CL200

A ana, A 10 ana
Module description

Edition 101

BOSCH
Automationstechnik

CL200

A ana, A 10 ana
Module description

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Before you start working with the A ana and A10 ana Aanalog Output 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 are used to generate and output voltages and currents.

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 guidelines on electromagnetic compatibility (89/336/EWG, 93/68/EWG and 93/44/EWG). Specific compliance with harmonized standards EN 50081-2 and EN 50082-2 is hereby certified.
- 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 German Electrical and Electronics Manufactures‘ Association (ZVEI). 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 will require special knowledge of 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, earth / ground and classify electric circuits and devices/systems in accordance with the relevant safety standards.

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!

Safety instructions in this manual

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

DANGER

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

CAUTION

This **CAUTION** 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.

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 employees responsible for the storage, transport and handling must be trained in ESD protection.
- EEMs must be stored and transported in the protective packaging specified.
- EEMs may basically only be handled at special ESD work places set up specifically for this purpose.
- Employees, work surfaces and all devices and tools, which could come into contact with EEMs must be same potential (e.g. earthed).
- Wear an approved earthing strap around your wrist. The grounding bracelet must be connected via a cable with integrated 1 MΩ resistance with the work surface.
- EEMs may on no account come into contact with chargeable objects, these include most plastics.
- When inserting EEMs into devices and removing them, the power source of the device must be switched off.

☞

This description applies to the following module versions:

A ana Version 1

A 10 ana Version 1

1 A ana Analog Output Module

1.1 Module Features

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

The A ana Analog Output Module generates analog voltages / currents.

The module provides two potential-isolated outputs, 0 and 1. These can be used as voltage or current outputs as required. The outputs are isolated via optocouplers, and are short-circuit protected.

In the event of a power failure in the built-in or external 24 V power supply, as well as upon Power-On of the respective power sources, the outputs are automatically switched to the LOW signal status.

The built-in diagnostics indicate a fault condition (cable break) when current output is selected on the module.

Fig. 1–1 A ana Analog Output Module

1.2 Module Functions

The A ana Analog Output Module features two analog outputs which can be independently used to output the following:

- Current ratings between 4 and 20 mA OR
- Voltages ±10 V

Currents are output at the I0 and I1, while voltages appear at the U0 and U1 output terminals. Resolution:

- Current: 1 Bit ≙ 244 nA
- Voltage: 1 Bit ≙ 305 µV

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

The outputs are reset to LOW signal status in the following cases:

- Power On/Off on built-in power supply
- Power On/Off on 24 V external power supply
- Controller enters STOP mode

Diagnostics

For the purpose of monitoring current outputs, the module features 2 LED indicators on the front panel, labelled Fault 0 and Fault 1, with the number corresponding to the respective output. These LED indicate cable breaks in the outputs.

☞ **A cable break is detected only within a current range of 4 to 20 mA.**

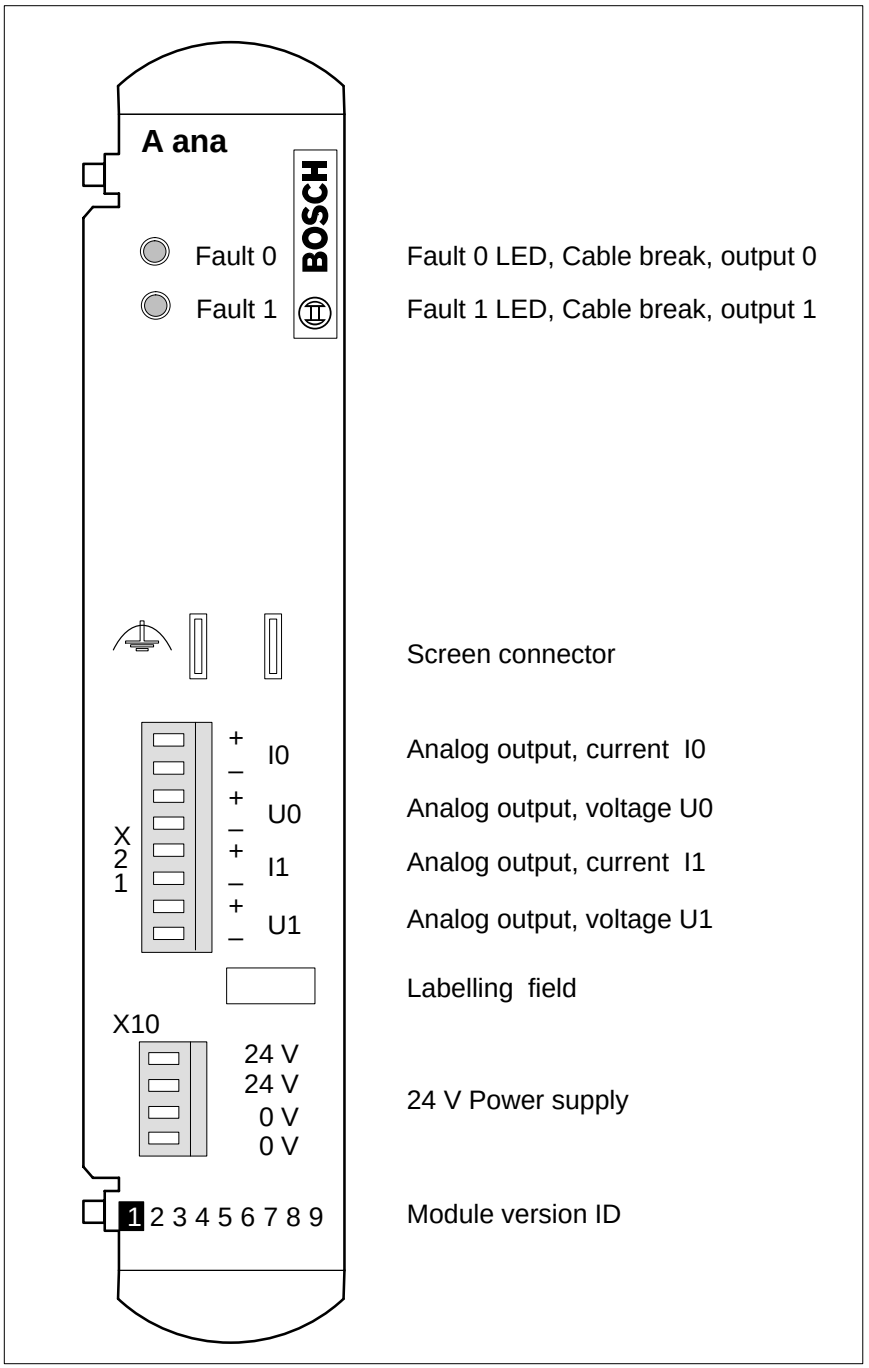

Fig. 1–2 Front Panel – A ana Analog Output Module

1.3 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!

With regard to module addressing, a differentiation is made between two application options:

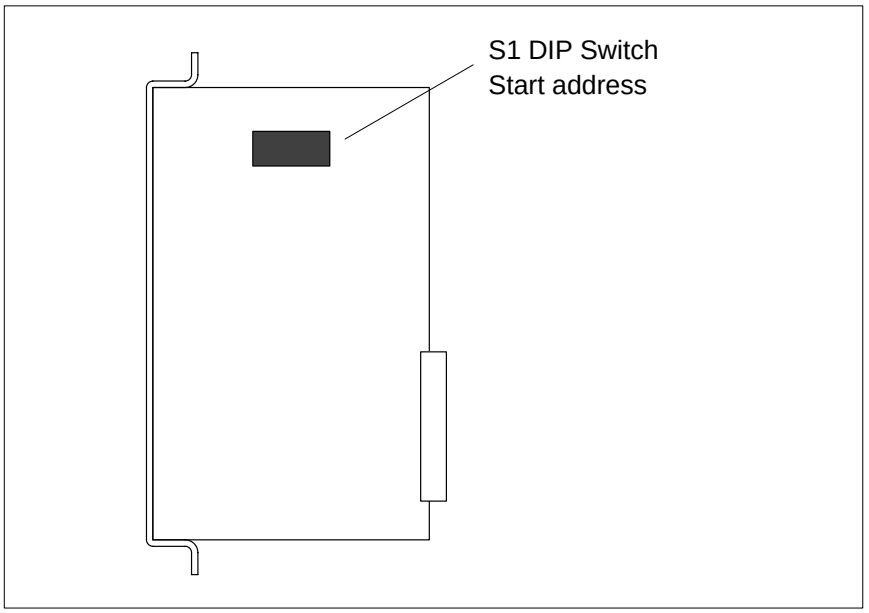

Fig. 1–3 S1 DIP Switch, Addressing

Switch	8	7	6	5	4	3	2	1
Weight	EO	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

The S1/8 DIP-switch segment is always positioned ON; the module is operated within the EO extended output range.

Centralized Application

In centralized application, the module uses two words in the EO extended output range. Only even-numbered addresses are permitted.

Addressing the A ana Analog Output Module always occurs via direct, word-by-word access.

The preselected start address corresponds to output 0. The preselected start address + 2 addresses output 1. In general, the following shall apply:

Extended range address (x) for output (n) of module with start address (m): x = m + (n x 2)

Decentralized Application

For decentralized application, the S1 DIP switch is used to select the module address. The module number is specified by means of the WinDP software or with the use of the COMNET-DP utility program.

The selected address represents the module address of the A ana Analog Output Module on the DP bus.

The module is addressed by the RM2-DP12 decentralized module.

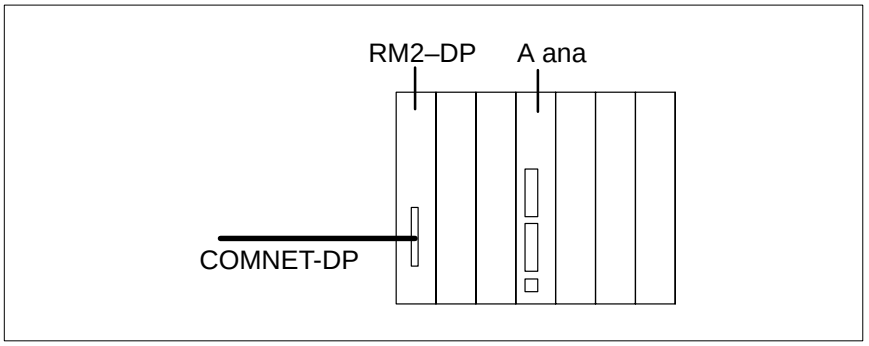

Fig. 1–5 Decentralized Application

Extended range address (x) for output (n) of module with module address (m): x = m + (n x 2)

1.4 Setting Output Range

Both outputs are provided with a jumper that is used to select either current or voltage output mode.

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!

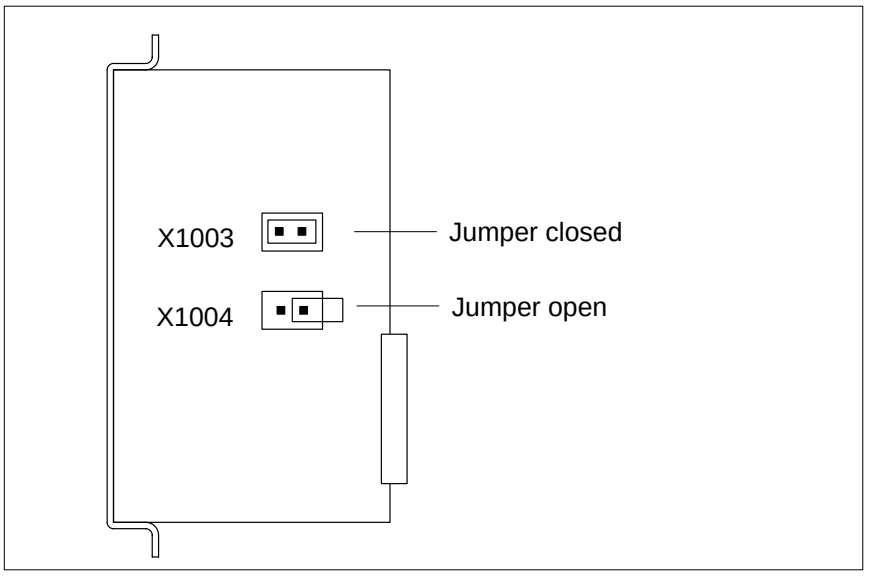

Fig. 1–6 Jumpers X1003 and X1004

The table below indicates available settings:

Output X21	Output range	Jumper
0	I0: 4 through 20 mA	X1003 closed
0	U0: ±10 V	X1003 open
1	I1: 4 through 20 mA	X1004 closed
1	U1: ±10 V	X1004 open

Fig. 1–7 Output Ranges

1.5 Module Slots

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!

Centralized Operation

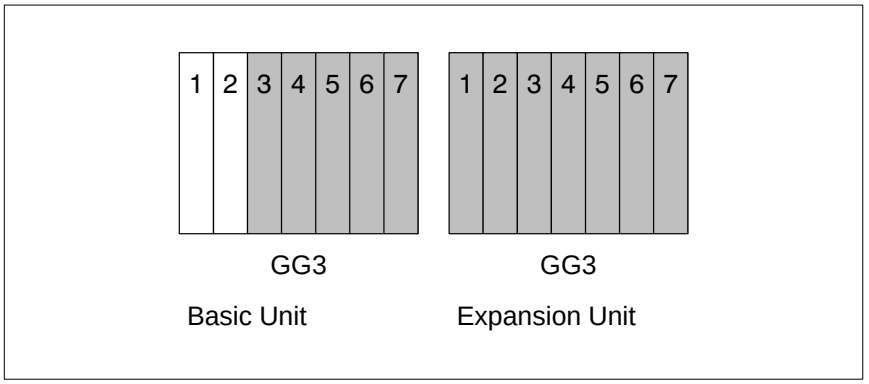

Fig. 1–8 Module Slots, Centralized Operation

Decentralized Operation

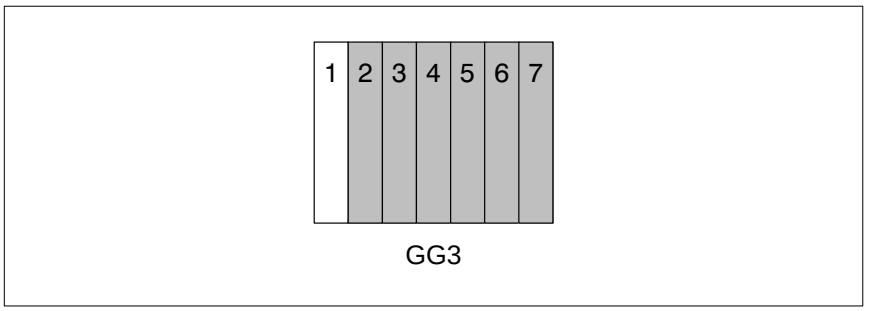

Fig. 1–9 Module Slots, Decentralized Operation

1.6 Connectivity Requirements

Signal Cables

The cable to be used is screened twisted-pair wiring with a maximum length of 200 m. This type of cable reduces the effect of external interference, thus safeguarding the optimum transmission of analog signals.

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

The cables must be provided with wire end ferrules.

The clamping terminal connections must be absolutely clean, and torqued up to proper tightness.

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

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, there are two options available:

- Installing an equalizing conductor with a sufficiently dimensiond 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.

Potential Isolation

The outputs of the A ana Analog Output Module are potential-isolated from the onboard power supply module. To maintain this isolation, the external power supply must be potential-isolated from the 24 V power supply feeding the built-in power supply module.

Terminals

Signal designation	Explanation
+I0	Output 0, current
–I0	Reference potential, Output 0, current
+U0	Output 0, voltage
–U0	Reference potential, Output 0, voltage
+I1	Output 1, current
–I1	Reference potential, Output 1, current
+U1	Output 1, voltage
–U1	Reference potential, Output 1, voltage

Fig. 1–10 Terminal Connections

Power Supply Diagram

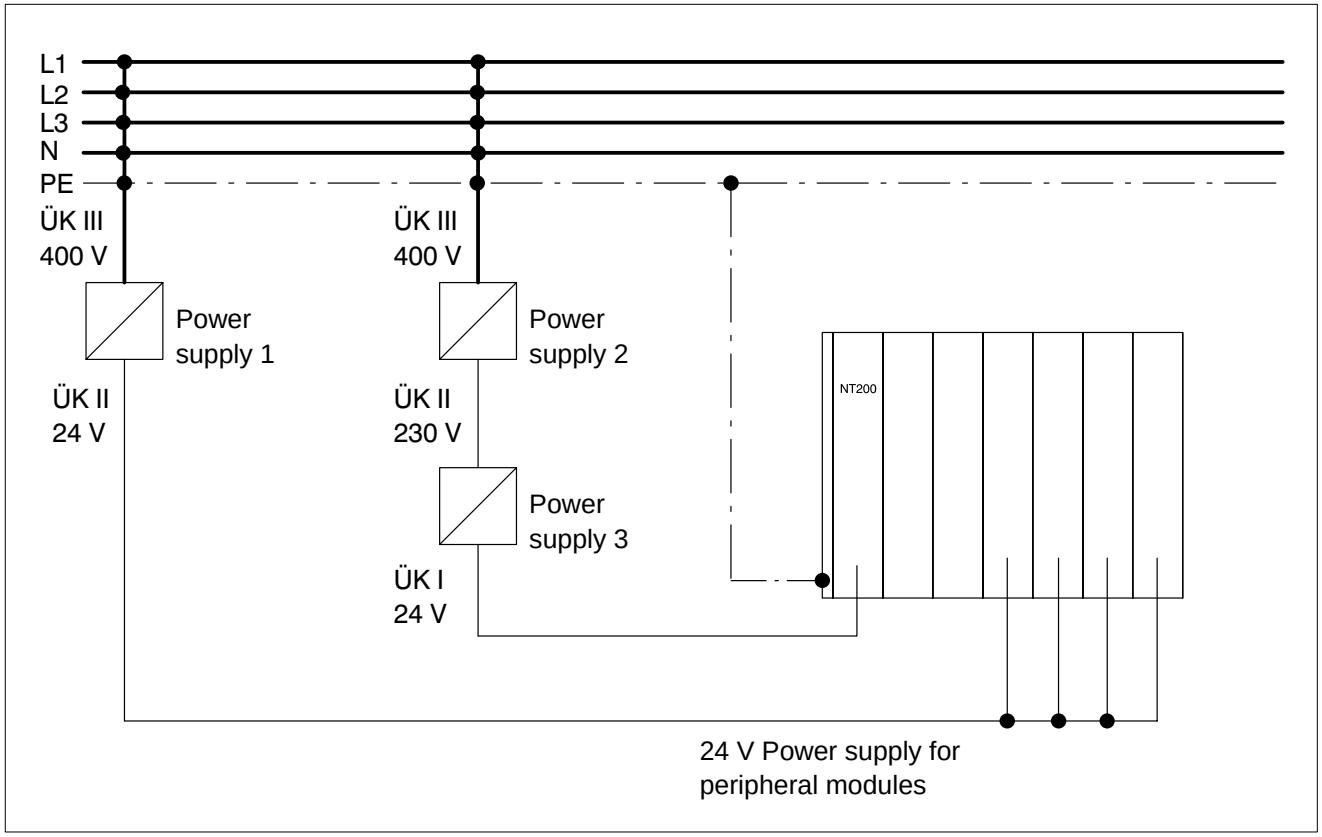

Fig. 1–11 Power Supply Diagram

1.7 Analog Outputs

Hexadecimal Representation of Analog Values

Voltage values: 1 Bit ≙ 305.18 µV

hexadecimal	Output range ± 10 V
FFFF	9.99969 V
FFFE	9.99939 V
C000	5.0 V
8001	305.18 µV
8000	0.0 V
7FFF	–305.18 µV
4000	–5.0 V
0001	–9.99969 V
0000	–10.0 V

Fig. 1–12 Voltage values

Current values: 1 Bit ≙ 244 nA

hexadecimal	Output range 4 through 20 mA
FFFF	19.999756 mA
FFFE	19.999512 mA
8001	12.000244 mA
8000	12.0 mA
7FFF	11.99975 mA
0001	4.000244 mA
0000	4.0 mA

Fig. 1–13 Current Values

Centralized Application

The module is located in the basic unit or expansion unit.

Each output is addressed via the start address plus output number x 2.

Example

The following examples detail the output of an analog value.

Example A: Output of voltage value +5 V on output 0, start address 2

```
L    W  KC000H,A          ;Load output value +5 V in register A
T    W  A,AZ2             ;Transfer output value to output 0
```

Example B: Output of voltage value –5 V on output 1, start address 2

```
L    W  K4000H,A          ;Load output value –5 V in Register A
T    W  A,AZ4             ;Transfer output value to output 1
```

Decentralized Application

The address selected with the S1 DIP switch represents the module address of the A ana Analog Output Module on the DP bus.

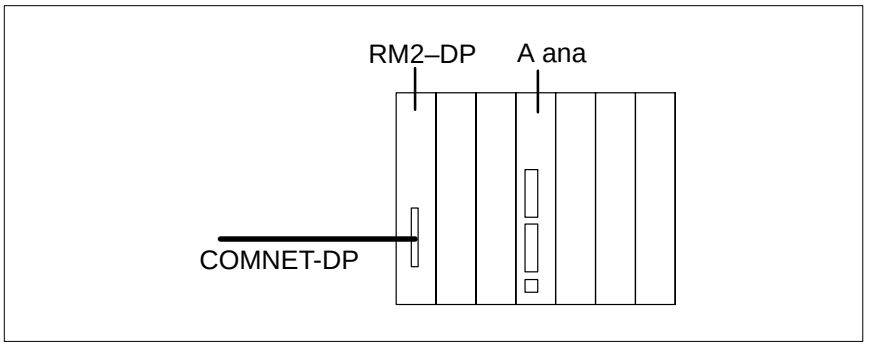

Fig. 1–14 Decentralized Application

Example

The following examples detail the output of an analog value.

Example A: Output of voltage value +5 V on output 0, module address 2

```
L    W   KC000H,A        ;Load output value +5 V in register A
T    W   A,AZ2           ;Transfer output value to output 0
```

Example B: Output of voltage value –5 V on output 1, module address 2

```
L    W   K4000H,A        ;Load output value –5 V in register A
T    W   A,AZ4           ;Transfer output value to output 1
```

1.8 Specifications

Specifications	A ana Analog Output Module
Order no.	1070 077 138
Analog outputs as per DIN EN 61131–2	2 voltage / current outputs, short-circuit protected
Voltage output ● Voltage range ● min. Load resistance	 ±10 V 1 kΩ
Current output ● Current range ● max. Load resistance	 4 through 20 mA 625 Ω
Maximum load ● inductive ● capacitive	 1 mH 1 µF
Potential isolation	Yes, outputs against earth potential, but not against each other and not against 0 V connection.
Protective devices ● Current output ● Voltage output	 ● Optocoupler ● Output disabled on cable break Optocoupler
Overswing	0.05 %
max. short-term deviation, as per prEN 5082–2	0.01 %
Digital mapping	16 Bit, straight binary
Resolution	16 Bit
1 Bit corresponds to: ● Voltage ● Current	 305 µV 244 nA
Settling time, full amplitude	max. 3 ms
Performance ● At 25 °C ● Over full temperature range	 ±0.15 % ±0.40 %
Temperature coefficient	±0.005 %/K

Specifications	A ana Analog Output Module
Monoticity	Yes
Repeat accuracy at specific temperature in steady-state condition	±0.05 %
Non-linearity	±0.012 %
Supply voltage range, as per DIN EN 61131–2	24 V–, permissible range 19.2 through 30 V
Current draw from • 24 V Power supply • I_{Per}	 100 mA 80 mA
Weight	250 g
Width	1 Slot
Maximum cable length	200 m, screened

Fig. 1–15 Specifications

2 A 10 ana

2.1 Module Features

The A 10 ana Analog Output Module is available in two versions:

- with 4 outputs, order no. 1070 078 507
- with 8 outputs, order no. 1070 078 295

The module is employed for centralized application in the CL200 control unit and, via COMNET–DP, in a decentralized (distributed) configuration in the CL200, CL350, CL400 and CL500 controllers.

The A 10 ana Analog Output Module generates analog voltages.

All outputs are isolated via optocouplers, and are short-circuit protected.

In the event of a power failure in the built-in or external 24 V power supply, as well as upon Power-On of the respective power sources, the outputs are automatically switched to 0 V.

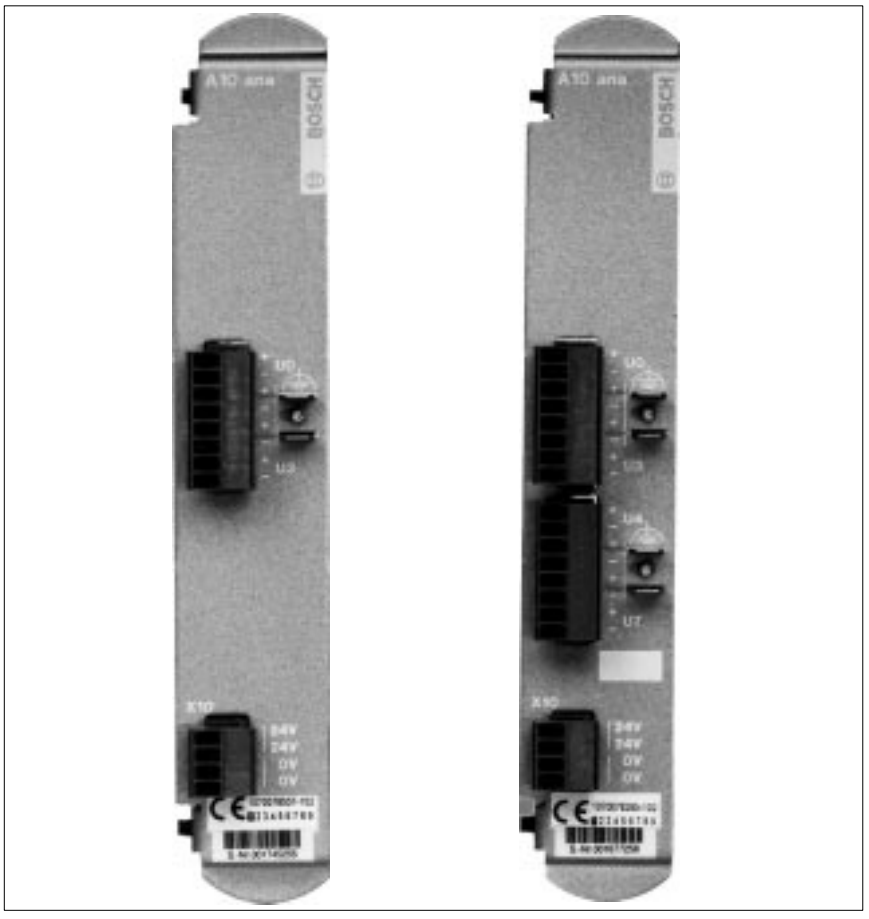

Fig. 2–1 A 10 ana Analog Output Module, Versions with 4 and 8 Outputs

2.2 Module Functions

Dependent upon the resopective module version, The A 10 ana Analog Output Module features 4 or 8 analog outputs which can be independently used to output voltages between 0 and 10 V.

The voltages are output at output terminals U0 through U3 or U0 through U7. The terminals marked (+) supply the voltage value, and terminals marked (–) provide the reference potential.

Resolution: 1 Bit = 10 V / 4096 = 2.44 mV

To operate the A 10 ana Analog Output Module, an external 24 V power supply is required.

The outputs are reset to 0 V in the following cases:

- Power On/Off on built-in power supply
- Power On/Off on 24 V external power supply
- Controller enters STOP mode

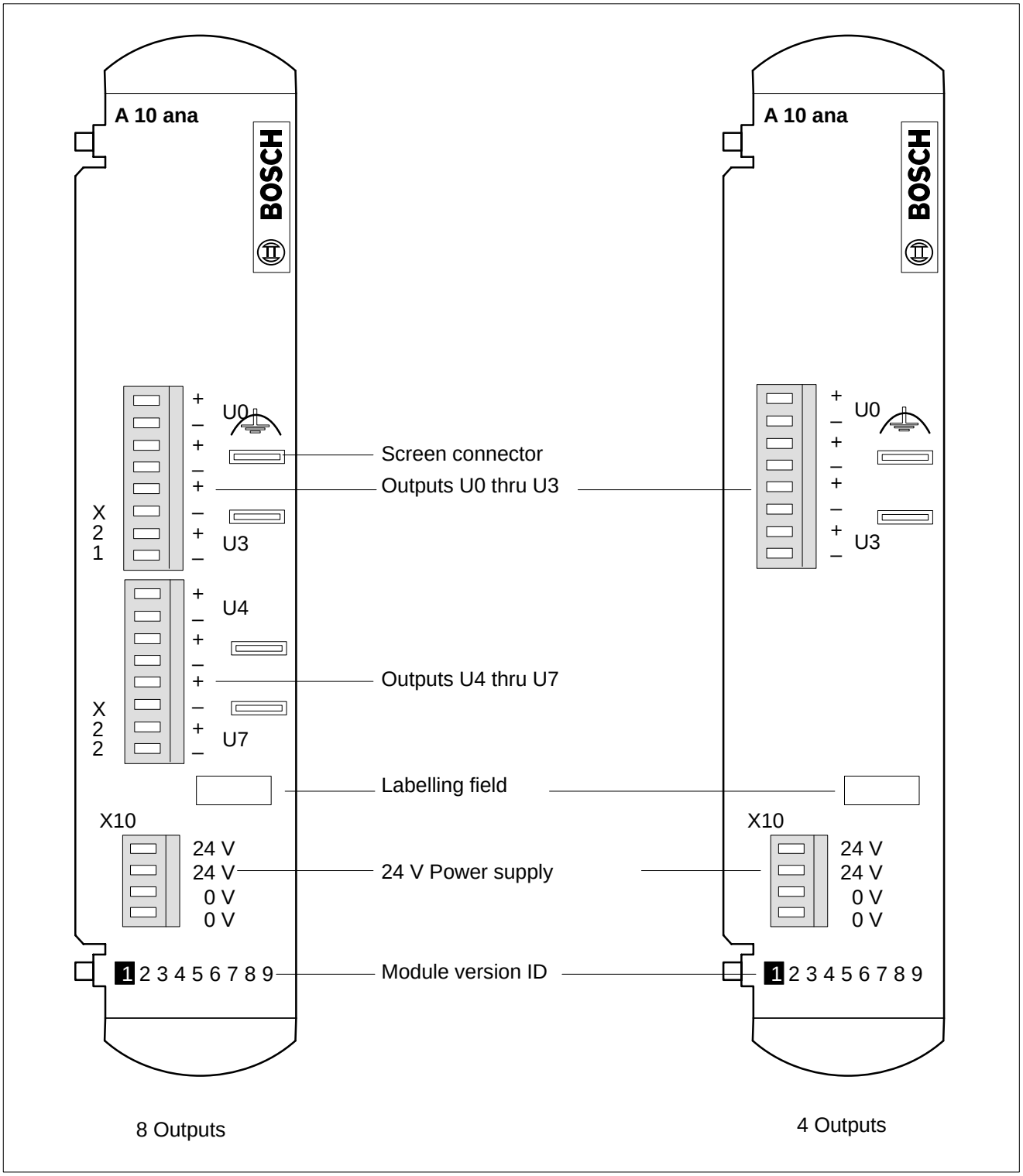

Fig. 2–2 Front Panel – A 10 ana Analog Output Module, 4 and 8 Output Versions

2.3 Addressing

CAUTION

2.1
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

2.2
Danger to the module!
All ESD protection measures must be observed when using the module! Prevent electrostatic discharges!

With regard to module addressing, a differentiation is made between two application options:

- Module is centrally located in basic unit or expansion unit
- Module is operated via COMNET–DP in distributed configuration

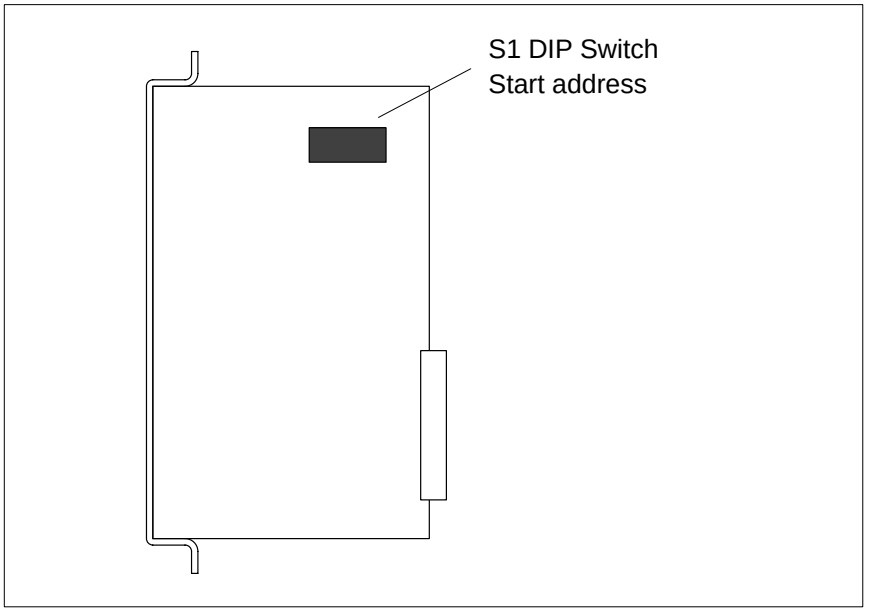

Fig. 2–3 S1 DIP Switch, Addressing

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

Fig. 2–4 S1 DIP Switch, Weight

The S1/8 DIP-switch segment is always positioned ON; the module is operated within the EO extended output range.

Centralized Application

In centralized application, the module uses 4 or 8 words, respectively, in the EO extended output range. Only even-numbered addresses are permitted.

Addressing the A 10 ana Analog Output Module always occurs via direct, word-by-word access.

The preselected start address corresponds to output 0. The preselected start address + 2 addresses output 1. In general, the following shall apply:

Extended range address (x) for output (n) of module with start address (m): x = m + (n x 2)

Decentralized Application

For decentralized application, the S1 DIP switch is used to select the module address. The module number is specified by means of the WinDP software or with the use of the COMNET-DP utility program.

The selected address represents the module address of the A 10 ana Analog Output Module on the DP bus.

The module is addressed by the RM2-DP12 decentralized module.

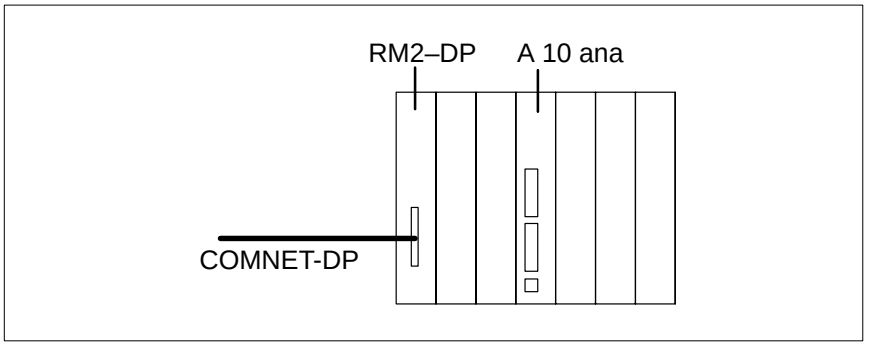

Fig. 2–5 Decentralized Application

Extended range address (x) for output (n) of module with module address (m): x = m + (n x 2)

2.4 Module Slots

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

CAUTION

2.3
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

2.4
Danger to the module!
All ESD protection measures must be observed when using the module! Prevent electrostatic discharges!

Centralized Operation

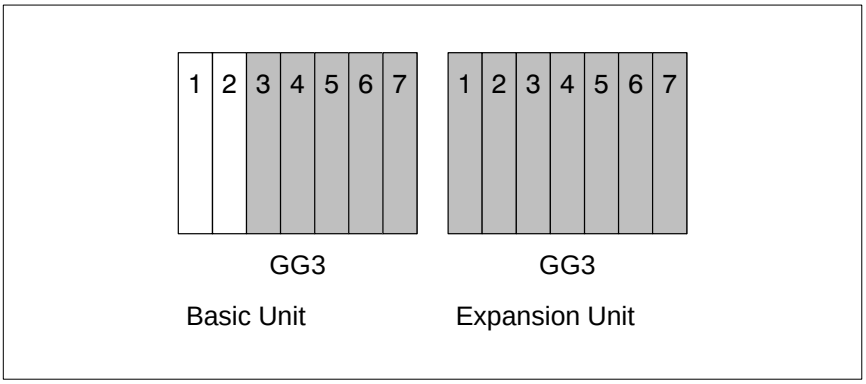

Fig. 2–6 Module Slots, Centralized Operation

Decentralized Operation

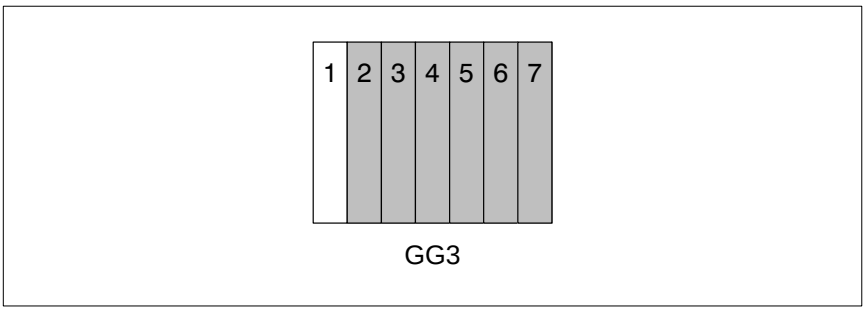

Fig. 2–7 Module Slots, Decentralized Operation

2.5 Connectivity Requirements

Signal Cables

The cable to be used is screened twisted-pair wiring with a maximum length of 200 m. This type of cable reduces the effect of external interference, thus safeguarding the optimum transmission of analog signals.

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

The cables must be provided with wire end ferrules.

The clamping terminal connections must be absolutely clean, and torqued up to proper tightness.

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

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, there are two options available:

- Installing an equalizing conductor with a sufficiently dimensiond 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.

Potential Isolation

The outputs of the A 10 ana Analog Output Module are potential-isolated from the onboard power supply module. To maintain this isolation, the external power supply must be potential-isolated from the 24 V power supply feeding the built-in power supply module.

Terminals

Module with 8 outputs

Signal designation	Explanation
+U0	Output 0, voltage
–U0	Reference potential, Output 0, voltage
+U1	Output 1, voltage
–U1	Reference potential, Output 1, voltage
+U2	Output 2, voltage
–U2	Reference potential, Output 2, voltage
+U3	Output 3, voltage
–U3	Reference potential, Output 3, voltage
+U4	Output 4, voltage
–U4	Reference potential, Output 4, voltage
+U5	Output 5, voltage
–U5	Reference potential, Output 5, voltage
+U6	Output 6, voltage
–U6	Reference potential, Output 6, voltage
+U7	Output 7, voltage
–U7	Reference potential, Output 7, voltage

Fig. 2–8 Terminal Connections, 8 Outputs

Module with 4 outputs

Signal designation	Explanation
+U0	Output 0, voltage
–U0	Reference potential, Output 0, voltage
+U1	Output 1, voltage
–U1	Reference potential, Output 1, voltage
+U2	Output 2, voltage
–U2	Reference potential, Output 2, voltage
+U3	Output 3, voltage
–U3	Reference potential, Output 3, voltage

Fig. 2–9 Terminal Connections, 4 Outputs

Power Supply Diagram

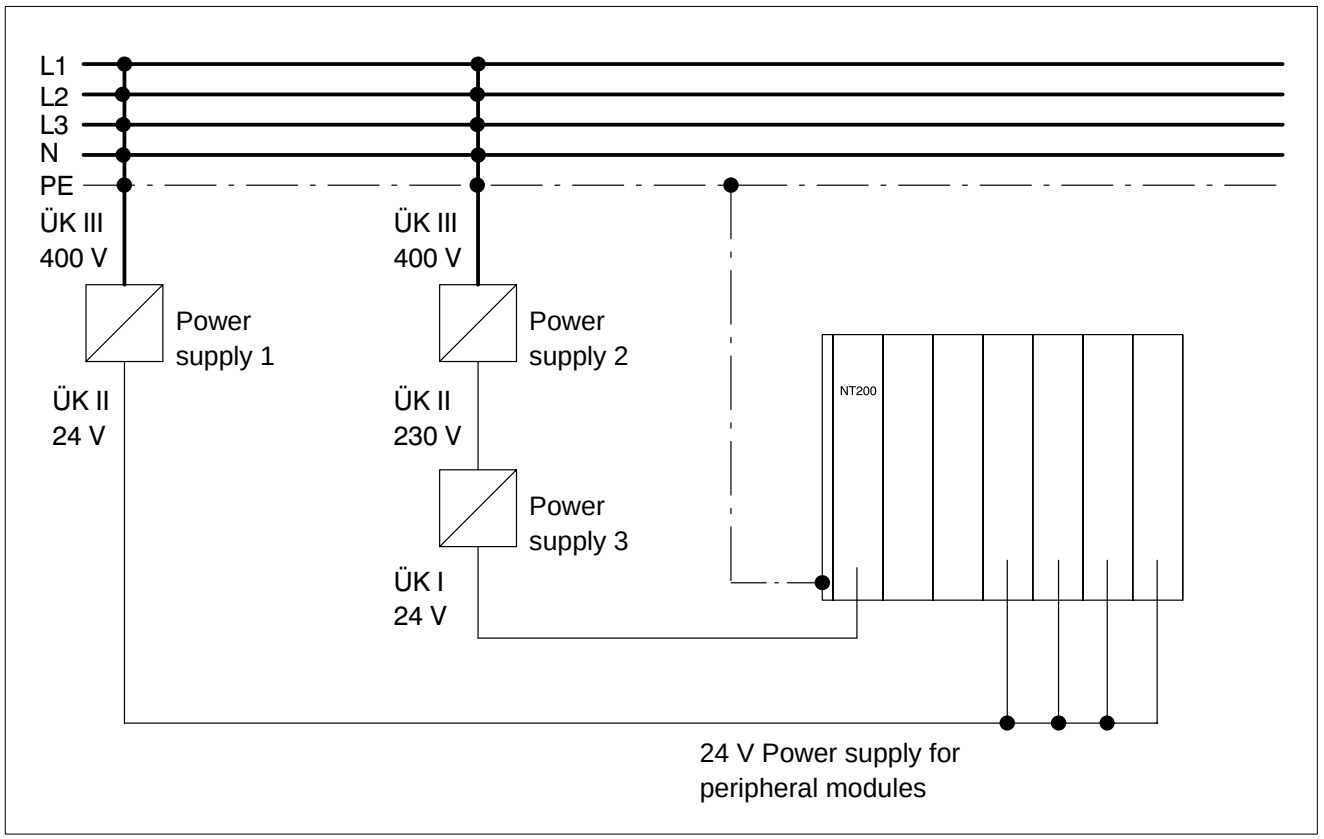

Fig. 2–10 Power Supply Diagram

2.6 Analog Outputs

Hexadecimal Representation of Analog Values

Voltage values: 1 Bit ≙ 2.44 mV

hexadecimal	Output range 0 through 10 V
0FFF	9.99756 V
0FFE	9.99512 V
0801	5.00244 V
0800	5.0 V
07FF	4.99756 V
0001	2.44 mV
0000	0.0 V

Fig. 2–11 Voltage values

Centralized Application

The module is located in the basic unit or expansion unit.

Each output is addressed via the start address plus output number x 2.

Example

The following examples detail the output of an analog value.

Example A: Output of voltage value 5 V on output 0, start address 16

```
L    W  K0800H,A          ;Load output value 5 V in register A
T    W  A,AZ16            ;Transfer output value to output 0
```

Example B: Output of voltage value 5 V on output 1, start address 16

```
L    W  K0800H,A          ;Load output value 5 V in register A
T    W  A,AZ18            ;Transfer output value to output 1
```

Decentralized Application

The address selected with the S1 DIP switch represents the module address of the A 10 ana Analog Output Module on the DP bus.

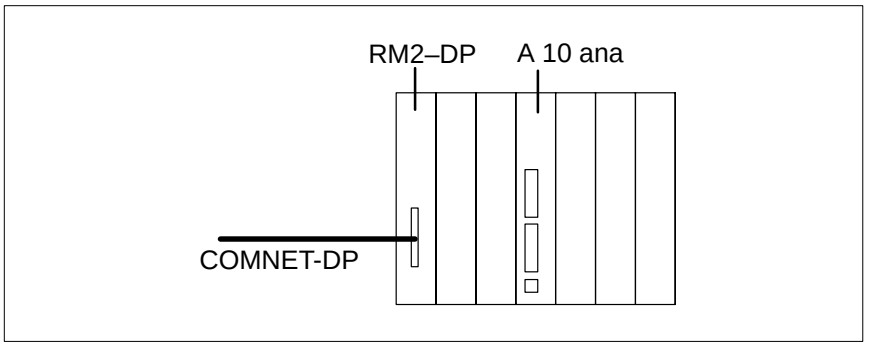

Fig. 2–12 Decentralized Application

Example

The following examples detail the output of an analog value.

Example A: Output of voltage value 5 V on output 0, module address 2

```
L    W   K0800H,A        ;Load output value 5 V in register A
T    W   A,AZ2           ;Transfer output value to output 0
```

Example B: Output of voltage value 5 V on output 1, module address 2

```
L    W   K0800H,A        ;Load output value 5 V in register A
T    W   A,AZ4           ;Transfer output value to output 1
```

2.7 Specifications

Specifications	A 10 ana Analog Output Module
Order no. ● 4 Outputs ● 8 Outputs	 1070 078 507 1070 078 295
Voltage output ● Voltage range ● Load resistance	 0 through 10 V ≥ 1 kΩ
Max. capacitive load	1 µF
Potential isolation	Yes, outputs against earth potential, but not against each other and not against 0 V connection.
Protective devices	● Optocoupler ● kurzschlußfest
Overswing	0.05 %
max. short-term deviation, as per prEN 5082–2	0.01 %
Digital mapping	16 Bit, straight binary
Resolution	12 Bit
1 Bit corresponds to:	2.44 mV
Settling time, full amplitude ● resistive load ● inductive load	 max. 50 µs max. 4 ms
Total output circuit conversion time	80 µs for resistive load
Peformance ● At 25 °C ● Over full temperature range	 ±0.15 % ±0.40 %
Temperature coefficient	±0.005 %/K
Monoticity	Yes
Repeat accuracy at specific temperature in steady-state condition	±0.05 %
Output ripple	±0.05 %
Non-linearity	±0.01 %
Power supply, as per DIN EN 61131-2	24 V–, permissible range 19.2 through 30 V

Specifications	A 10 ana Analog Output Module
Current draw from ● 24-V Power supply ● I_{Per}	 ● 100 mA for 4 outputs ● 200 mA for 8 outputs 60 mA
Weight	250 g
Width	1 Slot
Maximum cable length	200 m, screened

Fig. 2–13 Specifications

Notes:

A Appendix

A.1 Index

A.2 PLC Terminology German/English

Operanden/Operands

German		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

German		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

German		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

German		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

German		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

German		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

German		English	
TAH	Transfer absolut adressiert im Hinter-grund	TAB	Transfer absolut range in background
TAS	Transfer absolut adressiert im Hinter-grund 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/Moduls

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

Sonstige Software-Begriffe/Other software notions

German		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

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