ACE CESEHSA

Automation Control Equipment

Damping Technology

ACE: Your partner for industrial shock absorbers, gas springs and vibration control

Main Catalog 2018
North America

Metric Dimensions

Profile Dampers

The low cost alternative for continuous duty

The exceedingly successful TUBUS series from ACE is a perfect alternative, when masses don't need to be decelerated to an exact point. Available in more than 140 different versions, the profile dampers are used to slow down masses, particularly under extreme conditions.

They are also recommended for use if there is little installation space available. Manufactured in co-polyester elastomer, the highly resistant absorbers provide the best benefits in areas where other materials fail or where a similarly high service life of up to 1 million load changes cannot be achieved. They are affordable, compact and light and absorb the energy with different damping characteristics depending on the design.

- Competitive price/performance ratio
- Reliable in extreme situations
- Highly resistant material
- Compact and lightweight design
- Easy to mount
- Long service life

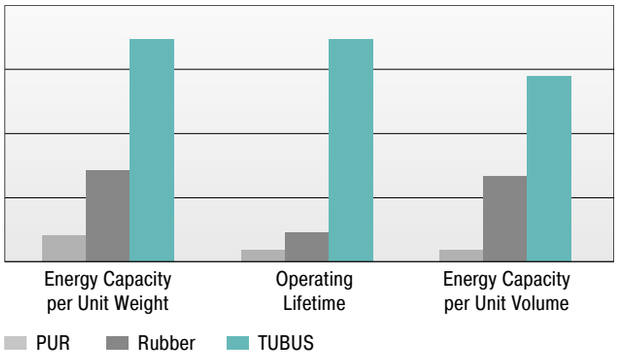
Physical Properties of TUBUS Profile Dampers

ACE TUBUS profile dampers are high performance damping elements made from a special Co-Polyester Elastomer. They have a high energy absorbing capacity compared with other materials.

The excellent damping characteristics are achieved as a result of the special elastomer material and the worldwide unique construction design. This enables us to change the characteristics of the elastomer material so that individual and distinct damping curves are possible.

TUBUS dampers offer a considerable performance advantage when compared to other materials such as rubber, urethanes (PUR) and steel springs.

An advantage over other damping elements is TUBUS´ operating life expectancy – up to twenty times longer than with urethane dampers, up to ten times longer than with rubber dampers and up to five times longer than with steel spring dampers.



Comparison of Damping Characteristics

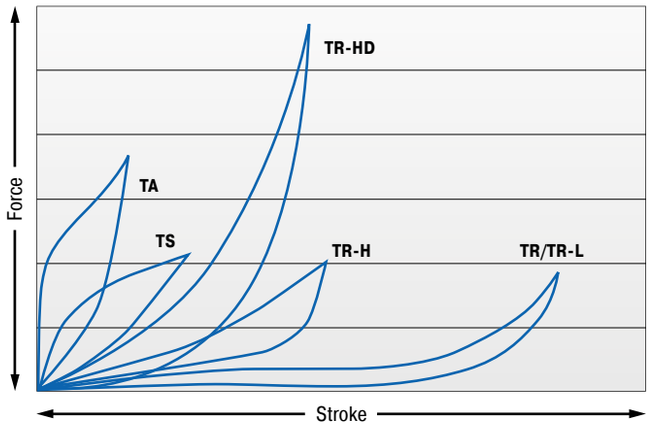
The innovative TUBUS dampers absorb energy while exhibiting the following damping characteristics:

Product family TA
Degressive characteristic with max. energy absorption with min. stroke.
Energy absorption: 58 % to 73 %

Product family TS
Almost linear characteristic with low reaction force over a short operating stroke.
Energy absorption: 35 % to 64 %

Product family TR/TR-L/TR-H
Progressive characteristic with gradually increasing reaction force over a long stroke.
Energy absorption TR: 25 % to 45 %
Energy absorption TR-L: 26 % to 41 %
Energy absorption TR-H: 39 % to 62 %

Product family TR-HD
Progressive characteristic with high energy absorption with a short stroke.
Energy absorption: 43 % to 72 %



Characteristics of dynamic energy absorption for impact velocity over 0.5 m/s.

or impact velocities under 0.5 m/s, please request a static characteristic curve.

Capacity Chart

TUBUS TA, TS, TR, TR-H, TR-HD

TYPES	Max. Energy Capacity [1] E_3 Nm/cycle	Max. Energy Capacity Emergency Stop E_3 Nm/cycle	Stroke max. mm	Page
TA12-5	2.0	3.0	5	117
TA17-7	6.0	9.0	7	117
TA21-9	10.0	16.0	9	117
TA22-10	11.5	21.0	10	117
TA28-12	29.0	46.0	12	117
TA34-14	48.0	87.0	14	117
TA37-16	65.0	112.0	16	117
TA40-16	82.0	130.0	16	117
TA43-18	112.0	165.0	18	117
TA47-20	140.0	173.0	20	117
TA50-22	170.0	223.0	22	117
TA54-22	201.0	334.0	22	117
TA57-24	242.0	302.0	24	117
TA62-25	304.0	361.0	25	117
TA65-27	374.0	468.0	27	117
TA70-29	421.0	524.0	29	117
TA72-31	482.0	559.0	31	117
TA80-32	570.0	831.0	32	117
TA82-35	683.0	921.0	35	117
TA85-36	797.0	1,043.0	36	117
TA90-38	934.0	1,249.0	38	117
TA98-40	1,147.0	1,555.0	40	117
TA116-48	2,014.0	2,951.0	48	117
TS14-7	2.0	3.0	7	119
TS18-9	4.0	6.0	9	119
TS20-10	6.0	7.0	10	119
TS26-15	11.5	15.0	15	119
TS32-16	23.0	26.0	16	119
TS35-19	30.0	36.0	19	119
TS40-19	34.0	42.0	19	119
TS41-21	48.0	63.0	21	119
TS44-23	63.0	72.0	23	119
TS48-25	81.0	91.0	25	119
TS51-27	92.0	114.0	27	119
TS54-29	122.0	158.0	29	119
TS58-30	149.0	154.0	30	119
TS61-32	163.0	169.0	32	119
TS64-34	208.0	254.0	34	119
TS68-36	227.0	272.0	36	119
TS75-39	291.0	408.0	39	119
TS78-40	352.0	459.0	40	119
TS82-44	419.0	620.0	44	119
TS84-43	475.0	635.0	43	119
TS90-47	580.0	778.0	47	119
TS107-56	902.0	966.0	56	119
TR29-17	1.2	1.8	17	121
TR37-22	2.3	5.4	22	121
TR43-25	3.5	8.1	25	121
TR50-35	5.8	8.3	35	121
TR63-43	12.0	17.0	43	121
TR67-40	23.0	33.0	40	121
TR76-46	34.5	43.0	46	121
TR83-50	45.0	74.0	50	121
TR85-50	68.0	92.0	50	121
TR93-57	92.0	122.0	57	121
TR100-60	115.0	146.0	60	121
TR30-15H	2.7	5.7	15	123
TR39-19H	6.0	18.0	19	123
TR45-23H	8.7	24.0	23	123
TR52-32H	11.7	20.0	32	123
TR64-41H	25.0	46.0	41	123
TR68-37H	66.5	98.0	37	123
TR79-42H	81.5	106.0	42	123
TR86-45H	124.0	206.0	45	123
TR87-46H	158.0	261.0	46	123
TR95-50H	228.0	342.0	50	123
TR102-56H	290.0	427.0	56	123
TR42-14HD	405.0	567.0	14	127
TR47-12HD	857.0	1,200.0	12	127
TR47-17HD	850.0	1,190.0	17	127
TR52-14HD	1,634.0	2,288.0	14	127
TR57-21HD	1,194.0	1,672.0	21	127

TUBUS TA, TS, TR, TR-H, TR-HD

TYPES	Max. Energy Capacity [1] E_3 Nm/cycle	Max. Energy Capacity Emergency Stop E_3 Nm/cycle	Stroke max. mm	Page
TR62-15HD	1,790	2,506	15	127
TR62-19HD	2,940	4,116	19	127
TR63-24HD	2,061	2,885	24	127
TR72-26HD	1,700	2,380	26	127
TR79-20HD	2,794	3,912	20	127
TR79-31HD	2,975	4,165	31	127
TR85-33HD	2,526	3,536	33	127
TR89-21HD	4,438	6,213	21	127
TR90-37HD	3,780	5,292	37	127
TR93-24HD	3,421	4,789	24	127
TR97-31HD	7,738	10,833	31	127
TR97-35HD	2,821	3,949	35	127
TR102-44HD	4,697	6,576	44	127
TR105-28HD	5,641	7,897	28	127
TR117-30HD	8,457	11,840	30	127

[1] Max. energy capacity per cycle for continous use.

TUBUS TR-L

TYPES	Max. Energy Capacity [1] E_3 Nm/cycle	Max. Energy Capacity Emergency Stop E_3 Nm/cycle	Stroke max. mm	Page
TR29-17L	7.2	10.9	17	125
TR43-25L	14.0	32.7	25	125
TR63-43L	21.9	32.0	43	125
TR66-40L-1	102.0	143.0	40	125
TR66-40L-2	204.0	286.0	40	125
TR66-40L-3	306.0	428.0	40	125
TR66-40L-4	408.0	571.0	40	125
TR66-40L-5	510.0	714.0	40	125
TR76-45L-1	145.0	203.0	45	125
TR76-45L-2	290.0	406.0	45	125
TR76-45L-3	435.0	609.0	45	125
TR76-45L-4	580.0	812.0	45	125
TR76-45L-5	725.0	1,015.0	45	125
TR83-48L-1	180.0	252.0	48	125
TR83-48L-2	360.0	504.0	48	125
TR83-48L-3	540.0	756.0	48	125
TR83-48L-4	720.0	1,008.0	48	125
TR83-48L-5	900.0	1,260.0	48	125
TR99-60L-1	270.0	378.0	60	125
TR99-60L-2	540.0	756.0	60	125
TR99-60L-3	810.0	1,134.0	60	125
TR99-60L-4	1,080.0	1,512.0	60	125
TR99-60L-5	1,350.0	1,890.0	60	125
TR99-60L-6	1,620.0	2,268.0	60	125
TR99-60L-7	1,890.0	2,646.0	60	125
TR143-86L-1	600.0	840.0	86	125
TR143-86L-2	1,200.0	1,680.0	86	125
TR143-86L-3	1,800.0	2,520.0	86	125
TR143-86L-4	2,400.0	3,360.0	86	125
TR143-86L-5	3,000.0	4,200.0	86	125
TR143-86L-6	3,600.0	5,040.0	86	125
TR143-86L-7	4,200.0	5,880.0	86	125
TR188-108L-1	1,100.0	1,540.0	108	125
TR188-108L-2	2,200.0	3,080.0	108	125
TR188-108L-3	3,300.0	4,620.0	108	125
TR188-108L-4	4,400.0	6,160.0	108	125
TR188-108L-5	5,500.0	7,700.0	108	125
TR188-108L-6	6,600.0	9,240.0	108	125
TR188-108L-7	7,700.0	10,780.0	108	125

[1] Max. energy capacity per cycle for continous use.

Profile Dampers

TUBUS TA

Page 116

Axial Damping
Compact size and strong force absorption
Linear slides, Pneumatic cylinders, Handling modules, Machines and plants

TUBUS TS

Page 118

Axial Soft Damping
Compact size and smooth deceleration
Linear slides, Pneumatic cylinders, Handling modules, Machines and plants

TUBUS TR

Page 120

Radial Damping
Compact size and soft deceleration
Furniture industry, Sports equipment, Linear slides, Pneumatic cylinders

TUBUS TR-H

Page 122

Radial Damping, Hard Version
Compact size with soft deceleration and high energy absorption
Furniture industry, Sports equipment, Linear slides, Pneumatic cylinders

TUBUS TR-L

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Radial Damping, Long Version
Powerhouse in long body length
Offshore industry, Agricultural machinery, Impact panels, Conveyor systems

TUBUS TR-HD

Page 126

Radial Damping, Heavy Duty Version
Compact powerhouse in solid material
Offshore industry, Agricultural machinery, Impact panels, Conveyor systems

TUBUS TA

Compact size and strong force absorption

Axial Damping
Energy capacity 2 Nm/Cycle to 2,951 Nm/Cycle
Maximum stroke 5 mm to 48 mm

Very efficient energy guzzlers: The TA profile dampers from the ACE TUBUS-Series are maintenance-free and ready to install. They're made of co-polyester elastomer; a material that only heats up slightly and ensures consistent damping. The TA models absorbs most of the energy at the start of the stroke.

The TA family has been specially developed for maximum energy absorption within a range of 2 Nm to 2,951 Nm (18 in-lbs to 26,119 in-lbs.). These dampers have a minimum height is thanks to the space-saving shape, with Ø 12 mm to Ø 116 mm (Ø 0.47" to Ø 4.57"). The dampers can be very easily and quickly installed with the provided special screw.

These compact, cost-effective dampers are ideal as end position dampers in linear axes, in toolmaking and tool machines, in hydraulic and pneumatic equipment, handling equipment and other applications.

Technical Data

Energy capacity: 2 Nm/Cycle to 2,951 Nm/Cycle

Energy absorption: 58 % to 73 %

Dynamic force range: 870 N to 90,000 N

Operating temperature range: -40 °C to 90 °C

Construction size: 12 mm to 116 mm

Mounting: In any position

Material hardness rating: Shore 55D

Material: Profile body: Co-Polyester Elastomer

Environment: Resistant to microbes, seawater or chemical attack. Excellent UV and ozone resistance. Material does not absorb water or swell.

Impact velocity range: Max. 5 m/s

Torque max.:
M3: 1 Nm
M4: 1.7 Nm
M5: 2.3 Nm
M6: 6 Nm
M8: 20 Nm
M12: 50 Nm
M16: 120 Nm

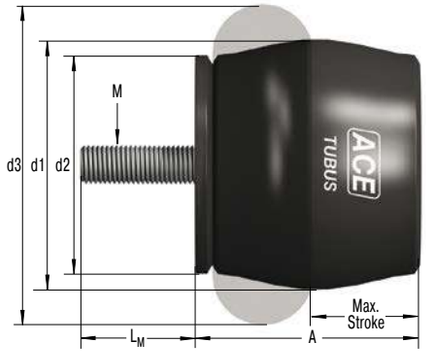
Application field: Linear slides, Pneumatic cylinders, Handling modules, Machines and plants, Swivel units, Electro-mechanical drives, Hydraulic devices, Conveyor systems, Crane systems

Note: Suitable for emergency stop applications and for continous use. For applications with preloading and increased temperatures please consult ACE.

Safety information: Mounting screw should additionally be secured with Loctite.

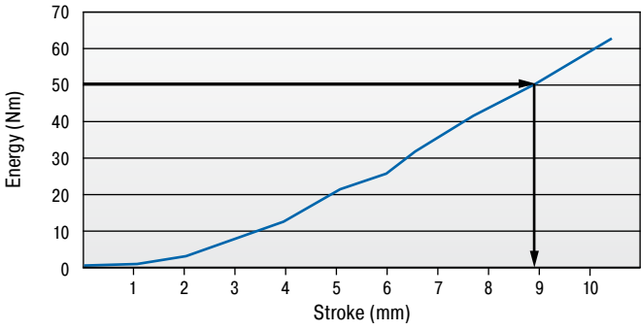
On request: Special strokes, -characteristics, -spring rates, -sizes and -materials.

TA

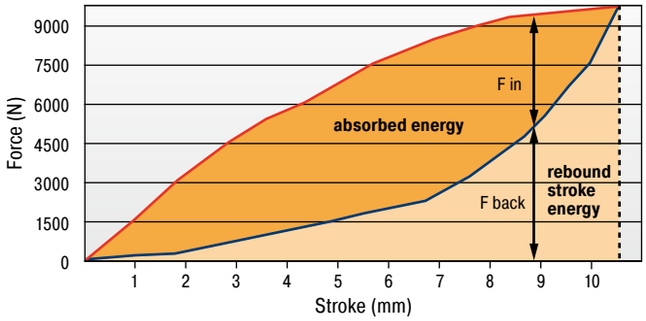


Characteristics

Type TA37-16
Energy-Stroke Characteristic (dynamic)
(with impact velocity over 0.5 m/s)



Type TA37-16
Force-Stroke Characteristic (dynamic)
(with impact velocity over 0.5 m/s)



With the aid of the characteristic curves above you can estimate the proportion of the total energy that will be absorbed.
Example: With impact energy of 50 Nm the Energy-Stroke diagram shows that a stroke of about 8.8 mm is needed.
On the Force-Stroke diagram you can estimate the proportion of absorbed energy to rebound energy at this stroke length.
Dynamic (v > 0.5 m/s) and static (v ⩽ 0.5 m/s) characteristics of all types are available on request.

The calculation and selection of the most suitable damper should be carried out or be approved by ACE.

Ordering Example **TA37-16**

TUBUS Axial
Outer-⌀ 1.46" (37 mm)
Stroke 0.63" (16 mm)

Performance and Dimensions

TYPES	[1] E_3 Nm/cycle	Emergency Stop E_3 Nm/cycle	Stroke max. mm	A mm	d1 mm	d2 mm	d3 mm	L_M mm	M	Weight kg
TA12-5	2.0	3	5	11	12	11	15	3	M3	0.001
TA17-7	6.0	9	7	16	17	15	22	4	M4	0.006
TA21-9	10.0	16	9	18	21	18	26	5	M5	0.017
TA22-10	11.5	21	10	19	22	19	27	6	M6	0.008
TA28-12	29.0	46	12	26	28	25	36	6	M6	0.016
TA34-14	48.0	87	14	30	34	30	43	6	M6	0.024
TA37-16	65.0	112	16	33	37	33	48	6	M6	0.030
TA40-16	82.0	130	16	35	40	34	50	8	M8	0.040
TA43-18	112.0	165	18	38	43	38	55	8	M8	0.051
TA47-20	140.0	173	20	41	47	41	60	12	M12	0.070
TA50-22	170.0	223	22	45	50	44	64	12	M12	0.085
TA54-22	201.0	334	22	47	54	47	68	12	M12	0.100
TA57-24	242.0	302	24	51	57	50	73	12	M12	0.116
TA62-25	304.0	361	25	54	62	53	78	12	M12	0.132
TA65-27	374.0	468	27	58	65	57	82	12	M12	0.153
TA70-29	421.0	524	29	61	70	60	86	12	M12	0.174
TA72-31	482.0	559	31	65	72	63	91	16	M16	0.257
TA80-32	570.0	831	32	69	80	69	100	16	M16	0.311
TA82-35	683.0	921	35	74	82	72	105	16	M16	0.350
TA85-36	797.0	1,043	36	76	85	75	110	16	M16	0.391
TA90-38	934.0	1,249	38	80	90	78	114	16	M16	0.414
TA98-40	1,147.0	1,555	40	86	98	85	123	16	M16	0.513
TA116-48	2,014.0	2,951	48	101	116	98	146	16	M16	0.803

[1] Max. energy capacity per cycle for continous use.

TUBUS TS

Compact size and smooth deceleration

Axial Soft Damping
Energy capacity 2 Nm/Cycle to 966 Nm/Cycle
Maximum stroke 7 mm to 56 mm

Energy absorption in a compact and uniform way: The TS (TUBUS soft) profile dampers are also manufactured from co-polyester elastomer. Due to the almost linear damping characteristic curve, the maintenance-free, ready-to-install components softly absorb the energy with minimum strain on the machine. Consistent damping is helped by the low temperature increase of the material during operation.

The TS product family impresses with maximum energy absorption within a range of 2 Nm to 966 Nm within a minimum height. The space-saving design has been implemented from Ø 14 mm to Ø 107 mm. The special screw supplied is used to simply and quickly fix the profile dampers in place.

Suitable for emergency stop and permanent applications, the cost-effective, durable TUBUS TS can be used as end position dampers in linear axes, in toolmaking and tool machines and in hydraulic, pneumatic and handling equipment.

Technical Data

Energy capacity: 2 Nm/Cycle to 966 Nm/Cycle

Energy absorption: 35 % to 64 %

Dynamic force range: 533 N to 23,500 N

Operating temperature range: -40 °C to 90 °C

Construction size: 14 mm to 107 mm

Mounting: In any position

Material hardness rating: Shore 40D

Material: Profile body: Co-Polyester Elastomer

Environment: Resistant to microbes, seawater or chemical attack. Excellent UV and ozone resistance. Material does not absorb water or swell.

Impact velocity range: Max. 5 m/s

Torque max.:
M4: 1.7 Nm
M5: 2.3 Nm
M6: 6 Nm
M12: 50 Nm
M16: 120 Nm

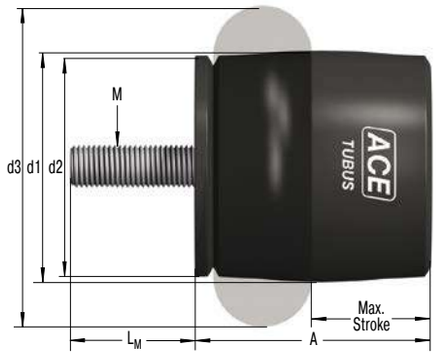
Application field: Linear slides, Pneumatic cylinders, Handling modules, Machines and plants, Swivel units, Electro-mechanical drives, Crane systems, Conveyor systems

Note: Suitable for emergency stop applications and for continous use. For applications with preloading and increased temperatures please consult ACE.

Safety information: Mounting screw should additionally be secured with Loctite.

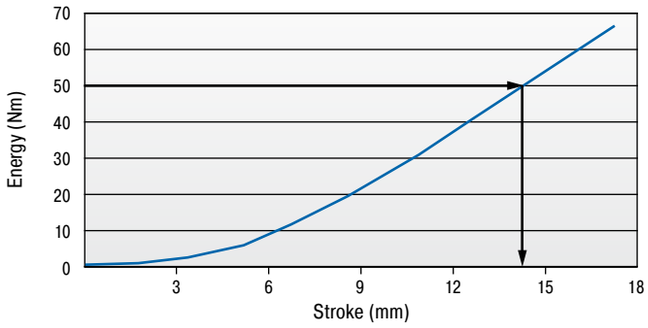
On request: Special strokes, -characteristics, -spring rates, -sizes and -materials.

TS

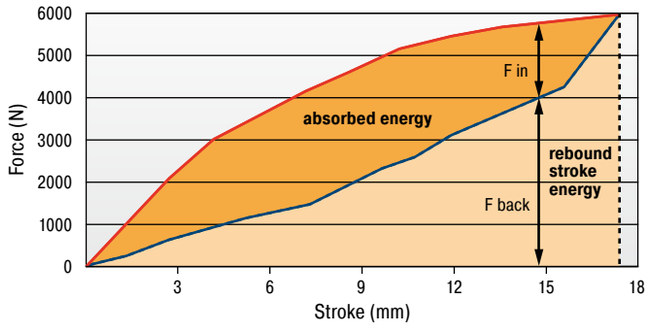


Characteristics

Type TS44-23
Energy-Stroke Characteristic (dynamic)
(with impact velocity over 0.5 m/s)



Type TS44-23
Force-Stroke Characteristic (dynamic)
(with impact velocity over 0.5 m/s)



With the aid of the characteristic curves above you can estimate the proportion of the total energy that will be absorbed.
Example: With impact energy of 50 Nm the Energy-Stroke diagram shows that a stroke of about 14 mm is needed.
On the Force-Stroke diagram you can estimate the proportion of absorbed energy to rebound energy at this stroke length.
Dynamic (v > 0.5 m/s) and static (v ⩽ 0.5 m/s) characteristics of all types are available on request.

The calculation and selection of the most suitable damper should be carried out or be approved by ACE.

Ordering Example **TS44-23**

TUBUS Axial Soft
Outer-⌀ 1.73" (44 mm)
Stroke 0.91" (23 mm)

Performance and Dimensions

TYPES	[1] E_3 Nm/cycle	Emergency Stop E_3 Nm/cycle	Stroke max. mm	A mm	d1 mm	d2 mm	d3 mm	L_M mm	M	Weight kg
TS14-7	2.0	3	7	15	14	13	19	4	M4	0.007
TS18-9	4.0	6	9	18	18	16	24	5	M5	0.008
TS20-10	6.0	7	10	21	20	19	27	6	M6	0.008
TS26-15	11.5	15	15	28	26	25	37	6	M6	0.015
TS32-16	23.0	26	16	32	32	30	44	6	M6	0.021
TS35-19	30.0	36	19	36	35	33	48	6	M6	0.028
TS40-19	34.0	42	19	38	40	34	51	6	M6	0.031
TS41-21	48.0	63	21	41	41	38	55	12	M12	0.060
TS44-23	63.0	72	23	45	44	40	60	12	M12	0.070
TS48-25	81.0	91	25	49	48	44	64	12	M12	0.080
TS51-27	92.0	114	27	52	51	47	69	12	M12	0.095
TS54-29	122.0	158	29	55	54	50	73	12	M12	0.105
TS58-30	149.0	154	30	59	58	53	78	12	M12	0.121
TS61-32	163.0	169	32	62	61	56	83	16	M16	0.203
TS64-34	208.0	254	34	66	64	60	87	16	M16	0.232
TS68-36	227.0	272	36	69	68	63	92	16	M16	0.248
TS75-39	291.0	408	39	75	75	69	101	16	M16	0.301
TS78-40	352.0	459	40	79	78	72	105	16	M16	0.332
TS82-44	419.0	620	44	84	82	75	110	16	M16	0.346
TS84-43	475.0	635	43	85	84	78	115	16	M16	0.402
TS90-47	580.0	778	47	92	90	84	124	16	M16	0.583
TS107-56	902.0	966	56	110	107	100	147	16	M16	0.733

[1] Max. energy capacity per cycle for continous use.

TUBUS TR

Compact size and soft deceleration

Radial Damping
Energy capacity 1.2 Nm/Cycle to 146 Nm/Cycle
Maximum stroke 17 mm to 60 mm

For long, soft braking action: The TUBUS TR models deliver linear damping forces. These maintenance-free, ready-to-install elements are made of co-polyester elastomer, which only heats up slightly during operation and therefore provides consistent damping.

The radial loading enables a very long and soft deceleration with progressive energy reduction at the end of the stroke. The TR product family has been specially designed for maximum stroke with a minimum height, producing an energy absorption per stroke extending from 1.2 Nm to 146 Nm. The dampers are available in compact formats of Ø 29 mm to Ø 100 mm and are supplied with a special screw for simple, quick assembly.

The TUBUS TR products are suitable as end position dampers in linear axes, in toolmaking and tool machines, in hydraulic and pneumatic equipment, handling equipment and other applications.

Technical Data

Energy capacity: 1.2 Nm/Cycle to 146 Nm/Cycle

Energy absorption: 25 % to 45 %

Dynamic force range: 218 N to 7,500 N

Operating temperature range: -40 °C to 90 °C

Construction size: 29 mm to 100 mm

Mounting: In any position

Material hardness rating: Shore 40D

Material: Profile body: Co-Polyester Elastomer

Environment: Resistant to microbes, seawater or chemical attack. Excellent UV and ozone resistance. Material does not absorb water or swell.

Impact velocity range: Max. 5 m/s

Torque max.:
M5: 3 Nm
M6: 6 Nm
M8: 20 Nm

Application field: Furniture industry, Sports equipment, Linear slides, Pneumatic cylinders, Handling modules, Machines and plants, Stacking units, Electro-mechanical drives, Conveyor systems, Dock constructions for shipbuilding

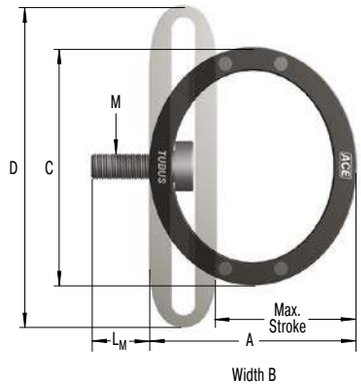
Note: Suitable for emergency stop applications and for continous use. For applications with preloading and increased temperatures please consult ACE.

Safety information: Mounting screw should additionally be secured with Loctite.

On request: Special strokes, -characteristics, -spring rates, -sizes and -materials.

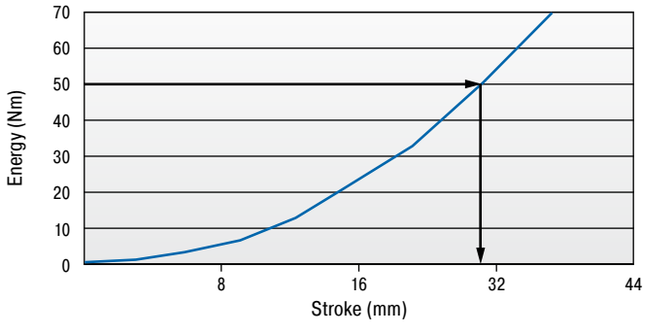
Issue 04.2018 – Specifications subject to change

TR

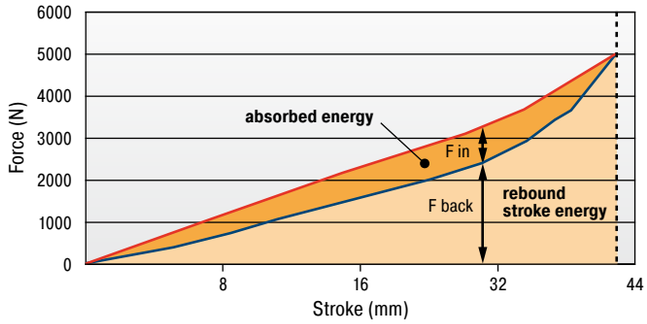


Characteristics

Type TR93-57
Energy-Stroke Characteristic (dynamic)
(with impact velocity over 0.5 m/s)



Type TR93-57
Force-Stroke Characteristic (dynamic)
(with impact velocity over 0.5 m/s)



With the aid of the characteristic curves above you can estimate the proportion of the total energy that will be absorbed.
Example: With impact energy of 50 Nm the Energy-Stroke diagram shows that a stroke of about 31 mm is needed.
On the Force-Stroke diagram you can estimate the proportion of absorbed energy to rebound energy at this stroke length.
Dynamic (v > 0.5 m/s) and static (v ⩽ 0.5 m/s) characteristics of all types are available on request.

The calculation and selection of the most suitable damper should be carried out or be approved by ACE.

Ordering Example **TR93-57**

TUBUS Radial
Outer-⌀ 3.66" (93 mm)
Stroke 2.24" (57 mm)

Performance and Dimensions

TYPES	[1] E_3 Nm/cycle	Emergency Stop E_3 Nm/cycle	Stroke max. mm	A mm	B mm	C mm	D mm	L_M mm	M	Weight kg
TR29-17	1.2	1.8	17	25	13	29	38	5	M5	0.007
TR37-22	2.3	5.4	22	32	19	37	50	5	M5	0.013
TR43-25	3.5	8.1	25	37	20	43	58	5	M5	0.017
TR50-35	5.8	8.3	35	44	34	50	68	5	M5	0.022
TR63-43	12.0	17.0	43	55	43	63	87	5	M5	0.051
TR67-40	23.0	33.0	40	59	46	67	88	5	M5	0.077
TR76-46	34.5	43.0	46	67	46	76	102	6	M6	0.104
TR83-50	45.0	74.0	50	73	51	83	109	6	M6	0.142
TR85-50	68.0	92.0	50	73	68	85	111	8	M8	0.206
TR93-57	92.0	122.0	57	83	83	93	124	8	M8	0.297
TR100-60	115.0	146.0	60	88	82	100	133	8	M8	0.308

[1] Max. energy capacity per cycle for continous use.

TUBUS TR-H

Compact size with soft deceleration and high energy absorption

Radial Damping, Hard Version
Energy capacity 2.7 Nm/Cycle to 427 Nm/Cycle
Maximum stroke 15 mm to 56 mm

Harder mixture of materials for higher energy absorption: The maintenance-free and ready-to-install TR-H profile dampers, are stressed radially in the same way as the basic TR model. With almost the same dimensions, they also decelerate with a very long and soft action. The harder co-polyester elastomer mixture leads to significantly high energy absorption of 2.7 Nm to 427 Nm (3.9 in-lbs to 3,779 in-lbs) in these models. The supplied special screw makes them easy to mount.

The TR-H product family is space-saving with dimensions of Ø 30 mm to Ø 102 mm (Ø 1.18“ to Ø 4.02“). It complements the TUBUS range between the progressive TR and almost linear TS models. Users are therefore provided with a full range of deceleration curves within the ACE TUBUS family.

The TUBUS TR-H products are suitable end position dampers in linear axes, in toolmaking and tool machines and in hydraulic, pneumatic and handling equipment as well as other applications.

Technical Data

Energy capacity: 2.7 Nm/Cycle to 427 Nm/Cycle

Energy absorption: 39 % to 62 %

Dynamic force range: 550 N to 21,200 N

Operating temperature range: -40 °C to 90 °C

Construction size: 30 mm to 102 mm

Mounting: In any position

Material hardness rating: Shore 55D

Material: Profile body: Co-Polyester Elastomer

Environment: Resistant to microbes, seawater or chemical attack. Excellent UV and ozone resistance. Material does not absorb water or swell.

Impact velocity range: Max. 5 m/s

Torque max.:
M5: 3 Nm
M6: 6 Nm
M8: 20 Nm

Application field: Furniture industry, Sports equipment, Linear slides, Pneumatic cylinders, Handling modules, Machines and plants, Stacking units, Electro-mechanical drives, Conveyor systems, Dock constructions for shipbuilding

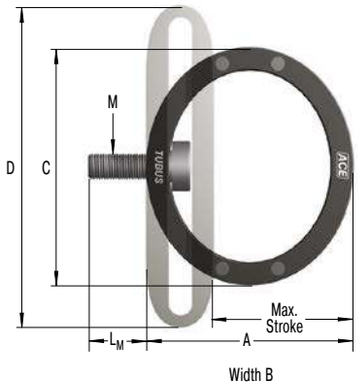
Note: Suitable for emergency stop applications and for continous use. For applications with preloading and increased temperatures please consult ACE.

Safety information: Mounting screw should additionally be secured with Loctite.

On request: Special strokes, -characteristics, -spring rates, -sizes and -materials.

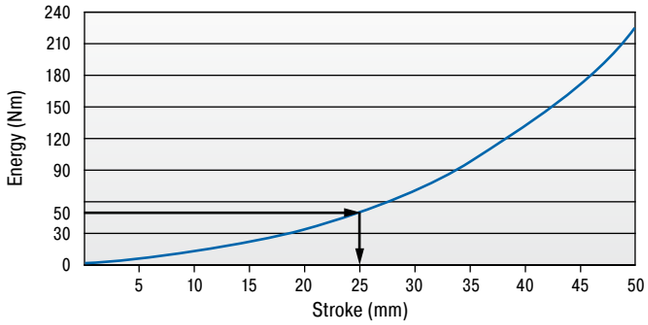
Issue 04.2018 – Specifications subject to change

TR-H

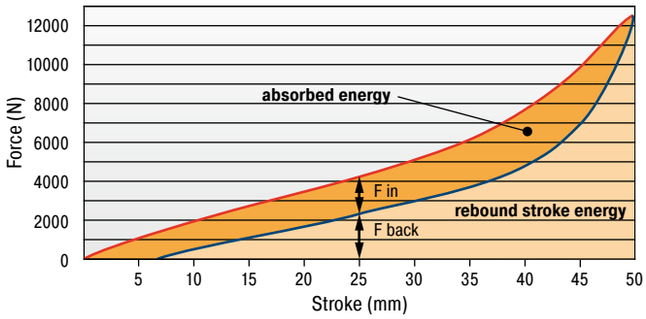


Characteristics

Type TR95-50H
Energy-Stroke Characteristic (dynamic)
(with impact velocity over 0.5 m/s)



Type TR95-50H
Force-Stroke Characteristic (dynamic)
(with impact velocity over 0.5 m/s)



With the aid of the characteristic curves above you can estimate the proportion of the total energy that will be absorbed.
Example: With impact energy of 50 Nm the Energy-Stroke diagram shows that a stroke of about 25 mm is needed.
On the Force-Stroke diagram you can estimate the proportion of absorbed energy to rebound energy at this stroke length.
Dynamic (v > 0.5 m/s) and static (v ⩽ 0.5 m/s) characteristics of all types are available on request.

The calculation and selection of the most suitable damper should be carried out or be approved by ACE.

Ordering Example **TR95-50H**

TUBUS Radial
Outer-⌀ 3.74" (95 mm)
Stroke 1.97" (50 mm)
Hard Version

Performance and Dimensions

TYPES	[1] E_3 Nm/cycle	Emergency Stop E_3 Nm/cycle	Stroke max. mm	A mm	B mm	C mm	D mm	L_M mm	M	Weight kg
TR30-15H	2.7	5.7	15	23	13	30	38	5	M5	0.006
TR39-19H	6.0	18.0	19	30	19	39	50	5	M5	0.013
TR45-23H	8.7	24.0	23	36	20	45	58	5	M5	0.019
TR52-32H	11.7	20.0	32	42	34	52	68	5	M5	0.027
TR64-41H	25.0	46.0	41	53	43	64	87	5	M5	0.054
TR68-37H	66.5	98.0	37	56	46	68	88	5	M5	0.083
TR79-42H	81.5	106.0	42	64	46	79	102	6	M6	0.107
TR86-45H	124.0	206.0	45	69	51	86	109	6	M6	0.152
TR87-46H	158.0	261.0	46	68	67	86	111	8	M8	0.202
TR95-50H	228.0	342.0	50	77	82	95	124	8	M8	0.281
TR102-56H	290.0	427.0	56	84	81	102	133	8	M8	0.334

[1] Max. energy capacity per cycle for continous use.

TUBUS TR-L

Powerhouse in long body length

Radial Damping, Long Version
Energy capacity 7.2 Nm/Cycle to 10,780 Nm/Cycle
Maximum stroke 17 mm to 108 mm

Especially for applications with long and soft deceleration: The radial tube dampers TR-L from the ACE TUBUS-Series are maintenance-free, ready-to-install elements made of co-polyester elastomer.

Their radial load offers designers a very long and soft deceleration with a progressive reduction in energy at the end of the stroke. The TR-L range has been specially developed for a maximum stroke with a minimum height and a range of 7.2 Nm to 10,780 Nm. The absorption capacity is dependent on the length of the selected tube damper. These models are available in sizes between Ø 29 mm and Ø 188 mm.

The TUBUS TR-L is used where impact or collision protection is necessary along a straight line e.g. on shovels in mining equipment, loading and lifting devices, dock systems in shipbuilding or luggage and transport belts.

Technical Data

Energy capacity: 7.2 Nm/Cycle to 10,780 Nm/Cycle

Energy absorption: 26 % to 41 %

Dynamic force range: 1,312 N to 217,700 N

Operating temperature range: -40 °C to 90 °C

Construction size: 29 mm to 188 mm

Mounting: In any position

Material hardness rating: Shore 55D

Material: Profile body: Co-Polyester Elastomer

Environment: Resistant to microbes, seawater or chemical attack. Excellent UV and ozone resistance. Material does not absorb water or swell.

Impact velocity range: Max. 5 m/s

Torque max.:
M5: 3 Nm
M8: 20 Nm
M16: 40 Nm (DIN912)
M16: 120 Nm (shouldered screw)

Application field: Offshore industry, Agricultural machinery, Impact panels, Conveyor systems, Stacking units, Shipbuilding, Shovels or articulated joints for construction machinery, Transport roads, Loading and lifting equipment

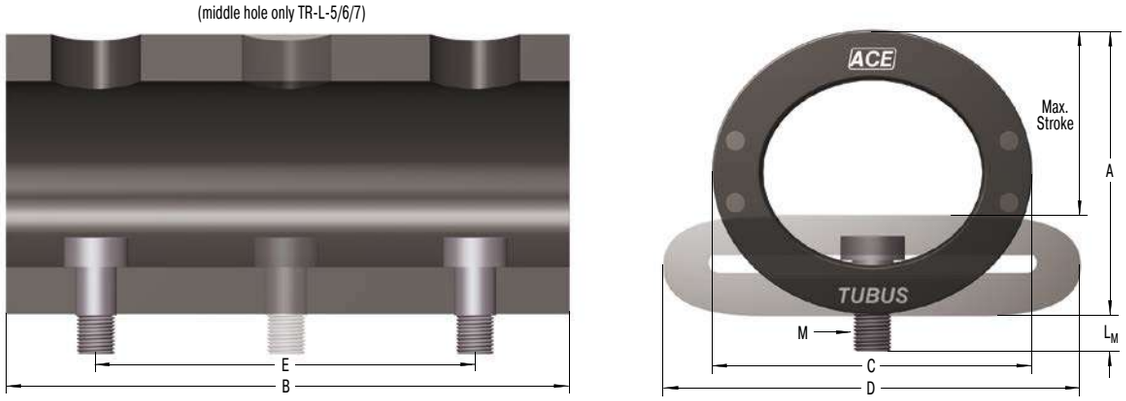
Note: Suitable for emergency stop applications and for continous use. For applications with preloading and increased temperatures please consult ACE.

Safety information: Mounting screw should additionally be secured with Loctite.

On request: Special strokes, -characteristics, -spring rates, -sizes and -materials.

Issue 04.2018 – Specifications subject to change

TR-L



The calculation and selection of the most suitable damper should be carried out or be approved by ACE.

Ordering Example **TR66-40L-2**

TUBUS Radial
Outer-⌀ 2.60" (66 mm)
Stroke 1.57" (40 mm)
Long Version
Length 2 = 12.01" (305 mm)

Performance and Dimensions

TYPES	[1] E_3 Nm/cycle	Emergency Stop E_3 Nm/cycle	Stroke max. mm	A mm	B mm	C mm	D mm	E mm	L_M mm	M	Weight kg
TR29-17L	7.2	10.9	17	25	80	29	38	40	5	M5	0.029
TR43-25L	14.0	32.7	25	37	80	43	58	40	5	M5	0.061
TR63-43L	21.9	32.0	43	55	80	63	87	40	5	M5	0.101
TR66-40L-1	102.0	143.0	40	59	152	66	87	102	8	M8	0.284
TR66-40L-2	204.0	286.0	40	59	305	66	87	254	8	M8	0.580
TR66-40L-3	306.0	428.0	40	59	457	66	87	406	8	M8	0.809
TR66-40L-4	408.0	571.0	40	59	610	66	87	559	8	M8	1.064
TR66-40L-5	510.0	714.0	40	59	762	66	87	711	8	M8	1.344
TR76-45L-1	145.0	203.0	45	68	152	76	100	102	8	M8	0.380
TR76-45L-2	290.0	406.0	45	68	305	76	100	254	8	M8	0.696
TR76-45L-3	435.0	609.0	45	68	457	76	100	406	8	M8	1.130
TR76-45L-4	580.0	812.0	45	68	610	76	100	559	8	M8	1.430
TR76-45L-5	725.0	1,015.0	45	68	762	76	100	711	8	M8	1.820
TR83-48L-1	180.0	252.0	48	73	152	83	106	102	8	M8	0.480
TR83-48L-2	360.0	504.0	48	73	305	83	106	254	8	M8	0.869
TR83-48L-3	540.0	756.0	48	73	457	83	106	406	8	M8	1.380
TR83-48L-4	720.0	1,008.0	48	73	610	83	106	559	8	M8	1.810
TR83-48L-5	900.0	1,260.0	48	73	762	83	106	711	8	M8	2.260
TR99-60L-1	270.0	378.0	60	88	152	99	130	102	8	M8	0.589
TR99-60L-2	540.0	756.0	60	88	305	99	130	254	8	M8	1.164
TR99-60L-3	810.0	1,134.0	60	88	457	99	130	406	8	M8	1.940
TR99-60L-4	1,080.0	1,512.0	60	88	610	99	130	559	8	M8	2.660
TR99-60L-5	1,350.0	1,890.0	60	88	762	99	130	711	8	M8	3.100
TR99-60L-6	1,620.0	2,268.0	60	88	914	99	130	864	8	M8	3.744
TR99-60L-7	1,890.0	2,646.0	60	88	1,067	99	130	1,016	8	M8	4.300
TR143-86L-1	600.0	840.0	86	127	152	143	191	76	22	M16	1.570
TR143-86L-2	1,200.0	1,680.0	86	127	305	143	191	203	22	M16	2.840
TR143-86L-3	1,800.0	2,520.0	86	127	457	143	191	355	22	M16	3.880
TR143-86L-4	2,400.0	3,360.0	86	127	610	143	191	508	22	M16	5.420
TR143-86L-5	3,000.0	4,200.0	86	127	762	143	191	660	22	M16	7.070
TR143-86L-6	3,600.0	5,040.0	86	127	914	143	191	812	22	M16	8.370
TR143-86L-7	4,200.0	5,880.0	86	127	1,067	143	191	965	22	M16	9.480
TR188-108L-1	1,100.0	1,540.0	108	165	152	188	245	76	26	M16	2.479
TR188-108L-2	2,200.0	3,080.0	108	165	305	188	245	203	26	M16	4.035
TR188-108L-3	3,300.0	4,620.0	108	165	457	188	245	355	26	M16	7.210
TR188-108L-4	4,400.0	6,160.0	108	165	610	188	245	508	26	M16	9.820
TR188-108L-5	5,500.0	7,700.0	108	165	762	188	245	660	26	M16	11.390
TR188-108L-6	6,600.0	9,240.0	108	165	914	188	245	812	26	M16	13.930
TR188-108L-7	7,700.0	10,780.0	108	165	1,067	188	245	965	26	M16	15.940

[1] Max. energy capacity per cycle for continous use.

TUBUS TR-HD

Compact powerhouse in solid material

Radial Damping, Heavy Duty Version
Energy capacity 405 Nm/Cycle to 11,840 Nm/Cycle
Maximum stroke 12 mm to 44 mm

Impact and collision protection: The TR-HD profile dampers are stressed in the same way as the basic model TR but offer a higher force and energy absorption with a shorter damping distance thanks to the solid design. Different damping characteristic curves can be achieved with two different co-polyester elastomer hardness levels. The slightly oval (bi-concave) shape also ensures a softer force intake.

This product family absorbs a lot of energy despite the low height: a range of 405 Nm to 11,840 Nm is progressively covered by strokes of 12 mm to 44 mm. Delivered with two included screws, the damper can be easily and quickly installed both horizontally or vertically. The drill hole distance can be adapted if required.

These dampers are used in agricultural technology and on shovels or break joints on construction machines as well as on loading and lifting or similar equipment.

Technical Data

Energy capacity: 405 Nm/Cycle to 11,840 Nm/Cycle

Energy absorption: 43 % to 72 %

Dynamic force range: 78.800 N to 812,900 N

Operating temperature range: -40 °C to 90 °C

Construction size: 42 mm to 117 mm

Mounting: In any position

Material hardness rating: Shore 40D, Shore 55D

Material: Profile body: Co-Polyester Elastomer

Environment: Resistant to microbes, seawater or chemical attack. Excellent UV and ozone resistance. Material does not absorb water or swell.

Impact velocity range: Max. 5 m/s

Torque max.:
M10: 7 Nm
M12: 12 Nm

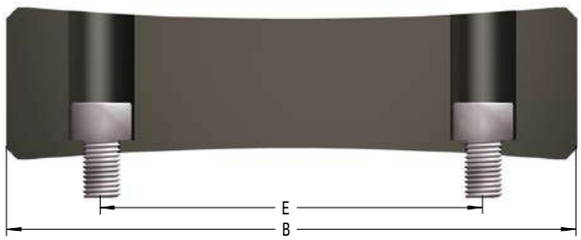
Application field: Offshore industry, Agricultural machinery, Impact panels, Conveyor systems, Stacking units, Shipbuilding, Shovels or articulated joints for construction machinery, Transport roads, Loading and lifting equipment

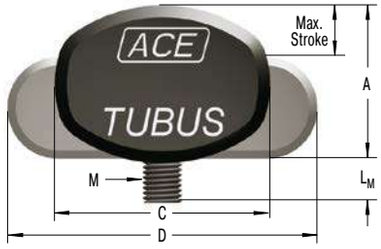
Note: Suitable for emergency stop applications and for continous use. For applications with preloading and increased temperatures please consult ACE.

Safety information: Mounting screw should additionally be secured with Loctite.

On request: Special strokes, -characteristics, -spring rates, -sizes and -materials.

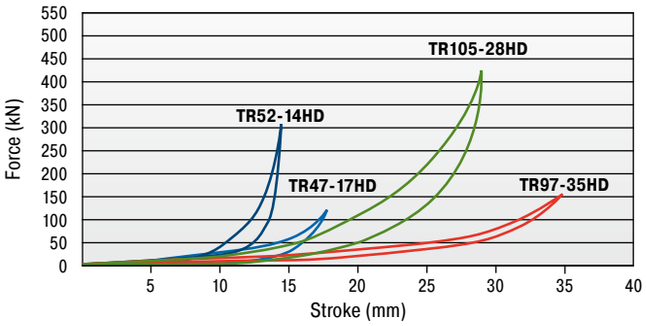
TR-HD





Characteristics

TUBUS TR-HD
Force-Stroke Characteristics (static)



The calculation and selection of the most suitable damper should be carried out or be approved by ACE.

Ordering Example **TR63-24HD**

TUBUS Radial
Outer-⌀ 2.48" (63 mm)
Stroke 0.94" (24 mm)
Heavy Duty Version

Performance and Dimensions

TYPES	[1] E_3 Nm/cycle	Emergency Stop E_3 Nm/cycle	F max. static N	Stroke max. mm	A mm	B mm	C mm	D mm	E mm	L_M mm	M	Weight kg
TR42-14HD	405	567	63,900	14	34	148	42	59	102	20	M10	0.214
TR47-12HD	857	1,200	149,600	12	31	150	47	58	102	19	M10	0.224
TR47-17HD	850	1,190	122,100	17	32	150	47	70	102	24	M10	0.224
TR52-14HD	1,634	2,288	304,500	14	29	153	52	69	102	22	M10	0.224
TR57-21HD	1,194	1,672	104,800	21	48	149	57	79	102	18	M10	0.384
TR62-15HD	1,790	2,506	245,000	15	40	153	62	77	102	16	M10	0.374
TR62-19HD	2,940	4,116	389,900	19	41	152	62	94	102	16	M10	0.320
TR63-24HD	2,061	2,885	194,400	24	46	153	63	92	102	20	M10	0.377
TR72-26HD	1,700	2,380	124,800	26	59	149	72	98	102	23	M12	0.560
TR79-20HD	2,794	3,912	289,300	20	54	153	79	98	102	24	M12	0.640
TR79-31HD	2,975	4,165	226,600	31	58	155	79	112	102	23	M12	0.530
TR85-33HD	2,526	3,536	146,100	33	71	150	85	111	102	23	M12	0.710
TR89-21HD	4,438	6,213	477,400	21	48	162	89	112	102	22	M12	0.630
TR90-37HD	3,780	5,292	240,700	37	69	155	90	128	102	23	M12	0.820
TR93-24HD	3,421	4,789	302,500	24	64	155	93	115	102	23	M12	0.790
TR97-31HD	7,738	10,833	575,200	31	63	159	97	129	102	21	M12	0.870
TR97-35HD	2,821	3,949	152,800	35	82	151	97	131	102	20	M12	1.060
TR102-44HD	4,697	6,576	254,500	44	81	156	102	147	102	22	M12	1.050
TR105-28HD	5,641	7,897	427,600	28	72	156	105	126	102	21	M12	1.000
TR117-30HD	8,457	11,840	639,100	30	66	166	117	143	102	25	M12	1.080

[1] Max. energy capacity per cycle for continous use.

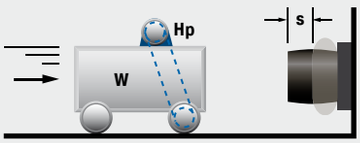
Application Examples

TUBUS TA

Safe end position damping

ACE TUBUS profile dampers protect the integrated loading station on a new high speed machining centre. The ACE TUBUS damper is designed to prevent overrun on the high speed loading station of a Camshaft machining centre used in the automobile industry. In the event that the drive train fails during operation or incorrect data is inputted the ACE TUBUS damper absorbs the impact preventing costly damage to the machine. The TA98-40 TUBUS damper impressed engineers with this exceptionally long service life in operation. When used as an emergency stop the TUBUS damper can absorb up to 73 % of the impact energy.

Safety with ultra high speed operation

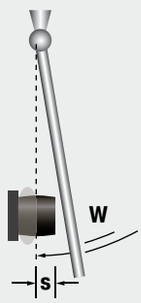


TUBUS TS

Safe braking of maintenance boats

The maintenance of wind turbines in open seas has long resulted in damage to maintenance boats. Because of impact velocity and swell, an increase in the boat's mass of up to 20 percent must be taken into account when landing on a rigid mooring structure. It is only since the landing operation has been carried out with the aid of the ACE company's TUBUS series that cable repair and maintenance work on wind turbines has been made safe for both personnel and equipment. TUBUS of the type TS84-43 are seawater resistant and can withstand ambient temperatures from -40 °C to + 90 °C.

Seawater-resistant, robust TUBUS profile dampers made of co-polyester elastomer allow boats and crew to dock safely
Wals Diving and Marine Service, 1970AC Ijmuiden, Netherlands

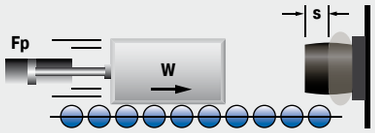


TUBUS TS

Protection of drive used in space treadmill

When training in zero gravity, a harness with bungee cords is used to ensure that trainees do not become disengaged. Three ACE profile dampers with a linear-working facility are utilized in this case. One so-called TUBUS is positioned in the pneumatic cylinder, while the other two are put in place in the rest of the system. All the dampers have the task of protecting the system if the treadmill drive belts become damaged. Otherwise, the cylinder would reach a very high speed and become seriously damaged at the end of the stroke.

TUBUS are used to protect a fitness machine in zero gravity
QinetiQ Space nv, 9150 Kruibeke, Belgium

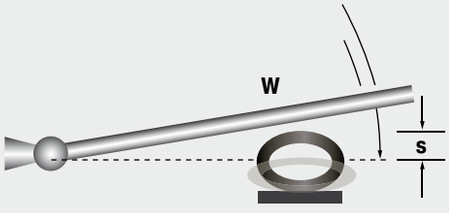


TUBUS TR

Gentle damping for electric scooters

TUBUS profile dampers make driving an e-scooter a real experience. The footboard of an electric scooter should be dampened to enable the driver to experience a comfortable ride even over potholes and other bumpy surfaces. Ideally, the characteristic line should be furnished with a soft increase in force over a long stroke. The elegant look of the scooter as well as the folding mechanism designed to save space have not allowed the use of feasible damper solutions up to now. Inferior alternatives such as rubber dampers made of polyurethane or simple steel springs could not be considered from the start. The TUBUS profile damper TR52-32H offered the perfect solution with its compact construction design paired with progressive damping action.

Profile dampers increase the riding comfort of an electric scooter



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