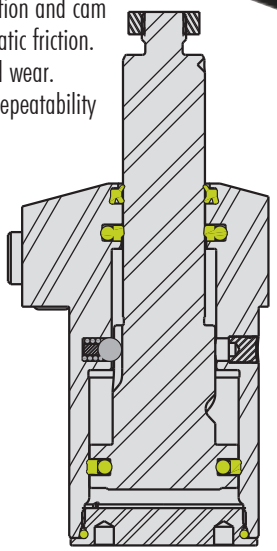
TuffCam™ 7 MPa Swing Clamp

Top Flange Swing Clamp

Double Acting

- Six clamp capacities are available ranging from1.9 kN to 20.4 kN.
- TuffCam™ 7 MPa Swing Clamps are designed to operate from 1 MPa (10 bar) to 7 MPa (70 bar) without pressure reducing. Even with extended arm.
- 7 MPa Clamps and work supports are paired to work at pressures between 4 MPa (40 bar) and 7 MPa (70 bar) without pressure reducing the clamp.
- Patented ball seat delivers improved rotary function and cam follower contact, while reducing dynamic and static friction.
- Tungsten-Carbide cam followers for strength and wear.
- Clamp repeatability ±0.25° and swing angle repeatability 90° ± 3°.
- Consult table on page C-2 for clamp time and fluid flow rates
- Clocking feature for the TuffCam™ 7 MPa product line see page C-11.
- Arms sold separately on pages D-2 to D-5. The standard length 7 MPa arm with the threaded contact bolt hole is designed to clamp over the work support centerline.
- Can be either manifold mounted or plumbed.
- Optional In-Port flow control is a meter-in device with a reverse free flow check valve.



ILML14000 REV B

TuffCam™ Swing Clamps

Specifications

Model No.	L1-4025-00-L L1-4025-00-R L1-4025-00-S	L1-4032-00-L L1-4032-00-R L1-4032-00-S	L1-4040-00-L L1-4040-00-R L1-4040-00-S	L1-4050-00-L L1-4050-00-R L1-4050-00-S	L1-4063-00-L L1-4063-00-R L1-4063-00-S	L1-4080-00-L L1-4080-00-R L1-4080-00-S
Double Acting (D/A) Cylinders, actuated hydraulically both directions.						
Swing Direction	Left Right	Left Right	Left Right	Left Right	Left Right	Left Right
Cylinder Capacity (kN)*	1.9	3.3	5.2	8.0	12.5	20.4
Bore Size (mm)	25	32	40	50	63	80
Vertical Clamp Stroke (mm)**	8	8	10	12	14	14
Total Stroke (Swing + Vertical) (mm)	18.5	19.5	25.0	30.0	32.0	35.0
Effective Piston Area (cm^2) Retract	3.14	5.50	8.76	13.47	21.00	34.36
Oil Capacity*** (cm^3) Extend	9.1	15.7	31.4	58.9	99.8	175.9
Oil Capacity*** (cm^3) Retract	5.8	10.7	21.9	40.4	67.2	120.3
Optional Flow Control Model No.****	L7-0203-71	L7-0203-71	L7-0203-71	L7-0203-74	L7-0203-74	L7-0203-74

WARNING! Never allow swing arm to contact workpiece or fixture during arm rotation.

* Cylinder capacities are listed at 7 MPa (70 bar) operating pressure, with a standard length VektorFlo® 7 MPa arm installed. Maximum operating pressure is 10 MPa (100 bar). The minimum operating pressure is 1 MPa (10 bar). The clamping force is adjustable by varying the hydraulic system pressure. To determine the approximate output force for your application, divide the cylinder capacity shown above by 7 MPa (70 bar), and multiply the resultant number by your system operating pressure MPa (bar) to obtain the approximate clamping force for your application. (Actual force will vary slightly due to internal cantilever loading, and/or friction loss.)

** To allow for piece part height variations, it is recommended that the vertical travel be set to about 50% of the vertical stroke.

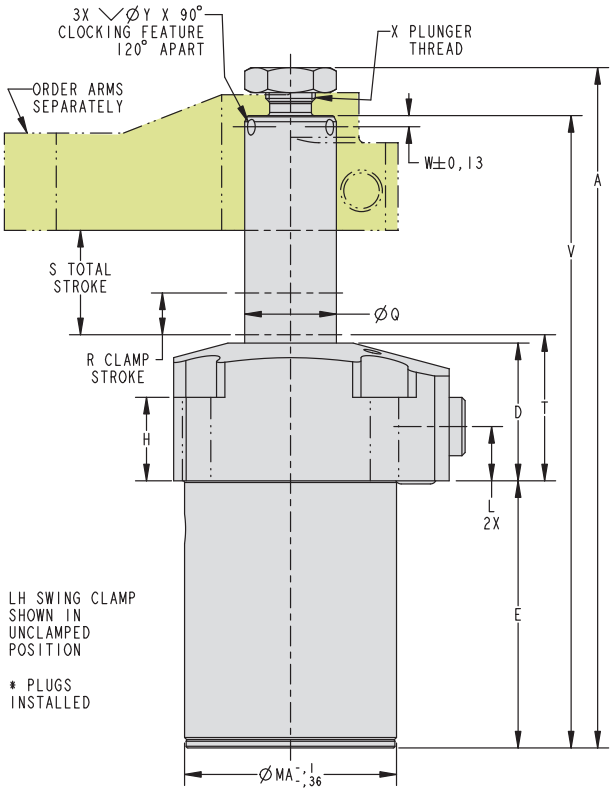
*** To ensure maximum service life and trouble-free operation, restrict fluid flow per table on page C-2.

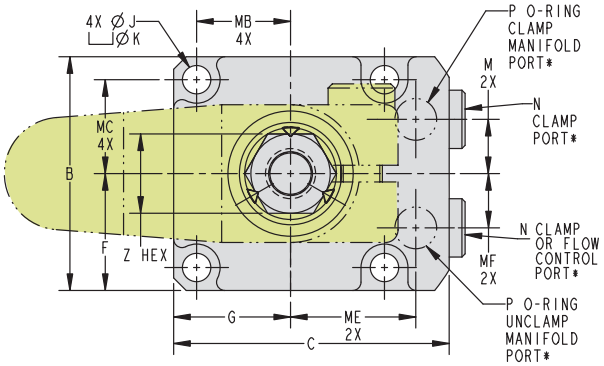
**** In-Port flow control requires the use of manifold mount port.

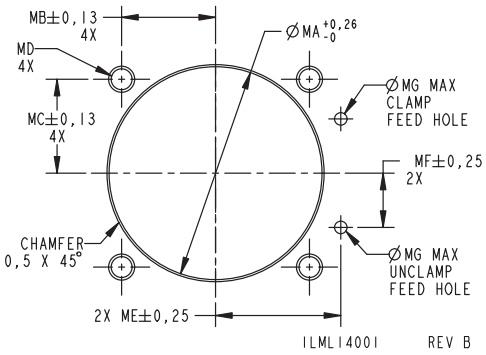
VEKTEK®

TuffCam™ 7 MPa Swing Clamp

Top Flange Swing Clamp







Dimensions

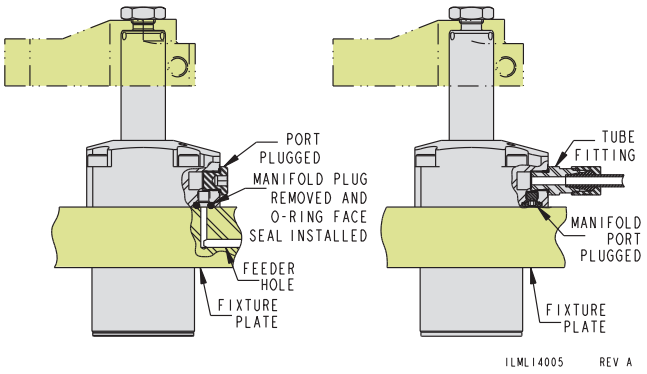
Model No.	L1-4025-00	L1-4032-00	L1-4040-00	L1-4050-00	L1-4063-00	L1-4080-00
Double Acting (D/A) Cylinders, actuated hydraulically both directions.						
A	124	134.5	163	196.5	227.5	263
B	40	47	56	70	85	103
C	54.5	58	66	84	98	115.5
D	29	31	33	38	45	50
E	48	50	64	77.5	85.5	97.5
F	20	23.5	28	35	42.5	51.5
G	20	23.5	28	35	42.5	51.5
H	20	20	20	23	28	30
J	4.8	5.8	6.8	8.8	10.8	12.8
K	8.25	9.75	11.25	14.5	17.5	19.5
L	13	13	13	15	15	15
M	10	10	13	16	18	23
N	G 1/8	G 1/8	G 1/8	G 1/4	G 1/4	G 1/4
P	ID 4.0 x CS 3.0	ID 4.0 x CS 3.0	ID 4.0 x CS 3.0	ID 8.0 x CS 3.0	ID 8.0 x CS 3.0	ID 8.0 x CS 3.0
Q	15	18	22	28	36	45
R	8	8	10	12	14	14
S	18.5	19.5	25	30	32	35
T	31	33	35	40	47	52
V	116.25	125	151.5	182.5	209.5	240.75
W	2	2	2.67	2.67	3.33	4
X	M8 x 1.00	M10 x 1.25	M12 x 1.50	M14 x 1.50	M18 x 1.50	M22 x 1.50
Y	3	3	4	4	5	6
Z	13	17	19	22	27	32
MA	35	42	51	63	77	95
MB	15.5	18.5	22.5	27.5	33.5	41.5
MC	15.5	18.5	22.5	27.5	33.5	41.5
MD	M4	M5	M6	M8	M10	M12
ME	26.5	26.5	30	39	45.5	54
MF	10	10	13	16	18	23
MG	3	3	3	6	6	6

Add the letter -L or -R to the end of your model number to indicate swing direction.

Through Plate Mounting Configuration

Plumb through the fixture using manifold mount port.

Plumb through tubing using G port.



For proper sealing, the mating surface must be flat within 0.08 mm with a maximum surface roughness of 1.6 μm R_a

TuffCam™ 7 MPa Swing Clamps

U. S. Patent Nos.
7,032,897
5,820,118

TuffCam™ 7 MPa Swing Clamp

TuffCam™ 7 MPa Swing Clamps were developed to meet your demand for high-speed, precise positioning and/or heavy arm applications in a 7 MPa operating pressure environment. One of the keys to this innovation is the patented spring loaded TuffCam™ design that was developed to improve strength and wear. Using the patented Vektek V-Groove, a stainless steel ball seat, these clamps have reduced static friction for improved clamp breakaway and reduced dynamic friction for improved life. This combination adds up to producing the most accurate and repeatable swing clamp cam assembly.

- Available in 6 sizes from 1.9 kN to 20.4 kN at 7 MPa (70 bar), in Top Flange and Bottom Flange body styles.
- Double acting
- Three cams for more accurate arm positioning (90° ± 3° swing accuracy) (±0.25° contact position repeatability)
- 7 MPa swing clamps are designed to work at any pressure between 1 MPa (10 bar) and 7 MPa (70 bar) using either the standard or extended length arms without the need for pressure reduction.
- Patented ball seat for improved rotary function, cam follower contact, and reduced dynamic and static friction.
- Tungsten Carbide balls
- BHC™ (Black Hard Coating) on the cylinder bodies helps prevent scoring and scratching.
- Clocking features help to improve and speed-up arm changes. (Page C-11)
- Arms ordered separately see section D.

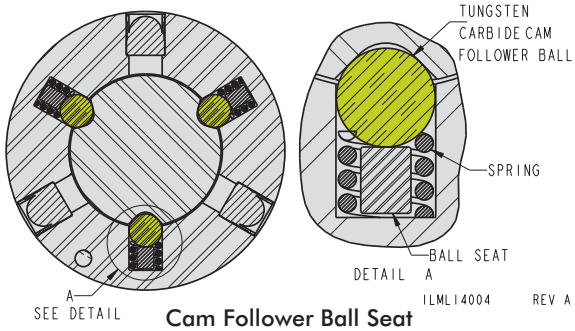
Clamp Time and Fluid Flow Rates for TuffCam™ 7 MPa Swing Clamps

Maximum TuffCam™ 7 MPa Swing Clamp Force (kN)	1.9	3.3	5.2	8.0	12.5	20.4
Bore Size (mm)	25	32	40	50	63	80
Standard Arm Fastest Allowable Clamp Time (sec)	0.25	0.25	0.25	0.38	0.5	0.63
Standard Arm Maximum Allowable Flow Rate (l/min)	1.4	2.6	5.3	6.4	8.1	11.5
Extended Arm Fastest Allowable Clamp Time (sec)	0.5	0.5	0.5	0.63	0.75	0.88
Extended Arm Maximum Allowable Flow Rate (l/min)	0.7	1.3	2.6	3.9	5.4	8.2

ILML14006 REV A

The above flows are maximum recommendations and clamp times are minimum recommendations.

- When using custom arms the extended arm flows and times are to be considered the limiting factor.
- The actual time to position the clamp will vary by custom arm configuration. Excess weights may require slower speeds and customer testing in specific application to establish limits.



Cam Follower Ball Seat

7 MPa TuffCam™ Swing Clamp Cam Follower Design

* Three cams for more accurate arm positioning, smoother rotation, and lower per cam surface contact pressure.
* Stainless steel ball seat for improved rotary function, cam follower contact, and reduced friction.
* Increased cam groove contact force provided by stainless steel springs.
* Ball material is tungsten carbide, one of the world's hardest materials.

TuffCam™ 7 MPa Swing Clamps

Frequently Asked Questions

When do you recommend the use of TuffCam™ 7 MPa Swing Clamps over other Vektek product?

Sometimes there are applications where speed is essential. Sometimes size and weight are critical. Often an available power supply limits pressure available.

What kind of return on my investment can I reasonably expect by converting my manual clamps to TuffCam™ 7 MPa Swing Clamps?

Ask your Vektek sales representative for the Power Workholding Brochure. Time studies and costs are comparable justification.

What makes the cam follower ball seat so special in these units?

The three cams and three cam balls guide the rotation of the plunger and provide greater guide, support and directional stability. The patented cam follower design is unique in the industry and uses solid tungsten carbide balls and stainless steel ball seats. The ball seat design assures that the ball rolls in the cam rather than jamming and scraping resulting in wear on both the cam track and ball. This vastly improves swing repeatability, contacting the same point ±0.25 degrees.

I want to use work supports with TuffCam™ 7 MPa Swing Clamps. Can you give me some tips that will help me get the most from my clamping devices?

Vektek 7 MPa Work Supports and Swing Clamps are made in capacity sets as well as arm-to-support centerline measurement.

It is important to hit my part in the exact place every time in my application. Will your TuffCam™ 7 MPa Swing Clamps meet this requirement ?

Standardized repeatability of ±0.25 degrees is "Best-In-Class" Worldwide.

What defines a TuffCam™ 7 MPa Swing Clamp?

TuffCam™ 7 MPa is a single direction tri-cam design swing clamp. These clamps produce the strength and reliability to support faster speeds and larger arms. TuffCam™ 7 MPa delivers notably better accuracy and repeatability over other brands. The clocking feature, dramatically reduces the time it takes to change arms for maintenance, replacement or design set up.

How can I measure the clamp speed?

The maximum speed of a swing clamp is applicable to both clamp and unclamp function, as the momentum on the cam track and cam follower apply to both movements. To approximate the speed of your application:

* Look down the centerline of the swing clamp, perpendicular to the arm.
* Actuate your clamping system while watching the arm "swing" into position.
* If while looking directly into the end of the swing clamp, you can observe the arm move through its swing, the positioning time should be somewhere around ½ second or longer. See flow rates and clamping time in page C-2
* If, while looking directly into the end of the swing clamp, you cannot observe the arm move, or it is unclamped and the next thing you can see is that it in the clamped position, the positioning time is something substantially less than 1/2 second. Your standard model clamp is at risk of premature failure. See flow rates and clamping time in page C-2
* It is possible to approximate the clamp time by adding the total active volume of devices in the specific control branch of your system, and dividing that volume (cubic mm) by your pump's output volume (cubic mm per minute) and then multiplying that number by 60 (60 seconds per minute). This will give you the theoretical calculated time to move a device through its stroke, but does not account for flow loss due to flow restrictions in the system.

I want to use the jam nut only to hold my arm in place. Will this work?

It is unlikely that you can use the jam nut to hold arm orientation adequately. We have had customers modify clamps to include flats, pins, serrations or use set screws to hold orientation. These methods may work in specific instances. We still recommend our method of attachment, locknut and cross bolt for a secure, dependable, universal attachment. Other methods may complicate the replacement of clamps when they are damaged by a machine crash or other problems.

Why should I buy your arm rather than have my toolmaker make one?

Our arm is designed to hold orientation when properly installed. It has a relief to keep from over-stressing the locknut. It will probably cost you less than the total cost of making your own. You can rest assured that our arm is made to our specifications and will withstand the forces our clamps generate, when used as recommended.

I need an arm slightly different from those you make. Can I make or modify your arms?

Our first recommendation is to modifying our existing arms if possible. All VektorFlo® arms are able to be machined or welded. You should be able to easily modify any standard arm you purchase. We recommend this because our original design for the cross bolt orientation mechanism is the most secure, dependable and versatile orientation method available. Many customers and competitors have tried to copy it, some with limited success.

If you desire to make your own arm(s), refer to the detailed information on page D-3. Please be sure to put in the 0.5 mm step for the locknut and relieve the cut in the arm so that the bolt will squeeze the plunger shaft. If you do not take these two steps, your custom arm may not work satisfactorily.

NOTE: See Arm Length and Pressure Limitation Graphs on Page D-5.