ENERPAC

Collet-Lok®

Enerpac Collet-Lok® products combine the automation of hydraulic actuation with the security of an internal locking mechanism. After actuation and locking, these products maintain their clamping or supporting capacity without maintaining hydraulic pressure in the circuit. Available in Swing, Push, and Work Supports models, Enerpac Collet-Lok® products are also available in numerous special configurations and modifications.

Swing Clamps

Enerpac Collet-Lok® Swing Clamps combine the rotational actuation and clamping force of a hydraulic Swing Clamp with an internal locking mechanism that maintains the applied clamping force without holding hydraulic pressure in the clamp. Ideal for use in large-scale fixtures, they are available in 4,4, 8,9 and 37,8 kN models. Standard models are available in either Threaded Body or Lower Flange configurations. Available modifications include flange top manifold porting, longer strokes, non-rotational versions and special design bodies. Viton seals are standard.

Work Supports

Enerpac Collet-Lok® Work Supports use internal spring force to lift the support rod into contact with the work piece and then maintain the support with an internal locking system. Cataloged in 8,9, 17,8, and 44,5 kN capacities, these products are available in Threaded Body (8,9 and 17,8 kN only) and Lower Flange models (8,9, 17,8, and 44,5 kN). Available modifications include longer strokes, flange top manifold porting, and special design bodies. Viton seals are standard.

Push Cylinders

Enerpac Collet-Lok® Push Cylinders are designed for either clamping or supporting applications. The clamping or supporting force is maintained once the internal lock is engaged. Available in either 11,1 or 22,2 kN capacities, these cylinders are available in both Threaded Body or Lower Flange models. Available modifications include flange top manifold porting, longer strokes, and special design bodies. Viton seals are standard.

Technical support

Refer to the "Yellow Pages" of this catalog for:

- Safety instructions
- Basic hydraulic information
- Advanced hydraulic technology
- FMS (Flexible Machining Systems) technology
- Conversion charts and hydraulic symbols

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Products

Collet-Lok® *Application & selection*

Shown: MPTC-110, MPFL-50V, MPFC-210, MPTS-100, MPFS-100

Enerpac Collet-Lok® cylinders are designed to mechanically hold the workpiece after hydraulic pressure is removed. Clamping capacities range from 4,4 to 37,8 kN.

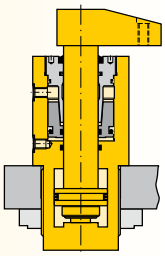
Hydraulic actuation with mechanical lock

- *Collet-Lok®* technology combines hydraulic actuation for clamping or supporting with an internal locking collet
- Clamp bodies are available in either threaded mount or flange mount
- Flange mount units feature both tubing ports and bottom manifold ports
- Flange top manifold ports available as a special
- VITON seals are standard.

Collet-Lok® Designs:

***Collet-Lok®* Swing Clamps**

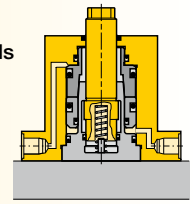
- Available in 4,4, 8,9 and 37,8 kN models
- Available in Right Hand or Left Hand Swing and Straight (guided) models.



12-15

***Collet-Lok®* Work Supports**

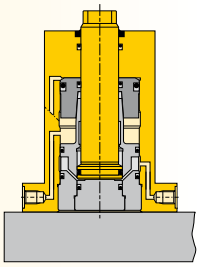
- Available in 4,4, 17,8 and 44,5 kN models
- Spring advance design to maintain contact with the work piece.



16-17

***Collet-Lok®* Push Cylinders**

- Available in 11,1and 22,2 kN models
- Designed for Push only
- Can be used as a heavy-duty Work Support.



18-19

MPTL-100 and MPTR-100 Collet-Lok® Swing Clamps are used to securely clamp these exhaust manifolds.

Collet-Lok®

Why use Collet-Lok®?

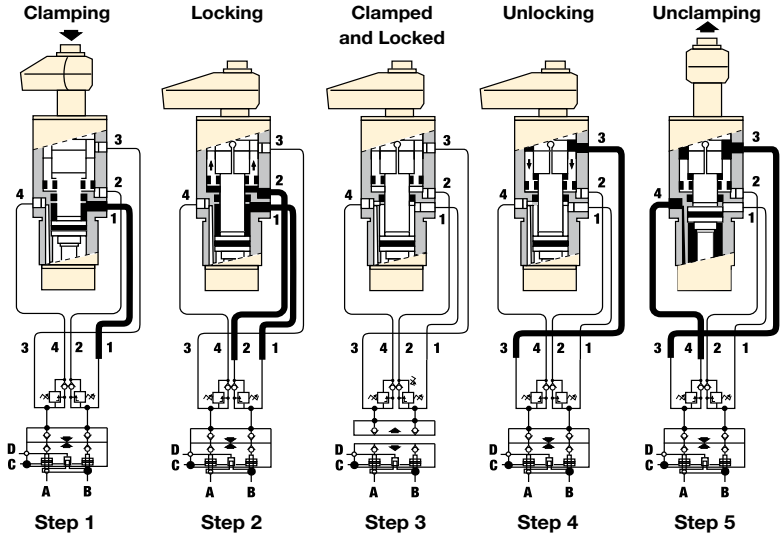
Collet-Lok® technology from Enerpac combines hydraulic actuation with mechanical locking to provide the automation and control of hydraulics and the long term security of a mechanical lock. Available in Swing Clamps, Push Cylinders and Work Supports, *Collet-Lok*® is a unique solution that is well suited to today's demanding manufacturing environment.

Force: 4,4 - 37,8 kN

Stroke: 24,0 - 42,0 mm

Pressure: 100 - 350 bar

Collet-Lok® Clamping and Unclamping Cycle



MPTR-100 Collet-Lok® swing cylinder

1 = 90° Rotation + Clamp
2 = Lock
3 = Unlock
4 = Unclamp + 90° Rotation

MCA-62, MPA-62 Auto coupler

A = Pressure line from pump to swing cylinder
B = Pressure line from pump to swing cylinder
C = Auto coupler advance
D = Auto coupler retract

Collet-Lok® Sequence:

Step 1
2-passage Auto coupler connects external power source with pallet receiver and the Collet-Lok® cylinder is activated for hydraulic clamping.

Step 2
After reaching maximum clamping pressure the sequence valve is opened and actuates the internal wedge hydraulically.

Step 3
The wedge system secures the plunger position mechanically and the hydraulic pressure is taken off, then the auto coupler retracts. The work piece on the pallet is now securely clamped, without being connected to a power source.

Step 4
After being in the machine the pallet returns to the loading and unloading position and the auto coupler is connected again to release the wedge.

Step 5
The hydraulic plunger is now retracted and the pallet is free for unloading and loading.

How Does Collet-Lok® Work?

The ports on Collet products are conveniently labeled in the order that they are used during a clamping or unclamping cycle.

The typical *Collet-Lok*® circuit pairs the Clamp circuits with the Lock circuits by using a sequence valve to delay the Lock function until the clamping pressure is almost reached. When unclamping, the Unlock and Unclamp circuits are also paired with a sequence valve so the Lock is released before the clamp extends to Unclamp. An alternate approach to controlling these circuits is to use a PLC to operate individual valves for the Clamp/Unclamp and Lock/Unlock functions.

Because *Collet-Lok*® provides a mechanical lock to hold the clamping force onto the work piece, support components used in standard hydraulic clamping circuits such as pilot operated check valves and accumulators are not needed. In typical applications, the hydraulic circuit in a fixture with *Collet-Lok*® clamps is de-pressurized after the clamping cycle is completed. This allows for complete security during the machining cycle, or if the work pieces are pre-clamped and staged in a pallet pool for extended periods of time.

Options

Collet-Lok® swing clamps 12

Collet-Lok® work supports 16

Collet-Lok® push cylinders 18

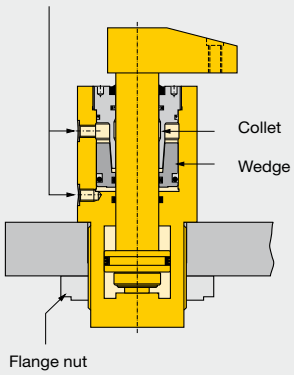

Swing cylinders - Collet-Lok® design

Shown: MPTR-100V, MPFR-100V

MP series

Enerpac Collet-Lok® cylinders are designed to mechanically hold the workpiece after hydraulic pressure is removed. Clamping capacities range from 4,4 to 37,8 kN.

BSPP oil connection



Hydraulic pressure pushes the collet up a wedge, locking the plunger in the clamping position.

Lower flange Collet-Lok® swing cylinder mounted on a pallet.

Ideal when live hydraulics are not available

- Double acting Collet-Lok® action allows fully automated operation
- Additional level of safety since live hydraulics are not required to maintain clamping force
- Collet-Lok® swing cylinders can be mounted by the flange or threaded into the fixture. Flanged models have manifold ports and tubing ports.
- Viton seals are standard.

Selection chart

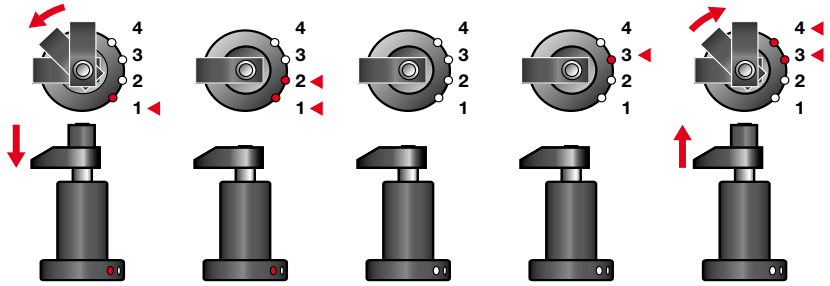
Clamping force [1]	Stroke		Left turning	Right turning	Cylinder effective area		Oil capacity		Max. oil flow [1]	Standard clamp arm
	mm			90°	cm^2		cm^3			Sold separately
kN	Clamp	Total			Clamp	Un-clamp	Clamp	Un-clamp	l/min	
▼ Lower flange			Model number							
4,4	8	24,2	MPFL-50V	MPFR-50V	1,6	4,5	3,9	10,9	0,5	MA-540
8,9	12	28,2	MPFL-100V	MPFR-100V	3,2	7,1	9,0	19,9	1,0	MA-1050
37,8	10	42	MPFL-300V*	MPFR-300V*	13,2	22,2	55,7	93,4	4,0	MA-3070
▼ Threaded body			Model number							
8,9	12	28,2	MPTL-100V	MPTR-100V	3,2	7,1	9,0	19,9	0,5	MA-1050
37,8	10	42	MPTL-300V*	MPTR-300V*	13,2	22,2	55,7	93,4	4,0	MA-3070

[1] Using standard clamp arm. Clamp arms are sold separately (14).

Note: - Call Enerpac for models with UNF thread and SAE port connections.
- Minimum working pressure for Collet-Lok® system is 100 bar.

* This product is made to order. Please contact Enerpac for delivery information before specifying in your design.

Collet-Lok® sequence



Step 1
Pressurize port #1.
Plunger turns 90° and clamps part.

Step 2
Keep port #1 pressurized.
Pressurize port #2.
Plunger will be locked in clamped position.

Step 3
Depressurize port #1 and #2.
Uncouple cylinder from hydraulic power source.
Part will be held in place.

Step 4
Pressurize port #3.
Plunger will be unlocked and the clamp force released.

Step 5
Keep port #3 pressurized.
Pressurize port #4.
Plunger will extend and turn to its original position.

Product dimensions in mm [⌖]

Left turning models *	A	B	C	C1	D Ø	D1 Ø	F Ø	H1	H2	H3
▼ Lower flange										
MPFL-50V	201,2	177	171,2	25	58	85	19	10	12,5	–
MPFL-100V	222,9	194,7	192,9	25	68	100	22,3	10	12,5	–
MPFL-300V	322	280	275	25	89,8	130	34,9	11	12,5	–
▼ Threaded body										
MPTL-100V	213,2	185	121,3	90,5	M48 x 1,5	64	22,3	31,5	67	75,5
MPTL-300V	310,5	268,5	163	115	M80 x 2,0	89	34,9	38	92	100,5

Note: Dimensions shown with standard clamp arm.
* For nonrotational model replace "L" with "N". Example: MPFN-100V.

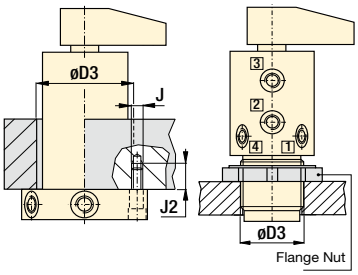
MP-series

Installation dimensions
in mm

Clamping force [1] kN	Fixture hole Ø D3	Mounting thread J mm	Minimum depth J2
▼ Lower flange			
4,4	58,4 ±0,3	M6 x 1	18
8,9	68,6 ±0,3	M8 x 1,25	19
37,8	90,5 ±0,3	M10 x 1,5	19

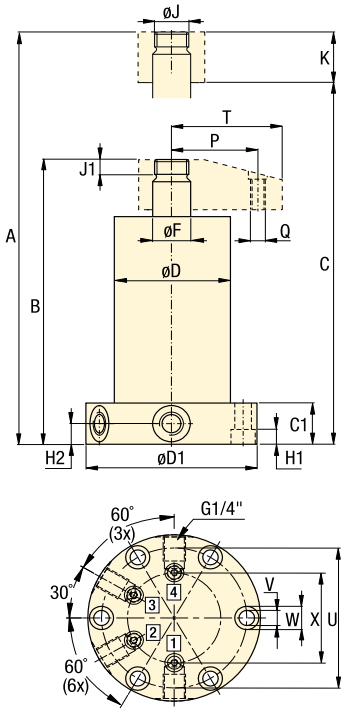
Clamping force [1] kN	Fixture hole Ø D3	Mounting flange Sold separately ▷87	Mounting nut Sold separately ▷86
▼ Threaded body			
8,9	M48 x 1,5	MF-482	FN-482
37,8	M80 x 2	MF-802	FN-802

[1] With standard clamp arm.

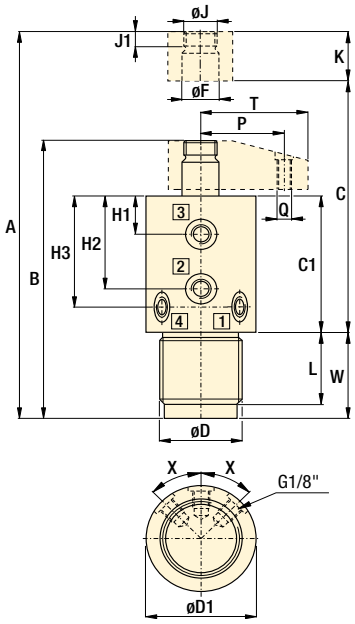


Oil port functions
1 90° Rotation and clamp
2 Locks system
3 Unlocks system
4 Unclamp and 90° rotation

MPF models



MPT models

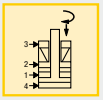


X = 45° MPT-100 models
X = 30° MPT-300 models

	J	J1	K	L	P	Q	T	U Ø	V Ø	W	X Ø	kg	Right turning models
													Lower flange ▼
	M16 x 1,5	8	30	–	40	M8 x 1,25	54	70,1	9	Ø 14	48,0	2,3	MPFR-50V*
	M20 x 1,5	9	30	–	50	M10 x 1,5	64	84,1	9	Ø 14	54,1	3,5	MPFR-100V*
	M33 x 2,0	10	47	–	70	M16 x 2	93	112,1	11	Ø 17	96,1	12,0	MPFR-300V*
													Threaded body ▼
	M20 x 1,5	9	30	41,5	50	M10 x 1,5	64	–	–	61,9	–	3,0	MPTR-100V*
	M33 x 2,0	10	47	85	70	M16 x 2	93	–	–	99,5	–	11,0	MPTR-300V*

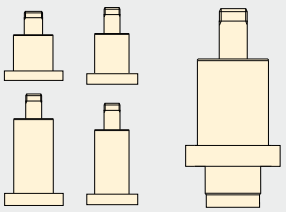
Force: 4,4 - 37,8 kN
Stroke: 24,0 - 42,0 mm
Pressure: 100 - 350 bar

E Cilindros giratorios
F Vérins de bridage pivotants
D Schwenkspannzylinder



Custom Options Available

Intermediate capacities | Different flange locations



Flexible Machining Systems
See Yellow Pages (224)

Options

Clamp arms ▷14 ▶


Collet-Lok® work supports ▷16 ▶


Sequence valves ▷152 ▶


Accessories ▷86 ▶


Important

Minimum unlock pressure must be at least 105 bar above lock pressure.

Swing cylinders, MA-series *Dimensions & options*

Force: 4,4 - 37,8 kN

Pressure: 100 - 350 bar

- (E) **Brazos de amarre**
- (F) **Bras de bridage**
- (D) **Spannarme**

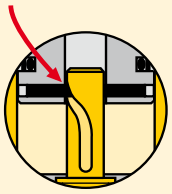
Important

Do not exceed maximum oil flow. If flow rates are exceeded, swing cylinder indexing mechanism may be permanently damaged.

When designing custom clamp arms, the flow rates must be further reduced. This rating should be in proportion to the mass and the center of gravity of the clamp arm.

Example:
If the mass of the arm is twice that of the long arm, flow rates must be reduced by 50%.

Index mechanisme



Options

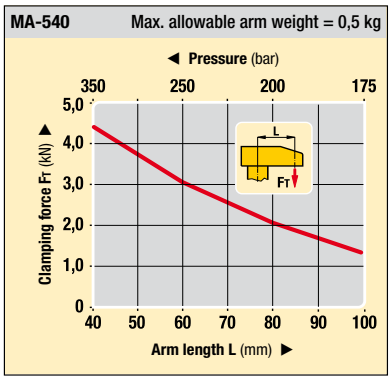
Gauges ▯190 ▶

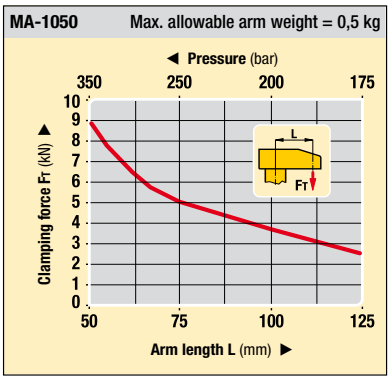
Flow control valves ▯155 ▶

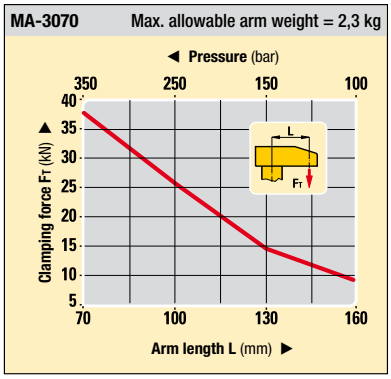
Sequence valves ▯152 ▶

Determine the right size of your Collet-Lok® swing cylinder

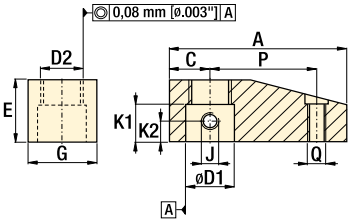
The maximum operating pressure, clamping force and length of the clamp arm will determine your size of swing cylinder. The real operating pressure is a function of both the clamp arm length and clamping force.
In the diagrams below you select the required clamp arm length and clamping force. The use of different length clamp arms requires reduction in apllied pressure and resulting clamp force. The diagrams below show this relation.







MA models **Standard clamp arms for Collet-Lok® swing clamps**



Product dimensions in mm [⌲ ⌖]

Clamp. force kN	Model number	A	C	D1 ø	D2	E	G	J	K1	K2	P	Q	kg
▼ **Standard clamp arms for Collet-Lok® swing clamps**													
4,4	**MA-540**	74,7	18,0	19,02-19,05	M16 x 2	30	32	M8 x 1,25	19	10	40	M8 x 1,25	0,5
8,9	**MA-1050**	83,0	19,0	22,30-22,33	M20 x 1,5	30	35	M8 x 1,25	18	10	50	M10 x 1,5	0,5
37,8	**MA-3070**	128,0	35,0	34,97-35,00	M33 x 2	47	59	M8 x 1,25	32	17	70	M16 x 2	2,3

Special Collet-Lok® Examples

Special configurations are available

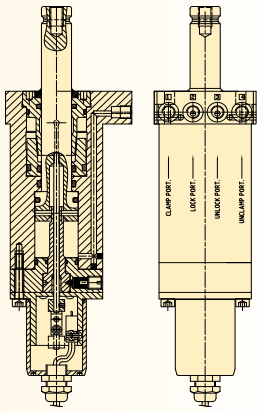
Model: MPFL100PE001-S

Body style: Upper flange

Clamp capacity: 9 kN (2000 lbs)

Clamping stroke: 18 mm (.71 in.)

Special feature: Position sensing



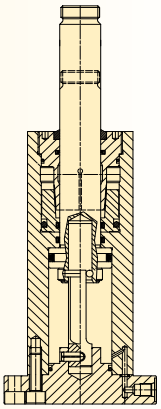
Model: MPFN300VE002

Body style: Lower flange

Clamp capacity: 39 kN (8800 lbs)

Clamping stroke (straight):
57,4 mm (2.25 in.)

Special feature: Viton seals
Long stroke



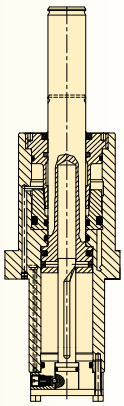
Model: MPFL200VE100

Body style: Mid-body flange

Clamp capacity: 20 kN (3900 lbs)

Clamping stroke (left hand):
63,5 mm (2.50 inch)

Special feature: Viton seals
Long stroke
Mid-flange body



Special features for Swing Cylinders *

Enerpac can design Collet-Lok® cylinders with special features to meet the needs of your production fixtures:

- Special mounting
- Special manifold port location
- Longer stroke
- Special rotation
- Internal clutch to protect rotation mechanism
- Viton seals
- Special rod end
- Position sensing

* Special features also available for Collet-Lok® Push Cylinders and Work Supports.

Work supports - Collet-Lok® design

Shown: MPFS-100, MPTS-100

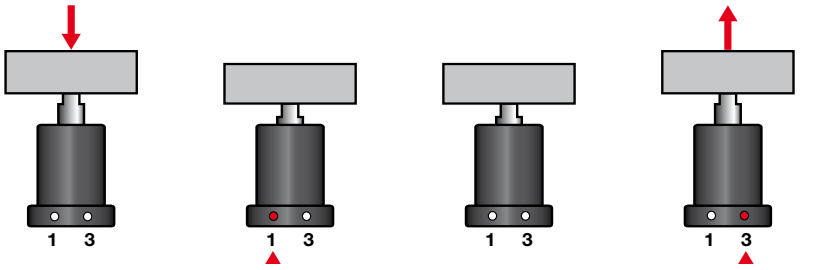
Hydraulically locked, mechanically maintained work support

- *Collet-Lok*® design allows the work support to maintain support position after the hydraulic pressure is removed
- *Collet-Lok*® maintains a higher level of safety, as it is not dependent on hydraulic supply pressure
- Low deflection: lowest deflection of any work support available
- Threaded or flanged body increases mounting flexibility
- Capacities up to 44,5 kN available.

MP series

Enerpac work supports provide either additional non-fixed location points to the clamps, or support to larger or thin section workpiece components, always in order to minimize workpiece deflection during machining. The *Collet-Lok*® design does not require hydraulic system pressure to maintain support position.

Collet-Lok® sequence

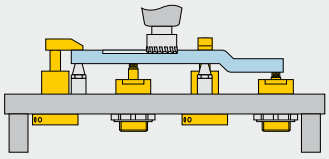


Step 1
Install the workpiece on the support cylinder. The plunger position will adjust to the contour of the workpiece.

Step 2
Pressurize oil port #1. The plunger will be locked in the supporting position.

Step 3
Depressurize oil port #1. Cylinder can be uncoupled from hydraulics and still support the workpiece.

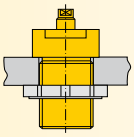
Step 4
Pressurize oil port #3. The plunger will be unlocked. When the workpiece is removed, plunger will extend into its original position.



Mounting style

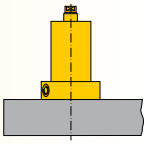
MPT series, Threaded mount

Threaded body can be used with a threaded hole in fixture plate or a jam nut with a bored hole. Ports are located in top collar block.



MPF series, Flange models

Mounts directly to fixture plate. Offers the flexibility of side ports or manifold ports on the underside of the flange.



While pallet No. 1 is in the machine, a new work piece is loaded on to pallet No. 2.

Product selection

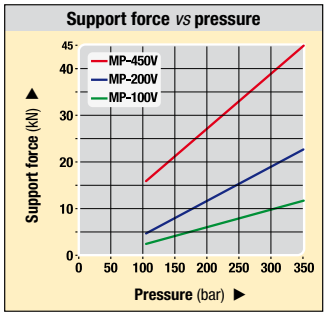
Max. support force	Support plunger stroke	Flange models	Threaded models	Operating pressure		Locking system displacement		Plunger contact spring force	Max. oil flow
				bar		cm^3			
kN	mm			min.	max.	lock	unlock	N	l/min
8,9	10	**MPFS-100V**	–	100	350	3,93	3,93	20,0	0,5
17,8	10	**MPFS-200V**	–	100	350	6,06	6,06	35,2	1,0
44,5	19,6	**MPFS-450V**	–	100	350	18,03	18,03	300,4	4,0
8,9	10	–	**MPTS-100V**	100	350	3,93	3,93	15,0	0,5
17,8	10	–	**MPTS-200V**	100	350	6,06	6,06	30,0	1,0

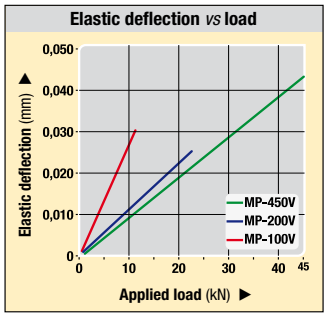
Force: 8,9 - 44,5 kN

Stroke: 10 - 19,6 mm

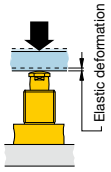
Pressure: 100 - 350 bar

(E) Cilindros de soporte
(F) Vérin anti-vibreur
(D) Abstützzylinder





Deflection chart:
Elastic deformation of the work support resulting from the application of load.



Options

Collet-Lok® swing cylinders 12 ▶

Auto couplers 174 ▶

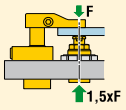
Positive clamping cylinders 80 ▶

Sequence valves 152 ▶

Important

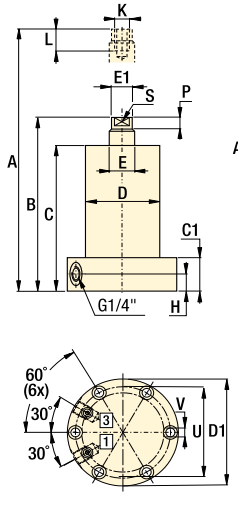
WARNING!

Support force and clamping force must be matched. Support force should be at least 150% of clamping force.

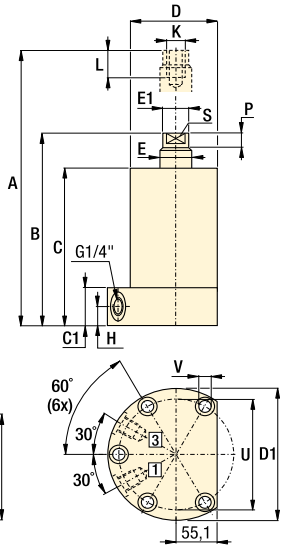


For proper application, clamp force, pressures and timing, consult Enerpac for support.

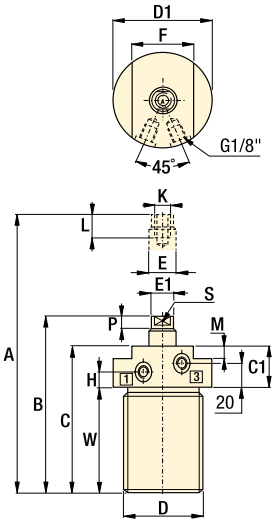
MPFS-100V, -200V



MPFS-450V



MPTS-100V, -200V



Product dimensions in mm [ ]

Model number	A	B	C	C1	D	D1 Ø	E Ø	E1 Ø	F	H	K	L	M	P	S*	U Ø	V Ø	W	X Ø	kg
▼ Flange models																				
MPFS-100V	126	116	106	25	Ø 76	110	15,9	14	–	12,5	M8 x 1,25	15	–	7	2,8	94,1	9	–	81,5	4,0
MPFS-200V	130	120	106	25	Ø 92	130	25	24	–	12,5	M12 x 1,75	20	–	9	2,8	112,1	9	–	97,1	6,0
MPFS-450V	193,4	173,8	161	25	Ø 130	165	50	48	–	12,5	M20 x 2	30	–	10	30 **	147	11	–	125	16,0
▼ Threaded models																				
MPTS-100V	125	115	105	38	M60 x 2	69	15,9	14	55	15,5	M8 x 1,25	15	20	7	2,8	–	–	67	–	3,0
MPTS-200V	129	119	105	38	M80 x 2	89	25	24	70	15,5	M12 x 1,75	20	20	9	2,8	-	-	67	-	4,0

* 2x spanner holes ø 2,8 mm for MPFS-100 and 200 models.
** Wrench Flats for MPFS-450.

Push cylinders - Collet-Lok® design

Shown: MPTC-110, MPFC-210

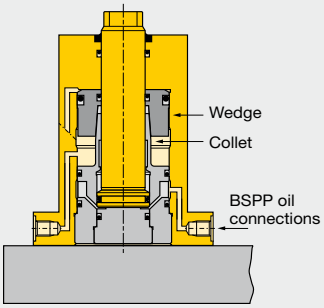
Ideal when live hydraulics are not available

…clamping is sustained mechanically so live hydraulics are not required during the machining cycle

- Double-acting *Collet-Lok®* action allows fully automated operation
- Additional level of safety since live hydraulics are not required
- *Collet-Lok®* push cylinders can either be mounted by the flange, or threaded into the fixture
- The *Collet-Lok®* design is an industry exclusive
- Capacities up to 39,9 kN available on request.

MP series

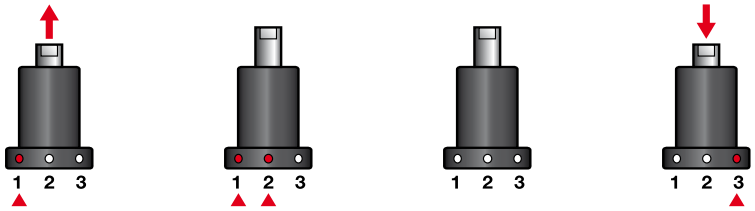
Collet-Lok® positive locking push cylinders are designed to mechanically hold the workpiece after hydraulic pressure is removed. Push capacities range from 11,1 kN to 22,2 kN.



Hydraulic pressure pushes the collet up a wedge, locking the plunger in the clamping position.

Lower flange Collet-Lok® push cylinder used for positioning a motorcycle frame.

Collet-Lok® sequence



Step 1
Pressurize port #1. Plunger extends and clamps workpiece.

Step 2
Keep port #1 pressurized. Pressurize port #2. Plunger will be locked in clamped position.

Step 3
Depressurize port #1 and #2. Cylinder should now be uncoupled from hydraulic power source and will maintain the clamped position.

Step 4
Pressurize port #3. Plunger will be unlocked and the plunger will be released to its original position.

Product selection

Max. push force	Hydr. plunger stroke	Lower flange	Threaded body	Operating pressure		Hydraulic effective area	Oil capacity			Max. oil flow
				bar		cm^2	cm^3			
kN	mm			min.	max.	adv.	adv.	unlock	retr.	l/min
		Model number								
11,1	15,3	MPFC-110V	MPTC-110V	50	350	3,23	4,92	6,06	3,93	2,0
22,2	15,2	MPFC-210V	MPTC-210V	50	350	6,39	10,00	10,00	6,06	4,0

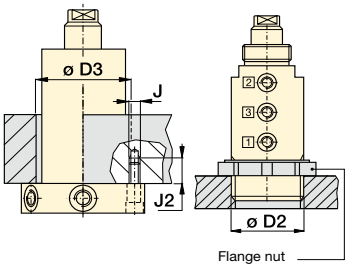
Maximum cycle rate: 8 cycles/min.
Note: Call Enerpac to order models with UNF thread and SAE port connections.
Capacities up to 39,9 kN available on request.

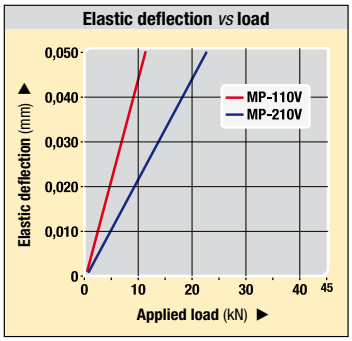
Dimensions in mm [ ]

Model number	A	B	C	C1	D	D1	D2	E	E1	F
						Ø		Ø	Ø	Ø
▼ Lower flange										
MPFC-110V	155,8	140,5	131	–	Ø 70,0	100	–	15,8	15	–
MPFC-210V	176,7	161,5	149	-	Ø 78,0	110	-	22,2	20	–
▼ Threaded body										
MPTC-110V	154,8	139,5	130	18,5	M60 x 2	60	M36 x 1,5	15,8	15	46
MPTC-210V	175,7	160,5	148	18	M70 x 2	70	M48 x 1,5	22,2	20	55

Installation dimensions in mm

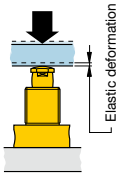
Push force kN	Fixture hole ø D3	Mounting thread J	Minimum depth J2
▼ Lower flange			
11,1	71	M6 x 1,0	17
22,2	79	M8 x 1,0	18
▼ Threaded body			
11,1	M60 x 2	–	–
22,2	M70 x 2	–	–



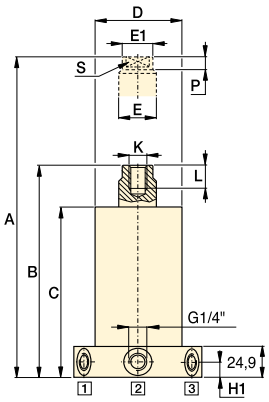


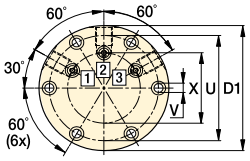
Deflection chart:

Elastic deformation of the plunger resulting from the application of load.



MPFC

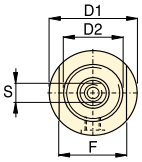


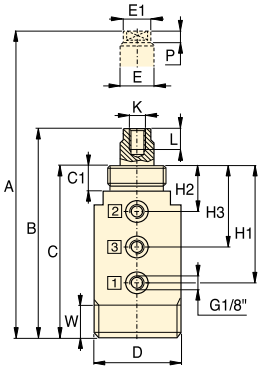


Oil port functions

1 Clamp
2 Lock
3 Unlock/Retract

MPTC





H1	H2	H3	K	L ø	P	S*	U ø	V	W	X ø	kg	Model number
												Lower flange ▼
12,5	–	–	M8 x 1,25	15	7,0	12,0	84,1	7	–	56,1	4,0	MPFC-110V
12,5	-	-	M10 x 1,5	20	8,7	16,0	94,0	9	-	70,0	5,0	MPFC-210V
												Threaded body ▼
96,0	33,0	64,5	M8 x 1,25	15	7,0	12,0	–	–	19	–	3,0	MPTC-110V
111,0	32,5	72,0	M10 x 1,5	20	8,7	16,0	–	–	20	–	3,4	MPTC-210V

* Spanner holes (x 2)

Force: 11,1 - 22,2 kN

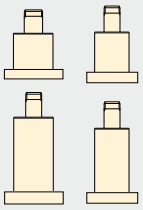
Stroke: 15,0 mm

Pressure: 50 - 350 bar

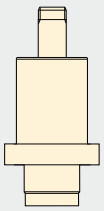
E Cilindros de empuje
F Vérins pousseurs
D Gesicherter Druckzylinder

Custom Options Available

Intermediate capacities



Different flange locations



Options

Auto couplers 174 ▶

Sequence valves 152 ▶

Accessories 86 ▶

Collet-Lok® swing cylinders 12 ▶

Important

For proper application, clamp force, pressures and timing, consult Enerpac for support.