

Communication module PA 700(X)

Communication unit
for PROFIBUS PA



Order number: 52 121 219

METTLER TOLEDO



70331

Warranty

Defects occurring within 1 year from delivery date shall be remedied free of charge at our plant (carriage and insurance paid by sender).

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Return of products under warranty

Please contact your local METTLER TOLEDO representative. Ship the cleaned device to the address you have been given. If the device has been in contact with process fluids, it must be decontaminated/disinfected before shipment. In that case, please attach a corresponding certificate, for the health and safety of our service personnel.



Disposal

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

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PROFIBUS®

is a registered trademark of the Profibus User Organization

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Declaration of conformity Konformitätserklärung Déclaration de conformité

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Description**Beschreibung/Description**

**PA 700X
52121181**

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**Explosion protection
Explosionsschutzrichtlinie
Prof. contre les explosions**

**94/9/EG
KEMA 04 ATEX 2056
NL-6812 AR Arnhem, KEMA 0344**

**Low-voltage directive
Niederspannungs-Richtlinie
Directive basse tension**

73/23/EWG

**EMC Directive
EMV-Richtlinie
Directive concernant la CEM**

89/336/EWG

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Lieu et date d'émission**

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<u>Norm/Standard/Standard</u>			
	94/9/EG:	EN 50014 EN 50020 EN 50281-1-1 EN 50284	
	73/23/EWG:	DIN EN 61010-1 / VDE 0411 Teil 1:	2002-08
	89/336/EWG:	DIN EN 61326 / VDE 0843 Teil 20:	2002-03

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Description

Beschreibung/Description

**PA 700
52121210**

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Low-voltage directive/ Nieder-spannungs-Richtlinie/ Directive basse tension

73/23/EWG

EMC Directive/ EMV-Richtlinie Directive concernant la CEM

89/336/EWG

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**EN 61010-1 / VDE 0411 Teil 1 :
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**2002-08
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Software Version

PA 700(X) module

Device software M 700(X)

The PA 700(X) module is supported by software version 5.0 or higher.


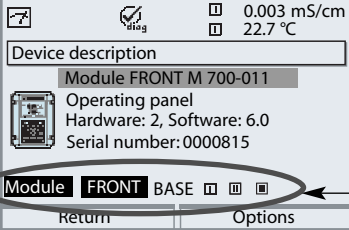
Module software PA 700(X)

Software version: refer to CD-ROM label / see below

Query actual device/module software

When the analyzer is in measuring mode:

Press **menu** key, open Diagnostics menu.

Menu	Display	Device description
		<p>Provides information about all modules installed: Module type and function, serial number, hardware and software version and device options.</p> <p>Select the different modules (FRONT, BASE, slots 1 - 3) using the arrow keys.</p>

Modular Concept and Instruction Manuals

Instruction manuals for basic unit, measuring module, additional functions.

The M 700 is an expandable modular process analysis system. The basic unit (FRONT and BASE modules) provides three slots which can be equipped by the user with any combination of measuring or communication modules. The software capabilities can be expanded by additional functions (options). Additional functions must be ordered separately. They are supplied with a device-specific TAN for function release.

M 700 modular process analysis system



Additional functions

Activation via device-specific TAN
For an overview see "Options" leaflet



SmartMedia card

Data recording



3 module slots

for free combination of measuring and communication modules

Measuring modules

- pH 2700
- O₂ 4700 / O₂ 4700 ppb
- Cond 7700
- Cond Ind 7700

Communication modules

- Out 700 (additional switching and current outputs)
- PID 700 (analog and digital controller)
- PA 700 (Profibus)

- **The instruction manual for the M 700** describes how to install, commission and operate the basic unit.
- **The instruction manual for the measuring or communication module** describes all functions required for commissioning and working with the respective measuring or communication module.
- **Additional functions** are supplied with a function description.

Intended Use / Safety Information

Intended use

The module is a communication unit for PROFIBUS-PA and allows digital communication via current modulation.

The PA 700X module is intended for operation in locations subject to explosion hazards which require equipment of Group II, device category 2(1), gas/dust.

Safety information

Caution! Never try to open the module! If a repair should be required, return the module to our factory.

If the specifications in the instruction manual are not sufficient for assessing the safety of operation, please contact the manufacturer to make sure that your intended application is possible and safe.

Be sure to observe during installation:

- Switch off power supply before replacing or inserting a module.
- Before commissioning it must be proved that the device may be connected with other equipment.

Application in hazardous locations:

PA 700X module

When using the PA 700X module, the stipulations for electrical installations in hazardous areas (EN 60079-14) must be observed. When installing the device outside the range of applicability of the 94/9/EC directive, the appropriate standards and regulations in the country of use must be observed.

The module has been developed and manufactured in compliance with the applicable European guidelines and standards.

Compliance with the European Harmonized Standards for use in hazardous locations is confirmed by the EC-Type-Examination Certificate.

Compliance with the European guidelines and standards is confirmed by the EC Declaration of Conformity.

There is no particular direct hazard caused by the operation of the device in the specified environment.

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

The PROFIBUS application range covers manufacturing, process and building automation. As open fieldbus standard to EN50170, 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. For further information refer to www.profibus.com.

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.

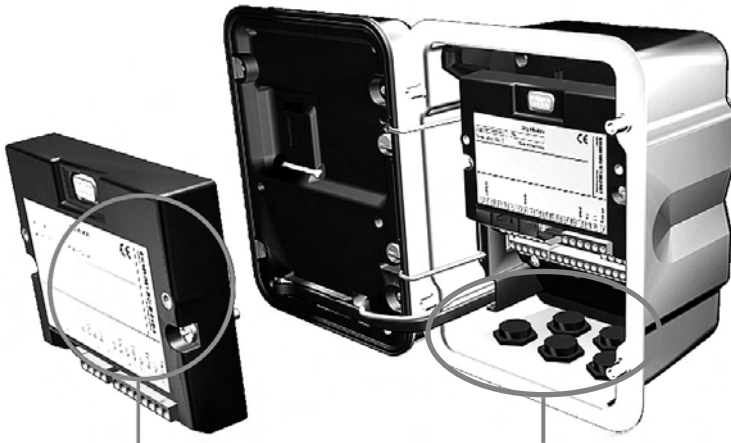
PROFIBUS-PA permits cyclic and acyclic services.

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

Inserting the Module



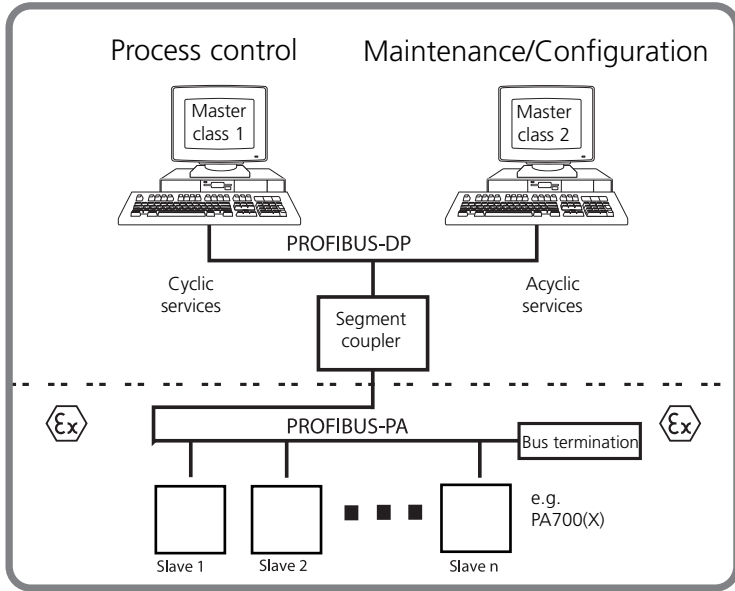
Thanks to the staggered arrangement of connectors and fastening screws the terminal strips of all modules are easy to access.

Make sure that the cable glands are tightly closed to protect against humidity.

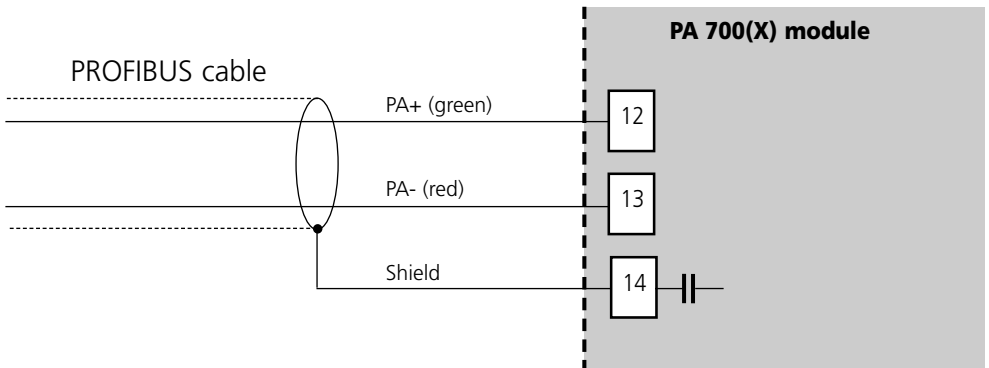
1. Switch off power supply
2. Open the device (loosen the 4 screws at the front)
3. Place module in slot (D-SUB connector)
4. Tighten fastening screws of the module
5. Connect signal lines
6. Close device, tighten screws at the front
7. Switch on power supply
8. Assign process variables to AI blocks on the device
9. Set parameters

PROFIBUS PA Installation

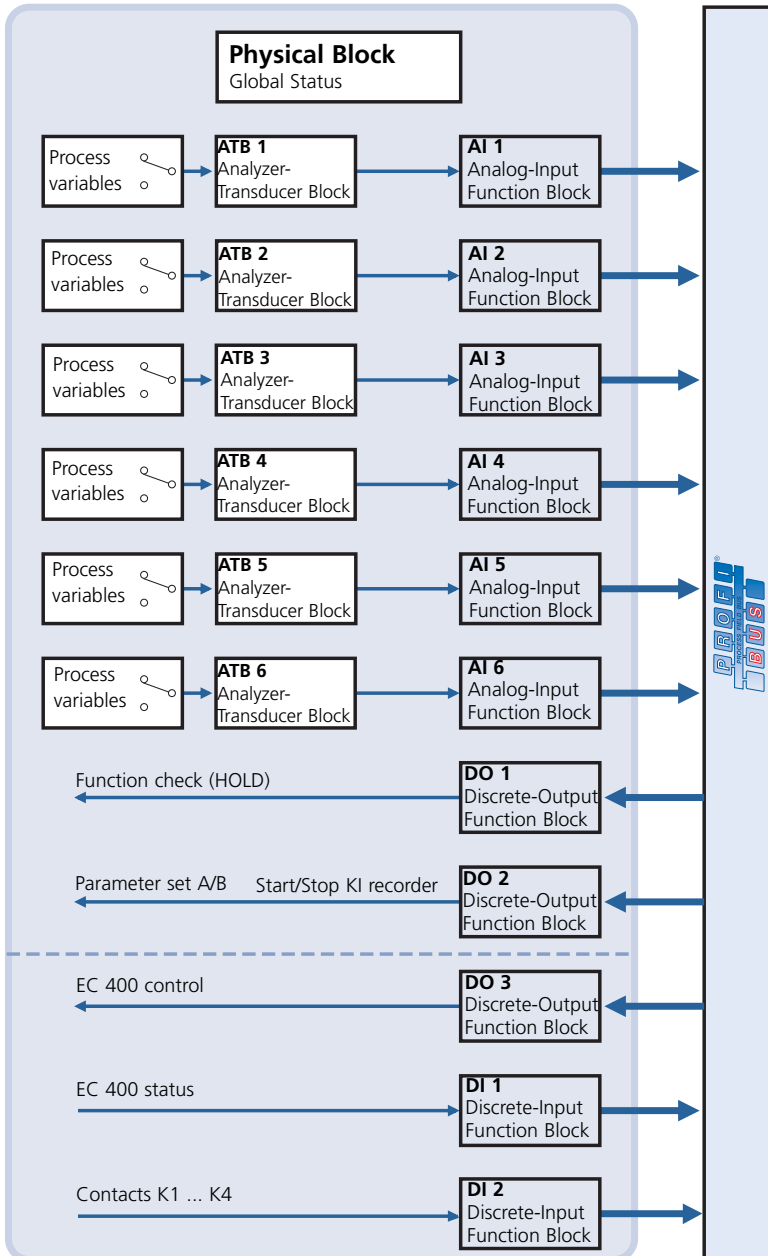
Basic build-up of a PROFIBUS system:



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



Communication Model



Communication Model

The device parameters are sorted in three function blocks:

Physical Block (PB)

This block contains the device-specific parameters.

Transducer Blocks (TB 1 ... TB 6) (ATB 1 ... ATB 6)

6 blocks – They contain measurement parameters (measured variable, temperature) according to the PROFIBUS-PA Profile 3.0 specification.

Function Blocks (cyclic services)

6 analog input blocks (AI 1 ... AI 6, for for mapping the appropriated measured values),

3 digital output blocks (DO 1 ... DO 3, for control signals) and

2 digital input blocks (DI 1 ... DI 2, for status messages).

Physical Block (PB) (acyclic services)

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

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

For detailed description of parameter set, see Page 26.

Analog Input Blocks

Analog Input Blocks

The module provides 6 analog input blocks (AI 1 ... AI 6).

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

Function*	Parameter	Remark
Channel selection	CHANNEL	Determined by assignment of process variable to AI Block on the M 700 (see Page 16)
Simulation	SIMULATE	Specifying an input value for testing the system
Process value	PV_SCALE	Scaling the measured variable
Scaling	OUT_SCALE EU at 100% EU at 0%	Specifying the output range Max value Min value
Attenuation	PV_FTME	Attenuating the input value to suppress noise peaks
Alarm	HI_LIM HI_HI_LIM LO_LIM LO_LO_LIM ALARM_HYS	Specifying HIGH warning Specifying HIGH alarm Specifying LOW warning Specifying LOW alarm Hysteresis

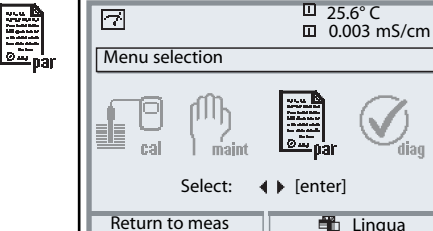
* not accessible on device, only via master class 2 (e.g. Siemens PDM)
(only exception: channel selection)

Analog Input Blocks

Function	Parameter	Remark
Block mode	MODE_BLK	Out of service Manual Automatic
Error behavior	FSAVE_TYPE	0: The content of [FSAVE_VALUE] is output as value, together with the status signal "Uncertain Substitute Value" 1: The last valid measured value is output, together with the status signal "Uncertain Substitute Value" 2: No change. Status: Bad

Function Blocks: Analog Input Blocks

Assignment of process variables to Analog Input Blocks on the device

Menu	Display	Assigning process variables to Analog Input Blocks
	<p>25.6 °C 0.003 mS/cm</p> <p>Menu selection</p> <p>cal maint par diag</p> <p>Select: ◀ ▶ [enter]</p> <p>Return to meas Lingua</p>	<p>Call up parameter setting</p> <p>From the measuring mode: Press menu key to select menu. Select parameter setting using arrow keys, confirm with enter.</p>
	<p>25.6 °C 0.003 mS/cm</p> <p>Parameter setting</p> <ul style="list-style-type: none"> ▢ Viewing level (All Data) view ▢ Operator level (Operation Data) opl ▢ Admin. level (All Data) adm <p>Return</p>	<p>Administrator level:</p> <p>Access to all functions, also passcode setting. Releasing or blocking function for access from the Operator level.</p>
	<p>25.6 °C 0.003 mS/cm</p> <p>Parameter setting (Administrator)</p> <ul style="list-style-type: none"> ▢ System control ▢ Module FRONT M 700-011 ▢ Module BASE M 700-021 ▢ Module Cond Ind 7700 ▢ Module pH 2700 ▢ Module PA 700 <p>Return Release</p>	<p>Select PA module:</p> <p>M 700 allows variable equipment with 2 measuring modules (and PA module). The available process variables are assigned via "AI configuration".</p>
	<p>25.6 °C 0.003 mS/cm</p> <p>AI configuration (Administrator)</p> <ul style="list-style-type: none"> ▢ Analog Input AI 1 pH ▢ Analog Input AI 2 ORP ▢ Analog Input AI 3 °C ▢ Analog Input AI 4 mV ▢ Analog Input AI 5 rH ▢ Analog Input AI 6 MOhm <p>Return</p>	<p>Select AI configuration:</p> <p>Now the process variables can be assigned to the 6 Analog Input Blocks (Analog Input AI1 ... AI6).</p>

For Copy: Individual Settings

Assignment of process variables to Analog Input Blocks on the device

AI Block

Process variable assigned

Analog Input Block AI 1

Analog Input Block AI 2

Analog Input Block AI 3

Analog Input Block AI 4

Analog Input Block AI 5

Analog Input Block AI 6

Configuration with PROFIBUS

Electronic device data sheets: (Geräte-Stammdaten-Datei)

The GSD file contains the description in order to achieve a simple Plug and Play configuration for PROFIBUS, electronic device data sheets (GSD files) are defined for the communication features of the devices. These GSD files allow easy configuration of PROFIBUS networks with devices from different manufacturers. GSD is a human readable ASCII text file.

The included CD-ROM contains the electronic device data sheet file (GSD) METT7534.gsd and the Device Description (DD) for the SIEMENS PDM software.

Cyclic Data Communication

The cyclic data traffic is divided into two directions:

- Input data (data transfer from field device to process control system)
- Output data (data transfer from process control system to field device)

Structure of cyclic input data telegram

Byte	Data	Access	Data format / Interpretation
0 .. 4	Analog Input Function Block 1 "Process Value 1"	r	Measured value (32-bit floating point, IEEE-754) status byte
5 .. 9	Analog Input Function Block 2 "Process Value 2"	r	Measured value (32-bit floating point, IEEE-754) status byte
10 .. 14	Analog Input Function Block 3 "Process Value 3"	r	Measured value (32-bit floating point, IEEE-754) status byte
15 .. 19	Analog Input Function Block 4 "Process Value 4"	r	Measured value (32-bit floating point, IEEE-754) status byte
20 .. 24	Analog Input Function Block 5 "Process Value 5"	r	Measured value (32-bit floating point, IEEE-754) status byte
25 .. 29	Analog Input Function Block 6 "Process Value 6"	r	Measured value (32-bit floating point, IEEE-754) status byte
30 .. 31	Discrete Input Function Block 1 "EC 400 Status" Status of EC 400	r	Byte <ul style="list-style-type: none"> Bit 0 = Probe in MEASURE position Bit 1 = Probe in SERVICE position Bit 3..2 = Reserved '00' Bit 4 = Program active Bit 7..5 = Active program <ul style="list-style-type: none"> 000 : No program 001 : Cleaning 010 : Cal 2pt 011 : Cal 1pt 100 : USER 1 101 : USER 2 110 : USER 3 111 : Service program Status byte (80h = OK)

Cyclic Input Data Telegram

Byte	Data	Access	Data format / Interpretation
32 .. 33	Discrete Input Function Block 2 "CONTACT Status" Status of contacts K1 .. K4	r	Byte Bit 0 = K4 (0=inactive, 1=active) Bit 1 = K3 (0=inactive, 1=active) Bit 2 = K2 (0=inactive, 1=active) Bit 3 = K1 (0=inactive, 1=active) Bit 7..4 = Reserved '0000' Status byte (80h = OK)
34 .. 35	Discrete Output Function Block 1 "HOLD Control / Status" Operating status of device	r	Byte Bit 0 = Status (0=Run, 1=Hold) Bit 7..1 = Reserved '0000000' Status byte (80h = OK)
36 .. 37	Discrete Output Function Block 2 "PARSET Control / Status" Active parameter set	r	Byte Bit 0 = Parameter set (0=A, 1=B) Bit 3..1 = Parameter set from card 000 : Parset not from card 001 : Parset 1 010 : Parset 2 011 : Parset 3 100 : Parset 4 101 : Parset 5 Bit 7..4 = Reserved '0000' Status byte (80h = OK)
38 .. 39	Discrete Output Function Block 3 "EC 400 control / status" Status of EC 400	r	Byte Bit 0 = Probe in MEASURE position Bit 1 = Probe in SERVICE position Bit 3..2 = Reserved '00' Bit 4 = Program active Bit 7..5 = Active program 000 : No program 001 : Cleaning 010 : Cal 2pt 011 : Cal 1pt 100 : Parkposition 101 : USER 1 110 : USER 2 111 : Service program Status byte (80h = OK)

Cyclic Output Data Telegram

Byte	Data	Access	Data format / Interpretation
0 .. 1	Discrete Output Function Block 1 "HOLD Control" or "HOLD Control / Status" Set operating status of device	w	Byte Bit 0 = Status (0=Run, 1=Hold) Bit 7..1 = Reserved '0000000' Status byte (80h = OK)
2 .. 3	Discrete Output Function Block 2 "PARSET Control" or "PARSET Control / Status" Activate Parameter set	w	Byte Bit 0 = Parameter set (0=A, 1=B) Bit 7..1 = Reserved '0000000' Status byte (80h = OK)
4 .. 5	Discrete Output Function Block 3 "EC 400 Control" or "EC 400 Control / Status" Control EC 400	w	Byte Bit 0 = preserved "0" Bit 1 = Service = 1, Measure = 0 Bit 2 = Auto = 0, 1 = not Auto (time base PHU 3400-110: on = 0, off = 1) Bit 3, 4 = preserved '00' Bit 7..5 = Program active 000 : no Program 001 : Cleaning 010 : Cal 2Pkt 011 : Cal 1Pkt 100 : Parkposition 101 : USER 1 110 : USER 2 Program Status Byte (80h = OK)

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 following scheme.

The configuration data consist of 11 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 ... 6) and Discrete Input Blocks (1 ... 2)

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 Byte	-
2	AI 2	0x00	Free Place	-	-
		0x42, 0x84, 0x08, 0x05 or 0x42, 0x84, 0x81, 0x81 or 0x94	"Process Value 2"	5 Byte	-
3	AI 3	0x00	Free Place	-	-
		0x42, 0x84, 0x08, 0x05 or 0x42, 0x84, 0x81, 0x81 or 0x94	"Process Value 3"	5 Byte	-
4	AI 4	0x00	Free Place	-	-
		0x42, 0x84, 0x08, 0x05 or 0x42, 0x84, 0x81, 0x81 or 0x94	"Process Value 4"	5 Byte	-
5	AI 5	0x00	Free Place	-	-
		0x42, 0x84, 0x08, 0x05 or 0x42, 0x84, 0x81, 0x81 or 0x94	"Process Value 5"	5 Byte	-
6	AI 6	0x00	Free Place	-	-
		0x42, 0x84, 0x08, 0x05 or 0x42, 0x84, 0x81, 0x81 or 0x94	"Process Value 6"	5 Byte	-
7	DI 1	0x00	Free Place	-	-
		0x42, 0x81, 0x05, 0x05 or 0x42, 0x81, 0x83, 0x81 or 0x91	"EC 400 Status"	2 Byte	-
8	DI 2	0x00	Free Place	-	-
		0x42, 0x81, 0x05, 0x05 or 0x42, 0x81, 0x83, 0x81 or 0x91	"CONTACT Status"	2 Byte	-

Configuration Data

Discrete Output Blocks (1 ... 3)

Section	Function Block	Configuration Data	Description	Input	Output
9	DO 1	0x00	Free Place	-	-
		0x82, 0x81, 0x05, 0x05 or 0x82, 0x81, 0x84, 0x82 or 0xA1	"HOLD Control"	2 Byte	-
		0xC1, 0x81, 0x81, 0x83 or 0xC2, 0x81, 0x81, 0x84, 0x83	"HOLD Control / Status"	2 Byte	2 Byte
10	DO 2	0x00	Free Place	-	-
		0x82, 0x81, 0x05, 0x05 or 0x82, 0x81, 0x84, 0x82 or 0xA1	"HOLD Control"	2 Byte	-
		0xC1, 0x81, 0x81, 0x83 or 0xC2, 0x81, 0x81, 0x84, 0x83	"HOLD Control / Status"	2 Byte	2 Byte
11	DO 3	0x00	Free Place	-	-
		0x82, 0x81, 0x05, 0x05 or 0x82, 0x81, 0x84, 0x82 or 0xA1	"HOLD Control"	2 Byte	-
		0xC1, 0x81, 0x81, 0x83 or 0xC2, 0x81, 0x81, 0x84, 0x83	"HOLD Control / Status"	2 Byte	2 Byte

PA 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
7	DI1	Sense EC 400 status
8	DI2	Sense contacts K1 ... K4
9	DO1	Control HOLD
10	DO2	Control parameter set
11	DO3	Control EC 400
12	TB1	Measured value for AI 1
13	TB2	Measured value for AI 2
14	TB3	Measured value for AI 3
15	TB4	Measured value for AI 4
16	TB5	Measured value for AI 5
17	TB6	Measured value for AI 6

PB Block Parameters

Defaults & Writable Ranges. Acyclic Data.

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. Acyclic Data. 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 2457: all parameters writable	0	34
FACTORY_RESET	Unsigned16	2	S	r/w	0	0: no action 1: reset parameters do default 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_INSTALL_DATE	OctedString	16	S	r/w	" "	no restrictions	0	38
LOCAL_OP_ENA	Unsigned8	1	N	r/w	1	0: local op. disabled 1: local op. enabled	0	39
IDENT_NUMBER_SELECTOR	Unsigned8	1	S	r/w	1	0: profile specific ID 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 5: Maintenance	0	53
DEVICE_STATE	Unsigned8	1	D	r/w	2	2: Run 5: Maintenance	0	54
GLOBAL_STATUS	Unsigned16	2	D	r	0		0	55

TB Analyzer 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 Analyzer 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	DS-61	8	N	r, w		depending on the kind of measurement	12-17	42
Begin_of_Range	Float	1			-2e3			
End_of_Range	Float	1			2e3	do not change		

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						
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		1-6	17
TAG_DESC	OctedString	32	S	r, w	" "	no restrictions	1-6	18
STRATEGY	Unsigned16	2	S	r, w	0	no restrictions	1-6	19
ALERT_KEY	Unsigned8	1	S	r, w	0	no restrictions	1-6	20
TARGET_MODE	Unsigned8	1	S	r, w	0x08	0x80: Out of Service 0x10: Manual 0x08: Automatic	1-6	21
MODE_BLK	DS-37	3	D	r			1-6	22
Actual	Unsigned8	1			0x08			
Permitted	Unsigned8	1			0x98			
Normal	Unsigned8	1			0x08			
ALARM_SUM	DS-42	8	D	r			1-6	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			
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 VALUE STATUS	DS-33 Unsigned8 Unsigned8	5 4 1	D	r/ (w)	0.0 0x4C	writable if MODE_BLK.Actual=Man no restrictions any of class Non Cascade	1-6	26
PV_SCALE	Float array	8	S	r, w	2e3, -2e3	no restrictions	1-6	27
OUT_SCALE	DS-36	11	S	r, w			1-6	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	29
CHANNEL	Unsigned16	2	S	r, w	TBn	do not change	1-6	30
PV_FTME	Float	4	S	r, w	0.0	>=0.0	1-6	32
FSAVE_TYPE	Unsigned8	1	S	r, w	2	0: FSAVE_VALUE/ UNC-substitute 1: last useable val / UNC-last useable 2: wrong val / BAD- (*=as calculated)	1-6	33
FSAVE_VALUE	Float	4	S	r, w	0.0	no restrictions	1-6	34
ALARM_HYS	Float	4	S	r, w	100.0	>=0.0	1-6	35
HI_HI_LIM	Float	4	S	r, w	2e3	no restrictions	1-6	37
HI_LIM	Float	4	S	r, w	2e3	no restrictions	1-6	39
LO_LIM	Float	4	S	r, w	-2e3	no restrictions	1-6	41
LO_LO_LIM	Float	4	S	r, w	-2e3	no restrictions	1-6	43
HI_HI_ALM	DS-39	16	D	r			1-6	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	47
Unacknowledged 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	48
Unacknowledged 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	49
Unacknowledged 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	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	51

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 0x10: Manual 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	DS-34	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 1: invert	7-8	31
FSAVE_TYPE	Unsigned8	1	S	r, w	1	0: FSAVE_VAL_D/ UNC-substitute 1: last useable val / UNC-last useable 2: wrong val / BAD- (*=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	OctetString	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 0x10: Manual 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	OctetString	2			0			
Unacknowledged	OctetString	2			0			
Unreported	OctetString	2			0			
Disabled	OctetString	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			

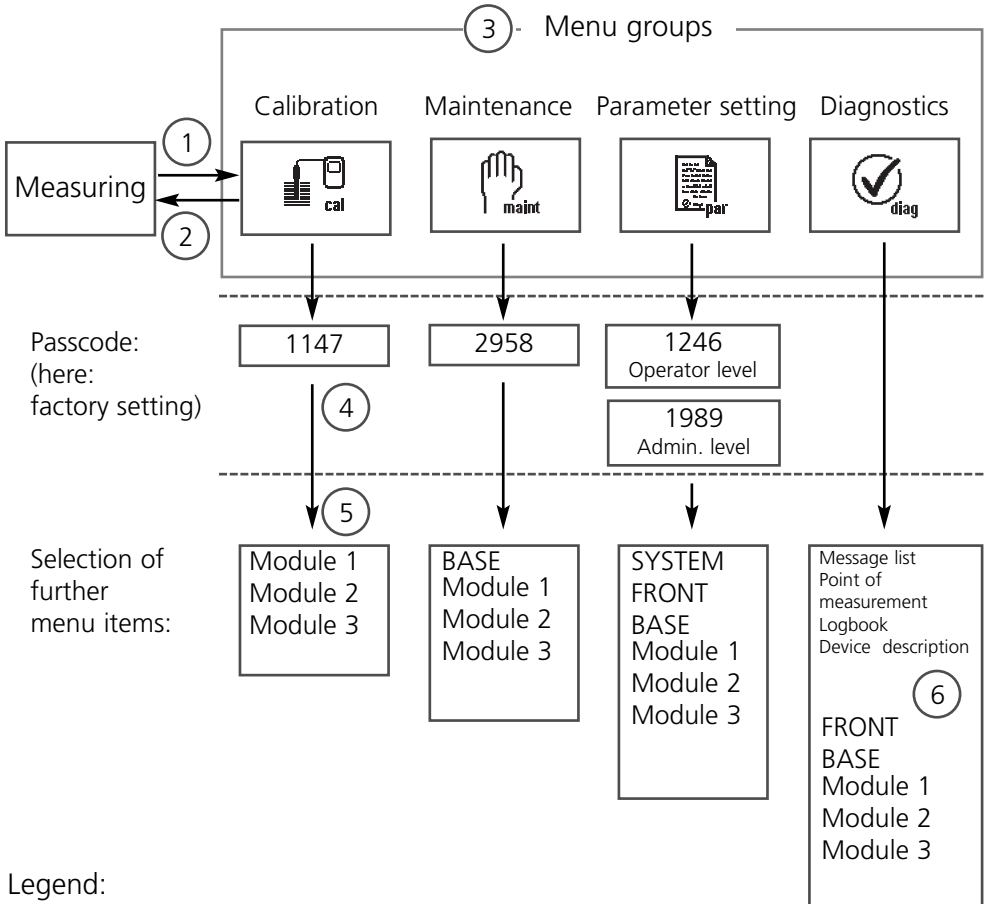
DO Function Block Parameters

Defaults & Writable Ranges. Continued.

Parameter Name	Data Type	Size	Store	Access	Default Value	Writable Range	Slot	Index
SP_D	DS-34	2	D	r, w			9-11	25
VALUE	Unsigned8	1			0	no restrictions		
STATUS	Unsigned8	1			0x18	any of class Non Cascade		
OUT_D	DS-34	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	DS-34	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 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: FSAVE_VAL_D/ UNC-substitute 1: last useable val / UNC-last useable	9-11	36
FSAVE_VAL_D	Unsigned8	1	S	r, w	0	no restrictions	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

Menu structure

M 700 FRONT



Legend:

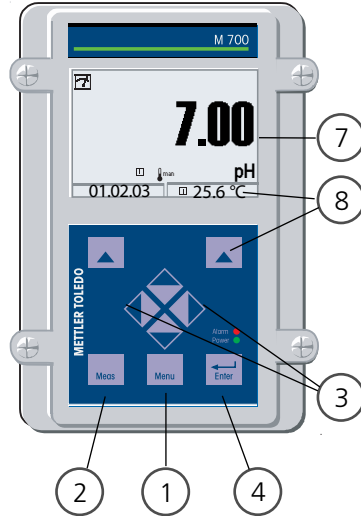
- (1) Pressing the **menu** key accesses menu selection
- (2) Pressing the **meas** key returns to measurement
- (3) Menu groups are selected using the arrow keys
- (4) Press **enter** to confirm, enter passcode
- (5) Further menu items are displayed
- (6) Selected functions of the Diagnostics menu can be recalled via softkey even when in measuring mode

Menu selection

M 700 FRONT

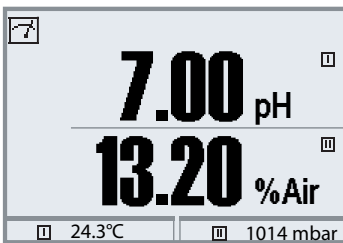
After switching on, the M 700 performs an internal test routine and automatically detects the number and type of modules installed. Then, the M 700 goes to measuring mode.

- Configure measurement display **(7)**
- Secondary displays/softkeys **(8)**

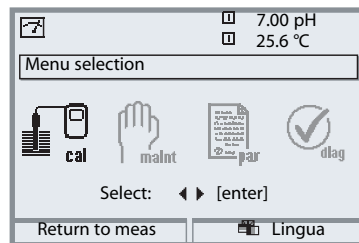
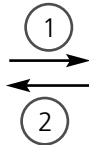


Menu selection

- (1) Pressing the **menu** key accesses menu selection
- (2) Pressing the **meas** key returns to measurement



(Measuring mode)



(Menu selection)

Select the desired menu group using the arrow keys **(3)**. Press **enter** **(4)** to confirm your choice. An overview of the menu structure is given on Pg 37.


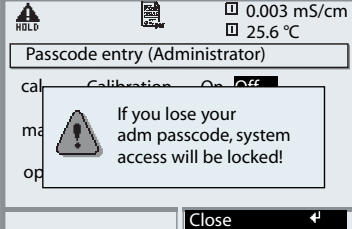
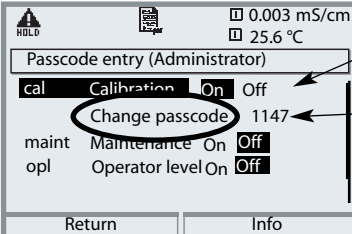
Passcode Entry

Enter passcode:

Select the position using the left/right keys, then edit the number using the up/down keys. When all numbers have been entered, confirm with **enter**.

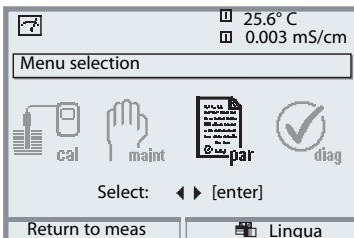
To change a passcode

- Open the menu selection (**menu** key)
- Select parameter setting
- Administrator level, enter passcode
- Select System control: Passcode entry

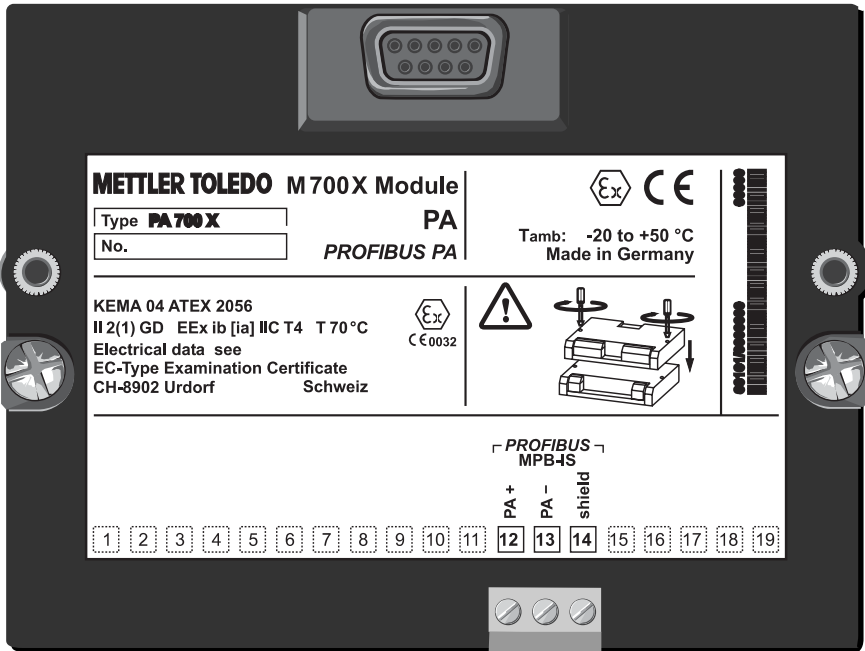
Menu	Display	System control: Passcode entry												
	 	<p>Changing a passcode: “Passcode entry” menu</p> <p>When this menu is opened, the analyzer displays a warning (Fig.). Passcodes (factory settings):</p> <table border="0"> <tr> <td>Calibration</td> <td>(cal)</td> <td>1147</td> </tr> <tr> <td>Maintenance</td> <td>(maint)</td> <td>2958</td> </tr> <tr> <td>Operator level</td> <td>(opl)</td> <td>1246</td> </tr> <tr> <td>Administrator level</td> <td>(adm)</td> <td>1989</td> </tr> </table> <p>Caution If you lose the Administrator passcode, system access is locked! Please consult our technical support!</p> <p>To change a passcode, select “On” using the arrow keys. Confirm with enter. Select the position using the left/right keys, then edit the number using the up/down keys. When all numbers have been entered, confirm with enter.</p>	Calibration	(cal)	1147	Maintenance	(maint)	2958	Operator level	(opl)	1246	Administrator level	(adm)	1989
Calibration	(cal)	1147												
Maintenance	(maint)	2958												
Operator level	(opl)	1246												
Administrator level	(adm)	1989												

Function Control Matrix

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

Menu	Display	Assigning process variables to Analog Input Blocks																									
	<p>25.6 °C 0.003 mS/cm</p> <p>Menu selection</p> <p>cal maint par diag</p> <p>Select: ◀ ▶ [enter]</p> <p>Return to meas Lingua</p>	<p>Call up parameter setting</p> <p>From the measuring mode: Press menu key to select menu. Select parameter setting using arrow keys, confirm with enter.</p>																									
	<p>25.6 °C 0.003 mS/cm</p> <p>Parameter setting</p> <p>Viewing level (All Data) view Operator level (Operation Data) opl Admin. level (All Data) adm</p> <p>Return</p>	<p>Administrator level:</p> <p>Access to all functions, also passcode setting. Releasing or blocking function for access from the Operator level.</p>																									
	<p>HOLD</p> <p>25.6 °C 0.003 mS/cm</p> <p>System control (Administrator)</p> <p>Memory card Copy configuration Parameter sets KI batch recording Function control matrix</p> <p>Return</p>	<p>At the Administrator level: Select "System control", then "Function control matrix".</p>																									
	<p>HOLD</p> <p>7.00 pH 25.6 °C</p> <p>Function control matrix (Administrator)</p> <table border="1"> <thead> <tr> <th></th> <th>ParSet</th> <th>KI rec.</th> <th>Fav</th> <th>EC400</th> </tr> </thead> <tbody> <tr> <td>Input OK2</td> <td><input type="radio"/></td> <td><input type="radio"/></td> <td><input type="radio"/></td> <td>-</td> </tr> <tr> <td>Left softkey</td> <td><input type="radio"/></td> <td><input type="radio"/></td> <td><input type="radio"/></td> <td>-</td> </tr> <tr> <td>Right softkey</td> <td><input type="radio"/></td> <td><input type="radio"/></td> <td><input type="radio"/></td> <td>-</td> </tr> <tr> <td>Profibus DO 2</td> <td><input checked="" type="radio"/></td> <td><input type="radio"/></td> <td><input type="radio"/></td> <td>-</td> </tr> </tbody> </table> <p>Return Connect</p>		ParSet	KI rec.	Fav	EC400	Input OK2	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	-	Left softkey	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	-	Right softkey	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	-	Profibus DO 2	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	-	<p>Function control matrix</p> <p>Clear assignment of function to control element. Example: PROFIBUS DO2 controls the parameter set selection. Assignment is made with the arrow keys, "Connect" or "Disconnect" with the right softkey. Confirm with enter.</p>
	ParSet	KI rec.	Fav	EC400																							
Input OK2	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	-																							
Left softkey	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	-																							
Right softkey	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	-																							
Profibus DO 2	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	-																							

Terminal assignment



Specifications

PA 700(X) module

PROFIBUS-PA *)	Digital communication in hazardous areas via current modulation (EEx ia IIC)	
Physical interface	MBP-IS ¹⁾ (to EN 61158-2), for use in a FISCO system	
Transmission rate	31.25 kBit/s	
Communication protocol	PROFIBUS DP-V1	
Profile	PROFIBUS PA 3.0	
Adress range	1 ... 126, factory setting 126, adjustable on the device	
Supply voltage	FISCO	≤ 17.5 V (trapezoidal or rectangular characteristic) ≤ 24 V (linear characteristic)
Current consumption	< 12 mA	
Max. current in case of fault (FDE)	< 15 mA	
Explosion protection (PA 700X only)	See rating plate: KEMA 04 ATEX 2056 II 2 (1) GD EEx ib [ia] IIC T4	
EMC	NAMUR NE 21 and EN 61326 VDE 0843 Part 20 /01.98 EN 61326/A1 VDE 0843 Part 20/A1 /05.99	
Emitted interference	Class B	
Immunity to interference	Industry	
Lightning protection	EN 61000-4-5, Installation Class 2	
Nominal operating conditions	Ambient temperature	-20 ... +55 °C (Ex: max. +50 °C)
	Relative humidity	10 ... 95 % not condensing
Transport/ Storage temperature	-20 ... +70 °C	
Screw clamp connection	Single wires and flexible leads up to 2.5 mm ² (AWG 14)	

*) Galvanic isolation up to 60 V

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

Measured Values Available for PROFIBUS

PA 700(X) module

Module type

pH 2700(X)

Cond 7700(X)

Cond Ind 7700(X)

O₂ 4700(X)
O₂ 4700(X) ppb

pH 2700(X)/EC 400(X)

CO2 5100(X)

Measured values

pH, ORP, °C, mV, rH, MOhm, kOhm, °F, zero, slope

S/cm, %, °C, g/kg, Ohm*cm, °F, cell

S/cm, %, °C, g/kg, Ohm*cm, °F, zero, cell

%Air, %O₂, °C, p, nA, mg/l, ppm, pL, °F, Vol%, ppm, zero, slope

pH, ORP, °C, mV, rH, MOhm, kOhm, °F, zero, slope

%, mg/l, °C, p, MOhm, kOhm, °F, zero, slope

Virtual modules (Calculation Blocks)

pH / pH

COND / COND

OXY / OXY

CO2 / CO2

pH, ORP, °C

S/cm, Ohm*cm, °C, Ratio, Pass, Reject, Deviat, pH

%Air, %O₂, °C, mg/l, ppm, Vol%, ppm

%CO₂, mg/l, °C, p

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