Compendium of ACA/ACJ Series

Excellent and stable deceleration and shock absorbing

If impacted by load,
the resistance will automatically adjust.

Three kinds of impact speed

High speed(Light load)
Middle speed(Middle load)
Low speed(Heavy load)

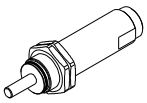
All threaded outer body

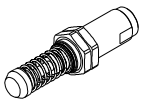
It is easy to install and adjust
and has good heat dissipation.

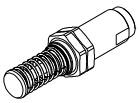
Two kinds of type

ACA: Self-compensation type shock absorber
ACJ: Adjustable type shock absorber

Three kinds of prevention crash cap

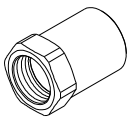

No cap

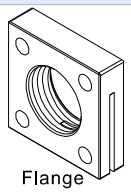

Plastic cap


Iron cap

Integrated structure

Two kinds of mounting accessories


Stop collar


Flange

Specification

Model	Stroke (mm)	Max. energy absorbed (Nm)	Max. energy absorbed/hour(Nm/h)	Max. effective mass(kg)			Max. impact speed(m/s)			Weight (g)
				High speed	Middle speed	Low speed	High speed	Middle speed	Low speed	
ACA0806	6	3	5400	5	20	25	4	2	1	12
ACA1007	7	6	14500	10	40	50	4	2	1	26
ACA1210	10	10	30000	18	60	80	4	2	1	40
ACA1215	15	14	35000	25	90	115	4	2	1	48
ACA1412	12	18	36000	30	110	150	4	2	1	70
ACA1416	16	22	39000	40	140	180	4	2	1	78
ACA1420	20	25	45000	45	155	200	4	2	1	85
ACA1616	16	35	43000	60	220	285	4	2	1	105
ACA1620	20	40	47000	70	250	325	4	2	1	115
ACA1625	25	45	51000	80	280	365	4	2	1	125
ACA2020	20	60	50000	240	660	960	4	2	1	175
ACA2025	25	65	54000	260	720	1040	4	2	1	185
ACA2030	30	70	58000	280	780	1120	4	2	1	210
ACA2040	40	80	65000	320	890	1280	4	2	1	225
ACA2525	25	100	75000	400	1100	1600	4	2	1	290
ACA2550	50	150	85000	600	1650	2400	4	2	1	370
ACA2725	25	140	85000	560	1550	2240	4	2	1	372
ACA2750	50	250	95000	1000	2780	4000	4	2	1	475
ACA3325	25	180	100000	720	2000	2880	4	2	1	596
ACA3350	50	300	120000	1200	3300	4800	4	2	1	750
ACA3625	25	220	135000	880	2400	3500	4	2	1	702
ACA3650	50	350	150000	1400	2500	5600	4	2	1	889

Model	Stroke(mm)	Max. energy absorbed (Nm)	Max. energy absorbed/hour(Nm/h)	Max. effective mass(kg)	Max. impact speed(m/s)	Weight(g)
ACJ1007	7	6	14500	50	4	28
ACJ1210	10	10	30000	80	4	43
ACJ1412	12	20	36000	160	4	75
ACJ2020	20	60	50000	960	4	189
ACJ2525	25	100	75000	1600	4	308
ACJ2550	50	150	85000	2400	4	395
ACJ2725	25	140	85000	2240	4	396
ACJ2750	50	250	95000	4000	4	510
ACJ3325	25	180	100000	2880	4	540
ACJ3350	50	300	110000	4800	4	800
ACJ3625	25	220	125000	2500	4	750
ACJ3650	50	350	130000	5600	4	950
ACJ4225	25	350	150000	5600	4	1150
ACJ4250	50	700	180000	11200	4	1420
ACJ4275	75	1050	210000	16800	4	1720

ACA, ACJ Series

Product feature

1. Excellent and stable deceleration and shock absorbing; if impacted by load, the resistance will automatically adjust.
2. Outer body of integrated structure is treated by QPQ, which has optimum corrosion and wear resistance and can withstand high pressure; it is easy to install and adjust for all threaded outer body which has good heat dissipation.
3. With high hardness stainless steel shaft, the shock absorber has better impact and corrosion resistance, and it can work under adverse conditions.
4. Special oiling process leads to stable shock absorbing.
5. Compact structure and high max. absorbed energy.
6. We use Special lubricants as buffer medium, which adapts to wide temperature range and ensures stable cushioning.

Ordering code

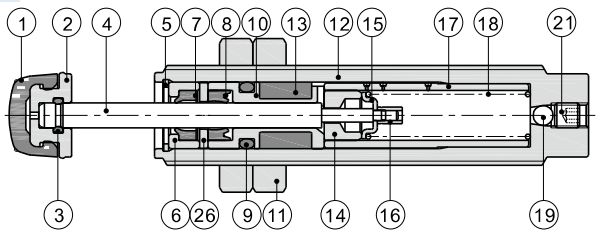
ACA 20 20 - 1 N

① ② ③ ④ ⑤

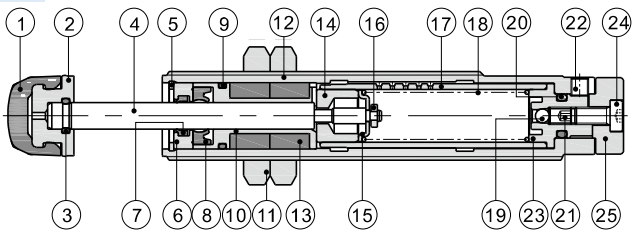
①Model	②Body male thread	③Stroke	④Impact speed	⑤Prevention crash cap
ACA: Self-compensation type shock absorber	08:M8 10:M10 12:M12 14:M14 16:M16 20:M20 25:M25 27:M27 33:M33 36:M36	Refer to the specification table for details.	1: High speed(Light load) 2: Middle speed(Middle load) 3: Low speed(Heavy load)	Blank: Plastic cap N: No cap
				Blank: Plastic cap F: Iron cap N: No cap
				Blank: Plastic cap F: Iron cap
ACJ: Adjustable type shock absorber	10:M10 12:M12 14:M14 20:M20 25:M25 27:M27 33:M33 36:M36 42:M42		Not this code	Blank: Plastic cap N: No cap
				Blank: Plastic cap F: Iron cap N: No cap
				Blank: Plastic cap F: Iron cap

Inner structure and material of major parts

ACA

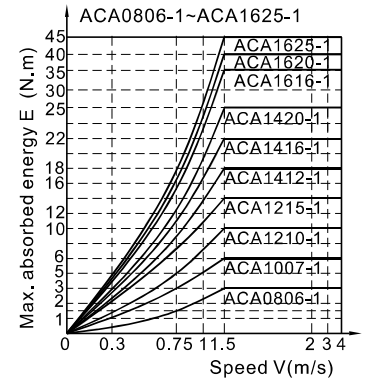


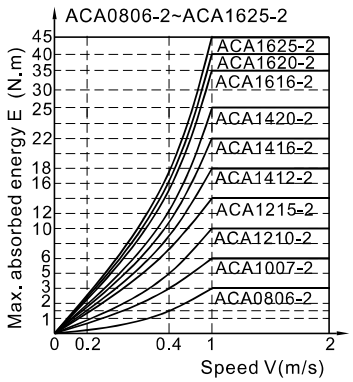
ACJ

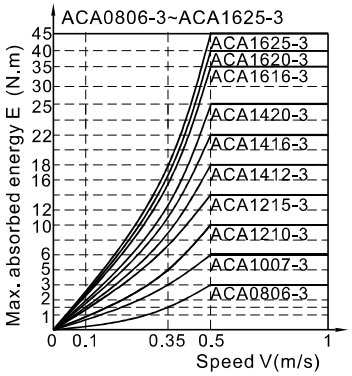


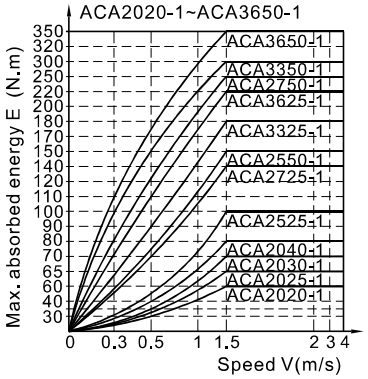
No.	Item	Material	No.	Item	Material
1	Bump cap	PA66(M8)\TPU(M10~M14)\TPU or S45C(M20~M42)	14	Piston	Brass
2	Bump cap(core)	No(M8)\Cutting steel(Others)	15	Spring seat	Spring steel
3	O-ring	NBR	16	Busher	Brass(M8~M12)\Aluminum alloy(M20~M27)
4	Piston rod	Stainless steel(M8~M27)\S45C(M33~M42)	17	Inlet body	Cutting steel(M8~M14)\Seamless steel tube(M20~M42)
5	Clip	No(M8~M10)\Spring steel(M12~M42)	18	Spring	SWPB
6	Front cover	Brass(M8)\Cutting steel(M10)\Aluminum(M12~M42)	19	Ball	GCr15
7	Front cover gasket	No(M8)\TPU(M10~M42)	20	O-ring	NBR
8	Front cover gasket	NBR	21	Set screw	Alloy steel
9	O-ring	NBR	22	Set screw	Alloy steel
10	Correcting body	Brass	23	Back cover	Brass
11	Nut	SS41	24	Screw	Alloy steel
12	Body	Cutting steel	25	Knob	Aluminum alloy
13	Accumulator	Foamex	26	Washer	SUS304(M10~M14)\No(Others)

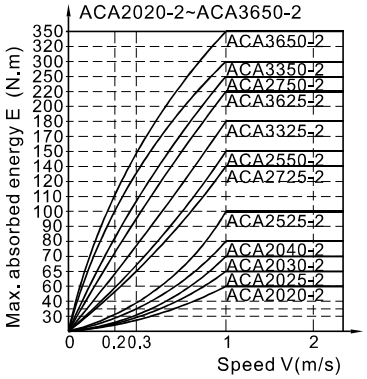
Max. absorbed energy and speed curve

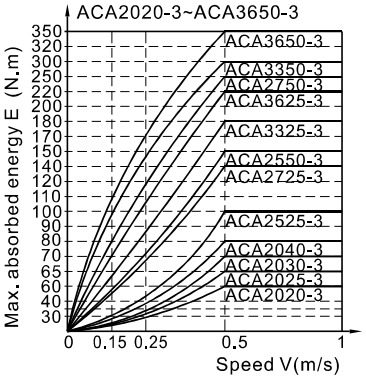






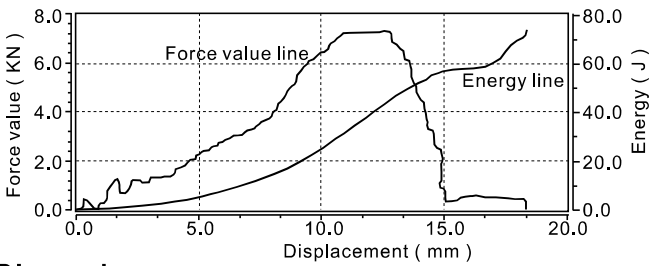






Note：1. The interval under the red line shows the energy range absorbed by corresponding shock absorber.
2. It is better to use 20%-80% of the Max. absorbed energy.

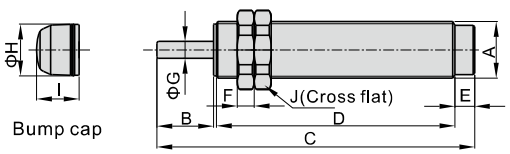
Buffer curve



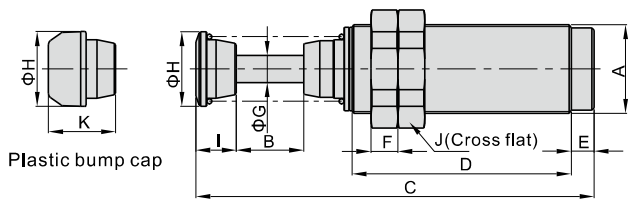
Note: As the chart shows, energy is absorbed by a lower reaction force at the beginning of the stroke, then by a smooth linear deceleration. It decelerates smoothly at last.

Dimensions

ACA



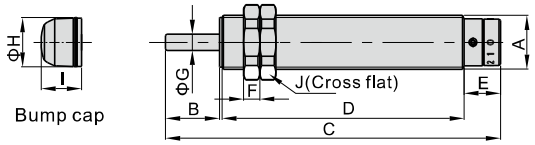
Model\Item	A	B	C	D	E	F	G	H	I	J
ACA0806	M8×1.0	6	46	32	5	4	3	6.5	6	11
ACA1007	M10×1.0	7	56	41	5	4	3	8.5	7.5	14
ACA1210	M12×1.0	10	63.5	47.5	5	4	3	10	7.5	17
ACA1215	M12×1.0	15	79	58	5	4	3	10	7.5	17
ACA1412	M14×1.5	12	80.5	62.5	5	6	4	12	12	19
ACA1416	M14×1.5	16	92.5	70.5	5	6	4	12	12	19
ACA1420	M14×1.5	20	103	77	5	6	4	12	12	19
ACA1616	M16×1.5	16	100.5	78.5	5	6	5	14	12	21
ACA1620	M16×1.5	20	109	83	5	6	5	14	12	21
ACA1625	M16×1.5	25	125	94	5	6	5	14	12	21
ACA2020	M20×1.5	20	112.5	84.5	7	6	6	18	15	26
ACA2025	M20×1.5	25	122.5	89.5	7	6	6	18	15	26
ACA2030	M20×1.5	30	142	104	7	6	6	18	15	26
ACA2040	M20×1.5	40	167.5	119.5	7	6	6	18	15	26
ACA2525	M25×1.5	25	123	89	8	6	6	23	16	32
ACA2550	M25×1.5	50	183	124	8	6	6	23	16	32
ACA2725	M27×1.5	25	127	93	8	6	8	24.5	17	36
ACA2750	M27×1.5	50	192	133	8	6	8	24.5	17	36



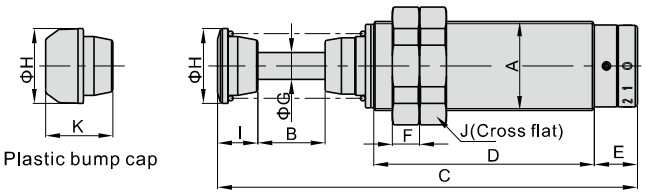
Model\Item	A	B	C	D	E	F	G	H	I	J	K
ACA3325	M33×1.5	25	148	81.5	8.5	10	10	27.8	15	41	25
ACA3350	M33×1.5	50	213	121.5	8.5	10	10	27.8	15	41	25
ACA3625	M36×1.5	25	148	81.5	8.5	10	10	27.8	15	46	25
ACA3650	M36×1.5	50	213	121.5	8.5	10	10	27.8	15	46	25

ACA, ACJ Series

ACJ



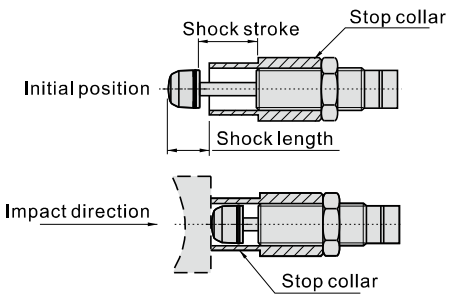
Model\Item	A	B	C	D	E	F	G	H	I	J
ACJ1007	M10×1.0	7	67	45.5	11	4	3	8.5	7.5	14
ACJ1210	M12×1.0	10	74	52	11	4	3	10	7.5	17
ACJ1412	M14×1.5	12	91	66.5	11.5	6	4	12	12	19
ACJ2020	M20×1.5	20	124.5	90	13.5	6	6	18	15	26
ACJ2525	M25×1.5	25	132.5	92	14.5	6	6	23	16	32
ACJ2550	M25×1.5	50	192.5	127	14.5	6	6	23	16	32
ACJ2725	M27×1.5	25	137	96.5	14.5	6	8	24.5	17	36
ACJ2750	M27×1.5	50	202	136.5	14.5	6	8	24.5	17	36



Model\Item	A	B	C	D	E	F	G	H	I	J	K
ACJ3325	M33×1.5	25	156	82	16	10	10	27.8	15	41	25
ACJ3350	M33×1.5	50	221	122	16	10	10	27.8	15	41	25
ACJ3625	M36×1.5	25	156	82	16	10	10	27.8	15	46	25
ACJ3650	M36×1.5	50	221	122	16	10	10	27.8	15	46	25
ACJ4225	M42×1.5	25	161.5	85.5	16	12	12	34.8	15	50	25
ACJ4250	M42×1.5	50	226.5	125.5	16	12	12	34.8	15	50	25
ACJ4275	M42×1.5	75	291.5	165.5	16	12	12	34.8	15	50	25

Accessories

How to set stop coller



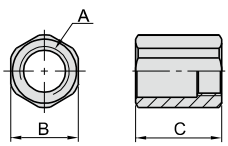
Ordering code

F - ACA 08 LM

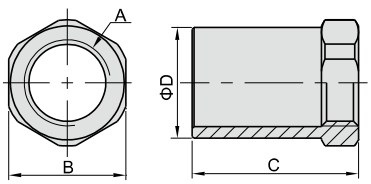
① ② ③ ④

①Accessory	②Model	③Female thread size	④Accessories type
		08 : M8	
		10 : M10	
		12 : M12	
		14 : M14	
		16 : M16	LM: Stop collar
		20 : M20	
		25 : M25	
		27 : M27	
		33 : M33	
		36 : M36	LM: Stop collar\FA: Flange
		42 : M42	FA: Flange

Dimensions

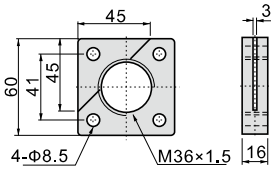


Model\Item	A	B	C
F-ACA08LM	M8×1.0	11	14
F-ACA10LM	M10×1.0	14	16
F-ACA12LM	M12×1.0	17	20

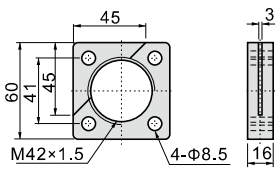


Model\Item	A	B	C	D
F-ACA14LM	M14×1.5	19	27	18
F-ACA16LM	M16×1.5	21	32	20
F-ACA20LM	M20×1.5	26	35	25
F-ACA25LM	M25×1.5	32	45	31
F-ACA27LM	M27×1.5	36	50	35
F-ACA33LM	M33×1.5	41	80	40
F-ACA36LM	M36×1.5	46	80	45

F-ACA36FA



F-ACA42FA



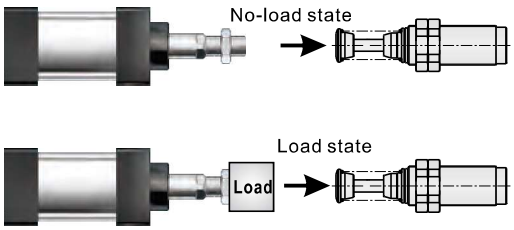
Selecting list

Model	Compatible absorber
F-ACA08LM	ACA0806
F-ACA10LM	ACA1007、ACJ1007
F-ACA12LM	ACA1210、ACA1215、ACJ1210
F-ACA14LM	ACA1412、ACA1416、ACA1420、ACJ1412
F-ACA16LM	ACA1616、ACA1620、ACA1625
F-ACA20LM	ACA2020、ACA2025、ACA2030、ACA2040、ACJ2020
F-ACA25LM	ACA2525、ACA2550、ACJ2525、ACJ2550
F-ACA27LM	ACA2725、ACA2750、ACJ2725、ACJ2750
F-ACA33LM	ACA3325、ACA3350、ACJ3325、ACJ3350
F-ACA36LM	ACA3625、ACA3650、ACJ3625、ACJ3650
F-ACA36FA	ACA3625、ACA3650、ACJ3625、ACJ3650
F-ACA42FA	ACJ4225、ACJ4250、ACJ4275

How to select

Theoretical energy parameter table for cylinders under no-load state Unit：J (N.m)

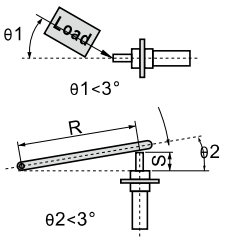
Stroke(mm)		6	7	10	12	15	16	20	25	30	40	50	75
Bore size (mm)	6	0.102	0.119	0.170	0.203	0.254	0.271	0.339	0.424	0.509	0.678	0.848	1.27
	8	0.181	0.211	0.301	0.362	0.452	0.482	0.603	0.754	0.904	1.21	1.51	2.26
	10	0.283	0.330	0.471	0.565	0.707	0.754	0.942	1.18	1.413	1.88	2.36	3.53
	12	0.407	0.475	0.678	0.814	1.017	1.085	1.36	1.70	2.035	2.71	3.39	5.09
	16	0.723	0.844	1.21	1.45	1.809	1.929	2.41	3.01	3.617	4.82	6.03	9.04
	20	1.13	1.32	1.88	2.26	2.826	3.014	3.77	4.71	5.652	7.54	9.42	14.13
	25	1.77	2.06	2.94	3.53	4.416	4.710	5.89	7.36	8.831	11.8	14.7	22.1
	32	2.89	3.38	4.82	5.79	7.235	7.717	9.65	12.1	14.47	19.3	24.1	36.2
	40	4.52	5.28	7.54	9.04	11.3	12.06	15.1	18.8	22.6	30.1	37.7	56.5
	50	7.07	8.24	11.8	14.1	17.7	18.84	23.6	29.4	35.33	47.1	58.9	88.3
	63	11.2	13.1	18.7	22.4	28.0	29.91	37.4	46.7	56.08	74.8	93.5	140.2
	80	18.1	21.1	30.1	36.2	45.2	48.23	60.3	75.4	90.43	120.6	150.7	226.1
	100	28.3	33.0	47.1	56.5	70.7	75.36	94.2	117.8	141.3	188.4	235.5	353.3
	125	44.2	51.5	73.6	88.3	110.4	117.8	147.2	184.0	220.8	204.4	368.0	552.0
	160	72.3	84.4	120.6	144.7	180.9	192.9	241.2	301.4	361.7	482.3	602.9	904.3
	200	113.0	131.9	188.4	226.1	282.6	301.4	376.8	471.0	565.2	753.6	942.0	1413.0
	250	176.6	206.1	294.4	353.3	441.6	471.0	588.5	735.9	883.1	1177.5	1471.9	2207.8
	320	289.4	337.6	482.3	578.8	723.5	771.7	964.6	1205.8	1446.9	1929.2	2411.5	3617.3



For example:
When the pressure is 0.6MPa, bore size of ϕ40 under no-load state plus shock stroke of 12mm can produce energy of 9.04 N.m. Refer to the specification table, you will find ACA1412 fits.
Note: Cylinders under full-load state can produce as twice as the energy shown above.

Installation and Operation

1. The scale range of adjustable shock absorbers is 0 to 9 (8). Factory set is at 6 (4) position. 0 means the softest, while 9 means the hardest;
2. Correct selection of shock absorbers can ensure a smooth deceleration and good shock absorbing properties;
3. If there exists rebounding at the beginning of the stroke, it shows the effective weight is too high. In this case, self-compensation type shall be replaced by high speed type (-1), while adjustable type shall be adjusted to softer, that is closer to 0;
4. If there exists rebounding at the end of the stroke, it shows the effective weight is too low. In this case, self-compensation type shall be replaced by low speed type (-3), while adjustable type shall be adjusted to harder, that is closer to 9;
5. In the work process, lateral load should be avoided as possible as one can. Eccentric angle must be controlled within 3°. Shock absorbers shall be securely locked;
6. The operating temperature range shall be -5 to 70℃;
7. To extend the service life, piston shall be stopped 1mm before reaching the end. It is better to install set screw with positioning and precise adjustment;
8. If two or more shock absorbers are installed at the same side, please make sure that they act synchronously;
9. No painting, welding or cleaning with corrosive substance on the body as well as the piston rod.
10. when installed the absorber, the moment forced on absorber can't be out of the range given in below list or may cause the absorber damage.



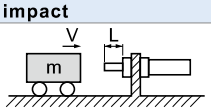
Compatible absorber	Male thread Spec(of body)	Max. Assembly Force on absorber(N.m)
ACA0806	M8×1.0[Note]	2.0
ACA1007、ACJ1007	M10×1.0	3.5
ACA1210、ACA1215、ACJ1210	M12×1.0	8.0
ACA1412、ACA1416、ACA1420、ACJ1412	M14×1.5	11.0
ACA1616、ACA1620、ACA1625	M16×1.5	15.0
ACA2020、ACA2025、ACA2030、ACA2040、ACJ2020	M20×1.5	24.0
ACA2525、ACA2550、ACJ2525、ACJ2550	M25×1.5	40.0
ACA2725、ACA2750、ACJ2725、ACJ2750	M27×1.5	63.0

[Note]
When ACA0806 is selected, bottom diameter of internal thread before tapping is $\Phi 7.1^{+0.1}_{0}$.

Calculation of energy under load state

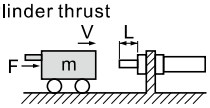
Horizontal impact

1)Horizontal impact



Impact weight (kg): m
Impact speed (m/s): v
Kinetic energy (J(N.m): $E1=\frac{m\times v^2}{2}$
Propelling energy(J(N.m): E2=0
Gross energy (J(N.m): E=E1+E2

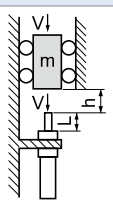
2)Horizontal impact with cylinder thrust



Impact weight (kg): m
Impact speed (m/s): v
Kinetic energy (J(N.m): $E1=\frac{m\times v^2}{2}$
Propelling energy(J(N.m): E2=F×L
Gross energy (J(N.m): E=E1+E2

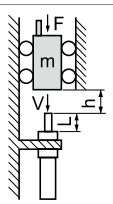
Vertical impact

1)Free fall



Impact weight (kg): m
Impact speed (m/s): v
Kinetic energy (J(N.m): E1=m×g×h
Propelling energy(J(N.m): E2=m×g×L
Gross energy (JN.m): E=E1+E2

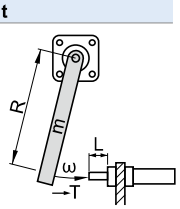
2)Push-down by cylinder



Impact weight (kg): m
Impact speed (m/s): v
Kinetic energy (J(N.m): E1= $\frac{m\times v^2}{2}$
Propelling energy(J(N.m): E2=(mg+F)×L
Gross energy (J(N.m): E=E1+E2

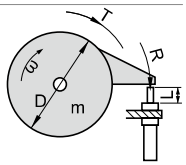
Rotation impact

1) Rocker



Impact weight (kg): m
Impact speed (m/s): v=R×ω
Kinetic energy (J(N.m): $E1=\frac{I\times\omega^2}{2}$
Propelling energy(J(N.m): $E2=\frac{T\times L}{R}$
Gross energy (J(N.m): E=E1+E2

2)Rotation



Impact weight (kg): m
Impact speed (m/s): v=R×ω
Kinetic energy (J(N.m): $E1=\frac{I\times\omega^2}{2}$
Propelling energy(J(N.m): $E2=\frac{T\times L}{R}$
Gross energy (J(N.m): E=E1+E2

Code	Explanation	Unit	Code	Explanation	Unit	Code	Explanation	Unit
m	Impact weight	kg	F	Thrust($(\pi\times D^2\times P)/4$)	N	N	Round per Minute	rpm
v	Impact speed	m/s	D	Nore size	mm	R	Distance fron rotation center to impact point	m
E	Gross energy	J(N.m)	P	Air pressure	MPa			
E1	Kinetic energy(Potential energy)	J(N.m)	L	Shock stroke	m	I	Moment of Inertia ($I=mr^2/2$)	$kg\times m^2$
E2	Propelling energy	J(N.m)	h	Height	m	ω	Angular velocity($\omega=2\pi N/60$) (90°=1.57rad/s)	rad/s
g	Gravity acceleration	9.8(m/s^2)	T	Torque	N.m			