Heavy Duty Shock Absorbers
HD, HDA Series

Overview

Enidine Heavy Duty Series (HD/HDA) large-bore hydraulic shock absorbers protect equipment from large impacts in applications such as automated storage and retrieval systems, as well as overhead bridge and trolley cranes.

They are available in a wide variety of stroke lengths and damping characteristics to increase equipment life and meet stringent deceleration requirements.

HD Series
Custom-orificed design accommodates specified damping requirements. Computer generated output performance simulation is used to optimize the orifice configuration. Available in standard bore dimensions of up to 6 in. (150mm) and strokes over 60 in. (1525mm).

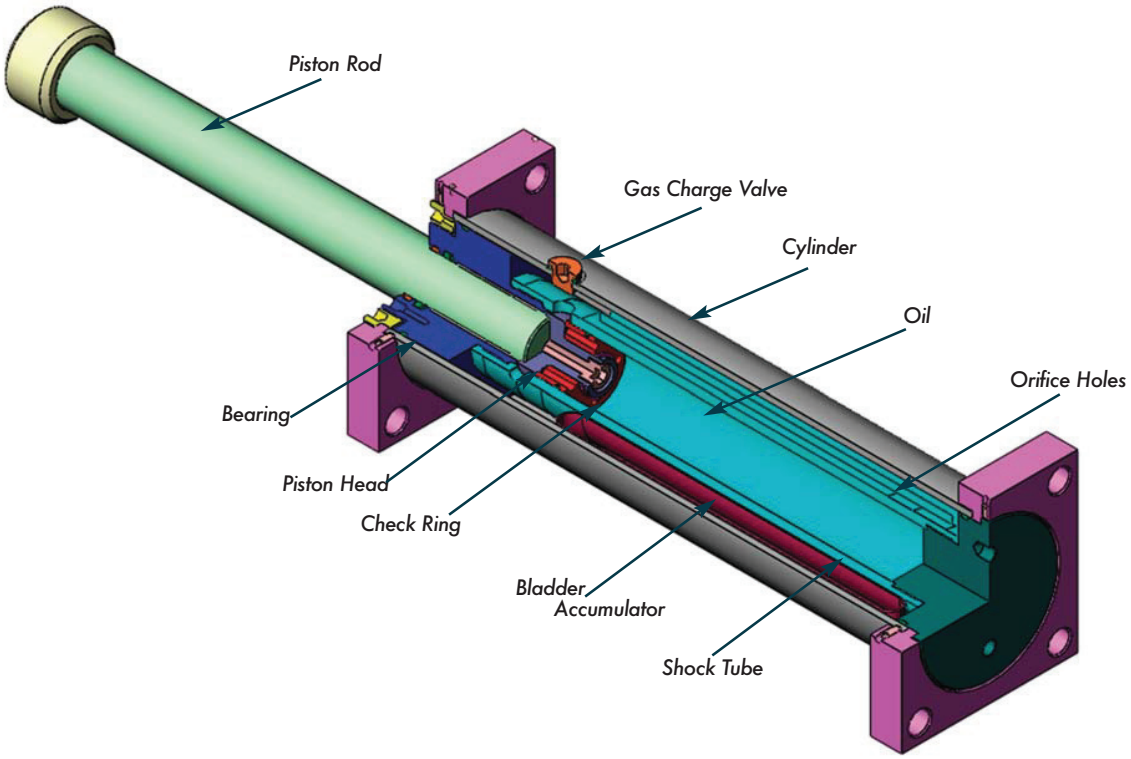
HDA Series
Adjustable units enable the user to modify shock absorber resistance to accommodate load velocity variations, with strokes up to 12in. (305mm). Standard adjustable configurations available. Special bore sizes and strokes for both HD and HDA Series models are available upon request.

Features and Benefits

- Compact design smoothly and safely decelerates large energy capacity loads up to 8,000,000 in-lbs. per cycle (903 880 Nm)
- Engineered to meet OSHA, AISE, CMMA and other safety specifications such as DIN and FEM.
- Internal air charged bladder accumulator replaces mechanical return springs, providing shorter overall length and reduced weight.
- Wide variety of optional configurations including bellows, clevis mounts and safety cables.
- Available in standard adjustable or custom-orificed non-adjustable models.
- Zinc plated external components provide enhanced corrosion protection.
- Epoxy painting and special rod materials are available for use in highly corrosive environments.
- All sizes are fully field repairable.
- Piston rod extension sensor systems available for reuse safety requirements.
- Incorporating optional fluids and seal packages can expand standard operating temperature range from 15°F to 140°F to -30°F to 210°F (-10°C to 60°C) to (-35°C to 100°C)

Enidine Heavy Duty (HD) Large-bore Series Shock Absorbers

Overview



The Enidine HD/HDA Series is a large-bore, multi-orifice family of shock absorbers which incorporates a double cylinder arrangement with space between the concentric shock tube and cylinder, and a series of orifice holes drilled down the length of the shock tube wall.

During piston movement, the check ring is seated and oil is forced through the orifices in the shock tube wall, into the gas charged bladder/accumulator area, and behind the piston head. The orifice area decreases as the piston moves and closes the orifice holes. The bladder/accumulator is also compressed by the oil during the compression stroke, which compensates for the fluid displaced by the piston rod during compression.

During repositioning, the pressure from the bladder/accumulator pushes the piston rod outward. This unseats the check ring and permits oil to flow rapidly through the piston head into the front of the shock tube. The unique gas-charged bladder accumulator replaces mechanical return springs, decreasing overall product size and weight.

The HD/HDA Series can provide conventional, progressive or self-compensating damping. Their compact, heavy-duty design safely and effectively decelerates large moving loads, with energy capacities of up to 8,000,000 in-lbs. per cycle (903 880 Nm).

HD/HDA Sizing Examples

1. Determine load weight (lbs. or Kg), impact velocity (in./sec or m/s), propelling force (lbs. or N) if any, cycles per hour and stroke (in. or mm) required.
2. Calculate total energy per cycle (in.-lbs./c or Nm/c) and total energy per hour (in.-lbs./hr or Nm/hr). Consult this catalog's sizing examples (pages 5-6) for assistance, if required.
3. Compare the calculated total energy per cycle (in-lbs./c or Nm/c) and total energy per hour (in.-lbs./hr or Nm/hr), to the values listed in the HD/HDA Series Engineering Data charts. For HDA selection, the impact velocity must be below 130 in./sec. (3.3 m/s).
4. Select the appropriate HD/HDA Series model.

Example: Horizontal Application

1. Weight (W): 55,000 lbs. (24 950 Kg)
Velocity (V): 43 in./sec. (1,1 m/s)
Propelling Force (F_D): 6,700 lbs. (29 803 N)
Cycles/Hour (C): 10 cycles/hr
Stroke (S): 5 in. (127 mm)

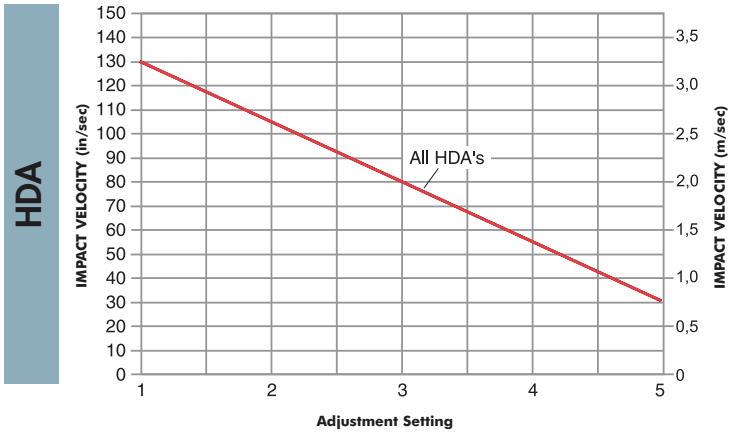
2. Total Energy/Cycle (E_T): 165,229 in.-lbs./c (18 6668 Nm/c)
Total Energy/Hour (E_TC): 1,652,290 in.-lbs./hr (18 6668 Nm/h)

3. Compare total energy per cycle and total energy per hour to the HD/HDA Series Engineering Data charts (pages 13-27).

4. Selection: HD 3.0 x 5 (HDA is not appropriate because maximum in.-lbs. per cycle (Nm per cycle) are exceeded).

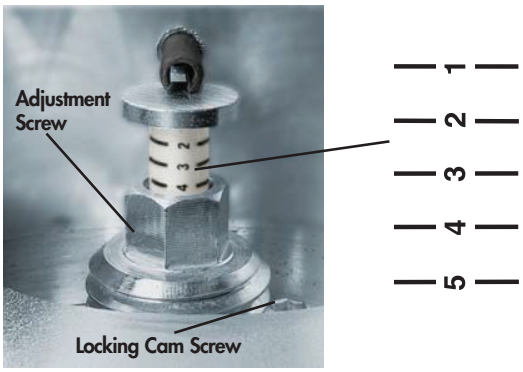
Adjustment Techniques

Useable Adjustment Setting Range



Damping Force

Position 1 provides minimum damping force.
Position 5 provides maximum damping force.



Adjustment is accomplished by turning the adjustment screw. Once the desired setting has been reached, lock in place by tightening the locking cam screw.

After properly sizing an HDA shock absorber, the useable range of adjustment settings can be determined:

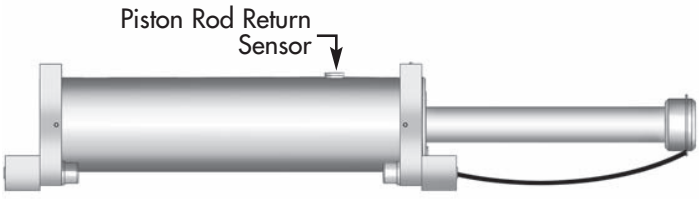
1. Locate the intersection point of the application's impact velocity and the HDA model graph line.
2. The intersection is the maximum adjustment setting to be used. Adjustments exceeding this setting could overload the shock absorber.
3. The useable adjustment setting range is from setting 1 to the MAXIMUM adjustment setting as determined in step 2.

EXAMPLE: HDA Series

1. Impact Velocity:	80 in./sec. (2 m/s)
2. Intersection Point:	Adjustment Setting 3
3. Useable Adjustment Setting Range:	1 to 3

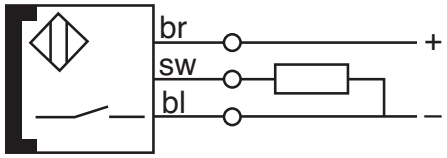
Optional Piston Rod Return Sensor

- Magnetic proximity sensor indicates complete piston rod return with 10-foot (3 m) long cable.
- If complete piston rod does not return the circuit remains open. This can be used to trigger a system shut-off.
- Contact Enidine for other available sensor types.



FM: Front and Rear Foot Mount
Also shown is optional safety cable, typically used in overhead applications.

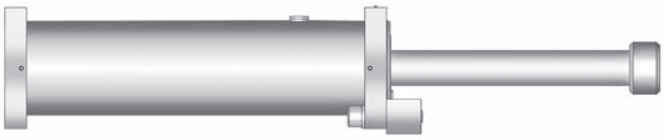
Sensor Specifications



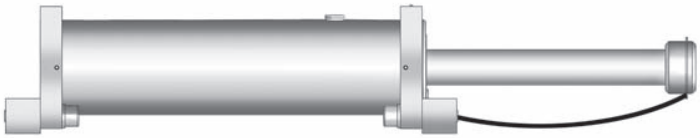
- Voltage 10 - 30V
- Load Current ≤ 200 mA
- Leakage Current ≤ 80 mA
- Load Capacitance ≤ 1.0 mF
- Ambient Temperature: -15° to 160°F (-40° to 71°C)

Ordering Information

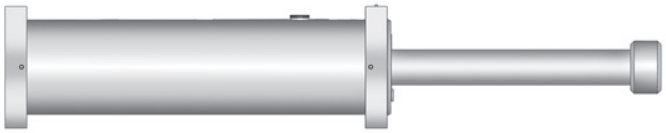
Typical mounting methods are shown below. Special mounting requirements can be accommodated upon request.



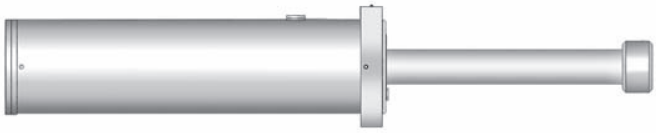
TM: Rear Flange Front Foot Mount



FM: Front and Rear Foot Mount
Also shown is optional safety cable, typically used in overhead applications.

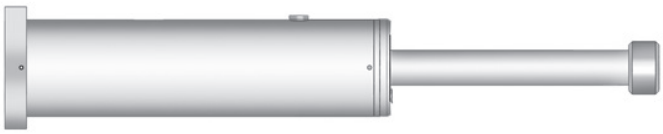


TF: Front and Rear Flanges



FF: Front Flange

CJ/CM: Clevis Mount



FR: Rear Flange

Note: Rear flange mounting not recommended for stroke lengths above 12 inches (300 mm).

Shock Absorbers

Note: HD models are custom-orificed, therefore all information must be provided to Enidine for unique part number assignment.

Example:

4
Select quantity

HD 3.0 x 5
Select HD (Non-Adjustable) or HDA (Adjustable) Catalog No. from Engineering Data Chart

TM
Select mounting method

- TM (Rear flange front foot mount)
- FM (Front and rear foot mount)
- TF (Front and rear flanges)
- FF (Front flange)
- FR (Rear flange)
- CJ (Imperial clevis mount)
- CM (Metric clevis mount)

C
Options

- C (Sensor cable)
- P (Sensor plug)
- SC (Safety cable)

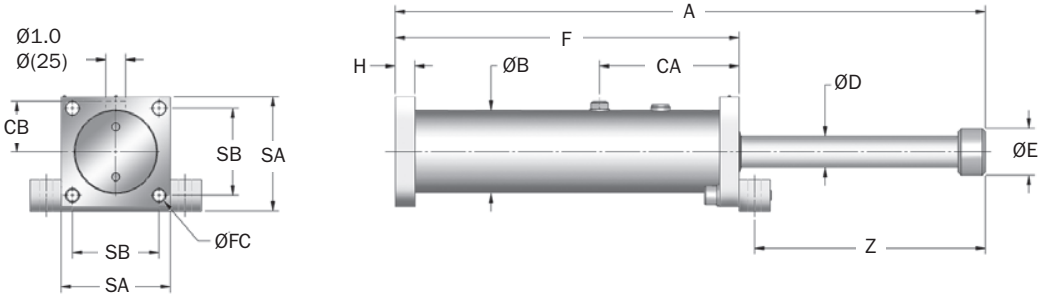
APPLICATION DATA
Required for HD models:

- Vertical or horizontal motion
- Weight
- Impact velocity
- Propelling force (if any)
- Cycles/Hr
- Other (temperature or other environmental conditions, safety standards, etc.)

Heavy Duty Series Shock Absorber
HD/HDA Series

Technical Data

HD 1.5 x 2 → HD 1.5 x 24 Series



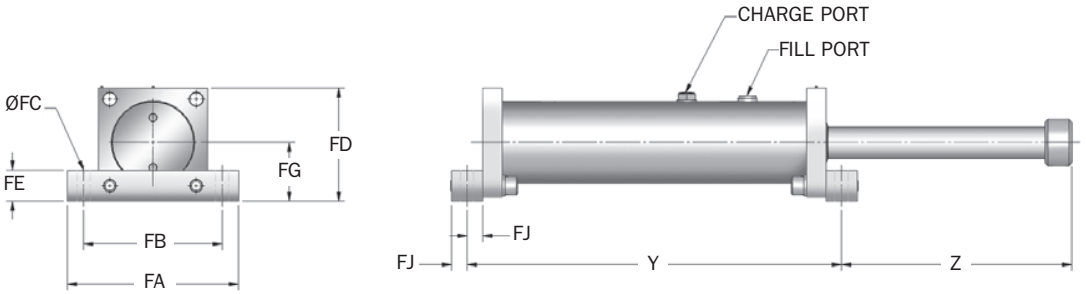
Note: For TF, FF and FR mounting, delete front foot and dimensions.

Catalog No./ Model	(S) Stroke in. (mm)	(E_T) Max. in.-lbs./cycle (Nm/cycle)	(E_TC) Max. in.-lbs./hour (Nm/hr)	(F_P) Max. Shock Force lbs. (N)	Nominal Return Force lbs. (N)	Flange Dimensions			Model Weight (lbs.) (Kg)
						SA in. (mm)	SB in. (mm)	Rec. Bolt Size in. (mm)	
HD 1.5 x 2	2 (50)	27,000 (3 000)	1,590,000 (180 000)	15,750 (70 000)	63 (280)	4.7 (120)	3.5 (90)	½ (M12)	22 (10)
HD 1.5 x 4	4 (100)	53,000 (5 950)	3,160,000 (357 000)	15,750 (70 000)	63 (280)	4.7 (120)	3.5 (90)	½ (M12)	24 (12)
HD 1.5 x 6	6 (150)	79,000 (8 930)	4,742,000 (535 800)	15,750 (70 000)	63 (280)	4.7 (120)	3.5 (90)	½ (M12)	26 (12)
HD 1.5 x 8	8 (200)	106,000 (11 900)	6,319,000 (714 000)	15,750 (70 000)	63 (280)	4.7 (120)	3.5 (90)	½ (M12)	29 (13)
HD 1.5 x 10	10 (250)	132,000 (14 900)	7,426,000 (839 181)	15,750 (70 000)	63 (280)	4.7 (120)	3.5 (90)	½ (M12)	31 (14)
HD 1.5 x 12	12 (300)	158,000 (17 800)	8,315,000 (939 646)	15,750 (70 000)	63 (280)	4.7 (120)	3.5 (90)	½ (M12)	35 (16)
HD 1.5 x 14	14 (350)	184,000 (20 800)	9,187,000 (1 038 141)	15,750 (70 000)	63 (280)	4.7 (120)	3.5 (90)	½ (M12)	37 (17)
HD 1.5 x 16	16 (400)	180,000 (20 400)	10,076,000 (1 138 606)	13,500 (60 000)	63 (280)	4.7 (120)	3.5 (90)	½ (M12)	40 (18)
HD 1.5 x 18	18 (450)	162,000 (18 300)	9,717,000 (1 098 000)	10,750 (48 000)	63 (280)	4.7 (120)	3.5 (90)	½ (M12)	42 (19)
HD 1.5 x 20	20 (500)	146,000 (16 500)	8,761,000 (990 000)	8,750 (39 000)	63 (280)	4.7 (120)	3.5 (90)	½ (M12)	44 (20)
HD 1.5 x 24	24 (600)	126,000 (14 200)	7,540,000 (852 000)	6,250 (28 000)	63 (280)	4.7 (120)	3.5 (90)	½ (M12)	50 (23)

Heavy Duty Series Shock Absorber
HD/HDA Series

Technical Data

HD 1.5 x 2 → HD 1.5 x 24 Series



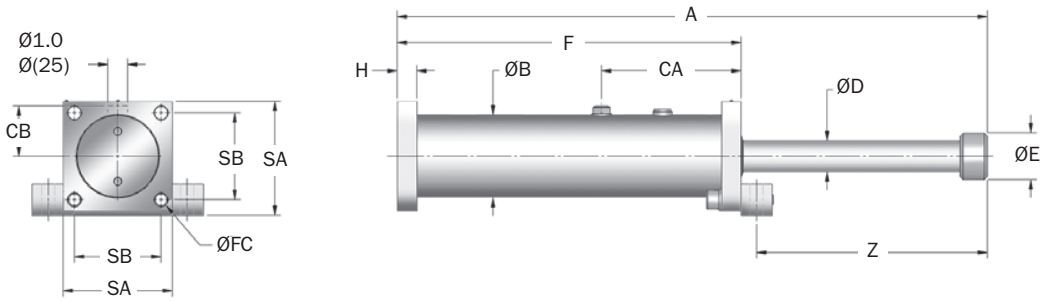
Note: For TF, FF and FR mounting, delete front foot and rear foot and dimensions.

									Foot Mount Dimensions							Charge Port Dimensions	
Catalog No./ Model	A in. (mm)	B in. (mm)	D in. (mm)	E in. (mm)	F in. (mm)	H in. (mm)	Y in. (mm)	Z in. (mm)	FA in. (mm)	FB in. (mm)	FC in. (mm)	FD in. (mm)	FE in. (mm)	FG in. (mm)	FJ in. (mm)	CA in. (mm)	CB in (mm)
HD 1.5 x 2	12.2 (310)	3.5 (90)	1.1 (28)	2.0 (50)	8.2 (208)	0.8 (20)	9.4 (240)	3.4 (86)	6.5 (165)	5.5 (140)	.55 (14)	4.9 (125)	1.3 (32)	2.5 (65)	.63 (16)	5.7 (144)	2.2 (56)
HD 1.5 x 4	16.1 (410)	3.5 (90)	1.1 (28)	2.0 (50)	10.2 (258)	0.8 (20)	11.4 (290)	5.3 (136)	6.5 (165)	5.5 (140)	.55 (14)	4.9 (125)	1.3 (32)	2.5 (65)	.63 (16)	5.7 (144)	2.2 (56)
HD 1.5 x 6	20.1 (510)	3.5 (90)	1.1 (28)	2.0 (50)	12.2 (308)	0.8 (20)	13.4 (340)	7.3 (186)	6.5 (165)	5.5 (140)	.55 (14)	4.9 (125)	1.3 (32)	2.5 (65)	.63 (16)	5.7 (144)	2.2 (56)
HD 1.5 x 8	24.1 (613)	3.5 (90)	1.1 (28)	2.0 (50)	14.2 (360)	0.8 (20)	15.4 (392)	9.3 (237)	6.5 (165)	5.5 (140)	.55 (14)	4.9 (125)	1.3 (32)	2.5 (65)	.63 (16)	5.7 (144)	2.2 (56)
HD 1.5 x 10	28.2 (715)	3.5 (90)	1.1 (28)	2.0 (50)	16.2 (411)	0.8 (20)	17.4 (443)	11.4 (288)	6.5 (165)	5.5 (140)	.55 (14)	4.9 (125)	1.3 (32)	2.5 (65)	.63 (16)	5.7 (144)	2.2 (56)
HD 1.5 x 12	32.2 (817)	3.5 (90)	1.1 (28)	2.0 (50)	18.2 (462)	0.8 (20)	19.4 (494)	13.4 (339)	6.5 (165)	5.5 (140)	.55 (14)	4.9 (125)	1.3 (32)	2.5 (65)	.63 (16)	5.7 (144)	2.2 (56)
HD 1.5 x 14	36.1 (918)	3.5 (90)	1.1 (28)	2.0 (50)	20.2 (512)	0.8 (20)	21.4 (544)	15.3 (390)	6.5 (154)	5.5 (140)	.55 (14)	4.9 (125)	1.3 (32)	2.5 (65)	.63 (16)	5.7 (1440	2.2 (56)
HD 1.5 x 16	40.1 (1 019)	3.5 (90)	1.1 (28)	2.0 (50)	22.2 (563)	0.8 (20)	23.4 (595)	17.3 (440)	6.5 (165)	5.5 (140)	.55 (14)	4.9 (125)	1.3 (32)	2.5 (65)	.63 (16)	5.7 (144)	2.2 (56)
HD 1.5 x 18	44.1 (1 121)	3.5 (90)	1.1 (28)	2.0 (50)	24.2 (614)	0.8 (20)	25.4 (646)	19.3 (491)	6.5 (165)	5.5 (140)	.55 (14)	4.9 (125)	1.3 (32)	2.5 (65)	.63 (16)	5.7 (144)	2.2 (56)
HD 1.5 x 20	48.2 (1 223)	3.5 (90)	1.1 (28)	2.0 (50)	26.2 (665)	0.8 (20)	27.4 (697)	21.4 (542)	6.5 (165)	5.5 (140)	.55 (14)	4.9 (125)	1.3 (32)	2.5 (65)	.63 (16)	5.7 (144)	2.2 (56)
HD 1.5 x 24	56.2 (1 427)	3.5 (90)	1.1 (28)	2.0 (50)	30.2 (767)	0.8 (20)	31.4 (799)	25.4 (644)	6.5 (165)	5.5 (140)	.55 (14)	4.9 (125)	1.3 (32)	2.5 (65)	.63 (16)	5.7 (144)	2.2 (56)

Notes: 1. HD shock absorbers will function satisfactorily at 5% of their maximum rated energy per cycle.
If less than these values, a smaller model should be specified.
2. It is recommended that the customer consult Enidine for safety-related overhead crane applications.
3. The energy data listed is for ideal linear impacts only. If side load conditions exist in the application, contact Enidine for sizing assistance.
4. Rear flange mounting of 12 inch (300 mm) strokes and longer not recommended. Front and rear flange or foot mount configurations are recommended.
5. Maximum cycle rate is 60 cycles/hr.
6. For impact velocities over 180 in./sec. (4.5 m/s), consult factory.

Heavy Duty Series Shock Absorber
HD/HDA Series

HD 2.0 x 10 → HD 2.0 x 56 Series

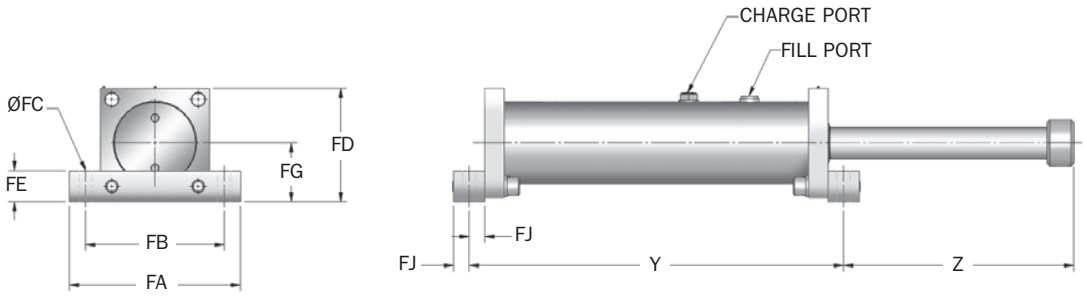


Note: For TF, FF and FR mounting, delete front foot and dimensions.

Catalog No./ Model	(S) Stroke in. (mm)	(E_T) Max. in.-lbs./cycle (Nm/cycle)	(E_TC) Max. in.-lbs./hour (Nm/hr)	(F_P) Max. Shock Force lbs. (N)	Nominal Return Force lbs. (N)	Flange Dimensions			Model Weight (lbs.) (Kg)
						SA in. (mm)	SB in. (mm)	Rec. Bolt Size in. (mm)	
HD 2.0 x 10	10 (250)	212,000 (24 000)	9,403,000 (1 062 482)	25,000 (110 000)	100 (440)	5.5 (140)	4.4 (111)	⅝ (M16)	51 (23)
HD 2.0 x 12	12 (300)	248,000 (28 000)	10,490,000 (1 185 355)	25,000 (110 000)	100 (440)	5.5 (140)	4.4 (111)	⅝ (M16)	55 (25)
HD 2.0 x 14	14 (350)	290,000 (32 700)	11,577,000 (1 308 227)	25,000 (110 000)	100 (440)	5.5 (140)	4.4 (111)	⅝ (M16)	60 (27)
HD 2.0 x 16	16 (400)	331,000 (37 400)	12,665,000 (1 431 099)	25,000 (110 000)	100 (440)	5.5 (140)	4.4 (111)	⅝ (M16)	64 (29)
HD 2.0 x 18	18 (450)	372,000 (42 000)	13,752,000 (1 553 971)	25,000 (110 000)	100 (440)	5.5 (140)	4.4 (111)	⅝ (M16)	68 (31)
HD 2.0 x 20	20 (500)	414,000 (46 800)	14,818,000 (1 674 434)	25,000 (110 000)	100 (440)	5.5 (140)	4.4 (111)	⅝ (M16)	73 (33)
HD 2.0 x 24	24 (600)	496,000 (56 100)	16,993,000 (1 920 178)	25,000 (110 000)	100 (440)	5.5 (140)	4.4 (111)	⅝ (M16)	79 (36)
HD 2.0 x 28	28 (700)	580,000 (65 500)	19,168,000 (2 165 922)	25,000 (110 000)	100 (440)	5.5 (140)	4.4 (111)	⅝ (M16)	93 (42)
HD 2.0 x 32	32 (800)	662,000 (74 800)	23,005,000 (2 599 589)	25,000 (110 000)	125 (560)	5.5 (140)	4.4 (111)	⅝ (M16)	108 (49)
HD 2.0 x 36	36 (900)	677,000 (76 500)	25,137,000 (2 840 514)	22,500 (100 000)	125 (560)	5.5 (140)	4.4 (111)	⅝ (M16)	117 (53)
HD 2.0 x 40	40 (1 000)	647,000 (73 100)	27,270,000 (3 081 440)	19,000 (86 000)	125 (560)	5.5 (140)	4.4 (111)	⅝ (M16)	124 (56)
HD 2.0 x 48	48 (1 200)	542,000 (61 200)	31,534,000 (3 563 292)	13,500 (60 000)	125 (560)	5.5 (140)	4.4 (111)	⅝ (M16)	141 (64)
HD 2.0 x 56	56 (1 400)	367,000 (41 650)	22,000,000 (2 500 000)	7,900 (35 000)	125 (560)	5.5 (140)	4.4 (111)	⅝ (M16)	161 (73)

Heavy Duty Series Shock Absorber
HD/HDA Series

HD 2.0 x 10 → HD 2.0 x 56 Series



Note: For TF, FF and FR mounting, delete front foot and rear foot and dimensions.

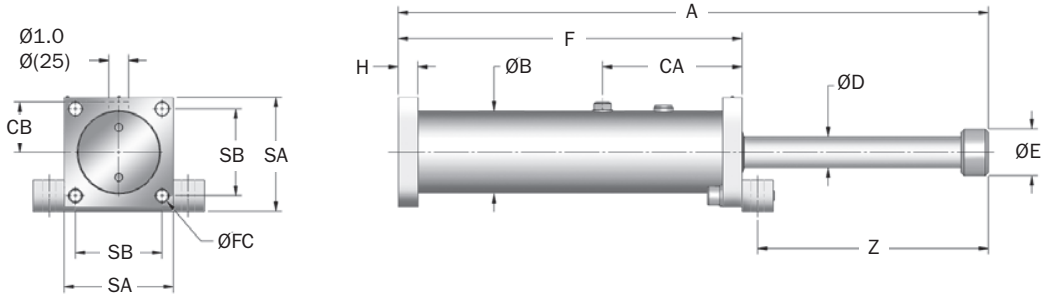
Catalog No./ Model	A in. (mm)	B in. (mm)	D in. (mm)	E in. (mm)	F in. (mm)	H in. (mm)	Y in. (mm)	Z in. (mm)	Foot Mount Dimensions FA in. (mm)	FB in. (mm)	FC in. (mm)	FD in. (mm)	FE in. (mm)	FG in. (mm)	FJ in. (mm)	Charge Port Dimensions CA in. (mm)	CB in. (mm)
HD 2.0 x 10	29.8 (757)	4.3 (110)	1.6 (40)	2.4 (60)	17.4 (441)	1.0 (25)	19.0 (481)	11.6 (296)	8.7 (220)	7.0 (178)	.67 (17)	5.8 (146)	1.6 (40)	3.0 (76)	.80 (20)	7.0 (179)	2.6 (65)
HD 2.0 x 12	33.8 (859)	4.3 (110)	1.6 (40)	2.4 (60)	19.4 (492)	1.0 (25)	21.0 (532)	13.6 (347)	8.7 (220)	7.0 (178)	.67 (17)	5.8 (146)	1.6 (40)	3.0 (76)	.80 (20)	7.0 (179)	2.6 (65)
HD 2.0 x 14	37.8 (960)	4.3 (110)	1.6 (40)	2.4 (60)	21.4 (543)	1.0 (25)	23.0 (583)	15.6 (397)	8.7 (220)	7.0 (178)	.67 (17)	5.8 (146)	1.6 (40)	3.0 (76)	.80 (20)	7.0 (179)	2.6 (65)
HD 2.0 x 16	41.8 (1 062)	4.3 (110)	1.6 (40)	2.4 (60)	23.4 (594)	1.0 (25)	25.0 (634)	17.6 (448)	8.7 (220)	7.0 (178)	.67 (17)	5.8 (146)	1.6 (40)	3.0 (76)	.80 (20)	7.0 (179)	2.6 (65)
HD 2.0 x 18	45.8 (1 164)	4.3 (110)	1.6 (40)	2.4 (60)	25.4 (645)	1.0 (25)	27.0 (685)	19.6 (499)	8.7 (220)	7.0 (178)	.67 (17)	5.8 (146)	1.6 (40)	3.0 (76)	.80 (20)	7.0 (179)	2.6 (65)
HD 2.0 x 20	49.8 (1 265)	4.3 (110)	1.6 (40)	2.4 (60)	27.4 (695)	1.0 (25)	29.0 (735)	21.6 (550)	8.7 (220)	7.0 (178)	.67 (17)	5.8 (146)	1.6 (40)	3.0 (76)	.80 (20)	7.0 (179)	2.6 (65)
HD 2.0 x 24	57.8 (1 469)	4.3 (110)	1.6 (40)	2.4 (60)	31.4 (797)	1.0 (25)	33.0 (837)	25.6 (652)	8.7 (220)	7.0 (178)	.67 (17)	5.8 (146)	1.6 (40)	3.0 (76)	.80 (20)	7.0 (179)	2.6 (65)
HD 2.0 x 28	65.8 (1 672)	4.3 (110)	1.6 (40)	2.4 (60)	35.4 (899)	1.0 (25)	37.0 (939)	29.6 (753)	8.7 (220)	7.0 (178)	.67 (17)	5.8 (146)	1.6 (40)	3.0 (76)	.80 (20)	7.0 (179)	2.6 (65)
HD 2.0 x 32	76.9 (1 953)	4.3 (110)	1.6 (40)	2.4 (60)	42.5 (1 079)	1.0 (25)	44.0 (1 119)	33.7 (854)	8.7 (220)	7.0 (178)	.67 (17)	5.8 (146)	1.6 (40)	3.0 (76)	.80 (20)	10.2 (260)	2.6 (65)
HD 2.0 x 36	84.7 (2 151)	4.3 (110)	1.6 (40)	2.4 (60)	46.4 (1 179)	1.0 (25)	48.0 (1 219)	37.5 (952)	8.7 (220)	7.0 (178)	.67 (17)	5.8 (146)	1.6 (40)	3.0 (76)	.80 (20)	10.2 (260)	2.6 (65)
HD 2.0 x 40	92.6 (2 351)	4.3 (110)	1.6 (40)	2.4 (60)	50.4 (1 279)	1.0 (25)	52.0 (1 319)	41.4 (1 052)	8.7 (220)	7.0 (178)	.67 (17)	5.8 (146)	1.6 (40)	3.0 (76)	.80 (20)	10.2 (260)	2.6 (65)
HD 2.0 x 48	108.3 (2 751)	4.3 (110)	1.6 (40)	2.4 (60)	58.0 (1 472)	1.0 (25)	59.5 (1 512)	49.6 (1 259)	8.7 (220)	7.0 (178)	.67 (17)	5.8 (146)	1.6 (40)	3.0 (76)	.80 (20)	10.2 (260)	2.6 (65)
HD 2.0 x 56	124.8 (3 171)	4.3 (110)	1.6 (40)	2.4 (60)	66.5 (1 689)	1.0 (25)	68.1 (1 729)	57.5 (1 462)	8.7 (220)	7.0 (178)	.67 (17)	5.8 (146)	1.6 (40)	3.0 (76)	.80 (20)	10.2 (260)	2.6 (65)

Notes: 1. HD shock absorbers will function satisfactorily at 5% of their maximum rated energy per cycle.
If less than these values, a smaller model should be specified.
2. It is recommended that the customer consult Enidine for safety-related overhead crane applications.
3. The energy data listed is for ideal linear impacts only. If side load conditions exist in the application, contact Enidine for sizing assistance.
4. Rear flange mounting of 12 inch (300 mm) strokes and longer not recommended. Front and rear flange or foot mount configurations are recommended.
5. Maximum cycle rate is 60 cycles/hr.
6. For impact velocities over 180 in./sec. (4.5 m/s), consult factory.

Heavy Duty Series Shock Absorber
HD/HDA Series

Technical Data

HD(A) 3.0 x 2 → HD 3.0 x 56 Series



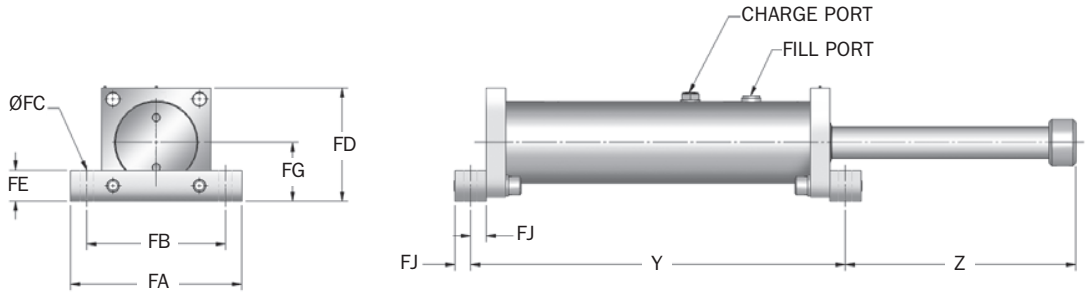
Note: For TF, FF and FR mounting, delete front foot and dimensions.

Catalog No./ Model	(S) Stroke in. (mm)	HD (E_T) Max. in.-lbs./cycle (Nm/cycle)	HD (E_TC) Max. in.-lbs./hour (Nm/hr)	HDA (E_T) Max. in.-lbs./cycle (Nm/cycle)	HDA (E_TC) Max. in.-lbs./hour (Nm/hr)	(F_P) Max. Shock Force lbs. (N)	Nominal Return Force lbs. (N)	Flange Dimensions SA in. (mm)	Flange Dimensions SB in. (mm)	Flange Dimensions Rec. Bolt Size in. (mm)	Model Weight lbs. (Kg)
HD(A) 3.0 x 2	2 (50)	83,000 (9 350)	4,965,000 (561 000)	40,000 (4 500)	2,400,000 (270 000)	50,000 (220 000)	125 (550)	6.7 (170)	4.9 (125)	¾ (M20)	40 (21)
HD(A) 3.0 x 3	3 (75)	124,000 (14 000)	5,924,000 (669 412)	60,000 (6 800)	3,600,000 (408 000)	50,000 (220 000)	125 (550)	6.7 (170)	4.9 (125)	¾ (M20)	42 (22)
HD(A) 3.0 x 5	5 (125)	207,000 (23 400)	7,210,000 (814 689)	100,000 (11 300)	6,000,000 (678 000)	50,000 (220 000)	125 (550)	6.7 (170)	4.9 (125)	¾ (M20)	48 (25)
HD(A) 3.0 x 8	8 (200)	331,000 (37 400)	9,100,000 (1 028 331)	160,000 (18 100)	9,400,000 (1 056 816)	50,000 (220 000)	125 (550)	6.7 (170)	4.9 (125)	¾ (M20)	57 (29)
HD 3.0 x 10	10 (250)	414,000 (46 800)	10,386,000 (1 173 607)	– –	– –	50,000 (220 000)	125 (550)	6.7 (170)	4.9 (125)	¾ (M20)	64 (32)
HD(A) 3.0 x 12	12 (300)	497,000 (56 100)	11,672,000 (1 318 884)	240,000 (27 200)	12,000,000 (1 347 370)	50,000 (220 000)	125 (550)	6.7 (170)	4.9 (125)	¾ (M20)	71 (35)
HD 3.0 x 14	14 (350)	580,000 (65 500)	14,218,000 (1 606 589)	– –	– –	50,000 (220 000)	125 (550)	6.7 (170)	4.9 (125)	¾ (M20)	88 (43)
HD 3.0 x 16	16 (400)	662,000 (74 800)	15,478,000 (1 749 017)	– –	– –	50,000 (220 000)	125 (550)	6.7 (170)	4.9 (125)	¾ (M20)	93 (45)
HD 3.0 x 18	18 (450)	745,000 (84 200)	16,789,000 (1 897 142)	– –	– –	50,000 (220 000)	125 (550)	6.7 (170)	4.9 (125)	¾ (M20)	99 (48)
HD 3.0 x 20	20 (500)	828,000 (93 500)	18,075,000 (2 042 419)	– –	– –	50,000 (220 000)	125 (550)	6.7 (170)	4.9 (125)	¾ (M20)	106 (51)
HD 3.0 x 24	24 (600)	993,000 (112 200)	20,621,000 (2 330 124)	– –	– –	50,000 (220 000)	125 (550)	6.7 (170)	4.9 (125)	¾ (M20)	119 (57)
HD 3.0 x 28	28 (700)	1,159,000 (130 900)	23,192,000 (2 620 677)	– –	– –	50,000 (220 000)	125 (550)	6.7 (170)	4.9 (125)	¾ (M20)	130 (62)
HD 3.0 x 32	32 (800)	1,083,000 (122 400)	25,738,000 (2 908 382)	– –	– –	40,500 (180 000)	160 (710)	6.7 (170)	4.9 (125)	¾ (M20)	143 (68)
HD 3.0 x 36	36 (900)	1,083,000 (122 400)	29,343,000 (3 315 726)	– –	– –	36,000 (160 000)	160 (710)	6.7 (170)	4.9 (125)	¾ (M20)	163 (77)
HD 3.0 x 40	40 (1 000)	1,053,000 (119 000)	31,864,000 (3 600 582)	– –	– –	31,500 (140 000)	160 (710)	6.7 (170)	4.9 (125)	¾ (M20)	176 (85)
HD 3.0 x 48	48 (1 200)	867,000 (97 900)	36,905,000 (4 170 294)	– –	– –	21,500 (96 000)	160 (710)	6.7 (170)	4.9 (125)	¾ (M20)	200 (94)
HD 3.0 x 56	56 (1 422)	576,000 (65 450)	34,320,000 (3 900 000)	– –	– –	12,500 (55 000)	160 (710)	6.7 (170)	4.9 (125)	¾ (M20)	235 (106)

Heavy Duty Series Shock Absorber
HD/HDA Series

Technical Data

HD 3.0 x 2 → HD 3.0 x 56 Series



Note: For TF, FF and FR mounting, delete front foot and rear foot and dimensions.

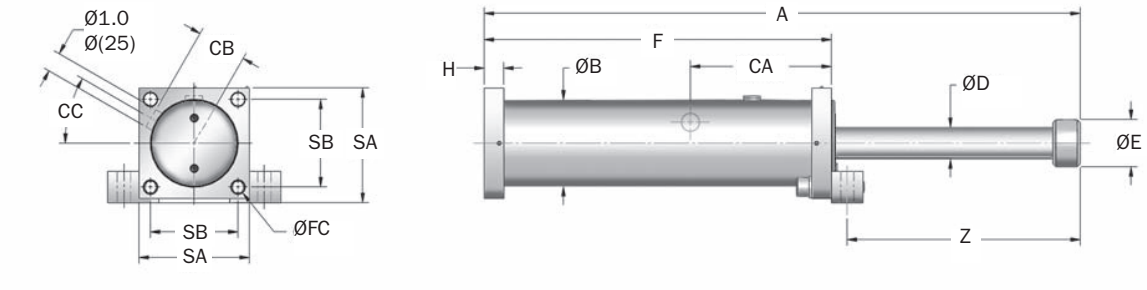
Catalog No./ Model	A in. (mm)	B in. (mm)	D in. (mm)	E in. (mm)	HD F in. (mm)	HDA F in. (mm)	H in. (mm)	HD Y in. (mm)	HDA Y in. (mm)	HD Z in. (mm)	HDA Z in. (mm)	Foot Mount Dimensions FA in. (mm)	FB in. (mm)	FC in. (mm)	FD in. (mm)	FE in. (mm)	FG in. (mm)	FJ in. (mm)	Charge Port Dimensions CA in. (mm)	CB in. (mm)
HD(A) 3.0 x 2	13.2 (336)	5.1 (130)	1.8 (45)	2.8 (70)	8.0 (203)	8.4 (213)	1.0 (25)	10.0 (253)	10.4 (263)	4.2 (108)	3.8 (98)	10.0 (255)	8.5 (216)	.87 (22)	6.8 (173)	2.0 (50)	3.5 (88)	1.0 (25)	5.3 (134)	3.0 (75)
HD(A) 3.0 x 3	15.2 (387)	5.1 (130)	1.8 (45)	2.8 (70)	9.0 (229)	9.4 (239)	1.0 (25)	11.0 (279)	11.4 (289)	5.2 (133)	4.8 (123)	10.0 (255)	8.5 (216)	.87 (22)	6.8 (173)	2.0 (50)	3.5 (88)	1.0 (25)	5.3 (134)	3.0 (75)
HD(A) 3.0 x 5	19.2 (489)	5.1 (130)	1.8 (45)	2.8 (70)	11.0 (280)	11.4 9290)	1.0 (25)	13.0 (330)	13.4 (340)	7.2 (184)	6.8 (174)	10.0 (255)	8.5 (216)	.87 (22)	6.8 (173)	2.0 (50)	3.5 (88)	1.0 (25)	5.3 (134)	3.0 (75)
HD(A) 3.0 x 8	25.2 (640)	5.1 (130)	1.8 (45)	2.8 (70)	14.0 (355)	14.4 (365)	1.0 (25)	16.0 (405)	16.4 (415)	10.2 (260)	9.8 (250)	10.0 (255)	8.5 (216)	.87 (22)	6.8 (173)	2.0 (50)	3.5 (88)	1.0 (25)	5.3 (134)	3.0 (75)
HD 3.0 x 10	29.2 (742)	5.1 (130)	1.8 (45)	2.8 (70)	16.0 (406)	N/A –	1.0 (25)	18.0 (456)	N/A –	12.2 (311)	N/A –	10.0 (255)	8.5 (216)	.87 (22)	6.8 (173)	2.0 (50)	3.5 (88)	1.0 (25)	5.3 (134)	3.0 (75)
HD(A) 3.0 x 12	33.2 (844)	5.1 (130)	1.8 (45)	2.8 (70)	18.0 (457)	18.4 (467)	1.0 (25)	20.0 (507)	20.4 (517)	14.2 (362)	13.8 (352)	10.0 (255)	8.5 (216)	.87 (22)	6.8 (173)	2.0 (50)	3.5 (88)	1.0 (25)	5.3 (134)	3.0 (75)
HD 3.0 x 14	39.2 (995)	5.1 (130)	1.8 (45)	2.8 (70)	22.0 (558)	– –	1.0 (25)	24.0 (608)	– –	16.2 (412)	– –	10.0 (255)	8.5 (216)	.87 (22)	6.8 (173)	2.0 (50)	3.5 (88)	1.0 (25)	7.2 (184)	3.0 (75)
HD 3.0 x 16	43.2 (1 097)	5.1 (130)	1.8 (45)	2.8 (70)	24.0 (609)	– –	1.0 (25)	26.0 (659)	– –	18.2 (463)	– –	10.0 (255)	8.5 (216)	.87 (22)	6.8 (173)	2.0 (50)	3.5 (88)	1.0 (25)	7.2 (184)	3.0 (75)
HD 3.0 x 18	47.2 (1 199)	5.1 (130)	1.8 (45)	2.8 (70)	26.0 (660)	– –	1.0 (25)	28.0 (710)	– –	20.2 (514)	– –	10.0 (255)	8.5 (216)	.87 (22)	6.8 (173)	2.0 (50)	3.5 (88)	1.0 (25)	7.2 (184)	3.0 (75)
HD 3.0 x 20	51.2 (1 301)	5.1 (130)	1.8 (45)	2.8 (70)	28.0 (711)	– –	1.0 (25)	30.0 (761)	– –	22.2 (565)	– –	10.0 (255)	8.5 (216)	.87 (22)	6.8 (173)	2.0 (50)	3.5 (88)	1.0 (25)	7.2 (184)	3.0 (75)
HD 3.0 x 24	59.2 (1 504)	5.1 (130)	1.8 (45)	2.8 (70)	32.0 (812)	– –	1.0 (25)	34.0 (862)	– –	26.2 (667)	– –	10.0 (255)	8.5 (216)	.87 (22)	6.8 (173)	2.0 (50)	3.5 (88)	1.0 (25)	7.2 (184)	3.0 (75)
HD 3.0 x 28	67.2 (1 707)	5.1 (130)	1.8 (45)	2.8 (70)	36.0 (914)	– –	1.0 (25)	38.0 (964)	– –	30.2 (768)	– –	10.0 (255)	8.5 (216)	.87 (22)	6.8 (173)	2.0 (50)	3.5 (88)	1.0 (25)	7.2 (184)	3.0 (75)
HD 3.0 x 32	75.2 (1 910)	5.1 (130)	1.8 (45)	2.8 (70)	40.0 (1 015)	– –	1.0 (25)	42.0 (1 065)	– –	34.2 (870)	– –	10.0 (255)	8.5 (216)	.87 (22)	6.8 (173)	2.0 (50)	3.5 (88)	1.0 (25)	7.2 (184)	3.0 (75)
HD 3.0 x 36	84.9 (2 156)	5.1 (130)	1.8 (45)	2.8 (70)	45.8 (1 164)	– –	1.0 (25)	47.8 (1 214)	– –	38.1 (967)	– –	10.0 (255)	8.5 (216)	.87 (22)	6.8 (173)	2.0 (50)	3.5 (88)	1.0 (25)	9.2 (234)	3.0 (75)
HD 3.0 x 40	92.8 (2 356)	5.1 (130)	1.8 (45)	2.8 (70)	49.8 (1 264)	– –	1.0 (25)	51.7 (1 314)	– –	42.1 (1 067)	– –	10.0 (255)	8.5 (216)	.87 (22)	6.8 (173)	2.0 (50	3.5 (88	1.0 (25)	9.2 (234)	3.0 (75)
HD 3.0 x 48	108.5 (2 756)	5.1 (130)	1.8 (45)	2.8 (70)	57.6 (1 464)	– –	1.0 (25)	59.6 (1 514)	– –	49.9 (1 267)	– –	10.0 (255)	8.5 (216)	.87 (22)	6.8 (173)	2.0 (50)	3.5 (88)	1.0 (25)	9.2 (234)	3.0 (75)
HD 3.0 x 56	124.2 (3 156)	5.1 (130)	1.8 (45)	2.8 (70)	65.5 (1 664)	– –	1.0 (25)	67.5 (1 714)	– –	57.7 (1 467)	– –	10.0 (255)	8.5 (216)	.87 (22)	6.8 (173)	2.0 (50)	3.5 (88)	1.0 (25)	9.2 (234)	3.0 (75)

Notes: 1. HD shock absorbers will function satisfactorily at 5% of their maximum rated energy per cycle.
HDA models will function satisfactorily at 10% of their maximum rated energy per cycle. If less than these values, a smaller model should be specified.
2. It is recommended that the customer consult Enidine for safety-related overhead crane applications.
3. The energy data listed is for ideal linear impacts only. If side load conditions exist in the application, contact Enidine for sizing assistance.
4. Rear flange mounting of 12 inch (300 mm) strokes and longer not recommended. Front and rear flange or foot mount configurations are recommended.
5. HDA models which have an impact velocity below 30 in./sec. (0,8 m/s), please contact Enidine for sizing assistance.
6. Maximum cycle rate is 60 cycles/hr.
7. For impact velocities over 180 in./sec. (4.5 m/s), consult factory.

Heavy Duty Series Shock Absorber
HD/HDA Series

Technical Data

HD 3.5 x 2 → HD 3.5 x 48 Series

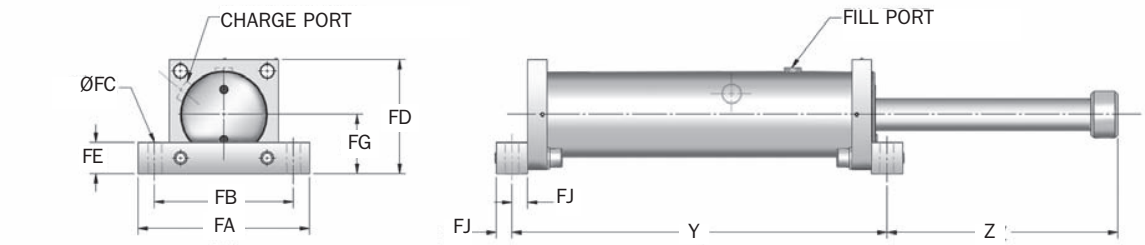


Note: For TF, FF and FR mounting, delete front foot and dimensions.

Catalog No./ Model	(S) Stroke in. (mm)	(E_T) Max. in.-lbs./cycle (Nm/cycle)	(E_TC) Max. in.-lbs./hour (Nm/hr)	(F_P) Max. Shock Force lbs. (N)	Nominal Return Force lbs. (N)	Flange Dimensions			Model Weight (lbs.) (Kg)
						SA in. (mm)	SB in. (mm)	Rec. Bolt Size in. (mm)	
HD 3.5 x 2	2 (50)	112,500 (12 750)	7,345,500 (830 000)	67,500 (300 000)	195 (860)	7.9 (200)	6.3 (160)	¾ (M20)	73 (33)
HD 3.5 x 4	4 (100)	225,500 (25 500)	8,850,000 (1 000 000)	67,500 (300 000)	195 (860)	7.9 (200)	6.3 (160)	¾ (M20)	82 (37)
HD 3.5 x 6	6 (150)	338,500 (38 250)	10,620,000 (1 200 000)	67,500 (300 000)	195 (860)	7.9 (200)	6.3 (160)	¾ (M20)	90 (41)
HD 3.5 x 8	8 (200)	451,500 (51 000)	11,947,500 (1 350 000)	67,500 (300 000)	195 (860)	7.9 (200)	6.3 (160)	¾ (M20)	99 (45)
HD 3.5 x 10	10 (250)	564,000 (63 750)	13,717,500 (1 550 000)	67,500 (300 000)	195 (860)	7.9 (200)	6.3 (160)	¾ (M20)	108 (49)
HD 3.5 x 12	12 (300)	677,000 (76 500)	15,045,000 (1 700 000)	67,500 (300 000)	195 (860)	7.9 (200)	6.3 (160)	¾ (M20)	117 (53)
HD 3.5 x 16	16 (400)	903,000 (102 000)	18,142,500 (2 050 000)	67,500 (300 000)	195 (860)	7.9 (200)	6.3 (160)	¾ (M20)	132 (60)
HD 3.5 x 20	20 (500)	1,128,500 (127 500)	23,010,000 (2 600 000)	67,500 (300 000)	195 (860)	7.9 (200)	6.3 (160)	¾ (M20)	163 (74)
HD 3.5 x 24	24 (600)	1,354,000 (153 000)	25,665,000 (2 900 000)	67,500 (300 000)	195 (860)	7.9 (200)	6.3 (160)	¾ (M20)	179 (81)
HD 3.5 x 28	28 (700)	1,580,000 (178 500)	28,762,500 (3 250 000)	67,500 (300 000)	195 (860)	7.9 (200)	6.3 (160)	¾ (M20)	196 (89)
HD 3.5 x 32	32 (800)	1,805,500 (204 000)	31,860,000 (3 600 000)	67,500 (300 000)	195 (860)	7.9 (200)	6.3 (160)	¾ (M20)	214 (97)
HD 3.5 x 36	36 (900)	1,760,000 (198 900)	34,957,500 (3 950 000)	58,500 (260 000)	195 (860)	7.9 (200)	6.3 (160)	¾ (M20)	231 (105)
HD 3.5 x 40	40 (1 000)	1,617,500 (182 750)	38,055,000 (4 300 000)	48,500 (215 000)	195 (860)	7.9 (200)	6.3 (160)	¾ (M20)	247 (112)
HD 3.5 x 48	48 (1 200)	1,400,000 (158 100)	44,250,000 (5 000 000)	35,000 (155 000)	195 (860)	7.9 (200)	6.3 (160)	¾ (M20)	282 (128)

Heavy Duty Series Shock Absorber
HD/HDA Series

HD 3.5 x 10 → HD 3.5 x 48 Series



Note: For TF, FF and FR mounting, delete front foot and rear foot and dimensions.

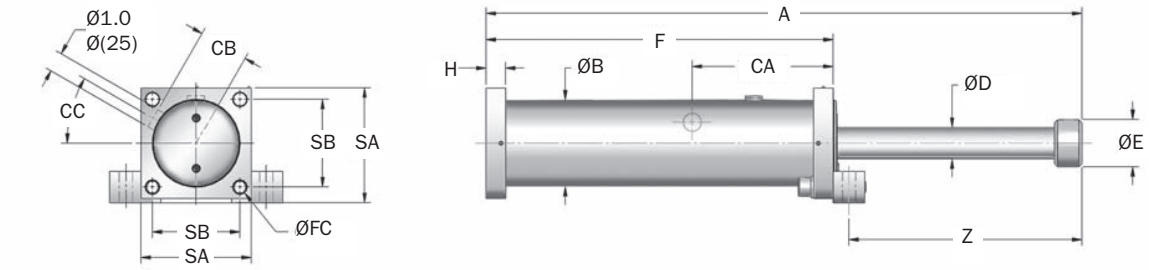
Catalog No./ Model	A in. (mm)	B in. (mm)	D in. (mm)	E in. (mm)	F in. (mm)	H in. (mm)	Y in. (mm)	Z in. (mm)	Foot Mount Dimensions FA in. (mm)	FB in. (mm)	FC in. (mm)	FD in. (mm)	FE in. (mm)	FG in. (mm)	FJ in. (mm)	Charge Port Dimensions CA in. (mm)	CB in. (mm)	CC deg.
HD 3.5 x 2	13.9 (658)	6.1 (155)	2.2 (56)	3.2 (82)	9.6 (396)	1.0 (25)	11.6 (446)	3.3 (237)	11.8 (300)	9.8 (250)	1.06 (27)	8.3 (210)	2.0 (50)	4.3 (110)	1.0 (25)	5.5 (139)	3.4 (86)	90° (90°)
HD 3.5 x 4	18.0 (760)	6.1 (155)	2.2 (56)	3.2 (82)	11.6 (447)	1.0 (25)	13.6 (497)	5.4 (288)	11.8 (300)	9.8 (250)	1.06 (27)	8.3 (210)	2.0 (50)	4.3 (110)	1.0 (25)	5.5 (139)	3.4 (86)	90° (90°)
HD 3.5 x 6	21.9 (862)	6.1 (155)	2.2 (56)	3.2 (82)	13.6 (498)	1.0 (25)	15.6 (548)	7.3 (339)	11.8 (300)	9.8 (250)	1.06 (27)	8.3 (210)	2.0 (50)	4.3 (110)	1.0 (25)	5.5 (139)	3.4 (86)	90° (90°)
HD 3.5 x 8	25.9 (1 064)	6.1 (155)	2.2 (56)	3.2 (82)	15.6 (599)	1.0 (25)	17.6 (649)	9.3 (440)	11.8 (300)	9.8 (250)	1.06 (27)	8.3 (210)	2.0 (50)	4.3 (110)	1.0 (25)	5.5 (139)	3.4 (86)	90° (90°)
HD 3.5 x 10	29.9 (354)	6.1 (155)	2.2 (56)	3.2 (82)	17.6 (244)	1.0 (25)	19.6 (294)	11.3 (85)	11.8 (300)	9.8 (250)	1.06 (27)	8.3 (210)	2.0 (50)	4.3 (110)	1.0 (25)	5.5 (139)	3.4 (86)	90° (90°)
HD 3.5 x 12	33.9 (456)	6.1 (155)	2.2 (56)	3.2 (82)	19.6 (295)	1.0 (25)	21.6 (345)	13.3 (136)	11.8 (300)	9.8 (250)	1.06 (27)	8.3 (210)	2.0 (50)	4.3 (110)	1.0 (25)	5.5 (139)	3.4 (86)	90° (90°)
HD 3.5 x 16	41.9 (556)	6.1 (155)	2.2 (56)	3.2 (82)	23.6 (345)	1.0 (25)	25.6 (395)	17.3 (186)	11.8 (300)	9.8 (250)	1.06 (27)	8.3 (210)	2.0 (50)	4.3 (110)	1.0 (25)	5.5 (139)	3.4 (86)	90° (90°)
HD 3.5 x 20	52.0 (1 323)	6.1 (155)	2.2 (56)	3.2 (82)	29.8 (756)	1.0 (25)	31.8 (806)	21.2 (542)	11.8 (300)	9.8 (250)	1.06 (27)	8.3 (210)	2.0 (50)	4.3 (110)	1.0 (25)	7.6 (194)	3.4 (86)	90° (90°)
HD 3.5 x 24	60.1 (1 527)	6.1 (155)	2.2 (56)	3.2 (82)	33.8 (858)	1.0 (25)	35.8 (908)	25.3 (644)	11.8 (300)	9.8 (250)	1.06 (27)	8.3 (210)	2.0 (50)	4.3 (110)	1.0 (25)	7.6 (194)	3.4 (86)	90° (90°)
HD 3.5 x 28	68.0 (1 729)	6.1 (155)	2.2 (56)	3.2 (82)	37.8 (959)	1.0 (25)	39.8 (1 009)	29.2 (745)	11.8 (300)	9.8 (250)	1.06 (27)	8.3 (210)	2.0 (50)	4.3 (110)	1.0 (25)	7.6 (194)	3.4 (86)	90° (90°)
HD 3.5 x 32	76.1 (1 933)	6.1 (155)	2.2 (56)	3.2 (82)	41.8 (1 061)	1.0 (25)	43.8 (1 111)	33.2 (847)	11.8 (300)	9.8 (250)	1.06 (27)	8.3 (210)	2.0 (50)	4.3 (110)	1.0 (25)	7.6 (194)	3.4 (86)	90° (90°)
HD 3.5 x 36	84.1 (2 137)	6.1 (155)	2.2 (56)	3.2 (82)	45.8 (1 163)	1.0 (25)	47.8 (1 213)	37.3 (949)	11.8 (300)	9.8 (250)	1.06 (27)	8.3 (210)	2.0 (50)	4.3 (110)	1.0 (25)	7.6 (194)	3.4 (86)	90° (90°)
HD 3.5 x 40	92.1 (2 339)	6.1 (155)	2.2 (56)	3.2 (82)	49.8 (1 264)	1.0 (25)	51.8 (1 314)	41.3 (1 050)	11.8 (300)	9.8 (250)	1.06 (27)	8.3 (210)	2.0 (50)	4.3 (110)	1.0 (25)	7.6 (194)	3.4 (86)	90° (90°)
HD 3.5 x 48	107.8 (2 739)	6.1 (155)	2.2 (56)	3.2 (82)	57.6 (1 464)	1.0 (25)	59.6 (1 514)	49.2 (1 250)	11.8 (300)	9.8 (250)	1.06 (27)	8.3 (210)	2.0 (50)	4.3 (110)	1.0 (25)	7.6 (194)	3.4 (86)	90° (90°)

Notes: 1. HD shock absorbers will function satisfactorily at 5% of their maximum rated energy per cycle.
2. It is recommended that the customer consult Enidine for safety-related overhead crane applications.
3. The energy data listed is for ideal linear impacts only. If side load conditions exist in the application, contact Enidine for sizing assistance.
4. Rear flange mounting of 12 inch (300 mm) strokes and longer not recommended. Front and rear flange or foot mount configurations are recommended.
5. Maximum cycle rate is 60 cycles/hr.
6. For impact velocities over 180 in./sec. (4.5 m/s), consult factory.

Heavy Duty Series Shock Absorber
HD/HDA Series

Technical Data

HD(A) 4.0 x 2 → HD 4.0 x 48 Series



Note: For TF, FF and FR mounting, delete front foot and dimensions.

Catalog No./ Model	(S) Stroke in. (mm)	HD		HDA		(F_P) Max. Shock Force lbs. (N)	Nominal Return Force lbs. (N)	Flange Dimensions			Model Weight lbs. (Kg)
		(E_T) Max. in.-lbs./cycle (Nm/cycle)	(E_TC) Max. in.-lbs./hour (Nm/hr)	(E_T) Max. in.-lbs./cycle (Nm/cycle)	(E_TC) Max. in.-lbs./hour (Nm/hr)			SA in. (mm)	SB in. (mm)	Rec. Bolt Size in. (mm)	
HD(A) 4.0 x 2	2 (50)	134,000 (15 100)	8,018,000 (906 000)	120,000 (13 500)	7,200,000 (810 000)	80,000 (355 000)	245 (1 090)	9.8 (250)	7.8 (197)	1 (M24)	141 (64)
HD(A) 4.0 x 4	4 (100)	268,000 (30 200)	13,302,000 (1 503 152)	240,000 (27 000)	13,700,000 (1 546 721)	80,000 (355 000)	245 (1 090)	9.8 (250)	7.8 (197)	1 (M24)	154 (70)
HD(A) 4.0 x 6	6 (150)	400,000 (45 300)	15,230,000 (1 721 000)	360,000 (40 500)	15,600,000 (1 764 569)	80,000 (355 000)	245 (1 090)	9.8 (250)	7.8 (197)	1 (M24)	168 (76)
HD(A) 4.0 x 8	8 (200)	535,000 (60 400)	17,235,000 (1 947 562)	480,000 (54 000)	17,600,000 (1 991 131)	80,000 (355 000)	245 (1 090)	9.8 (250)	7.8 (197)	1 (M24)	181 (82)
HD(A) 4.0 x 10	10 (250)	668,000 (75 400)	19,163,000 (2 165 410)	600,000 (67 500)	19,600,000 (2 208 980)	80,000 (355 000)	245 (1 090)	9.8 (250)	7.8 (197)	1 (M24)	192 (87)
HD 4.0 x 12	12 (300)	800,000 (90 500)	24,754,000 (2 797 169)	– –	– –	80,000 (355 000)	245 (1 090)	9.8 (250)	7.8 (197)	1 (M24)	238 (108)
HD 4.0 x 16	16 (400)	1,068,000 (120 700)	28,648,000 (3 237 222)	– –	– –	80,000 (355 000)	245 (1 090)	9.8 (250)	7.8 (197)	1 (M(24)	265 (120)
HD 4.0 x 20	20 (500)	1,336,000 (150 900)	32,581,000 (3 681 633)	– –	– –	80,000 (355 000)	245 (1 090)	9.8 (250)	7.8 (197)	1 (M24)	290 (131)
HD 4.0 x 24	24 (600)	1,602,000 (181 000)	36,514,000 (4 126 043)	– –	– –	80,000 (355 000)	245 (1 090)	9.8 (250)	7.8 (197)	1 (M24)	317 (144)
HD 4.0 x 28	28 (700)	1,870,000 (211 200)	40,408,000 (4 566 096)	– –	– –	80,000 (355 000)	245 (1 090)	9.8 (250)	7.8 (197)	1 (M24)	346 (157)
HD 4.0 x 32	32 (800)	2,137,000 (241 400)	44,341,000 (5 010 506)	– –	– –	80,000 (355 000)	245 (1 090)	9.8 (250)	7.8 (197)	1 (M24)	375 (170)
HD 4.0 x 36	36 (900)	2,404,000 (271 600)	48,274,000 (5 454 916)	– –	– –	80,000 (355 000)	245 (1 090)	9.8 (250)	7.8 (197)	1 (M24)	403 (183)
HD 4.0 x 40	40 (1 000)	2,182,000 (246 500)	52,168,000 (5 894 969)	– –	– –	65,000 (290 000)	245 (1 090)	9.8 (250)	7.8 (197)	1 (M24)	430 (195)
HD 4.0 x 48	48 (1 200)	1,806,000 (204 000)	59,880,000 (6 766 361)	– –	– –	45,000 (200 000)	245 (1 090)	9.8 (250)	7.8 (197)	1 (M24)	485 (220)

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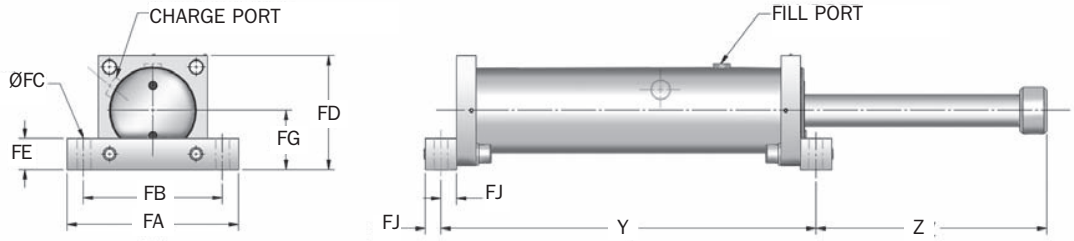
Heavy Duty Series Shock Absorber
HD/HDA Series

HD 4.0 x 2 → HD 4.0 x 48 Series



Note: For TF, FF and FR mounting, delete front foot and rear foot and dimensions.

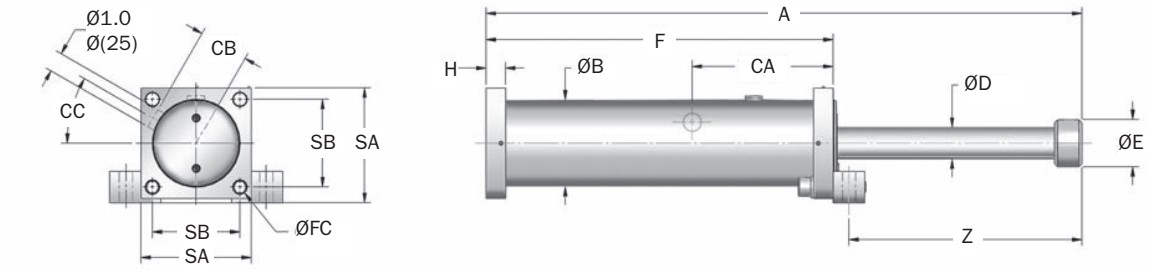
Catalog No./ Model	A in. (mm)	B in. (mm)	D in. (mm)	E in. (mm)	HD F in. (mm)	HDA F in. (mm)	H in. (mm)	HD Y in. (mm)	HDA Y in. (mm)	HD Z in. (mm)	HDA Z in. (mm)	Foot Mount Dimensions							Charge Port Dimensions		
												FA in. (mm)	FB in. (mm)	FC in. (mm)	FD in. (mm)	FE in. (mm)	FG in. (mm)	FJ in. (mm)	CA in. (mm)	CB in. (mm)	CC deg.
HD(A) 4.0 x 2	16.9 (430)	7.9 (200)	2.5 (63)	3.9 (100)	11.6 (294)	12.0 (304)	1.6 (40)	13.5 (344)	13.9 (354)	4.4 (111)	4.0 (101)	14.2 (360)	12.5 (317)	1.06 (27)	9.9 (252)	2.0 (50)	5.0 (127)	1.0 (25)	8.7 (220)	4.2 (107)	155° (155°)
HD(A) 4.0 x 4	20.9 (532)	7.9 (200)	2.5 (63)	3.9 (100)	13.6 (345)	14.0 (355)	1.6 (40)	15.5 (395)	15.9 (405)	6.4 (162)	6.0 (152)	14.2 (360)	12.5 (317)	1.06 (27)	9.9 (252)	2.0 (50)	5.0 (127)	1.0 (25)	8.7 (220)	4.2 (107)	155° (155°)
HD(A) 4.0 x 6	24.9 (632)	7.9 (200)	2.5 (63)	3.9 (100)	15.6 (395)	16.0 (405)	1.6 (40)	17.5 (445)	17.9 (455)	8.4 (212)	8.0 (202)	14.2 (360)	12.5 (317)	1.06 (27)	9.9 (252)	2.0 (50)	5.0 (127)	1.0 (25)	8.7 (220)	4.2 (107)	155° (155°)
HD(A) 4.0 x 8	28.9 (735)	7.9 (200)	2.5 (63)	3.9 (100)	17.6 (447)	18.0 (457)	1.6 (40)	19.5 (497)	19.9 (507)	10.4 (263)	10.0 (253)	14.2 (360)	12.5 (317)	1.06 (27)	9.9 (252)	2.0 (50)	5.0 (127)	1.0 (25)	8.7 (220)	4.2 (107)	155° (155°)
HD(A) 4.0 x 10	32.9 (836)	7.9 (200)	2.5 (63)	3.9 (100)	19.6 (497)	20.0 (507)	1.6 (40)	21.5 (547)	21.9 (557)	12.4 (314)	12.0 (304)	14.2 (360)	12.5 (317)	1.06 (27)	9.9 (252)	2.0 (50)	5.0 (127)	1.0 (25)	8.7 (220)	4.2 (107)	155° (155°)
HD 4.0 x 12	40.6 (1 032)	7.9 (200)	2.5 (63)	3.9 (100)	25.3 (642)	– –	1.6 (40)	27.2 (692)	– –	14.4 (365)	– –	14.2 (360)	12.5 (317)	1.06 (27)	9.9 (252)	2.0 (50)	5.0 (127)	1.0 (25)	12.2 (310)	4.2 (107)	30° (30°)
HD 4.0 x 16	48.6 (1 234)	7.9 (200)	2.5 (63)	3.9 (100)	29.3 (743)	– –	1.6 (40)	31.2 (793)	– –	18.4 (466)	– –	14.2 (360)	12.5 (317)	1.06 (27)	9.9 (252)	2.0 (50)	5.0 (127)	1.0 (25)	12.2 (310)	4.2 (107)	30° (30°)
HD 4.0 x 20	56.6 (1 438)	7.9 (200)	2.5 (63)	3.9 (100)	33.3 (845)	– –	1.6 (40)	35.2 (895)	– –	22.4 (568)	– –	14.2 (360)	12.5 (317)	1.06 (27)	9.9 (252)	2.0 (50)	5.0 (127)	1.0 (25)	12.2 (310)	4.2 (107)	30° (30°)
HD 4.0 x 24	64.6 (1 642)	7.9 (200)	2.5 (63)	3.9 (100)	37.3 (947)	– –	1.6 (40)	39.2 (997)	– –	26.5 (670)	– –	14.2 (360)	12.5 (317)	1.06 (27)	9.9 (252)	2.0 (50)	5.0 (127)	1.0 (25)	12.2 (310)	4.2 (107)	30° (30°)
HD 4.0 x 28	72.6 (1 844)	7.9 (200)	2.5 (63)	3.9 (100)	41.3 (1 048)	– –	1.6 (40)	43.2 (1 098)	– –	30.4 (771)	– –	14.2 (360)	12.5 (317)	1.06 (27)	9.9 (252)	2.0 (50)	5.0 (127)	1.0 (25)	12.2 (310)	4.2 (107)	30° (30°)
HD 4.0 x 32	80.6 (2 048)	7.9 (200)	2.5 (63)	3.9 (100)	45.3 (1 150)	– –	1.6 (40)	47.2 (1 200)	– –	34.4 (873)	– –	14.2 (360)	12.5 (317)	1.06 (27)	9.9 (252)	2.0 (50)	5.0 (127)	1.0 (25)	12.2 (310)	4.2 (107)	30° (30°)
HD 4.0 x 36	88.7 (2 252)	7.9 (200)	2.5 (63)	3.9 (100)	49.3 (1 252)	– –	1.6 (40)	51.2 (1 302)	– –	38.5 (975)	– –	14.2 (360)	12.5 (317)	1.06 (27)	9.9 (252)	2.0 (50)	5.0 (127)	1.0 (25)	12.2 (310)	4.2 (107)	30° (30°)
HD 4.0 x 40	96.6 (2 454)	7.9 (200)	2.5 (63)	3.9 (100)	53.3 (1 353)	– –	1.6 (40)	55.2 (1 403)	– –	42.4 (1 076)	– –	14.2 (360)	12.5 (317)	1.06 (27)	9.9 (252)	2.0 (50)	5.0 (127)	1.0 (25)	12.2 (310)	4.2 (107)	30° (30°)
HD 4.0 x 48	112.4 (2 854)	7.9 (200)	2.5 (63)	3.9 (100)	61.1 (1 553)	– –	1.6 (40)	63.1 (1 603)	– –	50.3 (1 276)	– –	14.2 (360)	12.5 (317)	1.06 (27)	9.9 (252)	2.0 (50)	5.0 (127)	1.0 (25)	12.2 (310)	4.2 (107)	30° (30°)

Notes: 1. HD shock absorbers will function satisfactorily at 5% of their maximum rated energy per cycle.
HDA models will function satisfactorily at 10% of their maximum rated energy per cycle. If less than these values, a smaller model should be specified.
2. It is recommended that the customer consult Enidine for safety-related overhead crane applications.
3. The energy data listed is for ideal linear impacts only. If side load conditions exist in the application, contact Enidine for sizing assistance.
4. Rear flange mounting of 12 inch (300 mm) strokes and longer not recommended. Front and rear flange or foot mount configurations are recommended.
5. HDA models which have an impact velocity below 30 in./sec. (0,8 m/s), please contact Enidine for sizing assistance.
6. Maximum cycle rate is 60 cycles/hr.
7. For impact velocities over 180 in./sec. (4.5 m/s), consult factory.

Heavy Duty Series Shock Absorber
HD/HDA Series

Technical Data

HD(A) 5.0 x 4 → HD 5.0 x 48 Series

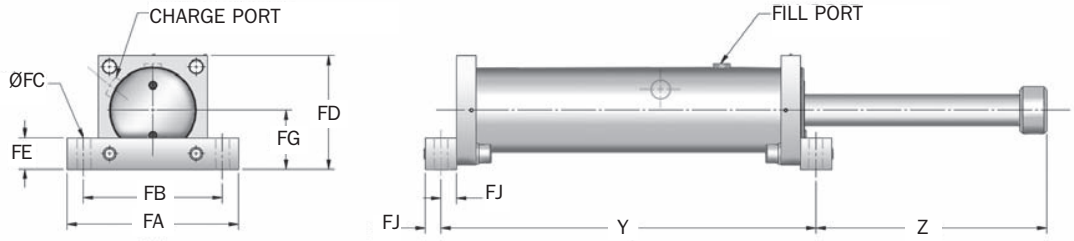


Note: For TF, FF and FR mounting, delete front foot and dimensions.

Catalog No./ Model	(S) Stroke in. (mm)	HD		HDA		(F_P) Max. Shock Force lbs. (N)	Nominal Return Force lbs. (N)	Flange Dimensions			Model Weight lbs. (Kg)
		(E_T) Max. in.-lbs./cycle (Nm/cycle)	(E_TC) Max. in.-lbs./hour (Nm/hr)	(E_T) Max. in.-lbs./cycle (Nm/cycle)	(E_TC) Max. in.-lbs./hour (Nm/hr)			SA in. (mm)	SB in. (mm)	Rec. Bolt Size in. (mm)	
HD(A) 5.0 x 4	4 (100)	414,000 (46 700)	15,600,000 (1 762 621)	327,000 (37 000)	16,000,000 (1 809 624)	124,000 (550 000)	400 (1 760)	10.8 (275)	8.7 (220)	1 ¼ (M30)	192 (87)
HD(A) 5.0 x 6	6 (150)	620,000 (70 000)	17,720,000 (2 002 337)	500,000 (56 000)	18,000,000 (2 049 340)	124,000 (550 000)	400 (1 760)	10.8 (275)	8.7 (220)	1 ¼ (M30)	207 (94)
HD(A) 5.0 x 8	8 (200)	828,000 (93 500)	19,841,000 (2 242 053)	660,000 (74 500)	20,250,000 (2 289 057)	124,000 (550 000)	400 (1 760)	10.8 (275)	8.7 (220)	1 ¼ (M30)	223 (101)
HD(A) 5.0 x 10	10 (250)	1,036,000 (117 000)	21,921,000 (2 477 070)	827,000 (93 500)	22,300,000 (2 524 073)	124,000 (550 000)	400 (1 760)	10.8 (275)	8.7 (220)	1 ¼ (M30)	238 (108)
HD(A) 5.0 x 12	12 (300)	1,239,000 (140 000)	24,042,000 (2 716 786)	990,000 (112 000)	24,500,000 (2 763 789)	124,000 (550 000)	400 (1 760)	10.8 (275)	8.7 (220)	1 ¼ (M30)	251 (114)
HD 5.0 x 16	16 (400)	1,655,000 (187 000)	28,285,000 (3 196 219)	– –	– –	124,000 (550 000)	400 (1 760)	10.8 (250)	8.7 (197)	1 ¼ (M24)	282 (128)
HD 5.0 x 20	20 (500)	2,071,000 (234 000)	36,688,000 (4 145 684)	– –	– –	124,000 (550 000)	400 (1 760)	10.8 (250)	8.7 (197)	1 ¼ (M24)	348 (158)
HD 5.0 x 24	24 (600)	2,478,000 (280 000)	40,930,000 (4 625 117)	– –	– –	124,000 (550 000)	400 (1 760)	10.8 (250)	8.7 (197)	1 ¼ (M24)	377 (171)
HD 5.0 x 28	28 (700)	2,894,000 (327 000)	45,132,000 (5 099 849)	– –	– –	124,000 (550 000)	400 (1 760)	10.8 (250)	8.7 (197)	1 ¼ (M24)	407 (185)
HD 5.0 x 32	32 (800)	3,310,000 (374 000)	49,374,000 (5 579 282)	– –	– –	124,000 (550 000)	400 (1 760)	10.8 (250)	8.7 (197)	1 ¼ (M24)	437 (198)
HD 5.0 x 40	40 (1 000)	4,133,000 (467 000)	57,818,000 (6 533 447)	– –	– –	124,000 (550 000)	400 (1 760)	10.8 (250)	8.7 (197)	1 ¼ (M24)	496 (225)
HD 5.0 x 48	48 (1 200)	3,700,000 (418 000)	66,262,000 (7 487 613)	– –	– –	92,000 (410 000)	400 (1 760)	10.8 (250)	8.7 (197)	1 ¼ (M24)	534 (242)

Heavy Duty Series Shock Absorber
HD/HDA Series

HD(A) 5.0 x 4 → HD 5.0 x 48 Series



Note: For TF, FF and FR mounting, delete front foot and rear foot and dimensions.

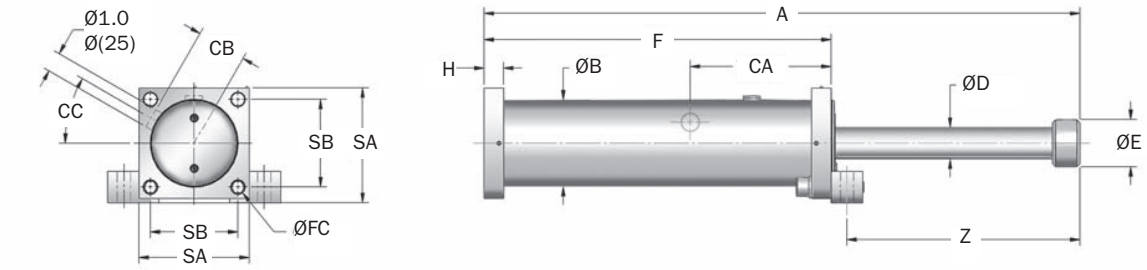
Catalog No./ Model	A in. (mm)	B in. (mm)	D in. (mm)	E in. (mm)	HD F in. (mm)	HDA F in. (mm)	H in. (mm)	HD Y in. (mm)	HDA Y in. (mm)	HD Z in. (mm)	HDA Z in. (mm)	Foot Mount Dimensions							Charge Port Dimensions		
												FA in. (mm)	FB in. (mm)	FC in. (mm)	FD in. (mm)	FE in. (mm)	FG in. (mm)	FJ in. (mm)	CA in. (mm)	CB in. (mm)	CC deg.
HD(A) 5.0 x 4	23.3 (591)	8.5 (215)	3.1 (80)	4.9 (125)	14.8 (375)	15.2 (385)	1.6 (40)	17.1 (435)	17.5 (445)	7.4 (186)	7.0 (176)	15.7 (400)	13.4 (340)	1.3 (33)	10.9 (278)	2.4 (60)	5.5 (140)	1.2 (30)	9.1 (230)	4.6 (117)	25° (25°)
HD(A) 5.0 x 6	27.3 (693)	8.5 (215)	3.1 (80)	4.9 (125)	16.8 (426)	17.2 (436)	1.6 (40)	19.1 (486)	19.5 (496)	9.4 (237)	9.0 (227)	15.7 (400)	13.4 (340)	1.3 (33)	10.9 (278)	2.4 (60)	5.5 (140)	1.2 (30)	9.1 (230)	4.6 (117)	25° (25°)
HD(A) 5.0 x 8	31.3 (795)	8.5 (215)	3.1 (80)	4.9 (125)	18.8 (477)	19.2 (487)	1.6 (40)	21.1 (537)	21.5 (547)	11.4 (288)	11.0 (278)	15.7 (400)	13.4 (340)	1.3 (33)	10.9 (278)	2.4 (60)	5.5 (140)	1.2 (30)	9.1 (230)	4.6 (117)	25° (25°)
HD(A) 5.0 x 10	35.3 (895)	8.5 (215)	3.1 (80)	4.9 (125)	20.8 (527)	21.2 (537)	1.6 (40)	23.1 (587)	23.5 (597)	13.4 (338)	13.0 (328)	15.7 (400)	13.4 (340)	1.3 (33)	10.9 (278)	2.4 (60)	5.5 (140)	1.2 (30)	9.1 (230)	4.6 (117)	25° (25°)
HD(A) 5.0 x 12	39.3 (997)	8.5 (215)	3.1 (80)	4.9 (125)	22.8 (578)	23.2 (588)	1.6 (40)	25.1 (638)	25.5 (648)	15.4 (389)	15.0 (379)	15.7 (400)	13.4 (340)	1.3 (33)	10.9 (2780	2.4 (60)	5.5 (140)	1.2 (30)	9.1 (230)	4.6 (117)	25° (25°)
HD 5.0 x 16	47.3 (1 201)	8.5 (215)	3.1 (80)	4.9 (125)	26.8 (680)	– –	1.6 (40)	29.1 (740)	– –	19.4 (491)	– –	15.7 (400)	13.4 (340)	1.3 (33)	10.9 (278)	2.4 (60)	5.5 (140)	1.2 (30)	9.1 (230)	4.6 (117)	25° (25°)
HD 5.0 x 20	59.2 (1 504)	8.5 (215)	3.1 (80)	4.9 (125)	34.7 (882)	– –	1.6 (40)	37.1 (942)	– –	23.3 (592)	– –	15.7 (400)	13.4 (340)	1.3 (33)	10.9 (278)	2.4 (60)	5.5 (140)	1.2 (30)	13.0 (230)	4.6 (117)	25° (25°)
HD 5.0 x 24	67.2 (1 708)	8.5 (215)	3.1 (80)	4.9 (125)	38.7 (984)	– –	1.6 (40)	41.1 (1 044)	– –	27.3 (694)	– –	15.7 (400)	13.4 (340)	1.3 (33)	10.9 (278)	2.4 (60)	5.5 (140)	1.2 (30)	13.0 (230)	4.6 (117)	25° (25°)
HD 5.0 x 28	75.2 (1 910)	8.5 (215)	3.1 (80)	4.9 (125)	42.7 (1 085)	– –	1.6 (40)	45.1 (1 145)	– –	31.3 (795)	– –	15.7 (400)	13.4 (340)	1.3 (33)	10.9 (278)	2.4 (60)	5.5 (140)	1.2 (30)	13.0 (230)	4.6 (117)	25° (25°)
HD 5.0 x 32	83.2 (2 114)	8.5 (215)	3.1 (80)	4.9 (125)	46.7 (1 187)	– –	1.6 (40)	49.1 (1 247)	– –	35.3 (897)	– –	15.7 (400)	13.4 (340)	1.3 (33)	10.9 (278)	2.4 (60)	5.5 (140)	1.2 (30)	13.0 (230)	4.6 (117)	25° (25°)
HD 5.0 x 40	99.2 (2 520)	8.5 (215)	3.1 (80)	4.9 (125)	54.7 (1 390)	– –	1.6 (40)	57.1 (1 450)	– –	43.3 (1 100)	– –	15.7 (400)	13.4 (340)	1.3 (33)	10.9 (278)	2.4 (60)	5.5 (140)	1.2 (30)	13.0 (230)	4.6 (117)	25° (25°)
HD 5.0 x 48	115.0 (2 920)	8.5 (215)	3.1 (80)	4.9 (125)	62.6 (1 590)	– –	1.6 (40)	65.0 (1 650)	– –	51.3 (1 300)	– –	15.7 (400)	13.4 (340)	1.3 (33)	10.9 (278)	2.4 (60)	5.5 (140)	1.2 (30)	13.0 (230)	4.6 (117)	25° (25°)

Notes: 1. HD shock absorbers will function satisfactorily at 5% of their maximum rated energy per cycle.
HDA models will function satisfactorily at 10% of their maximum rated energy per cycle. If less than these values, a smaller model should be specified.
2. It is recommended that the customer consult Enidine for safety-related overhead crane applications.
3. The energy data listed is for ideal linear impacts only. If side load conditions exist in the application, contact Enidine for sizing assistance.
4. Rear flange mounting of 12 inch (300 mm) strokes and longer not recommended. Front and rear flange or foot mount configurations are recommended.
5. HDA models which have an impact velocity below 30 in./sec. (0,8 m/s), please contact Enidine for sizing assistance.
6. Maximum cycle rate is 60 cycles/hr.
7. For impact velocities over 180 in./sec. (4.5 m/s), consult factory.

Heavy Duty Series Shock Absorber
HD/HDA Series

Technical Data

HD(A) 6.0 x 4 → HD 6.0 x 48 Series

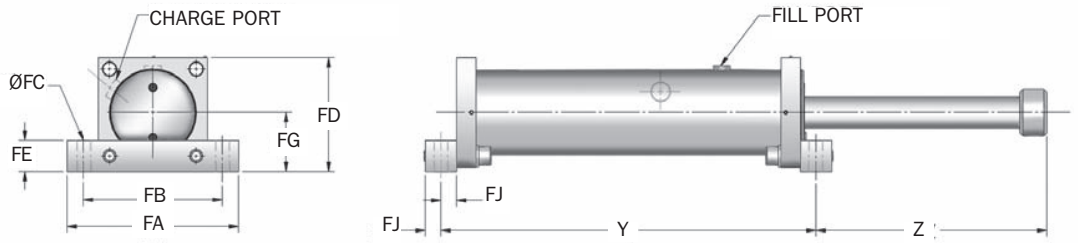


Note: For TF, FF and FR mounting, delete front foot and dimensions.

Catalog No./ Model	(S) Stroke in. (mm)	HD		HDA		(F_P) Max. Shock Force lbs. (N)	Nominal Return Force lbs. (N)	Flange Dimensions			Model Weight lbs. (Kg)
		(E_T) Max. in.-lbs./cycle (Nm/cycle)	(E_TC) Max. in.-lbs./hour (Nm/hr)	(E_T) Max. in.-lbs./cycle (Nm/cycle)	(E_TC) Max. in.-lbs./hour (Nm/hr)			SA in. (mm)	SB in. (mm)	Rec. Bolt Size in. (mm)	
HD(A) 6.0 x 4	4 (100)	677,000 (76 500)	21,280,000 (2 404 568)	540,000 (61 000)	22,000,000 (2 464 532)	202,250 (900 000)	625 (2 750)	13.0 (330)	10.2 (260)	1 ½ (M36)	362 (164)
HD(A) 6.0 x 6	6 (150)	1,010,000 (114 000)	23,933,000 (2 704 389)	810,000 (91 500)	24,500,000 (2 764 353)	202,250 (900 000)	625 (2 750)	13.0 (330)	10.2 (260)	1 ½ (M36)	386 (175)
HD(A) 6.0 x 8	8 (200)	1,354,000 (153 000)	26,586,000 (3 004 211)	1,080,000 (122 000)	27,000,000 (3 064 175)	202,250 (900 000)	625 (2 750)	13.0 (330)	10.2 (260)	1 ½ (M36)	410 (186)
HD(A) 6.0 x 10	10 (250)	1,690,000 (191 000)	29,345,000 (3 316 025)	1,350,000 (152 500)	30,000,000 (3 375 989)	202,250 (900 000)	625 (2 750)	13.0 (330)	10.2 (260)	1 ½ (M36)	432 (196)
HD(A) 6.0 x 12	12 (300)	1,982,000 (224 000)	32,052,000 (3 621 843)	1,620,000 (183 000)	33,000,000 (3 681 807)	202,250 (900 000)	625 (2 750)	13.0 (330)	10.2 (260)	1 ½ (M36)	456 (207)
HD 6.0 x 16	16 (400)	2,708,000 (306 000)	37,465,000 (4 233 478)	– –	– –	202,250 (900 000)	625 (2 750)	13.0 (330)	10.2 (260)	1 ½ (M36)	503 (228)
HD 6.0 x 20	20 (500)	3,380,000 (382 000)	42,877,000 (4 845 114)	– –	– –	202,250 (900 000)	625 (2 750)	13.0 (330)	10.2 (260)	1 ½ (M36)	551 (250)
HD 6.0 x 24	24 (600)	4,062,000 (459 000)	53,862,000 (6 086 375)	– –	– –	202,250 (900 000)	625 (2 750)	13.0 (330)	10.2 (260)	1 ½ (M36)	681 (309)
HD 6.0 x 30	30 (750)	5,070,000 (573 000)	61,928,000 (6 997 832)	– –	– –	202,250 (900 000)	625 (2 750)	13.0 (330)	10.2 (260)	1 ½ (M36)	752 (341)
HD 6.0 x 36	36 (900)	6,093,000 (688 500)	70,047,000 (7 915 285)	– –	– –	202,250 (900 000)	625 (2 750)	13.0 (330)	10.2 (260)	1 ½ (M36)	822 (373)
HD 6.0 X 42	42 (1 050)	7,106,000 (803 000)	78,113,000 (8 826 743)	– –	– –	202,250 (900 000)	625 (2 750)	13.0 (330)	10.2 (260)	1 ½ (M36)	893 (405)
HD 6.0 x 48	48 (1 200)	7,125,000 (805 000)	86,232,000 (9 744 196)	– –	– –	178,000 (790 000)	625 (2 750)	13.0 (330)	10.2 (260)	1 ½ (M36)	966 (438)

Heavy Duty Series Shock Absorber
HD/HDA Series

HD(A) 6.0 x 4 → HD 6.0 x 48 Series



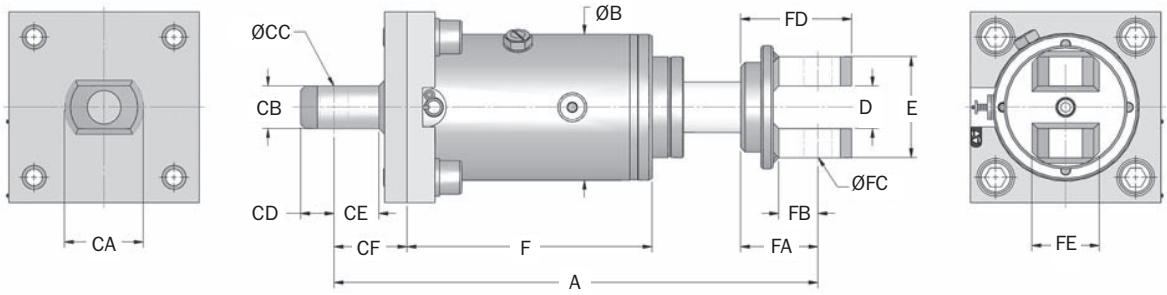
Note: For TF, FF and FR mounting, delete front foot and rear foot and dimensions.

Catalog No./ Model	A in. (mm)	B in. (mm)	D in. (mm)	E in. (mm)	HD F in. (mm)	HDA F in. (mm)	H in. (mm)	HD Y in. (mm)	HDA Y in. (mm)	HD Z in. (mm)	HDA Z in. (mm)	Foot Mount Dimensions							Charge Port Dimensions		
												FA in. (mm)	FB in. (mm)	FC in. (mm)	FD in. (mm)	FE in. (mm)	FG in. (mm)	FJ in. (mm)	CA in. (mm)	CB in. (mm)	CC deg.
HD(A) 6.0 x 4	25.1 (637)	10.8 (275)	3.9 (100)	6.3 (160)	15.4 (391)	15.8 (401)	2.0 (50)	18.2 (461)	18.6 (471)	8.3 (211)	7.9 (201)	17.7 (450)	15.0 (380)	1.6 (40)	13.1 (333)	2.8 (70)	6.6 (168)	1.4 (35)	7.8 (197)	5.7 (144)	30° (30°)
HD(A) 6.0 x 6	29.1 (737)	10.8 (275)	3.9 (100)	6.3 (160)	17.4 (441)	17.8 (451)	2.0 (50)	20.2 (511)	20.6 (521)	10.3 (261)	9.9 (251)	17.7 (450)	15.0 (380)	1.6 (40)	13.1 (333)	2.8 (70)	6.6 (168)	1.4 (35)	7.8 (197)	5.7 (144)	30° (30°)
HD(A) 6.0 x 8	33.1 (839)	10.8 (275)	3.9 (100)	6.3 (160)	19.4 (492)	19.8 (502)	2.0 (50)	22.2 (562)	22.6 (572)	12.3 (312)	11.9 (302)	17.7 (450)	15.0 (380)	1.6 (40)	13.1 (333)	2.8 (70)	6.6 (168)	1.4 (35)	7.8 (197)	5.7 (144)	30° (30°)
HD(A) 6.0 x 10	37.1 (941)	10.8 (275)	3.9 (100)	6.3 (160)	21.4 (543)	21.8 (553)	2.0 (50)	24.2 (613)	24.6 (623)	14.3 (363)	13.9 (353)	17.7 (450)	15.0 (380)	1.6 (40)	13.1 (333)	2.8 (70)	6.6 (168)	1.4 (35)	7.8 (197)	5.7 (144)	30° (30°)
HD(A) 6.0 x 12	41.1 (1043)	10.8 (275)	3.9 (100)	6.3 (160)	23.4 (594)	23.8 (604)	2.0 (50)	26.2 (664)	26.6 (674)	16.3 (414)	15.9 (404)	17.7 (450)	15.0 (380)	1.6 (40)	13.1 (333)	2.8 (70)	6.6 (168)	1.4 (35)	7.8 (197)	5.7 (144)	30° (30°)
HD 6.0 x 16	49.1 (1 246)	10.8 (275)	3.9 (100)	6.3 (160)	27.4 (696)	– –	2.0 (50)	30.2 (766)	– –	20.3 (515)	– –	17.7 (450)	15.0 (380)	1.6 (40)	13.1 (333)	2.8 (70)	6.6 (168)	1.4 (35)	7.8 (197)	5.7 (144)	30° (30°)
HD 6.0 x 20	57.1 (1 450)	10.8 (275)	3.9 (100)	6.3 (160)	31.4 (798)	– –	2.0 (50)	34.2 (868)	– –	24.3 (617)	– –	17.7 (450)	15.0 (380)	1.6 (40)	13.1 (333)	2.8 (70)	6.6 (168)	1.4 (35)	7.8 (197)	5.7 (144)	30° (30°)
HD 6.0 x 24	69.7 (1 769)	10.8 (275)	3.9 (100)	6.3 (160)	40.0 (1 015)	– –	2.0 (50)	42.7 (1 085)	– –	28.4 (719)	– –	17.7 (450)	15.0 (380)	1.6 (40)	13.1 (333)	2.8 (70)	6.6 (168)	1.4 (35)	12.3 (312)	5.7 (144)	30° (30°)
HD 6.0 x 30	81.6 (2 073)	10.8 (275)	3.9 (100)	6.3 (160)	46.0 (1 167)	– –	2.0 (50)	48.7 (1 237)	– –	34.3 (871)	– –	17.7 (450)	15.0 (380)	1.6 (40)	13.1 (333)	2.8 (70)	6.6 (168)	1.4 (35)	12.3 (312)	5.7 (144)	30° (30°)
HD 6.0 x 36	93.7 (2 379)	10.8 (275)	3.9 (100)	6.3 (160)	52.0 (1 320)	– –	2.0 (50)	54.7 (1 390)	– –	40.4 (1 024)	– –	17.7 (450)	15.0 (380)	1.6 (40)	13.1 (333)	2.8 (70)	6.6 (168)	1.4 (35)	12.3 (312)	5.7 (144)	30° (30°)
HD 6.0 x 42	105.6 (2 683)	10.8 (275)	3.9 (100)	6.3 (160)	58.0 (1 472)	– –	2.0 (50)	60.7 (1 542)	– –	46.3 (1 176)	– –	17.7 (450)	15.0 (380)	1.6 (40)	13.1 (333)	2.8 (70)	6.6 (168)	1.4 (35)	12.3 (312)	5.7 (144)	30° (30°)
HD 6.0 x 48	117.7 (2 989)	10.8 (275)	3.9 (100)	6.3 (160)	64.0 (1 625)	– –	2.0 (50)	66.7 (1 695)	– –	52.4 (1 329)	– –	17.7 (450)	15.0 (380)	1.6 (40)	13.1 (333)	2.8 (70)	6.6 (168)	1.4 (35)	12.3 (312)	5.7 (144)	30° (30°)

Notes: 1. HD shock absorbers will function satisfactorily at 5% of their maximum rated energy per cycle.
HDA models will function satisfactorily at 10% of their maximum rated energy per cycle. If less than these values, a smaller model should be specified.
2. It is recommended that the customer consult Enidine for safety-related overhead crane applications.
3. The energy data listed is for ideal linear impacts only. If side load conditions exist in the application, contact Enidine for sizing assistance.
4. Rear flange mounting of 12 inch (300 mm) strokes and longer not recommended. Front and rear flange or foot mount configurations are recommended.
5. For impact velocities over 180 in./sec. (4.5 m/s), consult factory.

HD(A) 3.0 x 2 → HD(A) 5.0 x 12 Series

Clevis Mounts (CM)



Note: Piston clevis dimensions are typical both ends on HD(A) 4.0 models.

Catalog No./ Model	A in. (mm)	B in. (mm)	D in. (mm)	E in. (mm)	HD F in. (mm)	HDA F in. (mm)	Cylinder Clevis Dimensions						Piston Clevis Dimensions				
							CA in. (mm)	CB in. (mm)	CC in. (mm)	CD in. (mm)	CE in. (mm)	CF in. (mm)	FA in. (mm)	FB in. (mm)	FC in. (mm)	FD in. (mm)	FE in. (mm)
HD(A) 3.0 x 2	17.0 (432)	5.1 (130)	1.5 (38)	3.5 (90)	8.2 (209)	8.6 (219)	2.4 (60)	1.5 (38)	1.0 (25)	1.2 (30)	1.5 (37)	2.6 (65)	2.7 (69)	1.3 (32)	1.0 (25)	3.9 (99)	2.0 (50)
HD(A) 3.0 x 3	19.0 (483)	5.1 (130)	1.5 (38)	3.5 (90)	9.2 (235)	9.6 (245)	2.4 (60)	1.5 (38)	1.0 (25)	1.2 (30)	1.5 (37)	2.6 (65)	2.7 (69)	1.3 (32)	1.0 (25)	3.9 (99)	2.0 (50)
HD(A) 3.0 x 5	23.0 (585)	5.1 (130)	1.5 (38)	3.5 (90)	11.2 (286)	11.6 (296)	2.4 (60)	1.5 (38)	1.0 (25)	1.2 (30)	1.5 (37)	2.6 (65)	2.7 (69)	1.3 (32)	1.0 (25)	3.9 (99)	2.0 (50)
HD(A) 3.0 x 8	29.0 (736)	5.1 (130)	1.5 (38)	3.5 (90)	14.2 (361)	14.6 (371)	2.4 (60)	1.5 (38)	1.0 (25)	1.2 (30)	1.5 (37)	2.6 (65)	2.7 (69)	1.3 (32)	1.0 (25)	3.9 (99)	2.0 (50)
HD(A) 3.0 x 10	330 (838)	5.1 (130)	1.5 (38)	3.5 (90)	16.2 (412)	– –	2.4 (60)	1.5 (38)	1.0 (25)	1.2 (30)	1.5 (37)	2.6 (65)	2.7 (69)	1.3 (32)	1.0 (25)	3.9 (99)	2.0 (50)
HD(A) 3.0 x 12	37.0 (940)	5.1 (130)	1.5 (38)	3.5 (90)	16.8 (463)	17.2 (473)	2.4 (60)	1.5 (38)	1.0 (25)	1.2 (30)	1.5 (37)	2.6 (65)	2.7 (69)	1.3 (32)	1.0 (25)	3.9 (99)	2.0 (50)
HD(A) 4.0 x 2	22.4 (570)	7.9 (200)	2.6 (65)	5.5 (140)	12.0 (304)	12.4 (314)	– –	– –	– –	– –	– –	3.5 (90)	3.9 (100)	2.0 (50)	2.0 (50)	5.9 (150)	3.9 (100)
HD(A) 4.0 x 4	26.4 (672)	7.9 (200)	2.6 (65)	5.5 (140)	14.0 (355)	14.4 (365)	– –	– –	– –	– –	– –	3.5 (90)	3.9 (100)	2.0 (50)	2.0 (50)	5.9 (150)	3.9 (100)
HD(A) 4.0 x 6	30.4 (772)	7.9 (200)	2.6 (65)	5.5 (140)	16.0 (405)	16.4 (415)	– –	– –	– –	– –	– –	3.5 (90)	3.9 (100)	2.0 (50)	2.0 (50)	5.9 (150)	3.9 (100)
HD(A) 4.0 x 8	34.4 (875)	7.9 (200)	2.6 (65)	5.5 (140)	18.0 (457)	18.4 (467)	– –	– –	– –	– –	– –	3.5 (90)	3.9 (100)	2.0 (50)	2.0 (50)	5.9 (150)	3.9 (100)
HD(A) 4.0 x 10	38.4 (976)	7.9 (200)	2.6 (65)	5.5 (140)	20.0 (507)	20.4 (517)	– –	– –	– –	– –	– –	3.5 (90)	3.9 (100)	2.0 (50)	2.0 (50)	5.9 (150)	3.9 (100)
HD(A) 5.0 x 4	29.6 (751)	8.5 (215)	2.8 (70)	5.9 (150)	15.2 (386)	15.6 (396)	– –	– –	– –	– –	– –	3.9 (100)	4.5 (115)	2.8 (70)	2.3 (60)	6.9 (175)	3.9 (100)
HD(A) 5.0 x 6	33.6 (853)	8.5 (215)	2.8 (70)	5.9 (150)	17.2 (437)	17.6 (447)	– –	– –	– –	– –	– –	3.9 (100)	4.5 (115)	2.8 (70)	2.3 (60)	6.9 (175)	3.9 (100)
HD(A) 5.0 x 8	37.6 (955)	8.5 (215)	2.8 (70)	5.9 (150)	19.2 (488)	19.6 (498)	– –	– –	– –	– –	– –	3.9 (100)	4.5 (115)	2.8 (70)	2.3 (60)	6.9 (175)	3.9 (100)
HD(A) 5.0 x 10	41.6 (1 055)	8.5 (215)	2.8 (70)	5.9 (150)	21.2 (538)	21.6 (548)	– –	– –	– –	– –	– –	3.9 (100)	4.5 (115)	2.8 (70)	2.3 (60)	6.9 (175)	3.9 (100)
HD(A) 5.0 x 12	45.6 (1 157)	8.5 (215)	2.8 (70)	5.9 (150)	23.2 (589)	23.6 (599)	– –	– –	– –	– –	– –	3.9 (100)	4.5 (115)	2.8 (70)	2.3 (60)	6.9 (175)	3.9 (100)