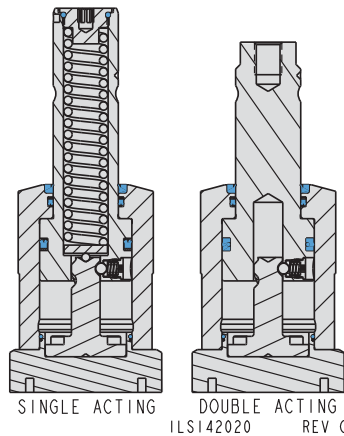


# TuffCam™ Swing Clamp

Low Profile Bottom Flange

## Single And Double Acting

- Single Acting models have increased spring forces for positive return in higher backpressure applications.
- Manifold mounting capability as well as SAE porting.
- Low Profile Swing Clamp Arm dimensions are found on pages O-8 and O-9.
- One piece body construction reduces potential leak paths and improves rigidity.
- Tungsten Carbide ball for strength and wear.
- TuffCam™ Low Profile Clacking feature uses standard length Vekttek arm (page C-18).
- Avoid cylinder damage and preserve warranty by using recommended flow rate limits and time calculations (C-18).
- Optional in-port flow control is a meter-in device with reverse free flow check valve.



C-21

| Model No.  | Clamp Swing Direction | Cylinder Capacity (lb.)* | Vertical Clam Stroke (in.)** | Total Stroke (Swing + Vertical) | Std Arm Length | Effective Piston Area (sq. in.) |         | Oil Capacity (cu. in.)*** |         | Optional Flow Control Model No. **** |
|--|-----------------------|--------------------------|------------------------------|---------------------------------|----------------|---------------------------------|---------|---------------------------|---------|--------------------------------------|
|  |                       |                          |                              |                                 |                | Extend                          | Retract | Extend                    | Retract |                                      |
| <b>Single Acting (S/A)</b>                                     |                       |                          |                              |                                 |                |                                 |         |                           |         |                                      |
| Cylinders, actuated hydraulically 1 direction, spring returned |                       |                          |                              |                                 |                |                                 |         |                           |         |                                      |
| 14-2718-00   | Right                 | 5000                     | 0.56                         | 1.10                            | 2.50           | N/A                             | 1.184   | N/A                       | 1.295   | 70-2037-72                           |
| 14-2718-01   | Left                  |                          | 0.56                         |                                 |                |                                 |         |                           |         |                                      |
| 14-2718-02   | Straight              |                          | 1.10                         |                                 |                |                                 |         |                           |         |                                      |
| 14-2121-00   | Right                 | 7500                     | 0.62                         | 1.18                            | 2.68           | N/A                             | 1.787   | N/A                       | 2.092   | 70-2037-72                           |
| 14-2121-01   | Left                  |                          | 0.62                         |                                 |                |                                 |         |                           |         |                                      |
| 14-2121-02   | Straight              |                          | 1.18                         |                                 |                |                                 |         |                           |         |                                      |
| <b>Double Acting (D/A)</b>                                     |                       |                          |                              |                                 |                |                                 |         |                           |         |                                      |
| Cylinders, actuated hydraulically both directions              |                       |                          |                              |                                 |                |                                 |         |                           |         |                                      |
| 14-2818-00   | Right                 | 5000                     | 0.56                         | 1.10                            | 2.50           | 2.411                           | 1.184   | 2.647                     | 1.295   | 70-2037-72                           |
| 14-2818-01   | Left                  |                          | 0.56                         |                                 |                |                                 |         |                           |         |                                      |
| 14-2818-02   | Straight              |                          | 1.10                         |                                 |                |                                 |         |                           |         |                                      |
| 14-2221-00   | Right                 | 7500                     | 0.62                         | 1.18                            | 2.68           | 3.553                           | 1.787   | 4.177                     | 2.092   | 70-2037-72                           |
| 14-2221-01   | Left                  |                          | 0.62                         |                                 |                |                                 |         |                           |         |                                      |
| 14-2221-02   | Straight              |                          | 1.18                         |                                 |                |                                 |         |                           |         |                                      |

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

\* Cylinder capacities are listed at 5,000 psi maximum operating pressure, with a standard length VektorFlo® arm installed. Minimum operating pressure is 750 psi for single acting, 500 psi for double acting. 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 5,000, and multiply the resultant number by your system operating pressure to obtain the approximate clamping force for your application. (Actual force will vary slightly due to internal cantilever loading, friction loss and/or return springs.)

\*\* 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-18.

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

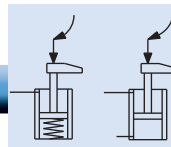
Optional in-port flow control is a meter-in device with reverse free flow check valve.



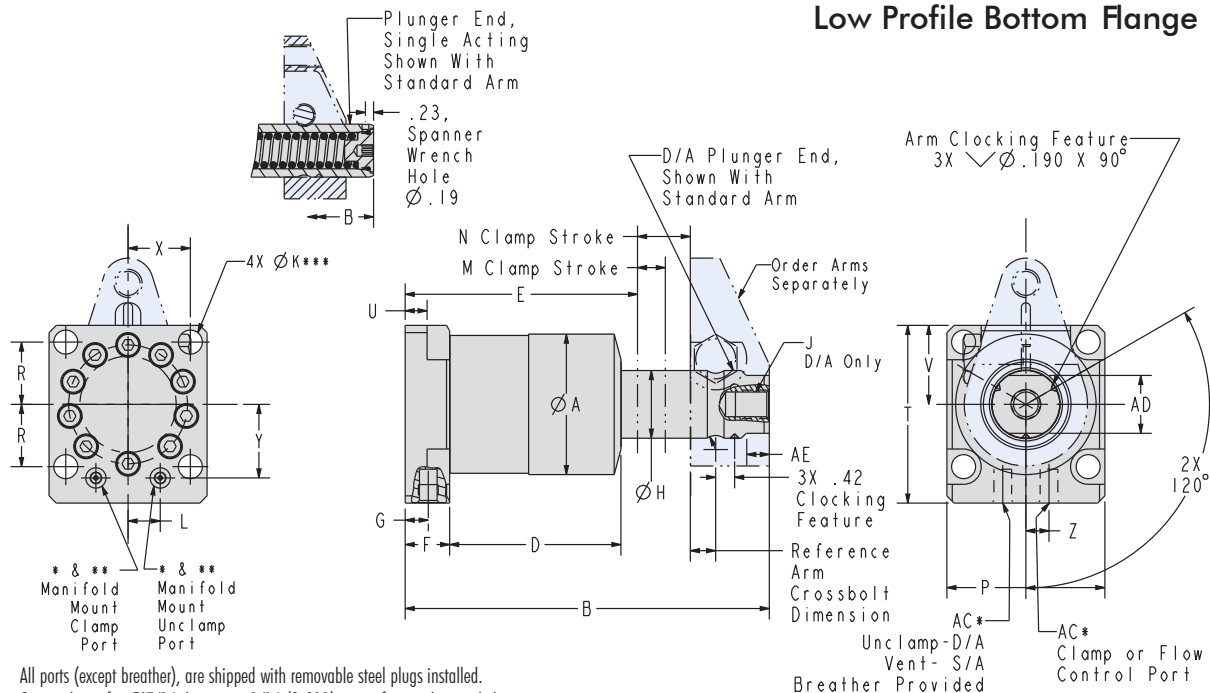
## Dimensions

| Model No.                  | A    | B    | D    | E    | F    | G    | H     | J                       | K    | L     | M    | N    |
|----------------------------|------|------|------|------|------|------|-------|-------------------------|------|-------|------|------|
| <b>Single Acting (S/A)</b> |      |      |      |      |      |      |       |                         |      |       |      |      |
| 14-2718-00                 |      |      |      |      |      |      |       |                         |      |       |      |      |
| 14-2718-01                 | 2.47 | 8.04 | 3.43 | 4.76 | 0.98 | 0.49 | 1.250 | N/A                     | 0.42 | 0.57  | 0.56 | 1.10 |
| 14-2718-02                 |      |      |      |      |      |      |       |                         |      |       |      |      |
| 14-2121-00                 |      |      |      |      |      |      |       |                         |      |       |      |      |
| 14-2121-01                 | 3.11 | 8.85 | 3.79 | 5.14 | 0.99 | 0.51 | 1.500 | N/A                     | 0.53 | 0.71  | 0.62 | 1.18 |
| 14-2121-02                 |      |      |      |      |      |      |       |                         |      |       |      |      |
| <b>Double Acting (D/A)</b> |      |      |      |      |      |      |       |                         |      |       |      |      |
| 14-2818-00                 |      |      |      |      |      |      |       |                         |      |       |      |      |
| 14-2818-01                 | 2.47 | 7.63 | 3.43 | 4.76 | 0.98 | 0.49 | 1.250 | M16 x 2.0<br>Depth 0.75 | 0.42 | 0.57  | 0.56 | 1.10 |
| 14-2818-02                 |      |      |      |      |      |      |       |                         |      |       |      |      |
| 14-2221-00                 |      |      |      |      |      |      |       |                         |      |       |      |      |
| 14-2221-01                 | 3.03 | 8.99 | 3.79 | 5.14 | 0.99 | 0.51 | 1.500 | M16 x 2.0<br>Depth 0.75 | 0.53 | 0.711 | 0.62 | 1.18 |
| 14-2221-02                 |      |      |      |      |      |      |       |                         |      |       |      |      |

# TuffCam™ Swing Clamp



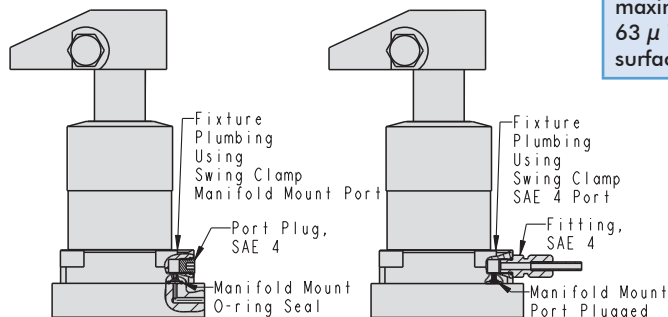
## Low Profile Bottom Flange



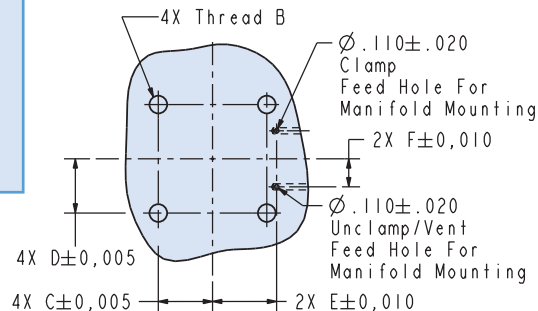
- \* All ports (except breather), are shipped with removable steel plugs installed.
- \*\* Counter bores for  $\varnothing 7/16$  diameter x 1/16 (2-011) o-ring face seals provided.
- \*\*\* When used as manifold mounted, all four (4) mounting bolts must be used to assure proper o-ring face sealing. Recommended fastener sizes are listed in column AF.

ILSI42021 REV C

For proper sealing, mating surface must be flat within 0.003 in. with a maximum  $63 \mu$  in.  $R_a$  surface finish.



ILSI42022 REV A



ILSI42023 REV A

## Mounting Dimensions

| Model No.  | B       | C     | D     | E     | F     |
|------------|---------|-------|-------|-------|-------|
| 14-2718-XX | 3/8-24  | 1.080 | 1.080 | 1.381 | 0.572 |
| 14-2818-XX | DP 0.59 | 1.080 | 1.080 | 1.381 | 0.572 |
| 14-2121-XX | 1/2-20  | 1.380 | 1.380 | 1.630 | 0.713 |
| 14-2221-XX | DP 0.78 | 1.380 | 1.380 | 1.630 | 0.713 |

| P | R | T | U | V | X | Y | Z | AC | AD | AE | AF |
|---|---|---|---|---|---|---|---|----|----|----|----|
|---|---|---|---|---|---|---|---|----|----|----|----|

Cylinders, actuated hydraulically 1 direction, spring returned

|      |      |      |      |      |      |      |      |       |     |     |        |
|------|------|------|------|------|------|------|------|-------|-----|-----|--------|
| 2.79 | 2.79 | 3.37 | 0.52 | 1.39 | 1.08 | 1.38 | 0.51 | SAE 4 | N/A | N/A | 3/8-24 |
| 3.50 | 3.50 | 3.94 | 0.49 | 1.75 | 1.38 | 1.63 | 0.51 | SAE 4 | N/A | N/A | 1/2-20 |

Cylinders, actuated hydraulically both directions

|      |      |      |      |      |      |      |      |       |      |      |               |
|------|------|------|------|------|------|------|------|-------|------|------|---------------|
| 2.79 | 2.79 | 3.37 | 0.52 | 1.39 | 1.08 | 1.38 | 0.51 | SAE 4 | 1.06 | 0.50 | 3/8-24        |
| 3.50 | 3.50 | 3.94 | 0.49 | 1.75 | 1.38 | 1.63 | 0.51 | SAE 4 | 1.31 | 0.50 | 1/2-20 x 1.25 |

# TuffCam™ Swing Clamp

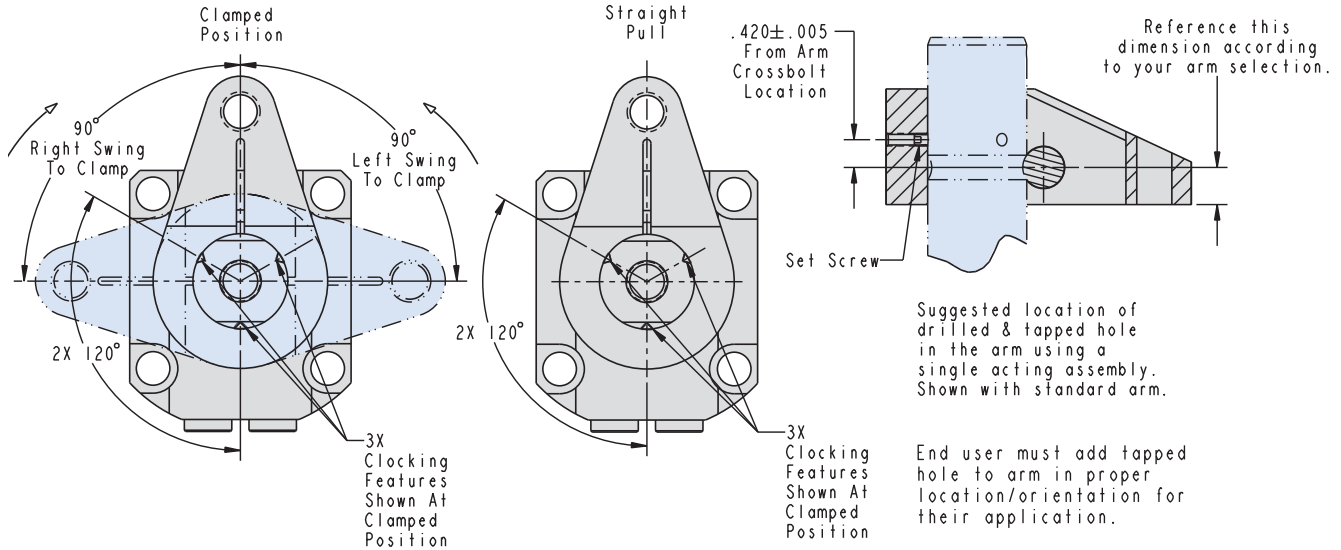
Low Profile Clamp Time and Flow Rates, Low Profile Clocking

## TuffCam™ Clocking Features

Three clocking features have been added to Vekttek's Low Profile Swing Clamp line. Customers have requested the clocking features to help improve and speed-up arm changes.

A drill point on each clamp standardizes arm location at a particular position. An additional 2 (two) orientation drill points reside 120° out from that position and each other. Access to the positioning feature is through the back or side of the arm, making modification a snap for users. Each arm position can have its own specification.

C-18



### TuffCam™ Low Profile Swing Clamp Arm Clocking Feature

Views shown apply to double and single acting TuffCam™ Top Flange and Bottom Flange models.

Three counter sunk  $\varnothing .19 \times 90^\circ$  clocking feature drill points are shown in the clamped position.

The three (3) Clocking features are equally spaced 120°.

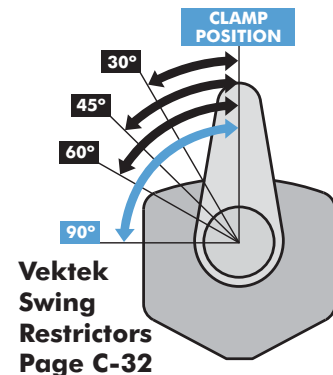
ILS140024 REV C

### Clamp Time and Fluid Flow Rates for TuffCam™

| Swing Clamp Capacity (lb.) | Standard Arm                        |  | Extended Arm                        |  |
|----------------------------|-------------------------------------|--|-------------------------------------|--|
|                            | Fastest Allowable Clamp Time (sec.) | Maximum Permissible Flow Rate (cu. in./min.) | Fastest Allowable Clamp Time (sec.) | Maximum Permissible Flow Rate (cu. in./min.) |
| 5000                       | 0.5                                 | 155  | 1.0                                 | 78   |
| 7500                       | 0.5                                 | 251  | 1.0                                 | 126  |

NOTE: Arm Length and Pressure Limitation Graphs on page O-3

ILS150108 REV G



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

- For upreach and double arms, use extended arm flows and times.
- 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 and may require customer testing in specific application to establish limits.



# TuffCam™ Swing Clamps

## Low Profile Features

- \* Tougher Cams
- \* Stronger Single Acting Springs
- \* Precise Swing Angle
- \* Clocking Feature

C-17



## TuffCam™ Low Profile Swing Clamps

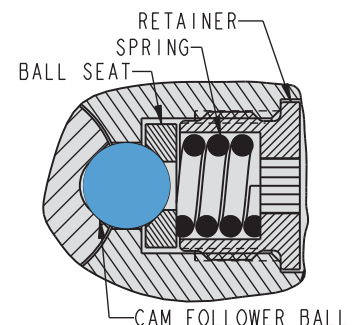
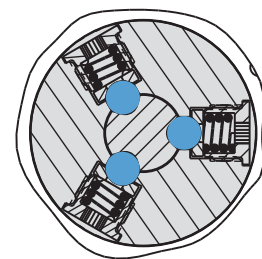
Vekttek's TuffCam™ Low Profile Swing Clamps meet your demand for speed, precise positioning, heavy arm applications and/or clamping capacity up to 7500 lbs. These Low Profile tri-cam design clamps, with their exclusive Cam Follower Seat, can position and clamp in one second or less and handle large arms with ease. Each clamp includes the Clocking feature that dramatically reduces the time it takes to change arms for maintenance, replacement or fixture setup.

One of the keys to this TuffCam™ innovation is the Cam Follower Ball Seat that was developed to improve strength and wear. Using the Vekttek patented V-Groove technology, tungsten carbide ball material for strength and wear, and a stainless steel spring, these clamps have reduced static friction for improved clamp breakaway and extended life.

- Available in these body styles:
  - Top Flange
  - Top Flange Long Stroke (Double Acting Only)
  - Bottom Flange
  - Rod Position Sensing
  - Magnetic Position Sensing
- Single and double acting models available. The Single Acting models have increased spring forces for positive return in higher backpressure applications.
- BHC™ (Black Hard Coating) on the cylinder bodies helps prevent scoring and scratching.
- Standard fluorocarbon wipers for improved coolant compatibility.
- Arm clocking feature uses standard Vekttek arms.

## TuffCam™ Low Profile Swing Clamp Cam Follower Design

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



ILS140025

REV A

