Operation manual

ALFRA TML 250

Safety instructions

Danger can occur when transporting loads by lifting devices due to improper use and/or poor maintenance, which may cause severe accidents and serious injury or even death. Please read and follow the operation and safety information contained in this operating manual very carefully. If you have any questions, contact the manufacturer.

Always...

- activate the lifting magnet completely
- activate the lifting magnet on metallic, ferromagnetic materials
- use the whole magnetic surface for lifting
- lift on plane surfaces
- check the magnetic holding force by lifting the load slightly by about 10 cm
- clean the magnetic surface and keep it clear of dirt, chips, welding spatter
- set the lifting magnet down gently to prevent damage to the magnetic surface
- check the magnetic surface and the entire lifting magnet for damage
- use suitable lifting gear
- follow the instructions in the operating manual
- instruct new users in the safe use of lifting magnets and read and understand the operating manual
- respect local and country-specific guidelines
- keep and use in a dry environment

Never...

- lift round or arched objects
- lift more than the specified maximum load
- transport loads above people’s heads
- lift several work pieces at once
- switch the lifting magnet off until the load has been set down carefully
- set the load swinging or stop it abruptly
- lift loads which do not have the recommended sizes
- lift loads with cavities, cut-out openings or drilled holes
- lift uneven loads
- turn loads from horizontal to vertical
- turn the load hook under load
- modify the lifting magnet or remove signs
- use the lifting magnet when damaged or when parts are missing
- strain the underside of the magnet through heavy impact or blows
- stand under the lifted load
- lift loads when there is someone in the hazard area
- leave the lifted load unattended
- use the lifting magnet without having been properly instructed
- use the lifting magnet to support, lift or transport persons
- operate the lifting magnet at temperatures above 60°C (140°F)
- bring into contact with corrosive substances

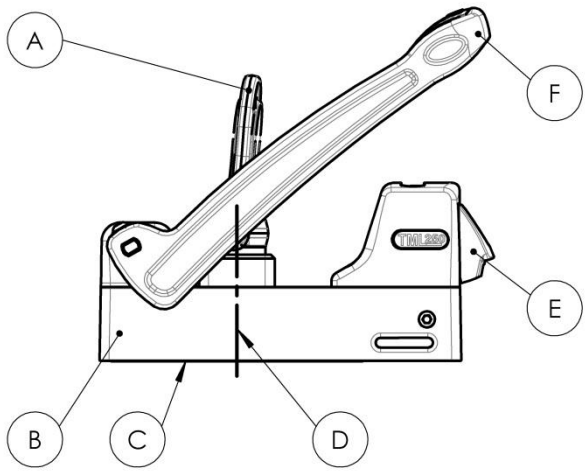
People using pacemakers or other medical devices should not use this lifting magnet until they have consulted with their physician.

Proper use

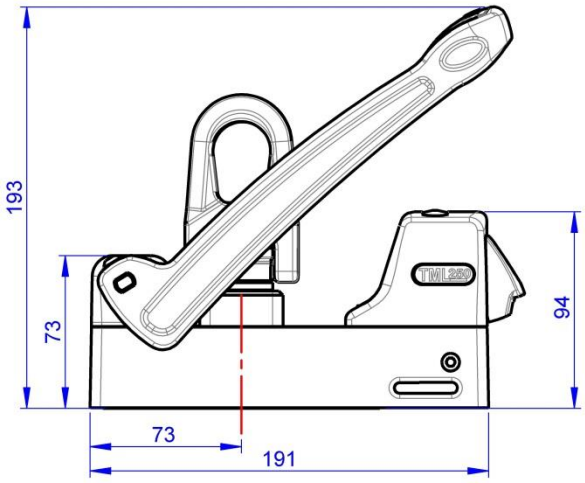
The permanent lifting magnet TML 250 has been designed for lifting ferromagnetic, metallic loads and may only be used within the context of its technical data and purpose. Proper use also includes adherence to the start-up, operating, environment and maintenance conditions specified by the manufacturer. Any use going beyond this is considered improper, and the manufacturer will not be liable for any damage resulting from such use.

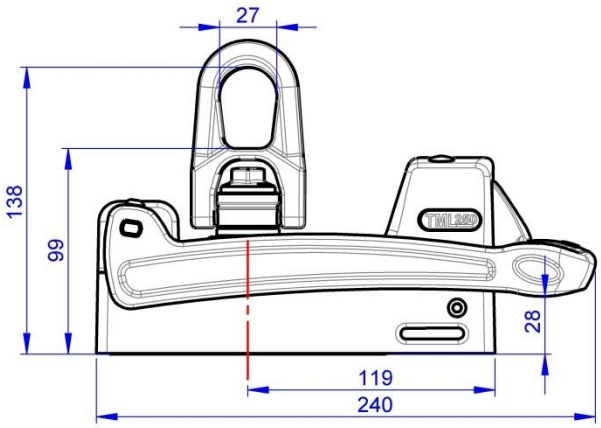
Device description

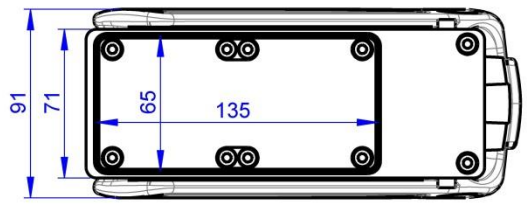
The TML (Thin Material Lifter) magnet is a permanently magnetic lifting magnet with manual actuation for the lifting, transporting and lowering of ferromagnetic materials. The magnetic field generated by the permanent magnet in the lower magnetic plate (C) area can be activated by pressing the lever (F) down. Due to the special design, a very compact magnetic field is generated which develops excellent adhesive force on thin materials (less than 10 mm) in particular. The safety tab (E) has to be pressed with the heel of the hand to deactivate the magnet; the lever can then be moved upwards. There is an eyelet located on the top of the lifting magnet for attachment to a crane. The load-bearing capacity of the lifting magnet is 1/3 of the maximum pull-off strength of the magnet and thus complies with the standard safety factor 3:1 (safe working load).



A) Load hook
B) Basic body
C) Magnetic surface
D) Center of the magnet
E) Safety tab
F) Lever for activation/deactivation





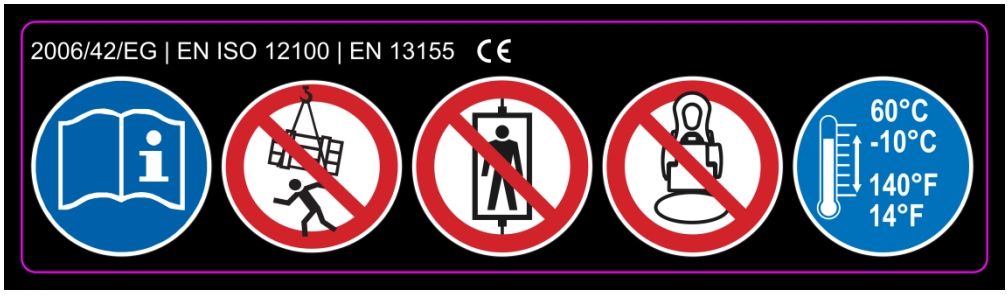


Technical data

Prod..-No.:	**41250**	
Designation:	TML 250 Lifting magnet	
Breakaway force:	>750 kg on 10 mm S235	>1650 lbs on 0,4” AISI CRS 1020 Colled Rolled Steel
Max. load-bearing capacity: (on flat material with safety factor 3:1)	250 kg on 10 mm S235	550 lbs on 0,4” AISI CRS 1020 Colled Rolled Steel
Max. load-bearing capacity: (at 6° inclination acc. to EN 13155 with safety factor 3:1)	230 kg on 10 mm S235	515 lbs on 0,4” AISI CRS 1020 Colled Rolled Steel
Dead weight of the magnet:	3,5 kg	7,7 lbs
Storage temperature:	-30°C to +60°C	-22°F to +140°F
Operating temperature:	-10°C to +60°C	+14°F to +140°F

Markings on the lifting magnet

There are additional detailed descriptions for handling and conditions of use on both sides of the lifting magnet. This labelling must not be modified, damaged or removed, as otherwise the manufacturer is released from liability for any personal injuries, property damage or accidents resulting from this fact. New labels must be ordered from the manufacturer if necessary.

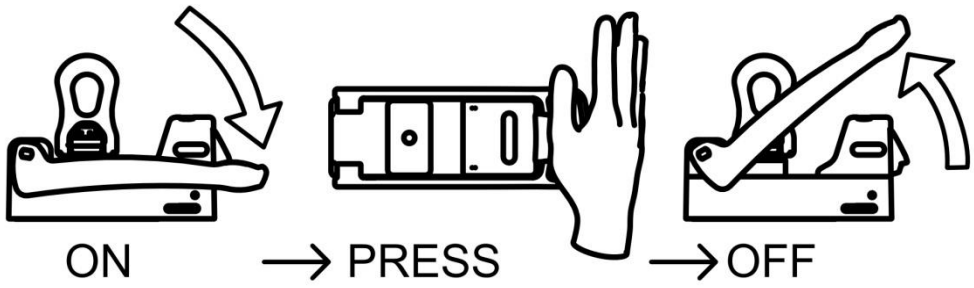


Start-up

You have received a completely assembled lifting magnet and detailed operating manual. Please check the condition of the goods upon receipt for any damage incurred during transport, and make sure the delivery is complete. If you have any problems, please contact the authorized reseller or manufacturer immediately.

Be sure to read the operation instructions completely before using this magnet for the first time!

1. The lever is facing upwards. The lifting magnet is deactivated.
2. Follow the safety instructions and clean the work piece and the lower magnetic plate of the lifting magnet if necessary.
3. Position the lifting magnet at the center of gravity of the load. The lifting magnet is pre-tensioned slightly in order to avoid inadvertent slipping and dropping of the magnet (e.g. when used in a vertical or other forced position).
4. Align the lifting magnet ideally according to the desired application.
5. Press the lever down as far as it will go into the ON position. Check that the safety tab has clicked into place correctly.
6. Move the load hook to the required position and lift the load by about 10 mm to check its deformation and the magnetic holding force.
7. Now move your load slowly and evenly, and avoid vibrations or impact.
8. After the load has been set down completely and safely, you can deactivate the lifting magnet. To do this, press the safety tab using the heel of your hand and move the lever upwards into the OFF position.



Basic information related to the handling of magnetic lifting gear, in particular TML

The magnetic surface is located on the underside of the lifting magnet and has multiple magnetic poles which generate the magnetic holding force when activated. The maximum holding force that can be achieved depends on different factors which are explained below:

Material thickness
The magnetic flow of the lifting magnet requires a minimum material thickness to be able to flow completely through the load. If this material thickness is not given, the maximum holding force is reduced in accordance with the material thickness. Conventional switchable permanent magnets have a deep penetrating magnetic field similar to tree tap roots, and require a large material thickness to achieve the maximum holding force. The compact magnetic field of the TML magnets is similar to a shallow root and achieves maximum holding force even with small material thicknesses. (See table 2 in this operating manual)

Material
Every material reacts in a different way to penetration of the magnetic field lines. The load-bearing capacity of the lifting magnets is determined using a low carbon material. Steels with a high carbon content or whose structure has been changed by heat treatment have a low holding force. Foamed or porous cast components also have a lower holding force, so that the given load-bearing capacity of the lifting magnet can be downgraded on the basis of the following table 1.

Table 1

Material	**Magnetic force in %**
Non-alloyed steel (0.1-0.3% C content)	100
Non-alloyed steel (0.3-0.5% C content)	90-95
Cast steel	90
Grey cast iron	45
Nickel	11
Most stainless steels, aluminium, brass	0

Surface quality
The maximum holding force of a lifting magnet is the result of a closed magnetic circuit in which the magnetic field lines can connect up freely between the poles, thus creating a high magnetic flow. In contrast to iron, for example, air has very high resistance to magnetic flow. If a kind of “air gap” is produced between the lifting magnet and the work piece, this reduces the holding force. In the same way, paint, rust, scale, surface coatings, grease or similar substances all form a gap, or an air gap, between the work piece and the lifting magnet. The increasing surface roughness or unevenness of the surface also has a negative effect on the holding force. Reference values can be found in the performance table of your lifting magnet.

Load dimensions
When working with large work pieces such as girders or plates, the load can deform during the lift. A large steel plate would bend downwards at the outer edges and create a curved surface which no longer has full contact with the bottom of the magnet. The resulting air gap reduces the maximum load-bearing capacity of the lifting magnet. Hollow objects or those smaller than the magnetic surface will also result in less holding power being available.

Load alignment
During load transport, care must be taken that the lifting magnet is always at the center of gravity of the work piece and that load, or lifting magnet respectively, is always aligned horizontally. In this case, the magnetic force of the lifter acts with its breakaway force perpendicular in relation to the surface, and the maximum rated load-bearing capacity is achieved with the 3:1 standard safety factor.
If the position of work piece and lifting magnet changes from horizontal to vertical, the lifting magnet is operated in shear mode and the work piece can slip away to the side. In shear mode, the load-bearing capacity decreases dependent upon the coefficient of friction between the two materials

Temperature
The high-power permanent magnets installed in the lifting magnet will begin to lose their magnetic properties irreversibly from a temperature of more than 80°C (180°F), so that the full load-bearing capacity is never reached again even after the magnet has cooled down.
Please note the specifications on your product or in the operating manual.

Maintenance and inspection of the lifting magnet

The user is obliged to maintain and service the lifting magnet in compliance with the specifications in the operating manual and according to the country-specific standards and regulations (e.g. ASME B30.20B, DGUV-Information 209-013; AMVO).

The maintenance intervals are classified according to the frequency with which the maintenance should be carried out:

Before every use...

- check the lifting magnet for visible signs of damage
- clean the surface of the work piece and the underside of the magnet
- free the underside of the magnet of rust, chips or unevenness
- check the blocking function of the safety tab on the lever

Weekly...

- check the lifting magnet and load hook for deformation, cracks or other defects
- check that the operating lever and safety tab are working properly
- check the load hook for damage or wear and have it replaced if necessary
- check the underside of the magnet for scratches, pressure points or cracks and have the magnet repaired by the manufacturer if necessary

Monthly...

- check the markings and labelling on the lifting magnet for legibility and damage and replace if necessary

Annually...

- have the load-bearing capacity of the lifting magnet checked by the supplier or an authorized workshop

An annual inspection is recommended for the safe use of this lifting magnet. We will be glad to perform this inspection for you in-house. Please send us an email to:

TML-Test@alfra.de

You will then promptly receive an offer and have the assurance that the lifting magnet will be inspected in a process-reliable manner where it was actually produced.

Unauthorized repairs or modification to the lifting magnet are not permitted.
Please contact the manufacturer if you have any questions or queries.

Detailed performance data for the TML 250 lifting magnet

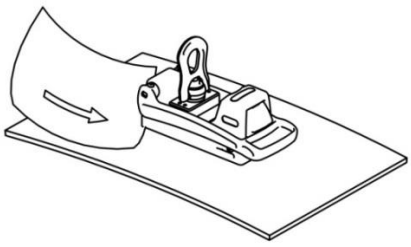
Values for load capacity are based on material S235 JR for the maximum comparable to AISI 1020 Cold Rolled Steel with the maximum, vertical breakaway force at 0° deviation from the load axis and additionally under a 6° inclined load in accordance with EN 13155, in each case with a 3:1 safety factor. There are not instructions for round material, as the TML 250 is optimised for flat material and round material or arched objects may not be lifted.

Table 2

	Load capacity in kg					
Thickness of material	Clean, flat, ground surface		Rusty, slightly scratched surface		Irregular, rusty or rough surface	
	Air gap <0.1 mm		Air gap = 0.25 mm		Air gap = 0.5 mm	
mm	**0°**	**6°**	**0°**	**6°**	**0°**	**6°**
2	50	45	40	35	32	30
3	90	80	80	70	65	60
4	145	130	110	100	90	80
5	180	165	135	125	100	90
6	205	185	155	140	105	95
8	240	220	165	150	110	100
10	250	230	180	165	110	100
15	250	230	180	165	115	105
>20	250	230	180	165	115	105

	Load capacity in lbs					
Thickness of material	Clean, flat, ground surface		Rusty, slightly scratched surface		Irregular, rusty or rough surface	
	Air gap <0.004 inches		Air gap = 0.01 inches		Air gap = 0.02 inches	
Inches	**0°**	**6°**	**0°**	**6°**	**0°**	**6°**
0.08	110	100	85	75	70	65
0.12	200	185	175	160	140	125
0.16	315	290	240	220	200	180
0.20	400	365	295	270	220	200
0.25	455	415	340	310	231	210
0.30	530	485	360	330	240	220
0.40	550	515	395	360	240	220
0.50	550	515	395	360	250	230
>1	550	515	395	360	250	230

The maximum dimensions of the loads to be lifted depend to a large extent on the geometry and resistance to bending of the workpieces, since an air gap forms under the magnetic surface if the workpiece bends, thus significantly reducing the load-bearing capacity. With each lifting operation, watch for any deformation of the workpiece that might occur and, if necessary, check for any air gap developing at the edges of the TiN-coated magnetic surface (e.g. with a sheet of paper; 80g/m^2). Spreader bars with additional magnets may be required to safely lift large or flexible loads.



Immediately stop the lift if there is any excessive deformation or an air gap.

Never exceed the dimensions and/or the load-bearing capacity of the material thickness given in the table 2.