

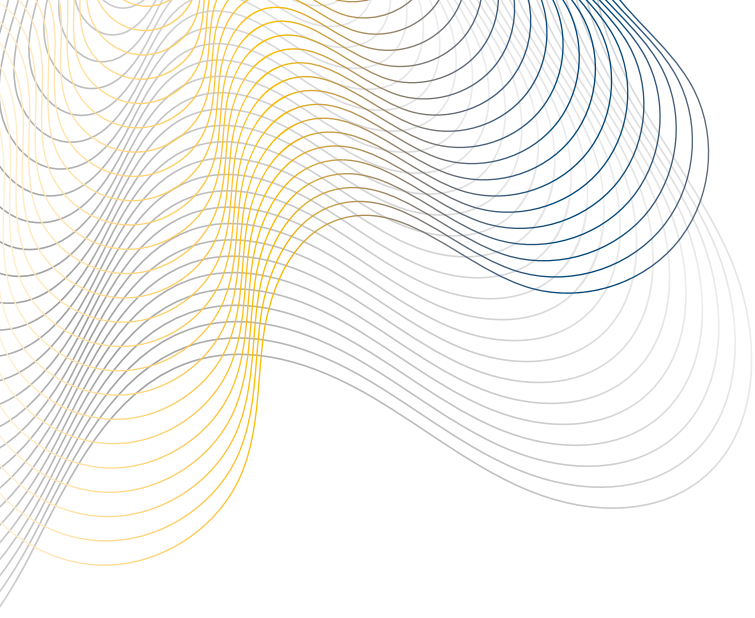


TRUST. WELL EARNED.

# PRISMIC® Power Management Systems

## Power without compromise





## Introducing BRUSH PRISMIC® PMS

*Load Shedding*  
*Generator Auto Dispatch*  
*System Power &  
Var Control*  
*System Frequency  
& Voltage Control*

The pressure of maintaining the high integrity power system that your business depends on has just been lifted.

**The BRUSH PRISMIC® Power Management System is an extremely powerful and flexible electrical power system controller. More than that, it's your guardian against outages and the ensuing disruption and cost.**

With a reputation for delivering a reliable and stable power supply whatever the industry or application PRISMIC® PMS sets the benchmark. That's why it's already the most widely used PMS in the oil and gas industry in many parts of the world and is becoming widely used across power and utilities sites, data centres, LNG terminals and military facilities.

PRISMIC® PMS is designed and produced by BRUSH, the world's leading independent manufacturer of generators and associated equipment. We were one of the first companies to use advanced digital technology and we continue to provide innovative solutions to meet the most demanding specifications.

We've been refining the design and functionality for over thirty years, using our experience and expertise, coupled with technological advancements, to add and improve features.

Our PMS has none of the limitations of generic PLC or off the shelf equipment modules. Our PMS can be used with equipment from other OEMs, multiple types of generators or prime movers and other associated power system equipment.

**PRISMIC® PMS is easy to use too. Operators interact with a fully featured Windows based Human Machine Interface (HMI) by using basic PC skills to navigate through the comprehensive and simple to use displays and settings.**

Your operators can quickly become familiar with the more challenging aspects of generation system control using the BRUSH power system simulation and utilising real generators at the BRUSH PRISMIC® training facility.





Each bespoke PRISMIC® PMS is tailored to specific site requirements and power system topology, with all design data meticulously controlled and recorded.

The systems are fully designed and tested by electrical engineers who use real time simulations to fully demonstrate many scenarios which can't be easily tested on site.

By adopting these methods commissioning time is cut considerably and down time is minimised. A fundamental purpose for PRISMIC® PMS is proactive prevention of blackouts and enabling uninterrupted performance of critical processes and operations.

By preventing disturbances, the PRISMIC® PMS maximises operational up time and minimises the costs associated with lost production.

### **BRUSH PRISMIC® PMS - a superior product with superior benefits**

- Improves power system security by managing energy requirements, using multiple techniques, such as load shedding, generator auto starting and load management.
- Optimises generator usage to minimise fuel consumption resulting in substantial cost savings.
- Proactively highlights potential issues helping to avoid blackouts.
- Minimises disturbance to operations.
- Accurately controls power flows and measures system capabilities, rationalises generator usage and manages type of fuel use.
- Comprehensive Training for your team is available both on site and at the BRUSH training facility.
- Whenever an event occurs it is locally time stamped to 1ms resolution before being stored or exported.
- Reduces the number of personnel required through the automation of many processes.
- Improves environmental performance by aiding implementation and operation of DLN/DLE turbine emissions reduction systems.
- Provides a clear visual representation of the power system, all necessary indications and alarm signals.
- Automates sequencing of critical circuit breaker operations reducing the risk of human error.
- Worldwide presence of BRUSH service engineers and our technical support team provide you with expert advice and assistance when you need it.
- Remotely re-program multiple controllers to accommodate changes in the power system.

# Comprehensive functionality with real flexibility

PRISMIC® PMS has been designed to provide a comprehensive solution for any industry, location and application, from oil platforms to financial data centres. And we've made sure it's flexible enough to be tailored to your specific organisation, to meet your exact site requirements.

## Intelligent Load Shedding:

- Fast acting initiated by sudden loss of generating capability
- Generator gradual overload shedding
- Under frequency shedding
- Rate of change of frequency shedding
- Initiated by turbine pre-trip warning such as turbine exhaust over temperature (T5)
- Initiated by transformer or interconnector overload
- Multiple or dynamic load priority tables
- Step load limiting

## Control of Voltage, Frequency, Power, Mvar/Power Factor:

- Power system frequency and voltage control
- Power sharing (MW and Mvar)
- Grid and interconnector power target control (MW, Mvar and PF)
- Individual generator baseload target control (MW, Mvar and PF)
- Group set-point target (MW, Mvar and PF)
- DLN/DLE operating modes
- Voltage boosting facility
- Generator capability de-rating

## Generator Set Management/Dispatch:

- Automatic start sequence with low spinning reserve
- Automatic start sequence prior to large motor start
- Automatic stop sequence with high spinning reserve
- Manual generator start and stop sequence initiation from HMI
- Neutral earthing contactor (automatic and manual)
- Black start

## Additional Control Options:

- Load start inhibits
- Load reconnection
- Controlled load reduction (VSD etc)
- Transformer tap-changer control and monitoring

## Powerful Human Machine Interface (HMI):

- HMIs provide improved control and visualisation of the electrical power system
- Multiple networked workstations can be fitted locally in control panels and/or desk mounted
- Comprehensive trending and event recording facilities are included
- HMIs can be used for operators to initiate commands for any required PMS functionality such as:
  - Generator starting and stopping
  - Busbar synchronising
  - Opening/closing of circuit breakers
  - Multiple language HMI options are available



## Data Transfer with External Systems:

A wide range of communication protocols are available for transfer of data to or from other systems such as:

- DCS/SCADA
- IEDs
- Switchgear
- Protection relays
- Motor control centres
- Generator and turbine controllers

## Options for Increased Integrity:

- Single location redundant master control modules – providing a local hot standby
- Multiple location redundant master control modules – autonomous controllers take control of the respective power system sections if the communications network is divided
- Redundant input/output modules
- Redundant communication channels

# Power, speed, control & versatility

## Intelligent Load Shedding

PRISMIC® PMS provides extremely rapid intelligent load shedding to prevent blackouts, which means operational uptime is maximised and disturbances to sensitive loads are minimised. Fast acting load shedding can be initiated in less than 10ms and intelligent load shedding algorithms ensure that only the minimum number of load feeders are tripped minimising disruption to operations.

Load priority assignments are easily adjusted by operators using the HMI software, or automatically using intelligent algorithms, to suit individual plant operational needs.

**Controlled load reduction is also possible to avoid the need for load shedding, for example by reducing thruster pitch.**

Gradual overload, under frequency and rate of change of frequency load shedding functions are also provided to protect the power system from a cascade failure and blackout.



## Generator Set Management/Dispatch

- The versatility of PRISMIC® PMS enables it to interact with any manufacturer's engine/ turbine and generator control systems, controlling any size of engine or generator.
- Generators can be manually started and stopped from the HMI
- Generators can be automatically started and stopped on load demand
- Fuel types used for turbines can be controlled or monitored
- DLN/DLE emissions reduction functionality can be supervised by PRISMIC® PMS

## Load Start Inhibit

When the power generation system spinning reserve is low PRISMIC® PMS is able to prevent additional loads from being connected to the system. The HMI clearly displays all loads that are inhibited.

## Control of Voltage, Frequency, Power, Mvar/Power Factor

PRISMIC® PMS can be configured to control system parameters to meet demand requirements to satisfy various combinations of operational needs such as minimum energy usage, export or import of system power as required by energy trading contracts or operation at particular levels to ensure minimum emissions.

- Steady state voltage and frequency of the power system are accurately controlled

- Active and reactive power levels are fully controlled with power shared evenly between all the generators or controlled to specified target levels
- Several modes of operation are available for each generator such as power factor control and reactive power control, baseload control etc
- PRISMIC® PMS can actively control power factor and import/export of power from a grid/utility network or another interconnected power generation system
- We use a real time closed loop simulation package to test real scenarios in a controlled environment. This simulation package is also available for onsite training.

## Other Control Features

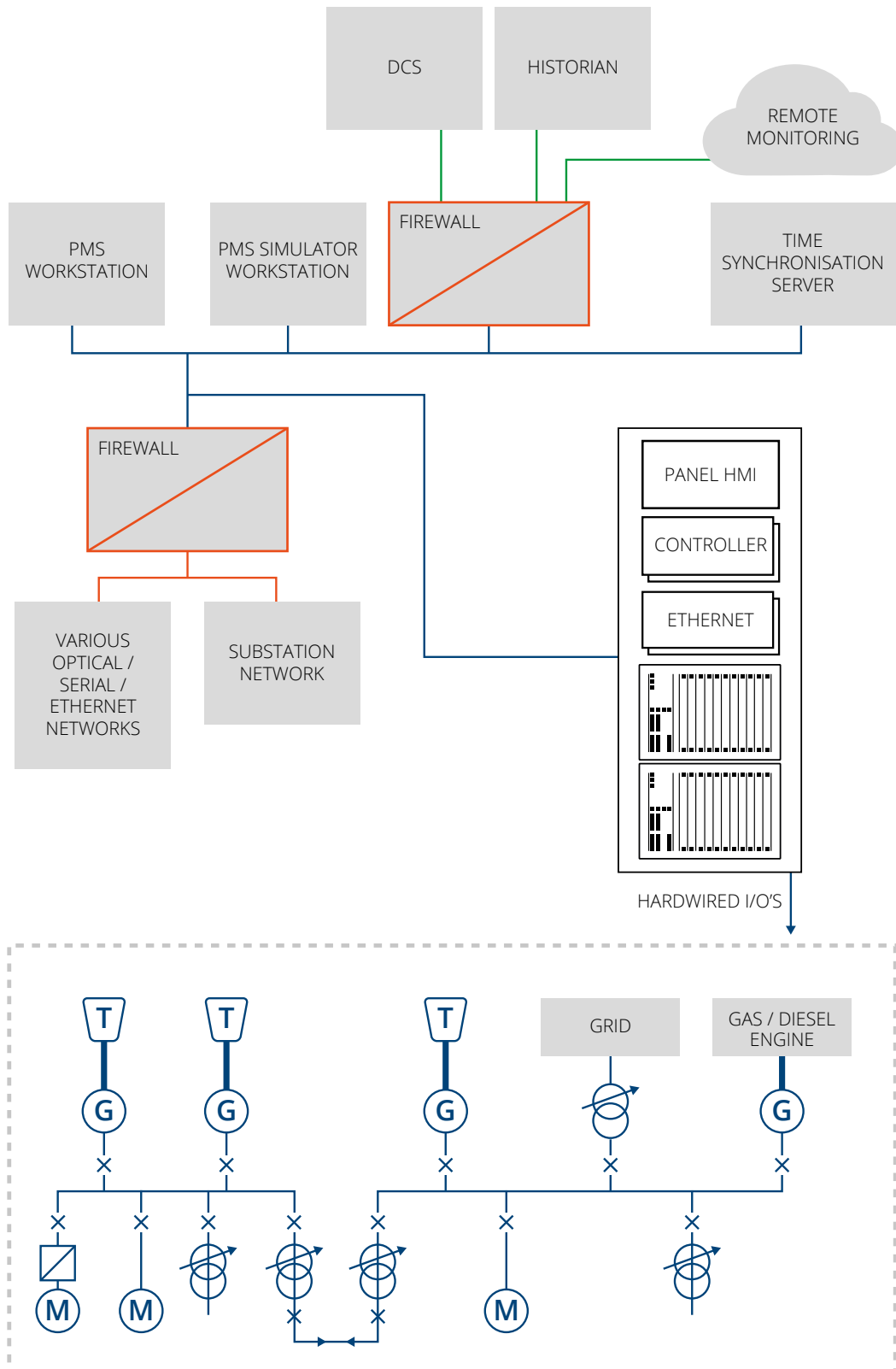
Our flexible approach and extensive knowledge of designing Power Management Systems allows us to easily implement your custom requirements.

- Circuit breakers, bus-ties and load feeders can be both monitored and controlled from the HMI
- Control of neutral earthing resistors is available, as well as tap-changer control of transformers
- PRISMIC® PMS can be configured to synchronise groups of generators across bus-couplers and interconnectors

***Extremely rapid Intelligent load Shedding.***



# System Overview



# PRISMIC® PMS Features

<b>Engine and Generator Control</b>	Voltage control
	Frequency control
	Watts control
	VAr control
	Grid target (Watts & Vars & PF)
	Group target (Watts & Vars)
	Generator targets (Watts & Vars & PF)
<b>Load Shedding</b>	Gradual shedding
	Under frequency shedding
	Multiple level under frequency shedding
	Rate of change of frequency shedding
	Transformer overload protection
	Interconnector overload protection
	Load shed test facilities
<b>Fast Acting Load Shedding</b>	Grid import limit
	Generator breaker (on opening)
	Generator protection (on operation)
	Pre-trip warning (on alarm)
	Turbine temperature HiHi (on alarm)
	Interconnector/bus coupler fault
	Transformer fault
	Fast shed test
	Multiple priority shed tables
	Dynamic priority shed tables
	IEC61850 GOOSE - trip input to shed output <10ms
Hardwired - trip input to shed output <40ms	
Mixture of IEC61850 GOOSE and hardwired - trip input to shed outputs <40ms	
<b>Generator Starting</b>	Low spinning reserve
	To replace set that has failed to start or synchronise
	To replace set with pre-trip warning
	Manual via HMI
	Manual confirmation
<b>Generator Stopping</b>	Via DCS/SCADA
	High spinning reserve
	Generator/turbine warning
	Manual via HMI
<b>Communications</b>	Via DCS/SCADA
	Real time deterministic Ethernet
	Serial DCS/SCADA link
	Ethernet DCS/SCADA
	Serial IED interface
	Ethernet IED interface
	OPC gateway
	IEC61850 MMS Client, GOOSE Publisher and subscriber (Editions 1 and 2)
	Time synchronisation
Multiple autonomous masters if comms fails	
<b>HMI</b>	High speed HMI data refresh rate and trending (selectable down to 100ms)
	High resolution event logging (1ms)
	Ethernet PMS to HMI link
	Serial PMS to HMI link
	Touch screen HMI
	Multiple alarm priorities
	Multi-language support
<b>Miscellaneous</b>	Group/multi set synchronising
	Tap changer control
	Enhanced dry low NOX control
	Load start inhibit
	Voltage boost for large motor start
	Load reconnect
	Manual circuit breaker control
	Black start
	System training simulator
	Temperature compensation
	Dead bus check and closure
CB discrepancy monitoring and associated safe mode	
Dual fuel compensation	
Engine load cycling	



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