

# General technical specifications for system suppliers, external constructions, service providers

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## 1. General requirements

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### 1.1 Foreword

The creator of this document is: **Hüller Hille GmbH** (hereinafter **Hüller Hille** resp. referred to as the **client**).

This document describes the basic technical regulations and requirements of the client for the procurement, execution and scope of services of components, devices, automation and mechanical equipment (hereinafter referred to as **the subject of the order**) for the contractor. In addition, if necessary, there may be a specification sheet specific to the assembly group, which describes the respective assembly group in more technical detail.

On the basis of the specifications, the contractor draws up a functional specification which describes in concrete terms how the contractor implements the requirements in the specifications.

### 1.2 Validity and scope of application

Compliance with the current general technical specifications is binding for the contractor. Deviations require the written authorisation of the client.

Contractors can obtain the latest version from their contact at Hüller Hille GmbH.

(Note: The general technical specifications are stored in PLM under AD.4000.7814).

Customer-specific specifications have priority.

### 1.3 Energy efficiency

The object of the order must be designed to reduce energy and media consumption. Consumption for regular operation, partial load operation and standby mode must be specified.

Energy efficiency measures must be listed:

- Use of appropriate hardware (e.g. pumps, motors with IE3)
- Shutdown strategies in partial load operation or standby mode (short-time shutdown)
- Long-term shutdown (e.g. weekend)

### 1.4 Order processing

If the Contractor recognises on the basis of its expertise that it is unable to provide contractually agreed services or can only provide them to a limited extent, this must be reported to the Client immediately and a solution must be found with the Client.

### 1.5 Data exchange

Small amounts of data up to 20 MB can be sent by e-mail to the relevant Hüller Hille administrator. Larger amounts of data are exchanged via the OneDrive programme. The required link will be provided by Hüller Hille.

### 1.6 Applicable documents

- Preferred list, components of the client
- Currently valid terms and conditions of purchase of Hüller Hille
- Non-disclosure agreement of Hüller Hille. See separate document Non-Disclosure Agreement (NDA).

### 1.7 Request for quotation

When requesting a quotation, the client sends all relevant information to the contractor. The contractor can prepare a detailed quotation on this basis. The construction costs are shown as a separate item.

The delivery dates are binding.

### 1.8 Secrecy

See separate document Non-Disclosure Agreement (NDA).

### 1.9 Preparation of contractor specifications

A separate technical specification sheet is provided by the client for each system order.

It is the working basis for the entire course of the project and is analysed during construction, approval and acceptance. The Contractor confirms fulfilment of the applicable points in the approval documents. If the specifications are not available at the time of approval, Hüller Hille will not grant approval. The submission deadline is deemed "not met".

### 1.10 Milestone plan

A milestone plan is provided by the client for each system order. The order confirmation with completed milestone plan must be sent to the contractor no later than 4 working days after receipt of the order. The individual milestones are defined backwards from the delivery date by the contractor.

By accepting the order, the contractor undertakes to adhere to the defined milestones. The client shall monitor compliance with the deadlines.

### 1.11 Quantity structure

The client plans with the following quantities.

- XX piece prototype(s)
- XX piece zero series
- XX units in the 1st year
- XX units in the 2nd year
- XX pieces in the 3rd year

### 1.12 Cost framework

The subject matter of the order may not exceed the following cost items.

If price specifications are not filled in by the client, please add relevant items by the contractor.

- |                          |       |
|--------------------------|-------|
| • ConstructionXXX        | ,-- € |
| • Other one-off costsXXX | ,-- € |
| • Prototype costsXXX     | ,-- € |
| • Zero series priceXXX   | ,-- € |
| • Series priceXXX        | ,-- € |

### 1.13 Overview of costs, timeline (project plan)

The contractor can use their own template for recording or request an overview template (see Appendix 2) of the costs and timeline from the client.

If a separate file is used, all the contents contained in Appendix 2 should be adopted. This document is the accompanying basis for processing the order.

### 1.14 Environmental and packaging regulations

The statutory environmental regulations and labour protection regulations are observed. The packaging of the order item fulfils the following characteristics.

- Shockproof packaging
- Sufficient moisture protection
- Sufficient corrosion protection
- Packaging material minimisation
- Preferably use returnable packaging,  
Use otherwise recyclable packaging materials
- Pack product in installation position
- Provision of their storage regulations

### 1.15 Transport

The following requirements must be met:

- Customs tariff number
- Declaration of origin
- Supplier manufacturer number
- Weight specifications
- Specification of the dimensions
- Centre of gravity

### 1.16 Disposal / Recycling

The following requirements must be met:

- Disposal instructions
- Material recycling list
- Return and disposal of the supplied components

### 1.17 Support from the manufacturer

The following information must be evaluated by the contractor:

- Assumption of costs in the event of a warranty claim (also abroad)
- Regulation of material and personnel warranty (also abroad)
- Enable repair by self-repair (see appendix)
- Return of the damaged goods from abroad to the contractor
- Are there local service centres or repair facilities on site on the part of the supplier?

### 1.18 Painting instructions

Attached painting instructions (attached)



### 1.19 REACH and RoHS 2

- If REACH and / or RoHS 2 parts are installed in the Contractor's components or parts, the Contractor must endeavour to use REACH and RoHS 2-free parts. If this is not possible, the Contractor must provide the Client with all necessary documents (e.g. data sheet, disposal instructions, etc.) so that the Client can inform the Customer of the existing substances and disposal instructions.

### 1.20 Oils and lubricants

- If oils or lubricants in components or parts to be supplied reach the client via the contractor, a release of the substance must be applied for and approved by the client in advance.

### 1.21 Authorisation

- Authorisations by Hüller Hille only cover the execution principle. They do not release the contractor from the responsibility to carry out an appropriate and state-of-the-art design.
- The quality characteristics defined by the Hüller Hille end customer are the basis for the design. It must already be evident in the approval documents that these characteristics will be achieved.
- If necessary, additional information will be noted upon authorisation by Hüller Hille.  
The contractor implements these instructions and sends the complete 3D model and the corresponding assembly drawing again to the Hüller Hille clerk.

### 1.22 Part numbers

The material number of the order item is assigned by Hüller Hille and is listed in the order.

#### 1.22.1 Manufacturer part numbers

The part numbers within the ordered components are managed exclusively by the Contractor. The Contractor shall ensure that its production-relevant documents can be assigned to the allocated part numbers.

### 1.23 Labelling

The order includes the eleven-digit article number from Hüller Hille. This must be noted on the assembly drawing in the area of the title block. The object of the order must be permanently labelled with the Hüller Hille article number and the contractor's part number. Labelling can be carried out by applying a corresponding label or engraving in the direct field of vision (coordination with Hüller Hille required).

### 1.24 Capacity planning

When accepting the order, the contractor takes its capacity utilisation into account. Capacity planning is carried out with the aim of meeting the defined milestones. Capacity problems must be reported to the client immediately so that a solution can be worked out without delay.

## 1.25 Contact person

The responsible person at Hüller Hille is the contact person for the contractor.  
The contractor shall appoint a contact person for all technical matters. Requirements:

- Professionally competent
- Authorisation for independent decisions

## 1.26 Parts lists

All electrical, fluidic components and mechanical components must be documented in parts lists. For wear and spare parts, the order data and manufacturer's details must be provided.

Required documents

- Parts lists
- Wear and spare parts lists

## 1.27 Interfaces

Interfaces are mechanical, fluidic, electrical and control limits of a functional unit or a device. The interface descriptions available from HÜLLER HILLE must be taken into account. If deviations are necessary, these must be agreed with Hüller Hille.

### 1.27.1 Export licence

Components and devices that are subject to export authorisation must be labelled and identified separately. The corresponding documents must also be supplied.

## 1.28 Components

All components may only be installed in their original condition without modification. The manufacturer's instructions must be observed.

Components that are subject to export authorisation must be labelled and identified separately. The corresponding documents must also be supplied.

Customer-specific requirements for components have priority; if no requirements exist, components from Hüller Hille's preferred list must be used.

In the case of components, it must be ensured that these components can still be procured for a period of 10 years from final acceptance.

### 1.28.1 Deviations

Deviations must be shown separately and approved in writing by Hüller Hille.

Verbal agreements are not binding. Application of the deviation to further orders is excluded.

In the case of components that are used on the basis of exemptions, it must be ensured that these components can still be procured for a period of 10 years from final acceptance.

If this cannot be guaranteed, a fully compatible replacement part must be specified for each of these components. Affected components must be listed and submitted for approval.

#### 1.28.2 Components subject to mandatory testing

Components subject to mandatory testing must be listed in an overview list and labelled with the corresponding test intervals.

#### 1.28.3 Customer protection

If components are subject to customer protection by the manufacturer, this protection must be cancelled for our spare parts procurement.

#### 1.28.4 Service life

Mechanical components must be designed in such a way that a service life of at least 5 years is achieved when operated without shift limitation. Exceptions are only permitted for components that have been labelled as wearing parts or in special agreement with the client. As an exception, the profile rail guides of the main axes are excluded.

#### 1.28.5 Accuracies

The geometric accuracies of the components must be designed in such a way that trouble-free operation of the system is guaranteed.

#### 1.29 Noise and noise measurement

The object of the order must be designed in such a way that minimised noise generation is guaranteed. The action values and exposure limits in accordance with DIN45635 apply. If the permissible limit values are exceeded, it is the responsibility of the contractor to make suitable improvements. If no noise reduction can be achieved, the costs for noise reduction shall be borne by the contractor. Proof of the components to be provided must be drawn up and handed over by the contractor.

#### 1.30 Technical design documents

Plans and designs must be drawn up in accordance with applicable standards.

The client may inspect the individual technical documents at any time.

If design plans are submitted for approval, this does not release the contractor from the responsibility for appropriate and state-of-the-art design. The approval only concerns the design principle.

##### 1.30.1 Technical documentation

- Circuit diagram with control cabinet layout
- Fluid plans
- Construction drawings including sectional drawings, complete 3D models and 3D/2D drawings:
  - > Native CAD data (CAD system 3D - Siemens NX) according to Hüller Hille CAD design guidelines.
    - CAD guidelines must be requested from the design department at the start of construction.
  - > STEP file (alternatively as Parasolid)
  - > 2D drawings as dxf/dwg
  - > Overview drawing for E/V parts as dwg or dxf
- Installation plan
- Device manuals
- Data sheets for the installed components, including ROHS and Reach documents
- Test protocols
- Calculations and risk assessments

### 1.31 Spare and wear parts

Code numbers in the parts list for spare and wear part labelling, by the supplier, as follows:

- 0: No spare part or empty field. Standard part is not included in the E+V list
- 1: Wear part up to 2000 operating hours
- 2: Wearing part up to 4000 operating hours
- 3: Wear part up to 10000 operating hours
- 4: Spare part up to 20000 operating hours
- 5: Spare part greater than 20000 operating hours

#### 1.31.1 Example (code number 0)

- Standard standard parts, pins, discs

#### 1.31.2 Example (code number 1)

- e.g: Filter elements (coolant, cooling), filter paper

#### 1.31.3 Example (code number 2)

- e.g: Oscillating or rotating components or the neighbouring parts if they are subject to wear  
Examples: Anti-rotation devices, articulated levers, plain bearings, roller bearings, cam pieces, guide and clamping bushes n Cylinders (pneumatics, hydraulics)
- e.g: Drill bushes, sealing rings G, SD, bellows, roller blind covers, compressed air filters
- e.g: Couplings, pressure intensifiers, support elements
- e.g: Batteries

#### 1.31.4 Example (code number 3)

- Components that are stocked by major customers, agencies or service centres, e.g. spindles, axis motors, spindle motors, ball screw spindles, control components, electrical drive parts, etc: Highly stressed production parts, wipers, brushes, bearing bushes, ball screws, rotary feedthroughs, sight glasses, compression/tension springs

#### 1.31.5 Example (code number 4)

- e.g: Hoses, energy chains, photocells, light barriers, rotary encoders, lights, halogen lamps, relays, rubber springs, shock absorbers

#### 1.31.6 Example (code number 5)

- e.g: Handles, shifting elements, frame parts, chains, pulleys

### 1.32 Parts lists

All electrical, fluidic, control and mechanical components must be documented in parts lists. For wear and spare parts, the order data and manufacturer's details must be provided.

Required documents

- Parts lists
- Wear and spare parts lists

### 1.33 Maintenance, servicing

After production release, a spare parts list must be submitted within 4 weeks.

### 1.33.1 Documents for preventive maintenance

- Maintenance and servicing cycles in operating hours (see chapter 6.4.2 Tab.1: Maintenance intervals)
- Work instructions (description of the steps for carrying out maintenance or servicing) and maintenance drawings
- Contact for preventive maintenance

### 1.33.2 Maintenance cycle

The maintenance cycle must be adhered to in order to keep the machining centre in optimum condition. The following maintenance cycles are planned at Hüller Hille:

Table 1: Maintenance intervals

Interval	Example of typical maintenance work
<b>24 h or daily</b>	<ul style="list-style-type: none"> <li>• e.g. clean the work area and table of chips and debris with a hand brush.</li> </ul>
<b>120 h or weekly</b>	<ul style="list-style-type: none"> <li>• e.g. check the clamping heads and fixing pins on the table for wear.</li> </ul>
<b>500 h or monthly</b>	<ul style="list-style-type: none"> <li>• e.g. clean the supports and fixing pins at the loading area.</li> </ul>
<b>1250 h or quarterly</b>	<ul style="list-style-type: none"> <li>• e.g. checking the filters on the pneumatic maintenance unit.</li> </ul>
<b>2500 h or Half-yearly</b>	<ul style="list-style-type: none"> <li>• E.g. check bolts and turntable of pallet changer for wear.</li> </ul>
<b>5000 h or annually</b>	<ul style="list-style-type: none"> <li>• e.g. check ball screw drives for damage or noise.</li> </ul>
<b>10000 h or every 2 years</b>	<ul style="list-style-type: none"> <li>• e.g. replace oil for gearbox spindle cooling.</li> </ul>
<b>20000 h or every 4 years</b>	<ul style="list-style-type: none"> <li>• e.g. hydraulic unit Replace hydraulic fluid.</li> </ul>
<b>25000 h or every 5 years</b>	<ul style="list-style-type: none"> <li>• e.g. replacement of all hydraulic hoses.</li> </ul>
<b>40000 h or every 8 years</b>	<ul style="list-style-type: none"> <li>• e.g. replacement of the SEGE safety disc.</li> </ul>

The maintenance cycles of the external system components must be adapted to Hüller Hille's maintenance cycles. Any deviations must be justified and agreed with Hüller Hille.

## 1.34 Technical documentation and customer documentation

### 1.34.1 Documentation, general

- When the component is delivered, the preliminary assembly drawings and parts lists are sent to the Hüller Hille clerk in digital form.
- The customer documentation (see chapter 4) is an integral part of the designed component and will be delivered immediately upon request. Hüller Hille will only make any outstanding payment once the design is complete and complies with the valid specifications.
- The specifications on which the order is based or the information in the order must be taken into account when creating technical documentation and customer documentation.
- The Contractor's internal documents may in principle form part of the final documentation, provided that the conditions required by Hüller Hille are met.
- The design and development of the component is part of the order and is included in the total costs. The complete documentation (e.g. design drawings, assembly and individual part drawings, parts lists, etc.) shall become the property of

Hüller Hille and shall be available to Hüller Hille without restriction.

- Formatting of the documents and templates (e.g. font headers) is not prescribed, provided that the conditions required by Hüller Hille are met.
- Always create PDF drawing documents in black and white and in the original format size. Suppress layer colours during conversion.
- If project-specific documentation is required by the Hüller Hille end customer, the design and scope will be clarified in the start-up meeting. The resulting additional work will be offered by the contractor.
- Take into account any equipment specifications of the Hüller Hille end customer. Parts of these specifications are supplemented and/or replaced by the Hüller Hille end customer's equipment regulations. If required, these specifications are stated in the order or will be communicated by the responsible Hüller Hille representative. The resulting additional expenditure will be offered by the Contractor.
- All changes and additions must be included in the final documentation. This also applies to points that were first implemented at Hüller Hille. These changes will be communicated to the Contractor by the Hüller Hille clerk.

### 1.34.2 Scope of delivery

#### 1.30.2. 1General components

Document/Description	Format
Assemblies, individual parts and Master part drawings	DWG/DXF and PDF
Exploded drawing with note of E+V parts	DWG or DXF
Parts lists for the assembly drawings <ul style="list-style-type: none"> <li>• Labelling of spare and wear parts</li> <li>• Details of manufacturer and manufacturer part number</li> </ul>	XLSX and PDF
Assembly and operating instructions	DOCX and PDF
Loading and transport instructions	DOCX and PDF
Set-up instructions	DOCX and PDF
Maintenance instructions	DOCX and PDF

### 1.34.3 Parts lists

Parts lists must contain the following information:

- POS no. Corresponds to the item numbering in the assembly drawing
- Material number, part number / ID no. of the contractor
- Drawing number. Different drawing number for production parts
- Revision status. Possibility of documentation for chronological characteristics
- Quantity. Quantity (number of pieces and unit)
- Manufacturer. For purchased parts, details of the manufacturer and manufacturer part number
- Spare and wear part labelling. Spare and wear parts must be explicitly labelled in the contractor's parts lists.

See applicable document: "Technical specifications, general requirements".

#### 1.34.4 Language

The Contractor shall always deliver the documents in German and English and the additional languages ordered. The languages to be used can be found in the order or the specifications. The translation covers the entire customer documentation.

#### 1.34.5 Dates

Dates can be found in the milestone plan.

##### 1.34.5.1 Deadline delay

If deadlines are not met by the Contractor and Hüller Hille is charged by the Customer due to incomplete or late delivery of documentation, Hüller Hille shall pass the charge on to the Contractor.

#### 1.34.6 Structure

The overall documentation is divided into the structure described below. Carry out the file and folder naming as described.

Replace space with "\_".

Note: The folder designations and file names are written without umlauts! The documentation must always be supplied in this form.

Integrate supplementary documents in other languages into this structure.

Legend:

- **Project number with customer** = name of the folder
- **A-No.** = Hüller Hille material number
- **AD no.** = drawing number of the client

Level 1	Level 2
<u>E+V assembly drawing</u> Designation: A-No._AD-No. e.g. A.9999.9999_AD.9999.9999	
<u>Individual part drawings</u> Designation: A-No._AD-No. e.g. A.9999.9999_AD.9999.9999	<u>Individual parts in contact with the workpiece</u>
	<u>All individual part drawings for the client</u>
<u>Parts list</u> Designation: A-No._AD-No. e.g. A.9999.9999_AD.9999.9999	With declaration in the parts list of the E+V parts as E or V
<u>Sub-assembly model</u> Designation: A-No._AD-No. e.g. A.9999.9999_AD.9999.9999	

<u>Other Documents</u> Designation: A-No._AD-No. e.g. A.9999.9999_AD.9999.9999	(operating instructions, data sheets, etc ....)
Folder structure	Project No. Contractor
Folder name: Project no. Client Name Client Project details	Assembly drawings and parts list Sub-assemblies with parts lists and individual parts Calculations and other documents

Tab.2 "General structure"

### Component

Each component ordered must be stored individually in a separate folder with the described structure

*Tab. 2 "General structure".*

## 2. Labelling and safety

### 2.1 Normative references

When executing the order, the specifications applicable at the time of first placing on the market must be observed in accordance with the German Product Safety Act [ProdSG]:

- EU directives and regulations
- Laws and regulations
- Technical and other standards
- Generally recognised rules of technology that serve to protect people, animals, the environment, buildings and systems from hazards.

### 2.2 EC Declaration of Conformity

For complete machines or mechanical systems, the contractor must issue an EC declaration of conformity in accordance with Annex II, 1 A of Directive 2006/42/EC for machines; this also applies to labelling requirements in accordance with other EU directives.

The contractor must carry out CE labelling for interlinked machines, mechanical systems and automation systems (including old systems) that are linked to each other in terms of function, control and safety.

Applied standards must be listed.

### 2.3 EC Declaration of Incorporation

Deliveries of partly completed machinery or mechanical equipment must be agreed with the client before the contract is awarded. For partly completed machinery or mechanical equipment, the contractor must issue a declaration of incorporation of partly completed machinery in accordance with Annex II, 1 B of Directive 2006/42/EC. If the subject of the contract is not functional on its own, the interfaces described must comply with the essential health and safety requirements of Directive 2006/42/EC.

### 2.4 Risk assessment

Upon request, the Client may inspect the risk assessment for the subject matter of the order; this also applies to risk assessments of the Contractor's subcontractors.



## 2.5 Functional safety

### 2.5.1 Safety functions

Realised safety functions in accordance with EN ISO 13849-1 and their requirement rates must be listed. The achieved performance level (PL) of the safety functions must be indicated in an overview.  $(PL_{Soll} - PL)_{Ist}$ . The detailed determination of the PL must be submitted on request (SISTEMA file).

### 2.5.2 Safety-relevant components

All safety-relevant components must be listed together with their safety-related characteristic values.

Examples of characteristic values:

- $B10_D$
- $MTTF_D$
- PL
- PFH

The safety-related equipment must be designed for a service life of 20 years. Safety-relevant components that do not reach this service life must be agreed with the client. If approved, these components must be listed in the documentation with their expected replacement interval.

## 2.6 Determination of follow-up time

Two-hand controls or electro-sensitive protective equipment (e.g. light curtains) must be designed in accordance with EN ISO 13855. For mechanical systems that are controlled by the client, a control response time of 0.05 seconds must be taken into account when processing the signals.

## 3. Acceptance

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### 3.1 Preliminary acceptance

#### 3.1.1 General

- The Client reserves the right to pre-accept the object of the order at the Contractor's premises in consultation with the Contractor. Any defects identified during the preliminary acceptance must be rectified by the time the object of the order is delivered. Any deviations must be clarified with the Client.
- Preliminary acceptance at the Client's premises shall take place after integration of the subject matter of the order and in consultation with the Contractor. If the contractual agreements are not fulfilled during the preliminary acceptance, the preliminary acceptance shall be repeated. The associated costs shall be borne by the Contractor.
- In the case of newly developed components, the client shall always carry out a preliminary acceptance at the contractor's premises. A preliminary acceptance does not necessarily have to take place for recurring components. This decision is the responsibility of the client's person in charge and is noted in the order.
- The pre-acceptance includes the inspection of all relevant points listed in the specifications. Before the preliminary acceptance can take place, the relevant points in the specifications must be assessed and completed by the contractor. The relevant documents in the specifications must be completed by the contractor and returned to the client before the preliminary acceptance.

#### 3.1.2 First article inspection AD.0070.1833

Compliance with the relevant and numbered test dimensions is documented in a meaningful measurement report. The numbers of the test dimensions are shown in the measurement report. The measurement report is sent in digital form to the client's person in charge after the preliminary acceptance.

#### 3.1.3 Proof of function

If the function of the object of the order has been demonstrated in accordance with the task, it shall be deemed to have been accepted; this must be documented in writing. The preliminary acceptance of the object of the order does not constitute the final acceptance.

### 3.2 Installation and commissioning

Installation, attachment, alignment and commissioning of the ordered item shall be carried out in accordance with the respective contractual agreements and must be agreed with the client.

### 3.3 Final acceptance

Final acceptance takes place in consultation with the end customer. The prerequisite for this is the fulfilment of the contractual agreements from the general, technical and project-related specifications.

## 4. Customer documentation

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### 4.1 Specifications for customer documentation

The customer documentation must be executed in accordance with the legal requirements.

- EN 82079-1, VDE 0039-1. Preparation of instructions for use - Organisation, content and presentation. Part 1: General principles and detailed requirements
- Hüller Hille document AD.0142.3940 (see Appendix 1). Hüller Hille implementation regulations for technical documentation
- Directive 2006/42/EC. Documentation requirements of Directive 2006/42/EC for complete and partly completed machinery
- Other applicable standards and regulations according to the order

## 5. Control technology

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### 5.1 Archiving

Archives of the created control unit software must be provided. It must be possible to use these to restore functional readiness if the control unit is replaced and loaded.

### 5.2 Software structure

The software must have a clear and modular structure in accordance with IEC 61131-3.

## 6. Software

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The software must have a clear and modular structure in accordance with IEC 61131-3.

### 6.1 Software documents

- Description NC programme
- Description PLC programme
- Assignment lists
- Parameter lists
- List of machine data
- List of all alarms with cause, effect and remedy
- Backup data carrier for recommissioning
- Software subject to licence (if required)

## 7. Construction documents

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### 7.1 Technical design documents

Plans and designs must be drawn up in accordance with applicable standards.

On request, the client may inspect the individual design documents prior to the start of assembly.

If design plans are submitted for approval, this does not release the contractor from the responsibility for appropriate and state-of-the-art design. The approval only concerns the design principle.

## 8. Electrics

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### 8.1 Electrical equipment

The electrical equipment such as system parts, assemblies and components must correspond to the state of the art at the time of acceptance.

The electrical equipment must be designed in accordance with EN 60204-1 (VDE 0113-1) in the currently valid version.

The electrical installation and wiring must be carried out in accordance with the relevant electrical engineering standards and regulations.

Before handover to Hüller Hille, the tests must be carried out in accordance with EN 60204-1 (VDE 0113-1) "Electrical equipment of machines". The test reports must also be supplied.

### 8.2 Connection data and mains connection

The customer must be informed of the connection data (maximum power, rated current, back-up fuse) before delivery.

The mains connection of the machine system must be carried out in the same way as for the machining centre. The specifications in the order are authoritative.

Germany:

- Supply voltage: 3x400V / N / PE
- Frequency: 50Hz
- Socket: 230V (VDE-SCHUKO)

Other countries:

- Supply voltage: as specified in the order
- Frequency: as specified in the order
- Socket: as specified in the order

The mains supply cable is fed into the control cabinet by the end customer. The cable entry of the supply cable to the control cabinet must be recognisable in the installation plan. This should preferably be variable (e.g. on the side or at the bottom).

### 8.3 Main switch

Main switch must comply with VDE0113:

- Mechanically operated
- Lockable

The connection can be made directly to the main switch or to terminals upstream of the main switch. When connecting with terminals, provide additional terminals for the N conductor and the protective earth conductor (PE) in addition to the phase conductor terminals. The terminals must be labelled as follows:

- L1, L2, L3, N, PE
- Note "Live"

Other connection variants must be clarified with Hüller Hille

### 8.4 Electrical installation compartments (switch cabinet, control panel, small housing)

The colouring of the electrical installation spaces must be carried out in accordance with the order. The size and arrangement of the switch cabinet must be coordinated with the design of the overall system.

The design of the switch cabinet must be at least IP54. Small plastic enclosures are not permitted.

Open threaded holes must be sealed with screw plugs. Sealing glands for cable entries must be of an oil-resistant design and must not be installed facing upwards.

Transport lugs must be fitted to free-standing switch cabinets. A suitable document tray must be provided for storing plans and data carriers inside the enclosure. Locks on electrical installation compartments must be designed with double-bit locking. The 7 mm square design is only approved for mechanical installation spaces.

The choice of galvanised mounting plates or rail systems is optional. Superstructures on doors and side walls are not permitted. It must be possible to replace built-in devices without dismantling other parts.

The heat development and heat sensitivity of the components must be taken into account when designing the switch cabinet.

Enclosures containing electrical equipment must be permanently labelled with a warning sign with a lightning arrow corresponding to the ambient conditions in accordance with DIN EN 60204-1.

Only electrical components may be installed in the control cabinet or control panel. Installation of the NC control unit in a separate control panel or the control cabinet housing is optional.

## 8.5 Electrical installation

EMC-compliant design of the installation and cable routing must be observed. Electrical interfaces of the individual systems must be designed to be pluggable and labelled. Connecting cables to the individual systems must be laid in suitable, oil-resistant hoses, cable trays or sheet metal ducts for mechanical protection.

Protect cables in the chip area with steel mesh hoses with a PUR inner part or with stainless sheet metal ducts. Cables must be routed using cable fasteners.

It is not permitted to remove plugs, disconnect or connect individual cables for despatch or installation of the system.

### 8.5.1 Protection against soiling

Plugs must be installed in such a way that no liquid can penetrate. Blanking plugs must be supplied to prevent the ingress of foreign bodies into connectors.

Circular connectors may only be tightened using the special tools provided.

All lines and cables are made of PUR or are suitable for dragging.

Connection cables for analogue switches, motor and encoder systems must be shielded. Cables and individual wires must be permanently labelled at both ends with a destination designation. Outgoing control cables must be routed to terminal strips, installation distributors or plug-in systems.

Only one cable may be connected to terminal points of terminal blocks. Terminals and plug connectors must be permanently labelled. Compliance with the circuit diagram must be ensured. Unused cores in multi-core cables must be connected to terminals on both sides. Wire end ferrules must be used for multi-wire connections. Push-in technology is preferable.

## 8.6 Wire colours

Specified wire colours for single-wire wiring based on EN 60204-1:

- Green-yellow: Protective conductor
- Black: AC and DC main circuits
- Red: Control circuits alternating current
- Light blue: Neutral conductor
- Blue: Direct current control circuits (24VDC). Exception: Direct current load supplies with voltages greater than 24V -> black.
- White-blue: Control circuits direct current (0VDC)
- Orange: Live circuits that are not switched off by the main switch (external voltage).

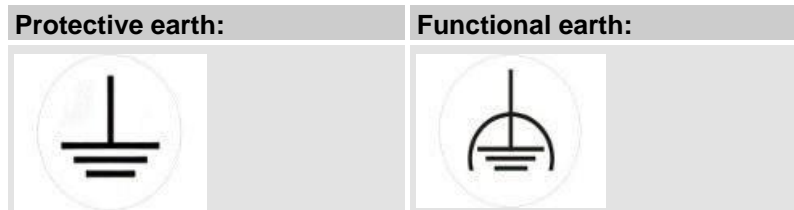
Label the entire length orange (e.g. with orange protective conduit). This does not apply to the protective conductor (green/yellow) and neutral conductor (light blue) Use single wires directly with orange insulation.

## 8.7 Voltage on the control circuit

The control voltage is 24 VDC.

## 8.8 Protective measures

Warning signs regarding electrical voltage must be attached. Signal and analogue cables must be shielded close to the device and must not be used as potential equalisation. Protective conductors must be connected individually and labelled with destination markers. The potential equalisation must be brought together at a central point. Design in accordance with the current EMC Directive. Protective and functional earthing must be distinguished and labelled in accordance with EN 60204-1.



DC consumers with a load > 2 A must not be connected to control circuits and must be protected with an appropriate fuse.

Transformers must be protected primarily by motor circuit breakers and secondarily by circuit breakers. No fuses may be used to protect the circuits. No automatic restart may be initiated after mains voltage failure and voltage recovery.

The effectiveness of the protective measures must be recorded with a corresponding VDE measurement.

## 8.9 Safety switches Safety gates, safety fences

Wire the safety switches of safety gates and safety fences 2-channel to safety relays or integrated safety technology with 24 VDC.

## 8.10 EMERGENCY stop

The emergency stop circuit must be 2-channel and wired to a safety relay or integrated safety technology with 24 VDC. In the event of an emergency stop, each axis or movement must be braked as quickly as possible. Drives must not run out or coast to a halt, but must be brought to a standstill by taking appropriate measures. Emergency stop control devices must supplement other protective measures and must not replace them.

The following points must be agreed with Hüller Hille:

- EMERGENCY stop concept for the mode of operation of the EMERGENCY stop device
- System components that are shut down with an EMERGENCY stop
- Number and mounting location of the push-buttons

## 8.11 Equipment labelling

Equipment labelling is carried out in accordance with EN 81346-2. Components must be permanently and legibly labelled within electrical installation spaces at the installation location and on the component.

Electrical components outside the installation spaces (switches, motors, valves, pressure switches, etc.) must be permanently labelled (engraved or lasered) at the installation location and on the connection cable. Concealed devices must also be labelled on the panels.

The labelling of the components must correspond to the circuit diagram. Labels may not be affixed in wet areas.

## 8.12 Enclosure cooling

The system must remain fully functional at an outside temperature of 10°C to 40°C. If necessary, an enclosure cooling system must be installed.

# 9. Fluid

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## 9.1 Fluidic equipment

The fluidic equipment such as system parts, assemblies and components must correspond to the state of the art at the time of acceptance. The fluidic equipment must be designed in accordance with EN ISO 4413 and EN ISO 4414 in the currently valid version. The design of the fluidic constructions and installations must be realised in accordance with the relevant standards and regulations.

The fluid technology equipment must be designed in accordance with EN ISO 4413 and EN ISO 4414 in the currently valid version. The design, execution and installation must be realised in accordance with the relevant standards and regulations.

# 10. Mechanics

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## 10.1 Mechanical equipment

The mechanical equipment such as system parts, assemblies and components must correspond to the state of the art at the time of acceptance.

## 10.2 Safety of the construction

The construction must be designed safely in accordance with DIN EN ISO 12100.

## 10.3 Feed drives

- High positioning accuracy
- Designing a service-friendly construction
- Low noise emission
- Jerk-free at low speeds
- High static and dynamic rigidity
- Insensitive to any disturbance variables and displacements
- Use of energy-efficient drives

## 10.4 Linear guides

- Do not fill screw holes in linear guide rails
- Design so that guide elements can be replaced in a service-friendly manner
- Select sealing and lubrication of the guideways to suit the application
- In the event of contact with cooling lubricant and chips, equip the guideways with additional wipers
- Use low-maintenance, grease-lubricated guideways
- Labelling guides with Hüller Hille article number A.XXXX.XXXX
- Protect guideways from soiling
- Guideways of the main axes are designed for at least 50,000 h L10h

On feed units in wet areas, run the entire length of the guideway at least once a day. Otherwise, there is a risk of solid residues forming on parts of the guideway that are not in constant use. The residues can no longer be wiped off. This can result in damage.



#### 10.5 Ball screws

- Ball screws must be labelled with Hüller Hille article number A.XXXX.XXXX on the nut
- Provision must be made for manual adjustment of the ball screw drive
- It must be possible to change the ball screw drive without dismantling neighbouring components

#### 10.6 Drive belt

- Use oil-resistant belts, as contact with media (oil, cooling lubricant, etc.) cannot be ruled out
- It must be possible to retension drive belts
- Information on the belt tension must be documented

#### 10.7 Rack and pinion drives

- Rack and pinion drives must be designed in such a way that no foreign bodies can remain on the toothing

#### 10.8 Linear direct drives

- Protect the permanent magnets of the drive so that no contact with media can occur
- Use labelling to indicate the magnetism of the secondary parts
- If there is a hazard due to the drive no longer being self-locking, check and document the hazardous situation separately
- Provide sufficiently dimensioned clamping elements

#### 10.9 Energy guiding chains

- Use cables and hoses suitable for energy chains
- Route hoses and cables in separate bars
- No crossing of hoses and cables in the cable drag
- Hoses and cables must be strain-relieved. C-rail version with hold-down device.
- Observe the manufacturer's minimum static and dynamic bending radii
- Ensure EMC-compliant installation and distribution

#### 10.10 Lubrication

- Use maintenance-free elements, if not possible, carry out lubrication as automatic, pressure-monitored centralised lubrication Coordination of the lubrication must be carried out with Hüller Hille.
- Lubrication points and lubrication systems must be accessible for maintenance work and must be refillable during operation.
- Attach a lubrication plan with all lubrication points of the automation system in a clearly visible location.
- Execution of the lubrication plan must be language-neutral

## 10.11 Workpiece handling

- Manual feed of transport equipment or pushing of parts on a conveyor system must be possible even if the drives fail
- Make conveyor belts easy to re-tension. Eliminate hazards such as feed points and pinch points
- If electrical, pneumatic or hydraulic power is lost or in the event of an emergency stop, the grippers must still be able to hold the workpiece securely
- Provide an adjustment option for the workpiece fixture for handling units
- Vertical handling units must be equipped with clamps or brakes
- Portal frames must be adjustable via adjustment plates and adjustment screws
- Lay out parts in contact with the workpiece in such a way that the workpiece is not damaged. Any deviations must be agreed with the customer.
- It must be possible to replace the workpiece driver quickly and easily
- Provide parts storage of sufficient size and coordinate with Hüller Hille.
- Execute part grippers with sensors for checking the presence of workpieces
- Provide a description of the transport process with time details with the attachment
- The installation and dismantling of the system at Hüller Hille and at the customer's premises shall be carried out by the contractor
- Permanently label the workpiece carriers with clearly legible signs

## 10.12 Protective device

- No functional modules may be mounted or attached to protective devices
- Frequently used doors should be designed with hinges
- For movable guards, interlocking safety switches with guard locking must be used in accordance with the Hüller Hille preferred list

## 11. Devices

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### 11.1 General information

This document describes the basic technical requirements of the client for the procurement, execution and scope of services for devices and the associated components (hereinafter referred to as the subject matter of the order) for the contractor.

Applicable document: "Device enquiry with functional description, technical specifications, general requirements".

### 11.2 Scope of services

- Selection and implementation of the fixture concept including interface to the machine
- Independent coordination of interfaces, cycle time and document exchange with Hüller Hille
- Preparation of documentation according to Hüller Hille specifications
- Preliminary acceptance

### 11.3 Execution

The following points must be agreed with the relevant specialist departments of the client:

- Changes due to the workpiece or its handling
- Changes/additions to the contractor's media lines

### 11.4 EMERGENCY stop

- The grippers must still be able to hold the workpiece securely if electrical, pneumatic or hydraulic power is lost or in the event of an emergency stop

### 11.5 Workpiece specifications

The system must be designed for the workpieces listed in the project-specific specifications. If the workpiece specifications are not adhered to or are changed by the customer during the course of the project, this may result in a functional impairment within the system and the system may have to be adapted or even completely redesigned. In this case, all additional costs associated with the points mentioned must be borne in full by the party responsible.

### 11.6 emissions

#### **Liquid-carrying power systems**

Liquid leakage through a burst pipe system must be prevented. A solenoid valve must be installed upstream of the system in the liquid-carrying pipe systems in the supply and return lines. These solenoid valves must be closed when the system is switched off.

### 11.7 Quality requirements

Hüller Hille is a VDA 6.4-certified supplier of high-quality machining centres. The quality of the products is guaranteed by a modern and effective quality assurance system. The quality competence of the supplier is therefore taken into account when awarding the contract. The contractor is regularly inspected after the award of contracts to ensure that the quality requirements are met.

are fulfilled. The delivered systems are only accepted as soon as the machine and process capability is guaranteed. (For details, see the currently valid quality assurance agreement)

#### 11.8 Cycle time

The cycle times of the system must be designed by the contractor in such a way that the cycle time of the machining centre is guaranteed. A cycle time reserve of 15 to 20% must be taken into account for any subsequent process optimisation. In the event of deviations or unacceptably high costs, this must be recorded in the machine-specific specifications.

#### 11.9 Plant utilisation and determination period

Unless otherwise agreed, the use of the facility is planned as follows:

- 250 working days per year with 24 working hours per working day
- At least 80% should be achieved at final acceptance
- 98 % must be reached after 4 months or 2,000 operating hours

## 12. Mechanical systems and automation

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In the following chapters, the object of the order is referred to simply as an "installation".

### 12.1 Scope of services

- Selection and implementation of the automation concept including the interface to the machine
- Independent coordination of interfaces, cycle times and document exchange with Hüller Hille
- Development and delivery of the initial equipment of stacking pallets (according to order)
- Preparation of documentation according to Hüller Hille specifications
- Preliminary acceptance
- Installation, commissioning and acceptance of the system
- Assembly and dismantling at Hüller Hille, reassembly at the end customer's premises

### 12.2 Execution

The following points must be agreed with the relevant specialist departments of the client:

- Changes due to the workpiece or its handling
- Hand-held control unit (depending on the control type and configuration of the overall system)
- Signals to the customer's loader interface
- Charger interface bus system (Profibus / Profinet)
- Selection of servomotors and control technology

#### 12.2.1 Execution of the cabling

Shielded cables must be used for the following components:

- Motors
- Measuring and encoder systems
- Bus systems n Analogue or other interference-sensitive components

### 12.3 Interfaces

Communication between the system and the machining centre takes place via Profibus or Profinet in accordance with the currently valid documentation for the "Interface for Automation".

The corresponding bus coupler is integrated in the Hüller Hille processing centre. The same bus system must be used for other participants within the system. Other bus systems are only permitted after consultation and written approval. The design of the interface, interface assignment or other interfaces between the system and the Hüller Hille processing centre must be specified in writing.

The machining centre must be defined at the start of the project and approved in writing.

### 12.4 Protective devices

The safety switches of safety doors, safety fences and other safety-relevant protective devices must be wired 2-channel to the safety technology with 24VDC.

## 12.5 EMERGENCY stop

The emergency stop circuit must be 2-channel and wired to a safety relay or integrated safety technology with 24 VDC. In the event of an emergency stop, each axis or movement must be braked as quickly as possible. Drives must not coast or coast to a stop, but must be brought to a standstill by taking appropriate measures.

Emergency stop control devices must supplement other protective measures and must not replace them.

Coordinate the following points with Hüller Hille:

- EMERGENCY stop concept for the mode of operation of the EMERGENCY stop device
- System components that are shut down with an EMERGENCY stop
- Number and installation location of the buttons

## 12.6 Malfunction and operation

If there is a fault in the system or if it is not possible to deposit a processed part, processing must be ended at the end of the next cycle. In the event of malfunctions in the system or the machining centre, enable diagnostics by correspondence. It must be possible to perform a simple home position run of the system and the machining centre using a button. The necessary retraction strategies and the handling of workpieces in progress must function from any situation.

### **Deactivation of automation**

The control of the machining centre is superordinate to the control of the system, i.e. the automation cell can be deactivated using a key switch. The system must then always be in the home position. This prevents collisions.

### **Manual operation**

Manual operation of the machining centre must be guaranteed (function independent of automation) and agreed with Hüller Hille. The applicable safety regulations must be complied with.

## 12.7 Workpiece specifications

The system must be designed for the workpieces listed in the project-specific specifications. If the workpiece specifications are not adhered to or are changed by the customer during the course of the project, this may result in a functional impairment within the system and the system may have to be adapted or even completely redesigned. In this case, all additional costs associated with the points mentioned must be borne in full by the party responsible.

## 12.8 Parts supply and removal

The parts supply and parts removal must be realised and delivered in accordance with the project and system-specific specifications from the point of view of a technically and economically optimal design. Clarify questions regarding mechanical and electrical interfaces, machine changeover times and exchange of the necessary documentation in co-operation with Hüller Hille.

Procedure:

- Unmachined or pre-machined parts are delivered without damage and in the correct position.

to the interface to the machine.

- Processed parts are removed from the machine interface and fed to the pallet system or discharge device without damage or dripping.
- The system must be designed to ensure that the entire system (machining centre and system) can run independently for the remaining time required by the customer.

## 12.9 SPC ejection and NIO handling (optional)

Both SPC ejection and the handling of NOK parts should be seen as options that can be implemented on a project-specific basis if necessary. It must be possible to discharge NIO parts without causing damage.

## 12.10 emissions

### **Liquid-carrying power systems**

Liquid leakage through a burst pipe system must be prevented. A solenoid valve must be installed upstream of the system in the liquid-carrying pipe systems in the supply and return lines. These solenoid valves must be closed when the system is switched off.

### **Drip tray**

Media discharge (oils, cooling lubricants, other substances) from the system must be prevented by suitable design measures. A drip tray must be installed between the system and the machining centre. The drip tray must be designed in such a way that a gradient directs the coolant into the drip tray of the system or into the drip tray of the machining centre. Additional collection systems must be provided below the path of workpieces, workpiece carriers, other components containing coolant and existing supports and gantries; baffle plates must be used if necessary. The drip pans, drip and guide plates must be designed in such a way that no cooling lubricant can flow onto the hall floor or onto personnel. Removal positions must be easily accessible. In the case of removable drip pans, pay attention to the maximum weight and handling during removal. The tray should have handles that are correctly positioned and ergonomically fastened. No coolant may escape from the attachment.

If the system is installed in a drip tray, the fastening of the installation points must be taken into account. The design must be such that no coolant can penetrate into the ground. In general, the relevant national regulations and laws must be observed, in particular those of the Ministry of the Environment on "Requirements for drip pans". Drawings of the drip pans must be submitted to Hüller Hille. The design must take into account the transport options, material, size and collection volume. Customer-specific requirements such as gradients must be observed.

### **Aerosol formation**

If blowing off takes place, e.g. in a separate station or with the door open, the problem of aerosol formation must be taken into account. In this case, it must be clarified with Hüller Hille how the resulting aerosol can be removed. If necessary, the end customer must be informed about the formation of aerosol. The scope of delivery and design of the drip pans, drip trays and baffle plates must be agreed with Hüller Hille.

## 12.11 Quality requirements

Hüller Hille is a VDA 6.4-certified supplier of high-quality machining centres. The quality of the products is guaranteed by a modern and effective quality assurance system. When awarding the contract, the

Quality competence of the provider is taken into account. The contractor is regularly inspected after the award of contracts to ensure that the quality requirements are met. The delivered systems are only accepted as soon as the machine and process capability is guaranteed. (For details, see the currently valid quality assurance agreement)

#### 12.12 Cycle time

The cycle times of the system must be designed by the contractor in such a way that the cycle time of the machining centre is guaranteed. A cycle time reserve of 15 to 20% must be taken into account for any subsequent process optimisation. In the event of deviations or unacceptably high costs, this must be recorded in the machine-specific specifications.

#### 12.13 Plant utilisation and determination period

Unless otherwise agreed, the use of the facility is planned as follows:

- 250 working days per year with 24 working hours per working day
- At least 80% should be achieved at final acceptance
- 98 % must be reached after 4 months or 2,000 operating hours

#### 12.14 Availability

The technical availability of the machining centre is determined on the basis of VDI guideline 3423. Only individual machines and not interlinked systems are considered. The technical availability must be guaranteed by the manufacturer of the system at 98 % without shift limitation. If the promised values are not achieved, the further procedure is determined in a joint discussion. If availability is significantly affected by repeated faults in individual components (hidden defects) within the system, the warranty period shall be extended by the time it takes to rectify the faults. Necessary changes to the system as well as more extensive optimisation and test phases shall be at the expense of the Contractor.

The operator of the system must consider and fulfil the following requirements:

- Precise compliance with all regulations from the operating and operating instructions
- Authorised machine use and preventive maintenance
- Use of qualified personnel for operation, maintenance and programming
- Identify the cause and time of failure by means of conclusive documents (e.g. BDE, printer, logbook, trace)

## 13. Robot systems

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### 13.1 Requirements for robot systems

Purchased robot systems and automation systems must fulfil EN ISO 10218-1 "Industrial Robots Safety Requirements, Part 1 Robots". Other applicable directives, standards, regulations and technical rules must be complied with.

### 13.2 Integration of robot systems

The robot system must be integrated in accordance with EN ISO 10218-2.



## 14. Services provided by the supplier

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### 14.1 Services during the warranty period

- Personnel guarantee on site.
- Material warranty on site.
- Service response after notification from Hüller Hille within 24 hours.
- If Hüller Hille is to provide support, the Supplier must provide Hüller Hille GmbH with the technical documentation for the replacement or repair instructions, as well as setting values and a list of the tools required.
- The value limit for the assumption of costs must be determined by the supplier. This also includes transport and customs clearance from abroad by the supplier.

### 14.2 Services after the warranty period

- Spare parts should be available for at least 10 years.
- Notifications of discontinuation by suppliers should be sent to Hüller Hille GmbH at least 6 months before the discontinuation comes into effect. Replacement components for discontinued products must also be named.

## 15. Preferred components (see specific specifications)

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## 16. Change history

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25.02.2021 Changes to chapter 11 Devices with Sebastian Kaufmann 24.03.2021

Additions to chapter 1.2 and change logo Gunther Deißler

## 17. Attachments

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### Appendix 1:

### **Directive on the supply of Documentation from suppliers**

1. Delivery: Documentation must comply with the current EU Machinery Directive!
2. Labelling: The documentation and CD version are labelled with our article number or drawing number and order number.
3. Number and language: The number and language(s) must fulfil the requirements of the (This is specified in the order), in addition a set of the documents must be supplied digitally and in German on CD in PDF format (operating instructions) and in Tiff or PDF format (drawings).
4. Design: The documents are double-sided in A4 format, Punched 4 times and delivered in a folder with index and table of contents.
5. Delivery: The documents are to be sent with the equipment with to our documentation department by separate post.
6. Maintenance: In the case of maintenance and servicing descriptions, all Describe the action steps, tools and aids and hand them over digitally to the client in a separate manual (as WORD or PDF).
7. E+V lists Replacement and wear parts lists are labelled (E or V). digitally to the client in an Excel file.

If document numbers are required, these must be requested in good time from our drawing administration department. (Tel. 06261 66 277 or 66 582)

If you have any questions or queries, please contact our documentation department. (Tel.: 06261 66 277 or 66 582)

