Spherical Magnetic Steering Compass

DELTA-PILOT

Installation & Operation Manual

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General

Because of the half-gimbal suspension DELTA-PILOT is especially suitable for installation of magnetic detectors for autopilots or transmitting magnetic compasses. For this it is necessary to use a special mounting cylinder according to the detector to be used.

Range of delivery:
Compass in black or white colour, a separate mounting flange, hood without aperture, illumination.
As extras available are:
B+C magazine correctors (two magazines with 2 pcs of magnetics inside, if detctor is mountied) or B+C turning correctors already mounted if not detector is intended.

Location of Compass

In case DELTA-PILOT will be used for steering purposes it should be installed in ahead direction of the helmsman at a distance of not more than 1,5 m to allow easy and convenient reading. In case the compass is intended to drive a magnetic detector only it can be located anywhere. In both cases ***to avoid magnetic interferences the following distances should be kept for safe and reliable operation of the compass***:
The distance is to be understood as a radius around the compass. This radius should be at least 50…60 cm to any magnetic iron. In addition this place should not be inside the cabin, hull or superstructure of the vessel if made of magnetic iron, because the iron environment will shield the earth`s magnetic field.

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Furthermore navigational instruments may cause deflection of the compass, so a loudspeaker should be at least 70 cm away from the compass, same with electro motors to drive the window wipers or echo sounders.
These moving fields will cause compass deflections which are never adjustable because the interference depend thereon if the instruments is switched on or off. In doubt the right distance to these different instruments should be determind by trial.

Mounting

Set-up type:

1. Pull from below the separate mounting flange to the compass binnacle. Refer to be attached fotos. The oblong holes show to fore and aft. Fix the ring with the plastic srews included to the compass binnacle in the lower position.
2. Fix the compass at the position as choosen according to the description before. Do this provisorically by non magnetic screws (not included in the range of delivery) using the ahead and aft oblong holes only. This is to allow alignment or A-error correction of the compass later. The main lubber mark is orientated to the bow of the vessel.
3. ***Adjust the compass if necessary. It is recommended to call a professional compass adjuster for this, because a reliable adjustment is necessary for safe navigation***. Part of the adjustment procedure is the correction of alignment error, the A-error. If this is finished fix the compass by use of the remaining holes.

Hint:
If spray water or rain will enter the compass binnacle from above it will flow out at the bottom of the compass again. Therfore don’t seal the bottom of the binnacle

Built-in type:

1. Cut a hole of 210 mm diameter at the compass place as choosen according to the description before. Pull the separate mounting flange from below to the compass. Remove the white plastic screws to be seen outside the binnacle. The oblong holes show to fore and aft. Fix the ring with the plastic screws included to the compass binnacle at the upper position.
2. Let down the compass into the hole. Fix the compass privisorically by non magnetic screws (not included in the range of delivery) using the ahead and aft oblong holes only. This is to allow alignment or A-error correction of the compass later. The main lubber mark is orientated to the bow of the vessel.
3. ***Adjust the compass if necessary. It is recommended to call a professional compass adjuster for this, because a reliable adjustment is necessary for safe navigation***. Part of the adjustment procedure is the correction of alignment error, the A-error. If this is finished fix the compass by use the remaining holes.

Hint:
For the built-in type of compass choose a place protected of spray water or rain. The water may enter the binnacle from above and come into the cabin.

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Mounting of Detector

To install the detector an adapter of special length is required to get a suitable field strenght from the directional system at the detector's position. This will be located below the gimbaled compass bowl. The adapter is prepared to fix the detector and to turn it for alignment.
Use the cable clamp inside the binnacle to fix the cable against pull. Between detector and clamp the cable should be laid spiral to allow move of the gimbaled compass bowl.

Delta-Pilot with B (right hand) and C (below) magazine correctors.

Adjusting the Compass

A reliable adjustment is necessary for safe navigation if magnetic materials are the neighbourhood of the compass. This is necessary even the compass position is choosen according to the notes mentioned above. To avoid interferences caused by variable magnetic fields the distance between compass and field source has to be increased. Variable fields cannot be adjusted and it is known no technical way to protect the compass against these fields. The sorces of variable fields are for example: hydraulik pumps, hatches…….On privat yachts made of wood or reinforced fibre glass and without any magnetic material near to the compass an adjustment may not be done.
Essential correctors are B+C and heeling:
B+C are to correct the ship's permanent longitudinal and athward field and the heeling corrector are to neutralize the ship's permanent vertical field. In the case of sailing yachts, which are heeled for longer times the use of a heeling corrector would be seriously recommended. In case of motor yachts the B+C correctors are essential but a heeling corrector may not be necessary.

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The compass adjustment should be carried out by an experienced compass adjuster!

Please be be aware to carry out a reliable adjustment because this makes your navigation safe. Steering by use of a non adjusted compass may because grounding or collision!

Optional there are two types of B+C corrector devices:
Turning correctors and corrector magazines

1. The turning correctors (#18165) consists of two brass rods with fixed magnets located in the base of the compass binnacle. One rod is parallel to the ship`s fore and aft (the B-corrector) and the other is parallel to the atwardship direction (the C-corrector). A detailled description will be included in the range of delivery if this corrector is mounted to your compass.
2. The corrector magazines (#18150) are separate with delivery (see above foto). One corrector magazine is for B and the other for C-correction. You will find in total 2 magnets when removing one of the U-shaped covers. A detailled description will be included in the range of delivery of this corrector.

The heeling corrector is a magnet tube that should be installed below the compass with the magnet tube vertically. The magnets are inside the tube. For details refer to the instructions included in the delivery of the heeling corrector.
For detailled-questions concerning the procedure of compass adjustment refer for example to: HANDBOOK OF COMPASS ADJUSTMENT, Pub. 226, U.S. Defense Mapping Agency.
Compass adjustment has to be checked from time to time.
Especially in case of lightning struck, grounding, welding works…..the compass adjustment has to be repeated.

Operation

The main lubber line is orientated to ship`s ahead direction. Course reading free of parallax error will be provided if the front and the back part of the lubber line are superposed.
Before cruising make sure that the compass is well adjusted!
Note that you have to apply the local magnetic variation to calculate the true heading (the heading found in the sea chart) from the compass heading. The local magnetic variation is printed on the charts of the sailing region.
Generally (if there were no contrary advise to Cassens & Plath with order) the directional system of the compass is balanced for northern hemisphere. If the vessel then sails in southern waters a tilt of the directional system may be occure. The southern part will be lowered. This is caused by the vertical magnetic field which is contrary to that in northern hemisphere. A small tilt of the directional system will not influence the operation of the compass.

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Illumination

The white illumination element is visible at the glass dome of the compass. It is fixed by a bracket to the glass dome. For replacement remove the white element and replace by a new one.
The bulb is of glow type which means the wires of the cable can be connected to the battery free of polarity. Use a rheostatic dimmer to reduce brightness of the light. In case of 12 VDC ship`s voltage the recommended resistance is 400…500 Ohms, in case of 24 VDC it is 2000…2500 Ohms. Power consumption of the light is abt. than 2 VA.

Maintainance

From time to time the suspension has to be oiled.
Strong vibrations may blunt the point or pivot of the card assembly. Check this especially on motor yachts with strong vibrations.
For this proceed as follows:

1. Locate the compass free of any interfering magnetic field. Note the heading when the directional systems stops the move.
2. Use a weak magnet (iron key for example) to deflect the card not more than 2° and wait until the movement of the card stops.
3. Pull away the deflection iron or magnet and wait until the card stops to move.
4. If the card returns to the originally noted heading within a tolerance of +/- 0,5° the pivot should be still in order. If not you have to send the compass to a compass workshop for replacment of the pivot.

Errors

Bubbles:
Air bubbles inside the compass do not disturb the indication as fas as they are smaller as about 10 … 20 mm. Nevertheless they should be removed when a workshop can be reached. In case of larger bubble the compass should be taken out off order.

Tilt of directional system:
When sailing in south hemisphere a small down of the south part of directional system is usually because of the different vertical magnetic field. If the inclination is too much this can show a leaking float. Contact a compass workshop and ask to replace the system, the compass should be taken out off order.

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