Introduction

The screw tightening process today entails adjusting a powered driver with a torque meter and assuming the tool will satisfactorily tighten screws. The inability to confirm screw tightness is a problem for users concerned with improving product quality. These powered drivers are equipped with torque sensors that enables them to function both as a work tools and as devices for fully testing screw tightness. We are confident that these drivers will improve your work efficiency and contribute to better product quality.
### PG Power Driver Parts

1. Driver cord
2. Sensor cord
3. Hanger
4. Forward/reverse switch
5. Start lever
6. Nut guard cover (Internal torque adjustment nut)
7. Joint shaft collar

### Specifications

<table>
<thead>
<tr>
<th></th>
<th>PG-3000</th>
<th>PG-5000</th>
<th>PG-7000</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Output Torque Range</strong></td>
<td>N·m</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.2-0.55</td>
<td>0.4-1.2</td>
<td>1.0-2.8</td>
</tr>
<tr>
<td></td>
<td>lbf·in</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1.7-4.8</td>
<td>3.5-10</td>
<td>8.8-24</td>
</tr>
<tr>
<td></td>
<td>(kgf·cm)</td>
<td>(4-12)</td>
<td>(10-28)</td>
</tr>
<tr>
<td><strong>Torque Switching</strong></td>
<td></td>
<td></td>
<td>Stepless Adjustment</td>
</tr>
<tr>
<td><strong>Unloaded Rotation Speed (r.p.m.)</strong></td>
<td>HI</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>980</td>
<td>900</td>
<td>960</td>
</tr>
<tr>
<td></td>
<td>LOW</td>
<td>680</td>
<td>590</td>
</tr>
<tr>
<td><strong>Screw Size (mm)</strong></td>
<td>Machine Screw</td>
<td>1.7-2.3</td>
<td>2.3-3.0</td>
</tr>
<tr>
<td></td>
<td>Tapping Screw</td>
<td>2.0-2.3</td>
<td>2.0-2.3</td>
</tr>
<tr>
<td><strong>External Dimensions</strong></td>
<td>Grip Diameter</td>
<td>φ 32.5</td>
<td>φ 33</td>
</tr>
<tr>
<td></td>
<td>Length (mm)</td>
<td>245</td>
<td>260</td>
</tr>
<tr>
<td><strong>Weight (g)</strong></td>
<td></td>
<td>345</td>
<td>509</td>
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<tr>
<td><strong>Bit Drive</strong></td>
<td>HIOS Shank</td>
<td>H4</td>
<td>H4</td>
</tr>
<tr>
<td></td>
<td>HEX Shank</td>
<td>On request</td>
<td>On request</td>
</tr>
<tr>
<td><strong>Power Supply</strong></td>
<td></td>
<td></td>
<td>T-70BL</td>
</tr>
<tr>
<td><strong>Driver Cord</strong></td>
<td></td>
<td>2m (6P)</td>
<td></td>
</tr>
<tr>
<td><strong>Sensor Cord</strong></td>
<td></td>
<td>1.7m (8P)</td>
<td></td>
</tr>
</tbody>
</table>

### Precautions

To prevent malfunctions please take the following precautions:

1. Do not drop the driver or power supply. Do not subject the driver or power supply to sudden impacts.
2. Do not over-lubricate or expose the driver to oils.
Preparing the Driver for Use

1. Make sure that the driver is paired with the appropriate power supply.
2. Plug the power supply into the AC power outlet and connect the driver power and sensor cord prior to turning the power supply ON.
3. Turn ON the power supply. The POWER LED will light up.
4. Refer to the section “Preparing the PG-01 for use.”
5. Torque adjustment
   - Torque is adjusted by varying the pressure on spring inside the torque adjustment nut.
   - Tightening the torque adjustment nut increases torque while loosening the adjustment nut reduces torque
   - The torque gradations on the driver do not represent output torque values. The lines should be used only as a rough guide of the output torque.
6. Adjusting torque
   - Torque should be adjusted with a HIOS torque meter and Fidaptor
   - If screw torque is low, tighten the torque adjustment nut upward. If screw torque is high, loosen the adjustment nut. Repeat this process until the appropriate amount of torque is reached

Screw tightening

1. Complete the procedures explained in PG-01 “Preparing the PG-01 for use”.
2. Attach a bit to the driver.
   - Remove the torque adjustment nut cover.
   - Press the joint shaft collar and mount the bit
3. Perform a screw tightening procedure.
   - Place the bit on a screw and tighten the screw.
4. The internal clutch will disengage at the set torque value and rotation will stop. Release the start lever.
   - Repeat this procedure for subsequent screws.
   - We have a variety of replacement bit types available. Please visit our Website for a complete list: http://www.hios.com/
   - When using HIOS shank-type φ4 (H4), φ5 (H5) bits, be sure to use genuine HIOS products.

Caution

When changing bits, turn OFF the power supply or remove the power cord from the driver. Changing bits on a powered driver is dangerous as an unexpected rotation of the bit may cause serious injury. Use sufficient caution when changing bits.

HIOS torque meters are recommended for checking torque.
   - HP series for setting torque on electric drivers.
   - HDP series for measuring slack torque and top-off torque.

After-sales Service

The PG Series is equipped with an axial force sensor. We recommend overhauling and inspecting the axial force sensor about once a year depending on usage conditions.


■ Overview
1. PG driver adjustment
   Locks the torque adjustment nut at the tightness value.
2. Teaching
   The driver records the reactive force detected during the tightening process into memory.
3. Percentage setting
   Sets the acceptable range for maximum and minimum recorded values.
4. Tightening
   Fully tests all screws against the values recorded in the memory. The results can be displayed and output.

■ Parts names and functions

<table>
<thead>
<tr>
<th>Name</th>
<th>Operation and function</th>
</tr>
</thead>
<tbody>
<tr>
<td>POWER</td>
<td>Turns the control unit ON and OFF. Press for 2 seconds to switch OFF. There is no auto OFF function. The Power lamp lights up when ON.</td>
</tr>
<tr>
<td>TEACHING</td>
<td>Turns the Teaching function ON and OFF. Press for 2 seconds to switch ON and OFF. The Teaching lamp lights up when ON</td>
</tr>
<tr>
<td>OPERATION OK</td>
<td>The OPERATION OK LED lights up during a tightening operation and turns off when on standby.</td>
</tr>
<tr>
<td>OPERATION NG</td>
<td>The OPERATION NG LED lights up during a tightening operation.</td>
</tr>
<tr>
<td>L.NG</td>
<td>This LED lights up when torque is below the L.G value.</td>
</tr>
<tr>
<td>L.G</td>
<td>This LED lights up when torque is within the specified percentage of the lower limit of GOOD.</td>
</tr>
<tr>
<td>GOOD</td>
<td>This LED lights up when torque is within the GOOD upper and lower limits.</td>
</tr>
<tr>
<td>H.G</td>
<td>This LED lights up when torque is within the specified percentage for the GOOD upper limit.</td>
</tr>
<tr>
<td>H.NG</td>
<td>This LED lights up when torque is above the H.G value.</td>
</tr>
</tbody>
</table>

For a description of the rear panel, refer to Connection procedure.
Preparation
1. PG driver adjustment (output torque adjustment) 
   (Refer to Diagram 1)
   Example ≫ (torque setting) When adjusting torque to 1N • m
1-1. Connect the HP-100 and PG screwdriver with a 
      Fidaptor.
1-2. Confirm the value displayed by the torque meter and then 
      adjust the torque adjustment nut (part A) until 1N • m is achieved. 
      This sets PG driver output torque.
1-3. When the driver torque value is set, go to the next 
      step. If the a rough torque setting was made with the values 
      on the adjustment nut, measurements can be made without 
      any prior preparation.

2. TEACHING (measurement standards, learning value, setup mode)
2-1. Press the Teaching button (SW2) for 2 seconds. The LED2 lights up.
2-2. This activates setup mode.
2-3. Tighten a screw as you would normally.
      ・Depress the PG driver start lever. The driver will begin to rotate.
      ・The buzzer sounds once. The peak value is recorded into memory.
      ・Release the start lever switch. The PG screwdriver is in standby mode as described in 2-4.
2-4. Perform the measurement process described above in 2-3 a minimum of 3 times.
2-5. To exit Teaching, press button 2 for 2 seconds.
2-6. The recorded minimum and maximum values become the driver’s standard values for 
      evaluating whether or not a measurement is acceptable. Turning off the screwdriver does not erase 
      these values.

Teaching values
Teaching values record measurement values and minimum and maximum values for a work 
procedure. This functions records at least 3 and up to 10 data samples. The driver will indicate an 
error if less than 3 samples are recorded. When more than 10 data samples are input, the 11th 
value is recorded and the 1st sample is deleted. If there is existing data in memory, it will be 
completely erased when setup mode is activated and the first new sample measurement is taken. 
Variation in the recorded values are the total sum of variations from the actual driver, screw and 
joined object combination.
3. Setting the percentage range
Percentage is set using the supplementary software. (Refer to the software manual for details.)

4. Screw tightening
A technician can use the evaluation LEDs to tighten screws with precision. A computer can be used for additional management capabilities.

Error procedures
1. PG driver idle rotation (OPERATION NG)
Solution: Inactivated due to no torque-up signal.

2. PG driver reverses rotation
Solution: Ignore reverse direction.

3. No Teaching values
Solution: Blinking L.NG and H.G LEDs. Perform Teaching a second time.

4. After finishing a tightening operation, the driver performs ON/OFF operations and tightens a second and third time.
Solution: Evaluation is NG.
In this case the driver clutch disengages once (completes tightening) and a second impact further tightens a screw already in place. This results in the screw being tightened to a value greater than the value specified by the driver. To ensure that screws are tightened to their appropriate values, be sure that the driver performs the operation only once.
Actual screw tightening procedure

There is a 100ms interval between when the start lever is depressed and when the measurement and evaluation actually begin.

Dimensions

Connection procedure
1. **PG driver input connector**
   Connect the PG driver before turning on the power supply (PG-01 connector).

2. **IO input/output connector** Output (open collector)

<table>
<thead>
<tr>
<th>Pin No.</th>
<th>Output signal</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>12</td>
<td>COM</td>
<td>GND</td>
</tr>
<tr>
<td>13</td>
<td>L.NG (Fail)</td>
<td>Output when below L.G value</td>
</tr>
<tr>
<td>14</td>
<td>L.G (Pass)</td>
<td>Output when within percentage set for GOOD lower limit</td>
</tr>
<tr>
<td>15</td>
<td>GOOD (Pass)</td>
<td>Output when within GOOD lower and upper limit</td>
</tr>
<tr>
<td>16</td>
<td>H.G (Pass)</td>
<td>Output when within percentage set for GOOD upper limit</td>
</tr>
<tr>
<td>17</td>
<td>H.NG (Fail)</td>
<td>Output when above L.G value</td>
</tr>
</tbody>
</table>

3. **RS232C connector**
   Pin assign (blank terminals are unconnected)

<table>
<thead>
<tr>
<th>Pin no.</th>
<th>Signal name</th>
<th>IO</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>RXD</td>
<td>OUT</td>
</tr>
<tr>
<td>3</td>
<td>TXD</td>
<td>IN</td>
</tr>
<tr>
<td>5</td>
<td>GND</td>
<td></td>
</tr>
<tr>
<td>1,4,7,8,9</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

PC/AT compatible with RS232C cable
4. USB connector

Initial setup (Check basic settings with Windows.)

4-1. Turn ON PG-01.
4-2. Connect PG-01 to the PC with a USB cable.
4-3. The following screen appears. Check “select from a list or install in a specified location” and then proceed to the next step.

4-4. Click **Browse**, from the attached CD select **USB-CDM 2.00.00**, click **OK**, and then proceed to the next step.

4-5. Installation begins. After installation is completed close the Wizard. This completes the initial setup.

**Confirm ports**

This step confirms which ports the USB is connected to before starting an application (EXCEL or some other application used for recording measurement data). Use the Device Manager to confirm the port location.

- Select Start, Settings, and then open the Control Panel to start the system.
• From system hardware, open the Device Manager and confirm the COM and LPT1 port numbers.

Data output formats

1. Measurement data output
Evaluation data is output for each measurement in three formats in the order shown below.

1-1. Measurement data
D10 □□□□ □□□□□ end of line
  Measurement time - 5 digits (unit 100mS)
  Torque value – 4 digits

1-2. Recorded learning value
D00 □□□□ □□□□ □□□□ □□□□□ □□□□□ end of line
  Displays learning measurement time maximum
  Displays learning measurement time minimum
  Displays learning maximum value
  Displays learning minimum value
  Displays learning number

1-3. Evaluation base values
D20 □ □□□ □□□□ □□□□ □□□□□ end of line
  Evaluation measurement time maximum value
  Evaluation measurement time minimum value
  Evaluation maximum value
  Evaluation minimum value

2. Error related output

2-1. Measurement value detected in zero domain error E90
2-2. Measurement time malfunction E91
2-3. Learning insufficient, ended without measurement E92
2-4. Measurement L N G E93
2-5. Measurement H N G E94

3. Measurement evaluation output

3-1. Measurement GOOD E00
3-2. Measurement LOW OK E01
3-3. Measurement HIGH OK E02

In this example, the USB port is COM4.
Communications settings
PG-01-PC communication settings

- Communication speed: 4800 BPS
- Start Bit: 1 Bit
- Stop Bit: 1 Bit
- Data length: 8 Bit
- Data format: ASCII

Computer input
1. Using Windows HyperTerminal
1-1. After turning on the computer and displaying version information, performs autozero correction. The following messages output during this process are debugging messages not directly involved in measurement.

Ver2.19aE 2010/10/21
[Zero adjusting A/D=FFF Gain=1D8]
[Zero adjusting A/D=803 Gain=1D9]
[Zero adjusting A/D=7FF Gain=1DA]
[Zero Adjustment end A/D=7FB Gain=1DA]

1-2. Example of a measurement OK message
In general, messages are either test messages or measurement data.

```
[Job Num = 4] S00
[Lever SW ON] S00
[Job Num = 6] S02
[Torque up ON] D10026900668

D000005026903150033701891
D2002026303210033001928

M21 [Judgment: LOW OK] E01
[Judgment end]
```

A debugging test message
Measurement data

1-3. Unsatisfactory result - display when evaluation results are abnormal

```
[Job Num = 4] S00
[Lever SW ON] S00
[Job Num = 6] S02
[Torque up ON] D10028600590

D00000600960010000101894
D2002140513090131201931

[E91 Abnormal termination at measurement time] E91
```

A debugging test message
Measurement data

2. Using included EXCEL data

Operating Environment
HIOS The driver data taking-in sheet can be carried out by:
・Microsoft Windows XP
・Microsoft Excel 2003
In case of not functioning, select application type "Driver Data Collection".
Please be aware that maintenance and support services are unavailable since this is a sample software.

Processing measurement settings

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>&quot;S00&quot;</td>
<td>Lever switch On</td>
</tr>
<tr>
<td>&quot;S01&quot;</td>
<td>Lever switch Off(no torque up)</td>
</tr>
<tr>
<td>&quot;S02&quot;</td>
<td>Torque up On</td>
</tr>
<tr>
<td>&quot;S10&quot;</td>
<td>Work On</td>
</tr>
<tr>
<td>&quot;S11&quot;</td>
<td>Work Off</td>
</tr>
<tr>
<td>&quot;E00&quot;</td>
<td>Judgment = Good</td>
</tr>
<tr>
<td>&quot;E01&quot;</td>
<td>Judgment = Low OK</td>
</tr>
<tr>
<td>&quot;E02&quot;</td>
<td>Judgment = High OK</td>
</tr>
<tr>
<td>&quot;E90&quot;</td>
<td>[Zero area detection/Impossible judgment ending]</td>
</tr>
<tr>
<td>&quot;E91&quot;</td>
<td>[The abnormally end at the measurement time]</td>
</tr>
<tr>
<td>&quot;E92&quot;</td>
<td>[The ending about which it is impossible to judge by the learning lack]</td>
</tr>
<tr>
<td>&quot;E93&quot;</td>
<td>Judgment = Low NG</td>
</tr>
<tr>
<td>&quot;E94&quot;</td>
<td>Judgment = High NG</td>
</tr>
</tbody>
</table>

2-1. Start EXCEL with the included CD.
Note: When you want to launch two different types of data, start by creating two different EXCEL files. For example, test1.xls and test2.xls.
Be sure to have both EXCEL files open in separate windows when launching the data. When launching data with a direct link, the data for the second EXCEL file will launch in the first EXCEL window. You will not be able to handle the data if this occurs.

2-2. Be sure to Enable macros (E).

Data upload sheet screen
Perform all settings after turning on the PG-01 power supply and connecting it to the computer. When using a USB connection, the computer may automatically turn off the power supply under certain conditions. If this occurs, disconnect and then reconnect the driver. There is no response if the PG driver is reversed.

1. Connection confirmation window
   No action necessary.

2. COM port
   After confirming the port being used, enter the port number.

3. Connect driver
   Click to start data input standby status. If previously input data needs to be retained, save the data before performing this operation. (Establishing a connection clears data.)

4. Disconnect driver
   Click to finish data upload.

5. LAN settings
   optional use

6. Evaluation error rate settings (%)
   Sets the acceptable evaluation range before a screw tightening operation. Switching to this screen transmits the values to the PG-01 memory. The PG-01 will use these values to evaluate measurements even when not connected to the computer.

   Setting selection values (2%・5%・10%・15%・20%) 02=2%

7. Work detection ON
   Normally turns on automatically when performing a process.

8. Output data
   Torque value Indicates actual work value.
   Measurement time Indicates time elapsed from the start of screw tightening to torque up.
   Learning number Indicates number of teaching operations performed.
   Learning minimum value Indicates minimum teaching value. (modifiable)
   Learning maximum value Indicates teaching maximum value. (modifiable)
   Learning minimum evaluation time Indicates teaching minimum time. (modifiable)
   Learning maximum evaluation time Indicates teaching maximum time. (modifiable)

9. Evaluation comparison data
   Torque value Indicates value output on the graph sheet.
   Minimum evaluation value Indicates the amount minus the % setting for the learning minimum value.
   Maximum evaluation value Indicates the amount plus the % setting for the learning maximum value.
   Evaluation minimum measurement time Indicates the amount of time minus the % setting for the learning minimum measurement time.
   Evaluation maximum measurement time Indicates the amount of time plus the % setting for the maximum minimum measurement time.
Evaluation
Indicates whether the screw tightening procedure has passed or failed.

Evaluation ON/OFF
Error E90, E91, E92 ON/OFF switch possible.
ON Indicates the measurement value in the data sheet.
OFF Indicates the measurement value in the irregular sheet.

Measurement settings processing table:
Other sheets

![Data sheet]

![Graph sheet]

![Irregular sheet]
Operation chart

Power ON

Select operation

NO When memory is not set or when changing memory

GO

% settings

Tighten screw (start signal) ON

LED turns off at completion

Tightening completed (torque up signal)

Evaluation

NG

OK

GOOD—LED light

Buzzer one time ON

Signal output

Complete (start signal) OFF

Process complete LED light

GOOD—LED blinks

Buzzer 2 times ON

Memory settings button 2 seconds

Memory mode standby

GOOD—LED blinks

Buzzer 2 times ON

NG

Select operation

GO

Memory over write

Tightening record (measurement)

Setting value is average value

= 0 times or no value in memory

GOOD—LED light

Buzzer 1 time ON

= 0 times

Has previous value in memory

≦ 1 times

GOOD—LED light

Buzzer 2 times ON

Signal output

GOOD—LED light

Buzzer 1 time ON

Memory delete button

= 0 times

Has previous value in memory

≦ 1 times
### China RoHS2 Table

If you export to China by yourselves, below is the table of China RoHS2.

<table>
<thead>
<tr>
<th>部件名称</th>
<th>有害物质名称及含量标识格式</th>
<th>有害物质名称及含量</th>
<th>产品中有害物质的名称及含量</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>铅(pb)</td>
<td>汞(Hg)</td>
<td>锑(Cd)</td>
</tr>
<tr>
<td>电路板总成</td>
<td>×</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>电机单元</td>
<td>×</td>
<td>○</td>
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</tr>
<tr>
<td>齿轮</td>
<td>×</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>外壳</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>螺丝刀线</td>
<td>×</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>电源适配器</td>
<td>×</td>
<td>○</td>
<td>○</td>
</tr>
</tbody>
</table>

本表格依据 SJ/T 11364 的规定编制。
○：表示该有害物质在该部件所有均质材料中的含量均在 GB/T 26572 规定的限量要求以下。
×：表示该有害物质至少在该部件的某均质材料中的含量超过 GB/T 26572 规定的限量要求。

In addition, if the following mark cannot be found at the rear side of the product and/or Product box, cut off a mark and stick a mark to the product and/or product box.