

ElectroMagnets

For Energise-to-Hold and Energise-to-Release applications



ELECTRO

**ECLIPSE
MAGNETICS**

Introduction



- We offer a range of Energise-to-Hold and Energise-to-Release magnets and the associated armature plates for clamping to.
- The Energise-to-Hold magnet is also known as an electromagnet or an electroholding magnet.
- The Energise-to-Release magnet is also known as an electropermanent magnet or an electroreleasing magnet.
- Your application will determine which product is best to use. Every application will have its own requirements that may affect the best choice of product.
- For pick-and-place applications and applications requiring a Factor of Safety such as 3:1 WLL it is recommended that an Eclipse Magnetics PSPM, ESPM or magnetic lifter is used instead; these have additional safety designed into them. For technical support please contact us.
- For optimal performance the recommended size of armature plate should be used. Other ferromagnetic surfaces can be used for clamping to but, as this will change the magnetic circuit and impact the performance.
- When a current passes through an Energise-to-Hold magnet this is a power consumption which will cause the unit to heat up. Where the unit will be clamping for more than two (2) hours continuously, or for more time than it is not clamping an Energise-to-Release magnet should be regarded as a more suitable option for reducing heat effects, and reducing energy consumption.
- The application will affect how hot the Energise-to-Hold or Energise-to-Release magnet may get during use, and the heat sink effect or heat insulation effect from the unit's surrounding can affect how it dissipates heat; overheating can reduce performance.
- The Energise-to-Hold magnets, Energise-to-Release magnets and the associated armature plates are REACH and RoHS compliant.
- This information is for technically qualified users to initially assess suitability of these products in their application. It does not guarantee the products are suitable for all applications. For support selecting the most suitable product please contact us.

Applications

- The Energise-to-Hold magnets are used for holding a ferrous part when energised and releasing the ferrous part when not energised. An electric current is needed for it to clamp; without a current it will not clamp.
- The Energise-to-Release magnets are used for holding a ferrous part when not energised and releasing the ferrous part when energised. It uses an internal magnet to clamp; an electric current is needed for it to not clamp.
- The Energise-to-Hold magnets are ideally suited for short timescale clamping applications where you only want to have a short timescale of voltage applied to hold a part for a short time to then turn the power supply off to allow a release of the clamped part. In this usage, power consumption is low and the electromagnet should not heat up much as it spends most of its time without a current applied so it is not clamping.
- The Energise-to-Release magnets are ideally suited for long timescale clamping applications where you want to have a part held in place for a long to very long time and only want to release to hold infrequently. In this usage, power consumption is low and the electromagnet should not heat up much as it spends most of its time clamping using the internal permanent magnet. If clamping for over two (2) hours continually, please use these Energise-to-Release magnets.
- Suitability of our product in your application will depend on your application and the environmental conditions (e.g. IP rating requirement). Examples of applications include, amongst others:
 - Magnetic fixtures (please also consider Magnetic Chucks)
 - Door/Gate holding
 - Machine Guards
 - Access Control
 - Control solenoids
 - Interlocking
 - Fire Doors
 - Magnetic latch / catch
 - General purpose electromagnetic clamping (without WLL requirements)

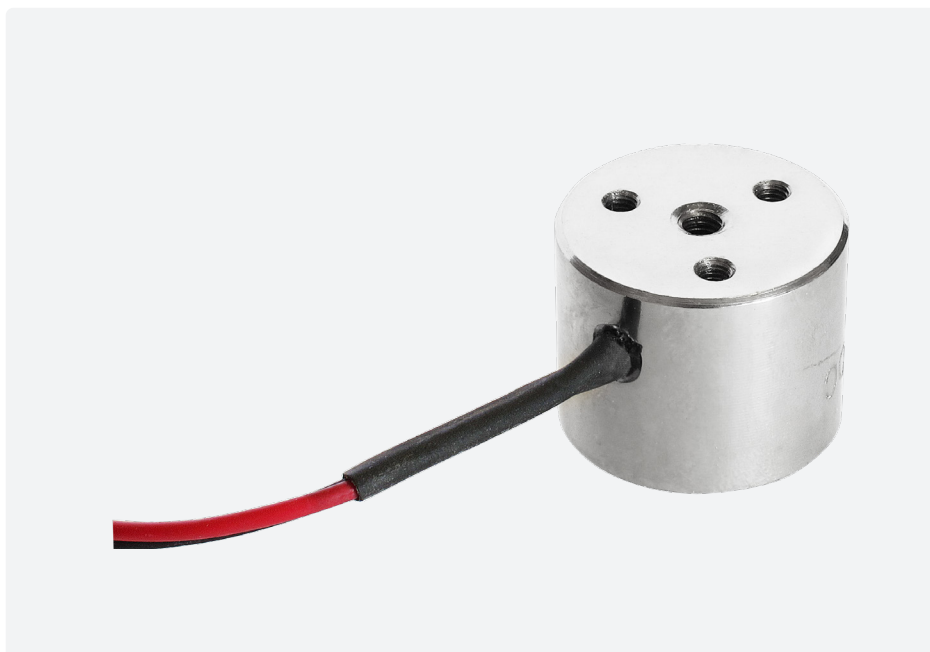


*** Expected performance variations.** The pull force of any energise-to-hold or energise-to-release magnet is not guaranteed and will vary according to the application, the power supply plus electrical circuit used, the environmental conditions, and also how hot the unit gets during operation. The values stated are typical maximum values at room temperature subject to an expected +/-10% variation. To achieve the optimum pull force, 100% contact area must be achieved; using the recommended armature plate is advised as the pull force is affected when other material specifications, thicknesses and surfaces are used, or if the armature fails to make full contact over the diameter of the magnet face. Where misalignment may be an issue, it is recommended that an oversized armature plate is used to ensure 100% contact, this however will reduce the stated pull force by approximately 10%. If being powered continuously for over two (2) hours, it is recommended that an energise-to-release magnet is used.

Energise-to-Hold Magnet: 20mm

Technical Data

Mountings	Threaded holes in rear face
Finish	Bright nickel-plated with machined face
Weight	36g
Typical Holding Force	5.2kg
ED Rating	100%
IP Rating	54
Standard Operating Voltage	12VDC M52180/12VDC 24VDC M52180/24VDC
Current	12V - 210mA 24V - 100mA
Typical Power	2.4 - 2.5W
Connection Type	12VDC & 24VDC Free Leads (500mm Long)

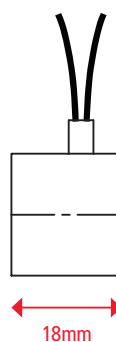


Recommended Armature Plate

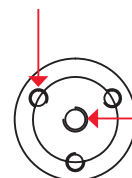
Finish	Bright nickel-plated
Diameter	25mm
Height	3mm
Screw	M3
Part Number	M52171/25ARM
Weight	15g



Leads:
1 Red & 1 Black
0.3mm Square
500mm Long

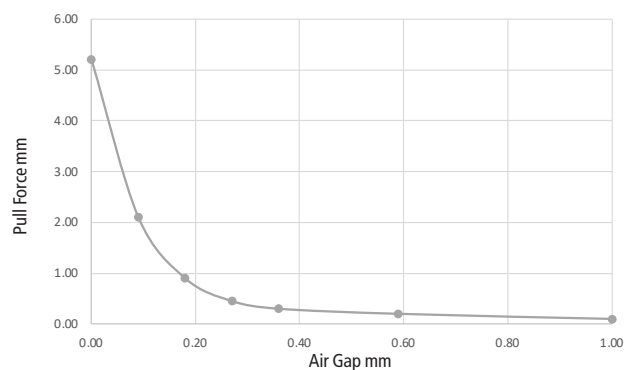


3 Holes Tapped M3
Coarse x 5mm Deep
on 14mm P.C.D.



Tapped M4 Coarse
x 10mm Deep

Air Gap (mm)	Pull Force* (kg)
0.00	5.20
0.09	2.10
0.18	0.90
0.27	0.45
0.36	0.30
0.59	0.20
1.00	0.10



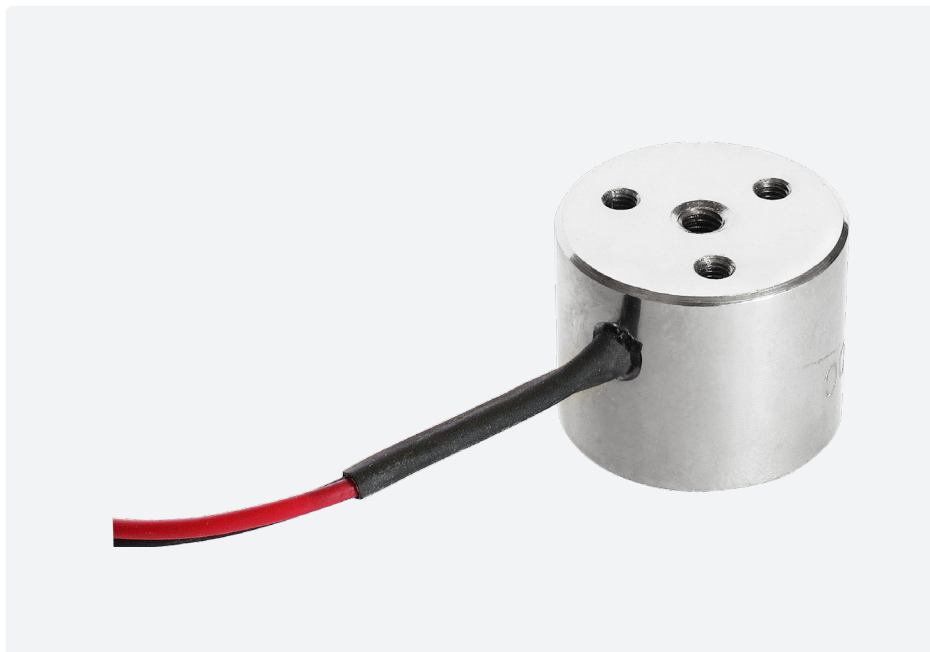
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Energise-to-Hold Magnet: 25mm



Technical Data

Mountings	Threaded holes in rear face
Finish	Bright nickel-plated with machined face
Weight	66g
Typical Holding Force	15.0kg
ED Rating	100%
IP Rating	54
Standard Operating Voltage	12VDC M52172/12VDC 24VDC M52172/24VDC
Current	12V - 180mA 24V - 90mA
Typical Power	2.1 - 2.2W
Connection Type	12VDC & 24VDC Free Leads (500mm Long)

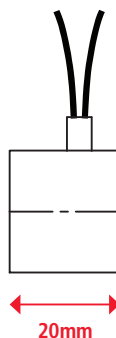


Recommended Armature Plate

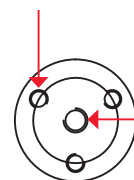
Finish	Bright nickel-plated
Diameter	25mm
Height	3mm
Screw	M3
Part Number	M52171/25ARM
Weight	15g



Leads:
1 Red & 1 Black
0.3mm Square
500mm Long

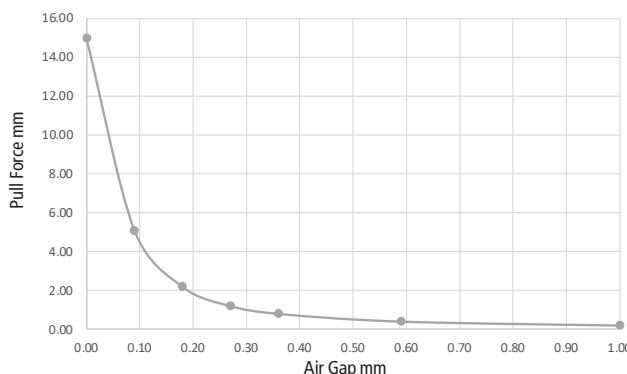


3 Holes Tapped M3
Coarse x 5mm Deep
on 15mm P.C.D.



Tapped M4 Coarse
x 10mm Deep

Air Gap (mm)	Pull Force* (kg)
0.00	15.00
0.09	5.10
0.18	2.20
0.27	1.20
0.36	0.80
0.59	0.40
1.00	0.20

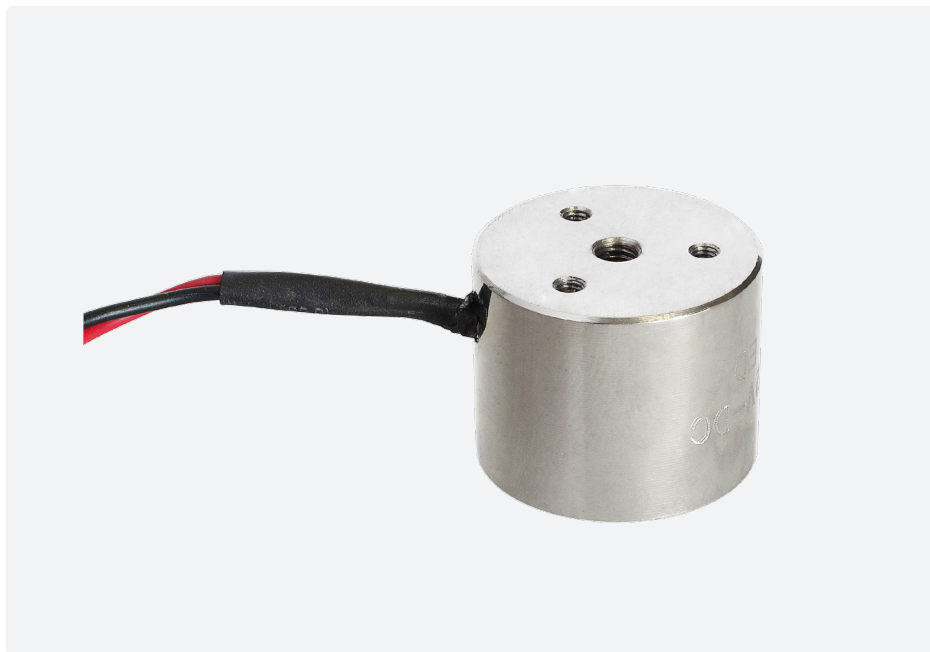


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Energise-to-Hold Magnet: 30mm

Technical Data

Mountings	Threaded holes in rear face
Finish	Bright nickel-plated with machined face
Weight	108g
Typical Holding Force	28.0kg
ED Rating	100%
IP Rating	54
Standard Operating Voltage	12VDC M52173/12VDC 24VDC M52173/24VDC
Current	12V - 280mA 24V - 140mA
Typical Power	3.3W
Connection Type	12VDC & 24VDC Free Leads (500mm Long)

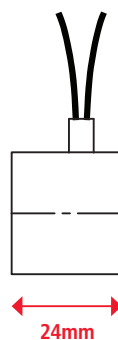


Recommended Armature Plate

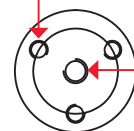
Finish	Bright nickel-plated
Diameter	30mm
Height	4mm
Screw	M4
Part Number	M52171/30ARM
Weight	30g



Leads:
1 Red & 1 Black
0.3mm Square
500mm Long

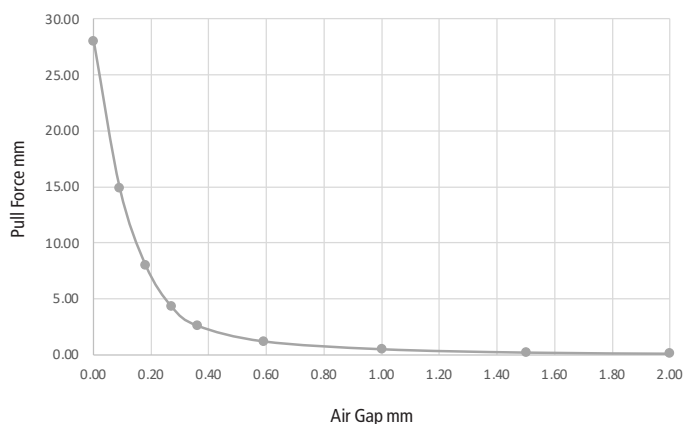


3 Holes Tapped M3
Coarse x 5mm Deep
on 18mm P.C.D.



Tapped M5 Coarse
x 10mm Deep

Air Gap (mm)	Pull Force* (kg)
0.00	28.00
0.09	14.90
0.18	8.00
0.27	4.30
0.36	2.60
0.59	1.20
1.00	0.50
1.50	0.20
2.00	0.10



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Energise-to-Hold Magnet: 40mm

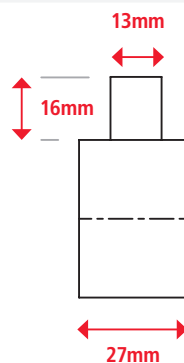
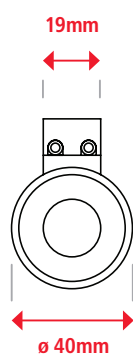
Technical Data

Mountings	Threaded holes in rear face
Finish	Bright nickel-plated with machined face
Weight	210g
Typical Holding Force	55.0 kg
ED Rating	100%
IP Rating	20
Standard Operating Voltage	12VDC M52174/12VDC 24VDC M52174/24VDC
Current	12V - 440mA 24V - 230mA
Typical Power	5.28 - 5.5W
Connection Type	12VDC & 24VDC Two-pole connector

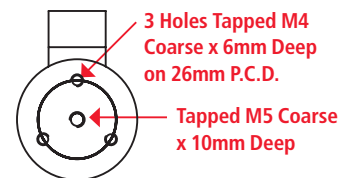


Recommended Armature Plate

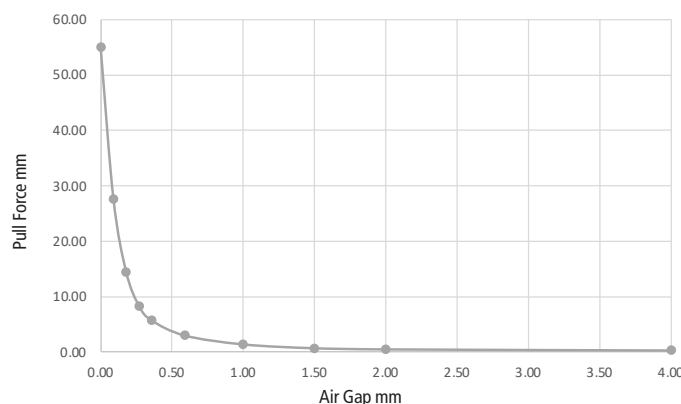
Finish	Bright nickel-plated
Diameter	40mm
Height	5mm
Screw	M4
Part Number	M52171/40ARM
Weight	50g



Connecting Block



Air Gap (mm)	Pull Force* (kg)
0.00	55.00
0.09	27.60
0.18	14.40
0.27	8.30
0.36	5.70
0.59	3.00
1.00	1.40
1.50	0.70
2.00	0.50
4.00	0.30



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Energise-to-Hold Magnet: 50mm



Technical Data

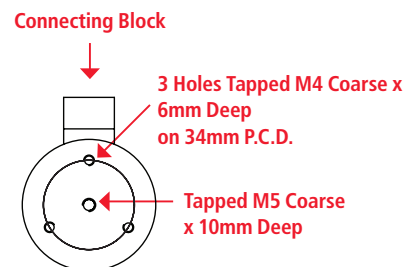
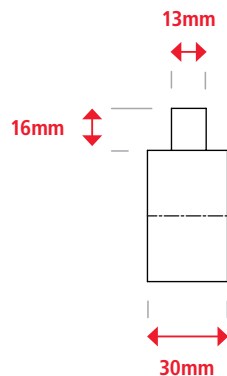
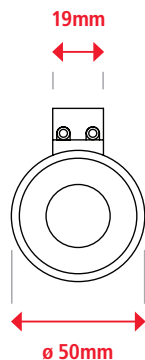
Mountings	Threaded holes in rear face
Finish	Bright nickel-plated with machined face
Weight	12V / 24V: 364g. 240V: 408g
Typical Holding Force	100.0kg
ED Rating	100%
IP Rating	20 - Two-pole connector 54 - Hirschmann connector
Standard Operating Voltage	12VDC M52175/12VDC 24VDC M52175/24VDC 240VAC M52175/240VA
Current	12V - 470mA 24V - 240mA 240V - 40mA
Typical Power	12V & 24V - 5.64 - 5.76W 240V - 8.56W
Connection Type	12VDC & 24VDC: Two-pole connector 240VAC: Hirschmann connector with Rectifier



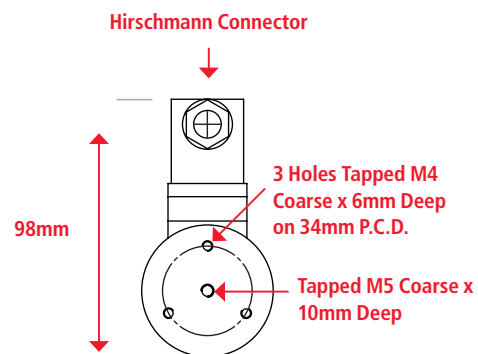
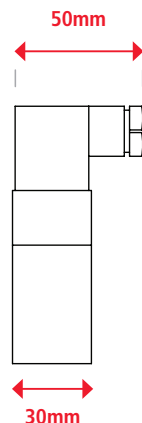
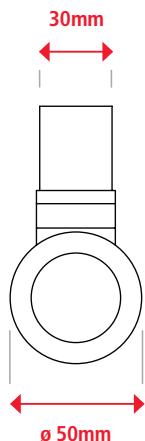
Recommended Armature Plate

Finish	Bright nickel-plated
Diameter	50mm
Height	6mm
Screw	M4
Part Number	M52171/50ARM
Weight	100g

12VDC/24VDC



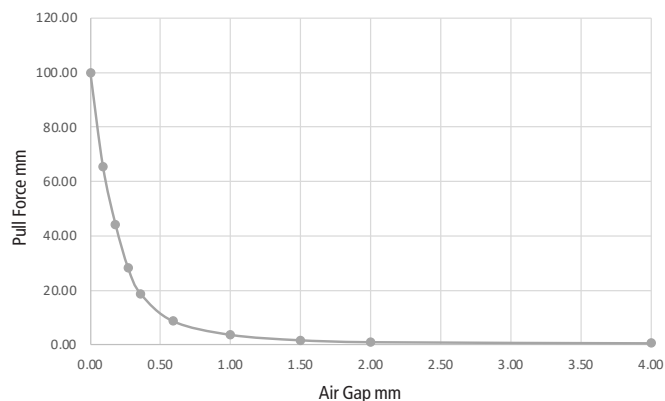
240VAC



Energise-to-Hold Magnet: 50mm

12VDC/24VDC/240VAC

Air Gap (mm)	Pull Force* (kg)
0.00	100.00
0.09	65.50
0.18	44.20
0.27	28.20
0.36	18.70
0.59	8.70
1.00	3.70
1.50	1.70
2.00	1.00
4.00	0.60



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Energise-to-Hold Magnet: 65mm



Technical Data

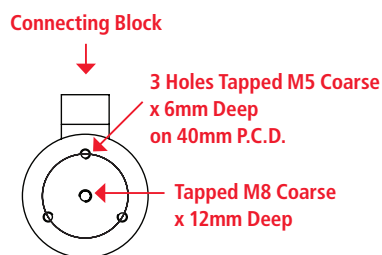
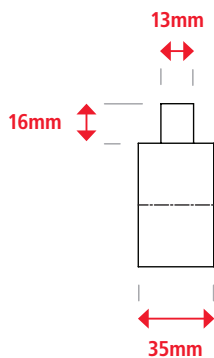
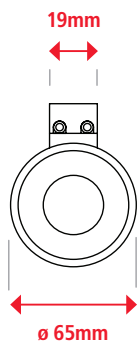
Mountings	Threaded holes in rear face
Finish	Bright nickel-plated with machined face
Weight	12V / 24V: 710g, 240V: 744g
Typical Holding Force	164.0kg 100%
ED Rating	20 - Two-pole connector
IP Rating	54 - Hirschmann connector
Standard Operating Voltage	12VDC M52176/12VDC 24VDC M52176/24VDC 240VAC M52176/240VA
Current	12V - 690mA 24V - 340mA 240V - 50mA
Typical Power	12V & 24V - 8.28W 240V - 10.7W
Connection Type	12VDC & 24VDC: Two-pole connector 240VAC: Hirschmann connector with Rectifier



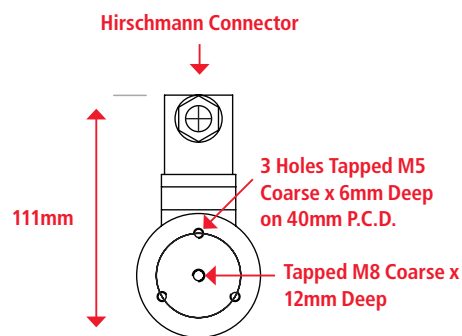
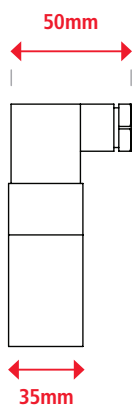
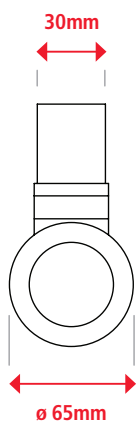
Recommended Armature Plate

Finish	Bright nickel-plated
Diameter	65mm
Height	8mm
Screw	M5
Part Number	M52171/65ARM
Weight	210g

12VDC/24VDC



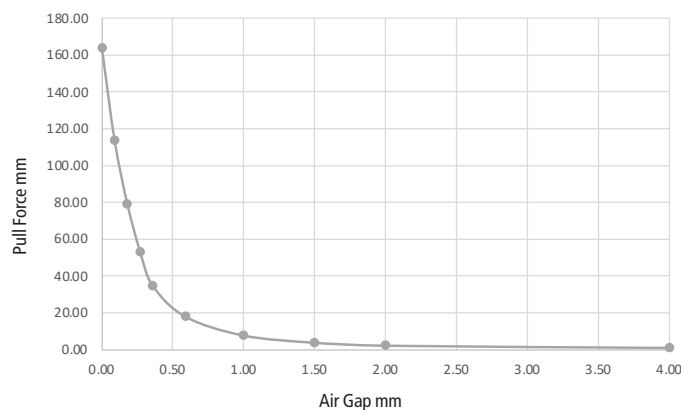
240VAC



Energise-to-Hold Magnet: 65mm

12VDC/24VDC/240VAC

Air Gap (mm)	Pull Force* (kg)
0.00	164.00
0.09	113.70
0.18	79.20
0.27	53.30
0.36	34.70
0.59	18.00
1.00	7.80
1.50	3.90
2.00	2.30
4.00	1.10



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Energise-to-Hold Magnet: 80mm



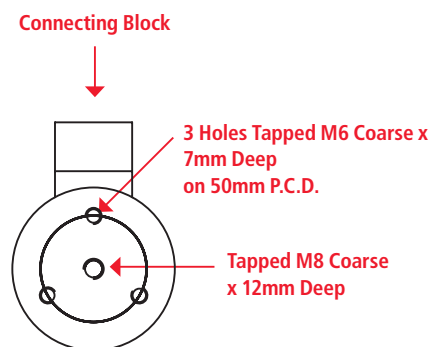
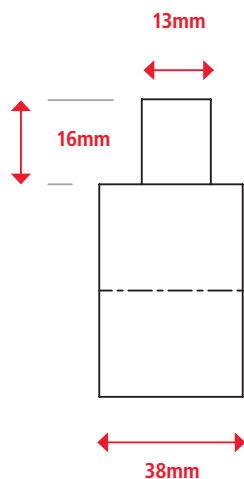
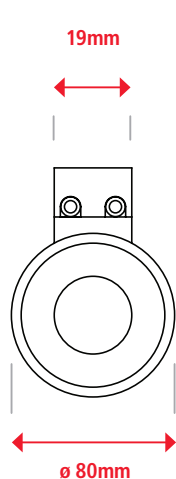
Technical Data

Mountings	Threaded holes in rear face
Finish	Bright nickel-plated with machined face
Weight	1203g
Typical Holding Force	228.0kg
ED Rating	100%
IP Rating	20
Standard Operating Voltage	12VDC M52183/12VDC 24VDC M52183/24VDC
Current	12V - 1116mA 24V - 580mA
Typical Power	13.4 - 13.9W
Connection Type	12VDC & 24VDC Two-pole connector



Recommended Armature Plate

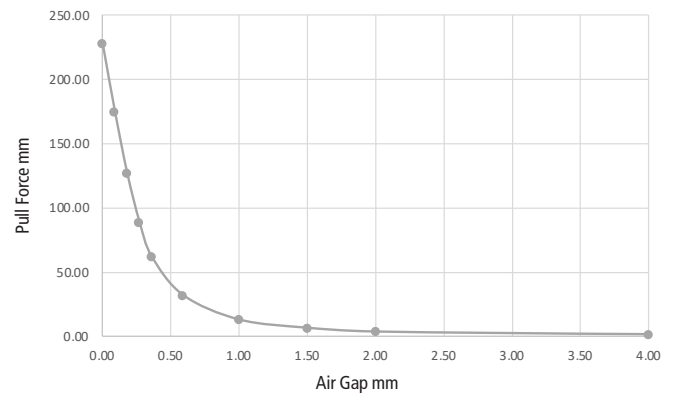
Finish	Bright nickel-plated
Diameter	80mm
Height	10mm
Screw	M6
Part Number	M52171/80ARM
Weight	400g



Energise-to-Hold Magnet: 80mm

12VDC/24VDC

Air Gap (mm)	Pull Force* (kg)
0.00	228.00
0.09	175.00
0.18	127.00
0.27	89.00
0.36	62.00
0.50	32.00
1.00	13.00
1.50	6.60
2.00	3.65
4.00	1.60
6.00	1.10
8.00	0.90



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Energise-to-Hold Magnet: 100mm



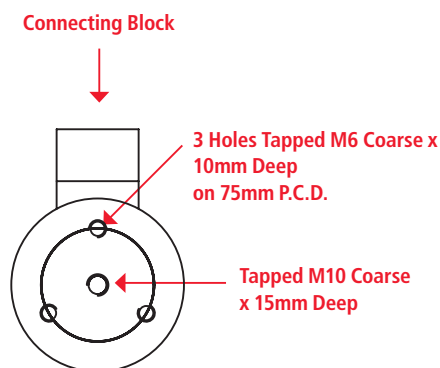
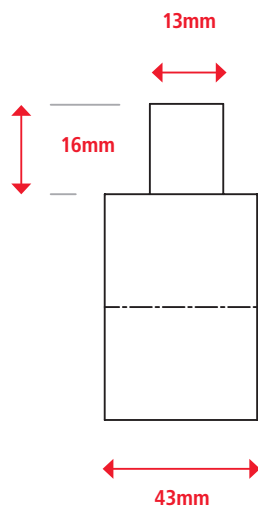
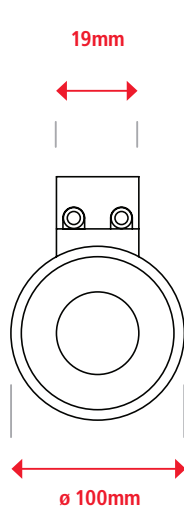
Technical Data

Mountings	Threaded holes in rear face
Finish	Bright nickel-plated with machined face
Weight	2200g
Typical Holding Force	360.0kg
ED Rating	100%
IP Rating	20
Standard Operating Voltage	12VDC M52184/12VDC 24VDC M52184/24VDC
Current	12V - 1850mA 24V - 940mA
Typical Power	22.2 - 22.6W
Connection Type	12VDC & 24VDC Two-pole connector



Recommended Armature Plate

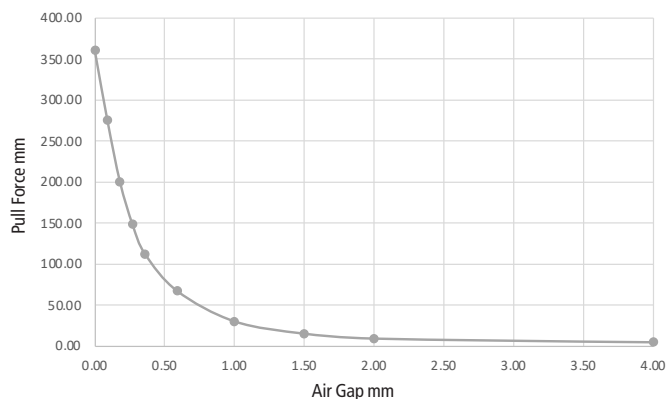
Finish	Bright nickel-plated
Diameter	100mm
Height	12mm
Screw	M10
Part Number	M52171/100ARM
Weight	740g



Energise-to-Hold Magnet: 100mm

12VDC/24VDC

Air Gap (mm)	Pull Force* (kg)
0.00	360.00
0.09	275.00
0.18	200.00
0.27	148.00
0.36	112.00
0.59	67.00
1.00	30.00
1.50	15.00
2.00	9.00
4.00	4.50
6.00	2.80
8.00	1.95



*** Expected performance variations.** The pull force of any energise-to-hold or energise-to-release magnet is not guaranteed and will vary according to the application, the power supply plus electrical circuit used, the environmental conditions, and also how hot the unit gets during operation. The values stated are typical maximum values at room temperature subject to an expected +/-10% variation. To achieve the optimum pull force, 100% contact area must be achieved; using the recommended armature plate is advised as the pull force is affected when other material specifications, thicknesses and surfaces are used, or if the armature fails to make full contact over the diameter of the magnet face. Where misalignment may be an issue, it is recommend that an oversized armature plate is used to ensure 100% contact, this however will reduce the stated pull force by approximately 10%. If being powered continuously for over two (2) hours, it is recommend that an energise-to-release magnet is used.

Energise-to-Release Magnet: 35mm



Technical Data

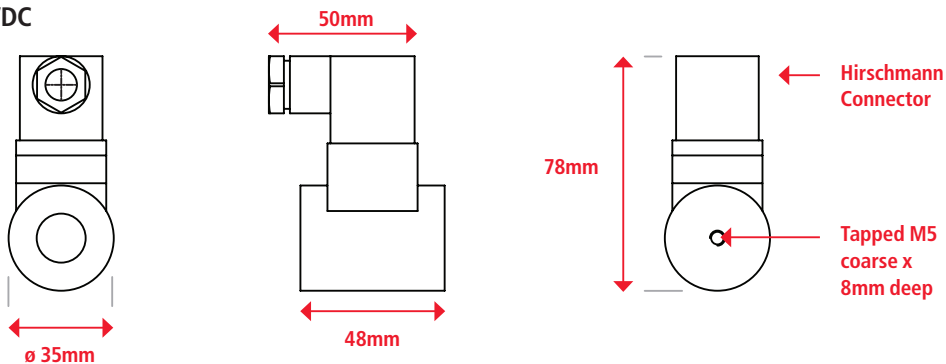
Mountings	Central machined hole in rear face of magnet
Finish	Bright nickel-plated with machined face
Weight	24VDC: 352g 240VAC: 354g
Typical Holding Force	23.0 kg
IP Rating	54
Standard Operating Voltage	24VDC M52177/24VDC 240VAC M52177/240VA
Current	24V - 240mA 240V - 50mA
Typical Power	24VDC: 5.28W 240VAC: 6.42W
Duty cycle	S2
Connection Type	24VDC: Hirschmann connector 240VAC: Hirschmann connector with rectifier



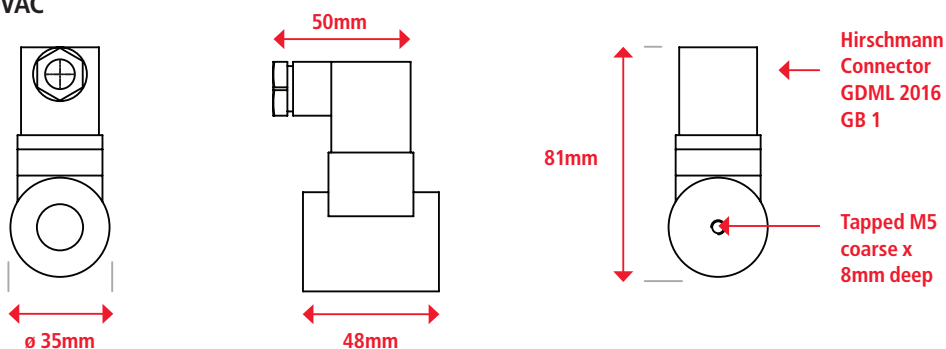
Recommended Armature Plate

Finish	Bright nickel-plated
Diameter	40mm
Height	5mm
Screw	M4
Part Number	M52171/40ARM
Weight	50g

24VDC



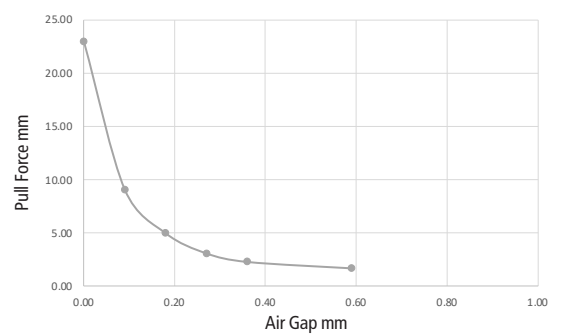
240VAC



Energise-to-Release Magnet: 35mm

24VDC/240VAC

Air Gap (mm)	Pull Force* (kg)
0.00	23.00
0.09	9.10
0.18	5.00
0.27	3.10
0.36	2.30
0.59	1.70



*** Expected performance variations.** The pull force of any energise-to-hold or energise-to-release magnet is not guaranteed and will vary according to the application, the power supply plus electrical circuit used, the environmental conditions, and also how hot the unit gets during operation. The values stated are typical maximum values at room temperature subject to an expected +/-10% variation. To achieve the optimum pull force, 100% contact area must be achieved; using the recommended armature plate is advised as the pull force is affected when other material specifications, thicknesses and surfaces are used, or if the armature fails to make full contact over the diameter of the magnet face. Where misalignment may be an issue, it is recommend that an oversized armature plate is used to ensure 100% contact, this however will reduce the stated pull force by approximately 10%. If being powered continuously for over two (2) hours, it is recommend that an energise-to-release magnet is used.

Energise-to-Release Magnet: 50mm



Technical Data

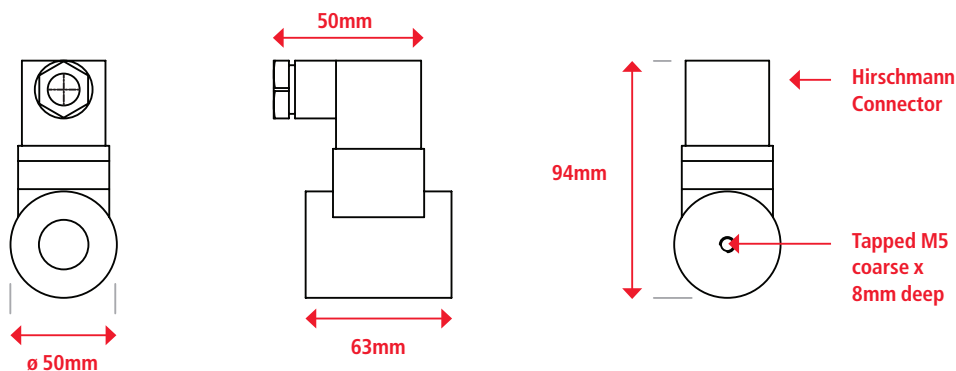
Mountings	Central machined hole in rear face of magnet
Finish	Bright nickel-plated with machined face
Weight	24VDC: 874g 240VAC: 880g
Typical Holding Force	55kg
IP Rating	54
Standard Operating Voltage	24VDC M52178/24VDC 240VAC M52178/240VA
Current	24VDC - 350mA 240VAC - 40mA
Typical Power	24VDC: 8.4W 240VAC: 8.56W
Duty cycle	S2
Ambient temperature	35°C
Connection Type	24VDC: Hirschmann connector 240VAC: Hirschmann connector with rectifier



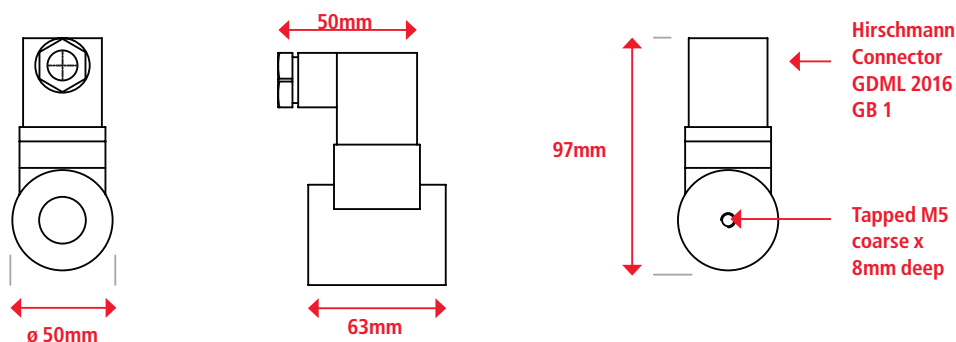
Recommended Armature Plate

Finish	Bright nickel-plated
Diameter	50mm
Height	6mm
Screw	M4
Part Number	M52171/50ARM
Weight	100g

24VDC



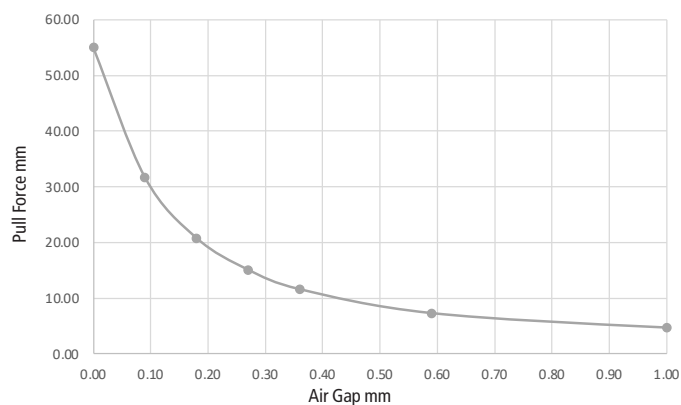
240VAC



Energise-to-Release Magnet: 50mm

24VDC/240VAC

Air Gap (mm)	Pull Force* (kg)
0.00	55.00
0.09	31.70
0.18	20.80
0.27	15.10
0.36	11.60
0.59	7.30
1.00	4.70
1.50	2.80



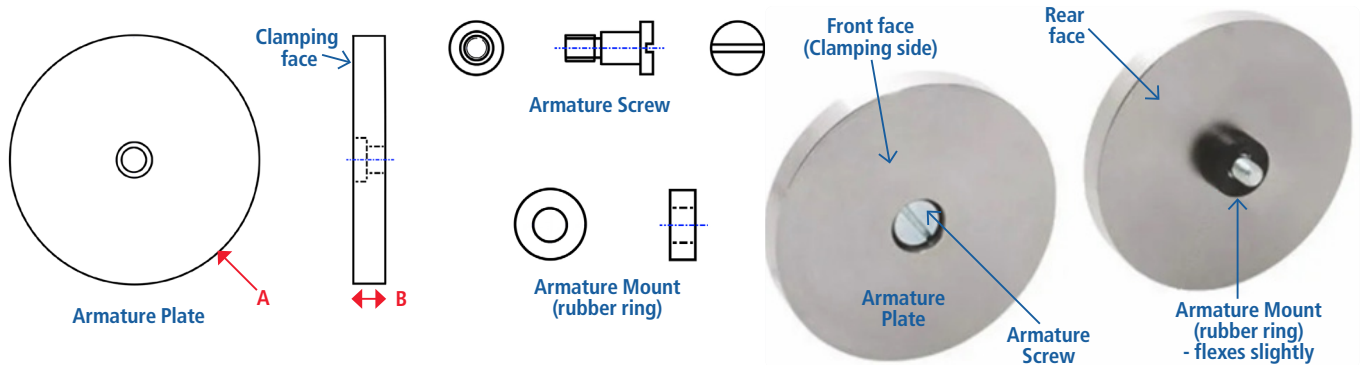
*** Expected performance variations.** The pull force of any energise-to-hold or energise-to-release magnet is not guaranteed and will vary according to the application, the power supply plus electrical circuit used, the environmental conditions, and also how hot the unit gets during operation. The values stated are typical maximum values at room temperature subject to an expected +/-10% variation. To achieve the optimum pull force, 100% contact area must be achieved; using the recommended armature plate is advised as the pull force is affected when other material specifications, thicknesses and surfaces are used, or if the armature fails to make full contact over the diameter of the magnet face. Where misalignment may be an issue, it is recommended that an oversized armature plate is used to ensure 100% contact, this however will reduce the stated pull force by approximately 10%. If being powered continuously for over two (2) hours, it is recommended that an energise-to-release magnet is used.

Armature Plates

- The armature plates fit both Energise-to-Hold and Energise-to-Release magnets. Supplied with armature screw and rubber ring armature mount.
- The armature plate is nickel plated to protect against any corrosion risks.
- Select an Armature Plate of same or bigger diameter than the Energise-to-Hold or Energise-to-Release magnet you have chosen.
- Rubber ring supplied allows for a small degree of flex in the armature plate movement to maximise direct contact to the Energise-to-Hold or Energise-to-Release magnet clamping face to enable maximum possible pull forces to be achieved. Air gaps and misalignment will reduce the pull force. The armature screw head sits under the contact face to prevent interference with the magnetic face so will not mechanically interfere with the Energise-to-Hold or Energise-to-Release magnetic force.



Product Number	Diameter (A) mm	Height (B) mm	Armature Screw supplied	To Suit ElectroMagnet Diameter mm	Weight g	Recommended to be used with ElectroMagnet Product Number	Recommended to be used with Electro-Permanent Magnet Product Number
M52171/25ARM	25	3	M3	20 / 25	15	M52180/12VDC, M52180/24VDC, M52172/12VDC, M52172/24VDC	
M52171/30ARM	30	4	M4	30	30	M52173/12VDC, M52173/24VDC	
M52171/40ARM	40	5	M4	35 / 40	50	M52174/12VDC, M52174/24VDC	M52177/24VDC, M52177/240VA
M52171/50ARM	50	6	M4	50	100	M52175/12VDC, M52175/24VDC, M52175/240VA	M52178/24VDC, M52178/240VA
M52171/65ARM	65	8	M5	65	210	M52176/12VDC, M52176/24VDC, M52176/240VA	
M52171/80ARM	80	10	M6	80	400	M52183/12VDC, M52183/24VDC	
M52171/100ARM	100	12	M10	100	740	M52184/12VDC, M52184/24VDC	



- The actual pull force that is achieved with an armature plate is always application specific. If you use a material other than our armature plates to clamping against the pull force you will achieve may differ to the stated values.
- The material type, thickness, area, smoothness of surface, etc can all affect the performance that could be achieved. If your material is thinner than our recommended Armature Plate thickness you should expect a reduced pull force in your application.
- When an electromagnet is clamping against any ferrous surface, there may be a risk that residual magnetisation may still exist after the power supply is turned off, creating a small retention force. The nickel plating on the armature plate helps to minimise this effect. Held up parts that are heavier in weight would assist in overcoming any residual magnetisation forces.

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Additional Notes

- It is assumed that the user has good knowledge of electrical components and electrical circuit designs.
- If you do not have suitable knowledge you should seek guidance from an electrical circuit expert to properly and safely guide you.
- We do not provide the Power Source or the Circuit Design.



- The Hirschmann Connector can be positioned in four ways as shown. There is a visible screw which when removed reveals a plastic clip holder which can be pushed through releasing the outer part to allow rotation in 90 degree increments. Once the right 90 degree position is selected, press the outer part back in to clip it back in place and put the screw back in to re-secure the assembly.
- When connecting same electromagnets in Series, the power source voltage is multiplied by the number of electromagnets in series. So, for example, if you have four identical 12V dc units in series, you would require a $4 \times 12V = 48V$ dc power supply (the current for the electromagnets would be the same as the stated current for the single unit). In simple series connections, if a component electrically fails (goes open circuit), that section in series will stop working (due to zero current).
- When connecting same electromagnets in Parallel (the most common method), the power source current becomes the sum of the currents needed for all the electromagnets in parallel (unchanged voltage). So, for example, if you have four identical 440mA units in parallel, you would require a $4 \times 440mA = 1760mA$ (1.76A) power supply (the voltage for the electromagnets would be the same as the stated voltage for the single unit). In simple parallel connections, if a component electrically fails (goes open circuit), the section in series with it will stop working (due to zero current) but the other parallel sections may continue to work (but you may not be aware of the failure if your circuit has no detection or indication designed in) - it always depends on the circuit design as to what effect you may or may not notice if part of the circuit fails.
- You must not use dc voltage units with an ac supply. You must not use ac voltage units with a dc supply. Both are extremely dangerous and will cause a serious accident. You must be competent with electrical circuitry to keep everyone safe. You must use the correct voltage and/or current supply for your circuit (see above note on circuit knowledge). Too high a voltage into an electromagnet risks damaging the electromagnet (burning out the coil) so must be avoided. Too low a voltage into an electromagnet will give a reduced performance (as it lowers the current in the coil).
- When a current flows within an electromagnet, this is an input of power which eventually becomes heat - the electromagnet will start to heat up over time (by how much depends on your application) which could increase the resistance in the armature windings which then causes the electric current flow to reduce. If your application has cooling (heat sinks) this effect may be reduced. If your application has a low duty cycle, the component will potentially not heat up as much or as quickly. Holding a part for over two (2) hours continuously is better achieved with Energise-to-Release magnets to minimise excess heat and heat-related performance drops; using Energise-to-Hold magnets for over two (2) hours continuously is not advisable and you should instead seek application guidance from Eclipse Magnetics.

Although we have made every attempt to provide accurate information, we do reserve the right to change any of the information in this document without notice.

We cannot accept any responsibility or liability for any errors or problems caused by using any of the information provided.

Conversions Guide:-

1kg $\approx$ 2.204lb $\approx$ 9.806N

1lb $\approx$ 0.453kg $\approx$ 4.448N

1N $\approx$ 0.101kg $\approx$ 0.224lb

10mm $\approx$ 0.393in ($\approx$ 25/64in)

1in $\approx$ 25.4mm

(the above conversion values are rounded down)

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