GTEC UPS MODEL:

LIBRA PRO

Calibration procedure

SERVICE DOCUMENT

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This procedure must be carried out only by a trained person, who will need to be warned against electrical hazard and will have to be properly equipped to operate inside electrical equipment.

Dangerous voltages are present inside the UPS cabinet. When the second level cabinet doors are opened or when the rear or lateral cover panels are removed, any failure of the internal components could cause a situation of danger for the operator, due for example to the explosion of semiconductors or capacitors.

BE VERY CAREFUL. This procedure doesn't cover all possible situations that can happen in the field; the only purpose of the described procedure is to give an example of a possible approach to a reparation.

The use of this procedure could cause damages to the person, the UPS and the equipment connected to the UPS.

See also the User manual of the UPS.

GENERAL

The following procedure refers to firmware version PXP028-rev**.
There may be some changes with different firmware version.

IMPORTANT

If the System Card has not been previously setted, the UPS will not start up and the flashing warning **"SET?"** will appear on the top left corner of display.
The flashing warning **"SET?"** will appear on the top left corner of display also when the calibration procedure will not be completed properly.

NECESSARY INSTRUMENTS

Digital multimeter
AC/DC Current Clamp meter

THE BASE CALIBRATION PROCEDURE

The base calibration procedure must be done on a new system card to select the ups size.
The base calibration procedure can be done on an operating system card to calibrate the readings and others control parameters.

Note that this procedure require to open the SWOUT switch.

On the field, in case of installation of a new system card were it needs to select the ups size , it is possible to execute this procedure also holding closed the SWMB breaker in order to hold ON the output load.
Note: if you close the SWMB after you have inserted the bypass code remember to push the key 8 before starting the procedure.

If you cannot open SWOUT you can do the "Auxiliary Calibration" to calibrate the readings and others control parameters. This procedure can be executed without opening the SWOUT switch and it does not change the normal status of operation. Therefore it can be executed also during the normal output load feeding.

START AND STEPS OF THE BASE CALIBRATION PROCEDURE

Power on the UPS.

Press the keys 3 and 5 in the control panel.
Insert the code 151515 to activate the "SET" mode.

On the UPS panel, on the right, it will be shown the word "SET" flashing and also it appears counting down that closes the "SET" mode after 255 sec if is not touched any key.

Press again the keys 3 and 5.
Insert the code 151541 to activate the "BASE CALIBRATION" procedure.

Follow the indications on the display.

```
            Adjusting procedure
1=Exit, 2= -> (Next),
```

1) Panel LCD contrast

Note: This step is present only in the UPS with the LCD Display

```
  Panel LCD contrast Offset :        +0
1=Exit, 2= -> (Next),               7-/8+
```

With button keys 7 and 8 set correct contrast for good reading of display

Pressing the button key 1 you will exit the procedure.
Pressing the button key 2 you will continue the procedure.

2) Select UPS size (The number of battery blocks is automatically set)

```
n.batt.12V=  40,   Nominal power kVA=100
1<,2>,                              7-/8+
```

Insert the correct power for the UPS with button keys 7 and 8.
Possible power (kVA): 30, 40, 60, 80, 100, 120, 160, 200, 250, 300, 400, 600, 800.
Note that if you insert a power not corresponding to the UPS you can damage the UPS itself.
Press 2 for the next step.

3) SWIN. Main input line voltage adjusting

```
V.SWIN: Vin1=230V;  Vin2=230V; Vin3=230V
1<,2>, (+  0)3-4+; (+  0)5-6+;(+  0)7-8+
```

> Connect a voltage meter on input terminal between L1A and N (phase 1).
Read the value on the meter and adjust Vin1 on the display at same value using the button keys 3 and 4.
> Repeat for L2A-N (phase 2) and adjust Vin2 on the display with button keys 5 and 6.
> Repeat for L3A-N (phase 3) and adjust Vin3 on the display with button keys 7 and 8.
Press 2 for the next step.

4) SWBY. Bypass input line voltage adjusting

```
V.SWBY:  Vby1=220V; Vby2=221V; Vby3=222V
1<,2>,  (+  0)3-4+;(+  0)5-6+;(+  0)7-8+
```

> Connect a voltage meter on input terminal between L1B and N (phase 1).
Read the value on the meter and adjust Vby1 on the display at same value using the button keys 3 and 4.
> Repeat for L2B-N (phase 2) and adjust Vby2 on the display with button keys 5 and 6.
> Repeat for L3B-N (phase 3) and adjust Vby3 on the display with button keys 7 and 8.
Press 2 for the next step.

5) Rectifier output DC voltage calibration and Inverter input DC voltage adjusting

```
DC voltage:  Vdc_rad=449V;  Vdc_inv=449V
1<, 2>,        (+  0)5-/6+;   (+  0)7-/8
```

Connect a voltage meter between the "+" DC bar and the "-" DC bar
for calibrating the Vdc_rad and for adjusting of the Vdc_inv (Inverter DC).

> Read the value on the meter and use the keys 7 and 8 for adjusting the correct value of **Vdc_inv** on the display.
> Use the keys 5 and 6 for calibrating the value on the meter to the correct value of **Vdc_rad** on display.

Press 2 for the next step.

6) Battery DC voltage measure adjusting

```
Ext. battery voltage:   Vbat_ext = 542V
1<, 2>,                      (+  0) 7-/8+
```

Connect a voltage meter between the connection points "+" and "-" of the batteries.
Use the keys 7 or 8 to adjust the value **Vbat_ext** to the value read on the meter.
Push 2 for the next step.

7) Battery current offset measure adjusting (Charging and Discharging measures)

```
Ibat.Zero: charge  0.01A; disch.=  0.01A
 1<, 2>,     (+  0)5-/6+;    (+  0)7-/8+
```

Open battery breaker. The Charge current and the Discharge current will be = 0 A.
> Push 6 until You will read a value of the displayed Charging current higher than 0.
Then push 5 to decrease this value until you will have: charge 0.00A.
> Push 8 until You will read a value of the displayed Discharging current higher than 0.
Then Push 7 to decrease this value until you will have: disch.= 0.00A.
Pus 2 for the next step.

8) Internal voltage and current reference auto adjusting

```
ph.Adj.:p3=-  123, p2=+    2,  p1=+  111
1<,2>,         SWOUT-->OFF=0,   adjust=0
```

Open SWOUT and wait some seconds. Then you will have:

```
ph.Adj.:p3=-  123, p2=+    2,  p1=+  111
1<,2>,        OK, SWOUT-->ON,   adjust=1
```

Close SWOUT.

```
ph.Adj.:p3=-  123, p2=+    2,  p1=+  111
1<,2>,        OK --> 2      ,   adjust=1
```

Result OK.
Push 2 for the next step

9) Inverter output voltage calibration

```
Vinv.=230.0V;  K1=+ 14, K2=+ 14, K3=+ 14
1<,2>,           3-/4+,   5-/6+,   7-/8+
```

Vinv.=230.0V is the nominal voltage of the Inverter. Different value for different customizations.
With the UPS operating on inverter, regulate the value of each of the 3 phases of the inverter at the nominal (displayed) value.
> Phase 1. Connect a voltage meter at the output bar between L1-N (or at the AC filter capacitors, if the SWMB is closed).
Use button keys 3 and 4 to calibrate the value on the voltage meter at nominal voltage.
> Phase 2. Connect a voltage meter at the output bar between L2-N (or at the AC filter capacitors, if the SWMB is closed).
Use button keys 5 and 6 to calibrate the value on the voltage meter at nominal voltage.
> Phase 3. Connect a voltage meter at the output bar between L3-N (or at the AC filter capacitors, if the SWMB is closed).
Use button keys 7 and 8 to calibrate the value on the voltage meter at nominal voltage.
Push 2 for the next step.

10) UPS output voltage measure adjusting

```
SWOUT:Vout1=230V; Vout2=230V; Vout3=230V
1<,2>,  (+  0)3-4+;(+  0)5-6+;(+  0)7-8+
```

> Phase 1. Connect a voltage meter at the output bar between L1-N.
Read the value on the meter and adjust Vout1 on the display at same value using the button keys 3 and 4.
> Phase 2. Connect a voltage meter at the output bar between L2-N.
Read the value on the meter and adjust Vout2 on the display at same value using the button keys 5 and 6.
> Phase 3. Connect a voltage meter at the output bar between L3-N.
Read the value on the meter and adjust Vout3 on the display at same value using the button keys 7 and 8.
Push 2 for the next step.

11) Inverter phase shift to bypass line auto adjusting

Note: this step is not present if the bypass line is not available.

```
Auto adjusting inv. bypass phase:    0
1<,2>,            SWOUT-->OFF
```

Open SWOUT and wait for a while.

```
Auto adjusting inv. bypass phase:    0
1<,2>,              Wait!
```

```
Auto adjusting inv. bypass phase:   !!
1<,2>,          OK, SWOUT-->ON
```

Result OK. Close SWOUT and wait some seconds.

```
Auto adjusting inv. bypass phase:   !!
1<,2>,          OK --> 2
```

Result OK.
Push 2 for the next step

12) UPS output current measure adjusting

Note: the output current adjusting is not allowed if the load is lower than 20%.
Note: in order to have a good accuracy the output current adjusting is not suggested if the load is lower than 90%.

```
Adj.  out1= 2.0A; out2= 2.0A; out3= 2.0A
1<,2>,(A% < 20%); (A% < 20%); (A% < 20%)
```

The Output current adjusting is allowed when the load is higher than 20%.

```
Adj.  out1=50.2A; out2=50.2A; out3=50.2A
1<,2>,(+  0)3-4+; (+  0)5-6+; (+  0)7-8+
```

> Put the clamp current meter on the output of L1 and measure output current.
Use 3 and 4 to adjust the value on the display at the measured value.
> Put the clamp current meter on the output of L2 and measure output current.
Use 5 and 6 to adjust the value on the display at the measured value.
> Put the clamp current meter on the output of L3 and measure output current.
Use 7 and 8 to adjust the value on the display at the measured value.
Push 2 for the next step

13) Battery current measure adjusting

```
Ibat.gain: charge 11.98A; disch.=  0.00A
 1<, 2>,                      (+  0)7-/8+
```

Put the clamp current meter on the battery connection (Dangerous: Be careful!).
Open SWIN to discharge battery

```
Ibat.gain: charge 00.00A; disch.= 99.99A
 1<, 2>,                      (+  0)7-/8+
```

Read the value on the meter and adjust the value on the display using the button keys 7 and 8.
Close SWIN and verify the charging current.
Push 2 for the next step

14) UPS input current measure adjusting

Note: the input current adjusting is not allowed if the load is lower than 20%.
Note: the input current adjusting is not suggested if the load is lower than 90%.

```
Input current1,2,3:   10A,   10A,   10A
1<,2>,           (k=+ 20)    (A% < 20%)
```

The Input current adjusting is allowed when the load is higher than 20%.

```
Input current1,2,3:  100A,  100A,  100A
1<,2>,           (k=+ 20)         7-/8+
```

> Put the clamp current meter on the input of L1 and measure output current.
Use 3 and 4 to adjust the value on the display at the measured value.
> Put the clamp current meter on the input of L2 and measure output current.
Use 5 and 6 to adjust the value on the display at the measured value.
> Put the clamp current meter on the input of L3 and measure output current.
Use 7 and 8 to adjust the value on the display at the measured value.
Push 2 for the next step

15) Test RS232 ports

Note: This test can be skipped, it is not exclusionary.

```
Test RS232:RX1=0, RX2=0, DCD1=0, DCD2=0
1<,2>;    Insert cable from port 1 to 2
```

Use a standard RS232 pin to pin cable. Connect it between RS232/1 and RS232/2.
Verify that:

```
Test RS232:RX1=1, RX2=1, DCD1=1, DCD2=1
```

Disconnect the RS232 cable.
Push 2 for the next step

16) Test Slots

```
Slot Test:       RX1=0, DCD1=0, DCD2=0
1<,2>; Insert test card into slot2 (AUX)
```

This test is to confirm the slot position.
This test can be skipped.
Push 2 for next step

17) Termination of the Calibration Procedure.

```
            Adjusting procedure
1=Exit, 2= -> (Next),
```

Note: in the UPS with the LCD Display:

```
  Panel LCD contrast Offset :      +0
1=Exit, 2= -> (Next),             7-/8+
```

Push 1 to exit the procedure.

Last display situation:

```
              NORMAL OPERATION
P100,    OUT=100%VA, Batt= 100%  SET: 255
```

At the low right corner will appear flashing "SET: 255" with a decreasing value.
When will be 0 it will disappear automatically.

To exit immediately from the "SET" mode, press the button keys 3 and 5 and insert the code 151515.

```
              NORMAL OPERATION
P100,    OUT=100%VA, Batt= 100%Ah, 5=ON
```

THE AUXILIARY CALIBRATION PROCEDURE

The Auxiliary Calibration can be done on an operating system card to calibrate the readings and others control parameters.

The Auxiliary Calibration can be executed without opening the SWOUT switch and it does not change the normal status of operation. Therefore it can be executed also during the normal output load feeding.

START AND STEPS OF THE AUXILIARY CALIBRATION PROCEDURE

UPS in normal operation.

Press the keys 3 and 5 in the control panel.
Insert the code 151515 to activate the "SET" mode.

On the UPS panel, on the right, it will be shown the word "SET" flashing and also it appears counting down that closes the "SET" mode after 255 sec if is not touched any key.

Press again the keys 3 and 5.
Insert the code 123451 to activate the "AUXILIARY CALIBRATION" procedure.

Follow the indications on the display.

```
           Adjusting procedure
1=Exit, 2= -> (Next),
```

1) Panel LCD contrast

Note: This step is present only in the UPS with the LCD Display

```
  Panel LCD contrast Offset :        +0
1=Exit, 2= -> (Next),               7-/8+
```

With button keys 7 and 8 set correct contrast for good reading of display

Pressing the button key 1 you will exit the procedure.
Pressing the button key 2 you will continue the procedure.

3) SWIN. Main input line voltage adjusting

```
V.SWIN: Vin1=230V;  Vin2=230V; Vin3=230V
1<,2>, (+  0)3-4+; (+  0)5-6+;(+  0)7-8+
```

> Connect a voltage meter on input terminal between L1A and N (phase 1).
Read the value on the meter and adjust Vin1 on the display at same value using the button keys 3 and 4.
> Repeat for L2A-N (phase 2) and adjust Vin2 on the display with button keys 5 and 6.
> Repeat for L3A-N (phase 3) and adjust Vin3 on the display with button keys 7 and 8.
Press 2 for the next step.

4) SWBY. Bypass input line voltage adjusting

```
V.SWBY:  Vby1=220V; Vby2=221V; Vby3=222V
1<,2>,  (+  0)3-4+;(+  0)5-6+;(+  0)7-8+
```

> Connect a voltage meter on input terminal between L1B and N (phase 1).
Read the value on the meter and adjust Vby1 on the display at same value using the button keys 3 and 4.
> Repeat for L2B-N (phase 2) and adjust Vby2 on the display with button keys 5 and 6.
> Repeat for L3B-N (phase 3) and adjust Vby3 on the display with button keys 7 and 8.
Press 2 for the next step.

5) Rectifier output DC voltage calibration and Inverter input DC voltage adjusting

```
DC voltage:  Vdc_rad=449V;  Vdc_inv=448V
1<, 2>,        (+  0)5-/6+;   (+  0)7-/8
```

Connect a voltage meter between the "+" DC bar and the "-" DC bar
for calibrating the Vdc_rad and for adjusting of the Vdc_inv (Inverter DC).

> Read the value on the meter and use the keys 7 and 8 for adjusting the correct value of **Vdc_inv** on the display.
> Use the keys 5 and 6 for calibrating the value on the meter to the correct value of **Vdc_rad** on display.

Press 2 for the next step.

6) Battery DC voltage measure adjusting

```
Ext. battery voltage:   Vbat_ext = 542V
1<, 2>,                      (+  0) 7-/8+
```

Connect a voltage meter between the connection points "+" and "-" of the batteries.
Use the keys 7 or 8 to adjust the value **Vbat_ext** to the value read on the meter.
Push 2 for the next step.

7) Battery current offset measure adjusting (Charging and Discharging measures)

```
Ibat.Zero: charge 00.01A; disch.=  0.01A
 1<, 2>,     (+  0)5-/6+;    (+  0)7-/8+
```

Open battery breaker. The Charge current and the Discharge current will be = 0 A.
> Push 6 until You will read a value of the displayed Charging current higher than 0.
Then push 5 to decrease this value until you will have: charge 00.00A.
> Push 8 until You will read a value of the displayed Discharging current higher than 0.
Then Push 7 to decrease this value until you will have: disch.= 0.00A.
Pus 2 for the next step.

9) Inverter output voltage adjusting

```
Vinv.=230.0V;  K1=+ 14, K2=+ 14, K3=+ 14
1<,2>,           3-/4+,   5-/6+,   7-/8+
```

Vinv.=230.0V is the nominal voltage of the Inverter. Different value for different customizations.
With the UPS operating on inverter, regulate the value of each of the 3 phases of the inverter at the nominal (displayed) value.
> Phase 1. Connect a voltage meter at the output bar between L1-N (or at the AC filter capacitors, between cables 1 and 4).
Use button keys 3 and 4 to calibrate the value on the voltage meter at nominal voltage.
> Phase 2. Connect a voltage meter at the output bar between L2-N (or at the AC filter capacitors, between cables 2 and 4).
Use button keys 5 and 6 to calibrate the value on the voltage meter at nominal voltage.
> Phase 3. Connect a voltage meter at the output bar between L3-N (or at the AC filter capacitors, between cables 3 and 4).
Use button keys 7 and 8 to calibrate the value on the voltage meter at nominal voltage.
Push 2 for the next step.

10) UPS output voltage measure adjusting

```
SWOUT:Vout1=230V; Vout2=230V; Vout3=230V
1<,2>,  (+  0)3-4+;(+  0)5-6+;(+  0)7-8+
```

> Phase 1. Connect a voltage meter at the output bar between L1-N.
Read the value on the meter and adjust Vout1 on the display at same value using the button keys 3 and 4.
> Phase 2. Connect a voltage meter at the output bar between L2-N.
Read the value on the meter and adjust Vout2 on the display at same value using the button keys 5 and 6.
> Phase 3. Connect a voltage meter at the output bar between L3-N.
Read the value on the meter and adjust Vout3 on the display at same value using the button keys 7 and 8.
Push 2 for the next step.

11-A) Inverter phase shift to bypass line auto adjusting

Note: this step is not present if the bypass line is not available.

```
Manual adjust inv. bypass phase: +   81
1<,2>,                          5-6+
```

Note: this test can be skipped.
Connect a voltage meter between the bypass input terminal L1B and the output terminal L1.
Use button keys 5 and 6 to minimize the value on the voltage meter.

12) UPS output current measure adjusting

Note: the output current adjusting is not allowed if the load is lower than 20%.
Note: the output current adjusting is not suggested if the load is lower than 90%.

```
Adj.  out1= 2.0A; out2= 2.0A; out3= 2.0A
1<,2>,(A% < 20%); (A% < 20%); (A% < 20%)
```

The Output current adjusting is allowed when the load is higher than 20%.

```
Adj.  out1=50.2A; out2=50.2A; out3=50.2A
1<,2>,(+  0)3-4+; (+  0)5-6+; (+  0)7-8+
```

> Put the clamp current meter on the output of L1 and measure output current.
Use 3 and 4 to adjust the value on the display at the measured value.
> Put the clamp current meter on the output of L2 and measure output current.
Use 5 and 6 to adjust the value on the display at the measured value.
> Put the clamp current meter on the output of L3 and measure output current.
Use 7 and 8 to adjust the value on the display at the measured value.
Push 2 for the next step

13) Battery current measure adjusting

```
Ibat.gain: charge 11.98A; disch.=  0.00A
 1<, 2>,                     (+  0)7-/8+
```

Put the clamp current meter on the battery connection (Dangerous: Be careful!).
Open SWIN to discharge battery

```
Ibat.gain: charge 00.00A; disch.= 99.99A
 1<, 2>,                     (+  0)7-/8+
```

Read the value on the meter and adjust the value on the display using the button keys 7 and 8.
Close SWIN and verify the charging current.
Push 2 for the next step

14) UPS input current measure adjusting

Note: the input current adjusting is not allowed if the load is lower than 20%.
Note: the input current adjusting is not suggested if the load is lower than 90%.

```
Input current1,2,3:   10A,   10A,   10A
1<,2>,           (k=+ 20)    (A% < 20%)
```

The Input current adjusting is allowed when the load is higher than 20%.

```
Input current1,2,3:  100A,  100A,  100A
1<,2>,           (k=+ 20)         7-/8+
```

> Put the clamp current meter on the input of L1 and measure output current.
Use 3 and 4 to adjust the value on the display at the measured value.
> Put the clamp current meter on the input of L2 and measure output current.
Use 5 and 6 to adjust the value on the display at the measured value.
> Put the clamp current meter on the input of L3 and measure output current.
Use 7 and 8 to adjust the value on the display at the measured value.
Push 2 for the next step

17) Termination of the Calibration Procedure.

```
          Adjusting procedure
1=Exit, 2= -> (Next),
```

Note: in the UPS with the LCD Display:

```
  Panel LCD contrast Offset :      +0
1=Exit, 2= -> (Next),             7-/8+
```

Push 1 to exit the procedure.

Last display situation:

```
            NORMAL OPERATION
P100,    OUT=100%VA, Batt= 100%  SET: 255
```

At the low right corner will appear flashing "SET: 255" with a decreasing value.
When will be 0 it will disappear automatically.

To exit immediately from the "SET" mode, press the button keys 3 and 5 and insert the code 151515.

```
            NORMAL OPERATION
P100,    OUT=100%VA, Batt= 100%Ah, 5=ON
```