

**Standard delivery specifications
of INTRAVIS GmbH**

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1. General

1.1. Applicable scope

The technical delivery specifications described here apply for the mechanical and electrical production, equipment and configuration of machines, mechanical equipment and devices which are delivered to INTRAVIS GmbH.

1.2. General requirements

1.2.1. Terms

The term "Contractor" is used in the following document to refer to the supplier of the machine/mechanical equipment. The term "Client" is used in the following document to refer to INTRAVIS GmbH.

Client and Contractor are collectively referred to in the following document as "Partner".

The machine, system or device supplied by the Contractor is referred to in the following document as "System".

1.2.2. Hierarchy

The following conditions apply in the specified sequence, both for the tender preparation as well as the order processing:

1. Set of specifications / purchase order text
2. Standard delivery specification
3. General conditions for the delivery of machines in accordance with VDMA delivery specification/business terms
4. EN-, DIN-, VDE-, DVI-, VDA guidelines

1.2.3. Deviations

The Contractor undertakes to comply with these delivery specifications.

If deviations are considered necessary, the Contractor must clarify this with the Client.

Prior written approval for any deviations from these delivery specifications must be obtained by the Contractor.

The Client reserves the right to make required changes in the event of failure to comply with the technical delivery specifications at the expense of the Contractor.

1.2.4. Drawings and documents of the Contractor

The Client acquires the right to make copies of the drawings provided by the Contractor for its own use and – to the extent required by the Contractor for the purpose of ordering replacement wear parts – also to submit the same to third parties

Insofar as special designs or workpiece-dependent devices for the Contractor are involved, the ownership of designs as well as assembly and single-part drawings with parts lists, the devices and instruments on data carriers shall be transferred to the Client and remain at their unlimited disposal.

Rights of reproduction and publication as well as all usage rights, including rights to make amendments and all other rights arising from these drawings shall remain with the Client. However, the Contractor is entitled to make copies of the drawings for its own requirements.

1.3. Normative references

The Contractor is responsible for ensuring that all applicable requirements for the rendering of its service which go beyond the scope of any of the current technical delivery specifications and which arise based on specifications, e.g. EC guidelines, regulations and other applicable laws, as well as from standards and generally acknowledged technical rules (in the following document, referred to as "Specifications, standards and rules"), are complied with, even when no similar instruction is explicitly contained in these technical delivery specifications.

The Contractor must independently verify whether the specifications, standards and rules governing the technology as well as additional specifications, standards and rules for its service to be rendered are applicable and to be observed, when reference is made to the same in these technical delivery specifications.

If the Contractor learns or becomes aware through its expertise that the service requested of it by the Client is not feasible for the intended purpose of use or only to a limited extent, it must inform the Client thereof immediately.

1.4. Risk assessment

The Contractor must perform a risk assessment in accordance with the current Machinery Directive.

2. General equipment provisions

2.1. Drawing and plan releases

All construction drawings and circuit diagrams shall be approved for release in writing by the Client.

2.2. Component release

Only components included on the component release list may be used. Other components may only be used after written confirmation of the Client.

2.3. Device versions: CE- or UL versions

For the systems to be supplied, a distinction shall be made between CE and UL configurations.

2.3.1. CE version

CE version systems shall be constructed by the Contractor in accordance with the applicable EU guidelines. The Contractor is responsible for compliance with all applicable EU guidelines.

The Contractor confirms the conformity of its supplied systems by issuing the CE declaration of conformity, or in the case of an "incomplete machine", in accordance with the Machinery Directive by issuing the declaration of incorporation.

2.3.2. UL version

UL version systems are intended for delivery to the North American market (USA, Canada).

The Client constructs such systems in accordance with the applicable American and/or Canadian specifications and is responsible for compliance with the same.

The specifications to be complied with generally include:

- NEC or NFPA70: National Electrical Code
- NFPA79: Electrical Standard for Industrial Machinery
- UL508A: Industrial Control Panels

The systems need not have UL approval.

3. Electrical equipment provisions

3.1. CE- and UL versions

3.1.1. Temperatures

Unless otherwise specified, the systems are to be designed for a maximum external temperature of 40°C.

3.1.2. 5-wire connection

A 5-wire connection system is generally used (TN-S network).

A connection between the neutral and protective cables within the system is prohibited.

3.1.3. Control voltage

Only the control voltage of 24VDC may be used. Any control voltage deviating from 24VDC must be clarified beforehand with the Client.

3.1.4. Substitute material

For each type of terminal used, 3 replacement terminals, including suitable jumper plugs must be installed in the switch cabinet.

For each fuse insert used, 2 replacement fuse inserts must be present in the switch cabinet.

3.2. CE version

3.2.1. Voltages

Unless otherwise agreed, the Contractor shall design the system for one of the following voltages:

Working voltage	3/N/PE AC 400/230V 50Hz or 1/N/PE AC 230V 50Hz
Control voltage	DC 24 V

3.2.2. Minimum cross-sections

Wire and cable cross-sections shall be designed corresponding to DIN EN 60204.

3.2.3. Wire colours in the switch cabinet

Wire colours shall be clarified with the Client. Unless otherwise separately agreed, the colour specifications shall be as provided for in DIN EN 60204.

3.3. UL version

3.3.1. Voltages

Unless otherwise agreed, the Contractor shall design the system for one of the following voltages:

Working voltage	3/N/PE AC 400/230V 60Hz or 1/N/PE AC 230V 60Hz or 1/N/PE AC 120V 60Hz
Control voltage	DC 24 V

3.3.2. Certain special features for UL versions

3.3.2.1. Component approvals for USA or Canada

All components used must have valid approval for use in the USA and/or Canada. The Client shall inform the Contractor of which approvals are required.

These approvals are generally issued by UL (Underwriters Laboratories) or CSA (Canadian Standards' Association). A certification seal to this effect shall be included on components.

Components without approval may only be used with the written consent of the Client.

All components used must be released.

The following is a non-exhaustive list of components:

- Wires
- Single cable for the internal switch cabinet wiring
- Engines
- Motor protection circuit
- Contactors
- Power supplies
- Transformers
- Circuit breaker
- Fuses

The Contractor undertakes to show evidence of approval for all components used on request.

3.3.2.2. Opening the switch cabinet

The switch cabinets of the system may only be opened when the system has been shut down. Reactivating the system with open doors for servicing purposes must be possible.

3.3.2.3. Use of circuit breakers

In motor circuits, no "normal" automatic circuit breakers may be used as short circuit protective devices. The term "normal" automatic circuit breakers refers to devices having obtained UL approval in accordance with UL1077.

In motor circuits, fuses with UL489 approval must be used (e.g. ABB S203UP-K15). Automatic circuit breakers with approvals in accordance with UL1077 are prohibited in motor circuits.

3.3.2.4. Use of motor protection circuits

Motor protection circuits are not permitted as short circuit protective devices. Prior to a motor protection circuit, a fuse in accordance with UL489 must be switched.

3.3.2.5. Components requiring supply from Class 2 power supplies

Certain components may only be supplied from a "Class 2" power supply (e.g. the CS3.241 24V power supply from the Puls company).

3.3.2.6. Cable laying

Within ducting, all wires require dielectric strength for the highest occurring voltage. If the dielectric strength of a particular wire is too low, it must be laid in a separate duct.

3.3.2.7. Minimum cross-sections

The minimum cross-sections for cables and wires are to be taken from the following table.

Regardless of the tabular specifications for the wiring in switch cabinets:

Electric circuits allocated for the supply of motors (motor circuits) must have a minimum cross-section of 14AWG in the switch cabinet over their entire length.

Cross-section		Current carrying capacity	Notes
AWG	mm ²	A	
12	3,3	25	

Cross-section		Current carrying capacity	Notes
AWG	mm ²	A	
14	2,1	20	Minimum cross-section for motor circuits in switch cabinets
16	1,3	10	
18	0,82	7	
20	0,52	5	
22	0,32	3	
24	0,2	2	
26	0,13	1	

3.3.2.8. Wire colours in the switch cabinet

Electric circuit	Cable colour	Notes
Phases Main current circuits	Black	Motor circuits: min. 2.5mm ² , 14AWG
Neutral conductor	White	
External voltages	Orange	
Electric circuits up to main switch	Orange	
Control current DC 24V	Blue	
Control current DC0V	Blue-white	

3.4. Signal transmission

3.4.1. Delivery form

All digital input and output signals of the system are delivered as potential-free 24V signals. The Contractor shall provide a relevant optical coupler, relay or contactor within its system accordingly.

The Contractor provides the control signals via an industry standard plug connector. The corresponding plug shall be included on delivery by the Contractor.

3.4.2. Signals

Unless otherwise agreed, the Contractor shall ensure the following signals are provided as a minimum:

Signal	Input Output	Notes
Ready for operation	Output	System ready, active high,
Start	Input	Start of the system, active high,

As required, additional signals may be specified between the specialist divisions of the Partner.

3.5. EMERGENCY-STOP and EMERGENCY-OFF

3.5.1. Configuration of safety installations

All safety installations of the system as well as the boundary of the EMERGENCY-STOP circuit and the defined intersection points shall be clarified with the Client.

3.5.2. Chaining

Where a system with chaining has been agreed, the system must include secure 2-channel contacts, which can be evaluated via the safety circuits of the Client system.

4. Component release

4.1. Electrical components

Operating material	Preferred makers		Alternative products	
	Manufacturer	Type	Manufacturer	Type
Switch cabinets	Lohmeier		Rittal	
Terminals	Phoenix			
Main switch	Moeller			
Motor protection circuit	Moeller			
Automatic circuit breaker	ABB		Moeller, Siemens	
Industrial relay	Phoenix			
Indicators	Phoenix			
Frequency converter	Siemens	G110 Micromaster 420		

5. Technical documentation

5.1. General requirements

5.1.1. Delivery and languages

The technical documentation is to be issued as a hard paper copy and electronically on a CD in the following quantities:

- Printed copies 2x in German
- Printed copies 2x in the language of the order country or 2x in English
- 1x in electronic form in German and in the appropriate national language or English

5.1.2. Storage and labelling

The technical documents are to be collated into folders and a table of contents shall be included.

The folder must be labelled. The labelling shall include the following data as a minimum:

- Manufacturer
- Order number of the client
- Name or type of system
- System number
- Year of construction
- Folder x of y, when there are multiple folders

5.2. Scope and requirements of the technical documentation

5.2.1. General

The following shall be delivered:

- Operating manual
- Operator maintenance schedule
- Transport and assembly instructions
- Third party documentation, product descriptions
- Function diagrams
- Risk analysis in accordance with current EC Machinery Directive
- CE declaration of conformity or CE-declaration of incorporation

5.2.2. Electrical engineering

The following shall be delivered:

- Circuit diagrams including component part lists
- Handbooks and system descriptions
- Electrical inspection record
- Inspection record for insulation resistance
- Inspection record for protective conductor resistance
- Measurement log for max. power consumption

5.2.3. Programmable and configurable devices and components

The Client must be provided with all the required details, so that in the event of any fault occurring the Client is able to install and operate an equivalent replacement device. These details should notably include:

- Information on programming or configuration (provided in a suitable digital format),
- Details on the interface and required software and
- Details on any hardware required (programming line etc.).

For components with a small number of parameters (up to 30), a listing of the parameters is sufficient.

The scope of the provisions outlined in the current section 5.2.3 also includes adjustable sensors and similar. Where settings or parameters for sensors and so on cannot be represented in an easily understandable form, instructions for calibration shall be specified.

5.2.4. Mechanics

The following shall be delivered:

- Drawings including parts lists
- Weight of the overall unit

5.2.5. Pneumatics

The following shall be delivered:

- Pneumatic diagram including component part lists

5.2.6. Hydraulics

The following shall be delivered:

- Hydraulics plan including component part lists

5.3. Technical documentation on data carrier

5.3.1. General

All documents included in the technical documentation must also be provided in electronic form.

5.3.2. Formats

Document	File format
Operating manual	DOC, PDF
Operator maintenance schedule	DOC, PDF
Transport and assembly instructions	DOC, PDF
Component part lists	XLS, PDF
External documentation / product descriptions	PDF, JPG, TIFF
Function diagrams	PDF
Circuit diagrams	PDF, Eplan5- or Eplan P8- format
Pneumatic and hydraulic plans	PDF
2D technical drawings	DWG, DXF
3D technical drawings	STEP