

# General Specifications

CMZ900 series

GS 80B10M15E 1<sup>st</sup>

CMZ900B  
GYROCOMPASS

## General

A gyrocompass detects the true north by means of a fast-spinning rotor, which is suspended with no friction and is influenced by gravity and rotation of the Earth. A gyrocompass consequently indicates a ship's heading.

CMZ900 series has been type approved in accordance with International Maritime Organization (IMO) standards, resolution A.424 (XI) as well as JIS-F9602, class A standards.

- RESOLUTION A.424(XI)

PERFORMANCE STANDARDS FOR GYRO-COMPASSES

## Certificate number of type approval

- JG: Under application (Gyrocompass CMZ900)

No. 4309 (Repeater compass MKR050)

- MED: Under application

- CCS: Scheduled

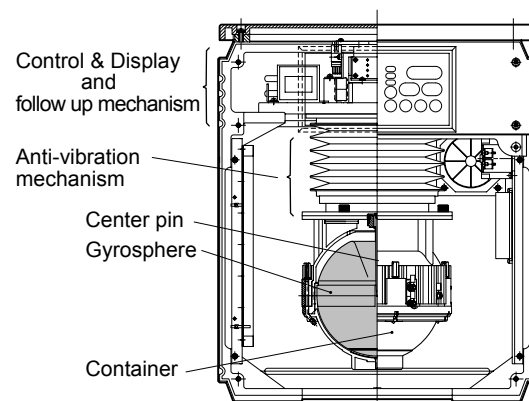
## Features

- 1) A modular design saves the space. Master compass can be integrated in the autopilot steering stand.
- 2) Manual speed error correction
- 3) External heading sensor can back up the heading outputs.
- 4) Serial data output IEC 61162-2 (high-speed transmission)
- 5) A unique anti-vibration mechanism enhanced by the velocity damping effect of high viscous oil, provides superior damping of vibration and decoupling of shock at sea.
- 6) A small and lightweight container enhances the follow up speed. The gyrocompass reading changes smoothly and does not lag when a small ship rapidly changes course.
- 7) Easy maintenance and long maintenance periods
  - Titanium capsule and electrodes are employed at lower hemisphere of Gyrosphere. Purity is maintained inside of the container, and maintenance interval is then longer-dated.
  - The container is divided into two pieces at bottom when overhauled. Ship's crew can replace Gyrosphere in case of emergency.
- 8) The restart time can be preset from 1 to 99 hours.



CMZ900B GYROCOMPASS

- MKM026 Master compass

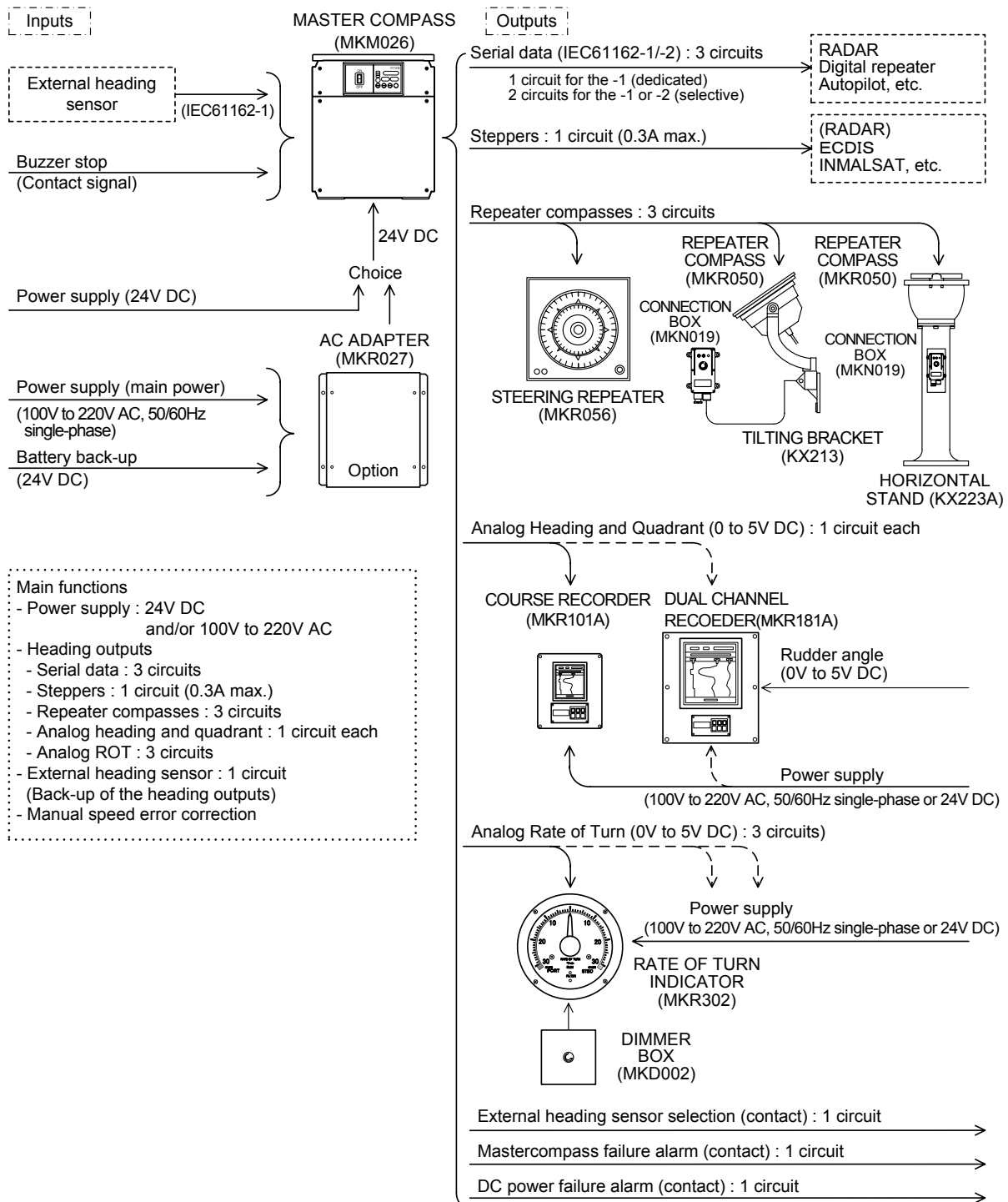


Exposure view of Master compass



Easy maintenance

## System configuration diagram



## Engineering specifications

### - Power supply

Supply voltage

- : 24V DC (20V to 30V DC)
- : and/or 100V / 110V / 115V / 220V AC, 50/60Hz, single-phase (MKR027 AC adapter is required.)

Power consumption at DC drive

- : Starting approx. 3.5A  
+ 0.35A x number of repeater compasses (Max. 3)
- : Operating approx. 2.3A  
+ 0.35A x number of repeater compasses (Max. 3)

Power consumption at AC drive

- : Starting approx. 125VA  
+ 12VA x number of repeater compasses (Max. 3)
- : Operating approx. 90VA  
+ 12VA x number of repeater compasses (Max. 3)

### - Signal inputs

- External heading signal

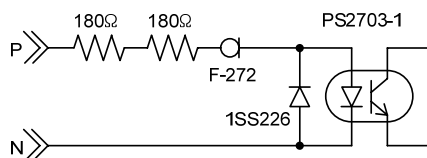
- Data source : External heading sensor
- Serial interface : IEC61162-1
- Transmission convention: Serial asynchronous form
- Signaling rate : 4800bps
- ID & formatter :

ID & formatter	Content
xx <sup>1)</sup> HDT	Heading, true
xx <sup>1)</sup> THS	True heading and status
xx <sup>1)</sup> HDG	Heading, deviation and variation
xx <sup>1)</sup> HDM	Heading, magnetic
xx <sup>2)</sup> HRC	Heading/ROT (Yokogawa inherent)

Note 1) Any Talker ID "xx" can be received.

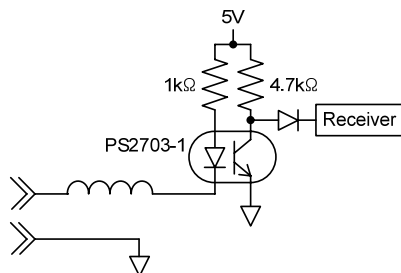
2) Talker ID "xx" of HRC sentence is HE or HC.

Receive circuit (Typical): Photo-coupler



- Buzzer stop (contact)

- No. of circuits : 1 circuit
- Contact action : Momentary close to command
- Source voltage : 5V DC
- Source current : 5mA
- Receive circuit (Typical)



### - Signal outputs

- Repeater compasses (heading signal)

- No. of circuits : 3 circuits
- Electrical characteristics: RS422 (use a driver circuit equivalent to RS422A.)
- Transmission convention: Serial asynchronous form
- Signaling rate : 9600bps
- Transmission interval : 50ms
- Characters : Start bit 1 bit  
Data bit 8 bit  
Stop bit 1 bit  
Parity bit none

ID, formatter and transmission interval:

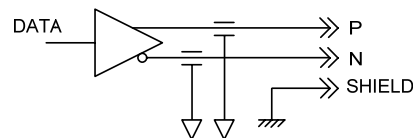
ID & formatter	Transmission interval
HEHDT	50ms
xx <sup>1)</sup> HRC	1s
PYDKH <sup>2)</sup>	1s

Note 1) Talker ID "xx" of HRC is HE or HC.

2) Yokogawa inherent format

Output circuit (Typical)

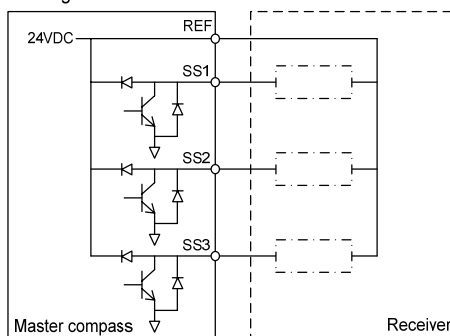
RS422 driver LTC486



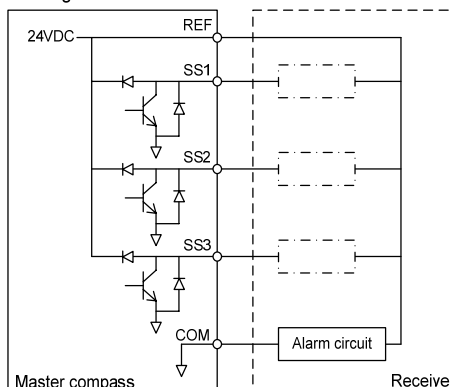
- Steppers (heading signal)

- No. of circuits : 1 circuit
- COM : 0V (circuit GND)
- REF output voltage : 24V DC or 35V DC (Option)
- REF output current : 0.3A max. or 1A max. (Option)
- Output form : Open collector (3-bit gray code)
- Sink current : 0.4A max. any signal line

4 wiring control circuit



5 wiring control circuit



- Serial data

- Serial interface : IEC61162-1 or -2
- No. of circuits : 3 circuits
  - 1 circuit for the -1 (dedicated)
  - 2 circuits for the -1 or -2 (selective)
- Electrical characteristics: RS422 (use a driver circuit equivalent to RS422A.)
- Transmission convention: Serial asynchronous form
- Signaling rate and transmission interval:

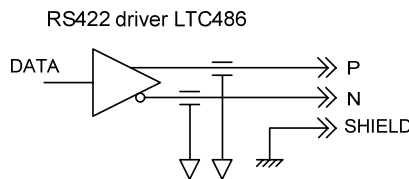
	Signaling rate	Transmission interval
IEC61162-1	4800bps	200/500/1000ms selective
IEC61162-2	38400bps	20ms

ID & formatter:

Data source		Content
Gyro	Ext. sensor	
HEHDT	xx <sup>1)</sup> HDT <sup>2)</sup>	Heading, true
HETHS	xx <sup>1)</sup> THS <sup>2)</sup>	True heading and status
-	xx <sup>1)</sup> HDG	Heading, deviation and variation
	xx <sup>1)</sup> HDM	Heading, magnetic
HEROT	xx <sup>1)</sup> ROT	Rate of turn <sup>3)</sup>
HEHRC <sup>4)</sup>	xx <sup>1)</sup> HRC	Heading / Rate of turn <sup>3)</sup>

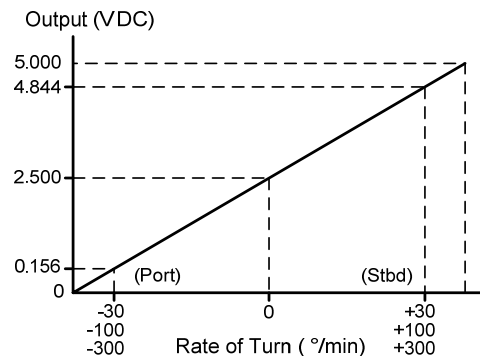
- Note 1) Talker ID "xx" is subjected to the ext. sensor's ID.
- 2) Applied in case Transmitting Heading Device (THD) is employed as the ext. sensor.
- 3) Rate of turn is internally calculated (default) or transferred from the ext. sensor (selective).
- 4) Formatter "HRC" is Yokogawa inherent.
- 5) Any circuit can transmit up to 3 records as far as the transmission interval allows.

Output circuit (Typical)



- Analog Rate of Turn (ROT)

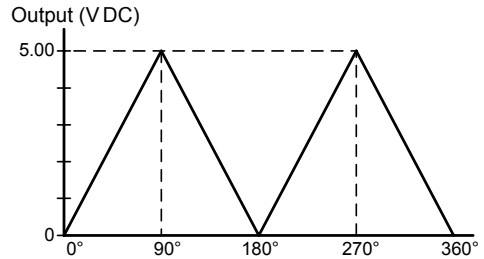
- No. of circuits : 3 circuits
- COM : 0V (circuit GND)
- Output voltage : 0V to 5V DC
- Output resolution : 2.5mV
- Output impedance : 2kΩ max.
- Input impedance of load : 500kΩ min.
- Signal format:



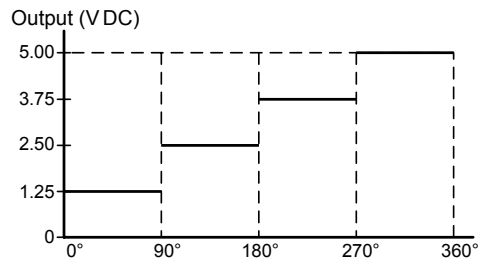
- Analog heading & quadrant signal

- No. of circuits : Heading, quadrant both 1 circuit
- COM : 0V (circuit GND)
- Output voltage : 0V to 5V DC
- Output resolution : 2.5mV
- Output impedance : 2kΩ max.
- Input impedance of load : 500kΩ min.
- Accuracy : ±1% (at 25 °C)
- Signal format

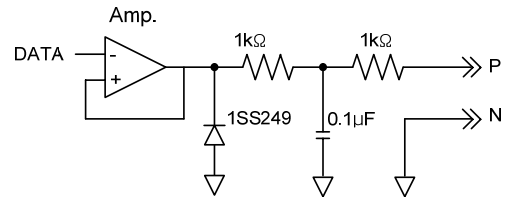
Heading signal



Quadrant signal



Output circuit (Typical)



- External heading sensor selection (contact)

- No. of circuits : 1 circuit
- Contact action : Closed and held during the external sensor is assigned to transmit
- Electrical rating (contact): 24V DC 0.5A

- Master compass failure alarm (contact)

- No. of circuits : 1 circuit
- Contact action : Opened and held during the master compass failure occurs
- Electrical rating (contact): 24V DC 0.5A

- DC power failure alarm (contact)

- No. of circuits : 1 circuit
- Contact action : Opened and held during the absence of DC power supplied to Master compass
- Electrical rating (contact): 24V DC 0.5A

## Performance specifications

- 1) Settling time : Within 5 hours  
(Usable accuracy in approx. 2 hours)
- 2) Accuracy
  - Static :  $\pm 0.25^\circ \times \text{sec Lat.}$  (Lat. = latitude)
  - Dynamic :  $\pm 0.75^\circ \times \text{sec Lat.}$  (Lat. = latitude)
- 3) Follow-up accuracy :  $0.1^\circ$  or less
- 4) Maximum follow-up speed :  $30^\circ/\text{s}$

## Environmental conditions

- 1) Permissible roll and pitch angle:  $\pm 40^\circ$
- 2) Permissible vibration
  - 0 to 8.3Hz 3mm<sub>p-p</sub> or less
  - 8.3 to 25Hz 0.35mm<sub>p-p</sub> or less
  - 25 to 50Hz 0.1mm<sub>p-p</sub> or less
- 3) Permissible ambient temperature
  - Protected equipments except Master compass :  $-15^\circ\text{C}$  to  $+55^\circ\text{C}$
  - Master compass :  $-10^\circ\text{C}$  to  $+50^\circ\text{C}$   
(Operating)
  - Bering repeater compass :  $-25^\circ\text{C}$  to  $+70^\circ\text{C}$
- 4) EMC: IEC 60945 4th edition

## Paint color

Master compass: Munsell 0.8Y 2.5/0.4 (Lamp Black)  
AC Adapter: Munsell 0.8Y 2.5/0.4 (Lamp Black)

## System components

This paragraph specifies, hereafter, the outline dimensions (in mm) and Model & Suffix Codes of equipment consisted in CMZ900B. The equipment is listed right and the connection diagram may be covered as far as possible.

### Equipment and accessories

Model	Nomenclature	Model	Nomenclature
MKM026	Master compass	MKR027	AC Adapter (Option)
MKR025	M. Operation unit		
MKR026	Switch unit		
MKT007	Gyrosphere		
MKZ115	Supporting liquid for installation		
MKZ512	Spare parts		

Other equipment and accessories listed right are available as a part of CMZ900B. For more detail information, another General Specifications GS80B11K03 is provided.

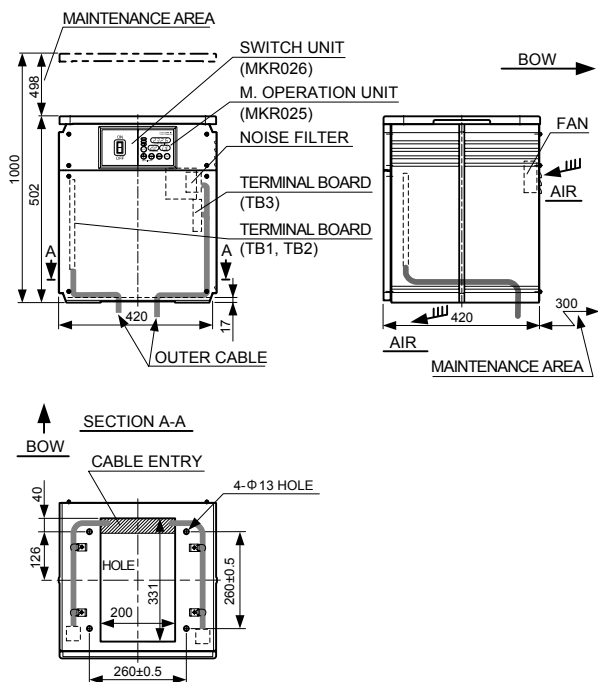
### Other equipment and accessories

Model	Nomenclature	Model	Nomenclature
(Analog repeater)		(Digital repeater)	
MKR050	Repeater compass	MHR110A	Universal data display
MKN019	Connection box	MHR112	Assist monitor
KX605	Shading circle	MHR120	Universal data display
KX607	Repeater cover	MKD002	Dimmer box
MKX617	Azimuth circle	(Rate of Turn indicator)	
MKR056	Steering repeater	MKR302	ROT indicator
(Pedestal and bracket)		MKD002	Dimmer box
KX201A	Horizontal bracket	(Recorder)	
KX213	Tilting bracket	MKR101A	Course recorder
KX223A	Horizontal stand	MKR181A	Dual channel recorder
KX607A	Horizontal stand cover	(Signal distributor)	
		KN054	Distribution box (for steppers)
		MHB306	Serial distributor

**MKM026 Master compass**

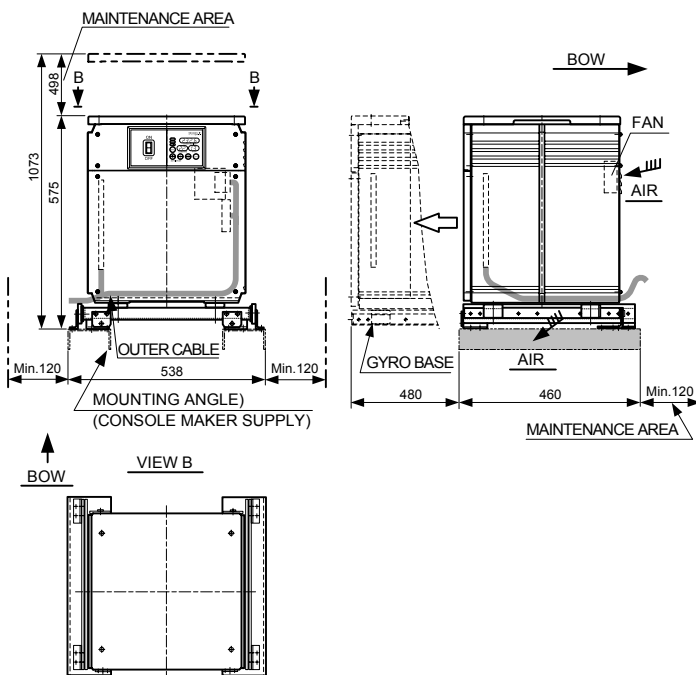
MODEL	MKM026-1
MASS	43 kg

NOTE: Indraft of cable requires approx. 1m long above the bottom of master compass.



MODEL	MKM026-4
MASS	51 kg

Note: 1. GYRO BASE is fastened to MOUNTING ANGLE with bolts. The MOUNTING ANGLE may be welded to Console.  
2. Indraft of cable requires approx. 1m long above the GYRO BASE.

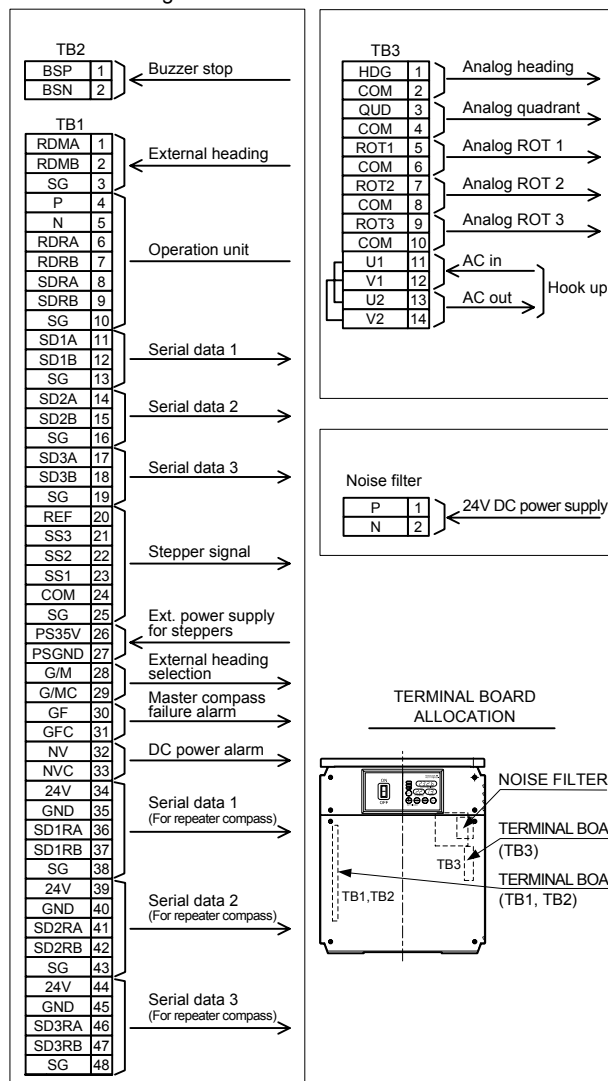


**Connection diagram**

**Master compass MKM026-X1...X7/option**

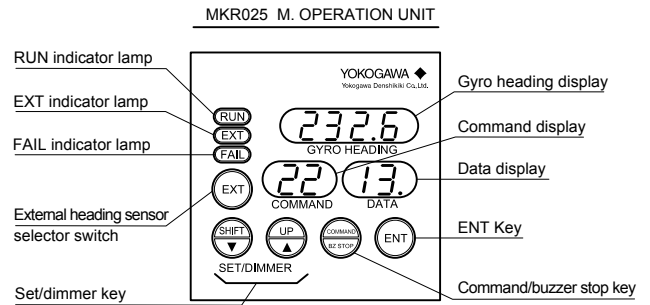
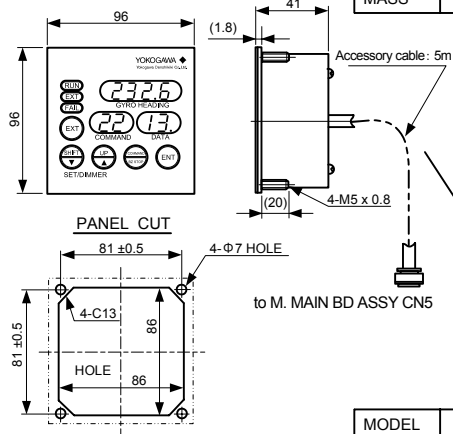
Model	Suffix	Specification
MKM026	.....	Master compass
Style	-1	Stand alone
	-3	Built-in Pilot stand
X1	-4	Built-in Console
Paint color	0	Not applicable
	X2	Munsell 0.8Y2.5/0.4 (LAMP BLACK)
M. Operation unit installation	0	Outside of Mastercompass
	X3	Inside of Master compass
Switch unit installation	-0	Outside of Mastercompass
	X4	Inside of Master compass
Standards	0	Not applicable
	1	JG
	2	MED (wheel mark)
X5		
Name plate	1	Japanese and English
X6	2	English
Applied to	-1	CMZ900B
X7		
Option	/48	4800bps Repeater compass (else 9600bps)
	/A1	Output range of ROT 30°/min
	/A2	Output range of ROT 100°/min
	/A3	Output range of ROT 300°/min
	/C	Chinese name plate
	/E	Serial data inputs: use
	/S24	Steppers reference 24V DC 1A max.
	/S35	Steppers reference 35V DC 1A max.
	/R1	C. Operation unit: use (with Junction unit built-in stand)
	/R2	C. Operation unit: use (with Junction unit out of stand)

Note: 1) M. Operation unit (MKR025) and Switch unit (MKR026) are not included in Master compass (MKM026). Individual order must be placed for these items.  
2) In case Master compass (MKM026) is built in Pilot stand, the other type of switch may be used instead of the Switch unit (MKR026).



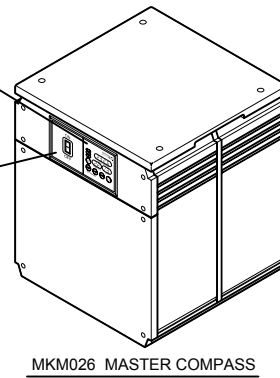
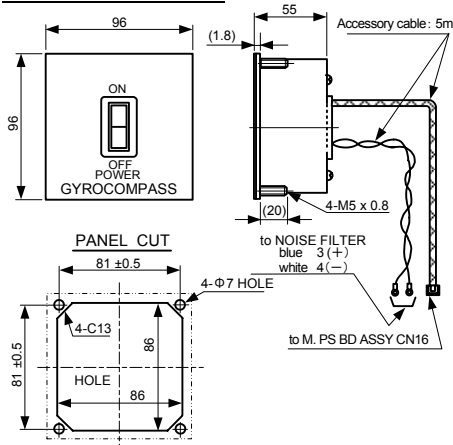
**MKR025 M. Operation unit**

MODEL	MKR025-3
MASS	1.4 kg



**MKR026 Switch unit**

MODEL	MKR026-3
MASS	1.5 kg



**M. Operation unit MKR025-X1...X3**

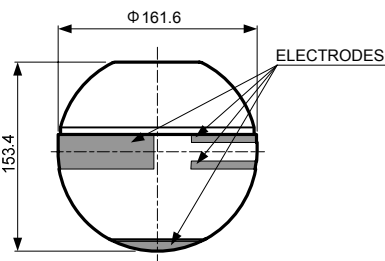
Model	Suffix	Specification
MKR025	.....	M. Operation unit
Style	-1	Built-in Master compass
	-2	Built-in Pilot stand
X1	-3	Console mount
Seat key	E	English
X2	J	Japanese
Name plate	1	Japanese & English
X3	2	English

**Switch unit MKR026-X1...X3**

Model	Suffix	Specification
MKR026	.....	Switch unit
Style	-1	Built-in Master compass
	-2	Built-in Pilot stand
X1	-3	Console mount
Seat key character	E	English
X2	J	Japanese
Name plate	1	Japanese & English
X3	2	English

**MKT007 Gyrosphere**

MODEL	MKT007-1
MASS	2.1 kg

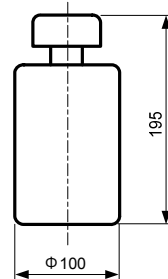


**Gyrosphere MKT007-1**

Model	Suffix	Specification
MKT007	.....	Gyrosphere
Applied to	-1	CMZ900
X1		

**MKZ115 Supporting liquid for installation**

MODEL	MKZ115-1
MASS	1.2 kg



**Supporting liquid for installation MKZ115-1/option**

Model	Suffix	Specification
MKZ115	.....	Supporting liquid for installation (1 $\phi$ )
Name plate	-1	English
X1		
Option	/C	Chinese name plate

**MKZ512 Spare parts**

Spare parts MKZ512 -X1...X3/option

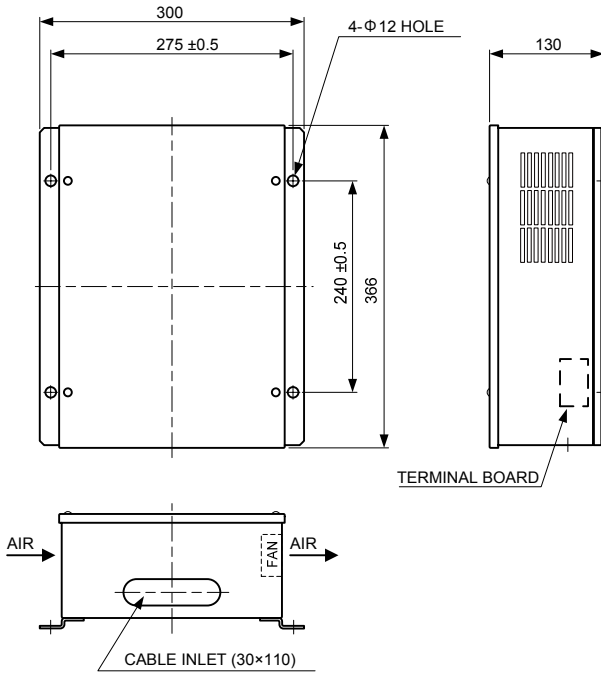
Model	Suffix	Specification
MKZ512	.....	Spare parts
Applied to	-1	CMZ900B without MKR027 AC adapter
X1	-2	CMZ900B with MKR027 AC adapter
Box size	B	Large (plastic made)
X2	S	Small (plastic made)
Name plate	1	Japanese and English
X3	2	English
Option	/C	Chinese name plate

Note: Content of spare parts

Item	CMZ900B without MKR027 AC adapter	CMZ900B with MKR027 AC adapter
Gyrosphere support	1 pc.	1 pc.
Container base	1 pc.	1 pc.
Injector	1 pc.	1 pc.
Meter cup	1 pc.	1 pc.
Funnel	1 pc.	1 pc.
Supporting liquid	1 liter	1 liter
Filter	10 pcs.	10 pcs.
Terminal screw driver	1 pc.	1 pc.
Illumination lamp	10 pcs. (28V 0.04A)	10 pcs. (28V 0.04A)
Fuse		4 pcs. (32V DC 15A)
Fuse		4 pcs. (250V AC 10A)
Fuse		4 pcs. (250V AC 2A)

**MKR027 AC adapter**

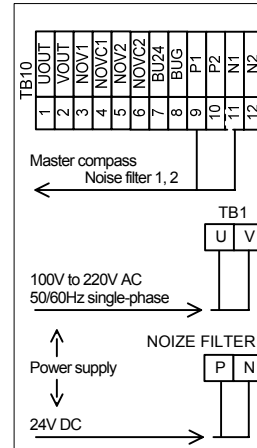
MODEL	MKR027
MASS	10.5 kg



AC adapter MKR027-X1...X4

Model	Suffix	Specification
MKR027	.....	AC adapter
Power supply	-1	100V AC 50/60Hz single-phase, 24V DC
	-2	110V AC 50/60Hz single-phase, 24V DC
	-3	115V AC 50/60Hz single-phase, 24V DC
X1	-4	220V AC 50/60Hz single-phase, 24V DC
Standards	0	Not applicable
	1	JG
	2	MED (wheel mark)
X2		
Name plate	1	Japanese and English
X3	2	English
Paint color	-1	Munsell 0.8Y2.5/0.4 (LAMP BLACK)
	-2	Munsell 2.5G7/2
X4	-3	Munsell 7.5BG7/2

Connection diagram



End