

General Specifications

PT500 Series Autopilot

General

The PT500 Series autopilot conforms to the technical requirements for the performance standard determined by IMO resolution A342 and meet type approval issued by Class NK (Approval No. KF96EQ-001)

It is available in two versions. The PT500A – Adaptive and the PT500D – Digital Autopilot, which differ in the respect of the method of auto steering. You can freely select a suitable model and configure the optimum system for the type of vessel concerned.

Features

The Steering Stand design is suitable for standing or sitting positions based on the ergonomic principles of height (1124mm).

A separate unit is used for each purpose allowing for excellent functional expandability and operability. However, all components within the stand can easily be incorporated into a panel and cockpit bridge console due to their compact design which is about 80% smaller when compared with our previous models.

In addition to the independent follow-up circuit, the automatic and hand steering control systems are also independent of each other.

A course setting dial (25 °/r) has been incorporated along with its associated set course indicator utilizing high intensity red LED Displays.

The function keys are easy to use and understand with pictorial characters for every function to help reduce the possibility of an incorrect/accidental command.

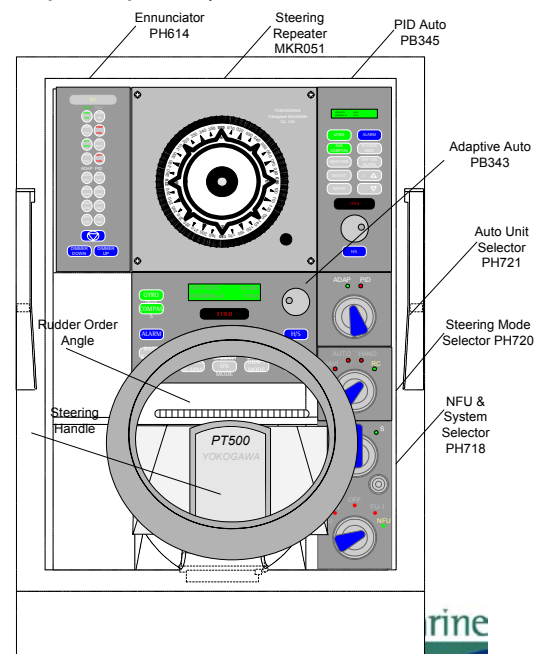
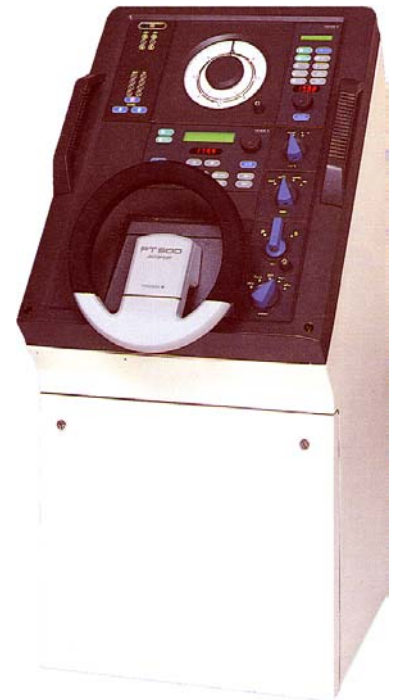
In addition, we have provided two heading input circuits. Thus by allowing a secondary heading signal from an external magnetic compass or DGPS. This provides a back up to the heading signal generated by the Gyrocompass. The PT500 can also track and route information feed from either a DGPS, INS or ECDIS System

The PT500 includes three different modes of the course keeping for automatic steering,

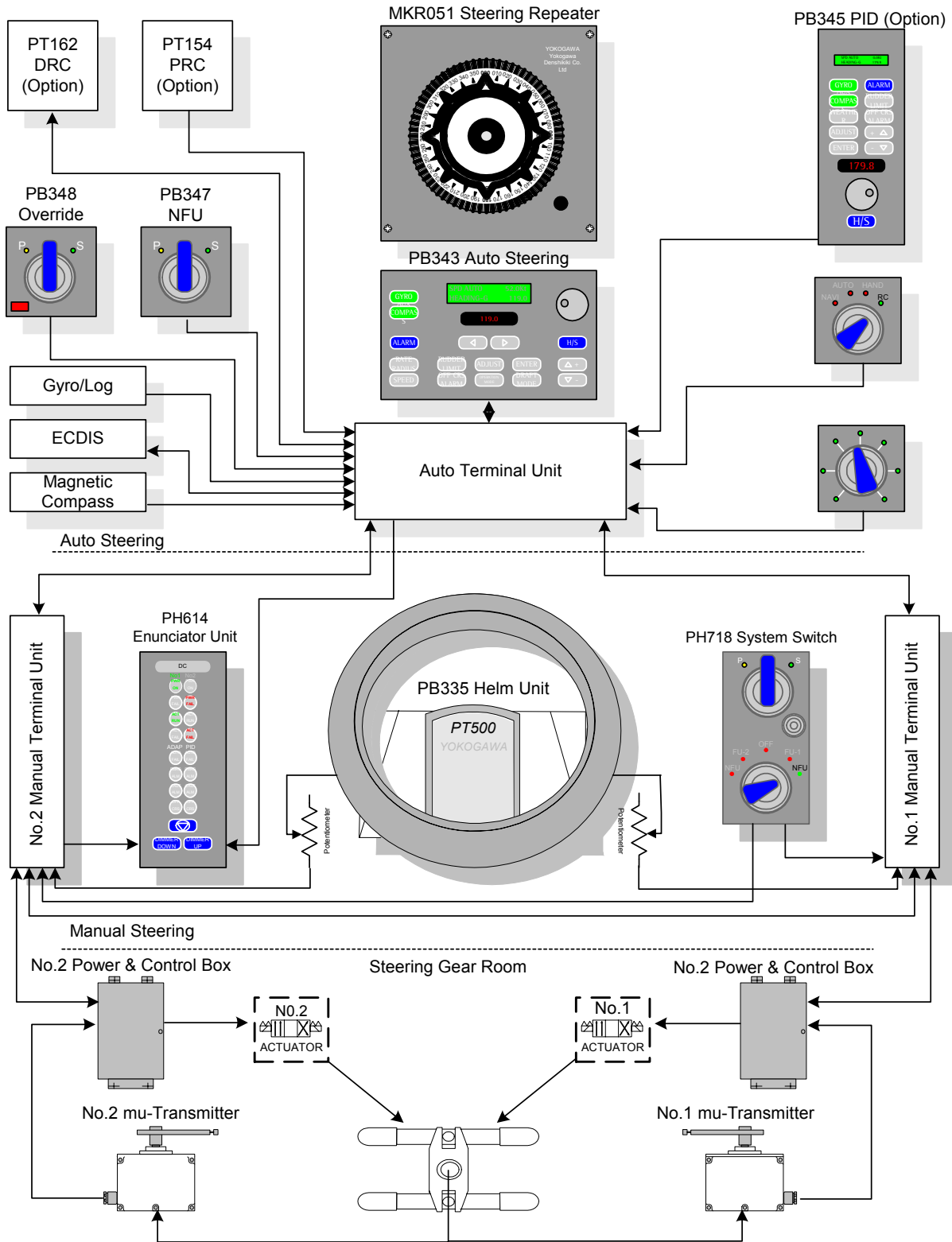
- PID Control
- Rate Constant Control
- Fixed radius course altering control

Various optional units include

- Upright type PID Control unit PB345
- NFU Steering Unit PH727
- Dial Steering Unit PT161
- Portable Remote Unit PT154
- Override Unit PH725
- Digital Remote Controller PT162



BLOCK DIAGRAM



Engineering Specification

Power

Main Power: 220/380/440AC +/-20% 50/60Hz +/- 1 or 3 Phase 700 VA

Enunciator: 24VDC

Input Signal

Speed Signal PT500A for Adaptive Control & PT500D for the lower speed band control (optional).

Pulse signal: 200PPNM

Output Circuit: Photo Coupler 5VDC @ 2mA.

Gyrocompass Heading Signal.

Serial Signal: NMEA0183 Transmission: ASYNC Serial Data

Baud Rate: 1200/2400/4800/9600

Output Interval: 100ms ~ 20s (100ms Interval)

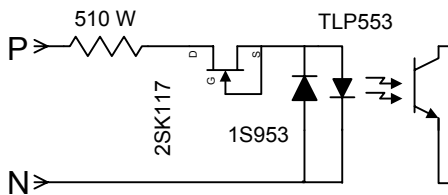
Data Format: Start 1 bit, Data 7/8 bits, Stop 1/2 bits, Parity none/odd/even

Header: 5 ACSII Letter

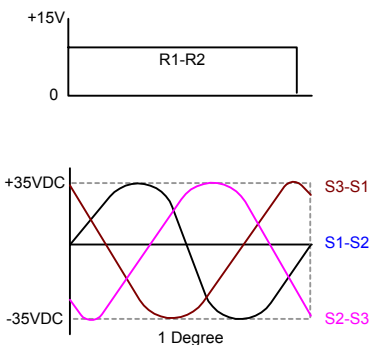
Position data: Set data based on the location of commas.

Checksum: Yes or No

Input Circuit: Photo Coupler



360X DC Synchro Drive for Steering Repeater (Optional)



External heading signal for back up at auto steering unit.

Serial Signal: NMEA0183

External Devices: DGPS, Magnetic Compass or Second Gyrocompass

Transmission: ASYNC Serial Data

Baud Rate: 1200/2400/4800/9600

Output Interval: 100ms ~ 20s (100ms Interval)

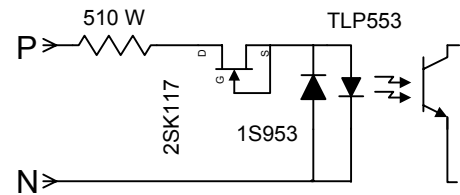
Data Form: Start 1 bit, Data 7/8 bits, Stop 1/2 bits, Parity none/odd/even

Header: 5 ACSII Letter

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

Checksum: Yes/No

Input Circuit: Photo Coupler



External set course signal for route tracking

Serial Signal: NMEA0183

External Devices: GPS, INS, ECDIS

Transmission: ASYNC Serial Data

Baud Rate: 1200/2400/4800/9600

Output Interval: 100ms ~ 20s (100ms Interval)

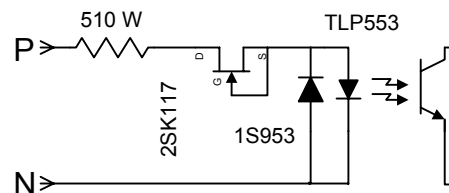
Data Format: Start 1 bit, Data 7/8 bits, Stop 1/2 bits, Parity none/odd/even

Header: 5 ACSII Letter

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

Checksum: Yes/No

Input Circuit: Photo Coupler



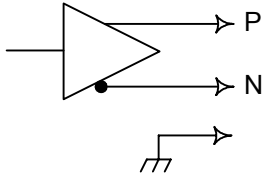
Buzzer Stop Contact Signal

Contact Signal when the buzzer is stopped, contact is closed

Output Signal

Course deviation/rudder angle/rate of turn steering mode signal

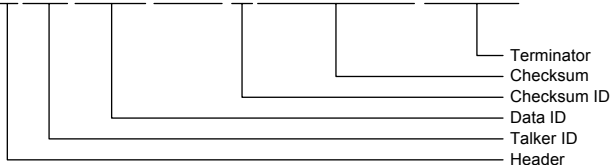
- Serial Signal: NMEA0183
- External Devices: INS, ECDIS
- Transmission: ASYNC Serial Data
- Baud Rate: 2400/4800
- Output Interval: 1 Second
- Data Form: Start 1 bit, Data 8 bit, Stop 2 bits, Parity none
- Output Circuit: EIA RS422A



Data Format: NMEA 0183

1 2 3 4 5 6 DATA 28 29 30 31 32

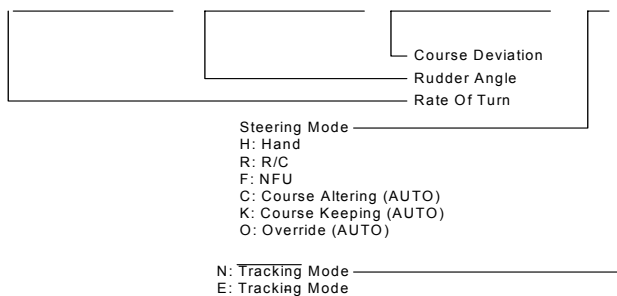
\$	A	G	D	R	R	DATA	*	SUM1	SUM2	CR	LF
----	---	---	---	---	---	------	---	------	------	----	----



Checksum: Checksum is the exclusive - OR between "\$" and before the "*" / The hex value of the result are converted to ASCII characters.

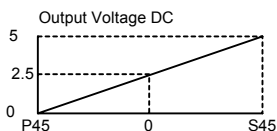
7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27

,	P/S	10 ¹	10 ⁰	,	10 ⁻¹	,	P/S	10 ¹	10 ⁰	,	10 ⁻¹	,	P/S	10 ¹	10 ⁰	,	10 ⁻¹	,	X	X
---	-----	-----------------	-----------------	---	------------------	---	-----	-----------------	-----------------	---	------------------	---	-----	-----------------	-----------------	---	------------------	---	---	---



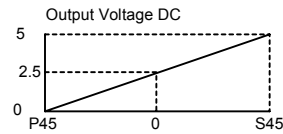
Analog rudder angle signal

- External Device: Courser Recorder
- Signal Level: 0 ~5VDC Resistance load5K



Analog course Deviation Signal

Signal Level: 0 ~5VDC Resistance load5K



- Ripple Level: 5mVpp
- Accuracy of output voltage +/- 5%

Buzzer Stop Signal

Contact Signal when the buzzer is stopped, contact is closed

No Voltage Alarm Contact Signal

Contact Signal when the power is on, contact is closed

Contact Rating 125VAC @ 1Amp

System Failure Alarm Contact Signal

Contact Signal when the is failure, contact is closed

Contact Rating 125VAC @ 1Amp

Performance Specification

- Accuracy of course keeping: < +/- 1°
- Overshoot: < +/- 2°
- Withstanding Voltage: 1500VAC for 1 Minute
- Insulation resistance: > 100hms (500V Megger)
- Power Value: >500VA

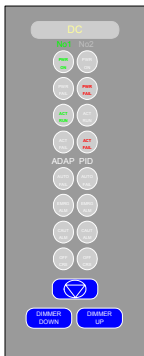
Environmental Conditions

Power Fluctuation

- Voltage: +/- 10%
- Frequency: +/- 5%
- Ship Battery: 20~30VDC
- Temperature: 0~55°C
- Humidity: 0~95% RH
- Vibration: 2.0~13.2Hz @ 2mm
13.2~100Hz @0.75
- Shock: 6 Direction, 20G, 10 mseconds
- Inclination: +/- 22.5°
- Swaying: +/- 22.5°
- With standing water: IP55 (Front Panel)

Alarm

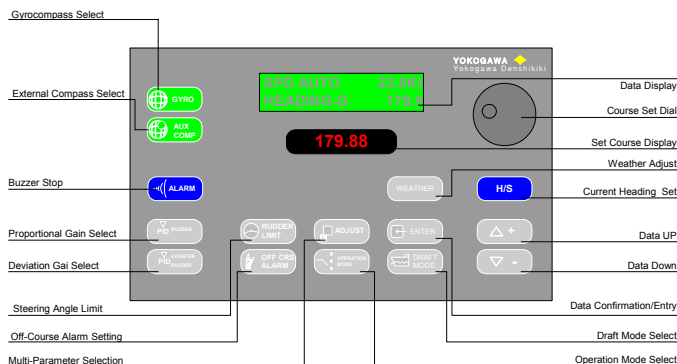
PT500 SERIES AUTOPILOT PROVIDE WITH LOTS OF MOUNTING FUNCTION TO ENSURE STEERING SAFETY



Case of error occurs when the alarm below "ALARM key blinks at 1 Second interval, and the alarm factors 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
External Compass input Error	06
Servo Loop Failure Alarm	07~10
Internal Interface Error	11, 12
Caution Alarm	Error Code
External Interface Error	01
Each of selector switch Error	01~07
Course Setting dial Error	08
Off-Course Alarm	15
Course Deviation alarm	16
Control & Power Box all rest error	17
Back-up RAM Battery Error	18
Program Start	12

Example of Alarm Display



Type and Code

➤ PT500D Component Models

PT500-- __ -- ____ (Twin Rudder)

Twin Rudder Design

Type of steering gear control:

N2:	Direct Activation of solenoid valves on steering unit duplicated.
N2F:	Direct Activation of solenoid valves on steering gear pump unit made by MITSUBISHI duplicated
J2:	Hydraulic Power Unit for Mitsubishi Janney steering gear duplicated
H2:	Hydraulic Power unit duplicated
K2T:	Continues control steering gear (2 pumps) made by Kawasaki Heavy Industries duplicated
K3T:	Continues control steering gear (3 pumps) made by Kawasaki Heavy Industries duplicated
Y2:	Torque motor control steering gear (2 pumps) made by Kawasaki Heavy Industries duplicated
Y3:	Torque motor control steering gear (3 pumps) made by Kawasaki Heavy Industries duplicated
S2:	DD Motor control steering gear (2 pumps) made by Hitachi Zosen Corp duplicated
S3:	DD Motor control steering gear (3 pumps) made by Hitachi Zosen Corp duplicated
T2:	Continuous control steering gear (2 pumps) made by Samsung Hatrapa duplicated
Style of Control Stand	
S: Stand Type	
H: Stand Type with built in CMZ700S Gyrocompass	
P: Panel/Console Mount	

Control Stand

Type	Code	Remarks
PM208	-----	Digital
Type of steering unit	-N2N -- -N2FN -- -J2N -- -H2N -- -K2TN -- -K3TN -- -Y2N -- -Y3N -- -S2N -- -S3N -- -T2N -- -Z_ --	N2 N2F J2 H2 K2T K3T Y2 Y3 S2 S3 T2 Z
Stand Style	-1 ---- -2 ----	Stand w/ CMZ700 Stand w/o
Steering Mode	S ---- 1 ---- 2 ---- 3 ---- Z ----	AUTO/HAND AUTO/HAND/RC NAVI/AUTO/HAND NAVI/AUTO/HAND/RC Custom
Steering Angle	1 ---- 2 ---- 3 ---- Z ----	+/- 35° +/- 40° to +/- 45° +/- 35° to +/- 70°
Name Plate	E ---- 1 ---- Z ----	English English & Japanese
Option	/BAU /ABU /RR1 /2RS /RFA /ST9 /MIC /DIA /Z	Additional auto unit PB345 AC Back-Up for Alarm Analog Output for RA Twin Rudder Rudder Fail Alarm Stepper Distribution Panel Dial Steering Unit

➤ PT500A Component Models

PT500-- -- -- (Twin Rudder)

Twin Rudder Design

Type of steering gear control:

N2:	Direct Activation of solenoid valves on steering unit duplicated.
N2F:	Direct Activation of solenoid valves on steering gear pump unit made by MITSUBISHI duplicated
J2:	Hydraulic Power Unit for Mitsubishi Janney steering gear duplicated
H2:	Hydraulic Power unit duplicated
K2T:	Continues control steering gear (2 pumps) made by Kawasaki Heavy Industries duplicated
K3T:	Continues control steering gear (3 pumps) made by Kawasaki Heavy Industries duplicated
Y2:	Torque motor control steering gear (2 pumps) made by Kawasaki Heavy Industries duplicated
Y3:	Torque motor control steering gear (3 pumps) made by Kawasaki Heavy Industries duplicated
S2:	DD Motor control steering gear (2 pumps) made by Hitachi Zosen Corp duplicated
S3:	DD Motor control steering gear (3 pumps) made by Hitachi Zosen Corp duplicated
T2:	Continuous control steering gear (2 pumps) made by Samsung Hatrapa duplicated

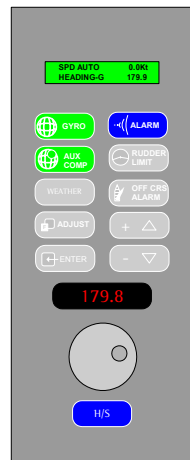
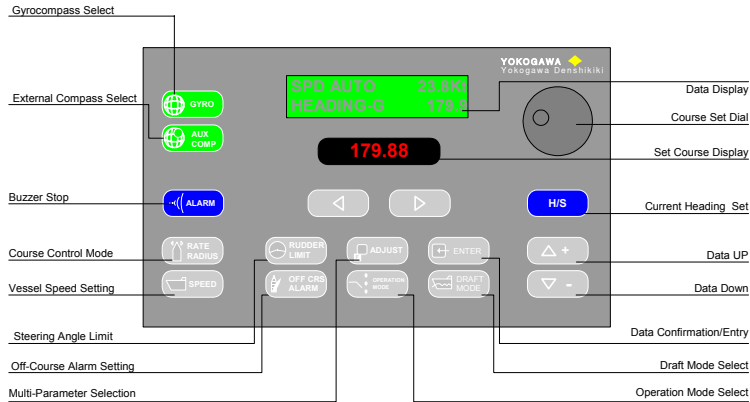
Style of Control Stand

S: Stand Type

H: Stand Type with built in CMZ700S Gyrocompass

P: Panel/Console Mount

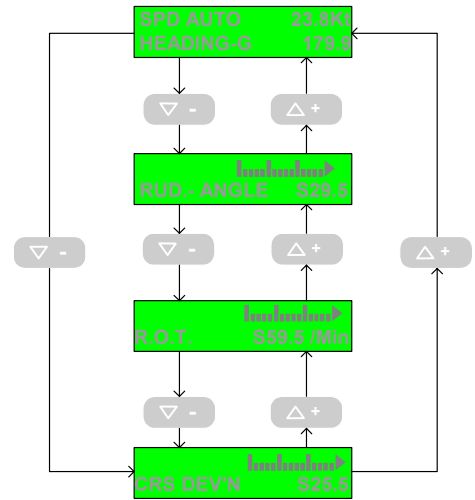
PB343 Adaptive Unit



Control Stand

Type	Code	Remarks
PM208	-----	Adaptive
Type of steering unit	-N2N --- -N2FN --- -J2N --- -H2N --- -K2TN --- -K3TN --- -Y2N --- -Y3N --- -S2N --- -S3N --- -T2N --- -Z ---	N2 N2F J2 H2 K2T K3T Y2 Y3 S2 S3 T2 Z
Stand Style	-1 ----- -2 -----	Stand w/ CMZ700 Stand w/o
Steering Mode	S ----- 1 ----- 2 ----- 3 ----- Z -----	AUTO/HAND AUTO/HAND/RC NAVI/AUTO/HAND NAVI/AUTO/HAND/RC Custom
Steering Angle	1 ----- 2 ----- 3 ----- Z -----	+/- 35° +/- 40° to +/- 45° +/- 35° to +/- 70°
Name Plate	E ----- 1 ----- Z -----	English English & Japanese
Option	/BAU /ABU /RR1 /2RS /RFA /ST9 /MIC /DIA /Z	Additional auto unit PB345 AC Back-Up for Alarm Analog Output for RA Twin Rudder Rudder Fail Alarm Stepper Distribution Panel Dial Steering Unit

Normal Indication



Rudder Limit



Dimensions

Control Stand

Mass: 90 kg

105 kg w/ built in Gyrocompass

