

Meissa OT – advanced robot for upper limb rehabilitation

Upper limb rehabilitation robot, tabletop mounted, designed for 2 main functions: upper limb continuous passive motion and upper limb continuous active motion

MAIN PARTS OF DEVICE:

- Device platform - with mounting system, is fixed to the tabletop
- Device working part (head) - can be rotated in relation to the platform horizontally in a range of -90° to 90° and vertically in the range of 0° to 90°
- Touchscreen color display
- Table mounting clamp
- Extensions sets



6 interchangeable attachments for functional therapy (disk, ball, screwdriver, key, door handle, mixer)

Measurement of the grip force in the measuring attachment (key)

Training various types of grips: cylindrical, pincer, hook, palmar, tip pinch, spherical and lateral

Functional exercises

Changeable, configurable plane of movement

4-channel electromyography, including EMG biofeedback

4-channel electrostimulation, including functional electrostimulation – enable working even with weak patients or spastic ones

Active-assistive exercises - movement of the upper limb triggered by electromyography

Exercises for flexion/extension and abduction/adduction of the wrist and pronation/supination of the forearm.

Interchange and automatic identification of attachments

Head rotation on the vertical axis / horizontal axis: 0° to 90°, step 15° / -90° to 90°, step 15°

Drive axle rotation range: unlimited

Mounting to a countertop by mounting clamp with a maximum thickness of 60 mm

Touchscreen display shows various parameters for control and monitoring, as well as clinical statistic information: Exercise name, patient name and other personal data, therapy duration (min:sec), rotation angle, number of repetitions, EMG values (μ V), mA values, connection status etc.



4 channels EMG/EMS cable:

- Each channel cable has 2 separate wires coming out of the splitter
- The wire has a snap connector for the electrode
- Lengths of channel cables:
 - Channel 1: 150 cm
 - Channel 2: 150 cm
 - Channel 3: 120 cm
 - Channel 4: 120 cm
 - Reference cable: 120 cm

GENERAL PARAMETERS

Dimensions (LxWxH): 347 x 294 x 485 mm

Ingress protection (IP code): IP21

Weight: 13 kg

Power supply: 100-240 V, AC 50/60 Hz

Emergency stop buttons: 2 pcs, located on the Meissa OT platform

Communication interfaces: wired (USB) and wireless (Wi-Fi, Bluetooth)

MECHANICAL PROPERTIES

Speed: up to 120 deg/s

Torque: 16 Nm

Torque measurement accuracy: ± 0.05 Nm

Head positioning accuracy: $\pm 2^\circ$

FORCE SENSOR PARAMETERS

Measurement range: 0 - 100 N

Measurement accuracy: ± 0.25 N

ELECTRICAL STIMULATION

- Electrical stimulation channels: up to 4, sequential
- Waveforms and types: low-frequency, dual-phase and direct current free rectangular, triangular, and trapezoidal pulses, electromyography-triggered
- Maximum output voltage and current: up to 50 V / 100 mA at 500 Ω
- Stimulation mode: Reciprocal, asynchronous, or sequential
- EMS Repetitions: 5 – 100

- **PULSES PARAMETERS:**

- Pulse frequency: 5 - 100 Hz
- Pulse width 50: - 500 μ s
- Rise time: 0 - 4 s
- Plateau time: 1 - 20 s
- Fall time: 0 - 4 s
- Waveform generation accuracy: ± 0.5 % full scale
- Sampling frequency up to: 1 000 000 samples/s
- Load impedance: 500 - 2000 Ω

ELECTROMYOGRAPHY

EMG measurement channels: up to 4 simultaneous sampling

Measuring Voltage range -0.6 V to 0.6 V

Sampling frequency: up to 1 000 samples/s per channel

Input impedance 10 M Ω

LED Ring front display indications, located on the device's head:

- Indicating the device is turning on or shutdown
- Indicates the extension's position

PROGRAMS

Preinstalled therapeutic games:

“Dream Drive” - the player controls a car using a special adapter

“Ocean Paradise” - the player controls a sea turtle collecting a specified number of coins



Rehabilitation programs

Continuous Passive Motion (CPM)

CPM Force: CPM triggered by the patient's muscle strength (during the exercise, the patient must generate pressure above the threshold selected by the therapist. When this is done, the extension moves the patient's hand to the end of the set range of motion)

CPM + EMS: CPM with synchronized electrostimulation of the selected muscle

CPM + EMG: CPM triggered by the patient's muscle activity by EMG

CPM + EMG + EMS: CPM with electrostimulation triggered by the patient's muscle activity

Isokinetic Continuous Active Motion (CAM)

CAM Torque: dynamic resistance based on the applied torque (the movement speed is proportional to the applied force)

CAM Turn Key: patient turns an extension, imitating the motion of turning a key in a lock (to rotate the extension, the set thresholds for both pinch force and rotation force must be exceeded simultaneously)

Optional: Transport box

- Box where operator can put and storage device.
- Provides protection for the device during delivery and storage.

Optional: Electric Table

- A table with electrically adjustable height.
- Equipped with measuring rulers on the front that allow for precise positioning of the arm support accessory to the patient's needs.
- Dimensions (WxDxH): 1150 x 750 x (670-1320) mm
- Speed: 36 mm/s
- Max table safe working load: 300 kg
- Power supply: 100-240 V, 50/60 Hz, 600 W max

Optional: Arm support

- Designed to provide continuous support for the patient's upper limb during training on the Meissa OT device.
- Adjustments allow for setting the height and positioning the limb in the transverse plane (horizontal) relative to the Meissa OT.
- Equipped in the interchangeable cushions for supporting the wrist or forearm, along with straps to secure the patient's limb.
- Maximum safe working load: 5 kg in its fully-extended position and 10 kg in half-extended position

