

EXECUTION STANDARD
FOR INDUSTRIAL SYSTEMS

EASY
SOLUTIONS
ANYTIME

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1. PLANNING LIST

The planning list is an ESA-internal 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 according to the schedule or project progress in order to meet the agreed deadlines.

- Unit designation for circuit diagram, visualisation, and PLC program
- Process number, process designation → for uniform identifier
- Electrical load rating
- Rated current
- Nominal voltage
- Connection diagram
- Operating instructions...

2. UNIT IDENTIFICATION

Units are designated according to the following structure:

=SYSTEM.SYSTEMPART+LOCATION.SUBLOCATION|UNIT.SUBUNIT

Example: =AT01.AS01+S01.VAB01|RM01.M01

System: Austria Plant 1
 System part: Outdoor silo
 Location: Silo 01
 Sub-location: Vibro discharge floor 01
 Unit: Vibration motor 01
 Sub-unit: Motor 01

2.1. System (examples)

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

2.2. System part (examples)

ABBREVIATION	DECSRIPTION
BL	Bagging line
ACC	Acceptance
ES	External silo
MLS	Mini load system
AGV	Automatic 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 cleaning

2.3. Place: (examples)

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

2.4. Sub place (examples)

ABBREVIATION	DESCRIPTION
NF	Nozzle filter
DC	Dosing control
SVF	Silo vent filter
SM	Screening machine
BAC	Bin activator

2.5. Unit (examples)

ABBREVIATION	DESCRIPTION	ABBREVIATION	DESCRIPTION
DST	Docking station	MIL	Mill
BV	Butterfly valve	PD	Product detector
GV	Gate valve	PR	Press
SV	shut-off valve	PU	Pump
BE	Bedieneinrichtung	PV	Pinch valve
CB	Control box	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
CVB	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 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	Lightning	SL	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

DESIGNATION	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 230 V AC
RED-WHITE	Control voltage N
BLUE	Control voltage 24 V DC
BLUE-WHITE	Control voltage 0 V DC
WHITE	Analogue signals
VIOLET	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. List of components

COMPONENT	PREFERRED MANUFACTURER
Control cabinet, air conditioning, and accessories	Rittal
Feed-in system max. 63 A	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“
- Parts list „pdf“
- Terminal diagram „pdf“
- Cable list „xlsx“

By using drawing connection symbols with target specification in the circuit diagram, each conductor can be clearly identified at each connection point using the technical documentation.

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:
 - In floor-standing distributors from below through the base by means of cable entry plates and grommets
 - In wall cabinets from below via a plastic cable flange plate with membranes
- Standard dimensions for floor-standing cabinets are 1200 × 2000 × 500 mm (W × H × D) or 500 mm plus a 200 mm enclosure base.
- Control cabinet lighting in each floor-standing cabinet
- Control cabinet lock, double bit
- Plastic circuit diagram
- Ambient temperature: 5–35°C for the design of the control cabinet air-conditioning system

4.2. Clamps

Spring-loaded terminals up to 16 mm² connection cross-section

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

4.3. Safety 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 implemented according to performance level “C”.

5. PLC

5.1. Software

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

- LAD/FBD 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 blocks developed by ESA to map systems. The service code creates a defined interface of the inputs/outputs to the HMI or the automatic code. The service code for manual operation 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 for all projects (incl. DACH region).

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

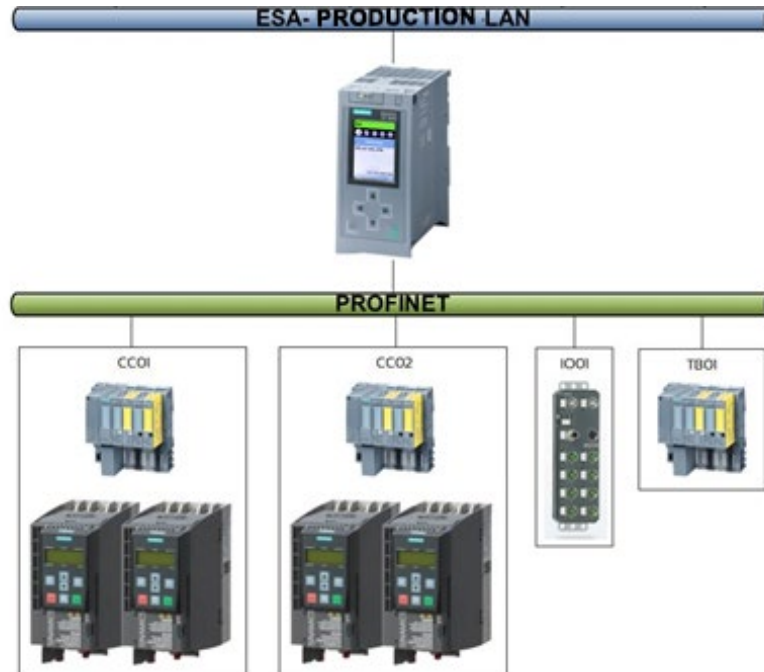
Step 7 classic/Service code V4.x

→ if desired or for existing installations

- 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 IO systems with the CPU. If necessary (communication with machines provided), 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 seen in the offer.

Other manufacturers on request.

6.2. Resolution

The system visualisation is designed for a monitor with a standard resolution of 1920 × 1080. This enables use up to large format screens. For touch PCs, the resolution depends on the type. Depending on the visualisation version, a multi-monitor system can also be used. (see offer)

6.3. Scope of delivery

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. Operator language: The visualisation is set up in several languages; translations must be provided by the customer

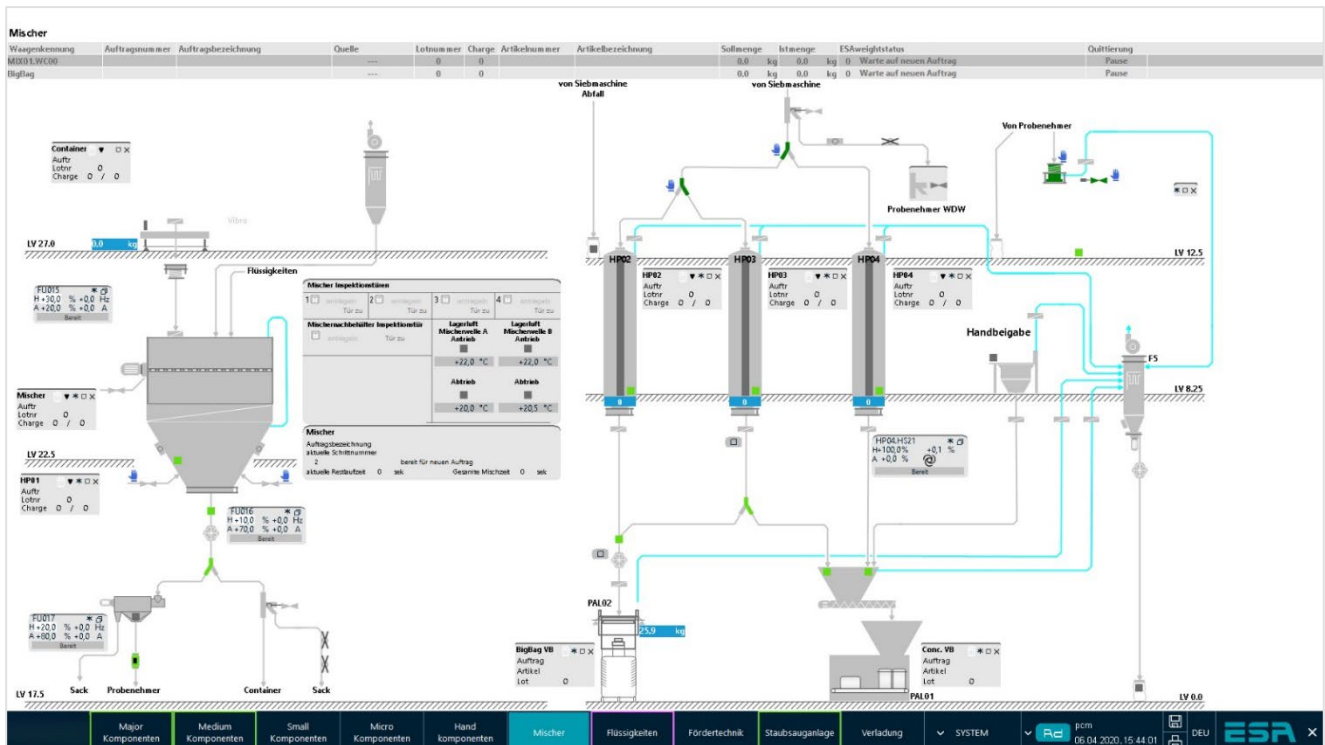
- Manual and automatic operation can be preselected for each unit
- Fault indication system with acknowledgement and logging
- Chronological event list (CEL)
- Colour changeover of the units when the operating status changes
- Colour switching of the active material paths
- Control of access via user administration
- Display of the current silo occupancy (item designation, weight) in connection with ESAweight
- Display of all recorded analogue values

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 provided. Examples of design:



Aggregate Identification =MFVII|M333

Aggregate designation Motor 01|Motor 333

Version Nr: 3.4 Offset: 10

OVERVIEW ALARM CEL SETTINGS DATA MAINTEN. SETTINGS SYS

ERRORREPORT

- Error 00: Motor protection switch
- Error 01: Not configured
- Error 02: Not configured
- Error 03: Not configured
- Error 04: Not configured
- Error 05: Not configured
- Error 06: Not configured
- Error 07: Not configured
- Error 08:
- Error 09: Run response for Right run
- Error 10:
- Error 11: Level switch not reached Right run
- Error 12:
- Error 13: Level switch lost Right run
- Error 14: both limit switches active
- Error 15:

ERROR

Single acknowledgment required X

Error Output only with control X

Error Number	Errordescription	Error active	Ackn.-depend.	Ackn.-bef. go
Error 00	025 Motor protection switch	✓	✓	X
Error 01	000 Not configured	✓	✓	X
Error 02	000 Not configured	✓	✓	X
Error 03	000 Not configured	✓	✓	X
Error 04	000 Not configured	✓	✓	X
Error 05	000 Not configured	✓	✓	X
Error 06	000 Not configured	✓	✓	X
Error 07	000 Not configured	✓	✓	X

AUX OUT

- Error ACTIVE -
- Error UNACKNOWLEDGED -
- Error ACTIVE and ACKNOWLEDGED -
- Error collective fault -

ALARMLIST

6.5. translations

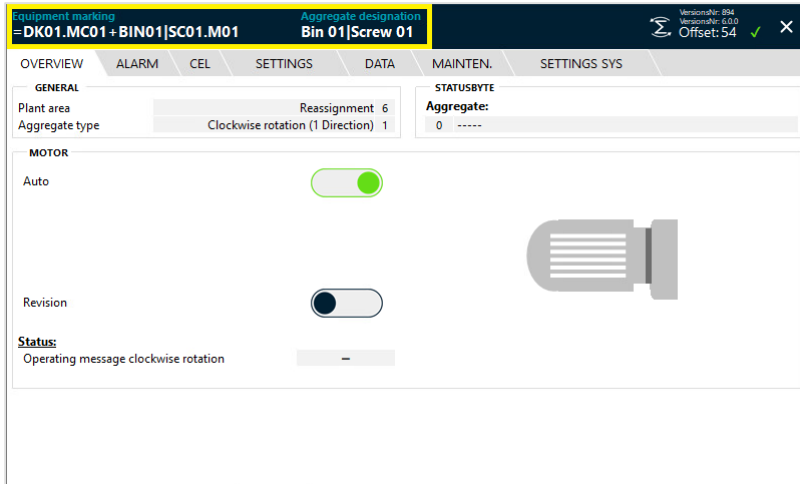
Designations are proper names, e.g.: BIN01|SC01 (figure 1) – no translation!

Opening pop ups for manual single operations, such as motor, flap etc., the data is read from the PLC.

Equipment marking: =DK01.MC01+BIN01|SC01.M01

Aggregate designation: Bin01|Screw 01

figure 1:



Following elements are included in translation:

- Menu bar
- Scale bar
- Necessary operator windows
- System overview
- CEL list
- Alarm list

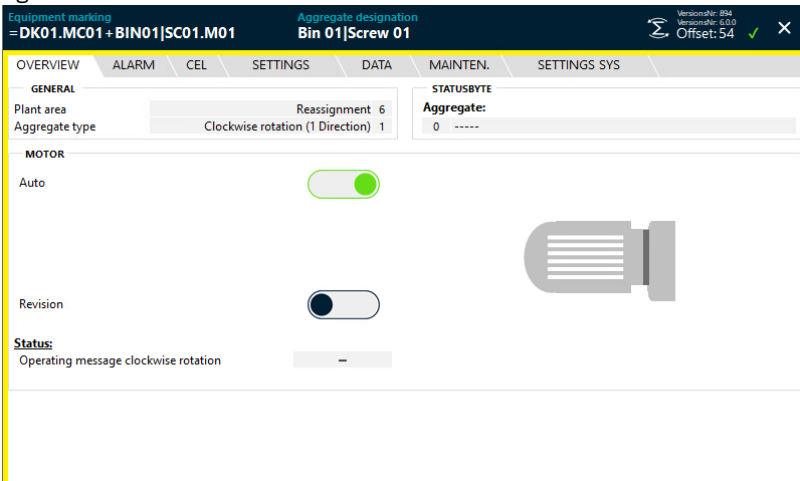
Single operations are excluded from translation (pop-up windows for units / process modules)

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 from translation into the respective national language. For these operations English is set as default language. Required translations into the respective national language have to be agreed separately and are not included in the scope of delivery (figure 2).

figure 2:



7. IT

7.1. Operating system

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

7.2. Hardware

COMPONENTS	MANUFACTURER/SERIES
Server	HPE ProLiant / Dell PowerEdge
Switch	ARUBA / Enterprise Switch
Access Point	ARUBA / Ubiquiti / Enterprise APs
Hand-held	Zebra MC9200
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



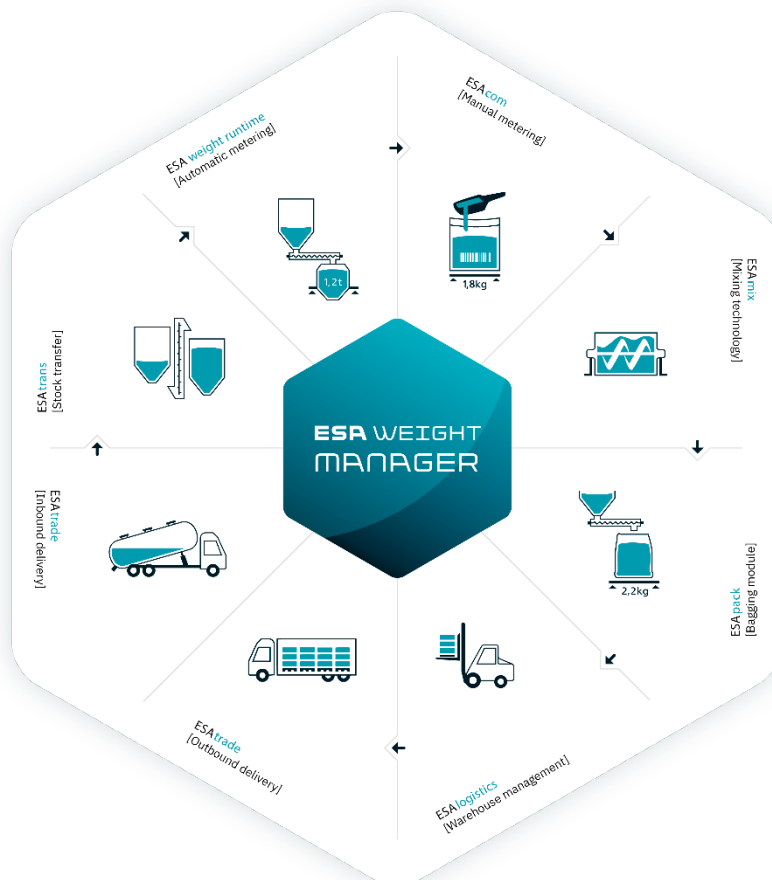
Typical structure

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 in the scope of delivery as standard and is 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 (Estrade). 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.

Operator language: The operation is set up in several languages; 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
- Corrections of notified errors and programme deficiencies

9. SCOPE OF DOCUMENTATION

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

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

10. HOTLINE

ESA operates a 24-hour/365 day hotline.

You will be supported by trained control technicians in German and English.

10.1. Hotline contracts

ESA offers two different contracts for the use of the support.

- The software maintenance contract defines both the updates of the ESA software packages and the services of the ESA hotline.
- The services of the ESA hotline 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 support team assists and advises the customer in handling or isolating the error and endeavours to rectify the error by means of remote maintenance.

The internet connection (e.g. VPN) required for remote maintenance 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 machines – electrical equipment of machines

Part 1: General requirements

11.3. Cable

The wiring is done with PVC control cables with a nominal voltage U_0/U of 300/500 V unless other agreements have been made. The cores are marked by colour or by numbers. The cables are labelled at the distributor and externally at the unit. Printable white plastic labels (Phoenix Contact WMTB HF 40 × 12) are used for cable labelling, which can be attached to the cable with cable ties at the holes on the side.

11.4. Lattice trays

Galvanised/electrolytically galvanised lattice trays with U-profile are used as standard. (See point 11.6).

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.

11.5. I/O systems for field installation

If deemed appropriate by ESA, the wiring of the sensors and actuators is combined in the field.

How the field installation is done is up to ESA.



Control distributor with ET200SP modules

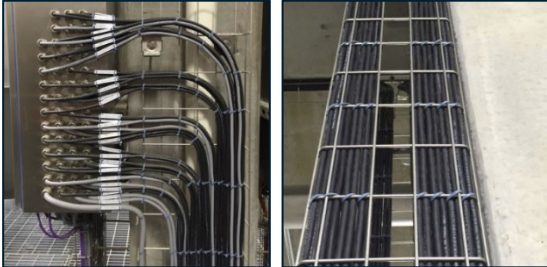


Decentralised I/O device IP67 (Phoenix Axioline E)

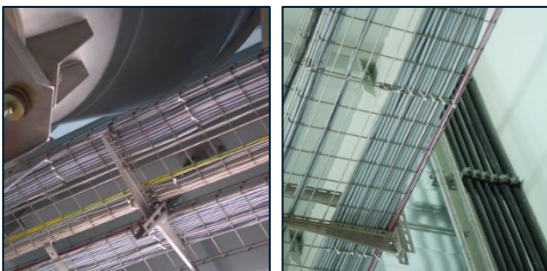


11.6. Electrical installation options (to be agreed separately)

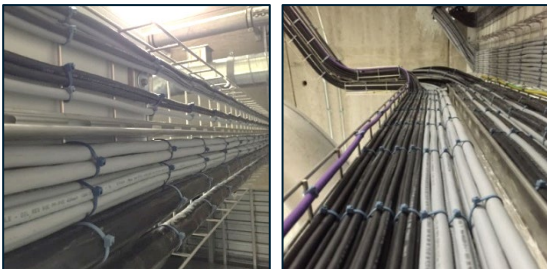
OPTION: Consistent use of detectable cable ties in production:
Detectable cable ties are used as standard in the food industry over open processes.



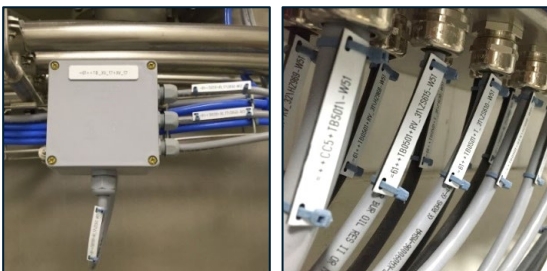
OPTION: Lattice trays in stainless steel V2A or V4A



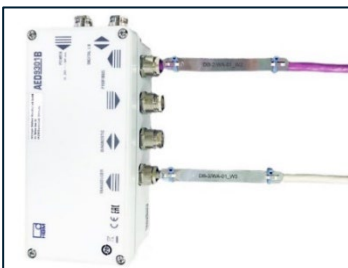
OPTION: Horizontal mounting with wall and ceiling brackets



OPTION: Separators for power and control cables



OPTION: Cable and device labelling with engraved plastic signs



OPTION: Cable labelling with engraved aluminium or stainless steel signs



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

11.7. 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.

11.7.1. Work included

- Connection of all sensors, actuators, intermediate terminal boxes, control cabinets
- Labelling of the lines
- Piping is 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

11.7.2. Work not included:

- Bricklaying, excavation, caulking, breakthrough, and plastering work as well as mechanical work on the machine/system
- System lighting
- 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 earth
- 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 resulting from mechanically unfinished system

11.7.3. 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.
- Fire protection bulkheads are provided on site after completion of the electrical wiring.
- 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).

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