



VISION ELECTRIC

**...vision
becomes reality**



combines innovative ideas with long time experience in the development, production and installation of bus-bars.

Vision Electric's modern factory and state of the art office equipment offers:

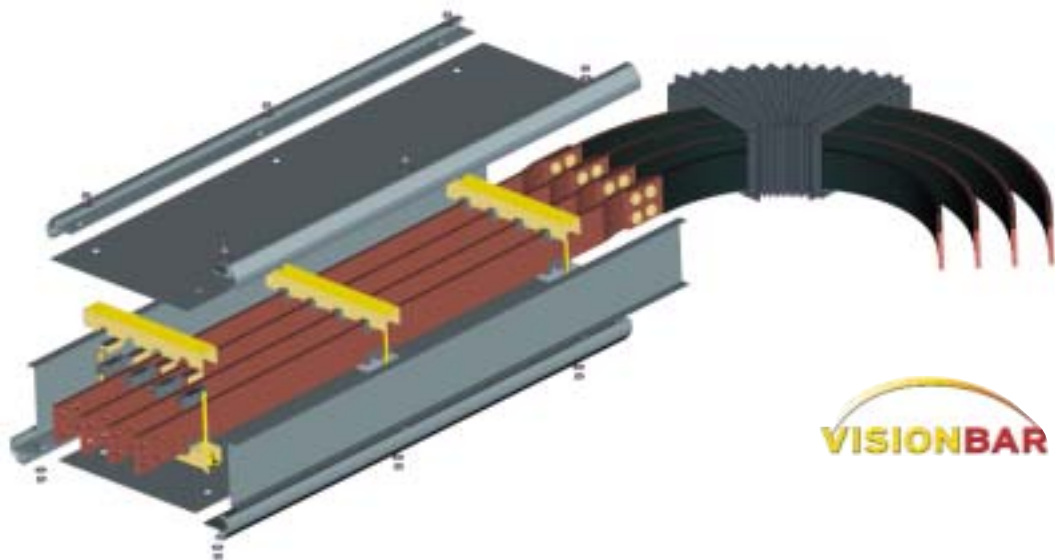
- Individual solutions
- Excellent service
- Cost effective pricing

Vision Electric's products are all designed to have the lowest impact on the environment. Painted enclosures and plastic coated conductors are not used thereby reducing environmental loads during production. Using clean and non-composite materials (e.g. aluminium instead of epoxy coated steel) makes recycling easily possible.



Vision Electric produces

- The type tested standard busbar system VisionBar with a range of 1200 A to 9000 A on 1000V with protection degrees of IP31 to IP55.
- Project specific busbars up to 300 kA can be produced according to the customer's specifications or can be supplied as "turn-key projects". These high power busbars are grouped under the product name IndustryBar.



The logo for VISIONBAR features a stylized rainbow arch above the word "VISIONBAR" in a bold, sans-serif font. The letters "V", "I", "S", and "I" are yellow, while "O", "N", "B", "A", and "R" are red.

VisionBar is a type tested standard busbar system fulfilling the requirements of IEC 439 - EN 60439 - DIN/VDE 0660 - EN NF 60439.

The combination of rigid and flexible parts is a technical advantage, which reduces the total installation time of a busbar connection. Our customers value other product features as important advantages like enclosure made of aluminium instead of steel, the mounting rail along the four edges and the possibility to change the protection degree within one busduct run.

VisionBar combines good technical values along with excellent cost effectiveness.

VisionBar is available with copper or aluminium conductors in ranges from 1200 A up to 9000A nominal current. IP31, IP 42, IP54 and IP55 are the standard protection degrees of the aluminium enclosure. VisionBar is designed for a nominal voltage of 1 kV.

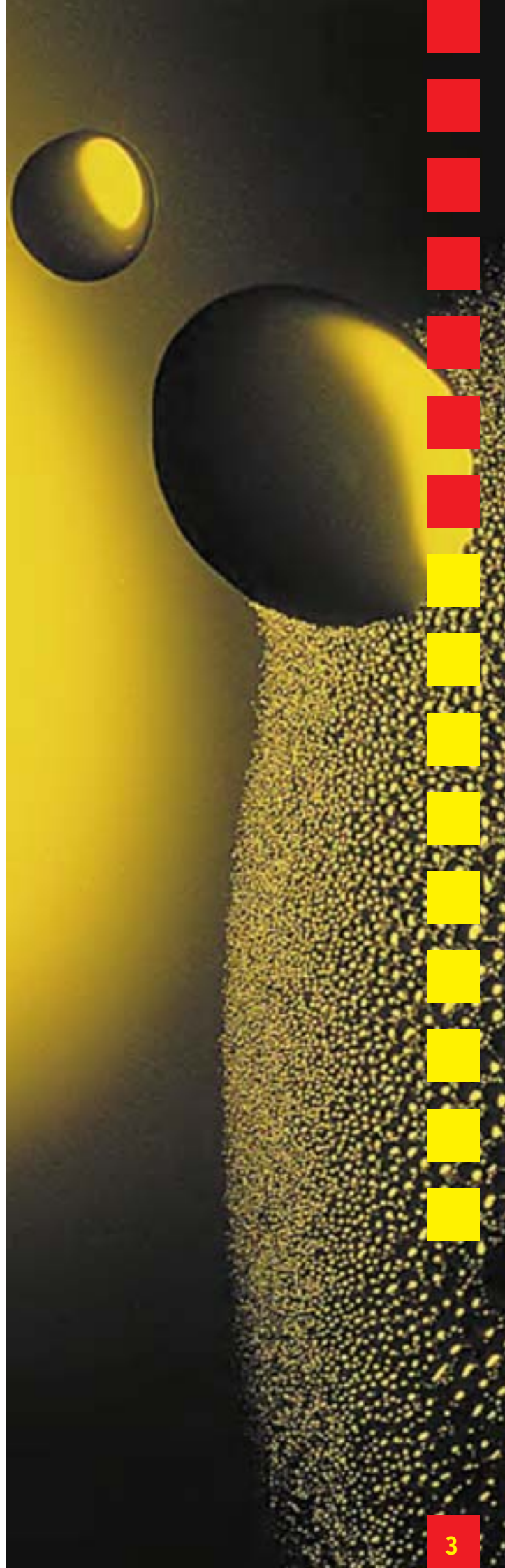
The logo for INDUSTRYBAR features a stylized rainbow arch above the word "INDUSTRYBAR" in a bold, sans-serif font. The letters "I", "N", "D", "U", "S", "T", "R", "Y", and "B" are yellow, while "A", "R", and "A" are red.

There are many different applications, usually in DC, for high power busbars in ranges of 10 to 300 kA. All applications are individual and are developed in accordance with special project conditions.

Specialized expertise and experience is available during the detail-engineering phase optimally combining industrial technologies with a variety of production methods and the proper materials.

Vision Electric produces IndustryBar according to customer drawings and specifications or handles the complete project containing

- Design and drawings
- Production and shipping
- Installation
- Installation supervision and commissioning.





The busbar system VisionBar is specially designed to connect electricity sources (alternator, transformer) to switchgears or large loads and distribution centers.

The unique combination of rigid and flexible construction parts allows for the adaptation of VisionBar to various installation conditions:

- Easy change of the busduct direction with no angle limitation
- Integrated dilatation elements
- High tolerance against incorrect positions of on site switchgears and transformers
- On site adaptation to changed building situations
- Integrated mounting rail allows for easy and quick installation

The high flexibility of VisionBar makes it possible to stay within the scheduled installation time even in the event of unexpected situations.

The standard VisionBar uses bare copper or tinned aluminum conductors. Thus, depending on the application, higher current densities (copper) or lower weights (aluminum conductors) are realized with the same nominal current level. Standard conductor dimensions are listed on page 10. On special requirement a conductor thickness between 5 and 15 mm can be used.

Operational safety was the first target to meet: During the design phase the distance between conductors was chosen with the assumption of high voltage and short circuit current carrying capacity, which is insured by the busbar's support distance. Insulators made of glasfiber reinforced polyamide are placed within the busbar supports and are able to withstand high thermal and mechanical loads.



COM PETENCE

Special insulated flexibles are used to conduct current in flexible angles and connection elements. The enclosure can be closed by using flexible bellows or movable rigid enclosure elements.

The current rate of the conductors depends on the degree of cooling, resp. ventilation. Due to optimized adaptation to the local conditions the aluminum enclosure can be produced ventilated (IP31) or closed (IP42, IP54). Other protection degrees as IP00 or IP55 are possible, too. Changing the protection degree during one busduct run (IP31 indoors, IP54 outdoors offers a cost advantage by getting a better usage of the conductor cross section indoors. The enclosure can be used as Protection Earth (PE) conductor due to the high conductivity of the aluminum. Tests have shown that the enclosure can carry the full short circuit current and therefore fulfills the requirements of IEC 439.

Two conditions dominated the selection of the insulator material: halogen free and lowest caloric value in case of fire. By using unpainted or uncoated enclosure parts and conductors the caloric value on the largest VisionBar size is below 0,1 W/m. All selected plastic material is self extinguishing and fulfills the requirements of UL94V0.

Fire sections in a building are maintained in accordance to DIN 4102 type firebreak elements with a minimum resistance category of S90.

Within the integrated production line the CAD computer transfers the construction data of each single VisionBar element via a production computer to the specific NC production machines. Customer orders are produced after definition of all technical data (approval of the layout drawings) without additional steps in a fast and reliable way. Thus the total process time between approval and delivery is tremendously reduced.



REALIZATION

Long time expertise in design, production and installation are necessary to work out optimal adopted, individual solutions. Vision Electric employs well experienced specialists to master the continuously changing project requirements. Additionally a network of cooperating companies and institutes are available.

For finding solutions Vision Electric has access to e.g.

- The University of Kaiserslautern for scientific calculations and laboratory tests and evaluations
- The GSB, Grevenbroich, a company specialized in installation and special switchgear production
- The EMS, Schwanenmühle as producer of flexible connectors and special electro technical products
- The GAA, Köln for special drawing and documentation tasks

Vision Electric is able to work out optimal solutions in corporation with the enduser by using the wide and extended know-how in the areas

- Industrial plants
- High current, high power technology
- Production methods
- Materials
- Welding technologies.

Within the limits of the installation conditions (e.g. ambient temperature, altitude above sea level, dust and water, available installation space) and operating values (nominal current, short circuit characteristics, magnetic fields, etc.) Vision Electric, in cooperation with the end-user, is able to work optimal solutions, e. g. simple, air-cooled bars or complicated water-cooled constructions.



VISIONS

Expertise and Experience are needed in all project phases: General project parameters are evaluated and fixed during feasibility study and project engineering.

During detail engineering all dimensions and realization methods are fixed taking into consideration the production and erection possibilities.

The correct production techniques guarantee the realization of design targets. Thus it is not possible that hidden changes can negatively influence lifetime or operational values.

The last important piece in the project chain is the competent and experienced installation or supervision which directs to normal operation.

Other equipment (e.g. transformers and rectifier units, DC switches, current transformers), which are in connection to IndustryBar can be incorporated within the project. In this case Vision Electric coordinates all interfaces including installation. The warranty for the complete project is not spread over to several suppliers.



EXPERIENCE

	Customer	Project	Current
	Egypt	GTIE/SDMO Holec /Samsung	Cairo Airport Western Desert Gas Development 2500 A 2700 A
	Belgium	Ergon Fabricom	Mariott Hotel Cockerill 1500 A 4250 A
	Chile	Siemens Erlangen Westinghouse	Codelco - Chuquicamata Kupfermine Paperplant Los Angeles 3200 A 3000 A
	Germany	ABB, Mannheim ABB, Mannheim Becker, Hanau Greil, München Haindl Papier, Schongau Kömmerling Werke, Pirmasens Siemens, Leipzig TW Kaiserslautern Sorg, Lohr	Combined Power Plant Berlin Combustion Plant Pirmasens New exhibition Leipzig Munich Airport Extension Paperplant Schongau Extrusion Machines Dresden Airport Power Plant Glass factory 4000 A 2500 A 1600 A 3150 A 3800 A 1250 A 3000 A 2500 A 2200 A
	Denmark	ABB Denmark ABB Denmark SSB, Kopenhagen	Carlsberg Brewery Silkeborg Power Plant Oeresund Tunnel Project 1500 A 3200 A 2500 A
	France	Bergerat Monoyeur Merlin Gerin Cecelec SEEE Clemessy Spie Trindell	Cannes Airport Caterpillar Trans Manche Link (Eurotunnel) St. Gobain Glass Factory Suchard Toulouse Airport 5400 A 3200 A 3150 A 3500 A 4000 A 4000 A
	Greece	ABB Athen ABB Athen	Aspropyrgos Power Plant Rodos Diesel Power Station 3200 A 2500 A
	Indonesia	Cegelec SNEF	Map Ta Piiut Sheraton Legian Beach 4000 A 2150 A
	Iran	ASCOTEC	Ahwaz Steel Complex 3300 A
	Luxemburg	AEG AEG, Luxemburg	Office building Cement Plant Dyckerhoff 1250 A 3000 A
	Malaysia	ABB Baden Moritani (MHI)	Kuala Langat PFK Project 2500 A 3000 A
	Norway	Bernard Engineering	EKA NOBEL9000 A
	Netherlands	EVU Amsterdam	Transformerstation 1250 A
	Qatar	ABB Mannheim Holec Hengelo	Ras Abu Fontas Quatar Gas 2500 A 3200 A
	Russia	ABB Cottbus ELPRO, Berlin	Gardabani Block 10 Componants Factory Aleksin 3500 A 4000 A
	Switzerland	Migros	Shopping Mall 1500 A
	Sweden	ABB	Power Plant 2500 A
	United Kingdom	Cecelec Brigg Rutherford Laboratories	Bradgate Hera - Accelerator, Hamburg 4000 A 1500 A

	Customer	Project	Current
Switzerland	CERN, Genf CERN, Genf CERN, Genf	Atlas Project DCCT Power Converter, water cooled busbars	20 kA 20 kA 15 kA
Germany	Uhde, Dortmund Uhde, Dortmund Hoechst, Frankfurt Desy Hamburg Dow Chemical, Stade Erftcarbon, Grevenbroich KFA Jülich Ringsdorfwerke, Bonn	Chlorine Plant Bayer, Bitterfeld Chlorine Plant Burghausen Chlorine Plant Hera Accelerator, Hamburg Chlorine Plant Graphitisation Plant Cosy-Ring Graphitisation Plant	12 kA 12 kA 300 kA 25 kA 220 kA 120 kA 6 kA 40 kA
France	Metaux Speciaux	Natriumelectrolysis	50 kA
Norway	Eka Nobel	Chlorine Plant Mo I Rana	120 kA
Saudi Arabien	ABB Mannheim	Riyadh Water Pipeline	8 kA
Sweden	Eka Nobel, Bohus	Chlorine Plant	160 kA
Italy	UCAR	Graphitisation Plant	48 kA

Vision Electric produces VisionBar as the next generation based on the Eribar busbar system manufactured by Erico. Some minor, non-relevant changes, in relation to the technical characteristics have been made. All References, tests and approvals are also valid for VisionBar even if performed under the name Eribar.

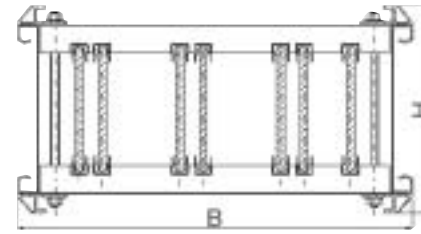
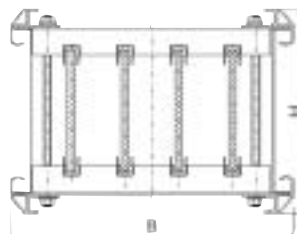
Tests - Measures - Approvals

VisionBar is produced according to the following standards:

Tested and approved by:

Performed Measurements and Checks:

- | | | |
|------------------------|---|-------------------------|
| IEC 439 | University of Kaiserslautern | Dielectrical parameters |
| IEC 529 | FGH Mannheim | Over temperature tests |
| EN NF 60439 | EdF France | Short Circuits |
| DIN VDE 0660, Teil 500 | CETE APAVE | Impedances |
| DIN 4102, F 90 | Siemens Frankfurt | Protection class |
| DIN 40050 | BEWAG Berlin | Corrosion behavior |
| | MPA Dortmund | Mechanical Strength |
| | Institute for Construction Technologies, Berlin | Insulation distances |
| | | Creepage distances |
| | | Fire resistance |



Conductor material: Copper (E-Cu 99,5 F25/30)

Nominal current on 50/60 Hz		Number of Conductors (I)	Phase Conductor		Short Circuit Current		Outside Dimensions		Weights	
IP31 A	IP42 - IP55 A		Dimensions mm	Cross Section mm ²	Peak (2) kA	1 sec kA	Width B (3) mm	Height H mm	Conductors(4) kg/m	Total(4) kg/m
1800	1500	4	80 x 10	800	85	50	370	190	29	45
2200	1800	4	100 x 10	1000	110	60	370	210	36	52
2600	2100	4	120 x 10	1200	150	70	370	230	43	60
3300	2650	4	160 x 10	1600	180	100	370	270	58	75
4000	3200	4	200 x 10	2000	200	120	370	310	72	90
4400	3600	4	160 x 15	2400	200	120	420	270	86	103
5000	4200	4	200 x 15	3000	220	140	420	310	108	125
5300	4300	7	2 x 160 x 10	3200	>220	160	510	270	100	125
6500	5100	7	2 x 200 x 10	4000	>220	180	510	310	125	150
7500	5900	7	2 x 160 x 15	4800	>220	200	510	270	150	175
9000	7100	7	2 x 200 x 15	6000	>220	>200	510	310	190	215

Conductor material: Aluminum (E-AlMgSi 0,5)

Nominal current on 50/60 Hz		Number of Conductors (I)	Phase Conductor		Short Circuit Current		Outside Dimensions		Weights	
IP31 A	IP42 - IP55 A		Dimensions mm	Cross Section mm ²	Peak (2) kA	1 sec kA	Width B (3) mm	Height H mm	Conductors(4) kg/m	Total(4) kg/m
1500	1250	4	80 x 10	800	70	35	370	190	9	25
1800	1500	4	100 x 10	1000	85	45	370	210	11	27
2100	1800	4	120 x 10	1200	105	55	370	230	13	30
2650	2250	4	160 x 10	1600	130	70	370	270	17	35
3200	2700	4	200 x 10	2000	140	80	370	310	22	40
3500	2900	4	160 x 15	2400	150	85	420	270	26	45
4100	3400	4	200 x 15	3000	160	100	420	310	32	50
4300	3500	7	2 x 160 x 10	3200	>220	120	510	270	30	50
5100	4200	7	2 x 200 x 10	4000	>220	130	510	310	38	65
5800	4600	7	2 x 160 x 15	4800	>220	140	510	270	45	70
7000	5800	7	2 x 200 x 15	6000	>220	160	510	310	57	85

Installation Conditions

Operating Voltage: 1000 VAC, 1500 VDC

Operating Frequency: 50/60 Hz

Ambient temperature at place of installation: 35°C (max. 40°C)

Altitude above sealevel at place of installation: up to 1000m

Changed installation conditions can be calculated acc. to the formulas of DIN 43670 and 43671.

- (1) VisionBar can be delivered with or without neutral conductor which has a thickness of 5, 10 or 15 mm. The enclosure is carrying the full short circuit current and can be used as PE-conductor. On special requirements an additionally insulated PE-conductor can be supplied.
- (2) If necessary, the peak short circuit carrying capacity can be changed easily by modification of the distances between the busbar supports.
- (3) The width B is the same on 3 or 4 conductor systems. With 6 conductors the width B is changed to 470 mm.
- (4) Given weights are for the mentioned number of conductors.

Checklist

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Fax +49 63 33/2757-27
E-mail: visionbar@vision-electric.com

Requirements to your VisionBar connection:

Projectdata:

Project: _____
Company: _____
Address: _____
Person in charge: _____
Tel: _____ Fax: _____ E-mail: _____

Specification:

Voltage: 400 V 690 V 1000 V 50 Hz 60 Hz DC
others: _____

Transformer data (if known):

Nominal power: _____ kVA Nominal Current: _____ A
Short circuit voltage: _____ %

Short Circuit Current:

Thermal (1 sec): _____ kA Peak: _____ kA

Required Protection degree:

IP00 IP31 IP42 IP54 IP55 others: _____

Installation Conditions:

Ambient Temperatur: 35°C (max. 40°C on 2 h within 24 h) _____
Installation altitude: below 1000m above sea level others: _____

Scope of Supply:

Total length, taken over the neutral line of the connection: _____ m

Additional functions:

End elements: _____ St. Fire Break elements S90: _____ St.
Angles, horizontal : _____ St. Angles, vertical: _____ St.
others: _____

Busbar layout in isometric view

If possible, please mention position and dimensions of equipment connection terminals.





is located in Waldfishbach, a small city in the Palatinate, between the cities of Kaiserslautern and Pirmasens. This central European location, close to the French border, allows for quick access to major industrial areas. This location also provides access to a large number of scientific persons because of our close working relationship with and proximity to the University of Kaiserslautern. Working together we are able to provide solutions to difficult customer applications.



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