CL200

E ana
Module description

Edition 102

BOSCH
Automationstechnik

CL200

E ana
Module description

1070 072 164-102 (97.11) GB

Reg. Nr. 16149-03

Nominal charge: DM 10.00

Safety Instructions and Information

Before you start working with the E ana Analog Input Module, we recommend that you thoroughly familarize yourself with the contents of this manual. Keep this manual in a place where it is always accessible to all users.

Standard operation

This instruction manual presents a comprehensive set of instructions and information required for the standard operation of the described products.

The products described hereunder –

- – were developed, manufactured, tested and documented in accordance with the relevant safety standards. In standard operation, and provided that the specifications and safety instructions relating to the project phase, installation and correct operation of the product are followed, there should arise no risk of danger to personnel or property.
- – are certified to be in full compliance with the EEC Council Directives 89/336/EEC (electromagnetic compatibility), 93/68/EEC (amending directives), 93/44/EEC (relating to machinery), as well as 73/23/EEC (operation within certain voltage limits). In addition, we certify compliance with harmonized standards EN 50081-2 and EN 50082-2.
- – are designed for operation in an industrial environment. Prior to the intended installation and/or operation within a private residence or business area, on retail premises or in a small-industry setting, the user will be required to obtain a single operating license issued by the appropriate national authority or approval body. In Germany, this is the Federal Institute for Posts and Telecommunications, and/or its local branch offices.

Qualified personnel

This instruction manual is designed for specially trained PLC personnel. The relevant requirements are based on the job specifications as outlined by the ZVEI and VDMA professional associations in Germany. Please refer to the following German-language publication:
Weiterbildung in der Automatisierungstechnik
Hrsg.: ZVEI und VDMA
MaschinenbauVerlag
Postfach 71 08 64
60498 Frankfurt

This instruction manual is specifically designed for PLC technicians. They require special skills in handling the CL200 controller.

Interventions in the hardware and software of our products which are not described in this instruction manual may only be performed by our skilled personnel.

Unqualified interventions in the hardware or software or non-compliance with the warnings listed in this instruction manual or indicated on the product may result in serious personal injury or damage to property.

Qualified personnel are persons who –

- – as **planning personnel**, are familiar with the safety guidelines used in electrical engineering and automation technology.
- – as **operating personnel**, are familiar with the equipment used in the field of automation technology and are thus familiar with the operating instructions in this manual.
- – as **commissioning personnel**, are authorized to commission, ground/earth and classify electric circuits and devices/systems in accordance with the relevant safety standards.

Safety Instructions on Control Components

The following warnings and notices may be affixed to the control components themselves, and have the following meaning:

DANGER: High voltage!

DANGER: Battery acid!

Electrostatically sensitive components!

Disconnect at mains before opening!

Pin for connecting PE conductor only!

This connection for functional earthing or low-noise earth only!

For screened conductor only!

Safety Instructions in this Manual

These symbols are used throughout this manual subject to the following conditions.

DANGER

This symbol is used to warn of the presence of **dangerous electrical current.** Insufficient or lacking compliance with these instructions can result in **personal injury.**

Safety instructions marked with this DANGER symbol are consecutively numbered throughout this manual., e.g. 0.1, 0.2, and so forth. Of the safety information shown here, translations in all official EC languages appear in the Appendix.

DANGER

This symbol is used wherever an insufficient or lacking compliance with instructions can result in **personal injury**.

Safety instructions marked with this DANGER symbol are consecutively numbered throughout this manual., e.g. 0.1, 0.2, and so forth. Of the safety information shown here, translations in all official EC languages appear in the Appendix.

CAUTION

This symbol is used wherever an insufficient or lacking compliance with instructions can result in **damage to equipment or data files**.

Safety instructions marked with this CAUTION symbol are consecutively numbered throughout this manual., e.g. 0.1, 0.2, and so forth. Of the safety information shown here, translations in all official EC languages appear in the Appendix.

This symbol is used to inform the user of special features.

Symbols used in this Manual

★

The asterisk symbol shows that the manual is describing an activity which you will be required to perform, e.g.:

★ Insert disk 1 into the floppy disk drive.

☞ **Can we improve our instruction manual? We invite our readers' contribution to the ongoing improvement of this documentation. Your opinion is important to us. To submit your suggestions, please use the questionnaire form provided on the last page of this manual.**

Safety Instructions

DANGER

0.1

Danger to persons and equipment!

Test every new program before operating the system!

CAUTION

0.2

Danger to the module!

Do not insert or remove the module while the controller is switched ON! This may destroy the module. Prior to inserting or removing the module, switch OFF or remove the power supply module of the controller, external power supply and signal voltage!

CAUTION

0.3

Danger to the module!

All ESD protection measures must be observed when using the module! Prevent electrostatic discharges!

Observe the following protective measures for electrostatically endangered modules (EEM)!

- The personnel responsible for storage, transport and handling must be trained in ESD protection.
- EEMs must be stored and transported in the specified protective packaging.
- Out of principle, EEMs may only be handled at special ESD work stations equipped for this particular purpose.
- Employees, work surfaces and all devices and tools that could come into contact with EEMs must be on the same potential (e.g. earthed).
- An approved earthing wrist strap must be worn. It must be connected to the work surface via a cable with integrated 1 MΩ resistor.
- EEMs may under no circumstances come into contact with objects susceptible of accumulating an electrostatic charge. Most items made of plastics belong to this category.
- When installing EEMs in or removing them from an electronic device, the power supply of the device must be switched OFF.

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Illustrations

1 Features and Functions

1.1 Module Features

The **E ana Analog Input Module** is employed for centralized application in the CL200 control unit and, via COMNET-DP, in a decentralized configuration in the CL200, CL350, CL400 and CL500 controllers.

The E ana Analog Input Module converts these analog readings to digital values:

- Voltages
- Currents
- Temperatures, by means of thermocouples or temperature-sensitive resistors, also *thermistors*.

All inputs feature potential isolation, and are isolated via optocouplers.

The built-in diagnostics indicate a fault status via the front panel Fault LED.

Fig. 1–1 E ana Analog Input Module

1.2 Module Functions

The primary measuring elements are connected to inputs E0 through E7. The positive signal line from the respective source is connected to the positive (+) terminals, and the negative line to the negative (–) terminals.

To operate the E ana Analog Input Module, an external 24 V power supply is required.

Complement of Functions

- 8 Potential-isolated differential inputs
- 16 Bit resolution at 13 bit linearity
- Freely selectable measuring range for each input
- Averaging of measured readings via numerical measurements
- Sensor failure and overrange monitoring
- 4 Voltage measuring ranges
- 2 Current measuring ranges
- Temperature measurement via thermocouples
  - Characteristic-curve correction
  - Compensation
  - Conversion to °C
- Temperature measurement via thermistors
  - Characteristic-curve correction
  - Conversion to °C
  - 4 Stabilized-power sources

Voltage Measurement Ranges

- ±10 V
- ±1 V
- ±100 mV
- ±10 mV

Current Measurement Ranges

- 0 through 20 mA
- 4 through 20 mA

For current measuring procedures, an external 50 Ω shunt must be connected. Detected currents that are below the respective measuring range may be recognized and reported as cable breaks.

Temperature Measurement via Thermocouples

The following thermocouples conforming to the IEC 584 standard may be used:

- Type B
- Type E
- Type J
- Type K
- Type R
- Type S
- Type T

The thermal voltage generated by the thermocouples is directly converted to degrees centigrade (°C). Both non-isolated and floating thermocouples can be used. Connections are of the 2-wire type.

Temperature Measurement via Thermistors

The following thermistors can be used:

- Pt100
- Pt500
- Pt1000
- Ni100
- Ni500
- Ni1000

Connections are of the 4, 3, or 2-wire type.

To power the temperature-dependent resistors, the E ana Analog Input Module provides four stabilized-output power sources.

1.3 Front Panel

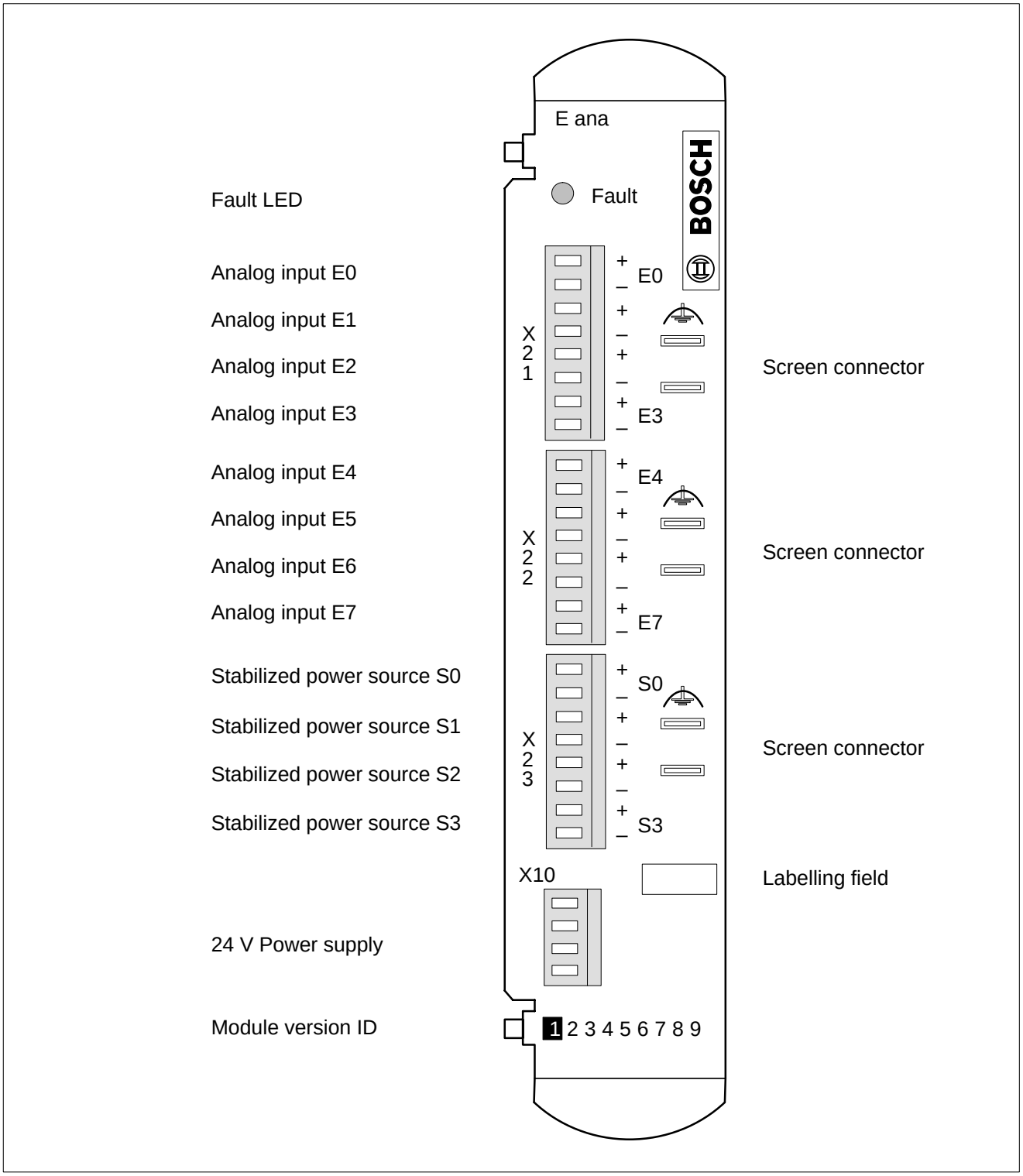

Fig. 1–2 Front Panel – E ana Analog Input Module

1.4 Addressing

CAUTION

1.1
Danger to the module!
Do not insert or remove the module while the controller is switched ON! This may destroy the module. Prior to inserting or removing the module, switch OFF or remove the power supply module of the controller, external power supply and signal voltage!

CAUTION

1.2
Danger to the module!
All ESD protection measures must be observed when using the module! Prevent electrostatic discharges!

When setting the addressing range and start address, a differentiation is made between centralized and decentralized applications.

In any case, module addressing is effected via the S1 DIP switch.

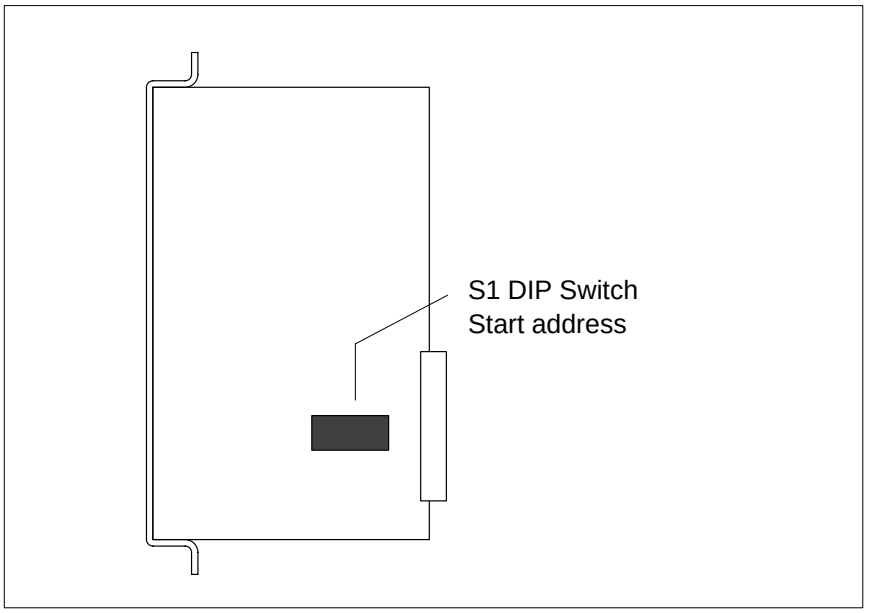

Fig. 1–3 S1 DIP Switch

Switch	8	7	6	5	4	3	2	1
Weight	2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0
Value	ON	64	32	16	8	4	2	1

Fig. 1–4 S1 DIP Switch, Weight

Centralized Operation

☞ **The start address must always be a multiple integer of 4. Switches 1 and 2 must always be set to OFF, and switch 8 always to ON position.**

The module is operated within the EI / EO ranges.

In centralized operation, the module uses two words in both the extended input (EI) and extended output (EO) ranges. Only even-numbered addresses are permitted.

Addressing the E ana Analog Input Module always occurs via direct, word-by-word access.

Decentralized Operation via COMNET-DP

In decentralized operation in an expansion module, the selected address represents the address of the E ana Analog Input Module within the DP bus.

The E ana Analog Input Module is addressed by the RM2-DP12 decentralized module. The data is always range-consistent, i.e., the data is only replaced as a whole message.

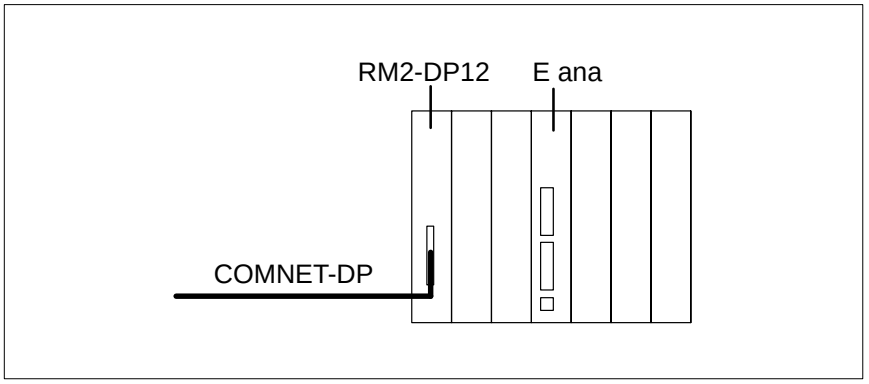

Fig. 1–5 Decentralized Operation

The module occupies 16 input words and 16 output words on the DP bus. The unused remaining four data words do not need to be allocated. The allocation of addresses is handled with the aid of the WinDP software.

Each DP data word is assigned a PLC peripheral address (I, EI, O pr EO) in a linear address range.

In decentralized operation, the contents and topology of data structures are identical to those occurring with centralized operation (see also Chapter 4, ”Module Initialization”).

The channel mode assignment via the WinDP software also includes the assignment of a channel number. This provides an additional addressing option. The data to be replaced is stored in a data module. The SPSKANAL function module handles the data transfer.

As discussed in Chapter 4, ”Module Initialization,” the contents and topology of data structures is identical with the other addressing modes.

☞ **Prior to a status query (in the DM), the SPSKANAL function module must be called up. The status data of the module must be obtained on a cyclical basis.**

Special considerations with decentralized application:

- Subsequent to Power-On, or after cycling from Stop to → Run status, an operating mode (*OpMode*) will NOT be automatically selected.
- The selected OpMode will also be lost in the event that the power supply of the DP bus is switched Off, or if a fault occurs on the DP bus.

1.5 Module Slot

In the diagram below, the available – and permitted – module slots are shaded for better identification.

CAUTION

1.3
Danger to the module!
Do not insert or remove the module while the controller is switched ON! This may destroy the module. Prior to inserting or removing the module, switch OFF or remove the power supply module of the controller, external power supply and signal voltage!

CAUTION

1.4
Danger to the module!
All ESD protection measures must be observed when using the module! Prevent electrostatic discharges!

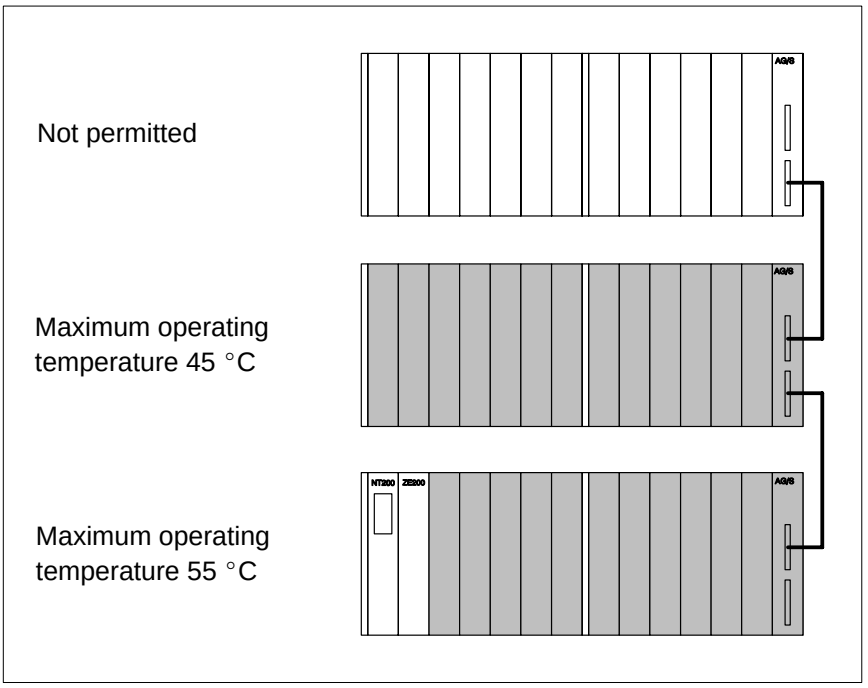

Fig. 1–6 Module Slot, Centralized Operation

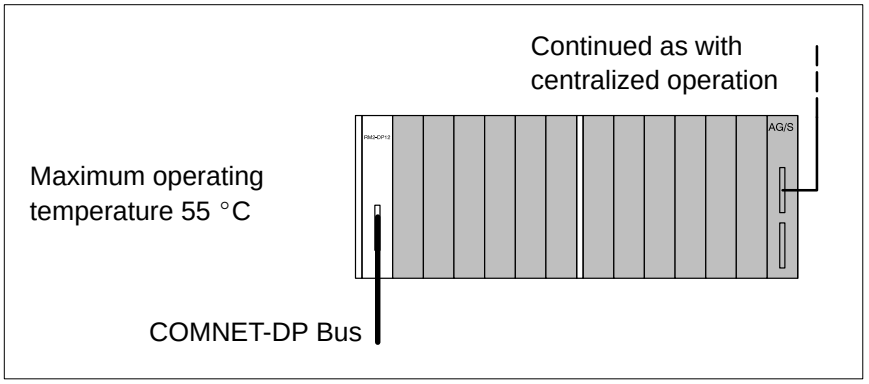

Fig. 1–7 Module Slot, Decentralized Operation

1.6 Specifications

Specifications	E ana Analog Input Module
Order no.	1070 078 565
Analog inputs	8 Differential inputs
Voltage range, input resistor	• ±10 V • ±1 V • ±100 mV • ±10 mV 3.4 MΩ
Current range, input resistor	• 0 through 20 mA • 4 through 20 mA 50 Ω
Temperature measurement with thermocouple, input resistor	• Type B • Type E • Type J • Type K • Type R • Type S • Type T 3.4 MΩ
Temperature measurement with resistance thermometer, input resistor	• Pt100 • Pt500 • Pt1000 • Ni100 • Ni500 • Ni1000 3.4 MΩ
Potential isolation	Yes, inputs against earth potential, bit not against each other and not against 0 V connection.
Protective devices	Optocoupler
Maximum input voltage	±20 V
Input filters	• RC-Filter 1st order • fg = 15.915 kHz • Max. frequency = 175 Hz, measurable without attenuation

Specifications	E ana Analog Input Module
Resolution and digital mapping	16 Bit, at 13 bit linearity, straight binary, value for amplification = 1 : 0000 = –10 V; for FFFF = +10 V; 1 bit = 0.30517 mV
Conversion principle	Successive approximation
Measuring principle	Integrating
Deviation, standard use ● Meas. range 10 mV, 100 mV ● Meas. range 1 V, 10 V	 1 % 0.5 %
Linearity error, referenced to input range	±0.05 %
Repeat accuracy at 25 °C	±0.05 %
Temperature coeffizient	±0.01 %/°C
Characteristic-curve linearization	Yes, for all thermocouples and thermistors.
Compensation	Yes, for all thermocouples, fixed-value or temperature-dependent resistors (thermistors) on input 7.
Stabilized power sources, short-circuit protected ● Accuracy ● Burden resistance	4 2.5 mA, ±0.5 % Max. 4 kΩ
Supply voltage range, as per DIN EN 61131-2	24 V–, permissible range 19.2 through 30 V
Current draw ● I_{Per} ● 24 V Power supply	 80 mA 120 mA
Wiring	Twisted-pair, screened
Maximum cable length ● Thermocouples ● 10 mV and 100 mV range	200 m 50 m 50 m
Weight	250 g
Width	1 Slot

Fig. 1–8 Specifications

Notes:

2 Connectivity Requirements

2.1 24 V Power Supply

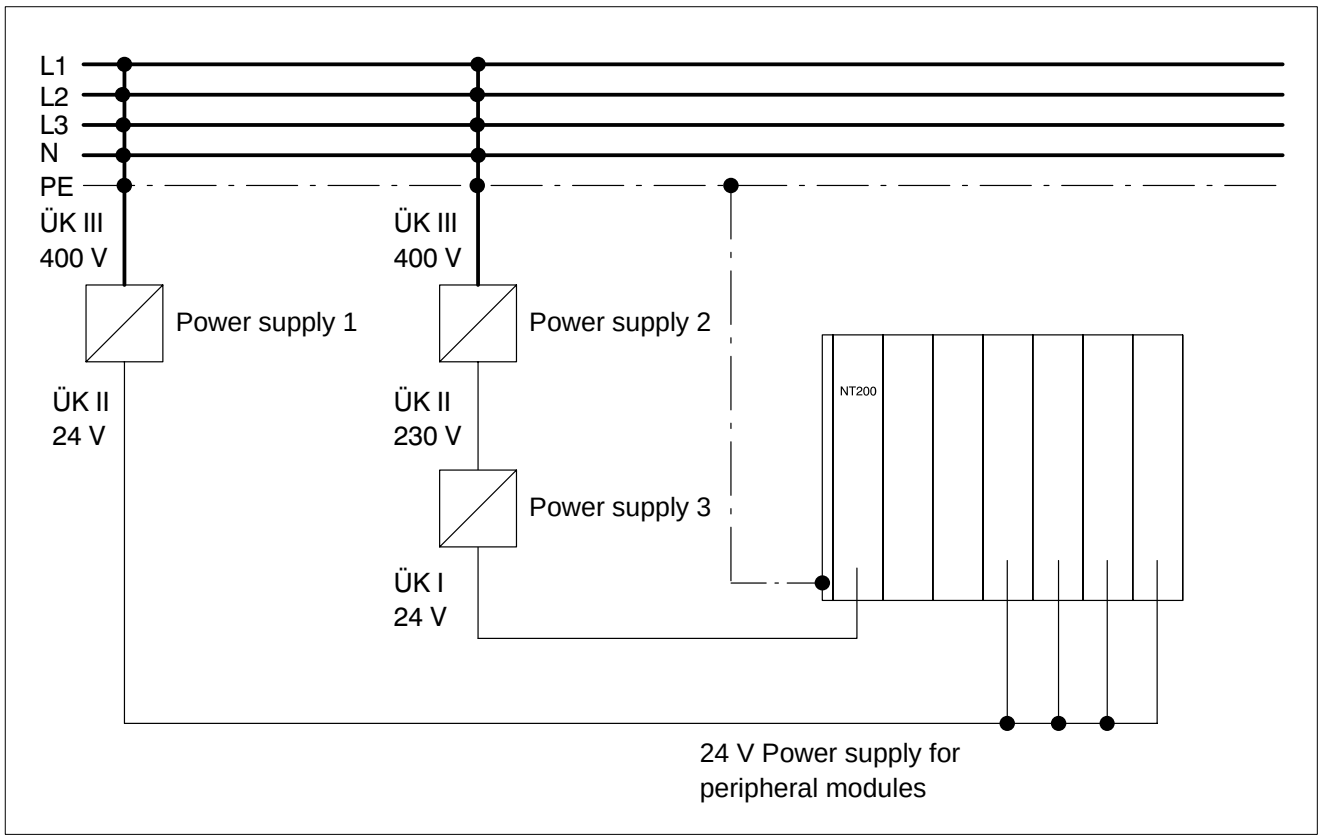

Fig. 2–1 24 V Power Supply

Potential Isolation

The inputs of the module are potential-isolated from the power supply module. To maintain and safeguard this isolation, the external 24 V power supply must also be potential-isolated from the 24 V power supply feeding the power supply module.

2.2 Sensor Connection

CAUTION

1.5

Danger to the module through excessively high input voltages caused by electrostatic fields (lightning surge and/or atmospheric overvoltage)! If required, the module must be protected by appropriate surge suppression or RC circuits!

The module can be destroyed if the following conditions occur:

- The voltage differential between the positive and negative inputs is larger than 40 V.
- The voltage differential between the positive or negative input, and the power supply GND connection on the module exceeds ± 20 V.

Both above mentioned voltage types can be exceeded by the effect of electrostatic fields (lightning surge or atmospheric overvoltage) occurring during thunderstorms or electrical storms. The module must therefore be protected by a surge protection circuit (see Sections 2.2.1, ”Voltage Sensor” and 2.2.2, ”Current Detector”).

Signal Lines

The cable to be used is screened twisted-pair wiring. This type of cable reduces the effect of external interference, thus safeguarding the optimum transmission of analog signals.

The maximum cable length is 200 m, for thermocouples and for the 10 mV and 100 mV voltage ranges, it is 50 metres.

To prevent capacitive interference, the signal lines must not be routed parallel and adjacent to power lines.

The cables must be provides with wire end ferrules. The clamping terminal connections must be absolutely clean, and torqued up to proper tightness.

The cable insulation must provide a sufficient insulation resistance against earth (> 10 MΩ).

In the case of signal lines for thermocouples, all connecting joints must be at the same temperature. If this does not apply, temperature compensation will be required.

Signal lines connecting temperature-dependent resistors (thermistors) must have a cross-section of at least 1.5 mm^2.

Screening / Earthing

The screening conductor must be connected at both ends of the signal line.

In the event that the line ends exhibit a differential between potential levels, this indicates the presence of a compensating current between both potentials, causing the analog signals to be falsified. If this is the case, two options are available:

- Installing an equalizing conductor with a sufficiently dimensioned wire cross-section.
- Connecting the screening conductor at one end of the line only.

The screening conductor must be tightly twisted together, and connected to the flat-pin plug by means of cable lugs.

Non-isolated Sensors

CAUTION

1.1
Compensating currents caused by potential differentials can falsify measured values, and may cause the destruction of the module! Ensure that potential equalizing measures are in place!

Non-isolated sensors are connected to the local earth potential. Because the sensors are installed at various locations throughout the system, potential differences between individual earthing points and the overall controller potential may occur.

This condition is prevented through the installation of potential equalization lines between the individual sensors. If this solution is used, the GND potential of the 24 V power supply must also be connected with the potential equalization bar.

Isolated Sensors

This type of sensor is never connected to the local earth potential.

Terminals

Signal designation	Signal function
+E0	Input 0
–E0	Input 0, Reference potential
+E1	Input 1
–E1	Input 1, Reference potential
+E2	Input 2
–E2	Input 2, Reference potential
+E3	Input 3
–E3	Input 3, Reference potential
+E4	Input 4
–E4	Input 4, Reference potential
+E5	Input 5
–E5	Input 5, Reference potential
+E6	Input 6
–E6	Input 6, Reference potential
+E7	Input 7
–E7	Input 7, Reference potential

Fig. 2–2 Terminal Connections, Sensors

2.2.1 Voltage Sensor

When connecting a voltage sensor to the E ana Analog Input Module, the signal polarity must be observed.

To keep measuring errors to a minimum, the voltage sensor must be as low-resistance as possible. It may be possible to compensate the influence of a high-resistance voltage sensor by increasing the sampling time.

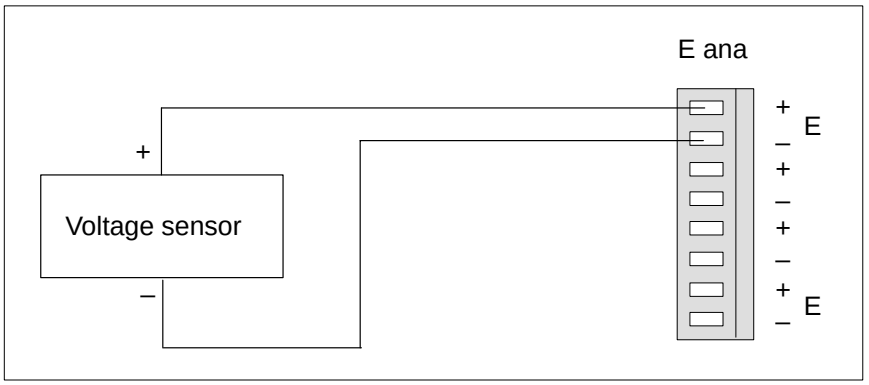

Fig. 2–3 Voltage Sensor, Terminals

Surge Suppression Circuit

This protective circuit is required if the voltage sensor is located at a large distance from the module, or if sections of the signal lines are routed outside of buildings. In cases of extensive length of signal lines installed outdoors, additional surge protection devices (e.g. a product named *Blitzductor*) will be required.

☞ **The introduction of an RC circuit may cause the measured values in the lower measuring ranges to be falsified.**

In Fig. 2–4, V1 and V2 represent bipolar transient diodes (12 – 18 V).

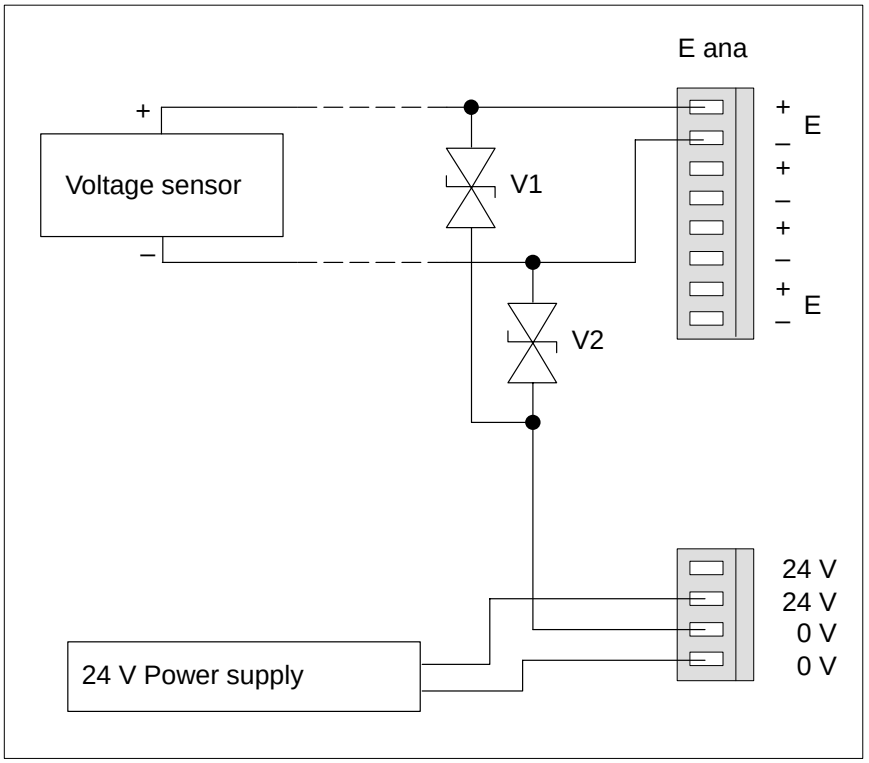

Fig. 2–4 Voltage Sensor with RC Circuit, Terminals

2.2.2 Current Sensor

When connecting a current sensor to the E ana Analog Input Module, the signal polarity must be observed.

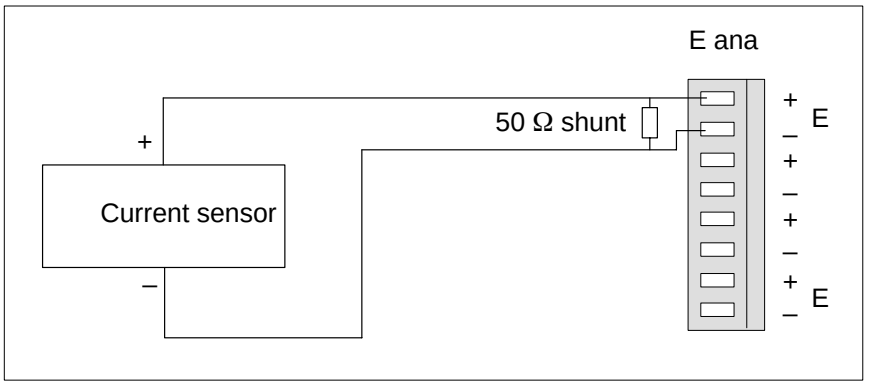

Fig. 2–5 Current Sensor, Terminals

Currents can be measured within both current measuring ranges, 0 through 20 mA and/or 4 through 20 mA, and in all voltage measuring ranges of the module.

The current-measuring ranges require the use of a 50 Ω shunt. For the voltage measuring ranges, the required shunt value can be freely selected. However, the shunt should be sufficiently dimensioned to ascertain maximum utilization of the Full-scale range (selected voltage range) of the converter when the maximum current is applied.

The shunt is subject to the following requirements:

- Low temperature drift
- Maximum tolerance value, ±0.1%.

Surge Suppression Circuit

This protective circuit is required if the current sensor is located at a large distance from the module, or if sections of the signal lines are routed outside of buildings. In cases of extensive length of signal lines installed outdoors, additional surge protection devices (e.g. a product named *Blitzductor* by Dehn Mfg.) will be required. Fig. 2–6 shows the use of the suppression circuit in conjunction with a 50 Ω shunt resistor.

V1 and V2 represent bipolar transient diodes (V1 = 20 through 30 V, V2 = 12 through 15 V). V1 can also be replaced by a *Blitzductor* surge protection device.

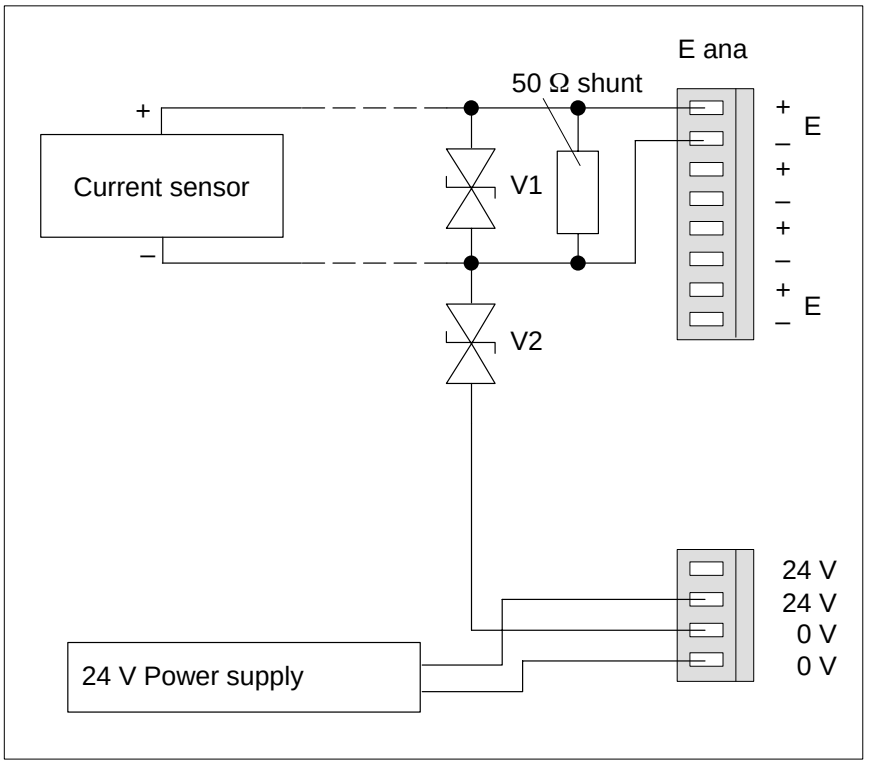

Fig. 2–6 Current Sensor with RC Circuit, Terminals

2.2.3 Thermocouple

A thermocouple assembly consists of the thermocouple and the connecting parts. In the event that there is a temperature difference between the measuring point and the free ends of the thermocouple, a voltage will be present at these free ends. This voltage depends upon the metals used for the thermocouple. The thermoelectric electromotive force (e.m.f.) is proportional to the temperature difference between measuring point and reference junction.

In order to determine the temperature of the measuring point, the temperature of the reference junction should be kept constant. This is normally not possible in the average working environment. However, as discussed in the sections below, precise temperature gauging is possible through the use of suitable compensation measures.

The connections of the thermocouple can be extended by means of equalizing conductors. To prevent falsification of the thermoelectric e.m.f., these conductors must be made of the same material as the respective thermocouple.

When connecting a thermocouple, the positive output terminal of the thermocouple that is marked with red enamel must be connected to the positive terminal of the E ana Analog Input Module.

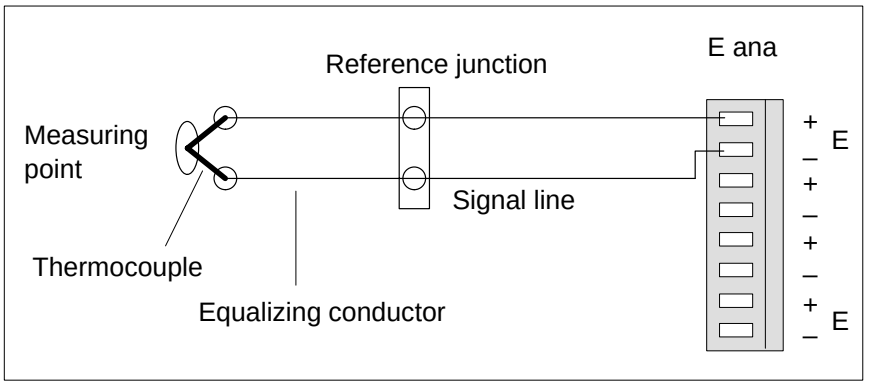

Fig. 2–7 Thermocouple Assembly, Terminals

Compensation via Reference Junction Temperature

The equalizing conductors are routed to a reference junction. From this point, the connection via copper signal lines to the E ana Analog Input Module is effected.

Using a thermistor, e.g. a Pt100, the temperature of the reference junction is measured. The E ana Analog Input Module will take this temperature reading into account in its calculations. For the purpose of compensation, the thermistor must always be connected to the E7 input (see also Section 4.3.3, ”Expand OpMode”).

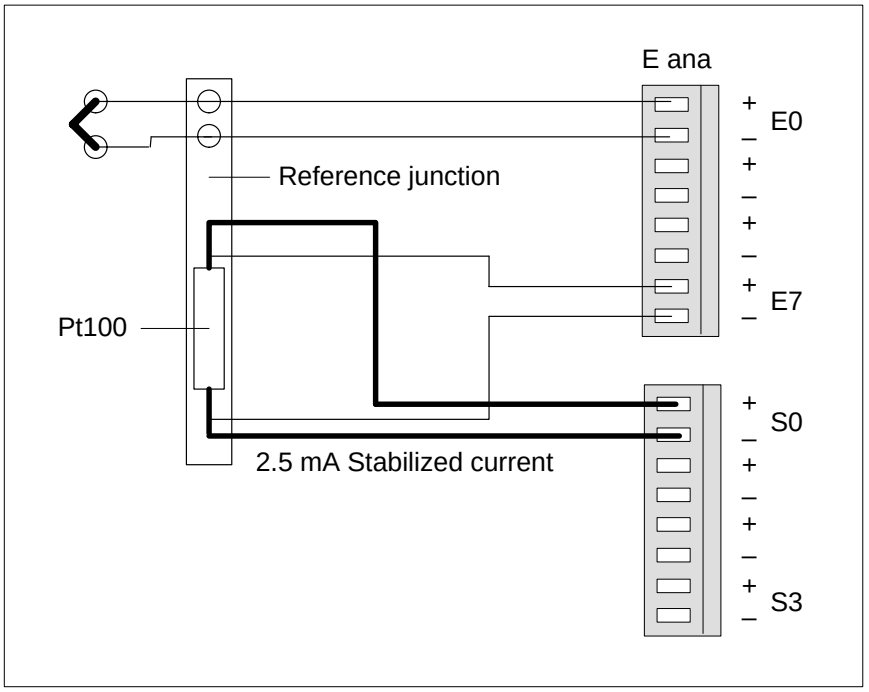

Fig. 2–8 Thermocouple with Compensation, Terminals

Compensation via Module Temperature

The equalizing conductors are routed through to the E ana Analog Input Module. The thermistor is mounted directly at the front panel of the E ana Analog Input Module. In this manner, the connector at the E ana Analog Input Module becomes the reference junction.

Compensation via Fixed-value Reference Temperature

In the Init 0, a fixed value using a 0.1 °C resolution, is entered. This compensation is used if the reference junction temperature naturally remains constant or is kept constant by appropriate means.

2.2.4 Temperature-dependent Resistors (Thermistors)

Within specific ranges of their characteristic curves, thermistors change their resistance properties in proportion to the prevailing temperature. A stabilized-power source onboard the E ana Analog Input Module provides a constant current of 2.5 mA to the resistor. The voltage drop across the resistor is measured and, in accordance with the characteristic curve, converted to °C.

4-Wire Connection

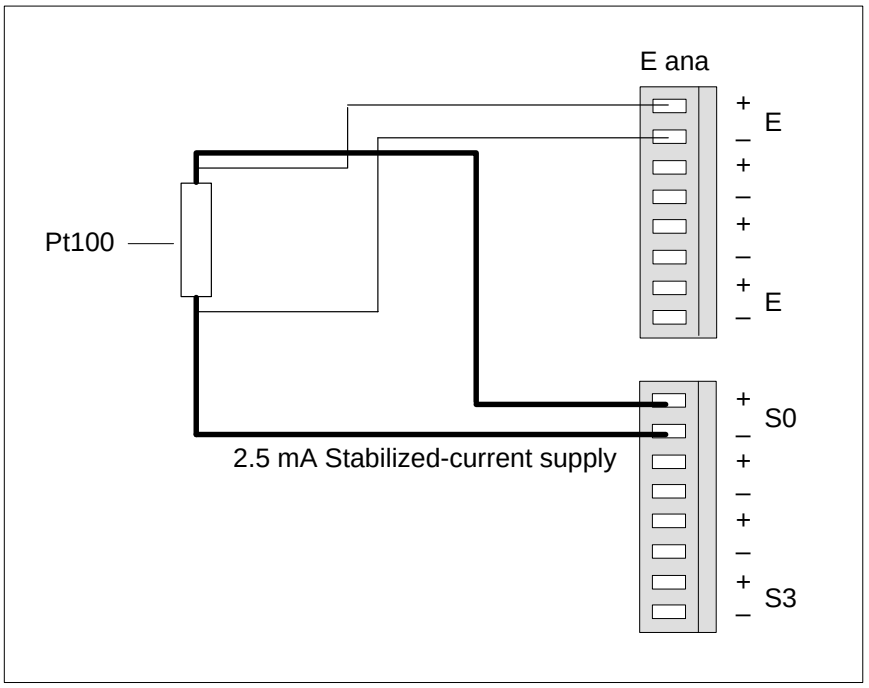

Fig. 2–9 Four-wire Connection

This connection type routes four wires to the resistor, thus measuring the voltage drop at the source with the greatest precision.

2-Wire or 3-Wire Connection

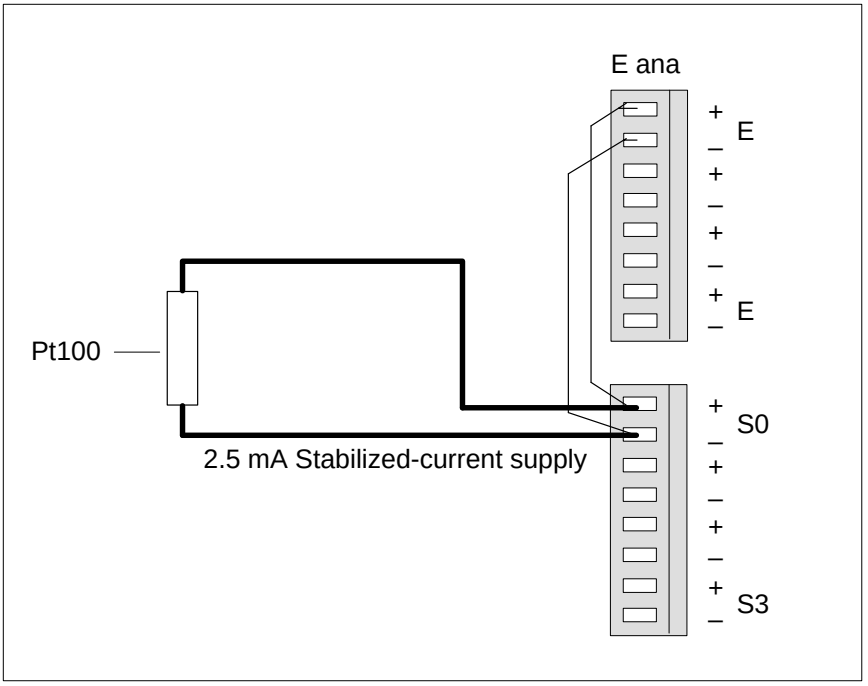

Fig. 2–10 Two-wire Connection

This connection type brings 2 and/or 3 conductors to the thermistor. However, because the voltage drop on the connecting lines to the Pt100 influences the measured value, it should be noted that, when compared with four-conductor wiring, the savings represented by having to install one (or two) less conductors generally comes at the price of lower-quality measuring results.

2.3 Stabilized Output Power Source

Each of the stabilized-output power sources S0 through S3 onboard the E ana Analog Input Module provides 2.5 mA for the temperature-dependent resistors.

☞ **The load on a given power source must not exceed 4 kΩ.**

To provide power to several thermistors, these can be switched in series. However, the maximum load must not be exceeded.

Signal designation	Signal function
+S0	Output 0, Power source
–S0	Output 0, Power source reference potential
+S1	Output 1, Power source
–S1	Output 1, Power source reference potential
+S2	Output 2, Power source
–S2	Output 2, Power source reference potential
+S3	Output 3, Power source
–S3	Output 3, Power source reference potential

Fig. 2–11 Stabilized-output Power Source, Terminals

Notes:

3 Operating Modes

The E ana Analog Input Module provides the following operating modes (OpModes):

- Fast
- Normal
- Expand
- Stop

☞ **The selected OpMode always applies to all inputs of the module.**

Measuring Range vs. OpMode			
	Fast	**Normal**	**Expand**
Voltage measurement	• ±10 V • ±1 V • ±100 mV • ±10 mV	• ±10 V • ±1 V • ±100 mV • ±10 mV	• ±10 V • ±1 V • ±100 mV • ±10 mV
Current measurement			• 0 through 20 mA • 4 through 20 mA
Temperature measurement			Thermocouples • Type B • Type E • Type J • Type K • Type R • Type S • Type T Thermistors • Pt100 • Pt500 • Pt1000 • Ni100 • Ni500 • Ni1000

Fig. 3–1 Measuring Range vs. OpMode

OpMode	Functions
Fast	• Uniform measuring range for all inputs • Extremely fast capture of measured value
Normal	• Variable measuring range • Variable sampling interval • Averaging of measured readings via numerical measurements
Expand	• Variable measuring range • Variable sampling interval • Averaging of measured readings via numerical measurements • Cable break monitoring • Overrange monitoring • Fixed-value temperature compensation • Temperature compensation via input E7

Fig. 3–2 OpMode and Functions

Immediately after the startup of the controller, the E ana Analog Input Module enters the Fast OpMode, and all inputs are enabled. As discussed in Chapter 4, ”Module Initialization,” the default initialization OpMode can be changed by modifying the initialization data.

For this purpose,

- the module is switched to Stop mode,
- the new initialization data is written,
- and the measured values are read.

Stop

In order to write new initialization data (e.g. changing the default OpMode), the E ana Analog Input Module must be switched to Stop mode.

Fast

The Fast OpMode is used for taking high-speed voltage measurements, using a uniform measuring range on all inputs. In this OpMode, the measuring range set on input E0 will apply to all inputs.

All inputs will be converted at the maximum possible speed.

Normal

The Normal OpMode is used for taking high-speed voltage measurements, using a variable measuring range and average-value formation.

The inputs will be converted over a variable measuring range, and with the selected sampling time. The average-value formation occurs on the basis of the defined number of single readings. No input monitoring function is enabled.

Expand

In the Expand OpMode, all measuring ranges and all functional variants are available.

The inputs are converted at the specified sampling rate. The conversion rate depends upon the functions that are enabled. An average value is formed in accordance with the specified number of single readings, and the obtained individual measured values.

Notes:

4 Module Initialization

In centralized operation, the initialization of the E ana Analog Input Module, and the required data exchange procedures, are handled by the EI / EO range of the CL200 controller. The E ana input module uses 4 bytes each in the extended input (EI) and extended output (EO).

In decentralized operation via COMNET-DP, the module initialization and required data exchange are handled directly via 32 input and 32 output bytes.

To effect initialization, 12 data words containing initialization data are transferred to the E ana input module. The 12 data words must be transferred in a single data block. The E ana input module commences the initialization procedure immediately upon receipt of the data.

The E ana input module used 12 data words to return the measured values on the inputs plus the status data to the central processing unit.

The following steps are required for module initialization:

- Connecting external 24 V power supply
- Switching E ana input module to Stop mode (see Section 4.1, below)
- Awaiting acknowledgement for Stop OpMode
- Initializing E ana input module (see Section 4.3, below)

4.1 Placing E ana Input Module into Stop Mode

In order to write new initialization data, the E ana input module must be placed into Stop mode via Init 3.

Dependent upon the previously selected OpMode, the switchover takes approximately 1 ms to 2 seconds. The completed switchover is confirmed by the indication of Stop in Status 3.

☞ **The wait time for the acknowledgement may cause the cycle time monitoring function to be activated.**

Recommendation: A suitable workaround is the programming of the switchover to Stop mode in the start-up organization modules, or to distribute it over several cycles.

To effect the switchover to Stop mode, the 24 V external power supply must be connected to the module.
Recommendation: Prior to attempting the switchover, query Status 2 for the presence of the 24 V power supply.

As a next step, the initialization data can be written.

To effect the change to Stop mode, the value 0001H must be written in Init 3.

Example

Start address 0

```
L     W   K0022D,A          ;Load data word address for Init 3
T     W   A,IO0             ;Write data word address to start address 0
L     W   K0001H,A          ;Load Stop
T     W   A,IO2             ;Write Init 3
      –Warte                ;Wait loop until module has entered Stop mode
L     W   K0022D,A          ;Load data word address for Status 3
T     W   A,IO0             ;Write data word address to start address 0
L     W   EI2,A             ;Load Status 3. Module in Stop?
CPLA  W   K0001H,A          ;Compare Stop code with Status 3
JPN       –Warte            ;Wait for confirmation of Stop
```

4.2 Reading Status Data

The measured values and the status data are generated by the E ana input module, read by the PLC program, and interpreted if and as required. The following table lists the data word addresses and the corresponding data.

Data word address	Corresponding data
0	Measured value, input 0
2	Measured value, input 1
4	Measured value, input 2
6	Measured value, input 3
8	Measured value, input 4
10	Measured value, input 5
12	Measured value, input 6
14	Measured value, input 7
16	Status 0
18	Status 1
20	Status 2
22	Status 3

Fig. 4–1 Measured values and Status Data

Status 0, Measuring Cycle Time

The data word indicates the current duration of a cycle time in ms. Upon expiration of this interval the module will return new measured values.

The measuring cycle time is calculated on the basis of the following formula:

Measuring cycle time
= Number of inputs x Sampling time x Numerical value n for average-value formation

Example:
8 inputs, 1 ms Sampling interval, 50 readings for average-value formation.

Measuring cycle time: = 8 x 1 ms x 50 = 400 ms

The example below shows the addressing routine for the E ana Analog Input Module, and the reading of Status 0 (start address 0):

```
L    W  K0016D,A          ;Load data word Status 0
T    W  A,IO0             ;Write data word to start address 0
L    W  EI2,A             ;Read Status 0 (start address +2)
```

Status 1, Fault Messages from Inputs

Status 1 indicates fault messages returned by the inputs. Typical faults are a cable break or an overrange indication. As an additional indication in the case of a cable break, Status 2 will return the value 0005H.

Bit	Explanation
0	Cable break, input 0
1	Cable break, input 1
2	Cable break, input 2
3	Cable break, input 3
4	Cable break, input 4
5	Cable break, input 5
6	Cable break, input 6
7	Cable break, input 7
8	Overrange indication, input 0
9	Overrange indication, input 1
10	Overrange indication, input 2
11	Overrange indication, input 3
12	Overrange indication, input 4
13	Overrange indication, input 5
14	Overrange indication, input 6
15	Overrange indication, input 7

Fig. 4–2 Status 1

The following example shows the addressing of the E ana Analog Input Module, and the reading of Status 1 (start address 0):

```
L    W  K0018D,A          ;Load data word address Status 1
T    W  A,EO0             ;Write data word address to start address
L    W  EI2,A             ;Read Status 1 (start address +2)
```

Status 2, Fault Messages from Module

If the data value of Status 3 equals 0000H, this indicates the presence of a fault. The cause of the fault is indicated in Status 2. In the event that a cable break or an overrange violation is detected, Status 1 will identify the affected input as an additional fault indication.

Data value	Fault message
0001H	Fault occurred during hardware test
0004H	Absence of external 24 V power supply; checked during start-up phase only
0005H	Cable break on an input
0010H	Faulty initialization data for input 0 in Fast OpMode
0011H	Faulty initialization data for input 1 in Fast OpMode
0012H	Faulty initialization data for input 2 in Fast OpMode
0013H	Faulty initialization data for input 3 in Fast OpMode
0014H	Faulty initialization data for input 4 in Fast OpMode
0015H	Faulty initialization data for input 5 in Fast OpMode
0016H	Faulty initialization data for input 6 in Fast OpMode
0017H	Faulty initialization data for input 7 in Fast OpMode
0020H	Faulty initialization data for input 0 in Normal OpMode
0021H	Faulty initialization data for input 1 in Normal OpMode
0022H	Faulty initialization data for input 2 in Normal OpMode
0023H	Faulty initialization data for input 3 in Normal OpMode
0024H	Faulty initialization data for input 4 in Normal OpMode
0025H	Faulty initialization data for input 5 in Normal OpMode
0026H	Faulty initialization data for input 6 in Normal OpMode
0027H	Faulty initialization data for input 7 in Normal OpMode
0030H	Faulty initialization data for input 0, Expand OpMode
0031H	Faulty initialization data for input 1, Expand OpMode
0032H	Faulty initialization data for input 2, Expand OpMode
0033H	Faulty initialization data for input 3, Expand OpMode
0034H	Faulty initialization data for input 4, Expand OpMode
0035H	Faulty initialization data for input 5, Expand OpMode

Data value	Fault message
0036H	Faulty initialization data for input 6, Expand OpMode
0037H	Faulty initialization data for input 7, Expand OpMode
0040H	Faulty initialization data in Init 3

Fig. 4–3 Status 2

With the exception of a cable break being reported by Status 2, all fault messages returned in Status 2 will cause Status 3 to go LOW. A cable break can only be detected by the query for the value 0005H in Status 2.

The following example shows the addressing of the E ana Analog Input Module, and the reading of Status 2 (start address 0):

```
L    W  K0020D,A        ;Load data word address Status 2
T    W  A,EO0           ;Write data word address to start address
L    W  EI2,A           ;Read Status 2 (start address +2 )
```

Status 3, OpMode

In Status 3 the current OpMode of the module is returned.

Data value	OpMode
0000H	Fault detected, description in Status 2
0001H	E ana in Stop mode, waiting for initialization data
0002H	E ana running in Fast OpMode
0004H	E ana running in Normal OpMode
0008H	E ana running in Expand OpMode

Fig. 4–4 Status 3

The following example shows the addressing of the E ana Analog Input Module, and the reading of Status 3 (start address 0):

```
L    W  K0022D,A        ;Load data word address Status 3
T    W  A,EO0           ;Write data word address to start address
L    W  EI2,A           ;Read Status 3 (start address + 2)
```

4.3 Initializing E ana Analog Input Module

The initialization data is generated by the PLC program, and transferred to the E ana input module. Faulty initialization data is reported in Status 3, and described in Status 2. The table below indicates the data word addresses and corresponding data.

Data word address	Corresponding data
0	Init input 0
2	Init input 1
4	Init input 2
6	Init input 3
8	Init input 4
10	Init input 5
12	Init input 6
14	Init input 7
16	Init 0, reference junction temperature
18	Init 1, sampling time
20	Init 2, average value
22	Init 3, OpMode

Fig. 4–5 Initialization Data

The initalization data must be transferred in a coherent data block, with Init 3 being the last word to be transferred. The E ana input module commences initialization immediately upon conclusion of the data transfer. In the event that faults occur during this process, this will be reported in Status 3, and the procedure must be repeated.

For inputs and/or data words that are not used (Init 0, 1 or 2), the value 000H may be transmitted.

☞ **The selected OpMode always applies to all inputs of the module.**

Init 0, Reference Junction Temperature

For a description of Init 0, refer to Section 4.3.3, ”Expand OpMode.”

Init 1, Sampling Interval

For a description of Init 1, refer to Section 4.3.2, ”Normal OpMode” or Section 4.3.3, ”Expand OpMode.”

Init 2, Average Value

For a description of Init 2, refer to o Section 4.3.2, ”Normal OpMode” or Section 4.3.3, ”Expand OpMode.”

Init 3, OpMode

Init 3 is used to determine the OpMode for the E ana Analog Input Module.

OpMode	Data value
Stop	0001H
Fast	0002H
Normal	0004H
Expand	0008H

Fig. 4–6 Init 3

4.3.1 Fast OpMode

Measuring ranges

- ±10 V
- ±1 V
- ±100 mV
- ±10 mV

The Fast OpMode is used for taking high-speed voltage measurements with a uniform measuring range for all inputs. The measuring range selected on input E0 is valid for all inputs.

Measuring range	Data value for Init, Inputs 0 through 7
±10 V	0001H
±1 V	0002H
±100 mV	0003H
±10 mV	0004H

Fig. 4–7 Measuring Range, Fast OpMode

☞ **The measuring range selected on input E0 applies to all inputs.**

In the Fast OpMode the data words Init 0, 1, and 2 have no functions, and are therefore set to 0000H.

Init 3, OpMode

Init 3 determines the OpMode, and is given the value 0002H.

Example

☞ **Prior to writing initialization data, the E ana Analog Input Module must be placed in Stop mode via Init 3.**

Start address 0

```
                                ;Initialize E ana Analog Input Module for Fast OpMode
L     W   K0000H,A              ;Load data word address for Init input 0
T     W   A,EO0                 ;Write data word address to start address 0
L     W   K0001H,A              ;Init input 0, Measuring range ±10 V
T     W   A,EO2
L     W   K0001H,A              ;Init input 1, Measuring range ±10 V
T     W   A,EO2
L     W   K0001H,A              ;Init input 2, Measuring range ±10 V
T     W   A,EO2
L     W   K0001H,A              ;Init input 3, Measuring range ±10 V
T     W   A,EO2
L     W   K0000H,A              ;Init input 4, not used
T     W   A,EO2
```

```
L    W  K0000H,A          ;Init input 5, not used
T    W  A,EO2
L    W  K0000H,A          ;Init input 6, not used
T    W  A,EO2
L    W  K0000H,A          ;Init input 7, not used
T    W  A,EO2
L    W  K0D,A             ;Init 0, not used
T    W  A,EO2
L    W  K0D,A             ;Init 1, not used
T    W  A,EO2
L    W  K0D,A             ;Init 2, not used
T    W  A,EO2
L    W  K0002H,A          ;Init 3, Fast OpMode
T    W  A,EO2
```

4.3.2 Normal OpMode

Measuring ranges

- ± 10 V
- ± 1 V
- ± 100 mV
- ± 10 mV

The Normal OpMode is used for taking high-speed voltage measurements, using a variable measuring range and average-value formation.

The inputs will be converted over a variable measuring range, and with the selected sampling time. The average-value formation occurs on the basis of the predefined number of single readings.

Measuring range	Data value for Init, Inputs 0 through 7
± 10 V	0001H
± 1 V	0002H
± 100 mV	0003H
± 10 mV	0004H

Fig. 4–8 Measuring Ranges, Normal OpMode

In the Normal OpMode the data word Init 0 has no function, and is therefore set to 0000H.

Init 1, Sampling Interval

The sampling time represents the time interval, expressed in µs, that is to elapse subsequent to measuring one input, and prior to measuring the next input. In the event that high-resistance voltage sensors cause faults on adjacent inputs, such faults can be reduced by increasing the length of the sampling interval.

Example: 20 µs ≙ 20D ≙ 0014H

Init 2, Average Value

The E ana Analog Input Module repeats the input measuring procedure n number of times. From the measured n-number of values it then forms the average value. If this value equals 0 (zero), no average-value formation will take place.

Example: 25 times ≙ 25D ≙ 0019H

Init 3, OpMode

Init 3 controls the OpMode, and is assigned the value 0004H.

Example

☞ **Prior to writing initialization data, the E ana Analog Input Module must be placed in Stop mode via Init 3.**

Start address 0

```
                    ;Initialize E ana Analog Input Module for Normal mode
L     W   K0000H,A  ;Load data word address for Init input 0
T     W   A,EO0     ;Write data word address to Start address 0
L     W   K0001H,A  ;Init input 0, measuring range ±10 V
T     W   A,EO2
L     W   K0002H,A  ;Init input 1, measuring range ±1 V
T     W   A,EO2
L     W   K0003H,A  ;Init input 2, measuring range ±100 mV
T     W   A,EO2
L     W   K0004H,A  ;Init input 3, measuring range ±10 mV
T     W   A,EO2
L     W   K0000H,A  ;Init input 4, not used
T     W   A,EO2
L     W   K0000H,A  ;Init input 5, not used
T     W   A,EO2
L     W   K0000H,A  ;Init input 6, not used
T     W   A,EO2
L     W   K0000H,A  ;Init input 7, not used
T     W   A,EO2
L     W   K0D,A     ;Init 0, not used
T     W   A,EO2
L     W   K20D,A    ;Init 1, 20 usec sampling interval
T     W   A,EO2
L     W   K25D,A    ;Init 2, 25 readings for average-value formation
T     W   A,EO2
L     W   K0004H,A  ;Init 3, Normal OpMode
T     W   A,EO2
```

4.3.3 Expand OpMode

In the Expand OpMode, all measuring ranges and all functional variants are available. The measuring range is defined in the LOW byte. The HIGH byte can be used to specify a monitoring or compensation function, as shown in table 4–10 on the following page.

Measuring range	Data value for Init, Inputs 0 through 7, LOW byte
Voltage	
± 10 V	xx01H
± 1 V	xx02H
± 100 mV	xx03H
± 10 mV	xx04H
Current	
0 through 20 mA	xx10H
4 through 20 mA	xx11H
Thermocouples	
Type R	xx20H
Type S	xx21H
Type B	xx22H
Type J	xx23H
Type T	xx24H
Type E	xx25H
Type K	xx26H
Thermistors	
Pt100	xx40H
Pt500	xx41H
Pt1000	xx42H
Ni100	xx43H
Ni500	xx44H
Ni1000	xx45H

Fig. 4–9 Measuring Ranges, Expand OpMode

Monitoring and Compensation Functions

In Expand OpMode it is possible to select, for each individual input, a cable break and overrange monitoring function, and temperature measuring compensation.

The desired monitoring or compensation function is specified in the HIGH byte of the data value of the Init for inputs 0 through 7.

Monitoring and Compensation	**Data value for Init, Inputs 0 through 7, HIGH byte**
None	00xxH
Cable break monitoring	01xxH
Range monitoring	02xxH
Cable break monitoring + Range monitoring	03xxH
Compensation via fixed value	04xxH
Compensation via Fixed value and Cable break monitoring	05xxH
Compensation via Fixed value and Range monitoring	06xxH
Compensation via Fixed value + Cable break monitoring + Range monitoring	07xxH
Compensation via E7	08xxH
Compensation via E7 + Cable break monitoring	09xxH
Compensation via E7 + Range monitoring	0AxxH
Compensation via E7 + Cable break monitoring + Range monitoring	0BxxH

Fig. 4–10 Monitoring and Compensation Functions

Cable Break and Range Monitoring

The cable break and range monitoring functions are dependent upon the measuring range. Cable break monitoring is available only in conjunction with current and temperature measuring. For listings of precise threshold values for the detection of a cable break or an overrange violation, please refer to Section 5.3, ”Representation of Measured Values.”

Compensation

When measuring temperature with the aid of thermocouples, the temperature of the reference junction must always be taken into account. To account for the reference junction temperature, the E ana Analog Input Module provides two compensation methods:

- Compensation through measuring the reference junction temperature via input E7.
- Compensation using a fixed-value for the reference junction temperature.

Compensation via Input E7

When using the compensation via input E7, the reference junction temperature is measured by means of a temperature-dependent resistor (thermistor). Refer also to the diagram in Fig. 2–8.

Init 0, Reference Junction Temperature

Any compensation by means of a fixed value is based upon the premise of a constant reference junction temperature (refer to Fig. 2–7). In the Init 0, the reference junction temperature is specified with a resolution of 0.1 °C per bit. The temperature can also have a negative value.

Example:

–200 °C	≙	K30768D
–100 °C	≙	K31768D
–10 °C	≙	K32668D
0 °C	≙	K32768D
+20 °C	≙	K32968D
+100 °C	≙	K33768D
+200 °C	≙	K34768D

Init 1, Sampling Interval

The sampling time represents the time interval, expressed in µs, that is to elapse subsequent to measuring one input, and prior to measuring the next input. If high-resistance voltage sensors cause faults on adjacent inputs, such faults can be reduced by increasing the length of the sampling interval.

Example: 20 µs ≙ 20D ≙ 0014H

Init 2, Average Value

The E ana Analog Input Module repeats the input measuring procedure n number of times. From the n-number of values it then forms the average value. If this value equals 0 (zero), no average-value formation will occur.

Example: 25 times ≙ 25D ≙ 0019H

Init 3, OpMode

Init 3 controls the OpMode, and is assigned the value 0008H.

Example

☞ **Prior to writing initialization data, the E ana Analog Input Module must be placed in Stop mode via Init 3.**

Start address 0

```
                    ;Initialize E ana Analog Input Module for Expand mode
L     W   K0000H,A  ;Load data word address for Init input 0
T     W   A,EO0     ;Write data word address to start address 0
L     W   K0001H,A  ;Init input 0, measuring range ±10 V
T     W   A,EO2
L     W   K0011H,A  ;Init input 1, measuring range 4 through 20 mA
T     W   A,EO2
L     W   K0002H,A  ;Init input 2, measuring range ±1 V
T     W   A,EO2
L     W   K0340H,A  ;Init input 3, Pt100, Cable break monitoring
                    ;and Range monitoring
T     W   A,EO2
L     W   K0822H,A  ;Init input 4, Type B, compensation via E7
T     W   A,EO2
L     W   K0423H,A  ;Init input 5, Type J, compensation via fixed value
T     W   A,EO2
L     W   K0000H,A  ;Init input 6, not used
T     W   A,EO2
L     W   K0040H,A  ;Init input 7, Pt100
T     W   A,EO2
L     W   K32968D,A ;Init 0, reference junction temperature +20 °C
T     W   A,EO2
L     W   K0D,A     ;Init 1, not used
T     W   A,EO2
L     W   K0D,A     ;Init 2, not used
T     W   A,EO2
L     W   K0008H,A  ;Init 3, Expand OpMode
T     W   A,EO2
```

Notes:

5 Measured Values

5.1 Validity of Measured Values

Subsequent to the initialization process, and once a complete measuring cycle has been processed, the E ana Analog Input Module acknowledges the selected OpMode. Prior to this point in time, all measured values will have a value of 0000H. Subsequent to this juncture, all measured values obtained during the last completed measuring cycle will be available.

In order to prevent the processing of invalid readings that were obtained, for example, while the first measuring cycle had not yet been completed, Status 3 must be queried subsequent to initialization. If it is found that Status 3 contains the value that corresponds to the selected OpMode, the measured values are deemed valid, and suitable for processing by the PLC program.

In the case of long measuring cycles, it is especially important that the measured values of all inputs always originate from the same measuring cycle.

Two different access modes are available for reading the measured values:

- Direct read-access to the data of a given input, OR
- Reading measured value by means of auto-incrementing.

Data word address (decimal)	Data
0	Measured value, input 0
2	Measured value, input 1
4	Measured value, input 2
6	Measured value, input 3
8	Measured value, input 4
10	Measured value, input 5
12	Measured value, input 6
14	Measured value, input 7
16	Status 0
18	Status 1
20	Status 2
22	Status 3

Fig. 5–1 Data Word Addresses of Inputs

☞ **The measured values of a given input are always read via the start address +2.**

5.2 Reading Measured Values

Single-access Addressing

An input is addressed by setting a dedicated address value.

Example

The objective is to read the measured value of input 4 of a module with start address 0 by means of a single access; data module identified as –DM0 is used to store analog values.

```
CM      –DM0            ;Call –DM0 data module
L   W   K0008D,A        ;Load data word address for input 4
T   W   A,EO0           ;Write data word address to start address 0
L   W   EI2,A           ;Read measured value at input 4
T   W   A,D2            ;and write to data word D2 of –DM0 data module
```

Auto-incrementing

In this case, the address value for the input is written only once. Subsequent to each access, the address value of the input that was last read by the PLC program is automatically incremented by a count of 2 by the PLC program. The subsequent inputs are then read in successive order.

Example

Start address 0, –DM0 data module to store analog values

```
CM      –DM0            ;Call –DM0 data module
L   W   K0000D,A        ;Load data word address for input 0
T   W   A,EO0           ;Write data word address to start address
L   W   EI2,A           ;Read measured value at input 0
T   W   A,D0            ;and write to data word D0 of –DM0
L   W   EI2,A           ;Read measured value at input 1
T   W   A,D2            ;and write to data word D2
L   W   EI2,A           ;Read measured value at input 2
T   W   A,D4            ;and write to data word D4
...
```

5.3 Representation of Measured Values

The representation of the measured values is dependent upon both the connected sensor and the selected measuring range. Specific conversion results are utilized for recognizing cable breaks and for range monitoring.

5.3.1 Voltage Measurement

Measuring Range ±10 V

decimal	hexadecimal	Voltage value	Status
65535	FFFF	+10 V	Overrange violation
65534	FFFE	+9.99969 V	Nominal range
32769	8001	+305.18 µV	
32768	8000	0 V	
32767	7FFF	–305.18 µV	
0001	0001	–9.99969 V	
0000	0000	–10 V	Overrange violation

Fig. 5–2 Voltage Measuring Range ± 10 V

Measuring Range ±1 V

decimal	hexadecimal	Voltage value	Status
65535	FFFF	+1 V	Overrange violation
65534	FFFE	+0.999969 V	Nominal range
32769	8001	+30.518 µV	
32768	8000	0 V	
32767	7FFF	–30.518 µV	
0001	0001	–0.999969 V	
0000	0000	–1 V	Overrange violation

Fig. 5–3 Voltage Measuring Range ± 1 V

Measuring Range ±100 mV

decimal	hexadecimal	Voltage value	Status
65535	FFFF	+100 m V	Overrange violation
65534	FFFE	+99.9969 mV	Nominal range
32769	8001	+3.0518 µV	
32768	8000	0 V	
32767	7FFF	–3.0518 µV	
0001	0001	–99.9969 mV	
0000	0000	–100 mV	Overrange violation

Fig. 5–4 Voltage Measuring Range ± 100 mV

Measuring Range ±10 mV

decimal	hexadecimal	Voltage value	Status
65535	FFFF	+10 m V	Overrange violation
65534	FFFE	+9.99969 mV	Nominal range
32769	8001	+0.30518 µV	
32768	8000	0 V	
32767	7FFF	–0.30518 µV	
0001	0001	–9.99969 mV	
0000	0000	–10 mV	Overrange violation

Fig. 5–5 Voltage Measuring Range ± 10 mV

5.4 Current Measurement

Measuring Range 0 through 20 mA

decimal	hexadecimal	Current value	Status
65535	FFFF	≥20 mA	Overrange violation
65534	FFFE	+19.9997 mA	Nominal range
0001	0001	+0.30518 µA	
0000	0000	≤0 mA	Cable break

Fig. 5–6 Current Measuring Range, 0 through 20 mA

Measuring Range 4 through 20 mA

decimal	hexadecimal	Current value	Status
65535	FFFF	≥20 mA	Overrange violation
65534	FFFE	+19.99975 mA	Nominal range
0001	0001	+4.000244 mA	
0000	0000	≤4 mA	Cable break

Fig. 5–7 Current Measuring Range, 4 through 20 mA

5.5 Temperature Measurement

Resolution: 0.1 °C = 1 Bit

Pt100, Pt500, Pt1000

decimal	hexadecimal	Temperature value	Status
65535	FFFF	> +850 °C	Overrange violation
41268	A134	+850 °C	Nominal range
32768	8000	0 °C	
30768	7830	–200 °C	
0000	0000	< –200 °C	Cable break

Fig. 5–8 Temperature Measurement, Using Pt100, Pt500, Pt1000

Ni100, Ni500, Ni1000

decimal	hexadecimal	Temperature value	Status
65535	FFFF	> +250 °C	Overrange violation
35268	89C4	+250 °C	Nominal range
32768	8000	0 °C	
32168	7DA8	–60 °C	
0000	0000	< –60 °C	Cable break

Fig. 5–9 Temperature Measurement, Using Ni100, Ni500, Ni1000

Type B Thermocouple, Platinum 30 % Rhodium / Platinum 6 % Rhodium

decimal	hexadecimal	Temperature value	Status
65535	FFFF	> +1820.1 °C	Overrange violation
50968	C718	+1820 °C	Nominal range
32768	8000	0 °C	
0000	0000	< –0.1 °C	Cable break

Fig. 5–10 Temperature Measurement, Type B Thermocouple

Type E Thermocouple, Nickel Chrome / Copper Nickel

decimal	hexadecimal	Temperature value	Status
65535	FFFF	> +1000.1 °C	Overrange violation
42768	A710	+1000 °C	Nominal range
32768	8000	0 °C	
30068	7574	–270 °C	
0000	0000	< –270.1 °C	Cable break

Fig. 5–11 Temperature Measurement, Type E Thermocouple

Type J Thermocouple, Fe / Copper / Nickel

decimal	hexadecimal	Temperature value	Status
65535	FFFF	> +1200.1 °C	Overrange violation
44768	AEE0	+1200 °C	Nominal range
32768	8000	0 °C	
30668	77CC	–210 °C	
0000	0000	< –210.1 °C	Cable break

Fig. 5–12 Temperature Measurement, Type J Thermocouple

Type K Thermocouple, Nickel Chrome / Nickel

decimal	hexadecimal	Temperature value	Status
65535	FFFF	> +1372.1 °C	Overrange violation
46488	B598	+1372 °C	Nominal range
32768	8000	0 °C	
30068	7574	–270 °C	
0000	0000	< –270.1 °C	Cable break

Fig. 5–13 Temperature Measurement, Type K Thermocouple

Type R Thermocouple, Platinum 13 % Rhodium / Platinum

decimal	hexadecimal	Temperature value	Status
65535	FFFF	> +1769,1 °C	Overrange violation
50458	C51A	+1769 °C	Nominal range
32768	8000	0 °C	
32268	7E0C	–50 °C	
0000	0000	< –50,1 °C	Cable break

Fig. 5–14 Temperature Measurement, Type R Thermocouple

Type S Thermocouple, Platinum 10 %, Rhodium / Platinum

decimal	hexadecimal	Temperature value	Status
65535	FFFF	> +1769.1 °C	Overrange violation
50458	C51A	+1769 °C	Nominal range
32768	8000	0 °C	
32268	7E0C	–50 °C	
0000	0000	< –50.1 °C	Cable break

Fig. 5–15 Temperature Measurement, Type S Thermocouple

Type T Thermocouple, Copper / Copper Nickel

decimal	hexadecimal	Temperature value	Status
65535	FFFF	> +400.1 °C	Overrange violation
36768	8FA0	+400 °C	Nominal range
32768	8000	0 °C	
30068	7574	–270 °C	
0000	0000	< –270.1 °C	Cable break

Fig. 5–16 Temperature Measurement, Type T Thermocouple

6 Programming Example

This chapter provides a programming example for the centralized operation of the E ana Analog Input Module. The module occupies 4 bytes in both the extended input (EI) and extended output (EO). In this example, the start address is 0 (zero), corresponding to EI0 and EO0.

In the event that another start address is selected, the following changes must be made in the program code:
EO0 = Start address
EO2 = Start address + 2
EI2 = Start address + 2

The module is to be initialized to run in Expand OpMode.

```
;Is the module installed in the module rack?
L    W  K0014H,A           ;Load data word address for Status 2
T    W  A,EO0              ;Write data word address to start address
L    W  EI2,A              ;Read Status 2
L    W  EI2,B              ;Read Status 3
O    W  A,B                ;If the value 0 is read at the address of
                           ;Status 2 and Status 3, no module was found.
JPN     –Fehler            ;General fault query
;here, it is not possible to program a response to any module in the module rack.
SP      –Ende1

        –Fehler
;Does the module report a general fault?
L    W  K0014H,A           ;Load data word address for Status 2
T    W  A,EO0
L    W  EI2,A              ;Read Status 2
L    W  EI2,B              ;Read Status 3
CPLA W  K0H,B              ;If Status 3 equals 0, this indicates a fault
JPN     –Init
CPLA W  K5H,A              ;If Status 2 not equal to 5, this indicates detection
                           ;of general fault
JPZ     –Init
;Here, the response to a general fault can be programmed
SP      –Ende1
```

```
        –Init
;Is the module already running in the correct Expand OpMode, and has no fault
;message been returned ?
L    W  K0016H,A           ;Load data word address for Status 3
T    W  A,EO0
L    W  EI2,A              ;Read Status 3
CPLA W  K0008H,A
JPZ     –initokay

;Begin initialization routine
;Switch E ana module to Stop mode
L    W  K0016H,A           ;Load data word address for Init 3
T    W  A,EO0
L    W  K0001H,A           ;Switch E ana module to Stop mode
T    W  A,EO2
;Query and/or wait time until E ana module has attained Stop mode
     –waitstop
L    W  K0016H,A           ;Load data word address for Init 3
T    W  A,EO0
L    W  EI2,A
CPLA W  K0001H,A
JPN     –waitstop

;In the program part below, the measuring range, and/or measuring type is
;selected for individual inputs, Init input 0 through input 7
;0000H = input not used
L    W  K0000H,A           ;Load data word address for Init input 0
T    W  A,EO0              ;Write data word address to start address 0
L    W  K0001H,A           ;Init input 0, measuring range ±10 V
T    W  A,EO2
L    W  K0011H,A           ;Init input 1, measuring range 4 through 20 mA
T    W  A,EO2
L    W  K0002H,A           ;Init input 2, measuring range ±1 V
T    W  A,EO2
L    W  K0340H,A           ;Init input 3, Pt100,
                           ;cable break and range monitoring
T    W  A,EO2
L    W  K0822H,A           ;Init input 4, Type B, compensation via E7
T    W  A,EO2
L    W  K0423H,A           ;Init input 5, Type J, compensation via fixed value
T    W  A,EO2
L    W  K0000H,A           ;Init input 6, not used
T    W  A,EO2
L    W  K0040H,A           ;Init input 7, Pt100
T    W  A,EO2
L    W  K32968D,A          ;Init 0, reference junction temperature +20 °C
T    W  A,EO2
```

```
L    W  K0D,A              ;Init 1, not used
T    W  A,EO2
L    W  K0D,A              ;Init 2, not used
T    W  A,EO2
L    W  K0008H,A           ;Init 3, Expand OpMode
T    W  A,EO2

;Writing to Init 3 causes the module to be restarted
;Query and/or wait time until E ana module has entered Expand OpMode
     –waitexpa
L    W  K0016H,A           ;Load data word address for Status 3
T    W  A,EO0
L    W  EI2,A              ;Read Status 3
CPLA W  K0008H,A
JPN      –waitexpa

     –initokay

;Read measured values, and copy to –DM0 data module
CM       –DM0              ;Module call for data module
L    W  K0000H,A           ;Load data word address for input 0
T    W  A,EO0
L    W  EI2,A              ;Read measured value, input 0
T    W  A,D0
L    W  EI2,A              ;Read measured value, input 1
T    W  A,D2
L    W  EI2,A              ;Read measured value, input 2
T    W  A,D4
L    W  EI2,A              ;Read measured value, input 3
T    W  A,D6
L    W  EI2,A              ;Read measured value, input 4
T    W  A,D8
L    W  EI2,A              ;Read measured value, input 5
T    W  A,D10
L    W  EI2,A              ;Read measured value, input 6
T    W  A,D12
L    W  EI2,A              ;Read measured value, input 7
T    W  A,D14
L    W  EI2,A              ;Status 0, read measuring cycle time
T    W  A,D16
L    W  EI2,A              ;Read Status 1, LOW byte cable monitoring, and
;                          ;HIGH byte range monitoring
T    W  A,D18
L    W  EI2,A              ;Read Status 2 fault messages
T    W  A,D20

     –Ende1
EM
```

Notes:

7 Diagnostics

Fault messages are indicated in Status 2 and Status 3. Status 3 uses 0000H to indicate a fault in the module (see also Fig. 4–4). The fault description occurs in Status 2 (see also Fig. 4–3). The fault message will remain until the fault has been eliminated.

A cable break at the input is not returned in Status 3 but indicated only in Status 2. In this case, Status 1 provides information with regard to the precise location of the cable break. In addition, Status 1 issues information about an overrange violation.

With the exception of overrange violations, the Fault LED at the front panel of the module illuminates in the case of all fault occurrences.

Hardware Faults

Subsequent to Power-ON, the E ana Analog Input Module recognizes a hardware fault, returning the value 0001H in Status 2.

Fault in 24 V Power Supply

Subsequent to Power-ON, the E ana Analog Input Module subjects the external 24 V power supply to a one-time check. If power is absent, the value 0004H is indicated in Status 2.

Initialization Fault

It appears that the user has caused faulty initialization data to be transferred to the E ana Analog Input Module. Accordingly, the module is unable to perform initialization. Status 2 indicates the source of the fault (see also Fig. 4–3).

The initialization data must be corrected and again transferred to the E ana Analog Input Module.

Cable Break Monitoring

With the module in Expand OpMode, the cable break monitoring function can be enabled. A disrupted input will be recognized, and indicated in Status 1 (see also Fig. 4–2).

Range Monitoring

With the module in Expand OpMode, a function monitoring the permissible measuring range can be enabled. A faulty input is then indicated in Status 1 (see Fig. 4–2).

Notes:

A Appendix

A.1 Abbreviations

EI	Extended input
EO	Extended output
FS	Full Scale
LSB	Least Significant Bit
MSB	Most Significant Bit
PE	Protective Earth

A.2 Index

A.3 PLC Terminology German / English

Operanden / Operands

Deutsch		**English**	
AST	Anwender-Stack	AST	Application stack
AWP	Anwenderprogrammzähler	UPP	User program pointer counter
A	Ausgang	O	Output
AZ	Ausgangszusatzfeld	EO	Extended output
D	Datum	D	Data
DB	Datenbaustein	DM	Data module
DF	Datenfeld	DF	Data field
DP	Datenpuffer	DB	Data buffer
E	Eingang	I	Input
EZ	Eingangszusatzfeld	EI	Extended input
F	Fehler	E	Error
FI	FIFO-Operand (Warteschlange)	FI	FIFO operand
IA	Interface-Ausgang	IO	Interface output
IE	Interface-Eingang	II	Interface input
K	Konstante	K	Constant
KD	Doppelwort-Konstante	KD	Constant double word
KF	Gleitkomma-Konstante	KF	Constant floating point
KME	Koordinierungsmerker einfach	CFS	Coordination flag single
KMP	Koordinierungsmerker permanent	CFP	Coordination flag permanent
Kx.y	Zeitkonstante	Kx.y	Constant of time
M	Merker	M	Marker
’nr’	Parameternummer	’nr’	Number as parameter
P	Parameter	P	Parameter
PI	Peripherieinterrupt	PI	Peripheral interrupt
S	Systembereich	S	System range
SI	Systeminterrupt	SI	System interrupt
SM	Sondermerker	SM	Special marker
T	Zeit	T	Time
TI	Zeitinterrupt	TI	TIme interrupt
Z	Zähler	C	Counter
$	direkte Adreßeingabe für die Befehle L und T	$	Operand absolute
−xx	Symbolischer Operand	−xx	Symbol

Befehle / Instructions

Deutsch		English	
ADC	Addition mit Carry	ADC	Addition with carry
ADD	Addition	ADD	Addition
AF	Alarm freigeben	AE	Alarm enable
AS	Alarm sperren	AD	Alarm disable
BA	Bausteinaufruf unbedingt	CM	Call module
BAAG	Bausteinaufruf arithmetisch größer, AG=1	CMAG	Call module arithmetical greater, AG=1
BAB	Bausteinaufruf bedingt, VKE=1	CMC	Call module conditional, RES=1
BAC	Bausteinaufruf Carry, C=1	CMCY	Call module carry, C=1
BACN	Bausteinaufruf Carry nicht, C=0	CMCN	Call module carry not, C=0
BACZ	Bausteinaufruf Carry oder Null, C=1 oder Z=1	CMCZ	Call module carry or zero, C=1 or Z=1
BAI	Bausteinaufruf invers, VKE=0	CMCI	Call module conditional invers, RES=0
BALG	Bausteinaufruf logisch größer, LG=1	CMLG	Call module logical greater, LG=1
BAM	Bausteinaufruf Minus, N=1	CMM	Call module minus, N=1
BAMZ	Bausteinaufruf Minus oder Null, N=1 oder Z=1	CMMZ	Call module minus or zero, N=1 or Z=1
BAN	Bausteinaufruf nicht Null, Z=0	CMN	Call module not zero, Z=0
BAO	Bausteinaufruf Overflow, O=1	CMO	Call module overflow, O=1
BAON	Bausteinaufruf Overflow nicht, O=0	CMON	Call module overflow not, O=0
BAP	Bausteinaufruf Plus, N=0	CMP	Call module plus, N=0
BAX	Bausteinaufruf im zweiten Segment	CMX	Call module into second segment
BAZ	Bausteinaufruf Null, Z=1	CMZ	Call module zero, Z=1
BE	Bausteinende unbedingt	EM	End of module
BEAG	Bausteinende arithmetisch größer, AG=1	EMAG	End of module arithmetical greater, AG=1
BEB	Bausteinende bedingt, VKE=1	EMC	End of module conditional, RES=1
BEC	Bausteinende Carry, C=1	EMCY	End of module carry, C=1
BECN	Bausteinende Carry nicht, C=0	EMCN	End of module carry not, C=0
BECZ	Bausteinende Carry oder Null, C=1 oder Z=1	EMCZ	End of module carry zero, C=1 or Z=1
BEI	Bausteinende invers, VKE=0	EMI	End of module invers, RES=0
BELG	Bausteinende logisch größer, LG=1	EMLG	End of module logical greater, LG=1
BEM	Bausteinende Minus, N=1	EMM	End of module minus, N=1
BEMZ	Bausteinende Minus oder Null, N=1 oder Z=1	EMMZ	End of module minus Zero, N=1 or Z=1
BEN	Bausteinende nicht Null, Z=0	EMN	End of module not zero, Z=0

Deutsch		English	
BEO	Bausteinende Overflow, O=1	EMO	End of module overflow, O=1
BEON	Bausteinende Overflow nicht, O=0	EMON	End of module overflow Not, O=0
BEP	Bausteinende Plus, N=0	EMP	End of module plus, N=0
BEZ	Bausteinende Null, Z=1	EMZ	End of module zero, Z=1
BID	Wandlung Binär in Dezimal	BID	Binary to decimal conversion
BLA	Blockanfang	SBL	Start of block
BLAA	Blockanfang absolut	SBLA	Start of block absolute
BLE	Blockende	EBL	End of block
BX	2. Datenbausteinaufruf	CX	2nd call data module
BXB	2. Datenbausteinaufruf bedingt, VKE=1	CXC	2nd call data module conditional, RES=1
BXI	2. Datenbausteinaufruf bedingt invers VKE=0	CXCI	2nd call data module conditional invers, RES=0
CH	Tausche unbedingt	CH	Change
CHAG	Tausche arithmetisch größer, AG=1	CHAG	Change arithmetical greater, AG=1
CHB	Tausche bedingt, VKE=1	CHC	Change conditional, RES=1
CHC	Tausche Carry, C=1	CHCY	Change carry, C=1
CHCN	Tausche Carry nicht, C=0	CHCN	Change carry not, C=0
CHCZ	Tausche Carry oder Null, C=1 oder Z=1	CHCZ	Change carry or zero, C=1 or Z=1
CHI	Tausche bedingt invers, VKE=0	CHCI	Change conditional invers, RES=0
CHLG	Tausche logisch größer, LG=1	CHLG	Change logical greater LG=1
CHM	Tausche Minus, N=1	CHM	Change minus, N=1
CHMZ	Tausche Minus oder Null, N=1 oder Z=1	CHMZ	Change minus or zero, N=1 or Z=1
CHN	Tausche nicht Null, Z=0	CHN	Change not zero, Z=0
CHO	Tausche Overflow, O=1	CHO	Change overflow, O=1
CHON	Tausche Overflow nicht, O=0	CHON	Change overflow not, O=0
CHP	Tausche Plus, N=0	CHP	Change plus, N=0
CHZ	Tausche Null, Z=1	CHZ	Change zero, Z=1
CLSB	Lösche Systembefehle	CLSI	Clear system instruction
CMP	Zweier-Komplement	TC	Tow's complement
DBA	Bausteinaufruf registerindirekt	DCM	Dynamical call module
DEB	Wandlung Dezimal in Binär	DEB	Decimal to binary conversion
DEC	Dekrement	DEC	Decrement
DEF	Definition	DEF	Define
DEFW	Definition Wort	DEFW	Define word
DI	Sperren Interruptgruppe	DAI	Disable all interrupts
DIV	Division	DIV	Division

Deutsch		English	
DX		DX	
EI	Freigeben Interruptgruppe	EAI	Enable all interrupts
ERE	Anwenderereignis erreicht	EVA	Event achieved
ERH	Anwenderereignis anfordern im Hintergrund	EVB	Event instruction background
ERS	Anwenderereignis anfordern im Hintergrund mit Systeminterrupt	EVS	Event with system interrupt
ERU	Anwenderereignis anfordern unmittelbar	EVD	Event instruction directly
EXC	Tausche Registerinhalt	EXC	Exchange
FF	Feld freigeben	FR	Field release
FS	Feld schützen	FS	Field save
G	Größer	GT	Greater than
GG	Größer oder gleich	GTE	Greater than or equal
GL	Gleich	EQ	Equal
HLT	Halt	HLT	Halt
IF	Interrupt freigeben	EI	Enable interrupt
INC	Inkrement	INC	Increment
IR	Interrupt rücksetzen (löschen)	RI	Reset interrupt
IS	Interrupt sperren	DI	Disable interrupt
K	Kleiner	LT	Less than
KG	Kleiner oder gleich	LTE	Less than or equal
KL	Kleiner	LT	Less than
L	Laden	L	Load
LABB	Laden Inhalt des Abbildbereiches	LIMR	Load image range
LAH	Laden absolut adressiert im Hintergrund	LAB	Load absolut range in background
LAS	Laden absolut adressiert im Hintergrund mit Systeminterrupt	LAS	LAB with system interrupt
LAU	Laden absolut adressiert unmittelbar	LAD	Load absolut range directly
LFH	Laden feldadressiert im Hintergrund	LFB	Load field in background
LFI	Laden aus FIFO-Speicher	LFI	Load from FIFO
LFS	Laden feldadressiert im Hintergrund mit Systeminterrupt	LFS	LFB with system interrupt
LFU	Laden feldadressiert unmittelbar	LFD	Load field directly
LI	Laden Interruptregister der Interruptgruppe	LAI	Load all interrupts
LM	Laden der Interruptmaske	LIM	Load interrupt mask

Deutsch		English	
LMB	Laden des Inhalts des Memoryberei-ches	LMB	Load memory band
LMBX	LMB im zweiten Segment	LMBX	LMB into second segment
LO	Leer Oder, entspricht: O(	LO	Empty logical or, O=(
LPB	Laden Peripherie Bus	LPB	Load periphery bus
LPC	Laden Programmzähler	LPC	Load program counter
LSP	Laden Stack Pointer	LSP	Load stack pointer
LUZ	Laden Uhrzeit zyklisch	LCC	Load clock cyclical
LUZS	Laden Uhrzeit zyklisch mit Systeminter-rupt	LCCS	LCC with system interrupt
LZS	Laden Zeit-Sollwert	LNT	Load normalize time
MUL	Multiplikation	MUL	Multiplication
N	Einer-Komplement	N	Negation, one’s complement
NOP0	Leeranweisung 0, 0000H	NOP0	No operation, 0000H
NOP1	Leeranweisung 1, FFFFH	NOP1	No operation, FFFFH
O	Oder	O	Or
ON	Oder nicht	ON	Or not
O(	Oder Klammer auf	O(	Empty logical or, O(
P	Prüfe Bit	TST	Test
PE	Programmende	EP	End of program
Pi	Parameterfestlegung bei parametrierten Bausteinaufruf, i=’nr’	Pi	Parameter line, i=’nr’
PN	Prüfe negiert Bit	TSTZ	Test on zero
POP	Transferiere vom Stack	POP	Transfer out from stack
PSi	Parameterfestlegung bei Systembefeh-len, i=’nr’	PSi	Parameter line of system instructions, i=’nr’
PUSH	Lade auf Stack	PUSH	Load into stack
R	Rücksetzen	R	Reset
RC	Rücksetze Carry Flag	RCY	Reset carry
RCL	Rotieren links durch Carry	RCL	Rotate through carry left
RCR	Rotieren rechts durch Carry	RCR	Rotate through carry right
RFI	Rücksetzen FIFO (Lösche FIFO)	RFI	Reset FIFO
RI	Rücksetzen der Interruptregister der In-terruptgruppe	RAI	Reset all interrupts
ROL	Rotieren links	ROL	Rotate left
ROM	Rücksetzen ohne Monitoranzeige	RWM	Reset without monitoring
ROR	Rotiere rechts	ROR	Rotate right
RT	Rücksetzen Zeit	RT	Reset time

Deutsch		English	
RZ	Rücksetzen Zähler	RC	Reset counter
S	Setzen	S	Set
SA	Starte Zeit als Ausschaltverzögerung	SF	Start time as falling delay
SAR	Schiebe arithmetisch rechts	SAR	Shift arithmetical to right
SBB	Subtraktion mit borgen	SBB	Subtraction with borrow
SC	Setze Carry Flag	SCY	Set carry
SE	Starte Zeit als Einschaltverzögerung	SR	Start time as raising delay
SI	Starte Zeit als Impuls	SP	Start time as puls
SINT	Sende Interrupt	SINT	Send interrupt
SLL	Schiebe logisch links	SLL	Shift logical to left
SLR	Schiebe logisch rechts	SLR	Shift logical to right
SOM	Setzen ohne Monitoranzeige	SWM	Set without monitoring
SP	Sprung unbedingt	JP	Jump
SPAG	Sprung arithmetisch größer, AG=1	JPAG	Jump arithmetical greater, AG=1
SPB	Sprung bedingt, VKE=1	JPC	Jump conditional, RES=1
SPC	Sprung Carry, C=1	JPCY	Jump carry, C=1
SPCN	Sprung Carry nicht, C=0	JPCN	Jump carry not
SPCZ	Sprung Carry oder Null, C=1 oder Z=1	JPCZ	Jump carry or zero, C=1 or Z=1
SPI	Sprung bedingt invers, VKE=0	JPCI	Jump conditional invers, RES=0
SPLG	Sprung logisch größer, LG=1	JPLG	Jump logical greater, LG=1
SPM	Sprung Minus, N=1	JPM	Jump minus, N=1
SPMZ	Sprung Minus oder Null, N=1 oder Z=1	JPMZ	Jump minus or zero, N=1 or Z=1
SPN	Sprung nicht Null, Z=0	JPN	Jump not zero, Z=0
SPO	Sprung Overflow, O=1	JPO	Jump overflow, O=1
SPON	Sprung Overflow nicht, O=0	JPON	Jump overflow not, O=0
SPP	Sprung Plus, N=0	JPP	Jump plus, N=0
SPZ	Sprung Null, Z=1	JPZ	Jump zero, Z=1
SS	Starte Zeit als speichernde Einschalt-verzögerung	SRE	Start time as raising delay extended
SUB	Subtraktion	SUB	Subtraction
SV	Starte Zeit als verlängerter Impuls	SPE	Start puls extended
SWAP	Vertausche Hi-/Lo-Byte im Register	SWAP	Interchange operand bytes
SYN	Synchronisationspunkt erreicht	SYN	Synchronisation point achieved
SZ	Setze Zähler	SC	Set counter
T	Transfer	T	Transfer
TABB	Transferiere in den Abbildbereich	TIMR	Transfer image range

Deutsch		English	
TAH	Transfer absolut adressiert im Hintergrund	TAB	Transfer absolut range in background
TAS	Transfer absolut adressiert im Hintergrund mit Systeminterrupt	TAS	TAB with system interrupt
TAU	Transfer absolut adressiert unmittelbar	TAD	Transfer absolut range directly
TDEC	Zeit dekrementieren	TDEC	Time decrement
TFH	Transfer feldadressiert im Hintergrund	TFB	Transfer field in background
TFI	Transfer in FIFO-Speicher	TFI	Transfer FIFO
TFS	Transfer feldadressiert im Hintergrund mit Systeminterrupt	TFS	TFB with system interrupt
TFU	Transfer feldadressiert unmittelbar	TFD	Transfer field directly
TH	Zeit halt	TH	Timer halt
TM	Transfer der Interruptmaske	TIM	Transfer interrupt mask
TMB	Transfer in Memory-Bereich	TMB	Transfer memory band
TMBX	TMB im zweiten Segment	TMBX	TMB into second segment
TPB	Transfer Peripherie Bus	TPB	Transfer periphery bus
TSP	Transferier Stack Pointer	TSP	Transfer stack pointer
U	Und	A	And
UG	Ungleich	NEQ	Not equal
UN	Und nicht	AN	And not
VGL	Vergleichen logisch	CPL	Compare logical
VGLA	Vergleichen logisch und arithmetisch	CPLA	Compare logical and arithmetical
WE	Wecken	AB	Alarm bell request
WES	Wecken mit Systeminterrupt	ABS	AB with system interrupt
WEZ	Wecken zyklisch	ABC	Alarm bell request cyclical
WEZS	Wecken zyklisch mit Systeminterrupt	ABCS	ABC with system interrupt
XO	Exklusiv Oder	XO	Exclusive or
XON	Exklusiv Oder nicht	XON	Exclusive or not
ZR	Zähle rückwärts	CD	Count down
ZV	Zähle vorwärts	CU	Count up
=	Zuweisung	=	Equal-to sign
=OM	Zuweisung ohne Monitoranzeige	=WM	Equal without monitoring
*	Hilfsmarke setzen	*	Set help label
(	Klammer auf	(	Left bracket
)	Klammer zu	)	Right bracket
)N	Klammer zu negiert	)N	Right bracket with negation

Bausteine / Modules

Deutsch		English	
ASS	Assemblerbaustein	ASS	Assembler module
DB	Datenbaustein	DM	Data module
FB	Funktionsbaustein	FM	Function module
OB	Organisationsbaustein	OM	Organization module
PB	Programmbaustein	PM	Program module
ZB	Zusatzbaustein	EM	Extended module

Software-Begriffe / Miscellaneous software tems

Deutsch		English	
AWL	Anweisungsliste	IL	Instruction list
FUP	Funktionsplan	FUD	Function diagram
KPL	Kontaktplan	LD	Ladder diagram
OKN	Operandenkennzeichnen	OID	Operand identifier
OPD	Operand	OPD	Operand
OPE	Operandenergänzung	OPA	Operand attribute
OPR	Operator	OPR	Operator
OPT	Operationsteil	OPP	Operation part
PA	Programmanweisung	PI	Program instruction
PAE	Parameterergänzung	PAA	Parameter attribute
PAR	Parameter	PAR	Parameter
PZ	Programmzweig	RG	Programm rung
Q	Quelloperand	SRC	Source operand
WSB	Weiterschaltbedingung		Step-on condition
Z	Zieloperand	DEST	Destination operand

A.4 Safety instructions

A.4.1 Dansk

Sikkerhedshenvisningerne i denne brugsanvisning

Disse symboler anvendes i den foreliggende brugsanvisning i følgende tilfælde:

FORSIGTIG

Dette symbol benyttes, hvis der skal advares mod **farlig elektrisk spænding**. Hvis advarslen ikke følges nøjagtigt eller ignoreres kan det medføre **personskader**.

FORSIGTIG

Dette symbol benyttes, hvis en unøjagtig eller manglende overholdelse af anvisningerne kan medføre beskadigelser af **personer**.

VIGTIGT

Dette symbol benyttes, hvis en unøjagtig eller manglende overholdelse af anvisningerne kan medføre beskadigelser af **apparater eller filer**.

Dette symbol benyttes for at gøre Dem opmærksom på noget særligt.

FORSIGTIG

0.1

Risiko for personer og ting!

Prøv hvert nyt program, inden De tager et anlæg i drift!

VIGTIGT

0.2

Risiko for modulet!

Modulet må ikke sættes i eller trækkes ud af stikket, når der er tændt for styringen! Modulet kan blive ødelagt. Der skal først slukkes for styringens netdelmodul, den eksterne spændingsforsyning og signalspændingen eller disse skal trækkes ud af stikket, inden modulet må sættes i eller trækkes ud af stikket!

VIGTIGT

0.3

Risiko for modulet!

Ved omgang med modulet skal alle forholdsregler til ESD-beskyttelse iagttages!

Undgå elektrostatiske udladninger!

Sikkerhedshenvisninger på styrekomponenterne

På styrekomponenterne selv kan der være anbragt følgende advarsler og henvisninger, som skal gøre Dem opmærksom på bestemte ting:

Advarsel mod farlig elektrisk spænding!

Advarsel mod farer fra batterier!

Elektrostatisk udsatte komponenter!

Træk netstikket ud, inden De åbner!

Bolt kun til tilslutning af jordledningen PE!

Tilslutning kun for funktionsjording, fremmedspændingsfattig jord!

Kun til tilslutning af en afskærmningsledning!

A.4.2 Deutsch

Sicherheitshinweise in dieser Gebrauchsanweisung

Diese Symbole werden in dieser Gebrauchsanweisung unter den folgenden Bedingungen verwendet.

VORSICHT

Dieses Symbol wird benutzt, wenn vor einer **gefährlichen elektrischen Spannung** gewarnt werden soll. Durch ungenaues Befolgen oder Nichtbefolgen dieser Anweisung kann es zu **Personenschäden** kommen.

VORSICHT

Dieses Symbol wird benutzt, wenn es durch ungenaues Befolgen oder Nichtbefolgen von Anweisungen zu **Personenschäden** kommen kann.

ACHTUNG

Dieses Symbol wird benutzt, wenn es durch ungenaues Befolgen oder Nichtbefolgen von Anweisungen zu **Beschädigungen von Geräten oder Dateien** kommen kann.

Dieses Symbol wird benutzt, wenn Sie auf etwas Besonderes aufmerksam gemacht werden sollen.

VORSICHT

0.1

Gefahr für Personen und Sachen!

Testen Sie jedes neue Programm bevor Sie eine Anlage in Betrieb nehmen!

ACHTUNG

0.2

Gefahr für die Baugruppe!

Baugruppe nicht bei eingeschalteter Steuerung stekken oder ziehen! Baugruppe kann zerstört werden. Zuerst Netzteilbaugruppe der Steuerung, externe Spannungsversorgung und Signalspannung ausschalten oder abziehen und erst dann Baugruppe stekken oder ziehen!

ACHTUNG

0.3

Gefahr für die Baugruppe!

Beim Umgang mit der Baugruppe müssen alle Vorkehrungen zum ESD-Schutz eingehalten werden! Elektrostatische Entladungen vermeiden!

Sicherheitshinweise an den Steuerungskomponenten

An den Steuerungskomponenten selbst können folgende Warnungen und Hinweise angebracht sein, die Sie auf bestimmte Dinge aufmerksam machen sollen:

Warnung vor gefährlicher elektrischer Spannung!

Warnung vor Gefahren durch Batterien!

Elektrostatisch gefährdete Bauelemente!

Vor dem Öffnen Netzstecker ziehen!

Bolzen nur für Anschluß des Schutzleiters PE!

Anschluß nur für Funktionserde, fremdspannungsarme Erde!

Nur für Anschluß eines Schirmleiters!

A.4.3 Ελληνικά

Υποδείξεις ασφαλείας στις παρούσες οδηγίες χρήσεως

Τα σύμβολα αυτά στις παρούσες οδηγίες χρήσεως χρησιμοποιούνται υπό τους ακόλουθους όρους:

ΚΙΝΔΥΝΟΣ

Αυτό το σύμβολο χρησιμοποιείται για να σας προειδοποιήσει από επικίνδυνη ηλεκτρική τάση. Αν δεν τηρούνται με ακρίβεια ή δεν τηρούνται καθόλου οι οδηγίες μπορεί να προκληθούν σωματικές βλάβες.

ΚΙΝΔΥΝΟΣ

Το σύμβολο αυτό χρησιμοποιείται, όταν μπορεί να προκληθούν σωματικές βλάβες, αν δεν τηρούνται με ακρίβεια ή δεν τηρούνται καθόλου οδηγίες.

ΠΡΟΣΟΧΗ

Το σύμβολο αυτό χρησιμοποιείται, όταν μπορεί να προκληθούν ζημίες σε συσκευές ή σε αρχεία, αν δεν τηρούνται με ακρίβεια ή δεν τηρούνται καθόλου οδηγίες.

Το σύμβολο αυτό χρησιμοποιείται, όταν θα πρέπει να επιστηθεί η προσοχή σας σε κάτι το σημαντικό.

ΚΙΝΔΥΝΟΣ

0.1

Κίνδυνος για πρόσωπα και αντικείμενα!

Δοκιμάστε κάθε καινούριο πρόγραμμα πριν θέσετε μια εγκατάσταση σε λειτουργία!

ΠΡΟΣΟΧΗ

0.2

Κίνδυνος για το στοιχείο κατασκευής!

Μην αφαιρείτε ή τοποθετείτε το στοιχείο κατασκευής σε κύκλωμα που είναι σε λειτουργία! Το στοιχείο κατασκευής μπορεί να καταστραφεί. Πρώτα αφαιρείτε ή αποσυνδέετε το στοιχείο κατασκευής της ρύθμισης του ηλεκτρικού κυκλώματος, κατόπιν την παροχή τάσης και την τάση σήματος και μετά τοποθετείτε ή αφαιρείτε το στοιχείο κατασκευής.

ΠΡΟΣΟΧΗ

0.3

Κίνδυνος για το στοιχείο κατασκευής!

Οταν έχετε στα χέρια σας το στοιχείο κατασκευής πρέπει να τηρείτε όλα τα μέτρα για την ηλεκτροστατική προστασία! Αποφεύγετε ηλεκτροστατικές εκφορτίσεις!

Υποδείξεις ασφαλείας σε εξαρτήματα ρύθμισης και ελέγχου

Τα εξαρτήματα ρύθμισης και ελέγχου μπορεί να φέρουν τις ακόλουθες προειδοποιήσεις και υποδείξεις, που επιστούν την προσοχή σας σε ορισμένα πράγματα:

Προειδοποίηση σχετικά με επικίνδυνη τάση ηλεκτρικού ρεύματος!

Προειδοποίηση σχετικά με κινδύνους, που προέρχονται από μπαταρίες!

Στοιχεία κατασκευής, για τα οποία υπάρχει ηλεκτροστατικός κίνδυνος!

Πριν από το άνοιγμα βγάλτε το φις από την πρίζα!

Πείροι μόνο για σύνδεση προστατευτικού αγωγού (γείωσης) PE!

Σύνδεση για γείωση λειτουργίας, γείωση για άσχετο ασθενές ρεύμα!

Μόνο για σύνδεση θωρακισμένου αγωγού!

A.4.4 English

Safety instructions in this manual

These symbols are used throughout this manual subject to the following conditions.

 DANGER

This symbol is used to warn of the presence of **dangerous electrical current.** Insufficient or lacking compliance with these instructions can result in **personal injury.**

 DANGER

This symbol is used wherever an insufficient or lacking compliance with instructions can result in **personal injury**.

 CAUTION

This symbol is used wherever an insufficient or lacking compliance with instructions can result in **damage to equipment or files**.

This symbol is used to inform the user of special features.

 DANGER

0.1

Danger to persons and equipment!

New programs must be tested before a system is put into operation!

 CAUTION

0.2

Danger to the module!

Do not insert or remove module when the control is switched on! This can destroy the module. Switch off or remove control power supply module, external power supply and signal voltage before inserting or removing the module!

 CAUTION

0.3

Danger for the module!

When handling the module, follow all precautions for e.s.d. protection! Avoid electrostatic discharges!

Safety instructions on the control components

The following warnings and notices may be indicated on the control components themselves and have the following meaning:

 Danger: High voltage!

 Danger: Battery acid!

 Electrostatically-sensitive components!

 Disconnect at mains before opening!

 Pin for connecting PE conductor only!

 This connection for functional earthing or low-noise earth only!

 For screened conductor only!

A.4.5 Español

Indicaciones de seguridad en estas instrucciones de empleo

Estos símbolos se utilizan en estas instrucciones de empleo bajo las siguientes condiciones.


PRECAUCION

Este símbolo se utiliza para advertir de una **tensión eléctrica peligrosa**. La ejecución inexacta o la no ejecución de esta instrucción puede provocar **daños a personas**.


PRECAUCION

Este símbolo se utiliza cuando por una ejecución inexacta o la no ejecución de instrucciones pueden llegar a producirse **daños a personas**.


ATENCION

Este símbolo se utiliza cuando por la ejecución inexacta o la no ejecución de instrucciones pueden llegar a producirse **daños en equipos o ficheros**.

Este símbolo se utiliza cuando se le debe llamar al usuario la atención respecto a algo especial.


PRECAUCION

0.1

¡Peligro para personas y bienes materiales!

¡Compruebe cada nuevo programa antes de poner en funcionamiento una instalación!


ATENCION

0.2

¡Peligro para el módulo!

¡No enchufe ni extraiga el módulo cuando el control está conectado! Puede destruirse el módulo. ¡Desconecte o desenchufe primero el módulo de fuente de alimentación del control, la alimentación de tensión externa y la tensión de señalización y sólo después enchufe o extraiga el módulo!


ATENCION

0.3

¡Peligro para el módulo!

¡Observe en la manipulación del módulo todas las precauciones en cuanto a la protección ESD! ¡Evite descargas estáticas!

Indicaciones de seguridad en los componentes de control

Los componentes de control mismos pueden estar marcados por las siguientes advertencias e indicaciones que le deben llamar la atención al usuario:


¡Advertencia ante tensión eléctrica peligrosa!


¡Advertencia ante riesgos por baterías!


¡Elementos constructivos con riesgos de descargas electrostáticas!


¡Antes de abrir, desenchufar el conector de la red!


¡Perno sólo para la conexión del conductor protector PE!


¡Conexión sólo para toma de tierra de funcionamiento, tierra de poca tensión externa!


¡Sólo para la conexión de un conector blindado!

A.4.6 Français

Directives de sécurité relatives au présent mode d'emploi

Ces symboles sont utilisés dans les conditions suivantes:

DANGER

Ce symbole est utilisé lorsque l'on veut mettre en garde contre une **tension électrique dangereuse**. Risque de **dommage corporel** si les consignes données ne sont pas respectées ou lorsqu'elles sont mal respectées.

DANGER

Ce symbole est utilisé s'il y a un risque de **dommage corporel** si les consignes données ne sont pas respectées ou lorsqu'elles sont mal respectées.

ATTENTION

Ce symbole est utilisé s'il y a un risque de dommage matériel ou risque de destruction de fichier si les consignes données ne sont pas respectées ou lorsqu'elles sont mal respectées.

☞

Ce symbole est utilisé lorsqu'il s'agit d'attirer votre attention sur un point particulier.

DANGER

0.1

Risque pour les personnes et le matériel !

Testez chaque nouveau programme avant de mettre une installation en service!

ATTENTION

0.2

Risque pour l'unité !

Ne branchez ou ne débranchez pas l'unité lorsque la commande est activée ! Risque de destruction de l'unité. Avant de brancher ou de débrancher l'unité, coupez ou déconnectez d'abord le bloc d'alimentation de la commande, l'alimentation en courant électrique externe et la tension de signal !

ATTENTION

0.3

Risque pour l'unité !

Respectez toutes les mesures de protection ESD lors du maniement de l'unité ! Evitez les décharges électrostatiques !

Mesures de sécurité relatives aux despositifs de commande

Les pictogrammes et messages d'avertissement suivants peuvent se trouver sur les éléments de commande afin d'attirer votre attention sur certains points:

Présence de tension électrique dangereuse

Danger lié à la présence de batteries

Modules sensibles à l'électricité statique

Eniever la fiche secteur avant l'ouverture

Uniquement pour le raccordement de la terre PE !

Uniquement pour le raccordement à la terre, terre sans bruit !

Uniquement pour le raccordement d'un câble blindé

A.4.7 Italiano

Avvertenze per la sicurezza in queste istruzioni per l'uso

Questi simboli vengono impiegati in queste istruzioni per l'uso nelle seguenti condizioni.

 PERICOLO

Questo simbolo viene impiegato per segnalare la presenza di **tensioni elettriche pericolose**. La mancata osservanza, anche parziale, di queste istruzioni può provocare danni alle **persone**.

 PERICOLO

Questo simbolo viene impiegato qualora l'osservanza imprecisa o la mancata osservanza delle istruzioni possono provocare danni alle **persone**.

 ATTENZIONE

Questo simbolo viene impiegato qualora l'osservanza imprecisa o la mancata osservanza delle istruzioni può provocare danni agli **apparecchi o ai file**.

Questo simbolo viene impiegato quando si voglia richiamare l'attenzione su qualcosa di particolare.

 PERICOLO

0.1
Pericolo per persone ed oggetti!
Provare ogni nuovo programma prima di mettere in funzione l'impianto!

 ATTENZIONE

0.2
Pericolo per il modulo!
Non innestare o rimuovere il modulo quando il comando è acceso! Il modulo potrebbe venire distrutto. Spegnere prima il modulo d'alimentazione del comando, l'alimentazione esterna di tensione e la tensione del segnale e solo successivamente innestare o rimuovere il modulo!

 ATTENZIONE

0.3
Pericolo per i moduli!
Durante operazioni con i moduli rispettare tutte le misure di protezione ESD! Evitare scariche elettrostatiche!

Avvertenze per la sicurezza sul componenti di comando

Sui componenti di comando stessi possono essere applicate le seguenti targhette di avvertimento e di avvertenza, che richiamano l'attenzione su particolari pericoli:

 Avvertimento per tensione elettrica pericolosa!

 Avvertimento per pericoli dovuti alle batterie!

 Elementi costruttivi danneggiabili da cariche elettrostatiche!

 Sfilare la spina dalla rete prima di aprire!

 Perno solo per il collegamento del conduttore di protezione PE!

 Collegamento per messa a terra funzionale, terra senza rumore!

 Solo per il collegamento di un conduttore schermato!

A.4.8 Nederlands

Veiligheidsrichtlijnen in deze gebruiksaanwijzing

Deze symbolen worden in deze gebruiksaanwijzing onder de volgende voorwaarden gebruikt.


ATTENTIE

Dit symbool wordt gebruikt, als de aandacht op een **gevaarlijke elektrische spanning** gevestigd moet worden. Wordt deze aanwijzing niet precies gevolgd of zelfs genegeerd, dan is **lichamelijk letsel** niet uitgesloten.


ATTENTIE

Dit symbool wordt gebruikt wanneer door onnauwkeurige of niet-naleving van aanwijzingen **schade aan personen** kan worden berokkend.


LET OP

Dit symbool wordt gebruikt wanneer door onnauwkeurige of niet-naleving van aanwijzingen **schade aan toestellen of bestanden** kan worden berokkend.

Dir symbool wordt gebruikt wanneer wij u op iets bijzonders willen attent maken.


ATTENTIE

0.1
Gevaar voor lichamelijk letsel en materiële schade!
Test elk nieuw programma voor u een installatie opstart!


LET OP

0.2
Gevaar voor de module!
Als de besturing ingeschakeld is, de module niet insteken of uittrekken! De module kan hierdoor kapot gaan. De module van het netdeel van de besturing, de externe spanningstoevoer en de signaalspanning uitschakelen of aftrekken en pas dan de module insteken of uittrekken.


LET OP

0.3
Gevaar voor de module!
In de omgang met de module alle voorschriften m.b.t. de ESD-beveiliging in acht nemen! Elektrostatische ontladingen vermijden!

Veiligheidsaanwijzingen bij de besturingscomponenten

Aan de besturingscomponenten zelf kunnen de volgende waarschuwingen en richtlijnen aangebracht zijn. Zij zijn bedoeld om u op bepaalde zaken te attenderen:


Waarschuwing voor gevaarlijke elektrische spanning.


Waarschuwing voor gevaar veroorzaakt door akku's.


Elektrostatisch gevoelige componenten.


Trek de stekker uit alvorens te openen.


Bouten alleen voor aansluiting van de veiligheidsaarding PE.


Aansluiting uitsluitend voor functionele, spanningsarme aarde!


Alleen voor aansluiting van een afgeschermde kabel.

A.4.9 Português

Instruções de segurança contidas nas presentes instruções de serviço

Estes símbolos são utilizados nas presentes instruções de serviço nos seguintes casos:

 CUIDADO

Este símbolo é utilizado para indicar uma **tensão eléctrica perigosa**. Em caso de não observância ou observância incorrecta desta instrução, existe **perigo de ferimento de pessoas**.

 CUIDADO

Este símbolo é utilizado quando existe o **perigo de ferimento de pessoas** por observância incorrecta ou não observância das instruções.

 ATENÇÃO

Este símbolo é utilizado quando existe o perigo de danificação de aparelhos ou ficheiros por observância incorrecta ou não observância das instruções.

Este símbolo é utlizado para chamar a atenção para algo de especial.

 CUIDADO

0.1

Perigos de ferimentos de pessoas e de danos materiais!

Antes de colocar uma instalação em funcionamento há que experimentar sempre qualquer programa novo!

 ATENÇÃO

0.2

Perigo para o módulo!

Não retire ou introduza o módulo quando o comando estiver ligado! O módulo poderá ser danificado. Primeiro desligue ou retire o módulo de alimentação do comando, o cabo alimentador da rede e a tensão de sinal, e em seguida, poderá introduzir ou retirar o módulo!

 ATENÇÃO

0.3

Perigo para o módulo!

Na utilização do módulo, respeitar todas as prescrições para a protecção do ESD! Evitar descargas electrostáticas!

Instruções de segurança nos componentes de comando

Nos próprios componentes de comando podem estar afixados os avisos ou as instruções seguidamente descritos para chamar à atenção para determinados pontos.

Aviso referente a uma tensão eléctrica perigosa!

Aviso referente a perigos relacionados com baterias!

Módulos em perigo electrostático!

Antes de abrir tirar o cabo alimentador da rede!

Borne apenas para ligação do condutor de protecção à massa PE!

Ligação apenas para ligação à terra funcional, terra com baixa tensão externa!

Só para ligação de um condutor blindado!

A.4.10 Suomi

Tämän käyttöohjeen turvallisuusohjeet

Näitä symboleja käytetään tässä käyttöohjeessa seuraavasti.


VAROITUS

Tätä symbolia käytetään, kun varoitetaan **vaarallisesta sähköjännitteestä**. Seurauksena voi olla **henkilövahinko**, jos ohjetta ei seurata tai sitä ei seurata tarkkaan.


VAROITUS

Tätä symbolia käytetään, jos ohjeiden noudattamatta jättäminen voi johtaa **henkilövahinkoihin**.


HUOMIO

Tätä symbolia käytetään, jos ohjeiden noudattamatta jättäminen tai niiden epätarkka seuraamihen voi johtaa **laitteiden tai tiedostojen vahingoittumiseen**.

Tätä symbolia käytetään, kun halutaan kiinnittää lukijan huomio johonkin erikoisseikkaan.


VAROITUS

0.1

Henkilö- ja tavaravahinkovaara!

Testaa jokainen uusi ohjelma, ennen laitteiston käyttöönottoa!


HUOMIO

0.2

Rakenneosaryhmä voi vioittua!

Älä liitä tai irrota rakenneosaryhmää ohjauksen ollessa päällekytkettynä! Rakenneosaryhmä voi tuhoutua. Kytke ensin ohjauksen verkko-osarakenneryhmä, ulkoinen jännitteentulo ja signaalijännite pois päältä tai irrota ne ja liitä tai irrota rakenneosaryhmä vasta sitten!


HUOMIO

0.3

Rakenneosaryhmä voi vioittua!

Rakenneosaryhmän kanssa toimittaessa on kaikkia ESD-suojaan liittyviä toimenpiteitä noudatettava! Elektrostaattista latausta on vältettävä!

Ohjauskomponenttien turvallisuusohjeet

Ohjauskomponentteihin voi olla merkittynä seuraavat varoitukset ja ohjeet, joiden tarkoitus on kiinnittää käyttäjän huomio tiettyihin seikkoihin:


Varoitus, vaarallinen sähköjännite!


Varoitus, akkujen aiheuttamat vaarat!


Sähköstaattisesti vaarannetut rakenneosat!


Vedä verkkopistoke irti pistorasiasta ennen avaamista!


Pultti vain suojajohtimen PE liitännälle!


Liitäntä häiriösuojattuun erilliseen suoja-maadoituspisteeseen!


Vain suojajohtimen litäntää varten!

A.4.11 Svenska

Säkerhetsanvisningar i denna driftsinstruktion

Dessa symboler används i denna driftsinstruktion för följande förutsättningar.

VARNING

Denna symbol används, vid varning för **farlig elektrisk späning**. Om denna anvisning inte exakt följs eller inte följs alls kan det medföra **personskador**.

VARNING

Denna symbol används, när **personer kan skadas** om anvisningar inte exakt följs eller inte följs alls.

OBS

Denna symbol används, när **apparater eller filer kan skada**s om anvisningar inte exakt följs eller inte följs alls.

Denna symbol används, när Ni skall göras uppmärksam på något särskilt.

VARNING

0.1

Fara för person- och sakskador!

Prova varje nytt program innan Ni tar en anläggning i drift!

OBS

0.2

Fara för en komponentgrupp!

Stick inte in och drag inte heller ur en komponentgrupp när styrningen är tillkopplad! Komponentgruppen kan förstöras. Frånkoppla eller drag först ur styrningens nätdelskomponentgrupp, extern spänningsförsörjning och signalspänningen och stick in eller drag först därefter ut komponentgruppen!

OBS

0.3

Fara för en komponentgrupp!

Vid arbeten med komponentgruppen skall alla åtgärder för ESD-skydd innehållas! Statiska urladdningar skall undvikas!

Säkerhetsanvisningar på styrningskomponenterna

På styrningskomponenterna kan följande varningar och anvisningar vara placerade, som vill göra Er uppmärksam på vissa saker:

Varning för farlig elektrisk spänning!

Varning för faror genom batterier!

Komponenter som kan skadas av elektrostatisk urladdning!

Drag ur kontakten innan öppning!

Bultar endast för anslutning av skyddsledaren PE!

Anslutning endast för funktionsjordning, jordning med läg interferens!

Endast för anslutning av en avskärmningsledare!

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Technische Änderungen vorbehalten

Ihr Ansprechpartner

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