SIT2STAND™ SQUAT-ASSIST TRAINER

INSTRUCTIONS FOR USE

950-560

950-560-10

BIODEX

Biodex Medical Systems, Inc.

20 Ramsey Road, Shirley, New York, 11967-4704, Tel: 800-224-6339 (*Int'l 631-924-9000*), Fax: 631-924-9241, Email: info@biodex.com, www.biodex.com

FN: 15-266-CLR Rev D 8/19

Sit2Stand™ Squat-Assist Trainer

This instructions for use document covers safe operation of the Sit2Stand Squat-Assist Trainer.

Additional information and resources are available upon request or directly from the Biodex website: www.biodex.com.

The user can find information from compliance to clinical support, and if the desired information is not found, Biodex can be contacted directly at supportservices@biodex.com

Thank you,

Biodex Medical Systems, Inc.

NOTE: *Component part lists, descriptions, calibration instructions, or other information used to assist service personnel to repair those parts of the equipment that are designated as repairable for this product are provided on the Biodex website, www.biodex.com or can be obtained by contacting Biodex Customer Service (see Contact information).*

Contact information

Manufactured by:

Biodex Medical Systems, Inc.
20 Ramsey Road, Shirley, New York, 11967-4704
Tel: 800-224-6339 (Int'l 631-924-9000)
Fax: 631-924-8355
email: supportservices@biodex.com
www.biodex.com

Table of Contents

Definition of Symbols

The following symbols and their associated definitions are used and implied throughout this manual.

Symbol	Definition
	Carefully read these instructions prior to use
	Operating Instructions
	Caution
	General Warning
	General Mandatory Action
	Dangerous Voltage
	“On” Power
	“Off” Power
	Pinch Point
	Earth (ground)
	Alternating Current
	Fuse
	USB Connector/Cable
	Non-Ionizing Electromagnetic Radiation
	Waste in Electrical Equipment
	Disposal Classification and Identification of Equipment
	Date of Manufacture
	Manufactured By
	Type B Applied Part

Warnings and Cautions

NOTE: The warnings, cautions, and instructions provided in this manual must be read, followed, and always kept available for consultation.

CAUTION: Do not modify this equipment without authorization from the manufacturer. Unauthorized modifications to this system are not permitted and void the manufacturer's warranty. Unauthorized modification might result in a hazard to the user and/or patient.

CAUTION: Federal Law restricts this device to sale by or on the order of a medical practitioner. When prescribed for therapeutic purpose, a physician must define the use clearly (for example, total work, maximum heart rate, and so on) to reduce the risk of patient injury.

CAUTION: All patients should consult a physician before beginning any rehabilitation program.

WARNING

- Allow only qualified, trained personnel to operate or service this system.
- Do not use this system a manner other than specified in this manual. If the equipment is used in a non-specified manner, the protection provided by the equipment might be impaired and results could be compromised.

WARNING: Never leave patient unattended.

Important Safety Information

Read the entire operation manual. Failure to read the manual might result in user error or inaccurate data. Save all documents for reference.

Follow the unpacking and assembly instructions document.

Follow the unpacking and assembly instructions document.

For product specifications, refer to the Table of Contents.

For Cleaning and Maintenance instructions, refer to the Table of Contents.

WARNING: The Biodex Sit2Stand Trainer is designed for use in a patient environment.

WARNING: Immediately discontinue exercise if patient feels faint, dizzy or short of breath.

CAUTION: Periodically monitor the heart rate of patients exercising on the Sit2Stand.

CAUTION: Instruct patients to use the handrails when learning to use the Sit2Stand, especially during first time use.

CAUTION: The system is intended to remain in one location during operation. One person can move the system. Use the wheels to move the system.

CAUTION: Keep hands, feet, and head away from moving parts and adjustment tubes.

CAUTION: Ensure that all adjustment pins and knobs are fully secured before using the machine.

Patient Profile

Up to 350 lb with a maximum support load of 250 lb for a 70% minimum support.

For additional technical advice, service or education information, please contact:
Biodex Medical Systems, Inc., 20 Ramsey Road, Shirley, New York 11967-4704;
1-800-224-6339 (Int'l 631-924-9000) or customerservice@biodex.com.

Authorized European Community Representative:

EC REP

Emergo Europe

Prinsessegracht 20

2514 AP, The Hague
The Netherlands

1. Introduction

Intended Use

This device is used to assist in the ability to stand from a seated position.

Indications for Use

With attention to detail in the biomechanics of the sit-to-stand motion and the therapy process, the Sit2Stand Squat-Assist Trainer is designed to allow the therapist full access to the patient to train and reinforce strategies for the sit-to-stand motion while providing the patient a safe environment.

In addition to lower extremity strengthening, the Sit2Stand contributes to upper extremity strength gain. Upper extremities often compensate for lower extremity weakness, which can lead to upper extremity pain. There is a correlation between increased leg strength and reduction in shoulder problems relating to the sit-to-stand motion.

By varying seat height and foot position, the patient will learn the effects of body position and joint angle to control center of mass and the role of momentum in rising. The large, comfortable contoured seat with pivoting backrest articulates naturally to correspond with pelvic tilt during sit-to-stand motion. Adjustable start and end seat position accommodates varying amounts of hip flexion and orthopedic conditions.

Contraindications

The device should not be used for patients who display dizziness or shortness of breath.

Theory of Operation

It is important for the therapist to know and clearly understand the normal kinematic movement components of the sit-to-stand sequence.

The progressive steps of the sit-to-stand motion, from a standing position, are as follows:

- From standing, sit on the device.
- Flexion Momentum: Anterior pelvic tilt, lumbar and thoracic extension.
- Momentum Transfer: Trunk flexion, hip flexion, head extension and maximal dorsiflexion.
- Extension: Lumbar and thoracic extension, scapular depression (This movement continues until the center of mass is directly over the base of support.)
- Stabilization: Regaining postural stabilization. Starts with terminal hip extension and ends with full extension of trunk and hips (Optimal end position is 0˚ hip and trunk extension.)

Figure 1.1. The Sit-to-Stand Sequence.

The functional task of being able to rise from the seated position is necessary for most activities of daily living (ADLs). Patients may have a multitude of impairments such as decreased muscle strength, sensation/proprioception issues, and visual perceptual problems that lead to limitations in their ability to perform even the most basic aspects of the sit-to-stand sequence. These impairments can lead to fear of movement, increased anxiety, and limited trust in the therapist making it difficult for patients to learn the components of sit-to-stand. In the cases of elderly or severely deconditioned individuals, when the inability to perform this basic skill is lost it can lead to impaired functioning and independence with mobility as well as with ADLs.

Therapists should have adequate clinical knowledge of proximal and distal key points of control on patients' bodies to facilitate sit-to-stand exercises. Based on this knowledge, therapists can use these handling techniques to teach the patient the appropriate steps in the sit-to-stand sequence. The therapist should engage the patient in a variety of practice and graded training sessions to teach this skill.

The Sit2Stand device is built to exercise and strengthen a patient through normal sit-to-stand kinematics. In particular, it is designed to get the patient's center of mass over his or her feet, a key component in the early phases of the sit-to-stand motion. It also relieves the therapist of the physical demands of manual facilitation, allowing them to focus on other physiological responses, such as blood pressure. The therapist can also observe and assess isolated muscle and joint activity in conjunction with behavioral responses of the patient.

Muscles Used During the Sit-to-Stand Sequence

1. *Trunk* – The trunk muscles move the vertebral column and form the thoracic and abdominal walls. The anterior portion of the trunk contains the abdominal muscles. The abdominal muscles are responsible for flexing the trunk. The posterior portion of the trunk contains the erector spinae muscles. These muscles run longitudinally on each side of the vertebral column and are the prime movers responsible for extending the vertebral column to maintain erect posture. The trunk muscles work together to contribute to spine stability in a variety of postures.
2. *Glutes* – The gluteal musculature is comprised of the gluteus maximus, gluteus medius and gluteus minimus. The prime movement for the gluteus maximus is extension of the thigh at the hip. The maximus also works to control downward movement of the hips when lowering to the chair. The medius and minimus help to steady the pelvis during weight bearing activities.
3. *Quadriceps* – The quadriceps muscles are on the anterior aspect of the thigh and are used in both sitting and standing. They act in an eccentric contraction to resist gravity when lowering into a chair. The quadriceps also concentrically contract to extend the leg at the knee to allow standing. The action of the quadriceps is to flex the hip and extend the knee.
4. *Hamstrings* – The hamstring muscle group is comprised of three separate muscles; the bicep femoris, the semintendinosus, and the semimembranosus. They originate from the ischial tuberosity of the pelvic bone and insert on the medial and lateral surfaces of the tibia. Hamstrings are primarily knee flexors and secondarily hip extensors.
5. *Gastro/Soleus* – The gastrocnemius function is to flex the knee and plantarflex the foot with the assist of the plantaris muscle. The soleus muscles plantarflex and invert the foot. Any movement with body weight on the foot will recruit the soleus in to assist as a stabilizer when rising to a stand position or lowering to a sit position.
6. *Tibialis Anterior* – The tibialis anterior is located lateral to the shin bone on the front of the lower leg. This muscle is responsible for dorsiflexing the foot but also works in an eccentric action to prevent hyper-flexion of the ankle when lowering into a sitting position. It also helps to stabilize the lower leg when standing.

Initial Setup and Considerations

The wheels in the rear of the Sit2Stand Squat-Assist Trainer base (and the finger grips in the front) can be used to move the unit to any safe, open space in a facility.

Figure 1.2. Moving the Sit2Stand Squat-Assist Trainer.

Please be aware of two particular areas of moving parts in the Sit2Stand Squat-Assist Trainer device. The first is the area underneath the seat and the second is where the seating column rests on the base. Be sure to keep hands and feet clear of these areas.

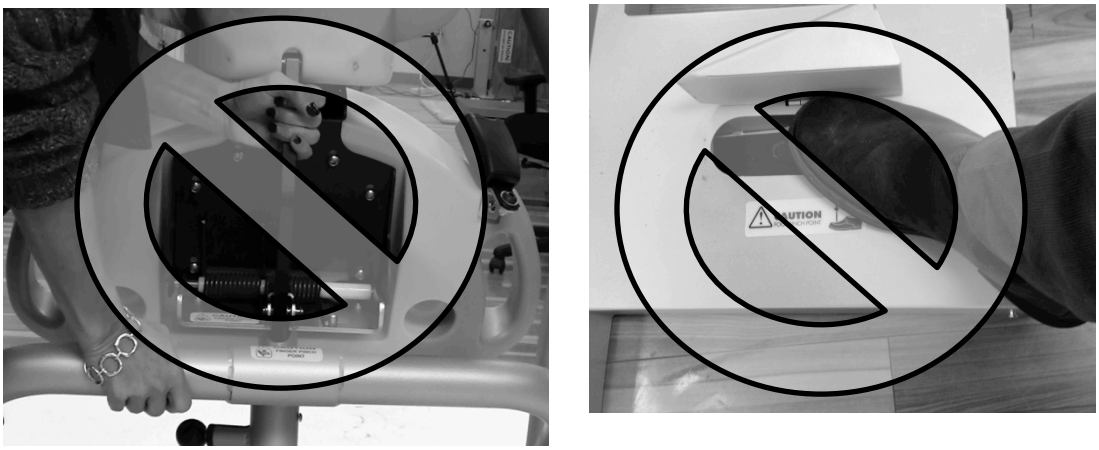

Figure 1.3. Keep Hands and Feet Clear of Areas with Moving Parts.

2. Operation

Using the Sit2Stand Squat-Assist Trainer with Patients

For patients who are independent or require only supervisory assistance (ones who do not need to be transferred from a wheelchair), simply stand by and direct them into the sit-to-stand exercise position on the device. Have them slide back ensuring their buttocks are towards the back of the seat. Apply the seat belt.

Figure 2.1. Getting a Patient Ready for Exercises.

There are lines for marking foot placement on the base. Patients should work with therapists in finding the safest, most comfortable position for exercising. In general, patients should always hold onto the handrails when exercising. But in particular, keep in mind that if patients place their feet behind the lines, they should always hold onto the handrails while exercising to keep from being pushed forward and possibly off balance.

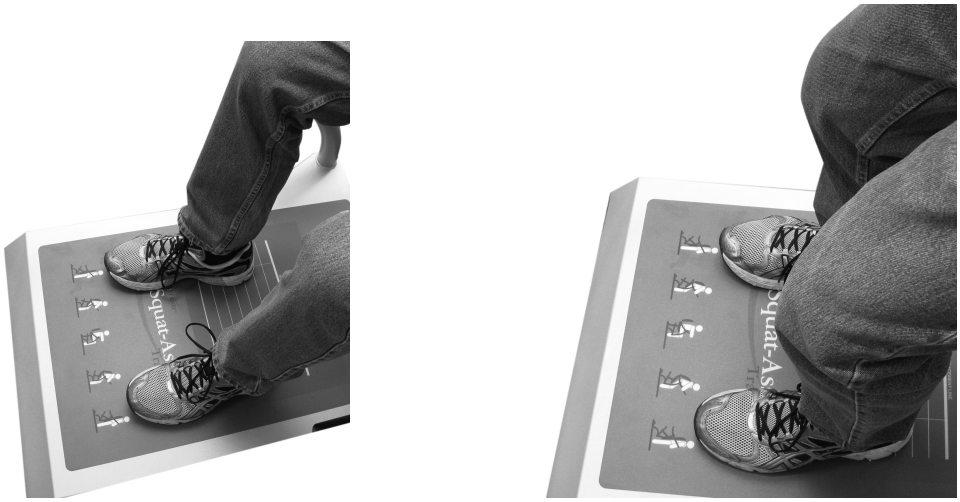

Figure 2.2. Use the Markings on the Base as a Reference for Patient Foot Placement.

Hip Flexion Wedge

Note that the wedge below the seating column can be used to create more or less flexion in a patient's hips. For less flexion, flip the wedge over the opening in the middle of the base. For more flexion, flip it to the side so the seating column will rest on a lower plane.

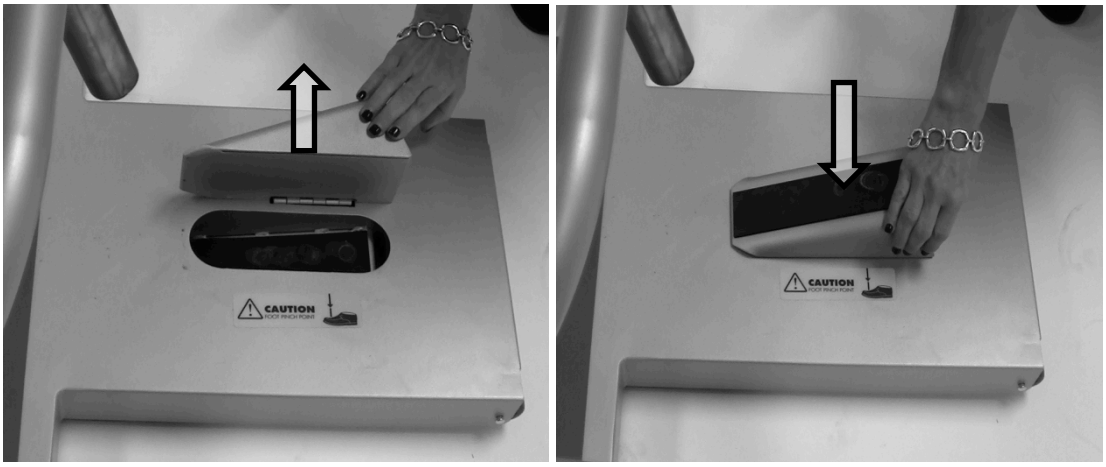

Figure 2.3. Use the Wedge to Create More or Less Joint Flexion

Adjusting Seat Height

Adjust the Sit2Stand Squat-Assist Trainer seat height as appropriately needed for various patients (approximate level of SI (sacroiliac) joint.)

To raise the seat, simply pull it up by gripping the two handles on either side of the seat. To lower it, pull out the black knob on the seating column and push the seat downward.

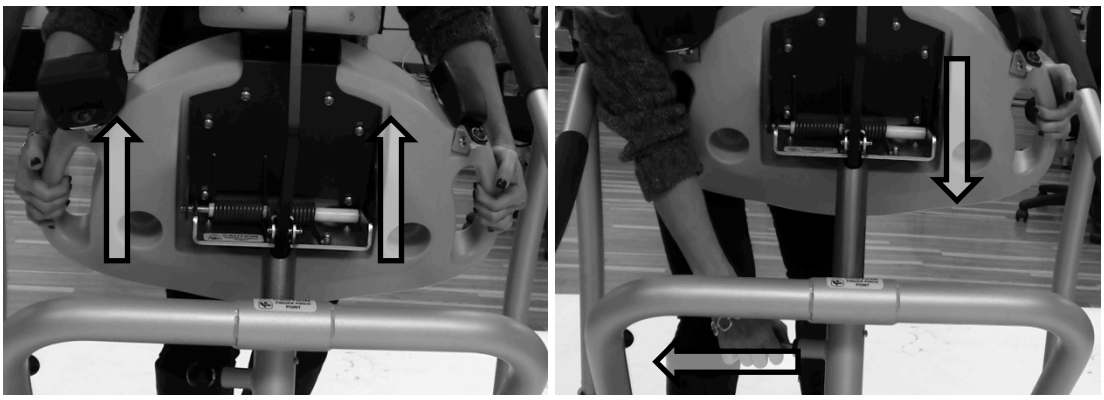

Figure 2.4. Adjust the Sit2Stand Squat-Assist Trainer Seat Height as Required.

Adjusting the Assist Resist Tension Knob

Adjust the Sit2Stand Squat-Assist Trainer Assist Resist™ tension knob to provide the appropriate amount of help during patient exercises. By moving the slider knob downward, the tension on the elastic cord is increased and the amount of assistance the patient receives when moving into the standing position is also increased. As a general guideline, a tension level that is equal to 20-50% of the patient's body weight is recommended.

Figure 2.5. Adjust the Assist Resist Tension Knob as Required.

CAUTION: Once a patient is seated (or is somehow pressing down on the seat) the elastic cord that connects the Assist Resist knob to the base will be under tension. Therefore the Assist Resist knob should only be adjusted prior to exercising with the device. Pulling up on the knob while it is under tension may cause it to "snap" to one side of the slider range.

Figure 2.6. Setting the Assist Resist Knob.

Removing the Handrails

The device's handrails can be removed to allow for easier patient access from a wheelchair. (It also allows more advanced patients to have a more challenging exercise setup, where they must rise from a seated position using just their leg and trunk muscles.) To remove a handrail, pull the release pin at the connection point, lift it up a few inches, and remove it from the base.

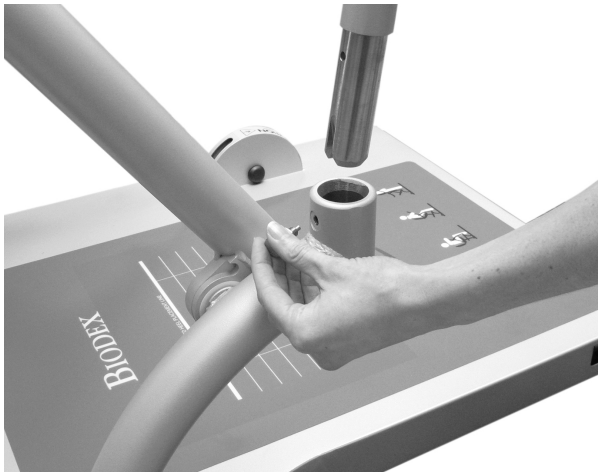

Figure 2.7. Pull the Pin Near the Connection Points to Remove the Handlebars.

To assist a "minimally involved" patient (one who needs to be transferred from a wheelchair) into a sit-to-stand exercise position, move one of the handrails out of the way and position the patient's wheelchair at a 45˚ angle to the device. Help the patient to step onto the device and get into position for exercises. Apply the seat belt.

Figure 2.8. Preparing a "Minimally Involved" Patient Ready for Exercises.

Recommended Training Methods, Goals, and Considerations for Sit2Stand Squat-Assist Trainer Exercises

Table 2-1. Goals, Methods, and Considerations

Training method	Intensity	Frequency	Goals	Special Considerations
Strength	8-15 reps 1-2 sets	2-3 days per week	-Improved skeletal muscle strength -Maintenance and /or growth of muscle mass -Improve functional tasks for transfers, walking and stair climbing	-Precautions for range of motion limitations -Precautions for holding breath
Endurance	12-15 reps 3-4 sets	3-4 days per week	-Promote increase muscle mass -Growth in bone density -Enhanced immune system -Increased functional ability to perform activities for longer durations	-Less tension -Increased fatigue -Longer exercise durations -Potential orthopedic injury
Range of motion	Within comfortable ranges	Daily	-Increased range of motion as tolerated -Joint lubrication	-Alerts to surgical precautions or contra-indications -Alerts to pain -Use range of motion stop if necessary

Integrating the Biodex BioSway into a Sit2Stand Squat-Assist Trainer Exercise Program

By introducing a device such as Biodex's portable BioSway into the sit-to-stand exercise program, real-time biofeedback on the patients' postural balance during an activity can viewed and analyzed.

In particular, two of the BioSway's Training modes can be helpful: the Percent Weight Bearing mode (where the percentage of weight the patient is bearing on each of his or her extremities can be viewed) and the Weight Shifting mode (where patients are challenged to practice shifting their weight in various directions.)

Figure 2.9. Using the BioSway in Sit-to-Stand Exercises.

Sit2Stand Squat-Assist Trainer in Fitness Facilities

The Sit2Stand exercise device is not only designed to be of benefit to therapists working one-on-one with patients — it can also be used by healthy, active seniors in traditional fitness facilities such as health clubs and gyms.

It may be helpful to have a therapist or trainer available to explain the basics of Sit2Stand Squat-Assist Trainer operation.

Pre-Training Checklist

The following covers important basic training and clinical considerations for any customer using the Sit2Stand Squat-Assist Trainer. Advise customers to:

- Warm up, stretch, and cool down.
- Drink plenty of water.
- Wear appropriate clothing, including supportive athletic footwear.
- Stop exercising if you experience pain.
- Avoid exercising any injured body part.
- Be ready to track your progress with a notebook or activity report.

Device Operation Checklist

The steps for operating the Sit2Stand Squat-Assist Trainer are the same for both clinicians and fitness facility members. Customers should:

- Adjust tension to 20 to 50 percent of body weight.
- Adjust seat height to belt level.
- Sit with buttocks at back of seat.
- Place feet in a comfortable place.
- Secure seat belt.
- Grab onto handrails for safety.
- Work in a mid-range of motion – no sitting or standing; movements should be the controlled up-and-down direction change in between a full sit and full stand.

For recommended exercise activities, refer to the chart in the Recommended Training Methods, Goals, and Considerations for Sit2Stand Exercises section.

3. Maintenance

The seat pad can be removed, cleaned, and reinstalled. To clean, use a spray disinfectant and wipe the pad dry with a dry cloth or paper towel.

Figure 3.1. The Seat Pad can be Removed and Re-attached for Cleaning.

Disposal

An appropriate waste disposal company is to be contacted (i.e., the local collection point for waste separation). Properly dispose of the device at the end of its service life:

- The device packaging is disposed of through resource recycling.
- The metal parts of the machine go to scrap metal disposal.
- Plastic parts are disposed of as hazardous waste.

The disposal of equipment must be in accordance with the respective national regulations.

Wear parts are considered hazardous waste! After being replaced, wear parts must be disposed of according to country-specific waste laws.

4. Bibliography

Lomaglio MJ, Eng Janice. Muscle strength and weight-bearing symmetry relate to sit to stand performance in individuals with stroke. Gait & Posture 22(2005) 126-131.

Talaty M, Esquenazi A., Klien M. Changes in Sit Stand Biomechanics after a Muscle Strengthening Program. Moss Rehab.

Janssen WGM, et al. Determinants of the Sit to Stand Movement: A Review. Phys Ther. 2002;82:866-879.

Schenkman M, et al. Whole-body movements during rising to standing from sitting. Phys Ther. 1990;70: 638-65.

5. Specifications

Dimensions: 31.75" w x 51" deep x 52" h (83 x 125 x 132 cm)

Seat Height:

Adjustable: Seven preset increments accommodate patients of various heights.

Seated Height: 18.5"

User Capacity: 350 lb (159 kg)

Weight: 147 lb (66 kg)

Assistance Range: 45 to 250 lb

Warranty: one year parts and labor