

General Specifications

PT70 Series Autopilot

General

PT70 series autopilot conform to the technical requirements for performance standard of IMO Resolution. Steering gear, to be operated with of PT70 Auto pilot, is solenoid valve (s) control type.

PT70 has 2 Panel mounting styles type and Stand type and able to comprise with various units specified herein,

PT70 series AUTOPILOT is applicable to the vessels less than 10,000 gross tons or the small high speed vessels, waterjet etc.

- (1) Integralities the Autopilot system interface and solenoid valve control circuit into the distribution unit contributed saving total space of Autopilot system.
- (2) Each units are selectable in accordance with the specification requirements of the ship and easier to design the system configuration.
- (3) Individual function divided in each unit is excellent in system development and maintenance of system function. The panel mounting or integration to cockpit console bridge are easily made.
- (4) There are two heading input circuit, you can input the heading sensor of magnetic compass etc. other than Gyrocompass. Thus, you can have back-up heading sensor.
- (5) You can freely generate a heading signal from a heading sensor, such as a gyro compass or magnetic compass, as well as a digital signal from ECDIS etc. according to the particular format.
- (6) 3 modes of course change control during Auto steering are available.
 - PD control
 - Turn Rate constant control
 - Fixed radius course change control
- (7) You can easily expend the system adding will following options.

o Basic system

- ① DISTRIBUTION UNIT (MPC145)
- ② AUTOSTEERING UNIT (MPB351)
- ③ SWITCH UNIT (SYSTEM switch) (MPH732)
- ④ μ TRANSMITTER (MPT132 / 133)
- ⑤ SWITCH UNIT (MODE switch) (MPH731)

o Options

- ① AC ADAPTER (Option) (MPC146)
- ② ANNUNCIATOR UNIT (Option) (MPH617)
- ③ NFU SWITCH UNIT (Option) (MPB352)
- ④ OVERRIDE UNIT (Option) (MPB353)
- ⑤ HAND STEERING UNIT (Option) (MPB354)
- ⑥ DIAL STEERING UNIT (Option) (PT161)
- ⑦ DIGITAL REMOTE CONTROLLER (Option) (PT162)

Panel type (PT70 Basic system)

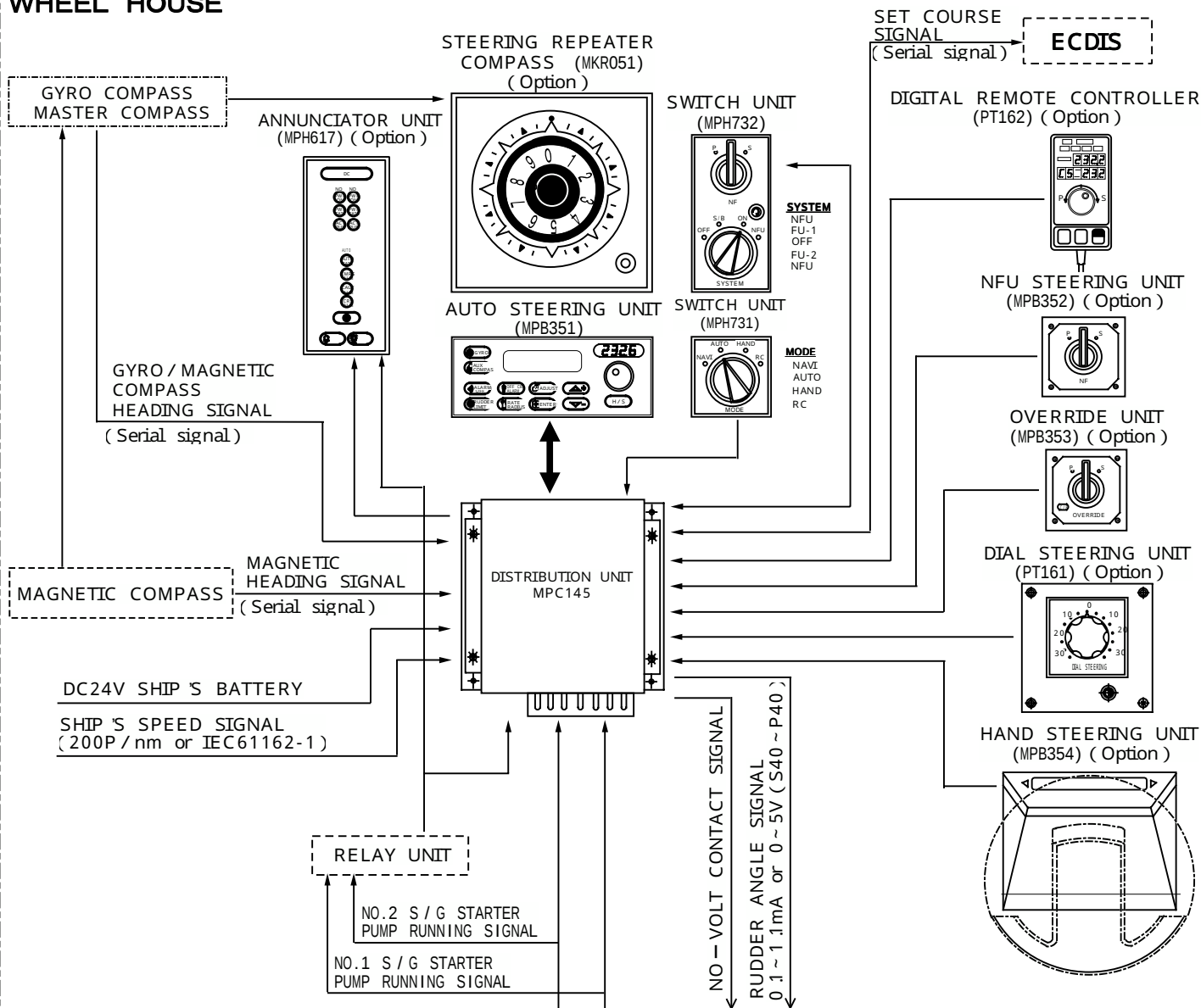


Stand type (PT70 stand type)

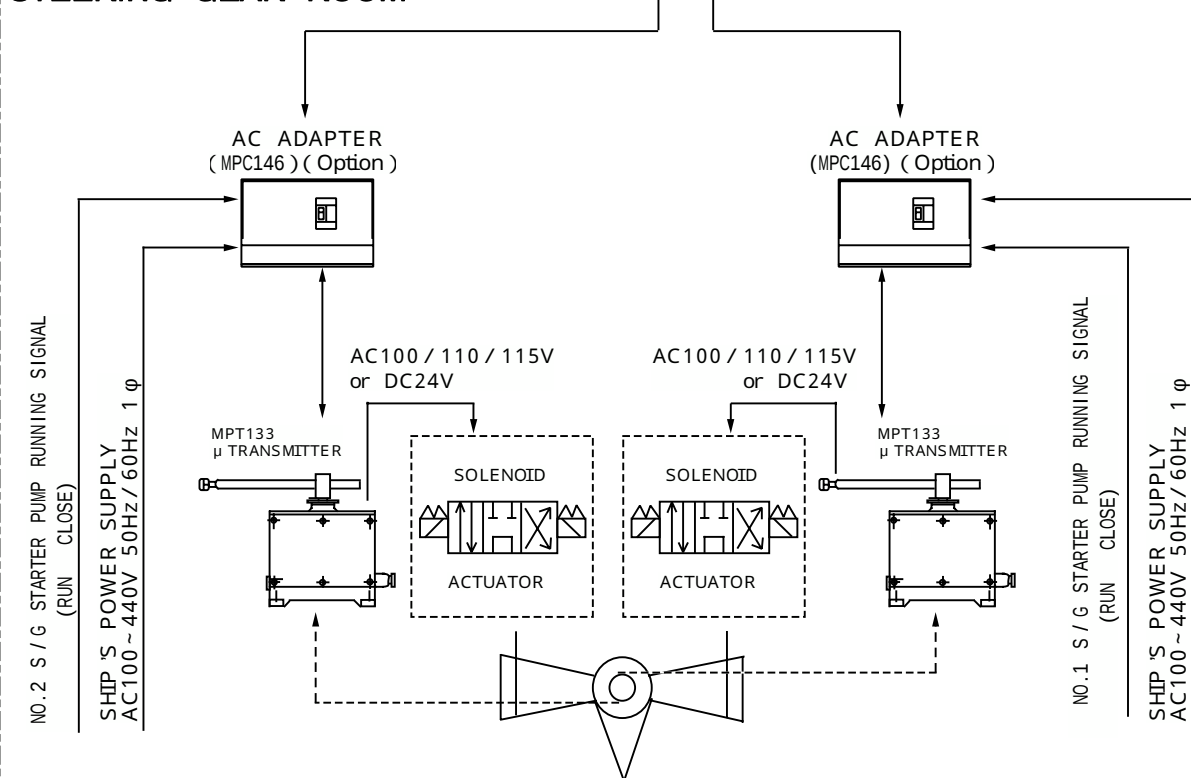


■ Block Diagram (Panel type)

WHEEL HOUSE

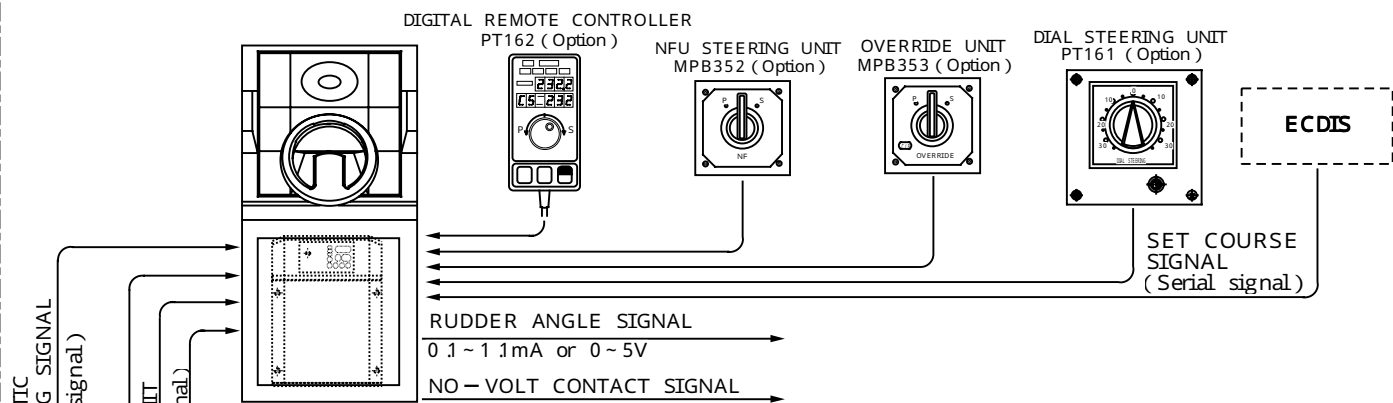


STEERING GEAR ROOM

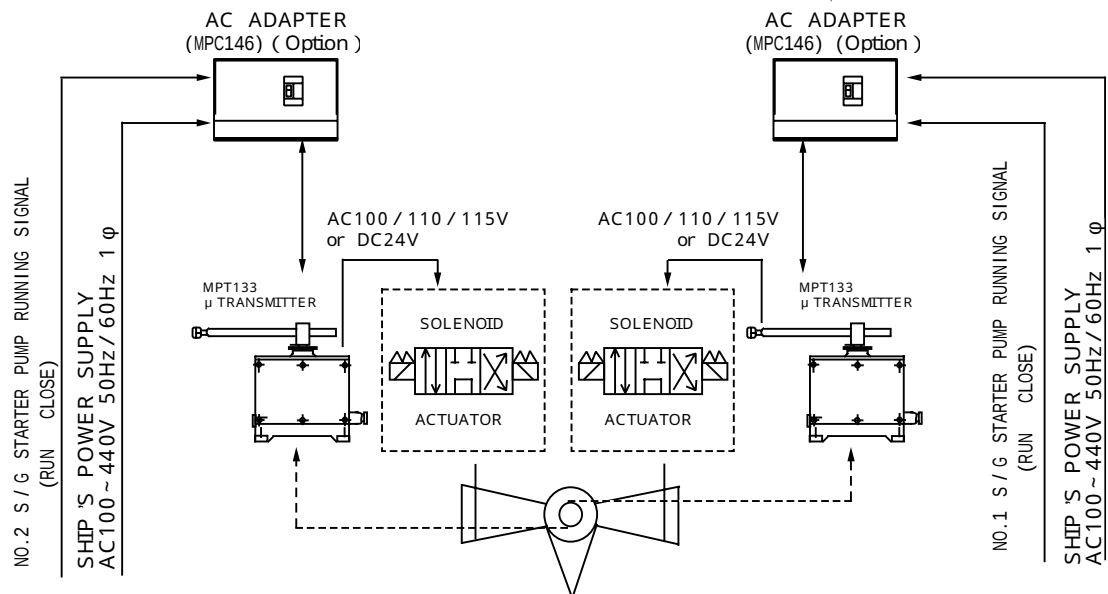
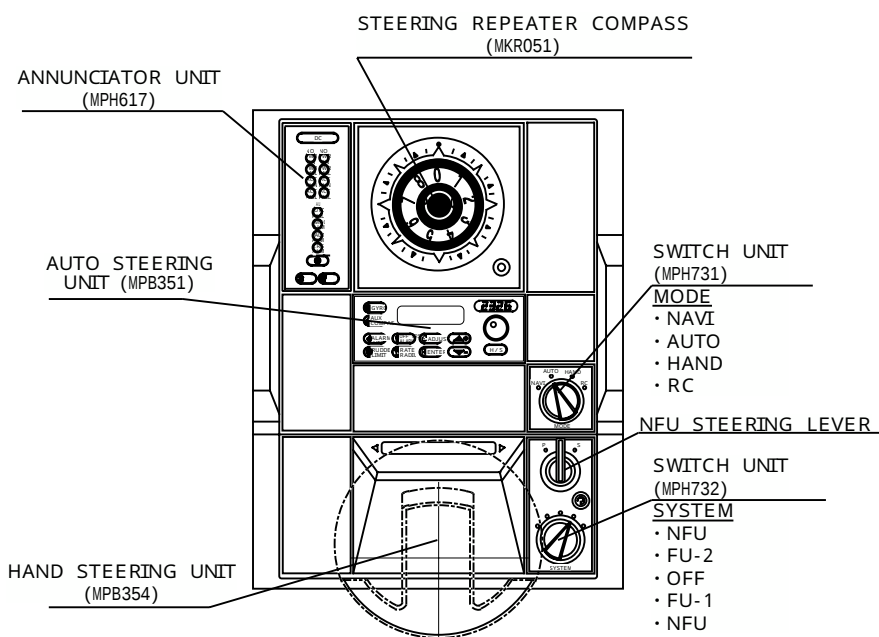


■ Block Diagram (Stand type)

WHEEL HOUSE



CONTROL STAND UPPER PANEL



STEERING GEAR ROOM

Engineering specification

□ Power

Main power : DC24V

When AC adapter (Option) is connected Additionally

AC100 / 115 / 110 / 220 / 380 / 440V $\pm$ 20 %

50 / 60Hz $\pm$ 5 % 1 ϕ

Power consumption : DD24V Max.3A

(System operating state)

□ Input signal

(1) Speed signal : PT70 $\rightarrow$ for adaptive control

o Pulse signal : 200 pulse/n mile

• Output circuit on the speed log :

Open collector (e.g., photo coupler) or contact

• Impressed voltage : DC5V

• Current value : 2mA (at ON)

o Serial signal : Conformance IEC61162 - 1

(Input signal format can be generated by auto steering unit)

• Transmission : Asynchronous serial data signal

• Baud rate : 1200 / 2400 / 4800 / 9600bps

• Output interval : 100ms~20s

(setting interval : 100ms)

• Data form : Start bit 1bit

Data bit 7/8bit

Stop bit 1/2bit

Parity none / odd / even

• Header character : 5 ASCII letter

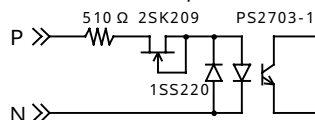
For example) VD VBW、VM VHW

• Position of speed data : Set data based on the location of commas.

• Checksum : use / unuse

• Terminator : CR LF

• Input circuit : Photo coupler



(2) Gyrocompass & Magnetic compass heading signal

o Serial signal : Conformance IEC61162 - 1

(Input signal format can be generated by auto steering unit)

• Transmission : Asynchronous serial data signal

• Baud rate : 1200 / 2400 / 4800 / 9600bps

• Output interval : 100ms~20s

(setting interval : 100ms)

• Data form : Start bit 1bit

Data bit 7/8bit

Stop bit 1/2bit

Parity none / odd / even

• Header character : 5 ASCII letter

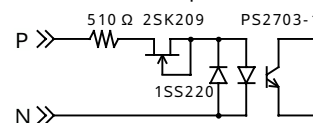
For example) HE HDT HC HDG

• Position of heading data : Set data based on the location of commas.

• Checksum : use / unuse

• Terminator : CR LF

• Input circuit : Photo coupler



(3) External set course signal (for the route tracking control)

o Serial signal : Conformance IEC61162 - 1

(Input signal format can be generated by auto steering unit)

• Device to be connected : ECDIS, INS etc.

• Transmission : Asynchronous serial data signal

• Baud rate : 1200 / 2400 / 4800 / 9600bps

• Output interval : 100ms~20s

(setting interval : 100ms)

• Data form : Start bit 1bit

Data bit 7/8bit

Stop bit 1/2bit

Parity none / odd / even

• Header character : 5 ASCII letter

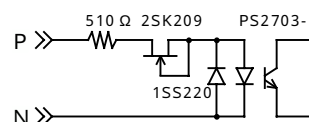
For example) EC HDT、EC APB

• Position of set course data : Set data based on the location of commas.

• Checksum : use / unuse

• Terminator : CR LF

• Input circuit : Photo coupler



(4) External steering device input signal

This interface can be used when connecting ECDIS or JOYSTIC steering device.(Command rudder angle signal is used with the voltage signal.)

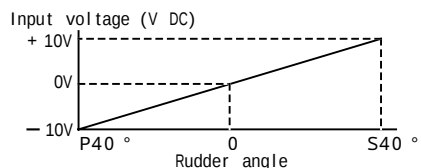
- o Contact signal for the external steering device selection

Select the external steering device $\Rightarrow$ close

Impressed voltage DC24V

- o Command rudder angle signal from the external steering device

$\pm 10V / 40^\circ$ ($\pm 0.25V / ^\circ$ (+ : S, - : P))



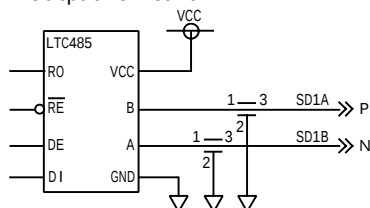
□ Output signal

(1) Serial signal : Conformance IEC61162 - 1

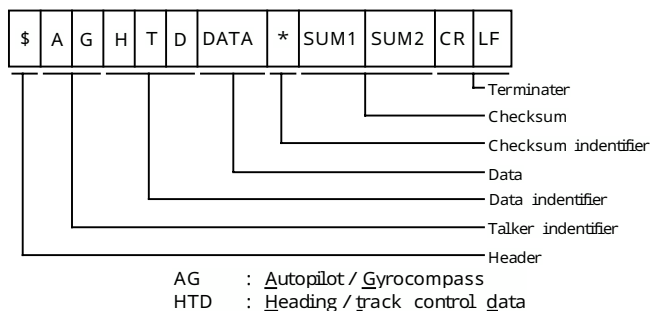
- Device to be connected : ECDIS、INS
- Transmission : Asynchronous serial data signal
- Baud rate : 1200 / 2400 / 4800 / 9600bps
- Output signal : 1s
- Data form : Start bit 1bit
Data bit 7/8bit
Stop bit 1/2bit
Parity none / odd / even

Note : Specification of mark * agree specification selected about ECDIS / INS input port.

• Output circuit



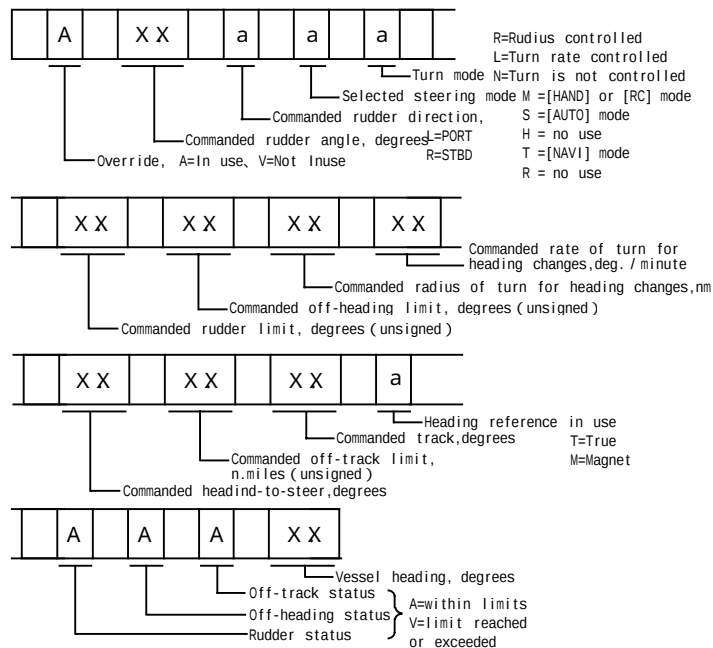
• Data format (Conformance IEC61162 - 1)



• Checksum :

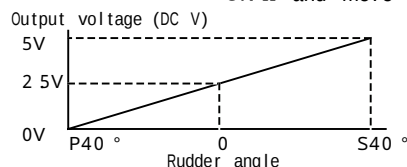
Checksum is the 8-bit exclusive-OR (no start or stop bits) of all characters in the sentence, including “,” delimiters, between but not including the “\$” and the “*” delimiters.

• Data block format



(2) Analog rudder angle signal

- Device to be connected : Course recorder
- Signal level : DC 0V~5V (Resistance load : 5k Ω and more then 5k Ω)



- Ripple level : 50mV $V_p - p$
- Accuracy of output voltage : $\pm 0.5\%$ F. S.

(3) Off-course alarm contact signal

- Contact signal : When alarm occurred, the contact is closed.

Note : If equipped with ANNUNCIATOR UNIT (MPH617), this contact signal can not be output to outside.

(4) No-voltage alarm contact signal

- Contact signal : At no-voltage, contact is open.(standard)

- Contact rating : AC125V、1A

(5) System failure alarm contact signal

- Contact signal : At the system failure, contact is close.

- Contact rating : AC125V、1A

Performance specification

- Power consumption : DC24V Max.3A
- Insulation resistance : At least 100M Ω using a DC500V megger.(excluding electronic circuit)
- Withstanding voltage : AC2500V for 1min.
(excluding electronic circuit)
- Temperature rise : 15°C (inside the stand)
- Steering angle output precision : Within $\pm 1.0^\circ$

Environmental conditions (Normal use)

- Power supply voltage :
DC18V~DC32V (DC24V Standard)
AC100V、110V、115V $\pm 10\%$
- Power supply frequency : 50Hz / 60Hz $\pm 5\%$
- Temperature : 0~55°C
- Humidity : 0~95% RH55°C
- Vibration : 2. 0~13. 2Hz amplitude 2mm
13. 2~80. 0Hz acceleration 6. 9m/s
- Shock : 6direction、20G、10ms
- Withstanding water : IP44
- Inclination : With roll, pitch Below $\pm 40^\circ$
- Swaying : With roll, pitch Below $\pm 22. 5^\circ$
- Noise : Static electricity noise Below 8kV
Radiation electromagnetic field
f=27MHz~500MHz
Electrolysis strength 10V/m
Pulse noise power supply 2kV
Signal 1kV

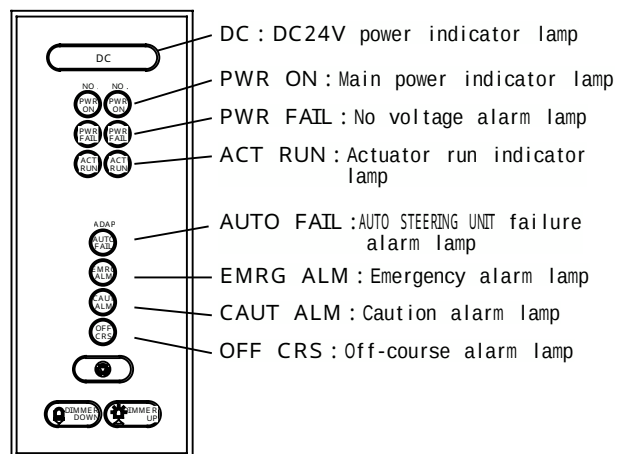
Alarms

PT70 autopilot provide with lots of monitoring function in order to steering safety.

Many functions are output of the Annunciator unit (MPH617) (option). These warnings are visible and audible warning.

o ANNUNCIATOR UNIT (MPH617)(Option)

Case of the error was occurred, the alarm below, "ALARM" key blinks at 1 sec. interval, and the alarm factor are displayed in order of alarm occurrence on the data display.



Emergency alarm	Error code
• CPU error	01
• Memory RAM error	02
• Memory ROM error	03
• AUTO OUTPUT error	04
• Gyrocompass input error	05
• Auxiliary compass input error	06
• Servo loop failure alarm	07 ~ 08
• Steering Mode switch error	09
Caution alarm	Error code
• Navigate data input error	01
• Each of selector switch error	02 ~ 08
• Off-course alarm	09
• Course deviation alarm	10
• S / G pump all rest error	11
• Back-up RAM battery error	12
• Speed input error	13
• Program start	14
• Remote controller error	15
• Program restart	16

Type and code

□ PT70 component models

PT70 - □ - □ □ (TWIN RUDDER)

- Twin rudder steering system
- Type of steering gear control
 - N1 : Direct activation of solenoid valves on steering gear pump unit.(1 system)
 - N2 : Direct activation of solenoid valves on steering gear pump unit.(2 systems)
- Style of control stand
 - S : Stand type
 - H : Stand type (built-in Gyro master compass)
 - P : Panel mounting type

Terminal number and contents

