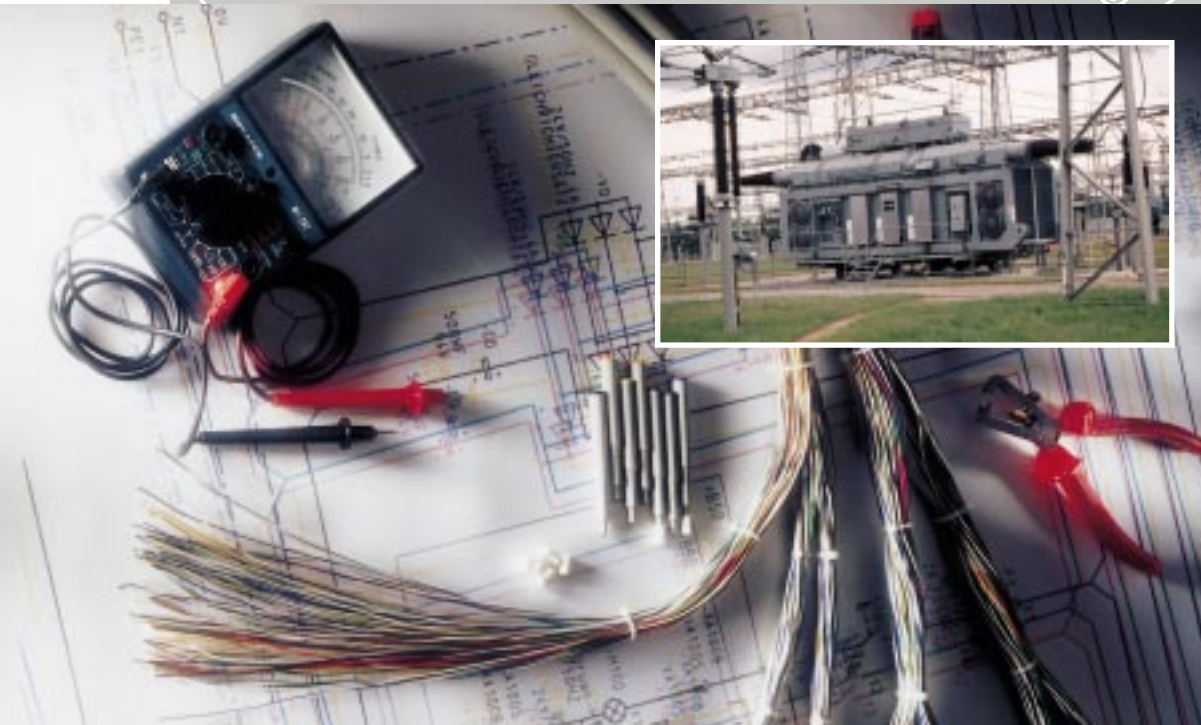


RUPLAN

SYSTEM- FEATURES



**EVU-Module – The complete range of electrical
documentation for power
supply companies**

Table of Contents

1. General	page 3
1.1 What is the EVU-Module ?	page 3
1.2 Why an EVU-Module ?	page 3
1.3 Use of the EVU-Module in German electrical power generation	page 4
1.4 Structure	page 4
1.5 Contents of the Reference Libraries	page 5
1.6 Which types of schematics are supported ?	page 6
1.7 How was the EVU-Module developed ?	page 7
2. Using the EVU-Module	page 7
2.1 User interface	page 7
2.2 Creation of electrical schematics	page 7
2.3 Quality check tools	page 8
2.4 Generation of Cross-references	page 8
3. Evaluations	page 9
3.1 Terminal list	page 9
3.2 Terminal editor	page 9
3.3 Cross connection list	page 9
3.4 Plug list	page 10
3.5 Cable engineering	page 10
3.6 Resource list	page 10
3.7 Table of contents	page 10
3.8 Sheet header captions	page 10
4. For additional information	page 11
5. EVU-Module output examples	page 11

1. General

1.1 What is the EVU-Module ?

The EVU-Module (Energie-Versorgungs-Unternehmen = energy supply companies, utilities) is an additional module of the RUPLAN CAE System specifically for the energy supply (utility) sector. This module cannot be used without RUPLAN. This module is targeted toward companies and organisations which design, plan, construct and/or operate power generating or distribution plants and installations. The EVU-Module supports the generation, management and maintenance of complete documentation in form of sets of schematic diagrams and tables.

1.2 Why an EVU-Module ?

The RUPLAN CAE System is a leader in the schematic diagram software area largely due to its capability of being universally applied. Experience has shown however, that a software product of this type must be adapted to the application requirements of specific branches of the electrical power industry. This adaptation capability is the great advantage of RUPLAN. The EVU-Module allows RUPLAN to be utilized to the optimum advantage of the end user in the energy generation and distribution field in Germany.

The advantages of this application specific module solution are:

- A common work methodology which can be used by the equipment manufacturers and the operators of electrical power generation and distribution installations.
- Data which is uniform and respects the requirements of the selected standards in order to allow the exchange of documentation
- Combination of schematics and data from various manufacturers by the installation operator without any conversion problems.
- Higher quality by means of software checks and tests of data.
- Paperless data exchange.
- Automatic generation of drawings.
- Data output is in accordance with DIN 40719, DIN 40900 as well as the rules established by the IG-EVU (electrical energy distribution interest group in Germany)

1.3 Use of the EVU-Module in German electrical power industry

In Germany the methods used by the power industry traditionally differ from those used by the energy distribution companies. The methodology used in performing the work and especially the identification systems are different.

The EVU-Module originated in the energy distribution field. Since that time many capabilities, which are important in the environment of the KKS (Kraftwerk-Kennzeichnungssysteme = power industrie identification numbering system) have been included in the EVU-Module:

- A 'software switch' allows switching over to the KKS numbering system
- Resource identification may have as many as 124 characters
- Special forms for the automatic generation of support documentation are available taking care of the large number of characters required by the KKS numbering system.
- Special symbols used in the power industrie have been taken over to the EVU-Module.
- Differences in processing are especially marked in the guidelines.

1.4 Structure

The EVU-Module consists of three major components:

- Guidelines
- Reference Libraries
- Evaluations

The guidelines can be used in the bid and design phase of a plant or project in order to assure a standardized specification for all bidders and/or manufacturers.

The operator of the plant or installation can, on completion of construction, easily combine the documentation from various manufacturers into one schematic diagram book. This is possible since all documentation is created using a common reference library. Manufacturers and system operators use the same library for graphical representations and their associated captions.

The exchange of documentation can be fully accomplished only through the use of networks. The EVU-Module, accordingly, has existing requirements to standardize the exchange of digital data via networks.

The evaluation portion of the EVU-Module takes into account the EVU specific requirements. Cross reference tables, resource lists, terminal lists, connection lists etc. are generated automatically.

1.5 Contents of the Reference Libraries

The symbols stored in the symbol databases are according to the following Standards:

- DIN 40900
- VDIN 40900 Part 1000
- DIN 40719 Part 2/3

as well as all other standards utilized by the reference library. The rules of the KKS (Kraftwerk-Kennzeichnungssystem = power industry identification numbering system) are also utilized

Symbol database

contains all symbols required for generating electrical power schematics as well as general symbols.

Sheet database

contains blank forms for all drawings, tables, overviews of the most important symbols, as well as, examples of schematics and tables used in electrical energy generation and distribution as generated by utilization of the EVU-Module.

Object database

contains the specifications/definitions of RUPLAN-objects used in the power industry and distribution of electrical energy.

AWT database

contains the user menus and evaluation programs required for the generation of schematics and evaluations.

1.5.1 Working with RUPLAN-objects

In addition to symbol, sheet and evaluation databases, RUPLAN also utilizes object databases. These object databases contain information about devices, their symbols and management in the schematics and tables. The concepts used in connection with these RUPLAN-objects should be briefly explained here.

Device

A physical unique model of device, identifiable by manufacturer number, order number, technical data etc. For example: AEG relay #SH04.22, 24V, screw fastened terminals. Device descriptions are not part of the purchase specification, but are of course, retained by RUPLAN and displayed in the appropriate evaluation tables such as device lists.

Resource

A device which is unambiguously identified by its resource identification. For Example: =E01+SW01-K1A .

Object

A summary of all allowable symbols (partial functions) for an device or resource in a table. The cross reference relationship is also defined and the connection identifiers are specified.

1.6 Which types of schematics are supported ?

1.6.1 Electrical schematics

Electrical schematics are used to describe the operation of an electrical circuit (DIN40719 part 1) and can consist of the following documents:

- Cover sheet
- Summary overview schematic
- Summary overview cable plan
- Captioning rules
- Table of contents
- Table of contents for sheets from other companies
- Sheets defining resources, terminals and cables
- Schematics
- Resource list

1.6.2 Wiring diagrams

Wiring diagrams are used for the design and test of the wiring of the resources for a component (switchgear cabinet, terminal board, etc.) and can consist of the following documents:

- Cover sheet
- Table of contents
- Definition sheets, specification
- Bill of material and general wiring instructions
- Terminal connections lists
- Plug connection diagrams
- Distribution connection diagrams
- Cross circuit connection diagrams
- Cable lists

1.7 How the EVU-Module was developed ?

The EVU-Module was developed in a cooperation between debis Systemhaus Standard-Software-Products (today AUCOTEC Frankfurt GmbH) and the Switchgear Department of AEG. The Project management know-how of the AEG Switch Gear specialists was combined with the Software know-how of the RUPLAN specialists in order to provide a superior solution for the electrical energy generation and distribution field in Germany.

The module has been developed widely during the last years from both partners. Moreover requests of project- and operating companies as well as changings of dstandardizing have been taken into consideration. A steering committee of users defines the base lines of development.

2. Using the EVU-Module

The use of the EVU-Module is regulated by the guidelines. The guidelines also describe the methodology to be utilized in the use of the RUPLAN system, such as the use of the various evaluation programs.

2.1 User interface

The standard RUPLAN graphics user interface is OSF-Motif. Special menu positions especially adapted for the EVU-Module simplify the utilization of the module by new users.

2.2 Creation of electrical schematics

Normally the first item in a project is the creation of the electrical schematics. The guidelines provide precise specifications for the:

- Structure and identification of sheets
- Adjustment of the graphical attributes (line width, line type, text height, color etc.)
- Adjustment of system controls
- Rules for electrical schematic design
- Selection of the data to be used

The use of the various symbols is precisely described. In addition to the symbols for resources, other symbols are provided for drawing break points, arrows, text captions etc. Specific device descriptions can easily be selected by notes and can be attached to the graphical symbol for the particular resource. In this way also small parts, such as mounting hardware and accessories, are managed.

By that all the schematics are generated in the succession cover sheets, resource definition sheets, schematics, resource lists and so on.

In addition to the unambiguous identification of a resource attached to its symbol, a ‚resource group‘ identification can also be used. A ‚resource group‘ is a partial representation of resources which is encircled with a closed polygon. The resource identification text is attached to the polygon and thereby automatically to all the partial resources inside the polygon.

The geographical location Identification (plant, substation, etc.) is added to a resource group in the same manner.

2.3 Quality check tools

After the electrical schematics are created, various test procedures are available to test the diagrams for completeness and to check for errors. A special quality check tool (that’s a separate RUPLAN-Module) helps the designer to find simple mistakes. It gives operators of power generation or distribution plants the possibility to check the quality of the delivered documentation. The check results are documented in a special status sheet and several error lists.

Details regarding the quality check tools are available in a separate description.

2.4 Generation of Cross-references

After checking the electrical schematics, the cross references are created. In the RUPLAN terminology this is called ‚generating object references‘.

All partial functions of a resource are checked and the cross references according to the object definition are created. The resource descriptions are stored in the online database and can be checked and changed over all sheets.

When these steps have been completed, the resource list is automatically generated (see 3.6). The resource cross references between the resource list and the electrical schematics are established.

3. Evaluations

A series of documentation is automatically created from the electrical schematics. As part of the evaluation procedure, error lists are generated which can reveal construction mistakes.

3.1 Terminal list

Single, multiple and relay terminals are evaluated. The output list parameters can be set with various options. For example the external/internal connection, the sorting sequence or the graphic representation of a terminal in the terminal list can be defined via terminal strip definition symbols.

The creation of a terminal list involves three steps:

- Automatic generation of the terminal list.
- Completion with accessories, possible change of internal/external connection of the wires/targets etc.
- Restore the modified terminal information in the electrical schematics

For each terminal strip a connection list will be generated containing all terminal numbers, the targets, the potential identifiers, hints to cross references, cable numbers, cable cores, loops, end plates, references in electrical schematics and remarks.

The restore of the modified terminal information in the electrical schematic assures that the modifications and details introduced will not get lost.

The system stores which schematics are relevant for a certain terminal strip. For a renewed evaluation run like making a revision only the corresponding schematics will be evaluated. By this in case of large documentations the run time will be shortened considerably.

A special one-sided terminal list evaluation supports the structured documentation and the representation with typicals.

3.2 Terminal editor

A special terminal editor provides global editing of all relevant information regarding a list or a single terminal even if the information is distributed on several sheets. In this manner the time consuming search for a particular terminal in schematics is eliminated.

3.3 Cross connection list

The cross connection list shows all connections between two or more resources which are not shown in the terminal or plug lists. The wiring sequence may be specified in the electrical schematics. Tests are also conducted to assure whether cross connection for the corresponding resource are able to be generated.

3.4 Plug list

A connection list is created for each connector utilized in a project. Target identification is noted, as well as information regarding cross connections and a cross reference to the electrical schematics.

3.5 Cable engineering

Cable engineering has been redesigned in version 2.11 of the EVU-Module. By means of cable definition sheets (that may be also summary overview cable plans) the evaluation can be controlled in a smart way.

Cable lists are generated that in addition to data regarding the resources also contain text information regarding the target. If cable cores are terminated on various terminal strips, a note to this effect will be entered in the logfile accompanying the cable list.

3.6 Resource list

The resource list shows a summary of resources used in the electrical schematics. The resource list contains:

- Technical and device specifications
- References to the distributed resource representation contained in the electrical schematics
- A complete electrical schematic of the resource.

The resource list is automatically generated upon completion of the electrical schematics. The resource list then contains all cross references and technical data from the electrical schematics (See 2.3).

3.7 Table of contents

A table of contents is created in a prepared form style.

3.8 Sheet header captions

The sheets of a project are provided with a common header with the basic data about the sheet and the project.

4. For Additional Information

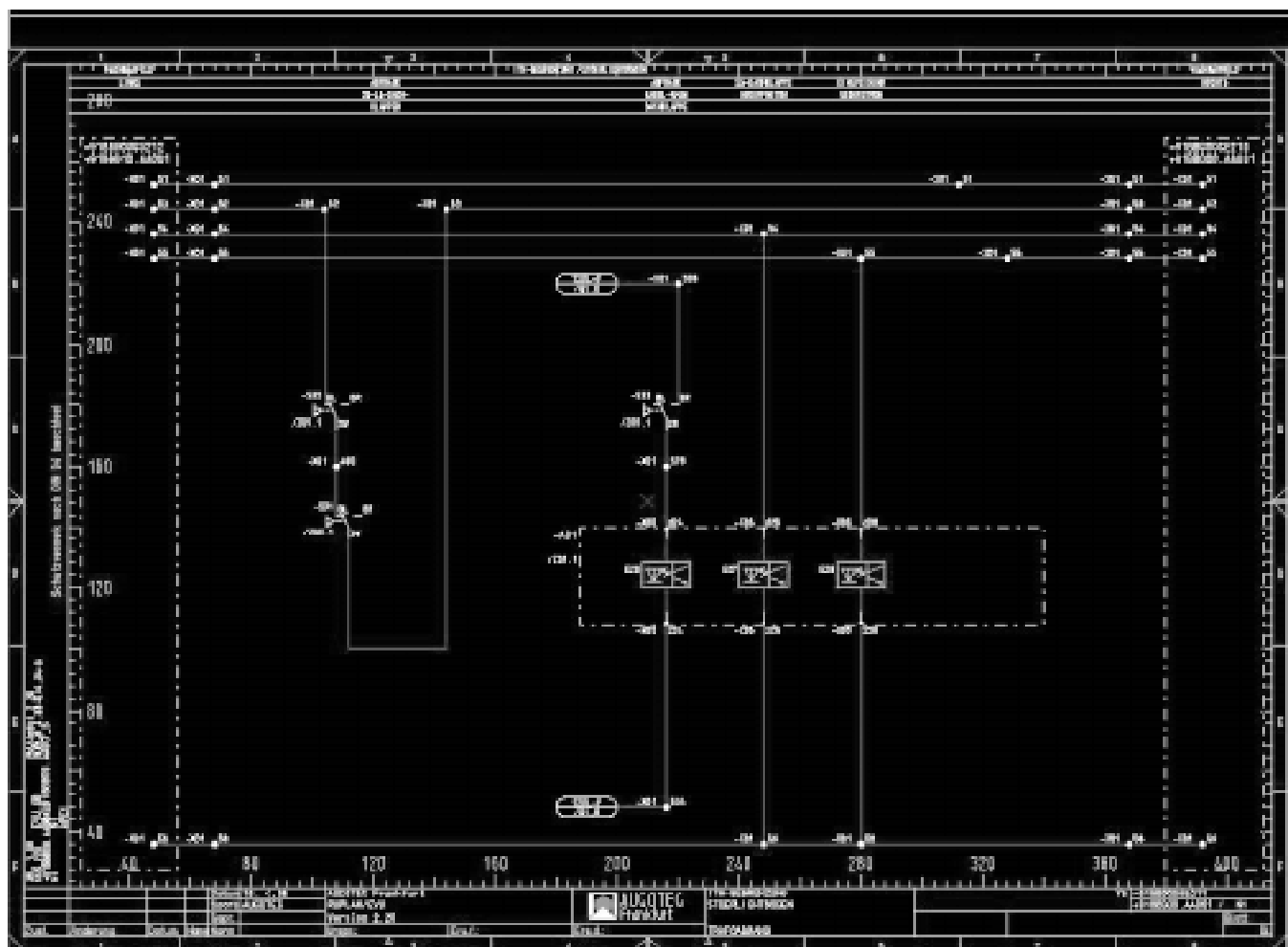
The EVU-Module is a product of:

AUCOTEC Frankfurt GmbH
 Goldsteinstrasse 235
 D-60528 Frankfurt am Main
 Germany

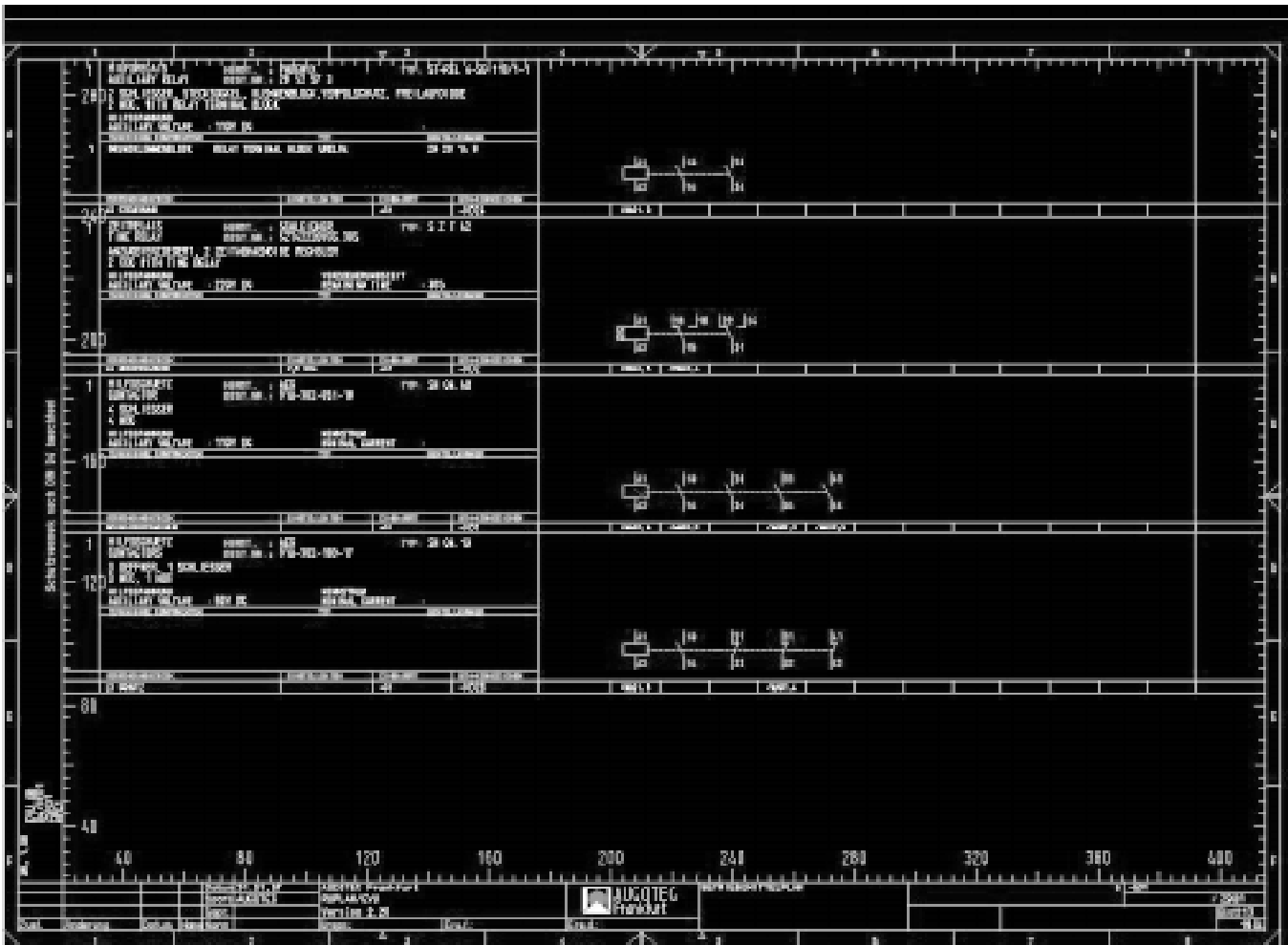
Telephone: +49 69 66418-0
 FAX : +49 69 66418-103

5. EVU-Module Output Examples

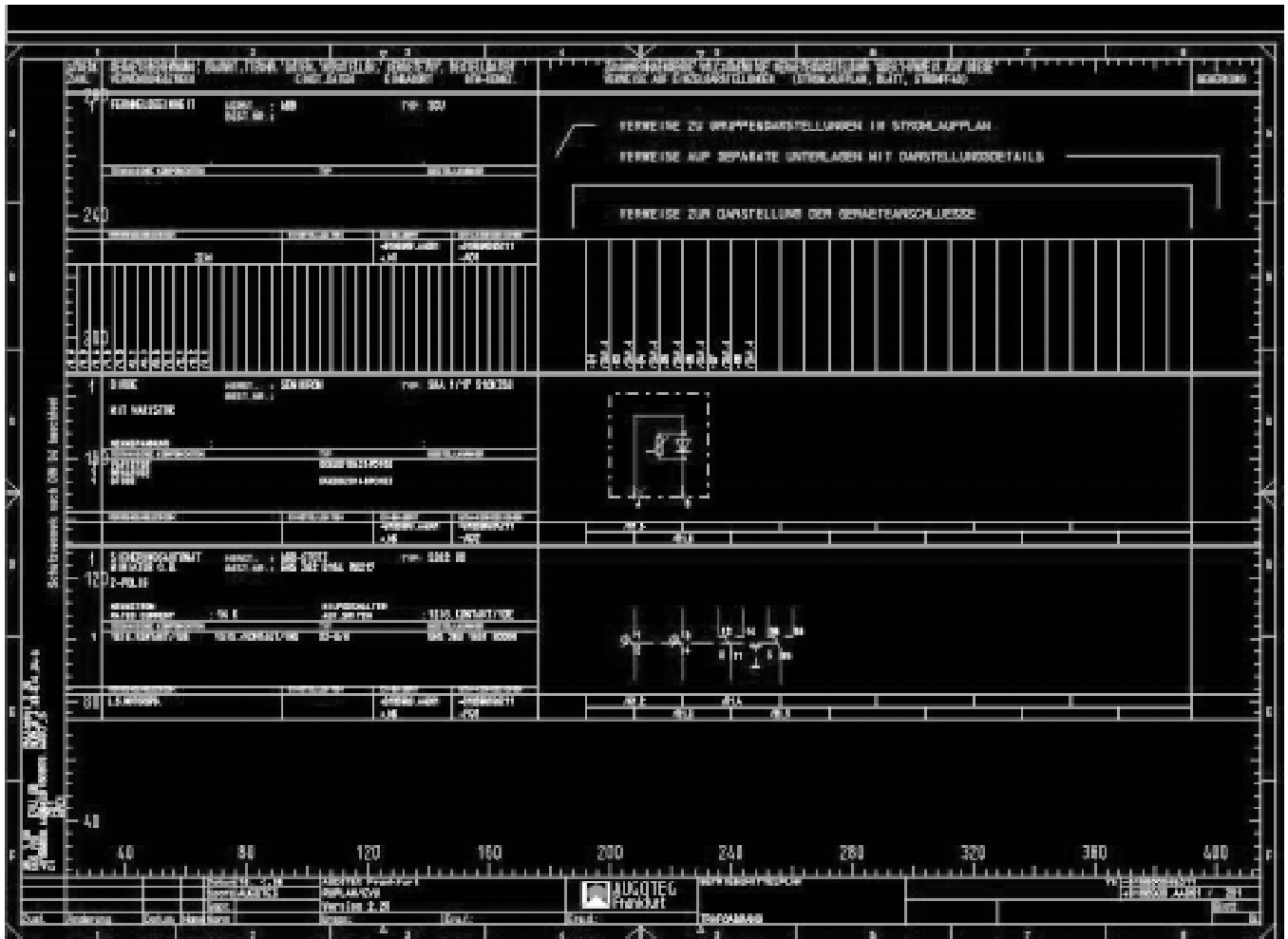
Diagram	Sheet	Contents
YS	91BBG00GS211/ A3	Table of contents KKS
S	E01 / MA01	Electrical schematic
YS	91BBG00GS211/ N1	Electrical schematic KKS
S	E01 / ZSK01	Resource list
YS	91BBG00GS211/ Z01	Resource lists KKS
V	E01 /K10	Terminal list
YV	91BBG00GS211/ K02	Terminal list KKS
V	E01 /S01	Plug list
YV	91BBG00GS211/ Q01	Cross connection list KKS
V	E01 /W01	Cable list
YV	91BBG00GS211/ V01	Wiring list KKS



Electrical schematic KKS



Resource list



Resource lists KKS

BÜRO: HINTER		STANDORT: 0074-2 1.2021		-X1		BÜRO: VOR		STANDORT: 0074-2-01 001		1-1 VORUS	
BEZUGS- SYSTEM	LIN (in mm) BAND	BOE	ZIELEICHTUNGEN	EXTERN	POT	NR	ZIELEICHTUNGEN	INTERN	LIN (in mm) BAND	BOE	BESCHREIBUNG
001.1			001 -01 -01	1	11	1	001 -01 -01	1			
001.2			002 -02 -02	2	12	2					
001.3			003 -03 -03	3	13	3					
001.4			004 -04 -04	4	14	4					
001.5			005 -05 -05	5	15	5					
001.6			006 -06 -06	6	16	6					
001.7			007 -07 -07	7	17	7					
001.8			008 -08 -08	8	18	8					
001.9			009 -09 -09	9	19	9					
001.10			010 -10 -10	10	20	10					
001.11			011 -11 -11	11	21	11					
001.12			012 -12 -12	12	22	12					
001.13			013 -13 -13	13	23	13					
001.14			014 -14 -14	14	24	14					
001.15			015 -15 -15	15	25	15					
001.16			016 -16 -16	16	26	16					
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001.99			099 -99 -99	99	109	99					
001.100			100 -100 -100	100	110	100					

Terminal list



AUCOTEC AG
Oldenburger Allee 24 · D-30659 Hanover
Telephone +49 511 6103-0
Telefax +49 511 614074
www.aucotec.com