

# ***KOBELT***

## **SmartBus Hub & Sensors**

### *Owner's Installation Manual*



### **SmartBus Hub (5 Port) – VT200**



**Barrel Temperature  
Sensor – VT100**



**High-Temperature  
Sensor – VT110**



**Ring Temperature  
Sensor – VT130**

May 2020  
(Rev A)





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# TABLE OF CONTENTS

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<b>1</b>	<b>Introduction .....</b>	<b>4</b>
1.1	Contact .....	4
1.2	Compliant Use .....	4
1.3	Copyrights & Trademarks .....	4
<b>2</b>	<b>Safety.....</b>	<b>5</b>
2.1	Safety Alerts.....	5
2.2	Notice to Installer .....	6
2.3	Product Hazards.....	6
<b>3</b>	<b>About the SmartBus Hub &amp; Sensors .....</b>	<b>7</b>
3.1	Product Description .....	7
3.2	Intended Use .....	7
3.3	Technical Data – SmartBus Hubs .....	7
3.4	Technical Data – Temperature Sensors.....	8
<b>4</b>	<b>Unpacking the Product .....</b>	<b>10</b>
4.1	SmartBus Hub Module.....	10
4.2	SmartBus Temperature Sensors.....	10
<b>5</b>	<b>Mechanical Installation.....</b>	<b>11</b>
5.1	SmartBus Hub Module.....	11
5.2	VT100 Barrel Temperature Sensor.....	11
5.3	VT110 High-Temperature Sensor .....	12
5.4	VT130 Ring Temperature Sensor .....	12
5.5	3D Model References.....	12
<b>6</b>	<b>Connecting the Electrical.....</b>	<b>13</b>
6.1	Electrical Connectors .....	13
6.2	Connecting the SmartBus .....	14
6.3	Cabling Recommendations .....	14
6.4	Bus Topology .....	15
6.5	Application Examples.....	16
<b>7</b>	<b>Warranty.....</b>	<b>19</b>

# 1 INTRODUCTION

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## 1.1 CONTACT

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This document is intended to clearly present comprehensive product data and provide technical information to assist the end user in design applications. Kobelt reserves the right, without notice, to change the design, or construction, of any products and to discontinue or limit distribution of any products. Kobelt also reserves the right to change, or update, without notice, any technical information contained within this document.

Kobelt recommends that customers visit our website to check for updates to this Manual. Once a product has been selected for use, it should be tested by the user to ensure proper function in all possible applications. For further instructions, please contact our distributors or visit our website.

## 1.2 COMPLIANT USE

Vitals is an aid only and should not be used as the sole method of decision making. Vitals will not protect the systems that it is monitoring. Vitals utilizes digital and analog data and electronic information from the various marine electronic instruments or sensors on-board the vessel. This device is only intended for use by persons trained in operating marine systems and only as an operational aid.

The installer shall:

- Only use non-defective products.
- Check the safety of operation and the condition of the device before each use.
- Verify that the product is operational at all times and keep it in good working conditions.

Only Kobelt Manufacturing Co. Ltd. Authorized Dealers or Authorized Technicians are to repair Vitals.

## 1.3 COPYRIGHTS & TRADEMARKS




All product names, logos and brands are property of their respective owners. All company, product and service names used in this manual are for identification purposes only. Use of these names, logos, and brands does not imply endorsement.

## 2 SAFETY

Throughout this manual, the following symbols are used to alert the installer to special instructions concerning a service or operation that may be hazardous if performed incorrectly or carelessly. The associated risk levels are

### 2.1 SAFETY ALERTS

Throughout this manual, the following symbols, and their accompanying explanation, are used to alert the user to special instructions concerning a service or operation that may be hazardous if performed incorrectly or carelessly. The associated risk levels are stated below.

 <b>DANGER</b>	This symbol indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.
 <b>WARNING</b>	This symbol indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.
 <b>CAUTION</b>	This symbol indicates a hazardous situation, which if not avoided, could result in minor or moderate injury.
<b>NOTICE</b>	This symbol informs the reader of events not related to personal injury but which there is a risk of damage to property or equipment.
<b>SAFETY INSTRUCTIONS</b>	This symbol informs the reader of safety-related instructions or procedures.

## 2.2 NOTICE TO INSTALLER

Disregarding the following safety measures can result in an accident causing severe injury to personnel and damage to material assets.

- Only use the product as directed in this manual.
- Never put the product into service if there is evidence of visible damage.
- Never put the product into service before fully completing installation and commissioning.
- Do not carry out any modifications to the product.
- Only use authentic Kobelt spare parts.
- Observe all local regulations, directives and laws during the installation of this product.
- All installation, commissioning, and maintenance work must only be conducted by qualified personnel. (For the purpose of this manual, qualified personnel are persons who are familiar with the assembly, installation, commissioning, and operation of the product and who have the qualifications necessary for their occupation.)
- Observe all specifications in this manual. If these guidelines are not followed and damage occurs, the warranty will be voided.

## 2.3 PRODUCT HAZARDS



### WARNING

**Disconnect Power:** Turn off power at distribution panel before beginning installation to protect installer from electrical hazards.



### CAUTION

**Voltage and Current Compatibility:** Confirm that the power source is compatible with the maximum voltage and current ratings of is product variant. Failure to do so could result in damage or fire.

## 3 ABOUT THE SMARTBUS HUB & SENSORS

### 3.1 PRODUCT DESCRIPTION

The SmartBus Hub Module allows the user to connector up to five (5) additional SmartBus sensors. Kobelt offers three (3) options for SmartBus temperature sensors that can be used in any configuration, depending on your needs. Kobelt offers a barrel style temperature sensor (VT100) for immersion in air or liquid, a ring-terminal sensor (VT130) for direct connection to a metal surface, and a high-temperature sensor (VT110) for high-temperature applications.

### 3.2 INTENDED USE

Vitals is designed to aid the installer to quickly identify possible issues and malfunctions of systems on the vessel, thus help the installer make a timely decision to protect equipment from sudden failure.

### 3.3 TECHNICAL DATA – SMARTBUS HUBS

Table 1: SmartBus Hub Module Technical Data

Electrical	
<b>Operating Voltage</b>	5VDC Nominal (SmartBus Powered)
<b>Operating Current</b>	Less than 20mA
<b>Short Circuit Protection</b>	Yes
<b>Reverse Battery Protection</b>	Yes
<b>Voltage Surge Protection</b>	Yes
<b>Interfaces</b>	SmartBus
<b>Connectors</b>	2x SmartBus Pass-Thru Ports (Interchangeable) 5x SmartBus Sensor Input Ports
Mechanical	
<b>Physical Dimensions (L x W x H)</b>	126 mm x 50 mm x 25 mm [5.0" x 2.0" x 1.0"]
<b>Mounting Dimensions (L x W)</b>	113.4 mm x 31.8 mm [4.465" x 1.252"] 4.5 mm [0.17"] Thru-Holes
<b>Product Weight</b>	0.1 kg [0.22 lbs]
<b>Enclosure Material</b>	Plastic, Polycarbonate
<b>Shipping Dimensions (L x W x H)</b>	216 mm x 140 mm [8.5" x 5.5"]
<b>Shipping Weight</b>	0.2 kg [0.44 lbs]
Environmental	
<b>Operating Temperature</b>	-20°C to 55°C [-4°F to 131°F]
<b>Storage Temperature</b>	-30°C to 70°C [-22°F to 158°F]
<b>Operating Humidity</b>	95% Non-condensing
<b>Storage Humidity</b>	75% Non-condensing
<b>Ingress Protection</b>	IP40

### 3.4 TECHNICAL DATA – TEMPERATURE SENSORS

Table 2: VT100 Barrel Temperature Sensor Technical Data

Specifications	
Measurement Temperature Range	-55°C to +125°C [-67°F to +257°F]
Typical Accuracy	±0.5°C (from -10°C to 85°C) ±2°C for the rest of the range
Cable Length	1 Metre [40"]
Electrical	
Operating Voltage	5VDC Nominal (SmartBus Powered)
Operating Current	Less than 5mA
Connectors	1x SmartBus
Mechanical	
Barrel Dimensions (L x Ø)	35 mm x 6 mm [1.4" x 0.25"]
Product Weight	20 g [0.05 lbs]
Environmental	
Operating Temperature	-55°C to +125°C [-67°F to +257°F]

Table 3: VT110 High-Temperature Sensor Technical Data

Specifications	
Measurement Temperature Range	-100°C to +700°C [-150°F to +1300°F]
Typical Accuracy	±2.2°C
Cable Length (Metal Braid Portion)	1 Metres [160"] fixed not extendable
Cable Length (Standard Portion)	3 Metres [80"] extendable up to 6m total
Electrical	
Operating Voltage	5VDC Nominal (SmartBus Powered)
Operating Current	Less than 10mA
Connectors	1x SmartBus
Mechanical	
Mounting Style	1/4 Inch NPT Fitting
Product Weight	160 g [0.4 lbs]



Table 4: VT130 Ring Temperature Sensor Technical Data

<b>Specifications</b>	
<b>Measurement Temperature Range</b>	-55°C to +125°C [-67°F to +257°F]
<b>Accuracy</b>	±0.5°C (from -10°C to 85°C) ±2°C for the rest of the range
<b>Cable Length</b>	2 Metres [80"]
<b>Electrical</b>	
<b>Operating Voltage</b>	5VDC Nominal (SmartBus Powered)
<b>Operating Current</b>	Less than 5mA
<b>Connectors</b>	1x SmartBus
<b>Mechanical</b>	
<b>Mounting Hole</b>	6.4 mm [0.25"] Ring Terminal
<b>Product Weight</b>	60 g [0.13 lbs]
<b>Environmental</b>	
<b>Operating Temperature</b>	-55°C to +125°C [-67°F to +257°F]

## 4 UNPACKING THE PRODUCT

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### 4.1 SMARTBUS HUB MODULE

When unpacking the box containing the SmartBus Hub Module, the box should include the following additional items:

- 1x SmartBus Hub Module
- 1x Quick Start Guide

If any of these items are missing or damaged, please contact Kobelt to arrange a replacement.

### 4.2 SMARTBUS TEMPERATURE SENSORS

SmartBus Temperature Sensors are shipped individually in a bag.

## 5 MECHANICAL INSTALLATION

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### 5.1 SMARTBUS HUB MODULE

#### 5.1.1 Choosing the Installation Location

The installer should consider the following parameters when choosing a mounting location:

1. The Module should be protected from direct water exposure.
2. The Module should be mounted close enough to the SmartBus Sensors to ensure the length of the sensors reaches the SmartBus Hub Inputs.
3. The Module should be mounted away from any AC cabling or power sources.
4. The Module should be mounted away from any large sources of Electromagnet Interference (EMI).
5. Wiring between the SmartBus Hub Module and SmartBus Sensors should not run parallel to high voltage or high current carrying wires or cables.

#### 5.1.2 Mounting the Product

Securing the SmartBus Hub Module is a crucial step in the installation process. This ensures safety to the product while providing ease of access to the installer.

There are two steps to securing the SmartBus Hub Module:

1. Ensure that there is enough room to accommodate the depth of the product and the attached cables.
2. Use recommended M4 or #8-32 screws to secure it into place at each side. Do not over-tighten the screws as it can lead to damaging the enclosure.

### 5.2 VT100 BARREL TEMPERATURE SENSOR

The VT100 Barrel Temperature Sensor is designed to be immersed in air or an inert fluid.



#### **WARNING**

Please make sure that the cabling is not touching any hot surfaces.

### 5.3 VT110 HIGH-TEMPERATURE SENSOR

The VT110 High Temperature Sensor is designed to be immersed in air or an inert fluid.

**WARNING**

Please make sure that the cabling is not touching any hot surfaces.

### 5.4 VT130 RING TEMPERATURE SENSOR

The VT130 Ring Temperature Sensor is designed to be connected directly to a metal surface.

**WARNING**

Please make sure that the cabling is not touching any hot surfaces.

### 5.5 3D MODEL REFERENCES

A 3D Model of the unit is available on the Kobelt product page for download (<http://www.kobelt.com/products/6700-0200/>).

## 6 CONNECTING THE ELECTRICAL

The SmartBus Hub Module requires cable to connect between the Vitals Monitor Panel and/or additional Hubs. Bulk cable is supplied separately and is available through a Vitals dealer or local marine installer.

### 6.1 ELECTRICAL CONNECTORS

Connectors are indicated as ① to ⑦. Connection to ① is required for basic operation. All other connections are optional and based on the users' specific installation needs.



Figure 1: SmartBus Hub Connector Overview

Table 5: SmartBus Hub Connectors

NO.	CONNECTOR NAME
1-2	SmartBus Pass-Thru Port (Interchangeable)
3-7	SmartBus Sensor Input Ports #1 - #5

### 6.1.1 SmartBus Pass-Thru Ports

The SmartBus Pass-Thru Port Connector are designed to connect directly to the Vitals Display SmartBus connector. These two ports can be used interchangeably as either input or output connections.

Table 6: SmartBus Pass-Thru Input Connector

1 - 2 SmartBus Pass-Thru Input Connector			
Pin #	Pin Designator	Pin Type	Function
1	5V	Power	Power, 5VDC
2	S	Signal	Communications Signal
3	G	Power	Power, Ground
4	Shld	Shield	Shield

### 6.1.2 SmartBus Sensor Input Ports #1 - #5

Up to five (5) SmartBus sensors can be connected directly to the five (5) SmartBus Input Ports. The SmartBus ports use a locking Molex connector that mates directly with SmartBus temperature sensors.

Table 7: SmartBus Sensor Input Ports #1 - #5

3 - 7 SmartBus Sensor Input Ports #1 - #5			
Pin #	Pin Designator	Pin Type	Function
1	5V	Power	Power, 5VDC
2	S	Signal	Communications Signal
3	G	Power	Power, Ground

## 6.2 CONNECTING THE SMARTBUS

To connect multiple devices to the SmartBus, SmartBus cabling must be run throughout the boat. All SmartBus devices will be branched off the main cabling at any location on the boat. Using the SmartBus Hub in the installation simplifies connections to the SmartBus.

## 6.3 CABLING RECOMMENDATIONS

The recommended cable for SmartBus is the Alpha Wire 75020 BK002 cable (Kobelt P/N: 6014-0424). Be sure to keep consistent with using the same pairs in all bus segments.

If using the recommended Alpha Wire cable, use the blue and blue/white wire pair for the ground and signal, respectively. The orange conductor should be used for +5V. The blue and blue/white wire pair has the tightest winding and lowest noise sensitivity.

Make sure to use the same cable for the sensor network backbone and follow the same colour code.

Follow recommended wiring practices and standards as per relevant local codes.

## NOTICE

Properly wired SmartBus should be capable of lengths of 30 m/100 feet. Use high quality twisted pair cable, as recommended. Install it following good wiring practices. Leave the unused pairs unterminated. Follow the preferred topology as described in the sections below.

Using the SmartBus hub simplifies cabling. When using hubs, the SmartBus sensors are connected to the hub directly with locking Molex connectors. If replacing the connectors be sure to use the appropriate Molex connectors, contacts, and crimping tools provided below.

- 3-Pin, Connector Housing (Molex: 50-57-9403)
- Contacts, 22-24AWG, Tin (Molex: 16-02-0102)
- Hand Crimp Tool (Molex: 0640160201)

## NOTICE

Crimps should be performed following manufacturer recommended instructions.

## 6.4 BUS TOPOLOGY

The sensors must be attached to the bus on separate terminal connectors. See the following interconnection diagrams for network type references.

### 6.4.1 Bus Topology

The SmartBus is a 3-conductor wire, starting from the master (Vitals Monitor Panel) and extending to the farthest sensor device. Other sensors are attached to SmartBus with minimal length branches (< 3m).

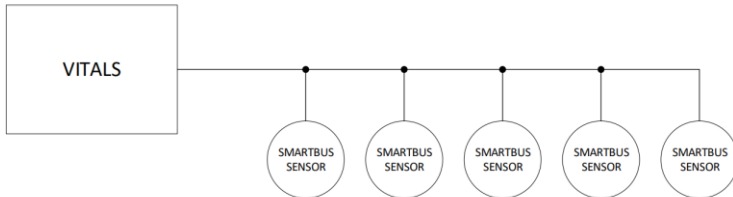


Figure 2: Bus Topology.

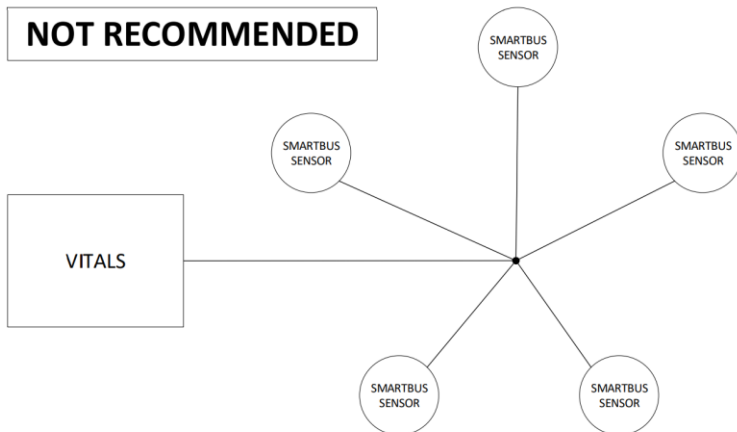
## 6.4.2 Star Topology

### **NOTICE**

Star topology is not recommended to be used in installations.

In star topology, the SmartBus is split at or near the master end and extends in multiple branches of varying lengths. There are slave devices along, or at the ends of, the branches.

Testing has shown that star-type network topologies (i.e., those with several branches diverging from the master) are unreliable. The junction of various branches presents highly mismatched impedances; reflections from the end of one branch can travel distances equal to nearly the length of the network (rather than the radius) and cause data errors. For this reason, the star topology is not recommended, and no guarantees can be made about their performance.



*Figure 3: Star Topology*

## 6.5 APPLICATION EXAMPLES

Vitals can be connected using either SmartBus Hubs or terminal strips. SmartBus Hubs greatly simplify the wiring.



6.5.1 With Hubs

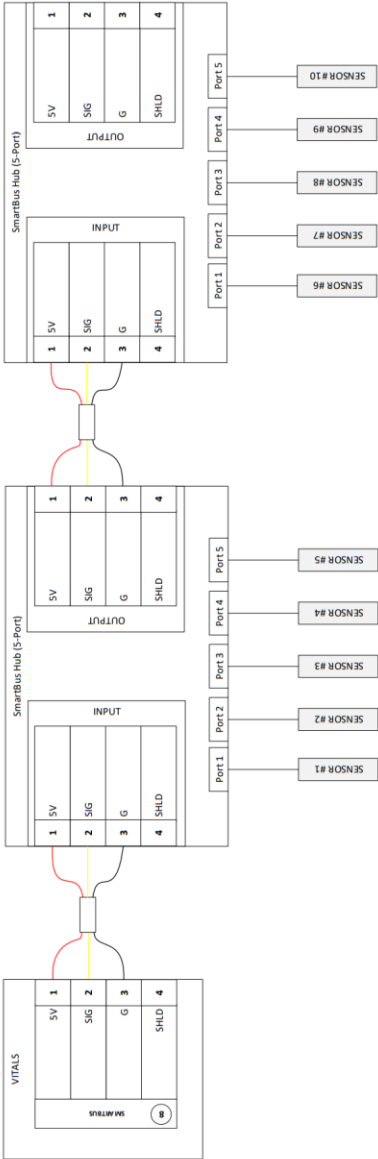


Figure 4: SmartBus sensor connection using hubs

6.5.2 No Hubs

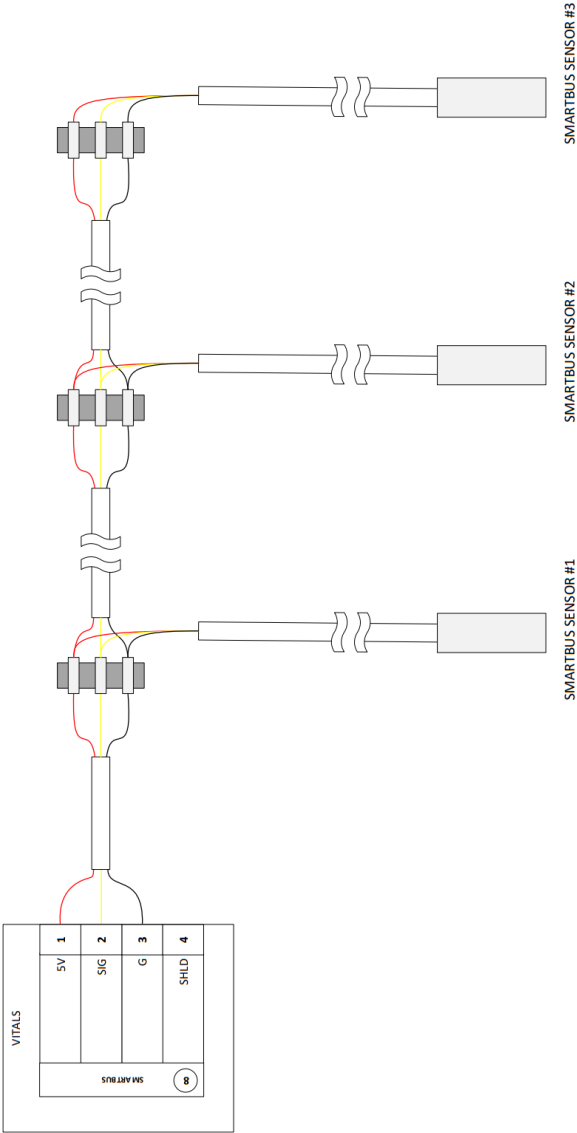


Figure 5: SmartBus sensor connection using terminals (Linear or Stubbed configuration)

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## 7 WARRANTY

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Kobel Manufacturing Co. Ltd. ("Kobel") warrants the Products and Parts manufactured by Kobel to be free from defects in workmanship or material and that said products are designed mechanically and functionally to perform to specifications.

This warranty is effective providing:

- The equipment is used within the intended operating conditions and in accordance with Kobel recommendations
- The equipment is installed according to equipment diagrams, specifications and recommendations which Kobel has provided

This warranty becomes invalid if the factory supplied serial number has been removed or altered on the product. This warranty does not cover cosmetic damage or damage caused by an act of God, accident, misuse, abuse, negligence or modification of any part of the product. This warranty does not cover damage due to improper operation or maintenance, connection to inappropriate equipment or attempted repair by anyone other than an authorized Kobel representative.

Upon identification of a potential issue or defect with a Kobel Product or Part, the Warranty Applicant ("Applicant") must immediately contact Kobel and describe the issue in writing, by letter, fax, email or other electronic conveyance. Kobel will then assess the cause of the defect and determine warranty applicability and appropriate remediation.

If any part is found to be defective, Kobel will replace said part FOB the Kobel factory provided that any such defective part is returned by the Buyer with freight and applicable forwarding charges prepaid by the Buyer. Kobel's sole obligation to the Applicant will be to repair or replace the defective part with same or similar product, to a maximum value of the list price of the product or part. The Kobel warranty does not cover labour charges, travel or any other associated expenses.

All Products and Parts manufactured by Kobel, are subject to a warranty against manufacturer's defects in materials or workmanship for a period of two (2) years from the date of purchase.

Kobel will be responsible for all Products or Parts sold by Kobel but manufactured by 3<sup>rd</sup> party manufacturing companies. However, these products and parts are subject to applicable 3<sup>rd</sup> party warranties and may not be the same as the Kobel warranty.

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