

**Execution recommendations for electro-technology**  
**Lenzing-Plastics GmbH & Co. KG**

Area of application:

Lenzing Plastics GmbH & Co. KG

**1. GENERAL INFORMATIONS**

The electrical operational funds are inserted use a plastic foil production plant. The working reliability of the electrical and electronic mechanisms provided by you is to be regarded as substantial criterion for the availability of the machines and plants.

*All electrical systems are in accordance with the European guidelines (low-voltage guideline as well EMV - guideline, EN-8001, EN-60204, EN-60439 and EN 50014 to 50020). Electrical construction units and devices must be provided with a CE - marking.*

In order to obtain an if possible economical spare part attitude, you should standardize after the settled equipment list.

If individual prescribing should not be fulfilled by you, *is to be communicated immediately with Mr. Stutz in written form. [s.stutz@lenzing-plastics.com](mailto:s.stutz@lenzing-plastics.com)*

**2. EXPLOSIONS PROTECTION**

If explosion protection is necessary, then the equipment interpretation is to be made on the basis of an ex zone plan over kind and range of the ex danger.

For ex operational funds are inspection certificates of an authorized European institute for examination to submit (devices and protective systems for highly combustible ranges must correspond to the European guideline 94/9/EG; ATEX 100a and/or 95).

It is to be planned suitable measures for the derivative of electrostatic loadings. A proof is to be furnished.

	<b>Erstellung/Prüfung</b>	<b>QM-Vermerk</b>	<b>Einkauf</b>	<b>Freigabe</b>	<b>Dok - Nr.:</b>
<b>Datum</b>					<b>Ausgabe:</b>
<b>Bereich</b>	<b>FOPT</b>	<b>FOQ</b>	<b>FO</b>	<b>FO</b>	<b>Rev. Nr:</b>
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<b>Unterschrift</b>					<b>Seite:</b> Seite 1 von 15

### **3. CURRENT AND AUXILIARY ENERGY SUPPLY**

Network configuration: TN-C-(S)  
3 x 400/230 V, 50 Hz

Connection and outputs are to be co-ordinate with the Lenzing plastics before establishing the plants to be able to clarify the possible supplying concepts and/or restrictions.

In order to avoid overriding and/or high establishment costs from inlets achievement and river realistic values are to be communicated.

Electrical measuring signals: (0) 4 - 20 mA, 0 - 10 V

Equipment interpretation: +/- 0,5 % constant frequency  
+/- 0,5 % constant tension

### **4. LIGHTNING PROTECTION AND GROUNDING SYSTEMS**

For the lightning protection and electrical installations perfect grounding systems are to be established, whereby in principle foundation earthings are to be brought in. The establishment must take place after latest EN-norms. To note it is that the main potential equalization the additional potential equalization and the potential price increase are to lay out as per the EN regulations.

In the foundation iron wire 10mm in diameter galvanized (execution after the last valid EN-NORMS), in the soil copper cable 50 mm<sup>2</sup> with lead coat use. Remarks for PA-rails and lightning protection are to be likewise manufactured with copper cable lead-coated. The wedged places iron - are embed lead-coated copper cable and with fat-bind from humidity to protect in the foundation concrete. Wedged places of any kind in the soil are likewise protecting with fat-bind from humidity.

At the time of executions of the lead-coated copper cable by concrete the lead coat is to be protected from corrosion through tapes with fat-binds. At the aboveground connection points the transition of the lead-coated copper cable to the lug (closed tube cable shoe) is to be locked by means of adhesive-coated heat shrink sleeve hermetically.

### **5. ELECTROMAGNETIC COMPATIBILITY**

The EMV of the used operational funds must be ensured. Concerning the relevant regulations noise immunity and breakdown sending are to be considered. EU NORM EN 50081 and 50082-2

## 6. MOTORS

The motors are in closed execution, IEC, enclosure IP 54, air-air-cooling, to at least implement with antifriction bearings, insulation class F, terminal box made of metal with sufficient number and/or the cable diameters adapted drillings for cable entry (with design B3 terminal box situation above).

For frequency converters the stators are to be implemented with 3 piece PTC resistor feelers (150° C with isolating class F). In special cases additionally 3 piece PTC resistor feelers (120° C). Additional the engines are to be equipped with their own strangely exhausts if necessary.

The output speeds of gear motors with self-ventilation must be regarded in such a way that at minimum production speed a sufficient cooling of the engines is ensured.

## 7. OVERLOAD PROTECTION OF THE CABLES (Engines with coil full protection, with and without frequency converter)

### a.) Drives without frequency converters

With special conditions such as heavy approach, high ambient temperatures are combined devices, which guarantee coil full protection and cable overload protection (e.g. Siemens 3RB12) to be used.

### b.) Drives with frequency converters

During the parameter attitude the current limiting of the frequency converter and/or the static inverter is the permissible permanent current of the cable to consider. (amassment, ambient temperature).

## 8. FREQUENCY CONVERTER

The frequency converters are to be equipped with all for the enterprise necessary mechanisms:

- Control display for frequency, tension, current, etc.
- Operating and breakdown reporting announcements
- Ground fault u. Phase failure monitoring
- PTC resistor release devices (also been suitable for Klixon)
- If necessary automatic restarting device with voltage failures until 2 seconds
- Diagnose plugs

If for the controlling of the plant a process control system is intended, by which the number of revolutions of the engines is adjusted, the desired value is to give in form of a signal 0/4 - 20 mA/DC or 0-10VDC. To plan further a feedback of is - frequency (is - number of revolutions) to the process control system.

Serial interfaces or connection of field bus only after previous arrangement (connection of bus preferred – PROFI BUS, ETHERNET).

If others than in should be used the equipment specification given frequency converter, agreement is to be caught up before by us.

Control and desired value being put for frequency converter and static inverter shielded shift and screen wide on mass/earth. If necessarily also the engine cables are to be implemented shielded.

The assembly instructions of the equipment manufacturers are to be considered.

## 9. PREVENTIVE MEASURES

In our work PROTECTIVE GROUNDING (PEN and/or PE leader) is generally used as preventive measures against indirect contact. In accordance with the EN-Norms if an additional protection is demanded, then is this to use (residual-current circuit breaker, protection isolation, and safe voltage and protection separation). For the secondarily circle (current circle) the one frequency converter intended preventive measure is to be indicated and proven.

All electrical and electronic plants are to be laid out after the last valid EN-Norms.

In the special one we refer regulations and EN-NORMS to in the electro-technology regulation as obligatorily explained EN-NORMS.

## 10. SWITCHGEAR CABINETS

Switchgear cabinet's specifications

Rittal system

Color: RAL 7035 / structure

Equipment:

- a) Assembly board galvanizes
- b) Switchgear cabinet light + electric socket with 30mA leakage current safe, supply voltage before main switch, cabinet light switchable with door end switch or motion dedector.
- c) Cable entries from down
- d) Catch for double beard keys and/or Ergoform safety grasps to the installation of half cylinders.
- e) Screwed bags, size DIN A3 for electrical documentation in the cabinet doors
- f) All switchgear cabinet's must be armed with air conditioner systems! (Rittal)

## 11. BUS BAR SYSTEM

Copper rail nickel - companies Rittal

Bus bar distance 60 mm, load: max. 400 A

Bus bar owners with covers, adapters and accessories - companies Rittal

Fuse elements - contact members nickel plates

## 12. WIRING AND PIPE CONNECTION

PVC channels for the admission of the wiring (rate of admission max. 60 %)

### Wiring material:

Control electric circuit 24 VDC

plastic-isolated line H03V-K 0,5/1,5 mm<sup>2</sup>

Main electric circuit

plastic-isolated line H07V-K,

cross section after EN 1

however at least 2,5 mm<sup>2</sup>

*Wiring colors see supplement 1.*

## 13. GENERAL INFORMATION

The switchgear cabinets are to be laid out in such a way that a place reserve of at least 20% is present. It is to be made certain that during according to large energy dissipation the waste heat in the switchgear cabinet is exhausted over air conditioned units of the company Rittal.

Additional a temperature control is to be planned in these cabinets.

Extension of the mounting surface by swing frames and/or door -, roof or side panel assembly is not allowed.

For floor installation you have to provide a cabinet-socket. Also for the main cable and cable cross-section you have to provide free space, so that the bending radius of cables can be adhered to. The implementation of the Main-cable to the electric cabinet is from bottom, and to be fixed on a cable rail.

The cabinet main switches must be open able in anyone (OFF / ON) position.

There are only electrical parts allowed, who have a finger scoop proof.

Switchgear cabinet doors and assembly boards are connected over sufficiently dimensioned, highly flexible, plastic-isolated lines, color yellow/green, with the PE leader. The type plates (rating plates) with the entries demanded in the EN-60439 §5.1 and/or EN-60204-1 §16.4 are to be attached.

**The leader marking in accordance with EN-60204-1 §13.1.1 is to be accomplished. The leader concerned is to be marked by the clamp number of the connection point.**

Terminal strip: The use of double or three-fold clamps is permitted only in special cases and after consultation. For each clamp side may be attached only one leader. For leading connections between line-up terminals lying next to each other cross connection systems of the clamp manufacturer are to be used.

Connection of more and/or finely wiring leaders:

With tinned cable lugs or vein cases tinned.

Screen connection:

With shielded cables the screen is wide on mass/earth to put (use of suitable screen clamps and/or handles). Both one-sided and reciprocal presenting of the screen can be necessary. The assembly instructions of the equipment manufacturers are to be considered.

Inscription:

All devices, terminal strips etc. are to be marked in agreement with technical information duly with signs in printed form, and steady execution.

The markings have to be in **double execution** (on the part and on the cable or on the installation plate) and must be readable without to remove any covers.

Assembly of the auxiliary devices preferably on galvanized DIN rail (TS 35).

Outgoing cables are across clamps to lead (only to 35 mm<sup>2</sup> conductor cross section) and to consider on anchor rails. To appropriate strain relief is to be paid attention.

Live parts are in accordance with EN 60204 contact-voltage-proof to take off (examine fingers).

All hydraulic-/pneumatics valves are with protective circuit, and LED to be performed.

The function-assignment of the valves must be marked with engraved or printed signs.

## 14. DRIVE CONTROL AND MONITORING

Independent of the system (heavy current, electronic control, process control system) ever for the plant enterprise absolutely necessary drive is to equip with:

- Control instruction equipment
- Operating condition message
- Optical and acoustic fault signal
- Motor currents
- Protective relay for motor mechanisms must possess a resetting

To the fast diagnosis for the operator over the machine condition, the following information is to be represented visual in the plain language:

- Main switch position, emergency from function, position of protective doors
- Did not fulfilled switching on conditions
- Disconnection by process variables (pressure monitor)
- Over current losses

Switch locally:

For each independent drive unit locally a lock off able main switch is to be planned.

## 15. EQUIPMENT- AND STANDARD ELECTRO-TECHNOLOGY

See supplement 2 (general demand CE marking)

## 16. DRIVETRAIN- AND CONTROL CABLING

Generally the wiring between devices is to be taken up locally and suburb expensive and/or clamping boxes to the range.

For cable routes, protective pipes, clips and assembly material rustproof material (galvanized iron, aluminum) is to use.

During the cable route dimensioning is a place reserve of at least 30 % to be planned.

The cables are to be dimensioned under allowing for the valid EN-Norms ambient temperatures and possibly increased with consideration of a reduction by amassment and laid.

Separate transfer with strong and communication cables (separation bars use)

## 17. LIGHTING SYSTEM

Lighting interpretation accordingly EN-NORMS.

Plant parts with an illuminance under 100 lux must be compensate with corresponding lighting.

Execution of Lighting concepts using LED technology.

With danger of a mechanical damage are the lights or protective pipe to be equipped with grille.

The assembly of the lights has to take place in such a way that a lamp change without large expenditure is possible. In difficult cases an arrangement is necessary.

## 18. MEASURING, AUTOMATIC CONTROL AND CONTROL ENGINEERING

The designation of measuring and rule places is to be made in accordance with DIN. The current supply of the measuring and automatic control is to plan with a transient filter to protect voltage- and current peaks.

Devices with radioactive radiation sources use only if it is absolutely necessary and only after consultation and/or permission of Lenzing plastic

## 19. EQUIPMENT STANDARD MEASURING TECHNIQUE

See supplement 3 (general demand CE marking)

## 20. CONTROL-UNIT

A SPS variant from Siemens (S7) is to be planned, which covers the functions measure, control, regulate, supervising, announcing and logging.

For other solutions a consultation is necessary.

Programming language Step7 or TIA Portal, exclusive in CONTACT PLAN (KOP) or FUNCTION PLAN (FUP) !

Visualizations only with WinCC flexible 2008, or TIA Portal.

Programming language GERMAN !

With the similar input cards is a continuous potential separation to plan.

The operation and monitoring are made by screens and mouse and/or control ball and/or keyboard. (Consideration of VDI/VDE 3564 and 3695).

If it is planned with a Touch screen, it must be a connection for an external mouse and keyboard.

The following pictures are to be planned:

- Plant summary screen
- Plant detail picture
- Regulate and control circuit's summary screen
- Automatic control loops detail
- Trend representations over at least 5 days for a sufficient number of freely selectable measured values
- Sufficient alarm and fault signals
- Service pictures

Around detailed additional information about a selected component (engine, valve, measured value, automatic control loop...) to receive, service pictures are to be made. These pictures contain dependent on the selected component corresponding additional information. Additional information for an engine e.g. is: Rated current, frequency, type, engine number, dynamic representation of the bolting devices for this engine etc..

Protocol printer for loads, layer, daily minutes etc., fault signals and hand override.

Hardcopy pickup for printing trend curves and parameter adjustments.



## 21. EXTERN PC's

A colleague of our IT-management is general to include → Mr. Schafleitner (DW 3549)

If external PC's are used, a second "reflected" non removable disk must be work parallel in the PC.

A data protection CD must be present locally for the plant.

## 22. TELESERVICE

In every PLC control must be a teleservice-modem installed, to enable service activities for the whole machine included the motion controller.

Convention with Lenzing-Plastics regarding VPN-Tunnel.

## 23. PROCESS DATA ASCERTAINMENT

For an internal process data acquisition we use all necessary variables, free of charge from the control unit.

Siemens communications processors type: CP343-1 is in the offer also to considering.

## 24. TRAINING FOR MAINTANANCE PERSONAL

A sufficient training of the maintenance personal is to happen in agreement with Lenzing-Plastics.

## 25. DOCUMENTATION

Language: German

The documentation must contain **all** for the enterprise, necessary documents for maintenance and [replacement part](#) procurement.

Add in the documentation an offer about spare parts.

Electrical drawings only in EPLAN P8. In any case ones are to be provided the used symbol libraries, in order to make possible a 100% further processing.

The RI flow sheets, function and circuit diagrams, arrangement plans, clamps -, cables -, hose -, route plans etc. are to be provided according to the last valid DIN standards.

All the plant documents directly concerning, like designs, electrical drawings, lists etc. are to be supplied as data file .dxf or .dwg and 3 times to copy.

One printed sheets must inserted into transparent foils (Contamination)

The documentation must correspond to the implemented conditions of the plant (as built) and contain the technical data demanded in the EN 60439 §5.1 and/or EN 60204 §17.4.

With start-up provided metrology records are to settle.

Up to the final supply of the final documentation (date: For the reduction of the plant) a corrected sentence on the plant must always be present.

The range of the documentation is to be indicated in the offer.

All program files from SPS, Touchpanels and the like, must give it to us without any component protects (Source code)!

Parameters of electronic devices are to be documented on, CD's, USB-keychain and lists. The associated program-software included license and the interface cable to parameter converter, controller, etc. is to be provided.

#### Supplements

- 1 wiring colors FARBEN3.DOC
- 2 equipment standards electro-technology GER-ELT3.DOC
- 3 equipment standards measuring technique GER-MES3.DOC

**WIRING COLORS**

**Wiring**

Protective grounding	... yellow - green
N-leader	... light-blue
Main stream phase L1, L2, L3	... black

**Control voltage only 24VDC**

DC-Voltage 24VDC	...violet (pos) ...grey (neg)
Measuring voltage	...white
External voltage	...orange
Resistance test potentiometer Pt 100, NTC, PTC	...white
Intrinsically safe electric circuits	...dark-blue
Signal current 0/4 - 20 mA, 0-10VDC current transformer 1/5 A food circle 2-Dr. MU	...brown

## EQUIPMENT STANDARD ELECTRO-TECHNOLOGY

### **Circuit-breaker to 2500A**

Moeller, Eaton, ABB

### **CEE socket outlet and plugs (contacts nickel plated)**

Mennekes, Walther, PCE

### **NH fuse bases**

Rittal, Siemens

### **NH fuse lead disrupter**

Rittal, Siemens

### **Fuse screws**

Neozed, Diazed Gr.II / III

### **Cable run and wireway**

Cable run in closed execution with screwed cover.

Cable run with bars are not allowed

Wireway grey Rittal TS

Cable route on the floor are not allowed, respectively minimum 30cm over the floor.

### **Energy chain**

Igus

### **Rider fuse elements (nickel plated)**

Rittal

### **Wire circuit breaker**

Siemens 5SY..

### **Contactor**

Siemens 3TF../ 3RT../ 3TB..

### **Auxiliary delays**

Siemens 3TH4.

### **Over current relay**

Siemens

**Thermistor protective devices**

Siemens 3RN..

Heavy starting relay Siemens 3RW..

**Plug-in relay**

Finder Socket (11pole; 3 change-over switch, gilded contacts)

**Coupling relay**

Siemens 3TX7002-1AB02

Siemens 3TX7003-1AB00

**Opto coupler**

Siemens 3TX7002-4AG00

**Time delay relay**

Siemens 3RP.. (snap on)

**Control switches**

Kraus & Naimer C17, C18

**Main switch**

Siemens, Moeller, Eaton, ABB

**Circuit-breaker/protective engine switchgear**

Siemens 3RV

**Safety relay, monitoring relay**

Pilz emergency stop relay

Siemens 3TK

**Command and message device (22 mm ø)**

Siemens metal version

**Bolting device magnets (safety interlocks)**

Siemens Siguard 3SE5

**Clamps**

Weidmüller WDU

**Wire Marking**

Weidmüller SFC

**Current transformer**

Weigel or equivalently

**Current transducer**

Weigel AU 03 51401 1A/ 4-20mA

**Analogue instruments**

Weigel or equivalently (with contact protection)

**Limit switch**

Mechanically: Siemens; Standard housing DIN EN 50041

Initiators inductive: design M8, M12, M18, M30 – Siemens, IFM

**Initiators capacitive:** Siemens respectively Pepperl & Fuchs, Ifm

**Safety limit switch:** Siemens

**Position alarm unit for cylinders:** IFM, SMC, Siemens

**Light barriers, Ultrasonic sensor. Laser measurement**

Siemens, Sick

**Single solenoid valves**

Festo

**Programmable controllers- Siemens S7 (execution in KOP)**

Exclusiv Siemens S7 PLC's accepted!

Programming language exclusive in CONTACT PLAN (KOP) or FUNCTION PLAN (FUP) !

With the employment of a SPS is to be gotten in touch before, in order to be able to clarify type, programming and software documentation despite production default with us.

Visualizations only with WinCC flexible 2008 or TIA Portal !

**Frequency converter**

Siemens , Lenze

**Motors**

Lenze, Siemens

**Gear motors**

Siemens, Lenze

**Power supply units 24 V DC**

Siemens SITOP power, Omron S82

**Stop guards**

Schmersal DIM 1...

**Anti Static Electrodes**

Eltex

## EQUIPMENT STANDARD MEASURING TECHNIQUE

### **Pressure measurements**

Dynisco, Gefran

### **Temperature measurements**

Jumo Resistance thermometer Pt 100, 8mm Ø according to DIN IEC 751  
In three or four-leader circuit, screw connection 1/2" (3/4")  
Fast-addressing execution, strengthened neck pipe (similar DIN 43765, 43766)  
Welding sleeves with sealing surfaces!  
Execution with bayonet lock.  
Preferred installation lengths: 160, 250, 400 mm

### **Thermocouples Fe-CuNi, NiCr-Ni execution according to DIN IEC 584**

Jumo

### **Temperature transducers (structure housings)**

Siemens

### **Temperature regulator**

preferentially to integrate in visualisation  
DREWS 5310 111 / 5310 611

### **Speed measurements/monitoring**

#### **Receivers**

Impulse disks and two-wire initiators after NAMUR and/or three-wire initiators  
Siemens

### **Incremental, Encoder, Absolute Encoder, etc.**

Lenze, Siemens

### **Number of revolutions transducer**

Pepperl & Fuchs

### **Isolating amplifier, calculating device (unit signals)**

Siemens