



HVDC ELECTRICITY GRIDS

MERSEN OFFER

Feb 2017



CLASSIFICATION OF SMART POWER DISTRIBUTION SYSTEMS

HVDC AND FACTS: BETTER POWER MANAGEMENT AND LONG DISTANCE TRANSMISSION

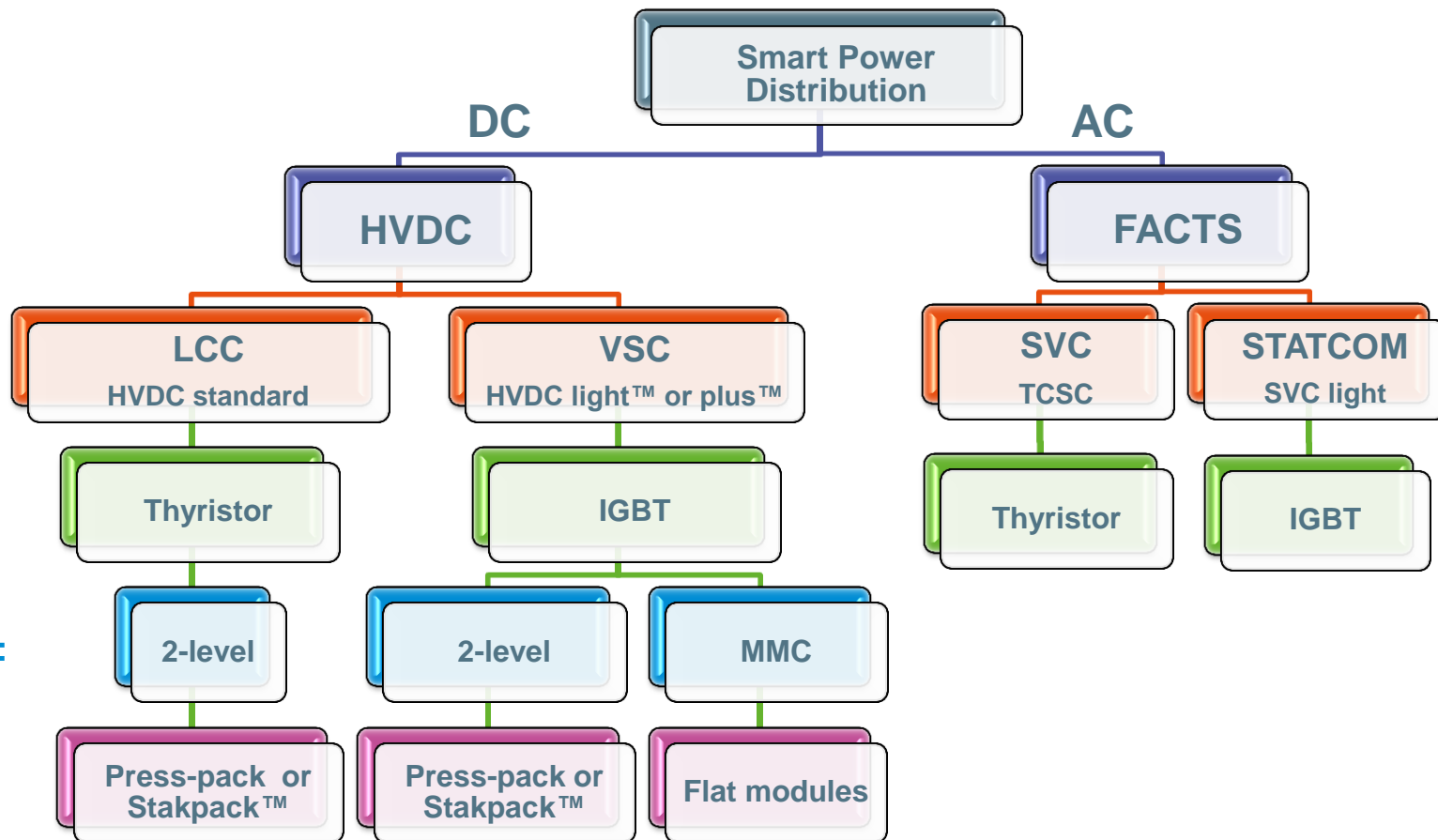
Power Transmission Technology:

Power Conversion Technologies:

Semiconductor Technology:



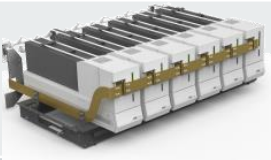





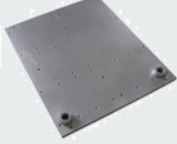
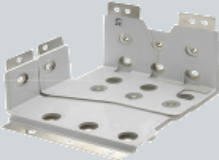
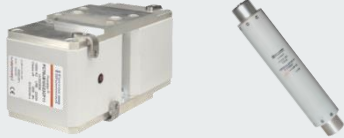
Circuit Topology:

Power Module Package Type:



HVDC : High Voltage Direct Current
FACTS : Flexible Alternating Current Transmission System
LCC : Line Commutated Converters
VSC : Voltage Source Converters
SVC : Static VAR Compensator (VAR: Reactive Power)
STATCOM (SVC light) : Static Synchronous Compensator

HVDC IN A NUTSHELL – MERSEN OFFER

Technology	LCC “HVDC Standard”	VSC “HVDC light” or “HVDC Plus” or “Flexible HVDC”	
		2- or 3-level	Multi-level MMC
Semiconductor technology	Thyristor 	IGBT 	IGBT 
Power module package	Press-pack 	Press-pack 	Flat 
Cooling			
Busbar	N/A	N/A	
Fuse	N/A	N/A	

HVDC CONVERTERS: MERSEN COOLING

■ LCC CONVERTER

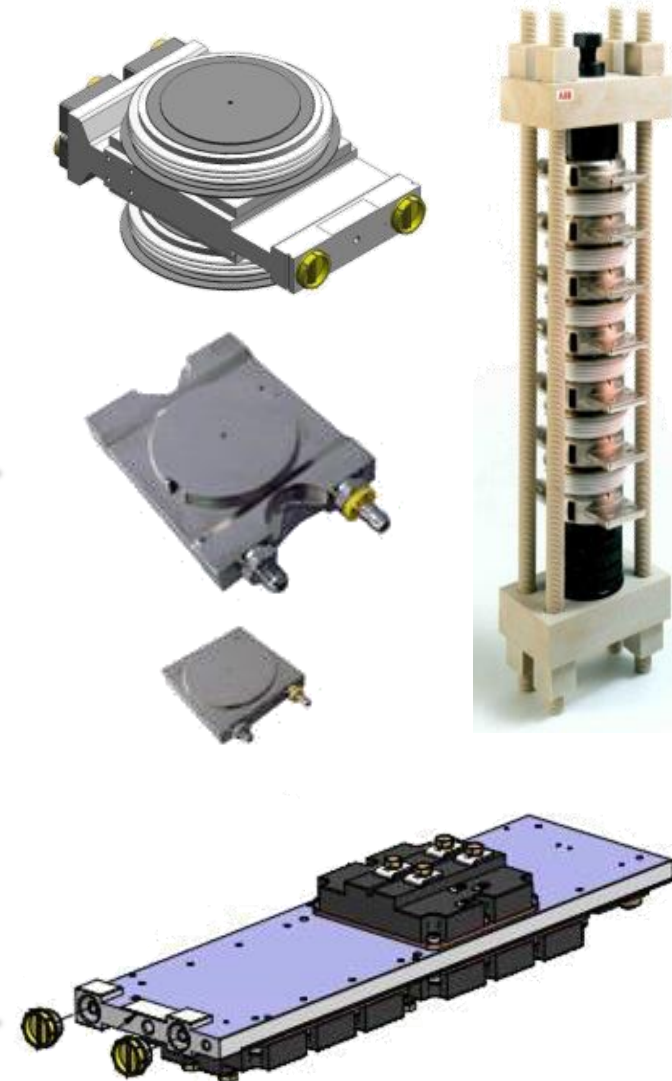
- Water cooling system is needed to dissipate the losses of the LCC **thyristor modules**.
Water cooled double-sided plates are used.
 - Each cooling plate has to dissipate about 2kW.
 - E.g. 2GW LCC installation: 3,360 double-sided water cooling plates.

■ VSC 2- OR 3-LEVEL CONVERTER

- Water cooling needed to dissipate the losses of the VSC **IGBT press-pack**.
 - Each cooling plate has to dissipate about 3kW.

■ VSC MMC CONVERTER

- Water cooling needed to dissipate the losses of the VSC **IGBT “flat” modules**



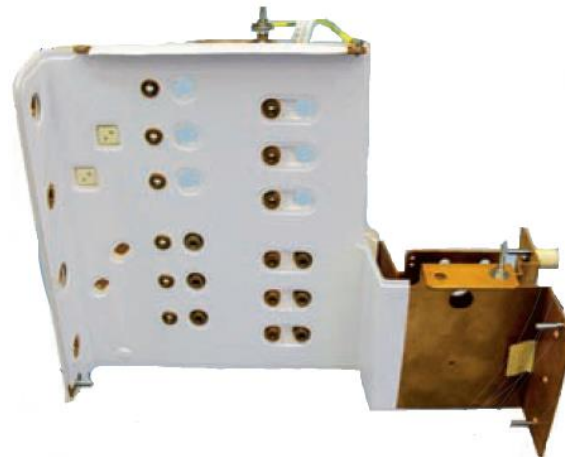
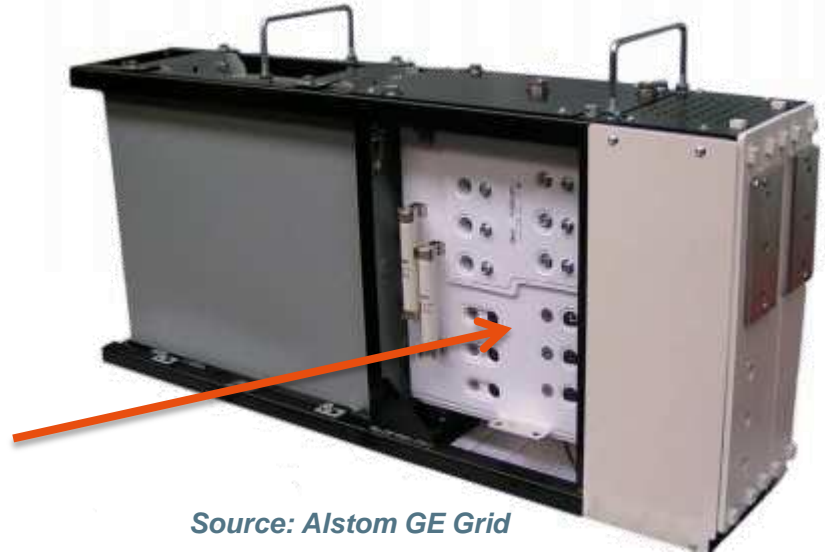
HVDC CONVERTERS: MERSEN BUSBAR

■ LCC & VSC 2-LEVEL CONVERTER

- No busbar

■ VSC MMC CONVERTER

- Laminated Busbar to connect IGBT power modules together with capacitor bank. 1 busbar / submodule



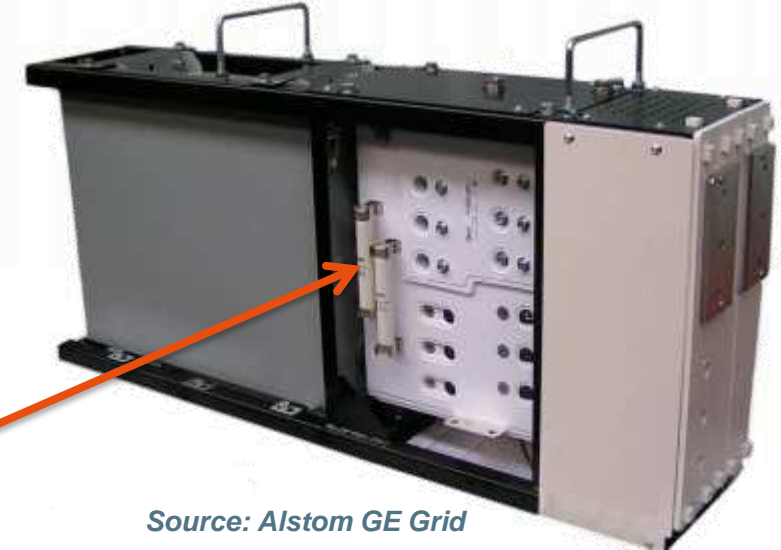
HVDC CONVERTERS: MERSEN FUSES

■ LCC & VSC 2-LEVEL CONVERTER

- No fuse

■ VSC MMC CONVERTER

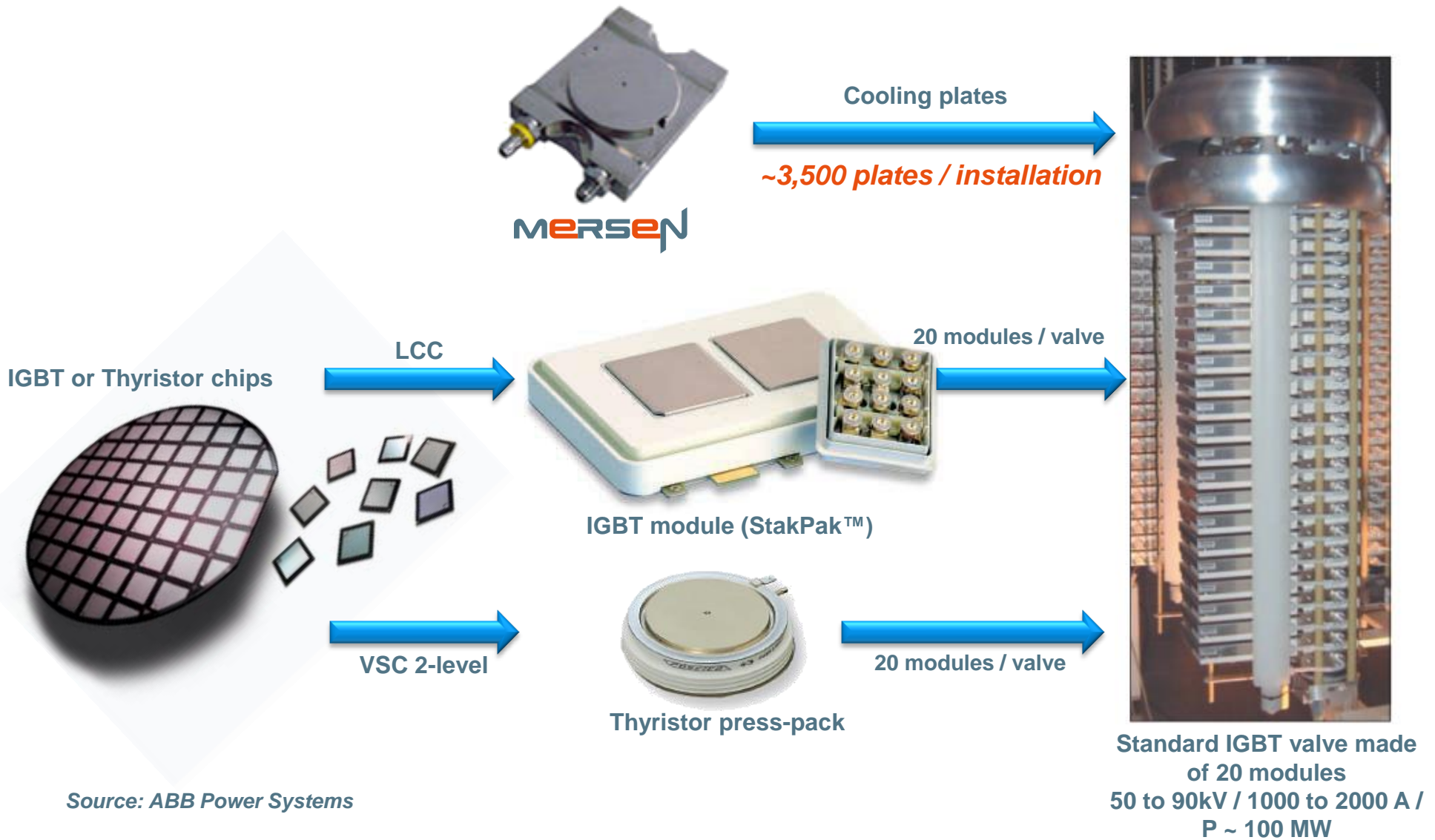
- 2 low-rating fuse for auxiliary PCB protection (gate driver board, and other functions)
- 2 to 4 main fuses for IGBT modules protection



Source: Alstom GE Grid



SUMMARY : MERSEN OFFER IN HVDC-LCC OR -VSC 2-LEVEL SYSTEM



SUMMARY : MERSEN OFFER IN HVDC-VSC MMC SUB-MODULE

