Measurement · Weighing · Control

TEKFA

Fieldbus unit
GATE 3S

Profibus DP ?
00

GATE 3S

Operating and Installation Instructions

Contents

1. Introduction

2. Installation

3. Set-up

4. Operating instructions

5. Communication

6. Troubleshooting

Appendices

Operating and Installation Instructions

1. Introduction

Fieldbus unit GATE 3S is developed to enable integration into fieldbus systems of instruments and servo units from Nobel Weighing Systems. They connect to GATE 3S through a serial communication port.
For the fieldbus connection, internal adapters for a number of common fieldbus types are available. These adapters include dual port memories that can be written and read from the fieldbus, and also from the slave units connected to the serial communication port.
Data transmission is performed by groups of bytes at high speed, allowing connection of several slave units to a fieldbus through one GATE 3S.

GATE 3S has a front panel with four function keys and a display, used for supervision of status and output signals in the network. The display can also be used in bus diagnostics to study the actual contents of any part of the dual port memory.
Configuration of GATE 3S is easily performed, using the display and function keys to set a few operation parameters for the actual installation.

GATE 3S is quickly snap-mounted on a DIN-rail or screw-mounted on a flat surface.

Functions

Master in a network for measurement or control.

GATE 3S has one serial port for communication by the Modbus RTU protocol and RS-485/RS-422 on 2-wires or 4-wires. To this serial port, several units for weight or force measurement, or servo units for position control, can be connected to make up a network with GATE 3S as master.
GATE 3S constantly sends requests for measurement values and status messages to all units in the network, and collects the received reply data in the dual port memory where it can be read by the fieldbus.
Over the fieldbus, commands and setpoint values are entered in the dual port memory, and are distributed by the serial communication port of GATE 3S to the intended network unit.
High transmission speed gives very short transfer times in GATE 3S.

GATE 3S supports the following types of units from Nobel Weighing Systems obel:

- AST 3 from programme name A001A130, TAD 3, and WEI 3 for weight and force measurement.
  These instruments are here referred to as 'Generation 3'.

- E-2-WEI, programme name W107A204, for weight and force measurement.

- microPOS servo units, from programme name M003A300, for position control.

Slave unit in a fieldbus system.

Connection of GATE 3S to the fieldbus system is done through an internal adapter unit. Adapters, type AnyBus-S from HMS Industrial Networks (www.hms-networks.com) are available for several common fieldbus types. Communication parameters for the fieldbus system must be set from the fieldbus master or by switches at the adapter unit in GATE 3S. For connection, setting of possible adapter switches, and understanding of possible indicators, refer to an appendix according to the summary below.

Appendix 2: Profibus-DP (standard)
Appendix 3: Ethernet, Modbus-TCP
Appendix 4: INTERBUS
Appendix 5: DeviceNet
Appendix 6: Modbus Plus
Appendix 7: CANopen
Appendix 8: ControlNet

Supervision.

By normal operation GATE 3S is in 'Operation' mode, and the panel display is used to show operating status, OK (= 1), WRONG (= 0), or INACTIVATED (= *) for all connected units in the measurement or control network. By the function keys it is also possible to select display of output and status for just one of the connected units at a time.

Diagnostics.

The diagnostics function, described in section 4. Operating instructions, can be used for troubleshooting. It allows reading of input and output data from the internal GATE 3S memory for any network unit.

Parameter set-up.

GATE 3S operation and network characteristics are controlled by parameters.
All parameter values can be set with GATE 3S in Set-up mode, using the function keys and the panel display.
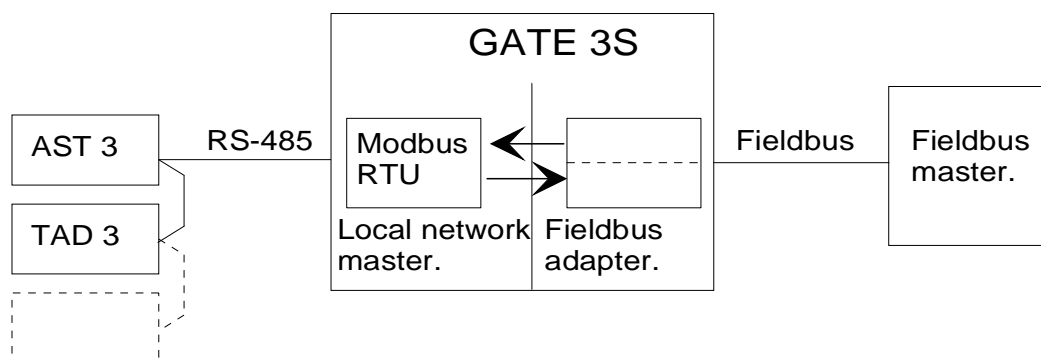Parameter setting is described in section 3. Set-up.

Figure 1. GATE 3S acts as intermediary for information between the fieldbus master and the units in the weighing or control network.

Technical data

Measurement and control port

Serial communication	RS-485 / RS-422	2-wires or 4-wires.
Baud rate	max. 460 kbaud.	
Protocol	Modbus RTU (multidrop).	

Units that can be connected:

Generation 3 units	AST 3B / P / IS, Progr. name A001A130 or later. TAD 3. WEI 3.
Fast mapping	6 byte in: control commands (zero, tare, etc.). 6 byte out: weight, weight status.
number of units	1 – 16. *)
total transfer time	4 ms / unit (at 115 kbaud).
General mapping	20 byte in: control (zero, tare, etc.), setpoints, write to any register. 20 byte out: weight, status info, read from any register.
number of units	1 – 16. *)
total transfer time	6 ms / unit (at 115 kbaud).
Weight transmitter units	E-2-WEI, Progr. name W107A204.
Mapping	20 byte in: control (zero, tare, etc.), setpoints. 20 byte out: weight, status info.
number of units	1 – 16. *)
total transfer time	60 ms / unit (at 9.6 kbaud).
Positioning servo units	microPOS, progr. name M003A300 or later.
Mapping	6 byte in: setpoint positions. 6 byte out: feedback positions, in position.
number of units	1 – 16. *)
total transfer time	10 ms / unit (at 115 kbaud).

*)   Max. number of units can be lower for some fieldbus types.
The number of units may also be limited by the master capacity.

Transfer in the fieldbus is not included in the above transfer time data. These times are normally shorter, but depend on the fieldbus configuration and speed.

Fieldbus interface

Anyone of the following fieldbus types can be used:
Profibus-DP   (standard).
Ethernet, Modbus-TCP.
INTERBUS.
DeviceNet.
Modbus Plus.
CANopen.
ControlNet.

Power supply

Supply voltage   24 VDC ±20 %.
Consumption   4 W.

Environmental

Temperature
   operation   -10 to +50 °C.
CE conformity   EMC, industrial for process control.

Mechanical data

Dimensions   75 x 100 x 110 mm.
                      At least 10 mm between adjacent units.
Mounting rail   DIN 46 277 or DIN EN 50022 (35 mm).
Dust / moisture   IP 20.

Front panel

Display   2 x 16 character LCD display.
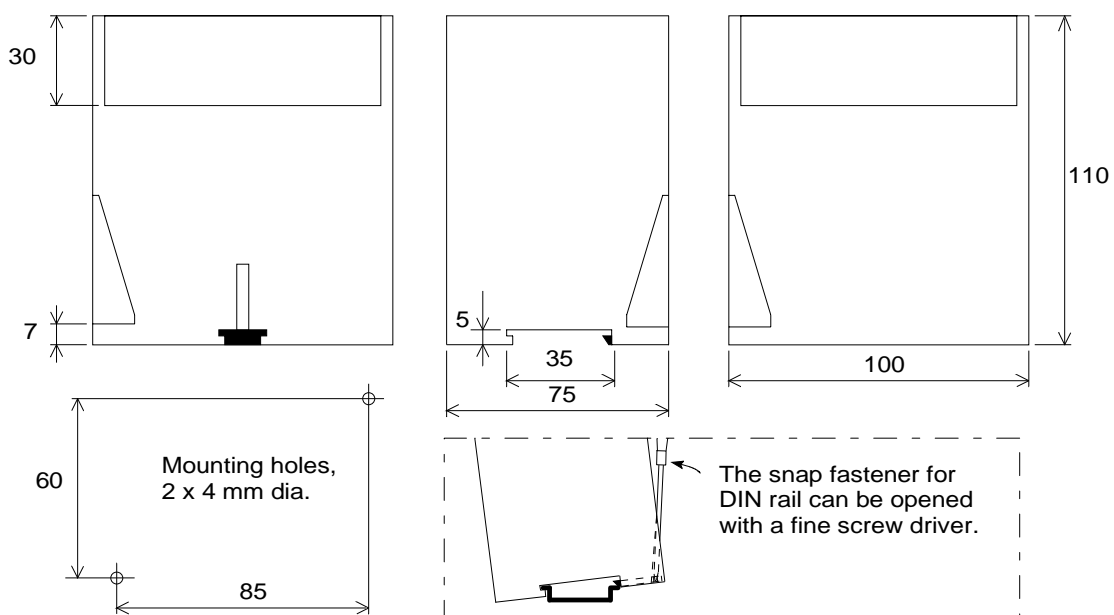Keys   4 keys for control and parameter set-up.

Figure 2. Mechanical dimensions for GATE 3S.

2. Installation

Mechanical installation

Figure 2.
Each fieldbus unit GATE 3S contains circuit boards for the local network and one adapter unit for the fieldbus, all built into a protective plastic housing.
GATE 3S can be snap-mounted on a 35 mm wide DIN rail or screw-mounted on a flat surface.
Leave a gap of at least 10 mm between adjacent units.

Electrical installation

GATE 3S is connected both to a fieldbus and to a local network with slave units like instruments for weighing / force measurement or servo control units.
All electrical connections to GATE 3S are made through plug-in terminals and/or connectors. Shielded cables are needed, except for the power supply, and the cables should be routed so that electromagnetical interference is avoided.
In GATE 3S the local network and the fieldbus are galvanically separated.

Cable connection for power supply and serial communication is shown below.
Fieldbus connection is described in an appendix for each fieldbus type.

Serial communication

Terminals 1 – 5.
A transmission line with RS-485 / RS-422, on 2-wires or 4-wires with common signal ground (COM), is used to connect instruments or servo units to the serial port at GATE 3S. Shielded cable with twisted pairs should be used. The cable shield should be connected to ground, preferably to a ground terminal on the mounting rail.

The transmission line must be terminated at both ends (see figure 3 on next page).
For GATE 3S, see 'Line termination' on next page.
For other units, refer to the 'line termination' section in the installation instructions.

Power supply

Terminals 6 - 8.
GATE 3S is powered with 24 VDC, see also Technical data. Connect terminal 8 to a ground terminal on the mounting rail. Rail mounted power supplies, intended for operation of 24 V units, are available from Nobel Weighing Systems.
Please observe power requirements for the units.

4-wires

1	TXD–
2	TXD+
3	RXD–
4	RXD+
5	COM.
SW2	
SW1	

2-wires

1	TXD–
2	TXD+
3	RXD–
4	RXD+
5	COM.
SW2	
SW1	

24 V DC

+	6	+
–	7	24V
	8	PE
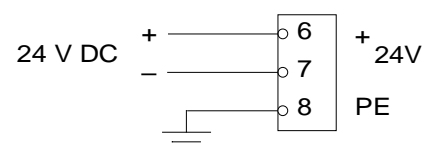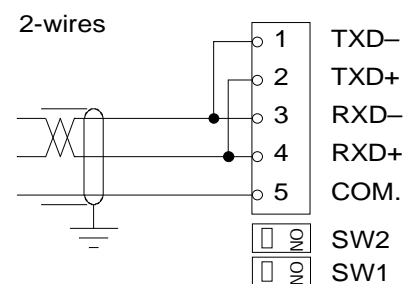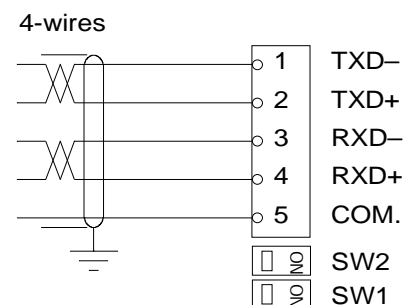
Network installation

Figure 3.
GATE 3S is an interface unit between a fieldbus system and a network with
instruments or servo units. In the network all slave units are connected in
parallel to a transmission line of 2-wires or 4-wires with common signal ground.
Shielded cable with twisted pairs should be used, and the cable shield should
be connected to a ground terminal at all slave units.

In case of 4-wires connection the transmit terminals (TXD+ and TXD-) in
the network must be connected to the receive terminals (RXD+ and RXD-)
at the serial communication port of GATE 3S.
In case of 2-wires connection both transmit and receive terminals must be
connected to the transmission line at the network units and at GATE 3S,
as indicated on previous page.

In all slave units in the network, 'baud rate' and 'data format' must be set equal to
the values in GATE 3S. For 'Generation 3' units, parameter 'Serial port mode'
should be set to 'Modbus auto' to give automatic setting of these parameters.
For other units, 'baud rate' and 'data format' must be set manually.

All slave units in the network must have unique addresses. In GATE 3S the slave
addresses are used in parameters 'Address, slave 1', 'Address, slave 2' etc. If any of
these parameters is set to '0', the corresponding slave is taken out of operation.

Arrange for line termination only at the units at the ends of the transmission line,
following the installation instructions for these units.

Line termination

GATE 3S has two switches, SW1 and SW2 close to the serial port terminals, that
control the line termination at the fieldbus unit.
If GATE 3S is not at the end of the line: SW1 = (OFF), SW2 = (OFF).
If GATE 3S is at the end of a 2-wire line: SW1 = (OFF), SW2 = ON.
If GATE 3S is at the end of a 4-wire line: SW1 = ON, SW2 = ON.
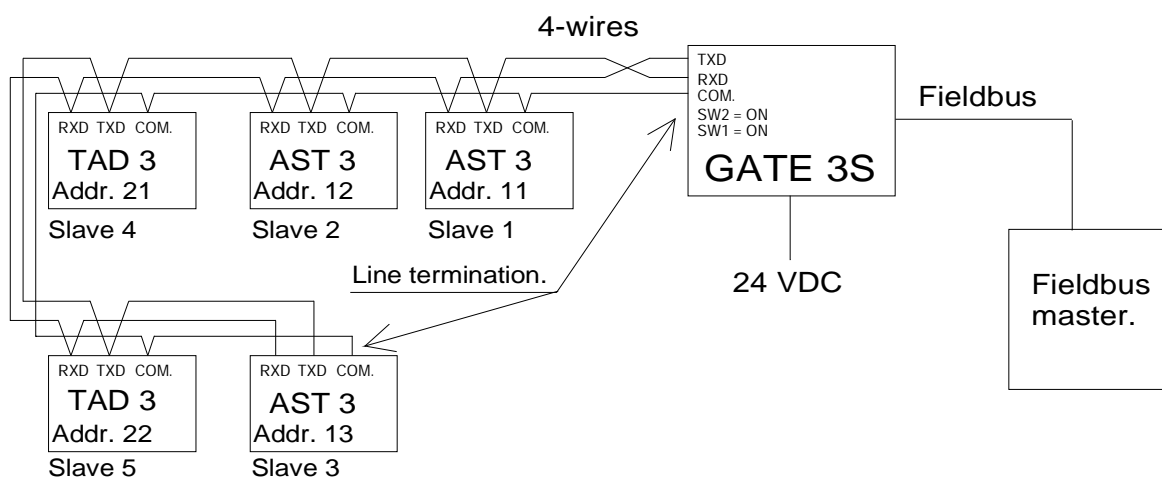
*Figure 3. Example of a network with five slave units from 'Generation 3', a group of AST 3
units, and a group of TAD 3 units, all connected to GATE 3S by 4-wires transmission.
Note that RXD at the slave units is connected to TXD at GATE 3S, and vice versa.*

3. Set-up

General

All operating functions in GATE 3S are controlled by parameters. The parameter values are permanently saved in the memory, so the settings will not be lost if the power is turned off.

At delivery the parameters are factory set to default values, giving certain standard functions at first start-up. These default values are indicated in the parameter descriptions on page 3-7 to 3-12 and in the set-up list, appendix 1.

At installation, some parameter values must probably be edited to suit the conditions of the actual installation.

Panel set-up

Normally the panel display is used to supervise the operating status of all slave units in the local network. But the display and function keys can also be used to view and edit the parameters that control the GATE 3S operation.

Before front panel editing can be performed, GATE 3S must be switched over from the normal 'Operating' mode to 'Set-up' mode.
This is accomplished by pressing the key ↑ for at least 2 seconds.

Figure 4. Before parameter editing can start, GATE 3S must be switched over to Set-up mode, indicated by this menu.

Operating mode

Start up/Reset

Operating status

```
Profibus-DP
11
```

↑ for 2 seconds

```
Enter password:
(Wrong)(Correct)
```
Shown only if 'Security lock' is On.

↵   ↵

Set-up mode,

Set-up

```
     Menu
GATE 3S set-up
```
+

−
```
     Menu
Exit set-up
```

↵

```
Save changes?
No    Esc. Yes
```
Shown only if any changes have been done.

−   ↑   ↵

```
Language
English
```
↑

−   +

```
Display contrast
4
```
↑

−   +

```
Security lock
Off
```
↑

−   +

Shown only if 'Security lock' is set to 'On'.

```
Password
****
```
↑

−   +

See previous column.

```
GATE 3S mode
Generation 3 6b
```
↑

```
IP-address (1)
192.168
```
↑

−   +   −   +

Shown only if 'Gate 3S mode' is set to 'Generation 3 20b' or 'Generation 3 6b'.

```
Weight format
Integer
```
↑

```
IP-address (2)
000.001
```
↑

−   +   −   +

Not shown if 'Gate 3S mode' is set to 'Slave'.

```
Number of slaves
2
```
↑

```
Subnet mask (1)
255.255
```
↑

−   +   −   +

Not shown if 'Gate 3S mode' is set to 'Slave'.

```
Address,slave 1
1
```
↑

```
Subnet mask (2)
255.000
```
↑

−   +   −   +

Not shown if 'Gate 3S mode' is set to 'Slave'.

```
Address,slave 2
7
```
↑

```
Gateway addr.(1)
000.000
```
↑

−   +   −   +

Not shown if 'Gate 3S mode' is set to 'Slave'.

```
Baudrate
115200
```
↑

```
Gateway addr.(2)
000.000
```
↑

−   +   −   +

Not shown if 'Gate 3S mode' is set to 'Slave'.

```
Data format
8-none-1
```
↑

```
GATE 3S address
1
```
↑

Shown only if 'Gate 3S mode' is set to 'Slave'.
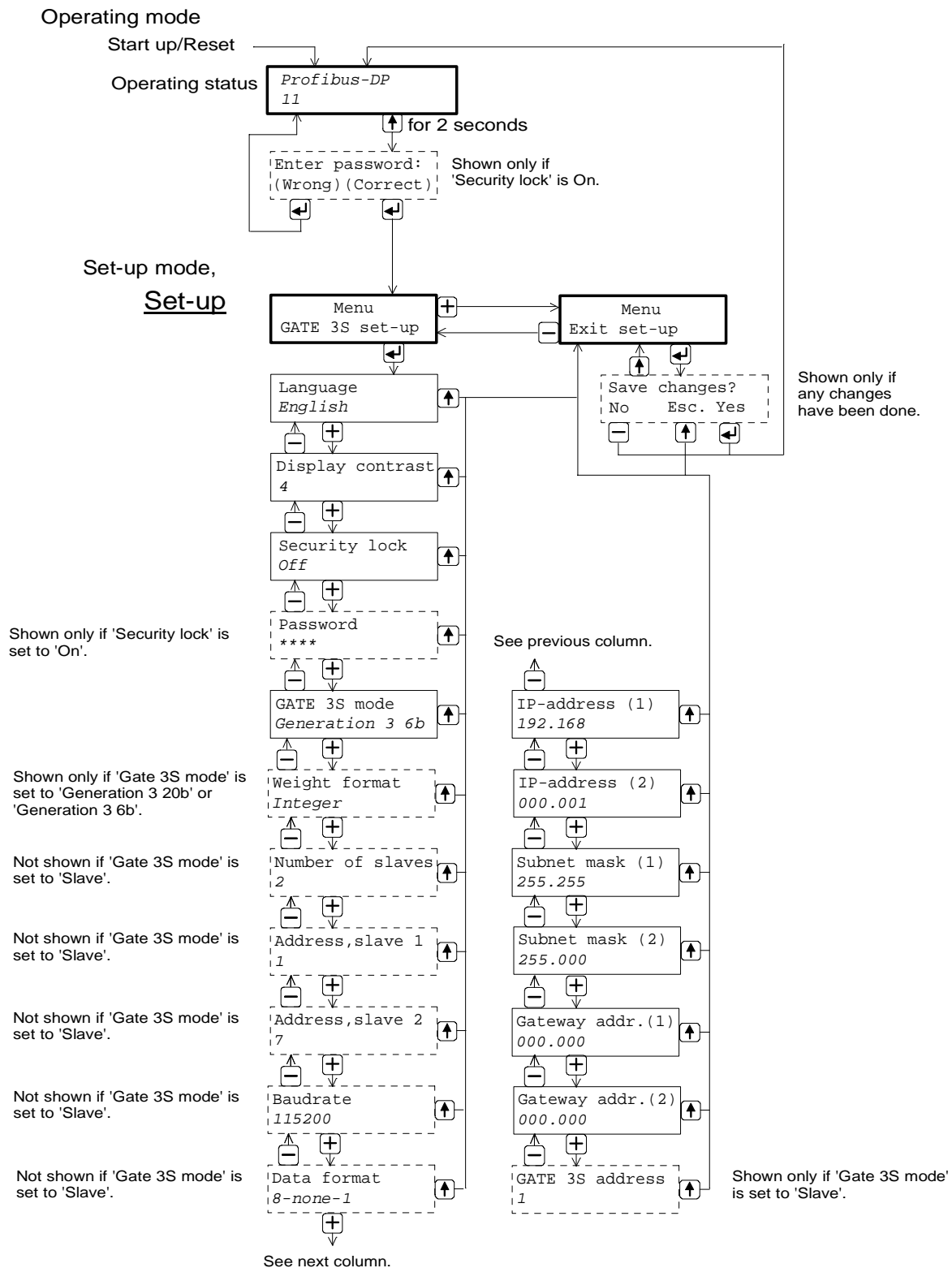
+

See next column.

*Figure 5. Parameter values for GATE 3S can be viewed,
and edited by the front panel keys.*

Start set-up

Figure 5.

Switching GATE 3S from Operating mode to Set-up mode is performed by pressing the key ↑ for 2 seconds.

In Set-up mode the display shows: 'Menu GATE 3S set-up', possibly after entry of correct code in the 'Enter password' menu.

As Set-up mode starts, the panel keys get the following functions:

– / +	Change main menu.
↑	No function.
↵	Go to parameter viewing/sub menu.

Only two main menus are available: 'GATE 3S set-up' and 'Exit set-up'.

To edit a parameter value, parameter viewing must be used to find the parameter.

Parameter viewing

Figure 5.

Press ↵ as 'Menu GATE 3S set-up' is displayed.

The name and actual value of the first parameter, 'Language', will be displayed. Now it is possible to step through the parameter menus, using the panel keys
+ and – . Note that the display of some parameters depends on the setting of other parameters.

Panel key functions during parameter viewing:

–	View previous parameter.
+	View next parameter.
↑	Cancel the parameter viewing, go to 'Menu Exit set-up'
↵	Start editing the value of the displayed parameter.

Parameter editing

As a certain parameter has been found by the parameter viewing, described on previous page, editing of the parameter value can be started by pressing key ↵ . A cursor appears at the first character of the parameter value, indicating that editing can be performed.

The parameter can have a 'numerical value' or a 'choice value':
A 'numerical value' is made up of digits that can be edited individually.
A 'choice value' is one value from a list of alternative values for the parameter.

Panel key functions during parameter editing:

━	Decrease the digit at the cursor, or Go to the previous alternative.
✚	Increase the digit at the cursor, or Go to next alternative.
↑	Cancel parameter editing. (The parameter will be shown with its previous value, without cursor).
↵	Brief: Accept the digit value at the cursor and move the cursor one step to the right. 2 seconds: Accept the displayed parameter value. (The parameter will be shown with its new value, without cursor).

After the parameter value is accepted, GATE 3S returns to 'parameter viewing' and another parameter can be selected for editing.

Exit 'Set-up'

Figure 5.
As the parameter editing is finished, the Set-up mode must be cancelled and the new parameter values saved in the permanent memory. This is performed in 'Menu 'Exit set-up' and its sub-menu 'Save changes?'.

Go to 'Menu Exit set-up', by pressing ↑ as any parameter is displayed without a cursor, or as 'Menu GATE 3S set-up' is displayed.

Exit the Set-up mode by pressing ↵ as 'Menu Exit set-up' is displayed.
    If no parameter values have been edited, this finishes Set-up mode and
      GATE 3S switches over to Operating mode.
    If any parameter value has been edited, sub menu 'Save changes? No Esc. Yes'
      is displayed and answers can be given by the panel keys:

↑	= Esc. Set-up mode is not finished. All edited parameters keep their edited values.

In this case GATE 3S stays in Set-up mode.

━	= No. All parameters resume the values they had before the parameter editing was started.
↵	= Yes. All edited parameter values are saved in the permanent memory.

In these two cases GATE 3S switches over to Operating mode.

Editing procedure

Editing must start by switching GATE 3S to Set-up mode:

Press ↑ for 2 seconds.
> 'Menu GATE 3S set-up' is displayed.

Editing can always be cancelled by pressing ↑ . See 'Press ↑ ' below.

Press ↵ .
> The first parameter with its actual value is displayed.

Press + (or −).
> Next parameter (or previous parameter) is displayed.

Press ↵ .
> A cursor appears at the displayed parameter value, indicating that
> the parameter value can be edited.
> The value can be made up by digits that can be edited individually
> or it can be a value from a list of alternatives.

Press (short) ↵ .
> If the value is made up by digits, the cursor moves one step to the right.
> Move the cursor to a digit to edit.
>
> If the value is an alternative from a list, nothing happens.

Press + (or −).
> The digit at the cursor increases (or decreases),
> or
> Next (or previous) alternative from the list is displayed.

As editing is done and a correct value for the parameter is displayed, with cursor:

Press ↵ for 2 seconds.
> This makes the new parameter value active and the parameter
> will be displayed with its new value, without cursor.

Continue viewing , and possibly editing, other parameter values.

As all editing is done, GATE 3S must leave the Set-up mode:

Press ↑ .
> 'Menu Exit set-up' is displayed.
> (Pressing − takes you back to 'Menu GATE 3S set-up')

Press ↵ .
> If no editing has been done, GATE 3S is switched over to Operating mode
>
> If any editing has been done, menu 'Save changes? No Esc. Yes' is displayed.
> (Press ↑ if you don't want to exit from Set-up mode now.)

Save the changes:
> Press ↵ . The new parameter values are saved and GATE 3S is switched
> over to Operating mode, displaying Operating status.

Cancel the changes:
> Press − . All edited values are cancelled and the parameters resume
> the values they had before the editing was started. GATE 3S is switched
> over to Operating mode.

Parameters

GATE 3S uses a number of set-up parameters to define the function of the fieldbus unit and the characteristics of the measurement and control network.
At delivery these parameters have default values, but these values can be edited by the front panel keys with GATE 3S in 'Set-up mode'.

All set-up parameters in GATE 3S are described on the following pages, but for some parameters displaying is conditional and depends on the setting of other parameters.

First the parameter name is given with **bold types.**

Then the parameter value range, or the list of value alternatives, is given.

Finally the parameter default value is given, within < >.

To the right there is a short explanation of the parameter and, in *italics*, the result for the different value alternatives.
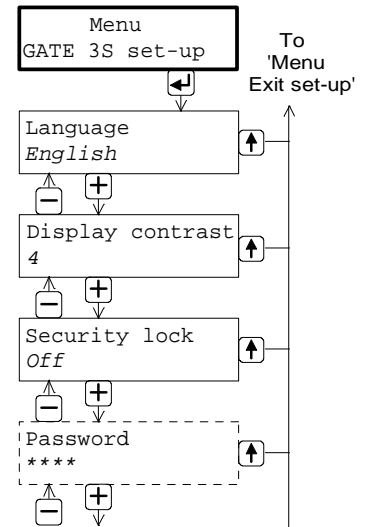
Range/Alternatives <default value>	Explanation and result of alternatives.

'Menu   GATE 3S set-up

Language

Svenska
English
Deutsch
Français
<English>

Defines the language to be used on the display.

```
      Menu
GATE 3S set-up
```
To
'Menu
Exit set-up'

```
Language
English
```

```
Display contrast
4
```

```
Security lock
Off
```

```
Password
****
```

Display contrast

0
1
2
3
4
5
6
7
<4>

Defines the contrast to be used on the display.

Low value *giving paler text but better readability on slanted panel.*

High value *giving sharper text but poorer readability on slanted panel.*

Security lock

Off
On
<Off>

Defines the security lock function and also turns display of 'Password' off and on.

Off: *Security lock not active, 'Password' is not displayed.*

On: *Security lock active, preventing unauthorised entry in 'Set-up mode'. The valid entry code can be changed in parameter 'Password'.*

Password

Range:
0001 – 9999
<1937>

Defines the password for entry in the Set-up mode. The password code is represented by four asterisks until editing is started.

This parameter is shown only if 'Security lock' is set to 'On'.

Range/Alternatives <default value>	Explanation and result of alternatives.

GATE 3S mode

Generation 3 20b Generation 3 6b E2WEI microPOS DigAmp 20b Safe DigAmp 20b Fast DigAmp 6b Slave <Generation 3 6b>	Defines instrument type and mapping in the network where GATE 3S is the master, or that GATE 3S acts as a slave, for example by programme loading. ***Generation 3 20b:*** *A network of 'Generation 3' instruments (AST 3, TAD 3, WEI 3) with 20 byte memory mapping.* ***Generation 3 6b:*** *A network of ' Generation 3' instruments (AST 3,TAD 3, WEI 3) with 6 byte memory mapping.* ***E2WEI:*** *A network of E-2-WEI instruments with 20 byte memory mapping.* ***microPOS:*** *A network of microPOS servo units with 6 byte memory mapping.* ***DigAmp 20b Safe:*** *Not used.* ***DigAmp 20b Fast:*** *Not used.* ***DigAmp 6b:*** *Not used.* ***Slave:*** *GATE 3S is used as slave unit.*

Weight format

Float Integer <Integer>	Defines the format used for transmission of weight values on the fieldbus. ***Float:*** *The weight values are exchanged as 32 bit floating point values in accordance with IEEE standard.* ***Integer:*** *The weight values are exchanged as integer values on the fieldbus. Use this format if floating point values are not supported in Your master system.* This parameter is shown only if parameter 'GATE 3S mode' is set to 'Generation 3 20b' or 'Generation 3 6b'.

Number of slaves

Range: 1 to 16 <1>	Defines the number of slave units in the network. Suitable memory areas (6 bytes or 20 bytes) for the slave units are assigned automatically in GATE 3S. The maximum number of slave units can be lower for some fieldbus types. This parameter is not shown if 'GATE 3S mode' is set to 'Slave'.

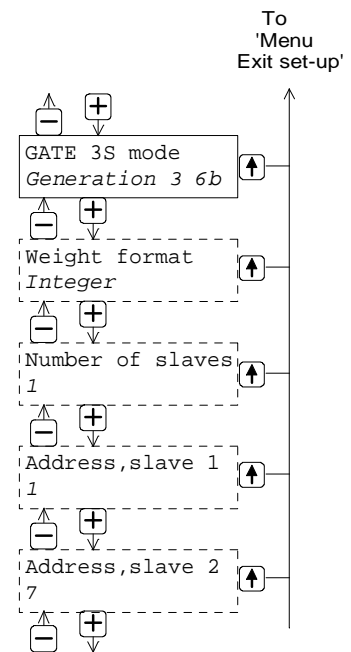| Range/Alternatives <default value>	Explanation and result of alternatives.
Address, slave 1	
Range: 0 to 247 <1>	Defines the address for slave unit number 1. If this parameter is set to '0', slave unit 1 is taken out of operation. This parameter is not shown if 'GATE 3S mode' is set to Slave'.
Address, slave 2 **Address, slave 3** **Address, slave 4** **Address, slave 5** **Address, slave 6** **Address, slave 7** **Address, slave 8** **Address, slave 9** **Address, slave 10** **Address, slave 11** **Address, slave 12** **Address, slave 13** **Address, slave 14** **Address, slave 15** **Address, slave 16**	
Range: 0 to 247 <0>	Defines the address for the indicated slave unit. Each slave unit must have a unique address, but the addresses must not be consecutive. If any of these parameters is set to '0', the corresponding slave unit is taken out of operation. These parameters are shown only for the number of slave units defined by parameter 'Number of slaves'. These parameters are not shown if 'GATE 3S mode' is set to Slave'.

To 'Menu Exit set-up'

```
GATE 3S mode
Generation 3 6b
```

```
Weight format
Integer
```

```
Number of slaves
1
```

```
Address,slave 1
1
```

```
Address,slave 2
7
```

Range/Alternatives <default value>	Explanation and result of alternatives.

Baudrate

300	Defines the baud rate for the serial communication.
600	The value must be equal for GATE 3S and all slave units
1200	in the network.
2400	This parameter is not shown if 'GATE 3S mode' is set
4800	to 'Slave', because then the baud rate is automatically
9600	set to the baud rate of the master unit.
19200	
38400	
57600	
115200	
230400	
460800	
<115200>	

Data format

8-none-1	Defines the data format for the network.
8-none-2	The value must be equal for GATE 3S and all slave units
8-even-1	in the network.
8-odd-1	This parameter is not shown if parameter 'GATE 3S mode'
<8-none-1>	is set to 'Slave', because then the data format is automatically set to '8-none-1'.

IP-address (1)

Range:	Defines the first part of the IP-address (192.168.xxx.xxx).
000.000 to	This parameter is only used if the installed fieldbus adapter
255.255	is of Ethernet type.
<192.168>	

IP-address (2)

Range:	Defines the second part of the IP-address (xxx.xxx.000.001).
000.001 to	This parameter is only used if the installed fieldbus adapter
255.255	is of Ethernet type.
<000.001>	

Range/Alternatives <default value>	Explanation and result of alternatives.

Subnet mask (1)

Range: 000.000 to 255.255 <255.255>

Defines the first part of the Subnet mask (255.255.xxx.xxx).

This parameter is only used if the installed fieldbus adapter is of Ethernet type.

Subnet mask (2)

Range: 000.000 to 255.255 <255.000>

Defines the second part of the Subnet mask (xxx.xxx.255.000).

This parameter is only used if the installed fieldbus adapter is of Ethernet type.

Gateway addr.(1)

Range: 000.000 to 255.255 <000.000>

Defines the first part of the Gateway address (000.000.xxx.xxx).

This parameter is only used if the installed fieldbus adapter is of Ethernet type.

Gateway addr.(2)

Range: 000.000 to 255.255 <000.000>

Defines the second part of the Gateway address (xxx.xxx.000.000)

This parameter is only used if the installed fieldbus adapter is of Ethernet type.

To 'Menu Exit set-up'

```
Baudrate
115200

Data format
8-none-1

IP-address (1)
192.168

IP-address (2)
000.001

Subnet mask (1)
255.255

Subnet mask (2)
255.000

Gateway addr.(1)
000.000

Gateway addr.(2)
000.000

GATE 3S address
1
```

GATE 3S address

Range: 1 to 247 <1>

Defines the unit address for GATE 3S as slave unit.

This parameter is displayed only if parameter 'GATE 3S mode' is set to 'Slave'.
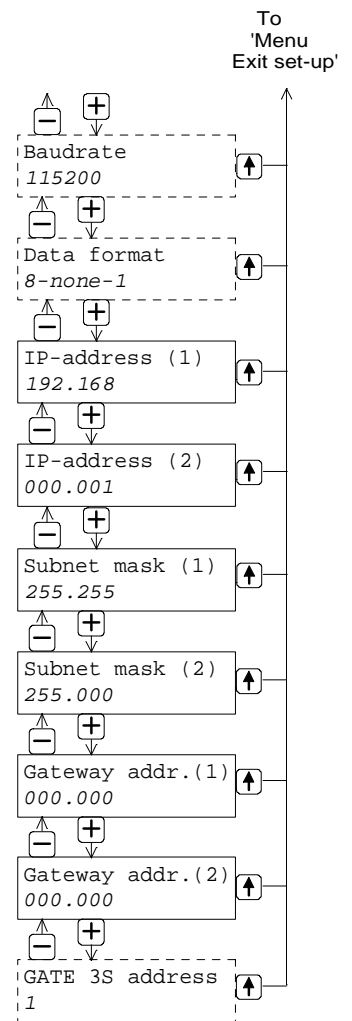
Range/Alternatives <default value>	Explanation and result of alternatives.

'Menu   Exit set-up'

Save changes?

Range:
No,
Esc.
Yes

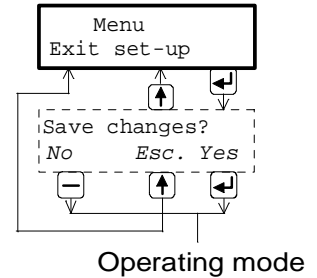To finish the parameter set-up, press ↵ as 'Menu Exit set-up' is displayed. If any parameter value has been changed, GATE 3S will switch over to the sub menu 'Save changes? No   Esc. Yes'.

*(Press **Esc.** If you do not wish to exit from the 'Set-up' mode now.)*

***No:** All edited values are cancelled and the parameters resume the values that were saved before 'Set-up' mode was started.*

***Yes:** All new parameter values are stored permanently in GATE 3S.*

No and ***Yes*** finishes the 'Set-up' mode and GATE 3S automatically switches over to 'Operating' mode, displaying Operating status.

```
  ┌─────────────────┐
  │      Menu       │
  │   Exit set-up   │
  └─────────────────┘
      ↑     ▲     ↵
  ┌ ─ ─ ─ ─ ─ ─ ─ ─ ┐
  │Save changes?    │
  │ No      Esc. Yes│
  └ ─ ─ ─ ─ ─ ─ ─ ─ ┘
     ─      ▲      ↵
      │            │
      ▼            │
```

Operating mode

4. Operating instructions

General

GATE 3S offers the possibility to connect a number of measurement instruments and servo units from Nobel Weighing Systems to several types of fieldbusses. The Modbus protocol and RS-485 / RS-422 on 2-wires or 4-wires is used for communication in the measurement and control network.

Connection to the fieldbus is provided through an internal adapter with assigned memory areas for output and input messages.
Adapters for several common fieldbus types are available. See appendices 2 to 8.

During normal operation, the display and keys on the front panel can be used to supervise the network operation, or to read data for a selected unit in the network.

Start-up

As the power supply is connected to GATE 3S, the programme name and the serial number of the unit are shown on the display for a few seconds.
After that, the module is automatically switched over to Operating mode.

If an error occurs the start-up stops and an error message is displayed.
See section Troubleshooting for information about error codes and error correction.

As GATE 3S is in Operating mode the fieldbus type and the operating status of all network units will be displayed.
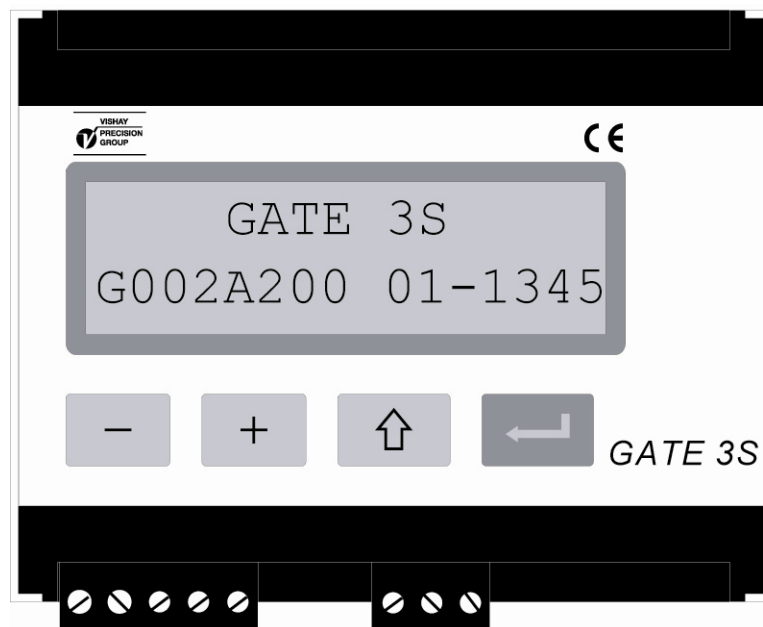

Figure 6. GATE 3S front panel during start-up.

Status views, 'Generation 3' and E-2-WEI

Figure 7.

During normal operation, the upper line of the first status view shows the type of fieldbus used for communication with the master. If the fieldbus goes out of operation, this is indicated by a question mark to the right on the line.

The lower line shows the communication status for the connected slave units.
Each unit, starting with slave 1 to the left, is represented by a symbol:
'1' is displayed for a slave unit with correct communication.
'0' is displayed for a slave unit with communication error.
'*' is displayed for a slave unit that is inactivated (the address set to 0).

In operating mode the panel keys have the following functions:

–	Switch to previous status view.
+	Switch to next status view.
↑	Brief: Switch to the first status view. 2 seconds Go to 'Set-up' mode. (Password may be required.)
↵	2 seconds: Go to 'Bus diagnostics'. See page 4-4.

Press + (or –) to get a status view for one of the measurement instruments (E-2-WEI or 'Generation 3') at a time.
These views contain:
  On the upper line, slave number and measurement value or a possible error code.
  On the lower line, unit address and weight status for the slave unit.

Briefly press ↑ to switch GATE 3S back to the first status view.

If ↵ is pressed for 2 seconds, 'Bus diagnostics' starts (see page 4-4).

Return to normal operation by pressing the key ↑ .
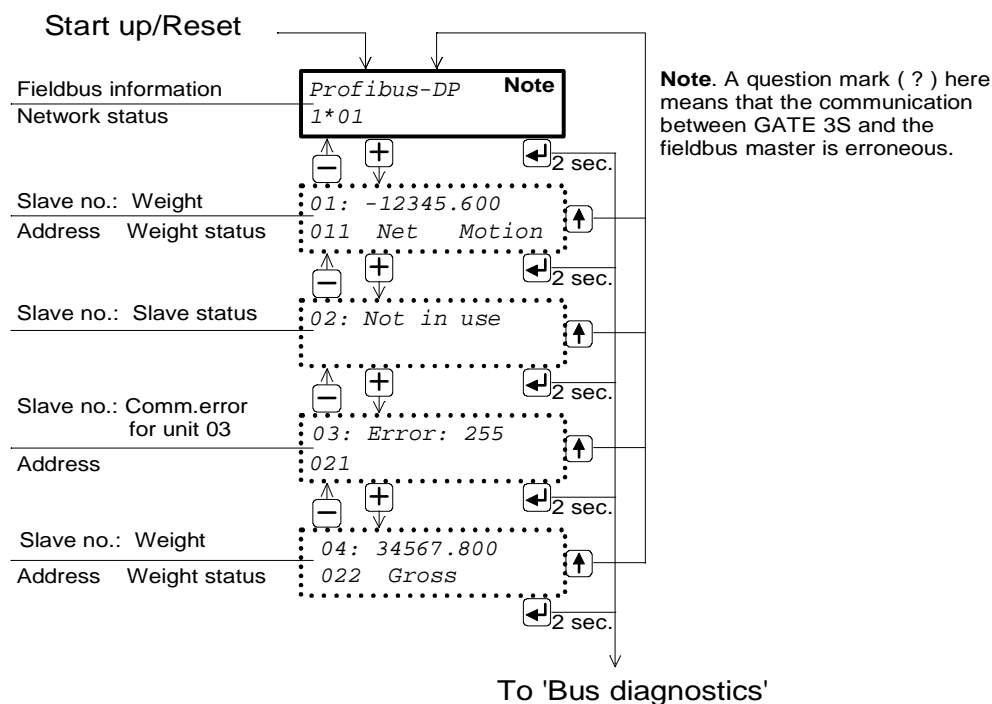
Figure 7. Example of display views in GATE 3S with four connected measurement instruments, 'Generation 3' or E-2-WEI.

Status views, microPOS

Figure 8.

During normal operation, the upper line of the first status view shows the type of fieldbus used for communication with the master. If the fieldbus goes out of operation, this is indicated by a question mark to the right on the line.

The lower line shows the communication status for connected microPOS units.

Each unit, starting with slave unit 1 to the left, is represented by a symbol:

'1' is displayed for a unit with correct communication.

'0' is displayed for a unit with communication error.

'*' is displayed for a slave unit that is inactivated (the address set to 0).

In operating mode the panel keys have the following functions:

—	Switch to previous status view.
+	Switch to next status view.
↑	Brief: Switch to the first status view. 2 seconds Go to 'Set-up' mode. (Password may be required.)
↵	2 seconds: Go to 'Bus diagnostics'. See page 4-4.

Press + (or −) to get a status view for one of the microPOS units at a time.

The upper line shows: slave number, setpoint value 1, a question mark if writing is not enabled, setpoint value 2.

By communication error each setpoint value is replaced by '- - - - - -'.

The lower line shows: status indicators for servo 1 and servo 2, feedback value 1, feedback value 2. The status indicators may be: '+' = in position, (blank = not in pos.), '?' = not controlled.

By communication error each feedback value is replaced by '- - - - - -'.

Briefly press ↑ to switch GATE 3S back to the first status view.

If ↵ is pressed for 2 seconds, 'Bus diagnostics' starts (see page 4-4).
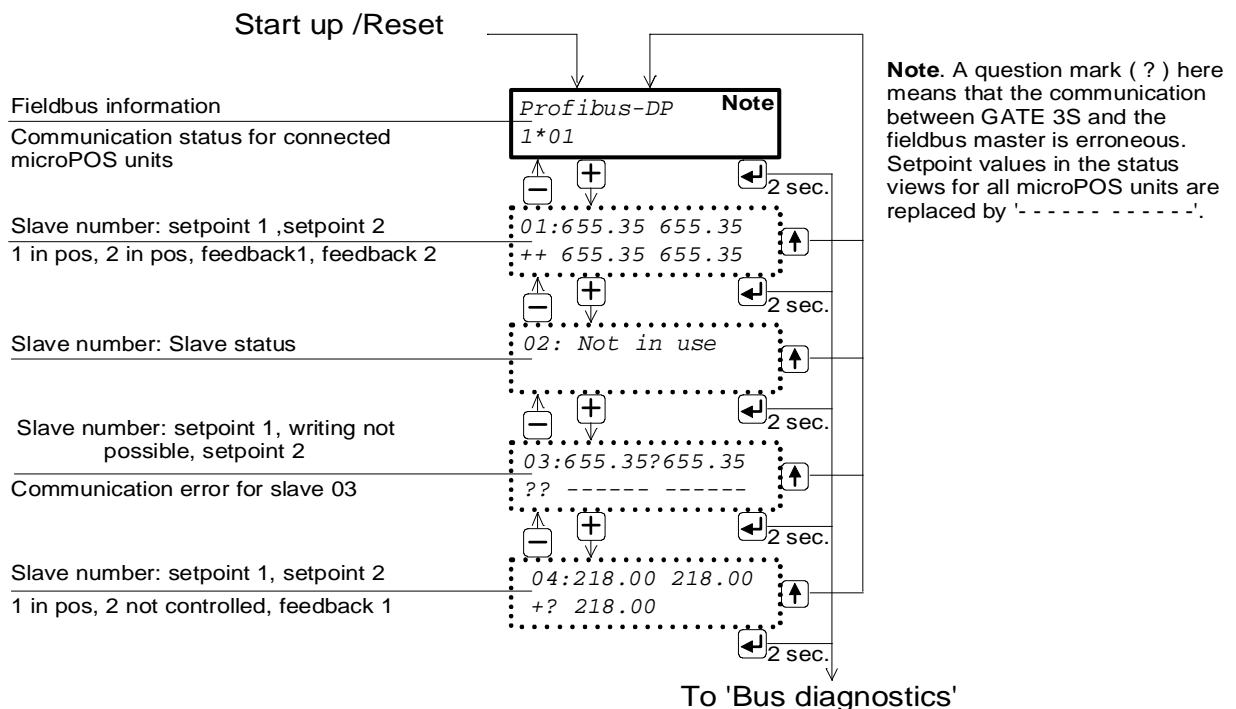
Return to normal operation by pressing the key ↑ .

Figure 8. Example of status views in GATE 3S with four microPOS servo units.

Bus diagnostics

Bus diagnostics gives the possibility to study the byte contents of a selected
part of the GATE 3S memory during normal operation. This function is very useful for
specialist troubleshooting in case of communication problems.

(Press ↑ to return to normal status views.)

To activate 'Bus diagnostics', press ↵ for 2 seconds as the status view
for a selected slave unit is shown.

Output memory byte values, in hexadecimal form, starting with the first bytes
for the selected slave unit, are presented on the two display lines.
Each line starting with 'o' for output and the number of the first byte on the line.
Use the panel keys + and − to step forwards and backwards in the memory.

Press ↵ to switch over to input bytes.
Input memory byte values, in hexadecimal form, starting with the first bytes
for the selected slave unit, are presented on the two display lines.
Each line starting with 'i' for input and the number of the first byte on the line.
Use the panel keys + and − to step forwards and backwards in the memory.

Now ↵ can be used to switch between display of the latest view
of output memory bytes and input memory bytes respectively.

Press ↑ to finish the 'Bus diagnostics' and get back to the status view for one unit.
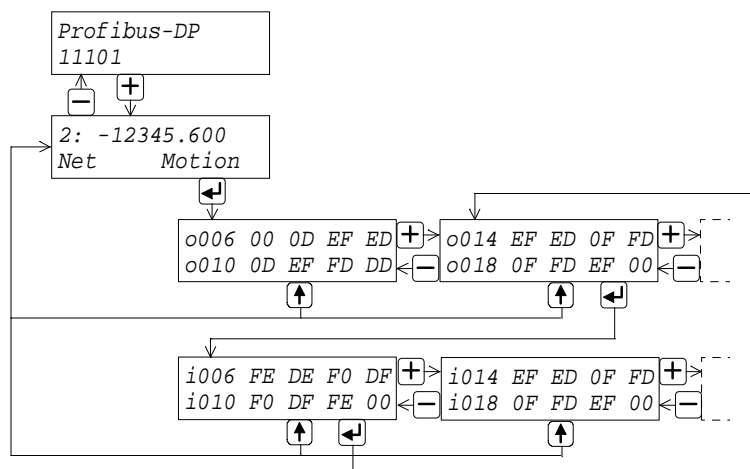

*Figure 9. Example showing how 'Bus diagnostics' is used to study
output and input bytes for slave unit number two in the network.*

5. Communication

GATE 3S connects to a network of measurement instruments or servo units through a serial communication port.

For the fieldbus communication GATE 3S uses an internal transfer module. Transfer modules for several common fieldbus types are available.

Serial communication interface

The serial communication utilises RS-485 / RS-422 on 2-wires or 4-wires for transmission via Modbus RTU. RS-485 / RS-422 is an interface working with differential voltages, giving a noise resistant transmission in networks with several slave units and long distances.
To ensure good communication, correct termination of the transmission line at both ends is required.
See section 2. Installation.

Memory mapping in GATE 3S

Data transmission in GATE 3S is performed by messages that are written into a memory, where they can be read from another unit.
The messages can be either 6 bytes or 20 bytes long, depending on the setting of parameter 'GATE 3S mode'.

6 byte mapping is used for microPOS servo units and for 'Generation 3' units (AST 3, TAD 3, WEI 3) when high transmission speed is needed.

20 byte mapping is used for E-2-WEI transmitters and for 'Generation 3' units when transmission of large amounts of data is needed.

Data representation

All data in GATE 3S is stored with the most significant byte on the lower memory address (Motorola format).
If the fieldbus master uses data with the most significant byte on the higher memory address (Intel format), the bytes need to be swapped in the master.

Examples:

Value	Used in GATE 3S. Bytes (Motorola)	Bytes (Intel)
1234.9 (floating point)	44 9A 5C CD	CD 5C 9A 44
123456789 (32 bit)	07 5B CD 15	15 CD 5B 07
12345 (16 bit)	30 39	39 30

As you can see the byte order is swapped in the two implementations.
You can use the Bus diagnostics to study the byte sequence.

'Generation 3' (AST 3, TAD 3, WEI 3), 6 byte mapping

In GATE 3S, 6 bytes of memory is assigned for each slave unit in the network, as shown in the table to the left below.

Slave 1 uses the bytes 00 through 05 (and slave 9 uses the bytes 48 through 53) according to the tables in the middle below.

The first byte to the fieldbus (00 or 48 in the tables below) is used for a status report. In the table to the right the meaning of each status bit is explained.

Memory

Bytes	Slave
00 - 05	1
06 - 11	2
12 - 17	3
18 - 23	4
24 - 29	5
30 - 35	6
36 - 41	7
42 - 47	8
48 - 53	9
54 - 59	10
60 - 65	11
66 - 71	12
72 - 77	13
78 - 83	14
84 - 89	15
90 - 95	16

Slave 1

Byte	From fieldbus	To fieldbus
00	Command */	Status
01	–	Instr. error **/
02	–	Displ.weight MSB
03	–	-"-
04	–	-"-
05	–	-"-

Slave 9

Byte	From fieldbus	To fieldbus
48	Command */	Status
49	–	Instr. error **/
50	–	Displ.weight MSB
51	–	-"-
52	–	-"-
53	–	-"-

Status, byte 00 (48) to fieldbus

Bit	Meaning of bit = 1
0	Good zero ***/
1	Net mode ***/
2	Motion ***/
3	Relay 1 activated
4	Relay 2 activated
5	Power failure
6	Above level 1
7	Above level 2

*/	See section Communication, Command register, in the manual for the unit.
**/	Error code 255 means communication error between the slave and GATE 3S. For other error codes, see section Troubleshooting in the manual for the slave.
***/	For AST 3 the function is not supported, the bit is always '0'.

If a power failure has occurred, bit 5 in the 'Status' byte is set to 1.
Sending **Command 202** to the unit will set this bit to 0.

NOTE! An action is activated only as the command value is changed. Thus, activation of a certain action one more time, must be preceded by a different command, for example 00, 'No action'.

Weight value representation for 'Generation 3', 6 byte mapping

A weight value is stored in GATE 3S as integer values or as a floating point value, depending on the setting of parameter 'Weight format':

- Integer   The first data word (16 bit) is the integer part of the value, and the second data word is the decimal part of the value, times 1000 to make it an integer.
  The words are signed integers, so they can represent both positive and negative values.

- Float   The weight is represented as a 32 bit floating point value , according to IEEE standard.

NOTE: Fieldbus masters using 'Intel format' will need to swap the bytes.

Examples:

Integer representation of weight values from slave unit 1:

Value	Address		Data	Bytes	Bits
123.5	02	03	123	00 7B	(0000 0000 0111 1011)
	04	05	0.5 * 1000 = 500	01 F4	(0000 0001 1111 0100)
123.456	02	03	123	00 7B	(0000 0000 0111 1011)
	04	05	0.456 * 1000 = 456	01 C8	(0000 0001 1100 1000)
12345.6	02	03	12345	30 39	(0011 0000 0011 1001)
	04	05	0.6 * 1000 = 600	02 58	(0000 0010 0101 1000)
-123.4	02	03	-123 (2's compl.)	FF 85	(1111 1111 1000 0101)
	04	05	-0.4 * 1000 = -400	FE 70	(1111 1110 0111 0000)

Range for the values will be -32768 to +32767 (with 0 to 3 decimals added).

A correct complete value is accomplished in the master computer by dividing the second word value by 1000 and adding the result to the first word value.

Float representation of weight value from slave unit 1:

Value	Address		Bytes
123.5	02	03	42 F7
	04	05	00 00

'Generation 3' (AST 3, TAD 3, WEI 3), 20 byte mapping

In GATE 3S, 20 bytes of memory is assigned for each slave unit in the network, as shown in the table to the left. To the right, the byte use for slave 1 is shown.

'Generation 3' (AST 3, TAD 3, WEI 3), 20 byte mapping

Memory

Bytes	Slave
00 - 19	1
20 - 39	2
40 - 59	3
60 - 79	4
80 - 99	5
100 - 119	6
120 - 139	7
140 - 159	8
160 - 179	9
180 - 199	10
200 - 219	11
220 - 239	12
240 - 259	13
260 - 279	14
280 - 299	15
300 - 319	16

Unit 1

Byte	From fieldbus	To fieldbus
00	Command */	Command ack.
01	Nbr of registers to write	Instrument error **/
02	Read/Write start address	Displ.weight, 32 bit ^{MSB}
03	Read/Write start address	-"-
04	Write register 1 ^{MSB}	-"-
05	Write register 1	-"-
06	Write register 2 ^{MSB}	No. of decimals ^{MSB}
07	Write register 2	-"-
08	Write register 3 ^{MSB}	Status register 1 ***/
09	Write register 3	Status register 1 ***/
10	Write register 4 ^{MSB}	Status register 2 ***/
11	Write register 4	Status register 2 ***/
12	Write register 5 ^{MSB}	Read start address ^{MSB}
13	Write register 5	Read start address
14	Write register 6 ^{MSB}	Read register 1 ^{MSB}
15	Write register 6	Read register 1
16	Write register 7 ^{MSB}	Read register 2 ^{MSB}
17	Write register 7	Read register 2
18	Write register 8 ^{MSB}	Read register 3 ^{MSB}
19	Write register 8	Read register 3

*/   See section Communication, Command register, in the manual for the slave.
**/   Error code 255 means communication error between the slave and GATE 3S. For other error codes, see section Troubleshooting in the manual for the slave.
***/   See section Communication, Status register 1 and 2, in the manual for the slave.

Three special commands are possible to use by 20 byte mapping of 'Generation 3':

Command 200. Command to write. The following bytes should contain the number of write registers, the address where the writing should start, and finally up to 8 registers that will be written to the slave unit.

Command 201. Command to select a 'read window', three registers wide that will be included in the messages from the slave unit. The bytes 02 and 03 in the table above should contain the address of the first register in the read window.

Command 202. If a power failure has occurred, bit 4 in 'Status register 2' is set to 1. Sending Command 202 to the slave unit will reset this bit to 0.

NOTE! An action is activated only as the command value is changed. Thus, activation of a certain action one more time, must be preceded by a different command, for example 00, 'No action'. Reading and writing of set-up parameters in AST 3 through GATE 3S is not possible. Only process parameters are available.

The command acknowledgement (byte 00) is either the code of the performed command, or an error code, 250 through 255, if the command is not performed.

Weight value representation for 'Generation 3', 20 byte mapping

A weight value (byte 02 – 07 for slave 1) is stored in GATE 3S as an integer value or as a floating point value, depending on the setting of parameter 'Weight format'.

- Integer: Byte 02 – 05 for slave 1 are used as one 4-byte integer value (with sign), and byte 06 and 07 for slave 1 define the number of decimals in the value.

- Float: The weight (byte 02 – 05 for slave 1) is represented as a 32 bit floating point value, according to IEEE standard. Byte 06 and 07 for slave 1 define the number of significant decimals.

NOTE: Fieldbus masters using 'Intel format' will need to swap the bytes.

E**xamples:**

Integer representation of a weight value from slave unit 1:

Value	Address	Bytes	
12345.678	02 03 04 05	00 BC 61 4E	(12345678)
Number of decimals	06 07	00 03	(3)

Calculations in decimal numbers:
First multiply the most significant word (byte 02 03) by 2^{16} (65536) and add the least significant word (byte 04 05) to that value.
188 (00 BC) * 2^{16} + 24910 (61 4E) = 12345678

Then divide by 1000, as the number of decimals is 3.
12345678 / 1000 = 12345.678

Float representation of a weight value from slave unit 1:

Value	Address	Bytes
123.5	02 03	42 F7
	04 05	00 00

Messages for 'Generation 3', 20 byte mapping

In the message from the fieldbus the first byte (00 for slave unit 1) is a command to the slave. The remaining bytes are explained in the following examples.

Ex.: Set 'Level 1 value' to 123.5 for AST 3, slave unit 1. (Float value)

Command 200 is used for this type of message. Make sure the previous command was not command 200. Prepare the message and finish by setting byte 00 to 200.

1. Use byte 01 to define the number of registers (2).

2. Use byte 02 and 03 to define the start address, 40234, for the writing.
   See AST 3 Technical Manual, Register description.

3. Use the following four bytes to set the value to 123.5.

4. Finally set byte 00 to the command number, 200.

Byte (slave 1)	Description	Dec	Hex
00	Command	200	C8
01	Number of registers to write	2	02
02 03	Start address	40234	9D 2A
04 05 06 07	Write register 1 and 2	123.5	42 F7 00 00

Ex.: Set 'Level 1 value' to 20.0 for AST 3, slave unit 1. (Integer value)

Command 200 is used for this type of messages. Make sure the previous command was not command 200. Prepare the message and finish by setting byte 00 to 200.

1. Use byte 01 to define the number of registers (3).
2. Use byte 02 and 03 to define the start address, 40031, for the writing.
   See AST 3 Technical Manual, Register description.
3. Use the following six bytes to set the value to 20.0, i.e. 200 and one decimal.
4. Finally set byte 00 to the command number, 200.

Byte (slave 1)	Description	Dec	Hex
00	Command	200	C8
01	Number of registers to write	3	03
02 03	Start address	40031	9C 5F
04 05 06 07	Write register 1 and 2	200	00 00 00 C8
08 09	Write register 3	1	00 01

Ex.: Set a read window to start at 40031 in AST 3, slave unit 1.

Command 201 is used to set a read window. Make sure the previous command was not command 201. Prepare the message and finish by setting byte 00 to 201. The number of registers to read is always three and cannot be changed, so the contents of byte 01 have no influence.

1. Use byte 02 and 03 to define the start address, 40031, for the reading .
2. Finally set byte 00 to the command number, 201.

Byte (slave 1)	Description	Dec	Hex
00	Command	201	C9
01	(Number of registers to read)	–	–
02 03	Start address	40031	9C 5F

In the message <u>to</u> the fieldbus (the fieldbus master)
– the first byte (00) is a command acknowledgement,
   either the code of the command that is performed or
   an error code, 250 through 255, if the command is not performed.
– the second byte (01) is an explanation of a possible error in slave unit 1,
   using the error codes described in the manual for the unit.
– the third through eighth bytes (02 through 07) contain the weight value.
– the following four bytes (08 through 11) contain the Status register 1
   and Status register 2 for slave unit 1.
– the last eight bytes (12 through 19) contain the start address of the read window
   and three registers that are read from slave unit 1.

20 byte mapping for E-2-WEI

In GATE 3S, 20 bytes of memory is assigned for each slave E-2-WEI in the network, as shown in the table to the left below.

Slave 1 uses the bytes 00 through 19 as shown in the table to the right.

Bytes 00 through 09 from the fieldbus are not used. Byte 10 and 11 are used for a command and bytes 12 through 19 are used for two setpoint values.

Bytes 00 through 03 to the fieldbus are used for error and status information, bytes 04 through 19 are used for gross weight, net weight, and setpoint values.

Commands, weight status, weight error codes, and data representation are explained on the following pages.

Memory

Bytes	Slave
00 - 19	1
20 - 39	2
40 - 59	3
60 - 79	4
80 - 99	5
100 - 119	6
120 - 139	7
140 - 159	8
160 - 179	9
180 - 199	10
200 - 219	11
220 - 239	12
240 - 259	13
260 - 279	14
280 - 299	15
300 - 319	16

Unit 1

Byte	From fieldbus	To fieldbus
00	–	Weight error code ^{MSB}
01	–	Weight error code
02	–	Weight status ^{MSB}
03	–	Weight status
04	–	Gross Weight Integer ^{MSB}
05	–	Gross Weight Integer
06	–	Gross Weight Decimal ^{MSB}
07	–	Gross Weight Decimal
08	–	Net Weight Integer ^{MSB}
09	–	Net Weight Integer
10	Command ^{MSB}	Net Weight Decimal ^{MSB}
11	Command	Net Weight Decimal
12	Setpoint 1 Integer ^{MSB}	Setpoint 1 Integer ^{MSB}
13	Setpoint 1 Integer	Setpoint 1 Integer
14	Setpoint 1 Decimal ^{MSB}	Setpoint 1 Decimal ^{MSB}
15	Setpoint 1 Decimal	Setpoint 1 Decimal
16	Setpoint 2 Integer ^{MSB}	Setpoint 2 Integer ^{MSB}
17	Setpoint 2 Integer	Setpoint 2 Integer
18	Setpoint 2 Decimal ^{MSB}	Setpoint 2 Decimal ^{MSB}
19	Setpoint 2 Decimal	Setpoint 2 Decimal

Commands for E-2-WEI

By the Command register (byte 10 and 11 from the fieldbus to E-2-WEI slave 1) a number of actions in E-2-WEI can be activated. The meaning of each register value for Command is explained in the table below.

Command value		Action activated in E-2-WEI
Dec	Hex	
0	00 00	No action is activated.
1	00 01	Activate setpoint relay 1.
2	00 02	Deactivate setpoint relay 1.
3	00 03	Activate setpoint relay 2.
4	00 04	Deactivate setpoint relay 2.
5	00 05	Activate setpoint relay 1 and 2.
6	00 06	Deactivate setpoint relay 1 and 2.
7	00 07	Auto tare.
8	00 08	Set to zero.
9	00 09	Select gross mode.
10	00 0A	Select net mode.
11	00 0B	Select normal weight.
12	00 0C	Select calibration value.
13 – 65535	00 0D – FF FF	No action is activated.

NOTE! An action in E-2-WEI is activated only as the command value is changed. Thus, activation of a certain action one more time, must be preceded by a different command, for example 'No action is activated' (0).

Weight status for E-2-WEI

Weight status indication for E-2-WEI is transmitted in bytes two and three to the fieldbus (bytes 02 and 03 for slave 1), bit 15 being the most significant bit.

In these two bytes, bits 0 – 5 and 8 – 11 are valid only by valid weight, i.e. as the error code, the first two bytes to the fieldbus, is = 00.

Byte 02 + 03 to the fieldbus for slave 1

Bit	Meaning of bit = 1	Bit	Meaning of bit = 1
0	Gross weight negative.	8	Relay 1 active.
1	Net weight negative.	9	Relay 2 active.
2	Motion.	10	Relay 1 cycle done.
3	Good zero, current weight.	11	Relay 2 cycle done.
4	Net mode. (Bit = 0, Gross mode.)	12	Not used.
5	Calibration resistor connected.	13	Good zero, gross weight.
6	Overload/Underload.	14	Good zero, net weight.
7	Overrange/Underrange.	15	Not used, always zero.

A 'relay cycle done' bit is cleared when the relay is not active and a new setpoint value is entered.

Weight error codes for E-2-WEI

Possible weight error information is transmitted to the fieldbus as
an error code in the two first bytes (00 and 01 for E-2-WEI slave 1).

During shunt calibration, error code 19 is transmitted and the calibration value
replaces the gross weight (bytes 04 through 07 for E-2-WEI slave 1).

By all other weight error codes, except code 00 'no error', the weight values
(bytes 04 through 11 for E-2-WEI slave 1) are set to zero.

Error code	Explanation
00	Valid 'normal' weight (no error).
10	Excitation short-circuit.
11	Sense voltage error.
12	Transducer signal error.
13	Transducer signal out of range.
14	Invalid A/D signal.
16	Underload or underrange. See also Weight status, bit 06 and 07.
17	Overload or overrange. See also Weight status, bit 06 and 07.
18	Integer part of weight value, gross or net weight, too high (>32767).
19	Calibration resistor connected. The calibration value is found in the gross weight register.
255	Communication error.

Data representation

All data values are stored in GATE 3S as integer values.

NOTE: Fieldbus masters using 'Intel format' will need to swap the bytes.

E**xamples:**
Integer value representation of gross weight values to the fieldbus from slave 1:

Value	Address		Data words	Bytes	Bits
123.5	04	05	123	00 7B	(0000 0000 0111 1011)
	06	07	0.5 * 1000 = 500	01 F4	(0000 0001 1111 0100)
123.456	04	05	123	00 7B	(0000 0000 0111 1011)
	06	07	0.456 * 1000 = 456	01 C8	(0000 0001 1100 1000)
12345.6	04	05	12345	30 39	(0011 0000 0011 1001)
	06	07	0.6 * 1000 = 600	02 58	(0000 0010 0101 1000)
-123.4	04	05	-123 (2's compl.)	FF 85	(1111 1111 1000 0101)
	06	07	-0.4 * 1000 = -400	FE 70	(1111 1110 0111 0000)

Range for the values will be -32768 to +32767 (with 0 to 3 decimals added).
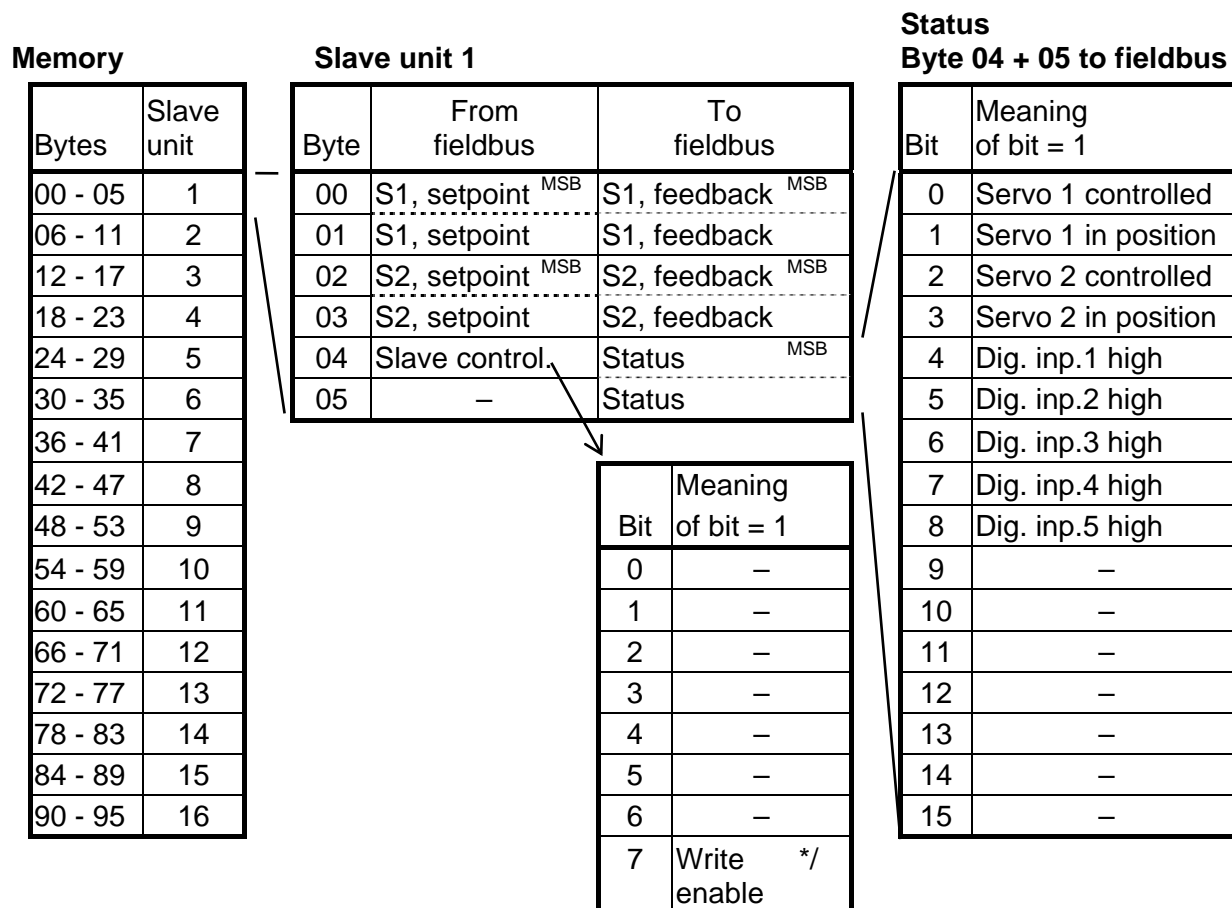
A correct complete value is accomplished in the master computer by dividing
the second word value by 1000 and adding the result to the first word value.

6 byte mapping for microPOS

In GATE 3S, 6 bytes of memory is assigned for each slave unit in the network, as shown in the table below to the left.
Unit 1 uses the bytes 00 through 05 as shown in the table in the middle.

The two last bytes to the fieldbus (04 and 05 in the example) are used for a status report, the meaning of the status bits is shown in the table to the right.

Memory

Bytes	Slave unit
00 - 05	1
06 - 11	2
12 - 17	3
18 - 23	4
24 - 29	5
30 - 35	6
36 - 41	7
42 - 47	8
48 - 53	9
54 - 59	10
60 - 65	11
66 - 71	12
72 - 77	13
78 - 83	14
84 - 89	15
90 - 95	16

Slave unit 1

Byte	From fieldbus	To fieldbus
00	S1, setpoint ^{MSB}	S1, feedback ^{MSB}
01	S1, setpoint	S1, feedback
02	S2, setpoint ^{MSB}	S2, feedback ^{MSB}
03	S2, setpoint	S2, feedback
04	Slave control.	Status ^{MSB}
05	–	Status

Bit	Meaning of bit = 1
0	–
1	–
2	–
3	–
4	–
5	–
6	–
7	Write enable */

Status
Byte 04 + 05 to fieldbus

Bit	Meaning of bit = 1
0	Servo 1 controlled
1	Servo 1 in position
2	Servo 2 controlled
3	Servo 2 in position
4	Dig. inp.1 high
5	Dig. inp.2 high
6	Dig. inp.3 high
7	Dig. inp.4 high
8	Dig. inp.5 high
9	–
10	–
11	–
12	–
13	–
14	–
15	–

*/   Writing of new values to the slave unit microPOS is possible only as bit 7 in byte 04 from the fieldbus is set to 1.
This gives a protection, preventing GATE 3S from changing the setpoint values if, as a consequence of a power interruption, the fieldbus master sets all bytes to 00.
If bit 7 is not = 1, this is indicated in the status view. See figure 8.

Data representation

Example:

Representation of feedback value from servo 1 in microPOS slave unit 1:

Value	Data	Bytes	Bits
123.50	12350	30 3E	(0011 0000 0011 1110)

A correct complete value is accomplished in the master computer by dividing the data by 100.

Range for the values: 0.00 to 655.35

6. Troubleshooting

General

GATE 3S has an automatic error checking facility. This serves to facilitate troubleshooting and to ensure that the instrument will function in the best possible manner. If an error occurs, an error code and a short message describing the error will be displayed.
Below some hints are given on how to correct errors and faults.

Start-up errors

These error codes can only appear during start-up.

Error code	Explanation

080 **Invalid set-up version.**
This error usually occurs at first start-up after a program upgrade.
The actual settings have been replaced by default values.
Enter set-up mode, perform the necessary editing and
save the new parameter settings.

081 **Invalid set-up data.**
Indicates faulty parameter checksum.
The actual settings have been replaced by default values.
Enter set-up mode, perform the necessary editing and
save the new parameter settings.

097 **RAM error.**
RAM memory error is a fatal error. It indicates equipment failure that
requires trained service personnel. The distributor must be contacted.

098 **FLASH error.**
Flash memory error is a fatal error. It indicates equipment failure that
requires trained service personnel. The distributor must be contacted.

099 **Watchdog error.**
If a watchdog error appears the system will be reinitialised. The operator
must then power the instrument off and on, to achieve normal operation.

The program regularly sends impulses to a special watchdog circuit to
ensure that the circuits and the program operate correctly.
However, if these impulses for any reason are omitted the watchdog
error indication will result.

Set-up list for GATE 3S

Location/Notes: ....

Progr. name: .... Ser. no.: .... Date: ....

Line termination switches (default = not ON): SW1: .... SW2: ....

Fieldbus adapter type: ....

Fieldbus address: .... Fieldbus termination (ON / Not ON):

Parameter name	**Default value**	**Set-up value**	
Language	English	....	....
Display contrast	4	....	....
Security lock	Off	....	....
Password	1937	....	....
GATE 3S mode	Generation 3 6b	....	....
Weight format	Integer	....	....
Number of slaves	1	....	....
Address, slave 1	1	....	....
Address, slave 2	0	....	....
Address, slave 3	0	....	....
Address, slave 4	0	....	....
Address, slave 5	0	....	....
Address, slave 6	0	....	....
Address, slave 7	0	....	....
Address, slave 8	0	....	....
Address, slave 9	0	....	....
Address, slave 10	0	....	....
Address, slave 11	0	....	....
Address, slave 12	0	....	....
Address, slave 13	0	....	....
Address, slave 14	0	....	....
Address, slave 15	0	....	....
Address, slave 16	0	....	....
Baudrate	115200	....	....
Data format	8-none-1	....	....
IP-address (1)	192.168	....	....
IP-address (2)	000.001	....	....
Subnet mask (1)	255.255	....	....
Subnet mask (2)	255.000	....	....
Gateway addr.(1)	000.000	....	....
Gateway addr.(2)	000.000	....	....
GATE 3S address	1	....	....

Operating and Installation Instructions

Fieldbus adapter for Profibus-DP

Connector	9-pin D-SUB (female).
Baud rate	Auto setting, 9.6 kbaud – 12 Mbaud.
Address	1 – 99, set by rotary switches.
Line termination	Selected by switch.
Max. fieldbus data size	200 byte. (May be limited by the fieldbus master.)
	This makes it possible to connect up to 16 units
	(Gen.3, microPOS. .) using 6 byte mapping,
	or up to 10 units using 20 byte mapping.

The fieldbus adapter for Profibus-DP is mounted inside the GATE 3S housing with connector, switches, and LED indicators accessible through a slot on one side.
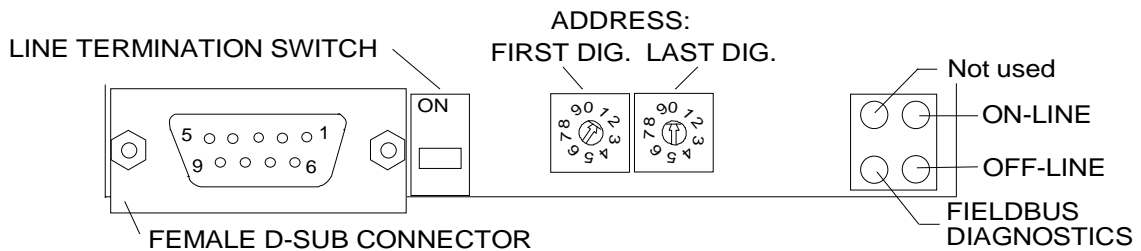
For connection of the adapter to the Profibus master, use a standard cable for Profibus, or connect another shielded cable with twisted pairs and a 9-pole D-SUB male connector according to the diagram below.
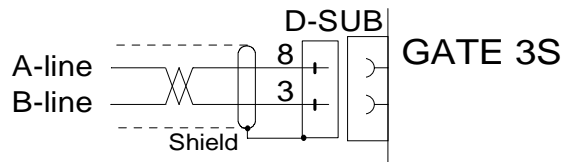
For reliable fieldbus function, line termination must be arranged at both ends of the transmission line. For a GATE 3S unit at the end of the line this is done by the line termination switch in ON position.
For other GATE 3S units along the line, this switch may not be in ON position.

Use the two rotary switches on the adapter to set an address for the GATE 3S unit. In the figure above, the switches are set for address 10.

LED indicators on the fieldbus adapter give function information:
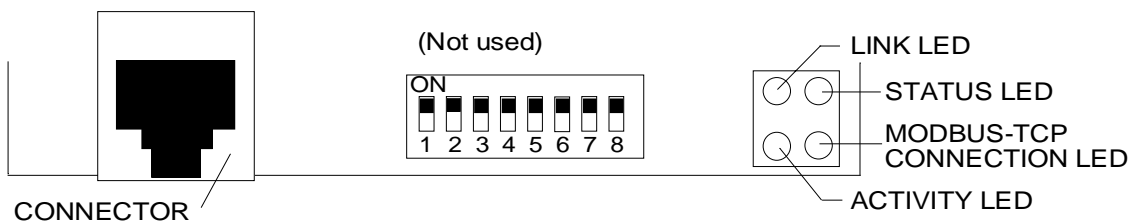
NAME	COLOUR	FUNCTION
On-Line	Green	Indicates that the module is On-Line on the fieldbus. **Off –** Module is not On-Line. **Green –** Module is On-Line and data exchange is possible.
Off-Line	Red	Indicates that the module is Off-Line on the fieldbus. **Off –** Module is not Off-Line. **Red –** Module is Off-Line and no data exchange is possible.
Fieldbus Diagnostics	Red	Indicates certain faults on the Fieldbus side. **Turned off –** No diagnostics present. **Flashing Red 1 Hz –** Error in configuration: IN and/or OUT length set during initialisation of the module is not equal to the length set during configuration of the network. **Flashing Red 2 Hz –** Error in user parameter data: The length/contents of the User Parameter data set during initialisation of the module is not equal to the length/contents set during configuration of the network. **Flashing Red 4 Hz –** Error in initialisation of the Profibus communication ASIC.

For configuration of the adapter, a GSD file (HMS_1003.GSD) is supplied with the GATE 3S unit and should be installed in the master.

Appendix 2
Profibus-DP

Fieldbus adapter for Ethernet, Modbus-TCP

Connector	RJ 45.
Baud rate	10 Mbit/s.
Ethernet configuration	IP-address, Subnet mask and Gateway address are set by parameters in the GATE 3S set-up.
Protocol	Conforms to Modbus-TCP specification 1.0.
Max. fieldbus data size	320 byte. (May be limited by the fieldbus master.) This makes it possible to connect up to 16 units (Gen.3, microPOS. .) using 6 byte or 20 byte mapping.

The GATE 3S unit is a slave node that can be read and written to from a Modbus master. The slave will not initiate communication to other nodes, it will only respond to incoming commands.

For connection of the adapter to the fieldbus, use a standard Ethernat cable.

LED indicators on the fieldbus adapter give function information:

NAME	COLOUR	FUNCTION
Link Led	Green	**Off –** The module is NOT connected to an Ethernet network.
		Green – Indicates that the module is connected to an Ethernet network.
Status Led	Red/Green	**Flashing Green 1 Hz –** Indicates that used IP address is not set by the DIP-switches.
		Flashing Red 1 Hz – The Ethernet MAC address is not correct. The module will not be able to initialise.
		Flashing Red 2 Hz – The module failed to load Ethernet configuration from the FLASH.
		Flashing Red 4 Hz – Internal error.
Activity Led	Green	**Off –** Flashes from green to off when a packet is received or transmitted.
		Green – No activity.
Modbus-TCP connection Led	Green	Indicates the number of Modbus-TCP connections to the module that are established. The led flashes to indicate the number of connections.
		Ex: If three connections are established then this led flashes three times, the led is off for a short period and then flashes three times again and so on.

Supported Modbus commands:

Function code	Function name	Recommended to use in GATE 3S
1	Read coils	No
2	Read input discretes	No
3	Read multiple registers	Yes
4	Read input registers	No
5	Write coil	No
6	Write single register	Yes
7	Read exception status	No
15	Force multiple coils	No
16	Write multiple registers	Yes
22	Mask write register	No
23	Read/Write registers	No

Modbus protocol

The Modbus protocol conforms to the Modbus-TCP specification 1.0.
It is possible to use up to eight Modbus-TCP connections simultaneously.

All requests are sent via TCP on registered port 502.

All data in the connected instruments is regarded as bytes (2 bytes/Modbus register) and are therefore normally read/written using the register based Modbus commands. The other commands can also be used but they are not recommended and not explained here.

Data FROM instrument to the fieldbus
Data from the instrument can be read by Modbus command 3 using Modbus register 40001 – 40161 (max). It is not possible to write data from the bus in this area.

Data TO the instrument from the fieldbus
Data to the instrument can be written by Modbus command 6 and 16 using Modbus register 41025 – 41185 (max).
Data in this area can also be read by Modbus command 3.

**Appendix 3**
Ethernet, Modbus-TCP

Fieldbus adapter for INTERBUS

Connectors	9-pole D-SUB (one female and one male).
Baud rate	500 kbaud.
Line termination	Built-in, selected by wiring in the output connector.
Max. fieldbus data size	320 byte. (May be limited by the fieldbus master.)
	This makes it possible to connect up to 16 units
	(Gen.3, microPOS. .) using 6 byte or
	20 byte mapping.

NOTE!   GATE 3S (the fieldbus unit) needs a power cycle after a change in
the GATE 3S set-up.

The GATE 3S unit is a slave node that can be read and written to from an INTERBUS
master. The slave will not initiate communication to other nodes, it will only respond to
incoming commands.

The fieldbus adapter for INTERBUS is mounted inside the GATE 3S housing with
connectors and LED indicators accessible through a slot on one side.

For connection of the adapter to the INTERBUS network, use a standard cable
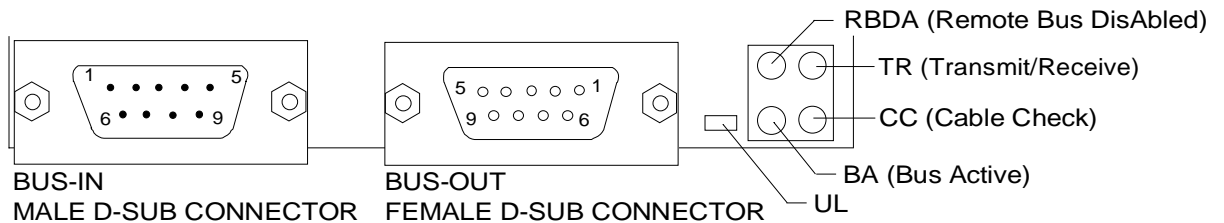
for INTERBUS, or connect another shielded cable with twisted pairs and 9-pole
D-SUB connectors according to the diagrams below.
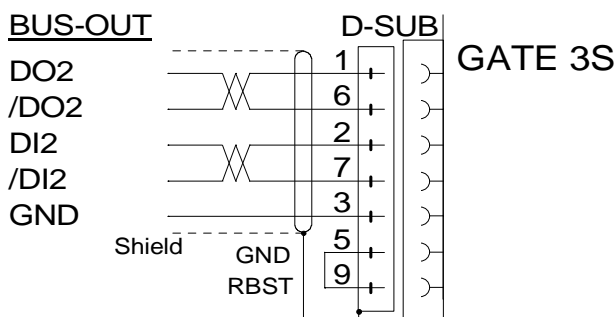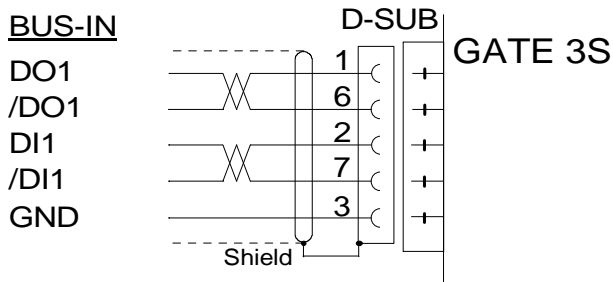
NOTE!
Always connect RBST to GND if it is
not the last module on the bus. If
the RBST is not connected to
ground on the output connector, the
INTERBUS will terminate the
outgoing bus.

LED indicators on the fieldbus adapter give function information:

NAME	COLOUR	FUNCTION
RBDA (Remote Bus DisAbled)	Red	**Off –** Outgoing remote bus is enabled. **Red –** Outgoing remote bus is disabled.
TR (Transmit/Receive)	Green	**Off –** No PCP communication. **Green –** PCP communication is carried out over the INTERBUS (0.6 s hold time (retriggerable) to be visual).
CC (Cable Check)	Green	**Off –** The cable connection is NOT good or the INTERBUS Master is in RESET. **Green –** The cable connection is good and the INTERBUS Master is not in RESET.
BA (Bus Active)	Green	**Off –** The bus is Not active. **Green –** The bus is active (monitoring layer 2). **Green flashing –** Configuration state.
UL	Green	**Off –** Voltage failure at bus interface. **Green –** Voltage at bus interface is OK.

Appendix 4
INTERBUS

The data is located as follows:
6-bytes mapping (GATE 3 mode is 'Generation 3 6b' or 'microPOS')
1 to 16 slaves.

Slave number	Cyclical I/O data	Parameter data, PCP (6 bytes/object)		
		PCP length (word)	Data to GATE 3S (PCP obj)	Data to master (PCP obj)
1 (byte 0-5)	byte 0 - 5	0 (1*)	-	-
2 (byte 6-11)	byte 6 - 11	0 (1*)	-	-
3 (byte 12-17)	byte 12 - 17	0 (1*)	-	-
4 (byte 18-23)	-	1	h'6000	h'6040
5 (byte 24-29)	-	1	h'6001	h'6041
6 (byte 30-35)	-	1	h'6002	h'6042
7 (byte 36-41)	-	1	h'6003	h'6043
8 (byte 42-47)	-	1	h'6004	h'6044
9 (byte 48-53)	-	1	h'6005	h'6045
10 (byte 54-59)	-	1	h'6006	h'6046
11 (byte 60-65)	-	1	h'6007	h'6047
12 (byte 66-71)	-	1	h'6008	h'6048
13 (byte 72-77)	-	1	h'6009	h'6049
14 (byte 78-83)	-	1	h'600A	h'604A
15 (byte 84-89)	-	1	h'600B	h'604B
16 (byte 90-95)	-	1	h'600C	h'604C

* If GATE 3S is configured for more than 3 slaves.

20-bytes mapping (GATE 3 mode is 'Generation 3 20b' or 'E2WEI')

GATE 3S configured for only one slave:
   Only cyclic I/O data, byte 0 -19 (PCP length = 0)

GATE 3S configured for 2 - 16 slaves:
   See table below

Slave number	Cyclical I/O data	Parameter data, PCP (20 bytes/object)		
		PCP length (word)	Data to GATE 3S (PCP obj)	Data to master (PCP obj)
1 (byte 0-19)	-	4	h'6000	h'6040
2 (byte 20-39)	-	4	h'6001	h'6041
3 (byte 40-59)	-	4	h'6002	h'6042
4 (byte 60-79)	-	4	h'6003	h'6043
5 (byte 80-99)	-	4	h'6004	h'6044
6 (byte 100-119)	-	4	h'6005	h'6045
7 (byte 120-139)	-	4	h'6006	h'6046
8 (byte 140-159)	-	4	h'6007	h'6047
9 (byte 160-179)	-	4	h'6008	h'6048
10 (byte 180-199)	-	4	h'6009	h'6049
11 (byte 200-219)	-	4	h'600A	h'604A
12 (byte 220-239)	-	4	h'600B	h'604B
13 (byte 240-259)	-	4	h'600C	h'604C
14 (byte 260-279)	-	4	h'600D	h'604D
15 (byte 280-299)	-	4	h'600E	h'604E
16 (byte 300-319)	-	4	h'600F	h'604F

Appendix 4
INTERBUS

Fieldbus adapter for DeviceNet

|	
Connector	5-pole terminal (included).
Baud rate	125, 250, and 500 kbit/s, set by DIP switches.
Address	0 – 63, set by DIP switches.
Line termination	121 ohm resistor.
Max. fieldbus data size	320 byte. (May be limited by the fieldbus master.)
	This makes it possible to connect up to 16 units
	(Gen.3, microPOS. .) using 6 byte or
	20 byte mapping.
	Recommended max. 100 bytes (Max. 5 x 20 bytes.)

The fieldbus adapter for DeviceNet is mounted inside the GATE 3S housing with connector, switches, and LED indicators accessible through a slot on one side.

The GATE 3S unit is a slave node that can be read and written to from a DeviceNet master. The slave will not initiate communication to other nodes, it will only respond to incoming commands. The GATE 3S is a group 2 only server, using the predefined master/slave connection set for Explicit, Polled I/O, Bit-strobed I/O or Change of state/Cyclic I/O.
A Polled I/O connection is recommended.

For connection of GATE 3S to the DeviceNet master, use a standard cable for DeviceNet, or connect another shielded cable with twisted pairs and a connector according to the diagram below.
Note: V- and V+ should be supplied with 12 – 24 V. (Normally done by network.)
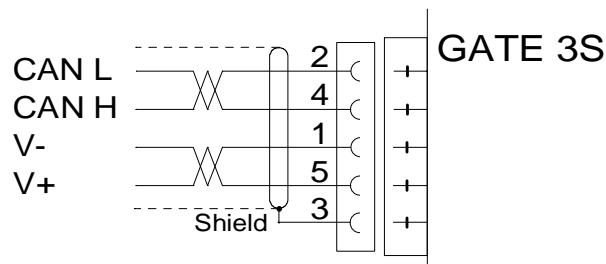
For reliable fieldbus function, line termination must be arranged at both ends of the transmission line. For a GATE 3S unit at the end of the line, this is done by placing a 121 ohm resistor between CAN L (pin 2) and CAN H (pin 4).

DIP switch settings for BAUD RATE and ADDRESS.

Baud rate, kbit/s	Set DIP: 1	2
125	OFF	OFF
250	OFF	**ON**
500	**ON**	OFF

Address	Set DIP: 3	4	5	6	7	8
0	OFF	OFF	OFF	OFF	OFF	OFF
1	OFF	OFF	OFF	OFF	OFF	**ON**
2	OFF	OFF	OFF	OFF	**ON**	OFF
3	OFF	OFF	OFF	OFF	**ON**	**ON**
4	OFF	OFF	OFF	**ON**	OFF	OFF
5	OFF	OFF	OFF	**ON**	OFF	**ON**
6	OFF	OFF	OFF	**ON**	**ON**	OFF
7	OFF	OFF	OFF	**ON**	**ON**	**ON**
.	.	.	.	.		
63	**ON**	**ON**	**ON**	**ON**	**ON**	**ON**

For configuration of the adapter an EDS file is supplied with the GATE 3S unit and should be installed in the master.

LED indicators on the fieldbus adapter give function information:

NAME	COLOUR	FUNCTION
Network Status	Red/Green	**Off –** Not powered/Not on line. **Green –** Link OK on line, Connected. **Flashing green –** On line not connected. **Red –** Critical Link failure. **Flashing red –** Connection Time Out.
Module status	Red/Green	**Off –** No power. **Green –** Device Operational. **Red –** Unrecoverable fault. **Flashing red –** Minor fault.

Appendix 5
DeviceNet

Fieldbus adapter for Modbus Plus

Connector	9-pin D-SUB (female).
Baud rate	1 Mbaud.
Address	1 – 64, set by DIP switches.
Line termination	Terminating D-SUB from Modicon, or 121 ohm resistor.
Max. fieldbus data size	320 byte. (May be limited by the fieldbus master.) This makes it possible to connect up to 16 units (Gen.3, microPOS. .) using 6 byte or 20 byte mapping.

The GATE 3S unit is a slave node that can be read and written to from a Modbus Plus master using Modbus commands (Global data is NOT supported). The slave will not initiate communication to other nodes, it will only respond to incoming commands.

Data FROM instrument to the fieldbus
Data from the instrument can be read by Modbus command 3 (Read Holding Registers) using Modbus register 40001 – 40161 (max).
It is not possible to write data from the bus in this area.

Data TO the instrument from the fieldbus
Data to the instrument can be written by Modbus command 16 (Preset Multiple Registers) or command 6 (Preset Single Register) using Modbus register 41025 – 41185 (max). Data in this area can also be read by Modbus commands.

The fieldbus adapter for Modbus Plus is mounted inside the GATE 3S housing with connector, switches, and LED indicators accessible through a slot on one side.

For connection of the adapter to the Modbus Plus network, use a standard cable for
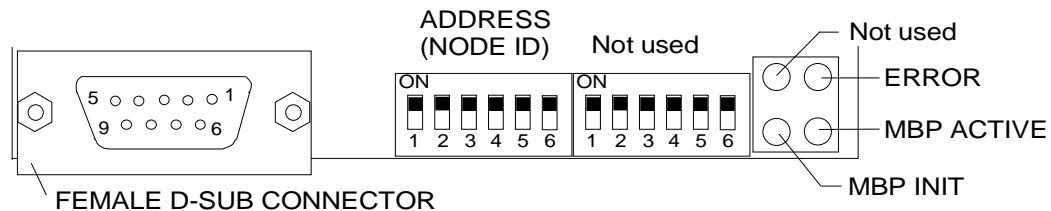
Modbus Plus, or connect another shielded cable with twisted pairs and a 9-pole D-SUB male connector according to the diagram below.
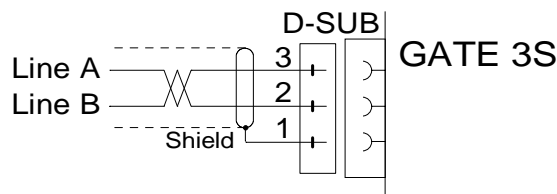
For reliable fieldbus function, line termination must be arranged at both ends of the transmission line. With a GATE 3S unit at the end of the line, this is done by a terminating connector from Modicon, or by connecting a 121 ohm resistor between Line A (pin 3) and Line B (pin 2).

DIP switch settings for ADDRESS (Node ID).

Address	Set DIP: 1	2	3	4	5	6
1	**ON**	**ON**	**ON**	**ON**	**ON**	**ON**
2	**ON**	**ON**	**ON**	**ON**	**ON**	OFF
3	**ON**	**ON**	**ON**	**ON**	OFF	**ON**
.	. . . .					
.	. . . .					
63	OFF	OFF	OFF	OFF	OFF	**ON**
64	OFF	OFF	OFF	OFF	OFF	OFF

NOTE! The DIP switches for Source ID are not used in this application.

LED indicators on the fieldbus adapter give function information:

| NAME	COLOUR	FUNCTION
Error	Red	**Off –** Communication OK. **Red –** Communication failure.
MBP Active	Green	This LED flashes in different patterns depending on the modules health. **Flash every 160 ms:** Working normal, receiving and passing token. **Flash every 1 s:** In MONITOR_OFFLINE state. **2 flashes, off 2 s:** In MAC_IDLE never-getting-token state. **3 flashes, off 1.7 s:** This node is not hearing any other nodes. **4 flashes, off 1.4 s:** This node has heard a valid packet that has a duplicate-node-address sent from another node on the network, using the same Node ID.
MBP Inint	Green	**Off –** The interface is NOT initialised. **Green –** The interface is initialised.

Appendix 6
Modbus Plus

Fieldbus adapter for CANopen

Connector	9-pin D-SUB (male).
Baud rate	10 kbaud – 1 Mbaud set by rotary switch.
Address	1 – 99, set by rotary switches.
Line termination	121 ohm resistor.
Max. fieldbus data size	320 byte. (May be limited by the fieldbus master.) This makes it possible to connect up to 16 units (Gen.3, microPOS. .) using 6 byte or 20 byte mapping.

The fieldbus adapter for CANopen is mounted inside the GATE 3S housing with connector, switches, and LED indicators accessible through a slot on one side.
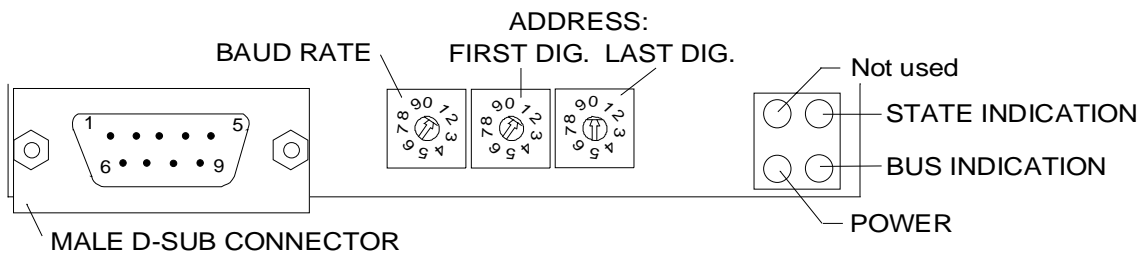
For connection of the adapter to the CANopen master, use a standard cable for CANopen, or connect another shielded cable with twisted pairs and a 9-pole D-SUB female connector according to the diagram below.
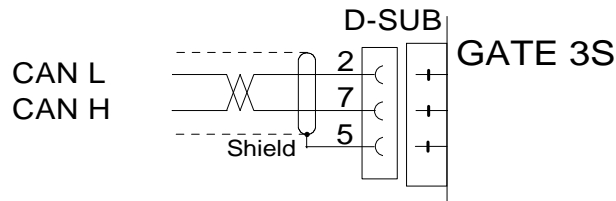
For reliable fieldbus function, line termination must be arranged at both ends of the transmission line. For a GATE 3S unit at the end of the line, this is done by placing a 121 ohm resistor between CAN L (pin 2) and CAN H (pin 7).

BAUD RATE SETTING.

Baud rate, kbit/s	Switch setting
10	1
20	2
50	3
125	4
250	5
500	6
800	7
1000	8

ADDRESS SETTING.

Use the two rotary switches on the adapter to set an address for the GATE 3S unit.
In the figure on the previous page the switches are set for address 10.

LED indicators on the fieldbus adapter give function information:

NAME	COLOUR	FUNCTION
State indication	Red/Green	**Green –** Module operational. **Flashing green 1 Hz –** Module in Pre-Operational. **Flashing green 2 Hz –** Module Prepared. **Flashing red 1 Hz –** Bus initialisation failed.
Bus indication	Red/Green	**Off –** Module power off or module not initialised. **Green –** Bus running. **Flashing green 1 Hz –** Bus off / Error passive. **Flashing red 1 Hz –** Other error.
Power	Green	**Off –** Not powered. **Green –** Module powered.

For configuration of the adapter an EDS file is supplied with the GATE 3S unit and should be installed in the master.

If no EDS file is used the data is located as follows:

Output data (To master)	Object Dictionary index	Object Dictionary sub index
byte 0 - 127	h'2000	1 - 128
byte 128 - 255	h'2001	1 - 128
byte 256 - 319	h'2002	1 - 64

Input data (To GATE 3S)	Object Dictionary index	Object Dictionary sub index
byte 0 - 127	h'2100	1 - 128
byte 128 - 255	h'2101	1 - 128
byte 256 - 319	h'2102	1 - 64

Appendix 7
CANopen

Fieldbus adapter for ControlNet

Connector | Two BNC connectors for connection to ControlNet (for redundant operation).
One Network access port (NAP) connector for temporary connection of configuration tools (RJ 45).

Baud rate | 5 Mbit/s.
Address (MacID) | 1 - 99, set by rotary switches.
Max. fieldbus data size | 320 byte (May be limited by the fieldbus master). This makes it possible to connect up to 16 units (Gen.3, microPOS. .) using 6 byte or 20 byte mapping.

The fieldbus adapter for ControlNet is mounted inside the GATE 3S housing with connector, switches, and LED indicators accessible through a slot on one side.
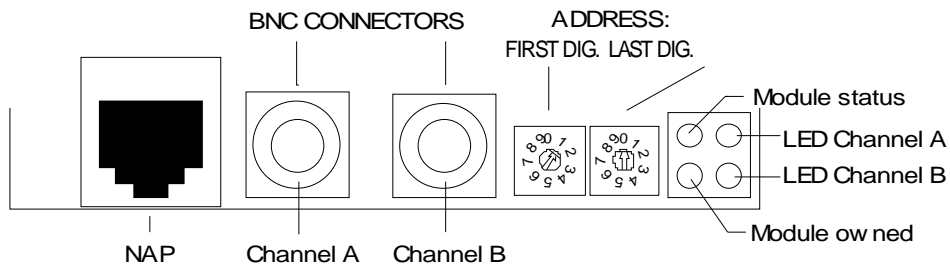
For connection of the adapter to the ControlNet network, use a RG-6 quad shield cable for ControlNet.

Use the two rotary switches on the adapter to set an address for the GATE 3S unit.
In the figure above, the switches are set for address 10.

LED indicators on the fieldbus adapter give function information:

NAME	COLOUR	FUNCTION
Module status	Red/Green	**Flashing Green –** Module is waiting for initialisation. **Steady Green –** Module is initialised. **Flashing Red –** Minor fault, MacID has been changed after initialisation etc. **Steady Red –** Major fault, module must be restarted.
Module owned	Green	**Off –** No connection is opened. **Green –** A connection is opened to the module.

CHANNEL LED's (Red/Green)	
LED A **and** B, steady off:	Module is not initialised.
LED A **and** B, steady red:	Faulted unit, must be restarted or repaired.
LED A **and** B, alternating red/green:	Self test of bus controller.
LED A **and** B, flashing red/off:	Incorrect node configuration, duplicate MacID etc.
LED A **or** B, steady off:	Channel is disabled, depending on network configuration.
LED A **or** B, steady green:	Normal operation of channel.
LED A **or** B, flashing green/off:	Temporary errors (node will self correct) or node is not configured to go online.
LED A **or** B, flashing red/off:	Media fault or no other nodes on the network.
LED A **or** B, flashing red/green:	Incorrect network configuration.

For configuration of the adapter an EDS file is supplied with the GATE 3S unit and should be installed in the master.

Appendix 8
ControlNet

Declaration of Conformity

We Nobel Elektronik AB
Box 423, S-691 27 KARLSKOGA
SWEDEN

declare under our sole responsibility that the product

Fieldbus unit GATE 3

to which this declaration relates is in conformity with the
following standards or other normative documents

EMC:

SS-EN 55011 (1991)	/ SS EN 50081-2 (1993):	Class A, Group 1
SS-ENV 50140 (1993)	/ SS-EN 50082-2 (1995):	10 V/m
ENV 50141 (1993)	/ SS-EN 50082-2 (1995):	10V
SS-EN 61000-4-2 (1995)	/ SS-EN 50082-2 (1995):	4 kV Contact discharge
		8 kV Air discharge
SS-EN 61 000-4-4 (1995)	/ SS-EN 50082-2 (1995):	2 kV AC Mains
		2 kV Control
		1 kV Signal

The product to which this declaration relates is in conformity with the essential
requirements in the EMC Directive 89/336/EEC
with amend. 92/31/EEC and 93/68/EEC

KARLSKOGA Sept 18 1998

Bengt-Åke Sjögren, Managing Director

Appendix 9
Declaration of Conformity.