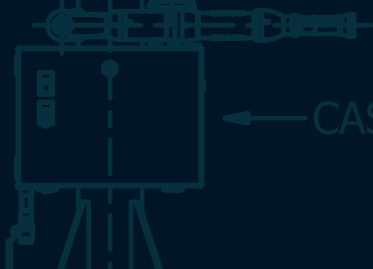
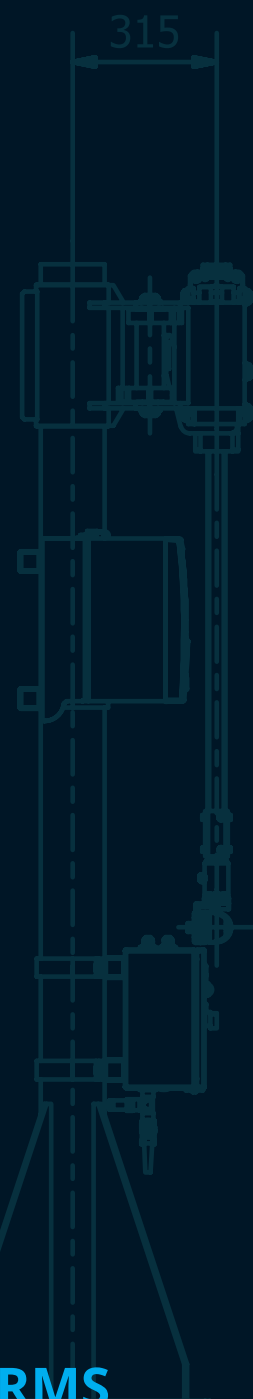


TSA TECNOLOGIE
SPECIALI
APPLICATE

PRESENTAZIONE
S010500



CASSETTA PNEUMATICA



ARTICULATED ARMS



WRISTS ARTICULATED ARMS

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TSA

SPECIAL APPLIED TECHNOLOGIES

TSA founded in 1984, for over 30 years has been designing, manufacturing and distributing pneumatic motors, articulated arms for torque reaction, assembling systems and special equipment.

Its technical design office is in charge of studying all of the required characteristics to guarantee maximum reliability and high productivity, according to modern ergonomic principles. Product quality and safety are now a consolidated standard for TSA.

Just-in-time deliveries, a wide, flexible range of products, including diversified motors and arms, an efficient spare parts warehouse and effective before- and after sales: these are the services offered by TSA to its customers. Thanks to its constant commitment and to the professionalism of its technicians,

TSA has gained the trust of major companies on the market. Its aim is to meet customer requirements in all respects: **QUALITY, PERFORMANCE AND COST EFFECTIVENESS.**



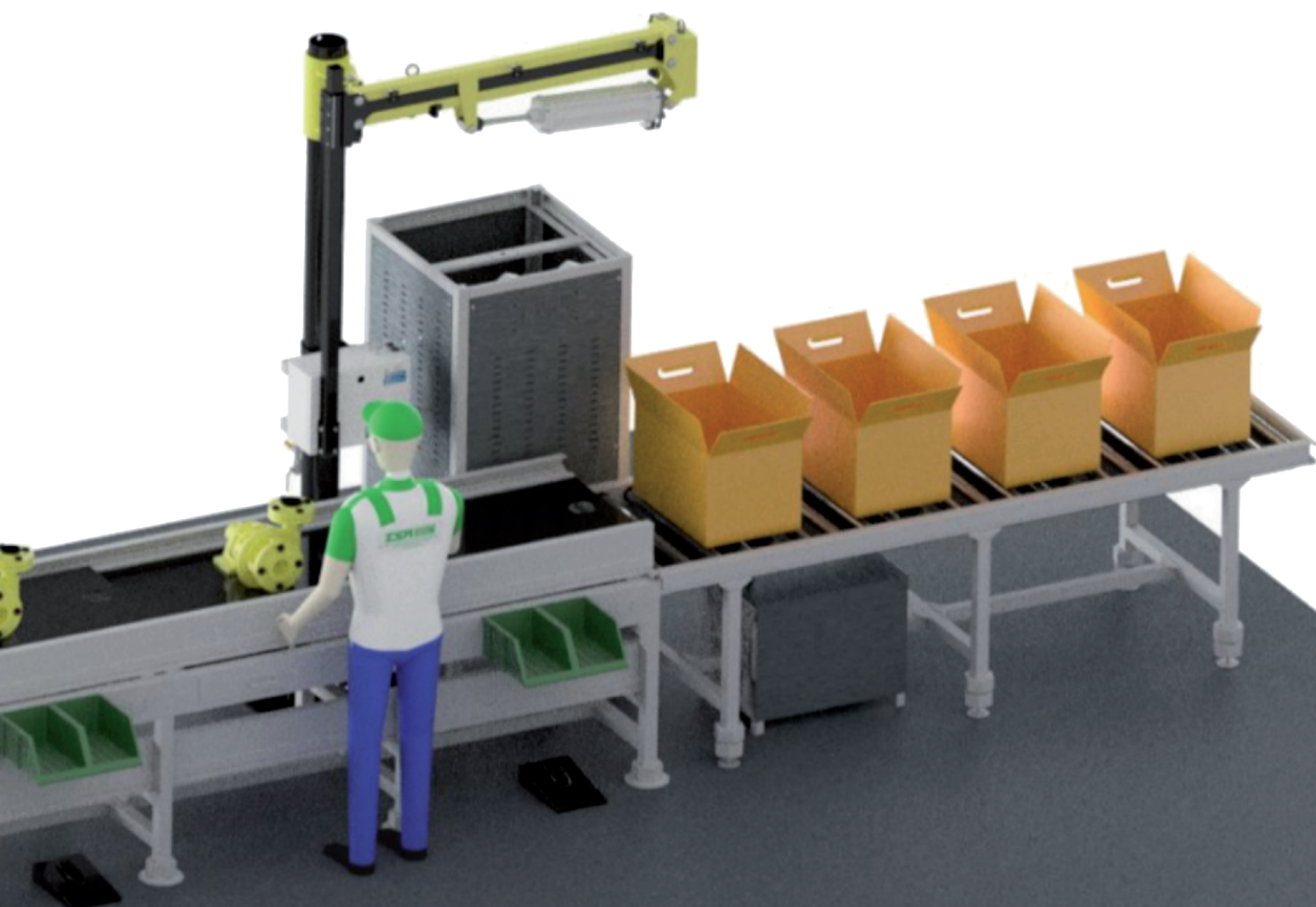
GENERAL INFORMATION

TSA manufactures a set of technical items for specific requirements associated with the automotive sector and with industrial production in general. **TOOL-MATE** is the name of our own line of articulated arms and accessories for our customers, which includes a wide product range with an excellent price/quality ratio.

This catalogue includes a description of models for general use. There are also, however, specific applications which we can make available upon express request.

GENERAL INFORMATION

The articulated-balanced **TSA** arms have been designed and developed in order to neutralise the reaction torque generated by tools (tighteners, tapping machines, drills etc.), and to reset their weight. All our articulated arms can be integrated with different kinds of wrists which allow for optimising tightening as required, having been designed to guarantee correct use and positioning of the tool during the tightening phase.



ARTICULATED ARM WRISTS

GENERAL INFORMATION

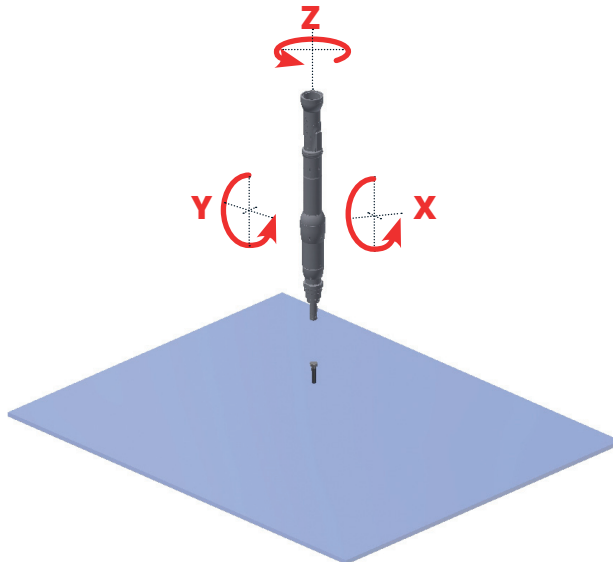
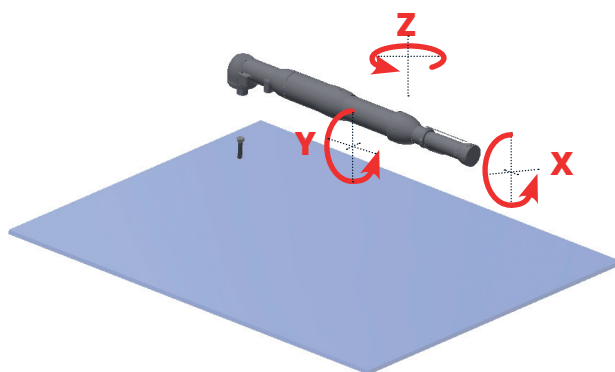
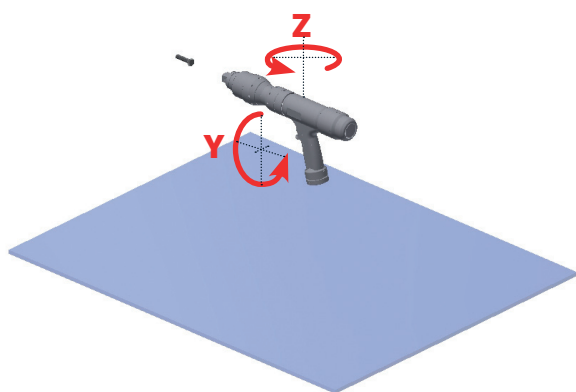
TSA articulated arms may be fitted with several accessories, to meet most requirements for mounting.

The accessories we present here have been designed and constructed following the main safety norms and in compliance with the 89/392 Directive .

It is increasingly frequent that a tool is required to

complete several kinds of tightening, which means that different types of clearance are required (see drawings) which are classified as:

- clearance on axis "Z"
- clearance on axis "X"
- clearance on axis "Y"



Important: For the torque reaction the working or parallel axis will always need to be limited.

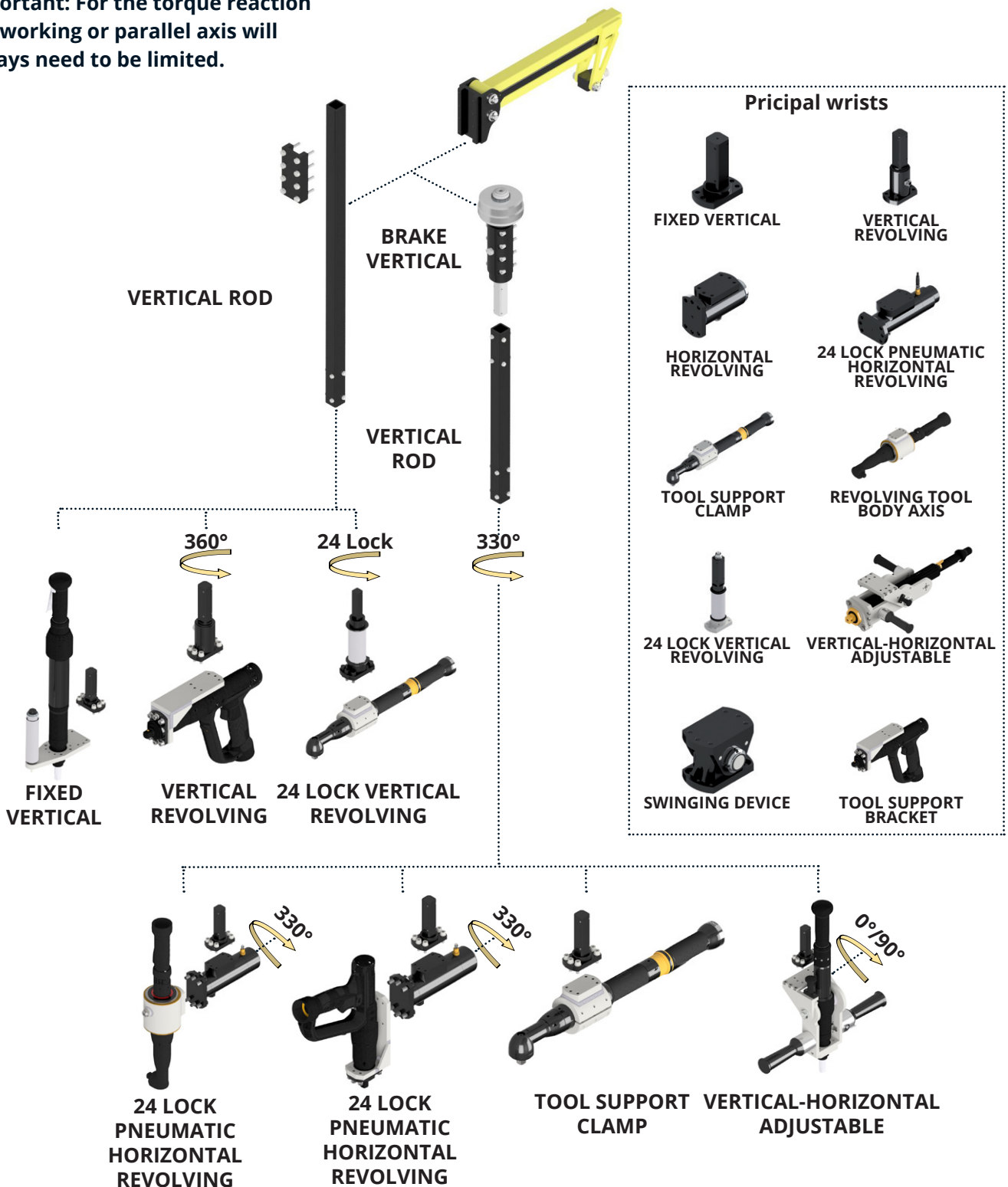
in choosing the most suitable accessory for individual requirements, attention should be paid in particular to:

- Maximum tool torque
- Tightening torque
- Type of electric or pneumatic tool, angular or straight
- Tightening precision %
- Tightening axis direction: Horizontal, Vertical or both
- Possible working areas

DIFFERENT WRIST COMBINATIONS

The diagram below shows a possible combination between different types of wrists. therefore, depending on the tightening axis direction (Horizontal, Vertical or both), the correct type of wrists needs to be chosen.

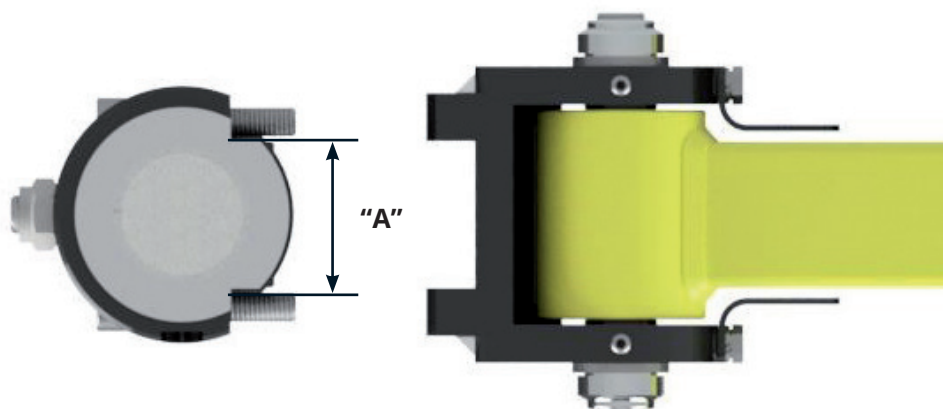
Important: For the torque reaction the working or parallel axis will always need to be limited.



PNEUMATIC BRAKES

VERTICAL AXIS PNEUMATIC BRAKE

TSA uses this type of brake to set a limit on the vertical axis "Z" (which is generally cleared), allowing for a rotation block before tightening. it is fitted with an electric safety sensor which, with the appropriate tool interface, prevents the tightening of the latter if no connection has been completed. this accessory is mounted directly on the vertical rod hinge of the articulated arm (using suitable screws), keeping the vertical rod rotation. In the section below. its position allows for easy cabling and limited size. This connection system also includes a protection guard, limit for the vertical axis rotation at 330° (to prevent cable twisting). This type of accessory is especially suitable for electric tools with torque control.

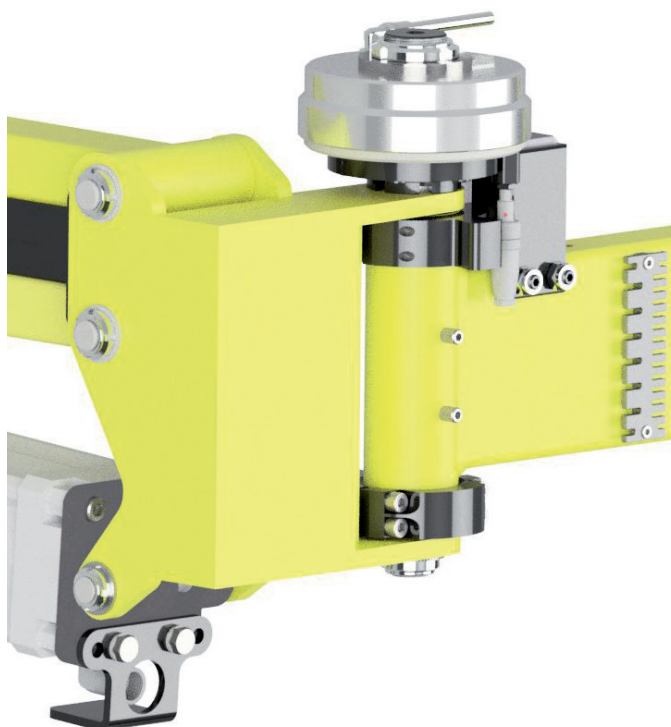


ENGAGEMENT CLUTCH	MAX TORQUE	MINIMUM OPERATING PRESSURE	AVAILABLE ACCESSORY FOR EACH ARM	LENGTH "A"	NUMBER OF CLUTCH TEETH	VERTICAL ROD	WEIGHT
	Nm	BAR	Size	mm			Kg.
F13P09000	150	4	1 (150Nm)	30	240	30X30	3
F24P11400	250	4	2	40	264	40X40	5
F34P14000 *	500	4	3	50	280	40X40	11
F35P16600	1000	4	3	50	300	50X50	14
F56P21000	2000	4	5	60	360	60X60	32

* The graft model marked with this symbol requires, in order to be interfaced with the articulated Arm, a VERTICAL ROD hinge of 50X50.

ARM ROTATION AXIS PNEUMATIC BRAKE

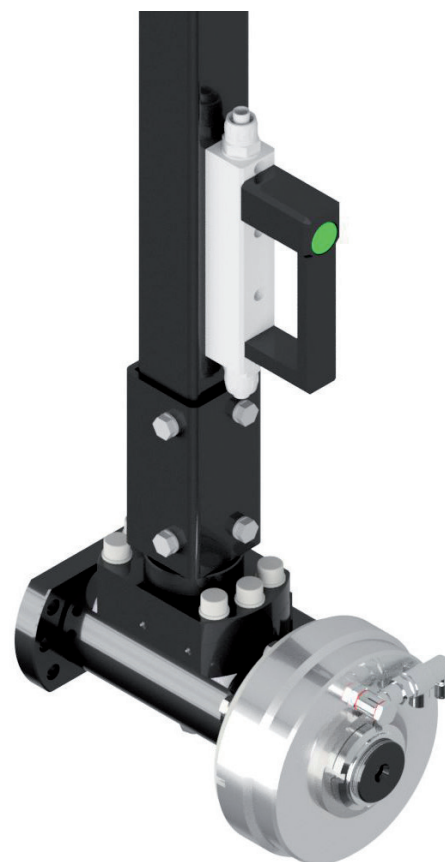
The brake applied to the rotating axis of the arm is used if the "Column" mounted on aerial slide tracks, needs not to be translated while tightening; in this case, for the torque reaction, a block on the "elbow" joint is required.



ENGAGEMENT CLUTCH	MAX TORQUE	MINIMUM OPERATING PRESSURE	AVAILABLE ACCESSORY FOR EACH ARM	NUMBER OF CLUTCH TEETH
	Nm	BAR	Size	
G10P09000	150	4	1 (150Nm)	240
G20P11400	250	4	2	264
G30P14000	500	4	3	280
G30P16600	1000	4	3	300
G50P21000	2000	4	5	360

HORIZONTAL AXIS PNEUMATIC BRAKE

TSA uses this type of brake to set a limit on the horizontal axis "X" (which is usually connected). This brake can be disabled (disconnected) by the operator pressing the button on the pneumatic handle; when the button is released the brake is enabled (connected) again. It is fitted with an electric safety sensor which, with the appropriate Interface with the tool management system, prevents tightening of the latter if the connection has not been completed. this accessory is mounted on the lower section of the vertical rod of the articulated arm (using suitable screws). Moreover, the brake also Includes a protection guard, limit for the vertical axis rotation at 330° (to prevent cable twisting). This accessory is particularly suited for electric tools with torque control. The torques which the horizontal axis brakes can support vary depending on the tightening axis, which can be orthogonal (90°) or parallel to the rotation axis of the brake.



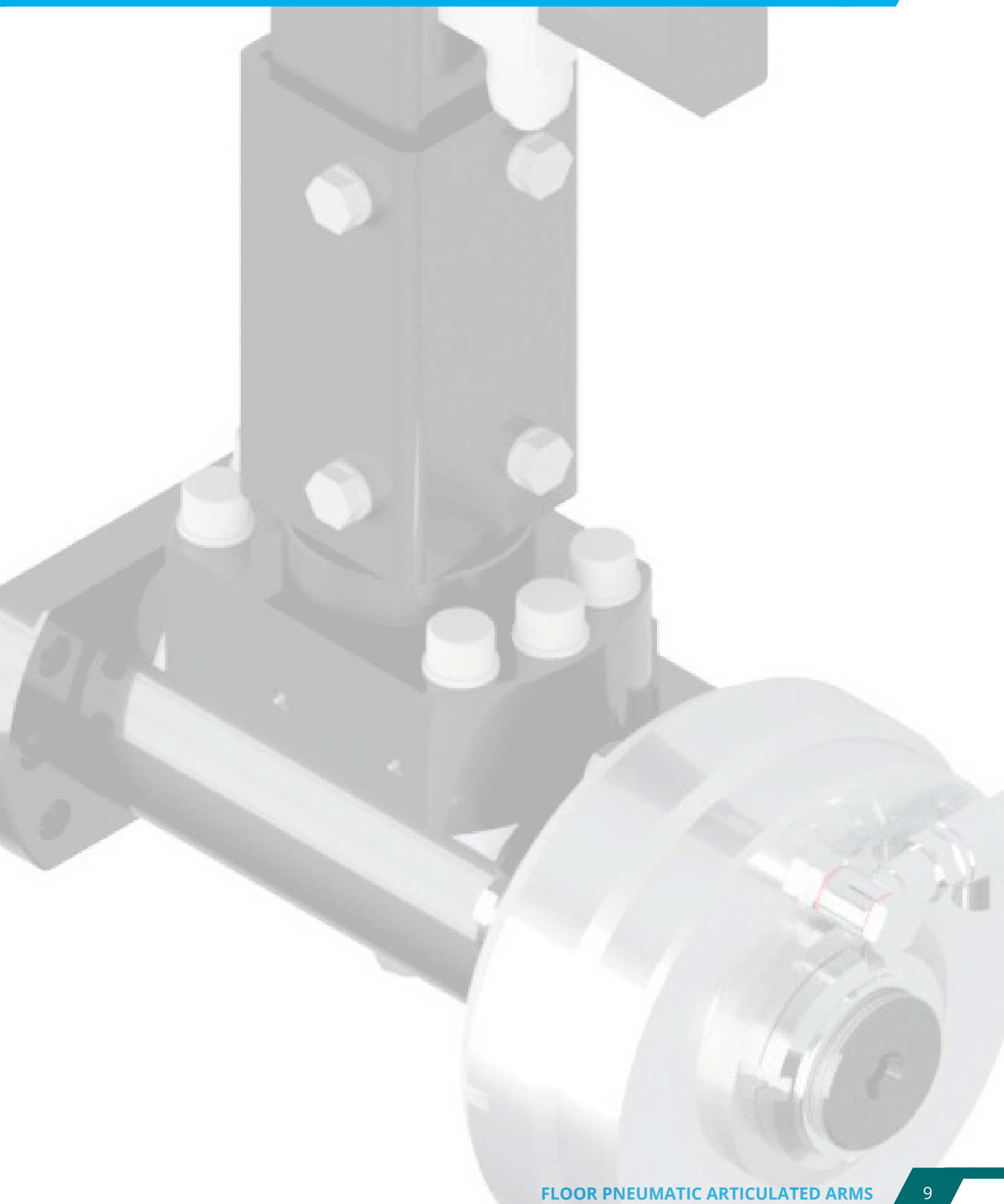
Torque on the orthogonal axis (90°)



Torque on the parallel axis



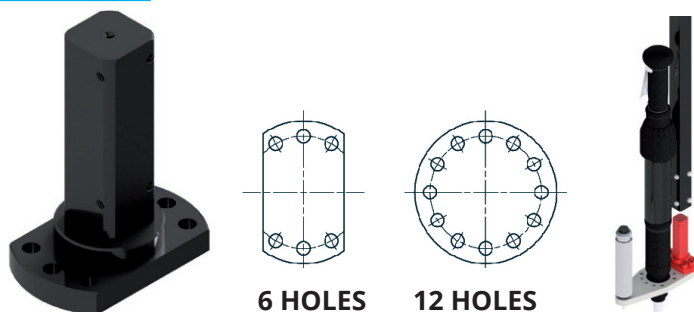
ENGAGEMENT CLUTCH	TORQUE OF ORTHOGONAL AXIS MAX.	TORQUE OF PARALLEL AXIS MAX.	MINIMUM WORKING PRESSURE	AVAILABLE ACCESSORY FOR EACH ARM	NUMBER OF CLUTCH TEETH	VERTICAL ROD	WEIGHT
	Nm	Nm		Size			Kg.
P34P11400	500	250	4	2-3	264	40X40	5
P35P14000	1000	500	4	3	280	50X50	11
P56P16600	2000	1000	4	5	300	60X60	16



WRIST ACCESSORIES

FIXED VERTICAL

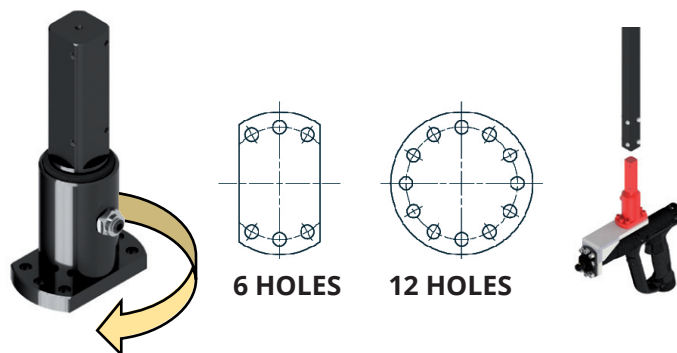
This flange is used as joint between the various types of wrists, brakes and vertical rods; moreover it is used to set a suitable limit to react to the torque caused by the tool.



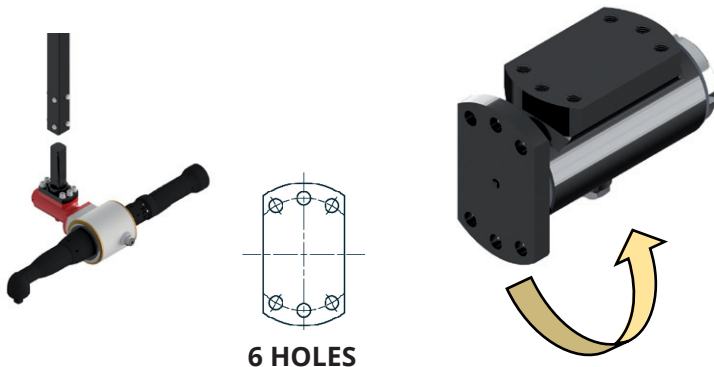
WRIST MODEL	TORQUE LIMIT	AVAILABLE ACCESSORY FOR EACH ARM	NUMBER OF FLANGE HOLES	VERTICAL ROD	WEIGHT
	Nm	Size			Kg.
PFV300000	150	1	6	30X30	0,5
PFV300003	150	1	12	30X30	0,5
PFV400000	500	2-3	6	40X40	1,3
PFV400003	500	2-3	12	40X40	1,3
PFV500000	1000	3-5	6	50X50	3
PFV500003	1000	3-5	12	50X50	3
PFV600000	2000	5	6	60X60	4,5
PFV600003	2000	5	12	60X60	4,5

VERTICAL REVOLVING

This type of wrist is used to produce a clearance on the vertical axis "Z" which allows for 360° rotation, thanks to a pair of radio-axial bearings, and is fitted with a 360° rotation limit system.



WRIST MODEL	TORQUE LIMIT	AVAILABLE ACCESSORY FOR EACH ARM	NUMBER OF FLANGE HOLES	VERTICAL ROD	WEIGHT
	Nm	Size			Kg.
PGV300000	150	1	6	40X40	1,5
PGV300003	150	1	12	40X40	1,5
PGV400000	500	2-3	6	50X50	2,3
PGV400003	500	2-3	12	50X50	2,3
PGV500000	1000	3-5	6	60X60	4
PGV500003	1000	3-5	12	60X60	4
PGV600000	2000	5	6	40X40	5
PGV600003	2000	5	12	40X40	5

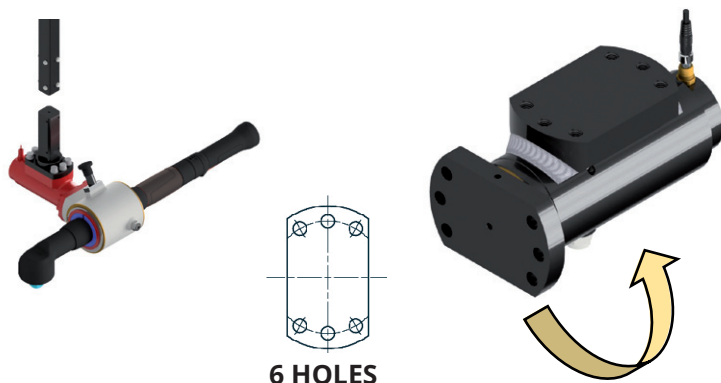


6 HOLES

HORIZONTAL REVOLVING

This type of wrist allows to release the perpendicular axis to the tool body by making a rotation. all versions are fitted with a 330° rotation limit, or at a required angle to be notified when making the purchase.

WRIST MODEL	TORQUE LIMIT	AVAILABLE ACCESSORY FOR EACH ARM	NUMBER OF FLANGE HOLES	VERTICAL ROD	WEIGHT
	Nm	Size			Kg.
PGO310000	150	1	6	30X30	3
PGO410000	500	2-3	6	40X40	5
PGO510000	1000	3-5	6	50X50	7,5
PGO610000	2000	5	6	60X60	10



6 HOLES

24 LOCK PNEUMATIC HORIZONTAL REVOLVING

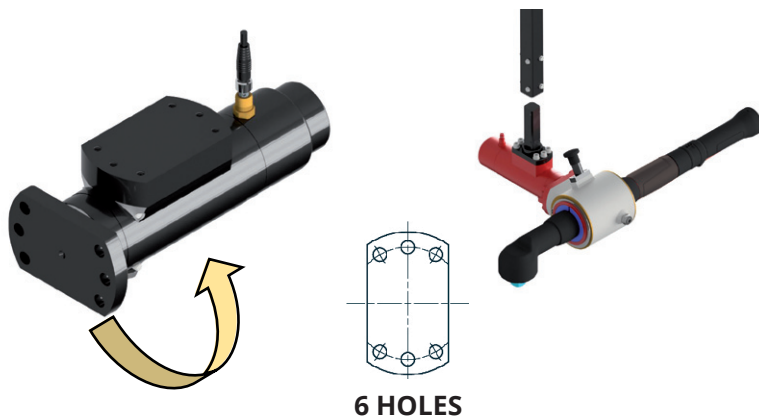
This type of wrist, normally locked, allows for releasing the perpendicular axis to the tool body, through the relevant pneumatic control (using a lever or button valve located close to the tool), making possible a 360° rotation with a 15° connection level. Note: When the tightening axis is parallel to the rotation of the wrist, an electric induction safety sensor prevents the tool from being activated if there is no connection.

WRIST MODEL	TORQUE LIMIT	SENSORE INDUTTIVO	AVAILABLE ACCESSORY FOR EACH ARM	NUMBER OF FLANGE HOLES	VERTICAL ROD	WEIGHT
	Nm		Size			Kg.
PLO320000	150	NO	1	6	30X30	5
PLO321000	150	SI	1	6	30X30	5
PLO420000	500	NO	2-3	6	40X40	5
PLO421000	500	SI	2-3	6	40X40	5
PLO520000	1000	NO	3-5	6	50X50	8,5
PLO521000	1000	SI	3-5	6	50X50	8,5

24 LOCK MANUAL HORIZONTAL REVOLVING

This type of wrist, normally locked, allows for releasing the perpendicular axis to the tool body, through the relevant manual command located at the back of the wrist, making possible a 360° rotation with a 15° connection level.

Note: When the tightening axis is parallel to the rotation of the wrist, an electric induction safety sensor prevents the tool from being activated if there is no connection.

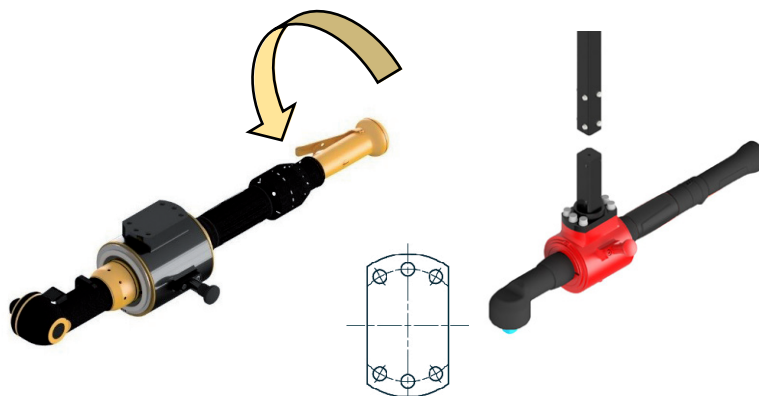


6 HOLES

WRIST MODEL	TORQUE LIMIT	SENSORE INDUTTIVO	AVAILABLE ACCESSORY FOR EACH ARM	NUMBER OF FLANGE HOLES	VERTICAL ROD	WEIGHT
	Nm		Size			Kg.
PLO310000	150	NO	1	6	30X30	5
PLO311000	150	SI	1	6	30X30	5
PLO411000	500	NO	2-3	6	40X40	5
PLO411000	500	SI	2-3	6	40X40	5
PLO511000	1000	NO	3-5	6	50X50	8,5
PLO511000	1000	SI	3-5	6	50X50	8,5

REVOLVING TOOL BODY AXIS

Questo tipo di polso viene impiegato esclusivamente per utensili a angolo. Questo tipo di strumento è utilizzato esclusivamente per utensili a angolo per creare una spaziatura lungo l'asse del corpo dello strumento che consente rotazioni all'angolo richiesto, da notificare al momento dell'acquisto.

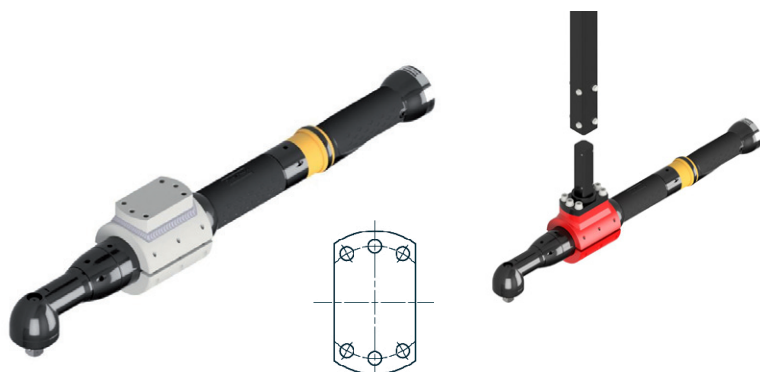


6 HOLES

WRIST MODEL	TORQUE LIMIT	AVAILABLE ACCESSORY FOR EACH ARM	NUMBER OF FLANGE HOLES	VERTICAL ROD	WEIGHT
	Nm	Size			Kg.
PAO310000	150	1	6	30X30	*
PAO410000	500	2-3	6	40X40	*
PAO510000	1000	3-5	6	50X50	*
PAO610000	2000	5	6	60X60	*

* The WEIGHT varies depending on the size of the toolutilizzare.

TOOL SUPPORT CLAMP

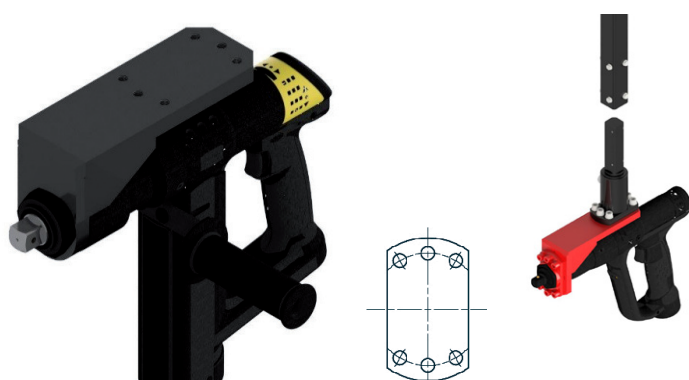


6 HOLES

This type of wrist is generally used for corner tools; it allows for rigid clamping of the tool. The wrist is available in four sizes, depending on the vertical rod in use.

WRIST MODEL	TORQUE LIMIT	AVAILABLE ACCESSORY FOR EACH ARM	NUMBER OF FLANGE HOLES	VERTICAL ROD	WEIGHT
	Nm	Size			Kg.
MSO310000	150	1	6	30X30	*
MSO410000	500	2-3	6	40X40	*
MSO510000	1000	3-5	6	50X50	*
MSO610000	2000	5	6	60X60	*

* The WEIGHT varies depending on the size of the toolutilizzare.



6 HOLES

TOOL SUPPORT BRACKET

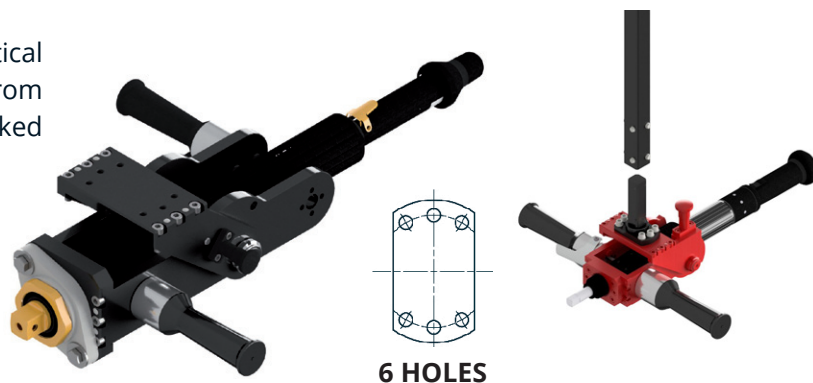
This type of wrist is used for horizontal tightening using straight or pistola tools.

WRIST MODEL	TORQUE LIMIT	AVAILABLE ACCESSORY FOR EACH ARM	NUMBER OF FLANGE HOLES	VERTICAL ROD	WEIGHT
	Nm	Size			Kg.
SSO310000	150	1	6	30X30	*
SSO410000	500	2-3	6	40X40	*
SSO510000	1000	3-5	6	50X50	*
SSO610000	2000	5	6	60X60	*

* The WEIGHT varies depending on the size of the toolutilizzare.

VERTICAL-HORIZONTAL ADJUSTABLE

This type of wrist is used for horizontal and vertical tightening. A fork allows for rotation of the tool from 0 to -90° on the horizontal axis, which can be locked in various positions using a manual stop.

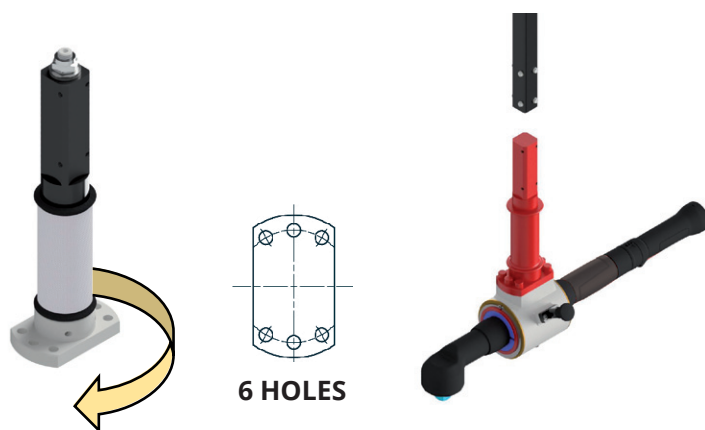


WRIST MODEL	TORQUE LIMIT	AVAILABLE ACCESSORY FOR EACH ARM	NUMBER OF FLANGE HOLES	VERTICAL ROD	WEIGHT
	Nm	Size			Kg.
PPO310000	150	1	6	30X30	*
PPO410000	500	2-3	6	40X40	*
PPO510000	1000	3-5	6	50X50	*
PPO61000	2000	5	6	60X60	*

* The WEIGHT varies depending on the size of the toolutilizzare.

24 LOCK VERTICAL REVOLVING

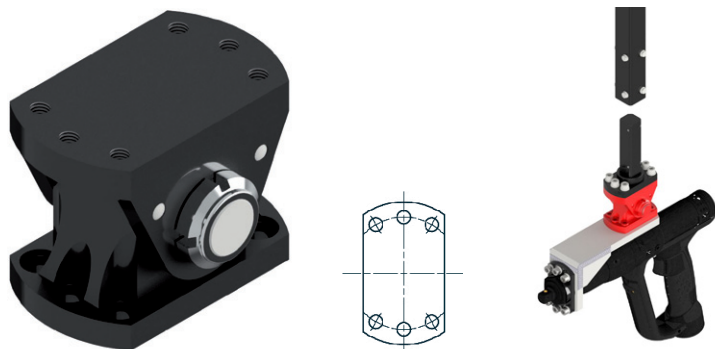
This type of wrist, normally locked, makes it possible to release the vertical axis using the handle on the body of the wrist, which allows for 360° rotation and a 15° connection level.



WRIST MODEL	TORQUE LIMIT	AVAILABLE ACCESSORY FOR EACH ARM	NUMBER OF FLANGE HOLES	VERTICAL ROD	WEIGHT
	Nm	Size			Kg.
PBV300000	150	1	6	30X30	3
PBV400000	500	2-3	6	40X40	3
PBV500000	1000	3-5	6	50X50	6
PBV600000	2000	5	6	60X60	8

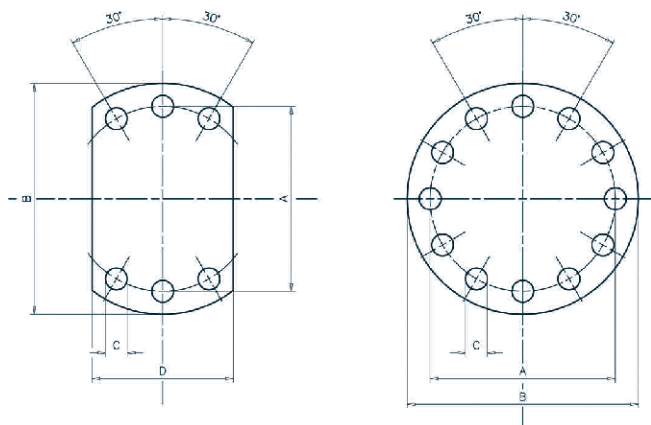
SWINGING DEVICE

This type of wrist is used for small oscillations by 10° or 20°.



6 HOLES

WRIST MODEL	TORQUE LIMIT	AVAILABLE ACCESSORY FOR EACH ARM	NUMBER OF FLANGE HOLES	GRADI DI OSCILLAZIONE	VERTICAL ROD	WEIGHT
	Nm	Size				Kg.
DPO300010	150	1	6	10°	30X30	0,8
DPO300020	150	1	6	20°	30X30	0,8
DPO400010	500	2-3	6	10°	40X40	1,8
DPO400020	500	2-3	6	20°	40X40	1,8
DPO500010	1000	3-5	6	10°	50X50	3,5
DPO500020	1000	3-5	6	20°	50X50	3,5
DPO600010	2000	5	6	10°	60X60	5,2
DPO600020	2000	5	6	20°	60X60	5,2



FLANGE FIXING HOLE - SIZES

The drawings below show the main levels which are required for interfacing with the various wrist sizes.

FLANGE MODEL	VERTICAL ROD	DRILLING ALTITUDE			
		A	B	C	D
30	30X30	Ø55	Ø70	N°6 HOLES Ø 6,5 N°12 HOLES Ø 6,5	40
40	40X40	Ø72	Ø90	N°6 HOLES Ø 8,5 N°12 HOLES Ø 8,5	55
50	50X50	Ø94	Ø115	N°6 HOLES Ø 10,5 N°12 HOLES Ø 10,5	75
60	60X60	Ø110	Ø135	N°6 HOLES Ø 12,5 N°12 HOLES Ø 12,5	85

PNEUMATIC MOTORS



GEAR-MOTORS



TELESCOPIC ARMS

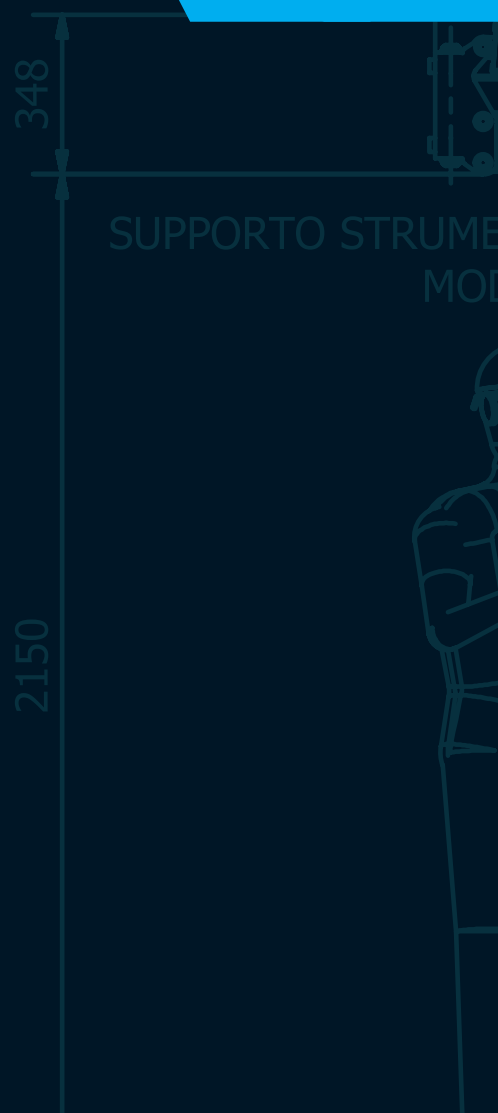
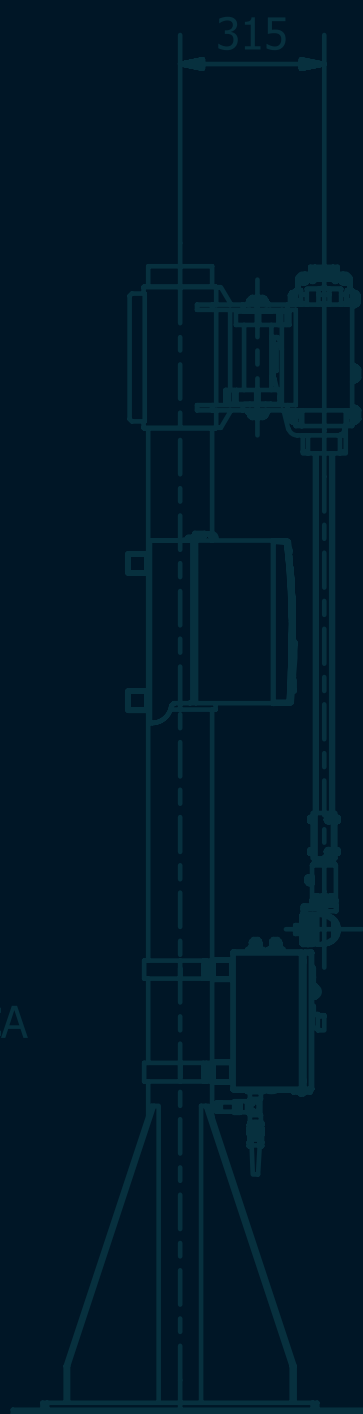


ARTICULATED ARMS



ACCESSORIES





SUPPORTO STRUMENTO
MOD.

EUMATICA

TSA TECNOLOGIE
SPECIALI
APPLICATE