Air track incl. standard accessory
Air track, complete

11202-18
11202-88

PHYWE Systeme GmbH & Co. KG
Robert-Bosch-Breite 10
D–37079 Göttingen

Telefon +49 (0) 551 604–0
Fax +49 (0) 551 604–107
E-mail info@phywe.de
Internet www.phywe.com

Operating instructions

Fig. 1: Air track, complete11202-88

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1 SAEFTY PRECAUTIONS

Caution!

- Carefully read these operating instructions completely before operating this instrument. This is necessary to avoid damage to it, as well as for user-safety.
- Protect the device from dust, moisture and vapours. Clean the device with a slightly damp, lint-free cloth. Harsh cleaning agents or solvents are not suitable.
- The surface with the air holes must be protected from scratches and deformation, as defects in this surface increase friction between the rail and the carriage.
- Do not operate if there are visible signs of damage to the unit.
- Only use the instrument for the purpose for which it is intended.

2 PURPOSE AND CHARACTERISTICS

Due to its extremely low friction, the air cushion track 11202-88 is ideal for investigating the kinematics and dynamics of linear motion sequences. The main component in this device system is the 2 m long air cushion track, on which numerous experiments can be carried out with the help of the individual parts included in the scope of delivery. The relationship between distance, time, speed and acceleration, as well as the dynamic connection between these variables, can be determined in a demonstrative measurement experiment.

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3 FUNKTIONS- UND BEDIENELEMENTE

3.1 Mounting the feet

The two feet are screwed into square nuts located in three grooves on the underside of the rail. Start with the large cross foot. Insert the square nuts into the two outer grooves at the end of the rail that has a hole for the blower hose. Place the rail face up on a table so that this end protrudes slightly over the edge. Place one of the Allen screws on the Allen key and insert it through one of the holes in the foot. Without loosening the connection between the screw and the key, fasten the screw in the square nut and tighten it with a few turns, but not so tight that the foot can no longer be moved on the rail. Repeat the process with the other screw. Once both screws are tight, you can tighten them a little further for the time being. Turn the rail over. Fasten the small foot in the same way in the two square nuts in the middle groove.

3.2 Final positioning of the feet

Even a strong, extruded aluminium profile has a certain degree of elasticity, which is why the feet are positioned in such a way that the rail is supported as well as possible. For a hypothetical ideal and straight rail of this length, model calculations show that the feet are best placed at positions 435 mm and 1465 mm on the printed distance scale of the rail. (If the current rail has a slight net curvature, this can actually be compensated for by adjusting the distance between the feet.

3.3 Mounting the end holders for the air cushion track

The two end holders 11202-15 are mounted with a finger screw, as shown in Figure 2.

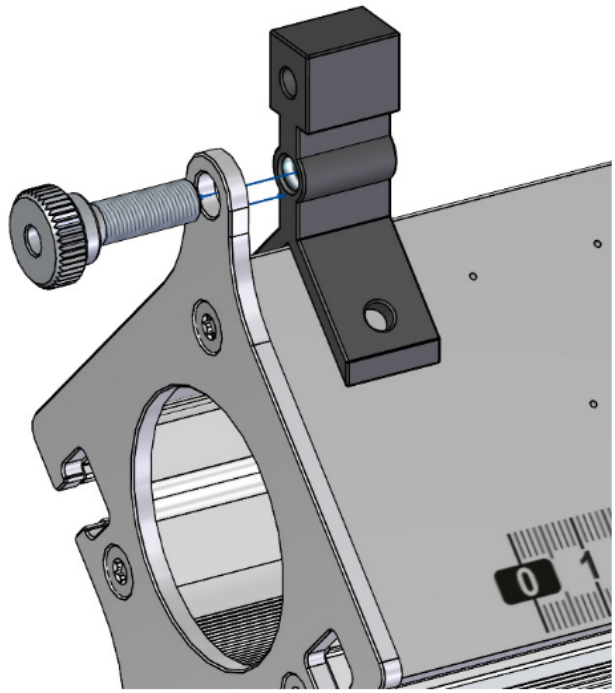

Fig. 2: Fastening the end holders

3.4 Setting up the air cushion track

Place the track on a stable table. Connect the blower 13772-97 and ensure that the hose is not pulling heavily at the end of the track (e.g. down towards the floor). Place a trolley with 1 weight on each side in the middle of the track. The trolley must now be aligned horizontally using the finger screws on the cross foot. The adjustment is made visually, ensuring that the trolley is as still as possible on the air cushion track. The friction is so low that the trolley can only very rarely be brought to a complete standstill – the last microscopic unevennesses are irrelevant in practice. The blower pressure is adjusted so that the trolley lifts safely off the rail and floats freely on the air cushion. Avoid excessive pressure, as this will impair the smooth movement of the trolley.

In addition to the parts described above for permanent mounting on the rail, 2 carriages 11202-02 and a plastic case with small parts 11202-01 are included in the scope of delivery. The carriages weigh approx. 180 g each and are equipped with two steel pins for placing weights. This allows the mass to be increased by 100 g or 200 g.

The trolley has 4 mm holes at each end for attaching accessories. These parts are of equal weight (10 g) and must always be attached to each end of the trolley for balance reasons.

An unbalanced trolley will ‘surf’ on the rail in the air stream. It is preferable to use the lower holes, as these are closer to the trolley's centre of gravity.

Glider 11202-02
Glider for gliding on the air track.

Screen with plug, l = 100 mm 11202-03
Can be attached to a glider to interrupt light barriers and control electronic timers.

Screen with plug, l = 25 mm 11202-04
Can be attached to a glider to interrupt light barriers and control electronic timers.

Tube with plug 11202-05
Tube in connection with needle with plug for inelastic collision on the air track.

Needle with plug 11202-06
Plug-in element for experiments with inelastic collisions. While colliding the needle penetrates the plastic filling in the tube.

Hook with plug 11202-07
Plug-in element for use in conjuction with precision pulley, weight holder, silk thread and 1 g slotted weights for accelerating the air track glider.

Fork with plug 11202-08
Plug-in fork of black plastic for application of 4 rubber band to plug onto gliders or in the end stop of the air- or demo-roller-track.

Rubber bands for fork with plug 11202-09
Rubber bands for fork with plug

Plate with plug 11202-10
Plug-in element for experiments with elastic collisions. For use in conjunction with electromagnetic starting device and with plug, for producing reproducible glider velocities.

Holder with plug 11202-11
Plug-in element for securing an air cushion track slide to the electromagnetic starting device.

Starting device 11202-13
Device for starting sleds on the air cushion track. For 3 different, reproducible starting impulses, also suitable for sled release without initial impulse.

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If the starting device is to be used, the end holder and screw on the starting side are removed (see Fig. 2). The holding magnet with plug 11202-14 is attached to the sled. Depending on the intended use, the starting device must be placed on the track and pushed to the end piece. There are two possible different orientations, which differ in the release process:
Transfer of initial impulses to the carriage.
In this case, the piston-shaped plunger 1 must point towards the centre of the track. The plunger is pressed in to the desired detent position and the carriage with the retaining magnet attached is coupled to the plunger. The carriage can now be started by actuating the wire release. When the experiment is repeated under the same conditions, i.e. with the same mass of the carriage and the same spring preload or detent position, the same initial velocity is obtained within narrow margins of error.

Starting a sled without giving it an initial impulse.
If the carriage is to be released using the starting device without an initial impulse being applied (e.g. in experiments involving uniformly accelerated motion), the starting device must be mounted on the air cushion track in such a way that the pipe connection 2 opposite the ram points towards the centre of the track. The ram is pressed in to the middle detent position and the slide with the holding magnet attached is pushed right up to the pipe connection. In this position, there is only a very small air gap between the ferromagnetic cylinder inside the pipe of the starting device and the holding magnet, so that the slide is magnetically fixed to the starting device. The holding force is greater than 0.2 N, i.e. the carriage is held securely in place with acceleration weights of up to 20g attached. When the trigger is activated, the ferromagnetic cylinder springs back to its starting position and releases the carriage.

Magnet with.plug for starter system 11202-14
Magnetic plug-in element for fixation of the air track glider or the cart of the demo-roller track to the starting device.

Endholder for air track 11202-15
End holder in V-profile made of aluminium for air cushion track. Note: If the mechanical starting device is to be used, this starting device is placed on the air cushion track instead of an end holder.

Stop, adjustable 11202-19
To limit the length of the air track.

Holder for light barrier 11202-27
Plug-in element for fixing an air track carriage to the electromagnetic starting device.

4 LIST OF EQUIPMENT

4.1 Scope of delivery von 11202-18

- 1x Air track, *l* = 2 m
- 2x Glider
- 2x End holder
- 4x 50 g Weight
- Slotted weights with holder 1x 10 g, 1x 5 g, 1x 2 g, 2x 1 g
- 3x Fork with plug, incl. rubber band
- 3x Plate with plug
- 1x Tube with plug
- 1x Needle with plug
- 1x Hook with plug
- 2x Plate with plug 25 mm
- 1x Pulley with plug

4.2 Scope of delivery von 11202-88

- 1x Air track, *l* = 2 m
- 1x Air blower 230 V~/50 Hz incl. pressure hose (1.5 m)
- 1x Starter system for air track
- 2x Glider
- 2x End holder
- 4x 50 g Weight
- Slotted weight with holder 1x 10 g, 1x 5 g, 1x 2 g, 2x 1 g
- 3x Fork with plug, incl. rubber bands
- 3x Plate with plug
- 1x Tube with plug
- 1x Needle with plug
- 1x Hook with plug
- 2x Plate with plug 25 mm
- 1x Pulley with plug
- 1x Plasticine, 10 sticks
- 1x Silk thread, *l* = 200 m

5 WASTE DISPOSAL

The packaging mainly consists of environmentally-friendly materials that should be returned to the local recycling stations.

Do not dispose of this product with normal household waste. If this unit needs to be disposed of, please return it to the address that is stated below for proper disposal.

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Customer Service
Robert-Bosch-Breite 10
D–37079 Göttingen

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