# Instruction manual

# PROFIBUS DP® slave interface
# for digital multibus
# Mass Flow / Pressure instruments

**ATTENTION**
**Please read this instruction manual carefully before installing and operating the instrument.**
**Not following the guidelines could result in personal injury and/or damage to the equipment.**

**Bronkhorst®**
HIGH-TECH

**Bronkhorst**
CORI-TECH

**Mass Flow** ONLINE

**M+W Instruments™**
a Bronkhorst® company

## *Disclaimer*

Even though care has been taken in the preparation and publication of the contents of this manual, we do not assume legal or other liability for any inaccuracy, mistake, mis-statement or any other error of whatsoever nature contained herein. The material in this manual is for information purposes only, and is subject to change without notice.

Bronkhorst High-Tech B.V.
July 2011

## *Symbols*

| | |
|---|---|
| ⚠ | *Important information. Discarding this information could cause injuries to people or damage to the Instrument or installation.* |
| 💡 | *Helpful information. This information will facilitate the use of this instrument.* |
| ⓘ | *Additional info available on the internet or from your local sales representative.* |

## *Warranty*

The products of Bronkhorst High-Tech B.V. are warranteed against defects in material and workmanship for a period of three years from the date of shipment, provided they are used in accordance with the ordering specifications and the instructions in this manual and that they are not subjected to abuse, physical damage or contamination. Products that do not operate properly during this period may be repaired or replaced at no charge. Repairs are normally warranted for one year or the balance of the original warranty, whichever is the longer.

> ⓘ  *See also paragraph 9 of the Conditions of sales:*
> *http://www.bronkhorst.com/files/corporate_headquarters/sales_conditions/en_general_terms_of_sales.pdf*

The warranty includes all initial and latent defects, random failures, and undeterminable internal causes.

It excludes failures and damage caused by the customer, such as contamination, improper electrical hook-up, physical shock etc.

Re-conditioning of products primarily returned for warranty service that is partly or wholly judged non-warranty may be charged for.

Bronkhorst High-Tech B.V. or affiliated company prepays outgoing freight charges when any party of the service is performed under warranty, unless otherwise agreed upon beforehand. However, if the product has been returned collect to our factory or service center, these costs are added to the repair invoice. Import and/or export charges, foreign shipping methods/carriers are paid for by the customer.

# Table of contents

# 1 GENERAL PRODUCT INFORMATION

## 1.1 INTRODUCTION

This manual will explain how to install a Bronkhorst[1] instrument to your PROFIBUS DP system. It only contains information which is needed most.

More detailed information about PROFIBUS can be obtained on the website of the (international) PROFIBUS organization: www.profibus.com or on the website of the (local) PROFIBUS organization of your country (when available).

Example of a Bronkhorst instrument with PROFIBUS interface

[1] **Bronkhorst:** **This includes Bronkhorst High-Tech B.V. , Bronkhorst Cori-Tech B.V. and M+W Instruments GmbH.**

## 1.2 MULTIBUS TYPES

In 2000 Bronkhorst developed their first digital instruments according to the "multibus" principle. The basic pc-board on the instrument contained all of the general functions needed for measurement and control, including alarm, totalizing and diagnostic functions. It had **analog** I/O-signals and also an **RS232** connection as a standard feature. In addition to this there is the possibility of integrating an interface board with **DeviceNet™**, **Profibus-DP**®, **Modbus** , **FLOW-BUS** or **EtherCAT** protocol. The first generation (**MBC-I**) was based on a 16 bit Fujitsu controller. It was superseded in 2003 by the Multibus type 2 (**MBC-II**). This version was also based on the 16 bit Fujitsu controller but it had several improvements to the MBC-I. One of them is the current steering of the valve. It reduced heat production and improved control characteristics. The latest version Multibus controller type 3 (**MBC3**) is introduced in 2011. It is build around a 72MHz 32 bit NXP ARM controller. It has AD and DA controllers on board which makes it possible to measure noise free and control valves without delays. The internal control loop runs 6 times faster compared to the MBC-II therefore control stability has improved significantly. It also has several improved functions like reverse voltage protection, inrush current limitation and overvoltage protection.

**MBC3** instruments can be recognised by the "MBC3" placed on lower left side of the instrument label (see example).

SNM1120XXXXA
P-702CV-21KA-AAD-22-V
500 ln/h N2
9 bar (a) / 1 bar (a)
20 °C   N.C. Control Valve

MBC3
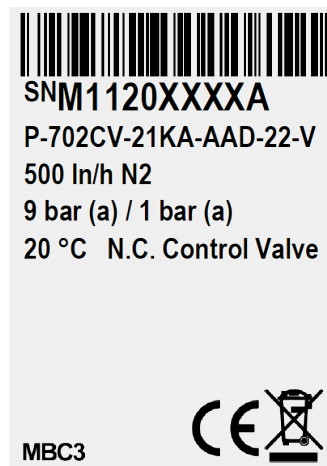
## 1.3 REFERENCES TO OTHER APPLICABLE DOCUMENTS

Manuals and guides for digital instruments are modular. General instructions give information about the functioning and installation of instruments. Operational instructions explain the use of the digital instruments features and parameters. Field bus specific information explains the installation and use of the field bus installed on the instrument.

### 1.3.1 Manuals and user guides:

| General instructions Instrument type based | Operational instructions | Field bus specific information |
|---|---|---|
| **Document 9.17.022**<br>Bronkhorst High-Tech<br>General instructions digital Mass Flow / Pressure | **Document 9.17.023**<br><br>Operational instructions for digital multibus Mass Flow / Pressure instruments | **Document 9.17.024**<br>FLOW-BUS interface |
| **Document 9.17.031**<br>Bronkhorst Cori-Tech<br>General instructions CORI-FLOW | | **Document 9.17.025**<br>PROFIBUS–DP interface |
| **Document 9.17.050**<br>Bronkhorst Cori-Tech<br>General instructions mini CORI-FLOW | | **Document 9.17.026**<br>DeviceNet interface |
| **Document 9.17.044**<br>Bronkhorst High-Tech<br>General instructions digital LIQUI-FLOW L30 | | **Document 9.17.035**<br>Modbus interface |
| M+W Instruments<br>Instruction manual MASS-STREAM D-6300 | | **Document 9.17.027**<br>RS232 interface with FLOW-BUS protocol |
| | | **Document 9.17.063**<br>EtherCAT interface |

### 1.3.2 Technical Drawings:

Hook-up diagram laboratory-style PROFIBUS          (document nr. 9.16.061)
Hook-up diagram industrial style PROFIBUS          (document nr. 9.16.053)
Hook-up diagram CORI-FLOW PROFIBUS               (document nr. 9.16.049)
Hook-up diagram LIQUI-FLOW L30 digital PROFIBUS  (document nr. 9.16.072)

### 1.3.3 Software tooling:
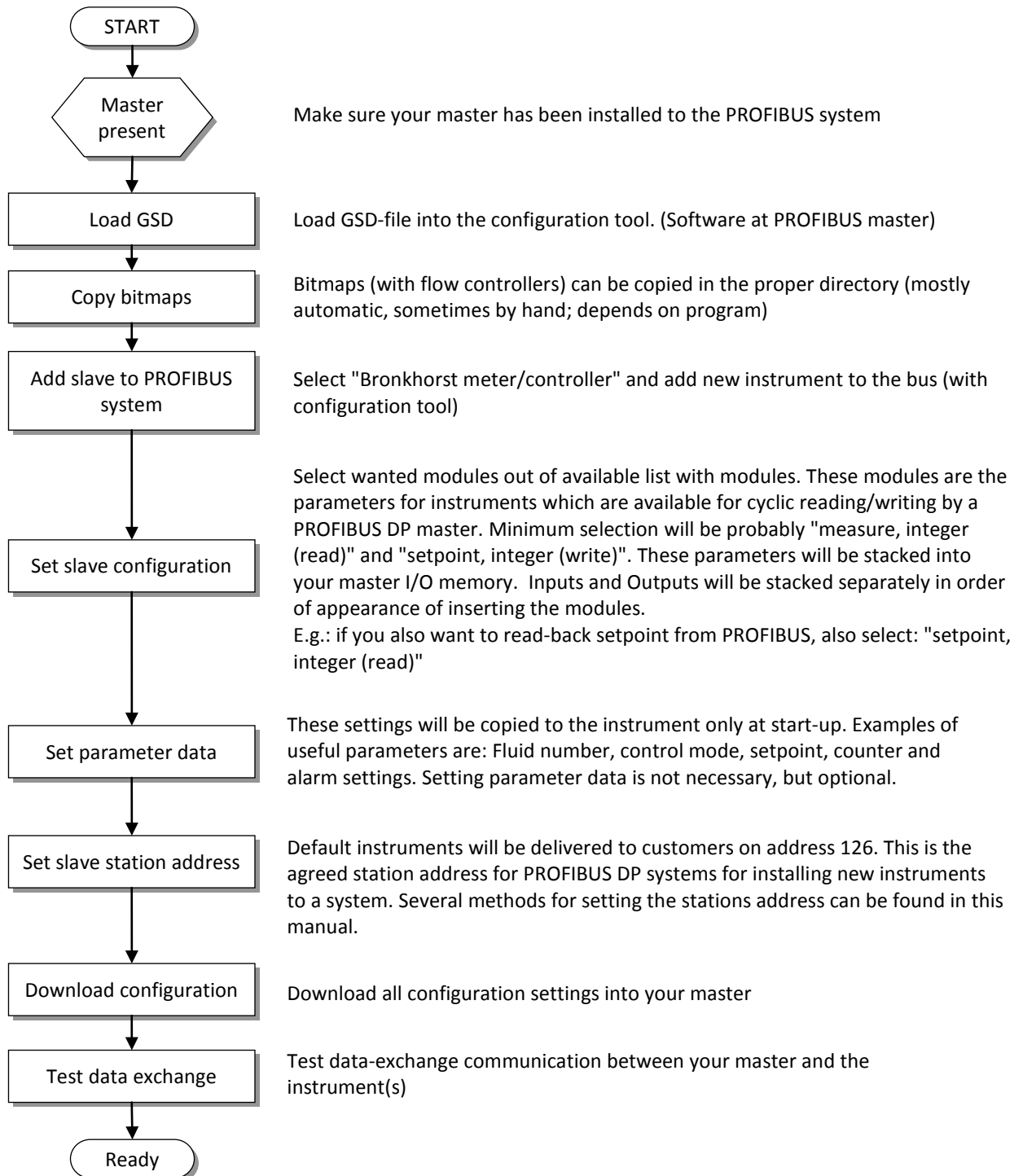
Flowfix
FlowDDE
GSD file

*All these documents can be found at:*
*http://www.bronkhorst.com/en/downloads*

## 1.4  SHORT FORM START-UP

All necessary settings for this module are already performed at Bronkhorst.
To follow next steps carefully is the quickest way to get this module operational in your own PROFIBUS environment.

| Flow step | Description |
|---|---|
| **START** | |
| **Master present** | Make sure your master has been installed to the PROFIBUS system |
| **Load GSD** | Load GSD-file into the configuration tool. (Software at PROFIBUS master) |
| **Copy bitmaps** | Bitmaps (with flow controllers) can be copied in the proper directory (mostly automatic, sometimes by hand; depends on program) |
| **Add slave to PROFIBUS system** | Select "Bronkhorst meter/controller" and add new instrument to the bus (with configuration tool) |
| **Set slave configuration** | Select wanted modules out of available list with modules. These modules are the parameters for instruments which are available for cyclic reading/writing by a PROFIBUS DP master. Minimum selection will be probably "measure, integer (read)" and "setpoint, integer (write)". These parameters will be stacked into your master I/O memory. Inputs and Outputs will be stacked separately in order of appearance of inserting the modules.<br>E.g.: if you also want to read-back setpoint from PROFIBUS, also select: "setpoint, integer (read)" |
| **Set parameter data** | These settings will be copied to the instrument only at start-up. Examples of useful parameters are: Fluid number, control mode, setpoint, counter and alarm settings. Setting parameter data is not necessary, but optional. |
| **Set slave station address** | Default instruments will be delivered to customers on address 126. This is the agreed station address for PROFIBUS DP systems for installing new instruments to a system. Several methods for setting the stations address can be found in this manual. |
| **Download configuration** | Download all configuration settings into your master |
| **Test data exchange** | Test data-exchange communication between your master and the instrument(s) |
| **Ready** | |

## 1.5 OPERATING PRINCIPLES

**PROFIBUS DP** is a 2-wire industrial data communication standard (Field bus) which allows automation components like sensors, actuators and controllers to exchange information.
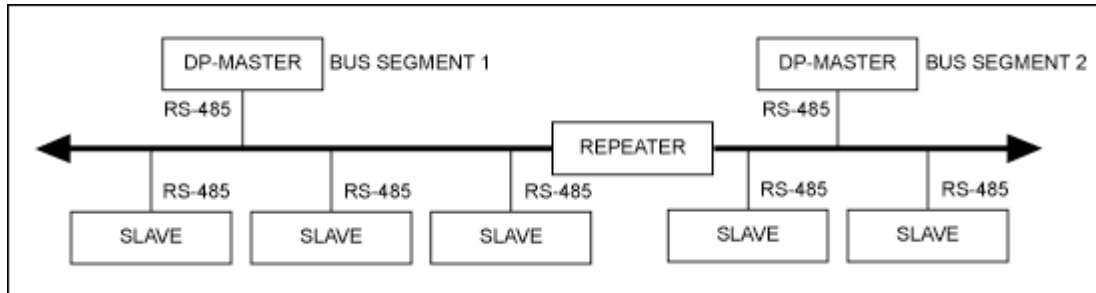


Simple PROFIBUS system.

PROFIBUS DP is a master / slave bus system. Bronkhorst instruments are all slaves. There is no mutual communication between PROFIBUS DP slaves, only between a master and slave. Each slave must have its own unique station address on the bus, otherwise there is no communication possible. Setting slave station address can be performed by either:

- **Via rotary switches (Non industrial instruments)**
- **Master configuration software.**
  For example:
    - Sycon V2.6.2. from Hilscher G.m.b.H. (in this manual)
    - Step 7 V5.1 from Siemens for PLC type S7-300 2DP.
  Most master configuration software tools work in the same way, because PROFIBUS DP is a standardized field bus system. Only on details and program operation things could be different.
  Read user manual carefully for correct operation of other programs than Sycon and Step 7.
- **Bronkhorst tooling software: eq FlowFix**
  The Bronkhorst tooling software is able to communicate with the instrument via RS232 using a special cable. If you don't have such a cable ask your local sales representative.
- **Via Micro-switch and Led's**

*PROFIBUS DP slaves using, will adapt automatically to baud rates determined by the master on a bus segment.*

# 2   FIELD BUS INSTALLATION

## 2.1   GENERAL

*The following installation guidelines only apply to data transfer using copper cables (RS 485) to EN 50170. Furthermore, operators of PROFIBUS equipment are strongly recommended only to use field bus devices and components which have been certified by the PROFIBUS User Organization e.V. (PNO). Certified products have undergone extensive tests carried out by specialists to demonstrate their compliance to the PROFIBUS standard EN 50170 in combination with PROFIBUS devices from other manufacturers. PROFIBUS data transfer is based on the RS 485 standard[1]. The relevant features for use with PROFIBUS-DP are described in EN 50170.*

*PROFIBUS DP field bus wiring is the cause of many problems if not proper installed.*
*Please use the instructions below and those mentioned on www.profibus.com*

## 2.2   PROFIBUS CONNECTOR

The chassis female PROFIBUS DP (sub miniature 9-pin) D-connector has the following pin configuration:

| Pin number | Description |
|---|---|
| 1 | not connected |
| 2 | not connected |
| 3 | RxD/TxD-P        -        plus (B – wire) |
| 4 | RTS |
| 5 | DGnd |
| 6 | VP(+5V) |
| 7 | not connected |
| 8 | RxD/TxD-N        -        minus (A - wire) |
| 9 | not connected |



The chassis female PROFIBUS M12 B-coded connector (IP65) has the following pin configuration:

| Pin number | Signal | Description |
|---|---|---|
| 1 | VP | Power supply plus, (P5V) |
| 2 | RxD / TxD-N | Receive / Transmit data –N, A-line |
| 3 | DGND | Data ground (reference potential to VP) |
| 4 | RxD / TxD-P | Receive / Transmit data –plus, B-line |
| 5 | not connected | |
| Thread | Shield | Shield or PE |

B-coded
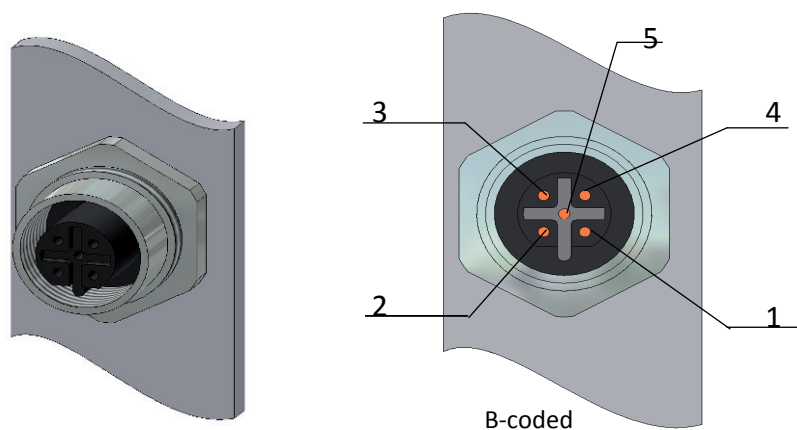
## 2.3   PROFIBUS DP CABLES

PROFIBUS cables are shielded twisted-pair copper cables which differ from each other in the type of wire (fixed/flexible) and/or sheath. The two inner cores of a PROFIBUS cable have green and red insulation. The specifications in this chapter are primarily intended to provide a general introduction and describe the cable properties to be considered (see also IEC 61784-5-3).

The cables for PROFIBUS DP are assigned to categories, the so-called line types, which define specific physical parameters. The individual line types are identified by the capital letters A, B, C and D. When planning a network you should exclusively use line type A.
The table below shows the parameters of line type A that must be complied with.

| Parameter | Specified limits |
|---|---|
| Impedance | 135..165 Ω with f = 3...20 MHz |
| Operational capacity | ≤ 30 pF/m |
| Loop resistance | ≤110 Ω/km |
| Wire diameter | >0.64 mm |
| Wire CSA | > 0.34 mm2 |

## 2.4   MAXIMAL CABLE LENGTH WITH PROFIBUS DP

The maximum transmission distance (Trunk Line), that can be achieved using copper cables is directly related to the transmission speed chosen for the PROFIBUS DP network. As a result, these two variables must always be considered together. The data transmission rate of PROFIBUS DP is adjustable in defined steps between 9.6 and 12.000 kbits/s. The data transmission rate must be identical for all segments of a PROFIBUS line. The table below shows the maximum possible transmission distances that can be reached when using copper cables. The minimal cable distance between two device connections is one (1) meter.

| Transmission rate (kbits/s) | maximum Transmission distance* ($L_T$)    (meter) |
|---|---|
| 9.6 | 1200 |
| 19.2 | 1200 |
| 45.45 | 1200 |
| 93.75 | 1200 |
| 187.5 | 1000 |
| 500 | 400 |
| 1500 | 200 |
| 3000 | 100 |
| 6000 | 100 |
| 12000 | 100 |
| *Calculated for PROFIBUS cable type A at 30 pF/m* ||

## 2.5 SPUR LINES WITH PROFIBUS DP

*(Also known as stubs or branches)*

In table 5 the maximum spur capacitance is set out to the baud rate.
With the use of PROFIBUS cable type A this will result in the stated length.

⚠️ *Spur-lines are not allowed when using higher baud rates (>1.5Mbit/s).*
*At baud rates lower than 1.5Mbit/s, spur-lines are allowed up to the maximum capacitance for the baud rate.*

| Transmission rate (kbit/s) | Total allowable spur capacitance (nF) | Total Spur cable length* ($\Sigma L_S$) (m) |
|---|---|---|
| 19.2 | 15 | 500 |
| 93.75 | 3.0 | 100 |
| 187.5 | 1.0 | 33 |
| 500 | 0.6 | 20 |
| 1500 | 0.2 | 6.7 |
| > 1500 | none | None |
| *Calculated for PROFIBUS cable type A at 30 pF/m* | | |

💡
- *The maximal Spur line length is 0.25m*
- *The total Spur line length of a segment represents the sum of all Spurs attached to that segment.*
- *The minimal Trunk line length should be longer then the sum of all Spur lines*
- *Spurs on DP segments should be avoided where possible.*
- *Each PROFIBUS device will have a short Spur line carrying the bus signals between the external bus connector and it's RS 485 driver chip (for calculations use about 5cm per node).*
- *Devices are tested for reflections as part of the certification process.*
- *Uncertified devices can cause reflections.*

Example:

> We are installing a M12 system with 19 nodes and a spur length of 25 cm.
> Additional 30 Sub-D instruments are installed.
> Transmission rate at 1500 kbits/s.
>
> Is this allowed?
> (19 nodes x 25cm + 19 nodes x 5cm) + 32 nodes x 5cm = 7.3m
> The maximum spur length at 1500 kbits/s is 6.7m so this is not allowed.

⚠️ *When spur lines are installed, additional termination at the end of a spur-line should not be used!*
*The rule that we must never exceed two terminations per segment, still applies even if using spurs.*

ℹ️ **References:**
http://PROFIBUScentre.com.au/docs/DP_Spur_Lines.pdf

## 2.6 NETWORK TERMINATION

A PROFIBUS DP network segment is based on an RS485 standard and requires two (2) and only two (2), termination resistor networks, at each of the furthest ends of the PROFIBUS DP cabling. These resistor networks are integrated in the IP20 connectors and can be enabled by a slide switch on the side of the connector. If connectors without these integrated resistors are used, a special termination plug containing this resistor must be placed.



$L_T$=Trunk Line Length
$L_S$=Total Spur Line Length

$L_{Sn} < 0.25m$
$L_S = L_{S1} + L_{S2} + .. + L_{Sn}$
$L_T > L_S$

■ Profibus node    ▮ Line termination    ■ T-junction
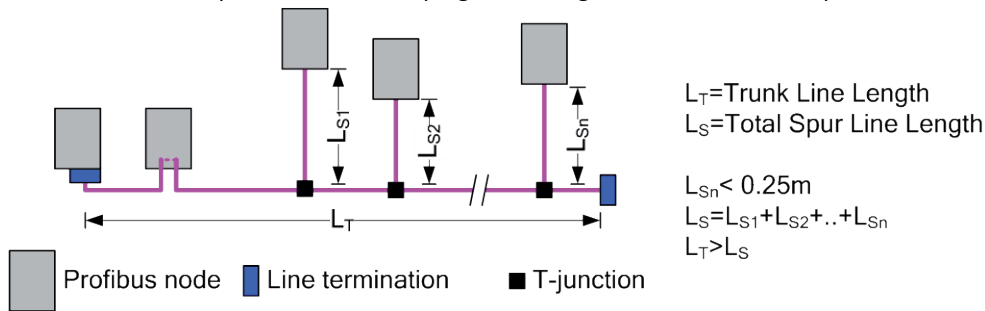
Example of a VP = 5V bus termination network.
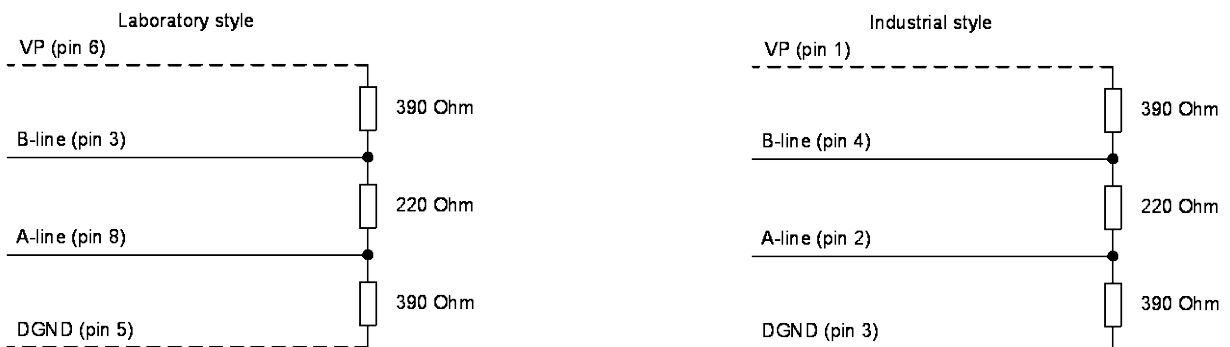


To allow correct bus termination, each station must connect the signals DGND and VP (5 V) to pins 5 and 6 of the connector, respectively. The 5 V supply for the terminating resistors (VP) should have a minimum current rating of 10 mA (the current load can increase to 12 mA if a NULL signal is sent through the bus). The current rating should be increased to app. 90 mA if you need to be able to supply other types of devices on the bus such as bus terminals and optical fiber cable drivers.

The electrical equipment in a plant is generally connected to a functional ground. It is used to lead away potential equalization and interference currents and to ensure compliance with EMC regulations and should thus be installed with regard to the requirements of high frequency currents.

Due to the capacitive load of the station and the resulting cable reflections, bus connectors should be provided with built-in series inductors as shown below.

Due to the built-in series inductors in the bus connectors, all bus connectors in the network should be attached to the field bus.



*References:*
*http://PROFIBUScentre.com.au/docs/DP_Spur_Lines.pdf*
*http://www.PROFIBUS.com*

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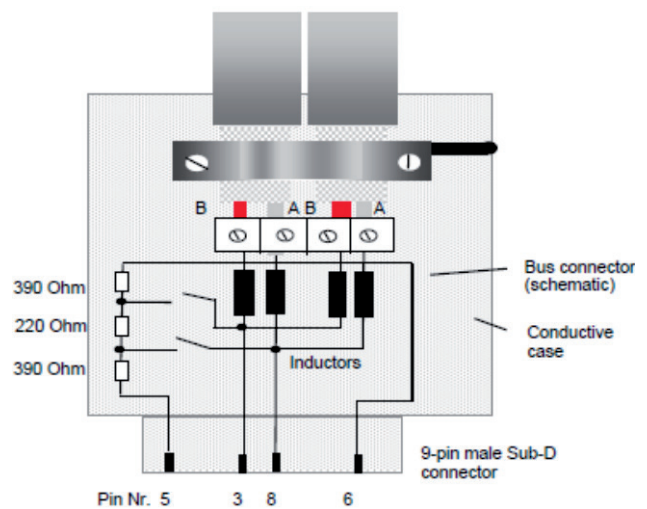
# 3 CONFIGURATION

## 3.1 GSD-FILE

Each type PROFIBUS DP instrument should have its own GSD-file with instrument specifications to tell the master configuration software which facilities/features the instruments offers to the PROFIBUS system. For Bronkhorst meter/controller the file is called: BHT_0586.GSD. This file is available on the Multibus documentation/software tool CD.

This GSD-file is a text-file containing:

Identification info:

- Model name: "Bronkhorst meter/controller"
- Vendor name: "Bronkhorst High-Tech B.V."
- Indent number: 0x0586
- Bitmap device: "0586_dev"
- Bitmap diag: "0586_dia"
- Bitmap SF: "0586_spf"

(Bitmap files are used in configuration software to indicate instrument status)

- Revision numbers

Hardware characteristics:
- SPC3-ASIC / VPC3+C dependable properties

Software characteristics:
- Supported features of PROFIBUS: Freeze, Sync, auto baud rate detection

Max. bus data lengths:
- Size of used data buffers

Parameter dialog boxes and parameter data for a-cyclic instrument variable settings.

Modules with cyclic input / output variables for the instrument.

After starting-up your master configuration software, this GSD-file should be load/import/copied.
This is needed only once (until an eventual next revision from the file).

## 3.2 CONFIGURATION SOFTWARE

In this manual we use as an example the software tool from Hilscher G.m.b.H.

The configuration tools offer viewing screens to monitor important GSD-settings.
Examples of these screens with their settings:
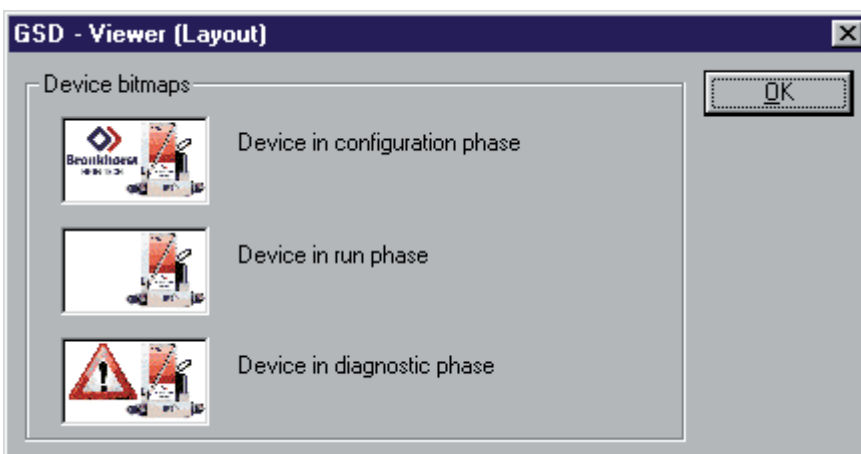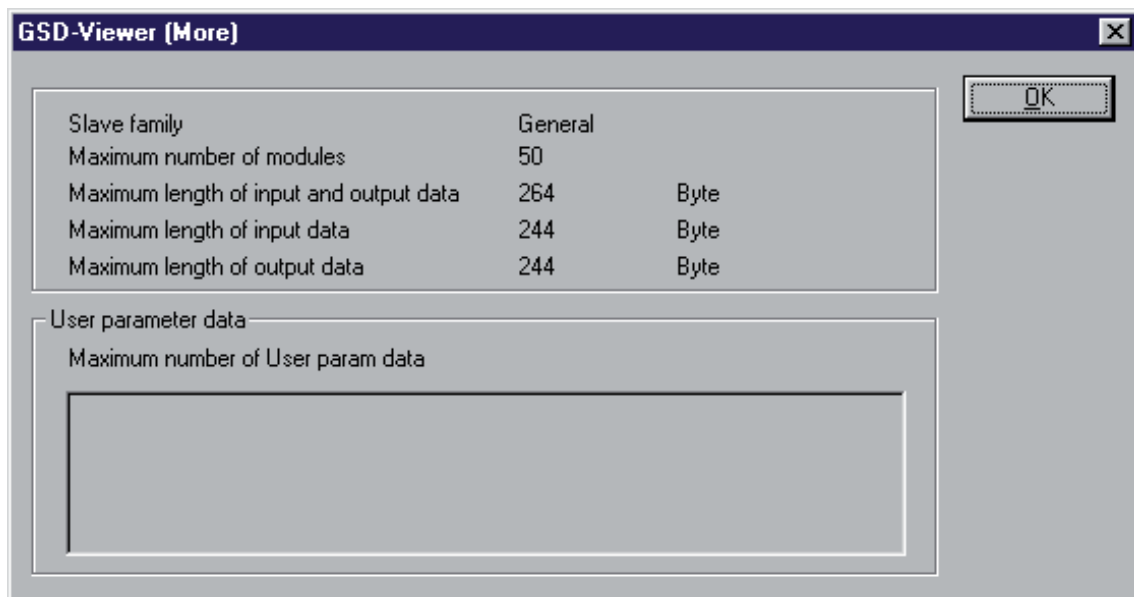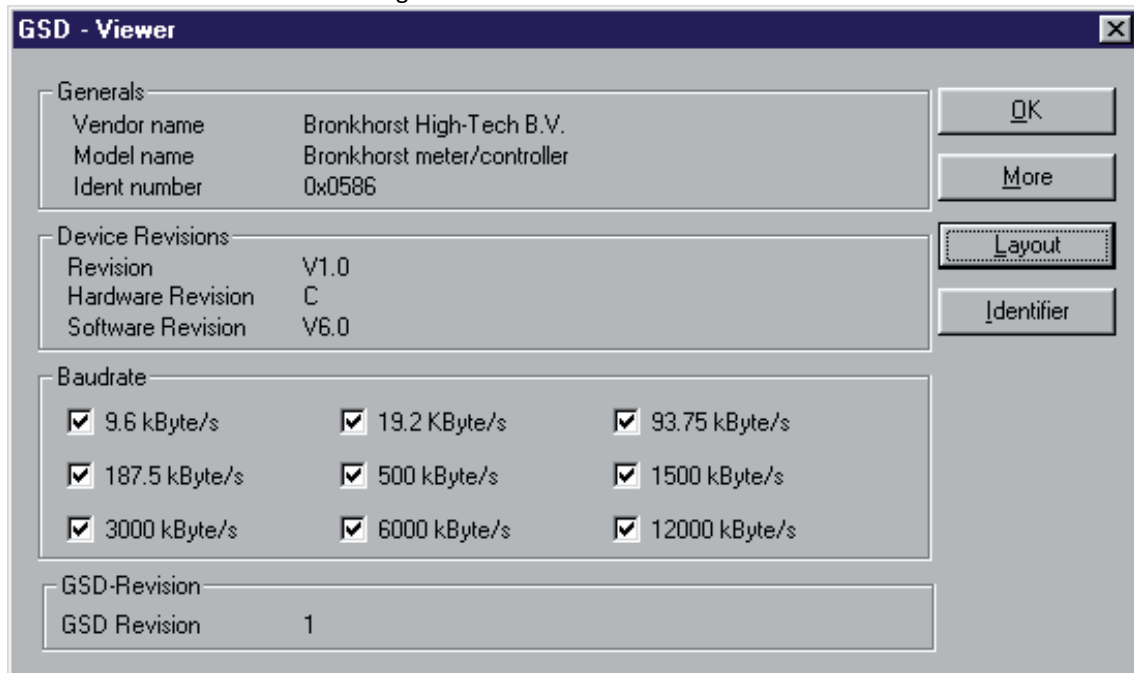
## 3.3 ADD SLAVE TO PROFIBUS DP

In your master configuration software select: [Insert][slave].
Select [Bronkhorst meter/controller] and evt. press [Add].

An example of this procedure can be found below:
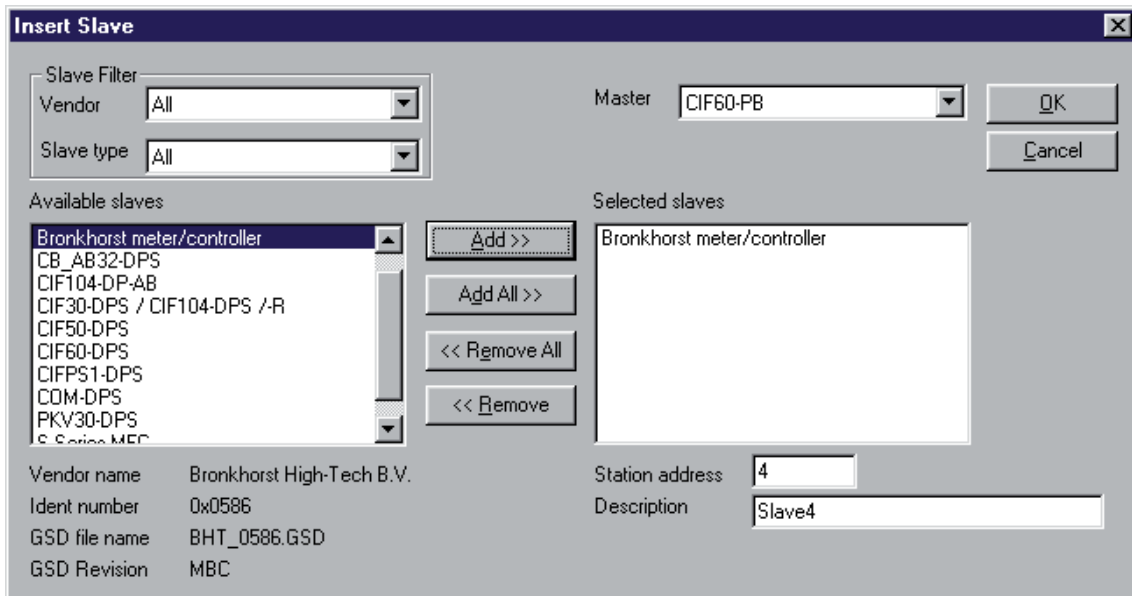


On the main screen the added Bronkhorst instrument can be found.
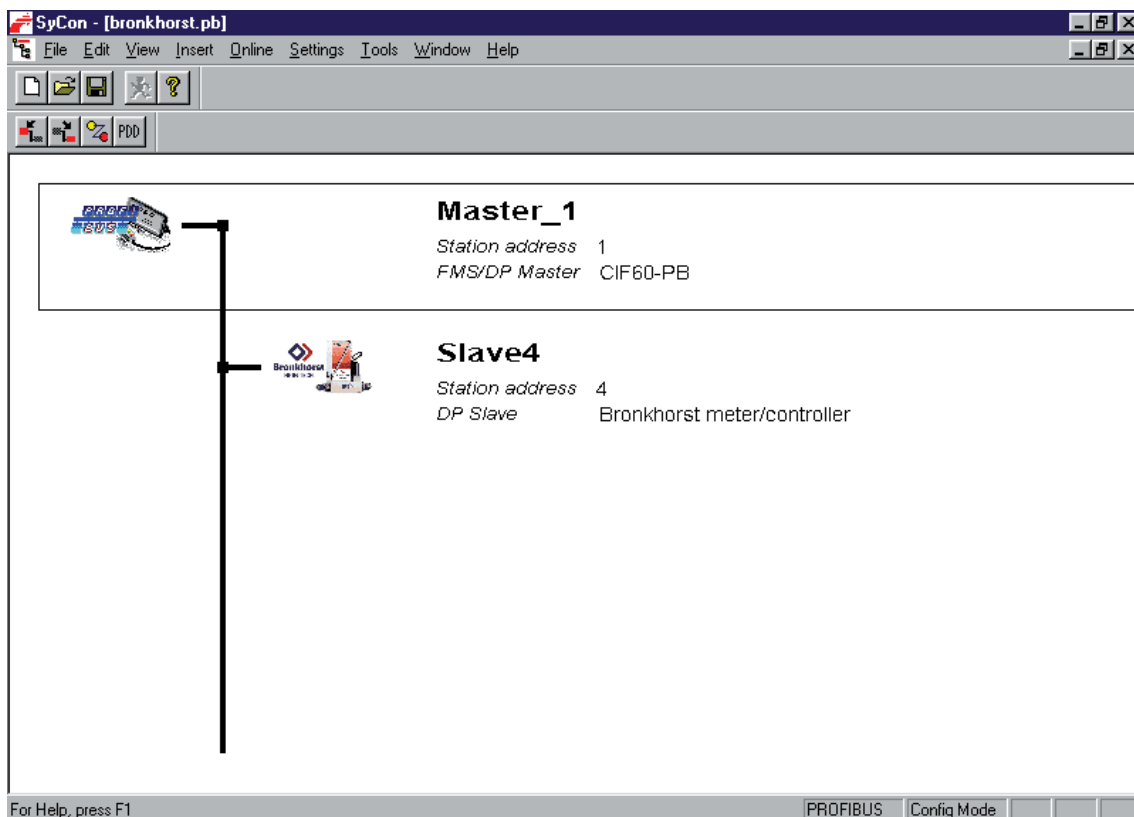
## 3.4 SLAVE CONFIGURATION SETTINGS

Bronkhorst PROFIBUS DP instruments offer many available modules/parameters for operation of the instruments. These modules/parameters can be selected by means of the master configuration tooling software (after loading the GSD-file: BHT_0586.GSD).

After installing the slave to the PROFIBUS DP system, point to actual slave and select: [slave configuration]. In the first table all available modules are listed. Select those instrument variables you want to use. The selected modules will be displayed in the second table.



*More information about* modules/parameters or an example of counter and alarm usage *can be found in the manual "917023 Operational instructions digital instruments"*
*This document can be found at:*
*http://www.bronkhorst.com/en/downloads/instruction_manuals/*

## 3.5 SLAVE PARAMETER SETTINGS

If you want to give your instrument specific values for certain variables at start-up you can do this by means of parameter settings. In your master configuration tool, point to the actual slave instrument and select [Parameter data] (also accessible sometimes from slave configuration screen). After pressing [common] all available parameter data will become visible.
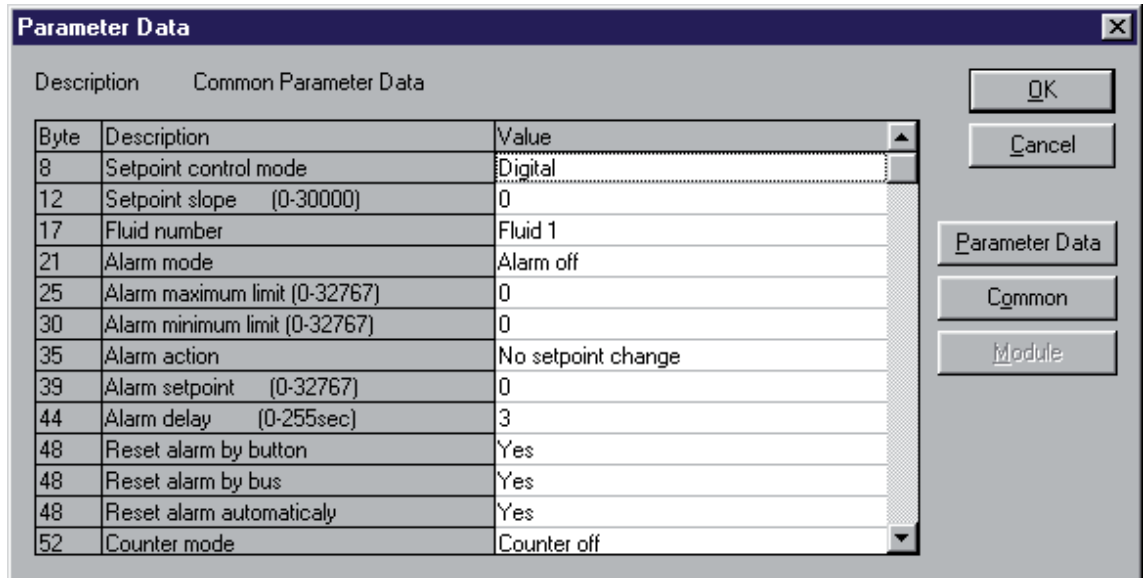
Selecting / double clicking on a value to be changed will either pop-up another window with available options or a window with an edit-box.
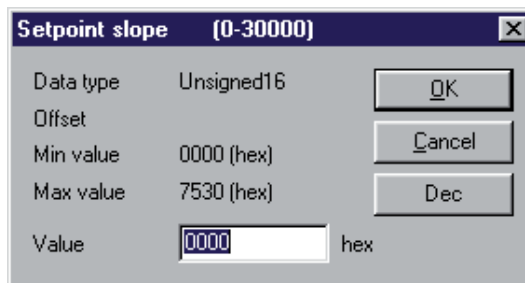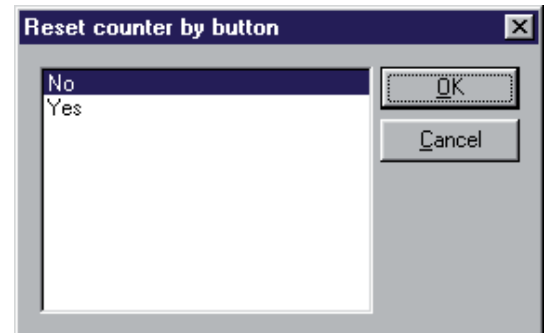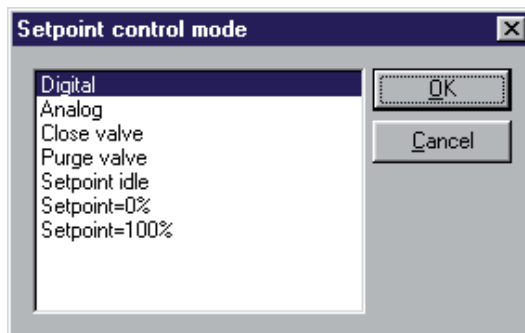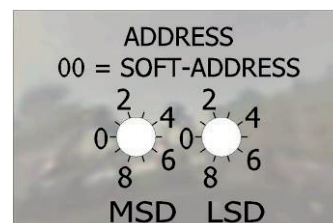
# 4   SLAVE ADDRESSING

## 4.1   GENERAL

When you have installed your Bronkhorst meter/controller PROFIBUS DP slave and made right settings for slave configuration and parameter data, you can give your instrument the slave address you want. Default instruments will be delivered with slave address 126. This address has been agreed by the PROFIBUS organization to be free for installing new devices to the bus. Changing the station address can be performed in five different ways:

## 4.2   VIA ROTARY SWITCHES ON THE SIDE OF INSTRUMENT (IF PRESENT)

On the side of the instrument are rotary switches placed and a label with the explanation of the switches. Make sure to use a suitable screwdriver for the switches.

The switches have the following function:



# ADDRESS (00 – 99)

With the ADDRESS switch, the slave station address can be set. The MSD is the high part of the decimal number and the LSD the low part. For instance address 25 means MSD on 2 and LSD on 5. The default switch position is 00. In this position the address is software programmable. The default software programmable address is 126.

During instrument initialization, the address switches are read. If the switches specify a valid PROFIBUS slave station address, i.e. a value from 1 to 99, this value is used.

 *Setting the address is by the rotary switches (non zero) overrules all other methods of addressing. This means that software addressing is no longer possible.*

## 4.3   VIA PROFIBUS:

Normal way to change addresses. Point to actual slave in your master configuration tool and select [online] [Set slave address]. Give correct old address and new address and press [Set address].
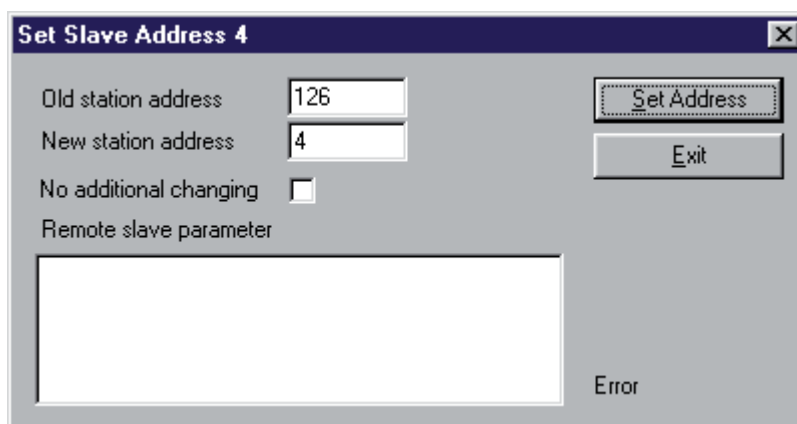
Re-address action can be checked using the option 'Live list'. This gives an overview of all masters and slaves connected to a PROFIBUS segment.
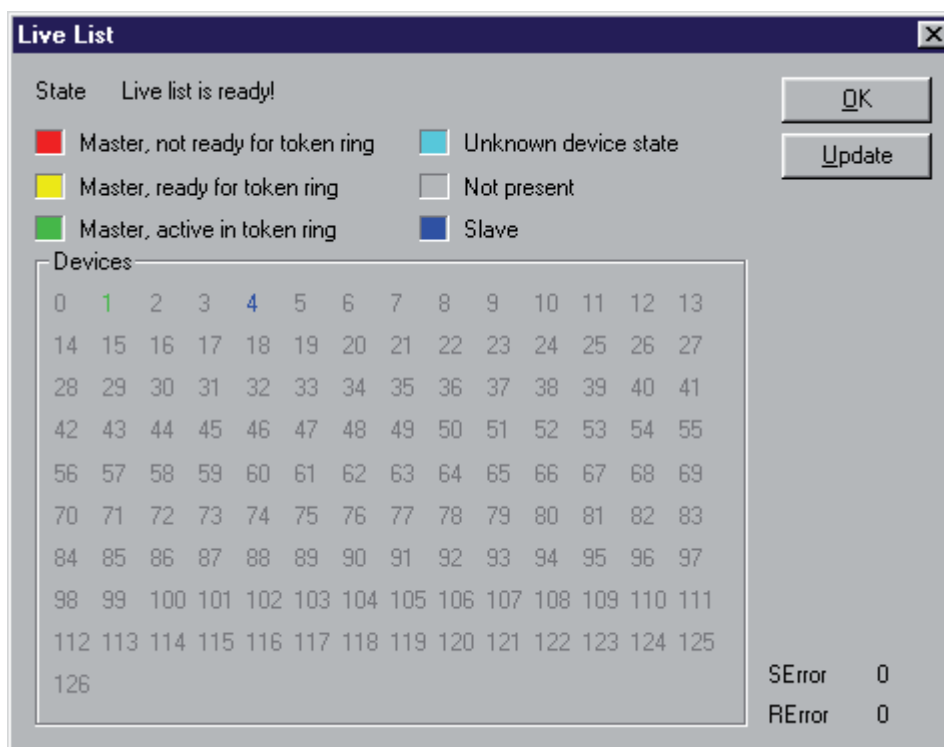


## 4.4 VIA RS232: FLOWFIX

'Off-line' via RS232-service communication port by means of a special tooling program, called FlowFix. FlowFix is a tool for multi-bus instruments which can be used for all field busses enabling the user to:

- Change slave station address
- Read and evt. change baud rate (depends on field bus system)
- Make a service log file to be send to Bronkhorst in case of trouble

*FlowFix software can be found at the Bronkhorst website*
*http://www.bronkhorst.com/en/products/accessories/software_tools/*

Connect your Bronkhorst meter/controller PROFIBUS DP slave instrument to a free COM-port using the cable mentioned below.

*A special RS232 cable (7.03.366) can be ordered separately. It consists of a T-part with 1 male and 1 female sub-D 9 connector on one instrument-side and a normal female sub-D 9 connector on the side of the computer. By means of this cable it is possible to offer RS232 communication and still be able to connect power-supply and analog interface through the (analog) sub-D 9 connector.*

Start-up FlowFix.exe and select COM-port. Then the configuration screen will appear.
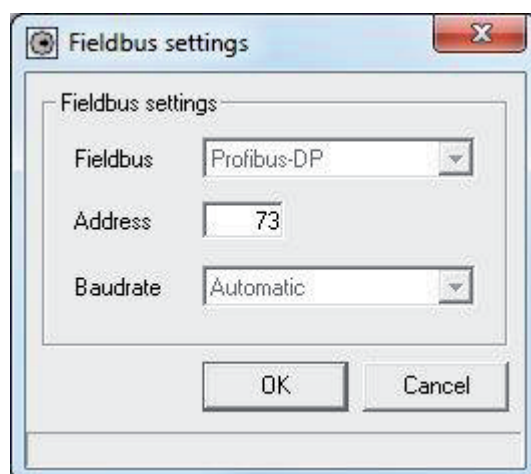


Enter slave station address and press [OK]. Changing baud rate will have no effect for PROFIBUS devices because the slave will adapt automatically to the baud rate of the master. Baud rate is only meant to be read. Re-address action can be checked using the option 'Live list'. This gives an overview of all masters and slaves connected to a PROFIBUS segment (see example in previous paragraph).

## 4.5 VIA RS232: OTHER PROGRAMS

It is also possible to read and or change slave station address or baud rate by means of any program via RS232 using the COM-port of your PC on 38400 Baud. This can be achieved using the FLOW-BUS protocol.

| Process | Parameter | Type | R/W | Init mode | Description |
|---------|-----------|------|-----|-----------|-------------|
| 125 | 9 | LONG | R/W | Soft init | Baud rate for field bus interface (PROFIBUS: Read only) |
| 125 | 10 | CHR | R/W | Soft init | Field bus station address/MAC ID |

**Table 6: Address setting and Baud rate reading by RS232 Pro-par**

> *More detailed information about the RS232 protocol (document 9.17.027) can be found at:*
> *http://www.bronkhorst.com/en/downloads/instruction_manuals/*

## 4.6 VIA MICRO-SWITCH AND LED'S ON TOP OF INSTRUMENT

With the micro-switch on top of the instrument it is possible to change and readout the settings for slave station address and baud rate. The Led's will indicate the tens of the address with green flashes and the units with red flashes. For baud rate-indication both Led's will flash (baud rate will adjust to master setting automatically and is therefore read-only).

> *See document 9.17.023 for a detailed description*
> *This document can be found at:*
> *http://www.bronkhorst.com/en/downloads/instruction_manuals/*

# 5   DOWNLOAD TO MASTER

When slave has been installed and all settings are done, everything has to be downloaded to the master. Point to actual master and select [online][download]. When this is ready, from that moment on there will be data-exchange between master and slave. The red Led on the instrument will stop blinking slowly and will go off when data-exchange is O.K.
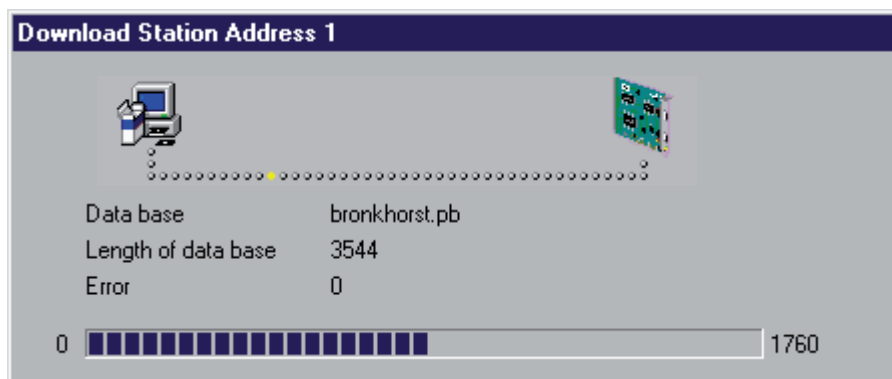


Data-exchange between master and slaves can be checked with Sycon.
Select [online][start debug mode]. When everything is O.K. the screen looks like this:
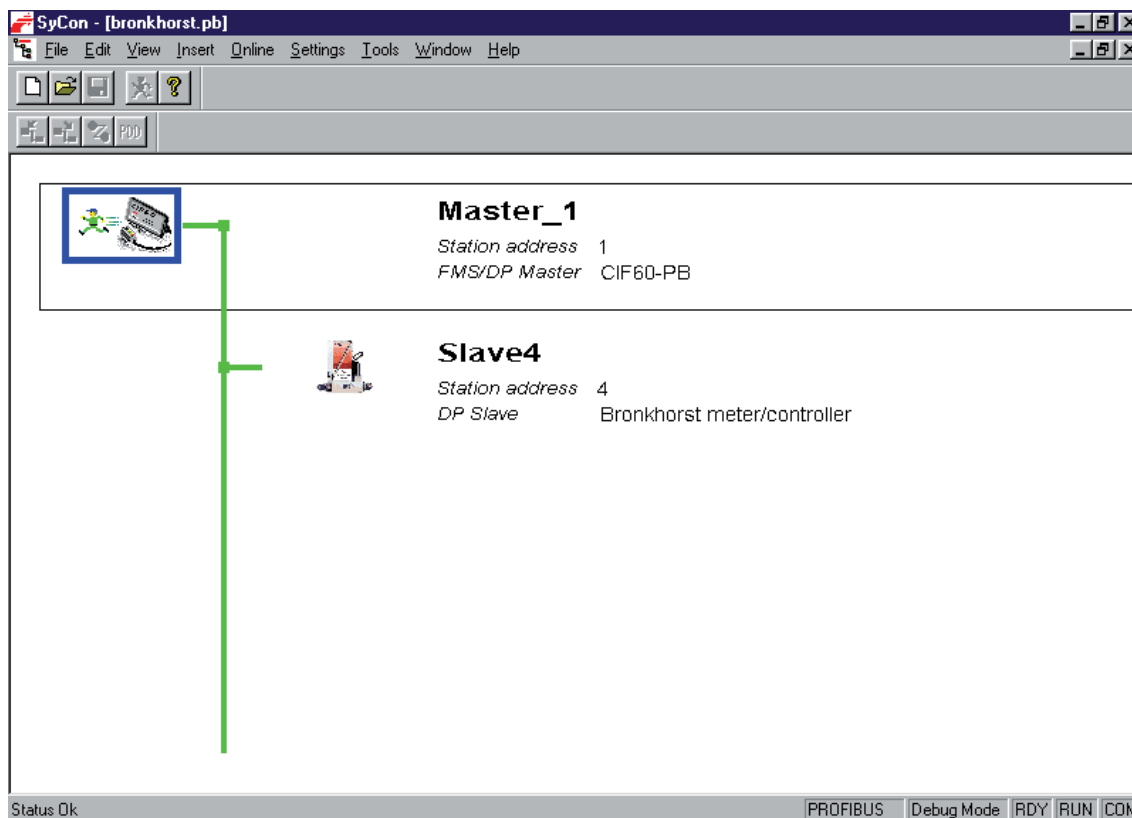



• It is possible that your master configuration software does not support this option.
• When there is something wrong, see 'device diagnostic' for details.

# 6 TEST COMMUNICATION

Some master configuration tool programs offer facilities to read input I/O and write output I/O data.
In this monitor only the first 32 bytes from your input and output data area will be displayed.



*If your program does not support such option, you have to use your master software or other available programs to check communication between master and slave(s).*

# 7  SAFE STATE

⚠️ *If PROFIBUS communication problems occur, so when instrument is not in data exchange mode, the instrument forces the valve (controllers only) into a safe state mode. This safe state depends on the type of valve. NC valves will be closed, NO valves will be opened fully. The green and red Led on top of the instrument indicates this mode by a short flash: 0.1 sec on, 2 sec off. As long as there is no data exchange between master and slave the instrument will stay in this mode. It will leave this mode automatically when data exchange starts. Via the RS232 communication interface it is possible to force the instrument out of the safe state by changing the control mode to a value other than 0. At for example control mode = 18 (RS232) or control mode = 1 (Analog input) the instrument will not get into safe state.*

# 8 TROUBLESHOOTING

## 8.1 LED INDICATION

| Led | Time | Indication |
|---|---|---|
| 🟢 **Green** | | |
| off | Continuously | Power-off or program not running |
| on | Continuously | Normal running/operation mode |
| Short flash | 0.1 sec on, 2 sec off | • Initialization mode<br>• Secured parameters can be changed<br>• Safe state active |
| normal flash | 0.2 sec on, 0.2 sec off | Special function mode<br>Instrument is busy performing any special function.<br>E.g. auto-zero or self-test |
| 🔴 **Red** | | |
| off | Continuously | No error |
| short flash | 0.1 sec on, 2 sec off | Bus communication warning. Instrument functions o.k.<br>No data-exchange between master and slave.<br>Automatic recovery. |
| normal flash | 0.2 sec on, 0.2 sec off | Warning message.<br>An error occurred of minor importance.<br>It would be wise to investigate the cause of this.<br>You are still able to work with your instrument. |
| long flash | 2 sec on, 0.1 sec off | A requested parameter is not available.<br>See troubleshoot in Profibus manual. |
| on | Continuously | Critical error message.<br>A serious error occurred in the instrument.<br>Instrument needs service before further using. |
| **Wink Mode** | 🟢 **Green** 🔴 **Red** 🟢 **Green** 🔴 **Red** turn by turn | |
| slow wink | 0.2 sec on, 0.2 sec off | Wink mode<br>By a command send via FLOW-BUS the instrument can "wink"<br>with Led's to indicate its position in a (large) system |
| normal wink | 1 sec on, 1 sec off | Alarm indication: minimum alarm, limit/maximum alarm; power-up alarm or limit exceeded or batch reached. |
| fast wink | 0.1 sec on, 0.1 sec off | Switch-released, selected action started |

## 8.2 TROUBLESHOOTING HINTS AND TIPS

| PROFIBUS problems | |
|---|---|
| No Communication | • Check power supply and cabling.<br>• Check bus termination. At the beginning and end of a bus segment, termination should be enabled in your connector or by means of any external special resistor network.<br>• Check all PROFIBUS settings at your master. Master and slave settings for use of memory modules must be the same. Select at least one module e.g. 'Measure, integer (read)' otherwise there will be no data-exchange.<br>• Check address of interface (slave)<br>• Try to reset the instrument and/or restart your master.<br>• Make sure all settings for your slave are downloaded to your master (otherwise it won't work).<br>• Contact PROFIBUS sales representative or service department. |
| Flow is not reacting to setpoint commands | • In case of PROFIBUS communication problems instrument will put it's valve into a safe state. This will close (NC) or open the valve fully (NO). When data exchange between master and slave has been re-established, instrument will respond to setpoint again. For overruling safe state via RS232 interface, see setpoint /control modes in chapter 2.5 from doc. nr. 9.17.023, (digital instrument description). |
| Red Led has long flash | • Make sure the requested parameters are available in the particular Bronkhorst Profibus-DP slave.<br>• Delete the Profibus slave configuration and add a new slave in your software, this will remove a corruption in the software configuration. |

# *9 SERVICE*

For current information on Bronkhorst and service addresses please visit our website:

🌐 **http://www.bronkhorst.com**

Do you have any questions about our products? Our Sales Department will gladly assist you selecting the right product for your application. Contact sales by e-mail:

✉ **sales@bronkhorst.com**

For after-sales questions, our Customer Service Department is available with help and guidance. To contact CSD by e-mail:

✉ **support@bronkhorst.com**

No matter the time zone, our experts within the Support Group are available to answer your request immediately or ensure appropriate further action. Our experts can be reached at:

☎ **+31 573 45 88 39**