VIBRONET®
Signalmaster

Installation

This manual is valid for:
VIBRONET Signalmaster, Standard package, VIB 5.890-3

Edition June 2016
VIB 9.520.G
Translation of the German manual

LEGAL NOTICES

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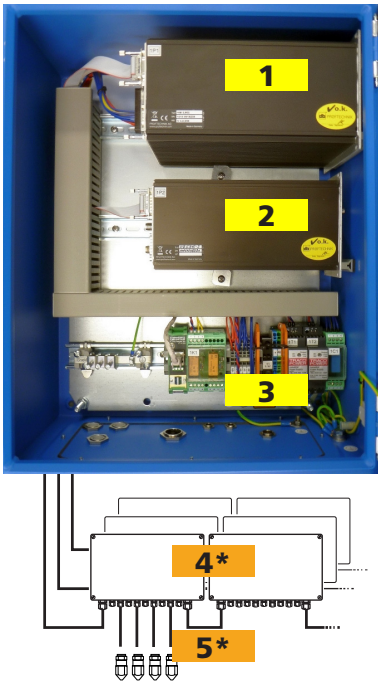
Chapter 1: Introduction

1.1 First steps

Checking the delivery

Please check the delivery without delay for damaged or missing parts. In case of incomplete delivery or defective parts, indicate the respective items on the freight documents and contact the carrier or your local PRÜFTECHNIK sales partner.



Standard package (VIB 5.890-3) and measuring equipment*

1: VIBRONET Signalmaster basic unit, VIB 5.802
2: Shock pulse module, VIB 5.815-3
3: System components, mounted in the cabinet:
Shield clamps, Ethernet, relay, terminal block, power supply
4: MUXes*
5: Sensors and cables*

What is not included

Project-specific measuring equipment, such as MUXes, sensors, cables, installation material is not included with the standard package VIB 5890-3.

Responsibilities

The owner / operator of the system must ensure that

- all applicable national regulations, all safety, accident prevention and environmental protection regulations as well as the recognized safety rules and safe work practices are complied with
- all tasks required for the proper installation of the system components are performed correctly:
  - the system is installed by a qualified specialist.
  - all components and tools required for the installation are available (see also “Installation”).
  - electric power and a data network connection that conforms to the specifications are available.
  - a potential equalization connection is available.

1.2 Service addresses

If you have any questions, please contact us:

Hotline: +49 89 99616-0
E-mail: info@pruftechnik.com

PRÜFTECHNIK Condition Monitoring GmbH
Oskar-Messter-Str. 19-21,
85737 Ismaning, Germany

Serial number

When calling our hotline, please have the serial number of the respective components at hand.

1.3 About this manual

This manual informs you how to install and commission the VIBRONET Signalmaster. Read through these instructions carefully before you install the system and put it into operation for the first time.

This manual is a part of the product. Keep it for the entire time period that you operate the system itself. Pass it on to subsequent users and owners together with the system.

Texts are marked as follows in these instructions:
- • Action steps are indented and marked with a bullet point •.
- - List entries are indented and marked with a dash -.

Information about the text markup

Functional instructions are separated from the remaining text by an upper and lower dividing line and are introduced by a context-dependent keyword.

⚠ WARNING

Instructions for the prevention of injury.
Failure to comply with these instructions can result in severe injuries.

Note

General information
for preventing damage to property.

Definitions

The following abbreviations are used in this manual:

- Condition Monitoring System	=	CMS, System
- VIBRONET Signalmaster basic unit	=	basic unit
- VIBRONET field multiplexer	=	MUX
- Current Linedrive	=	CLD

Chapter 2: Safety

VIBRONET Signalmaster was designed and built in strict compliance with the required harmonized standards and other technical specifications. The system therefore conforms to the state of the art and ensures maximum safety.

Nevertheless, dangers can arise during installation and must be avoided.

Please always comply with the general safety instructions in this chapter and with the safety instructions in the other chapters of this manual. The safety instructions explain how to protect yourself and other persons as well as property and equipment from harm.

The owner/operator shall be responsible for damage and injuries resulting from failure to comply with the information in this manual.

2.1 Information for the operator

Obligations of the operator

During operation of the system, maximum safety can only be achieved if all necessary measures are taken. It is the obligation of the operator to ensure that these measures are properly planned and implemented.

In particular, you must ensure that
- the system is used only for its intended purpose.
- the system is operated only when in proper working condition.
- the system is installed only by sufficiently qualified and authorized personnel.
- the responsibilities for installation, commissioning and operation have been defined.

Compliance with the installation manual

You must ensure that this manual
- is read, understood and complied with by the installation personnel for all work to be performed
- is stored in the immediate vicinity of the system and is available to the installation personnel at all times
- is handed over to any future owner of the system.

Training

Instruct the installation personnel regularly on the application of all safety regulations in safety instructions. It is your obligation to ensure compliance with all safety instructions.

You must also ensure compliance with all general statutory and other binding safety and accident prevention regulations, as well as the general safety instructions and specific warnings.

Ensure that the installation personnel works in a safety-conscious manner.

2.2 Information for the installation personnel

Qualification

Installation and disassembly may be performed only by a qualified electrician. The installation personnel must read and act in accordance with the installation manual.

Personal protective equipment

The following are required during installation and disassembly of the system: safety helmet, safety gloves, safety goggles.
No personal protective equipment is required for normal operation of the system.

Rules for normal operation

The operating state of the system is displayed by the SYSTEM LED on the rear side of the basic unit. In normal operation it lights up green (ready) or red (measuring). If the power supply is interrupted it is off.

Regularly check for the following:
- Is there visible damage to the system components?
- Are the cables pinched or damaged?

Defects must be repaired or reported to the operator without delay. Operate the system only if it is in proper working order!

In case of malfunctions, disconnect the system from the power supply and secure it against restarting.

If the system is shut down, this will not affect the operation of a machine. Therefore, the machine can continue operating during a shut-down.

2.3 Intended use

VIBRONET Signalmaster is a stationary CMS for monitoring the condition of anti-friction bearing machines based on the following characteristic values:

- Absolute component vibration
- Rotational speed and temperature
- Shock pulse overall value (bearing condition and cavitation)
- Process parameters as current/voltage value

The CMS is ideally suited for the following applications:
- Monitoring of distant assets
- Standard machinery (e.g. fans, pumps, ...)
- Assets located in hazardous areas

The system may only be operated within the specifications stated in this manual. Only the original VIBRONET components, sensors and cables listed in this manual and in the latest product catalog may be used for installation. Constructional changes to the components are not permitted. Intrinsic safety requirements must be observed.

2.4 Residual risks and protective measures

VIBRONET Signalmaster is proven to be safe if used as intended. Operating errors or improper use of the system can result in the following:

- Personal injuries
- Damage to the system or the machine

Risk of injury due to electric shock!
Improper connection of the system to the power supply can result in risk of injury due to low voltage (230 V).

- The electrical connection must be established by a qualified electrician.
- The mains voltage must conform to the IEC guidelines.
- During installation, repairs and maintenance of the system, it must be disconnected from the power supply.

Danger due to improperly laid cables
Personnel may stumble over an improperly laid cable and injure themselves. The cable can be damaged due to external influences.

- Lay the cable in such a way that no one can stumble over it.
- Use cable ties or a Velcro fastener to fix the cable in place.
- Lay the cable in a cable duct or protective tube.

Damage due to contamination
In a loaded industrial environment, the system components may have their function impaired or be damaged due to contamination or moisture when the switch cabinet is open.

- Keep the switch cabinet closed as much as possible.

Incorrect measurements due to electromagnetic interference
High frequency rays or electrostatic discharge in the vicinity of the system and measuring equipment can lead to incorrect measurements.

- Do not lay the sensor cables in the vicinity of heavy current lines.
- Select an installation site with low electromagnetic radiation exposure.

2.5 EU conformity

PRUFTECHNIK AG hereby declares that VIBGUARD compact conforms to the relevant European directives. The complete text of the EU conformity declaration is available at the following Internet address:

www.pruftechnik.com/
downloads/certificate-overview/ce-certificate-overview.html

Chapter 3: Technical data

3.1 Hardware

VIBRONET Signalmaster basic unit - VIB 5.802

PARAMETER		VIB 5.802
Interfaces	Meas. channels, analog	6 differential inputs (3 of them synchronous)
	Meas. channels, digital	RPM / Counter: 2 x TTL...30 V Keyphaser: ± 30 V AC and DC
	Input channels, digital	4 x, TTL...30 V
	Output channels, digital	8 x, 5 V, 5 mA
	Ethernet	1, data rate: 100 Mbit
	Serial - RS 232	2, data rate: 115,2 kBit
	FET switching output	12 V DC, 1 A, switchable
	Expanded no. of channels	External multiplexer for analog and digital outputs
Measurement	Meas. range, analog	±10 V, ±1 V, ±100 mV, ±10 mV
	Dynamic Range / Resolution	96 dB / 16 bit ADC
	Accuracy, analog input	0.05% of full scale
	Common mode rejection	> 115 dB at an amplification of 60 dB
	Temperature coefficient, analog input	20 ppm / K
	Input protection	Differential input: ± 12 V Digital input: + 30 V
	SW-Downsampling	4.8 / 2.4 / 1.2 / 0.6 / 0.3 / 0.15 kHz
	Phase error, synchronous analog inputs	< 0,05 %
	Crosstalk between analog inputs	< -100 dB
	Dynamic amplitude errors	< -0.1 dB (up to 50% of the max. signal frequency) < - 0.5 dB (up to 75% of the max. signal frequency) < -1.0 dB (up to 80% of the max. signal frequency) < - 3.0 dB (up to 100% of the max. signal frequency)
	Counter frequency	< 10 kHz
	Signal coupling	DC (AC/DC on the differential synchr. inputs)
	Sampling rate, analog inputs	153.6 / 76.8 / 38.4 / 19.2 / 9.6 kHz
	Frequency range	0...50 Hz to 0...50 kHz, sub-devided into 11 areas
	Frequency resolution	400, 800, 1600, 3200, 6400, 12800 lines
	Anti-aliasing	Dynamic adaptation
	Envelope	Digital input filter, selectable
	Measurement functions	Time waveform, spectrum, integration of the spectrum, envelope, orbit, Overall values: shock pulse, acceleration (RMS), vibration velocity (peak, RMS)
	Operation modes	Frequency band analysis, transient memory, online classification, trending
General parameters	Power supply	5.05V / 1.5A max. and 12V / 1.2A max.
	Memory	RAM: 128 MB / Flash: 1000 MB
	Temperature range, operation	- 20°C ... +60°C
	Humidity	10% to 100%, dew permitted
	Mechanical load	Shock:30 g / constant vibration: 2 g (10-150 Hz)
	Protection class	IP 66 (EN 60529) / NEMA 4
	Dimensions	approx. 260 x 130 x 150 mm (L x W x H)
	Total weight	approx. 1.5 kg

VIBRONET MUX - VIB 8.306..

PARAMETER		VIB 8.306	VIB 8.306 M20	VIB 8.306-V M20
General	Housing material	Cast aluminum housing, powder coated		Stainless steel (VA)
	Inputs / Outputs	9 sensor inputs, 1 string input, 1 string output		
	Env. protection	IP 65		IP 66
	Temperature range	-40C°...+80°C		
	Clamping range M12	3.0 ... 6.5 mm		--
	-, M20	7.0 ... 12.0 mm		
	Dimensions LxWxD	224 x 120 x 98 mm		253 x 253 x 120 mm
	Weight	approx. 3 kg		approx. 5 kg
Electrical	Power supply	Approx. 10V from VIBRONET Signalmaster 'string' output		
	Current consumption	In µA range		
	Interference protect.	Inputs and outputs protected by suppressor diodes		

Limited temperature range

The lower temperature limit (-40 ° C) applies only if the sensor cable is connected directly to the multiplexer. When using connection modules the lower temperature limit is -20 ° C.

PARAMETER		VIB 8.306 EX	VIB 8.306-V EX M20
General	Housing material	Cast aluminum housing, powder coated	Stainless steel (VA)
	Inputs / Outputs	9 sensor inputs, 1 string input, 1 string output	
	Env. protection	IP 65	IP 66
	Temperature range	-40C°...+70°C	
	Clamping range M12	3.0 ... 6.5 mm	--
	-, M20	7.0 ... 12.0 mm	
	Dimensions LxWxD	224 x 120 x 98 mm	253 x 253 x 120 mm
	Weight	approx. 3 kg	approx. 5 kg
Electrical	Power supply	approx. 10 V, from VIBRONET Signalmaster 'string' output	
	Current consumption	In µA range	
	Interference protect.	Inputs and outputs protected by suppressor diodes	
EX	Marking	Ex II 2 G Ex ib [ib] IIC T4	

Electrical parameters

The relevant electrical parameters with regards to intrinsic safety are given in section 5.2 (see 'Conditions for the safe operation (MUXes and sensors):', page 47).

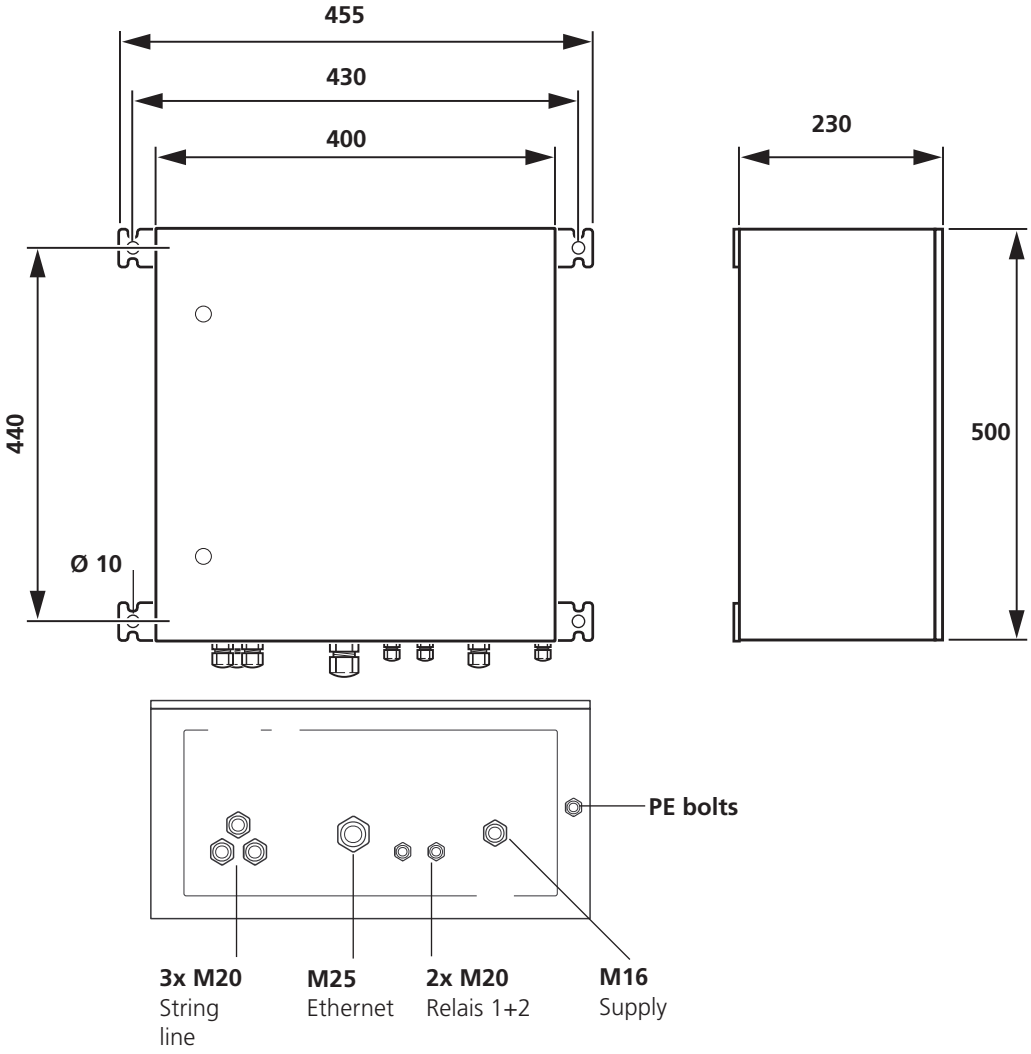
Connection modules for VIBRONET MUX - VIB 8.31x

PARAMETER		VIB 8.310 / VIB 8.310 EX	VIB 8.312	VIB 8.313 / VIB 8.313-1 EX	VIB 8.314 EX
Electrical	Input	Pt100 temperature probe	Current / Voltage	Inductive proximity sensor	CLD-type accelerometer
	Output	Digitalized current signal			
	Measurment range	-40C° ...+ 250°C	0 ...20mA / -10...+10V	-	-
	Sensitivity	0,385 Ohm/°C	--	2 mA	--
	Current output to sensor	< 2 mA	--	< 4 mA	--
	Voltage output to sensor	< 1 V	< 2.2 V (at connector, current module) 10 kOhm (Input resistance, voltage module)	< 8 V	--
	Balancing resistor	--			100 Ohm
General	Operation temperature	-20C° ...+ 80°C (... +70°C with EX version)			-40C° ...+ 70°C
	Dimensions	46 x 50 x 2 mm			

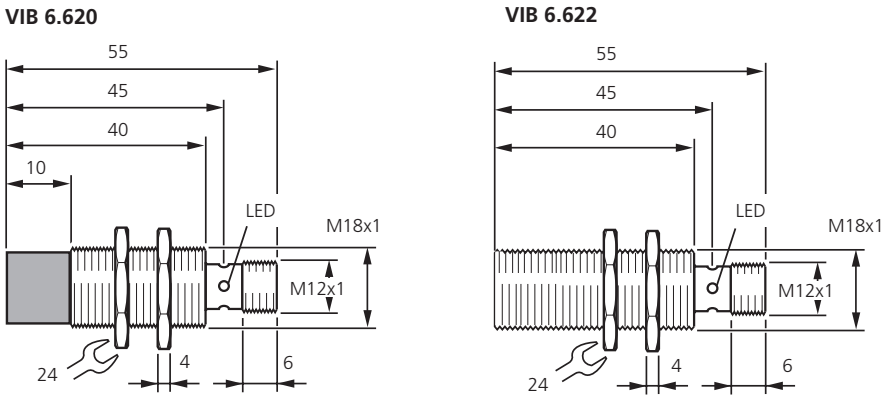
* only for installation in hazardous areas

3.2 Dimensions

VIBRONET Signalmaster cabinet

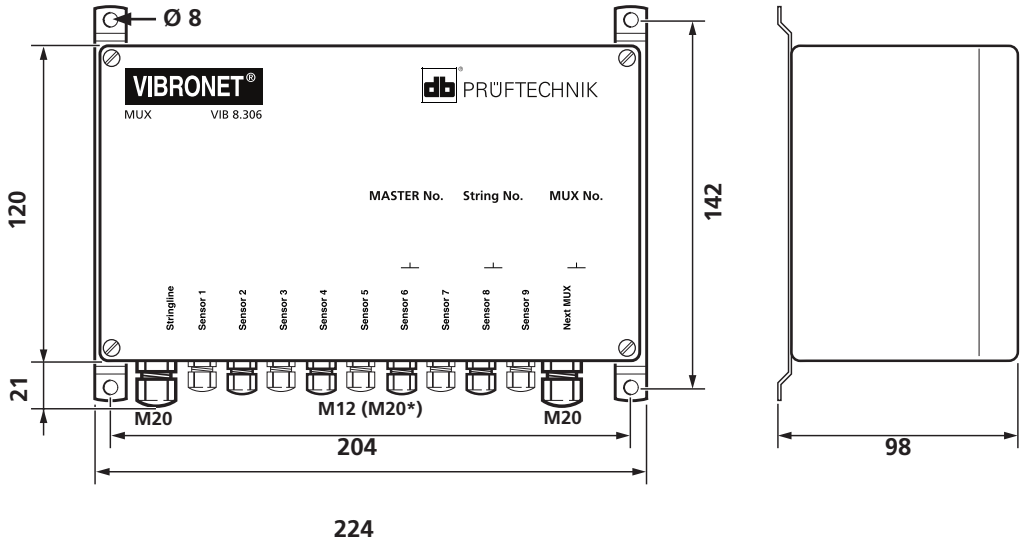


RPM sensor VIB 6.620 / VIB 6.622



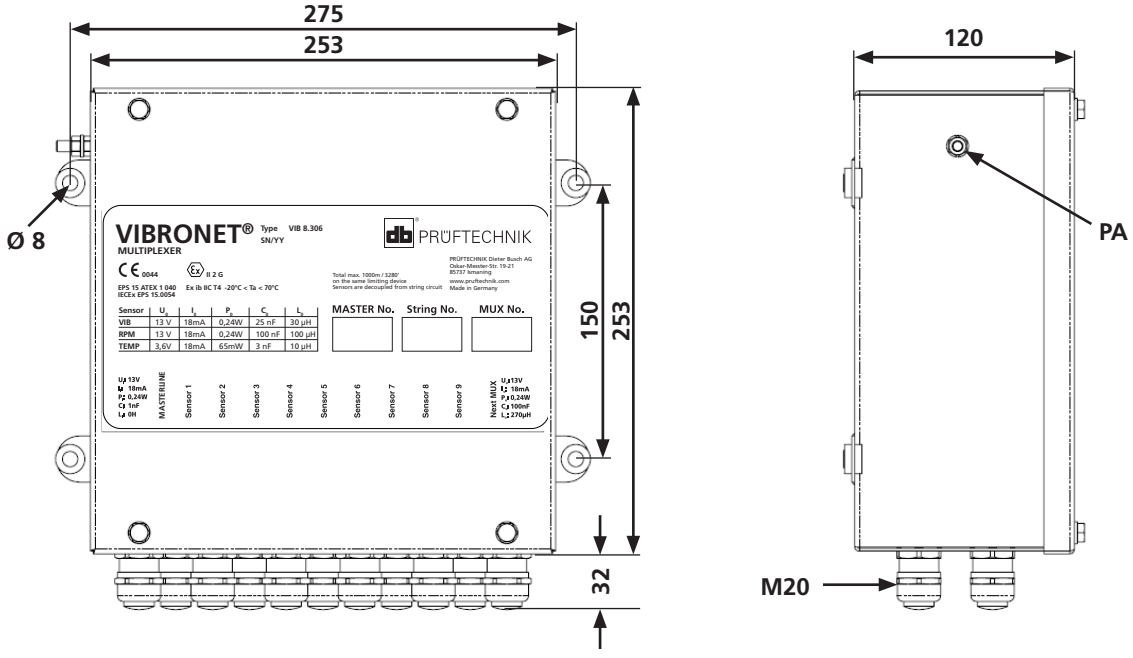
Dimensions in millimeters

VIBRONET MUX VIB 8.306, VIB 8.306 M20, VIB 8.306 EX

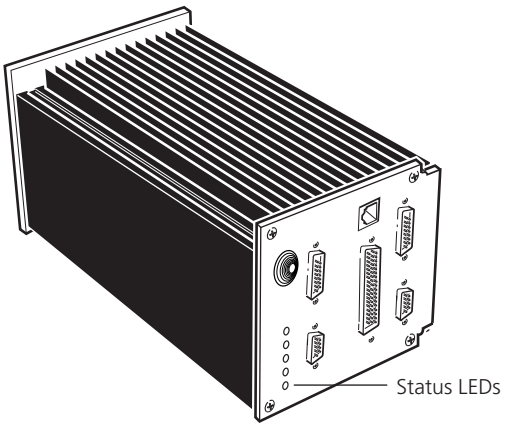


Dimensions in millimeters

VIBRONET MUX VIB 8.306-V M20, VIB 8.306-V EX M20



3.3. LED displays



LED	Color	Status
SYSTEM	Orange	Initialiation
	Green	Enabled
	Red	Measurement
STATE 1	Green	available
STATE 2	Green	available
LAN 1	Green	Connect
LAN 2	Green	Traffic

Chapter 4: Installation

This section provides information on how to mount the system and establish the electrical connections.

4.1 Preparation

For proper installation, the owner / operator must make the preparations necessary for meeting the following conditions:

Permissible ambient conditions

Temperature:	Depends on the permissible temperature range of the component installed (cable, MUX, sensor); (see 'Chapter 3: Technical data', page 11)
Relative humidity:	10% to 100%, condensation is permissible if all openings of the cabinet are closed securely (door, cable glands,..).
EM fields:	Strong electromagnetic fields, such as generators, high-voltage cables, etc. must be eliminated from the immediate vicinity of the system.

Required connections

Power supply:	100 – 240 VAC, 50/60 Hz
Network:	Ethernet (CAT 5 E) with TCP/IP, baud rate: 100 Mbit

Cabling

Shielded cables are used for standard installations. No special installation procedures are necessary unless the environment is electromagnetically contaminated; in that case, see the special notes listed in chapter 5.

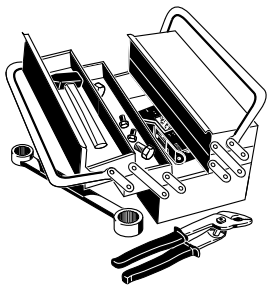
The following recommendations should be observed when laying out cable paths:

- Cables between MUXes and sensors should be kept short in order to minimize interference and cable expense.
- All the machines in a train should be connected to a suitable potential compensation lead.
- Maximum cable lengths:
  - Cabinet - last sensor in the string line: 1000 meters
  - Cabinet - Network: 50 meters
- All bends, loops, and excess cable (such as approx. 30 cm / 12" at each connection) must be included in cable length calculations.

Tools and consumables

For fastening the cabinet and the MUXes

- Drill and drill bit for M8 and M10 screws
- M8, M10 screws and matching washers or mounting anchors, 4 each
- Open-end wrench of suitable size



For mounting the temperature probe VIB 6.610
- Drill and drill bit 4.1 mm / 6.8 mm with depth gage and a fine thread tap M8 x 1.
- Compressed air for cleaning the drill hole
- Open-end wrench, size 14

For mounting the RPM sensors VIB 6.620 / VIB 6.622
- Suitable mounting bracket with mounting hole (D=19 mm)
- Open-end wrench, size 14, 2 pcs.

For mounting the internal sealing gland VIB 8.307-RT
- Open-end wrench (WAF 11, WAF 24)
- Loctite 480 contact adhesive for securing the threads

For the electrical installation
- Flathead screwdriver, blade width 2.5 or 3.5
- Phillips screwdriver, size PH2
- Wire stripper for coaxial / triaxial cables (VIB 81052 / VIB 81053)
- Wire stripper for Ethernet cable
- Crimping pliers (VIB 81026)
- Diagonal-nosed cutting pliers
- Installation checker(VIB 8.745)
- Multimeter
- 3-wire electric cable for low-voltage supply (1.5 mm^2)
- 2-wire electric cable for digital outputs (0.5 mm^2)
- Shielded industrial Ethernet cable (CAT 5)
- Insulated wire end ferrules for connecting the following wires:
  - Power supply
  - Ethernet
  - Digital outputs
- Coaxial cable, VIB 90008 for the connection Sensor - MUX
- Triaxial cable, VIB 90080 for the MUX string line
- Standard tools for electrical installations (wire cutters, cable strippers)
- Suitable strain relief devices for cables
- Suitable open-end wrenches for screwed cable glands.

4.2 Installing sensors

This section provides information on how to install the temperature probe VIB 6.610 and the RPM sensor VIB 6.620 / VIB 6.622.

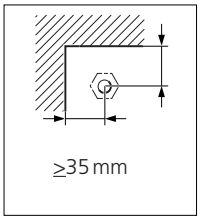
The installation of the PRÜFTECHNIK vibration sensors is described in the following manual:

- Installation manual for CLD sensor (type VIB 6.1xy) – VIB 9.831.G
- Installation manual for mini sensor (type VIB 6.20x) – VIB 9.830.G

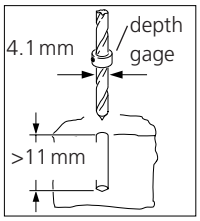
Temperature probe - VIB 6.610

The temperature probe is installed in the machine housing via threaded fitting.

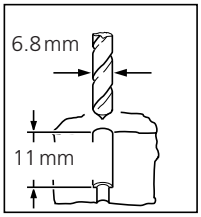
• Select appropriate mounting location:
Leave sufficient clearance between the mounting hole and the housing walls to allow tightening later with a wrench.



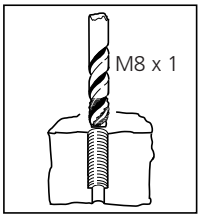
• Drill pilot hole:
Tool: 4.1 mm bit and depth gage.
Hole depth >11 mm; The hole should come close to the machine element of interest (e.g. the bearing) without damaging it. The temperature probe can be inserted up to 48 mm deep.



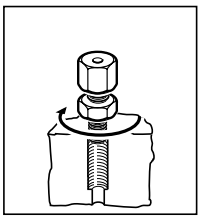
• Drill out hole
Tool: 6.8 mm bit .
Hole depth: approx. 11 mm.



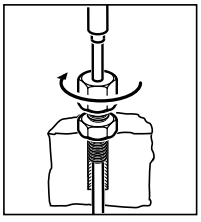
• Tap thread:
Tool: Fine thread tap M8 x 1.
Blow out any shavings with compressed air.



• Mount threaded fitting:
Use a number 14 wrench to tighten down the mounting bolt.
Leave the lock nut loose for now to allow insertion of the temperature probe.



• Insert temperature probe:
Insert the temperature probe into the hole through the threaded fitting.
Use a number 14 wrench to tighten the lock nut into place and the temperature probe along with it.



RPM sensor – VIB 6.620 / VIB 6.622

The machine speed is measured by means of a non-contact inductive RPM sensor. PRÜFTECHNIK offers two suitable sensors for different installation types and switching frequencies:

- VIB 6.620 – non-flush installation; switching frequency < 300 Hz
- VIB 6.622 – flush installation; switching frequency < 1500 Hz.

The sensor is mounted near the measurement marks of the machine shaft (e.g. threaded coupling or ring gear). For each revolution the measurement marks generate an electrical pulse in the sensor. For checking the function there is an LED on the sensor that goes out with each induced pulse. The rotational speed is the pulse frequency divided by the number of measurement marks on the shaft.

Measuring marks increase the measurement precision

The faster the shaft rotates and the more measurement marks are registered, the more precise is the measurement of the rotational speed. The upper switching frequency of the sensor must not be exceeded. For measuring low speeds (< 60 RPM) there must be at least two measurement marks on the shaft. The number of measurement marks must be recorded in the installation report and taken into account in the measurement configuration in the OMNITREND Center PC software (context: measuring channel).

Installation

The RPM sensor is electrically insulated. You can install it on the machine housing with a suitable mounting bracket. Make sure that the setup is not affected by machine vibrations.

- Switch off the machine and secure it against restarting.
- Select a suitable location in the vicinity of the measurement marks. The measurement mark should have a diameter of at least 10 mm. The distance between the measurement mark and the sensor must not exceed 8 mm (see illustration on next page).

⚠ WARNING

Risk of injury from fragments!

Insufficient measuring distance may lead to contact of measurement mark and sensor. Upon contact fragments may splinter and severely injure persons.

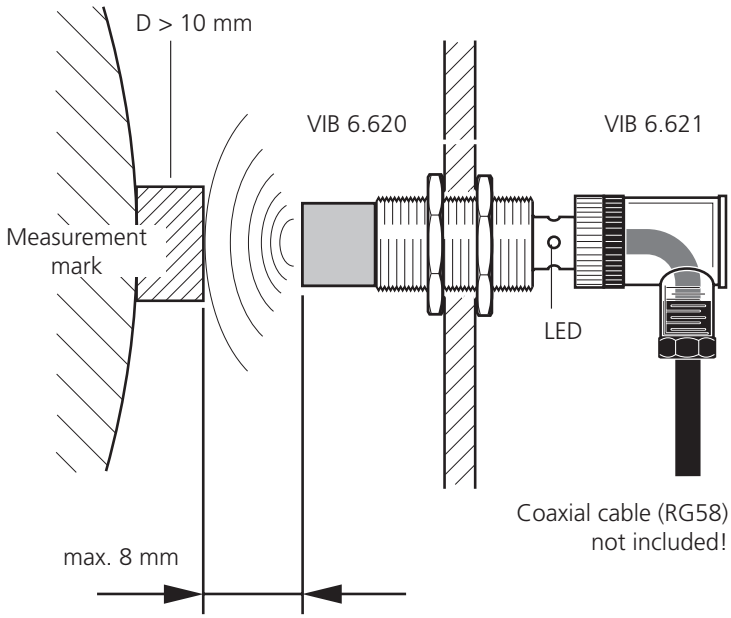
- When adjusting the measurement distance, take into account any radial shaft movement.

NOTE

Measurement error due to EM interference

No electromagnetic fields with a frequency of 600 Hz are permitted in the vicinity of the RPM sensor.

- Drill a hole in the mounting bracket; diameter: 19 mm
- Attach the sensor to the mounting bracket:
  - Unscrew the front locknut from the sensor.
  - Push the sensor through the mounting hole.
  - Screw the locknut onto the sensor and tighten the setup.
- Fasten the mounting bracket with the sensor on the machine.
- Use the locknuts to set the optimal measurement distance:
  - First connect the sensor to a suitable power supply.
  - Then turn the shaft: the LED goes out when the measurement mark passes the sensor.



RPM sensor mounted on shaft with ring gear (measurement marks)

4.3 Installing field multiplexers

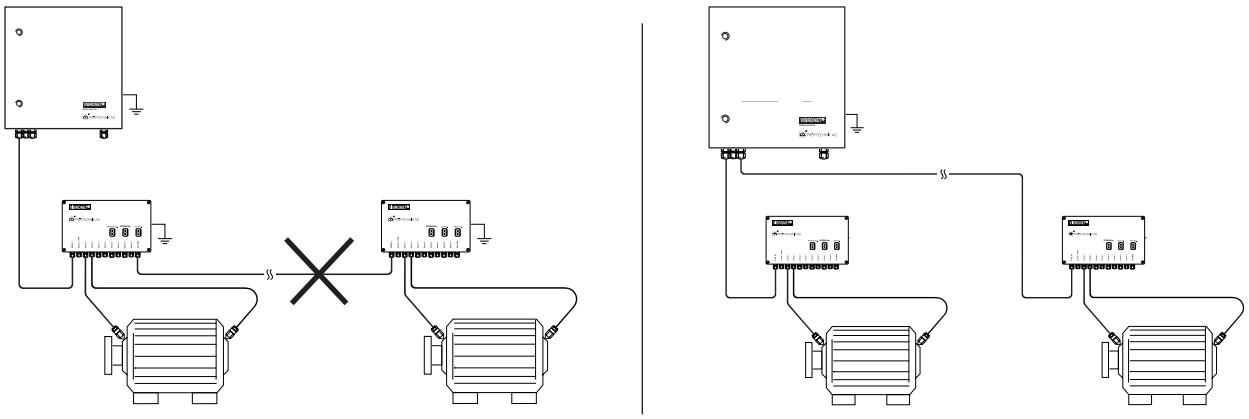
A field multiplexer (MUX) is an electric channel selector switch, that is installed in the measuring chain between the sensors and the basic unit. Each MUX merges up to 9 sensor cables into one string line thereby reducing the cable and installation costs of the CMS. Up to three lines with six MUXs each can be connected per basic unit.

Observe the following points when installing the multiplexer:

- Install the multiplexer as near as possible to the measurement location in order to minimize cable length and expense.
- Always isolate the multiplexer electrically, preferably on concrete walls or other nonconductive material.
- Machines of unequal electrical potential (not connected to a common potential compensation circuit) must never be connected to the same string line.
- Add additional multiplexers to the end of the string line.

Connect machines of unequal electrical potential to different string lines.

Installation



- Select a suitable installation location.

Cable loop

Leave sufficient clearance below the fittings for approx. 30 cm of cable loop.

- Drill four mounting holes for fastening the MUX (see '3.2 Dimensions', page 14).
- Fasten the MUX with four M8 bolts; use, if applicable, mounting dowels and vibration dampers.
- Label each MUX housing with its 3 digit ID number determined by the corresponding position in the network:

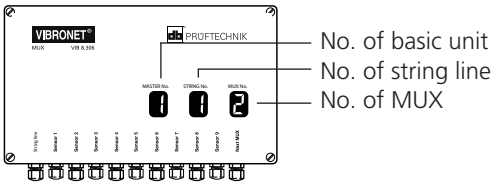
1st digit: VIBRONET Signalmaster basic unit (up to 8 per network)
2nd digit: String line (up to three per basic unit)
3rd digit: MUX (up to 6 per string line)

Accessories and templates

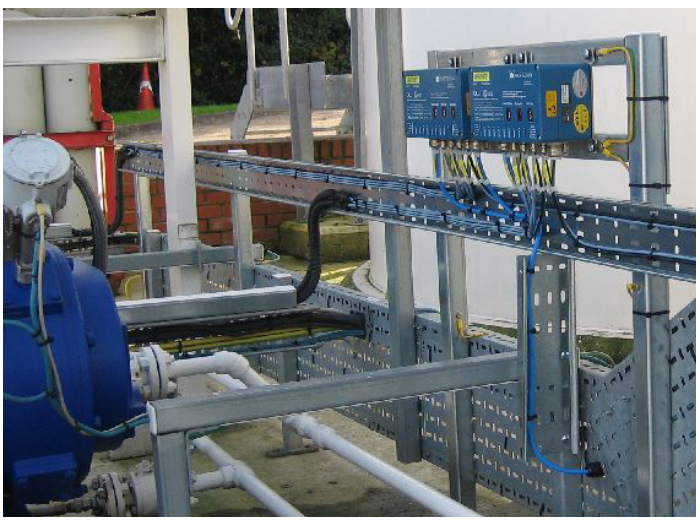
The labels are available as accessories. Order No .: VIB 8.361.

The appendix contains templates for documentation of the installed measurement locations and multiplexers (see 'Templates', page 64).

MUX labeling



Typical MUX installations



4.4 Installing the cabinet

The cabinet contains the basic unit and the interfaces for the string lines as well as for communication, supply and digital switching signals.

Installation

- Select a suitable installation location, which should be readily accessible.

Requirements

The cabinet is grounded through the power line. In addition, the cabinet must also be earthed via the PE bolt on the bottom of the cabinet.
Leave sufficient clearance below the fittings for approx. 30 cm of cable loop.
Leave enough clearance in front of the cabinet so that the housing lid can be fully opened (approx. 65 cm).

- Drill four mounting holes for fastening the cabinet (see '3.2 Dimensions', page 14).
- Fasten the cabinet with four M10 bolts; use, if applicable, mounting dowels.

PE bolt
on the bottom of the cabinet

4.5 Electrical connection

After installation, the electrical connection of the system components is carried out. The following section describes the standard installation, in which the cable lines are configured as follows:

- Coaxial cable (RG 58) for all sensor cables
- Triaxial cable for all string lines.

This description applies only in a 'normal' industrial environment characterized as follows:

- Frequency converters or their wiring must not be located near the installed cables.
- Radio communication or remote control systems must not be in operation near the installed cables.
- High-voltage cables must not be present in the VIBRONET cable conduits, channels or ducts.

When electromagnetic interference is present near the installed cables, special cables and shielding measures are required (see 'Chapter 5: Special installations', page 37).

Cable loop

Be sure to leave approx. 30 cm / 12" of cable loop at all connections (sensors, MUXes, basic unit) in order to avoid straining cable connections later during service and repair.

Details on cable connection procedures (coaxial, single-lead etc.) can be found in chapter 8 (see 'Electrical cable', page 59)

Connecting sensors

Sensor end:

- Slide a suitable protective cap and filler material onto the sensor cable prior to crimping.
- Crimp on a TNC connector (straight, angled).
- Connect the sensor cable to the sensor.
- Install a strain relief as needed.

MUX end:

- Open the MUX housing.

NOTE

Observe the ESD protection regulations

Electrostatic discharges can damage circuit paths and components.

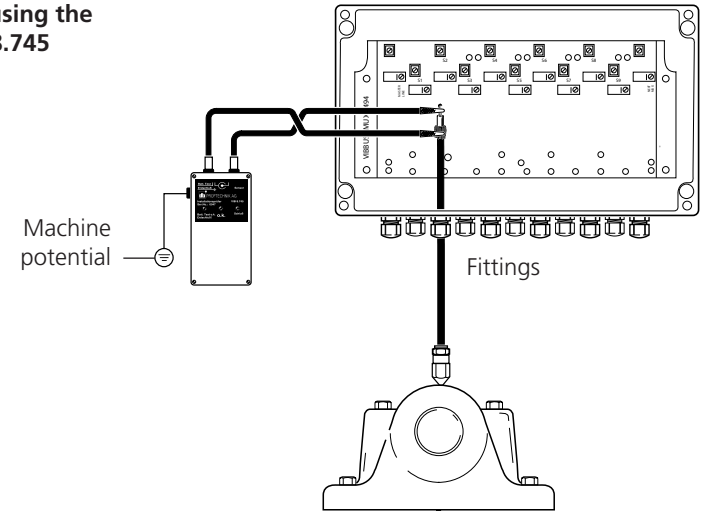
- Do not touch the board.

- Open a suitable fitting and insert the sensor cable into the MUX. The first and last fittings and connection terminals in the MUX are intended for string line connection.
- Shorten the cable to the proper length if necessary and insulate the end. Do not forget to leave approx. 30 cm of cable loop.

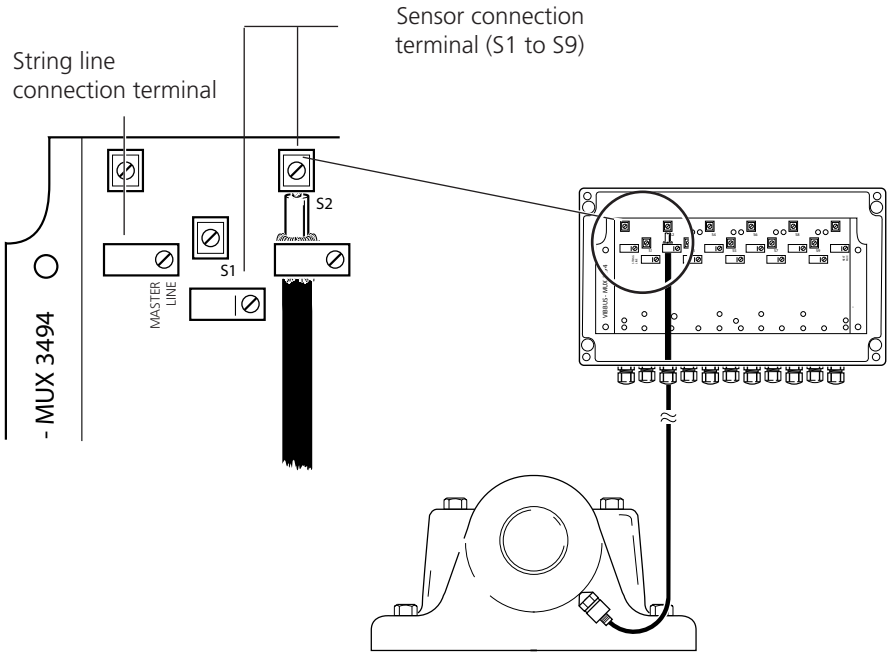
Installation

- Use the VIB 8.745 installation checker to test the circuit. The condition is indicated by one of the three LEDs on the housing: 'Ground loop', 'OK', 'Short circuit'.
- If the circuit is 'OK', connect the cable to the MUX terminal.
- Tighten down the fitting.

Check the sensor circuit using the installation checker, VIB 8.745



How to connect the vibration sensors to the MUX



Connecting RPM sensor and temperature probe

To connect these sensors to the Multiplexer you need special connection modules that are available as an accessory:

- RPM module: VIB 8.313,
- Temperature module: VIB 8.310

Connect the module to the MUX as follows:

• Open the MUX housing.

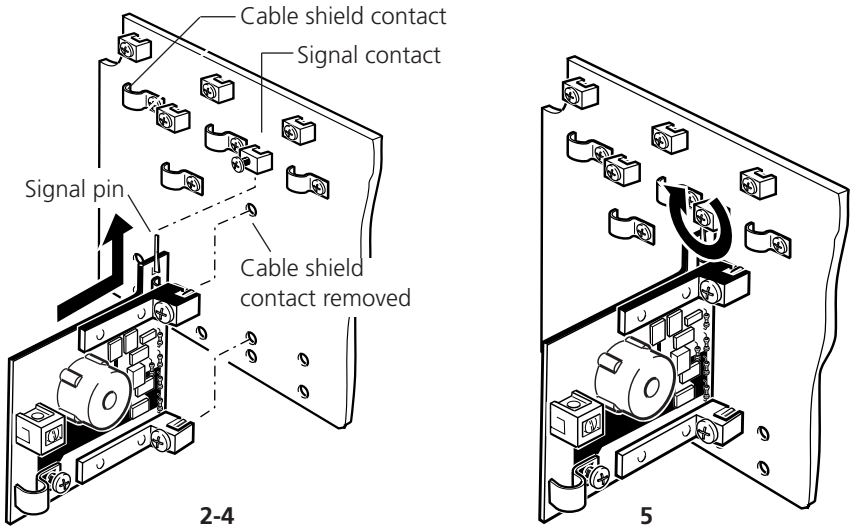
NOTE

Observe the ESD protection regulations

Electrostatic discharges can damage circuit paths and components.

• Do not touch the board.

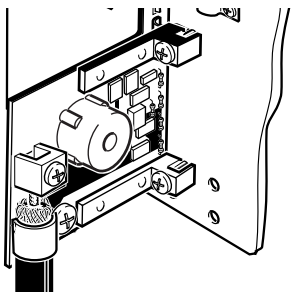
• Remove the cable shield contact from the MUX circuit board.
• Insert the signal pin of the module into the corresponding connection contact (but do not tighten it down yet).
• Screw the module firmly onto the circuit board.
• Tighten down the connection contact.



Connecting the module to the MUX

Connect the sensor cable to the connection module as follows:

• Open a suitable MUX fitting.
• Insert the sensor cable into the MUX.
• Connect the sensor cable to the module.
• Tighten down the MUX fitting.



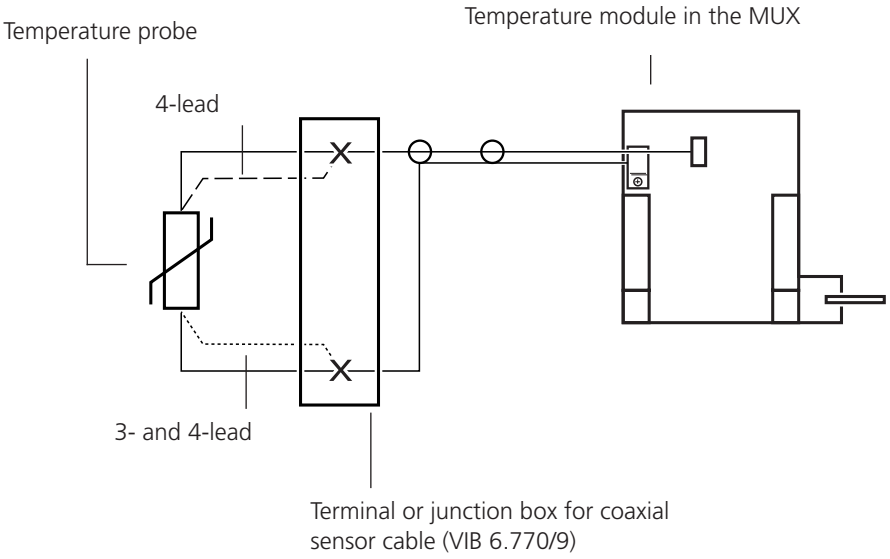
Connecting the sensor cable to the module

Cable extension

The RPM sensor is delivered without a connection cable. You can use a standard coaxial cable (RG 58) to connect the sensor. A suitable cable socket is available as an accessory (VIB 6.621).
If the cable to the MUX is not long enough, the same type of coaxial cable (RG 58) can be used as an extension. Join the cables with a TNC/TNC bulkhead connector (e.g. VIB 93036F), which must be mounted with electrical isolation.

Temperature probe with 3-lead or 4-lead connector

- Connect the temperature probe to an intermediate terminal or to the junction box (VIB 6.770/9) outside the MUX according to the below diagram.
- Connect the intermediate terminal or the junction box to the temperature module (VIB 8.310) in the multiplexer with a coaxial cable.



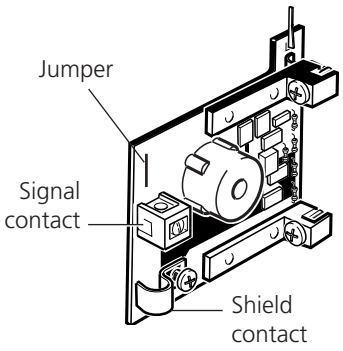
Connecting external process variables (I/U level)

External process variables from a control system can be input to the VIBRONET Signalmaster system as potential free current or voltage levels. Connection is made via the VIB 8.312 current/voltage module in similar fashion to that of RPM and temperature probes.

The module is configured by default for current level measurement. If voltage level is to be measured, the jumper on the module must be severed (see illustration at left).

Cable connection:

- Connect positive lead to signal contact.
- Connect negative lead to shield contact.



Current/voltage module
VIB 8.312

Connecting multiple MUXes to form a string line

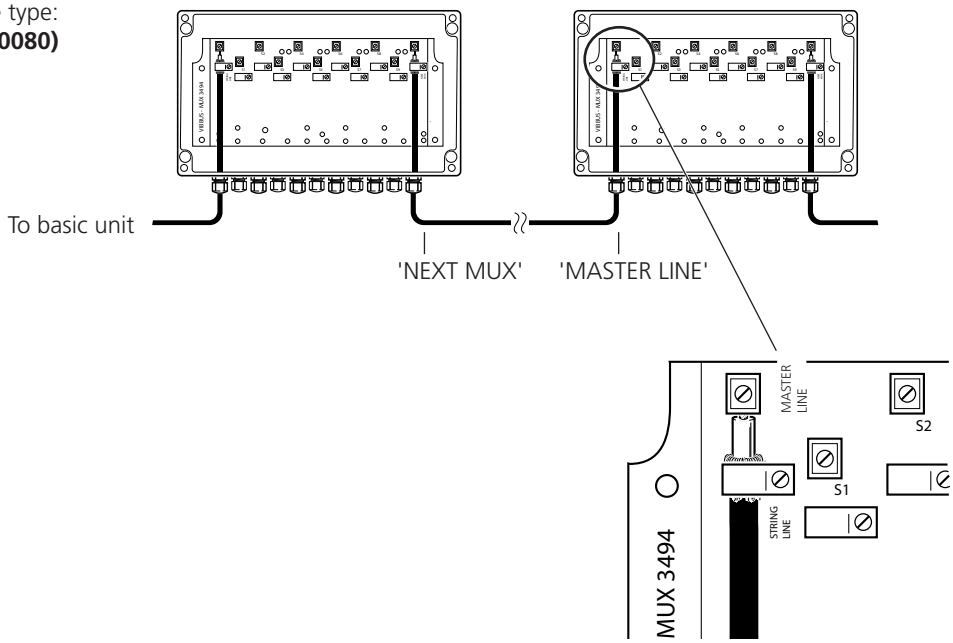
Up to 6 MUXes can be joined together to form a 'string line'. String lines can be expanded by attaching additional multiplexers to the end of the string line using triaxial cables.

Triaxial cable

Details on the connection of triaxial cables are given in chapter 8 (see 'Triaxial cable', page 61).

- Open the MUX housing.
- Trim the connection cable to the proper length (see 'Cabling', page 17).
- Lay a cable loop (approx. 30 cm).
- Insert the cable through the first or the last fitting.
- Connect the cable to the contacts marked NEXT MUX or MASTER LINE.
- Tighten down the fitting.

String line cable type:
Triaxial cable (e.g. VIB 90080)



Connecting a MUX string line to the basic unit

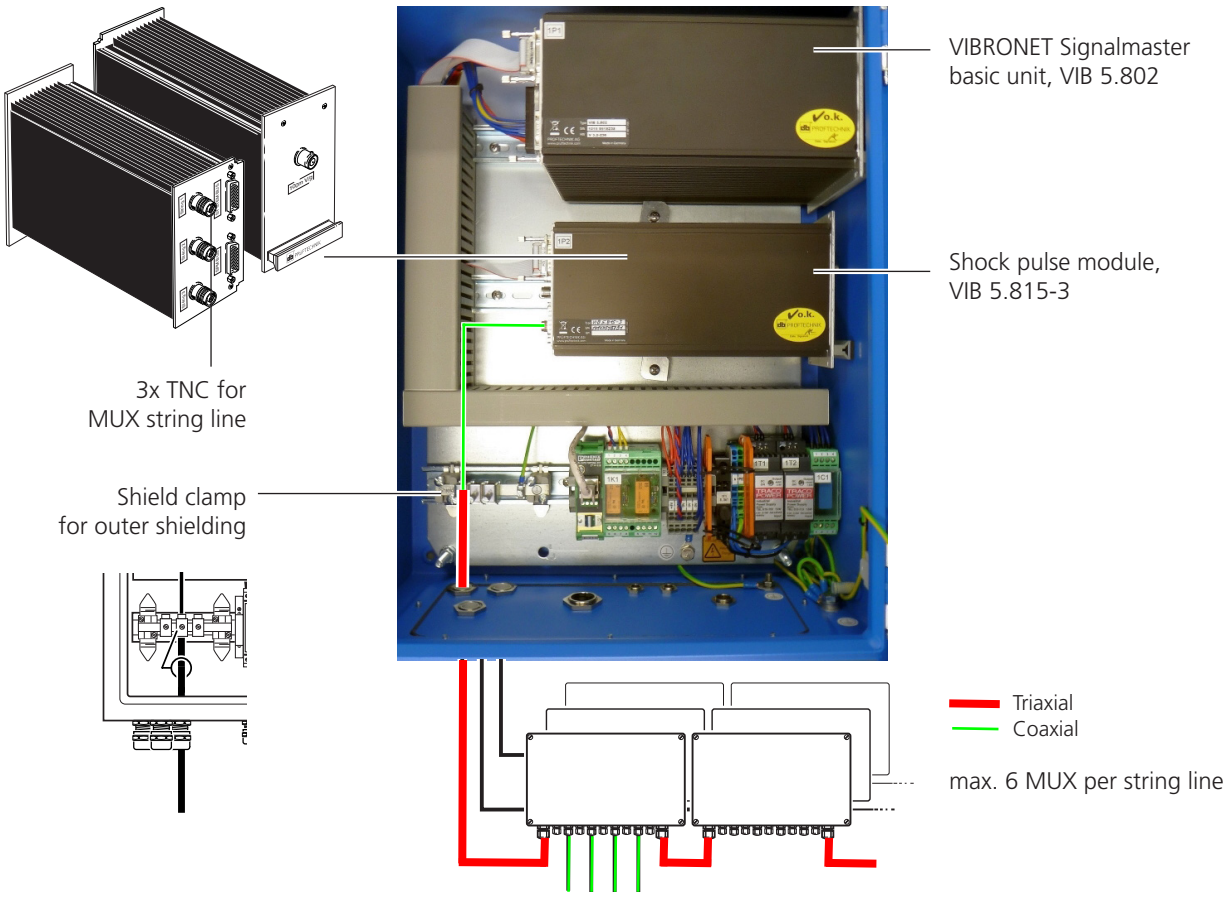
The MUX string line is connected via the shock pulse module (VIB 5.815-3) to the VIBRONET Signalmaster basic unit.

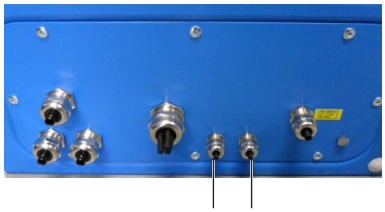
- Open the VIBRONET Signalmaster cabinet.
- Open a suitable fitting M20 on the bottom of the cabinet and remove the sealing.
- Lay a cable loop (approx. 30 cm).
- Insert the open cable end through the open fitting.
- Prepare the cable end for connection:
  - Strip off the outer sheath of the triaxial cable, so that you can apply the outer shielding to the shield clamp in the cabinet.
  - Crimp on a straight TNC connector (e.g. VIB 93022).
- Connect the TNC connector to the corresponding TNC socket at the shock pulse module ('String 1 ... String 3').
- Apply the outer shielding to the shield clamp.
- Tighten down the open fitting.

Threaded fittings M20 for MUX string line

Traixial cable and crimping

Details on the connection of triaxial cables and on crimping are given in chapter 8 (see 'Triaxial cable', page 61), (see 'Instructions for crimping (BNC/ TNC)', page 60).



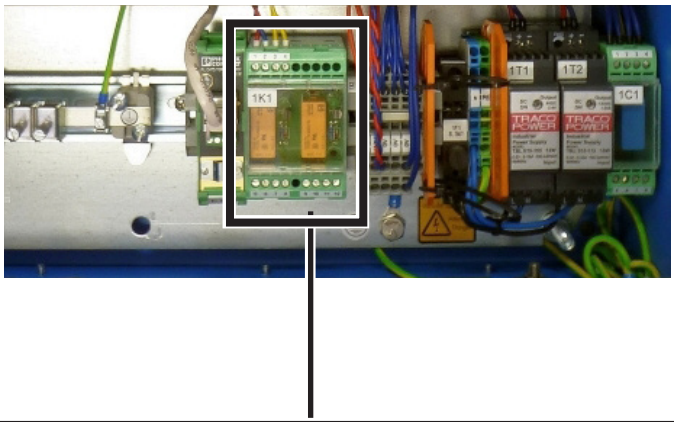


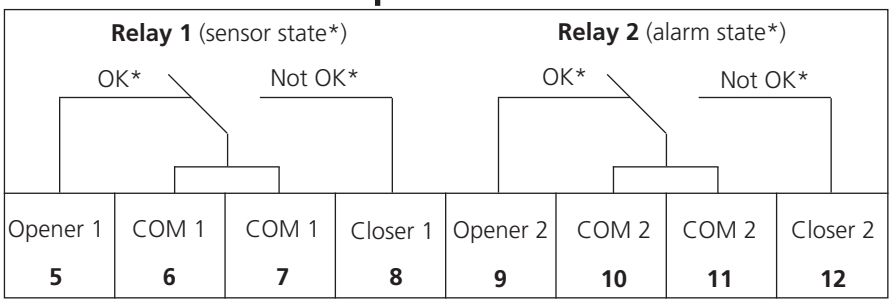
Threaded fittings M12 for
for relay outputs

Connecting the relay outputs

The system has two relay outputs for the output of binary alarm and warning signals. Use a standard 2-wire electrical cable (12 AWG) for signal transmission.

- Open the VIBRONET Signalmaster cabinet.
- Open a suitable fitting M12 on the bottom of the cabinet and remove the sealing.
- Lay a cable loop (approx. 30 cm).
- Insert the open cable end through the open fitting.
- Strip off the cable end.
- Crimp on the wire ends matching cable end sleeves.
- Connect the wires according to the following wiring plan.
- Tighten down the open fitting.





* Standard settings when programmed with OMNITREND Center

5 - 12: terminal labels

Relay configuration

The outputs can be defined as 'closers' or 'openers':

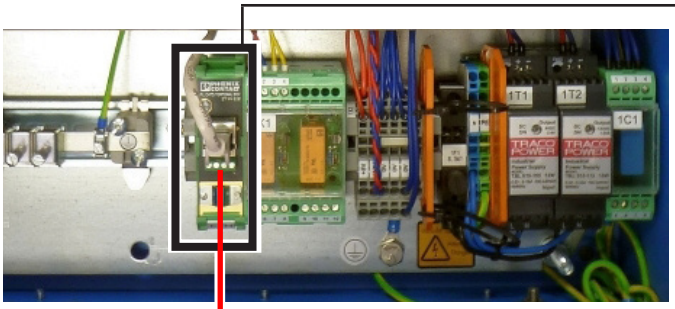
Output as 'closer' (COM & closer): If the measurement signal exceeds the selected alarm threshold, the switch 'closes' the contact and, thus, indicates that the alarm value has been exceeded.

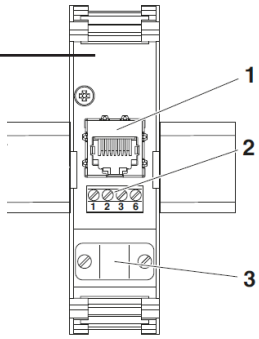
Output as 'opener' (COM & opener): If the measurement signal exceeds the selected alarm threshold, the switch 'opens' the contact and, thus, indicates that the alarm value has been exceeded.

Connecting a communication network

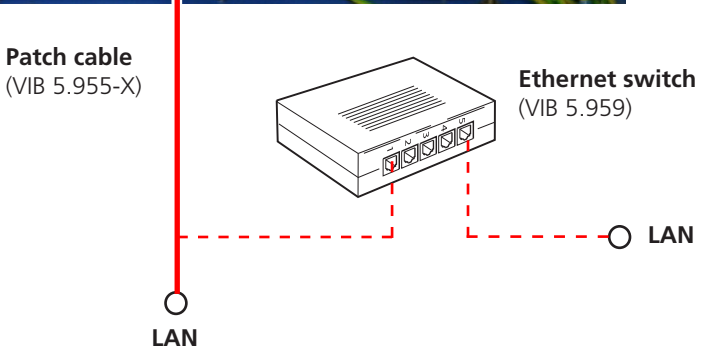
The system can be connected to a communication network via the built-in Ethernet terminal box (CAT 5). The components required for establishing the connection are available as an accessory:

- Patch cable - VIB 5.955-X
- Ethernet switch VIB 5.959





Ethernet terminal box (CAT 5):
1: RJ45 socket
2: Screw connection terminal
3: Strain relief with shield connection



Insert the patch cable into the cabinet as follows:

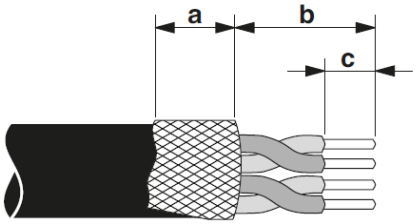
- Open the VIBRONET Signalmaster cabinet.
- Open the fitting M25 on the bottom of the cabinet and remove one of the four sealing inserts.
- Lay a cable loop (approx. 30 cm).
- Cut off the RJ45 plug from the relevant cable end.
- Insert the open cable end through the open fitting.

Threaded fitting M25
for Ethernet

Connect the patch cable to the Ethernet terminal box as follows:

- Remove cable sheath by 10 mm (length b).
- Fold back 10 mm of the braided shield over the outer sheath (length a).
- Remove the aluminum foil.
- Strip 5 mm off each single wire (length c).
- Lay the shielding under the clip bracket of the strain relief (3) and screw it tight.

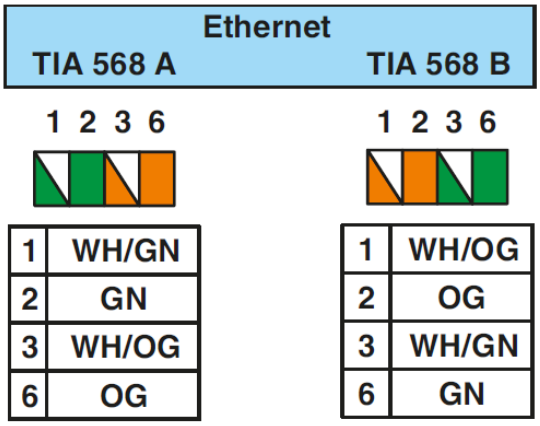
a = 10 mm
b = 10 mm
c = 5 mm



- Connect the single wires to the screw terminal blocks. If possible, make sure the single wires remain twisted up to the connection terminal blocks.
- Tighten down the open fitting M25.
- Connect the other end of the patch cable to the network socket or to the Ethernet switch respectively.

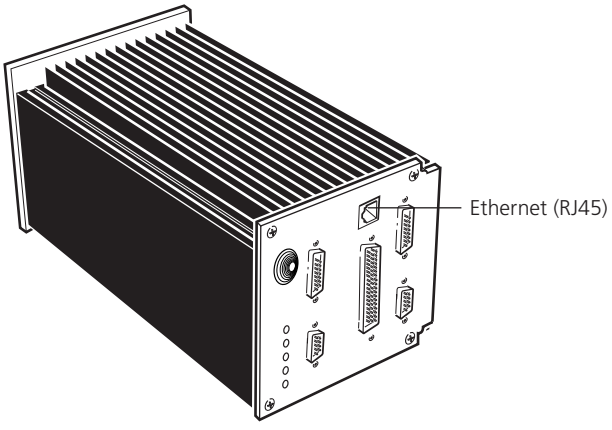
Pin assignment
1: Tx+
2: Tx-
3: Rx+
6: Rx-

Color coding
WH: white
GN: green
OG: orange



Connecting a laptop PC

A laptop can be connected directly to the Ethernet port (RJ45) of the basic unit via a crossover patch cable for commissioning and service.



Connecting an external power supply

The system is connected to the external power supply by means of a standard 3-wire electrical cable (1,5 mm²).

⚠ WARNING

Risk of injury due to electric shock!

Improper connection of the system to the power supply can result in risk of injury due to low voltage (230 V).

- The electrical connection must be established by a qualified electrician.

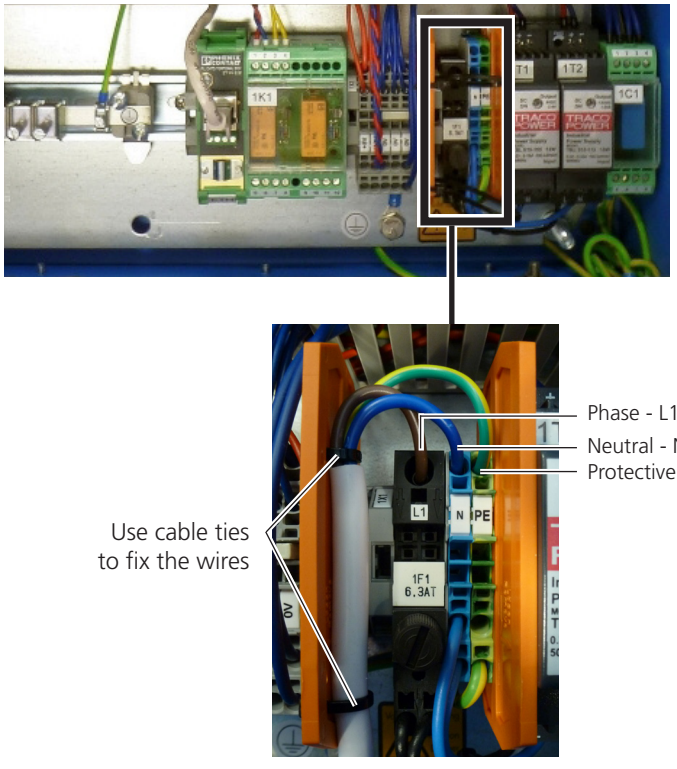
Note

Specification for external power supply

100-240 V AC / 0,71 - 0,43 A / 50-60 Hz

- Open the VIBRONET Signalmaster cabinet.
- Open the fitting M16 on the bottom of the cabinet and remove the sealing.
- Lay a cable loop (approx. 30 cm).
- Insert the power cable end through the open fitting.
- Strip off the cable end.
- Connect the wires to the respective terminals:
  - Black/brown wire > L1
  - Blue wire > N
  - Yellow/green > PE
- Fix the wires to the orange panels with the supplied cable ties.
- Tighten down the open fitting.

Threaded fitting M16
for power supply



Wiring diagram for VIBRONET Signalmaster cabinet

100 - 240V AC
0,71 - 0,43A
50-60Hz

MS16

connect to	1X1	Power Supply		connect to
L	L1	1F1 6,3AT	L1.1	1T1-L
			L1.1	1T2-L
N	N		N	1T1-N
			N	1T2-N
PE	PE		PE	nc
			PE	PE-Cabinet
1X2-5V	+	**1T1** TBL015-105 5,08VDC	L	1X1-L1.1
1C1-1	-		N	1X1-N
1X2-12V	+	**1T2** TBL015-112 12VDC	L	1X1-L1.1
1C1-3	-		N	1X1-N
1T1-	1	**1C1** VIB-SO-RV C220nF	5	PE-Cabinet
1X2-0V	2		6	nc
1T2-	3		7	nc
1X2-0V	4		8	nc

connect to	1X2 Term	Terminal Strip Funktion	Term	connect to
1T1+	5V		5V	nc
1P1-4	5V		5V	nc
1T2+	12V		12V	1K1-1
1P1-36	12V		12V	nc
1P1-21	0V		0V	1C1-2
1P1-37	0V		0V	1C1-4
1P1-22	0V		0V	1K1-2
1P1-23	0V		0V	nc
1P1-24	0V		0V	nc
1P1-25	0V		0V	nc
nc	12V-Switch		12V-Switch	1P1-3

connect to	1K1 Term	VIB 5.917 Funktion	Relais Term	connect to
		12 Vdc	1	1X2-12V
		PG	2	1X2-0V
		Sw-In 1	3	1P1-7
		Sw-In 2	4	1P1-8
NO1	5	Normally Open (12)		
COM1	6	Common (11)		
COM1	7	Common (11)		
NC1	8	Normally Close (14)		
NO2	9	Normally Open (12)		
COM2	10	Common (11)		
COM2	11	Common (11)		
NC2	12	Normally Close (14)		

Digital-OUT_1 — MS12

Digital-OUT_2 — MS12

connect to	Eth	CAT5 Terminal Box		connect to
Tx+	1	Tx+	RJ45	
Tx-	2	Tx-		1P1-RJ45
Rx+	3	Rx+		
Rx-	6	Rx-		
Eth. Schield	Shield	PE		

Ethernet CAT 5.E — MS25/4

		SIGNALMASTER 1P1	VIB 5.802	V3
connect to		MULTI-IO	Channel	50-pol
nc		17	A6:Hi (AD1)	RD
nc		33	A6:Lo (AD1)	BK
nc		16	A5:Hi (AD1)	RD
nc		32	A5:Lo (AD1)	BK
nc		15	A4:Hi (AD1)	RD
nc		31	A4:Lo (AD1)	BK
nc		14	A3:Hi (AD3)	RD
nc		30	A3:Lo (AD3)	BK
nc		13	A2:Hi (AD2)	RD
nc		29	A2:Lo (AD2)	BK
nc		12	A1:Hi (AD1)	RD
nc		28	A1:Lo (AD1)	BK
nc		11	OUT5	YE
nc		27	OUT6	YE
nc		44	OUT7	YE
nc		20	OUT8	YE
nc		9	P1	YE
nc		42	P2	YE
1K1-3		7	OUT1	YE
1K1-4		8	OUT2	YE
nc		40	OUT3	YE
nc		41	OUT4	YE
nc		5	IN1	YE
nc		6	IN2	YE
nc		38	IN3	YE
nc		39	IN4	YE
nc		10	KP/AC	YE
nc		43	SYNC	YE
1X2-12V-Switch		3	12V Switch	RD
1X2-12V		36	12 V Supply	RD
1X2-5V		4	5 V Supply	RD
nc		34	PE	GN/YE
nc		35	KP/DC	YE
nc		49, 50	AG	DBU
nc		47,48	AG	DBU
nc		45,46	AG	DBU
nc		26	PG	DBU
1X2-0V		24,25	PG	DBU
1X2-0V		22,23	PG	DBU
1X2-0V		21, 37	PG	DBU
nc		1	LAN: TX+	BN
nc		2	LAN: TX-	RD
nc		18	LAN: RX+	OG
nc		19	LAN: RX-	BU
nc		D-SUB	RS232/1	9-pol
nc		D-SUB	RS232/2	9-pol
Eth-RJ45		RJ45	Eth 100MBit	
1P2-SYSTEM-BUS		D-SUB	SYSTEM-BUS	15-pol
nc		D-SUB	EVENT-BUS	15-pol

String1 — MS20 EMV

String2 — MS20 EMV

String3 — MS20 EMV

		1P2	VIB 5.815-3	SP-Modul
connect to		Term	Channel	Signal
MUX-String1		TNC	String 1	
MUX-String2		TNC	String 2	
MUX-String3		TNC	String 3	
nc		BNC	100mV/g	
1P1-SYSTEM-BUS		D-SUB	SYSTEM-BUS	
nc		D-SUB	SPM-BUS	

connect to	Shield Term	Shield Clamp Function
Shield-String1	PE	max Ø8mm
Shield-String2		max Ø8mm
Shield-String3		max Ø8mm
PE-Cabinet		max Ø4mm

PE / PA — Earth-Bolt

PE-Cabinet	
1X1-PE	2,5mm²
Plate	2,5mm²
Flange Plate	2,5mm²
Cabinet Door	2,5mm²
Shield-PE	2,5mm²

1X1 wired with (1,5mm²)
PE wired with (2,5mm²)
all other with (0,5mm²), if not different denoted

AC Connection

1,5mm²

Fuse 6,3A

VIBRONET Signalmaster cabinet

Chapter 5: Special installations

5.1 EM contaminated environments

Sources of severe electromagnetic interference in the vicinity of cables require special installation procedures in order to ensure that the VIBRONET CMS functions properly. This type of interference can occur, for example, due to:

- Frequency converters
- Radio or remote control transmitters
- High-voltage cables

Cabling

Use a double-shielded triaxial cable (e.g. VIB 90080) for connecting sensors to MUXes in electromagnetically contaminated environments.

To facilitate the installation you may use coaxial cable for the first several meters. The transition to triaxial cable is made with the help of the junction box VIB 6.770/13. PLC connections are made without the junction box.

Connecting triaxial cable to junction box VIB 6.770/13:

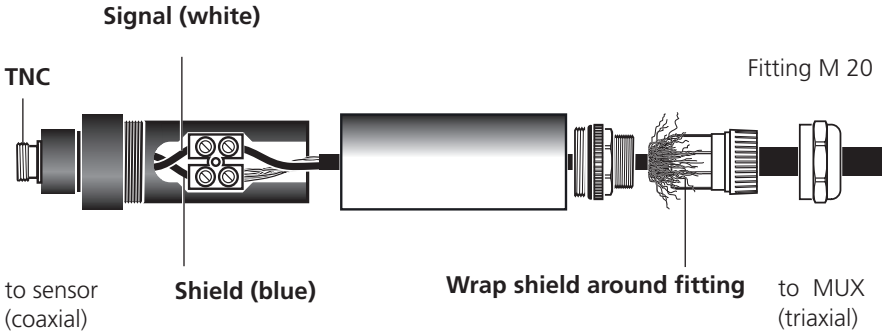
- Open the housing of the junction box.
- Remove the threaded fitting and insert the end of the triaxial cable through it.
- Wrap the exposed shield around the fitting.
- Strip the insulation from the signal conductor and its shield.
- Connect the signal conductor to the white lead and the shield to the blue lead.
- Reassemble the junction box, then the fitting.

Note

Risk of broken cable

Turn the metal tube and hold the fittings firmly so that the cable connection does not tear off.

- Mount the junction box electrically isolated in order to avoid ground loops.



Junction box VIB 6.770/13 with threaded fitting M20 for triaxial cables

Connecting the sensor cable to the junction box:
- Connect the sensor cable to the TNC socket.

Seal up connection

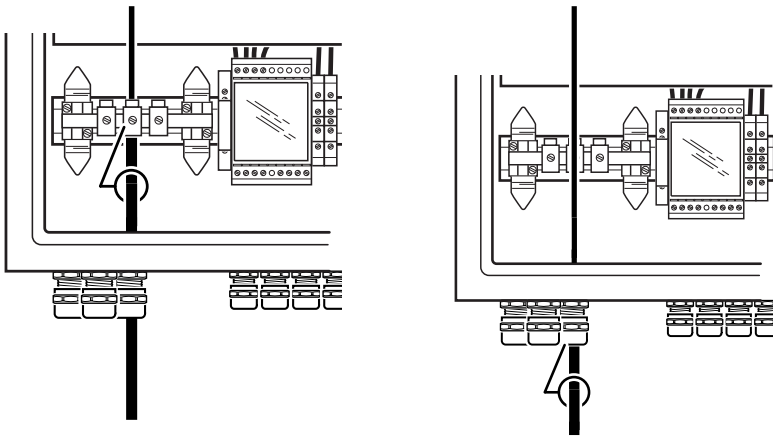
Accelerometers with a TNC socket (e.g. VIB 6.1xx) can be connected to the junction box using a short, pre-assembled cable with TNC connector and protective caps. Order information can be found in the latest PRÜFTECHNIK Condition Monitoring sensor catalog, available free of charge in the internet on www.pruftechnik.com.
RPM sensor, temperature probe: The open cable end must be crimped with a TNC plug (e.g. VIB 93022).
Attach the required protective caps on both cable ends to seal the cable-sensor interface:
- VIB 6.701, straight version
- VIB 6.711, angled version.

Shielding

The shield of the triaxial cable can be grounded in the fitting of the respective housing when permitted and appropriate. In the MUXes with stainless steel housing, the shield can also be placed on the internal shield terminal.

Shielded cables must be used for the digital outputs.

Triaxial cable
Earth shield via fitting (right) **or** shield terminal (left).

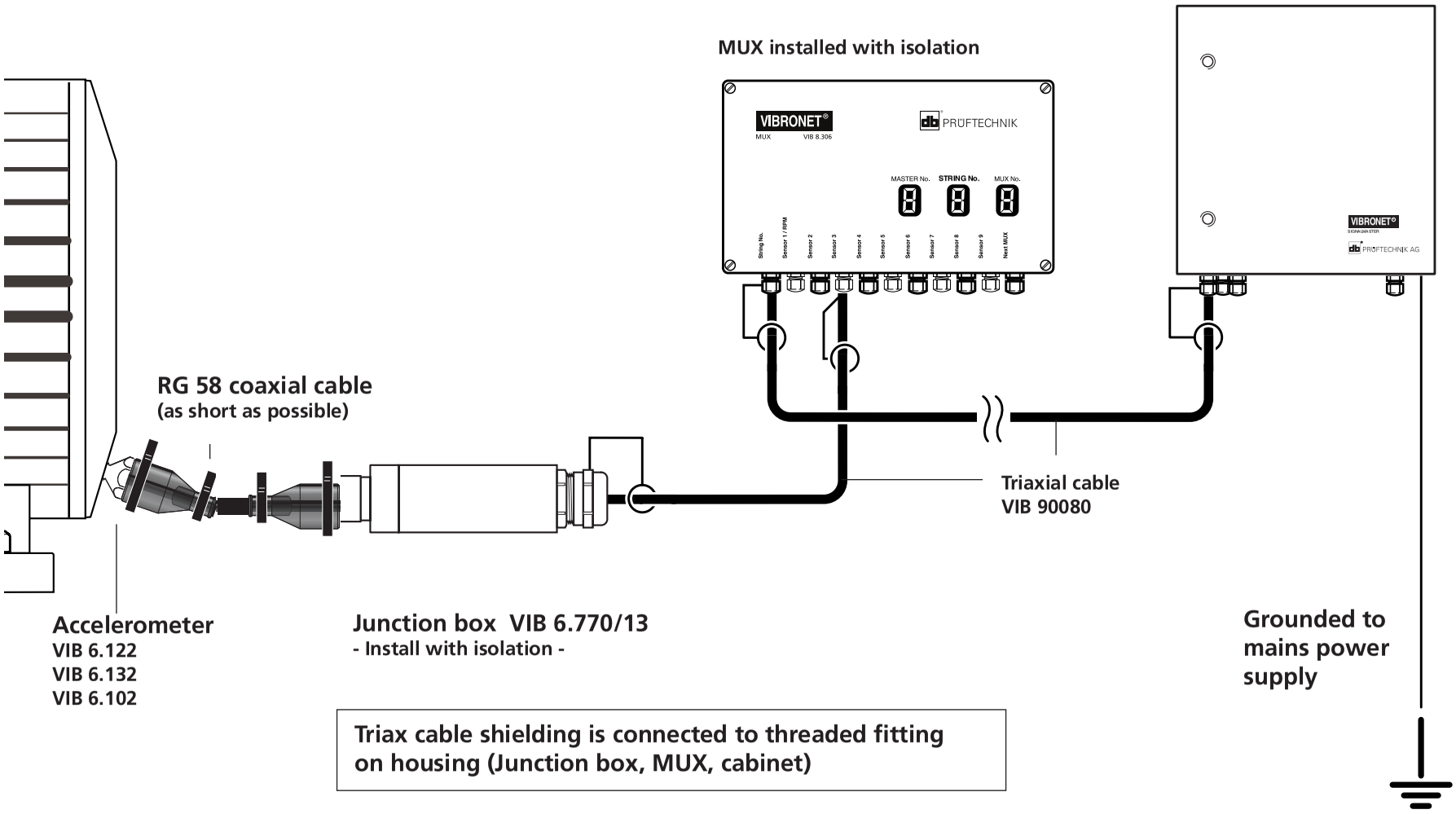


Insulation

Ensure that the junction box VIB 6.770/13 and the MUXes are electrically insulated when installed.

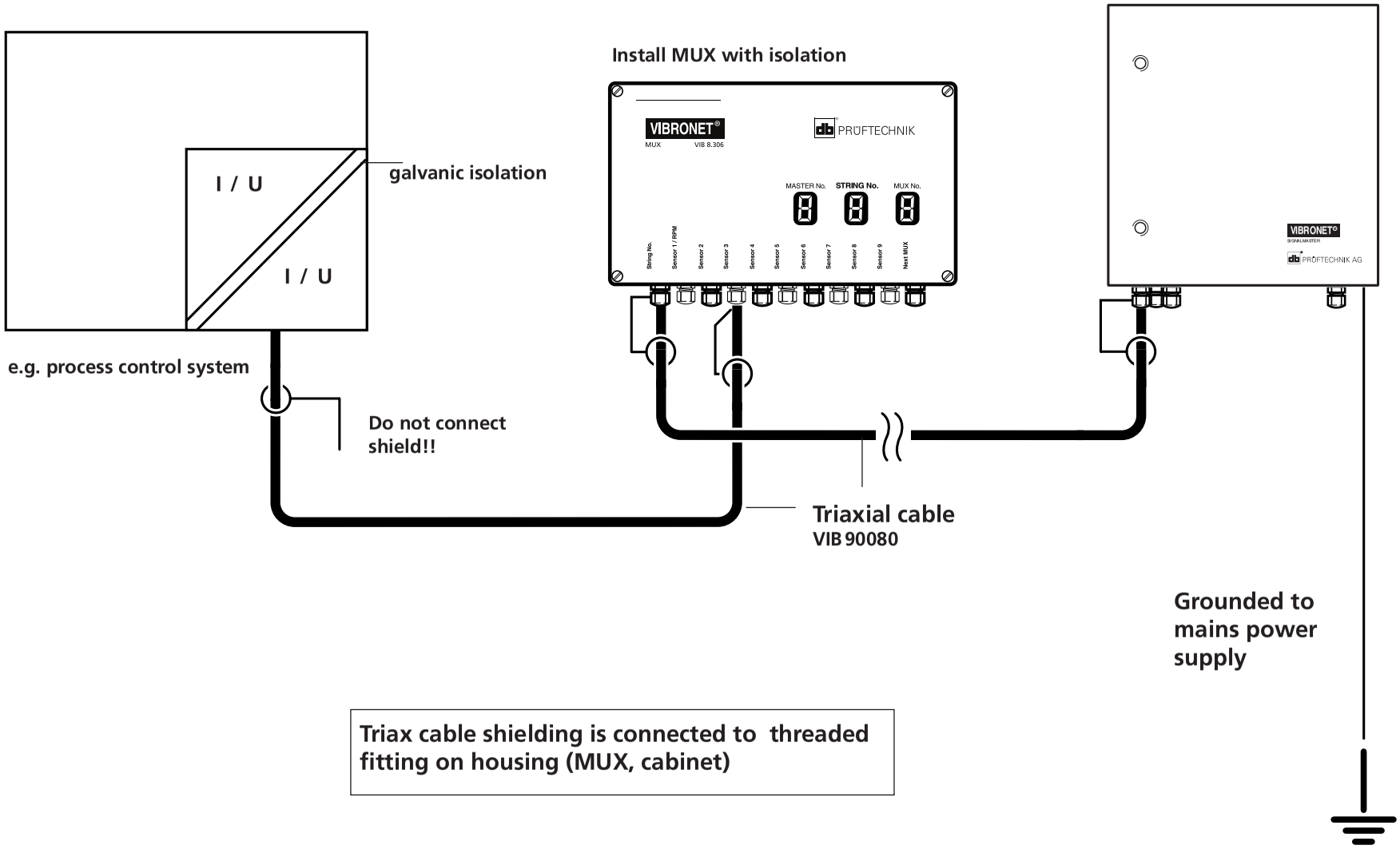
Connection plan for electomagnetically contaminated environment

Example: vibration monitoring



Connection plan in electromagnetically contaminated environment

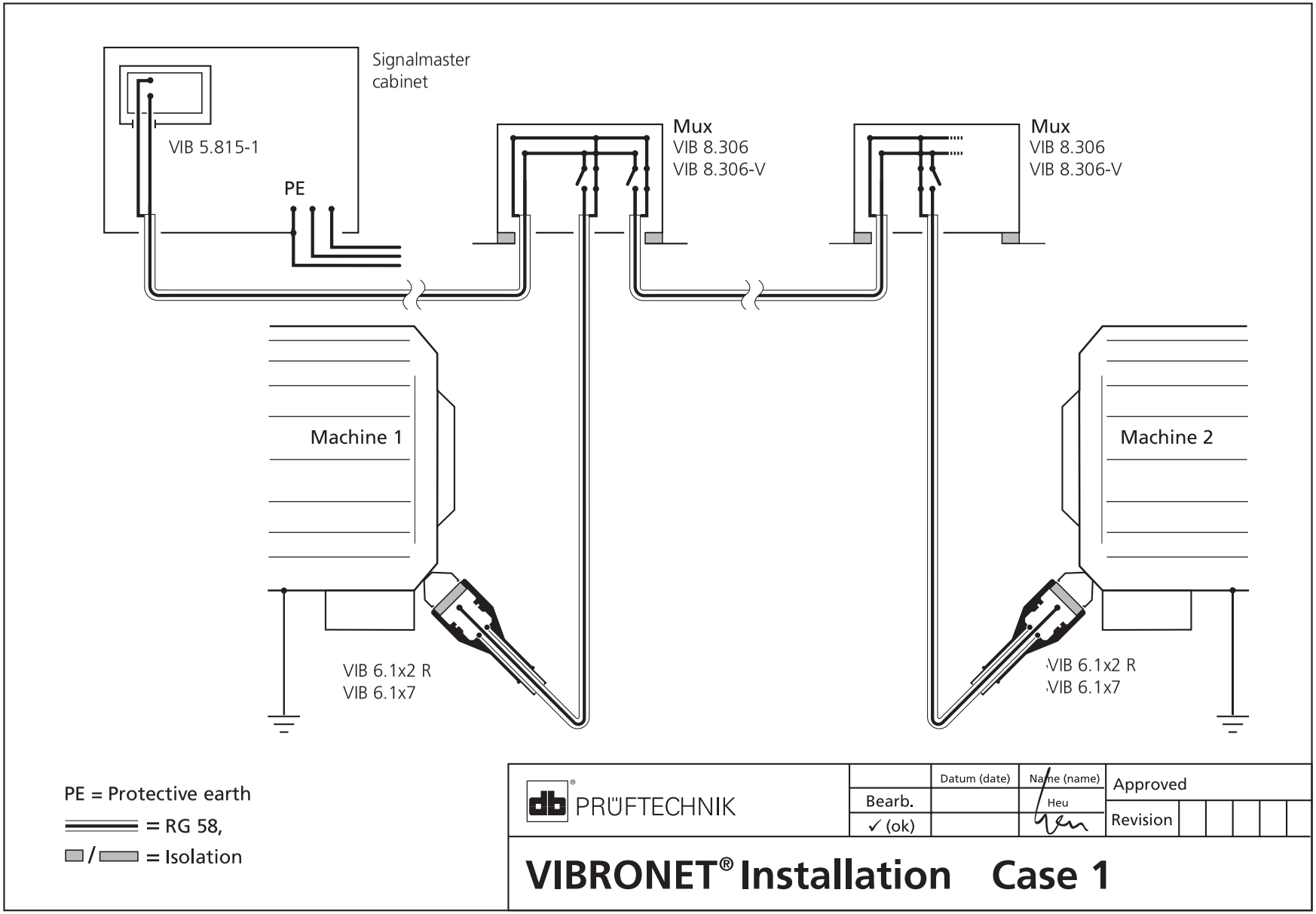
Example: Current/voltage level input



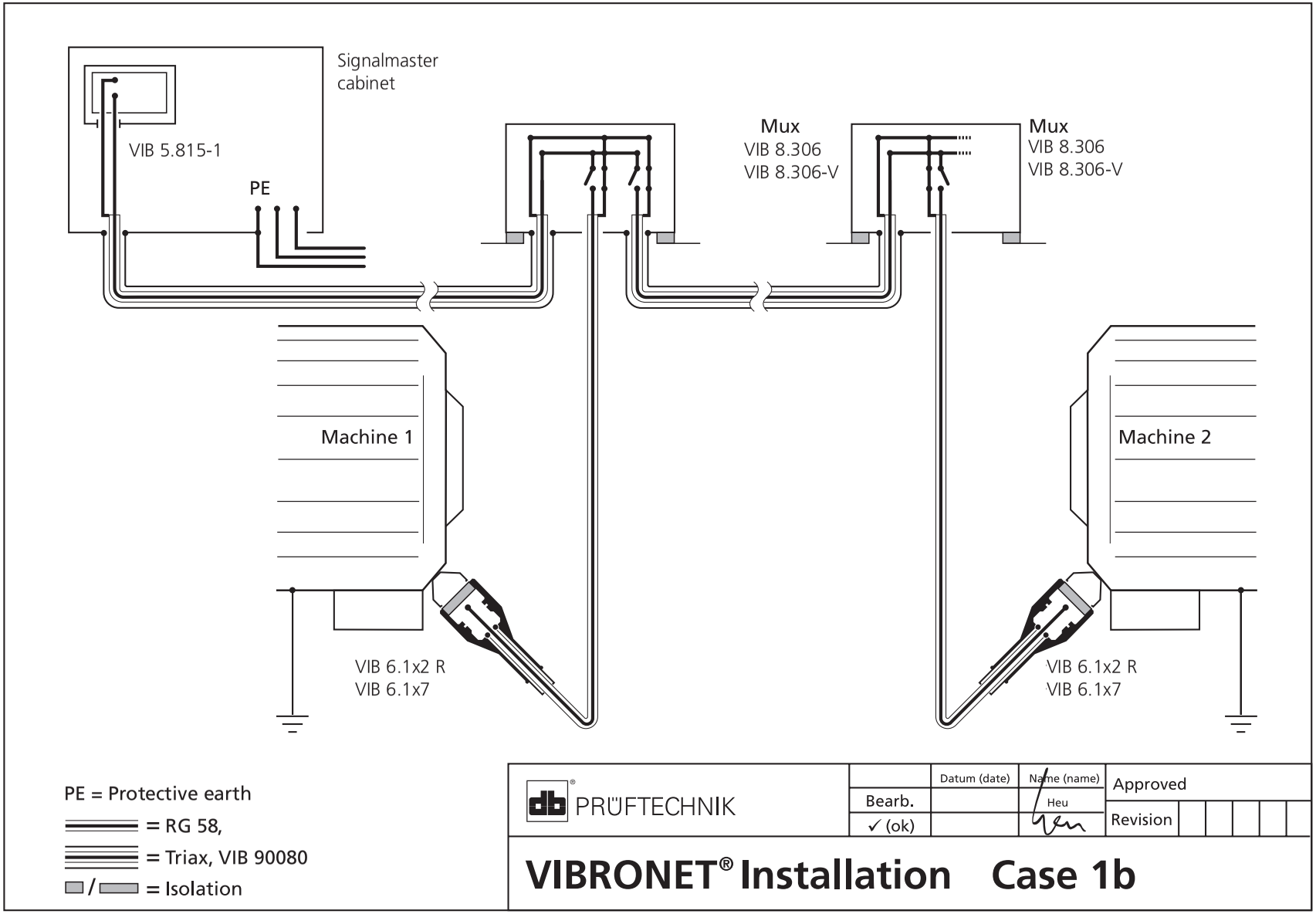
Triax cable shielding is connected to threaded fitting on housing (MUX, cabinet)

Case 1: Connection plan for electromagnetically less contaminated environment

Distance Signalmaster to last sensor < 100 Meter; Cable type: coaxial RG 58

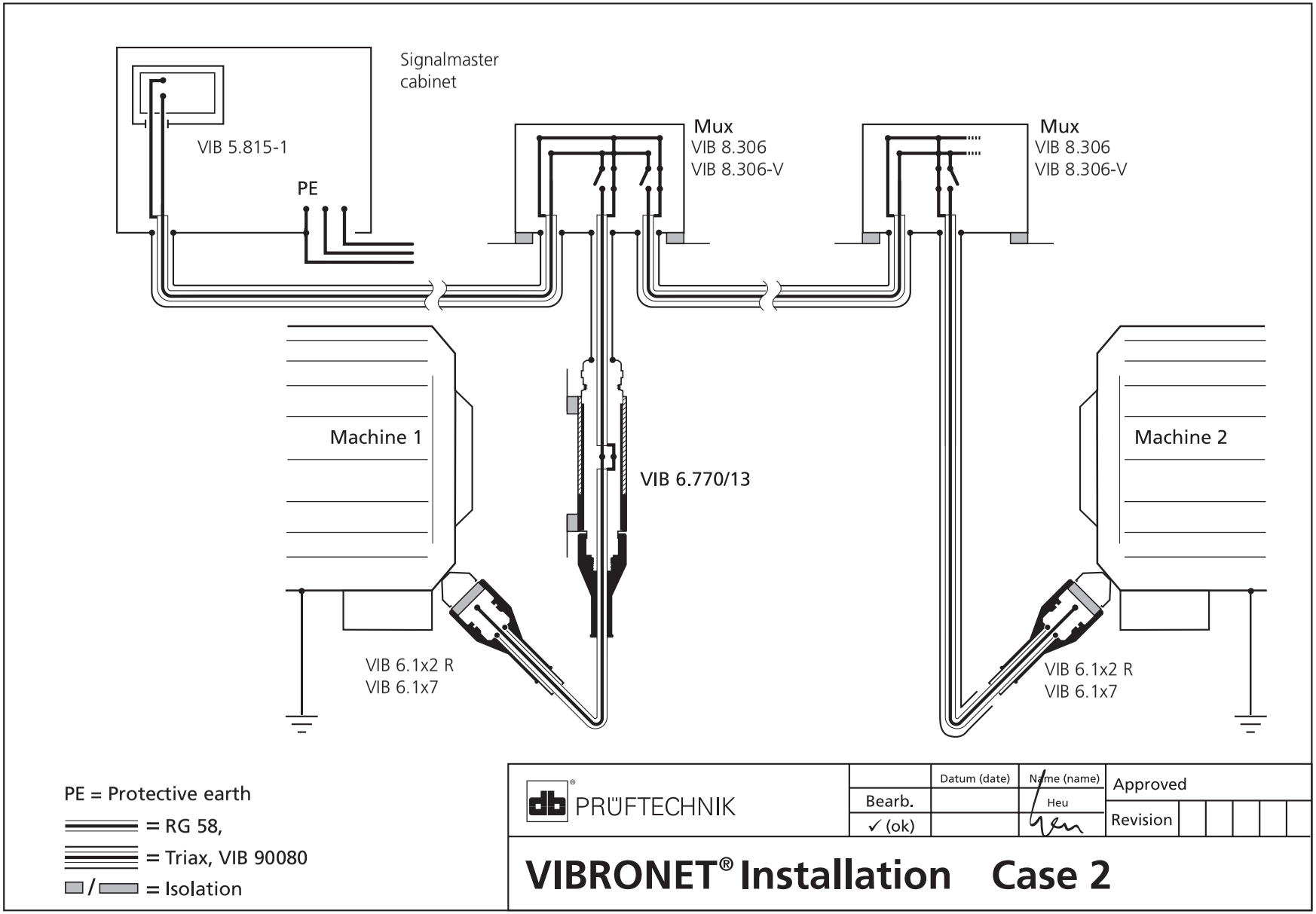


Case 1b: Connection plan for electromagnetically contaminated environment OR Distance Signalmaster last sensor > 100 m; Cable type: coaxial RG 58 (Sensor), triax (String line, see case 3a)

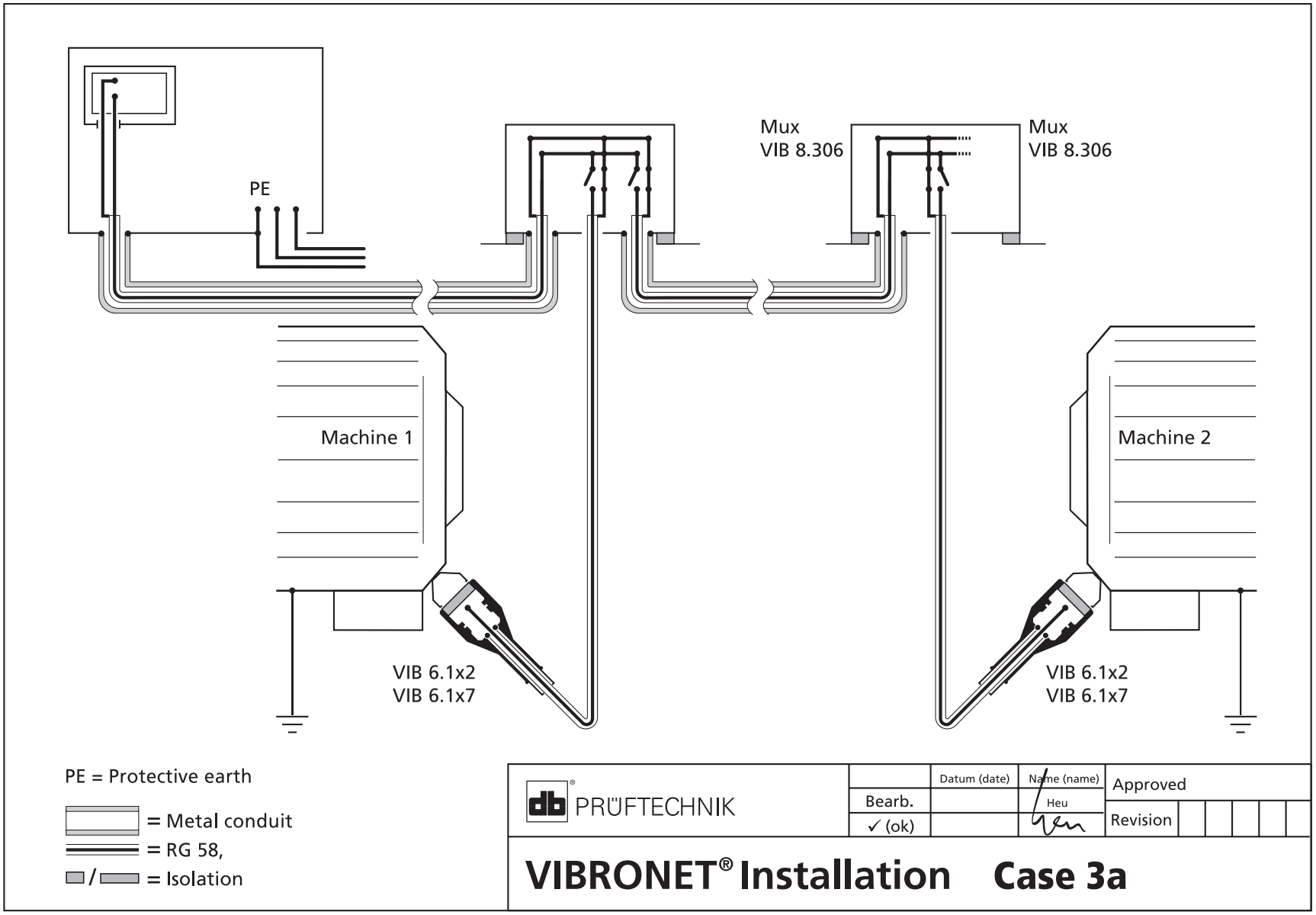


Case 2: Connection plan for electromagnetically strong contaminated environment (Frequency converter, radio control)

Sensor cable length: very long; Cable type: triaxial



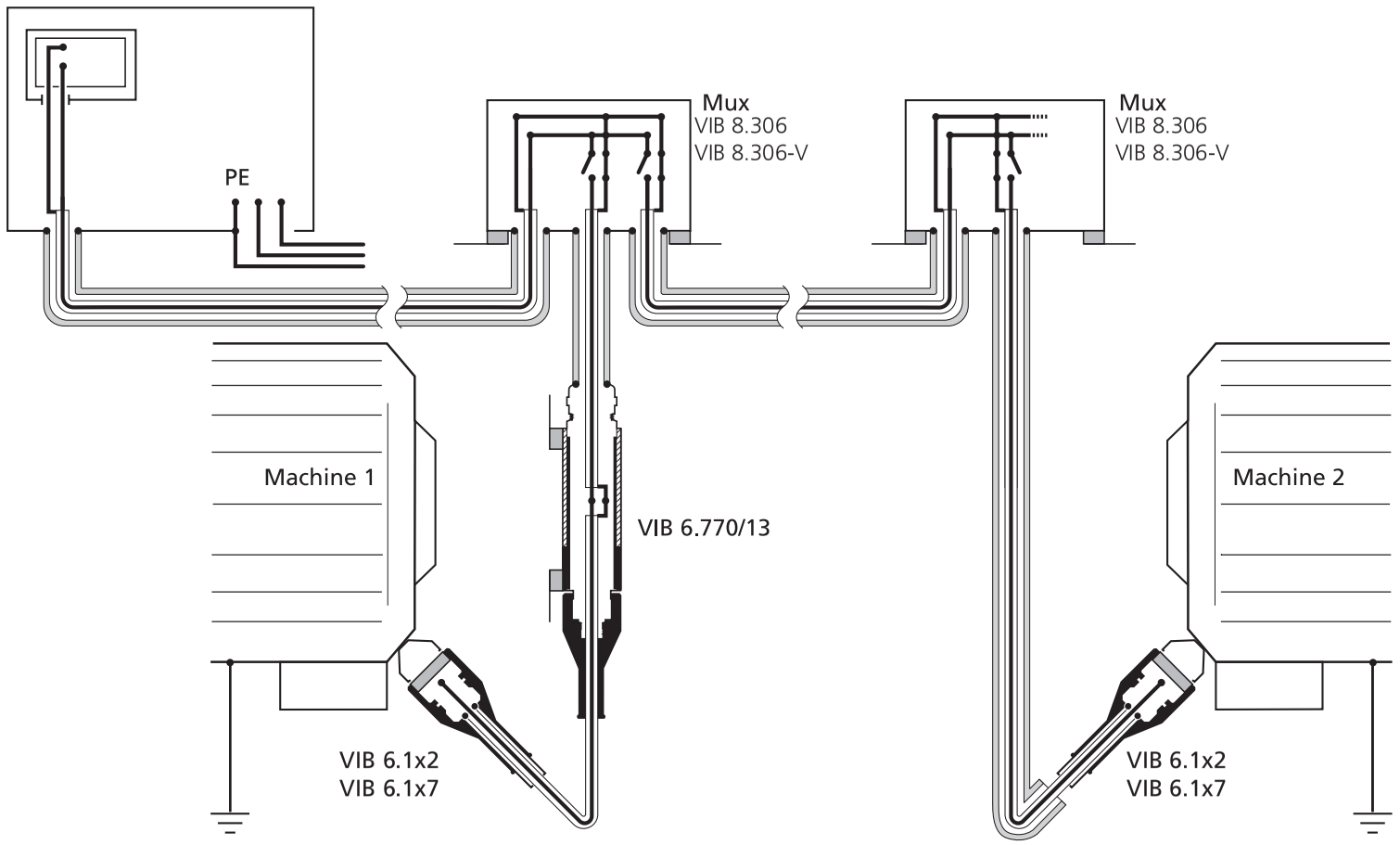
Case 3a: Connection plan for electromagnetically contaminated environment OR Distance Signalmaster last sensor > 100 m;
Cable type: Coax RG 58; String line with metal conduit (alternative to triaxial cable, see case 1b)



Case 3b: Connection plan for electromagnetically strong contaminated environment (Frequency converter, radio control)

Sensor cable length: very long;

Cable type: Coax with metal conduit (alternative to triaxial cable, see case 2)



PE = Protective earth

= Metal conduit

= RG 58,

/ = Isolation

PRÜFTECHNIK

		Datum (date)	Name (name)	Approved
Bearb.			Heu	
✓ (ok)				Revision

VIBRONET® Installation Case 3b

5.2 Installation in intrinsically safe areas

Prior to installation the system must be planned and calculated in detail. The planning and calculations must be documented and must be approved by the EX protection representative. The results of the calculations are used to document compliance with the interface parameters. All devices, cables, wires, connecting elements, sensors, etc. used in the respective potentially explosive areas must be taken into account and listed.

Data sheets, appendixes to prototype test certificates, etc. can be used for the calculations.

Data sheets for coaxial cables often specify the characteristic impedance and the capacity per unit of length, but not the inductance. In this case, the cable inductance can be calculated using the following formula:

$$L = Z^2 * C$$

Example for a system component with 4 MUXes (C_i = 18 nF), each with a 100 meter coaxial cable RG 58 for connecting the MUXes.

Technical data for the coaxial cable:
Z = 50±2 Ohm;
C' = 101 pF/m;

Calculation of the linear line inductance L':
$L' = Z^2 * C' = (52\ \text{Ohm})^2 * 101\ \text{pF/m} = 273\ \text{nH/m}$

4 multiplexers à 18 nF = 72 nF;
inductance is negligible

4 coaxial cables à 100 m:
Capacitance: 101 pF/m * 100 m * 4 = 40.4 nF
Inductance: 273 nH/m * 100 m * 4 = 109.2 μH

Result:
Effective capacitance in the cable section: 40.4 nF + 72 nF = 112.4 nF
Effective inductance in the cable section: 109.2 μH
The values are within the permissible range for the limiting device VIB 3.550: 300 nF / 1000 μH.

The sensors, sensor cables, etc. connected to the MUXes must be calculated and considered separately!

Conditions for the safe operation (MUXes and sensors):

1. Responsibility for the installation of intrinsically safe systems:

- Each intrinsically safe company has an authorized EX protection representative who is solely aware which conditions, norms, etc. must be observed in his company. Only the specialist personnel he authorizes are allowed to work on the system.
- The following installation recommendation must be authorized by the EX protection authorized representative.

2. Limiting device VIB 3.550

- The limiting device must be installed in the VIBRONET Signalmaster cabinet.
- The limiting device should be >50 mm (thread length) away from non-intrinsically safe circuits.
- The potential equalization connector (PA) should be connected first and individually to the HAZARDOUS AREAS EQUIPOTENTIAL BONDING SYSTEM.
- The VIBRONET Signalmaster cabinet should be earthed with the HAZARDOUS AREAS EQUIPOTENTIAL BONDING SYSTEM at the position of the limiting device.
- The only earthed position of the intrinsically safe circuits in the intrinsically safe area is the limiting device.
- It should have potential equalization with the machines to be monitored.

3. Sensors

- All sensors must be insulated against the machines.

4. MUX - Multiplexer

- The multiplexer housing should be connected to the HAZARDOUS AREAS EQUIPOTENTIAL BONDING SYSTEM on site.
- The sensors must be connected with the respective intrinsically safe modules in the multiplexer.
- Vibration transducers with the Vibration module (VIB 8.314 Ex), temperature probe with the temperature module (VIB 8.310 Ex) and RPM sensors with the RPM module (VIB 8.313-1 Ex).
- The software must take into account an additional resistance of 2 Ohm as the external resistance of the temperature module. The Vibration module has a resistor of 100 Ohm to balance out the sensor capacity.
- The EC-type Examination Certificate EPS 15 ATEX 1 040, available on the PRÜFTECHNIK homepage, must also be observed:

  www.pruftechnik.com/

  downloads/certificate-overview/ex-certificates.html

- All electronic circuits comply with kind of ignition protection Ex ib IIC. The sensor circuits shall only be connected to load circuits.
- The VIBRONET Multiplexer type VIB 8.3...--Ex-- is supplied ba an associated apparatus type VIB 3.550. Electrical output ratings: U_0 = 13 V; I_0 = 18 mA; P_0 = 240 mW, rectangular characteristic.

- Combined inductances and capacitances of the complete multiplexer circuit shall never exceed the following ratings:

L_0 [mH]	1.00	0.50	0.20	0.10	0.05	0.02
C_0 [µF]	0.50	0.59	0.75	0.92	1.00	1.00

- Impedances of the input line (Master _Line) and the output line (Next_Mux)are effectively connected through each multiplexer. This shall be respected for the assessment of the complete system. Impedances connected to each of the sensor-output and the sensor-input circuits are effectively separated.
- Overview (electrical data):

Master_Line Typ VIB 8.306--Ex--	U_i = 13 V I_i = 18 mA P_i = 240 mW	C_i = 17.33 nF L_i = 0 µH	C_0, L_o: see above
Next_Mux Typ VIB 8.306--Ex--	U_0 = 13 V I_0 = 18 mA P_0 = 240 mW	C_i = 17.33 nF L_i = 0 µH	C_0, L_o: see above
Sensor Vibration Typ VIB 8.314--Ex--	U_0 = 13 V I_0 = 18 mA P_0 = 240 mW	C_i = 0 nF L_i = 0 µH	C_0 = 25 nF L_0 = 30 µH
Sensor Rotation Typ VIB 8.313--Ex--	U_0 = 13 V I_0 = 18 mA P_0 = 240 mW	C_i = 11 nF (output) L_i = 0 µH	C_0 = 110 nF L_0 = 120 µH
Sensor Temperature Typ VIB 8.310--Ex--	U_0 = 3.6 V I_0 = 18 mA P_0 = 65 mW	C_i = 0 nF L_i = 0 µH	C_0 = 3 nF L_0 = 10 µH

5. Wiring to the HAZARDOUS AREAS EQUIPOTENTIAL BONDING SYSTEM:

- For reasons of noise suppression, a line resistor of <120 mOhm is recommended (120mOhm = 1.5qmm/10m cable length).
- Moreover, the safety regulations of personnel, goods, ... with respect of lightning, explosion, electricity and, if necessary, any other regulations of the respective customers, trade union, insurers, country, confederation, etc. must be taken into account.
- The respective installation regulations regarding the safety of the type of connection must also be followed here. Consequently, this must be performed by an authorized specialist there who is insured to do so.

6. Triaxial cable

- When using triaxial cables, the outer shield of the triaxial cable is:
  - Connected to the HAZARDOUS AREAS EQUIPOTENTIAL BONDING SYSTEM at the limiting device (PA).
  - Connected to the MUX housing for the MUX outputs (Next_Mux).
  - Not connected to the MUX input (Master_Line) and for the sensor, but reliably insulated instead (under shrinkage tube or insulating cap, 5mm gap to the TNC plug.)
  - Not connected to the metal housing at the junction box (VIB 6.770/13), but reliably insulated instead (or the metal housing should be insulated by shrinkage tube).
  - Cable interconnections must be insulated by shrinkage tube or insulating cap

7. The use of current-compensated coils for interference suppression is not allowed in the intrinsically safe area.

8. The insulated sensors must be fitted with the IP68 option or with caps beyond the insulating position. The caps must be reliably fixed by plastic clamps.

9. The lines from the MUX to the sensor have a maximum length of:
- 100 meters to the accelerometer,
- 60 meters to the RPM sensors,
- 30 meters to the temperature sensors.

RPM sensors with intrinsic safety:
- Inductive sensor VIB 6.620
- Type: NCN8-18GM40-N0-V1 (Fa. Pepperl & Fuchs)
- Inductive sensor VIB 6.622
- Type: NCB8-18GM40-N0-V1 (Fa. Pepperl & Fuchs)

Temperature probe with intrinsic safety
- Sensor VIB 6.610UKEX
- Type RL-4040-20 (Fa. Rössel Messtechnik GmbH)

Special installations

Intrinsically safe area: Wiring diagram for cabinet

		connect to	1X1	Power Supply		connect to
100 - 240V AC 0,71 - 0,43A 50-60Hz	MS16	L	L1	1F1 6,3AT	L1.1	1T1-L
					L1.1	1T2-L
		N	N		N	1T1-N
					N	1T2-N
		PE	PE		PE	nc
					PE	PE-Cabinet
		1X2-5V	+	**1T1** TBL015-105 5,08VDC	L	1X1-L1.1
		1C1-1	-		N	1X1-N
		1X2-12V	+	**1T2** TBL015-112 12VDC	L	1X1-L1.1
		1C1-3	-		N	1X1-N
		1T1-	1	**1C1** VIB-SO-RV C220nF	5	PE-Cabinet
		1X2-0V	2		6	nc
		1T2-	3		7	nc
		1X2-0V	4		8	nc

		connect to	1X2	Terminal Strip		connect to
			Term	Funktion	Term	
		1T1+	5V		5V	nc
		1P1-4	5V		5V	nc
		1T2+	12V		12V	1K1-1
		1P1-36	12V		12V	nc
		1P1-21	0V		0V	1C1-2
		1P1-37	0V		0V	1C1-4
		1P1-22	0V		0V	1K1-2
		1P1-23	0V		0V	nc
		1P1-24	0V		0V	nc
		1P1-25	0V		0V	nc
		nc	12V-Switch		12V-Switch	1P1-3

		connect to	1K1	VIB 5.917	Relais	connect to
			Term	Funktion	Term	
				12 Vdc	1	1X2-12V
				PG	2	1X2-0V
				Sw-In 1	3	1P1-7
				Sw-In 2	4	1P1-8
		NO1	5	Normally Open (12)		
Digital-OUT_1	MS12	COM1	6	Common (11)		
		COM1	7	Common (11)		
		NC1	8	Normally Close (14)		
Digital-OUT_2	MS12	NO2	9	Normally Open (12)		
		COM2	10	Common (11)		
		COM2	11	Common (11)		
		NC2	12	Normally Close (14)		

		connect to	Eth	CAT5 Terminal Box		connect to
Ethernet CAT 5.E	MS25/4	**Tx+**	1	Tx+	RJ45	1P1-RJ45
		Tx-	2	Tx-		
		Rx+	3	Rx+		
		Rx-	6	Rx-		
		Eth. Schield	Shield	PE		

50mm Distance to EX

			1B1	VIB 3.550		
		connect to EX	Triax	Limiting Device	Koax	connect to
String1	MS20 EMV	String1	Shield		Shield	1P2-String1
		String1	Centre		Centre	1P2-String1
		TRIAX-Shield	PA		PA	PE
			1B2	VIB 3.550		
		connect to EX	Triax	Limiting Device	Koax	connect to
String2	MS20 EMV	String2	Shield		Shield	1P2-String2
		String2	Centre		Centre	1P2-String2
		TRIAX-Shield	PA		PA	PE
			1B3	VIB 3.550		
		connect to EX	Triax	Limiting Device	Koax	connect to
String3	MS20 EMV	String3	Shield		Shield	1P2-String3
		String3	Centre		Centre	1P2-String3
		TRIAX-Shield	PA		PA	PE
		1B1-PA	PE		PE	1B2-PA
		PE-Cabinet	PE		PE	1B3-PA

PE / PA	Earth-Bolt	**PE-Cabinet**	
		1X1-PE	2,5mm²
		Plate	2,5mm²
		Flange Plate	2,5mm²
		Cabinet Door	2,5mm²

1X1 wired with (1,5mm²)
PE wired with (2,5mm²)
all other with (0,5mm²), if not different denoted

	SIGNALMASTER		
	1P1	VIB 5.802	V3
connect to	MULTI-IO	Channel	50-pol
nc	17	A6:Hi (AD1)	RD
nc	33	A6:Lo (AD1)	BK
nc	16	A5:Hi (AD1)	RD
nc	32	A5:Lo (AD1)	BK
nc	15	A4:Hi (AD1)	RD
nc	31	A4:Lo (AD1)	BK
nc	14	A3:Hi (AD3)	RD
nc	30	A3:Lo (AD3)	BK
nc	13	A2:Hi (AD2)	RD
nc	29	A2:Lo (AD2)	BK
nc	12	A1:Hi (AD1)	RD
nc	28	A1:Lo (AD1)	BK
nc	11	OUT5	YE
nc	27	OUT6	YE
nc	44	OUT7	YE
nc	20	OUT8	YE
nc	9	P1	YE
nc	42	P2	YE
1K1-3	7	OUT1	YE
1K1-4	8	OUT2	YE
nc	40	OUT3	YE
nc	41	OUT4	YE
nc	5	IN1	YE
nc	6	IN2	YE
nc	38	IN3	YE
nc	39	IN4	YE
nc	10	KP/AC	YE
nc	43	SYNC	YE
1X2-12V-Switch	3	12V Switch	RD
1X2-12V	36	12 V Supply	RD
1X2-5V	4	5 V Supply	RD
nc	34	PE	GN/YE
nc	35	KP/DC	YE
nc	49, 50	AG	DBU
nc	47,48	AG	DBU
nc	45,46	AG	DBU
nc	26	PG	DBU
1X2-0V	24,25	PG	DBU
1X2-0V	22,23	PG	DBU
1X2-0V	21, 37	PG	DBU
nc	1	LAN: TX+	BN
nc	2	LAN: TX-	RD
nc	18	LAN: RX+	OG
nc	19	LAN: RX-	BU
nc	D-SUB	RS232/1	9-pol
nc	D-SUB	RS232/2	9-pol
Eth-RJ45	RJ45	Eth 100MBit	
1P2-SYSTEM-BUS	D-SUB	SYSTEM-BUS	15-pol
nc	D-SUB	EVENT-BUS	15-pol

	1P2	VIB 5.815-3	SP-Modul
connect to	Term	Channel	Signal
1B1-VIB 3.550	TNC	String 1	
1B2-VIB 3.550	TNC	String 2	
1B3-VIB 3.550	TNC	String 3	
nc	BNC	100mV/g	
1P1-SYSTEM-BUS	D-SUB	SYSTEM-BUS	
nc	D-SUB	SPM-BUS	

AC Connection

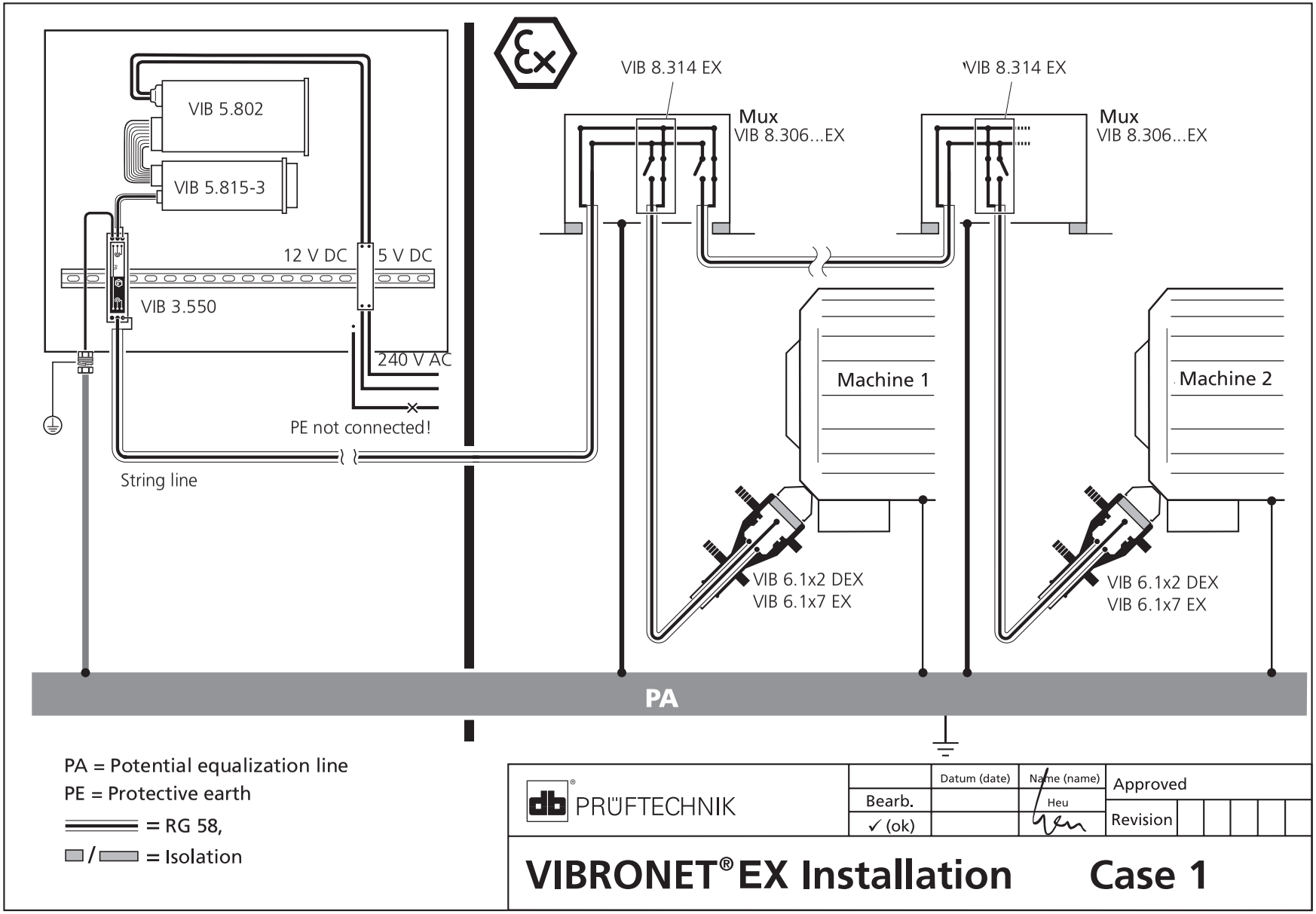
1,5mm²

Fuse 6,3A

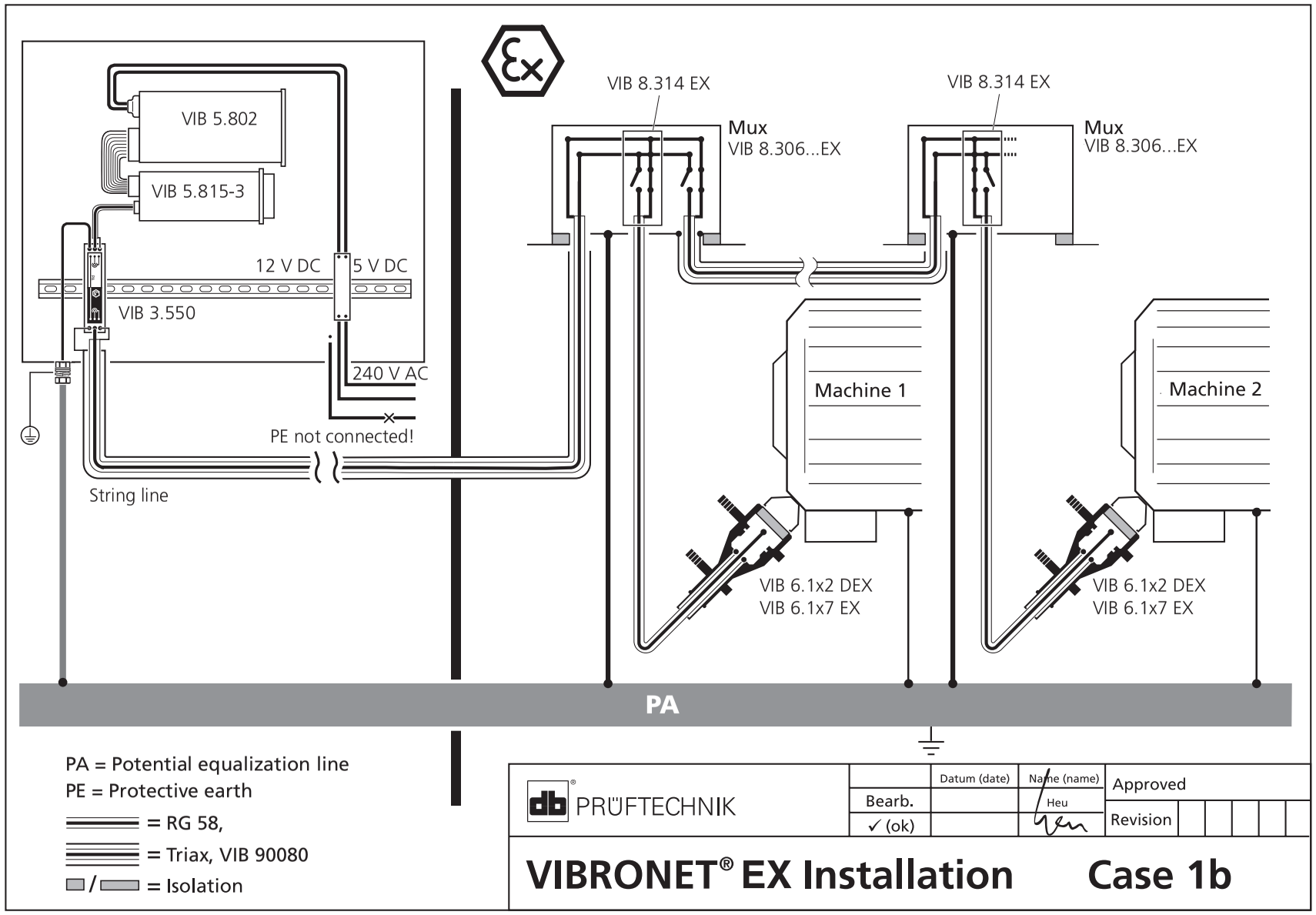
VIBRONET Signalmaster cabinet

Case 1: Connection plan for electromagnetically less contaminated environment

Distance Signalmaster to last sensor < 100 Meter; Cable type: coaxial RG 58

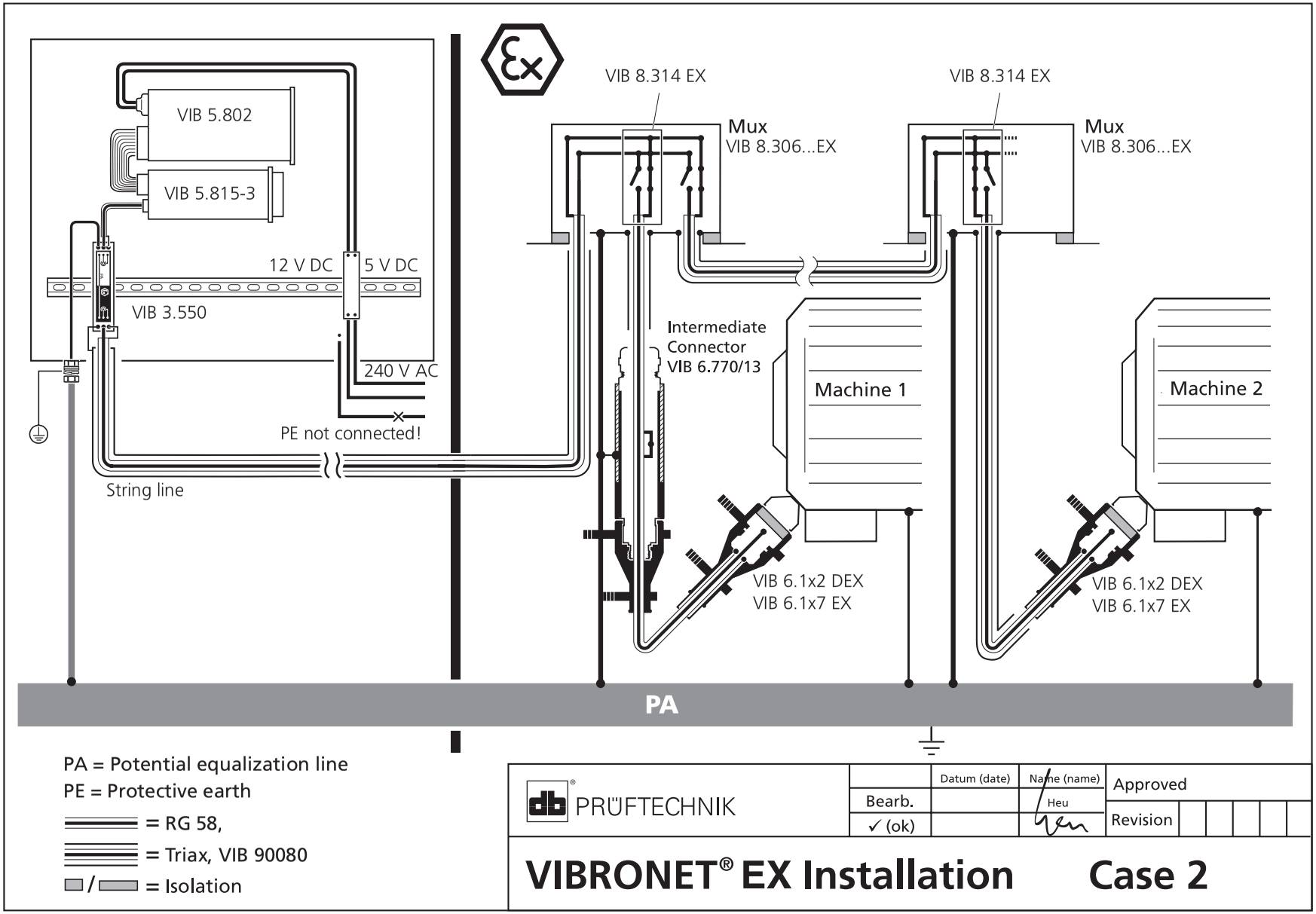


Case 1b: Connection plan for electromagnetically contaminated environment OR Distance Signalmaster last MUX > 100 m;
Cable type: coaxial RG 58 (Sensor), triaxial (String line, see case 3a)

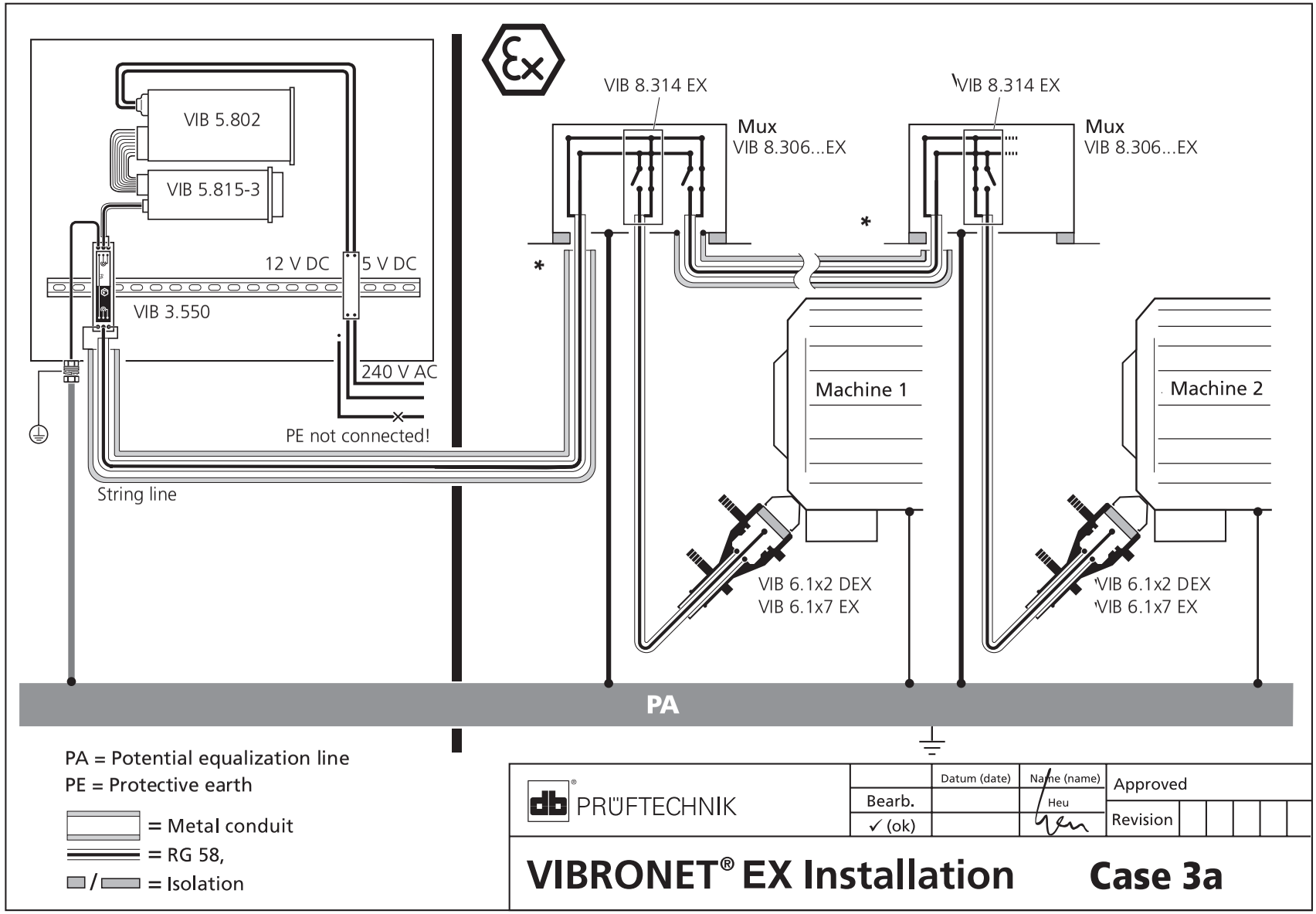


Case 2: Connection plan for electromagnetically strong contaminated environment (Frequency converter, radio control)

Sensor cable length: very long; Cable type: triaxial



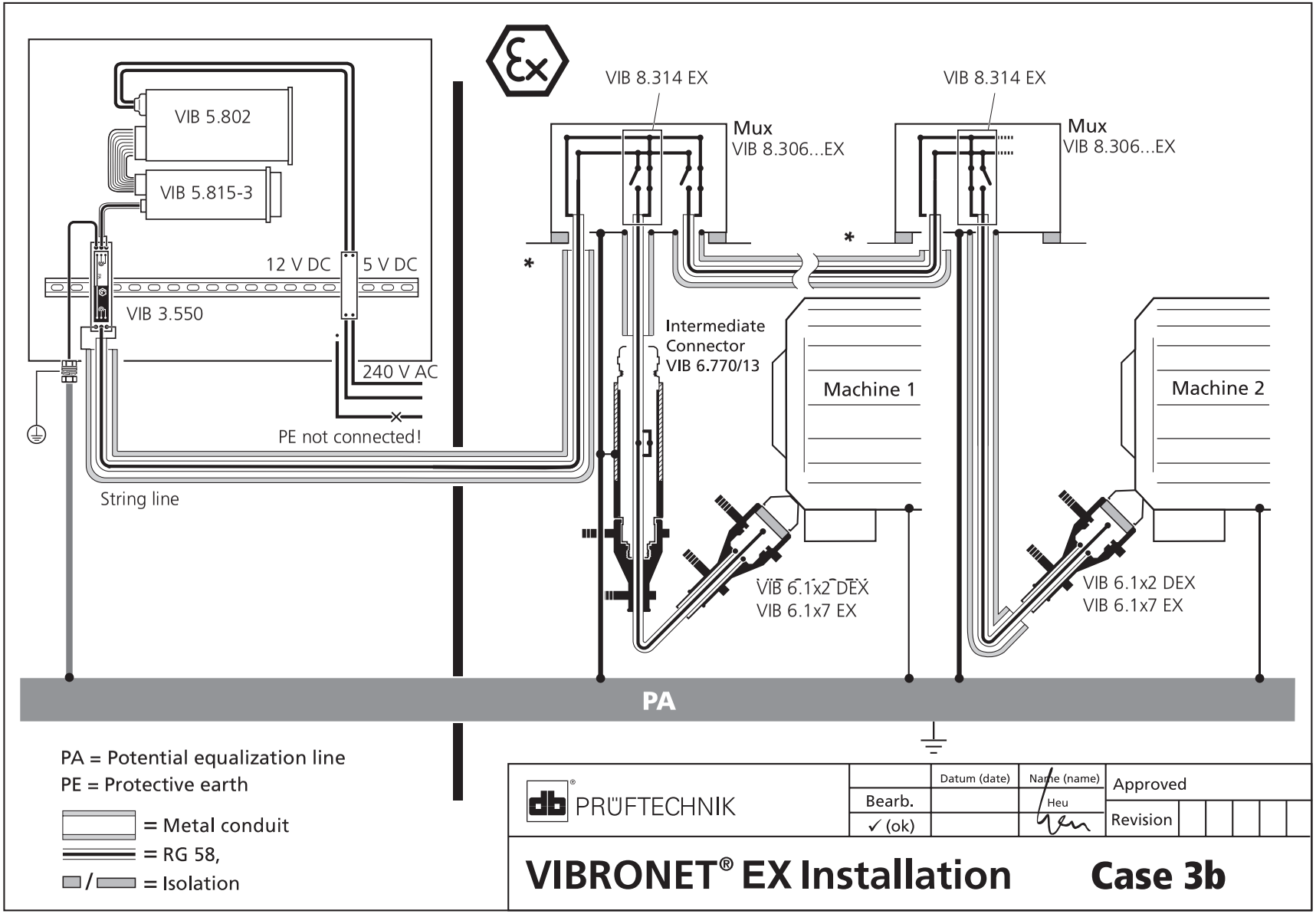
Case 3a: Connection plan for electromagnetically contaminated environment OR Distance Signalmaster last MUX > 100 m;
Cable type: coaxial RG 58; String line with metal conduit (alternative to triaxial cable, see case 1b)



Case 3b: Connection plan for electromagnetically strong contaminated environment (Frequency converter, radio control)

Sensor cable length: very long;

Cable type: coaxial with metal conduit (alternative to triaxial cable, see case 2)

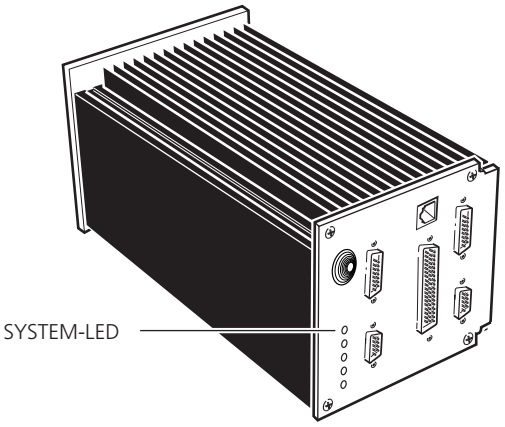


Chapter 6: Commissioning

After all system components are installed, check the system for visible damage. Check the connections in the cabinet as well.

Switch the power supply on to start up the systems. The operating status of the system is indicated by the LED status indicator on the back of the base unit.

- The SYSTEM LED on the back of the base unit illuminates orange, while the system is starting up.
- The SYSTEM LED illuminates green, when the system is ready for operation.



Chapter 7: Troubleshooting

SYMPTOM: The system does not start, after the power supply was switched on.

CAUSE: The fuse is blown.

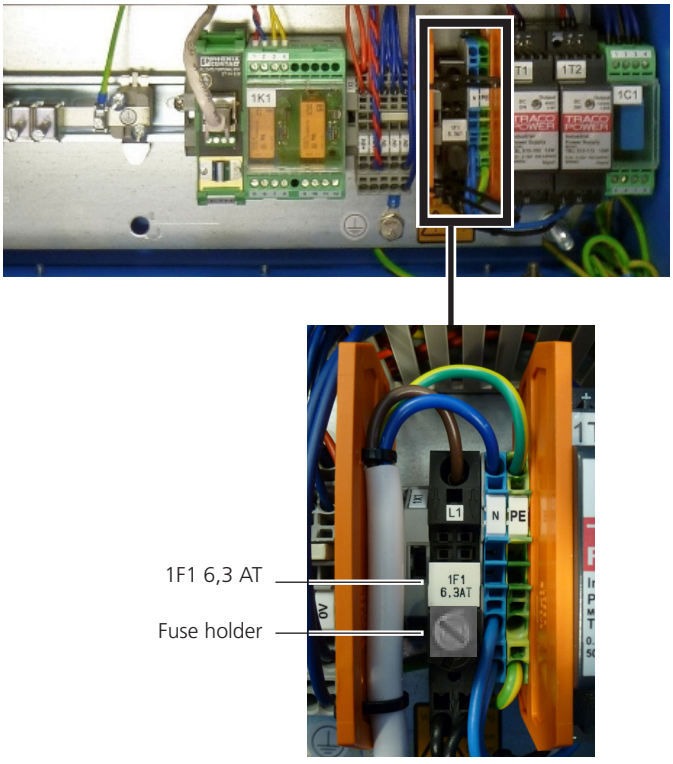
REMEDY: Replace fuse.

A fuse is installed in the cabinet (6.3 AT) that you can replace as follows:

⚠ WARNING

Risk of injury due to electric shock!
Disconnect the system from the power supply and secure it against reconnection.

- Unscrew the fuse holder from the 1F1 6.3 AT fuse terminal using a suitable screwdriver.
- Replace the fuse if it is blown. You can find a spare fuse with the key pack.
- Screw the fuse holder back in.



SYMPTOM: No signal from the sensor.

CAUSE: Cable connections defective.

REMEDY: Check the connections in the MUX and the sensor cable.

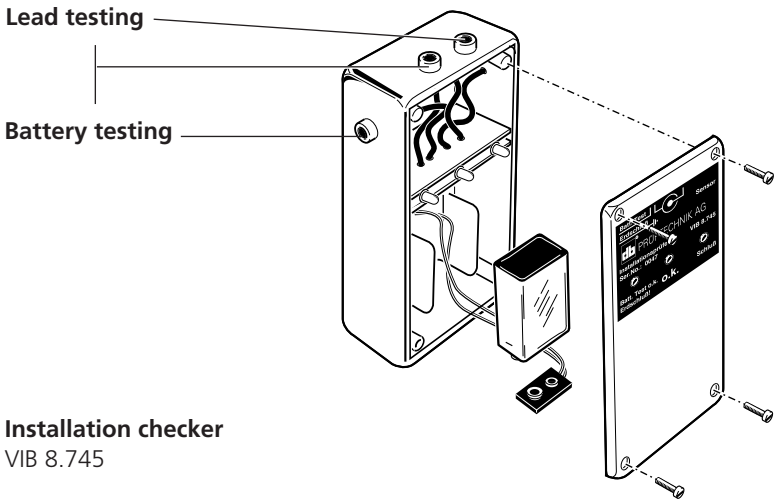
The installation checker (VIB 8.745) can be used to test sensor leads. The three status LEDs on the housing indicate the condition:

- Green LED : OK
- Red LED : Short circuit
- Yellow LED: Ground loop

Use a cable with banana plugs and alligator clips to connect the sensor cable. If none of the LEDs illuminate during testing and the battery is known to be fresh, then the sensor connection is broken.

The installation checker is powered by a 9V battery. Battery condition can be checked as follows:

- Connect the 'BATT. TEST' and 'GROUND' terminals together.
- If the yellow LED illuminates, then battery voltage is below 5 volts and is no longer sufficient for reliable testing.



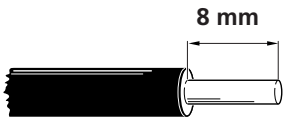
Installation checker
VIB 8.745

Chapter 8: Cable connections

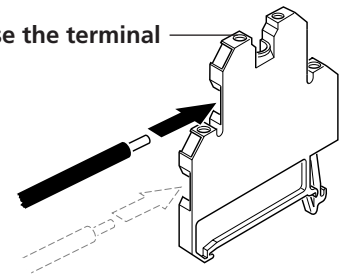
Electrical cable

The connections of the relay outputs and the supply lines are made using commercial single or multicore electrical cables (Wire size: AWG 24-12). For the terminals of the relay module 1K1 you need matching cable end sleeves.

- Strip the cable by 8 mm.
- Open the screw above the respective connection and insert the lead.
- Tighten up the screw again.



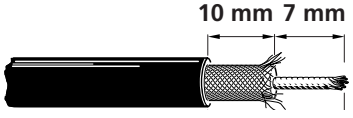
Electrical cable,
Wire size: AWG 24-12



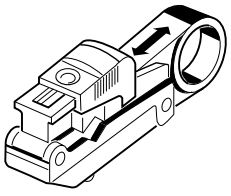
Coaxial cable

Coaxial cables are used to connect the sensors to the MUXes. Proceed as follows:

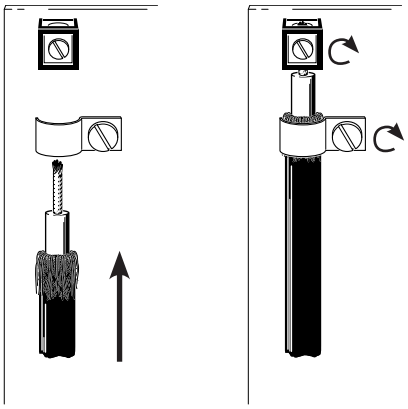
- Use an appropriate tool (e.g. cable stripper VIB 81052) to strip the free cable end. Please refer to the below diagram for details.
- Carefully wrap the exposed portion of the shield back around the cable sheath.
- Connect the cable to the respective terminal on the MUX board.



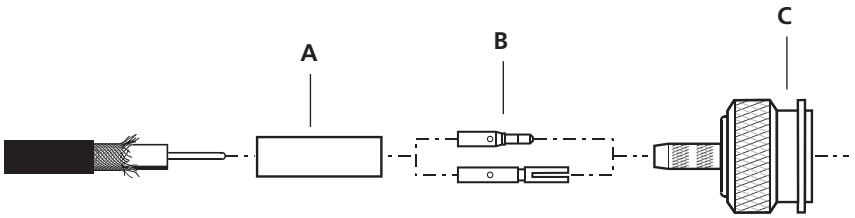
RG 58 coaxial cable



Cable stripper VIB 81052

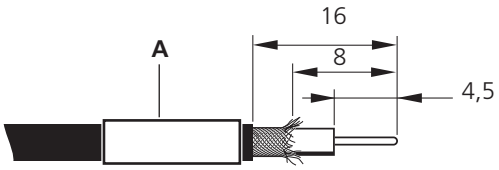


Instructions for crimping (BNC/ TNC)



Coaxial cable (RG 58 ; RG 59) **Sleeve** **Pin** **Connector housing**

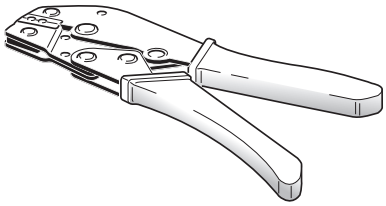
- Slide sleeve A onto the cable.
- Use an appropriate tool (e.g. cable stripper VIB 81052) to strip the free cable end as shown in diagram.



Dimensions in mm

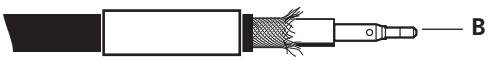
Note

Cable layout can be damaged!
During cable stripping the shielding, dielectric or inner conductor can be damanged!
Perform cable stripping properly. Cut off any damaged sections from the cable and repeat the procedure.

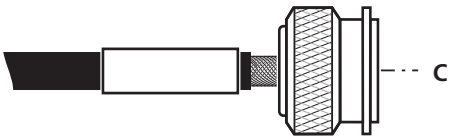


Crimping tool - VIB 81026

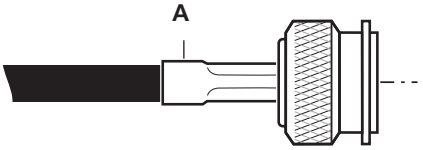
- Push contact B over the cable inner conductor up to the dielectric. Use an appropriate tool to crimp it (e.g. crimping tool VIB 81026).



- Spread the shielding slightly apart and insert the cable into the housing C. The shielding must lie over the crimping throat.



- Push sleeve A over the shielding and crimp as close as possible to housing C.



Triaxial cable

Triaxial cables are used for the connection between the MUXs and for the string line to the VIBRONET Signalmaster switch cabinet. In an environment with electromagnetic interference, triaxial cables are also recommended as sensor cables.

Triaxial cable VIB 90080

M12 cable glands

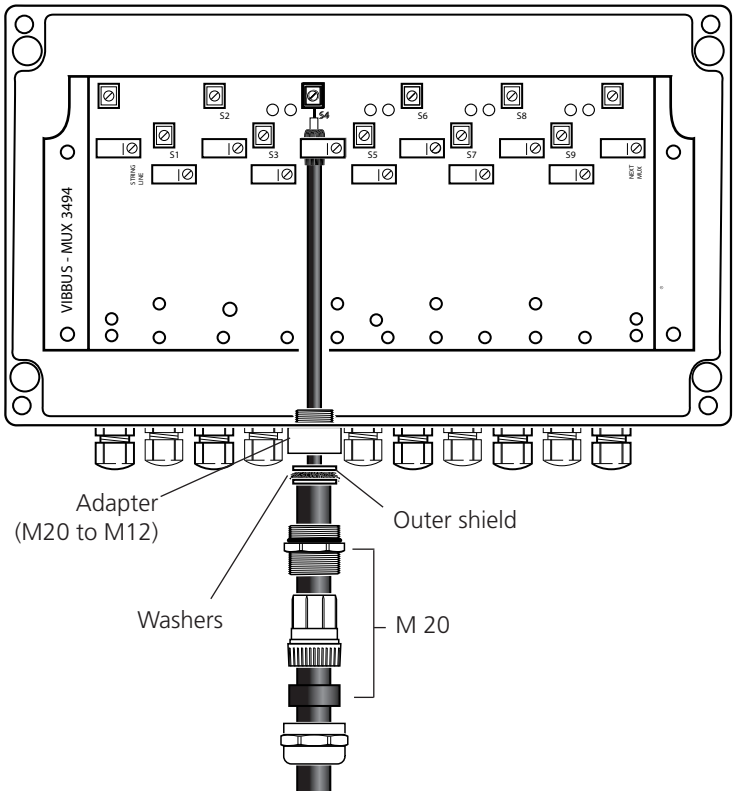
MUXs of the VIB 8.306 ... M20 series are equipped with M20 cable glands, whose clamping area is sufficient for entering a triaxial cable into the housing.
In the case of MUXs of the VIB 8.306 series, the M12 cable glands of the sensor cables (Sensor 1 ... 9) may have to be replaced with a suitable reduction (M20 - M12).

- Open the cable gland and remove the sealing insert as needed.
- Enter the cable end into the housing. Apply a few drops of oil to the cable sheath to facilitate entering.
- Strip the outer cable sheath using a suitable tool (e.g., cable stripper VIB 81053). Make sure that the length of the available, coaxial cable end reaches the connecting terminal.
- Place the outer cable shield into the gland. If a grounding rail is available, you can also ground the shield via this terminal strip.
- Tighten the cable gland.

Cable stripper for triaxial cable, VIB 81053

If a M12-M20 reduction is used:

- Remove the available M12 cable gland.
- Install the M12-M20 reduction.
- Place two matching washers between reduction and M20 cable gland.



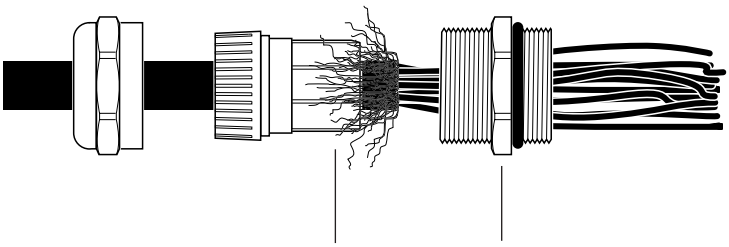
- Clamp the outer shield between the washers.
- Screw the M20 cable gland and the reduction together.

- Strip the inner cable sheath and connect the inner shield and signal cable to the respective terminals in the MUX (see 'Coaxial cable', page 59)

Shielded cable

In electromagnetically contaminated environments use a shielded cable for connecting the relay outputs.

1. Remove the threaded fitting from the housing and insert the cable end through it.
2. Strip the insulation from the individual conductors.
3. The cable is inserted through the fitting with outer insulation intact. The exposed length of inner leads should reach to the contact terminals.
4. Strip an additional 25 mm of outer insulation from the cable.
5. Disassemble the fitting and wrap the exposed portion of the shield around the sealing sleeve (see below).
6. Reassemble the fitting and refasten it to the housing.
7. Connect the individual leads to the corresponding contacts.



Index

Signalmaster No. _____

Serial No. _____

String No.
1 2 3

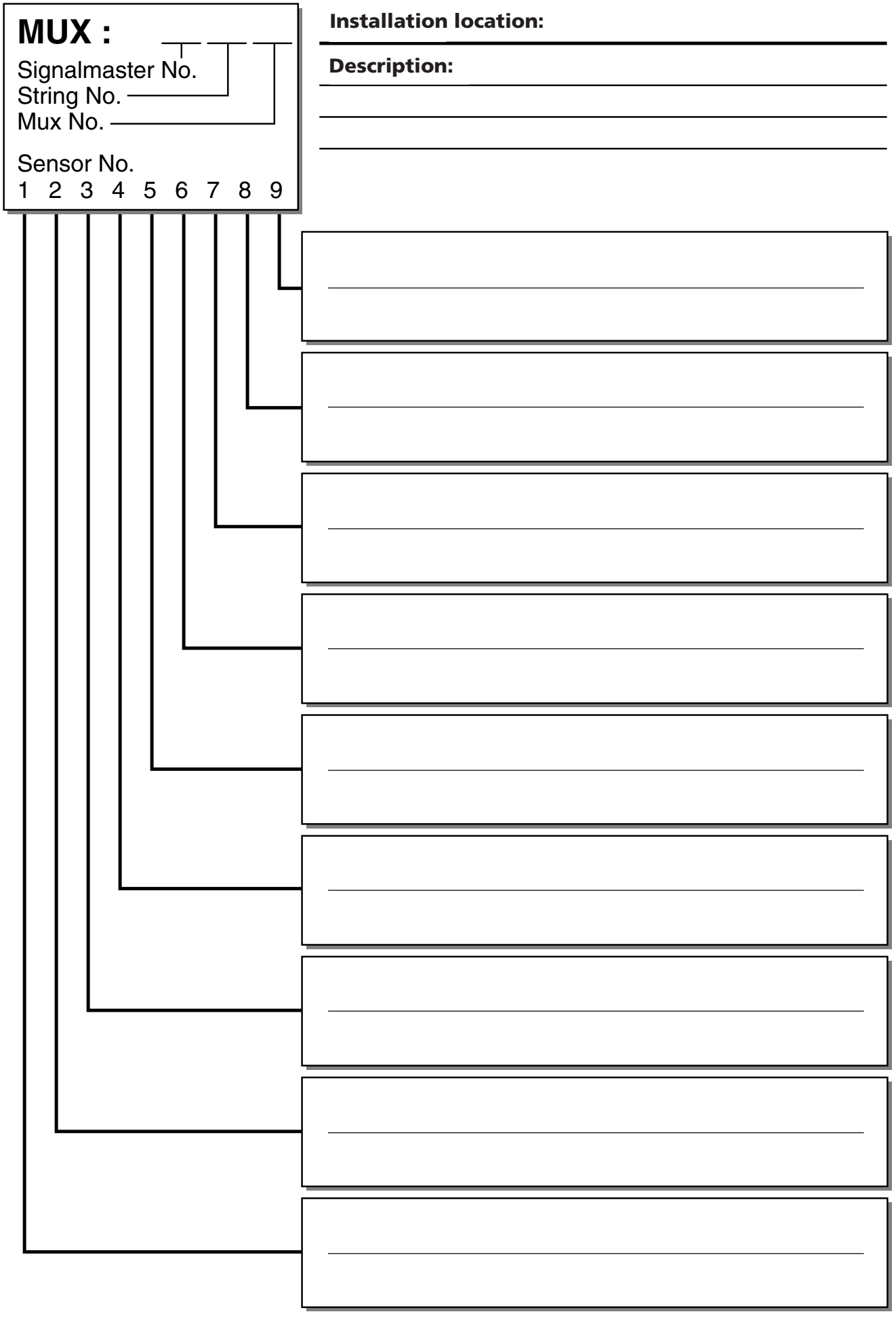
Machine: _____

Description: _____

MUX 1	MUX 2	MUX 3	MUX 4	MUX 5	MUX 6

MUX 1	MUX 2	MUX 3	MUX 4	MUX 5	MUX 6

MUX 1	MUX 2	MUX 3	MUX 4	MUX 5	MUX 6


MUX :
Signalmaster No.
String No.
Mux No.
Sensor No.
1 2 3 4 5 6 7 8 9
Installation location:
Description:

Printed in Germany VIB 9.520.G.06.2016

PRÜFTECHNIK

PRÜFTECHNIK
85737 Ismaning, Germany
info@pruftechnik.com
www.pruftechnik.com

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