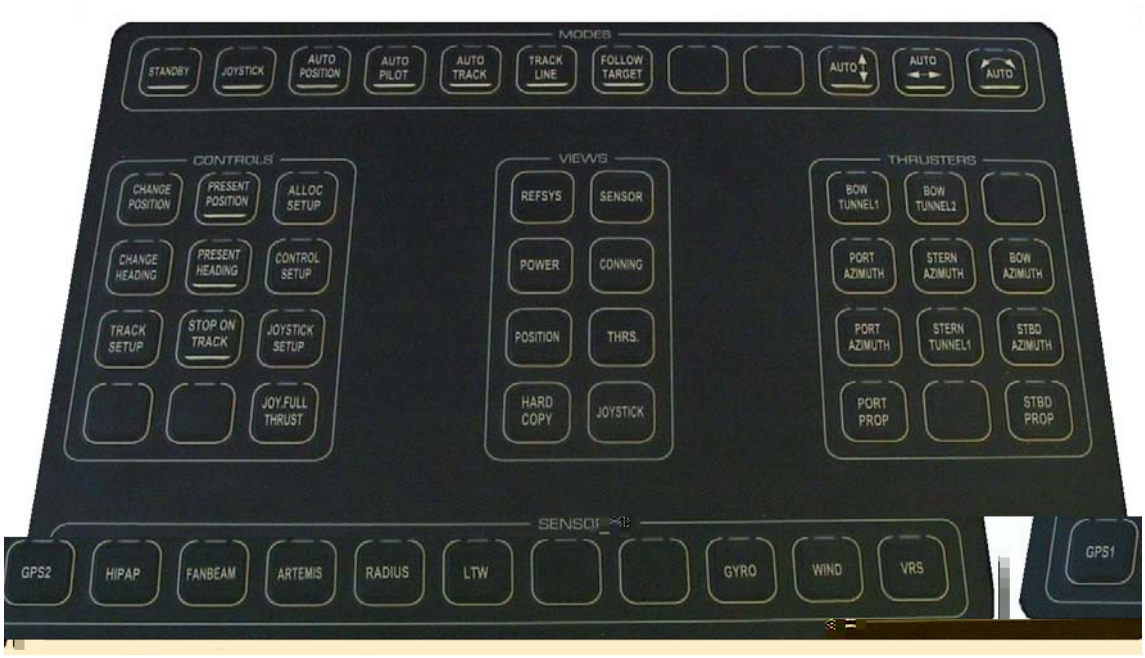
COP-05 BU-DP Panel

Hardware Module Description

Kongsberg Maritime Part no.603530



300983/B
January 2007

Document history

Document number: 300983		
Rev. A	July 2006	First version.
Rev. B	January 2007	Added information about the Power LED and done some minor corrections.

Note

Comments

To assist us in making improvements to the product and to this manual, we welcome comments and constructive criticism.
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Glossary

CPLD	Complex Programmable Logic Device
DI	Digital Input
DO	Digital Output
ESD	Electrostatic Discharge
GND	Ground
IE	Instrumentation Earth
IO	Input/Output
LED	Light Emitting Diode
PE	Protective Earth
PWM	Pulse Width Modulation
USB	Universal Serial Bus

1 OVERVIEW

The COP-05 BU-DP Panel is a command panel for DP systems. It contains 56 buttons and lamps.

The light intensity of the backlights and status lamps can be dimmed from the operator station the panel is a part of.

The COP-05 BU-DP Panel is powered from 24 Vdc.

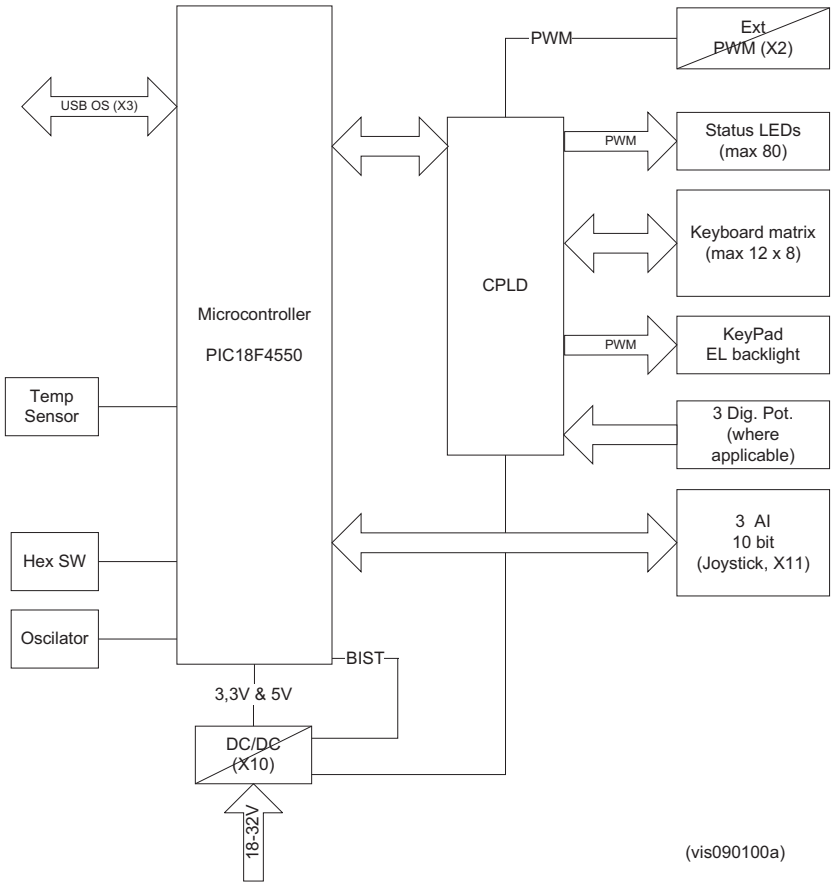
The COP-05 BU-DP Panel contains the following button-and-lamp groups:

- **MODES**, 12 buttons and lamps
- **CONTROLS**, 12 buttons and lamps
- **VIEWS**, 8 buttons and lamps
- **THRUSTERS**, 12 buttons and lamps
- **SENSORS**, 12 buttons and lamps

All buttons have text labels that can be easily replaced.

2 FUNCTION

Figure 1 COP-05 BU-DP Panel function diagram



The COP-05 BU-DP Panel is a status and command panel module used in a larger operator station panel. It provides buttons and lamps for commands in DP systems.

The COP-05 BU-DP Panel is built around a micro controller handling mainly the communication via USB and a CPLD handling mainly I/O for keyboard buttons and lamps.

The COP-05 BU-DP Panel electronics part is encapsulated to resist ESD and dust.

2.1 Power supply input (X10)

The COP-05 BU-DP Panel accepts 18 to 32 Vdc as supply voltage.

2.1.1 Power status LED

A Power status LED is located on the rear side of the panel. It is lit green when the power is ok and red if the polarity of the power supply is faulty.

2.1.2 Voltage monitoring

VCC (5 Vdc) and 3.3 Vdc are monitored as analog signals to discover any change over time (trending) or if being outside defined limits.

2.2 Data communication (X3)

The panel module communicates with a controller computer through a single USB. The controller computer is the master and polls the panel module at given time intervals.

2.2.1 Address switch

The panel has a fixed address digit that is panel-type specific. In addition the panel is provided with a hexadecimal switch, which defines the lower digit of the address for the panel. Allowed addresses are 0 to F. Address 0 (default) is used when only one of this panel type is used or for the first one if more panels of the same type are used. The second panel of this type will then have the address 1 etc.

The table below defines the hexadecimal-switch values and corresponding functions.

Table 1 Address switch values and functions

Value	Function
0	Default Product ID (First panel of this type)
1	Sub-panel 1 Product ID (Second panel of this type)
2	Sub-panel 2 Product ID (Third panel of this type)
3	Sub-panel 3 Product ID (Fourth panel of this type)
4	Sub-panel 4 Product ID (Fifth panel of this type)
5	Sub-panel 5 Product ID (Sixth panel of this type)
6	Sub-panel 6 Product ID (Seventh panel of this type)
7	Sub-panel 7 Product ID (Eight panel of this type)
8	No function
9	No function
A	No function
B	No function
C	No function
D	No function
E	For development and manufacturer use only (Loads fixed Product ID via Boot Loader to regain communication contact)
F	For service use only (Reloads software via Boot Loader)

2.2.2 COM LED

A LED is located on the rear side of the panel and is lit green as long as the communication on the USB is OK.

2.3 Joystick interface (X11)

The panel has built in three analog inputs for interfacing a three axis joystick. The analog input channels are available on a connector providing 2.5 Vdc reference voltage, +5 Vdc (VCC via fuse) and 0 Vdc (via 10 ohm) to interface the potentiometers of the joystick.

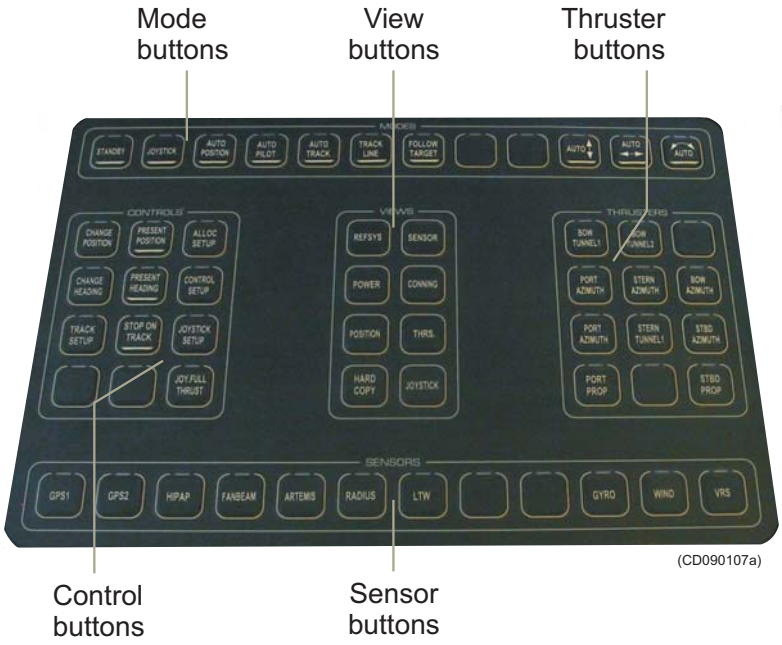
2.4 PWM output (X2)

The panel has a galvanic isolated PWM output for dimming of the panel backlight. The output is implemented using the optocoupler transistor.

2.5 Buttons and lamps

The illustration below shows the front layout of the COP-05 BU-DP Panel. All buttons except for those in the **VIEWS** group are provided with status lamps.

Figure 2 Front layout of the COP-05 BU-DP Panel



Some buttons need a double-press for activation. This means that a button must be pressed twice within a limited period of time to be activated. These buttons have a white field at the bottom.

2.5.1 MODES group buttons and lamps

The **MODES** group comprises twelve buttons with lamps.

Every button in the **MODES** group needs a double-press for activation.

When a button is pressed, a signal is sent to the computer to activate (or enable) the button's associated function. The lamp is lit green when the function has been activated (or enabled).

Buttons that are not configured do not report anything when pressed.

2.5.2 CONTROLS group buttons and lamps

The **CONTROLS** group comprises twelve buttons with lamps.

Some buttons in the **CONTROLS** group need a double-press for activation.

When a button is pressed, a signal is sent to the computer to activate (or enable) the button's associated function. The lamp is lit green when the function has been activated (or enabled).

Buttons that are not configured do not report anything when pressed.

2.5.3 VIEWS group buttons

The **VIEWS** group comprises eight buttons.

When a button is activated, it provides a signal to the computer.

2.5.4 THRUSTERS group buttons and lamps

The **THRUSTERS** group comprises twelve buttons with lamps.

When a button is pressed, a signal is sent to the computer to activate (or enable) the button's associated function. The lamp is lit green when the function has been activated (or enabled).

Buttons that are not configured do not report anything when pressed.

2.5.5 SENSORS group buttons and lamps

The **SENSORS** group comprises twelve buttons with lamps.

When a button is pressed, a signal is sent to the computer to activate (or enable) the button's associated function. The lamp is lit green when the function has been activated (or enabled).

Buttons that are not configured do not report anything when pressed.

2.6 Backlight

The backlight is integrated in the panel film and has yellow colour. The backlight intensity can be adjusted from the computer via USB and the function is implemented in the module using PWM.

2.7 Temperature sensor

A temperature sensor is provided within the module to monitor the operation temperature. If the temperature rises above a specified limit, a system alarm is given.

3 TECHNICAL SPECIFICATIONS

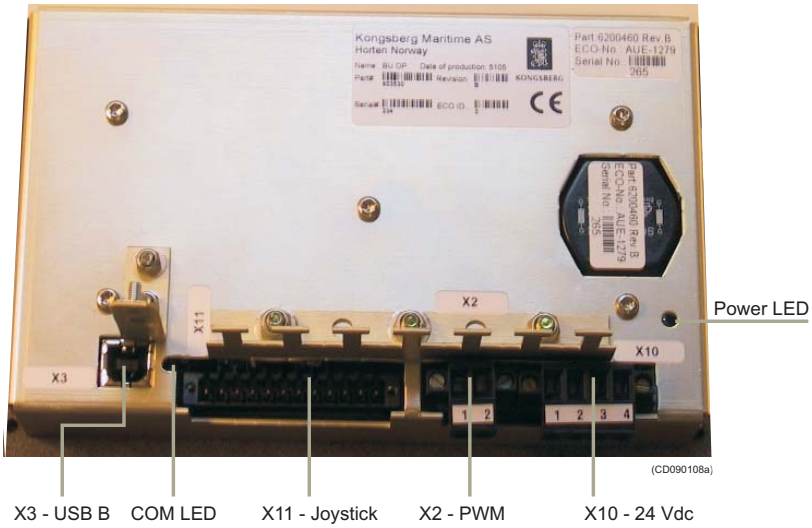
Table 2 Technical specifications

Power specifications	
Input voltage	24 Vdc. nom, 18 to 32 Vdc input range
Power consumption	3.0 W nom, 5.6 W maximum
Current consumption	125 mA nom at 24 Vdc, 233 mA maximum at 24 Vdc
Connectors	
Power (X10)	Weidmuller, SL—SMT5.08/ 4/180FSNSW 1830100000
USB B (X3)	AMP 787780–2 and 787834-1, USB B-type connector
PWM output (X2)	Weidmuller, SL-SMT5.08/ 2/180FSNSW 1837320000
Joystick (X11)	Harting Elektronik, 09 18 516 6914
USB interface	
Standard	USB ver 2.0
Data transfer rate	12 Mbit/s
Analog Input (Joystick)	
Voltage input (#1, 2 and 3)	0–5 V
PWM interface	
Maximum allowed ON current	25 mA
Maximum allowed OFF voltage	32 V
Frequency	600 Hz
Duty cycle range	1 – 99 %
Mechanical specification	
Size without strain relief (WxHxD) Size with strain relief (WxHxD)	256 x 176 x 35.3 mm 256 x 176 x 75.3 mm
Weight	1.0 kg
IP	IP22
Environmental requirements	
Operating temperature	-15 - +55 °C
Storage temperature	-25 - +70 °C
Refer to Kongsberg Maritime Environmental Specification, reg. no.: 848-161011	
Life cycle specifications	
MTBF	not yet available

4 CONFIGURATION

The illustration below shows the location of the status LEDs and connectors on the rear side of the COP-05 BU-DP Panel.

Figure 3 Rear layout of the COP-05 BU-DP Panel



4.1 X2 - PWM connector

X2 is a two-terminal, screw connector with plugable header. The header can be locked to the connector body by one bolt at each end of the header.

Table 3 X2 - PWM connector terminal allocation

Pin no.	Name	Function
1	P	Output positive terminal
2	N	Output negative terminal

4.2 X3 - USB connector

X3 is a vertical, type B USB connector with metal shell. The USB cable can be strapped to a built-in cable support to obtain strain relief (see Figure *Rear layout of the COP-05 BU-DP Panel* on page 12).

Table 4 X3 - USB connector terminal allocation

Pin no.	Name	Function
1	VBUS	Power supply, positive terminal
2	D-	Data signal, negative terminal

Table 4 X3 - USB connector terminal allocation (cont'd.)

Pin no.	Name	Function
3	D+	Data signal, positive terminal
4	GND	Power supply, ground reference
Shell	Shield	Cable shield

4.3 X10 - Power connector

X10 is a four-terminal, screw connector with plugable header. The header can be locked to the connector body by one bolt at each end of the header.

Internal links are provided between pin 1 and 2 and between pin 3 and 4, so that power can be linked to a neighbouring module.

Table 5 X10 - Power connector terminal allocation

Pin no.	Name	Function
1	+24 Vdc	Power supply, positive terminal
2	+24 Vdc	Power supply, positive terminal
3	0 Vdc	Power supply, ground reference
4	0 Vdc	Power supply, ground reference

4.4 X11 - Joystick connector

X11 is a twelve-terminal, screw connector with plugable header. The header can be locked to the connector body by one bolt at each end of the header.

Table 6 X11 - Joystick connector terminal allocation

Pin no.	Name	Function
1	VCC (fused)	+5 Vdc for potentiometer
2	GND (10R)	0 Vdc for potentiometer
3	2.5 V (ref)	N.C.
4	AIN #1	Potentiometer wiper (0–5 V)
5	VCC (fused)	+5 Vdc for potentiometer
6	GND (10R)	0 Vdc for potentiometer
7	2.5 V (ref)	N.C.
8	AIN #2	Potentiometer wiper (0–5 V)
9	VCC (fused)	+5 Vdc for potentiometer
10	GND (10R)	0 Vdc for potentiometer

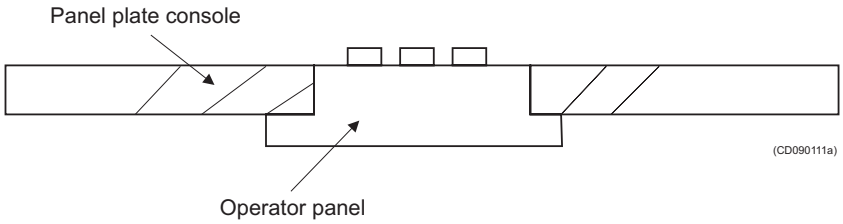
Table 6 X11 - Joystick connector terminal allocation (cont'd.)

Pin no.	Name	Function
11	2.5 V (ref)	N.C.
12	AIN #3	Potentiometer wiper (0–5 V)

5 INSTALLATION

5.1 Mechanical preparation before installation

1. Make a cut-out in the panel plate according to dimensions shown in drawing HA464028 located in Attachment 1.
2. Attach bolts to the panel plate on its rear side for the four fixing nuts of the COP-05 BU-DP Panel.



5.2 Electrical installation

1. Set correct USB address for the module on the hexadecimal switch.
2. Place the COP-05 BU-DP Panel in its position and fasten the four bolts attaching the COP-05 BU-DP Panel to the panel plate. (The panel is mounted from below, see figure above).
3. Terminate the PWM wires to the X2 screw terminals. Fasten the fixing bolts, one at each end of the connector header.
4. Connect the USB cable plug to X3.
5. Terminate the power wires to the X10 screw terminals. Fasten the fixing bolts, one at each end of the connector header.
6. Terminate the joystick wires to X11. Fasten the fixing bolts, one at each end of the connector header.
7. Strap the cables to the strain relief.
8. Provided the corresponding operator station (computer and monitor) is up and running, verify that the COP-05 BU-DP Panel is functioning OK.

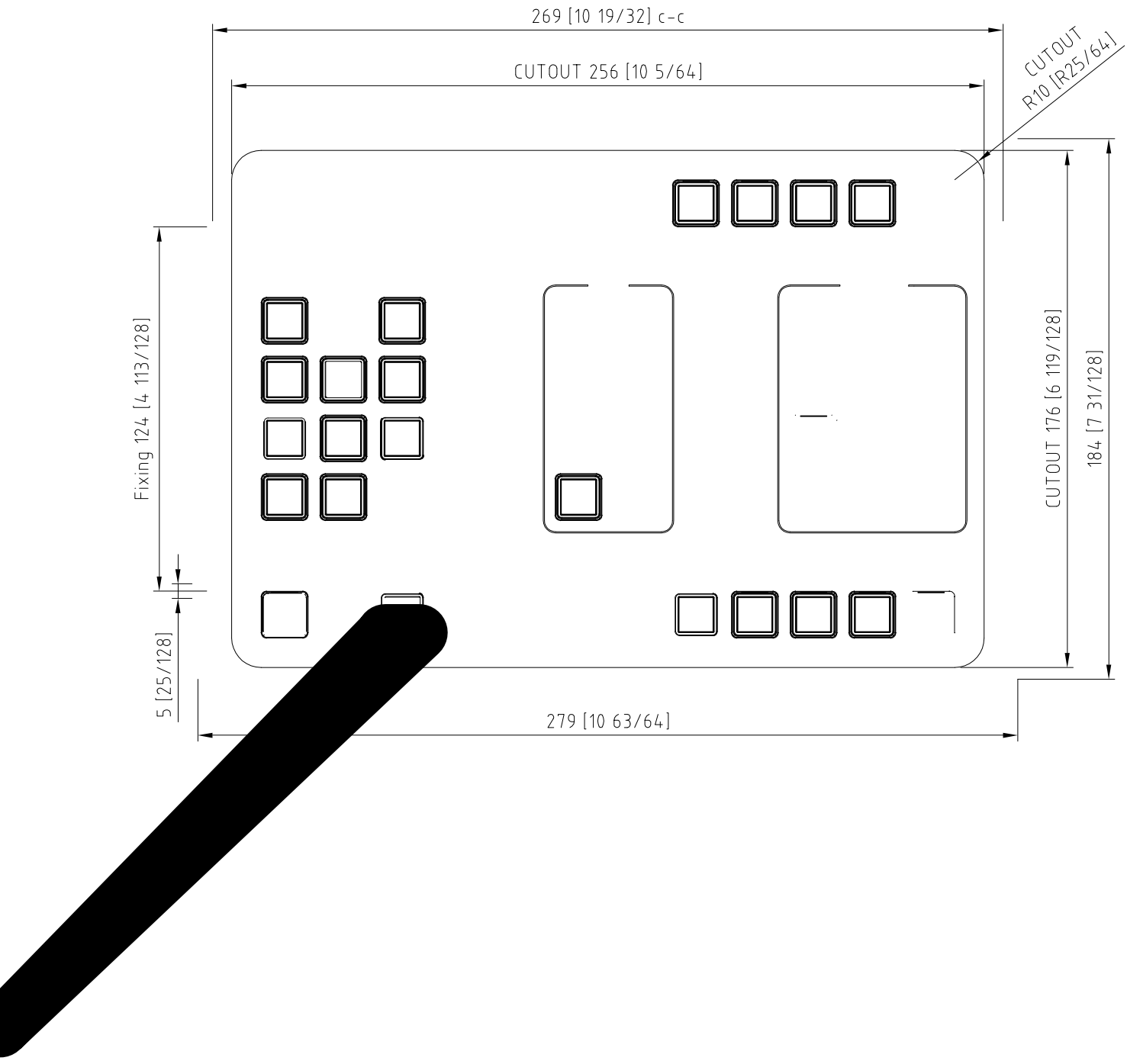
6 REPLACEMENT

1. Remove bolts that fixes the panel plate to its console body.
2. Place the panel plate in a position you can gain access to on both sides.
3. Unstrap the cables from the strain relief.
4. Remove the cable plug X3.
5. Remove the connector headers X2, X10 and X11 by releasing the end bolts using a screw driver with flat bit to split the connector header from the connector body.
6. Release the four nuts attaching the COP-05 BU-DP Panel to the panel plate.
7. Lift the COP-05 BU-DP Panel out of the panel plate.
8. Label the old panel with its error symptoms and put it aside.
9. Set the correct USB address for the new module on its hexadecimal switch.
10. Place the COP-05 BU-DP Panel in its position and fasten the four nuts attaching the COP-05 BU-DP Panel to the panel plate.
11. Reconnect the cable plug X3, and the connector headers X2, X10 and X11 by fastening the end bolts.
12. Strap the cables to the strain relief.
13. Provided the corresponding operator station (computer and colour monitor) is up and running, verify that the COP-05 BU-DP Panel is functioning OK.

7 ATTACHMENT

HA464028/B

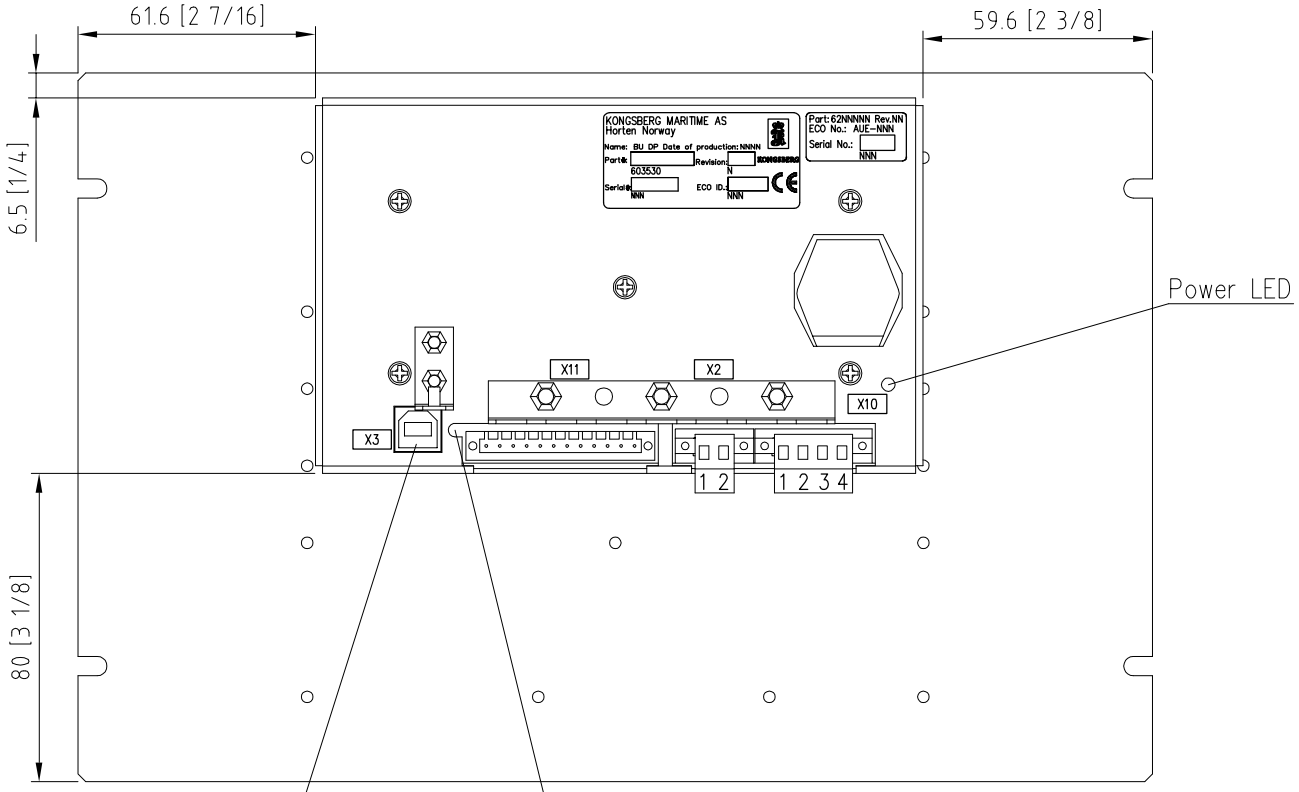
BU-DP PANEL, DIMENSIONS AND CUTOUT, STANDARD MODULE DRAWING


269 [10 19/32] c-c
CUTOUT 256 [10 5/64]
CUTOUT
R10 [R25/64]
Fixing 124 [4 113/128]
CUTOUT 176 [6 119/128]
184 [7 31/128]
5 [25/128]
279 [10 63/64]

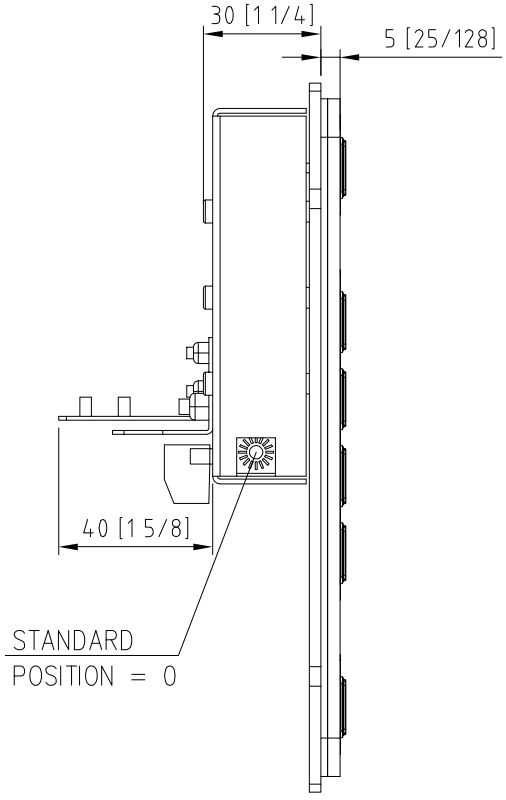
DOC.NO.: S-0653-E

ECO: AOE-011890

REAR VIEW



SIDE VIEW



NOTES

GENERAL TOLERANCES : +/− 0.2mm [1/128inch]
CUTOUT TOLERANCES : −0 +0.4mm [+2/128inch]
INGRESS PROTECTION : IP22
WEIGHT : 1.0kg [2.2lbs]
COLOUR : BLACK
REAR MOUNTING IN CONSOLE PLATE.

CONNECTION : X2 PWM
: X3 USB
: X10 24VDC
: X11 JOYSTICK

POWER CONSUMPTION : 3.0W nom
: 5.6W max

ISSUE	CHANGE	DATE	SIGN
B	COxxxx	05-12-05	BSK
A	1.PROD.ISSUE	05-11-03	BSK

BU DP PANEL

DIMENSIONS AND CUTOUT
STANDARD MODUEL DRAWING

Kongsberg Maritime AS

KONGSBERG

SCALE 1:2	DESIGNED 2005−11−03 BSK	CHECKED 2005−12−05 JTT
	TRACED	APPROVED 1
PROJ.METH.		APPROVED 2 2005−12−05 NHT
FILENAME	REPLACEMENT FOR	REPLACED BY
DWG.NO. HA464028		REV. B
REF.		PAGE 2 of 2

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