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WALDRICH COBURG – specifications for electrical equipment

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1 General Requirements

These specifications form an integral part of our written order.

By accepting the order, the contractor undertakes to apply the following provisions and to fulfill the requirements. If they are not fulfilled, the order shall be deemed not to have been properly executed.

The design and any significant design changes must be coordinated through the Purchasing Department with the WALDRICH COBURG departments responsible for mechanical and electrical design.

2 Standards and Regulations

- The system must be designed and constructed in accordance with the applicable DIN/VDE regulations and the applicable EC directives.
- IEC 60204 (Electrical Equipment of Machines) and IEC 60038 (Standard voltages) in their currently valid versions must be complied with.
- In general, the system must comply with Directive 2014/30/EU (EMC Directive). This directive defines the characteristics and capabilities that electrical equipment must possess in order to function satisfactorily in its electromagnetic environment without itself causing electromagnetic interference that would be unacceptable for other equipment in the same environment.
- Furthermore, accident prevention regulations must be observed.
- The system to be delivered must be designed in such a way that a subsequent CE declaration of conformity for the entire machine is possible (see also Regulation (EU) 2023/1230).
- Special requirements, if any, will be specified separately in the order.

3 Documentation

- Unless otherwise agreed in our order confirmation, the electrical schematics and installation diagrams must be sent to the WALDRICH COBURG Electrical Design Department for review and written approval prior to the start of component manufacturing.
- Valid and up-to-date circuit and installation diagrams, including specifications regarding power and power factor, must be provided to WALDRICH COBURG no later than upon delivery of the machine or system components. These diagrams must include all settings for the components used (e.g., switch settings). Unless otherwise agreed, a bill of materials in German and English (in MS Excel format) must be submitted to WALDRICH COBURG along with the plans, as well as the documentation from subcontractors (e.g., operating instructions/data sheets for electrical components, etc.) in a suitable format.
- PLC/NC programs and required parameter settings for assemblies (e.g., drive parameters) must be included with the documentation on a data storage medium and additionally transmitted digitally to the WALDRICH COBURG electrical design department. Updated software versions must be provided.
- After acceptance of the system, the revised electrical schematics must be delivered to WALDRICH COBURG within 4 weeks.
- Connections between individual machine components and the machine, and vice versa, must be routed to a defined transfer point, which is designed as a plug connection.
- When drive motors are used, the complete data sheets must be included with the documentation. This also includes calculation values for the drive design, specifying the maximum mechanically permissible torques.
- Furthermore, a cable list or suitable documentation must be provided that allows each cable on the system to be identified, replaced in the event of a spare part requirement, and assembled without additional specifications (specifying length, type, connector type, supplier, and order number).

4 Additional information on supplier components

For the supplier components listed below, the specified details regarding the agreed-upon deadlines must also be provided; the specifications in accordance with the WALDRICH COBURG requirements must be adhered to.

Regarding the following machine components:

- Chip conveyors,
- Exhaust extraction systems,
- Coolant systems,
- centrifuges,
- Filter systems,
- Hydraulic systems,
- Protective enclosures / protective doors (manual / automatic),
- Lubrication units,
- Tool change systems,
- Workpiece clamping devices,
- Operating platforms / personnel lifts

the following information is also required:

- Voltage + Frequency (with tolerance specified),
- Power requirement / Current consumption / Power factor,
- Star/delta start possible/required,
- Connection cross-sections and pre-fuse,
- Signal lines / power lines / cable types in accordance with the WALDRICH COBURG specifications,
- Connectors / terminal boxes in accordance with the WALDRICH COBURG specifications or circuit diagram,
- Pin assignment,

- Installation locations / transfer points,
- Cable routing (restrictions regarding lengths and cable routing),
- Required EMC measures,
- Motor data with manufacturer serial numbers,
- Information on applicable design specifications,
- For individual pump control: specifications for motor protection switches and contactor size,
- for wiring/installation by WALDRICH COBURG: technical data for all electrical components.

5 Electrical Specifications

- All electrical and electromechanical components necessary for operation are installed, wired, and adjusted to be fully functional.
- The components, including their cabling, must be protected from chips, cooling lubricants, etc., and arranged so they are easily accessible.
- Sufficient and user-friendly disconnect points (plugs, terminal boxes, etc.) must be provided for the installation/removal of the system or system component.
- All mounting locations, cable routing, and connection points must be coordinated with WALDRICH COBURG well in advance of installation.
- Any necessary cable bushings must be designed so that cables can be routed through them without disconnecting plug connections.
- Separate installation and separate cable and connector assignments must be ensured in accordance with:
 - Power cables for drives (shielded if necessary),
 - Measurement systems / sensors (shielded cables),
 - digital sensors/actuators,
 - analog sensors/actuators.

must be ensured.

- **Dragging chains:**
According to WALDRICH COBURG specifications, strain relief must be installed at the beginning and end of the drag chains. Only highly flexible drag chain cables (see also point 6) may be used in the drag chains.
- **External voltages:**
Components that are powered by external voltage sources and remain energized after the system is shut down must be marked with orange wiring.
- **When wiring the electrical components, labeling must be performed in accordance with the WALDRICH COBURG circuit diagram, provided that these are shown there.**
- **Wire markings must be performed in accordance with standards and consistent with the circuit diagram.**
- **Internal component labeling:**
All electrical and electromechanical components must be identified by labels permanently attached to the system. For components mounted behind covers, the same label as on the component must also be affixed to the cover.
- **Environmental conditions:**
 - All components used must be able to withstand the operational stresses caused by oils and coolants/lubricants on a permanent basis.
 - The following ambient temperatures apply: +5°C to +40°C.
Any deviating ambient temperatures must be specified separately.
- **Reserves:**
Sufficient reserves must be provided in control cabinets and enclosures (at least 10%). Notwithstanding the above, additional standard requirements must be observed (e.g., UL508A).
- **Protection class: min. IP 65.**

- **Connection requirements:**
WALDRICH COBURG provides a 3-wire connection (3 phases and PE) for peripheral devices. If a neutral conductor is required for a supplier component, it must be provided within the component itself (e.g., via a transformer). WALDRICH COBURG provides protection via motor protection switches (up to a phase current of 25 A) or circuit breakers, or via NH fuses (> 25 A). A power rating specification including the rated current from the supplier is therefore mandatory.
- The use of a separate main switch to shut down peripheral equipment must be coordinated with WALDRICH COBURG.
- The starting current for drives with power ratings exceeding 5 kW must be limited during startup by appropriate measures (e.g., star-delta starting, soft starting, etc.). These measures must be implemented in the supplier's installation in such a way that control via the machine logic by Waldrich is not necessary.
The devices to be used (see also Section 6) must be coordinated with WALDRICH COBURG Electrical Design well in advance of the start of construction.
- When using electronic components (e.g., frequency converters), standard devices must be used so that a 2-year warranty or 10-year spare parts availability (from the second commissioning at the end customer's site by WALDRICH COBURG) can be guaranteed. These devices must also be coordinated with WALDRICH COBURG Electrical Design well in advance of construction commencement.
- **Lighting (see also Section 6.12):**
 - The number and position of lighting fixtures must comply with DIN EN 12464-1 or its currently valid version.
 - The machine lights must be wired to defined disconnect points. These must be coordinated with WALDRICH COBURG (installation location: see drawing of protective device).
 - Cable routing is the responsibility of the supplier.

The supplier is responsible for the design and overall functionality.

6 Equipment Specifications

In general, only brand-new devices—no discontinued or phased-out models—are to be used in their original condition. Spare parts availability must be guaranteed for a minimum of 10 years for all components. The following device brands and models are to be used, unless special provisions apply:

6.1 Power supply

- Main switch, manually operated: Siemens, Wöhner, or ABB

6.2 General cabinet materials

- Connectors : Harting, type HAN ES 10-, 16-, or 24-pin
- Terminals : WAGO (spring-loaded terminals),
- Motor protection switch : Siemens,
- Fuses : Siemens.

6.3 Converter technology

➔ Standard type:

- Manufacturer, type series : Siemens, Sinamics G120
consisting of preferred type:
 - Power module and a CU,
compatible with the application, featuring a failsafe function,
including
 - BOP,
 - PC drive connection kit.

➔ Special applications in the field of fluidics/air technology:

- Manufacturer, type series : Kostal, exact model to be determined

➔ Special applications in the field of food processing:

- Manufacturer, type series : GFA, specific or other model upon consultation

 The use of inverters from Kostal or GFA requires approval.
Please request the appropriate approval from our technical departments.

6.4 Three-phase servo motors

- Manufacturer, type series : Siemens, 1FT7 or 1FK7 motors,
other manufacturers and models available upon request
- Motor encoder : Multiturn absolute encoder (2048 pulses/rev) with EnDat
interface or Drive-Cliq interface
- Motor power connector : Intercontec,
- Motor encoder connector : Intercontec, 17-pin or
DriveCliqu connector
- Drive family : Siemens, Sinamics S120.

6.5 Three-phase asynchronous motors

- Three-phase asynchronous motors must be designed in accordance with IEC 60038 with a voltage tolerance of $\pm 10\%$.
- The standard voltage for motors used in
 - 50 Hz systems: 400 V
 - 60 Hz systems: 460 V.
- Motors with power ratings ≤ 5 kW must be equipped with plug connections (HAN Drive), motors with power ratings > 5 kW must be equipped with terminal connections.
- For three-phase motors, direction-of-rotation arrows must generally be affixed.
- If the motor is operated via a frequency converter, the converter must be equipped with a suitable temperature monitoring system (typically PT1000 or PTC) that is connected directly to the converter and can be evaluated by it.
- Please note the legal requirements for minimum efficiency levels effective as of July 1, 2023, pursuant to the Ecodesign Regulation [\(EU\) 2019/1781](#):
 - Motors in the power range of 0.12 kW – ≤ 75 kW must have a minimum efficiency rating of IE3,
 - Motors in the power range of > 75 kW – ≤ 200 kW must meet at least IE4

6.6 PLC technology

When using PLC controllers,

- PLC controllers : Siemens, S7-1500 series
- PLC hardware : Siemens, ET200SP
- Communication via : ProfiNet I/O

to be used.

 The communication interface must be coordinated with WALDRICH COBURG

6.7 Direct measurement systems

- Manufacturer interface, : if possible, absolute measuring systems with an Endat2.1 interface,
preferably from Heidenhain, INA, AMO, Balluff, Siemens, other manufacturers upon request or approval
- Connectors : Upon consultation

6.8 Sensors

- Proximity switches, linear limit switches, etc.:
preferably from Balluff, Siemens; others upon request
- Inductive proximity switches:
preferably from Balluff,
specific model or other manufacturers upon request
- Pressure monitoring: if technically possible or practical,
then via analog pressure sensors with a 4–20 mA output signal,
preferably from IFM, Parker, Trafag, or others upon request
- General rule: Components with M12 connectors must be used,
others upon request.

6.9 Safety Technology

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Please note the relevant delivery instructions in our order texts regarding Machine enclosures. Unless otherwise agreed, WALDRICH COBURG will equip all doors with the necessary safety features. The following standard components are used:

For manual access doors

- Manufacturer, model series : Euchner, CET3-AR

Transponder-coded Unicode safety switch with mechanical interlock based on the closed-circuit principle and integrated evaluation electronics

- with M23 connector (RC18), 19-pin, straight or angled
- with PUR cable (16x0.5 + 3x1 mm²), cable length as required

Depending on the application, the following types are currently in use:

- without emergency release or with emergency release in short or long versions, depending on specifications from WALDRICH COBURG

CET accessories:

- | | | |
|---|--|-------------------|
| <ul style="list-style-type: none"> CET latch, | : CET-A-C/F
(for right- or left-hinged doors,
with emergency release, sliding lever from the rear) | Part No.: 106172 |
| <ul style="list-style-type: none"> CET actuator, | : CET-A-BWK-50X
(tamper-proof transponder integrated into the actuator) | Part No. : 096327 |
| <ul style="list-style-type: none"> CET emergency release (rotary knob) | : CET emergency release | Part No. : 103714 |

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The combination of switch type and its accessories depends on the door application and must be coordinated with WALDRICH COBURG in advance.

For automatic doors

- Manufacturer, type series : Euchner, CES...-AR

Transponder-coded, non-contact Unicode safety switch with integrated evaluation electronics

- Switch : CES-I-AR-U-C04-xxx Part No. : 119470/1/2/3

- Cable end (open or connector) and cable length as required

- Actuator : CES-A-BBN-C04 Part No. : 115271

for other safety functions

- Manufacturer, type series : Euchner, NZ2HB-xxx (with SR6 connector)

- ❗ The selection of the appropriate switching element depends on the function of the switch
and must be coordinated with WALDRICH COBURG in advance.

- Light barriers : Sick,
DETEC series,

Designed according to WALDRICH COBURG specifications

- Edge sensors : Mayser, Haake

If door control units are specified in the order text for protective enclosures, these must be equipped with the following Siemens components as standard:

Qty.	Component	Siemens Order No.	Waco Part No.
1	Empty housing 4 control stations	3SU1854-0AA00-0AB1	5-20900-01-264-0
1	Key switch, 3 positions	3SU1050-5BP61-0AA0	5-20900-01-189-0
1	Illuminated Pushbutton, Green	3SU1051-0AB40-0AA0	5-20900-01-268-0
1	LED module, green	3SU1401-2BB40-3AA0	5-20900-01-256-0
1	Emergency stop mushroom pushbutton, red	3SU1050-1HB20-0AA0	5-20900-01-053-0
1	Emergency Stop Label, Yellow	3SU1900-0BE31-0AA0	5-20900-01-286-0
1	Blind plug	3SU1950-0FA80-0AA0	5-20900-01-241-0
2	Switching element with spring-loaded terminal (Ö)		
		3SU1400-2AA10-3CA0	5-20900-01-280-0
4	Switching element with spring-loaded terminal (S)		
		3SU1400-2AA10-3BA0	5-20900-01-281-0
4	Mounting bracket	3SU1550-0AA10-0AA0	5-20900-01-182-0

6.10 Control / Indicator Devices

- Pushbutton / Indicator Elements : Schlegel, Siemens
- Two-hand control panel : Siemens, 3SU series
- Warning lights : Rittal
- Light columns : Rittal
 - Mounting element Item No. SG 2374.000
 - LED continuous light element RED Item No. SG 2372.001
 - LED steady light element YELLOW Item No. SG 2372.021
 - LED steady-state light element GREEN Item No. SG 2372.011

6.11 Cable

- Manufacturer : preferably from IGUS,
other manufacturers available upon request
- Features : Cable jacket material TPE or PUR,
PFAS-free

 Depending on the application, other properties such as drag resistance, minimum bending radius, etc., must be considered.

6.12 Lighting

Machine workspace or interior lighting

- Manufacturer, model series : Waldmann, MACH LED PLUS.seventy
 - Machine light MQAL 84S Item No. 113126000-00612973
 - Light fixture bracket set Item No. 408001876-00582065
 - M12 straight connector socket Item No. 336615019-00522018
 - M12 connection socket, angled Item No. 336615029-00522015

In control baskets / control platforms

- Manufacturer, model series : Same type as above or alternatively upon request
Waldmann, FLAT LED

In control cabinets

- Manufacturer : Rittal
 - System light 13W, 110-240V Item No. SZ2500.300
 - Connection accessories Item No. SZ2500.600

6.13 Installation materials

- Installation boxes : Rittal, Rose,
- Screw connections : metric,
- Connectors : Harting, other manufacturers upon request

6.14 Designations

All motors, sensors, actuators, and their cables must be labeled with black anodized aluminum plates featuring light-colored lettering,

- Component label : Aluminum, rectangular, 37 x 13 mm
- Cable label : Aluminum, round, diameter 30mm, thickness 1.2mm, hole 4.2mm

which must either be affixed to the component or attached to the corresponding cable using cable ties near the electrical component. They must be affixed in such a way that unambiguous identification is possible.

Inside the terminal boxes, the components must be labeled with smudge-proof adhesive labels. The labels must be affixed both to the component and to the mounting plate behind the component. The reason for this is to ensure that the component can be identified beyond doubt in the event of a fault and that the corresponding installation location can be located again after replacement. WALDRICH COBURG does not specify requirements for the adhesive labels, as these are usually not visible from the outside.

Note:

Examples of markings in the form of images are available from WALDRICH COBURG.

7 Change History

The change history up to version V5.3 can be traced in the previous specifications.

Version change from V5.3 to V6.0:

- The “Documentation” chapter has been revised
- The “Electrical Specifications” chapter has been revised
- The “Device Specifications” chapter has been revised. Older device types have been removed or replaced with new ones.
- The document’s layout has been revised.

Version update from V6.0 to V6.1:

- Point 2: Note regarding compliance with the EMC Directive added
- Section 5: Note regarding the protection of switching power supplies added
- Section 6.3: Manufacturer Kostal added

Version update from V6.1 to V6.2:

- Section 6.9: Various updates regarding
 - Euchner safety switches and
 - control units for manual doors

Version update from V6.2 to V6.3:

- General updates in Chapters 2 through 5
- Section 6.3: Adjustments regarding special drive applications

- Section 6.5: The
 - the link to www.desina.de was removed,
 - the note regarding the dual-rating nameplate 400V / 50Hz and 460V / 60Hz was removed
 - and supplemented with the note regarding standard voltages.
- Section 6.6: Updates regarding PLC technology
- Section 6.7: Updates
- Section 6.8: Analog pressure sensors have been added
- Section 6.9:
 - General note regarding changes to supplied components
 - Update regarding light barriers and control units
- Section 6.12: Updates
- Section 6.14: Updates