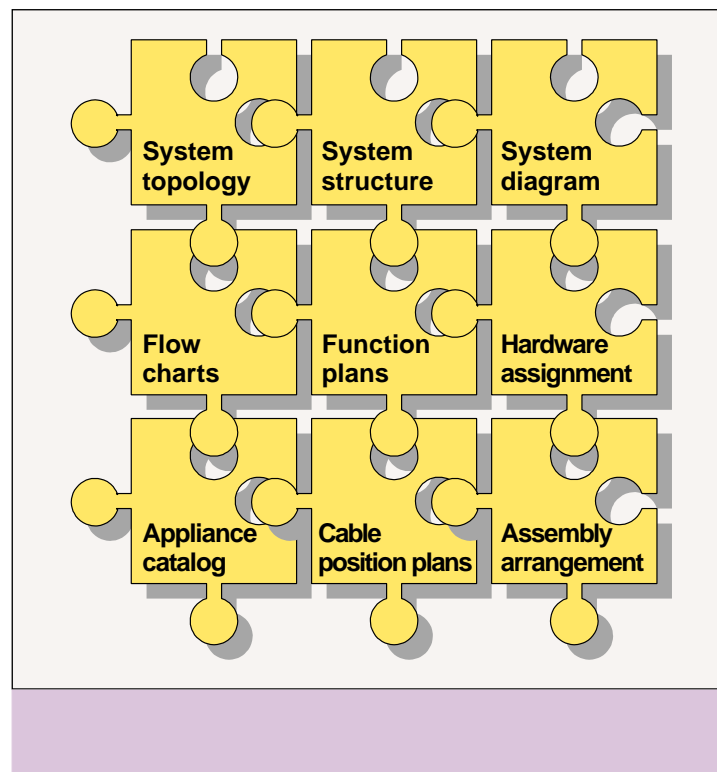


Process Control System

ME 4012



**Consistent Computer-aided
Engineering
ME-DRP**

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Process Control System ME 4012

Consistent Computer-aided Engineering (ME-DRP)

Objectives for the Introduction of the ME-DRP Concept

Due to increased system complexity, one of the big difficulties in today's system design is the fact that many different technical disciplines need to communicate with each other.

This can be illustrated using the example of a pump:

- The process engineer determines during basic planning that a pump with certain process-related specifications is needed.
- The supplier determines the pump according to his detailed specifications.
- The electrical engineer specifies the rating for the drive.
- The control and instrumentation engineer takes this drive into account for his automation concept.

Each of these disciplines has developed its own methods and tools in order to optimize the everyday planning processes. Every department functions independently of all the others and without any point of contact, although they are all working on the same object (in this case, a pump).

It is in just such a situation that an object server, which is the basis for the CAE Engineering Solution ME-DRP, can be put to optimal use.

Another reason for the development of the ME-DRP was the understanding that a considerable amount of the total cost (10 - 15%) of a system goes into scientifically based information. The fact that the information content can be considered a synonym for money or cost is understood by an increasing number of companies. The consequence is the introduction of maintenance and works management systems. System information that should be available from the system planning process has so far rarely been taken into consideration.

This means in practice that there is a break in the information flow between system planning and maintenance. The information (system data) needs to be laboriously ascertained and transferred manually to the corresponding systems.

Control and Instrumentation Systems, Planning, Diagnosis and Commissioning the Concept of Consistent Computer-aided Engineering (ME-DRP)

The ME-DRP concept on the other hand guarantees multiple forms of security and data presence for the user.

1. It allows the planner and the operator to work efficiently with one tool in all lifecycle phases of system planning. This ensures that all data from all stages, from planning through construction to commissioning is consistently and uniformly accessible. Already existing systems from other manufacturers can also be integrated by ME-DRP.
2. The system is database-neutral, meaning that relational databases (RDBMS) can be attached. Furthermore, the concept of the structure allows you to build on an object-oriented database. Investment costs for relational databases such as MS SQL-Server or ORACLE are hence secured.
3. Due to the open world-standard OLE Automation, all database-specific queries (relations) were removed from the ME-DRP modules and transferred to the Object Manager. This results, in contrast to existing database conceptions, in a separation of the applicationslevel / user area and database level.
4. The consistent use of OLE objects has led to one of the most open system structures currently in use. This allows various applications of other manufacturers (given OLE-ability) to call up the desired data via OLE objects of the ME-DRP server and hence access a uniform dataset.

5. Simple Object Manager server due to ME-DRP module, use of existing standard software or modules of other manufacturers based on standard software such as MS-Office (Word, Excel) and open standard programming tools such as, for example, Visual Basic, Visual C++, etc.

6. Access to the databases is only possible via the ME-DRP Object Manager. Meaning:

- accessibility to all ME-DRP modules
- easy handling and maintenance for administration, users and supporters of the entire database due to identical handling
- efficient determination of custom-made adjustments and applications due to uniform OLE Interface

Object Manager

All object operations are handled via the Object Manager in ME-DRP. The Object Manager saves objects which have been used in its memory administration. It is no longer necessary to read the called-up object from the database upon repeated access. Time-consuming database access is hence reduced to a minimum.

If several users in the network (DRP-LAN) are working on the same project, it is guaranteed that each user will access only the latest object data. If an object currently called up in the working memories of several work stations is altered or deleted, it is guaranteed that you will not access "old" versions of the object. ME-DRP prevents this from happening by constantly informing the ME-DRP work stations that are logged into the ME-DRP, about which objects have been changed or deleted. The Object Management of the called-up ME-DRP work station updates itself automatically.

Database Manager

The ME-DRP uses a standard MICROSOFT database manager: the Jet Database Module. The Jet Module is a component for data administration, to which other applications for accessing data can be attached (MS-ACCESS and Visual Basic). With the aid of Data Access Objects (DAO) or Open Database Connectivity (ODBC) the data can be accessed and saved.

Desktop Database

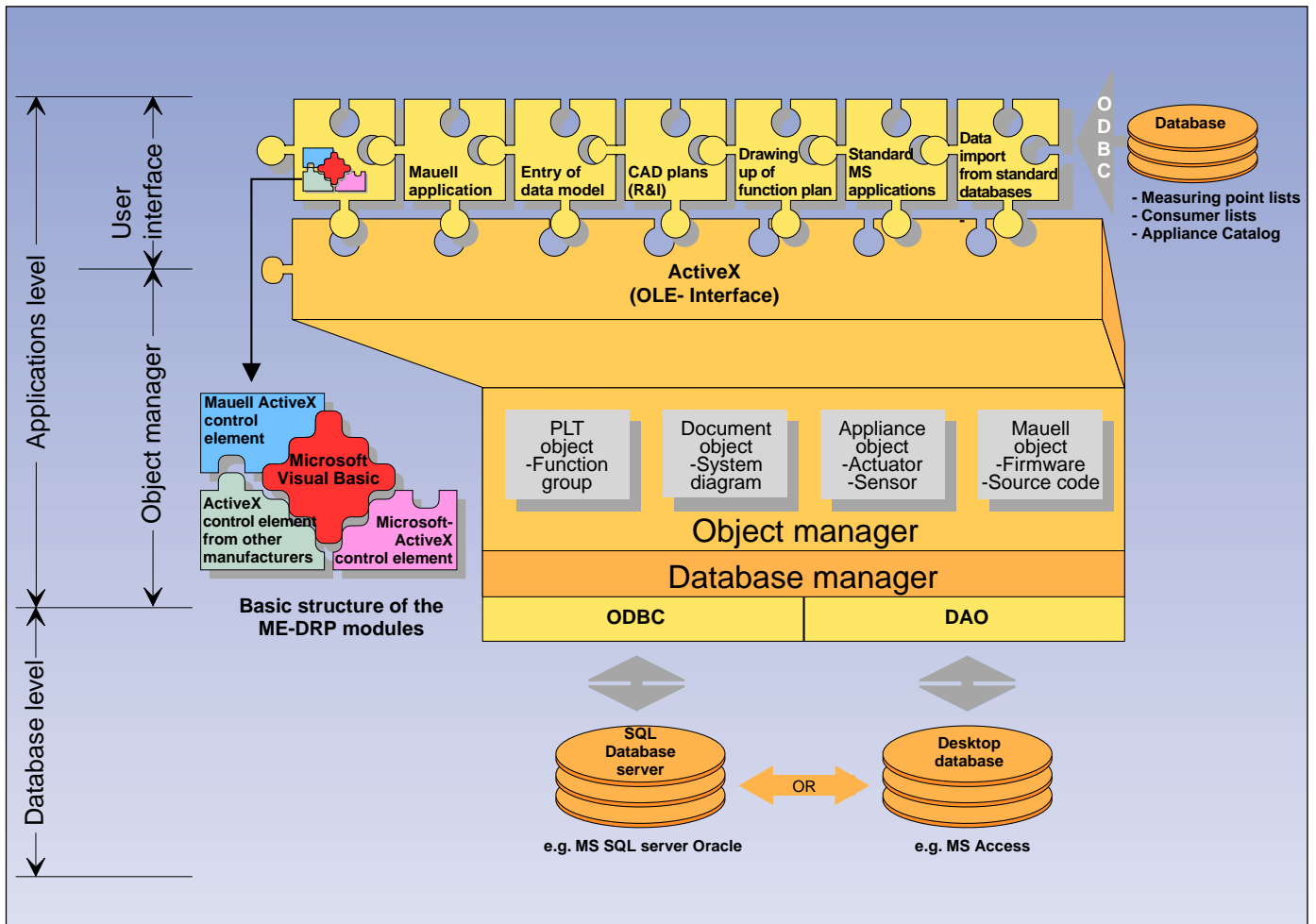
Additionally, the Database Manager arranges the connections to the database system. A Desktop Database (MS-ACCESS-compatible data format) is contained in ME-DRP and does not require further administration.

SQL Database Server

The Database Access Objects (DAO) of the Jet Module can connect to any database that contains an ODBC-Driver. The administrator has access to ME-DRP tools, in order to design the necessary tables in the desired relational database (SQL Server) and link them to the Database Manager.

ME-DRP Software Structure

During the development of ME-DRP, we aimed at the concept of an extensive, open program package based on standard interfaces such as COM and ActiveX. This allows the use of a uniform, Windows-oriented user interface for planning, initial operation and maintenance. For this, a number of norms and standards as well as quality control requirements need to be met (Windows NT, VGB 170-C, DIN/ISO 9001).



ME-DRP Software structure

ME-DRP Hardware Structure and Function Scope

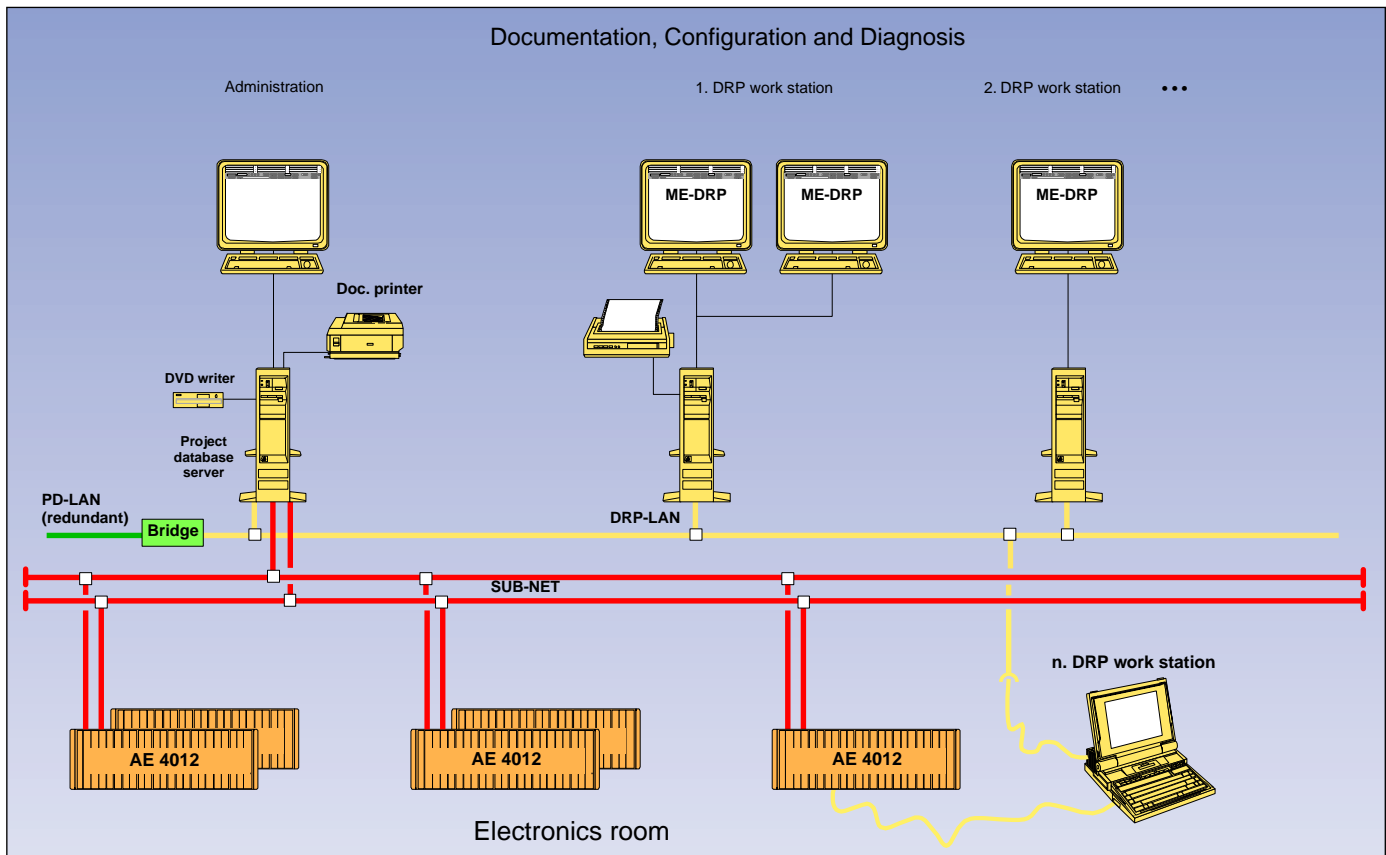
The use of ME-DRP allows you the central planning, documenting and editing of the configuration of the Operator Control and Process Monitoring System ME-VIEW and the programmable controllers AE 4012 or ME 400. For this you need to set up a configuration network (DRP-LAN), consisting of a central project database server, including a printer and at least one CAE work station. There is no limit on the number of work stations. Each work station has equal access to all the functions of ME-DRP. The work

stations can be equipped independently of each other with additional optional appliances such as, for example, up to 4 monitors or local printers.

If a portable, DRP-LAN-linked PC is used as an ME-DRP work station, it is also possible to connect it directly on-site with single sub-processors of the programmable controllers via the serial interfaces AE 4012. This will accelerate the data exchange with sub-processors in the case of extensive program transmissions.

The ME-DRP work stations make it possible to:

- administer the locality-specific regulations and project databases
- draw up the entire list and cross-reference system related to the central project database
- draw up the entire function and implementation documentation
- draw up the source code of all sub-processors in the programmable controllers AE 4012 along the entire process bus SUB-NET
- draw up system diagrams for the function plan. Simultaneously, this system diagram is the basis for the process graphics for the Operator Control and Process Monitoring System ME-VIEW
- connect the telediagnostic service interface for online diagnosis and technical support service of the Mauell Service in the home plant
- secure data centrally via the DVD disk drive (Writer) on DVD-RAM



Although engineering work can be carried out at several work stations simultaneously, the consistency of data maintenance is safeguarded due to the central project database and the online connection via the DRP-LAN between the single work stations and the server.

Configuration files of the decentralized sub-processors on the process bus SUB-NET are read out or written via a direct SUB-NET-interface of the ME-DRP Project Database Server. In order to transcribe new ME-VIEW flow charts and pre-designed layouts you can use the link (Bridge) to the PD-LAN (Process Data LAN). This will directly connect the construction work stations with the ME-VIEW operator control and process monitoring system. For the documentation of the project data, including the configuration data and the entire ME-VIEW user surface, the central server also functions as a printer server. It is thus connected to a color-video printer or laser printer. The ME-VIEW pictures are digitally prepared and made accessible via this interface. The operation-related system status is adopted, and blinking in the pushbutton control module, for example, is interpreted as a special color.

Function Planning

During project processing the customer demands are coordinated with the Mauell engineering standards during the costs-estimation phase and taken into account for the costs estimate. Among other things, the delivery parameters, the appliance spectrum and the rough control and instrumentation systems structure is determined in this phase.

Based on these specifications, our project team works out an exact, locality-specific project manual, the precise control and information systems structure in co-operation with the customer and possibly their production engineer.

The data that is relevant for the computer-aided engineering is based on the Mauell master data and adapted to the locality-specific demands. This includes, for example, the appliance spectrum (control and instrumentation systems-specific as well as actuators and sensors), the project-accompanying documentation, the software functions that are to be used, the identification system (e.g., KKS, AKS) for systems, as well as locality structure and process objects.

The process objects include all actuators, sensors and independent software functions (e.g. incremental controls, selection codes, regulations, etc.).

A basic logic function is assigned to each process object, consisting of elements such as field hardware (e.g., measuring transmitters), I/O-signal processing (e.g., filtering of measured values), basic logic, operator control and monitoring, logging/archival and registration. Although each function, and accordingly every process object, can be constructed of single elements, it is advisable to use a high level of standardization. This reduces the individual work of planning, test-department and initial operation.

Execution Planning

In order to realize the actual automation it is necessary during execution planning to obtain basic engineering from the customer, consisting of R+I diagram, measuring point and actuator lists as

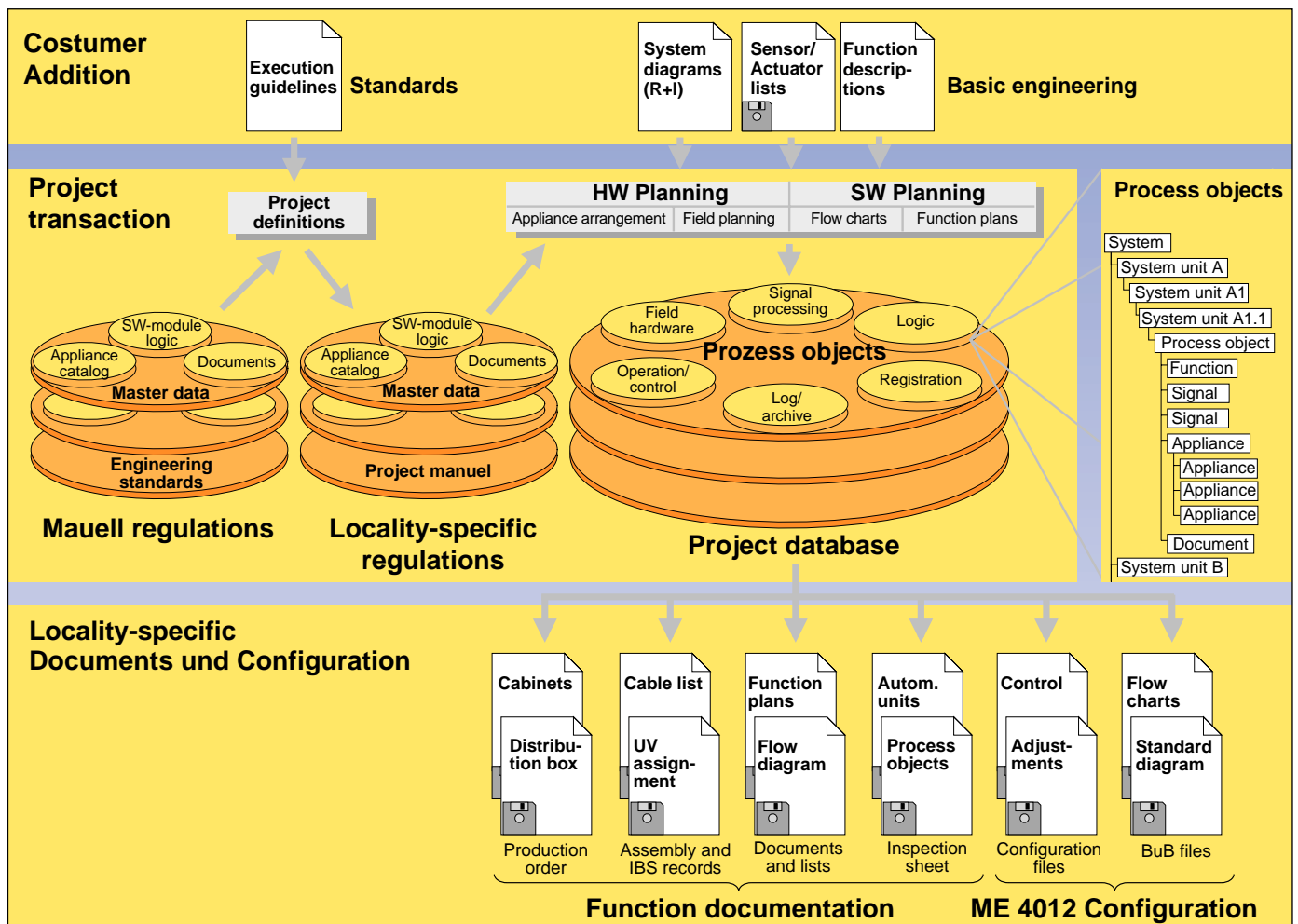
well as function descriptions.

The R+I diagrams display the process-control interrelationship of all drives (actuators), measuring points (sensors), vessels and their connections (e.g., tubing).

Project transaction will draw up a detail-engineering plan in the form of function documentation based on an object-oriented project database.

The main elements of function documentation are:

- measuring point lists
- actuator lists
- system diagrams as part of the function plans and specifications for the ME-VIEW Flow Chart Models
- function descriptions according to VGB 170R with function units



Overview of ME-DRP structures

Additional essential control systems documents are:

- LAN Network
- process bus SUB-NET Network
- structure of the programmable controllers
- structure of the appliances in the control and engineering rooms
- structure of the help cabinets for feed-in, distribution, power controllers, intermittent devices, etc.
- cabling documentation
- assembly documentation (including assembly structure drawing)
- field appliance documentation (appliance catalog)
- set-up plans

At present the configuration files are still drawn up in a separate step, using this documentation and a user-friendly interface (similar to IEC 1131-3). The automatic code generation is being set up.

During implementation of these planning steps the plausibility and syntax check of process data is carried out and compliance with locality-specific regulations tested.

This ensures data consistency and double entries are avoided.

Kennzeichen	Bezeichnung	Funktions-einheit	Verwendung	Schrank	Baugruppen-Platz Typ	Teilnehmer	Aktoren-typ	Schaltanlagen-Abzweig Typ	Unterverteiler	EAT	Leistung	U-Betr.	Bemerkung
01LAE13AA001	EinsprRV ÜHZ Str1	01HAH	02.01.01 02.01.02			1.012.002	RAS	01BJK11			1,5 kW	400 V	
01LAE23AA001	EinsprRV ÜHZ Str2	01HAH	02.01.00 02.01.02 02.01.01 02.01.00				RAS					400 V	
01NDA10AA101	AS VLF HzNetz HzKr 10		01HAH14DT001 05.01.00 02.01.00	01CBB01	A77 F4ATR 11AF	1.011.001	SA						
01NDB10AA101	AS RkLf HzNetz HzKr 10		05.01.00				SA						
01NDB10A#001	Aktor						2D						
01NDC11AP001	Ppe RkLf HzWa HzKr 10		05.00.00 05.01.00				D						
01NDC11GU001	FreqUmf RkLfPpeHzKr 10		05.00.00 05.01.00				RAK						
01NDC11AA102	DrKI Ppe RkLf HzKr 10		05.01.00				SA						
01NDC11AA101	SgKI Ppe RkLf HzKr 10		05.01.00	01CBB01	A21 UMFPR 11DF	1.011.062	SA	00LUI					
01NDC12AA103	AS Umf VLF HzKr 10		05.01.00				SA						
01NDC12GU001	FreqUmf VLF Ppe HzKr 10		05.00.00 05.01.00				RAK						
01NDC12AP001	Ppe VLF HzWa HzKr 10		05.00.00 05.01.00				D						
01NDC12AA102	DrKI Ppe VLF HzKr 10		05.01.00				SA						
01NDC12AA101	SgKI Ppe VLF HzKr 10		05.01.00				SA						
01NDK11AP001	Netzfüll-Ppe 1 HzKr 10		05.01.00	01CBB01	A21 UMFPR 11DF	1.011.062	D	0LHTI					
01NDK12AP001	Netzfüll-Ppe 2 HzKr 10		05.01.00				D						
01NDK13AP001	Netzfüll-Ppe 3 HzKr 10		05.01.00	01CBB01	A77 F4ATR 11AF	1.011.001	D	02BKD03 04L					
01NDK15AA001	Füll-RV HzWa HzKr 10		05.01.00				RAS						
01NDK16AA001	Abi-RV HzWa HzKr 10		05.01.00				RAS						
ME-VIEW12A#002Aktor			12.00.00				2D						
ME-VIEW12A#001Aktor			12.00.00				2D						

Schutzmerk nach DIN 34 beachten!

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			Uhrzeit	08:18								A	
			Bearb.	FHE/TBR									Blatt 2
Zust.	Änderung	Datum	Name	Norm	Urspr	Ers f. H. Mauell GmbH	Ers d. ME-DRP		Aktorenliste				Blätter ges. 2

Actuator list

Kennzeichen	Bezeichnung	Meßbereich Anfang Ende Dim.	Signalbereich	Unterverteiler Schrank	Baugruppen-Platz Typ	Teilnehmer EA-Adr.	Funktions-einheit	Verwendung	Bemerkung
01NDC12CE001	XQ01 E Ppe VLF HzWa HzKr 10	0 100 %	4 - 20 mA					05.01.00	
01NDC12CP001	XQ01 P VLF Ppe HzKr 10	0 15 bar	4 - 20 mA					05.00.00 05.01.00	
01NDC12CS001	XQ01 S VLF Ppe HzKr 10	0 1800 U/min	4 - 20 mA					05.00.00 05.01.00	
01NDC12CT001	XQ01 T VLF HzWa HzKr 10	50 150 °C	4 - 20 mA					05.00.00 05.01.00	
01NDC21CT001	XQ01 T RkLf HzWa HzKr 20	20 100 °C	4 - 20 mA					05.01.00	
01NDC22CT001	XQ01 T VLF HzWa HzKr 20	50 150 °C	4 - 20 mA					05.01.00	
01NDD10FF901	XR21 HzW HzWa HzKr 10	0 60 MW						05.00.00 05.01.00	
01NDD20FF901	XR21 HzW HzWa HzKr 20	0 60 MW						05.00.00 05.01.00	
01NDK10CL001	XQ01 L Netzfüll-Beh HzKr10	0 10 m	4 - 20 mA	01CBB01	A21 UMFPR 11DF	1.011.062	AE 02.01	05.00.00 05.01.00	
01NDK10CL901	XR21 L Dr-Haltung-Beh HzKr 10	0 10 m						01NDK10EC001	
01NDK10CP001	XQ01 P Netzfüll Beh HzKr 10	0 3 bar	4 - 20 mA					05.01.00	
01NDK15CG001	XQ01 G Füll-RV HzWa HzKr 10	0 100 %	4 - 20 mA					05.01.00	
01NDK18CG001	XQ01 G Abi-RV HzWa HzKr 10	0 100 %	4 - 20 mA					05.01.00	
01NDK18CF001	XQ01 F Füll/Abi HzWa HzKr10	-10 110 U/h	4 - 20 mA					05.01.00	
01NDK19CL001	XQ01 L Ausdehn Beh HzKr 10	0 5 m	4 - 20 mA					05.01.00	
01NDK19CP002	XQ01 P Ausdehn Beh HzKr 10	0 16 bar	4 - 20 mA					05.01.00 06.00.00	
01NDY10DU801	XR21 HzW-Reg HzKr 10		MW					05.01.00 05.00.00	
01NDY10FF901	XR21 HzW HzNetz HzKr 10	0 60 MW						05.00.00 05.01.00	

Schutzmerk nach DIN 34 beachten!

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			Uhrzeit	08:17								A	
			Bearb.	FHE/TBR									Blatt 5
Zust.	Änderung	Datum	Name	Norm	Urspr	Ers f. H. Mauell GmbH	Ers d. ME-DRP		Liste analoger Signale				Blätter ges. 5

Measuring point list of analog signals

Kennzeichen: **01NDK10CL001 XQ01**

Bezeichnung: **L Netzfüll-Beh HzKr10**

Funktionseinheit:

Mechanische Auslegung:

Medium: **Wasser**
 Betriebsdruck: **0 bis 100 bar**
 Betriebstemperatur: **0 bis 250 °C**
 Ex-Zone: **keine**
 Druckstufe: **PN100**
 Erf. Bescheinigung: **DIN 3.1B**
 Systemlieferant: **FAC**

Technische Spezifikation:

Geberlieferant: **Mauell**
 Menge: Gerätecatalog-Nr. Bezeichnung:
1 Stk 20.01.05.01 Contrans P MU ASK 800 -Meßsp. 0 - 2,5 bar
1 Stk 50.02.06.01 N541.87.239.52
1 Stk 50.50.18.01 Rohr W.-Nr. 1.4571, Länge 2x3m

Signalaufbereitung:

Verf. Messbereich: **0 bis 10 m**
 Signalbereich: **4 - 20 mA**
 MU-Absicherung:
 Unterverteiler:
 Schrank: **01CBB01**
 Baugruppenplatz: **A21**
 Baugruppentyp: **UMFPR 11DF**
 Teilnehmer: **1.011.062**
 EA-Bus-Adresse: **AEAN02.01**

Aufbau der Messung:

Lage: **A7B4**
 Montageanord.: **L#-DP##-01**

Messwertgeber:

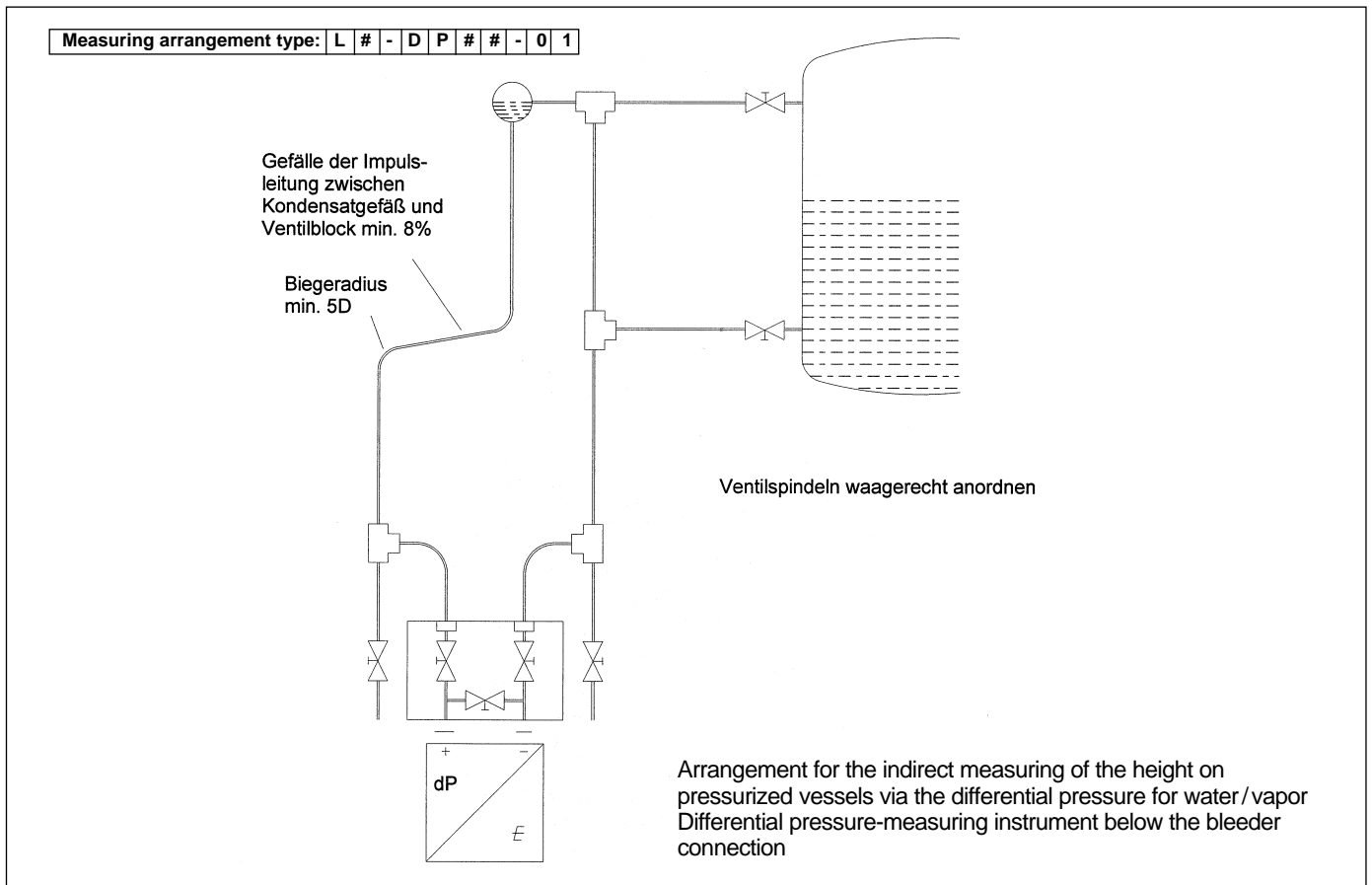
Hilfsenergie: **24 V**
 Versorgungstyp: **-(2-Leiter)**
 Leistung: **1 W**
 El.-Anschluß-Typ: **10-011-01**
 Phys. Messbereich: **0 bis 1 bar**

Bemerkung:

Schutzmaß nach DIN 34 beachten!

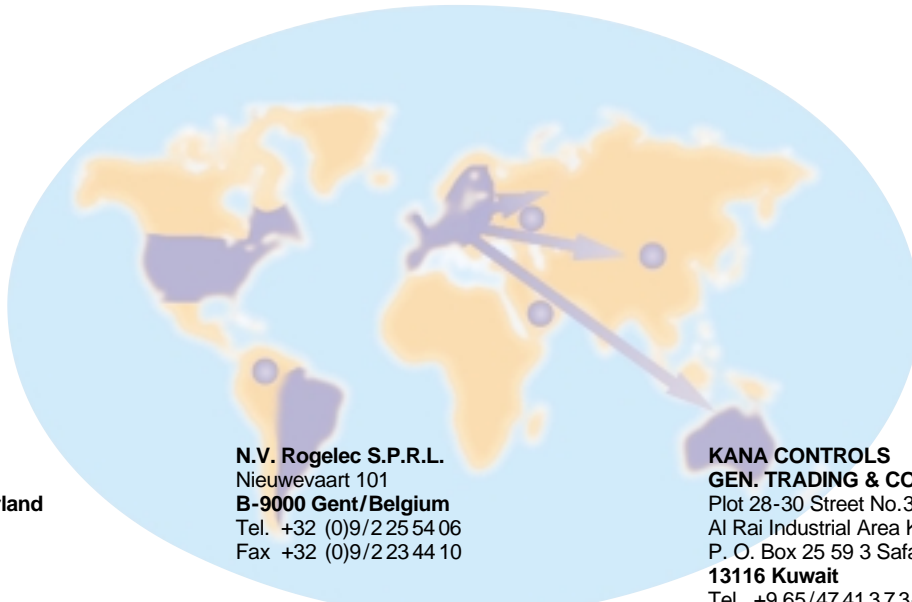
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			Bearb.	FHE/MP						
Zust.	Änderung	Datum	Name	Norm	Urspr.	Ers.f. H.Mauell GmbH	Ers.d. ME-DRP	Meßstellenkennblatt		Blatt 2 Blätter ges: 3

Measuring point sheet



Measuring arrangement

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