81-SS00085E

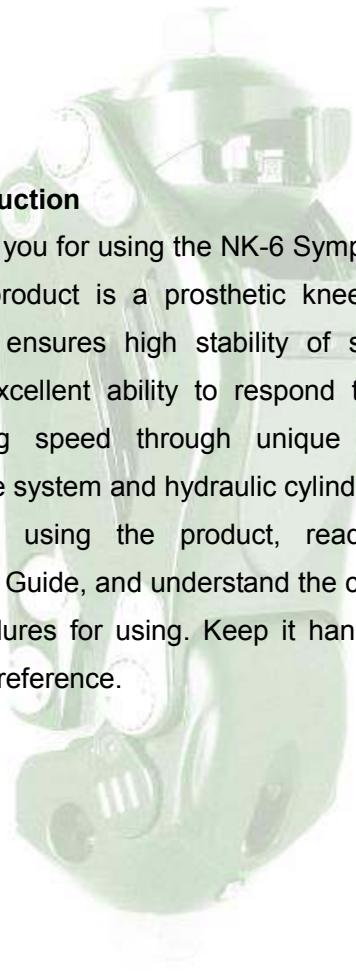
Nabtesco

For Users

6-Bar Hydraulic Knee Joint NK-6 Symphony

User's Guide

6-Bar Hydraulic Knee NK-6 Symphony™



Introduction

Thank you for using the NK-6 Symphony. This product is a prosthetic knee joint which ensures high stability of stance and excellent ability to respond to the walking speed through unique 6-bar linkage system and hydraulic cylinder.

Before using the product, read this User's Guide, and understand the correct procedures for using. Keep it handy for future reference.

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Contact

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MEMO

1-1 Definition of Symbols

	Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.
	Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury or property damage.
	Indicates a general caution to be observed.
	Indicates prohibition of a specific action.
	Indicates obligation of a specific action.

1-2 Mandatory Precautions

WARNING

MANDATORY ACTION

Read this User's Guide prior to use. Observe the directions and instructions for use.

Improper use can cause a fall or injury.

MANDATORY ACTION

Upon detecting any abnormal noise, play, or drop in hydraulic resistance, discontinue use and contact your local sales representative/dealer.

Continued use despite a detected abnormality may cause damage of parts, leading to a fall.

MANDATORY ACTION

This product shall be used as a prosthetic knee joint. Never use it for other purposes.

We do not warrant the product against damage caused by use for any unintended purpose.

4. Outline of the Product

● Specifications

Model No.	NK-6	NK-6+L	NK-6SH	NK-6SH+L
Proximal Connection	Male Pyramid Adapter		Screw Head	
Selective Lock	–	O	–	O
Total Length	197mm		191mm	
A ref. measurement	14mm		14.5mm	
B ref. measurement	156mm		156mm	
Weight	920g	970g	960g	1010g
Max. Knee Flexion Angle	170°			
Material	Titanium & Aluminum			
Max. Body Weight	125kg (100kg For Hip Prosthesis & High Active User) Compliance with ISO 10328 P6(A-125kg)			
Mobility Grade	Low ~ Mid Active (K-Level 2+3, Mobility Class 2+3)			

* These specifications are subject to changes without prior notice.

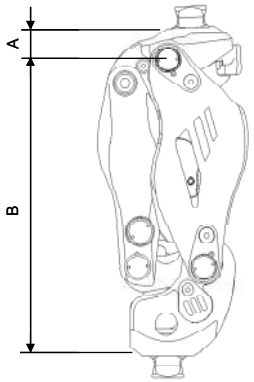

Fig. 7 Installation Height

● **Features**

1. **Smooth walking**
   The product is named "Symphony" because the knee smoothly harmonizes between the stance phase and swing phase control. The p-MRS system controls shifting from the stance phase to the swing phase seamlessly.
2. **High stability of stance and Stance-Flexion function**
   The 6-bar linkage using the p-MRS system identifies floor reaction force positions and controls the knee stability. The Stance-Flexion feature will reduce an impact at the heel strike and also reduce bobbing of center-of-mass.
3. **Locking of knee by selective lock (optional)**
   The user can lock the knee by himself/herself. Whenever the user needs stability, for example, while working at standing posture, walking on snowy road, in strong winds or on irregular ground, he/she can lock his/her knee to completely prevent knee buckling.

3-4 Precautions When Sitting in and Standing up from a Chair

- When sitting in a chair, never place the hand behind the knee. The hand can be caught in the swaying part of the hydraulic cylinder, causing serious injury.
- When standing up from a chair, never place the hand on the knee. Fingers can be caught between the knee plate and the linkages, causing serious injury. For ease of standing up from a chair, placing hands on the armrests or on the seating face* is recommended.

WARNING

*** In addition to the above, placing a hand on the socket or placing both hands on the sound leg also facilitate standing up from a chair. Provide instructions on the safe method according to the user's circumstances.**

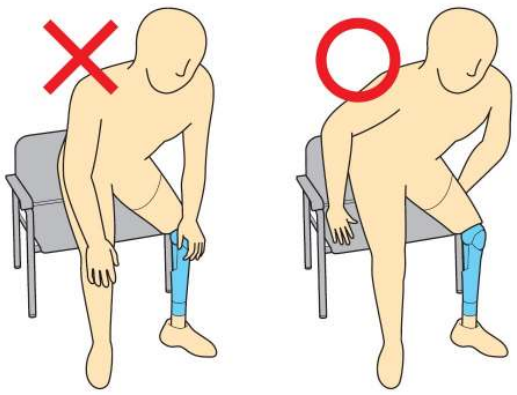

Fig. 6 Recommended Posture When Standing up from a Chair

PROHIBITION

DO NOT use for a person who weighs over 125 kg.

If used to a person who weighs over 125 kg, damage of parts may occur, leading to a fall. This, however, does not preclude loading and unloading of baggage, etc. occurring in daily life.

ISO 10328-P6-125kg*)

*) Body mass limit not be exceeded! For specific conditions and limitations of use see manufacture's written instructions on intended use!

Specific condition:For persons on a high activity level and persons wearing a hip prosthesis, the weight limit shall be 100 kg.

PROHIBITION

DO NOT place the hand behind the knee when flexing the knee.
DO NOT touch the knee when extending it.

Your hand can be caught, thereby causing injury.

PROHIBITION

Never attempt to disassemble or modify the knee joint.

Parts may be damaged, thereby causing a fall.

CAUTION

◆Instructions for storage◆

PROHIBITION

DO NOT put the product in a high place. DO NOT place it against something in an unstable state.

The product may drop or fall down, thereby causing damage to parts.

PROHIBITION

DO NOT put anything on the product. DO NOT step on it.

Parts may be damaged.

PROHIBITION

Avoid storing the product where the temperature may exceed the range of -20 to 50℃.

Parts may be deteriorated or deformed, thereby causing failure.

PROHIBITION

DO NOT leave the product in a place where it may be exposed to water or moisture.

Parts may rust, thereby causing failure.

3-3 Precautions for Operating the Selective Lock

【Precautions for locking operation】

CAUTION

Before starting to walk, make sure that the selective lock is securely activated.

CAUTION

To operate the selective lock, slide the switch surely to the position shown in Fig. 4. (A click will sound.) Although the lock can be activated before the position shown in Fig. 4, the lock parts may be damaged if the product is used in such a state.

【Precautions for unlocking operation】

CAUTION

After releasing the selective lock, make sure that the knee can be normally flexed before starting to walk.

CAUTION

To release the selective lock, slide the switch surely to the position shown in Fig. 5. (A click will sound.) The lock cannot be released if the switch is stopped before the position shown in Fig. 5. Slide it correctly.

【Foam cover】

Note that the cosmetic foam cover may be broken depending on the way of operating the selective lock if the lock is used with the cover fitted.

3-2 Procedures for Operating the Selective Lock

The selective lock is to be operated by the user. The user shall thoroughly understand the operating procedures.

The selective lock mechanism has a switch above the knee joint to switch the lock mode on or off. However, the lock switch cannot be operated while the knee is flexed. The joint can be locked when the knee is fully extended.

【Locking procedure】

As shown in Fig. 4, slide the lock switch in front of the knee plate in the arrow direction.

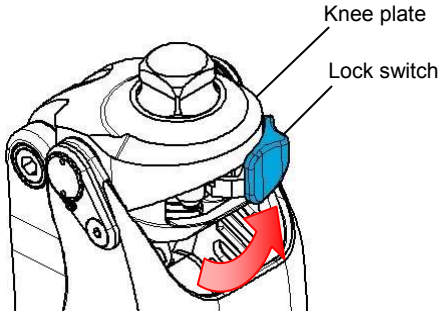

Fig. 4 Locking Procedure

【Unlocking procedure】

As shown in Fig. 5, slide the lock switch in front of the knee plate in the arrow direction.

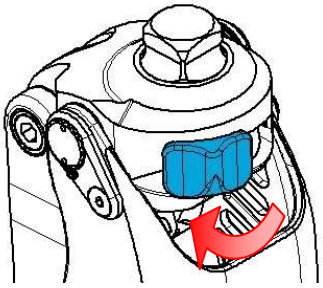

Fig. 5 Unlocking Procedure

◆Instructions for use◆

PROHIBITION

Avoid using the product where the outdoor temperature is lower than –20℃.

The lubricant and rubber parts may harden, thereby causing failure.

PROHIBITION

Avoid using the product near open flame or where the temperature exceeds 50℃.

The plastic parts may be deformed, thereby causing failure.

PROHIBITION

DO NOT immerse the product in any liquid such as water and seawater.

Parts may rust, thereby causing failure.

PROHIBITION

DO NOT jump down from a high place nor play active sports to intentionally give strong impact to the product.

Parts may be damaged, thereby causing a fall.

2. Basic Construction and Operational Principle

2-1 Basic Construction

The NK-6 Symphony consists of a 6-bar linkage which controls the stance phase and a hydraulic cylinder which controls the swing phase. The selective lock with which the user can lock the knee by himself/herself can be chosen at the user's option. (Model: NK6+L, NK-6SH+L)

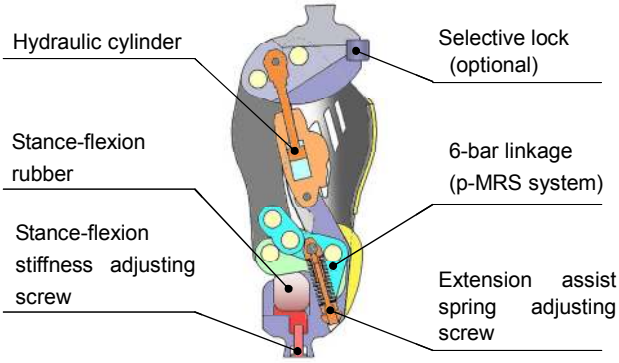

Fig. 1 Main Components

2-2 Operational Principle

The geometric self-locking system reliably functions while the prosthesis is in contact with the floor, thus preventing abrupt buckling. When the prosthesis leaves the floor, the hydraulic cylinder functions, providing cadence responsive swing control.

Fig. 2 Walking on a Level Floor

3. Before Use

3-1 How to Activate the "Stance-Flexion" Function

Fig. 3 shows how to load the prosthesis equipped with this knee joint. When the weight is placed on the heel as shown in the left figure while the knee is completely extended, the knee is automatically locked (self-locked) and slightly flexed (stance-flexion). The maximum flexion angle is 10˚ depending on the loading method and the setting of the adjustment. If the weight is placed on the toe as shown in the right figure, the lock is released.

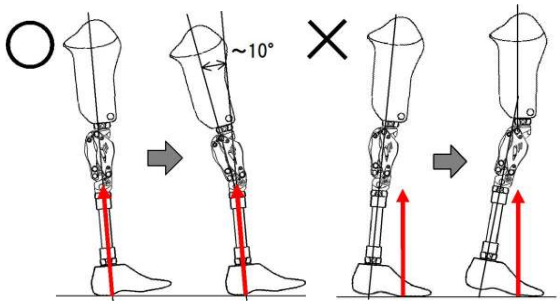

Fig. 3 Differences in self-lock function depending on loading method

CAUTION

Until getting used to use the product, place your weight on the prosthesis while holding on the parallel bars, and confirm the self-locking function. Thoroughly understand the mechanism and the function prior to use.

CAUTION

In a standing posture, put the prosthesis slightly forward, and weight on the heel while fully extending the knee. If the weight is placed when the knee is not fully extended or prior to toe-off, knee buckling may occur, and the user may fall down. Particularly users who have a habit of standing with their prostheses slightly backward shall keep this in mind.