Version 6 | Status 01.04.2024

EXECUTION STANDARD
FOR INDUSTRIAL SYSTEMS

EASY

SOLUTIONS

ANYTIME

TABLE OF CONTENTS

1. PLANNING LIST

The planning list is an internal ESA document and is used to record all relevant data for project planning. Other commonly used terms for the planning list are data point list or unit list. The following information must be available to ESA in accordance with the schedule or project progress in order to meet the agreed deadlines.

– Unit designation for circuit diagram, visualisation, PLC program
– Process number, process designation ➔ for uniform identifier
– Rated output
– Rated current
– Nominal voltage
– Connection diagram
– Operating instructions, ...

2. UNIT IDENTIFICATION

Units are labelled according to the following structure**:**
=SYSTEM.SYSTEMPART+LOCATION.SUBLOCATION|UNIT.SUBUNIT
Ex.: =AT01.AS01+S01.VAB01|RM01.M01
Facility: Austria Plant 1
System component: External silo
Place: Silo 01
Sub-location: Vibro discharge floor 01
Unit: Vibration motor 01
Sub-unit: Motor 01

2.1. System (examples)

ABBREVIATION	DESCRIPTION
AT	Plant x Austria
DE	Plant x Germany
FR	Plant x France

2.2. System part (examples)

ABBREVIATION	DESCRIPTION
BL	Bagging line
ACC	Acceptance
ES	External silo
MLS	Mini load system
AGV	Automated guided vehicle
LS	Liquid system
MF	Manual feed
LIF	Lift
IS	Internal silo
SC	Small components
SEQ	Storage equipment
MP	Mixing plant
CL	Cleaning
DS	Daily silo

ABBREVIATION	DESCRIPTION
DEC	Decanting plant
LO	Loading
CA	Central aspiration
CVC	Central vacuum cleaner

2.3. Location (examples)

ABBREVIATION	DESCRIPTION
BAG	Bagging
GEN	General
IS	Intake station
ASP	Aspiration
ASC	Automatic scales
BIS	Big Bag intake stations
BB	Big Bag
CO	Container
OST	Operator station
CO	Container
UL	Unloading
LV	Level
LID	Liquid dosing
GU	Gutter
BX	Box
KN	Kneader
MI	Mixer
PC	Pneumatic conveying
S	Silo
SIS	Sack intake station
TUS	Tanker unloading station
DR	Dryer

2.4. Sub-location (examples)

ABBREVIATION	DESCRIPTION
NF	Nozzle filter
DC	Dosing control
SVF	Silo vent filter
SM	Screening machine
VDF	Vibro discharge floor

2.5. Unit (examples)

ABBREVIATION	DESCRIPTION	ABBREVIATION	DESCRIPTION
DST	Docking station	MIL	Mill
BBV	Butterfly valve	PD	Product detector
GV	Gate valve	PR	Press
SOV	Shut-off valve	PU	Pump
COB	Control box	PV	Pinch valve
IC	Inflatable clamp	RC	Roller conveyor
FL	Flash light	VM	Vibrating motor
CR	Crusher	CV	Control valve
BRN	Burner	DV	Diverter valve
BD	Bursting disk	AG	Agitator
PT	Pressure transmitter	DES	Destoner
FM	Flow meter	HR	Hose reel
RD	Rotary distributor	SD	Safety device
PS	Pressure switch	RV	Rotary valve
ECH	Electric chain hoist	HSD	High-speed door
GM	Ground monitoring	JI	Jam indicator
EV	Elevator	SC	Screw
CB	Conveyor belt	SO	Sorter
SPD	Spark detection	FD	Feeder
FI	Filter	ST	Signal tower
BL	Blower	STP	Strato peeler
LIF	Lifter	ARA	Air-recycling aspirator
HT	Heating	TT	Temperature transmitter
CC	Chain conveyor	DR	Dryer
KN	Knocker	TS	Temperature switch
AS	Aeration system	TTC	Tank truck coupling

ABBREVIATION	DESCRIPTION	ABBREVIATION	DESCRIPTION
LB Light	Light barrier	VIB	Vibrator
LSL	Level switch low	LC	Loading chute
SOL	Solenoid	VF	Vibratory feeder
MD	Metal detector	SCL	Scale
MI	Mixer	DM	Distance measurement
CH	Cutter head	WMU	Water mixing unit
LSM	Level switch middle	RMI	Roller mill

2.6. Sub-unit (examples)

ABBREVIATION	DESCRIPTION	ABBREVIATION	DESCRIPTION
AEN	Absolute encoders	LB	Light barrier
EVU	Evaluation unit	M	Motor
LIG	Lighting	MP	Signal lamp
BI	Burstindicator	SV	Solenoid valve
PT	Pressure transmitter	SW	Switch
FM	Flow meter	OTD	Off-track detector
PS	Pressure switch	SS	Safety switch
PB	Push button	CNT	Control
SM	Speed monitor	TT	Temperature transmitter
LS	Limit switch	WE	Weighing electronic
FC	Frequency converter	LC	Load cell
TB	Terminal box	TP	Touch

3. CIRCUIT DIAGRAM

3.1. Version

The circuit diagrams are created using the engineering tool E-Plan P8.

Circuit diagrams are provided as a "pdf file".

The circuit diagrams can be viewed and printed out using a "pdf reader".

On request, circuit diagram pages can also be exported as and made available "dwg" or "dxf".

Other desired drawing programmes (engineering tools) on request.

3.2. Directives

2006/42/EC   Machinery Directive
2014/30/EU   EMC Directive
2014/35/EU   Low-voltage directive

3.3. Harmonised standards

ÖVE/ÖNORM EN 60204-1   Safety of machinery - Electrical equipment of machines
                             Part 1: General Requirements
ÖVE/ÖNORM EN 61439-1   Low-voltage switchgear and controlgear assemblies
                             Part 1: General specifications

ÖVE/ÖNORM EN 61439-2   Low-voltage switchgear and controlgear assemblies
                             Part 2: Power switchgear and controlgear assemblies

3.4. Equipment designation

The complete equipment designation in the circuit diagram consists of:

=system+location(distributor|distribution field) - equipment

Example:

=AT01+CC01|F1-10Q7   AT01   - Austria Plant 1
                                CC01   - Control Cabinet
                                F1   - Field 1 (if several control cabinet fields)
                                10Q7   - Contactor or motor protection switch on sheet 10 in path 7

Equipment designation according to DIN EN 81346-2
Numbering format: Page + standard character + path

3.5. Terminal strip designation

NAME	DESCRIPTION
X0	Feed
X1	400V AC outlets
X2	230V AC outlets
X3	24V DC control voltage control cabinet internal
X4	24V DC via emergency stop control cabinet internal
X5	24V DC control (CPU, coupler,…) control cabinet internal
X0V	0V DC control cabinet internal
X6	24V DC signal exchange
X7	External voltage
X8	Emergency stop circuit
X9	Transformer disconnect terminals
XEXT	24V DC power supply sensors/actuators

NAME	DESCRIPTION
XPE	Protective conductor

3.6. Wiring colours

COLOUR	DESCRIPTION
BLACK	Main circuits for alternating and direct current
LIGHT BLUE	Neutral conductor
GREEN-YELLOW	Protective conductor
RED	Control voltage 230V AC
RED-WHITE	Control voltage N
BLUE	Control voltage 24V DC
BLUE-WHITE	Control voltage 0V DC
WHITE	Analogue signals
PURPLE	Emergency stop circuit
ORANGE	Circuits before mains disconnection direction

3.7. Button colours

COLOUR	DESCRIPTION
GREEN	Operation
RED	Fault
YELLOW	Warning
BLUE	Restart
WHITE (CLEAR)	Start, on, up/down, …
BLACK	Stop, off

3.8. Traffic light colours

COLOUR	DESCRIPTION
RED	Fault
YELLOW	Warning
BLUE	Operator action required
GREEN	Normal state

3.9. Component list

COMPONENT	PREFERRED MANUFACTURER
Control cabinet, air conditioning, and accessories	Rittal
Feed-in system max. 63A	Siemens 3RV29
Clamps	Phoenix Contact
Low-voltage switchgear	Siemens
Relay, time relay	Phoenix Contact
PTC thermistor evaluators	Siemens
Safety switchgear	Siemens
Push button and indicator light	Siemens
Signal towers	Siemens
Signal horns	Werma
CPU	Siemens
Decentralised periphery	Siemens ET200 SP, Phoenix Contact Decentralised I/O IP67 Axoline E
Frequency converter	Siemens, Lenze
Soft starter	Siemens
Network device	Phoenix Contact
Control matching transformer	Eaton Möller, Trafomodern
Mounting screw connection	Jacob
Cable entry plate	Jacob, Murrplastik, Rittal

3.10. Circuit diagram documentation
–   Circuit diagram   "pdf"
–   Table of contents   "pdf"
–   Layout plan   "pdf"
–   Component list, parts list   "pdf"
–   Terminal diagram   "pdf"
–   Cable list   "xlsx"

3.11. Single wire labelling
By using connection symbols with target definition in the circuit diagram, each conductor can be clearly identified at each connection using the technical documentation.

The labelling of individual conductors is not included as standard, but is available as an option.

4. CONTROL CABINET

4.1. General

- Control cabinet housing, sheet steel, powder-coated RAL7035
- Control cabinet base, sheet steel, powder-coated RAL 9005
- Protection class IP54
- Power and control section in one control cabinet
- Cable entry:
  - o In floor-standing distributors from below through the base using cable entry plates and grommets
  - o In wall cabinets from below via a plastic cable flange plate with membranes

Standard dimensions for floor-standing cabinets are 1200x2000x500mm (WxHxD),
plus a 200mm enclosure.

- Control cabinet lighting in each floor-standing cabinet
- Control cabinet lock, double bit
- Plastic circuit diagram
- Ambient temperature: +5°C to +35°C for the design of the control cabinet air-conditioning system

4.2. Clamps

Spring terminals up to 16mm² connection cross-section

- Motor terminals: Phoenix Contact ST
- 230V AC outlets: Phoenix Contact PTI
- 24V DC: Phoenix Contact STIO, STTBS

4.3. Security technology

A risk assessment is not included in the scope of delivery of ESA!
This must be provided by the operator or the person placing the machine or system on the market.
Safety-related parts of a control system are designed according to EN 13849-1.
If no risk assessment or detailed information is available, safety functions are realised in accordance with performance level
"c".

5. PLC

5.1. Software

The Siemens controllers are programmed in the TIA Portal or, if required, in the Simatic Step7 Manager using the following programming languages:

- KOP / FUP if solvable, otherwise IL / SCL

The PLC software is modular and structured, and a distinction is made between:

- **Service code:**
  The service code consists of standard functions and data modules developed by ESA to map systems. The service code creates a defined interface between the inputs/outputs and the HMI or the automatic code. The service code for manual mode is executed unlocked.
- **Automatic code:**
  The automatic code consists of the functionality defined in the sequence description.

Starting with service code version 6.x (01/2023), the code language is English.

5.2. Makes / Programming

Step 7 professional in TIA Portal / service code V5.x or higher
→ preferred and standard used control series

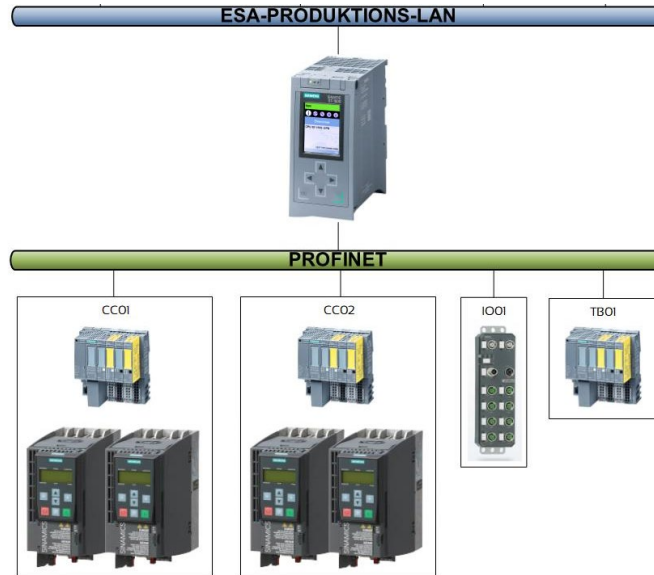- Siemens S7-1500 and Siemens S7-1500SP for small systems and machines

Step 7 classic / Service code V4.x
→ if requested or for existing installation

- Siemens S7-300 and Siemens S7-400

5.3. Fieldbus system

Fieldbuses enable cost-optimised and low-maintenance machine and system installation. PROFINET is used to connect complex automation components such as frequency converters and decentralised I/O systems to the CPU. If necessary (communication with provided machines), Profibus is also used.

6. VISUALISATION

6.1. Version

The visualisation is created with the following systems depending on the application:
- Siemens WinCC advanced (TIA)
- Siemens WinCC flexible
- Siemens WinCC V7.x
- Zenon

Which version is used can be found in the offer.

Other manufacturers on request.

6.2. Resolution

The system visualisation is designed for a monitor with a standard resolution of 1920x1080. This enables the use of large format screens. The resolution of touch PCs depends on the type. Depending on the visualisation version, a multi-monitor system can also be used (see offer).

6.3. Scope of delivery

- One or more system overview images by area based on provided diagrams
- Manual and automatic operation can be preselected for each unit
- Fault indication system with acknowledgement and logging
- Chronological event list (CEL)
- Colour changeover of the units when the operating status changes
- Colour switching of the active material paths
- Control of access via user administration
- Display of the current inventories (item designation, weight) in connection with ESAweight
- Display of all recorded analogue values

  Operating language: The visualisation is carried out in German or English in accordance with the offer or order; translations for other languages must be provided by the customer

From service code V5

– Production data acquisition
– Analogue values with trend recording
– Detectors / units can be put "out of service" by customers in the event of a defect
– Optionally available
  o Documentation can be stored for each unit

6.4. Visualisation design

The visualisation is created in the ESA standard design. Optional changes are possible on request.
A detailed visualisation description can be found in the "Visualisation Standard" user manual.
Examples of design:

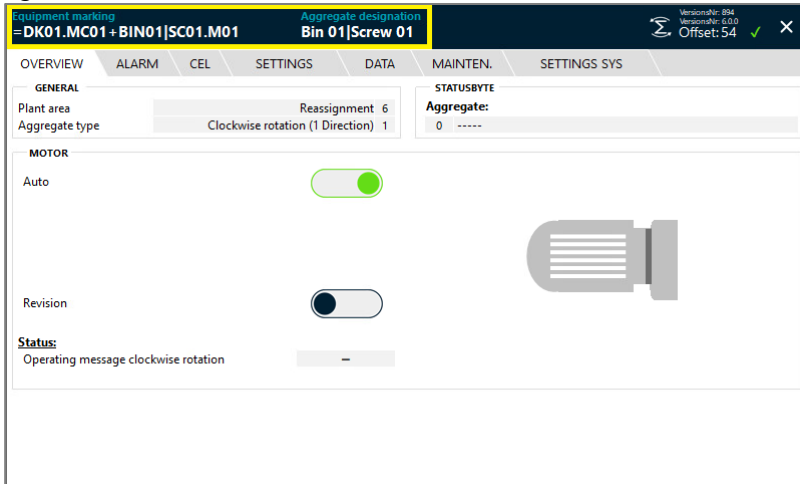## 6.5. Translations

Designations are proper names, e.g: BIN01|SC01 (figure1) - no translation is possible here.
The data is read from the PLC when the individual motor, flap etc. is opened.

Equipment marking: =DK01.MC01+BIN01|SC01.M01
Unit designation: Bin01|Screw 01

Figure 1:

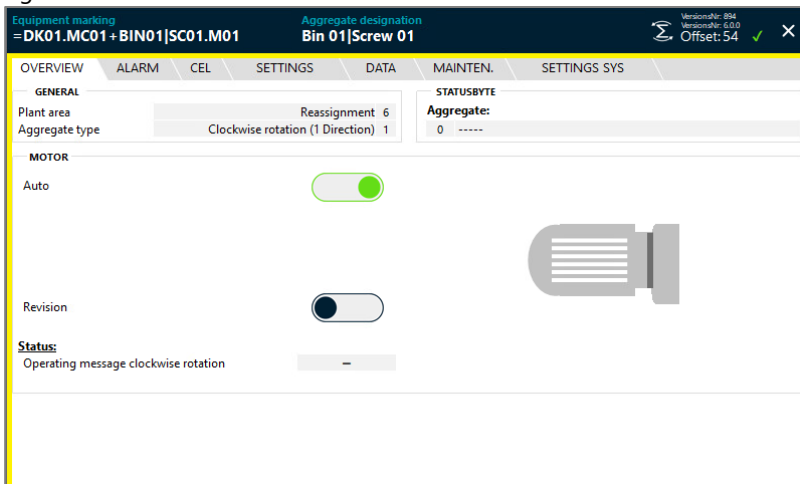When translating the operating language, the following is translated:
- Menu bar
- Scale bar
- Necessary operator windows
- System overview
- CEL list
- Alarm list

Single operations (pop-up window for units / process modules) **are not translated.**
Single operations, as for service and process modules, are not essential for the system operation.
This includes special settings, e.g. parameters for trained technicians.
Single operations are excluded form translation into the respective national language. For these operations English is set as default language. Translations into the national language are therefore not included in the scope of delivery and must be agreed separately if required. (Figure 2)

Figure 2:

7. IT

7.1. Operating system

Operating system Windows 10/11 Pro, 64bit depending on necessity or agreement, language German

7.2. Hardware

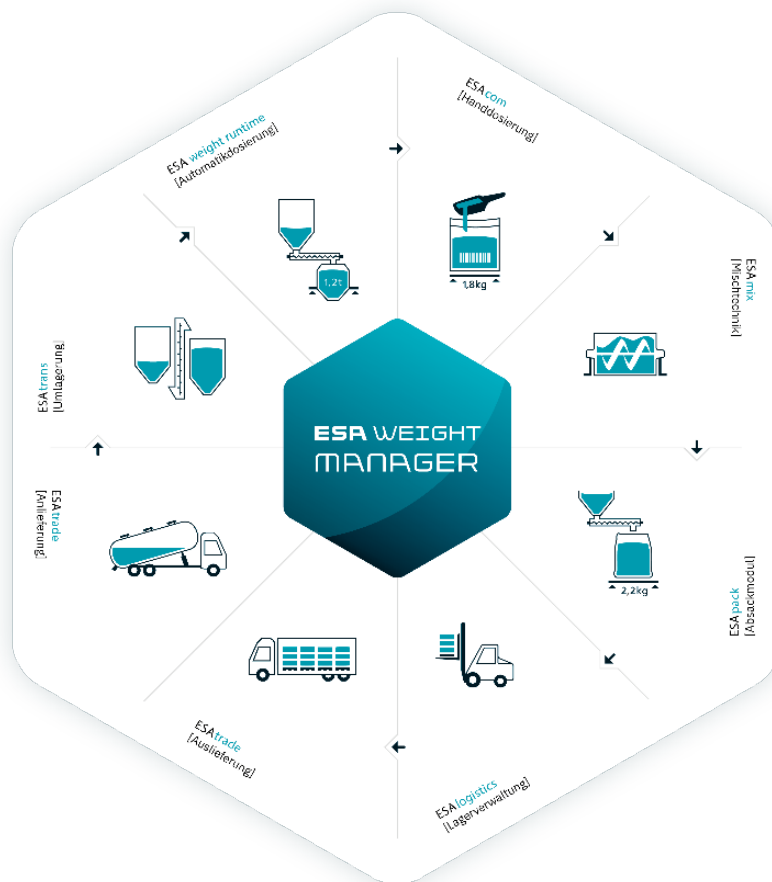| COMPONENT	MANUFACTURER & SERIES
Server	HPE ProLiant / Dell PowerEdge
Switch	ARUBA / Enterprise Switch
Access Point	ARUBA / Ubiquiti / Enterprise APs
Hand-held	Zebra MC9300
Hand Scanner	Datalogic Powerscan PD9330
Touch PC	Noax Steel Series R / Siemens TP 700/900
Workstation	HP / DELL / Lenovo
Label Printer	Zebra GK420t

7.3. Network overview

Typical structure

The actual scope of delivery of the components can be seen in the offer. The installation of the production LAN and the sockets (with/without UPS) is not included as standard and must be carried out on site.

8. PROCESS CONTROL SYSTEM ESAWEIGHT

The process control system was developed by ESA for the area of mixing and dosing as well as supplementary production and logistics processes. The central software unit is the ESAweight Manager. This is used to manage all master data and for the entire configuration of the ESAweight process control system. All system parameters such as lines, stations, scales, and warehouses are freely configurable. Based on MS SQL database and MS Windows versions, all data is managed centrally.

The following figure shows an excerpt of currently available modules that provide corresponding production-specific functionalities – from receiving (ESAtrade) and dosing (ESAweight runtime, ESAcom) to warehouse management (ESAlogistics) and delivery (ESAtrade). This makes it possible to cover customer requirements on the software side throughout the entire production process and to expand it modularly at any time.

8.1. Scope of delivery and functionalities

The scope of delivery of the ESAweight process control system is defined in the offer; the functions of the individual modules can be taken from the data sheets.
Operating language: The user interface is multilingual, translations must be provided by the customer.

8.2. Program updates

ESA provides updates of the software program with an existing software maintenance contract; this may include the following scope:
– Functional extensions
– Adaptation of the product in the event of legal changes insofar as they affect the product
– Correction of reported errors and program defects

9. SCOPE OF DOCUMENTATION

AREA	DOCUMENT	MEDIUM	LANGUAGE
Planning	Circuit diagram (for scope see 3.10)	PDF	DE, EN
Planning	Data sheets, manuals, declarations of conformity	PDF	DE, EN
IT	Computer logs - optional	PDF	DE, EN
IT	Network overview - optional	PDF	DE, EN
Visualisation	Standard Visu	PDF	DE, EN
Visualisation	Standard RT8	PDF	DE, EN
Visualisation	Project-specific; all Visu images	PDF	DE, EN
PLC/Commissioning	Safety test protocols, scale protocols, takeover protocol	PDF	DE, EN
Electrical installation	Test protocols in accordance with EN60204	PDF	DE, EN
Software development	Standard Manual ESAweight Manager	PDF	DE, EN
Software development	Standard manual of the modules	PDF	DE, EN

Deviating documentation languages and documentation shall be agreed separately in the offer and order.

10. HOTLINE

ESA operates 24 hours / 7 days a week hotline. You will be supported by trained control technicians in German and English. For more information on the hotline operating times, please refer to the maintenance contracts.

10.1. Hotline contracts

ESA offers two different contracts for using the hotline.
- The software maintenance contract defines both the updates of the ESA software packages and the services of the ESA hotline.
- The hotline services are defined in the hotline usage contract

Details can be found in the respective contracts.

10.2. Remote maintenance

If a problem cannot be solved by telephone support, remote maintenance access will be activated to solve the problem. The hotline supports and advises the customer in handling and isolating the error and endeavours to rectify the error by means of remote maintenance.

The Internet connection required for remote maintenance (VPN, etc.) must be established and kept available by the customer before the start of commissioning.

11. ELECTRICAL INSTALLATION

11.1. Directives

2014/30/EU	EMC Directive
2014/35/EU	Low-voltage directive

11.2. Harmonised standards

ÖVE/ÖNORM EN 60204-1:   Safety of machinery - Electrical equipment of machines
Part 1: General Requirements

11.3. Cable

The cabling is standardised with PVC control cables with a nominal voltage U_0/U of 300/500V. The conductors are identified by colour or number. The cables are labelled on the distributor and externally on the unit.

11.4. Cable labelling

Printable white plastic labels (Phoenix Contact WMTB HF 40x12) are used for cable labelling, which can be attached to the cable using cable ties in the holes provided on the side.
FDA-compliant cable labels with blue detectable plastic labels WMTB HF-D (40x12) R BU are used as standard in the food sector above open processes.

11.5. Lattice trays

Galvanised/electrolytically galvanised lattice trays with U-profile are used as standard. (See point 11.7).
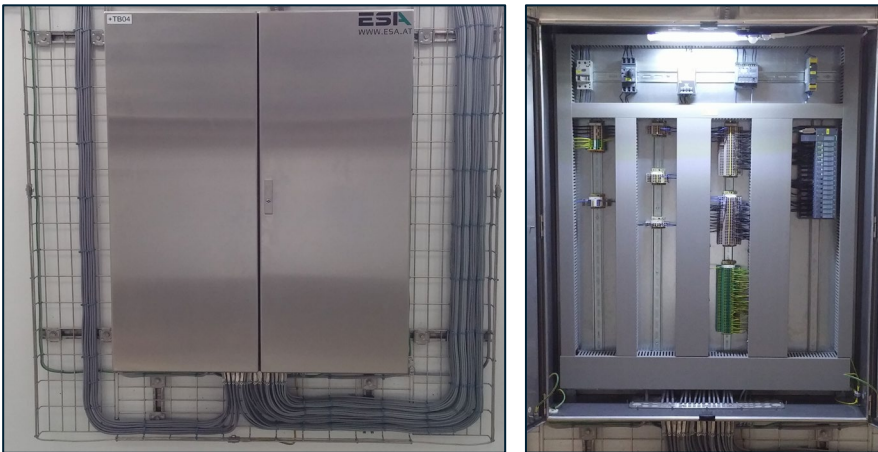As far as technically possible/meaningful, lattice trays are installed vertically in order to minimise dirt deposits. Power lines and signal lines are laid separately in the lattice trays.
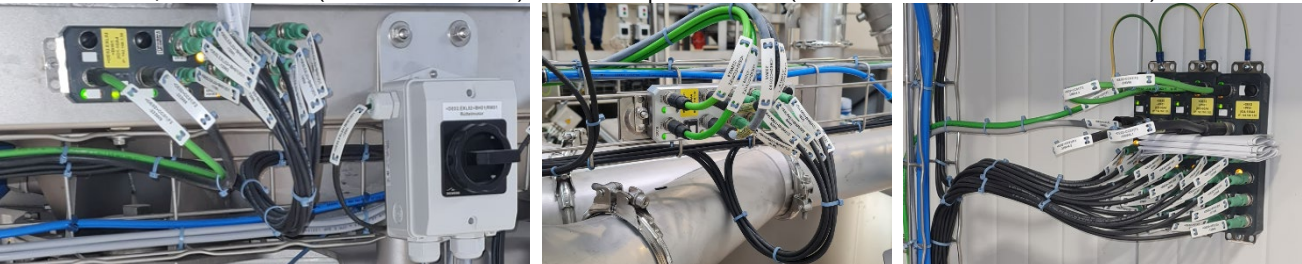
11.6. I/O systems for field installation

If ESA deems it appropriate, the cabling of the sensors and actuators in the field is combined.
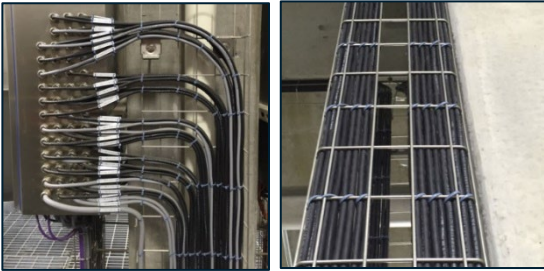How the field installation is done is up to ESA.
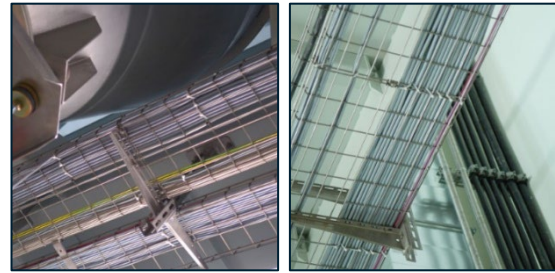
Control distributor with ET200SP modules:

Decentralised I/O device IP67 (Phoenix Axioline E) with white plastic labels (Phoenix Contact WMTB HF 40x12)
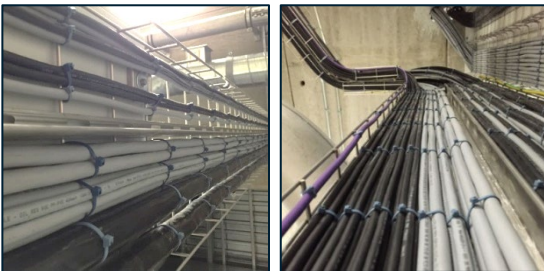
11.7. Electrical installation options lattice trays (to be agreed separately)

OPTION: Lattice trays in stainless steel V2A or V4A

OPTION: Horizontal mounting with wall and ceiling brackets

OPTION: Separators for power and control cables

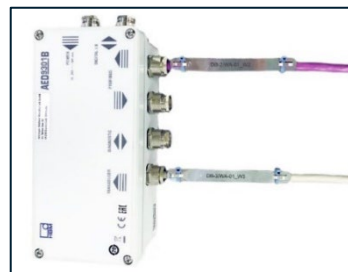## 11.8. Electrical installation options Cable labelling (to be agreed separately)

Detectable cable ties are used as standard in the food industry via open processes.
OPTION: Consistent use of detectable cable ties in production:

OPTION: FDA-compliant cable labelling with blue detectable plastic labels
WMTB HF-D (40x12) R BU

OPTION: Cable labelling with engraved aluminium or stainless steel signs

11.9. General conditions for wiring

The system is fully available to us during the wiring. The prerequisite is a mechanically ready system. Delays that occur as a result of unforeseeable events will be discussed on site and charged according to the applicable assembly rates at cost. The client's project manager must be reachable.

If required, additional assembly work will be charged according to our conditions for the provision of technical personnel. To coordinate the wiring, please contact us 15 working days in advance.

11.9.1. Work included

- Connection of all sensors, actuators, intermediate terminal boxes, control cabinets
- Labelling the lines
- Piping in open design
- Laying of the lines in the existing / new support system
- Fastening of the cables with cable ties or cable clamps where provided

11.9.2. Work not included:

- Bricklaying, excavation, caulking, breakthrough, and plastering work as well as mechanical work on the machine / system
- System lighting
- Fire protection bulkheads are provided on site after completion of the electrical wiring
- Installation of the control cabinet and possibly assembly of the operating housings
- Mechanical assembly of the control cabinet and the controls
- I/O check (according to order)
- Changes / Extensions
- System earthing
- Potential equalisation
- System supply – power supply (feed line) and connection to the main distribution board are provided on site
- LAN infrastructure up to LAN sockets in production
- Socket circuits, including wiring
- UPS system
- Delays due to mechanically unfinished system

11.9.3. Prerequisites - preparations required on site

- Required construction plans are to be provided by the client in electronic form (DWG, STEP, PKG)
- Core drilling and excavation work are carried out on site and are not included in our scope of delivery
- Required lifting equipment such as scissor lifts or articulated telescopic lifts for work on units over 4.5 m high or according to factory specifications will be provided on site
- Lockable rooms or material and team containers will be provided on site
- For assembly work on upper floors and on the silo floor, if a lift is available for transporting persons and (or) materials, it must be made available
- Electricity, sanitary facilities, water, and Internet will be provided free of charge on site
- Disposal of building rubble and waste as well as cleaning of the building is free of charge on site
  Installation work outdoors should be scheduled only during favourable weather conditions (e.g. free of ice and snow)

CONTACT

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APPENDIX 1: OPTIONS

The options listed in the execution guidelines are NOT included in the scope of delivery unless they are explicitly stated in the offer or subsequently in the order. The list below can be used to request optional designs but does not constitute a subject matter of the contract.

CONTROL dISTRIbUTOR:

Switchgear (4.1)

    The design is always shown in the offer and is listed with the individual items

    ☐ Standard: Sheet steel without pitched roof

    ☐ Version in V2A   ☐ Version in hygienic design   ☐ Version with pitched roof

Manufacturer according to component list (3.9)

    ☐ Standard: no deviation

    ☐ The following deviating suppliers:

....

Single wire labelling (3.11)

    ☐ Standard: no wire identification, tracking is provided by the target wiring in the circuit diagram

    ☐ Single wire identification

Repair and maintenance switch on the motors for all-pole disconnection on site:

    ☐ Standard: none

    ☐ for all motors

    ☐ for motors for: ....

External operation and display elements:

    ☐ Standard: Scope of delivery electrical installation company

    (Included in the scope of delivery if the electrical installation is carried out by ESA)

    ☐ Scope of delivery ESA

Cable labelling:

    ☐ Standard: Scope of delivery electrical installation company

    (Included in the scope of delivery if the electrical installation is carried out by ESA)

    ☐ Scope of delivery ESA

E-INSTALLATION:

Lattice trays (11.5) Material :

    ☐ Standard: electrolytically galvanised

    ☐ Hot-dip galvanised   ☐ Stainless steel V2A   ☐ Stainless steel V4A

Lattice trays (11.5) Assembly:

    ☐ Standard: standing

    ☐ Horizontal with wall and ceiling bracket

Lattice trays (11.5) Dividers:

    ☐ Standard: no dividers, but separate routing of signal and power cables

    ☐ Yes

Cable labelling (11.4):

    ☐ Standard: Printed plastic sign | non-detectable

    ☐ Plastic sign printed blue | detectable

    ☐ Engraved stainless steel sign

PROJECT INFORMATION / NAME / dATE

....