

APPLIED MONOLITHIC TECHNOLOGY

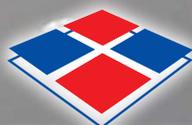


**MillTec** **GRIP**  
FUNCTION

MAGNETIC SYSTEMS  
FOR WORKPIECES CLAMPING  
IN MILLING OPERATIONS

- *5 faces machining in 1 setup*
- *100% steel surface - max reliability*
- *Automatic self-shimming*

INTERNATIONAL  
PATENTS



**TECNOMAGNETE**  
Safety through power

### Magnetic systems for workpieces clamping on machine tools



Magnetic systems are the optimal solution for the clamping of workpieces on milling machines, machining centres, pallets, squares and FMS systems.

#### The main advantages:

- **Machining in one setup**

With a magnetic chuck the piece is always free on 5 sides; working with a single positioning optimizes the toolpath in face milling, contouring and drilling.

The limits of traditional mechanical clamping systems are thus overcome: in fact, their presence obstructs the complete access to the component to be machined, forcing to multiple placements to complete the processing cycle.

- **Uniformity of clamping**

The clamping force is evenly distributed over the entire contact surface: the workpiece is not compressed or deformed.

Traditional clamps are used to act by points, causing tensions that generate vibrations and machining resonances.

- **Quick positioning and fixing of the workpiece**

In a few seconds, through an electrical discharge, the magnetic circuit is activated and the workpiece is clamped.

The power supply is required only for the phases of activation and deactivation.



## MillTec characteristics:

- **Monolithic technology**  
Made from a block of steel, without any fixing elements
- **Permanent-electro safety**  
Workpiece remains clamped even without power supply
- **Concentrated force**  
Tool and machine are not influenced by the magnetic field
- **GRIP function**  
For vibrations reduction during machining
- **Uniformity and Quality of clamping**  
Uniform clamping throughout the piece surface
- **Automatic shimming**  
With special RMP extensions
- **Quick and easy setup**  
Fast and accurate operations
- **A solution for any need**  
Our know-how can meet any special need
- **Advanced electronics**  
Operative safety to control the magnetic force

## Monolithic technology

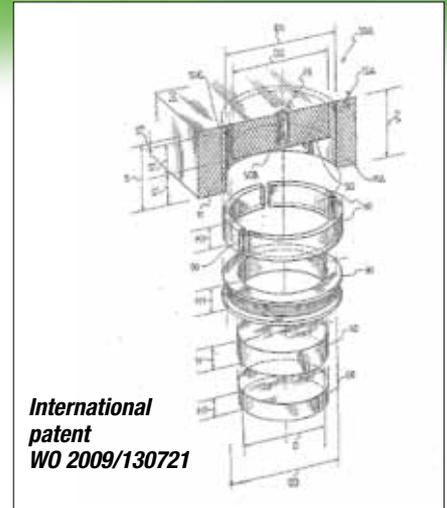
MillTec series is a new generation of magnetic equipment, characterized by a monolithic honeycomb structure, without mechanically-assembled parts.

The poles, obtained by core drilling from a single block of steel, are an integral part of the frame and therefore capable of absorbing heavy operating efforts, maintaining absolute stability.

The circular-islands polar geometry allows an optimal distribution of the magnetic area, leaving free machinable areas for the insertion of precision bushings, stops, references or to obtain hybrid clamping surfaces.

### A unique and impenetrable surface

The steel surface is homogeneous, free of sealing resin, inserts or other containment elements that wear out over time. It acts as a mechanical shield to protect the electrical circuit and internal components of the system.



### Total reliability

The absence of moving parts prevents wear and makes the system maintenance-free, for total reliability over time.

### Magnetic poles are integral part of the frame.





## Permanent-electro safety

Safety is intrinsic to a permanent-electro system.

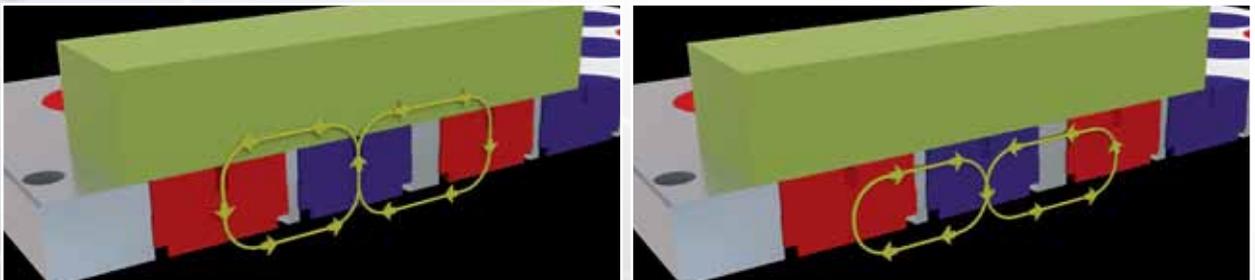
MillTec concentrates all the magnetic force on the workpiece, granting high performances in total safety.

A one-second electric pulse activates the system (**MAG** cycle).

### Concentrated force

The checkerboard arrangement allows a flat and horizontal circuiting of the flux, totally concentrated in the polar area, i.e. on the piece to be clamped.

Tool and machine are not affected by the magnetic field: the perfect balance



### From MAG to DEMAG phase



Magnetic flux



Magnetic poles



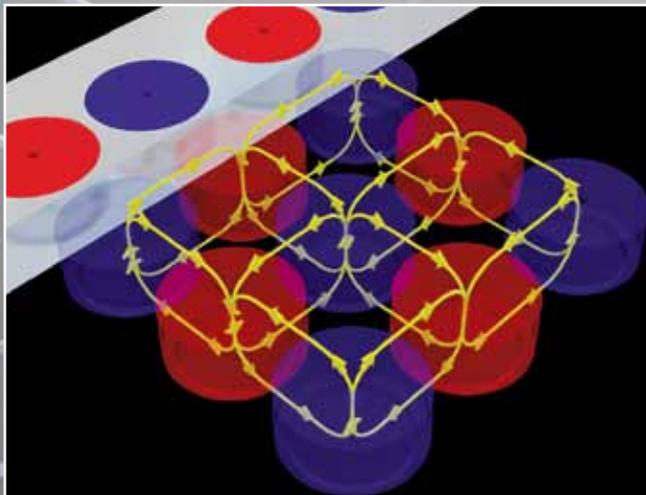
The piece remains clamped indefinitely by the intrinsic and constant force generated by the high-energy permanent magnets, without any power supply.

The system can be deactivated (**DEMAG** cycle) with an additional electric pulse.

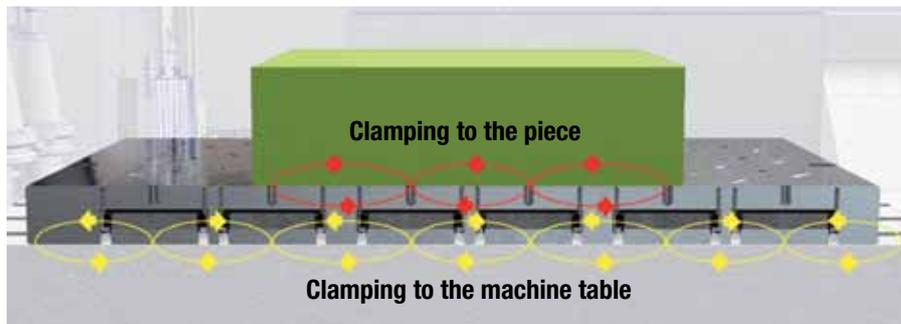
of the magnetic circuit prevents any flux leakage phenomenon and interference, ensuring certain and constant performance (Neutral Crown patent).

### Respect for the environment

The permanent-electro magnetism has low energy consumption, limited to the phases of activation and deactivation. It does not produce waste or oil for disposal.



## GRIP function



### Uniformity and Quality

The removal of machining vibrations enhances the uniform clamping characteristic of the magnetic system.

This results in better finishes, more precision and optimum machining speed, reduced tool consumption.

Thanks to GRIP technology, the magnetic modules now can be manufactured with a limited thickness, maintaining at the same time high structural rigidity.

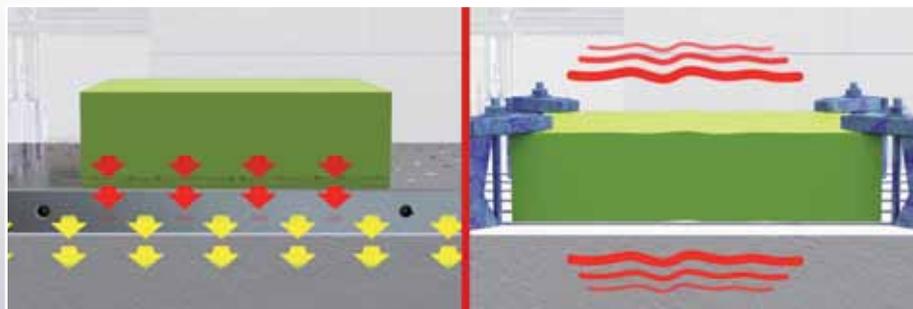
The reduced thickness and the reduced weight help to optimize machine performance, increasing headway and load capacity, as well as reducing stress levels thanks to faster cycle times.

MillTec GRIP offers great advantages in terms of increased productivity and quality.

It is finally possible to achieve a uniform total clamping, i.e. between the workpiece, the magnetic system and the machine table.

GRIP generates a self-clamping force towards the machine table, in addition to the magnetic force that holds the piece.

The clamping force to the machine table eliminates possible bending or deformations, typical of traditional mechanical clamping elements.



Clamping with GRIP

Traditional mechanical clamps



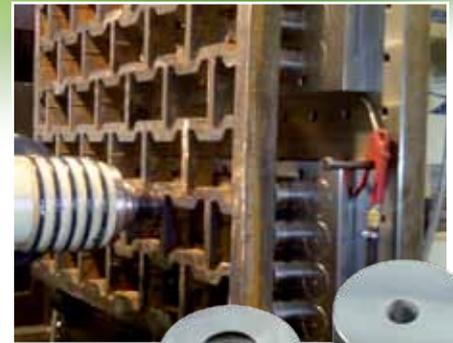


## APPLIED MONOLITHIC TECHNOLOGY

### Automatic shimming and stress release with polar extensions



The combination of MillTec + polar extensions makes it possible to quickly and easily clamp workpieces with irregular or rough surfaces. High precision can be achieved on large surfaces with just one positioning. Polar extensions are efficient, easily interchangeable and protect MillTec's surface from abrasion and wear.



#### Main advantages in use:

- **Automatic shimming**

The combination of 3 fixed extensions with a suitable number of mobile ones (to create an adequate contact surface) let's compose a flexible magnetic bed, able to adapt itself on the piece.

When activated, the magnetic flux stiffens the extensions with the workpiece, making it monolithic.

- **Quick stress release**

Repeating DEMAG and MAG cycles at the end of the machining process, the internal tensions of the workpiece are automatically released, without losing the positioning references.

- **Contouring and through-holes**

The polar extensions (either fixed or mobile ones) are also used to raise the workpiece from the magnetic surface to facilitate through holes and undercuts machining operations .

- **Working with thin pieces**

The /SC series extensions present a recess on the face in contact with the piece. This configuration reduces the depth of the magnetic field, allowing the use with thin pieces (minimum thickness 10 mm).





The protective cover prevents swarf or impurities from entering the mechanism; performance remains constant without the need for maintenance for cleaning.

The "double action" technology allows the free positioning of the extensions on the magnetic surface.

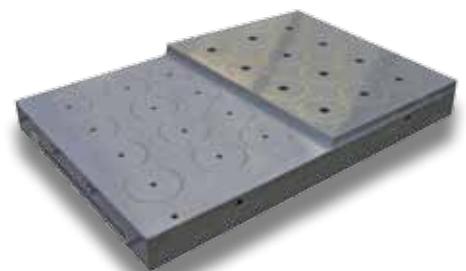


The traditional "single-action" tilted extensions require to respect a specific layout with alternating opposing rows. This increases the setup time and the risks of malfunction caused by a wrong positioning.

The RMP extension, equipped with threaded pin integrated, can be positioned with **no possibility of error** in just a few moments, easily and without any tool.

### Special-shaped workpieces

DDP polar plates allow the creation of shaped clamping beds on the profile of the workpiece.



### RMP mobile extensions

Based on an exclusive patent, the RMP offer exclusive advantages in terms of practicality of use and efficiency.

The internal "double action" mechanism grants a 20% higher magnetic efficiency compared to traditional extensions with "single action" tilted surface.





## Easy and quick setup

### Machining examples

MillTec allows the machining of workpieces of various shapes and sizes, either on vertical or horizontal spindle machines.

It is also the ideal solution for clamping workpieces on 5-axis machines and on machining centres.

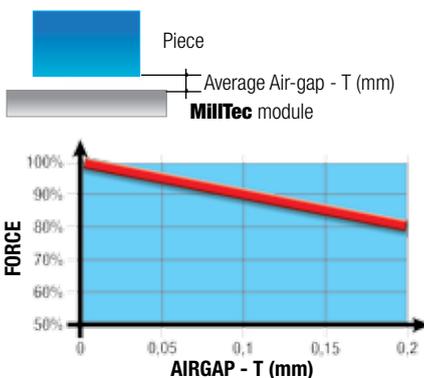
Thanks to its modularity, it is easy to combine several elements to compose magnetic tables in various sizes.

There is no limit to flexibility: with the help of fixed and mobile polar extensions you can clamp and machining complex pieces, leaving complete freedom of movement to the tool.



#### • Face milling

Dc	Tool diameter	mm	125
Zn	Cutting edges	n.	8
n	Cutting speed	rpm	860
ap	Cutting depth	mm	1,5
ae	Cutting width	mm	80
Vf	Feed of the table	mm/min	4000
Q	Stock removal data	cm <sup>3</sup> /min	480



MillTec guarantees high performance even on workpieces with irregular surfaces or high roughness.



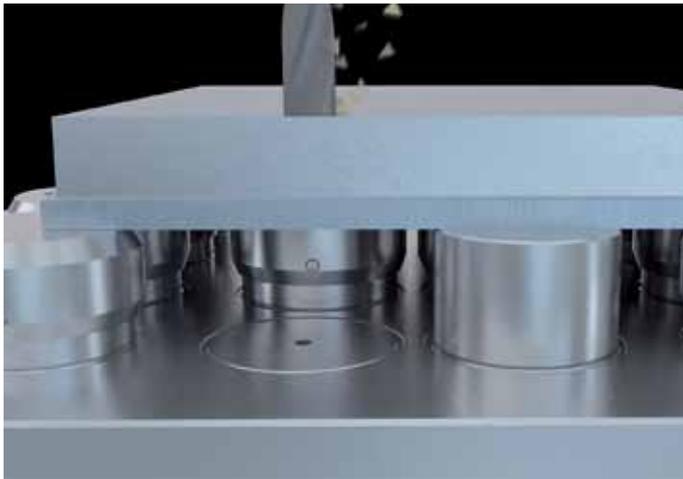
#### • Edge milling and chamfering

#### • Face milling and pocket execution



Machining samples data for achieved with:

- Piece dimensions: 410x260x50mm, positioned on 3 fixed extensions PFR 70/45 and 9 mobile RMP 70/45. Material: FE 275 JR. Machine: VMC 1600 - 27kW
- Magnetic chuck: MillTec GRIP 304HD (320x425x42mm), magnetically clamped on machine table.



• **Slot execution / drilling**

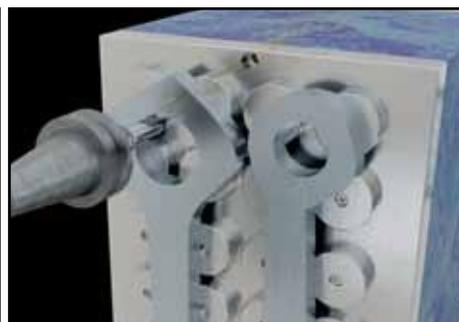
Dc	Tool diameter	mm	50
Zn	Cutting edges	n.	5
n	Cutting speed	rpm	1800
ap	Cutting depth	mm	2
ae	Cutting width	mm	50
Vf	Feed of the table	mm/min	5000
Q	Stock removal data	cm <sup>3</sup> /min	500

• **Contouring**

Dc	Tool diameter	mm	50
Zn	Cutting edges	n.	5
n	Cutting speed	rpm	1800
ap	Cutting depth	mm	5
ae	Cutting width	mm	5
Vf	Feed of the table	mm/min	4000
Q	Stock removal data	cm <sup>3</sup> /min	100



• **Multiple parts lined up**



• **Boring forged parts**



• **Machining on tombstone**





## APPLIED MONOLITHIC TECHNOLOGY

# MillTec

**GRIP**  
FUNCTION



**NO**  
**VIBRATIONS!**

### For a drastic reduction of machining vibrations

MillTec GRIP is characterized by the exclusive GRIP function: the system generates, in parallel to the magnetic force of the piece, an additional magnetic flux directed towards the machine table.

The GRIP effect does not reduce the clamping force to the workpiece; it is an extra force to make the assembly workpiece / magnetic plate / machine monolithic.

The magnetic clamping force to the machine table, equivalent to about 30% of the nominal force generated towards the workpiece, allows perfect stability and structural uniformity, eliminating resonances and vibrations.

The /SK control unit allows to select the direction of activation of the magnetic force.

MillTec is suitable for all machines: just clamp it using screws on the 2 through holes.

The standard supply includes also the parking plate, an essential accessory for removing and eventually repositioning the module on another machine.



### Technical data - MillTec series

Model	Polar density	GRIP function	Force/pole	Thickness mm	Control unit
<b>MillTec GRIP</b>	HD	yes	640 daN	42	XT200SK/ST200SK
<b>MillTec/R</b>	HD	yes	640 daN	42	ST200SK
<b>MillTec/B</b>	HD/ST	no	640 daN	51	XT200F/ST200F
<b>MillTec HDN</b>	HD	no	370 daN	51	ST200R
<b>MillTec Duo</b>	HD	no	640 daN	51	ST200F
<b>MillTec Block</b>	HD	no	640 daN	51	ST200F
<b>MillTec Zero</b>	ST	no	640 daN	51	XT200F

**MillTec** is available in standard dimensions starting from 200x200 mm.

# MillTec/R




## For 5-axis machines

MillTec /R is the circular version of MillTec, optimized for installation on 5-axis machines.

Working on 5 axes means using shorter tools to increase feed rates and cutting speeds. With MillTec /R, the workpiece is clamped on all its surface, without any obstacle for the complete machining.

The reduced thickness and low weight improve the performance of the machine, preserving daylight and capacity.

Equipped with a set of fixed polar extensions, MillTec /R allows to rise the work-piece from the surface to allow:

- **Complete profiling**
- **Under edge machining, through holes and pocket features.**

MillTec /R features a solid steel frame that can be machined to create precise reference points, holes or key-ways.

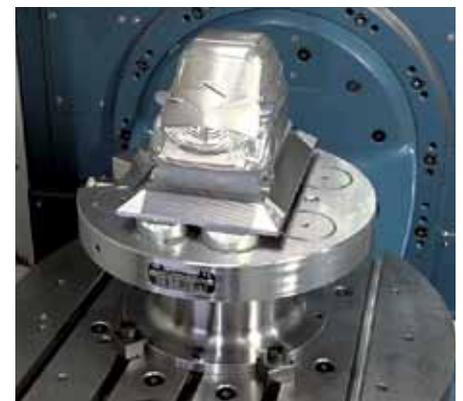
## MillTecDuo

### 360° accessibility



MillTec /R is available in MillTec Duo configuration, i.e. in combination with a pedestal manufactured from solid block.

Raising the magnetic module (and therefore the workpiece on it) increases the daylight granting complete accessibility for the tool.





## APPLIED MONOLITHIC TECHNOLOGY

A solutions for any need

### MillTec/B

Monolithich technology on traditional frame



All the advantages of MillTec technology, in a simplified version that has no built-in GRIP function.

MillTec /B is available in 2 configurations, both with a thickness of 51mm: the regular HD and the new ST version.

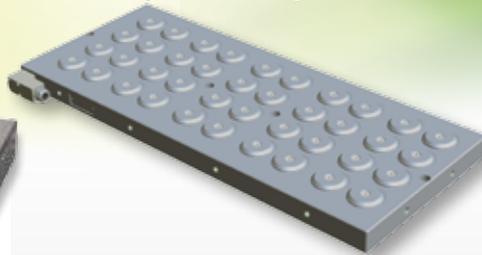
The ST, optimized for clamping medium-large piece, is recommended to compose magnetic tables with a low investment.

MillTec /B is supplied with XT200 or ST200 /F series controls.



### MillTecHDN

For alloyed steel piece



Alloy steel parts may present persistence of magnetism after being machined clamped through a magnetic chuck.

MillTec HDN solves the matter: its special demagnetization circuit - NUFLUX - completely removes any magnetic residue from the workpiece.

HDN is supplied complete with special conical polar extensions.

The estension concentrate the magnetic flux only to the workpiece to be clamped, to achieve the maximum performances.

The special control unit allows you to choose between 8 levels of magnetization, thus adapting the clamping force to the phisical characteristics of the piece.

### MillTecCubo

For horizontal spindle machines



MillTec GRIP can be easily coupled to tombstones and cubes.

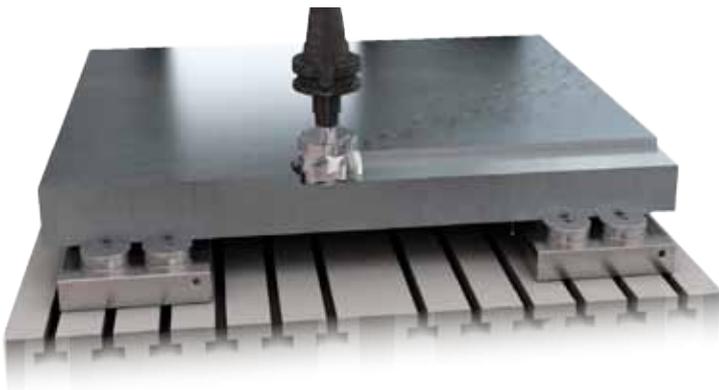
The uniformity of clamping granted by the GRIP function allows the realization of magnetic tombstones with unique characteristics of stability, rigidity and robustness.

The reduced thickness and the low weight of MillTec GRIP help to optimize machine performance, increasing headway and load capacity, as well as reducing stress levels thanks to faster cycle times.



## MillTecBlock

Modular magnetic blocks



MillTec Block is designed to solve the problem of those who have to block pieces with complex morphology: hold them in place and leave the area of junction between the parts free.

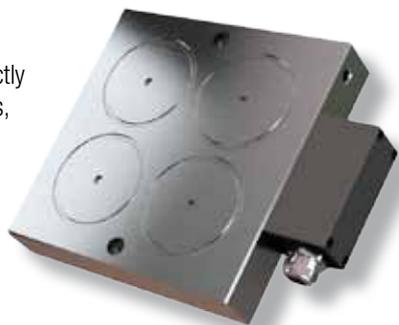
MillTec Block system is composed by a combination of 2/4/6 permanent magnetic 4-poles-modules, independent and freely positionable to clamp pieces of any shape and size.

Each module is supplied with 4 pole extensions; these can be machined and modified to better suit the piece to be clamped.

MillTec Block frame can be machined to insert reference pins and stops.

The system is modular, i.e. can be expanded depending on your needs: is possible to join more modules to create denser "magnetic webs".

MillTec Block is fixed directly on machine bed with bolts, using the 2 holes on each module.



## MillTecZero

Precise and repeatable clamping



This is a highly innovative solution: a "zero point" with magnetic technology.

MillTec Zero combines the operational flexibility of the magnetic clamping with the precision and repeatability typical of a "zero point" system.

Equipped with a precision grid, it is suitable for the rapid and precise positioning of pre-machined pieces, pallets and clamping equipment.

Modular and practical to use, it presents a large clamping surface suitable for pieces of various shapes and sizes.

MillTec Zero has 2 centering devices in hardened steel, precision turrets for support the workpiece and a series of mobile extensions for automatic shimming.



Advanced electronics



ST 200 SK

The ST and XT series electronic control units are designed to perform rapid activation / deactivation cycles and to reduce power consumption.

Experience and innovation are combined in a reliable and safe control electronics, in accordance with EMC directives (Electro Magnetic Compatibility).

The push-button panel allows the functions of magnetization and demagnetization, offering a clear display of the status of the system.

The rear RS 232 connector allows interfacing with the machine's PLC.

Operational safety is guaranteed by a set of devices integrated in the control unit and in the magnetic module, capable of monitoring the functioning of the system.

**UCS:** electronic circuit that verifies the circulation of the electric current in the module necessary for a correct magnetization of the system.

**FCS / MFD:** magnetic flux control system. Controls the magnetic permeability of the workpiece and the reaching of optimal saturation values.

MFD inhibits magnetization in the absence of the workpiece and generates an alarm signal.

**ST 200**

The control unit series ST200 can activate single chucks or multiple modules in a table. Available with voltages from 200V to 480V, is supplied with the practical TC remote control. The /SK version includes the key selector for GRIP function.



**XT200**

The XT series is characterized by compactness and lightness.

Designed to be positioned vertically on the machine cabinet, it is supplied pre-arranged with a rear hooking system.

XT200 has an integrated push button with high intensity LEDs and is available with voltages from 360V to 480V.

**PCR**

The PCR module connects the controller to the machine: all signals (Mag or Demag status, magnetic saturation, MAG levels, alarms) are transferred to the machine PLC.



PCR makes MillTec an "Industry 4.0 compliant" system, able to achieve advanced functionalities such as interconnection, predictivity, remote maintenance capability.



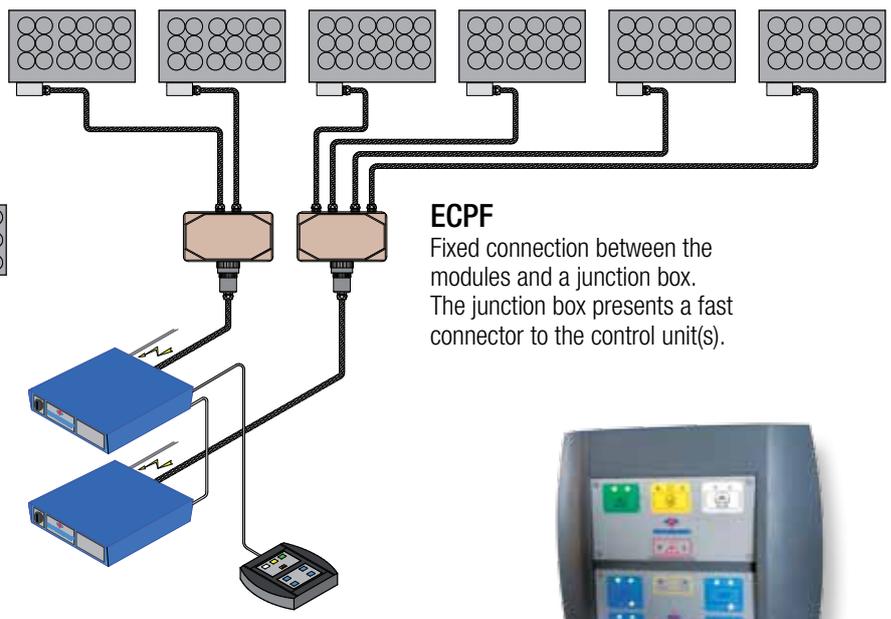


It is easy to compose tables combining standard modules with ECPM and ECPF connection kits

**Modular system for all demands**

MillTec modules can be easily combined to compose magnetic tables, either using the standard installation KITs ECPM / ECPF or through customized solutions according to the application needs.

The fixing is made through holes already present on the modules.



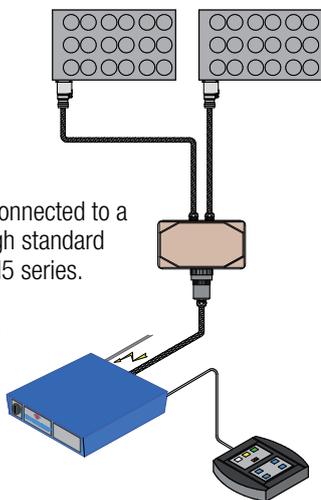
**ECPF**

Fixed connection between the modules and a junction box. The junction box presents a fast connector to the control unit(s).

**ECPM**

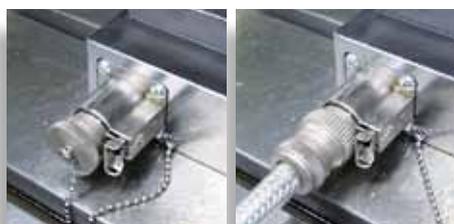
The modules are connected to a junction box through standard connectors ERGON5 series.

The box presents a fast connector to the control unit(s).



**ERGON 5 connectors**

ERGON 5 connectors have a reinforced structure with simplified maintenance. Easy to handle and quick to insert, they offer absolute watertightness and high reliability.



**TCF**

Push-button panel for tables, complete with keys for the selection of the modules.



**CCE**

Pulpit control with push-button panel for individual selection of the modules - signal lamps included.





MILLING AND TURNING



HEAVY LIFTING



LIGHT LIFTING



METAL STAMPING



INJECTION MOLDING



## Magnetic systems for clamping, moulding and material handling

Tecnomagnete revolutionized the world of clamping ferrous components with the invention of the electro-permanent circuit and Quadsystem technology through the 70's and 80's.

The current technological generation represents a further step forward in terms of economy, safety and reliability. These aspects distinguish the entire range of products: clamping systems for injection presses, metal stamping, machine tools and for the handling of ferrous loads.

We have always been devoted to research the best technology to be applied in industrial activities. Thanks to our know-how we are able to develop high complexity tailor-made solutions.

Our widespread presence around the world through subsidiaries, technical and commercial centers and distributors, as well as our active cooperation with leading global OEMS make Tecnomagnete a reliable partner with long experience, able to provide advice on specific needs or technical support.



**TECNOMAGNETE®**  
leading the way in magnetism

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