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Department: Central Maintenance Department

Tel.: 883 355 165

Date: 24.10.2022

Issue: 4

Brose Sitech sp. z o.o.

ul. Strefowa 2

59-101 Polkowice

Specification of energy requirements

- Lastenheft energy

Prepared by:

Approved by:

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Date and signature

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1. General part

1.1. Introduction

This List of Supplies and Works should be considered as a supplement to the Technical Requirements Specification. It describes only the scope of supply of electrotechnical equipment - the general part for the Brose Sitech Polkowice area and the Głogów branch.

Before submitting a bid, it is necessary to consult with those included in the general technical specifications of the contract. The date for these consultations should be agreed upon in due course.

The selection of the Contractor will also take into account the use of energy consumption of a particular machine/process and the technology used which has a significant impact on Brose Sitech's energy efficiency score.

The Contractor shall reasonably use (consume) the utilities supplied to it by Brose Sitech.

1.2. Regulations

With regard to electrical equipment and control devices, the following must be observed:

- European Community directives on machinery
- DIN/VDE regulations
- EN, VDI, DIN/ISO technical standards
- laws on technical means of production
- workplace regulations
- accident prevention regulations
- environmental laws and specific regulations required separately for electrical projects:
- guidelines for electrical diagrams
- catalog of requirements for transport equipment
- industrial computer requirements
- industrial network diagnostics
- 6E directives (electrotechnical equipment of machinery, installations and equipment)
- 10E directives

The scope of delivery includes the European Community Declaration of Conformity, CE marking, operating instructions with hazard analysis and complete documentation. The Contractor is obliged to check whether any proceedings are required to be initiated in order to obtain the relevant permits in accordance with the current environmental law. If the supplier intends to select implementation variants that are contrary to VW's regulations on means of production, the contractor is required to obtain special permission in writing for such

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deviations. Such an arrangement is necessary to standardize the equipment of the devices and is only valid for a specific project.

All electrical equipment must meet the strict conditions found in the automotive industry. Oily air and increased dust are to be expected, so appropriate measures must be taken to ensure safe operation.

All components used must be made at least to industry standard, and the use of components used in office communications requires prior agreement with the Planning and Technology Development Department and Central Maintenance.

All components used must comply with EN 50081-2 (Interference emission limits for electrical equipment in industrial environments).

The use of second-hand materials that may affect the electrical availability of the equipment is permitted only with the written approval of the Technology Planning and Development and Central Maintenance Department.

1.3. Basics of the offer

Electrical equipment should be agreed early on, generally before the construction phase begins, with the Technology Planning and Development Department and the Central Maintenance Department.

All electrical equipment documents (circuit diagrams, installation plans, wiring diagrams, terminal diagrams) must be submitted to the Technology Planning and Development Department and the Central Maintenance Department in duplicate for approval in due time before the start of installation. Necessary changes made at the installation site that will not affect the cost of performance and delivery date should be taken into account.

Electrical equipment should be made by the supplier only after receiving documentation that includes any changes and has an approval annotation.

Approval of the documentation relates only to the principle of construction of the installation, but it does not relieve the supplier of responsibility for providing a structure that is fit for purpose and meets the state of the art, its correct functioning and the correct dimensioning of structural components. Defects or deviations that are not revealed during the inspection do not relieve the supplier of its obligation to comply with Brose Sitech's regulations for means of production. If changes in electrical equipment arise after approval of the documentation, then the documentation must be resubmitted for approval.

The bid must include all items listed in the tender documents (Preismatrix).

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If the bidder provides for the possibility of alternatives or additions, then they must be clearly marked. This should be accompanied by an appropriate justification and technical description. If it is anticipated that elements of the installation will be given to a subcontractor to perform entirely, then the scope of delivery and the subcontractor must be specified. Brose Sitech reserves the right to reject subcontractors before accepting an order.

Maintenance and operation of the production asset until it is transferred to the relevant Brose Sitech maintenance department will be carried out by the supplier's company. The handover is conditional on documenting trouble-free operation of the machine in multi-shift mode in terms of correct work processes with the expected human input and required clocking times.

The buyer should receive a functionally efficient device, taking into account all relevant regulations. After the handover is completed, comprehensive training/instruction should be provided to the user and the relevant maintenance department.

1.4. Documentation

The documentation must be made in accordance with VOLKSWAGEN AG's regulations for production means and supplementary specific regulations and marked with a single drawing number according to VW nomenclature (and at the same time the project name according to EPLAN), which will be provided upon request by the Technology Planning and Development Department and the Central Maintenance Department.

The components of the bidding scope include, but are not limited to, the following documents:

- overview plans of the installation (layout plans), for the entire installation and for individual groups of control cabinets
- functional descriptions
- equipment layout plans
- circuit diagrams
- parameterization plans (bridge settings) for components
- schematic diagrams of internal connections for special components
- documentation of Profinet and Profibus networks
- terminal diagrams
- control cabinet installation diagrams
- material lists
- descriptions of interfaces and macros
- lists of consumable parts with recommendation for replacement parts
- operating and maintenance instructions
- rough description of the software structure

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- network documentation
- software listings in the form of contact (ladder) diagrams with alphanumeric additional texts and footer
- full list of links with topology
- program media (CDs, DVDs, flash drives) with complete application programs, symbolic addresses and additional texts.
- installation-specific firmware (delivered as additional backup)

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2. Technical part

2.1. Technical data

Operating voltage:	3 x 400V~, N,PE/50 Hz, +10%/-15%		
Cabinet color:	RAL 7032 interior and exterior (preferred)		
Wire conductor colors:	power part min. 2,5mm ²		Black
	force drains under 10A=1.5 mm ²		Black
	24V DC voltage, min. 1 mm ²		
	extraneous voltage 24V=1.5 mm ²		Light blue
			Orange
	control voltage 230V~/50Hz		Red
	general zero conductor in the circuit, min. 2,5 mm ²		Blue
Ambient temperature:	hall level:		max. 40°C.
	transportation level:		max. 45°C.
	backyard (shed) zones:		max. 55°C.

Industrial interference such as increased levels of pollution, sources of electromagnetic interference, oils, grinding dust with conductive properties, dust from the welding process, shocks, noise, etc. must be expected at all times.

All fields of control cabinets are to be fully wired using the wiring system mentioned above.

Each group of control cabinets will have a fold-out drawing compartment on the inside of the SPS control cabinet door. All other components of the control cabinets will be equipped with a metal pocket for storing wiring diagrams.

Proximity switches should be used with plug-in connectors with 2 LEDs and pinout according to DIN EN 50044.

The control cabinet housing should be designed with as few fuses as possible. From the main circuit breaker outlet up to and including 16 A (also for three-phase current outlets), use automatic fuses with an auxiliary circuit breaker which in terms of control technology must be controlled from the SPS.

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All contactor contacts must correspond to the upper and lower load values to prevent oxidation.

All control cabinets including terminal boxes, etc. shall be equipped with E1 lock.

All switchboards and switchgear cabinets should be protected from damage.

If the devices are equipped with parallel drives, motion synchronization is required.

All reporting and signaling cables must be equipped with LED plugs.

Ethernet plug sockets must have IP-65 class protection.

Provide all necessary software licenses that are required by law.

2.2. Collecting information on energy consumption

The production machine should be equipped with devices to measure utility consumption:

- Electricity: AS 3-mini energy analyzer + current transformers selected according to the power of the production machine.

The energy analyzer must be connected on the DIN rail of the production machine's electrical cabinet according to the instructions of the device.



2.3. Device modes, "Stand by" function, energy saving

2.3.1. Single motion (manual mode)

In this mode of operation, it must be possible to perform all movements individually, with safety interlocks which depend on operational factors, remaining active. After switching to the "Coupled operation" mode and after giving permission to start, it must be ensured that the machine automatically continues to run from any position which the machine is located in. Adjacent groups of desktops should respond automatically to movement commands issued (single man handling).

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2.3.2. Setting mode

Switching to setting mode using the E7 key switch (for conveyors at service level E9) should only be possible with the "Single Motion" mode selected. (Machine) protections, which depend on operational factors, are then deactivated. The motion limit switches remain active! The above mode should be used only in elevators or other hard-to-reach parts of the installation.

2.3.3. Coupled operation mode (automatic mode)

In this mode of operation, all interlocks and links to all plant components that are necessary for automatic operation are enabled. After each stoppage of the system, regardless of the type of stoppage (emergency shutdown or stoppage determined by operational factors), it must be possible each time to put the system back into automatic operation through a simple startup.

Accidental activation of the sensor when the system is inactive must not lead to an erroneous response of the system (such as a blockage).

2.3.4. Simulation operation mode

This is a type of automatic operation with the difference that the machine does not perform production activities (e.g. CNC machine tools: a complete course of the machining cycle without the workpiece in the machining jig)

In general, the following movement characteristics should be considered:

- Stopping in the starting position
- With detail, no course
- Course without detail
- Course at full load in automatic mode
- No-load course in automatic mode

2.3.5. Stand-by mode

The machine and its peripherals must be able to switch to Stand by mode to reduce power consumption as much as possible, but still allow for quick resumption of work.

2.4. Intelligent machine lighting

Each machine as well as the station lighting of that machine should be equipped with energy-saving LED lighting.

The machine's lighting as well as the entire machine should switch to energy-saving mode. This means that the lighting must be divided into 2 circuits.

- circuit 1: the necessary lighting of the workplace, switched on and off at the main panel.

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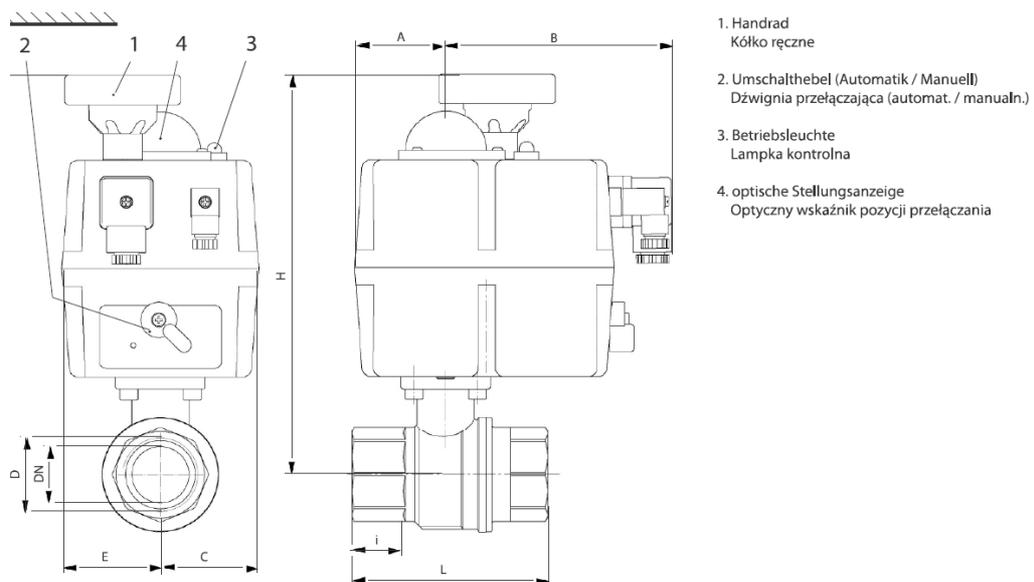
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- circuit 2: intelligent illumination of the machine interior. This lighting will also be on/off at the machine's main control panel, but turned off automatically when the door is closed in the machine's automatic operation mode and turned on after "X" translation time. Only basic lighting is then available in the cabin, which is sufficient for work. When the security door is open, all 3 phases are switched on.

An additional switch is installed at the security door, which can be turned on at any time with the security door closed.

2.5. Compressed air electric valve

Each new production machine should be equipped with a 964 DN 15 brass PN 65 ball valve with 24-volt electric drive (AKE964-1/2-L10-24V). When there is no production (when the machine is not producing), the solenoid valve cuts off the air supply.



2.6. Cylinder covers

Due to the welding process, the actuators embedded in the dies must be shielded by a spark-resistant material (e.g., sheet metal)

2.7. Spark-resistant hoses

In the working part of the die/device, the compressed air lines must be additionally covered with a spark-proof shield.

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2.8. Compressed air bypass

When adapting new machines or relocating old ones, a bypass should be made on the compressed air system at the machine. Such a bypass is to be used, taking measurements of compressed air whether the cabin does not generate losses in the form of leaks of this medium.



2.9. No higher compressed air pressure than 7 bar.

Efforts should be made to ensure that newly purchased machines use a compressed air pressure no higher than 7 bar. If it is not possible to meet this condition, pressure amplifiers should be used together with a buffer tank. The selection of the amplifier should be made knowing the compressed air intake of the machine.



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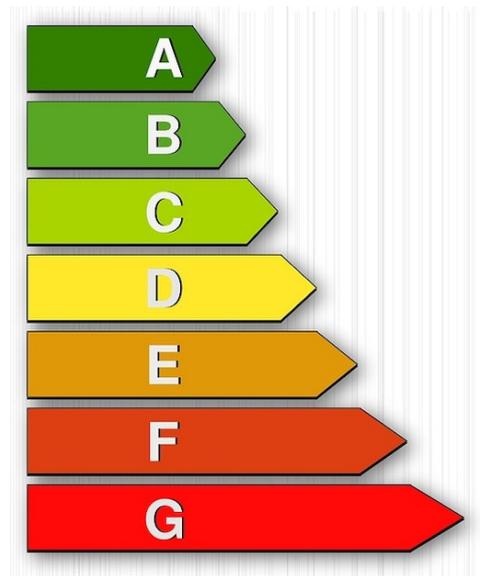
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2.10. Verification of energy consumption data by the machine manufacturer.

At the time of machine acceptance as well as in production, the energy intake should be verified with the data provided by the manufacturer. The energy measurement will be performed by a CUR electrician or by an analyzer that will be plugged into the AS-Forte energy reading system.



2.11. Use of appropriate compressed air connectors

During the adaptation of new machines or the relocation of old ones, the compressed air installation should be made of Sanha series materials (Sanha Therm)



2.12. Energy efficient motors

Any motor purchased with a particular device must meet the highest efficiency IE3.

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2.13. Ventilation hood

The ventilation hood located on each welding or sealing machine should be equipped with an electric damper connected to the operation of the machine.

When there is no production on the machine, the BELIMO actuator closes the dampers from the hood after about 1 min from the end of the welding, sealing process.



2.14. Energy-saving jets

Use energy-saving Silvent blowing nozzles with adequate blowing power. (applies to laser booths)

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