

## Instructions for the replacement of the brake assembly

### 1. Application

This instruction can be applied to the following intelligent prostheses.

**NI-C111t (Product number 8111-2700088-01, -11)**

### 2. Procedures

#### 【Step 1】

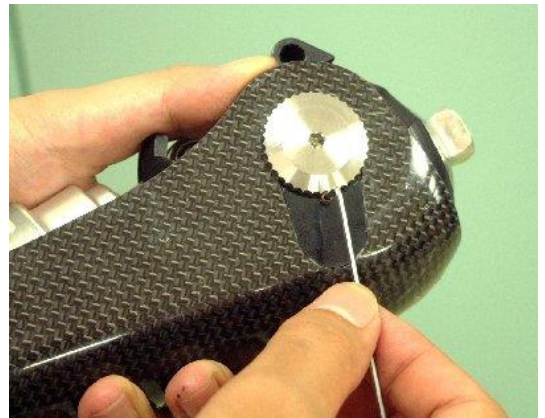
Using a 3 mm width wrench, loosen the Crevice Pin Bolt (7) fixing the cylinder rod.

Note that the number in the bracket in this instruction indicates the reference number summarized in the parts list on the pages 8 and 9.



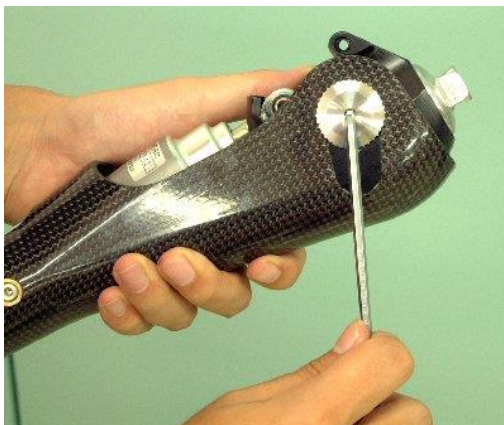
#### 【Step 2】

Unscrew the Set Screw M3×6 (23) using a 1.5 mm width wrench.



#### 【Step 3】

Unscrew the Knee Axis Screw (22) on both sides of the Frame COMP (1) using a 4 mm width wrench.



#### 【Step 4】

Take the knee plate unit out from the frame while keeping the flexion of the knee plate at around 120 degrees.



**【Step 5】**

Pull out the Knee Plate Shaft (12) from the Brake Block (11) after removing the Thrust Washers (20), the Dustproof Cover (21) and the Thrust Bearings (19).



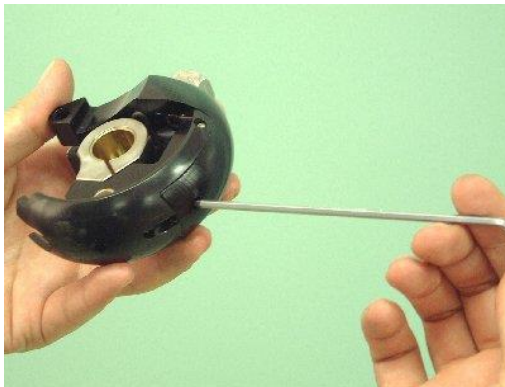
**【Step 6】**

Using a 2 mm width wrench, unscrew the Set Screw, M4×5 (6), which fixes the Pad Adj. Screw (5).



**【Step 7】**

Using a 3 mm width wrench, turn the Pad Adj. Screw (5) back about two turns.



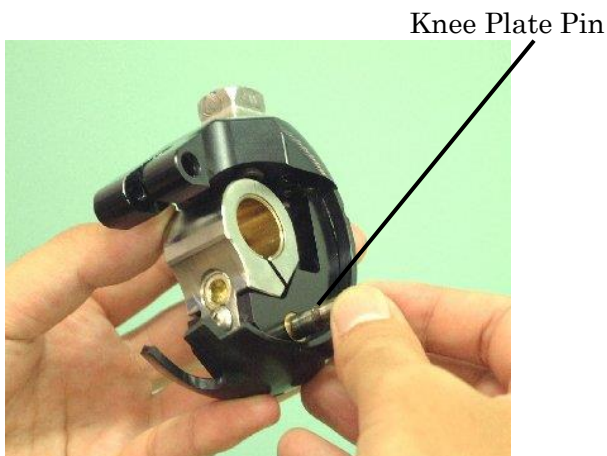
**【Step 8】**

Using a 2 mm width wrench, unscrew the Set Screw, M4×4 (18), which fixes the Knee Plate Pin (16).



**【Step 9】**

Pull out the Knee Plate Pin (16).



**【Step 10】**

Dismantle the Brake Block (11).



**【Step 11】**

Remove the Machine Screw, M4×5 (17) from the Brake Block (11).

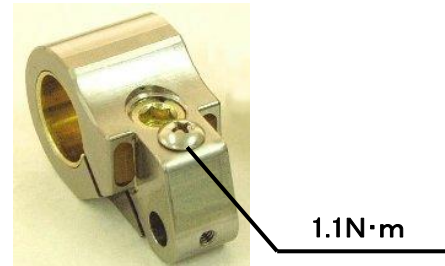


**【Step 12】**

Install and tighten the Machine Screw, M4x5(17) which is removed in Step11.

NOTE : Apply adhesive (equivalent to Loctite 242) to the Machine Screw (17) to prevent loosening.

Tighten it with a torque setting of 1.1N·m.



**【Step 13】**

Inject lithium grease into the grooves of the Knee Plate Pin (16).  
Do not apply the grease to the center groove of the pin.

The groove in which grease should be injected.

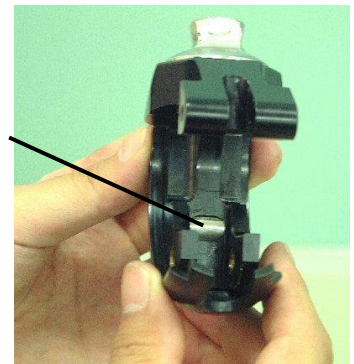


**【Step 14】**

Check if the Brake Pad (4) stays in the Knee Plate Ass'y (3) or not. If not, the pad must be installed while keeping the chamfered part upward. (See page 8). Apply grease to part of the Brake Pad (4), which contacts the Brake Block (11).

A high viscosity MoS2 grease like paste (AEROSHELL GREASE #17 or equivalent) is recommended.

Apply grease



**【Step 15】**

Insert the newly assembled Brake Block (11) into the Knee Plate Ass'y (3) and adjust the location of the hole for the Knee Plate Pin (16) to that of the Knee Plate (3).



**【Step 16】**

Insert the Knee Plate Pin (16) into the hole of the Knee Plate Ass'y (3) to fix the Brake Block to the Knee Plate Ass'y (3). The Knee Plate Pin (16) must be pushed until the end of the pin comes to the surface of the Knee Plate Ass'y (3).



**【Step 17】**

Apply adhesive (equivalent to Loctite 242) to the Set Screw (18) to prevent loosening.



**【Step 18】**

Using a 2 mm width wrench, tighten the Set Screw (18) to a maximum torque of 1.8Nm.



**【Step 19】**

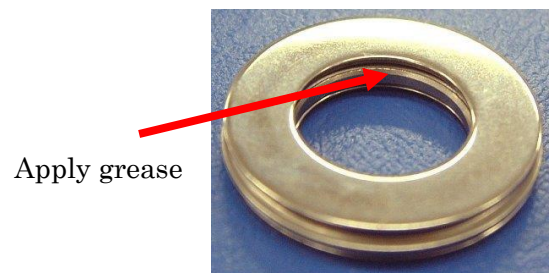
Using chemical solvent, remove grease from the surface of the Knee Plate Shaft (12).



**【Step 20】**

In preparation for Step 25, apply grease to the inner edge of the Thrust Bearing (19) and Thrust Washers (20), where will contact with the Knee Plate Shaft (12).

A high viscosity MoS<sub>2</sub> grease (AEROSHELL GREASE #17 or equivalent) is recommended to prevent leakage to the main shaft.



**【Step 21】**

Assemble the Knee Plate Ass'y (3) with installation of the Thrust Bearing (19), the Thrust Washers (20) and Dustproof Cover (21) into the Knee Plate Shaft (12).

Note that the Thrust Bearing (19) must be sandwiched between the Thrust Washers (20).



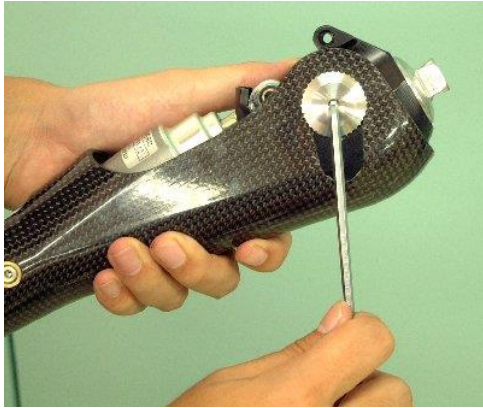
**【Step 22】**

Insert the Knee Plate Ass'y (3) into the CFRP Frame COMP (1) while holding the Thrust Washers (20) with fingers, where the hole of the Knee Plate Shaft (12) must be fitted to that of the CFRP Frame COMP (1).



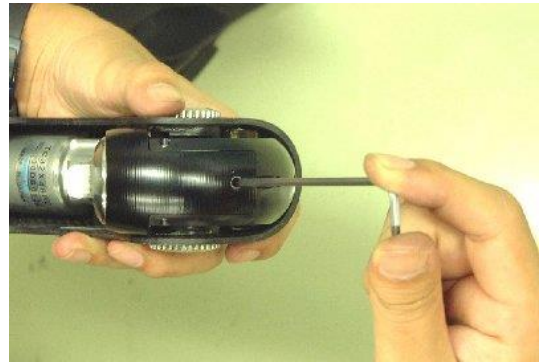
**【Step 23】**

Using a 4 mm width wrench, tighten the Knee Axis Screw (22) temporarily until no gap remains in the thrust direction. (Do not overtighten. Refer step 30.)



**【Step 24】**

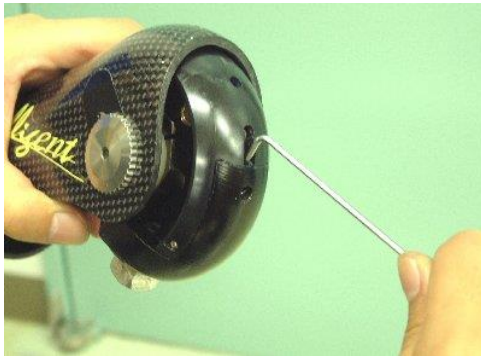
Adjust the gap between the Knee Plate Shaft (12) and Brake Block (11). First, drive the Pad Adj. Screw (5) to the bottom with a 3 mm width wrench. The bottom can be defined when the torque reaches about 0.8 Nm. Then turn the Pad Adj. Screw (5) back 90 degrees.  
\* Confirm that the Knee Plate can be rotated smoothly.



**【Step 25】**

Using a 2 mm width wrench, tighten the Set Screw (6), to a torque of 1.8Nm.

An anti-loosening adhesive (equivalent to Loctite 242) must be applied to the Set Screw M4×5 (6) prior to the installation of the screw, as shown in step 21.



**【Step 26】**

Using a 3mm width wrench, tighten the Knee Axis Screw (22) to a torque of 2-3 Nm.  
\*Confirm that the knee has no wobble around the knee axis.



**【Step 27】**

Confirm the performance of the brake while attaching the socket and foot to the knee joint.

In the case where the brake does not work effectively, loosen the Adj. Plug (13). (See step 16.)

Find a start position of the brake operating, and turn the Adj. Plug (13) 90 degrees counterclockwise.

In the case where effective brake performance cannot be obtained, go back to Step 28 and slightly tighten the Pad Adj. Screw (5) after loosening the Set Screw (6). Repeat the steps 28 and 29.



**【Step 28】**

Using the torque wrench shown in the right figure, measure the resistance to the flexion of the knee without connection to the rod of the cylinder.

Note:

- 1 The pyramid of the knee plate should be clamped for the flexion test.
- 2 The torque wrench should be inserted into the hexagonal hole of the Knee Axis Screw.

The resistance to the flexion of the knee must be below 0.5Nm.

If it varied from the standard, adjust the tightness of the Knee Axis Screw (22) by turning.

In the case where the Knee Axis Screw (22) turns during the measurement, the Set Screw (23) should be used to fix the Knee Axis Screw in place.



**【Step 29】**

Using a 1.5 mm width wrench, tighten the Set Screw (23) with prior application of an anti-loosening adhesive (equivalent to Loctite 242).

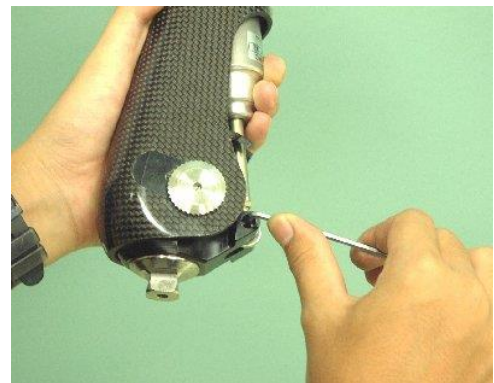
\* The screw is just a stopper for rotation of the Knee Axis Screw (22). It is not necessary to tighten too much.



**【Step 30】**

Using a 3 mm width wrench, tighten the Crevice Pin Bolt (7) to a torque of 3.7 Nm.

Prior to the installation of the bolt, an anti-loosening adhesive (equivalent to Loctite 242) must be applied to the bolt as shown in step 23 and a lithium-grease must be applied to the O-Ring (8).



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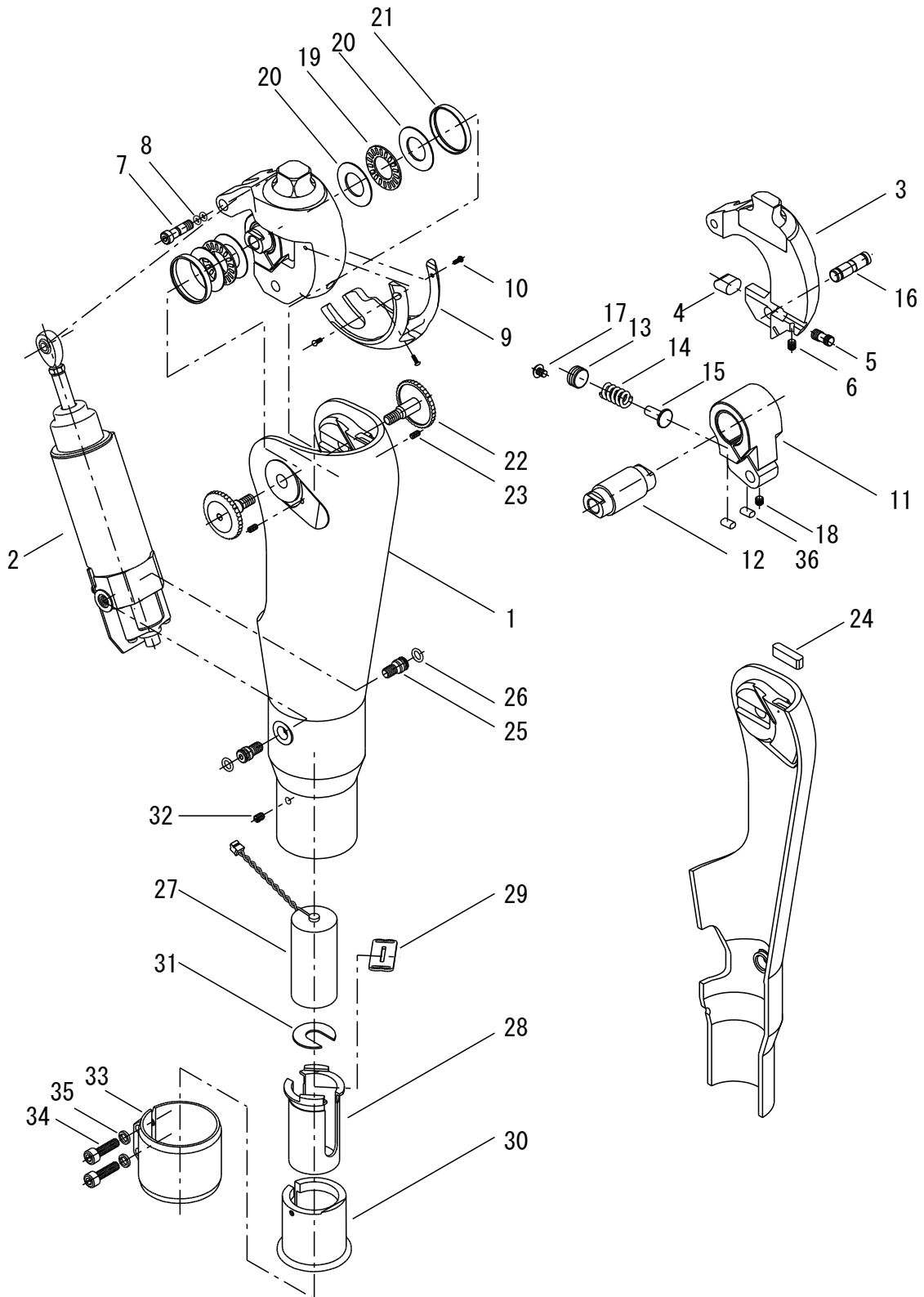
**【Reference】**

In final stage, the resistance of the knee must be less than or equal to 1.0Nm when the valve position of the cylinder is at 10.

Using the torque wrench with a 4 mm hexagonal head shown in the below figure, measure the resistance to the flexion of the knee.



【NI-C111t Components/Parts】





【NI-C111t Component /Parts list】

36	8111-4700251-01	CUSHION RUBBER	2	
35	6251-3-140112-04	SPRING WASHER,M5	2	
34	0002-0105018-53	HEXAGON SOCKET HEAD BOLT,M5X18	2	TORQUE:4.7N·m (48kgf·cm)
33	74748729-01	CLAMP (A)	1	
32	0050-0104060-43	SET SCREW,M4X6	1	
31	74748726-01	CUSHION RUBBER	1	
30	74748723-01	CLAMP (B)	1	
29	74748725-01	BATT. HOLDER CAP	1	
28	73748724-01	BATT. HOLDER CASE	1	
27	74748727-01	LITHIUM BATTERY	1	
26	6254-4-140362-04	O-RING	2	
25	74748722-01	TRUNNION PIN	2	TORQUE:2.4N·m(24kgf·cm)
24	8111-4700112-01	EXTENSION STOPPER	2	
23	0051-0103006-51	SET SCREW,M3X6	2	
22	8111-3700152-01	KNEE AXIS SCREW	2	
21	8111-4700110-01	DUSTPROOF COVER	2	
20	74751891-03	THRUST WASHER	4	
19	74751890-02	THRUST BEARING	2	
18	0051-3104004-51	SET SCREW,M4X4	1	TORQUE:1.8N·m (1.8kgf·cm)
17	0031-6104005-80	MACHINE SCREW,M4X5	1	TORQUE:1.1N·m (11kgf·cm)
16	8111-4700109-01	KNEE PLATE PIN	1	
15	8111-4700258-01	SPRING SEAT	1	
14	8111-4700257-01	ADJ. SPRING	1	
13	8111-4700193-01	ADJ. PLUG	1	
12	8111-4700108-01	KNEE PLATE SHAFT	1	
11	8111-4700268-01	BRAKE BLOCK	1 <sup>Set</sup>	
10	0031-1102005-80	MACHINE SCREW,M2X5	3	
9	8111-3700105-01	KNEE COVER	1	
8	74748721-01	O-RING	2	
7	8111-4700026-01	CREVICE PIN BOLT	1	TORQUE:3.7N·m(37kgf·cm)
6	0051-3104005-51	SET SCREW,M4X5	1	TORQUE:1.8N·m (18kgf·cm)
5	8111-4700231-01	PAD ADJ. SCREW	1	
4	8111-4700230-01	BRAKE PAD	1	
3	8111-4700115-01	KNEE PLATE	1 <sup>Set</sup>	
2	8111-3700092-01	TC32x48RC-t AIR CYLINDER	1 <sup>Set</sup>	
1	8111-3700089-01	CFRP FRAME	1 <sup>Set</sup>	
REF. NO.	PART No.	DESCRIPTION	QTY	REMARKS