Lightning and overvoltage protection
Wind turbines

ABB : recognized competence in lightning protection

COMPETENCE

ABB Lightning Protection Group, established in the South West of France, benefiting from acquired experience during the last decades, makes the most of its masterly skills in lightning and overvoltage protection technology. In addition to its present expertise concerning the global supply for lightning protection (both external and internal protection), ABB henceforth proposes a range of lightning arresters against overvoltages, dedicated to wind turbine installations.

Moreover, ABB Lightning Protection Group benefits from a laboratory including various generators enabling surge arresters to be tested under real conditions with shock currents of different amplitudes, and this in order to optimize protection solutions specific to the customer as regards wind turbine installations.

LESPS Laboratory at Bagnères-de-Bigorre, in France

Lightning wave generator 10 / 350

200 kV generator

Why do wind turbines need to be protected ?

Farm of wind turbines

Wind turbine in the countryside

Wind turbines, connected to the public electricity network provide power as a renewable energy source.

Due to their height (over 100 meters) and location (isolated areas), wind turbines are often exposed to direct & indirect lightning strike consequences i.e transient surges, overvoltages and overcurrents.

These induced consequences will directly affect power & signal leads and damage costly equipment i.e PDP (Primary Distribution Panel), TCU (Tower Control Unit) and all signal & communications lines.

Lightning consequences can be very costly :
- loss of operating equipment
- production loss for the utilities in terms of power generation

Therefore, wind generation towers need high capacity and reliable lightning and surge protection.

The close cooperation of ABB with manufacturers' engineers helped ABB to understand better their needs to design specific surge and lightning protection dedicated to wind towers that will help them to avoid those losses and make their equipment safer.

ENERGY network

Protection of power supply

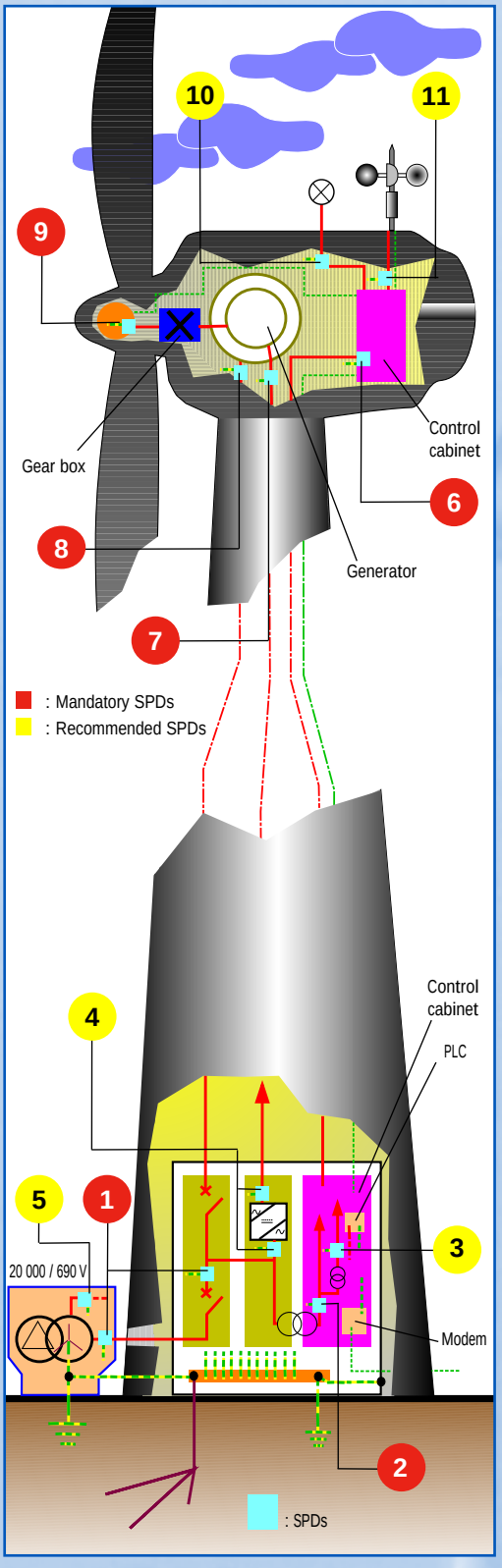
Because windmills are very high and located in isolated areas, the risk of direct lightning strike is important, therefore ABB recommends to install a Type 1 SPD in the MSB (Main Switch Board).
In addition, fine protection is required with Type 2 SPDs installed close to the sensitive equipment of the installation (like the anemometer for instance).
Moreover, windmill applications are specific because many different voltages exist : 24V (for HUB protection,...) 48V / 230V between Phase and Neutral, and 380V / 480V / 690V or 1000V (for stator protection,...) between Phases.

Technical remarks

The wind turbine and all its equipment have to be grounded properly and, should be equipotential.

In some wind turbines, the transformer (690 / 20 000V) can be located in the nacelle. In that case, please contact us for the appropriate protection.

In case of 690V or 1000V IT network, use a 3+1 system (please consult us).



All these SPDs are also available without TS (remote indication) option.

1 Heading protection

Description	Part number	Nominal voltage : Un (L-L)
OVR T1-T2 Wind turbine	2CTB815101R9400	690V
3 x OVR T1 25 440-50	2CTB815101R9300	690V

2 Control cabinet protection (230V)

Description	Part number	Nominal voltage : Un (L-L)
OVR T2 3N 40 275 P TS	2CTB803953R0500	230 V**

3 Control cabinet protection (24V / 48V)

Description	Part number	Nominal voltage : Un (L-N)
OVR 2 15 75s P TS	2CTB813852R1300	24 V

4 Inverter protection for rotor power supply

Description	Part number	Nominal voltage : Un (L-L)
OVR T2 3L 40 275 P TS	2CTB803853R2500	380V*
OVR 3L 40 440 P TS	2CTB803853R2400	480V*
OVR T2 3L 40 440 / 690 P TS	2CTB803853R4600	690V*

5 Control breaker protection

Description	Part number	Nominal voltage : Un (L-N)
OVR T2 3N 40 275 P TS	2CTB803953R0500	230 V**

6 Control cabinet protection

Description	Part number	Nominal voltage : Un (L-N)
OVR T2 3N 40 275 P TS	2CTB803953R0500	230 V**

7 Rotor protection

Description	Part number	Nominal voltage : Un (L-L)
OVR T2 3L 40 275 P TS	2CTB803853R2500	380 V*
OVR 3L 40 440 P TS	2CTB803853R2400	480 V*
OVR T2 3L 40 440 / 690 P TS	2CTB803853R4600	690 V*

8 Stator protection

Description	Part number	Nominal voltage : Un (L-L)
OVR T2 3L 40 440 / 690 P TS	2CTB803853R4600	690 V

9 HUB protection

Description	Part number	Nominal voltage : Un (L-N)
OVR 2 15 75s P TS	2CTB813852R1300	24, 48V
OVR T2 3N 40 275 P TS	2CTB803953R0500	230V**

10 Obstruction lighting protection

Description	Part number	Nominal voltage : Un (L-L)
OVR T2 1N 40 275 P TS	2CTB803952R0500	230 V

11 Anemometer

Description	Part number	Nominal voltage : Un (L-N)
OVR 2 15 75s P TS	2CTB813852R1300	24 V

* :
If Neutral distributed, use OVR T2 3N xxx

** :
If Single phase system (Ph + N), use
OVR T2 1N xxx

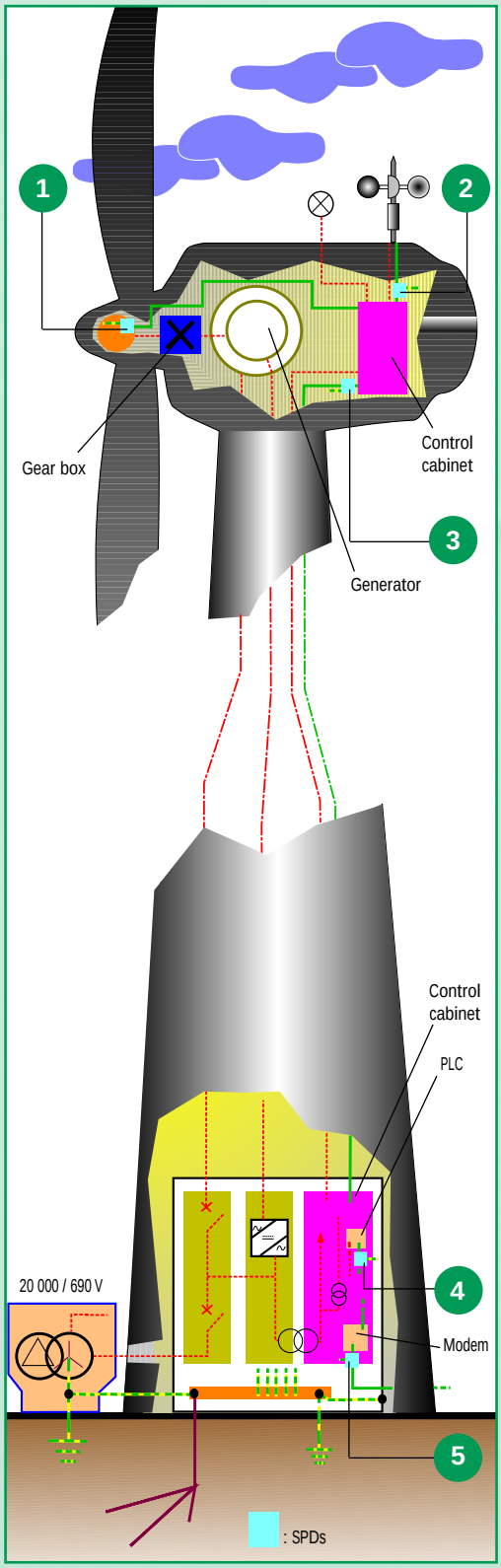
Protection of dataline network

DATALINE

Transmission line surge arresters (OVR TC) provide protection against transient overvoltages for equipment connected to telephone lines (digital or analog), computer links or current loops, for applications such as RS-485, 4-20 mA.

The data concerning the wind's orientation and speed (sensed by the anemometer) are transmitted to the hub and yaw system for optimally orienting the nacelle and the blades.
Further, the communication lines between automatic systems should be protected against lightning.

For system monitoring and control, the data of the wind energy plant manufacturer for service and maintenance work as well as to the plant operator / power utilities.



1 HUB communication line protection

Description	Part number	Voltage : Un	Application
OVR TC 24V P	2CTB804850R0200	24 V	4-20mA loop

2 Dataline anemometer protection

Description	Part number	Voltage : Un	Application
OVR TC 48V P	2CTB804850R0300	48V	

3 Dataline or Databus protection

Description	Part number	Voltage : Un	Application
OVR TC 6V P	2CTB804850R0000	6V	
1 to 4 x OVR TC 6V P	2CTB804850R0000	6V	RS 485 / RS 422
2 to 4 x OVR TC 24V P	2CTB804850R0200	24V	RS 232

4 Dataline or Databus protection

Description	Part number	Voltage : Un	Application
OVR TC 6V P	2CTB804850R0000	6V	
1 to 4 x OVR TC 6V P	2CTB804850R0000	6V	RS 485 / RS 422
2 to 4 x OVR TC 24V P	2CTB804850R0200	24V	RS 232

5 Modem and phone line protection

Description	Part number	Voltage : Un	Application
OVR TC 48V P	2CTB804850R0300	48V	
OVR TC 200V P	2CTB804850R0400	200V	

The base of these dataline SPDs have screw connection.
The bases with RJ 11 and RJ 45 connection are also available.

Base TC RJ 11 / 2CTB804840R1000
Base TC RJ 45 / 2CTB804840R1100

Imp. Carret-Vène - Février 2007 -

ABB Lightning Protection Group
22, rue du 8 Mai 1945
95340 - Persan
France

Tel : +33 (0) 1 30 28 60 88
Fax : +33 (0) 1 30 28 60 79