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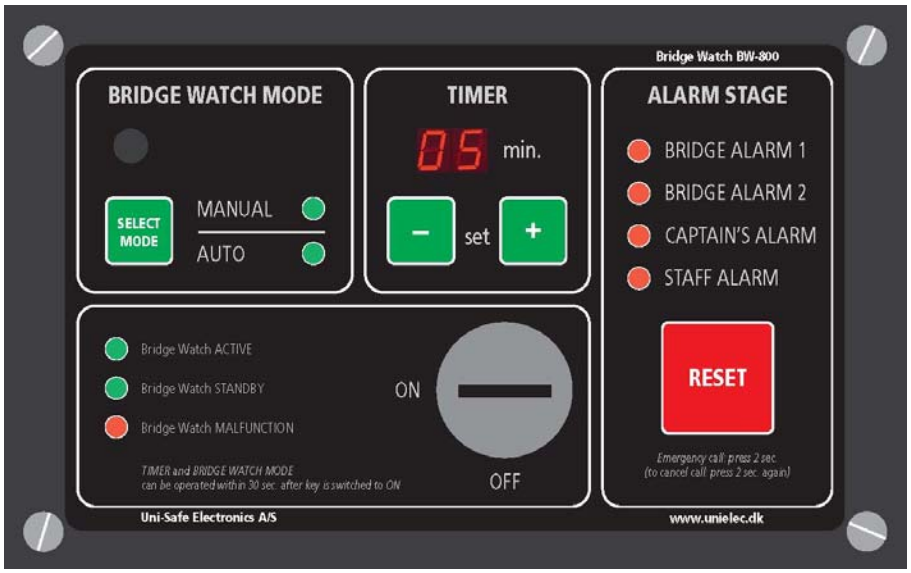
Instruction Manual BW-800



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1) General description

The purpose of a bridge navigational watch alarm system (BNWAS) is to monitor bridge activity and detect operator disability which could lead to marine accidents. The system monitors the awareness of the Officer of the Watch (OOW) and automatically alerts the Captain or another qualified OOW if for any reason the OOW becomes incapable of performing the OOW's duties. This purpose is achieved by a series of indications and alarms to alert first the OOW and, if he is not responding, then to alert the Captain or another qualified OOW. Additionally, the BNWAS may provide the OOW with a means of calling for immediate assistance if required. The BNWAS should be operational whenever the ship's heading or track control system is engaged, unless inhibited by the Captain.

New regulations from IMO's Maritime Safety Committee (MSC) will require carriage of a Bridge Navigational Watch Alarm System (BNWAS) complying with IMO performance standards. For existing ships, the equipment should be installed in connection with the first survey after the following deadlines:

- Existing passenger ships and ships over 3,000 GT: 1 July 2012.
- Existing ships over 500 GT: 1 July 2013.
- Existing ships over 150 GT: 1 July 2014.
- New ships over 150 GT and all new passenger ships constructed after 1 July 2011 shall be equipped with a Bridge Navigational Watch Alarm System.

Complies with following standards:

IMO A.694(17)
IMO A.830(19)
IMO MSC. 128(75)
IEC 62616
IEC 60945
IEC 62288
IEC 61162

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2) Operating instructions

The Bridge Watch can only be activated and deactivated by use of a key. Therefore, only authorised personnel (usually the captain) can decide if the bridge watch alarm should be active or not.

When the key is turned on, it is possible to change BRIDGE WATCH MODE and TIMER for 30 seconds.

BRIDGE WATCH MODE:

Select MANUAL:
In this mode is BW-800 always on and LED for “Bridge Watch ACTIVE” is illuminated.

Select AUTO:
In this mode is BW-800 only active when the ship's heading or track control system is engaged.
When active: The LED for “Bridge Watch ACTIVE” is illuminated.
Not active: The LED for “Bridge Watch STANDBY” is illuminated.

Timer setting:
Turn the key on and adjust the timer by activating the + or – button.
The display on the BW-800 unit is always showing the dormant setting indication.

Bridge alarm 1(visual):
When the timer has run out, a visual warning is activated. This gives the OOW time to reset the timer before the alarm is activated. If the OOW of the ship has not reset the timer within 15 seconds, the 1st of the 3 audio alarms will be activated. The reset of the timer can be done in two different ways: manually by activating a **reset button** or by ensuring a constant movement (activity) sensed by the motion sensor on the bridge.

Bridge alarm 2 (audio):
This alarm is placed on the bridge and is meant to ensure a wakening of e.g. a drowsy ships master. The alarm can be switched off by resetting the timer. If the timer is not reset after 15 seconds the alarm switches to **Captain’s alarm**. Both alarm 1 and 2 is now active.

Captain’s alarm:
This alarm is placed where the back-up officer / captain is presumed to be.
If the alarm is not switched off and there is still no activity on the bridge after 60-180 seconds the **Staff alarm**, now alarm 1, 2 and 3 is activated. The timer can be set from 60-180 seconds during installation, to give time to the back-up officer to react on the alarm.

Staff alarm:
This alarm is placed in the crew area.
Alarm 2 and 3 remains active until the reset button is activated.

Emergency calls:
BW-800 also has an option for connection of emergency calls. This will be in the form of a push button. When activated for 2 seconds the alarm will automatically go to alarm 2 and subsequently to alarm 3 if no action is taken. Using this function the ships master is able to call for assistance if needed.
The emergency call can be switched off by a push on the reset button for 2 seconds.

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3) Installation

Main Power:
Connect power cables (24Vdc) via external fuse from ships main power supply.

Backup power supply:
Connect power cables (24Vdc) via external fuse from a battery backup system able to supply BW-800 for a period of 6 hours (min. 3Ah battery backup)

Reset units:
Connect external reset units with visual alarm (801). The reset function should only be available in positions on the bridge giving proper look out and preferably adjacent to visual indications. The reset function should be easily accessible from the conning position, the workstation for navigating and manoeuvring, the workstation for monitoring and the bridge wings.

Motion sensor:
Mount the Motion sensor/sensors with dual sensor (microwave and PIR detection)
Connect the motion sensor wire to pin 5, 6 and 7.
Use the standard mounting bracket when mounting the motion sensor.

Heading or track control system:
Connect the ship's heading or track control system to the remote activation input. Low voltage will activate BW-800.

Reset 2 input:
Connect other equipment on the bridge, capable of registering operator actions in positions giving proper look out, to Reset 2. A high or low pulse will activate BW-800.

Black box:
Connect BW-800 to the ship’s Blackbox/VDR. Relay is closed when BW-800 is active.

Malfunction:
Connect failure relay output to an external alarm unit.
24Vdc out when BW-800 is okay.

First stage bridge audible alarm:
Mount the 802 unit with visual and audio alarm.

Second stage remote audible alarm:
Mount the 802 unit with visual and audio alarm in the back-up officer’s and/or Captain’s (Master’s) location. An external selector switch can be mounted.

Third stage remote audible alarm:
Mount the 802 unit with visual and audio alarm at the locations of further crew members capable of taking corrective actions.
In vessels other than passenger vessels, the second or third stage remote audible alarms may sound in all the above locations at the same time. If the second stage audible alarm is sounded in this way, the third stage alarm may be omitted.

Automatic dimmer control:
The BW-800 and the reset unit (801) have an automatic dimmer control.
This can be adjusted on the back of the unit at installation.

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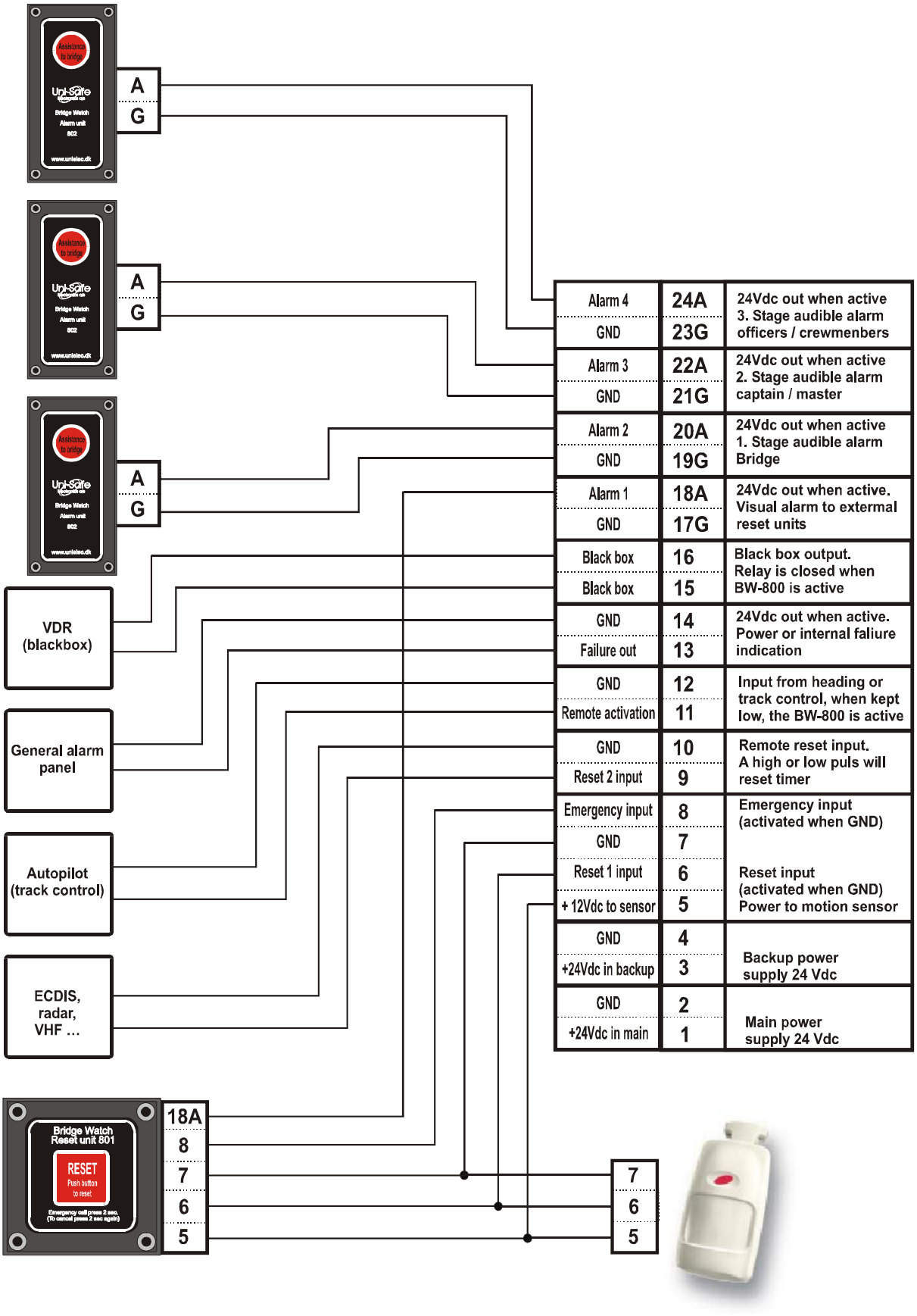
BW-800 installation diagram



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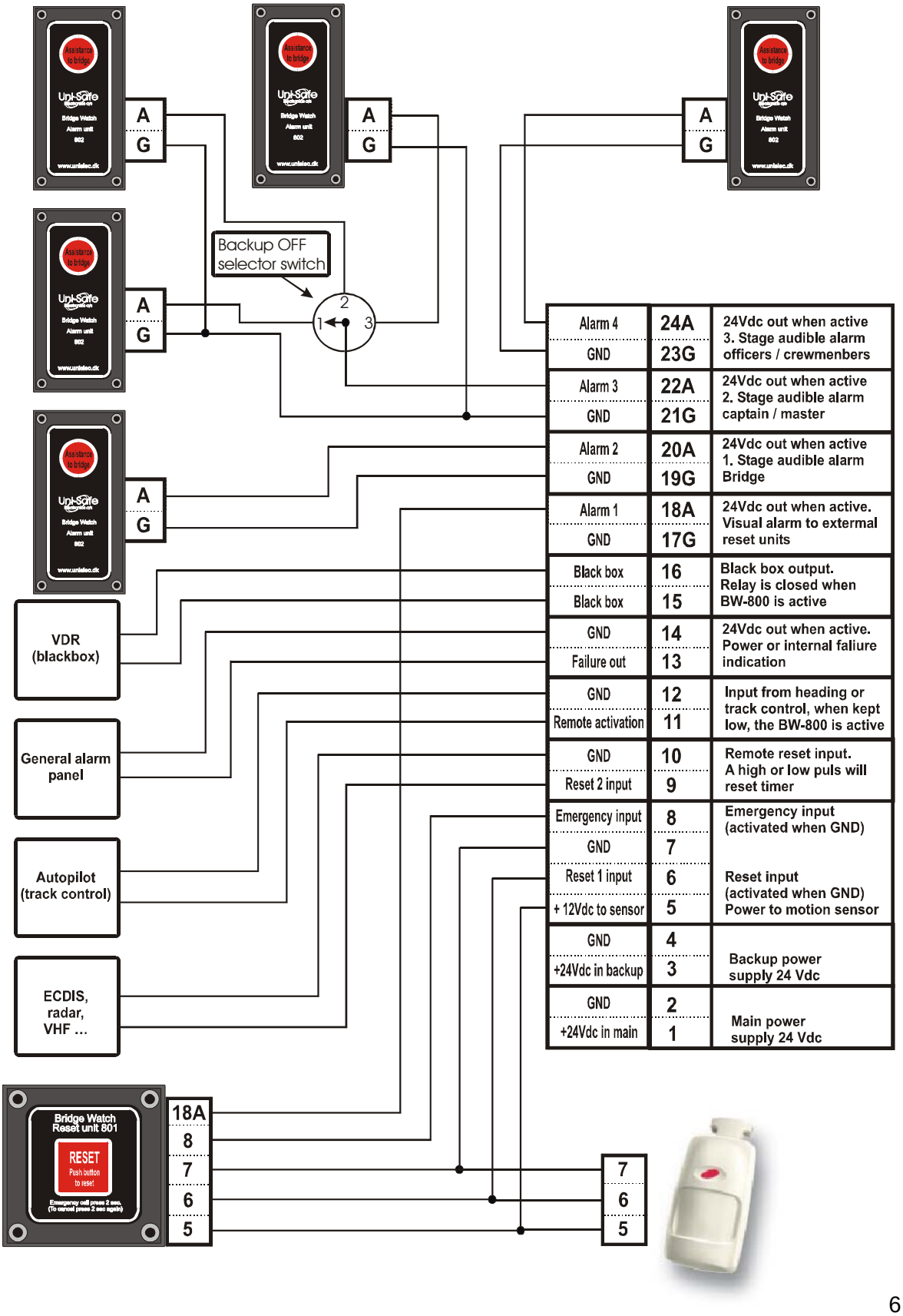
BW-800 installation diagram with backup officer selector switch



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4) Test

	After installation of the system, please test as follows:	OK:
1	Turn BW-800 on, set the timer on 3 minutes and the bridge watch mode in manual.	
2	Go to the external reset unit and do not move for 3 minutes. After 3 minutes check that the reset unit is flashing and it stops if you move or press the reset button.	
3	Leave the bridge for 3 minutes and check that first audible alarm on the bridge sounds.	
4	Go to the captain/master and/or the officer cabins and check that the second stage remote audible alarm sounds 15 seconds after first audible alarm.	
5	Go to the crew area and check that the third stage remote audible alarm sounds 90-180 seconds after second audible alarm.	
6	Go to the bridge and reset all alarms by pushing the reset button.	
7	Press and hold the reset button for 2 seconds. Check that the LED for Captains alarm and staff alarm is illuminated. Cancel the alarm again: Press 2 seconds again.	
8	Remove the fuse from main power and check that the LED for Bridge Watch MALFUNCTION is illuminated. Mount the fuse again.	
9	Remove the fuse from backup power and check that the LED for Bridge Watch MALFUNCTION is illuminated.	
10	Check that equipment connected to the Failure relay output is activated. Mount the fuse again.	
11	If other equipment on the bridge capable of registering operator actions in positions giving proper look out is connected to Reset 2, check that the units can reset the timer.	
12	If the VDR/Black box output is used, check that the input on the VDR is activated.	
13	Turn the key off and on again. Select AUTO mode. Check that the LED for Bridge Watch ACTIVE is illuminated when the ship's heading or track control system is activated.	

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5) Troubleshooting

Step:	Problem:	Description:	Possible Causes:
1	No reset from motion sensor.	Check voltage on Reset 1 input (BW-800 connector pin 6). Low voltage when LED in motion sensor is red. If constant low, remove the wire to the motion sensor and check again.	Standard mounting bracket not used and screws behind the PCB is shortcutting the sensor. Remove the screws and use the standard mounting bracket.
2	No lights in BW-800	Check external fuses Check DC power on terminal 1-4 (24Vdc) Check the cable connections	BW-800 has no power
3	No alarm on bridge and Alarm LED 2 and 3 are always on	Check DC power on terminal 6 on BW-800 (0V/low, only when reset button is pushed or a movement is detected) Movement detector: When the red LED is on, a low pulse is sent from terminal "R" If constantly low: 1) Turn the BW-800 off (key in position off) 2) Remove all wires from terminal 6 3) Set the alarm to 3 minutes and set the key in position on 4) Check that "alarm 1" starts after 3 minutes (BW-800 is then ok) 5) Turn the BW-800 off 6) Mount the wire from one reset button to terminal 6 7) Set the key in position on 8) Check that "alarm 1" starts after 3 minutes 9) Check that you can reset the alarm by pushing the reset button (reset button 1 is ok) 10) Turn the BW-800 off 11) Mount the wire from one movement detector to terminal 6 12) Set the key in position on and don't move 13) Check that "alarm 1" starts after 3 minutes 14) Check that you can reset the alarm by walking around (movement detector is ok) 15) Check additional reset buttons and movement detectors by the same procedure as above	Installation failure Movement detectors defective Reset button defective
4	No alarm 1-3 and the LED's for alarm 1-3 are on	Check the cable connections. Check 24Vdc power at the terminals on the alarm units.	Cable failure Alarm units defective

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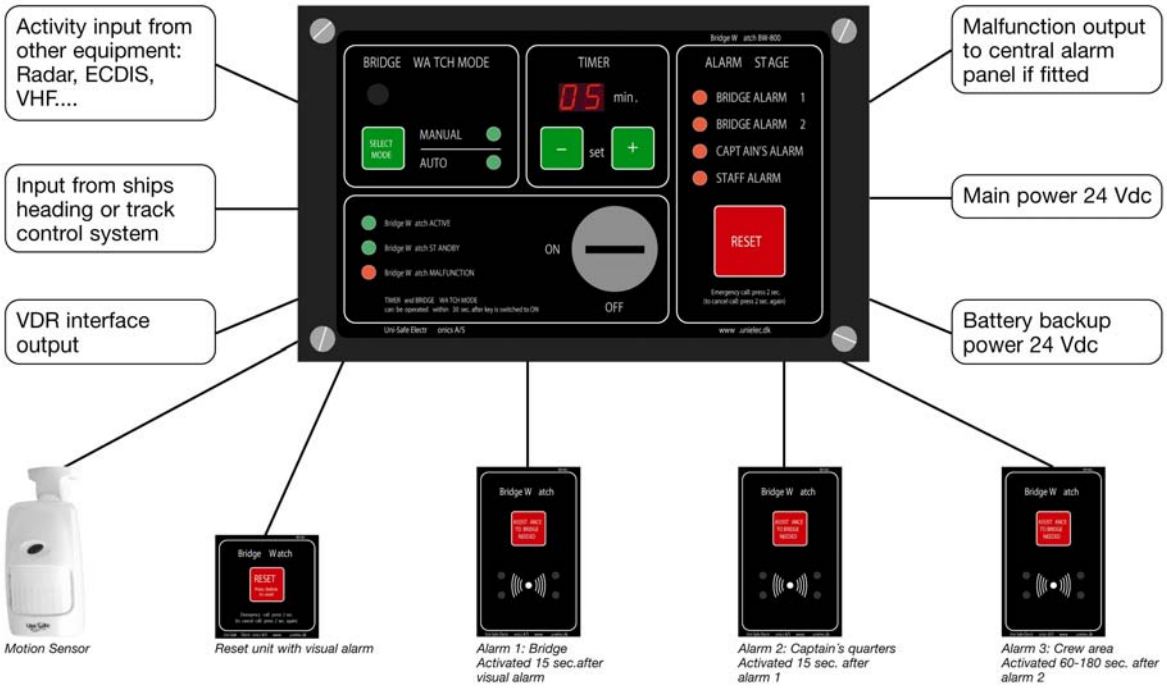
6) Block diagram



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7) Motion sensor

Input Voltage: 9 to 16 VDC
Current Drain: About 28 mA @ 12 VDC

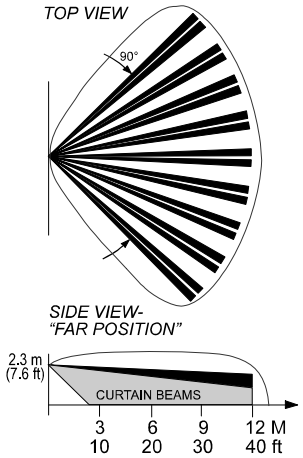
Size (H x W x D): 117 x 65 x 47 mm.
Weight: 109 g (3.85 oz) w/o bracket, 124 g (4.4 oz) with bracket.

PIR SECTION
Detector: Low noise dual-element pyroelectric sensor
Tripping Indication: LED flashes green for up to 5 seconds
Motion Event Verification Counter: Selectable, 1 or 2 events
No. of Beams: 36 in two layers (curtain beams in bottom layer)
Max. Coverage: 12 x 12 m (40 x 40 ft) / 90° field of view
Vertical Adjustment: FAR and NEAR, by sliding the circuit board along a two-position scale.

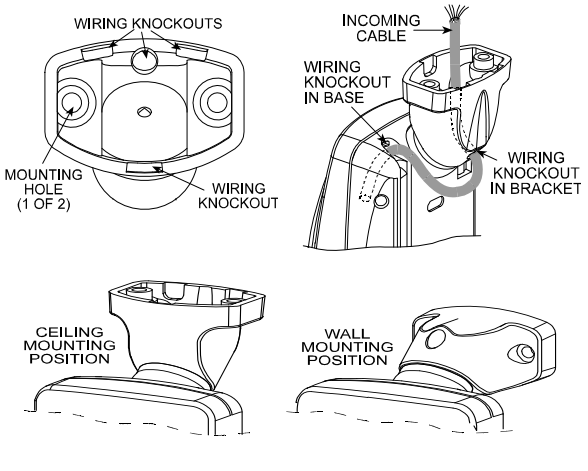
MW SECTION
Oscillator: Microstrip DRO-stabilized Doppler module
Frequency: 10.525 GHz (U.S.A. only) or 2.45 GHz (Europe)
Detection Range: Adjustable from 25% to 100% (3 m to 12 m)
Tripping Indication: LED glows green for up to 5 seconds
Alarm Indication: LED glows red for 1.3 to 5 seconds if both detectors trip

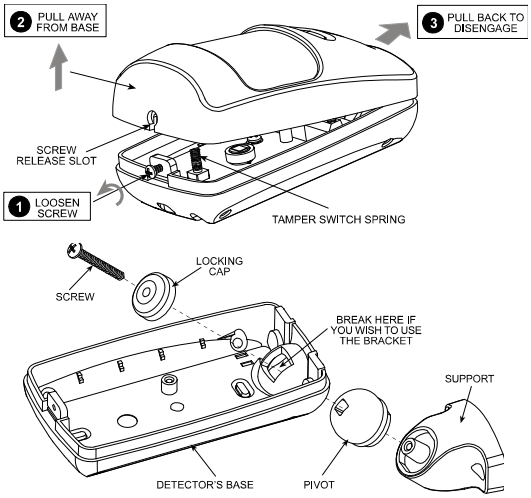
MOUNTING
Height: Up to 3.6 m (12 ft)
Room Size: 8 -12 m (24 - 40 ft) in the "FAR" position;
2 - 8 m (6 - 24 ft) in the NEAR position.
Bracket Adjustment: 20° downward, 20° left and right.
Installation Options: Surface or corner (without bracket);
surface or ceiling (with bracket)

ENVIRONMENTAL
RFI Protection: >30 V/m up to 1000 MHz.
Operating Temperatures: -10°C to 50°C (14°F to 122°F).
Storage Temperatures: -20°C to 60°C (-4°F to 140°F).



Mounting with Swivel Bracket
A. Remove the front cover.
B. Remove the PCB and put it temporarily aside.
C. Punch out the large knockout in the round bulge at the top part of the base.





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Visual Indications
The dual color LED is used to signal various alarm and trouble messages as shown in Table 1 below:

Table 1. *Interpreting the Visual Indications*

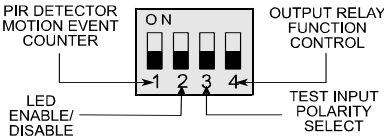
Visual Indication	Significance
None	No detection
Steady green (5 s)	MW walk-test detection
Flashing green	PIR walk-test detection
Steady red (5 s)	Alarm: MW + PIR detection
Flashing red and green (alternately)	- Trouble or masking is being detected by the self test circuitry - Initial warm-up routine (stops 60 seconds after power up).

Notes:

During walk testing, the green light glows steadily (MW detection) or flashes (PIR detection), depending on which one of the two detectors discovered the movement first. Upon subsequent discovery of the movement by the other detector, the green light goes off and the red light glows (alarm).

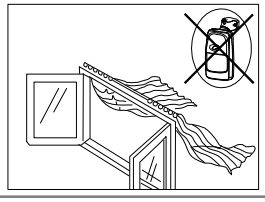
If the LED maintains alternate red and green flashing beyond the warm-up period, a malfunction or masking has been diagnosed. Replace the unit without delay.

The DIP switch mode selector is mounted on the unit's PC board (see Figure 5). It controls four functions as demons- trated in Figure 12 and as detailed in Table 2.

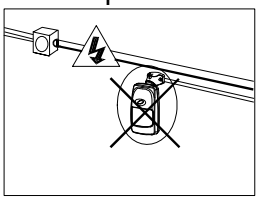


Installation hints:

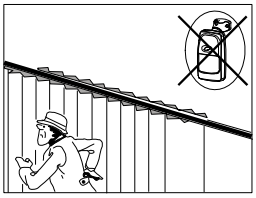
Prevent direct sunlight from reaching the detector

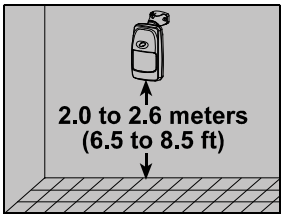


Keep wiring away from electrical power cables

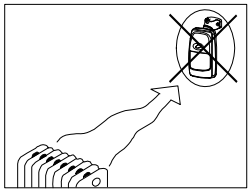


Do not install behind partitions

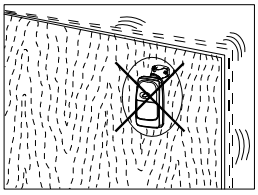




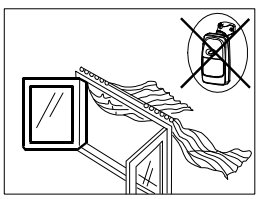
Do not aim at heat sources



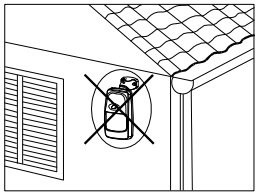
Mount on solid, stable surfaces



Do not expose to air drafts



Do not install outdoors



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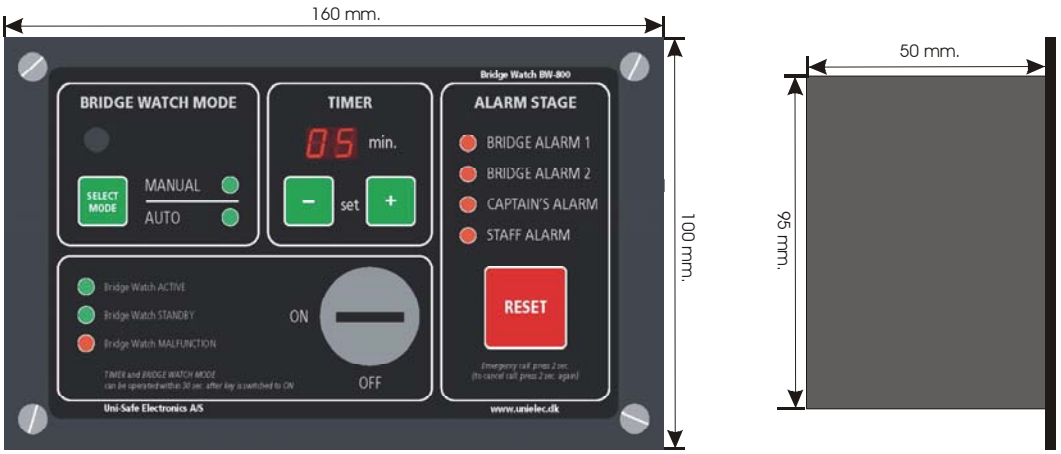
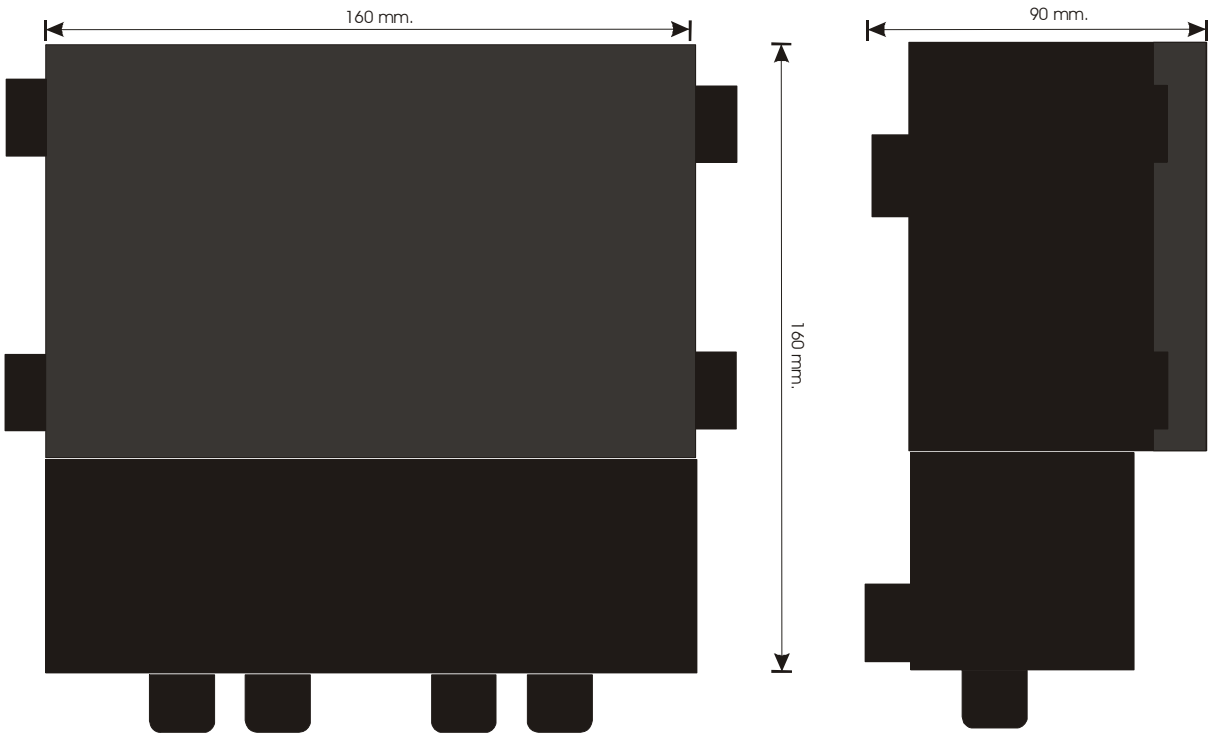
8) Dimension drawings

Flush mounting:
Front: 160 mm x 100 mm
Cut out: 140 mm x 95 mm
Depth: 50 mm



Wall mounting box:
Front: 160 mm x 160 mm
Depth: 90 mm



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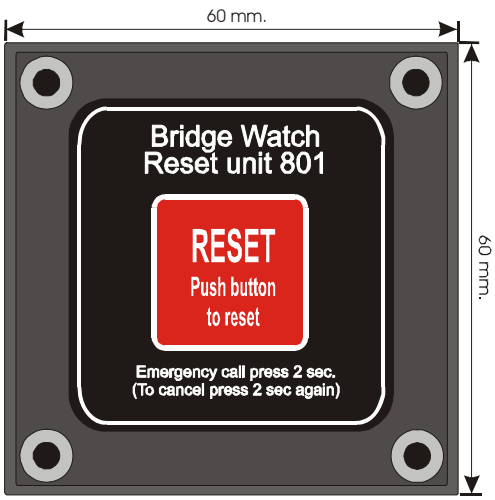
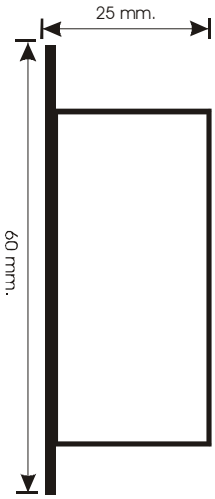
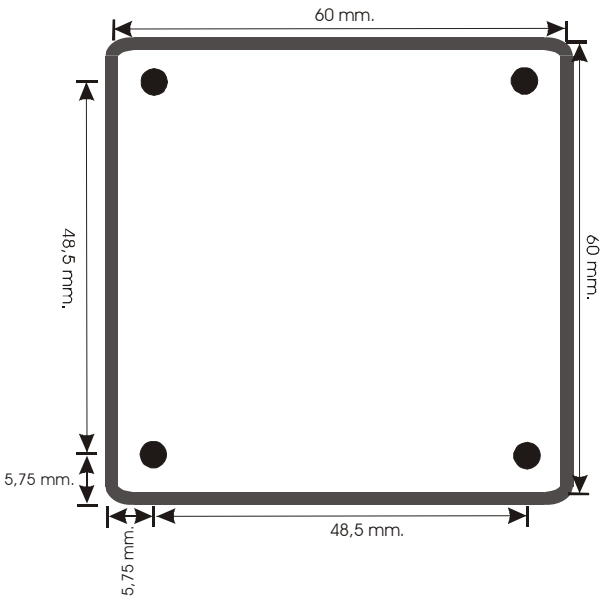
801 dimension drawing

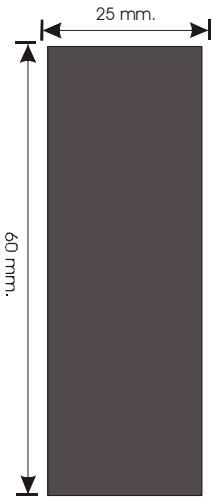
Panel mounting:





Wall mounting foundation for 801:





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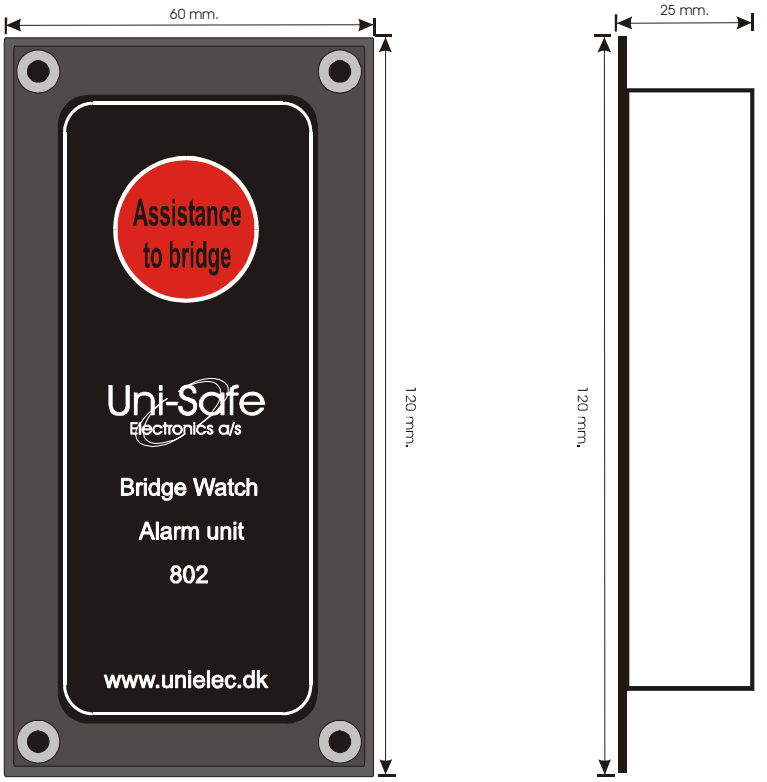
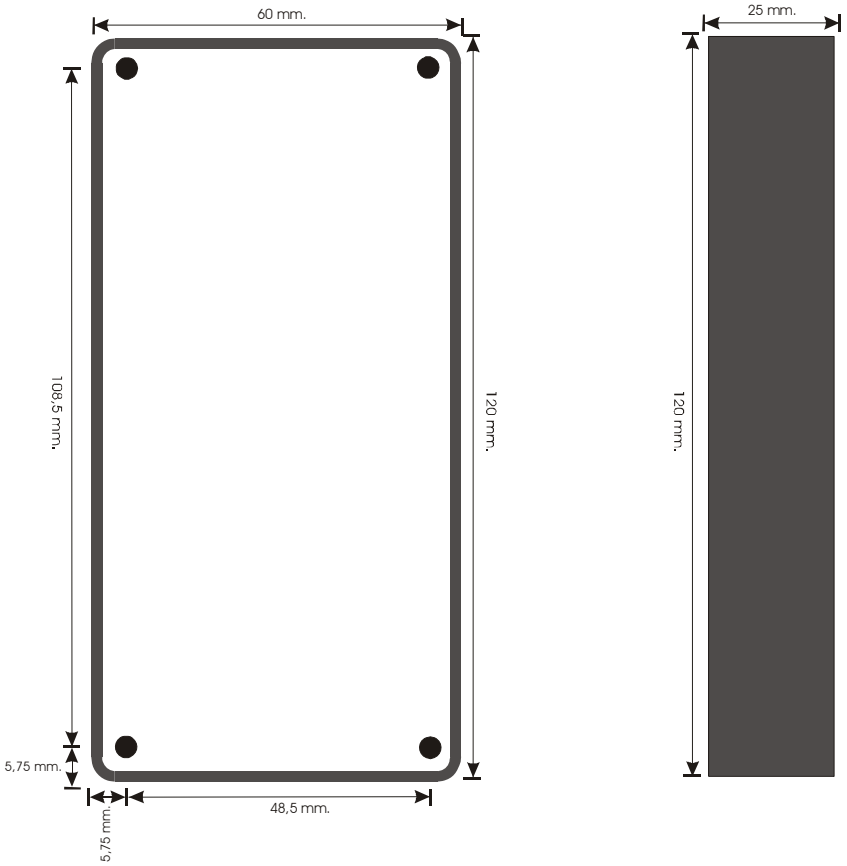
802 dimension drawing

Panel mounting:



Wall mounting foundation for 802:



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9) Specifications

Mains supply:
24Vdc
Mains supply must be secured against overcurrent with an external fuse. Max. 500 mA

Timer interval:
3-12 min.

Battery backup:
24Vdc
Battery backup supply must be secured against overcurrent with an external fuse. Max. 500 mA.
Battery backup must be able to supply BW-800 for a period of 6 hours (min. 3 Ah battery backup)

Cable connections:
Input:
Mains power supply 24 Vdc
Battery backup power supply 24 Vdc
Reset pulse from radar
Autopilot positive pulse
Autopilot negative pulse
Output:
12 Vdc to motion sensor
Indication to black box (when active)
Alarm for malfunction/power failure

Display:
2 LED displays (2 digits)
Relay contacts:
Max. 10 A / 24 Vdc.
Relay contacts must be secured against overcurrent with external fuses

Protection:
IP 65 (IP 67 when mounted in wall box)

Abbreviations:

BNWAS:	Bridge Navigational Watch Alarm System
OOW:	Officer On Watch (on the bridge)
LED:	Light Emitting Diode (a little lamp)
VDR:	Voyage Data Recorder

Glossary:

Motion sensor:	Unit that detect movement on the bridge