Brushless Screwdriver with Torque sensor

PGF-3000 / PGF-5000 / PGF-7000

Control Unit

PG-01

Instruction Manual

(May 2019)
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Safety Instructions

Please read this instruction manual carefully before use to ensure proper operation.

Installation

Do not install this unit in the places listed below. It may cause a fire or a malfunction.

- A place with high humidity or lots of dust
- A place that becomes too hot
- A place with naked flames
- A place exposed to direct sunlight
- A place with corrosive gas in the air
- An unstable place

Power supply

Be sure to install an earth leakage breaker and a safety breaker to the commercial power supply to be used.

Do not connect anything other than specified parts to the connection part of this unit.

Do not damage the power cord or allow oil to touch it. Also, do not place heavy objects on the power cord. It may cause a fire.

When connecting/disconnecting the power cord or screwdriver cord, etc., always hold the plug.

How to handle this unit

Do not disassemble or remodel this unit. It may cause a malfunction.

Do not cause severe impacts or apply excessive force. It may cause a malfunction.

Do not operate this unit with wet or oily hands.

Do not work with an unsteady posture or in an unstable place.

Set an appropriate overtime period as the screw tightening time and avoid situations where this unit rotates continuously more than necessary.

If uneven rotations, abnormal noise, overheating, activation of the breaker, etc., occur during usage, immediately stop using the screwdriver for repair. However, overheating is possible due to usage frequency and screw types. To prevent such overheating, get a spare screwdriver of the same unit and use it alternately, or review the selection of the screwdriver model.

Do not place an overload large enough to make the clutch unable to run out. It may cause the motor to malfunction.

Do not touch the rotating screwdriver. It may cause an injury or malfunction.

Maintenance

Do not wear clothes with large cuffs, gloves, neckties etc. They may get caught in the rotating screwdriver and cause an injury or malfunction.

Wear suitable clothing and protective eyewear for work. Cover long hair with a hat etc., so that you can work safely.

Please contact our distributor if you cannot attach/remove a bit according to the instruction manual.

Maintenance

- If you do not use this unit for a long time, turn off the power and unplug the plug from the outlet for safety.
- If you do not use this unit for a long time, remove the accessories from it and store them in the packing box.
- Keep this unit in a place where appropriate temperatures and humidity are controlled.
- Keep this unit in a place out of reach of people other than authorized workers.
Check the Accessories

If anything is missing or damaged, please contact the dealer from whom you purchased this unit.

- Main Unit
- PGF-SUBBOX
- PG-01
- Screwdriver Cord (3 m)
- Cord for PGF-SUBBOX (40 cm)
- AC Adaptor (1.5 m)
- Sensor Cord (3 m)
- Start/Torque-up Cable (50 cm)
- RS-232C Cable (2 m)
- Spare Fixing Inch Screws x 4
- CD-ROM
- I/O Flat Cable (30 cm)
- USB / RS-232C Converter (35 cm)

- A USB cable is not included. Please procure it as necessary.
- For “USB to RS-232 Adapter” Users
  Driver CD for “USB to RS-232 Adapter” may not be included depending on time period. You can download the newest driver at ATEN website as needed.
Switch to the Start Reading Mode

**Note:**
The pulse start mode is set for this unit by default. Since its start mode is compatible only to the reading start, it is necessary to change the start mode.

1. Unscrew the eight screws on the side of the power supply to remove the cover.

![Image of power supply being unscrewed](image)

2. Turn off the switch (No. 2 of SW6) for reading/pulse located on the front side board inside the cover.
   - Be careful that foreign matter does not enter inside while working.

   **Power supply: BLT-AY-61 / BLT-AY-71 Inside the cover**

   ![Diagram of SW6](image)

3. Replace the cover after changing to the start mode.
Connect the Cords

Connect the cords included. After connecting all the cords, start the power supply by inserting the plug into the outlet.

**Power Supply: Front**
- Power Cord
- To the outlet

**Power Supply: Rear**
- I/O Flat Cable
- PLC
- RS-232C Cable
- Connect to PC/PLC
- Cord for PGF-SUBBOX

**PGF**
- Sensor Cord
- Screwdriver Cord

**PG-01**
- I/O Flat Cable
- PLC
- RS-232C Cable
- Connect to PC/PLC
- Cord for PGF-SUBBOX

**PGF-SUBBOX**
- Start/Torque-up Cable
- Pin No. 1 2 3 4
- PGF-SUBBOX: Blue Orange – Black
- PLC/BLT FOR FINISH – GND
- PLC

**Table**

<table>
<thead>
<tr>
<th>Pin No.</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>PGF-SUBBOX</td>
<td>Blue</td>
<td>Orange</td>
<td>–</td>
<td>Black</td>
</tr>
<tr>
<td>PLC/BLT</td>
<td>FOR</td>
<td>FINISH</td>
<td>–</td>
<td>GND</td>
</tr>
</tbody>
</table>
■ System Configuration of the Screwdriver

Note:
Since PLC needs to send a FOR signal separately to PGF-SUBBOX either from BLT-AY-61 or BLT-AY-71, do not synchronize the FOR signals forcibly.
Check the Combination of the Screwdriver and the Power Supply

Refer to the instruction manual for operating method of power supply.

<table>
<thead>
<tr>
<th>Screwdriver</th>
<th>Compatible Power Supply</th>
</tr>
</thead>
<tbody>
<tr>
<td>PGF-3000/PGF-5000</td>
<td>BLT-AY-61</td>
</tr>
<tr>
<td>PGF-7000</td>
<td>BLT-AY-71</td>
</tr>
</tbody>
</table>

Installation Precautions

Note:
Do not use this unit with a universal joint. If you use a universal joint or jig, etc., the actual torque may differ from the specified torque.

Turn on the Power

PG-01 automatically turns on when the AC adaptor is connected.

Note:
PG-01 performs automatic zero adjustment when the power is turned on. Do not apply a load to the tip of the screwdriver or do not drive it during adjustment.
Change Power Supply Setting

For details of how to set up the power supply, refer to the instruction manual of the power supply.

⚠️ Note:

As this unit does not support the setting of the torque up trigger and multiple impacts, please set the power supply as described below.

1. Press and hold the ⬤ button.
   - The buzzer will sound twice in about two seconds after that. The setting mode will be enabled.
   - The LED for operation and the segment for setting value will be lit.

2. Use the ➡️ button to select the setting for the number of forward rotation impacts and the torque up trigger.

3. Use the ➤️ / ➩ button to change the setting to <d1>.
   - Set HIGH and LOW respectively.

4. Press and hold the ⬤ button.
   - The buzzer will sound twice about two seconds after that. The setting mode will be disabled.
   - The LED for operation and the segment for setup value will turn off.
Parts and Their Functions

**PGF-3000/PGF-5000/PGF-7000**

1. **Joint Shaft Collar**
   This is used when a bit is attached or removed.

2. **Torque Adjustment Nut**
   This is to adjust the output torque.

3. **Nut Fixing Ring**
   This is to prevent misalignment of the torque adjustment nut. It should be fitted closely to the torque adjustment nut without a gap.

4. **Torque Adjustment Scale**
   It indicates the reference value for adjustment of output torque. For details of torque value, refer to “Reference Table of Output Torque” (P.15).

5. **Flange**
   This is used to install the screwdriver to a fixing base.

6. **Screwdriver Cord Connector**
   This is used to connect the screwdriver cord.

7. **Sensor Cord Connector**
   This is used to connect the sensor cord.
The measurement result of tightening a screw will be informed by the indicator and sound.
For setting of OK/NG judgment, refer to "Set Learning Values (Teaching)" (P.17).

1. **L.NG Indicator**
   This indicator is lit when the measured value is no good (smaller than the minimum pass value).

2. **L.G Indicator**
   This indicator is lit when the measured value is good (larger than the minimum pass value and below the minimum learning value).

3. **GOOD Indicator**
   This indicator is lit when the measured value is good (larger than the minimum learning value and smaller than the maximum learning value).

4. **H.G Indicator**
   This indicator is lit when the measured value is good (larger than the maximum learning value and below the maximum pass value).

5. **H.NG Indicator**
   This indicator is lit when the measured value is no good (larger than the maximum pass value).

6. **Teaching Indicator**
   This indicator is lit when in the teaching mode (for setting of learning values).

7. **Teaching Button**
   This is for setting to the teaching mode. Pressing and holding this button (2 seconds or longer) in the teaching mode will cancel the mode. For details of teaching, refer to "Set Learning Values (Teaching)" (P.17).

8. **OPERATION OK Indicator**
   This indicator is lit while the screwdriver is rotating positively.

9. **OPERATION NG Indicator**
   - This indicator is lit when the operation ends without torque up.
   - This blinks when the operation ends due to an abnormal measurement time.

10. **Power Button**
    This is not used for this unit. When the AC adaptor is connected, power will be supplied automatically.

11. **Power Indicator**
    This indicator is lit when power is supplied.
**Connector for the PGF-SUBBOX Cord**
The PGF-SUBBOX cord is connected here.

**I/O Connector**
The I/O flat cable is connected here for the evaluation result to be output. The output format is an open collector. Use this when you cannot connect with RS-232C.

<table>
<thead>
<tr>
<th>Pin No.</th>
<th>Output signal</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>12</td>
<td>COM GND</td>
<td>—</td>
</tr>
<tr>
<td>13</td>
<td>LNG (NG)</td>
<td>Output when the measurement value is NG (below the minimum pass value)</td>
</tr>
<tr>
<td>14</td>
<td>L.G (OK)</td>
<td>Output when the measurement value is OK (equal to or larger than the minimum pass value and smaller than the minimum learning value)</td>
</tr>
<tr>
<td>15</td>
<td>GOOD (OK)</td>
<td>Output when the measurement value is OK (equal to or larger than the minimum learning value and smaller than the maximum learning value)</td>
</tr>
<tr>
<td>16</td>
<td>H.G (Pass)</td>
<td>Output when the measurement value is good (equal to or larger than the minimum learning value and smaller than the maximum learning value)</td>
</tr>
<tr>
<td>17</td>
<td>H.NG (Fail)</td>
<td>Output when the measurement value is no good (larger than the maximum pass value)</td>
</tr>
</tbody>
</table>

**USB Port**
A USB cable is connected here. No USB cable is provided with the unit. Procure one if necessary.

**RS-232C Connector**
An RS-232C cable is connected here.
Pin assignment (the terminals not described are unused)

<table>
<thead>
<tr>
<th>Pin No.</th>
<th>Signal name</th>
<th>I/O</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>
</tbody>
</table>

**AC Adaptor Connector**
An AC adaptor is connected here. Power will be automatically supplied when an AC adaptor is connected.
Sensor Cord Connector
A sensor cord connector is connected here.

Connector for PGF-SUBBOX Cord
The PGF-SUBBOX cord is connected here.

Start/Torque up Cable Connector
A start/torque up cable is connected here.

<table>
<thead>
<tr>
<th>Pin No.</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>PGF-SUBBOX</td>
<td>Blue</td>
<td>Orange</td>
<td>—</td>
<td>Black</td>
</tr>
<tr>
<td>PLC/BLT-AY</td>
<td>FOR (START)</td>
<td>FINISH (T.UP)</td>
<td>—</td>
<td>GND</td>
</tr>
</tbody>
</table>
**Attach a Bit**

**Notes:**
- Do not attach or remove a bit while the screwdriver is powered. It may cause an unexpected accident.
- Use of a special bit may not fully demonstrate the original performance of PGF. Please contact us for details.

1. **Insert a bit while pushing the joint shaft collar into the main unit.**

2. **Release the joint shaft collar and check if the bit is locked.**
   - Pull the bit lightly and check if it will come out.

**Remove a Bit**

1. **Pull out a bit while pushing the joint shaft collar into the main unit.**

**Precautions when Using a Hexagonal Bit**
- No hexagonal bit is provided with this unit. Procure bits of any shape according to your requirement.
- A double bit or a hexagonal bit with two grooves cannot be used.

<table>
<thead>
<tr>
<th>Bit Drive</th>
<th>SHex (WAF: 5mm)</th>
<th>1/4HEX (WAF: 6.35mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Shape</strong></td>
<td><img src="image1" alt="5HEX Diagram" /></td>
<td><img src="image2" alt="1/4HEX Diagram" /></td>
</tr>
</tbody>
</table>
**Adjust Torque**

**Note:**
The "reference table of output torque" and the torque adjustment scale are approximate and do not guarantee actual setting values.
For accurate torque check, please use an HIOS torque meter and Fidaptor.

1. If the torque is determined beforehand, turn the torque adjustment nut and nut fixing ring referring to the "reference table of output torque".
   - Turn the torque adjustment nut clockwise to increase the torque and turn it counterclockwise to decrease the torque.
   - Adjust it so that the end face of the nut fixing ring is right above the scale.

![Diagram of torque adjustment](image)

- After the nut fixing ring is positioned, fit the torque adjustment nut accordingly.

2. Try to fasten a screw and check how it is fastened after the screwdriver stops and adjust the most appropriate torque.

**Reference Table of Output Torque**

<table>
<thead>
<tr>
<th>PGF-3000</th>
<th>PGF-5000</th>
<th>PGF-7000</th>
</tr>
</thead>
<tbody>
<tr>
<td>N·m</td>
<td>N·m</td>
<td>N·m</td>
</tr>
<tr>
<td>0.2</td>
<td>0.4</td>
<td>1.0</td>
</tr>
<tr>
<td>0.3</td>
<td>0.6</td>
<td>1.4</td>
</tr>
<tr>
<td>0.4</td>
<td>0.8</td>
<td>1.8</td>
</tr>
<tr>
<td>0.5</td>
<td>1.0</td>
<td>2.2</td>
</tr>
<tr>
<td>0.55</td>
<td>1.2</td>
<td>2.6</td>
</tr>
</tbody>
</table>

[Torque Scale](image)

[Torque Scale](image)

[Torque Scale](image)
Activation and Stop of Screwdriver

Note:
This unit is designed to be used eight hours a day (about 4,000 shots).

Activate Screwdriver

1. Input a FOR signal to the power supply.

Stop Screwdriver

1. Either turn off a FOR signal or input a RESET signal.

Timing Chart of Screw Tightening

PLC Internal Sequence

1. PLC sends OFF signal 100ms after it receives FINISH signal from BLT.
2. PLC sends a signal 100ms later
3. PLC sends ON signal to SUBBOX after it receives FINISH signal from BLT
4. The torque in T.UP signal sent to SUBBOX is saved.
5. PLC sends OFF signal 100ms after it receives FINISH signal from BLT-AY-XX (the torque is sent from PG-01 to PLC within 100ms).
6. The screwdriver turns off when the Z-axis ascent sensor turns on (after a time lag of over 100ms).
Set Learning Values (Teaching)

Measure the "tightening torque" and "working time" by using screws and materials actually used to set the reference values for work. The two values recorded are the minimum and maximum, respectively. Also, after teaching, it is possible to change the error tolerance of the learning values and the learned values in the attached application or Excel file.

**Note:**
Teaching should be done under the same conditions as actual operation. An error may occur in the measured value if the screw to be used, the materials to be fastened, the attaching method of the screw, etc., are different from actual operation.

1. **Press and hold the teaching button.**

   - A buzzer sounds in about 2 seconds and the teaching mode is enabled.
   - The teaching indicator is lit.
   - L.NG indicator and H.NG indicator blinks.

2. **Using the screws and materials to be actually used, perform tightening more than 3 times.**

   - Every time after tightening is completed, a buzzer sounds once, and the measured value is recorded.
   - The measured values of the third to tenth trials are recorded and the values after the eleventh trial will overwrite the old values.

3. **Press and hold the teaching button.**

   - A buzzer sounds in 2 seconds and the teaching mode ends.
   - The teaching indicator, L.NG indicator and H.NG indicator turn off.

**About Learning Values**

- The learned values do not disappear even when the power is turned off.
- To reset the learned values, perform teaching again. The previous learned values will be deleted when the teaching mode is enabled.
- After purchasing, please perform teaching with PG-01 for the first time. Otherwise, it is not possible to set learning values with the attached application.
Evaluation of Screw Tightening

- It measures actual screw tightening work in real time, compares the measurement with the learning value, and informs the user of the evaluation result with an indicator and sound.
- The reverse rotation of the screwdriver is not evaluated.
- The allowable error range at the time of purchase is set to 10% for both upper and lower limits. If you want to change it, please use the attached application.

■ OK/NG Judgment of Tightening Torque Value

If no error is detected in the screw tightening work, one of L.G, GOOD or H.G indicator is lit and the buzzer sounds.

If the torque is within the learning values, the GOOD indicator will be lit, and if it falls within the allowable error range, either L.G or H.G indicator will be lit. Conversely, when the torque is less than the lower limit value, the L.NG indicator will be lit, and when the torque exceeds the upper limit value, the H.NG indicator will be lit, which means fail.
— Evaluation of Operation Time —

- The operation time from start of rotation to stop of the screwdriver is evaluated against the learning values.
- The blinking and lighting of the OPERATION NG indicator will turn off when the START signal is entered again.

Main reasons why OPERATION NG indicator is lit
- No torque up signal is sent because of reasons like screwdriver idling.

Main reasons why OPERATION NG indicator blinks
- A torque up signal was not sent during the learning measurement period.
  - If it is not necessary to strictly measure the operation time, by using the application, change the setting value so that the learning interval will become larger.
- Continuous ON/OFF operations at the end of tightening (pushing the button twice or three times in a row)

⚠️ Note:
There is a nonintervention time of 100mS for torque measurement and evaluation after the START signal is input.

If the screwdriver output is given to a screw even after tightening, the value will be larger than the measuring value and not the expected tightening value.
To perform proper screw tightening, please do not perform continuous operations.
Flowchart of Judgment

1. Power ON
2. Select an operation
3. Set the judgment value (TEACHING)
   - L.NG, and H.NG blinks if no teaching value is set.
4. Set the evaluated value
   - TEACHING LED is lit (red)
   - L.NG & H.NG LED blinks (red)
5. Normal operations
6. The set value can be changed later from the tabulation software on the connected PC.
7. Tightening (Start signal) ON
8. BLT-AY-61/71 FOR
9. LED OFF at completion
   - Initial resetting of PG-01
10. OPERATION OK LED ON (green)
    - One beep
11. End of tightening (Torque up signal)
   - No torque up signal
    - OPERATION NG LED ON (red)
12. Evaluation
    - NG
    - L.G, GOOD or H.G LED ON (green)
    - One beep
    - Signal output
    - L.NG LED or H.NG LED ON (red)
    - If measurement time is NG, OPERATION NG LED blinks (red)
    - Two beeps
    - Signal output
13. OK
14. End (Start signal: OFF)
   - BLT-AY-61/71 T-UP
**Screw Suction (Optional: Suction Attachment)**

With the suction attachment (optional), it is possible to suck a screw to the bit end by using the negative pressure of the pump. There are two shapes of the suction attachment. The pump to generate negative pressure is not provided with the unit. Please procure it by yourself or contact us.

### Configuration of PGFQ Type

![Diagram of the configuration of PGFQ Type]

<table>
<thead>
<tr>
<th>Model</th>
<th>P/N</th>
<th>Type</th>
<th>Compatible bit</th>
<th>Accessories</th>
</tr>
</thead>
<tbody>
<tr>
<td>PGF-3000</td>
<td>PGFQ3-SET</td>
<td>F3</td>
<td>Ø4, L80mm</td>
<td>3 Hose (L: 3.5m, I/D: Ø4, O/D: Ø7)</td>
</tr>
<tr>
<td>PGF-5000</td>
<td>PGFQ5-SET</td>
<td></td>
<td>Ø4, L80mm</td>
<td></td>
</tr>
<tr>
<td>PGF-7000*</td>
<td>PGFQ7-SET</td>
<td>F6</td>
<td>Ø5, L100mm</td>
<td></td>
</tr>
</tbody>
</table>

* If the socket of the bit is 1/4HEX, please contact us.
1 **Attach a bit as required.**
   - A bit longer than an ordinary one is preferable.

2 **Attach the suction attachment.**
   - Turn it counterclockwise.

3 **Attach a mouthpiece.**
   - Turn it clockwise.

4 **Connect the hose.**
Adjust the Under-head Length

It is possible to adjust the under-head length (margin) of a screw at the mouthpiece end.

1 **Turn A and B counterclockwise at the same time to loosen them.**
   - It becomes loose and the holder slides.

2 **After length adjustment, turn A clockwise.**
   - Fix (A) closely to the screwdriver unit.
Configuration of PGFR

The special suction attachment PGFR with a long holder to be assembled to PGF-5000 and PGF-7000 (socket: 1/4HEX) is available. Before purchasing PGFR, it is necessary to check the sizes below: ❶ the suction attachment ASSY, ❷ bit and ❸ spring-type mouthpiece. The accessories are all optional.

⚠️ Notes:
The bit (❷) is attached to the holder by turning it clockwise. So, if the screwdriver is used in the reverse rotation, the bit may become loose.
The hose is not provided with the unit. Please procure it by yourself or contact us.
The specifications of the hose: Φ4 (I/D) x Φ6 (O/D)

<table>
<thead>
<tr>
<th>Model</th>
<th>❶ P/N</th>
<th>❷ End shape (screw diameter, P/N); length; end diameter</th>
<th>❸ P/N</th>
</tr>
</thead>
<tbody>
<tr>
<td>PGFR-5000</td>
<td>PGFR5-SA</td>
<td>+ #1 (M2.0-M2.6, RBP4140S) + #2 (M3.0-M5.0, RBP4240S) 40mm Φ4</td>
<td>See &quot;Spring-type Mouthpiece&quot; (P.25).</td>
</tr>
<tr>
<td>PGFR-7000 (1/4HEX)</td>
<td>PGFR7-SA</td>
<td>+ #1 (M2.0-M2.6, RBP4140S) + #2 (M3.0-M5.0, RBP4240S) 40mm Φ4</td>
<td></td>
</tr>
</tbody>
</table>

Variations

- The standard length of the mouthpiece and its holder is 85L. There are other special options including 32L, 56L, 60L, 95L, 100L and 125L.
- The mouthpiece with a deep hole comes in 41L and 61L in addition to the standard 27L.

*It may take some time for the delivery of the products with special specifications depending on inventory. Contact us before placing an order.
Spring-type Mouthpiece

The spring-type mouthpiece has two variations: with a movable inner sleeve and a movable outer sleeve. Select one according to your needs.

How to Read the Part No.

<p>| | | | | | |</p>
<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>Type: F3, F6</td>
<td>With a spring</td>
<td>Classification of screwdriver torque range</td>
<td>Movable sleeve: outer (0), inner (1)</td>
<td>I/D (example: 80 stands for 8.0)</td>
<td>Material and shape: J: Duracon, A: aluminum, S: stepped</td>
</tr>
</tbody>
</table>

Movement of the Inner Sleeve Type

When a screw and the bit are fitted by vacuum pressure, the sliding mouthpiece moves horizontally to keep the screw vertical and supports the screw head.
### Movement of the Outer Sleeve Type

When a screw and the bit are fitted by vacuum pressure, the sliding mouthpiece moves horizontally to keep the screw vertical and supports the screw head. Since the diameter of the mouthpiece is smaller than the outer diameter of a screw, it is good for screw tightening in a tight space.

### Reference Table of Suitable Screw Sizes

<table>
<thead>
<tr>
<th>Size</th>
<th>M2.6</th>
<th>M3.0</th>
<th>M4.0</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pan</td>
<td>Binding</td>
<td>Truss</td>
<td>Pan</td>
</tr>
<tr>
<td>Model</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PGFR-5000</td>
<td>FS61-68</td>
<td>FS61-68</td>
<td>FS60-68J</td>
</tr>
<tr>
<td>PGFR-7000</td>
<td>FS61-68S</td>
<td>FS61-68S</td>
<td>FS60-68A</td>
</tr>
<tr>
<td>PGFR-7000</td>
<td>FS61-68S</td>
<td>FS61-68S</td>
<td>FS61-74</td>
</tr>
</tbody>
</table>

Special products to be able to hold small screws (less than 2.6mm) are available. Contact us for details. It may take some time for the delivery of the products with special specifications depending on inventory. Contact us before placing an order.
1. Remove the bit attached to the screwdriver if required.

2. Attach the suction attachment.
   - Turn it counterclockwise.

3. Attach the bit to the mouthpiece holder.
   - Push the mouthpiece holder into the main unit.
   - Attach the bit to the bit holder by turning it clockwise.

4. Attach the mouthpiece.
   - Turn it counterclockwise.

5. Connect the hose.
1. Remove the bit attached to the screwdriver when necessary.

2. Remove the flange
   - Turn it clockwise.

3. Remove the base from the suction attachment.
   - Turn it counterclockwise.

4. Attach the base from the attachment to the main unit.
   - Turn it counterclockwise.

5. Attach the flange.
   - Turn it counterclockwise.
6 Attach the suction attachment.
- Turn it clockwise.

7 Attach the bit to the mouthpiece holder.
- Push the holder into the main unit.
- Attach the bit to the holder by turning it clockwise.

8 Attach the mouthpiece.
- Turn it counterclockwise.

9 Connect the hose.
Clean the Mouthpiece

Clean the mouthpiece regularly for safe use.

1  **Remove the mouthpiece by holding the knurled part.**
   - Turn it clockwise.

2  **Dismantle it using a spanner of 7 mm across flats.**
   - Turn it clockwise.
   - Be careful not to lose internal small parts.

3  **Clean the mouthpiece.**

4  **Reassemble the mouthpiece to the original condition and check if the sliding mouthpiece moves smoothly.**
Connect to PC (USB)

Make sure that PG-01 is powered on before connecting.

Installation of Device Driver

1. Connect PG-01 to PC with a USB cable.
   • The wizard screen is displayed.

2. Select <Install from a list or a specific location> and click <Next>.

3. <Reference>, Select [USB-CDM 2.00.00] in the attached CD-ROM and click <OK> and <Next>.

   • Installation begins.
4 After installation is finished, click <Finish> on the wizard.

This ends the initial setting.

⚠️ Note:
Depending on your environment, the installation screen may be displayed again. In that case, please follow the same procedure as above.

Checking the Port
This step checks which port the USB is connected to.

1 Select [Start] menu, [Setting], [Control Panel] and [System].

2 Click [Hardware] tab and [Device Manager] to display the connection port by [Port (COM and LPT)].

USB in this case is [COM4].
Data Output Format by Either RS-232C or USB Connection

Output of Data for Judgment

The data for judgment is output for each measurement in the three formats in the sequence below.

1 Measurement Data
D10 XXXX XXXXX <LF>
- Measurement time – 5 digits (unit: mS)
- Torque conversion value – 4 digits

2 Recorded Learning Value
D00 XXXX XXXX XXXX XXXXX <LF>
- Display maximum learning measurement time
- Display learning maximum value
- Display minimum learning measurement time
- Display learning minimum value
- Display learning number

3 Judgment reference values
D20 XX XXXX XXXX XXXXX <LF>
- Judgment measurement time maximum value
- Judgment maximum value
- Judgment measurement time minimum value
- Judgment minimum value
- Judgment error rate

Error-related Output

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>E90</td>
<td>End which cannot be detected by 0 areas, and judged</td>
<td>[Zero area detection/Impossible judgment ending]</td>
</tr>
<tr>
<td>E91</td>
<td>Abnormal termination at measurement time</td>
<td>[The abnormally end at the measurement time]</td>
</tr>
<tr>
<td>E92</td>
<td>Study shortage and end which cannot be judged</td>
<td>[The ending about which it is impossible to judge by the learning lack]</td>
</tr>
<tr>
<td>E93</td>
<td>Judgment=LOW NG</td>
<td>[Judgment = Low NG]</td>
</tr>
<tr>
<td>E94</td>
<td>Judgment=HIGH NG</td>
<td>[Judgment = High NG]</td>
</tr>
</tbody>
</table>

Measurement Judgment Output

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>E00</td>
<td>Judgment=GOOD</td>
<td>[Judgment = Good]</td>
</tr>
<tr>
<td>E01</td>
<td>Judgment=LOW OK</td>
<td>[Judgment = Low OK]</td>
</tr>
<tr>
<td>E02</td>
<td>Judgment=HIGH OK</td>
<td>[Judgment = High OK]</td>
</tr>
</tbody>
</table>
**Hyper terminal (Example: Windows XP)**

After the PC is turned on and the version information is displayed, auto-zero correction is performed. The following messages for debugging are displayed that are not directly related to measurement.

Ver3.04 2012/07/03
[Zero Adj A/D=7C2 G=1EA F=200]
[Zero Adj A/D=806 G=1EB F=200]
[Zero Adj A/D=808 G=1EC F=200]
[Zero Adj A/D=803 G=1ED F=200]
[Zero Adjustment end A/D=7FF Gain=1ED]

**Example of a Measurement OK Message**

In general, messages are either operation check messages or measurement data.

<table>
<thead>
<tr>
<th>Job Num = 4</th>
<th>Operation check message for debugging</th>
</tr>
</thead>
<tbody>
<tr>
<td>S00</td>
<td></td>
</tr>
<tr>
<td>Lever SW ON</td>
<td></td>
</tr>
<tr>
<td>Job Num = 6</td>
<td></td>
</tr>
<tr>
<td>S02</td>
<td></td>
</tr>
<tr>
<td>Torque UP ON</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>D10026900668</th>
<th>Measurement data</th>
</tr>
</thead>
<tbody>
<tr>
<td>D000005026903150033701891</td>
<td></td>
</tr>
<tr>
<td>D2002026303210033001928</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>M21[Judgment=LOW OK] E01</th>
<th>Operation check message for debugging</th>
</tr>
</thead>
<tbody>
<tr>
<td>[Judgment end]</td>
<td></td>
</tr>
</tbody>
</table>

**Abnormal Conditions**

This displays the condition when judgment results are abnormal.

<table>
<thead>
<tr>
<th>Job Num = 4</th>
<th>Operation check message for debugging</th>
</tr>
</thead>
<tbody>
<tr>
<td>S00</td>
<td></td>
</tr>
<tr>
<td>Lever SW ON</td>
<td></td>
</tr>
<tr>
<td>Job Num = 6</td>
<td></td>
</tr>
<tr>
<td>S02</td>
<td></td>
</tr>
<tr>
<td>Torque UP ON</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>D10028600590</th>
<th>Measurement data</th>
</tr>
</thead>
<tbody>
<tr>
<td>D000006009600010000101894</td>
<td></td>
</tr>
<tr>
<td>D2002140513090131201931</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>[Abnormal termination at measurement time] E91</th>
<th>Operation check message for debugging</th>
</tr>
</thead>
</table>
Data Taking-in Sheet (HIOS-PG-0611-V2-2.5)

By using the data taking-in sheet in the attached CD-ROM, you can check the OK/NG of screw tightening on the PC or record the measurement data.

**Notes:**
- Enable macros.
- Start settings after turning on PG-01 and connecting it to the PC.
- When using USB, the PC may turn off PG-01 automatically in some cases. In that case, please disconnect and reconnect the screwdriver.
- There is no reaction to the reverse rotation of the screwdriver.
- If you want to take in two types of data, create two files (for example, test1.xls and test2.xls) in advance. Then, start up two applications, and then open each file.
  - If you open files by double-clicking them in Windows Explorer, two files are opened in the same application and the application cannot be used.

**Operating Environment**

The data taking-in sheet was confirmed to be effective in the following environments:
- Microsoft Windows XP
- Microsoft Excel 2003

If it is not functioning, select application type “screwdriver data collection”.

Please be aware that maintenance and support services are unavailable since this is sample software.
Configuration of the Screen

1. **Connection confirmation window**
   The login information is displayed.

2. **Disconnect button**
   This ends data import.

3. **Connect button**
   This makes the data import standby. If the previous data is necessary, please save the current data first and then connect the screwdriver. (The previous data will be cleared upon connection.)

4. **COM port**
   Check the port number and enter it. Then, press [Enter] on the keyboard. Generally, select COM as the port.

   **Cell colors**
   - Gray: the screwdriver is not connected.
   - Yellow: the screwdriver is connected.

5. **LAN settings**
   Optional

6. **Judge On/Off**
   Errors E90/E91/E92 can be turned ON/OFF.
   - ON: the measured values are entered in the datasheet.
   - OFF: the measured values are entered in the irregular sheet.

7. **Measurement settings processing table**
   The table shows commands and settings processing that are displayed in the log.

8. **Judgment**
   This indicates OK/NG of screw tightening with colors.

9. **Output data**
   Torque equivalent value: this indicates values taken during actual operation.
   Measurement time: this indicates the time from screw tightening to torque-up.
   Number of the learning: indicates the number of teaching operations performed.
Minimum of the learning: indicates the minimum teaching value (modifiable).
Maximum of the learning: indicates the maximum teaching value (modifiable).
Measurement time of minimum: indicates the teaching minimum time (modifiable).
Measurement time of maximum: indicates the teaching maximum time (modifiable).
After inputting a number, press [Enter] on the keyboard.
• These learning-related values will be sent to PG-01 by clicking the [Write learn-value] button after entering a number.
• If the [Learned value change] button is not pressed, the memory in PG-01 won't be updated and the previous value will be recovered after the next torque-up operation.

Judgment comparison data
Torque value: indicates the value output on the graph sheet.
Judgment minimum value: indicates the amount minus the % setting for the learning minimum value.
Judgment maximum value: indicates the amount plus the % setting for the learning maximum value.
Meas. Time of judge minimum: indicates the amount of the time minus the % setting for the learning minimum measurement time.
Meas. Time of judge maximum: indicates the amount of the time plus the % setting for the learning maximum measurement time.

Judgment error rate (%)
This sets the acceptable evaluation threshold before a screw tightening operation.
Selecting the judgment error rate while the screwdriver is connected transmits the selected rate to PG-01. Even after disconnecting the PC, the selected rate will be retained.
The selectable rates: 0%, 2%, 5%, 10% or 20% (02=2%)

Work On
Normally this turns on automatically when an operation is performed.

Other Sheet

Collection of Screwdriver Data (Application)
The operation data is collected in the same way as the data taking-in sheet. The data is saved in the CSV format.
For details, click [Instructions] on the screen of screwdriver data collection.
Troubleshooting

If you have any problem while using this machine, please check the items in this section before making inquiries. Then, if the problem persists, please contact your dealer or us.

**The L.NG or H.NG indicator blinks when the power is turned on.**

There is a possibility that the learning values are not set correctly. Repeat teaching 3 times or more to set the learning values.

➡"Set Learning Values (Teaching)" (P.17)

**The L.NG or H.NG indicator flashes even when the teaching mode is ended and measurement cannot be performed.**

There is a possibility that data for evaluation comparison is insufficient. If the learning count is less than 3, the indicator will keep flashing even if the teaching mode ends. Repeat teaching 3 times or more again to set the learning values.

➡"Set Learning Values (Teaching)" (P.17)

In the following cases it is difficult to make an evaluation, and it may not be counted as learning.

- Torque value is 10 or less ("E90" [Zero area detection/Impossible judgment ending])
- Idling of the screwdriver occurs or the measurement time is 100 mS or shorter. ("S01" [Lever switch Off(no torque up)])

**Teaching or evaluation cannot be done properly.**

Make sure that the start mode of the power has been changed to the reading mode. Also, turn off power to check if the cords are connected correctly and then turn on the power again.

➡"Switch to the Start Reading Mode" (P.05)
➡"Connect the Cords" (P.06)

**Setting cannot be changed from the tabulation software.**

Click the [Write learn-value] button after input of a number. The settings in PG-1 will be updated by clicking the [Write learn-value] button.

➡"Data Taking-in Sheet (HIOS-PG-0611-V2-2_5)" (P.35)

**The torque is abnormally low or high.**

Make sure that the serial number of this machine is the same as that of PG-01/PGF-SUBBOX. Also, turn off the power to check if the cords are connected correctly and then turn on the power again.

If the problem persists, replace the sensor cord.
When a Problem Cannot Be Solved

When contacting us, have the following information ready:

- Product name (PGF-3000 / PGF-5000 / PGF-7000)
- Dealer where this machine was purchased
- Description of the problem (detailed description of the operation performed and its result, etc.)
- Serial number (on the label of the product)
Specifications

The product specifications are subject to change without prior notice due to improvements of the product.
The external dimension drawings are not full-scale.

Specifications of PGF-3000/PGF-5000/PGF-7000

<table>
<thead>
<tr>
<th>Model</th>
<th>PGF-3000</th>
<th>PGF-5000</th>
<th>PGF-7000</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Output Torque Range</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>N·m</td>
<td>0.2-0.55</td>
<td>0.4-1.2</td>
<td>1.0-2.8</td>
</tr>
<tr>
<td>Kgf·cm</td>
<td>(2-5.5)</td>
<td>(4-12)</td>
<td>(10-28)</td>
</tr>
<tr>
<td>Torque Switching</td>
<td></td>
<td></td>
<td>Stepless Adjustment</td>
</tr>
<tr>
<td>Unloaded Rotation Speed (rpm) ±10%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HI (11 steps)</td>
<td>625-950</td>
<td>690-985</td>
<td>645-935</td>
</tr>
<tr>
<td>LOW (11 steps)</td>
<td>115-325</td>
<td>115-320</td>
<td>210-595</td>
</tr>
<tr>
<td><strong>Screw Size (mm)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Machine Screw</td>
<td>1.7-2.3</td>
<td>2.3-3.0</td>
<td>2.6-5.0</td>
</tr>
<tr>
<td>Tapping Screw</td>
<td>2.0-2.3</td>
<td>2.0-2.3</td>
<td>2.6-4.0</td>
</tr>
<tr>
<td><strong>Bit Drive</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HIOS Shank</td>
<td>H4</td>
<td>H4</td>
<td>H5 and 5HEX</td>
</tr>
<tr>
<td>HEX Shank</td>
<td>—</td>
<td>—</td>
<td>1/4HEX</td>
</tr>
<tr>
<td><strong>Power supply</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>BLT-AY-61</td>
<td>BLT-AY-71</td>
<td></td>
</tr>
<tr>
<td><strong>Weight</strong></td>
<td>363g</td>
<td>494g</td>
<td>809g</td>
</tr>
<tr>
<td><strong>Dimensions</strong></td>
<td></td>
<td></td>
<td>See the external dimension drawing</td>
</tr>
</tbody>
</table>
**PGF-3000 External Dimension Drawing**

**PGFQ-3000**

- Ø40
- Ø8.5
- Ø23
- 2.4
- 38.5
- 331
- 52.5
- 102

**PGF-3000**

- Ø40
- Ø8.5
- Ø23
- 2.4
- 38.5
- 331
- 52.5
- 102
### Specifications of PG-01

| AC Adaptor | Input: AC100-240V (50-60Hz)  
Output: DC12V |
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight</td>
<td>513g</td>
</tr>
<tr>
<td>Dimensions</td>
<td>See the external dimension drawing</td>
</tr>
</tbody>
</table>

#### RS-232C communication
- **Speed:** 4800bps
- **Start bit:** 1Bit
- **Stop bit:** 1Bit
- **Data length:** 8Bit
- **Data format:** ASCII
- **Parity:** none
- **Standard:** RS-232C
- **Terminal:** D-SUB 9 pins

#### I/O input output
- **Common to plus and minus**
- **Output:** sink type

---

**Example of Connections**

**External Dimension Drawing of PG-01**
Specifications of PGF-SUBBOX

Weight 391g

Dimensions See the external dimension drawing

External Dimension Drawing of PGF-SUBBOX

1 青：Blue
2 橙：Orange
3 --
4 黒：Black
Maintenance and Calibration (Excluded from Warranty)

Because transducer is installed in PGF, an overhaul or a calibration is recommended every 6 months. Please make sure to enclose PG-01 that has the same serial number as PGF when you ask for a maintenance.

China RoHS2 Table

If you are asked by China Customs, please show this table to them.

<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>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>
</tr>
<tr>
<td>电路板总成</td>
<td>×</td>
<td>○</td>
</tr>
<tr>
<td>电机单体</td>
<td>×</td>
<td>○</td>
</tr>
<tr>
<td>齿轮</td>
<td>×</td>
<td>○</td>
</tr>
<tr>
<td>外壳</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>螺丝刀线</td>
<td>×</td>
<td>○</td>
</tr>
<tr>
<td>电源适配器</td>
<td>×</td>
<td>○</td>
</tr>
<tr>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

本表格依据 SJ/T 11364 的规定编制。
〇：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一均质材料中的含量超出 GB/T 26572 规定的限量要求。

In addition, the China RoHS marks also is required at the product and product box.
At the product, you can find it at the bottom and it is marked on the product box.
If you cannot find the mark, please ask your distributor.
In case of emergency, please cut the mark below and stick at the bottom of product and on the product box.

China RoHS mark

Note:
Minimum size of China RoHS mark is 5mm at outer diameter.
Disclaimer

The information in this document is subject to change without notice.

Trademarks

Microsoft, Windows, Windows XP, and Excel are trademarks or registered trademarks of Microsoft Corporation in the United States and other countries. Also, other company names and product names in this manual are trademarks or registered trademarks.

Illustrations

Illustrations used in this manual are those for PGF-5000 unless otherwise noted. However, if models have differences, multiple illustrations are also displayed with the model names such as "PGF-XXXX / PGF-XXXX".

Abbreviations

The following product names used in this manual are abbreviated.

Microsoft Windows XP operating system → Windows XP