

## The Company

We are an established world force in the design and manufacture of instrumentation for industrial process control, flow measurement, gas and liquid analysis and environmental applications.

As a part of ABB, a world leader in process automation technology, we offer customers application expertise, service and support worldwide.

We are committed to teamwork, high quality manufacturing, advanced technology and unrivalled service and support.

The quality, accuracy and performance of the Company's products result from over 100 years experience, combined with a continuous program of innovative design and development to incorporate the latest technology.

The UKAS Calibration Laboratory No. 0255 is just one of the ten flow calibration plants operated by the Company and is indicative of our dedication to quality and accuracy.

EN ISO 9001:2000



Cert. No. Q 05907

EN 29001 (ISO 9001)



Lenno, Italy – Cert. No. 9/90A

Stonehouse, U.K.



## Electrical Safety

This equipment complies with the requirements of CEI/IEC 61010-1:2001-2 'Safety Requirements for Electrical Equipment for Measurement, Control and Laboratory Use'. If the equipment is used in a manner NOT specified by the Company, the protection provided by the equipment may be impaired.

## Symbols

One or more of the following symbols may appear on the equipment labelling:

	<b>Warning</b> – Refer to the manual for instructions		Direct current supply only
	<b>Caution</b> – Risk of electric shock		Alternating current supply only
	Protective earth (ground) terminal		Both direct and alternating current supply
	Earth (ground) terminal		The equipment is protected through double insulation

Information in this manual is intended only to assist our customers in the efficient operation of our equipment. Use of this manual for any other purpose is specifically prohibited and its contents are not to be reproduced in full or part without prior approval of the Technical Publications Department.

### Health and Safety

To ensure that our products are safe and without risk to health, the following points must be noted:

1. The relevant sections of these instructions must be read carefully before proceeding.
2. Warning labels on containers and packages must be observed.
3. Installation, operation, maintenance and servicing must only be carried out by suitably trained personnel and in accordance with the information given.
4. Normal safety precautions must be taken to avoid the possibility of an accident occurring when operating in conditions of high pressure and/or temperature.
5. Chemicals must be stored away from heat, protected from temperature extremes and powders kept dry. Normal safe handling procedures must be used.
6. When disposing of chemicals ensure that no two chemicals are mixed.

Safety advice concerning the use of the equipment described in this manual or any relevant hazard data sheets (where applicable) may be obtained from the Company address on the back cover, together with servicing and spares information.

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# 1 Introduction

**Note.** This Supplementary User Guide contains information specific to ABB Profibus<sup>®</sup>-DP-enabled AV400 Series Monitors and must be read in conjunction with the appropriate User Guide for the product.

## 1.1 Profibus<sup>®</sup>

Profibus is a manufacturer-independent, open fieldbus standard for a wide range of applications in manufacturing, process and building automation. Manufacturer independence and openness are ensured by the international standard EN 50170.

Using the Profibus protocol, devices from different manufacturers exchange information on the same communications bus without the need for special interface equipment.

The Profibus family comprises three types of protocol, Profibus-DP, Profibus-FMS and Profibus-PA, each of which is used for different tasks. Of these three protocols, the most important for process automation are Profibus-DP and Profibus-PA.

Further information on Profibus can be found at [www.profibus.com](http://www.profibus.com).

### 1.1.1 Profibus-DP

Profibus-DP is designed for high-speed data exchange and is commonly used by complex or externally powered devices. The central controller or 'master' device (e.g. PLC or PC) utilizes Profibus-DP as a fast serial connection with distributed (slave) field devices such as ABB Profibus-enabled products.

The master reads the input information cyclically in a defined, recurring order from the slave(s). When configuring the bus system, the user assigns an address in the range 0 to 125 to each slave device and also defines which of the slaves are to be included in, or excluded from, the data acquisition cycle.

### 1.1.2 Profibus-PA

Profibus-PA is designed to accommodate process automation field devices that require power via the network with the option to use intrinsic safety for hazardous areas. Typical devices using this protocol include transmitters and positioners. A DP/PA coupler or link device is used to connect the Profibus PA network to the Profibus DP network.

## 1.2 Profibus and ABB Products

AV400 analyzers utilize Profibus DP as this is the protocol optimized for high speed and low connection costs (see [www.abb.com/fieldbus](http://www.abb.com/fieldbus) and follow the [Profibus](#) link).

## 1.3 Profibus DP Transmission Technology

The transfer method of Profibus-DP is RS485 – a proven technology. A twisted, shielded, two-wire copper cable is used as the transfer medium.

The bus structure enables addition and removal of stations or step-by-step commissioning of the system without affecting other stations. Later expansion has no influence on stations already in operation.

Transmission speeds of between 9.6 kbit/sec and 12 Mbit/sec are available. One uniform transmission speed is selected for all devices on the bus when the system is commissioned.

## 2 Installation

### 2.1 Installation Overview – Fig. 2.1

All devices are connected in a bus structure ('line'). Up to 32 stations (master or slaves) can be linked to create one 'segment'.

Each end of a segment must be terminated by an active bus terminating resistor. Both bus terminators must always be powered to ensure fault-free operation therefore it is strongly recommended that they are connected to a back-up power supply.

Up to three line bus amplifiers (repeaters) can be used to extend the network to a total of four segments, allowing a maximum of 125 devices to be installed in the system.

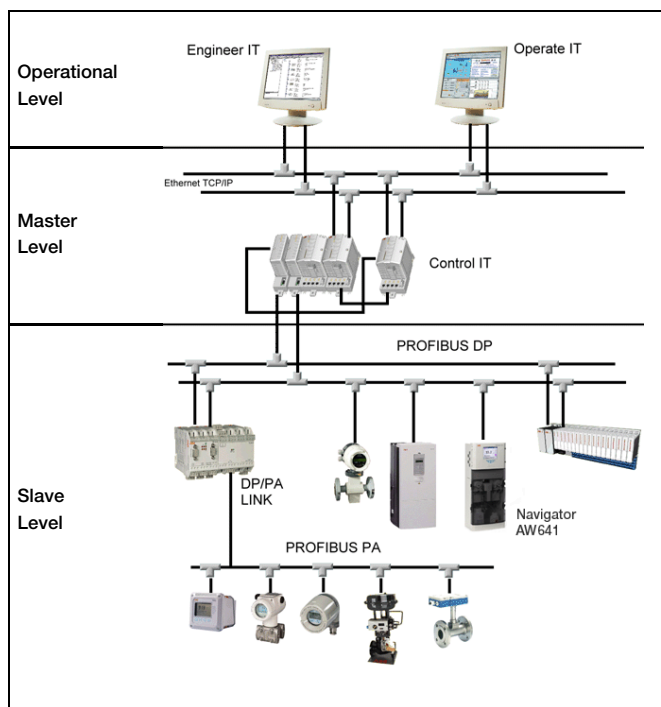


Fig. 2.1 Typical Profibus Network

### 2.2 Cable Length

The maximum cable length of a segment is determined by the transmission speed – see Table 2.1. The cable length specified can be extended by using repeaters but it is recommended that no more than three repeaters be connected in series.

Transmission Rate (bits/sec)	Maximum Segment Length (m)	Maximum Total Network Length (m)
9.6 to 93.75K	1200	4800
187.5K	1000	4000
500K	400	1600
1.5M	200	800
3 to 12M	100	400

Table 2.1 Cable Length

### 2.3 Cable Specification

The cable lengths in Table 2.1 refer to the following cable type:

Characteristic impedance	135 to 165Ω
Capacitance per unit length	<30 pf/m
Loop resistance	110Ω/km
Core diameter	0.64mm
Core cross section	>0.34mm <sup>2</sup>

Suitable Profibus cable, Part Nos. PCA010, PCA 011 and PCA 012, can be obtained from ABB. Refer to Data Sheet 10/63-6.46 EN.

### 2.4 Device Integration – the GSD File

Profibus devices differ with respect to available functionality and parameters and these vary individually for each device type and manufacturer. In order to obtain Plug-and-Play configuration for Profibus, characteristic device communication features such as manufacturer name, device name, hardware/software versions, baud rate and the number and nature of inputs/outputs are defined in an electronic device data sheet known as a GSD (Gerätstammdaten) file.

A GSD file is readable ASCII text file that contains both general and device-specific specifications for communication. Each of the entries describes a feature supported by a device. By the means of keywords, a configuration tool reads the device identification, the adjustable parameters, the corresponding data type and the permitted limit values for the configuration of the device from the GSD. Some keywords are mandatory, e.g. Vendor\_Name; others are optional, e.g. Sync\_Mode\_supported.

The GSD file (ABB\_OAD4\_1001.gsd) for Profibus-enabled AV400 Series Monitors conforms to the Profibus standard.

Appendix A lists all Profibus-enabled AV400 Series monitors, grouped by module.

### 3 Network Connection and Configuration

**Warning.** When connecting a Profibus-enabled device to a Profibus-DP network:

- Use shielded data lines and ensure they are not reversed.
- Ensure all data lines are routed clear of the source of any strong electrical and magnetic fields.
- Refer to the relevant User Guide for all other installation and connection details.

#### 3.1 Network Connections – Fig. 3.1

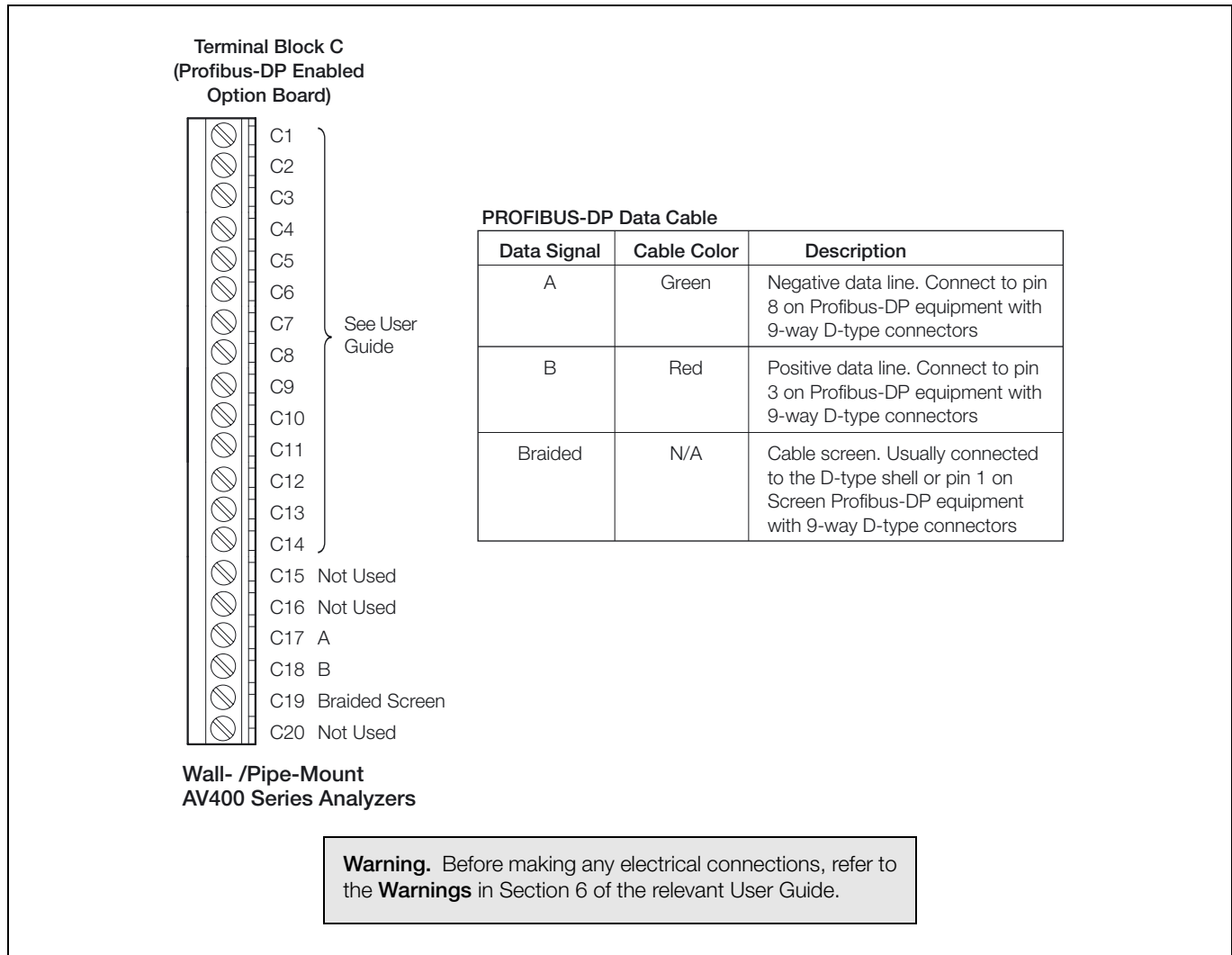
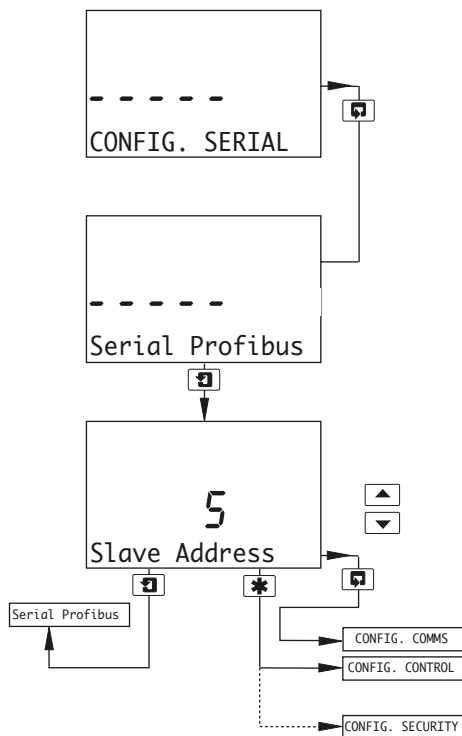


Fig. 3.1 Network Cable Connection

### 3.2 Network Configuration

**Note.** An AV400 Series monitor is not configured using Profibus commands but via the analyzer's keypad and menu system. Configure the analyzer for Profibus communication as shown below.



#### Configure Serial Communications

Refer to relevant User Guide and access the **CONFIG. SERIAL** page.

#### Communications System Protocol

Select **Serial Profibus** for use in a Profibus system.

#### Slave Address

Enter the slave address assigned to the analyzer (within the range 0 to 125).

Return to main menu.

Single input analyzer **and** option board not fitted – see **Configure Control** Section in relevant User Guide.

Dual input analyzer **and** option board not fitted – see **Security** Section in relevant User Guide.

## Appendix A – GSD File Modules

**Note.**

- Float = Floating-point number – requires 4 bytes
- Char = Character – requires 1 byte
- Int = Integer – requires 2 bytes

### A.1 Module 01

- AV410 Low Range Dissolved Organics
- AV420 High Range Dissolved Organics
- AV450 Nitrate

Byte	Contents	Sensor	Description
1 to 4	Float	A	Measured Process Variable
5 to 8	Float	N/A	Not Used
9	Char	A	Sensor Status (see Table A.3)
10	Char	N/A	Alarm Status (see Table A.4)

Table A.1 Module 01 Data

### A.2 Module 02

- AV411 Dual I/P – Low Range Dissolved Organics
- AV412 Dual I/P – Low & High Range Dissolved Organics
- AV422 Dual I/P – High Range Dissolved Organics
- AV455 Dual I/P – Nitrate

Byte	Contents	Sensor	Description
1 to 4	Float	A	Measured Process Variable
5 to 8	Float	N/A	Not Used
9 to 12	Float	B	Measured Process Variable
13 to 16	Float	N/A	Not Used
17	Char	A	Sensor Status (see Table A.3)
18	Char	B	Sensor Status (see Table A.3)
19	Char	N/A	Alarm Status (see Table A.4)
20	Char	N/A	Not Used

Table A.2 Module 02 Data

### A.3 Sensor Status Message

	Bit							
	0	1	2	3	4	5	6	7
Sensor Type	Status Message							
7320 100	Lamp Disabled	Low Signal	Cleaner Fail	Input Brd. Fault	24V Power Loss	12V Power Loss	Check Flexicable	RAM Fault
7320 200	"	"	"	"	"	"	"	"
7330 100	"	"	"	"	"	"	"	"

Alarm Status								
Bit	0	1	2	3	4	5	6	7
Alarm	A1	A2	A3	A:Out Of Sample	B:Out of Sample	–	–	–
Bit Status	0 or 1	0 or 1	0 or 1	0 or 1 *	1 or 1 *	X	X	X

\*If the alarm input is disabled, the status is always 0

Table A.3 Sensor Status Messages

### A.4 Alarm Status

Table A.4 shows the alarm that is associated with each bit of the alarm status byte for each AV400 Series analyzer variant.

**Note.** Alarms A4 and A5 are available only if the option board is fitted to the instrument and analog features enabled – see Section 7.3 of the relevant User Guide.

Bit	0	1	2	3	4	5	6	7
Alarm No.	A1	A2	A3	A4	A5	–	–	–
Bit Status	0 or 1	0 or 1	0 or 1	0 or 1	0 or 1	X	X	X

0 = Not Active  
1 = Active  
X = Always 0

Table A.4 Alarm Status

## Notes

# PRODUCTS & CUSTOMER SUPPORT

## Products

### Automation Systems

- for the following industries:
  - Chemical & Pharmaceutical
  - Food & Beverage
  - Manufacturing
  - Metals and Minerals
  - Oil, Gas & Petrochemical
  - Pulp and Paper

### Drives and Motors

- AC and DC Drives, AC and DC Machines, AC Motors to 1kV
- Drive Systems
- Force Measurement
- Servo Drives

### Controllers & Recorders

- Single and Multi-loop Controllers
- Circular Chart and Strip Chart Recorders
- Paperless Recorders
- Process Indicators

### Flexible Automation

- Industrial Robots and Robot Systems

### Flow Measurement

- Electromagnetic Flowmeters
- Mass Flowmeters
- Turbine Flowmeters
- Wedge Flow Elements

### Marine Systems & Turbochargers

- Electrical Systems
- Marine Equipment
- Offshore Retrofit and Refurbishment

### Process Analytics

- Process Gas Analysis
- Systems Integration

### Transmitters

- Pressure
- Temperature
- Level
- Interface Modules

### Valves, Actuators and Positioners

- Control Valves
- Actuators
- Positioners

### Water, Gas & Industrial Analytics Instrumentation

- pH, Conductivity and Dissolved Oxygen Transmitters and Sensors
- Ammonia, Nitrate, Phosphate, Silica, Sodium, Chloride, Fluoride, Dissolved Oxygen and Hydrazine Analyzers
- Zirconia Oxygen Analyzers, Katharometers, Hydrogen Purity and Purge-gas Monitors, Thermal Conductivity

## Customer Support

We provide a comprehensive after sales service via a Worldwide Service Organization. Contact one of the following offices for details on your nearest Service and Repair Centre.

### United Kingdom

ABB Limited  
Tel: +44 (0)1453 826661  
Fax: +44 (0)1453 829671

### United States of America

ABB Inc.  
Tel: +1 775 850 4800  
Fax: +1 775 850 4808

### Client Warranty

Prior to installation, the equipment referred to in this manual must be stored in a clean, dry environment, in accordance with the Company's published specification.

Periodic checks must be made on the equipment's condition. In the event of a failure under warranty, the following documentation must be provided as substantiation:

1. A listing evidencing process operation and alarm logs at time of failure.
2. Copies of all storage, installation, operating and maintenance records relating to the alleged faulty unit.

Profibus® is a registered trademark of Profibus International

**ABB** has Sales & Customer Support expertise  
in over 100 countries worldwide

[www.abb.com](http://www.abb.com)

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