

# ABB Advanced Power Electronics

## STATCOM for Industrial Plants to start large motors

Substation with STATCOM inside



PCS 6000 STATCOM: +/- 13 MVar unit



# Introduction and Main Technical Features

Electric motors are becoming popular as a replacement for gas turbines large industrial plants in order to lower maintenance costs and improve plant process reliability. The introduction of large new motors to the existing plant network may place more stress on the network, due to the large starting current of such motors. It is therefore necessary that the effects of motor-starting and motor-running should not affect the plant. In addition to this, there is an incentive for industrial plants to improve power quality on their network to lower the energy bill.

## Problem description

Motors can demand more than five times their rated current during start-up. In order to reduce the effect of motor starting on the grid, an add-on equipment like the STATCOM is required. When the motors are running in steady state, the STATCOM is able to dynamically compensate the power factor of the motors with reactive power and thereby lower the energy costs.

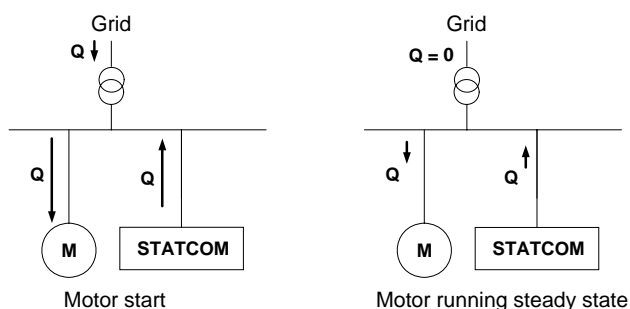


Figure 1: Principle overview: Q demand of motor

## Low maintenance

Plant outages result in lost production as well as the associated financial losses for industrial plants. Such motor installations are critical to the plant process and must have extremely high reliability and low maintenance requirements.

In the rare event that the STATCOM should require service, it can be serviced while the motors are running without affecting the plant process.

Alternative “soft-start” solutions such as Variable Speed Drives cannot be serviced whilst the motor is in operation, which causes interruptions in the plant process. A STATCOM installation avoids this costly scenario.

## Reliability runs in the family

The MV STATCOM design is part of ABB’s family of PCS 6000 products which are used for a wide range of applications. It uses the same power technology as the ACS 6000 range of MV Drives. The standardization of these power electronic modules delivers substantial advantages in terms of cost and quality. With many PCS 6000 units sold worldwide this converter has a proven track record and high reliability.



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## STATCOM

The STATCOM (Static Synchronous Compensator) provides outstanding performance for both steady state and dynamic operation as a pure static device with no switched passive elements. Having no switched passive elements means no oscillation problems, as is the case with other solutions. Especially, the fast dynamic voltage control and the behavior during balanced as well as unbalanced grid faults (fault ride through) support the grid.

The STATCOM has a small footprint and is based on three-level IGCT phase modules. The IGCT (Integrated Gate Commutated Thyristor) is the state-of-the-art semiconductor element for this power range. The converter units are connected by a medium voltage DC link (intermediate circuit). The converter modules are water cooled with a virtually maintenance free closed loop water system equipped with redundant circulating pumps.

## Case study

One PCS 6000 STATCOM was delivered to BASF PETRONAS Chemicals in Kuantan, Malaysia, as part of the replacement of existing gas turbines with electric motors. The two compressors which are run by the two motors are critical to the plant process and therefore need to run reliably.

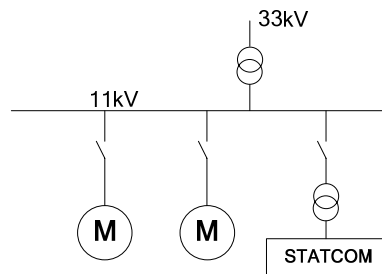


Figure 2: Project overview

Based on the two 5 MW motors in the plant, ABB successfully commissioned a PCS 6000 STATCOM rated at +/- 13 MVar in order to support the voltage and reduce the current drawn from the grid to half during motor starts.

In steady state operation, the STATCOM compensates the power factor of the motors, resulting in savings on the customer’s electricity bill. Tests have proven the value of the STATCOM solution.

## Case study project data

Plant:	BASF PETRONAS Chemicals, Malaysia
Application:	STATCOM
Type:	PCS 6000 STATCOM single indoor
Installation:	Indoor
Nominal reactive power:	+/- 13 MVar
Nominal voltage:	11 kV
Nominal frequency:	50Hz
Over-riding Controller:	ABB AC800M
STATCOM Controller:	ABB AC800PEC
Motor Rating:	2x ABB 5MW