

# IEM



TRUSTED SOLUTIONS AND INNOVATION

## CAM CATALOG



## SERVICE WE DELIVER AND QUALITY YOU CAN DEPEND ON

**IEM** is a leading manufacturer of die and die component products supplied globally to the parts forming industry. Backed by years of tool and die experience, quality and innovation are some of the reasons why our name is respected throughout the world. We have taken the lead role in creating and bringing new products to customers and helping them find solutions that improve their operations. Based on the capabilities **IEM** offers, we can help you to meet the demands of quick deliveries, technical support, quality products and competitive prices. **IEM** and its' broad distribution channels and direct sales personnel will assist you in any way to make your product a better and more profitable one.

Whether standard or customized products, with our years of experience, customers can be sure the products they receive will meet their expectations for reliability and dependable performance. We understand the demanding schedules of die builders and production personnel and have developed efficient manufacturing processes to shorten product lead times as well as put inventory on our shelves so you can have it in your facility when you need it. Put the **IEM** network to work for you. We've got the service you've been looking for.

Included in our full line offering are both inch and metric size die sets and die components that are designed to numerous die standards including ISO, NAAMS, JIS and many large automotive and appliance manufacturers' standards. The complete product offering includes:

- Accu-Bend Rotary Benders
- Air Presses
- Cams
  - Aerial & Diemount Cams
  - Box Cams
  - Roller Cams
  - Wide Cams
- Die Accessories
- Die Sets
  - Plain & Ball Bearing Sets
  - Catalog Ball Bearing Sets
  - Wear Plate Sets
  - Cast Sets
- Ejector Boxes
- Guide Posts & Bushings
  - Plain & Ball Bearing Styles
  - Steel, Bronze, Bronze-Plated &
  - Self-Lubricating Bushings
  - Lempoloy Bushings
  - Special Pins, Bushings & Retainers
- Hydraulics
  - Electronic Die Setters
  - Die Separators
  - Drill & Tap Equipment
  - Hydraulic Motors
- In-Die Tapping Units
- Machined and Cut Ground Plate
  - Adapter Plates
  - Bolster Plates
  - 1020, 1045 & 4140 materials
- Manufacturing Services
  - CNC Machining
  - Blanchard Grinding
  - Stress Relieving
  - Die Set Repair
- Mold Components
  - Bronze Plated & Self-Lubricated Bushings
  - Leader Pins
  - Bronze & Bronze Plated Wear Strips & Ways
- Punches, Buttons & Retainers
- Reliance Fabrications
  - Custom Fabrications
  - Robotic Welding
  - Aluminum & Steel Fixture Bases
- Springs
  - DieMax L Inch Series Springs
  - DieMax XL Series ISO Springs
  - JIS Series Springs
  - Custom Heavy Duty Springs
  - Marsh Mellow Springs
  - Formathane Urethane
  - Kaller Gas Springs
  - Utility & Disc Springs
- Wear Products
  - Plates, Strips, Gibs & Blocks
  - Steel, bronze, Bronze-Plated and Self-Lubricating Materials

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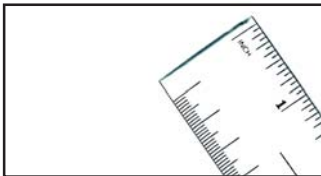
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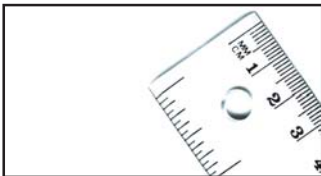
# Cam Selection Matrix

	NAAMS Standards								
	Gib Cam™	Mini Cam™	Long Travel Box	Standard Box	Max Power™ Box (MP)	Milfab®	NDM Die Mounts	NAC Aerial	Long Reaching Die Mount
Inch		X	X	X		X			
Metric	X	X	X	X	X	X	X	X	X
Low profile	X					X			
Narrow width		X	X			X			
Short length		X		X	X	X			
Maximum slide travel			X						X
Maximum stripping force					X	X			
Nitrogen Return					X	X	X	X	X
Positive return	X					X	X	X	X
Maximum piercing force					X	X	X	X	X
Designed to NAAMS Standards							X	X	
Special Cam Designs Available	X	X	X	X	X	X	X	X	X

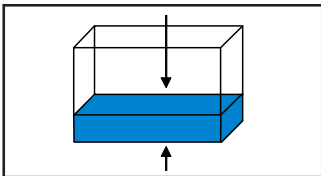
Items in the blue shaded area are included in this catalog.



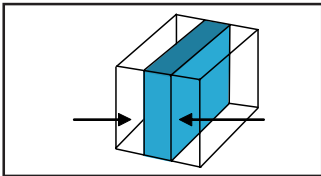
**Inch Design** – Cam is designed around the English or Inch measurement standard. Bolt and dowel holes are standard inch components.



**Metric Design** – Cam is designed around the Metric measurement standard. Bolt and dowel holes are standard metric components. (May require a metric callout when placing an order)

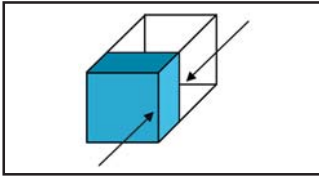


**Low Profile** – The overall height is minimized in a die design. The low profile cams are an excellent choice for short press stroke operations, where die space is limited.

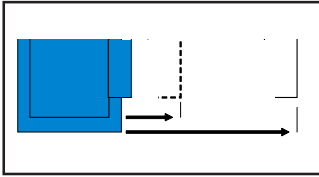


**Narrow Width** – Reduces progression space used in a die design while allowing multiple standard cams to align side-by-side in a die.

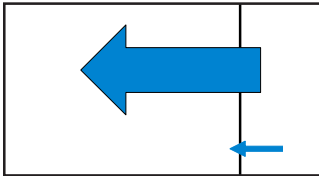
# Cam Selection Matrix



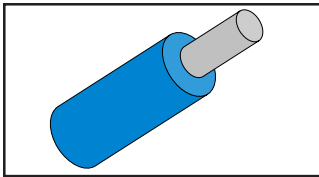
**Short Length** – The short length design is ideal for working at the edge of a die or on the inside of a large part working out. The length of the cam is minimized by an internal spring return.



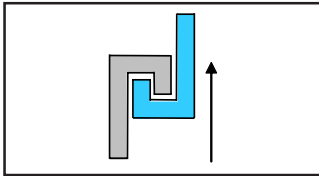
**Maximum Slide Travel/Long Reaching** – The slide travel increases by 30% or more over standard design cams. Cams are good in applications where there is a need to reach over large part flanges or stock material placement limits the proximity of the cam.



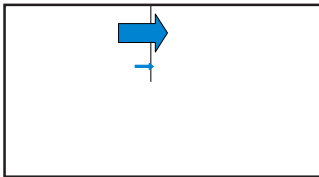
**Maximum Stripping Force** – Return spring force is 10% of working force. May require Nitrogen Return option.



**Nitrogen Return** – Gas springs are designed into the cam to provide higher stripping forces and even slide return. Cams with nitrogen gas springs will either come standard with a gas spring or may be an option to replace or use in combination with standard mechanical springs.



**Positive Return** – A mechanical return designed into the cam to pull the slide and tooling out of the part. Ideal for applications piercing large holes or in sticky materials where there is a chance of die damage due to a stuck punch.



**Maximum Piercing Force** – Large self lubricated surface areas on moving parts provides maximum piercing forces over long extended periods of cam operation.



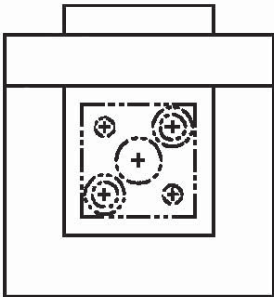
**Designed to NAAMS Standards** – Cams meet or exceed all of the NAAMS Global Standards for Aerial and Die Mount Cam design.



**Special Cam Designs** – If a standard cam design doesn't work for you, then give us your application specifications and we will design a special cam for you.

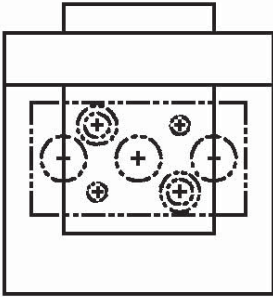
# Retainer Mounting Methods

**STANDARD RETAINER**



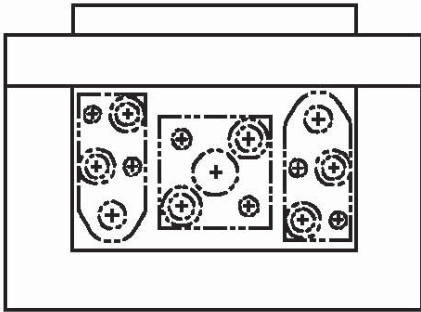
The soft mounting face of the cam slide allows for the mounting of a standard light or heavy duty punch retainer.

**STANDARD RETAINER**



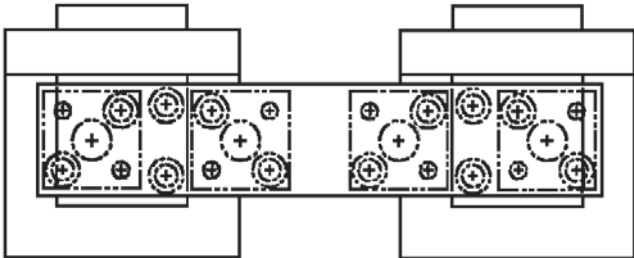
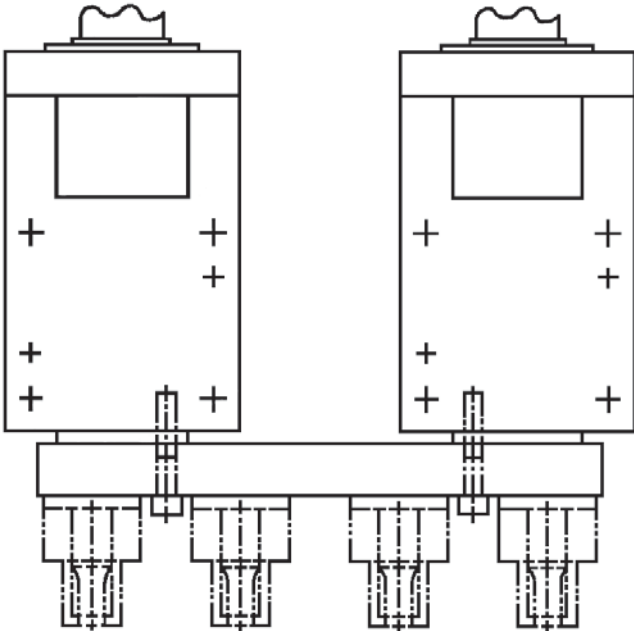
Oversized retainers work well if multiple punches are set in an even load pattern in relation to the center of the slide. Off-center loads will reduce the working tonnage rating of the cam.

**STANDARD RETAINER**



Multiple retainers easily fit our "double wide" #4L and #14L cams. Applications requiring off-center loading of the slide reduces the working tonnage rating of the cam.

**GANG MOUNTING RETAINERS ON (2) CAMS**



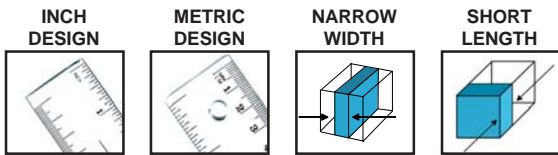
Using a bridge block fastened on the slide face of two of the same cams allows for mounting of multiple retainers. Precise timing of both cam slides ensures load sharing between the cams.

# Mini Cam™

## Technical Information

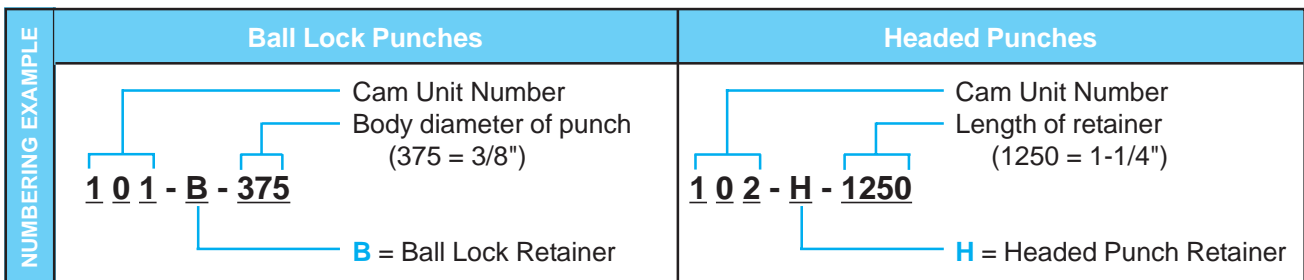


STANDARD UNIT (NO RETAINER)	CAM WITH RETAINER	
	HEADED PUNCH	BALL LOCK PUNCH
101	101H0875	101B250
	101H1125	101B375
	101H1375	—
101MM METRIC	101H0875MM	101B250MM
	101H1125MM	101B375MM
	101H1375MM	—
102	102H1000	102B250
	102H1250	102B375
	102H1500	102B500
	—	102B625
102MM METRIC	102H1000MM	102B250MM
	102H1250MM	102B375MM
	102H1500MM	102B500MM
	—	102B625MM



Calculated stroke, tonnage and wear curves are presented as a guideline for design and maintenance only. No warranty exists, either expressed or implied, as a result of the application, as it may relate to the information provided.

Standard Metric Models	Slide Diameter in/mm	Travel in/mm	Working Load tons/kN	Spring Force lbs/N	Maximum Tooling Weight lbs/kg	Approx. Cam Weight lbs/kg	Spring Catalog Number	Number of Springs
101	1.25	.75	2	140	2	8	9-1012-26	1
101MM	31.75	19.05	17.8	24.5	0.91	3.63	9-1012-26	1
102	1.50	1.00	3	308	2	12	9-1214-26	1
102MM	38.10	25.40	26.7	53.9	0.91	5.44	9-1214-26	1



### RETAINERS FOR BALL LOCK PUNCHES

Ball-lock punches are widely used in the industry because the self-locking feature eliminates the need for keying the punch. The necessity for sharpening or the replacement of a broken punch during production is simplified.

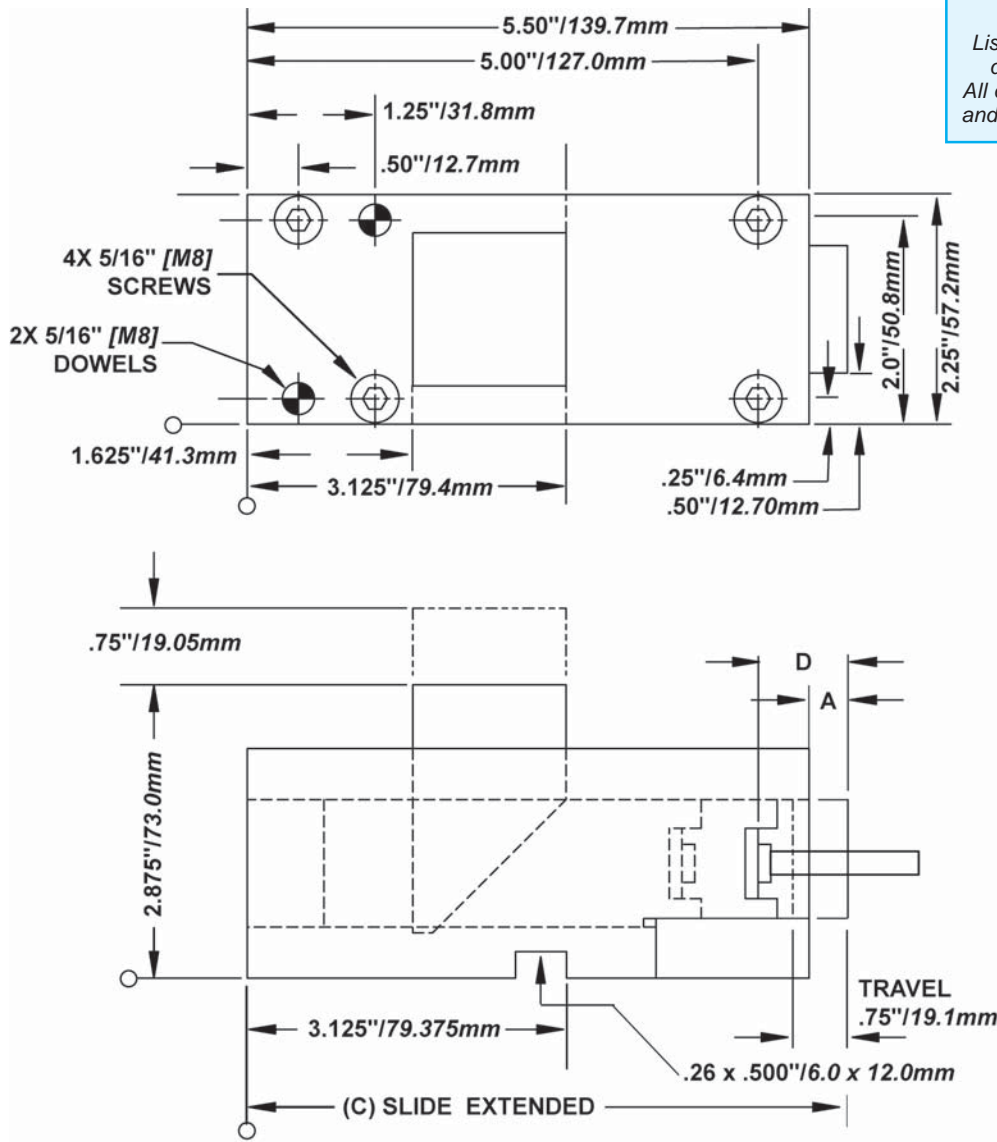
### RETAINERS FOR HEADED PUNCHES

Retainers for headed punches come in three (3) different lengths for each Mini Cam™ unit. The shortest length retainer comes as a standard for each unit and will be suitable for most applications. However, some applications may require the use of a longer retainer. An example might be an application in which an exceptionally long punch is used, or when perforating a heavy material. A longer retainer allows for greater stability due to increased gripping range on the body of the punch.

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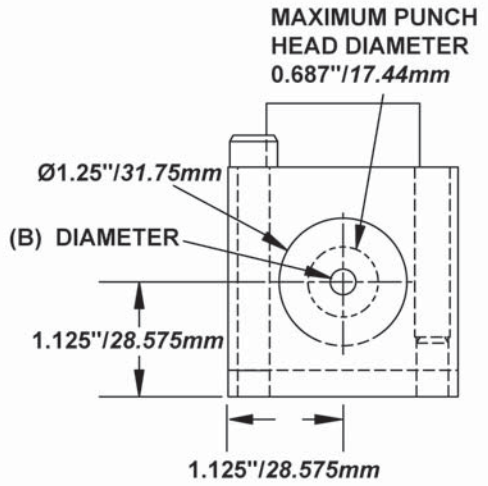
# Mini Cam™ 101/101MM Slide Unit

Cam models are designed in both inch and metric.  
Listed dimensions may not convert directly into the other standard.  
All dimensions are for reference only and no tolerance is stated or implied.



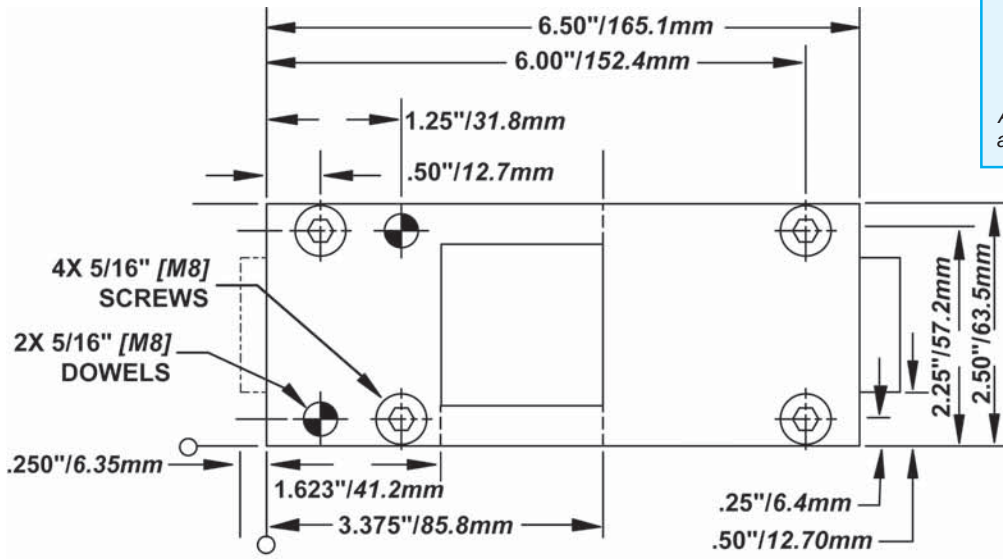
Catalog Number with Retainer	Retainer Height Dimension D in/mm
101H0875	.875 (22.2)
101H1125	1.125 (28.6)
101H1375	1.375 (34.9)
101B250	1.000 (25.4)
101B375	1.000 (25.4)

Catalog Number with Retainer	A in/mm	B in/mm	C in/mm	Headed Punches		Light Duty Ball Lock Punches in
				Shaped Point in	Round Point in	
101H0875	3/8 9.5	.1884 4.79	5-7/8 149.2	3/16 – 3/8	up to 3/8	–
101H1125	5/8 15.9	.1884 4.79	6-1/8 155.6	3/16 – 3/8	up to 3/8	–
101H1375	7/8 22.2	.1884 4.79	6-3/8 161.9	3/16 – 3/8	up to 3/8	–
101B250	11/16 17.5	.2503 6.36	6-3/16 157.2	–	–	1/4
101B375	11/16 17.5	.375 9.53	6-3/16 157.2	–	–	3/8

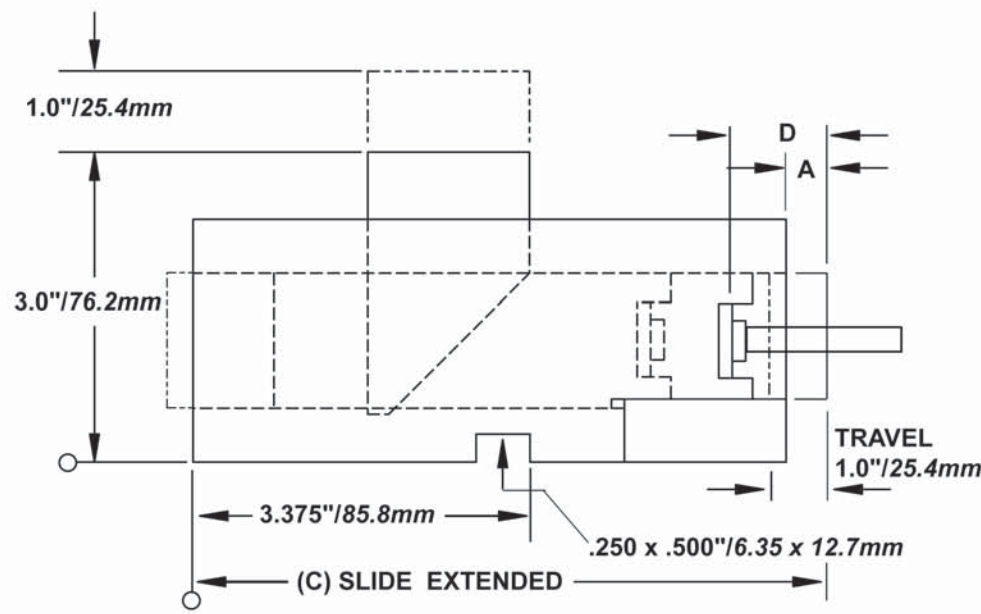


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# Mini Cam™ 102/102MM Slide Unit

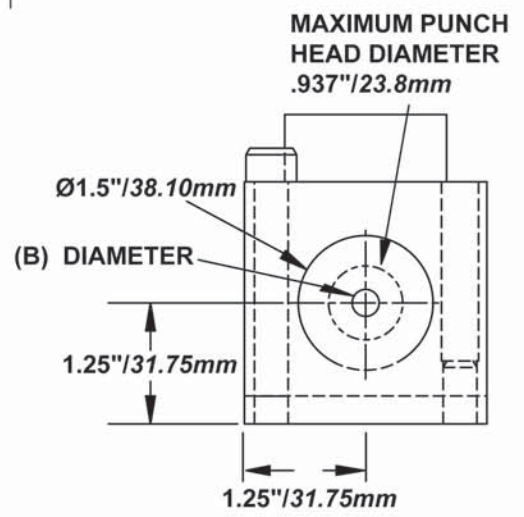


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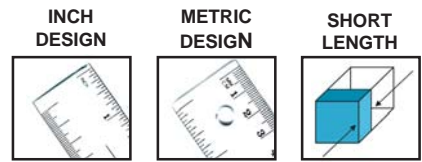
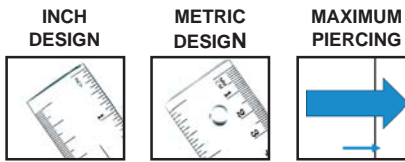
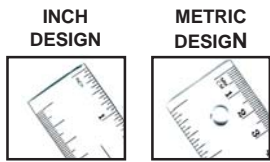
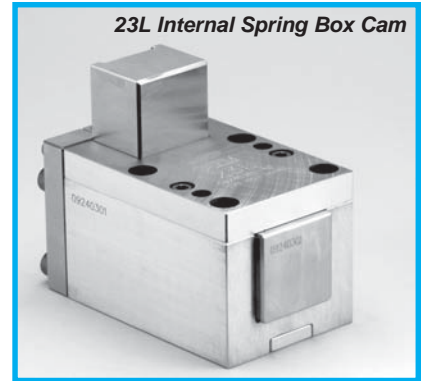
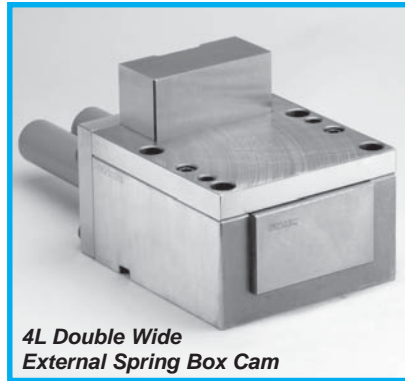
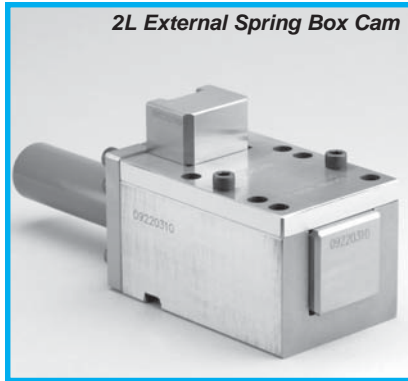
Catalog Number with Retainer	Retainer Height Dimension D in/mm
102H1000	1.000 (25.4)
102H1250	1.250 (31.8)
102H1500	1.500 (38.1)
102B250	1.000 (25.4)
102B375	1.000 (25.4)
102B500	1.000 (25.4)
102B625	1.000 (25.4)

Catalog Number with Retainer	A in/mm	B in/mm	C in/mm	Headed Punches		Light Duty Ball Lock Punches in
				Shaped Point in	Round Point in	
102H1000	1/4 6.35	.2509 6.37	6 - 3/4 171.5	1/4 - 5/8	up to 3/4	-
102H1250	1/2 12.7	.2509 6.37	7 177.8	1/4 - 5/8	up to 3/4	-
102H1500	3/4 19.0	.2509 6.37	7 - 1/4 184.2	1/4 - 5/8	up to 3/4	-
102B250	1/2 12.7	.2503 6.37	7 177.8	-	-	1/4
102B375	1/2 12.7	.3753 9.53	7 177.8	-	-	3/8
102B500	1/2 12.7	.5003 12.70	7 177.8	-	-	1/2
102B625	1/2 12.7	.6253 15.88	7 177.8	-	-	5/8



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# Standard Box Cam



## EXTERNAL SPRING

Standard Cam Models	Face Size X in/mm	Travel in/mm	Working Load tons/kN	Spring Force lbs/N	Maximum Tooling Weight lbs/kg	Approx. Cam Weight lbs/kg	Spring Catalog Number	Number of Springs
2L 2LHM	1.875 Sq 48 Sq	0.75 19	2.5 22.2	216 960	5 2.27	17 8	9-1614-21	1
3L 3LHM	2.5 Sq 63 Sq	1.625 42	4 35.6	444 1975	8 3.64	42 20	9-2020-21	1
4L 4LHM	2.75 x 4.75 70 x 121	1.625 45	8 71.2	888 3950	12 5.45	78 36	9-2020-21	2
5L 5LHM	3.25 Sq 82 Sq	2.5 64	7 62.3	652 2900	10 4.55	93 43	9-2428-21	1

## INTERNAL SPRING

\* Combination Spring

Standard Cam Models	Face Size X in/mm	Travel in/mm	Working Load tons/kN	Spring Force lbs/N	Maximum Tooling Weight lbs/kg	Approx. Cam Weight lbs/kg	Spring Catalog Number	Number of Springs
22L 22LHM	1.875 Sq 48 Sq	.75 19	2.5 22.2	258 1148	5 2.27	15 33.1	9-1612-21	1
23L 23LHM	2.50 Sq 63 Sq	1.625 42	4 35.6	415 1846	8 3.64	41 90.4	9-2020-21	1
24MP	3.0 x 4.75 76 x 120	1.625 41.3	12 106.8	2,141 9,516	12 5.45	125 56.7	C.909.025* 9-2428-26	2 2
24MP-XW	3.0 x 8.0 76 x 203	1.625 41.3	20 178	3,213 14,280	20 9.09	183 83	C.090.025* 9-2428-26	3 3

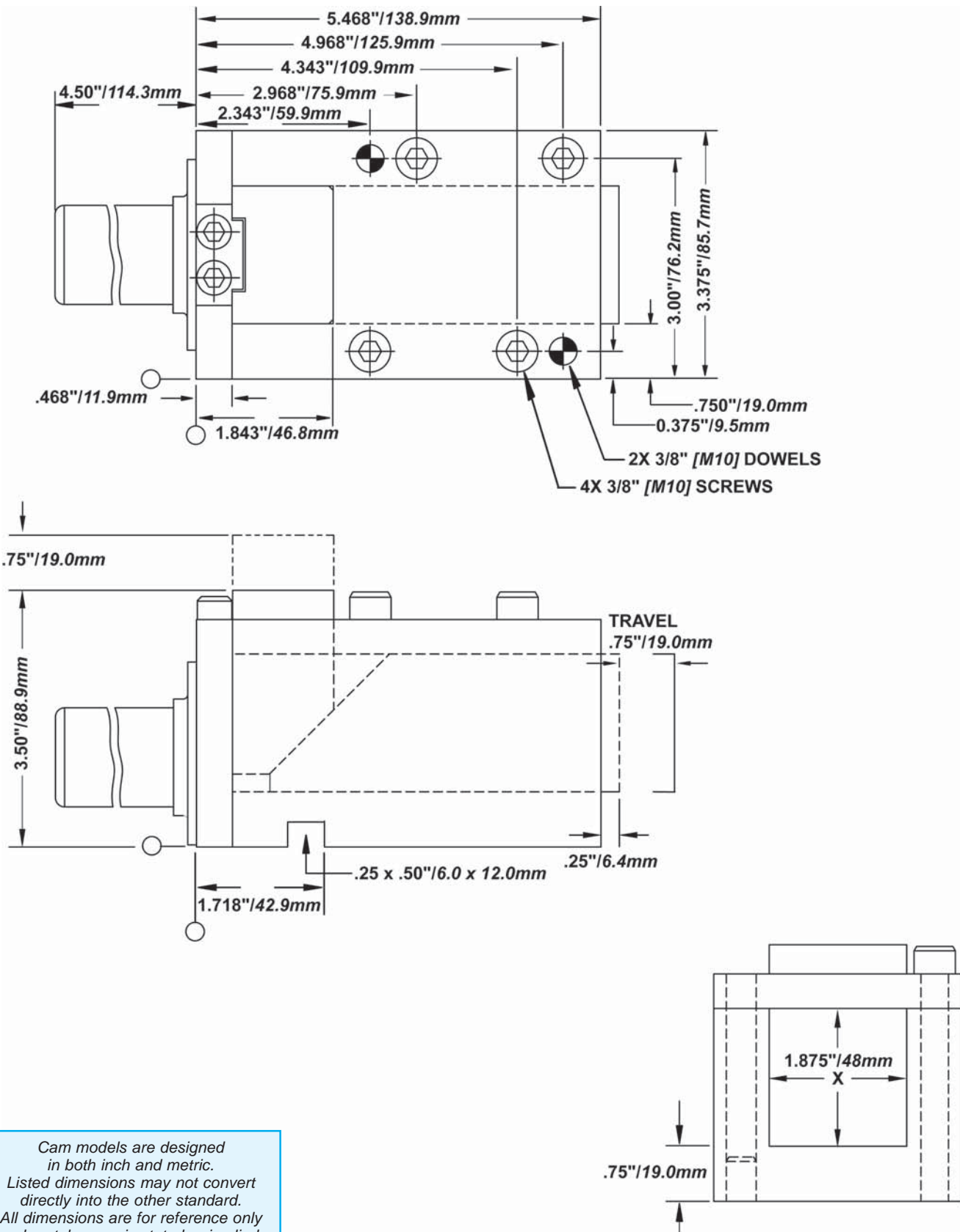
Calculated stroke, tonnage and wear curves are presented as a guideline for design and maintenance only. No warranty exists, either expressed or implied, as a result of the application, as it may relate to the information provided.

### NOTE:

- The cam slide has .0005" – .001" (0.0127 – .0254mm) clearance between each side of the slide and body to allow for lubrication and heat dissipation. Tighter tolerances are available upon request.

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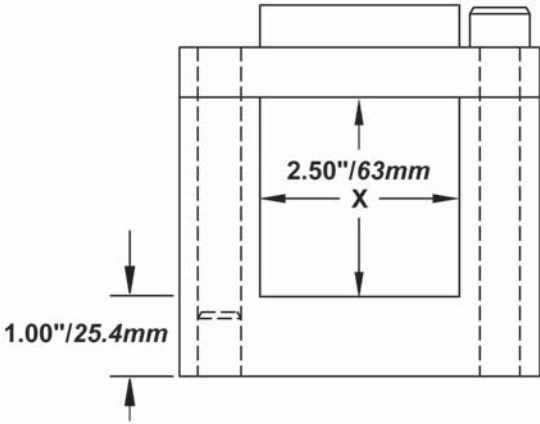
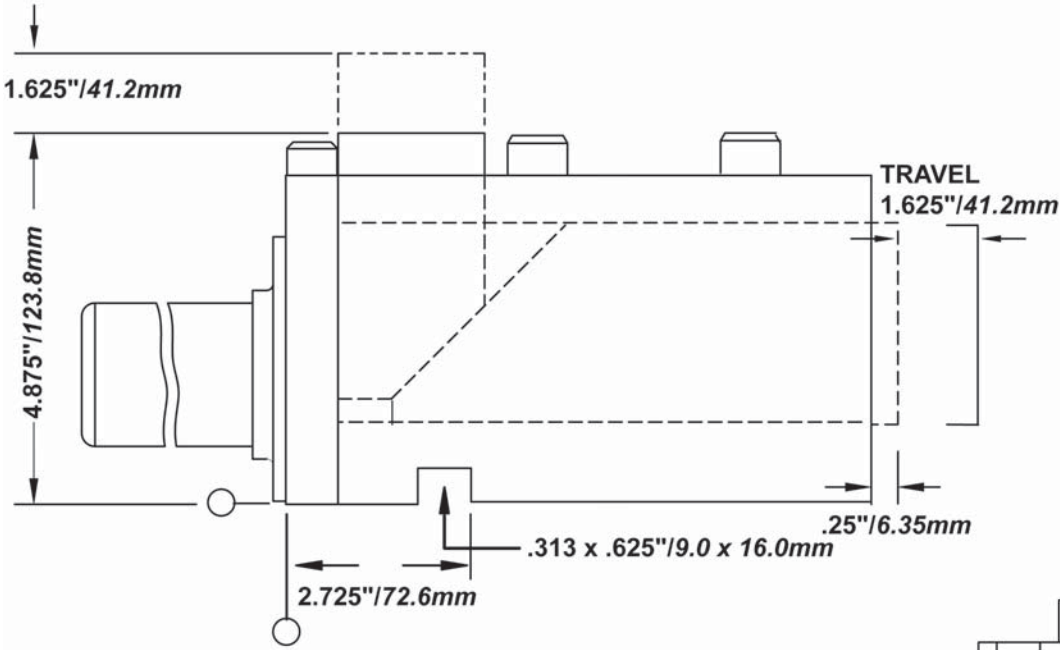
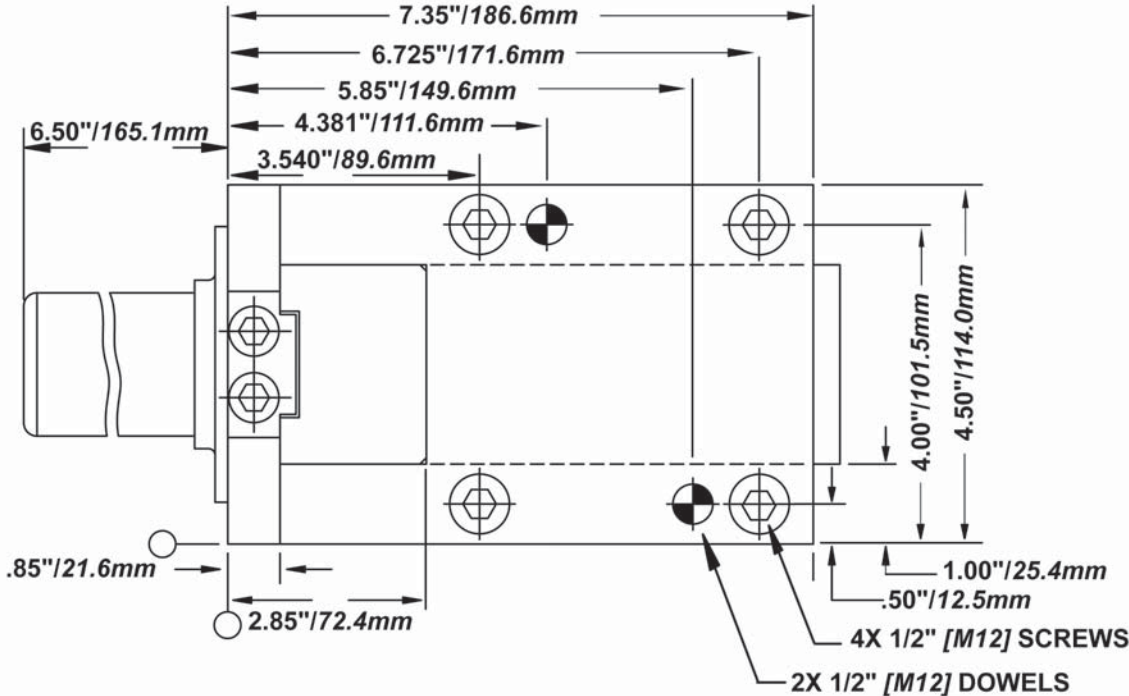
# External Spring Box Cam 2L/2LHM



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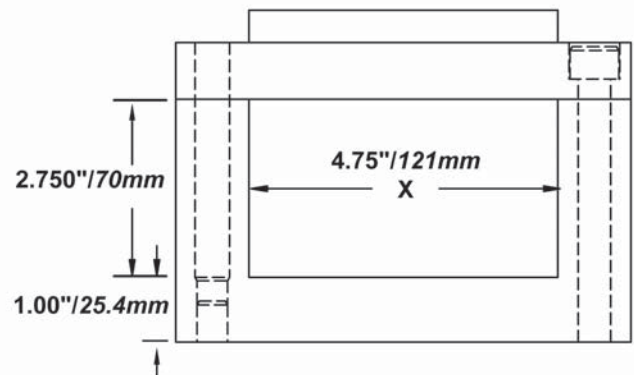
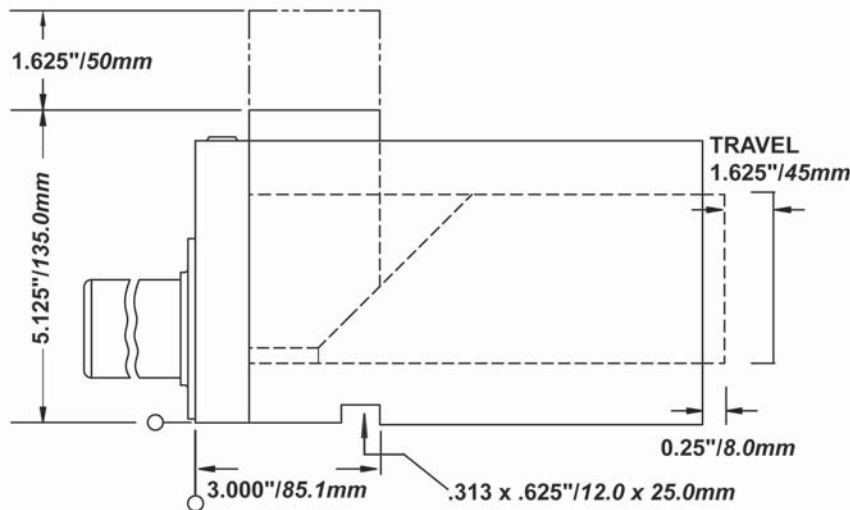
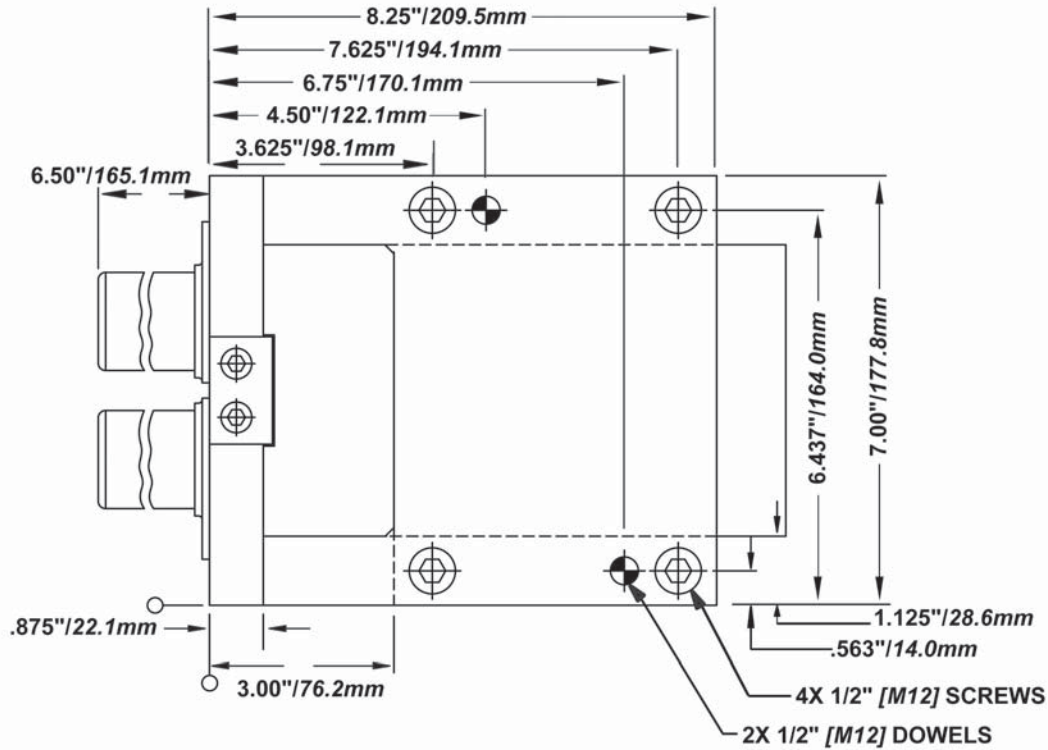
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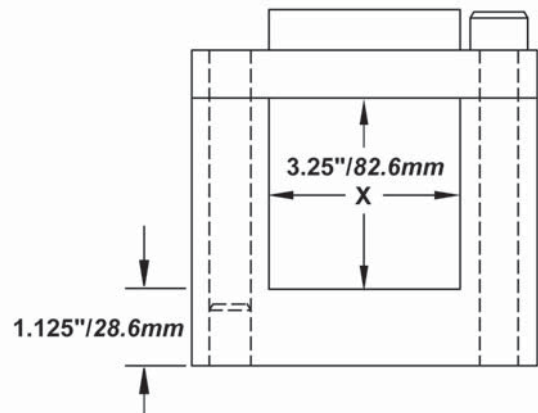
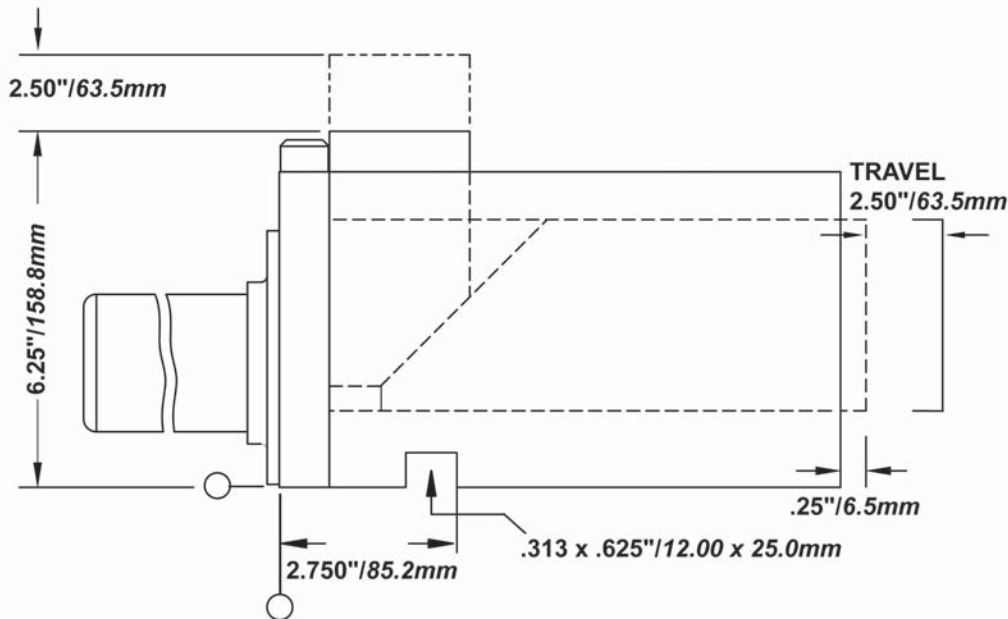
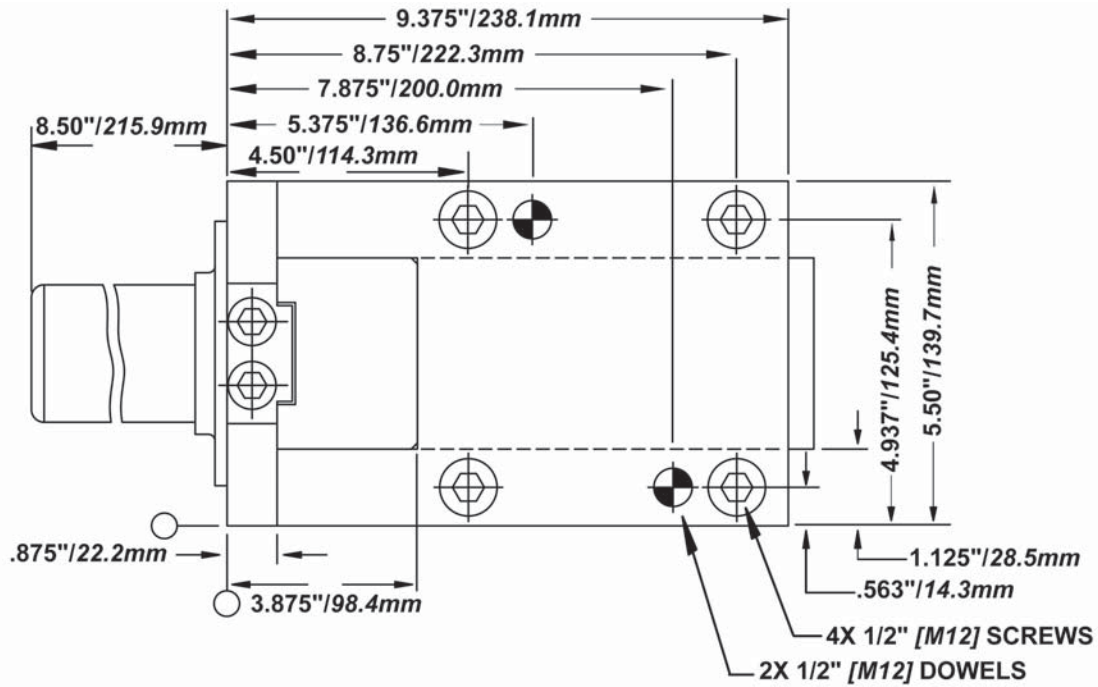
# External Spring Box Cam (Double Wide) 4L/4LHM



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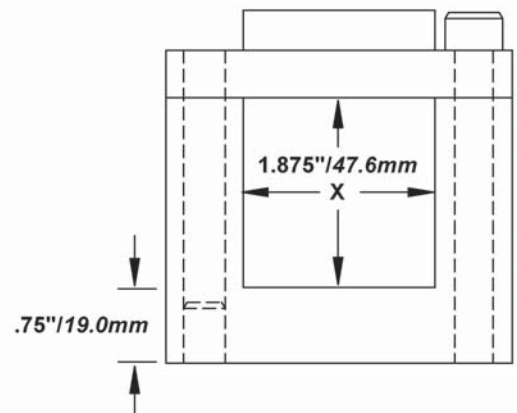
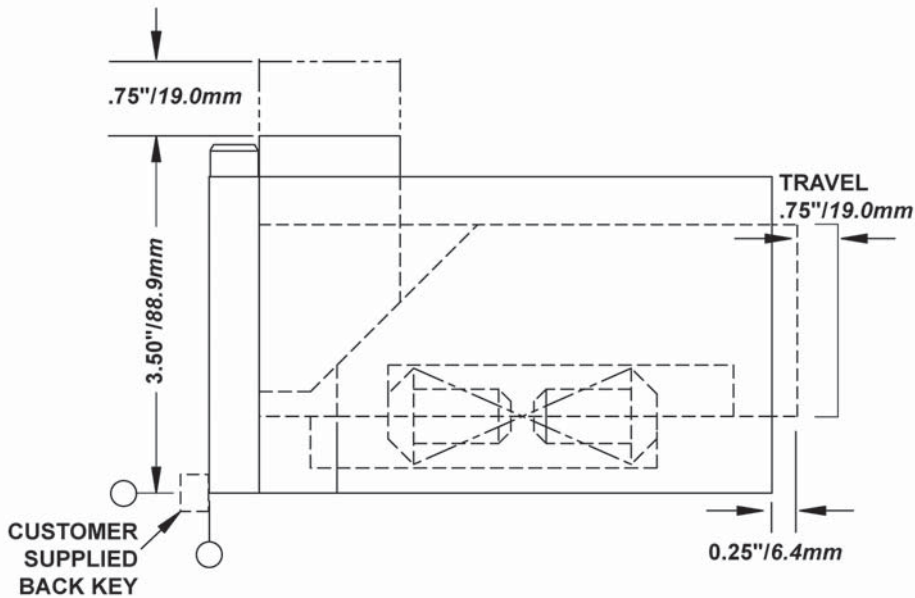
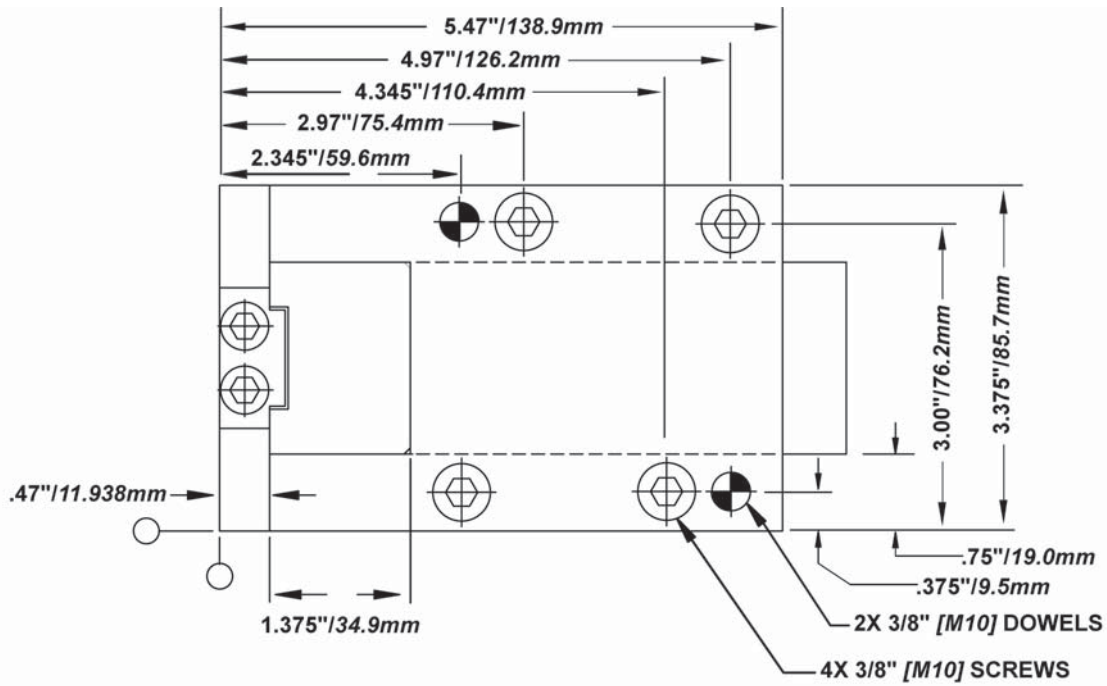
# External Spring Box Cam 5L/5LHM



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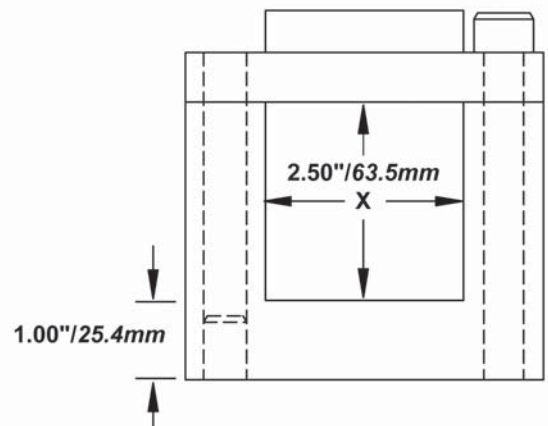
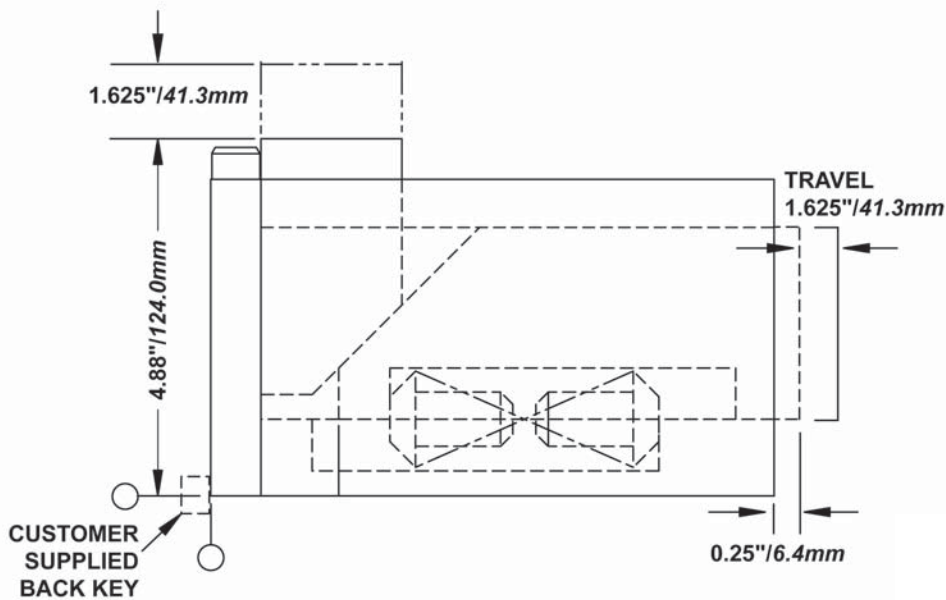
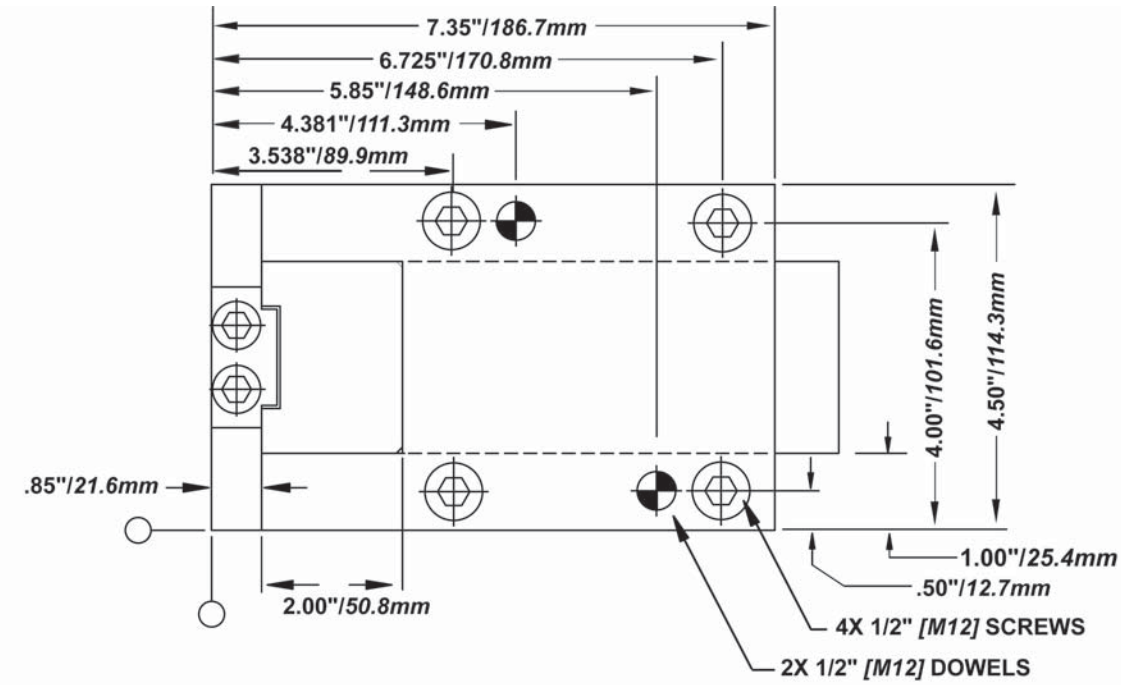
# Internal Spring Box Cam 22L/22LMM



Cam models are designed in both inch and metric. Listed dimensions may not convert directly into the other standard. All dimensions are for reference only and no tolerance is stated or implied.

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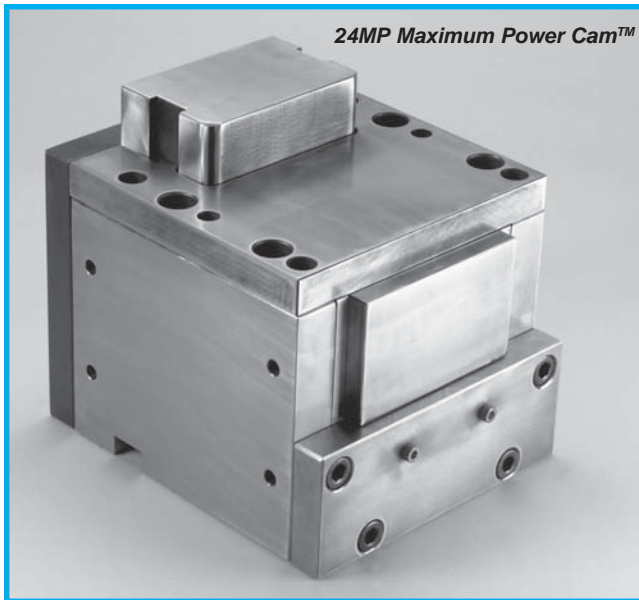
# Internal Spring Box Cam 23L/23LMM



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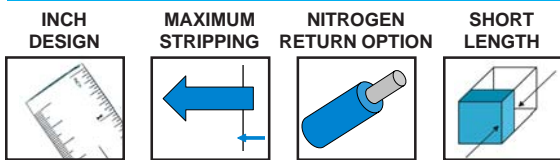
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# Maximum Power Heavy Duty Cam™ (MP)



## Product Features

The Maximum Power Cam™ is designed for tight spaces where length and height is limited. It's a compact high power cam with a maximum working load for applications requiring pierced holes through thicker steel like automotive chassis frame rails. You will find the bronze wear plates with graphite inserts provide a premium wear surface for the slide to move along. The maximum stripping power is derived from a combination mechanical and nitrogen spring slide return design. The Maximum Power Cam™ is a cam with everything a large automotive type cam has except the large size.



\* Combination Spring

Standard Cam Models	Face Size X in/mm	Travel in/mm	Working Load tons/kN	Spring Force lbs/N	Maximum Tooling Weight lbs/kg	Approx. Cam Weight lbs/kg	Spring Catalog Number	Number of Springs
24MP	3.0 x 4.75	1.625	12	2,141	12	125	C.909.025*	2
	76 x 120	41.3	106.8	9,516	5.45	56.7	9-2428-26	2
24MP-XW	3.0 x 8.0	1.625	20	3,213	20	183	C.090.025*	3
	76 x 203	41.3	178	14,280	9.09	83	9-2428-26	3

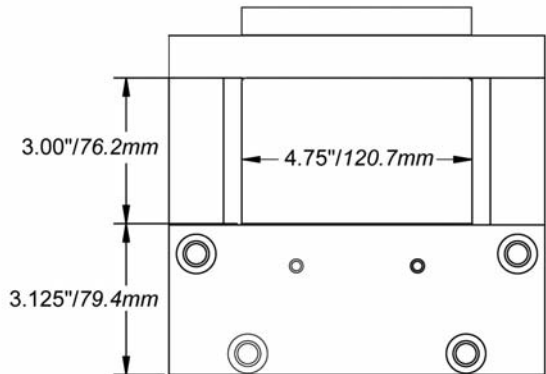
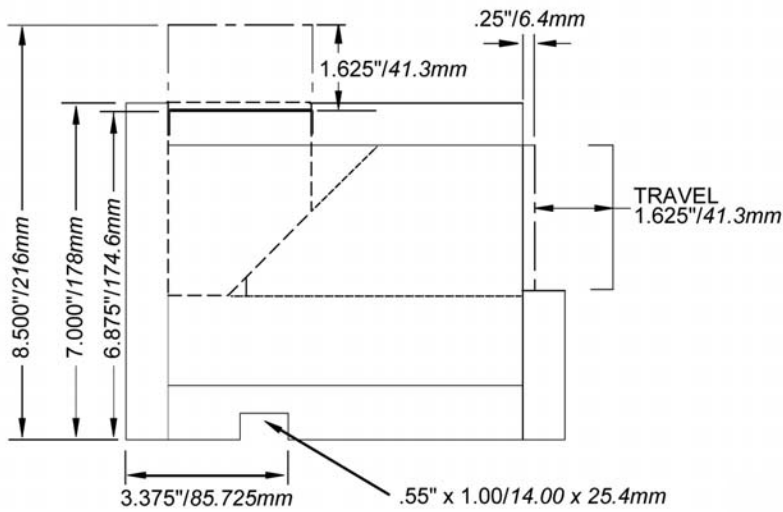
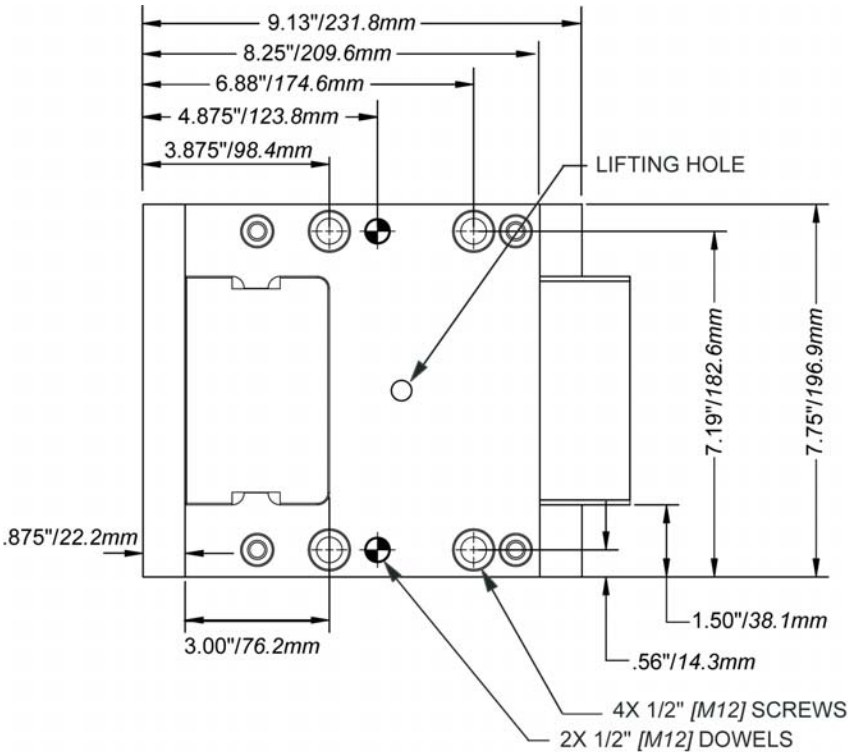
### NOTES:

- <sup>1</sup> Nitrogen and mechanical spring combination.
- ◆ Cam is designed in hard inch. Metric dimensions are for reference only.
- ◆ The cam slide has .0005" – .001" (0.0127 – .0254mm) clearance between each side of the slide and body to allow for lubrication and heat dissipation. Tighter tolerances are available upon request.

*Calculated stroke, tonnage and wear curves are presented as a guideline for design and maintenance only. No warranty exists, either expressed or implied, as a result of the application, as it may relate to the information provided.*

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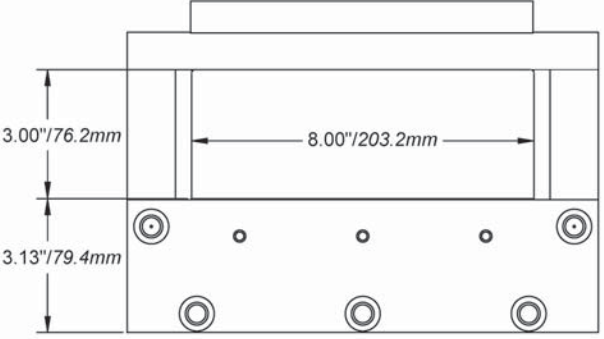
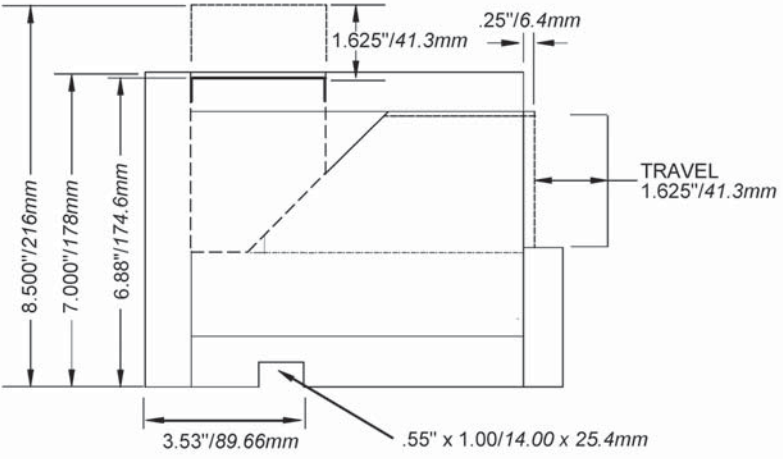
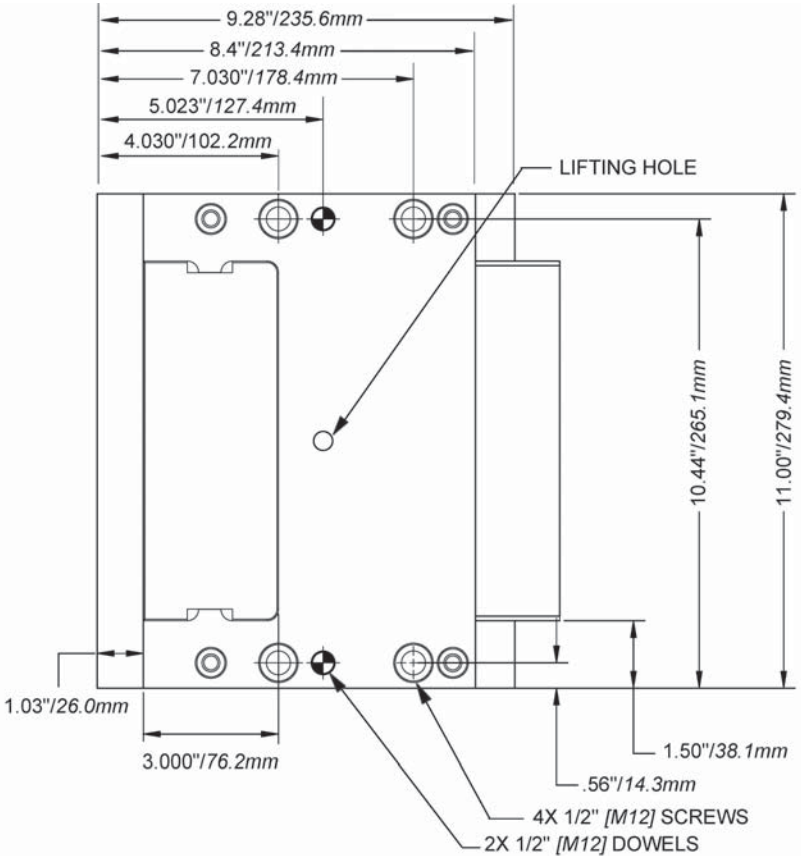
# Maximum Power Heavy Duty Cam™ (MP) 24MP



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and no tolerance is stated or implied.

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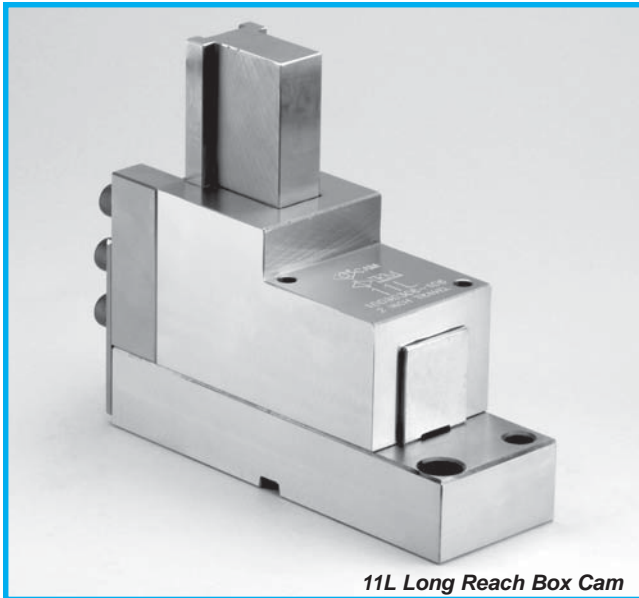
# Maximum Power Heavy Duty Cam™ (MP) 24MP-XW



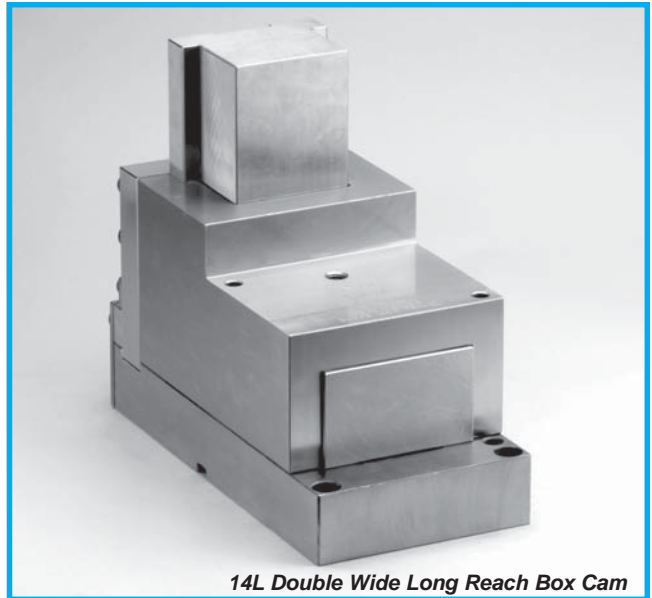
All dimensions are for reference only and no tolerance is stated or implied.

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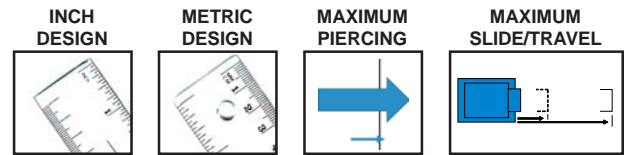
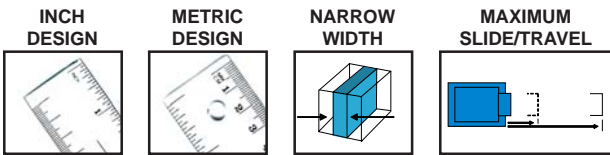
# Long Travel Box Cam



11L Long Reach Box Cam



14L Double Wide Long Reach Box Cam



Standard Cam Models	Face Size X in/mm	Travel in/mm	Working Load tons/kN	Spring Force lbs/N	Maximum Tooling Weight lbs/kg	Approx. Cam Weight lbs/kg	Spring Catalog Number	Number of Springs
11 L 11LMM	1.875 Sq 47.6 Sq	2 51	5 44.5	199 885	4 1.82	29 13.16	9-1632-21	1
12L 12LMM	2.125 Sq 54 Sq	2.50 64	7 62.3	314 1397	5 2.27	50 22.68	9-2040-21	1
13L 13LMM	2.50 Sq 63.5 Sq	3.25 83	11 97.9	476 2117	8 3.64	100 45.37	9-2448-21	1
14L 14LMM	2.875 x 4.75 73 x 120.7	3.25 83	16 142.3	952 4234	12 5.45	153 69.42	9-2448-21	2
15L 15LMM	3.25 Sq 82.6 Sq	3.25 83	12 106.8	738 3283	10 4.55	140 63.52	9-3248-21	1

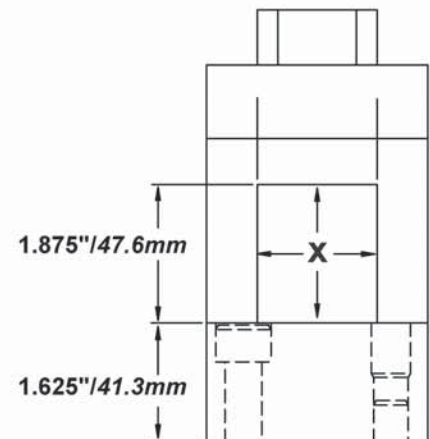
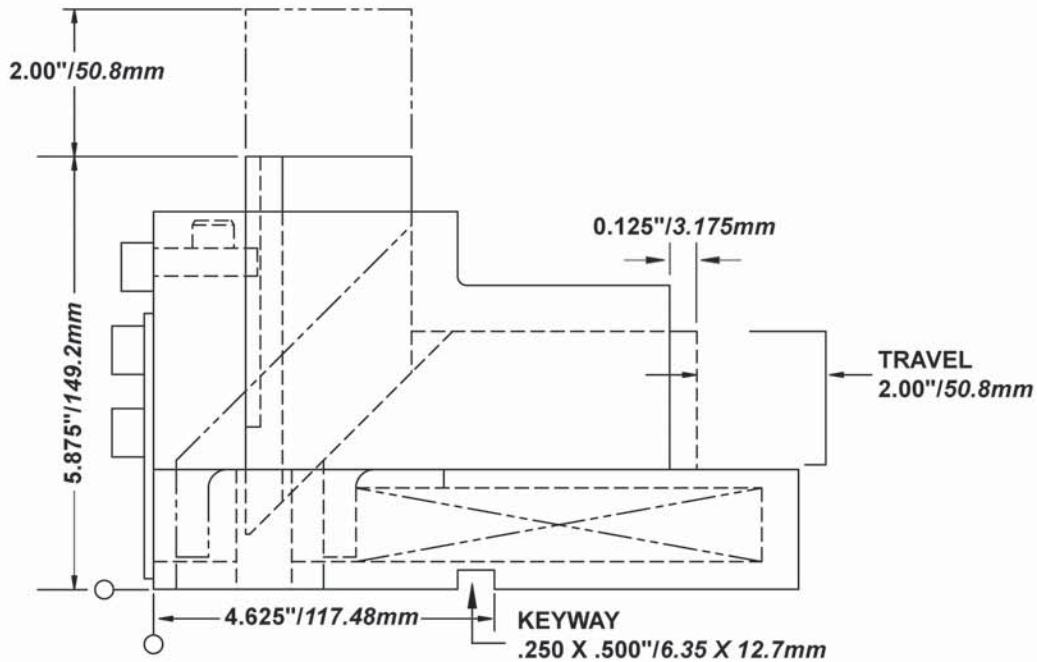
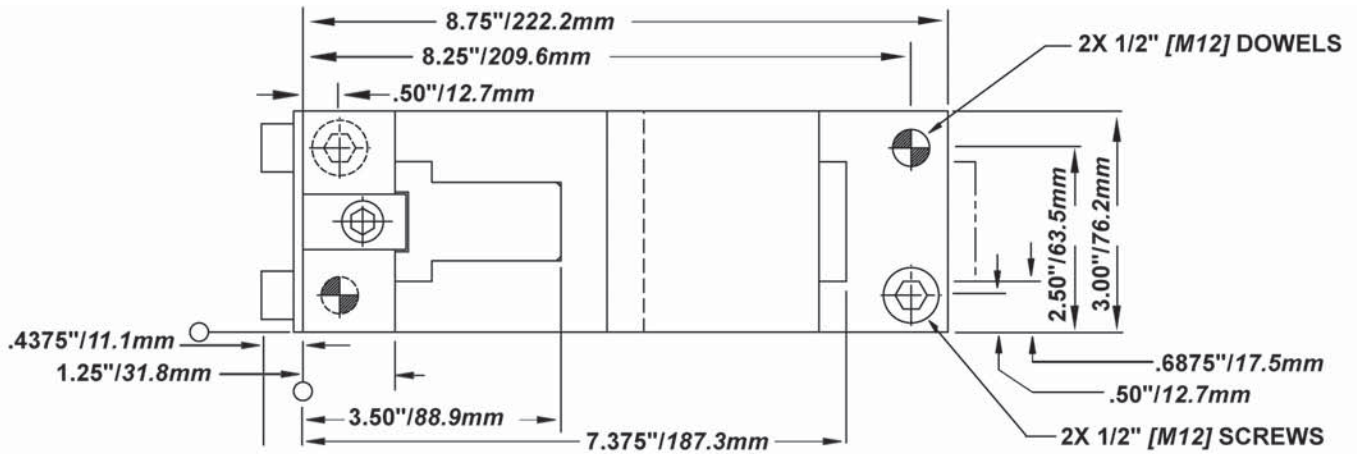
Calculated stroke, tonnage and wear curves are presented as a guideline for design and maintenance only. No warranty exists, either expressed or implied, as a result of the application, as it may relate to the information provided.

**NOTE:**

- The cam slide has .0005" – .001" (0.0127 – .0254mm) clearance between each side of the slide and body to allow for lubrication and heat dissipation. Tighter tolerances are available upon request.

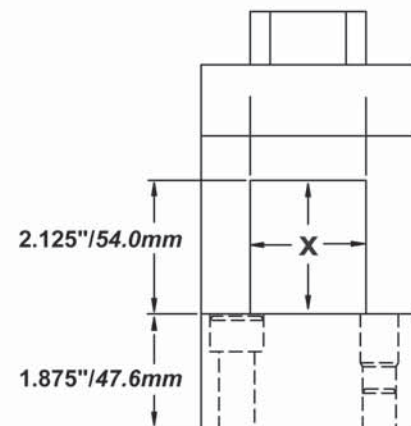
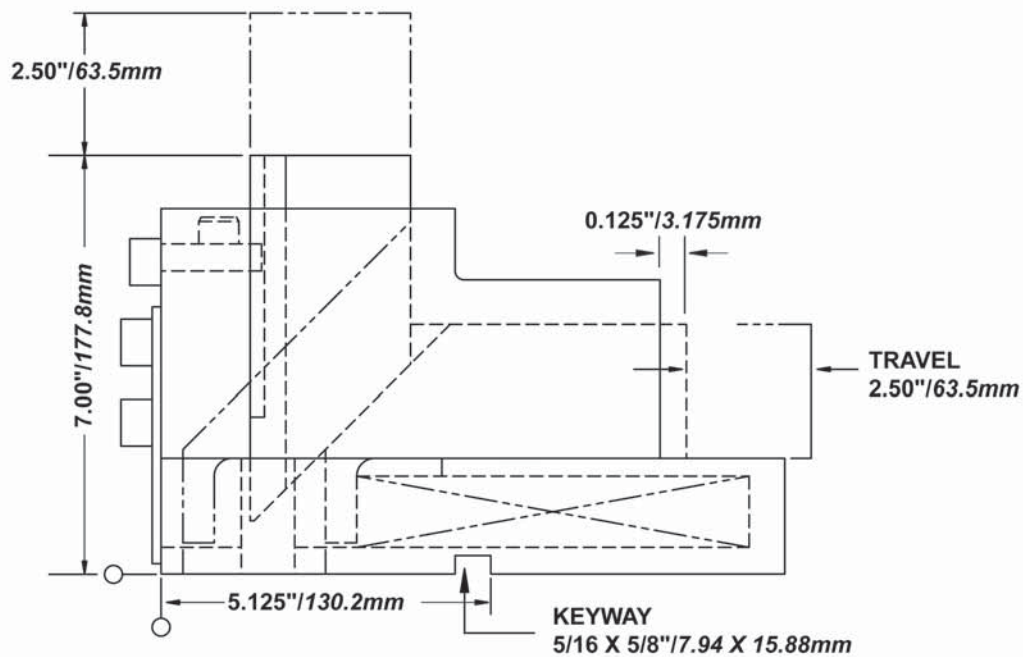
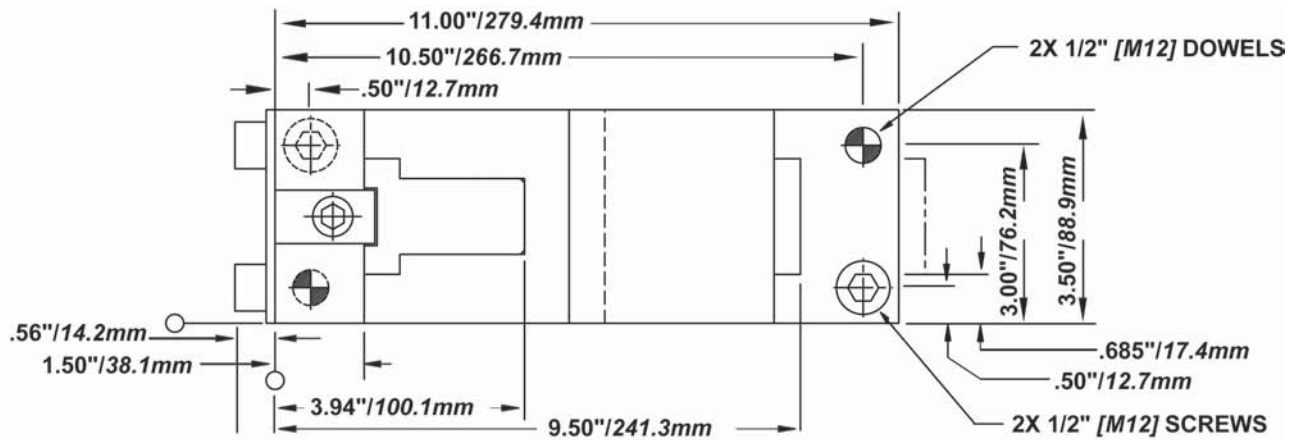
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# Long Travel Box Cam 11L/11LMM



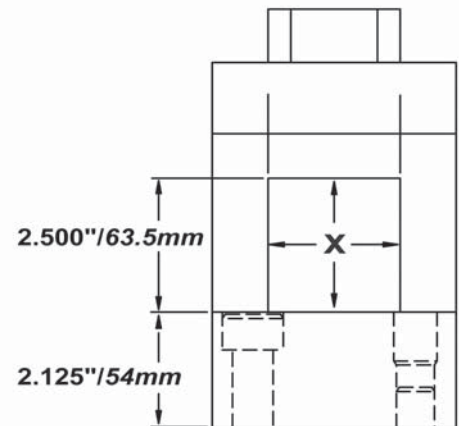
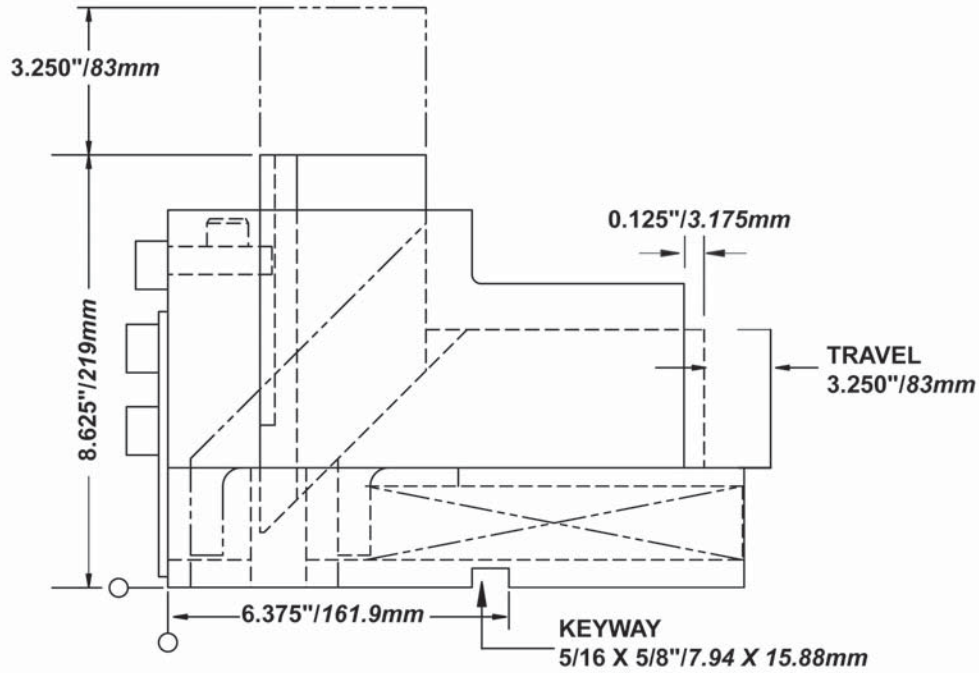
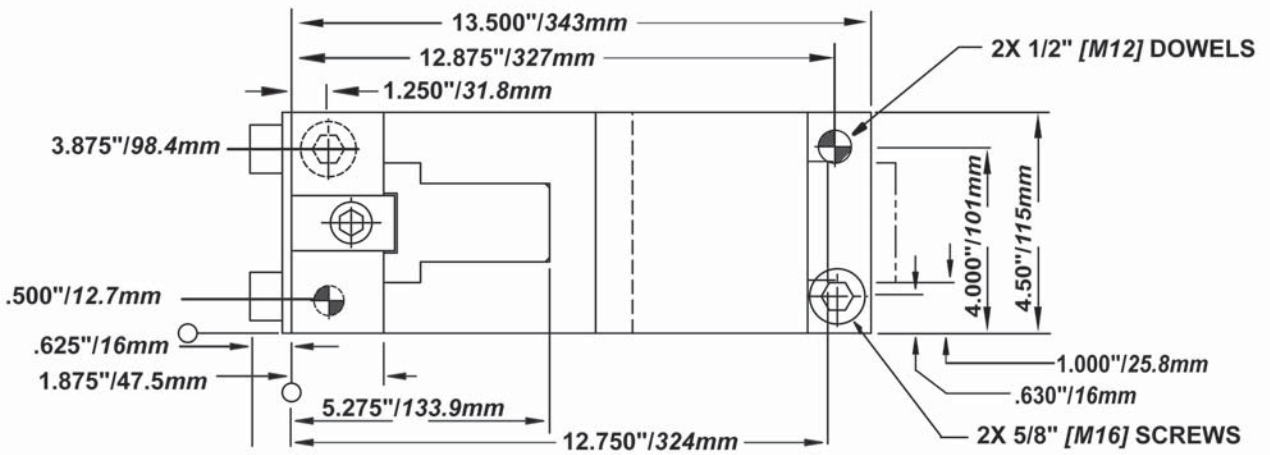
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# Long Travel Box Cam 12L/12LMM



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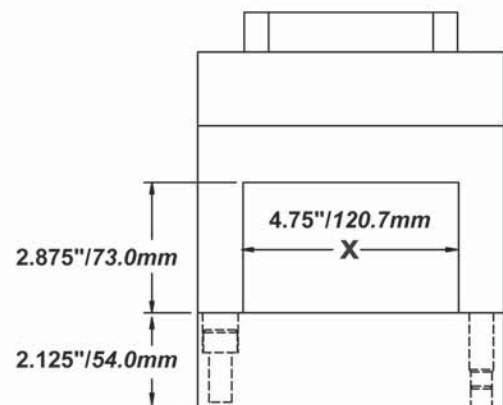
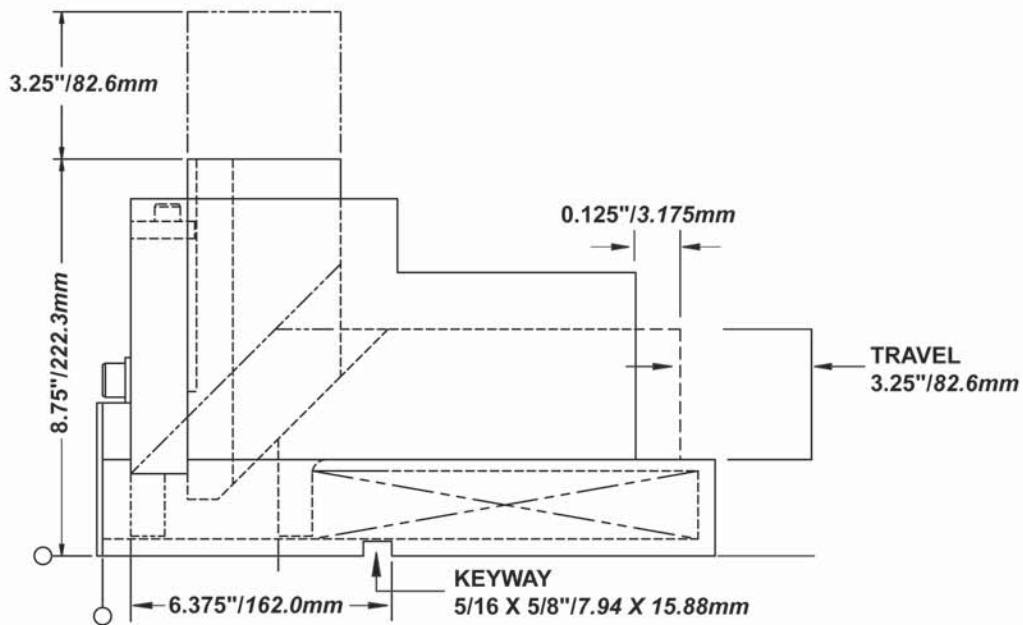
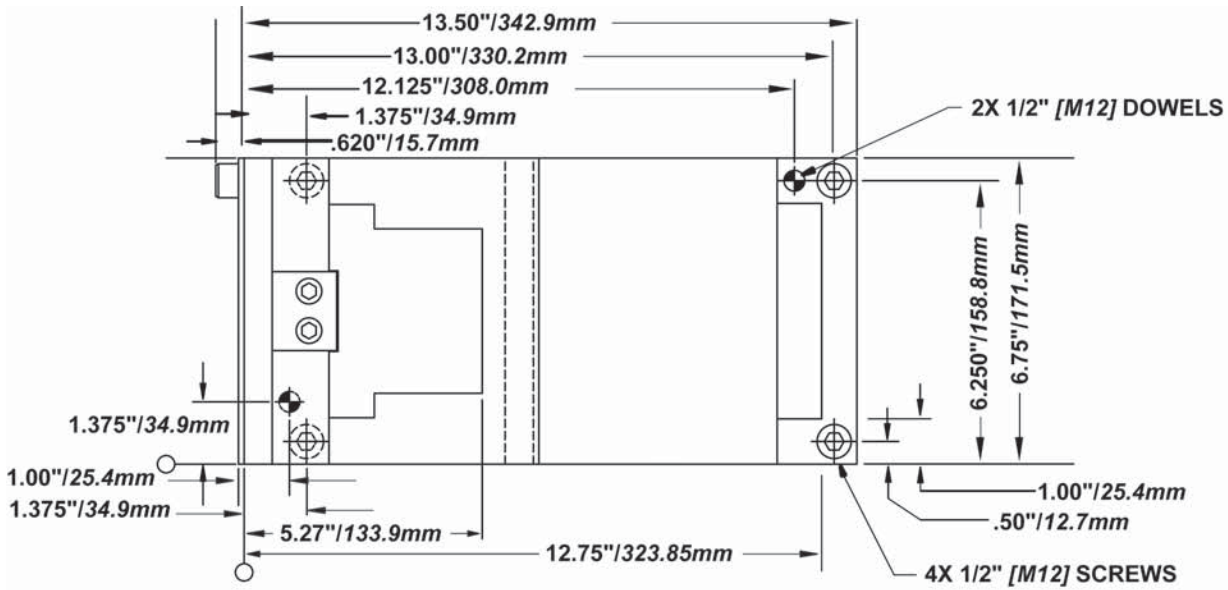
# Long Travel Box Cam 13L/13LMM



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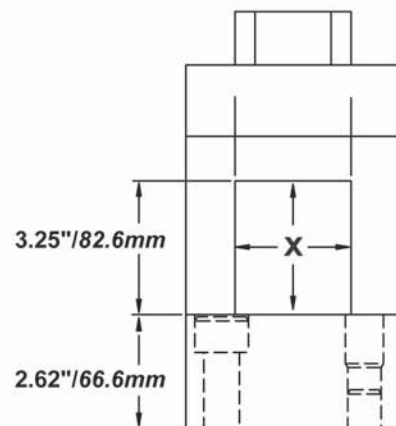
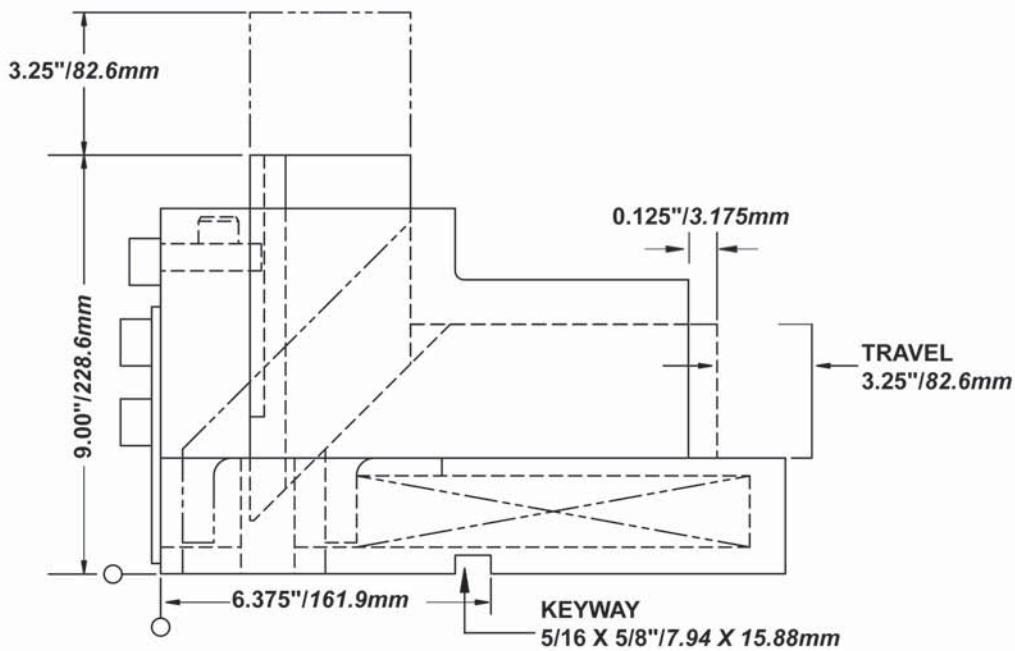
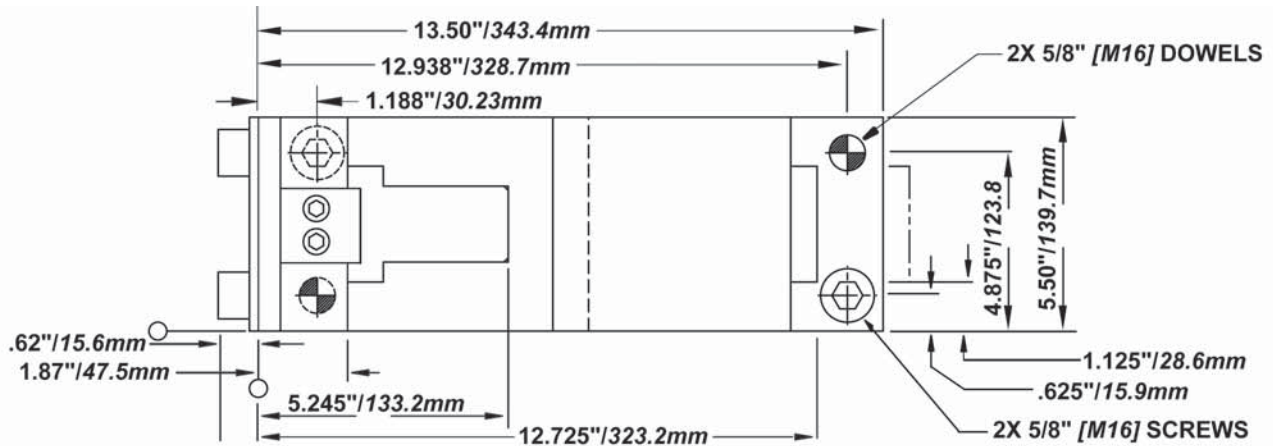
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# Long Travel Box Cam (Double Wide) 14L/14LMM



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# Long Travel Box Cam 15L/15LMM

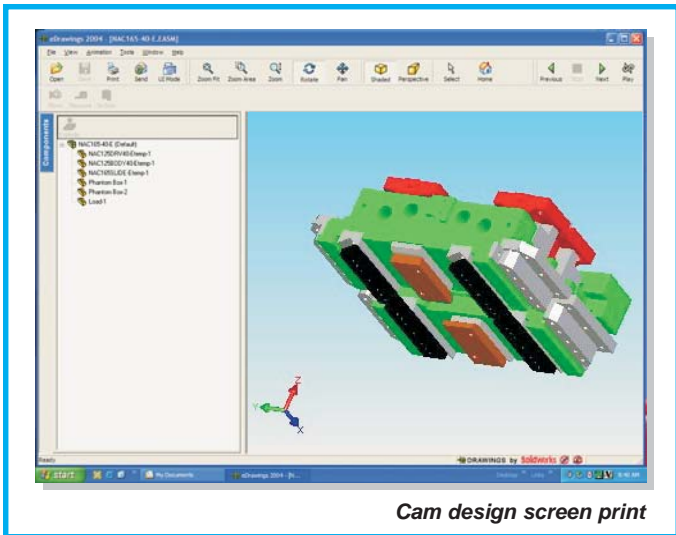


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# Notes

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## Product Features

Although **IEM** has a large offering of catalog cams, we realize that in today's competitive environment, a catalog cam doesn't always fit all applications.

Custom cams include:

- ◆ Cams engineered by **IEM** specifically for your application
- ◆ Cams machined to your design

## CUSTOM CAM CAPABILITIES:

- ◆ **CAM DESIGN**
  - **IEM's** engineering team designs for any application
- ◆ **CAM MANUFACTURING**
  - **IEM** can build your cam design
    - Machining – components up to 900mm
    - Flame hardening with minimal distortion

## BENEFITS:

- ◆ Frees up your design resources
- ◆ Frees up your machine capacity
- ◆ Provides the best solution for your application
- ◆ Can improve your project scheduling
- ◆ Saves you money as compared to in-house costs
- ◆ Lets you focus on your core competencies



## CAM CATALOG



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