VINGTOR STENTOFON
by ZENITEL GROUP

Amplified Batteryless Telephone System

VSP 12-Way

Document Scope

This document is intended for qualified technicians who will install and service the VSP 12-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 12-Way system:

Product	Item Name	Item Number
Main Station, panel mounted	VSP-211-L	1020600931
Main Station, panel mounted with relay circuit	VSP-223-L	1020600943
Main Station, watertight	VSP-122	1020600910
Main Station, portable, watertight	VSP-122P	3006200024
Main Station, panel mounted, indoor unit	VSP-213-L	1020600935

Publication Log

Rev.	Date	Author	Comments
4.0	2008-04-23		Published
5.0	2009-08-24	SEN/JF	New circuit board Some contents updates New document layout
5.1	18-05-2010	HKL	Complete DIP switch settings
5.5	30-08-2010	ER	New front and back page. Doc. no. VSP-12-Way_is is replaced by A100K10873
6.0	22-7-2011	HKL	Version 6.0 station models, revised block diagram
6.1	16-5-2012	HKL	Revised block diagram
6.2	08.12.2017	SEN	Revised cabling diagram page 9
7.0	1-11-2018	HKL	Ground removed on wiring diagram
7.1	7-10-2019	HKL	Unique extension number deleted

Related Documentation

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

Doc. no.	Subject	Documentation
A100K10675	VSP 12-Way Amplified Batteryless Telephones	Getting Started Guide
A100K10758	VSP-M Amplified Batteryless Telephones	Technical Manual
VSP-Ex_iu	Intrinsically Safe Set for VSP VSP-5012 Buffer unit & VSP-512 Main station	Installation & User Manual

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1 General Description

1.1 System

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

The VSP system described in this manual is a system comprising up to 12 main stations with selector switches for selective calling between all connected stations. The VSP system can also be connected to a 24V DC power supply and work as a Common Battery Telephone System.

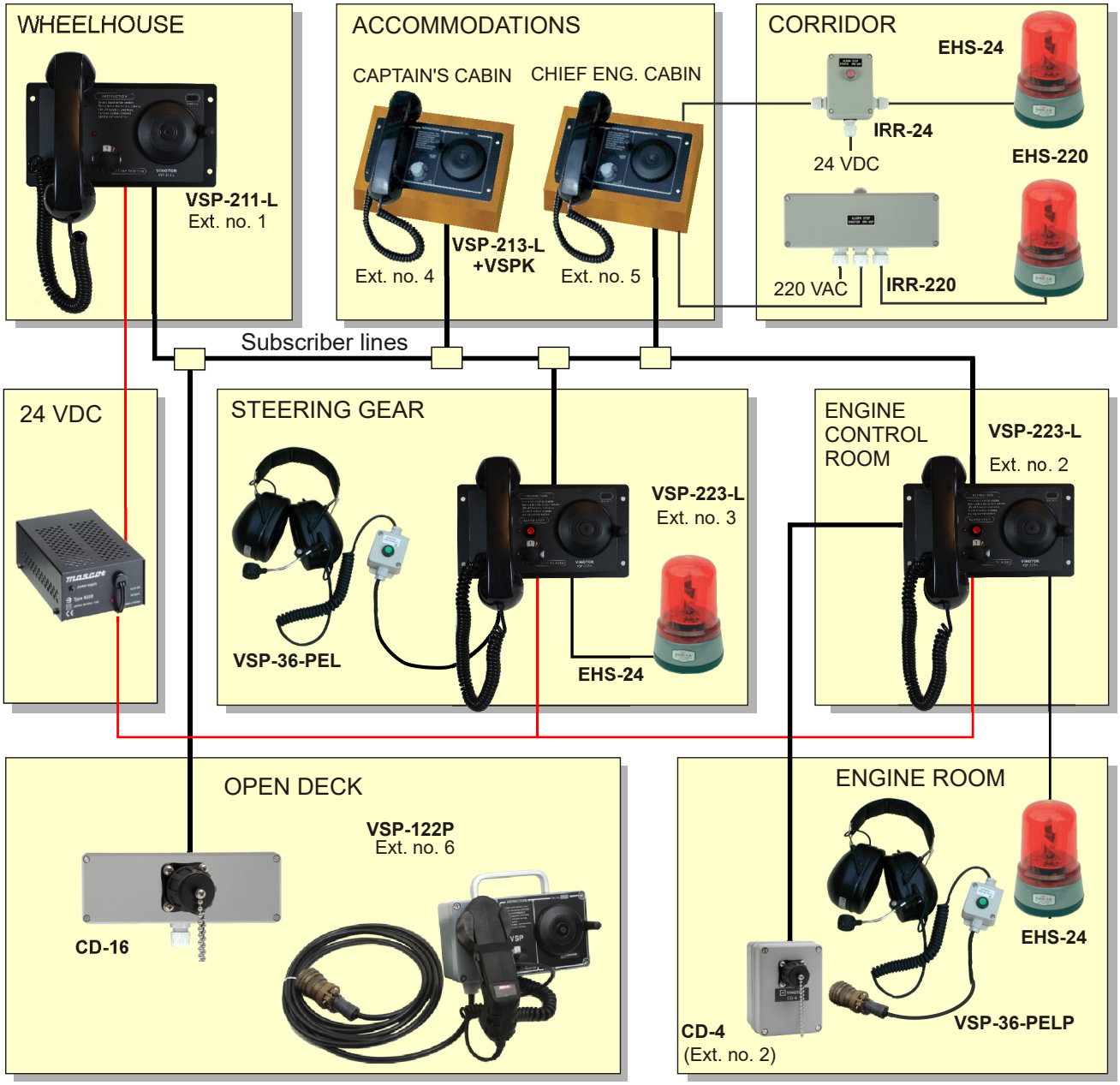


Figure 1: System Configuration Example

1.2 Station Types

The VSP 12-Way system is a range of stations with up to 12 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-211-L Main Station, panel mounted

- Main station with built-in amplifier
- Bulkhead mount in on-wall back-box MBOKS
- Suitable for weelhouse and control room

VSP-223-L Main Station, panel mounted with relay

- Alarm stop button
- Noise compensated microphone
- LED call indicator
- Bulkhead mount in on-wall back-box MBOKS
- Suitable for control room and noisy areas

VSP-122 Main Station, watertight

- Main station in watertight housing
- Water resistant mil.spec. handset
- Bulkhead mount
- Suitable for bridge wings and open deck areas

VSP-122P Main Station, portable, watertight

- Main station in watertight housing
- Water resistant military spec. handset
- Portable with handle and 5 or 10 m cable
- Suitable for bridge wings and open deck areas with plug box CD-16

VSP-213-L Main Station, panel mounted indoor

- Desk or wall mount in wooden cabinet VSPK
- Bulkhead mount in on-wall back-box MBOKS
- Suitable for weelhouse, control room or accommodation

For further information about VSP stations and accessories, visit www.vingtor.com.

2 Functional Description

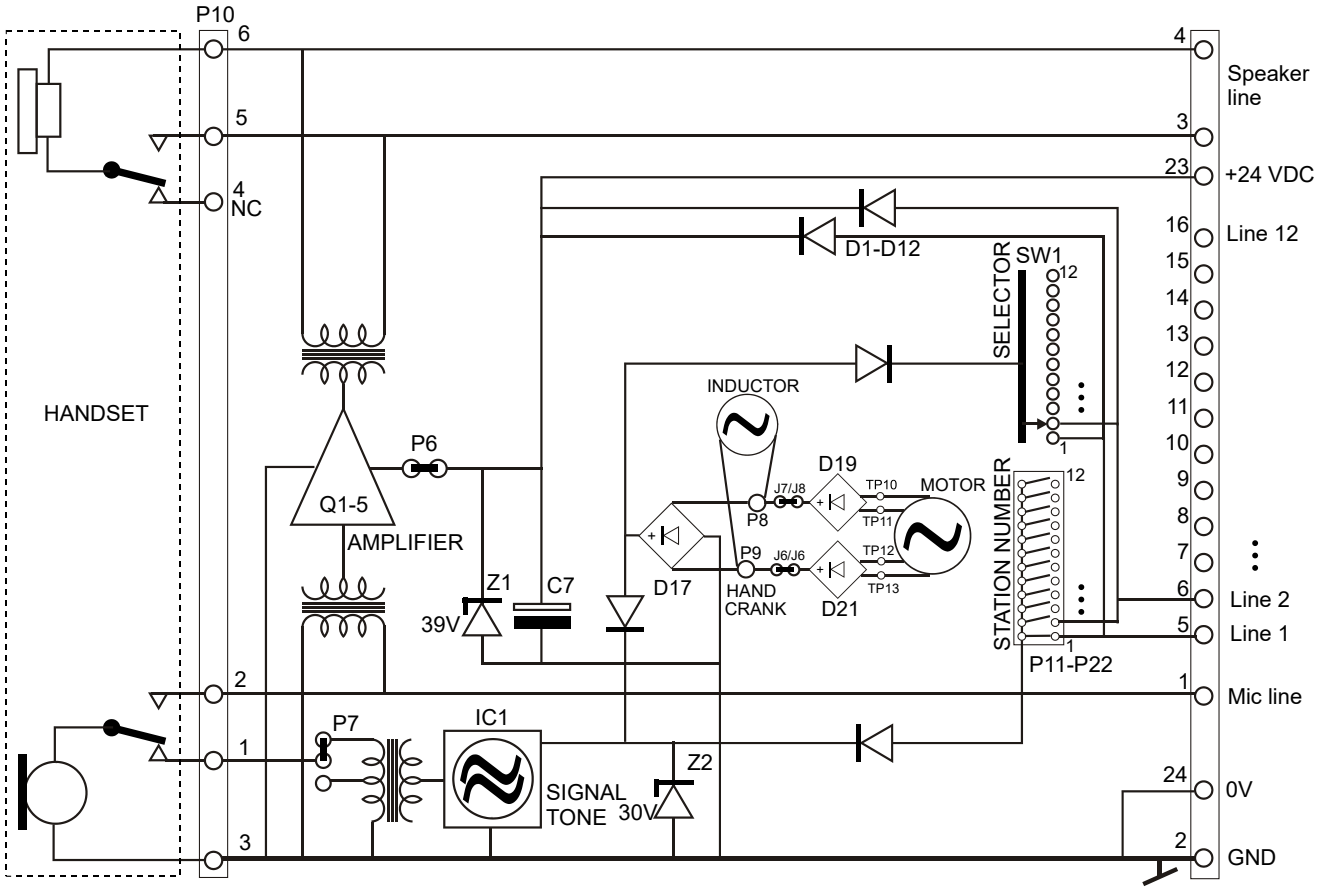
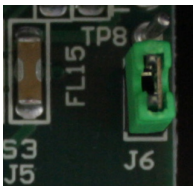


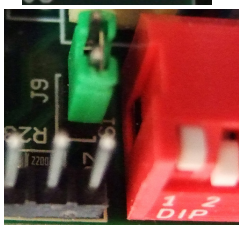
Figure 2: Main station VSP-211-L principle diagram

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

ⓘ *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 (-).

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

ⓘ *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 a 12-way rotary switch. When turning the hand crank, a voltage is supplied to the selected line.

2.3 Amplifier

Only the Main Station VSP-211-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 Iq = 20 uA at U = 20-30 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-211-L.

The microphone line is marked 1 and 2 on the screw terminals in all VSP 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-211-L.

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

3 Installation

In a VSP system, one station MUST BE a VSP-211-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 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 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 16 (lines 1 to 12)

VSP-223-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-211-L station

The VSP 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)

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. A full system with 12 stations therefore requires 8 pairs of wires.
- The screen must be connected to terminal 2 in VSP-211-L to avoid noise problems.

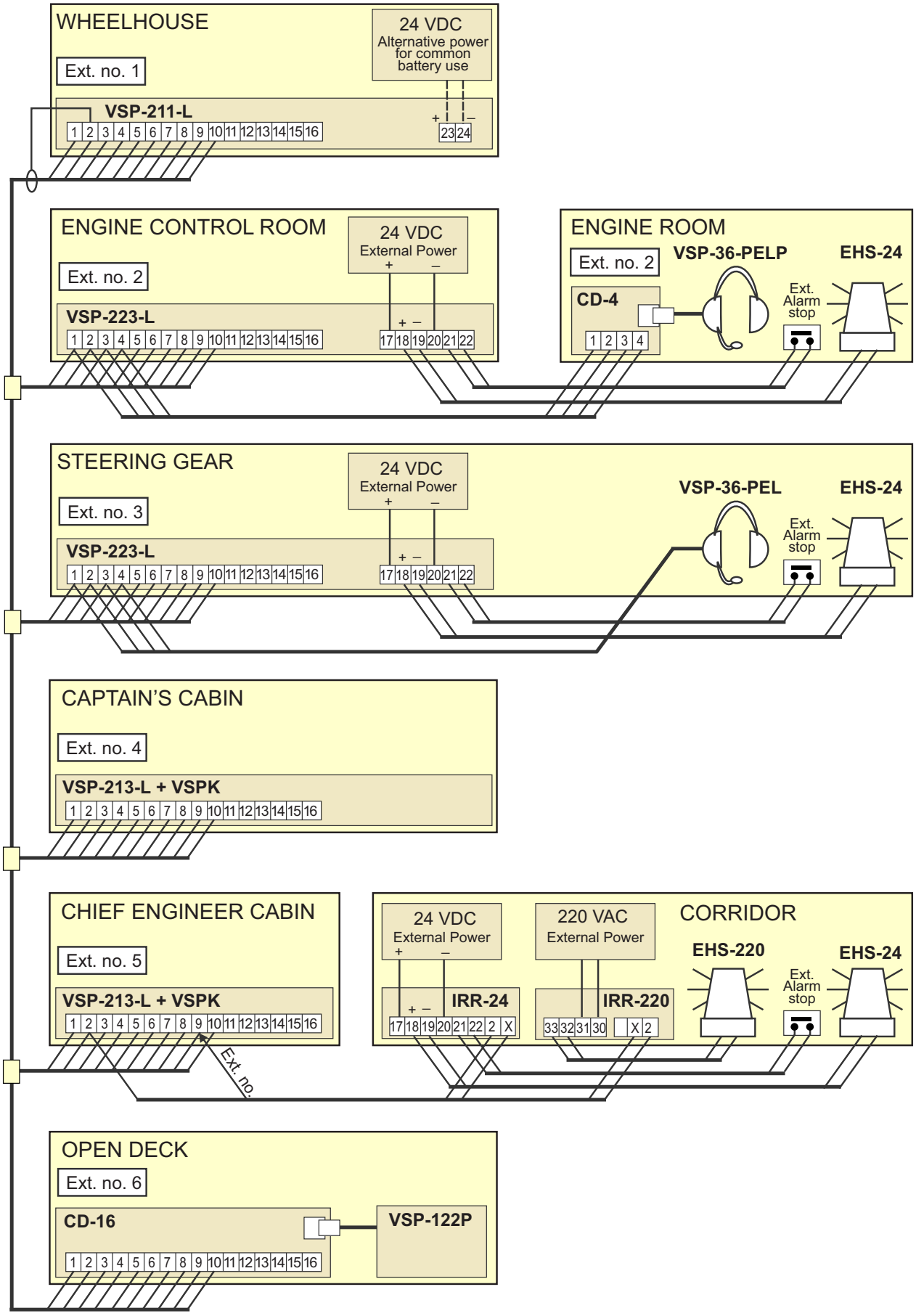


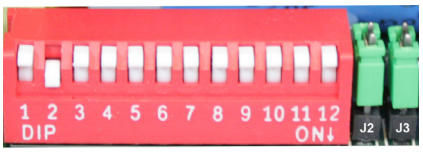
Figure 3: Cabling diagram based on system configuration example

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 station must have its own extension number, 1 to 12, set by DIP switches.

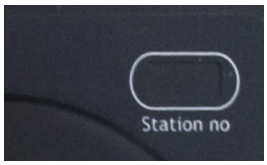


To set the extension number:

1. Insert jumpers into pins J2 and J3.
2. Activate the DIP switch on the PCB corresponding to the selected number by sliding it to the ON position.

Figure 4: DIP switch setting for extension no. 2

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



A label strip with numbers 1 to 12 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.

Figure 5: Extension number label

4 Operation

To make a call to another station:

1. Set the rotary switch (**Line Selector**) to the extension number of the station you wish to call.
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-211-L may be defective.
  - Replace the station with one that is in working order.

5.2 Call Tone

Extension numbers 11 and 12 do not work. No call tone

- Jumpers on pins J2 and J3 are not inserted.
  - Insert jumpers on pins J2 and J3 located on the right side of the DIP switch.

Station receives calls from two or more lines

- Several extension numbers are set.
  - Verify that the station has the correct extension number set on the DIP switch.

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 AC voltmeter while operating the crank or by use of an ohm-meter between P8 and P9.

No call tone in called station

- Check the cable connection to the corresponding station number.

Terminal no.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Station no.					1	2	3	4	5	6	7	8	9	10	11	12

- 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.

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

6 Specifications

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, 2nd 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:

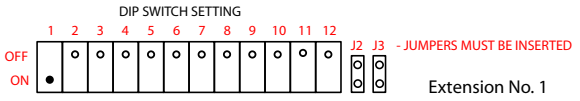
Report No.:	96-1196
Issued by:	DET NORSKE VERITAS AS
Report No.:	S97 0662a and S97 0662b
Issued by:	Jydske EMC Lab A/S, Denmark

Type Approval Certificates:

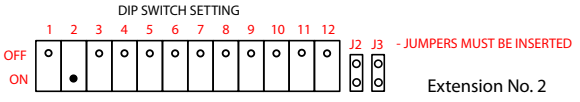
Certificate no.:	TAA00001JF
Valid until:	2022-12-10
Issued by:	DNV GL
Certificate no.:	ELE225816CS001
Valid until:	2021-10-10
Issued by:	RINA - Registro Italiano Navale
Certificate no.:	BG17T00006_03
Valid until:	2021-4-9
Issued by:	China Classification Society
Certificate no.:	16-LD1543066-PDA
Valid until:	2021-07-12
Issued by:	ABS - American Bureau of Shipping
Certificate no.:	11080100
Valid until:	2019-08-13
Issued by:	Russian Maritime Register of Shipping
Certificate no.:	03-001639/031364
Valid until:	2022-06-09
Issued by:	Croatian Register of Shipping
Certificate no.:	03/00041(E1)
Valid until:	2019-07-24
Issued by:	Lloyd’s Register EMEA
Certificate no.:	TE-2039-880575-14
Valid until:	2019-12-10
Issued by:	PRS - Polski Rejestr Statków

7 DIP Switch Settings for Extension Numbers

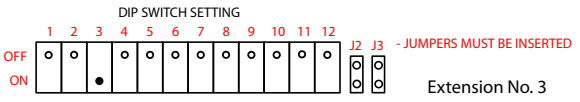
Extension numbers 1 to 12 are set using the following DIP switch configurations.



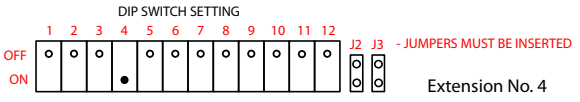
Extension No. 1



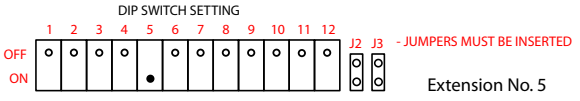
Extension No. 2



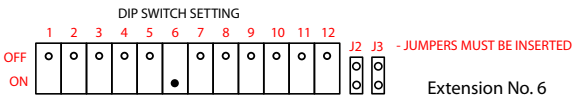
Extension No. 3



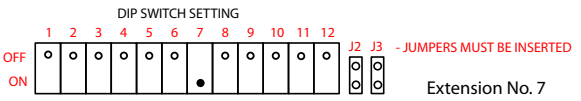
Extension No. 4



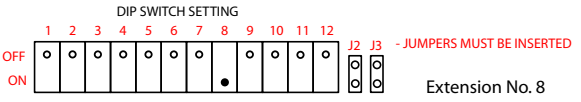
Extension No. 5



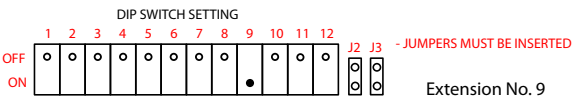
Extension No. 6



Extension No. 7



Extension No. 8



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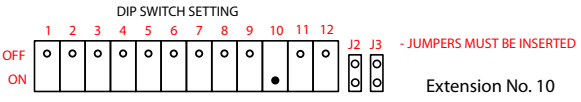
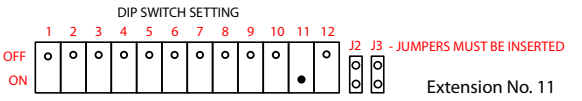
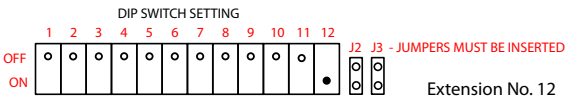


Extension No. 10



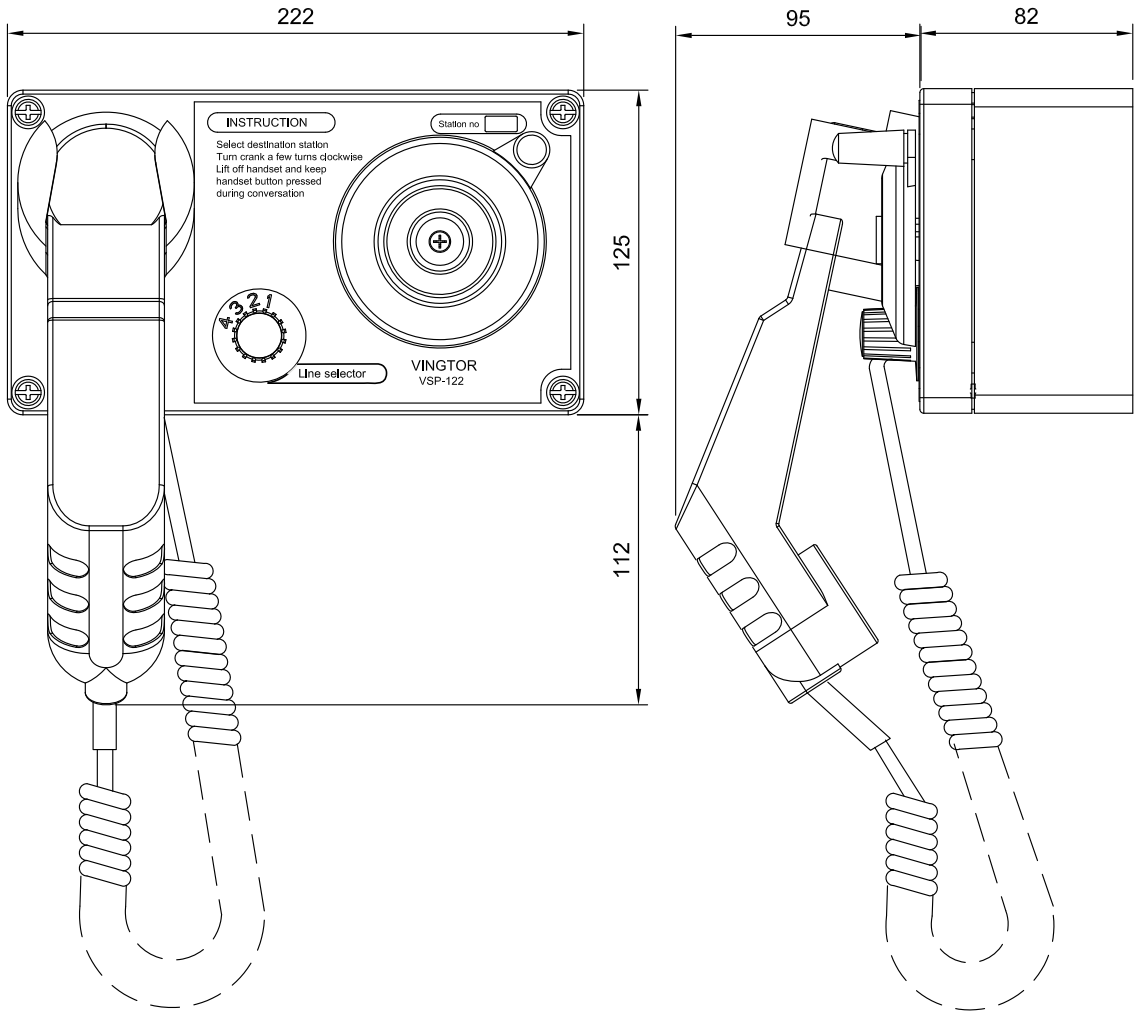
Extension No. 11

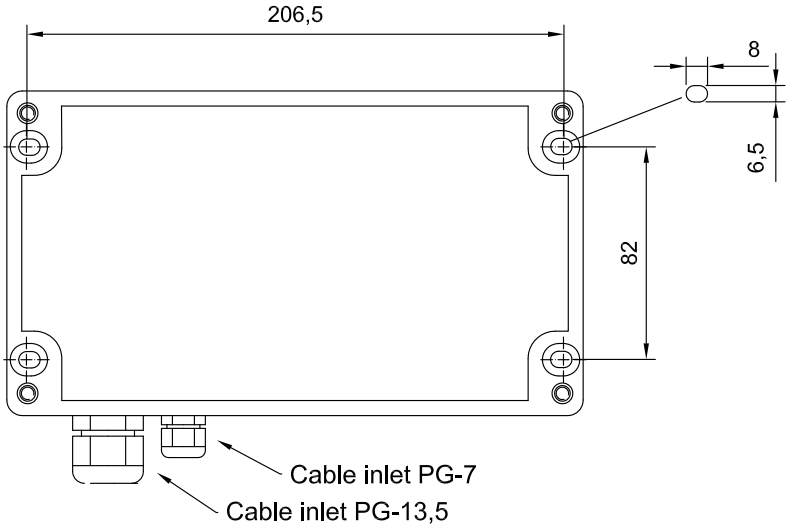


Extension No. 12

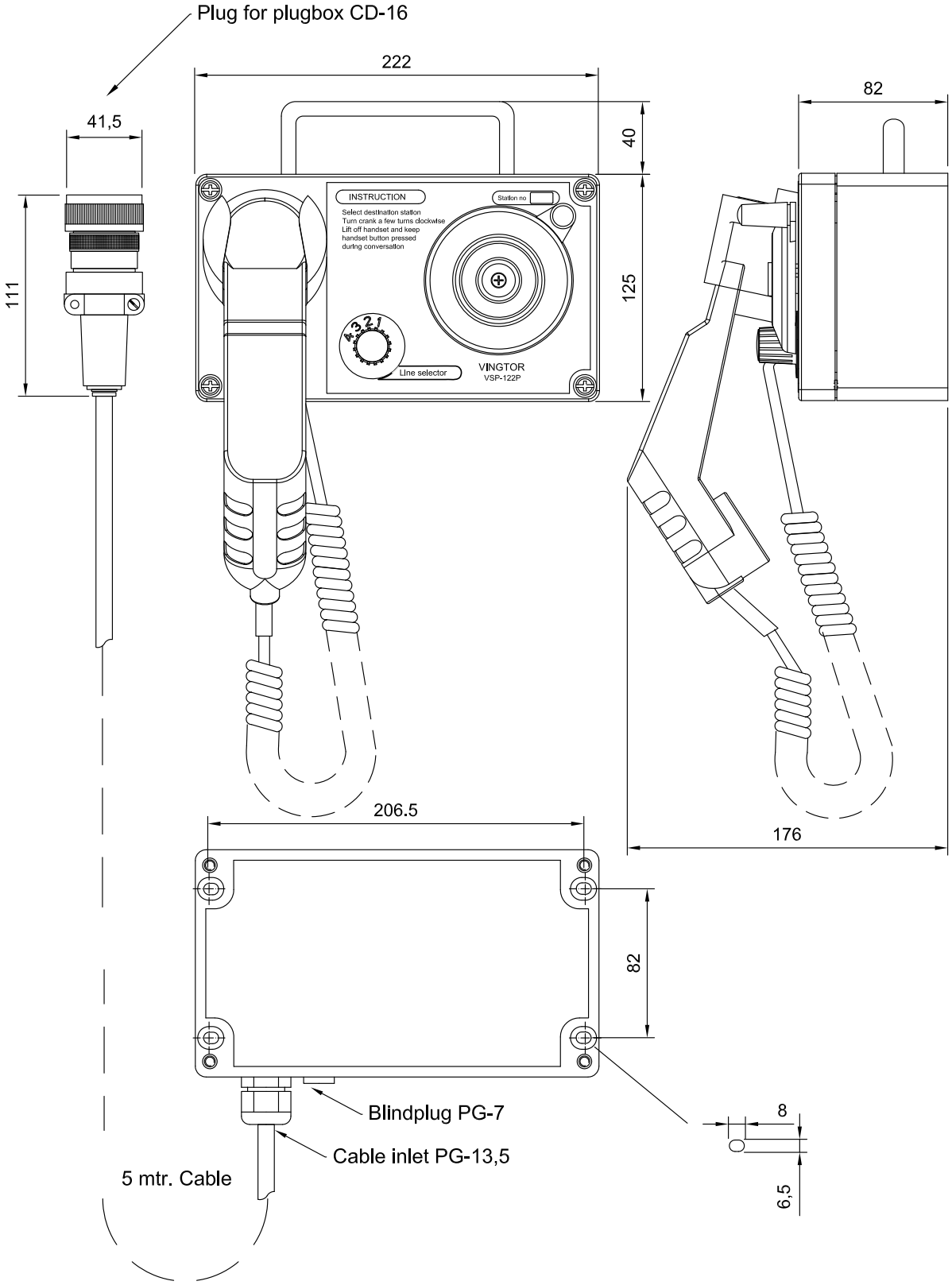
8 Station & Mounting Dimensions

8.1 VSP-122

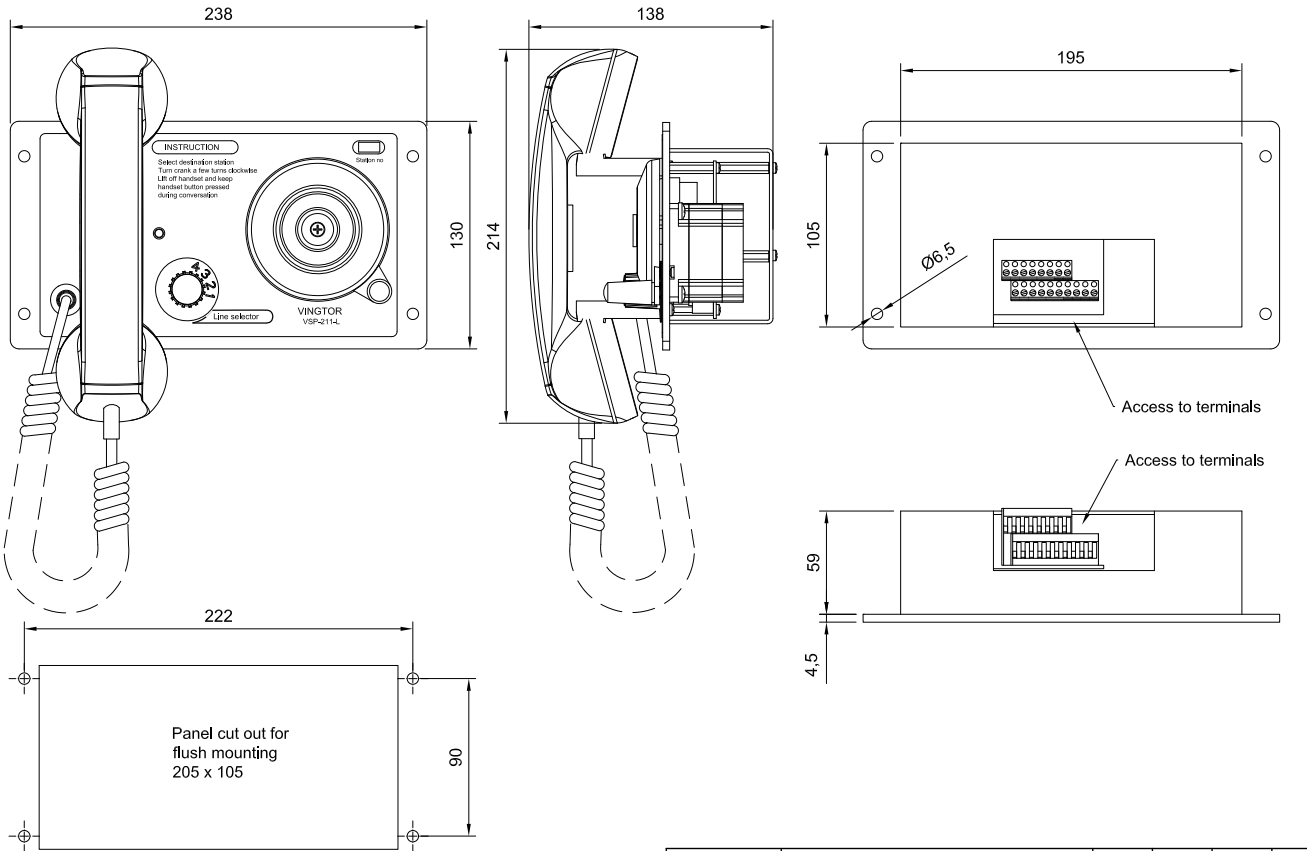




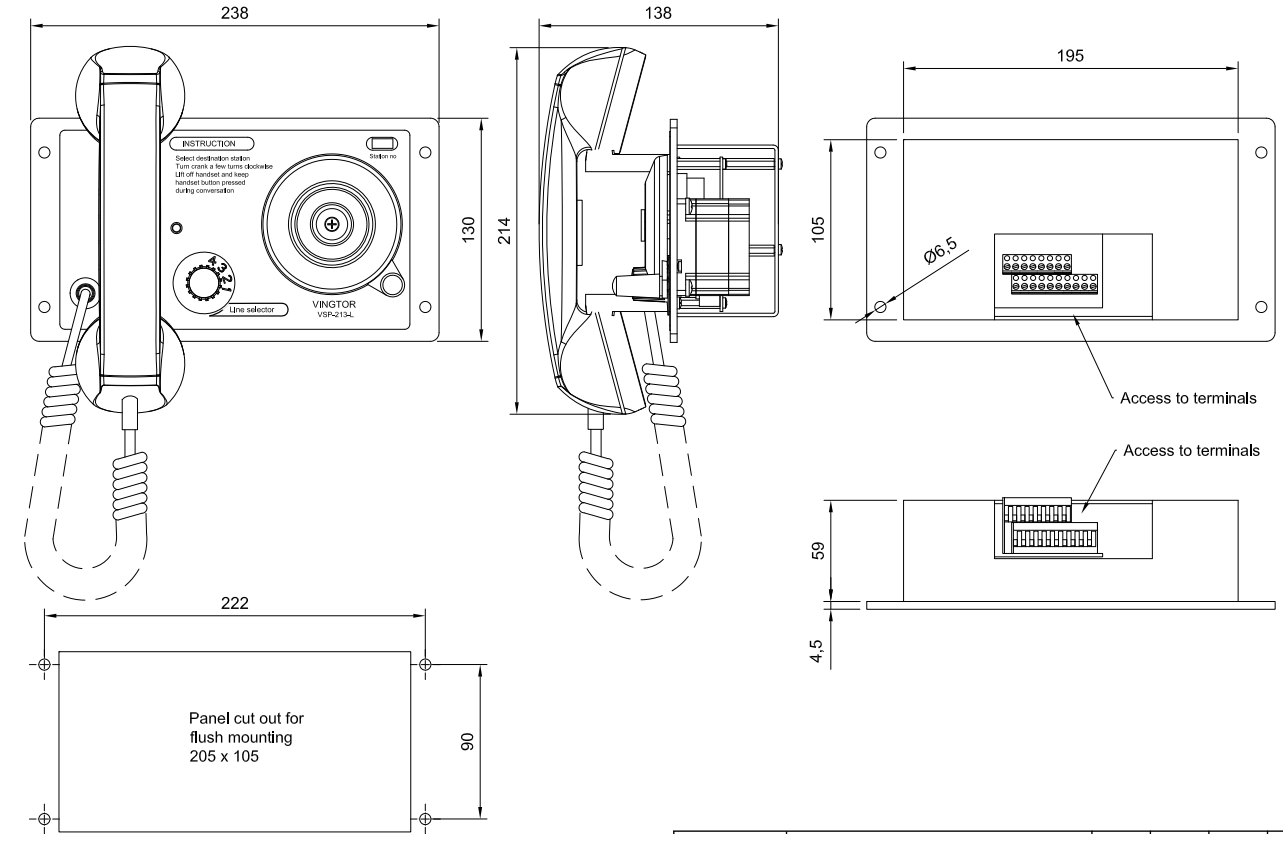
8.2 VSP-122P


Plug for plugbox CD-16
222
41,5
111
40
125
82
INSTRUCTION
Station no
Select destination station
Turn crank a few turns clockwise
Lift off handset and keep
handset button pressed
during conversation
4 3 2 1
Line selector
VINGTOR
VSP-122P
206.5
176
82
Blindplug PG-7
Cable inlet PG-13,5
5 mtr. Cable
8
6,5

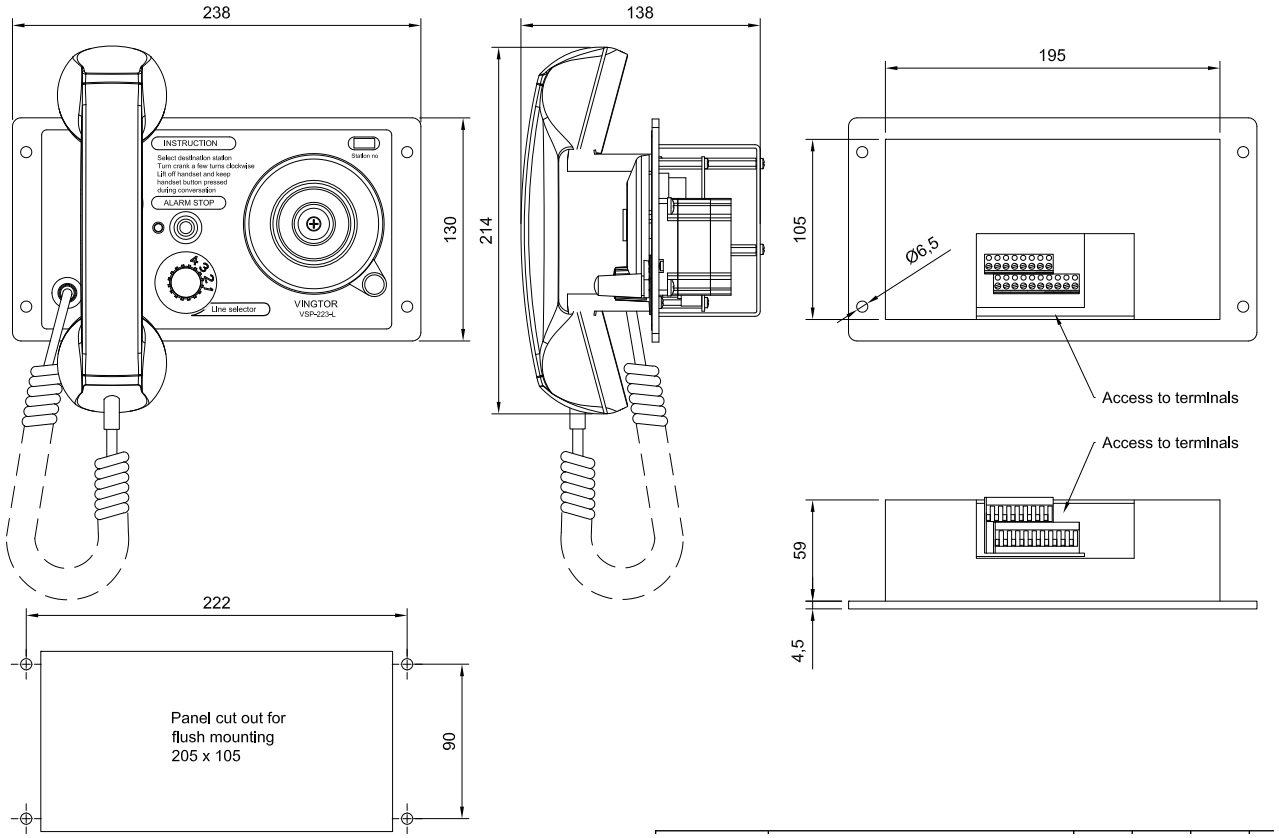
8.3 VSP-211-L



8.4 VSP-213-L



8.5 VSP-223-L


238
138
195
INSTRUCTION
Select destination station
Turn crank a few turns clockwise
Lift off handset and keep
handset button pressed
during conversation
ALARM STOP
Station no
Line selector
VINGTOR
VSP-223-L
130
214
105
Ø6.5
Access to terminals
Access to terminals
59
4.5
222
Panel cut out for
flush mounting
205 x 105
90

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.