



# Amplified Batteryless Telephone System

## VSP-M 20-Way

## About this Document

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### Document Scope

This document is intended for qualified technicians who will install and service the VSP-M 20-Way Amplified Batteryless Telephone System on marine vessels.

The document provides relevant information on system features, available equipment, typical configurations, simplified wiring and programming, and technical data for the system.

Interconnection procedures, hardware requirement and special terminal programming for configuration are also described.

The following station models (version 6.0) are available for the VSP-M system:

Product	Item Name	Item Number
Main Station, panel mounted	VSP-211M-L	3006200025
Main Station, panel mounted with relay circuit	VSP-212M-L	3006200028
Main Station, watertight	VSP-22M	3006200030
Main Station, panel mounted, indoor unit	VSP-213M-L	3006200029

### Publication Log

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4.0	23-04-2008	JF	published
5.0	27-10-2009	HKL	published
5.5	18-05-2010	HKL	Complete DIP switch settings Revised cabling diagram
6.0	22-7-2011	HKL	Version 6.0 station models, revised block diagram
6.1	16-5-2012	HKL	Revised block diagram
7.0	1-11-2018	HKL	Ground removed on wiring diagram

### Related Documentation

For further information about the VSP-M Amplified Batteryless Telephone System not covered by this manual, refer to the following documentation:

Doc. no.	Subject	Documentation
A100K10756	VSP-M 20-Way Amplified Batteryless Telephones	Getting Started Guide
A100K10873	VSP 12 Way Amplified Batteryless Telephones	Technical Manual
VSP-Ex_iu	Intrinsically Safe Set for VSP VSP-5012 Buffer unit & VSP-512 Main station	Installation & User Manual

# Contents

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<b>1</b>	<b>General Description</b> .....	<b>4</b>
1.1	System.....	4
1.2	Station Types .....	5
<b>2</b>	<b>Functional Description</b> .....	<b>6</b>
2.1	Power.....	6
2.2	Calling.....	7
2.3	Amplifier.....	7
2.4	Call Signal.....	7
2.4.1	Stations for Use in Safe Areas.....	7
2.4.2	Stations for Use in Hazardous Areas.....	7
2.5	Handset.....	8
<b>3</b>	<b>Installation Instructions</b> .....	<b>9</b>
3.1	Connection.....	9
3.2	Cabling.....	9
3.3	Compass Safety.....	11
3.4	Setting Extension Number .....	11
<b>4</b>	<b>Operation</b> .....	<b>12</b>
<b>5</b>	<b>Troubleshooting</b> .....	<b>13</b>
5.1	Conversation Lines .....	13
5.2	Call Tone .....	13
<b>6</b>	<b>Specifications</b> .....	<b>14</b>
6.1	Electrical Specifications .....	14
6.2	Certificates .....	14
<b>7</b>	<b>DIP Switch Settings for Extension Numbers</b> .....	<b>16</b>
<b>8</b>	<b>Station &amp; Mounting Dimensions</b> .....	<b>17</b>
8.1	VSP-211M-L.....	17
8.2	VSP-212M-L.....	17
8.3	VSP-213M-L.....	18
8.4	VSP-22M.....	18

## Figures

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Figure 1	System Configuration Example.....	4
Figure 2	Main station VSP-211M-L principle diagram.....	6
Figure 3	Cabling diagram based on system configuration example .....	10
Figure 4	DIP switch setting example.....	11
Figure 5	Extension number label .....	11

# 1 General Description

## 1.1 System

The VSP-M Amplified Batteryless Telephone System is designed for safe, loud and clear communication, and as a replacement for the conventional Sound Powered Telephones.

The conventional facilities are retained and a low power consumption amplifier with capacitor-battery ensures excellent communication.

Through the use of dynamic microphone- and receiver-inserts, speech and hearing levels that are 4 times louder can be obtained as compared to the Sound Powered Telephones.

The VSP-M system is independent of the vessel's power supply and fulfills the demands for emergency communication between vital locations onboard.

The VSP-M system described in this manual is a system comprising up to 20 main stations with selector switches for selective calling between all connected stations.

By connecting a 24V DC power supply, the VSP-M system can also be used as a Common Battery Telephone System.

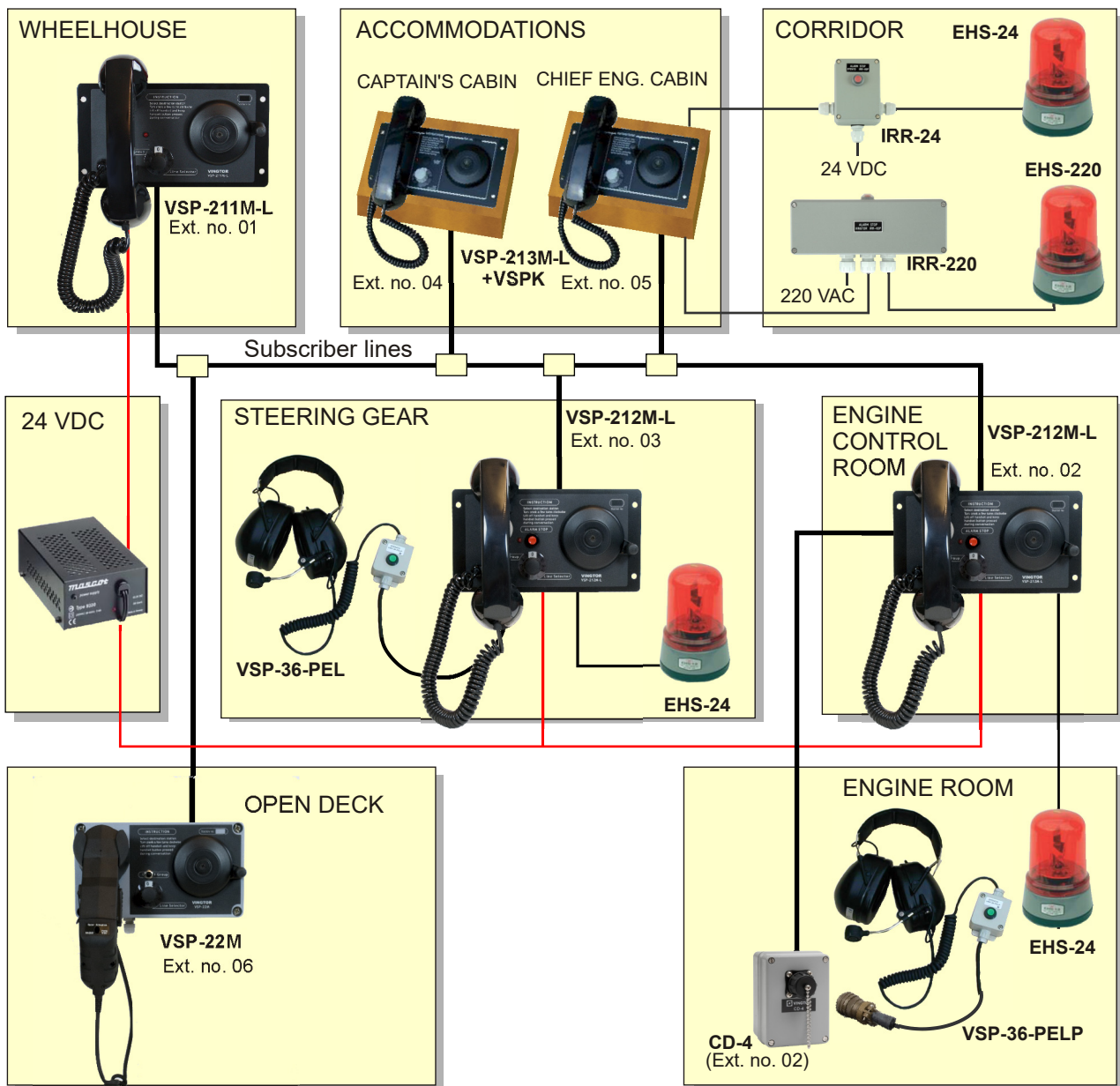


Figure 1 System Configuration Example

## 1.2 Station Types

The VSP-M 20-Way system is a range of stations with up to 20 extensions designed to provide clear and secure communication in any area and under all conditions on board a vessel or rig.

The various station types can be mounted to suit particular onboard environments.

Mounting	Environments
Flush or panel	Bridge and Control Rooms
Desktop	Accommodations
Light wall	Noisy areas
Bulkhead	Deck areas, Hazardous areas

The following station types are version 6.0 models.



### **VSP-211M-L Main Station, panel mounted wheelhouse unit**

- Main station with built-in amplifier
- Desk or bulkhead mounting with corresponding wooden or on-wall metal back-box
- Suitable for wheelhouse and control rooms



### **VSP-212M-L Substation, panel mounted with relay**

- Alarm stop button
- Noise compensating microphone
- Desk or bulkhead mounting with corresponding wooden or on-wall metal back-box
- Suitable for control rooms and noisy areas



### **VSP-22M Substation, watertight**

- Substation in watertight housing
- Water resistant military spec handset
- Bulkhead mounting
- Suitable for bridge wings and open deck areas



### **VSP-213M-L Substation, panel mounted indoor unit**

- LED call indicator
- Desk or bulkhead mounting with corresponding wooden or on-wall metal back-box
- Suitable for control rooms and accommodations

For further information about VSP-M stations and accessories, visit [www.vingtor.com](http://www.vingtor.com).

## 2 Functional Description

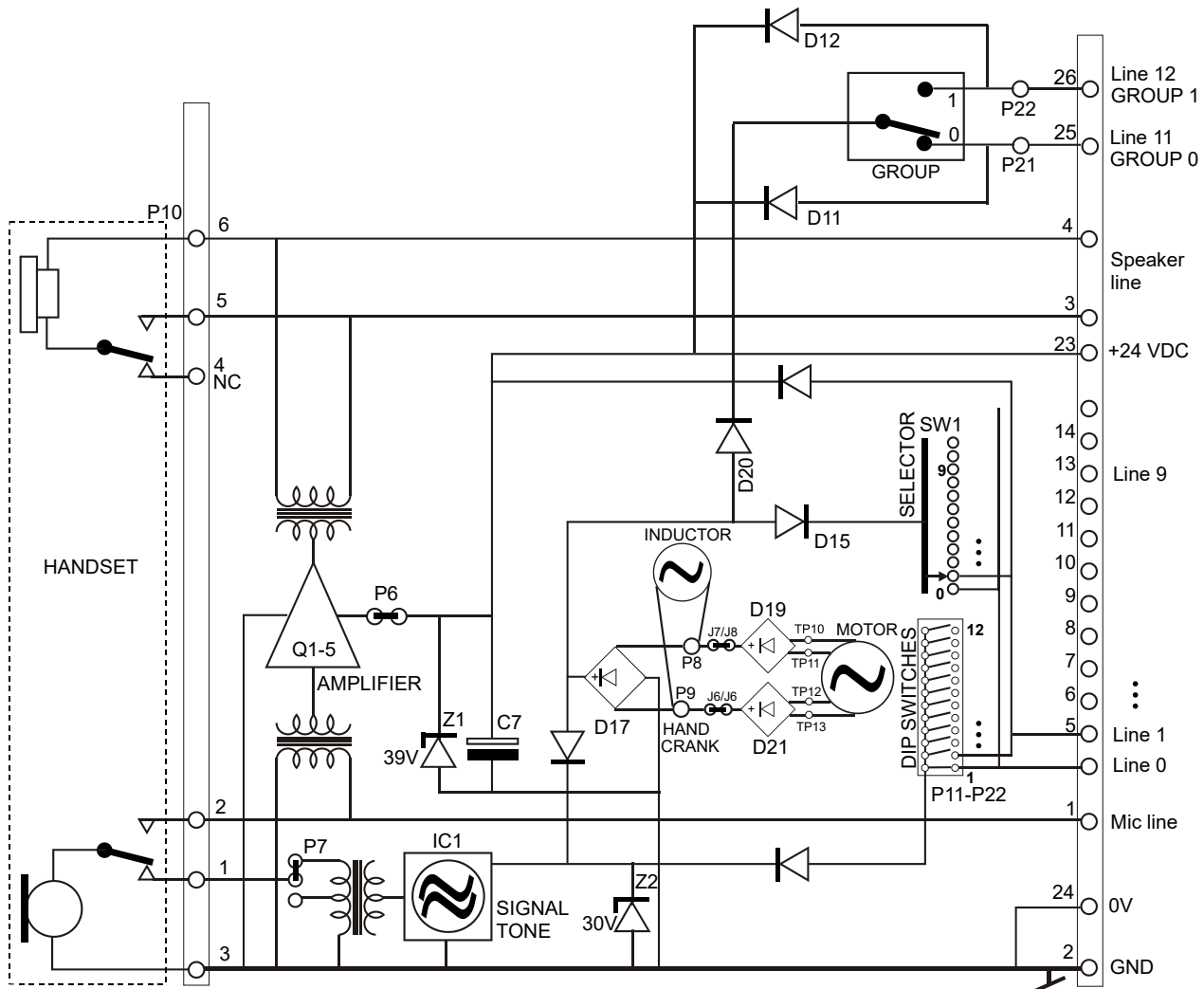


Figure 2 Main station VSP-211M-L principle diagram

### 2.1 Power

- An AC voltage appears between TP10/TP11 and TP12/TP13 when the hand crank is activated. This voltage is rectified in D19 and D21, providing DC power for two purposes:
  - Powering the amplifier
  - Creating a call signal

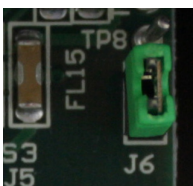
① P8 and P9 together with D17 enables the use of the board with the old inductor.

- When a call is being made, the actual line will carry a generated voltage. This voltage is fed through the active line via the corresponding diode D11 and D12 to the amplifier.

- A permanent amplifier 24 VDC power can be supplied on the connection block terminal 23 (+) and 24 (-).

① To avoid noise problems, the 24 VDC power supply must be connected via a DC/DC converter.

① Note that the circuit boards can be used as spare parts for the older VSP units. When using boards with inductors, remove jumpers from pins J6 and J7/J8 and insert a jumper on pin J9 located to the left of the DIP switches.



## 2.2 Calling

- The station's extension number is set by DIP switches P11 - P22. This will activate the call signal generator in the called station and provide power to the amplifier.
- The desired station is selected by setting the **Group** switch to either 0 or 1 and the rotary switch (**Line Selector**) to numbers from 0 to 9 giving 20 station extensions from 00 to 19. When turning the hand crank, a voltage is supplied to the selected line.

## 2.3 Amplifier

Only the Main Station VSP-211M-L has a built-in microphone amplifier. This amplifier is used by all stations in the system.

- The capacitor C7 will be charged and act as the battery power for the transistorized amplifier.
  - The voltage across C7 is limited to 39 VDC by the Zener diode Z1.
  - The voltage will slowly decrease to less than 20 V during a period of 15 to 20 minutes. Despite the change in voltage level, full amplification will be obtained during this period.
- The amplifier quiescent current can be measured by replacing the strap P6 with a uA-meter.
  - The quiescent current is set to  $I_q = 20 \text{ uA}$  at  $U = 20\text{-}30 \text{ V}$  when delivered from the factory and can be adjusted by RV1.

## 2.4 Call Signal

### 2.4.1 Stations for Use in Safe Areas

- The oscillator will start when the hand crank is activated and the DC voltage exceeds Zener diode Z2 limitation (30 V).
  - A call tone will be heard in the handset microphone both at the calling station and the station being called. (In this case, the dynamic microphone acts as a 'loudspeaker').
  - The calling tone frequency is 2500 Hz.

It is not recommended to change the call tone frequency because it is adjusted to the mechanical resonance of the handset.

The call tone has a fluttering frequency at about 15 Hz because of the crank speed.

Depending on environmental noise, it is possible to choose a high or low level for the call tone by strapping P7 on the station PCB.

### 2.4.2 Stations for Use in Hazardous Areas

- No call signal is supplied in EX approved stations (VSP-512) used in hazardous areas.
  - Calls to a station in a hazardous area will be indicated by use of EX approved audible or visible signal units.
  - When VSP-512 is called, a relay in the buffer unit will be activated and necessary power for the signal devices will be supplied.

## 2.5 Handset

The microphones in all stations are connected to the same line when their handset button is pressed. This line is connected to the input transformer of the system amplifier located in VSP-211M-L.

The microphone line is marked 1 and 2 on the screw terminals in all VSP-M units.

The speakers in all station handsets are connected to the same line when the handset button is pressed. This line is connected to the output transformer of the system amplifier located in VSP-211M-L.

The speaker line is marked 3 and 4 on the screw terminals in all VSP-M units.



## 3 Installation Instructions

In a VSP-M system, one station MUST BE a VSP-211M-L where the transistorized amplifier is located. This amplifier is used by all stations.

The other stations in the system can be any other VSP station type, depending on the requirements and environments.

### 3.1 Connection

All stations in a VSP-M system are connected in parallel, i.e. all terminals with the same number are linked together in all stations.

Some stations have additional terminals for station type related connections.

#### **All VSP-M stations**

General screw terminal block numbered from 1 to 16.

Microphone line	1 (signal) and 2 (ground)
Speaker line	3 and 4 (balanced)
Station lines	5 to 14, 25 & 26 (lines 1 to 20)

#### **VSP-212M-L station**

This station has a built-in latch relay circuit for activating external audible and/or visible signal units. Additional terminals 17 - 22 are added for this feature.

Local 24 VDC for signal unit	17 (+24 V) and 20 (0 V)
Signal unit connection	18 (+24 V) and 19 (0 V)
Alarm stop button	21 and 22

#### **VSP-211M-L station**

The VSP-M system can also work as a common battery telephone system when an external 24 VDC power supply is connected to the system amplifier. Two terminals are added for this purpose.

External power in	23 (+24 V) and 24 (0 V)
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① *To avoid noise problems, the 24 VDC power supply must be delivered via a DC/DC converter.*

### 3.2 Cabling

The recommended cable is 0.5 sq. mm revolved in pairs with an outer insulated screen, like RCOP.

The number of wires needed depends on the number of stations in the system.

- Two twisted pairs are used as microphone (1 pair, terminals 1 & 2) and speaker (1 pair, terminals 3 & 4) lines. In addition, one wire is used for each station selection, 0 to 9 (5 pairs). One wire each is used for Group 0 and Group 1 (1 pair). A full system with 20 stations therefore requires 8 pairs of wires.
- The screen must be connected to terminal 2 in VSP-211M-L to avoid noise problems.

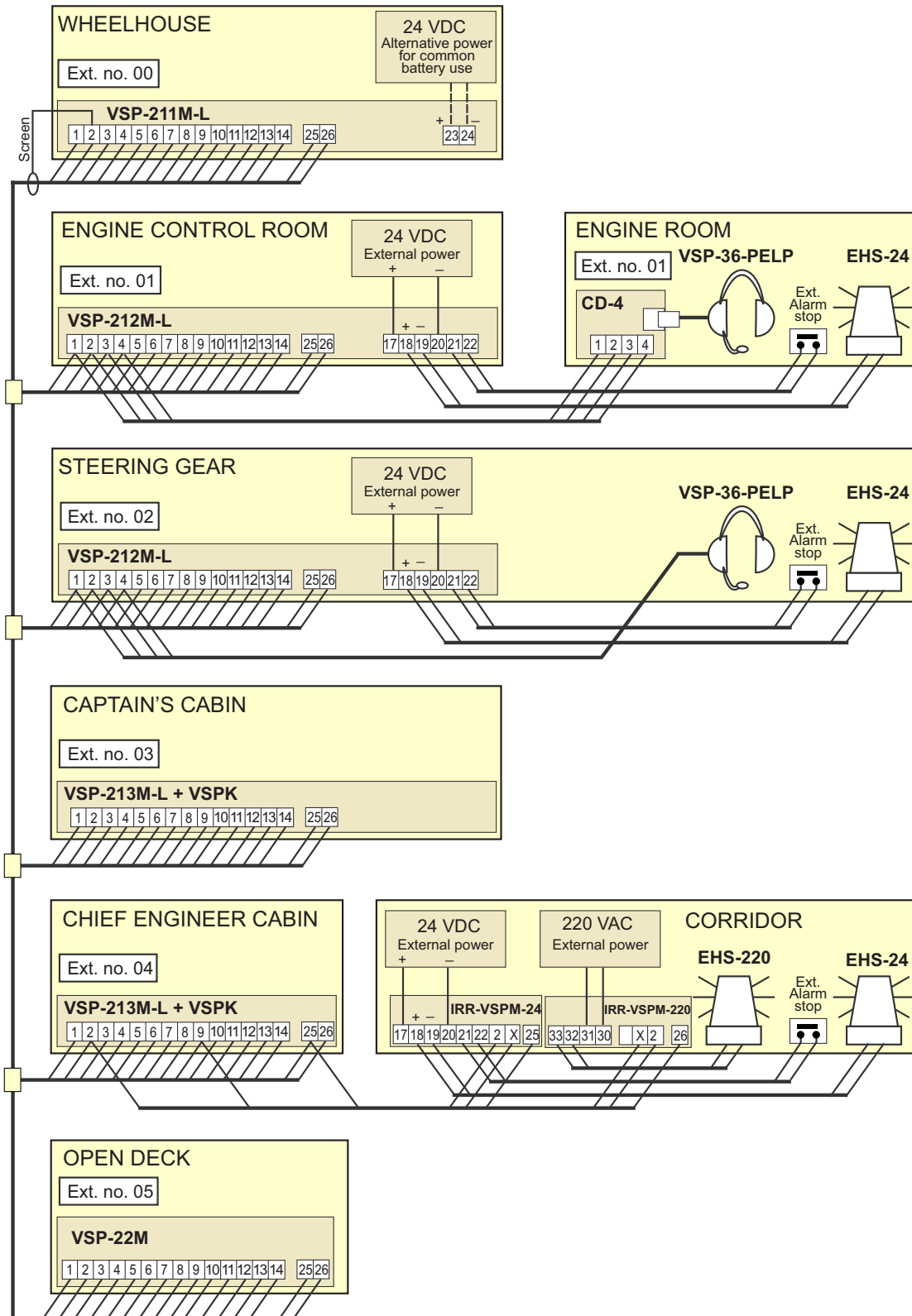


Figure 3 Cabling diagram based on system configuration example

### 3.3 Compass Safety

The station units must be installed at least 155 cm away from the vessel's magnetic compass.

### 3.4 Setting Extension Number

Each VSP-M station must have its own unique extension number, 00 to 19, set by DIP switches. The DIP switches are activated by sliding them to the ON position.

To set the extension number:

1. Remove jumpers from pins J2 and J3.
2. Set the first digit (**Group**) in the extension number according to:  
switch 11 = 0 or switch 12 = 1
3. Set the second digit in the extension number according to:  
switch 1 to 10 where switch 1 = 0, switch 2 = 1 .... switch 10 = 9

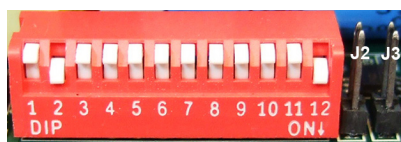


Figure 4 DIP switch setting example

Example:

- For extension no. 03, set switch 11 and 4 to the ON position
- For extension no. 11, set switch 12 and 2 to the ON position (see example on left)

For information on all extension number settings, see section 7 *DIP Switch Settings for Extension Numbers*.



Figure 5 Extension number label

A label strip with numbers 00 to 19 is shipped with each station.

- Fix the label with the relevant extension number in the frame next to the text *Station no* at the front of the station.

## 4 Operation

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To make a call to another station:

1. Set the extension number (00 - 19) of the station you wish to call:
  - Select the first digit by setting the **Group** switch to either 0 or 1.
  - Select the second digit by setting the rotary switch (**Line Selector**) to numbers from 0 to 9 (numbers 10 and 11 are blocked).
  - Example: to make a call to extension number 15, set the GROUP switch to 1 and the rotary switch to 5.
2. Turn the crank clockwise until a loud beeping tone is heard from the station.
  - About 5 to 6 turns will be required.
3. Lift the handset, press the button on the handset and keep it pressed during the entire conversation.

You may now converse with full power and without distortion for a guaranteed period of 20 minutes.

After 20 minutes, the conversation period can be extended by turning the crank again.

- By calling a station with a built-in relay circuit for operating external signal units, the relay is activated for about 20 seconds. The signal may be muted earlier than 20 seconds by pressing the ALARM STOP button located at the front of the station.

The relay circuit can also be delivered built into a separate wall-mount box and hooked up to any actual station.

In noisy areas, a headset with a noise compensating microphone may be connected to the station, either fixed-connected or plugged into a separate plug box.

# 5 Troubleshooting

## 5.1 Conversation Lines

### One station is not working

- Verify that the station has the correct address set on the DIP switches.
- Check the cable and terminal connections numbers 1, 2, 3 and 4 in the non-working station.

### One or more stations are not working

- Check connection cable
- Check plugs/sockets for portable units
- Check handset/headset used

### No stations in the system are working

- Check that the voltage on P6 is between 20 and 39 V.
- Check quiescent current.
  - The amplifier quiescent current can be measured by replacing the strap P6 with a uA-meter.
  - The quiescent current is adjusted by RV1 to 20 uA at  $U_{C7} = 20-30$  V.
- The amplifier in VSP-211M-L may be defective.
  - Replace the station with one that is in working order.

## 5.2 Call Tone

### Station receives calls from both groups

- Verify that only DIP switch 11 for Group 0 or only DIP switch 12 for Group 1 are set to the ON position.
- Remove jumpers from pins J2 and J3.

### No call tone in own station

- Check the P8/P9 connections to the generator and rectifier in the station
- Check that the generator is working by use of an AC voltmeter while operating the crank or by use of an ohmmeter between P8 and P9.

### No call tone in called station

- Check the cable connection to the corresponding station number.

	Line Selector SW1														Group Selector S1	
Terminal no.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	25	26
Station no.					00	01	02	03	04	05	06	07	08	09	0	
Station no.					10	11	12	13	14	15	16	17	18	19		1

- Check that the voltage across Z2 is 30 V when called.
- The oscillator in the called station may be defective.
  - Replace the station with one that is working.

① *Stations used in hazardous areas do not have a call tone oscillator.*

# 6 Specifications

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## 6.1 Electrical Specifications

### Built-in system amplifier

Operating voltage (C7 battery):	39 – 20 VDC
Operating voltage (external supply):	24 VDC
Frequency range (-3dB):	180 – 4500 Hz
S/N ratio:	< -55 dB
TDH-N:	< 1%
Amplifier input impedance:	Z = 213 ohm @ 1 kHz Z = 180 ohm @ 250 Hz (R = 52 ohm)
Microphone signal level:	5 - 10 mV
Microphone impedance:	135 ohm @ 1 kHz
Amplifier output impedance:	Z = 92 ohm @ 1 kHz Z = 60 ohm @ 250 Hz (R = 1.5 ohm)
Speaker signal level:	0.7 V
Speaker impedance:	135 ohm @ 1 kHz
Compass safety distance:	155 cm

## 6.2 Certificates

The system components have a light, robust and corrosion resistant construction, and conform to the following Product Specifications:

- IEC 533, 2<sup>nd</sup> edition, June 1996;  
*«EMC of Electrical and Electronic Installation in Ships and of Mobile and Fixed Offshore Units»*
- Det Norske Veritas (DNV), Certification Notes no. 2.4;  
*«Environment test Specification for Instrumentation and Automation Equipment»*

### Optional EMC requirements

- IEC 945, February 1995;  
*«Maritime navigation and Radio Equipment and Systems - general requirements, methods of testing and required test results»*

### CENELEC

- EN50081-1 January 1992;  
*«Generic emission standard, Part 1: Residential, commercial and light industry»*
- EN50082-2 March 1995;  
*«Generic immunity standard, Part 2: Industrial environment»*

### Test reference

Report No.:	96-1196
Issued by:	DET NORSKE VERITAS AS
Report No.:	S97 0662a and S97 0662b
Issued by:	Jydske EMC Lab A/S, Denmark

**Type approval certificates**

Certificate no.: A-10636  
Valid until: 2012-06-30  
Issued by: DET NORSKE VERITAS AS (DNV)

Certificate no.: ELE/436605CS1  
Valid until: 2011-03-15  
Issued by: Registro Italiano Navale (RINA)

Certificate no.: 03/00041(E1)  
Valid until: 2013-04-07  
Issued by: Lloyd's Register (EMEA)

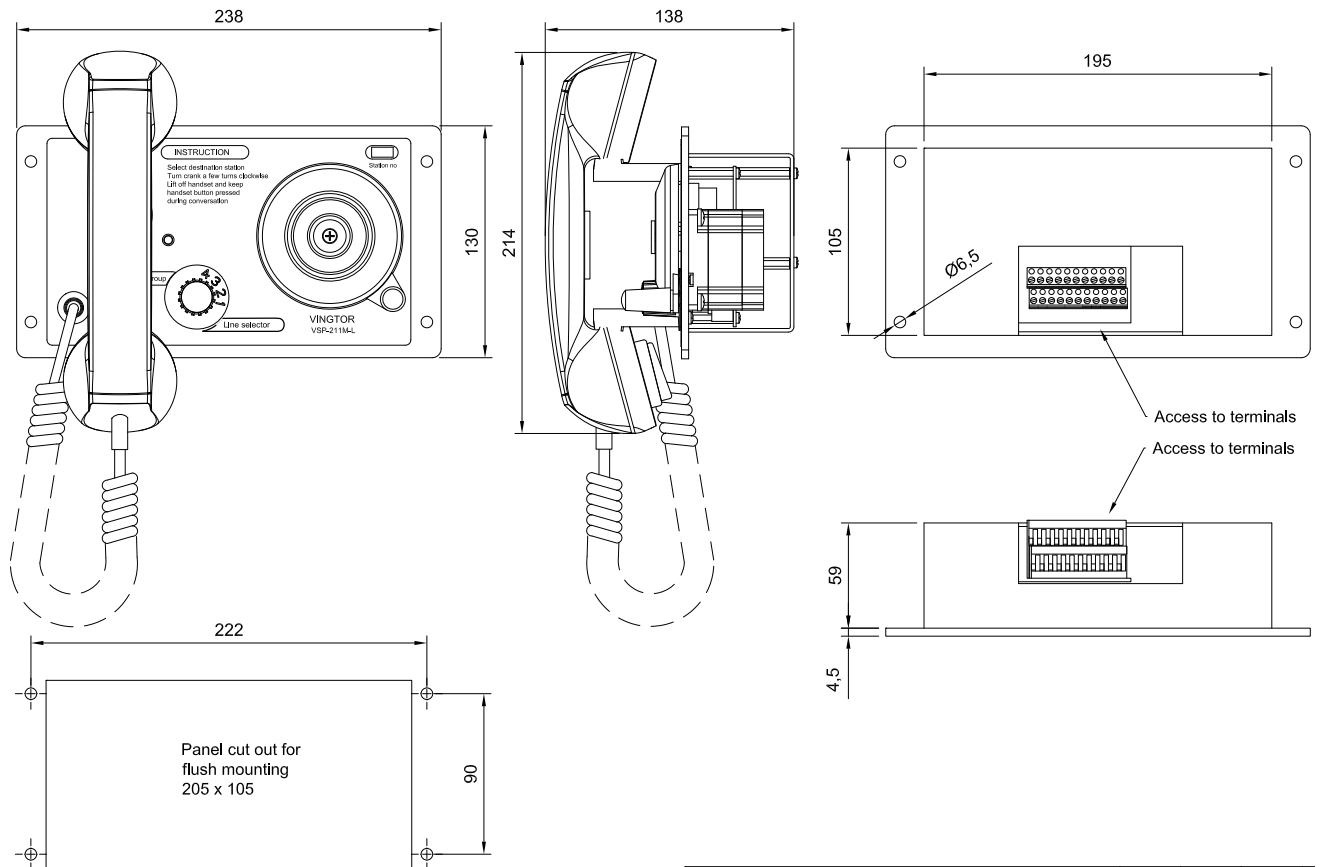
Certificate no.: 09.00033.262  
Valid until: 2014-01-15  
Issued by: Russian Maritime Register of Shipping



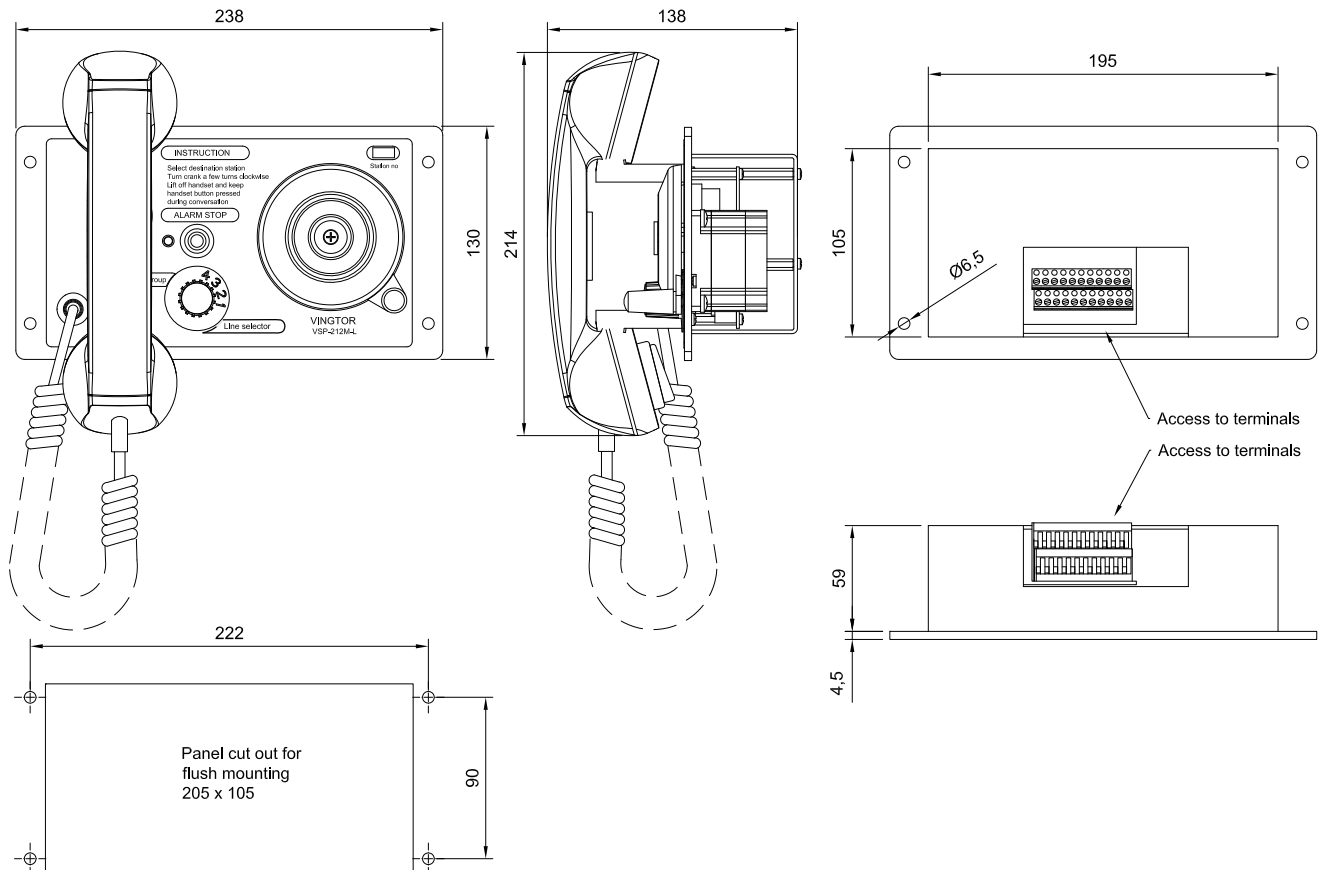


# 8 Station & Mounting Dimensions

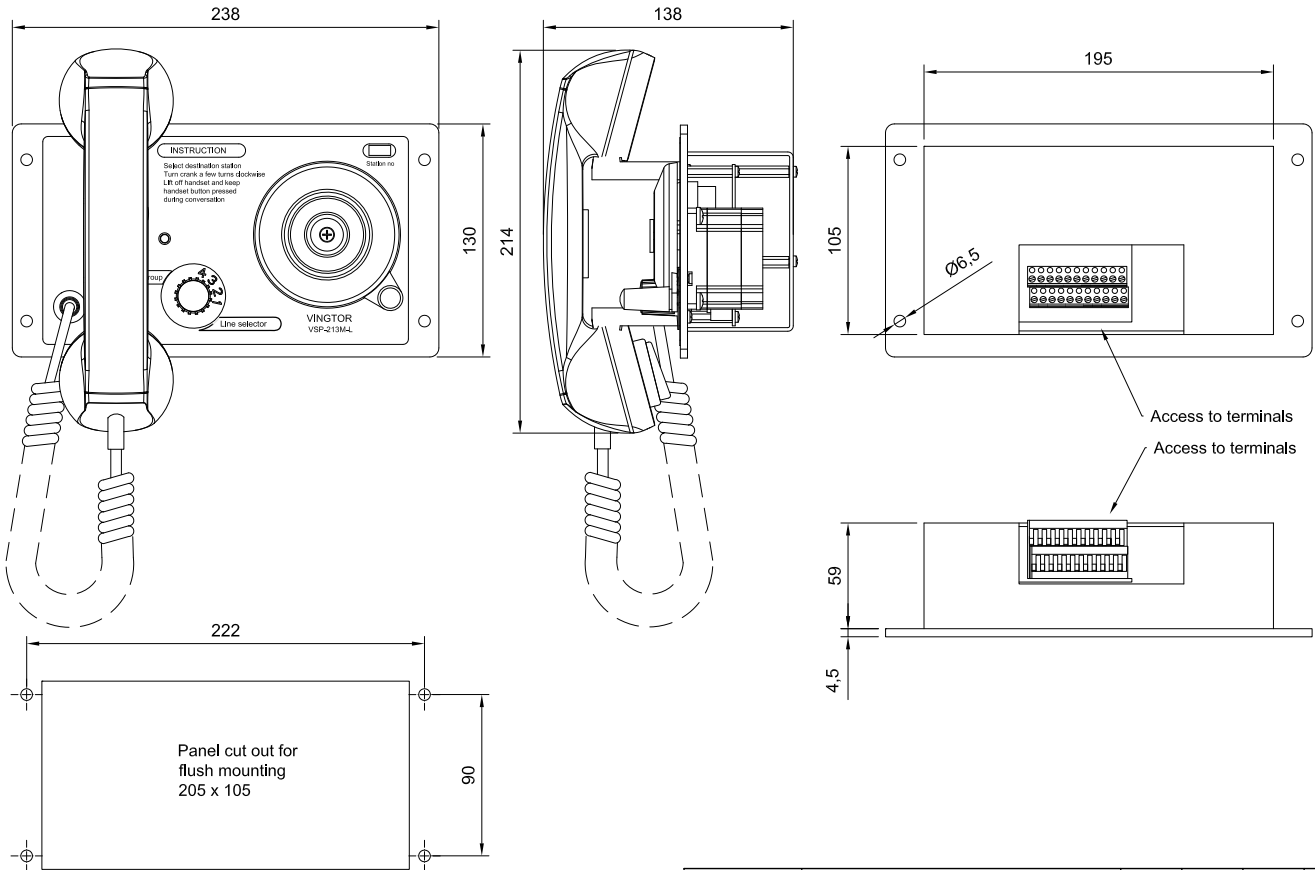
## 8.1 VSP-211M-L



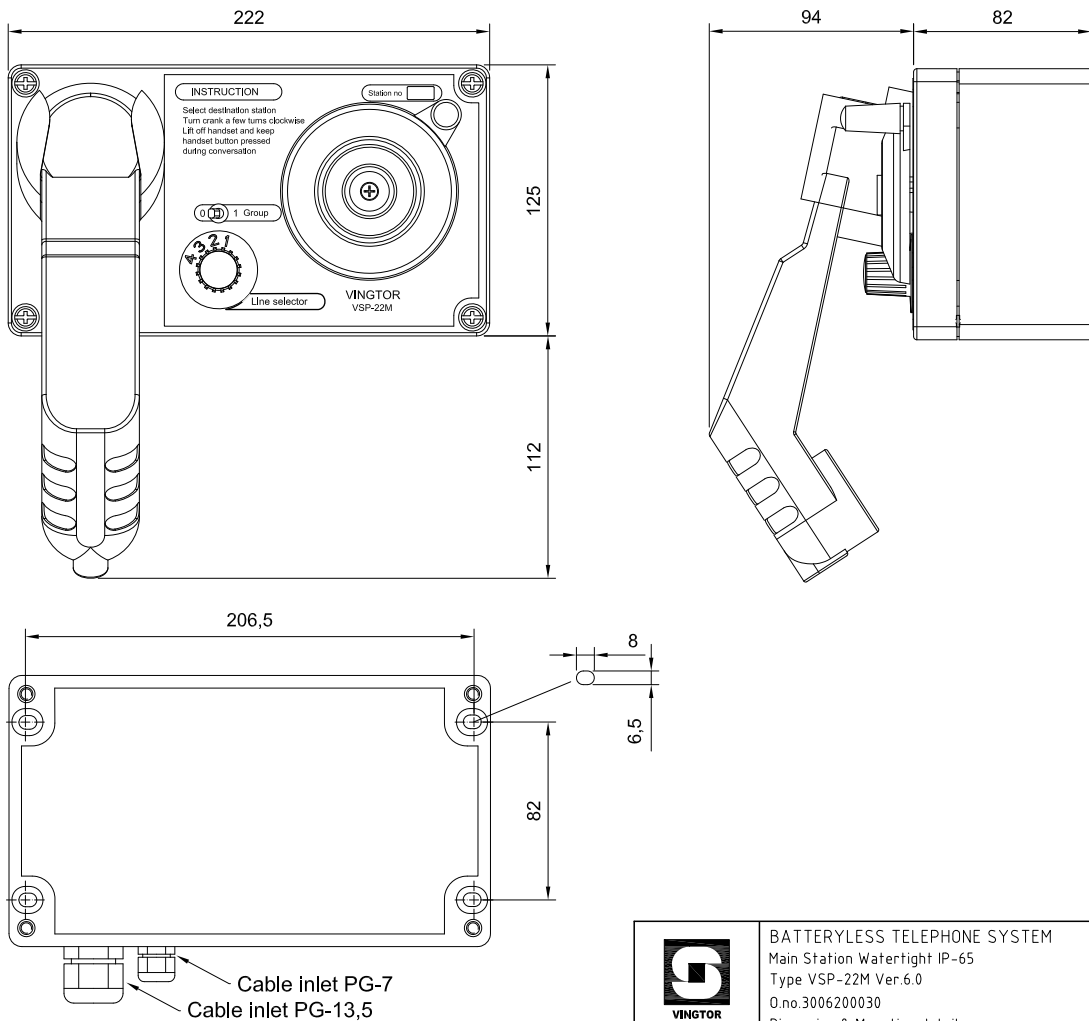
## 8.2 VSP-212M-L



### 8.3 VSP-213M-L



### 8.4 VSP-22M



	BATTERYLESS TELEPHONE SYSTEM
	Main Station Watertight IP-65
	Type VSP-22M Ver.6.0
	O.no.3006200030
	Dimension & Mounting details





The WEEE Directive does not legislate that Zenitel, as a 'producer', shall collect 'end of life' WEEE.

This 'end of life' WEEE should be recycled appropriately by the owner who should use proper treatment and recycling measures. It should not be disposed to landfill.

Many electrical items that we throw away can be repaired or recycled. Recycling items helps to save our natural finite resources and also reduces the environmental and health risks associated with sending electrical goods to landfill.



Under the WEEE Regulations, all new electrical goods should now be marked with the crossed-out wheeled bin symbol shown.

Goods are marked with this symbol to show that they were produced after 13th August 2005, and should be disposed of separately from normal household waste so that they can be recycled.

