



6DR2104-4

SIPART DR21 K-Controller

Product scope

- Uses the SIPART DR21 K-controller architecture with the -4 supply option for 24 V UC operation.
- Provides two standard 0/4–20 mA inputs, one analog output and configurable digital interfaces.
- Supports front-panel parameterization with optional serial or PROFIBUS DP communication modules.

Manufacturer source

Siemens SIPART DR21 Operating Instructions C73000-B7476-C143-08

Siemens SIPART DR21 Manual C73000-B7476-C143-08, including K-controller block diagram and 24 V UC technical data.

Request a fast quote	Product reference	
Email: info@apterpower.com Phone: +86 18106909650 apter.com/inquiry.php	6DR2104-4	

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6DR2104-4 product reference

SIPART DR21 K-Controller

Verified configuration

Siemens 6DR2104-4 is a SIPART DR21 K-controller for 24 V UC supply, combining analog process control, front-panel configuration and modular signal or communication options.

Manufacturer	Siemens
Model	6DR2104-4
Product family	SIPART DR21
Product type	Process Controller
Order number	6DR2104-4
Controller family	SIPART DR21
Controller type	K-controller
Supply option	24 V UC
AC supply range	20 to 28 VAC
DC supply range	20 to 35 VDC
Standard analog inputs	2 x 0/4 to 20 mA
Analog input resistance	248 ohms $\pm 1\%$

Manufacturer source

Siemens SIPART DR21 Operating Instructions C73000-B7476-C143-08

The following pages retain the manufacturer technical content for configuration and engineering review.

2 Technical Description

2.1 Safety notes and scope of delivery



WARNING

When operating electrical equipment, certain parts of this equipment automatically carry dangerous voltages. Failure to observe these instructions could therefore lead to serious injury or material damage. Only properly trained and qualified personnel are allowed to work on this equipment. This personnel must be fully conversant with all the warnings and commissioning measures as described in this user's guide.

The perfect and safe operation of this equipment is conditional upon proper transport, proper storage, installation and assembly as well as on careful operation and commissioning.

- **Scope of delivery**

When the controller is delivered the box also contains:

- 1 Controller as ordered
- 1 three-pin plug at 115/230 V AC or special plug at 24 V UC
- 2 Clamps, pluggable
- 2 Adhesive labels "Power supply 115 V" (for 115/230 V-version).
- 1 CD ROM with documentation

- **Standard controllers**

The following variants of the SIPART DR21 are available:

Order number:	Output stage	Power Supply
6DR2100-4	K/S-output	24 V UC
6DR2100-5	K/S-output	115/230 V AC, switchable

- **Options modules (signal converters)**

Signal converters have separate ordering- and delivery items.

For handling reasons standard controllers and signal converters which were ordered at the same time may be delivered by separate mail.

- **Documentation**

This user's guide is available in the following languages:

English	C73000-B7476-C143
German	C73000-B7400-C143

2.4 Design

• Standard controller

The process controller has a modular structure and is therefore maintenance friendly and easy to convert- and retrofit.

The standard controller consists of

- the front module with the control- and display elements
- the backplane module with the power supply unit
- the plastic housing with four slots for optional modules

• Front module

The front module accommodates the control- and display elements, the CPU (Central Processing Unit) and the connectors for the backplane- and options modules.

It is operated by a membrane keyboard with IP64 degree of protection. The front design is based directly on the SIPART DR 20/22/24-controller-family with color coded assignment of the display- and control elements.

For better monitoring of the process, SIPART DR21 has user-friendly analog displays for the setpoint- and actual value display, a four-digit digital display which can be set for setpoint, actual value and alarms (depending on the controller setting), a two-digit digital display for the manipulated variable y, numerous control keys and indicator diodes for various status signals.

The tag plate and the scales for the analog displays are replaceable.

• Backplane module with power supply unit

The following signal connections are accessible through the backplane.

- 2 analog inputs AI1, AI2, potential-bound to GND, 0/4 to 20 mA
- 1 analog output AO, potential-bound to GND, 0/4 to 20 mA
- 2 digital outputs + Δy , - Δy , potential-free via relay contacts
- 2 digital inputs DI1, DI2, for 24V-logic, function can be set
- 2 digital outputs DO1, DO2, for 24V- logic, function and direction can be set
- 1 Voltage output L+ to the transmitter supply

The power supply is located in a die-cast housing on the backplane module. The heat loss is transferred to the back of the controller by cooling fins.

A DIN rail can be mounted for connecting a powerful coupling relay module.

The power supply unit is high powered and offers a total 200 mA current for:

- supplying the analog output (0/4 to 20 mA)
- Active digital outputs (up to 6 digital outputs)
- L+-output for supplying two-wire-transmitters
- supplying the interface module

• Connection technique

The power supply is connected

- for 230 V/115 V AC by a three-pin plug
- for 24 V UC by a special two-pin plug.

On the standard controller the field lines (signal cables) are connected to three functionally combined plug-in screw-type terminals.

The options modules for analog inputs and digital inputs- and outputs have their own terminals which are also designed as plug-in screw-type terminals.

The interface module is connected by its own plug.



Figure 2-1 Front view

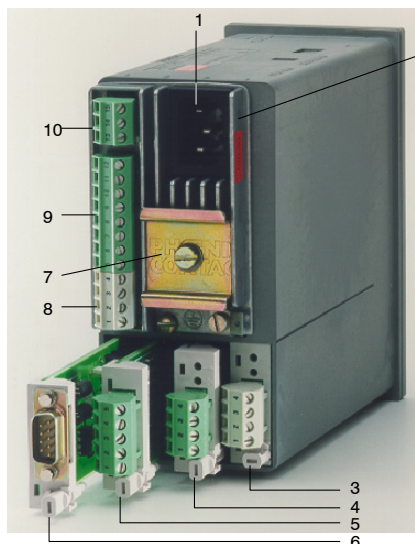


Figure 2-2 Rear view

- | | |
|----|---|
| 1 | Mains plug |
| 2 | Power supply unit |
| 3 | Slot 1 AI3 (I/U, R, P, T) |
| 4 | Slot 2 AI4 (I/U, R, P, T) |
| 5 | Slot 3 4DO, 24 V or 2DO relay or 5DI |
| 6 | Slot 4 SES/PROFIBUS-DP |
| 7 | DIN rail (scope of delivery of the relay module) |
| 8 | Terminal block 1 AI1 to AI2 (I) |
| 9 | Terminal block 2 AO1 DI1 to DI2 DO1 to DO2 24 V L+; M |
| 10 | Terminal block 3 Digital outputs $\pm \Delta y$ |

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C73000-B7476-C143-08

storage of the calculated variables for transmission mode of the serial interface take place. In S-controllers, the program run is interrupted every 5 ms to be able to switch off the S-outputs for better resolution. The interface communication also runs in interrupt mode.

• Power supply unit

A cast, overload-protected mains transformer for 115 V or 230 V AC built into a heat sink or a primary clocked plug-in type power supply unit for 24 V UC built into a heat sink generates the secondary internal supply voltages +24 V, +5 V and U_{ref} from the power supply. The metal body rests on protective conductors (protection class I).

The power supply and internal supply voltages are isolated from each other by safe separation.

The internal supply voltages are function low voltages.

Since no other voltages are generated in the instrument, these statements apply to all field signal lines with the exception of relay connection lines (used standards see chapter 2.6 Technical data, page 34).

• Configuring

The controller has a large number of prepared functions for controlling processing plants. The user programs the instrument himself by selecting the desired functions or setting parameters by setting structure switches. The total functioning of the instrument is given by the combination of the individual structure switches or parameter settings. No programming knowledge is necessary (see Operation, chapter 5, page 149).

All settings are made without exception on the front operating panel of the SIPART DR21 or the serial interface.

The job-specific program written in this way is saved in the non-volatile user program memory.

The instrument is configured as a fixed value controller in the factory setting. This setting can be restored with the "APSt"-function at any time.

The following parameterization- and structuring modes are available for configuring the SIPART DR21 controller.

onPA	The transmission properties of the controller and with these the process course are determined with the online-parameters . They can be changed during control operation (online)
oFPA	The offline-parameters determine the basic functions such as display elements, limit values, safety values. The controller is blocked (offline) while they are being set, the last value of the manipulated variable is held.
StrS	The instrument structure, e.g. fixed value controller or follow-up controller is determined with the structure switches . The controller is blocked (offline) while they are being set, the last value of the manipulated variable is held.
APSt	The all preset-function restores the factory setting.

2.6 Technical Data

2.6.1 General data

Installation position	any
Climate class to IEC 721	
Part 3-1 Storage 1k2	-25 to +75 °C
Part 3-2 Transport 2k2	-25 to +75 °C
Part 3-3 Operation 3k3	0 to +50 °C
Type of protection according to EN 60529	
Front	IP64
Housing	IP30
Connections	IP20
Housing design	
• Electrical safety	
- acc. to DIN EN 61 010 part 1,	
- Protection class I acc. to IEC 536	
- Safe disconnection between mains connection and field signals	
- Air and creep lines, unless specified otherwise, for overvoltage class III and degree of contamination 2	
• EC Declaration of Conformity No. A5E00065058I-01	
- Conformity	
The product described above in the form as delivered is in conformity with the provisions of the following European Directives:	
2004/108/EC EMC	
Directive of the European Parliament and of the Council on the approximation of the laws of the Member States relating to electromagnetic compatibility and repealing Directive 89/336/EEC	
2006/95/EC LVD	
Directive of the European Parliament and of the Council on the harmonisation of the laws of Member States relating to electrical equipment designed for use within certain voltage limits.	
• Spurious emission, interference immunity according to EN 61 326, NAMUR NE21 8/98	
Weight, standard controller	approx. 1.2 kg
Color	
Front module frame	RAL 7037
Front surface	RAL 7035
Material	
Housing, front frame	Polycarbonate, glass-fiber reinforced
Front foil	Polyester
Backplanes, modules	Polybutylenterephthalate

Connection technique

Power Supply
115/230 V AC
24 V UC
Field signals

Three-pin plug IEC320/V DIN 49457A
Special 2-pin plug
Plug-in terminals for 1.5 mm² AWG 14

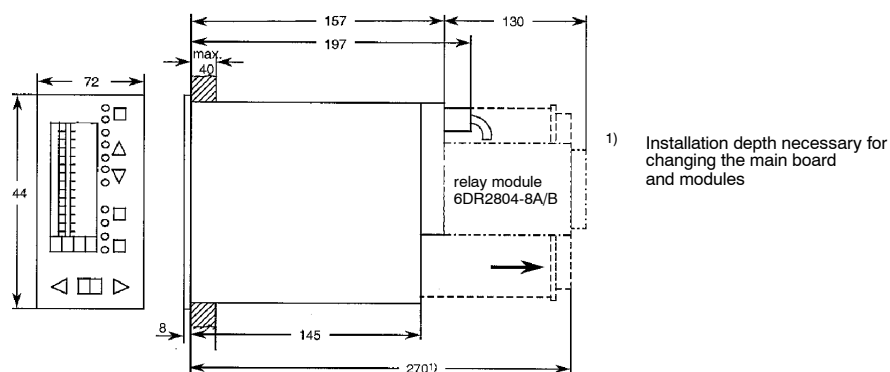


Figure 2-5 Dimensions SIPART DR21, dimensions in mm

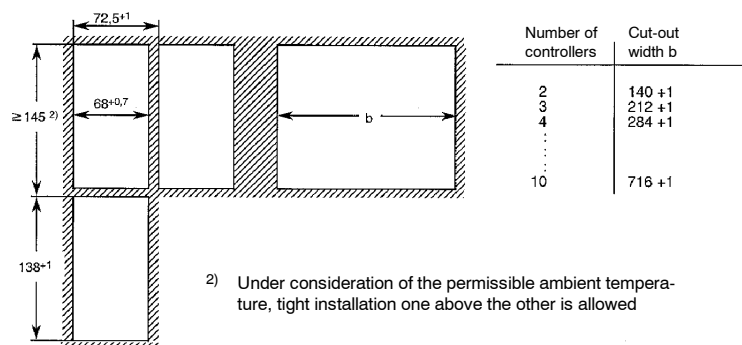


Figure 2-6 Panel cut-outs, dimensions in mm

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2.6.2 Standard controller

Power Supply

Rated voltage	230 V AC	115 V AC	24 V UC	
	switchable			
Operating voltage range	195 to 264 V AC	97 to 132 V AC	20 to 28 V AC	20 to 35 V DC ¹⁾
Frequency range	48 to 63 Hz			---
External current $I_{Ext}^{2)}$	200 mA			
Power consumption				
Standard controller without options without I_{Ext} active power/apparent power (capacitive)	5 W/9 VA	5 W/9 VA	4 W/6 VA	4 W
Standard controller with options without I_{Ext} active power/apparent power (capacitive)	11 W/15 VA	11 W/15 VA	8.5 W/12 VA	8.5 W
Standard controller with options with I_{Ext} active power/apparent power (capacitive)	15 W/19 VA	15 W/19 VA	12 W/17 VA	12 W
Permissible voltage breaks based on $0.85 U_N$ and max. load Time ³⁾	≤ 20 ms	≤ 20 ms	≤ 20 ms	≤ 20 ms

¹⁾ including harmonic

²⁾ current transmitted from L+, DO, AO to external loads

³⁾ The load voltages of the AO are reduced hereby to 13 V, L+ to 15 V and the DO to 14 V

Table 2-1 Power supply standard controller

Analog inputs AI1 to AI2

Current

Rated signal range	0/4 to 20 mA		
Modulation range	-0.1 to 22 mA		
Input resistance			
Difference (load)	248 Ω ± 1 %		
Filter time constant	10 ms		
Zero error	see AD-converter		
Full scale error	see AD-converter		
Linearity error	see AD-converter		
Temperature influence	see AD-converter		
Static destruction limit	± 40 mA		
Parameterizable transmitter fault message			
AI1/2	0 mA to 20 mA	≤ -0.5 %;	≥ 106.25 %
	4 mA to 20 mA	≤ -2.5 %;	≥ 106.25 %
AI3/4	0/4 mA to 20 mA	≤ -2.5 %;	≥ 106.25 %

Digital inputs DI1, DI2

Signal status 0	$\leq 4.5 \text{ V}$ or open
Signal status 1	$\geq 13 \text{ V}$
Input resistance	$\geq 27 \text{ k}\Omega$
Static destruction limit	$\pm 35 \text{ V}$


NOTE

All error specifications refer to the rated signal range

Analog outputs AO

Rated signal range (0 to 100 %)	0 to 20 mA or 4 to 20 mA
Modulation range	0 to 20.5 mA or 3.8 to 20.5 mA
Load voltage	from -1 to 18 V
No-load voltage	$\leq 26 \text{ V}$
Inductive load	$\leq 0.1 \text{ H}$
Time constant	10 ms
Residual ripple 900 Hz	$\leq 0.2 \%$
Resolution	$\leq 0.1 \%$
Load dependence	$\leq 0.1 \%$
Zero error	$\leq 0.3 \%$ ¹⁾
Full scale error	$\leq 0.3 \%$ ¹⁾
Linearity	$\leq 0.05 \%$
Temperature influence	
Zero point	$\leq 0.1 \%/10 \text{ K}$
Full scale	$\leq 0.1 \%/10 \text{ K}$
Static destruction limit	-1 to 35 V

S-output (relay 230 V) DO7 and DO8

- Contact material	Ag / Ni	
- Contact load capacity		
Switching voltage		
AC	$\leq 250 \text{ V}$	
DC	$\leq 250 \text{ V}$	
Switching current	Contacts	Contacts
	<u>locked</u>	<u>unlocked</u>
AC	$\leq 8 \text{ A}$	$\leq 2.5 \text{ A}$
DC	$\leq 8 \text{ A}$	$\leq 2.5 \text{ A}$
Rating		
AC	$\leq 1250 \text{ VA}$	
DC	$\leq 30 \text{ W at } 250 \text{ V}$	
	$\leq 100 \text{ W at } 24 \text{ V}$	

¹⁾ Applies for interference acc. to IEC 801-3 to 3 V/m, with 10 V/m at 290 to 310 MHz $\leq 4.3 \%$

Service life	
mechanical	2×10^7 switching cycles
230 V AC 8A electrical ohmic	10^5 switching cycles
Spark quenching element	Series circuit 22 nF/220 Ω parallel to it varistor 420 V _{rms}

Digital outputs DO1 to DO2 (with wired-or diodes)

Signal status 0	≤ 1.5 V
Signal status 1	+19 V to 26 V
load current	≤ 30 mA
Short-circuit current	≤ 50 mA
Static destruction limit	-1 V to +35 V

Measuring transmitter feed L+

Rated voltage	+20 to 26 V
load current	≤ 60 mA, short-circuit-proof
Short-circuit current	≤ 200 mA clocking
Static destruction limit	-1 to +35 V

CPU data

Cycle time	100 ms
Minimum integration speed	$\frac{dy}{dt} = \frac{kp \cdot xd}{tn} = \frac{0.1 \cdot 0.1 \%}{10^4 \text{ s}}$

**A/D conversion except UNI module
6DR2800-8V**

Procedure	Successive approximation per input > 120 conversions and averaging within 20 or 16.67 ms
Modulation range	-5 % to 105 % of the modulation range
Resolution	11 bits ± 0.06 % of the modulation range
Zero error	≤ 0.2 % of the modulation range
Full scale error	≤ 0.2 % of the modulation range
Linearity error	≤ 0.2 % of the modulation range
Temperature influence	
Zero point	≤ 0.05 %/10 K of the modulation range
Full scale	≤ 0.1 %/10 K of the modulation range

Setpoint- and manipulated variable adjustment

Setting	With 2 keys (more -- less)
Speed	progressive
Resolution	1 digit
wi	0.1 % of rated range 0 to 20 mA
y	

Parameters

Setting	With two keys (more – less)
Speed	progressive
Resolution	
Linear parameters, %	$\leq 0.1 \%$
Linear parameters, physical	1 digit
Logarithmic parameters	128 values/octave
Accuracy	
Time parameters	$\pm 2 \%$
All others	Resolution accordingly, absolute

Display technique

– x- and w-Digital display

Color	4digit 7-segment LED red
Digit height	7 mm
Display range	Adjustable start and end
Number range	–1999 to 9999
Overrun	<–1999: –oFL >9999: oFL
Decimal point	adjustable (fixed point) _.---- to ----
Refresh rate	Adjustable 0.1 to 9.9 s
Resolution	1 digit but not better than AD-converter
Display error	corresponding to AD-converter and analog inputs

– x- and w-Analog display

Color	x w
Display range	LED array vertical 30 LEDs
Overrun	red green
Refresh rate	0 to 100 %
Resolution	flashing first or last LED cyclic
	1.7 % by alternate glowing of 1 or 2 LEDs, the center of the illuminated field serves as a pointer

– y-display (digital)

Color	2digit 7-segment-LED
Digit height	red
Display range	7 mm
Overrun	0 to 100 %
Refresh rate	–9 % to 109 %, display >99 % h0 to h9
Resolution	Adjustable 0.1 s to 9.9 s
	1 %

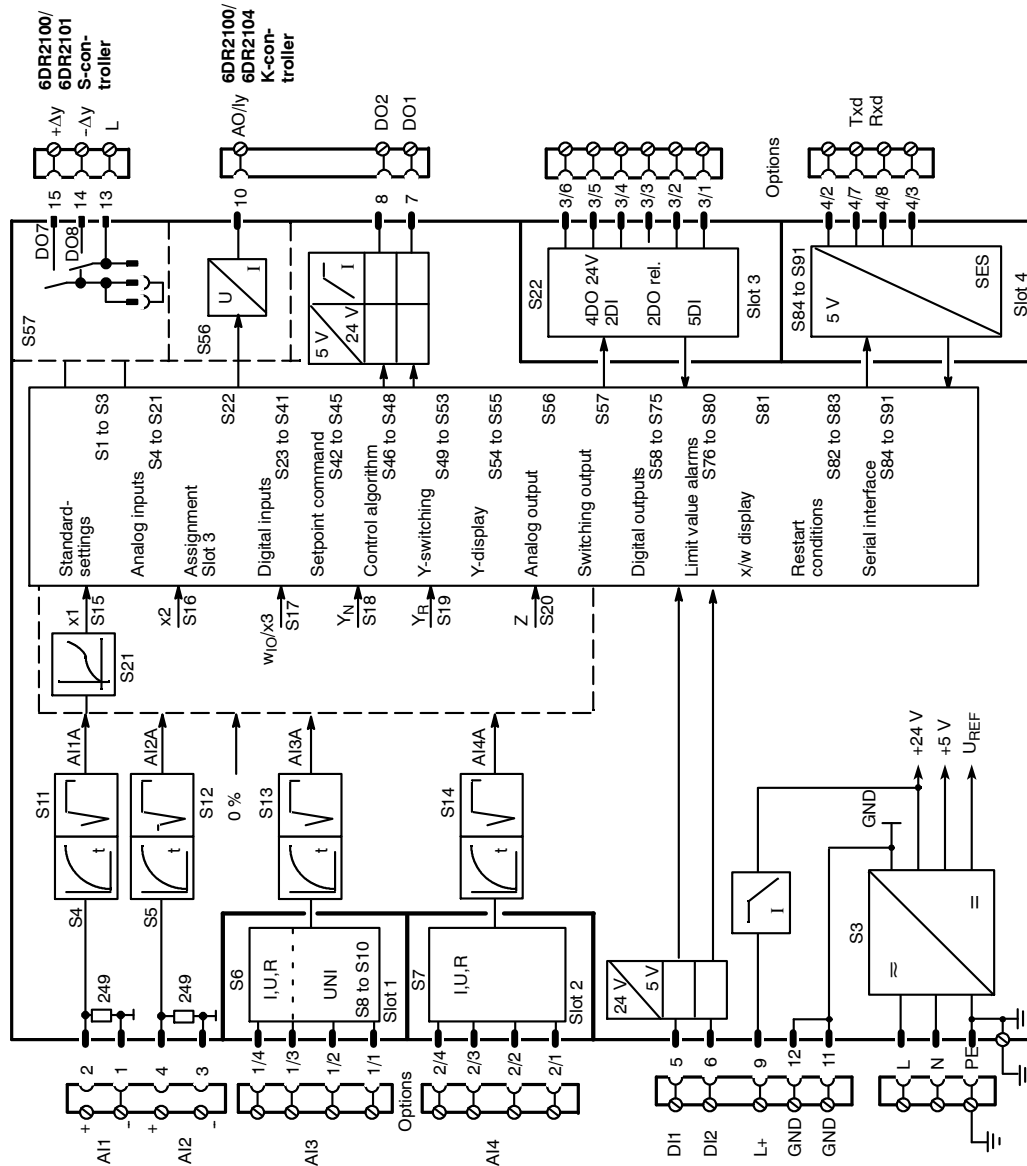


Figure 4-9 Block diagram SIPART DR21

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8.5 Ordering data

SIPART DR21 process controller 72 x 144

S-/K-controller for

- Power supply UC 24 V 6DR2100-4
- Power supply AC 230 V, can be switched to AC 115 V 6DR2100-5

Options/accessories

Signal converter/analog signals

- for current input 0/4 to 20 mA or 0/0.2 to 1 V or 0/2 to 10 V (U/I-module) 6DR2800-8J
- for resistance potentiometer (R-module) 6DR2800-8R
- for TC/RTD/R/MV-signals, programmable (UNI-module) 6DR2800-8V
- Reference point terminal for TC, internal 6DR2805-8A
- Measuring range plug for I = 20 mA and U = 10 V 6DR2805-8J

Signal converter/switching signals

- with 5 digital inputs (5DI-module) 6DR2801-8C
- with 2 relay outputs (35 V) (2 DO-relay-module) 6DR2801-8D
- with 4 digital outputs and 2 digital inputs (2DI 4DO-module) 6DR2801-8E

Interface for serial communication RS 232/RS 485 6DR2803-8C

Interface for PROFIBUS DP RS 232/RS 485 6DR2803-8P

Coupling relay module for mounting on a DIN rail on the back of the controller

- with 4 relays (AC 250 V) 6DR2804-8A
- with 2 relays (AC 250 V) 6DR2804-8B

Assembly- and installation guide

- German/English C73000-M7474-C35
- French/Spanish/Italian C73000-M7450-C35

Quick Reference

- German/English C73000-B7474-C141
- French/Spanish/Italian C73000-B7450-C141

Manual

- German C73000-B7400-C143
- English C73000-B7476-C143

SIPART DR21 Serial SIPART DR210x bus interface / Operating Manual

can be downloaded from the INTERNET. Internet address: www.fielddevices.com (version 05/2000)



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