Digitric 100

Versatile single loop controller for all basic control functions

10/61-6.11 EN

- **Single channel controller with P, PI, PD or PID characteristic**
- **Continuous, time proportioning ON/OFF, heat-off-cool and motorized valve output**
- **Basic unit with 1 universal input, 1 analog output, 2 binary inputs/outputs and 3 relays**
- **Universal input for 0/4...20 mA, TC, RTD and potentiometer**
- **Optional 2nd universal input with transmitter supply**
- **Filtering, linearization and square-rooting of the input signal**
- **Ramp rate for set point and output signal**
- **High and low limitation for set point and output signal**
- **Programmer with 10 programms, 15 segments with 1 analog and 4 digital profiles each**
- **4 configurable alarms**
- **Preconfigured control strategies for the applications shown on page 11**
- **Self-setting of parameters and parameter control**
- **Access bar for 'Parameter setting' and 'Configuration' by means of password or digital input**
- **Spray-water protected front panel IP 65**
- **Brilliant LC display with colour interchange (red/green)**
- **Plug-in module slot for analog and digital inputs/outputs extension**
- **Serial interface for parameter setting and configuration as standard**
- **Optional buscapable RS 485 interface for Modbus or PROFIBUS-DP**

Technical data

Description

The industrial controller Digitric 100 is a single channel compact controller used for complementing single control loops for automating small and medium-sized processes in control engineering. It is universally applicable and suitable for accomplishing simple and special control tasks.

Basic version

1 Universal input for the controlled variable. Without having to modify the hardware, thermocouples, the resistance thermometer Pt 100, teletransmitters and standard signals 0/4...20 mA can be connected. If non-linearized temperature transmitters are used, linearization if effected in the controller. Linearization tables for all standard sensors are stored in the device.

1 analog output (0/4...20 mA) for the actuating signal or other values, e.g. for setpoint 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).

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

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

Hardware extension

2nd universal input with integrated transmitter power supply (50 mA) for e. g. external setpoint, feed forward or position feedback for motorized valve control.

1 module slot 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. The display colour can be set to green or red and can be interchanged as function of process status.

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)

Proportioning ON/OFF controller, PID characteristic.

Heat/off/cool-control, optionally with two switching or one continuous and one switching output.

Motorized valve control for motor driven valves, butterfly valves and gate valves.

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 PID parameters, ramp rates for setpoints and control output, alarm setpoints etc., can be set.

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 with the same configuration (see Data Sheet 62-6.70 EN).

Inputs

Common data:

without electronical isolation
Resolution ≤ 0.01 %
Accuracy (referred to nominal range) ≤ 0.2 %
Temperature effects ≤ 0.2 %/10 °C
Hardware input filter limit frequency 7 Hz

Analog:

Universal input AI01

connected to internal device ground

used for standard signal
0/4...20 mA at 50 Ω ±1 %

Overcurrent/polarity reversal protection
up to ± 40 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	≤ 0.2 %
E	-200...1000 °C	85.18 mV	≤ 0.2 %
K	-200...1400 °C	61.53 mV	≤ 0.2 %
L	-200...1000 °C	78.21 mV	≤ 0.2 %
U	-200... 600 °C	40.00 mV	≤ 0.3 %
R	0...1700 °C	20.22 mV	≤ 0.5 %
S	0...1800 °C	18.72 mV	≤ 0.5 %
T	-200... 400 °C	26.47 mV	≤ 0.4 %
B	0...1800 °C	13.24 mV	≤ 0.6 %
D	0...2300 °C	36.92 mV	≤ 0.4 %

Technical data

Reference junction compensation
internal or external: 0, 20, 50 or 60 °C

Internal reference junction

Error limit	± 1 °C/10 K
Reference temperature	22 °C ± 1 °C
Ambient temperature	0...50 °C

Sensor break monitoring
with configurable reaction

Used for resistance thermometer Pt100 DIN

Measuring range
-200.0...+200.0 °C
-200.0...+800.0 °C

Measuring current
≤ 1 mA

Measuring circuit: 2-wire circuit to 40 Ω line resistance
Line balancing: by software

3-wire circuit: for symmetrical lines up to 3 x 10 Ω

used for resistance teletransmitter (potentiometer)
Measuring ranges
150 Ω, (75...200 Ω); 1.5 kΩ (0.75...2 kΩ)

Measuring current: ≤ 1 mA
other data as resistance thermometer

Optional universal input 2 (AI02)
with integrated transmitter power supply
Input for mA, Pt100, thermocouple or potentiometer, technical data as AI01, but with electronical isolation.

Permissible common-mode voltage against device ground
± 4 V DC

Permissible differential-mode voltage Uss (50 Hz)
50 mV

Transmitter power supply
output voltage 20...25 V DC, 50 mA

Short-circuit proof
automatic cut off on overload

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...28.8	approx. 1 mA
1-signal	24	13.0...30.2	approx. 1 mA
0-signal	0	- 3.0... 5.0	< 0.2 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...0.15 mA

Switching frequency ≤ 8 Hz

Outputs

Analog output AO01
galvanical isolated

Control output or retransmission
0/4...20 mA at max. 750 Ω, short-circuit and open-circuit proof

Control range
0...≥ 21 mA

Load-dependency
0.1 %/100 Ω

Resolution
≥ 0.01 %

binary:
see inputs

3 relays with NO contact (B03/B04/B05)
for max. 250 V AC, 3 A resistive load
for min. ≥ 12 V AC, ≥ 100 mA
Contact material AgCdO

Programmer

10 programs can be stored
each program:
15 segments
Set point in physical units
Segment time 0...99:99:9 hours, four digital tracks

Serial interfaces

TTL interface for connection to PC with fixed telegram format matching parameter setting and configuration program IBIS-R+ (see Data Sheet 62-6.70 EN).

For adapter cable see ordering information.
Bus capable RS 485 interface retrofittable (see modules)

CPU data

Measured value and correction value resolution
≤ 0.01 %

Cycle time
approx. 100 ms

Configuration and data backup
Flash-EPROM

Power supply

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

Max.	13.3 VA (11 W)
Power failure bridging	≥ 150 ms at ≥ 180 V AC

24 V UC

24 V DC	-25...+30 %, residual ripple ≤ ± 3 V_{ss}
24 V AC	-15...+10 %, 47...63 Hz

Power consumption:

Max.	15 VA (12 W)
Power failure bridging	≥ 20 ms at 0.85 x U_{nom}

Power factor cosφ = 0.7

Safety
The device needs no external safety of power supply

Technical data

Environmental conditions

Climatic class
3K3 to EN 60721-3-3

Ambient temperature
0...50 °C

Storage and transport temperature
-20...70 °C

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

Minimum atmospheric pressure
80 kPa

Electromagnetic compatibility

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

Interference resistance EN 61326-1

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

Max. interference resistance, if device is mounted in a metal panel

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 145 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

Electrical connections

Plug-in screw terminals
for wire or stranded wire to 1.5 mm^2, coded

Power supply
2.5 mm^2

No shielded cables required – except for interface leads

Mounting orientation
any

Weight
approx. 600 g without modules
additional module approx. 40 g
additional relay module approx. 80 g

Scope of supply and delivery

2 straining screws (integrated in case), Operating Manual and plug-in screw terminals

Modules

One of the modules listed below can be plugged in for extending the I/O or for using digital communication.

Analog inputs

Module AE4_MA for standard signals

4 inputs
0/4...20 mA with electronical isolation

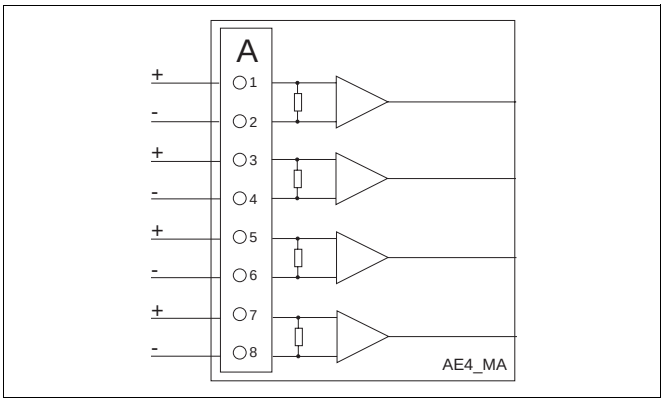
Input resistance approx. 50 Ω

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



Technical data

Module 4_MV for thermocouples

4 inputs
-10...80 mV, with electronical isolation

Signal resolution
20.000 for -10...80 mV

Input resistance
approx. 5 MΩ

Permissible common-mode voltage ≤ ± 4 V against device ground

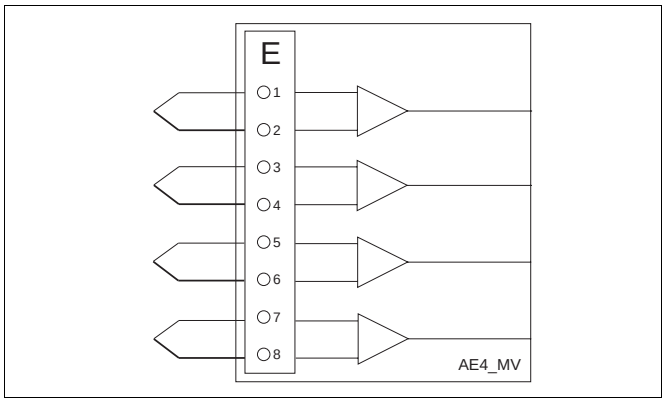
Permissible differential-mode voltage 50 mV_{ss}

Destruction proof
Voltage at one input ± 10 V
Voltage 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 galvanical isolation

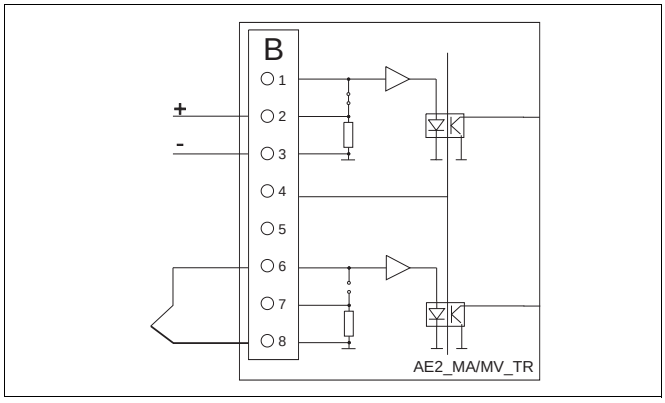
2 inputs with galvanical isolation
0/4...20 mA or -10...80 mV (changeable by means of jumpers)

Input resistance at
20 mA: 25 Ω; -10...80 mV: approx. 5 MΩ

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}

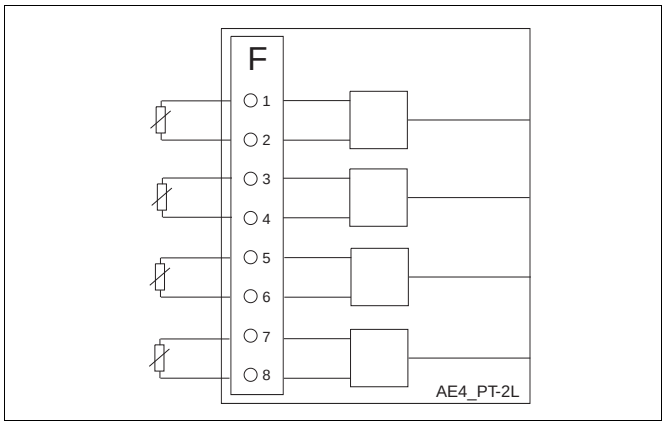
Signal resolution ≤ 0.01 % for 400 Ω

Measuring current ≤ 1.5 mA

Measuring range configurable
-200.0...+200.0 °C
0.0...+450.0 °C
-200.0...+800.0 °C

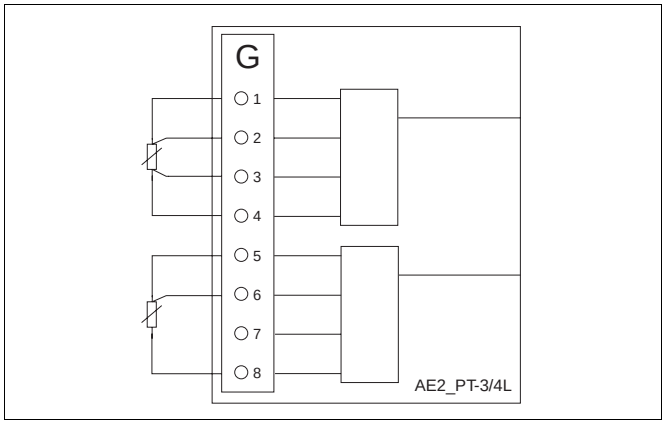
Line balancing by software

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

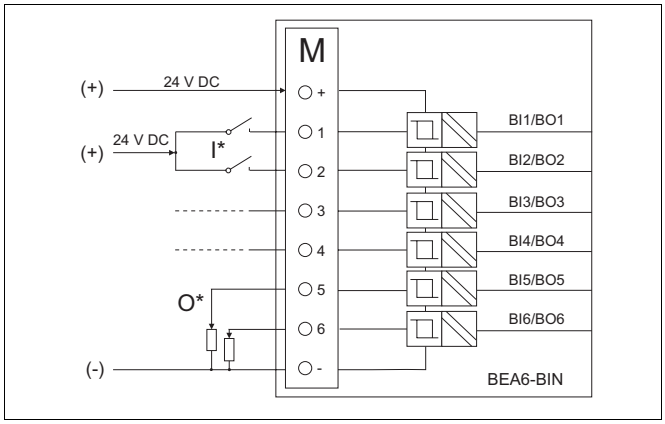
Measuring current < 0.5 mA

Technical data

Binary inputs/outputs

Module BEA6-BIN

6 binary inputs/outputs, galvanical isolation
Function configurable as input or output, direct or reverse action



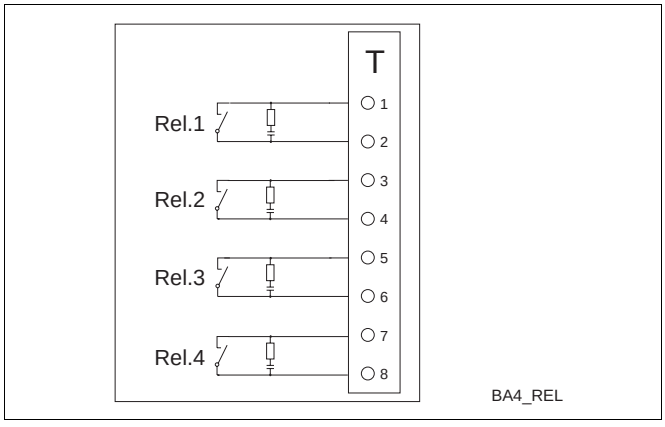
*) Connection example: I = binary inputs; O = binary outputs

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

Module BA4_REL

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

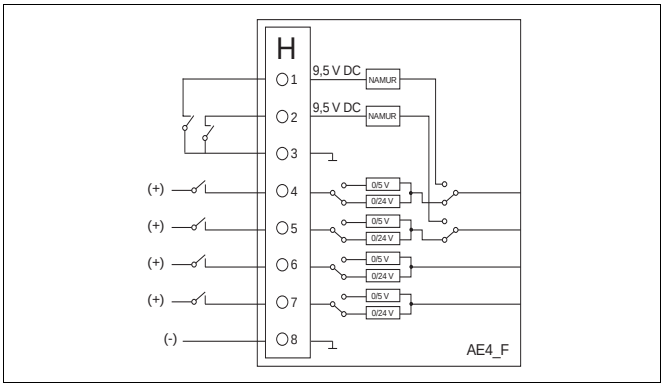
Types of input signals:

Max. 2 Namur inputs according to DIN 19234
Open circuit voltage U_i = 9.5 V
Internal resistance R_i = 1 kΩ
Signal range L = 0...1.2 mA/H = 2.1...4.0 mA

Max. 4 digital inputs according to DIN 19240 (0/24 V DC)
Input resistance R_E > 6 kΩ
Signal range L = -3...5 V/H = 13...20.2 V

Max. 4 digital inputs TTL (0/5 V DC)
Input resistance R_E > 6 kΩ
Signal range L = 0...0.8 V/H = 3.5...24 V

Accuracy: ± 0.1 %



Technical data

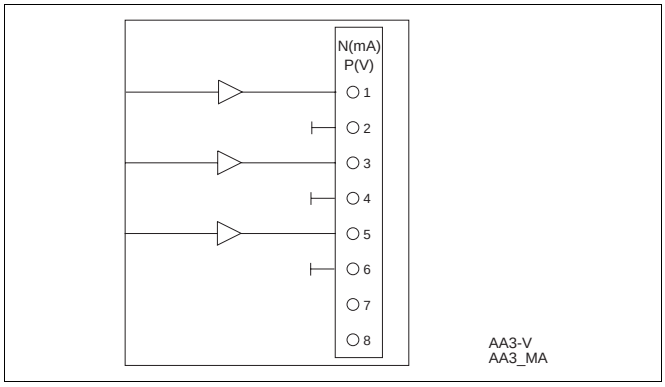
Analog outputs

Module AA3_MA

Triple current output 0/4...20 mA at 750 Ω
Signal resolution ≤ 0.02 % for 20 mA
Load dependency 0.1 %/100 Ω
Output monitoring, reaction configurable

Module AA3_V

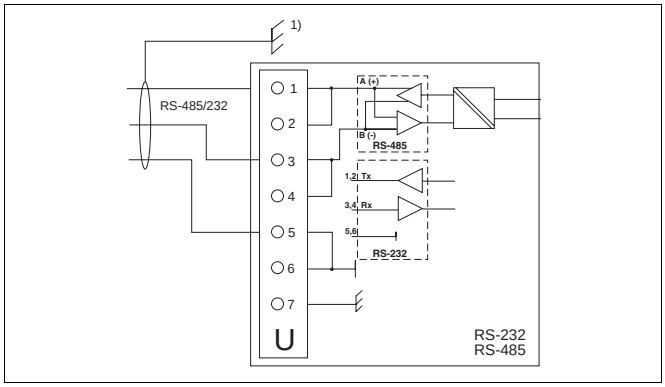
Triple voltage output 0/2...10 V ≥ 5 kΩ



Interface modules

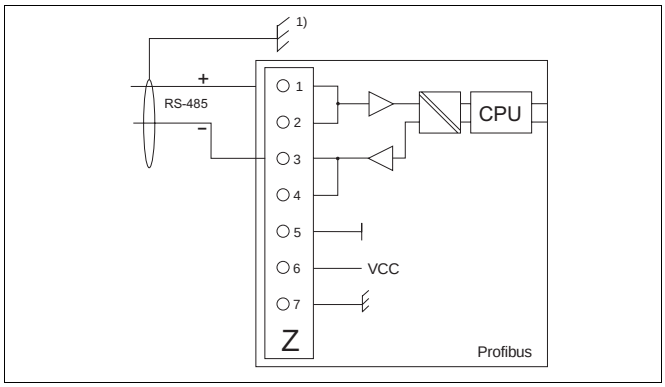
Module RS 485 or RS 232

Interface module in accordance with RS 485 or RS 232 specification. Electrically isolated. Standard protocol: MODBUS-RTU.

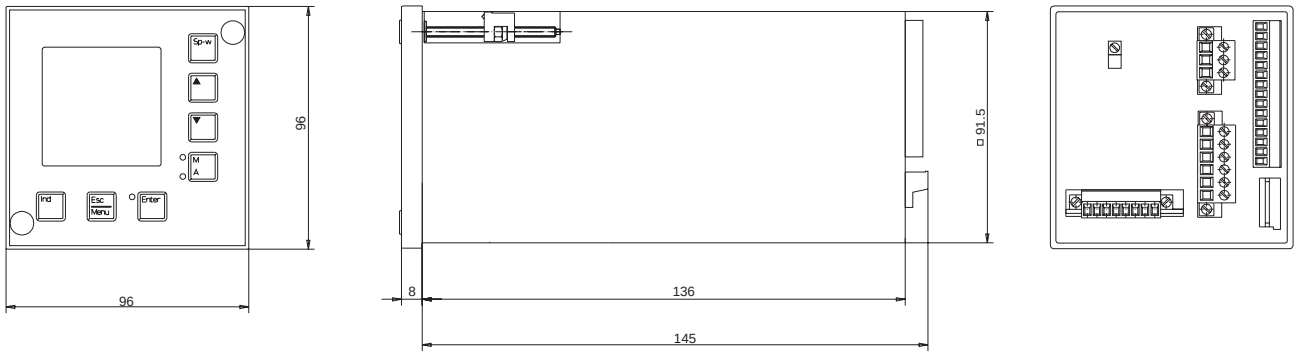


Module PROFIBUS-DP/DP-V1 (Slave)

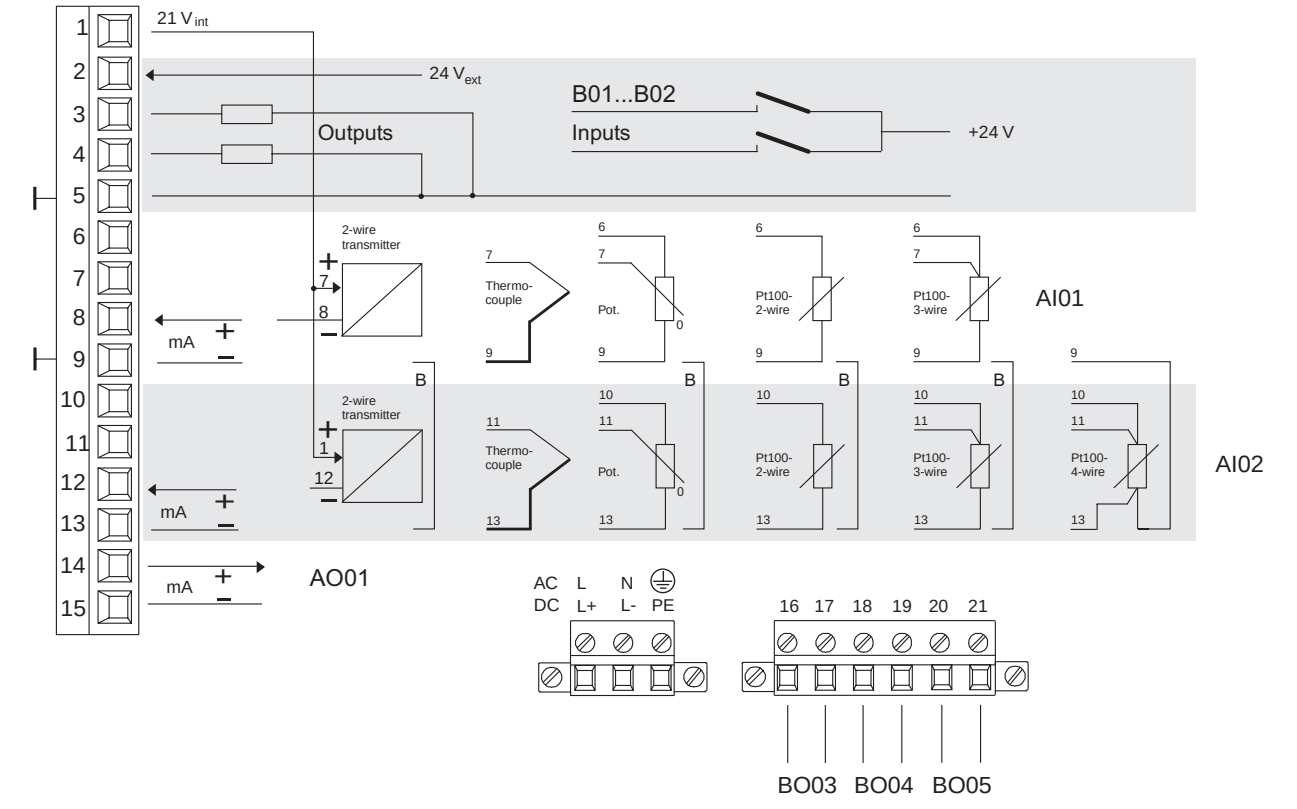
Module with the full functional capabilities of DIN 19245, parts 1 to 4. Transmission rate up to 1.5 MBaud.
Bus terminating adapter see accessories on page 10



Dimensional drawings



Connection diagrams of basic models



Connection diagram

AI01	Universal input 1
AI02	Universal input 2, optional
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, optional
B	Jumper required (terminal 9/13) only if power feed to transmitter for AI02 from terminal 1, or if AI02 is used for Pt100 or potentiometer input
BO03...BO05	Relay outputs (NO contact) max. 250 V AC/1 A

Ordering information

	Catalog No.								Code		
Digitric 100	**V61611A-**				**0**						
Power supply											
115/230 V AC		1									
24 V UC (available from 1/2002)		2									
Basic instrument with											
1 universal input			0								
2 universal inputs with integrated transmitter supply			1								
No extension module				0							
Extension module Analog Inputs											
4fold thermocouple				E							
2fold thermocouple or mA with galvanical isolation				B							
4fold Pt100 in 2-wire circuit				F							
2fold Pt100 in 3-/4-wire circuit				G							
4fold frequency input				H							
4fold 0/4…20 mA with electrical isolation				A							
Extension module Digital Inputs/Outputs											
6fold binary inputs/outputs				M							
Extension module Analog Outputs											
3fold 0/4...20 mA				N							
3fold 0/2...10 V				P							
4fold relays				T							
Extension module Communication											
RS 485 for MODBUS RTU				U							
RS 232 for MODBUS RTU				Y							
PROFIBUS DP/DP-V1				Z							
Adjusted control strategy (factory setting, other strategy configurable)											
Continuous control					0						
Time proportioning ON/OFF control					1						
Heat-Off-Cool-Control					2						
Motorised valve control					3						
Alarm station					4						
Customer specified (as separate item V61675A)					5						
Approvals											
Standard (CE)						0					
DIN 3440 (in preparation)						1					
VdTÜV water level (in preparation)						2					
Design Front											
OEM design (RAL 9005)							0				
ABB design (RAL 9002)							1				
Manual											
German								D			
English								E			
French								F			

Notes:
The universal controller Digitric 100 can optionally be pre-adjusted for a basic control strategy at the factory (see Ordering information) This strategy can be changed or extended to any other function by the user.

Control strategy	Control output (other control outputs configurable)	Sensor type for process variable (other sensor types and ranges config.)	Template-Code (selectable at the controllers faceplate)
Continuous control	Control output 4...20 mA	4...20 mA (0...100 %)	**1**00A0
Time proportioning ON/OFF control	Control output relay 1 Err-high/low alarm	4...20 mA (0...100 %)	**2**0EA0
Heat-Off-Cool-control	2 control outputs relay	4...20 mA (0...100 %)	**3**00A0
Motorised valve control	2 control outputs relay for boundless motorized valve control (without position feedback)	4...20 mA (0...100 %)	**5**00A0
Alarm station	1 PV high and 1 PV low alarm	4...20 mA (0...100 %)	**10**0IA0

Ordering information

The extension modul can also be ordered seperately and plugged in later.

Accessories

Part	**Designation**	Catalog No.		
GSD	Device master data file for PROFIBUS-DP, disk	62695-3601109		
Bus terminating adapter		62619-0346488		

Type of modules	**Designation**	Code	Catalog No.		
Inputs					
AE4_mV	4fold thermocouple	E	62619-0346280		
AE2_mA/mV_TR	Dual thermocouple or mA with galvanical isolation	B	62619-0346250		
AE4_PT_2L	4fold Pt100 in 2-wire circuit	F	62619-0346255		
AE2_PT_3/4L	2fold Pt100 in 3-/4-wire circuit	G	62619-0346281		
AE4_F[3)]	4fold frequency input	H	62619-0346444		
AE4_mA	4fold 0/4…20mA with electrical isolation	A	62619-0346254		
Binary inputs/outputs					
BEA6_BIN	6fold binary input/output	M	62619-0346282		
Outputs					
AA3_mA[1)]	Triple 0/4...20 mA	N	62619-0346252		
AA3_V	Triple 0/2...10 V	P	62619-0346253		
BA4_REL	4fold relay	T	62619-0346263		
Interfaces					
RS 485	RS 485, not dependent on protocol, bus compatible	U	62619-0346324		
RS 232	RS 232, not dependent on protocol, not bus compatible	Y	62619-0346326		
PROFIBUS[2)3)]	PROFIBUS DP/DP-V1 (slave)	Z	62619-0346470		

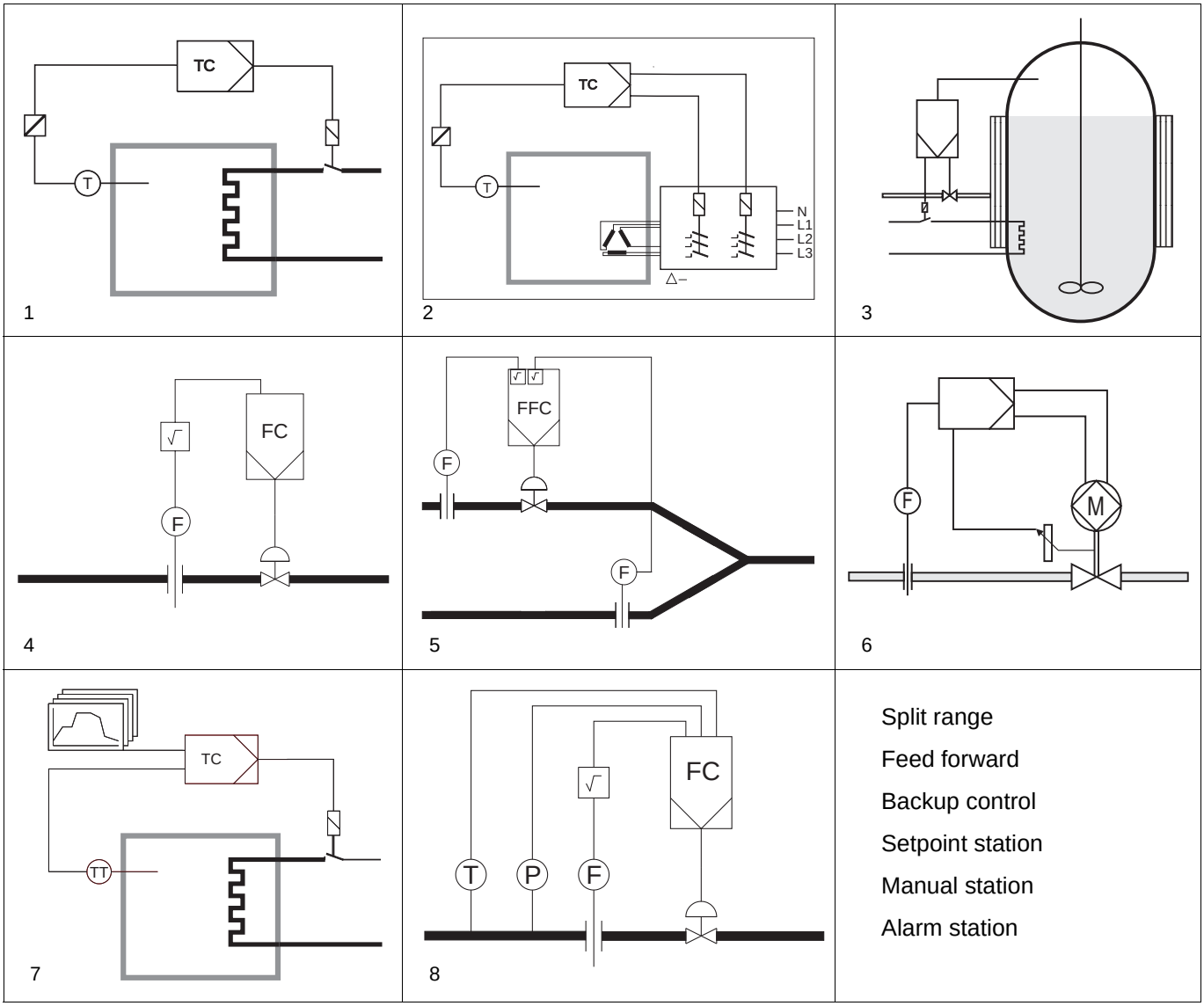
Ordering information

	Catalog No.								Code		
List configuration	**V61675A-**			**0**	**0**	**0**	**0**	**0**			
Custumer-specific configuration as separate item (please enclose task definition in clear text)											
List configuration											
List configuration		4									
Adopted from previous order (see Code No. 302)		5									
Delivery											
Stored in unit (see Code No. 302)			1								
3.5 inch. disk			2								

Special features

	Catalog No.	Code		
Configuration				
Entered at position of current order (clear text)		301		
Adopted from order number and position of previous order (clear text)		302		
Accessories				
IBIS-R+ PC program for setting parameter and configuration (see Data Sheet 62-6.70 EN)				
PC cable with adapter for connection to the serial interface TTL interface	62695-0346270			
Spare parts				
Analog input AI02 with integrated transmitter power supply	0346866V			

Applications



1 ON/OFF control e.g. for furnace control
2 ON/OFF control with additional heating power selector high-low-off
3 Heat-off-cool control, e.g. heating (ON/OFF), cooling (continuous)
4 Continuous control e.g. for flow control
5 Ratio control
6 Motorized valve control with or without position feedback
7 Program control with up to 10 profiles
8 Flow compensation for gas or steam

ABB Automation Products GmbH
Hoeseler Platz 2
D-42579 Heiligenhaus
Phone +49(0)20 56 - 12 51 81
Fax +49(0)20 56 - 12 50 81
http://www.abb.com

Subject to technical changes.
Printed in the Fed. Rep. of Germany
10/61-6.11 EN 08.01