- **Integrated Control and Safety Systems**
- **Alarm Monitoring System**
- **HV/MV/LV/MCC Switchborad**
- **Power Management System**
- **Dynamic Positioning System**

Integrated Control and Safety System

> General

Norr Systems Korea's ICSS consist of three parts, DCS, ESD and FGS. The non-failsafe part of the process controlled by DCS while the failsafe part of the process is controlled by ESD & FGS. The ICSS will use Schneider Modicon Quantum PLC for process applicatons.

> Features

Open System Stucture

- International standard for ship IT unified network structure
- Embedded environment standard operation system
- International standard and industry field bus protocol

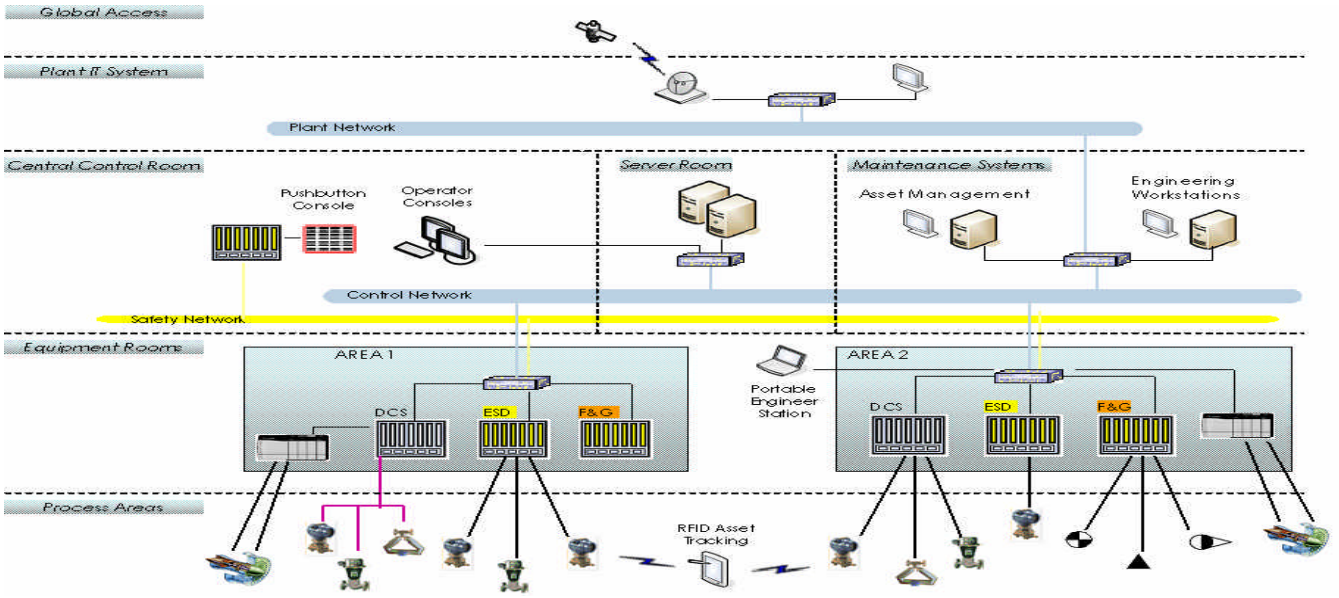
High System Reliability and Maintainability

- System H/W and S/W diagnosis function
- Dual CPU and network. field bus communication
- H/W exchangeability while system is in operation

> Benefits

- Easy to install and extend
- Easy to learn and use
- High product quality
- Low maintenance cost
- Effective control mechanism
- Reduced cost in cable materials and labor
- Simple to commission
- Easy integration with heterogeneous systems

> SYSTEM CONFIGURATION



Alarm Monitoring & Control System

> General

Norr Systems Korea's AMS is an Integrated Alarm Monitoring and Control System for optimal solution of the main engine monitoring function and the cargo/ ballast control function of merchant ships and offshore facilities.
It is designed to provide various information to operators in order to manipulate safe and effcient operations based on high reliability and complete flexibility.

Also, open architecture technology of Norr AMS allows easy integration with other system. It complies with the requirement of IMO, IACS and several classification societies and conforms to all rules and regulations, and all components are type approved.

> Features

DECISIVE ADVANTAGE

- High quality product
- Safe and easy operation
- Easy and simple installation and integration
- Low maintenance cost

OUTSTANDING SYSTEM ARCHITECTURE

- International standard for the unified network struture
- Embedded enviroment standard operation system
- International standard and industry fieldbus protocol

MAXIMIZED RELIABILITY

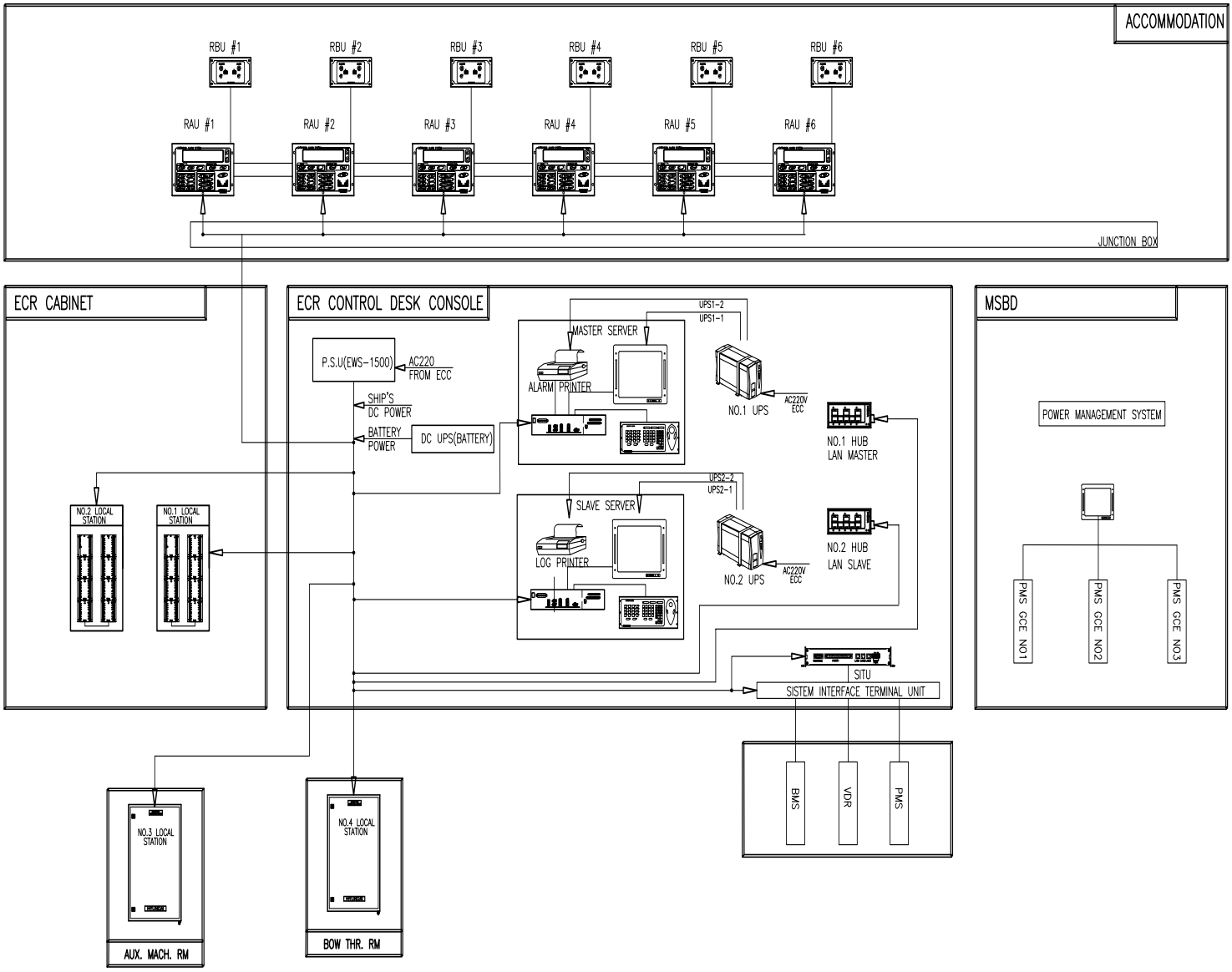
- H/W and S/W diagnosis function
- Redundant Server and Network
- H/W exchangeability during operations

HIGHLY ADAPTABLE APPLICATION

NORR SYSTEMS KOREA's AMS provides compliete solution for various applications such as :

- Alarm and Monitoring System
- Cargo and Ballast Control System
- Power Management System
- Valve and Pump Control Function
- Feedback Control Function (PID Control)

SYSTEM CONFIGURATION



SYSTEM CAPACITY

Operator work Station	Max. 10 Stations
Alarm Printer	Max. 16 Sets
Log Printer	Max. 16 Sets
Temperature	0-75°C (Dry Heat) / 55°C (Wet)
Relative Humidity	96% RH
Vibration	0-100 Hz, 1.0 G (X, Y, and Z Axis)
Accuracy	± 1%

Gateway (Processor Communication Controller)	16 Stations (Max.)
Total Tag	160000 Points (Max.)
I/O Board	- 24DI, 16RT - 16DO, 8AO - 16AI

PRODUCT SPECIFICATION

COMMUNICATION SPECIFICATION

System Communication

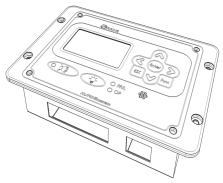
Distance	150m Without Repeater (Extensible to Repeater)
Speed	10/100 Mbps
Cable	FTP or STP Category 5 LAN Cable
Protocol	Ethemet, TCP/IP (Dual Network)

Processor Controller Communication

Distance	250 m without Repeater (Extensible to Repeater)
Speed	1 Mbps
Cable	Shielded Twisted Pair Cable (Not thinner than AWG22)
Protocol	CAN 2.0B (Dual Network)

EXTENSION ALARM SYSTEM

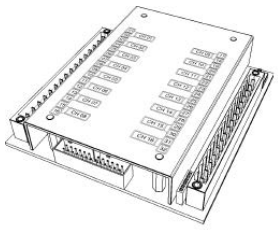
RAU, RBU Alarm Unit, are provide detailed alarm information and on-duty engineer display, engineer call function and watch-responsibility between bridge and engine control room.



Features
Watch Responsibility
Alarm Transfer
Engineer Calling
Re-Alarm Function
Adjustable Dimming /Sound Level

LOCAL I/O STATION

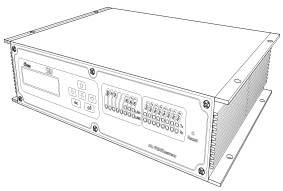
All data acquisition, signal conditioning & scaling, and control process are performed by each individual I/O Process Module with I/O modules. All I/O Modules are designed to be extensible without cable connection.



DIP	• Type - Digital Input Processor • Channel - 16 • Comm. - Dual High Speed Serial I/O Bus
DOP	• Type - Digital Output Processor • Channel - 16 • Comm. - Dual High Speed Serial I/O Bus
Alarm Printer	• Type - Analogue Input Processor • Channel - 16 • Comm. - Dual High Speed Serial I/O Bus
AOP	• Type - Analogue Output Processor • Channel - 8 • Comm. - Dual High Speed Serial I/O Bus
RTP	• Type - Resistance Temp.Processor • Channel - 16 • Comm. - Dual High Speed Serial I/O Bus

SYSTEM INTERFACE

SIU, the System interface Unit, is designed to interface with other third party system such as BMS, VDR, Load Computer, Level Gauging System and others.



Technical Data
System Processing - 32bit RICS Processor
Display - 16x2 Character LCD
Serial Interface - 8Port (RS422/485)
Ethernet Interface - 1Port, 10VASE-T

HV/MV/LV/MCC Switch board

> General

Norr Systems Korea provides complete electrical engineering desing and custom solutions for each application. we obtained support from major brands to provide complete package

Norr Systems Korea design and integrate electrical switchboards that suit all electical power distribution requirments. Mult-function power management system with easy configuration and easy link to PLC system are some of the key advantages of Norr package. The package also has complete sysem approval with major classification bodies.

> Features

- Using high reliabilty and quality breakers
- Equipped with necessary type-approved control devices and instruments required
- System Approval from major marine clssification bodies
- Simple configurations for interface to PLC System
- Available from manual operation, semi-au to fully automatic which are suitable for marine and offshore applications

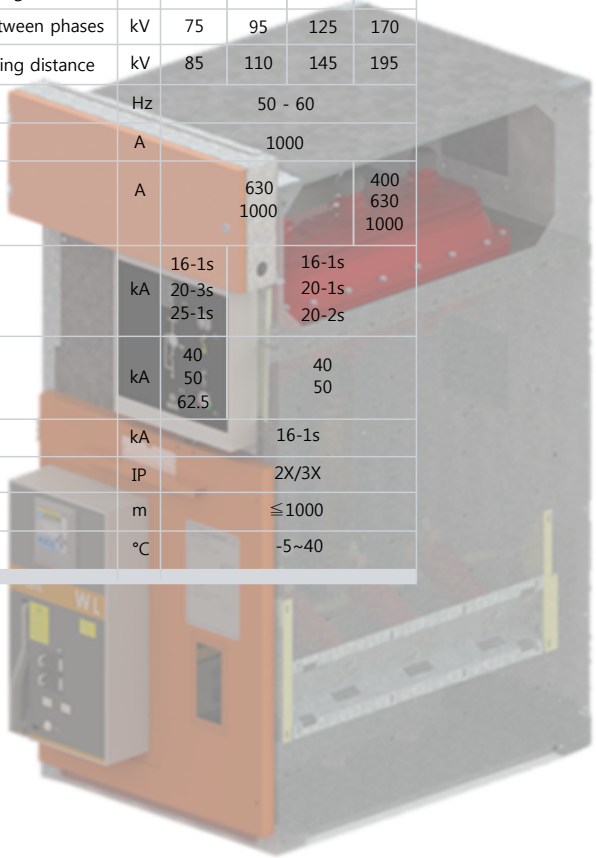
High/Middle Voltage Switchborad

> General

Norr Systems Korea's HV, MV are High voltage and Midium voltage switchboard metal clad type, air isculated, equipped with vacuum circuit breaker suitable for the primary distribution. The switchboard is modular and is made up by placing standardized units side by side in a coordinated way.
The unit compartments are metallically segregated from each other and the live parts are air insulated.
The switchboard functional units are guaranteed to be arc-proof in compliance with IEC 62271-200 Annex A. The switchboard is fitted with all the interlocks needed for high level of safety for equipment and personnel, as wll as relable operation.

Electrical Characterist

Rated voltage		kV	12	17.5	24	36
Rated power frequency withstand voltage 50Hz 1Min (kV r.m.s)	To earth and between phases	kV	28	38	50	70
	Across the isolating distance	kV	32	45	60	80
Rated lightning impulse withstand voltage (Peak value)	To earth and between phases	kV	75	95	125	170
	Across the isolating distance	kV	85	110	145	195
Rated frequency		Hz	50 - 60			
Rated current main bus bars up to		A	1000			
Rated current unit		A	630 1000			400 630 1000
Short-time withstand current		kA	16-1s 20-3s 25-1s		16-1s 20-1s 20-2s	
Peak value		kA	40 50 62.5		40 50	
Withstand internal arc		kA	16-1s			
Protection degree indoor / outdoor		IP	2X/3X			
Altitude		m	≦1000			
Ambient temperature		℃	-5~40			



Low Voltage Switchboard

> General

Norr Systems Korea's LV is a LV distribution switchboard that is particularly suited to applications that demand high levels of performance and reliability. This switchboard is generally installed downstream of the LV transformers or generator groups and contains the main and distribution circuit breakers of the LV plant

Electrical Characteristic

Rated insulation voltage	1000V
Rated operating volatage	Up to 690V
Rated frequency	50/60Hz
Main busbar rated current	Up to 5000A
Distribution busbar rated current	630A
Rated short-time withstand current for 1sec.	Up to 100kA
Rated peak withstand current	Up to 220kA
External/Internal degree of protection	Up to IP43/IP4X
Maximum number of withdrawable units per panel	12/24 (half module)
Withdrawable unts sizes (multiple of 152 mm)	1-2-3-4
Segregation form	From 4 type B
Access and Installation	From the front/Against wall or back to back
Cable entrance	Bottom or top

Motor Control Center

> General

Norr Systems Korea's MCC is a modular system with withdrawable units for powering, controlling and protecting low-voltage motors, Thanks to its versatility, it can easily be adapted to suit any plant configuration, eletrical layout or installation site. All the operations involved in the insertion and removal of the withdrawable units can be carried out from the front, with no risk of coming into contact with any live parts.

Electrical Characterist

Rated insulation voltage		1000V
Rated operating volatage		400V - 690V
Rated frequency	main busbars	50/60Hz
Rated current	distribution busbars	≦4000A
		630A
Rated short-time withstand current for 1sec. (Icw)		Up to 100kA
Rated peak withstand current (Ipk)		Up to 220kA
Degree of Protection (according to EN60529)	external enclosure	IP31/IP42
	with open door	IP2X/IP4X
Segregation form		From 4 type B
Maximum nember of modules for section		12 (24)
Standard color of external enclosure		RAL7032 and other colors on request
Access		from the front
Entry and exit of cables		from top or bottom

Power Management System

> General

Norr Systems Korea's PMS is and advanced system for full automation of the power plant : including generator control, power management, generator protection and engine safety system

The PMS is built-up with two modules for each generator set:GDP(GCE Display Panel) and GCE(Generator Control Equipment).

Gce Display Panel (GDP)

The GDP unit (which is flush panel mounted in each generator section) has the layout according the drawing below.

Note that in the drawing you can find the function of the two 4 digit digital display, function of the push buttons and function of the LED status indicators. The GDP is identical for all generators and no specific hardware setting is required.

Note that the PMS configuration (parameter setting) is done via this panel by switching the mode switch to push and enter the password.

> Display of

- Generator voltage, frequency and power
- Genarator R, S and T-pahse current
- Busbar total net power, used power and available

> Power

- Generator status
- Generators alarm
- CB status
- Stanby selection indication
- Busbar abnormal status
- Load status (Heavy/Light Load)
- parameter index and set values

Generator Control Equipment (GCE)

The GCE of each generator is connected to the GCE of the other generators via a redundant Field-bus connection. The Field-bus is based upon the ARC-net bus standard. I/O signals from Bus Bar, generator, engine and breaker are directly connected to GCE.

> Specification

- High speed 32-bit CPU
- Generator current input
- Generator voltage input
- Busbar voltage input
- Digital inputs
- Digital outputs
- Aux. I/O signals

ARCNet communications (Redanduncy)

Serial communications (RS-422, RS-232)

Dynamic Positioning System

> General

Dynamic Positioning is on integration of a numver of shipboard systems in order to obtain accurate maneuverability and station keeping. It is an automatic system which automatically controls a vessel's position and heading exclusively by means of active thrust with respect to the inputs provided by the reference sensors.

Dynamic Positioning System, with the benefits of continuos technological advancement has proven highly successful in both the workboat and offshore markets.

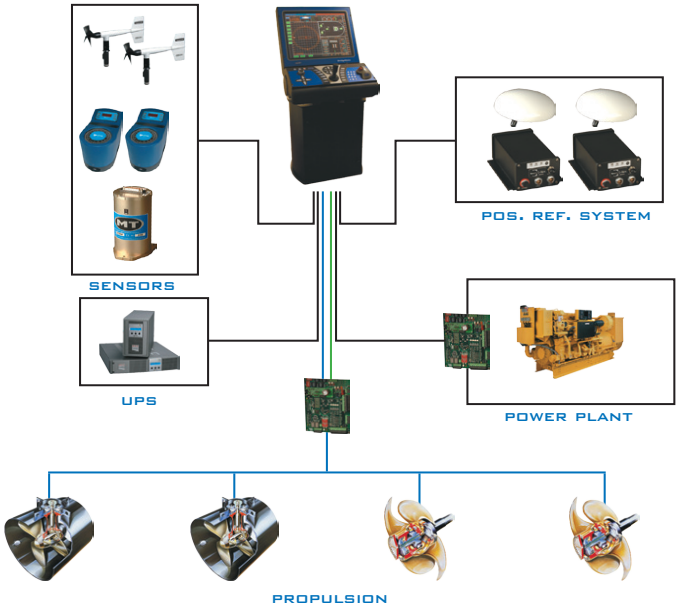
> Features

- DP algorithms based on prven PID Controller/ Feedback technology and ship's model with built -in Kalman filter
- The platform for the software is a LINUX Operating System
- The program is written is the JAVA-PC software code
- User Graphics Interface designed with simple touch sceen operability
- The system uses a TCP/UDP/IP interfaced client/ server network for continuous rapid communications between the server and the clients
- The TCP/IP further allows for remote telnet access for remote diagnistics
- Optional feature to telnet is the Cellular or Satellite phone system that allow programmers to view the software poeration remotely when authorizedt

Class1

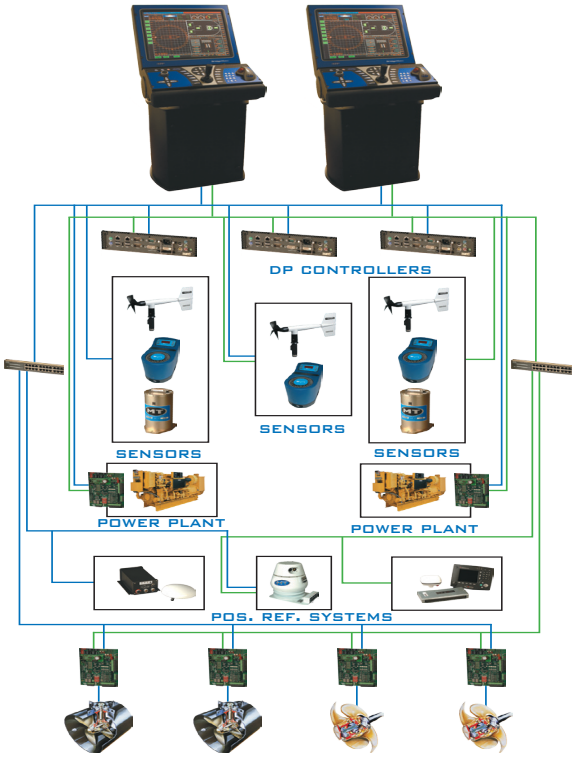
A single-computer system or 'simplex' DP

Control system provides no redundancy



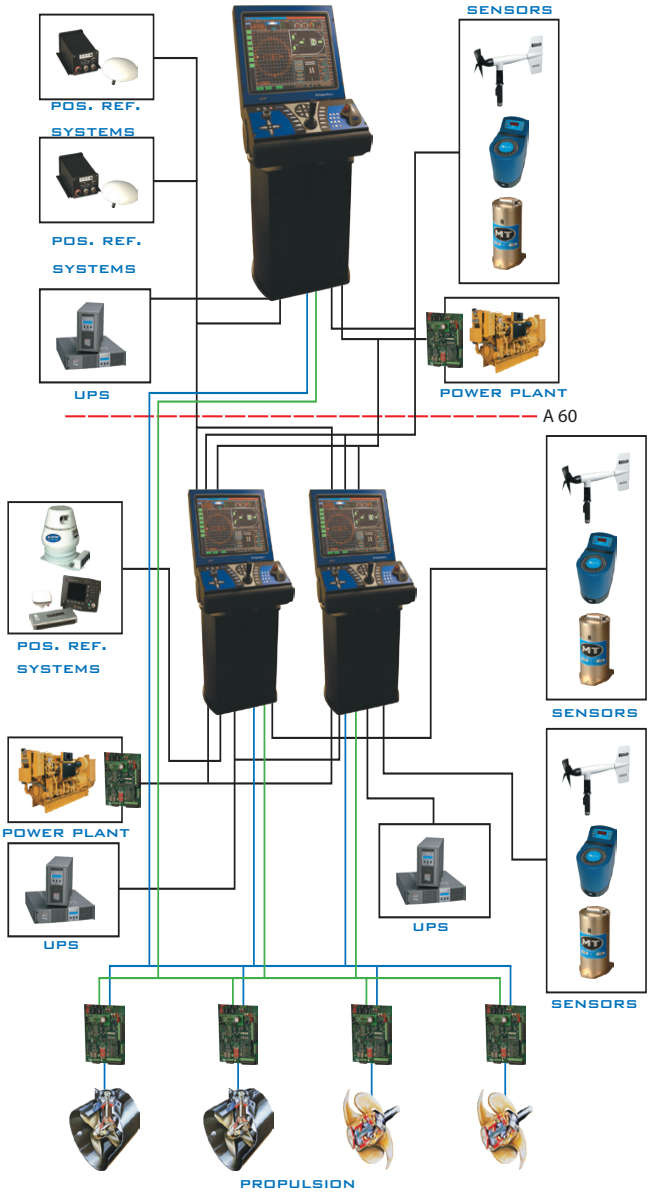
Class2

A dual or two-computer system provides redundancy and auto-changerover if the online system fails



Class3

A triple or 'triplex' system provides an extra element of security and an opportunity for 2-out-of-3 voting. The level of redundancy depends on the equipment class selected by the vessel



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