

Multi-loop Process Controller D500 with powerful PLC functionality, extensible with hardware modules

Intelligent,
compact and efficient



1 ... 4 channel fixed-value, ratio, override and cascade controller

— With P, PI, PD or PID characteristic

Dead time algorithm (Smith predictor)

Spray-water protected front panel IP 65

Brilliant LCD display with color interchange red/green

Basic unit with 2 analog inputs, 1 analog output, 2 binary inputs/outputs and 2 relay outputs

Universal input for temperature sensor

Filtering, linearization and square-rooting of the input signal

Ramp rate for set point and output signal

Programmer and program controller

High and low limitation for set point and output signal

Preconfigured input signal connection

Analog or switching controller output

Self-setting of parameters and parameter control

Lock for 'parameter setting' and 'configuration' by means of password or digital input

Additional plug-in modules

Custom configuration with function block diagram or instruction list

Serial interface

— For parameterization and configuration as standard

Buscapable RS 485 interface

— For Modbus or PROFIBUS

Data storage in Flash-EPROM

Description

The industrial controller D500 is a 1...4 channel compact controller used for complementing single control loops and for automating small and medium-sized processes in control engineering. It is universally applicable and suitable for accomplishing simple and complex control tasks.

Basic version

1 Universal input for the controlled variable. Without having to modify the hardware, thermocouples, the resistance thermometer Pt100, teletransmitters and standard signals 0/4...20 mA can be connected. If non-linearized temperature transmitters are used, linearization is effected in the controller. Linearization tables for all standard sensors are stored in the device.

1 input for mA and teletransmitter. It can be used as a transmitter for disturbance variable or set point input. In step controllers this input can be used for position feedback signalling.

1 mA output for the actuating signal or other values, e.g. for set point or actual values.

2 binary inputs/outputs. These inputs and outputs can be configured by the user. These can thus not only be used optionally as controller or alarm outputs but also as inputs for switching over the controller (e.g. manual/automatic).

2 relays for the actuating signal or alarm outputs and for fault reporting.

...a rear TTL interface to connect a parameterisation and configuration PC. This makes the setting work in connection with commissioning easier.

Hardware extension

4 module slots for extending the input and output levels.

Front control panel

The front control panel gives information on the state of the process and permits specifically-targeted intervention in the process sequence. Digital displays and clear-text information permit precise reading and accurate setting of set point and correction values.

Programmer

Every unit has a configurable programmer which provides a time-dependent set point. Up to 10 programs with 15 segments each can be stored in the unit.

Controller outputs (adjustable acc. to configuration list)

Two-position controller, PID characteristic without or with leading contact for high/low/off levelling.

Controller for heating/off/cooling, optionally with two switching or one continuous and one switching output.

Step controller for motorised valve control.

Continuous controller, optionally also split-range output with two continuous positioning signals.

Parameter setting

After entering a password, the user accesses the parameter setting level by means of a menu key. At the parameter setting level parameters for the available functions, such as controller gain K_p , or time constants, can be set.

Configuration can be effected in two ways:

List configuration

The menu key accesses the password-protected configuration level. There the standard functions are selected from a list provided in the unit. As an alternative to the user keyboard, the selection can also be made by way of the PC program **IBIS-R**. This especially simplifies the setting procedure if several units are to be set at the same time (see Data Sheet 62-6.70 EN).

Free configuration

Apprpr. prepared models allow for customer-specific configuration, i.e. functions beyond the standard functions of the controller.

The PC program IBIS-R enables a graphical programming with function block diagrams for realising any special calculation or PLC functions. Retrofitting the plug-in Confi IC allows subsequent free configurability.

Inputs

Common data:

without electronical isolation
Resolution $\leq 0.01\%$
Accuracy (referred to nominal range) $\leq 0.2\%$
Temperature effects $\leq 0.2\%/10^\circ\text{C}$
Hardware input filter limit frequency 7 Hz

Permissible common-mode voltage against device ground

$\leq \pm 4\text{ V DC}$

Permissible differential-mode voltage U_{ss} (50 Hz): 50 mV

Analog:

Universal input AI01

used for standard signal

0/4...20 mA at $50\ \Omega \pm 1\%$

Overcurrent/polarity reversal protection

to $\pm 40\text{ mA}$

Linearization, square-rooting

configurable

at 4...20 mA

Line break monitoring with configurable reaction

used for thermocouples

Types	Temperature range	Voltage range	Typical accuracy
J	-200...1200 °C	77.43 mV	$\leq 0.2\%$
E	-200...1000 °C	85.18 mV	$\leq 0.2\%$
K	-200...1400 °C	61.53 mV	$\leq 0.2\%$
L	-200...1000 °C	78.21 mV	$\leq 0.2\%$
U	-200... 600 °C	40.00 mV	$\leq 0.3\%$
R	0...1700 °C	20.22 mV	$\leq 0.5\%$
S	0...1800 °C	18.72 mV	$\leq 0.5\%$
T	-200... 400 °C	26.47 mV	$\leq 0.4\%$
B	0...1800 °C	13.24 mV	$\leq 0.6\%$
D	0...2300 °C	36.92 mV	$\leq 0.4\%$

Technical data

Reference junction compensation

internal or external: 0, 20, 50 or 60 °C

Internal reference junction

Error limit $\pm 1\text{ °C}/10\text{ K}$
 Reference temperature $22\text{ °C} \pm 1\text{ °C}$
 Ambient temperature $0\ldots 50\text{ °C}$

Sensor break monitoring

with configurable reaction

Used for resistance thermometer Pt100 DIN

Measuring range

$-200.0\ldots+200.0\text{ °C}$
 $-200.0\ldots+800.0\text{ °C}$

Measuring current

$\leq 1\text{ mA}$

Measuring circuit: 2-wire circuit to $40\text{ }\Omega$ line resistance
 Line balancing: by software

3-wire circuit: for symmetrical lines up to $3 \times 10\text{ }\Omega$

4-wire circuit: sensor short-circuit and break monitoring
 with configurable reaction

used for resistance teletransmitter (potentiometer)

Measuring ranges

$150\text{ }\Omega$, $(75\ldots 200\text{ }\Omega)$; $1.5\text{ k}\Omega$ $(0.75\ldots 2\text{ k}\Omega)$

Measuring current: $\leq 1\text{ mA}$

other data as resistance thermometer

Analog input 2 (AI02)

Input for mA signals and teletransmitter, technical data as AI01, but without electrical isolation. $0\ldots 10\text{ V}$ as option (see Code No. 310).

binary:

2 binary inputs/outputs (B01/B02)

Direct/reverse function configurable

Input DIN 19240	Rated signal V DC	Voltage range (V)	Current range
Rated level	24	$20.4\ldots 28.8$	approx. 1 mA
1-signal	24	$13.0\ldots 30.2$	approx. 1 mA
0-signal	0	$-3.0\ldots 5.0$	$< 0.2\text{ mA}$

Output DIN 19240	Rated signal V DC	Voltage range (V)	Current range
Rated level	24 ext.	$20.4\ldots 28.8$	100 mA
1-signal	24	$13.0\ldots 30.2$	$0\ldots \text{max. mA}$
0-signal	0	$-3.0\ldots 5.0$	$0\ldots 0.15\text{ mA}$

Switching frequency $\leq 8\text{ Hz}$

Outputs

Analog:

Control output or retransmission

$0/4\ldots 20\text{ mA}$ at max. $750\text{ }\Omega$, short-circuit and open-circuit proof

Control range

$0\ldots \geq 21\text{ mA}$

Load-dependency

$0.1\text{ }\%/100\text{ }\Omega$

Resolution: $\geq 0.01\text{ }\%$

binary: see inputs

2 relays with NO contact (B03/B04)

for max. 250 V AC , $1\text{ A cos}\phi = 0.9$
 for min. $\geq 12\text{ V AC}$, $\geq 100\text{ mA}$
 built-in spark quenching feature $0.022\text{ }\mu\text{F} + 100\text{ }\Omega$
 Contact material AgCdO

Transmitter feed

Output voltage: $20\ldots 24\text{ V DC}$, 100 mA, short-circuit proof

Load monitoring

Output automatically cuts off on overload

Programmer

10 programs can be stored

each program:
 15 segments
 Set point in physical units
 Segment time $0\ldots 99:99:9$ hours, four digital tracks

Serial interfaces

TTL interface for coupling to PC to match parameter setting and configuration program IBIS-R (see Data Sheet 62-6.70 EN).

For adapter cable see ordering information.

Buscapable RS 485 interface retrofittable (see modules)

CPU data

Measured value and correction value resolution

$\leq 0.01\text{ }\%$

Cycle time

$\geq 35\text{ ms}$ (master setting without modules)

Data backup

Flash-EEPROM

Power supply

115 to 230 V AC (90...260 V), 47...63 Hz

Power consumption:
 D500 without modules 9 VA (6 W)
 Max. component mounting + 7.4 VA (5 W)
 Power failure bridging $\geq 150\text{ ms}$ at $\geq 180\text{ V AC}$

24 V UC

24 V DC $-25\ldots +30\text{ }\%$,
 residual ripple $\leq \pm 3\text{ V}_{SS}$
 24 V AC $-15\ldots +10\text{ }\%$, 47...63 Hz
 Power consumption:
 D500 without modules 10 VA (7 W)
 Max. component mounting + 8.2 VA (5.5 W)
 Power failure bridging $\geq 20\text{ ms}$ at $0.85 \times U_{nom}$

Power factor $\cos\phi = 0.7$

Safety

The device needs no external safety of power supply

Environmental conditions

Climatic class

3K3 to EN 60721-3-3 (KWF to DIN 40040)

Ambient temperature

$0\ldots 50\text{ °C}$

Storage and transport temperature

-20...+70 °C

Relative humidity

< 85 %, short-term to 95 %, no condensation

Electromagnetic compatibility

Meets protection requirements of EMC directive 89/336/EEC, 5/89

Interference resistance EN 50082-2, March 1995 (i.a. IEC 801)

Interference emission EN 50081-1, 1/92
(referred to: EN 55011, class B)

Industry standard to NAMUR NE 21 T.1, May 1993

Connection, case, safety**Degree of protection to DIN EN 60529**

Front panel: IP 65

Case: IP 30

Terminals: IP 20

Electrical safety

Class of protection 1 to EN 61010 T.1 (VDE 0411 T.1, March 1994)

Clearances and creepage distances as per EN for overvoltage category 3, degree of contamination 2

All inputs and outputs, including the interface and the transmitter feed but excepting all relay outputs are functional extra-low voltage circuits to DIN VDE 0100, part 410. The safe isolation of these circuits meets the requirements to DIN VDE 0106, part 101.

Mechanical stress features**to DIN IEC 68, part 2-27 and 68-2-6**

Shock 30 g/18 ms; Vibration 2 g/0.15 mm/5...150 Hz

Case dimensions

Front panel 96 mm x 96 mm

Installed depth 200 mm

Panel cutout

92 mm x 92 mm to DIN 43700

Mounting

in panel

Horizontal high-density construction possible

Vertical spacing 36 mm

Fixing with straining screws at top and bottom

Electrical connections**Plug-in screw terminals**for wire or stranded wire to 1.5 mm², coded**Power supply**2.5 mm²

No shielded cables required – except for interface leads

Mounting orientation

any

Weight

approx. 800 g without modules

each module approx. 40 g

each relay module approx. 80 g

Scope of supply and deliveryController including mounting material and
Operating Manual**Modules**

With few exceptions, the modules can be run at all slots (see table page 10). The controllers identify the inserted modules automatically.

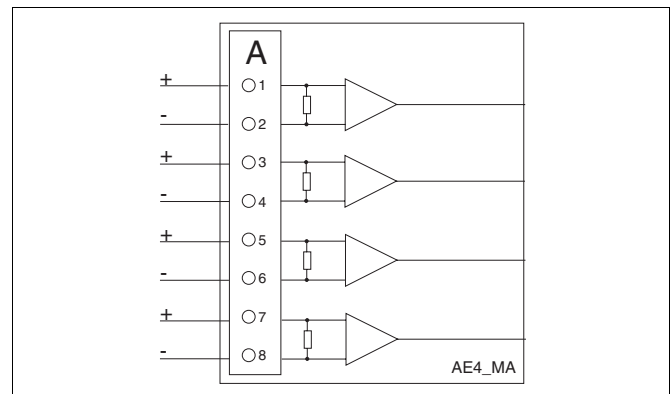
Analog inputs**Module AE4_MA** for standard signals**4 inputs**

0/4...20 mA with electrical isolation

Input resistance: approx. 50 Ω**Signal resolution:** ≤ 0.01 % for 20 mA**Permissible common-mode voltage:** ≤ ± 4 V against device ground**Permissible differential-mode voltage:** 50 mV_{SS}**Destruction proof**

Input current < 50 mA

Voltage between input and ground ± 50 V

**Module AE4_MA-MUS**for mA or V signals, integrated transmitter feed
(pay attention to maximum power consumption, page 10)**4 inputs**

0/4...20 mA, indiv. switchable to 0/2...10 V with common ground

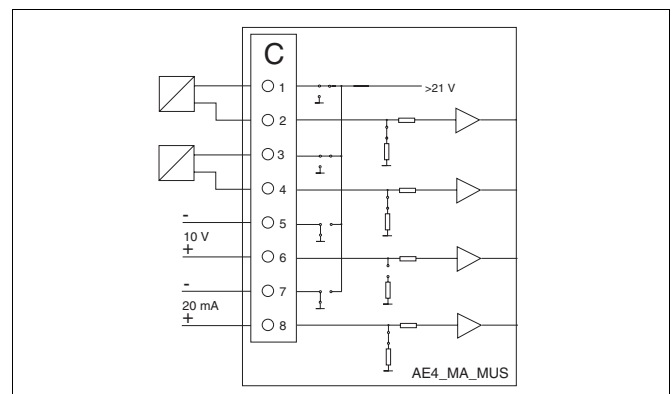
Input resistance at

mA input: approx. 50 Ω; 10 V input: 200 kΩ

Transmitter feed: 20 V, 82 mA

Other data as module 4_MA

Example of an input configuration



Module 4_MV for thermocouples**4 inputs**

-10...80 mV, with electrical isolation

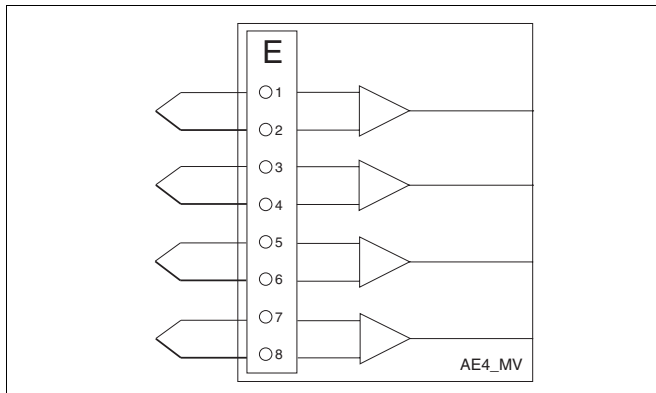
Signal resolution: 20.000 for -10...80 mV**Input resistance:** approx. 5 M Ω **Permissible common-mode voltage:** $\leq \pm 4$ V against device ground**Permissible differential-mode voltage:** 50 mV_{ss}**Destruction proof**Voltage at one input ± 10 VVoltage between input and ground ± 50 V**Break monitoring**

configurable reaction

Reference junction compensation

configurable, internal or external 0, 20, 50 or 60 °C

Linearization configurable like AI01

**Module AE2_MA/MV-TR**

for mA signals or thermocouple with electrical isolation

2 inputs with electrical isolation

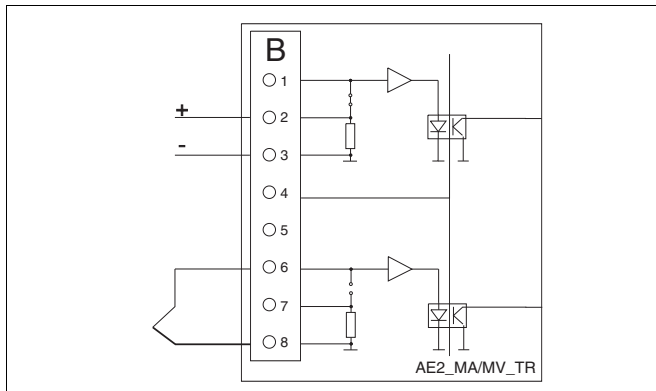
0/4...20 mA or -10...80 mV (changeable by means of jumpers)

Input resistance at20 mA: 25 Ω ; -10...80 mV: approx. 5 M Ω **Dielectric strength of input and output leads against each other and against grounded conductor:**

Test voltage 500 V AC

Continuous operation 45 V AC

Technical data as modules 4_MV or 4_MA

**Module AE4_PT_2L** for RTD 2-wires**4 inputs:** for Pt100 in 2-wire circuit**Range:** 0...400 Ω **Permissible differential mode voltage:** 100 mV_{ss}**Signal resolution:** ≤ 0.01 % for 400 Ω **Measuring current:** ≤ 1.5 mA**Measuring range configurable**

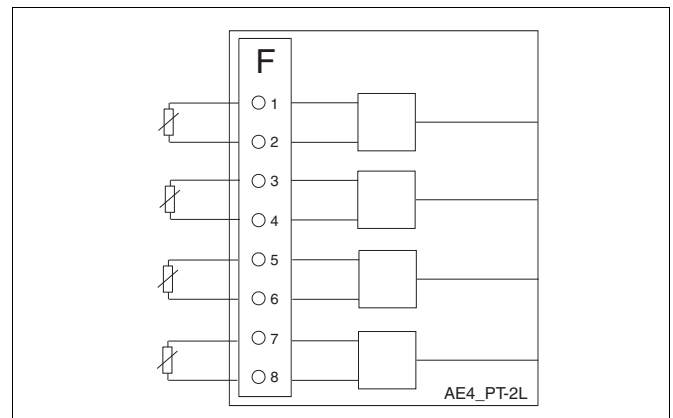
-200.0...+200.0 °C

0.0...+450.0 °C

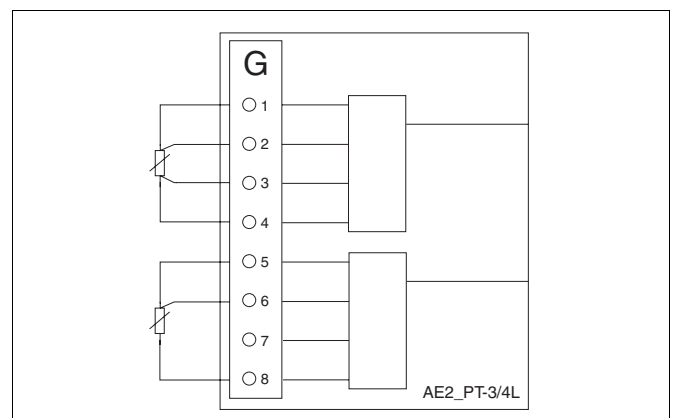
-200.0...+800.0 °C

Line balancing by software**Sensor break and short-circuit monitoring**

configurable reaction

**Module AE2_PT-3/4L** for RTD 3-/4-wires**2 inputs**

for Pt100 in 3- or 4-wire circuit or potentiometer



Technical data for Pt100 as module AE4_PT_2_L

Potentiometer R150: 0...150 Ω Series resistance: 0...500 Ω

Measuring current < 1.5 mA

Potentiometer R1500: 0...1500 Ω Series resistance: 0...1500 Ω

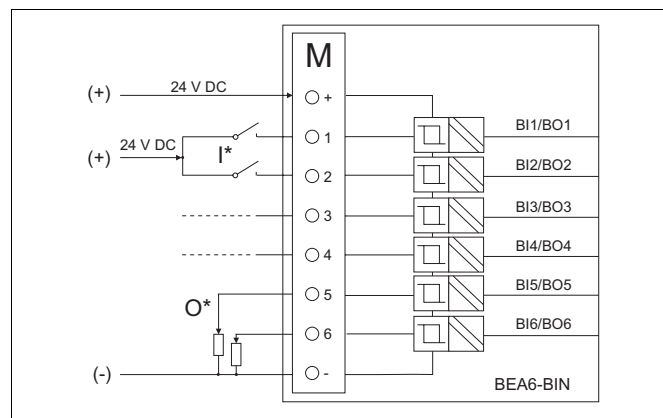
Measuring current < 0.5 mA

Binary inputs/outputs

Module BEA6-BIN

6 binary inputs/outputs, electrical isolation

Function configurable as input or output, direct or reverse action



*) Connection example: I = binary inputs; O = binary outputs

Input DIN 19240	Rated signal V DC	Voltage range (V)	Current range
Rated level	24	20.4...28.8	approx. 3 mA
1-signal	24	13.0...30.2	approx. 3 mA
0-signal	0	-3.0...5.0	≤ 0.1 mA

Output DIN 19240	Rated signal V DC	Voltage range (V)	Current range
Rated level	24 ext	20.4...28.8	100 mA
1-Signal	24	13.0...30.2	0...max. mA
0-Signal	0	-3.0...5.0	0...0.1 mA

Real time clock

Module BEA4_RTC

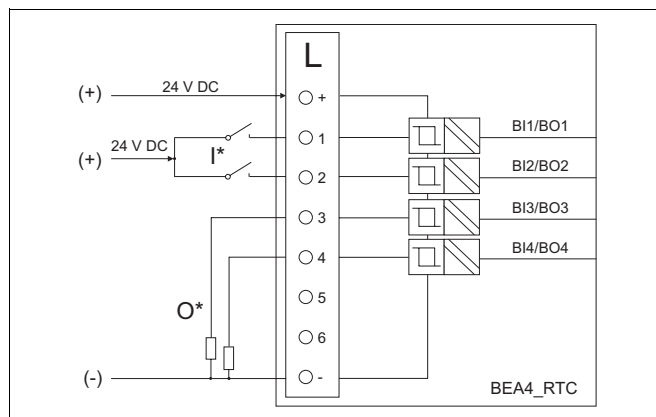
Real time clock with date, weekday and time

Daylight saving time and leap year switching

Synchronisation by digital input

Battery buffer or capacitor buffer (> 72 h)

4 digital I/O, electrical isolated, function configurable as inputs or outputs (technical data see Module BEA6-BIN)



*) Connection example: I = binary inputs; O = binary outputs

Module BA4_REL

(only usable at slot 1)

4 relays

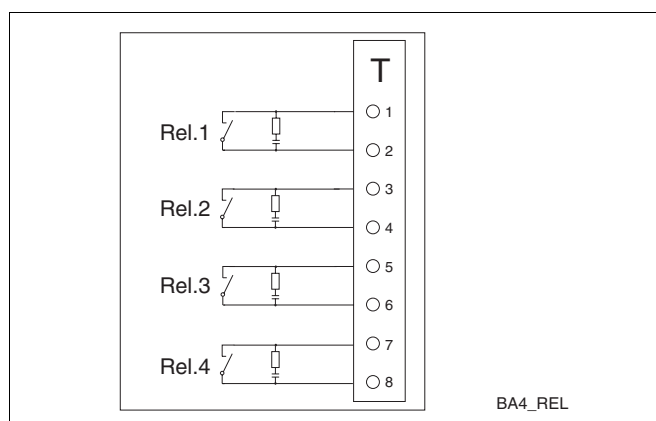
with NO contact for max. 250 V AC, 1 A resistive load

Built-in spark-quenching

0.022 μF + 100 Ω

For max. 250 V, max. 1 A at cosφ = 0.9

Contact material AgCdO



Module AE4_F

4 inputs for:

Frequency (1/4 inputs)

Range 1 input	0...20 kHz
Range 4 inputs	0...10 kHz
Signal resolution	1 Hz

Periode (1-4 inputs)

Range	0...20 s
Signal resolution	1 ms

Impulses (1-4 inputs)/incremental angle (2 inputs)

Range: 0...20.000 impulses/cycletime
min. impulse length: 50 µs

Absolute incremental angle (1 input)

Range: 0...20.000 impulses
min. impulse length: 50 µs

Types of input signals:**Max. 2 Namur inputs according to DIN 19234**

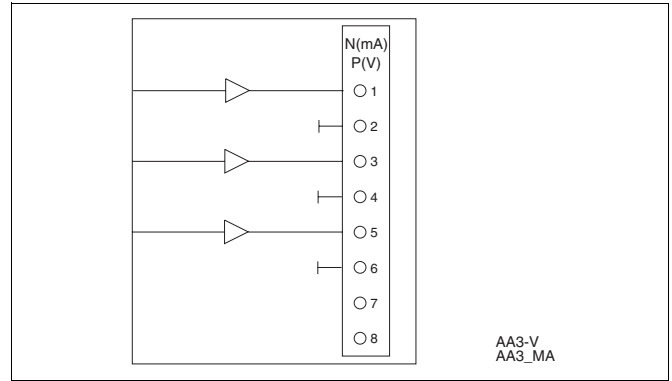
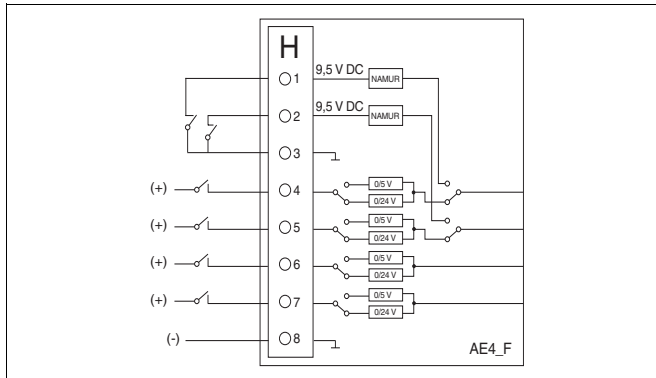
Open circuit voltage	$U_i = 9.5 \text{ V}$
Internal resistance	$R_i = 1 \text{ k}\Omega$
Signal range	$L = 0...1.2 \text{ mA/H} = 2.1...4.0 \text{ mA}$

Max. 4 digital inputs according to DIN 19240 (0/24 V DC)

Input resistance	$R_E > 6 \text{ k}\Omega$
Signal range	$L = -3...5 \text{ V/H} = 13...20.2 \text{ V}$

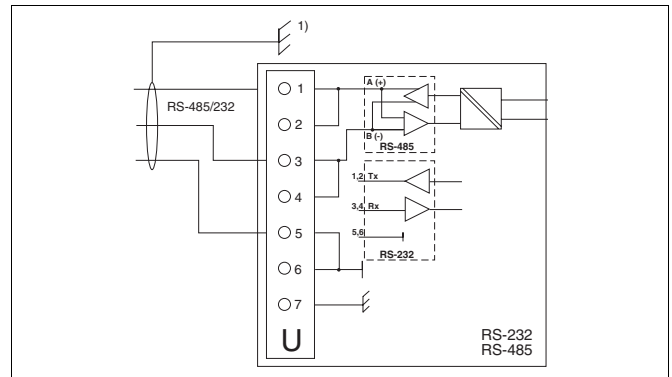
Max. 4 digital inputs TTL (0/5 V DC)

Input resistance	$R_E > 6 \text{ k}\Omega$
Signal range	$L = 0...0.8 \text{ V/H} = 3.5...24 \text{ V}$

Accuracy: $\pm 0.1 \%$ **Interface modules****Module RS 485 or RS 232**

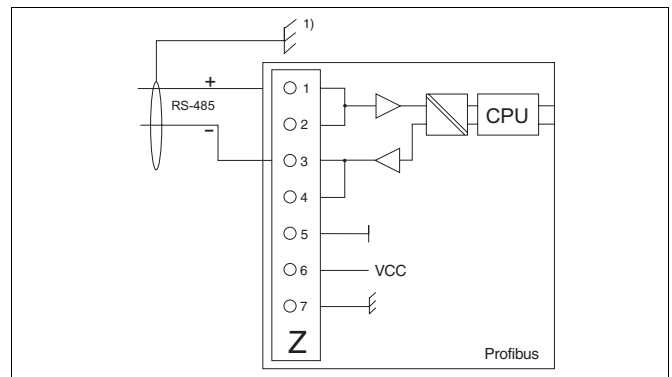
(can only be used in slot 4)

Interface module in accordance with RS 485 or RS 232 specification. Electrically isolated. Not dependent on protocol (the protocol used is configured in the controller. Standard protocol: MODBUS-RTU. The RS 485 module also allows rapid, direct data exchange for lateral communication between up to 6 devices. Thus it is possible to expand the basis for inputs/outputs and also realise redundancy with controllers in simple fashion. Transmission rate up to 187.5 kbaud.

**Module PROFIBUS DP/DPV1 (Slave)**

Can be used in all slots 1...4. Module with the full functional capabilities of DIN 19245, parts 1 to 4. Maximum 1 module can be used in the device. Transmission rate up to 1.5 Mbaud.

Bus terminating adapter see accessories on page 10

**Analog outputs****Module AA3_MA**

(pay attention to maximum power consumption, page 10)

Triple current output 0/4...20 mA at 750 Ω

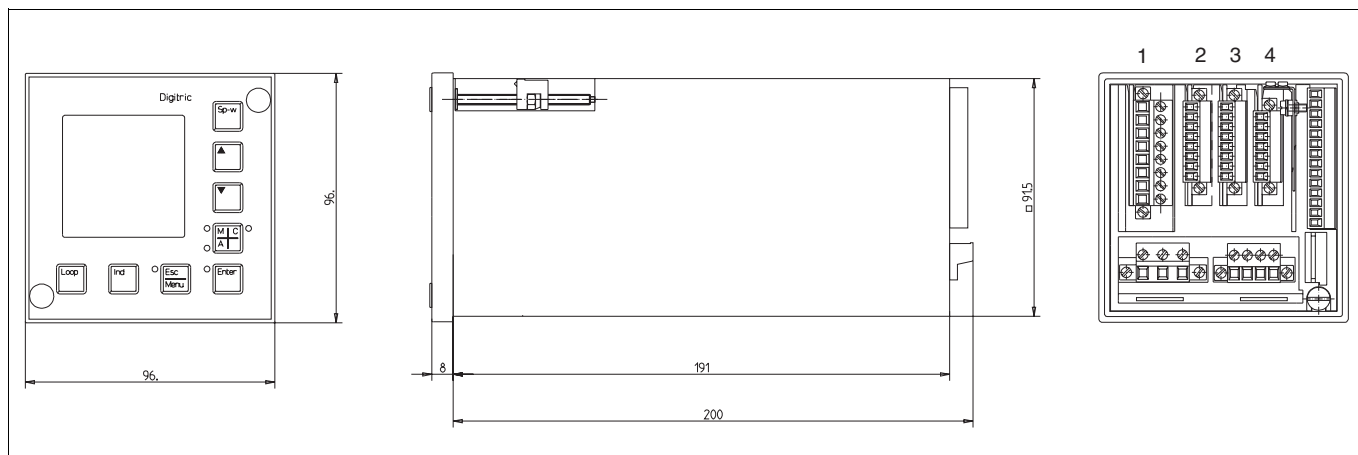
Signal resolution $\leq 0.02 \%$ for 20 mA

Load dependency 0.1 %/100 Ω

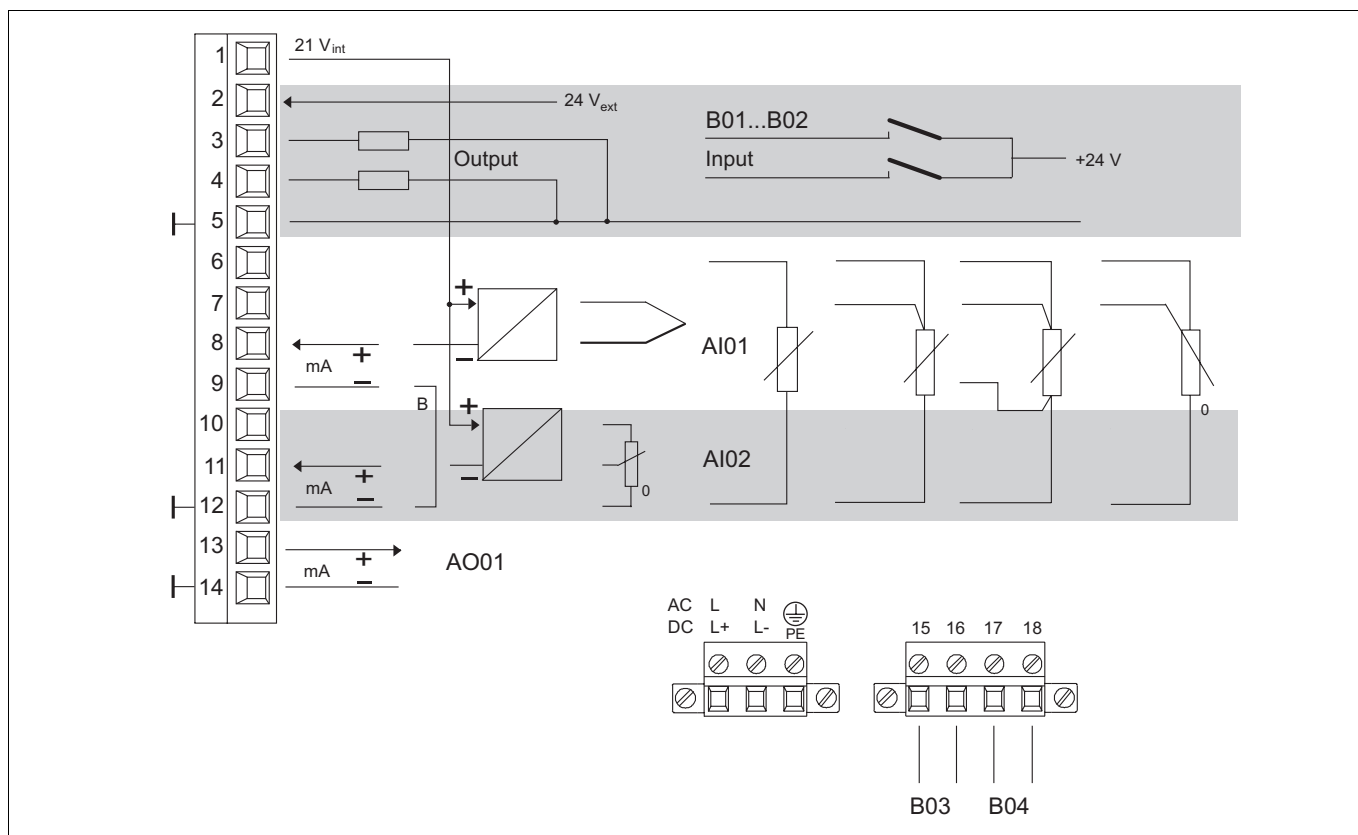
Output monitoring, reaction configurable

Module AA3_VTriple voltage output 0/2...10 V $\geq 5 \text{ k}\Omega$

Dimensional drawings



Connection diagrams of basic models



Connection diagram

AI01	Universal input
AI02	Additional current input (0/4...20 mA) and teletransmitter
B01...B02	Binary inputs or outputs, Function configurable
AO01	Analog output 1 (0/4...20 mA)
21 V	Feed for 2-wire transmitter and/or binary inputs and outputs
B	Jumper required only if power feed to transmitter from terminal 1 and connection to AI01
B03...B04	Relay outputs (NO contact) max. 250 V AC/1 A

Ordering information

	Catalog No.							Code		
Standard model Digitric 500 without modules pre-configured as single-channel continuous controller	V61615A-			0	0	0	0			
Digitric 500 configurable acc. to list¹⁾ 115-230 V AC 24 V UC		1 2	1 1							
Digitric 500 acc. to list and freely configurable¹⁾ 115-230 V AC 24 V UC		1 2	2 2							
Front colours Black, RAL 9005 with grey keys Light grey, RAL 9002 with blue-white keys								0 1		
Modul(s) installed in item ... of the current order ²⁾ entered at position of current order Input 2 (AE02) for 0/2...10 V instead of 0/4...20 mA Express handling for non-stock orders (controllers equipped with modules within 3 workdays)								300 301 310 400		

From these basic models, by configuration and, as appropriate, installation of modules, all function can be realized.

The freely configurable units can be functionally expanded specific to customer requirements with the configuration program IBIS-R. The functions and functional modules available in the configuration program are based on Freelance 2000, and comply with IEC 1131-3.

¹⁾ Explanation see page 2

²⁾ including bus board

Ordering information

Modules (add-on) The bus backplane must also be ordered when a module is ordered for retrofitting. The bus backplane is required once per device and need not be ordered if device already contains a module. When fitting or planning the module equipment of the controller, it is necessary to ensure that the sum of the individual module power parameters does not exceed 170. The project verification of the controller or the hardware editor in IBIS-R monitors the power limit and prevents an overload.									
Accessories									
Part	Designation	Catalog No.							
Bus backplane		61619-0346840							
GSD	Device master data file for PROFIBUS DP, disk	62695-3601109							
Bus terminating adapter PROFIBUS DP		62619-0346488							
Type of modules	Designation	Module power param.	Code	available slots				Catalog No.	
				1	2	3	4		
Inputs									
AE4_mV	4fold thermocouple	0	E	x	x	x	x	62619-0346280	
AE2_mA/mV_TR	Dual thermocouple or mA with galvanical isolation	0	B	x	x	x	x	62619-0346250	
AE4_PT_2L	4fold Pt100 in 2-wire circuit	0	F	x	x	x	x	62619-0346255	
AE2_PT_3/4L	2fold Pt100 in 3-/4-wire circuit	0	G	x	x	x	x	62619-0346281	
AE4_F ³⁾	4fold frequency input	50	H	x	x	x	x	62619-0346444	
AE4_mA_MUS ¹⁾	4fold 0/4...20mA / 0/2...10V with transmitter feed	84	C	x ¹⁾	x ¹⁾	x ¹⁾	x ¹⁾	62619-0346441	
AE4_mA	4fold 0/4...20mA with electrical isolation	0	A	x	x	x	x	62619-0346254	
Binary inputs/outputs									
BEA6_BIN	6fold binary input/output	0	M	x	x	x	x	62619-0346282	
Real time clock									
BEA4_RTC-B ²⁾⁴⁾	Real time clock with battery 4fold binary input/output	0	L	x	x	x	x	62619-0318634	
BEA4_RTC-C ²⁾⁴⁾	Real time clock with capacitor 4fold binary input/output	0	L	x	x	x	x	62619-0318635	
Outputs									
AA3_mA ¹⁾	Triple 0/4...20 mA	73	N	x ¹⁾	x ¹⁾	x ¹⁾	x ¹⁾	62619-0346252	
AA3_V	Triple 0/2...10 V	3	P	x	x	x	x	62619-0346253	
BA4_REL	4fold relay	27	T	x				62619-0346263	
Interfaces									
RS 485	RS 485, not dependent on protocol, bus compatible baud rate up to 187.500 bd.	0	U				x	62619-0346841	
RS 232	RS 232, not dependent on protocol, not bus compatible	0	Y				x	62619-0346845	
PROFIBUS ²⁾³⁾	PROFIBUS DP/DPV1 (slave)	80	Z	x ¹⁾	x ¹⁾	x ¹⁾	x ¹⁾	62619-0346470	

Code No. for all modules:

For subsequent orders of ready-fitted devices, it may be sensible to fit the modules in the works.

In such cases, the Catalog No. must be supplemented as follows:

Installed in item ... of the current order (state position and item)

Code No. 300

¹⁾ Pay attention to the sum of power parameters (≤ 170)

²⁾ Maximum 1 module can be used in the device

³⁾ can only be used with devices from firmware version 01.190 (DPV1 from 01.200)

⁴⁾ can only be used with devices from firmware version 01.200

Ordering information

	Catalog No.								Code		
Configuration	V61675A-			0	0	0	0	0			
Customer-specific configuration as separate item (please enclose task definition in clear text)											
Configuration											
List configuration		1									
Free configuration (price according to time and expense)		2									
Adopted from previous order (see Code No. 302)		3									
Delivery											
Stored in unit (see Code No. 301)		1									
Diskette 3.5 inch.		2									
by E-Mail		4									
Configuration											
Entered at position of current order (clear text)									301		
Adopted from order number and position of previous order (clear text)									302		

Documentation on the configuration is in German (1 copy is provided);
other languages on request!

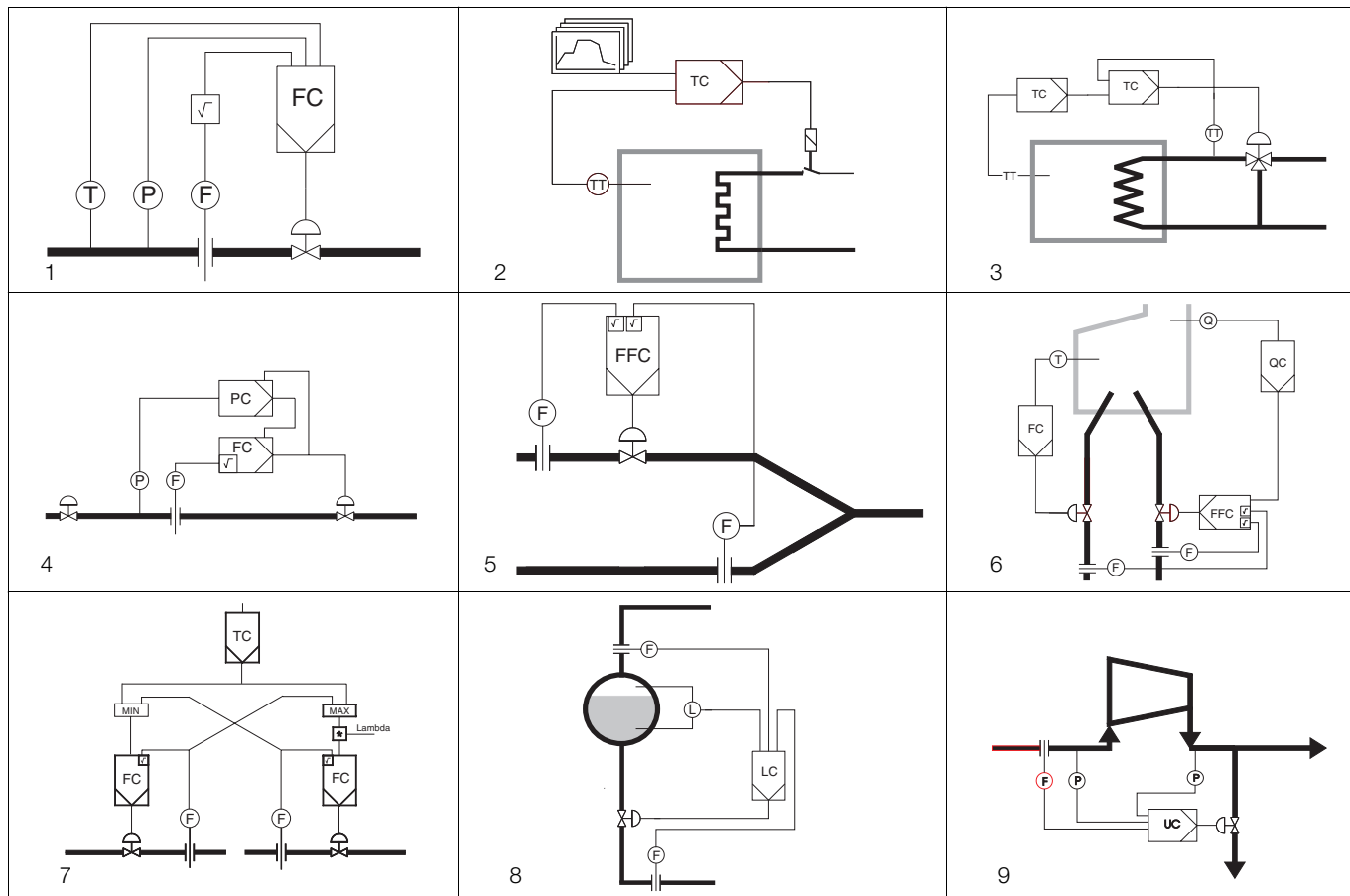
Special features	Catalog No.	Code		
Accessories				
IBIS-R PC program for setting parameter and configuration (see Data Sheet 10/62-6.70 EN)				
PC cable with adapter for connection to the serial interface	62695-0346270			
TTL interface				
Adapter without PC cable	62695-0346267			
Confi IC for enabling the free configuration	62619-0346461			
Spare parts Digitric 500				
CPU board	61608-0346856			
Power supply 230 V AC	61608-0346857			
Power supply 24 V UC	61608-0346858			
Case with integrated front panel module (black, RAL 9005) ¹⁾	61608-0346833			
EPROM set	61608-0346854			
EPROM mounting tool	61608-0967978			

Further spare parts on request

¹⁾ Shall only be used for controllers with firmware 1.206 or later.

If the controller has a older firmware it must be upgraded to the actual firmware.

Applications



1 Fixed value control, e.g. flow control, optionally with flow compensation

2 Program control with up to 10 programs

3 Cascade control

4 Override control

5 Ratio control

6 Air/fuel control

7 Load control

8 Drum water level – 3 element control

9 Anti surge control, requires additional configurations

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Note

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