SBI Connectors

SICAME GROUP

ENERGY IS OUR JOB

BUSBAR DAMPERS

AEOLIAN VIBRATION SOLUTION

SBI Connectors
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BUSBAR DAMPERS,

The effects of wind on busbar substation

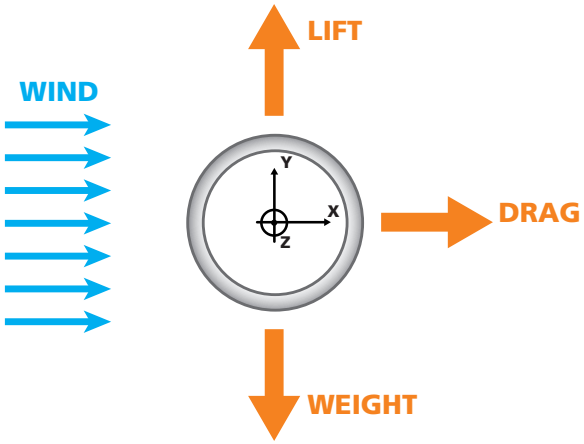
High voltage (HV) and ultra high voltage (UHV) substations are, depending upon their geographical location, exposed to climatic conditions: especialy wind.

The wind causes sinusoidal turbulence to the substation busbars that in return causes variations in the carrying capacity with the fluid (air) moving in the same way as on an aeroplane's wing (fig1).

In certain frequency conditions, busbars that are exposed to the wind can reach their natural resonance frequency (low frequency) that creates severe vibrations (fig2) that can damage the installation.

To resolve this problem, a means of shock-absorption must be fitted to the tube that opposes and dissipates the vibration, taking into account the tube's natural resonance frequency.

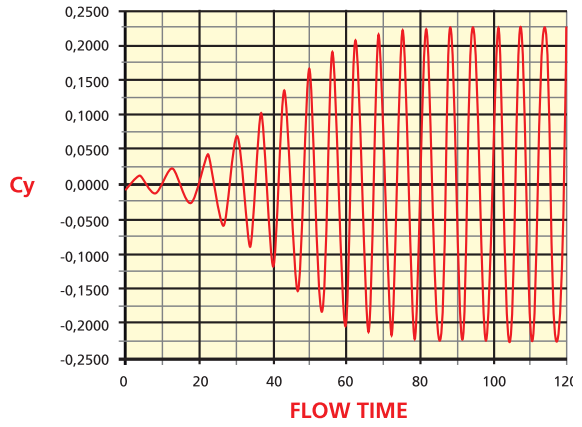
fig1 Balance of forces on a tube exposed to wind



The most common solution to date is to place a cable within the tube. But this cheap method is not satisfactory as the cable subjected to the vibrations may come out of the tube if the end caps are not properly tightened or welded then could be loose, creating a short circuit when they touch the ground.

Furthermore, if the cable within the conductor starts to vibrate, it may produce a noise that would be registered as a false-positive for a malfunction.

fig2 Magnitude of vibrations on a tube



$$L(t) = \tfrac{1}{2} C_y \rho U^2 d$$

L = lift
Cy = dimensionless cœfficient
ρ = air density
U = wind impact speed
d = conductor diameter

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The study of prevailing winds

Above all else and to effectively protect the busbars and all other devices attached to them, a study of the prevailing winds, their directions and their forces during the seasons can provide precise data for the implementation of the necessary protections in the proper way.

This study is generally conducted according to local and seasonal weather data recorded on maps.

WIND The measured wind refers to the horizontal movement of air on a level of 10 meters above surface in any direction. In the phenomenon described before, the perpendicular laminar wind is the worst cause, without any gust or peak. It can be not perpendicular to the busbar, but its component in a plane parallel to land surface could affect maybe more than the first one. The value of wind database used is the average velocity mean in everyday registered. Along 10 years, each meteorological station has registered more than 3,500 values of wind speed, which it used in this document.

Example of a map of meteorological stations measurements in Holland and risk levels of wind causing vibrations

STATION	RISK
210	4
225	2
235	3
240	4
242	2
249	4
251	3
257	1
260	5
265	5
267	3
269	4
270	4
273	4
275	4
277	3
278	5
279	4
280	4
283	5
286	4
290	5
310	3
319	4
323	4
330	2
340	4
344	4
348	4
350	5
356	4
370	4
375	4
377	4
380	4
391	5

Risk	Lower	Upper	Color
5	81	100	
4	61	80	
3	41	60	
2	21	40	
1	0	20	

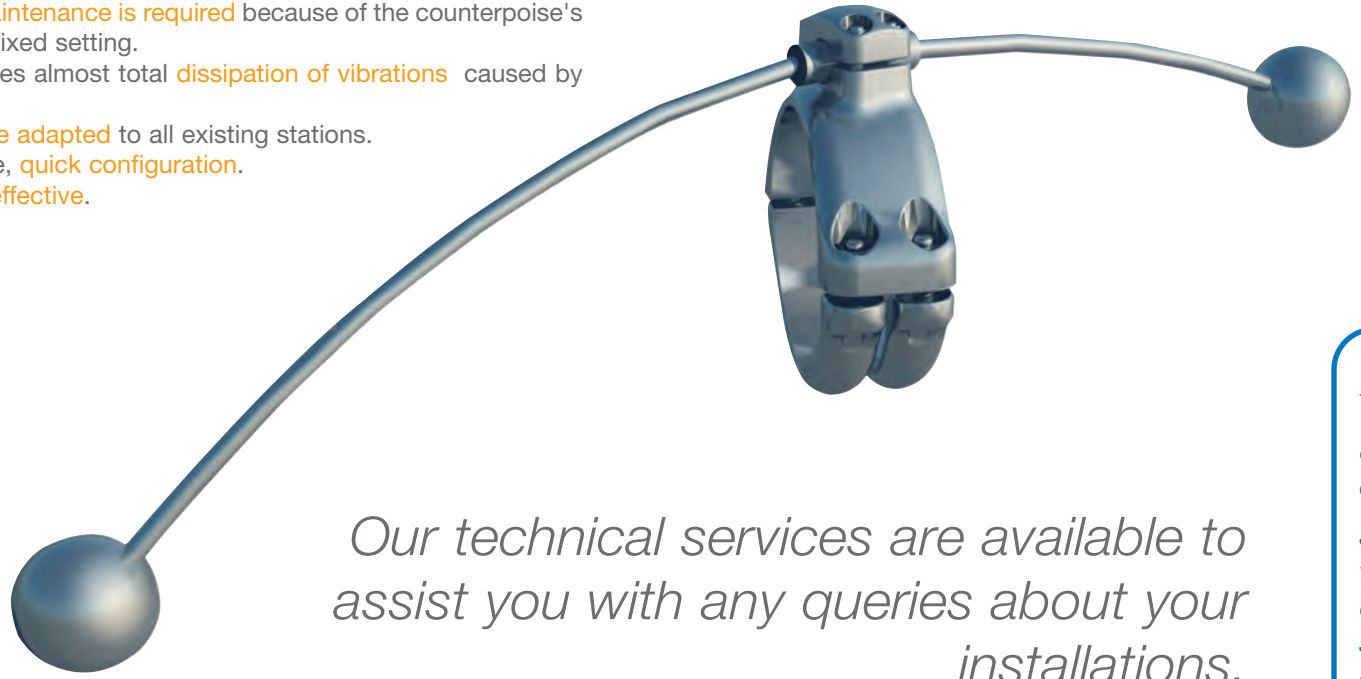
BUSBAR DAMPERS,

busbar damper, the new solution from SBI Connectors and SALVI

Being aware that the various current solutions are neither technically nor economically satisfactory, SBI Connectors in consultation with SALVI requested the participation of Milan (Italy) and Stellenbosh (South Africa) Polytechnic Universities in researching a new generation of dampers: **the busbar damper**.

This new generation is suitable for the majority of situations and is highly efficient. Following positive results from experimental tests, the new damper offers the following advantages:

- Protects and lengthens the lifetime of station equipment.
- No maintenance is required because of the counterpoise's initial fixed setting.
- Provides almost total dissipation of vibrations caused by wind.
- Can be adapted to all existing stations.
- Simple, quick configuration.
- Cost effective.



Our technical services are available to assist you with any queries about your installations.

SALVI is a global specialist in the design and manufacture of shock absorption systems for electricity carrying lines.

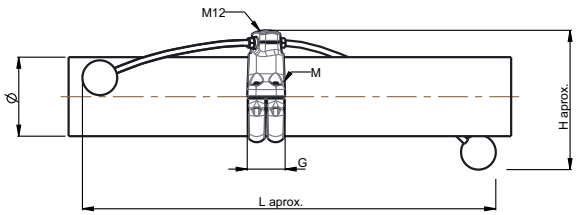
SALVI is primarily specialised in front line technological projects that require the expertise of a team of engineers, sophisticated lab equipment and close collaboration with research centres and universities.

the smart solution

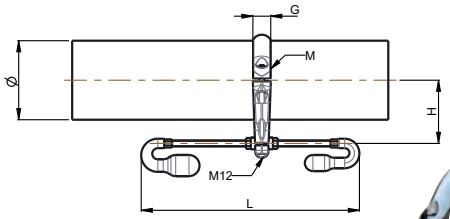
Technical characteristics chart

O.D. (mm)	Damper model	SBI P/Nr	L (mm)	G (mm)	H (mm)	Weight (kg)
63	B	SDAM63BNS	1130	120	330	10.0
63	D	SDAM63DNS	565	57	106	4.3
63	E	SDAM63ENS	695	57	106	4.6
63	F	SDAM63FNS	770	57	106	13.8
70	B	SDAM70BNS	1130	120	330	10.2
70	D	SDAM70DNS	565	57	110	4.5
70	E	SDAM70ENS	695	57	110	4.6
80	A	SDAM80ANS	1300	120	440	13.9
80	B	SDAM80BNS	1130	120	330	10.5
80	D	SDAM80DNS	565	57	115	4.5
80	E	SDAM80ENS	695	57	115	4.8
80	F	SDAM80FNS	770	57	115	14.0
90	B	SDAM90BNS	1130	120	330	10.8
90	D	SDAM90DNS	565	57	120	4.7
90	E	SDAM90ENS	695	57	120	4.9
90	F	SDAM90FNS	770	57	120	14.1
100	B	SDAM100BNS	1130	120	330	11.1
100	D	SDAM100DNS	565	57	125	4.8
100	E	SDAM100ENS	695	57	125	5.0
100	F	SDAM100FNS	770	57	125	14.3
120	A	SDAM120ANS	1300	120	440	15.0
120	B	SDAM120BNS	1130	120	330	11.6
120	D	SDAM120DNS	565	57	135	5.0
120	E	SDAM120ENS	695	57	135	5.3
120	F	SDAM120FNS	770	57	135	14.5
140	A	SDAM140ANS	1300	120	440	15.3
140	B	SDAM140BNS	1130	120	330	11.9
140	C	SDAM140CNS	1540	120	670	16.4
140	D	SDAM140DNS	565	57	145	4.6
140	E	SDAM140ENS	695	57	145	4.8
140	F	SDAM140FNS	770	57	145	14.1
150	A	SDAM150ANS	1300	120	440	15.5
150	B	SDAM150BNS	1130	120	330	12.1
150	C	SDAM150CNS	1540	120	670	16.6
150	D	SDAM150DNS	565	57	150	4.6
150	E	SDAM150ENS	695	57	150	4.9
150	F	SDAM150FNS	770	57	150	14.1

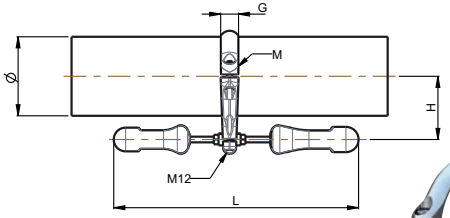
O.D.	Damper model	SBI P/Nr	L (mm)	G (mm)	H (mm)	Weight
160	A	SDAM160ANS	1300	120	440	15.8
160	B	SDAM160BNS	1130	120	330	12.4
160	C	SDAM160CNS	1540	120	670	16.9
160	D	SDAM160DNS	565	57	155	4.7
160	E	SDAM160ENS	695	57	155	4.9
160	F	SDAM160FNS	770	57	155	14.2
180	A	SDAM180ANS	1300	120	440	16.3
180	B	SDAM180BNS	1130	120	330	12.9
180	C	SDAM180CNS	1540	120	670	17.4
180	D	SDAM180DNS	565	57	165	4.9
180	E	SDAM180ENS	695	57	165	5.1
180	F	SDAM180FNS	770	57	165	14.4
200	A	SDAM200ANS	1300	120	440	16.8
200	B	SDAM200BNS	1130	120	330	13.4
200	C	SDAM200CNS	1540	120	670	17.9
200	D	SDAM200DNS	565	57	175	5.0
200	E	SDAM200ENS	695	57	175	5.2
220	A	SDAM220ANS	1300	120	440	17.3
220	B	SDAM220BNS	1130	120	330	13.9
220	C	SDAM220CNS	1540	120	670	18.4
220	D	SDAM220DNS	565	57	185	5.1
220	E	SDAM220ENS	695	57	185	5.4
220	F	SDAM220FNS	770	57	185	14.7
250	A	SDAM250ANS	1300	120	440	18.1
250	B	SDAM250BNS	1130	120	330	14.7
250	C	SDAM250CNS	1540	120	670	19.2
250	E	SDAM250ENS	695	57	200	5.6
250	F	SDAM250FNS	770	57	200	14.9
300	A	SDAM300ANS	1300	120	440	18.6
300	B	SDAM300BNS	1130	120	330	15.2
300	C	SDAM300CNS	1540	120	670	19.7
300	E	SDAM300ENS	695	57	225	5.9
300	F	SDAM300FNS	770	57	225	15.2

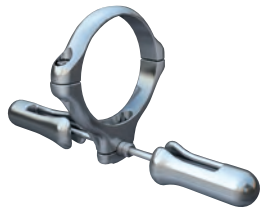


Damper A, B, C



Damper D & E





Damper F

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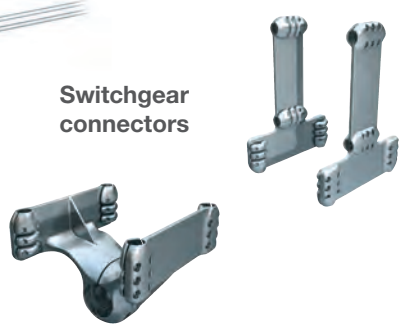
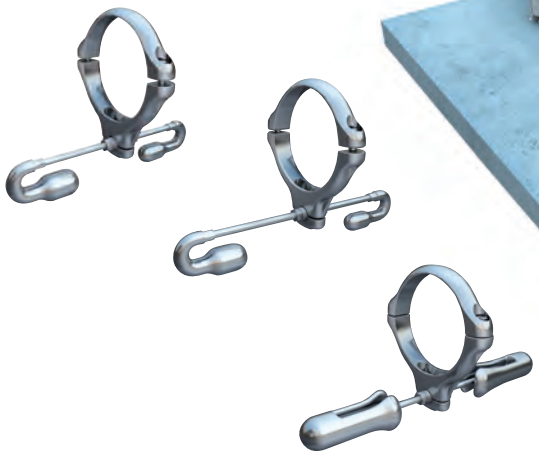
Ask for our full range of HV and UHV substation accessories

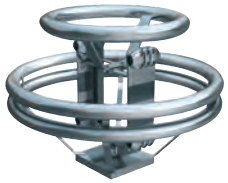
Switchgear connectors





Dampers

Corona-effect protection

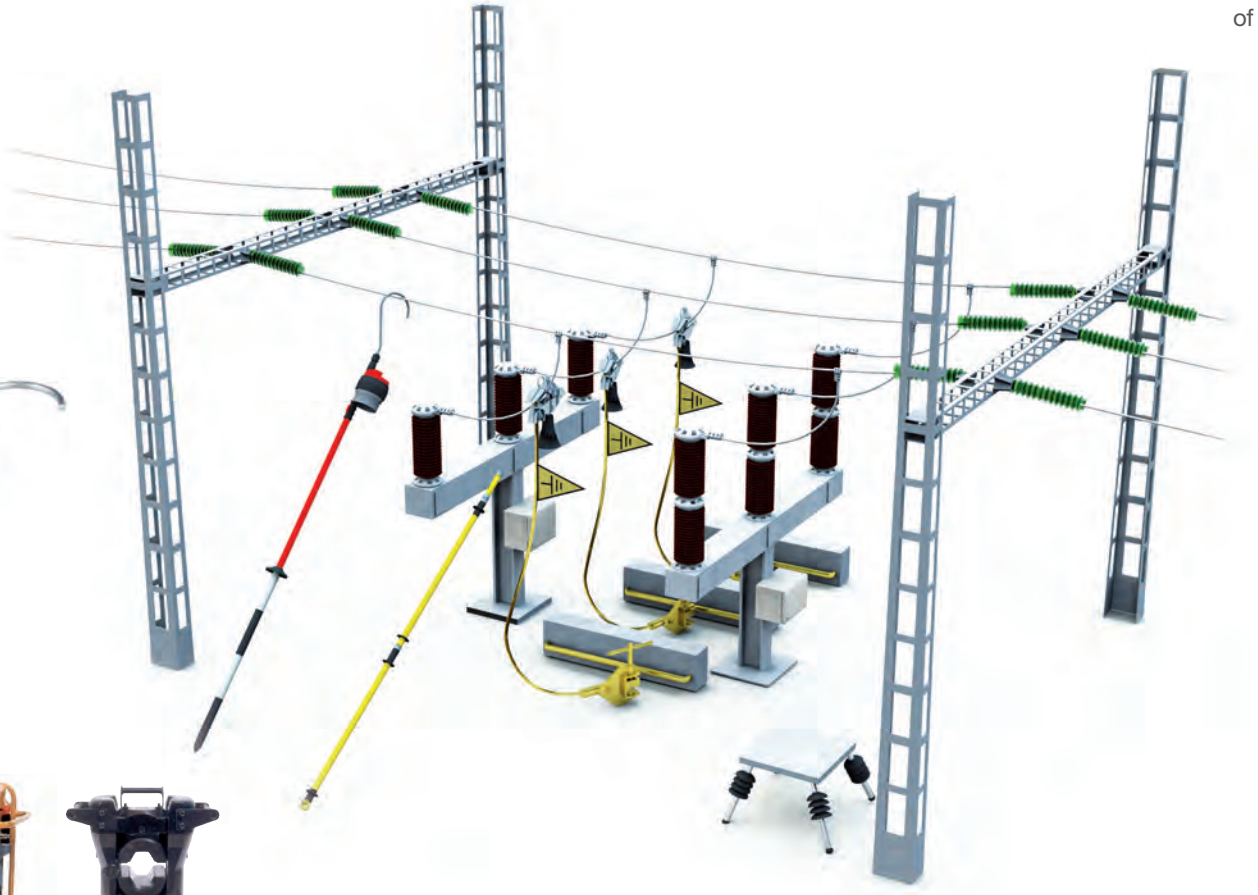


Other equipment for substation (some examples of full ranges)

PROTECTIVE EQUIPMENT

SBI CONNECTORS provide a full range of safety equipement:

- personnal protective equipement,
- warning signs,
- voltage detectors,
- short circuiting and earthing systems.



EARTHING EQUIPMENT

SBI CONNECTORS provide a full range of earthing equipment.

CRIMPING TOOLS

SBI CONNECTORS provide a full range of tools.

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Your specialist in electrical connections

SBI Connectors España, S.A.U. C/ Albert Einstein, 5-7 Polígono Industrial Sesrovires
08635 Sant Esteve Sesrovires (Barcelona, Spain)
Tel. : +34 93 771 58 73 • Fax : +34 93 771 39 20 • Email: substation@sbiconnect.es
www.sbiconnect.es

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