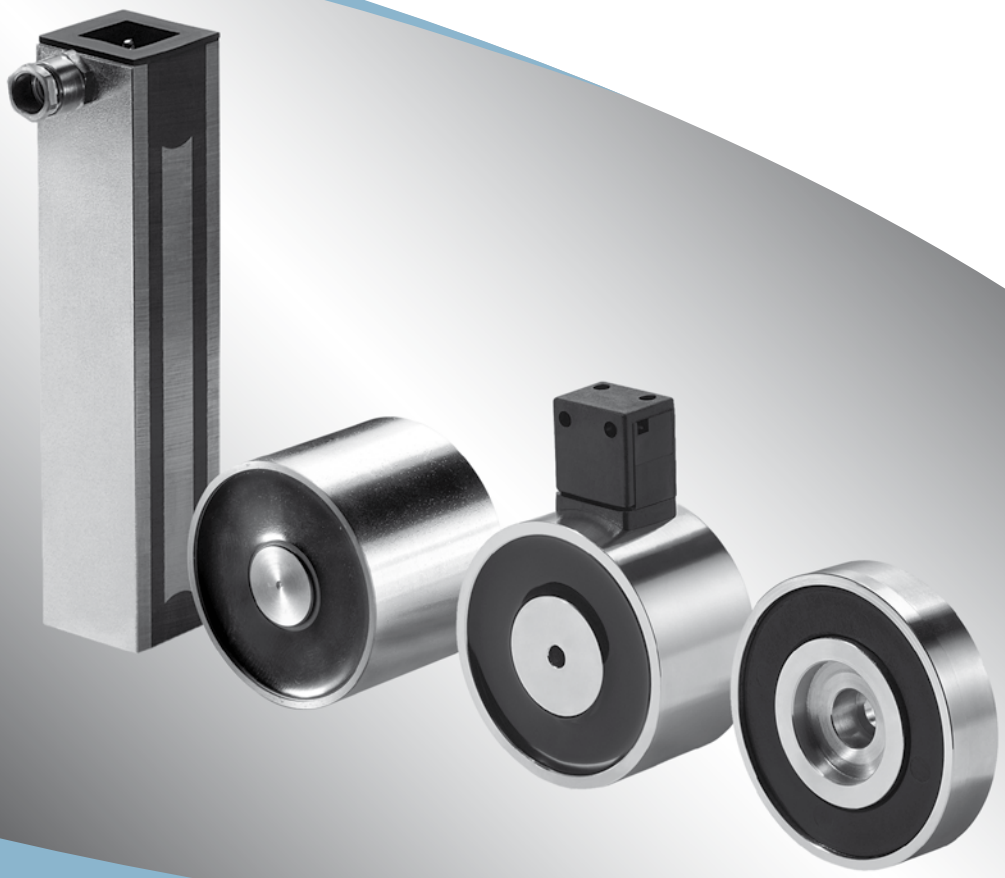
KENDRION

WE MAGNETISE THE WORLD

INDUSTRIAL MAGNETIC SYSTEMS

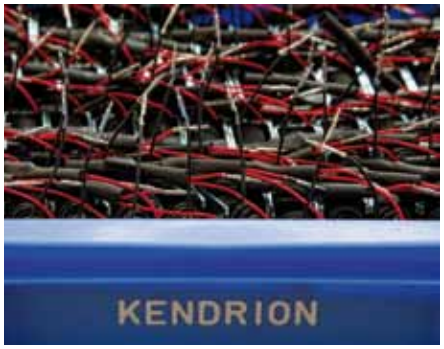


Industrial Line

Electromagnetic Holding Solenoids
Permanent Magnetic Holding Solenoids

BINDER

WE MAGNETISE THE WORLD



Kendrion N.V. is one of the leading manufacturers of solenoids and electromagnetic components worldwide.
Consisting of the four business units Industrial Magnetic Systems, Commercial Vehicle Systems, Industrial Drive Systems and Passenger Car Systems, Kendrion guarantees solution-oriented customer care. The company excels in innovative capability and maximum productivity.
Over the years Kendrion has integrated the brands Binder, Magnet AG, Neue Hahn Magnet, Thoma Magnettechnik, Linnig Antriebstechnik, Tri Tech LLC, Magneta and FAS Controls.

Our business unit Industrial Magnetic Systems develops, manufactures and distributes linear-, holding-, locking-, spreading-, control-, rotary- and vibrator solenoids as well as solenoid valves for industrial applications worldwide.

The strengths of Kendrion lie both in the area of standard applications and in the area of customer-specific solutions and applications.

With our technological know-how we ensure that your application will run smoothly.

All products are tested and developed according to DIN VDE 0580/ 07.2000. Kendrion Magnettechnik GmbH is a company certified according to ISO 9001:2008.

The main locations are in Donaueschingen (D) and Engelswies (D). Further locations are in Hausen am Albis (CH), Linz (A), Bradford (UK), Suzhou (CN), Mishawaka (USA) and Turin (I).

With our global distribution network we are available for our customers at any time and will be pleased to advise you.

Our products are used in almost all industrial areas. To name a few:

- Machine building
- Safety engineering
- Transportation industry
- Medical engineering
- Power engineering
- Environmental technology
- Elevator industry
- Automation

Your industry is not listed?
We are sure to have an optimum solution.

Wherever innovations and new approaches are required our staff will be happy to assist you.

Contact us. We're looking forward to assisting you!

Sales Hotline +49 (0) 771 8009 3770

Please find detailed performance data in our product catalogues, with the help of our experts or by our product finder on:

www.kendrion.com

Direct Current Holding Solenoids – Industrial Line

The DC holding solenoids of the Industrial Line are divided into two different designs and variants. They are available in round or rectangular design resp. in the systems “electromagnetic holding solenoids” and “permanent magnetic holding solenoids”.

1. Electromagnetic Holding Solenoids

Electromagnetic holding solenoids are pot magnets and consist of a magnet housing and a DC-excited coil. In switched-on state the open magnetic circuit allows to hold resp. span ferromagnetic workpieces. When the voltage is switched off the workpiece to be held falls off. Potential remanence, especially with light parts, can be avoided by attaching a non-magnetic foil. The holding system works with a very low operating current and without wear (maintenance-free).

Designs

- Round
- Rectangular
- Flat design
- Ring-shaped

2. Permanent Magnetic Holding Solenoids

These holding solenoids consist of a permanent magnetic holding system to hold ferromagnetic workpieces and of an excitation winding which neutralizes the magnetic field at the holding surface when switched on. Due to this principle these holding solenoids are preferably used where long holding times are required and the device is switched on for short times only. Furthermore, they are used as safety magnets in transportation devices as loads are held reliably even in the case of power failure.

Designs

- Round
- Rectangular (bar shaped)

In both systems the maximum holding forces are only reached depending on the surface roughness of the material, the material thickness and in case of full coverage (air gap= 0mm). Furthermore, the holding forces refer to 90% nominal voltage and warmed up condition.

The following basic data are defined as standard:

Nominal Voltage

- 24 Volt, DC

Duty Cycle

- Electromagnetic holding solenoids: 100%
- Permanent magnetic holding solenoids: 25%

Protection Class

- IP 65 = device (protection against dust and hose water)
- IP 54 = device (protection against dust and splashing water)
- IP 00 = electrical connection (no protection)
- IP 20 = electrical connection over terminal (protection against foreign substances)

If the application is based on different conditions the holding force is reduced accordingly. Depending on the design the holding surface can be partly zinced resp. polished. Therefore, the customer may have to ensure corrosion protection.

The solenoids are manufactured and tested acc. **DIN VDE 0580.**

Depending on the quantities required other voltages and modifications are possible at extra cost.

Design subject to change.

Electromagnetic Holding Solenoids

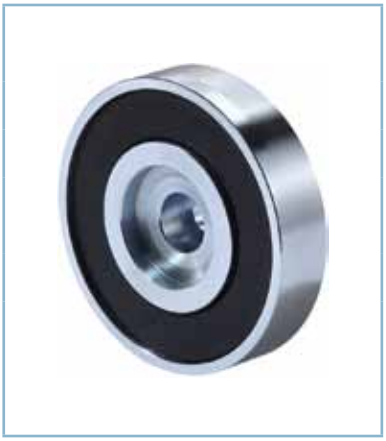
Type GTB

Features	Coil vacuum potted, tested acc. DIN VDE 0580
Size	Ø 15 - 250 mm
Holding force	36 N - 30000 N
Standard nominal voltage	24 V DC
Anchor plate	Available for sizes Ø 15 – 100 mm
Application	Automation Fixture construction Transportation and handling

Type GTH

Features	High holding force, application only in case of direct overlay of an anchor plate
Size	Ø 15 - 100 mm
Holding force	45 N - 4890 N
Standard nominal voltage	24 V DC
Anchor plate	Available for sizes Ø 15 – 100 mm
Application	Automation Tool manufacture General machine buildingg Transportation and handling

Type 10 331



Features	Flat design
Size	Ø 56 - 170 mm
Holding force	750 N - 5000 N
Standard nominal voltage	24 V DC
Anchor plate	Available for size Ø 56 mm
Application	Automation Electric brakes Gripping systems Transportation and handling

Type 10 310

Features	High holding force, variable Pg connection possible
Size	Width: 32 mm, 60 mm Length: 101.5 - 601.5 mm
Holding force	880 N - 10400 N
Standard nominal voltage	24 V DC
Application	General machine building General materials handlin Transportation and handling Door and gate technology, Automation

Permanent Magnetic Holding Solenoids

Type 01 310

Features	Permanent magnetic holding rod, neutralization of the magnetic field by energizing of coil
Size	Length x width: 60 mm x 151.5 mm Length x width: 60 mm x 201.5 mm
Holding force	1000 N - 1530 N
Standard nominal voltage	24 V DC
Application	Automation Magnetic lock Transportation and handling Safety and protection systems

Type 01 320

Features	Permanent magnetic holding solenoid, neutralization of the magnetic field by energizing of coil
Size	Ø 20 - 150 mm
Holding force	40 N - 3500 N
Standard nominal voltage	24 V DC
Anchor plate	for sizes Ø 20 – 105 mm
Application	Automation Magnetic lock Safety systems Transportation and handling

Electromagnetic Holding Solenoid - Series GTB

This series includes a complete product range of round solenoids with a diameter of 15 – 250 mm and a holding force of 36 – 30000 N.

As connections there are free braids resp. cables for GT100B and higher. With sizes GT025B to GT080B a terminal is also possible (Cross section 3).

The coil is potted with resin (protection class IP65) resp. unpotted (protection class IP54). The complete magnet housing including holding surface is zinced. The mounting is achieved by a central thread at the rear side of the housing.

These solenoid systems are preferably used in fixture construction and in the industrial areas automation, transportation and handling.

Lateral force loading equates to a displacement force Fv of approximately $^1/_4$ F_H.

Technical Data

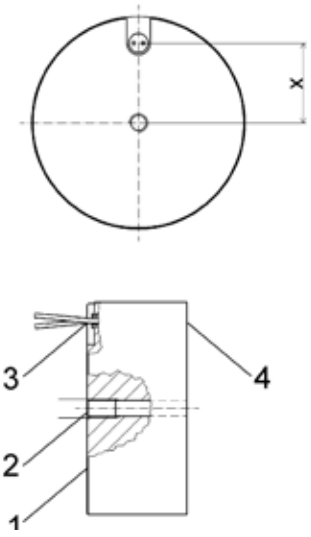
Standard nominal voltage: 24 V DC
Duty cycle: 100% ED
Insulation class: E

Accessories

You find suitable anchor plates on page 24.

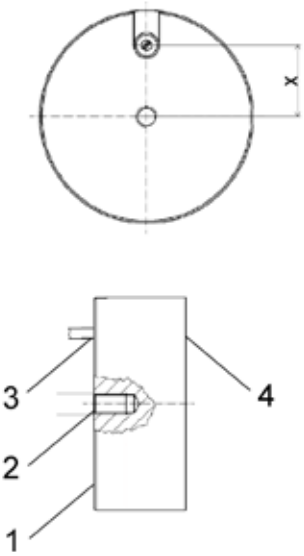
Cross sections

Type GT015B to GT090B
with free braids



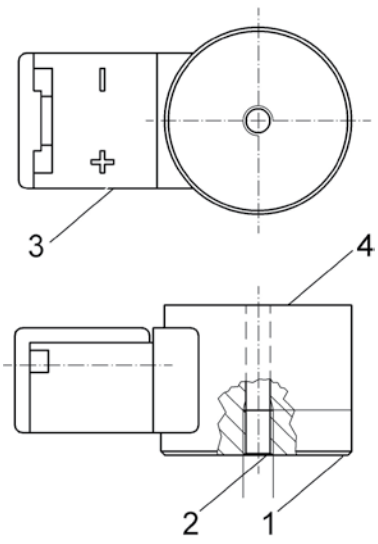
Cross section 1

Type GT100B to GT250B
with cable



Cross section 2

Type GT025B to GT080B
with terminal



Cross section 3

1= Mounting surface 2= Mounting thread 3= Electrical connection 4= Holding surface / pole surface x= Clearance / Lead exit

Technical Data

Designation	Diameter x height [mm]	Max. holding force [N]	Nominal power [W]	Thickness of counter plate [mm]	Thread x depth [mm]	Clearance (x) [mm]	Cable- / Lead length [mm]	Weight [kg]
GT015B011	15 x 12	36	2	2	M3x6	5,5	200	0,02
GT018B001	18 x 11	45	1.4	2	M3x5	6,5	200	0,02
GT025B001	25 x 20	140	3.1	3	M4x6	10	200	0,06
GT032B001	32 x 22	230	3.5	3.6	M4x6	13,5	200	0,1
GT040B001	40 x 25.5	475	5.1	4.5	M5x8	17	200	0,2
GT050B001	50 x 27	750	6.2	6	M5x8	21,5	200	0,3
GT063B001	63 x 30	1000	7.9	7	M8x12	27	200	0,6
GT070B001	70 x 35	1500	12	8	M8x12	29	200	0,9
GT080B001	80 x 38	1800	14.9	10	M8x12	34	200	1,2
GT090B001	90 x 42	2400	14	10	M8x12	37	200	1,7
GT100B001	100 x 43	3400	20.6	10.5	M10x15	45	300	2
GT150B001	150 x 56	9000	37	17	M16x24	57	300	6
GT180B001	180 x 63	15000	49	21	M24x36	71	300	10
GT250B001	250 x 80	30000	90	29	M24x36	98	300	26

Ordering Example

GT025B001.10
100 % ED; 24 V DC; 3.1 Watt

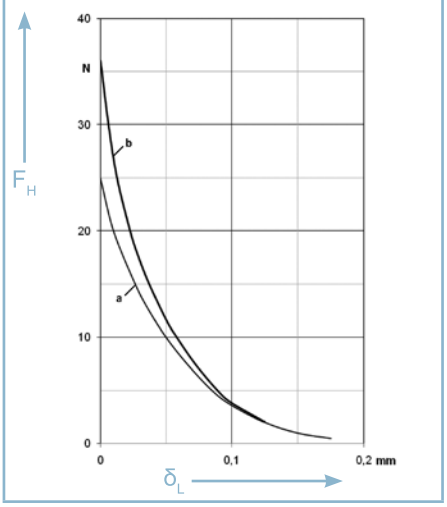
Electrical Connection

.00 = Free braids / cable
.10 = Terminal

Holding Force Curves

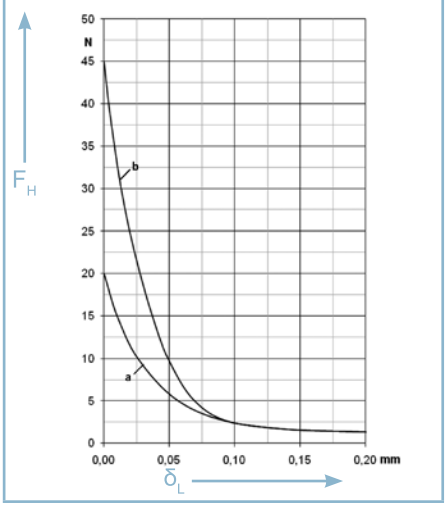
Holding forces F_H depending on air gap δ_L between holding solenoid and workpiece and on the indicated layer thickness of the counter plate. The values are valid for workpieces of material S235JR with 100% coverage of the holding surface, 90% of nominal voltage and warmed up condition (appr. 70 K excessive temperature without additional heat dissipation).

GT015B011



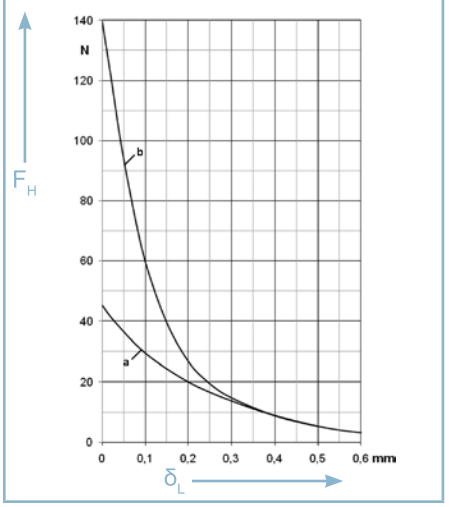
Layer thickness ≙ material thickness:
a = 1 mm
b = 2 mm

GT018B001



Layer thickness ≙ material thickness:
a = 1 mm
b = 2 mm

GT025B001

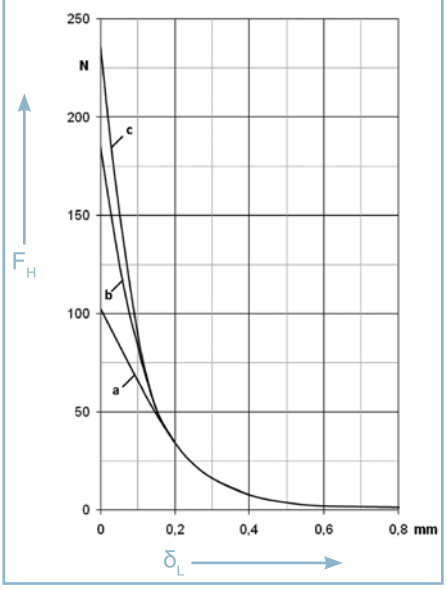


Layer thickness ≙ material thickness:
a = 1 mm
b = 3 mm

Holding Force Curves

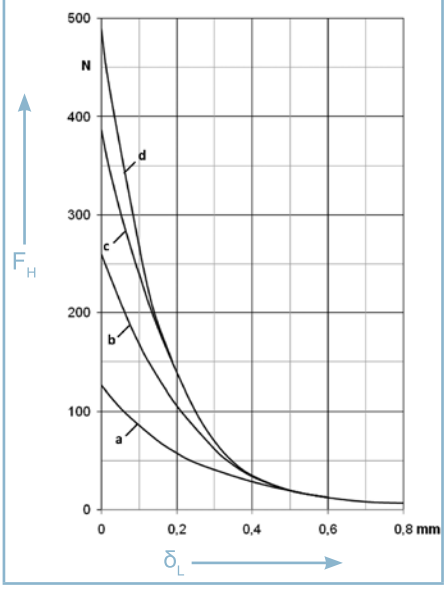
Holding forces F_H depending on air gap δ_L between holding solenoid and workpiece and on the indicated layer thickness of the counter plate. The values are valid for workpieces of material S235JR with 100% coverage of the holding surface, 90% of nominal voltage and warmed up condition (appr. 70 K excessive temperature without additional heat dissipation).

GT032B001



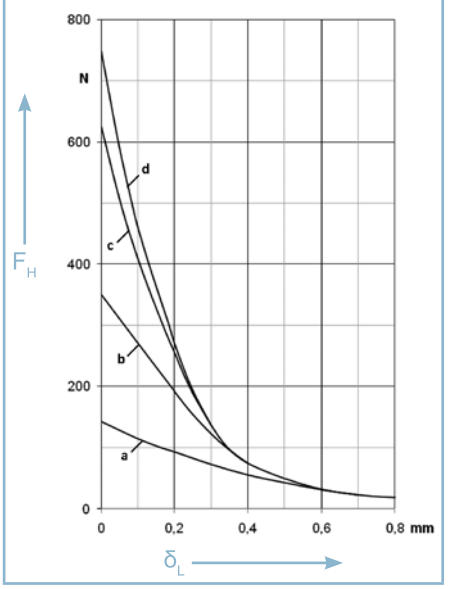
Layer thickness ≙ material thickness:
a = 1 mm c = 3.6 mm
b = 2 mm

GT040B001



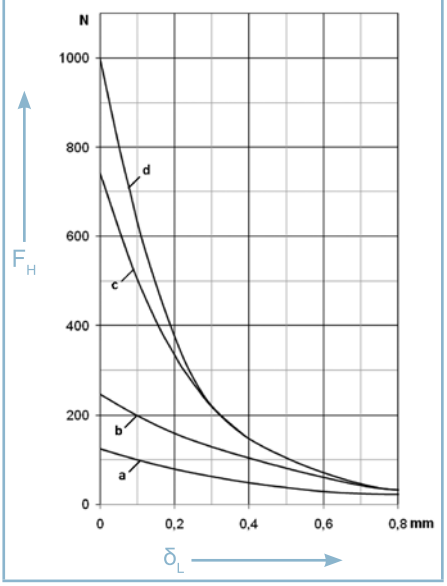
Layer thickness ≙ material thickness:
a = 1 mm c = 3 mm
b = 2 mm d = 4.5 mm

GT050B001



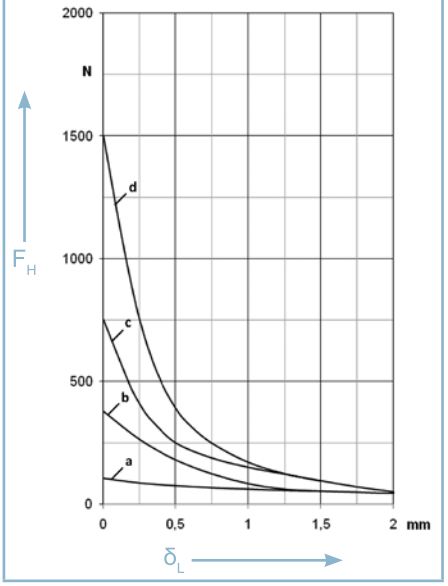
Layer thickness ≙ material thickness:
a = 1 mm c = 4 mm
b = 2 mm d = 6 mm

GT063B001



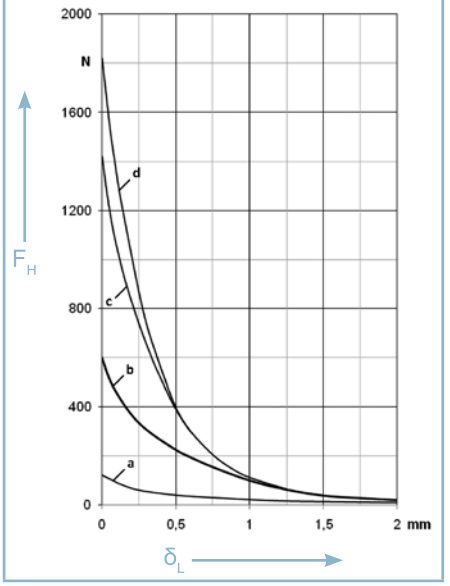
Layer thickness ≙ material thickness:
a = 1 mm c = 4 mm
b = 2 mm d = 7 mm

GT070B001



Layer thickness ≙ material thickness:
a = 1 mm c = 5 mm
b = 3 mm d = 8 mm

GT080B001

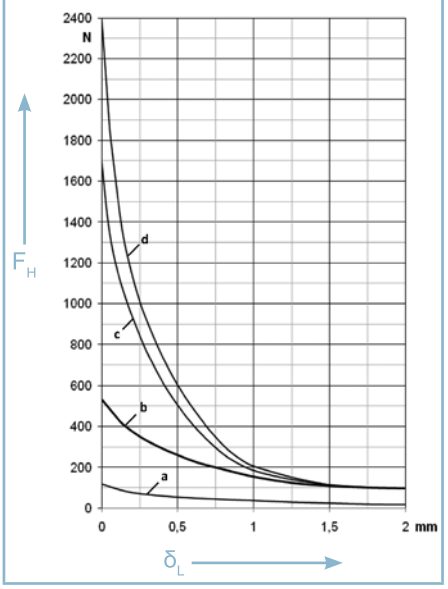


Layer thickness ≙ material thickness:
a = 1 mm c = 6 mm
b = 3 mm d = 10 mm

Holding Force Curves

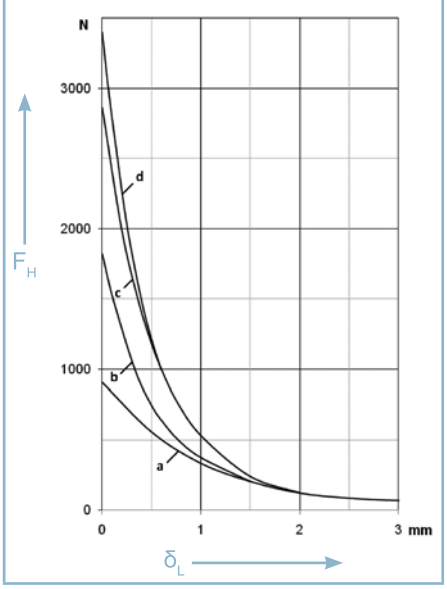
Holding forces F_H depending on air gap δ_L between holding solenoid and workpiece and on the indicated layer thickness of the counter plate. The values are valid for workpieces of material S235JR with 100% coverage of the holding surface, 90% of nominal voltage and warmed up condition (appr. 70 K excessive temperature without additional heat dissipation).

GT090B001



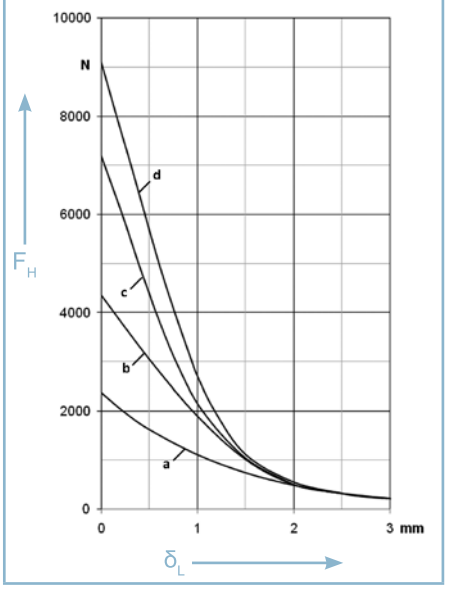
Layer thickness ≙ material thickness:
a = 1 mm c = 6 mm
b = 3 mm d = 10 mm

GT100B001



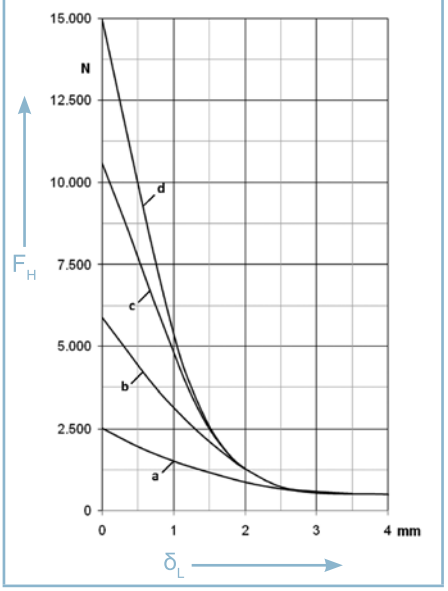
Layer thickness ≙ material thickness:
a = 3.5 mm c = 7.5 mm
b = 5.5 mm d = 10.5 mm

GT150B001



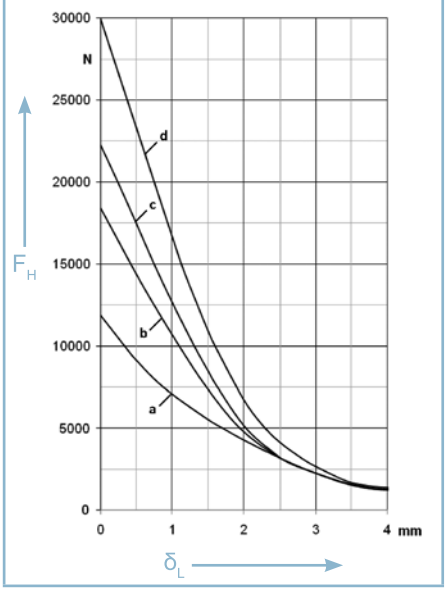
Layer thickness ≙ material thickness:
a = 5 mm c = 12 mm
b = 8 mm d = 17 mm

GT180B001



Layer thickness ≙ material thickness:
a = 5 mm c = 13 mm
b = 9 mm d = 21 mm

GT250B001



Layer thickness ≙ material thickness:
a = 13 mm c = 21 mm
b = 18 mm d = 29 mm

Electromagnetic Holding Solenoid - Series GTH

Compared to the series GTB these solenoids offer a higher holding force with similar dimensions. This is achieved by a larger dimensioning of the central pole. The coil is vacuum potted, the magnet housing is zinced, and the holding surface is polished.

The electrical connection is made by free braids. The series includes a product range of 11 sizes with a magnet diameter of 15 – 100 mm and a holding force of 52 – 4890 N. The mounting is achieved by a central thread at the rear side of the housing.

These solenoid systems are preferably used in machine and tool manufacture, where air gap adjustments are not required.

Please observe, that the complete functioning of the divice is only guaranteed if the counter plate is places exactly.

Lateral force loading equates to a displacement force Fv of approximately $^1/_4$ F_H.

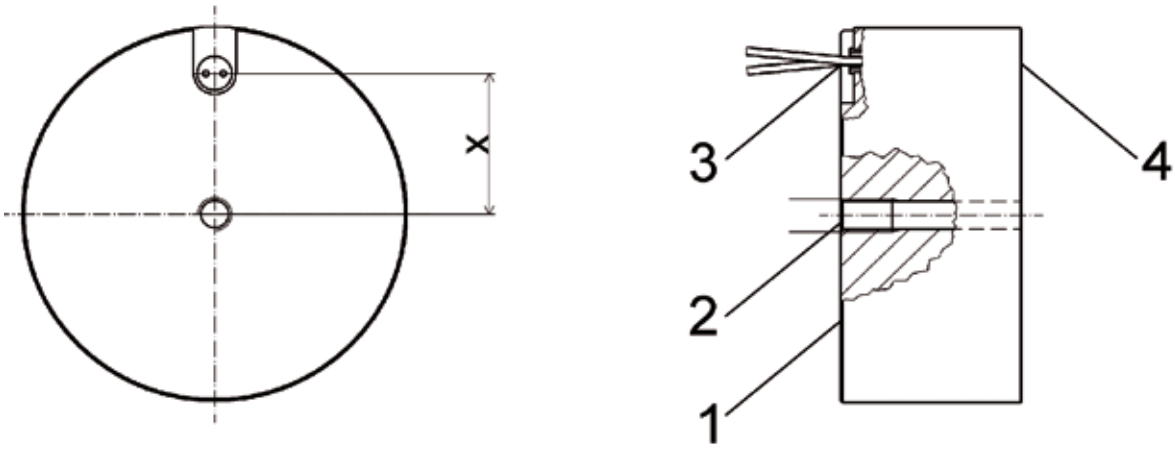
Technical Data

Standard nominal voltage: 24 V DC
Duty cycle: 100% ED
Insulation class: E

Accessories

You find suitable anchor plates on page 24.

Cross Section



1= Mounting surface 2= Mounting thread 3= Electrical connection 4= Holding surface / pole surface x= Clearance / Lead exit

Technical Data

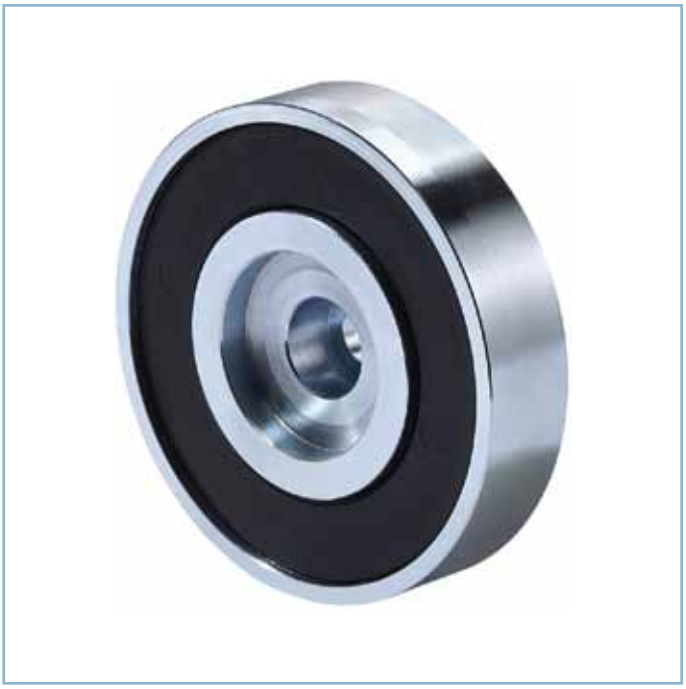
Designation	Diameter x height [mm]	Max. holding force [N]	Nominal power [W]	Thickness of counter plate [mm]	Thread x depth [mm]	Clearance (x) [mm]	Lead length [mm]	Weight [kg]
GT015H050	15 x 12	45	1.4	1.5	M3x5	5,2	200	0,01
GT020H030	20 x 15	112	2.2	2.5	M3x5	7,5	200	0,03
GT025H060	25 x 20	240	3.2	3.5	M4x6	9	200	0,06
GT030H060	30 x 25	355	4.1	4	M4x6	11	200	0,10
GT040H060	40 x 27	740	5.9	6	M5x8	14,5	200	0,20
GT050H170	50 x 30	1250	7.5	7.5	M6x9	18	200	0,40
GT060H050	60 x 35	1730	10.3	8.5	M8x12	22	200	0,70
GT070H130	70 x 35	2310	12.1	10.5	M10x14	25	200	1,00
GT080H040	80 x 38	3190	14.9	12	M12x18	29	200	1,40
GT090H050	90 x 42	3880	17.8	13	M14x21	33	200	1,80
GT100H030	100 x 40	4890	18.4	14.4	M16x24	36	200	2,20

Ordering Example

GT025H060
100 % ED; 24 V DC; 3.2 Watt

Additional Information

Air gap adjustments are not possible, as otherwise the holding forces will not be effective. Furthermore, it has to be observed that the anchor plate can only be used if the holding surface is polished.



Electromagnetic Holding Solenoid – Series 10 331

This series excels by its extremely flat design and a through-hole for spindle or shaft attachment.

The connection is made by free braids on the rear of the housing. The magnet housing is zinced and the coil is vacuum potted. The mounting is achieved by means of one resp. several central bores which are accessible from the pole surface.

The product range includes 3 sizes with a magnet diameter of 56, 110 and 170 mm and a holding force of 750 – 5000 N.

This series is preferably used in the handling and robotics area, where installation space is narrow, flat and limited by the customer.

Lateral force loading equates to a displacement force Fv of approximately $^1/_4$ F_H.

Technical Data

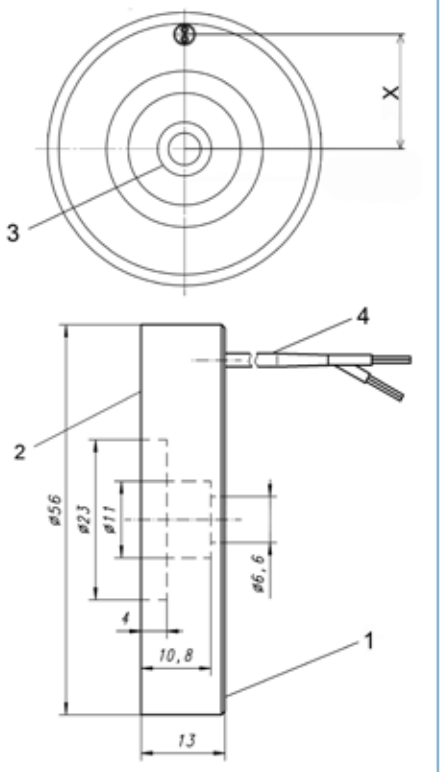
Standard nominal voltage: 24 V DC
Duty cycle: 100% ED
Insulation class: E

Accessories

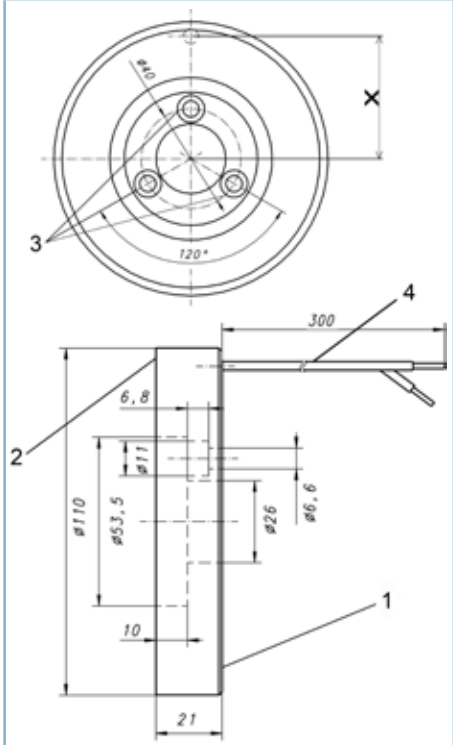
You find suitable anchor plates on page 24.

Cross Sections

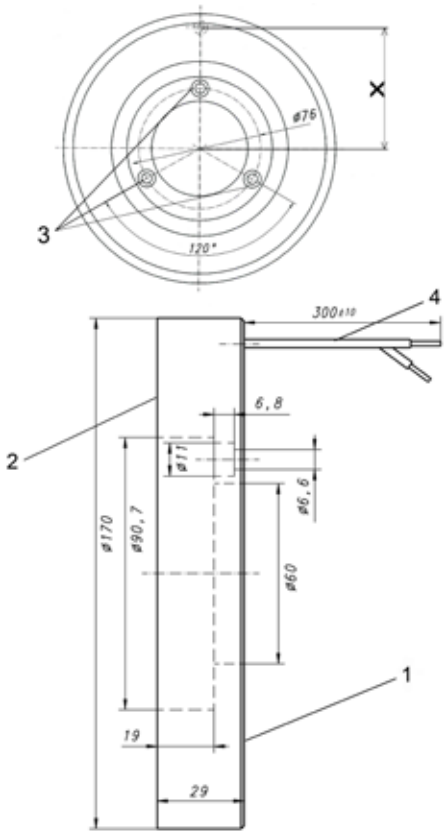
Type 10 33106A00



Type 10 33111A00



Type 10 33117A00



1= Mounting surface 2= Holding surface / pole surface 3= Mounting bore 4= Electrical connection x= Clearance / Lead exit

Technical Data

Designation	Diameter x height [mm]	Max. holding force [N]	Nominal power [W]	Thickness of counter plate [mm]	Mounting bore(s) [mm]	Clearance (x) [mm]	Lead length [mm]	Weight [kg]
10 33106A00	56 x 13	750	7.1	4	11	24	300	0,20
10 33111A00	110 x 21	2050	14.7	6	3 x 11	50	300	1,00
10 33117A00	170 x 29	5000	31.4	10	3 x 11	77	300	3,00

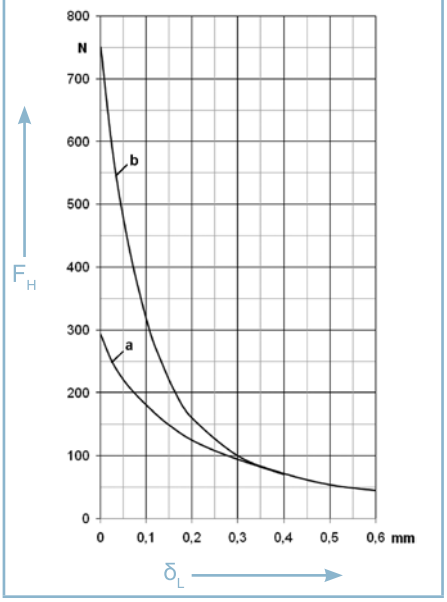
Ordering Example

10 33111A00
100 % ED; 24 V DC; 14.7 Watt

Holding Force Curves

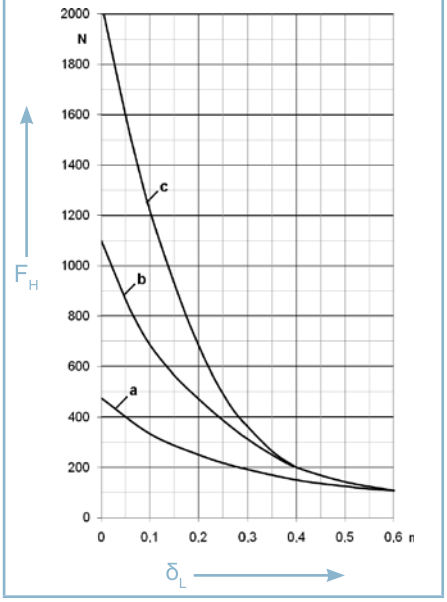
Holding forces F_H depending on air gap δ_L between holding solenoid and workpiece and on the indicated layer thickness of the counter plate. The values are valid for workpieces of material S235JR with 100% coverage of the holding surface, 90% of nominal voltage and warmed up condition (appr. 70 K excessive temperature without additional heat dissipation).

10 33106A00



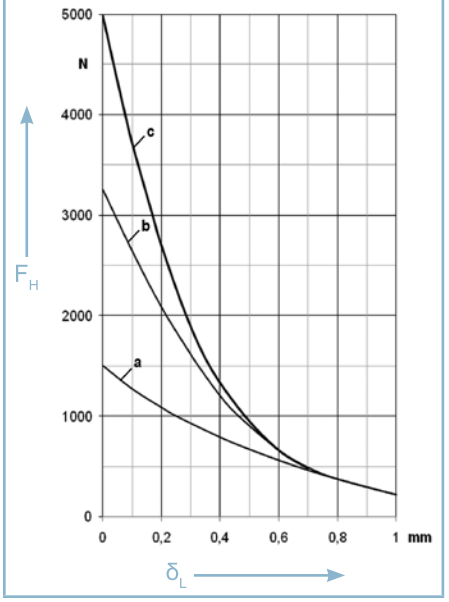
Layer thickness ≙ material thickness:
a = 1.5 mm b = 4 mm

10 33111A00



Layer thickness ≙ material thickness:
a = 1 mm b = 3 mm
c = 6 mm

10 33117A00



Layer thickness ≙ material thickness:
a = 2 mm b = 4 mm
c = 10 mm

Electromagnetic Holding Solenoid – Series 10 310

The electromagnetic holding rods are DC holding systems. The magnetic circuit which is open in switched on condition allows to hold ferromagnetic workpieces. The coil is vacuum potted.

For mounting there are thread bores at the bottom side of the device. The electrical connection is made at two connecting screws which are easily accessible within the device and can be reached via a Pg gland. This gland can be screwed in alternately from the side or from the bottom.

The program explains 10 different sizes with a length of 100 to 600 mm and a width of 32 or 60 mm.

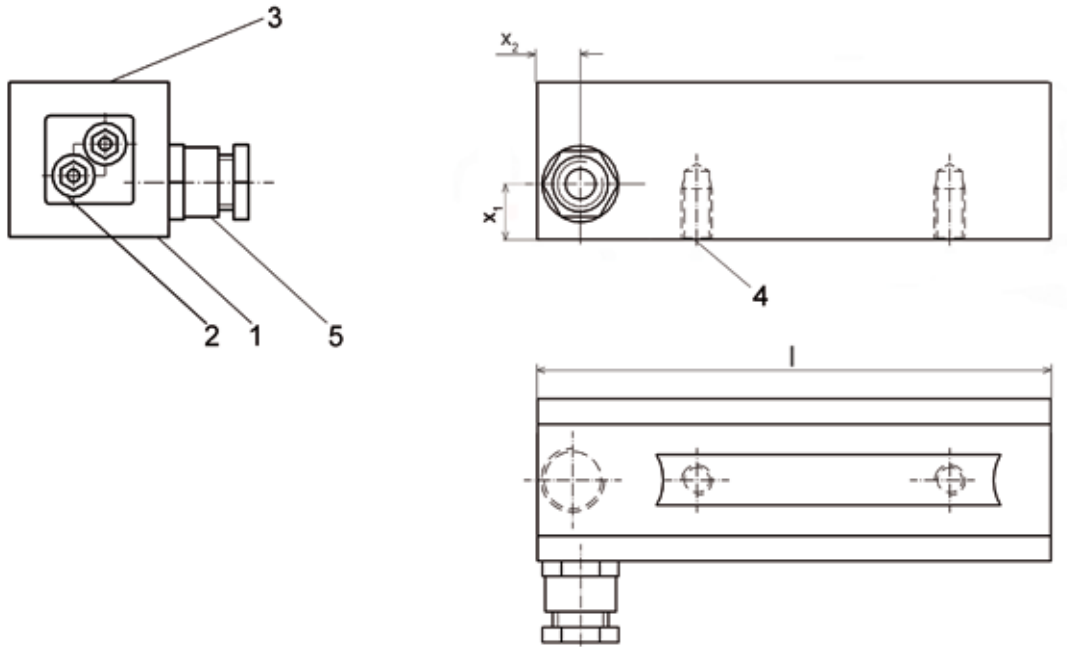
These solenoid systems are preferably used in general machine building, for handling and in safety technology for machine building.

Lateral force loading equates to a displacement force Fv of approximately $^1/_4$ F_H.

Technical Data

Standard nominal voltage: 24 V DC
Duty cycle: 100% ED
Insulation class: E

Cross Section



1= Mounting surface 2= Electrical connection 3= Holding surface / pole surface 4= Mounting thread 5= Pg gland x= Clearance l= Length
x_1= Clearance mounting side x_2= Clearance on the face

Technical Data

Designation	Length (l) x width x hight [mm]	Max. holding force [N]	Nominal power [W]	Thickness of counter plate [mm]	Thread x depth [mm]	Clearance (x_1) [mm]	Clearance (x_2) [mm]	Weight [kg]
10 31001A1	101.5 x 32 x 31	880	6.5	8	M6x10	12	8,5	0,60
10 31002A1	151.5 x 32 x 31	1500	10.5	8	M6x10	12	8,5	1,00
10 31003A1	201.5 x 32 x 31	2100	12.9	8	M6x10	12	8,5	1,20
10 31004A1	401.5 x 32 x 31	4700	24	8	M6x10	12	8,5	2,60
10 31005A1	501.5 x 32 x 31	6000	30.6	8	M6x10	12	8,5	3,20
10 31006A1	601.5 x 32 x 31	7200	45.7	8	M6x10	12	8,5	4,00
10 31007A00	151.5 x 60 x 49	2600	22.3	10	M8x12	18	10	2,20
10 31008A00	202.0 x 60 x 49	3750	30.2	10	M8x12	18	10	3,10
10 31009A00	502.0 x 60 x 49	10400	64.9	10	M8x12	18	10	8,00

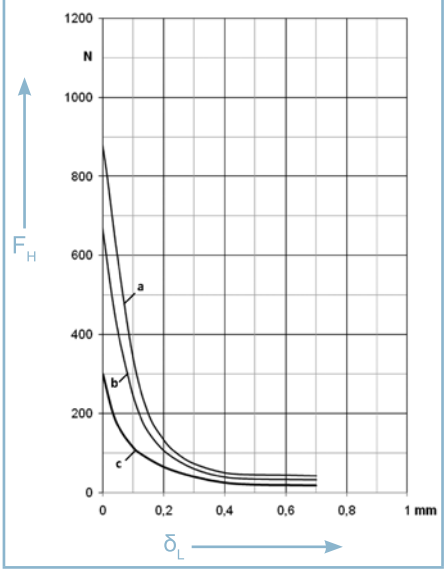
Ordering Example

10 31001A1
100 % ED; 24 V DC; 6.5 Watt

Holding Force Curves

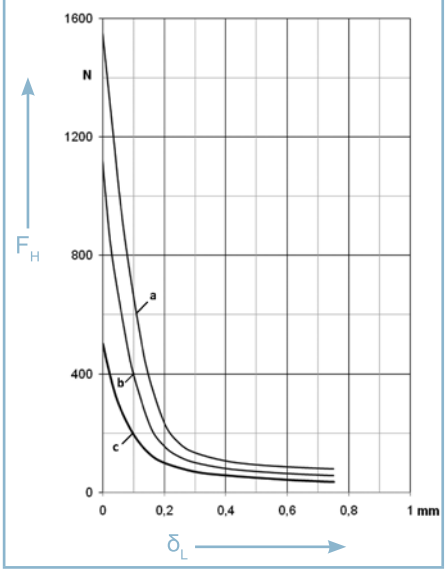
Holding forces F_H depending on air gap δ_L between holding solenoid and workpiece and on the indicated layer thickness of the counter plate. The values are valid for workpieces of material S235JR with 100% coverage of the holding surface, 90% of nominal voltage and warmed up condition (appr. 70 K excessive temperature without additional heat dissipation).

10 31001A1



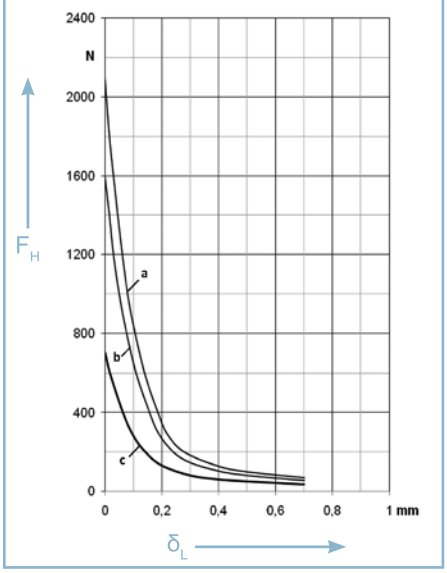
Layer thickness ≙ material thickness:
a = 8 mm c = 1,5 mm
b = 3 mm

10 31002A1



Layer thickness ≙ material thickness:
a = 8 mm c = 1,5 mm
b = 3 mm

10 31003A1

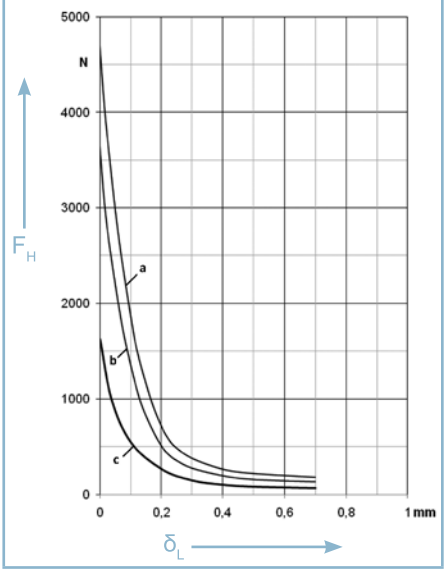


Layer thickness ≙ material thickness:
a = 8 mm c = 1,5 mm
b = 3 mm

Holding Force Curves

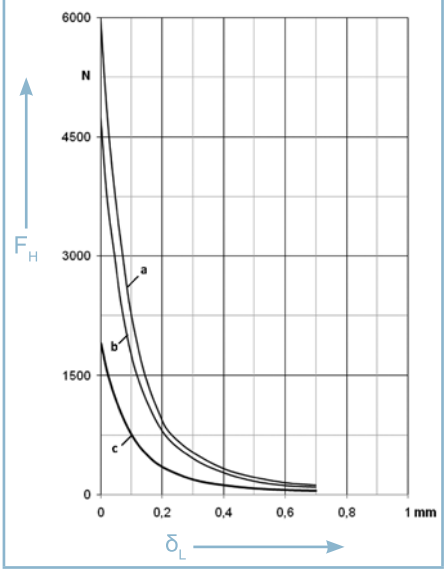
Holding forces F_H depending on air gap δ_L between holding solenoid and workpiece and on the indicated layer thickness of the counter plate. The values are valid for workpieces of material S235JR with 100% coverage of the holding surface, 90% of nominal voltage and warmed up condition (appr. 70 K excessive temperature without additional heat dissipation).

10 31004A1



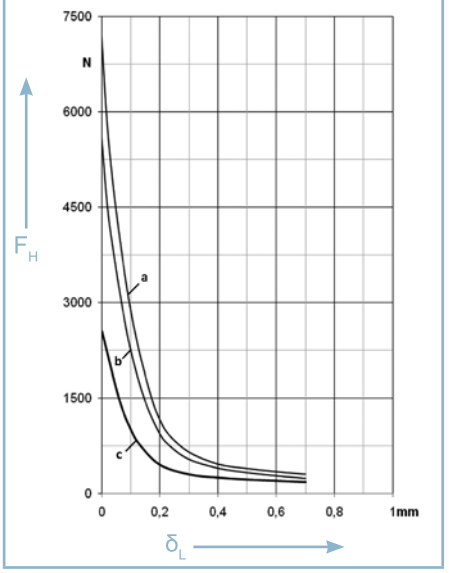
Layer thickness ≙ material thickness:
a = 8 mm c = 1,5 mm
b = 3 mm

10 31005A1



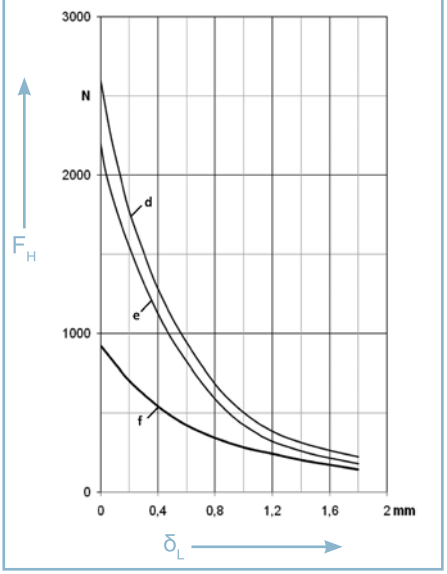
Layer thickness ≙ material thickness:
a = 8 mm c = 1,5 mm
b = 3 mm

10 31006A1



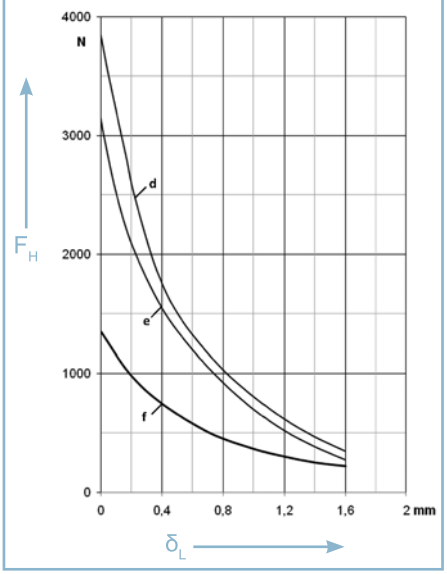
Layer thickness ≙ material thickness:
a = 8 mm c = 1,5 mm
b = 3 mm

10 31007A00



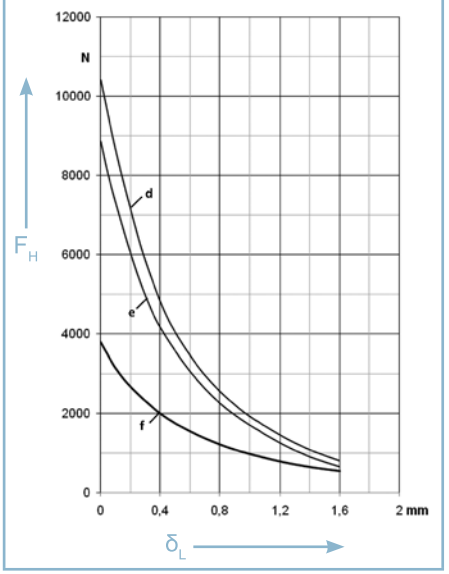
Layer thickness ≙ material thickness:
d = 10 mm e = 5 mm
f = 2,5 mm

10 31008A00



Layer thickness ≙ material thickness:
d = 10 mm e = 5 mm
f = 2,5 mm

10 31009A00



Layer thickness ≙ material thickness:
d = 10 mm e = 5 mm
f = 2,5 mm

Notes – Electromagnetic Holding Solenoids

Permanent Magnetic Holding Solenoid – Series 01 310

These permanent magnetic holding rods are electrically switchable holding solenoids. They consist of a permanent magnet and a DC-excited coil (vacuum potted) to neutralize the permanent magnetic field at the pole surface. The open magnetic circuit allows to hold ferromagnetic workpieces.

For mounting there are thread bores at the bottom side of the device. The electrical connection is made at two connecting screws which are easily accessible within the device and can be reached via a Pg gland. This gland can be screwed in alternately from the side or from the bottom.

The programm explains two different sizes with a lenght of 150 or 200 mm and a width of 60 mm.

These systems are preferably used where long holding times without energy consumption are required and a load or workpieces must be held reliably and safely in the case of power failure. These solenoids are maintenance-free and primarily used in automation and safety engineering.

Lateral force loading equates to a displacement force Fv of approximately $^1/_4$ F_H.

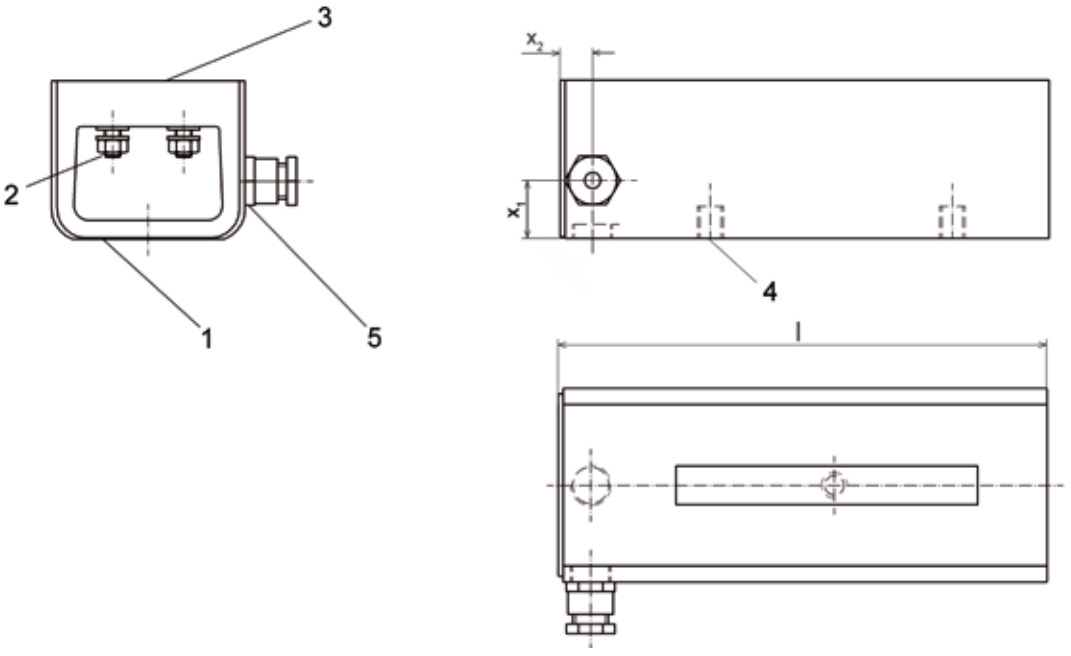
Technical Data

Standard nominal voltage: 24 V DC
Duty cycle: 25% ED
Insulation class: E

Safety note

The attractive or repulsive forces of the permanent magnet can cause skin-contusion through sudden collide, even with larger distances.

Cross Section



1= Mounting surface 2= Electrical connection 3= Holding surface / pole surface 4= Mounting thread 5= Pg gland x= Clearance l= Length
x_1= Clearance mounting side x_2= Clearance on the face

Technical Data

Designation	Length (l) x width x hight [mm]	Max. holding force [N]	Nominal power [W]	Thickness of counter plate [mm]	Thread x depth [mm]	Clearance (x_1) [mm]	Clearance (x_2) [mm]	Weight [mm]
01 31007A00	151.5 x 60 x 50	1000	27.9	6	M8x10	18	9,5	2,20
01 31008A00	201.5 x 60 x 50	1530	40	6	M8x10	18	9,5	3,00

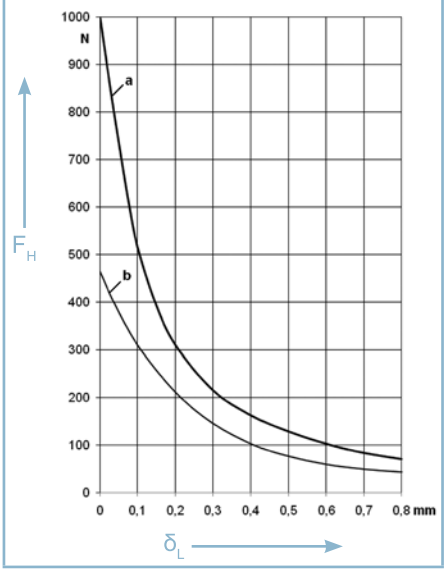
Ordering Example

01 31007A00
25 % ED; 24 V DC; 27.9 Watt

Holding Force Curves

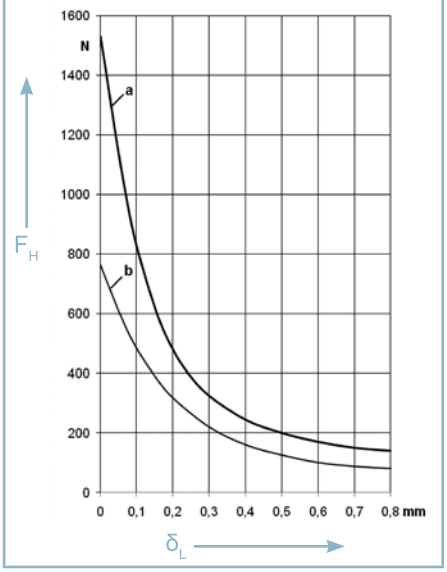
Holding forces F_H depending on air gap δ_L between holding solenoid and workpiece and on the indicated layer thickness of the counter plate. The values are valid for workpieces of material S235JR with 100% coverage of the holding surface, 90% of nominal voltage and warmed up condition (appr. 70 K excessive temperature without additional heat dissipation).

01 31007A00



Layer thickness ≙ material thickness:
a = 6 mm b = 3 mm

01 31008A00



Layer thickness ≙ material thickness:
a = 6 mm b = 3 mm

Permanent Magnetic Holding Solenoid Series 01 320

These permanent magnetic holding solenoids are electrically switchable holding systems. They consist of a permanent magnet and a DC-excited coil to neutralize the permanent magnetic field at the pole surfaces.

The open magnetic circuit allows to hold ferromagnetic workpieces.

These systems are used where in currentless state a load, a workpiece or machine parts must be held reliably and safely. The magnet housing is completely zinced and the coil is vacuum potted.

Lateral force loading equates to a displacement force Fv of approximately $^1/_4$ F_H.

Safety note

The attractive or repulsive forces of the permanent magnet can cause skin-contusion through sudden collide, even with larger distances. It is therfore absolutely essential to use protective gloves.

Technical Data

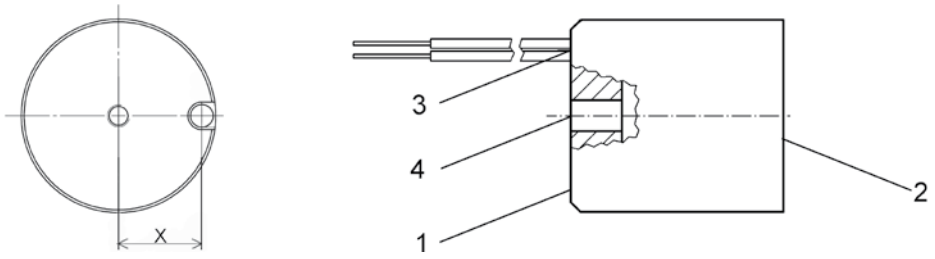
Standard nominal voltage: 24 V DC
Duty cycle: 25% ED / 100% ED
Lenght of the braid: ca. 200 mm
Insulation class: E

Accessories

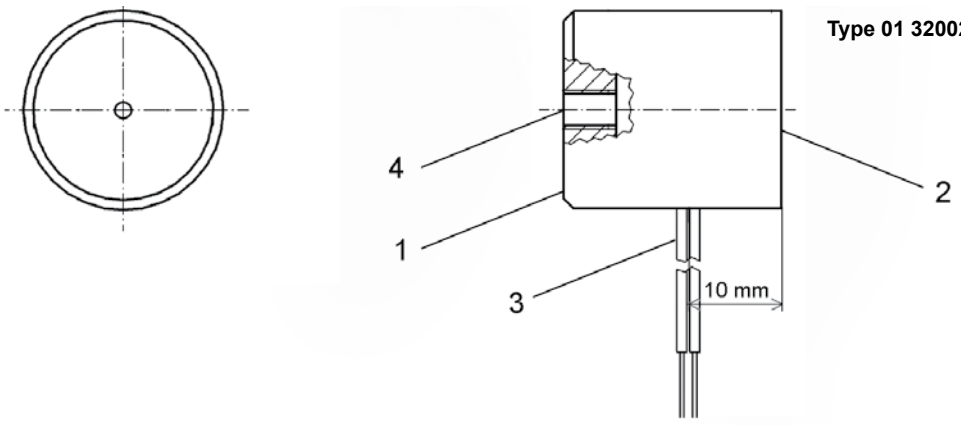
You find suitable anchor plates on page 24.

Cross Section

Type 01 32003B00 to 01 32015B00 and 01 32003A1



Type 01 32002B00



1= Mounting surface 2= Holding surface / pole surface 3= Electrical connection 4= Mounting thread x= Clearance / Lead exit

Series 01 320...B ; 24 V DC ; 25% ED

Technical Data

Designation	Diameter x height [mm]	Max. holding force [N]	Nominal power [W]	Thickness of counter plate [mm]	Thread x depth [mm]	Clearance (x) [mm]	Lead length [mm]	Weight [kg]
01 32002B00	20 x 22	40	3.6	2.5	M4x4.5	10	200	0,04
01 32003B00	35 x 28	160	4.6	3	M4x5	15	200	0,15
01 32005B00	55 x 36	420	8.9	4.5	M5x5	23	200	0,50
01 32007B00	70 x 45	720	13.3	6	M8x5	30	200	0,90
01 32009B00	90 x 48	1200	21.7	7.5	M8x7.5	39	200	1,50
01 32010B00	105 x 56	1600	28	9	M10x10	47	300	2,70
01 32015B00	150 x 63	3500	40.5	12.5	M16x16	68	300	6,40

Ordering Example

01 32002B00
25 % ED; 24V DC; 3.6 Watt

Series 01 32003A1 ; 24 V DC ; 100% ED

Technical Data

Designation	Diameter x height [mm]	Max. holding force [N]	Nominal power [W]	Thickness of counter plate [mm]	Thread x depth [mm]	Clearance (x) [mm]	Lead length [mm]	Weight [kg]
01 32003A1	32.2 x 40	260	6.2	4	M4x4.7	13	200	0,2

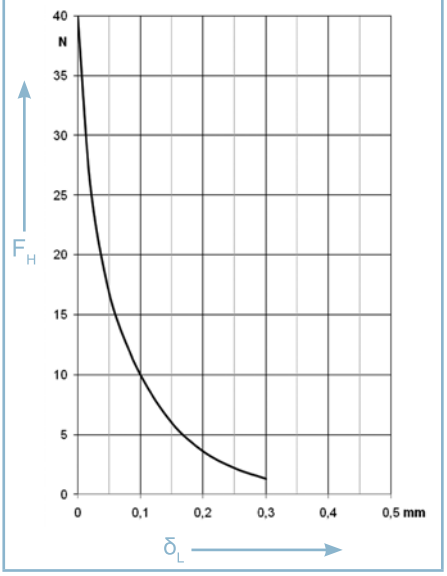
Ordering Example

01 32003A1
100 % ED; 24V DC; 6.2 Watt

Holding Force Curves

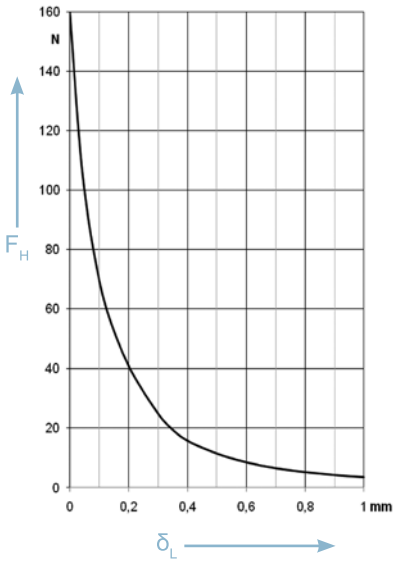
Holding forces F_H depending on air gap δ_L between holding solenoid and workpiece and on the indicated layer thickness of the counter plate. The values are valid for workpieces of material S235JR with 100% coverage of the holding surface, 90% of nominal voltage and warmed up condition (appr. 70 K excessive temperature without additional heat dissipation).

01 32002B00



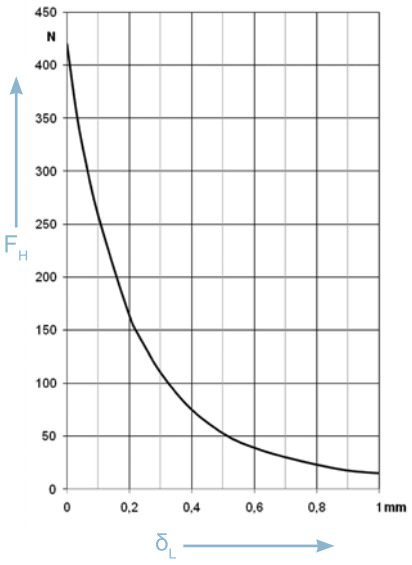
Layer thickness ≙ material thickness: 2.5 mm

01 32003B00



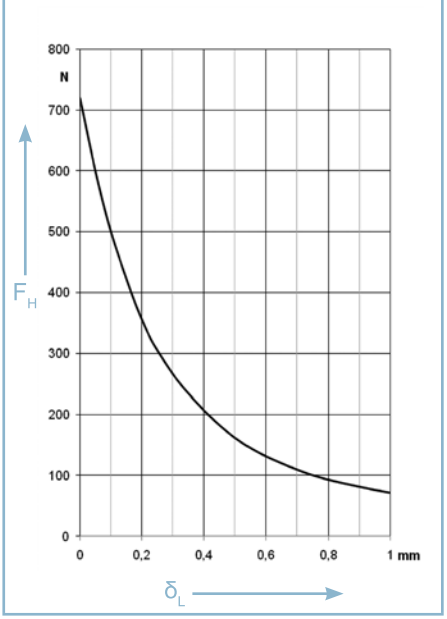
Layer thickness ≙ material thickness: 3 mm

01 32005B00



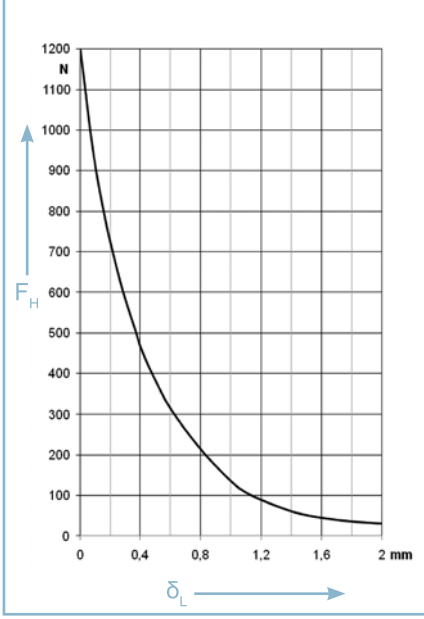
Layer thickness ≙ material thickness: 4.5 mm

01 32007B00



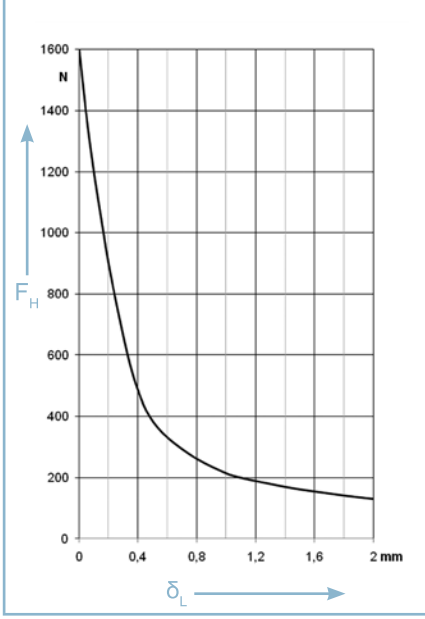
Layer thickness ≙ material thickness: 6 mm

01 32009B00



Layer thickness ≙ material thickness: 7.5 mm

01 32010B00

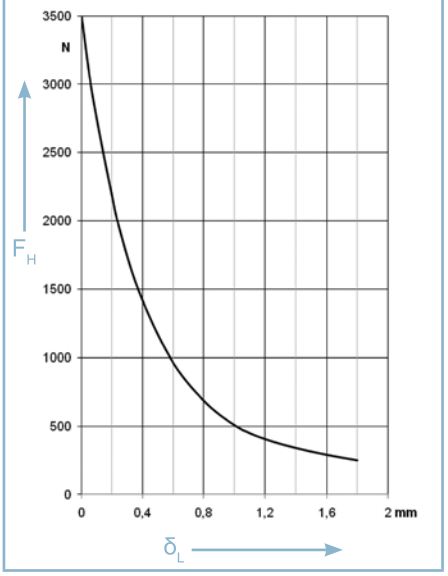


Layer thickness ≙ material thickness: 9 mm

Holding Force Curves

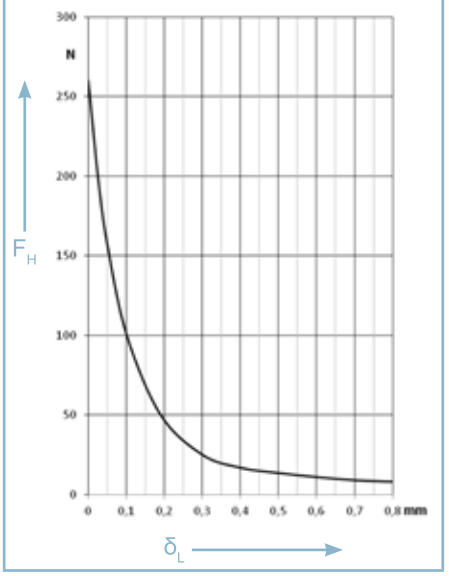
Holding forces F_H depending on air gap δ_L between holding solenoid and workpiece and on the indicated layer thickness of the counter plate. The values are valid for workpieces of material S235JR with 100% coverage of the holding surface, 90% of nominal voltage and warmed up condition (appr. 70 K excessive temperature without additional heat dissipation).

01 32015B00



Layer thickness ≙ material thickness: 12.5 mm

01 32003A1



Layer thickness ≙ material thickness: 4 mm

Notes – Permanent Magnetic Holding Solenoids

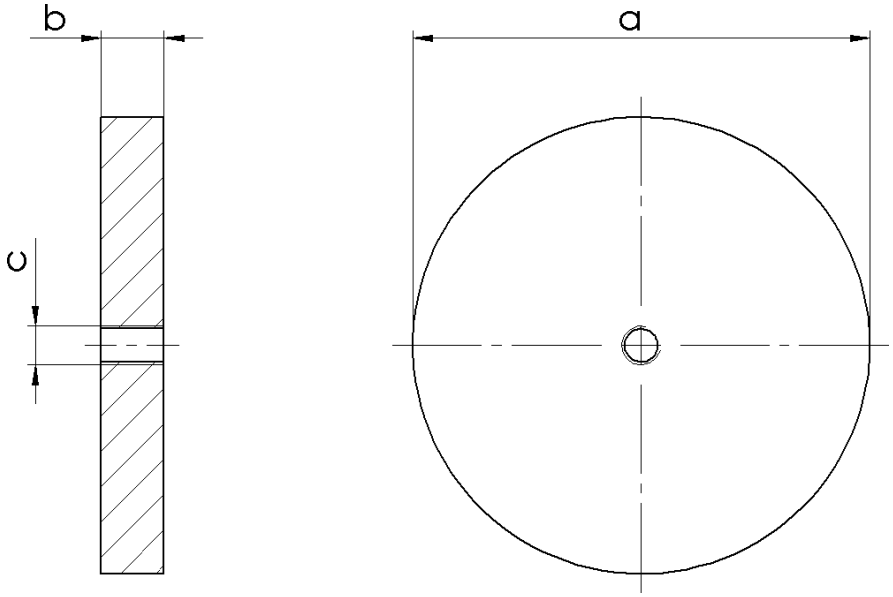
General Accessories

Anchor Plates

The anchor plate has to be selected according to the size of the holding solenoid. The plates are designed for the optimum holding forces and are larger in diameter than the corresponding holding solenoids. This allows for an easier fixation on the solenoid while mounting. If the anchor thickness is smaller or materials with an inferior surface quality are used the holding force is reduced. The complete anchor is protected against corrosion by a zinc layer. The mounting is achieved by a through-going thread boring.

For application and use of the anchor plates are the technical explanations on page 26 obsered!

Cross Section



Designation	Dimensions [mm] Diameter (a) x thickness (b)	Mounting thread (c)
GT015B001-200	17 x 4	M3
GT018B001-200	22 x 4	M3
GT025B001-200	28 x 4	M4
GT032B001-200	37 x 4	M4
GT040B001-200	42 x 7	M5
GT050B001-200	58 x 8	M5
GT063B001-200	65 x 10	M6
GT070B001-200	72 x 11	M8
GT080B001-200	82 x 13	M10
GT090B001-200	92 x 14	M10
GT100B001-200	107 x 15	M12

Notes

Technical Explanations

General user instructions for KENDRION products of magnet technology

Ferromagnetic
Magnetic properties of substances with a permeability μr » 1.

Open Magnetic Circuit
The entirety of all parts penetrated by the magnetic flux F which is supplemented by the workpiece (anchor).

Magnetic Pole N (North) S (South)
The place where the magnetic flux leaves resp. enters the holding solenoid.

Holding Force F_H
The force required to tear off a workpiece perpendicular to the holding surface when the device is switched on. The details in the data sheets refer to the total holding surface and an optimal material thickness.

Displacement Force F_V
The force required to displace a workpiece parallel to the holding surface when the device is switched on. Depending on the quality of the workpiece surface it amounts to 20 … 30% of F_H ($^1/_4$ F_H).

Air Gap δ_L
The mean distance between the holding surface of the solenoid and the bearing area of the workpiece. Shape and roughness of the surfaces facing each other and non-magnetic substances between them (e.g. galvanic coatings, varnish, scale) determine its size.

Remanence
The holding force remaining between holding solenoid and workpiece when the device is switched off without reversion of polarity. Depending on the workpiece and material it amounts to 20 … 40% of F_H.

Insulation Class
Depending on the permanent heat resistance the insulation classes are divided acc. DIN VDE 0580.

Thermal Class Insulation Class	Maximum permitted limit temperature
Y	95 °C
A	105 °C
E	120 °C
B	130 °C
F	155 °C
H	180 °C

Reversion of Polarity
Reduction of the remanence remaining between holding surface and workpiece by means of a time or current dosed reverse pulse.

Demagnetization
Reduction of the field intensity H_C. in the workpiece. It involves a polarity reversal with decreasing amplitude.

Relative Duty Cycle ED
The ratio between duty cycle and circular-trip time, e.g. expressed in per cent (% ED). In general, the electromagnetic holding solenoids are designed for 100% ED.

Warmed Up Condition
The excessive temperature identified acc. DIN VDE 0580, increased by the reference temperature. Unless otherwise indicated the reference temperature is 35°C.

Protection Class
Designates the kind of shielding of the device against outer influences.

IP 6 5
Code letters
Code no. 1
Code no. 2

Code number 1	Scope of protection Protection against contact / foreign substances
0	no protection
1	protection against large foreign substances
2	protection against medium-sized foreign substances
3	protection against small foreign substances
4	protection against grain-shaped foreign substances
5	protection against dust deposit
6	protection against dust penetration

Code number 2	Scope of protection Protection against water
0	no protection
1	protection against vertical dripping water
2	protection against dripping water falling at an angle
3	protection against spray water
4	protection against splashing water
5	protection against hose water
6	protection against flooding
7	protection during immersion
8	protection during submersion

Magnetic Flux Φ
Every permanent magnetic holding solenoid or electromagnetic holding solenoid generates a magnetic field at the holding surface between the north and south poles. By covering it with a workpiece the open magnetic circuit is closed and the usable magnetic flux F is increased. The number of lines of force penetrating a random surface A vertically per cm^2 is the flux density or the magnetic induction B.

$$\Phi = B \cdot A$$

The higher the magnetic flux Φ penetrating the workpiece is in case the holding surface remains unchanged or the higher induction B is the higher will be holding force F_H.

$$F_H = \left(\frac{B}{5000}\right)^2 \cdot (A_1 + A_2)$$

It is determined by the unfavourable resistance in the magnetic circuit. So the maximum holding force a workpiece can achieve depends on:
- the size of its bearing area
- its material properties
- the roughness of its bearing area
- the covering of the magnetic holding surface in per cent
- the air gap δ_L.

Workpiece and Bearing Area
The bearing area is the contact area with which the workpiece rests on the holding solenoid. It does not always equal the size of the workpiece. The holding force per surface unit of a holding solenoid is almost identical across the total holding surface. Particularly by the size of its bearing area the workpiece determines the maximum holding force to be achieved.

Workpiece and Material
The components of the holding solenoids which carry the magnetic flux are out of soft iron of high permeability. Due to the high magnetic conductivity of these parts the maximum holding force to be achieved depends, among other things, on the permeability of the workpiece. The workpieces differ in their structural constitution and composition. Additions of carbon, chrome, nickel, manganese, molybdenum, copper, etc. reduce the magnetic conductivity. In addition, the holding force is reduced if workpieces are hardened. The higher the hardness the more unfavourable is the magnetic conductivity.

$$B = f(H)$$

Fixing and grouping
Using several holding solenoids

a) A non-rigid fixing is required for every holding solenoid so that each one can adapt to uneven surfaces (Fig. 1).

b) Every holding solenoid should be spring-mounted below a transverse rail to dampen the stroke acceleration so that in the case of uneven bearing surfaces the difference between the loads carried by the individual magnets does not vary too greatly (Fig.2).

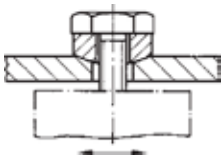


Fig. 1: Individual fixing

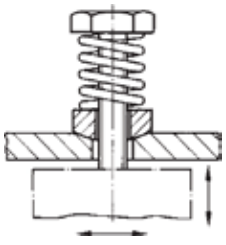


Fig. 2:Ideal fixing for group of magnets

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Special Developments

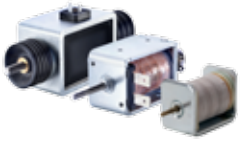
Customer-Specific Solutions

With our many years of product experience, our large product portfolio and our modern manufacturing methods we guarantee you first-class products.

We develop special **linear solenoids, rotary solenoids, combined lifting/holding systems, solenoid valves as well as coils and components** for a wide range of industries:

- Switchgear engineering
- Medical engineering
- Safety engineering
- Sorting technology
- Environmental technology
- Special engineering
- Beverage dispensing
- Control technology

Linear Solenoids



Classic Line

- Direct acting solenoids
- Monostable direct acting solenoids

High Performance Line

- High performance direct acting solenoids

High Power Line

- Direct acting solenoids
- Reversible solenoids

Control Power Line

- Control solenoids

Elevator Line

- Single-acting spreader solenoids
- Double-acting spreader solenoids

ATEX Line

- Explosion-proof direct acting solenoids

Locking Line

- Locking solenoids

System Line

- AC solenoids

Holding Solenoids

HAHN CQ^{LINE}

- Door holding solenoids

Industrial Line

- Electromagnetic holding solenoids
- Permanent magnetic holding solenoids

Oscillating Solenoids

Oscillating Line

- Shaker solenoids
- Arc vibrators
- Inline vibrators
- Linear vibrators

- Oscillating solenoids

KENDRION

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INDUSTRIAL MAGNETIC SYSTEMS

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