



DVCAS

Switchgears for transformer substations in wind farms

36 kV

SECONDARY
DISTRIBUTION
SWITCHGEAR

331





In line with our customers and their needs.

In a sector like energy, which requires the maximum collaboration between all of its components, joining forces clearly aimed at achieving optimum service for final customers and recipients...

We are on line

Guidelines for which MESA has established protocols which mean that the contribution, help, relations and comprehension of requirements and needs are established within a structured collaboration program subject to a process of continuous improvement.

A member of Schneider Electric, MESA was founded in 1947. It currently has more than 370 employees, two production plants making up over 20,000 m², and its own power and test laboratories.

Its management and production processes are structured in line with ISO 9001-2000 and ISO 14001, and developments are supported by certificates and approvals issued by local and international laboratories and bodies.

Only in this way is it possible to provide innovative solutions in medium and high voltage in more than 90 countries.

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Functional groups

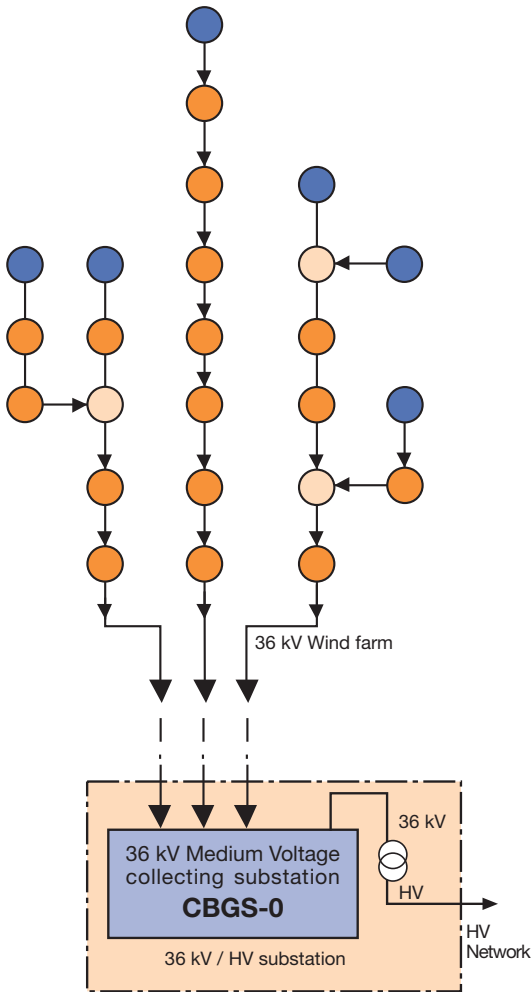
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DVCAS Switchgears for transformer substations in wind farms





Wind farms

DVCAS switchgears functional groups have been designed as compact units, and built as the union of modular switchgears.

Each functional unit contains all the necessary equipment for the protection and connection of the transformer of each wind generator to the MV network of the wind farm.



DVCAS

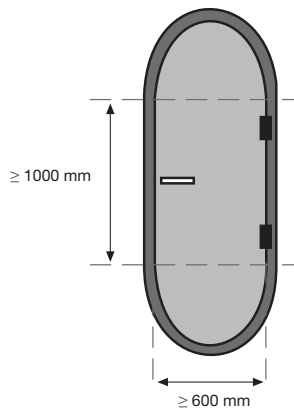
DVCAS switchgears have been specifically designed to meet all the needs of collecting networks up to 36 kV, inside wind farms.

These DVCAS switchgears can be installed in wind farms up to 2000 m over the sea level.



CBGS-0

36kV CBGS-0 switchgears are the perfect complement for DVCAS, in the MV/HV collecting substations of wind farms.



New Wind farms 36kV x Multi MW

The continuous technological development in wind farms leads to new challenges, for which DVCAS is the best solution.

- **Rated power of wind generators: constant growth**
- **Medium Voltage networks: 36 kV is the dominant trend**
- **Installation inside the towers: Size restrictions**

Wind farms present special erecting conditions, and a critical aspect in their design is the size of the doors which give access to wind generators.

Medium voltage switchgears are usually installed inside the wind generators, so their design must allow enough access through the door in case replacement was needed.

DVCAS switchgears can go through doors only 600 mm wide.

World-wide leadership ... and still growing

DVCAS switchgears benefit from the accumulated experience gathered by MESA for more than 60 years in the design and manufacturing of MV and HV equipment.

From the mid nineties on, until the end of 2006, MESA has supplied MV switchgears for more than 350 wind farms all over the world.

Gamesa, Vestas, Suzlon, Ecotecnia, Nordex, GE, Enercon,... are some of the main manufacturers of wind generators who already equip their wind turbines with switchgears made by MESA.

Such references place MESA as the world leader in wind power application for MV switchgears.

Experience in wind farms

- More than 6500 transformer substations
- More than 375 collecting substations
- More than 7500 MW

Advantages of the DVCAS range

- Maximum availability: service continuity.
- Minimum dimensions: < 600 mm.
- Maximum safety conditions for staff personnel.
- Environment insensitivity: SF6 insulation.
- Certificates: IEC.
- Approved quality: ISO 9001-2000.
- Environmentally friendly: ISO 14001.
- Simple installation.
- Economical.

Choosing DVCAS switchgears ensures the experience of a world leader in the field of wind power.



Main W. F.

Star Fish	Cinseiro
Comodoro	Salajones
Arklow	Almendarache
Krtolin	Puntanza
Zafarana	La Muela
El Pical	Sotavento
El Cerro	Gatún
La Plana	Gamoneda
Penouta	Castelo
Alcarama	Gavilanes
La Plana	Tarayuela
Saso Plano	Moraleja
Malpica	Pedregoso
Ameixeiras	Viveiro
El Aguila	Carrasquillo
Muras	Goia Peñote
Hedroso Aciberos	Navazo
Lubian	Arico
Yerga	Viana
Meira	Sigean
Cabanillas	Tir Mostyn
Préjano	Forrest Moor
Coscojar	Fenlands
Nerea	Ffynnon Oer
Guerinda	Megas Lakos
Lerga	Movar
Izko-Aibar	Kealkill
Trucafort	Trapanni
Montes del Cierzo	Vizzini
Altos del Voltoya	Ochiri
Sierra del Madero	Alogarachi
Curiscao Pumar	Colle Della Selva
Raposeras	Serra Do Marrocco
Romeral	Itho
Teruela	Puck
Tardienta	Vergao
Touriñan	Vilareal
Larriba	Señora Vito
Tharsis	

Countries

Australia	Hungary
Argentina	Ireland
Croatia	Italy
Egypt	Japan
France	Mexico
Germany	Poland
Great Britain	Portugal
Greece	Spain ...

Environment

A strict policy of materials management throughout the whole manufacturing process, allows the traceability of the product and ensures that no pollutants are released into the environment.



No emissions

MESA is highly committed to the protection of the environment.

As a part of this compromise, DVCAS switchgears have been designed to be environmentally friendly.

Due to the level of tightness of the cubicles, DVCAS switchgears may be classified as "sealed pressure systems", according to the definition established in the standards.

All the materials used, that is, the conductors, as well as the insulators, can be clearly identified and easy-to-separate.

At the end of their life, DVCAS switchgears can be processed, recycled and their components recovered, following the directions given by the European legislation regarding end-of-life of electrical and electronic products.

The environmental management system followed by MESA is certified according to the established requirements of the ISO 14001 standard.



Quality



International Standards

Design: Certified as per IEC Standards

DVCAS switchgears have been designed and certified according to the following standards, some of which are at present being updated and whose new reference is in brackets:

- **Common specifications for switchgears** IEC 60694 (IEC 62271-1); IEC 60298 (IEC 60271-200)
- **Circuit breakers IEC 60056** (IEC 62271-100)
- **Disconnectors and earthing switches** IEC 60129 (IEC 62271-102)
- **Switch-disconnectors** IEC 60625-1

Manufacturing: accurate and systematic control

The quality system followed for the design and manufacturing of DVCAS switchgears has been certified in accordance with the requirements of the ISO 9001-2000 quality standard.

For quality control purposes, each DVCAS switchgear undergoes systematic routine tests during its manufacturing process.

The results of all these controls are recorded and are a part of the test certificate which each switchgear has available.



Compact and modular

For their standard wind power application, DVCAS switchgears can be composed of up to 4 interconnected modular functional units, thus forming the most commonly used wind power functional groups.

Each of the modular functional units is composed of:

- Metal base frame.
- Operating mechanism and relay compartment.
- MV cable compartment.
- Stainless steel, gas-tight cubicle which uses SF6 gas as insulating medium and houses the busbar system and the breaking devices.

One of the advantages of DVCAS switchgears design is the low pressure of SF6 gas inside the cubicle.

The busbar system is interconnected between functional units by means of single-phase coupling bushings made of screened elastomeric insulation.

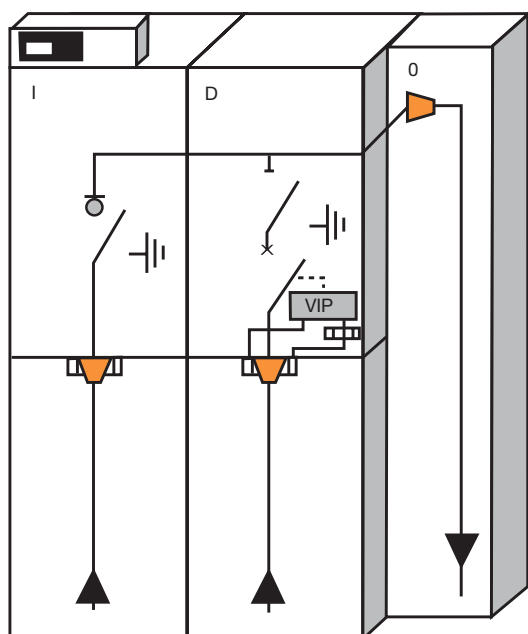
DVCAS switchgears are supplied as complete functional groups, the different functional units being assembled on factory. Such configuration provides the user with the advantages of a compact architecture and modularity at the same time.



General electrical / Constructive data

Frequency	(Hz)	50
Rated voltage	(kV)	36
Insulation level		
Power frequency withstand voltage	(kV)	70
Lightning impulse withstand voltage	(BIL-kV)	170
Rated current of the main busbar	(A)	630
Short time withstand current	(kA/s)	20/3
Short circuit breaking current capacity	(kA)	20
Short circuit making capacity	(kA peak)	50
Internal arc withstand IAC AFL	(kA/1s)	20
Degree of protection		
HV compartment	(IP)	67
LV and operating mechanism compartment	(IP)	3X
SF6 gas pressure at 20°bcC	(bar)	0.3

For other values, please consult.



Definition depending on the type of switchgear:

- D Circuit-breaker
- I Three position switch-disconnector
- T Riser with earthing switch
- O Rigid riser between cables and busbar system

Definition depending on the coupling possibilities:

- NE Non extensible
- LE Extensible on the left
- RE Extensible on the right
- DE Extensible on both sides

 Connection of plug-in connectors into bushings

 Switchgears interconnection

Functional modular units

Considering the special characteristics of the MV collecting networks most commonly used in wind farms, the units that are going to be installed must provide the following functions:

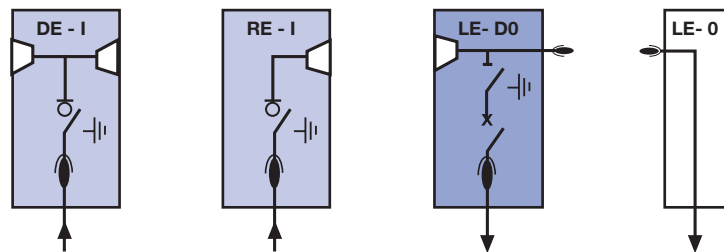
- 0** Outgoing line to the following wind generator (*)
- I** Incoming line from the preceding wind generator (**)
- D** Transformer protection

The union of the different functional units creates a series of standard configurations. Such configurations represent the whole range of specific solutions for wind farms usual needs.

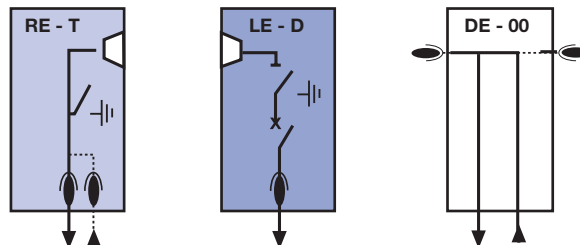
Range of modular switchgears

The combination of functional units and coupling possibilities form the particular range of functional units, with different versions depending on their performance.

Standard configurations



Special configurations

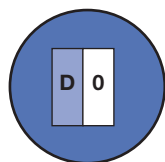


(*) The following wind generator is the nearest to the substation.
(**) The preceding wind generator is the farthest from the substation.

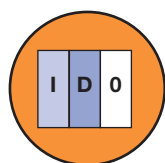
Combination of functions

Depending on the number of circuit inputs that each wind generator receives from the preceding wind generators, the following functional groups can be required.

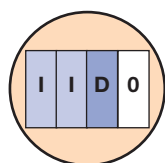
Recommended functional groups



DVCAS-36 kV NE-D0
Transformer protection + Outgoing line



DVCAS-36 kV NE-ID0
Transformer protection + Outgoing line + Incoming line

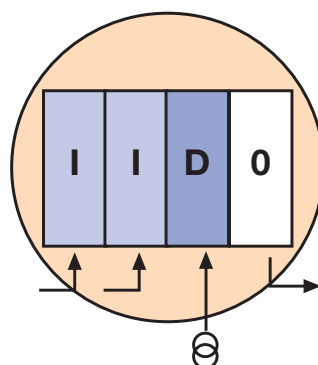
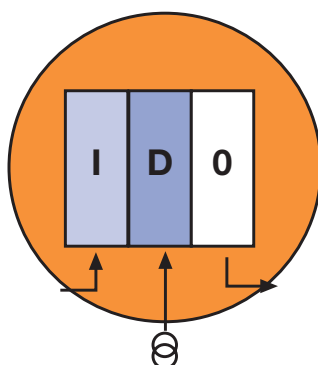
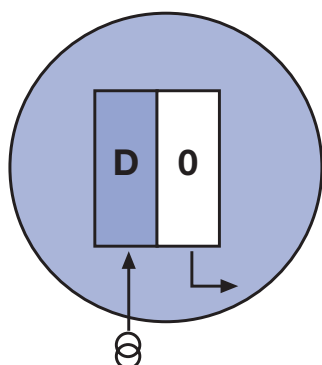
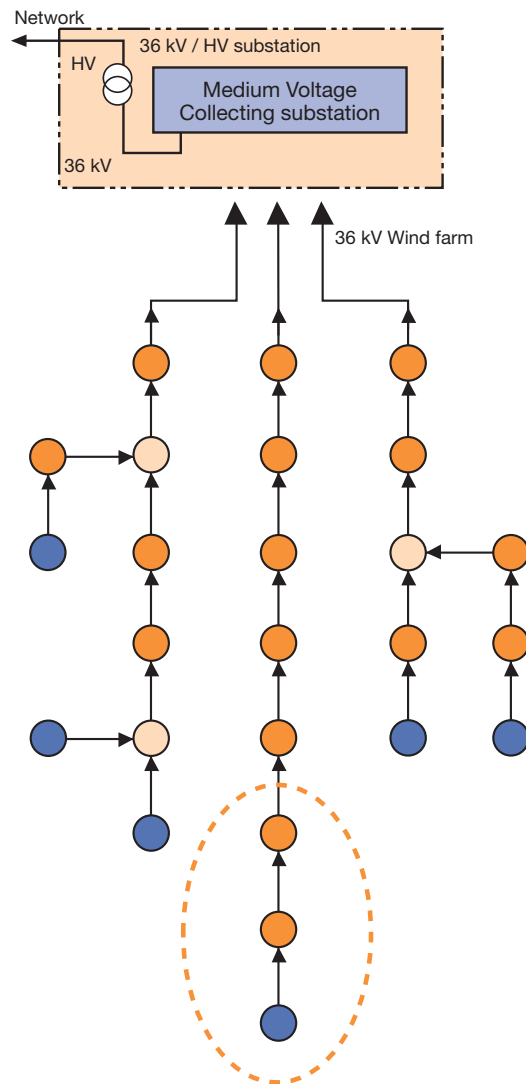


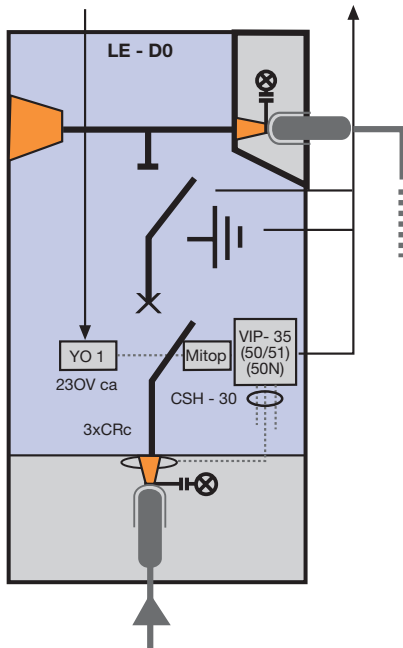
DVCAS-36 kV NE-IID0
Transformer protection + Outgoing line + 2 x Incoming line

The protection of the LV / 36kV transformer in modern wind generators, multi-megawatt type, is performed in all cases by means of a circuit breaker (D).

A rigid riser of cables is recommended for the outgoing line to the following wind generator (0).

For the incoming line from the preceding wind generators, a three position switch-disconnector is advised (I).





Each modular switchgear with protection function D is composed of:

- **Metal base frame**
- **Operating mechanism and relay compartment**
 - Disconnecter operating mechanism
 - Operating mechanism of the circuit breaker
 - Protection relay VIP-35
 - Homopolar current sensor CSH-30
- **MV cable compartment**
 - Bushings for cable connection 1 CRC current sensor per phase (3)
- **Stainless steel, gas-tight tank:**
 - Busbar system
 - Three position disconnecter
 - Circuit breaker

There are two options, depending on their interconnection possibilities: LE-D0, and LE-D.

Apart from the circuit breaker, the LE-D0 option is also provided with a direct outgoing line through right upper bushings.

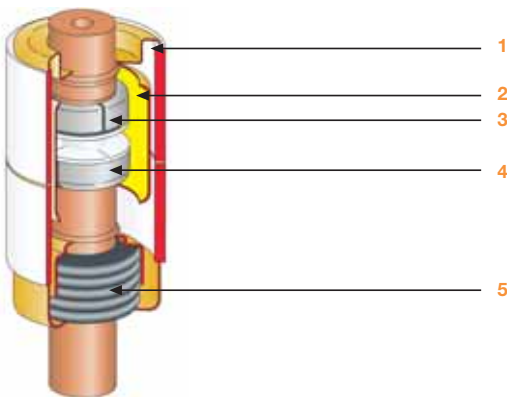
For both cases, LE-D0, and LE-D, any connection of functional units, type I or T, is always performed on the left.

In case of no connection on the left of function D, the inner cones must be provided with insulating caps.

DVCAS switchgears are supplied with a vacuum circuit breaker which complies with the requirements of IEC 62271-100 standard.

The breaking technology used is AMF type (Axial Magnetic Field).

Components of the Vacuum Circuit Breaker

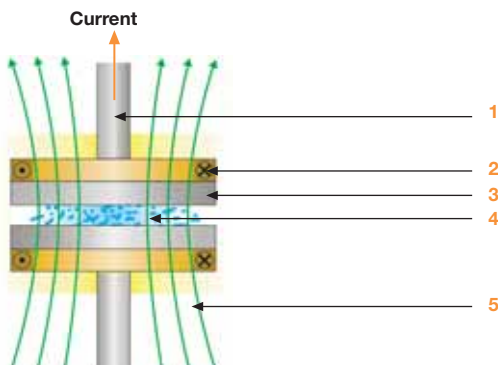


- 1 Ceramic chamber
- 2 Screen
- 3 Fixed contact
- 4 Mobile contact
- 5 Metal bellows

Electrical data of Evolis CAS circuit breakers

Frequency	(Hz)	50
Rated voltage	(kV)	36
Insulation level		
Power frequency withstand voltage (50-60Hz/1 min)	(kV)	70
Lightning impulse withstand voltage (1.2/50 μs)	(kV peak)	170
Rated current	(A)	630
Short time withstand current	(kA/s)	20/3
Short circuit breaking current capacity	(kA)	20
Short circuit making capacity	(kA peak)	50
Operation sequence		
Electrical endurance	(Class)	E2
Mechanical endurance	(Class /Op)	M1/2000

Section of the AMF Contact



- 1 Electrode
- 2 AMF Coil
- 3 Contact plate
- 4 Plasma arc
- 5 Axial magnetic field

Protection chain

Protection systems characteristics
For their usual wind power application, DVCAS switchgears are provided with a protection system which allows operation with no need of auxiliary power supply.

The system comprises:

- **3 CRC current sensor per phase**
They are toroidal type.
- **Homopolar current sensor CSH-30**
It is also toroidal-shaped and it is usually fitted on the rear part of the VIP-35 relay.
- **Electronic relay VIP-35**
It is usually fitted on the front operating mechanism panel and is protected by a transparent cover which gives the unit a degree of protection IP-54.

Main electrical characteristics:

- Protection against phase to phase faults (50/51).
- Protection against earth faults (50 N).
- No need of auxiliary power supply.

- **Tripping coils**

- DVCAS switchgears with circuit breaker are standard equipped with 2 tripping coils:
- Mitop coil: self-powered through relay.
 - YO1 coil for external tripping.

Indications: Reliability

The indication system for the disconnecter position is highly reliable as it complies with the specifications of IEC 62271-102 standard. That is why it needs no windows or any other device for visual checking of the position of the main contacts.

Interlocks

In the design of both the circuit breaker and the disconnecter, all possible operating conditions have been taken into account, in order to assure maximum safety for the operators and the installation. Adequate interlockings are provided to prevent the possibility of maloperation.

Combination of circuit breaker and disconnecter

Whenever the selector of the disconnecter is not in neutral position, any mechanical or electrical operations on the circuit breaker are not possible.

Also, when the disconnecter is earthed, no electrical operations on the circuit breaker can be performed. Moreover, any operation on the three position disconnecter is not possible whenever the circuit breaker is closed.

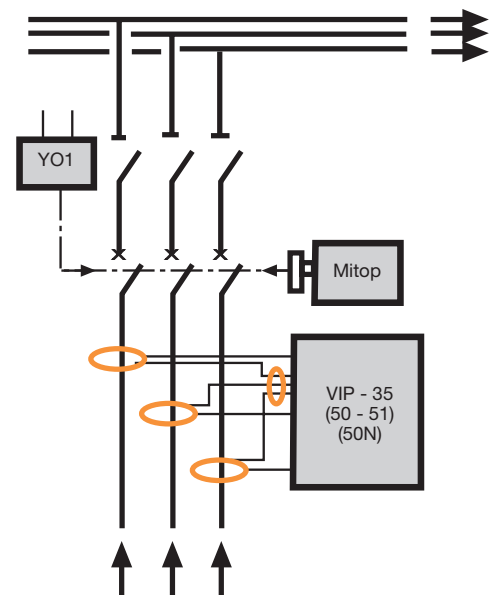
Access to MV cables and transformer compartment

The interlocking latch is released only once the circuit has been earthed, and access to the MV cable compartment is then unblocked. It is also possible to release the key from the key lock under the same conditions.

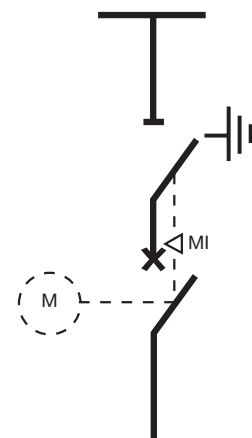
The release of this key has a double function. First, if this key and the key corresponding to the transformer are fastened with a ring, it allows safe access to the transformer.

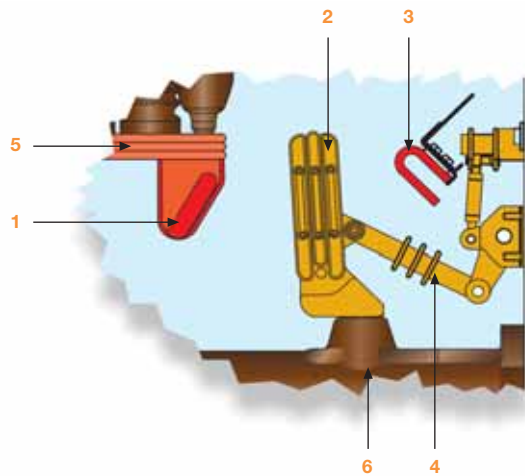
Secondly, there are specific internal interlocks which block any operation on the circuit breaker or on the earthing switch. They also work when the MV cable panel is removed.

Low Voltage Diagram



Synoptic





- 1 Fixed contact "disconnector closed"
- 2 Mobile contact fingers
- 3 Fixed contact "disconnector earthed"
- 4 Insulating rod
- 5 Upper internal bars
- 6 Support

Three position disconnector

DVCAS switchgears are provided with a three position disconnector, which meets the requirements of IEC 62271-102 standard for disconnectors and earthing switches.

Electrical data of disconnectors

Rated voltage	(kV)	36
Insulation level		
Power frequency withstand voltage (50Hz/1 min)	(kV)	70
Lightning impulse withstand voltage (1.2/50 μ s)	(kV peak)	170
Rated current	(A)	630
Short time withstand current	(kA/s)	20/3
Disconnector		
Electrical endurance	(Class)	E0
Mechanical endurance	(Class/Op)	M0/1000
Earthing switch (through circuit breaker)		
Short circuit making capacity	(kA peak)	50
Mechanical endurance	(Class/Op)	M0/1000

The speed of all opening and closing operations depends on the operator's performance. The short circuit making capacity is performed by means of the circuit breaker on both extreme positions of the disconnector, that is, busbar and earth.

Operation

The three position disconnector is always manually operated by means of a handle.

The function (admissible operation on the disconnector) is selected by means of a flag type selector.

Rising function: 0

For safe access to MV cables in the 0 function, the earthing-switch of the following wind generator must be previously earthed.

The modular switchgear DE-00 can also be used as an outgoing line using two MV cables per phase.

Every modular switchgear with outgoing line function 0, consists of:

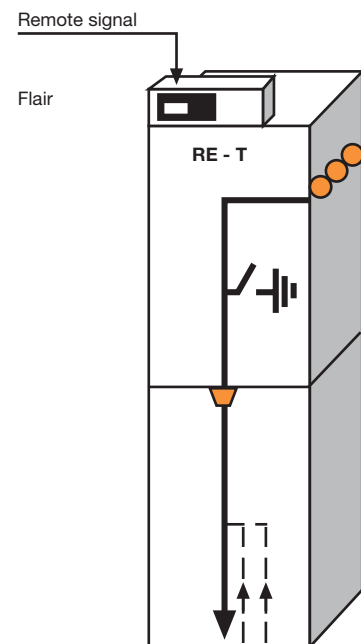
- Metal base frame
- Voltage presence indicator
- MV cable compartment
 - Bushings for cable connection
 - Clamps for MV cable fastening

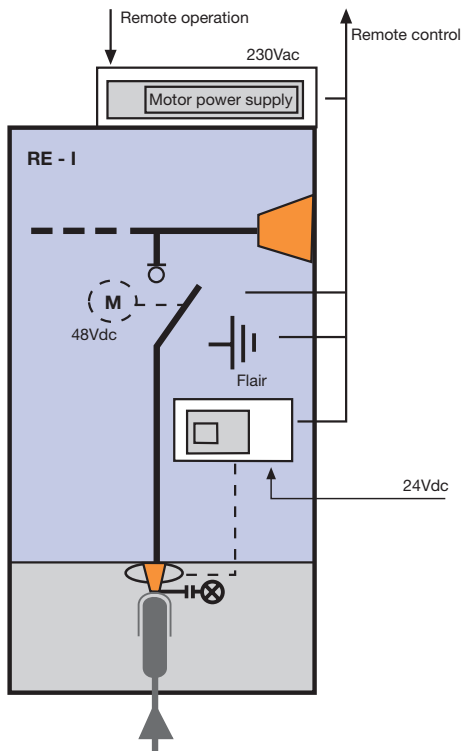
Rising function with earthing switch 000T (0T+0T+0T)

In some cases, an earthing switch is required for the outgoing function. DVCAS T fulfils this requirement. This function permits the connection of up to three cables per phase for incoming and outgoing lines T-(RE-000T).

Adequate interlocks must be used in order to avoid any unintentional earthing of the whole MV circuit being under voltage.

The components of this module are the same as those of the incoming line function I, except for the associated elements to the switch function, which is not included in this unit.





Fault detectors type Flair fitted on the incoming line, provide an advanced management of the MV network in wind power plants.

Maximum efficiency is achieved when IM switch-disconnectors incoming lines are motor operated. In this way, faults can be detected and service conditions immediately restored in the unaffected part of the network.

Switch-disconnector function I

A modular DVCAS switchgear with a three position switch-disconnector is recommended for the incoming line function from the preceding wind generator in MV networks of wind farms: (I)

- Reduces breakdown time caused by faults.
- Helps fault detection.
- Reduces interruptions due to maintenance work.
- Improves energization works.
- Etc.

Each modular switchgear with line function I consists of:

- **Metal base frame**
- **Operating mechanism compartment**
 - Operating mechanism of the switch-disconnector
 - 48Vdc motor for the operating mechanism (optional)
- **MV cable compartment**
 - Bushings for cable connection
- **Stainless steel, gas-tight tank**
 - Busbar system
 - Three position switch-disconnector

There are two options, depending on their interconnection possibilities: RE-I, and DE-I.

Function I is always connected to protection function D on the right by means of single phase coupling bushings made of elastomeric screened insulation.

Characteristics

DVCAS switchgears are provided with a three position switch-disconnector, which meets the requirements of IEC 60265-1 standard for switches and IEC 62271-102 standard for disconnectors and earthing switches.

Electrical data

Frequency	(Hz)	50
Rated voltage	(kV)	36
Insulation level		
Power frequency withstand voltage (50 Hz/1 min)	(kV)	70
Lightning impulse withstand voltage (1.2/50 μ s)	(kV peak)	170
Switch-disconnector		
Rated current	(A)	630
Electrical endurance	(Class / Op)	E3/100
Mechanical endurance	(Class / Op)	M1/1000
Short time withstand current	(kA/s)	20/3
Short circuit making capacity	(kA)	50
Mechanical endurance	(Class / Op)	E3/5
Earthing switch		
Short time withstand current	(kA/s)	20/3
Short circuit making capacity	(kA)	50
Electrical endurance	(Class / Op)	E2/5
Mechanical endurance	(Class / Op)	M0/1000

Switch-disconnector

The breaking system uses the autopneumatic “puffer” technique of SF6 gas onto the contacts separation area.

Operation

The speed of all opening and closing operations is independent of the operator’s action (except for the earthing switch opening).

The three position switch-disconnector is always manually operated by means of a handle.

Optionally, the operating mechanism of the switch function can be motorized and the handle can be anti-reflex type.

The optional motorization kit can also include a battery charger-rectifier (Ni Cd or Pb) with a power supply of 230 Vac, in order to allow switch-disconnector operation even in case of lack of auxiliary voltage.

This function, combined with the fault detectors Flair and the protections in the collecting substation, permits remote fault isolation and gradual service restoration.

Indications: Reliability

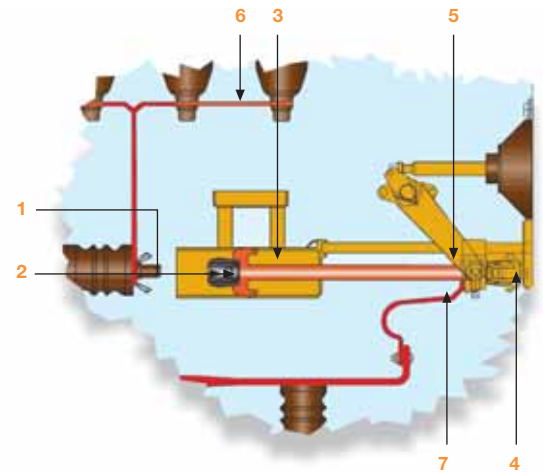
The indication system for the switch-disconnector position is highly reliable as it complies with the specifications of IEC 62271-102. That is why it needs no windows or any other device for visual checking of the position of the main contacts.

Interlockings

In the design of the switch-disconnector, all possible operating conditions have been taken into account to ensure maximum safety for the operators and the installation.

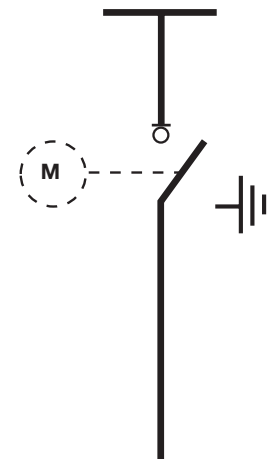
The architecture of the switch-disconnectors used in DVCAS switchgears is of the 3 position type (closed / opened / earthed), which, by design, avoids the possibility of maloperation.

- Earthing the circuit, Access to MV cable compartment is always interlocked with the switch-disconnector earthed. So the cover of this compartment can only be opened in this position. An interlock by key lock can be supplied optionally, where the key is released with the earthing switch in closed position.



- 1 Fixed contact “switch in closed position”.
- 2 Mobile contact fingers
- 3 Switch chamber
- 4 Fixed contact “earthing switch in closed position”.
- 5 Insulating rods.
- 6 Upper internal busbar
- 7 Flexible connection

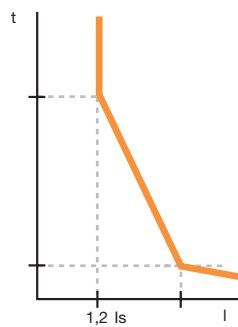
Synoptic



VIP-35



Phase Protection



General description

VIP-35 relays have the optimum design for transformer protection in transformer substations of wind farms. They are provided with phase functions (50-51) and earth functions (50N).

They are self-powered relays (no external auxiliary voltage is required), which are fed by toroidal current sensors, CRc type, fitted on the bushings for MV outgoing cables to the transformer.

The VIP-35 relay operates on the circuit breaker by means of a tripping (coil), Mitop type.

The relay is usually placed on the operating mechanism front panel of the DVCAS switchgear, protected by a transparent cover which can be lead-sealed. The whole assembly has a degree of protection IP-54.

Phase protection Is (50-51)

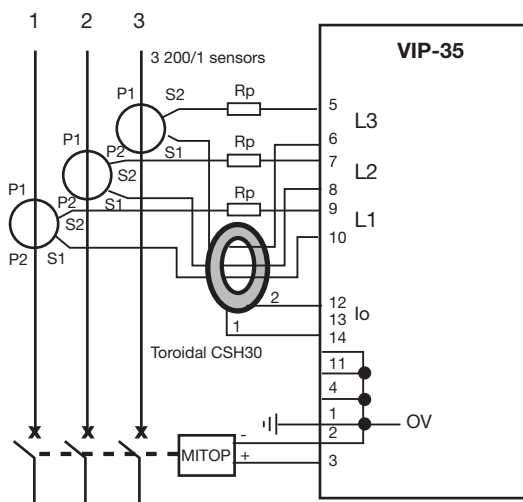
Phase protection is provided by a time-dependant curve which operates as of 1,2 times the operating current (I_s).

Phase current is measured by means of three CRc toroidal sensors which are usually fitted on the bushings for MV cable connection.

Phase operating current is adjusted on the front, using rotary switches. Settings are done according to the transformer rating and the operating voltage.

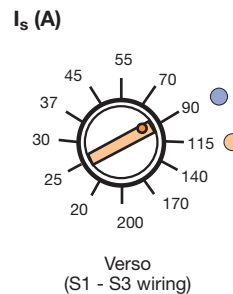
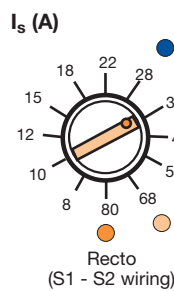
Operating threshold can be adjusted from 8A to 80A or from 20A to 200A.

VIP-35 Relay Wiring Diagram



$$I_s (A) \geq \frac{\text{Transformer rating (kW)}}{1.73 \times \text{operating voltage (kV)}}$$

I_s Regulation



Voltage (kV)		Rating of the transformer to be protected (kVA) (*)														
Rated	Service	1500	1750	2000	2250	2500	2750	3000	3250	3500	3750	4000	4250	4500	4750	5000
	30	29	34	39	43	48	53	58	63	67	72	77	82	87	92	96
36	33	26	31	35	39	44	48	53	57	61	66	70	74	79	83	88
38	34.5	25	29	34	38	42	46	50	54	59	63	67	71	75	80	84

(*) It might be considered only the generation power transformer.

I_0 (50N)

Earth protection works by means of a curve at independent time.

Measurement is carried out by a CSH-30 core balance CT, mounted on the back of the VIP-35. This toroidal measures the residual current based on the sum of the sensor secondary currents .

Time delay to can be set in a range between 0.1s and 1s.

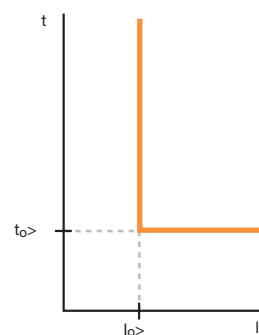
Phase current (I_0) and time delay settings are done on the front of the relay, with the corresponding rotary switches

The VIP-35 relay is supplied with a selector switch (ON-1s) which starts up the inrush current delay. This time delay prevents tripping from the earth protection when the transformer is energized if I_0 and to settings are low.

When this selector switch is in "on" position and 1s after the transformer has been energized, earth protection is time delayed as per the selected setting to.

Although VIP-35 relays can perform an adequate protection function in wind farms, DVCAS switchgears can be optionally supplied with other relays, like the VIP-300 or any of the models of the Sepam range.

Earth Protection of the VIP-35



Tripping Timer



VAP-6

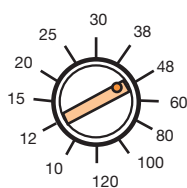
Relay tester

VIP relays have a test plug for VAP-6 unit connection. This testing unit allows:

- Injecting an electrical stimulus, two pushbuttons are used to check that the short-circuit and zero sequence fault current protection devices are operating.
- An extra push-button may be supplied to inhibit tripping of the circuit breaker.

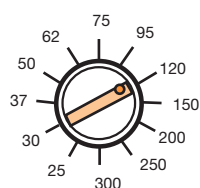
I_s Regulation

I_0 (A)



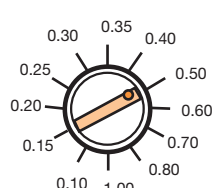
Recto
(S1 - S2 wiring)

$I_0 >$ (A)



Verso
(S1 - S3 wiring)

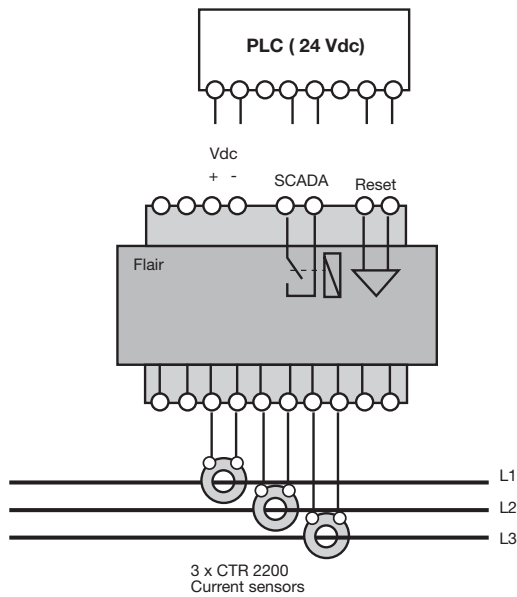
$t_0 >$ (s)



VAP-6



Flair Fault Detector



Advanced management of wind farms

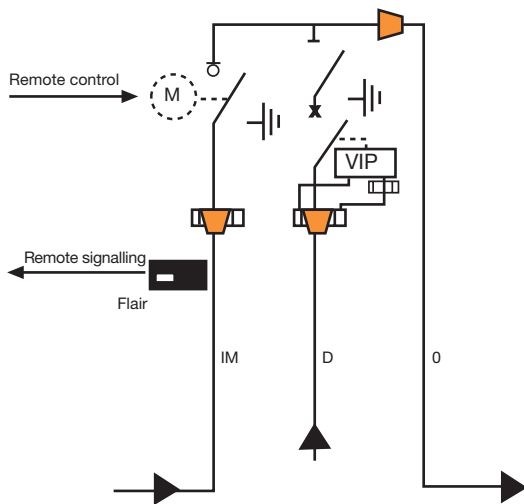
The use of fault indicators, Flair type, provide an advanced management of the MV network in wind power plants.

Flair indicators, due to their quick fault detection function in MV networks, reduce the breakdown time required for fault reparation purposes.

Flair indicators, when fitted on the incoming lines functions I, allow a quick isolation of the fault section. Thus, the wind farm gains in service availability.

Moreover, maximum advantages are offered by Flair indicators when in the I incoming lines, the switch-disconnectors are motor operated (48 Vdc) and provided with a battery charger-rectifier (230 Vac). In this case, service can be immediately restored from the remote control, even in case of lack of voltage in the MV wind farm network.

Synoptic IMDO



Easergy Flair



CTR-2200 current sensors



The MV cable compartment contains the following elements:

- Panel for access to the compartment
- Warning signal for electrical hazard
- Voltage presence indicators
- 3 C type bushings (630A / 25kA / screwed M16)
- Fastening system (clamps) for MV cables
- Earth busbar

Apart from the visual safety elements (voltage indicators and electrical hazard signal), the access panel of the MV cable compartment is provided with the necessary interlockings to ensure safe operating conditions.

For all functions (D, I, T), the panel can only be removed when the corresponding earthing switch is in closed position.

With respect to 0 functions, as there is no associated earthing switch, tools are required to remove the panel. Optionally, other specific interlockings with key lock associated to other earthing switches of the installation can be provided.

Bushings

The role of the bushings is to carry the flow of the current from the outside to the inside of the SF6 tank, keeping the conductors isolated from earth.

The profiles, contacts and dimensions of the bushings used in DVCAS switchgears, are defined as per EN 50181 standard.

Particularly, the bushing used in all the functions of DVCAS switchgears is type C with an M16 thread, in compliance with the above-mentioned standard. Values are 630A rated current and 25kA/1s (62.5 kA peak value) short circuit current.

All the bushings made of epoxy resin undergo routine dielectric tests at power frequency as well as partial discharge tests.

Connectors

DVCAS switchgears have been designed with bushings that can only be connected by "T" type screwed connectors of the range 36kV / 630A / 20kA.

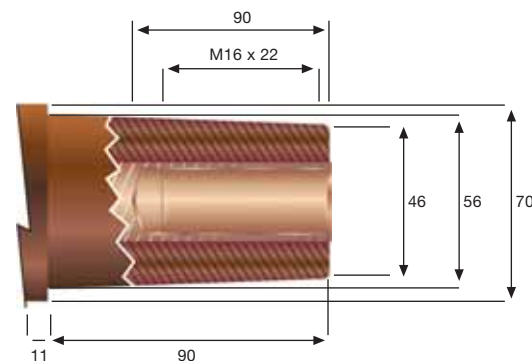
Although in their most common application in wind farms, DVCAS switchgears are supplied with an only MV cable per phase, they allow the connection of two cables per phase in all cases.

Selection chart of connectors

General characteristics	
Geometry	"T" shaped
Screened (recommended)	Earthed
Inner profile	C type
Screwed connection	M16
Rated and testing voltage	36/70/170kV
Rated current	630A
Short time withstand current	20kA/3S

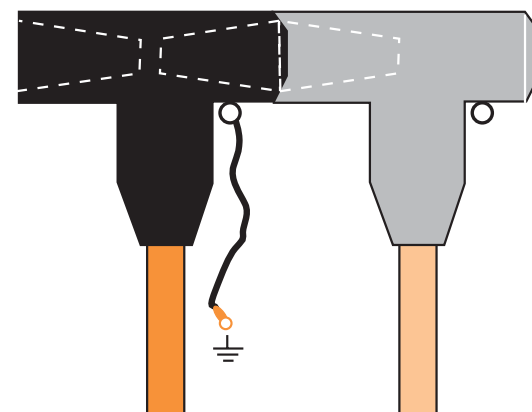
Manufacturer (examples)	Gama	Section (max)
Nkt	CB-36/630(1250)	630 mm ²
Pirelli	PMA-5/400/36 AC	240 mm ²
Euromold	M440/400-TB/G	630 mm ²

Detail of a C type standard bushing in compliance with the requirements of EN 50181 for power connectors



Dimensions in mm

Connectors



For a more specific definition of the MV connector to be used in each case, it is necessary to make a precise description of the cable that is going to be connected. The following data may be required:

- Kind of conductor: aluminium or copper.
- Cross section of the conductor in mm².
- Insulation diameter
- Cable composition: single core or three core
- Type of insulation: dry or paper impregnated.
- Type of screen
- Armature ...

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