

HS Series Precision Hardened Way Slides

- ***Saddle Widths: 7" to 32"***
- ***Standard & Custom HS Series Slides***
- ***Slide Options & Accessories***

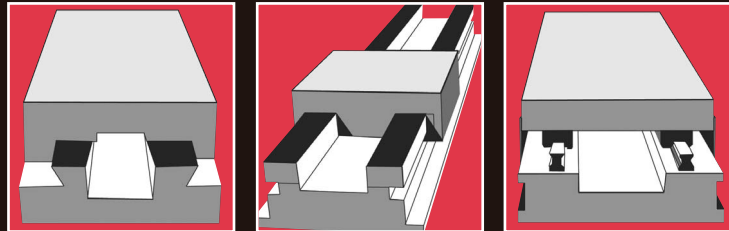


MASTERTM
SETCO

Production Slide Specialists

Dovetail, Hardened Way & Linear Bearing Slides

- ✓ 8 Sizes of Tooling, Utility & Precision Dovetail Slides — 167 Standard Models!
- ✓ 7 Sizes of Hardened Way Slides
- ✓ 6 Sizes of Linear Bearing Slides
- ✓ Standard & Custom Precision Slides
- ✓ Rise & Fall Slide Modules
- ✓ Custom Spindle/Slide Arrangements



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SETCO™

We Meet Your Needs & Expectations

The SETCO manufacturing plant is located in Cincinnati, Ohio. This 40,000 square foot facility is dedicated to producing spindles, dovetail, hardened steel, linear ball slides, modules and combination spindle/slide assemblies.

With nearly 100 years of experience, SETCO has been providing single source solutions for all industries and applications.

The new HS Hardened Way Slide design featured in this catalog provides more standard sizes that can be shipped to you quicker, offering more drive variations that adapt to your positioning devices, and a customization technique to make your special machine application come to reality quickly and with increased reliability.

SETCO is focused as world leaders in design, manufacture, and rebuild of spindles, slides, and modules. Our goal is to provide “solution partnerships” that impact the quality of your product and your bottom line. We want to meet your needs and exceed your expectations through teamwork engineering, continuous improvement, and the use of the latest manufacturing technologies.

Easier Slide Selection

To assist in your design and selection process, we’ve included our full line of SETCO Precision Hardened Way Slides in one comprehensive catalog. We’ve also included a full array of drive and accessory packages, illustrations, drawings, charts, design data and working solution photos.

To help speed up your slide design and purchasing process, an Electronic supplement of the entire catalog, including detailed CAD drawings, can be downloaded from our website.

Our staff of slide experts is ready to assist with your toughest linear and rotary motion applications. The SETCO Solution Team can recommend the exact slide – including dovetail, hardened way, and linear bearing or slide/spindle combination – that matches your application needs.

When you need technical expertise in slides, call the leader. Our customer service and technical support people are readily available to answer your questions. For details, visit our website: www.setcousa.com

Note: Due to continual improvements, specifications are subject to change without notice. For current specifications, request a certified print when placing your order.

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To Place Your Order
Phone: 1-800-543-0470 Fax: 1-513-941-6913
Email: sales@setcousa.com

HS Series

Introducing the HS Series Hardened Way Slides

100% Computer Designed Using 3D Modeling

Standard Features

- 100% computer designed using 3D modeling.
- Designed for maintainability.
- Seven pre-engineered base widths of 7" through 32".
- Precision saddle top and way surfaces.
- Cast iron base and saddle.
- Hardened rails manufactured from high carbon steel and case hardened to 58/62 Rc.
- Hardened rails are bolted and chemically adhered to the base.
- Turcite™ coating lowers coefficient of friction and increases load carrying capacity.
- Way wipers.
- Full saddle length cast iron keepers.
- Full saddle length adjustable straight gib.

Standard HS Series Slides and Options

- Six to eight week shipment.
- Wide range of sizes and accessories.

Shipment in six to eight weeks on selected models. Slide widths are available in 7", 9", 12", 15", 18", and 24". Saddle lengths are available in various lengths. Base lengths are available in 3" or 6" increments up to 96". Available with no-feed, ballscrew or external cylinder drive package and accessories that include limit switches, automatic lubrication, valley wipers, metal way covers, and accordion way covers.

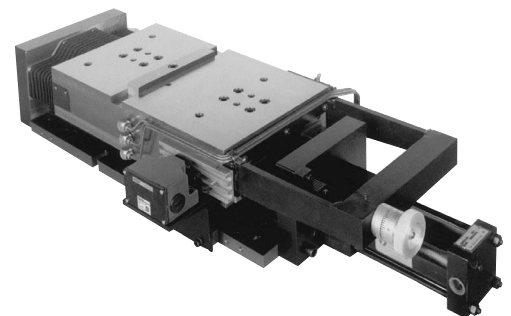
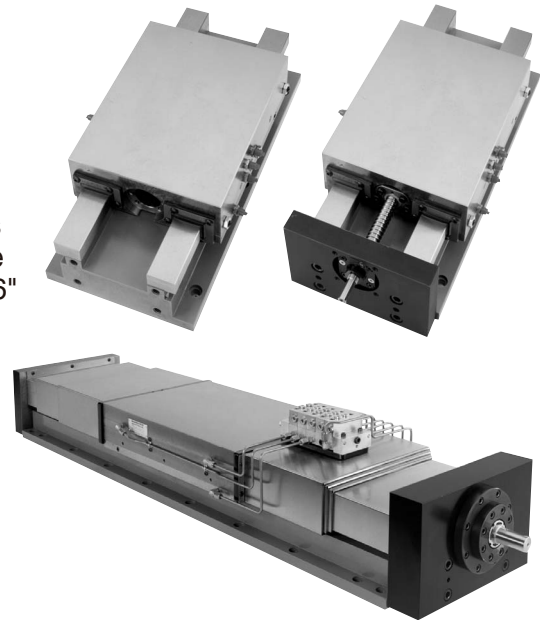
Ideal for stand alone machines, shuttle devices, feeding applications with high frequency cycles, and applications that require high rigidity and heavy loading.

Custom HS Series Slides and Options

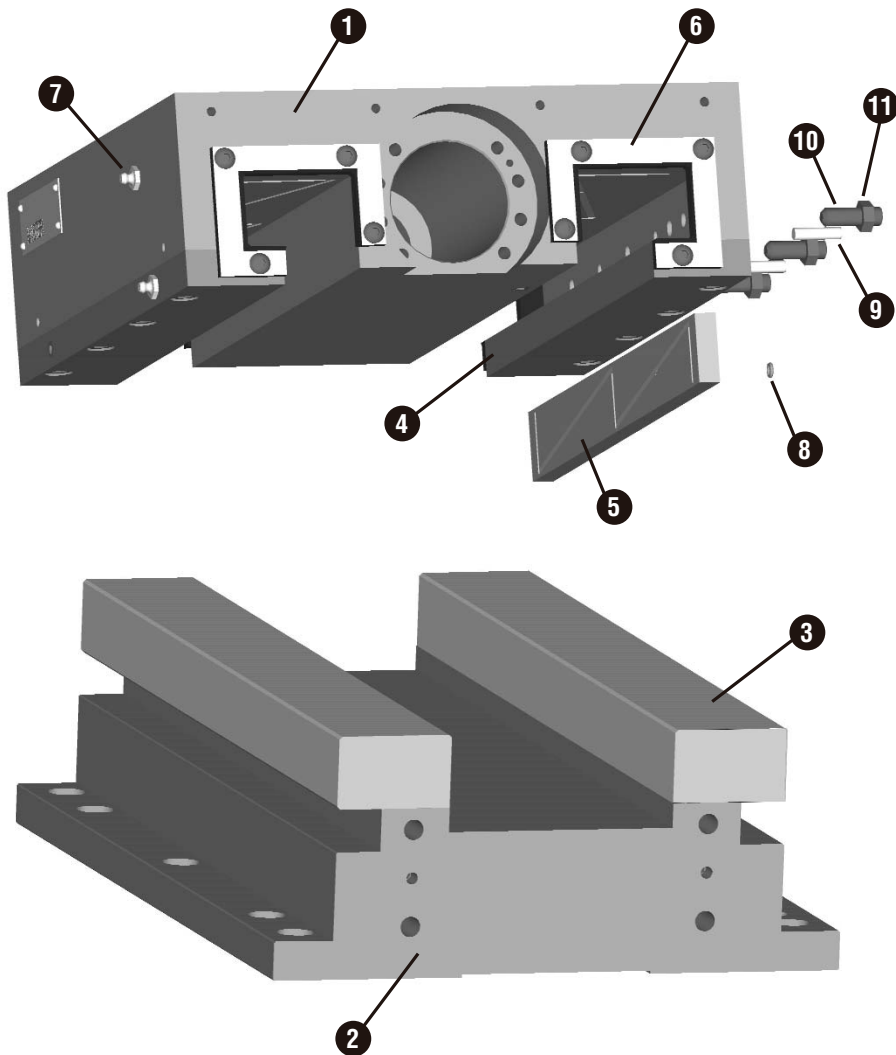
- Engineered around a standard product building block.
- Allows modification to "Standard" Series Slides to meet specific application requirements.
- Reduces excessive lead time and helps control project costs.

The Custom HS Slide Series is designed around the standard base-line platform, with the addition of a 32" slide width. Base lengths are available up to 120" inches. This modular design allows our Team of Solutions Engineers the flexibility to custom design a slide that will match your application needs in size and capability, but without excessive lead times and cost premiums that are associated with custom designed slides.

Custom HS Slides are factory engineered, manufactured, assembled, runoff and shipped to you ready to install. Lead time is contingent on the complexity of your slide design.



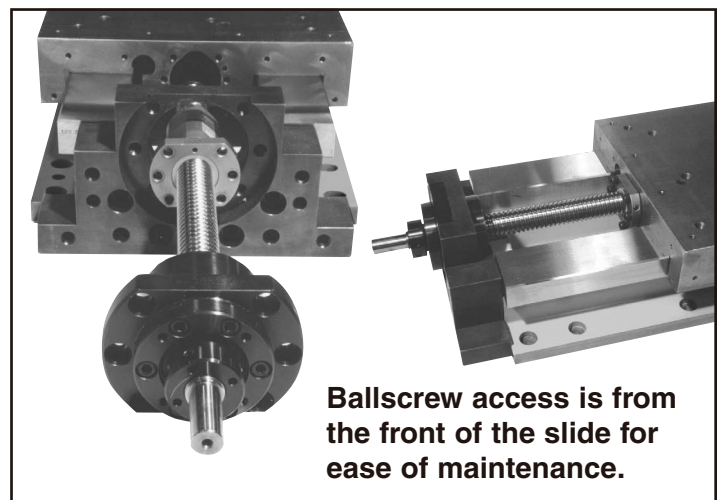
Identification of Basic Slide



1. Saddle
2. Base
3. Hardened Rails
4. Keepers
5. Straight Gib
6. Way Wipers
7. Lubrication Fittings
8. O-Ring
9. Gib Pin
10. Gib Adjusting Screws
11. Gib Screw Nuts

Designed and Built for Ease of Maintenance

- The ballscrew can be removed and replaced without major disassembly and tear-down. In most cases, the saddle assembly and customer mounted tooling do not need to be removed for ballscrew maintenance.
- The ballscrew is removed through the bearing support bracket from the front of the slide.
- The “ease of maintenance” design of the HS-series slides saves time and can reduce your maintenance costs.



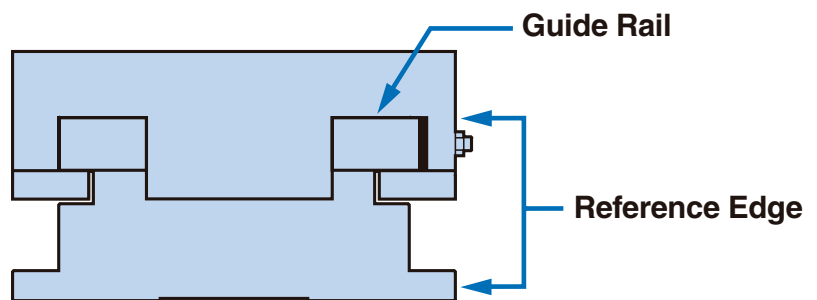
Ballscrew access is from the front of the slide for ease of maintenance.

HS Series

Single Guide Rail Design (Standard)

All HS slides provide a single guide rail design for superior tracking accuracy. The single rail design maximizes accuracy because the saddle movement is controlled by one support side wall for smoother positioning.

As standard, all HS-series slides have a guaranteed straightness of travel (side-to-side and up-and-down) not to exceed 0.0005" in 12 inches, and with an accumulation not to exceed 0.00025" in each additional 12" of travel.



Low-Friction Turcite™ Material (Standard)

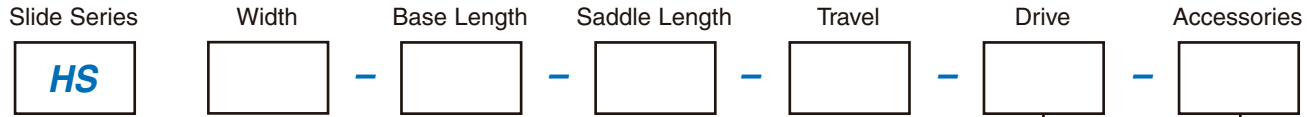
As standard, HS-series slides are equipped with low friction, self-lubricating Turcite bound to the gib and saddle way surfaces to reduce the effects of friction on the slide assembly. This low-friction bearing material minimizes "stick-slip", and makes wear negligible on guiding and sliding surfaces.

The use of a low-friction Turcite doubles the load carrying capacity of a slide. The coefficient of friction with low-friction is 0.10; this drops to 0.05 when combined with a forced lubrication system. (When neither is used, the coefficient of friction is 0.30.)



Slide Model Code How To Order Slide

Example: HS18-42-27-14-HSR-BE-A-F-X-Q [DKS]



Standard HS Series Shipment: 6 to 8 weeks

- No Drive (B)
- Precision Ground Ballscrew (FGM)
- External Hydraulic Cylinder (HSR)
- External Air Cylinder (ASR)

Custom HS Series Shipment: Consult Factory

- Internally Mounted Hydraulic Cylinder (DSR)
- Partially Internally Mounted Hydraulic Cylinder (PDSR)
- Internally Mounted Air Cylinder (DSRI)
- Partially Internally Mounted Air Cylinder (PDSRI)
- Heavy Duty Cylinder (HI-JIC)
- Air Cylinder with Hydro-Check (ACH)
- Belt Drive Package (U)
- Direct Drive Package (M)
- Servo Cylinder Drive (*)
- Hand Feed Drive (FSI)
- Special Ballscrew (*)
- Special Pressure Cylinder (*)

Standard HS Series Shipment: 6 to 8 weeks

- Valley Wipers (W)
- Accordion Covers (BE)
- Metal Covers (C)
- Automatic Lubrication (A)
- Limit Switches (Plunger Actuated)
(3) Travel < Saddle Length (F)

Custom HS Series Shipment: Consult Factory

- Tapered Gib (X)
- Drilling (D)
- T-Slot (S)
- Keyway (K)
- Positive Stop (Q)
- Keeper Clamps (*)
- Shot Pin (*)
- Invert Mount (I)
- Limit Switches (Plunger Actuated)
(2) End Travel (E)
(3) Travel < Saddle Length (F)
(3) Travel > Saddle Length (G)
- Special Limit Switches (*)
- Special Tracking Tolerances (*)
- Compound Slide (*)
- Linear Scales (*)
- Ballscrew Protectors (*)

(*) Consult Factory for Special Model Code.

Easy Steps To HS Slide Selection

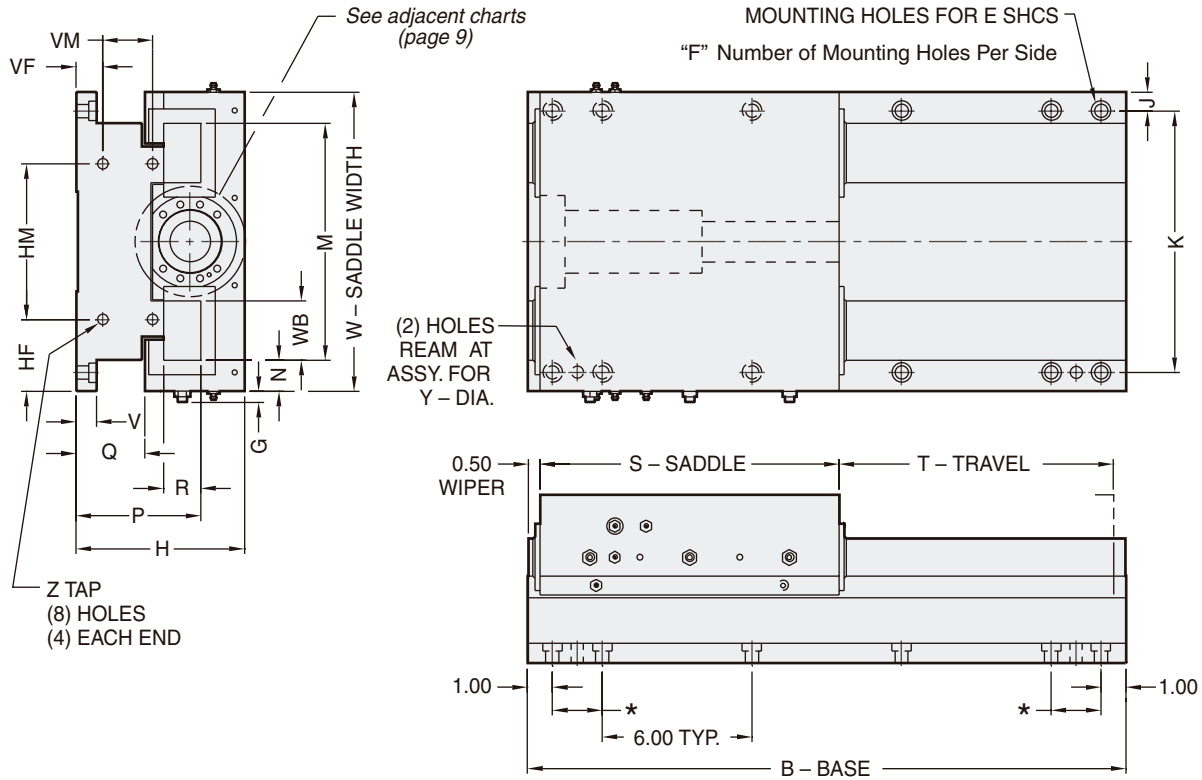
1. Choose slide width (inches).
 2. Choose saddle length (inches).
 3. Choose slide travel (inches).
 4. Choose drive and accessories.
- Base length equals the sum of steps 2 and 3 plus 1" for basic models, ballscrew models, and cylinder drives.
 - To determine base length when accordion way covers or metal covers are selected, see the corresponding accessory page.

To Place Your Order

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HS Series

General Dimensional Data



Travel = Base - (Saddle + 1)
1" = wipers on each end

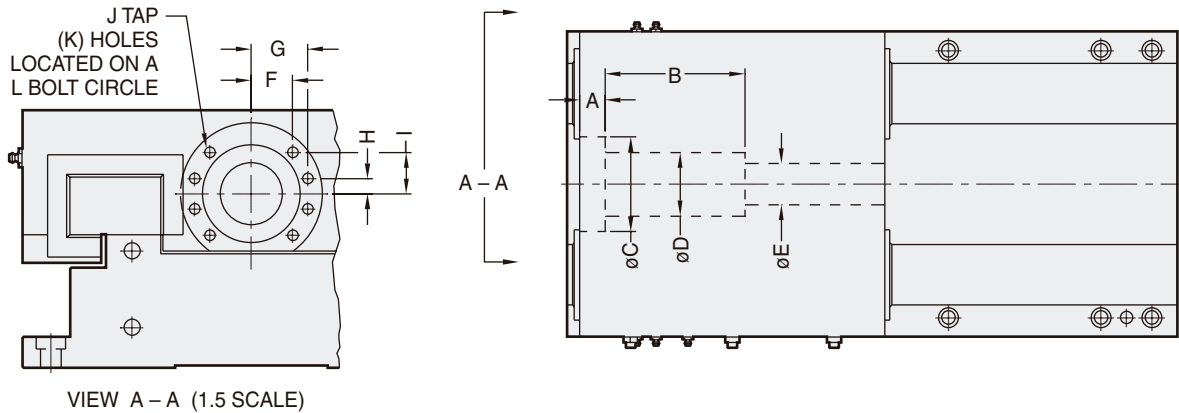
$F^* = (B-6) / 6 = \text{Round down to nearest integer} = S$
 $= (S+1) \times 2 + 4$
 * = Variable Value
 $= (B - ((F/2 - 3) \times 6 + 2)) / 2$

Note: Charted dimensions do not include "Internally Mounted Cylinder" option.

HS Series Slides

MODEL	DIMENSIONS IN INCHES																		
Basic	Height H	E	G	J	K	M	P	Q	R	V	Y	N	WB	HF	HM	VF	VM	Z	
HS 7___B	4.50	3/8	0.38	0.50	6.00	5.50	3.13	1.88	0.75	0.63	0.38	0.75	1.25	1.62	3.75	0.69	1.44	3/8-16	
HS 9___B	5.25	3/8	0.38	0.50	8.00	6.75	3.13	1.88	0.75	0.69	0.38	1.13	1.25	2.00	5.00	0.56	1.50	3/8-16	
HS12___B	7.50	1/2	0.44	0.75	10.50	9.50	5.00	2.75	1.50	0.81	0.50	1.25	2.38	2.88	6.25	1.06	2.00	1/2-13	
HS15___B	7.50	1/2	0.44	0.75	13.50	12.00	5.00	2.50	1.50	0.81	0.50	1.50	2.38	3.25	8.50	0.75	2.25	1/2-13	
HS18___B	10.25	3/4	0.62	1.00	16.00	14.50	7.06	3.81	2.00	1.38	0.50	1.75	4.00	4.75	8.50	1.44	3.00	3/4-10	
HS24___B	10.25	3/4	0.62	1.00	22.00	19.50	7.06	3.81	2.00	1.38	0.50	2.25	4.00	6.00	12.00	1.06	2.75	3/4-10	
HS32 slides are only available in the Custom HS Series Slides.																			
HS32___B	11.00	3/4	0.62	1.00	30.00	27.50	7.50	4.25	2.00	1.50	0.50	2.25	4.00	10.0	12.0	1.25	2.75	3/4-10	

Actuator Dimensional Data



HS Series

MODEL	DIMENSIONS IN INCHES											
Basic	A	B	C	D	E	F	G	H	I	J	K	L
HS7	0.50	2.00	2.00	1.13	0.88	0.53	0.75	0.00	0.53	M5 x 0.80	6	1.50
HS9	0.50	2.50	2.75	1.63	1.25	0.71	1.00	0.00	0.71	M6 x 1.00	6	2.00
HS12	0.63	5.13	3.88	2.50	1.75	1.09	1.48	0.40	1.09	M8 x 1.25	8	3.07
HS15	0.63	5.13	3.88	2.50	1.75	1.09	1.48	0.40	1.09	M8 x 1.25	8	3.07
HS18	0.75	6.00	5.13	3.63	2.75	1.50	2.05	0.55	1.50	M10 x 1.50	8	4.25
HS24	0.75	6.00	5.13	3.63	2.75	1.50	2.05	0.55	1.50	M10 x 1.50	8	4.25
HS32	0.75	6.00	5.13	3.63	2.75	1.50	2.05	0.55	1.50	M10 x 1.50	8	4.25

Saddle and Base Dimensional Data

HS Standard

MODEL	DIMENSIONS IN INCHES								Lb.	
	Basic	W-Width	S - Saddle Length			B - Base		Base Increments	Weight Per Inch	
Min.						Max.	Saddle		Base	
HS7___B	7.00	7.00	9.00	12.00	15.00	12.00	48.00	3" to 30" length, 6" beyond	3.5	3.4
HS9___B	9.00	9.00	12.00	15.00	18.00	12.00	60.00	3" to 36" length, 6" beyond	6.9	4.4
HS12___B	12.00	12.00	18.00	24.00	-	15.00	84.00	3" to 48" length, 6" beyond	8.8	10.0
HS15___B	15.00	15.00	23.00	30.00	-	18.00	84.00	3" to 60" length, 6" beyond	12.1	12.0
HS18___B	18.00	18.00	27.00	36.00	-	24.00	96.00	6" to 60" length, 12" beyond	17.1	18.4
HS24___B	24.00	24.00	36.00	48.00	-	30.00	96.00	6" to 60" length, 12" beyond	24.9	23.8

HS Custom

MODEL	DIMENSIONS IN INCHES					Lb.	
	Basic	W-Width	S - Saddle		B - Base		Weight Per Inch
Min.			Max.	Min.	Max.	Saddle	Base
HS7___B	7.00	7.00	96.00	10.00	120.00	3.5	3.4
HS9___B	9.00	9.00	96.00	12.00	120.00	6.9	4.4
HS12___B	12.00	12.00	96.00	15.00	120.00	8.8	10.0
HS15___B	15.00	15.00	96.00	18.00	120.00	12.1	12.0
HS18___B	18.00	18.00	96.00	21.00	120.00	17.1	18.4
HS24___B	24.00	24.00	96.00	27.00	120.00	24.9	23.8
HS32___B	32.00	32.00	96.00	35.00	120.00	45.0	34.5

Drive Options

Precision Ground Thread Ballscrew

Model Code: FGM

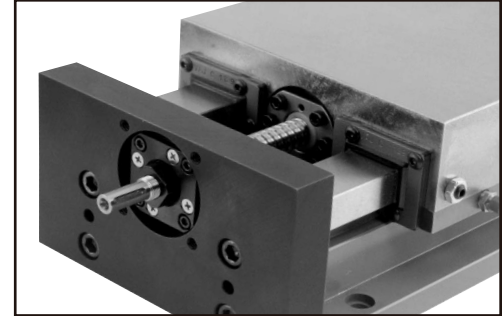
A Precision Ground Thread Ballscrew package with integral preloaded single ballnut is recommended for applications where:

- Optimum positioning accuracy and repeatability are required.
- Backlash cannot be tolerated.
- Optimum stiffness and smooth linear motion are required.

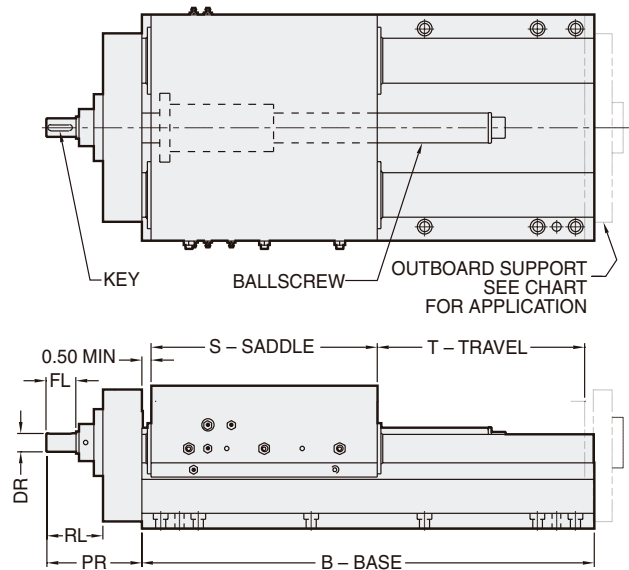
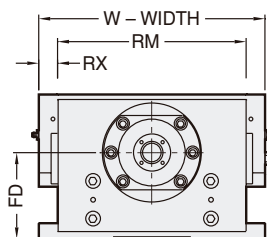
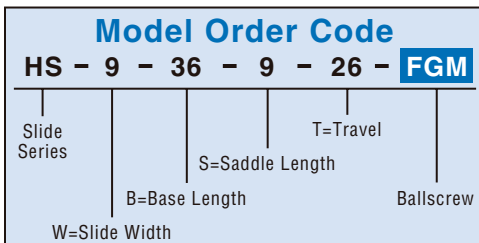
The lead accuracy of the precision ballscrew is within 0.0005 in./ft. cumulative, with the integral preloaded single ballnut providing zero backlash. The ballscrew is supported by multiple precision bearing arrangement.

To protect the ballscrew from contaminants, optional wipers, accordion way covers or metal way covers are available.

Applications requiring long travels or high traverse rates may require a outboard support mounted opposite the drive.



Note: For Force and Torque requirements see page 27.



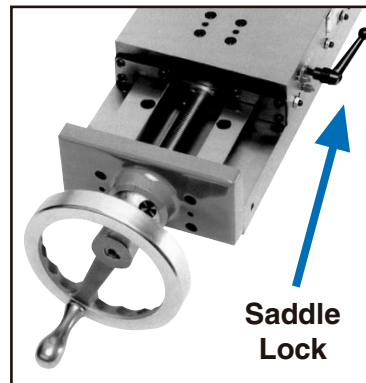
MODEL	DIMENSIONS IN INCHES									DIMENSIONS IN MILLIMETERS			Max. Travel W/Out Outboard Support
	Max. Base Length Standard	Max. Base Length Custom	FD	FL	RL	PR	RX	RM	W	DR	Key	Ballscrew Size	
HS7___FGM	40	96	2.88	0.98	1.34	2.34	0.41	6.19	7.00	10.00	3mm x 16mm	16mm x 5RH Ground	16.0
HS9___FGM	40	96	2.94	1.38	2.61	4.55	0.03	8.94	9.00	12.00	4mm x 16mm	25mm x 5RH Ground	24.0
HS12___FGM	60	96	4.56	1.97	3.86	6.24	0.03	11.94	12.00	25.00	8mm x 25mm	40mm x 10RH Ground	30.0
HS15___FGM	60	96	4.56	1.97	3.86	6.24	0.03	14.94	15.00	25.00	8mm x 25mm	40mm x 10RH Ground	30.0
HS18___FGM	60	96	6.50	2.76	4.93	8.06	0.03	17.94	18.00	35.00	10mm x 50mm	63mm x 12RH Ground	38.0
HS24___FGM	60	96	6.50	2.76	4.93	8.06	0.03	23.94	24.00	35.00	10mm x 50mm	63mm x 12RH Ground	38.0
HS32___FGM	N/A	96	6.94	2.76	4.93	8.06	4.03	23.94	32.00	35.00	10mm x 50mm	63mm x 12RH Ground	38.0

Drive Options

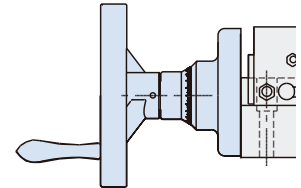
Hand Feed

Model Code: FSI (Hand Feed, Manual)

A Hand Feed package is offered for applications requiring accurate manual feed capability. Smooth manual feed is obtained with an Acme threaded leadscrew and a micrometer dial graduated in 0.001" increments. The position Saddle Lock is provided as standard. A Backlash Adjustment is optional.



Model Order Code			
HS	- 9 -	36 -	9 - 26 - FGM
Slide Series		S=Saddle Length	T=Travel
	B=Base Length		Ballscrew
W=Slide Width			



Motor Drive Packages

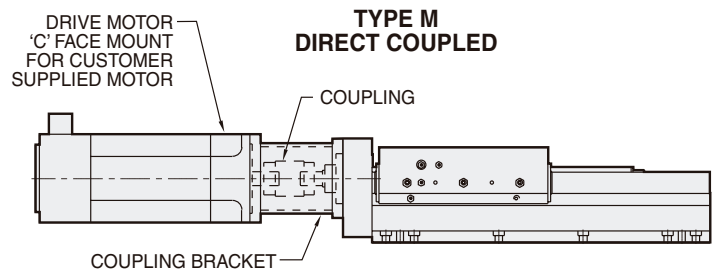
Direct Coupled Package (Customer Supplied Motor)

Model Code: M (Direct Drive)

The Direct Coupled Drive Package is available to adapt C-face motors. The package allows for higher traverse rates and offers a compact design. The package consists of a zero backlash coupling and motor mounting/coupling bracket.

Note: Since motor drives will vary with application, complete dimensions of the drive package can only be supplied with the final design.

Note: For special applications, complete ServoMotor Drive Packages can be provided. Consult factory to review your application.



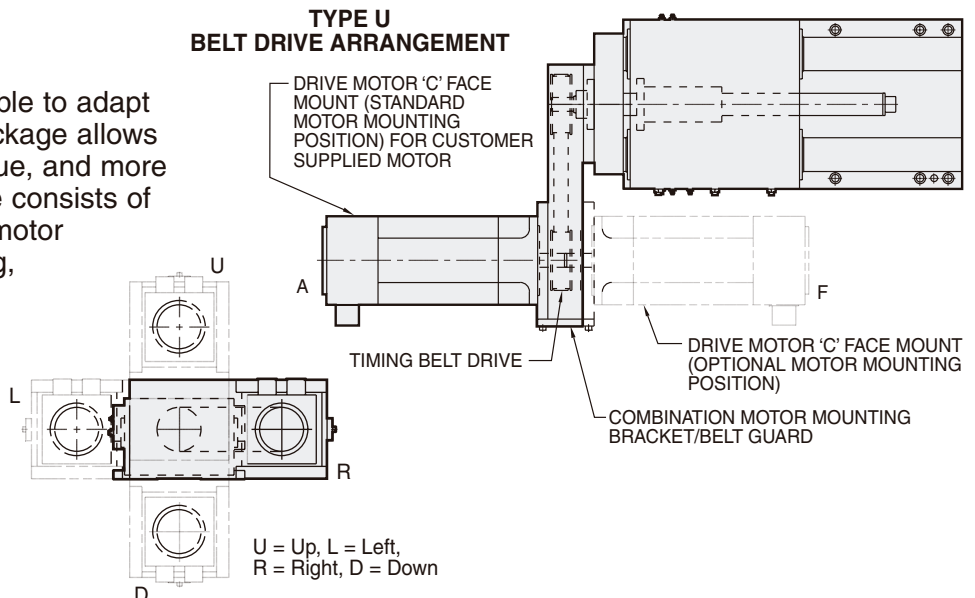
Belt Drive Package

(Customer Supplied Motor)

Model Code: U (Belt Drive)

The Belt Drive Package is available to adapt C-face mounted motors. This package allows for the use of smaller, lower torque, and more economical motors. The package consists of a timing belt drive, combination motor mounting plate for belt tensioning, and mounting of customer supplied motor (if required).

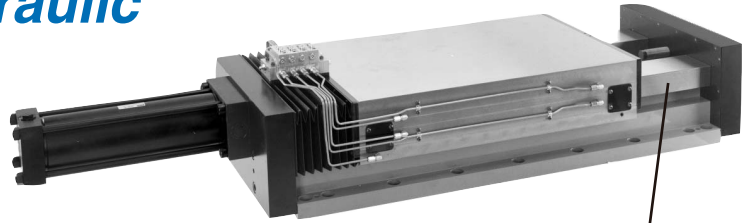
Note: Special timing belts are available, consult factory. For dimensional data, consult factory.



Drive Options

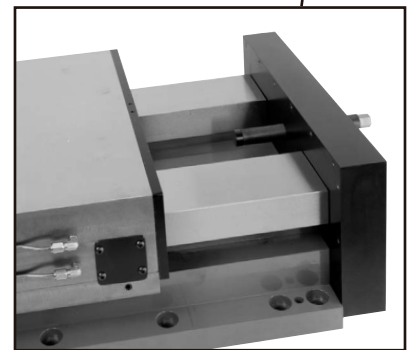
Externally Mounted Hydraulic and Air Cylinder Drives

Cylinder Model Code: HSR = Hydraulic Cylinder Drive
ASR = Air Cylinder Drive



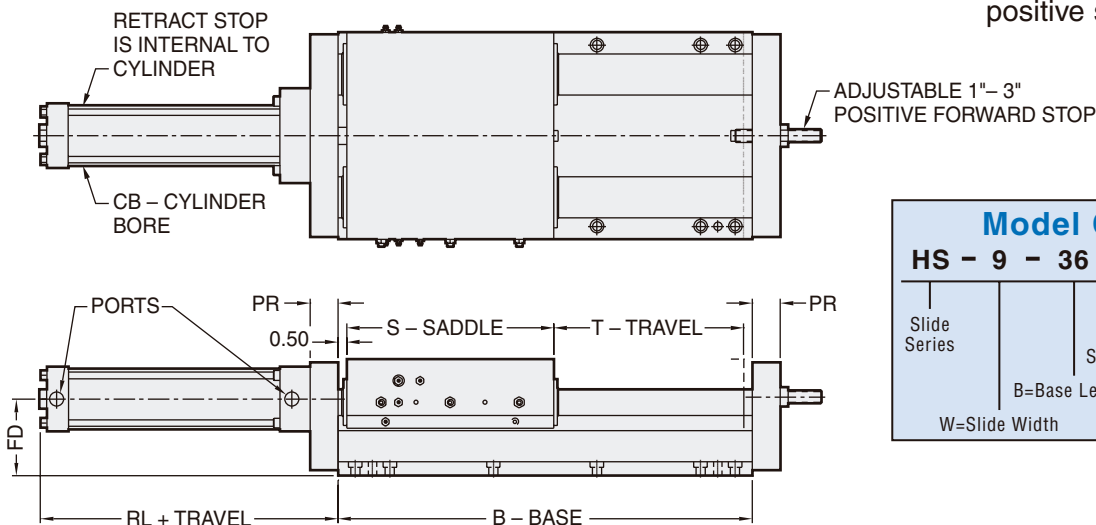
The Hydraulic Cylinder Drive accessory is designed with an externally mounted hydraulic cylinder, 500 psi or 3000 psi endurance rating depending on the slide width, and a cushioned cap end. See chart below for standard cylinder pressures per size of slide. HS-HSR slides are used for heavy load applications that require fine feed control and/or multiple feedings.

The Hydraulic Cylinder Drive accessory package includes an adjustable inline forward and retract positive stop as standard. Inline positive stops provide accurate stopping in the forward and retract direction. Since the reaction force of this positive stop is co-linear induced by the feed mechanism, the stop provides optimum positioning accuracy and repeatability. Adjustment of the stops is limited to approximately 1" - 3" on forward stroke and 1" on retract stroke.



Standard Positive Stop.
See page 19 for alternative positive stop designs.

Note: For cylinder Push/Pull Forces, see page 29.



Model Order Code				
HS	- 9	- 36	- 9	- 26 - HSR
Slide Series		S=Saddle Length	T=Travel	External Hydraulic Cylinder Drive
		B=Base Length		
		W=Slide Width		

MODEL	DIMENSIONS IN INCHES						
	Max. Base Length Standard	Max. Base Length Custom	CB	FD	PR	RL	Max. Cyl Pressure
HS7___HSR	60.0	96.0	2.00	2.69	1.13	5.06	500
HS9___HSR	60.0	96.0	2.50	2.81	1.38	5.44	500
HS12___HSR	60.0	96.0	3.25	4.44	1.63	6.25	500
HS15___HSR	60.0	96.0	4.00	4.44	1.88	6.50	500
HS18___HSR	60.0	96.0	4.00	6.50	2.38	8.69	3000
HS24___HSR	60.0	96.0	5.00	6.38	3.13	10.19	3000
HS32___HSR	NA	96.0	5.00	6.81	3.13	10.19	3000

Drive Options

Internally Mounted and Partially Internally Mounted Hydraulic and Air Cylinder Drives

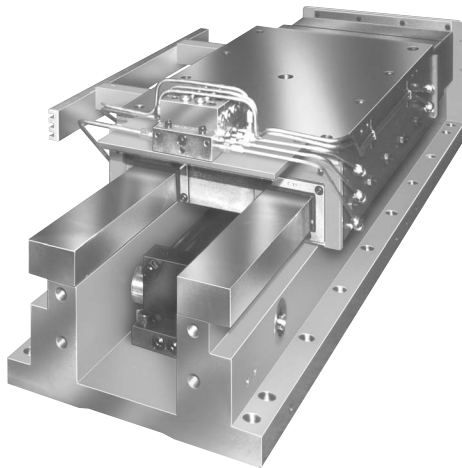
Internal and Partially Internal Model Codes: DSR and PDSR = Hydraulic Cylinder Drive
 DSRI and PDSRI = Air Cylinder Drive

HS slides with an Internally and Partially Internally Mounted Cylinder are furnished with a standard in-line forward acting adjustable positive stop, way wipers, mounting holes in base, and porting with oil grooving for acceptance of an automatic or manual lubrication system. These slides are designed with a hydraulic endurance rated cylinder and arranged with a cushion cap end.

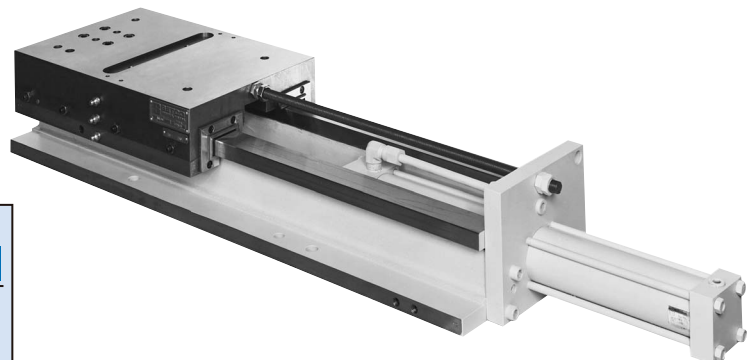
HS slides are used for heavier load applications that require fine feed control or multiple feeding. Depending on design parameters and job requirements, and DSR or PDSR configuration selected, cylinder ports may be accessible through the side of the base, out the back of the slide, or out the bottom of the slide base. All designs offer easy access for cylinder plumbing and service.

The internally and partially internal mounted hydraulic cylinders are 500 or 3000 psi endurance rated (see chart, next page). Higher cylinder pressures are available. Consult factory for details.

- Note:** 1) Internal or partially internal mounted cylinders are not available on the HS7 model slide.
- 2) If slide travel exceeds cylinder length, refer to the “Partially Internally Mounted” configuration model.
- 3) Height of DSR option is greater than that of standard HS slide.



Model Order Code				
HS	- 12 -	36	- 24 -	11 - DSR
Slide Series		B=Base Length	S=Saddle Length	T=Travel Internal Hydraulic Cylinder Drive
	W=Slide Width			



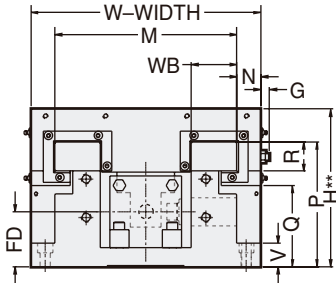
Model Order Code				
HS	- 12 -	36	- 16 -	19 - PDSR
Slide Series		B=Base Length	S=Saddle Length	T=Travel Partially Internal Hydraulic Cylinder Drive
	W=Slide Width			

Drive Options

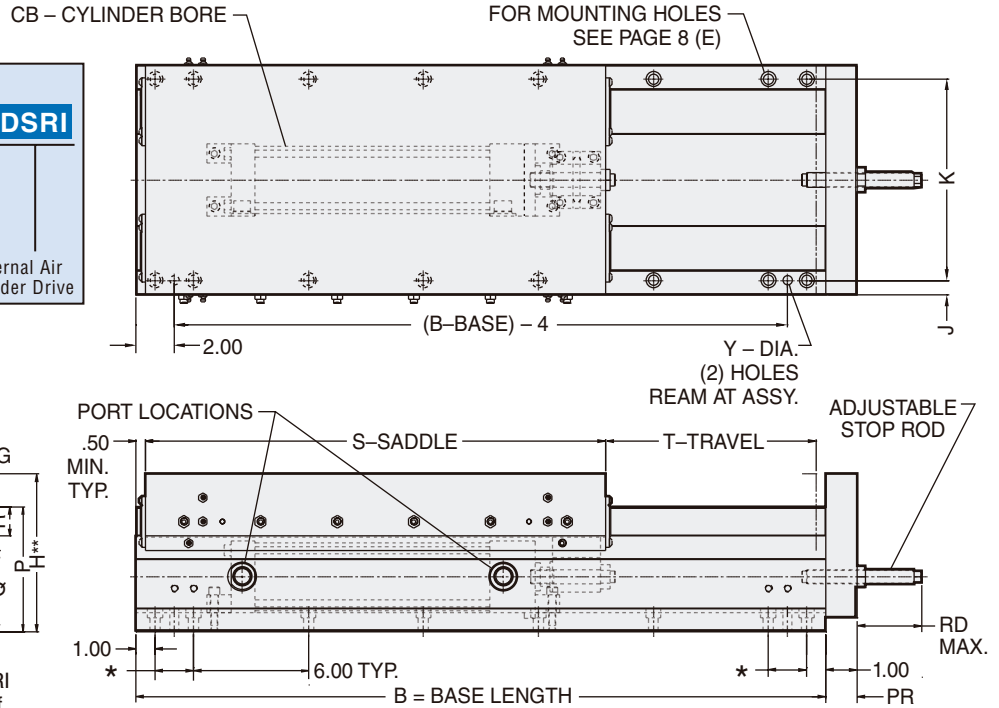
Internally Mounted Cylinder (DSR and DSRI)

Model Order Code
HS - 12 - 36 - 24 - 11 - DSRI

Slide Series			T=Travel
		S=Saddle Length	
	B=Base Length		Internal Air Cylinder Drive
W=Slide Width			



** Height of the DSR and DSRI option is greater than that of standard HS slide.



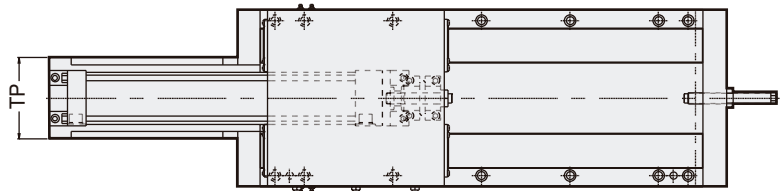
Note: For reference dimensions not charted, refer to the General Dimensional Data chart on page 8.

MODEL	DIMENSIONS IN INCHES												Max Cylinder Pressure	
	Type	Width W	Height H	M	P	Q	V	CB	PR	RD	TP	ZE	V2	Standard
HS9__ _DSR	9.0	6.00	6.50	3.75	2.25	0.75	2.00	1.38	4.00	2.50	N/A	N/A	500	3000
HS12__ _DSR	12.0	9.00	9.50	6.50	4.25	1.25	3.25	1.63	4.63	5.50	6.88	2.91	500	3000
HS15__ _DSR	15.0	10.00	12.00	7.56	5.06	1.25	4.00	1.88	4.63	6.00	7.25	3.06	500	3000
HS18__ _DSR	18.0	12.00	14.50	8.88	5.62	1.63	4.00	2.38	5.00	7.50	9.38	4.47	3000	N/A
HS24__ _DSR	24.0	14.00	19.50	10.75	7.50	1.88	5.00	3.13	5.25	8.50	10.50	5.06	3000	N/A
HS32__ _DSR	32.0	15.00	27.50	11.50	8.25	1.88	5.00	3.13	5.25	8.50	10.50	5.06	3000	N/A

Partially Internally Mounted Cylinder (PDSR and PDSRI)

Model Order Code
HS - 12 - 36 - 16 - 19 - PDSRI

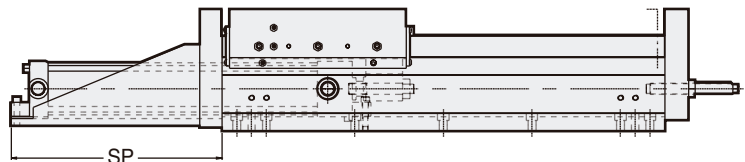
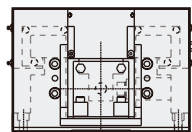
Slide Series			T=Travel
		S=Saddle Length	
	B=Base Length		Partially Internal Air Cylinder Drive
W=Slide Width			



SP = Cylinder Stickout
 $SP = (ZE + TRAVEL) - [(SADDLE - V2) + .5*]$

* When using telescoping metal covers, substitute RL dimension (see page 16).

* When using accordian covers, substitute CL dimension (see page 17).



Drive Options

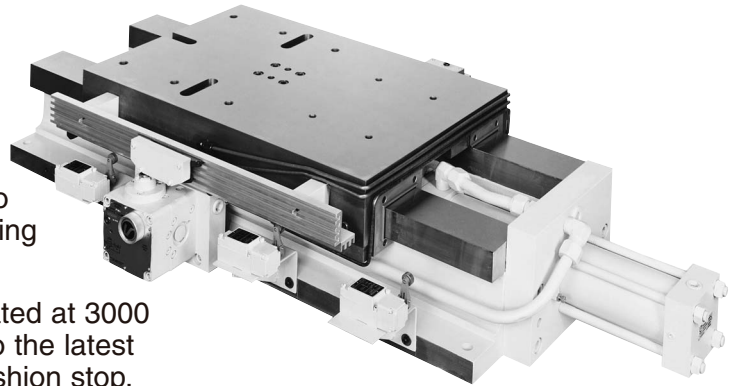
Heavy Duty Hydraulic Cylinder JIC Package

Model Code: HI-JIC

This HS slide configuration provides a Heavy Duty Partially Internal Cylinder and flow control devices to provide a combination rapid infeed and fine positioning slide control.

The HI-JIC option provides heavy duty cylinder, rated at 3000 psi, and designed for high production applications to the latest automotive standards. The cylinder has a retract cushion stop. It includes a deceleration valve, manifold, plunger-type triggering device, arm-type triple limit switch package, and inline adjustable positive stop. Also includes piping to accept customer's automatic lubrication system.

Note: A JIC package is also available in the HSR model. Consult the factory for details.



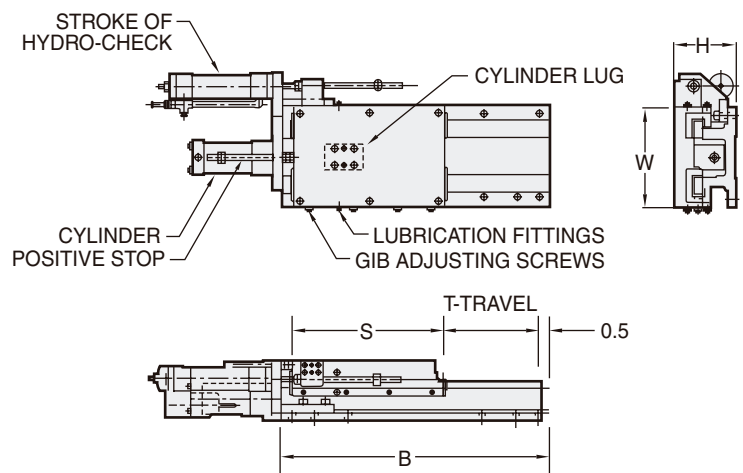
Model Order Code				
HS - 12 - 36 - 16 - 19 - HI-JIC				
Slide Series		S=Saddle Length	T=Travel	Hydraulic Cylinder Drive
	B=Base Length			
	W=Slide Width			

Air Cylinder and Hydro-Check

Model Code: ACH

This HS slide configuration is equipped with a combination air and hydraulic drive system to provide a rapid advance and a smooth feed stroke. An air cylinder drive provides the rapid advance, and a hydraulic cylinder drive controls the slide to finish position. Usually, the length of the rapid advance and feed stroke is custom designed for the application. As an option, the feed stroke can be ordered to operate in either a forward or retract stroke, or both forward and retract.

The speed of the rapid advance stroke is controlled by a needle valve. Typically, the feed rate at 80 psi air pressure is 4 to 300 ipm. A variety of Hydro-Check Systems are available; including automated skip-check, stop-check, and combination stop-check and skip-check cycles.



Model Order Code				
HS - 12 - 36 - 16 - 19 - ACH				
Slide Series		S=Saddle Length	T=Travel	Hydraulic Cylinder Drive
	B=Base Length			
	W=Slide Width			

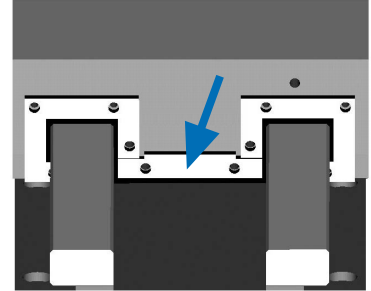
Accessories

Valley Wipers

Model Code: W

For some applications, Valley Wipers can reduce your maintenance costs by preventing chips, dirt and other contaminants from building up and damaging slide components. Durable wipers are attached to the saddle on the end opposite the drive. As the slide cycles, chips are automatically wiped away to prevent buildup and contamination.

With over 100 years of experience, all of our solutions are not featured in this catalog. Let the SETCO applications group review your project and recommend a solution that meets your needs.



Accordion Way Covers

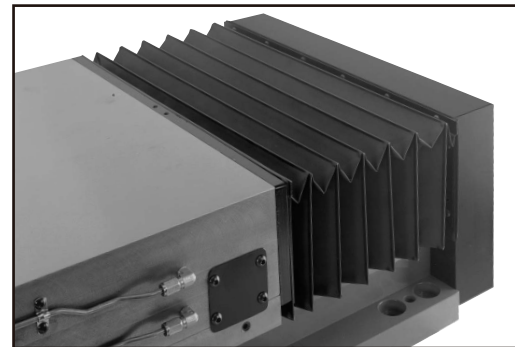
Model Code: BE

The Accordion Way Cover accessory is designed to shield slide way surfaces, feed mechanisms and slide cavity from contamination by abrasive material, coolant and dust. Made of polyurethane coated nylon, these protective covers have internal stiffeners for more protection and increased durability. They are available for Standard and Custom HS Slides.

Note: When Accordion Way Covers are used, the slide travel length is reduced due to the stack-up of accordion bellows folds at each end of the slide.

$$B = (T \times MU) + 2 + S$$

Where: B = Base length
S = Saddle length
T = Travel
MU = From adjacent chart

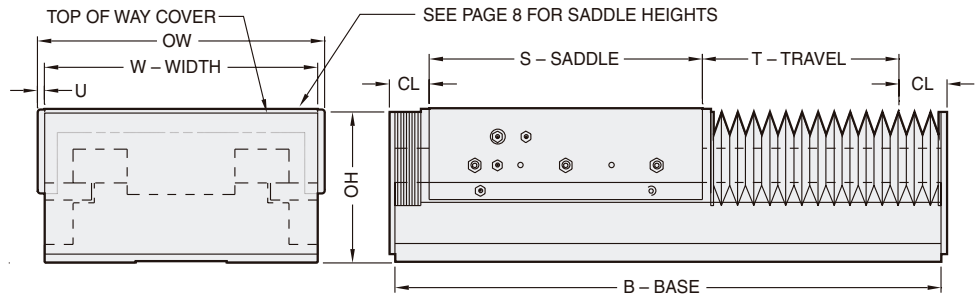


Model Order Code

HS - 9 - 36 - 9 - 18 - BE

Slide Series	B=Base Length	T=Travel	Accordion Way Covers
W=Slide Width	S=Saddle Length		

To determine stack-up of the accordion way cover folds at each end of the slide, use the CL formula from the chart below.



MODEL	CL	DIMENSIONS IN INCHES				
		MU	OW	U	W	OH
HS7	$CL = \frac{B - S - T}{2}$	1.30	7.60	0.30	7.00	4.4
HS9		1.37	9.00	0.00	9.00	5.1
HS12		1.30	12.00	0.00	12.00	7.4
HS15		1.30	15.00	0.00	15.00	7.4
HS18		1.23	18.00	0.00	18.00	10.1
HS24		1.23	24.00	0.00	24.00	10.1
HS32		N/A	32.00	0.00	32.00	11.0

Metal Way Covers

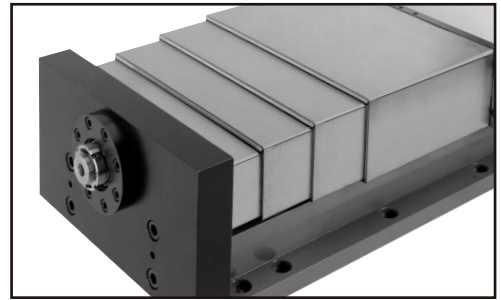
Model Code: C

The telescoping Metal Way Cover accessory is designed to shield slide way surfaces, feed mechanisms and slide cavity from contamination by abrasive material, coolant and dust. The metal covers are manufactured from high quality steel, with molded wipers encasing each collapsible section for optimum protection. Metal covers are available for Standard and Custom HS Slides.

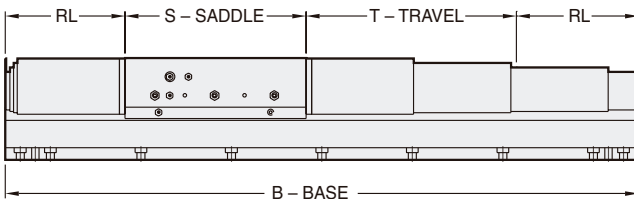
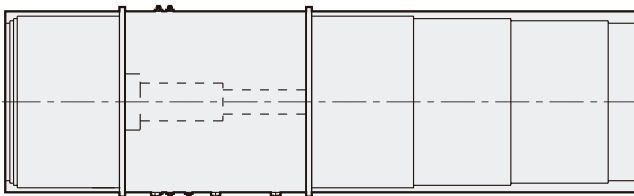
Note: When Metal Way Covers are used, the slide travel length is reduced due to the stack-up of the collapsible sections at each end of the slide. Knowing two of the three parameters (base length, saddle length, and travel) the third can be calculated by using the following formula:

$$B = S + T + (2 \times RL)$$

Where: B = Base length
 S = Saddle length
 T = Travel
 RL = From adjacent chart



Model Order Code			
HS - 9 - 36 - 9 - 13 - C			
Slide Series		T=Travel	Metal Way Covers
	B=Base Length	S=Saddle Length	
	W=Slide Width		



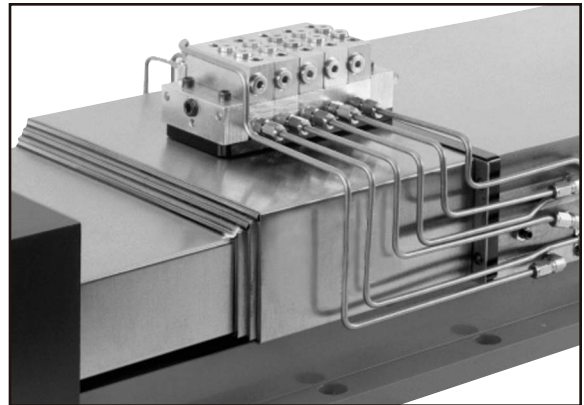
Slide Travel	DIMENSIONS IN INCHES			
	HS7	HS9	HS12	HS15, 18, 24 & 32
	RL (Each end)	RL (Each end)	RL (Each end)	RL (Each end)
	RL = 0.33T + 2.31	RL = 0.25T + 2.5	RL = 0.25T + 2.59	RL = 0.25T + 2.63
4	3.63	3.5	3.59	3.63
6	4.29	4.0	4.09	4.13
8	4.95	4.5	4.59	4.63
10	5.61	5.0	5.09	5.13
12	6.27	5.5	5.59	5.63
14	6.93	6.0	6.09	6.13
16	7.59	6.5	6.59	6.63
18	8.25	7.0	7.09	7.13
20	8.91	7.5	7.59	7.63
22	9.57	8.0	8.09	8.13
24	10.23	8.5	8.59	8.63
26	10.89	9.0	9.09	9.13
28	11.55	9.5	9.59	9.63
30	12.21	10.0	10.09	10.13
32	12.87	10.5	10.59	10.63
34	13.53	11.0	11.09	11.13
36	14.19	11.5	11.59	11.63
38	14.85	12.0	12.09	12.13
40	15.51	12.5	12.59	12.63
42	16.17	13.0	13.09	13.13
44	16.83	13.5	13.59	13.63
46	17.49	14.0	14.09	14.13
48	18.15	14.5	14.59	14.63
50	18.81	15.0	15.09	15.13
52	19.47	15.5	15.59	15.63
54	20.13	16.0	16.09	16.13
56	20.79	16.5	16.59	16.63
58	21.45	17.0	17.09	17.13
60	22.11	17.5	17.59	17.63

Accessories

Automatic Lubrication

Model Code: A

For ease and convenience in connecting and maintaining your lubrication system, allow SETCO to mount the necessary piping, manifold, distribution blocks and connections to your slide assembly. Hook-up requires the connection of only one input line.



Tapered Gib

Model Code: X

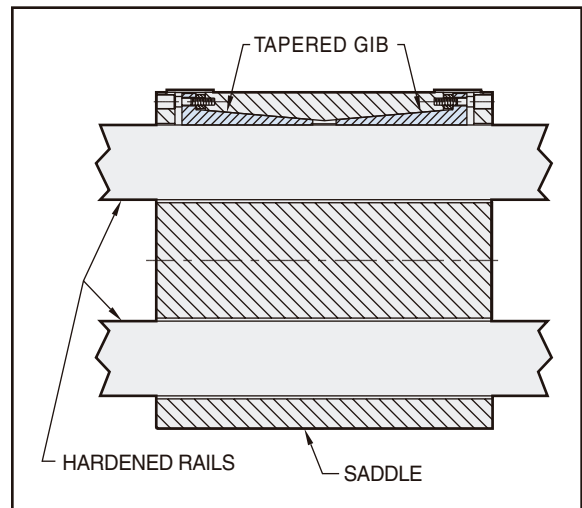
A Tapered Gib should be considered on power applications having a high duty cycle, and on applications requiring precise positioning.

The tapered gib ensures complete surface contact with the hardened rail, allowing for more even wear, which results in smoother motion and longer slide life than is common with a standard straight gib.

The tapered gib has an adjusting screw at the end of the gib, as opposed to the straight gib which uses a series of adjusting screws along its side. By adjusting the screw from the end of the tapered gib, the gib wedges against the hardened rail for complete surface contact.

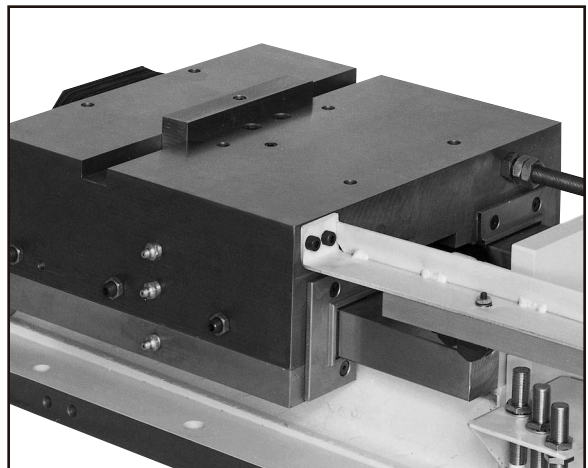
For instruction on gib adjustment, see page 24.

Note: Not available on HS7 and HS9 slide models.



Drilling, Keyway, T-Slot, Key (Standard or Sine)

Special machining can be provided in any slide saddle or base, with dimensions and tolerances to meet your exact requirements. Allow SETCO to handle this machining for guaranteed accuracy and your convenience in mounting.



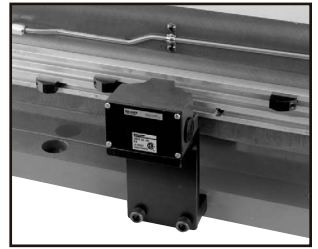
Limit Switches

Model Code: F

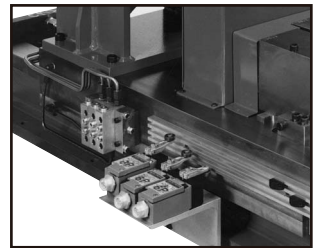
Plunger or roller arm actuated Electro-Mechanical Type A with adjustable trip pawls 240 Volt AC – N.O./N.C. contacts NEMA 4-113 oil and water tight rating 1/2 N.P.T. for O-ring conduit connection.

Limit switches are available in packages of 1, 2, 3, or 4 switches.

**Plunger Type
Limit Switches**



**Roller Arm
Limit Switches**



**Solid State
Proximity Switches**



Proximity Switches

Solid state Proximity Switches are also available. These switches are non-contact devices, and are available in several styles. Consult factory to order.

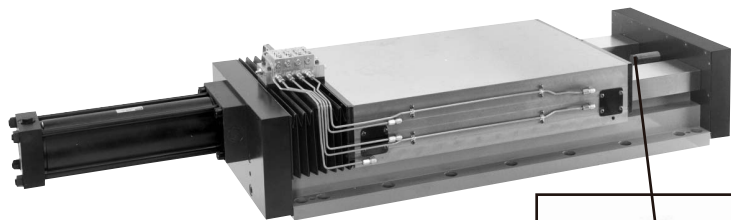
Positive Stops

The hydraulic cylinder accessory package includes an adjustable inline forward and retract positive stop as standard. Inline positive stops provide accurate stopping in the forward and retract direction.

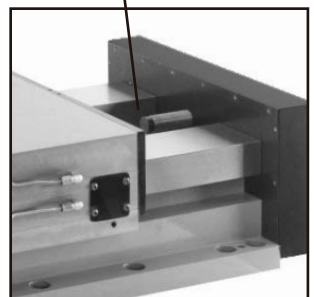
Since the reaction force of this positive stop is co-linear, induced by feed mechanism, the stop provides optimum positioning accuracy and repeatability. Adjustment of the stops is limited to approximately 1" to 3" on forward stroke and 1" on retract stroke.

If the protrusion of the inline end plate positive stop beyond the base is unwanted, an inline recessed positive stop is available. The recessed stop is positioned between the rails and provides the same optimum positioning accuracy and repeatability as the end plate positive stop.

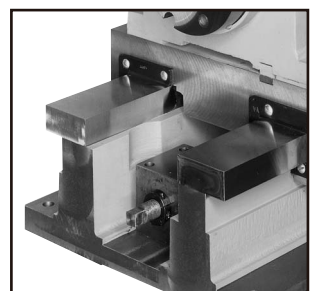
Note: Positive Stops are available in Forward Position, Retract Position, and Bi-Directional limit control configurations. Consult factory for details.



**In-line
End Plate Mounted
Positive Stop**



**In-line
Recessed Mounted
Positive Stop
(Available with DSR
drive option only)**

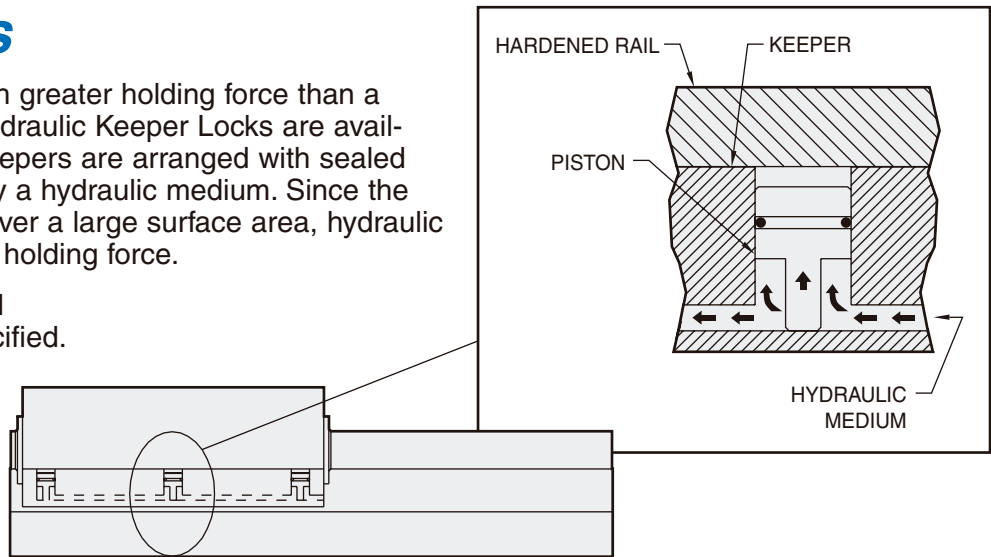


Accessories

Keeper Clamps

For retention of the saddle with greater holding force than a power gib lock can provide, hydraulic Keeper Locks are available, for any size slide. The keepers are arranged with sealed pistons that are pressurized by a hydraulic medium. Since the pressure is being distributed over a large surface area, hydraulic keeper locks provide optimum holding force.

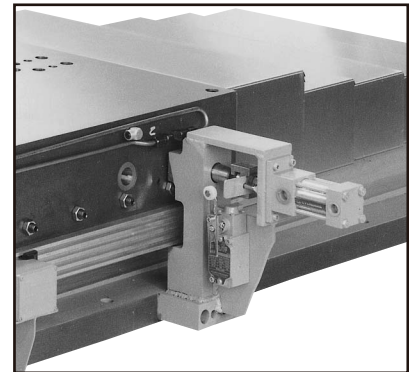
Note: Turcite™ is not supplied when this option is specified.



Shot Pin Locator

A Shot Pin Locator provides accurate positioning of the saddle at any point along the axis of travel, within $\pm .005"$. The shot pin mechanism contains a small low-pressure hydraulic cylinder, which when activated by a limit switch, pushes the locating pin into a locator bushing machined in the saddle. The saddle remains in the positive stop location until the cylinder retracts the pin, allowing the saddle to continue in motion.

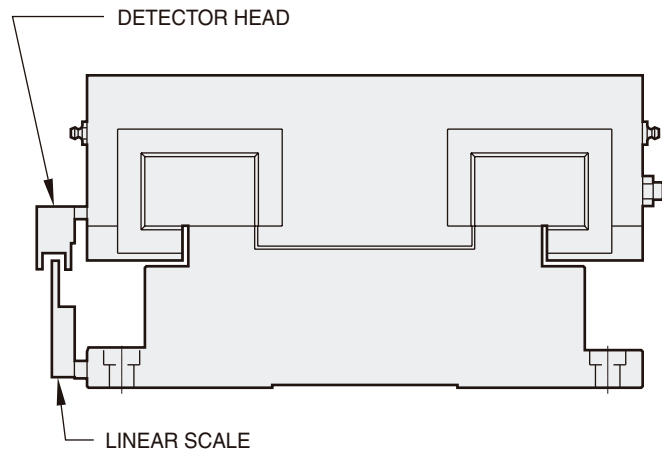
Any number of locator bushings can be machined in the saddle for a series of positive stop locations, while utilizing only one shot pin locating mechanism.



Linear Scale

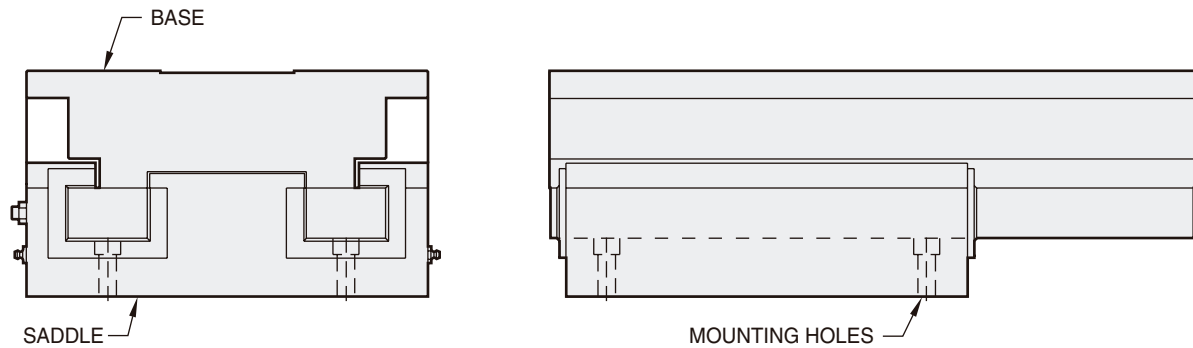
Linear Scales are excellent for applications that require precise positioning over the entire range of travel. Available in either photo-optical or magnetic designs, linear scales offer the following advantages:

- Ideal for high or low traverse rates
- Ideal for long or short travels
- Zero wear contactless
- High accuracy positioning.



Invert Mount

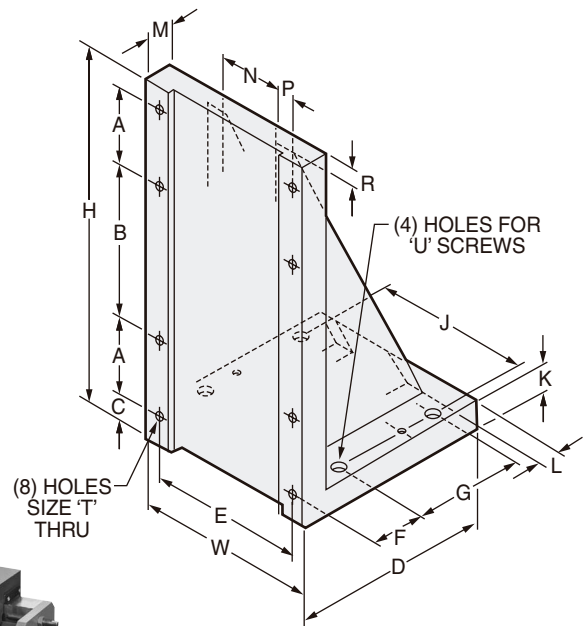
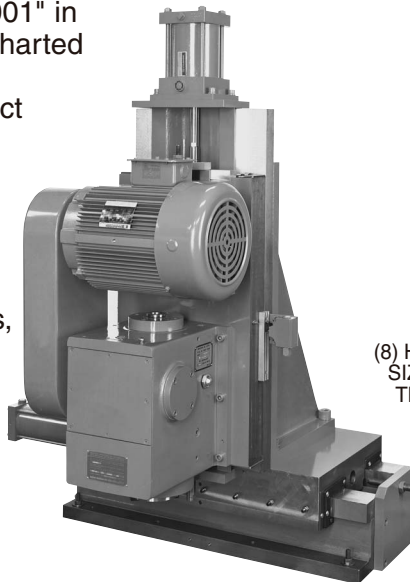
Inverted mounted HS slides are ideal for applications that require an overhung load and a short travel. Functions of the saddle and base are reversed in invert mounting applications: the base is the moving member and the saddle is the fixed member. The saddle is affixed to the mounting surface via mounting holes accessed through the saddle guides.



Angle Plate

Angle plates can be utilized in building multi-axis slide assemblies. These precision plates are ground to provide perpendicularity of 0.001" in 12 inches. While standards are charted below, modified angle plates are commonly furnished to meet exact requirements. Use the letter dimensions shown to advise the lengths and tolerances you require.

SETCO angle plates are also used to mount other components, such as spindles, motors, workpieces, tools, etc.



DIMENSIONS IN INCHES																				
Type	Width W	Height H	A	B	C	D	E	F	G	H	J	K	L	M	N	P	R	T	U	Weight (lbs)
P3	8.00	16.00	3.125	6.750	1.50	8.75	6.750	1.38	6.750	16.00	6.750	1.12	0.00	0.75	3.75	0.50	0.00	1/2-13	1/2	62
P4	10.00	20.00	4.250	8.500	1.50	11.00	8.500	1.75	8.500	20.00	8.500	1.12	0.00	1.00	4.50	0.50	0.00	1/2-13	1/2	120
P5	12.00	24.00	4.750	10.500	2.00	13.00	10.500	1.75	10.500	24.00	10.500	1.00	0.50	1.00	7.00	0.50	0.50	5/8-11	5/8	168
P6	16.00	32.00	7.000	14.000	2.00	17.00	14.000	2.12	14.000	32.00	14.000	1.50	0.00	1.50	10.50	0.75	2.00	3/4-10	3/4	404
P7	20.00	36.00	8.000	17.000	1.50	21.12	17.000	2.62	17.000	36.00	17.000	1.50	0.00	1.50	12.50	0.75	2.00	3/4-10	3/4	580
P8	24.00	40.00	7.000	21.500	2.25	25.50	21.500	2.75	21.500	40.00	21.500	1.50	0.00	1.50	16.50	0.75	2.00	1-8	1	734

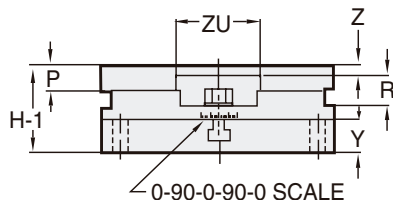
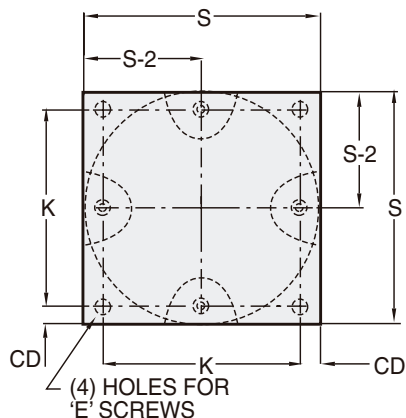
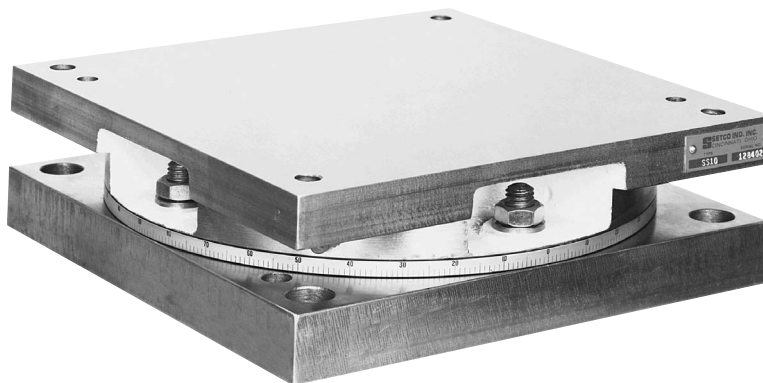
Accessories

Swivel

For 360° rotation of your assembly, a series of square swivels are available. The top plate rotates on a hardened center pivot plug, with T-bolts riding in a circular T-slot. Access from the four sides allows for tightening of the nuts to lock the swivel in place.

The swivel is equipped with a circular scale, indicating the degrees of rotation. Mounting holes are furnished in the base.

The load capacity of the swivel is equivalent to the comparable size of the slide.



DIMENSIONS IN INCHES

Type	CD	E	H-1	K	P	R	S	S-2	Y	Z	ZU	Weight (lbs)
SS8	0.62	0.50	3.00	6.75	0.88	1.06	8	4	1.12	0.38	2.88	40
SS10	0.75	0.50	3.00	8.50	0.88	1.06	10	5	1.12	0.38	3.25	65
SS12	0.75	0.62	3.50	10.50	1.00	1.25	12	6	1.38	0.38	4.50	94
SS16	1.00	0.75	4.00	14.00	1.12	1.50	16	8	1.62	0.38	5.25	190
SS20	1.50	0.75	4.50	17.00	1.50	1.50	20	10	1.62	0.75	5.88	390
SS24	1.25	1.00	5.00	21.50	1.50	1.62	24	12	2.00	0.75	6.75	590

Slide & Spindle Combinations

Slide & Spindle Combinations

The following chart provides reference information to help size the HS slide to a spindle configuration. The information is not exclusive, but provides dimensional considerations that are important to ordering HS slides. For design data, refer to the charts at the back of the catalog.

DIMENSIONS IN INCHES				
Spindle Width	Spindle Body Length with Belt Drive	Spindle Mounting Hole Width	Model HS Slide (Minimum)	HS Saddle Length (Minimum)
3.75	8.0	3.0	HS-7	9.0
5.0	14.0	4.0	HS-7	15.0
6.0	16.0	5.0	HS-9	18.0
7.0	18.0	6.0	HS-12	18.0
8.5	22.0	7.0	HS-15	23.0

For application assistance, consult factory.

To Place Your Order
Phone: 1-800-543-0470 Fax: 1-513-941-6913
Email: sales@setcousa.com

Slide Gib

Straight gibs are standard, and are adequate for most manual feed and powered feed slide applications having low duty cycles.

Tapered gibs are optional and should be considered on most power applications having high duty cycles and/or precision positioning applications. Single tapered gibs are limited to saddles with lengths no more than twice the saddle width. For lengths greater than twice the saddle width, two opposing tapered gibs must be used.

As standard, the gib is located on the right side of the slide, when viewing from the drive end. An exception to this is when the slide is mounted sidewall, the gib should be on the bottom. Also, the gib should always be on the side opposite the direction of loading.

The following is offered as a guideline to properly adjust the gib. Gib adjustment may vary for each particular application with final adjustment determined by the customer to assure proper performance.

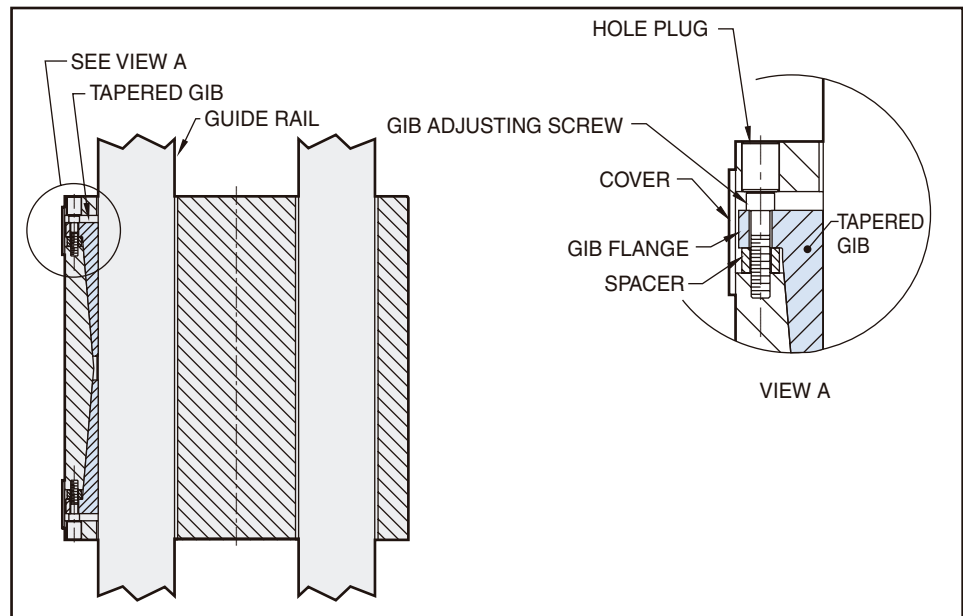
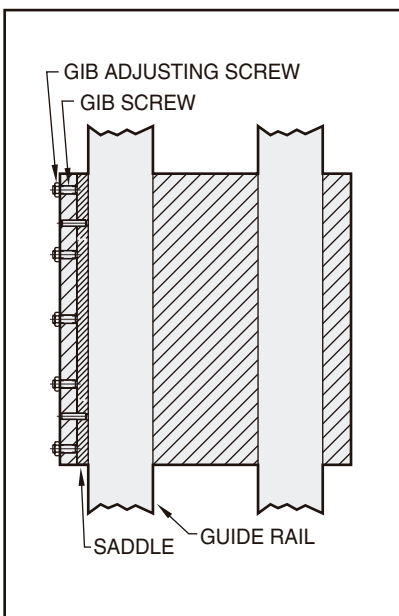
Straight Gib Adjustment

1. Loosen gib screw nut on each gib adjusting screw.
2. Adjust screws starting with center and work outward.
3. Tighten all gib adjusting screws (alternating from end to end) sufficiently to ensure complete bearing contact between saddle and guide rail.
4. Loosen each gib adjusting screw and retighten each until it meets resistance.
5. Tighten gib screw nut on each gib adjusting screw.
6. Verify alignment by indicating side-to-side movement.
7. Cycle slide to assure free and smooth motion.

Tapered Gib Adjustment

Note: Slides with tapered gibs have two opposing tapered gibs that must be adjusted simultaneously.

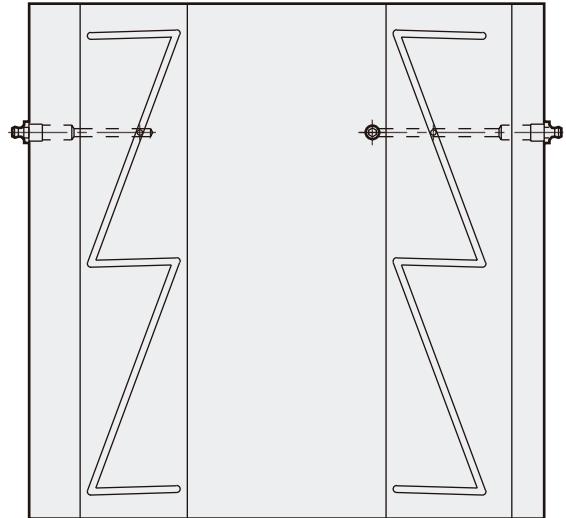
1. Remove gib covers.
2. Loosen and remove gib adjusting screws on both ends of the saddle.
3. Remove spacers.
4. Replace gib adjusting screws and tighten sufficiently to ensure complete bearing contact between saddle and guide rail.
5. Loosen gib adjusting screws and retighten until they meet resistance.
6. Measure gap between the saddle and the bottom of gib flange and grind the spacers the respective dimension.
7. Remove gib adjusting screws, replace spacers, replace and retighten gib adjusting screws, replace cover.
8. Cycle slide to assure free and smooth motion.



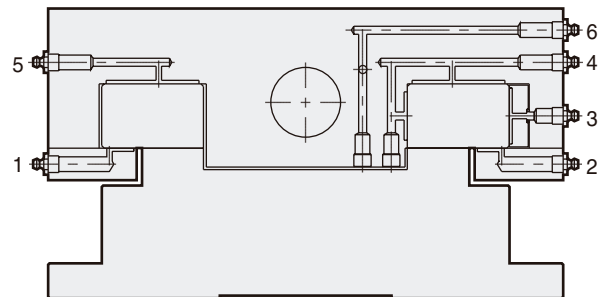
Lubrication

As a standard feature, all HS series slides are arranged with porting and oil grooving for acceptance of an automatic or manual lubrication system.

- Drawing 'A' illustrates the standard oil grooving in the saddle.
- Drawing 'B' illustrates the standard internal porting to the keepers, gib, rails and (optional) ballnut.
- The lubrication bearing area data is provided for properly sizing an automatic lubrication system.
- The type of lubricant recommended for both automatic and manual systems is Mobil Vactra #2 Way Oil or an equivalent. (Do not use grease).
- Lube Port #6 is required only on those slide assemblies having ballscrew drive packages.
- Saddle lengths that exceed 15" will require (1) additional port at each plane of lubrication. In these cases when computing the amount of bearing area that must be lubricated use 1/2 the saddle length for each port.
- Saddles with tapered gibs require (1) additional #3 port. In these cases when computing the amount of bearing area that must be lubricated use 1/2 the saddle length for each port.



Drawing A



Drawing B

Bearing Area (square inches) per inch of Saddle Length						
Model	Port 1	Port 2	Port 3	Port 4	Port 5	Port 6
HS7	0.44	0.44	0.75	2.00	1.25	0.1 to 0.5 cu.in./hr
HS9	0.44	0.44	0.75	2.00	1.25	
HS12	0.81	0.81	1.50	3.88	2.38	
HS15	0.81	0.81	1.50	3.88	2.38	
HS18	1.38	1.38	2.00	6.00	4.00	
HS24	1.38	1.38	2.00	6.00	4.00	
HS32	1.38	1.38	2.00	6.00	4.00	

Lube Port	Bearing Surface
1	Keeper
2	Keeper
3	Gib
4	Top and Side of Guide Rail
5	Top of Open Rail
6	Ballnut

Design Data

Slide Tolerances

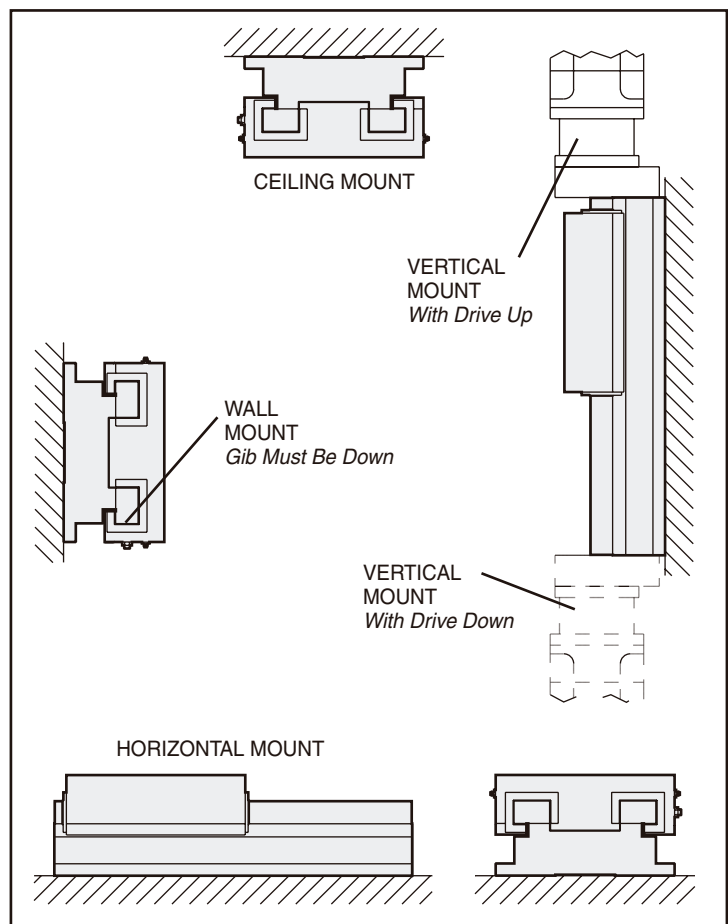
- Flatness of base bottom - 0.001" per 12".
- Flatness of saddle top - 0.001" per 12".
- Parallelism of saddle top to base bottom - 0.001 per 12".
- Parallelism of reference edge (on side base) to guide rail - 0.001" per 12".
- Slide overall height tolerance - nominal to +/-0.010".
- Perpendicularity to base ends to base bottom and base reference edge - 0.001".
- Perpendicularity of saddle ends to saddle top and saddle reference edge - 0.003".
- Squareness in each plane of compound slide - 0.001" per 12" cumulative from axis to axis.

Slide Tracking Accuracy

All SETCO Hardened Way Slides have a guaranteed straightness of travel (side to side and up and down) not to exceed 0.0005" per 12", with an accumulation not to exceed 0.00025" for each additional 12" of travel.

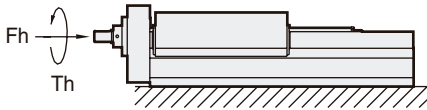
Slide Mounting Attitude

SETCO Hardened Way Slides can be mounted in any attitude, with the most common illustrated to the right. The mounting attitude affects power requirements as well as lubrication grooves and porting. Specify slide mounting attitude on all applications.



Force and Torque Requirements

The force required to power the slide includes the force required to move the saddle plus the force required to overcome all external loads, multiplied by a factor of safety depending on the type of drive used. The factor of safety is applied to assure sufficient power to accelerate the load.



Force Calculations:

$$F_h = (F_{wh} + F_f + F_{MX} + F_{MY} + F_{MZ}) fs$$

$$F_v = (F_{wv} + F_f + F_{MX} + F_{MY} + F_{MZ}) fs$$

$$F_{wh} = \mu (WSL) (SL)$$

$$F_{wv} = (WSL) (SL)$$

$$F_f = \mu (F_h + F_v + F_s)$$

$$F_{MX} = 2\mu (M_x/SW) + \mu (F)$$

$$F_{MY} = 3\mu (M_y/SL) + F$$

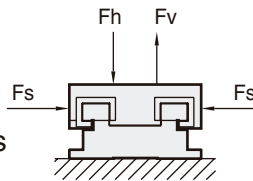
$$F_{MZ} = 3\mu (M_z/SL) + F$$

Torque Calculations:

$$T_h = (F_h) (L) (k)$$

$$T_v = (F_v) (L) (k)$$

All forces, loads, and moments must be added using correct sign positive or negative.



Definitions

Force and Thrust Requirements

- F_h = Force required to power slide horizontally (lbs.)
- F_v = Force required to power slide vertically (lbs.)
- F_{wh} = Force required to power saddle weight horizontally (lbs.)
- F_{wv} = Force required to power saddle weight vertically (lbs.)
- F_f = Force required to overcome applied loads (lbs.)
- F = Applied external load (see force direction in Load Cases on page 28)
- d = Perpendicular distance from saddle to applied load (inches)
- F_h = Applied load perpendicular and into plane of saddle top (lbs.) (see drawing to left)
- F_v = Applied load perpendicular and away from plane of saddle top (lbs.) (see drawing to left)
- F_s = Applied load perpendicular and into or away from plane of saddle side (lbs.) (see drawing to left).
- F_{MX} = Force required to overcome moment M_x and load F (lbs.)
- F_{MY} = Force required to overcome moment M_y and load F (lbs.)
- F_{MZ} = Force required to overcome moment M_z and load F (lbs.)
- M = Applied external moment (inch-lbs)
- M_x = Moment about saddle width (inch-lbs)
- M_y = Moment about plane of saddle top (inch-lbs)
- M_z = Moment about saddle length (inch-lbs)
- fs = Factor of safety:
 - Manual drives = 1.5
 - Feedscrew drives = 2
 - Hydraulic cylinder drives = 2.5.
- μ = Coefficient of friction (see page 28)
- WSL = Unit weight of saddle (lbs./in.)
- SL = Saddle length (inches)
- SW = Saddle width (inches)
- T_h = Torque required to power slide horizontally (inch-lbs.)
- T_v = Torque required to power slide vertically (inch-lbs.)
- L = Lead of screw (inches/rev.)
- k = Screw constant
 - Acme screw = 0.5
 - Ballscrew = 0.2

Thrust Capacities

The maximum thrust capacity for the various ballscrew drive packages is shown in the following chart. For proper selection of slide sizing and saddle lengths, the thrust capacity of the drive package being considered must be compared to the load capacity (M_z) of the slide. (See page 28.)

Notes:

1. The chart values are based on the mechanical thrust limitations of the drive package.
2. For extremely long travels consult SETCO Proposal Engineering for limitations due to column loading.
3. For static applications, consult SETCO Proposal Engineering for limitations due to saddle locking device and/or back-driving force.

MODEL	Ballscrew Thrust Capacity		
	Diameter (mm)	Dynamic (lbs.)	Static (lbs.)
HS 7___FGM	16	1550	12,279
HS 9___FGM	25	1360	11,780
HS 12___FGM	40	4730	37,110
HS 15___FGM	40	4730	37,110
HS 18___FGM	63	9480	78,530
HS 24___FGM	63	9480	78,530
HS 32___FGM	63	9480	78,530

Design Data

Slide Load Capacity

To optimize slide operation over the long haul, one of the most important considerations in selection is the loading applied to the slide. Loading capacity is based on the pressure exerted by an externally applied load on the engaged slide way surfaces. These externally applied loads are considered to be the following:

- **STATIC** Loading - External loading is applied to a stationary saddle.
- **DYNAMIC** Loading - External loading is applied to a moving saddle.
- **SINGLE** Loading - Only one external load is applied.
- **COMBINED** Loading - More than one external load is applied.

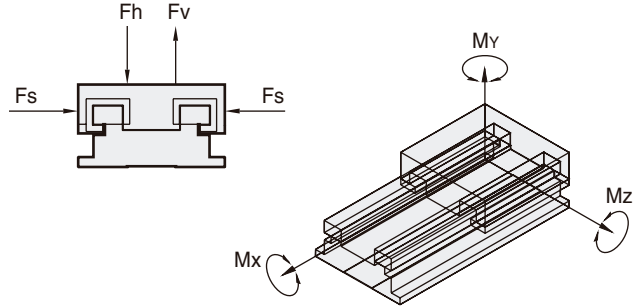
The recommended maximum load and moment capacities can be determined from the "Slide Load Capacity Chart." Use the data only as a guide to determine the proper size slide for a particular application. The values in the chart are based on a way surface bearing pressure of 50 psi. However, this pressure may be adjusted to suit your application using the following guidelines:

- **Use 50 psi for:**
 - Manual feed slides.
 - Manual lubricated slides.
 - Slides used for precision machining and grinding applications.
 - Slides subjected to combined loading.
- **Use 100 psi (multiply values in chart by 2) for:**
 - Power feed slides.
 - Slides having forced lubrication.
 - Slides used for rough machining and positioning applications.
 - Slides subjected to single loading.
- **Use 500 psi (multiply values in table by 10) for:**
 - Slides subjected to static loading.

Coefficient of Friction

- 0.10 as standard.
- 0.05 with forced lubrication.

Slide Load Capacity Chart



Data based on calculations at 50 psi.
S = Saddle Length (inches)

Model	Fh (lbs)	Fv (lbs)	Fs (lbs)	Mx (in-lbs)	My (in-lbs)	Mz (in-lbs)
HS 7	125 x S	44 x S	75 x S	102 x S	9 x S ²	16 x S ²
HS 9	125 x S	44 x S	75 x S	129 x S	9 x S ²	16 x S ²
HS 12	238 x S	81 x S	150 x S	321 x S	19 x S ²	30 x S ²
HS 15	238 x S	81 x S	150 x S	413 x S	19 x S ²	30 x S ²
HS 18	400 x S	138 x S	200 x S	812 x S	25 x S ²	51 x S ²
HS 24	400 x S	138 x S	200 x S	1156 x S	25 x S ²	51 x S ²
HS 32	400 x S	138 x S	200 x S	1706 x S	25 x S ²	51 x S ²

Load Cases and Equations

<p>Slide Loading = F Slide Capacity = Fh Fh > F</p> <p>Load Case I</p>	<p>Slide Loading (M) = F x d Slide Capacity = Mx Mx > F x d</p> <p>Load Case IV</p>
<p>Slide Loading = F Slide Capacity = Fv Fv > F</p> <p>Load Case II</p>	<p>Slide Loading (M) = F x d Slide Capacity = Mz Mz > F x d</p> <p>Load Case V</p>
<p>Slide Loading = F Slide Capacity = Fs Fs > F</p> <p>Load Case III</p>	<p>Slide Loading (M) = F x d Slide Capacity = My My > F x d</p> <p>Load Case VI</p>

F = Applied external load (lbs.)
d = Perpendicular distance from saddle to applied load (inches)

Cylinder Push and Pull Forces

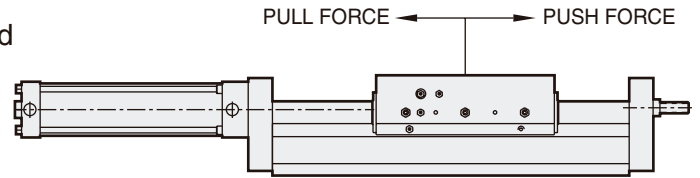
The theoretical push and pull forces for hydraulic and air cylinders are derived from the following formula:

$$F = P \times A$$

F = Force (lbs.)

P = Pressure at the cylinder in psi, gauge

A = Effective area of cylinder piston (Sq. In.)



Model	Cylinder Bore (In.)	Piston Area (Sq. In.)	Piston Rod Area (In.)	Piston Rod Dia. (In.)	PUSH FORCE (lbs) at Various Pressure (psi)							PULL FORCE (lbs) at Various Pressure (psi)						
					80	100	250	500	1000	2000	3000	80	100	250	500	1000	2000	3000
HS7	2	3.14	0.31	0.63	251	314	785	1570	3140	6280	9420	227	283	709	1417	2835	5670	8504
HS9	2.5	4.91	0.79	1.00	393	491	1228	2455	4910	9820	14730	330	412	1031	2062	4123	8247	12370
HS12	3.25	8.30	0.79	1.00	664	830	2075	4150	8300	16600	24900	601	751	1878	3755	7510	15021	22531
HS15-18	4	12.57	2.41	1.75	1006	1257	3143	6285	12570	25140	37710	813	1016	2540	5080	10160	20320	30180
HS24-32	5	19.64	3.14	2.00	1571	1964	4910	9820	19640	39280	58920	1320	1650	4125	8250	16500	33000	49500

Example of Combined Load Case

A horizontal mounted HS slide is required to feed a boring spindle. The boring spindle weighs 600 lbs. and subjects the slide to a 750 lb. feed thrust as shown below.

Dynamic Loading - moving weight of spindle

Load Case = 1 (see page 28)

Loading (F) = 600 lbs. (see page 28)

Equation: = $F_h > F$ (see page 28)

Knowing that F_h must be at least 600 lbs (F), F_h can be assumed to be 600 lbs, and considering a HS 12, the minimum saddle length can be calculated from the following slide load formula:

$$F_h = 238 \times S \text{ (see page 28)}$$

$$600 = 238 \times S$$

$$S = 2.52 \text{ saddle length}$$

Rounding up to the nearest whole number:

S = 3 inches (Note: A slide's length should never be less than its width).

$$S = 12 \text{ inches}$$

Dynamic Loading - feeding boring spindle

Load Case = V (see page 28)

Slide moment Loading (M) = $F \times d$ (see page 28)

$$M = F \times d = 6 \times 750 = 4500 \text{ (inch-lbs.)}$$

Equation: = $M_z > F \times d$ (see page 28)

Knowing that M_z must be at least 4500 inch-lbs ($M=F \times d$), M_z can be assumed to be 4500 inch-lbs, and considering a HS12, the minimum saddle length can be calculated from the following slide load formula:

$$M_z = 30 \times S^2$$

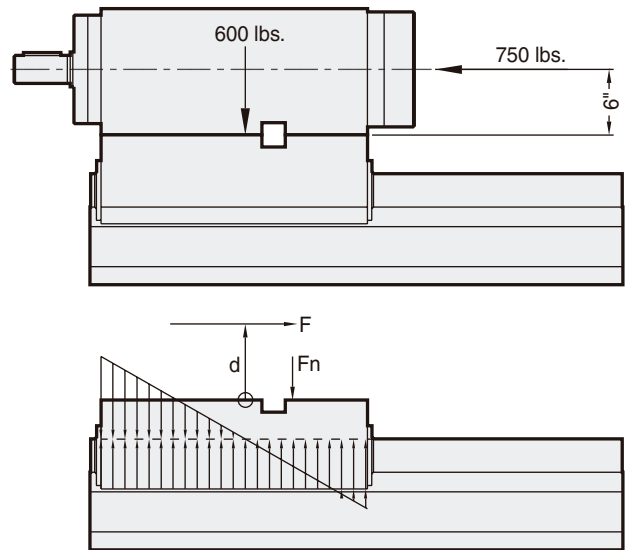
$$4500 = 30 \times S^2$$

$$S = 12.25$$

Rounding up to the nearest whole number:

$$S = 13 \text{ inches}$$

Use a HS12 slide with 13 inch long saddle.



Note: For applications where load is applied in the direction of slide travel, the slide load capacity may be limited to the capacity of the slide feed mechanism. Check the load values with the maximum thrust capacities for the feed mechanism being used. For static applications the saddle-locking device may limit the slide load capacity.

Slide load capacity is based on uniformly applied loads and moments. Consult the SETCO proposal-engineering department on all applications where shock loading is present.

HS Application Photos

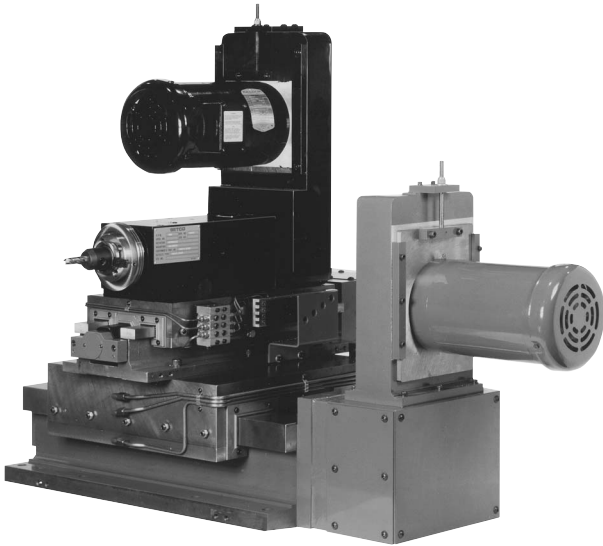


Photo #4289S

Compound HS24/HS12 slide assembly. Slide accessories include limit switches, automatic lubrication, and belt driven ballscrews. A belt driven milling spindle is mounted to the HS12 slide assembly.

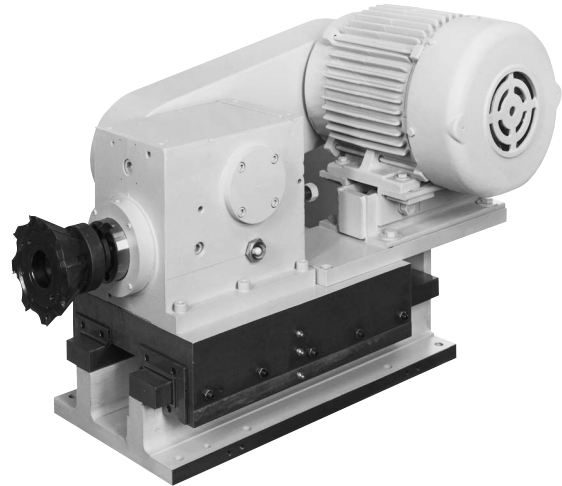


Photo #4096S

Right angle geared milling spindle with manual draw bar and 3HP motor, is fed vertical nose down by type HS12HI slide with an internal hydraulic cylinder providing 4" stroke.

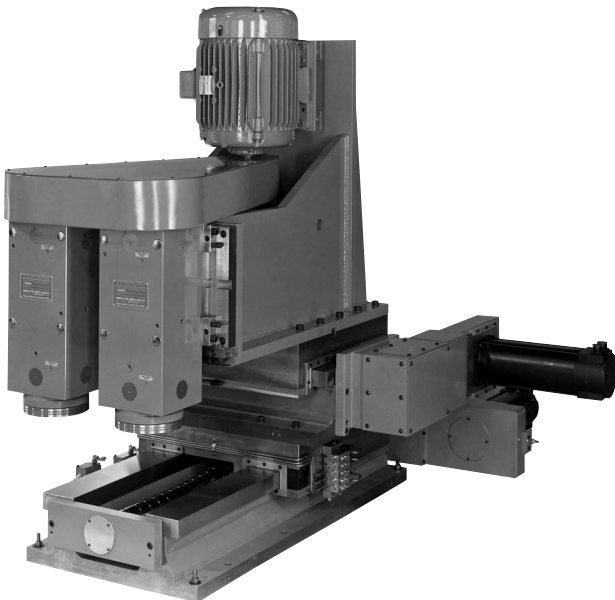


Photo #4230S

Compound HS24 slide assembly. Slide accessories include limit switches, automatic lubrication, and belt driven ballscrews. Two spindles driven by a single 10 HP motor are mounted to an angle plate, which in turn is mounted to the cross feed HS24.

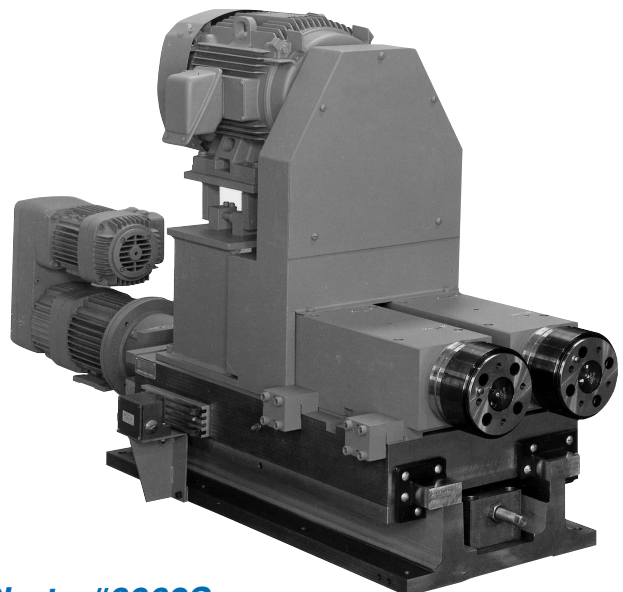


Photo #3962S

Dual AC motor drive provides slow feed and rapid traverse of Type HS15FGM slide assembly. Slide accessories include a direct-coupled ballscrew, limit switches, and in-line recessed positive stop. Spindles are equipped with adjusting blocks and fitting spacers for accurate centerline to centerline location, and are driven by a common 10 HP motor.

HS Application Photos

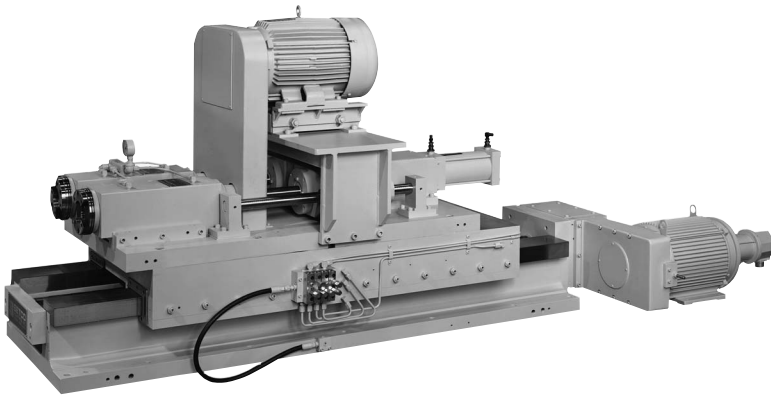


Photo #4129

HS slide/spindle configuration used in machining automotive valve seats. The arrangement includes a feedout package to actuate inner arbors to feedout gun reamers. A bridge mounted 10 hp motor drives (2) 4304BGRY spindles which are subplate mounted to an HS24 slide assembly. The slide is powered by servo drive system with timing belt and ground thread ballscrew. Accessories include limit switches, manifold, and piping for a customer supplied auto lubrication system.

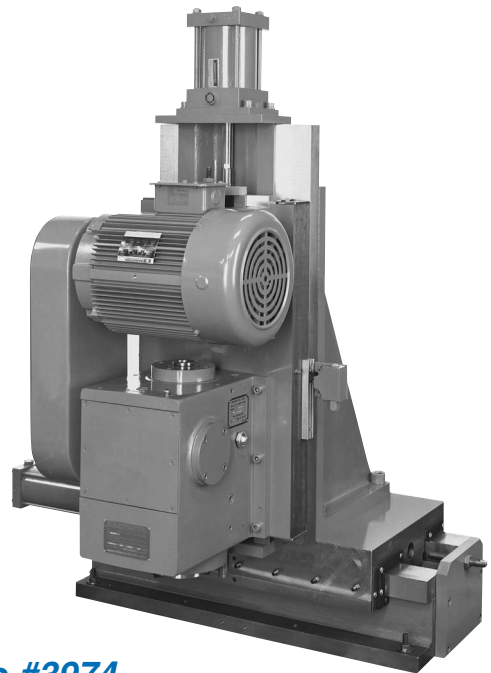


Photo #3974

This HS slide arrangement features a right angle geared milling spindle, type RM5-10, which is cross-fed by an HS18 slide. An externally mounted cylinder with adjustable positive stop is used as the feed mechanism. A 6" dovetail slide with hydraulic cylinder feed is mounted on a P6 Angle Plate to provide depth-of-cut control.

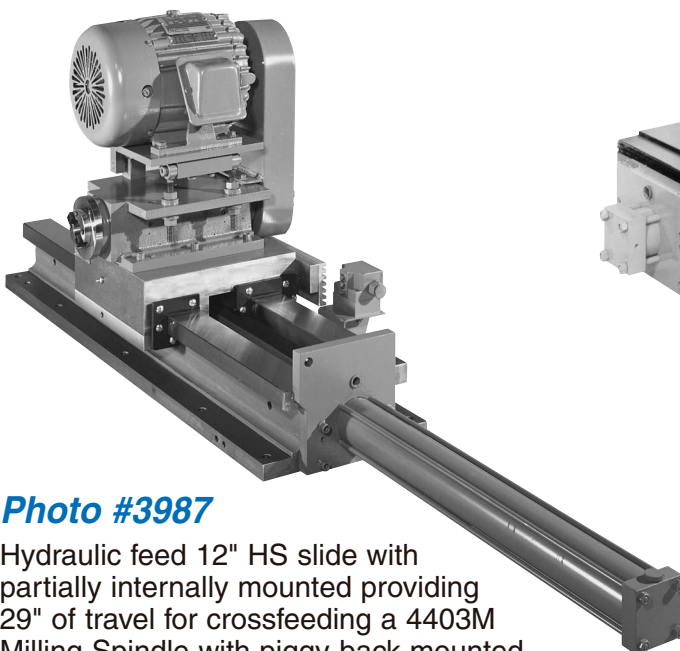


Photo #3987

Hydraulic feed 12" HS slide with partially internally mounted providing 29" of travel for crossfeeding a 4403M Milling Spindle with piggy-back mounted 5 hp motor.

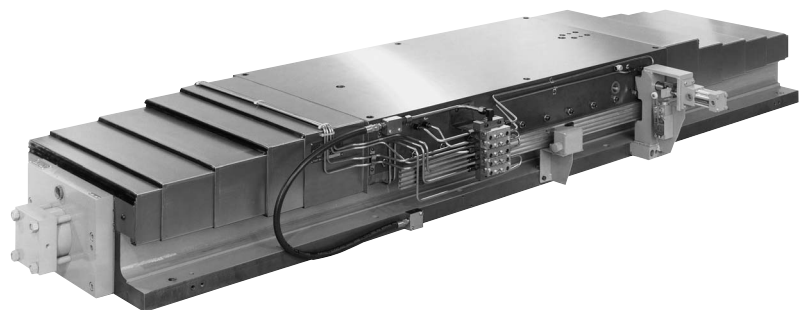


Photo #4117

A 24" HS Slide application with internally mounted hydraulic cylinder providing 40" stroke adjustable positive stop at each end of slide, shop pin locator for central positive stop location, metal way covers, limit switches, and manifold and piping for the customer's auto-lubrication system.

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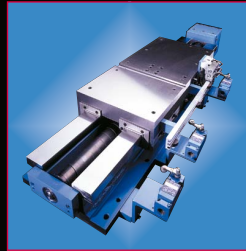
PRODUCTS



Dovetail Slides



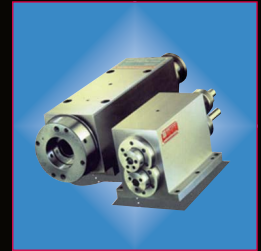
Linear Recirculating Bearing Slides



Hardened Steel Way Slides



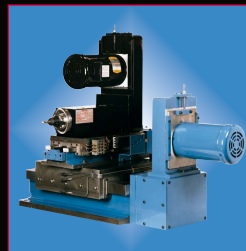
Grinding Spindles and Accessories



Boring and Milling Spindles



Sentry Belt-Driven Spindles



Spindle/Slide Combinations



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