Lovibond® Water Testing

Tintometer® Group

Power & Communications Module

PTV Series

www.lovibond.com

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GB Table of Contents

GB Introduction

General Information

⚠ DANGER
A hazard exists that will result in death or severe injury if not avoided.

⚠ WARNING
A hazard exists that may result in death or severe injury if not avoided.

⚠ CAUTION
A hazard exists that may result in minor or moderate injury.

NOTICE
Important information or specific instructions need to be strictly followed.

Safety Notifications

Do not begin operation or installation of this equipment before reading and understanding the risks associated with this equipment. Damage to the equipment and/or severe injury or death may occur if the information and hazard statements presented in this document are disregarded

⚠ DANGER
Disabling, tampering with or impairing the safety devices or labeling of this instrument may result in severe injury or death.

CHEMICAL AND/OR BIOLOGICAL HAZARDS MAY EXIST WHERE THIS PRODUCT IS USED. ABIDE BY ALL GOVERNING LAWS, REGULATIONS AND PROTOCOLS WHEN OPERATING, MAINTAINING OR TAKING REMEDIATION ACTIONS REGARDING THIS EQUIPMENT.

GB Introduction

Guide to Symbols

Labels attached to the instrument should be strictly observed to avoid personal injury or damage to the instrument. Refer to the table below for information regarding the nature of the danger or risk before taking any action where such label is present.

	ATTENTION! - Indicates that important information or specific instructions need to be strictly followed; (Information or instructions that can be found in the manual). 
	For professional users in the European Union: If you wish to discard electrical and electronic equipment (EEE), please contact your dealer or supplier for further information. For disposal in countries outside of the European Union: This symbol is only valid in the European Union (EU). If you wish to discard this product please contact your local authorities or dealer and ask for the correct method of disposal.
	DANGER! - A risk of severe injury or death from ELECTRICAL shock.
	DANGER! - A risk of CHEMICAL injury.
	WARNING! - A risk of severe burn; HOT SURFACE.
	WARNING! - A risk of severe injury; PROTECTIVE EYE WEAR required.
	ATTENTION! - radio wave emissions.

Certification

EMC conducted and radiated emissions	CISPR 11 (Class A Limits)	CE Mark
EMC Immunity	EN 61326-1 (Industrial limits)	CE Mark
Safety	EN 61010-1	TÜV safety mark
FCC	FCC Class A	FCC mark

FCC Class A Notice

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions

- This device may not cause harmful interference.
- This device must accept any interference received, including interference that may cause undesired operation.

Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Shielded Cables

Connections between the system and its peripherals must be made using shielded cables in order to maintain compliance with FCC radio frequency emission limits.

Modifications

Any modifications made to this device that are not approved by Tintometer may void the authority granted to the user by the FCC to operate this equipment.

DOC Class A Notice - Avis DOC, Classe A

This Class A digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.

Cet appareil numérique de la classe A respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

GB Introduction

Introduction

The Power & Communications Module (PCM) contains the high voltage power supply, digital and analog communication interfaces for Lovibond® Process Sensors.

A qualified electrician trained in the installation of electrical equipment should read and understand this manual prior to working with this component as potential lethal hazards are present.

The manufacturer does not take responsibility for any issues caused by use of the unit not in accordance with the instructions in this manual.

Preface

Do not exceed temperatures or time spans in any case.

All warning labels must NOT be removed and should be replaced if they become damaged or faded.

Important Information

The PCM can be mounted to a panel or to a wall.

Notes on power connection

The PCM should be permanently connected to mains power.
See local building codes for permanently connecting equipment.

Safety instructions for operation

Never open the high voltage housing while the PCM is connected to mains power. There is a danger of electric shock and other hazards. The high voltage area may only be opened and serviced by qualified professionals.

Ensure proper grounding of the metal bonding plate near the bottom of the enclosure. It must be connected to GND for proper operation.

GB Introduction

Product Overview

#	Item	Description
1	24VDC Power Switch	A 24VDC power switch is provided at location SW1. This switches power on/off to the attached sensor, but does not remove power from the high voltage board.
2	Analog Outputs	The two isolated 0-20 / 4-20mA outputs are controlled by the sensor. See the sensor manual for assigning zero and full scale to each analog output, and trimming the analog outputs.
3	Service Connection	For authorized service use only
4	24VDC Power Indicator	Illuminates when power to low voltage board and attached sensor is turned on.
5	USB Power Indicator	The USB power indicator illuminates when a USB host device is connected to the PCM
6	USB Micro Connector	One Micro-USB connector (back side of board) is provided for connection to a Windows computer or a compatable Android Tablet. (Refer specific device manual)
7	Anybus Module Communication LED	Flashes once a second when when Anybus module is communicating with network.
8	Device Communication LED	Flashes when PCM is communicating with connected device.
9	Relay Outputs	Each of the three (3) relays are controlled by the sensor. See the appropriate sensor manual for assigning low, high, power fail, or other alarms to each relay.
10	High Voltage Connection	AC power and protective earth wires.

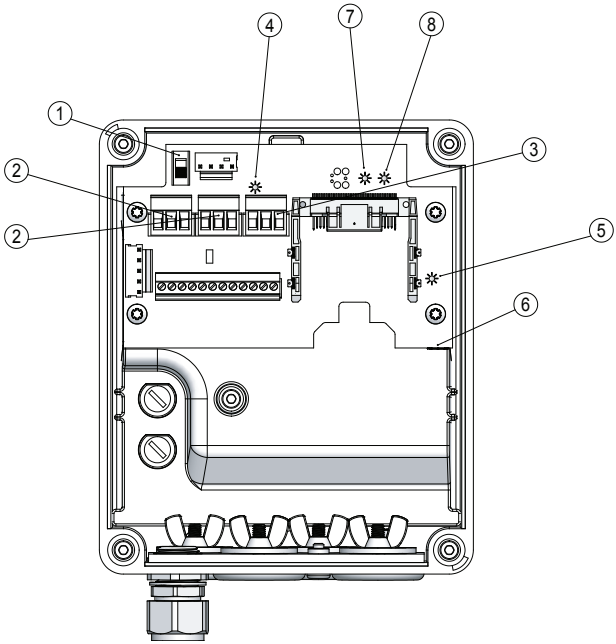

Figure 10: Feature locations - Low Voltage Board

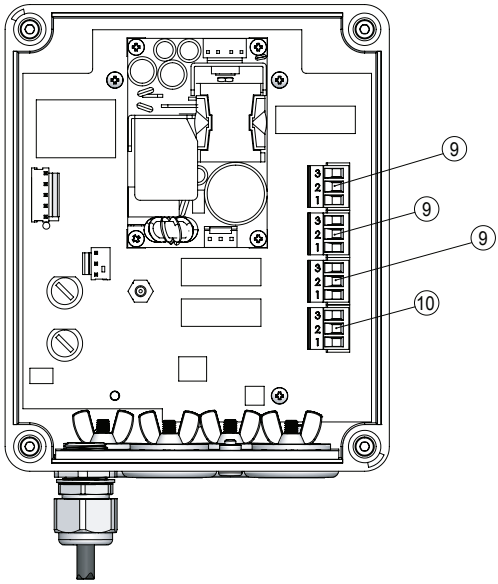

Figure 11: Feature locations - High Voltage Board

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GB Specifications

Specifications

Specification	Details
Power supply	100-240V / 50-60Hz
Power	40W
Output	24VDC for one instrument
Analog Outputs (2)	0-20 / 4-20mA isolated outputs 10VDC loop voltage
Relay Outputs (3)	100-240V 5A resistive maximum
Size	170mm x 140mm x 95mm (6.7" x 5.5" x 3.7")
Weight	1.7 kg (3.8 lbs.)
Construction materials	Thermoplastic enclosure
IP Rating	IP66
Conduit holes	4X 12.7mm (4X ½")
Operating Temperature	0° to 50°C (32° to 122°F)
Humidity	0-95%RH (Non-condensing)
Digital Interface	Profibus DP-V1 Modbus TCP (Ethernet) Modbus RTU RS485/RS232
Warranty	1 Year

Installation

Unpacking

Carefully inspect all items to ensure that every part on the list below is present and no visible damage has occurred during transportation.

Store the packing material to return the unit for repair or other kinds of transport.

The table below shows the parts included in the packing

Part List

Part	Description	Quantity
1	PCM	1
2	Instruction Manual	1

Mounting

1. Remove four screws on the front cover from the PCM
2. Align the PCM on the wall or panel, and mark and drill 4 mounting holes
3. Install (4) M4 x 20 or similar mounting screws

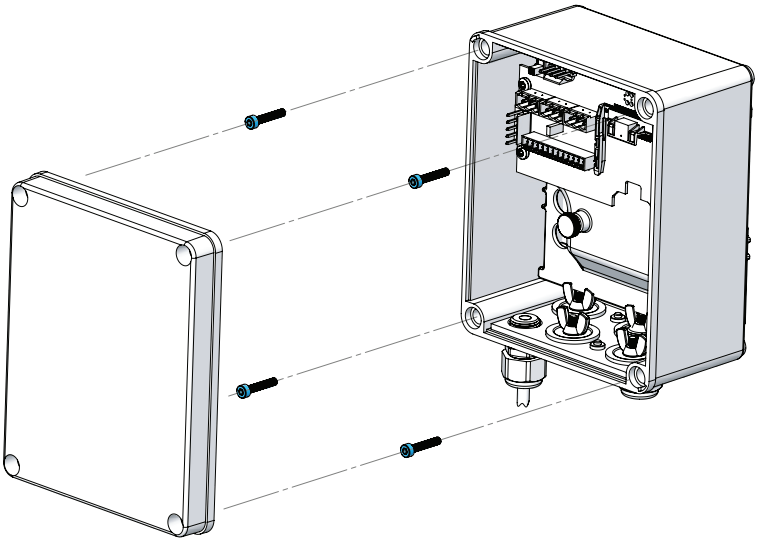

Figure 1: Mounting screw locations

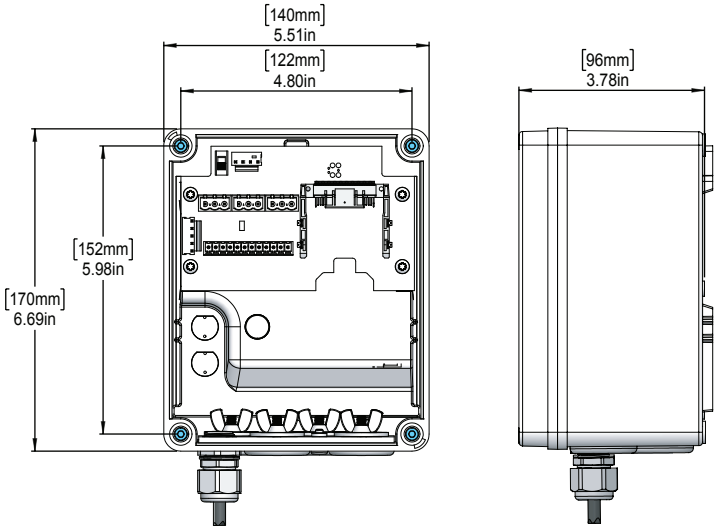

Figure 2: Mounting and product dimensions

GB Installation

High Voltage Installation

⚠ DANGER

DISCONNECT POWER BEFORE SERVICING! Only a qualified installation technician should connect AC power to the PCM.

NOTICE

A local disconnect mounted in a suitable and easily reached location must be included in the installation of this equipment. The local disconnect must be marked as the disconnecting device for this equipment.

NOTICE

This unit was tested with metallic conduit as per UL 61010-1 with a bending moment of 34Nm (300 lb-in) at a horizontal distance of 300mm (12").
Do not exceed this bending moment.

1. Remove the red thumb screw and connectors at position J102 and J109
2. Remove the low voltage circuit board and high voltage barrier

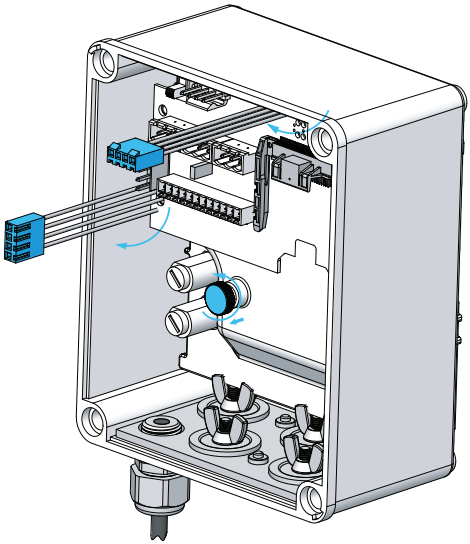

Figure 3: Red thumb screw, J102 and J109 locations

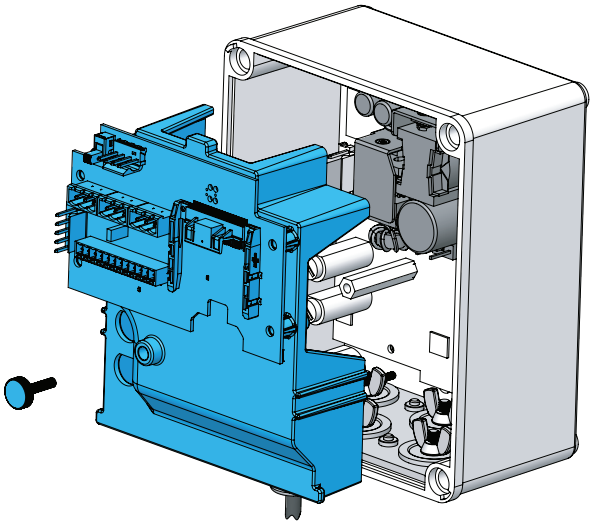

Figure 4: Remove high voltage barrier

High Voltage Installation

DANGER

ELECTRIC SHOCK HAZARD. The barrier must stay in place except when a qualified installation technician is connecting power or relay outputs.

3. Remove the appropriate hole plugs from the bonding plate. The two near the back are intended for high voltage use. Use proper connection hardware to ensure grounding connection to metal bonding plate. (see Figure 5)

CAUTION

ENSURE PROPER GROUNDING. Connect metal bonding plate to protective earth for proper operation.

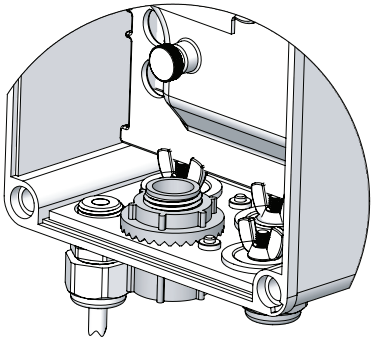

Figure 5: Grounding connection

4. Connect AC power to the connector labeled J1 (see Figure 6 for power connector location). AC power and protective earth wires must be 12 to 18 AWG. A local disconnect switch or circuit breaker which meets local electrical code is also required on the AC power input, and must be located near the PCM.

WARNING

POTENTIAL FIRE HAZARD. The relay contacts are not fused and are rated at 5A max. External devices should have a current limiting device to keep the current below 5A.

5. Connect Relay outputs to connectors labeled J2, J3, and J4. Note that Normally Open (NO) and Normally Closed (NC) contacts are provided. See Figure 6 for wiring information.

6. Reinstall the low voltage board connectors at position J102 and J109 and the red thumb screw.

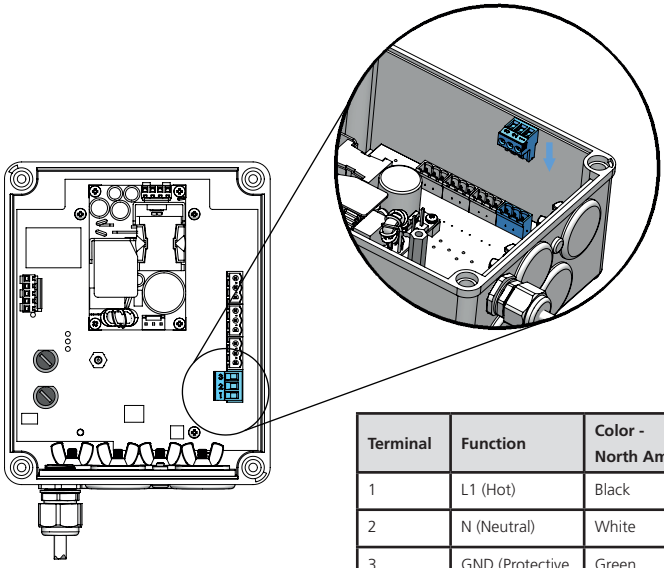

Figure 6: Power connector

Terminal	Function	Color - North America	Color EU
1	L1 (Hot)	Black	Brown
2	N (Neutral)	White	Blue
3	GND (Protective Earth)	Green	Green/Yellow

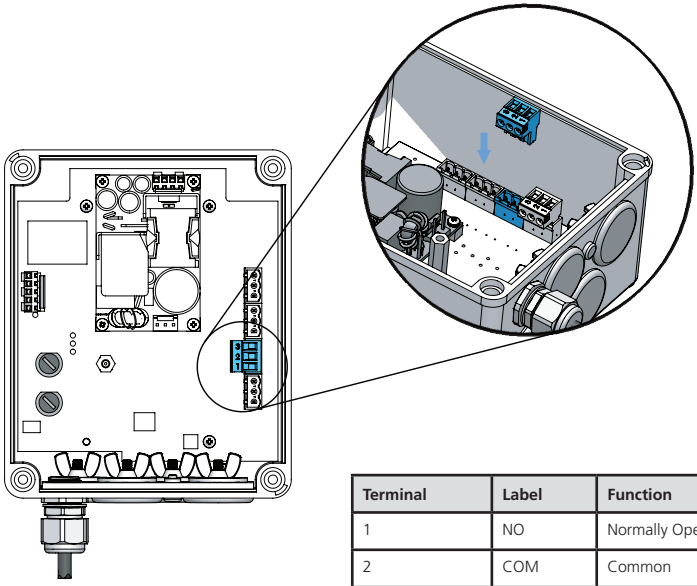

Figure 7: Relay connections

Terminal	Label	Function
1	NO	Normally Open
2	COM	Common
3	NC	Normally Closed

4-20mA Installation

The two isolated 0-20 / 4-20mA outputs are controlled by the sensor.

1. Remove the appropriate hole plugs from the bonding plate. The two near the front are intended for low voltage use.
2. Connect 0-20mA or 4-20mA devices to connectors labeled J5 and J6.

Terminal	Label	Function
1	-	Analog -
2	+	Analog +
3	S	Shield

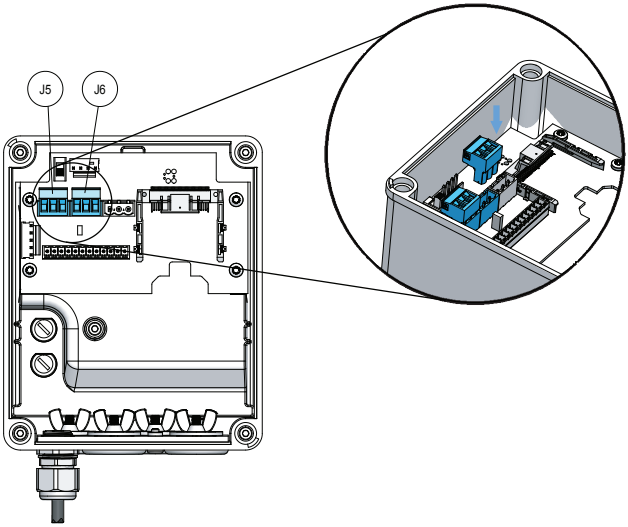

Figure 8: 4-20 mA connections

Sensor Connection

The 12 conductor sensor wire located at position J2 is pre-wired from the factory. If the cable is removed during installation, connect the positions as follows.

Terminal	Color	Function
1	BLACK	24VDC GND
2	RED	24VDC+
3	WHITE	RS232 TXD
4	GREEN	RS232 RXD
5	YELLOW	RS485A+
6	GRAY	RS485B-
7	PINK	4-20 -
8	BLUE	4-20 +
9	ORANGE	CANL
10	TAN	CANH
11	BROWN	FLOW
12	VIOLET	PE

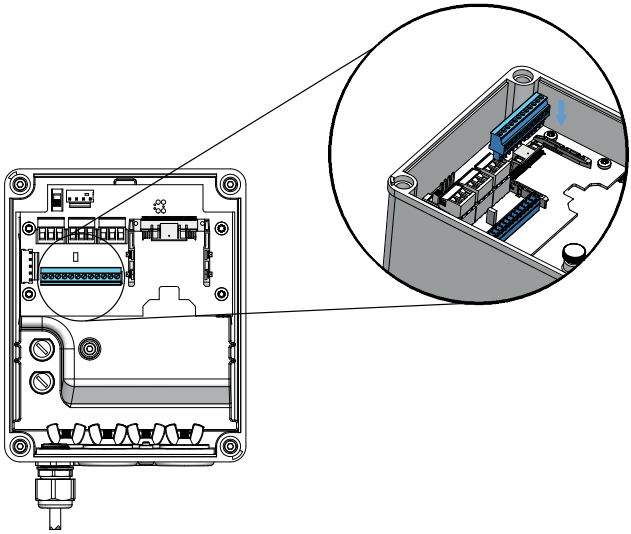

Figure 9: 12 pin connection

PCM Digital Interface

Description

The PCM digital interface uses Anybus® network modules to connect the PCM to a digital network such as Profibus® DP or Modbus TCP. A block of registers is available for the network master to scan, including measurements, alarms, errors and status information.

Installation

A single Anybus module is installed into the PCM as follows.

⚠ DANGER

DISCONNECT POWER BEFORE SERVICING! Only a qualified installation technician should connect AC power to the PCM

1. Remove the 4 screws and front cover from the PCM.
2. Slide the Anybus module into position J100 on the low voltage circuit board.
3. If necessary, field terminate the appropriate connector (DB9, RJ-45, etc) and insert the connector into the Anybus module.
4. Replace the front cover and secure with 4 screws.

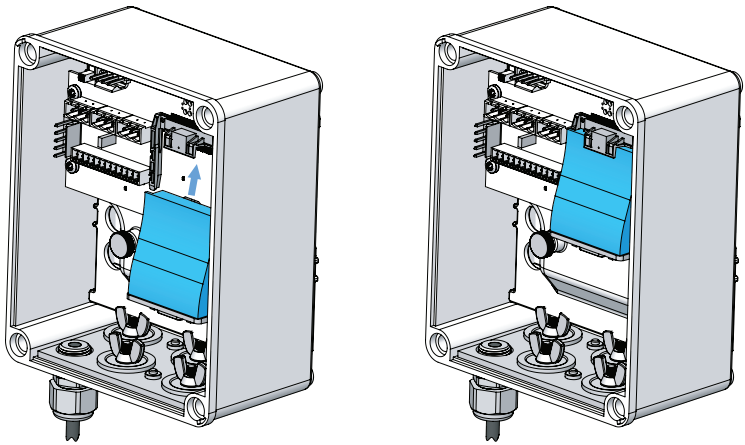

Figure 10: Anybus connector

PROFIBUS-DP

Introduction

The PROFIBUS-DP supports both PROFIBUS-DP-V1 and DP-V0.

Features

- Supports PROFIBUS-DP-V1 and DP-V0
- PROFIBUS connector (9-pin female D-Sub)
- Automatic baud rate detection
- Max. read process data: 244 bytes
- Max. write process data: 244 bytes
- Max. process data (read + write, in bytes): 488 bytes
- Generic and PROFIBUS specific diagnostic support
- User Parameterization Data support
- Set Slave Address support
- ADI access via DP-V1 read/write services
- Device identity customization
- GSD file provided
- Support for Modular Device Mode

GSD File

Refer to specific instrument manual for information.

Connector

A 9 pin D-sub female connector provides connection to the PROFIBUS Network.

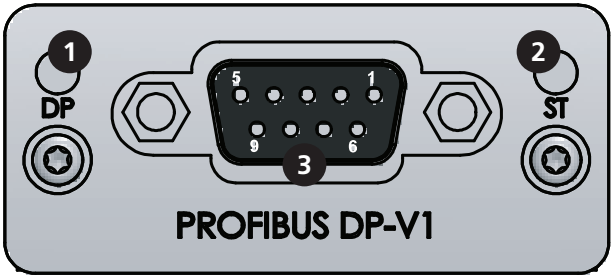

Figure 11: 9-pin D-sub female connector

#	Item
1	Network Status LED
2	Module Status LED
3	9 Pin Female Connector

Network Status LED

LED State	Indication
Off	Not online / No power
Green	Online, data exchange
Flashing Green	Online, clear
Flashing Red (1 flash)	Parametrization error
Flashing Red (2 flashes)	Profibus configuration error

Module Status LED

LED State	Indication
Off	Not initialized
Green	Initialized
Flashing Green	Initialized, diagnostic event present
Red	Exception error

9 Pin Female Connector

Pin	Signal	Description
1	-	-
2	-	-
3	B Line	Positive RxD/TxD, RS485 level
4	RTS	Request to send
5	GND Bus	Ground (isolated)
6	+5V Bus Output	+5V termination power (isolated, short-circut protected)
7	-	-
8	A Line	Negative RxD/TxD, RS485 level
9	-	-
Housing	Cable Shield	Internally connected to the Anybus protective earth via cable shield filters according to the Profibus standard

Mating Board Connector

1. Plug the mating board 9 pin connector into the Anybus module.

2. Connect the PROFIBUS network wires to the terminal block. Two sets of terminal blocks are provided.

3. Set

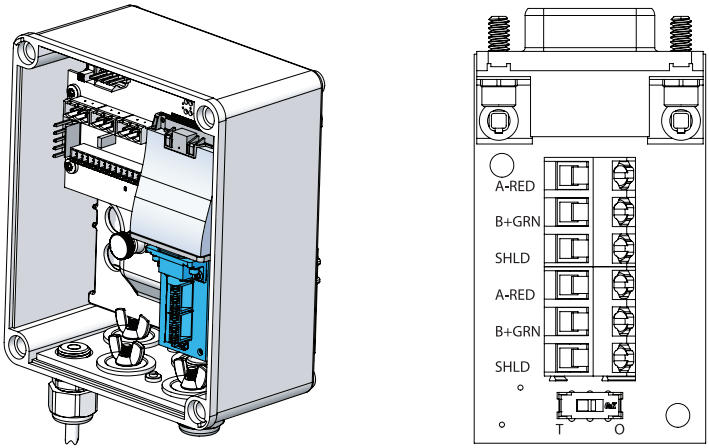

Figure 12: Profibus connector

Modbus TCP (Ethernet)

Introduction

The Modbus TCP module supports industry standard Modbus TCP protocol over Ethernet. Two RJ-45 connectors provide connection to the Ethernet network.

Features

- 10/100 Mbit/s Ethernet operation
- Modbus TCP V3.0 Compliant
- 2x RJ-45 Modbus TCP 100 Mbit/s ports available simultaneously
- Supports all standard Modbus function codes: 01, 02, 03, 04, 05, 06, 15, 16, 23, 43/15
- Fast data transfer: Up to 1536 bytes of I/O data in each direction
- Supports DHCP and will retrieve the IP settings from a DHCP-server automatically

Register Map

Refer to specific instrument manual for information.

Connector

Two RJ-45 connectors provide connection to the Modbus TCP Ethernet network.

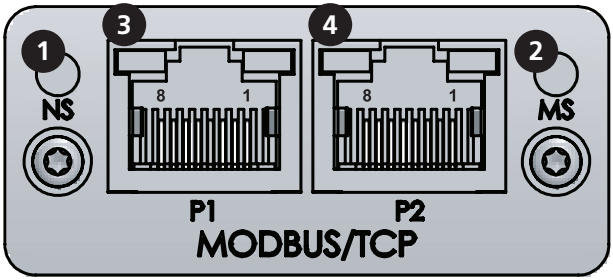

Figure 13: RJ-45 female connector

Two RJ-45 female connectors provide connection to the Modbus/TCP Network.
In addition, two LEDs show the module status.

#	Item
1	Network Status LED
2	Module Status LED
3	Link / Activity Port 1 LED
4	Link / Activity Port 2 LED

RJ-45 Female Connector

Pin		
1	TxD+	Transmit positive
2	TxD-	Transmit negetive
3	RxD+	Receive positive
4	-	-
5	-	-
6	RxD-	Receive negetive
7	-	-
8	-	-

Network Status LED

LED State	Indication
Off	No IP address or in state EXCEPTION
Green	At least one Modbus message received
Flashing Green	Waiting for Modbus message
Flashing Red (1 flash)	IP address conflict detected, FATAL ERROR
Flashing Red (2 flashes)	Connection timeout. No Modbus message has been received within the configured "process active timeout" time

Module Status LED

LED State	Description
Off	No power
Green	Normal operation
Red	Major fault (including Anybus exception), FATAL
Red, flashing	Minor fault
Alternation red/green	Firmware update from the file system in progress

Link/Activity LED 3/4

LED State	Description
Off	No link, no activity
Green	Link (100 Mbit/s) established
Green, flickering	Activity (100 Mbit/s)
Yellow	Link (10 Mbit/s) established
Yellow, flickering	Activity (10 Mbit/s)

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Modbus RS485/RS232

Introduction

The Module supports Modbus-RTU (8 bit) over both RS-485/RS232

Features

- Node address range is fron 1-247.
  (See specific instrument manual for setting node address)
- Even Parity with 1 stop bit
- Baud rate is 192000bps
- Supports all standard Modbus function codes: 01, 02, 03, 04, 05, 06, 15, 16, 23

Register Map

Refer to specific instrument manual for information.

Connector

A 9 pin D-sub female connector provides connection to the Modbus Network.

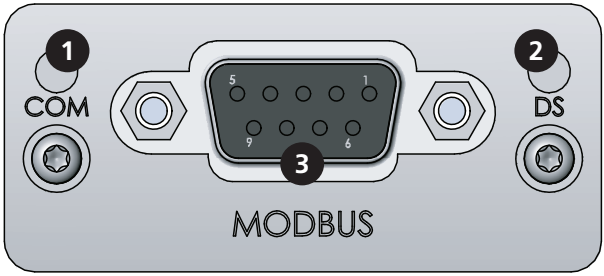

Figure 14: 9-pin D-sub female connector

#	Item
1	Network Staus LED
2	Module Status LED
3	9 Pin Female Connector

Network Status LED

LED State	Indication
Off	Not online / No power
Yellow	This LED will flash during correct reception and transmission (20 ms on, 40 ms off)
Red	A FATAL ERROR has occured

Module Status LED

LED State	Indication
Off	Not initialized
Green	Initialized
Red	Internal error or major unrecoverable fault
Red, Single Flash	Communication fault or configuration error Case 1: Invalid settings in Network Configuration Object Case 2: Settings in Network Configuration Object has been changed during runtime (i.e. the settings do not match the currently used configuration.)
Red, Double Flash	Application diagnostics available

9 Pin Female Connector

The Modbus interface is galvanically isolated, and provides both RS-232 and RS-485

Pin	Direction	Signal	Comment
Housing	-	PE	Protective Earth
1	-	GND	Bus polarization, ground (isolated)
2	Output	5V	Bus polarization +power 5V DC (Isolated) Any current drawn from this pin will affect the total power consumption.
3	Input	PMC	Connect to pin #2 for RS-232 operation. Leave unconnected for RS-485 operation
4	-	-	-
5	Bidirectional	B-Line	RS-485 B-Line (+)
6	-	-	-
7	Input	Rx	RS-232 Data Receive
8	Output	Tx	RS-232 Data Transmit
9	Bidirectional	A-Line	RS-485 A-Line (-)

Mating Board Connector

The Modbus Wiring Adapter contains 2 slide switches SW1 and SW2.

SW1 enables the integrated resistor combination. Setting SW1 to “T” side, connects the terminating resistor across the network. Setting SW1 to “O” side disconnects the terminating resistor, which can be used to change from RS485 to RS232.

SW2 is used to select RS485 or RS232 for communication. Setting SW2 to “RS232” enables R232. Setting SW2 to “RS485” enables RS485.

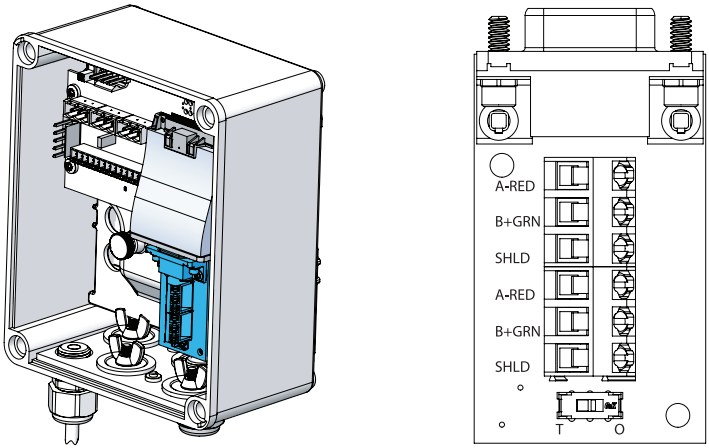

Figure 15: Modbus RS485/RS232 Connector

Maintenance

DANGER

DISCONNECT POWER BEFORE SERVICING! Always remove AC power from the PCM before performing maintenance on the device.

Fuse Replacement

The unit is protected by two 1.6A, 250VAC fuses. Should the fuses need changing, disconnect the unit from AC power and open the cover with a suitable tool to access the fuses.

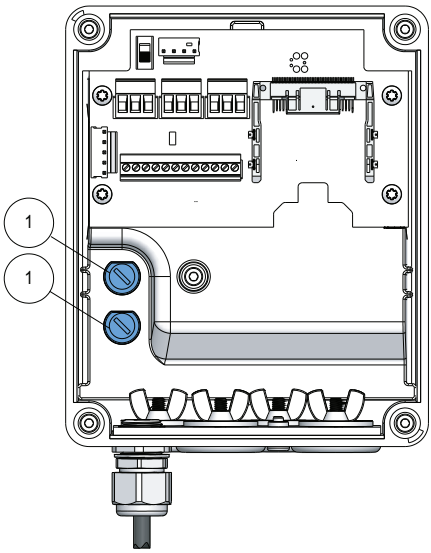

Figure 16: Fuse locations

Cleaning

No special maintenance is necessary.

If desired, the exterior of the enclosure can be cleaned using a dust-free cloth with a non flammable, non aggressive detergent.

GB Troubleshooting

Troubleshooting

Symptom	Action
No 0-20/4-20mA output	Check connection with sensor
Relays off continuously	Check connection with sensor Check cable at position J3 on low voltage board
Relays on continuously	Check connection with sensor
No green power light	Check fuses Check AC mains circuit breaker Check cable at J9 on low voltage board
No USB connection	Check USB power LED1
USB driver not found	Download and install "CP210x Windows Drivers"

Replacement Parts

Item	Description	Part Number
Fuse, 1.6A, 250VAC	5X20MM, 218 SERIES	19806-717
Connectors	Kit, Installation Connector	19806-718
Anybus, PROFIBUS	Installation Kit	19806-070
Anybus, Modbus TCP (Ethernet)	Installation Kit	19806-073
Anybus, Modbus RS-485/RS-232	Installation Kit	19806-074

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