FURUNO

AUTOPILOT

Model: FAP-3000



Efficient Steering

With adaptive Autopilot



www.furuno.com



Optimal control for safe and efficient steering

The Furuno Autopilot FAP-3000 provides excellent quality in steering and control, with optimal routing and low fuel consumption as a result.

- **Type approved with Furuno FMD ECDIS, Track control**
- **Adaptive Autopilot modes**
- **Course Mode for automatic drift compensation**
- **NAUT AW compliant with a standby unit**
- **Curved EBL – shown on ECDIS**
- **Alarm interface for Bridge Alarm Management**
- **Intuitive operation**
- **6.5 inch TFT display with high luminance**

Key information displayed:

- Speed information, water and ground speed
- Rudder order
- Actual rudder (if feedback is provided)
- Clear indication of rudder limits
- Heading, Set Heading
- Actual Gyro in use
- Chosen performance mode
- Course mode (when course mode is used)



FAP-3000 consists of:

- Autopilot Control Panel (MIP241)
- Autopilot Cable (CE2MM)
- Autopilot Electronic Unit (AEU611)

Design

FAP-3000 is based on many years of experience in cost efficient and safe Autopilot design. It is designed with a tiller on the control panel, where the navigator can directly change set-point, both heading and radius. The panel is designed with pushbuttons that have LED backlight and an LED lightbar above each button. The lightbar clearly indicates which mode is in use, so operation can be done safely. The navigator is never in doubt, when an order is given due to the required actuation force of both tiller and pushbuttons.

To ensure the best experience and readability on the display at all times, the navigator can choose between day, dusk and night view.

Adaptive Autopilot modes

FAP-3000 has two sets of adaptive modes to help with *fuel efficiency* and *steering optimization*. The Autopilot adapts its performance based on the choice made by the navigator.

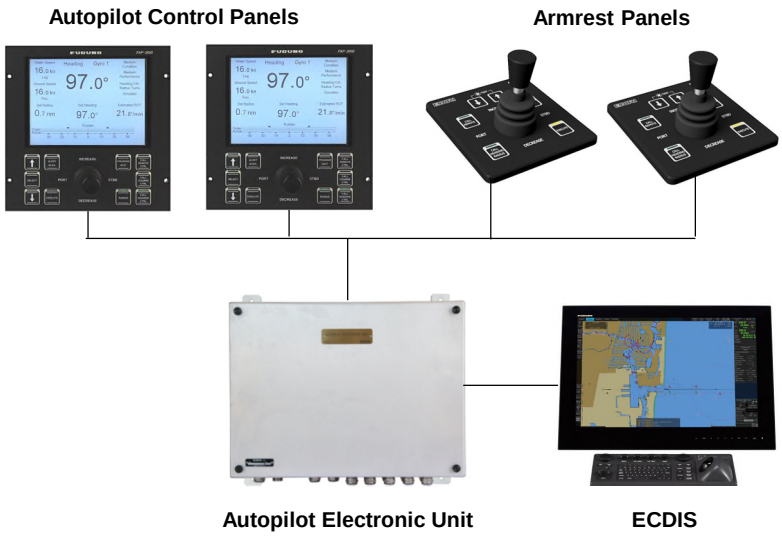
Precise, Medium and Economy
Three options are available, depending on how tight the vessel needs to follow the set heading. Economy mode provides the most relaxed, fuel saving heading control by minimizing use of rudder movements.

Loaded, Medium and Light
Three options are available, depending on the vessel´s loaded condition. The Autopilot will automatically optimize the steering based on the chosen condition.

Flexible design options

The Autopilot can have up to 4 control panels connected to the same AEU (Autopilot Electronic Unit) in case more panels are requested.

In FAP-3000 new parameter settings can be uploaded directly to the Autopilot via USB key. It makes it quick and easy to make adjustments if needed.



Armrest control

Steering from the navigator´s chair is possible with an Armrest Panel that is designed for easy control of the essential Autopilot functions while adding better ergonomics for the navigator.

In order to ensure safety and avoid any possible confusion by the navigator, the Armrest Panel has similar layout and functional style as the autopilot control panel. It is operated by the use of pushbuttons with an actuation force of 5.5N and a rocker tiller designed to avoid any unwarranted actions.

The Armrest Panel is installed directly to the Autopilot Electronic Unit via CAN-bus terminals or through a junction box.

Armrest display (coming soon)

A 5-inch vertical Armrest display that can be built into the same front plate for a slim line control panel.



Setup

FAP-3000 is preset from factory, where parameters are loaded into the Autopilot based on known ship data. This makes setup and sea trial simple. The preset is done with decades of experience in the field and acknowledged steering performance.

If requested, additional finetuning can be performed by a service engineer. Useful setup wizards are available and provides extensive opportunities for adjusting to specific individual preferences and vessel steering capabilities.

Retrofit

FAP-3000 offers an improved human machine interface with extensive opportunities in its design and functionality. Retrofitting from FAP-2000 to FAP-3000 does not require any console work, as the equipment is designed to fit into the existing cut-outs onboard. We can identify and deliver the correct Autopilot setup based on known ship data, making it as simple as possible for the crew onboard. This makes it cost efficient, while also minimizing the time needed to perform the retrofit.

Older/other Autopilots can be retrofitted to FAP-3000 by performing an observation of the existing system.

Standard mounting



The control panel is usually mounted in the bridge console cutout by using the four mounting holes.

Plugged mounting option



The mounting holes are plugged and the control panel can be mounted in the console from the bottom up in order to create a visually streamlined look in the console.

Advantages of retrofitting

- Improved display
- More relevant information is provided for the navigator
- Course Mode
- Improved Programming Mode
- Rudder Toe angle – better fuel economy for dual rudder vessels
- Product lifetime considerations
- More bridge design options
- Improved service tools

Programming Mode

The navigator can plan changes ahead by programming next heading, next course or next radius which is stored in the Autopilot and ready to be executed. It is especially useful when navigating in narrow waters such as the archipelagoes.

When programming the next settings, the navigator can keep the actual settings available in the background and thereby be able to make an easy swap between modification of ongoing maneuvers and programming mode. The Autopilot control panel clearly and logically displays the step-by-step programming using the terminology “next” to avoid any possible confusion.

Rudder Toe Angle

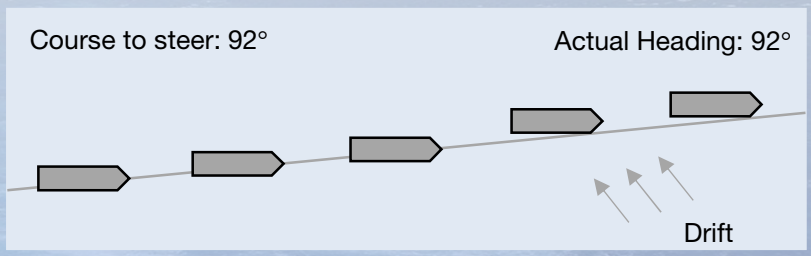
For dual rudder vessels, FAP-3000 can display the Toe angle on the control panel. When using Toe angle control of the rudders, it is possible to optimize the fuel consumption by avoiding loss of propulsion.

Course Mode

Besides Heading and Track control, FAP-3000 can be used in Course Mode which is a drift compensated heading control. No manual corrections are necessary, as the Autopilot automatically compensates for any drift by using the Gyro as dynamic reference and GPS signal as static reference to stay on course.

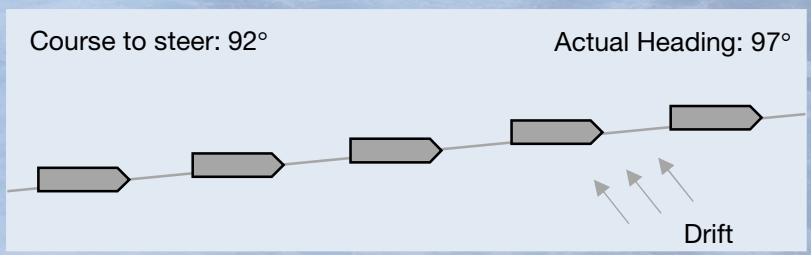
Heading control

Classic heading control will maintain the set heading making it necessary for the navigator to manually compensate for any drift to stay on course.



Course Mode

When operating in Course Mode the Autopilot will compensate for any drift by automatically adjusting the actual heading to stay on course.



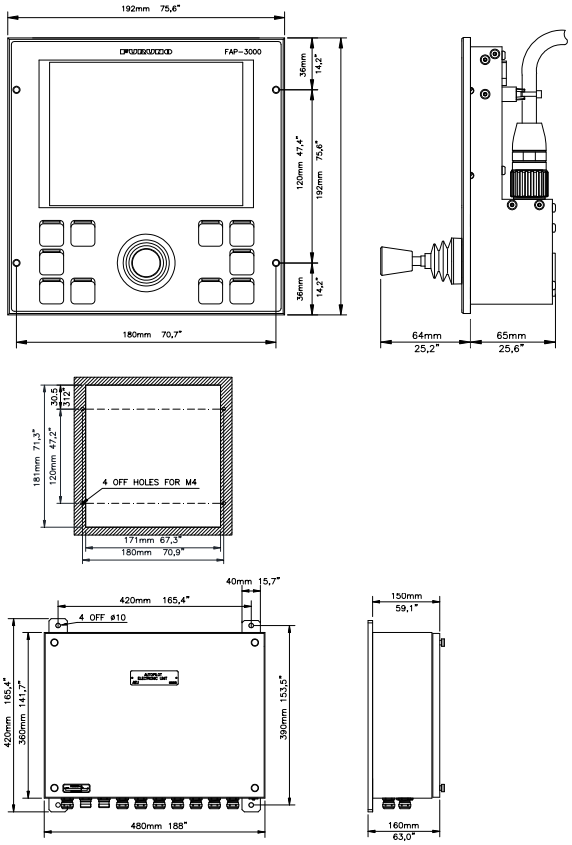
Product Name FAP-3000

Autopilot Control Panel (MIP241)

1. **Power supply**
   24 VDC Supply from the Autopilot Electronic Unit(AEU611)
   Power: Max 17W
2. **Display**
   6.5" TFT display
   LED backlight
   Luminance 800 cd/m2
   Presentation of information according to IEC62288
   Actuation of pushbuttons: 5.5 Newton
3. **Mode selections**
   Heading
   Course
   Track
   Radius
4. **Interface**
   CAN bus: 2 ports
   Ethernet: 1 port 100 base-T
   USB: 1 port (1x device USB 2.0 type B)

Autopilot Electronic Unit (AEU611)

1. **Power supply**
   Ship Supply 24 VDC +30/-25%
   Power: Max 48W
2. **Interface**
   CAN bus: 2 ports
   Ethernet: 1 port 100 Base-T
   USB: 2 ports (1x HOST USB1.1 type A, 1x DEVICE USB1.1 type B)
   Serial I/O: 6 ports RS422
   Digital input: 17 (opto isolated)
   Digital output: 15
   Analog output: 2 ports +/- 10V with possibility to convert to 4-20mA using an optional isolation amplifier
   Analog input: 4 ports +/- 10V with possibility to convert to 4-20mA using an optional isolation amplifier
   Isolated outputs: 3 opto isolated FET outputs



Environmental conditions

1. Ambient temperature range (operating): -15degrees celsius/55degrees celsius
2. Ambient temperature range (storage): -15degrees celsius/55degrees celsius
3. Humidity: Tested up to 93%RH at 40degrees celsius
4. Vibration: 0.7g acc. to IEC60945:2008
5. Immunity radiated radio frequencies: 80-2000MHz acc. to IEC60945:2008
6. Immunity conducted radio frequencies: 0.15-80MHz acc. to IEC60945:2008
7. Radiated emission: 0.15MHz – 2000 MHz acc. to IEC60945:2008
8. Enclosure degree of protection: IP22

Standards conformity

1. Functional testing: ISO 11674:2008
2. Environmental testing: IEC60945:2008
3. Serial interface: IEC 61162-1:2016
4. Presentation of navigation information: IEC 62288:2014
5. Bridge Alert Management: MSC.302(87)

NMEA sentences

The autopilot can receive the following list of Standard NMEA sentences:
Generally the sentences must follow the IEC 61162-1 Edition 5, but old sentences are also received.

NMEA Sentence	Signal input	Remarks
$xxTHS	Heading True from Gyro	
$xxHCR	Heading Correction report from Gyro	Coming before related THS
$XXHDT	Heading True from Gyro	Old standard
$XXHDG	Heading from Magnetic Compass	
$XXHDM	Heading from Magnetic Compass	Specified not recommended in NMEA ver. 2.0
$XXVBW	Speed from Doppler LOG	Both IEC61162 & earlier NMEA standard is received.
$XXVTG	Ground Speed from GPS	
$XXVHW	Water speed and ships Heading	
$PESSA $PESSD $PESSX	ECDIS	Proprietary EMRI NMEA sentence
$XXROT	Rate Of Turn	
$XXACK	Acknowledged Alerts	
$XXACN	Alert Command	Advanced alert communication

Further the Robertson STX sentence can be received as heading information. 9600 baud.

The Autopilot can transmit the following list of Standard NMEA sentences:
Generally the sentences follows the IEC 61162-1 Edition 5.

NMEA Sentence	Signal input	Remarks
$XXALR	Autopilot Alert sentence	
$XXALF, BAM	Alert sentence	Advanced Alert communication
$XXALC, BAM	Cyclic Alert List	Advanced Alert communication
$XXARC, BAM	Alert command refused, Not used.	Advanced Alert communication
$XXHBT, BAM	Heartbeat	To BAM, INS.
$XXEVE	Event sentence, BNWAS	
$PESSA $PESSD	ECDIS	Proprietary EMRI NMEA sentence

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