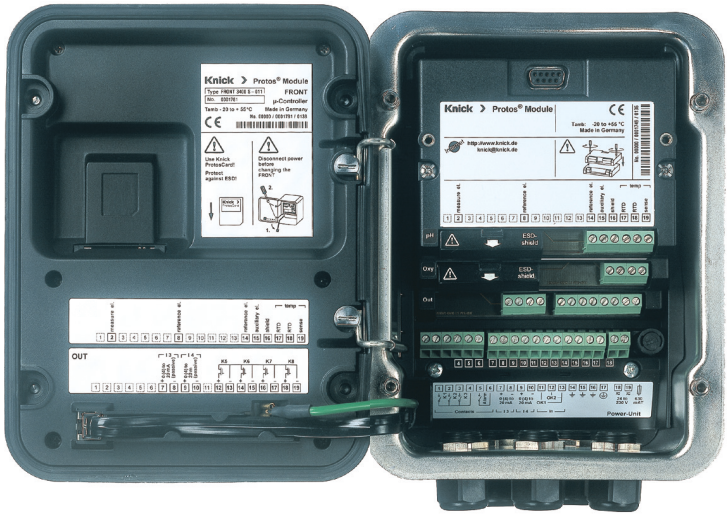
Knick

# Protos II 4400(X) / Protos 3400 Process Analysis System

User Manual

**Protos COMPA 3400(X)-081**
**Communication Module**
Communication Unit for PROFIBUS PA




Latest Product Information: www.knick.de

## Returns

Please contact our Service Team before returning a defective device. Ship the cleaned device to the address you have been given.
If the device has been in contact with process medium, it must be decontaminated/disinfected before shipment. In this case, place a Declaration of Contamination in the consignment to prevent any risk to the health and safety of our service personnel. The declaration is available at:

https://www.knick-international.com/en/service/repairs/

## Disposal

Please observe the applicable local or national regulations concerning the disposal of "waste electrical and electronic equipment".

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# Intended Use

The module is a communication unit for PROFIBUS-PA.

The COMPA 3400X-081 module is intended for operation in locations subject to explosion hazards which require equipment of Group II, device category 2(1), gas/dust.

**Operation in Explosive Atmospheres: COMPA 3400X-081 Module**
The module is approved for operation in explosive atmospheres.
When installing the product in a hazardous location, observe the information in the supplements to the certificates and, if applicable, the relevant control drawings.
Observe all applicable local and national codes and standards for the installation of electrical equipment in explosive atmospheres. For further guidance, consult the following:

- IEC 60079-14
- EU directives 2014/34/EU and 1999/92/EC (ATEX)
- NFPA 70 (NEC)
- ANSI/ISA-RP12.06.01
- User's Guide to Explosion-Proof Equipment in Factories JNIOSH-TR-No.44

⚠ **WARNING!** Possible impairment of explosion protection.

- Modules which have already been used shall be subjected to a professional routine test before they may be operated in another type of protection.
- Prior to commissioning, the operating company must verify the intrinsic safety in accordance with the installation regulations of IEC 60079-14 for the complete interconnection of all equipment involved, including the connecting cables.
- The interconnection of Ex and non-Ex modules (mixed assembly) is not permitted.
- In hazardous locations the device shall only be cleaned with a damp cloth to prevent electrostatic charging.

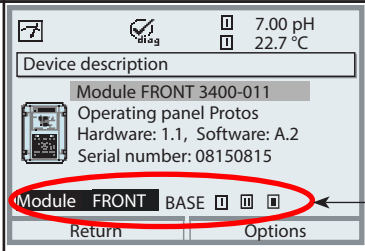
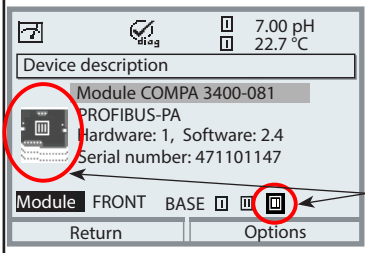
**Maintenance**
The Protos modules cannot be repaired by the user. For inquiries regarding module repair, please contact Knick Elektronische Messgeräte GmbH & Co. KG at www.knick.de.

# Firmware Version

**COMPA 3400(X)-081 module firmware:** Firmware version 2.x

| **Module compatibility** | COMPA 3400-081 | COMPA 3400X-081 |
|---|---|---|
| Protos 3400 from FRONT firmware version 7.0 | x | |
| Protos II 4400 from FRONT firmware version 1.0.0 | x | |
| Protos II 4400X from FRONT firmware version 1.0.0 | | x |

**Query Current Device Firmware/Module Firmware**
When the device is in measuring mode:
Press **menu** key, open Diagnostics menu: Device Description

| Menu | Display | Device description |
|---|---|---|
| diag |  | **Device hardware and firmware version**<br>Provides information on all modules installed: Module type and function, serial number, hardware and firmware version, and device options.<br>Select the different modules (FRONT, BASE, slots 1 - 3) using the arrow keys. |
| |  | **Query module software**<br>Module COMPA 3400-081, hardware and firmware version, serial number –<br>here installed in slot 3. |

**Note:** The display may vary depending on the device version.

# PROFIBUS Technology

PROFIBUS is a digital communication system that connects different field devices over a common cable and integrates them into a control system.
In the long term, PROFIBUS will replace the 4-20mA technology, which only supplies pure measured values. Advantages of the PROFIBUS technology are:

- easy and cost-saving cabling
- convenient operation over a central control station
- transmission, evaluation, and control of high amounts of data from field device to control station.
- devices installed in hazardous locations are configured and maintained from the control station

PROFIBUS is the leading open fieldbus system in Europe. Its application range covers manufacturing, process, and building automation. As open fieldbus standard to EN 50170 and IEC 61158, PROFIBUS ensures communication of different devices over one bus. The PROFIBUS User Organization (PNO) provides for further development and maintenance of the PROFIBUS technology.
It combines the interests of users and manufacturers.

**Variants and Basic Characteristics**
PROFIBUS determines the technical and functional characteristics of a serial bus system. There are two PROFIBUS variants:

- PROFIBUS DP (decentralized peripherals)
  Tailored for communication of automation systems and distributed peripherals.
  RS-485 standard with transmission rates up to 12 MBits/sec
- PROFIBUS PA (process automation)
  Dedicated to the process industry. It permits connection of sensors and actuators to a common bus even in hazardous locations. PROFIBUS PA has a transmission rate of 31.25 kBits/sec.

PROFIBUS distinguishes between two types of devices:

- Masters
  Control the data traffic on the bus.
  They send messages without external request.
- Slaves
  Peripheral devices such as valves, drives, transmitters, and analyzers.
  They can react acyclically to servicing, configuration, and diagnostic tasks of the master. The central controller cyclically reads the measurement data with status.

**Definitions for PROFIBUS PA**

The bus protocol defines type and speed of the data exchange between master and slave devices and determines the transmission protocol of the respective PROFIBUS system.

PROFIBUS PA permits cyclic and acyclic services.

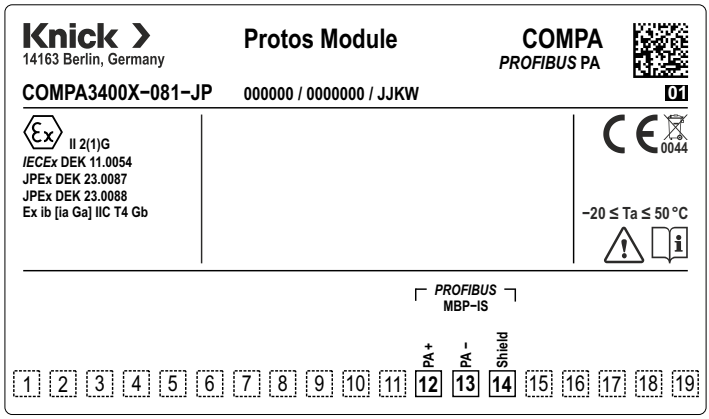
- Cyclic services are used for transmission of measurement data and actuating commands with status information.
- Acyclic services are used for device configuration, maintenance and diagnostics during operation.

The PA 3.0 device profile defines the device class and typical functionalities with parameters, ranges, and limit values.

The FISCO model developed by the German PTB for hazardous locations permits connection of several devices to one common bus and defines permissible limits for device and cable parameters.

# Terminal Plate

### Terminal Plate COMPA3400X-081-JP Module:




### Attaching the Terminal Plates

The terminal plates of the lower modules can be sticked to the inner side of the door.
This facilitates maintenance and service.

# Installing the Module

⚠ **CAUTION!** Electrostatic discharge (ESD).
The modules' signal inputs are sensitive to electrostatic discharge.
Take measures to protect against ESD before inserting the module and wiring the inputs.

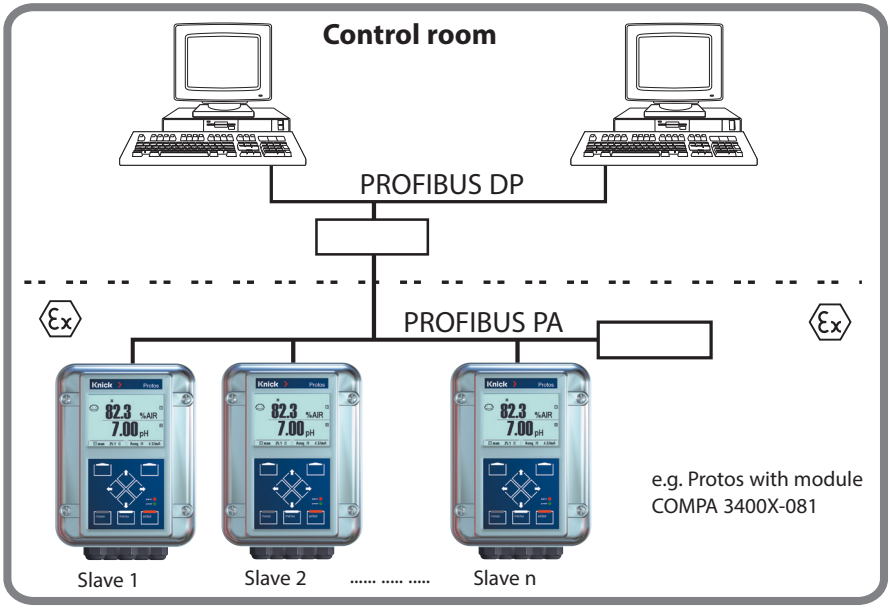
**Note:** Strip the insulation from the wires using a suitable tool to prevent damage.

1) Switch off the power supply to the device.
2) Open the device (loosen the 4 screws on the front).
3) Plug the module into the slot (D-SUB connector), see figure.
4) Tighten the module's fastening screws.
5) Connect the signal lines (see next page).
6) Check whether all connections are correctly wired.
7) Close the device by tightening the screws on the front.
8) Switch on the power supply.

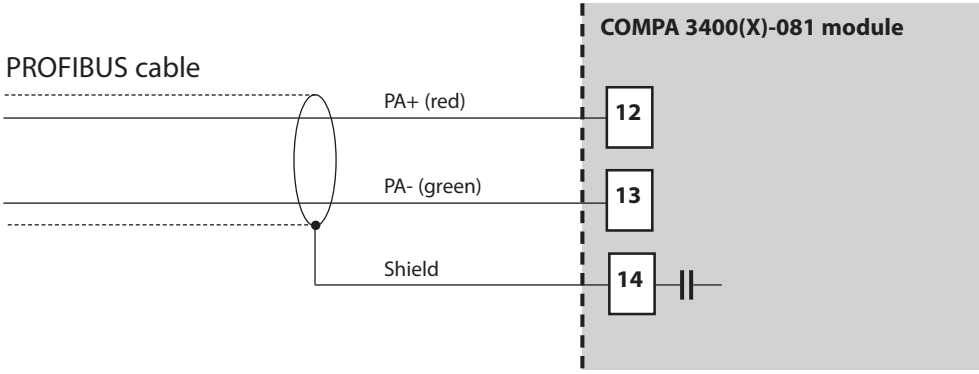
⚠ **CAUTION!** Incorrect measurement results.
Incorrect parameter setting, calibration or adjustment may result in incorrect measurements being recorded. Protos must therefore be commissioned by a system specialist, all its parameters must be set, and it must be fully adjusted.

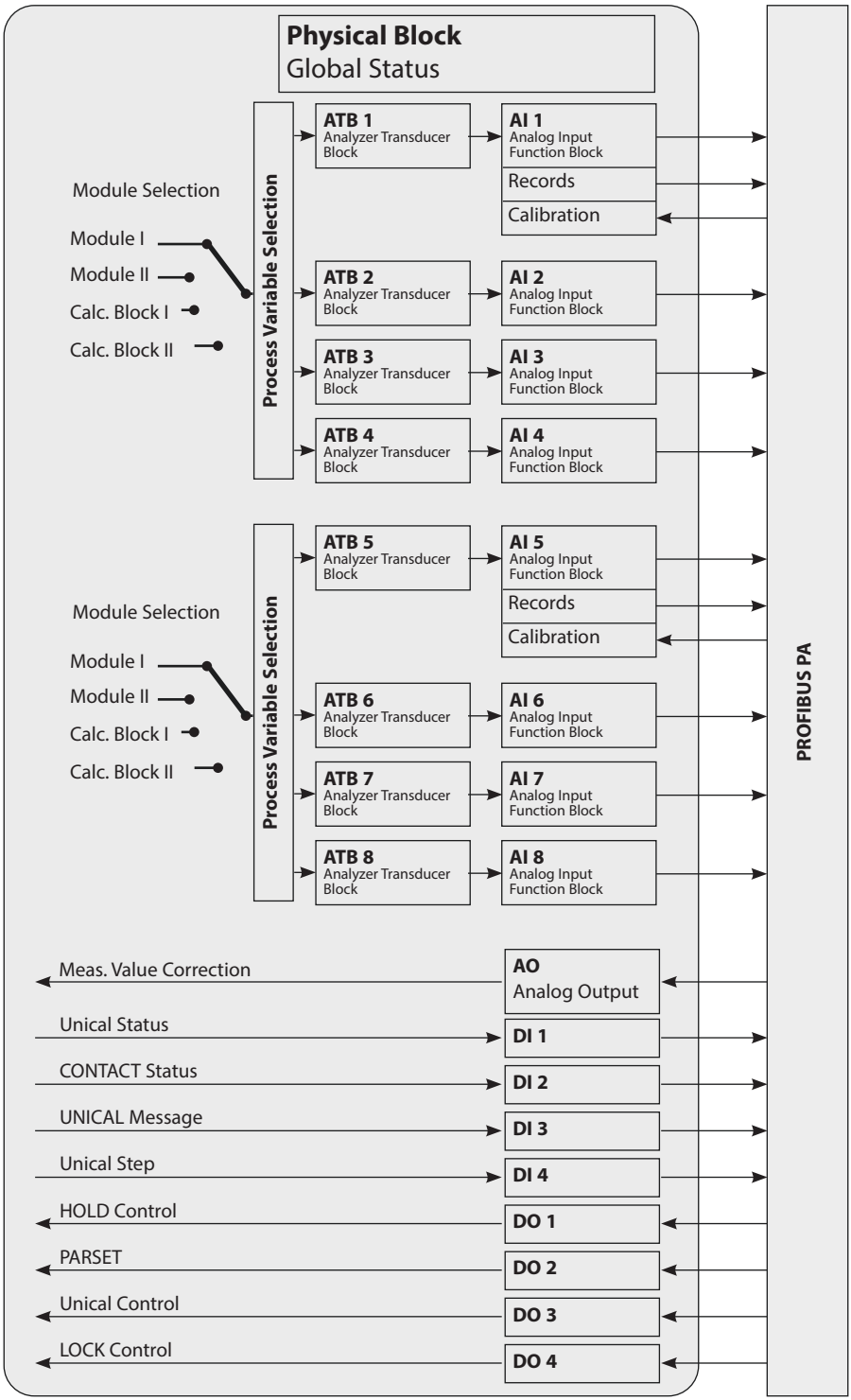
# PROFIBUS PA Installation

Basic build-up of a PROFIBUS system:




Electrical connection between module and PROFIBUS PA is in accordance with the PROFIBUS Guideline, Order No. 2.092 (www.profibus.com).




Physical Block
Global Status
Process Variable Selection
Module Selection
Module I
Module II
Calc. Block I
Calc. Block II
ATB 1
Analyzer Transducer Block
AI 1
Analog Input Function Block
Records
Calibration
ATB 2
AI 2
ATB 3
AI 3
ATB 4
AI 4
Process Variable Selection
Module Selection
Module I
Module II
Calc. Block I
Calc. Block II
ATB 5
AI 5
Records
Calibration
ATB 6
AI 6
ATB 7
AI 7
ATB 8
AI 8
PROFIBUS PA
Meas. Value Correction
AO
Analog Output
Unical Status
DI 1
CONTACT Status
DI 2
UNICAL Message
DI 3
Unical Step
DI 4
HOLD Control
DO 1
PARSET
DO 2
Unical Control
DO 3
LOCK Control
DO 4

# Communication Model

See diagram on previous side

The device parameters are sorted in three types of blocks:

**Physical Block (PB)**
This block contains the general parameters which apply to the whole device.

**Transducer Blocks (TB 1 ... TB 8)**
8 analog blocks. They contain measurement parameters (process variable, temperature) according to the PROFIBUS-PA Profile 3.0 specification.

**Function Blocks**
8 analog input blocks (AI1..4, AI5..8)
4 digital output blocks (DO 1 ... DO 4, for control signals)
4 digital input blocks (DI 1 ... DI 4, for status messages)
1 analog output block (AO 1) for analog compensation signals, e.g. $O_2$ process pressure.

**Physical Block (PB)**
This block contains the device-specific parameters (model designation, manufacturer ID, serial number...) and controls basic device functions such as:

- Write protection
  ("WRITE_LOCKING" parameter)
  Enables or locks acyclic services (maintenance, configuration).
- Blocking operator access to the device
  ("LOCAL_OP_ENA" parameter)
  Enables or locks access via the user interface on the device.
  **Please note:** When communication fails for more than 30 seconds, the device automatically switches to local access.
- Reset
  ("FACTORY_RESET" parameter)
  Caution – data loss!
  Resets all configuration values to factory setting.

**Analog Input Blocks**
The module provides 8 analog input blocks (AI 1 ... AI 8).
They are divided into two groups (channels):
AI 1..4: Channel 1
AI 5..8: Channel 2
Each channel can be assigned to one measuring module (or Calculation Block).
The "AI 1..4 configuration" ("AI 5..8 configuration") menu only displays those measured values which are provided by the selected measuring module.
Both channels can also be assigned to the same measuring module.
For configuration on the device, see Page 18.

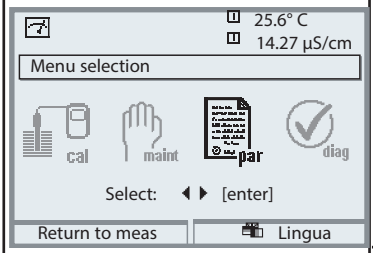
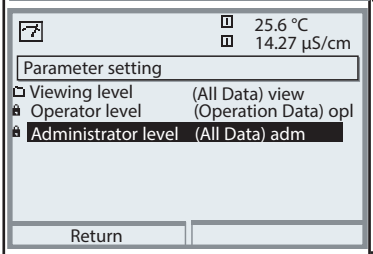
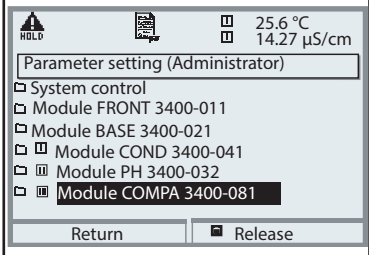
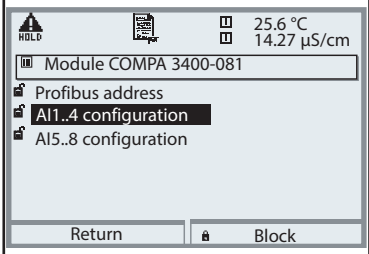
An Analog Input Block contains the signal processing options for the process variable supplied from the Transducer Block.
The following parameters are available:

# Analog Input Blocks

| Function | Parameter | Remark |
|---|---|---|
| Channel selection | CHANNEL | Determined by the assignment of process value to AI block in the Protos (see page 18) |
| Simulation | SIMULATE | Specifying an input value for testing the system |
| Process value | PV_SCALE | Scaling the measured variable |
| Scaling | OUT_SCALE<br>EU at 100%<br>EU at 0% | Scaling of output range<br>Max value<br>Min value |
| Attenuation | PV_FTIME | Attenuating the input value to suppress noise peaks |
| Alarm | HI_LIM<br>HI_HI_LIM<br>LO_LIM<br>LO_LO_LIM<br>ALARM_HYS | Specifying HIGH warning<br>Specifying HIGH alarm<br>Specifying LOW warning<br>Specifying LOW alarm<br>Hysteresis |
| Block mode | MODE_BLK | Out of service<br>Manual<br>Automatic |
| Error behavior | FSAFE_TYPE | The content of [FSAFE_VALUE] is output as value, together with the status signal “Uncertain Substitute Value”<br>The last valid measured value is output, together with the status signal “Uncertain Last Usable Value”<br>2: No editing. Status: Bad |

# Function Blocks: Analog Input Blocks

Selecting the channels of the Analog Input Blocks on the device
Channel 1: AI 1..4, channel 2: AI 5..8

| Menu | Display | Assigning process variables to Analog Input Blocks |
|---|---|---|
| par |  | **Open parameter setting**<br>From the measuring mode:<br>Press **menu** key to select menu.<br>Select parameter setting using arrow keys, confirm by pressing **enter**. |
| |  | **Administrator level:**<br>Access to all functions, also passcode setting.<br>Releasing or blocking a function for access from the Operator level. |
| |  | **Select PROFIBUS module:**<br>Protos permits variable equipment with 2 measuring modules (and PROFIBUS PA module). The available process variables are assigned via "AI... configuration". |
| |  | **Select channel:**<br>Now you can assign a measuring module to one of the two channels (4 Analog Input blocks each) on the device. Both channels can be assigned to the same module. This allows evaluating more measured values. |

**Note:** The display may vary depending on the device version.

# For Copy: Individual Settings

Assigning process variables to Analog Input Blocks on the device

**Note:** The display may vary depending on the device version.

| Menu | Display | Assigning process variables to Analog Input Blocks |
|---|---|---|
| par | HOLD<br>25.6 °C<br>14.27 µS/cm<br>AI1..4 configuration (Administrator)<br>Meas. module: Module COND 3400-041<br>Analog Input AI 1: S/cm<br>Analog Input AI 2: °C<br>Analog Input AI 3: USP<br>Analog Input AI 4: Off<br>Return | **Select AI configuration:**<br>Here you assign the process variables of a module to the 4 Analog Input blocks. |

| AI Block | Process variable assigned |
|---|---|
| AI1..4 | Selected measuring module |
| | Analog Input Block AI 1 |
| | Analog Input Block AI 2 |
| | Analog Input Block AI 3 |
| | Analog Input Block AI 4 |
| AI5..8 | Selected measuring module |
| | Analog Input Block AI 5 |
| | Analog Input Block AI 6 |
| | Analog Input Block AI 7 |
| | Analog Input Block AI 8 |

# Integration to Project Planning Tools

The following files for integration to project planning tools available to download on our website:

**GSD: Generic Station Description**
Device database file for project planning of PLCs

**DD: Device Description Files**
Device Description files for integration in the Simatic PDM configuration software from Siemens or Emerson AMS software, for example

**DTM: Device Type Manager**
Device Type Manager files for integration in Field Device Tools (FDT)

# Cyclic Data Communication

The cyclic data traffic has two transport directions:

- Input data (data are sent from field device to process control system: Input data are provided by Analog Input and Discrete Input function blocks.)
- Output data (data are sent from process control system to field device: Output data are processed by Analog Output and Discrete Output function blocks.)

### Structure of Cyclic Input Data Telegram

| Data | Access | Data format / Interpretation |
|---|---|---|
| Analog Input Function Block 1 "Process Value 1" | r | Measured value (32-bit floating point, IEEE-754)<br>Status byte |
| Analog Input Function Block 2 "Process Value 2" | r | Measured value (32-bit floating point, IEEE-754)<br>Status byte |
| Analog Input Function Block 3 "Process Value 3" | r | Measured value (32-bit floating point, IEEE-754)<br>Status byte |
| Analog Input Function Block 4 "Process Value 4" | r | Measured value (32-bit floating point, IEEE-754)<br>Status byte |
| Analog Input Function Block 5 "Process Value 5" | r | Measured value (32-bit floating point, IEEE-754)<br>Status byte |
| Analog Input Function Block 6 "Process Value 6" | r | Measured value (32-bit floating point, IEEE-754)<br>Status byte |
| Analog Input Function Block 7 "Process Value 7" | r | Measured value (32-bit floating point, IEEE-754)<br>Status byte |
| Analog Input Function Block 8 "Process Value 8" | r | Measured value (32-bit floating point, IEEE-754)<br>Status byte |

# DI Function Blocks

Unical with Protos II 4400(X) from FRONT firmware version 02.xx.xx

## DI 1: Unical Status

| Bit | | | | | | | | Meaning |
|---|---|---|---|---|---|---|---|---|
| 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 | |
| | | | | | | | 1 | Probe in MEASURE position (PROCESS) |
| | | | | | | 1 | | Probe in SERVICE position |
| | | | | | 1 | | | Service switch actuated |
| | | | | 1 | | | | Unical alarm (collective fault message for Unical failures, see p. 24) |
| | | | 1 | | | | | Unical program active |
| 0 | 0 | 0 | | | | | | No program |
| 0 | 0 | 1 | | | | | | Program: Cleaning |
| 0 | 1 | 0 | | | | | | Program: Cal 2point |
| 0 | 1 | 1 | | | | | | Program: Cal 1point |
| 1 | 0 | 0 | | | | | | Program: Parking |
| 1 | 0 | 1 | | | | | | Program: USER 1 |
| 1 | 1 | 0 | | | | | | Program: USER 2 |
| 1 | 1 | 1 | | | | | | Program: Service |

## DI 2: CONTACTS / LOCK Status / ENABLE Request

| Bit | | | | | | | | Meaning |
|---|---|---|---|---|---|---|---|---|
| 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 | |
| | | | | | | | 1 | Contact K4 active |
| | | | | | | 1 | | Contact K3 active |
| | | | | | 1 | | | Contact K2 active |
| | | | | 1 | | | | Contact K1 active |
| | | | 1 | | | | | CAL terminates AI-TB1 (1 min or until cal record collected) |
| | | 1 | | | | | | CAL terminates AI-TB2 (1 min or until cal record collected) |
| 0 | 0 | | | | | | | Measuring mode |
| 0 | 1 | | | | | | | Unconfirmed enable request |
| 1 | 0 | | | | | | | Confirmed enable request |
| 1 | 1 | | | | | | | Enable |

# DI Function Block Unical Messages

Unical with Protos II 4400(X) from FRONT firmware version 02.xx.xx

## DI 3: Unical Messages

| Bit 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 | Meaning |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | 1 | Probe maintenance request |
| | | | | | | 1 | | Media adapter maintenance request |
| | | | | | 1 | | | Unical basic device maintenance request |
| | | | | 1 | | | | Medium maintenance request |
| | | | 1 | | | | | Probe failure |
| | | 1 | | | | | | Media adapter failure |
| | 1 | | | | | | | Unical basic device failure |
| 1 | | | | | | | | Calibration / Communication error |

## Explanation of Unical Messages: Maintenance request

| **Probe maintenance request** | |
|---|---|
| U 231 | Probe move time MEASURE (PROCESS) |
| U 234 | Probe move time SERVICE |
| U 232 | Proble wear counter |
| U 228 | Probe cylinder untight |
| **Media adapter maintenance request** | |
| U 190 | Buffer I almost empty |
| U 191 | Buffer II almost empty |
| U 192 | Cleaner almost empty |
| **Maintenance request / Unical basic device** | |
| U 233 | Water pressure switch |
| U 229 | Sensor dismount guard defective |
| U 235 | Safety valve defective |
| U 248 | Water valve defective (electrical) |

| **Medium maintenance request** | |
|---|---|
| U 241 | Check water |
| U 242 | Check buffer I |
| U 243 | Check buffer II |
| U 244 | Check cleaner |
| U 245 | Check aux. valve I |
| U 246 | Check aux. valve II |

# Unical Messages, Unical Step

Unical with Protos II 4400(X) from FRONT firmware version 02.xx.xx

## Explanation of Unical Messages: Failure

| | |
|---|---|
| **Probe failure** | |
| U 230 | Probe limit position MEASURE (PROCESS) |
| U 227 | Probe limit position SERVICE |
| **Media adapter failure** | |
| U 194 | Buffer I empty |
| U 195 | Buffer II empty |
| U 196 | Cleaner empty |
| **Unical basic device failure** | |
| U 220 | Compressed air switch |
| U 225 | Probe valve defective |
| U 224 | Unical flooded |
| U 221 | Sensor dismounted |
| **Calibration / Communication error** | |
| U 251 | Calibration error |
| U 252 | Communication error |

## DI 4: Unical Step

| Bit | | | | | | | | Meaning |
|---|---|---|---|---|---|---|---|---|
| 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 | |
| | | | | | | | 1 | System in SINGLE_STEP |
| | | X | X | X | X | X | | Step 1 ... 30 |
| | 0 | | | | | | | Reserved |
| 0 | | | | | | | | Reserved |

The half-automated Unical program control in Single-Step Mode can only be activated and triggered from the Protos. Control via bus is not possible, however the Single-Step Mode can be watched.

# DO Function Blocks

## DO 1: HOLD Control

| Bit 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 | Meaning |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | 1 | System HOLD |
| | | | | | | 0 | | Reserved |
| | | | | | 0 | | | Reserved |
| | | | | 0 | | | | Reserved |
| | | | 0 | | | | | Reserved |
| | | 0 | | | | | | Reserved |
| | 0 | | | | | | | Reserved |
| 0 | | | | | | | | Reserved |

## DO 2: PARSET

| Bit 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 | Meaning |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | 1 | Parameter set A (internal) |
| | | | | 0 | 0 | 0 | | Parameter set not from card |
| | | | | 0 | 0 | 1 | | Parameter set 1 (card) |
| | | | | 0 | 1 | 0 | | Parameter set 2 (card) |
| | | | | 0 | 1 | 1 | | Parameter set 3 (card) |
| | | | | 1 | 0 | 0 | | Parameter set 4 (card) |
| | | | | 1 | 0 | 1 | | Parameter set 5 (card) |
| | | | 0 | | | | | Reserved |
| | | 0 | | | | | | Reserved |
| | 0 | | | | | | | Reserved |
| 0 | | | | | | | | Reserved |

# DO Function Blocks

## DO 3: Unical Control

| Bit | | | | | | | | Meaning |
|---|---|---|---|---|---|---|---|---|
| 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 | |
| | | | | | | | X | Reserved |
| | | | | | | 1 | | Probe in SERVICE position (MEASURE = 0) |
| | | | | | 1 | | | Manual, Time control Off (Auto, Time control On = 1) |
| | | | | X | | | | Reserved |
| | | | X | | | | | Reserved |
| 0 | 0 | 0 | | | | | | No program start |
| 0 | 0 | 1 | | | | | | Program: Cleaning |
| 0 | 1 | 0 | | | | | | Program: Cal 2point |
| 0 | 1 | 1 | | | | | | Program: Cal 1point |
| 1 | 0 | 0 | | | | | | Program: Parking |
| 1 | 0 | 1 | | | | | | Program: USER 1 |
| 1 | 1 | 0 | | | | | | Program: USER 2 |
| 1 | 1 | 1 | | | | | | Program: Service |

## DO 4: LOCK Control

| Bit | | | | | | | | Meaning |
|---|---|---|---|---|---|---|---|---|
| 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 | |
| | | | | | | 0 | 0 | Measuring mode |
| | | | | | | 0 | 1 | Enabled |
| | | | | | | 1 | 0 | Busy |
| | | | | | | 1 | 1 | Not used |
| | | | | | X | | | Reserved |
| | | | | X | | | | Reserved |
| | | | X | | | | | Reserved |
| | | X | | | | | | Reserved |
| | X | | | | | | | Reserved |
| X | | | | | | | | Reserved |

# Configuration Data

The "Cyclic Data Communication" table on the previous pages shows the maximum configuration of the cyclic data telegram.
The telegram can be adapted to the respective system requirements if you do not require all data.

For projecting, proceed as follows:
- Load the GSD file in the software of the automation system
- From the configuration software of the automation system, select those data which are required in the cyclic telegram.

From your projecting data, the configuration software of the automation system collects the configuration data which will be transferred from the process control to the field device. The configuration data (CHK_CFG) determine the contents of the cyclic data telegram.
As an alternative, you can also compile the configuration data according to the tables shown on the following pages.

The configuration data consist of 17 sections, each section being assigned to a Function Block. The content determines whether a Function Block takes part in the cyclic data traffic or not. The sequence of data in the cyclic Input/Output data telegram corresponds to the position of the respective Function Block in the configuration data.

# Configuration Data

Analog Input Blocks (1 ... 8)

| Section | Function Block | Configuration Data | Description | Input | Output |
|---|---|---|---|---|---|
| 1 | AI 1 | 0x00 | Free Place | - | - |
| | | 0x42, 0x84, 0x08, 0x05, or 0x42, 0x84, 0x81, 0x81, or 0x94 | "Process Value 1" | 5 bytes | - |
| 2 | AI 2 | 0x00 | Free Place | - | - |
| | | 0x42, 0x84, 0x08, 0x05, or 0x42, 0x84, 0x81, 0x81, or 0x94 | "Process Value 2" | 5 bytes | - |
| 3 | AI 3 | 0x00 | Free Place | - | - |
| | | 0x42, 0x84, 0x08, 0x05, or 0x42, 0x84, 0x81, 0x81, or 0x94 | "Process Value 3" | 5 bytes | - |
| 4 | AI 4 | 0x00 | Free Place | - | - |
| | | 0x42, 0x84, 0x08, 0x05, or 0x42, 0x84, 0x81, 0x81, or 0x94 | "Process Value 4" | 5 bytes | - |
| 5 | AI 5 | 0x00 | Free Place | - | - |
| | | 0x42, 0x84, 0x08, 0x05, or 0x42, 0x84, 0x81, 0x81, or 0x94 | "Process Value 5" | 5 bytes | - |
| 6 | AI 6 | 0x00 | Free Place | - | - |
| | | 0x42, 0x84, 0x08, 0x05, or 0x42, 0x84, 0x81, 0x81, or 0x94 | "Process Value 6" | 5 bytes | - |
| 16 | AI 7 | 0x00 | Free Place | - | - |
| | | 0x42, 0x84, 0x08, 0x05, or 0x42, 0x84, 0x81, 0x81, or 0x94 | "Process Value 7" | 5 bytes | - |
| 17 | AI 8 | 0x00 | Free Place | - | - |
| | | 0x42, 0x84, 0x08, 0x05, or 0x42, 0x84, 0x81, 0x81, or 0x94 | "Process Value 8" | 5 bytes | - |

# Configuration Data

Discrete Input Blocks (1 ...4)

| Section | Function Block | Configuration Data | Description | Input | Output |
|---|---|---|---|---|---|
| 7 | DI 1 | 0x00 | Free Place | - | - |
| | | 0x42, 0x81, 0x05, 0x05, or 0x42, 0x81, 0x83, 0x81, or 0x91 | "UNICAL Status" | 2 bytes | - |
| 8 | DI 2 | 0x00 | Free Place | - | - |
| | | 0x42, 0x81, 0x05, 0x05, or 0x42, 0x81, 0x83, 0x81, or 0x91 | "CONTACT Status" | 2 bytes | - |
| 12 | DI 3 | 0x00 | Free Place | - | - |
| | | 0x42, 0x81, 0x05, 0x05, or 0x42, 0x81, 0x83, 0x81, or 0x91 | "UNICAL Message" | 2 bytes | - |
| 13 | DI 4 | 0x00 | Free Place | - | - |
| | | 0x42, 0x81, 0x05, 0x05, or 0x42, 0x81, 0x83, 0x81, or 0x91 | "UNICAL Step" | 2 bytes | - |

# Configuration Data

Discrete Output Blocks (DO1 ... 4), Analog Output Block AO1

| Section | Function Block | Configuration Data | Description | Input | Output |
|---|---|---|---|---|---|
| 9 | DO 1 | 0x00 | Free Place | - | - |
| | | 0x82, 0x81, 0x84, 0x82, or 0xA1 | "HOLD Control" | 2 bytes | - |
| | | 0xC1, 0x81, 0x81, 0x83, or 0xC2, 0x81, 0x81, 0x84, 0x83 | "HOLD Control / Status" | 2 bytes | 2 bytes |
| 10 | DO 2 | 0x00 | Free Place | - | - |
| | | 0x82, 0x81, 0x84, 0x82, or 0xA1 | "PARSET" | 2 bytes | - |
| | | 0xC1, 0x81, 0x81, 0x83, or 0xC2, 0x81, 0x81, 0x84, 0x83 | "Control / Status" | 2 bytes | 2 bytes |
| 11 | DO 3 | 0x00 | Free Place | - | - |
| | | 0x82, 0x81, 0x84, 0x82, or 0xA1 | "Unical Control" | 2 bytes | - |
| | | 0xC1, 0x81, 0x81, 0x83, or 0xC2, 0x81, 0x81, 0x84, 0x83 | "Control / Status" | 2 bytes | 2 bytes |
| 14 | DO 4 | 0x00 | Free Place | - | - |
| | | 0x82, 0x81, 0x84, 0x82, or 0xA1 | "Lock Control" | 2 bytes | - |
| | | 0xC1, 0x81, 0x81, 0x83, or 0xC2, 0x81, 0x81, 0x84, 0x83 | "Lock Control / Status" | 2 bytes | 2 bytes |
| 15 | AO 1 | 0x00 | Free Place | - | - |
| | | 0x82, 0x84, 0x82, 0x82, or 0xA4 | "Compensation Value" | 2 bytes | - |

# COMPA Slot Model

| Slot No. | Block | Usage |
|---|---|---|
| 0 | PB | General data |
| 1 | AI1 | Measured value 1 |
| 2 | AI2 | Measured value 2 |
| 3 | AI3 | Measured value 3 |
| 4 | AI4 | Measured value 4 |
| 5 | AI5 | Measured value 5 |
| 6 | AI6 | Measured value 6 |
| 16 | AI7 | Measured value 7 |
| 17 | AI8 | Measured value 8 |
| 7 | DI1 | Sense Unical status |
| 8 | DI2 | Sense contacts K1 ... K4 |
| 12 | DI3 | Unical Message |
| 13 | DI4 | Unical Step |
| 9 | DO1 | HOLD control |
| 10 | DO2 | Parameter set control |
| 11 | DO3 | Unical control |
| 14 | DO4 | Lock Control |
| 15 | AO1 | Analog Output 1 |
| 18 | TB1 | Measured value for AI 1 |
| 19 | TB2 | Measured value for AI 2 |
| 20 | TB3 | Measured value for AI 3 |
| 21 | TB4 | Measured value for AI 4 |
| 22 | TB5 | Measured value for AI 5 |
| 23 | TB6 | Measured value for AI 6 |
| 24 | TB7 | Measured value for AI 7 |
| 25 | TB8 | Measured value for AI 8 |

# PB Block Parameters

Defaults & Writable Ranges

| Parameter Name | Data Type | Size | Store | Access | Default Value | Writable Range | Slot | Index |
|---|---|---|---|---|---|---|---|---|
| BLOCK_OBJECT | DS-32 | 20 | C | r | | | 0 | 16 |
| Reserved | Unsigned8 | 1 | | | | | | |
| Block_Object | Unsigned8 | 1 | | | | | | |
| Parent_Class | Unsigned8 | 1 | | | | | | |
| Class | Unsigned8 | 1 | | | | | | |
| DD_Reference | Unsigned32 | 4 | | | | | | |
| DD_Revision | Unsigned16 | 2 | | | | | | |
| Profile | OctetString | 2 | | | | | | |
| Profile_Revision | Unsigned16 | 2 | | | | | | |
| Execution Time | Unsigned8 | 1 | | | | | | |
| Number_of_Param | Unsigned16 | 2 | | | | | | |
| Address_of_View_1 | Unsigned16 | 2 | | | | | | |
| Number_of_Views | Unsigned8 | 1 | | | | | | |
| ST_REV | Unsigned16 | 2 | N | r | 0 | | 0 | 17 |
| TAG_DESC | OctedString | 32 | S | r, w | " " | no restrictions | 0 | 18 |
| STRATEGY | Unsigned16 | 2 | S | r, w | 0 | no restrictions | 0 | 19 |
| ALERT_KEY | Unsigned8 | 1 | S | r, w | 0 | no restrictions | 0 | 20 |
| TARGET_MODE | Unsigned8 | 1 | S | r, w | 0x08 | 0x08; automatic | 0 | 21 |
| MODE_BLK | DS-37 | 3 | D | r | | | 0 | 22 |
| Actual | Unsigned8 | 1 | | | 0x08 | | | |
| Permitted | Unsigned8 | 1 | | | 0x08 | | | |
| Normal | Unsigned8 | 1 | | | 0x08 | | | |
| ALARM_SUM | DS-42 | 8 | D | r | | | 0 | 23 |
| Current | OctedString | 2 | | | 0 | | | |
| Unacknowledged | OctedString | 2 | | | 0 | | | |
| Unreported | OctedString | 2 | | | 0 | | | |
| Disabled | OctedString | 2 | | | 0 | | | |
| SOFTWARE_REVISION | VisibleString | 16 | C | r | | | 0 | 24 |
| HARDWARE_REVISION | VisibleString | 16 | C | r | | | 0 | 25 |

# PB Block Parameters

Defaults & Writable Ranges. Continued.

| Parameter Name | Data Type | Size | Store | Access | Default Value | Writable Range | Slot | Index |
|---|---|---|---|---|---|---|---|---|
| DEVICE_MAN_ID | Unsigned16 | 2 | C | r | | | 0 | 26 |
| DEVICE_ID | VisibleString | 16 | C | r | | | 0 | 27 |
| DEVICE_SER_Num | VisibleString | 16 | C | r | | | 0 | 28 |
| DIAGNOSIS | OctedString | 4 | D | r | 0 | | 0 | 29 |
| DIAGNOSIS_EXTENSION | OctedString | 6 | D | r | 0 | | 0 | 30 |
| DIAGNOSIS_MASK | OctedString | 4 | C | r | | | 0 | 31 |
| DIAGNOSIS_MASK_EXTENSION | OctedString | 6 | C | r | | | 0 | 32 |
| DEVICE_CERTIFICATION | VisibleString | 32 | C | r | | | 0 | 33 |
| WRITE_LOCKING | Unsigned16 | 2 | N | r/w | 2457 | 0: no acyclic write<br>2457: all parameters writable | 0 | 34 |
| FACTORY_RESET | Unsigned16 | 2 | S | r/w | 0 | 0: no action<br>1: reset parameters do default<br>2506: warmstart, no param change | 0 | 35 |
| DESCRIPTOR | OctedString | 32 | S | r/w | " " | no restrictions | 0 | 36 |
| DEVICE_MESSAGE | OctedString | 32 | S | r/w | " " | no restrictions | 0 | 37 |
| DEVICE_INSTAL_DATE | OctedString | 16 | S | r/w | " " | no restrictions | 0 | 38 |
| LOCAL_OP_ENA | Unsigned8 | 1 | N | r/w | 1 | 0: local op. disabled<br>1: local op. enabled | 0 | 39 |
| IDENT_NUMBER_SELECTOR | Unsigned8 | 1 | S | r/w | 1 | 0: profile specific ID<br>1: manufacturer specific ID number | 0 | 40 |
| DEVICE_CONFIGURATION | VisibleString | 32 | N | r | " " | | 0 | 52 |
| INIT_STATE | Unsigned8 | 1 | S | r/w | 2 | 2: Run<br>5: Maintenance | 0 | 53 |
| DEVICE_STATE | Unsigned8 | 1 | D | r/w | 2 | 2: Run<br>5: Maintenance | 0 | 54 |
| GLOBAL_STATUS | Unsigned16 | 2 | D | r | 0 | | 0 | 55 |

# TB Analyser Block Parameters

Defaults & Writable Ranges

| Parameter Name | Data Type | Size | Store | Access | Default Value | Writable Range | Slot | Index |
|---|---|---|---|---|---|---|---|---|
| BLOCK_OBJECT | DS-32 | 20 | C | r | | | 12-17 | 16 |
| Reserved | Unsigned8 | 1 | | | | | | |
| Block_Object | Unsigned8 | 1 | | | | | | |
| Parent_Class | Unsigned8 | 1 | | | | | | |
| Class | Unsigned8 | 1 | | | | | | |
| DD_Reference | Unsigned32 | 4 | | | | | | |
| DD_Revision | Unsigned16 | 2 | | | | | | |
| Profile | OctetString | 2 | | | | | | |
| Profile_Revision | Unsigned16 | 2 | | | | | | |
| Execution Time | Unsigned8 | 1 | | | | | | |
| Number_of_Param | Unsigned16 | 2 | | | | | | |
| Address_of_View_1 | Unsigned16 | 2 | | | | | | |
| Number_of_Views | Unsigned8 | 1 | | | | | | |
| ST_REV | Unsigned16 | 2 | N | r | 0 | | 12-17 | 17 |
| TAG_DESC | OctedString | 32 | S | r, w | " " | no restrictions | 12-17 | 18 |
| STRATEGY | Unsigned16 | 2 | S | r, w | 0 | no restrictions | 12-17 | 19 |
| ALERT_KEY | Unsigned8 | 1 | S | r, w | 0 | no restrictions | 12-17 | 20 |
| TARGET_MODE | Unsigned8 | 1 | S | r, w | 0x08 | 0x08; automatic | 12-17 | 21 |
| MODE_BLK | DS-37 | 3 | D | r | | | 12-17 | 22 |
| Actual | Unsigned8 | 1 | | | 0x08 | | | |
| Permitted | Unsigned8 | 1 | | | 0x08 | | | |
| Normal | Unsigned8 | 1 | | | 0x08 | | | |
| ALARM_SUM | DS-42 | 8 | D | r | | | 12-17 | 23 |
| Current | OctedString | 2 | | | 0 | | | |
| Unacknowledged | OctedString | 2 | | | 0 | | | |
| Unreported | OctedString | 2 | | | 0 | | | |
| Disabled | OctedString | 2 | | | 0 | | | |
| COMPONENT_NAME | OctedString | 32 | S | r, w | Transducer Block n | no restrictions | 12-17 | 24 |
| PV | DS-60 | 12 | D | r | | | 12-17 | 25 |
| PV | Unsigned8 | 4 | | | 0.0 | | | |
| Measurement_Status | Unsigned8 | 1 | | | 0x4C | | | |
| PV_Time | Unsigned8 | 7 | | | Monday, 1. Jan 2003 0h | | | |

# TB Analyser Block Parameters

Defaults & Writable Ranges: continued

| Parameter Name | Data Type | Size | Store | Access | Default Value | Writable Range | Slot | Index |
|---|---|---|---|---|---|---|---|---|
| PV_UNIT | Unsigned16 | 2 | S | r, w | 1243 | depending on the kind of measurement | 12-17 | 26 |
| PV_UNIT_TEXT | OctedString | 8 | S | r, w | " " | no restrictions | 12-17 | 27 |
| ACTIVE_RANGE | Unsigned8 | 1 | S | r, w | 1 | 1 | 12-17 | 28 |
| AUTORANGE_ON | Boolean | 1 | S | r, w | 1 | 1 | 12-17 | 29 |
| SAMPLING_RATE | Time Diff | 4 | S | r, w | 1000 | do not change | 12-17 | 30 |
| NUMBER_OF_RANGES | Unsigned8 | 1 | N | r | 1 | | 12-17 | 41 |
| RANGE_1<br>Begin_of_Range<br>End_of_Range | DS-61<br>Float<br>Float | 8<br>1<br>1 | N | r, w | <br>-2e3<br>2e3 | depending on the kind of measurement do not change | 12-17 | 42 |

# AI Function Block Parameters

Defaults & Writable Ranges

| Parameter Name | Data Type | Size | Store | Access | Default Value | Writable Range | Slot | Index |
|---|---|---|---|---|---|---|---|---|
| BLOCK_OBJECT | DS-32 | 20 | C | r | | | 1-6, | 16 |
| Reserved | Unsigned8 | 1 | | | | | 16, | |
| Block_Object | Unsigned8 | 1 | | | | | 17 | |
| Parent_Class | Unsigned8 | 1 | | | | | | |
| Class | Unsigned8 | 1 | | | | | | |
| DD_Reference | Unsigned32 | 4 | | | | | | |
| DD_Revision | Unsigned16 | 2 | | | | | | |
| Profile | OctetString | 2 | | | | | | |
| Profile_Revision | Unsigned16 | 2 | | | | | | |
| Execution Time | Unsigned8 | 1 | | | | | | |
| Number_of_Param | Unsigned16 | 2 | | | | | | |
| Address_of_View_1 | Unsigned16 | 2 | | | | | | |
| Number_of_Views | Unsigned8 | 1 | | | | | | |
| ST_REV | Unsigned16 | 2 | N | r | 0 | | 1-6 16,17 | 17 |
| TAG_DESC | OctedString | 32 | S | r, w | " " | no restrictions | 1-6 16,17 | 18 |
| STRATEGY | Unsigned16 | 2 | S | r, w | 0 | no restrictions | 1-6 16,17 | 19 |
| ALERT_KEY | Unsigned8 | 1 | S | r, w | 0 | no restrictions | 1-6 16,17 | 20 |
| TARGET_MODE | Unsigned8 | 1 | S | r, w | 0x08 | 0x80: Out of Service<br>0x10: Manual<br>0x08: Automatic | 1-6 16,17 | 21 |
| MODE_BLK | DS-37 | 3 | D | r | | | 1-6 16,17 | 22 |
| Actual | Unsigned8 | 1 | | | 0x08 | | | |
| Permitted | Unsigned8 | 1 | | | 0x98 | | | |
| Normal | Unsigned8 | 1 | | | 0x08 | | | |
| ALARM_SUM | DS-42 | 8 | D | r | | | 1-6 16,17 | 23 |
| Current | OctedString | 2 | | | 0 | | | |
| Unacknowledged | OctedString | 2 | | | 0 | | | |
| Unreported | OctedString | 2 | | | 0 | | | |
| Disabled | OctedString | 2 | | | 0 | | | |
| BATCH | DS-42 | 10 | S | r, w | | no restrictions | 1-6 | 24 |
| BATCH-ID | Unsigned32 | 4 | | | 0 | | 16,17 | |
| RUP | Unsigned16 | 2 | | | 0 | | | |
| OPERATION | Unsigned16 | 2 | | | 0 | | | |
| PHASE | Unsigned16 | 2 | | | 0 | | | |

# AI Function Block Parameters

Defaults & Writable Ranges. Continued.

| Parameter Name | Data Type | Size | Store | Access | Default Value | Writable Range | Slot | Index |
|---|---|---|---|---|---|---|---|---|
| OUT | 101 | 5 | D | r/ (w) | | writable if MODE_BLK. Actual=Man | 1-6 | 26 |
| VALUE | Unsigned8 | 4 | | | 0.0 | no restrictions | 16, | |
| STATUS | Unsigned8 | 1 | | | 0x4C | any of class Non Cascade | 17 | |
| PV_SCALE | Float array | 8 | S | r, w | 2e3, -2e3 | no restrictions | 1-6 16,17 | 27 |
| OUT_SCALE | DS-36 | 11 | S | r, w | | | 1-6 16,17 | 28 |
| EU at 100% | Float | 4 | | | 2e3 | no restrictions | | |
| EU at 0% | Float | 4 | | | -2e3 | no restrictions | | |
| Units Index | Unsigned16 | 2 | | | 1243 | do not change | | |
| Decimal Point | Integer8 | 1 | | | 1 | no restrictions | | |
| LIN_TYPE | Unsigned8 | 1 | S | r, w | 0 | 0: no linearization | 1-6 16,17 | 29 |
| CHANNEL | Unsigned16 | 2 | S | r, w | TBn | do not change | 1-6 16,17 | 30 |
| PV_FTIME | Float | 4 | S | r, w | 0.0 | >=0.0 | 1-6 16,17 | 32 |
| FSAVE_TYPE | Unsigned8 | 1 | S | r, w | 2 | 0: FSAVE_VALUE/ UNC-substitute<br>1: last useable val / UNC-last useable<br>2: wrong val / BAD-* (*=as calculated) | 1-6 16,17 | 33 |
| FSAVE_VALUE | Float | 4 | S | r, w | 0.0 | no restrictions | 1-6 16,17 | 34 |
| ALARM_HYS | Float | 4 | S | r, w | 100.0 | >=0.0 | 1-6 16,17 | 35 |
| HI_HI_LIM | Float | 4 | S | r, w | 2e3 | no restrictions | 1-6 16,17 | 37 |
| HI_LIM | Float | 4 | S | r, w | 2e3 | no restrictions | 1-6 16,17 | 39 |
| LO_LIM | Float | 4 | S | r, w | -2e3 | no restrictions | 1-6 16,17 | 41 |
| LO_LO_LIM | Float | 4 | S | r, w | -2e3 | no restrictions | 1-6 16,17 | 43 |
| HI_HI_ALM | DS-39 | 16 | D | r | | | 1-6 16,17 | 46 |
| Unacknowledged | Unsigned8 | 1 | | | 0 | | | |
| Alarm State | Unsigned8 | 1 | | | 0 | | | |
| Time Stamp | Time Val | 8 | | | 0 | | | |
| Subcode | Unsigned16 | 2 | | | 0 | | | |
| Value | Float | 4 | | | 0.0 | | | |

# AI Function Block Parameters

Defaults & Writable Ranges. Continued.

| Parameter Name | Data Type | Size | Store | Access | Default Value | Writable Range | Slot | Index |
|---|---|---|---|---|---|---|---|---|
| HI_ALM | DS-39 | 16 | D | r | | | 1-6 16,17 | 47 |
| Unacknowledged | Unsigned8 | 1 | | | 0 | | | |
| Alarm State | Unsigned8 | 1 | | | 0 | | | |
| Time Stamp | Time Val | 8 | | | 0 | | | |
| Subcode | Unsigned16 | 2 | | | 0 | | | |
| Value | Float | 4 | | | 0.0 | | | |
| LO_ALM | DS-39 | 16 | D | r | | | 1-6 16,17 | 48 |
| Unacknowledged | Unsigned8 | 1 | | | 0 | | | |
| Alarm State | Unsigned8 | 1 | | | 0 | | | |
| Time Stamp | Time Val | 8 | | | 0 | | | |
| Subcode | Unsigned16 | 2 | | | 0 | | | |
| Value | Float | 4 | | | 0.0 | | | |
| LO_LO_ALM | DS-39 | 16 | D | r | | | 1-6 16,17 | 49 |
| Unacknowledged | Unsigned8 | 1 | | | 0 | | | |
| Alarm State | Unsigned8 | 1 | | | 0 | | | |
| Time Stamp | Time Val | 8 | | | 0 | | | |
| Subcode | Unsigned16 | 2 | | | 0 | | | |
| Value | Float | 4 | | | 0.0 | | | |
| SIMULATE | DS-50 | 6 | S | r, w | | | 1-6 16,17 | 50 |
| Simulate_Status | Unsigned8 | 1 | | | 0x60 | any of class Non cascade | | |
| Simulate_Value | Float | 4 | | | 0.0 | no restrictions | | |
| Simulate_Enabled | Unsigned8 | 1 | | | 0 | no restrictions | | |
| OUT_UNIT_TEXT | OctedString | 16 | S | r, w | " " | no restrictions | 1-6 16,17 | 51 |
| SENSOR_ID | OctedString | 20 | D | r | 0 | | 1-6 16,17 | 61 |
| CAL_PRD_MODE | Unsigned8 | 1 | S | r, w | 0 | no restrictions | 1, 5 | 62 |
| CAL_PRD_SAMPLE | Unsigned8 | 1 | D | r, w | 0 | 0 .. 1 | 1, 5 | 63 |
| CAL_PRD_STORED_VAL | Float | 4 | D | r | 0.0 | | 1, 5 | 64 |
| CAL_PRD_TRUE_VAL | Float | 4 | D | r, w | 0.0 | no restrictions | 1, 5 | 65 |
| CAL_PRD_STEP | Unsigned8 | 1 | D | r | 0 | | 1, 5 | 66 |
| CAL_CAL_RESULT | Unsigned8 | 1 | D | r | 0 | | 1-6, 16,17 | 67 |
| CALPROT_STATUS | Unsigned8 | 1 | D | r | 0 | | 1, 5 | 69 |
| CALPROT_DATA | OctedString | 200 | D | r | 0 | | 1, 5 | 70 |
| CALPROT_CONFIRM | Unsigned8 | 1 | D | r, w | 0 | 0 .. 3 | 1, 5 | 71 |
| CALPROT_DATA_FIXLEN | OctedString | 100 | D | r | 0 | | 1, 5 | 72 |

# DI Function Block Parameters

Defaults & Writable Ranges

| Parameter Name | Data Type | Size | Store | Access | Default Value | Writable Range | Slot | Index |
|---|---|---|---|---|---|---|---|---|
| BLOCK_OBJECT | DS-32 | 20 | C | r | | | 7-8 | 16 |
| Reserved | Unsigned8 | 1 | | | | | | |
| Block_Object | Unsigned8 | 1 | | | | | | |
| Parent_Class | Unsigned8 | 1 | | | | | | |
| Class | Unsigned8 | 1 | | | | | | |
| DD_Reference | Unsigned32 | 4 | | | | | | |
| DD_Revision | Unsigned16 | 2 | | | | | | |
| Profile | OctetString | 2 | | | | | | |
| Profile_Revision | Unsigned16 | 2 | | | | | | |
| Execution Time | Unsigned8 | 1 | | | | | | |
| Number_of_Param | Unsigned16 | 2 | | | | | | |
| Address_of_View_1 | Unsigned16 | 2 | | | | | | |
| Number_of_Views | Unsigned8 | 1 | | | | | | |
| ST_REV | Unsigned16 | 2 | N | r | 0 | | 7-8 | 17 |
| TAG_DESC | OctedString | 32 | S | r, w | " " | no restrictions | 7-8 | 18 |
| STRATEGY | Unsigned16 | 2 | S | r, w | 0 | no restrictions | 7-8 | 19 |
| ALERT_KEY | Unsigned8 | 1 | S | r, w | 0 | no restrictions | 7-8 | 20 |
| TARGET_MODE | Unsigned8 | 1 | S | r, w | 0x08 | 0x80: Out of Service<br>0x10: Manual<br>0x08: Automatic | 7-8 | 21 |
| MODE_BLK | DS-37 | 3 | D | r | | | 7-8 | 22 |
| Actual | Unsigned8 | 1 | | | 0x08 | | | |
| Permitted | Unsigned8 | 1 | | | 0x98 | | | |
| Normal | Unsigned8 | 1 | | | 0x08 | | | |
| ALARM_SUM | DS-42 | 8 | D | r | | | 7-8 | 23 |
| Current | OctedString | 2 | | | 0 | | | |
| Unacknowledged | OctedString | 2 | | | 0 | | | |
| Unreported | OctedString | 2 | | | 0 | | | |
| Disabled | OctedString | 2 | | | 0 | | | |
| BATCH | DS-42 | 10 | S | r, w | | no restrictions | 7-8 | 24 |
| BATCH-ID | Unsigned32 | 4 | | | 0 | | | |
| RUP | Unsigned16 | 2 | | | 0 | | | |
| OPERATION | Unsigned16 | 2 | | | 0 | | | |
| PHASE | Unsigned16 | 2 | | | 0 | | | |

# DI Function Block Parameters

Defaults & Writable Ranges. Continued.

| Parameter Name | Data Type | Size | Store | Access | Default Value | Writable Range | Slot | Index |
|---|---|---|---|---|---|---|---|---|
| OUT_D | 102 | 2 | D | r, w | | writable if MODE_BLK. Actual=Man | 7-8 | 26 |
| VALUE | Unsigned8 | 1 | | | 0 | no restrictions | | |
| STATUS | Unsigned8 | 1 | | | 0x4C | any of class Non Cascade | | |
| CHANNEL | Unsigned16 | 2 | S | r, w | 0 | 0 | 7-8 | 30 |
| INVERT | Unsigned8 | 1 | S | r, w | 0 | 0: not inverted<br>1: invert | 7-8 | 31 |
| FSAVE_TYPE | Unsigned8 | 1 | S | r, w | 1 | 0: FSAVE_VAL_D/ UNC-substitute<br>1: last useable val / UNC-last useable<br>2: wrong val / BAD-*<br>(*=as calculated) | 7-8 | 36 |
| FSAVE_VAL_D | Unsigned8 | 1 | S | r, w | 0 | no restrictions | 7-8 | 37 |
| SIMULATE | DS-51 | 3 | S | r, w | | | 7-8 | 40 |
| Simulate_Status | Unsigned8 | 1 | | | 0x60 | any of class Non Cascade | | |
| Simulate_Value | Unsigned8 | 1 | | | 0 | no restrictions | | |
| Simulate_Enabled | Unsigned8 | 1 | | | 0 | no restrictions | | |

# DO Function Block Parameters

Defaults & Writable Ranges

| Parameter Name | Data Type | Size | Store | Access | Default Value | Writable Range | Slot | Index |
|---|---|---|---|---|---|---|---|---|
| BLOCK_OBJECT | DS-32 | 20 | C | r | | | 9-11 | 16 |
| Reserved | Unsigned8 | 1 | | | | | | |
| Block_Object | Unsigned8 | 1 | | | | | | |
| Parent_Class | Unsigned8 | 1 | | | | | | |
| Class | Unsigned8 | 1 | | | | | | |
| DD_Reference | Unsigned32 | 4 | | | | | | |
| DD_Revision | Unsigned16 | 2 | | | | | | |
| Profile | OctetString | 2 | | | | | | |
| Profile_Revision | Unsigned16 | 2 | | | | | | |
| Execution Time | Unsigned8 | 1 | | | | | | |
| Number_of_Param | Unsigned16 | 2 | | | | | | |
| Address_of_View_1 | Unsigned16 | 2 | | | | | | |
| Number_of_Views | Unsigned8 | 1 | | | | | | |
| ST_REV | Unsigned16 | 2 | N | r | 0 | | 9-11 | 17 |
| TAG_DESC | OctedString | 32 | S | r, w | " " | no restrictions | 9-11 | 18 |
| STRATEGY | Unsigned16 | 2 | S | r, w | 0 | no restrictions | 9-11 | 19 |
| ALERT_KEY | Unsigned8 | 1 | S | r, w | 0 | no restrictions | 9-11 | 20 |
| TARGET_MODE | Unsigned8 | 1 | S | r, w | 0x08 | 0x80: Out of Service<br>0x10: Manual<br>0x08: Automatic | 9-11 | 21 |
| MODE_BLK | DS-37 | 3 | D | r | | | 9-11 | 22 |
| Actual | Unsigned8 | 1 | | | 0x08 | | | |
| Permitted | Unsigned8 | 1 | | | 0x98 | | | |
| Normal | Unsigned8 | 1 | | | 0x08 | | | |
| ALARM_SUM | DS-42 | 8 | D | r | | | 9-11 | 23 |
| Current | OctedString | 2 | | | 0 | | | |
| Unacknowledged | OctedString | 2 | | | 0 | | | |
| Unreported | OctedString | 2 | | | 0 | | | |
| Disabled | OctedString | 2 | | | 0 | | | |
| BATCH | DS-42 | 10 | S | r, w | | no restrictions | 9-11 | 24 |
| BATCH-ID | Unsigned32 | 4 | | | 0 | | | |
| RUP | Unsigned16 | 2 | | | 0 | | | |
| OPERATION | Unsigned16 | 2 | | | 0 | | | |
| PHASE | Unsigned16 | 2 | | | 0 | | | |

# DO Function Block Parameters

Defaults & Writable Ranges. Continued.

| Parameter Name | Data Type | Size | Store | Access | Default Value | Writable Range | Slot | Index |
|---|---|---|---|---|---|---|---|---|
| SP_D | 102 | 2 | D | r, w | | | 9-11 | 25 |
| VALUE | Unsigned8 | 1 | | | 0 | no restrictions | | |
| STATUS | Unsigned8 | 1 | | | 0x18 | any of class Non Cascade | | |
| OUT_D | 102 | 2 | D | r, w | | writable if MODE_BLK. Actual=Man | 9-11 | 26 |
| VALUE | Unsigned8 | 1 | | | 0 | no restrictions | | |
| STATUS | Unsigned8 | 1 | | | 0x1C | any of class Non Cascade | | |
| READBACK_D | 102 | 2 | D | r | | writable if MODE_BLK. Actual=Man | 9-11 | 28 |
| VALUE | Unsigned8 | 1 | | | 0 | no restrictions | | |
| STATUS | Unsigned8 | 1 | | | 0x4C | any of class Non Cascade | | |
| CHANNEL | Unsigned16 | 2 | S | r, w | 0 | do not change | 9-11 | 33 |
| INVERT | Unsigned8 | 1 | S | r, w | 0 | 0: not inverted<br>1: invert | 9-11 | 34 |
| FSAVE_TIME | Float | 4 | S | r, w | 0.0 | 0.0 ... 6000.0 | 9-11 | 35 |
| FSAVE_TYPE | Unsigned8 | 1 | S | r, w | 2 | 0: UNC-substitute<br>1: last useable val | 9-11 | 36 |
| FSAVE_VAL_D | Unsigned8 | 1 | S | r, w | 0 | 0: sensor in pos. measure<br>2: sensor in pos. service | 9-11 | 37 |
| SIMULATE | DS-51 | 3 | S | r, w | | | 9-11 | 40 |
| Simulate_Status | Unsigned8 | 1 | | | 0x60 | any of class Non Cascade | | |
| Simulate_Value | Unsigned8 | 1 | | | 0 | no restrictions | | |
| Simulate_Enabled | Unsigned8 | 1 | | | 0 | no restrictions | | |
| CHECK_BACK | OctedString | 3 | D | r | 0, 0, 0 | | 9-11 | 49 |
| CHECK_BACK_MASK | OctedString | 3 | C | r | 5, 0, 0 | | 9-11 | 50 |

# AO Function Block Parameters

Defaults & Writable Ranges.

| Parameter Name | Data Type | Size | Store | Access | Parameter Usage / Kind of Transport | Default value | Mandatory Optional (Class A,B) |
|---|---|---|---|---|---|---|---|
| SP | 101 | 5 | D | r/ (w) | I / cyc | - | M |
| VALUE | Unsigned8 | 4 | | | | | |
| STATUS | Unsigned8 | 1 | | | | | |
| PV_SCALE | DS-36 | 11 | S | r, w | C / a | 2000, -2000, mV | M |
| EU at 100% | Float | 4 | | | | | |
| EU at 0% | Float | 4 | | | | | |
| Units Index | Unsigned16 | 2 | | | | | |
| Decimal Point | Integer8 | 1 | | | | | |
| READBACK | 101 | 5 | D | r/ (w) | O / cyc | - | M |
| VALUE | Unsigned8 | 4 | | | | | |
| STATUS | Unsigned8 | 1 | | | | | |
| IN_CHANNEL | Unsigned16 | 2 | S | r, w | C / a | - | M |
| OUT_CHANNEL | Unsigned16 | 2 | S | r, w | C / a | - | M |
| FSAFE_TIME | Float | 4 | S | r, w | C / a | 0 | M |
| FSAFE_TYPE | Unsigned8 | 1 | S | r, w | C / a | 2 | M |
| FSAFE_VALUE | Float | 4 | S | r, w | C / a | 0 | M |
| POS_D | 102 | 2 | D | r, w | O / cyc | - | M |
| VALUE | Unsigned8 | 1 | | | | | |
| STATUS | Unsigned8 | 1 | | | | | |
| CHECK_BACK | OctedString | 3 | D | r | O / cyc | - | M |
| CHECK_BACK_MASK | OctedString | 5 | Cst | r | C / a | - | M |
| SIMULATE | DS-50 | 6 | S | r, w | C / a | disabled | M |
| Simulate_Status | Unsigned8 | 1 | | | | | |
| Simulate_Value | Float | 4 | | | | | |
| Simulate_Enabled | Unsigned8 | 1 | | | | | |
| INCREASE_CLOSE | Unsigned8 | 1 | S | r, w | C / a | 0 | M |
| OUT | 101 | 5 | D | r/ (w) | C / a | - | M |
| VALUE | Unsigned8 | 4 | | | | | |
| STATUS | Unsigned8 | 1 | | | | | |
| OUT_SCALE | DS-36 | 11 | S | r, w | C / a | - | M |
| EU at 100% | Float | 4 | | | | | |
| EU at 0% | Float | 4 | | | | | |
| Units Index | Unsigned16 | 2 | | | | | |
| Decimal Point | Integer8 | 1 | | | | | |

# Calibration Record Parameters

Specification

The calibration records are stored in the AI Function Block 1 (channel 1) or AI Function Block 5 (channel 2) of the COMPA 3400(X)-081 module as soon as a calibration / adjustment is terminated.

| Parameter | Description |
|---|---|
| CALPROT_STATUS | Shows how many calibration records of the measured module configured for this channel are available and can be read out from the CALPROT_DATA parameter.<br>Coding: 0...3 = Number of retrievable records |
| CALPROT_DATA | Calibration record of the measured module configured for this channel.<br>3...120 bytes can be requested for reading. If you request more data than the record actually contains, the telegram is filled with zeroes up to the requested data amount. If the record contains more data than requested for reading, the remaining data must be retrieved by further read accesses to CALPROT_DATA (see CALPROT_CONFIRM).<br>Byte 2 of each read record section shows whether the record has been transmitted completely (=0) or whether further read accesses are required (=1). Byte 1 of each read record section contains a section counter to prove the completeness of a record that was read in repeated accesses.<br>The n bytes sent by the device are thus encoded as follows:<br>Byte 1: BLOCK_NBR: Section counter, starting with 0<br>Byte 2: MORE_DATA: 0 = Record transmitted completely<br>1 = Further data available<br>Byte 3 – n: Parameter blocks (the actual calibration record) |
| CALPROT_DATA_ FIXLEN | Like CALPROT_DATA but with a fixed length of 100 bytes |
| CALPROT_CONFIRM | Confirmation after readout of record. After readout of the calibration record, the host must write this parameter to the Protos. After execution of the command, the Protos automatically resets the parameter to 0.<br>Coding:<br>0 = No action (default)<br>1 = CONFIRM: Read confirmation of a record. Protos deletes this record and places the next record in CALPROT_DATA for readout. CALPROT_STATUS is reduced by one. When there is no further record in the buffer, the CALPROT_STATUS is set to 0. Further records can only be retrieved after CONFIRM has been sent.<br>2 = REWIND: Repeat.<br>The record can be retrieved once more from the beginning.<br>3 = NEXT_BLOCK: Read confirmation of a record section.<br>When a record is read in several sections, each read section must be acknowledged with NEXT_BLOCK. Then, Protos places the next section in CALPROT_DATA for readout. Unless NEXT_BLOCK has been sent, every read access will retrieve the already read section. |

# Calibration Record Parameters

**Parameter Blocks**
The record is transmitted as a structured byte string. Each parameter is preceded by a 3-byte block with structure information so that it forms a parameter block.
**Length** (1 byte):
Number of bytes of this parameter block (= data byte number + 3).
Exception: 0x00 = end identifier.
**ID** (2 bytes):
Specifies the type of parameter. This identifier implies how the data bytes are to be interpreted (float, integer, ASCII, ...).
**Data** (n bytes): Data bytes = parameter content.

Typical calibration record with 2 entries and an end identifier:

| Length | ID | | Data 1 | ... | Data n | Length | ID | | Data 1 | ... | Data n | Length |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| n+3 | | | | | | n+3 | | | | | | 0 |

Please note that calibration records have different lengths. If a calibration process is interrupted, for example, only the sections that have been processed until the moment of interruption are stored as parameter blocks in the record. Therefore, the automatic interpretation of the calibration record must always be performed by using the parameter ID and not by using offsets in the data string.

# Calibration Record IDs

GMP Calibration. The list shows all presentable entries.
Which entries really appear in the respective record depends on the calibration mode, process variable, module etc.

**pH Calibration Record Entries**

| ID | Record entry | Unit of measure |
|---|---|---|
| 102 | Calibration | |
| 103 | User | |
| 104 | Cal mode | |
| 105 | Sensor designation | |
| 106 | Serial number | |
| 110 | Impedance glass (25°C) | [Mohm] |
| 111 | Impedance ref (25°C) | [kohm] |
| 112 | Allowed deviation | [pH] |
| 113 | Adjustment limit | [pH] |
| 114 | Sample value | [pH] |
| 115 | Lab value | [pH] |
| 116 | 1st buffer value | [pH] |
| 117 | Electrode voltage | [mV] |
| 118 | Cal temp | [°C] |
| 119 | Response time | [s] |
| 120 | Setpoint | [pH] |
| 121 | Actual value | [pH] |
| 122 | Deviation | [pH] |
| 123 | Allowed dev. exceeded | |
| 124 | Adj. limit exceeded | |
| 125 | 2nd buffer value | [pH] |
| 126 | Electrode voltage | [mV] |
| 127 | Cal temp | [°C] |
| 128 | Response time | [s] |
| 129 | Setpoint | [pH] |
| 130 | Actual value | [pH] |
| 131 | Deviation | [pH] |

# Calibration Record IDs

GMP Calibration. The list shows all presentable entries.
Which entries really appear in the respective record depends on the calibration mode, process variable, module etc.

**pH Calibration Record Entries**

| ID | Record entry | Unit of measure |
|---|---|---|
| 132 | Allowed dev. exceeded | |
| 133 | Adj. limit exceeded | |
| 134 | 3rd buffer value | [pH] |
| 135 | Electrode voltage | [mV] |
| 136 | Cal temp | [°C] |
| 137 | Response time | [s] |
| 138 | Setpoint | [pH] |
| 139 | Actual value | [pH] |
| 140 | Deviation | [pH] |
| 141 | Allowed dev. exceeded | |
| 142 | Adj. limit exceeded | |
| 143 | Zero point (adj) | [pH] |
| 144 | Zero point (cal) | [pH] |
| 145 | Deviation | [pH] |
| 146 | Dev. > tolerance | |
| 147 | Zero > Min/Max | |
| 148 | Slope (adj) | [mV/pH] |
| 149 | Slope (Cal) | [mV/pH] |
| 150 | Deviation | [mV/pH] |
| 151 | Dev. > tolerance | |
| 152 | Slope > Min/Max | |
| 153 | Calibration successful | |
| 154 | Adjustment required | |
| 155 | Adjustment successful | |
| 156 | Zero | [pH] |
| 157 | Slope | [mV/pH] |
| 158 | First Adjustment | |

# Calibration Record IDs

GMP Calibration. The list shows all presentable entries.
Which entries really appear in the respective record depends on the calibration mode, process variable, module etc.

**pH Calibration Record Entries**

| ID | Record entry | Unit of measure |
|---|---|---|
| 170 | Sample value | [pH] |
| 171 | Lab value | [pH] |
| 172 | Sample value | [pH] |
| 173 | Lab value | [pH] |
| 182 | Batch number (Lot) for buffer 1 | |
| 183 | Batch number (Lot) for buffer 2 | |
| 184 | Batch number (Lot) for buffer 3 | |
| 200 | Adjustment | |
| 201 | User | |
| 202 | Calibration | |
| 203 | User | |
| 204 | Cal mode | |
| 205 | Sensor designation | |
| 206 | Serial number | |
| 207 | Isothermal potential | [mV] |
| 208 | Isothermal point | [pH] |
| 209 | ISFET zero | [mV] |
| 210 | Impedance glass (25°C) | [Mohm] |
| 211 | Impedance ref (25°C) | [kohm] |
| 214 | Sample value | [pH] |
| 215 | Lab value | [pH] |
| 216 | 1st buffer value | [pH] |
| 217 | Electrode voltage | [mV] |
| 218 | Cal temp | [°C] |
| 219 | Response time | [s] |
| 225 | 2nd buffer value | [pH] |
| 226 | Electrode voltage | [mV] |

# Calibration Record IDs

GMP Calibration. The list shows all presentable entries.
Which entries really appear in the respective record depends on the calibration mode, process variable, module etc.

**pH Calibration Record Entries**

| ID | Record entry | Unit of measure |
|---|---|---|
| 227 | Cal temp | [°C] |
| 228 | Response time | [s] |
| 234 | 3rd buffer value | [pH] |
| 235 | Electrode voltage | [mV] |
| 236 | Cal temp | [°C] |
| 237 | Response time | [s] |
| 243 | Zero | [pH] |
| 244 | Old zero | [pH] |
| 245 | Deviation | [pH] |
| 246 | Dev. > tolerance | |
| 247 | Zero > Min/Max | |
| 248 | Slope | [mV/pH] |
| 249 | Old slope | [mV/pH] |
| 250 | Deviation | [mV/pH] |
| 251 | Dev. > tolerance | |
| 252 | Slope > Min/Max | |
| 253 | Adjustment successful | |
| 254 | Check buffer | [pH] |
| 255 | Electrode voltage | [mV] |
| 256 | Cal temp | [°C] |
| 257 | Response time | [s] |
| 258 | Setpoint | [pH] |
| 259 | Adj. limit exceeded | |
| 260 | Check successful | |
| 262 | Actual value: | [pH] |
| 263 | GMP cal successful | |
| 270 | Sample value | [pH] |

# Calibration Record IDs

GMP Calibration. The list shows all presentable entries.
Which entries really appear in the respective record depends on the calibration mode, process variable, module etc.

**pH Calibration Record Entries**

| ID | Record entry | Unit of measure |
|---|---|---|
| 271 | Lab value | [pH] |
| 272 | Sample value | [pH] |
| 273 | Lab value | [pH] |
| 300 | Feature for QA | |
| 282 | Batch number (Lot) for buffer 1 | |
| 283 | Batch number (Lot) for buffer 2 | |
| 284 | Batch number (Lot) for buffer 3 | |
| 301 | Ref/Pos | |
| 302 | Meas.point | |
| 306 | Cal Buffer 1 | [pH] |
| 307 | Accuracy | [pH] |
| 308 | Durability | |
| 309 | Batch no. | |
| 310 | Cal Buffer 2 | [pH] |
| 311 | Accuracy | [pH] |
| 312 | Durability | |
| 313 | Batch no. | |
| 314 | Cal Buffer 3 | [pH] |
| 315 | Accuracy | [pH] |
| 316 | Durability | |
| 317 | Batch no. | |
| 319 | Tolerance Zero | [pH] |
| 320 | Min | [pH] |
| 321 | Max | [pH] |
| 322 | Tolerance Slope | [mV/pH] |
| 323 | Min | [mV/pH] |
| 324 | Max | [mV/pH] |

# Calibration Record IDs

GMP Calibration. The list shows all presentable entries.
Which entries really appear in the respective record depends on the calibration mode, process variable, module etc.

| pH Calibration Record Entries | | |
|---|---|---|
| **ID** | **Record entry** | **Unit of measure** |
| 325 | Allowed tolerance | [pH] |

| $O_2$ Calibration Record Entries | | |
|---|---|---|
| **ID** | **Record entry** | **Unit of measure** |
| 402 | Last calibration | |
| 403 | User | |
| 404 | Cal mode | |
| 405 | Sensor designation | |
| 406 | Serial number | |
| 410 | Impedance | [kohm] |
| 412 | Allowed deviation | [Air] |
| 413 | Adjustment limit | [Air] |
| 415 | Relative humidity | [%] |
| 416 | Cal pressure | [mbar] |
| 417 | Sensor current | [nA] |
| 418 | Cal temp | [°C] |
| 419 | Response time | [s] |
| 420 | Setpoint | [Air] |
| 421 | Actual value: | [Air] |
| 422 | Deviation | [Air] |
| 423 | Allowed dev. exceeded | |
| 424 | Adj. limit exceeded | |
| 430 | Sample value | [Air] |
| 431 | Lab value | [Air] |
| 432 | Sample value | [µg/l] |
| 433 | Lab value | [µg/l] |

# Calibration Record IDs

GMP Calibration. The list shows all presentable entries.
Which entries really appear in the respective record depends on the calibration mode, process variable, module etc.

| **$O_2$ Calibration Record Entries** | | |
|---|---|---|
| **ID** | **Record entry** | **Unit of measure** |
| 434 | Sample value | [Vol%] |
| 435 | Lab value | [Vol%] |
| 436 | Sample value | [ppm] |
| 437 | Lab value | [ppm] |
| 444 | Zero | [nA] |
| 447 | Slope | [nA] |
| 448 | Slope (adj) | [nA] |
| 449 | Slope (Cal) | [nA] |
| 450 | Deviation | [nA] |
| 451 | Dev. > tolerance | |
| 452 | Slope > Min/Max | |
| 453 | Calibration successful | |
| 454 | Adjustment required | |
| 458 | First Adjustment | |
| | | |
| 502 | Active adjustment | |
| 503 | User | |
| 504 | Cal mode | |
| 505 | Sensor designation | |
| 506 | Serial number | |
| 510 | Impedance | [kohm] |
| 515 | Relative humidity | [%] |
| 516 | Cal pressure | [mbar] |
| 517 | Sensor current | [nA] |
| 518 | Cal temp | [°C] |
| 519 | Response time | [s] |
| 530 | Sample value | [Air] |

# Calibration Record IDs

GMP Calibration. The list shows all presentable entries.
Which entries really appear in the respective record depends on the calibration mode, process variable, module etc.

| $O_2$ Calibration Record Entries | | |
|---|---|---|
| **ID** | **Record entry** | **Unit of measure** |
| 531 | Lab value | [Air] |
| 532 | Sample value | [µg/l] |
| 533 | Lab value | [µg/l] |
| 534 | Sample value | [Vol%] |
| 535 | Lab value | [Vol%] |
| 536 | Sample value | [ppm] |
| 537 | Lab value | [ppm] |
| 544 | Zero | [nA] |
| 547 | Slope | [nA] |
| 553 | Adjustment successful | |
| 563 | GMP cal successful | |

# Calibration Record IDs

GMP Calibration. The list shows all presentable entries.
Which entries really appear in the respective record depends on the calibration mode, process variable, module etc.

| Conductivity Calibration Record Entries | | |
|---|---|---|
| **ID** | **Record entry** | **Unit of measure** |
| 602 | Last calibration | |
| 603 | User | |
| 604 | Cal mode | |
| 605 | Sensor designation | |
| 606 | Serial number | |
| 617 | Solution table value | [µS] |
| 618 | Cal temp | [°C] |
| 619 | Response time | [s] |
| 643 | Zero | [µS] |
| 647 | Cell factor | |
| 653 | Calibration successful | |
| | | |
| 702 | Last calibration | |
| 703 | User | |
| 704 | Cal mode | |
| 705 | Sensor designation | |
| 706 | Serial number | |
| 717 | Solution table value | [µS] |
| 718 | Cal temp | [°C] |
| 719 | Response time | [s] |
| 743 | Zero | [µS] |
| 747 | Cell factor | |
| 753 | Calibration successful | |

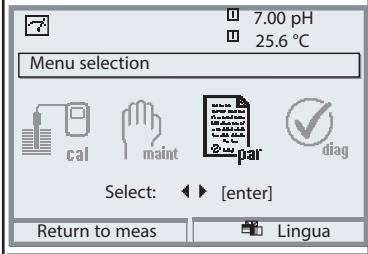
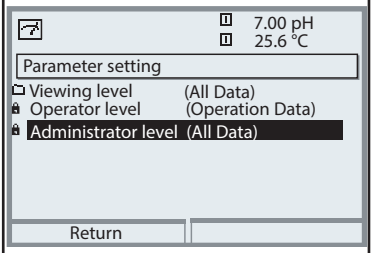
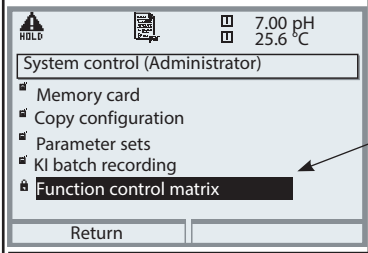
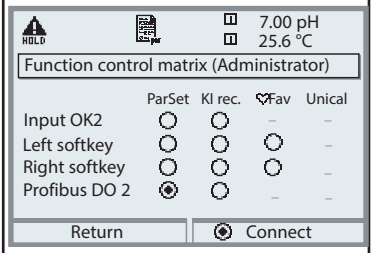
# Calibration Record IDs

GMP Calibration. The list shows all presentable entries.
Which entries really appear in the respective record depends on the calibration mode, process variable, module etc.

| Electrodeless Conductivity Calibration Record Entries | | |
|---|---|---|
| **ID** | **Record entry** | **Unit of measure** |
| 802 | Last calibration | |
| 803 | User | |
| 804 | Cal mode | |
| 805 | Sensor designation | |
| 806 | Serial number | |
| 817 | Solution table value | [µS] |
| 818 | Cal temp | [°C] |
| 819 | Response time | [s] |
| 843 | Zero | [µS] |
| 847 | Cell constant | [ /cm] |
| 853 | Calibration successful | |
| | | |
| 902 | Last calibration | |
| 903 | User | |
| 904 | Cal mode | |
| 905 | Sensor designation | |
| 906 | Serial number | |
| 917 | Solution table value | [µS] |
| 918 | Cal temp | [°C] |
| 919 | Response time | [s] |
| 943 | Zero | [µS] |
| 947 | Cell constant | [ /cm] |
| 953 | Calibration successful | |

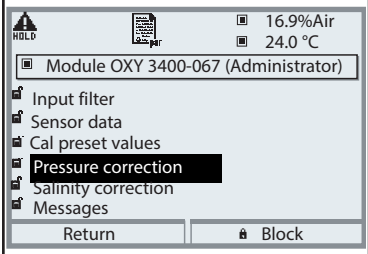
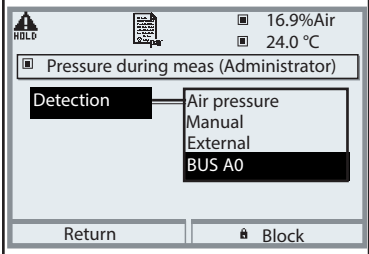
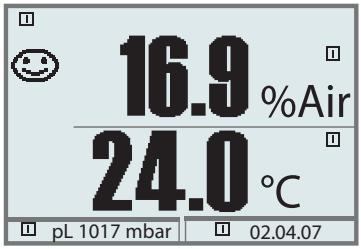
# Function Control Matrix

Controlling parameter set selection / KI recorder via PROFIBUS DO2
Parameter setting/Administrator level/System control/Function control matrix

| Menu | Display | Control via PROFIBUS DO2 |
|---|---|---|
| par |  | **Open parameter setting**<br>From the measuring mode:<br>Press **menu** key to select menu.<br>Select parameter setting using arrow keys, press **enter** to confirm. |
| |  | **Administrator level:**<br>Access to all functions, also passcode setting.<br>Releasing or blocking a function for access from the Operator level. |
| |  | At the Administrator level:<br>Select "System control",<br>then<br>"Function control matrix". |
| |  | **Function control matrix**<br>Clear assignment:<br>control element/function.<br>Example: PROFIBUS DO2 controls the parameter set selection.<br>**Note:** KI recorder only with Protos 3400<br>Unical with Protos II 4400(X) from FRONT firmware version 02.xx.xx |

**Note:** The display may vary depending on the device version.

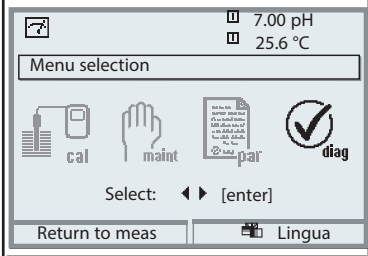
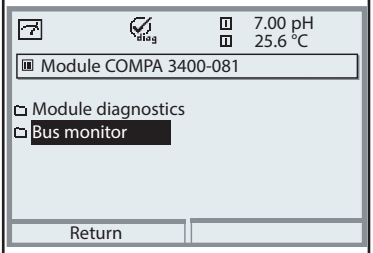
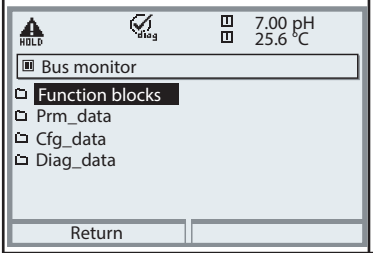
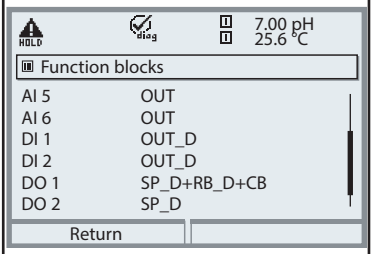
# Pressure Compensation via Bus (AO1)

| Menu | Display | Parameter setting OXY module |
|---|---|---|
| |  | **Parameter setting of OXY module**<br>Select "Pressure correction" from the Parameter setting menu of the oxygen module. |
| |  | **Pressure during meas**<br>Select "BUS A0".<br>The AO1 block provides the analog value for pressure compensation. |
| |  | **Display of compensated pressure in measuring mode**<br>The compensated "pL" value can be displayed by pressing a softkey. |

**Note:** The display may vary depending on the device version.

# Diagnostics: Bus Monitor

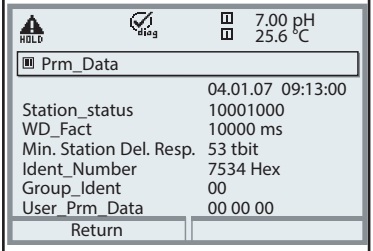
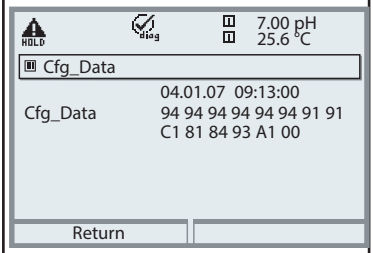
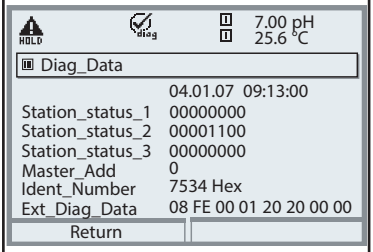
Overview of Parameters Transmitted via Fieldbus
Diagnostics/Module selection/Bus monitor

| Menu | Display | Bus monitor |
|---|---|---|
| diag |  | **Open diagnostics**<br>From the measuring mode:<br>Press **menu** key to select menu.<br>Select diagnostics using arrow keys, press **enter** to confirm. |
| |  | **Bus monitor:**<br>Overview of parameters transmitted via Fieldbus. |
| |  | Parameters |
| |  | **Function blocks**<br>Shows the contents of the Chk_Cfg telegram in interpreted form, i.e. it is shown for each Function Block whether and which data is communicated cyclically.<br>SP_D: Setpoint (Discrete Value)<br>RB_D: Readback (Discrete Value)<br>CB: Check_Back. |

**Note:** The display may vary depending on the device version.

# Bus Monitor

Overview of Parameters Transmitted via Fieldbus
Diagnostics/Module selection/Bus monitor

| Menu | Display | Bus monitor |
|---|---|---|
| diag |  | **Prm_Data**<br>Shows the 10 data bytes of the Set_Prm telegram in partially interpreted form. Interpretation according to Profibus DP (IEC 61158, Type 6). |
| |  | **Cfg_Data:**<br>Shows the data of the Chk_Cfg telegram in hexadecimal form. This telegram is used by the PLC to specify which data is to be communicated cyclically. |
| |  | **Diag_Data**<br>Shows the 14 data bytes of the Slave_Diag telegram in partially interpreted form. Interpretation according to Profibus DP (IEC 61158, Type 6) and Profile for Process Automation (PA 3.0). |

**Note:** The display may vary depending on the device version.

# Specifications

## Protos COMPA 3400(X)-081

| | | |
|---|---|---|
| **PROFIBUS-PA** | Galvanic isolation up to 60 V<br>COMPA 3400X-081: Digital communication in hazardous areas via current modulation (Ex ia IIC) | |
| Physical interface | MBP-IS [1] (to EN 61158-2), for use in a FISCO system | |
| Transfer rate | 31.25 kbits/s | |
| Communication protocol | PROFIBUS DP-V1 | |
| Profile | PROFIBUS PA 3.0 | |
| Address range | 1 ... 126, factory setting 126, can be set on device | |
| Supply voltage | FISCO | ≤ 17.5 V (trapezoidal or rectangular characteristic)<br>≤ 24 V (linear characteristic) |
| Current consumption | < 12 mA | |
| Max. current in case of fault (FDE) | < 15 mA | |

1) MBP-IS = Manchester Bus Powered – Intrinsic Safety

# Specifications

## General data

| | |
|---|---|
| **Explosion protection**<br>(COMPA3400X-081 only) | EU-Type Examination Certificate KEMA 03ATEX2530<br>IECEx Certificate of Conformity IECEx DEK 11.0054<br>JPEx Certificates DEK23.0087/DEK23.0088<br>Ex ib [ia Ga] IIC T4 Gb<br>For entity parameters, see attachment to certificates or control drawings. |
| **RoHS conformity** | According to EU directive 2011/65/EU |
| **EMC** | EN 61326-1, EN 61326-2-3<br>NAMUR NE 21 |
| Emitted interference | Industrial applications* (EN 55011 Group 1 Class A) |
| Interference immunity | Industrial applications |
| Lightning protection | to EN 61000-4-5, Installation class 2 |
| **Rated operating conditions** | Ambient temperature:<br>Safe area: -20 ... 55 °C / -4 ... 131 °F<br>Ex: -20 ... 50 °C / -4 ... 122 °F<br>Relative humidity: 10 ... 95 % non-condensing |
| **Transport/storage temperature** | -20 ... 70 °C / -4 ... 158 °F |
| **Screw clamp connector** | Single or stranded wires up to 2.5 $mm^2$ |

* This equipment is not designed for domestic use, and is unable to guarantee adequate protection of the radio reception in such environments.

# Process Variables (PROFIBUS)

Process variables which can be assigned to Analog Input Blocks (AI):

**pH Modules**

| Measured value | Unit of measure |
|---|---|
| pH value | pH |
| Electrode potential | mV |
| Electrode potential (ORP) | mV |
| rH value | rH |
| Glass impedance | Ohm |
| Reference impedance | Ohm |
| Temperature | °C |
| Temperature | °F |
| pH zero point | pH |
| pH slope | mV/pH |
| Cal timer (adaptive) / ACT | h |
| Sensor wear | % |
| Remaining lifetime / DLI | d |

**Calculation Block pH / pH**

| Measured value | Unit of measure |
|---|---|
| Delta pH value | pH |
| Delta ORP | mV |
| Delta temperature | °C |

# Process Variables (PROFIBUS)

Process variables which can be assigned to Analog Input Blocks (AI):

### $O_2$ Modules

| Measured value | Unit of measure |
|---|---|
| Saturation (Air) | % |
| Saturation ($O_2$) | % |
| Concentration | mg/l |
| Concentration | ppm |
| Volume concentration (GAS) | % |
| Volume concentration (GAS) | ppm |
| Sensor current | nA |
| Temperature | °C |
| Temperature | °F |
| Air pressure | mbar |
| $O_2$ partial pressure | mbar |
| Zero | nA |
| Slope | nA/mbar |
| Cal timer (adaptive) | h |
| Current input | mA |

### Calculation Block $O_2$ / $O_2$

| Measured value | Unit of measure |
|---|---|
| Delta saturation (Air) | % |
| Delta saturation ($O_2$) | % |
| Delta temperature | °C |
| Delta $O_2$ concentration | mg/l |
| Delta $O_2$ concentration | ppm |
| Delta volume conc. (gas) | % |
| Delta volume conc. (gas) | ppm |

# Process Variables (PROFIBUS)

Process variables which can be assigned to Analog Input Blocks (AI):

### COND Modules

| Measured value | Unit of measure |
|---|---|
| Conductivity | µS/cm |
| Resistivity | Ohm/cm |
| Concentration | % |
| Concentration | g/kg |
| Temperature | °C |
| Temperature | °F |
| Cell constant | $cm^{-1}$ |
| USP value | % |

### Calculation Block COND/COND

| Measured value | Unit of measure |
|---|---|
| Delta conductivity | µS/cm |
| Delta resistivity | Ohm/cm |
| Delta temperature | °C |
| Ratio | |
| Passage | % |
| Rejection | % |
| Deviation | % |
| pH value | pH |

# Process Variables Available (PROFIBUS)

Process variables which can be assigned to Analog Input Blocks (AI):

**CONDI Modules**

| Measured value | Unit of measure |
|---|---|
| Conductivity | µS/cm |
| Resistivity | Ohm/cm |
| Concentration | % |
| Concentration | g/kg |
| Temperature | °C |
| Temperature | °F |
| Zero | S/cm |
| Cell factor | $cm^{-1}$ |

**Calculation Block CONDI / CONDI**

| Measured value | Unit of measure |
|---|---|
| Delta conductivity | µS/cm |
| Delta resistivity | Ohm/cm |
| Delta temperature | °C |
| Ratio | |
| Passage | % |
| Rejection | % |
| Deviation | % |

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**Knick**
**Elektronische Messgeräte**
**GmbH & Co. KG**

Beuckestraße 22 • 14163 Berlin
Germany
Phone: +49 30 80191-0
Fax: +49 30 80191-200
info@knick.de
www.knick-international.com

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