connect to the first unit using USB-CDC/GP-IB/LAN. In this mode, you only need to specify the Multi-Drop parameter. Remote commands only support SCPI commands.

For these two modes, each unit is assigned a unique address, which can then be controlled independently of the host PC.

5-1-4-1. Legacy Multi-Drop mode

Operation

1. Check the F-89 (System version and build date) settings first on all units (see page 66). The two parameters O and P (Option Module) must be the same on all units before any multiple unit connection can be established. Example: F-89 O:00, P:01.
2. Connect the first unit's IN port to a PC via RS-232C or RS-485 serial cable.
   - Use the serial cables supplied in the PSU-232 or PSU-485 connection kit.
3. Plug in intermediate connector to the OUT port on the first unit then using the slave serial link cable (black plug) to connect intermediate connector to the IN port of the second unit.
4. Connect all the remaining units in the same fashion until all the units have been daisy-chained together.



5. Terminate the OUT port of the last unit with the end terminal connector included in the PSU-232 or PSU-485 connection kit.
6. Press the Function key to enter the Normal configuration settings for the master unit.

Page 69

Set the following settings:

F-70 = 1~3	Configure the master unit as you normally would for RS-232C or RS-485 remote control, see page 91.
F-71 = 0~7	Set the baud rate (set all units the same). See page 91.
F-72 = 1	Set to 8 data bits.
F-73 = 0	Parity to none.
F-74 = 0	1 Stop bit.
F-75 = 0 or 1	F-75 = 0 Set the UART TCP to SCPI. F-75 = 1 Set the UART TCP to PU (emulation mode).
F-76 = 00~30	Set the address of the master unit. It must be a unique address identifier.
F-77 = 0	Disable Multi-Drop mode.

7. Press the Function key to enter the Normal configuration settings for the slave(s). Page 69
   Set the following settings:

F-70 = 2~3	Set the slave unit to RS-485.

Connect to PC using	F-70 (Master)	F-70 (All slave)
RS-232C	1	2
RS-485 4W	2	2

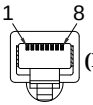
F-71 = 0~7	Set the baud rate (make all units, including the master, the same baud). See page 91.
F-72 = 1	Set to 8 data bits.
F-73 = 0	Parity to none.
F-74 = 0	1 Stop bit.
F-75 = 0~1	F-75 = 0 Set the UART TCP to SCPI. F-75 = 1 Set the UART TCP to PU (emulation mode). Set the uart tcp (make all units, including the master, the same uart tcp). See page 91.
F-76 = 00~30	Set the address of each slave to a unique address identifier
F-77 = 0	Disable Multi-Drop mode.

8. Multiple units can now be operated at the same time. See the programming manual or see the function check below for usage details.

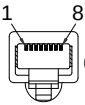
Slave serial link cable with RJ-45 shielded connectors from PSU-232 or PSU-485 connection kit

RS-485 slave serial link pin assignment

8 Pin Connector (IN)(RJ-45)			8 Pin Connector (OUT)(RJ-45)	
Pin No.	Name		Pin No.	Name
Housing	Shield		Housing	Shield
1	SG		1	SG
6	TXD -		6	TXD -
3	TXD +		3	TXD +
5	RXD -		5	RXD -
4	RXD +		4	RXD +

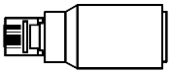


(RJ-45)



(RJ-45)

Diagram of Intermediate connector

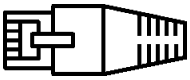


Intermediate connector from PSU-232 or PSU-485 connection kit.

Intermediate connector

8 Pin (Male)			8 Pin (Female)		
Pin No.	Name		Pin No.	Name	Remarks
Housing	Shield		Case	Shield	
1	SG		1	SG	
6	TXD -		6	TXD -	Internal paralleled by
3	TXD +		3	TXD +	120 ohm
5	RXD -		5	RXD -	Internal paralleled by
4	RXD+		4	RXD +	120 ohm

Diagram of End terminal connector



End terminal connector from PSU-232 or PSU-485 connection kit.

End terminal connector

8 Pin Connector

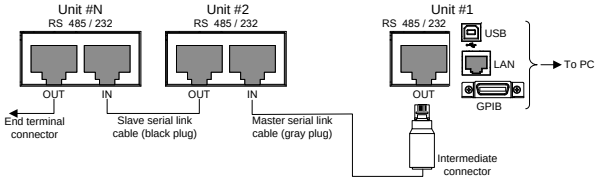
Pin No.	Remarks
3	Internal shorted
7	
4	Internal shorted

5-1-4-2. Multi-Drop mode

Operation

1. Check the F-89 (System version and build date) settings first on all units (see page 66). The two parameters O and P (Option Module) must be the same on all units before any multiple unit connection can be established.
   Example: F-89 O:00, P:01.
2. All units must be powered down before starting the Multi-Drop mode configuration.
3. Connect the first unit's LAN, USB or GP-IB port to a PC.

4. Plug in intermediate connector to the OUT port on the first unit then using the master serial link cable (gray plug) to connect intermediate connector to the IN port of the second unit.
5. Connect all the remaining units between the OUT port and the IN port with the slave serial link cable (black plug) supplied in the PSU-232 or PSU-485 connection kit until all the desired units have been daisy-chained together.



6. Terminate the OUT port of the last unit with the end terminal connector included in the PSU-232 or PSU-485 connection kit.
7. Power up all slave units.
8. Set the addresses of all slave units using the F-76 parameter.

   F-76 = 00~30 Set the address of the unit. It must be a unique address identifier.
9. Set the Multi-Drop setting parameter (F-77) to Slave for all slave units.

   F-77 = 2 Set the Multi-Drop setting to slave.
10. Power up the master unit.
11. Set the address of the master unit using the F-76 parameter.

    F-76 = 00~30 Set the address of the unit. It must be a unique address identifier.
12. You can check the slaves' addresses by using the F-77 parameter on the master unit.

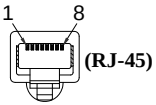
    F-77 = 3 Display on each slave units the configured address. This can show if identical addresses have been assigned individually to each slave units.
13. Set the Multi-Drop setting parameter (F-77) to Master.

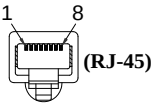
    F-77 = 1 Set the Multi-Drop setting to master.
14. You can display the status of each slave unit by using the F-78 parameter.

    F-78 = 0~30 Displayed parameter: AA-S
    AA: 00~30 (Address),
    S: 0~1 (Off-line/On-line status).
15. Multiple units can now be operated using SCPI commands. See the programming manual or see the function check below for usage details.

Slave serial link cable with RJ-45 shielded connectors from PSU-232 or PSU-485 connection kit

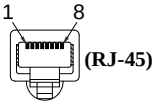
RS-485 slave serial link pin assignment				
8 Pin Connector (IN)(RJ-45)			8 Pin Connector (OUT)(RJ-45)	
Pin No.	Name		Pin No.	Name
Housing	Shield		Housing	Shield
1	SG		1	SG
6	TXD -		6	TXD -
3	TXD +		3	TXD +
5	RXD -		5	RXD -
4	RXD +		4	RXD +





Master serial link cable with RJ-45 shielded connectors from PSU-232 or PSU-485 connection kit

RS-485 master serial link pin assignment				
8 Pin Connector (IN)(RJ-45)			8 Pin Connector (OUT)(RJ-45)	
Pin No.	Name		Pin No.	Name
Housing	Shield		Housing	Shield
1	SG		1	SG
6	TXD -		5	RXD -
3	TXD +		4	RXD +
5	RXD -		6	TXD -
4	RXD +		3	TXD +



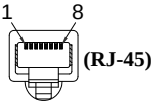
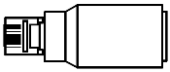


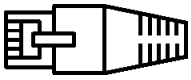
Diagram of Intermediate connector



Intermediate connector from PSU-232 or PSU-485 connection kit.

Intermediate connector					
8 Pin (Male)			8 Pin (Female)		
Pin No.	Name		Pin No.	Name	Remarks
Housing	Shield		Case	Shield	
1	SG		1	SG	
6	TXD -		6	TXD -	Internal paralleled by
3	TXD +		3	TXD +	120 ohm
5	RXD -		5	RXD -	Internal paralleled by
4	RXD +		4	RXD +	120 ohm

Diagram of End terminal connector



End terminal connector from

End terminal connector
8 Pin Connector

PSU-232 or PSU-485 connection kit.

Pin No.	Remarks
3	Internal shorted
7	
4	Internal shorted
8	

5-1-4-3. Multiple units Function Check

Functionality check

Invoke a terminal application such as Realterm.
To check the COM port No, see the Device Manager in the PC. Control panel → System → Hardware tab.
Below shows examples using the Legacy Multi-Drop mode and the Multi-Drop mode.

Legacy Multi-Drop mode

When using SCPI commands or PU Series commands, each unit can be individually controlled using the unique address identifiers. For this function check, we will assume that the master unit is assigned to address 8, while a slave is assigned address 11.
Run this query command via the terminal application after the instruments have been configured for multi-unit control with Legacy Multi-Drop mode. See page 93.

SCPI commands

Command or response	Status
INST:SEL 8	Typing
*IDN?	Typing
TEXIOTECHNOLOGY,PTE40-38, ,T0.01 .12345678	Return
Selects the unit with address 8 and returns its identity string.	Note
INST:SEL 11	Typing
*IDN?	Typing
TEXIOTECHNOLOGY,PTE6-200,,T0.01. 12345678	Return
Selects the unit with address 11 and returns its identity string.	Note

PU Series commands

(Because the terminal character used by the PU Series command is CR instead of LF, the terminal characters are specifically listed below)

Command or response	Status
ADR 8\r	Typing
OK\r	Return
IDN? \r	Typing
TEXIOTECHNOLOGY,PTE40-38,,T0.01.1 2345678\r	Return

	Selects the unit with address 8 and returns its identity string.	Note
	ADR 11\r	Typing
	OK\r	Return
	IDN? \r	Typing
	TEXIOTECHNOLOGY,PTE6-200,,T0.01.12345678\r	Return
	Selects the unit with address 11 and returns its identity string.	Note

⚠ Note	PU Series commands do not use LF (line feed) codes to terminate commands. See the PU Series user manual for further information.

Multi-Drop mode

When using the Multi-Drop mode, the entire SCPI command list developed for the PTE can be used. Each unit can be individually controlled after a slave unit has been selected. For this function check, we will assume that the master unit is assigned to address 0, while a slave is assigned address 5.

Run this query command via the terminal application after the instruments have been configured for multi-unit control with Multi-Drop mode. See page 95.

SCPI commands

Command or response	Status
INST:SEL 0	Typing
*IDN?	Typing
TEXIOTECHNOLOGY,PTE150-10,,T0.01.12345678	Return
Selects the unit with address 0 and returns its identity string.	Note
INST:SEL 5	Typing
*IDN?	Typing
TEXIO TECHNOLOGY, PTE150-10,,T0.01.12345678	Return
Selects the unit with address 5 and returns its identity string.	Note
INST:SEL 6	Typing
Selects the unit with address 6 (not configured in our example). An error is displayed on the master front panel.	Note
INST:SEL 0	Typing
SYST:ERR?	Typing
-221, “Settings conflict”	Return
Query the system errors. “Settings conflict” is returned.	Note

INST:STAT?		Typing
33,0		Return
Returns the active units and master unit in the bus. 33=0b100001 The units at address 0 and address 5 are on-line. 0 Master device's address is 0.		Note

5-1-5. Configure Ethernet Connection

The Ethernet interface can be configured for a number of different applications. Ethernet can be configured for basic remote control or monitoring using a web server or it can be configured as a socket server.
The PTE series supports both DHCP connections so the instrument can be automatically connected to an existing network or alternatively, network settings can be manually configured.

Ethernet configuration Parameters

For details on how to configure the Ethernet settings, please see the configuration chapter on page 64.

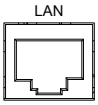
MAC Address (display only)	LAN Enable/Disable
DHCP Enable/Disable	IP Address
Subnet Mask	Gateway
DNS Address	Sockets Server Enable/Disable
Web Server Enable/Disable	Web Password Enable/Disable
Web Enter Password	

5-1-5-1. Web Server Configuration

Configuration

This configuration example will configure the PTE as a web server and use DHCP to automatically assign an IP address to the PTE.

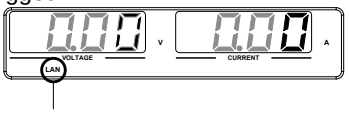
1. Connect an Ethernet cable from the network to the rear panel Ethernet port.



2. Press the Function key to enter the Normal configuration settings. Page 69
   Set the following LAN settings:

F-36 = 1	Turn LAN on
F-37 = 1	Enable DHCP
F-59 = 1	Turn the web server on
F-60 = 0 or 1	Set to 0 to disable web password, set to 1 to enable web password
F-61 = 0000 ~9999	Set the web password

3. The LAN indicator will turn on when a network cable is plugged in.



LAN indicator

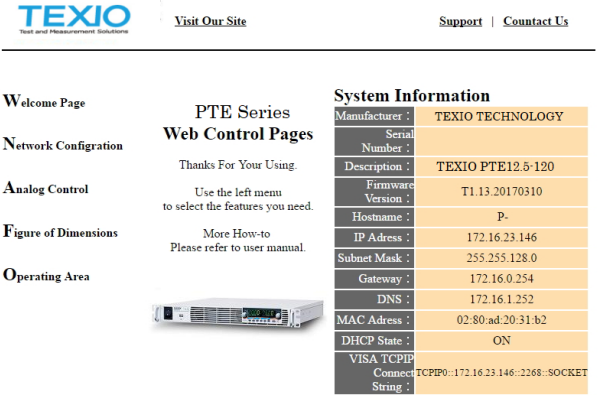
Note

It may be necessary to cycle the power or refresh the web browser to connect to a network.

5-1-5-2. Web Server Remote Control Function Check

Functionality check

Enter the IP address of the power supply in a web browser after the instrument has been configured as a web server (page 100).
The web server allows you to monitor the function settings of the PTE.
You can check the IP address by checking F-39 to F-42.
F-39 = AAA IP Address part 1 of 4
F-40 = BBB IP Address part 2 of 4
F-41 = CCC IP Address part 3 of 4
F-42 = DDD IP Address part 4 of 4
http:// AAA.BBB.CCC.DDD
The web browser interface appears.



The web browser interface allows you to access the following:
Network configuration settings
Analog control pinouts & usage
PTE dimensions
Operating area diagram

Note

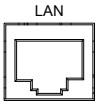
For further details, please see the programming manual, available on the TEXIO TECHNOLOGY web site.

5-1-5-3. Sockets Server Configuration

Configuration

This configuration example will configure the PTE socket server.
The following configuration settings will manually assign the PTE an IP address and enable the socket server. The socket server port number is fixed at 2268.

1. Connect an Ethernet cable from the network to the rear panel Ethernet port.



2. Press the Function key to enter the Normal configuration settings.

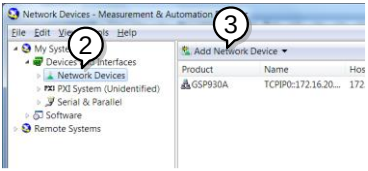
Set the following LAN settings:

F-36 =	1	Enable LAN
F-37 =	0	Disable DHCP
F-39 =	172	IP Address part 1 of 4
F-40 =	16	IP Address part 2 of 4
F-41 =	5	IP Address part 3 of 4
F-42 =	133	IP Address part 4 of 4
F-43 =	255	Subnet Mask part 1 of 4
F-44 =	255	Subnet Mask part 2 of 4
F-45 =	128	Subnet Mask part 3 of 4
F-46 =	0	Subnet Mask part 4 of 4
F-47 =	172	Gateway part 1 of 4
F-48 =	16	Gateway part 2 of 4
F-49 =	21	Gateway part 3 of 4
F-50 =	101	Gateway part 4 of 4
F-57 =	1	Enable Sockets

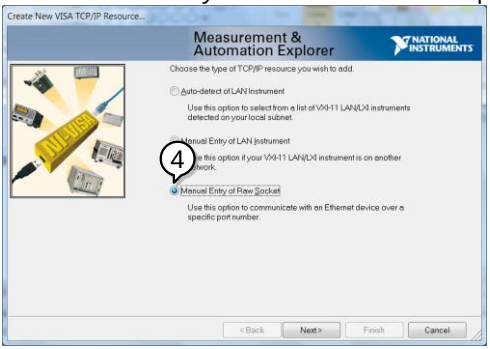
5-1-5-4. Socket Server Function Check

Background	To test the socket server functionality, National Instruments Measurement and Automation Explorer can be used. This program is available on the NI website, www.ni.com., via a search for the VISA Run-time Engine page, or “downloads” at the following URL, http://www.ni.com/visa/
Requirements	Operating System: Windows 10
Functionality check	1. Start the NI Measurement and Automation Explorer (MAX) program. Using Windows, press: *Start>All Programs>National Instruments>Measurement & Automation*

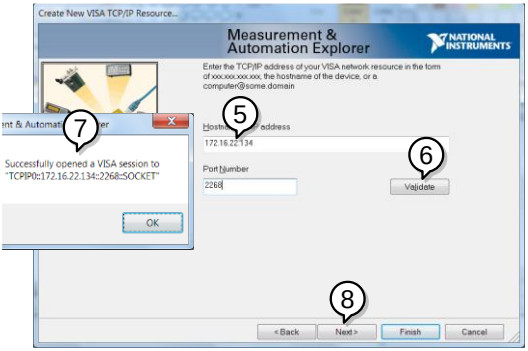
2. From the Configuration panel access;
   My System>Devices and Interfaces>Network Devices
3. Press *Add New Network Device>Visa TCP/IP Resource…*



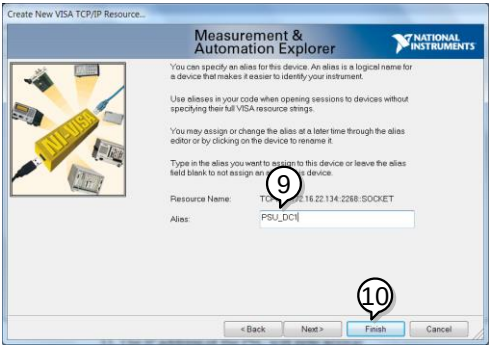
4. Select *Manual Entry of Raw Socket* from the popup window.



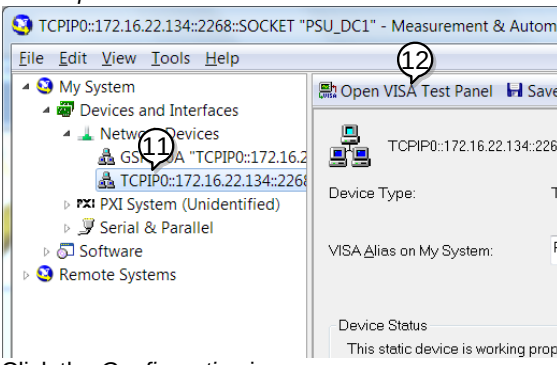
5. Enter the IP address and the port number of the PTE. The port number is fixed at 2268.
6. Click the Validate button.
7. A popup will appear if a connection is successfully established.
8. Click Next.



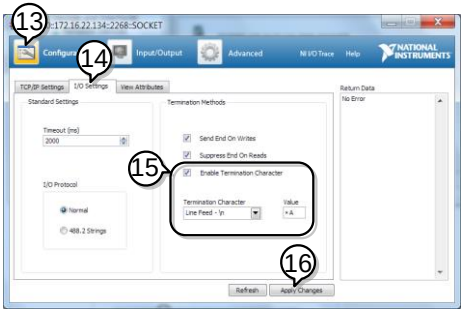
9. Next configure the Alias (name) of the PTE connection. In this example the Alias is: PTE_DC1
10. Click finish.



11. The IP address of the PTE will now appear under Network Devices in the configuration panel. Select this icon now.
12. Click *Open VISA Test Panel.*

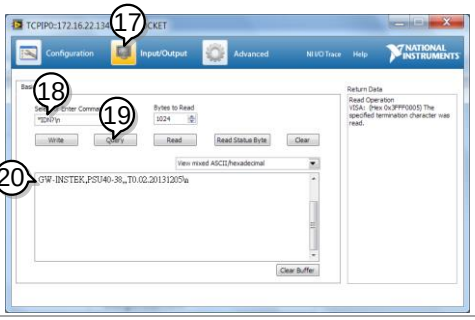


13. Click the *Configuration* icon,
14. Click on *I/O Settings*.
15. Make sure the *Enable Termination Character* check box is checked, and the terminal character is \n (Value: xA).
16. Click *Apply Changes*.



17. Click the *Input/Output* icon.
18. Enter *IDN? in the *Select or Enter Command* dialog box if it is not already.
19. Click the *Query* button.
20. The *IDN? query will return the Manufacturer, model name, serial number and firmware version in the dialog box.

    TEXIO TECHNOLOGY,PTE40-38,
    TW123456,T0.02.20131205



Note	For further details, please see the programming manual, available on the TEXIO TECHNOLOGY web site @ www.texio.co.jp.

6. FAQ

- How often should the power supply be calibrated?
- The OVP voltage is triggered earlier than expected.
- Can I combine more than 1 cable together for the output wiring?
- The accuracy does not match the specification.

The OVP voltage is triggered earlier than expected.

When setting the OVP voltage, take into account the voltage drop from the load cables. As the OVP level is set from the output terminals and not the load terminals, the voltage at the load terminals may be slightly lower.

Can I combine more than 1 cable together for the output wiring?

Yes. Cables can be used together (in parallel) if the current capacity of a single cable is insufficient. However the withstand voltage should also be taken into account. Ensure the cables are twisted together and are the same length.

The accuracy does not match the specification.

Make sure the device is powered On for at least 30 minutes, within +20°C~+30°C. This is necessary to stabilize the unit to match the specification.

For more information, contact your local dealer or TEXIO TECHNOLOGY

7. Appendix

7-1. Specifications

The specifications apply when the PTE series is powered on for at least 30 minutes.

7-1-1. PTE Series for 1U/1.5kW

7-1-1-1. Output

Model	PTE	6-200	8-180	12.5-120	15-100	20-76
Rated Output Voltage[*1]	V	6	8	12.5	15	20
Rated Output Current[*2]	A	200	180	120	100	76
Rated Output Power	W	1200	1440	1500	1500	1520

Model	PTE	30-50	40-38	50-30	60-25	80-19
Rated Output Voltage[*1]	V	30	40	50	60	80
Rated Output Current[*2]	A	50	38	30	25	19
Rated Output Power	W	1500	1520	1500	1500	1520

Model	PTE	100-15	150-10	300-5	400-3.8	600-2.6
Rated Output Voltage[*1]	V	100	150	300	400	600
Rated Output Current[*2]	A	15	10	5	3.8	2.6
Rated Output Power	W	1500	1500	1500	1520	1560

7-1-1-2. Constant Voltage Mode

Model		PTE	6-200	8-180	12.5-120	15-100	20-76
Line regulation[*3]		mV	2.6	2.8	3.25	3.5	4
Load regulation[*4]		mV	2.6	2.8	3.25	3.5	4
Ripple and noise[*5]	p-p[*6]	mV	60	60	60	60	60
	r.m.s.[*7]	mV	8	8	8	8	8
Temperature coefficient		ppm/°C	100ppm/°C of rated output voltage, after a 30 minute warm-up.				
Remote sense compensation voltage (single wire)		V	1	1	1	1	1
Rise time[*8]	Rated load	ms	80	80	80	80	80
	No load	ms	80	80	80	80	80
Fall time[*9]	Rated load	ms	10	50	50	50	50
	No load	ms	500	600	700	700	800
Transient response time[*10]		ms	1.5	1.5	1	1	1

Model		PTE	30-50	40-38	50-30	60-25	80-19
Line regulation[*3]		mV	5	6	7	8	10
Load regulation[*4]		mV	5	6	7	8	10
Ripple and noise[*5]	p-p[*6]	mV	60	60	60	60	80
	r.m.s.[*7]	mV	8	8	8	8	8
Temperature coefficient		ppm/°C	100 ppm/°C of rated output voltage, after a 30 minute warm-up.				
Remote sense compensation voltage (single wire)		V	1.5	2	2	3	4
Rise time[*8]	Rated load	ms	80	80	80	80	150

	No load	ms	80	80	80	80	150
Fall time[*9]	Rated load	ms	80	80	80	80	150
	No load	ms	900	1000	1100	1100	1200
Transient response time[*10]		ms	1	1	1	1	1

Model		PTE	100-15	150-10	300-5	400-3.8	600-2.6
Line regulation[*3]		mV	12	17	32	42	62
Load regulation[*4]		mV	12	17	32	42	62
Ripple and noise[*5]	p-p[*6]	mV	80	100	150	200	300
	r.m.s.[*7]	mV	8	10	25	40	60
Temperature coefficient		ppm/°C	100ppm/°C of rated output voltage, after a 30 minute warm-up.				
Remote sense compensation voltage (single wire)		V	5	5	5	5	5
Rise time[*8]	Rated load	ms	150	150	150	200	250
	No load	ms	150	150	150	200	250
Fall time[*9]	Rated load	ms	150	150	150	200	250
	No load	ms	1500	2000	2500	3000	4000
Transient response time[*10]		ms	1	2	2	2	2

7-1-1-3. Constant Current Mode

Model		PTE	6-200	8-180	12.5-120	15-100	20-76
Line regulation[*3]		mA	22	20	14	12	9.6
Load regulation[*11]		mA	45	41	29	25	20.2
Ripple and noise[*12]	r.m.s.	mA	400	360	240	200	152
Temperature coefficient		ppm/°C	100 ppm/°C of rated output current, after a 30 minute warm-up.				

Model		PTE	30-50	40-38	50-30	60-25	80-19
Line regulation[*3]		mA	7	5.8	5	4.5	3.9
Load regulation[*11]		mA	15	12.6	11	10	8.8
Ripple and noise[*12]	r.m.s.	mA	125	95	85	75	57
Temperature coefficient		ppm/°C	100 ppm/°C of rated output current, after a 30 minute warm-up.				

Model		PTE	100-15	150-10	300-5	400-3.8	600-2.6
Line regulation[*3]		mA	3.5	3	2.5	2.38	2.26
Load regulation[*11]		mA	8	7	6	5.76	5.52
Ripple and noise[*12]	r.m.s.	mA	45	35	25	17	12
Temperature coefficient		ppm/°C	100 ppm/°C of rated output current, after a 30 minute warm-up.				

7-1-1-4. Protection Function

Model	PTE		6-200	8-180	12.5-120	15-100	20-76
Over voltage protection (OVP)	Setting range	V	0.6 - 6.6	0.8-8.8	1.25 - 13.75	1.5 - 16.5	2 - 22
	Setting accuracy	mV	60	80	125	150	200
Over current protection (OCP)	Setting range	A	5 - 220	5-198	5 - 132	5 - 110	5 - 83.6
	Setting accuracy	mA	4000	3600	2400	2000	1520
Under voltage limit (UVL)	Setting range		0 - 6.3	0 - 8.4	0 - 13.12	0 - 15.75	0 - 21

Model	PTE		30-50	40-38	50-30	60-25	80-19
Over voltage protection (OVP)	Setting range	V	3 - 33	4 - 44	5 - 55	5 - 66	5 - 88
	Setting accuracy	mV	300	400	500	600	800
Over current protection (OCP)	Setting range	A	5 - 55	3.8 - 41.8	3 - 33	2.5 - 27.5	1.9 - 20.9
	Setting accuracy	mA	1000	760	600	500	380
Under voltage limit (UVL)	Setting range		0 - 31.5	0 - 42	0 - 52.5	0 - 63	0 - 84

Model	PTE		100-15	150-10	300-5	400-3.8	600-2.6
Over voltage protection (OVP)	Setting range	V	5 - 110	5 - 165	5 - 330	5 - 440	5 - 660
	Setting accuracy	mV	1000	1500	3000	4000	6000
Over current protection (OCP)	Setting range	A	1.5 - 16.5	1 - 11	0.5 - 5.5	0.38 - 4.18	0.26 - 2.86
	Setting accuracy	mA	300	200	100	76	52
Under voltage limit (UVL)	Setting range		0 - 105	0 - 157.5	0 - 315	0 - 420	0 - 630

Model	PTE All models	
Over temperature protection (OHP)	Operation	Turn the output off.
Incorrect sensing connection protection (SENSE)	Operation	Turn the output off.
Low AC input protection (AC-FAIL)	Operation	Turn the output off.
Shutdown (SD)	Operation	Turn the output off.
Power limit (POWER LIMIT)	Operation	Over power limit.
	Value (fixed)	Approx. 105% of rated output power

7-1-1-5. Analog Programming and Monitoring

Model	PTE All models
External voltage control output voltage	Accuracy and linearity: ±0.5% of rated output voltage.
External voltage control output current	Accuracy and linearity: ±1% of rated output current.
External resistor control output voltage	Accuracy and linearity: ±1% of rated output voltage.
External resistor control output current	Accuracy and linearity: ±1.5% of rated output current.
Output voltage monitor	Accuracy: ±1%
Output current monitor	Accuracy: ±1%
Shutdown control	Turns the output off with a LOW (0V to 0.5V) or short-circuit.
Output on/off control	Possible logic selections: Turn the output on using a LOW (0V to 0.5V) or short-circuit, turn the output off using a HIGH (4.5V to 5V) or open-circuit. Turn the output on using a HIGH (4.5V to 5V) or open-circuit, turn the output off using a LOW (0V to 0.5V) or short-circuit.
Alarm clear control	Clear alarms with a LOW (0V to 0.5V) or short-circuit.
CV/CC/ALM/PWR ON/OUT ON indicator	Photo coupler open collector output; Maximum voltage 30V, maximum sink current 8mA.
Trigger out	Maximum low level output = 0.8V; minimum high level output = 2V; Maximum source current = 8mA.
Trigger in	Maximum low level input voltage = 0.8V; minimum high level input votage = 2.0V, Maximum sink current = 8mA.

7-1-1-6. Front Panel

Model		PTE	6-200	8-180	12.5-120	15-100	20-76
Display, 4 digits							
Voltage accuracy	0.1% +	mV	12	16	25	30	40
Current accuracy	0.2% +	mA	600	540	360	300	228
Model		PTE	30-50	40-38	50-30	60-25	80-19
Display, 4 digits							
Voltage accuracy	0.1% +	mV	60	80	100	120	160
Current accuracy	0.2% +	mA	150	114	90	75	57
Model		PTE	100-15	150-10	300-5	400-3.8	600-2.6
Display, 4 digits							
Voltage accuracy	0.1% +	mV	200	300	600	800	1200
Current accuracy	0.2% +	mA	45	30	15	11.4	7.8

Model	PTE All models
Indications	GREEN LED's: CV, CC, V, A, VSR, ISR, DLY, RMT, LAN, M1, M2, M3, RUN, Output ON RED LED's: ALM, ERR
Buttons	Lock/Local(Unlock), PROT(ALM_CLR), Function(M1), Test(M2), Set(M3), Shift, Output
Knobs	Voltage, Current
USB port	Type A USB connector

7-1-1-7. Programming and Measurement

Model	PTE		6-200	8-180	12.5-120	15-100	20-76
Output voltage programming accuracy	0.05% +	mV	3	4	6.25	7.5	10
Output current programming accuracy	0.2% +	mA	200	180	120	100	76
Output voltage programming resolution		mV	0.2	0.27	0.4	0.5	0.7
Output current programming resolution		mA	6	6	4	3.3	2.5
Output voltage measurement accuracy	0.1% +	mV	6	8	12.5	15	20
Output current measurement accuracy	0.2% +	mA	400	360	240	200	152
Output voltage measurement resolution		mV	0.2	0.27	0.4	0.5	0.7
Output current measurement resolution		mA	6	6	4	3.3	2.5

Model	PTE		30-50	40-38	50-30	60-25	80-19
Output voltage programming accuracy	0.05% +	mV	15	20	25	30	40
Output current programming accuracy	0.2% +	mA	50	38	30	25	19
Output voltage programming resolution		mV	1	1.3	1.7	2	2.7
Output current programming resolution		mA	1.7	1.2	1	0.8	0.65
Output voltage measurement accuracy	0.1% +	mV	30	40	50	60	80
Output current measurement accuracy	0.2% +	mA	100	76	60	50	38
Output voltage measurement resolution		mV	1	1.3	1.7	2	2.7
Output current measurement resolution		mA	1.7	1.2	1	0.8	0.65

Model	PTE		100-15	150-10	300-5	400-3.8	600-2.6
Output voltage programming accuracy	0.05% +	mV	50	75	150	200	300
Output current programming accuracy	0.2% +	mA	15	10	5	3.8	2.6
Output voltage programming resolution		mV	3.4	5.2	10.2	13.6	20.4
Output current programming resolution		mA	0.5	0.34	0.19	0.13	0.09
Output voltage measurement accuracy	0.1% +	mV	100	150	300	400	600
Output current measurement accuracy	0.2% +	mA	30	20	10	7.6	5.2
Output voltage measurement resolution		mV	3.4	5.2	10.2	13.6	20.4
Output current measurement resolution		mA	0.5	0.34	0.19	0.13	0.09

7-1-1-8. Input Characteristics

Model		PTE 1U models
Nominal input rating		100Vac to 240Vac, 50Hz to 60Hz, single phase
Input voltage range		85Vac ~ 265Vac
Input frequency range		47Hz ~ 63Hz
Maximum input current	100Vac	21 A
	200Vac	11 A
Inrush current		Less than 50A.
Maximum input power		2000 VA
Power factor	100Vac	0.99
	200Vac	0.98
Hold-up time		20ms or greater

Model		PTE	6-200	8-180	12.5-120	15-100	20-76
Efficiency[*13]	100Vac	%	76.5	78	82	82	83
	200Vac	%	79	81	85	85	86

Model		PTE	30-50	40-38	50-30	60-25	80-19
Efficiency[*13]	100Vac	%	83	84	84	84	84
	200Vac	%	86	87	87	87	87

Model		PTE	100-15	150-10	300-5	400-3.8	600-2.6
Efficiency[*13]	100Vac	%	84	84	84	84	84
	200Vac	%	87	87	87	87	87

7-1-1-9. Interface Capabilities

Model	PTE All models
USB	TypeA: Host, TypeB: Slave, Speed: 1.1/2.0, USB Class: CDC(Communications Device Class)
LAN	Instrument IP Address, Subnet Mask, Gateway IP Address, DNS IP Address, User Password, DHCP,100BASE-TX/AUTO MDI-X
RS-232C/RS-485	Complies with EIA232D / EIA485 Specifications
GP-IB (Factory Option)	SCPI - 1993, IEEE 488.2 compliant interface

7-1-1-10. Environment Conditions

Model	PTE All models
Operating temperature	0˚C to 50˚C[*14]
Storage temperature	-25˚C to 70˚C
Operating humidity	20% to 85% RH; No condensation
Storage humidity	90% RH or less; No condensation
Altitude	Maximum 2000m

7-1-1-11. General Specifications

Model	PTE All models
Weight	Less than 8.7kg
Dimensions	423×43.6×447.2 mm
Cooling	Forced air cooling by internal fan.
EMC	Complies with the European EMC directive for Class A test and measurement products.
Safety	Complies with the European Low Voltage Directive and carries the CE-marking.
Withstand voltage	AC to Chassis: 1500Vac/1min AC to Output terminal: 3000Vac/1min Output terminal to Chassis: Vout ≤ 150V: 1000Vdc/1min 150V<Vout ≤600V: 1500Vdc/1min
Insulation resistance	Chassis and output terminal; chassis and AC input; AC input and output terminal: 100MΩ or more (DC 1000V)

Notes:

*1 Minimum voltage is guaranteed to maximum 0.2% of the rated output voltage.

*2 Minimum current is guaranteed to maximum 0.4% of the rated output current.

*3 At 85 ~ 132Vac or 170 ~ 265Vac, constant load.

*4 From No-load to Full-load, constant input voltage. Measured at the sensing point in Remote Sense.

*5 Measure with JEITA RC-9131B (1:1) probe

*6 Measurement frequency bandwidth is 10Hz to 20MHz.

*7 Measurement frequency bandwidth is 5Hz to 1MHz.

*8 From 10% to 90% of rated output voltage, with rated resistive load.

*9 From 90% to 10% of rated output voltage, with rated resistive load.

*10 Time for output voltage to recover within 0.5% of its rated output for a load change from 0 to 90% of its rated output current. Voltage set point from 10% to 100% of rated output.

*11 For load voltage change, equal to the unit voltage rating, constant input voltage.

*12 For 6V~20V model the ripple is measured at 2V ~ rated output voltage and full output current. For other models, the ripple is measured at 10 ~ 100% output voltage and full output current.

*13 At rated output power.

*14 If install the front panel filter kit, the temperature is guaranteed to 40˚C.

7-1-2. PTE Series for 2U/3kW

7-1-2-1. Output

Model	PTE	6-400	8-360	12.5-240	15-200	20-152
Rated output voltage (*1)	V	6	8	12.5	15	20
Rated output current (*2)	A	400	360	240	200	152
Rated output power	W	2400	2880	3000	3000	3040

Model	PTE	30-100	40-76	50-60	60-50	80-38
Rated output voltage (*1)	V	30	40	50	60	80
Rated output current (*2)	A	100	76	60	50	38
Rated output power	W	3000	3040	3000	3000	3040

Model	PTE	100-30	150-20	300-10	400-7.6	600-5.2
Rated output voltage (*1)	V	100	150	300	400	600
Rated output current (*2)	A	30	20	10	7.6	5.2
Rated output power	W	3000	3000	3000	3040	3120

7-1-2-2. Constant Voltage Mode

Constant Voltage Mode		PTE	6-400	8-360	12.5-240	15-200	20-152
Line regulation (*3)		mV	0.01% of rated output voltage +2mV				
Load regulation (*4)		mV	0.01% of rated output voltage +5mV				
Ripple and noise (*5)	p-p (*6)	mV	75	75	75	75	75
	r.m.s. (*7)	mV	10	10	10	10	10
Temperature coefficient	ppm/°C		100ppm/°C after a 30 minute warm-up				
Temperature stability			0.05% of rated output voltage over 8hrs interval following 30 minutes warm-up. Constant line, load & temp.				
Warm-up drift			Less than 0.05% of rated output voltage +2mV over 30 minutes following power on.				
Remote snese compensation voltage (single wire)		V	1	1	1	1	1
Rise time (*8)	No load	ms	80	80	80	80	80
Fall time (*9)	Rated load	ms	10	50	50	50	50
	No load	ms	500	600	700	700	800
Transient response time (*10)		ms	3	3	3	3	3
Constant Voltage Mode		PTE	30-100	40-76	50-60	60-50	80-38
Line regulation (*3)		mV	0.01% of rated output voltage +2mV				
Load regulation (*4)		mV	0.01% of rated output voltage +5mV				
Ripple and noise (*5)	p-p (*6)	mV	75	75	75	75	100
	r.m.s. (*7)	mV	10	10	10	10	15
Temperature coefficient	ppm/°C		100ppm/°C after a 30 minute warm-up				
Temperature stability			0.05% of rated output voltage over 8hrs interval following 30 minutes warm-up. Constant line, load & temp.				
Warm-up drift			Less than 0.05% of rated output voltage +2mV over 30 minutes following power on.				
Remote snese compensation voltage (single wire)		V	1.5	2	2	3	4
Rise time (*8)	No load	ms	80	80	80	80	150
Fall time (*9)	Rated load	ms	80	80	80	80	150
	No load	ms	900	1000	1100	1100	1200
Transient response time (*10)		ms	3	3	3	3	3
Constant Voltage Mode		PTE	100-30	150-20	300-10	400-7.6	600-5.2
Line regulation (*3)		mV	0.01% of rated output voltage +2mV				
Load regulation (*4)		mV	0.01% of rated output voltage +5mV				
Ripple and noise (*5)	p-p (*6)	mV	100	120	300	300	500
	r.m.s. (*7)	mV	15	25	35	35	120
Temperature coefficient	ppm/°C		100ppm/°C after a 30 minute warm-up				
Temperature stability			0.05% of rated output voltage over 8hrs interval following 30 minutes warm-up. Constant line, load & temp.				
Warm-up drift			Less than 0.05% of rated output voltage +2mV over 30 minutes following power on.				
Remote snese compensation voltage (single wire)		V	5	5	5	5	5
Rise time (*8)	No load	ms	150	150	150	200	250
Fall time (*9)	Rated load	ms	150	150	150	200	250
	No load	ms	1500	2000	2500	3000	4000
Transient response		ms	3	3	3	3	3

time (*10)

7-1-2-3. Constant Current Mode

Model		PTE	6-400	8-360	12.5-240	15-200	20-152
Line regulation[*3]		mA	0.05% of rated output current				
Load regulation[*11]		mA	0.5% of rated output current				
Ripple and noise[*12]	r.m.s.	mA	850	800	650	590	520
Temperature coefficient	ppm/ °C		100 ppm/°C of rated output current, after a 30 minute warm-up.				

Model		PTE	30-100	40-76	50-60	60-50	80-38
Line regulation[*3]	of rated output current	mA	0.05%				
Load regulation[*11]	of rated output current	mA	0.5%				1%
Ripple and noise[*12]	r.m.s.	mA	290	185	137	107	85
Temperature coefficient	ppm/ °C		100 ppm/°C of rated output current, after a 30 minute warm-up.				

Model		PTE	100-30	150-20	300-10	400-7.6	600-5.2
Line regulation[*3]		mA	0.05% of rated output current				
Load regulation[*11]		mA	1% of rated output current				
Ripple and noise[*12]	r.m.s.	mA	69	58	30	20	15
Temperature coefficient	ppm/ °C		100 ppm/°C of rated output current, after a 30 minute warm-up.				

7-1-2-4. Protection Function

Model		PTE	6-400	8-360	12.5-240	15-200	20-152
Over voltage protection (OVP)	Setting range	V	0.6 - 6.6	0.8-8.8	1.25 - 13.75	1.5 - 16.5	2 - 22
	Setting accuracy	mV	60	80	125	150	200
Over current protection (OCP)	Setting range	A	5 - 440	5-396	5 - 262	5 - 220	5 - 167.2
	Setting accuracy	A	8	7.2	4.8	4	3.04
Under voltage limit (UVL)	Setting range		0 - 6.3	0 - 8.4	0 - 13.12	0 - 15.75	0 - 21

Model		PTE	30-100	40-76	50-60	60-50	80-38
Over voltage protection (OVP)	Setting range	V	3 - 33	4 - 44	5 - 55	5 - 66	5 - 88
	Setting accuracy	mV	300	400	500	600	800
Over current protection (OCP)	Setting range	A	5 - 110	5 - 83.6	5 - 66	5 - 55	3.8 - 41.8
	Setting accuracy	mA	2	1.52	1.2	1	0.76
Under voltage limit (UVL)	Setting range		0 - 31.5	0 - 42	0 - 52.5	0 - 63	0 - 84

Model		PTE	**100-30**	**150-20**	**300-10**	**400-7.6**	**600-5.2**
Over voltage protection (OVP)	Setting range	V	5 - 110	5 - 165	5 - 330	5 - 440	5 - 660
	Setting accuracy	mV	1000	1500	3000	4000	6000
Over current protection (OCP)	Setting range	A	3 - 33	2 - 22	1 - 11	0.76 - 8.36	0.52 - 5.72
	Setting accuracy	mA	0.6	0.4	0.2	0.152	0.104
Under voltage limit (UVL)	Setting range		0 - 105	0 - 157.5	0 - 315	0 - 420	0 - 630

Model	PTE All models	
Over temperature protection (OHP)	Operation	Turn the output off.
Incorrect sensing connection protection (SENSE)	Operation	Turn the output off.
Low AC input protection (AC-FAIL)	Operation	Turn the output off.
Shutdown (SD)	Operation	Turn the output off.
Power limit (POWER LIMIT)	Operation	Over power limit.
	Value (fixed)	Approx. 105% of rated output power

7-1-2-5. Front Panel

Model		PTE	6-400	8-360	12.5-240	15-200	20-152
Voltage accuracy	0.1% +	mV	12	16	25	30	40
Current accuracy	0.2% +	mA	1200	1080	720	600	456

Model		PTE	30-100	40-76	50-60	60-50	80-38
Voltage accuracy	0.1% +	mV	60	80	100	120	160
Current accuracy	0.2% +	mA	300	228	180	150	114

Model		PTE	100-30	150-20	300-10	400-7.6	600-5.2
Voltage accuracy	0.1% +	mV	200	300	600	800	1200
Current accuracy	0.2% +	mA	90	60	30	22.8	15.6

Model	PTE All models
Indications	GREEN LED's: CV, CC, V, A, VSR, ISR, DLY, RMT, LAN, M1, M2, M3, RUN, Output ON
	RED LED's: ALM, ERR
Buttons	Lock/Local(Unlock), PROT(ALM_CLR), Function(M1), Test(M2), Set(M3), Shift, Output
Knobs	Voltage, Current
USB port	Type A USB connector

7-1-2-6. Programming and Measurement

Model	PTE		6-400	8-360	12.5-240	15-200	20-152
Output voltage programming accuracy	0.05% +	mV	3	4	6.25	7.5	10
Output current programming accuracy	0.2% +	mA	400	360	240	200	152
Output voltage programming resolution		mV	0.2	0.27	0.4	0.5	0.7
Output current programming resolution		mA	12	12	8	6.6	5
Output voltage measurement accuracy	0.1% +	mV	6	8	12.5	15	20
Output current measurement accuracy	0.2% +	mA	800	720	480	400	304
Output voltage measurement resolution		mV	0.2	0.27	0.4	0.5	0.7
Output current measurement resolution		mA	12	12	8	6.6	5

Model	PTE		30-100	40-76	50-60	60-50	80-38
Output voltage programming accuracy	0.05% +	mV	15	20	25	30	40
Output current programming accuracy	0.2% +	mA	100	76	60	50	38
Output voltage programming resolution		mV	1	1.3	1.7	2	2.7
Output current programming resolution		mA	3.4	2.4	2	1.6	1.3
Output voltage measurement accuracy	0.1% +	mV	30	40	50	60	80
Output current measurement accuracy	0.2% +	mA	200	152	120	100	76
Output voltage measurement resolution		mV	1	1.3	1.7	2	2.7
Output current measurement resolution		mA	3.4	2.4	2	1.6	1.3

Model	PTE		100-30	150-20	300-10	400-7.6	600-5.2
Output voltage programming accuracy	0.05% +	mV	50	75	150	200	300
Output current programming accuracy	0.2% +	mA	30	20	10	7.6	5.2
Output voltage programming resolution		mV	3.4	5.2	10.2	13.6	20.4
Output current programming resolution		mA	1	0.68	0.38	0.26	0.18
Output voltage measurement accuracy	0.1% +	mV	100	150	300	400	600
Output current measurement accuracy	0.2% +	mA	60	40	20	15.2	10.4
Output voltage measurement resolution		mV	3.4	5.2	10.2	13.6	20.4
Output current measurement resolution		mA	1	0.68	0.38	0.26	0.18

7-1-2-7. Input Characteristics

Model	PTE All models
Nominal input rating	B type : 1P2W 200V
Input voltage range	B type : 1P2W 170-265Vac
Input frequency range	47Hz ~ 63Hz
Maximum input current	22A (200Vac)
Inrush current	Less than 100A.
Power factor	200Vac 0.98 (200Vac)
Hold-up time	20ms or greater

Model		PTE	6-400	8-360	12.5-240	15-200	20-152
Efficiency[*13]	200Vac	%	78.5	81	85	85	86

Model		PTE	30-100	40-76	50-60	60-50	80-38
	200Vac	%	86	87	87	87	87

Model		PTE	100-30	150-20	300-10	400-7.6	600-5.2
	200Vac	%	87	87	87	87	87

7-1-2-8. Interface Capabilities

Model	PTE All models
USB	TypeA: Host, TypeB: Slave, Speed: 1.1/2.0, USB Class: CDC(Communications Device Class)
LAN	Instrument IP Address, Subnet Mask, Gateway IP Address, DNS IP Address, User Password, DHCP,100BASE-TX/AUTO MDI-X
RS-232C/RS-485	Complies with EIA232D / EIA485 Specifications
GP-IB (Factory Option)	SCPI - 1993, IEEE 488.2 compliant interface

7-1-2-9. Environment Conditions

Model	PTE All models
Operating temperature	0˚C to 50˚C*14
Storage temperature	-25˚C to 70˚C
Operating humidity	20% to 85% RH; No condensation
Storage humidity	90% RH or less; No condensation
Altitude	Maximum 2000m

7-1-2-10. General Specifications

Model	PTE All models
Weight	Less than 20kg
Dimensions	423×87.2×447.2 mm
Cooling	Forced air cooling by internal fan.
Withstand voltage	AC to Chassis: 1500Vac/1min AC to Output terminal: 3000Vac/1min Output terminal to Chassis: Vout ≤ 150V: 1000Vdc/1min 150V<Vout ≤600V: 1500Vdc/1min
Insulation resistance	Chassis and output terminal; chassis and AC input; AC input and output terminal: 100MΩ or more (DC 1000V)

Notes:
(*1) Minimum voltage is guaranteed to maximum 0.2% of the rated output voltage.
(*2) Minimum current is guaranteed to maximum 0.4% of the rated output current.
(*3) Single phase 200V models: 170-265Vac. Three phase 200V models : 180-253Vac.
(*4) From No-load to Full-load, constant input voltage. Measured at the sensing point in Remote Sense.
(*5) Measured at rated output voltage and current with JEITA RC-9131B probe
(*6) Measurement frequency bandwidth is 10Hz to 20MHz.
(*7) Measurement frequency bandwidth is 5Hz to 1MHz.
(*8) From 10% to 90% of rated output voltage, with rated resistive load.
(*9) From 90% to 10% of rated output voltage, with rated resistive load.
(*10) Time for output voltage to recover within 2% of its rated output for a load change from 50 to 100% of its rated output current. Voltage set point from 10% to 100% of rated output.
(*11) For load voltage change, equal to the unit voltage rating, constant input voltage.

(*12) For 6V~20V model the ripple is measured at 2V ~ rated output voltage and full output current. For other models, the ripple is measured at 10 ~ 100% output voltage and full output current.
(*13) Single phase and three phase 200V models : at 200Vac input voltage. At rated output power.
(*14) If install the front panel filter kit, the temperature is guaranteed to 40˚C.

7-1-3. PTE Series for 3U/4.5kW

7-1-3-1. Output

Model	PTE	6-600	8-540	12.5-360	15-300	20-228
Rated output voltage (*1)	V	6	8	12.5	15	20
Rated output current (*2)	A	600	540	360	300	228
Rated output power	W	3600	4320	4500	4500	4560

Model	PTE	30-150	40-114	50-90	60-75	80-57
Rated output voltage (*1)	V	30	40	50	60	80
Rated output current (*2)	A	150	114	90	75	57
Rated output power	W	4500	4560	4500	4500	4560

Model	PTE	100-45	150-30	300-15	400-11.4	600-7.8
Rated output voltage (*1)	V	100	150	300	400	600
Rated output current (*2)	A	45	30	15	11.4	7.8
Rated output power	W	4500	4500	4500	4560	4680

7-1-3-2. Constant Voltage Mode

Constant Voltage Mode		PTE	6-600	8-540	12.5-360	15-300	20-228
Line regulation (*3)		mV	0.01% of rated output voltage +2mV				
Load regulation (*4)		mV	0.01% of rated output voltage +5mV				
Ripple and noise (*5)	p-p (*6)	mV	75	75	75	75	75
	r.m.s. (*7)	mV	10	10	10	10	10
Temperature coefficient		ppm/°C	100ppm/°C after a 30 minute warm-up				
Temperature stability			0.05% of rated output voltage over 8hrs interval following 30 minutes warm-up. Constant line, load & temp.				
Warm-up drift			Less than 0.05% of rated output voltage +2mV over 30 minutes following power on.				
Remote snese compensation voltage (single wire)		V	1	1	1	1	1
Rise time (*8)	No load	ms	80	80	80	80	80
Fall time (*9)	Rated load	ms	10	50	50	50	50
	No load	ms	500	600	700	700	800
Transient response time (*10)		ms	3	3	3	3	3

Constant Voltage Mode		PTE	30-150	40-114	50-90	60-75	80-57
Line regulation (*3)		mV	0.01% of rated output voltage +2mV				
Load regulation (*4)		mV	0.01% of rated output voltage +5mV				
Ripple and noise (*5)	p-p (*6)	mV	75	75	75	75	100
	r.m.s. (*7)	mV	10	10	10	10	15
Temperature coefficient		ppm/°C	100ppm/°C after a 30 minute warm-up				
Temperature stability			0.05% of rated output voltage over 8hrs interval following 30 minutes warm-up. Constant line, load & temp.				
Warm-up drift			Less than 0.05% of rated output voltage +2mV over 30 minutes following power on.				

Remote snese compensation voltage (single wire)		V	1.5	2	2	3	4
Rise time (*8)	No load	ms	80	80	80	80	150
Fall time (*9)	Rated load	ms	80	80	80	80	150
	No load	ms	900	1000	1100	1100	1200
Transient response time (*10)		ms	3	3	3	3	3
Constant Voltage Mode		PTE	100-45	150-30	300-15	400-11.4	600-7.8
Line regulation (*3)		mV	0.01% of rated output voltage +2mV				
Load regulation (*4)		mV	0.01% of rated output voltage +5mV				
Ripple and noise (*5)	p-p (*6)	mV	100	120	300	300	500
	r.m.s. (*7)	mV	15	25	35	35	120
Temperature coefficient		ppm/°C	100ppm/°C after a 30 minute warm-up				
Temperature stability			0.05% of rated output voltage over 8hrs interval following 30 minutes warm-up. Constant line, load & temp.				
Warm-up drift			Less than 0.05% of rated output voltage +2mV over 30 minutes following power on.				
Remote snese compensation voltage (single wire)		V	5	5	5	5	5
Rise time (*8)	No load	ms	150	150	150	200	250
Fall time (*9)	Rated load	ms	150	150	150	200	250
	No load	ms	1500	2000	2500	3000	4000
Transient response time (*10)		ms	3	3	3	3	3

7-1-3-3. Constant Current Mode

Constant Current Mode		**PTE**	**6-600**	**8-540**	**12.5-360**	**15-300**	**20-228**
Line regulation (*3)	of rated output current	mA	0.1%		0.05%		
Load regulation (*11)	of rated output current	mA	0.5%				
Load regulation thermal drift			Less than 0.1% of rated output current over 30 minutes following load change.				
Ripple and noise(*12)	r.m.s.	mA	1400	1315	1060	987	900
Temperature coefficient		ppm/°C	100ppm/°C after a 30 minute warm-up				
Temperature stability			0.05% of rated output current over 8hrs interval following 30 minutes warm-up. Constant line, load & temp.				
Warm-up drift			6~15V model : Less than 0.5% rated output current over 30 minutes following power on. 20~600V model : Less than 0.25% rated output current over 30 minutes following power on.				
Constant Current Mode		**PTE**	**30-150**	**40-114**	**50-90**	**60-75**	**80-57**
Line regulation (*3)	of rated output current	mA	0.05%				
Load regulation (*11)	of rated output current	mA	0.50%				1%
Load regulation thermal drift			Less than 0.1% of rated output current over 30 minutes following load change.				
Ripple and noise(*12)	r.m.s.	mA	472	275	191	138	110
Temperature coefficient		ppm/°C	100ppm/°C after a 30 minute warm-up				

Temperature stability			0.05% of rated output current over 8hrs interval following 30 minutes warm-up. Constant line, load & temp.				
Warm-up drift			20~600V model : Less than 0.25% rated output current over 30 minutes following power on.				
Constant Current Mode		**PTE**	**100-45**	**150-30**	**300-15**	**400-11.4**	**600-7.8**
Line regulation (*3)	of rated output current	mA			0.05%		
Load regulation (*11)	of rated output current	mA			1%		
Load regulation thermal drift			Less than 0.1% of rated output current over 30 minutes following load change.				
Ripple and noise(*12)	r.m.s.	mA	92	81	30	20	15
Temperature coefficient		ppm/°C	100ppm/°C after a 30 minute warm-up				
Temperature stability			0.05% of rated output current over 8hrs interval following 30 minutes warm-up. Constant line, load & temp.				
Warm-up drift			20~600V model : Less than 0.25% rated output current over 30 minutes following power on.				

7-1-3-4. Protection Function

Model		PTE	**6-600**	**8-540**	**12.5-360**	**15-300**	**20-228**
Over voltage protection (OVP)	Setting range	V	0.6 - 6.6	0.8-8.8	1.25 - 13.75	1.5 - 16.5	2 - 22
	Setting accuracy	mV	60	80	125	150	200
Over current protection (OCP)	Setting range	A	5 - 660	5-594	5 - 396	5 - 330	5 - 250.8
	Setting accuracy	mA	12	10.8	7.2	6	4.56
Under voltage limit (UVL)	Setting range		0 - 6.3	0 - 8.4	0 - 13.12	0 - 15.75	0 - 21

Model		PTE	**30-150**	**40-114**	**50-90**	**60-75**	**80-57**
Over voltage protection (OVP)	Setting range	V	3 - 33	4 - 44	5 - 55	5 - 66	5 - 88
	Setting accuracy	mV	300	400	500	600	800
Over current protection (OCP)	Setting range	A	5 - 165	5 - 125.4	5 - 99	5 - 82.5	5 - 62.7
	Setting accuracy	mA	3	2.28	1.8	1.5	1.04
Under voltage limit (UVL)	Setting range		0 - 31.5	0 - 42	0 - 52.5	0 - 63	0 - 84

Model		PTE	**100-45**	**150-30**	**300-15**	**400-11.4**	**600-7.8**
Over voltage protection (OVP)	Setting range	V	5 - 110	5 - 165	5 - 330	5 - 440	5 - 660
	Setting accuracy	mV	1000	1500	3000	4000	6000
Over current protection (OCP)	Setting range	A	4.5 - 49.5	3 - 33	1.5 - 16.5	1.14 - 12.54	0.78 - 8.58
	Setting accuracy	mA	0.9	0.6	0.3	0.228	0.156
Under voltage limit (UVL)	Setting range		0 - 105	0 - 157.5	0 - 315	0 - 420	0 - 630

Model	PTE All models	
Over temperature protection (OHP)	Operation	Turn the output off.
Incorrect sensing connection protection (SENSE)	Operation	Turn the output off.
Low AC input protection (AC-FAIL)	Operation	Turn the output off.
Shutdown (SD)	Operation	Turn the output off.
Power limit (POWER LIMIT)	Operation	Over power limit.

7-1-3-5. Front Panel

Model		PTE	6-600	8-540	12.5-360	15-300	20-228
Voltage accuracy	0.1% +	mV	12	16	25	30	40
Current accuracy	0.2% +	mA	1800	1620	1080	900	684

Model		PTE	30-150	40-114	50-90	60-75	80-57
Voltage accuracy	0.1% +	mV	60	80	100	120	160
Current accuracy	0.2% +	mA	450	342	270	225	171

Model		PTE	100-45	150-30	300-15	400-11.4	600-7.8
Voltage accuracy	0.1% +	mV	200	300	600	800	1200
Current accuracy	0.2% +	mA	135	90	45	34.2	23.4

Model	PTE All models
Indications	GREEN LED's: CV, CC, V, A, VSR, ISR, DLY, RMT, LAN, M1, M2, M3, RUN, Output ON
	RED LED's: ALM, ERR
Buttons	Lock/Local(Unlock), PROT(ALM_CLR), Function(M1), Test(M2), Set(M3), Shift, Output
Knobs	Voltage, Current
USB port	Type A USB connector

7-1-3-6. Programming and Measurement

Programming and Measurement (RS-232C/485, USB, LAN, GP-IB)		PTE	6-600	8-540	12.5-360	15-300	20-228
Output voltage programming accuracy	0.05% +	mV	3	4	6.25	7.5	10
Output current programming accuracy	0.2% +	mA	600	540	360	300	228
Output voltage programming resolution		mV	0.2	0.27	0.4	0.5	0.7
Output current programming resolution		mA	18	18	12	9.9	7.5
Output voltage measurement accuracy	0.1% +	mV	6	8	12.5	15	20
Output current measurement accuracy	0.2% +	mA	1200	1080	720	600	456
Output voltage measurement resolution		mV	0.2	0.27	0.4	0.5	0.7
Output current measurement resolution		mA	18	18	12	9.9	7.5

Programming and Measurement (RS-232C/485, USB, LAN, GP-IB)		PTE	30-150	40-114	50-90	60-75	80-57
Output voltage programming accuracy	0.05% +	mV	15	20	25	30	40
Output current programming accuracy	0.2% +	mA	150	114	90	75	57
Output voltage programming resolution		mV	1	1.3	1.7	2	2.7
Output current programming resolution		mA	5.1	3.6	3	2.4	1.95
Output voltage measurement accuracy	0.1% +	mV	30	40	50	60	80

Output current measurement accuracy	0.2% +	mA	300	228	180	150	114
Output voltage measurement resolution		mV	1	1.3	1.7	2	2.7
Output current measurement resolution		mA	5.1	3.6	3	2.4	1.95

Programming and Measurement (RS-232C/485, USB, LAN, GP-IB)		PTE	100-45	150-30	300-15	400-11.4	600-7.8
Output voltage programming accuracy	0.05% +	mV	50	75	150	200	300
Output current programming accuracy	0.2% +	mA	45	30	15	11.4	7.8
Output voltage programming resolution		mV	3.4	5.2	10.2	13.6	20.4
Output current programming resolution		mA	1.5	1.02	0.57	0.39	0.27
Output voltage measurement accuracy	0.1% +	mV	100	150	300	400	600
Output current measurement accuracy	0.2% +	mA	90	60	30	22.8	15.6
Output voltage measurement resolution		mV	3.4	5.2	10.2	13.6	20.4
Output current measurement resolution		mA	1.5	1.02	0.57	0.39	0.27

7-1-3-7. Input Characteristics

Model	PTE All models
Nominal input rating	B type : 1P2W 200V models
	C type : 3P3W 200V models、
Input voltage range	B type : 1P2W 170-265Vac
	C type : 3P3W 180-253Vac
Input frequency range	47Hz ~ 63Hz
Maximum input current	B type : 33A
	C type : 19A
Inrush current	B type : 1P2W 200V models Less than 150A.
	C type:3P3W 200V model Less than 100A.
Power factor	B type:1P2W 200V models 0.98
	C type：3P3W 200V models 0.95
Hold-up ti+me	20ms or greater

Model		PTE	6-600	8-540	12.5-360	15-300	20-228
Efficiency[*13]	200Vac	%	78.5	81	85	85	86

Model		PTE	30-150	40-114	50-90	60-75	80-57
	200Vac	%	86	87	87	87	87

Model		PTE	100-45	150-30	300-15	400-11.4	600-7.8
	200Vac	%	87	87	87	87	87

7-1-3-8. Interface Capabilities

Model	PTE All models
USB	TypeA: Host, TypeB: Slave, Speed: 1.1/2.0, USB Class: CDC(Communications Device Class)
LAN	Instrument IP Address, Subnet Mask, Gateway IP Address, DNS IP Address, User Password, DHCP,100BASE-TX/AUTO MDI-X
RS-232C/RS-485	Complies with EIA232D / EIA485 Specifications
GP-IB (Factory Option)	SCPI - 1993, IEEE 488.2 compliant interface

7-1-3-9. Environment Conditions

Model	PTE All models
Operating temperature	0˚C to 50˚C*14
Storage temperature	-25˚C to 70˚C
Operating humidity	20% to 85% RH; No condensation
Storage humidity	90% RH or less; No condensation
Altitude	Maximum 2000m

7-1-3-10. General Specifications

Model	PTE All models
Weight	Less than 28.7kg
Dimensions	423×130.8×447.2 mm
Cooling	Forced air cooling by internal fan.
Withstand voltage	AC to Chassis: 1500Vac/1min AC to Output terminal: 3000Vac/1min Output terminal to Chassis: Vout ≤ 150V: 1000Vdc/1min 150V<Vout ≤600V: 1500Vdc/1min
Insulation resistance	Chassis and output terminal; chassis and AC input; AC input and output terminal: 100MΩ or more (DC 1000V)

Notes:
(*1) Minimum voltage is guaranteed to maximum 0.2% of the rated output voltage.
(*2) Minimum current is guaranteed to maximum 0.4% of the rated output current.
(*3) Single phase 200V models: 170-265Vac. Three phase 200V models : 180-253Vac.
(*4) From No-load to Full-load, constant input voltage. Measured at the sensing point in Remote Sense.
(*5) Measured at rated output voltage and current with JEITA RC-9131B probe
(*6) Measurement frequency bandwidth is 10Hz to 20MHz.
(*7) Measurement frequency bandwidth is 5Hz to 1MHz.
(*8) From 10% to 90% of rated output voltage, with rated resistive load.
(*9) From 90% to 10% of rated output voltage, with rated resistive load.
(*10) Time for output voltage to recover within 2% of its rated output for a load change from 50 to 100% of its rated output current. Voltage set point from 10% to 100% of rated output.
(*11) For load voltage change, equal to the unit voltage rating, constant input voltage.
(*12) For 6V~20V model the ripple is measured at 2V ~ rated output voltage and full output current. For other models, the ripple is measured at 10 ~ 100% output voltage and full output current.
(*13) Single phase and three phase 200V models : at 200Vac input voltage. At rated output power.
(*14) If install the front panel filter kit, the temperature is guaranteed to 40˚C.

7-1-4. PTE Series for 4U/6kW

7-1-4-1. Output

Model	PTE	6-800	8-720	12.5-480	15-400	20-304
Rated output voltage (*1)	V	6	8	12.5	15	20
Rated output current (*2)	A	800	720	480	400	304
Rated output power	W	4800	5760	6000	6000	6080

Model	PTE	30-200	40-152	50-120	60-100	80-76
Rated output voltage (*1)	V	30	40	50	60	80
Rated output current (*2)	A	200	152	120	100	76
Rated output power	W	6000	6080	6000	6000	6080

Model	PTE	100-60	150-40	300-20	400-15.2	600-10.4
Rated output voltage (*1)	V	100	150	300	400	600
Rated output current (*2)	A	60	40	20	15.2	10.4
Rated output power	W	6000	6000	6000	6080	6240

7-1-4-2. Constant Voltage Mode

Constant Voltage Mode		PTE	6-800	8-720	12.5-480	15-400	20-304
Line regulation (*3)		mV	0.01% of rated output voltage +2mV				
Load regulation (*4)		mV	0.01% of rated output voltage +5mV				
Ripple and noise (*5)	p-p (*6)	mV	75	75	75	75	75
	r.m.s. (*7)	mV	10	10	10	10	10
Temperature coefficient		ppm/°C	100ppm/°C after a 30 minute warm-up				
Temperature stability			0.05% of rated output voltage over 8hrs interval following 30 minutes warm-up. Constant line, load & temp.				
Warm-up drift			Less than 0.05% of rated output voltage +2mV over 30 minutes following power on.				
Remote snese compensation voltage (single wire)		V	1	1	1	1	1
Rise time (*8)	No load	ms	80	80	80	80	80
Fall time (*9)	Rated load	ms	10	50	50	50	50
	No load	ms	500	600	700	700	800
Transient response time (*10)		ms	3	3	3	3	3

Constant Voltage Mode		PTE	30-200	40-152	50-120	60-100	80-76
Line regulation (*3)		mV	0.01% of rated output voltage +2mV				
Load regulation (*4)		mV	0.01% of rated output voltage +5mV				
Ripple and noise (*5)	p-p (*6)	mV	75	75	75	75	100
	r.m.s. (*7)	mV	10	10	10	10	15
Temperature coefficient		ppm/°C	100ppm/°C after a 30 minute warm-up				
Temperature stability			0.05% of rated output voltage over 8hrs interval following 30 minutes warm-up. Constant line, load & temp.				
Warm-up drift			Less than 0.05% of rated output voltage +2mV over 30 minutes following power on.				
Remote snese compensation voltage (single wire)		V	1.5	2	2	3	4
Rise time (*8)	No load	ms	80	80	80	80	150
Fall time (*9)	Rated load	ms	80	80	80	80	150
	No load	ms	900	1000	1100	1100	1200
Transient response time (*10)		ms	3	3	3	3	3

Constant Voltage Mode		PTE	100-60	150-40	300-20	400-15.2	600-10.4
Line regulation (*3)		mV	0.01% of rated output voltage +2mV				
Load regulation (*4)		mV	0.01% of rated output voltage +5mV				
Ripple and noise (*5)	p-p (*6)	mV	100	120	300	300	500
	r.m.s. (*7)	mV	15	25	35	35	120
Temperature coefficient		ppm/°C	100ppm/°C after a 30 minute warm-up				
Temperature stability			0.05% of rated output voltage over 8hrs interval following 30 minutes warm-up. Constant line, load & temp.				
Warm-up drift			Less than 0.05% of rated output voltage +2mV over 30 minutes following power on.				
Remote snese compensation voltage (single wire)		V	5	5	5	5	5
Rise time (*8)	No load	ms	150	150	150	200	250
Fall time (*9)	Rated load	ms	150	150	150	200	250
	No load	ms	1500	2000	2500	3000	4000
Transient response time (*10)		ms	3	3	3	3	3

7-1-4-3. Constant Current Mode

Constant Current Mode		PTE	6-800	8-720	12.5-480	15-400	20-304
Line regulation (*3)		mA	0.10% of rated output current				0.05%
Load regulation (*11)		mA	0.50% of rated output current				
Load regulation thermal drift			Less than 0.1% of rated output current over 30 minutes following load change.				
Ripple and noise(*12)	r.m.s.	mA	2000	1900	1500	1390	1250
Temperature coefficient		ppm/°C	100ppm/°C after a 30 minute warm-up				
Temperature stability			0.05% of rated output current over 8hrs interval following 30 minutes warm-up. Constant line, load & temp.				
Warm-up drift			6~15V model : Less than 0.5% rated output current over 30 minutes following power on. 20~600V model : Less than 0.25% rated output current over 30 minutes following power on.				

Constant Current Mode		PTE	30-200	40-152	50-120	60-100	80-76
Line regulation (*3)		mA	0.05% of rated output current				
Load regulation (*11)	of rated output current	mA	0.50%				1%
Load regulation thermal drift			Less than 0.1% of rated output current over 30 minutes following load change.				
Ripple and noise(*12)	r.m.s.	mA	650	365	245	170	140
Temperature coefficient		ppm/°C	100ppm/°C after a 30 minute warm-up				
Temperature stability			0.05% of rated output current over 8hrs interval following 30 minutes warm-up. Constant line, load & temp.				
Warm-up drift			Less than 0.25% rated output current over 30 minutes following power on.				

Constant Current Mode		PTE	100-60	150-40	300-20	400-15.2	600-10.4
Line regulation (*3)		mA	0.05% of rated output current				
Load regulation (*11)		mA	1% of rated output current				
Load regulation thermal drift			Less than 0.1% of rated output current over 30 minutes following load change.				
Ripple and noise(*12)	r.m.s.	mA	116	104	30	20	15
Temperature coefficient		ppm/°C	100ppm/°C after a 30 minute warm-up				
Temperature stability			0.05% of rated output current over 8hrs interval following 30 minutes warm-up. Constant line, load & temp.				
Warm-up drift			Less than 0.25% rated output current over 30 minutes following power on.				

7-1-4-4. Protection Function

Protection Function		PTE	6-800	8-720	12.5-480	15-400	20-304
Over voltage protection (OVP)	Setting range	V	0.6 - 6.6	0.8 -8.8	1.25 - 13.75	1.5 - 16.5	2 - 22
	Setting accuracy	mV	60	80	125	150	200
Over current protection (OCP)	Setting range	A	5 - 880	5 -792	5 - 528	5 - 440	5 - 334.4
	Setting accuracy	A	16	14.4	9.6	8	6.08
Under voltage limit (UVL)	Setting range		0 - 6.3	0 -8.4	0 - 13.12	0 - 15.75	0 - 21
Over temperature protection (OHP)	Operation		Turn the output off.				
Incorrect sensing connection protection (SENSE)	Operation		Turn the output off.				
Low AC input protection (AC-FAIL)	Operation		Turn the output off.				
Shutdown (SD)	Operation		Turn the output off.				
Power limit (POWER LIMIT)	Operation		Over power limit.				
	Value (fixed)		Approx. 105% of rated output power				

Protection Function		PTE	30-200	40-152	50-120	60-100	80-76
Over voltage protection (OVP)	Setting range	V	3 - 33	4 - 44	5 - 55	5 - 66	5 - 88
	Setting accuracy	mV	300	400	500	600	800
Over current protection (OCP)	Setting range	A	5 - 220	5 - 167.2	5 - 132	5 - 110	5 - 83.6
	Setting accuracy	A	4	3.04	2.4	2	1.52
Under voltage limit (UVL)	Setting range		0 - 31.5	0 - 42	0 - 52.5	0 - 63	0 - 84
Over temperature protection (OHP)	Operation		Turn the output off.				
Incorrect sensing connection protection (SENSE)	Operation		Turn the output off.				
Low AC input protection (AC-FAIL)	Operation		Turn the output off.				
Shutdown (SD)	Operation		Turn the output off.				

Power limit (POWER LIMIT)	Operation		Over power limit.
	Value (fixed)		Approx. 105% of rated output power

Protection Function		PTE	100-60	150-40	300-20	400-15.2	600-10.4
Over voltage protection (OVP)	Setting range	V	5 - 110	5 - 165	5 - 330	5 - 440	5 - 660
	Setting accuracy	mV	1000	1500	3000	4000	6000
Over current protection (OCP)	Setting range	A	5 - 66	4 - 44	2 - 22	1.52 - 16.72	1.04 - 11.44
	Setting accuracy	A	1.2	0.8	0.4	0.304	0.208
Under voltage limit (UVL)	Setting range		0 - 105	0 - 157.5	0 - 315	0 - 420	0 - 630
Over temperature protection (OHP)	Operation		Turn the output off.				
Incorrect sensing connection protection (SENSE)	Operation		Turn the output off.				
Low AC input protection (AC-FAIL)	Operation		Turn the output off.				
Shutdown (SD)	Operation		Turn the output off.				
Power limit (POWER LIMIT)	Operation		Over power limit.				
	Value (fixed)		Approx. 105% of rated output power				

7-1-4-5. Front Panel

Front Panel		PTE	6-800	8-720	12.5-480	15-400	20-304
Voltage accuracy	0.1% +	mV	12	16	25	30	40
crrent accuracy	0.2% +	mA	2400	2160	1440	1200	912
Front Panel		PTE	30-200	40-152	50-120	60-100	80-76
Voltage accuracy	0.1% +	mV	60	80	100	120	160
Current accuracy	0.2% +	mA	600	456	360	300	228
Front Panel		PTE	100-60	150-40	300-20	400-15.2	600-10.4
Voltage accuracy	0.1% +	mV	200	300	600	800	1200
Current accuracy	0.2% +	mA	180	120	60	45.6	31.2
Front Panel		PTE	All Models				
Indications			GREEN LED's: CV, CC, V, A, VSR, ISR, DLY, RMT, LAN, M1, M2, M3, RUN, Output ON				
			RED LED's: ALM, ERR				
Buttons			Lock/Local(Unlock), PROT(ALM_CLR), Function(M1), Test(M2), Set(M3), Shift, Output				
Knobs			Voltage, Current				
USB port			Type A USB connector				

7-1-4-6. Programming and Measurement

Programming and Measurement (RS-232C/485, USB, LAN, GP-IB)		PTE	6-800	8-720	12.5-480	15-400	20-304
Output voltage programming accuracy	0.05% +	mV	3	4	6.25	7.5	10
Output current programming accuracy	0.2% +	mA	800	720	480	400	304
Output voltage programming resolution		mV	0.2	0.27	0.4	0.5	0.7
Output current programming resolution		mA	24	24	16	13.2	10
Output voltage measurement accuracy	0.1% +	mV	6	8	12.5	15	20
Output current measurement accuracy	0.2% +	mA	1600	1440	960	800	608
Output voltage measurement resolution		mV	0.2	0.27	0.4	0.5	0.7
Output current measurement resolution		mA	24	24	16	13.2	10

Programming and Measurement (RS-232C/485, USB, LAN, GP-IB)		PTE	30-200	40-152	50-120	60-100	80-76
Output voltage programming accuracy	0.05% +	mV	15	20	25	30	40
Output current programming accuracy	0.2% +	mA	200	152	120	100	76
Output voltage programming resolution		mV	1	1.3	1.7	2	2.7
Output current programming resolution		mA	6.8	4.8	4	3.2	2.6
Output voltage measurement accuracy	0.1% +	mV	30	40	50	60	80
Output current measurement accuracy	0.2% +	mA	400	304	240	200	152
Output voltage measurement resolution		mV	1	1.3	1.7	2	2.7
Output current measurement resolution		mA	6.8	4.8	4	3.2	2.6

Programming and Measurement (RS-232C/485, USB, LAN, GP-IB)		PTE	100-60	150-40	300-20	400-15.2	600-10.4
Output voltage programming accuracy	0.05% +	mV	50	75	150	200	300
Output current programming accuracy	0.2% +	mA	60	40	20	15.2	10.4
Output voltage programming resolution		mV	3.4	5.2	10.2	13.6	20.4
Output current programming resolution		mA	2	1.36	0.76	0.52	0.36
Output voltage measurement accuracy	0.1% +	mV	100	150	300	400	600
Output current measurement accuracy	0.2% +	mA	120	80	40	30.4	20.8
Output voltage measurement resolution		mV	3.4	5.2	10.2	13.6	20.4
Output current measurement resolution		mA	2	1.36	0.76	0.52	0.36

7-1-4-7. Input Characteristics

Model	PTE All models
Nominal input rating	B type : 1P2W 200V models
	C type : 3P3W 200V models、
Input voltage range	B type : 1P2W 170-265Vac
	C type : 3P3W 180-253Vac
Input frequency range	47Hz ~ 63Hz
Maximum input current	B type : 44A
	C type : 29A
Inrush current	B type:1P2W 200V models Less than 200A.
	C type：3P3W 200V model Less than 100A.
Power factor	B type:1P2W 200V models 0.98
	C type：3P3W 200V models 0.95
Hold-up ti+me	20ms or greater

Model		PTE	6-800	8-720	12.5-480	15-400	20-304
Efficiency[*13]	200Vac	%	78.5	81	85	85	86

Model		PTE	30-200	40-152	50-120	60-100	80-76
	200Vac	%	86	87	87	87	87

Model		PTE	100-60	150-40	300-20	400-15.2	600-10.4
	200Vac	%	87	87	87	87	87

7-1-4-8. Interface Capabilities

Model	PTE All models
USB	TypeA: Host, TypeB: Slave, Speed: 1.1/2.0, USB Class: CDC(Communications Device Class)
LAN	Instrument IP Address, Subnet Mask, Gateway IP Address, DNS IP Address, User Password, DHCP,100BASE-TX/AUTO MDI-X
RS-232C/RS-485	Complies with EIA232D / EIA485 Specifications
GP-IB (Factory Option)	SCPI - 1993, IEEE 488.2 compliant interface

7-1-4-9. Environment Conditions

Model	PTE All models
Operating temperature	0˚C to 50˚C[*14]
Storage temperature	-25˚C to 70˚C
Operating humidity	20% to 85% RH; No condensation
Storage humidity	90% RH or less; No condensation
Altitude	Maximum 2000m

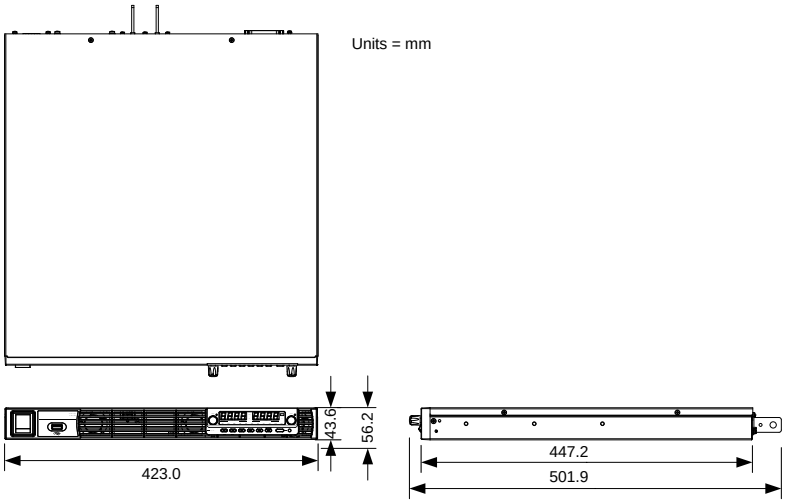
7-1-4-10. General Specifications

Model	PTE All models
Weight	Less than 37.4kg
Dimensions	423×174.4×447.2 mm
Cooling	Forced air cooling by internal fan.
Withstand voltage	AC to Chassis: 1500Vac/1min AC to Output terminal: 3000Vac/1min Output terminal to Chassis: Vout ≤ 150V: 1000Vdc/1min 150V<Vout ≤600V: 1500Vdc/1min
Insulation resistance	Chassis and output terminal; chassis and AC input; AC input and output terminal: 100MΩ or more (DC 1000V)

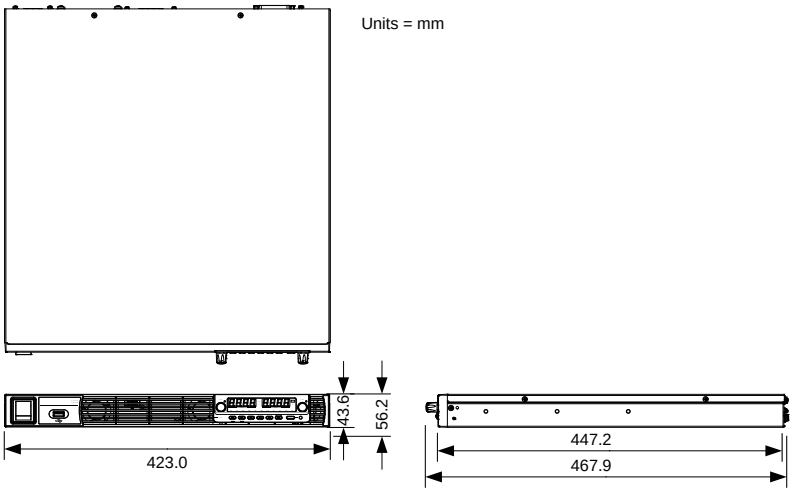
Notes:
(*1) Minimum voltage is guaranteed to maximum 0.2% of the rated output voltage.
(*2) Minimum current is guaranteed to maximum 0.4% of the rated output current.
(*3) Single phase 200V models: 170-265Vac. Three phase 200V models : 180-253Vac.
(*4) From No-load to Full-load, constant input voltage. Measured at the sensing point in Remote Sense.
(*5) Measured at rated output voltage and current with JEITA RC-9131B probe
(*6) Measurement frequency bandwidth is 10Hz to 20MHz.
(*7) Measurement frequency bandwidth is 5Hz to 1MHz.
(*8) From 10% to 90% of rated output voltage, with rated resistive load.
(*9) From 90% to 10% of rated output voltage, with rated resistive load.
(*10) Time for output voltage to recover within 2% of its rated output for a load change from 50 to 100% of its rated output current. Voltage set point from 10% to 100% of rated output.
(*11) For load voltage change, equal to the unit voltage rating, constant input voltage.
(*12) For 6V~20V model the ripple is measured at 2V ~ rated output voltage and full output current. For other models, the ripple is measured at 10 ~ 100% output voltage and full output current.
(*13) Single phase and three phase 200V models : at 200Vac input voltage. At rated output power.
(*14) If install the front panel filter kit, the temperature is guaranteed to 40˚C.

7-2. Dimensions

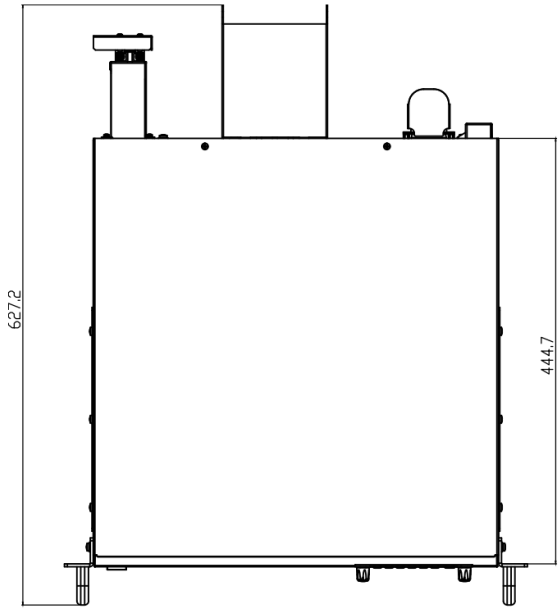
7-2-1. PTE 1.5kW Low voltage type

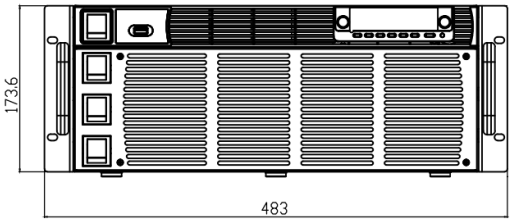


7-2-2. PTE 1.5kW High voltage type

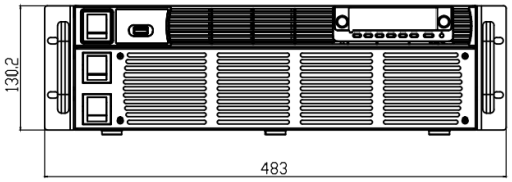


7-2-3. PTE 3kW/4.5kW/6kW type

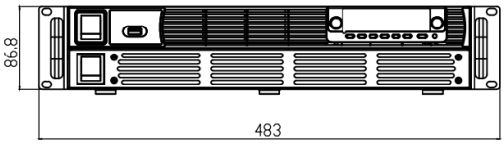




6kW/4U type



4.5kW/3U type



3kW/2U type

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