

## ENA Control

- **1-channel, fixed value, ratio controller**
  - with P, PI, PD or PID characteristic
- **2-channel cascade or override controller**
  - with 1 control output
- **Dead time algorithm (Smith predictor)**
- **Spray-water protected front panel IP 65**
- **Clearly laid-out LCD with color change (red/green)**
  - analog displays for process variable, set point and controller output
- **2 analog inputs, 1 analog output, 4 binary inputs/outputs**
- **Universal input for temperature sensor**
- **Filtering, linearization and square-rooting**
- **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 connections**
- **Analog or switching controller output**
  - (two-position controller, step controller, continuous controller, configurable without hardware modification)
- **Self-setting of parameters and parameter control**
- **Access bar for 'Parameter setting' and 'Configuration' by means of password or digital output**
- **Serial interface**
  - for parameter setting and configuration as standard
- **Bus capable RS 485 interfaces**
  - for Modbus or PROFIBUS for connection to higher-level systems, optional



Intelligent,  
compact and efficient

## Description

The P100 process controller is the basic model of the Protrenic series. It can be operated as a process-specific single unit or in conjunction with higher-level systems.

The front panel distinctly shows the current measured values and operating modes, from a long distance, in illuminated displays. For operation, all information is clearly presented on an LC display.

### In the basic model the P100 has ...

... **an universal input**. Without modification of the unit hardware, thermocouples, Pt100 resistance thermometers, and also standard signals 0/4...20 mA can be connected. When non-linearized temperature transmitters are used, linearization is carried out in the controller. The linearization tables for all standard sensors are stored in the unit.

... **an mA input**, which is usable as a disturbance variable or set point input. In step controllers this input can be used for position feedback signal.

... **an mA output** for the positioning signal or other values, e.g. for set point and actual value.

... **four binary inputs/outputs**. These inputs/outputs are user-configurable as inputs or outputs. They are therefore optionally usable as controller outputs or alarm value outputs, but also as inputs for switchovers in the controller (e.g. manual/automatic).

... **an front panel TTL interface** for connection of a parameter setting and configuration PC. This facilitates the necessary adjustments in commissioning.

... **an slot** for connection of an RS 485, RS 232 or PROFIBUS interface module.

## Front control panel

The front control panel gives information on the state of the process and permits specifically-targeted intervention in the process sequence. Illuminated displays, which can also be seen from a distance, indicate the process state. 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

**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

## Continuous controller

## 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

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 ENA62-6.70 EN).

The configuration of a P100 can be adopted onto the process controller P500/P550.

## Technical data

### Inputs

#### Common data:

without electrical isolation  
Resolution  $\leq 0.01\%$   
Measured error (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

up 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 meas. error
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 %

**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

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

**used for resistance teletransmitter (potentiometer)**

**Measuring ranges**

- 150 Ω, (75...200 Ω);
- 1500 Ω (750...2000 Ω)

Measuring current: ≤ 1 mA  
other data as resistance thermometer

**Universal input 2 (AI02)**

Input for mA signals, technical data as AI01, but without electrical isolation.

**binary:**

**4 binary inputs/outputs**

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:**

**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 %

**Only short version (210 mm) after Q2/2002:**

Analog output is electrical isolated

**binary:**

see inputs

**Transmitter feed**

**Output voltage**

20...24 V DC, 50 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...99:59:59 hours, 4 control signal tracks

**CPU data**

**Measured value and correction value resolution**

≤ 0.01 %

**Cycle time**

≥ 100 ms

**Data backup**

Flash-EPROM

**Power supply**

**Short version (210 mm) after Q2/2002**

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

Power consumption	
P100 without module	7.5 VA (5 W)
P100 with module	max. 11.3 VA (7,5 W)
Power failure bridging	≥ 120 ms at ≥ 180 V AC

**24 V UC**

24 V DC	-25 %...+30 %; 47...63 Hz
24 V AC	Residual ripple ≤ 3 V <sub>ss</sub> -15 %...+10 %; 47...63 Hz
Power consumption	
P100 without module	9 VA (6 W)
P100 with module	max. 12.8 VA (8.5 W)
Power failure bridging	≥ 20 ms at U ≥ 0.85 x U <sub>Nenn</sub>
Power factor	cosφ = 0.7

**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 air pressure**

80 kPa

**Electromagnetic compatibility**

Meets protection requirements of EMC directive 89/336/EEC, 5/89  
Interference resistance EN 61326, May 2004  
interference emission EN 61000-6-3, June 2005  
(referred to: EN 55011, August 2003, class B)  
Industry standard to NAMUR NE 2, February 2004  
Maximum immunity if assembled in metallic 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 are functional extra-low  
voltage circuits to DIN VDE 0100 part 410.

**Mechanical stress capabilities**

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 72 mm x 144 mm  
Installed depth short version: 210 mm

**Panel cutout**

68 mm x 138 mm to DIN IEC 61554

**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 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**

1 kg without modules;  
interface module approx. 40 g

**Scope of supply and delivery**

2 straining screws, operating manual and  
plug-in screw terminals

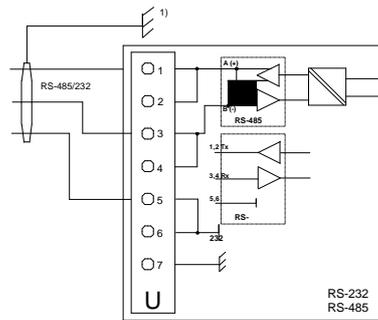
**Serial interfaces**

**TTL interface** accessible after removing front panel module for connection  
to PC via TTL/RS 232 converter (Catalog No. 62695-0346270) with  
fixed telegram format matching parameter setting and configuration program  
**IBIS-RS** (see Data Sheet 62-6.70 EN).

**Interface module**

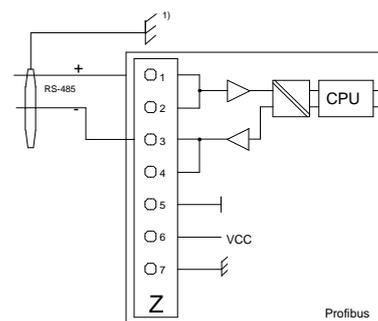
**Modul RS 485 or RS 232**

Interface module as per RS 485 or RS 232 specification. Electrically isolated.  
The used protocol is MODBUS-RTU.



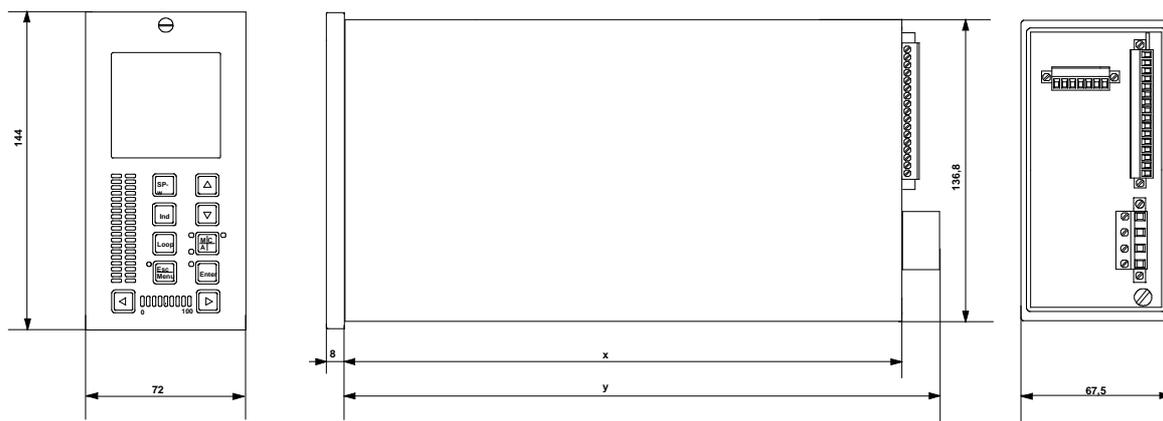
**Module PROFIBUS**

Module with the full functionality acc. to DIN 19245, parts 1 to 4



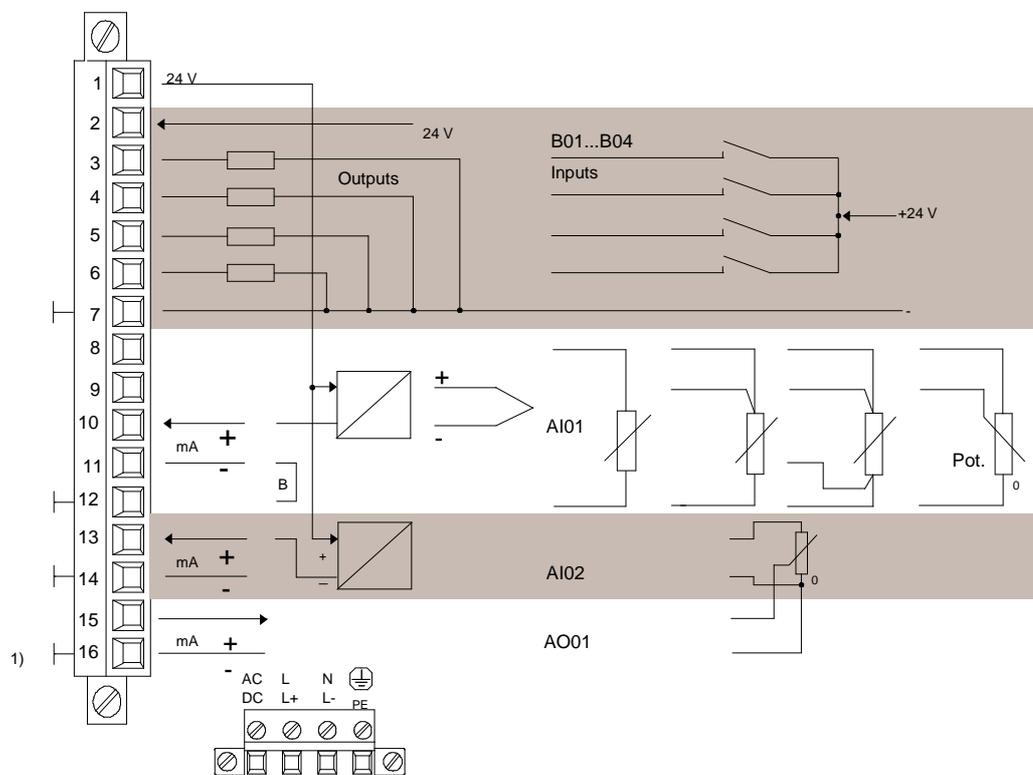
1) Shield connection plate

**Dimensional drawing**



Short version (after Q2/2002): x = 193 mm, y = 210 mm

**Connection diagram**



**Connection diagram**

- AI01 Universal input
- AI02 Additional current input
- B01...B04 Binary inputs or outputs, Function configurable
- AO01 Analog output 1 (20 mA)
- 24 V Feed for 2-wire transmitter and/or binary inputs and outputs
- B Jumper only power feed to transmitter from terminal 1

1) **Note:** The short version (210 mm) of the P100 has an electrically isolated analog output AO01. Pin 16 is not connected to ground.

**Ordering information**

		Catalog No.										Code	
<b>Standard model Protrenic 100</b> pre-configured as single-channel continuous controller		V62611A-		1	1			0	0	3	0		
<b>Power supply</b> 115-230 V AC 24 V UC			5										
<b>Front</b> Standarddisplay TFT Display colours <b>Grey, RAL 7032 with keys in yellow, green and grey</b>												0 2	
<b>Attached manual</b> German, English on CD													
<b>Special features</b>												Code	
Configuration entered at position of current order												301	
Input 2 (AE02) for 0/2...10 V instead of 0/4...20 mA												310	

<b>Retrofit modules</b>		Catalog No.										Code	
<b>Interfaces</b>	RS 485 for Modbus-RTU	62619-0346257											
RS 485	Baudrate up to 187.500 Baud (including shield connection plate)												
RS 232	RS 232 for Modbus-RTU (including shield connection plate)	62619-0346456											
PROFIBUS <sup>4)</sup>	RS 485 for PROFIBUS DP/DPV1 (slave) (including shield connection plate)	62619-0346470											
<b>Accessories</b>	GSD Device master data file for PROFIBUS DP	62695-3601109											
	Bus terminating adapter for PROFIBUS DP	62619-0346488											
	Passive display unit (dummy)	62608-9760231											

**Ordering information**

<b>List configuration</b>		Catalog No.										Code	
Customer-specific configuration as separate item (please enclose task definition in clear text)		V62675A-				0	0	0	0	3			
<b>List configuration</b> List configuration Adopted from previous order (see Code No. 302)			4	5									
<b>Delivery</b> Stored in unit (see Code No. 301) 3.5 inch. disk by E-Mail					1	2	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	

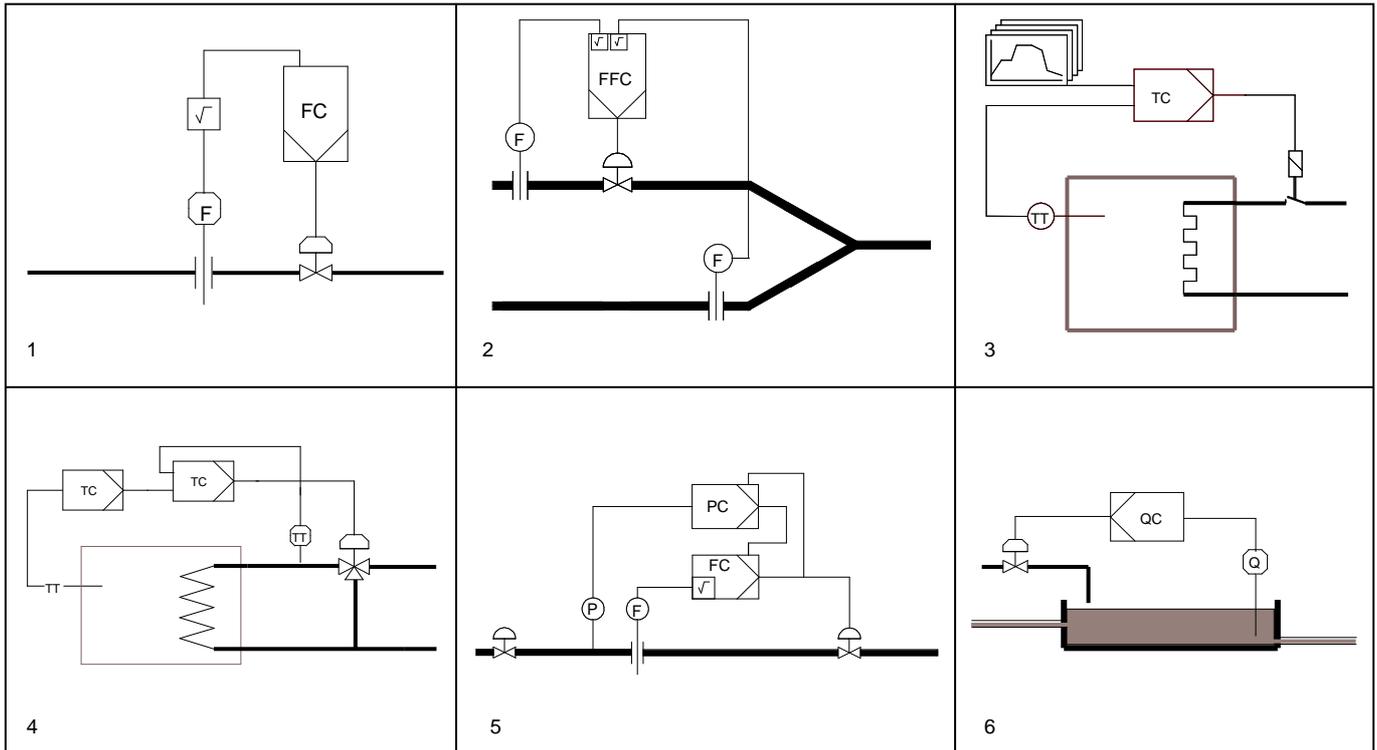
Documentation on the configuration is in German (1 copy is provided); other languages on request!

<b>Special features</b>		Catalog No.										Code	
<b>Spare parts Protrenic 100</b>													
CPU circuit board	with 115-230 V AC power supply	62608-0346343											
	with 24 V UC power supply	62608-0346344											
Display unit Protr. 100/500 (Grey, RAL 7032 with keys in yellow, green and grey)		62619-9760225											
TFT Display		62619-9760494											
Casing (for Protrenic 100 short, 210 mm)		62608-0346345											
EPROM set		62608-0346325											

(Further spare parts on request)



## Applications



- 1 Fixed value control, e.g. flow control
- 2 Ratio control or summation control
- 3 Program control with up to 10 programs
- 4 Cascade control
- 5 Override control
- 6 Neutralization control (controlled system with dead time, controller with Smith predictor)

# ENA Control

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