



Instructions for Use

THERA TRAINER

Models:

☐ THERA-vital

☐ THERA-live

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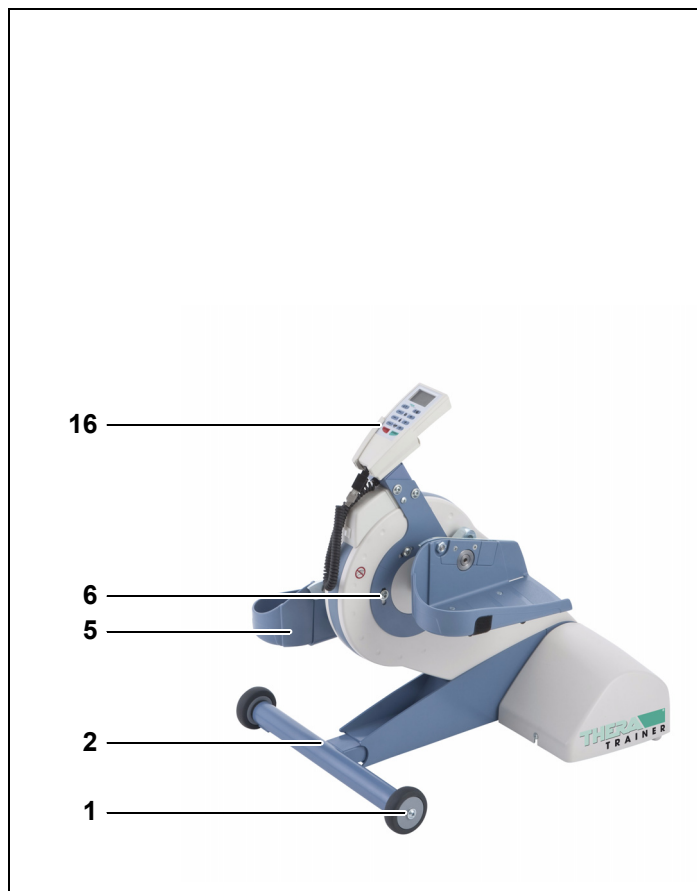
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* Illustration shows optional equipment



THERA-live basic version

Congratulations!

You have made an excellent choice with the purchase of your THERA-Trainer. This therapeutic exerciser is an innovative, high-quality product made in Germany.

These instructions will help you to familiarise yourself with your THERA-Trainer. They will guide you carefully through its functions and operation and offer numerous tips and hints on getting the best use out of your new therapeutic exerciser.

Before using the exerciser for the first time, please take careful note of the safety instructions on page 7.

If you have any questions or observations, the staff at medica Medizintechnik GmbH will be only too pleased to help.

Enjoy exercising and stay active with your THERA-Trainer.

Exerciser components and controls

- 1 Castors
- 2 Exerciser stand, extending and height compensating
- 3 Self-operated stabiliser straps (optional feature)
- 4 Infinitely adjustable cranks (optional feature)
- 5 Footrest
- 6 Angle adjuster for handlebar/upper torso exerciser
- 7 Calf rests (optional feature)
- 8 Support tube for handlebar/Upper torso exerciser
- 9 Knurled-handle screw for reach adjustment on upper torso exerciser
- 10 Upper torso exerciser (optional feature)
- 11 Therapy grips
- 12 Control pad with touchscreen display (optional feature, THERA-vital only)
- 13 USB interface (THERA-vital)
- 14 Knurled-handle screw for height adjustment/upper torso exerciser
- 15 Foot fixing (optional feature)
- 16 Control pad (THERA-live)



Use only genuine medica accessories.

Contents

Exerciser components and controls	3				
1 Exerciser options	5				
1.1 Basic exerciser	5				
1.2 Options	5				
2 Symbols used	6				
3 Intended use	6				
4 Safety	7				
5 Notes on exercise therapy	9				
5.1 General observations	9				
5.2 Uses	9				
5.3 Correct posture	9				
5.4 Exercise programme planning	10				
5.5 Active and Passive exercising	10				
5.6 Muscle hypertonia/spasms	11				
5.7 Side effects	11				
6 Transporting and commissioning	12				
6.1 Before using for the first time	12				
6.2 Transporting	12				
6.3 Connecting to the power supply	12				
6.4 Switching the exerciser on/off (standby mode)	12				
7 Operation	13				
7.1 Adjusting the exerciser stand	13				
7.2 Footrests	13				
7.3 Adjusting crank length, 2-position cranks	13				
7.4 Infinitely variable crank length (optional feature)	14				
7.5 Foot fixings (optional feature)	14				
7.6 Calf rests (optional feature)	15				
7.7 Adjusting the handlebar (optional feature on THERA-live)	16				
7.8 Upper torso exerciser (optional feature)	17				
7.9 Forearm rests (optional feature)	19				
7.10 Wrist supports (optional feature)	20				
7.11 Adjustable legs (optional feature)	20				
7.12 Stabiliser chocks (optional feature)	21				
7.13 Self-operated stabiliser straps (optional feature)	21				
7.14 THERA-assist exercising software (optional feature for THERA-vital only)	21				
7.15 Printer for exercising data (optional feature on THERA-vital only)	22				
7.16 Cardio-Pulse set (optional feature, THERA-vital only)	22				
7.17 THERA-vital: Control pad with colour screen	23				
7.18 THERA-live: Control pad	28				
8 Submenu (THERA-vital only, for experienced users)	32				
8.1 Navigating the submenu	32				
8.2 Menu structure	33				
8.3 Description of exerciser functions on submenu	34				
8.4 Duration	34				
8.5 Forwards/backwards auto reversal	34				
8.6 Bio-feedback	34				
8.7 Motor power	34				
8.8 Spasticity detection	35				
8.9 Spasticity program	35				
8.10 Automatic speed adjustment	35				
8.11 Heart rate limit	35				
8.12 Muscle support	35				
8.13 Microphone sensitivity	36				
8.14 Contrast	36				
8.15 Basic exercising settings	36				
9 Bio-feedback	36				
9.1 Bio-feedback for leg exerciser	36				
9.2 Bio-feedback for upper torso exerciser	38				
10 Analysis of session data (THERA- vital only)	39				
10.1 Printing out session data	39				
11 Motor power	40				
12 Technical specifications	41				
13 Cleaning and disinfection	42				
14 Replacing the fuse	42				
15 Guarantee	42				
16 Recycling	42				
17 EC Declaration of Conformity	43				
18 Tips and tricks	44				
19 Notes on electromagnetic compatibility	46				
19.1 Electrical leads, lead lengths and accessories	46				
19.2 Warning note about accessories used	46				
19.3 Warning note about siting	46				
19.4 Compliance levels	46				
19.5 Interference emission	46				
19.6 Interference immunity	47				
19.7 Recommended safe distances between portable and mobile equipment, high-frequency telecommunications equipment and THERA-Trainers	49				
Index	50				

1 Exerciser options

1.1 Basic exerciser

THERA-vital

The basic version of the THERA-vital can be used for passive (driven by the exerciser) and active (where the motive power is provided by the patient) therapeutic exercise of the legs. The patient's legs are held in the footrests by Velcro straps. For balance and stability there is also a handlebar that can be adjusted for height and angle. All important parameters can be set on the control pad. The exercising data is displayed on the colour screen.

The THERA-vital can be fitted with different control pads:

- Control pad with 5.7" colour screen
- Control pad with 10.4" colour touchscreen

The function of the THERA-vital is identical whichever control pad is fitted; the larger screen and touchscreen functionality offer a greater level of user-friendliness, however.

THERA-live

The basic version of the THERA-live can be used for passive (driven by the exerciser) and active (where the motive power is provided by the patient) therapeutic exercise of the legs. The patient's legs are held in the footrests by Velcro straps.

The THERA-live is equipped with a hand-held control pad and a 2" display screen.

1.2 Options

Handlebar (THERA-live only): the adjustable handlebar provides optimum support and stability, especially when exercising actively.

Upper torso exerciser: Instead of the handlebar, the THERA-Trainer can be fitted with an upper torso exerciser. This has a separate motor, in other words both passive and active exercise are possible. It is controlled from the same control pad as on the basic exerciser. The patient holds onto the therapy grips. When exercising the legs, the therapy grips are replaced by adapter handles.

Forearm rests, wrist straps, special Tetra-Knurlled-handles and wrist supports: for more effective restraint of the lower arms, especially in cases of partial paralysis, there is a choice of various optional forearm rests, forearm rest straps, special Tetra-grips and wrist supports to suit the particular disability.

Infinitely variable crank length: with the variable crank length option, the crank length and, therefore, extent of leg movement can be individually adapted to the patient without the use of tools.

Calf rests: the pivoting and vertically adjustable calf rests help to secure and guide the lower legs, particularly in cases of partial paralysis.

Foot fixings: The foot fixings are useful for patients to be able to quickly and easily strap their own feet into the footrests.

Stabiliser straps, self-operated: the self-operated stabiliser straps are simply hooked onto the wheelchair and tightens itself automatically. It prevents the wheelchair from tipping over when the patient is exercising with the THERA-Trainer.

Height adjuster: the height adjuster enables the THERA-Trainer to be adjusted to the height of the patient's chair/wheelchair.

Cardio-Pulse set (THERA-vital only): the Cardio-Pulse set (heart rate monitor with chest strap) monitors the patient's precise heart rate with the aid of a chest strap. The heart rate is displayed on the colour screen.

THERA-assist (THERA-vital only): the THERA-assist software is an exercising program for recording, analysing and documenting exercising data. A USB memory stick is used to transfer the data from the exerciser to the computer on which the software is installed.




Printer for exercising data (THERA-vital only): the printer can be connected to the THERA-vital via a Bluetooth connection. It enables quick and easy documentation of the exercising data.






Control pad with 10.4" colour touchscreen: the large screen and touchscreen functionality offer a greater level of user-friendliness.

2 Symbols used

The symbols used in this instruction manual and, if applicable, on the trainer are intended to draw your attention to possible dangers when using the trainer.

You should make sure you understand the meaning of the symbols so that you can act accordingly and thereby use the exerciser effectively and safely.

Symbol	Meaning
	Danger warning: read the Instructions for Use and follow the directions given.
	Danger of moving parts: do not reach into the cranks during an exercising session.
	Alternating current: the THERA-Trainer uses an alternating current power supply.
	Earth lead connection

Symbol	Meaning
	Static discharge damage warning: connections marked with this symbol must not be touched with fingers or tools. Make sure you are not carrying any static charge by touching a metal part of the exerciser frame. Finish the exercising session before connecting a USB memory stick or other USB storage device to a USB interface.
	Important information not relating to dangers to people or property is marked with this symbol.
	Action
	Cross reference to other places in the document or other documents
	List item/bullet

3 Intended use

The THERA-Trainer is suitable for use in the home, in hospitals, care institutions and medical practices. It is intended to improve the mobility of persons suffering impaired mobility as a result of accidents, surgical operations or general conditions affecting the mobility of the support and locomotor systems.

The THERA-Trainer can be used both as a leg exerciser and as an upper torso exerciser. It is suitable for passive exercise (where the patient's limbs are moved by the machine) as well as active therapeutic exercise (where the patient provides the motive power). The transition from passive to active exercising is gradual. Operating both upper torso and leg exerciser at the same time is not possible.

It is not possible to give specific details of the use of the THERA-Trainer in the case of the various possible medical conditions or to provide specific exercise programmes. The possible settings depend on the individual condition (age, build, physical constitution, fitness, ...) of the patient. Consultation with a doctor and/or therapist is advisable.



THERA-Trainers are therapeutic exercisers and not medical instruments for diagnostic purposes.

4 Safety

- ☐ Discuss with your doctor or therapist whether exercising on the THERA-Trainer without an assistant is advisable.
- ☐ Before using the exerciser for the first time or if it has been transported some distance, leave it to stand for approximately 1 hour at room temperature.
- ☐ Only move the THERA-Trainer on its castors on a firm and level surface (see page 12).
- ☐ Always place the THERA-Trainer on a level and non-slip surface so as to ensure maximum stability. Make sure that the adjustable stand **2** is properly tightened (page 13).
- ☐ The THERA-Trainer may only be connected to a power supply matching the specifications on the rating plate. Only connect the exerciser to a properly earthed power socket.
- ☐ The power cord must be routed in such a way that it does not represent a tripping hazard, that it cannot become caught up in the cranks and that it cannot be damaged by other equipment. Never use the exerciser with a damaged power cord. Use only the original power cord supplied with the exerciser.
- ☐ To prevent the RISK of electric shock, only connect the exerciser to an earthed power supply.
- ☐ To prevent electric shock, the THERA-Trainer must never be used in wet, damp or very hot conditions.
- ☐ Have your trained supplier or doctor/therapist show you how to operate the exerciser before using it for the first time.
- ☐ Do not wear shoes that have laces when exercising on the THERA-Trainer. The shoe laces could become caught in the cranks and cause injury as a result.
- ☐ Always wear close-fitting clothing when using the exerciser. Do not wear any jewelry or accessories that could become caught up in the cranks of the upper torso or leg exerciser.
- ☐ If the THERA-vital is to be used by a patient in a wheelchair, and if it is not possible to be absolutely certain that the wheelchair will not tip over backwards (e.g. with spastic or extremely active patients), wheelchair stabilisers **3** must be used (see page 21).
- ☐ The THERA-Trainer is designed to be used in a sitting position only. Never stand on the footrests **5** with the full weight of your body.
- ☐ Before commencing a leg exercising session, rotate the footrests by hand (without the motor) through one full revolution with the patient's feet in position and the legs strapped in to ensure that the cranks can move freely, that the crank length is correctly set and that movement of the legs is not restricted (legs cannot become trapped). Perform a similar check before using the upper torso exerciser.
- ☐ Never reach into or attempt to take hold of moving parts of the exerciser (e.g. cranks, crank length adjusters, footrests, calf rests, forearm rests, ...) when it is running.
- ☐ Before starting an upper torso exerciser session, extend the exerciser stand **2** at least 210 cm (see page 13).
- ☐ When exercising with the THERA-Trainer, make sure that your posture is physiologically correct. Seek advice from a doctor/therapist.
- ☐ In cases of partial paralysis, spasticity or instability of the legs, only use the exerciser with the optional calf rests **7**.
- ☐ In the case of muscle contractures or limited joint movement, the infinitely variable crank length option **4** must be used.
- ☐ The crank length must not be altered when the motor is running. Do not adjust the crank length when the patient's feet are in the footrests. Tighten the locking screw (see page 14) and check that it is tight before every exercising session.
- ☐ Start with an exercising session of no longer than 15 minutes. You can gradually increase the length of subsequent exercising sessions to suit the patient's individual capabilities.
- ☐ Start the exercising session with a passive, motor-powered phase to loosen up.
- ☐ The greater the distance between the THERA-Trainer and the patient's seat/wheelchair, the more the knee, hip and arm joints are extended. Therefore, you should start at a close distance. Avoid over-extending the joints.
- ☐ Before starting a leg exercising session, adjust the height of the handlebar/upper-torso exerciser so that the thighs/knees can not strike any part of the exerciser. Make sure that the height adjuster (see page 16/ 17) is properly tightened.

- ☐ During a leg exercising session, the cranks of the arm exerciser must be locked in a horizontal position. Otherwise they could trap the thighs.
- ☐ The handlebar/upper torso exerciser must not be used as a support for standing – the exerciser could tip over.
- ☐ The feet must not be placed in the footrests during an upper torso exercising session.
- ☐ The adjustable-length cranks for the upper-torso exerciser must not be used without additional protection against shearing.
- ☐ Make sure that the forearm rests are securely attached to the cranks/therapy grips (see page 19) during an upper torso exercising session. Make sure that the patient's arms cannot come out of the forearm rests.
- ☐ If the patient suffers symptoms of illness brought on by an exercising session, consult a doctor immediately.
- ☐ Children must always be constantly supervised when exercising on the THERA-Trainer. Never leave the THERA-Trainer unattended when there are children present.
- ☐ The exerciser is only completely disconnected from the electrical power supply when the plug is removed from the power outlet socket.
- ☐ Always unplug the power cord before opening the exerciser casing. Never run the THERA-Trainer with the casing open or if the casing is damaged.
- ☐ Before starting the THERA-Trainer with upper torso exerciser attached, check that the forearm rests can rotate completely freely.
- ☐ So as to avoid any safety hazards, when exercising in an ordinary chair, it should be completely stable and sturdy and should not have castors.
- ☐ When exercising in an electric wheelchair, the electronic controls/wheelchair movement functions must be switched off.
- ☐ Exercising with only one footrest is not permissible.
- ☐ When exercising the legs, both feet must be in the footrests.
- ☐ Repairs may only be carried out by trained specialist dealers. If the exerciser is damaged/faulty or if it produces abnormal noises or smells, stop the exercising session immediately, unplug the power cord and contact your trained service engineer.
- ☐ Never use liquids that contain solvents to clean the exerciser.
- ☐ With a short crank length and a high motor power setting, the patient can be subjected to very strong forces. Limit the motor power to the level necessary for the patient and his/her exercising situation.
- ☐ During upper torso exercising sessions using forearm rests on a THERA-vital with 10.4" screen, make sure that the patient's digits – especially the thumbs – cannot strike the screen.
- ☐ Make sure that the coiled lead for the control pad (optional feature, THERA-live) does not fall into the area swept by the cranks. Otherwise the coiled lead could become caught in the cranks and cut off.
- ☐ Only accessories approved by the manufacturer (medica) may be connected to the USB connections.

5 Notes on exercise therapy

5.1 General observations

The object of therapy depends on the medical condition of the patient and may be aimed at maintaining mobility (preventative therapy) or at rehabilitation after an operation, injury or illness, i.e. at regaining mobility and strength.

We recommend that the THERA-Trainer is used as part of a planned exercise programme prescribed by a doctor or therapist.

Begin exercise sessions slowly and then increase the level of intensity gradually to no more than 70% of the user's physical capability, being particularly careful to avoid over-exertion.

5.2 Uses

The THERA-Trainers can be used both as leg exercisers and as upper torso exercisers.

- ❑ **Using the THERA-Trainer as a leg exerciser:** The patient sits on a chair or wheelchair. The THERA-Trainer stands on the floor in front of the patient. If possible the wheelchair footrests should be removed or folded to the side out of the way. The feet are placed in the exerciser footrests **5** and may be further secured by the calf rests **7** or the foot fixings **15**. The leg exerciser is started by means of the control pad **12** or **16** remote control.

- ❑ **Using the THERA-Trainer as an upper torso exerciser:** The patient sits on a chair or wheelchair. The THERA-Trainer stands on the floor in front of the patient. The patient's feet are placed on the floor or the wheelchair's footrests. The upper torso exerciser is adjusted to the correct height and reach. The arms are fixed to the therapy grips, wrist supports (optional feature), forearm rests (optional feature) or the special Tetra-grips (optional feature) (see page 19/ 20). The upper torso exerciser is then started from the control pad by an assistant.

THERA-Trainers are specifically recommended for the following conditions:

- ❑ Multiple sclerosis (MS)
- ❑ Strokes, hemiplegia and apoplexy
- ❑ Paraplegia, tetraplegia and spina bifida
- ❑ Parkinson's disease
- ❑ Skull and brain trauma
- ❑ Muscular diseases such as muscular dystrophy
- ❑ Cerebral palsy
- ❑ Cardio-vascular problems
- ❑ Rheumatic conditions
- ❑ Arthritis and osteoarthritis
- ❑ Impaired mobility and ability to walk
- ❑ General lack of mobility

5.3 Correct posture

Always make sure that the patient's posture when exercising with the THERA-Trainer is in keeping with the purpose of the therapy.

The greater the distance between the THERA-Trainer and the patient's chair/wheelchair, the more the knee and hip or elbow and shoulder joints are stretched. Therefore, you should start the exercise programme with the THERA-Trainer positioned close to the patient's chair/wheelchair. When exercising in an electric wheelchair, the height of the THERA-Trainer should be individually adjusted to suit. In that way you will avoid overstretching the joints or damaging muscles/tendons/ligaments.

It is also important to ensure that the patient's sitting position in the chair/wheelchair is as upright as possible.

5.4 Exercise programme planning

The frequency and duration of exercise sessions are heavily dependent on the patient's particular medical condition and should normally be individually planned and prescribed by a doctor or therapist. Therefore, only general guidance on exercise programme planning can be given at this point.

Regular exercising with the THERA-Trainer is extremely important if improvements in mobility, and particularly in strength and endurance, are to be achieved. Short but frequent sessions are better than long strenuous ones.

You should therefore start with sessions of no more than 15 minutes of continuous exercise.

Always start with a period of gentle passive exercise to warm up and then progress to light, active exercising with a low resistance setting. The length of the session, the cadence, the amount of active exercising and the resistance can be gradually increased a small amount at a time.

You can also schedule several exercise sessions a day – always providing that no negative symptoms of illness occur and that the physical capabilities of the patient are not exceeded. The intensity of the therapy is correct if strength, endurance and mobility gradually improve and the patient feels well.

5.5 Active and Passive exercising

Active exercising means that the patient uses his/her own efforts and energy to turn the machine's cranks against the set resistance level (see the section "Resistance/Power demand" on page 24).

The THERA-vital offers the patient a number of options for active exercising:

- ☐ **Resistance demand:** the patient exercises against a set resistance level (see page 24).
- ☐ **Power demand:** the patient works at a constant power output level (measured in watts). The resistance is automatically adjusted according to the pedalling speed (see page 24).
- ☐ **Heart rate limit:** the patient exercises up to a level of intensity defined by a heart rate limit. If the patient's heart rate rises above the set limit, the resistance is automatically lowered. This function requires the optional Cardio-Pulse set.
- ☐ **Speed demand:** A required cadence (pedalling speed) is set that is then held constant by the THERA-vital throughout the exercising session. The patient can thus make a physical effort by actively pushing on the pedals without having to co-ordinate the effort with the speed of rotation (see page 24).

Passive exercising means that the patient's limbs are moved by the exerciser without any effort on the part of the patient. The motive power is provided by the THERA-Trainer.

When first switched on, the THERA-Trainer always starts with a passive exercising phase with a preset cadence. When the patient starts actively exercising with the same motion, the THERA-Trainer automatically changes over to active exercising mode.

5.6 Muscle hypertonia/spasms

Muscle hypertonia can generally be reduced by gentle and even circular motion on the THERA-vital.

The important consideration is that the distance between the THERA-Trainer and the patient's chair/wheelchair is kept as small as possible. If this is combined with an upright sitting position and a short crank length (see "Adjusting crank length" on page 14), a reduction in the muscle hypertonia can generally be observed within a short time. Experience has shown that this effect can last for several hours.

In consultation with a doctor or therapist, an exercise programme should be drawn up so as to achieve the correct "degree" of hypertonia reduction. If a spasm (= sudden, involuntary increase in muscle tightness) occurs while exercising, the electronic circuitry of the THERA-Trainer detects it and immediately stops the motor – assuming the anti-spasm function has been activated (factory setting).

When a spasm occurs, the THERA-Trainer stops and then continues to rotate forwards after a short delay (factory setting). That forward rotation stretches the muscles and allows the spasm to recede. Depending on the individual requirements, the direction of rotation after a spasm is detected can be changed:

- ☐ THERA-vital: Submenu, Spasticity program, see page 35
- ☐ THERA-live: Permanently changing factory settings, see page 31

5.7 Side effects

In rare cases, exercising on the THERA-Trainer can cause undesirable side effects such as:

- ☐ an increase in pain in some cases
- ☐ over-reduction of muscle tone in some cases
- ☐ skin injuries (e.g. pressure ulcers)

However, in our many years of experience, we know of virtually no side effects occurring.

6 Transporting and commissioning

6.1 Before using for the first time

Remove the THERA-Trainer from the packaging and check for any signs of damage that may have occurred in transit. Also check that the power supply voltage specified on the rating plate matches that of your mains power supply.

If you discover any damage or if the power supply voltage is incorrect, you should contact your supplier immediately.

6.2 Transporting

The THERA-Trainer is fitted as standard with castors for the purposes of transporting. To move the exerciser, tip it as shown and push it in front of you or pull it behind you.



You can also pull the THERA-Trainer closer to you when sitting in a chair/wheelchair so as to obtain the best distance from the machine when exercising. Tip the THERA-vital towards your chair/wheelchair so that it is balancing on its castors. Then pull it towards you until it is at the right distance.

Without the handlebar/upper torso exerciser fitted, the THERA-live is easy to carry using the carrying grip. Take hold of the exerciser by the carrying grip with one hand and under the motor casing with the other.



The wheels are not suitable for moving the exerciser over uneven surfaces or unsurfaced ground.

- The exerciser must be carried up or down steps. This requires at least two persons.

6.3 Connecting to the power supply

Connect the THERA-Trainer to the power outlet socket using the power cord. The exerciser is then ready for operation. You can start it from the control pad.



6.4 Switching the exerciser on/off (standby mode)

As soon as the power supply is connected, the THERA-Trainer is ready for operation and an exercising session can be started (see page 24/ 28).

If no button is pressed on the THERA-Trainer for more than a certain period of time, the exerciser goes into standby mode. That is evident from the display:

- ☐ On the THERA-vital, the screen backlighting switches off.
- ☐ On the THERA-live the backlighting on the control pad switches off and the display shows three lines.

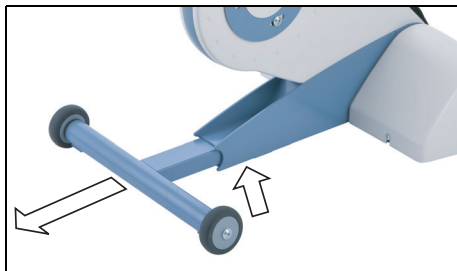
Pressing any button brings the THERA-Trainer out of standby into normal operating mode. The screen lights up and, following a self-test lasting a few seconds, the THERA-Trainer is ready for use.

7 Operation

7.1 Adjusting the exerciser stand

The THERA-Trainer can be given greater stability by extending the stand. It is imperative that the exerciser stand is extended, especially for upper torso exercising.

- ▶ Tip the THERA-vital on its rear bottom edge.
- ▶ Undo the two fixing screws using the tool supplied.
- ▶ Extend the exerciser stand taking care not to exceed the maximum extension marked on the stand (12 cm).
- ▶ Retighten the fixing screws.



- ▶ Tip the THERA-vital forwards again into its normal position.
- ▶ To level the THERA-vital on an uneven floor, the rubber feet on the exerciser stand can be adjusted (except with adjustable legs option).
- ▶ Undo the lock-nut with an open-ended spanner (size 10 mm) and unscrew the rubber foot until the THERA-Trainer stands firmly.
- ▶ Re-tighten the lock-nut.

7.2 Footrests

The footrests are designed for exercising with or without shoes.

The feet can be securely fixed in the footrests with the Velcro straps provided. To do so, pull the Velcro strap over the top of the foot to the outer side of the footrest and press it against the Velcro strip.



Before every exercising session, check that your feet are correctly positioned in the footrests and are securely held by the Velcro straps.



Do not wear open shoes when exercising on the exerciser. If shoes with open heels are worn, the feet can slip backwards out of the footrests.

- ▶ Do not wear shoes with laces. The shoe laces could become caught in the cranks and cause injury as a result.

7.3 Adjusting crank length, 2-position cranks

The THERA-Trainers are fitted as standard with cranks that have 2 length settings. They can be adjusted by a technically competent person. Using a 6 mm Allen key, the crank length can be set to the suitable position. Please note that the right-hand crank has a right-hand thread (unscrewed by turning anticlockwise) and the left-hand crank a left-hand thread (unscrewed by turning clockwise). Make sure you tighten the screws properly again after changing the crank length.

The 2-position cranks are not suitable for frequently changing the crank length. Optional infinitely variable cranks are available for such cases.



Exercising must only ever be undertaken with both footrests fitted.

7.4 Infinitely variable crank length (optional feature)

If the exerciser has the optional infinitely adjustable cranks, the crank length can be infinitely adjusted. Thus the degree of movement can be adjusted individually to suit each patient's mobility.



- ▶ Switch off the THERA-Trainer by pressing the "STOP" button.
- ▶ Unplug the power cord.
- ▶ Remove the feet from the footrests.
- ▶ Undo the variable-crank locking screw.
- ▶ Slide the footrest along the crank to the desired position and **firmly tighten the locking screw.**

- ▶ Adjust the opposite crank in the same way. Make sure that both cranks are set to the same length (the cranks are marked with a scale to facilitate adjustment). In certain cases, it may be beneficial for therapeutic reasons to have different crank lengths on each side (e.g. if the patient's legs are different lengths or have different degrees of mobility).



If the crank lengths are set differently on each side, no useful analysis of symmetry is possible when using the Bio-feedback function.



Exercising must only ever be undertaken with both footrests fitted.

If the crank length needs to be changed frequently (e.g. in hospitals, medical practices, etc.), infinitely variable cranks with T-bar Allen key are available as an option.

7.5 Foot fixings (optional feature)

The foot fixings allow the feet to be secured in the footrests **quickly, safely** and **in many cases by the patient.**



Risk of injury:

- ▶ Only fasten/unfasten the foot fixings while the THERA-Trainer is not running.

To secure the foot in the footrest:

- ▶ Press the locking button on the foot fixing. The retainer strap will spring open.
- ▶ Place the foot in the footrest.
- ▶ Close the foot fixing so that it holds the foot securely without being too tight.



To undo the foot fixing:

- ▶ press the retainer strap down slightly while pressing the locking button on the foot fixing.
- ▶ Let go of the retainer strap while still pressing the locking button.

The retainer strap will open so that the foot can be removed from the footrest.



The pad on the foot fixing is attached by a Velcro strap.

- ▶ Position the pad so that it fits the foot/shoe as snugly as possible.

7.6 Calf rests (optional feature)

The calf rests help to secure the legs in cases of paralysis. They are connected to the footrests by a pivoting joint so as not to impair movement of the ankles.

Fitting the calf rests



Risk of injury:

- ▶ if the calf rests are not used, the pivoting arms must be folded out of the way. They are held in that position by a magnet behind the footrest.

The pivoting arm for attaching the calf rest is integrated in the footrest.

- ▶ Fold the pivoting arm upwards.
- ▶ Undo the knurled-handle screw on the calf rest and pass it through the slot in the pivoting arm.
- ▶ Secure the calf rest by tightening the knurled-handle screw.



Positioning the calf rests

- ▶ Adjust the height of the calf rests so that the cups fit around the calves. Secure the lower legs with the Velcro straps.



Make sure that patients whose legs are held in the THERA-Trainer by Velcro straps are able to undo the straps on their own or else can always call on the assistance of another person.

7.7 Adjusting the handlebar (optional feature on THERA-live)

If you wish to exercise actively but suffer from muscle hypertonia or a lack of abdominal stability, the handlebar provides extra stability and balance. You can adjust the handlebar position to suit your individual size and sitting position.

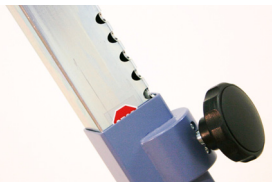
Height adjustment is effected by means of a locating pin and clamp function:

- Loosen the knurled-handle screw on the support tube by turning it anticlockwise (approx. one turn).

- Take the weight off the locating pin by lifting the handlebar upwards.



Do not withdraw the handlebar out of the handlebar/upper torso exerciser support tube any further than the minimum insertion mark. No more than half of the STOP label should be visible..



- Pull out the locating pin and move the handlebar to the desired height.



- Allow the locating pin to snap into position and **tighten the knurled-handle screw** by turning it clockwise.
- If you wish to adjust the handlebar horizontally, you must slightly loosen the eight screws using the tool supplied.
- Move the handlebar to the desired position and then retighten the screws.



Set the handlebar position so as to obtain as upright an exercising position as possible.

7.8 Upper torso exerciser (optional feature)



Before exercising with the upper torso exerciser, the cranks must be unlocked (see page 18).

7.8.1 Adjusting the upper torso exerciser

The upper torso exerciser for the THERA-Trainer can be adjusted to suit the size and sitting position of the patient.



The upper torso exerciser should be adjusted so as to obtain as upright an exercising position as possible. The crank spindle should be roughly at shoulder height.

- ▶ Consult your doctor or therapist as to the best position for the upper torso exerciser.

Adjusting the height



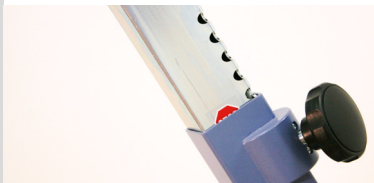
Adjust the upper section to a height at which the thighs/knees cannot strike the upper torso exerciser at any point.

Height adjustment is effected by means of a locating pin and clamp function:

- ▶ Loosen the knurled-handle screw on the support tube by turning it anticlockwise (approx. one turn).
- ▶ Take the weight off the locating pin by lifting the upper torso exerciser upwards.



Do not withdraw the upper torso exerciser out of the handlebar/upper torso exerciser support tube any further than the minimum insertion mark. No more than half of the STOP label should be visible..



- ▶ Pull out the locating pin and move the handlebar to the desired height.
- ▶ Allow the locating pin to snap into position and **tighten the knurled-handle screw by turning it clockwise.**

Adjusting the reach

The ideal reach setting for the upper torso exerciser is one at which the arms are not quite fully straightened when the exerciser grips are at their furthest position from the body.

- ▶ Undo the knurled-handle screw on the underneath of the upper torso exerciser by turning it anticlockwise (approx. one turn).
- ▶ Adjust the upper torso exerciser horizontally to the desired position.
- ▶ **Re-tighten the knurled-handle screw by turning it clockwise.**



When using the upper torso exerciser, make sure that the exerciser stand 2 is extended at least 10 cm (see page 13).

7.8.2 Adapter handles for upper torso exerciser

The adapter handles convert the upper torso exerciser into an upper section with handlebars in a few simple operations.

Fitting the adapter handles

- ▶ Press in the locating pin on the exercising grip/forearm rest and pull the exercising grip/forearm rest off the crank.
- ▶ Press in the locating pin on the adapter grip and push the grip onto the crank.

- Release the locating pin and push the adapter grip fully home. The locating pin should audibly snap into place.



To use the upper torso exerciser with adapter handles as a handlebar, the cranks must be locked by means of the arrester knob (see following section).



The adapter handles are not designed to support the full weight of the body or for carrying the exerciser.

Locking/unlocking the cranks

- Turn the arrester knob a quarter turn and then let go of it.
- Turn the cranks to a horizontal position so that the arrester knob audibly snaps into position. It should now not be possible to rotate the cranks.



- To unlock the cranks, pull the arrester knob downwards, turn it a quarter turn and let it go.

7.8.3 Therapy grips for upper torso exerciser

The therapy grips offer a variety of holding positions for the hands. The therapy grips should only be used for upper torso exercising if the patient is capable of gripping them sufficiently well and securely.

To fit the exercising grip:

- press in the locating pin on the exercising grip and carefully slide the exercising grip onto the crank spindle and push it fully home.
- Now release the locating pin. The exercising grip should snap audibly into position.
- Repeat the operation with the second exercising grip.



To remove the exercising grip:

- press in the locating pin and pull the exercising grip off the crank spindle.
- Repeat the operation with the second exercising grip.

7.9 Forearm rests (optional feature)

The purpose of the forearm rests is to help patients with symptoms of paralysis, muscle hypertonia, spasms or lack of hand/arm mobility to obtain a secure hold.

Apart from the forearm rests for the therapy grips, all forearm rests can and should be individually adjusted. Combinations of forearm rests are also possible, as is the use of only one forearm rest. Adjustment by a doctor or therapist is essential. Elastic Velcro straps allow the forearms to be secured in the forearm rests.

You can either

- ▶ place the arm in the forearm rest after the forearm rest has been attached to the upper torso exerciser

-or-

- ▶ fix the forearm rest to the arm first and then slide the forearm rest onto the spindle on the crank.



During upper torso exercising sessions on a THERA-vital with 10.4" screen, make sure that the patient's digits – especially the thumbs – cannot strike the screen.

- ▶ If necessary, hold the thumbs in place with the Velcro strap.



Forearm rest for therapy grips



Special Tetra-grip



Forearm rest with knob grip



Wrist band for forearm rest



Forearm rest with vertical bar grip



Forearm rest with horizontal bar grip

7.10 Wrist supports (optional feature)

If the patient's hand is paralysed, the wrist support allows it to be quickly and easily secured to the handlebar, therapy grip or special Tetra-grip.



Wrist support

7.11 Adjustable legs (optional feature)

The adjustable legs enable the THERA-Trainer to be adjusted to the height of the patient's chair/wheelchair:



- ▶ Loosen the knurled-handle screw on one of the legs by turning it anticlockwise (approx. one turn).
- ▶ Take the weight off the locating pin by lifting the THERA-Trainer slightly.
- ▶ Pull out the locating pin and adjust the THERA-Trainer to the desired height.



- ▶ Allow the locating pin to snap into position and **tighten the knurled-handle screw by turning it clockwise.**
- ▶ Adjust the other three legs in the same way.

7.12 Stabiliser chocks (optional feature)

The stabiliser chocks prevent the wheelchair from tipping over when the patient is exercising with the THERA-Trainer.



The stabiliser chocks must be fitted by an assistant.



The stabiliser chocks can only be used with wheelchairs that are fitted with tilting bars.

- Push the two stabiliser chocks firmly under wheelchair's tilting bars.



7.13 Self-operated stabiliser straps (optional feature)

The self-operated stabiliser straps prevent the wheelchair from tipping over when the patient is exercising with the THERA-Trainer.

- Position the wheelchair in front of the THERA-Trainer as required for exercising.
- Press down on the red lever on the first inertia belt reel and at the same time pull the belt out with the hook.
- Attach the hook to a permanently fixed part of the wheelchair frame in such a way that it can not slip off.
The belt will then tighten itself automatically.



Do not attach the belt to removable parts of the wheelchair such as foot-rests, side panels, castors, etc.
The belt must be attached to the wheelchair at an angle of at least 30°.



7.14 THERA-assist exercising software (optional feature for THERA-vital only)

The THERA-vital (software version 01.04.00 or later) supports the THERA-assist software for recording, analysing and documenting exercising data as standard.


THERA-assist is available as an optional feature. A detailed description of its functions is provided in the manual supplied with the software package.

7.15 Printer for exercising data (optional feature on THERA-vital only)


The printer connects via Bluetooth and provides an easy means of producing exercising documentation in hard-copy form.



The printer is connected and operated as follows:

- Plug the Bluetooth transmitter into the USB socket above the screen **13**.
When a Bluetooth connection is detected, the Bluetooth symbol  appears on the status bar.
- Now complete the exercising session. To obtain a session analysis, the exercising session on the THERA-vital must last at least one minute.

At the end of the exercising session, the analysis appears on the screen (see page 39).

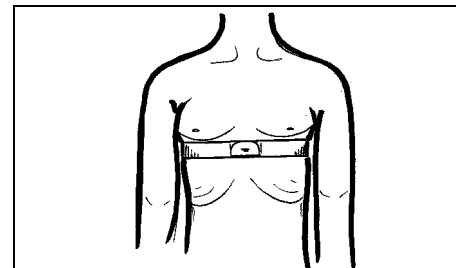
When the Bluetooth transmitter is plugged in, a printer symbol  appears at the top right that you can use to open the Print dialog screen. For more detailed information about printing, please refer to the Instructions for Use supplied with the printer.

- ☞ The Bluetooth connection has a range of approx. 10 m. A single printer can simultaneously serve multiple THERA-vital exercisers if each THERA-vital has its own Bluetooth transmitter. They are available as accessories.

7.16 Cardio-Pulse set (optional feature, THERA-vital only)

The chest-strap heart rate monitor (Cardio-Pulse set) can be used to keep a check on the maximum heart rate of patients with heart and circulation conditions (see page 35, „Heart rate limit“).

- ☞ The heart rate signal is transmitted wirelessly to the THERA-vital. The receiver is factory fitted on exercisers supplied with Cardio-Pulse set or else is available as a retrofit option.
- Slightly moisten the inside of the chest-band and strap it around the chest (close to the heart) so that the transmitter is facing towards the THERA-vital.



To prevent interference when several THERA-vital exercisers are being used with Cardio-Pulse sets, there should be a gap of at least 1.5 m between exercisers.

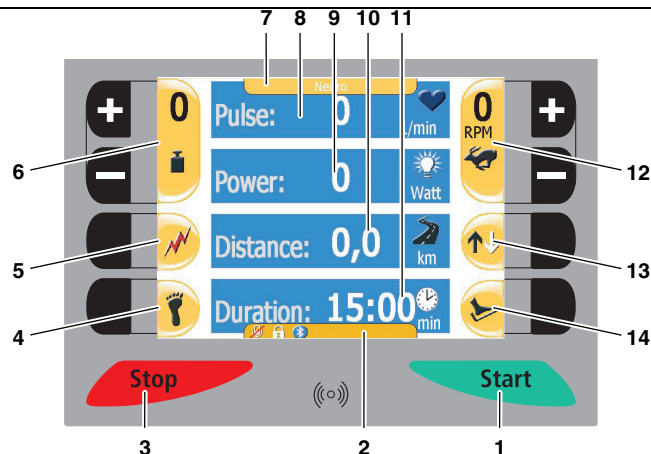


Correct functioning of the heart rate monitor can be checked on the screen: if a heart rate figure is indicated and the heart symbol is at least partially coloured red, the signals from the heart rate monitor are sufficiently strong and regular. If the heart symbol is completely coloured red, the heart rate signals are of the optimum strength.

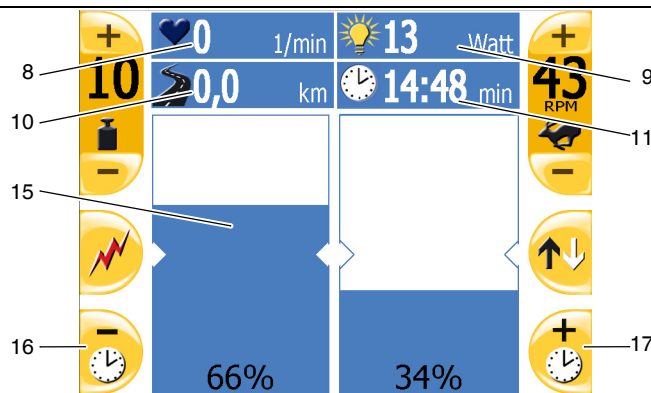
7.17 THERA-vital: Control pad with colour screen

All important settings and exercising session data are always visible on the colour screen. The basic start screen view shows the following information:

- 1 **START button** (see page 24).
- 2 **Status bar**, e.g. showing keypad lock, voice deactivation on/off, connection to printer for exercising data
- 3 **STOP/Pause button** (see page 24)
- 4 Toggle button for **leg/upper torso exerciser** (see page 25).
- 5 **Anti-spasm function** (see page 25)
- 6 **Resistance** (see page 24)
- 7 **Exercising mode** (see page 26)
- 8 **Heart rate** (only with Cardio-Pulse set connected, optional feature)
- 9 **Power output** (only shown when exercising actively)
- 10 **Distance completed**
- 11 **Remaining session time**
- 12 **Cadence** (see page 24)
- 13 **Direction of rotation** (see page 25)
- 14 **Assisted entry** (see page 26).
- 15 **Bio-feedback display** (symmetry bars)
- 16+17 **Remaining session time buttons**



Display shown before exercising or when exercising passively (control pad with 5.7" colour touchscreen)



Display shown during active exercising (control pad with 10.4" colour touchscreen)

7.17.1 Traffic light START/STOP function



When in **stand-by mode**, the THERA-vital is activated by pressing any button. The screen then lights up. Following a short self-test, the THERA-vital is ready for use. Pressing the **START** button then starts an exercising session with the basic settings.

The exerciser starts at a cadence of 10 rpm. By actively turning the cranks at a speed greater than that of the motor, you can change over to active exercising at any time.

You can **pause an exercising session in progress** by pressing the **STOP** button once and resume it by pressing the **START** button.

Pressing the **STOP** button twice during an ongoing exercising session ends the session. The display then shows the analysis for that exercising session (see page 39).

7.17.2 Resistance/Power demand



You use this control to set the difficulty or power level for the exercising session. The following settings are possible:

Resistance (Neuro mode): in Neuro exercising mode (see page 34) you can set the resistance level.

The current resistance level is shown on a scale from 1 to 15. The maximum resistance is dependent on the set motor power (see page 40) and is 22 Nm at most.

The resistance can be increased by pressing the **+** button. To increase the resistance one increment at a time, press and release the button.

The resistance can be reduced by pressing the **-** button and has a minimum setting of **0**.

If you press and hold the **+** or **-** button, the setting increases/decreases continuously up/down to the maximum/minimum.

The set resistance remains constant at all cadences. A higher cadence means a higher power output.

Power setting in watts (Ortho/Cardio mode): in Ortho and Cardio exercising modes (see page 34) exercising is based on a power output setting (up to a maximum of 80 watts). The power level is set by pressing the **+** or **-** button. The THERA-vital modulates the resistance automatically according to the pedalling speed so that the amount of power required is always the same.

For more information on correctly setting the motor power, see page 40.

7.17.3 Cadence



When exercising actively, this shows the actual speed of rotation of the cranks; when exercising passively it shows the preset cadence, which is the speed of the motor.

The cadence can be increased by pressing the **+** button. To increase the cadence one increment at a time, press and release the button. If you press and hold the **+** or **-** button, the cadence setting increases/decreases continuously up/down to the maximum/zero. An exercising session always starts with a cadence of 10 rpm.

Speed demand (Isokinetics mode): in Isokinetics exercising mode (see page 34), exercising is based on a preset cadence.

A **required cadence** (pedalling speed) is set that is then held constant by the THERA-vital throughout the exercising session. The patient can thus make a physical effort by actively pushing on the pedals without having to co-ordinate the effort with the speed of rotation.

As soon as the pedalling rate drops below the required speed, the resistance is automatically reduced. If the pedalling rate exceeds the set speed, the resistance is automatically increased.

7.17.4 Spasticity detection (only when exercising is in progress)



The spasticity detection function on the THERA-vital protects spastic patients or those with sensitive bones or joints from undue stresses.

Pressing the button switches spasticity detection on or off. When the function is active, the symbol is shown in solid red.



Even when the spasticity detection is off, **very severe** changes in the pattern of motion (locking of the cranks, extreme fluctuations in the forces applied) are still detected. For safety reasons, such severe changes are treated as detected spasms.

If the THERA-vital detects a spasm, transmission of power to the pedals is stopped immediately. The pedals can then rotate freely without resistance. The indication "SPASM" appears on the screen. After a pause of about 5 sec. the exerciser continues at a cadence 5 rpm lower (see also "Spasticity program", page 35).

If the spasticity detection is triggered repeatedly, the exercising session should be stopped and the following adjustments made before restarting:

- ☐ Reduce the distance between the patient's seated position and the exerciser.
- ☐ Reduce the crank length → Adjusting crank length, page 13/ 14.
- ☐ Reduce the cadence → Cadence, page 24.
- ☐ Increase the motor power → page 34 or 40.



Switching spasticity detection off can be helpful if the patient pedals unevenly and so triggers the spasticity detection. The spasticity detection may also be triggered if the patient suffers from uncontrolled muscular activity other than spasticity.

- Please read the notes on page 11, "Muscle hypertonia/spasms".

Exceeding the set motor power

If the set motor power (factory setting 10 Nm) is exceeded, the THERA-vital reacts in the same way as if it had detected a spasm. The message "Max. motor power exceeded" appears on the screen.

If the maximum motor power warning occurs repeatedly, the exercising session should be stopped and the motor power increased (a small amount at a time) before restarting (→ page 34 or 40).

7.17.5 Direction of rotation



The current direction of rotation is indicated by the solid black arrow. Pressing the button reverses the direction of rotation.

The change of direction is performed "gently" when exercising is in progress. The speed reduces gradually to 0 and then increases in the opposite direction to the set cadence. All other parameters (cadence, motor power, arm/leg exerciser, spasticity detection) remain the same.

7.17.6 Leg/Upper torso exerciser



You can select either the leg exerciser or the upper torso exerciser. The symbol indicates which exerciser is currently active. The foot symbol indicates the leg exerciser and the hand indicates the upper torso exerciser.

You can only switch between the leg exerciser and the upper torso exerciser if you have first ended the current exercising session by pressing the STOP button.

While an exercising session is in progress or if there is no upper torso exerciser fitted, the button is deactivated.



Before starting an upper torso exercising session, the exercising handles or the forearm rests must be fitted (see page 18) and the cranks unlocked (see page 18).

7.17.7 Assisted entry



You can use the Assisted entry function to move each pedal to a low position for easily getting the feet in.

► Press and release the button.

The cranks rotate to the easy entry position (crank at lowest position) for the first foot.

- Place the first foot in the footrest that is at the bottom.
- Press the button again.
The cranks rotate to the easy entry position for the second foot.
- Now secure the first foot in the footrest at the top and then place the second foot in the footrest at the bottom.
- Press the button again.
The cranks rotate to the easy entry position for the first foot again.
- Now secure the second foot in the footrest.



While the assisted entry function is active, the screen shows the symbol with a red background.

- Pressing the START or STOP button cancels the assisted entry function.

7.17.8 Changing the session time



When an exercising session is in progress, two buttons for changing the session time are shown at the bottom left and right of the screen.

Pressing the + button increases the session time. To increase the session time in one-minute increments, press and release the button. If you press and hold the + or – button, the session time increases/decreases continuously up/down to the maximum/minimum.

7.17.9 Indication of/changing exercising mode (quick changing only possible with 10.4" screen)



The start screen shows the current exercising mode at the top of the screen. By pressing the + or – buttons at either end of the mode bar you can change the exercising mode as required. The exercising mode can not be changed while exercising is in progress; the + and – are not shown.


When using the THERA-vital with 5.7" screen, the exercising mode is indicated but there are no buttons for quickly changing it. Instead, you must open the submenu to change the exercising mode (see page 32).

7.17.10 Keypad lock

The keypad lock can be used to prevent settings being changed on the exerciser during an exercising session. When the keypad lock has been activated, there is a period of 30 seconds after starting an exercising session during which settings can still be changed.

- Press and hold the STOP button. Then simultaneously press the left plus button at the top.



Successful activation of the keypad lock is indicated by the appearance of the status bar showing a lock symbol . The status bar at the bottom of the screen only appears when the exerciser is in "Stop mode". It is hidden while an exercising session is in progress.

- To cancel the keypad lock, press the same key combination again.

IMPORTANT: the START and STOP buttons are always active.

7.17.11 Opening the submenu

- ▶ Simultaneously press the STOP button and the left minus button



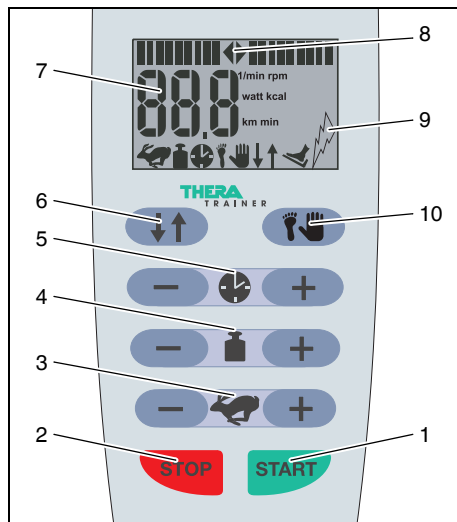
- ▶ The submenu button can be activated on both control pads in the System/Configuration settings.



It enables quick access to the submenu. The factory setting is for the button not to be visible.

For more information see page 32.

7.18 THERA-live: Control pad



- 1 **START button**
- 2 **STOP button**
- 3 **Cadence buttons**
- 4 **Resistance buttons**
- 5 **Remaining session time buttons**
- 6 **Direction of rotation toggle button**
- 7 **Display of exercising parameters**
(cadence, power, energy consumption, distance, remaining session time)
- 8 **Symmetry display**
- 9 **Spasm indication** (see page 30)
- 10 **Leg/Upper torso exerciser toggle button**

7.18.1 START/STOP traffic-light function



When in **stand-by mode**, the THERA-live is activated by pressing any button.


The screen then lights up. Following a short self-test, the THERA-live is ready for use. Pressing the START button then starts an exercising session with the basic settings.

The exerciser starts at a cadence of 10 rpm. By actively turning the cranks at a speed greater than the set motor speed, you can change over to active exercising at any time.

Pressing the STOP button ends the exercising session. Pressing the STOP button again displays the distance completed in km and pressing the STOP button once more shows the energy consumption in kcal on the screen. You can continue "cycling" through the session data by repeatedly pressing the STOP button until either the START button is pressed or the power is switched off.

7.18.2 Displaying exercising parameters

While an exercising session is in progress, the display cycles between Cadence (rpm) Power (watts) Energy consumption (kcal) Distance (km) Remaining session time (min).

Automatic cycling of the display between the exercising parameters can be deactivated. To do so, press the  button. The exercising parameter currently displayed flashes. To revert to automatic cycling between the parameters, press the button again.

Pressing the START button while a session is in progress switches from the display of one parameter to the next.

7.18.3 Cadence



The passive cadence can be increased to a maximum of 60 rpm by pressing the + button. The screen then shows the cadence (in rpm) and the flashing hare as the symbol for speed. The cadence can be reduced by pressing the – button to a minimum of 1 rpm.

7.18.4 Resistance



The resistance can be increased by pressing the + button. Pressing the – button reduces the resistance. The resistance level is set on a scale of 1 to 15. While it is being set, the screen shows the flashing weight symbol and the resistance level.

For more information on correctly setting the motor power, see page 40.

7.18.5 Duration



If the + or – button is used to set the length of the exercising session, the "Clock" symbol flashes and the set session time can be changed. The display always shows the remaining session time in minutes. The session time can be increased to a maximum of 59 minutes.

7.18.6 Direction of rotation



Pressing the direction of rotation button reverses the current direction of rotation.

The change of direction is performed "gently" when exercising is in progress. The speed reduces gradually to 0 and then increases in the opposite direction to the set cadence. All other parameters (cadence, motor power, arm/leg exerciser, session time) remain the same.

While the setting is being changed, the direction of rotation arrow for the new direction flashes.

7.18.7 Leg/Upper torso exerciser



You can select either the leg exerciser or the upper torso exerciser.

The exerciser that is currently active is indicated on the screen by a foot symbol (= leg exerciser) or a hand symbol (= upper torso exerciser). Pressing the button toggles between leg exerciser and upper torso exerciser. You can only switch between the leg exerciser and the upper torso exerciser if you have first ended the current exercising session by pressing the STOP button.

7.18.8 Assisted entry

You can use the Assisted entry function to move each pedal to a low position for easily getting the feet in.

- ▶ Press and hold the START button until the assisted entry symbol appears on the screen.
The cranks rotate to the easy entry position (crank at lowest position) for the first foot.
- ▶ Place the first foot in the footrest that is at the bottom.
- ▶ Press and hold the START button again until the cranks start moving again.
The cranks rotate to the easy entry position for the second foot.
- ▶ Now secure the first foot in the footrest at the top and then place the second foot in the footrest at the bottom.
- ▶ Press and hold the START button again until the cranks start moving again.
The cranks rotate to the easy entry position for the first foot again.
- ▶ Now secure the second foot in the footrest.

While the assisted entry function is active, the screen shows the symbol .

- ▶ Pressing any button apart from the START button cancels the assisted entry function.

7.18.9 Right/left symmetry display



The symmetry display only appears when using the leg exerciser. During an upper torso exercising session the two triangles appear static.

As soon as the patient starts exercising actively (= using his/her own efforts) the exerciser measures the activity separately for the right and left legs.

If the activity of the right leg is at the same level as that of the left leg, the screen indicates that "symmetry" of activity by two triangles. One triangle points to the right and the other to the left.

If the activity of the right leg is greater than that of the left leg, it is indicated by black bars that move to the right. If the left leg is more active than the right, it is indicated by black bars that move to the left.


One black bar corresponds to a 5% degree of asymmetry (example: right = 52.5%, left = 47.5%).



The symmetry display may indicate false readings if the patient **pulls** on the footrests or different crank lengths have been set on each side.

7.18.10 Spasticity detection

The spasticity detection function on the THERA-live protects spastic patients or those with sensitive bones or joints from undue stresses.

If the THERA-live detects a spasm, transmission of power to the pedals is stopped immediately. The pedals can then rotate freely without resistance. The screen displays the spasm symbol .

After a pause of about 5 sec. the exerciser continues to rotate forwards at a cadence 5 rpm lower. That relieves an extension spasm, the type of spasm suffered by most patients, and the exercising session can be continued as normal. The direction of rotation can be set

→ Section 7.18.13.

If the spasticity detection is triggered repeatedly, the exercising session should be stopped and the following adjustments made before restarting:

- ☐ Reduce the distance between the patient's seated position and the exerciser.
- ☐ Reduce the crank length → Adjusting crank length, page 13/ 14.
- ☐ Reduce the cadence → Cadence, page 28.
- ☐ Increase the motor power → Section 7.18.13 or page 40.

7.18.11 Saving exercising settings

You can make your own individual exerciser settings by defining the following parameters **before** starting an exercising session:

- ☐ Direction of rotation
- ☐ Session time
- ☐ Resistance
- ☐ Leg/Upper torso exerciser

Every subsequent exercising session will then start with those settings.

The settings can be reset by turning off the power or resetting the exerciser to the factory settings (→ see below).

7.18.12 Resetting the THERA-live to factory settings.

The current settings can be reset by simultaneously pressing the "Direction of rotation" and "Leg/Upper torso exerciser" buttons.

7.18.13 Permanently changing factory settings

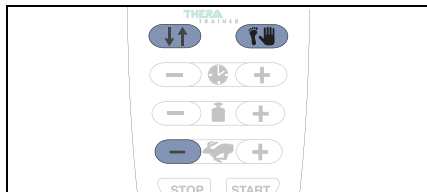
You can permanently change some settings. The altered settings will then remain stored even after switching off the power or performing a reset.

The following factory settings can be changed:

- ☐ Motor power/Resistance
- ☐ Leg/Upper torso exerciser
- ☐ Spasticity program

To change the factory settings:

- ▶ Simultaneously press the buttons shown until the screen shows the current settings.



- ▶ Set the desired maximum motor power using the buttons.
- ▶ Set the desired type of exerciser usable by means of the button. The screen shows the setting as follows:
 - ☐ Foot symbol only: only the leg exerciser is active
 - ☐ Foot and hand symbol: leg and upper torso exerciser are active
 - ☐ Hand symbol only: only the upper torso exerciser is active

- ▶ Set the spasticity program parameters as desired using the button. The screen shows the setting as follows:

- ☐ “Arrow pointing up” (forwards): always restart forwards after detecting a spasm (recommended for patients with tendency to suffer extension spasms)
- ☐ “Arrow pointing down” (backwards): always restart backwards after detecting a spasm (recommended for patients with tendency to suffer flexion spasms)
- ☐ “Both arrows” (in alternation): direction of rotation is reversed after detecting a spasm
- ☐ “No arrow” (continue as before): the exerciser restarts in the same direction as before after detecting a spasm

8 Submenu (THERA-vital only, for experienced users)

The THERA-vital has a number of exercising programs that are based on the needs of typical patient groups. For each patient group, the exercising parameters can be set on a submenu.

The complete menu structure is shown on page 33.

8.1 Navigating the submenu

- ▶ Simultaneously press the STOP button and the left minus button

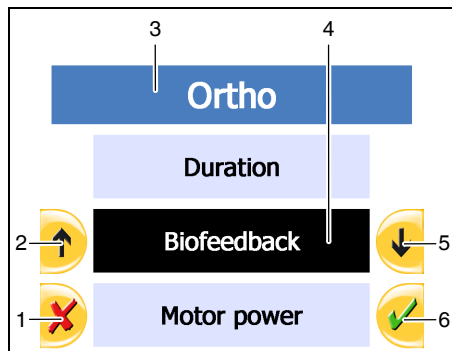


- ▶ The submenu button can be activated on both control pads in the System settings.



It enables quick access to the submenu. The factory setting is for the button not to be visible.

When opened, the submenu lists the items **Neuro, Ortho, Cardio, Isokinetics** and **System**. The function of the buttons changes as well:



Submenu

1 Cancel/Discard changes

This button takes you back up to the next higher menu level.

2 Up/Increase

This button scrolls the display up. In the case of menu items which require entry of an amount (e.g. motor power), this button increases the setting.

3 Current submenu item

4 Current selection (inverted colours)

5 Down/Decrease

This button scrolls the display down. The menu item selected is highlighted by inverted colours. In the case of menu items which require entry of an amount (e.g. motor power), this button decreases the setting.

6 Save changes/Confirm

This button saves your settings. If the menu item selected has further options, this button takes you to the next menu option.

8.2 Menu structure

The parameters of the exercising programmes and system settings are arranged in the following menu structure:

1st Level	2nd Level	Possible settings and functions	Factory setting	See page
Neuro				
	Duration	1 to 180 minutes	15 min	34
	Forw/backw auto	On/Off	Off	34
	Bio-feedback	Symmetry bars/road, Passive, Off	Symmetry bars	36
	Motor power	2 to 22 Nm	10 Nm	40
	Spasticity detection	Fine/Medium/Rough	Medium	35
	Spasticity program	Forwards/Backwards/Opposite/As before	Forwards	35
	Automatic speed adjustment	On/Off	Off	35
	Heart rate limit	60 to 160 bpm	100 bpm	35
Ortho				
	Duration	1 to 180 minutes	15 min	34
	Bio-feedback	Symmetry bars/road, Off	Symmetry bars	36
	Motor power	2 to 22 Nm	10 Nm	40
	Muscle support	Off/On	On	35
	Heart rate limit	60 to 160 bpm	100 bpm	35
Cardio				
	Duration	1 to 180 minutes	15 min	34
	Bio-feedback	Symmetry bars/road, Passive, Off	Symmetry bars	36
	Motor power	2 to 22 Nm	10 Nm	40
	Heart rate limit	60 to 160 bpm	100 bpm	35
Isokinetics				
	Duration	1 to 180 minutes	15 min	34
	Bio-feedback	Symmetry bars/road, Passive, Off	Symmetry bars	36
	Motor power	2 to 22 Nm	10 Nm	40
	Spasticity detection	Fine/Medium/Rough	Medium	35
	Spasticity program	Forwards/Backwards/Opposite/As before	Forwards	35
	Heart rate limit	60 to 160 bpm	100 bpm	35
System				
	Microphone sensitivity	0 (Off), 1 to 10	5	36
	Language			
	Contrast	1 to 40	15	
	Configuration	Code-protected service menu for technicians	–	

8.3 Description of exerciser functions on submenu

The first menu level comprises the following items:

- ☐ Neuro
- ☐ Ortho
- ☐ Cardio
- ☐ Isokinetics
- ☐ System

Neuro (basic setting)

Exercising programmes for patients with neurological conditions, e.g. hemiplegia, paraplegia, MS, Parkinson's disease. The method of exercising is set here to **Resistance demand**. The set resistance remains constant at all cadences. A higher cadence means a higher power output.

Ortho

Exercising programmes for orthopaedic patients, e.g. following a knee or hip operation. In this exercising mode, the method of exercising is preset to **Power demand**. The patient is given a set power level at which to exercise. The THERA-vital modulates the resistance automatically according to the pedalling speed so that the amount of power required is always the same.

Cardio

Exercising programmes for cardio-vascular patients whose heart rate must be kept below a certain limit. In Cardio exercising mode, a **heart rate limit** is set. The THERA-vital reduces the resistance as soon as the patient's heart rate reaches that limit.

Isokinetics

This exercising program is suitable for patients with co-ordination difficulties. A **required cadence** (pedalling speed) is set that is then held constant by the THERA-vital throughout the exercising session. The patient can thus make a physical effort by actively pushing on the pedals without having to co-ordinate the effort with the speed of rotation.

As soon as the pedalling rate drops below the required speed, the resistance is automatically reduced. If the pedalling rate exceeds the set speed, the resistance is automatically increased.

System

The menu option System allows you to make basic settings for options such as microphone sensitivity, language, etc. The menu option Configuration enables service technicians to make the necessary configuration settings. The functions are protected by an access code.

8.4 Duration

The length of the exercising session can be set to between 1 and 180 minutes in all exercising modes. The factory setting is 15 minutes.

8.5 Forwards/backwards auto reversal

When the Auto reversal function is active, the exerciser automatically changes the direction of rotation every four minutes **when the patient is exercising passively**.

When the patient is exercising actively the direction of rotation is not reversed.

8.6 Bio-feedback

You select the diagram mode on the submenu. For details, see page 36.

8.7 Motor power

You can set the maximum motor power limit on the submenu. For information on the correct motor power setting, see page 40.

8.8 Spasticity detection

This setting is used to specify the threshold at which the THERA-vital sensors detect a spastic reaction on the part of the patient and stop the motor to minimise the risk of overstretching the patient.

Select the setting for patients subject to spasms as follows:

- ☐ **High** for patients with very sensitive joints and tendons. At this setting even very slight resistance is enough to stop the motor.
- ☐ **Medium** for patients with less sensitive responses.
- ☐ **Low** for patients with pronounced spasticity. The exerciser does not stop until there is a large amount of resistance.



The longer the crank length (page 13) or the lower the motor power (page 40), the more sensitively the spasticity detection responds and vice versa.

8.9 Spasticity program

The function Spasticity program is used to set the direction in which the exerciser rotates after detecting a spasm.

Select from the following options:

- ☐ **Forwards:** always restart forwards after detecting a spasm (recommended for patients with tendency to suffer extension spasms)

- ☐ **Backwards:** always restart backwards after detecting a spasm (recommended for patients with tendency to suffer flexion spasms)
- ☐ **Opposite:** direction of rotation is reversed after detecting a spasm
- ☐ **As before:** the exerciser restarts in the same direction as before after detecting a spasm

8.10 Automatic speed adjustment

If Automatic speed adjustment is set to "On" the **passive exercising (motor) speed** automatically adjusts to greater effort by the patient when **exercising actively**.

Example: if the patient is exercising actively at 30 rpm when the motor speed (passive exercising speed) is set to 15 rpm, after about 10 seconds, the THERA-vital adjusts the passive exercising speed to 25 rpm. If the patient subsequently changes back to passive exercising, the THERA-vital operates at a speed of 25 rpm. Thus the patient individually controls the speed and obtains a passive exercising speed at which he/she is comfortable.

8.11 Heart rate limit

The THERA-vital reduces the resistance level as soon as the preset heart rate limit is reached. This is to ensure that the patient always exercises at a heart rate below the limit prescribed by the doctor.



Since all Ortho and Cardio exercising programmes expect a high level of active effort from the patient, a long crank length is advisable (see page 13).


8.12 Muscle support

This function assists patients with only minimal residual strength or minimal strength on one side. The residual strength is supplemented by this function so that an even pedalling action is always obtained. The function operates according to the principle of "as much assistance as necessary but as little assistance as possible". The intention is to strengthen the patient's own efforts at all times.

In the case of leg-amputee patients, the Muscle assistance function performs the work of the inactive side. In such cases, the Muscle assistance function operates like an "electronic fly-wheel".

8.13 Microphone sensitivity

The THERA-vital can be stopped by a long, loud shout (safety voice deactivation). This function is particularly useful for patients who use the upper torso exerciser with their arms strapped to the forearm rests and cannot, therefore, use the control pad.

The menu option System/Microphone sensitivity provides the facility for adjusting the sensitivity of the microphone fitted in the control pad or switching it off altogether (indicated by  on the status bar at the bottom of the screen; the status bar only appears when the exerciser is in "Stop mode"; it is hidden while an exercising session is in progress).

Set the sensitivity as follows:

- ☐ **0 (Off)** if the ambient noise is so loud that it causes the exerciser to switch off
- ☐ **1 to 3** if the ambient noise is very loud
- ☐ **4 to 6** if the ambient noise is of a normal level
- ☐ **7 to 10** if the ambient noise is very quiet
- ▶ Check that the setting is correct by carrying out a practical test.
- ▶ Afterwards press the START button to continue the exercising session.

8.14 Contrast

If necessary, the contrast of the colour screen can be adjusted by selecting the menu option System/Contrast.

8.15 Basic exercising settings

When the exerciser leaves the factory it is programmed with the basic settings as specified in the column Factory Setting on page 33.

If any settings are changed on the submenu, those changes are retained even if the power is disconnected. That means that the same settings can be used for the next exercising session.

If you wish to reset the THERA-vital to the factory settings, proceed as follows:


- ▶ Press and hold the STOP button. Press the Direction of rotation button.



The exerciser has now been reset to the factory setting as described on page 33. The settings on the System menu are not reset.


9 Bio-feedback

The purpose of the Bio-feedback function is to provide the patient with feedback about the progress of the session.

-  For users with red/green colour blindness, the colours of the Bio-feedback display can be adjusted by a service technician.

9.1 Bio-feedback for leg exerciser

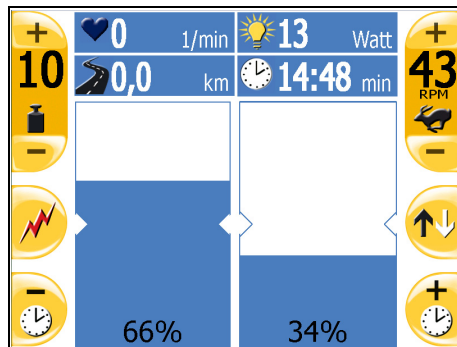
The two Bio-feedback diagrams, Symmetry bars and Symmetry road, show how symmetrically **active exercising** is being performed, i.e. how great the power difference between the right and left legs is for each direction of rotation (forwards and backwards, see page 25).

-  The readings will be corrupted if...
 - ▶ different crank lengths have been set on each side (see page 13),
 - ▶ the patient's sitting position is not central,
 - ▶ the patient not only "pushes" but also "pulls" on the pedals.

If you have set Symmetry bars or Symmetry road as the diagram mode, you can switch between the two diagram modes while an exercising session is in progress by pressing the START button.

Symmetry bars

The bar diagram shows the distribution of power output between the two sides. The total of the two bars always adds up to 100 %.



Symmetry road

With the road diagram, a bicycle moves to the left or right on the road according to the distribution of power output between the left and right sides.

At irregular intervals, obstacles appear on the road. If an obstacle is “avoided” by appropriate “one-sided” exercising (obstacle on the left more activity on the right) the obstacle changes to green.



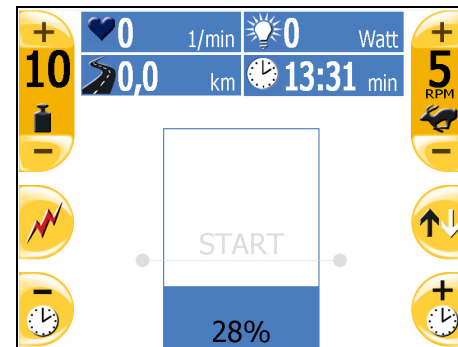
Bio-feedback for muscle tightness

When the patient is **exercising passively**, the colour screen shows a bar representing the motor power currently required to move the legs, thus providing information on the degree of muscle tightness.

The maximum height of the bar represents 100% of the motor power setting (see page 40).

The “START” figure shows the average power delivered by the motor during the first minute of exercising.

The filled section of the bar and the percentage figure at the bottom (22% in this example) show what percentage of the set motor power is currently being used to move the legs.



Changing the crank length has a substantial effect on this Bio-feedback display. The percentage figures from two different exercising sessions are only comparable if the crank length and the maximum motor power (submenu) settings are the same for both sessions.



This data is not suitable for drawing clinical conclusions. Its purpose is to show the patient how tight or loose his/her limbs are or how muscle tightness has changed.

9.2 Bio-feedback for upper torso exerciser

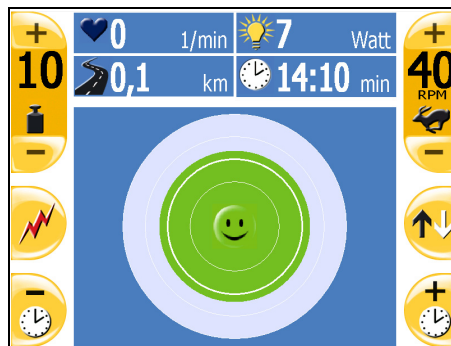
The upper torso exerciser Bio-feedback function is intended to provide the patient with feedback as to how well his/her arms are working together on the cranks, i.e. how evenly they are pulling and pushing.

The Biofeedback display shows two things:

- ☐ The colour indicates how well co-ordinated the two arms are during active exercising.
- ☐ The size of the coloured area indicates the patient's level of activity.



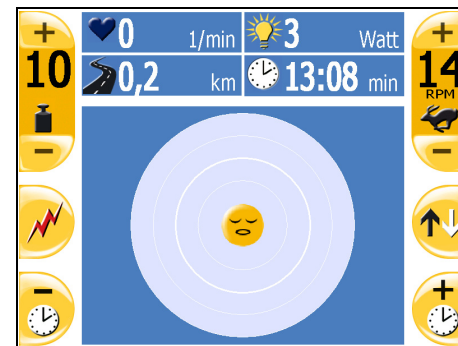
The aim is to keep the green area as steadily as possible at the size of the thick white line.



As long as the coloured area remains green, the two arms are working harmoniously together (pulling and pushing evenly).




A change of colour to orange indicates that the arms are no longer working together harmoniously or that they are being moved jerkily.



A sleeping smiley means that there is too little or no activity on the part of the patient.

10 Analysis of session data (THERA- vital only)


At the end of an exercising session, an analysis of the session data is displayed. The data is only calculated if the session has lasted for at least one minute and was started by pressing the START button.


 Report	
Duration:	03:01 min
Activity:	~ 34 %
Activity left:	~ 46 %
Activity right:	~ 54 %
Distance:	0,3 km
Spasms:	0
Calories:	~ 0,1 kcal
Motor power begin:	~ 0,1 Nm
Motor power end:	~ 0,1 Nm

The following data is displayed:

- ❑ **Duration:** total length of exercising session (in minutes) excluding pauses
- ❑ **Activity** (patient's own efforts): proportion of the session time (in %) during which the patient was exercising by his/her own efforts.
- ❑ **Activity left:** proportion of activity for the left leg (in %).
- ❑ **Activity right:** proportion of activity for the right leg (in %).
- ❑ **Distance:** total distance completed (in km).
- ❑ **Spasms:** number of spasms detected during the exercising session.

- ❑ **Calories:** calories consumed (in kcal). The figure indicated relates to the energy applied to the THERA-vital. The number of calories actually used by the patient can be roughly calculated by multiplying the figure by 5.
- ❑ **Motor power begin:** resistance (muscle tightness) at the start of the exercising session (during the first 60 seconds)
- ❑ **Motor power end:** resistance (muscle tightness) at the end of the exercising session (in the last 60 seconds)


 The exercising data analysis only appears if the patient has been exercising for at least 1 minute.

Pressing the START, STOP or  button takes you back to the basic display.

Recalling session data

Pressing the STOP button toggles between session analysis and basic display. The session data can be recalled by pressing the STOP button until either a new exercising session is started by pressing START on the basic display or the THERA-vital is restarted (including from standby mode).

10.1 Printing out session data

When a printer is connected (see page 22), a printer symbol  appears at the top right that you can use to open the Print dialog screen. The printer thus provides an easy means of producing exercising documentation in hard-copy form. For more detailed information about printing, please refer to the Instructions for Use supplied with the printer.

11 Motor power

The set motor power (torque) has a greater effect on the patient's legs with a smaller crank length than with a longer crank length.

The motor power setting limits the motor's maximum torque output. It can be set to between 2 and 22 Nm. The graph below provides a guide to the motor power setting based on body weight and crank length.

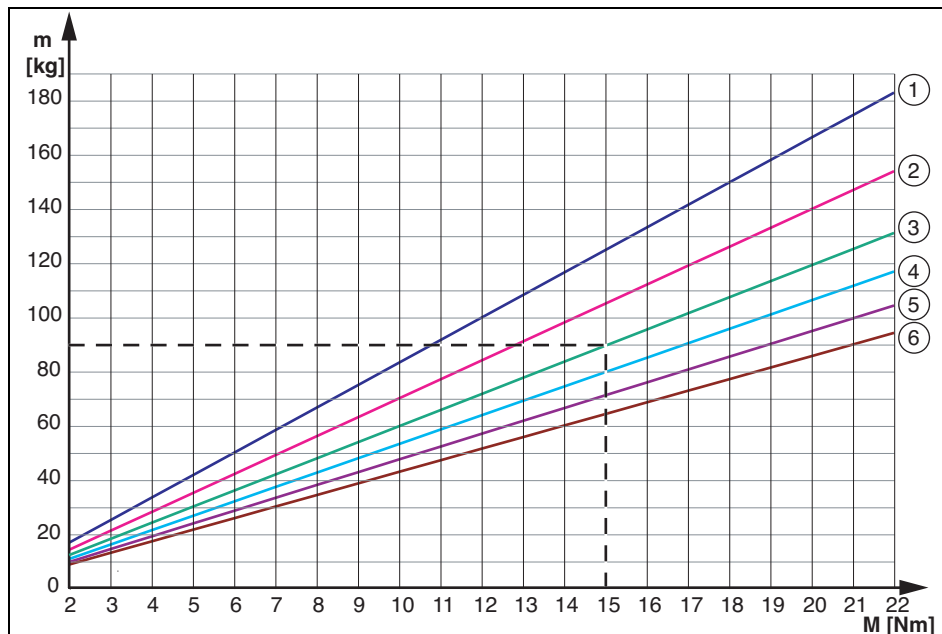
Example of how to use the graph:

a patient weighing 90 kg and using crank length setting 3 (for therapeutic purposes) should exercise with a motor power setting of 15 Nm.



With a short crank length (page 13) and a high motor power setting, the patient can be subjected to very strong forces. The motor power for the upper torso exerciser is approx. 30% of the power of the leg exerciser.

- On the THERA-vital you can set the maximum motor power limit on the submenu (see page 34).
- On the THERA-live you can set the maximum motor power limit in the factory settings (see page 31).



① to ⑥ = Infinitely adjustable crank length settings

① = Very short crank length

⑥ = Very long crank length

m = Mass (weight) of patient

M = Motor torque (power setting)


The motor power also affects the resistance level and the spasticity detection

- ☐ High motor power:
 - ☐ High resistance
 - ☐ Slower spasticity detection
- ☐ Low motor power:
 - ☐ Low resistance
 - ☐ Faster spasticity detection



With the 2-length cranks, the shorter crank length roughly equates to setting 3 and the longer crank length to setting 6.

12 Technical specifications

	THERA-vital			THERA-live		
Basic exerciser						
□Length	74 cm			54 cm		
□Width	46 cm			46 cm		
□Height	100-110 cm			46 cm (101 cm with handlebar)		
□Weight	32 kg			25 kg (28.5 kg with handlebar)		
With upper torso exerciser						
□Length	70-80 cm			70-80 cm		
□Width	46 cm			46 cm		
□Height	120-130 cm			110-120 cm		
□Weight	45 kg			32 kg		
Crank length	75 mm/110 mm 65-115 mm					
□2-length						
□Infinitely adjustable						
Cadence range, passive exercising	1-60 rpm			1-60 rpm		
Cadence range, active exercising	1-90 rpm			1-90 rpm		
Torque range	Approx. 2-22 Nm					
Power supply	230 V~, 50/60 Hz	115 V~, 50/60 Hz	100 V~, 50/60 Hz	230 V~, 50/60 Hz	115 V~, 50/60 Hz	100 V~, 50/60 Hz
Power consumption	230 V~, 50/60 Hz	115 V~, 50/60 Hz	230 V~, 50/60 Hz	115 V~, 50/60 Hz	230 V~, 50/60 Hz	230 V~, 50/60 Hz
Fuse	2 × 1.0 A slow	2 × 1.6 A slow	2 × 1.6 A slow	2 × 1.0 A slow	2 × 1.6 A slow	2 × 1.6 A slow
Materials used	Steel, polystyrene, polyurethane, ABS and others					
Safety class	I					
Safety rating	Type B 					
Enclosure rating	I PXO					
Noise emission	Lpa ≤ 70 dB (A)					
Noise emission rating	To DIN 45635-19-01-KL2					
Ambient conditions for operation	10 °C to 35 °C/50 °F to 95 °F 0 to 90 % Rh 970 to 1030 hPa					
Ambient conditions for storage/transport	−30 °C to 65 °C/−22 °F to 149 °F 0 to 90 % Rh 970 to 1030 hPa					

13 Cleaning and disinfection



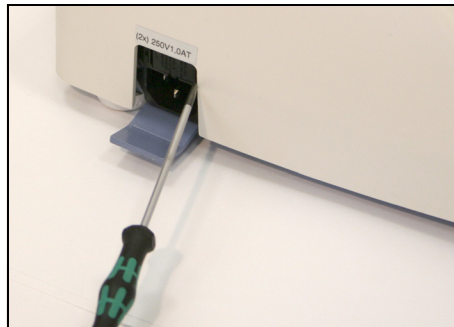
Make absolutely sure the mains power cord is unplugged from the power outlet socket before cleaning the THERA-Trainer.

- ▶ Clean the surface of your THERA-Trainer with a soft, moist cloth.
- ▶ Never use cleaning agents that are abrasive, corrosive or contain solvents, and when cleaning be careful of foils and stickers.
- ▶ You can disinfect the surfaces of the THERA-vital and the Cardio-Pulse set by wiping down with a conventional disinfectant.
- ▶ For cleaning the screen, use a suitable cleaner that is approved for use on TFT screens, laptops, PDAs, mobile phones, touchscreens etc. Do not use cleaners that contain solvents such as alcohol, white spirit or ammonia.

The exerciser requires no servicing.

14 Replacing the fuse

- ▶ Unplug the power cord from the exerciser.
- ▶ Using a small screwdriver, remove the power supply fuse cover.
- ▶ Use the screwdriver to remove both fuse holders.
- ▶ Remove blown fuses.
- ▶ Insert fuses of the correct rating as per the rating plate in the fuse holders.
- ▶ Refit fuse holders and fuses.
- ▶ Replace power supply fuse cover.



15 Guarantee

The guarantee complies with the statutory requirements.

If there are any problems with the exerciser, please contact your supplier/specialist dealer.

16 Recycling

THERA-Trainers are high-quality and durable products that offer long service, are environmentally friendly and recyclable. Most components can be recycled as used metal. Plastic components are made of polystyrene, ABS or polyurethane. The electrical and electronic components should be disposed of as electronic scrap.

17 EC Declaration of Conformity

We,

medica Medizintechnik GmbH
Blumenweg 8
D-88454 Hochdorf

hereby declare that the products

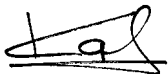
THERA-Trainer

- ☐ Model: THERA-vital
- ☐ Model: THERA-live

comply with the applicable requirements of the
following Directives:

- ☐ Directive 93/42/EEC
- ☐ DIN EN 60 601-1 (03/1996)
- ☐ DIN EN 60 601-1 (09/1994)
- ☐ EMC Directive 89/336/EEC
- ☐ Classification IEC 601-1
- ☐ EMC Directive 89/336/EEC

Hochdorf, 7/10/2009



Peter Kopf

18 Tips and tricks

Problem	Suggested solution	See also
THERA-Trainer has too little power.	Shorten crank length.	Page 13
	Increase motor power one increment.	Page 40
	Be certain to consult your therapist to make sure your joints and tendons are not being overstressed.	
The spasticity detection responds too frequently.	Reduce the sensitivity of the spasticity detection (THERA-vital only).	Page 35
	Shorten crank length.	Page 13
	Increase motor power one increment.	Page 40
	Optimise sitting position/distance from exerciser.	Page 9
	Be certain to consult your therapist to make sure your joints and tendons are not being overstressed.	
The resistance is too high for active exercising.	If exercising in Neuro mode, reduce the resistance level (THERA-vital only).	Page 24
	In Ortho or Cardio exercising mode, reduce the power setting (THERA-vital only).	Page 24
	Reduce motor power.	Page 40
	Increase crank length.	Page 13
The heart rate monitor doesn't work (THERA-vital only).	Are the transmitter (in chest band) and receiver (in the control pad) facing one another?	Page 22
	Check that the chest band has been moistened and is tight enough to be in proper contact with the skin.	Page 22
The exerciser runs unevenly.	Switch on muscle support (THERA-vital only).	Page 35
	Set equal crank length on both sides.	Page 13
	Check that sitting position is central (relative to spindle).	Page 36
	Inform service technician and have exerciser checked.	

Problem	Suggested solution	See also
The exerciser won't start	Have you pressed START (twice if exerciser is in stand-by mode)?	Page 24
	Check power cord.	Page 12
	Check power supply fuse.	Page 42
	Unplug power cord and then reconnect, then press START.	
	Select the correct exerciser (arm or leg).	Page 25
	Unlock the upper torso exerciser.	Page 17
Exercising session analysis is not displayed (THERA-vital only).	Exercise for at least 1 minute.	
Safety voice deactivation doesn't respond (THERA-vital only).	Set higher microphone sensitivity.	Page 36
Exercising settings have changed.	Set new basic settings and save.	Page 36/ 31
	Reset basic settings to factory settings	Page 36/ 30
Leg/Arm exerciser button has no effect	Is upper torso exerciser fitted/connected/activated?	
Symmetry bars/road diagram in Bio-feedback display shows obviously incorrect data (THERA-vital only).	Set equal crank length on both sides.	Page 13
	Check that sitting position is central (relative to spindle).	Page 36
	Are you "pulling" instead of "pushing" with one foot?	
	Have the THERA-Trainer recalibrated.	
Crank doesn't stop when using assisted entry function.	Press STOP to end mistakenly started exercising session.	
	If problem persists, contact service engineer	

19 Notes on electromagnetic compatibility

19.1 Electrical leads, lead lengths and accessories

The THERA-Trainers may only be operated with the original power cord.

Length of the power cord: 2 m

19.2 Warning note about accessories used

Only the original Cardio-Pulse set supplied by medica may be used. Other heart rate sensors may damage the apparatus or impair its EMC characteristics.

19.3 Warning note about siting

The apparatus or system may not be placed in the immediate proximity of or stacked together with other equipment. If operation in the immediate proximity of or stacked together with other equipment is absolutely unavoidable, the apparatus or system should be observed in order to make sure it is operating as intended in that location.

19.4 Compliance levels

The apparatus complies with the interference immunity testing levels required by IEC 60601.

19.5 Interference emission

Guidance and manufacturer's declaration on electromagnetic emissions		
THERA-Trainers are intended for operation in the electromagnetic environment specified below. The THERA-Trainer owner or user should ensure that the apparatus is used in such an environment.		
Emission measurements	Compliance	Guidance on electromagnetic environment
High-frequency emissions as per CISPR 11	Group 1	The THERA-Trainers only use high-frequency energy for their internal functions. Therefore, their high-frequency emissions are very low and it is unlikely that adjacent electronic equipment will suffer interference.
High-frequency emissions as per CISPR 11	Class B	The THERA-Trainers are intended for use in all types of facility including: - residential areas - facilities that are directly connected to a public power grid that also supplies residential buildings.
High-frequency oscillations as per IEC 61000-3-2	Class A	
Voltage fluctuations/flicker as per IEC 61000-3-3	Complies	


19.6 Interference immunity

Guidance and manufacturer's declaration on electromagnetic interference immunity			
THERA-Trainers are intended for operation in the electromagnetic environment specified below. The THERA-Trainer owner or user should ensure that the apparatus is used in such an environment.			
Interference immunity test	IEC 60601 testing level	Compliance levels	Guidance on electromagnetic environment
Electrostatic discharge (ESD) as per IEC 61000-4-2	± 6 kV contact discharge (indirect) ± 8 kV air discharge	± 6 kV contact discharge ± 8 kV air discharge	Floors should be wooden or concrete or surfaced with ceramic tiles. If the floor has a covering made of synthetic material, the relative humidity must be at least 30%.
Rapid transient electrical interference bursts as per IEC 61000-4-4	± 2 kV for power leads ± 1 kV for input and output leads	± 2 kV for power leads ± 1 kV for input and output leads	The quality of the power supply voltage should match that of a typical business or hospital environment.
Voltage surges to IEC 61000-4-5	± 1 kV out-of-phase voltage (symmetrical) ± 2 kV in-phase voltage (asymmetrical)	± 1 kV out-of-phase voltage (symmetrical) ± 2 kV in-phase voltage (asymmetrical)	The quality of the power supply voltage should match that of a typical business or hospital environment.
Voltage dips, temporary interruptions and fluctuations of the power supply voltage as per IEC 61000-4-11	< 5 % UT for 0.5 periods (> 95% dip) 40 % UT for 5 periods (60% dip) 70 % UT for 25 periods (30% dip) < 5 % UT for 5 s (> 95% dip)	< 5 % UT for 0.5 periods (> 95% dip) 40 % UT for 5 periods (60% dip) 70 % UT for 25 periods (30% dip) < 5 % UT for 5 s (> 95% dip)	The quality of the power supply voltage should match that of a typical business or hospital environment. If the THERA-Trainer user requires continued functioning even during power supply interruptions we recommend that the THERA-Trainer is supplied by an uninterruptible power supply or battery.
Magnetic field at power supply frequency (50/60 Hz) as per IEC 61000-4-8	3 A/m	3 A/m	Magnetic fields at the power supply frequency should match the typical levels encountered in business and hospital environments.

NOTE: UT is the mains alternating voltage before application of the testing level.

Guidance and manufacturer's declaration on electromagnetic interference immunity

THERA-Trainers are intended for operation in the electromagnetic environment specified below. The THERA-Trainer owner or user should ensure that the apparatus is used in such an environment.

Interference immunity test	IEC 60601 testing level	Compliance levels	Guidance on electromagnetic environment
Conducted high-frequency interference as per IEC 61000-4-6	3 Veff 150 kHz to 80 MHz	3 Veff	<p>Portable and mobile radio equipment should not be used in closer proximity with the THERA-Trainer (including power cord) than the recommended safe distance. That distance is calculated according to the equation appropriate to the transmission frequency.</p> <p>Recommended safe distance:</p> $d = [3.5/3] \sqrt{P} = 1.17 \sqrt{P}$ $d = [3.5/3] \sqrt{P} = 1.17 \sqrt{P} \text{ for 80 MHz to 800 MHz}$ $d = [7.0/3] \sqrt{P} = 2.33 \sqrt{P} \text{ for 800 MHz to 2.5 GHz}$ <p>where P is the rated output of the transmitter in watts (W) as stated by the transmitter manufacturer and d is the recommended safe distance in metres (m).</p> <p>The field strength of fixed radio transmitters at all frequencies should be below the compliance level based on on-site measurements.</p> <p>Interference is possible in the vicinity of equipment that carries the following symbol.</p> <div style="text-align: center;">  </div>
Irradiated high-frequency interference as per IEC 61000-4-3	3 V/m 80 MHz to 2.5 GHz	3V/m	

NOTE 1: At 80 MHz and 800 MHz the higher frequency range applies.

NOTE 2: This guidance may not be applicable in all cases. The propagation of electromagnetic energy is affected by absorption and reflection by buildings, objects and people.

- ❑ The theoretical field strength of fixed transmitters such as radio telephone and mobile agricultural radio equipment base stations, amateur radio transmitters, AM and FM radio and TV transmitters cannot be precisely determined in advance. In order to determine the electromagnetic environment in respect of fixed transmitters, a study of the location should be considered. If the measured field strength at the location of the THERA-Trainer exceeds the compliance levels, the THERA-Trainer should be observed to verify that it is functioning as intended. If unusual performance characteristics are observed, additional measures may be required such as modifying or changing the location of the THERA-Trainer.
- ❑ Above the frequency range of 150 kHz to 80 MHz the field strength should be less than 3 V/m.

19.7 Recommended safe distances between portable and mobile equipment, high-frequency telecommunications equipment and THERA-Trainers

THERA-Trainers are intended for operation in the electromagnetic environment specified below. The THERA-Trainer owner or user can help to prevent electromagnetic interference by observing the minimum distances between portable and mobile high-frequency telecommunications equipment (transmitters) and the THERA-Trainer as specified below (according to the output power of the communication device).

Rated output of transmitter [W]	Safe distance based on transmission frequency [m]		
	150 kHz to 80 MHz	80 MHz to 800 MHz	800 MHz to 2.5 GHz
	$d = 1.17 \sqrt{P}$	$d = 1.17 \sqrt{P}$	$d = 2.33 \sqrt{P}$
0.01	0.12	0.12	0.23
0.1	0.37	0.37	0.74
1	1.17	1.17	2.33
10	3.70	3.70	7.37
100	11.70	11.70	23.30

For transmitters whose rated output is not specified in the above table, the distance can be determined using the equation specified in each case. P is the rated output of the transmitter in watts (W) in each case as stated by the transmitter manufacturer.

NOTE 1:

For calculating the recommended safe distance from transmitters within the frequency range of 80 MHz to 2.5 GHz an additional factor of 10/3 was applied. That reduces the likelihood that a mobile/portable communications device inadvertently brought into the patient area will cause interference.

NOTE 2:

This guidance may not be applicable in all cases. The propagation of electromagnetic energy is affected by absorption and reflection by buildings, objects and people.

Index

A

Active exercising	10
Active proportion	39
Activity	
left	39
right	39
Adapter handles	17
Adjusting crank length	13
Adjusting height of upper section	17
Analysis of session data	39
Arm/Leg exercising	25
Arm/Upper torso exerciser	
locking/unlocking	18
Assisted entry	26, 29
Automatic speed adjustment	35

B

Basic setting (factory setting)	33
Basic settings (factory settings)	36
Bio-feedback	
Leg exerciser	36
Upper torso exerciser	38
Buttons	
Description of function	23, 32
START	24, 28
STOP	24, 28

C

Cadence	28
Passive cadence	24
Calories	
consumed (exercising session analysis)	39
Cardio	33
Cardio-Pulse set	22
Cleaning and disinfection	42
Commissioning	12
Connecting to the power supply	12
Control pad	
THERA-live	28
THERA-vital	23
Controls	3
Correct posture	9

D

Direction of rotation	25, 29
Auto reversal	34
Disinfection and cleaning	42
Distance	
completed so far	23
Total (exercising session analysis) ..	39
Distance completed	23
Duration	33, 34
Session time (Exercising session analysis)	39

E

EC Declaration of Conformity	43
Exceeding the set motor power	25
Exercise programme planning	10
Exerciser components	3
Exerciser options	5
Exerciser stand	13
Exercising	
active	10
Method of exercising	33, 34
passive	10
Session data	39
Exercising level	24
Exercising parameters	28
extension spasms	31, 35

F

Factory setting	33, 36
flexion spasms	31, 35
Foot fixing	20
Foot fixings	14
Footrests	13
Forearm rests	19

G		M	
General observations.....	9	Mains fuse.....	41
Guarantee.....	42	Max. motor power exceeded.....	25
H		Microphone sensitivity for safety voice de-activation.....	33, 36
Handlebar.....	16	Motor power.....	40
Heart rate.....	23	Muscle support.....	35
Heart rate limit.....	33, 34, 35	Muscle tightness.....	37, 39
Heart rate monitor (Cardio-Pulse set).....	22	N	
I		Neuro.....	33
Intended use.....	6	Notes on electromagnetic compatibility.....	46
Isokinetics.....	33, 34	Notes on exercise therapy.....	9
K		Number of spasms (exercising session analysis).....	39
Keypad lock.....	26	O	
L		On uneven surfaces.....	13
Leg exerciser.....	9	Operation.....	13
Leg/Upper torso exerciser.....	29	Ortho.....	33
Switching between.....	25		
Levelling.....	13		
Locking the cranks.....	18		

P		R	
Passive cadence.....	24	Recycling.....	42
Passive exercising.....	10	Replacing the fuse.....	42
Power demand (Ortho).....	34	Resistance.....	23, 24, 28
Power supply.....	41	Resistance demand.....	34
Proportion of active exercising.....	39		

S		T	
Safety voice deactivation	36	Technical specifications	41
Sensitivity of spasticity detection	35	THERA-assist exercising software.....	21
Servicing	42	Therapy grips	18
Session time	26	Tips and tricks.....	44
Setting		Transporting.....	12
Heart rate (Cardio).....	34		
Heart rate limit (Cardio).....	35	U	
Power (Ortho)	34	Upper torso exerciser.....	17
Resistance (Neuro).....	34	locking/unlocking.....	18
Spasticity		Upper torso exercising.....	18
Anti-spasm function	23, 28	Uses.....	9
Sensitivity of #xd	35		
Spasticity program	35	V	
Spasticity detection	25, 35	Voice deactivation.....	36
Speed			
Automatic adjustment	35	W	
Stabiliser chocks	21	Wrist supports	20
Stabiliser straps, self-operated	21		
START	24, 28		
START/STOP button	24, 28		
STOP	24, 28		
Submenu.....	32		
Menu structure	33		
Navigating	32		
Supports			
Calf rests.....	15		
Switching on/off.....	12		
Symmetry diagram.....	37		

Notes

Notes

Notes