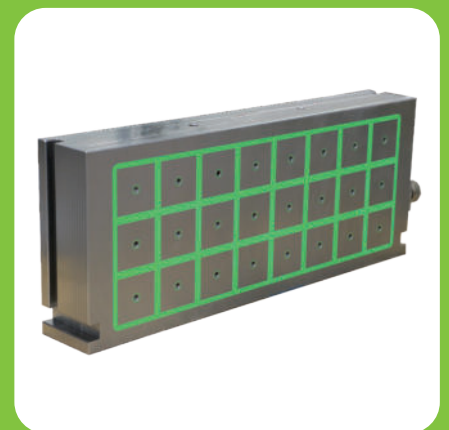
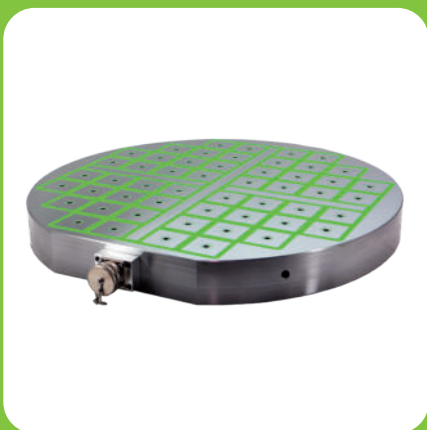


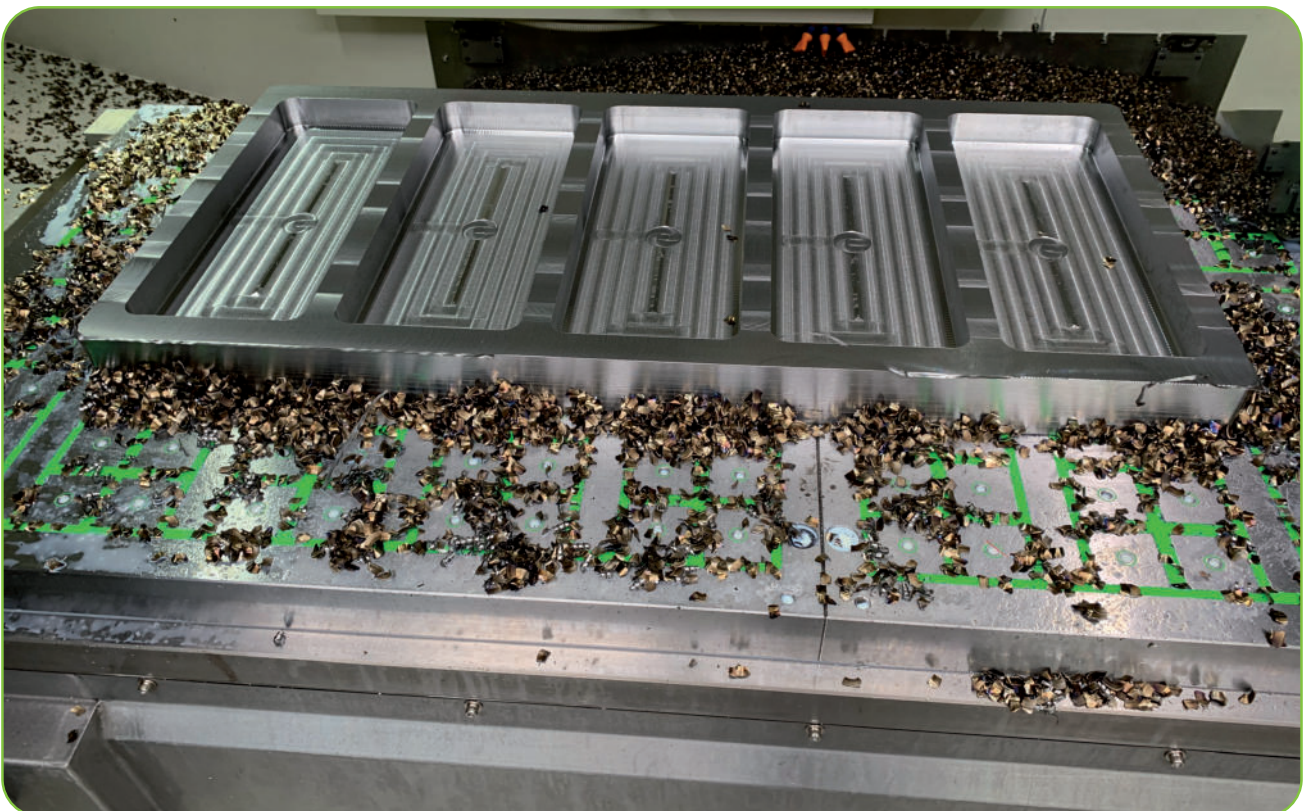
ELECTRO PERMANENT MAGNETIC CLAMPING





Flaig Magnetsysteme GmbH & Co. KG from Hardt in the Black Forest has been manufacturing magnets for lifting, clamping and holding for 21 years. We manufacture a wide range of standard and special solutions of all kinds on modern machines. Our experience and innovative spirit make us a competent partner for magnetic applications.

Flaig Magnetic Systems - From experience and innovation



FXL Electro-Permanent Magnetic Clamping Systems

Clamping is fun!

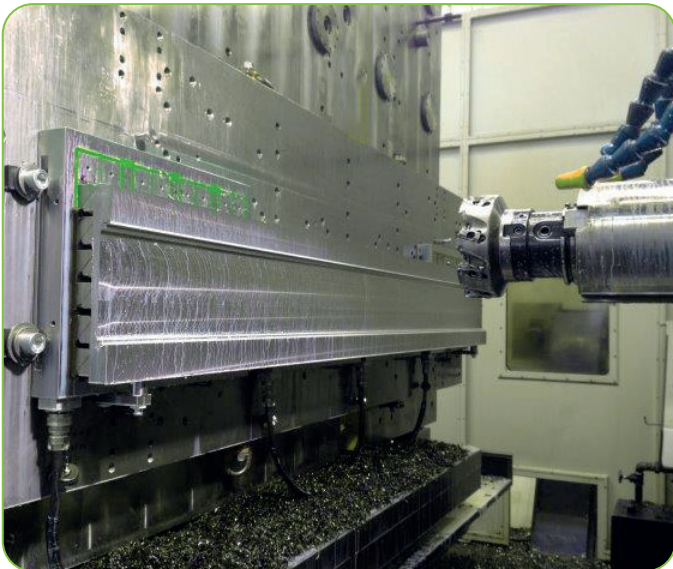
Place the workpiece on the table, activate the clamping system, start machining.

Sounds like it's too good to be true, but in fact it is a feasible reality for many workpieces.

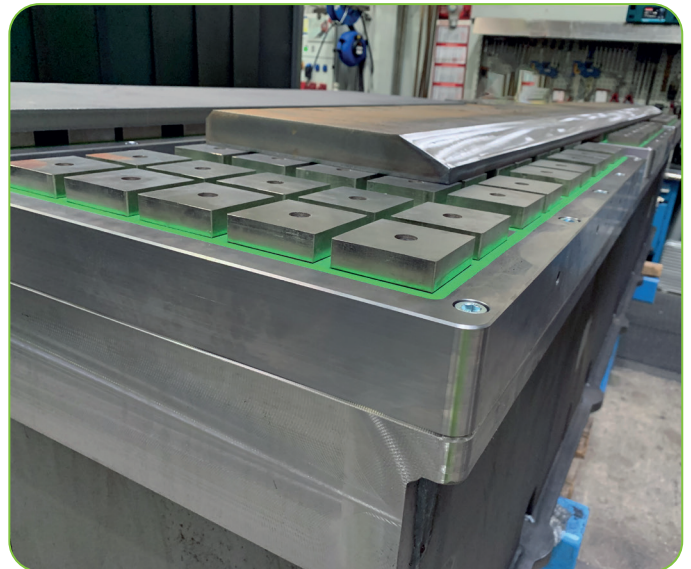
The simplicity of the application is by far not the only argument for magnetic clamping technology:

- Low-vibration machining and clamping of workpieces
- Fast and safe clamping of uneven parts
- Uniform clamping force over the entire surface without distorting or crushing the workpiece
- Five-sided machining in only one setup
- Full usability of the traverse paths
- Minimal set-up times
- Fast and accurate plane-parallel milling
- Clamping of warped welded constructions in the shortest possible time
- Fast assembly of individual, magnetic clamping devices
- Same holding force in all directions due to square pole technology

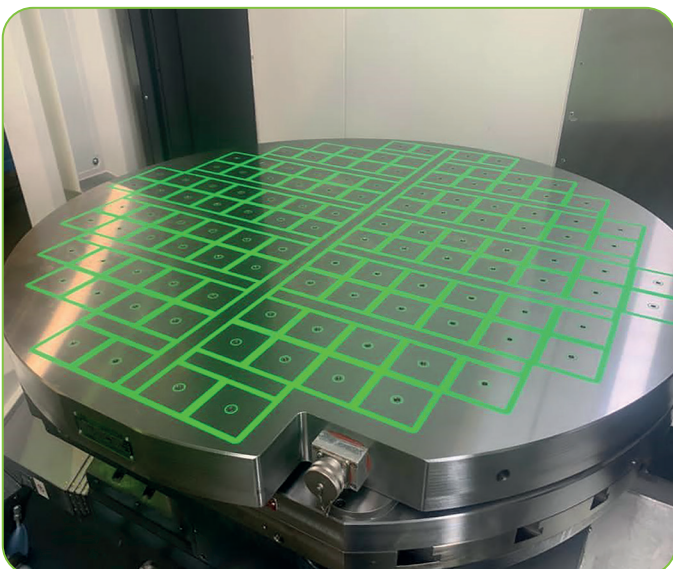
Depending on the machining and workpiece geometry, plates in rectangular or round design, with square or radial poles, are used.



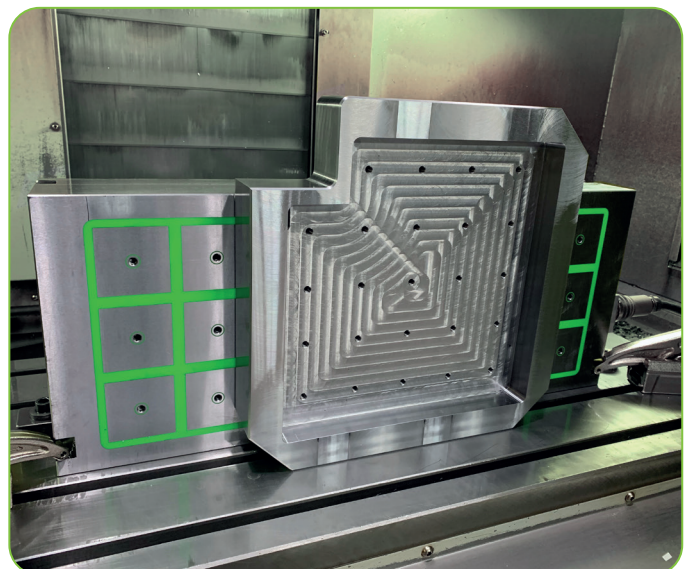
Milling of toolpaths, clamped in vertical tension on mobile pole extensions



Weld edge preparation in large part manufacturing



FXL-R magnetic clamping plate on a machining centre with rotary table D=1250mm



FXL Block expands the possibilities on 3-axis machines

FXL Electro-Permanent Magnetic Clamping Systems

The FXL square pole technology is the result of over 20 years of experience in magnetic clamping technology and combines solutions to the most common customer requirements in the highest quality design.

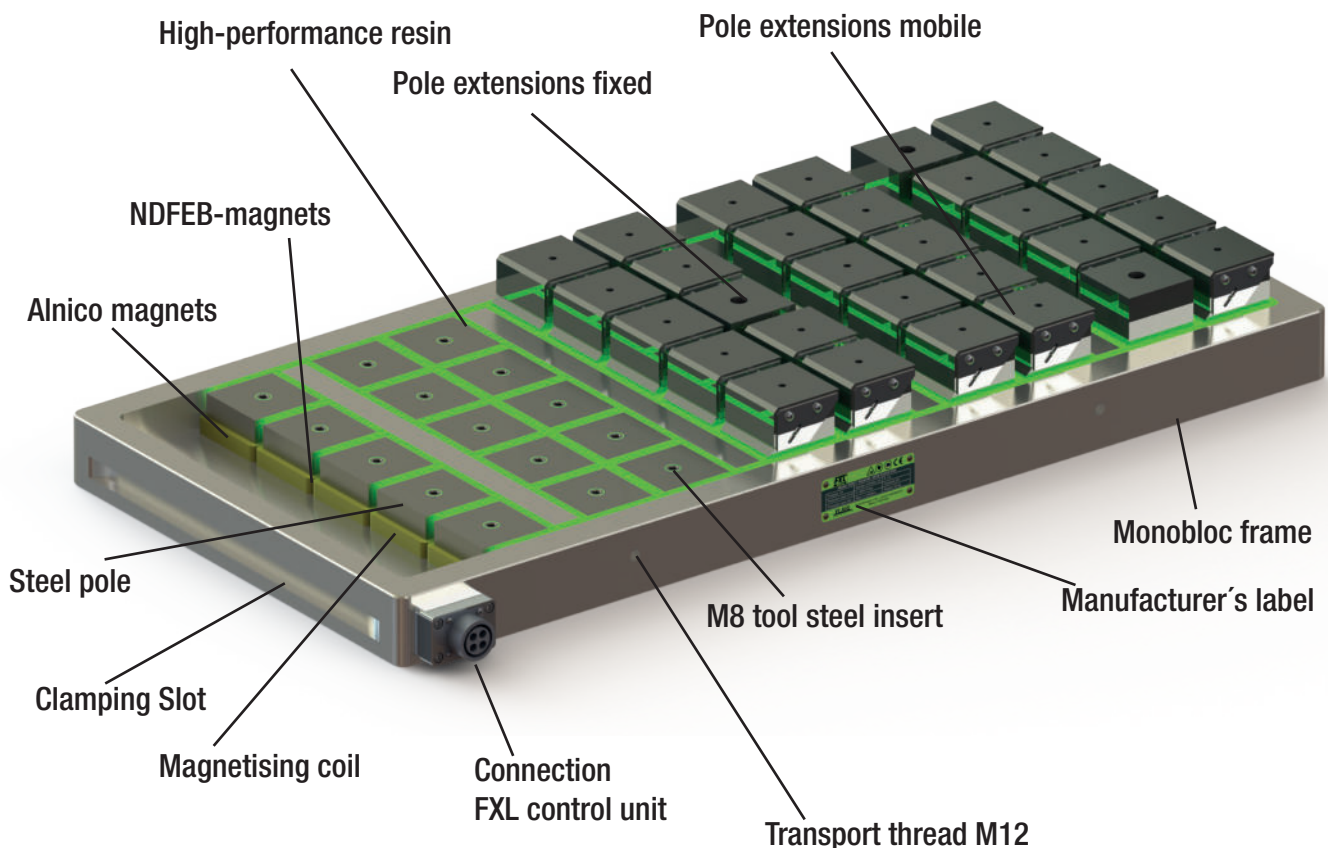
Magnetic poles, fed by Alnico and NDFeB magnets, are anchored in a solid, super-stiff monobloc body by means of a tool steel insert with M8 internal thread. The back of the clamping plate remains flat and can be drilled in at all points - for example, for inserting a zero-point clamping system. For this purpose, the magnet system is coated with high-performance resin in a multi-stage process, which has a high mechanical strength and ensures absolute tightness and perfect electrical insulation.

Clamping slots and transport threads help to quickly attach and fix the magnetic clamping plates; the connection is made via the proven 28mm 4-pin Feme plug connection or also via fixed connection sockets.

FXL magnetic clamping plates can be controlled with our FXL-C control units or with almost all control units from other leading manufacturers.

For our FXL magnetic clamping systems, which are manufactured in Germany, we use only materials of the highest quality.

Various pole sizes and geometries are available. Depending on the expected workpiece geometry, you can choose between 50 square poles, 70 square poles or even radial poles.



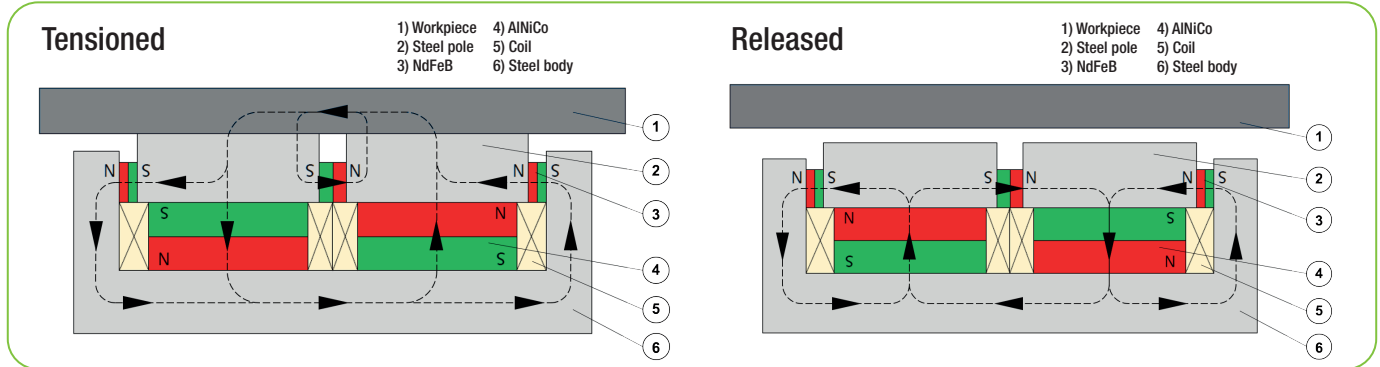
Quality Made in Germany

FXL Electro-Permanent Magnetic Clamping Systems

Reliable

Electro-permanent magnetic clamping technology requires the connection to the control unit only for clamping and unclamping, the cable can be disconnected during machining.

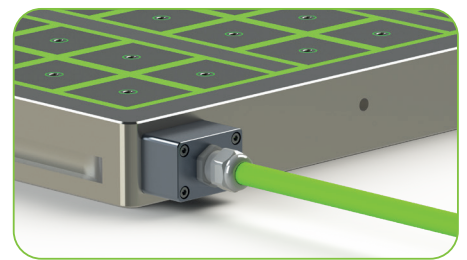
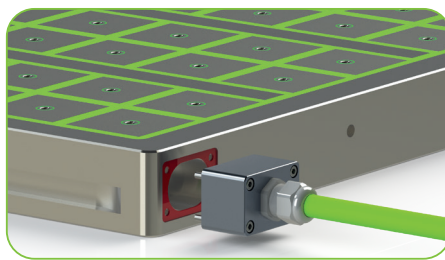
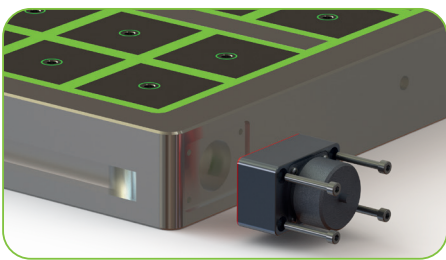
Ideal for palletising, for rotating clamping plates or even just to be able to close the machine door.



Clever

With little effort, it is possible to convert on site from a plug-in connection to a fixed connection or vice versa. In this way, a flexible clamping plate can quickly be converted into a fixed clamping plate with maximum availability if requirements or machinery change.

Info: the plug-in connection with closed cover achieves protection class IP67
 the fixed connection achieves protection class IP68, tight up to 5 bar
 the connection is made via spring clips - quick and safe



Informative

The optionally available switching status display informs the user about the switching status of the clamping plate even when the cable is disconnected; ideal for palletising.

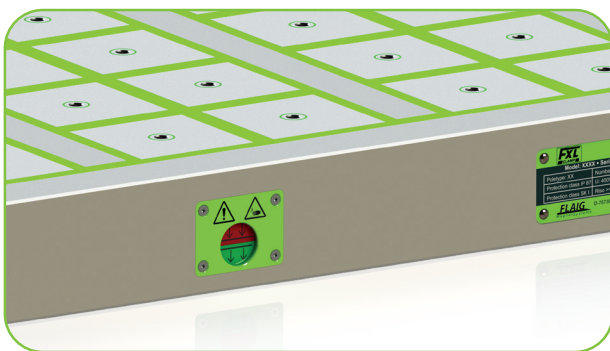


Plate magnetised

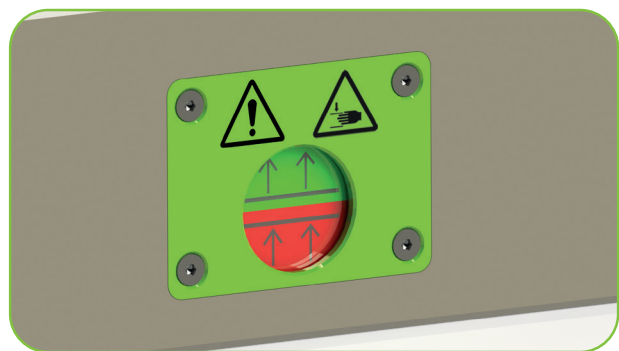
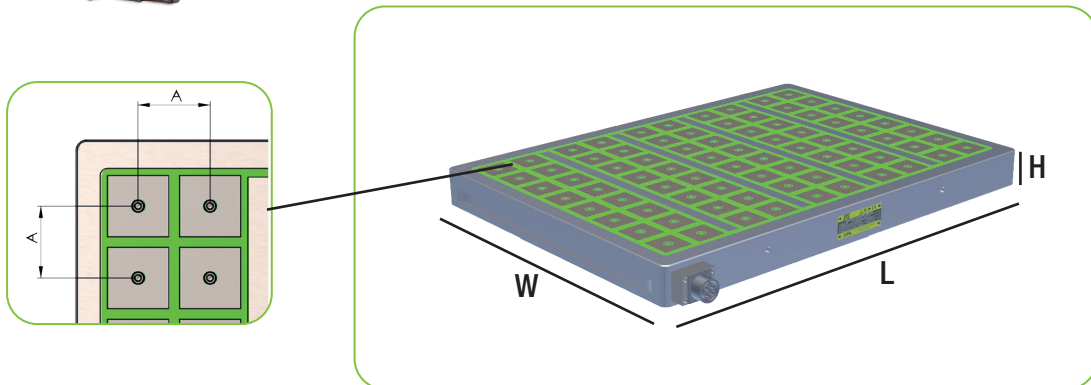


Plate demagnetised

FXL-50 Electro-Permanent Magnetic Clamping Plates

FXL magnetic chucks with pole type 50 are used to securely clamp workpieces from approx. 100x100mm with low material thickness.

Poles of size 50x50mm generate a magnetic field that penetrates approx. 12mm into the workpiece, which is why they are particularly suitable for thinner and smaller workpieces. Another advantage is that, especially with smaller workpieces, more pole transitions are occupied, which ensures more even clamping. The nominal holding force is a super strong $160 \text{ N/cm}^2 = 4\text{kN}$ per pole.



Model	Art.-Nr.	Dimensions (mm)				Quantity Pole° N	Weight (kg)
		L	W	H	A		
FXL 203/50	2950 0203	320	198	66	64,2	8	30
FXL 204/50	2950 0204	440	198	66	64,2	12	42
FXL 206/50	2950 0206	650	198	66	64,2	18	62
FXL 303/50	2950 0303	320	320	66	64,2	16	48
FXL 305/50	2950 0305	500	320	66	64,2	24	75
FXL 306/50	2950 0306	630	320	66	64,2	32	96
FXL 308/50	2950 0308	800	320	66	64,2	40	121
FXL 404/50	2950 0404	392	392	66	64,2	25	73
FXL 406/50	2950 0406	620	392	66	64,2	40	115
FXL 408/50	2950 0408	810	392	66	64,2	50	150
FXL 410/50	2950 0410	1120	392	66	64,2	70	210
FXL 505/50	2950 0505	500	460	66	64,2	36	110
FXL 506/50	2950 0506	650	460	66	64,2	48	150
FXL 508/50	2950 0508	810	460	66	64,2	60	176
FXL 510/50	2950 0510	1120	460	66	64,2	84	250
FXL 606/50	2950 0606	650	580	66	64,2	64	175
FXL 608/50	2950 0608	800	580	66	64,2	80	220
FXL 610/50	2950 0610	1120	580	66	64,2	112	310
FXL 612/50	2950 0612	1258	580	66	64,2	128	350

Suitable control units from page 16

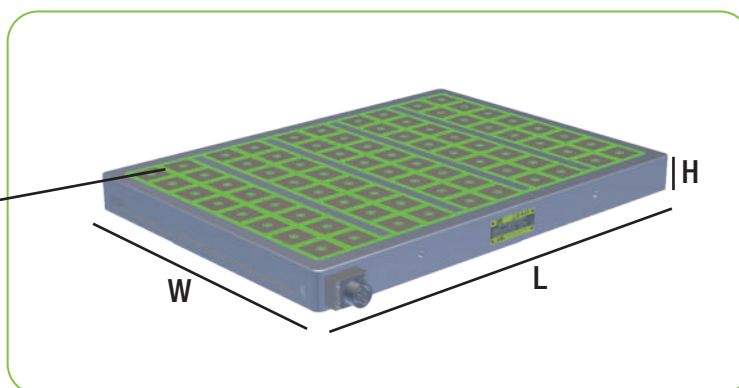
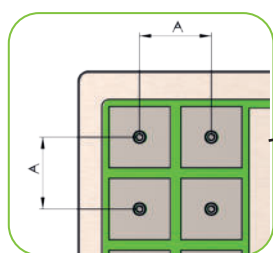
FXL-70 Electro-Permanent Magnetic Clamping Plates

FXL magnetic chucks with pole type 70 are used to securely clamp workpieces from approx. 150x150mm with material thicknesses from approx. 15mm.

Poles of size 70x70mm generate a magnetic field that penetrates approx. 18mm into the workpiece, which is why they are particularly suitable for larger workpieces.

A very good air gap behaviour also allows uneven workpieces to be clamped securely. In addition, pole extensions with a larger stroke can be used on 70 poles for height compensation.

The nominal holding force is a super strong $160 \text{ N/cm}^2 = 7.8\text{kN}$ per pole.



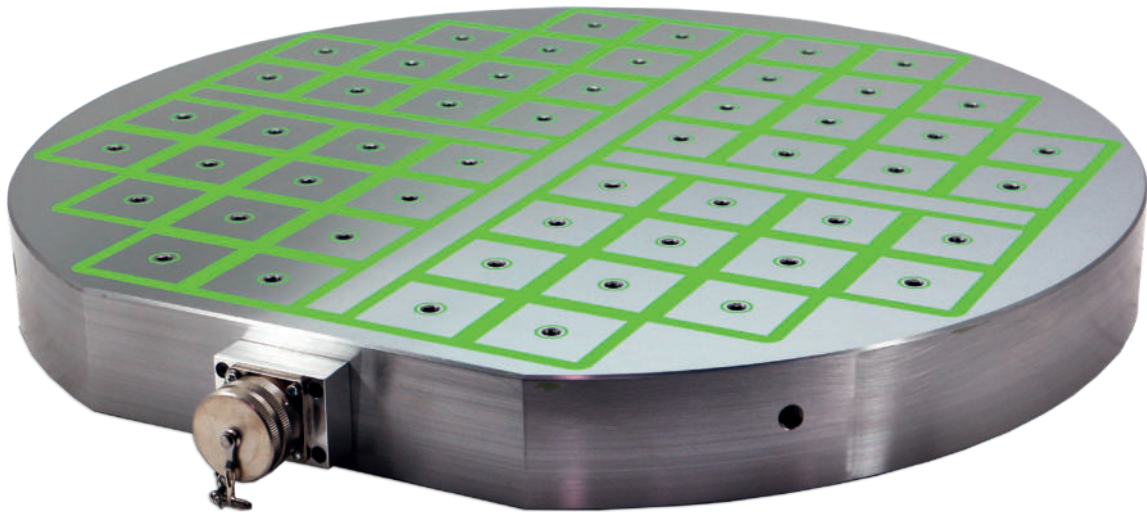
Model	Art.-Nr.	Dimensions (mm)				Quantity Pole° N	Weight (kg)
		L	W	H	A		
FXL 306/70	2971 0306	610	310	66	82,2	18	90
FXL 308/70	2971 0308	800	310	66	82,2	24	120
FXL 310/70	2971 0310	1000	310	66	82,2	30	100
FXL 404/70	2971 0404	470	390	66	82,2	20	40
FXL 406/70	2971 0406	610	390	66	82,2	24	110
FXL 408/70	2971 0408	800	390	66	82,2	32	150
FXL 410/70	2971 0410	1000	390	66	82,2	40	185
FXL 506/70	2971 0506	610	480	66	82,2	30	140
FXL 508/70	2971 0508	800	480	66	82,2	40	185
FXL 510/70	2971 0510	1000	480	66	82,2	50	230
FXL 512/70	2971 0512	1200	480	66	82,2	60	275
FXL 606/70	2971 0606	610	580	66	82,2	36	170
FXL 608/70	2971 0608	800	580	66	82,2	48	222
FXL 610/70	2971 0610	1000	580	66	82,2	60	275
FXL 612/70	2971 0612	1200	580	66	82,2	72	335
FXL 808/70	2971 0808	820	770	66	82,2	64	305

Suitable control units from page 16

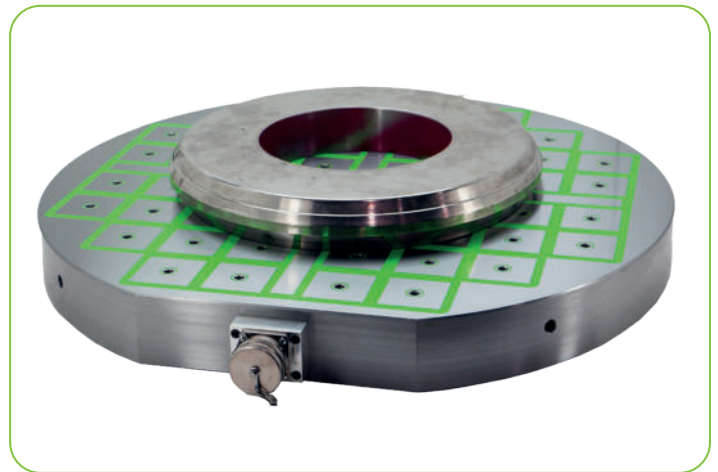
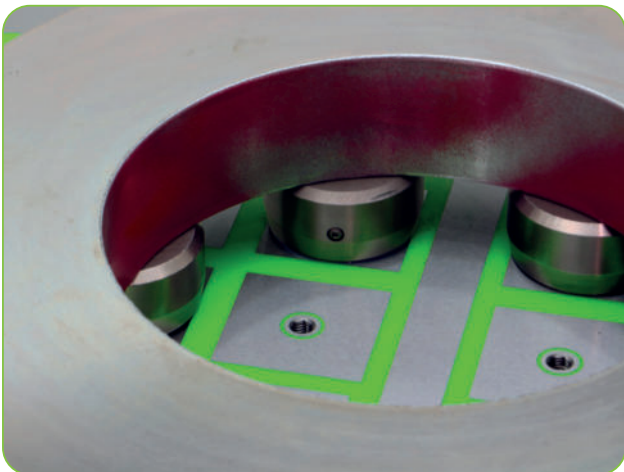
FXL-R Electro-Permanent Magnetic Clamping Plates

FXL-R round magnetic clamping plates in square pole technology are especially suitable for use on the lathe and on rotary tables of machining centres. The frame construction of the FXL plate can be fitted with centring elements both at the front on the clamping side and at the rear.

The connection to the FXL-C control unit can be plugged in externally or also via a rear sliding contact with shaft lead-through.



The back can be drilled 25mm deep at all points. FXL-R are often customised to fit the machine rotary table exactly and, if required, are also equipped with zero point clamping systems.



Model	Art.-Nr.	Dimension (mm)		Quantity Pole °N	Weight (kg)
		ØD	H		
FXL-R 420/50	2915 0420	420	66	24	65
FXL-R 600/50	2915 0600	600	66	52	135
FXL-R 750/50	2915 0750	750	66	68	210
FXL-R 900/50	2915 0900	900	66	108	300
FXL-R 1000/70	2917 1000	1000	66	72	390
FXL-R 1250/70	2917 1250	1250	80	120	550

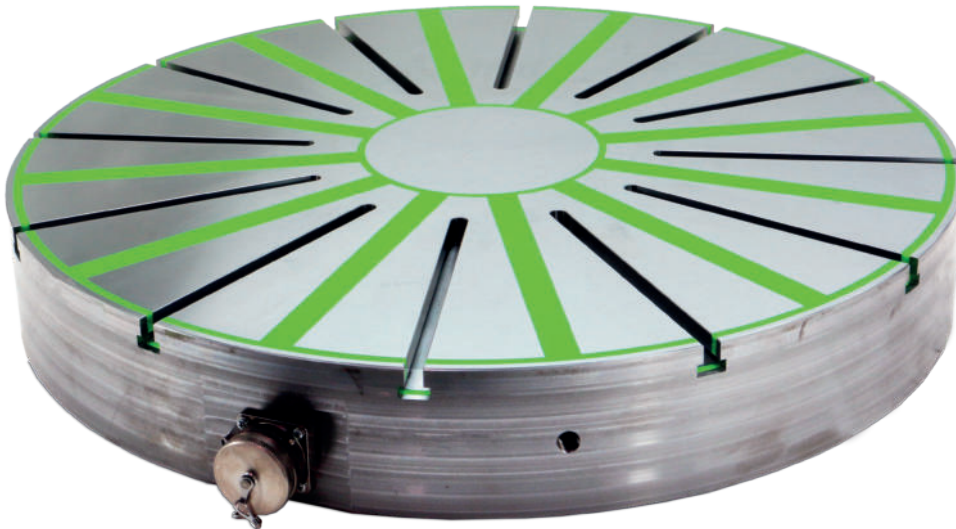
Suitable control units from page 16

FXL-RR Electro-Permanent Magnetic Clamping Plates

FXL-RR magnetic chucks are especially suitable for the rotationally symmetrical machining of rings, sleeves and flanges. The radial pole pitch ensures uniform clamping over the entire contact surface and additional mechanical positioning and clamping aids can be inserted into the T-slots in the poles.

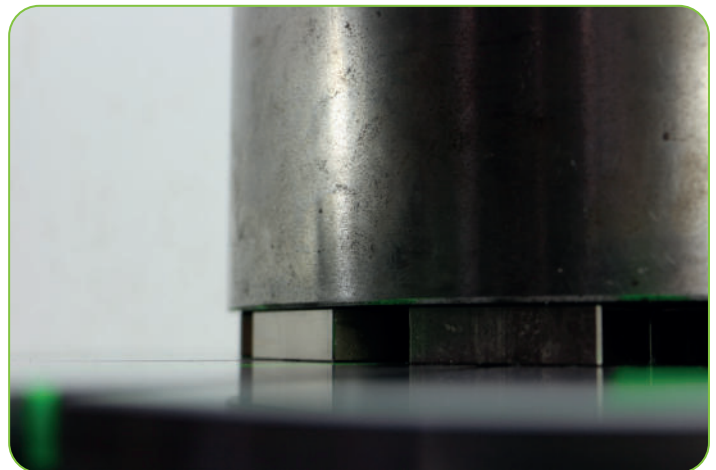
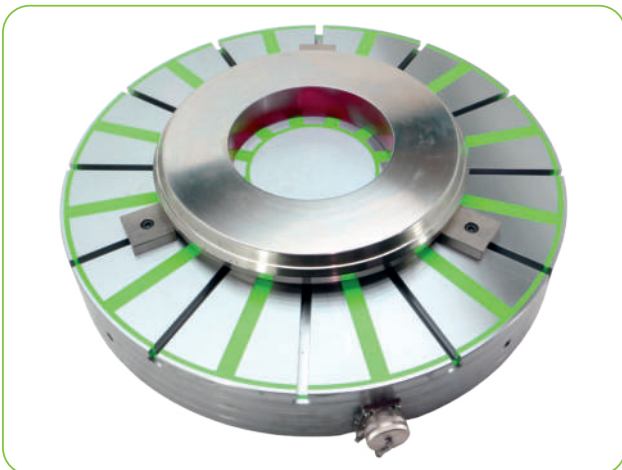
The T-slots offer the further option of also using mobile or fixed pole extensions to free the workpiece or to clamp it without pulling it down.

The connection to the FXL-C control unit is plugged in externally or via a rear sliding contact with shaft lead-through.



FXL RR magnetic chucks are available in two versions

- FXL RR with max. 160 N magnetic force per cm² active surface and release impulse for turning with maximum holding force
- FXL RR-Z with max. 120 N magnetic clamping force per cm² active surface and optimised demagnetisation for fine machining on high-alloy and heat-treated workpieces

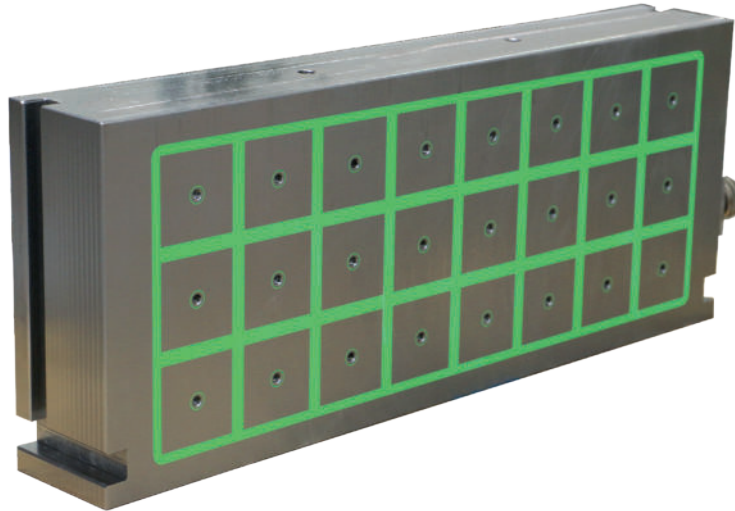


Model	Art.-Nr.	Dimension (mm)		Quantity Pole °N	Weight (kg)
		ØD	H		
FXL-RR 600*	2925 0600	600	90	12	190
FXL-RR 750*	2925 0750	750	90	12	250
FXL-RR 1000*	2925 1000	1000	90	20	490
FXL-RR 1250*	2925 1250	1250	90	20	780

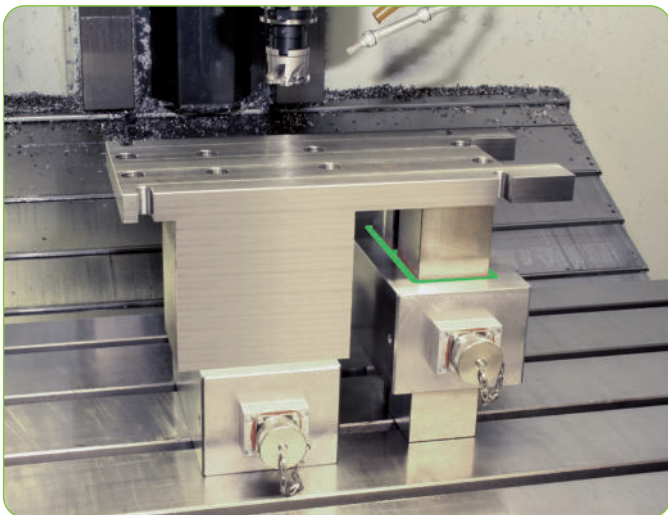
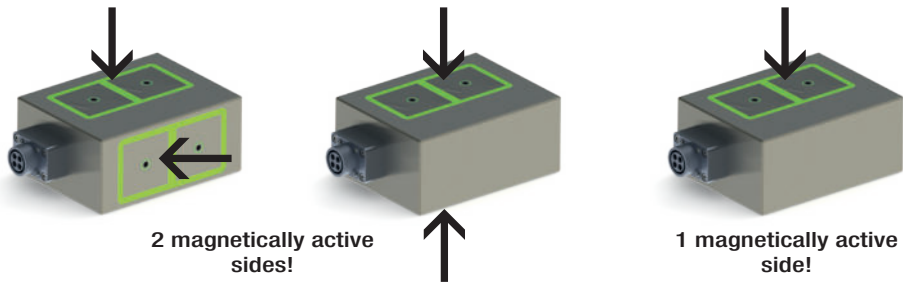
Suitable control units from page 16
Other sizes on request • *All models also available as Z model

FXL-Block Electro-Permanent magnetic clamping block

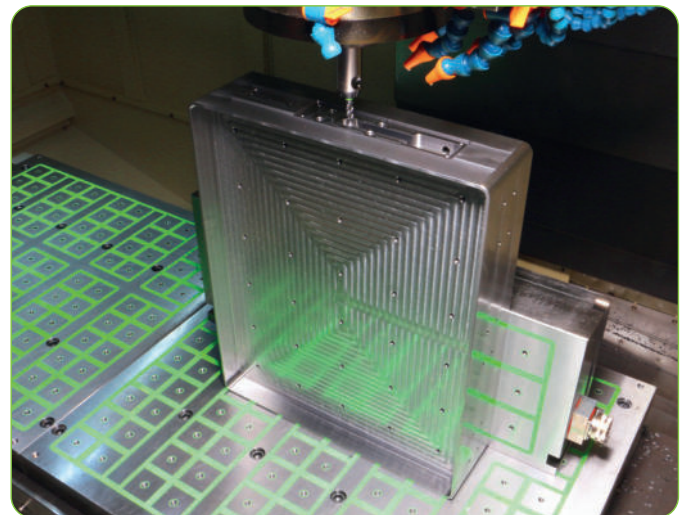
We offer FXL magnetic clamping blocks in many sizes and designs. They can be manufactured with one or more clamping surfaces and different pole sizes. As with the FXL magnetic clamping plates, they are controlled via an FXL-C control unit; optionally with only one channel or also with several channels in order to be able to control the individual clamping surfaces of a block separately.



Options



Height-flexible, tensioning underframe blocks



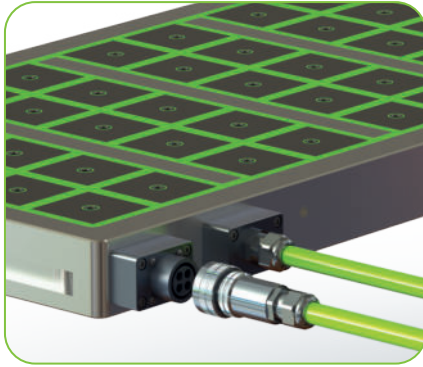
Vertical clamping surface on 3-axis machines

Model	Art.-Nr.	Dimensions (mm)			Clamping surfaces	Quantity Pole °N	Type of pole	Weight (kg)
		L	W	H				
FXL-B 1x8/50	2952 0108	310	230	95	1	8	50	48
FXL-B 1x2/70	2972 0102	200	100	66	1	2	70	9
FXL-B 2x2/70	2972 0202	200	100	130	2	2x2	70	18
FXL-B 1x12/70	2972 0112	420	298	115	1	12	70	98
FXL-B 1x24/70	2972 0124	750	298	115	1	24	70	170

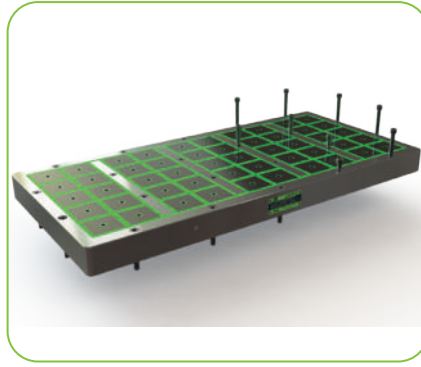
Many other sizes on request

FXL electro-permanent magnetic plates are perfectly customised for your individual application

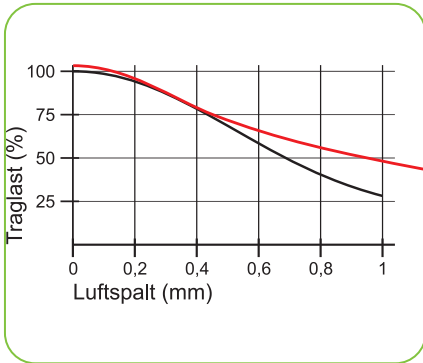
Plug-in or fixed connection sockets can be designed at almost any position on the clamping plate



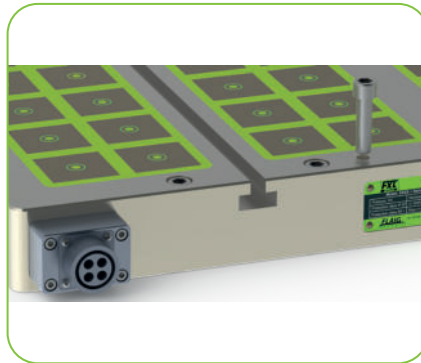
Fixing holes can be through-holes or threaded holes from the rear



Inserts for NSP systems possible anywhere on the backside



If required, we can design a reinforced magnet system for difficult surfaces or poorly magnetisable materials according to your requirements



T-slots and boreholes, adapted clamping surface geometry combined with mechanical clamping and positioning options



All-metal surfaces, also corrosion resistant, for maximum wear resistance, heat conduction or machinability



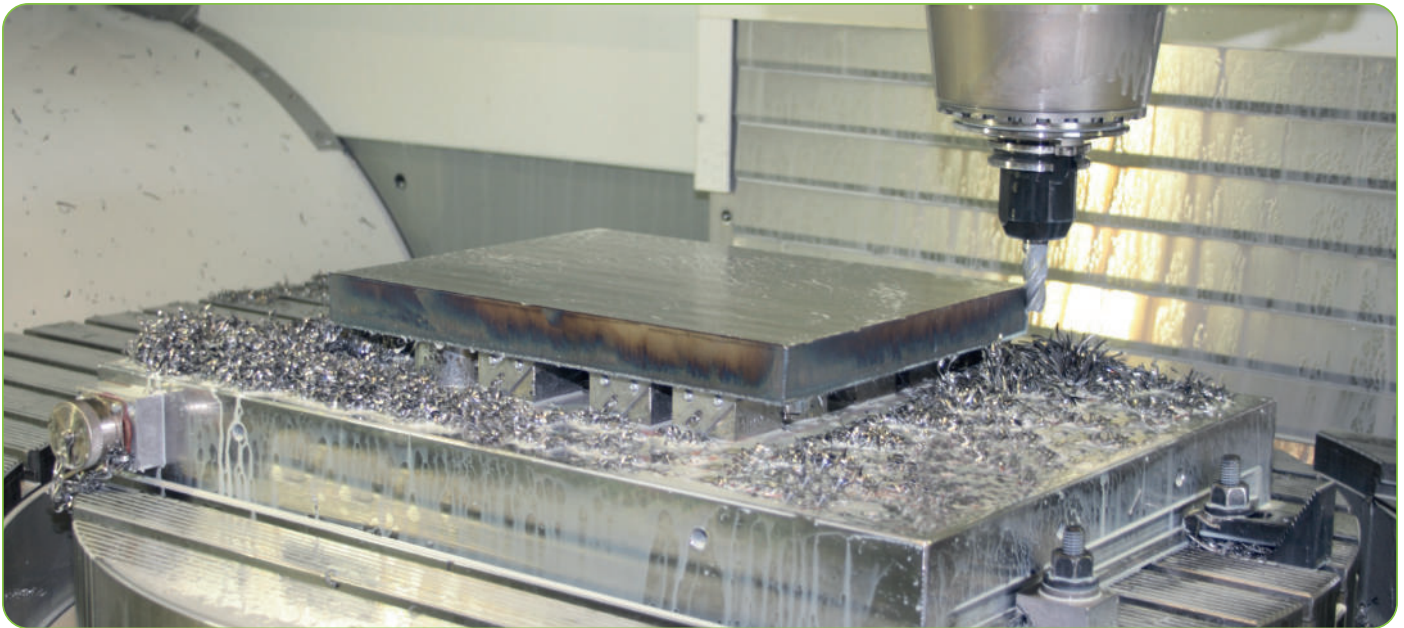
FXL Supplies

Mobile and fixed pole extensions on the square pole clamping system enable the clamping of wavy and warped metal parts. They adapt to your workpiece and hold it securely. The individual contact points between the magnetic clamping plate and the workpiece can be defined individually.

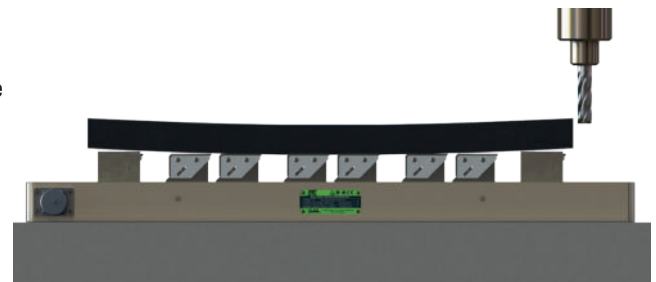
It is also possible to drill through and machine the inner edges of magnetically clamped workpieces. Additional pole extensions can be set up and attached or interfering pole extensions removed in no time at all - so every workpiece has its own individual clamping device in no time at all.

For five-sided machining, the workpiece can be exposed with pole extensions. Pole plates can be used to incorporate complex structures of workpieces that are difficult to clamp into the magnetically active surface.

Our pole extensions are made of high-quality special steel and have the best magnetic flux properties. Technically perfect and durable.



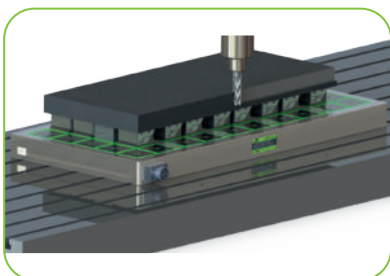
- Low-vibration machining and clamping of workpieces
- Protection of the magnetic clamping plate
- Flexibility in clamping height
- No interfering contours / drilling and milling possible
- No vacuum adhesion between magnetic plate and workpiece
- Problem-free release of the workpiece even with high-alloy hardened materials



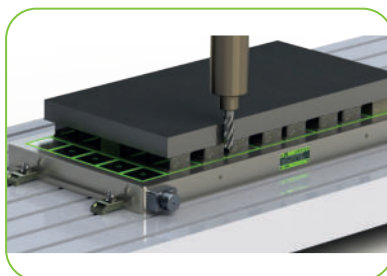
Tilt-free three-point support with 3 fixed pole extensions and mobile pole extensions for automatic adaptation to the workpiece.

Lightning-fast parallel

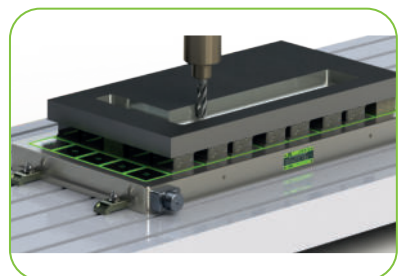
Roughening the 1st surface



Turning and roughening the 2nd surface



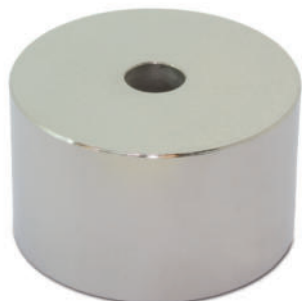
Turning and finishing the 1st surface



Standard Pole Extensions

Fixed pole extensions are used to pre-set the three-point support when used in conjunction with mobile pole extensions or to set inherently rigid, flat materials high.

By using a full complement of fixed pole extensions, the magnetic chuck is protected from deterioration and defects. The pole extensions can always be milled over when worn.



Single-pole, round

Model	Art.-Nr.	Dimension (mm)	
		Ø	H
PVR 50 H15	2410 15031-15	50	15 ±0,01
PVR 50 H32	2410 15031	50	32 ±0,01
PVR 70 H20	2410 17021	70	20 ±0,01
PVR 70 H45	2410 17043	70	45 ±0,01



Single-pole, square

Model	Art.-Nr.	Dimension (mm)	
		L x W	H
PVQ 50 H15	2410 15032-15	50 x 50	15 ±0,01
PVQ 50 H32	2410 15032-1	50 x 50	32 ±0,01
PVQ 50 H54	2410 15032-54	50 x 50	54 ±0,01
PVQ 70 H20	2410 17020-1	70 x 70	20 ±0,01
PVQ 70 H45	2410 17045-1	70 x 70	45 ±0,01
PVQ 70 H70	2410 17020-2	70 x 70	70 ±0,01

MP Mobile Standard Pole Extensions

Mobile pole extensions MP are screwed onto the magnetic poles with an Allen key. The surface of the MP pole extension is blasted and electrolytically nickel-plated. Mobile pole extensions are used to clamp workpieces over their entire surface without distortion. Via the inclined plane, the upper part of the pole extension moves to the level of the workpiece and stiffens it without pulling it down.



MP 50 H32 / MP 70 H45
Upper part secured by guide plate.
Advantageous for vertical clamping!



MP 50 H54

Top free floating, allows maximum height compensation and easy cleaning!



MP 70 H70

Model	Art.-Nr.	Suitable for Pole size	Dimension (mm)			Suitable for fixed Pole extensions	Weight (kg)
			L	W	H		
MP 50 H32	2410 35032-1	50 mm	50	50	29 - 35	H = 32mm	0,5
MP 50 H54	2410 35054	50 mm	50	50	44 - 59	H = 54mm	1
MP 70 H45	2410 37045	70/75mm	70	70	40,5 - 50,5	H = 45mm	1,5
MP 70 H70	2410 37070	70/75mm	70	70	60 - 75	H = 70mm	2,5

With mounting screws M8

RMP Mobile Pole Extensions

Mobile pole extensions of the RMP type are simply screwed onto the magnet plate by hand via the screwed-on threaded pin (M8 x 10 mm) onto the magnetic plate. The surface of the RMP pole extension is completely machined and chemically nickel-plated. Compared to the standard square pole extension, the magnetic power is approx. 20% higher than the standard square pole extension and the closed design largely prevents the intrusion of dirt and chips. The round design generates a purely vertical stroke. The clamping surface is sandblasted to increase friction.



RMP 57 / RMP 78

Model	Art.-Nr.	Suitable for Pole size	Dimension (mm)		Suitable for fixed Pole extensions	Weight (kg)
			Ø	H		
RMP 57	2420 057	50 mm	57	29,5 - 34,5	H = 32mm	0,5
RMP 78	2420 078	70/75mm	78	40 - 47,5	H = 45mm	1,2

SMS Full metal pole plates

Full metal pole plates of type SMS 50 and SMS 70 can be mounted on FXL magnetic clamping plates. The pole plates are manufactured using the shrink-fit process and are extremely rigid.

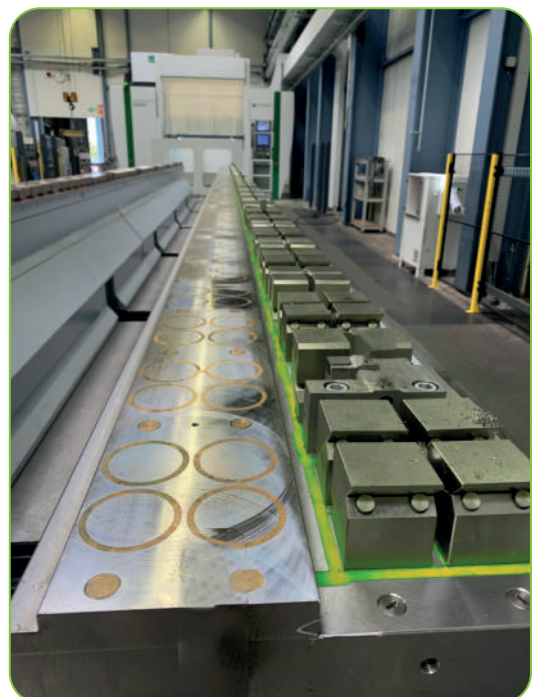
For fixtures for batch production, grooves, stops, contours and the like can be machined into the magnetically active, mechanically machinable surface.

For automated applications, compressed air outlets can be incorporated into the pole plate for cleaning the pole plates and safely releasing the workpieces.

The size of the pole plates is determined according to the customer's specific requirements and application. Heights between 22mm and 52mm can be realised.

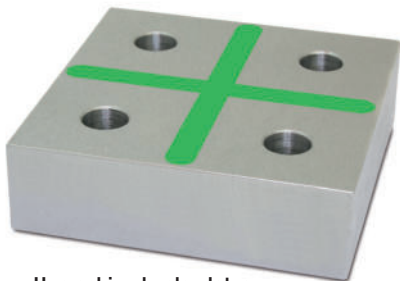
The use of magnetic clamping plate + SMS pole plate has proven itself for welding 3D sheet metal parts!

Dimensions are available to fit all FXL magnetic chucks or customised.

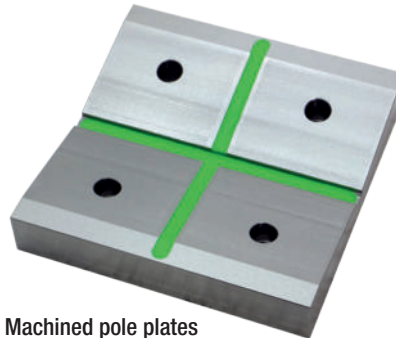


Pole Plates

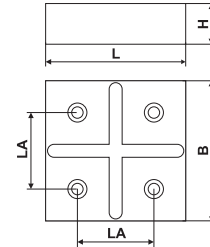
Multiple pole plates make it possible to create large-area magnetically active surfaces with incorporation options. For example, contours and workpiece shapes can be inserted into the pole surface with maximum rigidity. Complex workpieces made of cast iron or steel that are difficult to clamp can thus be easily inserted into your mould. Likewise, a vertical, active clamping edge can be created to apply or additionally stabilise workpieces. Pole plates and multiple poles are “soft chucks” for your clamping system.



Unmachined pole plates

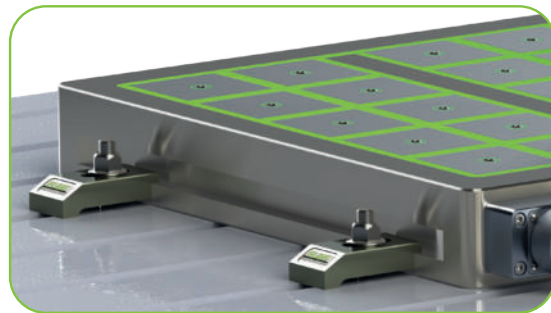
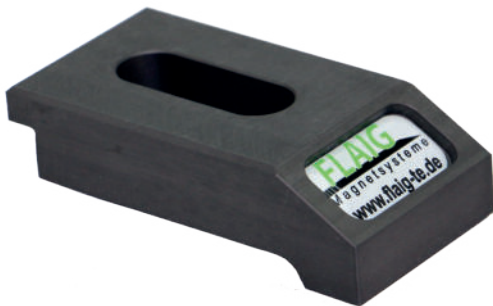


Machined pole plates



Clamping claws

Matching clamping claws made of high-quality tool steel ensure a perfect hold on your machine table.



Model	Art.-Nr.	Dimension (mm)		
		L	W	H
Clamping claw set M12 4 pc.	8 2900 0012	78	40	21
Clamping claw set M16 4 pc.	8 2900 0016	78	40	21

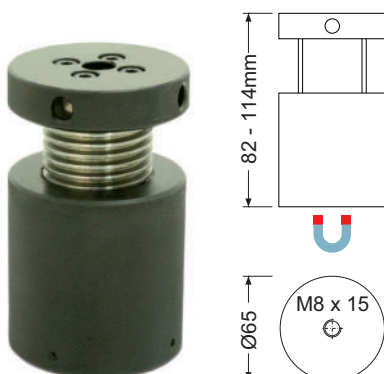
Screws and sliding blocks not included

MBR Magnet block

MBR magnetic blocks serve as an additional support to reduce vibrations when the workpiece protrudes beyond the magnetic chuck or when 2 magnetic chucks are mounted at a large distance. Likewise, MBR magnetic clamping blocks can form the 3-point support of the workpiece outside the magnetic clamping plate.

On one side, the MBR is equipped with a powerful permanent magnetic base. The other side is brought to the desired height via the massive, self-locking trapezoidal spindle. The MBR allows all heights required for our magnetic clamping systems to be set - from 82mm to 114mm.

The height (H) can be extended as desired by means of additional adapter discs that are simply screwed onto the system.



Model	Art.-Nr.	Dimension (mm)		Force (N)	Weight (kg)
		Ø	H		
MBR 65	2410 0065	65	82 - 114	280	1,8

CONTROL TECHNOLOGY FOR FXL

Pole reversal controllers from the FXL-C family not only reliably control our FXL magnetic chucks, but almost all electro-permanent magnet systems on the market.

Input voltages of 100-500 VAC / 50-60Hz and matching modulated, pulsed output voltages and pulse powers of up to 24 kVA are unique key data which are only required under extreme conditions, but ensure maximum stability in normal use.

FXL-C is available from a simple, handy table-top unit to a control cabinet version for large-scale applications; autonomous from hand-operated, part-connected with feedback to the machine to full integration into the machine control for automated applications.



FXL-CT table-top units

We build FXL-CT table-top units for a maximum of 2 channels without preselection, they can be used to control magnetic chucks up to a total area of approx. 1.2m² can be controlled.

FXL-CT is designed as a table-top unit or to be attached to the machine wall by means of the magnetic feet on the back. It is operated directly on the machine.

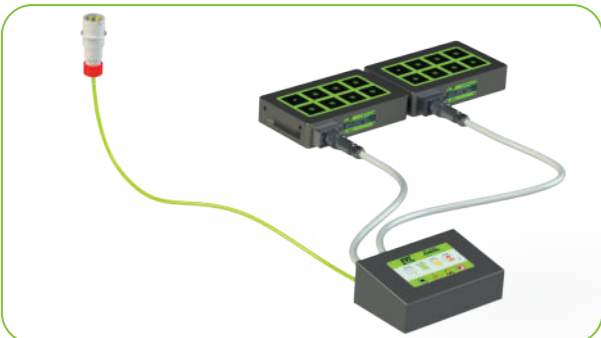
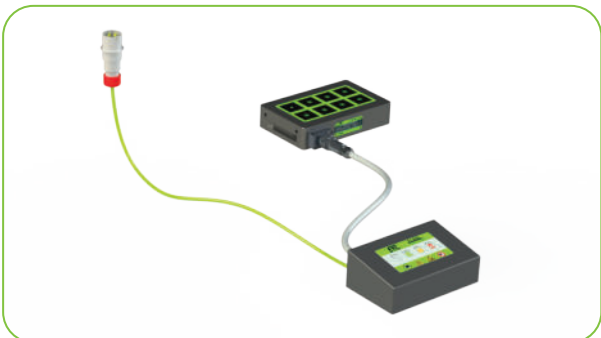


Function

- Magnetisation in 4 holding levels
- Pulse release cycle
- Feedback via double LED signals
- Machine sensing clamped via NO contact possible

Technical Data

- Input voltage 100-500V AC (standard 360-440 VAC / 50-60Hz)
- Output voltage 100-500V DC
- Mains cable 3m/4mm²
- Mains plug CEE 32A
- Protection class I
- Protective class IP65
- Back-up fuse C 16 - C 32 A (depending on the power of the connected system)
- Output cable 6m 4mm² 4 PIN FEME 28mm



Model	Art.-Nr.
FXL-CT 401 1-Channel	9050 1612-1
FXL-CT 402 2-Channel	9050 1612-2

Also available in 230V supply voltage or as -S version for single magnet application with full demagnetization

FXL-C Control cabinet version

FXL-C control units in the control cabinet version control magnetic clamping systems from very small to very large, control is via an FXL-HB manual control unit or automated/integrated via the machine control/PLC.

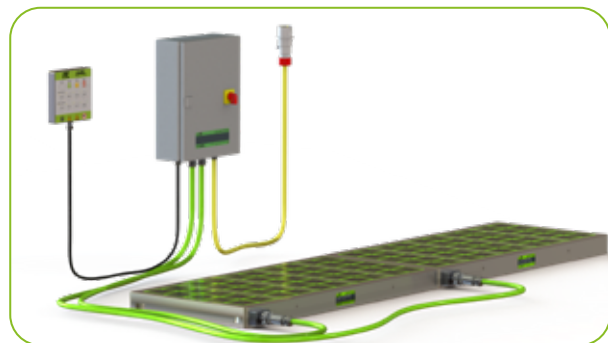
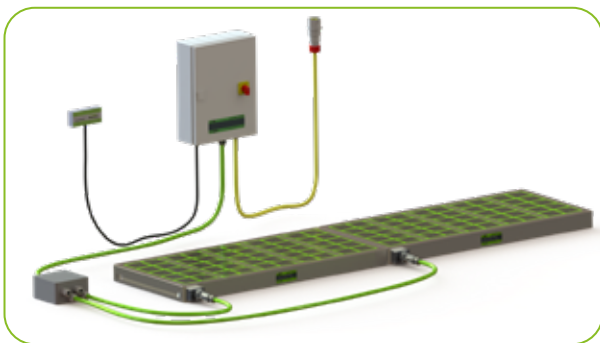


Function

- Group formation/preselection
- Magnetisation in 4 holding levels
- Pulse release cycle
- Feedback via double LED signals
- Machine sensing clamped via NO contact possible
- Connection via machine PLC possible

Technical Data

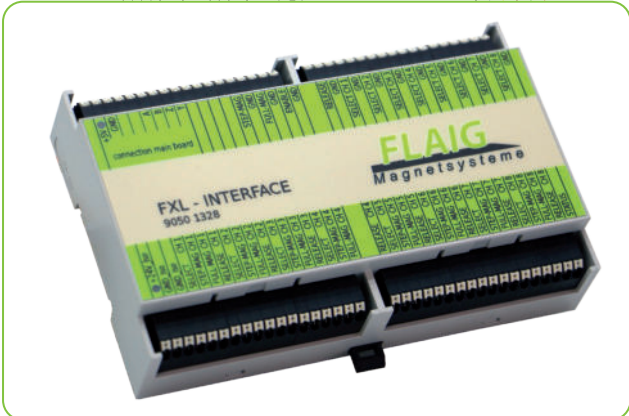
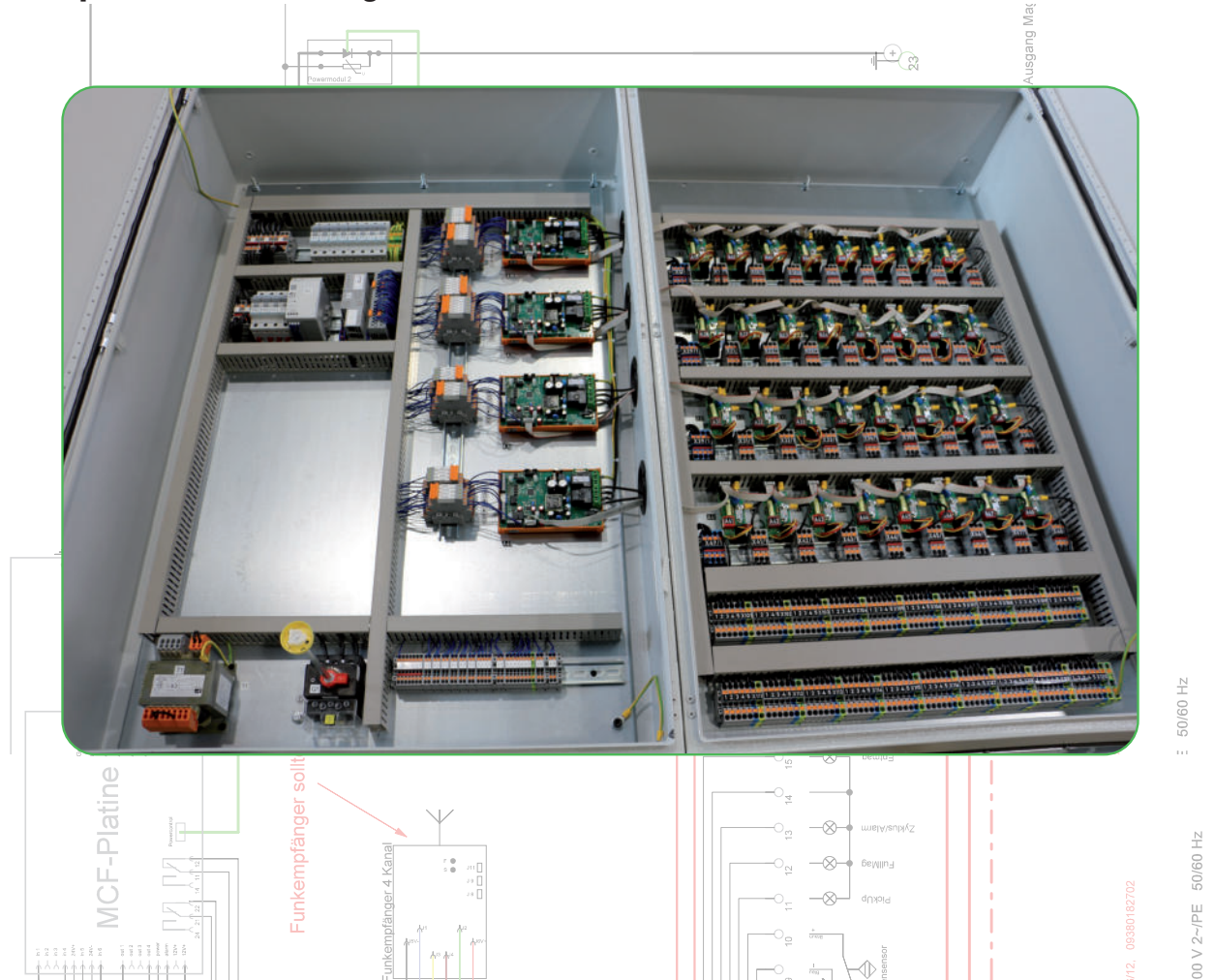
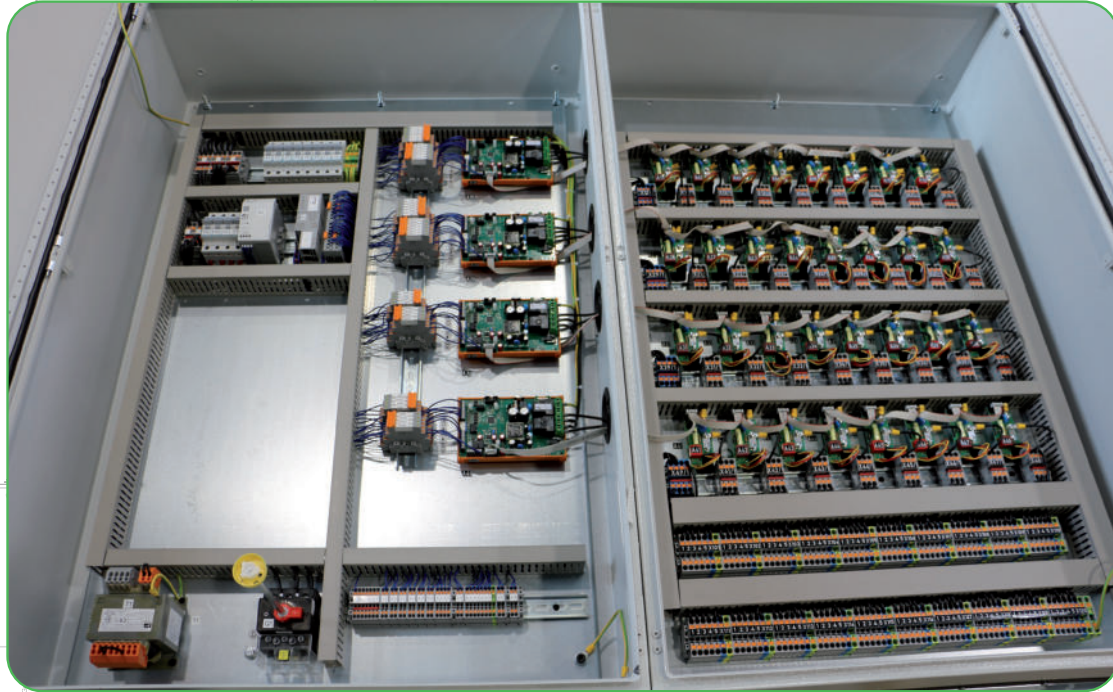
- Input voltage 100-500V AC (standard 360-440 VAC / 50-60Hz)
- Output voltage 100-500V DC
- Mains access and load output via terminal blocks (also with cable and plug depending on integration)
- Protection class I
- Protective class IP54
- Back-up fuse C 16 - C 32 A (depending on the power of the connected system)



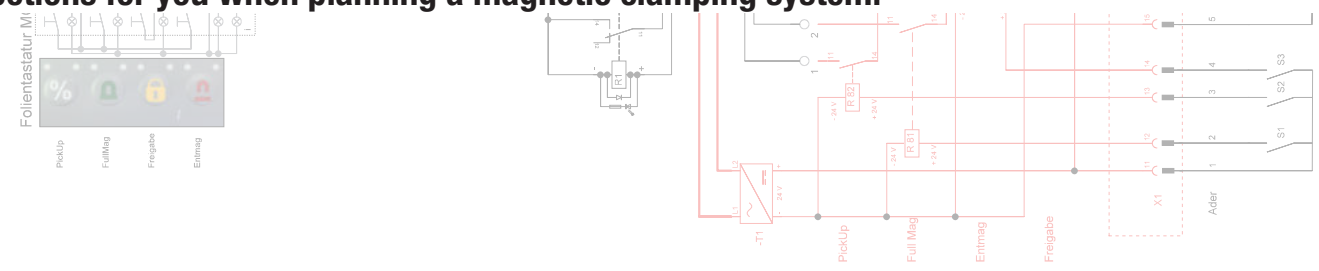
Model	Art.-Nr.	Model	Art.-Nr.
FXL-C 401 1-Channel	9050 1622-1	FXL-HB Handheld control 1-Channel	9050 1690-1
FXL-C 402 2-Channel	9050 1622-2	FXL-HB Handheld control 4-Channel	9050 1690-4
FXL-C 404 4-Channel	9050 1622-4	FXL-HB Handheld control 8-Channel	9050 1690-8
FXL-C 408 8-Channel	9050 1622-8	FXL-Interface	9050 1328

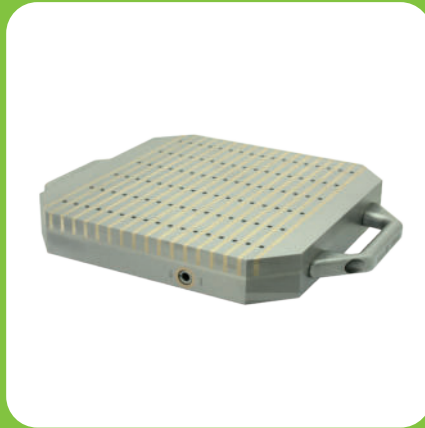
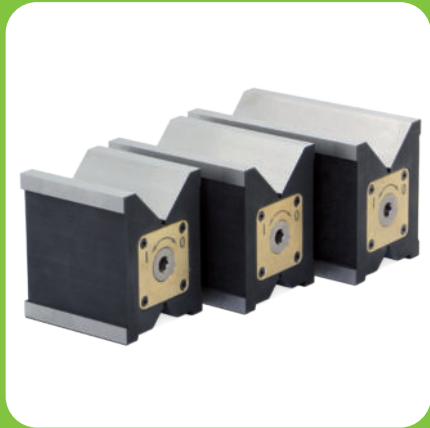
Also available in 230V supply voltage or as -S version for single magnet application with full demagnetization

The customer's needs are very specific? No problem for us. Individual control solutions in all sizes and control options are our strength.



We will put together junction boxes with plug-in or fixed connection, suitable cabling sets and connections for you when planning a magnetic clamping system.





ELECTRO PERMANENT MAGNETIC CLAMPING

