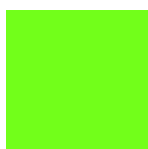




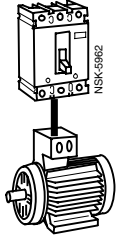
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Appendix

Glossary

Requirements for circuit-breakers for motor protection



- Inrush immunity:
 - Response threshold of the short-circuit release up to $11 \times I_n$ or
 - Inrush current buffering due to tripping delay (approx. 10 ms to 20 ms)
- Temperature compensation
- Phase-failure sensitivity
- Adjustable trip class for matching the start-up response of the motor
- Thermal memory (repeated attempts at starting heat the motor)
- Overload release according to IEC 60947-4-1:
 - **Must not trip** at **1.05 times** load **within two** hours
 - **Must trip** at **1.2 times** load **within two** hours (at 1.15 times load with 2-phase loads).

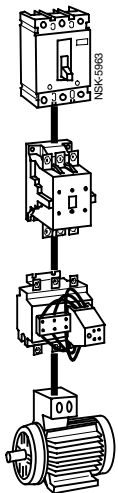
Circuit-breakers for motor protection

Switching

- Motor operating currents
- Short-circuit currents that flow in this load feeder.

When circuit-breakers are used with an adjustable time lag class, they can be matched to almost any motor starting current.

Circuit-breakers for starter combinations



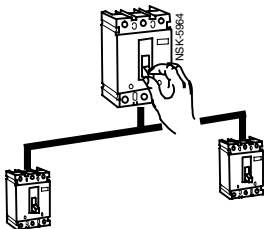
These circuit-breakers are only designed for short-circuit-protection of series-connected equipment and loads, they do not feature overload releases. The short-circuit release is adjustable.

In this case, overload protection must be implemented elsewhere. This can be a simple bi-metal relay or a convenient electronic motor control unit (SIMOCODE) between the load contactor and the load. In the event of a fault, it is then extremely easy to distinguish between an overload (checkback signal of the bi-metal relay) or short-circuit (acknowledgement signal from the circuit-breaker).

If a circuit-breaker with overload protection is chosen instead, the acknowledgement signals from the devices cannot always be clearly distinguished.

For information on the correct assignment of contactors, overload relays and circuit-breakers, please refer to the manual "Fuseless assembly of load feeders", Order No. E20002-A580-P302-V2 or the relevant tables in the Technical Information LV 1 T.

Non-automatic circuit-breakers



This type of circuit-breaker is used in applications in which different load circuits must be decoupled or connected together. They do not feature overload releases. The short-circuit release is not adjustable.

Current-limiting circuit-breakers



NSEO_01270

This symbol shows the form of the short-circuit current after the circuit-breaker. Because the let-through current of the circuit-breaker is lower than the maximum value of the short-circuit current (dotted line) they are known as current-limiting circuit-breakers.

The load on the series-connected devices, cables and wires is therefore significantly reduced (see the current limiting characteristic).

Requirements for circuit-breakers for system protection



NSEO_00695

- Compliance with IEC 60947-1 and IEC 60947-2 standards:
 - **Must not trip at 1.05 time** load **within two** hours
 - **Must trip at 1.3 time** load **within two** hours.
- Usual adjustment range:
 - It is usually not necessary to adjust the overload release;
 - Response threshold of the short-circuit release 1.25 to $10 \times I_n$ or
- A selectivity analysis is necessary.

Circuit-breaker for system protection with permanently set values

They have a permanently set overload release and a permanently set short-circuit release.

Current-limiting.

Example:

Circuit-breaker in outgoing feeder to subdistribution boards or switchboards.

Circuit-breakers for system protection with some permanently set values



NSEO_00015

They have a permanently set overload release and an adjustable short-circuit release.

Current-limiting.

Example:

Circuit-breaker in outgoing feeder to subdistribution boards or switchboards with special requirements for short-circuit releases.

Circuit-breakers for system protection with adjustable values



NSEO_00704

They have an adjustable overload release and an adjustable short-circuit release.

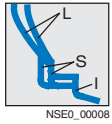
Current-limiting.

Example:

For direct protection of non-motor loads.

Glossary

Circuit-breakers for system protection with adjustable values and short-time delayed release



NSE0_00008

The meaning of the symbols are as follows:

- L: Inverse-time delayed overload release or thermal overload release.
 - If the actual current rises above the value of set operational current (I_r), the circuit-breaker will trip within a certain time.
 - The time of the tripping operation is dependent on the current level.
 - The higher the current, the shorter the tripping delay.
- S: Short-time delayed short-circuit release.
 - The level of short-circuit current (I_{sd}) can be adjusted flexibly.
 - The short-circuit current that flows through the circuit-breaker excites the tripping mechanism (electromagnetic or solid-state).
 - The tripping operation is delayed for the set time (t_{sd}).
 - This means that time-selective grading can be implemented for the circuit-breakers.
- I: Instantaneous short-circuit release.
 - The short-circuit current that flows through the circuit-breaker excites the tripping mechanism (electromagnetic or solid-state).
 - The tripping operation is not delayed.

The value for the I-release (I_r) should be larger than the value for the S-release. In the case of the S-release, if the time (t_{sd}) is set to zero, the S-release responds in the same manner as the I-release, i.e. the tripping operation can be instantaneous, if required.

Example: Circuit-breaker in power distribution with total selectivity.

Circuit-breakers for motor protection with permanently set time lag class



NSE0_01243

They have an adjustable overload release, a permanently set short-circuit release and a permanently set time lag class.

Current-limiting.

Example:

For protecting motors in this starting class.

Circuit-breakers for motor protection with adjustable time lag class



They have an adjustable overload release, a permanently set short-circuit release and an adjustable time lag class.

Current-limiting.

With phase-failure sensitivity.

Example:

For the protection of motors of differing starting classes (one standard circuit-breaker for all motors), or for AC loads in hazardous areas (phase-failure sensitivity).

Circuit-breakers for starter combinations



They have an adjustable short-circuit release but no overload release.

Current-limiting.

Example:

In applications where a bi-metal relay is connected in series and a separate indication is required for short-circuits (from starter switch) and overloads (from bi-metal relay).

Non-automatic circuit-breakers, current-limiting



MCCB:

They have a permanently set short-circuit release but no overload release (VL160X to VL1600).

The let-through current is limited.

Example:

For disconnecting different load circuits.

Non-automatic circuit-breakers



ACB:

They have neither electronic trip units nor short-circuit releases (3W.).

Non current-limiting.

Example:

For disconnecting different load circuits.

Appendix

Training

Training is decisive for your success

SITRAIN® - the Siemens Training for Automation and Industrial Solutions - provides you with comprehensive support when solving your tasks.

Training by the market leader in automation, plant installation and support permits you to make your decisions with certainty and full command. Especially where the optimum and efficient use of products and plants are concerned. You can eliminate deficiencies in existing plants, and exclude expensive faulty planning right from the beginning.

All in all, this represent an enormous gain for your company: shortened startup times, optimized plant components, faster troubleshooting, reduced down times. In other words, increased profits and lower costs.



Top trainers

Our trainers know their topics in practice, and possess comprehensive didactic experience. Course developers have a direct wire to product development, and directly pass on their knowledge to the trainers.

Practical experience

The practical experience of our trainers makes it possible for them to pass on theoretical matter in a plausible manner. But since it is known that all theory is drab, we attach great importance to practical exercises which can comprise up to half of the course time. You can therefore immediately implement your new knowledge in practice. We train you on state-of-the-art methodically/didactically designed training equipment. You feel absolutely certain when trained in this manner.

Wide variety

With a total of approx. 300 local attendance courses, we train the complete range of A&D products and a large portion of the system solutions from I&S. Telecourses, teach-yourself software and seminars presented on the Web supplement our classical range of courses.

Close to our customers

The distance is short. You can find us approx. 60 times in Germany, and worldwide in 62 countries. You wish to have individual training instead of one of our 300 courses? No problem: we will provide a program tailored exactly to your personal requirements. Training can be carried out in our Training Centers or at your company.

The right mixture: Blended Learning

Blended learning is understood to be the combination of various training media and sequences. For example, a local attendance course in a Training Center can be optimally supplemented by a teach-yourself program as preparation or follow-up. Furthermore, SITRAIN utilizes supported online training for live instruction on the Internet at agreed times.

The right mixture is the solution. Therefore blended learning can convey complex topics well, and train networked thinking. Additional effect: reduced travelling costs and periods of absence through training sequences independent of location and time.

The international training portal

<http://www.siemens.com/sitrain>

All training facilities at a glance: search in the worldwide range of courses at leisure, call up all course dates online, utilize the daily updated display of vacant course spaces - and register directly.

Customer comments on Sitrain

"... the good course documents, competence and flexibility convinced me."

[Manfred Riek from Festo Systemtechnik, responsible for planning the basic and further training of project engineers]

"... represents effective training, constructive dialogs, and solutions which provide great help."

[Günter Niedermaier, electrical design manager at AMT, Aalen]

Contact

Visit us on the Internet at:

<http://www.siemens.com/sitrain>

or let us advise you personally. You can request our latest training catalog from:

Course office, Infoline Germany:
Tel.: +49 (0)1805 / 23 56 11 (0.12 €/Min)
Fax: +49 (0)1805 / 23 56 12

Further documentation

Overview

You will find all the latest information material, such as brochures, catalogs, manuals and operating instructions on low-voltage, controls and distribution on the Internet at:

<http://www.siemens.com/lowvoltage/info>

Here you can order your copy of the available documentation or download it in common file formats (PDF, ZIP).



We also provide further support for SIRIUS - SENTRON - SIVACON



Brochures, catalogs and CDs offer fast and more in-depth information

We regard product support as just as important as the products and systems themselves. Visit our Support site on the Internet for a comprehensive range of material on SIRIUS, SENTRON and SIVACON, such as

- Catalogs available to order free of charge
- Operating instructions and manuals for direct download
- Online registration for seminars and events
- Up-to-date answers to your queries and problems
- Software upgrades and updates for fast download
- Telephone assistance in more than 190 countries
- Photos and graphics for external use

and much, much more - all conveniently and easily accessible

Appendix

Standards and approvals

Overview

Verification certificates and characteristic curves

To find the latest overview of the certificates available for our low-voltage controls and distribution products, as well as other technical documentation, please visit our Internet site at:

<http://www.siemens.com/lowvoltage/support>

The screenshot shows the Siemens website interface. The left sidebar contains a navigation tree with categories like 'Automation and Drives' and 'Service & Support'. The main content area is titled 'Approvals / Certificates' and displays a list of documents. The list includes columns for document type, part number, and document title. The first few entries are:

Document Type	Part No.	Document Title	Document ID
Test Certificate	E31119 Vol 10 Sec 1	USACanada UL-USTED / Report, E31119 Vol 10 Sec 1 [206 x KB], english	82432004
Test Certificate	E14111 Vol 1 Sec 1	USACanada UL-USTED / Report, E14111 Vol 1 Sec 1 [358 x KB], english	85720206
Test Certificate	3P420, 3P421, 3P422, 3P423	USACanada UL-USTED / Report, E44883 Vol 2 Sec 17 [83 x KB], english	11518772

Product support: Approvals / Certificates

The screenshot shows the Siemens website interface. The left sidebar contains a navigation tree with categories like 'Automation and Drives' and 'Service & Support'. The main content area is titled 'Characteristic curves' and displays a list of documents. The list includes columns for document type, part number, and document title. The first few entries are:

Document Type	Part No.	Document Title	Document ID
Tripping Characteristics	41ED969095 07	Tripping Characteristics, 41ED969095 07 [82 x KB], german	86142000
Tripping Characteristics	41ED969095 05	Tripping Characteristics, 41ED969095 05 [81 x KB], german	86142002
Tripping Characteristics	41ED969095 06	Tripping Characteristics, 41ED969095 06 [82 x KB], german	86142003

Product support: Characteristic curves

Quality management

The quality management system of our A&D division complies with the international standard EN ISO 9001.

The products and systems described in this catalog are sold under application of a quality management system certified by DQS and TÜV Management Service GmbH in accordance with ISO 9001. The certificates are recognized in all IQ Net countries.

DQS Registered Certificate Nos.:

Siemens AG
Automation and Drives

- Industrial Automation Systems
Reg. No.: 001323 QM
- Industrial Communication SIMATIC NET
Reg. No.: 002613 QM.

TÜV (German Technical Inspectorate) Registered Certificate No.:

Siemens AG
Automation and Drives

- Low-Voltage Controls
Reg. No.: 12 100 16950 TMS.

BVQI Registered Certificate No.:

Siemens AG
Automation and Drives

- Electrical Installation Technology
Reg. No.: 117779

Certificates

An overview of the certificates available for SIMATIC NET products (CE, UL, CSA, FM, shipping authorizations) can be found on the Internet at:

<http://www.siemens.com/simatic-net>

Other certificates for SIMATIC products can be found on the Internet at:

<http://www.siemens.com/simatic>

These lists are continuously revised and updated and data for products not yet included in the overview are continuously collected and prepared for subsequent editions.

You can find certificates, approvals, verification certificates and characteristic curves at:

Support\Infomaterial\Certificates



or by going directly to the Link Box:



Appendix

Siemens contacts

Siemens contacts worldwide



At:

<http://www.siemens.com/automation/partner>

you can find details of Siemens contact partners worldwide responsible for particular technologies.

You can obtain in most cases a contact partner for

- Technical Support,
- Spare parts/repairs,
- Service,
- Training,
- Sales or
- Consultation/engineering.

You start by selecting a

- Country,
- Product or
- Sector.

By further specifying the remaining criteria you will find exactly the right contact partner with his/her respective expertise.

A&D in the WWW



A detailed knowledge of the range of products and services available is essential when planning and configuring automation systems. It goes without saying that this information must always be fully up-to-date.

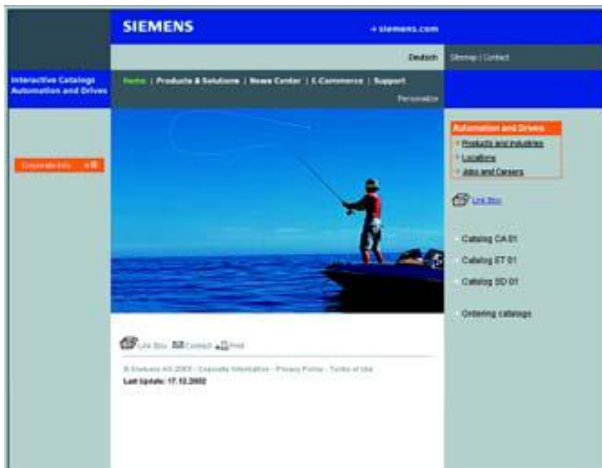
The Siemens Automation and Drives Group (A&D) has therefore built up a comprehensive range of information in the World Wide Web, which offers quick and easy access to all data required.

Under the address

<http://www.siemens.com/automation>

you will find everything you need to know about products, systems and services.

Product selection using the interactive catalog



Detailed information together with convenient interactive functions:

The interactive catalog CA 01 covers more than 80,000 products and thus provides a full summary of the Siemens Automation and Drives product base.

Here you will find everything that you need to solve tasks in the fields of automation, switchgear, installation and drives. All information is linked into a user interface which is easy to work with and intuitive.

After selecting the product of your choice you can order at the press of a button, by fax or by online link.

Information on the interactive catalog CA 01 can be found on the Internet under

<http://www.siemens.com/automation/ca01>

or on CD-ROM or DVD.

Easy shopping with the A&D Mall



The A&D Mall is the virtual department store of Siemens AG in the Internet. Here you have access to a huge range of products presented in electronic catalogs in an informative and attractive way.

Data transfer via EDIFACT allows the whole procedure from selection through ordering to tracking of the order to be carried out online via the Internet.

Numerous functions are available to support you.

For example, powerful search functions make it easy to find the required products, which can be immediately checked for availability. Customer-specific discounts and preparation of quotes can be carried out online as well as order tracking and tracing.

Please visit the A&D Mall on the Internet under:

<http://www.siemens.com/automation/mall>

Appendix

Customer support



In the face of harsh competition you need optimum conditions to keep ahead all the time: A strong starting position. A sophisticated strategy and team for the necessary support - in every phase. Service & Support from Siemens provides this support with a complete range of different services for automation and drives.

In every phase: from planning and startup to maintenance and upgrading.

Our specialists know when and where to act to keep the productivity and cost-effectiveness of your system running in top form.

Configuration and software engineering



Support in configuring and developing with customer-oriented services from actual configuration to implementation of the automation project.²⁾

Technical support



Competent consulting in technical questions covering a wide range of customer-oriented services for all our products and systems.

Tel.: +49 (180) 50 50 222
Fax: +49 (180) 50 50 223

E-Mail: ad.support@siemens.com

Online support



The comprehensive information system available round the clock via Internet ranging from Product Support and Service & Support services to Support Tools in the Shop.

<http://www.siemens.com/automation/service&support>

Service on site



With Service On Site we offer services for startup and maintenance, essential for ensuring system availability.

Tel.: +49 (180) 50 50 444²⁾

Technical consulting



Support in the planning and designing of your project from detailed actual-state analysis, target definition and consulting on product and system questions right to the creation of the automation solution.²⁾

Repairs and spare parts



In the operating phase of a machine or automation system we provide a comprehensive repair and spare parts service ensuring the highest degree of operating safety and reliability.

Tel.: +49 (180) 50 50 446²⁾

Technical assistance



Expert technical assistance¹⁾ for Low-voltage controls and electrical installation.

Tel.: +49 (9 11) 8 95-59 00
Fax: +49 (9 11) 8 95-59 07

E-Mail: technical-assistance@siemens.com

Optimization and upgrading



To enhance productivity and save costs in your project we offer high-quality services in optimization and upgrading.²⁾

1) Contact:

[Technical assistance](#) for product selection · Old/new coding · Competitor coding · Special versions · Special requirements · Sales promotion (Infoline).

[Your regional contacts](#) for sales support (prices, discounts, delivery times).

[Technical Support](#) for commissioning support and after-sales services.

2) For country-specific telephone numbers go to our Internet site at:

<http://www.siemens.com/automation/service&support>

Overview**Software types**

Software requiring a license is categorized into types. The following software types have been defined:

- Engineering software
- Runtime software

Engineering software

This includes all software products for creating (engineering) user software, e.g. for configuring, programming, parameterizing, testing, commissioning or servicing. Data generated with engineering software and executable programs can be duplicated for your own use or for use by third-parties free-of-charge.

Runtime software

This includes all software products required for plant/machine operation, e.g. operating system, basic system, system expansions, drivers, etc. The duplication of the runtime software and executable programs created with the runtime software for your own use or for use by third-parties is subject to a charge. You can find information about license fees according to use in the ordering data (e.g. in the catalog). Examples of categories of use include per CPU, per installation, per channel, per instance, per axis, per control loop, per variable, etc. Information about extended rights of use for parameterization/configuration tools supplied as integral components of the scope of delivery can be found in the readme file supplied with the relevant product(s).

License types

Siemens Automation & Drives offers various types of software license:

- Floating license
- Single license
- Rental license
- Trial license

Floating license

The software may be installed for internal use on any number of devices by the licensee. Only the concurrent user is licensed. The concurrent user is the person using the program. Use begins when the software is started. A license is required for each concurrent user.

Single license

Unlike the floating license, a single license permits only one installation of the software. The type of use licensed is specified in the ordering data and in the Certificate of License (CoL). Types of use include for example per device, per axis, per channel, etc. One single license is required for each type of use defined.

Rental license

A rental license supports the "sporadic use" of engineering software. Once the license key has been installed, the software can be used for a specific number of hours (the operating hours do not have to be consecutive). One license is required for each installation of the software.

Trial license

A trial license supports "short-term use" of the software in a non-productive context, e.g. for testing and evaluation purposes. It can be transferred to another license.

Certificate of License

The Certificate of License (CoL) is the licensee's proof that the use of the software has been licensed by Siemens. A CoL is required for every type of use and must be kept in a safe place.

Downgrading

The licensee is permitted to use the software or an earlier version/release of the software, provided that the licensee owns such a version/release and its use is technically feasible.

Delivery versions

Software is constantly being updated. The following delivery versions

- PowerPack
- Upgrade

can be used to access updates.

Existing bug fixes are supplied with the ServicePack version.

PowerPack

PowerPacks can be used to upgrade to more powerful software.

The licensee receives a new license agreement and CoL (Certificate of License) with the PowerPack. This CoL, together with the CoL for the original product, proves that the new software is licensed. A separate PowerPack must be purchased for each original license of the software to be replaced.

Upgrade

An upgrade permits the use of a new version of the software on the condition that a license for a previous version of the product is already held.

The licensee receives a new license agreement and CoL with the upgrade. This CoL, together with the CoL for the previous product, proves that the new version is licensed. A separate upgrade must be purchased for each original license of the software to be upgraded.

ServicePack

ServicePacks are used to debug existing products. ServicePacks may be duplicated for use as prescribed according to the number of existing original licenses.

License key

Siemens Automation & Drives supplies software products with and without license keys. The license key serves as an electronic license stamp and is also the "switch" for activating the software (floating license, rental license, etc.). The complete installation of software products requiring license keys includes the program to be licensed (the software) and the license key (which represents the license).



Detailed explanations concerning license conditions can be found in the "Terms and Conditions of Siemens AG" or under <http://www.siemens.com/automation/mail> (A&D Mail Online-Help System)

Appendix

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Catalogs of the Automation and Drives Group (A&D)

Further information can be obtained from our branch offices listed in the appendix or at www.siemens.com/automation/partner

Automation and Drives	<i>Catalog</i>		
Interactive catalog on CD-ROM and on DVD			
• The Offline Mall of Automation and Drives		CA 01	
Automation Systems for Machine Tools			
SINUMERIK & SIMODRIVE		NC 60	
SINUMERIK & SINAMICS		NC 61	
Drive Systems			
<u>Variable-Speed Drives</u>			
SINAMICS G130 Drive Converter Chassis Units,		D 11	
SINAMICS G150 Drive Converter Cabinet Units			
SINAMICS G110 Inverter Chassis Units		D 11.1	
SINAMICS GM150/SINAMICS SM150		D 12	
Medium-Voltage Converter 0.6 MVA to 28 MVA			
SINAMICS S120		D 21.1	
Vector Control Drive System			
SINAMICS S120 Servo Control Drive System		D 21.2	
SINAMICS S150 Drive Converter Cabinet Units		D 21.3	
Asynchronous Motors Standardline		D 86.1	
DC Motors		DA 12	
SIMOREG DC MASTER 6RA70 Digital Chassis Converters		DA 21.1	
SIMOREG K 6RA22 Analog Chassis Converters		DA 21.2	
SIMOREG DC MASTER 6RM70 Digital Converter Cabinet Units		DA 22	
SIMOVERT PM Modular Converter Systems		DA 45	
SIEMOSYN Motors		DA 48	
MICROMASTER 410/420/430/440 Inverters		DA 51.2	
MICROMASTER 411/COMBIMASTER 411		DA 51.3	
SIMOVERT MASTERDRIVES Vector Control		DA 65.10	
SIMOVERT MASTERDRIVES Motion Control		DA 65.11	
Synchronous and asynchronous servomotors for SIMOVERT MASTERDRIVES		DA 65.3	
SIMODRIVE 611 universal and POSMO		DA 65.4	
<u>Low-Voltage Three-Phase-Motors</u>			
Squirrel-Cage Motors, Totally Enclosed, Fan-Cooled		M 11	
<u>Automation Systems for Machine Tools SIMODRIVE</u>		NC 60	
• Main Spindle/Feed Motors			
• Converter Systems SIMODRIVE 611/POSMO			
<u>Automation Systems for Machine Tools SINAMICS</u>		NC 61	
• Main Spindle/Feed Motors			
• Drive System SINAMICS S120			
<u>Drive and Control Components for Hoisting Equipment</u>		HE 1	
Electrical Installation Technology			
ALPHA Small Distribution Boards and Distribution Boards		ET A1	
<i>PDF: ALPHA 8HP Molded-Plastic Distribution System</i>		ET A3	
<i>PDF: ALPHA FIX Terminal Blocks</i>		ET A5	
BETA Modular Installation Devices		ET B1	
DELTA Switches and Outlets		ET D1	
GAMMA Building Management Systems		ET G1	
Human Machine Interface Systems SIMATIC HMI		ST 80	
Industrial Communication for Automation and Drives	<i>Catalog</i>		
			IK PI
Low-Voltage			
Controls and Distribution – SIRIUS, SENTRON, SIVACON			LV 1
Controls and Distribution – Technical Information SIRIUS, SENTRON, SIVACON			LV 1 T
SIDAC reactors and filters			LV 60
SIVACON 8PS Busbar trunking systems			LV 70
CD, BD01, BD2 up to 1250 A			
Motion Control System SIMOTION			PM 10
Process Instrumentation and Analytics			
Field Instruments for Process Automation			FI 01
Measuring Instruments for Pressure, Differential Pressure, Flow, Level and Temperature, Positioners and Liquid Meters			
<i>PDF: Indicators for panel mounting</i>			MP 12
SIREC Recorders and Accessories			MP 20
SIPART, Controllers and Software			MP 31
SIWAREX Weighing Systems			WT 01
Continuous Weighing and Process Protection			WT 02
Process Analytical Instruments			PA 01
<i>PDF: Process Analytics, Components for the System Integration</i>			PA 11
SIMATIC Industrial Automation Systems			
SIMATIC PCS Process Control System			ST 45
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pc-based Automation			ST PC
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SIMATIC Sensors			FS 10
SIPOS Electric Actuators			
Electric Rotary, Linear and Part-turn Actuators			MP 35
Electric Rotary Actuators for Nuclear Plants			MP 35.1/2
Systems Engineering			
Power supplies SITOP power			KT 10.1
System cabling SIMATIC TOP connect			KT 10.2
System Solutions			
Applications and Products for Industry are part of the interactive catalog CA 01			
TELEPERM M Process Control System			
<i>PDF: AS 488/TM automation systems</i>			PLT 112

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