

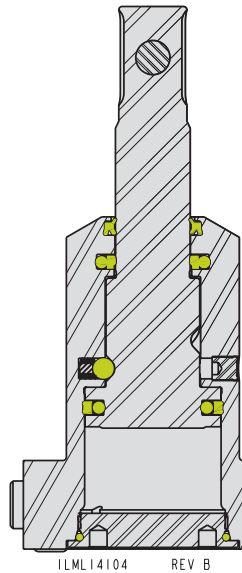


TuffCam™ 7 MPa Swing Clamps

Clevis Plunger Bottom Flange

Double Acting

- Clamps available in 6 retract capacities ranging from 2.2 kN to 24.1 kN. Designed to operate at 7 MPa.
- Use double ended Rocker Arms to apply equal force on two surfaces of different heights.
- Allowable arm travel for work piece deviation is $\pm 10^\circ$
- Six standard arm positions available in 30° increments. Request other angle increments through Vektek.
- Clamp repeatability $\pm 0.25^\circ$ and swing angle repeatability $90^\circ \pm 3^\circ$.
- Consult table on page C-2 for clamp time and fluid flow rates
- Patented ball seat delivers improved rotary function, cam follower contact, while reducing dynamic and static friction.
- Choose manifold mount above or below the flange or plumb the device.
- Tungsten-Carbide cam followers for strength and wear.
- Clocking feature for the TuffCam™ 7 MPa on page C-11.
- Arms sold separately on pages D-2 to D-6. The standard length 7 MPa arm with the threaded contact bolt hole is designed to clamp over the work support centerline.
- Optional in-port flow control via a meter-in device with a reverse free flow check valve.



Specifications

Model No.	L1-4125-10-L L1-4125-10-R L1-4125-10-S	L1-4132-10-L L1-4132-10-R L1-4132-10-S	L1-4140-10-L L1-4140-10-R L1-4140-10-S	L1-4150-10-L L1-4150-10-R L1-4150-10-S	L1-4163-10-L L1-4163-10-R L1-4163-10-S	L1-4180-10-L L1-4180-10-R L1-4180-10-S
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Double Acting (D/A) Cylinders, actuated hydraulically both directions.

Swing Direction	Left		Right		Left		Right	
	Straight	Straight	Straight	Straight	Straight	Straight	Straight	Straight
Cylinder Capacity (kN)*	2.2	3.8	6.1	9.4	14.7	24.1		
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		

Add the Clevis orientation indicator to the end of your item number, include the dash. The indicators are -0, -30, -60, -90, -120, or -150. Include the dash.

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

* Cylinder retract capacities are listed at 7 MPa (70 bar) operating pressure. Divide cylinder retract force by 2 for when using symmetrical length arm. 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 retract force for your application. (Actual force will vary slightly due to internal 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 page C-2.

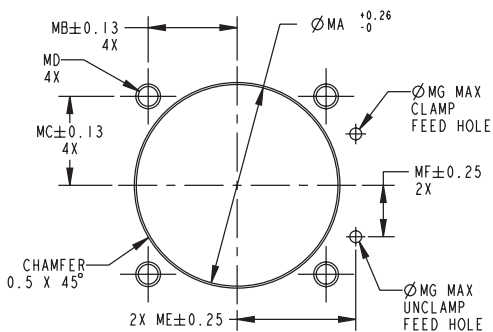
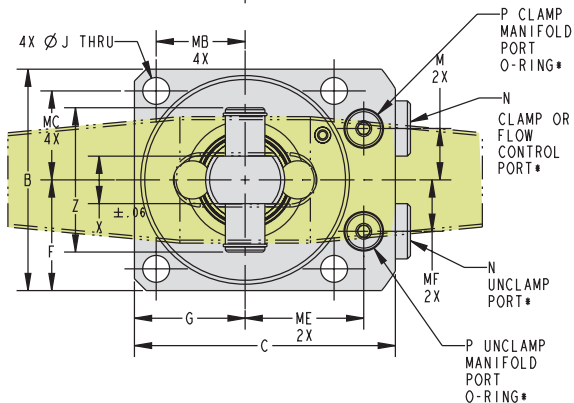
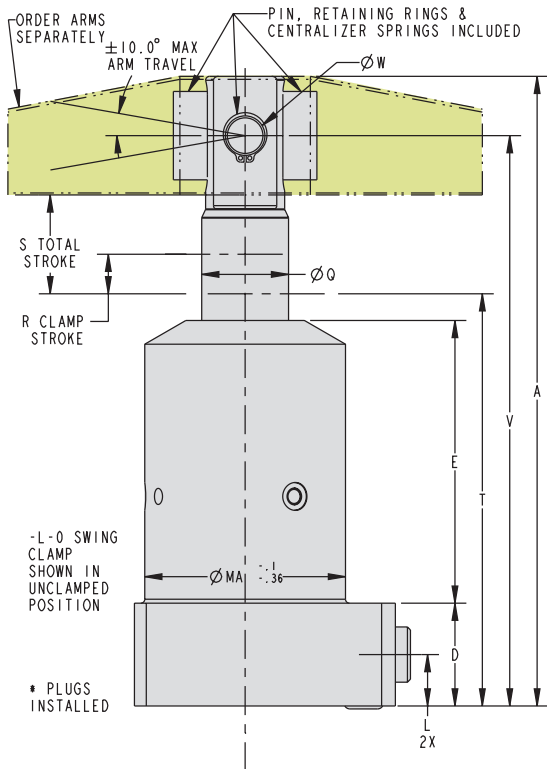
**** In-port flow control requires the use of manifold mount port.



TuffCam™ 7 MPa Swing Clamps



Clevis Plunger Bottom Flange



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

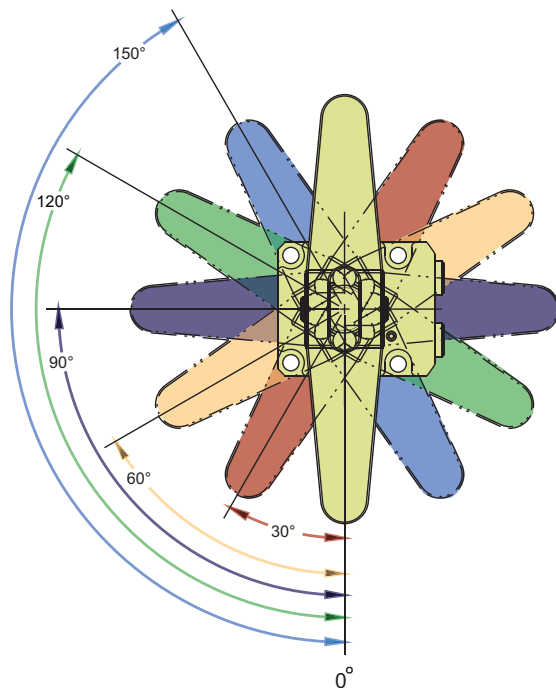
Dimensions

Model No.	L1-4125-10-L	L1-4132-10-L	L1-4140-10-L	L1-4150-10-L	L1-4163-10-L	L1-4180-10-L
	L1-4125-10-R	L1-4132-10-R	L1-4140-10-R	L1-4150-10-R	L1-4163-10-R	L1-4180-10-R
	L1-4125-10-S	L1-4132-10-S	L1-4140-10-S	L1-4150-10-S	L1-4163-10-S	L1-4180-10-S

Double Acting (D/A) Cylinders, actuated hydraulically both directions.

A	120	131.25	159.25	189.25	219.25	252.25
B	40	47	56	70	85	103
C	54.5	58	66	84	98	115.5
D	26	26	26	30	24	35
E	51.5	55.5	71.5	86	97	113
F	20	23.5	28	35	42.5	51.5
G	20	23.5	28	35	42.5	51.5
J	4.8	5.8	6.8	8.8	10.8	12.8
L	13	13	13	15	17	20
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	83.5	87.75	104.25	123.25	139.25	158.25
V	111	119.25	144.25	171.25	195.25	223.25
W	6	8	10	12	16	20
X	8	10	12	15	20	24
Z	24	30.5	36.5	42.5	55.5	68.5
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 Clevis orientation indicator to the end of your item number. The indicators are -0, -30, -60, -90, -120, or -150. Include the dash.



VIEW SHOWS CLEVIS ORIENTATION IN THE CLAMPED POSITION.

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TuffCam™ 7 MPa Swing Clamps

Features



C-2

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 Vektex 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 ($90^\circ \pm 3^\circ$ swing accuracy) ($\pm 0.25^\circ$ 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.
- Clcking features help to improve and speed-up arm changes. (Page C-11)
- Arms ordered separately see section D.

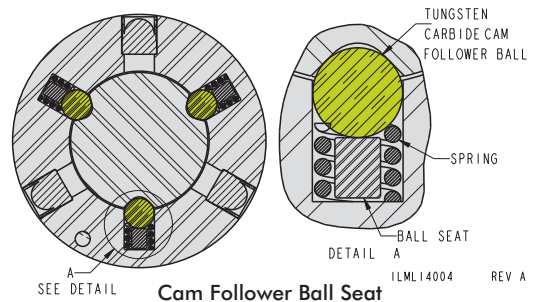
Clamp Time and Fluid Flow Rates for TuffCam™ 7 MPa Swing Clamps

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

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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.



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

Clocking, Swing Clamp Restrictors

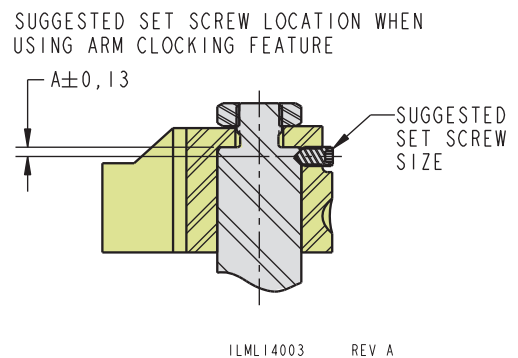
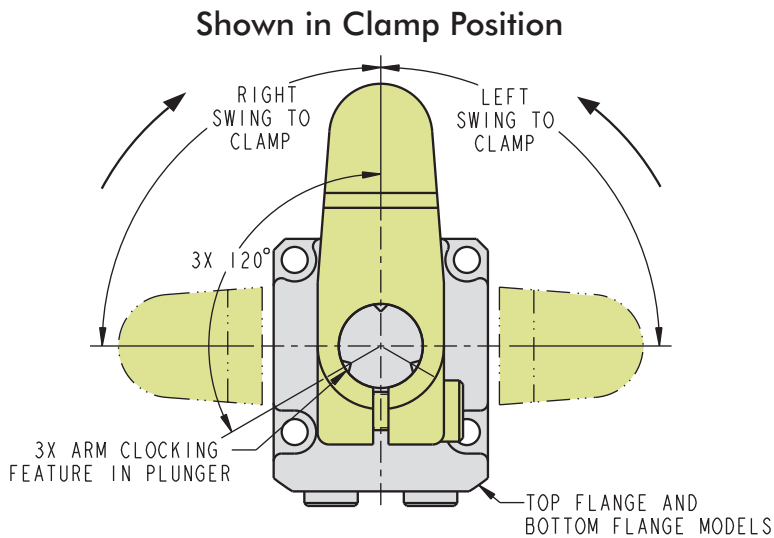
TuffCam™ 7 MPa Arm Clocking Feature

The 3 divots or "Clocking Features", located on the plunger, help arm installation in repeat fixture applications and with arm changes when maintaining fixtures. Installing a set screw into the arm properly positions the arm relative to the plunger and swing clamp body. The 3 divots are located at 120° intervals around the plunger to assure access to at least one in any body-arm orientation. Vekttek swing clamp arms are made with clearance to allow the drilling and installation of set screws according to this drawing.



TuffCam™ is a trademark of Vekttek, Inc.

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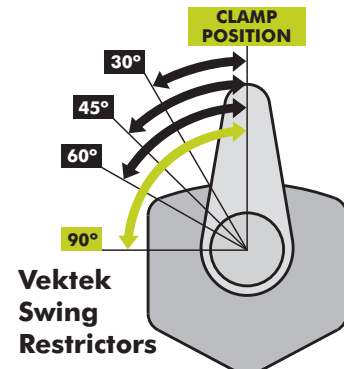


Set Screw Size and Location

Model No.	L1-4X25-00-X	L1-4X32-00-X	L1-4X40-00-X	L1-4X50-00-X	L1-4X63-00-X	L1-4X80-00-X
Set Screw	M3	M3	M4	M4	M5	M6
A	1.75	1.75	2.42	2.42	3.08	3.75

TuffCam™ Swing Clamp Swing Restrictors

Model No.	L1-4X25-00-X	L1-4X32-00-X	L1-4X40-00-X	L1-4X50-00-X	L1-4X63-00-X	L1-4X80-00-X
Clamp Capacity (kN)	1.9	3.3	5.2	8.0	12.5	20.4
Bore Size (mm)	25	32	40	50	63	80
Swing Restrictor 30°	L1-4925-30	L1-4932-30	L1-4940-30	L1-4950-30	L1-4963-30	L1-4980-30
Swing Restrictor 45°	L1-4925-45	L1-4932-45	L1-4940-45	L1-4950-45	L1-4963-45	L1-4980-45
Swing Restrictor 60°	L1-4925-60	L1-4932-60	L1-4940-60	L1-4950-60	L1-4963-60	L1-4980-60



Custom, angle restrictors available on request.

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TuffCam™ 7 MPa Swing Clamp Arms

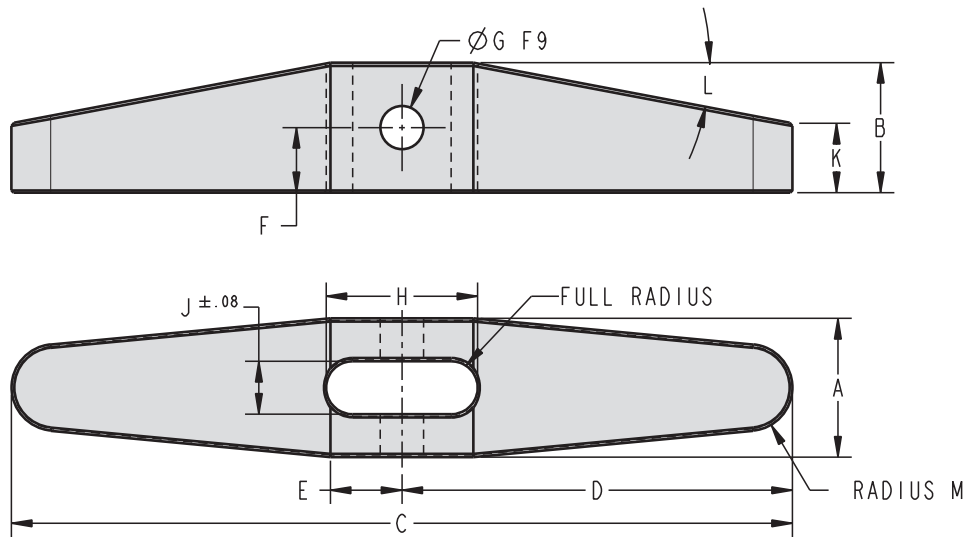
Double Ended Rocker Arm for Clevis Models

NEW

TuffCam™ 7 MPa Double Ended Rocker Arm

- Purchase arms using Model Numbers in the table.
- Dimensions to make your own.

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ILML91403 REV A

7 MPa Double Ended Rocker Arm Dimensions

Model No.	L9-1425-03	L9-1432-03	L9-1440-03	L9-1450-03	L9-1463-03	L9-1480-03
Cylinder Capacity (kN)	2.2	3.8	6.1	9.4	14.7	24.1
Bore Size (mm)	25	32	40	50	63	80
A	20	26	32	38	50	62
B	18	24	30	36	48	58
C	120	150	180	210	240	300
D	60	75	90	105	120	150
E	11.25	13.5	16.5	21	27	33.75
F	9	12	15	18	24	29
G	6	8	10	12	16	20
H	22.5	28.1	34.9	44.5	58.5	73
J	8.2	10.2	12.2	15.2	20.2	24.2
K	10	13	16	19	25	31
L	9	10	11	11	14	13
M	6	8	10	12	16	20

ILML91403 REV A



TuffCam™ 7 MPa Swing Clamp

Concept

Versatile Double Acting Clevis Plunger Swing Clamps

- TuffCam™ Top Flange Swing Clamps and Clevis Plunger Bottom Flange Swing Clamps working together.
- Adjustable clamping force.
- Use double ended Rocker Arms to apply equal force on two surfaces of different heights.
- Allowable arm travel for work piece deviation is $\pm 10^\circ$
- Six standard arm positions available in 30° increments.
- Clamp position repeatability is $\pm 0.25^\circ$ and Swing angle at $90^\circ \pm 3^\circ$
- Can be manifold mounted or plumbed.

D-7

