

CL200

KETTE200

Software module description

Version

103

CL200

KETTE200

Software module description

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Safety information and additional literature

Before you start working with the KETTE200 module, we recommend that you thoroughly familiarise 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 for the purpose of programming the CL200 controller.

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 Manufacturers' 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 technical personnel, and requires specific 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, 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!



Anschluß nur für Funktionserde, fremdspannungsarme Erde!



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 accompanied by this symbol are serially numbered, for example 0.1. The appendix provides translations of the safety notes shown here in all the official EC languages.



DANGER

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

Safety instructions accompanied by this symbol are serially numbered, for example 0.1. The appendix provides translations of the safety notes shown here in all the official EC languages.



CAUTION

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

Safety instructions accompanied by this symbol are serially numbered, for example 0.1. The appendix provides translations of the safety notes shown here in all the official EC languages.



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



We would greatly appreciate any contributions to improve this manual. If you have any suggestions, please fill out the page provided at the end 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 when the control is switched on! This can destroy the module. Switch off or remove the power supply module of the control, external power supply and signal voltage before inserting or removing the module!

**CAUTION****0.3**

Danger to the module!

All ESD protection measures must be observed when using the module! Avoid 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 M Ω 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.

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2. Introduction

2.1 KETTE200 Process Control and Diagnostics Concept

The method of sequential-step diagnostics discussed in these pages is best described as the sequential arrangement of individual processing steps to form a coherent processing sequence, i.e., individual steps forming a cascade, or *chain* (German: "Kette"). As a consequence, the product name (KETTE200) as well as derivative generic terms, such as "KETTE", "KETTE sequence", or "cascade", will appear throughout this product description.

A new process control and diagnostics concept has been developed for use with the Bosch CL200 Programmable Logic Controller. The concept is based upon the premise that, with small and cost-effective controllers, no additional hardware within the PLC must be required for visual processing of diagnostic data. Accordingly, the task of a software solution performing sequential-step diagnostics consists of making the data obtained as a result of diagnostics available in a memory buffer accessible to external devices. Processing and display of such data is accomplished with the aid of external operating and display devices (i.e., BT5 and BT20). The designated data transfer and storage area is the DM120 data module.

As a further innovation in comparison with the previously employed concepts, the number of required modules has been reduced to a single function module. In addition, this FM was integrated into the controller firmware, preventing any demands on PLC memory capacity occupied by the firmware.

The functions of this module are centred around two major tasks:

- the controller tasks, and
- the diagnostic routines.

The KETTE200 program module has been integrated into the CL200 firmware in the form of an assembler function module, and is invoked from the PLC program by means of the **KETTE200.PBL** application module.

This module is called within the PLC program as a library module. The software may be ordered by specifying part number 1070 077 186.

2.2 Differences Between Diagnostics Concepts – CL400/CL500 vs. CL 200

Definition	CL400/CL500	CL200
Sequence admin.	A separate module call of the "KETTE" function module is required for each process sequence.	One single module call of the "KETTE" function module is required for all process sequences.
Synchronisation	All cascades in all steps.	Not implemented.
Operating modes	Are written to the "KETTE" PM in the form of parameters.	Are written directly to the data module.
Diagnostics	The "DIAG400E" function module is called once for all process sequences.	The function is integrated into the KETTE200 module and must therefore not be invoked separately.
MADAP	All menu management functions and parameter processing of the standard FMs is handled within the PLC program.	Menu management functions are handled by the BT5/BT20. Parameter processing of the standard FMs is handled within the PLC program.
Assignment of KETTE DMs	In this case, to reduce demands on memory capacity in the CL200, the binary statuses of the active steps and of command outputs were disregarded.	
Marker assignment	Since the marker address range of the controllers is of different size, the addresses of the functionally specified markers, i.e., BEFA, WSB, etc., differ accordingly.	
Step module programming	With non-bit instructions on the CL200, and in order to ignore such instructions (i.e., time defaults, monitoring and wait time intervals) for diagnostics purposes, entering the jump instruction JPC (never executed) is required. If only bit instructions are used, identical programming routines are acceptable. The diagnostics result is the same with all controllers.	
Command output programming	For reasons of saving memory capacity on the CL200, the binary statuses of the command releases were omitted. Accordingly, the command release is based exclusively on a comparison of nominal and actual values.	

3. Modules, Markers and Register Functions

3.1 Modules Used

The KETTE200 module is able to manage
**32 step modules with
128 steps each.**

The following program modules are permanently assigned to the step modules:

Program modules **PM1 through PM32** as KETTE PMs

Data modules **DM1 through DM32** as KETTE DMs

The PM and DM numbers correspond to the KETTE (cascade) numbers.

The designated module for storing and transfer of the diagnostic results is the
DM120 data module.

3.2 Markers Used

Originating in the marker range, the markers listed in the following table will be assigned a permanent function.

Address	Symbol	Function
M191.0	-BEFA	Command output instruction
M191.1	-WSB	Step-on instruction
M191.2	-STOEM	Fault marker; STOEM = 0 indicates fault
M191.5	-WZT_HLT	Halt wait time
M191.6	-WZT	Wait time status 0: Wait time is counting 1: Wait time expired
M191.7	-UEKONTR	Monitoring time control If UEKONTR = 1, no diagnostic function is enabled upon expiry of the monitoring interval.
M188	-VERZW	Program rung address (word) Step number within the KETTE sequence to which branching is to be effected if WSB = 1.

3.3 PLC Registers

Neither the PLC registers A, B, C and D, nor the control flags (i.e., RES, Carry) are preserved until after the module call. Upon the return of the function module to the program module from which the call originated, the registers contain the following specified contents which should be stated in the case of inquiries.

Reg.	Source	Contents
A	FW (ABLST)	Version number of the ABLST firmware module
B	FW (ABLST)	Status message of the ABLST firmware module (refer also to parameter P4)
C	FW (INTFKT)	Version number of the "INTFKT" jump distributor within the firmware
D	SPS KETTE200	Version number of the KETTE200.PBL function module

4. Program Handling

The KETTE200 function module is invoked only once during the PLC cycle, and subsequently services all specified KETTE, or *cascade*, sequences. For this purpose, the number of cascade sequences (number of last cascade to be processed) is specified as a parameter, and the operating modes are entered directly into the appropriate data modules.

In this process, to enable the assembly of functioning KETTE groups, it is possible to leave gaps while the cascade is assembled. This means that the KETTE sequences for which no DM was specified are skipped during reading the instructional sequences, and program processing continues with the respective subsequent cascade sequence.

In the event that step modules are to be excluded from processing, the data word indicating the operating mode must be specified as 0. In this case the module in D0 of the KETTE data module will issue the message "8000_H".

4.1 Calling Modules

In the implementation of the KETTE200.PBL module, a parameter list was included which significantly facilitates module calls during programming procedures. In the event that, in the course of programming, the PG function is used, the following program block is displayed immediately:

```
CM      -KETTE200,5
;
;          +----+
P0  B  -DIAGAKT ; <  ! Manual diagnostics ON/OFF
P1  B  -AUTOHAND ; <  ! Diagnostics branch selection
P2  BY -KETTENNR ; <  ! Cascade number
P3  BY -KETTANZ ; <  ! Number of step sequences (cascades)
P4  W  -FBSTATUS ; !  > Status message from function module
;          +----+
```

4.2 Parameter Description

Important Note: Neither the markers M188.0 through M191.7 nor data words may be used as parameters!

P0 B -DIAGAKT (Input parameter)

Activates manual diagnostics, i.e., the active step of the KETTE sequence specified by P2 is diagnosed independently of a possible fault message. The diagnostic result is stored in DM120 in data words D278 through D340.

Manual diagnostics are enabled when P0 = 1.

P1 B AUTOHAND (Input parameter)

In the manual diagnostics mode, this parameter determines which rung of the step sequence, or cascade, is to be diagnosed:

P1 = 0: Diagnostics of manual rung

P1 = 1: Diagnostics of automatic rung

Independent of the foregoing, a diagnostic routine triggered by a fault in a KETTE sequence always uses the automatic rung.

P2 BY KETTENNR (Input parameter)

Specifies the cascade number to be diagnosed during manual diagnostics.

Since parameter P2 is cyclically queried by the function module during an activated manual diagnostic routine, a cascade may be changed without requiring further parameter modifications.

P3 BY KETTANZ (Input parameter)

The KETTE200.PBL program module services all cascade modules with a function module call.

During this process the KETTANZ (number of cascades) input parameter specifies the number of the cascade which will be the last one to be processed by the function module.

The permissible range of values is 1 through 32.

P4 W FBSTATUS (Output parameter)

The function module transfers the possibly identified fault and/or status messages to the controller operand determined by this output parameter.

If the parameter status equals 0, no message has been generated (see below!).

4.3 Module Fault and Status Messages

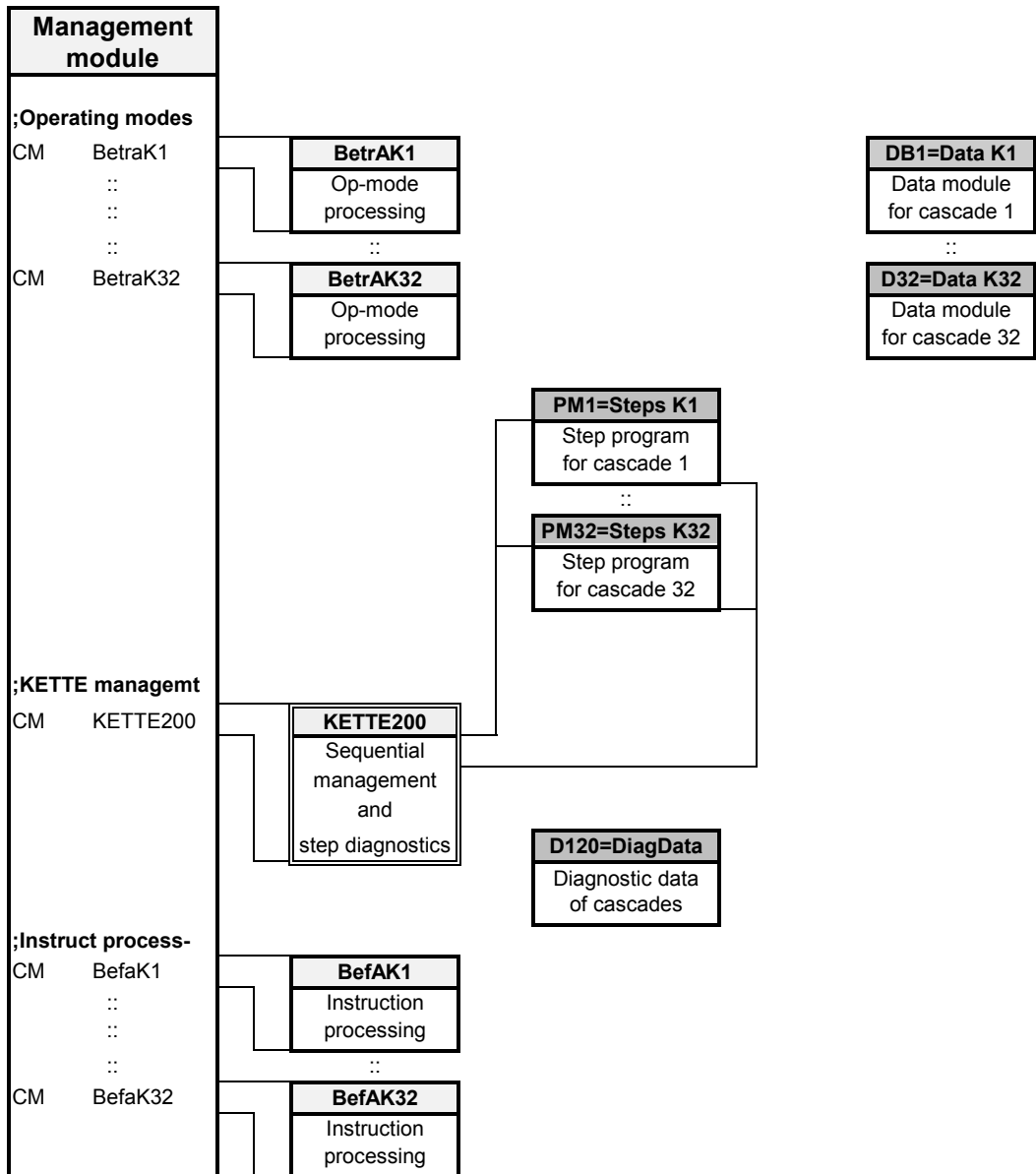
The function module uses output parameter P4 to output the faults it has detected. These fault messages are restricted to those that cannot be entered in data word 0 of the KETTE data module.

Bit	Fault and/or status message	Troubleshooting
15	Centralised fault indication	This bit always occurs in conjunction with one of more of the bits listed in the following.
14		
13	DM120 linking too short	Correct DM120 link to proper length
12		
11		
10		
9	Cascade number P3 = 0	Enter desired cascade number
8	Wrong cascade number for manual diagnostics	Enter correct default value Program / link PMn and/or DMn
7	Step module (PMn) not programmed	Program PMn module or remove associated DMn
6	DMn linking too short	Correct current DM link to proper length The KETTE DM's must be linked with a length of ≥ 82 byte. Non-existent data modules will not cause a fault message, because this enables the creation of intentional gaps in cascade numbering for the formation of functional cascade groups.
5	Cascade no., bit 5	When bit 6 is set, bits 0 through 5 indicate the last cascade number in which the fault has been detected.
4	Cascade no., bit 4	
3	Cascade no., bit 3	
2	Cascade no., bit 2	
1	Cascade no., bit 1	
0	Cascade no., bit 0	

Note: In the event that the DM120 data module was not linked with the program, the controller enters the STOP mode and returns an "Unknown Module Invoked" fault message.



4.4 Suggested Program Structuring



5. Description of Functions and Features

5.1 Process Control

This section of the module assumes the administrative functions for the entire process control, including operating modes, process management and command output.

5.1.1 Selecting Operating Modes

As described in the foregoing, the KETTE200 program module manages up to 32 step modules, each with one active step per cycle.

Prior to invoking the KETTE200 module, the cascade operating mode for all cascades is effected by writing to data word D6 in the currently active cascade data module.

The same applies to the selection of wait and monitoring times for the cascades. Data words D22 (wait time) and D24 (monitoring time) are used for this purpose.

5.1.2 Setting Priorities for Operating Mode Bits

The priority ranking of operating mode bits, with several default bits being presented simultaneously, is as follows:

RESET → Halt → Start Hand → Inching → Automatic

5.1.2.1 Operating Mode Default Bits

Overview of OpMode default bits in the corresponding D6

Bit	Operating mode
D7.7	Automatic / manual fault acknowledgement
D7.6	
D7.5	
D7.4	
D7.3	
D7.2	
D7.1	
D7.0	Halt
D6.7	Reset
D6.6	Manual acknowledge
D6.5	Set step
D6.4	S + 1 Step-on in inching mode
D6.3	Start
D6.2	Automatic mode
D6.1	Inching mode
D6.0	Manual mode

**Description of Operating Mode Default Bits**

D6.0	Manual operation	Manual mode is default mode
D6.1	Inching mode	Inching mode is default mode
D6.2	Automatic mode	Automatic mode is default mode
D6.3	Start	Start / Command release If Start = 0, BEFA (D16=0) is deleted and the monitoring time is stopped. The wait time expires. This bit is valid for all operating modes. To generate the cascade data modules, "Start" must be deleted.
D6.4	S+1	Executes the next step. If in INCHING mode this bit shows a positive transition and the step-on condition is satisfied (WSB = 1), the next step is executed.
D6.5	Set step	Transfers preselected step number. In Manual mode the step prepared in D14 is transferred to the active step (D12) and then executed.
D6.6	Manual acknowledge	Manual fault acknowledgement Effective only when D7.7 = 1 (manual fault acknowledgement). A positive transition on this bit causes acknowledgement of a fault (cascade halt) which may have been triggered by an expired monitoring time interval or resetting of the fault marker. The wait time and monitoring time intervals are restarted.
D6.7	Reset	Cascade is reset D6.7 = 1 causes the following actions: <ul style="list-style-type: none">- clears active step- re-initialises cascade- generates new cascade DM After reset, step 1 is prepared.
D7.0	Halt	Stops cascade progress If the bit goes HIGH, the cascade is halted, and processing of the current step continues, command output is maintained (D16 is unchanged), wait time and monitoring times are halted.
D7.7	Acknowledge	Fault acknowledgement If this bit is set to HIGH, any fault occurrence must be acknowledged by bit D6.6. If bit D7.7 is reset, and the step-on condition has been met, the cascade will generate an automatic acknowledgement (auto-acknowledge).

5.1.3 Reported Operating Mode

In the event that several operating modes are selected simultaneously by means of data word D6 and/or D30 of the KETTE data module, the KETTE200 will set the processing mode on the basis of the following table:

- | | |
|------------------------|------------------|
| 1. Reset | highest priority |
| 2. Halt | ↓ |
| 3. Start | ↓ |
| 4. Manual operation | ↓ |
| 5. Inching operation | ↓ |
| 6. Automatic operation | lowest priority |

Data word D8 of each cascade DM contains the reported operating mode which is returned **subsequent to processing** the KETTE200 function module.

Overview of the reported operating mode in the corresponding D8

Bit	Operating mode
D9.7	Static fault signal
D9.6	Pulsed fault signal
D9.5	
D9.4	
D9.3	
D9.2	
D9.1	
D9.0	Halt: Cascade stopped
D8.7	Reset: Cascade reset
D8.6	Wait time runs (0) / wait time expired (1)
D8.5	
D8.4	Automatic or Inching mode enabled
D8.3	Start (common to all operating modes)
D8.2	Automatic mode
D8.1	Inching mode
D8.0	Manual mode

**Description of reported operating mode bits**

D8.0	Manual mode	Manual mode is selected for the cascade.
D8.1	Inching mode	Inching mode is selected for the cascade.
D8.2	Automatic mode	Automatic mode is selected for the cascade.
D8.3	Start	The cascade has received the start bit.
D8.4	Automatic / Inching	Either Automatic or Inching mode has been selected for the cascade. This bit is used to determine whether, in the cascade module, the manual or the Automatic / Inching program rung shall be processed.
D8.6	Wait time running	If the bit is set to HIGH, this indicates that the wait time for this step has expired. Prior to calling the step, the KETTE200 function module mirrors the status of bit D8.6 on marker 191.6, making the waiting time value available to the steps in the form of a diagnosable operand. If the wait time has expired, the query <code>UB M191.6</code> will return a "1".
D8.7	Reset cascade	The cascade is reset and the active step is cleared (D12 = 0).
D9.0	Cascade halted	The cascade has been halted. This operating mode is enabled by the following conditions: <ul style="list-style-type: none">• D7.0 = 1 (Halt),• fault marker M191.2 is reset OR• fault in automatic mode after monitoring time has expired (applies only to manual acknowledgement, if D7.7 = 1).
D9.6	Pulsed fault signal	Upon detecting a fault, output of a pulse signal for the duration of a PLC cycle. Criteria for fault detection are as follows: <ul style="list-style-type: none">• Fault marker M191.2 is reset OR• monitoring time has expired.
D9.7	Static fault signal	Upon detecting a fault, output of a static signal (criteria for fault detection are similar to D9.6, above). The bit is reset by acknowledging the fault.

5.1.4 Assignment of KETTE Data Modules

The data modules managing the process control provide all essential data for system control.

DW	Symbol	Description	Data format	Entry by: K: KETTE200 U: User
D00	FEHLER	Error bits	binary	K
D02	KETTNR	Cascade number n (1 - 32)	decimal	U
D04	SCHANZ	Number of steps in the cascade	decimal	U
D06	BAWAHL	Operating mode selection	binary	U
D08	BAMLDG	Reported operating mode	binary	K
D10	SCHR-1	Step number, previous step	decimal	K
D12	SCHR	Step number, current step	decimal	K
D14	SCHRNR	Step number, set step	decimal	U
D16	BEFAAUS	Step number for command output	decimal	K
D18	KWA	Actual value of wait time	dec.x 100ms	K
D20	KUE	Actual value of monitoring time	dec.x 100ms	K
D22	SOLLWZT	Nominal value, cascade wait time	dec.x 100ms	U
D24	SOLLUZT	Nominal value, cascade monitoring time	dec.x 100ms	U
D26				K
D28				K
D30				K
D32	K/S_1L	HIGH byte = Cascade no. LOW byte = Step no. for movement screen, press LH key 1	hex	U
::	::	as for D32, for LH movement keys		U
D46	K/S_8L	HIGH byte = Cascade no. LOW byte = Step no. for movement screen, press LH key 8	hex	U
D48	K/S_1R	HIGH byte = Cascade no. LOW byte = Step no. for movement screen, press RH key 1	hex	U
::	::	as for D48, for RH movement keys		U
D62	K/S_8R	HIGH byte = Cascade no. LOW byte = Step no. for movement screen, press RH key 8	hex	U
D64	internal	occupied by function module		K
::	::	::		K
D80	internal	occupied by function module		K

5.1.4.1 Evaluation of Actual and Nominal Values for Wait and Monitoring Time

Upon entry into a new step, the KETTE200 software checks whether the actual values for wait and monitoring time (D18, D20) have been set by the application program. All values not equal to zero are taken to be valid time values for the current step, and evaluated accordingly. If this is not the case, the time default values are derived from the nominal values (D22, D24).

5.1.4.2 Error Bits
Assignment of data word D0: Error bits

Bit	Error and/or Status message	Fault clearance
15		
14		
13		
12		
11		
10		
9		
8		
7		
6		
5		
4		
3	Faulty step conclusion	Each step must be concluded with the command sequence = WSB EM → Correct the programming instructions
2	Step contains non-diagnosable op-code	Step may contain load or transfer instructions which cannot be diagnosed. → Correct the programming instructions
1	Step module (PM) not available	The program module PMn assigned to a defined DMn is not available. → Ensure module linking
0	Number of steps too high, or zero	Number of steps must be > 0 and ≤ 128. → Correct the programming instructions

5.1.5 Command Output

Following the dictate of logical program progression, the command output is effected immediately following the call-up of the cascade management module controlling all cascades.

This procedure compares the current step in the form of an actual value with the nominal constant for the instruction and, as soon as identical values are obtained, issues the command release.

In the event that no BEFA branch is processed within the cascade, data word D16 is cleared.

Example of a command output for a cascade (KETTE1) in four steps:

```

CM          DM1          ; Open Kettle cascade in cascade DM
L          W          D16,A      ; active output

; Step 1
CPLA      W          K1,A      ; BEFA (command output) for step 1
A          B          Z          ; BEFA = 1 ?
=          B          A1.0      ; Enable output

; Step 2
CPLA      W          K2,A      ; BEFA (command output) for step 2
A          B          Z          ; BEFA = 2 ?
=          B          A2.0      ; Enable output

; Step 3
CPLA      W          K3,A      ; BEFA (command output) for step 3
A          B          Z          ; BEFA = 3 ?
=          B          A3.0      ; Enable output

; Step 4
CPLA      W          K4,A      ; BEFA (command output) for step 4
A          B          Z          ; BEFA = 4 ?
=          B          A4.0      ; Enable output
EM

```

The program instructions for command output described above must be repeated for all active cascades and with all steps.



5.2 Process Control Diagnostics

5.2.1 Criteria Analysis

The purpose of the diagnostic segment of the KETTE200 program is the monitoring of a machine which is programmed using the step-cascade technique. In the event of a fault occurrence the monitored steps are checked for non-satisfied step-on conditions (WSB). In the case of a fault the first non-completed branch is treated as a diagnostic result and transferred to the DM120 data module. The search for the non-satisfied branch commences in the BEFA branch.

In representing the diagnostic result, a differentiation is made between the manual and the automatic branch.

The subject diagnostic procedures presuppose the structure of the step module as described in the section entitled *Step Module Structure* later on in this manual.

5.2.1.1 Diagnosable Step-on Conditions

The following instructions are permitted in the syntax of the step-on conditions (WSB):

Bit instructions:

```
A      AN
O      ON
S      R
=
```

Special instructions:

```
(      )      )N
```

```
NOPO  NOPI
```

```
Network instruction
```

The following operands are permitted for link instructions:

```
I      Inputs          I0.0      -      I23.7
O      Outputs         O0.0      -      O15.7
M      Markers         M0.0      -      M191.7
T      Times           T0        -      T127
C      Counters        C0        -      C63
```

The CL200-specific operands, such as Carry (CY), Overflow (O), Negative (N) and Zero (Z), as well as the indirect bit instructions must not be included in the syntax of command output (BEFA) or step-on condition (WSB) instructions. Using the diagnostic method in question, the links with the cited operands cannot be evaluated, and may therefore produce erroneous results.

5.2.2 Storing Diagnostic Data in the DM120 Data Module

If a first-value error occurs in a step cascade, the DM120 data module automatically stores information on this first-value error. As the program user, you have the option of causing the data related to follow-up errors occurring in step cascade processing within the decentralised controller to be entered in an additional storage range.

5.2.2.1 Definition of Terms

- **First-value error**
The fault-free operation of a system continues as long as all step cascades participating in program processing (a maximum of 64) experience no processing errors while in automatic operating mode. If an error occurs in a step cascade, the controller detects this error. Since this error is registered as the first occurrence of a processing error (i.e., the first time a fault value is detected) in the system, this error is designated the *first-value error*.
- **Follow-up error**
As a rule, the occurrence of a first-value error in a system causes consequential fault conditions in subsequent step cascades. Such a fault condition following the initial first-value error is called a *follow-up error*. In general practice the follow-up errors are of lesser significance, since the system can very often be returned to proper operation by simply eliminating the cause of the first-value error.

5.2.2.2 Criteria for Generating Error Entries

There are two ways of generating a step cascade error entry:

Monitoring time

- Each step of a step cascade controls a single function. This function may be a movement within the system, but it may also constitute the preparation for subsequent movements. Each function is subject to a time interval which can be measured. The monitoring time is used to control the value of this time interval, and to respond to overrange occurrences by generating an error entry.

Fault marker

- In the case of faults the timing of which is critical, such as the opening of protective hatches, the monitoring time interval cannot be used in a useful manner. In this case the fault marker is reset immediately upon the occurrence of an error, causing an immediate error entry.

**5.2.2.3 Entries in the DM120 Data Module**

	DW	HIGH byte contents	LOW byte contents
	D0	Control flags	
Automatic diagnostic range	D2	Day	Month
	D4	Year	Hour
	D6	Minute	Second
	D8	Day of week (0=Sunday)	(unused)
	D10	Cascade number	Step number
	D12	Module type	Module number
	D14	Cascade status	Number of messages
	D16	Opcode 1	
	D18	Opcode 2	
	:	:	
(First-value error)	D142	Opcode 64	
	D144	Spare	
	D146	Spare	
	D148	Spare	
	D150	Cascade 1 information	
	:	:	
	D276	Cascade 64 information	
Manual diagnostic range	D278	Cascade number	Step number
	D280	Module type	Module number
	D282	Cascade status	Number of messages
	D284	Opcode 1	
	:	:	
	D410	Opcode 64	

5.2.2.4 Control Flags

The control flags are stored in data word D0, with various functions assigned to the individual data bits.

D0.0 If the entry of a first-value error has been effected, the KETTE200 software sets data bit D0.0 to HIGH. Subsequent to reading out the first-value error, the data bit **must again be reset by yourself (acknowledgement)**. This data bit is functionally interdependent with data bit D0.1.

D0.1 Data bit D0.1 determines subsequent actions in the event that a first-value error has been detected.

D0.1 = 0 :

The first-value error is always entered. If the data module contains a first-value error that has not been acknowledged, the latter will be overwritten by a new first-value error.

D0.1 = 1 :

A newly occurring first-value error can be overwritten only if a previous first-value error has been acknowledged by means of data bit D0.0. If this is not the case, the new first-value error will be discarded.

D1.0 If a first-value error is present, the KETTE200 software will set this bit to HIGH. If this is not the case, this bit is automatically reset to LOW.

D1.2 In the event that the status of the diagnosed conditions is changed, or if an error message is received and/or output, this bit will go HIGH for the duration of one PLC cycle.



5.2.2.5 Automatic Diagnostic Range

In the event of a fault occurrence, the KETTE200 module automatically enters error data into subsequent data words. As the program user, you are able to read-access these data words, and to use them for your diagnostic purposes.

Date format

Upon detection of a first-value error, the time-of-day (system clock) and the date of the occurrence are entered in hexadecimal format into data words **D2** through **D8**. Days of the week are expressed as follows:

- 0 = Sunday
- 1 = Monday
- 2 = Tuesday
- 3 = Wednesday
- 4 = Thursday
- 5 = Friday
- 6 = Saturday

Cascade number

This data byte stores the cascade number of the cascade containing the fault.

Step number

This data byte stores the step number of the cascade containing the fault.

Module type

This data byte indicates the module type of the cascade containing the fault. In the case of the CL200, the value '1' = program module, is entered here.

Module number

You program each step cascade in a designated program module. This data byte stores the number of the program module.

Cascade status

For the cascade containing the fault, this data byte indicates the operating mode active at the time the first-value error occurred.

- Bit 0 (value 1) = Cascade in manual mode
- Bit 1 (value 2) = Cascade in inching mode
- Bit 2 (value 4) = Cascade in automatic mode

Number of messages

The number of conditions associated with the current first-value error is entered in this location. The representation is effected in hexadecimal (HEX) format. Only the first 64 conditions are written to the data module. In the event that the BEFA or WSB branch comprises more than 64 conditions, the number of messages is set to 65.

5.2.2.6 Manual Diagnostic Range

The functional range of manual diagnostics is identical to that of the automatic diagnosis. However, the date and the time-of-day of an entry are not stored.

5.2.3 Cascade Information Structure

The cascade information is generated for each cascade.

Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Z	r	s	h	Op-mode			Step no.									
						0	0	1	= Manual							
						0	1	0	= Inching							
						1	0	0	= Automatic							
	r	= Reset		Op-mode extensions												
	s	= Start														
	H	= Halt														
Cascade status:																
0 = OK																
1 = Faulty																

5.2.4 OpCode Structure (Automatic and Manual Diagnostics)

OpCodes / Link Status

Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	Instruction
Z	OpCode			Operand +			Byte addr.			Bit 0-7							
z	0	0	0														A
z	0	0	1														AN
z	0	1	0														O
z	0	1	1														ON
z	1	0	0														S
z	1	0	1														R
z	1	1	0														=
	1	1	1					1	1	1				0	0	0	(
	1	1	1					1	1	1				0	0	1	O(
z	1	1	1					1	1	1				0	1	0)
z	1	1	1					1	1	1				0	1	1)N
	1	1	1					1	1	1				1	X	X	Spare

Operand / Link status: 1: satisfactory; 0: not satisfactory

Operand Identifier and Byte Address Ranges

Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	Hex.	Operand
Z	Instruct.			Operand +			Byte addr.			Bit 0-7			Mask					
from					0	0	0	0	0	0	0	0	0				0000	C: Counter status 8 bytes
to										0	1	1	1				0038	
from					0	0	0	0	1	0	0	0	0				0080	T: Time status 16 bytes
to										1	1	1	1				00F8	
from					0	1	0	0	0	0	0	0	0				0400	I: Inputs Byte 0-23
to								0	1	0	1	1	1				04B8	
from					0	1	1	0	0	0	0	0	0				0600	O: Outputs Byte 0-15
to								0	0	1	1	1	1				0678	
from					1	0	0	0	0	0	0	0	0				0800	M: Marker Byte 0-191
to						1	0	1	1	1	1	1	1				0EB8	

Representation is valid also for C+T
Example: C 127 is represented as Z 15.7
After unmasking bits 0-2 and 12-15



5.2.5 Step Module Structure

A step module is structured as follows:

```
JP          [A]
JP          -Schritt1
JP          -Schritt2
:           :
JP          -Schrittn

                -Schritt1
JPCY        -VERKN1           ; nur für Diagnosemodul

; Modification of wait time for this step only
L          W      Kxxx,O
T          W      O,D18

; Modification of monitoring time for this step only
L          W      Kyyy,O
T          W      O,D20

; Transferring a branching address
L          W      Kzzz,O
T          W      O,M188

; Branching to manual / automatic mode
                -VERKN1
L          W      D8,O           ; branch selection
A          B      O.4
SPB        -AUTO           ; Automatic branch ? -> YES

; Links for manual mode
A          B      IO.0
=          B      -BEFA

A          B      IO.1
=          B      -WSB           ; Compulsory syntax
EM                                     ; for step conclusion

; Links for automatic and inching mode
                -AUTO
A          B      IO.6
=          B      -BEFA
A          B      IO.7
=          B      -WSB           ; Compulsory syntax
EM                                     ; for step conclusion

                -Schritt2
A          B      IO.2
=          B      -BEFA
A          B      IO.3
=          B      -WSB           ; Compulsory syntax
EM                                     ; for step conclusion
```

The KETTE200 module ensures that the step is always invoked with a reset carry flag. This prevents the jump instruction (JPCY), which has been inserted only for diagnostic purposes, from ever being executed, and a linear program progression follows. Within the range between the jump instruction and the diagnosable links (commencing with the jump destination), all instructions contained in the CL200 command set are acceptable.

In the event that only bit linking is effected within a given step, the JPCY jump instruction may be omitted (as shown in step 2 of the preceding example).

5.2.6 Performing Diagnostics

Effective realisation of step-on condition analysis by the KETTE200 software uses an approach similar to that employed in existing systems. The step to be diagnosed is subsequently software-processed on a command-by-command basis. During this process the operand statuses are read from the image range of the CL200 and linked according to the PLC instruction. As a consequence of this procedure, the Carry, Overflow, Negative and Zero status flags as well as the smear markers cannot be properly evaluated.

As a precondition to a step cascade diagnosis using the method presented here, the step cascade must be programmed as described in the examples under *Step Module Structure*, earlier in this manual.

5.2.7 Basic Diagnostic Process

- If a cascade fault occurs, the cascade management module invokes the diagnostic module, specifying the cascade and step number where the error was detected. Using the jump table, the diagnostic module then locates the start of the programming sequence for the current step.
- The next diagnostic step investigates whether another jump (JPCY) is programmed.
- To locate the actual initial step-on condition, a check is made whether there is a difference between manual and automatic branch. Based upon this determination, either the manual or the automatic branch is then diagnosed.
- The diagnostic results is subsequently converted to the operand code.
- This code is then entered into the DM120 data module.
- The investigations discussed in the foregoing are continued until the diagnostic routine locates one of the following instructions:
 - = B M191.0 ; BEFA
 - OR
 - = B M191.1 ; WSB
- As a next step, the RES is evaluated, and the branch is designated faulty (RES = 0) or OK (RES = 1).
- The diagnostic routine is terminated as soon as the first unprocessed or incomplete BEFA (command output) and/or WSB (step-on condition) branch has been found.

5.2.8 Processing Faults

The diagnostics concept demands precise adherence to the step cascade programming instructions. Any programming errors in the step cascade module will cause the system behaviour discussed in the following:

- 1.) **Step module does not commence with an indirect jump instruction and/or a network instruction.** (This is a pseudo-command which is automatically generated upon separating the PLC program into networks).

System response:

The step cascade will run as long as register A in the instruction section before the jump distributor is not modified. When diagnostics are called up (manual and automatic diagnostics), an error message is generated, and diagnostics will not take place.

- 2.) **The jump distributor contains instructions other than jump instructions.**

System response:

On the CL200, the indirect jump must only lead to an unconditional jump. If this is not the case due to a faulty jump instruction, the firmware cancels program processing and invokes OM9, or it enters Stop mode.

- 3.) **The programmed progression prior to the query related to manual or automatic branch (i.e., before L W D8,O) is exited with an open bit branch.**

System response:

In this case, the instruction sequence forming the link instruction:
U B A.4 is shortened by two bytes. The consequence is a faulty computation of the start addresses for the manual and automatic links. Upon invoking the diagnostics, the controller will enter the Stop mode while returning a message indicating "Illegal Operand Address" in the KETTE200 module.

- 4.) **In addition to the permitted instructions, other commands are programmed into the link branch.**

System response:

The diagnostics will be aborted while returning an error message such as "Illegal OpCode in Link Branch".



6. Module Specifications

Module length of call-up module:	12 words
Processing times:	
Cascade management	1.8 ms + cascade processing time
Diagnostics	max. 50 μ s per each instruction to be diagnosed.
Number of managed cascades:	max. 32
Number of steps per cascade:	max. 128
Number of step-on conditions per step:	max. 32
Monitoring time, minimum:	100 ms
Monitoring time, maximum:	1 hr 49 min
Monitoring time matrix:	100 ms
Wait time, minimum:	100 ms
Wait time, maximum:	1 hr 49 min
Wait time matrix:	100 ms
Diskette name:	CL200 Process Control Order no. 1070 077 186



A Appendix

A.1 Abbreviations

EEM	Electrostatically endangered modules
ESD	electrostatic discharge, Abbreviation for all terms which involve electrostatic discharges, e.g., ESD protection, ESD risk
PE	Protective earth

A.2 Safety instructions

A.2.1 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 netdelmodulet, 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.2.2 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 stecken oder ziehen! Baugruppe kann zerstört werden. Zuerst Netzteilbaugruppe der Steuerung, externe Spannungsversorgung und Signalspannung ausschalten oder abziehen und erst dann Baugruppe stecken 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.2.3 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 ζημιές 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!

Όταν 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 φως 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.2.4 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.2.5 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 podrá provocar **daños a las personas**.



PRECAUCION

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



ATENCION

Este símbolo se utiliza cuando por la ejecución inexacta o la no ejecución de instrucciones se pueden llegar a producir **daños en los aparatos o archivos**.



Este símbolo se utiliza cuando se le debe llamar 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

En los componentes de control mismos pueden estar dispuestos las siguientes advertencias e indicaciones que le deben llamar la atención sobre determinados temas:



¡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 puesta a tierra para funcionamiento, tierra silenciosa!



¡Sólo para la conexión de un conector blindado!

A.2.6 Français

Directives de sécurité relatives au présent mode d'emploi



Ces symboles sont utilisés dans les conditions suivantes:



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.



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.



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.



0.1
Risque pour les personnes et le matériel !
Testez chaque nouveau programme avant de mettre une installation en service!



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 !

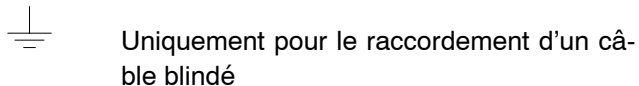
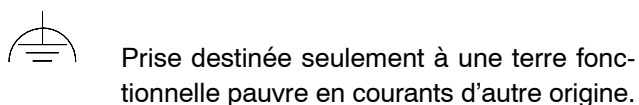
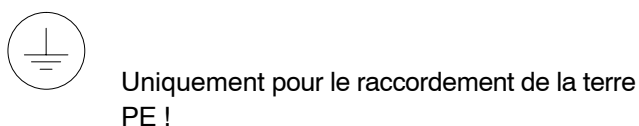
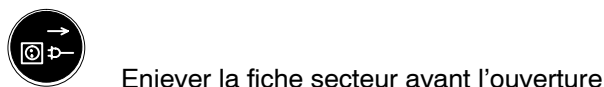
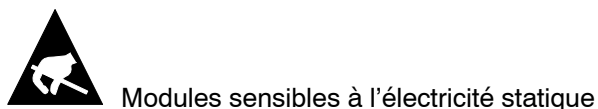
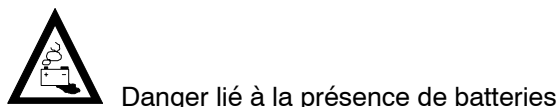
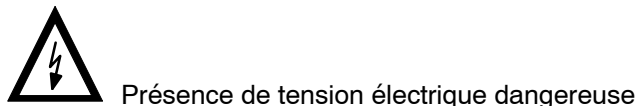


0.3

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 dispositifs 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:





A.2.7 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. Spegnerne 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 sui 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.2.8 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.



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



ATTENTIE

0.1

Gevaar voor lichameeljk 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 inste-

ken 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.2.9 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 utilizado 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.2.10 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 seuraaminen 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

Rakennesaryhmä voi vioittua!

Älä liitä tai irrota rakennesaryhmää ohjauksen ollessa päällekytkettynä! Rakennesaryhmä voi tuhoutua. Kytke ensin ohjauksen verkko-osarakenneryhmä,

ulkoinen jännitteentulo ja signaalijännite pois päältä tai irrota ne ja liitä tai irrota rakennesaryhmä vasta sitten!



HUOMIO

0.3

Rakennesaryhmä voi vioittua!

Rakennesaryhmän 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 rakennesosat!



Vedä verkkopistoke irti pistorasiasta ennen avaamista!



Pultti vain suojajohtimen PE liitännälle!



Liitäntä häiriösuojattuun erilliseen suoja- maadoituspisteeseen!



Vain suojajohtimen liitäntää varten!



A.2.11 Svenska

Säkerhetsanvisningar i denna driftsinstruktion



Dessa symboler används i denna driftsinstruktion för följande förutsättningar.



VARNING

Denna symbol används, vid varning för **farlig elektrisk spänning**. 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 skadas** 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

nättdelskomponentgrupp, 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 låg interferens!



Endast för anslutning av en avskärmningsledare!

Notes:



We have designed this manual to make it user-friendly for our customers.

We depend on your suggestions – and criticisms – to ensure your continued satisfaction with our products.

Please help us by completing the questionnaire and returning it to us.

We would be pleased to have your address as well.

However if you prefer not to tell us, we will still take note of your comments and suggestions.

How do you use this manual,

for reference?

for information about a specific item?

for information about the product before commissioning?
(i.e. you read the complete manual)

How long have you worked with Bosch PLC products?

Did you attend a Bosch training course?

Do you recall when that was?

which one?

May we thank you in advance for saying something about this manual.

Did you find any typographical errors?

What are they and where?

Is the typeface large enough and legible?

yes/ no

Is the manual designed as you would like it? yes/ no

If no, can you be more specific?

Does the manual answer all your questions? yes / no

If no, did you have problems with

– the list of contents? yes / no

– the text, i.e. unclear? yes / no

– the figures, i.e. not enough detail? yes / no

– other information? yes / no

If yes, which information?

Can you be more specific? (page no., Chapter or Fig. number)

For your address if you want to give it.

Thank you for your assistance.

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