

Versatile single loop controller  
for all basic control functions

## ENA Control

- **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**
  - optional 2nd universal input with transmitter supply
- **Filtering, linearization and square-rooting of the input signal**
- **Ramp rate and high and low limitation for set point and output signal**
- **Programmer with 10 programs, 15 segments**
  - 1 analog and 4 digital profiles each
- **4 configurable alarms**
- **Preconfigured control strategies**
- **Self-tuning of parameters and parameter control**
- **Lock for 'Parameter setting' and 'Configuration' by 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 or RS 485 interface (Modbus RTU) or PROFIBUS DP interface
- **Serial interface**
  - for parameter setting and configuration as standard



Intelligent,  
compact and efficient

## Description

The industrial controller Digitrenic 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 is 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 ENA62-6.70 EN).

**Technical data****Inputs****Common data:**

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

**Analogue:****Universal input AI01**

connected to internal device ground

**used for standard signal**0/4...20 mA at 50  $\Omega$   $\pm 1\%$ **Overcurrent/polarity reversal protection**up to  $\pm 40$  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 $^\circ\text{C}$	77.43 mV	$\leq 0.2\%$
E	-200...1000 $^\circ\text{C}$	85.18 mV	$\leq 0.2\%$
K	-200...1400 $^\circ\text{C}$	61.53 mV	$\leq 0.2\%$
L	-200...1000 $^\circ\text{C}$	78.21 mV	$\leq 0.2\%$
U	-200... 600 $^\circ\text{C}$	40.00 mV	$\leq 0.3\%$
R	0...1700 $^\circ\text{C}$	20.22 mV	$\leq 0.5\%$
S	0...1800 $^\circ\text{C}$	18.72 mV	$\leq 0.5\%$
T	-200... 400 $^\circ\text{C}$	26.47 mV	$\leq 0.4\%$
B	0...1800 $^\circ\text{C}$	13.24 mV	$\leq 0.6\%$
D	0...2300 $^\circ\text{C}$	36.92 mV	$\leq 0.4\%$

**Reference junction compensation**internal or external: 0, 20, 50 or 60  $^\circ\text{C}$ **Internal reference junction**

Error limit	$\pm 1\text{ }^\circ\text{C}/10\text{ K}$
Reference temperature	22 $^\circ\text{C} \pm 1\text{ }^\circ\text{C}$
Ambient temperature	0...50 $^\circ\text{C}$

**Sensor break monitoring**

with configurable reaction

**used for resistance thermometer Pt100 DIN****Measuring range**

- 200.0...+200.0  $^\circ\text{C}$
- 200.0...+800.0  $^\circ\text{C}$

**Measuring current** $\leq 1$  mA**Measuring circuit**

- 2-wire circuit to 40  $\Omega$  line resistance
- Line balancing by software

**3-wire circuit**for symmetrical lines up to 3 x 10  $\Omega$ **used for resistance teletransmitter (potentiometer)****Measuring ranges**150  $\Omega$ , (75...200  $\Omega$ ); 1.5 k $\Omega$  (0.75...2 k $\Omega$ )**Measuring current** $\leq 1$  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 electrical isolation.

**Permissible common-mode voltage against device ground** $\pm 4$  V DC**Permissible differential-mode voltage  $U_{ss}$  (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  $\leq 8$  Hz**Outputs****Analog output AO01**

galvanical isolated

**Control output or retransmission**0/4...20 mA at max. 750  $\Omega$ , short-circuit and open-circuit proof**Control range**0... $\geq 21$  mA**Load-dependency**0.1 %/100  $\Omega$ **Resolution** $\geq 0.01\%$ **binary:**

see inputs

**3 relays with NO contact (B03/B04/B05)**

for max. 250 V AC, 3 A resistive load  
for min.  $\geq 12$  V AC,  $\geq 100$  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 ENA62-6.70 EN).

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

**CPU data****Measured value and correction value resolution**

$\leq 0.01$  %

**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	$\geq 150$ ms at $\geq 180$ V AC

**Safety**

The device needs no external safety of power supply

**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 61000-6-3, June 2005

Interference emission EN 50081-1, 1/92  
(referred to: EN 55011, August 2003, 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**

Meets requirements to EN 61010 -1 (VDE 0411 part 1), August 2002  
Class of protection 1

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.

**Mechanical stress features****to EN 60068-2-27, March 1995 and EN 60068-2-6, May 1996**

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 IEC 61554

**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<sup>2</sup>, coded

**Power supply**

2.5 mm<sup>2</sup>

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 electrical isolation

**Input resistance**

approx. 50 Ω

**Signal resolution**

≤ 0.01 % for 20 mA

**Permissible common-mode voltage**

≤ ± 4 V against device ground

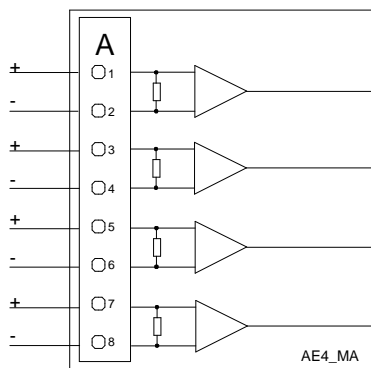
**Permissible differential-mode voltage**

50 mV<sub>ss</sub>

**Destruction proof**

Input current < 50 mA

Voltage between input and ground ± 50 V



**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 MΩ

**Permissible common-mode voltage**

≤ ± 4 V against device ground

**Permissible differential-mode voltage**

50 mV<sub>ss</sub>

**Destruction proof**

Voltage at one input ± 10 V

Voltage between input and ground ± 50 V

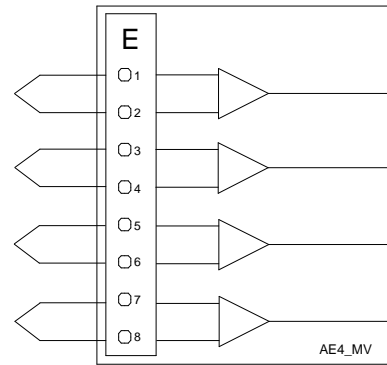
**Break monitoring**

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)

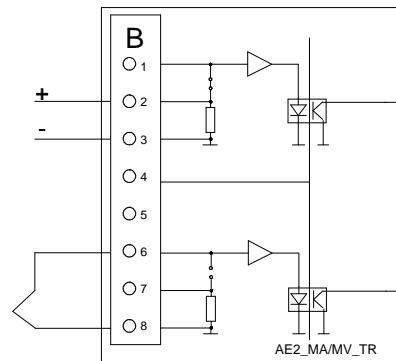
**Input resistance at**

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

**Line resistance**

0...125 Ω per line

**Permissible differential mode voltage**

100 mV<sub>ss</sub>

**Signal resolution**

≤ 0.01 % for 400 Ω

**Measuring current**

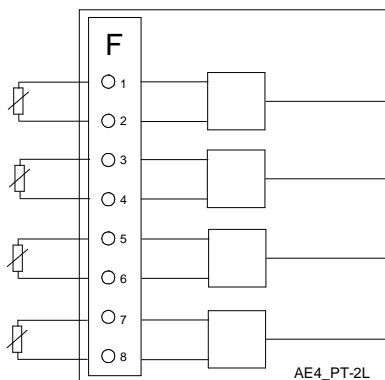
≤ 1.5 mA

**Measuring range configurable**

- 200.0...+200.0 °C
- 0...+450.0 °C
- 200.0...+800.0 °C

**Line balancing by software**

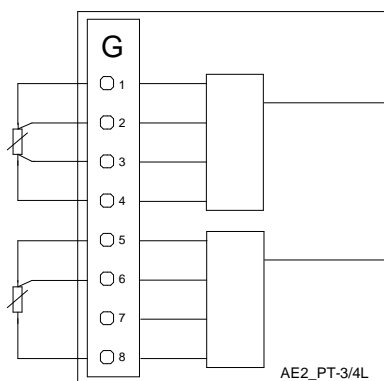
**Sensor break and short-circuit monitoring**  
configurable reaction



**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**

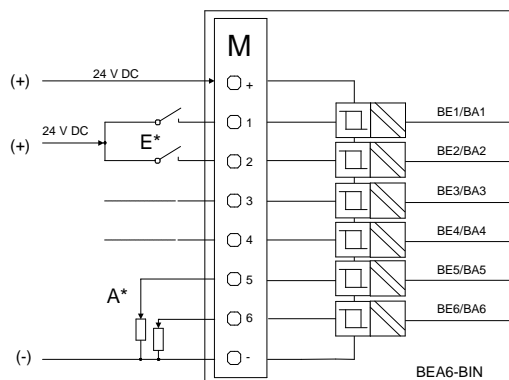
< 0.5 mA

**Binary inputs/outputs**

**Module BEA6-BIN**

**6 binary inputs/outputs, 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**

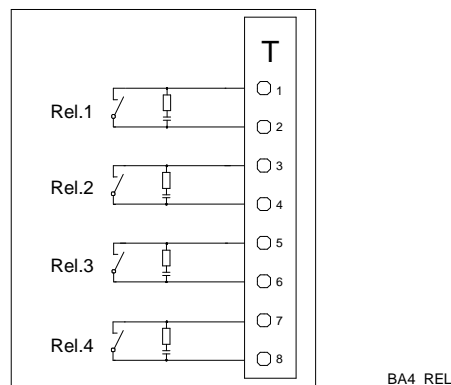
with NO contact for max. 250 V AC, 1 A resistive load

**Built-in spark-quenching**

0.022 μF + 100 Ω

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

Contact material AgCdO



Versatile single loop controller for all basic control functions

**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)**

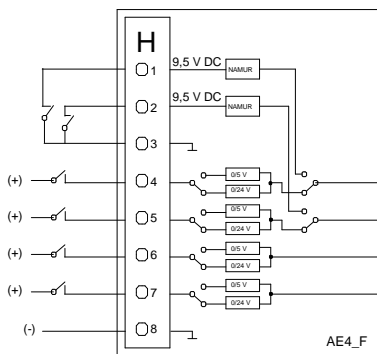
Input resistance	$R_E > 6 \text{ k}\Omega$
Signal range	$L = -3...5 \text{ V/H} = 13...20.2 \text{ V}$

**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**

± 0.1 %



**Analog outputs**

**Module AA3\_MA**

**Triple current output**

0/4...20 mA at 750 Ω

**Signal resolution**

≤ 0.02 % for 20 mA

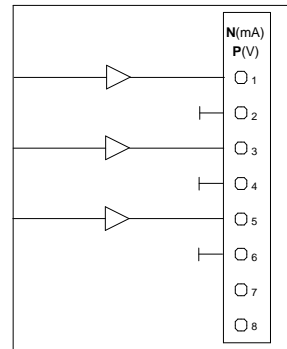
**Load dependency**

0.1 %/100 Ω

Output monitoring, reaction configurable

**Module AA3\_V**

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

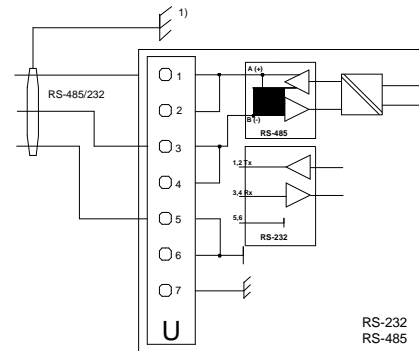


AA3-V  
AA3\_MA

**Interface modules**

**Module RS 485 or RS 232**

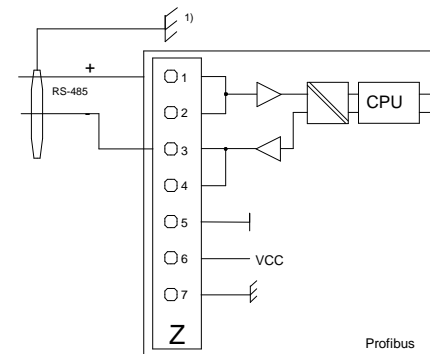
Interface module in accordance with RS 485 or RS 232 specification. Electrically isolated. Standard protocol: MODBUS-RTU.



RS-232  
RS-485

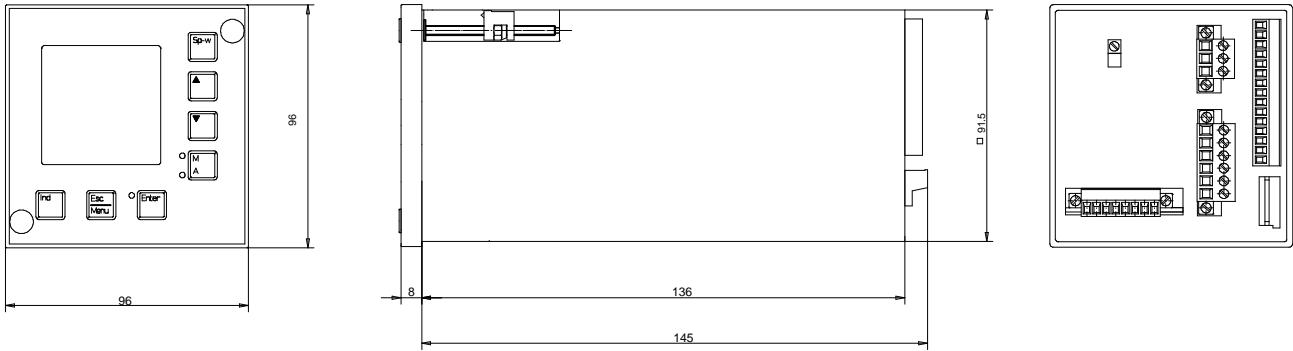
**Module PROFIBUS DP/DPV1 (Slave)**

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

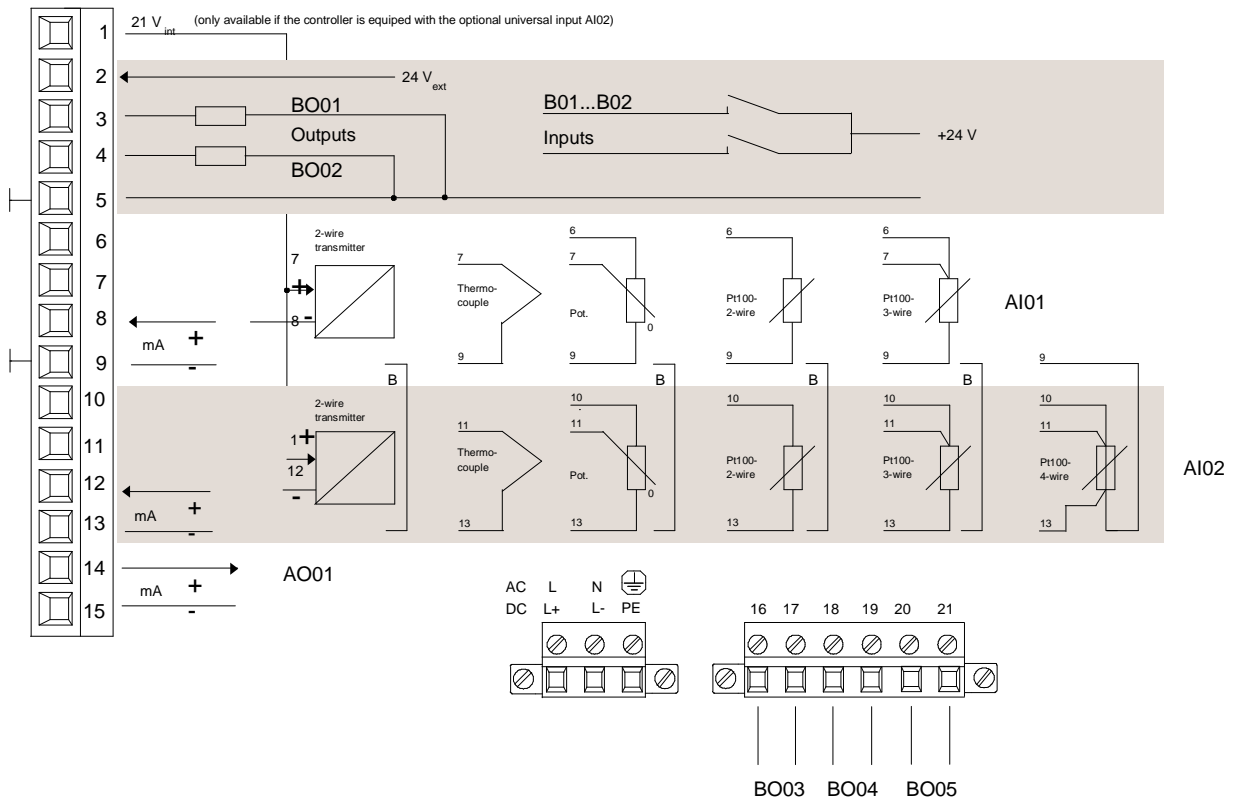


Profibus

**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.										
<b>Digitrenic 100</b>	<b>V61611A-</b>	<b>1</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>3</b>	<b>0</b>	
<b>Power supply</b> 115-230 V AC <b>Basic instrument with</b> 2 universal inputs with integrated transmitter supply <b>No extension module</b> <b>Adjusted control strategy</b> Continuous control (factory setting, other strategy configurable) <b>Design Front</b> Black, RAL 9005 with grey keys <b>Manual</b> German, English on CD											
<b>Configuration</b> Entered at position of current order (clear text)										Code 301	

<b>Special features</b>	Catalog No.	Code		
<b>Accessories</b>				
IBIS-R PC program for setting parameter and configuration (see Data Sheet ENA62-6.70 EN) PC cable with adapter for connection to the serial interface TTL interface	62695-0346270			
<b>Spare parts</b>				
Analog input AI02 with integrated transmitter power supply	0346866V			

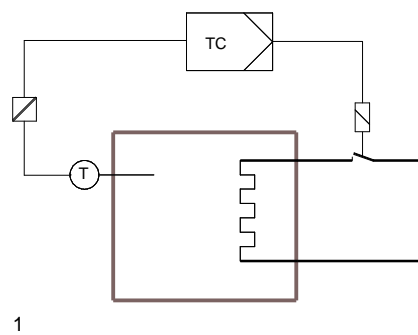
**Ordering information**

<b>The extension modul can also be ordered seperately and plugged in later.</b>					
<b>Accessories</b>					
<b>Part</b>	<b>Designation</b>		<b>Catalog No.</b>		
GSD	Device master data file for PROFIBUS DP, disk		62695-3601109		
Bus terminating adapter			62619-0346488		
<b>Type of modules</b>					
<b>Type of modules</b>	<b>Designation</b>	<b>Code</b>	<b>Catalog No.</b>		
<b>Inputs</b>					
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	4fold frequency input	H	62619-0346444		
AE4_mA	4fold 0/4...20mA with electrical isolation	A	62619-0346254		
<b>Binary inputs/outputs</b>					
BEA6_BIN	6fold binary input/output	M	62619-0346282		
<b>Outputs</b>					
AA3_mA	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		
<b>Interfaces</b>					
RS 485	RS 485, not dependent on protocol, bus compatible	U	62619-0346257		
RS 232	RS 232, not dependent on protocol, not bus compatible	Y	62619-0346456		
PROFIBUS	PROFIBUS DP/DPV1 (slave)	Z	62619-0346470		

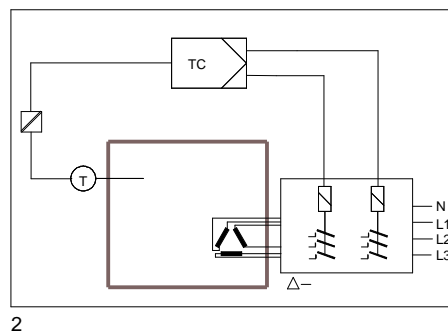
<b>Ordering information</b>	<b>Catalog No.</b>							<b>Code</b>		
<b>List configuration</b>	<b>V61675A-</b>									
Customer-specific configuration as separate item (please enclose task definition in clear text)				0	0	0	0	3		
<b>List configuration</b>										
List configuration		4								
Adopted from previous order (see Code No. 302)		5								
<b>Delivery</b>										
Stored in unit (see Code No. 301)			1							
3.5 inch. disk			2							
by E-Mail			4							
<b>Configuration</b>										
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!

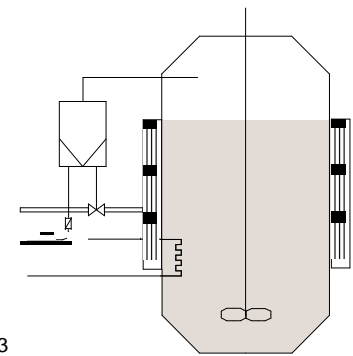
Applications



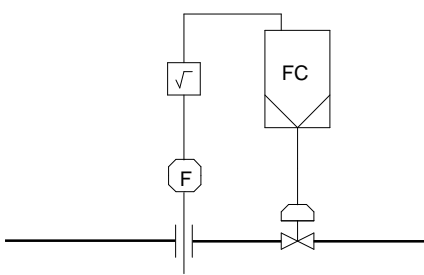
1



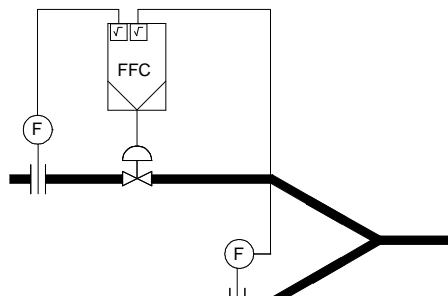
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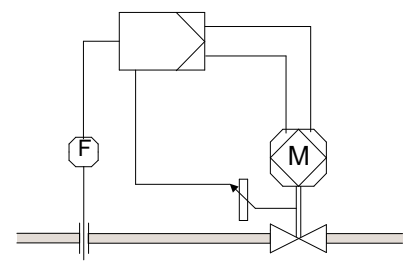
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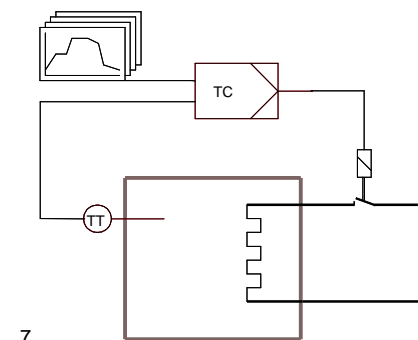
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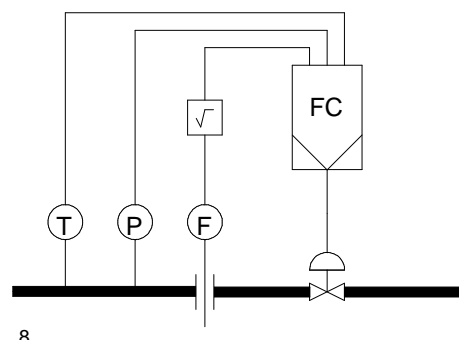
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6



7



8

- Split range
- Feed forward
- Backup control
- Setpoint station
- Manual station
- Alarm station

- 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

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# ENA Control

**ElectronXx**  
Haberstrasse 46  
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