



HD Series

HD Series

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 150mm and strokes over 1525mm.

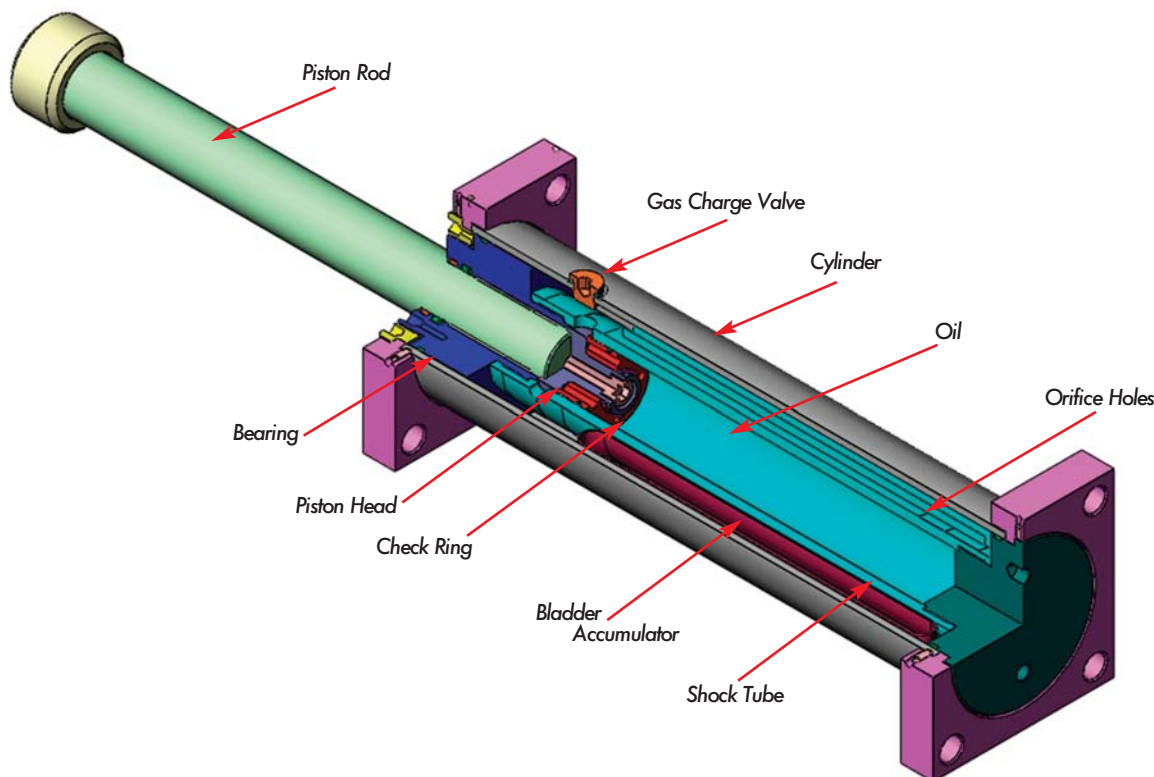
#### HDA Series

Adjustable units enable the user to modify shock absorber resistance to accommodate load velocity variations, with strokes up to 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 903 880 Nm per cycle.
- 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 (-10°C – 60°C) to (-35°C – 100°C).

## Enidine Heavy Duty (HD) Large-Bore Series Shock Absorbers



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 903 880 Nm per cycle.

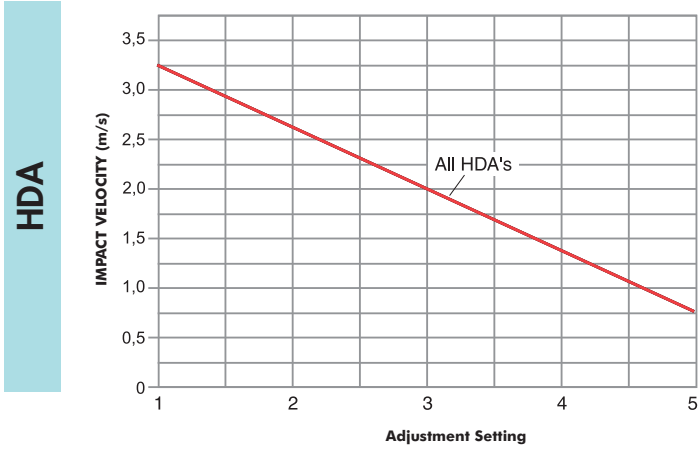
### HD/HDA Sizing Examples

1. Determine load weight (Kg), impact velocity (m/s), propelling force (N) if any, cycles per hour and stroke (mm) required.
2. Calculate total energy per cycle (Nm/c) and total energy per hour (Nm/hr). Consult this catalog's sizing examples (pages 5-14) for assistance, if required.
3. Compare the calculated total energy per cycle (Nm/c) and total energy per hour (Nm/hr), to the values listed in the HD/HDA Series Engineering Data charts. For HDA selection, the impact velocity must be below 3,3 m/s.
4. Select the appropriate HD/HDA Series model.

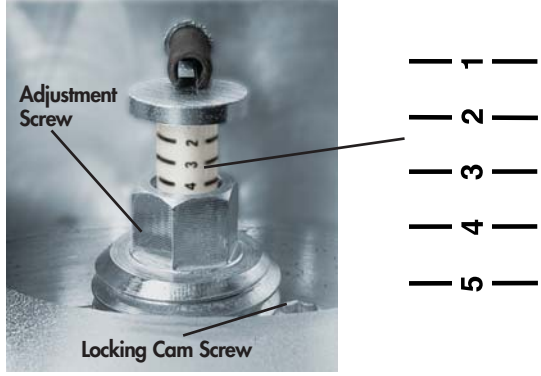
#### Example: Horizontal Application

- |                                     |              |
|-------------------------------------|--------------|
| 1. Mass (M):                        | 24 950 Kg    |
| Velocity (V):                       | 1,1 m/s      |
| Propelling Force (F <sub>D</sub> ): | 29 803 N     |
| Cycles/Hour (C):                    | 10 cycles/hr |
| Stroke (S):                         | 127 mm       |
2. Total Energy/Cycle ET: 18 6668 Nm/c  
Total Energy/Hour ETC: 18 6668 Nm/h
  3. Compare total energy per cycle and total energy per hour to the HD/HDA Series Engineering Data charts (pages 73-87).
  4. Selection: HD 3.0 x 5 (HDA is not appropriate because maximum Nm per cycle are exceeded).

**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:

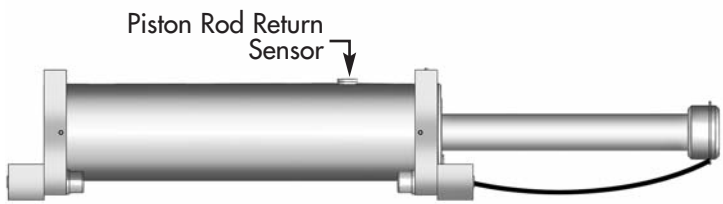
1. Locate the intersection point of the application's impact velocity and the HDA model graph line.
2. The intersection is the maximum adjustment setting to be used. Adjustments exceeding this setting could overload the shock absorber.
3. The useable adjustment setting range is from setting 1 to the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

**EXAMPLE: HDA Series**

1. Impact Velocity: 2 m/s
2. Intersection Point: Adjustment Setting 3
3. Useable Adjustment Setting Range: 1 to 3

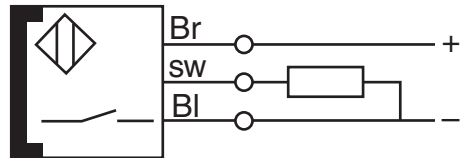
**Optional Piston Rod Return Sensor**

- Magnetic proximity sensor indicates complete piston rod return with 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: -35°C to 71°C

# Heavy Duty Series Shock Absorber

## HD/HDA Series

### 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 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 (Metric clevis mount)
- CM (Imperial clevis mount)

**C**

Options

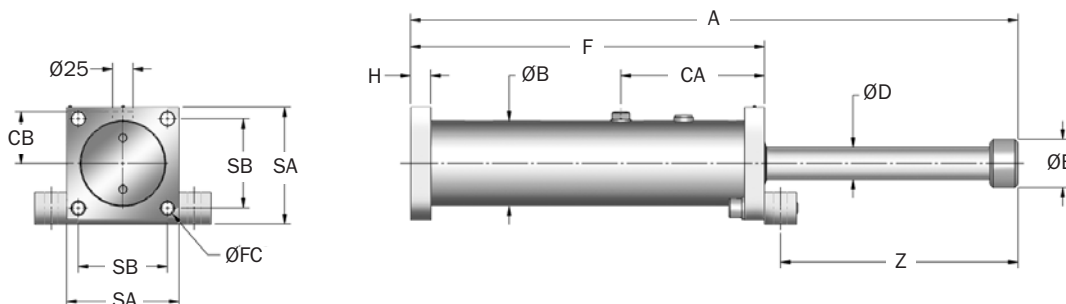
- C (Sensor cable)
- P (Sensor plug)
- SC (Safety cable)

**APPLICATION DATA**

Required for HD models:

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

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 mm	E <sub>T</sub> Max. Nm/c	E <sub>T</sub> C Max. Nm/hr	F <sub>p</sub> Max. Reaction Force N	Nominal Return Force N	Flange Dimensions			Model Mass Kg
						SA mm	SB mm	Rec. Bolt Size mm	
HD 1.5 x 2	50	3 000	180 000	70 000	280	120	90	M12	10
HD 1.5 x 4	100	5 950	357 000	70 000	280	120	90	M12	12
HD 1.5 x 6	150	8 930	535 800	70 000	280	120	90	M12	12
HD 1.5 x 8	200	11 900	714 000	70 000	280	120	90	M12	13
HD 1.5 x 10	250	14 900	839 181	70 000	280	120	90	M12	14
HD 1.5 x 12	300	17 800	939 646	70 000	280	120	90	M12	16
HD 1.5 x 14	350	20 800	1 038 141	70 000	280	120	90	M12	17
HD 1.5 x 16	400	20 400	1 138 606	60 000	280	120	90	M12	18
HD 1.5 x 18	450	18 300	1 098 000	48 000	280	120	90	M12	19
HD 1.5 x 20	500	16 500	990 000	39 000	280	120	90	M12	20
HD 1.5 x 24	600	14 200	852 000	28 000	280	120	90	M12	23

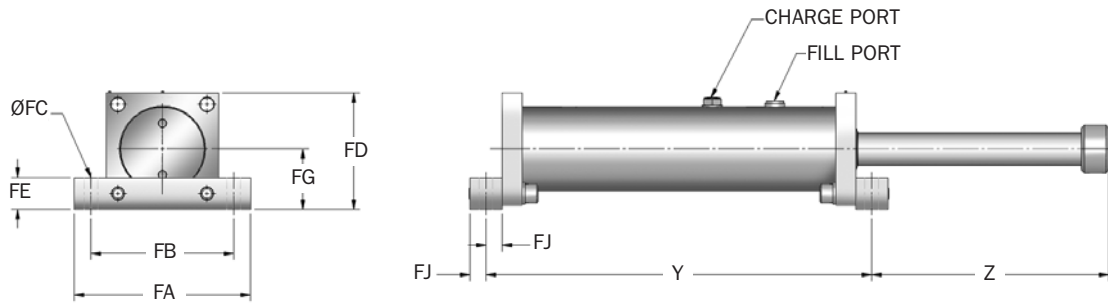
Note: All dimensions in millimeters.

# 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 and rear foot and dimensions.

Catalog No./ Model	Foot Mount Dimensions													Charge Port Dimensions			
	A mm	B mm	D mm	E mm	F mm	H mm	Y mm	Z mm	FA mm	FB mm	FC mm	FD mm	FE mm	FG mm	FJ mm	CA mm	CB mm
HD 1.5 x 2	310	90	28	50	208	20	240	86	165	140	14	125	32	65	16	144	56
HD 1.5 x 4	410	90	28	50	258	20	290	136	165	140	14	125	32	65	16	144	56
HD 1.5 x 6	510	90	28	50	308	20	340	186	165	140	14	125	32	65	16	144	56
HD 1.5 x 8	613	90	28	50	360	20	392	237	165	140	14	125	32	65	16	144	56
HD 1.5 x 10	715	90	28	50	411	20	443	288	165	140	14	125	32	65	16	144	56
HD 1.5 x 12	817	90	28	50	462	20	494	339	165	140	14	125	32	65	16	144	56
HD 1.5 x 14	918	90	28	50	512	20	544	390	154	140	14	125	32	65	16	144	56
HD 1.5 x 16	1 019	90	28	50	563	20	595	440	165	140	14	125	32	65	16	144	56
HD 1.5 x 18	1 121	90	28	50	614	20	646	491	165	140	14	125	32	65	16	144	56
HD 1.5 x 20	1 223	90	28	50	665	20	697	542	165	140	14	125	32	65	16	144	56
HD 1.5 x 24	1 427	90	28	50	767	20	799	644	165	140	14	125	32	65	16	144	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.

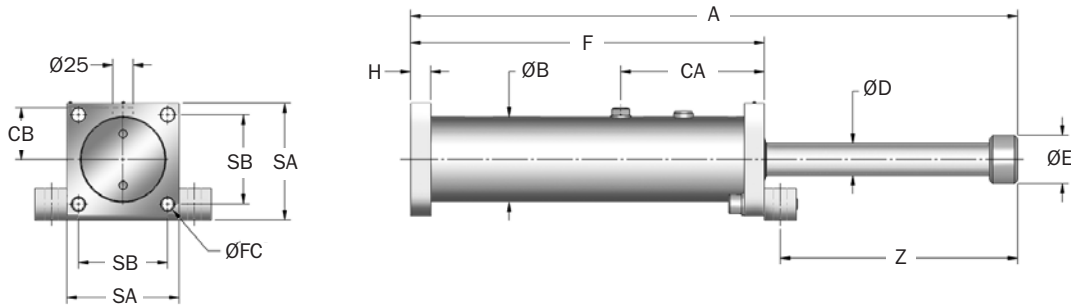
- It is recommended that the customer consult Enidine for safety-related overhead crane applications.
- The energy data listed is for ideal linear impacts only. If side load conditions exist in the application, contact Enidine for sizing assistance.
- Rear flange mounting of 300 mm strokes and longer not recommended. Front and rear flange or foot mount configurations are recommended.
- Maximum cycle rate is 60 cycles/hr.
- For impact velocities over 4,5 m/s, consult factory.

# Heavy Duty Series Shock Absorber

## HD/HDA Series

### Technical Data

HD 2.0 x 10 → HD 2.0 x 56 Series

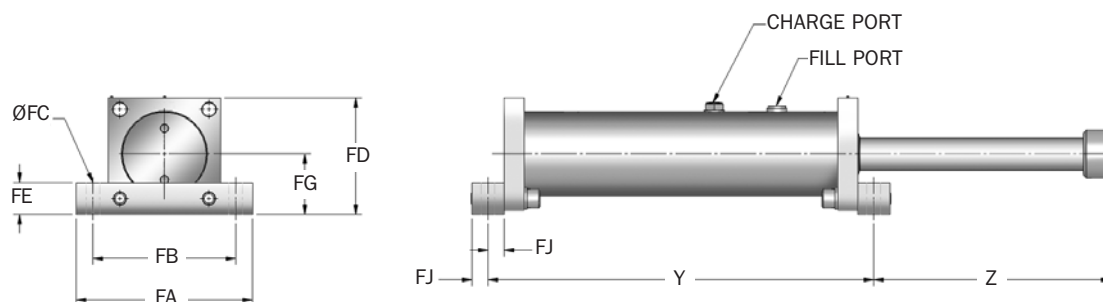


Note: For TF, FF and FR mounting, delete front foot and dimensions.

Catalog No./ Model	(S) Stroke mm	$E_T$ Max. Nm/c	$E_{TC}$ Max. Nm/hr	$F_P$ Max. Reaction Force N	Nominal Return Force N	Flange Dimensions			Model Mass Kg
						SA mm	SB mm	Rec. Bolt Size mm	
HD 2.0 x 10	250	24 000	1 062 482	110 000	440	140	111	M16	23
HD 2.0 x 12	300	28 000	1 185 355	110 000	440	140	111	M16	25
HD 2.0 x 14	350	32 700	1 308 227	110 000	440	140	111	M16	27
HD 2.0 x 16	400	37 400	1 431 099	110 000	440	140	111	M16	29
HD 2.0 x 18	450	42 000	1 553 971	110 000	440	140	111	M16	31
HD 2.0 x 20	500	46 800	1 674 434	110 000	440	140	111	M16	33
HD 2.0 x 24	600	56 100	1 920 178	110 000	440	140	111	M16	36
HD 2.0 x 28	700	65 500	2 165 922	110 000	440	140	111	M16	42
HD 2.0 x 32	800	74 800	2 599 589	110 000	560	140	111	M16	49
HD 2.0 x 36	900	76 500	2 840 514	100 000	560	140	111	M16	53
HD 2.0 x 40	1 000	73 100	3 081 440	86 000	560	140	111	M16	56
HD 2.0 x 48	1 200	61 200	3 563 292	60 000	560	140	111	M16	64
HD 2.0 x 56	1 400	41 650	2 500 000	35 000	560	140	111	M16	73

Note: All dimensions in millimeters.

HD 2.0 x 10 → HD 2.0 x 56 Series



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

Catalog No./ Model	Main Dimensions									Foot Mount Dimensions						Charge Port Dimensions	
	A mm	B mm	D mm	E mm	F mm	H mm	Y mm	Z mm	FA mm	FB mm	FC mm	FD mm	FE mm	FG mm	FJ mm	CA mm	CB mm
HD 2.0 x 10	757	110	40	60	441	25	481	296	220	178	17	146	40	76	20	179	65
HD 2.0 x 12	859	110	40	60	492	25	532	347	220	178	17	146	40	76	20	179	65
HD 2.0 x 14	960	110	40	60	543	25	583	397	220	178	17	146	40	76	20	179	65
HD 2.0 x 16	1 062	110	40	60	594	25	634	448	220	178	17	146	40	76	20	179	65
HD 2.0 x 18	1 164	110	40	60	645	25	685	499	220	178	17	146	40	76	20	179	65
HD 2.0 x 20	1 265	110	40	60	695	25	735	550	220	178	17	146	40	76	20	179	65
HD 2.0 x 24	1 469	110	40	60	797	25	837	652	220	178	17	146	40	76	20	179	65
HD 2.0 x 28	1 672	110	40	60	899	25	939	753	220	178	17	146	40	76	20	179	65
HD 2.0 x 32	1 953	110	40	60	1 079	25	1 119	854	220	178	17	146	40	76	20	260	65
HD 2.0 x 36	2 151	110	40	60	1 179	25	1 219	952	220	178	17	146	40	76	20	260	65
HD 2.0 x 40	2 351	110	40	60	1 279	25	1 319	1 052	220	178	17	146	40	76	20	260	65
HD 2.0 x 48	2 751	110	40	60	1 472	25	1 512	1 259	220	178	17	146	40	76	20	260	65
HD 2.0 x 56	3 171	110	40	60	1 689	25	1 729	1 462	220	178	17	146	40	76	20	260	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.

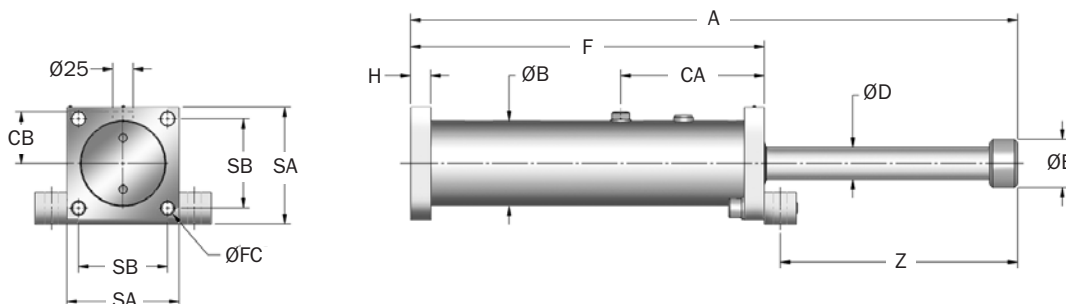
- It is recommended that the customer consult Enidine for safety-related overhead crane applications.
- The energy data listed is for ideal linear impacts only. If side load conditions exist in the application, contact Enidine for sizing assistance.
- Rear flange mounting of 300 mm strokes and longer not recommended. Front and rear flange or foot mount configurations are recommended.
- Maximum cycle rate is 60 cycles/hr.
- For impact velocities over 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.

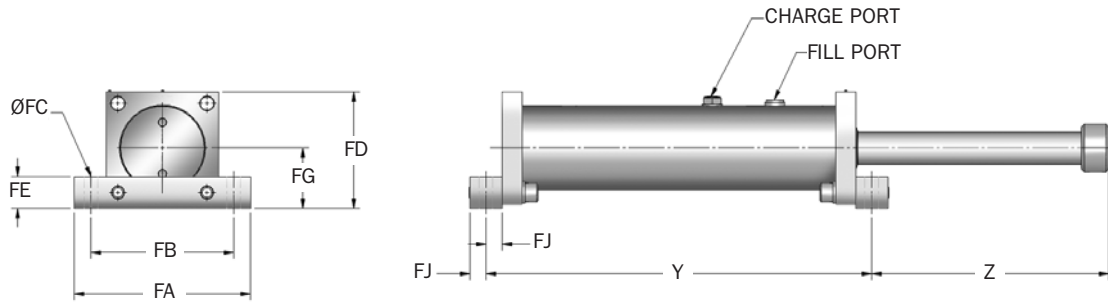
Catalog No./ Model	(S) Stroke mm	HD		HDA		F <sub>p</sub> Max. Reaction Force N	Nominal Return Force N	Flange Dimensions			Model Mass Kg
		E <sub>T</sub> Max. Nm/c	E <sub>T</sub> C Max. Nm/hr	E <sub>T</sub> Max. Nm/c	E <sub>T</sub> C Max. Nm/hr			SA mm	SB mm	Rec. Bolt Size mm	
HD(A) 3.0 x 2	50	9 350	561 000	4 500	270 000	220 000	550	170	125	M20	21
HD(A) 3.0 x 3	75	14 000	669 412	6 800	408 000	220 000	550	170	125	M20	22
HD(A) 3.0 x 5	125	23 400	814 689	11 300	678 000	220 000	550	170	125	M20	25
HD(A) 3.0 x 8	200	37 400	1 028 331	18 100	1 056 816	220 000	550	170	125	M20	29
HD 3.0 x 10	250	46 800	1 173 607	–	–	220 000	550	170	125	M20	32
HD(A) 3.0 x 12	300	56 100	1 318 884	27 200	1 347 370	220 000	550	170	125	M20	35
HD 3.0 x 14	350	65 500	1 606 589	–	–	220 000	550	170	125	M20	43
HD 3.0 x 16	400	74 800	1 749 017	–	–	220 000	550	170	125	M20	45
HD 3.0 x 18	450	84 200	1 897 142	–	–	220 000	550	170	125	M20	48
HD 3.0 x 20	500	93 500	2 042 419	–	–	220 000	550	170	125	M20	51
HD 3.0 x 24	600	112 200	2 330 124	–	–	220 000	550	170	125	M20	57
HD 3.0 x 28	700	130 900	2 620 677	–	–	220 000	550	170	125	M20	62
HD 3.0 x 32	800	122 400	2 908 382	–	–	180 000	710	170	125	M20	68
HD 3.0 x 36	900	122 400	3 315 726	–	–	160 000	710	170	125	M20	77
HD 3.0 x 40	1 000	119 000	3 600 582	–	–	140 000	710	170	125	M20	85
HD 3.0 x 48	1 200	97 900	4 170 294	–	–	96 000	710	170	125	M20	94
HD 3.0 x 56	1 422	65 450	3 900 000	–	–	55 000	710	170	125	M20	106

# 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 and rear foot and dimensions.

Catalog No./ Model												Foot Mount Dimensions							Charge Port Dimensions	
	A	B	D	E	HD F	HDA F	H	HD Y	HDA Y	HD Z	HDA Z	FA	FB	FC	FD	FE	FG	FJ	CA	CB
	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm
HD(A) 3.0 x 2	336	130	45	70	203	213	25	253	263	108	98	255	216	22	173	50	88	25	134	75
HD(A) 3.0 x 3	387	130	45	70	229	239	25	279	289	133	123	255	216	22	173	50	88	25	134	75
HD(A) 3.0 x 5	489	130	45	70	280	290	25	330	340	184	174	255	216	22	173	50	88	25	134	75
HD(A) 3.0 x 8	640	130	45	70	355	365	25	405	415	260	250	255	216	22	173	50	88	25	134	75
HD 3.0 x 10	742	130	45	70	406	—	25	456	—	311	—	255	216	22	173	50	88	25	134	75
HD(A) 3.0 x 12	844	130	45	70	457	467	25	507	517	362	352	255	216	22	173	50	88	25	134	75
HD 3.0 x 14	995	130	45	70	558	—	25	608	—	412	—	255	216	22	173	50	88	25	184	75
HD 3.0 x 16	1 097	130	45	70	609	—	25	659	—	463	—	255	216	22	173	50	88	25	184	75
HD 3.0 x 18	1 199	130	45	70	660	—	25	710	—	514	—	255	216	22	173	50	88	25	184	75
HD 3.0 x 20	1 301	130	45	70	711	—	25	761	—	565	—	255	216	22	173	50	88	25	184	75
HD 3.0 x 24	1 504	130	45	70	812	—	25	862	—	667	—	255	216	22	173	50	88	25	184	75
HD 3.0 x 28	1 707	130	45	70	914	—	25	964	—	768	—	255	216	22	173	50	88	25	184	75
HD 3.0 x 32	1 910	130	45	70	1 015	—	25	1 065	—	870	—	255	216	22	173	50	88	25	184	75
HD 3.0 x 36	2 156	130	45	70	1 164	—	25	1 214	—	967	—	255	216	22	173	50	88	25	234	75
HD 3.0 x 40	2 356	130	45	70	1 264	—	25	1 314	—	1 067	—	255	216	22	173	50	88	25	234	75
HD 3.0 x 48	2 756	130	45	70	1 464	—	25	1 514	—	1 267	—	255	216	22	173	50	88	25	234	75
HD 3.0 x 56	3 156	130	45	70	1 664	—	25	1 714	—	1 467	—	255	216	22	173	50	88	25	234	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.

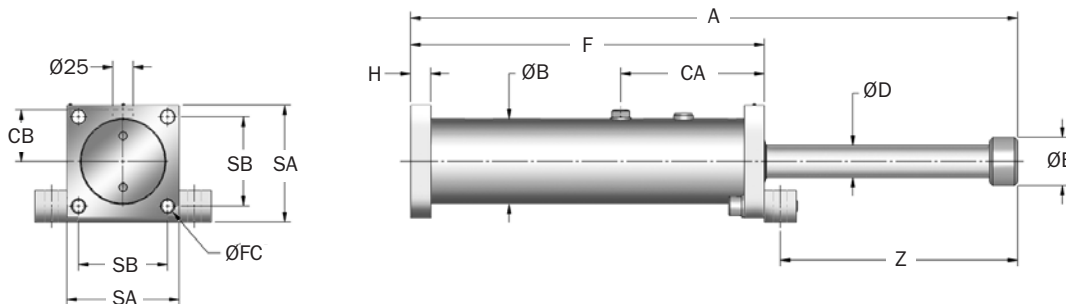
- It is recommended that the customer consult Enidine for safety-related overhead crane applications.
- The energy data listed is for ideal linear impacts only. If side load conditions exist in the application, contact Enidine for sizing assistance.
- Rear flange mounting of 300 mm strokes and longer not recommended. Front and rear flange or foot mount configurations are recommended.
- HDA models which have an impact velocity below 0,8 m/s, please contact Enidine for sizing assistance.
- Maximum cycle rate is 60 cycles/hr.
- For impact velocities over 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

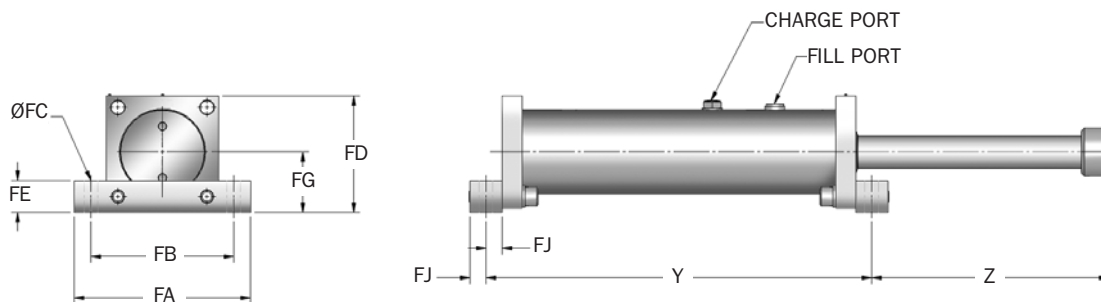


Note: For TF, FF and FR mounting, delete front foot and dimensions.

Catalog No./ Model	(S) Stroke mm	E <sub>T</sub> Max. Nm/c	E <sub>T</sub> C Max. Nm/hr	F <sub>p</sub> Max. Reaction Force N	Nominal Return Force N	Flange Dimensions			Model Mass Kg
						SA mm	SB mm	Rec. Bolt Size mm	
HD 3.5 x 2	50	12 750	830 000	300 000	860	200	160	M20	33
HD 3.5 x 4	100	25 500	1 000 000	300 000	860	200	160	M20	37
HD 3.5 x 6	150	38 250	1 200 000	300 000	860	200	160	M20	41
HD 3.5 x 8	200	51 000	1 350 000	300 000	860	200	160	M20	45
HD 3.5 x 10	250	63 750	1 550 000	300 000	860	200	160	M20	49
HD 3.5 x 12	300	76 500	1 700 000	300 000	860	200	160	M20	53
HD 3.5 x 16	400	102 000	2 050 000	300 000	860	200	160	M20	60
HD 3.5 x 20	500	127 500	2 600 000	300 000	860	200	160	M20	74
HD 3.5 x 24	600	153 000	2 900 000	300 000	860	200	160	M20	81
HD 3.5 x 28	700	178 500	3 250 000	300 000	860	200	160	M20	89
HD 3.5 x 32	800	204 000	3 600 000	300 000	860	200	160	M20	97
HD 3.5 x 36	900	198 900	3 950 000	260 000	860	200	160	M20	105
HD 3.5 x 40	1 000	182 750	4 300 000	215 000	860	200	160	M20	112
HD 3.5 x 48	1 200	158 100	5 000 000	155 000	860	200	160	M20	128

Note: All dimensions in millimeters.

HD 3.5 x 2 → HD 3.5 x 48 Series



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

Catalog No./ Model	Foot Mount Dimensions																Charge Port Dimensions	
	A mm	B mm	D mm	E mm	F mm	H mm	Y mm	Z mm	FA mm	FB mm	FC mm	FD mm	FE mm	FG mm	FJ mm	CA mm	CB mm	
HD 3.5 x 2	354	155	56	82	244	25	294	85	300	250	27	210	50	110	25	139	86	
HD 3.5 x 4	456	155	56	82	295	25	345	136	300	250	27	210	50	110	25	139	86	
HD 3.5 x 6	556	155	56	82	345	25	395	186	300	250	27	210	50	110	25	139	86	
HD 3.5 x 8	658	155	56	82	396	25	446	237	300	250	27	210	50	110	25	139	86	
HD 3.5 x 10	760	155	56	82	447	25	497	288	300	250	27	210	50	110	25	139	86	
HD 3.5 x 12	862	155	56	82	498	25	548	339	300	250	27	210	50	110	25	139	86	
HD 3.5 x 16	1 064	155	56	82	599	25	649	440	300	250	27	210	50	110	25	139	86	
HD 3.5 x 20	1 323	155	56	82	756	25	806	542	300	250	27	210	50	110	25	194	86	
HD 3.5 x 24	1 527	155	56	82	858	25	908	644	300	250	27	210	50	110	25	194	86	
HD 3.5 x 28	1 729	155	56	82	959	25	1 009	745	300	250	27	210	50	110	25	194	86	
HD 3.5 x 32	1 933	155	56	82	1 061	25	1 111	847	300	250	27	210	50	110	25	194	86	
HD 3.5 x 36	2 137	155	56	82	1 163	25	1 213	949	300	250	27	210	50	110	25	194	86	
HD 3.5 x 40	2 339	155	56	82	1 264	25	1 314	1 050	300	250	27	210	50	110	25	194	86	
HD 3.5 x 48	2 739	155	56	82	1 464	25	1 514	1 250	300	250	27	210	50	110	25	194	86	

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.

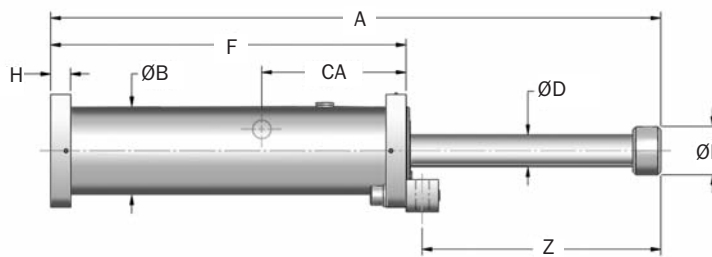
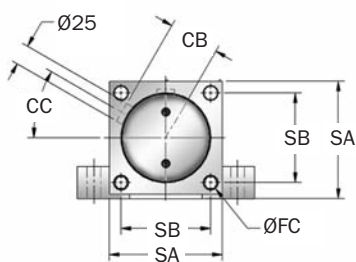
3. The energy data listed is for ideal linear impacts only. If side load conditions exist in the application, contact Enidine for sizing assistance.

4. Rear flange mounting of 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 4,5 m/s, consult factory.

HD(A) 4.0 x 2 → HD 4.0 x 48 Series

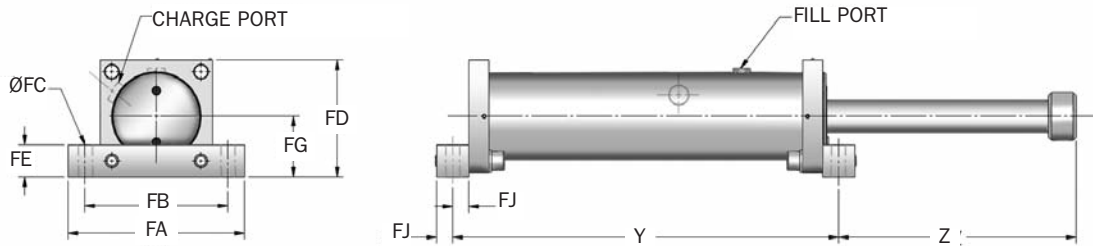


Note: For TF, FF and FR mounting, delete front foot and dimensions.

Catalog No./ Model	(S) Stroke mm	HD		HDA		F <sub>p</sub> Max. Reaction Force N	Nominal Return Force N	Flange Dimensions			Model Mass Kg
		E <sub>T</sub> Max. Nm/c	E <sub>T</sub> C Max. Nm/hr	E <sub>T</sub> Max. Nm/c	E <sub>T</sub> C Max. Nm/hr			SA mm	SB mm	Rec. Bolt Size mm	
HD(A) 4.0 x 2	50	15 100	906 000	13 500	810 000	355 000	1 090	250	197	M24	64
HD(A) 4.0 x 4	100	30 200	1 503 152	27 000	1 546 721	355 000	1 090	250	197	M24	70
HD(A) 4.0 x 6	150	45 300	1 721 000	40 500	1 764 569	355 000	1 090	250	197	M24	76
HD(A) 4.0 x 8	200	60 400	1 947 562	54 000	1 991 131	355 000	1 090	250	197	M24	82
HD(A) 4.0 x 10	250	75 400	2 165 410	67 500	2 208 980	355 000	1 090	250	197	M24	87
HD 4.0 x 12	300	90 500	2 797 169	–	–	355 000	1 090	250	197	M24	108
HD 4.0 x 16	400	120 700	3 237 222	–	–	355 000	1 090	250	197	M24	120
HD 4.0 x 20	500	150 900	3 681 633	–	–	355 000	1 090	250	197	M24	131
HD 4.0 x 24	600	181 000	4 126 043	–	–	355 000	1 090	250	197	M24	144
HD 4.0 x 28	700	211 200	4 566 096	–	–	355 000	1 090	250	197	M24	157
HD 4.0 x 32	800	241 400	5 010 506	–	–	355 000	1 090	250	197	M24	170
HD 4.0 x 36	900	271 600	5 454 916	–	–	355 000	1 090	250	197	M24	183
HD 4.0 x 40	1 000	246 500	5 894 969	–	–	290 000	1 090	250	197	M24	195
HD 4.0 x 48	1 200	204 000	6 766 361	–	–	200 000	1 090	250	197	M24	220

Note: All dimensions in millimeters.

HD(A) 4.0 x 2 → HD 4.0 x 48 Series



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

Catalog No./ Model	A mm	B mm	D mm	E mm	HD F mm	HDA F mm	H mm	HD Y mm	HDA Y mm	HD Z mm	HDA Z mm	Foot Mount Dimensions						Charge Port Dimensions			
												FA mm	FB mm	FC mm	FD mm	FE mm	FG mm	FJ mm	CA mm	CB mm	CC °
HD(A) 4.0 x 2	430	200	63	100	294	304	40	344	354	111	101	360	317	27	252	50	127	25	220	107	155°
HD(A) 4.0 x 4	532	200	63	100	345	355	40	395	405	162	152	360	317	27	252	50	127	25	220	107	155°
HD(A) 4.0 x 6	632	200	63	100	395	405	40	445	455	212	202	360	317	27	252	50	127	25	220	107	155°
HD(A) 4.0 x 8	735	200	63	100	447	457	40	497	507	263	253	360	317	27	252	50	127	25	220	107	155°
HD(A) 4.0 x 10	836	200	63	100	497	507	40	547	557	314	304	360	317	27	252	50	127	25	220	107	155°
HD 4.0 x 12	1 032	200	63	100	642	-	40	692	-	365	-	360	317	27	252	50	127	25	310	107	30°
HD 4.0 x 16	1 234	200	63	100	743	-	40	793	-	466	-	360	317	27	252	50	127	25	310	107	30°
HD 4.0 x 20	1 438	200	63	100	845	-	40	895	-	568	-	360	317	27	252	50	127	25	310	107	30°
HD 4.0 x 24	1 642	200	63	100	947	-	40	997	-	670	-	360	317	27	252	50	127	25	310	107	30°
HD 4.0 x 28	1 844	200	63	100	1 048	-	40	1 098	-	771	-	360	317	27	252	50	127	25	310	107	30°
HD 4.0 x 32	2 048	200	63	100	1 150	-	40	1 200	-	873	-	360	317	27	252	50	127	25	310	107	30°
HD 4.0 x 36	2 252	200	63	100	1 252	-	40	1 302	-	975	-	360	317	27	252	50	127	25	310	107	30°
HD 4.0 x 40	2 454	200	63	100	1 353	-	40	1 403	-	1 076	-	360	317	27	252	50	127	25	310	107	30°
HD 4.0 x 48	2 854	200	63	100	1 553	-	40	1 603	-	1 276	-	360	317	27	252	50	127	25	310	107	30°

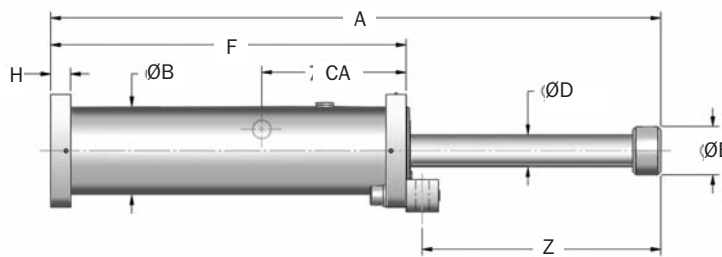
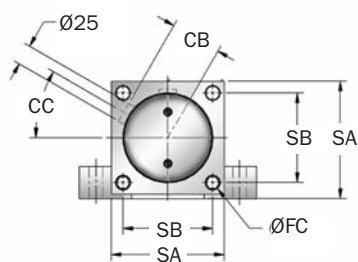
- Notes:
1. HD shock absorbers will function satisfactorily at 5% of their maximum rated energy per cycle.  
HDA models will function satisfactorily at 10% of their maximum rated energy per cycle. If less than these values, a smaller model should be specified.
  2. It is recommended that the customer 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 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 0,8 m/s, please contact Enidine for sizing assistance.
  6. Maximum cycle rate is 60 cycles/hr.
  7. For impact velocities over 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

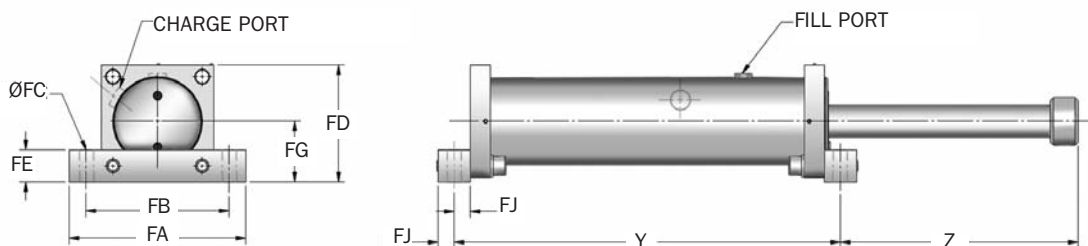


Note: For TF, FF and FR mounting, delete front foot and dimensions.

Catalog No./ Model	(S) Stroke mm	HD		HDA		F <sub>p</sub> Max. Reaction Force N	Nominal Return Force N	Flange Dimensions			Model Mass Kg
		E <sub>T</sub> Max. Nm/c	E <sub>T</sub> C Max. Nm/hr	E <sub>T</sub> Max. Nm/c	E <sub>T</sub> C Max. Nm/hr			SA mm	SB mm	Rec. Bolt Size mm	
HD(A) 5.0 x 4	100	46 700	1 762 621	37 000	1 809 624	550 000	1 760	275	220	M30	87
HD(A) 5.0 x 6	150	70 000	2 002 337	56 000	2 049 340	550 000	1 760	275	220	M30	94
HD(A) 5.0 x 8	200	93 500	2 242 053	74 500	2 289 057	550 000	1 760	275	220	M30	101
HD(A) 5.0 x 10	250	117 000	2 477 070	93 500	2 524 073	550 000	1 760	275	220	M30	108
HD(A) 5.0 x 12	300	140 000	2 716 786	112 000	2 763 789	550 000	1 760	275	220	M30	114
HD 5.0 x 16	400	187 000	3 196 219	—	—	550 000	1 760	250	197	M24	128
HD 5.0 x 20	500	234 000	4 145 684	—	—	550 000	1 760	250	197	M24	158
HD 5.0 x 24	600	280 000	4 625 117	—	—	550 000	1 760	250	197	M24	171
HD 5.0 x 28	700	327 000	5 099 849	—	—	550 000	1 760	250	197	M24	185
HD 5.0 x 32	800	374 000	5 579 282	—	—	550 000	1 760	250	197	M24	198
HD 5.0 x 40	1 000	467 000	6 533 447	—	—	550 000	1 760	250	197	M24	225
HD 5.0 x 48	1 200	418 000	7 487 613	—	—	410 000	1 760	250	197	M24	242

Note: All dimensions in millimeters.

HD(A) 5.0 x 4 → HD 5.0 x 48 Series



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

Catalog No./ Model	A mm	B mm	D mm	E mm	HD F mm	HDA F mm	H mm	HD Y mm	HDA Y mm	HD Z mm	HDA Z mm	Foot Mount Dimensions						Charge Port Dimensions			
												FA mm	FB mm	FC mm	FD mm	FE mm	FG mm	FJ mm	CA mm	CB mm	CC °
HD(A) 5.0 x 4	591	215	80	125	375	385	40	435	445	186	176	400	340	33	278	60	140	30	230	117	25°
HD(A) 5.0 x 6	693	215	80	125	426	436	40	486	496	237	227	400	340	33	278	60	140	30	230	117	25°
HD(A) 5.0 x 8	795	215	80	125	477	487	40	537	547	288	278	400	340	33	278	60	140	30	230	117	25°
HD(A) 5.0 x 10	895	215	80	125	527	537	40	587	597	338	328	400	340	33	278	60	140	30	230	117	25°
HD(A) 5.0 x 12	997	215	80	125	578	588	40	638	648	389	379	400	340	33	278	60	140	30	230	117	25°
HD 5.0 x 16	1 201	215	80	125	680	—	40	740	—	491	—	400	340	33	278	60	140	30	230	117	25°
HD 5.0 x 20	1 504	215	80	125	882	—	40	942	—	592	—	400	340	33	278	60	140	30	230	117	25°
HD 5.0 x 24	1 708	215	80	125	984	—	40	1 044	—	694	—	400	340	33	278	60	140	30	230	117	25°
HD 5.0 x 28	1 910	215	80	125	1 085	—	40	1 145	—	795	—	400	340	33	278	60	140	30	230	117	25°
HD 5.0 x 32	2 114	215	80	125	1 187	—	40	1 247	—	897	—	400	340	33	278	60	140	30	230	117	25°
HD 5.0 x 40	2 520	215	80	125	1 390	—	40	1 450	—	1 100	—	400	340	33	278	60	140	30	230	117	25°
HD 5.0 x 48	2 920	215	80	125	1 590	—	40	1 650	—	1 300	—	400	340	33	278	60	140	30	230	117	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.

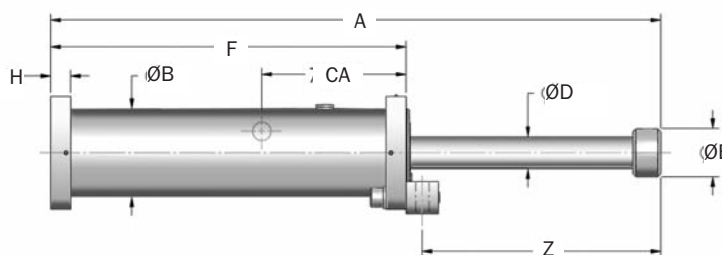
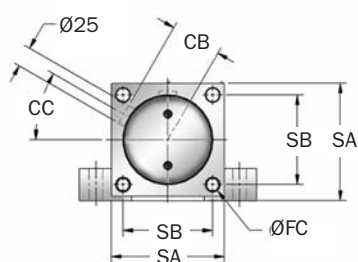
- It is recommended that the customer consult Enidine for safety-related overhead crane applications.
- The energy data listed is for ideal linear impacts only. If side load conditions exist in the application, contact Enidine for sizing assistance.
- Rear flange mounting of 300 mm strokes and longer not recommended. Front and rear flange or foot mount configurations are recommended.
- HDA models which have an impact velocity below 0,8 m/s, please contact Enidine for sizing assistance.
- Maximum cycle rate is 60 cycles/hr.
- For impact velocities over 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 mm	HD		HDA		F <sub>p</sub> Max. Reaction Force N	Nominal Return Force N	Flange Dimensions			Model Mass Kg
		E <sub>T</sub> Max. Nm/c	E <sub>T</sub> C Max. Nm/hr	E <sub>T</sub> Max. Nm/c	E <sub>T</sub> C Max. Nm/hr			SA mm	SB mm	Rec. Bolt Size mm	
HD(A) 6.0 x 4	100	76 500	2 404 568	61 000	2 464 532	900 000	2 750	330	260	M36	164
HD(A) 6.0 x 6	150	114 000	2 704 389	91 500	2 764 353	900 000	2 750	330	260	M36	175
HD(A) 6.0 x 8	200	153 000	3 004 211	122 000	3 064 175	900 000	2 750	330	260	M36	186
HD(A) 6.0 x 10	250	191 000	3 316 025	152 500	3 375 989	900 000	2 750	330	260	M36	196
HD(A) 6.0 x 12	300	224 000	3 621 843	183 000	3 681 807	900 000	2 750	330	260	M36	207
HD 6.0 x 16	400	306 000	4 233 478	—	—	900 000	2 750	330	260	M36	228
HD 6.0 x 20	500	382 000	4 845 114	—	—	900 000	2 750	330	260	M36	250
HD 6.0 x 24	600	459 000	6 086 375	—	—	900 000	2 750	330	260	M36	309
HD 6.0 x 30	750	573 000	6 997 832	—	—	900 000	2 750	330	260	M36	341
HD 6.0 x 36	900	688 500	7 915 285	—	—	900 000	2 750	330	260	M36	373
HD 6.0 X 42	1 050	803 000	8 826 743	—	—	900 000	2 750	330	260	M36	405
HD 6.0 x 48	1 200	805 000	9 744 196	—	—	790 000	2 750	330	260	M36	438

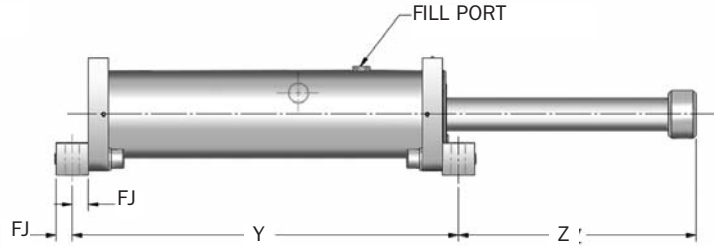
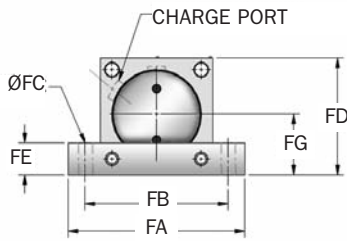
Note: All dimensions in millimeters.

# 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 and rear foot and dimensions.

Catalog No./ Model	A mm	B mm	D mm	E mm	HD F mm	HDA F mm	H mm	HD Y mm	HDA Y mm	HD Z mm	HDA Z mm	Foot Mount Dimensions						Charge Port Dimensions			
												FA mm	FB mm	FC mm	FD mm	FE mm	FG mm	FJ mm	CA mm	CB mm	CC mm
HD(A) 6.0 x 4	637	275	100	160	391	401	50	461	471	211	201	450	380	40	333	70	168	35	197	144	30°
HD(A) 6.0 x 6	737	275	100	160	441	451	50	511	521	261	251	450	380	40	333	70	168	35	197	144	30°
HD(A) 6.0 x 8	839	275	100	160	492	502	50	562	572	312	302	450	380	40	333	70	168	35	197	144	30°
HD(A) 6.0 x 10	941	275	100	160	543	553	50	613	623	363	353	450	380	40	333	70	168	35	197	144	30°
HD(A) 6.0 x 12	1043	275	100	160	594	604	50	664	674	414	404	450	380	40	333	70	168	35	197	144	30°
HD 6.0 x 16	1 246	275	100	160	696	—	50	766	—	515	—	450	380	40	333	70	168	35	197	144	30°
HD 6.0 x 20	1 450	275	100	160	798	—	50	868	—	617	—	450	380	40	333	70	168	35	197	144	30°
HD 6.0 x 24	1 769	275	100	160	1 015	—	50	1 085	—	719	—	450	380	40	333	70	168	35	312	144	30°
HD 6.0 x 30	2 073	275	100	160	1 167	—	50	1 237	—	871	—	450	380	40	333	70	168	35	312	144	30°
HD 6.0 x 36	2 379	275	100	160	1 320	—	50	1 390	—	1 024	—	450	380	40	333	70	168	35	312	144	30°
HD 6.0 x 42	2 683	275	100	160	1 472	—	50	1 542	—	1 176	—	450	380	40	333	70	168	35	312	144	30°
HD 6.0 x 48	2 989	275	100	160	1 625	—	50	1 695	—	1 329	—	450	380	40	333	70	168	35	312	144	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.

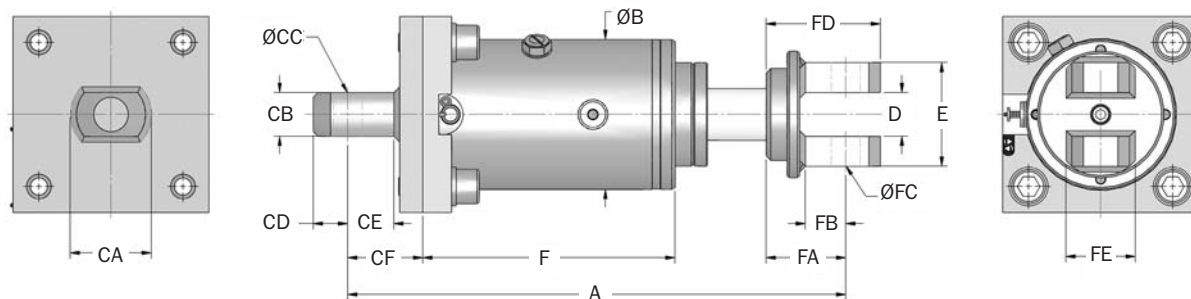
3. The energy data listed is for ideal linear impacts only. If side load conditions exist in the application, contact Enidine for sizing assistance.

4. Rear flange mounting of 300 mm strokes and longer not recommended. Front and rear flange or foot mount configurations are recommended.

5. For impact velocities over 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 mm	B mm	D mm	E mm	HD F mm	HDA F mm	Cylinder Clevis Dimensions						Piston Clevis Dimensions				
							CA mm	CB mm	CC mm	CD mm	CE mm	CF mm	FA mm	FB mm	FC mm	FD mm	FE mm
HD(A) 3.0 x 2	432	130	38	90	209	219	60	38	25	30	37	65	69	32	25	99	50
HD(A) 3.0 x 3	483	130	38	90	235	245	60	38	25	30	37	65	69	32	25	99	50
HD(A) 3.0 x 5	585	130	38	90	286	296	60	38	25	30	37	65	69	32	25	99	50
HD(A) 3.0 x 8	736	130	38	90	361	371	60	38	25	30	37	65	69	32	25	99	50
HD 3.0 x 10	838	130	38	90	412	—	60	38	25	30	37	65	69	32	25	99	50
HD(A) 3.0 x 12	940	130	38	90	463	473	60	38	25	30	37	65	69	32	25	99	50
HD(A) 4.0 x 2	570	200	65	140	304	314	—	—	—	—	—	90	100	50	50	150	100
HD(A) 4.0 x 4	672	200	65	140	355	365	—	—	—	—	—	90	100	50	50	150	100
HD(A) 4.0 x 6	772	200	65	140	405	415	—	—	—	—	—	90	100	50	50	150	100
HD(A) 4.0 x 8	875	200	65	140	457	467	—	—	—	—	—	90	100	50	50	150	100
HD(A) 4.0 x 10	976	200	65	140	507	517	—	—	—	—	—	90	100	50	50	150	100
HD(A) 5.0 x 4	751	215	70	150	386	396	—	—	—	—	—	100	115	70	60	175	100
HD(A) 5.0 x 6	853	215	70	150	437	447	—	—	—	—	—	100	115	70	60	175	100
HD(A) 5.0 x 8	955	215	70	150	488	498	—	—	—	—	—	100	115	70	60	175	100
HD(A) 5.0 x 10	1 055	215	70	150	538	548	—	—	—	—	—	100	115	70	60	175	100
HD(A) 5.0 x 12	1 157	215	70	150	589	599	—	—	—	—	—	100	115	70	60	175	100

